Main catalog

Product Selector

Control Products
Circuit Protective Devices
Power Quality
Systems

ABB

ABB... Your complete low voltage solution!

Products referenced in other publications

Timers and Controls – ABB and SSAC products
Programmable timers & controls • Time delay relays • Solid state timing modules
Solid state flashers • Three phase voltage monitors • AC & DC current sensors
Motor protection controls • Alternating relays • Liquid level controls
HVAC/R timers & controls • Obstruction lighting controls • Vending timers
DIN rail mount timers, flashers, voltage & current monitors, liquid level controls and motor monitoring relays

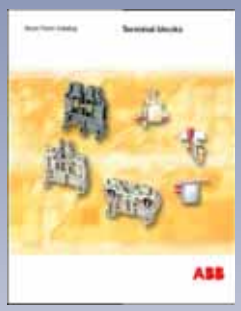
Literature: SS3 Timers & Controls on-line catalog: www.ssac.com
SS3 [1TRC 001 009 C0201] ABB SSAC Timers & Controls catalog
SS3 [1TRC 001 010 C0203] ABB SSAC Timers & Controls CD-ROM catalog

Automation products
AC010 Micro Controllers • AC 31 Programmable Controllers, I/O modules, & connection modules • AC500 PLCs • PM Modular PLCs and Remote I/O • PM ASI Bus modules • S500 Remote I/O • Field bus plug • Bridgeport radio fieldbus • CX Touch screens & CE Touch computers • Wiring interface modules • Power supplies • Low power surge protection • Diode logic modules • Serial data converters • Analog signal converters • Plug-in relays • Interface relays • Optocoupler modules • Sensors • Wireless proximity detectors

Literature: LV020 [1SXU 000 020 C0201] - Automation Products

HVAC Products
A collection of control products designed for HVAC and Refrigeration applications including: Combination starters • Across the line starters • MSSP single phase manual starters • Enclosed pilot devices • Enclosed disconnect switches • Softstarters

Literature: LV018 [1SXU133018C0201] - HVAC Products



Terminal blocks
The largest assortment of terminal blocks and connection systems available. Functions include feed through blocks, fuse blocks, protection blocks, & switch blocks in single to triple deck models. Connection choices include screw terminals, spring terminals and ADO insulation displacement connectors. The ABB terminal block line includes power blocks, distribution blocks, 5.08mm blocks, mini blocks, railway blocks and ATEX blocks. Accessories include popular DIN rail styles, a complete marking system including tags, software, and plotter. Absolute Rail Design product configurator available for download on www.abb-control.com; also available on CD.

Literature: LV006 [1SXU 160 006 C0201] - Terminal Blocks

Switchboard MaxSB
UL 891 low voltage switchboard
Main breakers up to 5000 amps
Plated copper bus
Single & group mounted feeder breakers
Expandable frame based enclosure
Large cable area, easy access to terminals
NEMA Type 12 and full glass doors available

Switchgear MaxSG
ANSI C37.20.1, C37.51 & UL1558
Modular frame arrangements
Emax 1066 UL Listed power circuit breakers up to 5000A
Closed door draw out w/safety shutters
Plated copper bus
Trip unit visible with door closed
Plug-in UL accessories can be field installed

Literature: AC1800 Switchgear MaxSB brochure, AC1801 Switchgear MaxSG brochure

Product Selector

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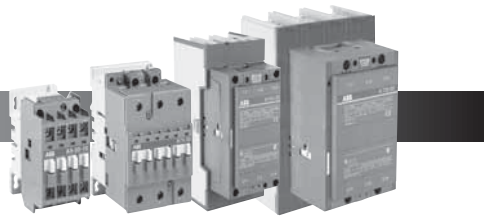
Industrial controls
Contactors



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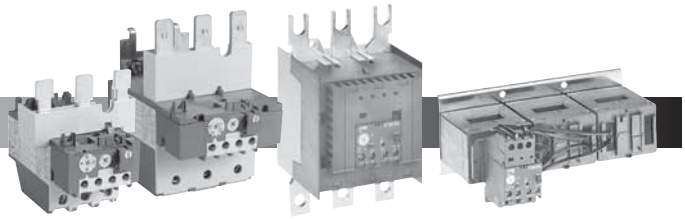

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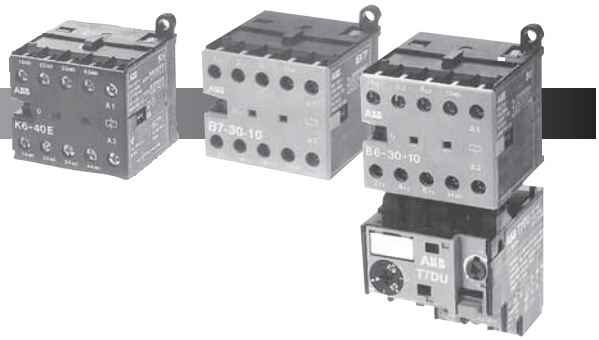
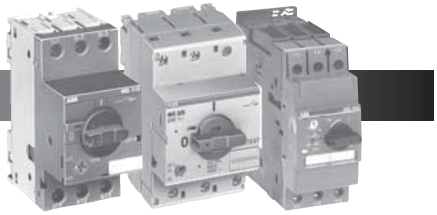


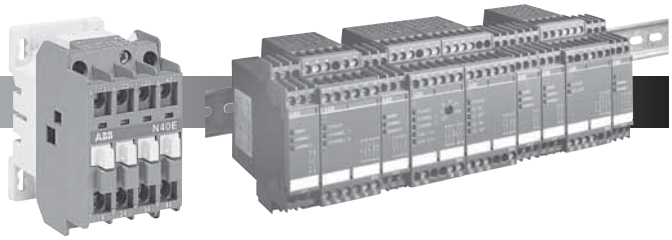
4 - Miniature controls



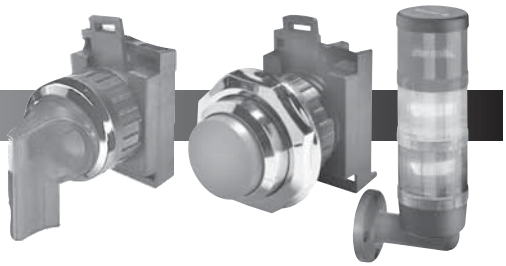
5 - Manual motor protectors

6 - Softstarters

7 - Relays



8 - Pilot devices



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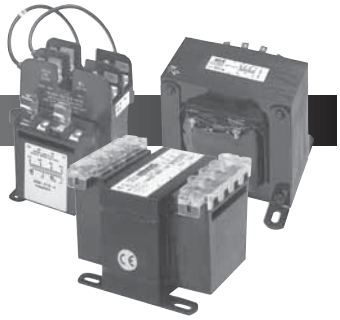
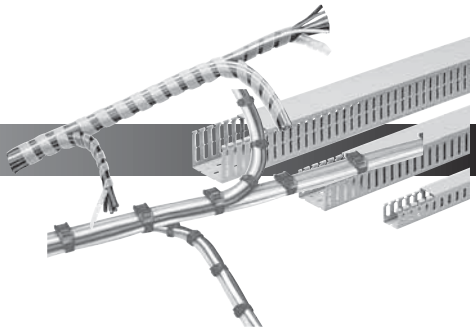
Cable management systems

11 - Cam switches

12 - Transformers



13 - Cable management systems



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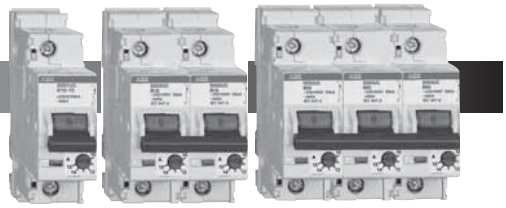

14 - System pro M compact

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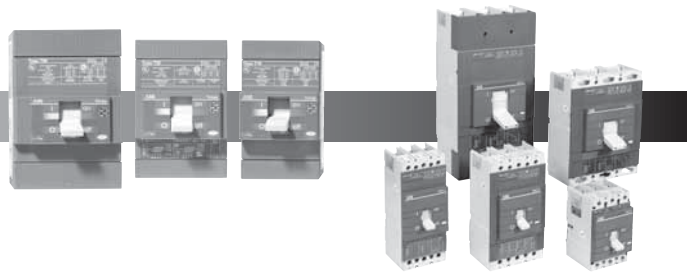
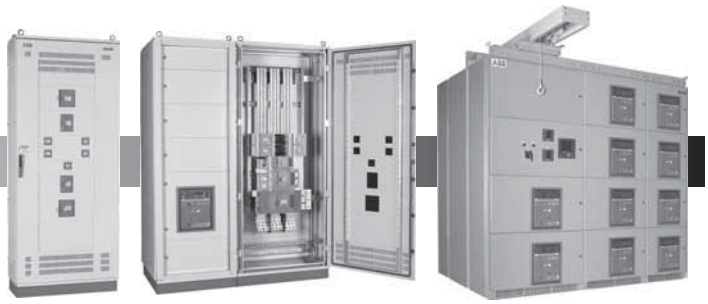


15 - Molded case circuit breakers

16 - Power breakers



17 - Power distribution systems

1SXU 000 023 C0201

Circuit protective devices
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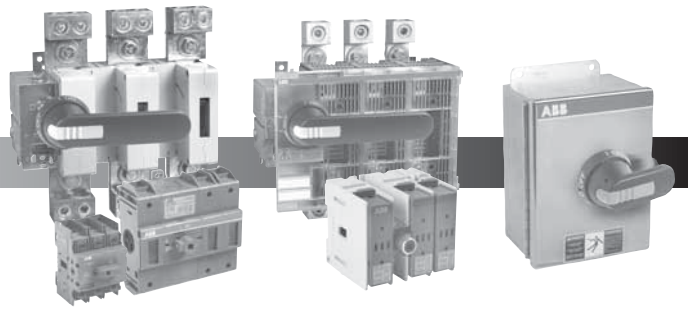
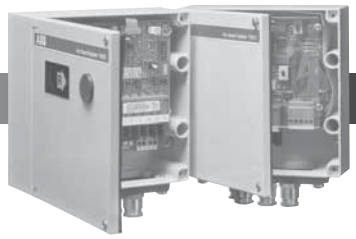
18 - Disconnect switches





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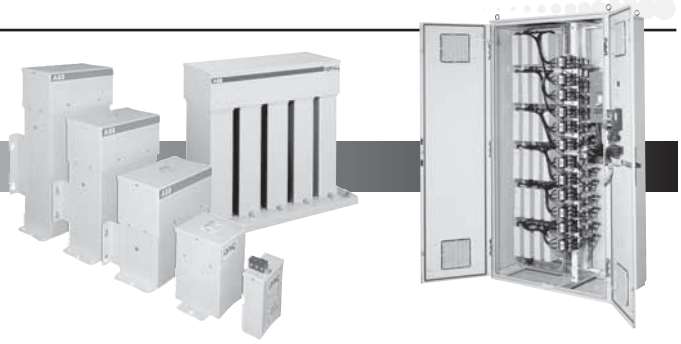
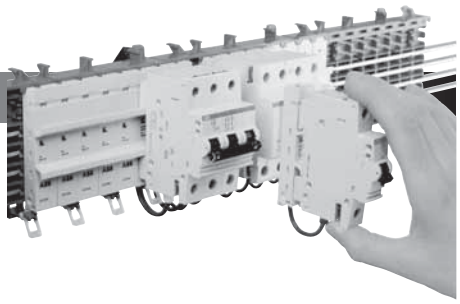


20 - Low Voltage Network Quality



21 - Systems

05019 – 1SAF900800R1220

Alphanumeric

1SAF900800R1230 – 1SL5310A00

1SL5312A00 – A145SN2-84*

Alphanumeric

A145SN3-84* – A185SY2-84**

A185SY3-84** – A26NSM4-84***

A26NSM7-84*** – A400SGX-84**

A400SH1-70*** – A4D900B9A

Alphanumeric

A4G1000B10A – A63SH-84**

A63SHX-84** – A75NSRF1-84*6D

Alphanumeric

A75NSRF2-84*6C – A9SP-84*

A9SR1-84* – AL9ZM-30-01-15

Alphanumeric

AL9ZM-30-10-15 – C245G25

C245G30 – C486G40-3FI

Alphanumeric

C486G42.5-3FI – CA5-40N

CA5-40N – EHDBCK960-2

EHDBCK960-NC – FC302-3PB6B

FC302-3TB6B – K3MI-H

K3MI-V – K7TUT

K7TUT – KE6S4-2

KE6S5 – LS35P31L02-R

LS35P31L20 – LS45P51D11

Alphanumeric

LS45P51L02 – LSTE91

LSTE92 – MCBH-111

MCBH-12 – MS325-HK11

MS325-HK20 – NF200P-3TB4B

Alphanumeric

NF200P-4PB8B – NF633-3MB6A

NF633-3PB6A – OETL-NF800A2SW

OETL-NF800A4SW – ONA2PB

ONA3EKB – OT1200B4-280

Alphanumeric

OT1600M8-325 – OXP12X465-45

OXP12X535 – P37DB1-60N

P37DF1-48C – PST85-600-70

PSTB1050-600-70 – S202-K60

Alphanumeric

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S204-C1.6 – S3H080TW-2

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S3H090TW – S502-K0.42

S502-K0.58 – SK 615 546-4

SK 615 546-5 – T250D2-60M

T250DB1-48B – T4SQ030TW

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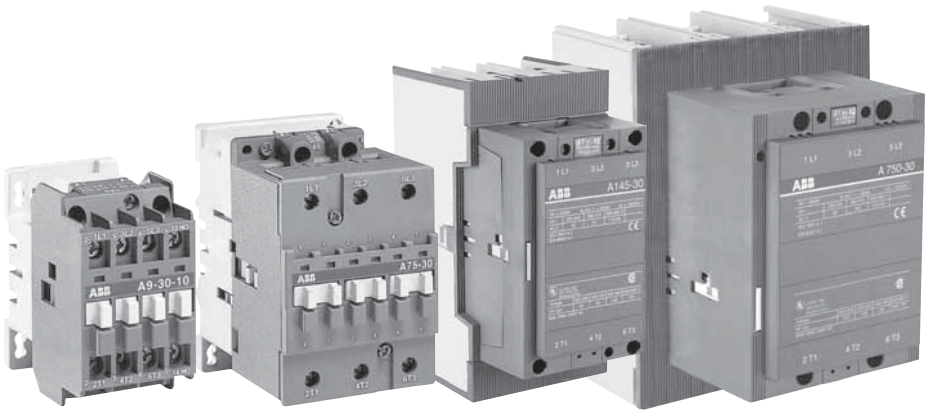
Notes

Across the line contactors
A9 - AF1650

Across the line
Contactors



A9 - A110

- Maximum UL/CSA horsepower ratings according to UL508 and CSA22.2 No. 14
- Includes NEMA sizes 00 - 3
- CE mark
- Compact space saving design
- Standard auxiliary contact configurations:
  A9 - A40 1 NO or 1 NC
  A50 - A110 1 NO & 1 NC
- Contactor sizes A50 - A110 can be supplied without auxiliaries
- Additional auxiliary contact blocks are available
- D.C. ratings & D.C. control operation available
- Fast, snap-on DIN rail mounting
- Double break contact design
- Snap-on front mounted accessories include mechanical latch, pneumatic timer, and 1 & 4 pole auxiliary contact blocks
- Contactors ensure positive safety between their auxiliary contact blocks.
- Easy coil change
- Captive terminal screws
- NEMA, UL, IEC, CSA, VDE and most other international standards
- Touch safe design: All connection terminals are protected against accidental touch
- Terminals supplied open for ease of wiring
- Operates over an extended voltage range of 85% to 110% of rated control voltage
- Screwdriver guide holes
- UL File No: E39231 (A9 - A75); (AE9 - AE75); (AL9 - AL40); (AF50 - AF75)
- UL File No: E79416 (A95 - A110); (AE95 - AE110); (AF145 - AF750)
- CSA File No: LR56745 (A9 - A75); (AE9 - AE75); (AF50 - AF75)
- CSA File No: LR19700 (A95 - A110); (AE95 - AE110); (AF145 - AF750)
- CSA approved for elevator service

A145 - AF1650

- Maximum UL/CSA horsepower ratings according to UL508 and CSA22.2 No. 14
- Includes NEMA sizes 4 - 8
- CE mark
- 1 NO & 1 NC auxiliary contacts are standard and up to 6 additional auxiliary contacts may be added to provide a total of 8 (4 NO & 4 NC)
- Contactors ensure positive safety between their auxiliary contact blocks.
- D.C. ratings and D.C. control operation available
- Easy maintenance of main contacts and coil inspection
- Can be mounted in any position
- Operates over an extended voltage range of 85% to 110% of rated control voltage
- NEMA, UL, IEC, CSA, VDE and most other international standards
- UL File No: E79416 (A/AF145 - AF750)
- UL File No: E73397 (AF1350 - AF1650)
- CSA File No: LR19700

General information
A9 - A300, AC operated
UL rated, 3 phase

Application
A-Line contactors are mainly used for controlling 3-phase motors and for controlling power circuits corresponding to their operating characteristics up to 690 and even 1000 VAC. and 440 VDC.

Description of 3 pole and 4 pole contactors A9 - A300
All A-Line contactors can be assembled side by side. The add-on or built-in auxiliary contacts are suitable for low level currents.

Control circuit types
- A-Line types: AC operated with laminated magnetic circuit.

Contactor types
- 3 pole contactors with NO or NC built in auxiliary contact for A9 - A40 contactors; factory assembled auxiliary contacts for A50 - A300 contactors
- 4 pole contactors: 4 NO or 2 NO & 2 NC without any auxiliary contacts. (A9 - A75)

Quick mounting on DIN rail: EN 50022 and EN 50023 standards:

35 x 7.5mm for A9 - A40

35 x 15mm for A9 - A75

75mm for A45 - A110

Location of side mounted accessories: on right or left hand side. Factory mounted on left hand side for CAL5 on A50 - A300

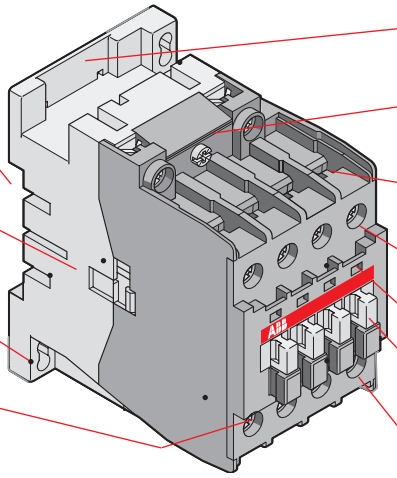
Holes for screw mounting (screws not supplied). Distance between holes according to EN 50003.

Terminals delivered in open position with captive screws (screws of unused terminals must be tightened).

Screwdriver guidance for all terminals makes it possible to use motorized screwdrivers.

All terminals provide protection against accidental direct contact with live parts according to VDE0106 - Part. 100.

All A9 - A40 contactor terminals as well as A45 - A300 contactor auxiliary contact and coil terminals ensure IP20 degree of protection according to IEC 947-1.



A9 - A300

Location of surge suppressors.

Clear marking of coil voltages and frequencies.

Connecting point for control leads in top part of main terminals of A50 - A75 contactors. For A95 & A110 contactors these are additional power connections.

Terminal marking according to IEC 947-4-1, EN 50005, EN 50012 and NEMA standards.

Location of function marker.

Stops for attaching front mounted accessories.

Terminal screws:
- Posidrive (+,-) No 2 for all A9 - A75
- M8 hex threaded socket screw for A95 - A300 main terminals.

Catalog number explanation

A9-30-10-84

Frame size

Power pole

30 = 3 NO
40 = 4 NO
22 = 2 NO & 2 NC

Coil voltage
(see coil voltage selection chart)

Auxiliary contacts

10 = 1 NO & 0 NC
01 = 0 NO & 1 NC
11 = 1 NO & 1 NC
00 = No auxiliary provided
22 = 2 NO & 2 NC

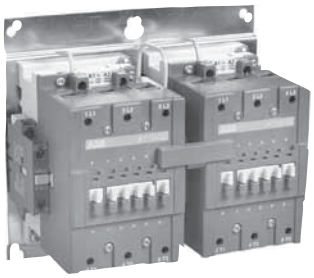
Coil voltage selection chart

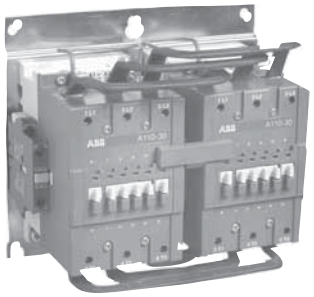
Hz	Cntr type	Volts															
		12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

A9 - A300, AC operated
Non-reversing, mechanically interlocked, reversing
UL rated, 3 phase


A26-30-10-84


A110M-30-11-84


A110R-30-11-84

UL general purpose current	UL motor switching current	Maximum motor horsepower ratings				Standard Aux. contacts		Non-reversing		Mechanically interlocked		Reversing	
		208V	240V	480V	575/600V	NO	NC	Catalog number	List price	Catalog number	List price	Catalog number	List price
AC1		UL rated											
21	9	2	2	5	7.5	1 0	0 1	A9-30-10-84 A9-30-01-84	**$ 78**	A9M-30-10-84 A9M-30-01-84	**$ 255**	A9R-30-10-84 A9R-30-01-84	**$ 315**
25	11	3	3	7.5	10	1 0	0 1	A12-30-10-84 A12-30-01-84	**84**	A12M-30-10-84 A12M-30-01-84	**315**	A12R-30-10-84 A12R-30-01-84	**375**
30	17	5	5	10	15	1 0	0 1	A16-30-10-84 A16-30-01-84	**102**	A16M-30-10-84 A16M-30-01-84	**345**	A16R-30-10-84 A16R-30-01-84	**413**
40	28	7.5	10	20	25	1 0	0 1	A26-30-10-84 A26-30-01-84	**183**	A26M-30-10-84 A26M-30-01-84	**405**	A26R-30-10-84 A26R-30-01-84	**480**
50	34	10	10	25	30	1 0	0 1	A30-30-10-84 A30-30-01-84	**252**	A30M-30-10-84 A30M-30-01-84	**548**	A30R-30-10-84 A30R-30-01-84	**623**
60	42	10	15	30	40	1 0	0 1	A40-30-10-84 A40-30-01-84	**297**	A40M-30-10-84 A40M-30-01-84	**639**	A40R-30-10-84 A40R-30-01-84	**750**
80	54	15	20	40	50	1	1	A50-30-11-84	**330**	A50M-30-11-84	**713**	A50R-30-11-84	**810**
90	65	20	25	50	60	1	1	A63-30-11-84	**372**	A63M-30-11-84	**870**	A63R-30-11-84	**1013**
105	80	25	30	60	75	1	1	A75-30-11-84	**413**	A75M-30-11-84	**1155**	A75R-30-11-84	**1298**
125	95	30	30	60	75	1	1	A95-30-11-84	**450**	A95M-30-11-84	**1230**	A95R-30-11-84	**1425**
140	110	30	40	75	100	1	1	A110-30-11-84	**480**	A110M-30-11-84	**1365**	A110R-30-11-84	**1628**
230	130	40	50	100	125	1	1	A145-30-11-84	**825**	A145M-30-11-84	**2235**	A145R-30-11-84	**2250**
250	156	50	60	125	150	1	1	A185-30-11-84	**1290**	A185M-30-11-84	**3360**	A185R-30-11-84	**3375**
300	192	60	75	150	200	1	1	A210-30-11-84	**1635**	A210M-30-11-84	**4035**	A210R-30-11-84	**4050**
350	248	75	100	200	250	1	1	A260-30-11-84	**1815**	A260M-30-11-84	**4485**	A260R-30-11-84	**4500**
400	302	100	100	250	300	1	1	A300-30-11-84	**1875**	A300M-30-11-84	**5460**	A300R-30-11-84	**5475**
550	414	125	150	350	400	1	1						
650	480	150	200	400	500	1	1						
750	602	200	250	500	600	1	1						
900	810	250	300	600	700	1	1						
1350	960	—	400	800	900	1	1						
1650	1080	—	450	900	1000	1	1						

See Type AF contactors, page 1.9

Coil voltage selection

All AC operated catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 contactor: A75-30-11-**80**

Auxiliary contact blocks

For additional auxiliary contact blocks, see catalog number explanation on page 1.2. Add $ 20 to list price for each additional auxiliary, and see page 1.18 for available combinations. Only side-mounted blocks are allowed to be factory installed. If auxiliary contacts are not required for A50 - A300, subtract $ 40 from list price and change catalog number to “00” instead of “11.”

Mechanical interlock

Mechanically interlocked contactors are designed for reversing, 2 speed, reduced voltage, etc. type starter applications. The complete assembly consists of two mechanically and electrically interlocked contactors mounted as follows with line and load terminals:

- A9 - A16 — mounted on 35mm DIN rail
- A26 - A300 — mounted on common baseplate

Power wiring is not included. The NC electrical interlock is provided with the mechanical interlock for A9 - A110 contactors.

Coil voltage selection chart

Hz	Cntr type	Volts															
		12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Reversing

Reversing contactors are designed for reversing type starter applications. The complete assembly consists of two mechanically and electrically interlocked contactors mounted as follows with line and load terminals:

- A9 - A16 — mounted on 35mm DIN rail
- A26 - A300 — mounted on common baseplate

The NC electrical interlock is provided with the mechanical interlock for A9 - A110 contactors.

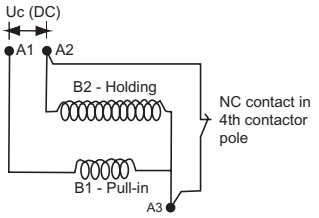
General information
AE9 - AE110, DC operated
UL rated, 3 phase

Application

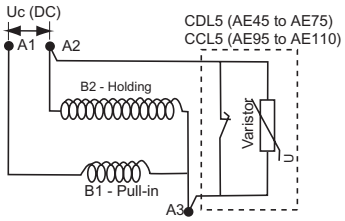
A-Line contactors are mainly used for controlling 3-phase motors and for controlling power circuits corresponding to their operating characteristics up to 690 and even 1000 VAC. and 440 VDC.

Control circuit types

AE types: with laminated magnetic circuit and double-winding coil fed from DC supply via a CDL5 insertion contact mounted on the device. The CDL5 has an NC lagging contact for insertion of the second winding. (See schematic.)



AE9 to AE40



AE45 to AE110

Quick mounting on DIN rail: EN 50022 and EN 50023 standards:

35 x 7.5mm for AE9 - AE40

35 x 15mm for AE9 - AE75

75mm for AE45 - AE110

Location of side mounted accessories: on right or left hand side. Factory mounted on left hand side for CAL5 on A50 - A300

- right hand side for CDL5/CCL5 on AE45 - AE110

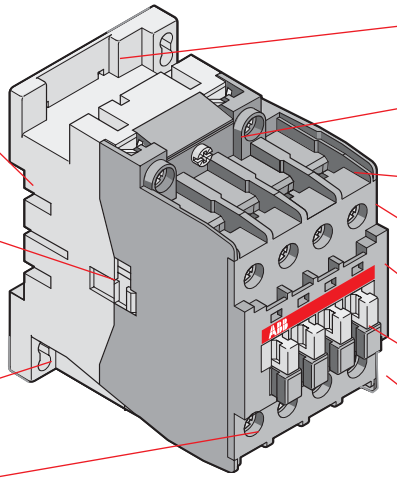
Holes for screw mounting (screws not supplied). Distance between holes according to EN 50003.

Terminals delivered in open position with captive screws (unused terminal screws must be tightened).

Screwdriver guidance for all terminals makes it possible to use motorized screwdrivers.

All terminals provide protection against accidental direct contact with live parts according to VDE0106 - Part. 100.

All AE9 - AE40 contactor terminals as well as AE45 - AE110 contactor auxiliary contact and coil terminals ensure IP20 degree of protection according to IEC 947-1.



AE9 - AE110

Location of surge suppressors.

Clear marking of coil voltages and frequencies.

Connecting point for control leads in top part of main terminals of AE50 - AE75 contactors. For AE95 & AE110 contactors these are additional power connections.

Terminal marking according to IEC 947-4-1, EN 50005, EN 50012 and NEMA standards.

Location of function marker.

Stops for attaching front mounted accessories.

Terminal screws:

- Posidrive (+,-) No° 2 for all AE9 - AE75
- M8 hex threaded socket screw for AE95 & AE110

Catalog number explanation

AE9-30-00-81

Frame size

Power pole

30 = 3 NO
40 = 4 NO
22 = 2 NO & 2 NC

Coil voltage
(see coil voltage selection chart)

Auxiliary contacts

00 = No auxiliary provided
11 = 1 NO & 1 NC

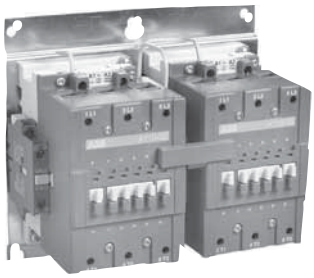
Coil voltage selection chart

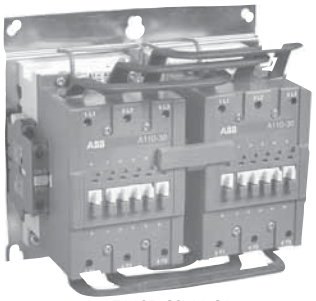
Hz	Contr. type	Volts						
		12	24	48	110	125	220	240
DC	AE	80	81	83	86	87	88	89

For other voltages, see page 1.26.

AE9 - AE110
Non-reversing, mechanically interlocked, reversing
DC operated, UL rated, 3 phase


AE26-30-11-81


AE110M-30-11-81


AE110R-30-11-81

General purpose current	UL motor switching current	Maximum motor horsepower ratings				Standard Aux. contacts		Non-reversing		Mechanically interlocked		Reversing	
		208V	240V	480V	575/600V	NO	NC	Catalog number	List price	Catalog number	List price	Catalog number	List price
AC1		UL rated											
21	9	2	2	5	7.5	1	1	AE9-30-11-81	**$ 118**	AE9M-30-11-81	**$ 335**	AE9R-30-11-81	**$ 395**
25	11	3	3	7.5	10	1	1	AE12-30-11-81	**124**	AE12M-30-11-81	**395**	AE12R-30-11-81	**455**
30	17	5	5	10	15	1	1	AE16-30-11-81	**142**	AE16M-30-11-81	**425**	AE16R-30-11-81	**493**
40	28	7.5	10	20	25	1	1	AE26-30-11-81	**223**	AE26M-30-11-81	**485**	AE26R-30-11-81	**560**
50	34	10	10	25	30	1	1	AE30-30-11-81	**292**	AE30M-30-11-81	**628**	AE30R-30-11-81	**703**
60	42	10	15	30	40	1	1	AE40-30-11-81	**337**	AE40M-30-11-81	**720**	AE40R-30-11-81	**830**
80	54	15	20	40	50	1	1	AE50-30-11-81	**375**	AE50M-30-11-81	**803**	AE50R-30-11-81	**930**
90	65	20	25	50	60	1	1	AE63-30-11-81	**477**	AE63M-30-11-81	**1080**	AE63R-30-11-81	**1208**
105	80	25	30	60	75	1	1	AE75-30-11-81	**518**	AE75M-30-11-81	**1365**	AE75R-30-11-81	**1493**
125	95	30	30	60	75	1	1	AE95-30-11-81	**555**	AE95M-30-11-81	**1440**	AE95R-30-11-81	**1635**
140	110	30	40	75	100	1	1	AE110-30-11-81	**690**	AE110M-30-11-81	**1785**	AE110R-30-11-81	**2048**
230	130	40	50	100	125	1	1						
250	156	50	60	125	150	1	1						
300	192	60	75	150	200	1	1						
350	248	75	100	200	250	1	1						
400	302	100	100	250	300	1	1						
550	414	125	150	350	400	1	1						
650	480	150	200	400	500	1	1						
750	602	200	250	500	600	1	1						
900	810	250	300	600	700	1	1						
1350	960	—	400	800	900	1	1						
1650	1080	—	450	900	1000	1	1						

See AF contactors, page 1.9

Coil voltage selection

All DC operated catalog numbers include a 24VDC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 110V coil is required for an AE75 contactor: AE75-30-11-**86**

Auxiliary contact blocks

For additional auxiliary contact blocks, see catalog number explanation on page 1.4. Add $ 20 to list price for each additional auxiliary, and see page 1.18 for available combinations.

Mechanical interlock

Mechanically interlocked contactors are designed for reversing, 2 speed, reduced voltage, etc. type starter applications. The complete assembly consists of two mechanically and electrically interlocked ocntactors mounted as follows with line and load terminals:

- AE9 - AE16 — mounted on 35mm DIN rail
- AE26 - AE110 — mounted on common baseplate

Power wiring is not included.

The NC electrical interlock is provided with the mechanical interlock.

Coil voltage selection chart

Hz	Contr. type	Volts						
		12	24	48	110	125	220	240
DC	AE	80	81	83	86	87	88	89

For other voltages, see page 1.26.

Reversing

Reversing contactors are designed for reversing type starter applications. The complete assembly consists of two mechanically and electrically interlocked contactors mounted as follows with line and load terminals:

- AE9 - AE16 — mounted on 35mm DIN rail
- AE26 - AE110 — mounted on common baseplate

The NC electrical interlock is provided with the mechanical interlock.

General information
AL9 - AL40, DC operated
UL rated, 3 phase

Application

AL and AL...Z contactors are mainly used for controlling 3-phase motors and for controlling power circuits corresponding to their operating characteristics up to 690 and even 1000 VAC. and 440 VDC.

Control circuit types

AL9 - AL40: DC coil with low power consumption of 3W to 3.5W
AL9Z - AL16Z: DC coil with low power consumption of 2.4W. Designed to be directly controlled by PLC.

Quick mounting on DIN rail: EN 50022 and EN 50023 standards:

35 x 7.5mm for AL9 - AL40
35 x 15mm for AL9 - AL40

Location of side mounted accessories: on right or left hand side.

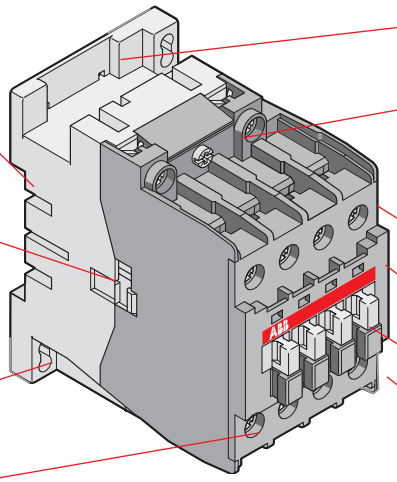
Holes for screw mounting (screws not supplied). Distance between holes according to EN 50003.

Terminals delivered in open position with captive screws (unused terminal screws must be tightened).

Screwdriver guidance for all terminals makes it possible to use motorized screwdrivers.

All terminals provide protection against accidental direct contact with live parts according to VDE0106 - Part. 100.

All AL9 - AL40 contactor terminals as well as contactor auxiliary contacts and coil terminals ensure IP20 degree of protection according to IEC 60947-1.



AL9 - AL40

Location of surge suppressors.

Clear marking of coil voltages and frequencies.

Terminal marking according to IEC 60947-4-1, EN 50005, EN 50012 and NEMA standards.

Location of function marker.

Stops for attaching front mounted accessories.

Terminal screws:

- Posidrive (+,-) No° 2 for all AL contactors

Catalog number explanation

AL9 - 30 - 10 - 81

Frame size

Power pole
30 = 3 NO

Coil voltage
(see coil voltage selection chart)

Auxiliary contacts
10 = 1 NO & 0 NC
01 = 0 NO & 1 NC

Coil voltage selection

Hz	Contr. type	Volts						
		12	24	48	110	125	220	240
DC	AL	80	81	83	86	87	88	89
DC	AL...Z		15	28				

For other voltages, see page 1.26.

AL9 - AL40, AL9Z - AL16Z
Non-reversing, mechanically interlocked, reversing
DC operated, UL rated, 3 phase

AL9-30-10-81

AL26-30-10-81

AL40-30-10-81

AL Contactors — 3W and 3.5W consumption

General purpose current AC1	UL motor switching current	Maximum motor horsepower ratings 208V	240V	480V	575/600V	Standard Aux. contacts NO	NC	Non-reversing Catalog number	List price	Mechanically interlocked Catalog number	List price	Reversing Catalog number	List price
		UL rated											
21	9	2	2	5	7.5	1 0	0 1	AL9-30-10-81 AL9-30-01-81	**$ 110**	AL9M-30-10-81 AL9M-30-01-81	**$ 319**	AL9R-30-10-81 AL9R-30-01-81	**$ 379**
25	11	3	3	7.5	10	1 0	0 1	AL12-30-10-81 AL12-30-01-81	**135**	AL12M-30-10-81 AL12M-30-01-81	**417**	AL12R-30-10-81 AL12R-30-01-81	**477**
30	17	5	5	10	15	1 0	0 1	AL16-30-10-81 AL16-30-01-81	**150**	AL16M-30-10-81 AL16M-30-01-81	**441**	AL16R-30-10-81 AL16R-30-01-81	**501**
40	28	7.5	10	20	25	1 0	0 1	AL26-30-10-81 AL26-30-01-81	**190**	AL26M-30-10-81 AL26M-30-01-81	**473**	AL26R-30-10-81 AL26R-30-01-81	**533**
50	34	10	10	20	30	1 0	0 1	AL30-30-10-81 AL30-30-01-81	**260**	AL30M-30-10-81 AL30M-30-01-81	**618**	AL30R-30-10-81 AL30R-30-01-81	**678**
60	42	10	15	30	40	1 0	0 1	AL40-30-10-81 AL40-30-01-81	**300**	AL40M-30-10-81 AL40M-30-01-81	**715**	AL40R-30-10-81 AL40R-30-01-81	**775**

ALZ Contactors — 2.4W consumption

General purpose current AC1	UL motor switching current	Maximum motor horsepower ratings 208V	240V	480V	575/600V	Standard Aux. contacts NO	NC	Non-reversing Catalog number	List price	Mechanically interlocked Catalog number	List price	Reversing Catalog number	List price
		UL rated											
21	9	2	2	5	7.5	1 0	0 1	AL9Z-30-10-15 AL9Z-30-01-15	**$ 110**	AL9ZM-30-10-15 AL9ZM-30-01-15	**$ 319**	AL9ZR-30-10-15 AL9ZR-30-01-15	**$ 379**
25	11	3	3	7.5	10	1 0	0 1	AL12Z-30-10-15 AL12Z-30-01-15	**135**	AL12ZM-30-10-15 AL12ZM-30-01-15	**417**	AL12ZR-30-10-15 AL12ZR-30-01-15	**477**
30	17	5	5	10	15	1 0	0 1	AL16Z-30-10-15 AL16Z-30-01-15	**150**	AL16ZM-30-10-15 AL16ZM-30-01-15	**441**	AL16ZR-30-10-15 AL16ZR-30-01-15	**501**

Coil voltage selection

All DC operated catalog numbers include a 24VDC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 48V coil is required for an AL30 contactor: AL30-30-10-**83**

Auxiliary contact blocks

For additional auxiliary contact blocks, see catalog number explanation on page 1.6. Add $ 20 to list price for each additional auxiliary, and see page 1.18 for available combinations.

Coil voltage selection

Hz	Contr. type	Volts 12	24	48	110	125	220	240
DC	AL	80	81	83	86	87	88	89
DC	AL...Z		15	28				

For other voltages, see page 1.26.

Mechanical interlock

Mechanically interlocked contactors are designed for reversing, 2 speed, reduced voltage, etc. type starter applications. The complete assembly consists of two mechanically and electrically interlocked contactors mounted as follows with line and load terminals:

- AL9 & AL16 — mounted on 35mm DIN rail
- AL26 & AL40 — mounted on common baseplate

Power wiring is not included.

The NC electrical interlock is provided

Reversing

Reversing contactors are designed for reversing type starter applications. The complete assembly consists of two mechanically and electrically interlocked contactors mounted with line and load terminals.

① Only coil voltages available for AL9Z – AL16Z.

General information
AF50 - AF1650, AC & DC operated
UL rated, 3 phase

Application
A-Line contactors are mainly used for controlling 3-phase motors and for controlling power circuits corresponding to their operating characteristics up to 690 and even 1000 VAC. and 440 VDC.

Description of 3 pole contactors AF50 - AF1650
All AF contactors can be assembled side by side. The add-on auxiliary contacts are suitable for low level currents.

Control circuit types
- AF types: AC/DC operated with laminated magnetic circuit.

Contact or types
- 3 pole contactors with 1 NO or 1 NC factory assembled auxiliary contacts for AF50 - AF1650 contactors

Quick mounting on DIN rail: EN 50022 and EN 50023 standards:

35 x 15mm for AF50 - AF75

75mm for AF50 - AF110

Location of side mounted accessories: on right or left hand side. Factory mounted on left hand side for CAL5 on AF50 - AF1650

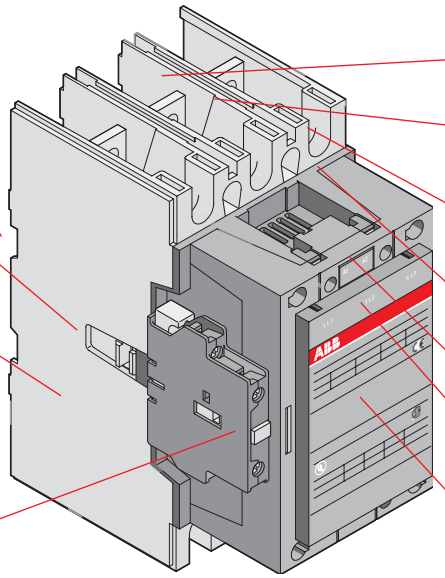
Holes for screw mounting (screws not supplied). Distance between holes according to EN 50003.

Terminals delivered in open position with captive screws (screws of unused terminals must be tightened).

Screwdriver guidance for all terminals makes it possible to use motorized screwdrivers.

All terminals provide protection against accidental direct contact with live parts according to VDE0106 - Part. 100.

All AF50- AF110 contactor terminals as well as AF50 - AF1650 contactor auxiliary contact and coil terminals ensure IP20 degree of protection according to IEC 947-1.



AF50 - AF1650

Surge suppressors built in as standard on the printed circuit board.

Clear marking of coil voltages and frequencies.

Connecting point for control leads in top part of main terminals of AF50 - AF75 contactors. For AF95 & AF110 contactors these are additional power connections.

Terminal marking according to IEC 947-4-1, EN 50005, EN 50012 and NEMA standards.

Location of function marker.

Stops for attaching front mounted accessories.

Terminal screws:
- Posidrive (+,-) No 2 for all AF50 – AF75
- M8 hex threaded socket screw for AF95 – AF1650 main terminals.

Catalog number explanation

AF50 - 30 - 11 - 70

Frame size

Power pole

30 = 3 NO
40 = 4 NO
22 = 2 NO & 2 NC

Coil voltage
(see coil voltage selection chart)

Auxiliary contacts

11 = 1 NO & 1 NC
00 = No auxiliary provided
22 = 2 NO & 2 NC

Coil voltage selection – AF50 to AF1650

AC/DC VOLTS, 40 - 60 Hz

24 - 60 DC	20 - 60 DC	48 - 130 AC/DC	100 - 250 AC/DC	250 - 500 AC//DC
68 ①	72 ②	69	70 ③	71 ④

① AF400 – AF750, DC only.
② AF50 – AF300, DC only.
③ Only option for AF1350 / AF1650.
④ AF400 - AF750 only.

AF50 - AF1650

Non-reversing, mechanically interlocked, reversing AC & DC operated, UL rated, 3 phase

AF63-30-11-70

AF95-30-11-70

AF400-30-11-70

AF750-30-11-70

3 Pole

General purpose current AC1	UL motor switching current	Maximum UL Listed motor horsepower ratings 208V	240V	480V	575/600V	Standard auxiliary contacts NO	NC	Non-reversing Catalog number	List price	Mechanically interlocked Catalog number	List price	Reversing Catalog number	List price
80	54	15	20	40	50	1	1	AF50-30-11-70	**$ 450**	AF50M-30-11-70	**$ 953**	AF50R-30-11-70	**$ 1050**
90	65	20	25	50	60	1	1	AF63-30-11-70	**495**	AF63M-30-11-70	**1116**	AF63R-30-11-70	**1259**
105	80	25	30	60	75	1	1	AF75-30-11-70	**535**	AF75M-30-11-70	**1399**	AF75R-30-11-70	**1542**
125	95	30	30	60	75	1	1	AF95-30-11-70	**570**	AF95M-30-11-70	**1470**	AF95R-30-11-70	**1665**
140	110	30	40	75	100	1	1	AF110-30-11-70	**600**	AF110M-30-11-70	**1605**	AF110R-30-11-70	**1868**
230	130	40	50	100	125	1	1	AF145-30-11-70	**1110**	AF145M-30-11-70	**2655**	AF145R-30-11-70	**2670**
250	156	50	60	125	150	1	1	AF185-30-11-70	**1635**	AF185M-30-11-70	**3870**	AF185R-30-11-70	**3885**
300	192	60	75	150	200	1	1	AF210-30-11-70	**1980**	AF210M-30-11-70	**4545**	AF210R-30-11-70	**4560**
350	248	75	100	200	250	1	1	AF260-30-11-70	**2235**	AF260M-30-11-70	**5055**	AF260R-30-11-70	**5070**
400	302	100	100	250	300	1	1	AF300-30-11-70	**2385**	AF300M-30-11-70	**6030**	AF300R-30-11-70	**6045**
550	414	125	150	350	400	1	1	AF400-30-11-70	**3120**	AF400M-30-11-70	**6705**	AF400R-30-11-70	**6720**
650	480	150	200	400	500	1	1	AF460-30-11-70	**4425**	AF460M-30-11-70	**13,275**	AF460R-30-11-70	**13,290**
750	602	200	250	500	600	1	1	AF580-30-11-70	**6900**	AF580M-30-11-70	**18,375**	AF580R-30-11-70	**18,390**
900	810	250	300	600	700	1	1	AF750-30-11-70	**7200**	AF750M-30-11-70	**19,725**	AF750R-30-11-70	**19,740**
1350	960	—	400	800	900	1	1	AF1350-30-11-70	**8490**	—	—	—	—
1650	1080	—	450	900	1000	1	1	AF1650-30-11-70	**10,230**	—	—	—	—

Coil voltage selection – wide range AC/DC coils

All catalog numbers include a 100-250V AC/DC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 24V coil is required for a AF110 contactor: AF110-30-11-**72**

Coil voltage selection – AF50 to AF1650

AC/DC VOLTS, 40 - 60 Hz				
24 - 60 DC	20 - 60 DC	48 - 130 AC/DC	100 - 250 AC/DC	250 - 500 AC//DC
68 ①	72 ②	69	70 ③	71 ④

① AF400 – AF750, DC only.
② AF50 – AF300, DC only.
③ Only option for AF1350 / AF1650.
④ AF400 - AF750 only.

Contactors for ring tongue termination
A/AE9 - A/AE110, AC & DC operated
UL rated, 3 phase

UL general purpose current AC1	UL Motor switching current	UL/CSA horsepower ratings			Auxiliary contacts		AC operated		DC operated	
		240V	480V	575/600V	NO	NC	Catalog number	List price	Catalog number	List price
21	9	2	5	7.5	1 0	0 1	A93010RT-84 A93001RT-84	**$ 81**	AE93000RT-81 —	**$ 91** **—**
25	11	3	7.5	10	1 0	0 1	A123010RT-84 A123001RT-84	**87**	AE123000RT-81 —	**97** **—**
30	17	5	10	15	1 0	0 1	A163010RT-84 A163001RT-84	**106**	AE163000RT-81 —	**116** **—**
40	28	10	20	25	1 0	0 1	A263010RT-84 A263001RT-84	**189**	AE263000RT-81 —	**199** **—**
80	54	20	40	50	0	0	A503000RT-84	**311**	AE503000RT-81	**356**
90	65	25	50	60	0	0	A633000RT-84	**354**	AE633000RT-81	**459**
105	80	30	60	75	0	0	A753000RT-84	**396**	AE753000RT-81	**501**
125	95	30	60	75	0	0	A953000RT-84	**466**	AE953000RT-81	**571**
140	110	40	75	100	0	0	A1103000RT-84	**543**	AE1103000RT-81	**753**

Coil voltage selection – AC coils

All AC operated catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the AC coils Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 contactor: A753000RT-80

Coil voltage selection – DC coils

All DC operated catalog numbers include a 24VDC coil. To select other coil voltages, substitute the code from the DC coils Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 110V coil is required for an AE75 contactor: AE753000RT-86

Auxiliary contact blocks

For additional auxiliary contact blocks, see catalog number explanation on page 1.2. Add $ 20 to list price for each additional auxiliary, and see page 1.18 for available combinations. Only side-mounted blocks are allowed to be factory installed.

Auxiliary contact block with ring tongue termination

Positioning	Maximum number of contact blocks	Contact description	Catalog number	List price
Front mounting (C4-pole)	1 block A/AE9 – A/AE110	2 NO & 2 NC 3 NO & 1 NC 4 NO	CA5-22ERT CA5-31ERT CA5-40ERT	**$ 35**

Coil voltage selection chart – AC coils

Hz	Cntr type	Volts																
		12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Coil voltage selection chart – DC coils

Hz	Contr. type	Volts					
		24	48	110	125	220	240
DC	AE	81	83	86	87	88	89

For other voltages, see page 1.26.

A9 – AF1650
Non-reversing, mechanically interlocked, reversing NEMA rated, AC operated, 3 phase


A26N1-30-10-84


A145N4-30-11-84


AF400N6-30-11-70

NEMA size	Continuous current	Maximum motor horsepower ratings			Standard Aux. contacts		Non-reversing		Mechanically interlocked		Reversing	
		200V	230V	460/575V	NO	NC	Catalog number	List price	Catalog number	List price	Catalog number	List price
		NEMA rated										
00	9	1.5	1.5	2	1	0	A9N00-30-10-84	**$ 78**	A9N00M-10-84	**$ 255**	A9N00R-10-84	**$ 315**
0	18	3	3	5	1	0	A16N0-30-10-84	**102**	A16N0M-10-84	**345**	A16N0R-10-84	**413**
1	27	7.5	7.5	10	1	0	A26N1-30-10-84	**183**	A26N1M-10-84	**405**	A26N1R-10-84	**480**
2	45	10	15	25	1	1	A50N2-30-11-84	**330**	A50N2M-11-84	**713**	A50N2R-11-84	**810**
3	90	25	30	50	1	1	A75N3-30-11-84	**413**	A75N3M-11-84	**1155**	A75N3R-11-84	**1298**
4	135	40	50	100	1	1	A145N4-30-11-84	**825**	A145N4M-11-84	**2235**	A145N4R-11-84	**2250**
5	270	75	100	200	1	1	A260N5-30-11-84	**2235**	A260N5M-11-84	**5055**	A260N5R-11-84	**5070**
6	540	150	200	400	1	1	AF460N6-3011-70	**4425**	AF460N6M-11-70	**13,275**	AF460N6R-11-70	**13,290**
7	810	—	300	600	1	1	AF750N7-3011-70	**7200**	AF750N7M-11-70	**19,725**	AF750N7R-11-70	**19,740**
8	1215	—	450	900	1	1	AF1650N83011-70	**10,230**	—	**—**	—	**—**

Coil voltage selection – A contactors

All AC operated catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 contactor: A75N3-30-11-**80**

Coil voltage selection – wide range AC/DC coils

The NEMA size 6,7 and 8 contactors are provided with a wide range coil voltage. They are shown with the standard 100-250V AC/DC coil. To select other ranges substitute the code from the coil voltage selection chart for the two digits after the last dash in the catalog number.

Ex.: A 24V coil is required for the AF460N6 contactor: AF460N6-3011-**68**

Auxiliary contact blocks

For additional auxiliary contact blocks, see catalog number explanation on page 1.2. Add $ 20 to list price for each additional auxiliary, and see page 1.18 for available combinations.

Mechanical interlock

Mechanically interlocked contactors are designed for reversing, 2 speed, reduced voltage, etc. type starter applications. The complete assembly consists of two mechanically and electrically interlocked contactors mounted as follows with line and load terminals:

- A9 - A16 — mounted on 35mm DIN rail
- A26 - A750 — mounted on common baseplate

Power wiring is not included.

For A9 - A110 contactors the NC electrical interlock is provided with the mechanical interlock.

Reversing

Reversing contactors are designed for reversing type starter applications. The complete assembly consists of two mechanically and electrically interlocked contactors mounted as follows with line and load terminals:

- A9 - A16 — mounted on 35mm DIN rail
- A26 - A750 — mounted on common baseplate

For A9 - A750 contactors the NC electrical interlock is provided with the mechanical interlock.

Coil voltage selection – A contactors

Hz	Cntr type	Volts															
		12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Coil voltage selection – AF460N6 to AF1650N8

AC/DC VOLTS, 40 - 60 HZ			
24 - 60 DC	48 - 130 AC/DC	100 - 250 AC/DC	250-500 AC/DC
68 ①	69	70 ③	71 ②

① AF400 – AF750, DC only.
② AF400 - AF750 only.
③ Only option for AF1650.

AE9 – AF1650, AL9 – AL26
Non-reversing, mechanically interlocked, reversing
NEMA rated, DC operated, 3 phase


AE26N1-30-11-81


AF145N4-30-11-68


AF460N6R-11-68

AE & AF Contactors

NEMA size	Continuous current	Maximum motor horsepower ratings			Standard Aux. contacts		Non-reversing		Mechanically interlocked		Reversing	
		200V	230V	460/575V	NO	NC	Catalog number	List price	Catalog number	List price	Catalog number	List price
		NEMA rated										
00	9	1.5	1.5	2	1	0	AE9N00-30-11-81	**$ 118**	AE9N00M-11-81	**$ 335**	AE9N00R-11-81	**$ 395**
0	18	3	3	5	1	0	AE16N0-30-11-81	**142**	AE16N0M-11-81	**425**	AE16N0R-11-81	**493**
1	27	7.5	7.5	10	1	0	AE26N1-30-11-81	**223**	AE26N1M-11-81	**485**	AE26N1R-11-81	**560**
2	45	10	15	25	1	1	AE50N2-30-11-81	**375**	AE50N2M-11-81	**803**	AE50N2R-11-81	**930**
3	90	25	30	50	1	1	AE75N3-30-11-81	**518**	AE75N3M-11-81	**1365**	AE75N3R-11-81	**1493**
4	135	40	50	100	1	1	AF145N4-3011-70	**1110**	AF145N4M-11-70	**2655**	AF145N4R-11-70	**2670**
5	270	75	100	200	1	1	AF260N5-3011-70	**2235**	AF260N5M-11-70	**5055**	AF260N5R-11-70	**5070**
6	540	150	200	400	1	1	AF460N6-3011-70	**4425**	AF460N6M-11-70	**13,275**	AF460N6R-11-70	**13,290**
7	810	—	300	600	1	1	AF750N7-3011-70	**7200**	AF750N7M-11-70	**19,725**	AF750N7R-11-70	**19,740**
8	1215	—	450	900	1	1	AF1650N83011-70	**10,230**	—	**—**	—	**—**

AL Contactors

NEMA size	Continuous current	Maximum motor horsepower ratings			Standard Aux. contacts		Non-reversing		Mechanically interlocked		Reversing	
		208V	240V	460/575V	NO	NC	Catalog number	List price	Catalog number	List price	Catalog number	List price
		NEMA rated										
00	9	1.5	1.5	2	1	0	AL9N00-30-10-81	**$ 110**	AL9N00M-10-81	**$ 319**	AL9N00R-10-81	**$ 379**
0	18	3	3	5	1	0	AL16N0-30-10-81	**150**	AL16N0M-10-81	**441**	AL16N0R-10-81	**501**
1	27	7.5	7.5	10	1	0	AL26N1-30-10-81	**190**	AL26N1M-10-81	**473**	AL26N1R-10-81	**533**

Coil voltage selection – AE contactors

All DC operated catalog numbers include a 24VDC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 125V coil is required for an AE75 contactor: AE75N3-30-11-**87**

Coil voltage selection – AF wide range AC/DC coils

All catalog numbers include a 100-250V AC/DC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 24V coil is required for a AF145 contactor: AF145N4-30-11-**72**

Auxiliary contact blocks

For additional auxiliary contact blocks, see catalog number explanation on page 1.2. Add $ 20 to list price for each additional auxiliary, and see page 1.18 for available combinations.

Mechanical interlock

Mechanically interlocked contactors are designed for reversing, 2 speed, reduced voltage, etc. type starter applications. The complete assembly consists of two mechanically and electrically interlocked contactors mounted as follows with line and load terminals:

- AE9 - AE16 — mounted on 35mm DIN rail
- AE26 - AE75 — mounted on common baseplate

Power wiring is not included.

For AE9 - AE75 contactors the NC electrical interlock is provided with the mechanical interlock.

Reversing

Reversing contactors are designed for reversing type starter applications. The complete assembly consists of two mechanically and electrically interlocked contactors mounted as follows with line and load terminals:

- AE9 - AE16 — mounted on 35mm DIN rail
- AE26 - AE75 — mounted on common baseplate

For AE9 - AE75 contactors the NC electrical interlock is provided with the mechanical interlock.

Coil voltage selection – AF50 to AF1650

AC/DC VOLTS, 40 - 60 Hz

24 - 60 DC	20 - 60 DC	48 - 130 AC/DC	100 - 250 AC/DC	250 - 500 AC/DC
68 ①	72 ②	69	70 ④	71 ③

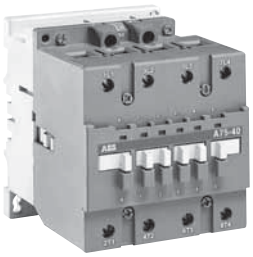
Coil voltage selection – AE & AL contactors

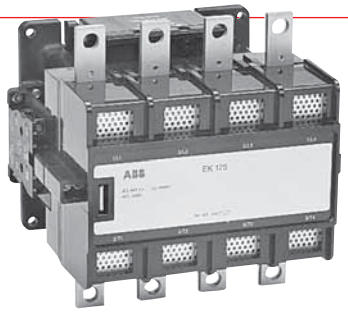
Hz	Contactor type	Volts						
		12	24	48	110	125	220	240
DC	AE, AL	–	81	83	86	87	88	89

① AF400 – AF750, DC only.
② AF50 – AF300, DC only.
③ AF400 - AF750 only.
④ Only option for AF1650.

A9 – A/AE75 , EK110 – EK1000, AL9 – AL26
AC & DC operated
UL rated, 4 pole


A9-40-00


A75-40-00


EK175C4P-PL

4 Pole – 4 NO power poles

UL general purpose current		AC operated		DC operated	
AC operated	DC operated	Catalog number	List price	Catalog number	List price
21	21	A9-40-00-84	**$ 120**	AL9-40-00-81	**$ 133**
30	30	A16-40-00-84	**165**	AL16-40-00-81	**172**
40	40	A26-40-00-84	**228**	AL26-40-00-81	**224**
65	65	A45-40-00-84	**360**	AE45-40-00-86	**420**
80	80	A50-40-00-84	**413**	AE50-40-00-86	**473**
105	105	A75-40-00-84	**525**	AE75-40-00-86	**570**
150	150	EK110C4P-1L	**743**	EK110C4P-PL	**953**
200	200	EK150C4P-1L	**1013**	EK150C4P-PL	**1238**
250	250	EK175C4P-1L	**1763**	EK175C4P-PL	**1988**
300	300	EK210C4P-1L	**2025**	EK210C4P-PL	**2280**
400	400	EK370C4P-1L	**4650**	EK370C4P-PL	**5010**
600	600	EK550C4P-1L	**6510**	EK550C4P-PL	**7005**
1000 ①	1000 ①	EK1000C4P-1L	**9000**	EK1000C4P-PL	**9700**

4 Pole – 4 NC power poles

UL general purpose current	AC operated	
AC operated	Catalog number	List price
30	A16-04-00-84	**$ 165**

4 Pole – 2 NO & 2 NC power poles

UL general purpose current		AC operated		DC operated	
AC operated	DC operated	Catalog number	List price	Catalog number	List price
21	21	A9-22-00-84	**$ 120**	AL9-22-00-81	**$ 133**
30	21	A16-22-00-84	**165**	AL16-22-00-81	**172**
40	30	A26-22-00-84	**228**	AL26-22-00-81	**224**
65	65	A45-22-00-84	**360**	AE45-22-00-86	**420**
105	105	A75-22-00-84	**525**	AE75-22-00-86	**570**

Coil voltage selection

All AC operated catalog numbers include a 120VAC coil. All DC operated catalog numbers include a 110VDC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 contactor: A75-30-00-**80**

Auxiliary contact blocks

For additional auxiliary contact blocks, see catalog number explanation on page 1.2. Add $ 20 to list price for each additional auxiliary, and see page 1.18 for available combinations.

Accessories for EK

Please consult factory.

Coil voltage selection – A contactors

Hz	Cntr	Volts																
	type	12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Coil voltage selection – EK contactors

Hz	Contr.	Volts															
	type	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	EK	F	G		1		B		2	C	Z		3	4		6
50	EK	N		1				J			3	M			5	
DC	EK	Y	W	P		Q		R					T			

- For other voltages, consult factory.
- 24 & 48VAC coils are not available for sizes EK550. For these applications, use an interposing control relay.

Coil voltage selection – AE & AL contactors

Hz	Contr.	Volts						
	type	12	24	48	110	125	220	240
DC	AE, AL	–	81	83	86	87	88	89

For other voltages, see page 1.26.

① Not UL Listed. IEC value AC1 for 40°C.

AF45 - AF75
AC & DC operated
UL rated, 4 pole

Auxiliary contact blocks

For additional auxiliary contact blocks, see catalog number explanation on page 1.8. Add $ 20 to the list price for each additional auxiliary and see page 1.18 for available combinations. If auxiliary contacts are required for AF50 – AF750 contactors, add $ 40 to the list price and change the 8th & 9th digits in the catalog number from "00" to "11".

4 Pole — 4 NO power poles

General purpose AC1	Auxiliary contacts NO	Auxiliary contacts NC	Catalog number	List price
65	0	0	AF45-40-00-70	**$ 385**
80	0	0	AF50-40-00-70	**435**
105	0	0	AF75-40-00-70	**645**

4 Pole — 2 NO - 2 NC power poles

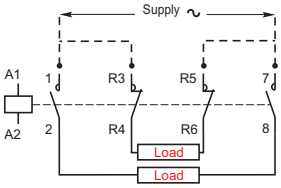
General purpose AC1	Auxiliary contacts NO	Auxiliary contacts NC	Catalog number	List price
65	0	0	AF45-22-00-70	**$ 385**
105	0	0	AF75-22-00-70	**645**

These contactors (2 NO & 2 NC power poles) can be used for controlling either 2 separate circuits, i.e. 2 loads with 2 separate supplies, or 1 circuit comprising 2 separate loads with 1 single supply (see diagrams below).

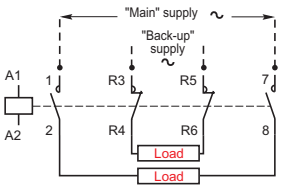
When the contactor operates, there is no mechanical overlapping between the NO main poles and NC main poles: Break before Make.

These contactors (2 NO & 2 NC power poles) are not suitable for a reversing starter or a wye-delta starter or for controlling a single load from 2 separate supplies.

1 single supply and 2 separate loads



2 separate supplies and 2 separate loads



Coil voltage selection – wide range AC/DC coils

All catalog numbers include a 100-250V AC/DC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 24V coil is required for a AF45 contactor: AF45-22-00-**72**

Coil voltage selection – AF50 to AF75

AC/DC VOLTS, 40 - 60 HZ			
24 - 60 DC	20 - 60 DC	48 - 130 AC/DC	100 - 250 AC/DC
68 ①	72 ②	69	70

① AF400 – AF750, DC only.
② AF50 – AF300, DC only.

UA26 – UA110
for 3 phase capacitor switching, 3 phase AC operated

UA75-30-00-84

UA95-30-00-84

Max kvar switching capacity			Standard auxiliary contacts		Catalog number	List price
240V	480V	575/600V	NO	NC		
12.5	25	30	1	0	UA26-30-10-84	**$ 225**
16	32	40	1	0	UA30-30-10-84	**338**
20	40	50	0 1	0 1	UA50-30-00-84 UA50-30-11-84	**345** **375**
27.5	55	70	0 1	0 1	UA75-30-00-84 UA75-30-11-84	**450** **480**
35	70	75	0 1	0 1	UA95-30-00-84 UA95-30-11-84	**465** **495**
40	80	85	0 1	0 1	UA110-30-00-84 UA110-30-11-84	**525** **570**

For 3 phase capacitors carrying out single bank or stepped bank compensation.
Max. peak current Î: 100 times the capacitor nominal r.m.s. current at U_e ≤500V or 90 times for U_e>500V
Electrical durability: 100,000 operating cycles.

Power in kvar

Contactor	208V	240V	480V	600V	Max amps
UA26	3.5	4.0	8.0	10.0	10
UA30	7.0	8.0	16.5	20.5	20
UA50	10.5	12.5	25.0	31.0	30
UA75	21.5	25.0	50.0	62.0	60
UA95	25.0	29.0	58.0	72.0	70
UA110	28.5	33.0	66.0	83.0	80
A145	43	50	100	125	120
A185	57	66	133	166	160
A210	66	77	153	192	185
A260	75	87	174	218	210
A300	88	101	203	254	245
AF400	119	137	274	343	330
AF460	142	164	329	410	396
AF580	178	205	411	514	495
AF750	214	247	495	618	595

Coil voltage selection

All AC operated catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Auxiliary contact blocks

For additional auxiliary contact blocks, see catalog number explanation on page 1.2. Add $20 to list price for each additional auxiliary, and see page 1.18 for available combinations.

Coil voltage selection chart

		Volts																
Hz	Cntr type	12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Accessories
for A/AF/AL & AE contactors

CAL5-11

CA5-10

Auxiliary contact blocks – Standard

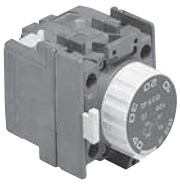
Positioning	Maximum number of contact blocks	Contact Description	Catalog number	List price
Front mounting (single pole)	4 blocks: A9 – A26 AE9 – AE26 AL9 – AL26	1 N.O. 1 N.C.	CA5-10 CA5-01	**$ 15**
	5 blocks: A30, A40, AE30, AE40, AL30, AL40 6 blocks: A45 – A110 AE45 - AE110 AF45 - AF110	1 N.O. Early make 1 N.C. Late break	CC5-10 CC5-01	
Front mounting (4 pole)	1 block: A9 – A26-40-00 A30 – A110 AE9 – AE110	4 N.O. 3 N.O. & 1 N.C. 2 N.O. & 2 N.C. 4 N.C. 2 N.O./2 N.C.①	CA5-40E CA5-31E CA5-22E CA5-04E CA5-11/11E	**30**
	1 block: A9 – A40-30-10 AL9 – AL40-30-10	3 N.O. & 1 N.C. 2 N.O. & 2 N.C. 1 N.O. & 3 N.C. 4 N.C. 4 N.O. 2 N.O./2 N.C.①	CA5-31M CA5-22M CA5-13M CA5-04M CA5-40N CA5-11/11M	
Side mounting (2 pole)	2 blocks: A9 – A75, AE9-AE45 1 block: AE50 – AE75, AL9 – AL40	1 N.O. & 1 N.C.	CAL5-11	
	1 block: A/AE/AF95 - A/AE/AF110	1 N.O. & 1 N.C.	CAL18-11	
	2 blocks: A145 – A300, AF145-AF1650 2 blocks: A145 – A300, AF145-AF1650	1 N.O. & 1 N.C. (inside L or R) 1 N.O. & 1 N.C. (outside, L or R)	CAL18-11 CAL18-11B	

Auxiliary contact blocks – Front mounting, switching low voltage and low current

Positioning	Maximum number of contact blocks	Contact Description	Degree of protection	Catalog number	List price
Front mounting (single pole)	4 blocks: A9 – A26	1 N.O.	IP40	CE5-10D0.1	**$ 38**
	AE9 – AE26	1 N.C.	IP40	CE5-01D0.1	
	AL9 – AL26	1 N.O.	IP40	CE5-10D2	
		1 N.C.	IP40	CE5-01D2	
	5 blocks: A30, A40, AE30, AE40, AL30, AL40 6 blocks: A45 – A110 AE45 - AE110 AF45 - AF110	1 N.O. 1 N.C. 1 N.O. 1 N.C.	IP67 IP67 IP67 IP67	CE5-10W0.1 CE5-01W0.1 CE5-10W2 CE5-01W2	**42**

① Includes 1 N.O. & 1 N.C. overlapping

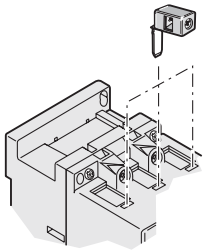
Accessories
for A/AF/AL & AE contactors


TP40DA


VE5-1


VM300H


LK75-A LK75-A1 LK110



Pneumatic timers

Mounting on	Timing range	Contacts N.O.	Contacts N.C.	Catalog number	List price
A9 – A75 AE9 – AE75 AL9 – AL40	On delay 0.1 – 40 s On delay 10 – 180 s Off delay 0.1 – 40 s Off delay 10 – 180 s	1 1 1 1	1 1 1 1	TP40DA TP180DA TP40IA TP180IA	**$ 108**

Interlocks for two horizontally mounted contactors – A9 - A110

Feature	Mounting on	Contacts N.O.	Contacts N.C.	Catalog number	List price
Mechanical/electrical	A/AE/AL9 – A/AE/AL40	—	2	VE5-1	**$ 45**
Mechanical/electrical	A45 – A110	—	2	VE5-2 ①	**45**
Mechanical	A/AE/AL9 – A/AE/AL40	—	—	VM5-1	**21**

Interlocks for two horizontally mounted contactors – A95 - AF750 contactors

Feature	Left contactors	Right contactors	Catalog number	List price
Mechanical	A95 – A300	A145 – A300	VM300H	**$ 110**
Mechanical	A210 – A300	AF400 – AF460	VM300/460H	**130**
Mechanical	AF400 – AF750	AF400 – AF750	VM750H	**150**

Interlocks for two vertically mounted contactors – A95 - AF750 contactors

Feature	Top contactor	Bottom Contactor	Catalog number	List price
Mechanical	A95 – A300	A145 – A300	VM300V	**$ 205**
Mechanical	A210 – A300	AF400 – AF460	VM300/460V	**250**
Mechanical	AF400 – AF750	AF400 – AF750	VM750V	**270**

Interlocks for two horizontally mounted contactors – AF1350 - AF1650 contactors

Feature	Left contactor	Right Contactor	Catalog number	List price
Mechanical	AF1350 – AF1650	AF1350 – AF1650	VM1650H	**$ 665**

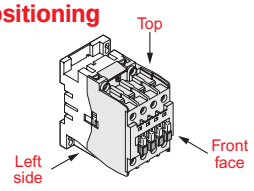
Auxiliary lead terminals (Set of 2)

Connections	Mounting on	Catalog number	List price
Connects from side	A50 – A75	LK75-A	**$ 15**
Connects from top	A50 – A75	LK75-A1	**15**
Connects from side	A95 – A110	LK110	**23**

① Use type VE 5-2 for mechanical and electrical interlocking between A30/A40 and A50 - A75 contactors.

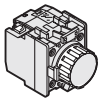
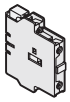
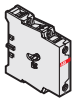
Accessories
Possible accessory combinations for A contactors

Positioning



Accessories — Front face mounting			Accessories — Side mounting		
Auxiliary contacts 1 – pole	Auxiliary contacts 4 – pole	Pneumatic timers	Auxiliary contacts	Electrical or mechanical interlock①	
CA5-10 or CA5-01	CA5-40 or CA5-22 or CA5-31	TP – D or TP – I	CAL 5-11 CAL18-11 CAL18-11B	VE5-1 or VM 5-1	VE 5-2 VM300H VM300/460H VM750H

Configurations of accessories are different depending on whether front or side mounted.

N Contactor relays A and AE Contactors		Accessories — Front mounting				Accessories — Side mounting	
		Auxiliary contact blocks 1-pole CA5-		Auxiliary contact blocks 4-pole CA5-		TP - A Pneumatic timer block	Auxiliary contact Blocks 2-pole CAL5-11, CAL18-11	Interlock units
Type	Main poles / Built-in auxiliary contacts							
A9 – A26	**– 3 0 – 1 0**	1 to 4 **CA5-** 1-pole blocks	OR	1 **CA5-** 4-pole block	OR	1 **TP - A** block	+ 1 to 2 **CAL5-11** blocks	OR 1 **VM/E 5-1** block + 1 **CAL5-11** block
A9 – A26 ①	**– 3 0 – 0 1**							
A9 – A26	**– 4 0 – 0 0**							
A9 – A26 ①	**– 2 2 – 0 0**							
AE9 – AE26	**– 3 0 – 0 0**							
AL9 – AL26	**– 3 0 – 1 0**	1 to 4 **CA5-** 1-pole blocks	OR	1 **CA5-** 4-pole block	OR	—	OR 1 **CAL5-11** block	OR 1 **VM/E 5-1** block + 1 **CAL5-11** block
AL9 – AL26	**– 3 0 – 0 1**							
AL9 - AL16	**– 4 0 – 0 0**	1 to 4 **CA5-** 1-pole blocks	OR	1 **CA5-** 4-pole block	OR	—	OR 1 **CAL5-11** block	OR 1 **VM/E 5-1** block + 1 **CAL5-11** block
AL9 - AL16	**– 2 2 – 0 0**							
AL26	**– 4 0 – 0 0**							
AL26	**– 2 2 – 0 0**							
A9 – A16	**– 3 0 – 2 2**	—		—		—	+ 1 to 2 **CAL5-11** blocks	OR 1 **VM/E 5-1** block + 1 **CAL5-11** block
A9 – A26	**– 3 0 – 3 2**							
A30, A40	**– 3 0 – 1 0**	1 to 5 **CA5-** 1-pole blocks	OR	1 **CA5-** 4-pole block + 1 **CA5-** 1-pole block	OR	1 **TP - A** block + 1 **CA5-** 1-pole block	+ 1 to 2 **CAL5-11** blocks	OR 1 **VM/E 5-1** block + 1 **CAL5-11** block
A30, A40	**– 3 0 – 0 1**							
AE30, AE40	**– 3 0 – 1 0**							
AE30, AE40	**– 3 0 – 0 1**							
AE30, AE40	**– 3 0 – 1 0**	1 to 5 **CA5-** 1-pole blocks	OR	1 **CA5-** 4-pole block + 1 **CA5-** 1-pole block	OR	—	OR 1 **CAL5-11** block	OR 1 **VM/E 5-1** block + 1 **CAL5-11** block
AE30, AE40	**– 3 0 – 0 1**							
A30, A40	**– 3 0 – 3 2**	1 **CA5-** 1-pole block		—		—	+ 1 to 2 **CAL5-11** blocks	OR 1 **VM/E 5-1** block + 1 **CAL5-11** block
A50 – A75	**– 3 0 – 0 0**	1 to 6 **CA5-** 1-pole blocks	OR	1 **CA5-** 4-pole block + 2 **CA5-** 1-pole blocks	OR	1 **TP - A** block + 2 **CA5-** 1-pole blocks	+ 1 to 2 **CAL5-11** blocks 2 **CAL18-11** blocks	OR 1 **VE5-2** block + 1 **CAL5-11** block 1 **VE5-2** + **CAL5-11**
A45 – A75	**– 4 0 – 0 0**					—		
A45, A75 ②	**– 2 2 – 0 0**							
A95, A110	**– 3 0 – 0 0**							
A50 – A75	**– 3 0 – 2 2**	2 **CA5-** 1-pole blocks		—		—	+ 1 to 2 **CAL5-11** blocks	OR 1 **VE5-2** block + 1 **CAL5-11** block
A95, A110	**– 3 0 – 2 2**							
AE50 – AE75	**– 3 0 – 0 0**	1 to 6 **CA5-** 1-pole blocks	OR	1 **CA5-** 4-pole block + 2 **CA5-** 1-pole blocks	OR	1 **TP - A** block + 2 **CA5-** 1-pole blocks —	+ 1 **CAL5-11** block 1 **CAL5-11** block 1 **CAL5-11** block 1 **CAL18-11** block	OR 1 **VE5-2** block
AE45 – AE75	**– 4 0 – 0 0**							
AE45, AE75 ②	**– 2 2 – 0 0**							
AE95, AE110	**– 3 0 – 0 0**							
A50 – A75	**– 3 0 – 1 1**	1 to 6 **CA5-** 1-pole blocks	OR	1 **CA5-** 4-pole block + 2 **CA5-** 1-pole blocks	OR	1 **TP - A** block + 2 **CA5-** 1-pole blocks —	+ 1 **CAL5-11** block — 1 **CAL18-11** block —	OR 1 **VE5-2** block — 1 **VE5-2** block —
AE50, AE75	**– 3 0 – 1 1**							
A95, A110	**– 3 0 – 1 1**							
AE95, AE110	**– 3 0 – 1 1**							
A145 – AF1650	**– 3 0 – 0 0**	—		—		—	1 to 2 **CAL18-11** blocks + 1 to 2 **CAL18-11B** blocks	OR 1 **CAL18-11** block + 1 **CAL18-11B** block + **VM300H** or **VM300/460H** or **VM750H** interlock

Contactor mounting configurations (standard from factory)

Auxiliary contacts are mounted on the contactor in the following order:

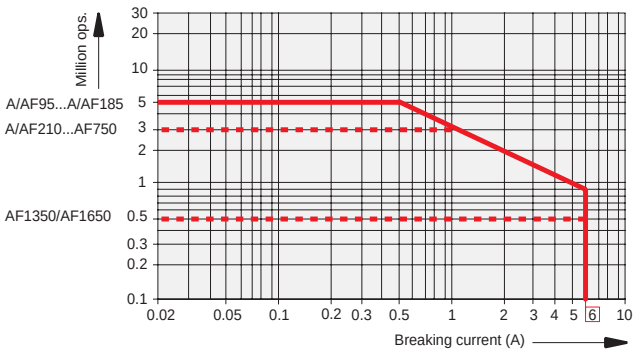
Left – 1st
Right – 2nd
Top – 3rd (L to R)

① In mounting position 5 (see page 1.36), there should be no more than 2 "N.C." front-mounted auxiliary contacts – The **CAL 5-11** side-mounted blocks offer additional "N.C." contacts.
② Whatever the mounting position (see page 1.36), there should be no more than 2 "N.C." front-mounted auxiliary contacts – The **CAL 5-11** side-mounted blocks offer additional "N.C." contacts.

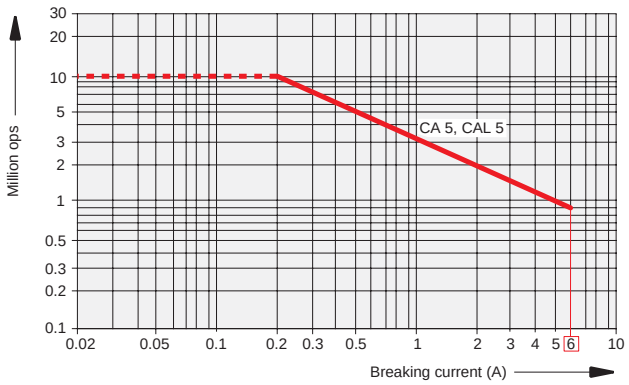
Accessories
Auxiliary contact block technical data
CA5/CAL5-11/CAL18-11/CC5

Types			1-pole CA5, 4-pole CA5 2-pole CAL5-11 and 1-pole CC5	CAL18-11 CAL18-11B
Standards			IEC 947-5-1 and EN 60947-5-1	
Rated insulation voltage U_i				
according to IEC 947-5-1		**V**	690	690
according to UL/CSA		**V**	600	690
Rated operational voltage U_e		**~ V**	24 to 690	
Conventional thermal current I_{th}		**A**	16	
Rated operational current I_e				
in AC-15 acc. to IEC 947-5-1	24 to 127 V	**A**	6	
	220 to 240 V	**A**	4	
	380 to 440 V	**A**	3	
	500 to 690 V	**A**	2	
in DC-13 acc. to IEC 947-5-1	24 V	**A**	6	
	48 V	**A**	2.8	
	72 V	**A**	1	
	125 V	**A**	0.55	
	250 V	**A**	0.3	
Connecting terminals (delivered in open position. Screws of unused terminals should be tightened).			M 3.5 (+,-) pozidriv 2 screw with cable clamp	
Connecting capacity				
• **Rigid solid**	**1 or 2 x mm²**		1 to 4	
• **Flexible with cable end**	**1 x mm²**		0.75 to 2.5	
	2 x mm²		0.75 to 2.5	
Mechanical durability		cycles	10 million, A9 - A75;	5 million, A/AF95 - A/AF185; 3 million, A/AF210 - AF750; 0.5 million, AF1350 & AF1650
Max. switching frequency		cycles/h	3600	
Electrical durability			See curve below	
Max. switching frequency		cycles/h	1200	
Rated making capacity			10 x I_e AC-15	
Rated breaking capacity			10 x I_e AC-15	
Rated short-time withstand current I_{cw}	1 s	**A**	100	
q = 40°C	0.1 s	**A**	140	
Min. switching capacity			17 V / 1 mA	24V / 50 mA
Short-circuit protection - gG (gl) fuses		**A**	10	
Power loss per pole at 6 A		**W**	0.15	
Degree of protection according to IEC 529, IEC 144, DIN 40 050 and NFC 20-010			IP 20	

CAL18



CA5, CAL5



Electrical durability

AC-15 according to IEC 947-5-1
making current: 10 x I_e where cos φ = 0.7 and U_e
breaking current: I_e where cos φ = 0.4 and U_e

The curves opposite show the electrical durability of the auxiliary contact blocks according to breaking current I_c.

These curves have been plotted for resistive and inductive loads up to 690 V, 40 to 60 Hz.

Accessories
Auxiliary contact block technical data
CE5

Auxiliary contact blocks for switching low level voltage and current

Types			CE5-10D0.1 CE5-01D0.1 CE5-10W0.1 CE5-01W0.1 Version 100 mA	CE5-10DZ CE5-01DZ CE5-10WZ CE5-01WZ Version 2 A
Standards			IEC 947-5-1 and EN 60947-5-1	
Approvals			UL / CSA	
Rated insulation voltage U_i				
according to IEC 947-5-1		**V**	250	250
according to UL/CSA		**V**	125	250
Rated operational voltage U_e		**V**	125	250
Rated operational current I_e				
in AC-15 or AC-14 acc. to IEC 947-5-1		**A**	0.1	2
in DC-12 acc. to IEC 947-5-1	24 V	**A**	0.1	2
	60 V	**A**	0.1	0.5
	110 V	**A**	0.1	0.2
	220 V	**A**	0.1	0.1
Minimal switching			3 V / 1 mA	17 V / 1 mA
Reliability for the minimal switching			10^{-8}	
Connecting terminals			M3.5 (+,-) posidriv 2 screw with cable clamp	
Connecting capacity				
• Rigid solid			1 ou 2 (1...4) mm^2	
• Flexible with cable end			1 ou 2 (0.75... 2.5) mm^2	
Short circuit protection			100 mA	10 A
Degree of protection				
according to IEC529, IEC 144, DIN 40 050, NFC 20-010		IP 20		
Mounting			Front mounting on contactors: A, AE, TAE9...110, AL, AF, GA, N, NE	
Dimensions			Identical to those of CA5 single pole	

Accessories
Surge suppressors for A/AE/AL/EK contactors

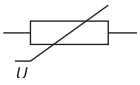
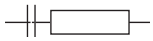
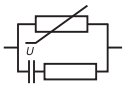

RV 5/50


RC 5-1/150

Surge suppression device

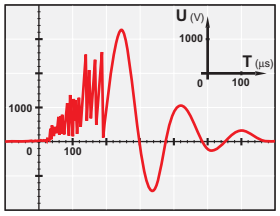
Mounting on	Voltage range	Catalog number	List price
AE9 to AE110 AL9 to AL40	12 – 32 VDC 25 – 65 VDC 50 – 90 VDC 77 – 150 VDC 150 – 264 VDC	RT5/32 RT5/65 RT5/90 RT5/150 RT5/264	
A9 to A110; AE9 to AE110 AL9 to AL40	24 – 50 VAC/VDC 50 – 133 VAC/VDC 110 – 250 VAC/VDC 250 – 440 VAC/VDC	RV5/50 RV5/133 RV5/250 RV5/440	**$ 30**
A9 to A40	24 – 50 VAC 50 – 133 VAC 110 – 250 VAC 250 – 440 VAC	RC5-1/50 RC5-1/133 RC5-1/250 RC5-1/440	
A45 to A300	24 – 50 VAC 50 – 133 VAC 110 – 250 VAC 250 – 440 VAC	RC5-2/50 RC5-2/133 RC5-2/250 RC5-2/440	
EK110 to EK210	24 – 48 VAC 110 – 415 VAC	RC-EH250/48 RC-EH250/415	
EK370 to EK550	48 – 110VAC	RC-EH800/110	**26**
EK110 to EK550	24 – 125VDC	RC-EH800/110	
EK370 to EK550	220 – 600VAC	RC-EH800/600	

Technical data

Type		Control circuit	Opening time growth factor	Residual overvoltage or clipping voltage	Remarks	
RT 5 /... transil diode					Advantages	• Good energy absorption
	32	DC		50 V		• Unpolarized system
	65	DC		100 V		• Simple, reliable system
	90	DC	2.5 to 3	150 V	Drawback	• A certain delay on drop out which does not however reduce contactor breaking capacity.
	150	DC		210 V		
	264	DC		390 V		
Varistor	**RV 5/...**				Advantages	• High energy absorption; good damping
	50	AC/DC		132 V		• Unpolarized system
	133	AC/DC	1.1 to 1.5	270 V		
	250	AC/DC		480 V	Drawback	• Clipping as from U_{vdr}, thus voltage front up to this point
	440	AC/DC		825 V		
RC 5-1/... or RC 5-2/... **RC-EH 300/...**	see table above	AC	1.2 to 3	2 to 3 x Uc	Advantages	• Very fast clipping • Attenuation of steep fronts and thus of high frequencies • No operating delays
						
Varistor + RC	**RC-EH ...**				Advantages	• High energy absorption: good damping
	800/110	AC/DC	1.1 to 1.5	205 V		• Unpolarized system
	800/600	AC		1100 V		• The RC system damps the voltage front under the Uvdr* threshold.

*Uvdr = Varistor operating voltage (voltage dependent resistor), tolerance ± 10%

Accessories
Surge suppressors for A/AE/AL/EK contactors
General information



General

The operation of inductive circuits causes overvoltages, in particular on opening of the contactor coil.

The electromagnetic energy stored by the coil during contactor closing is restored on opening in the form of surges, the slope and amplitude of which may rise to several kilovolts. A number of drawbacks are observed ranging from interference on the electronic devices to breakdown of insulators and even destruction of certain sensitive components.

The graph opposite reproduces the oscillogram showing voltage discharges at the terminals of a 42V/50Hz coil without peak clipping. The coil was switched by 8 series-connected poles of a contactor relay.

Following a burst of discharges with a very steep slope a damped oscillation emerges with a peak value of 3500V.

Overvoltage factor

The overvoltage factor k is defined as the ratio of the maximum overvoltage peak value $\hat{U}_s$ to the peak value $\hat{U}_c$ of the coil rated control voltage U_c:

$$k = \frac{\hat{U}_s \text{ max.}}{\hat{U}_c}$$ in DC: $$k = \frac{\hat{U}_s \text{ max.}}{U_c}$$ or in AC: $$k = \frac{\hat{U}_s \text{ max.}}{U_c\sqrt{2}}$$

For example the following is obtained for the above graph: $$k = \frac{3500}{42\sqrt{2}} \approx 60$$

Surge suppressors

To guard against the harmful effects of these overvoltages, ABB has developed a range of surge suppressors designed to reduce the k factor defined above and to limit or even completely eliminate the high pre-damping voltage frequencies.

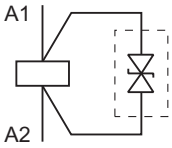
Each case is different, but the technical data tolerances and the generous sizing of parts have enabled us to reduce the number of variants.

We have chosen the following solutions: transil diodes, varistors and RC blocks.

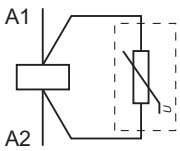
Note: A varistor is a resistor whose value increases to a very large extent when a certain voltage is applied at its terminals.

Wiring diagrams

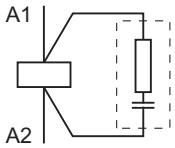
Transil diode



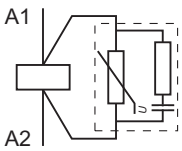
Varistor (only)



RC type



Varistor + RC



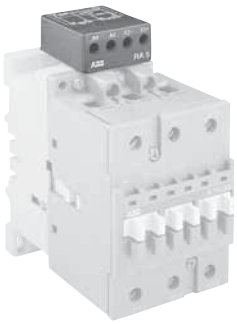
General technical data

The housings and impregnation resins of the surge suppressors are made of flame-resistant materials in accordance with the UL 94 standard.

These systems are not polarized, i.e. d.c. operated devices do not have to be connected in a specific direction.

- Operating temperature: -20 to +70 °C
- Connection to the coil terminals (parallel mounting)
  - For **RT 5**, **RV 5**, **RC 5-1** and **RC 5-2**: clip-on for both fixing and connection.
- Mounting:
  - **RT 5**, **RV 5** and **RC 5**: clipped onto the top part of the contactor base. This mounting method prevents any projections and change in contactor dimensions.
  - **RC-EH**: glued to the top part of the contactor base.

Accessories
Interface relays for A contactors



A30-30-10 + RA 5

RA 5

Interface relays

Mounting on contactor types	Coil voltages	Catalog number	List price
N, A9 – A110	24 – 250V, 50, 60 Hz	RA5	**$ 75**

Description

RA5 interface relays are designed to receive 24 VDC signals delivered by PLCs or other sources with a low output power and to restore them with sufficient power to operate the coils of the relevant contactors

Types

- RA5 for combination with A9 – A110 contactors and N contactor relays.

Description

RA5 interface relays are made up of a miniature electromechanical relay equipped with a N.O. contact and with a low consumption 24 VDC coil.

The interface relay coil is controlled by the PLC while the N.O. contact ensures switching of the power contactor.

Coil switching gives rise to overvoltages which have adverse effects on the electronic devices, insulators and, more generally, on component lifetime. The RA 5 is equipped with surge suppressors:

- on the 24 VDC relay coil via a diode
- on the power contactor coil via a varistor.

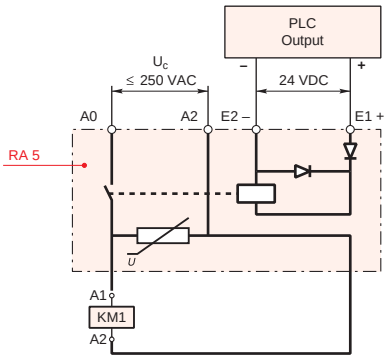
Furthermore, the RA5 are protected against relay pole reversal by a diode inserted between the E1 and E2 input terminals.

Connection

The "E1+" and "E2–" input terminals must be connected, according to their polarity, to the PLC output.

- The RA 5 is equipped with two terminal pads for connection to the A1 and A2 terminals of the contactor coil. This coil is supplied between the A0 and A2 terminals of the RA 5.

RA 5 interface relay for the A 9 – A 110 contactors and N control relays



Mounting

- RA5: terminal pads clamped inside the contactor coil terminals.

Accessories
Interface relay technical data

General technical data		
Standards		IEC 255-5
Rated insulation voltage U_i		
acc. to IEC 947-4-1 and VDE 0110	VAC	250
Permissible ambient temperature		
• For free air operation:		
– at U_e = 24VDC (between E1 & E2)	°C	-25 to + 70
– from 0.85 to 1.1 U_e	°C	-25 to +55
• For storage	°C	-40 to +70
Climatic withstand		Complies with that of associated contactors
Mounting position		No limitation
Operating height	meters	3000
Mounting		Using the contactor A1 and A2 terminal connecting points
Connecting terminals (open on delivery)		Cable clamps and M 3.5 (+, –) pozidriv screws (2)
Cable cross-sectional area:		
• Rigid solid	2 x mm²	1 to 4
• Flexible	2 x mm²	0.75 to 2.5
Degree of protection		Protection against direct contact acc. to VDE 0106, Part 100
Construction data		
Surge suppression:		
• For contactor coil		Varistor
• For interface relay coil		Diode
Protection against polarity reversal between terminals E1 and E2		Diode
Use on contactors with coils:		
• 24 to 250V/50, 60 Hz	types	N, A9 – A110
Interface relay operating time	ms	
Total operating time, interface relay + contactor		
• Between energization and:		
– NO contact opening	ms	19 to 36
– NC contact opening	ms	16 to 32
• Between de-energization and:		
– NO contact opening	ms	15 to 25
– NC contact opening	ms	18 to 28
Electrical input data		
Control voltage (E1 and E2 terminals) U_c:		
• Rated value	VDC	24
• Maximum range	VDC	17 to 30
Max. consumption for U_c = 24 VDC, Ø=20°C	W	0.3
"0" status (relay open)		
• For U_c	VDC	≤ 2.4
• For I_c	mA	≤1
"1" status (relay closed) for U_c	VDC	≥ 17
Max. short supply interruption immunity time	ms	4
Electrical output data		
Switching voltage (A0 and A2 terminals)	VAC	≤ 250
	VDC	–
Electrical lifetime	millions of operations	4 (600 ops.h) on A9 – A40 2 (600 ops./h) on A45 – A110

Accessories
for A/AE/AL/AF contactors


ATK185


ATK750/3


ZL75


ZL145

WB75A-04


BA5-50

Terminal lug kits (Set of 3)

Wire range	For contactor	Catalog number	List price
6 – 250 MCM	A145 – A185	ATK185	**$ 45**
4 – 400 MCM	A210 – A300	ATK300	**68**
(2) 4-500 MCM	A210 – A300	ATK300/2	**110**
(2) 2/0 – 500 MCM	AF400 – AF580	ATK580/2	**150**
(3) 2/0 – 500 MCM	AF580 – AF750	ATK750/3	**225**
(4) 4/0 – 500 MCM	AF1350	ATK1350/4	**235**
(4) 1/0 – 750 MCM	AF1350 – AF1650	ATK1650/4	**335**
(6) 1/0 – 750 MCM	AF1350 – AF1650	ATK1650/6	**560**

Contact kits

	For contactors	Catalog number	List price
3 Pole			
	A/AE/AF50	ZL50	**$ 113**
	A/AE/AF63	ZL63	**135**
	A/AE/AF75	ZL75	**158**
	A/AE/AF95	ZL95	**225**
	A/AE/AF110	ZL110	**255**
	A/AF145	ZL145	**300**
	A/AF185	ZL185	**420**
	A/AF210	ZL210	**525**
	A/AF260	ZL260	**855**
	A/AF300	ZL300	**1020**
	AF400	ZL400	**1716**
	AF460	ZL460	**2434**
	AF580	ZL580	**3795**
	AF750	ZL750	**3960**
	AF1350	ZL1350	**4255**
	AF1650	ZL1650	**4890**
4 Pole			
	A/AE45	ZLT45	**150**
	A/AE50	ZLT50	**150**
	A/AE75	ZLT75	**210**
3 Pole	UA50	ZLU50	**150**
	UA75	ZLU75	**215**
	UA95	ZLU95	**306**
	UA110	ZLU110	**347**

Mechanical latches

For contactors	Catalog number	List price
A9 - A75, AE45 - AE75, & AL9 - AL40	WB75A-★	**$ 84**

★ - Coil voltage suffix. Refer to Coil Voltage Selection chart and substitute the desired coil voltage suffix for the ★.

Coil voltage selection chart — mechanical latches for A, AE & AL contactors

50 Hz (AC/DC)	60 Hz (AC)	Voltage code
24	24 – 28	**01**
42	42 – 48	**02**
48	48 – 55	**03**
110	110 – 127	**04**

50 Hz (DC)	60 Hz (AC)	Voltage code
220 – 230	220 – 255	**06**
230 – 240	230 – 277	**05**
380 – 415	380 – 440	**07**
415 – 440	440 – 480	**08**

Range: WB75A for contactors A9 – A75, AL9 – AL40, AE45 – AE75 and control relays N and NL.

Description: WB75A block: contains a mechanical latching device with electromagnetic impulse unlatching (AC or DC) or manual unlatching. Captive screw type connecting terminals, built-in cable clamps, M 3.5 (=, -) posidrive 1 screw with screwdriver guidance, delivered untightened and protected against accidental direct contact.

Operation: After closing, the contactor continues to be held in the closed position by the latching mechanisim should the supply voltage fail at the contact coil terminals.

Contactor opening can be controlled:

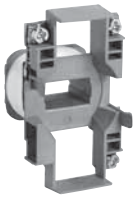
- Electrically by an impulse* (AC or DC) on the WB75A block coil. The coil is not designed to permanently energized.
- Manually by pressing the pushbutton on the front face of the WB75A block.

Mounting: WB75A is clipped onto the front face of the contactor.

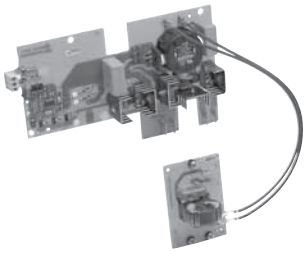
Identification markers

Mounting on	Coil voltage	Catalog number	List price
A/AE/AL/AF9 – A/AE/AL/AF110	Pack of 50	BA5-50	**$ 15**

Accessories
for A/AE/AL/AF contactors
Coils & coil voltage codes


ZA16-81


ZAF1650


ZP1650

Coils — AC operated

For contactors	Catalog number	List price
A9 – A16	ZA16-★	**$ 24**
A26 – A40	ZA40-★	**30**
A45 – A75	ZA75-★	**57**
A95 – A110	ZA110-★	**60**
A145 – A185	ZA185-★	**150**
A210 – A300	ZA300-★	**180**

Coils — DC operated

AE9 – AE16	ZAE16-★	**24**
AE26 – AE40	ZAE40-★	**30**
AE45 – AE75	ZAE75-★	**57**
AE95 – AE110	ZAE110-★	**90**
Auxiliary including an insertion contact and a varistor for DC operated contactors		
AE95 – AE110	CCL18-01	**45**

Coils — AC/DC operated (coil and printed circuit board except ZAF1650)

AF45 – AF75	ZAF75-★	**120**
AF95, AF110	ZAF110-★	**165**
AF145 – AF185	ZAF185-★	**200**
AF210 – AF300	ZAF300-★	**240**
AF400, AF460	ZAF460-★	**450**
AF580, AF750	ZAF750-★	**525**
AF1350, AF1650 (Set of 2 coils only)	ZAF1650-★	**920**

Printed circuit board — AC/DC operated

AF1350 – AF1650	ZP1650	**1620**

★ – Coil voltage suffix. Refer to Coil Voltage Selection charts below and substitute the desired coil voltage code for the ★.

Coil voltage selection — AC operated for A9 – A300; UA26 – UA110

VAC (50Hz)	VAC (60Hz)	Voltage Code
24	24	**81**
26	28	**16**
28	32	**17**
42	42	**82**
48	48	**83**
60	60	**73**
100	100 – 110	**74** ②
110	110 – 120	**84**
110 – 115	115 – 127	**89** ③
120	140	**29**
125 – 127	150	**30**
175	208	**34**
190	220	**36**
200	200 – 220	**75** ②
220 – 230	230 – 240	**80**
230 – 240	240 – 260	**88**
230 – 240	277	**42**
230/400	—	**62** ①
—	230/400	**63** ①
380 – 400	400 – 415	**85**
400 – 415	415 – 440	**86**
—	480	**51**
440	500	**53**
500	600	**55**
550	—	**56**
660 – 690	—	**58**

Coil voltage selection — DC operated for AE contactors

VDC	Voltage code AE contactors
12	**80**
24	**81**
42	**82**
48	**83**
50	**21**
60	**84**
75	**85**
110	**86**
125	**87**
220	**88**
240	**89**
250	**38**

Coil voltage selection — AC/DC operated for AF50 – AF1650

VAC & VDC 40-60 Hz	Suffix Code
24 – 60 VDC	**68** ④
20 – 60 VDC	**72** ⑤
48 – 130 VAC/VDC	**69**
100 – 250 VAC/VDC	**70** ⑦
250 – 500 VAC/DC	**71** ⑥

① Only for A9 – A16.
② Not for A145 – A300
③ A145 – A300 at 60 Hz, 115V only
④ AF400 – AF750, DC only
⑤ AF45 – AF300
⑥ AF400 - AF750 only
⑦ Only option for AF1350 - AF1650

Accessories
for EK contactors
Coils & coil voltage codes

Coils — AC & DC operated

Contactor size	AC Coils		DC Coils	
	Catalog number	List price	Catalog number	List price
EK110, EK150	KH210-★	**$ 200**	KH210-★	**$ 260**
EK175, EK210	KH300-★	**240**	KH300-★	**320**
EK370, EK550	KH800-★	**580**	KH800-★	**700**

★ – Coil voltage suffix. Refer to the Coil Voltage Selection chart and substitute the desired coil voltage suffix for the ★. AC and DC operated contactors DO NOT have the same magnet structure. Therefore, DC coils will not fit on an AC magnet structure and vice versa.

Coil voltage selection — AC operated
for EK110 – EK550

VAC (50Hz)	VAC (60Hz)	Voltage Code
–	24	**F**
24	–	**N**
–	48	**G**
110	120	**1**
–	208	**B**
–	240	**2**
220 – 230	–	**J**
–	380	**Z**
380 – 400	440	**3**
400 – 415	–	**M**
–	480	**4**
500	–	**5**
–	600	**6**

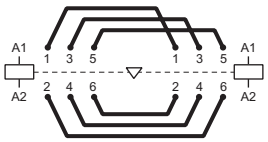
Consult factory if other voltages are required.

Coil voltage selection — DC operated
for EK110 – EK550

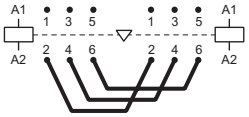
VDC	Voltage Code
24	**Y**
48	**W**
110	**P**
125	**Q**
220	**R**
440	**T**

Consult factory if other voltages are required.

Accessories
for A/AE/AL/AF contactors



BEM circuit diagram



BES110 connection diagram

BED...

Connection kits for reversing

Mounting on 3 pole contactors	Catalog number	List price
A/AE/AL9 – A/AE/AL16	BEM16-30	**$ 23**
A/AE/AL26	BEM26-30	**30**
A/AE/AL30, A/AE/AL40	BEM40-30	**45**
A/AE/AF50 – A/AE/AF75	BEM75-30	**165**
A/AE/AF95, A/AE/AF110	BEM110-30	**180**
A/AF145 – A/AF185	BEM185-30	**260**
A/AF210 – A/AF300	BEMA300-30	**470**
AF400 – AF460	BEM460-30	**850**
AF580 – AF750	BEM750-30	**1200**

Application
Connections between the main poles of **two 3 pole contactors** mounted side by side so that they operate as reversing contactors.

Description
The connection kits for reversing contactors are made up of three reversing connections and three phase to phase connections.

BEM16-30 — Insulated, solid, rigid copper wires
BEM26 and 40-30 — Insulated, stranded, rigid copper wires
BEM75 and 110-30 — Insulated, solid copper bars

Connection kits for phase to phase

Mounting on 3 pole contactors	Catalog number	List price
A/AE/AF50, A/AE/AF75	BES75-30	**$ 75**
A/AE/AF95, A/AE/AF110	BES110-30	**90**
A/AF145 – A/AF185	BES185-30	**130**
A/AF210 – A/AF300	BESA300-30	**200**
AF400 – AF460	BES460-30	**425**
AF580 – AF750	BES750-30	**650**

The connection kit for phase to phase contactors is made up of three phase to phase bus bars.

Connection kits for wye-delta starters

Mounting on contactors		Catalog number	List price
Line and delta contactor	Wye contactor		
A30 A40	A26 A26	BED40U	**$ 53**
A50 A63	A30 A40	BED50U	**165**
A75 A95 A110 A145 A185 A210	A50 A75 A95 A110 A145 A185	BED75U BED95U BED110U BED145U BED185U BED210U	**180** **195** **225** **250** **290** **375**
A260/A300	A210	BED300U	**500**
AF400/AF460	A260/A300	BED400U	**850**
AF460	AF400	BED460U	**900**
AF580	AF400/AF460	BED580U	**1250**
AF750	AF580	BED750U	**1450**

Application
Connections between the main poles of a wye-delta starter.

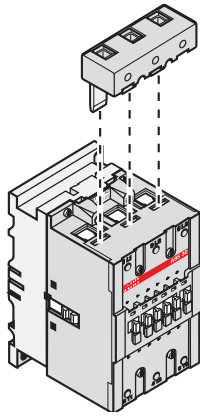
Description
The connection kits for wye-delta starters are made up of:
- Three line contactor/wye contactor connections — line side.
- Three wye contactor/delta contactor connections — load side.
- The shorting connection for the “S” contactor.

BED40U – Insulated, stranded, rigid copper wires.

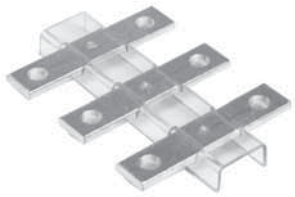
BED50U thru BED750U — Insulated, solid copper bars.

The above connection sets allow a mechanical interlock unit to be mounted between the wye and delta contactors if required.

Accessories
for A/AE/AL/AF contactors


LD110


BEXT-75


LX...


LT185-AC


LT185-AL


LW...

Additional terminal blocks

Mounting on 3 pole contactors	Wire range	Catalog number	List price
A/AE/AL9 – A/AE/AL16 (set of 2)	16 – 6	LD-16	**$ 20**
A/AE/AL26 (set of 2)	14 – 6	LD-26	**22**
A/AE/AL30 – A/AE/AL40	12 – 4	LD-40	**26**
A/AE/AF50 – A/AE/AF75	10 – 2	LD-75	**28**
A/AE/AF95 – A/AE/AF110	8 – 1	LD-110	**30**

Utilization – The LD series terminal block is designed to increase the connection capacity of the contactor on which it is mounted. The LD 75 and LD110 terminal blocks are mounted in the three independ apertures located above the built-in connectors.

Terminal extensions

Mounting on contactors	Catalog number	List price
A/AE/AF50 – A/AE/AF75	BEXT-75	**$ 15**
A/AE/AF95, A/AE/AF110	LW-110	**15**
A/AF145 – A/AF185	LX185	**90**
A/AF210 – A/AF300	LX300	**140**
AF400 – AF460	LX460	**195**
AF580 – AF750	LX750	**225**

Application
They are designed to increase the width of the contactor terminal pads to allow larger connectors to be mounted.

Description
Terminal extension sets contain 3 bars.

Terminal shrouds — two pieces

For contactor	Catalog number	List price
A/AF145 – A/AF185 for flush mount	LT185-AC	**$ 10**
A/AF145 – A/AF185 for extended mount	LT185-AL	
A/AF145 – A/AF185 for shorting bar LY...between A(F)145 / A(F)185 & TA200DU	LT185-AY	
A/AF210 – A/AF300 for flush mount	LT300-AC	
A/AF210 – A/AF300 for extended mount	LT300-AL	
A/AF210 – A/AF300 for shorting bar LY300	LT300-AY	
AF400 – AF460 for flush mount	LT460-AC	**20**
AF400 – AF460 for extended mount	LT460-AL	
AF580 – AF750 for flush mount	LT750-AC	
AF580 – AF750 for extended mount	LT750-AL	

Terminal enlargements

For contactor	Catalog number	List price
A/AF95 – A/AF110	LW110	**$ 95**
A/AF145 – A/AF185	LW185	**120**
A/AF210 – A/AF300	LW300	**130**
AF400 – AF460	LW460	**295**
AF580 – AF750	LW750	**355**

Arc chutes

For contactor	Catalog number	List price
A/AF145 – A/AF185	ZW185	**$ 130**
A/AF210 – A/AF300	ZW300	**180**
A/AF400 – A/AF460	ZW460	**190**
A/AF580 – A/AF750	ZW750	**230**
AF1350 – AF1650	ZW1650	**315**

Accessories
for A/AE/AF contactors


BEA185/S3/S4


BEAD185D/S3/S4


BEA185H/S4


LP185


LY...

Vertical connection bars between contactor and MCCB — three bars

MCCB	For contactor	Catalog number	List price
T1	A/AE/AF50 – A/AE/AF75	BEA75/T1	**$ 85**
T3	A/AE/AF95 – A/AE/AF110	BEA110/T3	**95**
T3	A/AF145 – A/AF185	BEA185/T3	**60**
S3, S4	A/AF145 – A/AF185	BEA185/S3/S4	**60**
S4	A/AF210 – A/AF300	BEA210/S4	**70**
S5	A/AF210 – A/AF300	BEA300/S5	**75**
S5①	AF400 – AF460	BEA400/S5	**95**
S6	AF400 – AF750	BEA750/S6	**115**

Vertical connection bars between contactor and MCCB — three bars

MCCB	For contactor	Catalog number	List price
S3, S4	A/AF145 – A/AF185	BEA185D/S3/S4	**$ 70**
S4	A/AF210 – A/AF300	BEA210D/S4	**80**
S5	A/AF210 – A/AF300	BEA300D/S5	**85**
S5	AF400 – AF460	BEA400D/S5	**105**
S6	AF400 – AF750	BEA750D/S6	**125**

To be used when power take off is needed (IP00) or with other bus bars. (EX: Reversing, IP20)

Horizontal connection busbars between contactor and MCCB — three bars

MCCB	For contactor	Catalog number	List price
S3, S4	A/AF145 – A/AF185	BEA185H/S4	**$ 150**
S4	A/AF210 – A/AF300	BEA210H/S4	**220**
S5	A/AF210 – A/AF300	BEA300H/S5	**220**
S5	AF400 – AF460	BEA400H/S5	**435**
S6	AF400 – AF460	BEA460H/S6	**660**
S6	AF580 – AF750	BEA750H/S6	**670**

Shorting bars, 2 pole

For contactor	Catalog number	List price
A/AF145 – A/AF185	LP185	**$ 35**
A/AF210 – A/AF300	LP300	**50**
AF400 – AF460	LP460	**50**
AF580 – AF750	LP750	**50**

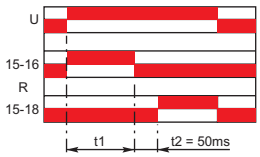
Shorting bars, 3 pole

For contactor	Catalog number	List price
A/AE45 – A/AE/AF75	LF75	**$ 40**
A/AE/AF95 – A/AE/AF110	LY110	**40**
A/AE/AF145 – A/AE/AF185	LY185	**40**
A/AE/AF210 – A/AE/AF300	LYA300	**60**
AF400 – AF460	LY460	**60**
AF580 – AF750	LY750	**60**

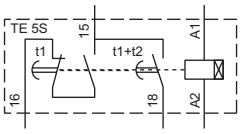
① Not for use with flange handles.

Accessories
for A contactors
TE5S electronic timer for wye-delta starters

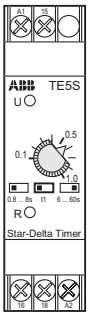
TE5S-*



Chart



Equivalent diagram



Front face

Electronic timer

For contactors	Rated control voltage U_c V	Packing piece	Unit weight kg	Catalog number	List price
A9 – AF750	24 AC/DC	1	0.080	TE5S-24	**$ 120**
	110 – 120 AC	1	0.080	TE5S-120	
	220 – 240 AC	1	0.080	TE5S-240	
	380 – 440 AC	1	0.080	TE5S-440	

Application

Utilization

When used in wye-delta starters, the **TE5S** lags the wye connection and provides a lapse of 50 ms before the switchover to the delta connection.

Description

According to the type of device chosen, the electronic circuit has a 24 VAC/VDC, 110 – 120 VAC or 220 – 230 VAC supply. An output relay with reversing contact ensures high current switching. A two-position switch allows selection of one of the two time delay ranges: 0.8 to 8 s or 6 to 60 s. The 0.1 to 1.0 adjustable knob allows an initial setting without steps within the previously selected range which can then be adjusted using a stopwatch.

Note: We recommend that you allow for temperature drift for the final adjustment of the time delay setting. Drift: – 0.2% per °C. For example, a setting made at 20 °C will yield a time delay shorter by 7% at 55 °C in an enclosure. (– 0.2% per °C i.e. – 0.2 x 35 = – 7%).

The TE5S, which is not affected by these settings, establishes a fixed “lapse” of 50 ms between the opening of contact 15 – 16 and the closing of contact 15 – 18. It is this time delay that prevents from arc short-circuit during wye to delta switching.

Operation

On energization, the green U indicator light (voltage applied) comes on. Contact 15 – 16 then immediately moves to the closed position.

Count-down of the programmed time immediately commences.

When the time delay has elapsed, contact 15 – 16 opens and at the same time the 50 ms lapse, t2, begins after which contact 15 – 18 moves to the closed position. The yellow R indicator light comes on.

On de-energization, the U and R indicator lights go out and, after the 250 ms resetting time, the device is ready for a new cycle.

Mounting

Mounts on 35mm DIN rail.

Accessories
for A contactors
TE5S electronic timer for wye-delta starters, technical data

Technical Data

Types			TE5S-24	TE5S-120	TE5S-240	TE5S-440
Compliance with standards			IEC 60947-5-1, EN 60947-5-1			
Rated insulation voltage U_i according to IEC 60947-5-1		V	440			
Rated operational voltage U_e		V d.c.	24			–
according to IEC 60947-5-1		V a.c.	24 ... 240			440
Conventional free air thermal current I_{th}		A	10			
Rated operational current I_e acc. to IEC 60947-5-1						
AC-15	24-120 V a.c.	A	5			–
	220-240 V a.c.	A	4			–
	380-440 V a.c.	A	–			3
DC-13	24 V d.c.	A	4			–
Short-circuit protection - gG type fuses		A	10			
Rated supply voltage U_c		V d.c.	24	–	–	–
		V a.c.	24	110 ... 120	220 ... 240	380 ... 440
– Rated frequency limits		Hz	48 ... 63			
– Supply voltage range			0.85 ... 1.1 U_c			
– Overvoltage protection			Built-in varistor			
– Load factor		%	100			
– Average consumption	– in d.c.	W	0.7	–	–	–
	– in a.c.	VA	1.5	3.5	6.5	12.5
Time delay range (t_1) selected by switch		s	0.8 ... 8 and 6 ... 60			
– Temperature drift		% per °C	-0.2			
– Mechanical setting accuracy			±15 % of the setting range			
– On-load reiteration accuracy under constant conditions			±2 % after 1 million operating cycles			
Minimum time lapse (t_2)		ms	50			
Min. time lapse after 1 million operating cycles		ms	40			
Resetting time (maximum)		ms	250			
Front panel display: – green indicator light			Energization			
– yellow indicator light					Output relay activated	
Permissible air temperature						
– for operation		°C	-25 ... +60			
– for storage		°C	-40 ... +85			
Vibration withstand acc. to IEC 60068-2-6, EN 60068-2-6			3 g from 10 to 300 Hz in the 3 directions			
Shock withstand acc. to IEC 60068-2-27, EN 60068-2-27			20 g / 11 ms in directions A and C 15 g / 11 ms in direction B			
Electrical durability	in millions of op. cycles		1			
Mechanical durability	in millions of op. cycles		5			
On-load maximum switching frequency		cycles/h	720			600
Fixing on mounting rail acc. to IEC/EN 60715			35 x 7.5 or 35 x 15			
Connecting terminals			(+,-) pozidriv 1 screw			
Connecting capacity						
– rigid solid	1 or 2 x mm^2		1 ... 2.5			
– flexible with cable end	1 or 2 x mm^2		0.75 ... 2.5			
Tightening torque		Nm	0.6 ... 0.8 max.			
Degree of protection according to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		Terminals	IP 20			

Accessories
Terminal markings
CA/CC/CAL/CCL auxiliary contacts

One pole auxiliary contacts

CA5-01

CA5-10

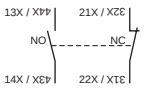
CE5-01

CE5-10

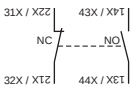
CC5-01

CC5-10

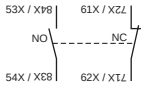
Two pole auxiliary contacts



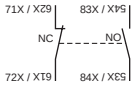
CAL5-11 (L. h. s. mounted)



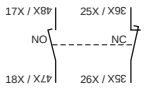
CAL5-11 (R. h. s. mounted)



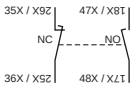
CAL5-11B (L. h. s. mounted)



CAL5-11B (R. h. s. mounted)



CCL5-11 (L. h. s. mounted)



CCL5-11 (R. h. s. mounted)

CAL16-11 A

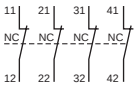
CAL16-11 B

CAL16-11 C

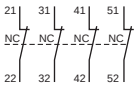
CAL16-11 D

CCL16-11 E

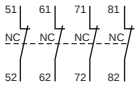
Four pole auxiliary contacts



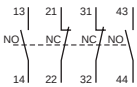
CA5-04 E



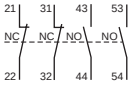
CA5-04 M



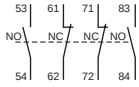
CA5-04 N



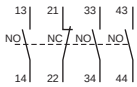
CA5-22 E



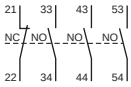
CA5-22 M



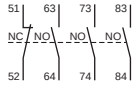
CA5-22 N



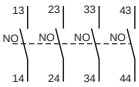
CA5-31 E



CA5-31 M



CA5-31 N



CA5-40 E

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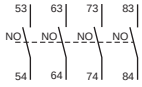
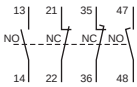
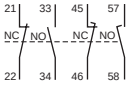


CA5-40 N



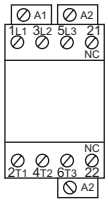
CA5-11/11 E



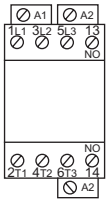
CA5-11/11 M

Accessories
Terminal markings & positioning for A/UA contactors

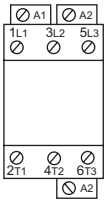
Standard devices without addition of auxiliary contacts



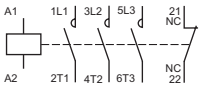
A9 – A40-30-01



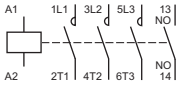
A9 – A40-30-10



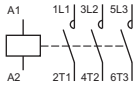
A50 – A110-30-00
UA50 – UA110-30-00



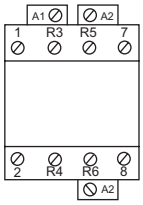
A9 – A40-30-01



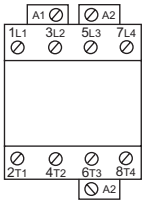
A9 – A40-30-10



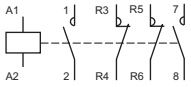
A50 – A110-30-00
UA50 – UA110-30-00



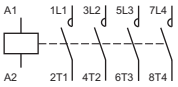
A9 – A26-22-00
A45 – A75-22-00



A9 ... A26-40-00
A45 ... A75-40-00

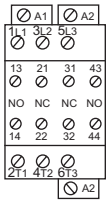


A9 – A26-22-00
A45 – A75-22-00

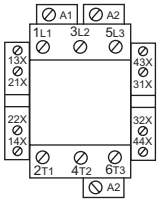


A9 – A26-40-00
A45 – A75-40-00

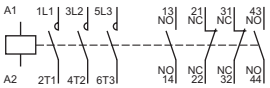
Standard 3 pole devices with factory mounted auxiliary contacts



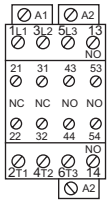
A9 – A16-30-22



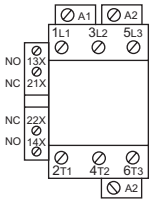
Combination 22



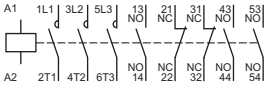
A9 – A16-30-22
A50 – A110-30-22



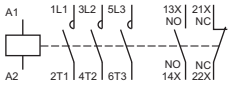
A9 – A40-30-32



A50 ... A110-30-11
UA50 ... UA110-30-11

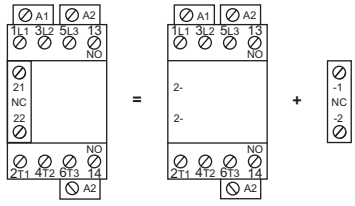


A9 – A40-30-32

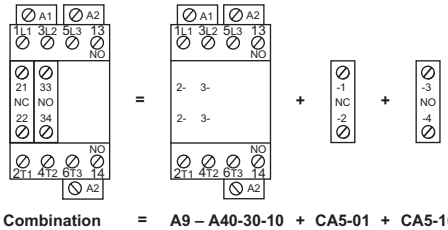


A50 – A110-30-11
UA50 – UA110-30-11

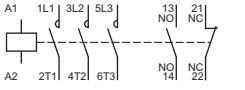
Other possible contact combinations with auxiliary contacts added by the user



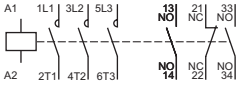
Combination 11 = A9 – A40-30-10 + CA5-01



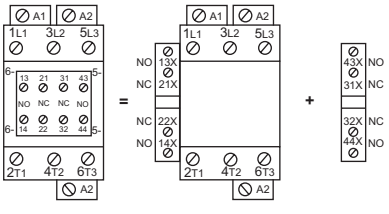
Combination 21 = A9 – A40-30-10 + CA5-01 + CA5-10



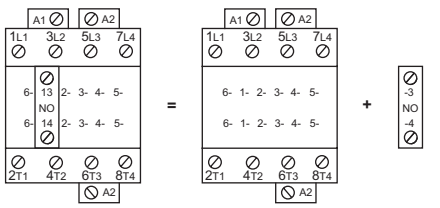
Combination 11



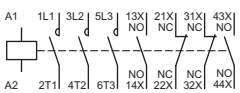
Combination 21



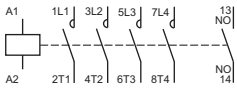
A50 – A110-30-22 = A50 – A75-30-11 + CAL5-11



Combination 10 = A45 – A75-40-00 + CA5-10



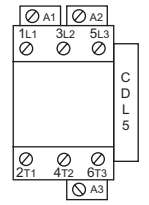
Combination 22



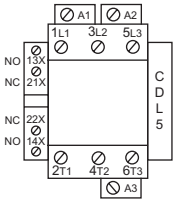
Combination 10

Accessories
Terminal marking and positioning for AE/AL contactors

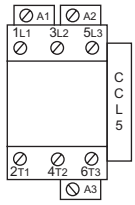
AE Contactors — D.C. operated



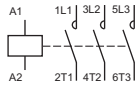
AE50 – AE75-30-00



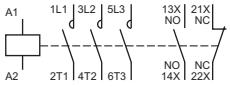
AE50 – AE75-30-11



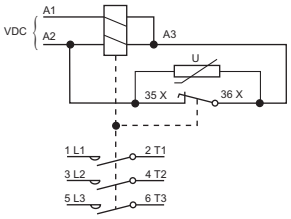
AE95 – AE110-30-00



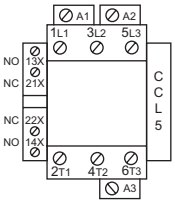
AE50 – AE110-30-00



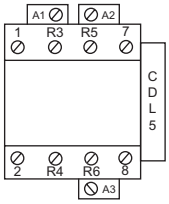
AE50 – AE110-30-11



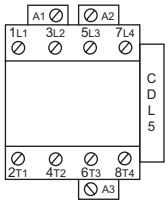
Coil wiring



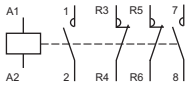
AE95 – AE110-30-11



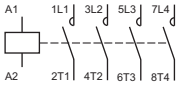
AE45 – AE75-22-00



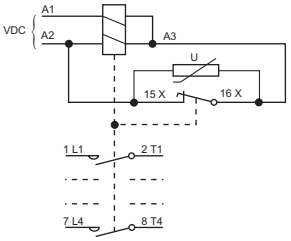
AE45 – AE75-40-00



AE45 – AE75-22-00

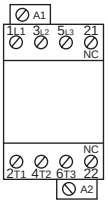


AE45 – AE75-40-00

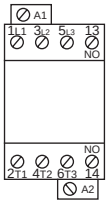


Coil wiring

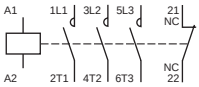
AL Contactors — D.C. operated
Standard devices without addition of auxiliary contacts



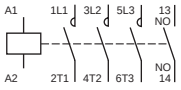
AL9 – AL40-30-01



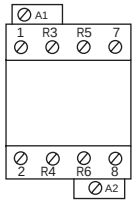
AL9 – AL40-30-10



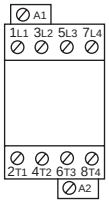
AL9 – AL40-30-01



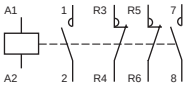
AL9 – AL40-30-10



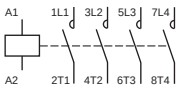
AL9 – AL26-22-00



AL9 – AL26-40-00

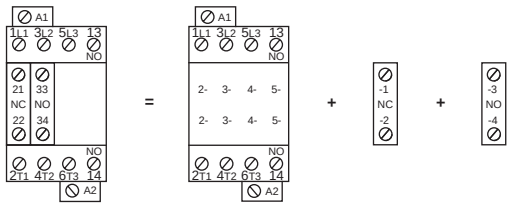


AL9 – AL26-22-00

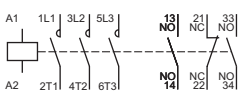


AL9 – AL26-40-00

Other possible contact combinations with auxiliary contacts added by the user



Combination 21 = AL9 – AL40-30-10 + CA5-01 + CA5-10

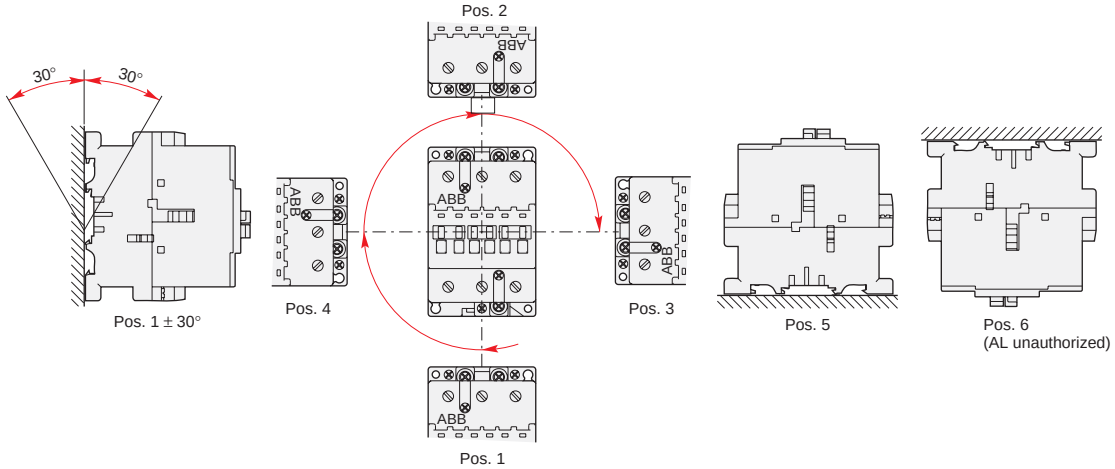


Combination 21

UL & CSA Technical data
A/AE9 – A/AE/AF110, AL9 – AL40
AC & DC operated

ABB contactor frame size		A/AE/AL 9	A/AE/AL 12	A/AE/AL 16	A/AE/AL 26	A/AE/AL 30	A/AE/AL 40	A/AE/AF 45	A/AE/AF 50	A/AE/AF 63	A/AE/AF 75	A/AE/AF 95	A/AE/AF 110
NEMA size		00	—	0	1	1P	—	—	2	—	3	—	—
Number of poles		3 OR 4	3	3 OR 4	3 OR 4	3	3	4	3 OR 4	3	3 OR 4	3	3
AC rating information													
NEMA cont. amp rating	thermal current	9	—	18	27	36	—	—	45	—	90	—	—
NEMA maximum H.P. ratings	1 phase												
115	VAC	1/3	—	1	2	3	—	—	3	—	—	—	—
230	VAC	1	—	2	3	5	—	—	7.5	—	—	—	—
NEMA maximum H.P. ratings	3 phase												
200	VAC	1.5	—	3	7.5	—	—	—	10	—	25	—	—
230	VAC	1.5	—	3	7.5	—	—	—	15	—	30	—	—
460/575	VAC	2	—	5	10	—	—	—	25	—	50	—	—
U.L. general purpose current	40°C	21	25	30	40	50	60	65	80	90	105	125	140
Max. 3 Ph Switching motor loads	A	9	11	17	28	34	42	—	54	65	80	95	110
U.L. maximum H.P. ratings	1 phase												
115	VAC	1/2	3/4	1.5	2	3	3	—	3	5	7.5	7.5	10
230	VAC	2	2	3	5	7.5	7.5	—	7.5	10	15	20	25
U.L. maximum H.P. ratings	3 phase												
200-208	VAC	2	3	5	7.5	10	10	—	15	20	25	30	30
220-240	VAC	2	3	5	10	10	15	—	20	25	30	30	40
440-480	VAC	5	7.5	10	20	25	30	—	40	50	60	60	75
550-600	VAC	7.5	10	15	25	30	40	—	50	60	75	75	100
U.L. maximum H.P. ratings													
120	VDC	1	1.5	2	3	3	5	—	7.5	10	10	—	—
240	VDC	2	3	3	5	7.5	10	—	15	20	25	—	—
Lighting — ballast and incandescent	600VAC	15	15	20 ①	35	50	60	65	65	85	105	120	—
Resistive heating applications	600VAC	15	15	20	35	50	60	65	65	85	105	—	—
CSA Elevator ratings													
220 – 240VAC	3 phase	—	—	5	—	—	10	—	15	—	20	20	—
440 – 480VAC	3 phase	—	—	10	—	—	20	—	30	—	30	40	—
550 – 600VAC	3 phase	—	—	10	—	—	20	—	30	—	40	50	—
230VAC	1 phase	—	—	2	—	—	5	—	7.5	—	10	10	—
Auxiliary contacts													
NEMA rating	AC	A600	A600	A600	A600	A600	A600	—	A600	A600	A600	A600	A600
AC rated voltage	VAC	600	600	600	600	600	600	—	600	600	600	600	600
AC thermal rated current	A	10	10	10	10	10	10	—	10	10	10	10	10
AC maximum volt-ampere making	VA	7200	7200	7200	7200	7200	7200	—	7200	7200	7200	7200	7200
AC maximum volt-ampere breaking	VA	720	720	720	720	720	720	—	720	720	720	720	720
NEMA rating	DC	P600	P600	P600	P600	P600	P600	—	P600	P600	P600	P600	P600
DC rated voltage	VDC	600	600	600	600	600	600	—	600	600	600	600	600
DC thermal rated current	A	5	5	5	5	5	5	—	5	5	5	5	5
DC Maximum make-break	A	0.2	0.2	0.2	0.2	0.2	0.2	—	0.2	0.2	0.2	0.2	0.2
Approximate weight													
Contactor	lbs.	0.7	0.7	0.7	1.01	1.2	2.25	2.25	2.25	2.25	2.25	3.5	5
Starter	lbs.	1.04	1.04	1.04	1.35	1.54	3	—	3	3	3	6	7
Terminal wire range	AWG	18-10	18-10	18-10	12-8	8-4	8-4	8-1	8-1	8-1	8-1	6-2/0	6-2/0
Number of wires per phase		2	2	2	2	2	2	1	1	1	1	1	1
Maximum short circuit ratings													
MCCB,MCP, Amps/kA	480VAC	50/35	50/35	50/35	100/35	150/65	150/65	—	150/85	250/85	250/85	250/85	250/85
MCCB,MCP, Amps/kA	600VAC	10/35	10/35	10/35	100/35	150/25	150/25	—	—	—	—	250/35	250/35
Fuse,Amps — type/kA	600VAC	30J/200	30J/200	30J/200	60J/200	60J/200	100J/200	—	100J/200	200J/200	200J/200	200J/200	200J/200

Mounting positions



① 30A Ballast

UL & CSA Technical data
A/AF145 – AF750
AC & DC operated

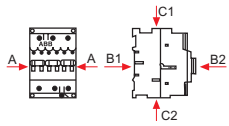
ABB contactor frame size		A/AF 145	A/AF 185	A/AF 210	A/AF 260	A/AF 300	AF 400	AF 460	AF 580	AF 750
NEMA size		4	—	—	5	—	—	6	—	7
Number of poles		3	3	3	3	3	3	3	3	3
AC rating information										
NEMA maximum H.P. ratings	3 phase									
200	VAC	40	—	—	75	—	—	150	—	—
230	VAC	50	—	—	100	—	—	200	—	300
460/575	V	100	—	—	200	—	—	400	—	600
U.L. general purpose current	40°C	230	250	300	350	400	550	650	750	900
Max. 3 Ph switching motor loads	Amps	130	156	192	248	302	414	480	590	720
U.L. maximum H.P. ratings	1 phase									
115	VAC	10	15	—	—	—	—	—	—	—
230	VAC	25	30	40	50	—	—	—	—	—
U.L. maximum H.P. ratings	3 phase									
200—208	VAC	40	50	60	75	100	125	150	200	250
220—240	VAC	50	60	75	100	100	150	200	250	300
440—480	VAC	100	125	150	200	250	350	400	500	600
550—600	VAC	125	150	200	250	300	400	500	600	700
Lighting – ballast and incandescent	600VAC	200	—	300	—	400	—	—	—	—
CSA Elevator ratings										
220 – 240VAC	3 phase			40	50	60	—	—	—	—
240 – 480VAC	3 phase	Consult	Consult	75	100	125	—	—	—	—
550 - 600VAC	3 phase	factory	factory	100	125	150	—	—	—	—
230VAC	1 phase			—	—	—	—	—	—	—
Auxiliary contacts										
NEMA rating	AC	A600	A600	A600	A600	A600	A600	A600	A600	A600
AC rated voltage	VAC	600	600	600	600	600	600	600	600	600
AC thermal rated current	A	10	10	10	10	10	10	10	10	10
AC maximum volt—ampere making	VA	7200	7200	7200	7200	7200	7200	7200	7200	7200
AC maximum volt—ampere breaking	VA	720	720	720	720	720	720	720	720	720
NEMA rating	DC	P600	P600	P600	P600	P600	P600	P600	P600	P600
DC rated voltage	VDC	600	600	600	600	600	600	600	600	600
DC thermal rated current	A	5	5	5	5	5	5	5	5	5
DC Maximum make—break	A	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Approximate weight										
Contactor	lbs.	7.1	7.1	13	13	13	26	26	33	33
Starter	lbs.	9.11	9.11	17.67	17.67	17.67	35	35	45	45
Terminal wire range	AWG	6-250MCM	6-250MCM	4-400MCM	4-400MCM	4-500MCM	250-500MCM	250-500MCM	2/0-500MCM	2/0-500MCM
Number of wires per phase		1	1	1	1	2	2	2	2	3
Maximum short circuit ratings										
MCCB,MCP,amps/kA	480VAC	400/85	400/85	800/85	800/85	800/85	800/80	800/80	1200/42	1200/42
MCCB,MCP,amps/kA	600VAC	400/35	400/35	800/35	800/35	800/35	800/42	800/42	—	—
Fuse, amps—Type/kA	600VAC	400J/200	400J/200	600J/200	600J/200	600J/200	1000L/80	1000L/80	1200L/80	1200L/80

UL & CSA Technical data
AF1350 – AF1650
AC & DC operated

ABB contactor frame size		AF 1350	AF 1650
NEMA size		—	8
Number of poles		3	3
AC rating information			
NEMA maximum H.P. ratings	3 phase		
200	VAC	—	—
230	VAC	—	450
460/575	V	—	900
U.L. general purpose current	40°C	1350	1650
Max. 3 Ph switching motor loads	Amps	960	1080
U.L. maximum H.P. ratings	1 phase		
115	VAC	—	—
230	VAC	—	—
U.L. maximum H.P. ratings	3 phase		
200—208	VAC	—	—
220—240	VAC	400	450
440—480	VAC	800	900
550—600	VAC	900	1000
Auxiliary contacts			
NEMA rating	AC	A600	A600
AC rated voltage	VAC	600	600
AC thermal rated current	A	10	10
AC maximum volt—ampere making	VA	7200	7200
AC maximum volt—ampere breaking	VA	720	720
NEMA rating	DC	P600	P600
DC rated voltage	VDC	600	600
DC thermal rated current	A	5	5
DC Maximum make—break	A	0.2	0.2
Approximate weight			
Contactor	lbs.	75	75
Starter	lbs.	—	—
Terminal wire range	AWG	1/0-750 MCM	1/0-750 MCM
Number of wires per phase		4	6
Maximum short circuit ratings			
MCCB,MCP,amps/kA	480VAC	2000/42	2000/42
MCCB,MCP,amps/kA	600VAC	—	—
Fuse, amps—Type/kA	600VAC	1600L/82	2000L/82

UL/CSA & IEC Technical data
A/AE9 – A/AE/AF/TAE110

Contactor types: A..., AE...	9	12	16	26	30	40	45	50	63	75	95	110
AF..., TAE...	–	–	–	–	–	–	45	50	63	75	95	110
Rated insulation voltage U_i												
according to IEC 60947-4-1 V							1000					
according to UL/CSA V							600					
Rated impulse withstand voltage $U_{imp.}$ kV							8					
Standards							Devices complying with international standards IEC 60947-1 / 60947-4-1 and European standards EN 60947-1 / 60947-4-1					
Air temperature close to contactor							see "Conditions for use" page 1.50, for control voltage limits and authorized mounting positions					
– fitted with thermal O/L relay °C							-25 to +55					
– without thermal O/L relay °C							-40 to +70 (55 max. for TAE... contactors)					
– for storage °C							-60 to +80				-40 to +70	
Climatic withstand							acc. to IEC 60068-2-30 and 60068-2-11 - UTE C 63-100 specification II				acc. to IEC 68-2-	
30												
Operating altitude m							≤ 3000					
Shock withstand												
acc. IEC 60068-2-27 and EN 60068-2-27												
Mounting position 1 (see page 1.50)												



1/2 sinusoidal shock for 11 ms: no change in contact position

Shock direction	Making position	Breaking position
A	20 g	20 g
B1	10 g	5 g ①
B2	15 g ②	15 g ②
C1	20 g	20 g
C2	20 g	20 g

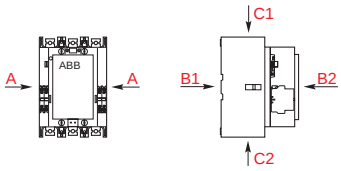
Not valid for DIN-rail mounting

① 3 g for AF 45-22, AE 45-22, AF 75-22 and AE 75-22.
② 10 g for AF 45-22, AE 45-22, AF 75-22 and AE 75-22.

UL/CSA & IEC Technical data
A/AF145 – AF1650

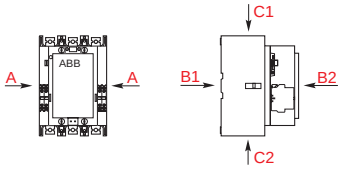
A/AF145 – AF750

Contactor types: A...		145	185	210	260	300	–	–	–	–
AF...		145	185	210	260	300	400	460	580	750
Rated insulation voltage U_i according to IEC 60947-4-1	V	1000								
according to UL/CSA		V600								
Rated impulse withstand voltage $U_{imp.}$	kV	8								
Standards		Devices complying with international standards IEC 60947-1 / 60947-4-1 and European standards EN 60947-1 / 60947-4-1								
Air temperature close to contactor		see "Conditions for use" page 1.51 , for control voltage limits and authorized mounting positions								
– fitted with thermal O/L relay	°C	-25 to +55								
– without thermal O/L relay	°C	-40 to +70								
– for storage	°C	-40 to +70								
Climatic withstand		acc. to IEC 60068-2-30								
Operating altitude	m	≤ 3000								
Shock withstand acc. IEC 60068-2-27 and EN 60068-2-27 Mounting position 1 (see page 1.51)		1/2 sinusoidal shock for 30 ms: no change in contact position 5 g in all directions (A, B1, B2, C1, C2)								



AF1350 – AF1650

Contactor types: AF...		1350	1650
Rated insulation voltage U_i			
according to IEC 60947-4-1		1000	
according to UL/CSA	V	600	
Rated impulse withstand voltage $U_{imp.}$	kV	8	
Standards		Devices complying with international standards IEC 60947-1 / 60947-4-1 and European standards EN 60947-1 / 60947-4-1	
Air temperature close to contactor		see "Conditions for use" page 1.51 , for control voltage limits and authorized mounting positions	
– fitted with thermal O/L relay		°C-25 to +55	
– without thermal O/L relay		°C-40 to +70	
– for storage		°C-40 to +70	
Climatic withstand		acc. to IEC 60068-2-30	
Operating altitude	m	≤ 3000	
Shock withstand acc. IEC 60068-2-27 and EN 60068-2-27 Mounting position 1 (See page 1.51)		1/2 sinusoidal shock for 30 ms: no change in contact position 5 g in all directions (A, B1, B2, C1, C2)	

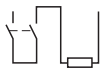
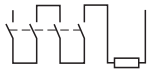
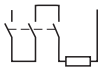
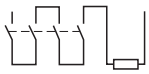
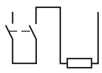
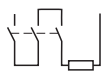
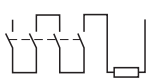


IEC Technical data
DC circuit switching
A/AE9 – GAE75

General

The arc switching on d.c. is more difficult than on a.c.

- For selecting a contactor it is essential to determine the current, the voltage and the L/R time constant of the controlled load.
- For information, typical time constant values are quoted hereafter: non inductive loads such as resistance furnaces (L/R ≃ 1 ms), inductive loads such as shunt motors (L/R ≃ 2 ms) or series motors (L/R ≃ 7.5 ms).
- The addition of a resistor in parallel with an inductive winding helps in the elimination of the arcs.
- All the poles required for breaking must be connected in series between the load and the source polarity not linked to earth (or chassis).

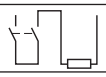
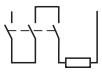
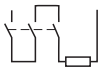
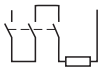
a.c. operated contactors **a.c. / d.c. operated (electronic coil interface)** **d.c. operated contactors**			**A9 – AE9**	**A12 – AE12**	**A16 – AE16**	**A26 – AE26**	**A30 – AE30**	**A40 – AE40**	**A45 AF45 AE45**	**A50 AF50 AE50**	**A63 AF63 AE63**	**A75 AF75 AE75**	**GA75 – GAE75**
Utilization category DC-1, L/R ≤ 1 ms													
	≤ 72 V	A	25	27	30	45	55	60	70	100	110	120	120
	110 V	A	10	15	20	–	–	–	–	–	–	–	120
	220 V	A	–	–	–	–	–	–	–	–	–	–	120
	440 V	A	–	–	–	–	–	–	–	–	–	–	100
	600 V	A	–	–	–	–	–	–	–	–	–	–	75
	≤ 72 V	A	25	27	30	45	55	60	70	100	110	120	–
	110 V	A	25	27	30	45	55	60	70	100	110	120	–
	220 V	A	10	15	20	–	–	–	–	–	–	–	–
	≤ 72 V	A	25	27	30	45	55	60	70	100	110	120	–
	110 V	A	25	27	30	45	55	60	70	100	110	120	–
	220 V	A	25	27	30	45	55	60	70	100	110	120	–
	≤ 72 V	A	25	27	30	45	–	–	70	100	–	120	–
	110 V	A	25	27	30	45	–	–	70	100	–	120	–
	220 V	A	25	27	30	45	–	–	70	100	–	120	–
	440 V	A	10	15	20	–	–	–	–	–	–	–	–
Utilization category DC-3, L/R ≤ 2 ms													
	≤ 72 V	A	25	27	30	45	55	60	70	100	110	120	120
	110 V	A	6	7	8	–	–	–	–	–	–	–	120
	220 V	A	–	–	–	–	–	–	–	–	–	–	100
	440 V	A	–	–	–	–	–	–	–	–	–	–	85
	≤ 72 V	A	25	27	30	45	55	60	70	100	110	120	–
	110 V	A	25	27	30	45	55	60	70	100	110	120	–
	220 V	A	6	7	8	–	–	–	–	–	–	–	–
	≤ 72 V	A	25	27	30	45	55	60	70	100	110	120	–
	110 V	A	25	27	30	45	55	60	70	100	110	120	–
	220 V	A	25	27	30	45	55	60	70	100	110	120	–
	≤ 72 V	A	25	27	30	45	–	–	70	100	–	120	–
	110 V	A	25	27	30	45	–	–	70	100	–	120	–
	220 V	A	25	27	30	45	–	–	70	100	–	120	–
	440 V	A	6	7	8	–	–	–	–	–	–	–	–
Utilization category DC-5, L/R ≤ 7.5 ms													
	≤ 72 V	A	9	12	16	25	30	40	50	50	63	75	85
	110 V	A	4	4	4	–	–	–	–	–	–	–	85
	220 V	A	–	–	–	–	–	–	–	–	–	–	85
	440 V	A	–	–	–	–	–	–	–	–	–	–	35
	≤ 72 V	A	25	27	30	45	55	60	70	100	110	120	–
	110 V	A	10	15	20	30	45	50	70	80	90	100	–
	220 V	A	4	4	4	–	–	–	–	–	–	–	–
	≤ 72 V	A	25	27	30	45	55	60	70	100	110	120	–
	110 V	A	25	27	30	45	55	60	70	100	110	120	–
	220 V	A	9	12	16	25	30	40	50	50	63	75	–
	≤ 72 V	A	25	27	30	45	–	–	70	100	–	120	–
	110 V	A	25	27	30	45	–	–	70	100	–	120	–
	220 V	A	10	15	20	30	–	–	70	70	–	100	–
	440 V	A	4	4	4	–	–	–	–	–	–	–	–

IEC Technical data
DC circuit switching
A/AF/AE95 – AF750

Technical Data

- The tables indicate for the standard contactors the I_e max. operating currents depending on: the utilization category (i.e. L/R) DC-1, DC-3, DC-5 as defined in the IEC 60947-4-1 publication, the operating voltage U_e and the pole coupling details. See page 1.81.
  Ampere values quoted in the tables below are valid for a -25 … +70 °C temperature close to the contactors, as long as the AC-1 Ampere values (see pages 1.45 - 146) for the corresponding ambient temperature are not exceeded.
- Max. switching frequency: 300 ops/h.
- For switching higher d.c. ratings, we recommend the use of bar mounted contactors, R series (63 … 2000 A).

The selection table for AE 50 ... AE 110 contactors can be used for the TAE 50 ... TAE 110 types.

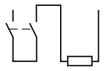
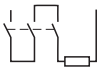
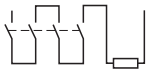
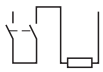
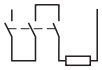
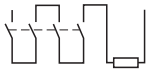
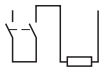
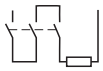
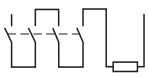
a.c. operated contactors **a.c. / d.c. operated (electronic coil interface)** **d.c. operated contactors**			**A95** **AF95** **AE95**	**A110** **AF110** **AE110**	**A145** **AF145** **–**	**A185** **AF185** **–**	**A210** **AF210** **–**	**A260** **AF260** **–**	**A300** **AF300** **–**	**–** **AF400** **–**	**–** **AF460** **–**	**–** **AF580** **–**	**–** **AF750** **–**
Utilization category DC-1, L/R ≤ 1 ms													
	≤110 V	A	–	–	–	–	–	–	–	600	700	800	1050
	≤110 V	A	145	160	250	275	350	400	450	600	700	800	1050
	220 V	A	–	–	–	–	–	–	–	600	700	800	1050
	≤110 V	A	145	160	250	275	350	400	450	600	700	800	1050
	220 V	A	145	160	250	275	350	400	450	600	700	800	1050
	440 V	A	–	–	–	–	–	–	–	600	700	800	1050
	600 V	A	–	–	–	–	–	–	–	600	700	800	1050
Utilization category DC-3, L/R ≤ 2.5 ms													
	≤110 V	A	–	–	–	–	–	–	–	600	700	800	1050
	≤110 V	A	145	160	250	275	350	400	450	600	700	800	1050
	220 V	A	–	–	–	–	–	–	–	600	700	800	1050
	≤110 V	A	145	160	250	275	350	400	450	600	700	800	1050
	220 V	A	145	160	250	275	350	400	450	600	700	800	1050
	440 V	A	–	–	–	–	–	–	–	600	700	800	1050
	600 V	A	–	–	–	–	–	–	–	600	700	800	1050
Utilization category DC-5, L/R ≤ 15 ms													
	≤110 V	A	–	–	–	–	–	–	–	600	700	800	1050
	≤110 V	A	145	160	250	275	350	400	450	600	700	800	1050
	220 V	A	–	–	–	–	–	–	–	600	700	800	1050
	≤110 V	A	145	160	250	275	350	400	450	600	700	800	1050
	220 V	A	145	160	250	275	350	400	450	600	700	800	1050
	440 V	A	–	–	–	–	–	–	–	600	700	800	1050
	600 V	A	–	–	–	–	–	–	–	600	700	800	1050

IEC Technical data
DC circuit switching
AL9 — AL40

General

The arc switching on d.c. is more difficult than on a.c.

- For selecting a contactor it is essential to determine the current, the voltage and the L/R time constant of the controlled load.
- For information, typical time constant values are quoted hereafter: non inductive loads such as resistance furnaces (L/R ≃ 1 ms), inductive loads such as shunt motors (L/R ≃ 2 ms) or series motors (L/R ≃ 7.5 ms).
- The addition of a resistor in parallel with an inductive winding helps in the elimination of the arcs.
- All the poles required for breaking must be connected in series between the load and the source polarity not linked to earth (or chassis).

A.C. operated contactors			AL9	AL12	AL16	AL26	AL30	AL40
Utilization category DC-1, L/R ≤ 1 ms								
	≤ 72 V	A	25	27	30	45	55	60
	110 V	A	10	15	20	–	–	–
	220 V	A	–	–	–	–	–	–
	440 V	A	–	–	–	–	–	–
	600 V	A	–	–	–	–	–	–
	≤ 72 V	A	25	27	30	45	55	60
	110 V	A	25	27	30	45	55	60
	220 V	A	10	15	20	–	–	–
	≤ 72 V	A	25	27	30	45	55	60
	110 V	A	25	27	30	45	55	60
	220 V	A	25	27	30	45	55	60
	≤ 72 V	A	25	27	30	45	–	–
	110 V	A	25	27	30	45	–	–
	220 V	A	25	27	30	45	–	–
	440 V	A	10	15	20	–	–	–
Utilization category DC-3, L/R ≤ 2 ms								
	≤ 72 V	A	25	27	30	45	55	60
	110 V	A	6	7	8	–	–	–
	220 V	A	–	–	–	–	–	–
	440 V	A	–	–	–	–	–	–
	≤ 72 V	A	25	27	30	45	55	60
	110 V	A	25	27	30	45	55	60
	220 V	A	6	7	8	–	–	–
	≤ 72 V	A	25	27	30	45	55	60
	110 V	A	25	27	30	45	55	60
	220 V	A	25	27	30	45	55	60
	≤ 72 V	A	25	27	30	45	–	–
	110 V	A	25	27	30	45	–	–
	220 V	A	25	27	30	45	–	–
	440 V	A	6	7	8	–	–	–
Utilization category DC-5, L/R ≤ 7.5 ms								
	≤ 72 V	A	9	12	16	25	30	40
	110 V	A	4	4	4	–	–	–
	220 V	A	–	–	–	–	–	–
	440 V	A	–	–	–	–	–	–
	≤ 72 V	A	25	27	30	45	55	60
	110 V	A	10	15	20	30	45	50
	220 V	A	4	4	4	–	–	–
	≤ 72 V	A	25	27	30	45	55	60
	110 V	A	25	27	30	45	55	60
	220 V	A	9	12	16	25	30	40
	≤ 72 V	A	25	27	30	45	–	–
	110 V	A	25	27	30	45	–	–
	220 V	A	10	15	20	30	–	–
	440 V	A	4	4	4	–	–	–

IEC Technical data
DC circuit switching
EK110 — EK1000

General

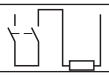
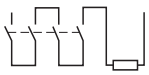
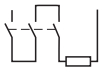
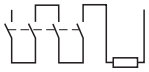
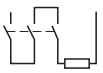
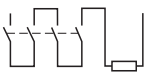
The arc switching on d.c. is more difficult than on a.c.

- For selecting a contactor it is essential to determine the current, the voltage and the L/R time constant of the controlled load.
- For information, typical time constant values are quoted hereafter: non inductive loads such as resistance furnaces (L/R ≃ 1 ms), inductive loads such as shunt motors (L/R ≃ 2 ms) or series motors (L/R ≃ 7.5 ms).
- The addition of a resistor in parallel with an inductive winding helps in the elimination of the arcs.
- All the poles required for breaking must be connected in series between the load and the source polarity not linked to earth (or chassis).

Technical Data

- The tables indicate for the standard contactors the I_e max. operating currents depending on: the utilization category (i.e. L/R) DC-1, DC-3, DC-5 as defined in the IEC 60947-4-1 publication (see page 1.75 for more details), the operating voltage U_e and the pole coupling details.
  Ampere values quoted in the tables below are valid for a -25 … +70 °C temperature close to the contactors, as long as the AC-1 Ampere values (see page 1.61) for the corresponding ambient temperature are not exceeded.
- Max. switching frequency: 300 ops/h.
- For switching higher d.c. ratings, we recommend the use of bar mounted contactors, R series (63 … 2000 A).

Selection Table

a.c. / d.c. operated contactors			EK110	EK150	EK175	EK210	EK370	EK550	EK1000
Utilization category DC-1, L/R ≤ 1 ms									
	≤ 72 V	A	120	145	210	210	370	550	–
	110 V	A	120	145	210	210	370	550	–
	≤ 72 V	A	200	200	300	300	550	800	–
	110 V	A	200	200	300	300	550	800	–
	220 V	A	200	200	300	300	550	800	–
	≤ 72 V	A	200	200	300	300	550	800	–
	110 V	A	200	200	300	300	550	800	–
	220 V	A	200	200	300	300	550	800	–
	440 V	A	–	–	210	210	450	650	–
	600 V	A	–	–	–	–	450	650	–
	≤ 72 V	A	200	200	300	300	550	800	–
	110 V	A	200	200	300	300	550	800	–
	220 V	A	200	200	300	300	550	800	–
	440 V	A	200	200	260	300	450	650	–
	600 V	A	–	–	260	300	450	650	–
Utilization category DC-3, L/R ≤ 2 ms									
	≤ 72 V	A	120	145	210	210	370	550	–
	≤ 72 V	A	135	145	210	210	450	650	–
	110 V	A	135	135	210	210	450	650	–
	220 V	A	135	135	210	210	450	650	–
	≤ 72 V	A	135	145	210	210	450	650	–
	110 V	A	135	135	210	210	450	650	–
	220 V	A	135	135	210	210	450	650	–
	440 V	A	–	–	210	210	450	650	–
	600 V	A	–	–	–	–	450	650	–
	≤ 72 V	A	135	145	210	210	450	650	–
	110 V	A	135	135	210	210	450	650	–
	220 V	A	135	135	210	210	450	650	–
	440 V	A	135	135	210	210	450	650	–
	600 V	A	–	–	170	210	450	650	–
Utilization category DC-5, L/R ≤ 7.5 ms									
	≤ 72 V	A	135	145	210	210	450	650	–
	110 V	A	135	135	210	210	450	650	–
	220 V	A	135	135	210	210	450	650	–
	≤ 72 V	A	135	145	210	210	450	650	–
	110 V	A	135	135	210	210	450	650	–
	220 V	A	135	135	210	210	450	650	–
	440 V	A	–	–	210	210	450	650	–
	600 V	A	–	–	–	–	450	650	–
	≤ 72 V	A	135	145	210	210	450	650	–
	110 V	A	135	135	210	210	450	650	–
	220 V	A	135	135	210	210	450	650	–
	440 V	A	135	135	210	210	450	650	–
	600 V	A	–	–	170	210	450	650	–

IEC Technical data
A/AE9 — A/AE/AF/TAE110

Main Pole - Utilization Characteristics

Contactor types: A..., AE... / AF..., TAE...			9 –	12 –	16 –	26 –	30 –	40 –	45 45	50 50	63 63	75 75	95 95	110 110
Rated operational voltage U_e max.		V	690						1000 (690 for AF... contactors)					
Rated frequency limits		Hz			25-400									
Conventional free-air thermal current I_{th} acc. to IEC 60947-4-1, open contactors ø ≤ 40 °C		A	26	28	30	45	65	65	100	100	125	125	145	160
with conductor cross-sectional area		mm²	4	4	6	16	16	35	35	50	50	50	70	
Rated operational current I_e / AC-1 for air temperature close to contactor														
U_e max. 690 V	ø ≤ 40 °C	A	25	27	30	45	55	60	70	100	115	125	145	160
	ø ≤ 55 °C	A	22	25	27	40	55	60	60	85	95	105	135	145
	ø ≤ 70 °C ③	A	18	20	23	32	39	42	50	70	80	85	115	130
with conductor cross-sectional area		mm²	2.5	4	4	6	10	16	25	35	50	50	50	70
Utilization categorie AC-3 for air temperature close to contactor ≤ 55 °C														
Rated operational current I_e AC-3 ①														
3-phase motors	220-230-240 V	A	9	12	17	26	33	40	40	53	65	75	96	110
	380-400 V	A	9	12	17	26	32	37	37	50	65	75	96	110
	415 V	A	9	12	17	26	32	37	37	50	65	72	96	110
	440 V	A	9	12	16	26	32	37	37	45	65	70	93	100
	500 V	A	9	12	14	22	28	33	33	45	55	65	80	100
	690 V	A	7	9	10	17	21	25	25	35	43	46	65	82
	1000 V	A	–	–	–	–	–	–	–	23 ②	25 ②	28 ②	30 ②	30 ②
Rated operational power AC-3 ①														
1500 r.p.m. 50 Hz, 1800 r.p.m. 60 Hz 3-phase motors	220-230-240 V	kW	2.2	3	4	6.5	9	11	11	15	18.5	22	25	30
	380-400 V	kW	4	5.5	7.5	11	15	18.5	18.5	22	30	37	45	55
	415 V	kW	4	5.5	9	11	15	18.5	18.5	25	37	40	55	59
	440 V	kW	4	5.5	9	15	18.5	22	22	25	37	40	55	59
	500 V	kW	5.5	7.5	9	15	18.5	22	22	30	37	45	55	59
	690 V	kW	5.5	7.5	9	15	18.5	22	22	30	37	40	55	75
	1000 V	kW	–	–	–	–	–	–	–	30 ②	33 ②	37 ②	40 ②	40 ②
Rated making capacity AC-3 according to IEC 60947-4-1			10 x I_e AC-3											
Rated breaking capacity AC-3 according to IEC 60947-4-1			8 x I_e AC-3											
Short-circuit protection for contactors without thermal O/L relay - Motor protection excluded U_e ≤ 500 V a.c. - gG type fuse		A	25	32	32	50	63		80	100	125	160	160	200
Rated short-time withstand current I_{cw} at 40 °C ambient temp., in free air, from a cold state	1 s	A	250	280	300	400	600		1000				1320	1320
	10 s	A	100	120	140	210	400		650				800	800
	30 s	A	60	70	80	110	225		370				500	500
	1 min	A	50	55	60	90	150		250				350	350
	15 min	A	26	28	30	45	65		110	110	135	135	160	175
Maximum breaking capacity cos ø = 0.45 (cos ø = 0.35 for I_e > 100 A)														
	at 440 V	A	250			420	820		900	1300			1160	
	at 690 V	A	90			170	340		490	630			800	
Heat dissipation per pole	I_e / AC-1	W	0.8	1	1.2	1.8	2.5	3	2.5	5	6.5	7	6.5	7.5
	I_e / AC-3	W	0.1	0.2	0.35	0.6	0.9	1.3	0.65	1.3	1.5	2	2.7	3.6
Max. electrical switching frequency														
– for AC-1		cycles/h	600						600 (300 for AF..., AE... TAE...)				300	
– for AC-3		cycles/h	1200 (600 for AE...)						600 (300 for AF..., AE... TAE...)				300	
– for AC-2, AC-4		cycles/h	300						150				150	
Electrical durability			see pages 1.70 - 1.73											
Mechanical durability														
– millions of operating cycles			10 (5 for AE... and TAE... contactors)											
– max. mechanical switching frequency		cycles/h	3600 (300 for AF... contactors)											

① For the corresponding hp/A values of 1500 r.p.m., 50Hz, 3-phase motors, see page 1.76.
② AF... contactors excluded
③ Unauthorized for TAE... contactors.

IEC Technical data
A/AF145 – AF750

Main Pole - Utilization Characteristics

Contactor types: A...			145	185	210	260	300	–	–	–	–
AF...			145	185	210	260	300	400	460	580	750
Rated operational voltage U_e max.		V	690								
Rated frequency limits		Hz	25 ... 400								
Conventional free-air thermal current I_{th} acc. to IEC 60947-4-1, open contactors ø ≤ 40 °C		A	250	275	350	400	500	600	700	800	1050
with conductor cross-sectional area ①		mm²	120	150	185	240	300 ③	2 x 185	2 x 240	2 x 240	2 x 80 x 5 ②
Rated operational current I_e / AC-1 for air temperature close to contactor											
U_e max. 690 V	ø ≤ 40 °C	A	250	275	350	400	500	600	700	800	1050
	ø ≤ 55 °C	A	230	250	300	350	400	500	600	700	800
	ø ≤ 70 °C	A	180	180	240	290	325	400	480	580	720
with conductor cross-sectional area		mm²	120	150	185	240	300 ③	2 x 185	2 x 240	2 x 240	2 x 80 x 5 ②
Utilization categorie AC-3 for air temperature close to contactor ≤ 55 °C											
Rated operational current I_e AC-3											
3-phase motors	220-230-240 V	A	145	185	210	260	305	400	460	580	750
	380-400 V	A	145	185	210	260	305	400	460	580	750
	415 V	A	145	185	210	260	300	400	460	580	750
	440 V	A	145	185	210	240	280	400	460	580	750
	500 V	A	145	170	210	240	280	400	460	580	750
	690 V	A	120	170	210	220	280	350	400	500	650
	1000 V	A	–	–	–	–	–	–	–	–	–
Rated operational power AC-3											
1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors	220-230-240 V	kW	45	55	59	80	90	110	132	160	220
	380-400 V	kW	75	90	110	140	160	200	250	315	400
	415 V	kW	75	90	110	140	160	220	250	355	425
	440 V	kW	75	90	110	140	160	220	250	355	450
	500 V	kW	90	110	132	180	200	250	315	400	520
	690 V	kW	110	132	160	200	250	315	355	500	600
	1000 V	kW	–	–	–	–	–	–	–	–	–
Rated making capacity AC-3 according to IEC 60947-4-1			10 x I_e AC-3								
Rated breaking capacity AC-3 according to IEC 60947-4-1			8 x I_e AC-3								
Short-circuit protection for contactors without thermal O/L relay - Motor protection excluded U_e ≤ 500 V a.c. - gG type fuse		A	315	355	400	500		630	800	1000	
Rated short-time withstand current I_{cw} at 40 °C ambient temp., in free air, from a cold state	1 s	A	1800	2000	2500	3500		4600		7000	
	10 s	A	1200	1500	1700	2400		4400		6400	
	30 s	A	800	1000	1200	1500		3100		4500	
	1 min	A	600	800	1000	1100		2500		3500	
	15 min	A	280	320	400	500		840		1300	
Maximum breaking capacity cos ø = 0.45 (cos ø = 0.35 for I_e > 100 A)											
	at 440 V	A	1500	2000	2300	2600	3000	4000	5000	6000	7500
	at 690 V	A	1200	1600	2000	2400	2500	3500	4500	5000	7000
Heat dissipation per pole	I_e / AC-1	W	13	16	18	25	32	30	42	32	50
	I_e / AC-3	W	5	8	9	14	18	16	21	17	28
Max. electrical switching frequency											
– for AC-1		cycles/h	300		300			300		300	
– for AC-3		cycles/h	300		300			300		300	
– for AC-2, AC-4		cycles/h	150		150			60		60	
Electrical durability			see pages 1.65 ... 1.69					–	–	–	–
Mechanical durability											
– millions of operating cycles			5					3			
– max. mechanical switching frequency		cycles/h	3600 (300 for AF... contactors)					300			

① Conductors with preparation.
② Dimensions of the bars (in mm).
③ For currents above 450A, use terminal extension / enlargement pieces LX 300 / LW 300 see page 1.31).

Main Pole - Utilization Characteristics

Contactor types: AF...			1350	1650
Rated operational voltage U_e max.		V	1000	1000
Rated frequency limits		Hz	25-400	25-400
Conventional free-air thermal current I_{th} acc. to IEC 60947-4-1, open contactors ø ≤ 40 °C		A	1350	1650
with conductor cross-sectional area①		mm²	2/100x5	3/100x5
Rated operational current I_e / AC-1 for air temperature close to contactor				
U_e max. 690 V	ø ≤ 40 °C	A	1350	1650
	ø ≤ 55 °C	A	1150	1450
	ø ≤ 70 °C	A	1000	1270
with conductor cross-sectional area		mm²	2 x 80 x 5①	2 x 80 x 5①
Utilization categorie AC-3 for air temperature close to contactor ≤ 55 °C				
Rated operational current I_e AC-3				
3-phase motors	220-230-240 V	A	860	1050
	380-400 V	A	860	1050
	415 V	A	860	1050
	440 V	A	860	1050
	500 V	A	—	—
	690 V	A	—	—
	1000 V	A	—	—
Rated operational power AC-3				
1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors	220-230-240 V	kW	257	315
	380-400 V	kW	475	560
	415 V	kW	500	600
	440 V	kW	560	670
	500 V	kW	—	—
	690 V	kW	—	—
	1000 V	kW	—	—
Rated making capacity AC-3 according to IEC 60947-4-1			10 x I_e, AC-3	
Rated breaking capacity AC-3 according to IEC 60947-4-1			8 x I_e, AC-3	
Short-circuit protection for contactors without thermal O/L relay - Motor protection excluded U_e ≤ 500 V a.c. - gG type fuse		A	Product coordination with ABB circuit breaker Consult factory	
Rated short-time withstand current I_{cw} at 40 °C ambient temp., in free air, from a cold state	1 s	A	10,000	12,000
	10 s	A	8000	10,000
	30 s	A	6000	7500
	1 min	A	4500	5500
	15 min	A	1600	2200
Maximum breaking capacity cos ø = 0.45 (cos ø = 0.35 for I_e > 100 A)				
	at 440 V	A	10,000	12,000
	at 690 V	A	—	—
Max. electrical switching frequency				
– for AC-1		cycles/h	60	60
– for AC-3		cycles/h		
– for AC-2, AC-4		cycles/h		
Electrical durability			50,000	50,000
Mechanical durability				
– millions of operating cycles			500,000	500,000
– max. mechanical switching frequency		cycles/h	60	60

① Dimensions of the bars (in mm).

IEC Technical data
A/AF9 — AF110

Magnet System Characteristics for A... Contactors

Contactor types: A...			9	12	16	26	30	40	45	50	63	75	95	110
Rated control circuit voltage U_c														
– at 50 Hz		V	20 ... 690											
– at 60 Hz		V	24 ... 600											
Coil operating limits			ø ≤ 55 °C									ø ≤ 70 °C		
according to IEC 60947-4-1			0.85 ... 1.1 x U_c										0.85 ... 1.1 x U_c	
Drop-out voltage in % of U_c			roughly 40 ... 65 %											
Coil consumption														
Average pull-in value	50 Hz	VA	70			120			180				350	
	60 Hz	VA	80			140			210				450	
	50/60 Hz ①	VA/VA	74/70			125/120			190/180				410/365	
Average holding value	50 Hz	VA/W	8/2			12/3			18/5.5				22/6.5	
	60 Hz	VA/W	8/2			12/3			18/5.5				26/8	
	50/60 Hz ①	VA/W	8/2			12/3			18/5.5				27/7.5	
Operating time														
between coil energization and:														
– N.O. contact closing		ms	10 ... 26			8 ... 21			8 ... 27				10 ... 25	
– N.C. contact opening		ms	7 ... 21			6 ... 18			7 ... 22				7 ... 22	
between coil de-energization and:														
– N.O. contact opening		ms	4 ... 11			4 ... 11			4 ... 11				7 ... 15	
– N.C. contact closing		ms	9 ... 16			7 ... 14			7 ... 14				10 ... 18	

Magnet System Characteristics for AF... Contactors

Contactor types: AF...			–	–	–	–	–	–	45	50	63	75	95	110
Rated control circuit voltage U_c														
– at 50 Hz		V							48 ... 250				48 ... 250	
– at 60 Hz		V							48 ... 250				48 ... 250	
– d.c.		V							20 ... 250				20 ... 250	
Coil operating limits									ø ≤ 70 °C					
according to IEC 60947-4-1									0.85 ... 1.1 x U_c					
Drop-out voltage in % of U_c									55 %					
Coil consumption														
Average pull-in value	50 Hz	VA							210				350	
	60 Hz	VA							210				350	
	d.c.	W							190				400	
Average holding value	50 Hz	VA/W							7/2.8				7/3.5	
	60 Hz	VA/W							7/2.8				7/3.5	
	d.c.	W							2.8				2	
Operating time														
between coil energization and:														
– N.O. contact closing		ms							30 ... 100				30 ... 80	
– N.C. contact opening		ms							27 ... 95				27 ... 77	
between coil de-energization and:														
– N.O. contact opening		ms							30 ... 110				55 ... 125	
– N.C. contact closing		ms							35 ... 115				60 ... 130	

① 50/60 Hz coils: voltage codes 8 0 to 8 8. see page 1.28.

Magnet System Characteristics for A... Contactors

Contactor types: A...			145	185	210	260	300	–	–	–	–
Rated control circuit voltage U_c											
– at 50 Hz		V	24 ... 690								
– at 60 Hz		V	24 ... 690								
Coil operating limits			ø ≤ 70 °C								
according to IEC 60947-4-1			0.85 ... 1.1 x U_c								
Drop-out voltage in % of U_c			roughly 25 ... 65 %								
Coil consumption											
Average pull-in value	50 Hz	VA	550		1350						
	60 Hz	VA	600		1550						
	50/60 Hz ①	VA/VA	700/650		1700/1550						
Average holding value	50 Hz	VA/W	35/11		60/16						
	60 Hz	VA/W	40/12		65/19						
	50/60 Hz ①	VA/W	44/13		80/21						
Operating time											
between coil energization and:											
– N.O. contact closing		ms	13 ... 27		17 ... 35						
– N.C. contact opening		ms	8 ... 22		12 ... 30						
between coil de-energization and											
– N.O. contact opening		ms	5 ... 10		7 ... 13						
– N.C. contact closing		ms	9 ... 13		10 ... 16						

Magnet System Characteristics for AF... Contactors

Contactor types: AF...			145	185	210	260	300	400	460	580	750
Rated control circuit voltage U_c											
– at 50 Hz		V	48 ... 250								
– at 60 Hz		V	48 ... 250								
– d.c.		V	24 ... 250								
Coil operating limits			ø ≤ 70 °C								
according to IEC 60947-4-1			0.85 ... 1.1 x U_c								
Drop-out voltage in % of U_c			55 %								
Coil consumption											
Average pull-in value	50 Hz	VA	430		470			890		850	
	60 Hz	VA	430		470			890		850	
	d.c.	W	500		520			990		950	
Average holding value	50 Hz	VA/W	12/3.5		10/2.5			12/4		12/4.5	
	60 Hz	VA/W	12/3.5		10/2.5			12/4		12/4.5	
	d.c.	W	2		2			4		4.5	
Operating time											
between coil energization and:											
– N.O. contact closing		ms	30 ... 115					50 ... 120			
– N.C. contact opening		ms	30 ... 115					50 ... 120			
between coil de-energization and											
– N.O. contact opening		ms	25 ... 80					40 ... 70			
– N.C. contact closing		ms	25 ... 80					40 ... 70			

① 50/60 Hz coils: voltage codes 8 0 to 8 8. see page 1.28.

IEC Technical data
AF1350 — AF1650

Magnet System Characteristics for AF.. Contactors

Contactor types: AF..			1350	1650
Rated control circuit voltage U_c				
– at 50 Hz		V	100 - 250	
– at 60 Hz		V	100 - 250	
– d.c.		V	100 - 250	
Coil operating limits			ø ≤ 70 °C	
according to IEC 60947-4-1			0.85 ... 1.1 x U_c	
Drop-out voltage in % of U_c			55 %	
Coil consumption				
Average pull-in value	50 Hz	VA	1900	
	60 Hz	VA	1900	
	d.c.	W	1700	
Average holding value	50 Hz	VA/W	48/17	
	60 Hz	VA/W	48/17	
	d.c.	W	16	
Operating time				
between coil energization and:				
– N.O. contact closing		ms	50 - 80	
– N.C. contact opening			ms	50 - 80
between coil de-energization and				
– N.O. contact opening			ms	35 - 55
– N.C. contact closing		ms	35 - 55	
With PLC				
between coil energization and				
– N.O. contact opening			ms	40 - 65
– N.C. contact closing		ms	40 - 65	
between coil de-energization and				
– N.O. contact opening			ms	10 - 30
– N.C. contact closing		ms	10 - 30	

① 50/60 Hz coils: voltage codes 8 0 to 8 8. see page 1.28.

Magnet System Characteristics for AE... Contactors

Contactor types: AE...			9	12	16	26	30	40	45	50	63	75	95	110
Rated control circuit voltage U_c														
		V d.c.	12 ... 250											
Coil operating limits			ø ≤ 55 °C										ø ≤ 70 °C	
according to IEC 60947-4-1			0.85 ... 1.1 x U_c											
Drop-out voltage in % of U_c			roughly 10 ... 30 %						roughly 15 ... 40 %					
Coil consumption - Average values														
– pull-in value		W	90			110			200				400	
– holding value		W	2			2.5			4				2.4	
Coil time constant														
– open	L/R	ms	2			3			3				6	
– closed	L/R	ms	9			16			15				30 ... 40	
Operating time														
between coil energization and:														
– N.O. contact closing		ms	10 ... 16			13 ... 21			13 ... 30				15 ... 25	
– N.C. contact opening		ms	8 ... 12			11 ... 16			10 ... 27				12 ... 22	
between coil de-energization and														
– N.O. contact opening		ms	5 ... 14 ①			6 ... 12 ①			5 ... 15 ①				15 ... 20 ①	
– N.C. contact closing		ms	11 ... 17 ①			8 ... 16 ①			8 ... 18 ①				18 ... 23 ①	

Magnet System Characteristics for TAE... Contactors

Contactor types: TAE...			–	–	–	–	–	–	45	50	–	75	95	110
Rated control circuit voltage U_c														
		V d.c.							17 ... 264					
Coil operating limits									ø ≤ 55 °C					
according to IEC 60947-4-1									U_c min. ... U_c max.					
Drop-out voltage in % of U_c max.									roughly 20 ... 35 %					
Coil consumption														
values for U_c min. ... U_c max.														
– pull-in value		W							120 ... 250				300 ... 1000	
– holding value		W							1.7 ... 6.5				2 ... 7	
Coil time constant														
– open	L/R	ms							3				6	
– closed	L/R	ms							15				40	
Operating time														
between coil energization and:														
– N.O. contact closing		ms							13 ... 30				15 ... 25	
– N.C. contact opening		ms							10 ... 27				12 ... 22	
between coil de-energization and														
– N.O. contact opening		ms							5 ... 15 ②				15 ... 20 ②	
– N.C. contact closing		ms							8 ... 18 ②				18 ... 23 ②	

① The use of surge suppressors increases the opening time on a scale of 1.1 to 1.5 for a varistor suppressor and on a scale of 4 to 8 for a diode suppressor.
AE 9 ... AE 40 contactors and $U_c \geq 110$ V: table values for contactors with RV 5 surge suppressor (factory mounted).
② The use of surge suppressors increases the opening time on a scale of 1.1 to 1.5 for a varistor suppressor and on a scale of 4 to 8 for a diode suppressor.

IEC Technical data
A9 — A110

Built-in Auxiliary Contacts - Utilization Characteristics

Contactor types: A...		9	12	16	26	30	40	45	50	63	75	95	110
Rated operational voltage U_e max.	V	690						–	–	–	–	–	–
Conventional free air thermal current I_{th} - ø ≤ 40 °C	A	16						–	–	–	–	–	–
Rated frequency limits	Hz	25 ... 400					–	–	–	–	–	–	
Rated operational current I_e / AC-15 according to IEC 60947-5-1													
24-127 V 50/60 Hz	A	6						–	–	–	–	–	–
220-240 V 50/60 Hz	A	4						–	–	–	–	–	–
380-440 V 50/60 Hz	A	3						–	–	–	–	–	–
500 V 50/60 Hz	A	2						–	–	–	–	–	–
690 V 50/60 Hz	A	2						–	–	–	–	–	–
Rated operational current I_e / DC-13 according to IEC 60947-5-1													
24 V d.c.	A / W	6 / 144						–	–	–	–	–	–
48 V d.c.	A / W	2.8 / 134						–	–	–	–	–	–
72 V d.c.	A / W	2 / 144						–	–	–	–	–	–
125 V d.c.	A / W	1.1 / 138						–	–	–	–	–	–
250 V d.c.	A / W	0.55 / 138					–	–	–	–	–	–	
Rated making capacity acc. to IEC 60947-5-1		10 x I_e / AC-15						–	–	–	–	–	–
Rated breaking capacity acc. to IEC 60947-5-1		10 x I_e / AC-15						–	–	–	–	–	–
Short-circuit protection gG type fuse	A	10						–	–	–	–	–	–
Rated short-time withstand current I_{cw}													
for 1.0 s	A	100						–	–	–	–	–	–
for 0.1 s	A	140						–	–	–	–	–	–
Minimum switching capacity	V / mA	17 / 5						–	–	–	–	–	–
Non-overlapping time between N.O. and N.C. contacts	ms	≥ 2						–	–	–	–	–	–
Insulating resistance at 500 V d.c. after durability test	MOhm	5						–	–	–	–	–	–
Heat dissipation per pole at 6 A	W	0.10						–	–	–	–	–	–

Mounting characteristics

Contactor types: A..., AE...	9	12	16	26	30	40	45	50	63	75	95	110
AF..., TAE...	–	–	–	–	–	–	45	50	63	75	95	110
Mounting positions	see "Conditions for use"											
Mounting distances	The contactors can be assembled side by side											
Mounting												
on DIN rail according to IEC 715 and EN 50022 / EN 50023	35 x 7.5 mm 35 x 15 mm						35 x 15 mm 75 x 25 mm				75 x 25 mm	
by screws (not supplied)	2 x M4						2 x M6					

Conditions for Use

Sustainable utilization conditions for contactors involving at the same time the Mounting position, Ambient temperature and Control voltage operating limits are summarized in the table below.

Contactors	Mounting position	Ambient temperature	Control voltage
A 9 ... A 110, AE 9 ... AE 110	1, 1 ± 30°, 2, 3, 4, 5	≤ 55 °C	0.85 ... 1.1 x U_c
		55 ... 70 °C	U_c
	6	≤ 55 °C	0.95 ... 1.1 x U_c
		> 55 °C unauthorized	–
AF 45 ... AF 110	1, 1 ± 30°, 2, 3, 4, 5	≤ 70 °C	0.85 U_c min. ... 1.1 x U_c max.
	6 unauthorized	–	–
TAE 45 ... TAE 110	1, 1 ± 30°, 2, 3, 4, 5	≤ 55 °C	U_c min. ... U_c max.
		> 55 °C unauthorized	–
	6 unauthorized	–	–

Notes for 4-pole contactors

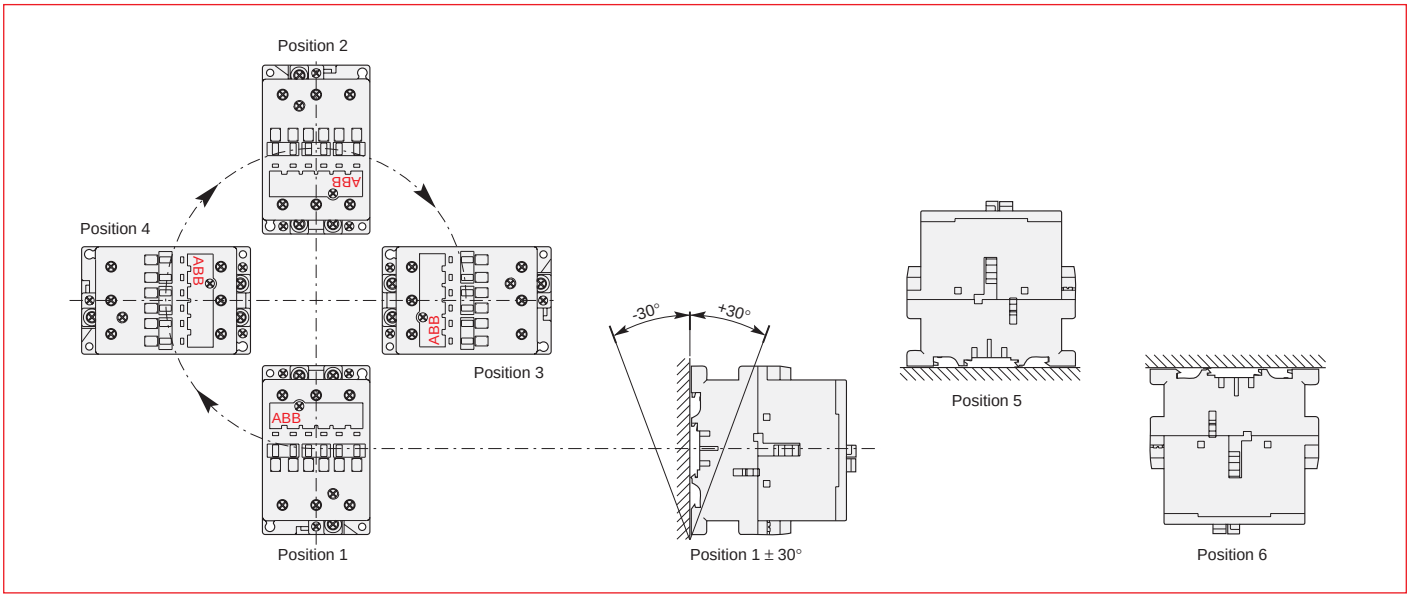
Whatever the coil voltage: Pos. 5 unauthorized for A 45-22-00, AE 45-22-00, A 75-22-00, AE 75-22-00 contactors.

For 60 Hz coil voltage: (only for devices fitted with CA 5-.. and CAL 5-11 auxiliary contacts or TP timer)

– A 45-40-00, A 50-40-00 and A 75-40-00 contactors
  Mounting positions 1 to 5 and ambient temperature ≤ 55 °C: tolerance reduced to 0.9 ... 1.1 U_c (instead of 0.85 ... 1.1 U_c) for coil voltage codes 7 □ and 8 □.
– A 45-22-00 and A 75-22-00 contactors
  Mounting positions 1 to 4 (pos. 5 unauthorized) and ambient temperature ≤ 55 °C: tolerance reduced to 0.9 ... 1.1 U_c (instead of 0.85 ... 1.1 U_c) for coil voltage codes 7 □ and 8 □.

For mounting position 6 or ambient temperature of 55 to 70 °C the information given on this page remains applicable.

Mounting Positions (see the above table for authorized positions)



IEC Technical data
A/AF145 — AF1650

Mounting Characteristics — A/AF145 — AF750

Contactor types: A... / AF..	145 / 145	185 / 185	210 / 210	260 / 260	300 / 300	– / 400	– / 460	– / 580	– / 750
Mounting positions	see "Condition for use"								
Mounting distances	The contactors can be assembled side by side								
Fixing									
on DIN rail according to IEC 715 and EN 50022 / EN 50023	–	–	–	–	–	–	–	–	–
by screws (not supplied)	4 x M5							4 x M6	

Mounting Characteristics — AF1350 — AF1650

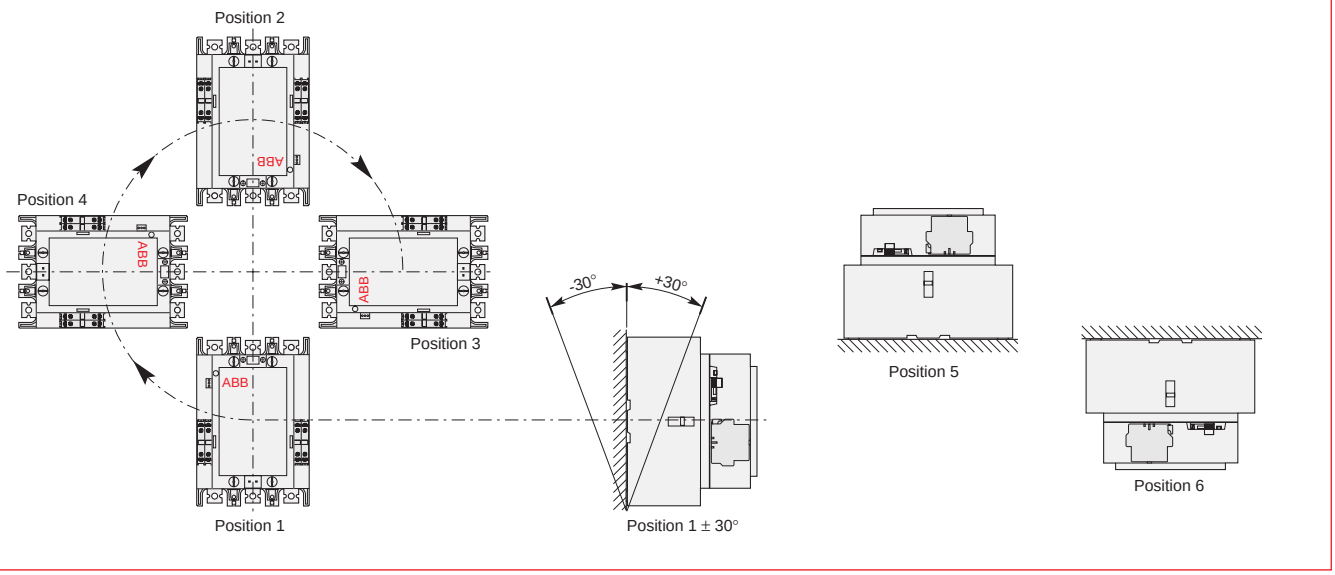
Contactor types: AF	1350	1650
Mounting positions	see "Condition for use"	
Mounting distances	The contactors can be assembled side by side	
Fixing		
on DIN rail according to IEC 715 and EN 50022 / EN 50023	–	–
by screws (not supplied)	4 x M8	

Conditions for Use

Sustainable utilization conditions for contactors involving at the same time the Mounting position, Ambient temperature and Control voltage operating limits are summarized in the table below.

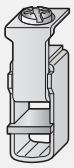
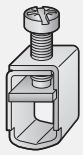
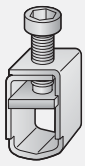
Contactors	Mounting position	Ambient temperature	Control voltage
A 145 ... A 300	1, 1 ± 30°, 2, 3, 4, 5	≤ 70 °C	0.85 ... 1.1 x U_c
	6 unauthorized	–	–
AF 145 ... AF 750	1, 1 ± 30°, 2, 3, 4, 5	≤ 70 °C	0.85 x U_c min. ... 1.1 x U_c max.
	6 unauthorized	–	–

Mounting Positions (see the above table for authorized positions)



IEC Technical data
A/AE9 — AF/TAE110

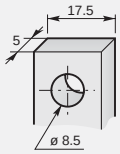
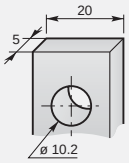
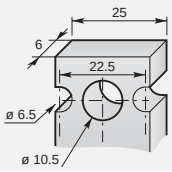
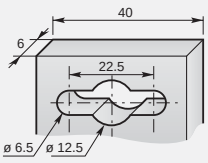
Connecting Characteristics

Contactor types: A..., AE...	9	12	16	26	30	40	45	50	63	75	95	110
AF..., TAE...	–	–	–	–	–	–	45	50	63	75	95	110
Main terminals	 with cable clamp				 with double connector 2 x (5.6 x 6.5 mm)		 with single connector (13 x 10 mm)				 with single connector (14 x 14 mm)	
Connecting capacity (min. ... max.) Main conductors (poles)												
Rigid: solid (≤ 4 mm²) 1 x mm²	1 ... 4			1.5 ... 6	2.5 ... 16		6 ... 50				10 ... 95	
stranded (≥ 6 mm²) 2 x mm²	1 ... 4			1.5 ... 6	2.5 ... 16		6 ... 16				6 ... 35	
Rigid with connector single for Cu cable mm²	–	–	–	–	–	–	–	–	–	–	–	–
single for Al/Cu cable mm²	–	–	–	–	–	–	–	–	–	–	–	–
double for Al/Cu cable mm²	–	–	–	–	–	–	–	–	–	–	–	–
Flexible with cable end 1 x mm²	0.75 ... 2.5			0.75 ... 4	2.5 ... 10		6 ... 35				10 ... 70	
2 x mm²	0.75 ... 2.5			0.75 ... 4	2.5 ... 10		6 ... 25				6 ... 35	
Bars or lugs L mm ≤	8			10	–	–	–	–	–	–	30 ②	
l mm >	3.7			4.2	–	–	–	–	–	–	6	
Auxiliary conductors (built-in auxiliary terminals + coil terminals)												
Rigid solid 1 x mm²	1 ... 4										0.75 ... 2.5	
2 x mm²	1 ... 4										0.75 ... 2.5	
Flexible with cable end 1 x mm²	0.75 ... 2.5						1 ... 2.5				0.75 ... 2.5	
2 x mm²	0.75 ... 2.5											
Lugs L mm ≤	8			①	8							
l mm >	3.7			①	3.7							
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529	Protection against direct contact acc. to VDE 0106 - Part. 100											
– Main terminals	IP 20						IP 10					
– Coil terminals	IP 20											
– Built-in auxiliary terminals	IP 20						–	–	–	–	–	–
Screw terminals	(delivered in open position, screws of unused terminals must be tightened)											
Main terminals	(+,-) pozidriv 2 screws										hexagon socket	
	M3.5			M4	M5		M6				M8 (s = 4 mm)	
Coil terminals	M3.5 (+,-) pozidriv 2 screws with cable clamp											
Built-in auxiliary terminals	(+,-) pozidriv 2 screws with cable clamp						–	–	–	–	–	–
	M3.5			M4	M5		–	–	–	–	–	–
Tightening torque												
Main pole terminals												
– recommended Nm / lb.in	1.00 / 9			1.7 / 15	2.30 / 20		4.00 / 35				6.00 / 53	
– max. Nm	1.20			2.20	2.60		4.50				6.50	
Coil terminals												
– recommended Nm / lb.in	1.00 / 9											
– max. Nm	1.20											
Built-in auxiliary terminals												
– recommended Nm / lb.in	1.00 / 9			1.7 / 15	1.00 / 9		–	–	–	–	–	–
– max. Nm	1.20			2.20	1.20		–	–	–	–	–	–
Terminal marking and positioning	see pages 1.34											

① L ≤ 8 and l > 3.7 for coil terminal - L ≤ 10 and l > 4.2 for built-in auxiliary terminals.
② With LW 110 enlargement piece. See page 1.31.

IEC Technical data
A/AF145 — AF750

Connecting Characteristics

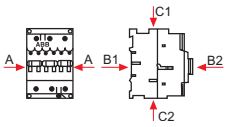
Contactor types:	A...	145	185	210	260	300	–	–	–	–
	AF...	145	185	210	260	300	400	460	580	750
Main terminals Flat type										
Connecting capacity (min. ... max.) Main conductors (poles)										
Rigid:	1 x mm²	–	–	–	–	–	–	–	–	–
	2 x mm²	–	–	–	–	–	–	–	–	–
Rigid with connector										
single for Cu cable	mm²	6 ... 185		16 ... 240			240		300	
single for Al/Cu cable	mm²	25 ... 150		120 ... 240			240		300	
double for Al/Cu cable	mm²	–		2 x 95 ... 120			2 x 240		3 x 185	
Flexible	1 x mm²	–	–	–	–	–	–	–	–	–
	2 x mm²	–	–	–	–	–	–	–	–	–
Bars or lugs	L mm ≤	24		32			47 / 45		52 / 50	
	Ø mm >	8		10			10		12	
Auxiliary conductors (coil terminals)										
Rigid solid	1 x mm²	1 ... 4								
	2 x mm²	1 ... 4								
Flexible with cable end	1 x mm²	0.75 ... 2.5								
	2 x mm²	0.75 ... 2.5								
Lugs	L mm ≤	8								
	l mm >	3.7								
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		Protection against direct contact acc. to VDE 0106 - part 100								
– Main terminals		IP 00								
– Coil terminals		IP 20								
– Built-in auxiliary terminals		–								
Screw terminals										
Main terminals		Screws and bolts								
		M8		M10			M10		M12	
Coil terminals (delivered in open position)		M3.5 (+,-) pozidriv 2 screws with cable clamp								
Built-in auxiliary terminals		–	–	–	–	–	–	–	–	–
		–	–	–	–	–	–	–	–	–
Tightening torque										
Main pole terminals										
– recommended	Nm / lb.in	18 / 160		28 / 240			40 / 354		45 / 443	
– max.	Nm	20		30			44		49	
Coil terminals										
– recommended	Nm / lb.in	1.00 / 9								
– max.	Nm	1.20								
Built-in auxiliary terminals										
– recommended	Nm / lb.in	–	–	–	–	–	–	–	–	–
– max.	Nm	–	–	–	–	–	–	–	–	–
Terminal marking and positioning		see pages 1.36 & 1.37								

Connecting Characteristics

Contactor types: AF...			1350	1650
Main terminals Flat type				
Connecting capacity (min. ... max.) Main conductors (poles)				
Rigid:		1 x mm²	–	–
		2 x mm²	–	–
Rigid with connector single for Cu cable		mm²	–	–
single for Al/Cu cable		mm²	–	–
double for Al/Cu cable		mm²	–	–
Flexible		1 x mm²	–	–
		2 x mm²	–	–
Bars or lugs		L mm ≤	100	100
		Ø mm >	12	12
Auxiliary conductors (coil terminals)				
Rigid solid		1 x mm²	1...4	1...4
		2 x mm²	1...4	1...4
Flexible with cable end		1 x mm²	0.75...2.5	0.75...2.5
		2 x mm²	0.75...2.5	0.75...2.5
Lugs		L mm ≤	8	8
		l mm >	3.7	3.7
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 – Main terminals – Coil terminals – Built-in auxiliary terminals			IP 00 IP 20	IP 00 IP 20
Screw terminals Main terminals			Screw and bolts M12	
Coil terminals (delivered in open position)			M3.5 (+,-) pozidriv 2 screws with cable clamp	
Built-in auxiliary terminals			—	—
Tightening torque Main pole terminals				
– recommended		Nm / lb.in	45/443	45/443
– max.		Nm	49	49
Coil terminals – recommended		Nm / lb.in	1.00 / 9	1.00 / 9
– max.		Nm	1.20	1.20
Built-in auxiliary terminals – recommended		Nm / lb.in	—	—
– max.		Nm	—	—

UL/CSA & IEC Technical data
AL9 — AL40

Contactor types:	AL	AL9	AL12	AL16	AL26	AL30	AL40
Rated insulation voltage U_i							
according to IEC 60947-4-1	V				1000		
according to UL/CSA	V				600		
Rated impulse withstand voltage $U_{imp.}$	kV				8		
Standards		Devices complying with international standards IEC 60947-1 / 60947-4-1 and European standards EN 60947-1 / 60947-4-1					
Air temperature close to contactor		see "Conditions for use" page 1.50, for control voltage limits and authorized mounting positions					
– fitted with thermal O/L relay	°C	-25 to +55					
– without thermal O/L relay	°C	-40 to +70 (55 max. for TAE... contactors)					
– for storage	°C	-60 to +80					
Climatic withstand		acc. to IEC 60068-2-30 and 60068-2-11 - UTE C 63-100 specification II					
Operating altitude	m	≤ 3000					
Shock withstand acc. IEC 60068-2-27 and EN 60068-2-27 Mounting position 1 (see page 1.50)		1/2 sinusoidal shock for 11 ms: no change in contact position					



Shock direction	Making position	Breaking position
A	20 g	20 g
B1	10 g	5 g
B2	15 g	15 g
C1	20 g	20 g
C2	20 g	20 g

IEC Technical data
AL9 — AL40

Main Pole - Utilization Characteristics

Contactor types:		AL	AL9	AL12	AL16	AL26	AL30	AL40
Rated operational voltage U_e max.		V			690			
Rated frequency limits		Hz			25-400			
Conventional free-air thermal current I_{th} acc. to IEC 60947-4-1,								
open contactors ø ≤ 40 °C		A	26	28	30	45	65	65
with conductor cross-sectional area	mm²	4	4	4	6	16	16	35
Rated operational current I_e / AC-1 for air temperature close to contactor								
U_e max. 690 V ø ≤ 40 °C		A	25	27	30	45	55	60
U_e max. 690 V ø ≤ 55 °C		A	22	25	27	40	55	60
U_e max. 690 V ø ≤ 70 °C ③		A	18	20	23	32	39	42
with conductor cross-sectional area	mm²		2.5	4	4	6	10	16
Utilization categorie AC-3 for air temperature close to contactor ≤ 55 °C								
Rated operational current I_e AC-3 ①								
3-phase motors	220-230-240 V	A	9	12	17	26	33	40
	380-400 V	A	9	12	17	26	32	37
	415 V	A	9	12	17	26	32	37
	440 V	A	9	12	16	26	32	37
	500 V	A	9	12	14	22	28	33
	690 V	A	7	9	10	17	21	25
	1000 V	A	–	–	–	–	–	–
Rated operational power AC-3 ①								
1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors	220-230-240 V	kW	2.2	3	4	6.5	9	11
	380-400 V	kW	4	5.5	7.5	11	15	18.5
	415 V	kW	4	5.5	9	11	15	18.5
	440 V	kW	4	5.5	9	15	18.5	22
	500 V	kW	5.5	7.5	9	15	18.5	22
	690 V	kW	5.5	7.5	9	15	18.5	22
	1000 V	kW	–	–	–	–	–	–
Rated making capacity AC-3 according to IEC 60947-4-1					10 x I_e AC-3			
Rated breaking capacity AC-3 according to IEC 60947-4-1					8 x I_e AC-3			
Short-circuit protection for contactors without thermal O/L relay - Motor protection excluded								
U_e ≤ 500 V a.c. - gG type fuse		A	25	32	32	50	63	
Rated short-time withstand current I_{cw} at 40 °C ambient temp., in free air,								
from a cold state	1 s	A	250	280	300	400	600	
	10 s	A	100	120	140	210	400	
	30 s	A	60	70	80	110	225	
	1 min	A	50	55	60	90	150	
	15 min	A	26	28	30	45	65	
Maximum breaking capacity cos ø = 0.45 (cos ø = 0.35 for I_e > 100 A)								
	at 440 V	A	250	—	—	420	820	
	at 690 V	A	90	—	—	170	340	
Heat dissipation per pole	I_e / AC-1	W	0.8	1	1.2	1.8	2.5	
	I_e / AC-3	W	0.1	0.2	0.35	0.6	0.9	
Max. electrical switching frequency								
– for AC-1		cycles/h			600			
– for AC-3		cycles/h			1200			
– for AC-2, AC-4		cycles/h			300			
Mechanical durability								
– millions of operating cycles					10			
– max. mechanical switching frequency		cycles/h			3600			

IEC Technical data
AL9 — AL40, TAL9 – TAL40

Magnet system characteristics for AL contactors

Contactor types: AL		AL9	AL12	16	26	30	40
Rated control circuit voltage U_c	V d.c.	12 ... 240 (24V & 48V for AL...Z)					
Coil operating limits according to IEC 60947-4-1		ø ≤ 55 °C 0.85 ... 1.1 x U_c					
Drop-out voltage in % of U_c		roughly 15 ... 30 %					
Coil consumption - Average values							
– pull-in value	W	3 (2.4 for AL9Z - AL16Z)			3.5		
– holding value	W	3 (2.4 for AL9Z - AL16Z)			3.5		
Coil time constant							
– open L/R	ms	40					
– closed L/R	ms	90					
Operating time between coil energization and:							
– N.O. contact closing	ms	50 ... 75					
– N.C. contact opening	ms	45 ... 70					
between coil de-energization and							
– N.O. contact opening	ms	15 ... 30					
– N.C. contact closing	ms	17 ... 32					

Magnet System Characteristics for TAL... Contactors

Contactor types: TAL		TAL9	TAL12	TAL16	TAL26	TAL30	TAL40
Rated control circuit voltage U_c	V d.c.	9 ... 264					
Coil operating limits according to IEC 60947-4-1		ø ≤ 55 °C 0.85 ... 1.1 x U_c					
Drop-out voltage in % of U_c max.		roughly 20... 35 %					
Coil consumption values for U_c max. and 20 °C							
– Uc max. DC	W	8.5			9		
– Uc min. DC	W	2.5			2.7		
– Uc DC	W	5			5.4		
Operating time between coil energization and:							
– N.O. contact closing	ms	50 ... 100			55 ... 110		
– N.C. contact opening	ms	20 ... 70			25 ... 75		
between coil de-energization and							
– N.O. contact opening	ms	10 ... 17 ①			12 ... 18 ①		
– N.C. contact closing	ms	16 ... 27 ①			18 ... 28 ①		

① The use of surge suppressors increases the opening time on a scale of 1.1 to 1.5 for a varistor suppressor and on a scale of 4 to 8 for a diode suppressor.

Built-in Auxiliary Contacts - Utilization Characteristics

Contactor types: AL			AL9	AL12	AL16	AL26	AL30	AL40
Rated operational voltage U_e max.	V				690			
Conventional free air thermal current I_{th} - ø ≤ 40 °C	A				16			
Rated frequency limits	Hz				25 ... 400			
Rated operational current I_e / AC-15 according to IEC 60947-5-1								
24-127 V 50/60 Hz	A				6			
220-240 V 50/60 Hz	A				4			
380-440 V 50/60 Hz	A				3			
500 V 50/60 Hz	A				2			
690 V 50/60 Hz	A				2			
Rated operational current I_e / DC-13 according to IEC 60947-5-1								
24 V d.c.	A / W				6 / 144			
48 V d.c.	A / W				2.8 / 134			
72 V d.c.	A / W				2 / 144			
125 V d.c.	A / W				1.1 / 138			
250 V d.c.	A / W				0.55 / 138			
Rated making capacity acc. to IEC 60947-5-1					10 x I_e / AC-15			
Rated breaking capacity acc. to IEC 60947-5-1					10 x I_e / AC-15			
Short-circuit protection gG type fuse	A				10			
Rated short-time withstand current I_{cw}								
for 1.0 s	A				100			
for 0.1 s	A				140			
Minimum switching capacity	V / mA				17 / 5			
Non-overlapping time between N.O. and N.C. contacts	ms				≥ 2			
Insulating resistance at 500 V d.c. after durability test	MOhm				5			
Heat dissipation per pole at 6 A	W				0.10			

IEC Technical data
AL9 — AL40

Mounting characteristics

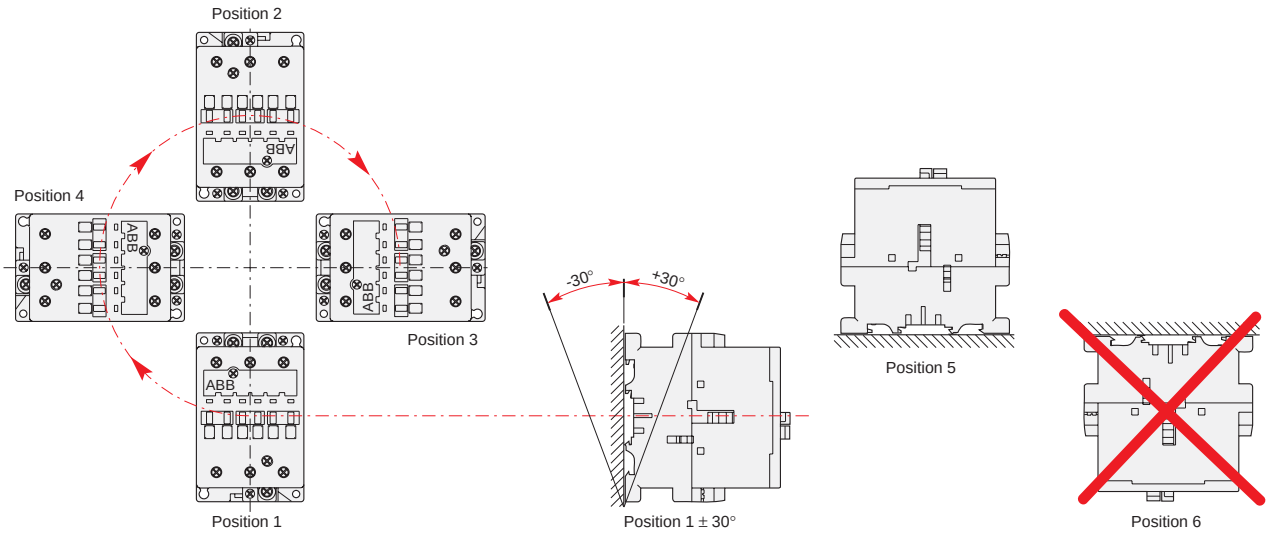
Contactor types:	AL	AL9 AL12 AL16 AL26 AL30 AL40
Mounting positions		see "Conditions for use"
Mounting distances		The contactors can be assembled side by side
Mounting		
on DIN rail according to IEC 715 and EN 50022 / EN 50023		35 x 7.5 mm 35 x 15 mm
by screws (not supplied)		2 x M4

Conditions for Use

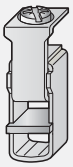
Sustainable utilization conditions for contactors involving at the same time the Mounting position, Ambient temperature and Control voltage operating limits are summarized in the table below.

Contactors	Mounting position	Ambient temperature	Control voltage
AL9 – AL40	1, 1 ± 30°, 2, 3, 4, 5	≤ 55 °C	0.85 ... 1.1 x U_c
		55 ... 70 °C	U_c
	6 (Unauthorized)		

Mounting Positions (see the above table for authorized positions)



Connecting Characteristics

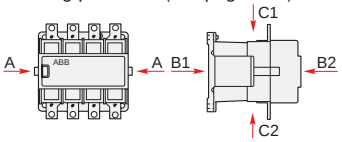
Contactor types: AL		AL9	AL12	AL16	AL26	AL30	AL40
Main terminals		 with cable clamp				 with double connector 2 x (5.6 x 6.5 mm)	
Connecting capacity (min. ... max.) Main conductors (poles)							
Rigid: solid (≤ 4 mm²)	1 x mm²	1 ... 4			1.5 ... 6	2.5 ... 16	
stranded (≥ 6 mm²)	2 x mm²	1 ... 4			1.5 ... 6	2.5 ... 16	
Rigid with connector							
single for Cu cable	mm²	–	–	–	–	–	–
single for Al/Cu cable	mm²	–	–	–	–	–	–
double for Al/Cu cable	mm²	–	–	–	–	–	–
Flexible with cable end	1 x mm²	0.75 ... 2.5			0.75 ... 4	2.5 ... 10	
	2 x mm²	0.75 ... 2.5			0.75 ... 4	2.5 ... 10	
Bars or lugs	L mm ≤	8			10	–	–
	l mm >	3.7			4.2	–	–
Auxiliary conductors (built-in auxiliary terminals + coil terminals)							
Rigid solid	1 x mm²	1 ... 4					
	2 x mm²	1 ... 4					
Flexible with cable end	1 x mm²	0.75 ... 2.5					
	2 x mm²	0.75 ... 2.5					
Lugs	L mm ≤	8			①	8	
	l mm >	3.7			①	3.7	
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		Protection against direct contact acc. to VDE 0106 - Part. 100					
– Main terminals		IP 20					
– Coil terminals		IP 20					
– Built-in auxiliary terminals		IP 20					
Screw terminals		(delivered in open position, screws of unused terminals must be tightened)					
Main terminals		(+,-) pozidriv 2 screws					
		M3.5			M4	M5	
Coil terminals		M3.5 (+,-) pozidriv 2 screws with cable clamp					
Built-in auxiliary terminals		(+,-) pozidriv 2 screws with cable clamp					
		M3.5			M4	M5	
Tightening torque							
Main pole terminals							
– recommended	Nm / lb.in	1.00 / 9			1.7 / 15	2.30 / 20	
– max.	Nm	1.20			2.20	2.60	
Coil terminals							
– recommended	Nm / lb.in	1.00 / 9					
– max.	Nm	1.20					
Built-in auxiliary terminals							
– recommended	Nm / lb.in	1.00 / 9			1.7 / 15	1.00 / 9	
– max.	Nm	1.20			2.20	1.20	
Terminal marking and positioning		see pages 1.35					

① L ≤ 8 and l > 3.7 for coil terminal - L ≤ 10 and l > 4.2 for built-in auxiliary terminals.
② With LW 110 enlargement piece. See page 1.31.

IEC Technical data
EK110 — EK1000

General Technical Data

Contactor types: EK...		110	150	175	210	370	550	1000
Rated insulation voltage U_i								
according to IEC 60947-4-1	V	1000						
according to UL/CSA	V	600						
Rated impulse withstand voltage $U_{imp.}$	kV	8						
Standards		Devices complying with international standards IEC 60947-1 / 60947-4-1 and European standards EN 60947-1 / 60947-4-1						
Air temperature close to contactor		see "Conditions for use" page 1.63, for control voltage limits and authorized mounting positions						
– fitted with thermal O/L relay	°C	-25 to +55						
– without thermal O/L relay	°C	-40 to +70						
– for storage	°C	-50 to +70						
Climatic withstand		acc. to IEC 60068-2-30						
Operating altitude	m	≤ 3000						
Shock withstand								
acc. IEC 60068-2-27 and EN 60068-2-27								
Mounting position 1 (see page 1.63)		1/2 sinusoidal shock for 15 ms: no change in contact position Contactor in making or breaking position Shock direction: A, C1, C2: 10 g B1: 10 g B2: 10 g						



Main Pole - Utilization Characteristics

Contactor types: EK...			110	150	175	210	370	550	1000
Rated operational voltage U_e max.		V	1000						690
Rated frequency limits		Hz	25 ... 400						
Conventional free-air thermal current I_{th} acc. to IEC 60947-4-1, open contactors ø ≤ 40 °C		A	200	250	300	350	550	800	1000
with conductor cross-sectional area		mm²	95	150	185	240	2 x 185	2 x 240	2 x 300
Rated operational current I_e / AC-1 for air temperature close to contactor									
U_e max. 690 V	ø ≤ 40 °C	A	200	250	300	350	550	800	1000
	ø ≤ 55 °C	A	180	230	270	310	470	650	800
	ø ≤ 70 °C	A	155	200	215	250	400	575	720
with conductor cross-sectional area		mm²	95	150	185	240	2 x 185	2 x 240	2 x 300
Utilization categorie AC-3 for air temperature close to contactor ≤ 55 °C									
Rated operational current I_e AC-3									
3-phase motors	220-230-240 V	A	120	145	210		400	550	–
	380-400 V	A	120	145	210		400	550	–
	415 V	A	120	145	210		400	550	–
	440 V	A	120	145	210		370	550	–
	500 V	A	120	145	210		370	550	–
	690 V	A	120	120	210		370	550	–
	1000 V	A	64	80	113		155	175	–
Rated operational power AC-3									
1500 r.p.m. 50 Hz	220-230-240 V	kW	30	45	59		110	160	–
1800 r.p.m. 60 Hz	380-400 V	kW	55	75	110		200	280	–
3-phase motors	415 V	kW	55	75	110		220	315	–
	440 V	kW	59	75	110		220	315	–
	500 V	kW	75	90	132		250	400	–
	690 V	kW	110	110	160		355	500	–
	1000 V	kW	90	110	160		220	250	–
Rated making capacity AC-3 according to IEC 60947-4-1			10 x I_e AC-3						–
Rated breaking capacity AC-3 according to IEC 60947-4-1			8 x I_e AC-3						–
Short-circuit protection for contactors without thermal O/L relay - Motor protection excluded									
U_e ≤ 500 V a.c. - gG type fuse		A	250		355		630	800	1000
Rated short-time withstand current I_{cw} at 40 °C ambient temp., in free air, from a cold state	1 s	A	1700	1800	2300		5500		6800
	10 s	A	900	1200	1680		5300		6400
	30 s	A	600	700	1000		3700		4400
	1 min	A	450	550	800		3000		3400
	15 min	A	210	250	320		1000		1200
Maximum breaking capacity cos ø = 0.45 (cos ø = 0.35 for I_e > 100 A)									
	at 440 V	A	1400	1500	2000		5000	5400	–
	at 690 V	A	1100	1200	1700		5000	5400	–
Heat dissipation per pole	I_e / AC-1	W	10	13	18		40	60	80
	I_e / AC-3	W	3	5	9		15	25	–
Max. electrical switching frequency									
– for AC-1		cycles/h	300						300
– for AC-3		cycles/h	300						–
– for AC-2, AC-4		cycles/h	150		120				–
Electrical durability			see pages 1.75						
Mechanical durability									
– millions of operating cycles			10				5		
– max. mechanical switching frequency		cycles/h	3600				3600		

IEC Technical data
EK110 — EK1000

Magnet System Characteristics for EK... Contactors - a.c. Operated

Contactor types: EK...			110	150	175	210	370	550	1000
Rated control circuit voltage U_c									
– at 50 Hz		V	24 ... 500				48 ... 500		
– at 60 Hz		V	24 ... 600				110 ... 600		
Coil operating limits			ø ≤ 70 °C						
according to IEC 60947-4-1			0.85 ... 1.1 x U_c						
Drop-out voltage in % of U_c			roughly 45 ... 65 %						
Coil consumption									
Average pull-in value	50 Hz①	VA	800		1100		3500		
	60 Hz①	VA	900		1200		4000		
	50/60 Hz②	VA/VA	500/500		630/630		3800/3400		
Average holding value	50 Hz①	VA/W	44/15		52/18		125/50		
	60 Hz①	VA/W	52/18		65/22		140/60		
	50/60 Hz②	VA/W	2.5/2.5		2.5/2.5		140/60		
Operating time									
between coil energization and:									
– N.O. contact closing		ms	20 ... 40① / 30 ... 50②				30 ... 60		
– N.C. contact opening		ms	15 ... 35① / 25 ... 45②				25 ... 55		
between coil de-energization and:									
– N.O. contact opening		ms	7.5 ... 15① / 95 ... 120②				10 ... 20		
– N.C. contact closing		ms	10 ... 18① / 100 ... 125②				13 ... 23		

Magnet System Characteristics for EK... Contactors - d.c. Operated

Contactor types: EK...			110	150	175	210	370	550	1000
Rated control circuit voltage U_c									
		V d.c.	12 ... 220				24 ... 220		
Coil operating limits			ø ≤ 70 °C						
according to IEC 60947-4-1			0.85 ... 1.1 x U_c						
Drop-out voltage in % of U_c			roughly 15 ... 50 %						
Coil consumption - Average values									
– pull-in value		W	500		630		1100		
– holding value		W	2.5		2.5		20		
Coil time constant									
– open	L/R	ms	8				12		
– closed	L/R	ms	50				60		
Operating time									
between coil energization and:									
– N.O. contact closing		ms	30 ... 50				60 ... 80		
– N.C. contact opening		ms	27 ... 47				55 ... 75		
between coil de-energization and:									
– N.O. contact opening		ms	10 ... 35						
– N.C. contact closing		ms	13 ... 38						

① "A" coil voltage codes see page 1.29.
② 50/60 Hz "E" coil voltage codes see page 1.29.

Mounting Characteristics

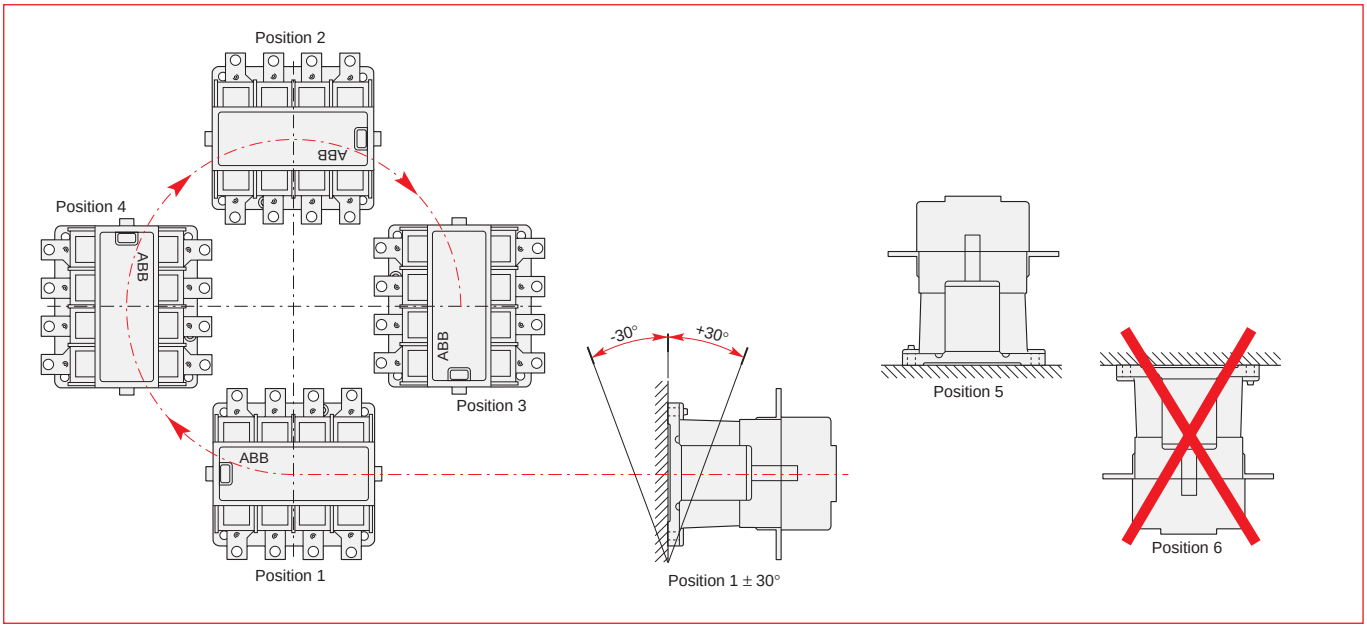
Contactor types: EK...	110	150	175	210	370	550	1000
Mounting positions	see "Conditions for use"						
Fixing by screws (supplied) 4 x M6	4 x M6 (1)						

Conditions for Use

Sustainable utilization conditions for contactors involving at the same time the Mounting position, Ambient temperature and Control voltage operating limits are summarized in the table below.

Contactors	Mounting position	Ambient temperature	Control voltage
E110 ... EK210	1, 1 ± 30°, 3, 4, 5	≤ 70 °C	0.85 ... 1.1 x U_c
	2, 6 unauthorized		
E370 ... EK1000	1, 1 ± 30°, 2, 3, 4, 5	≤ 70 °C	0.85 ... 1.1 x U_c
	6 unauthorized		

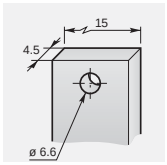
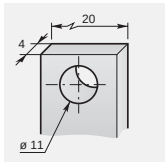
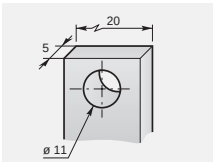
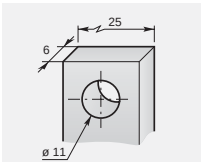
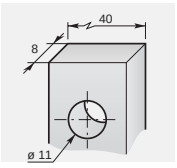
Mounting Positions (see the above table for authorized positions)



① Damping elements are supplied

IEC Technical data
EK110 — EK1000

Connecting Characteristics

Contactor types: EK...			110	150	175	210	370	550	1000
Main terminals Flat type									
Connecting capacity (min. ... max.) Main conductors (poles)									
Rigid:		1 x mm²	–	–	–	–	–	–	–
		2 x mm²	–	–	–	–	–	–	–
Rigid with connector single for Cu cable	mm²	25 ... 120	25 ... 185			70 ... 300		–	
single for Al/Cu cable		mm²	10 ... 70	35 ... 120			70 ... 300		95 ... 300
double for Al/Cu cable		mm²	–	–			2 x 35 ... 185		2 x 95 ... 300
Flexible		1 x mm²	–	–	–	–	–	–	–
		2 x mm²	–	–	–	–	–	–	–
Bars or lugs		L mm ≤	30	30	33		55		
		Ø mm >	6	10	10		10		
Auxiliary conductors (coil terminals)									
Rigid solid		1 x mm²	0.5 ... 2.5						
		2 x mm²	0.5 ... 2.5						
Flexible with cable end		1 x mm²	0.5 ... 2.5						
		2 x mm²	0.5 ... 2.5						
Lugs		L mm ≤	8						
		l mm >	3.7						
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			Protection against direct contact acc. to VDE 0106 - Part. 100						
– Main terminals			IP 00						
– Coil terminals			IP 20						
Screw terminals									
Main terminals			Screws and bolts						
			M6	M10					
Coil terminals (delivered in open position)			M3.5 (+,-) pozidriv 2 screws with cable clamp						
Tightening torque									
Main pole terminals									
– recommended		Nm / lb.in	5 / 44	18 / 160					
– max.		Nm	6	22					
Coil terminals									
– recommended		Nm / lb.in	1.00 / 9						
– max.		Nm	1.20						

IEC Technical data
Contactor electrical durability and Utilization categories

General

Utilization categories determine the current making and breaking conditions relating to the characteristics of the loads to be controlled by the contactors. International standard IEC 60947-4-1 and European standard EN 60947-4-1 are the standards to be referred to.

If I_c is the current to be broken by the contactor and I_e the rated operational current normally drawn by the load, then:

- Categories AC-1 and AC-3: $I_c = I_e$
- Category AC-2: $I_c = 2.5 \times I_e$
- Category AC-4: $I_c = 6 \times I_e$

Generally speaking $I_c = m \times I_e$ where m is a multiple of the load operational current.
On pages 1.66 - 1.71, the curves corresponding to categories AC-1, AC-2, AC-3 and AC-4 represent the electrical durability variation of standard contactors in relation to the breaking current I_c.
Electrical durability is expressed in millions of operating cycles.
These curves have been plotted for 400 V - 50 Hz 3-phase currents but remain valid up to 690 V - 40 ... 60 Hz provided that a check is carried out to make sure that at the operational voltage U_e, the current I_e normally drawn by the load does not exceed the value of the contactor rated operational current: I_e / AC-1 for category AC-1 and I_e / AC-3 for categories AC-3 and AC-4. The values are given for each type of contactor in pages 1.44, 1.45, 1.54, and 1.61 (Technical Data).

Curve Utilization Mode

Electrical durability forecast and contactor selection for categories AC-1, AC-2, AC-3 or AC-4

- Note the characteristics of the load to be controlled:
  - Operational voltage ..... U_e
  - Current normally drawn ..... I_e (U_e / I_e / kW relation for motors, + page 0/0).
  - Utilization category ..... AC-1, AC-2, AC-3 or AC-4
  - Breaking current ..... $I_c = I_e$ for AC-1 and for AC-3 ; $I_c = 2.5 \times I_e$ for AC-2 ; $I_c = 6 \times I_e$ for AC-4
- Define the number of operating cycles N required.
- On the diagram corresponding to the operational category, select the contactor with the curve immediately above the intersection point (I_c ; N).

Electrical durability forecast and contactor selection for mixed duty motor control: AC-3 ($I_c = I_e$) type switching off while "motor running" and, occasionally, AC-4 ($I_c = 6 \times I_e$) type switching off while "motor accelerating".

- Note the characteristics of the motor to be controlled:
  - Operational voltage ..... U_e
  - Current normally drawn while "motor running" ..... I_e (U_e / I_e / kW relation for motors, + 0/0).
  - Breaking current for AC-3 ..... $I_c = I_e$
  - Breaking current for AC-4 while "motor accelerating" ..... $I_c = 6 \times I_e$
  - Percentage of AC-4 operations ..... K (on the basis of the total number of operating cycles)
- Define the total number of operating cycles N required.
- Note the smallest contactor rating compatible for AC-3 (U_e / I_e) on pages 2/62, 2/63, 2/73, and 2/79.
- For the selected contactor make a note of the following in relation to the voltage using diagram AC-3 page 2/85 and AC-4 page 2/86 or 2/87:
  - The number of operating cycles A for $I_c = I_e$ (AC-3)
  - The number of operating cycles B for $I_c = 6 \times I_e$ (AC-4)
- Calculate the estimated number of cycles N' (N' is always below A)

$$N' = \frac{A}{1 + 0.01\ K\ (A/B - 1)}$$

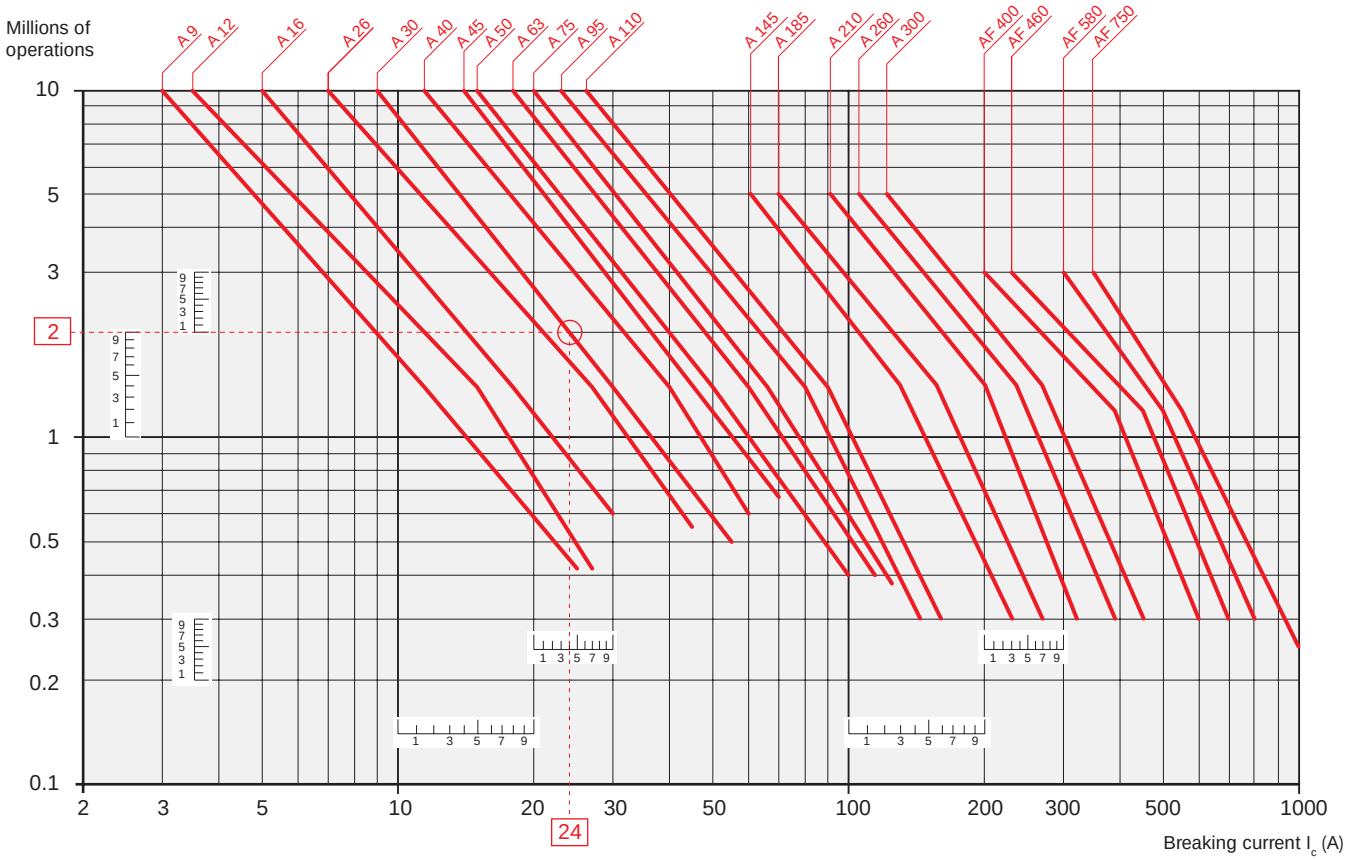
  - If N' is too low in relation to the target N, calculate the estimated number of cycles for a higher contactor rating.

Case of uninterrupted duty.
Among the different utilization categories, the uninterrupted duty implies the following remark. The combinated effect of environmental conditions and the proper temperature of the product may require some disposals. As a matter of fact, for this duty, the use duration prevails over the number of operating cycles.
For long term service, some verifications of preventing maintenance are needed to check the functionality of the concerned product (consult us).
Over a duration of five years, in these conditions the contactor might present high internal resistance. We recommend to change the contactor or change the contacts.

IEC Technical data
A9 — AF750
Electrical durability

Electrical Durability for AC-1 Utilization Category. Ambient Temperature ≤ 55 °C

Switching non-inductive or slightly inductive loads. The breaking current I_c for AC-1 is equal to the rated operational current of the load.

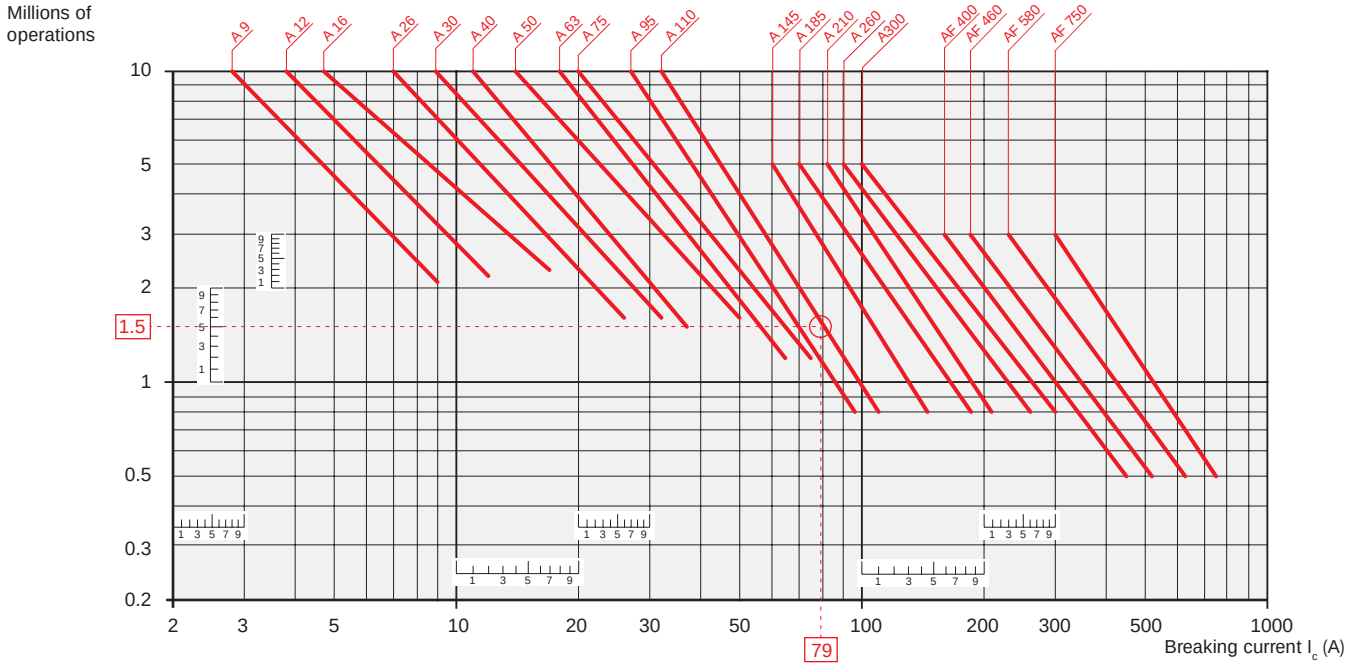


Example:
I_c / AC-1 = 24 A – Electrical durability required = 2 million operations.
Using the AC-1 curves above select the A 30 contactor at intersection "○" (24 A / 2 million operations).

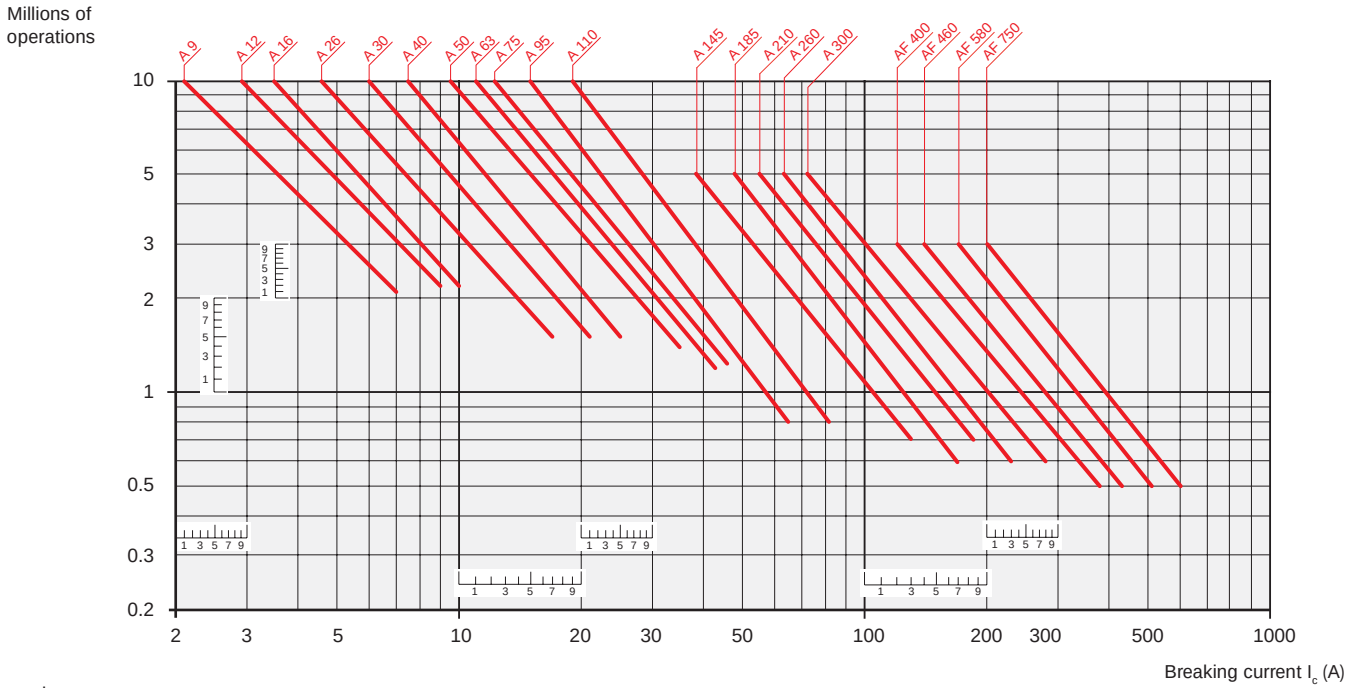
IEC Technical data
A9 — AF750
Electrical durability

Switching cage motors: starting and switching off running motors. The breaking current I_c for AC-3 is equal to the rated operational current I_e (I_e = motor full load current).

Electrical Durability for AC-3 Utilization Category - $U_e \leq 440$ V. Ambient Temperature ≤ 55 °C



Electrical Durability for AC-3 Utilization Category - 440 V < $U_e \leq 690$ V. Ambient Temperature ≤ 55 °C



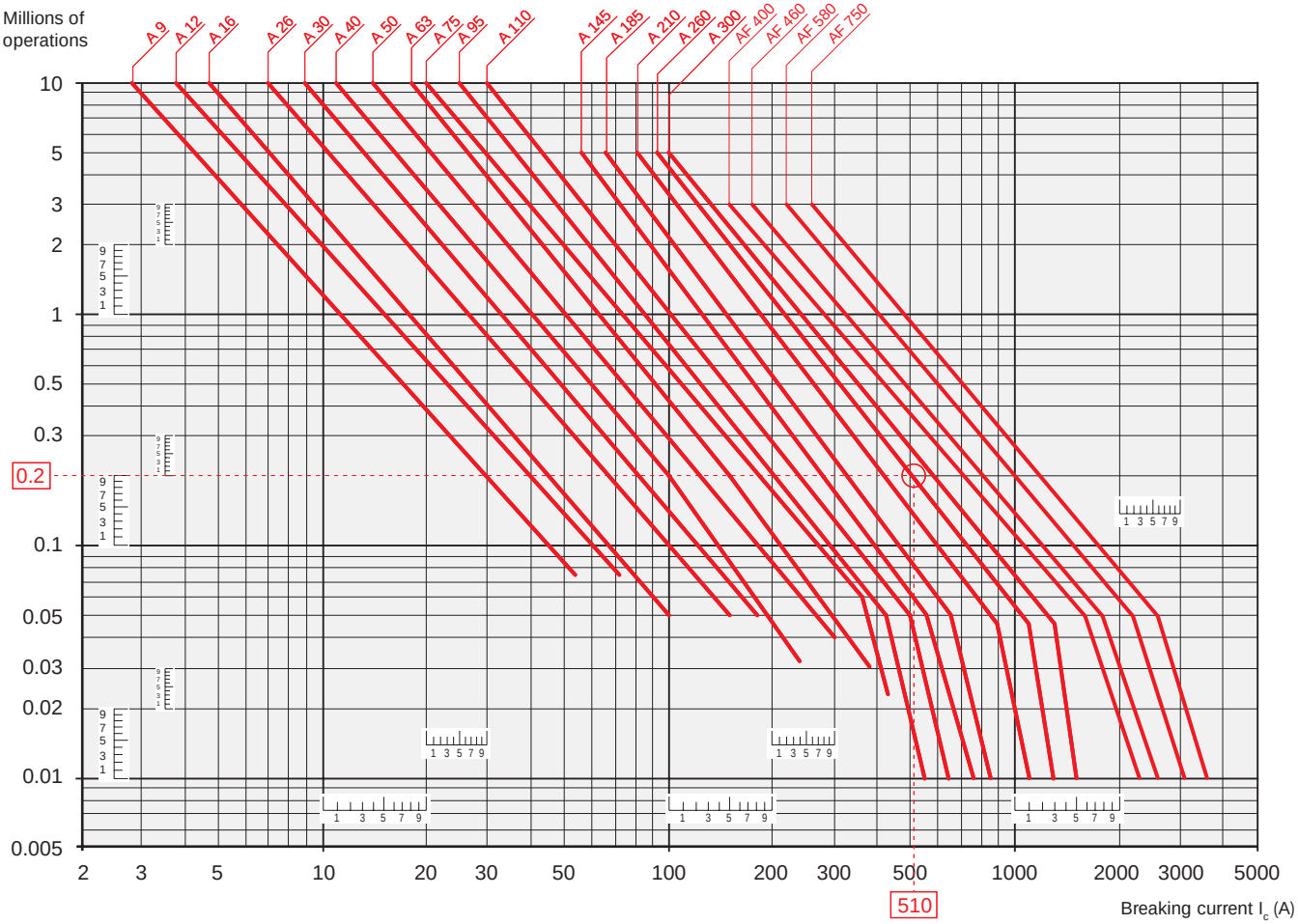
Example:
Motor power 40 kW for AC-3 - U_e = 400 V utilization – Electrical durability required = 1.5 million operations.
40 kW, 400 V corresponds to I_e = 79 A. For AC-3: $I_c = I_e$. Select the A 110 contactor at intersection "○" (79 A / 1.5 million operations) on the curves (AC-3 - $U_e \leq 440$ V).

IEC Technical data
A9 — AF750
Electrical durability

Electrical Durability for AC-2 or AC-4 Utilization Category - $U_e \leq 440$ V. Ambient Temperature ≤ 55 °C

Maximum number of AC-2 or AC-4 operations: 300 per hour for A 9 ... A 40 contactors,
150 per hour for A 50 ... A 300 contactors.

Switching cage motors: starting, reverse operation and step-by-step operation. The breaking current I_c is equal to 2.5 x I_e for AC-2 and 6 x I_e for AC-4, keeping in mind that I_e is the motor rated operational current (I_e = motor full-load current).



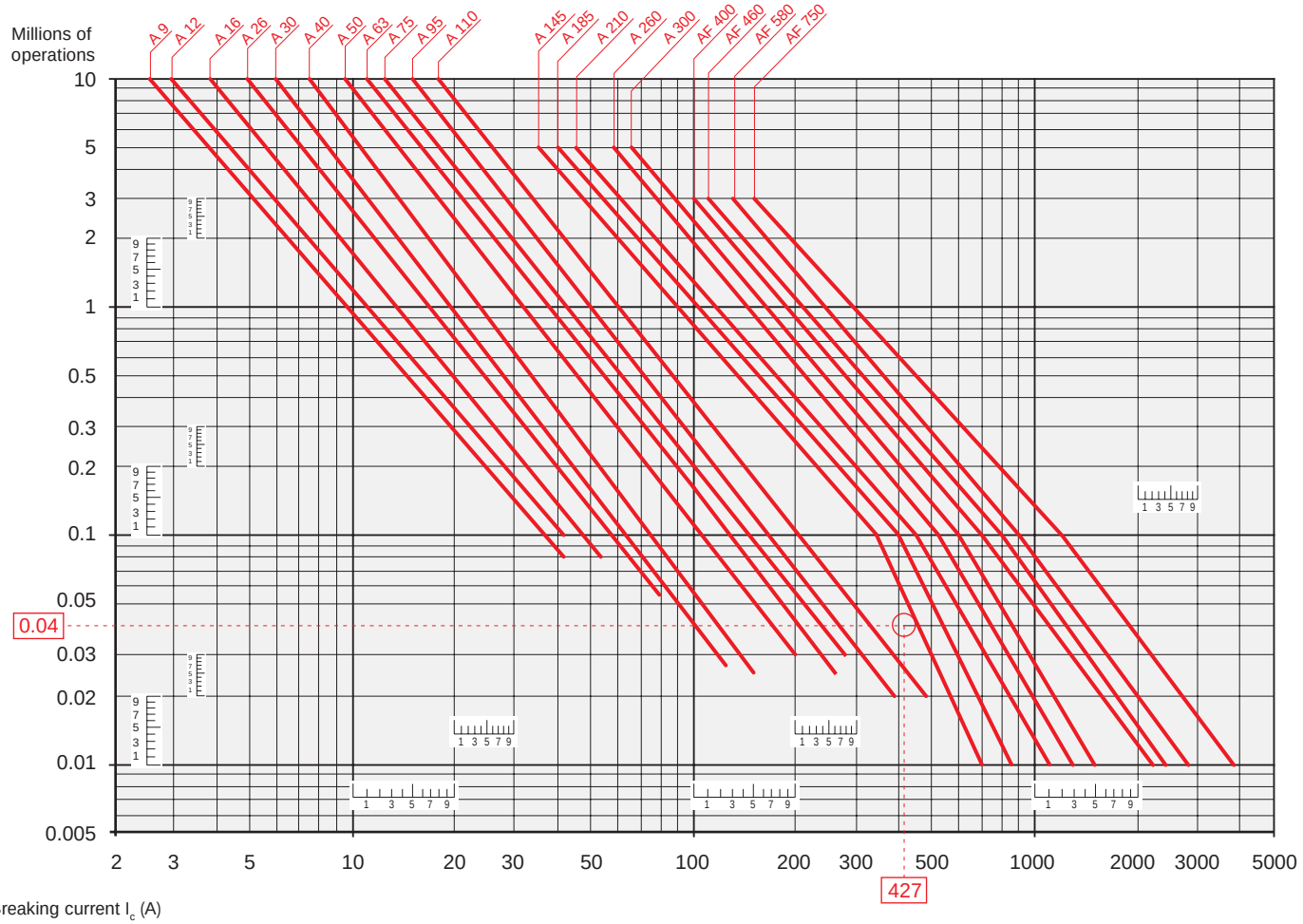
Example:
Motor power 45 kW for AC-4 - U_e = 400 V utilization – Electrical durability required = 0.2 million operations.
45 kW, 400 V corresponds to I_e = 85 A.
For AC-4: I_c = 6 x I_e = 510 A - Select the A 260 contactor at intersection "○" (510 A / 0.2 million operations) on the curves (AC-4 - $U_e \leq 440$ V).

IEC Technical data
A9 — AF750
Electrical durability

Electrical Durability for AC-2 or AC-4 Utilization Category - 440 V < U_e ≤ 690 V. Ambient Temperature ≤ 55 °C

Maximum number of AC-2 or AC-4 operations: 300 per hour for A 9 ... A 40 contactors,
150 per hour for A 50 ... A 300 contactors.

Switching cage motors: starting, reverse operation and step-by-step operation. The breaking current I_c is equal to 2.5 x I_e for AC-2 and 6 x I_e for AC-4, keeping in mind that I_e is the motor rated operational current (I_e = motor full-load current).



Breaking current I_c (A)

Example:
Motor power 59 kW for AC-4 - U_e = 600 V utilization – Electrical durability required = 0.04 million operations.
As stated on page 0/0: 59 kW, 600 V corresponds to I_e = 71.1 A.
For AC-4: I_c = 6 x I_e = 426.6 A - Select the A 145 contactor at intersection "○" (427 A / 0.04 million operations) on the curves (AC-4 - 440 V < U_e ≤ 690 V).

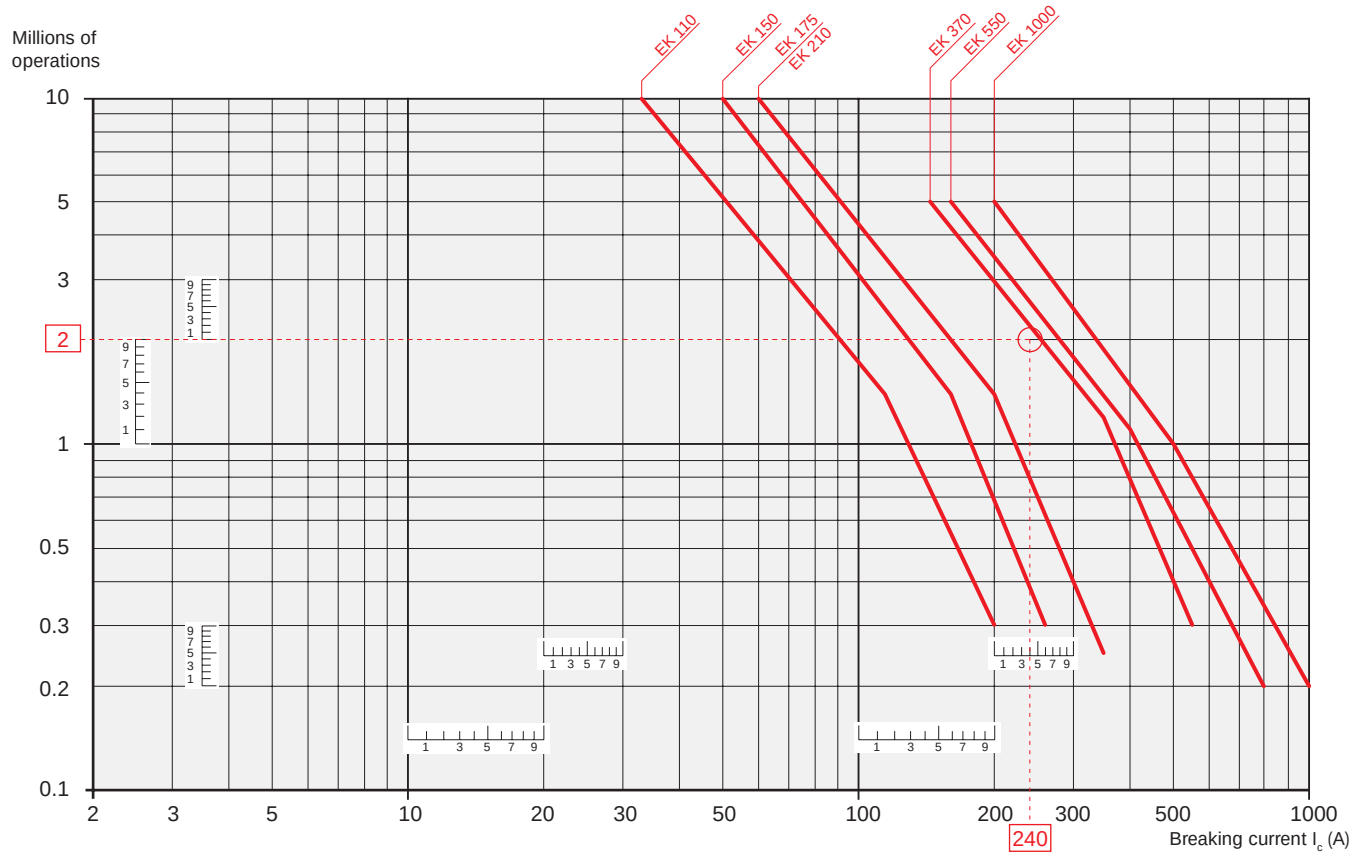
IEC Technical data
AL9 — AL40
Electrical durability

Consult factory

IEC Technical data
EK110 — EK1000
Electrical durability

Electrical Durability for AC-1 Utilization Category. Ambient Temperature ≤ 55 °C

Switching non-inductive or slightly inductive loads. The breaking current I_c for AC-1 is equal to the rated operational current of the load.



Example:
I_c / AC-1 = 240 A – Electrical durability required = 2 million operations.
Using the AC-1 curves above select the EK 370 contactor at intersection "○" (240 A / 2 million operations).

IEC Technical data
Influence of the length of conductors used in contactor control circuits

A 50-30-00

AF 460-30-11

Under certain conditions the excessive length of the control circuit conductors may prevent the contactor from carrying out closing and opening orders.

– no closing: due to excessive voltage drop (in a.c. or d.c.).
– no opening: due to excessive capacitance (in a.c.).

Contactor Closing (contactor with a.c. or d.c. fed control circuit)

The voltage drop is due to the pull-in current (pull-in power) and to the resistance of the control circuit conductors.

The table and graph below can be used to determine the single length of line feeders (distance between the control device and the contactor coil) in relation to:

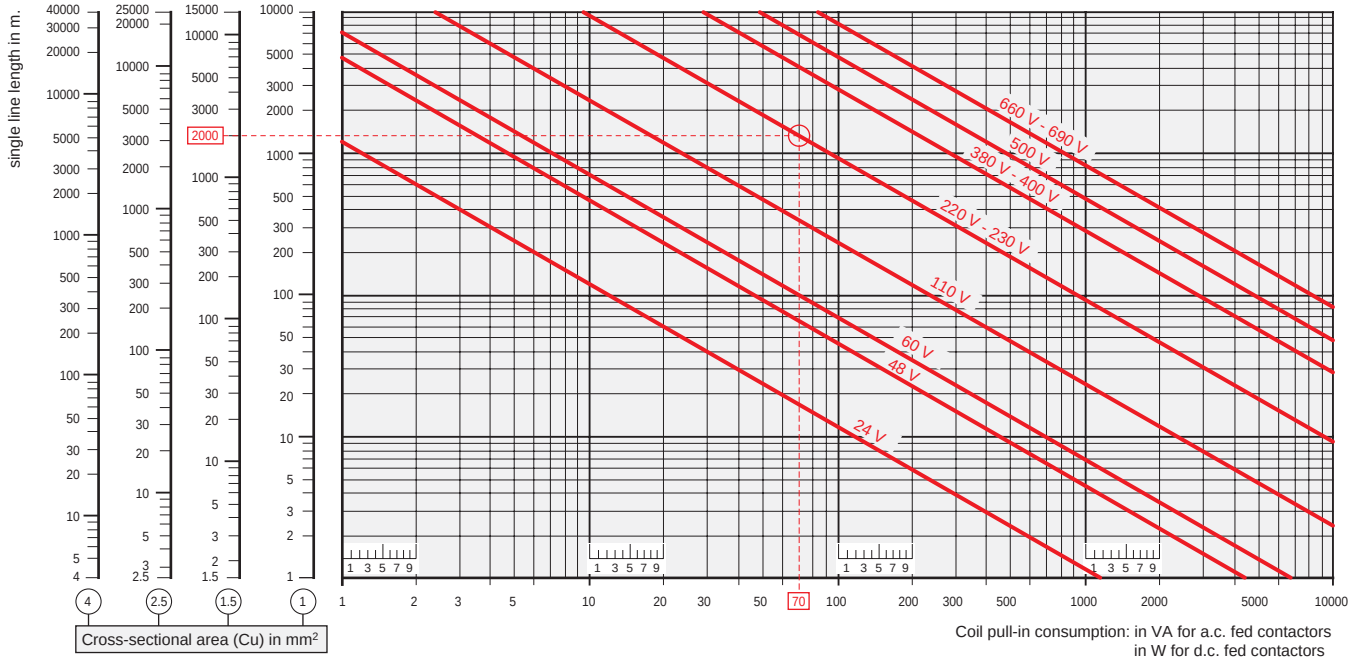
- the coil pull-in consumption.
- the supply voltage.
- the connecting wire cross-sectional area.

The graph has been drawn for a max. line voltage drop of 5 %.

Coil pull-in consumption (average value)

Contactors	a.c. control circuit 50 Hz	Contactors	d.c. control circuit
A 9, 12, 16	70 VA	AE 9, 12, 16	90 W
A 26, 30, 40	120 VA	AE 26, 30, 40	110 W
A 45, 50, 63, 75	180 VA	AE 45, 50, 63, 75	200 W
A 95, 110	450 VA	AE 95, 110	400 W
A 145, 185	700 VA	BC 9, 16, 18, 25, 30	7 W
A 210, 260, 300	1700 VA		
AF 45, 50, 63, 75	210 VA	AF 45, 50, 63, 75	190 W
AF 95, 110	350 VA	AF 95, 110	400 W
AF 145,185	430 VA	AF 145,185	500 W
AF 210, 260, 300	470 VA	AF 210, 260, 300	520 W
AF 400, 460	890 VA	AF 400, 460	990 W
AF 580, 750	850 VA	AF 580, 750	950 W

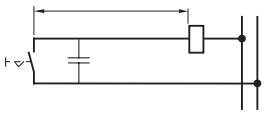
Permissible single length for the control circuit conductors on contactor closing:
Depending on the coil pull-in power consumption on the supply voltage and on the control circuit conductor cross-sectional area.



Example:
A 9 contactor
Coil voltage: 230 V 50 Hz, contactor coil pull-in power consumption: 70 VA,
control circuit conductor cross-sectional area: Cu 1.5 mm².
Max. permissible length: 2000 m.

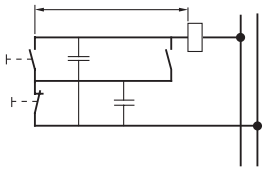
IEC Technical data
Influence of the length of conductors used in contactor control circuits

Single control line length



Wiring diagram A
Via maintained pushbutton and 2-core cable (with a capacity of 0.2 µF/km, for example).

Single control line length



Wiring diagram B
Via momentary pushbutton plus hold-in contact and 3-core cable (with a capacity of 2 x 0.2 = 0.4 µF/km, for example).

Contactor Opening (contactor with a.c. fed control circuit)

Under certain conditions, an a.c. operated contactor does not open when the control circuit is de-energized.

This is due to a critical capacity of the excessively long control circuit line and the type of contactor coil control layout (see diagrams A and B opposite).

This may be caused by the following factors:
- high control voltage.
- low coil holding consumption.
- low contactor drop-out voltage (according to IEC 60947-4-1: 0.2 to 0.75 x U_c).

If lines longer than those indicated are required, the following measures must be taken:
- select a contactor with a higher rating.
- select a lower control voltage.
- connect "R_P" impedances in parallel with the contactor coil:

sizing of parallel resistor: $R_P = \frac{10^3}{C}$ (with C in µF)

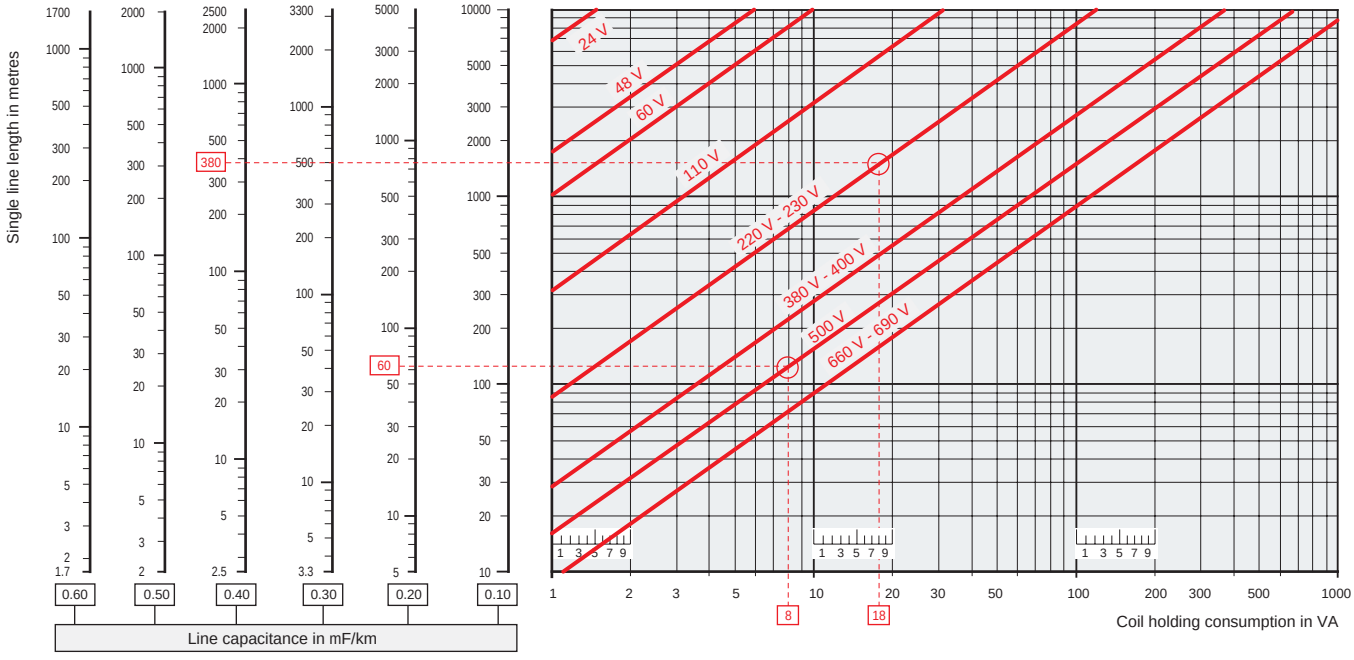
The table and graph below can be used to determine the single length of line feeders (distance between the control device and the contactor coil) in relation to:
- the coil holding consumption VA.
- the supply voltage.
- the capacity in µF/km (depending on the control layout).

Wiring diagrams A and B opposite show two supply and coil control wiring examples.

Coil holding consumption (average value)

Contactors	a.c. control circuit 50 Hz	Contactors	a.c. control circuit 50 Hz
A 9, 12, 16	8 VA	AF 45, 50, 63, 75	7 VA
A 26, 30, 40	12 VA	AF 95, 110,	7 VA
A 45, 50, 63, 75	18 VA	AF 145, 185,	12 VA
A 95, 110	22 VA	AF 210, 260, 300	10 VA
A 145, 185	35 VA	AF 400, 460	12 VA
A 210, 260, 300	60 VA	AF 580, 750	12 VA

Permissible single length for the control circuit conductors on contactor opening:
Depending on the coil holding power consumption, on the supply voltage and on the control circuit conductor capacity.



Examples:

A 16 contactor
Coil voltage U_c = 500 V, 50 Hz, 8 VA contactor coil holding consumption, control type: diagram A, via maintained pushbutton, and 2-core cable with a capacity of 0.2 µF/km.
Max. permissible length: 60 m.

A 50 contactor
Coil voltage U_c = 230 V, 50 Hz, 18 VA contactor coil holding consumption, control type: diagram B via momentary pushbutton, hold-in contact and 3-core cable with a capacity of 2 x 0.2 µF/km = 0.4 µF/km.
Max. permissible length: 380 m.

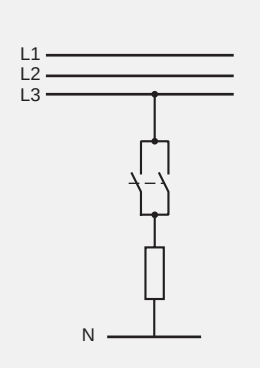
IEC Technical data
Parallel connection of main poles

Parallel Connection of Main Poles

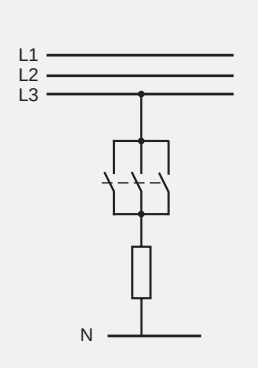
Purpose: Increasing the a.c. resistive load.
Remarks:
– Parallel connection of main poles to increase the d.c. resistive load is not acceptable.
– Parallel connection of main poles does'nt increase the breaking capacity.

Means: The poles can be connected in parallel via shorting bars. See page 1.30.
– LP and LH for parallel connection of 2 poles,
– LY and LF for parallel connection of 3 poles,

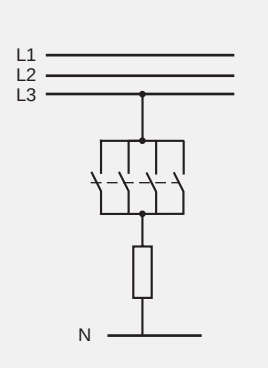
The table below shows the uprating factor for I_e / AC-1 max. in relation to the number of poles in parallel and for a max. switching frequency.



2 poles in //



3 poles in //



4 poles in //

Contactors			Factor to be applied to the rated operational current I_e / AC-1 to obtain the permissible				
a.c. Operated	d.c. Operated	Cycles / h	current I_e / AC-1 with "n" poles in parallel.				
3-pole contactors							
A 9 ... A 75	AF 50 ... AF 75						
AF 50 ... AF 75	AE..., TAE...	600	1.6	2.2	–		
	AL...	A 95 ... A 300	AF 145 ... AF 750	300	1.6	2.2	–
AF 145 ... AF 750							
4-pole contactors							
A 9 ... A 75	AF 45 ... AF 75						
AF 45 ... AF 75	AE..., TAE...	600	1.6	2.2	2.6		
	AL...	EK...	EK...	300	1.6	2.2	2.8

Utilization of Contactors for Temporary / Intermittent Duty

The table below shows the factor to be applied to the rated operational current I_e / AC-1 to obtain the permissible operational current I_e / AC-1 in relation to the switching frequency and the current flow time per cycle.

Operating cycles per hour		**120**	**60**	**20**	**6**	**2**	**1**
Current flow time per cycle in seconds.		Factor to be applied to the rated operational current I_e / AC-1 max. to obtain the permissible current I_e / AC-1 for temporary / intermittent duty.					
	5	2.8	3.4	4	4.7	5	5.2
	10	2.2	2.6	3	3.4	3.7	3.8
	20	1.6	2	2.4	2.6	2.7	2.8
	30	–	1.7	2.1	2.2	2.3	2.4
	40	–	1.5	1.9	2.0	2.1	2.2
	60	–	–	1.7	1.8	1.8	1.9

Example:

A 9 contactor (intermittent duty, resistive load)

Rated operational current I_e / AC-1 at 55 °C (see page 1.42)	22 A
Switching frequency	2 operations/h
Current flow time per cycle	20 s
Factor to be applied to the current I_e / AC-1	2.7
Permissible current: 2.7 x 22 =	59 A

Technical data
Technical terms and definitions

Altitude
Refers to the height of the site where the equipment is located, expressed in meters above the sea level.

Ambient temperature
Temperature of the air surrounding the unit.

Circuits
• Auxiliary circuit

All the conducting parts of a contactor, intended to be included in a circuit different from the main circuit and the control circuit of the contactor e.g. signalization, interlocking circuits etc …

• Control circuit

All the conducting parts of a contactor (other than the main circuit) included in a circuit used for the closing operation, or opening operation, or both, of the contactor.

• Main circuit

All the conducting parts of a contactor included in the circuit which it is designed to close or open.

Coil operating range
Expressed as a multiple of the rated control circuit voltage Uc for the lower and upper limits.

Cycle duration
Total time of the on-load + off-load period.

Endurance / durability
• Electrical endurance

Number of on-load operating cycles (i.e. with current on the main contacts) a contactor can achieve, varies depending on the utilization category.

• Mechanical endurance

Number of off-load operating cycles (i.e. without current on the main contacts) a contactor can achieve.

Inching
Energizing a motor once or repeatedly for short periods to obtain small movements of the driven mechanism.

Insulation class according to the VDE 0110 and NFC 20-040
Characterizes contactors suitability in accordance with environment and utilization conditions. A contactor can be classified depending on its own clearance and creepage distances in the insulation classes A, B, C, D which correspond to different insulation voltage values.

The insulation class C is applicable to most of the industrial applications. Equipment described in this catalogue correspond to insulation class C.

Intermittent duty
Duty in which the main contacts of a contactor remain closed for periods of time insufficient to allow the contactor to reach thermal equilibrium, the current-carrying periods being separated by off-load periods of sufficient duration to restore equality of temperature with the cooling medium.

Mounting positions
Stated by the manufacturer. Please note restrictions when applicable.

On-load factor
Ratio of the current flow time to the total time of the cycle x 100.

Plugging
Stopping or reversing a motor quickly by interchanging two supply leads whilst the motor is running.

Rated breaking capacity; Rated making capacity
Value of r.m.s current a contactor can break or make at a fixed voltage value, within the conditions specified by the standards, depending on the utilization category.

Rated control circuit voltage Uc
Control voltage value for which the control circuit of the unit is sized.

Rated insulation voltage U_i
Voltage value which designates the unit and to which dielectric tests, clearance and creepage distances are referred.

Rated impulse withstand voltage U_{imp}
The highest peak value of an impulse voltage of prescribed form 1.2/50, which does not cause breakdown under specified conditions of test.

Rated operating current I_e
Current value stated by the manufacturer and taking into account the rated operating voltage U_e, the rated frequency, the rated duty, the utilization category, the electrical contact life and the type of the protective enclosure.

Rated operating voltage U_e
Voltage value to which utilization characteristics of the contactor are referred, i.e. phase to phase voltage in 3 phase circuits.

Conventional thermal current I_{th}
Value of current the contactor can withstand with poles in closed position, in free air for an eight hour duty, without the temperature rise of its various parts exceeding the limits specified by the standards.

Resistance to shocks
Requirements applicable for instance to vehicles, crane operation or switchgear slide-in module systems.

At the quoted permissible «g» values, contactors must not undergo a change in switching state and O/L relays must not trip.

Resistance to vibrations
Requirements applicable to all the vehicles, vessels and other similar transport systems. At the quoted amplitude and vibration frequency values, the unit must be capable to achieve the required duty.

Short-circuit protection co-ordination
Achieved by using back-up protection devices such as circuit-breakers, H.R.C. fuses or standard fuses.

Co-ordination types a, b, c are defined in IEC 292-1 publication, VDE 0660, NFC 63-650 standards. Co-ordination types "1" and "2" are defined in IEC 947-4-1.

• Type 1 co-ordination

There has been no discharge of parts beyond the enclosure. Damage to the contactor and the overload relay is acceptable.

• Type 2 co-ordination

No damage to the overload relay or other parts has occured, except that welding of contactor or starter contacts is permitted, if they are easily separated.

Switching frequency
Number of operating cycles per hour.

Time
• Closing time

Time between energization of the coil until the moment the contacts of the first current path to be closed actually close.

• Opening time

Time from the beginning of state causing breaking until the moment when the contacts of the last current path to be opened are open.

• Minimal operation time

Shortest control duration to ensure complete closing or opening of a contactor.

• Short time current permissible

Value of current which the contactor can withstand in closed position for a short time period and within specified conditions.

• Time constant

Ratio of inductance to the resistance : L/R = mH/Ohm = ms.

Standards

• IEC standards 158-1: “Contactors” and series IEC 292 :

“Motor-starters” have been revised and replaced by the new IEC 947-4-1 (1990-05): “Contactors and Motor-starters” referring to IEC 947-1 (1988): “General rules”

The new standards will constitute the basis of the future European and National standards, not yet revised.

Therefore the ratings indicated in this catalog are established according to the former and the future standards.

• Main changes and additions in the new standards are:

• Revision and extension of the utilization categories (see hereafter)

• Replacement of the coordination classes types a, b, c by new types: “1” (approximately equivalent to former class “a”) and “2” (approximately equivalent to former class “c”) with additional requirements.

• Classification of the thermal overload relays in tripping classes: 10 A; 10; 20 and 30 depending on their tripping times, at 1.5 and 7.2 times their setting current, in order to cover motor applications depending on their starting times. Class 10 A is adapted for motors according to IEC 34-1.

• Introduction of tests to verify the connecting capability and the mechanical strength of terminals.

Utilization categories

A contactor duty is characterized by the utilization category plus indication of the rated operating voltage and the rated operating current (see at Rated …), or the motor characteristics.

Utilization categories for contactors according to IEC 947-4-1

Alternating current:	AC-1	Non-inductive or slightly inductive loads, resistance furnaces. Power factor 0.7 - 0.8 (slightly inductive).
	AC-2	Slip-ring motors: starting, switching-off.
	AC-3	Squirrel-cage motors: starting, switching-off motors during running. Power factor 0.4 - 0.5 (AC-3).
	AC-4	Squirrel-cage motors: starting, plugging, inching.
	AC-5a	Switching of electric discharge lamp controls.
	AC-5b	Switching of incandescent lamps.
	AC-6a	Switching of transformers.
	AC-6b	Switching of capacitor banks
	AC-8a	Hermetic refrigerant compressor motor control with manual resetting of overload releases
	AC-8b	Hermetic refrigerant compressor motor control with automatic resetting of overload releases.
Direct current:	DC-1	Non-inductive or slightly inductive loads, resistance furnaces.
	DC-3	Shunt motors: starting, plugging, inching. Dynamic breaking of d.c. motors.
	DC-5	Series motors: starting, plugging, inching. Dynamic breaking of d.c. motors.
	DC-6	Switching of incandescent lamps

Utilization categories for contactor relays according to IEC 947-5-1

Alternating current:	AC-12	Control of resistive loads and solid state loads with isolation by opto couplers.
	AC-13	Control of solid state loads with transformer isolation.
	AC-14	Control of small electromagnetic loads (≤ 72 VA).
	AC-15	Control of electromagnetic loads (> 72 VA).
Direct current:	DC-12	Control of resistive loads and solid state loads with isolation by opto couplers.
	DC-13	Control of electromagnets.
	DC-14	Control of electromagnetic loads having economy resistors in circuit.

Utilization categories AC-1, AC-2, AC-3, AC-4 and DC-1, DC-3, DC-5 are maintained with slightly more severe tests.

Other categories have been added in order to standardize specific applications. In fact some contactor applications and the specific criteria characterizing the types of load controlled can modify the recommended utilization characteristics. These major applications are, for example :

Switching of capacitor banks

This application is characterized by high current peaks when switching-on the contactor and presence of harmonic currents on uninterrupted duty. For this application, IEC 947-4-1 has defined an utilization category AC-6b. Practical ratings have to be defined according to tests or, in absence of tests, by a calculation indicated in IEC 947-4-1.

Switching of transformers

This application is characterized by high current peaks on contactor closing due to magnetization phenomena. The corresponding utilization category according to IEC 947-4-1 is AC-6a. Ratings are derived from test-values for AC-3 or AC-4 according to formula given in IEC 947-4-1.

Switching of lighting circuits

The current peaks on contactor closing and power factor vary depending on the type of lamps, the switching method used and if compensation systems are fitted or not.

IEC 947-4-1 contains two standard utilization categories

AC-5a for switching of the electric discharge lamps.
AC-5b for switching of incandescent lamp.

UL/CSA Technical data
Motor data

Ampere ratings of 3 phase, AC induction motors

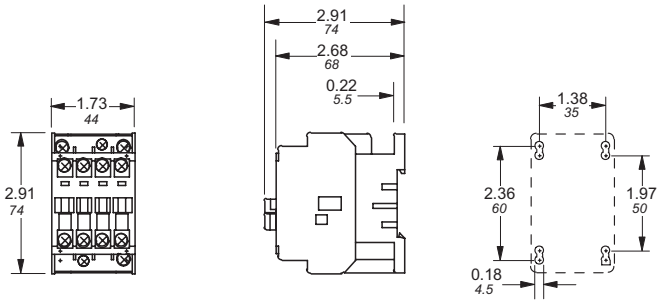
Horse power	110 – 120V			200 – 208V			220 – 240V			380 – 415V①		440 – 480V			550 – 600V		
	Single phase	Two phase	Three phase	Single phase	Two phase	Three phase	Single phase	Two phase	Three phase	Single phase	Three phase	Single phase	Two phase	Three phase	Single phase	Two phase	Three phase
1/10	3.0	—	—	1.65	—	—	1.5	—	—	1.0	—	—	—	—	—	—	—
1/8	3.8	—	—	2.1	—	—	1.9	—	—	1.2	—	—	—	—	—	—	—
1/6	4.4	—	—	2.4	—	—	2.2	—	—	1.4	—	—	—	—	—	—	—
1/4	5.8	—	—	3.2	—	—	2.9	—	—	1.8	—	—	—	—	—	—	—
1/3	7.2	—	—	4.0	—	—	3.6	—	—	2.3	—	—	—	—	—	—	—
1/2	9.8	4.0	4.4	5.4	2.2	2.4	4.9	2.0	2.2	3.2	1.3	2.5	1.0	1.1	2.0	0.8	0.9
3/4	13.8	4.8	6.4	7.6	2.6	3.5	6.9	2.4	3.2	4.5	1.8	3.5	1.2	1.6	2.8	1.0	1.3
1	16.0	6.4	8.4	8.8	3.6	4.6	8.0	3.2	4.2	5.1	2.3	4.0	1.6	2.1	3.2	1.3	1.7
1 1/2	20.0	9.0	12.0	11.0	5.0	6.6	10.0	4.5	6.0	6.4	3.3	5.0	2.3	3.0	4.0	1.8	2.4
2	24.0	11.8	13.6	13.2	6.5	7.5	12.0	5.9	6.8	7.7	4.3	6.0	3.0	3.4	4.8	2.4	2.7
3	34.0	16.6	19.2	18.7	9.2	10.6	17.0	8.3	9.6	10.9	6.1	8.5	4.2	4.8	6.8	3.3	3.9
5	56.0	26.4	30.4	30.8	14.5	16.8	28.0	13.2	15.2	17.9	9.7	14.0	6.6	7.6	11.2	5.3	6.1
7 1/2	80.0	38.0	44.0	44.0	21.0	24.2	40.0	19.0	22.0	27.0	14.0	21.0	9.0	11.0	16.0	8.0	9.0
10	100.0	48.0	56.0	55.0	26.4	30.8	50.0	24.0	28.0	33.0	18.0	26.0	12.0	14.0.	20.0	10.0	11.0
15	135.0	72.0	84.0	75.0	39.6	46.2	68.0	36.0	42.0	44.0	27.0	34.0	18.0	21.0	27.0	14.0	17.0
20	—	94.0	108.0	96.8	52.0	60.0	88.0	47.0	54.0	56.0	34.0	44.0	23.0	27.0	35.0	19.0	22.0
25	—	118.0	136.0	121.0	65.0	75.0	110.0	59.0	68.0	70.0	44.0	55.0	29.0	34.0	44.0	24.0	27.0
30	—	138.0	160.0	150.0	76.0	88.0	136.0	69.0	80.0	87.0	51.0	68.0	35.0	40.0	54.0	28.0	32.0
40	—	180.0	208.0	194.0	100.0	115.0	176.0	90.0	104.0	112.0	66.0	88.0	45.0	52.0	70.0	36.0	41.0
50	—	226.0	260.0	238.0	125.0	143.0	216.0	113.0	130.0	139.0	83.0	108.0	56.0	65.0	86.0	45.0	52.0
60	—	—	—	—	147.0	160.0	—	133.0	154.0	—	103.0	—	67.0	77.0	—	53.0	62.0
75	—	—	—	—	183.0	212.0	—	166.0	192.0	—	128.0	—	83.0	96.0	—	66.0	77.0
100	—	—	—	—	240.0	273.0	—	218.0	248.0	—	165.0	—	109.0	124.0	—	87.0	99.0
125	—	—	—	—	—	344.0	—	—	312.0	—	208.0	—	135.0	156.0	—	108.0	125.0
150	—	—	—	—	—	396.0	—	—	360.0	—	240.0	—	156.0	180.0	—	125.0	144.0
200	—	—	—	—	—	528.0	—	—	480.0	—	320.0	—	208.0	240.0	—	167.0	192.0
250	—	—	—	—	—	663.0	—	—	602.0	—	403.0	—	—	302.0	—	—	242.0
300	—	—	—	—	—	—	—	—	—	—	482.0	—	—	361.0	—	—	289.0
350	—	—	—	—	—	—	—	—	—	—	560.0	—	—	414.0	—	—	336.0
400	—	—	—	—	—	—	—	—	—	—	636.0	—	—	477.0	—	—	382.0
500	—	—	—	—	—	—	—	—	—	—	786.0	—	—	590.0	—	—	472.0

① To obtain full load currents for 265V and 277V motors, decrease corresponding 220 – 240V ratings by 13 percent and 17 percent.

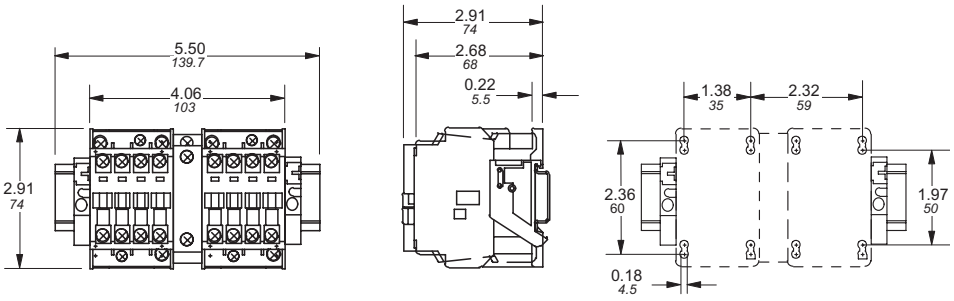
Approximate dimensions
3 pole contactors, A/AE9 – A/AE26

00.00 / 00.00 Inches [Millimeters]

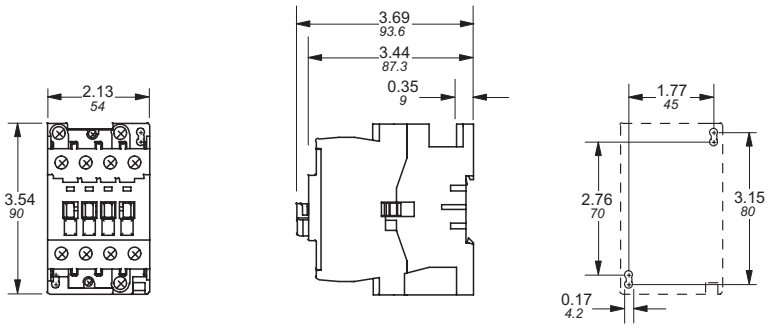
A/AE9 – A/AE16 — Contactor, 3 pole



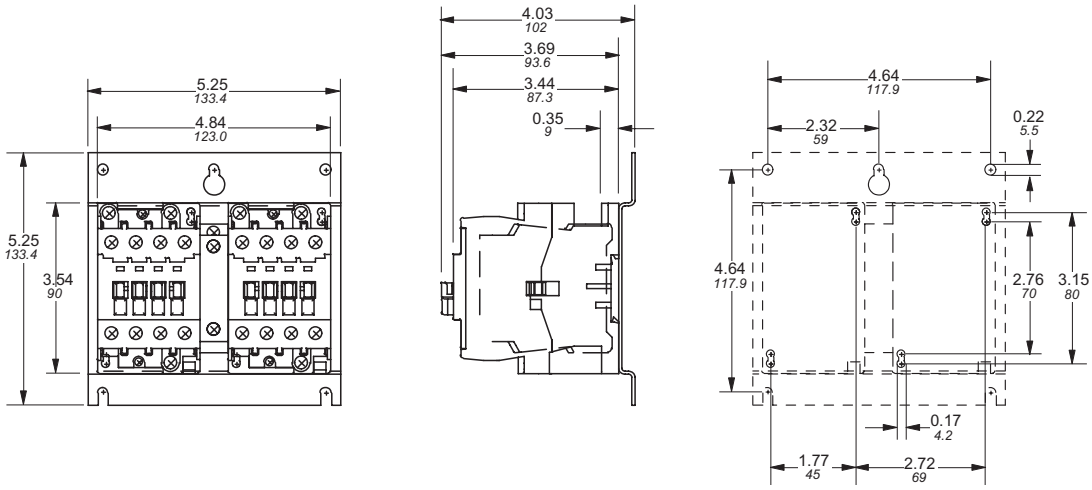
A/AE9 – A/AE16 + VM5 or VE5 — Mechanically interlocked contactor, 3 pole



A/AE26 — Contactor, 3 pole



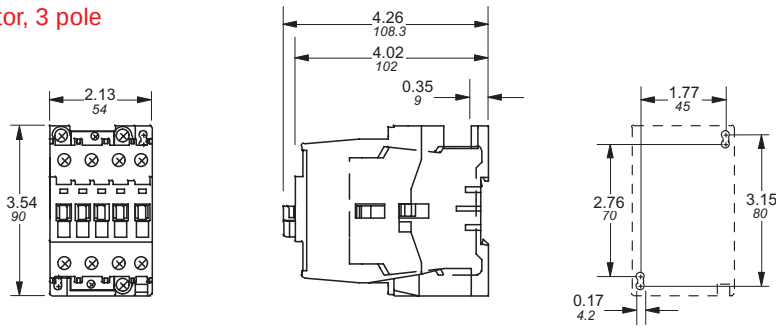
A/AE26 + VM5 or VE5 — Mechanically interlocked contactor, 3 pole



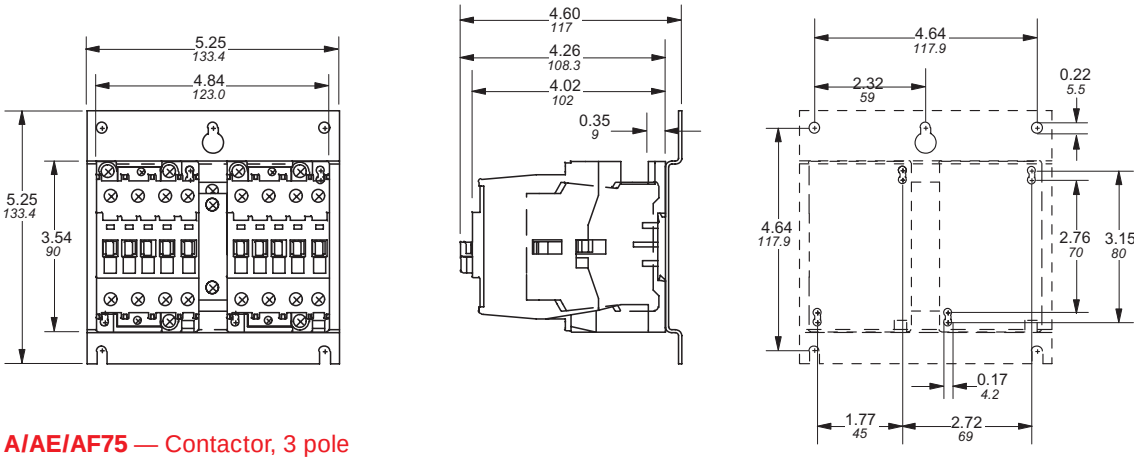
Approximate dimensions
3 pole , A/AE30 – A/AE/AF75

00.00 / 00.00 Inches [Millimeters]

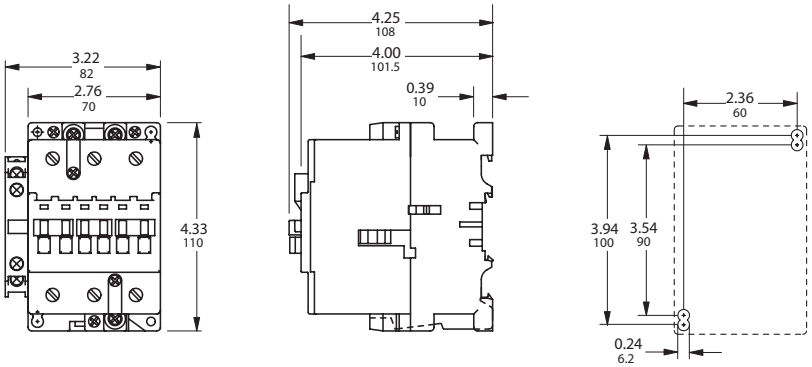
A/AE30 & A/AE40 — Contactor, 3 pole



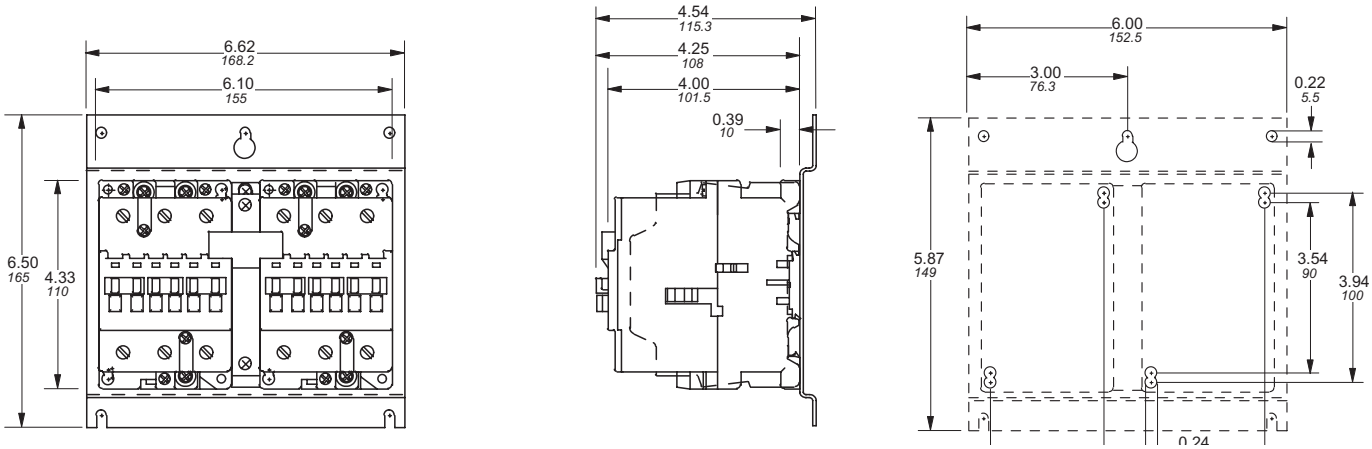
A/AE30 & A/AE40 + VM5 or VE5 — Mechanically interlocked contactor, 3 pole



A/AE/AF50 – A/AE/AF75 — Contactor, 3 pole



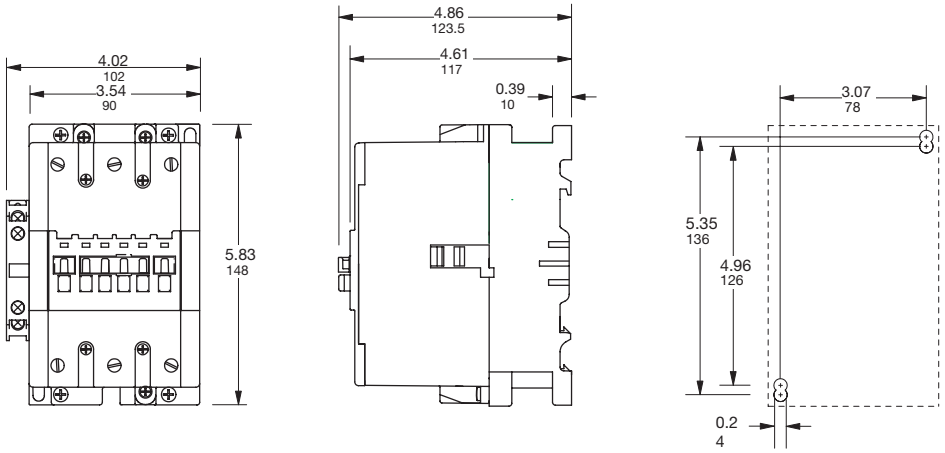
A/AE/AF50 – A/AE/AF75 + VM5 or VE5 — Mechanically interlocked contactor, 3 pole



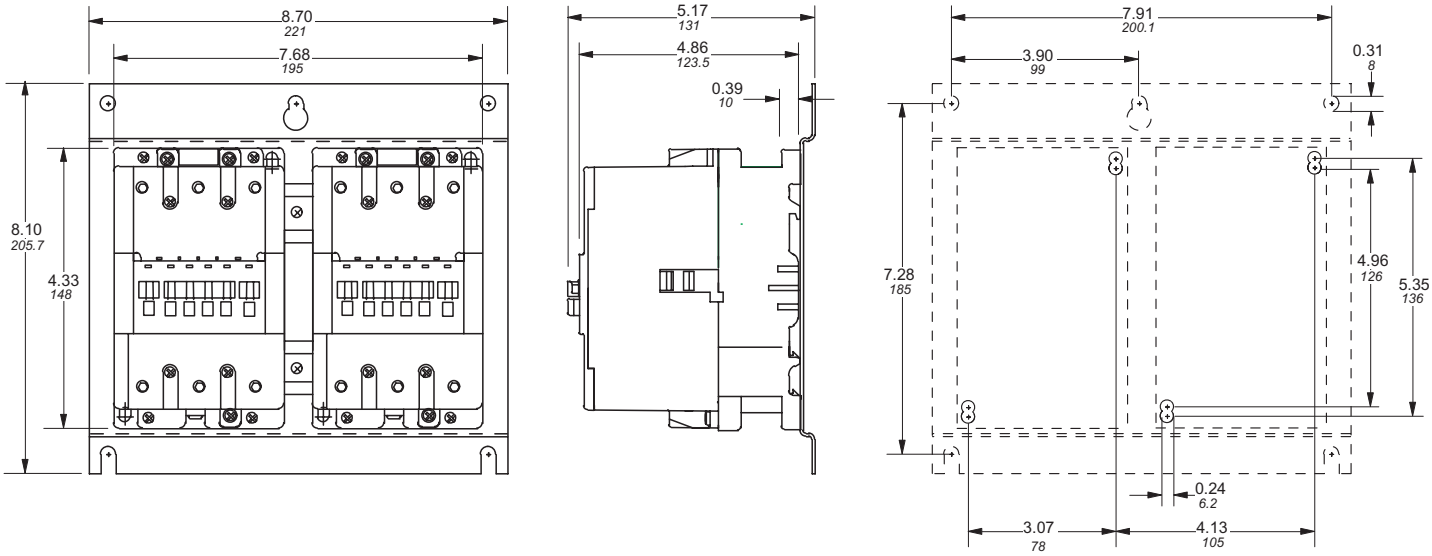
Approximate dimensions
3 pole, A/AE/AF95 & A/AE/AF110

00.00
00.00
Inches
[Millimeters]

A/AE/AF95 & A/AE/AF110 — Contactor, 3 pole



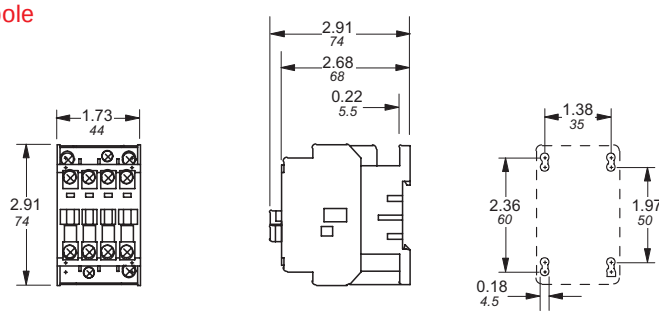
A/AE/AF95 & A/AE/AF110 + VE5 — Mechanically interlocked contactor, 3 pole



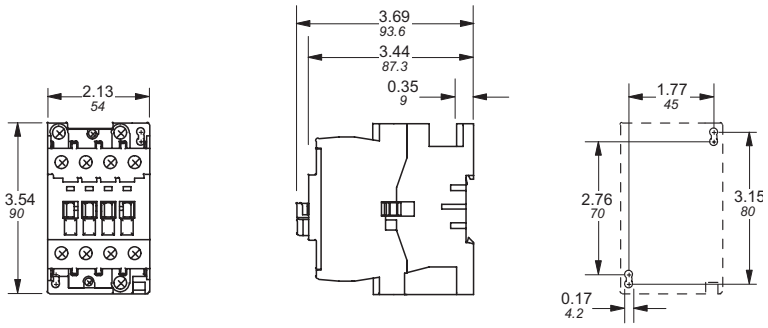
Approximate dimensions
4 pole contactors, A/AE9 – A/AE/AF75

00.00 / 00.00 Inches [Millimeters]

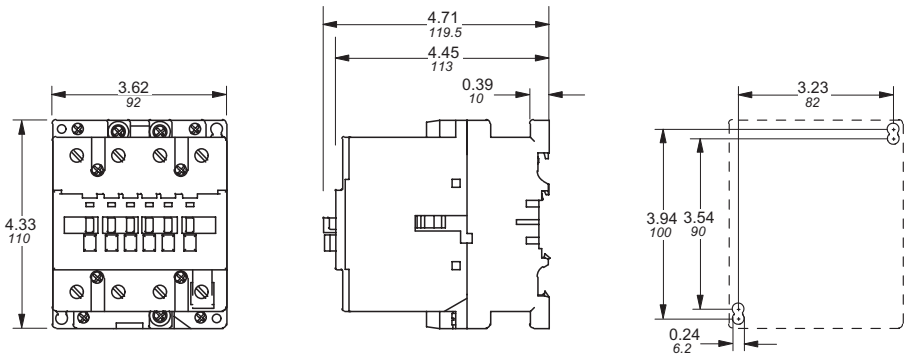
A/AE9 – A/AE16 — Contactor, 4 pole



A/AE26 — Contactor, 4 pole



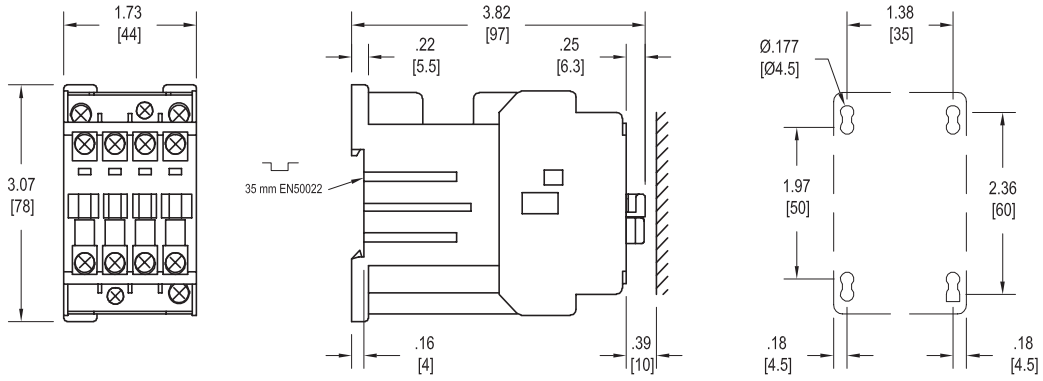
A/AE/AF45 – A/AE/AF75 — Contactor, 4 pole



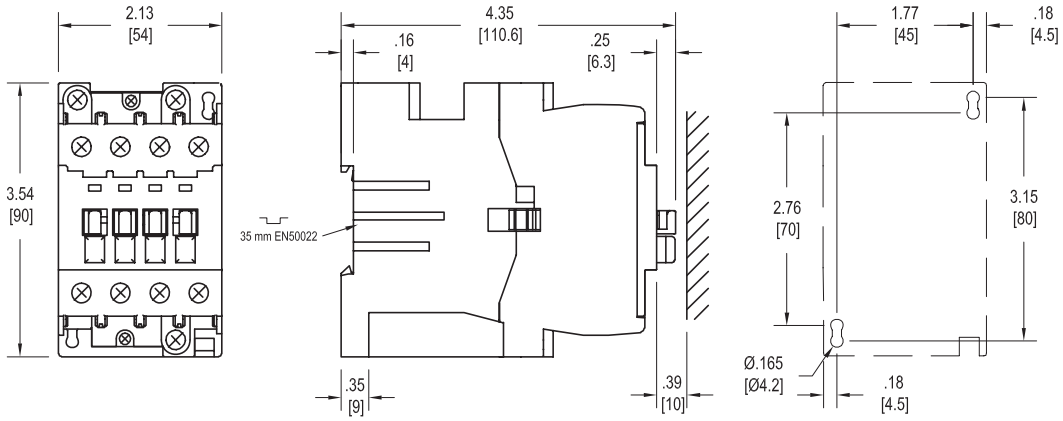
Approximate dimensions
3 & 4 pole contactors, AL9 – AL40

00.00
00.00
Inches
[Millimeters]

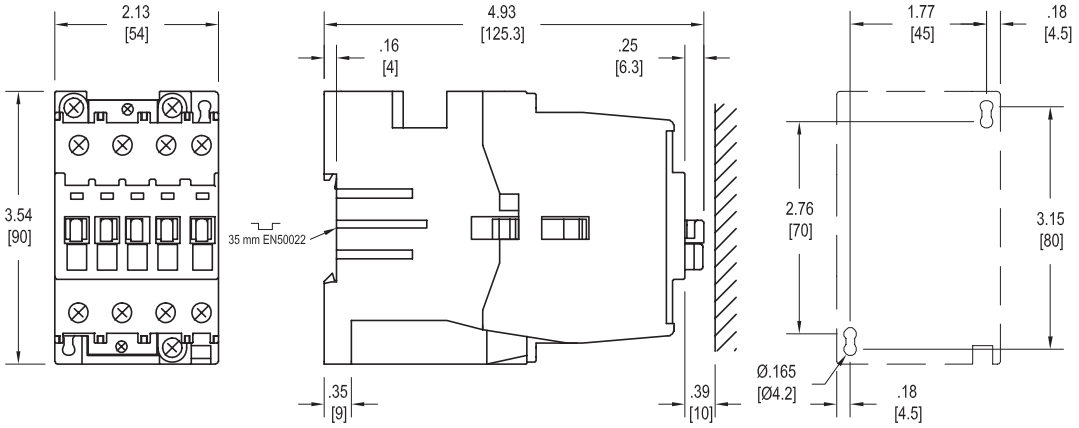
AL9, AL12,, AL16 — Contactor, 3 & 4 pole



AL26 — Contactor, 3 & 4 pole



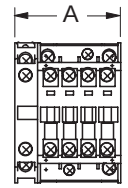
AL30, AL40 — Contactor, 3 pole



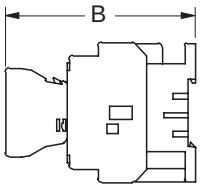
Approximate dimensions
Accessories for A/AE9 – A/AE/AF110

00.00 / 00.00 Inches [Millimeters]

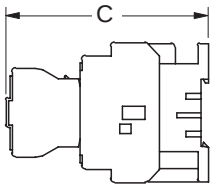
A/AE9 – A/AE40
A/AE/AF50 – A/AE/AF110



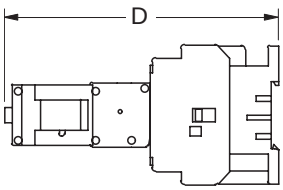
SIDE MOUNTED AUXILIARY



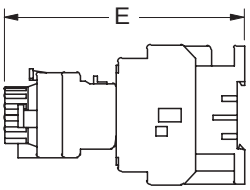
SINGLE POLE TOP MOUNTED AUXILIARY



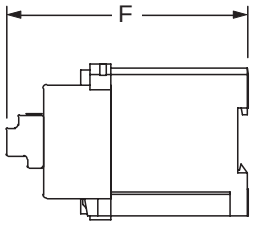
FOUR POLE TOP MOUNTED AUXILIARY



ON-POSITION LATCH



PNEUMATIC TIMER



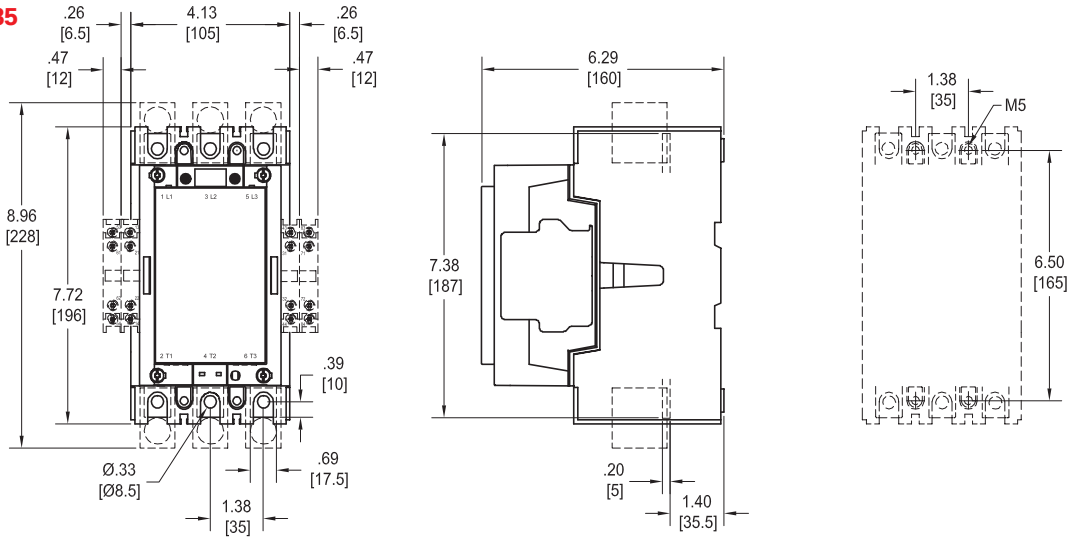
MECH INTERLOCK D.C. OPERATED

TYPE		A	B	C	D	E	F
A/AE9-16	IN	2.20	3.96	4.21	5.71	5.00	–
	MM	56	100.5	107	145	127	–
A/AE26	IN	2.20	4.72	4.97	6.47	5.76	–
	MM	56	119.8	126.3	164.3	146.3	–
A/AE30-40	IN	2.20	5.30	5.55	7.05	6.34	–
	MM	56	134.5	141	179	161	–
A/AE/AF50-75	IN	3.23	5.27	5.52	7.03	6.32	–
	MM	82	133.9	140.3	178.5	160.4	–
A/AE/AF45	IN	4.09	5.73	5.98	7.48	6.77	–
	MM	104	145.5	152	190	172	–
A/AE/AF95-110	IN	4.02	5.91	6.16	–	–	–
	MM	102	150	156.5	–	–	–

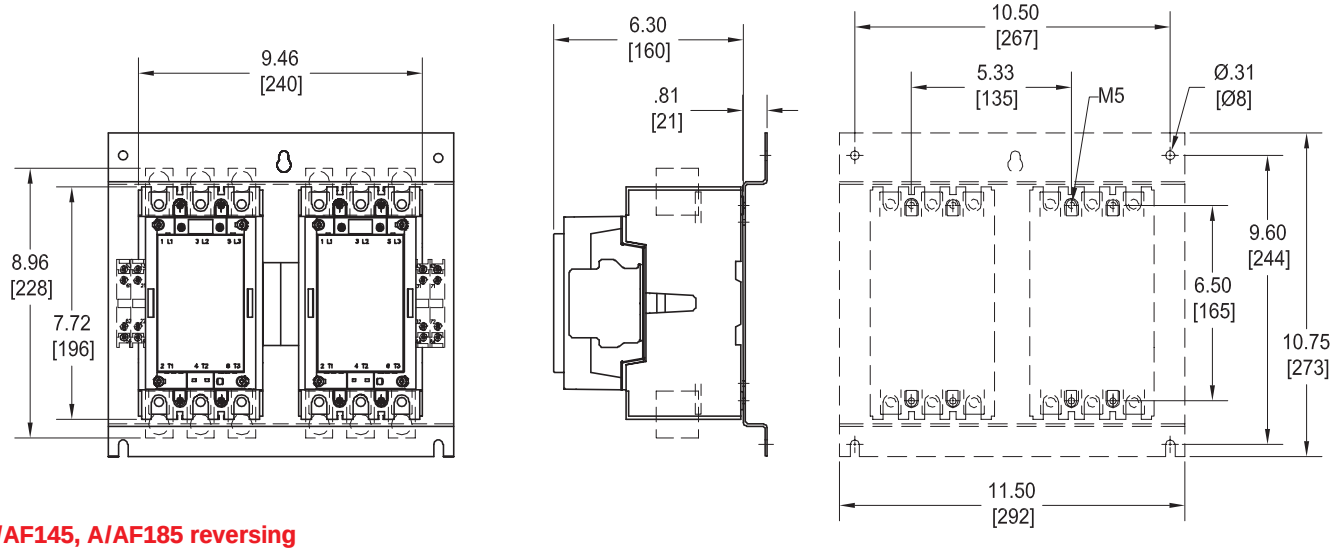
Approximate dimensions
A/AF145 – A/AF185

00.00 / 00.00 Inches [Millimeters]

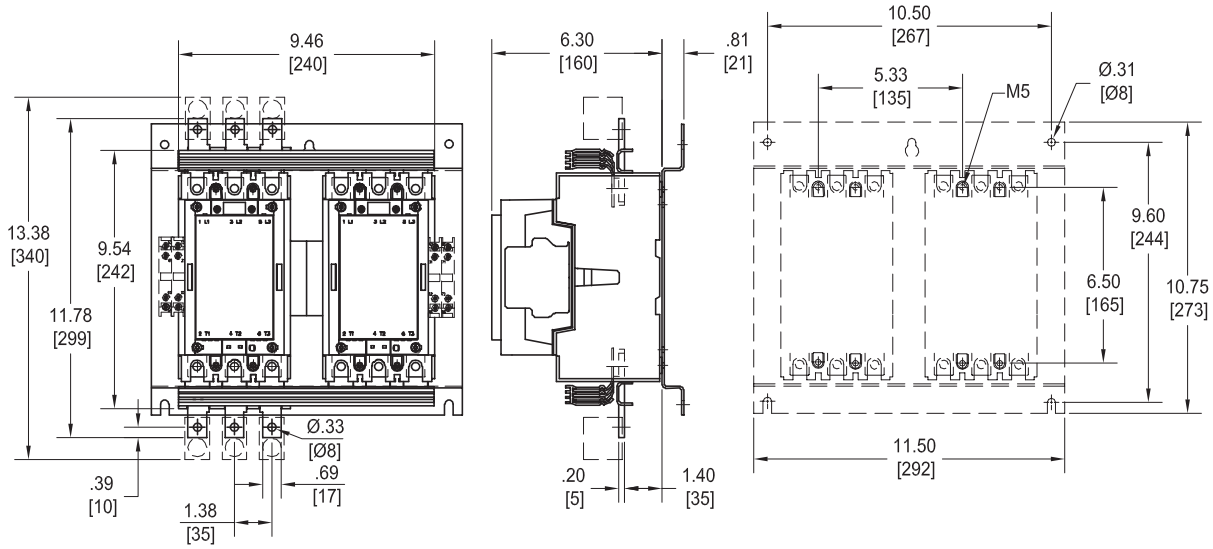
A/AF145 & A/AF185



A/AF145, A/AF185 with mechanical interlock



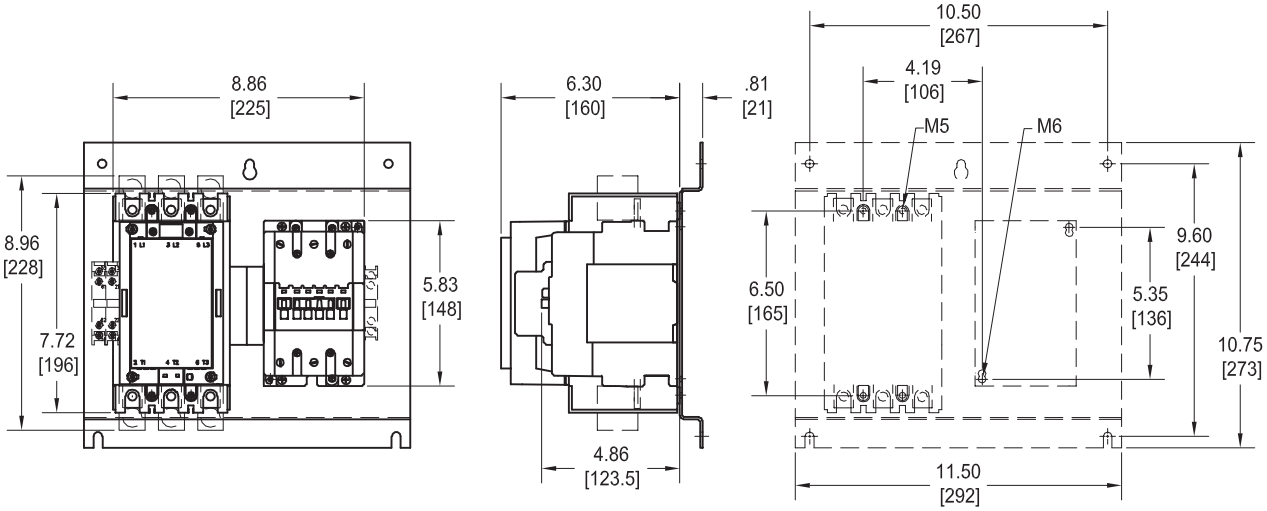
A/AF145, A/AF185 reversing



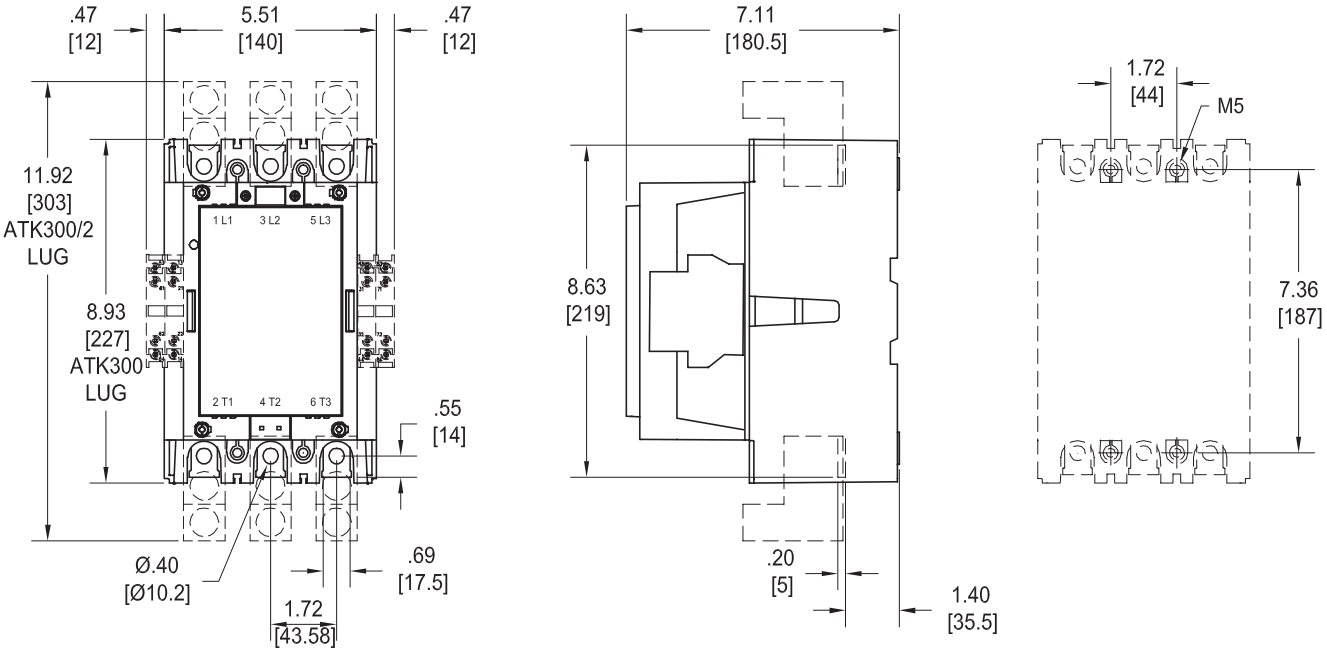
Approximate dimensions
A/AF145 – A/AF300

00.00 / 00.00 Inches [Millimeters]

A/AF145 – A/AE/AF95-110 mechanically interlocked



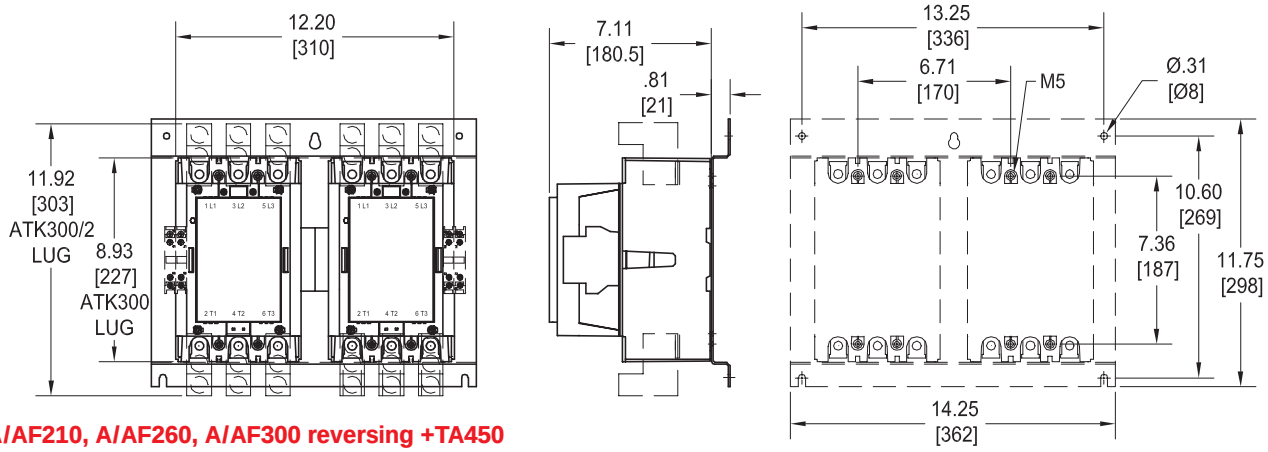
A/AF210, A/AF260, A/AF300



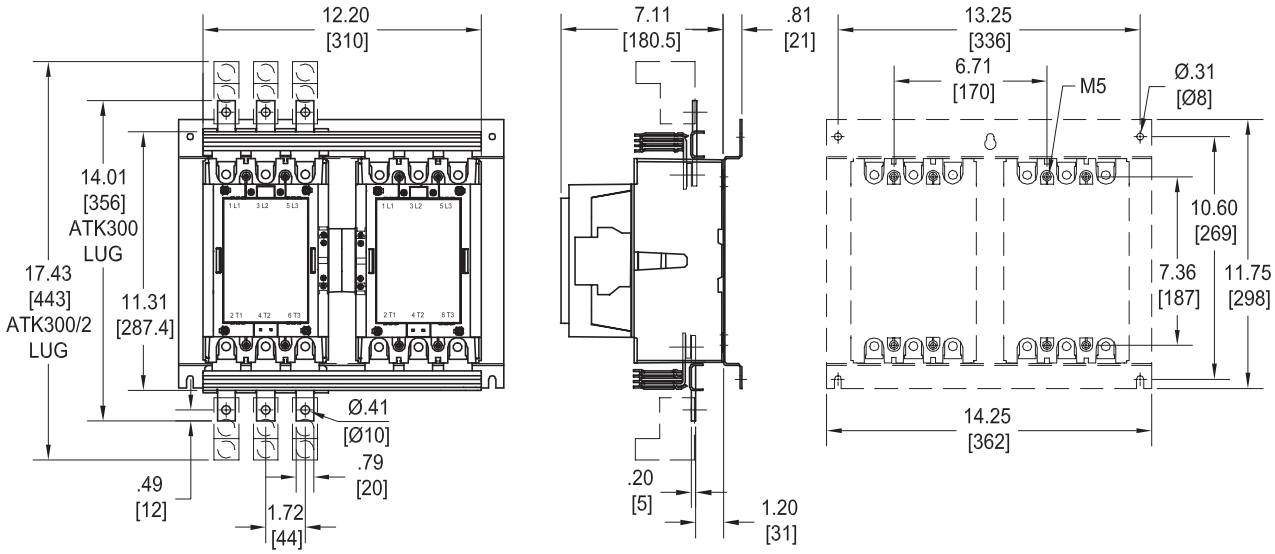
Approximate dimensions
A/AF210 – A/AF300

00.00
00.00
Inches
[Millimeters]

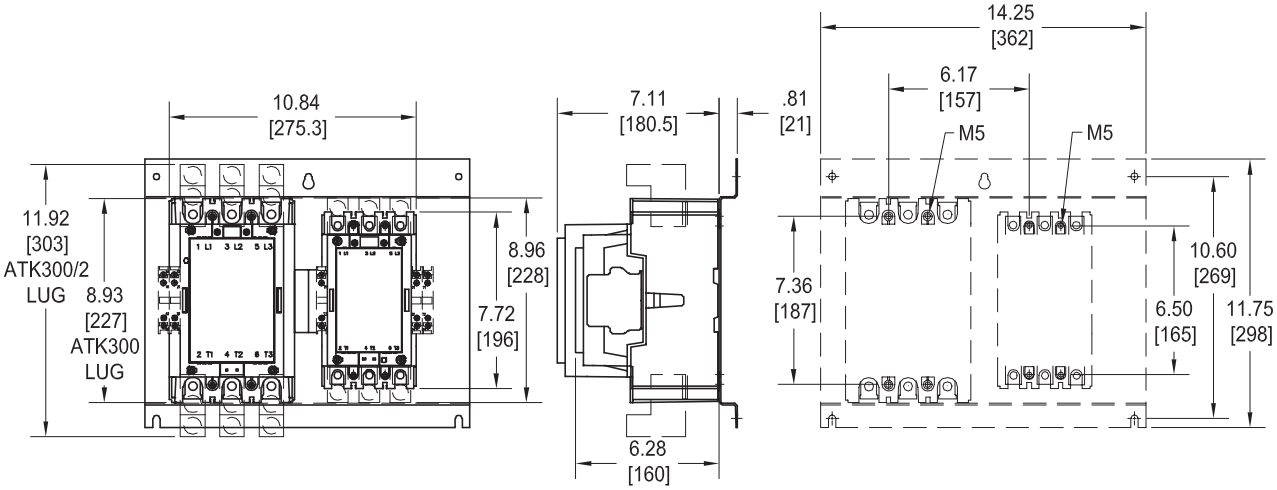
A/AF210, A/AF260, A/AF300 with mechanical interlock



A/AF210, A/AF260, A/AF300 reversing +TA450



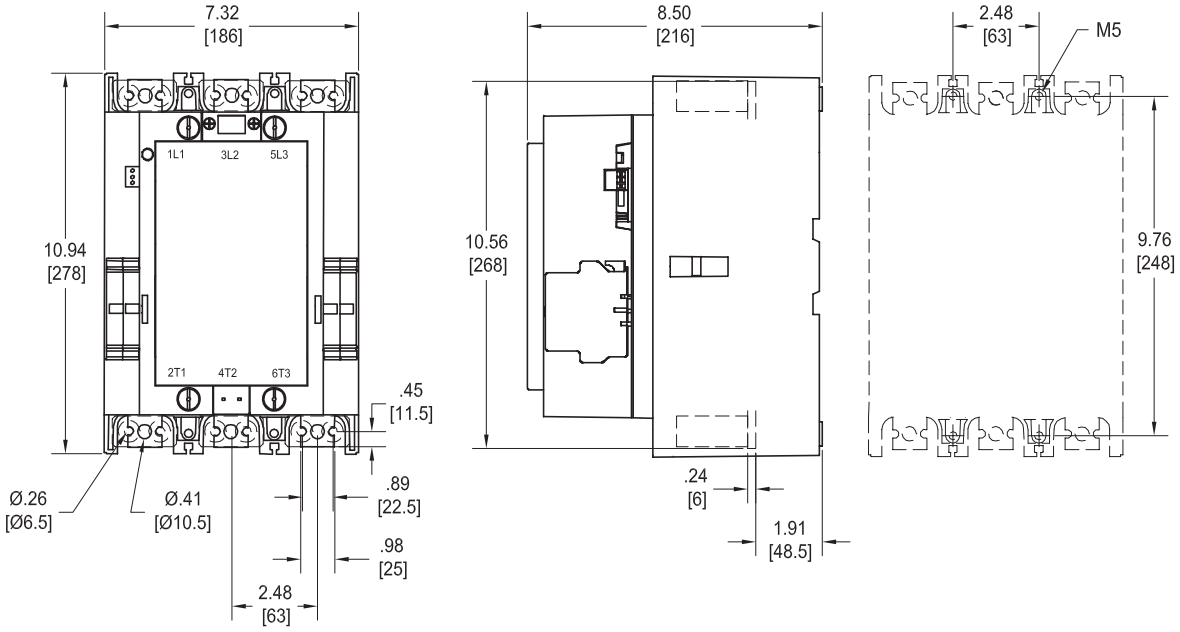
A/AF210, A/AF145 with mechanical interlock



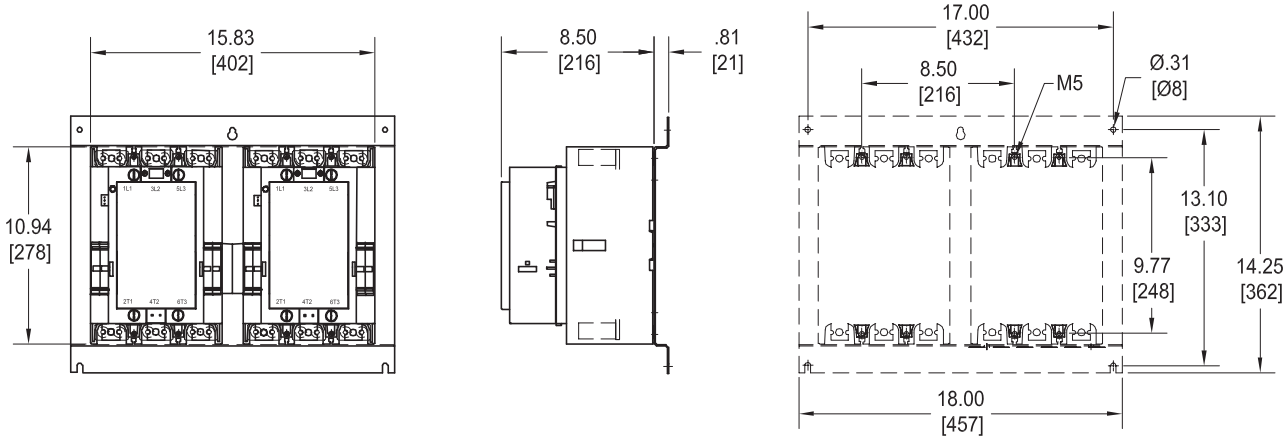
Approximate dimensions
AF400 – AF460

00.00 / 00.00 Inches [Millimeters]

AF400, AF460



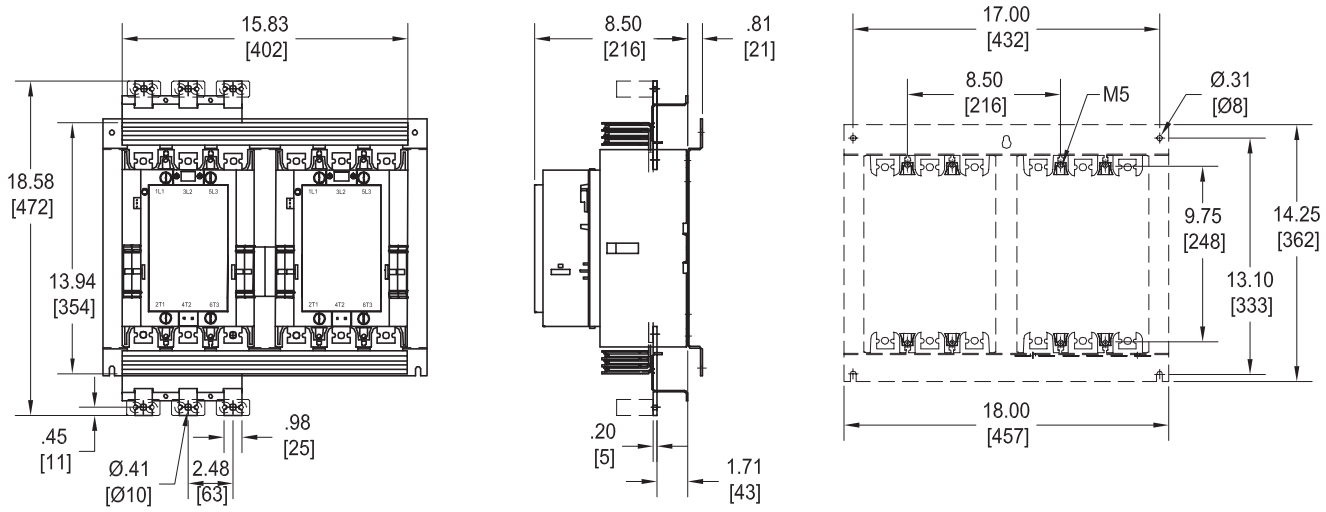
AF400, AF460 with mechanical interlock



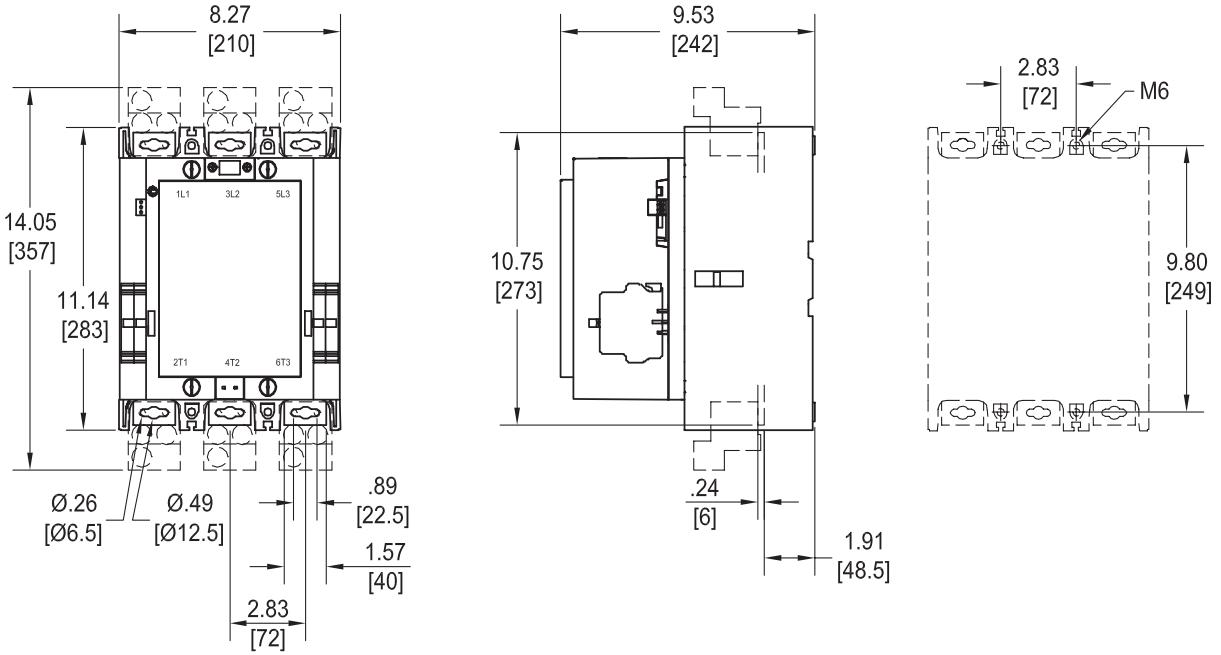
Approximate dimensions
AF400 – AF750

00.00
00.00
Inches
[Millimeters]

AF400, AF460 reversing



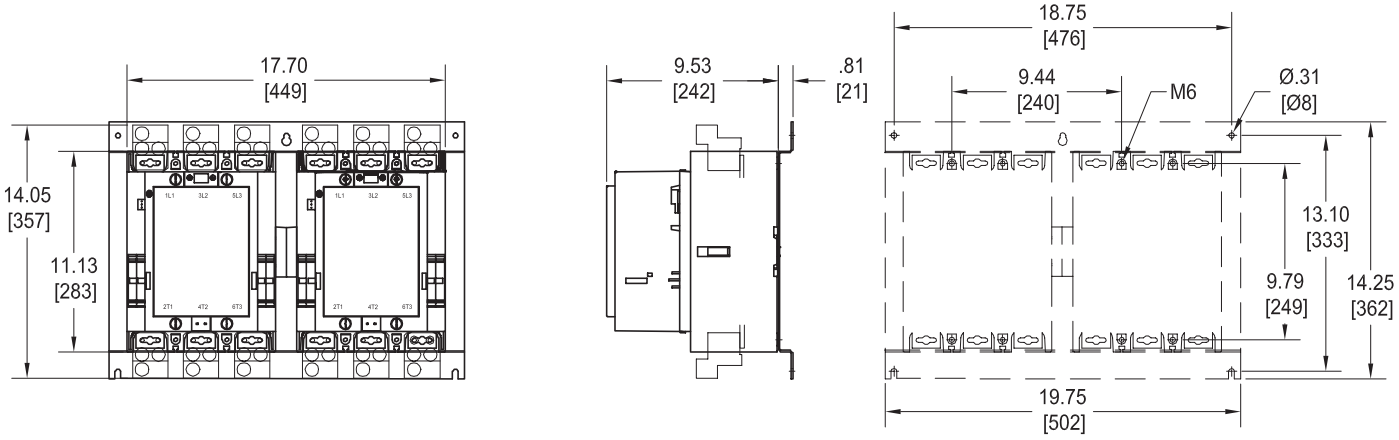
AF580 – AF750



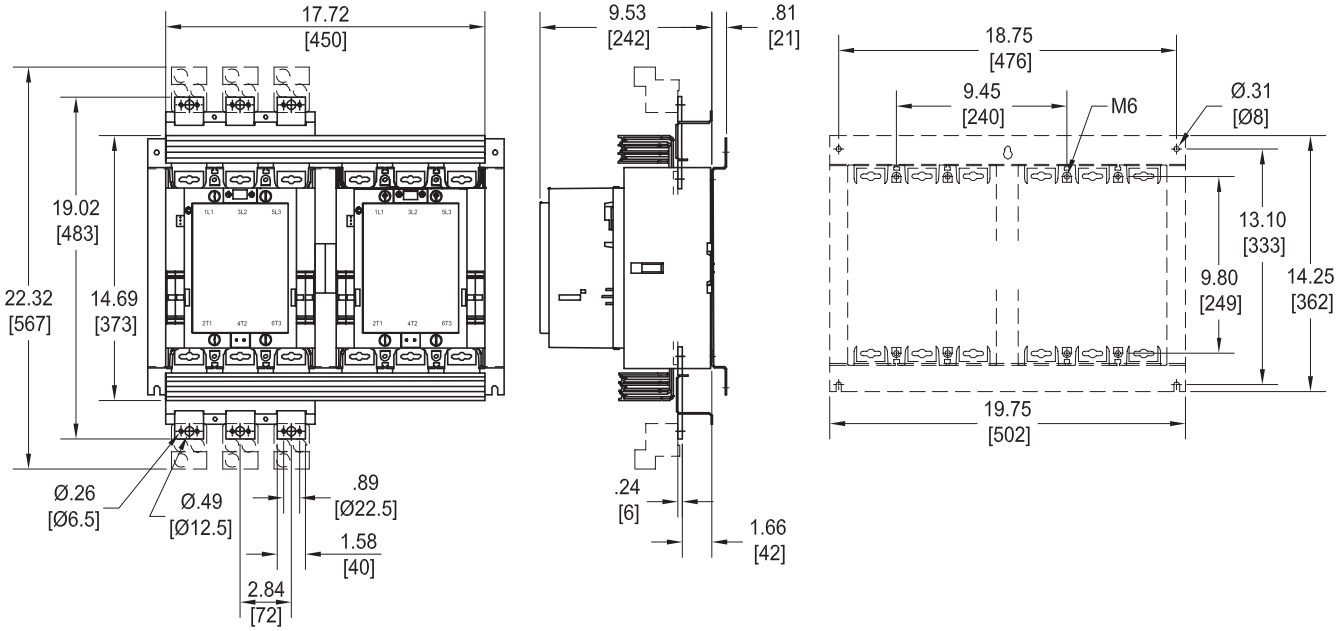
Approximate dimensions
AF580 – AF750

00.00 / 00.00 Inches [Millimeters]

AF580 – AF750 with mechanical interlock



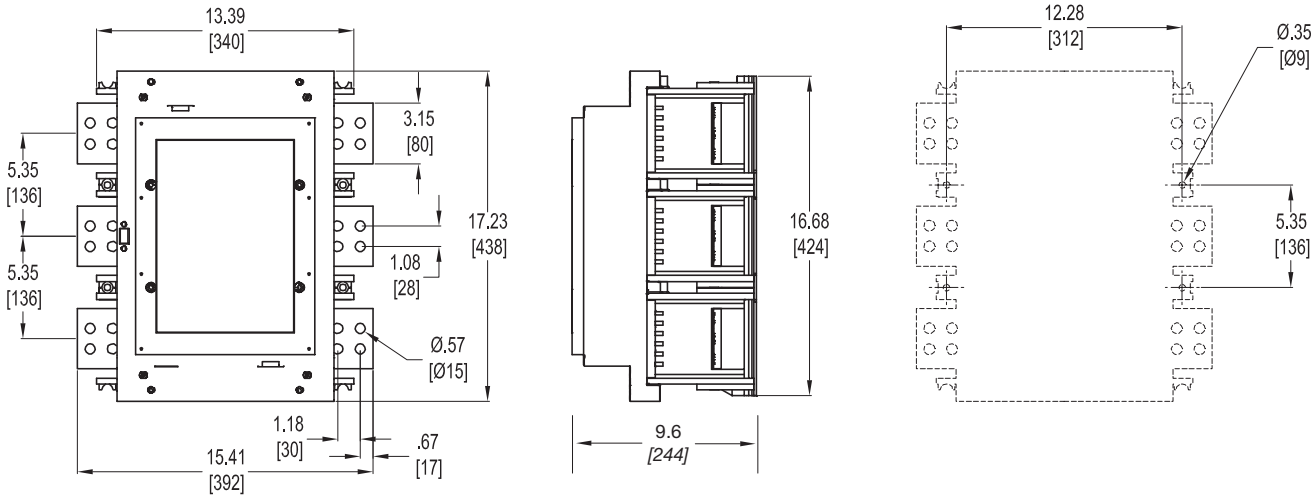
AF580 – AF750 reversing



Approximate dimensions
AF1350 – AF1650

00.00
00.00
Inches
[Millimeters]

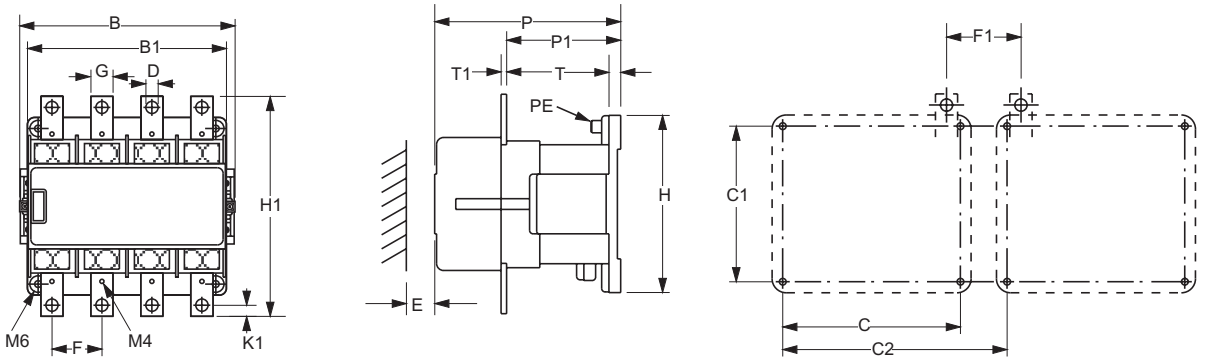
AF1350 – AF1650



Approximate dimensions

EK110 – EK550, 4 pole, non-reversing

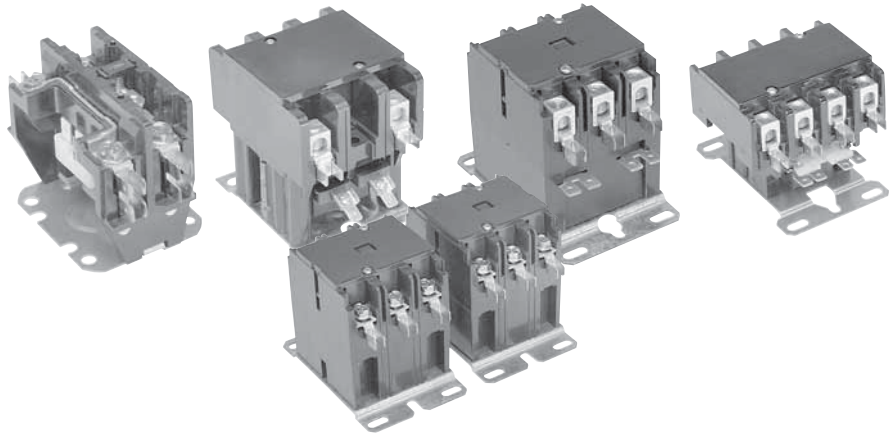
00.00 / 00.00 Inches [Millimeters]



		B	B1	C	C1	D	E	F	F1	G	H	H1	K1	P	P1	T	T1
EK 110	in	6.50	5.35	4.72	5.51	0.26	1,57	1.61	1.69	0.59	6.14	6.14	0.30	6.08	4.03	0.39	0.16
	mm	*165*	*136*	*120*	*140*	*6.6*	*40*	*41*	*43*	*15*	*156*	*156*	*7.5*	*154.5*	*102.3*	*10*	*4*
EK 150	in	6.50	5.35	4.72	5.51	0.43	1.57	1.65	1.65	0.79	6.14	6.77	0.39	6.08	4.03	0.39	0.16
	mm	*165*	*136*	*120*	*140*	*11*	*40*	*42*	*42*	*20*	*156*	*172*	*10*	*154.5*	*102.3*	*10*	*4*
EK 175	in	7.91	6.93	6.30	5.51	0.43	0.59	1.77	2.64	0.79	6.14	7.80	0.39	6.77	4.20	0.39	0.20
	mm	*201*	*176*	*160*	*140*	*11*	*15*	*45*	*67*	*20*	*156*	*198*	*10*	*172*	*106.7*	*10*	*5*
EK 210	in	7.91	6.93	6.30	5.51	0.43	0.59	1.77	2.64	0.79	6.14	7.80	0.39	6.77	4.20	0.39	0.20
	mm	*201*	*176*	*160*	*140*	*11*	*15*	*45*	*67*	*20*	*156*	*198*	*10*	*172*	*106.7*	*10*	*5*
EK 370	in	10.63	9.61	8.66	7.87	0.43	1.57	2.64	2.76	0.98	8.78	10.71	0.49	8.88	5.49	0.91	0.24
	mm	*270*	*244*	*220*	*200*	*11*	*40*	*67*	*70*	*25*	*223*	*272*	*12.5*	*225.5*	*139.5*	*23*	*6*
EK 550 EK 1000	in	10.63	9.61	8.66	7.87	0.43	1.57	2.64	2.76	0.98	8.78	10.71	0.49	8.88	5.49	0.91	0.24
	mm	*270*	*244*	*220*	*200*	*11*	*40*	*67*	*70*	*25*	*223*	*272*	*12.5*	*225.5*	*139.5*	*23*	*6*

Definite purpose contactors

Definite purpose Contactors



Applications

Type DP contactors provide high performance with flexibility and reliability, designed to match numerous applications including:

- Motors
- Power supplies
- Food service equipment
- Compressors
- Business machines
- Resistive heating
- Air conditioning
- Refrigeration equipment
- Welding

Agency approvals

- UL 508 Guide No. NLDX2, File # E224401
- CE/Semko Certified
- EN60947-4-1:1991
- IEC 947-4-1

Features

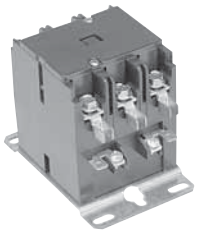
- Available as:
  – 30A, 1, 2, 3 or 4 pole
  – 40A, 2, 3 or 4 pole
  – 60A, 3 pole
- Industry standard mounting plate provides easily accessible mounting holes
- Coil terminals are provided with #6-32 screws and (1) .250 quick connect or dual .250 quick connect terminals
- Exclusive hex, slotted, phillips #10-32 terminal screws for main terminals
- Coil is Class B (130° C) Insulation system with wide range of voltages and 50/60 Hz ratings
- Double E Magnet Assembly provides optimal performance with reduced power consumption
- Snap-in auxiliary switch with 1 SPDT or 2 SPDT contacts available as an option
- 1 NO & 1 NC auxiliary contact block with 600 VAC rating available as an option
- Base assembly is made from high arc-resistant plastic

Catalog number explanation

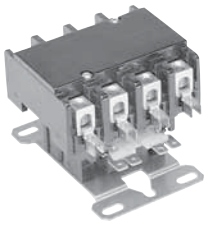
DP 30 C 3P - 1 /B

- **DP** — **Definite purpose**
- **30** — **Frame size**
  30 = 30A
  40 = 40A
  60 = 60A
- **C** — **Contactor type**
  C = Non-reversing
- **3P** — **Power poles**
  1P = 1 NO
  2P = 2 NO
  3P = 3 NO
  4P = 4 NO
- **1** — **Coil voltage**
  (See coil voltage selection chart)
- **/B** — **Bulk pack quantities**

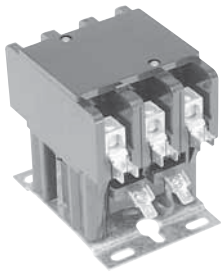
30A, 40A & 60A



DP30C3P-F



DP40C4P-F



DP60C3P-F

30A, 40A & 60A

Full load amps	Number of poles	Locked rotor amps 240/277V	Locked rotor amps 480V	Locked rotor amps 600V	Resistive amps	Maximum HP 1 phase 120V	Maximum HP 1 phase 240V	Maximum HP 3 phase 200/208V	Maximum HP 3 phase 240/277V	Maximum HP 3 phase 480V	Maximum HP 3 phase 600V	Bulk pack ①	Catalog number qty.	Individual pack list price	Bulk pack list price
30	1	150	75	50	40	1	2	—	—	—	—	50	DP30C1P-F	**$ 30**	**$ 27**
30	2	150	125	100	40	2	3	—	—	—	—	50	DP30C2P-F	**38**	**34**
30	3	180	150	120	40	2	5	10	10	15	20	25	DP30C3P-F	**55**	**50**
30	4	180	150	120	40	2	5	10	10	10	—	20	DP30C4P-F	**75**	**68**
40	2	240	200	160	50	2	3	—	—	—	—	50	DP40C2P-F	**46**	**42**
40	3	240	200	160	50	3	7.5	10	10	20	25	25	DP40C3P-F	**60**	**54**
40	4	240	200	160	50	3	7.5	10	10	10	—	20	DP40C4P-F	**100**	**90**
60	3	360	300	240	75	2	10	25	25	30	30	10	DP60C3P-F	**147**	**140**

Coil voltage selection chart

Voltage	24VAC	120VAC	208/240VAC	277VAC	480VAC	575VAC
Suffix #	F	1	2	C	4	5

Coil voltage selection

All catalog numbers include a 24VAC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the first digit after the dash in the catalog number.

Auxiliary contact blocks (3 pole only)

Description	Catalog number 30A - 40A	Catalog number 60A	List price
NO or NC SPDT 1 NO & 1 NC	CADP40-10 CADP40-11	CADP60-10 —	**$ 10**

Contact rating of 1 NO & 1 NC

		120V	240V	480V	600V
Break	A	3.0	1.5	.75	.6
Make	A	30	15	7.5	6
Continous	A	10	10	10	10

Quick connect terminals on all auxiliary switches are .250 wide.

Contact rating of SPDT

Voltage	Current rating
125VAC	10A, 1/3 HP
120VAC	4A on lamp load
250VAC	10A, 1/3 HP
125VDC	.5A
250VDC	.25A

Ordering bulk quantities

To order bulk package quantities add "/B" to the end of the catalog number.

Example: For quantities of 25 of a 30A 3 pole contactor with 24VAC coil, the catalog number would be: DP30C3P-F/B

Mechanical interlock

Frame size		Catalog number	List price
DP30 DP40		VMDP-1	**$ 7**

① Must be ordered in standard pack quantities as shown. Add suffix "/B" to the catalog number.

Technical data
30A – 60A
1, 2, 3, & 4 Pole

30A – 40A — 1 & 2 pole

Coil technical data		DP30C1P				DP30, DP40C2P			
Nominal coil voltage		24	120	208/240	277	24	120	208/240	277
Maximum pickup volts		18	88	177	221	18	88	177	221
Drop-out volts range		6 – 15	20 – 70	40 – 170	50 – 165	6 – 15	20 – 70	40 – 140	50 – 165
Nominal inrush VA	50 Hz	31	31	35	31	22	22	22	22
Nominal inrush VA	60 Hz	28	28	32	28	20	20	20	20
Nominal sealed VA	50 Hz	6	6	7	6	5.5	5.5	5.5	5.5
Nominal sealed VA	60 Hz	5	5	6	5	4.5	4.5	4.5	4.5
Nominal DC resistance	Ohms	17.5	450	1800	2252	13	275	1056	1772
Other specifications		DP30C1P				DP30, DP40C2P			
Line and load terminals		# 10 – 32 screw ①				Box lug ①			
Wire size AWG min – max		16 – 8②				14 – 4 Cu/Al			
Tightening torque (recommended)		25 in. lbs.				40 in. lbs			
Coil termination		Dual .250 QC (2)				Dual .250 QC (2)			
Quick connects .250 std. 1 – 1.5 pole		Quad				Quad			
Quick connects .250 std. 2 pole		Dual or quad				Dual or quad			
Covers		Optional				Standard			
Insulation system		130° C Class B				130° C Class B			

30A - 60A — 3 pole

Coil technical data		DP30, DP40C3P					DP60C3P				
Nominal coil voltage		24	120	208/240	277	480	24	120	208/240	277	480
Maximum pickup volts		18	88	177	220	384	18	93	177	235	374
Drop-out volts range		6 –15	20 – 70	40 – 140	65 – 185	150 – 270	6 – 15	20 – 70	40 – 135	50 – 180	150 – 286
Nominal inrush VA	50 Hz	65	65	65	65	65	140	140	140	140	140
Nominal inrush VA	60 Hz	60	60	60	60	60	132	132	132	132	132
Nominal sealed VA	50 Hz	7.5	7.5	7.5	7.5	7.5	20	20	20	20	20
Nominal sealed VA	60 Hz	6	6	6	6	6	14	14	14	14	14
Nominal DC resistance	Ohms	6.6	165	660	880	1320	2.4	45	180	280	852
Other specifications		DP30C3P					DP40C3P			DP60C3P	
Line and load terminals		# 10 – 32 Screw ①					Box lug ①			Box lug ①	
Wire size AWG min – max		16 – 8 ②					14 – 7 Cu/Al			14 – 2 Cu/Al	
Tightening torque (recommended)		25 in. lbs					40 in.lbs			50 in. lbs	
Quick connects: power terminals		Dual.250 QC					Dual.250 QC			Dual.250 QC	
Coil terminals		Dual .250 QC (2)					Dual .250 QC (2)			#6 – 35 screw & .250 QC (2)	
Covers		Optional					Standard			Standard	
Insulation system		130° C Class B					130° C Class B			130° C Class B	

30A – 40A — 4 Pole

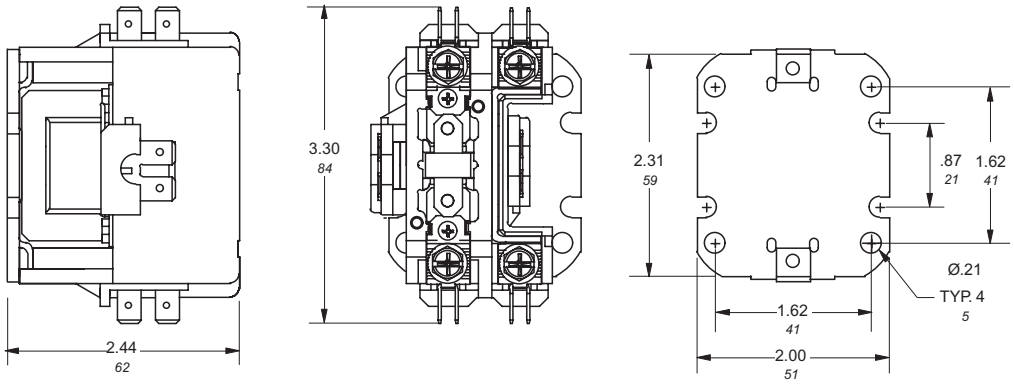
Coil technical data		DP30, DP40C4P				
Nominal coil voltage		24	120	208/240	277	480
Maximum pickup volts		19.2	88	177	220	384
Drop-out volts range		6 – 15	20 – 70	40 – 140	65 – 185	150 – 270
Nominal inrush VA	50 Hz	68	68	58	58	48
Nominal inrush VA	60 Hz	60	60	55	52	52
Nominal sealed VA	50 Hz	14	14	11	11	11
Nominal sealed VA	60 Hz	9	9	9.5	9.5	9
Nominal DC resistance	Ohms	5	148	550	750	2100
Other specifications		DP30C4P			DP40C4P	
Line and load terminals		# 10 – 32 screw ①			Box Lug	
Wire size AWG Min – Max		16 – 8 ②			14 – 4 Cu/AL	
Tightening torque (recommended)		22 in. lbs			40 in. lbs	
Quick connects: power terminals		Dual .250 QC			Dual .250 QC	
Coil terminals		Dual .250 QC (2)			Dual .250 QC (2)	
Covers		Optional			Standard	
Insulation system		130° C Class B			130° C Class B	

① See page 1.82 to 1.85 for description and approximate dimensions.
② Stranding must be split for #8 wire.

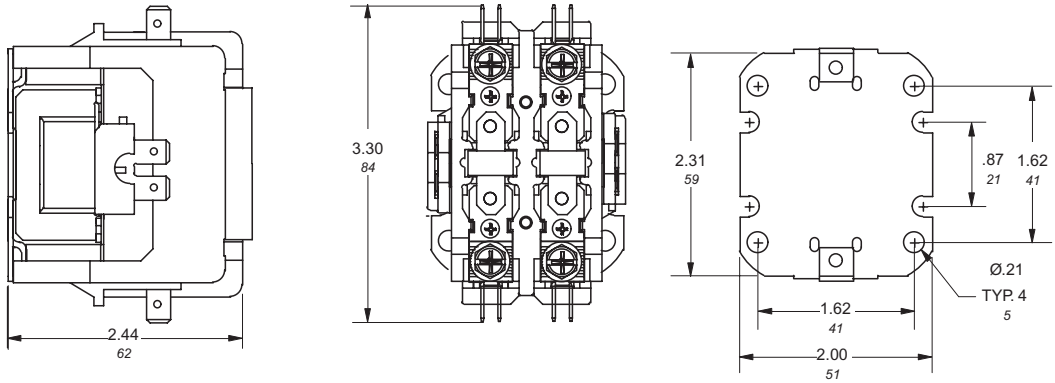
Approximate dimensions
30A
1, 2 & 3 Pole

00.00 / 00.00 Inches [Millimeters]

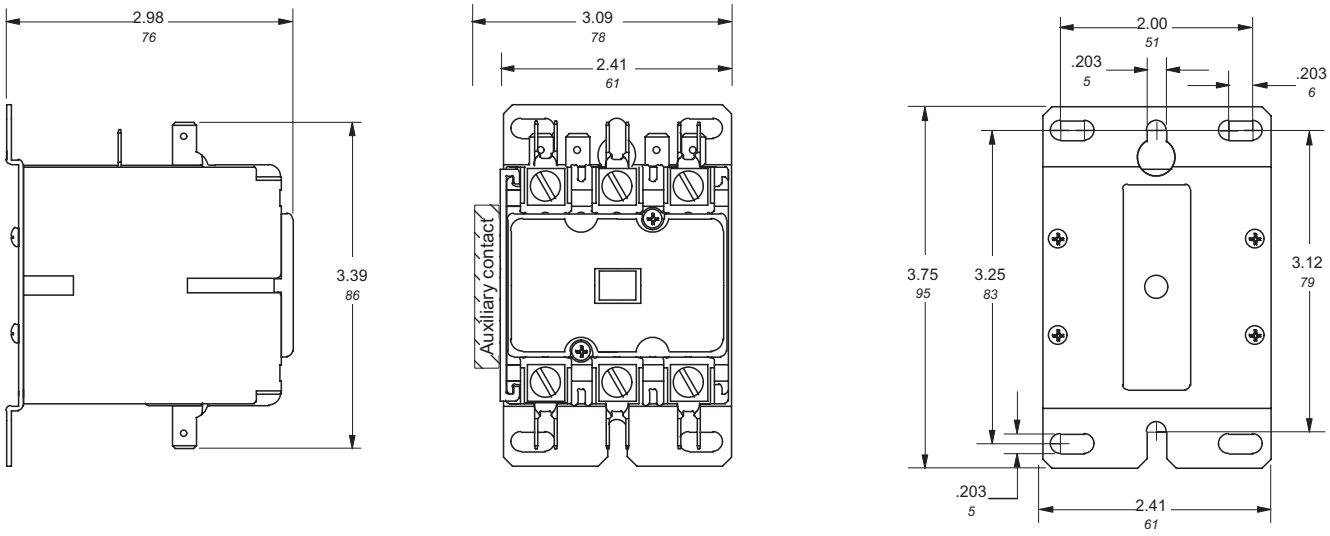
DP30C1P



DP30C2P



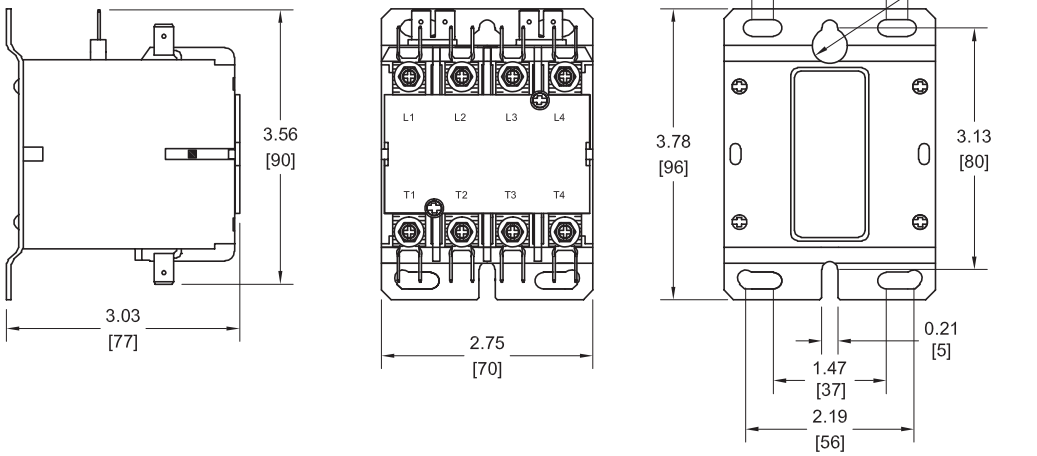
DP30C3P



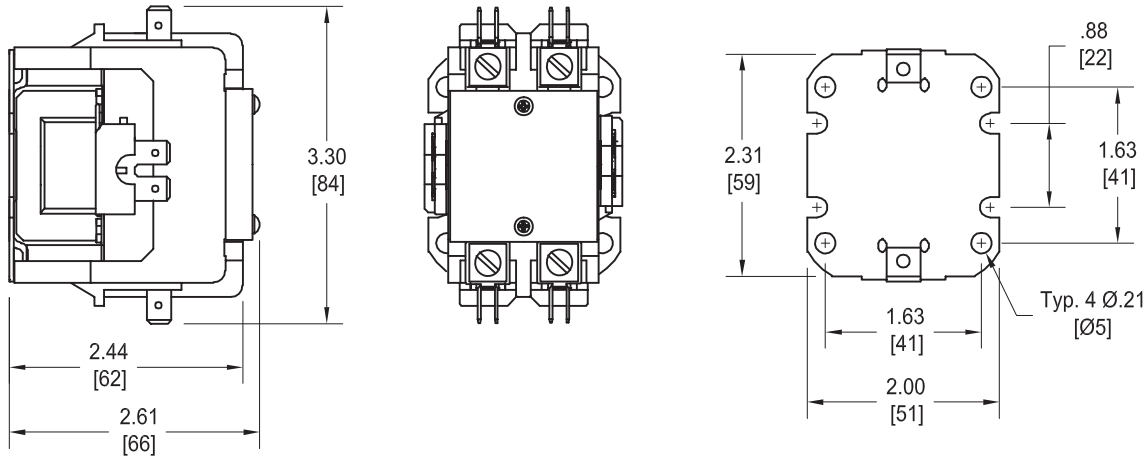
Approximate dimensions
30A 4 Pole
40A 2 & 3 Pole

00.00
00.00
Inches
[Millimeters]

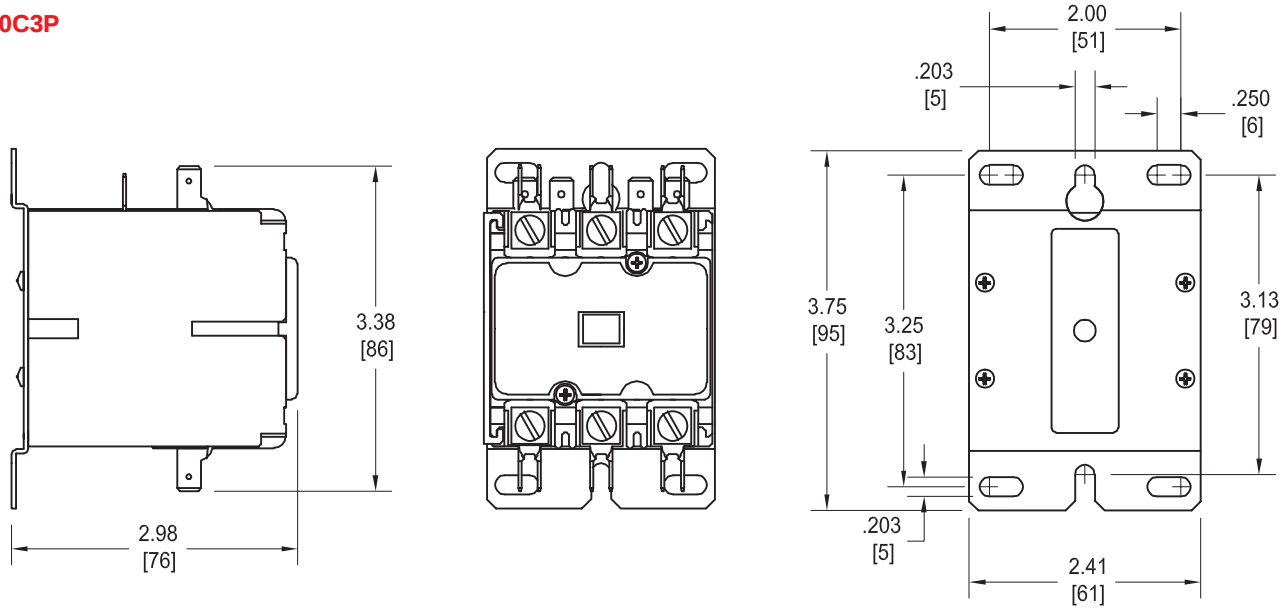
DP30C4P



DP40C2P

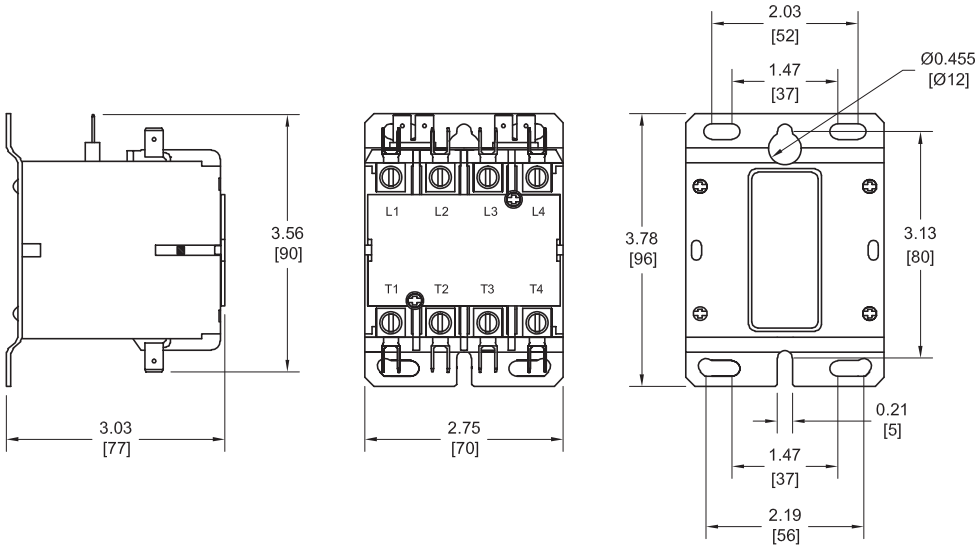


DP40C3P

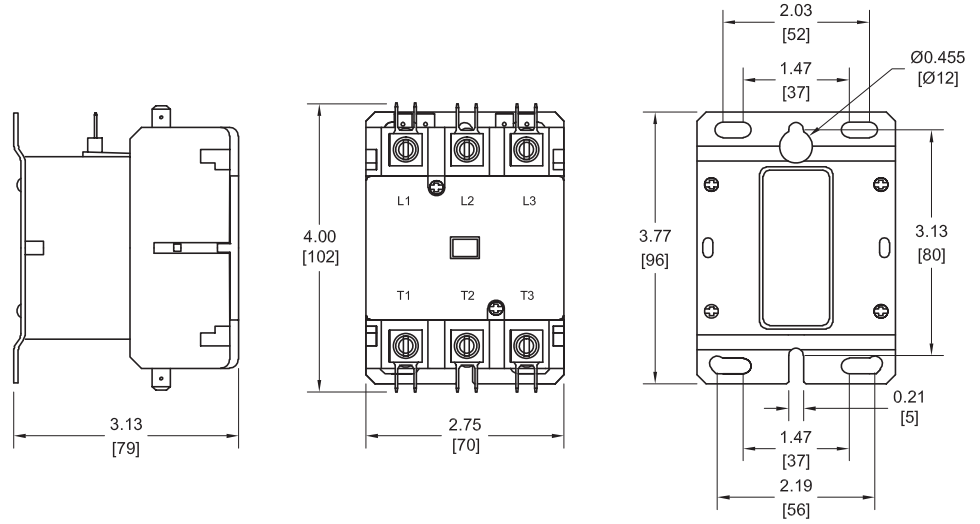


Approximate dimensions
40A 4 Pole
60A 3 Pole

DP40C4P

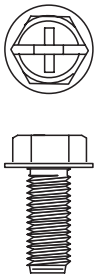


DP60C3P



Approximate dimensions
Terminations

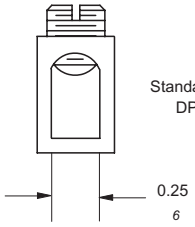
Screw



Standard on DP30

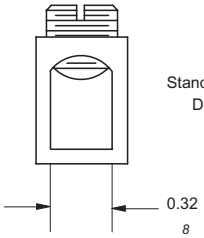
10-32 Combination Phillips, slotted & 5/16 Hex Head

Lugs



Standard on DP40

14 - 4 AWG, Cu / Al



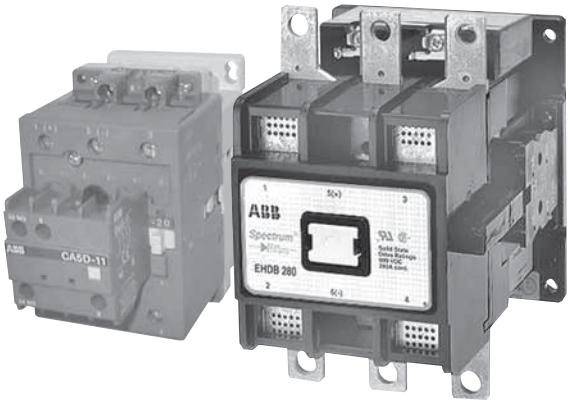
Standard on DP60

14 - 2 AWG, Cu / Al

Notes

Drive contactors
Type DA & EHDB

Drive Contactors



Description

Type DA

- 60 amps size
- 500 volt DC ratings
- 160 and 300 volt DC normal closed ratings for dynamic braking
- Low energy auxiliary contacts available (17V, 5mA)
- Mechanically interlocked version available for reversing applications
- Small compact design
- 2 pole (2 N.O.) and 3 pole (2 N.O. & 1 N.C.) available
- Additional auxiliary contact blocks available
- Auxiliary contacts available to meet elevator standards
- Fast, snap-on DIN rail mounting
- Double break contact design
- Captive terminal screws
- Touch-safe design: all connection terminals are protected against accidental touch
- Terminals supplied open for ease of wiring
- Operates over an extended voltage range of 85% to 110% of rated control voltage
- N.C. dynamic braking pole is easily added to two pole contactors
- Screwdriver guide holes
- Snap-on front mounted accessories
- UL and CSA approved

Type EHDB

- 220 amps to 960 amps
- 2 pole (2 N.O.) and 3 pole (2 N.O. & 1 N.C.) power poles available
- 600 VDC making capacity: 300 VDC breaking capacity
- 1 N.O. & 1 N.C. auxiliary contacts are standard and up to six additional auxiliary contacts may be added to provide a total of 8 (4 N.O. & 4 N.C.)
- Early make & late break auxiliary contacts available
- Auxiliary contacts available to meet elevator standards
- EHDB 220, 280 & 360 contactors have withdrawable coils
- Mechanically interlocked contactors available for reversing applications
- Double break contact design with magnetic arc chamber extinguishes arc in shortest possible time
- High temperature encapsulated coil
- Easy removal of arc chute for quick inspection and change of contacts
- Operates over an extended voltage range of 85% to 110% of rated control voltage
- DC control operation available
- UL & CSA approved
  UL File # E79416
  CSA File # LR19700

Type DA
60 Amps

DA75-21A-11-84

2 & 3 pole — 500 volt N.O. ratings with 160 volt N.C. dynamic braking rating

Thermal amp rating	Maximum amp rating N.C. contact		Auxiliary contacts included		2 pole (2 N.O.)		3 pole (2 N.O. & 1 N.C.)	
	Make 300 VDC	Break 160 VDC	N.O.	N.C.	Catalog number	List price	Catalog number	List price
60	90	55	2 1	1 1	— DA75-20-11-84	— **310**	DA75-21-21-84 —	$ **385** —

3 pole — 500 volt N.O. ratings with 300 volt N.C. dynamic braking rating

Thermal amp rating	Maximum amp rating N.C. contact		Auxiliary contacts included		3 pole (2 N.O. & 1 N.C.)	
	Make 500 VDC	Break 300 VDC	N.O.	N.C.	Catalog number	List price
60	90	55	1	1	DA75-21A-11-84	$ **430**

NOTE: DA75 2 & 3 pole contactors are equipped with poloarity-dependent N.O. contacts.

Description

DA drive contactors are specifically designed for use with solid state D.C. adjustable speed drive systems. In drive applications, the contactor is not required to make or break the load during normal operation. The N.C. contact is used for dynamic braking applications.

Coil voltage selection

All DC operated catalog numbers include a 24VDC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 24V coil is required for an DA75 contactor: DA75-20-11-**81**

Coil voltage selection chart

Hz	Cntr	Volts																
	type	12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

NOTE: DC coils are available for DA75 contactors only.

For other voltages, see page 1.26.

Additional auxiliary contacts

Contactor number	Number of auxiliary contacts that may be added to DA contactors
DA75-21-21-84	(1 – 2) CA5 & (1) CAL5 Aux
DA75-20-11-84	(1) DB Adder deck & (2) CA5 & (1) CAL5 Aux

Auxiliary contact block adders

Top mounted for DA9 – DA75	Catalog number	List price
N.O. N.C.	CA5-10 CA5-01	**$ 15**
1 N.O. & 1 N.C.	CAL5-11	**30**

All above auxiliary contact blocks fulfill the mirror contacts standards in IEC609 47-1 Annex F, Positive driven action IEC 609 47-1, Chapter 4. They also fulfill elevator standard ASME A17-1-2000.

Type EHDB
220 to 960 Amps

EHDB280C-1L

EHDB520C2P-1L

2 & 3 pole — 600 volt N.O. ratings with 300 volt N.C. dynamic braking rating

Thermal amp rating 600 volts	Maximum amp rating N.C. contact		Auxiliary contacts included		2 pole (2 N.O.)		3 pole (2 N.O. & 1 N.C.)	
	Make 300 VDC	Break 160 VDC	N.O.	N.C.	Catalog number	List price	Catalog number	List price
220	450	285	1	1	EHDB220C2P-1L	**$ 698**	EHDB220C-1L	**$ 998**
280	565	363	1	1	EHDB280C2P-1L	**945**	EHDB280C-1L	**1290**
380	728	472	1	1	EHDB360C2P-1L	**1950**	EHDB360C-1L	**2820**
520	1040	680	1	1	EHDB520C2P-1L	**2250**	EHDB520C-1L	**3375**
650	1300	850	1	1	EHDB650C2P-1L	**3953**	EHDB650C-1L	**4650**
800	1600	1050	1	1	EHDB800C2P-1L	**4845**	EHDB800C-1L	**5700**
960	1920	1250	1	1	EHDB960C2P-1L	**6120**	EHDB960C-1L	**7200**

Description
EHDB drive contactors are specifically designed for use with solid state D.C. adjustable speed drive systems. In drive applications, the contactor is not required to make or break the load during normal operation. The N.C. contact is used for dynamic braking applications. EHDB contactors are provided less terminal lugs.

Coil voltage selection
All catalog numbers include a 120V coil. To select other coil voltages, substitute the code from the coil voltage selection chart for the first digit after the dash in the catalog number.

Coil voltage selection chart – EHDB contactors

	Volts														
	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	F	G		1		B	2	2	C			3	4		6
50	N		1				J			3	4			6	
DC	Y	W	P		O		R								

NOTE: For other voltages, consult factory. • 24VAC coils are not available for sizes EHDB520 – EHDB960. • 48VAC coils are not available for sizes EHDB520 – EHDB960. For these 24V and 48V applications, use an interposing control relay. • 12VDC coils are not available for EHDB520 – EHDB960.

DC operated contactors
EHDB220 – EHDB960

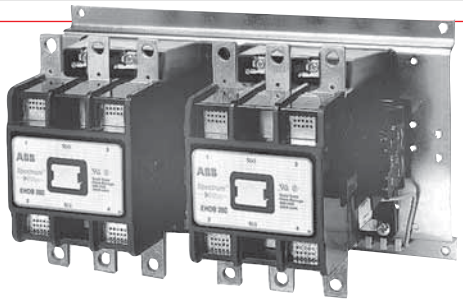
DC and AC operated contactors have the same magnet structure except the DC coil includes a resistor and a normally closed late break auxiliary interlock. To order, substitute the code from the coil voltage selection chart and refer to the DC magnet coils chart for the price adder.

DC operated contactors are supplied with 2 N.O. & 1 N.C. auxiliary contacts. One additional 1 N.O. & 1 N.C. auxiliary contact block can be mounted on the left side of the contactor.

DC magnet coils (per contactor)

Contactor size	List price
EHDB220 – EHDB280	**$ 255**
EHDB360	**285**
EHDB520	**360**
EHDB650 – EHDB960	**495**

Type DA & EHDB, mechanically interlocked
60 to 960 Amps



EHDB280M-1L

2 & 3 pole — 600 volt N.O. ratings with 300 volt N.C. dynamic braking rating

Thermal amp rating 500V (DA) 600V (EHDB)	Maximum amp rating N.C. contact		Auxiliary contacts included each contactor		2 pole (2 N.O.)		3 pole (2 N.O. & 1 N.C.)	
	Make	Break	3 Pole N.O.	2 Pole N.C.	Catalog number	List price	Catalog number	List price
60	90	55	1 NO & 1 NC	1 NO & 1 NC	DA75M-20-11-84	**$ 780**	DA75M-21A-11-84	**$ 935**
220	450	285	1 NO & 1 NC	1 NO & 1 NC	EHDB220M2P-1L	**1653**	EHDB220M-1L	**2253**
280	565	363	1 NO & 1 NC	1 NO & 1 NC	EHDB280M2P-1L	**2148**	EHDB280M-1L	**2838**
380	728	472	1 NO & 1 NC	1 NO & 1 NC	EHDB360M2P-1L	**4296**	EHDB360M-1L	**6036**
520	1040	680	1 NO & 1 NC	1 NO & 1 NC	EHDB520M2P-1L	**4986**	EHDB520M-1L	**7236**
650	1300	850	1 NO & 1 NC	1 NO & 1 NC	EHDB650M2P-1L	**8391**	EHDB650M-1L	**9786**
800	1600	1050	1 NO & 1 NC	1 NO & 1 NC	EHDB800M2P-1L	**10,266**	EHDB800M-1L	**11,976**
950	1920	1250	1 NO & 1 NC	1 NO & 1 NC	EHDB960M2P-1L	**12,816**	EHDB960M-1L	**14,976**

DA75 contactors are equipped with polarity dependent N.O. contacts. EHDB contactors are equipped with polarity dependent N.C. contacts.

Description

EHDB mechanically interlocked drive contactors are designed for reversing applications. The complete assembly consists of two mechanically and electrically interlocked contactors supplied without control and power wiring. The coil voltage selection

Coil voltage selection

Type DA

All DC operated catalog numbers include a 24VDC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 24V coil is required for an DA75M contactor: DA75M-20-11-**81**

Type EHDB

All catalog numbers include a 120V coil. To select other coil voltages, substitute the code from the coil voltage selection chart for the first digit after the dash in the catalog number.

Ex.: A 220V coil is required for an EHDB960M contactor: EHDB960M2P-**2**L

Coil voltage selection chart – DA contactors

Hz	Cntr type	Volts 12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

NOTE: DC coils are available for DA75 contactors only.

For other voltages, see page 1.26.

Coil voltage selection chart – EHDB contactors

	Volts 24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	F	G		1		B	2	2	C			3	4		6
50	N		1				J			3	4			6	
DC	Y	W	P		O		R								

NOTE: For other voltages, consult factory. • 24VAC coils are not available for sizes EHDB520 – EHDB960. • 48VAC coils are not available for sizes EHDB520 – EHDB960. For these 24V and 48V applications, use an interposing control relay. • 12VDC coils are not available for EHDB520 – EHDB960.

DC magnet coils (per contactor)

Contactor size	List price
EHDB220M – EHDB280M	**510**
EHDB360M	**570**
EHDB520M	**720**
EHDB650M – EHDB960M	**990**

Replacement parts

EHDBRC280-1

Coils

Contactor size		Catalog number	AC coils list price	DC coils list price
	DA75	ZA75-★ ①	**$ 57**	**$ 57**
	EHD220, EHD280	EHDRC280-★	**150**	**195**
	EHD350	EHDRC360-★	**180**	**240**
Withdrawable type	EHDB220, EHDB280	EHDBRC280-★	**150**	**195**
	EHDB360	EHDBRC360-★	**180**	**240**
	EHDB520, EHDB650	EHDBRC650-★	**360**	**450**
	EHDB800, EHDB960	EHDBRC960-★	**435**	**525**

★ Subtitute the ★ for a coil voltage suffix found in the Coil Voltage Selection Chart.
EHDB coils can be used as replacement parts in EHD contactors.

Coil voltage selection chart – DA contactors ①

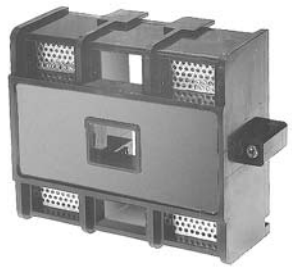
Hz	Cntr type	Volts															
		12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

NOTE: DC coils are available for DA75 contactors only.

Coil voltage selection chart – EHDB contactors

	Volts														
	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	F	G		1		B	2	2	C			3	4		6
50	N		1				J			3	4			6	
DC	Y	W	P		O		R								

NOTE: For other voltages, consult factory. • 24VAC coils are not available for sizes EHDB520 – EHDB960. • 48VAC coils are not available for sizes EHDB520 – EHDB960. For these 24V and 48V applications, use an interposing control relay. • 12VDC coils are not available for EHDB520 – EHDB960.



EHDBAS280

Arc shields

Contactor size		Catalog number	List price
3 Pole			
	EHDB220	EHDBAS220	**$ 200**
	EHDB280	EHDBAS280	**233**
	EHDB360	EHDBAS360	**254**
	EHDB520	EHDBAS520	**305**
	EHDB650	EHDBAS650	**350**
	EHDB800	EHDBAS800	**371**
	EHDB960	EHDBAS960	**396**
2 Pole			
	EHDB220	EHDBAS220-2	**192**
	EHDB280	EHDBAS280-2	**221**
	EHDB360	EHDBAS360-2	**242**
	EHDB520	EHDBAS520-2	**293**
	EHDB650	EHDBAS650-2	**338**
	EHDB800	EHDBAS800-2	**357**
	EHDB960	EHDBAS960-2	**383**

Auxiliary contact blocks — EHDB220 to EHDB960

Contactor sizes	Description	Terminal markings N.O.	Terminal markings N.C.	Catalog number		List price
EHDB130 to EHDB960	Standard 1 N.O. & 1 N.C.	13, 14	21, 22	CAL16-11A	L	**$ 88**
	Standard 1 N.O. & 1 N.C.	43, 44	31, 32	CAL16-11B	R	**88**
	Standard 1 N.O. & 1 N.C.	53, 54	61, 62	CAL16-11C	L	**88**
	Standard 1 N.O. & 1 N.C.	83, 84	71, 72	CAL16-11D	R	**88**
	Late break 1 N.O. & 1 N.C.	47, 48	35, 36	CAL16-11E	L,R	**100**

EHDB130 to EHDB960 contactors are provided with a 1 N.O. & 1 N.C. auxiliary contact block mounted on each contactor. One additional 1 N.O. & 1 N.C. auxiliary contact block can be mounted on the left side of the contactor and two additional 1 N.O. & 1 N.C. contact blocks can be mounted on the right side.

Positive driven action auxiliary contact blocks — EHDB220 to EHDB360

Contactor sizes	Description	Terminal markings N.O.	Terminal markings N.C.	Catalog number	List price
EHDB220 to EHDB360	Standard 1 N.O. & 1 N.C. (left side)	13, 14	21, 22	CAL16-11N	**$ 160**
	Standard 1 N.O. & 1 N.C. (right side)	43, 44	31, 32	CAL16-11P	

Only one of these auxiliary contact blocks can be mounted on each side of the contactor. They fulfill the mirror contacts IEC609 47-1 Annex F, positive driven action IEC609 47-1, Chapter 4. They also fulfill elevator standard ASME A17-1-2000.

① For other voltages, see page 1.26.

Replacement parts

EHDBCK280-2

EHDBCK280-NC

Contact kits

Contactor size	Catalog number	List price
2 Pole, N.O.		
DA75	ZL75	**$ 158**
EHDB220	EHDBCK220-2	**300**
EHDB280	EHDBCK280-2	**360**
EHDB360	EHDBCK360-2	**698**
EHDB520	EHDBCK520-2	**1026**
EHDB650	EHDBCK650-2	**1368**
EHDB800	EHDBCK800-2	**1688**
EHDB960	EHDBCK960-2	**2115**

N.C. DB Kit only

Contactor size	Contact rating	Auxiliary interlocks	Catalog number	List price
DA75	55A/160V; 28A/300V	1 NO	CA5D-11	**$ 60**
DA75	300V	—	CA5D-01	**75**
EHDB220	300V	—	EHDBCK220-NC	**165**
EHDB280	300V	—	EHDBCK280-NC	**165**
EHDB360	300V	—	EHDBCK360-NC	**315**
EHDB520	300V	—	EHDBCK520-NC	**513**
EHDB650	300V	—	EHDBCK650-NC	**513**
EHDB800	300V	—	EHDBCK800-NC	**690**
EHDB960	300V	—	EHDBCK960-NC	**690**

Lug kits

Contactor size	Wire size	Catalog number	List price
2 & 3 Pole			
EHDB220 – EHDB280	6-250	EHTK210	**$ 90**
EHDB360 – EHDB650	4-500	EHTK550N	**150**
EHDB800	(2) 4-500	EHTK700	**200**
EHDB960	(3) 2-600	EHTK800	**450**

Technical data
Type DA

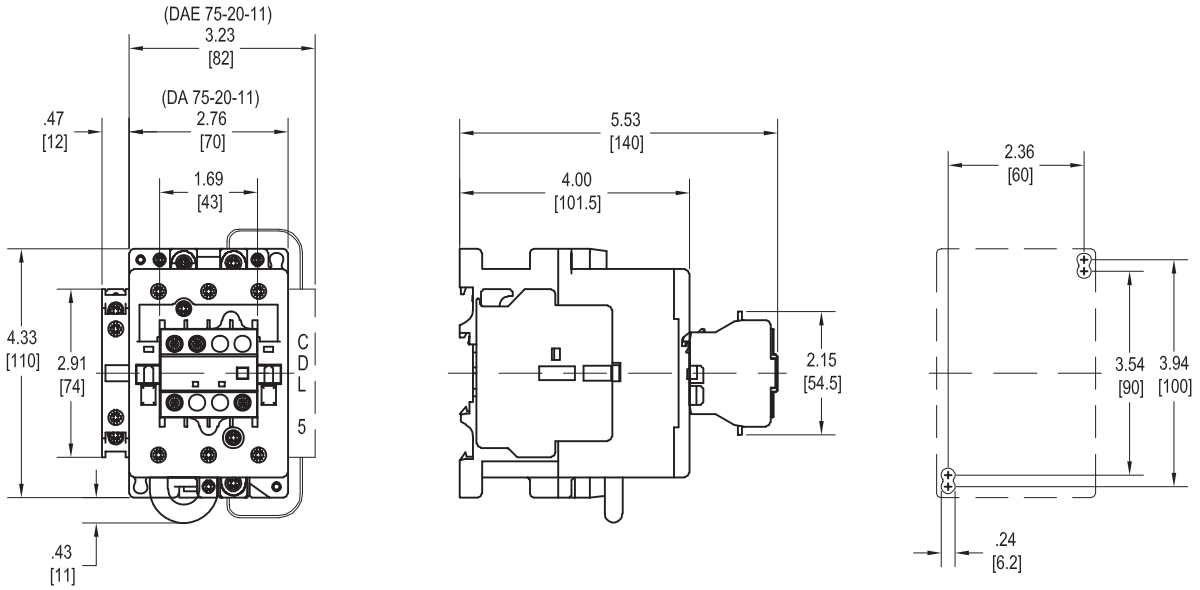
Contactor		DA75-21	DA75-21A
Main poles			
N.O. Poles, Amps @ 500VDC	A	60	60
240 VDC	HP	15	15
500 VDC	HP	30	30
Center pole			
N.C. Pole, 160V Make	Max. Amps	90	—
N.C. Pole, 160V Break	Max. Amps	55	—
N.C. Pole, 300V Make	Max. Amps	—	90
N.C. Pole, 300V Break	Max. Amps	—	55
DC rating			
Maximum thermal current	A	60	60
Peak interrupting current	A	90	90
Connectable wire size			
Main poles with lugs		8 – 1	8 – 1
Auxiliary contacts, min/max		18 – 10	18 – 10
Main contacts (contactor life)			
Mechanical endurance @ no load	mil.	5	5
Electrical endurance, main poles	mil.	1.5	1.5
Frequency of operations	per hour	600	600
Auxiliary contacts			
NEMA rating		A600	A600
AC rated voltage	V	600	600
AC thermal rated current	A	10	10
AC maximum making	VA	7200	7200
AC maximum breaking	VA	720	720
NEMA rating		P600	P600
DC rated voltage	V	600	600
DC thermal rated current	A	5	5
DC maximum make-break	A	0.2	0.2
Min. breakdown AC RMS voltage between live parts and ground	V	2200	2200
Minimum permissable load, 17V	A	0.005	0.005
Max. wire size on terminals @ 2/term		10 AWG	10 AWG
Max. operations per hour		600	600
Min. expected mechanical life	mil.	10	10
Min. expected electrical life	mil.	2	2
Coil operating data			
AC power consumption			
Inrush 60 Hz	VA	200	200
Holding 60 Hz	VA	20	20
Holding 60 Hz	W	5.5	5.5
AC operating time (in milliseconds)			
Closing time	ms	20 – 25	20 – 15
Opening time	ms	10 – 15	10 – 15
General data			
Approximate weight	lbs	2.4	2.4
Temperature limits			
Maximum operating temperature	°C	50	50
Minimum operating temperature	°C	-25	-25
Minimum storage temperature	°C	-40	-40
Maximum storage temperature	°C	70	70
Min. breakdown AC RMS voltage	V	2200	2200
Operating altitude			
Maximum operating altitude	feet	10,000	10,000

Technical data
Type EHDB

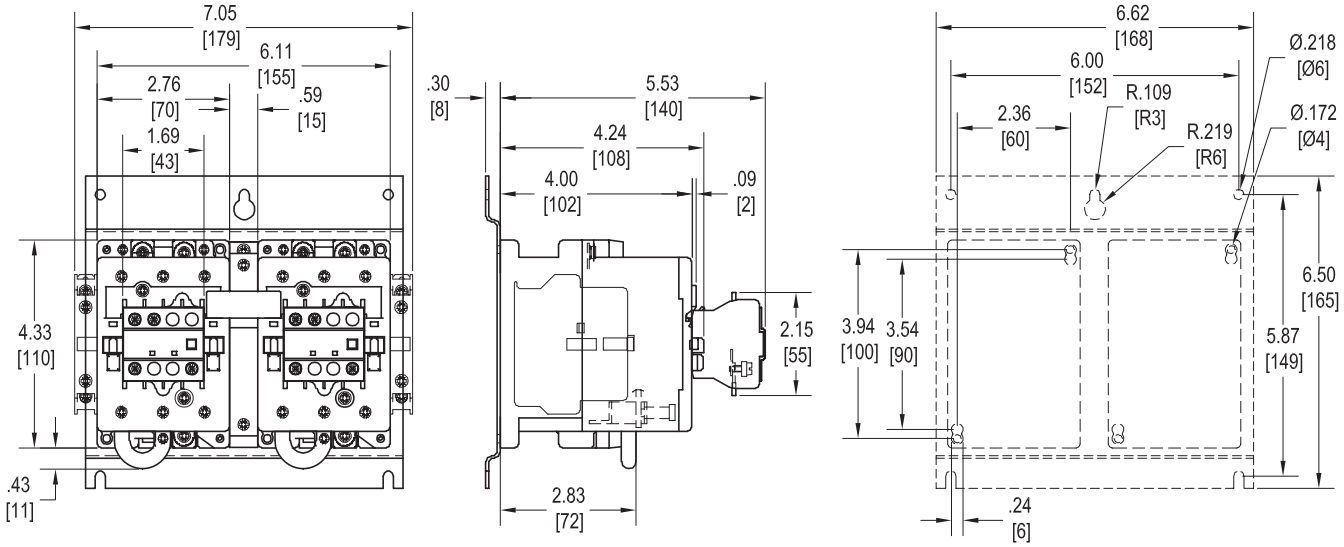
Contactor model number		EHDB220	EHDB280	EHDB360	EHDB520	EHDB650	EHDB800	EHDB960
N.O. poles, Amps	600 VDC	220	280	360	520	650	800	960
N.C. pole, 600V Make	Max. amps	456	565	728	1040	1300	1600	1920
N.C. pole, 300V Break	Max. amps	285	363	472	680	850	1050	1250
Connectable wire size								
Main poles with lugs		8 – 30	5 – 250 kcmils	4 – 500 kcmils	(2) 4 – 500 kcmils	(2) 4 – 500 kcmils	(3) 2 – 600 kcmils	(3) 2 – 600 kcmils
Auxiliary contacts	min./max.	16/10	16/10	16/10	16/10	16/10	16/10	16/10
DC rating information	**No. Poles**							
Peak interrupting current	A	330	420	540	780	975	1200	1440
Maximum thermal current	A	220	280	360	520	650	800	960
Main contacts (contactor life)								
Mechanical endurance @ no load	mil.	5	5	5	5	5	5	5
Electrical endurance	mil.	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Frequency of operations	per hour	300	300	300	300	300	300	300
Auxiliary contacts								
NEMA rating		A600	A600	A600	A600	A600	A600	A600
AC rated voltage	V	600	600	600	600	600	600	600
AC thermal rated current	A	10	10	10	10	10	10	10
AC maximum making	VA	7200	7200	7200	7200	7200	7200	7200
AC maximum breaking	VA	720	720	720	720	720	720	720
NEMA rating								
DC rated voltage	V	600	600	600	600	600	600	600
DC thermal rated current	A	5	5	5	5	5	5	5
DC maximum make-break	A	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Min. breakdown AC RMS voltage between live parts and ground		2200	2200	2200	2200	2200	2200	2200
Min. permissable load, 17V	A	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Expected mechanical life	mil.	5	5	5	5	5	5	5
Max. operations per hour		300	300	300	300	300	300	300
Coil operating data								
AC power consumption								
Inrush 60 Hz	VA	900	900	1200	2900	2900	400	4000
Holding 60 Hz	VA	52	52	65	105	105	140	140
Holding 60 Hz	W	18	18	22	44	44	60	60
DC power consumption								
Inrush	W	500	500	630	800	800	1100	1100
Holding	W	3.6	3.6	4	20	20	20	20
AC operating time								
Closing time	ms	20 – 30	20 – 30	20 – 30	30 – 50	30 – 50	30 – 50	30 – 50
Opening time	ms	7 – 15	7 – 15	7 – 15	10 – 20	10 – 20	10 – 20	10 – 20
DC operating time								
Closing time	ms	30 – 40	30 – 40	30 – 40	60 – 80	60 – 80	60 – 80	60 – 80
Opening time	ms	27 – 37	27 – 37	27 – 37	10 – 20	55 – 75	55 – 75	55 – 75
General data								
Approximate weight	lbs	9.2	9.2	13	27.3	27.3	37	38
Temperature limits								
Maximum operating temperature	°C	70	70	70	70	70	70	70
Minimum operating temperature	°C	-40	-40	-40	-40	-40	-40	-40
Minimum storage temperature	°C	-50	-50	-50	-50	-50	-50	-50
Maximum storage temperature	°C	70	70	70	70	70	70	70
Min. Breakdown AC	RMS Voltage	2200	2200	2200	2200	2200	2200	2200
Operating altitude								
Maximum operating altitude	feet	10,000	10,000	10,000	10,000	10,000	10,000	10,000

Approximate dimensions
Type DA, 2 & 3 pole

DA75

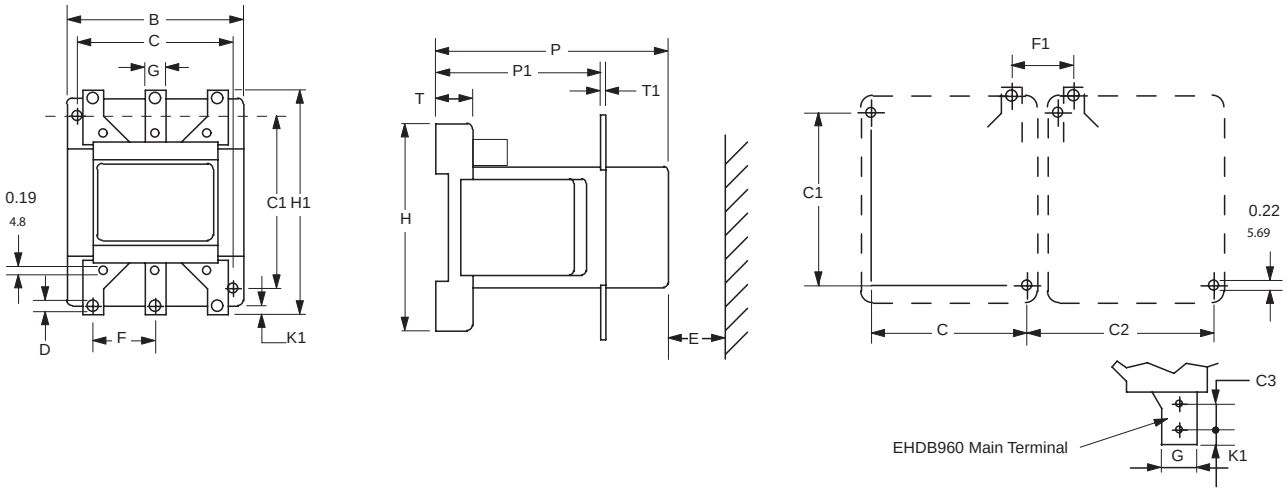


DA75M



Approximate dimensions
Type EHDB 2 & 3 pole; Mounting positions

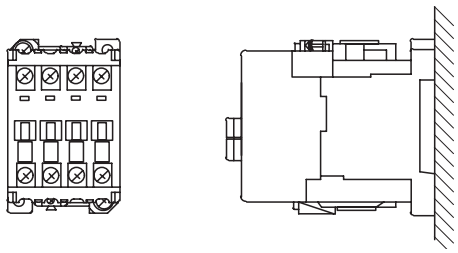
EHDB220 – EHDB960



DIM.	B			B2	C	C1	C2				E	D	F	G	H	H1	K1	P	P1	T	T1	C3
	1, 2	3	4				① Aux. contact block	②	③	④												
EHDB220in	5.35	5.83	6.30	6.46	4.72	5.51	5.39	5.39	5.87	6.34	0.59	0.24	1.77	0.79	6.14	7.79	0.39	6.65	4.06	0.41	0.20	—
mm	*136*	*148*	*160*	*164*	*120*	*140*	*137*	*137*	*149*	*161*	*15*	*6*	*45*	*20*	*156*	*198*	*10*	*169*	*103*	*10.5*	*5*	—
EHDB280in	5.35	5.83	6.30	6.46	4.72	5.51	5.39	5.39	5.87	6.34	0.59	0.24	1.77	0.79	6.14	7.79	0.39	6.65	4.06	0.41	0.20	—
mm	*136*	*148*	*160*	*164*	*120*	*140*	*137*	*137*	*149*	*161*	*15*	*6*	*45*	*20*	*156*	*198*	*10*	*169*	*103*	*10.5*	*5*	—
EHDB360in	6.92	7.44	7.72	8.11	6.30	5.51	7.20	7.32	7.48	7.76	1.18	0.24	2.44	0.98	6.14	8.14	0.49	6.88	4.21	0.7 ⑤	0.20	—
mm	*176*	*189*	*196*	*206*	*160*	*140*	*183*	*186*	*190*	*197*	*30*	*6*	*62*	*25*	*156*	*207*	*12.5*	*175*	*107*	*19* ⑤	*5*	—
EHDB520in	7.80	8.23	8.62	8.90	6.69	7.87	7.91	7.91	8.19	8.54	1.57	0.24	2.64	0.98	8.78	10.71	0.49	8.90	5.51	0.9 ⑤	0.24	—
mm	*198*	*209*	*219*	*226*	*170*	*200*	*201*	*201*	*208*	*217*	*40*	*6*	*67*	*25*	*223*	*272*	*12.5*	*226*	*140*	*23* ⑤	*6*	—
EHDB650in	7.80	8.23	8.62	8.90	6.69	7.87	7.91	7.91	8.19	8.54	1.57	0.24	2.64	0.98	8.78	10.71	0.49	8.90	5.51	0.9 ⑤	0.24	—
mm	*198*	*209*	*219*	*226*	*170*	*200*	*201*	*201*	*208*	*217*	*40*	*6*	*67*	*25*	*223*	*272*	*12.5*	*226*	*140*	*23* ⑤	*6*	—
EHDB800in	9.61	9.96	10.31	10.63	8.66	7.87	9.69	9.690	10.00	10.35	1.57	0.24	3.23	1.57	8.78	11.57	0.79	8.90	5.51	0.9 ⑤	0.24	—
mm	*244*	*253*	*262*	*270*	*220*	*200*	*246*	*246*	*254*	*263*	*40*	*6*	*82*	*40*	*223*	*294*	*20*	*226*	*140*	*23* ⑤	*6*	—
EHDB960in	9.61	9.96	10.31	10.63	8.66	7.87	9.69	9.690	10.00	10.35	1.57	0.24	3.23	1.57	8.78	11.57	0.79	8.90	5.51	0.9 ⑤	0.24	1.36
mm	*244*	*253*	*262*	*270*	*220*	*200*	*246*	*246*	*254*	*263*	*40*	*6*	*82*	*40*	*223*	*294*	*20*	*226*	*140*	*23* ⑤	*6*	*34.5*

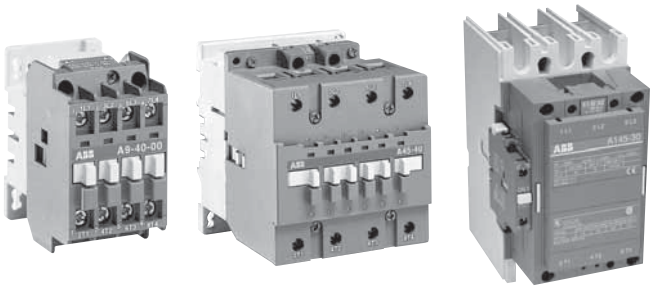
① Minimum dimension
② Makes distance F1 = F
③ Includes space for three auxiliary contact blocks between the contactors.
④ Includes space for four auxiliary contact blocks between the contactors.
⑤ Damping elements are included.
NOTE: Screw, nut and washer are included for terminal hardware.

Type DA & EHDB mounting positions



Lighting contactors
A9 – A300

Lighting Contactors



Applications

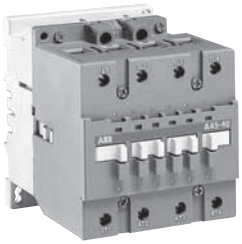
Lighting contactors can be used to control a variety of lighting loads including:
- Tungsten filament lighting loads (incandescent)
- Electric discharge lighting loads (ballast)

Description

The A-Line lighting contactors are available with or without an enclosure.
- Maximum operating voltage of 600VAC 60Hz
- Includes 3, 4, 8 or 12 pole versions, other versions on request
- Electrically or mechanically held contactors
- IP 20 protection for connection terminals
- Can be mounted onto a mounting plate or a 35 X 7.5mm DIN rail
- UL/CSA Approved

A9 - A300
Electrically & mechanically held

A9-40-00



A45-40-00

A145-30-11

Normally Open Power Poles			Electrically Held					Mechanically Held				
			Open Type		UL Type 1 Enclosed			Open Type		UL Type 1 Enclosed		
Ballast Amp Rating	Incandes-cent (Tungsten) Amp Rating	Number of Power Poles	Catalog number	List price	Enclosure Size	Catalog number	List price	Catalog number	List price	Enclosure Size	Catalog number	List price
15	15	4	A9-40-00-84	**$ 120**	A	A9C4P1-84	**$ 175**	A9L-40-00-84	**$ 214**	A	A9LC4P1-84	**$ 269**
15	15	8	A9-80-00-84	**272**	A	A9C8P1-84	**327**	A9L-80-00-84	**460**	A	A9LC8P1-84	**515**
15	15	12	A9-120-00-84	**392**	A	A9C12P1-84	**447**	A9L-120-00-84	**674**	A	A9LC12P1-84	**729**
30	20	4	A16-40-00-84	**165**	A	A16C4P1-84	**220**	A16L-40-00-84	**259**	A	A16LC4P1-84	**314**
30	20	8	A16-80-00-84	**362**	A	A16C8P1-84	**417**	A16L-80-00-84	**550**	A	A16LC8P1-84	**605**
30	20	12	A16-120-00-84	**527**	A	A16C12P1-84	**582**	A16L-120-00-84	**809**	A	A16LC12P1-84	**864**
30	30	4	A16-40L-00-84	**175**	A	A16C4PL1-84	**230**	A16L-40L-00-84	**269**	A	A16LC4PL1-84	**324**
30	30	8	A16-80L-00-84	**372**	A	A16C8PL1-84	**427**	A16L-80L-00-84	**560**	A	A16LC8PL1-84	**615**
30	30	12	A16-120L-00-84	**537**	A	A16C12PL1-84	**592**	A16L-120L-00-84	**819**	A	A16LC12PL1-84	**874**
35	35	4	A26-40-00-84	**228**	A	A26C4P1-84	**283**	A26L-40-00-84	**322**	B	A26LC4P1-84	**409**
35	35	8	A26-80-00-84	**488**	A	A26C8P1-84	**543**	A26L-80-00-84	**676**	B	A26LC8P1-84	**764**
35	35	12	A26-120-00-84	**716**	B	A26C12P1-84	**803**	A26L-120-00-84	**998**	B	A26LC12P1-84	**1,085**
50	50	3	A30-30-10-84	**252**	A	A30C3P1-84	**328**	A30L-30-10-84	**346**	C	A30LC3P1-84	**522**
60	60	3	A40-30-10-84	**297**	A	A40C3P1-84	**373**	A40L-30-10-84	**391**	C	A40LC3P1-84	**567**
60	60	4	A45-40-00-84	**360**	B	A45C4P1-84	**536**	A45L-40-00-84	**454**	C	A45LC4P1-84	**730**
65	65	3	A50-30-00-84	**300**	B	A50C3P1-84	**424**	A50L-30-00-84	**394**	C	A50LC3P1-84	**618**
65	65	4	A50-40-00-84	**413**	B	A50C4P1-84	**568**	A50L-40-00-84	**507**	C	A50LC4P1-84	**772**
85	85	3	A63-30-00-84	**342**	B	A63C3P1-84	**502**	A63L-30-00-84	**436**	C	A63LC3P1-84	**696**
105	105	3	A75-30-00-84	**383**	B	A75C3P1-84	**576**	A75L-30-00-84	**477**	C	A75LC3P1-84	**770**
105	105	4	A75-40-00-84	**525**	B	A75C4P1-84	**672**	A75L-40-00-84	**619**	C	A75LC4P1-84	**866**
120	120	3	A95-30-00-84	**420**	B	A95C3P1-84	**720**	---	**---**	---	---	**---**
200	200	3	A145-30-00-84	**785**	E	A145C3P1-84	**1,336**	---	**---**	---	---	**---**
300	300	3	A210-30-00-84	**1,595**	F	A210C3P1-84	**3,624**	---	**---**		---	**---**
400	400	3	A300-30-00-84	**1,835**	F	A300C3P1-84	**3,864**	---	**---**	---	---	**---**

Normally Closed Power Poles			Electrically Held					Mechanically Held				
			Open Type		UL Type 1 Enclosed			Open Type		UL Type 1 Enclosed		
Ballast Amp Rating	Incandes-cent (Tungsten) Amp Rating	Number of Power Poles	Catalog number	List price	Enclosure Size	Catalog number	List price	Catalog number	List price	Enclosure Size	Catalog number	List price
30	20	4	A16-04-00-84	**$ 165**	A	A16C4NCP1-84	**$ 220**	A16L-04-00-84	**$ 259**	A	A16LC4NCP1-84	**$ 314**
30	20	8	A16-08-00-84	**362**	A	A16C8NCP1-84	**417**	A16L-08-00-84	**550**	A	A16LC8NCP1-84	**605**
30	20	12	A16-012-00-84	**527**	A	A16C12NCP1-84	**582**	A16L-012-00-84	**809**	A	A16LC12NCP1-84	**864**

2 Normally Open & 2 Normally Closed Power Poles			Electrically Held					Mechanically Held				
			Open Type		UL Type 1 Enclosed			Open Type		UL Type 1 Enclosed		
Ballast Amp Rating	Incandes-cent (Tungsten) Amp Rating	Number of Power Poles	Catalog number	List price	Enclosure Size	Catalog number	List price	Catalog number	List price	Enclosure Size	Catalog number	List price
15	15	2NO/2NC	A9-22-00-84	**$ 120**	A	A9C22P1-84	**$ 175**	A9L-22-00-84	**$ 214**	A	A9LC22P1-84	**$ 269**
30	20	2NO/2NC	A16-22-00-84	**165**	A	A16C22P1-84	**220**	A16L-22-00-84	**259**	A	A16LC22P1-84	**314**
35	35	2NO/2NC	A26-22-00-84	**228**	A	A26C22P1-84	**283**	A26L-22-00-84	**322**	B	A26LC22P1-84	**409**
60	60	2NO/2NC	A45-22-00-84	**360**	B	A45C22CP1-84	**536**	A45L-22-00-84	**454**	C	A45LC22CP1-84	**730**
105	105	2NO/2NC	A75-22-00-84	**525**	B	A75C22CP1-84	**672**	A75L-22-00-84	**619**	C	A75LC22CP1-84	**866**

Coil voltage selection

All catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 contactor: A75-30-00-80

Coil voltage selection

	Cntr	Volts															
Hz	Type	12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, consult factory

Control transformer voltage selection chart

		Volts			
Hz	Type	208/120	230 – 240/120	460 – 480/120	575 – 600/120
50/60	A	0	7	8	9

For other voltages, consult factory

Control transformer option

Contactor size	VA rating	List price adder
A9 – A40	45	**$ 300**
A9 – A40	50	**360**
A50 – A75	75	**435**
A95	100	**560**
A145	150	**720**
A210 – A300	250	**795**

Accessories
Factory modifications


CAL5-11 CA5-10


WB75A-01


RV5/50

Accessories

Auxiliary contact blocks

Mounting on contactors	Positioning	Contacts	Catalog number	List price
A 9 ... A 95	Front face	1 -	CA5-10	**$ 15**
		- 1	CA5-01	
A 9 ... A 40	Front face	3 1	CA5-31M	
		2 2	CA5-22M	
A 9 ... A 75	Side	1 1	CAL5-11	**30**
A 95 ... A 300	Side	1 1	CAL18-11	
A145... A 300	Side	1 1	CAL18-11B	

Mechanical latch

For contactors	Voltage	Catalog number	List price
A 9 ... A 75	24 ... 28 V a.c./d.c.	WB75A-01	**$ 84**
	48 ... 55 V a.c./d.c.	WB75A-03	
	110 ... 127V a.c./d.c.	WB75A-04	
	230 ... 277 V a.c./d.c.	WB75A-05	
	380 ... 440 V a.c./d.c.	WB75A-07	
	440 ... 480 V a.c./d.c.	WB75A-08	

Surge suppressor, varistor

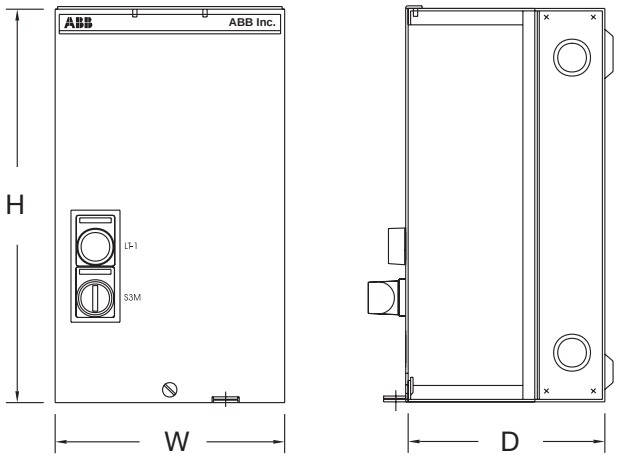
For contactors	Voltage range	Catalog number	List price
A 9 ... A 110	24 ... 50 V a.c./d.c.	RV5/50	**$ 30**
	50 ... 133 V a.c./d.c.	RV5/133	
	110 ... 250 V a.c./d.c.	RV5/250	
	250 ... 440 V a.c./d.c.	RV5/440	

Factory modifications for enclosed contactors

Pilot devices

Description	Suffix code	List price
Selector - 2 position maintained OFF - ON	C	**$ 72**
Selector - 3 position maintained HAND OFF - AUTO	D	**72**
Pilot light - ON (green)	R	**135**

Approximate dimensions



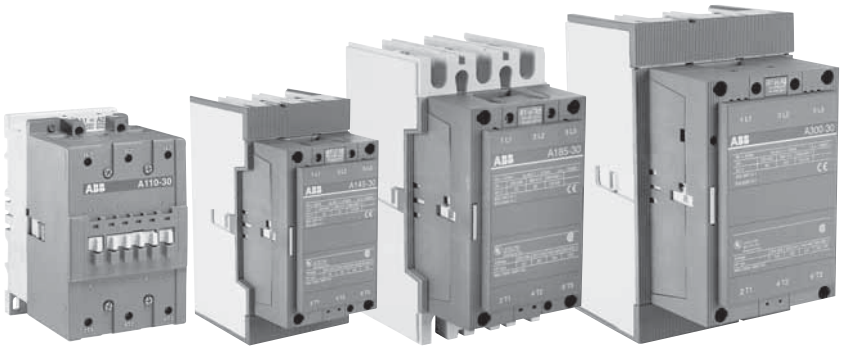
Enclosure dimensions (in)

Type	H	W	D
A	11	6	5
B	13	9	7
C	14	12	8
D	24	12	8
E	30	24	9

Notes

Welding isolation contactors

Welding isolation Contactors



Applications

ABB welding isolation contactors are suited to the rugged demands set forth by the automotive industry and are specifically designed for use in high current welding applications. ABB is the leading contactor supplier for automotive welding applications.

Features

- Includes sizes:
  – W3 thru W6 in 3 pole configurations
  – W4 thru W5 in 2 pole configurations
- Unique contact design assures reliable and safe operation during high current welding cycles
- 1 N.O. & 1 N.C. auxiliary contacts are standard and up to 6 additional auxiliary contacts may be added to provide a total of 8 (4 N.O. & 4 N.C.)
- Easy front removal of arc chute for quick inspection and change of contacts
- Operates over an extended voltage range of 85% to 110% of rated control voltage
- UL Listed, File # E79416
- CSA Certified, File # LR19700

AW welding isolation contactors can save substantial space compared to other conventional contactors.

140A – 600A
2 & 3 Pole


A110W


A300W


AF460W

3-Pole, A.C.

Size	Amp rating	Catalog number	List price
W3	140	A110W-30-11-84	**$ 480**
—	200	A145W-30-11-84	**825**
W4	250	A185W-30-11-84	**1290**
—	300	A210W-30-11-84	**1635**
W5	350	A260W-30-11-84	**1815**
—	400	A300W-30-11-84	**1875**
W6	600	AF460W-30-11-70	**4425**

2-Pole, A.C.

Size	Amp rating	Catalog number	List price
W3	140	—	—
—	200	A145W-20-11-84	**$ 750**
W4	250	A185W-20-11-84	**1180**
—	300	A210W-20-11-84	**1500**
W5	350	A260W-20-11-84	**1675**
—	400	A300W-20-11-84	**1750**
W6	600	—	—

Coil voltage selection – wide range AC/DC coils for AF contactors

All AC operated catalog numbers include a 100-250 V AC/DC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 24V coil is required for a AF460W contactor: AF460W-30-11-**68**

Coil voltage selection – A contactors

All AC operated catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 contactor: A75-30-11-**80**

Auxiliary contact blocks

For additional auxiliary contact blocks, see catalog number explanation on page 1.2. Add $ 20 to list price for each additional auxiliary, and see page 1.18 for available combinations.

Vertical connection bars between 2 pole contactor and MCCB – two bars

MCCB	For contactor	Catalog number	List price
S3, S4	A145W-20 – A185W-20	BEA185-20D/S3S4	**$ 50**
S3,S4	A210W-20 – A300W-20	BEA210-20D/S4	**55**
S5	A210W-20 – A300W-20	BEA300-20D/S5	**60**

For other accessories, see page 1.16 to 1.35.

Coil voltage selection chart – A contactors

Hz	Cntr type	Volts 12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Coil voltage selection – AF50 to AF750

AC/DC VOLTS, 40 - 60 HZ

24 - 60 DC	20 - 60 DC	48 - 130 AC/DC	100 - 250 AC/DC
68 ①	72 ②	69	70

① AF400 – AF750, DC only.
② AF50 – AF300, DC only.

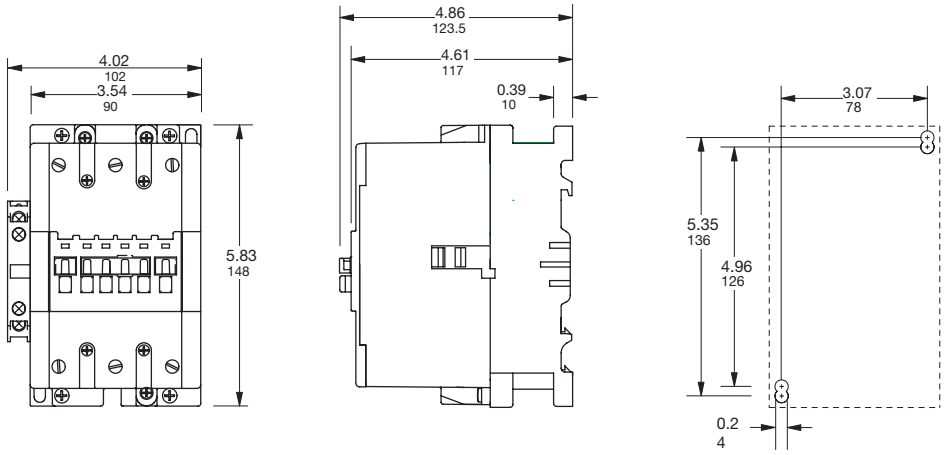
Technical data

Frame size		A110W	A145W	A185W	A210W	A260W	A300W	AF460W
Amp rating, 50°C		140	200	250	300	350	400	600
Making capacity, 600 VAC		1320	1740	2220	2520	3120	3360	4550
Breaking capacity, 480 VAC		880	1160	1480	1680	2080	2240	4180
Withstand current								
RMS		2500	2700	2900	3200	3600	4100	5800
Peak		3500	3900	4100	4600	5200	5900	8816
Short time current								
1 second		1320	1800	2000	2500	3100	3500	4600
10 seconds		800	1200	1500	1700	2100	2400	4400
30 seconds		500	800	1000	1200	1300	1500	3100
1 minute		350	600	800	1000	1000	1100	2500
15 minute		175	280	320	400	450	500	840
Coil operating data								
A.C. power consumption								
Inrush 60 Hz, VA		450	600	600	1350	1350	1350	800
Holding 60 Hz, VA		27	40	40	65	65	65	40
Holding 60 Hz, W		8	12	12	19	19	19	4.5
Maximum short circuit ratings								
MCCB	kA @ 480VAC	85	85	85	85	85	85	84
	kA @ 600VAC	35	35	35	35	35	35	42
Class J fuses	kA @ 600VAC	200	200	200	200	200	200	–

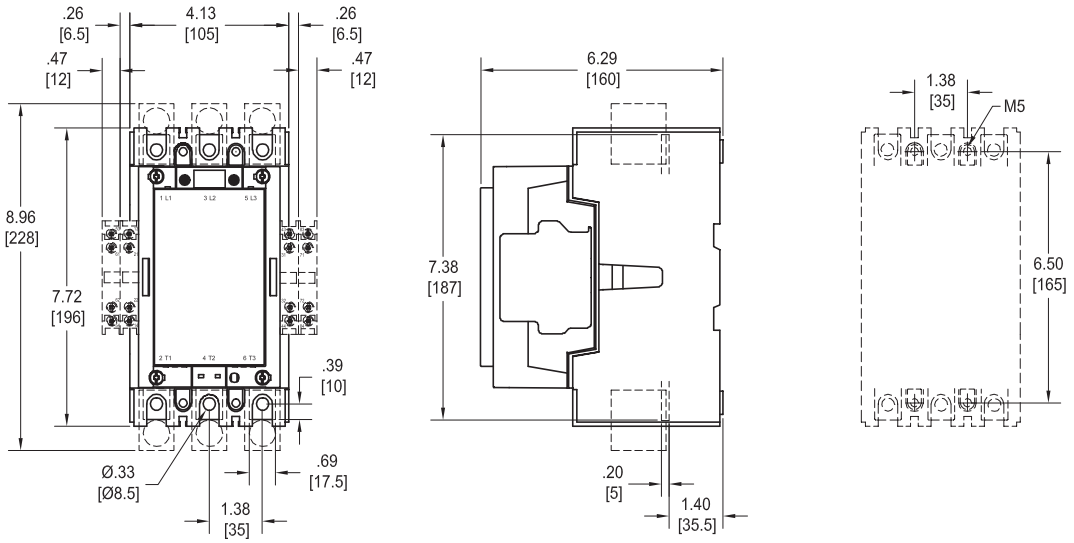
Approximate dimensions
A110W – A300W

00.00 / 00.00 Inches [Millimeters]

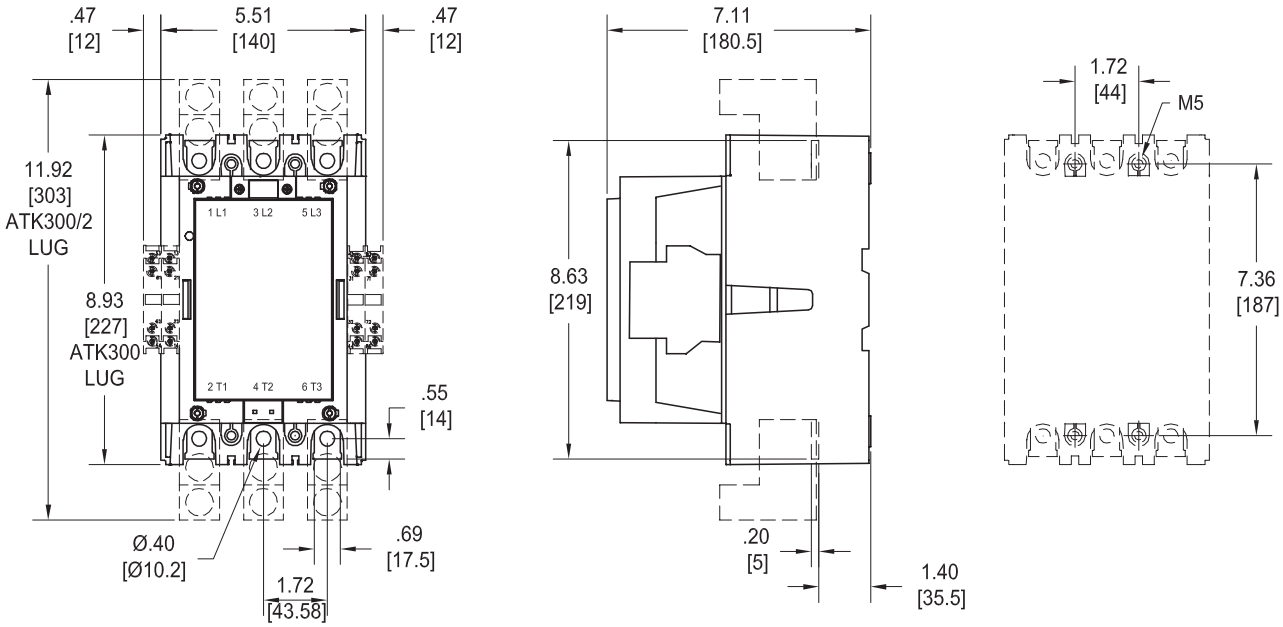
A110W



A145W, A185W



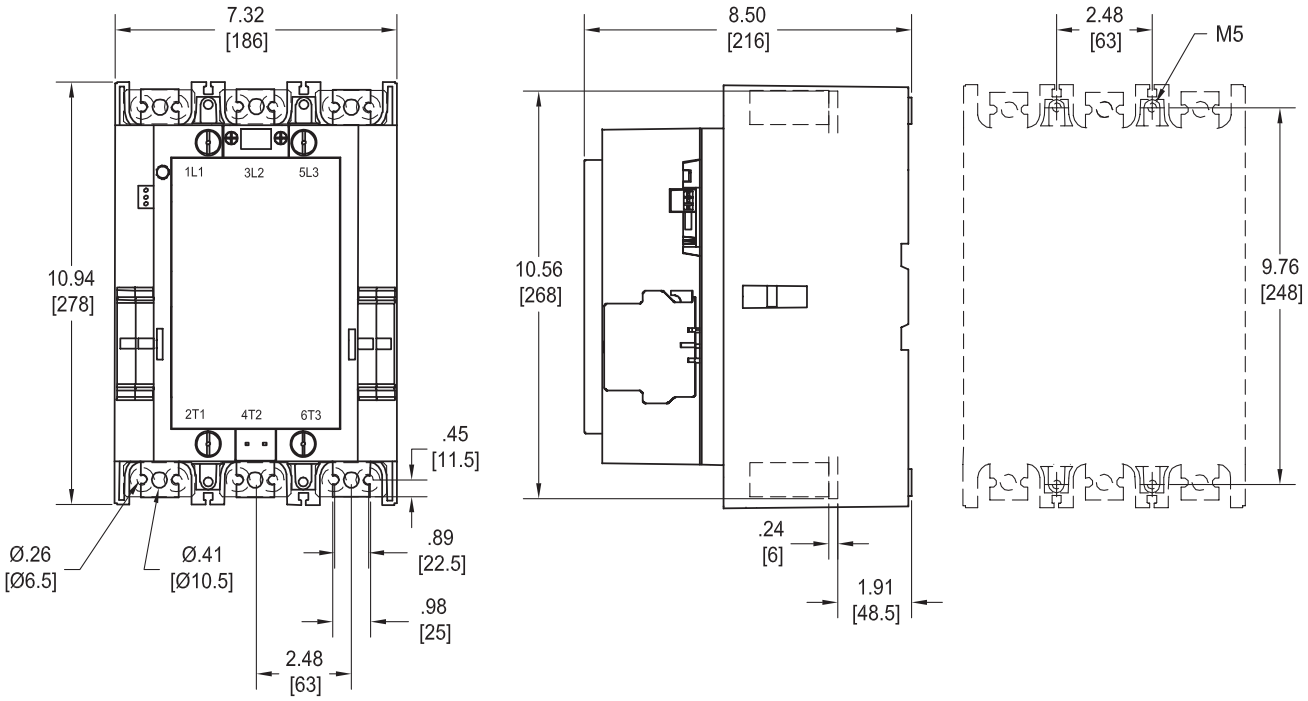
A210W, A260W, A300W



Approximate dimensions
AF460W

00.00
00.00
Inches
[Millimeters]

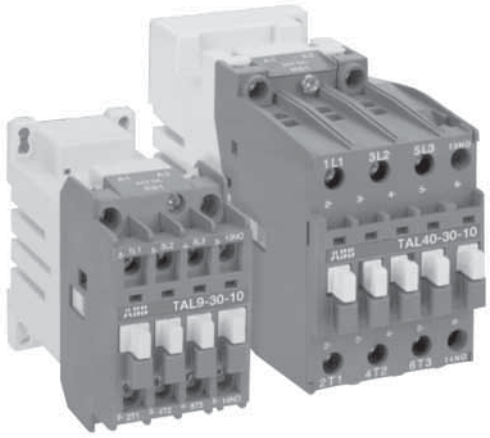
AF460W



Notes

AC Circuit switching contactors
Type TAL & TAE

AC Circuit switching
Contactors



Description
TAL and TAE contactors with a wide coil voltage range are designed to operate in control circuits with large voltage variations. Example: battery supply.

TAL9 - TAE110
D.C. Operated
3 & 4 pole

TAL9-30-01

3 Pole

General purpose current AC1	AC3	Maximum motor horsepower ratings 208V	240V	480V	575/600V	Standard auxiliary contacts N.O.	N.C.	Catalog number	List price
22	9	2	2	5	7.5	1 0	0 1	TAL9-30-10-★ TAL9-30-01-★	**$ 141**
25	11	3	3	7.5	10	1 0	0 1	TAL12-30-10-★ TAL12-30-01-★	**173**
28	16	5	5	10	15	1 0	0 1	TAL16-30-10-★ TAL16-30-01-★	**218**
45	25	7.5	10	20	25	1 0	0 1	TAL26-30-10-★ TAL26-30-01-★	**263**
55	30	10	10	25	30	1 0	0 1	TAL30-30-10-★ TAL30-30-01-★	**338**
60	42	10	15	30	40	1 0	0 1	TAL40-30-10-★ TAL40-30-01-★	**354**
100	50	15	20	40	50	0 1	0 1	TAE50-30-00-★ TAE50-30-11-★	**388** **428**
125	75	25	30	60	75	0 1	0 1	TAE75-30-00-★ TAE75-30-11-★	**560** **600**
146	96	30	30	60	75	0 1	0 1	TAE95-30-00-★ TAE95-30-11-★	**600** **640**
160	110	30	40	75	100	0 1	0 1	TAE110-30-00-★ TAE110-30-11-★	**755** **795**

★ To select a coil voltage, substitute the code from the Coil Voltage Selection Chart for the ★

4 Pole

Rated operational current AC1 0≤40°C	AC1 0≤55°C	Maximum motor horsepower ratings 208V	240V	480V	575/600V	Standard auxiliary contacts N.O.	N.C.	Catalog number	List price
22	20	2	2	5	7.5	0	0	TAL9-40-00-★	**$ 190**
28	25	5	5	10	15	0	0	TAL16-40-00-★	**268**
45	40	7.5	10	20	25	0	0	TAL26-40-00-★	**303**
70	60	10	10	25	30	0	0	TAE45-40-00-★	**405**
100	85	15	20	40	50	0	0	TAE50-40-00-★	**505**
125	105	25	30	60	75	0	0	TAE75-40-00-★	**615**

★ To select a coil voltage, substitute the code from the Coil Voltage Selection Chart for the ★

4 Pole mounted with 2 N.O. & 2 N.C. main poles

Rated operational current AC1 0≤40°C	AC1 0≤55°C	Maximum motor horsepower ratings 208V	240V	480V	575/600V	Standard auxiliary contacts N.O.	N.C.	Catalog number	List price
22	20	2	2	5	7.5	0	0	TAL9-22-00-★	**$ 190**
28	25	5	5	10	15	0	0	TAL16-22-00-★	**268**
45	40	7.5	10	20	25	0	0	TAL26-22-00-★	**303**

★ To select a coil voltage, substitute the code from the Coil Voltage Selection Chart for the ★

These contactors can be used for controlling either 2 separate circuits, i.e. 2 loads with 2 separate supplies, or 1 circuit comprising 2 separate loads with 1 single supply. When the contactor operates, there is no mechanical overlapping between the N.O. main poles and N.C. main poles: BREAK before MAKE.

NOTE: These contactors are not suitable for a reversing starter or a star-delta starter or for controlling a single load from 2 separate supplies.

Coil characteristics

No extra voltages applicable on the U_c min. - max. values of the Coil Voltage selection table.

Coil consumption at U_c max. and q = 20 °C:
- 9 W pull-in/holding for TBC type
- 450 W pull-in/ 7 W holding for TAE 50 and TAE 75 types
- 950 W pull-in/ 7 W holding for TAE 95 and TAE 110 types

Coil voltage selection

Min. U_c Max	Voltage
17 – 32	51
24 – 45	52
36 – 65	54
42 – 78	58
50 – 90	55
77 – 143	62
90 – 150	66
152 – 264	68

Surge supressors
for contactor coils

For mounting on contactor type	Control voltage	Packing	Weight	Catalog number	List price
TAE/AE45 – TAE/AE75 TAL9 – TAL30	12 to 32 VDC	2	0.015	RT5/32	$ **30**
	25 to 65 VDC	2	0.015	RT5/65	
	50 to 90 VDC	2	0.015	RT5/90	
	77 to 150	2	0.015	RT5/150	
	150 to 264	2	0.015	RT5/264	

Technical data

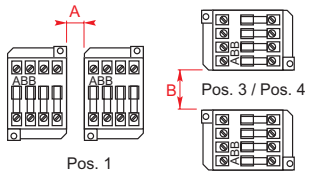
Type	Control circuit	Opening time growth factor	Residual overvoltage or clipping voltage	Remarks
RT5 /...transil diode			Advantages	• Good energy absorption
32	DC	2.5 to 3	50V	• Unpolarized system
65	DC	2.5 to 3	100V	• Simple, reliable system
90	DC	2.5 to 3	150V	Disadvantages • A certain delay on drop out which does not reduce contactor breaking capacity
150	DC	2.5 to 3	210V	
264	DC	2.5 to 3	390V	

NOTE: For all other accessories, see the Accessories section for across the line contactors, pages 1.16 – 1.32.
TAL contactors use the same accessories as AL contactors.
TAE contactors use the same accessories as AE contactors.

Technical data

Mounting Distance – for coil operating limits U_c min. - U_c max.

A mm	B mm	Ambient temp. °C	Max. switching frequency Operating cycles/h
2	20	≤ 20	1200
5	20	≤ 55	1200

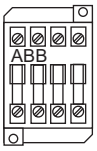


Add-on accessories

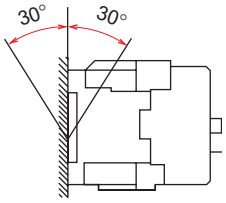
Contactors	Max. number of auxiliary contact blocks CA5-10	CA5-01	CA5-40	CA5-31	CA5-22	CA5-04	Timer TP - A	Interlock unit	Label marker
pos. 1, 3 or 4 TAL - –30 - 00 TAL - –30 - 10 TAL - –40 - 00	4	2	1	1	1	–	–	VE5-1	BA5-50
pos. 1, 3 or 4 TAL - –30 - 01	4	1	1	1	–	–	–	VE5-1	BA5-50
pos. 1, 3 or 4 TAL - –22 - 00	4	–	1	–	–	–	–	VE5-1	BA5-50
pos. 1 ±30° TAL - all types	–	–	–	–	–	–	–	VE5-1	BA5-50
all positions TAE -	6	6	1	1	1	1	1	VE5-2 ①	BA5-50

Note: Railway (traction) projects on request. Type RT surge suppressors are suitable for TAL and TAE contactors.

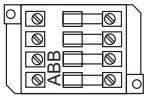
Mounting positions:



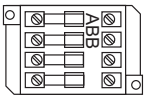
Pos. 1



Pos. 1 ± 30°



Pos. 3



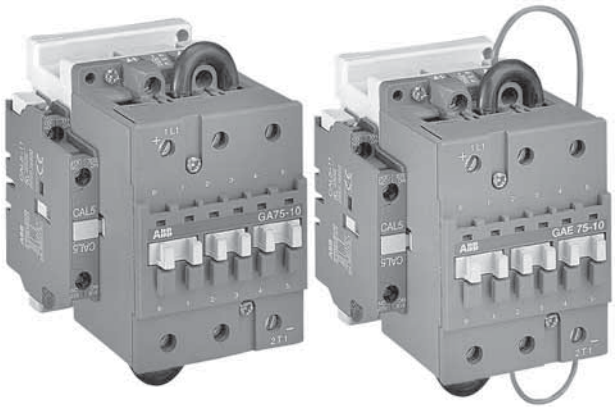
Pos. 4

① Only valid for TAE 50-30-00 and TAE 75-30-00.

DC Circuit switching contactors

Type GA75 & GAE75

DC Circuit switching Contactors



General

Arc suppression is more difficult in DC than in AC. To choose a contactor, it is necessary to know the current and voltage to be broken as well as the L/R time constant of the power circuit to be controlled.

Here are some typical time constant values:

- Non inductive loads such as resistance furnaces: L/R ≃ 1 ms.
- Shunt motors: L/R ≃ 2 ms.
- Series motors: L/R ≃ 7.5 ms.

Remark: the addition of a resistor in parallel with an inductive winding makes arc suppression easier.

Types

GA75-10-··	AC operated contactor
GAE 75-10-··	DC operated contactor

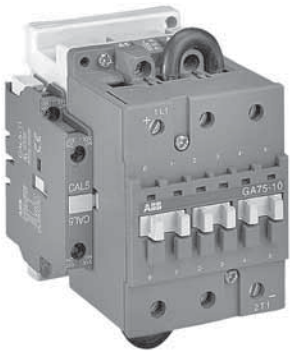
Description

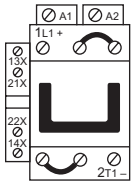
GA and **GAE** contactors are mounted with arc chutes with permanent magnets specially designed for DC breaking.

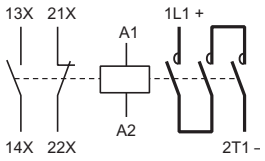
The three contactor paths are arranged in series via two supplied and mounted insulated connections (25 mm^2).

The **GA75** and **GAE75** are “single-pole” devices for which the connection polarities, indicated next to the connection terminals, must be respected. See wiring diagram information on next page.

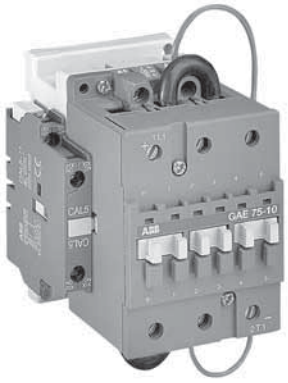
GA75 - GAE75

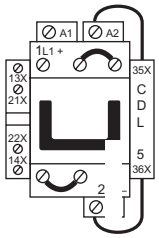


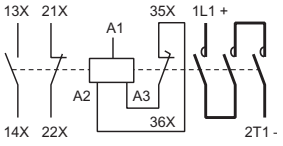




GA75-10-00-84







GAE75-10-00-84

Maximum rated operational current DC-1 $U_e \leq 440V$ A	DC-1 $U_e \leq 600V$ A	DC-3 $U_e \leq 440V$ A	DC-5 $U_e \leq 220V$ A	DC-5 $U_e \leq 440V$ A	Mounted auxiliary contacts N.O.	Mounted auxiliary contacts N.C.	Catalog number	List price
100	75	85	85	35	–	–	GA75-10-00-84	**$ 570**
100	75	85	85	35	–	–	GAE75-10-00-81	**675**
					1	1	GAE75-10-11-81	**705**

Rated insulation voltage $\mathbf{U_i}$ = 1000 V d.c. according to IEC 947-4-1.
Maximum switching frequencies: 300 operating cycles/h

Coil voltage selection

All AC operated catalog numbers include a 120VAC coil. All DC operated catalog numbers include a 24VDC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240VAC coil is required for a GA75 contactor: GA75-10-00-80
A 110VDC coil is required for a GAE75 contactor: GAE75-10-00-86

Coil voltage selection chart

Hz	Cntr type	Volts 12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	GA		81	83	84	84		34	75	80	42	48	86	86	51	53	55
50	GA		81	83	84				80			85	86			55	
DC	GAE	80	81	83	86		87		88	89							

For other voltages, see page 1.26.

Accessories

Standard **A** and **AE 40 - 75** contactor accessories are suitable for **GA75** and **GAE75** contactors.
Coils are the standard coils for **A** and **AE50 - 75** contactors.
Contacts cannot be changed.

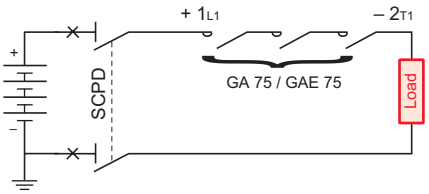
Wiring diagrams

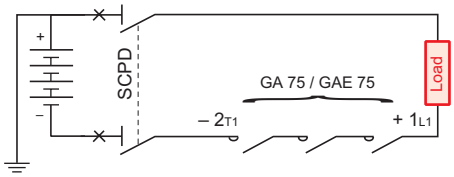
In D.C. circuits, the source to earth (or frame) connection mode is an important element.

Three modes are mainly used:
A – insulated source, i.e. unearthed (or not connected to the frame).
B – source earthed via its central point.
C – source earthed via one of its outer poles.

Modes **A** and **B** do not impose any constraints with regard to the distribution of the contactor poles between the two source/load connecting branches. Mode **C** requirements are therefore suitable for modes **A** and **B**.
For mode **C**, *all the poles necessary for breaking must be installed in series between the load and the ungrounded source polarity.We recommend this solution for all connection modes.*

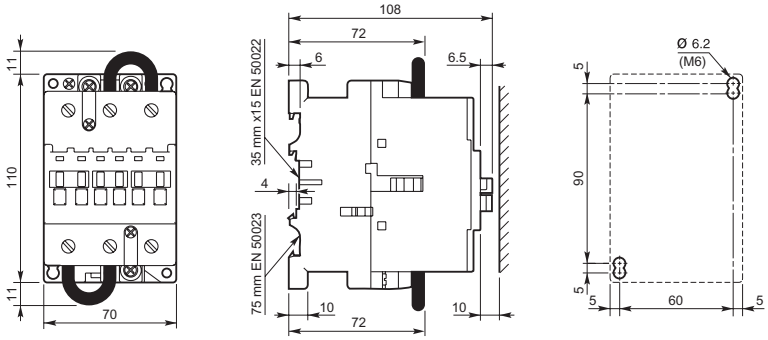
The above provisions relate to power circuit switching, the SCPD (Short-Circuit Protection Device) must comply with protection rules.



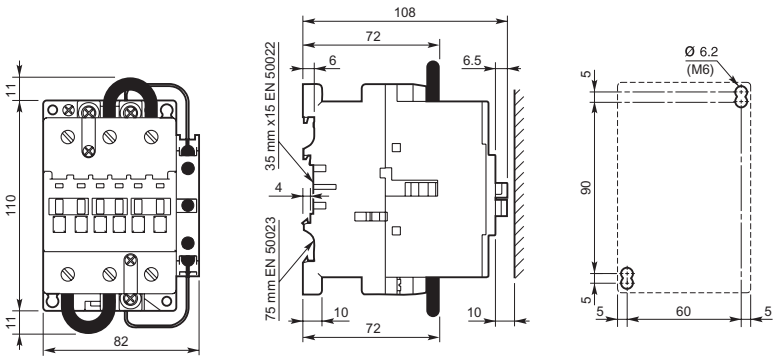


Approximate dimensions (mm)

GA75



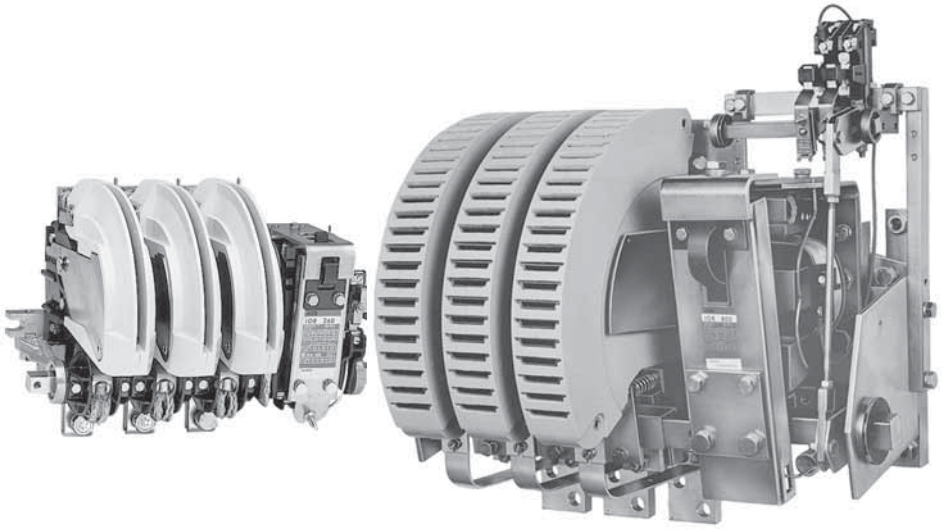
GAE75



Notes

Bar contactors

Bar Contactors



Description

- Variable number and type of main poles, (N.O., N.C.)
- Large number and type of auxiliary contacts
- Extremely versatile and easily accessible for maintenance
- Main poles maximum operating voltage:
  - AC switching up to 500 V, Type IOR
  - AC switching up to 1200V, Type IOR – MT
  - DC switching up to 440V, Type IOR
  - DC switching up to 750V, Type IOR – CC
- Specific construction available as standard:
  - Contactors with N.O./N.C. main poles, with or without overlapping
  - Contactors with magnetic latch or mechanical latch

Applications

Bar mounted contactors are largely used in the iron and steel industry for traction (rolling stock), electrolysis and hoisting equipment for applications from 63A to 5000A.

Standards

Bar contactors comply with major international standards:

• IEC 947-4-1	International Electrotechnical Commission
• UTE NF C 63-110	France
• VDE 0660	Germany
• BS 5424	Great Britain
• NBN 222-2	Belgium

Please fill out the form on the next page with the required information and fax to us at 940-397-7085, ATTN: Standard control. We will get right back to you!

Specification check list

NAME: _____

COMPANY: _____

PHONE: _____

FAX: _____

Copy, complete, and fax to us at 940-397-7085. We'll get right back to you!

Control circuit

Supply	Operating	
❑ AC current	AC current	**R** ❑
Voltage ……**V … Hz**	Rectified current	**RR** ❑
❑ DC current	DC current (economy resistor)	**RE** ❑
Voltage … **VDC**	DC current (solid core magnetic circuit)	**RC** ❑

Available auxiliary contacts

NO contacts:_____

NC contacts:_____

Magnetic latch ❑

Mechanical latch ❑

Latching voltage BF:_____

Delatching voltage BOI:_____

Switching frequency

Number of operations:_____

On-load factor:_____

Dimensions

Fixing dimension F=:_____mm

Expected delivery date: / /

Alternative current	Direct current
AC1, AC2, AC3, AC4	DC1, DC2, DC3, DC4, DC5 L/R = ____ ms

Rated operational current Ie:_____A

Rated operational voltage Ue:_____V

Rated insulation voltage Ui:_____kV

Number of poles

NO main poles:_____

NC main poles:_____

3-phase + Neutral: ❑

Ratings

❑ R63/85	❑ R800	❑ R3150
❑ R125/170	❑ R1000	❑ R4000
❑ R200/260	❑ R1250	❑ other
❑ R315/420	❑ R1500	
❑ R500/550	❑ R2000	

Contactors with NC main poles:

❑ With mechanical overlapping

❑ Without mechanical overlapping

❑ **Adapted blow-out coil:** (DC switching)

I = _____A

❑ **No blow-out coil**

Climactic conditions

❑ Corrosive atmosphere

❑ Salty mist atmosphere

Additional information you can provide:

Specification sheet, electrical diagrams, mounting sketches and any other useful information.

Operating altitude

❑ above 2,000 meters

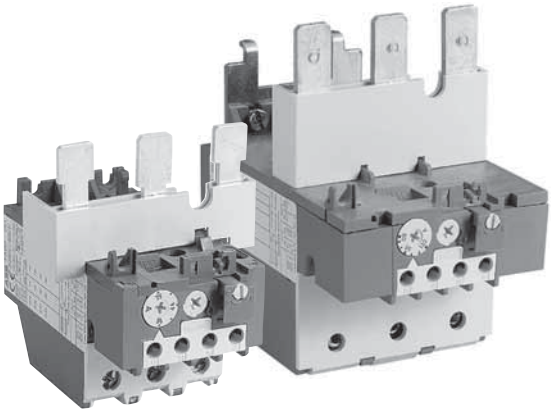
❑ below 2,000 meters

Overload relays
Index

Notes

Thermal Overload relays

Thermal overload relays
Type TA
Class 10



Description

- Available for starter construction with A Line contactors and separate panel mounting
- Designed for close couple mounting
- Separate base mounting available for all overload relays
- Class 10 adjustable overload relays are standard with all ABB Line starters
- Reset can also be adjusted to function as a stop button
- Screwdriver guide holes
- All terminal screws are available from the front
- UL File No: E48139
- CSA File No: LR98336
- Trip indication
- Remote trip and reset option available
- Single phase and phase unbalance protection
- Isolated alarm circuit (N.O.) contact
- Ambient compensation: -25°C to +55°C (-13°F to +131°F)
- Manual test
- Manual or automatic reset
- Factory calibrated and tested
- Wide adjustment range

Tripping classes of the thermal overload relays

Standard classes in IEC 947-4-1 are classes: 10 A, 10, 20, 30. The tripping class indicates according to IEC 947-4-1 the maximum tripping time in seconds under specified conditions of test at 7.2 times the setting current and specifies tripping and non tripping times for 1.5 and 7.2 times the setting current. Mostly used class is 10 A.

Abstract from IEC 947-4-1

Tripping class		10 A	10	20	30
Max. tripping time at 1.5 x setting current (warm state)	(s)	120	240	480	720
Tripping time at 7.2 x setting current (cold state)	(s)	2 – 10	4 – 10	6 – 20	9 – 30
At 1.05 x setting current		no tripping			

Description

TA thermal overload relays are used with A Line contactors for the protection of motors having a nominal voltage of up to 600VAC max per UL/CSA (690VAC and 800VDC per IEC).

Product range

- **Standard relays:**

Types: TA25DU, TA42DU, TA75DU, TA80DU, TA110DU, TA200DU and TA450DU

  – TA25 to TA110 and TA200 are directly connected in the motor circuit.
  – TA450DU relays are fed through a linear type transformer

- **Special construction**

Thermal overload relays with different certifications and approvals.
Relays for protection EEx e motors.

Construction and function

- **General**

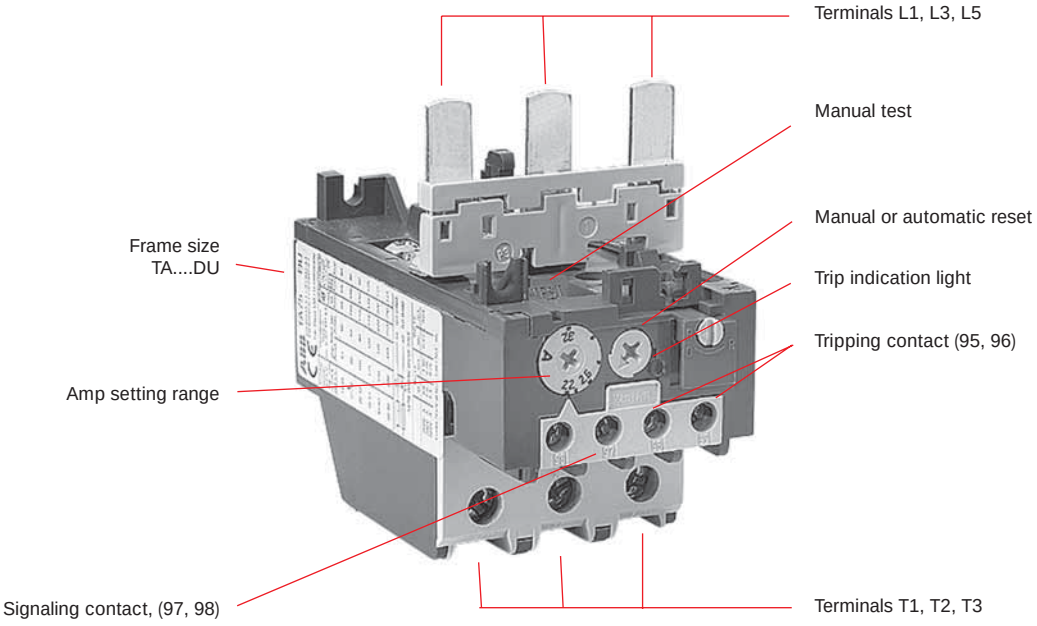
Thermal O/L relays and their accessories meet UL, CSA and most other important international standards (IEC), European standards (EN) and the most important national standards (DIN-VDE, NFC-UTE, BS, etc.). They meet the certification and approval directives required throughout the world.

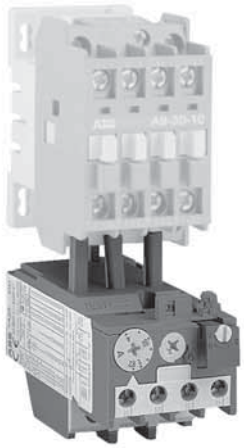
Thermal overload relays are 3 pole. The motor current flows through their bimetals (1 per phase) which are indirectly heated. Under the effect of the heating, the bimetals bend, cause the relay to trip and the position of the auxiliary contacts to change.

The relay setting range is graduated in amps. In compliance with international and national standards, the setting current is the motor nominal current and not the tripping current (no tripping at 1.05 x setting current, tripping at 1.2 times setting current).

The tripping curves (cold or warm starting, 3 phases and 2 phases) are shown on page 2.14.

The relays are built to be self protecting in the event of an overload until the short circuit protection device is activated.





TA25DU

Application
Technical data

- **All the relays have:**
  - Free tripping: the resetting button, even if held in, does not prevent tripping of the thermal overload relay in the event of a fault.
  - Temperature compensation
  - Phase failure protection according to IEC 947-4-1: Within the limits of the setting range, a reduced tripping time, and thus improved motor protection, is obrtained in case of a phase failure.
  - Tripping class: 10A, for TA relays
  - Test functions and resetting: see table below.

- **Auxiliary contacts**

The relays have two built in auxiliary contacts: NC marked 95-96; NO marked 97-98. Both contacts are physically separate and can thus be used for 2 different circuits (control circuit and indication circuit).

Function of TA25DU – TA450DU thermal O/L relays

Resetting / Contacts	**Relay tripped** {**95-96 Open** **97-98 Closed**		**Relay not tripped** {**95-96 Closed** **97-98 Open**
	Manual	Automatic	Both manual and automatic
Effect of blue	Resetting	Yes	No	No
button indexed on R (RESET ONLY)	95-96	Closed when the button is pressed	No effect	No effect
	97-98	Open when the button is pressed		
Effect of blue	Resetting	Yes	No	No
button indexed on R/O (RESET/OFF)	95-96	Closed when the button is released	No effect	Open when the button is pressed Closed when the button is released
	97-98	Open when the button is pressed		No effect

Selection guide
TA25DU – TA80DU

Types


TA25DU


TA42DU


TA75DU


TA80DU

Main characteristics

Construction		3 pole with ambient temperature variation compensation. Protection against single phase operation. Built in auxiliary contacts: 1N.O. + 1N.C.			
Resetting		Convertible:	Manual	to Automatic	
Setting ranges	Number	18	3	6	4
	from	0.1 – 0.16A	18 – 25A	18 – 25A	29 – 42A
	to	24 – 32A	29 – 42A	60 – 80A	60 – 80A
Mounted with contactors					
Mounting kit		No kit is required for mounting thermal O/L relays below contactors			
Types of contactors for combined mounting		A/AE/AL9 A/AE/AL12 A/AE/AL16 A/AE/AL26 A/AE/AL30 A/AE/AL40	A/AE30 A/AE40	A/AE/AF50 A/AE/AF63 A/AE/AF75	A/AE/AF95 A/AE/AF110
Mounted separately (i.e. separate from contactor)					
Separate mounting kit		DB25	DB80		
Accessories					
Tripping coil		DS25-A			
Resetting coil		DR25-A			
Terminal shroud		Terminals protected against direct contact (without the addition of terminal shrouds)			
Function markers			BA5-50		

Selection guide
TA110DU – TA450DU

Types


TA110DU


TA200DU


TA450DU

Main characteristics

Construction		3 pole with ambient temperature variation compensation. Protection against single phase operation. Built in auxiliary contacts: 1N.O. + 1N.C.			
Resetting		Convertible: manual to automatic			
Setting ranges	Number	2	6	3	
	from A	65 – 90	65 – 90	130 – 185	
	to A	80 – 110	150 – 200	220 – 310	

Mounted with contactors

Mounting kit	No kit is required for mounting thermal O/L relays		See page 2.7.	
Types of contactors for combined mounting	A/AE/AF95 A/AE/AF110	A/AF145 A/AF185	A/AF210 + DT450/A300 A/AF260 + DT450/A300 A/AF300 + DT450/A300	

Mounted separately (i.e. separate from contactor)

Separate mounting kit	DB200		No kit required for separate mounting of thermal O/L relays	

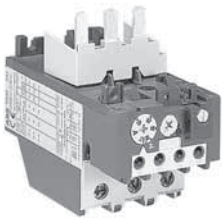
Accessories

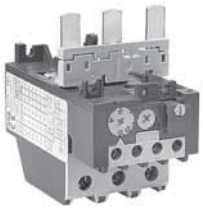
Tripping coil				
Resetting coil				
Terminal shroud	①	LT200 –	LT450 –	
Function markers	BA5-50			

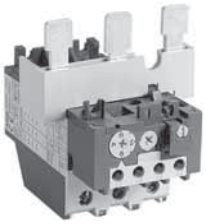
① Terminals protected against direct contact (without the addition of terminal shrouds)

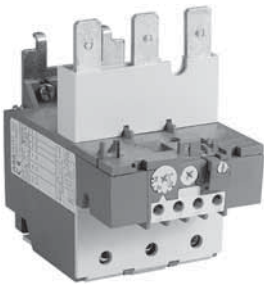
TA25 - TA450
Class 10
for Contactors A9 – A/AF300


TA25DU


TA42DU

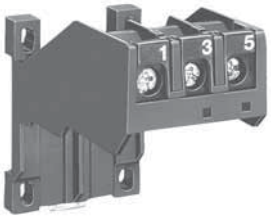

TA75DU


TA80DU


TA110DU

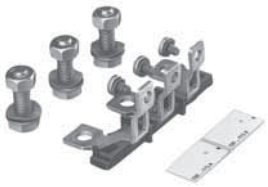
For contactor	Setting range A	Suffix Code	Catalog number	List price
A/AE/AL9 – A/AE/AL40	0.1 – 0.16	A	TA25DU0.16	**$ 63**
	0.16 – 0.25	B	TA25DU0.25	
	0.25 – 0.4	C	TA25DU0.4	
	0.4 – 0.63	D	TA25DU0.63	
	0.63 – 1.0	E	TA25DU1.0	
	1.0 – 1.4	F	TA25DU1.4	
	1.3 – 1.8	G	TA25DU1.8	
	1.7 – 2.4	H	TA25DU2.4	
	2.2 – 3.1	J	TA25DU3.1	
	2.8 – 4.0	K	TA25DU4.0	
	3.5 – 5.0	L	TA25DU5.0	
	4.5 – 6.5	M	TA25DU6.5	
	6.0 – 8.5	N	TA25DU8.5	
	7.5 – 11	P	TA25DU11	
	10 – 14	Q	TA25DU14	
	13 – 19	R	TA25DU19	
	18 – 25	S	TA25DU25	
	24 – 32	T	TA25DU32	
A/AE30 – A/AE40	18 – 25	A	TA42DU25	**78**
	22 – 32	B	TA42DU32	
	29 – 42	C	TA42DU42	
A/AE/AF50 – A/AE/AF75	18 – 25	A	TA75DU25	**102**
	22 – 32	B	TA75DU32	
	29 – 42	C	TA75DU42	
	36 – 52	D	TA75DU52	
	45 – 63	E	TA75DU63	
	60 – 80	F	TA75DU80	
A/AE/AF95 – A/AE/AF110	29 – 42	C	TA80DU42	**135**
	36 – 52	D	TA80DU52	
	45 – 63	E	TA80DU63	
	60 – 80	F	TA80DU80	
	65 – 90	A	TA110DU90	**165**
	80 – 110	B	TA110DU110	
A/AF145 – A/AF185	65 – 90	A	TA200DU90	**165**
	80 – 110	B	TA200DU110	
	100 – 135	C	TA200DU135	**225**
	110 – 150	D	TA200DU150	
	130 – 175	E	TA200DU175	
	150 – 200	F	TA200DU200	
A/AF210 – A/AF300	130 – 185	A	TA450DU185 ①	**488**
	165 – 235	B	TA450DU235	
	220 – 310	C	TA450DU310	
AF400 – AF750	See electronic overloads, pages 2.21			

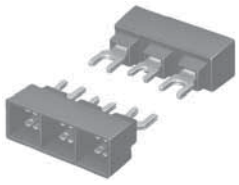
① TA450 overloads require mounting kits for installation.



DB25/25A

DB80


DB200


LC26-B1

Separate mounting kits

For O/L relays	Amps	Catalog number	List price
TA25DU	0.1 – 25	DB25/25A	**$ 30**
TA25DU	24 – 32	DB25/32A	**38**
TA42DU, TA75DU, TA80DU	18 – 80	DB80	**45**
TA110DU, TA200DU	100 – 200	DB200	**60**

Flat pin terminal blocks

Mounting on:	Catalog number	List price
TA25DU relay DB25/25A or DB25/32A	LC30-T LC26-B1	**$ 6**

Terminal block — AWG #8 cable

Mounting on:	Catalog number	List price
TA25DU (25A or less) or DB25/25A	DX25	**$ 15**

LC terminal blocks can be used to convert standard connections into Faston connections: 2 x 6.3mm or 4 x 2.8mm per pole. The connections are protected against accidental contact.

The LC30-T has a terminal block for the 3 power terminals and a second for the 4 auxiliary terminals of a TA25DU thermal O/L relay.

The LC26-B1 has two identical terminal blocks each for 3 power terminals. This block allows the power terminals to be mounted with two DB25 kits or a TA25DU thermal O/L relay and DB25 kit assembly.

NOTE: According to DIN 46429 part 1 and NFC 20-120 the max. capacity of a Faston connection is 25 A.

Mounting kit – for TA450 overload relay

For contactor	Catalog number	List price
A145 – A185 A210 – A300	DT450/A185 DT450/A300	**$ 225**

Terminal shrouds – for contactors and overload relays

Contactor	Overload relay	Catalog number	List price
A9 – A16 A26 – A40	TA25DU	Included	—
A30 – A40	TA42DU	Included	—
A50 – A75	TA75DU	Included	—
A95 – A110	TA80DU TA110DU	Included	—
A145 – A185	TA200DU	LT185-AY	**$ 10**
A145 – A185	Load side of TA200DU	LT200A185	**50**

Terminal lug kits

Wire range	For overloads	Catalog number	List price
6 – 250MCM	TA110DU, TA200DU	EHTK210	**$ 90**
4 – 400MCM	TA450DU185	ATK300HK	**78**
(2) 4 – 500MCM	TA450DU310	ATK300/2HK	**120**

Discount schedule ABA — A-contactor accessories
Discount schedule TAA — TA25
Discount schedule TBA — TA42, TA75
Discount schedule TCA — TA80, TA110, TA200, TA450

Accessories

DS25A

DR25A

Remote tripping coils

U voltage at 50/60 Hz	Catalog number ①	List price
DS25-A remote tripping coil		
24V	DS25-A-24	
48V	DS25-A-48	
110V	DS25-A-110	
220/380V	DS25-A-220/380	
500V	DS25-A-500	**$ 60**
DS25-A remote resetting coil		
24V	DR25-A-24	
48V	DR25-A-48	
110V	DR25-A-110	
220/380V	DR25-A-220/380	
500V	DR25-A-500	

Application

• The DS25-A coil is used for remote electrical tripping of the TA25 DU thermal O/L relay and is connected to the relay's normally closed 95-96 auxiliary contact.

• The DR 25-A coil is used for remote electrical resetting of the TA25DU thermal O/L relay which is adjusted for "Manual resetting;" it is connected to the relay's normally open 97-98 auxiliary contact.

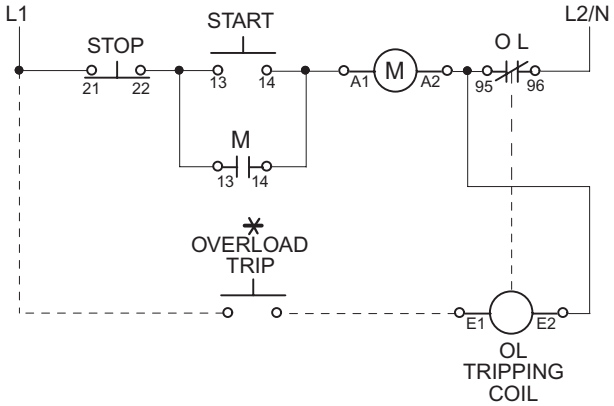
The coils are not designed for continuous duty. Impulse duration: 0.2 to 0.35 s.

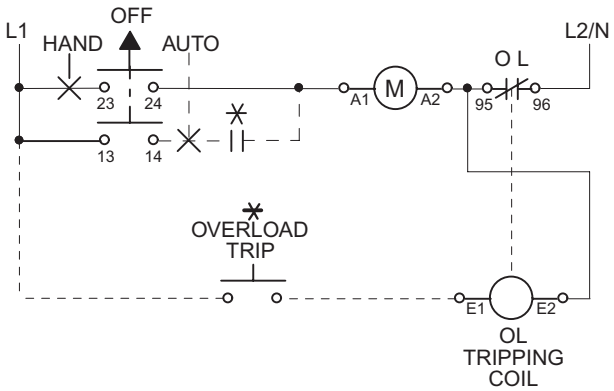
Set the button to "Man" (Manual resetting).

Mounting: clipped on to TA25DU thermal O/L relay.

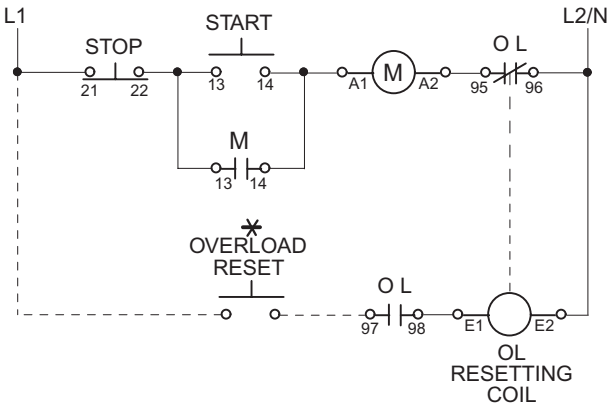
Installation diagrams

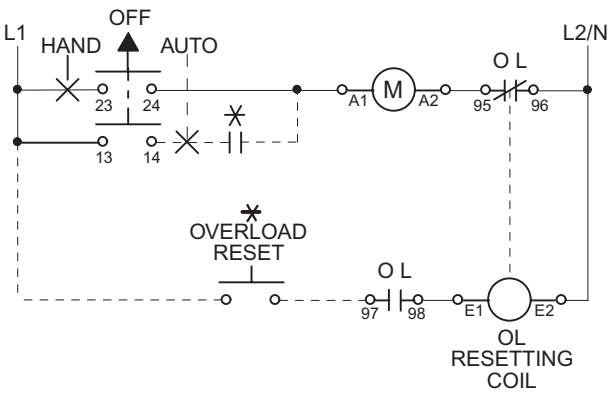
For connection of DS25-A to TA25DU relay





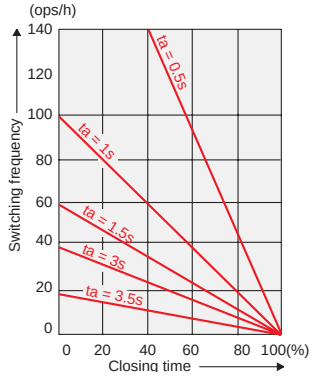
For connection of DR25-A to TA25DU relay



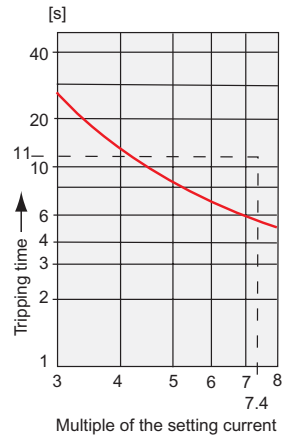


① Cannot be used with TA42, TA75, or TA200 overload relays.

Intermittent duty



Switching frequency
in relation to load factor.
t_a: motor starting time.



TA thermal O/L relay cold-state
tripping characteristics

Switching frequency:

To avoid untimely tripping, TA and T thermal O/L relays have been designed to withstand roughly 15 switching operations per hour with an approximately equal distribution between working and rest cycles.

In these conditions, the motor starting time must not exceed 1 second and the starting current must be lower than or equal to 6 times the motor $\mathbf{I}_n$.

For intermittent operations, the diagram opposite specifies relay operating limits.

Example: Motor starting time: 1 sec.
Load factor: 40 %
Switching frequency: 60 ops./h according to diagram

For a higher number of operations and for load variations (e.g. frequent starting and braking), it is advisable to use CUSTORAPID® protection.

For motors subject to particularly severe operating conditions (e.g. locked rotor) it is advisable to use protection combined with a thermal O/L relay and the CUSTORAPID® system.

Protection of motors with long starting time

See electronic overload relay section, pages 2.21 - 2.32.

Mounting position

On a support at an angle of ± 30° in relation to the vertical plane (standard position).

Other mounting positions possible, except mounting on a horizontal plane (in this case the tripping mechanism would be located above the bimetals).

Special version for EEx e motors

Consult factory.

Tripping limits at ambient temperatures varying by + 20°C

Ambient temperature compensation

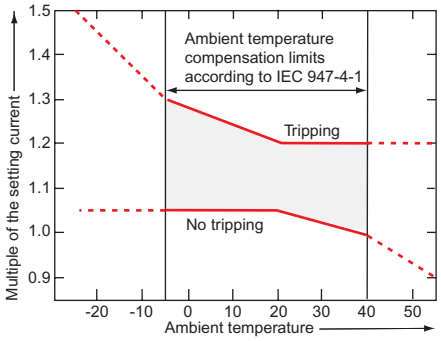
Thermal O/L relays are compensated against ambient temperature variations by a compensation bimetal which is sensitive to the ambient temperature.

Thermal O/L relays are designed to operate between –5 °C and +40 °C in compliance with standard IEC 947-4-1. For a wider range of –25° C to +55 °C consult the graph opposite.

Example: tripping at –25 °C. Tripping takes place before 1.5 times the setting current.

Resetting: TA25DU – TA450 DU thermal O/L relays have convertible manual/automatic resetting.

Delivery: in manual resetting mode.



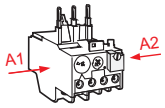
Technical data
TA25DU – TA80DU

Types		TA25DU	TA42DU	TA75DU	TA80DU
Standards: (international, European)		IEC 947-4-1, EN 60947-4-1			
Rated insulation voltage U_i according to IEC 947-4-1	V	690			
Rated impulse withstand voltage U_{imp} according to IEC 947-4-1	kV	6			
Permissible ambient temperature					
– for storage	°C	–40 to +70			
– for operation	°C	–25 to +55 with temperature compensation (maximum values: see page 2.9)			
Climatic withstand DIN 50017		Humidity in alternate climate KFW, 30 cycles			
Mounting positions		On a support at an angle of ±30° in relation to the vertical plane (standard position). Other positions possible except mounting on a horizontal plane (in this case the tripping mechanism would be located above the bimetals).			
Shock withstand at nominal I_e	shock duration ms	15			
Critical direction of shocks A1, A2	multiples of g	12			
Resistance to vibrations (±1 mm, 50 Hz)	multiples of g	8			
Mounting – on contactor		Latching below the contactor, screw fixing on main terminals			
– separate with DB - kit		Using screws: 2 x M4 or 35 mm EN 50022			
Terminals and cross-sectional areas for main conductors (motor side)		TA25DU setting ranges: from 0.1-0.16A to 18-25A	24-32 A		
• screw terminal		M4	–		
– with cable clamp		–	M5	M6	M6
– via tunnel connector		–	–	–	–
– flat type for lug or bar		–	–	–	–
• conductor cross-sectional area					
– rigid solid or rigid stranded	mm^2	2 x 1.5 - 6	1 x 10	1 x 2.5 - 35 or 2 x 2.5 x 16	
– flexible with cable end	mm^2	2 x 1.5 - 4	2 x 0.75- 6	1 x 2.5 - 25 or 2 x 2.5 x 10	
– recommended bars	mm	–	–	–	–
Terminals and cross-sectional area for auxiliary conductors					
• screw terminal (screw size)					
– with cable clamp		M 3.5			
• conductor cross-sectional area					
– rigid solid or rigid stranded	2 x mm^2	0.75 - 4			
– flexible with cable end	2 x mm^2	0.75 - 2.5			
Degree of protection		All the terminals are protected against direct contact according to VDE 0106/Part. 100. (without additional terminal shrouds)			All the terminals are protected against direct
					direct contact according to VDE0106/part 100 (with additional terminal shrouds for the main terminals

Pole Technical Characteristics

Types		TA25 DU	TA42 DU	TA75 DU	TA80 DU	TA10 DU	TA200 DU	TA450 DU
Number of poles		3						
Setting ranges		see page 2.6						
Tripping class according to IEC 947-4-1, EN 60947-4-1		10 A						
Rated operational frequencies	Hz	0 - 400						50/60
Max. switching frequency without untimely tripping		Up to 15 starts/h or 60 starts/h with 40 % on-load factor when neither the starting current of 6 x I_n nor the starting time 1 s are exceeded.						
Resistance per phase in mΩ and heat dissipation in W		see page 2.13						

Technical data
TA110DU – TA450DU

Types		TA110DU	TA200DU	TA450DU
Standards: (international, European)		IEC 947-4-1, EN 60947-4-1		
Rated insulation voltage U_i according to IEC 947-4-1	V	690		1000
Rated impulse withstand voltage U_{imp} according to IEC 947-4-1	kV	6		8
Permissible ambient temperature				
– for storage	°C	–40 to +70		
– for operation	°C	–25 to +55 with temperature compensation (maximum values: see page 2.9)		
Climatic withstand DIN 50017		Humidity in alternate climate KFW, 30 cycles		
Mounting positions		On a support at an angle of ±30° in relation to the vertical plane (standard position). Other positions possible except mounting on a horizontal plane (in this case the tripping mechanism would be located above the bimetals).		
Shock withstand at nominal I_e	shock duration ms	15		
Critical direction of shocks A1, A2	multiples of g	12		
Resistance to vibrations (±1 mm, 50 Hz)	multiples of g	8		
Mounting – on contactor – separate with DB - kit		4 x M5 screws		
Terminals and cross-sectional areas for main conductors (motor side) • screw terminal – with cable clamp – via tunnel connector – flat type for lug or bar		 – HC, M8 –	 – – M10	 – – M10
• conductor cross-sectional area – rigid solid or rigid stranded – flexible with cable end – recommended bars	 mm^2 mm^2 mm	 16 – 35 16 – 35 12 x 3	 25 – 120 25 – 95 20 x 4	 2 x 240 2 x 240 20 x 4...5
Terminals and cross-sectional area for auxiliary conductors • screw terminal (screw size) – with cable clamp		M 3.5		
• conductor cross-sectional area – rigid solid or rigid stranded – flexible with cable end	2 x mm^2 2 x mm^2	0.75 - 4 0.75 - 2.5		
Degree of protection		All the terminals are protected against direct contact according to VDE 0106/Part. 100. (with additional terminal shrouds)		

Technical characteristics of auxiliary contacts for thermal O/L relays: TA25DU to TA450DU

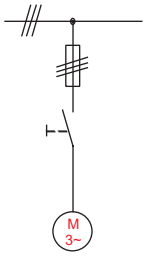
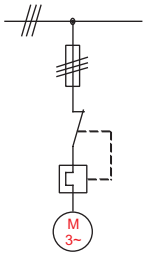
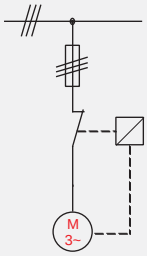
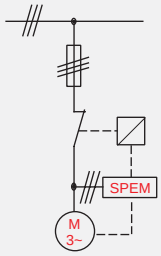
Auxiliary contacts		normally closed N.C.	normally open N.O.
Terminal marking		95-96	97-98
Rated operational voltage U_e	VAC	500	500
Conventional thermal current (in free air) I_{th}	A	10	6
Rated operational current I_e, AC-15			
up to 240 V	A	3.0	1.5
up to 440 V	A	1.9	0.95
up to 500 V	A	1.0	0.75
Rated operational current I_e DC-13			
up to 250 V	A	0.12	0.04
Protection against short circuits			
gG (gl) fuses (according to IEC 269)	A	10	6
S 271/S 281circuit-breaker	A	k3	k1
Maximum potential difference between N.C. and N.O. auxiliary contacts	VAC VDC	500 440	500 440

Technical data
Motor protection; Choice of protective device

Motor Protection — general

It is very important to choose an adequate protective device for the safety of the motor during operation and for its durability.
The efficiency of protection methods varies according to the application. The overview below will help you to choose.
There is no general rule and we are available to advise you for special applications and especially in the case of difficult starting.

Protective devices and efficiency

	Protection in relation to current:		Protection in relation to temperature:	
	Fuses	Protective relay with phase fault protection	Motor protection via CUSTORAPID® thermistor	Motor protection via SPEM electronic relay
				
Causes of dangerous overloads for the motor windings				
1 Overload with current 1.2 times the nominal current	❑	●	●	●
2 S1-S8 nominal duties according to IEC 34-I	❑	■	●	●
3 Operation with starting, braking, reversal in operating direction	❑	■	●	●
4 Operation with starting rate at > 15 cycles/hour	❑	■	●	●
5 Locked rotor	■	●	■ for motors with special rotor	●
6 Overloads due to phase failure	❑	●	●	●
7 Network undervoltage or overvoltage	❑	●	●	●
8 Fluctuation of network frequency	❑	●	●	❑
9 Ambient temperature too high	❑	●	●	❑
10 Overheating due to external cause (i.e. overheating of bearings)	❑	❑	●	❑
11 Motor cooling disturbed	❑	❑	●	❑
12				Undercurrent protection on drop in load
13				Protection of asymmetry: wrong phase direction rotation or asymmetrical load
14				Earth fault protection
15				Automatic disconnection for auxiliary load fault

Protection efficiency:

- ❑ unsuitable
- ■ very average efficiency
- ● perfectly efficient

Note: Fuses

Fuses do not protect motors against overloads. They are only used to protect installations and lines against short circuits.

To ensure efficient protection of a motor against short circuits, it is advisable to use aM type fuses in association with thermal OLR relays.

For the selection of fuses or circuit-breakers, refer to the indications given in this catalogue concerning contactors on the one hand and thermal O/L relays on the other.

In general, fuse protection for direct-on-line starting must be sized as follows:
– aM fuses: choose the fuse rating immediately above the full load value of the motor current.
– gG (gl) fuses: determine the fuse rating immediately above the motor current value and choose the next highest fuse rating.

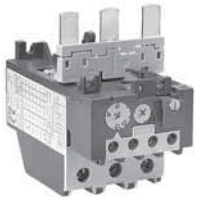
Resistance and Joule losses per phase, short circuit protection

Setting range current from – to A A	Resistance per phase mΩ	Joule losses per phase at max. setting W
TA25DU		
0.1 – 0.16	85850	2.2
0.16 – 0.25	85150	2.2
0.25 – 0.4	13750	2.2
0.4 – 0.63	5370	2.2
0.63 – 1.0	2190	2.2
1.0 – 1.4	1120	2.2
1.3 – 1.8	670	2.2
1.7 – 2.4	383	2.2
2.2 – 3.1	229	2.2
2.8 – 4.0	137	2.2
3.5 – 5.0	87.5	2.2
4.5 – 6.5	61	2.2
6.0 – 8.5	30.4	2.2
7.5 – 11	18.2	2.2
10 – 14	11.2	2.2
13 – 19	6.3	2.3
18 – 25	4.7	2.9
24 – 32	3.2	3.3
TA42DU		
18 – 25	5.5	3.43
22 – 32	2.89	2.91
29 – 42	1.84	3.24
TA75DU		
18 – 25	5.5	3.43
22 – 32	2.89	2.91
29 – 42	1.84	3.24
36 – 52	1.3	3.51
45 – 63	0.936	3.72
60 – 80	0.615	3.94
TA80DU		
29 – 42	1.84	3.24
36 – 52	1.3	3.51
45 – 63	0.936	3.72
60 – 80	0.615	3.94

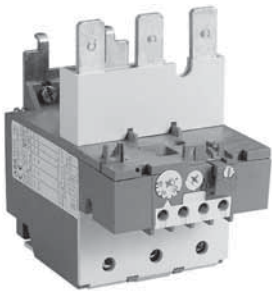
Setting range current from – to A A	Resistance per phase mΩ	Joule losses per phase at max. setting W
TA110DU		
80 – 110	0.378	3.78
TA200DU		
100 – 135	0.318	5.79
110 – 150	0.255	5.74
130 – 175	0.214	6.55
150 – 200	0.182	7.28
TA450DU		
130 – 185	—	2.5
165 – 235	—	2.5
220 – 310	—	2.5

Technical data
Tripping curves

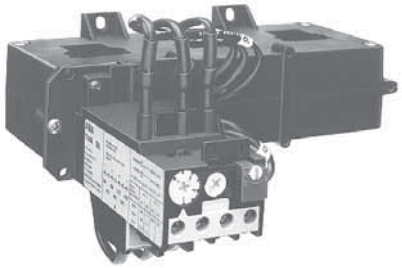
TA25DU



TA75DU



TA110DU/SU

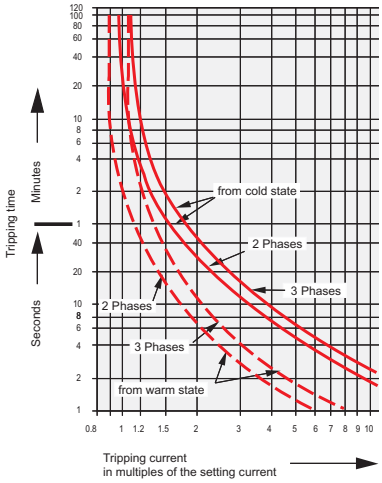


TA450DU

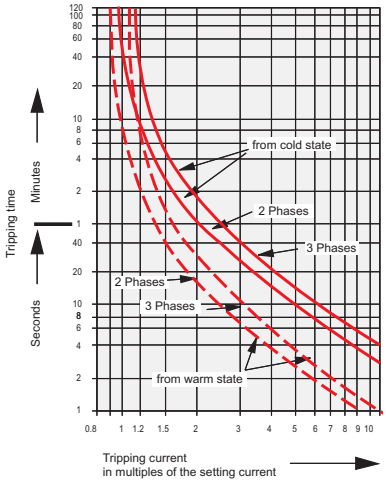
TA-DU thermal O/L relays are 3-pole with manual or automatic resetting mode selection.
The resetting button can also be used for stopping.
Built-in auxiliary contacts are physically separate and, consequently, can be used in different circuits (control circuit/indication circuit).
Each relay is temperature compensated and ensures phase failure protection.
Protective relays up to size TA75DU are protected against direct contact via the front face. Terminal shrouds are available for TA200DU to TA450DU size relays.
The connecting terminals are delivered in open position with (+,-) pozidriv screws and screwdriver guidance. It is advisable to tighten unused terminal screws.

Thermal O/L relay tripping curves

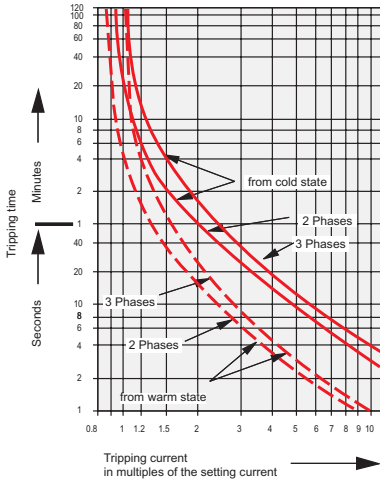
TA25DU
(tripping class 10A)



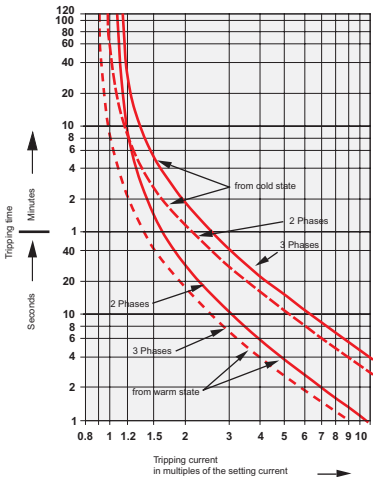
TA42DU, TA75DU and TA80DU
(tripping class 10A)



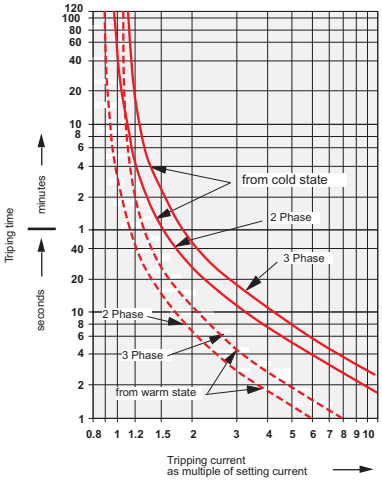
TA110DU
(tripping class 10A)



TA200DU
(tripping class 10A)



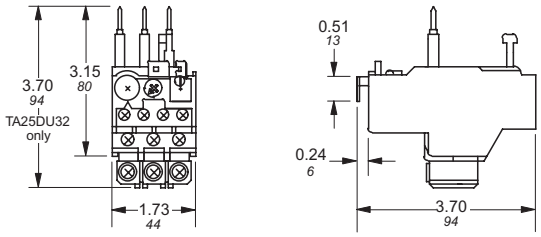
TA450DU
(tripping class 10A)



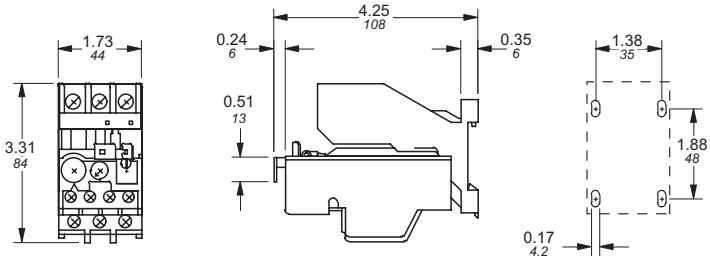
Approximate dimensions
T25DU – TA42DU

00.00 / 00.00 Inches [Millimeters]

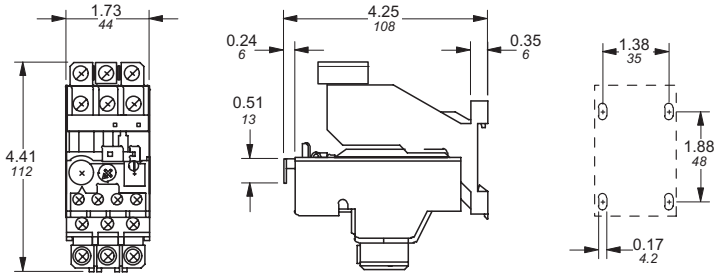
TA25DU



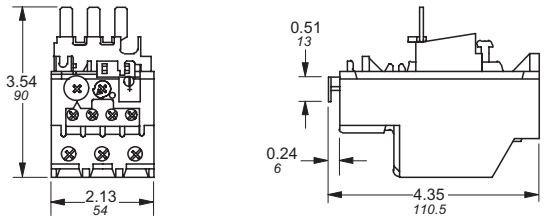
TA25DU & DB25



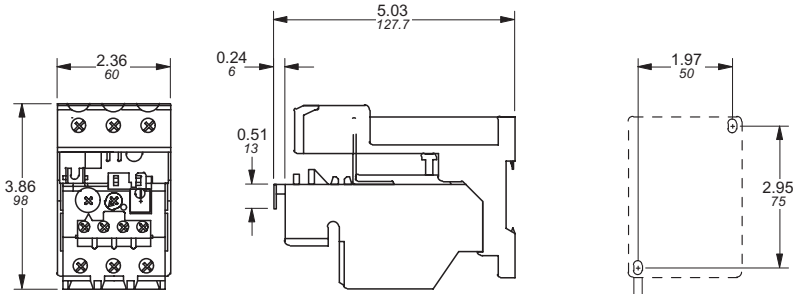
TA25DU & DB25/32



TA42DU



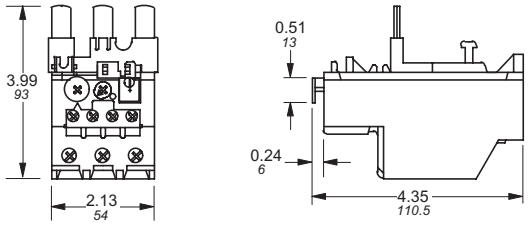
TA42DU / TA75DU & DB80



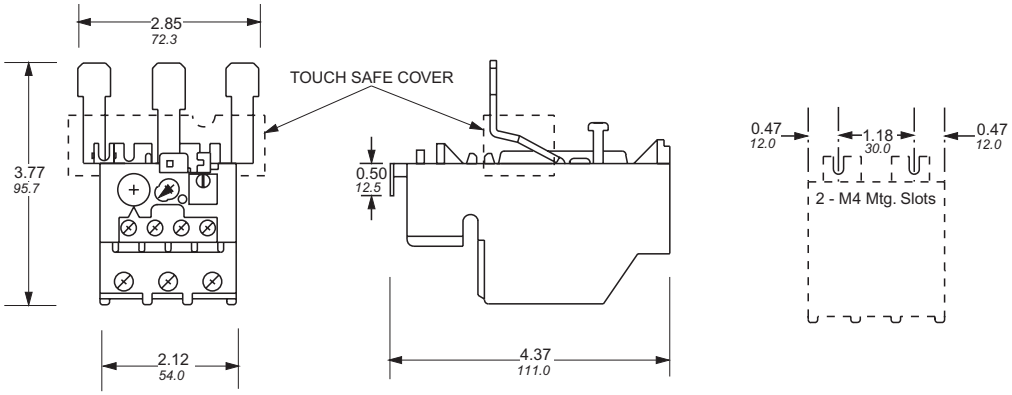
Approximate dimensions
TA75DU – TA200DU

00.00 / 00.00 Inches [Millimeters]

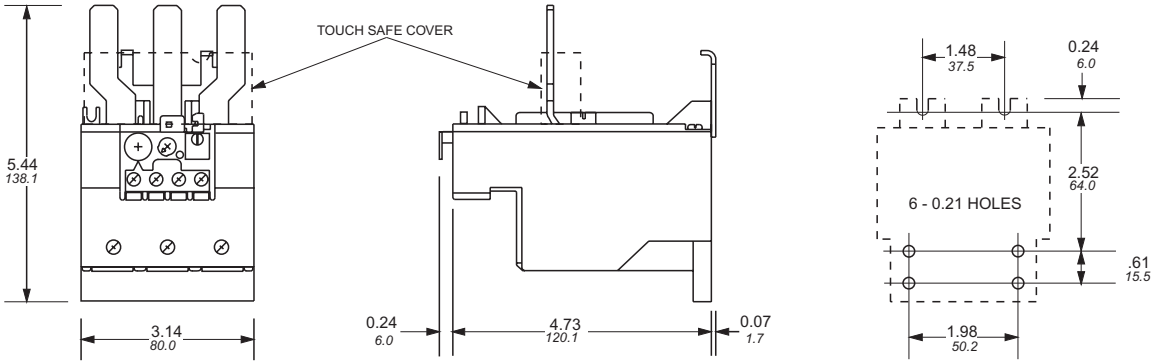
TA75DU



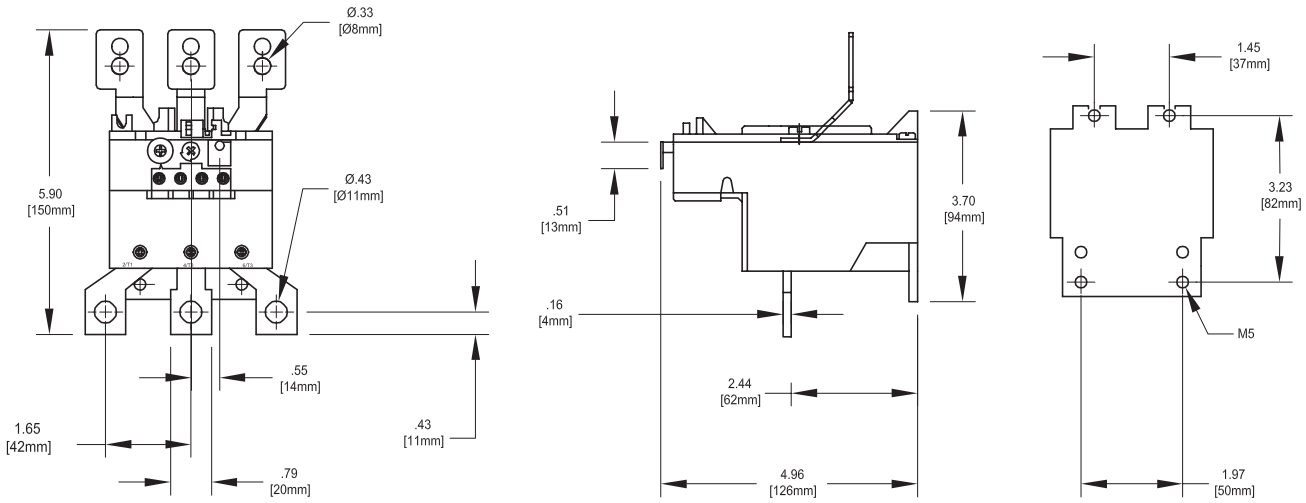
TA80DU



TA110DU



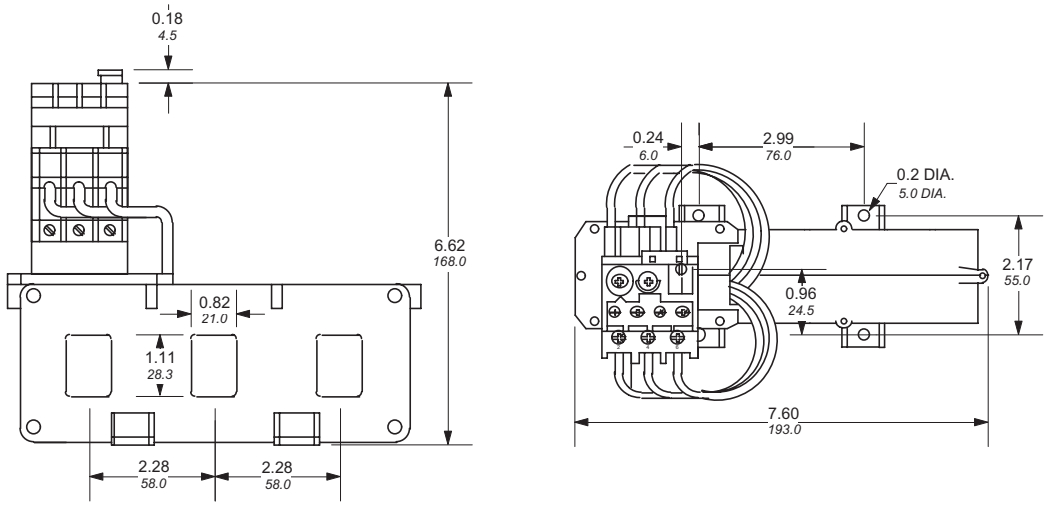
TA200DU



Approximate dimensions
TA450DU

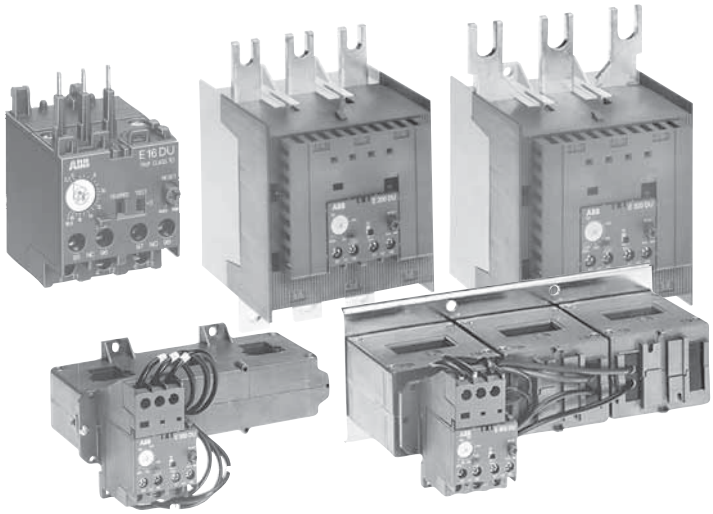
00.00 / 00.00 Inches [Millimeters]

TA450DU



Notes

Electronic overload relays
E16DU – E1250DU



Description

- Available for starter construction with A Line contactors and separate panel mounting
- Designed for close couple mounting
- Separate base mounting available for all overload relays
- E16DU Class 10, 20, & 30, factory selectable
- E200DU – E800DU Class 10, 20 & 30, field selectable
- Stop button
- Screwdriver guide holes
- All terminal screws are available from the front
- Single phase and phase unbalance protection
- Isolated alarm circuit (N.O.) contact
- Ambient compensation: -25°C to +70°C (-13°F to +158°F)
- Manual test
- Manual or automatic reset
- Factory calibrated and tested
- Wide adjustment range
- UL File No: E48139
- CSA File No: LR98336

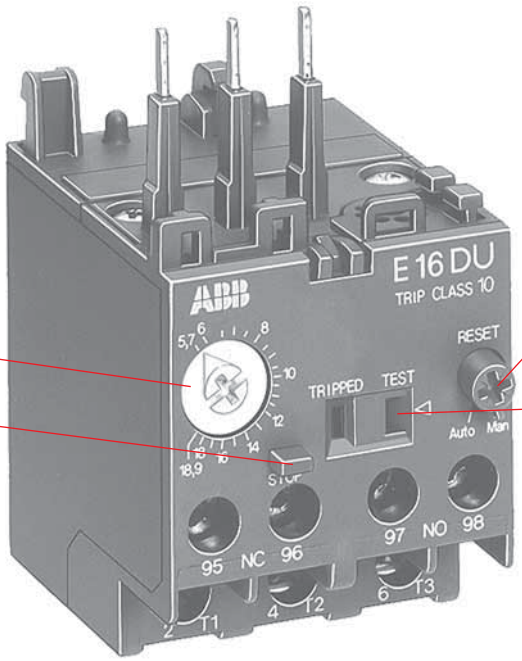
Tripping classes of the thermal overload relays

Standard classes in IEC 947-4-1 are classes: 10 A, 10, 20, 30. The tripping class indicates according to IEC 947-4-1 the maximum tripping time in seconds under specified conditions of test at 7.2 times the setting current and specifies tripping and non tripping times for 1.5 and 7.2 times the setting current. Mostly used class is 10 A.

Abstract from IEC 947-4-1

Tripping class		10 A	10	20	30
Max. tripping time at 1.5 x setting current (warm state)	(s)	120	240	480	720
Tripping time at 7.2 x setting current (cold state)	(s)	2 – 10	4 – 10	6 – 20	9 – 30
At 1.05 x setting current		no tripping			

Catalog number explanation



Nominal current setting

Stop button

Reset, manual or automatic

Trip indicator test function

Catalog number explanation

E16DU 1.0 10

Frame size
E16DU
E200DU
E320DU
E500DU
E800DU

Amp rating
1.0
200
320
500
800

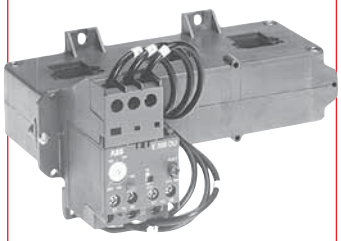
Class size
10
20
30

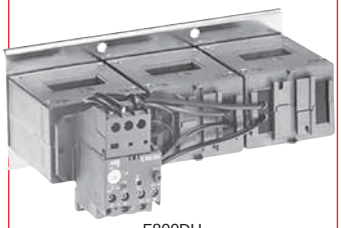
E16DU – E800DU
for contactors and mini contactors

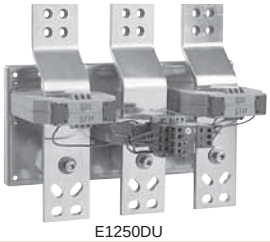

E16DU


E200DU


E320DU


E500DU


E800DU


E1250DU

E16DU – Tripping Class 10

For contactor	Setting range	Suffix code	Catalog number ①	List price
B/BC6 – B/BC7 A/AE/AL9 – A/AE/AL16	0.1 – 0.32 0.3 – 1.0 0.9 – 2.7 2.0 – 6.3 5.7 – 18.9	A1 B1 C1 D1 E1	E16DU0.32-10 E16DU1.0-10 E16DU2.7-10 E16DU6.3-10 E16DU18.9-10	**$ 96**

E16DU – Tripping class 20

For contactor	Setting range	Suffix code	Catalog number ①	List price
B/BC6 – B/BC7 A/AE/AL9 – A/AE/AL16	0.1 – 0.32 0.3 – 1.0 0.9 – 2.7 2.0 – 6.3 5.7 – 18.9	A2 B2 C2 D2 E2	E16DU0.32-20 E16DU1.0-20 E16DU2.7-20 E16DU6.3-20 E16DU18.9-20	**$ 96**

E16DU – Tripping class 30

For contactor	Setting range	Suffix code	Catalog number ①	List price
B/BC6 – B/BC7 A/AE/AL9 – A/AE/AL16	0.1 – 0.32 0.3 – 1.0 0.9 – 2.7 2.0 – 6.3 5.7 – 18.9	A3 B3 C3 D3 E3	E16DU0.32-30 E16DU1.0-30 E16DU2.7-30 E16DU6.3-30 E16DU18.9-30	**$ 96**

E200DU – E1250DU – Tripping class 10, 20 & 30

For contactor	Setting range	Suffix code	Catalog number ①	List price
A/AF145 – A/AF185	65 – 200	E2	E200DU200	**$ 325**
A/AF210a – A/AF300	105 – 320	E3	E320DU320	**775**
AF400 – AF460	170 – 500	E5	E500DU500	**865**
AF580 – AF750	270 – 800	E8	E800DU800	**950**
AF1350	375 – 1250	E9	E1250DU1250	**2970**

① Not suitable for single-phase motors and direct current (DC) motors.

Accessories

DB16E

A300 contactor with E320 overload & LT320E terminal shrouds

Mounting kits
for direct mounting on contactors AF400 – AF750

For overload relays	On contactor	Catalog number	List price
E500DU	AF400 – AF460 AF400 – AF460 w/reversing kits	DT500/AF460S DT500/AF460L	**$ 395**
E800DU	AF580 – AF750 AF580 – AF750 w/reversing kits	DT800/AF750S DT800/AF750L	**415**

Separate mounting kits

For overload relays	Catalog number	List price
E16DU	DB16E	**$ 15**

Lug kits

Wire range	Electronic overload	Catalog number	List price
6 – 250 MCM	E200DU200	ATK185	**$ 45**
4 – 400 MCM	E320DU320	ATK300	**68**
(2) 4 – 500 MCM	E320DU320	ATK300/2	**110**
(2) 2/0 – 500 MCM	E500DU500	ATK580/2HK	**160**
(3) 2/0 – 500 MCM	E800DU800	ATK750/3HK	**235**
(4) 1/0 – 750 MCM	E12150DU1250	ATK1350/4HK	275

Terminal shrouds

For overload relays	Catalog number	List price
E200DU E320DU	LT200E LT320E	**$ 41**
E500DU E800DU	LT500E LT800E	**52** **56**

General technical data

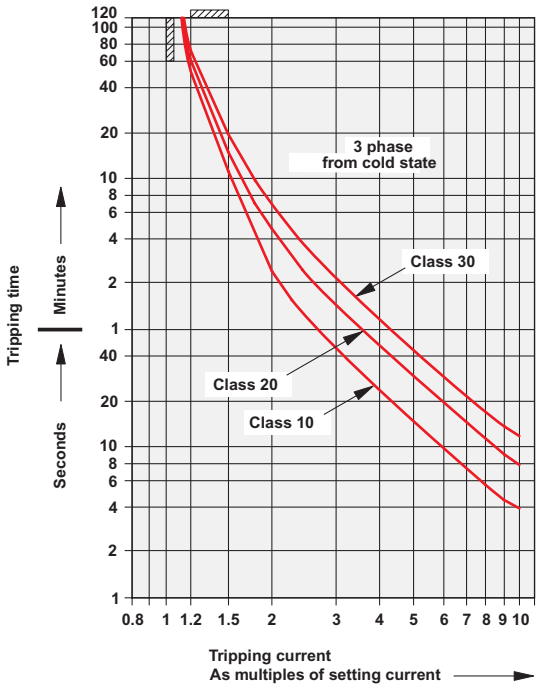
Type		E 16 DU
Standards:		UL508, IEC 60 947-4-1 / IEC 60 947-5-1 EN 60 947-4-1 / EN 60 947-5-1
Rated insulation voltage U_i	UL / IEC V	600 / 690
Rated operational voltage U_e	UL / IEC V	600 / 690
Impulse withstand voltage U_{imp}	kV	6
Permissible ambient temperature		
- for storage	°C	- 25 to 70
- with compensated operation	°C	- 25 to 70
Climatic resistance acc. to		IEC 68-2-1, IEC 68-2-2, IEC 68-2-14, IEC 68-2-30
Resistance to shock	Shock duration ms	11
	multiple of g	15
Resistance to vibrations (±1 mm, 10 ... 100 Hz)	multiple of g	5
Mounting - on contactor - with AB... kit		Direct to contactor's main terminal
Terminal types and connecting capacity of main conductors (on load side) /and auxiliary contacts.		
- Screw terminals (screw size)		
- with self-disengaging clamping piece		M3.5
- with terminal block		–
- with busbar or cable lugs		–
- Torque	lbin / Nm	7 / 1.0
- connection cross sections		
- copper stranded	AWG / mm^2	10 - 20 / 2X0.75...4
- flexible with connector sleeve	AWG / mm^2	10 - 20 / 2X0.75...4
Protection degree to IEC 947-1/EN 60 947-1		All terminals are safe from finger-touch and touch by the back of the hand in acc. with VDE 0106, Part 100
Weight	lbs / kg	.33 / .15

Technical data of the current paths

Type		E 16 DU
Number of paths		3
Setting ranges		see page 2.21
Tripping class acc. to IEC 947-4-1/EN 60 947-4-1		see page 2.21
Operating frequency	Hz	50 and 60
Switching frequency without early tripping		up to 80 ops./h with 40 % continuous duty if starting current not higher than 6 x I_n and starting time not longer than 1s
Resistance per phase q and heat dissipation per phase in W acc. to max. setting current		see page 2.24
Required fuses for short circuit protection		see page 2.24

Technical data

Tripping characteristics



Resistance and power dissipation

Setting range	gL/gG	Short circuit protection UL/CSA 600V 5kA	UL/CSA 480V/50kA	Resistance per phase		Joule losses per phase at upper current setting
A – A	A	RK5	Class J	mΩ	q	W
0.1 – 0.32	1	2	2	970	0.97	0.1
0.3 – 1.0	4	2	2	113	0.113	0.11
0.9 – 2.7	10	4	4	14	0.014	0.1
2.0 – 6.3	20	15	15	2.4	0.0024	0.1
5.7 – 18.9	50	30	30	0.8	0.0008	0.29

Technical characteristics of auxiliary contacts

Type		N.C. 95-96	N.O. 97-98
Rated operational voltage U_e	V	500	
Conventional free air thermal current I_{th}	A	6	
Rated operational current I_{th}			
on AC-15, 230V	A	3	
on AC-15, 400V	A	1.1	
on AC-15, 500V	A	0.9	
on AC-15, 690V	A	0.7	
on DC-13, 24V	A	1.5	
on DC-13, 60V	A	0.5	
on DC-13, 110V	A	0.4	
on DC-13, 220V	A	0.2	
Short circuit protection gG (gf) fuses	A	6	

Technical data
E200DU – E1250DU

Type			E 200 DU	E 320 DU	E 500 DU	E 800 DU	E 1250 DU
Standards: (major European and international standards)			IEC 60947-4-1 / IEC 60947-5-1 EN 60947-4-1 / EN 60947-5-1				
Rated insulation voltage U_i		V	690				
Rated operating voltage U_e		V	690				
Impulse withstand voltage U_{imp}		kV	6				
Permissible ambient temperature	- Storage	°C	- 25 to +70				
	- Operation	°C	- 25 to +70				
Climatic resistance according to			IEC 60068-2-1, IEC 60068-2-2, IEC 60068-2-14, IEC 60068-2-30		IEC 60068-2-1, IEC 60068-2-2, IEC 60068-2-30		
Mounting position			any				
Resistance to shock	Shock duration ms		30				—
	multiple of g		5				—
Resistance to vibrations to IEC/EN 61373			category 1, class B				—
Mounting	- onto contactor		Clipped beneath the contactor, fixed by screws on its main terminals				—
	- with DT.. mounting kit for single set-ups		By screws: 2 x M4 or DIN rail				—
	- onto panel plate		By screws: 4 x M5		By screws: 4 x M6		
Connection terminals and attachment type Auxiliary contacts. • Screw terminal (screw size) - with self-disengaging clamping piece			M3.5				
• Tightening torque		Nm	1				
• Connection cross-sections - single-core or stranded		mm^2	2 x 0.75...4				
- flexible with wire end ferrule		mm^2	2 x 0.75...4				
Connection terminals and attachment type Main conductors. • Screw terminal (screw size)			M8	M10	(M10)	(M12) (rail order separately)	(M12)
Protection degree to IEC 60947-1/EN 60947-1			All terminals are protected against access to hazardous parts with back hand and finger in acc. with EN 50274				IP 00 (Main terminals) (auxiliary circuits are protected)

Technical data of the conducting paths

Type			E 200 DU	E 320 DU	E 500 DU	E 800 DU	E 1250 DU
Number of conducting paths			3				
Setting ranges		A	60 ... 200	100 ... 320	150 ... 500	250 ... 800	375 ... 1250
Tripping classes to IEC 60947-4-1/EN 60947-4-1			10, 20, 30 eligible				
Frequency range		Hz	50 and 60 (only for a.c. operating 3 phase)				

Load rating of auxiliary contacts

Type			E 200 DU, E320 DU, E 500 DU, E 800 DU, E 1250 DU	
Contact			NC (95-96)	NO (97-98)
Rated operating voltage U_e		V	600	600
Rated thermal continuous current		A	6	6
Rated operating current I_e	at AC-15 230 V	A	3	3
	at AC-15 400 V	A	1.1	1.1
	at AC-15 500 V	A	0.7	0.7
	at DC-13 24 V	A	1.5	1.5
	at DC-13 60 V	A	0.5	0.5
	at DC-13 110 V	A	0.4	0.4
	at DC-13 220 V	A	0.2	0.2
Short-circuit protection fuse or	gG	A	6	6
STOTZ safety circuit-breaker:	S271 S281		(1)	(1)

(1) on request

Technical data
Terms and technical definitions

Altitude
Characterizes the place of use. It is expressed in meters above sea level.

Circuits
- Auxiliary circuit – all the conductive parts of a contactor designed to be inserted in a different circuit from the main circuit and the contactor control circuits.
- Control circuit – all the conductive parts of a contactor (other than the main circuit and the auxiliary circuit) used to control the contactor's closing operation or opening operation or both.
- Main circuit – all the conductive parts of a contactor designed to be inserted in the circuit that it controls.

Insulation Class according to NFC 20 040 and VDE 0110
Characterizes adaptation of the devices to ambient temperature and operating conditions. For given clearances and creepage distances, a device will have different insulating voltages depending on insulation classes A, B, C & D. Class C corresponds to most industrial applications. The devices in this catalog belong to Class C.

Coordination of equipment protections during a short circuit
This is the addition upstream of the contactor and thermal overload relay of a short circuit (SCPD) protection device such as a circuit breaker, a fuse with a high breaking capacity or other fuses.

IEC publication 947-4-1 defines coordination Types 1 & 2:

- Type 1 – Coordination requires that, in the event of a short circuit, the contactor or starter does not endanger persons or installations and will not be able to operate without being repaired or parts being replaced.
- Type 2 – Coordination requires that, in short circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts being welded is acceptable. In this case, the manufacturer must stipulate the measures to be taken with respect to maintenance of the equipment.

Rated operational current I_e
Current rated by the manufacturer. It is mainly based on the rated operational voltage U_e, the rated frequency, the utilization category, the rated duty and the type of protective enclosure, if necessary.

Conventional free air thermal current I_{th}
Current that the contactor can withstand in free air for a duty time of 8 hours without the temperature rise of its various parts exceeding the maximum values given by the standard.

Cycle time
Cycle time is the sum of the current flow time and the no-current time for given cycle.

Electrical durability
Number of on-load operations that the contactor is able to carry out; it depends on the utilization category.

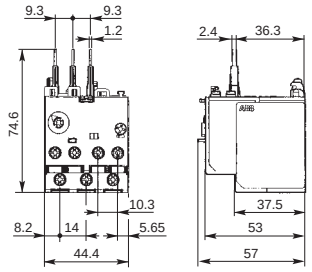
Mechanical durability
Number of no-current operations that a contactor is able to carry out.

Load factor
Ratio of the on-load operating time to the total cycle time x 100.

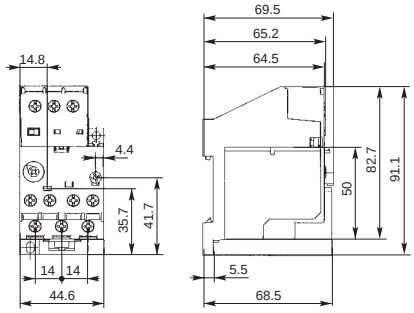
Switching frequency
Number of switching cycles per hour.

Approximate dimensions
E16DU – E200DU

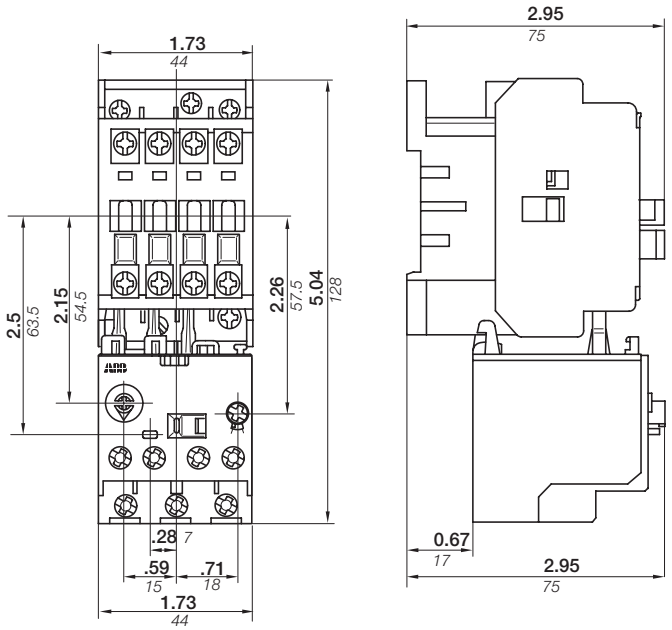
E16DU



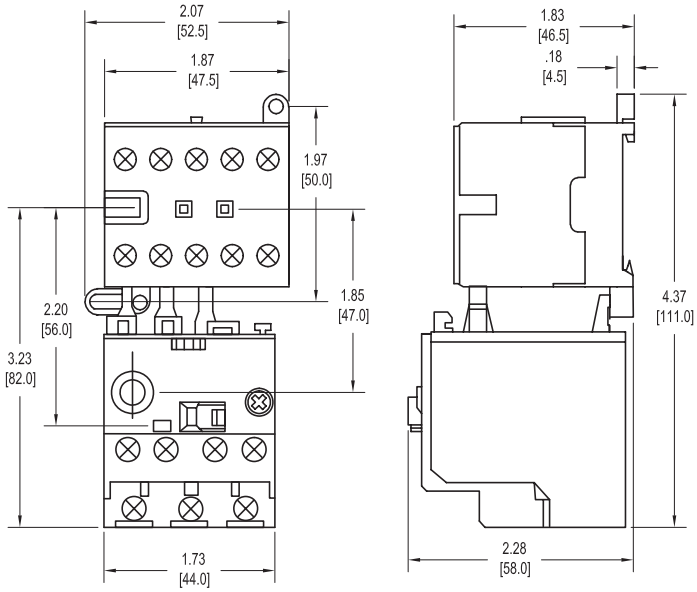
E16DU with DB16E



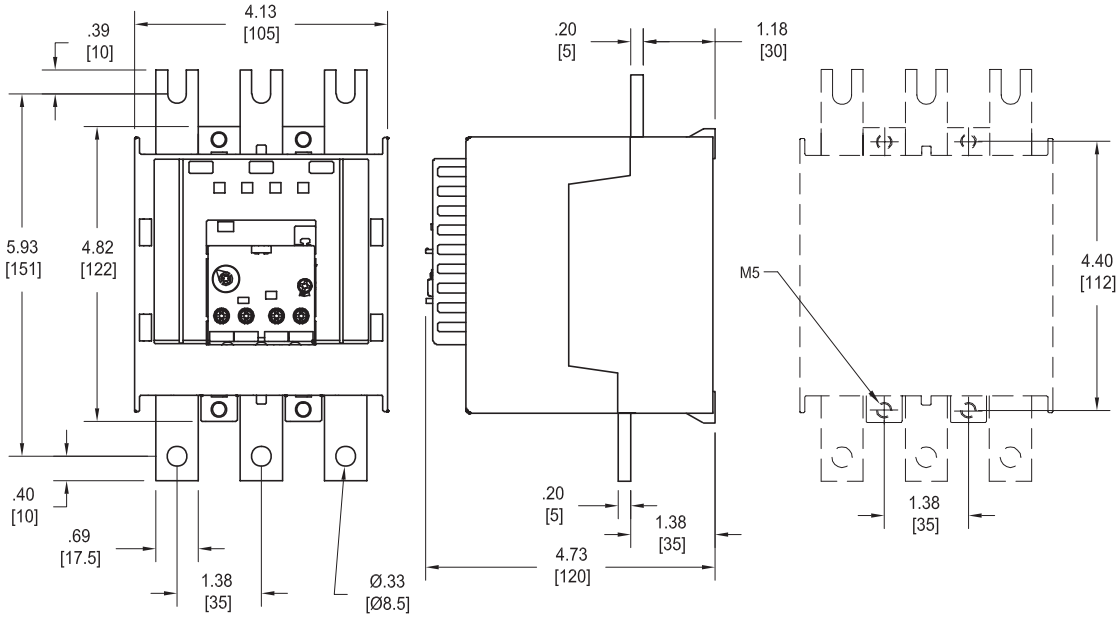
E16DU with A/AE9, A/AE12, A/AE16



E16DU with B/BC6, B/BC7

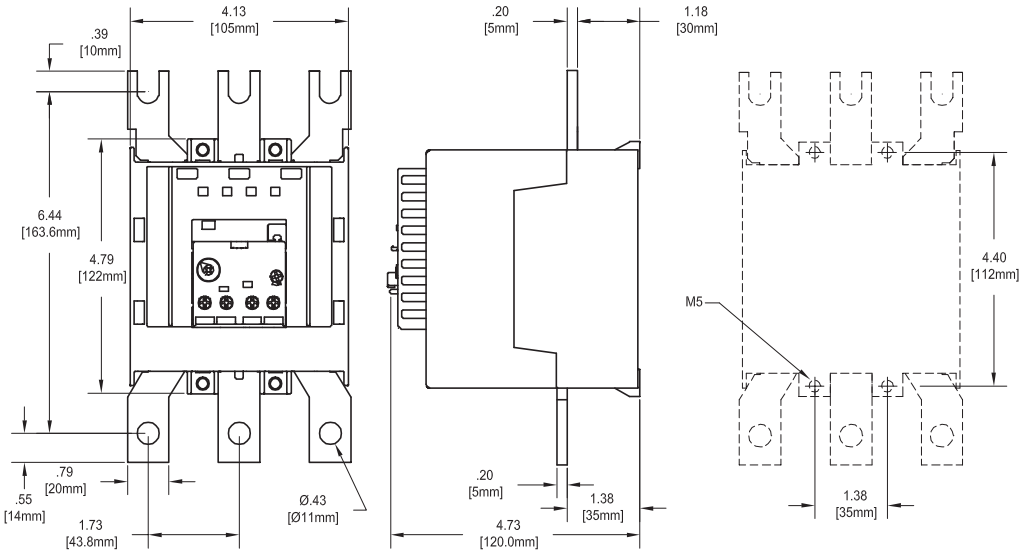


E200DU

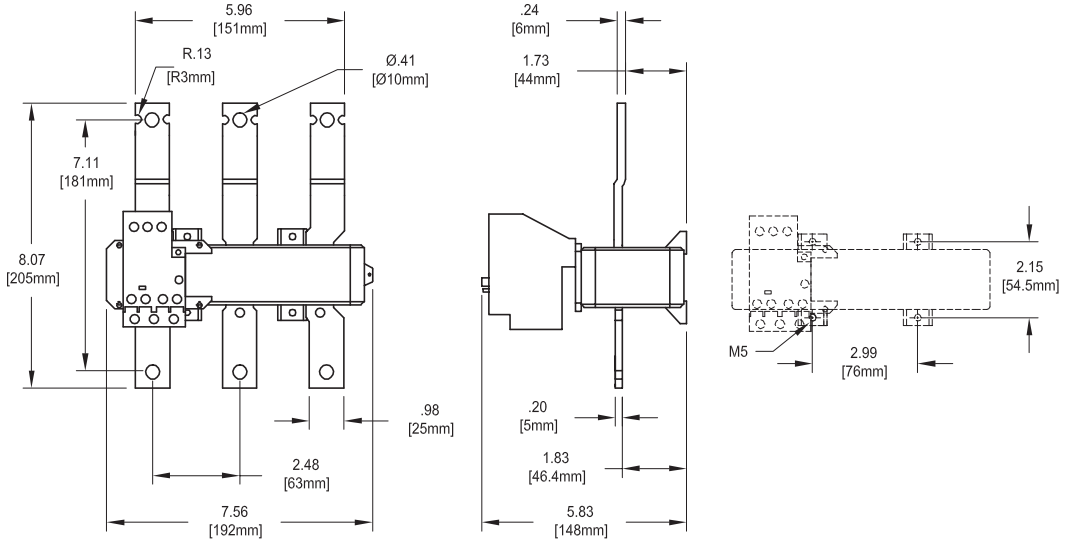


Approximate dimensions
E320DU – E800DU

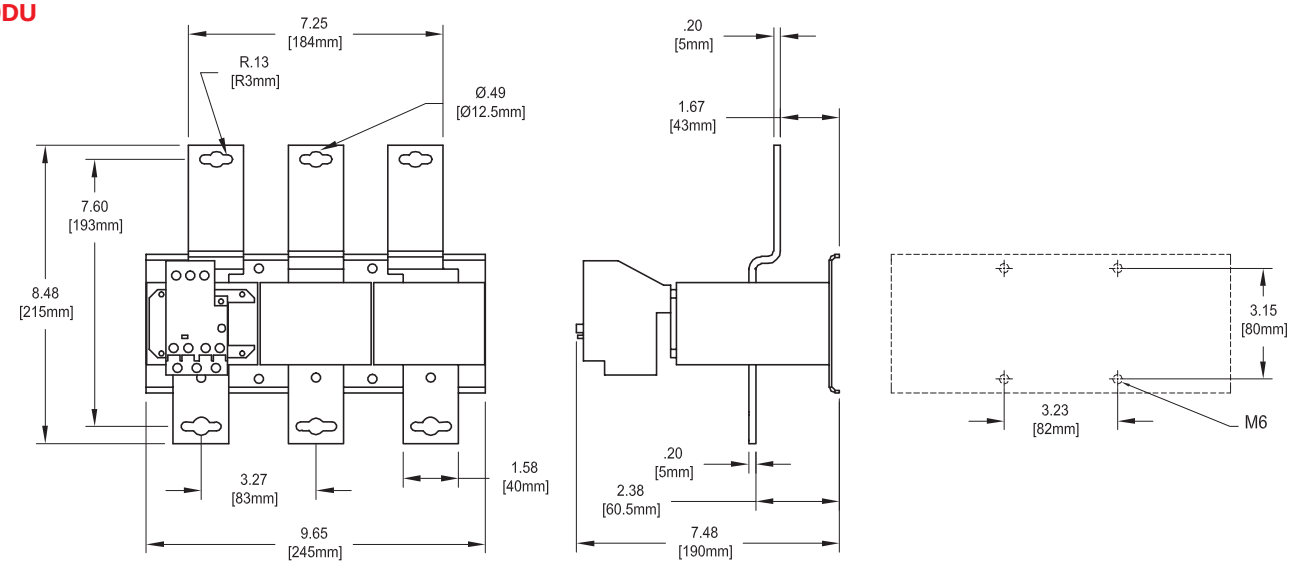
E320DU



E500DU



E800DU



Starters
Index

3

Continued next page

Starters
Index

Across the line • Combination • Reduced voltage

Starters

Starters
Across the line
Combination
Reduced voltage

3

General information
Field modification kits
A Starters

Start-Stop pushbutton kit – dual element

Starter size	Catalog number	List price
A9 – A750	MPSSK	**$ 38**

For field installation on NEMA 1 enclosures. Kit includes **one dual element pushbutton** and hardware.

Start-Stop pushbutton kit

Starter size	Catalog number	List price
A9 – A750	MP4SSK4	**$ 48**

For field installation on all enclosures. Kit includes **two momentary pushbuttons** and hardware. ①

Fwd-Rev-Stop pushbutton kit

Starter size	Catalog number	List price
A9 – A750	MPFRK-4	**$ 120**

For field installation on all enclosures. Kit includes three momentary pushbuttons and hardware. ①

2 Position selector switch kit

Starter size	Catalog number	List price
A9 – A750	MPSL2K-4	**$ 90**

For field installation on all enclosures. Labels for ON-OFF are included. Kits include mounting hardware. ①

3 Position selector switch kit

Starter size	Catalog number	List price
A9 – A750	MPSL3K-4	**$ 90**

For field installation on all enclosures. Labels for HAND-OFF-AUTO are included. Kits include mounting hardware. ①

Pilot light kits

Starter size	Voltage	Catalog number	List price
A9 – A750	120 240 480V	MPPLK-41 MPPLK-42 MPPLK-44	**$ 90**

For field installation on all enclosures. ①

Reset button kits

Starter size	Catalog number	List price
A9 – A750	KPR3-104B	**$ 14**

For field installation on all enclosures. ①

① For use with UL Type 3R, 4, 4X, 12 & 13.

General information
Factory modifications

Control cover accessories – A9-A750

Description	Control suffix ①	List price adder NEMA 1 3R 4, 4X & 12
Start-stop pushbutton	A	$ 72
Fwd-rev-stop pushbutton	B	360
2 position selector switch (Std. ON-OFF)	C	72
3 position selector switch (Std. HAND-OFF-AUTO)	D	72
Pilot light, Red, RUN (Std.)	E	135
Pilot light, Green, RUN	R	135
Pilot light suffix + V= Neon bulb	V	–
Pilot light suffix + X= LED bulb	X	–
Start-stop pushbutton & pilot light	F	207
Fwd-rev-stop pushbutton & pilot light	G	496
2 position selector switch & pilot light	H	207
3 position selector switch & pilot light	J	207
Fast-slow-stop pushbuttons	K	360
Fast-slow-stop pushbuttons & pilot light	L	495
Fast-slow-off-auto selector switch	M	150
Emergency stop	P	100
F suffix + 1NO & 1NC auxiliary contact	T	237
J suffix + 1NO & 1NC auxiliary contact	U	237
Pushbutton (standard START)	Y	36

Special modifications

Contact configuration	Suffix code ①	List price adder
Contactor		
Coil surge suppressor	S	$ 75
Auxiliary relays		
Type N control relay (4 pole)	CR	225
Electronic timer		
1.5 – 30, On Delay	TN30	300
5 – 100, On Delay	TN100	300
1.5 – 30, Off Delay	TF30	300
5 – 100, Off Delay	TF100	300
Phase failure phase reversal with over and undervoltage relays	PFPR	525
Ground fault protection	GFP	2250
For multi-speed controllers		
Compelling relay	CPR	600
Accelerating relay	ACR	600
Decelerating relay	DCR	600
Meters & metering		
Current transformer	CT	375
Ammeter (including C.T.)	AM	705
Ammeter & ammeter switch	AMS	1800
Voltmeter	VM	1200
Voltmeter & voltmeter switch	VMS	1800
Elapsed time meter	ETM	375
Operation counter	OC	560
Wattmeter	WM	3650
Miscellaneous		
Lightning arrestor	LA	320
Space heater, 100W with thermostat	SH	600

Control circuit transformer (standard VA) – A9 - A750 ②

Standard size with fused secondary			Coil suffix	Starter size	CCT VA	List price
Primary	Secondary	Hz				
				A9 – A40	45 ③	$ 300
				A9 – A40	50	360
200/208V	110V	50/60	0	A50 – A75	75	435
220/240V	110/120V	50/60	7	A95 – A110	100	560
440/480V	110/120V	50/60	8	A145 – A185	150	720
550/600V	110/120V	50/60	9	A210 – A300	250	795
				A400 – A460	150	720 ④
				A580 – A750	250	795 ④

Control circuit transformers do include two primary fuses and one secondary fuse.

Additional auxiliary contact blocks — A9 – A750

Contact configuration	Suffix code ①	A9 – A110 list price adder	A145 – A750 list price adder
1 N.O.	10	$ 20	–
1 N.C.	01	20	–
2 N.O.	20	30	–
1 N.O. & 1 N.C.	11	30	$ 30
2 N.C.	02	30	–
4 N.O.	40	60	–
3 N.O. & 1 N.C.	31	60	–
2 N.O. & 2 N.C.	22	60	60
1 N.O. & 3 N.C.	13	60	–
4 N.C.	04	60	–
3 N.O. & 3 N.C.	33	90	90

Reduced voltage & multi-speed starters — price adders

Starter size	Non-fusible switch price adder	Fusible switch price adder	MCCB or MCP price adder
A9	$ 990	$ 1008	$ 1287
A12	990	1008	1287
A16	990	1008	1287
A26	990	1008	1287
A30	990	1224	1350
A40	990	1224	1350
A50	1152	1224	1350
A63	1230	1350	1785
A75	1494	1602	1809
A95 – A110	2310	2565	2982
A145	3042	3366	4158
A185	3300	3735	4533
A210	3450	3825	6000
A260	3744	4068	6849
A300	4200	6000	8750
A400	6600	9450	9030
A460	8200	11,100	9475
A580	8400	11,800	10,200
A750	9000	12,450	12,900

Hazardous location enclosure accessories, NEMA 7 & 9

Item	Catalog ① Suffix No.	List price
3R Breather/drain	A	$ 80
Start PB green	B	180
Stop PB red	C	180
St/St dual PB	D	360
Em. Stop mush momentary	E	220
Em. Stop mush maintained	F	460
Black PB N.O. auxiliary	G	180
Black PB N.C. auxiliary	H	180
Pilot light	J	180
Illuminated PB	K	460
Push-to-test pilot light	L	450
Potentiometer	M	460
2-Pos Selector Maintained	N	260
2-Pos Selector spring L to R	P	280
2-Pos Selector spring R to L	Q	280
3-Pos Selector sw. main.	R	260
3-Pos Selector spring L to R	S	280
3-Pos Selector spring R to L	T	280
3-Pos Selector spring to C	U	280
2-Pos Selector key operated	V	450
3-Pos Selector key operated	W	450

① Add this suffix to the last digit of the catalog number.
② Consult factory if additional VA is required.
③ Does not include primary fusing.
④ A400 - A750 utilizes the AF wide range coil with a lower coil consumption than A210 - A300.

Discount schedule – Always applied to the applicable starter discounts

General information
Catalog number explanation

A110 SR F 1 - 84 C 6D 4 L A

Starter size

Starter type
S - Non-reversing
SR - Reversing
SS - Single phase, non-reversing
ST - Multi-speed, 2 speed 1 winding, 2 speed 2 winding
SA - Autotransformer
SG - Wye-delta open transition
SY - Wye-delta closed transition
SH - Part winding
N - NEMA

Combination type
N - Non-fusible disconnect
F - Fusible disconnect
B - Thermal magnetic or electronic trip type circuit breaker
M - Motor Circuit Protection (MCP)

Enclosure
1 - UL Type 1
2 - UL Type 12
3 - UL Type 3R
4 - UL Type 4
X - UL Type 4X stainless steel
P - Plastic
7 - UL Type 7 & 9
Class I, Group C, D, Div 1 & 2
Class II, Groups E, F & G, Div 1 & 2
Class III
74 - Hazardous Type 4

Coil voltage/CCT

Coil voltage selection – A9 - A300 ①

Hz	Cntr type	Volts 12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Coil voltage selection – A400 - A750

Hz	Cntr type	Volts 24 - 60	48 - 130	100 - 250	250 - 500
60	AF	68	69	70	71 ②
50	AF	68	69	70	71 ②
DC	AF	68	69	70	71 ②

Control transformer voltage selection chart

Hz	Type	Volts 208/120	230 – 240/120	460 – 480/120	575 – 600/120
50/60	A/AF	0	7	8	9

For other voltages, consult factory.

Overload range
See Overload Relay Selection chart, see page 3.6.

Accessories
See Factory modifications, page 3.3.

Horsepower

A - 10	N - 200
B - 15	P - 250
C - 20	R - 300
D - 25	S - 350
E - 30	T - 400
F - 40	U - 500
G - 50	V - 600
H - 60	W - 700
J - 75	X - 800
K - 100	Y - 900
L - 125	Z - 1000
M - 150	

Line voltage
1 - 200 – 208V
2 - 230 – 240V
3 - 380 – 415V
4 - 460 – 480V
6 - 575 – 600V

Fuse clip
6A- 30A, 600V, Class J
6B- 60A, 600V, Class J
6C- 100A, 600V, Class J
6D- 200A, 600V, Class J
6E- 400A, 600V, Class J
6F- 600A, 600V, Class J
6G- 800A, 600V, Class L
6H- 1200A, 600V, Class L

Circuit breaker amp rating (600V)

6D -15	6M-70	6W - 225	6E - 700
6E -20	6N - 80	6X - 250	6F - 800
6F -25	6P - 90	6Y - 300	6G - 900
6G -30	6R - 100	6Z - 350	6H - 1000
6H -35	6S - 125	6A - 400	6J - 1200
6J -40	6T - 150	6B - 450	
6K -50	6U - 175	6C - 500	
6L-60	6V - 200	6D - 600	

Circuit breaker amp rating (200V – 480V)

4D -15	4M-70	4W - 225	4E - 700
4E -20	4N - 80	4X - 250	4F - 800
4F -25	4P - 90	4Y - 300	4G - 900
4G -30	4R - 100	4Z - 350	4H - 1000
4H -35	4S - 125	4A - 400	4J - 1200
4J -40	4T - 150	4B - 450	
4K -50	4U - 175	4C - 500	
4L-60	4V - 200	4D - 600	

MCP amp rating (600V)

6A - 3	6E - 50	6J - 400	6N-1200
6B - 5	6F - 100	6K - 600	
6C - 10	6G - 150	6L - 800	
6D - 25	6H - 250	6M - 1000	

MCP amp rating (200V – 480V)

4A - 3	4E - 50	4J - 400	4N - 1200
4B - 5	4F - 100	4K - 600	
4C - 10	4G - 150	4L - 800	
4D - 25	4H - 250	4M - 1000	

① For AF50 - AF300 starters, consult factory.
② For AF400 - AF750 only.

Ampere ratings of 3 phase, AC induction motors

Horse power	110 – 120V			200 – 208V			220 – 240V			380 – 415V		440 – 480V			550 – 600V		
	Single phase	Two phase	Three phase	Single phase	Two phase	Three phase	Single phase	Two phase	Three phase	Single phase	Three phase	Single phase	Two phase	Three phase	Single phase	Two phase	Three phase
1/10	3.0	—	—	1.65	—	—	1.5	—	—	1.0	—	—	—	—	—	—	—
1/8	3.8	—	—	2.1	—	—	1.9	—	—	1.2	—	—	—	—	—	—	—
1/6	4.4	—	—	2.4	—	—	2.2	—	—	1.4	—	—	—	—	—	—	—
1/4	5.8	—	—	3.2	—	—	2.9	—	—	1.8	—	—	—	—	—	—	—
1/3	7.2	—	—	4.0	—	—	3.6	—	—	2.3	—	—	—	—	—	—	—
1/2	9.8	4.0	4.4	5.4	2.2	2.4	4.9	2.0	2.2	3.2	1.3	2.5	1.0	1.1	2.0	0.8	0.9
3/4	13.8	4.8	6.4	7.6	2.6	3.5	6.9	2.4	3.2	4.5	1.8	3.5	1.2	1.6	2.8	1.0	1.3
1	16.0	6.4	8.4	8.8	3.6	4.6	8.0	3.2	4.2	5.1	2.3	4.0	1.6	2.1	3.2	1.3	1.7
1 1/2	20.0	9.0	12.0	11.0	5.0	6.6	10.0	4.5	6.0	6.4	3.3	5.0	2.3	3.0	4.0	1.8	2.4
2	24.0	11.8	13.6	13.2	6.5	7.5	12.0	5.9	6.8	7.7	4.3	6.0	3.0	3.4	4.8	2.4	2.7
3	34.0	16.6	19.2	18.7	9.2	10.6	17.0	8.3	9.6	10.9	6.1	8.5	4.2	4.8	6.8	3.3	3.9
5	56.0	26.4	30.4	30.8	14.5	16.8	28.0	13.2	15.2	17.9	9.7	14.0	6.6	7.6	11.2	5.3	6.1
7 1/2	80.0	38.0	44.0	44.0	21.0	24.2	40.0	19.0	22.0	27.0	14.0	21.0	9.0	11.0	16.0	8.0	9.0
10	100.0	48.0	56.0	55.0	26.4	30.8	50.0	24.0	28.0	33.0	18.0	26.0	12.0	14.0.	20.0	10.0	11.0
15	135.0	72.0	84.0	75.0	39.6	46.2	68.0	36.0	42.0	44.0	27.0	34.0	18.0	21.0	27.0	14.0	17.0
20	—	94.0	108.0	96.8	52.0	60.0	88.0	47.0	54.0	56.0	34.0	44.0	23.0	27.0	35.0	19.0	22.0
25	—	118.0	136.0	121.0	65.0	75.0	110.0	59.0	68.0	70.0	44.0	55.0	29.0	34.0	44.0	24.0	27.0
30	—	138.0	160.0	150.0	76.0	88.0	136.0	69.0	80.0	87.0	51.0	68.0	35.0	40.0	54.0	28.0	32.0
40	—	180.0	208.0	194.0	100.0	115.0	176.0	90.0	104.0	112.0	66.0	88.0	45.0	52.0	70.0	36.0	41.0
50	—	226.0	260.0	238.0	125.0	143.0	216.0	113.0	130.0	139.0	83.0	108.0	56.0	65.0	86.0	45.0	52.0
60	—	—	—	—	147.0	160.0	—	133.0	154.0	—	103.0	—	67.0	77.0	—	53.0	62.0
75	—	—	—	—	183.0	212.0	—	166.0	192.0	—	128.0	—	83.0	96.0	—	66.0	77.0
100	—	—	—	—	240.0	273.0	—	218.0	248.0	—	165.0	—	109.0	124.0	—	87.0	99.0
125	—	—	—	—	—	344.0	—	—	312.0	—	208.0	—	135.0	156.0	—	108.0	125.0
150	—	—	—	—	—	396.0	—	—	360.0	—	240.0	—	156.0	180.0	—	125.0	144.0
200	—	—	—	—	—	528.0	—	—	480.0	—	320.0	—	208.0	240.0	—	167.0	192.0
250	—	—	—	—	—	663.0	—	—	602.0	—	403.0	—	—	302.0	—	—	242.0
300	—	—	—	—	—	—	—	—	—	—	482.0	—	—	361.0	—	—	289.0
350	—	—	—	—	—	—	—	—	—	—	560.0	—	—	414.0	—	—	336.0
400	—	—	—	—	—	—	—	—	—	—	636.0	—	—	477.0	—	—	382.0
500	—	—	—	—	—	—	—	—	—	—	786.0	—	—	590.0	—	—	472.0

① The above values of full-load currents are typical for motors running at speeds normal for belted motors and motors with normal torque characteristics. Whenever possible, use the actual motor nameplate full-load current when selecting motor control products.

General information
Standard thermal overload relays

A9

A50

Standard – Thermal, Type TA, Class 10 & Electronic, Type E, Class 10, 20 & 30

For contactor	Setting range A	Suffix code for all other starters	Catalog number
A/AE9 – A/AE40 BC9 – BC30	0.1 – 0.16	A	TA25DU0.16
	0.16 – 0.25	B	TA25DU0.25
	0.25 – 0.4	C	TA25DU0.4
	0.4 – 0.63	D	TA25DU0.63
	0.63 – 1.0	E	TA25DU1.0
	1.0 – 1.4	F	TA25DU1.4
	1.3 – 1.8	G	TA25DU1.8
	1.7 – 2.4	H	TA25DU2.4
	2.2 – 3.1	J	TA25DU3.1
	2.8 – 4.0	K	TA25DU4.0
	3.5 – 5.0	L	TA25DU5.0
	4.5 – 6.5	M	TA25DU6.5
	6.0 – 8.5	N	TA25DU8.5
	7.5 – 11	P	TA25DU11
	10 – 14	Q	TA25DU14
	13 – 19	R	TA25DU19
	18 – 25	S	TA25DU25
	24 – 32	T	TA25DU32
A/AE30 – A/AE40	18 – 25	A	TA42DU25
	22 – 32	B	TA42DU32
	29 – 42	C	TA42DU42
A/AE/AF50 – A/AE/AF75	18 – 25	A	TA75DU25
	22 – 32	B	TA75DU32
	29 – 42	C	TA75DU42
	36 – 52	D	TA75DU52
	45 – 63	E	TA75DU63
	60 – 80	F	TA75DU80
A/AE/AF95 – A/AE/AF110	29 – 42	C	TA80DU42
	36 – 52	D	TA80DU52
	45 – 63	E	TA80DU63
	60 – 80	F	TA80DU80
	65 – 90	A	TA110DU90
	80 – 110	B	TA110DU110
A/AF145 – A/AF185	65 – 90	A	TA200DU90
	80 – 110	B	TA200DU110
	100 – 135	C	TA200DU135
	110 – 150	D	TA200DU150
	130 – 175	E	TA200DU175
	150 – 200	F	TA200DU200
A/AF210 – A/AF300	130 – 185	A	TA450DU185 ①
	165 – 235	B	TA450DU235
	220 – 310	C	TA450DU310
A/AF400 – A/AF460	170 – 500	E5	E500DU500 ②
A/AF580 – A/AF750	270 – 800	E8	E800DU800 ②

① TA450 overloads require mounting kits for installation.
② Not suitable for single-phase motors or direct current (DC) motors.

A145

Optional – Electronic, Type E, Class 10, 20 & 30

For contactor	Setting range	Suffix code	Catalog number ①	List price adder
E16DU – Tripping Class 10	0.1 – 0.32	A1	E16DU0.32-10	
	0.3 – 1.0	B1	E16DU1.0-10	
A/AE9 – A/AE16	0.9 – 2.7	C1	E16DU2.7-10	**$ 33**
	2.0 – 6.3	D1	E16DU6.3-10	
	5.7 – 18.9	E1	E16DU18.9-10	
E16DU – Tripping Class 20	0.1 – 0.32	A2	E16DU0.32-20	
	0.3 – 1.0	B2	E16DU1.0-20	
A/AE9 – A/AE16	0.9 – 2.7	C2	E16DU2.7-20	**33**
	2.0 – 6.3	D2	E16DU6.3-20	
	5.7 – 18.9	E2	E16DU18.9-20	
E16DU – Tripping Class 30	0.1 – 0.32	A3	E16DU0.32-30	
	0.3 – 1.0	B3	E16DU1.0-30	
A/AE9 – A/AE16	0.9 – 2.7	C3	E16DU2.7-30	**33**
	2.0 – 6.3	D3	E16DU6.3-30	
	5.7 – 18.9	E3	E16DU18.9-30	
E200DU – Tripping Class 10, 20 & 30				
A/AF145 – A/AF185	65 – 200	E2	E200DU200	**325**
A/AF210 – A/AF300	105 – 320	E3	E320DU320	**775**
AF400 – AF460	170 – 500	E5	E500DU500	**865**
AF580 – AF750	270 – 800	E8	E800DU800	**950**

① Not suitable for single-phase motors and direct current (DC) motors.

General information
Enclosures

Type enclosure	For use with	Dimensions H x W x D (inches)	Catalog number	List price
IP65	A9 – A16 Contactors & starters, blank cover A9 – A16 Contactors & starters, start & stop/reset A9 – A16 Contactors & starters, reset only	7 x 3.5 x 5.2	EKA16S-0 EKA16S-A EKA16S-R	**$ 75** **90** **90**
NEMA 1 Lift off cover	A9 – A26 Contactors, non-reversing & reversing starters A30 – A75 Contactors, non-reversing & reversing starters	11.5 x 7 x 6 13 x 9 x 7	EK-N1A9A26 EK-N1A30A75	**113** **188**
NEMA 1 Indoor metal hinged cover	A9 – A40 Non-reversing starters + CCT A9 – A40 Reversing contactors A9 – A40 Reversing starters	10 x 8 x 6	EK-11H	**160**
	A50 – A75 Contactors A50 – A75 Non-reversing starters + CCT A50 – A75 Reversing starters	14 x 12 x 8	EK-12	**205**
	A95 – A110 Contactors A95 – A110 Non-reversing starters + CCT	24 x 12 x 8	EK-13	**405**
NEMA 1, 3R 4, 4X & 12 Plastic	A9 – A40 Contactors A9 – A40 Non-reversing starters + CCT A9 – A40 Reversing starters	10 x 8 x 7	EK-W	**160**
	A50 – A75 Contactors A50 – A75 Non-reversing starters + CCT A50 – A75 Reversing starters	12 x 10 x 7	EK-W2	**220**
NEMA 12 Indoor metal dusttight	A9 – A40 Contactors A9 – A40 Non-reversing starters A9 – A40 Reversing contactors A9 – A40 Reversing starters	10 x 8 x 6	EK-24	**180**
	A50 – A75 Contactors + CCT A50 – A75 Non-reversing starters + CCT A50 – A75 Reversing starters	14 x 12 x 8	EK-22	**270**
NEMA 3R Outdoor metal	A9 – A40 Contactors + CCT A9 – A40 Non-reversing starters + CCT A9 – A40 Reversing contactors A9 – A40 Reversing starters	10 x 8 x 6	EK-31	**225**
	A50 – A75 Contactors + CCT A50 – A75 Non-reversing starters + CCT A50 – A75 Reversing contactors A50 – A75 Reversing starters A95 – A110 Contactors + CCT A110 Non-reversing starters + CCTA95 – A110 Contactors + CCT A110 Non-reversing starters + CCT	14 x 12 x 8	EK-32	**435**

NOTE : (1) All enclosures come standard with reset button and predrilled back panel.

Introduction

An enclosure is a surrounding case constructed to provide a degree of protection to personnel against accidental contact with the enclosed equipment and to provide a degree of protection to the enclosed equipment against specified environmental conditions.

A brief description of the more common types of enclosures used by the electrical industry relating to their environmental capabilities follows.

Refer to NEMA Standards Publication for more information regarding applications, features and design tests.

Individual NEMA product Standards Publications or third party certification standards may contain additional requirements for product testing and performance.

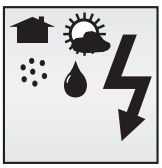
Definitions pertaining to nonhazardous locations

Type 1

Enclosures are intended for indoor use primarily to provide a degree of protection against limited amounts of falling dirt. (NEMA Standard 7-15-1991.)

Type 3R

Enclosures are intended for outdoor use primarily to provide a degree of protection against rain, sleet and damage from external ice formation. (NEMA Standard 7-15-1991.)



Type 4

Enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water, hose-directed water and damage from external ice formation. (NEMA Standard 1-10-1979.)

Type 4X

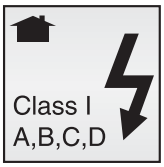
Enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, hose-directed water and damage from external ice formation. (NEMA Standard 1-10-1979)

Type 12

Enclosures are intended for indoor use primarily to provide a degree of protection against circulating dust, falling dirt, and dripping noncorrosive liquids. (NEMA Standard 7-15-1991.)

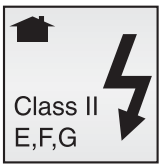
Type 13

Enclosures are intended for indoor use primarily to provide a degree of protection against dust, spraying of water, oil and noncorrosive coolant. (NEMA Standard 1-10-1979.)



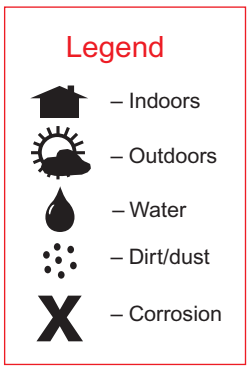
Type 7

Enclosures are intended for indoor use in locations classified as Class I, Groups, A, B, C, or D, as defined in the National Electrical Code. (NEMA Standard 7-15-1991.)



Type 9

Enclosures are intended for indoor use in locations classified as Class II, Groups E, F, or G, as defined in the National Electrical Code. (NEMA Standard 7-15-1991.)



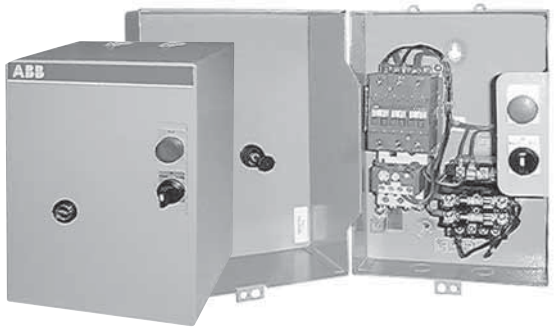
General information
IP Environmental ratings

IP ratings

indicate the degree of protection against dust, liquids and impacts. The IP degrees of protection are defined by the French standard NFC 20-010. To rate a device's degrees of protection, the letters IP are followed by up to three numbers. These numbers are defined as follows:

first number protection against solid objects	second number protection against liquids	third number protection against mechanical impacts
IP 0 — no protection	IP 0 — no protection	IP 0 — no protection
1 — protected against solid objects over 50mm (e.g. accidental touch by hands.)	1 — protected against vertically falling rain or condensation	1 — impact 0.225 joule 150g falling from 15cm
2 — protected against solid objects over 12mm (e.g. fingers)	2 — protected against direct sprays of water up to 15° from vertical	2 — impact 0.375 joule 250g falling from15cm
3 — protected against solid objects over 2.5mm (tools & wires)	3 — protected against sprays to 60° from vertical	3 — impact 0.50 joule 250g falling from 20cm
4 — protected against solid objects over 1mm (small tools & small wires)	4 — protected against water sprayed from all directions	5 — impact 2.00 joule 500g falling from 40cm
5 — protected against dust (no harmful deposit)	5 — protected against low pressure jets of water from all directions	7 — impact 6.00 joule 1.5kg falling from 40cm
6 — totally protected against dust	6 — protected from strong jets of water (e.g. for use on ship decks)	9 — impact 20.00 joule 5 kg falling from 40cm
	7 — protected against the effects of immersion between 15cm and 1m	

Across the line starters
Open & enclosed
A9 – A750



Description
A9 – A750

- Maximum UL/CSA horsepower ratings
- UL508A Panel Program, #E105450
- NEMA sizes 00 – 7 available
- Compact space-saving design
- Standard auxiliary contact configurations:
  A9 – A40 1 NO or 1 NC
  A50 – A750 1 NO & 1 NC
- Additional auxiliary contact blocks are available
- DC ratings & DC control operation available
- Fast, snap-on DIN rail mounting (A9 - A110)
- Double break contact design
- Snap-on front and side mounted accessories include mechanical latch, pneumatic timer and 1 & 4 pole auxiliary contact blocks (A9 – A110)
- Easy coil change
- Captive terminal screws
- NEMA, UL, CSA, and most other international standards
- cUL marked
- Operates over an extended voltage range of 85% to 110% of rated control voltage
- Screwdriver guide holes

Enclosure types

- NEMA 1 (Indoor metal)
- NEMA 3R (Outdoor metal)
- NEMA 12 (Metal dusttight)
- NEMA 4X (Stainless steel)
- NEMA 4 (Water tight)
- NEMA 1, 3R, 4, 4X, & 12 (Plastic)
- IP 65 plastic A9 – A16 starters
- NEMA 7 & 9
  Class I, Group C, D, Div 1 & 2
  Class II, Groups E, F, & G, Div 1 & 2
  Class III, 4X

Overload relay protection

Starters, sizes A9–A185, have Class 10 adjustable thermal bimetallic overload relay protection as standard.

Sizes A210 – A750, have selectable Class 10, 20, 30 adjustable electronic overload relay protection as standard.

Electronic overload relay protection is available for other starter sizes.

A110 SR 1 - 84 C A

Starter size

Starter type
S - Non-reversing
SR - Reversing
SS - Single phase, non-reversing
ST - Multi-speed, 2 speed 1 winding, 2 speed 2 winding
N - NEMA

Enclosure
1 - UL Type 1
2 - UL Type 12
3 - UL Type 3R
4 - UL Type 4
X - UL Type 4X stainless steel
P - Plastic
7 - UL Type 7 & 9
Class I, Group C, D, Div 1 & 2
Class II, Groups E, F & G, Div 1 & 2
Class III
74 - Hazardous Type 4

Coil voltage/CCT
See Coil Voltage Selection charts on page 3.12

Overload range
See Overload Relay Selection chart, see page 3.6.

Accessories
See Factory modifications, page 3.3

Across the line **Starters**

Starter selection by motor horsepower & voltage
Maximum UL/CSA ratings, three phase

Motor horsepower 3-phase, 1800 RPM ①				Complete starter		Starter components			
						Contactors		Overload relays	
200V	230V	460V	575V	Catalog number	List price	Catalog number	List price	Catalog number	List price
—	—	—	1/4	A9S-84C		A9-30-10-84		TA25DU0.4 (0.25 – .4)	
—	—	1/4,1/3	1/3	A9S-84D		A9-30-10-84		TA25DU0.63 (0.4 – .63)	
—	—	—	1/2	A9S-84E		A9-30-10-84		TA25DU1.0 (0.63 – 1.0)	
—	—	1/2	3/4	A9S-84F		A9-30-10-84		TA25DU1.4 (1.0 – 1.4)	
—	—	3/4	—	A9S-84G		A9-30-10-84		TA25DU1.8 (1.3 – 1.8)	
—	1/2	1	1.5	A9S-84H	**$ 165**	A9-30-10-84	**$ 78**	TA25DU2.4 (1.7 – 2.4)	**$ 63**
1/2	—	1.5	2	A9S-84J		A9-30-10-84		TA25DU3.1 (2.2 – 3.1)	
3/4	3/4	2	—	A9S-84K		A9-30-10-84		TA25DU4.0 (2.8 – 4.0)	
—	1	—	3	A9S-84L		A9-30-10-84		TA25DU5.0 (3.5 – 5.0)	
1	1.5	3	5	A9S-84M		A9-30-10-84		TA25DU6.5 (4.5 – 6.5)	
2	2	5	—	A9S-84N		A9-30-10-84		TA25DU8.5 (6.0 – 8.5)	
—	—	—	7.5	A9S-84P		A9-30-10-84		TA25DU11 (7.5 – 11)	
3	3	7.5	10	A12S-84Q	**171**	A12-30-10-84	**84**	TA25DU14 (10 – 14)	
5	5	10	15	A16S-84R	**200**	A16-30-10-84	**102**	TA25DU19 (13 – 19)	
—	7.5	15	20	A26S-84S	**294**	A26-30-10-84	**183**	TA25DU25 (18 – 25)	
7.5	10	20	25	A26S-84T		A26-30-10-84		TA25DU32 (24 – 32)	
10	10	—	—	A30S-84B	**365**	A30-30-10-84	**252**	TA42DU32 (22 – 32)	**78**
—	—	25	30	A30S-84C				TA42DU42 (29 – 42)	
10	15	30	40	A40S-84C	**423**	A40-30-10-84	**297**	TA42DU42 (29 – 42)	
15	—	40	50	A50S-84D	**458**	A50-30-11-84	**330**	TA75DU52 (36 – 52)	
—	20	—	—	A50S-84E		A50-30-11-84		TA75DU63 (45 – 63)	
20	—	—	—	A63S-84F	**522**	A63-30-11-84	**372**	TA75DU80 (60 – 80)	**102**
—	—	50	60	A63S-84F		A63-30-11-84			
25	30	60	75	A75S-84F	**563**	A75-30-11-84	**413**		
30	—	—	—	A95S-84A	**735**	A95-30-11-84	**450**	TA110DU90 (65 – 90)	**165**
—	40	75	100	A110S-84B	**765**	A110-30-11-84	**480**	TA110DU110 (80 – 110)	
40	—	—	—	A145S-84C	**1315**	A145-30-11-84	**825**	TA200DU135 (100 – 135)	**225**
—	50	100	125	A145S-84D				TA200DU150 (110 – 150)	
50	60	125	150	A185S-84E	**1730**	A185-30-11-84	**1290**	TA200DU175 (130 – 175)	
60	75	150	200	A210S-84E3	**2135**	A210-30-11-84	**1635**	E320D4320 (105-320)	**775**
75	100	200	250	A260S-84E3	**2740**	A260-30-11-84	**1815**		
100	—	250	300	A300S-84E3	**2890**	A300-30-11-84	**1875**		
125	125, 150	350	400	A400S-70E5	**4125**	AF400-30-11-70	**3120**	E500DU500 (170 – 500)	**865**
150	200	400	500	A460S-70E5	**5700**	AF460-30-11-70	**4425**		
200	250	500	600	A580S-70E8	**8346**	AF580-30-11-70	**6900**	E800DU800 (270 – 800)	**950**
250	300	600	700	A750S-70E8	**8646**	AF750-30-11-70	**7200**		

CAUTION: The above ratings are based on average motor FLA. Actual FLA on the motor nameplate should be used for overload relay setting.

Coil voltage selection

All AC operated catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 starter: A75S-**80**F

D.C. operated starters

If DC operation is required, consult factory.

Factory modifications

See page 3.3

Coil voltage selection – A9 - A300 ②

	Cntr	Volts															
Hz	type	12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Coil voltage selection – A400 - A750 ②

Cntr	Volts				
Hz	type	24 - 60	48 - 130	100 - 250	250 - 500
60	AF	68	69	70	71
50	AF	68	69	70	71
DC	AF	68	69	70	71

Control transformer voltage selection chart

		Volts			
Hz	Type	208/120	230 – 240/120	460 – 480/120	575 – 600/120
50/60	A/AF	0	7	8	9

For other voltages, consult factory.

① For motors with RPM greater or less than 1800 RPM, check full load amp rating on motor nameplate to ensure proper overload protection.
② For AF50 – AF 300 starters, consult factory.

Starter selection by motor horsepower & voltage
NEMA sizes & ratings, three phase

NEMA size	Motor horsepower 3-phase, 1800 RPM ① 200V	230V	460V	575V	Complete starter Catalog number	List price	Starter components: Contactors Catalog number	List price	Overload relays Catalog number	List price
00	— — — — — 1/3,1/4 1/2 3/4 — 1 1.5	— — — 1/4 1/3 1/2 — 3/4 1 1.5 —	— — 1/4 1/3,1/2 3/4 1 — 1.5, 2 — — —	1/4 1/3 1/2 — 3/4 1 1.5, 2 — — — —	A9N00S-84C A9N00S-84D A9N00S-84E A9N00S-84F A9N00S-84G A9N00S-84H A9N00S-84J A9N00S-84K A9N00S-84L A9N00S-84M A9N00S-84N	**$ 165**	A9N00-30-10-84 A9N00-30-10-84 A9N00-30-10-84 A9N00-30-10-84 A9N00-30-10-84 A9N00-30-10-84 A9N00-30-10-84 A9N00-30-10-84 A9N00-30-10-84 A9N00-30-10-84 A9N00-30-10-84	**$ 78**	TA25DU0.4 (0.25 – .4) TA25DU0.63 (0.4 – .63) TA25DU1.0 (0.63 – 1.0) TA25DU1.4 (1.0 – 1.4) TA25DU1.6 (1.3 – 1.6) TA25DU2.4 (1.7 – 2.4) TA25DU3.1 (2.2 – 3.1) TA25DU4.0 (2.8 – 4.0) TA25DU5.0 (3.5 – 5.0) TA25DU6.5 (4.5 – 6.5) TA25DU8.5 (6.0 – 8.5)	**$ 63**
0	— — 2 3	— — 2 3	— 3 5 —	3 5 — —	A16N0S-84L A16N0S-84M A16N0S-84N A16N0S-84P	**200**	A16N0-30-10-84 A16N0-30-10-84 A16N0-30-10-84 A16N0-30-10-84	**102**	TA25DU5.0 (3.5 – 5.0) TA25DU6.5 (4.5 – 6.5) TA25DU8.5 (6.0 – 8.5) TA25DU11 (7.5 – 11)	
1	— — 5 7.5	— — 5 7.5	— 7.5 10 —	7.5 10 — —	A26N1S-84P A26N1S-84Q A26N1S-84R A26N1S-84S	**294**	A26N1-30-10-84 A26N1-30-10-84 A26N1-30-10-84 A26N1-30-10-84	**183**	TA25DU11 (7.5 – 11) TA25DU14 (10 – 14) TA25DU19 (13 – 19) TA25DU25 (18 – 25)	
2	—	—	—	15	A50N2S-84R	**393**	A50N2-30-11-84	**330**	TA25DU19 (13 – 19) ③	
	— — 10	— 10 15	15 20 25	20 25 —	A50N2S-84A A50N2S-84B A50N2S-84C	**458**	A50N2-30-11-84 A50N2-30-11-84 A50N2-30-11-84	**330**	TA75DU25 (18 – 25) TA75DU32 (22 – 32) TA75DU42 (29 – 42)	**102**
3	— 15 20 25	— — 20 25,30	— 30 40 50	30 40 50 —	A75N3S-84C A75N3S-84D A75N3S-84E A75N3S-84F	**563**	A75N3-30-11-84 A75N3-30-11-84 A75N3-30-11-84 A75N3-30-11-84	**413**	TA75DU42 (29 – 42) TA75DU52 (36 – 52) TA75DU63 (45 – 63) TA75DU80 (60 – 80)	
4	— 30 40	— 40 50	60 75 100	60, 75 100 —	A145N4S-84A A145N4S-84B A145N4S-84C	**1315**	A145N4-30-11-84 A145N4-30-11-84 A145N4-30-11-84	**825**	TA200DU90 (65 – 90) TA200DU110 (80 – 110) TA200DU135 (100 – 135)	**165**
5	50,60,75 —	60,75,100 100	125,150,200 200	200 —	A260N5S-8E3 A260N5S-8E3	**2740**	A260N5-30-11-84	**1815**	E320DU320 (105-320)	**775**
6	100, 125 150	125,150 200	250, 300 400	250, 300 400	A460N6S-70E5	**5700**	AF460N6-3011-70	**4425**	E500DU500 (170 - 500)	**865**
7	—	250, 300	500, 600	500, 600	A750N7S-70E8	**8646**	AF750N7-3011-70	**7200**	E800DU800 (270 - 800)	**950**

CAUTION: The above ratings are based on average motor FLA. Actual FLA on the motor nameplate should be used for overload relay setting.

Coil voltage selection

All AC operated catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 starter: A75NS-**80**F

D.C. operated starters

If DC operation is required, consult factory.

Factory modifications

See page 3.3

Coil voltage selection – A9 - A300 ②

Hz	Cntr type	Volts 12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Coil voltage selection – A400 - A750 ②

Hz	Cntr type	Volts 24 - 60	48 - 130	100 - 250	250 - 500
60	AF	68	69	70	71 ④
50	AF	68	69	70	71 ④
DC	AF	68	69	70	71 ④

Control transformer voltage selection chart

Hz	Type	Volts 208/120	230 – 240/120	460 – 480/120	575 – 600/120
50/60	A/AF	0	7	8	9

For other voltages, consult factory.

① For motors with RPM greater or less than 1800 RPM, check full load amp rating on motor nameplate to ensure proper overload protection.
② For AF50 – AF 300 starters, consult factory.
③ Overload to be base mounted.
④ AF400 - AF750 only.

Non-reversing
A9 - A750
Three phase

Open & enclosed

UL motor switching current	Maximum ratings – UL Listed: Maximum motor horsepower ratings (UL) 200/208V	230/240V	460/480V	575/600V	Open type: Catalog number	List price	UL Type1 (Indoor metal) ⑤: Catalog number	List price	UL Type 3R (Outdoor metal): Catalog number	List price
UL rated										
9	2	2	5	7.5	A9S-84★	**$ 165**	A9S1-84★	**$ 255**	A9S3-84★	**$ 330**
11	3	3	7.5	10	A12S-84★	**171**	A12S1-84★	**285**	A12S3-84★	**360**
17	5	5	10	15	A16S-84★	**200**	A16S1-84★	**300**	A16S3-84★	**383**
28	7.5	10	20	25	A26S-84★	**294**	A26S1-84★	**405**	A26S3-84★	**465**
34	10	10	25	30	A30S-84★	**365**	A30S1-84★	**473**	A30S3-84★	**533**
42	10	15	30	40	A40S-84★	**423**	A40S1-84★	**525**	A40S3-84★	**578**
54	15	20	40	50	A50S-84★	**458**	A50S1-84★	**600**	A50S3-84★	**719**
65	20	25	50	50	A63S-84★	**522**	A63S1-84★	**713**	A63S3-84★	**795**
80	25	30	60	75	A75S-84★	**563**	A75S1-84★	**975**	A75S3-84★	**1058**
95	30	30	60	75	A95S-84★	**735**	A95S1-84★	**1140**	A95S3-84★	**1485**
110	30	40	75	100	A110S-84★	**765**	A110S1-84★	**1170**	A110S3-84★	**1515**
130	40	50	100	125	A145S-84★	**1315**	A145S1-84★	**1765**	A145S3-84★	**2130**
156	50	60	125	150	A185S-84★	**1730**	A185S1-84★	**2400**	A185S3-84★	**2805**
192	60	75	150	200	A210S-84★	**2135**	A210S1-84★	**2650**	A210S3-84★	**3375**
248	75	100	200	250	A260S-84★	**2740**	A260S1-84★	**3825**	A260S3-84★	**4650**
302	100	100	250	300	A300S-84★	**2890**	A300S1-84★	**4125**	A300S3-84★	**4875**
414	125	150	350	400	A400S-70★	**4125**	A400S1-70★	**7857**	A400S3-70★	**8625**
480	150	200	400	500	A460S-70★	**5700**	A460S1-70★	**9375**	A460S3-70★	**9435**
590	200	250	500	600	A580S-70★	**8346**	A580S1-70★	**12,400**	A580S3-70★	**13,465**
810	250	300	600	700	A750S-70★	**8646**	A750S1-70★	**13,350**	A750S3-70★	**14,325**

NEMA size	Continuous current	200V	230V	460/575V						
NEMA rated										
00	9	1.5	1.5	2	A9N00S-84★	**$ 165**	A9NS1-84★	**$ 255**	A9NS3-84★	**$ 330**
0	18	3	3	5	A16N0S-84★	**200**	A16NS1-84★	**300**	A16NS3-84★	**383**
1	27	7.5	7.5	10	A26N1S-84★	**294**	A26NS1-84★	**405**	A26NS3-84★	**465**
2	45	10	15	25	A50N2S-84★	**458**	A50NS1-84★	**600**	A50NS3-84★	**719**
3	90	25	30	50	A75N3S-84★	**563**	A75NS1-84★	**975**	A75NS3-84★	**1058**
4	135	40	50	100	A145N4S-84★	**1315**	A145NS1-84★	**1765**	A145NS3-84★	**2130**
5	270	75	100	200	A260N5S-84★	**2740**	A260NS1-84★	**3825**	A260NS3-84★	**4650**
6	540	150	200	400	A460N6S-70★	**5700**	A460NS1-70★	**9375**	A460NS3-70★	**9435**
7	810	—	300	600	A750N7S-70★	**8646**	A750NS1-70★	**13,350**	A750NS3-70★	**14,325**

★ Overload relay suffix code. Select from the overload relay selection chart on page 3.6.

Coil voltage selection

All AC operated catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 starter: A75S-**80**F

D.C. operated starters

If DC operation is required, consult factory.

Factory modifications

See page 3.3

Control transformer option

Contactor size	VA rating	List price adder
A9 – A40	45 ①	**$ 300**
A9 – A40	50	**360**
A9 – A40 (N7 & 9)	50	**630** ③
A50 – A75	75	**435**
A95 – A110	100	**560**
A145 – A185	150	**720**
A210 – A300	250	**795**
A400 – A460	150	**720** ④
A580 – A750	250	**795** ④

Coil voltage selection – A9 - A300 ②

Hz	Cntr type	Volts 12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Coil voltage selection – A400 - A750 ②

Hz	Cntr type	Volts 24 - 60	48 - 130	100 - 250	250 - 500
60	AF	68	69	70	71 ⑥
50	AF	68	69	70	71 ⑥
DC	AF	68	69	70	71 ⑥

Control transformer voltage selection chart

Hz	Type	Volts 208/120	230 – 240/120	460 – 480/120	575 – 600/120
50/60	A/AF	0	7	8	9

For other voltages, consult factory.

① No primary fusing provided.
② For AF50 – AF 300 starters, consult factory.
③ List price reflects larger enclosure for starters with control transformer.
④ A400 - A750 utilizes the AF wide range coil with a lower coil consumption than A210 - A300.
⑤ A9 – A75 starters are mounted in a UL Type 1 lift-off cover enclosure.
⑥ AF400 - AF750 only.

Discount schedule

	Open	Enclosed	
	AA	**AAE**	– A9 - A110
	AEA	**AEAE**	– A145 - AF1650

Non-reversing
A9 - A750
Three phase

UL Type 12 (Metal dustight)		UL Type 4 (Watertight)		UL Type 4X (Stainless steel)		UL Type 1, 3R, 4, 4X & 12 (Plastic)		UL Type 7 & 9 non-reversing (Explosion proof)	
Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price
UL rated									
A9S2-84★	**$ 330**	A9S4-84★	**$ 495**	A9SX-84★	**$ 645**	A9SP-84★	**$ 315**	A9S7-84★	**$ 1500**
A12S2-84★	**360**	A12S4-84★	**540**	A12SX-84★	**713**	A12SP-84★	**345**	A12S7-84★	**1560**
A16S2-84★	**383**	A16S4-84★	**570**	A16SX-84★	**743**	A16SP-84★	**360**	A16S7-84★	**1590**
A26S2-84★	**465**	A26S4-84★	**630**	A26SX-84★	**831**	A26SP-84★	**443**	A26S7-84★	**1680**
A30S2-84★	**533**	A30S4-84★	**690**	A30SX-84★	**885**	A30SP-84★	**510**	A30S7-84★	**2040**
A40S2-84★	**578**	A40S4-84★	**1050**	A40SX-84★	**1275**	A40SP-84★	**555**	A40S7-84★	**2410**
A50S2-84★	**719**	A50S4-84★	**1103**	A50SX-84★	**1328**	A50SP-84★	**698**	A50S7-84★	**2600**
A63S2-84★	**795**	A63S4-84★	**1170**	A63SX-84★	**1410**	A63SP-84★	**773**	A63S7-84★	**3350**
A75S2-84★	**1058**	A75S4-84★	**1425**	A75SX-84★	**2010**	A75SP-84★	**1035**	A75S7-84★	**3900**
A95S2-84★	**1485**	A95S4-84★	**2070**	A95SX-84★	**2783**	A95SP-84★	**1410**	A95S7-84★	**5510**
A110S2-84★	**1515**	A110S4-84★	**2100**	A110SX-84★	**2813**	A110SP-84★	**1440**	A110S7-84★	**5550**
A145S2-84★	**2130**	A145S4-84★	**2700**	A145SX-84★	**3375**	A145SP-84★	**1950**	A145S7-84★	**6040**
A185S2-84★	**2805**	A185S4-84★	**3340**	A185SX-84★	**3900**	A185SP-84★	**2440**	A185S7-84★	**8100**
A210S2-84★	**3375**	A210S4-84★	**3900**	A210SX-84★	**4785**	A210SP-84★	**3000**	A210S7-84★	**9600**
A260S2-84★	**4650**	A260S4-84★	**5175**	A260SX-84★	**5815**	A260SP-84★	**4200**	A260S7-84★	**11,740**
A300S2-84★	**4875**	A300S4-84★	**5400**	A300SX-84★	**6040**	A300SP-84★	**4425**	A300S7-84★	**11,965**
A400S2-70★	**8625**	A400S4-70★	**9000**	A400SX-70★	**9855**	—	—	—	—
A460S2-70★	**10,380**	A460S4-70★	**10,800**	A460SX-70★	**11,700**	—	—	—	—
A580S2-70★	**13,465**	A580S4-70★	**14,250**	A580SX-70★	**14,590**	—	—	—	—
A750S2-70★	**14,325**	A750S4-70★	**14,850**	A750SX-70★	**15,745**	—	—	—	**—**
NEMA rated									
A9NS2-84★	**$ 330**	A9NS4-84★	**$ 495**	A9NSX-84★	**$ 645**	A9NSP-84★	**$ 315**	A9NS7-84★	**$ 1500**
A16NS2-84★	**383**	A16NS4-84★	**570**	A16NSX-84★	**743**	A16NSP-84★	**360**	A16NS7-84★	**1590**
A26NS2-84★	**465**	A26NS4-84★	**630**	A26NSX-84★	**831**	A26NSP-84★	**443**	A26NS7-84★	**1680**
A50NS2-84★	**719**	A50NS4-84★	**1103**	A50NSX-84★	**1328**	A50NSP-84★	**698**	A50NS7-84★	**2600**
A75NS2-84★	**1058**	A75NS4-84★	**1425**	A75NSX-84★	**2010**	A75NSP-84★	**1035**	A75NS7-84★	**3900**
A145NS2-84★	**2130**	A145NS4-84★	**2700**	A145NSX-84★	**3375**	A145NSP-84★	**1950**	A145NS7-84★	**6040**
A260NS2-84★	**4650**	A260NS4-84★	**5175**	A260NSX-84★	**5815**	A260NSP-84★	**4200**	A260NS7-84★	**11,740**
A460NS2-70★	**10,380**	A460NS4-70★	**10,800**	A460NSX-70★	**11,700**	—	—	—	—
A750NS2-70★	**14,325**	A750NS4-70★	**14,850**	A750NSX-70★	**15,745**	—	—	—	—

★ Overload relay suffix code. Select from the overload relay selection chart on page 3.6.

Non-reversing
A9 - A185
Single phase

Open & enclosed

UL motor switching current	Maximum ratings – UL Listed Maximum motor horsepower ratings (UL) 115V	230V	Open type Catalog number	Open type List price	UL Type 1 (Indoor metal) Catalog number	UL Type 1 (Indoor metal) List price
UL rated						
9	1/2	1	A9SS-84★	**$ 165**	A9SS1-84★	**$ 255**
11	3/4	2	A12SS-84★	**171**	A12SS1-84★	**285**
17	1	3	A16SS-84★	**200**	A16SS1-84★	**300**
28	1.5	5	A26SS-84★	**294**	A26SS1-84★	**405**
34	2	7.5	A30SS-84★	**372**	A30SS1-84★	**473**
42	3	7.5	A40SS-84★	**423**	A40SS1-84★	**525**
54	3	7.5	A50SS-84★	**458**	A50SS1-84★	**600**
65	5	10	A63SS-84★	**522**	A63SS1-84★	**713**
80	7.5	15	A75SS-84★	**563**	A75SS1-84★	**975**
95	7.5	20	A95SS-84★	**735**	A95SS1-84★	**1140**
110	10	25	A110SS-84★	**765**	A110SS1-84★	**1170**
130	10	25	A145SS-84★	**1315**	A145SS1-84★	**1765**
156	15	30	A185SS-84★	**1728**	A185SS1-84★	**2400**

NEMA rated

NEMA size	Continuous current	115V	230V	Open type Catalog number	Open type List price	UL Type 1 Catalog number	UL Type 1 List price
00	9	1/3	1	A9N00SS-84★	**$ 165**	A9N00SS1-84★	**$ 255**
0	18	1	2	A16N0SS-84★	**200**	A16N0SS1-84★	**300**
1	27	2	3	A26N1SS-84★	**294**	A26N1SS1-84★	**405**
2	45	3	7.5	A50N2SS-84★	**458**	A50N2SS1-84★	**600**

★ Overload relay suffix code. Select from the overload relay selection chart on page 3.6.

Coil voltage selection

All AC operated catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 starter: A75SS-**80**F

D.C. operated starters

If DC operation is required, consult factory.

Factory modifications

See page 3.3

DC ratings

Frame size	Max current	Maximum DC HP ratings (UL) 125VDC	250VDC
A9	9.5	1	2
A12	13.2	1.5	3
A16	17	2	3
A26	25	3	5
A30	25	3	7.5
A40	40	5	10
A50	58	7.5	15
A63	76	10	20
A75	76	10	25

Control transformer option

Contactor size	VA rating	List price adder
A9 – A30	45 ①	**$ 300**
A9 – A30	50	**360**
A40 – A75	75	**435**
A95 – A110	100	**560**
A145 – A185	150	**720**

Coil voltage selection – A9 - A300 ②

Hz	Cntr type	12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

(Volts)

For other voltages, see page 1.26.

Control transformer voltage selection chart

Hz	Type	208/120	230 – 240/120	460 – 480/120	575 – 600/120
50/60	A/AF	0	7	8	9

(Volts)

For other voltages, consult factory.

① No primary fusing provided.
② For AF50 – AF 300 starters, consult factory.

Non-reversing
A9 - A185
Single phase

UL Type 3R (Outdoor metal)		UL Type 12 (Metal dustight)		UL Type 4 (Watertight)		UL Type 4X (Stainless steel)		UL Type 1, 3R, 4, 4X & 12 (Plastic)	
Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price
UL rated									
A9SS3-84★	**$ 330**	A9SS2-84★	**$ 330**	A9SS4-84★	**$ 495**	A9SSX-84★	**$ 645**	A9SSP-84★	**$ 315**
A12SS3-84★	**360**	A12SS2-84★	**360**	A12SS4-84★	**540**	A12SSX-84★	**713**	A12SSP-84★	**345**
A16SS3-84★	**383**	A16SS2-84★	**383**	A16SS4-84★	**570**	A16SSX-84★	**743**	A16SSP-84★	**360**
A26SS3-84★	**465**	A26SS2-84★	**465**	A26SS4-84★	**630**	A26SSX-84★	**831**	A26SSP-84★	**443**
A30SS3-84★	**533**	A30SS2-84★	**533**	A30SS4-84★	**690**	A30SSX-84★	**885**	A30SSP-84★	**510**
A40SS3-84★	**578**	A40SS2-84★	**578**	A40SS4-84★	**1050**	A40SSX-84★	**1275**	A40SSP-84★	**555**
A50SS3-84★	**719**	A50SS2-84★	**719**	A50SS4-84★	**1103**	A50SSX-84★	**1328**	A50SSP-84★	**698**
A63SS3-84★	**795**	A63SS2-84★	**795**	A63SS4-84★	**1170**	A63SSX-84★	**1410**	A63SSP-84★	**773**
A75SS3-84★	**1058**	A75SS2-84★	**1058**	A75SS4-84★	**1425**	A75SSX-84★	**2010**	A75SSP-84★	**1035**
A95SS3-84★	**1485**	A95SS2-84★	**1485**	A95SS4-84★	**2070**	A95SSX-84★	**2783**	A95SSP-84★	**1075**
A110SS3-84★	**1515**	A110SS2-84★	**1515**	A110SS4-84★	**2100**	A110SSX-84★	**2813**	A110SSP-84★	**1440**
A145SS3-84★	**2130**	A145SS2-84★	**2130**	A145SS4-84★	**2700**	A145SSX-84★	**3375**	A145SSP-84★	**1950**
A185SS3-84★	**2805**	A185SS2-84★	**2805**	A185SS4-84★	**3340**	A185SSX-84★	**3900**	A185SSP-84★	**2440**
NEMA Rated									
A9N00SS3-84★	**$ 330**	A9N00SS2-84★	**$ 330**	A9N00SS4-84★	**$ 495**	A9N00SX-84★	**$ 645**	A9N00SP-84★	**$ 315**
A16N0SS3-84★	**383**	A16N0SS2-84★	**383**	A16N0SS4-84★	**570**	A16N0SX-84★	**743**	A16N0SP-84★	**360**
A26N1SS3-84★	**465**	A26N1SS2-84★	**465**	A26N1SS4-84★	**630**	A26N1SX-84★	**831**	A26N1SP-84★	**443**
A50N2SS3-84★	**719**	A50N2SS2-84★	**719**	A50N2SS4-84★	**1103**	A50N2SX-84★	**1328**	A50N2SP-84★	**698**

★ Overload relay suffix code. Select from the overload relay selection chart on page 3.6.

Reversing
A9 - A750
Three phase

Open & enclosed

UL motor switching current	Maximum ratings – UL Listed — Maximum motor horsepower ratings Ⓛ 200/208V	230/240V	460/480V	575/600V	Open type — Catalog number	List price	UL Type 1 (Indoor metal) — Catalog number	List price
UL rated								
9	2	2	5	7.5	A9SR-84★	**$ 342**	A9SR1-84★	**$ 510**
11	3	3	7.5	10	A12SR-84★	**387**	A12SR1-84★	**585**
17	5	5	10	15	A16SR-84★	**443**	A16SR1-84★	**630**
28	7.5	10	20	25	A26SR-84★	**503**	A26SR1-84★	**810**
34	10	10	25	30	A30SR-84★	**675**	A30SR1-84★	**953**
42	10	15	30	40	A40SR-84★	**765**	A40SR1-84★	**1080**
54	15	20	40	50	A50SR-84★	**1152**	A50SR1-84★	**1395**
65	20	25	50	50	A63SR-84★	**1515**	A63SR1-84★	**1780**
80	25	30	60	75	A75SR-84★	**1620**	A75SR1-84★	**1905**
95	30	30	60	75	A95SR-84★	**1697**	A95SR1-84★	**2767**
110	30	40	75	100	A110SR-84★	**1800**	A110SR1-84★	**2970**
130	40	50	100	125	A145SR-84★	**2997**	A145SR1-84★	**3570**
156	50	60	125	150	A185SR-84★	**3996**	A185SR1-84★	**4755**
192	60	75	150	200	A210SR-84★	**4650**	A210SR1-84★	**5580**
248	75	100	200	250	A260SR-84★	**5436**	A260SR1-84★	**7615**
302	100	100	250	300	A300SR-84★	**6190**	A300SR1-84★	**8070**
414	125	150	350	400	A400SR-70★	**7980**	A400SR1-70★	**15,450**
480	150	200	400	500	A460SR-70★	**14,550**	A460SR1-70★	**22,482**
590	200	250	500	600	A580SR-70★	**19,755**	A580SR1-70★	**25,800**
810	250	300	600	700	A750SR-70★	**21,105**	A750SR1-70★	**29,250**

NEMA rated

NEMA size	Continuous current	200V	230V	460/575V				
00	9	1.5	1.5	2	A9N00SR-84★	**$ 342**	A9NSR1-84★	**$ 510**
0	18	3	3	5	A16N0SR-84★	**443**	A16NSR1-84★	**630**
1	27	7.5	7.5	10	A26N1SR-84★	**503**	A26NSR1-84★	**810**
2	45	10	15	25	A50N2SR-84★	**1152**	A50NSR1-84★	**1395**
3	90	25	30	50	A75N3SR-84★	**1620**	A75NSR1-84★	**1905**
4	135	40	50	100	A145N4SR-84★	**2997**	A145NSR1-84★	**3570**
5	270	75	100	200	A260N5SR-84★	**5436**	A260NSR1-84★	**7615**
6	540	150	200	400	A460N6SR-70★	**14,550**	A460NSR1-70★	**22,482**
7	810	—	300	600	A750N7SR-70★	**21,105**	A750NSR1-70★	**29,250**

★ Overload relay suffix code. Select from the overload relay selection chart on page 3.6.

Coil voltage selection

All AC operated catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 starter: A75SS-**80**F

D.C. operated starters

If DC operation is required, consult factory.

Factory modifications

See page 3.3

Control transformer option

Contactor size	VA rating	List price adder
A9 – A40	45 ①	**$ 300**
A9 – A40	50	**360**
A9 – A40 (N7 & 9)	50	**630**
A50 – A75	75	**435**
A95 – A110	100	**560**
A145 – A185	150	**720**
A210 – A300	250	**795**
A400 – A460	150	**720** ③
A580 – A750	250	**795** ③

Coil voltage selection – A9 - A300 ②

Hz	Cntr type	Volts 12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Coil voltage selection – A400 - A750 ②

Hz	Cntr type	Volts 24 - 60	48 - 130	100 - 250	250 - 500
60	AF	68	69	70	71
50	AF	68	69	70	71
DC	AF	68	69	70	71

Control transformer voltage selection chart

Hz	Type	Volts 208/120	230 – 240/120	460 – 480/120	575 – 600/120
50/60	A/AF	0	7	8	9

For other voltages, consult factory.

① No primary fusing provided.
② For AF50 – AF 300 starters, consult factory.
③ A400 - A750 utilizes the AF wide range coil with a lower coil consumption than A210 - A300.

Reversing
A9 - A750
Three phase

UL Type 3R (Outdoor metal)		UL Type 12 (Metal dustight)		UL Type 4 (Watertight)		UL Type 4X (Stainless steel)		UL Type 1, 3R, 4, 4X & 12 (Plastic)	
Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price
UL rated									
A9SR3-84★	**$ 630**	A9SR2-84★	**$ 630**	A9SR4-84★	**$ 810**	A9SRX-84★	**$ 1125**	A9SRP-84★	**$ 608**
A12SR3-84★	**705**	A12SR2-84★	**705**	A12SR4-84★	**915**	A12SRX-84★	**1230**	A12SRP-84★	**683**
A16SR3-84★	**750**	A16SR2-84★	**750**	A16SR4-84★	**990**	A16SRX-84★	**1313**	A16SRP-84★	**765**
A26SR3-84★	**900**	A26SR2-84★	**900**	A26SR4-84★	**1125**	A26SRX-84★	**1725**	A26SRP-84★	**960**
A30SR3-84★	**1043**	A30SR2-84★	**1043**	A30SR4-84★	**1313**	A30SRX-84★	**1868**	A30SRP-84★	**1103**
A40SR3-84★	**1305**	A40SR2-84★	**1305**	A40SR4-84★	**1500**	A40SRX-84★	**2010**	A40SRP-84★	**1230**
A50SR3-84★	**1763**	A50SR2-84★	**1763**	A50SR4-84★	**1875**	A50SRX-84★	**2213**	A50SRP-84★	**1530**
A63SR3-84★	**2310**	A63SR2-84★	**2310**	A63SR4-84★	**2588**	A63SRX-84★	**3143**	A63SRP-84★	**1695**
A75SR3-84★	**2813**	A75SR2-84★	**2813**	A75SR4-84★	**3113**	A75SRX-84★	**3600**	A75SRP-84★	**2250**
A95SR3-84★	**3427**	A95SR2-84★	**3427**	A95SR4-84★	**3697**	A95SRX-84★	**4276**	A95SRP-84★	**3025**
A110SR3-84★	**3630**	A110SR2-84★	**3630**	A110SR4-84★	**3900**	A110SRX-84★	**4479**	A110SRP-84★	**3230**
A145SR3-84★	**4275**	A145SR2-84★	**4275**	A145SR4-84★	**4650**	A145SRX-84★	**5665**	A145SRP-84★	**3804**
A185SR3-84★	**5215**	A185SR2-84★	**5215**	A185SR4-84★	**5550**	A185SRX-84★	**6555**	A185SRP-84★	**4640**
A210SR3-84★	**6255**	A210SR2-84★	**6255**	A210SR4-84★	**6640**	A210SRX-84★	**7680**	A210SRP-84★	**5566**
A260SR3-84★	**8355**	A260SR2-84★	**8355**	A260SR4-84★	**9340**	A260SRX-84★	**11,995**	A260SRP-84★	**7434**
A300SR3-84★	**8835**	A300SR2-84★	**8835**	A300SR4-84★	**10,015**	A300SRX-84★	**12,055**	A300SRP-84★	**7861**
A400SR3-70★	**16,125**	A400SR2-70★	**16,125**	A400SR4-70★	**17,100**	A400SRX-70★	**20,690**	—	—
A460SR3-70★	**23,230**	A460SR2-70★	**23,230**	A460SR4-70★	**23,625**	A460SRX-70★	**24,250**	—	—
A580SR3-70★	**26,250**	A580SR2-70★	**26,250**	A580SR4-70★	**27,000**	A580SRX-70★	**28,500**	—	—
A750SR3-70★	**30,225**	A750SR2-70★	**30,225**	A750SR4-70★	**31,275**	A750SRX-70★	**32,625**	—	—
NEMA rated									
A9NSR3-84★	**$ 630**	A9NSR2-84★	**$ 630**	A9NSR4-84★	**$ 810**	A9NSRX-84★	**$ 1125**	A9NSRP-84★	**$ 608**
A16NSR3-84★	**750**	A16NSR2-84★	**750**	A16NSR4-84★	**990**	A16NSRX-84★	**1313**	A16NSRP-84★	**765**
A26NSR3-84★	**900**	A26NSR2-84★	**900**	A26NSR4-84★	**1125**	A26NSRX-84★	**1725**	A26NSRP-84★	**960**
A50NSR3-84★	**1763**	A50NSR2-84★	**1763**	A50NSR4-84★	**1875**	A50NSRX-84★	**2213**	A50NSRP-84★	**1530**
A75NSR3-84★	**2813**	A75NSR2-84★	**2813**	A75NSR4-84★	**3113**	A75NSRX-84★	**3600**	A75NSRP-84★	**2250**
A145NSR3-84★	**4275**	A145NSR2-84★	**4275**	A145NSR4-84★	**4650**	A145NSRX-84★	**5665**	A145NSRP-84★	**3804**
A260NSR3-84★	**8355**	A260NSR2-84★	**8355**	A260NSR4-84★	**9340**	A260NSRX-84★	**11,995**	A260NSRP-84★	**7434**
A460NSR3-70★	**23,230**	A460NSR2-70★	**23,230**	A460NSR4-70★	**23,625**	A460NSRX-70★	**24,250**	—	—
A750NSR3-70★	**30,225**	A750NSR2-70★	**30,225**	A750NSR4-70★	**31,275**	A750NSRX-70★	**32,625**	—	—

★ Overload relay suffix code. Select from the overload relay selection chart on page 3.6.

2 Speed, 1 winding
A9 - A750
Three phase

Open & enclosed

UL motor switching current	Maximum ratings – UL Listed: Maximum motor horsepower ratings 200/208V	230/240V	460/480V	575/600V	Open type: Catalog number	List price	UL Type 1 (Indoor metal): Catalog number	List price
UL rated								
9	2	2	5	7.5	A9ST-84★1★	**$ 504**	A9ST1-84★1★	**$ 690**
11	3	3	7.5	10	A12ST-84★1★	**525**	A12ST1-84★1★	**771**
17	5	5	10	15	A16ST-84★1★	**581**	A16ST1-84★1★	**837**
28	7.5	10	20	25	A26ST-84★1★	**752**	A26ST1-84★1★	**1097**
34	10	10	25	30	A30ST-84★1★	**1038**	A30ST1-84★1★	**1316**
42	10	15	30	40	A40ST-84★1★	**1259**	A40ST1-84★1★	**1577**
54	15	20	40	50	A50ST-84★1★	**1697**	A50ST1-84★1★	**1940**
65	20	25	50	50	A63ST-84★1★	**2150**	A63ST1-84★1★	**2195**
80	25	30	60	75	A75ST-84★1★	**2307**	A75ST1-84★1★	**2592**
95	30	30	60	75	A95ST-84★1★	**2495**	A95ST1-84★1★	**2950**
110	30	40	75	100	A110ST-84★1★	**2681**	A110ST1-84★1★	**3851**
130	40	50	100	125	A145ST-84★1★	**4506**	A145ST1-84★1★	**5079**
156	50	60	125	150	A185ST-84★1★	**5845**	A185ST1-84★1★	**6605**
192	60	75	150	200	A210ST-84★1★	**6895**	A210ST1-84★1★	**7825**
248	75	100	200	250	A260ST-84★1★	**8535**	A260ST1-84★1★	**10,710**
302	100	100	250	300	A300ST-84★1★	**9171**	A300ST1-84★1★	**11,391**
414	125	150	350	400	A400ST-70★1★	**10,100**	A400ST1-70★1★	**19,460**
480	150	200	400	500	A460ST-70★1★	**17,995**	A460ST1-70★1★	**28,910**
590	200	250	500	600	A580ST-70★1★	**23,735**	A580ST1-70★1★	**35,400**
810	250	300	600	700	A750ST-70★1★	**26,645**	A750ST1-70★1★	**39,195**

NEMA size	Continuous current	200V	230V	460/575V				
NEMA rated								
00	9	1.5	1.5	2	A9N00ST-84★1★	**$ 504**	A9NST1-84★1★	**$ 690**
0	18	3	3	5	A16N0ST-84★1★	**581**	A16NST1-84★1★	**837**
1	27	7.5	7.5	10	A26N1ST-84★1★	**752**	A26NST1-84★1★	**1097**
2	45	10	15	25	A50N2ST-84★1★	**1697**	A50NST1-84★1★	**1940**
3	90	25	30	50	A75N3ST-84★1★	**2307**	A75NST1-84★1★	**2589**
4	135	40	50	100	A145N4ST-84★1★	**4506**	A145NST1-84★1★	**5079**
5	270	75	100	200	A260N5ST-84★1★	**8535**	A260NST1-84★1★	**10,710**
6	540	150	200	400	A460N6ST-70★1★	**17,995**	A460NST1-70★1★	**28,910**
7	810	—	300	600	A750N7ST-70★1★	**26,645**	A750NST1-70★1★	**39,195**

★ Overload relay suffix code. Select from the overload relay selection chart on page 3.6.
1st ★ low speed, 2nd ★ high speed

Description

Motors that have separate windings for each speed provide more combinations of speed variations. Multi-speed starters from ABB Control are available for constant horsepower, constant torque and variable torque motors.

Constant horsepower

Motors that maintain the same horsepower regardless of speed are called constant horsepower motors. These motors are used in applications like metal working.

Constant torque

Motors that maintain constant torque at all speeds are called constant torque motors. In applications like conveyors, horsepower varies directly with speed.

Variable torque motors

Motors that produce a torque characteristic which varies as the square of the speed are called variable torque motors and are used in applications like blowers and fans.

Control transformer option

Contactor size	VA rating	List price adder
A9 – A40	45 ①	**$ 300**
A9 – A40	50	**360**
A9 – A40 (N7 & 9)	50	**630**
A50 – A75	75	**435**
A95 – A110	100	**560**
A145 – A185	150	**720**
A210 – A300	250	**795**
A400 – A460	150	**720** ③
A580 – A750	250	**795** ③

① No primary fusing provided.
② For AF50 – AF 300 starters, consult factory.
③ A400 - A750 utilizes the AF wide range coil with a lower coil consumption than A210 - A300.
④ AF400 - AF750 only.

Coil voltage selection

All catalog numbers include a 120V coil. To select other coil voltages, substitute the code from the coil voltage selection chart for the first digit after the dash in the catalog number.

Ex.: A 240V coil is required for an A95-starter: A95ST-80★1B★

D.C. operated starters

If DC operation is required, consult factory.

Factory modifications

See page 3.3

Coil voltage selection – A9 - A300 ②

Hz	Cntr type	Volts 12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Coil voltage selection – A400 - A750 ②

Hz	Cntr type	Volts 24 - 60	48 - 130	100 - 250	250 - 500
60	AF	68	69	70	71 ④
50	AF	68	69	70	71 ④
DC	AF	68	69	70	71 ④

Control transformer voltage selection

Hz	Type	Volts 208/120	230 – 240/120	460 – 480/120	575 – 600/120
50/60	A/AF	0	7	8	9

For other voltages, consult factory.

Discount schedule Open: **AA**, **AEA** – Enclosed: **AAE**, **AEAE** – A9 - A110, A145 - AF1650

2 Speed, 1 winding
A9 - A750
Three phase

UL Type 3R (Outdoor metal)		UL Type 12 (Metal dustight)		UL Type 4 (Watertight)		UL TYpe 4X (Stainless steel)		UL Type 1, 3R, 4, 4X & 12 (Plastic)	
Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price
UL rated									
A9ST3-84★1★	**$ 810**	A9ST2-84★1★	**$ 810**	A9ST4-84★1★	**$ 1020**	A9STX-84★1★	**$ 1305**	A9STP-84★1★	**$ 788**
A12ST3-84★1★	**891**	A12ST2-84★1★	**891**	A12ST4-84★1★	**1095**	A12STX-84★1★	**1416**	A12STP-84★1★	**869**
A16ST3-84★1★	**957**	A16ST2-84★1★	**957**	A16ST4-84★1★	**1215**	A16STX-84★1★	**1520**	A16STP-84★1★	**972**
A26ST3-84★1★	**1187**	A26ST2-84★1★	**1187**	A26ST4-84★1★	**1515**	A26STX-84★1★	**2012**	A26STP-84★1★	**1247**
A30ST3-84★1★	**1406**	A30ST2-84★1★	**1406**	A30ST4-84★1★	**1688**	A30STX-84★1★	**2231**	A30STP-84★1★	**1466**
A40ST3-84★1★	**1802**	A40ST2-84★1★	**1802**	A40ST4-84★1★	**2100**	A40STX-84★1★	**2507**	A40STP-84★1★	**1727**
A50ST3-84★1★	**2307**	A50ST2-84★1★	**2307**	A50ST4-84★1★	**2528**	A50STX-84★1★	**2757**	A50STP-84★1★	**2075**
A63ST3-84★1★	**2945**	A63ST2-84★1★	**2945**	A63ST4-84★1★	**3285**	A63STX-84★1★	**3777**	A63STP-84★1★	**2330**
A75ST3-84★1★	**3500**	A75ST2-84★1★	**3500**	A75ST4-84★1★	**3788**	A75STX-84★1★	**4287**	A75STP-84★1★	**2835**
A95ST3-84★1★	**3900**	A95ST2-84★1★	**3900**	A95ST4-84★1★	**4250**	A95STX-84★1★	**4850**	A95STP-84★1★	**3200**
A110ST3-84★1★	**4511**	A110ST2-84★1★	**4511**	A110ST4-84★1★	**4800**	A110STX-84★1★	**5358**	A110STP-84★1★	**4300**
A145ST3-84★1★	**5784**	A145ST2-84★1★	**5784**	A145ST4-84★1★	**6265**	A145STX-84★1★	**7175**	A145STP-84★1★	**5513**
A185ST3-84★1★	**7059**	A185ST2-84★1★	**7059**	A185ST4-84★1★	**7440**	A185STX-84★1★	**8400**	A185STP-84★1★	**6729**
A210ST3-84★1★	**8500**	A210ST2-84★1★	**8500**	A210ST4-84★1★	**8890**	A210STX-84★1★	**9925**	A210STP-84★1★	**8103**
A260ST3-84★1★	**11,455**	A260ST2-84★1★	**11,455**	A260ST4-84★1★	**12,940**	A260STX-84★1★	**15,090**	A260STP-84★1★	**10,919**
A300ST3-84★1★	**12,155**	A300ST2-84★1★	**12,155**	A300ST4-84★1★	**13,425**	A300STX-84★1★	**16,275**	A300STP-84★1★	**11,586**
A400ST3-70★1★	**20,135**	A400ST2-70★1★	**20,135**	A400ST4-70★1★	**21,600**	A400STX-70★1★	**24,700**	—	—
A460ST3-70★1★	**29,652**	A460ST2-70★1★	**29,652**	A460ST4-70★1★	**30,000**	A460STX-70★1★	**30,675**	—	—
A580ST3-70★1★	**35,850**	A580ST2-70★1★	**35,850**	A580ST4-70★1★	**36,225**	A580STX-70★1★	**38,097**	—	—
A750ST3-70★1★	**40,170**	A750ST2-70★1★	**40,170**	A750ST4-70★1★	**40,875**	A750STX-70★1★	**42,570**	—	—
NEMA rated									
A9NST3-84★1★	**$ 810**	A9NST2-84★1★	**$ 810**	A9NST4-84★1★	**$ 1020**	A9NSTX-84★1★	**$ 1305**	A9NSTP-84★1★	**$ 788**
A16NST3-84★1★	**957**	A16NST2-84★1★	**957**	A16NST4-84★1★	**1215**	A16NSTX-84★1★	**1520**	A16NSTP-84★1★	**972**
A26NST3-84★1★	**1187**	A26NST2-84★1★	**1187**	A26NST4-84★1★	**1515**	A26NSTX-84★1★	**2012**	A26NSTP-84★1★	**1247**
A50NST3-84★1★	**2307**	A50NST2-84★1★	**2307**	A50NST4-84★1★	**2528**	A50NSTX-84★1★	**2757**	A50NSTP-84★1★	**2075**
A75NST3-84★1★	**3500**	A75NST2-84★1★	**3500**	A75NST4-84★1★	**3788**	A75NSTX-84★1★	**4287**	A75NSTP-84★1★	**2835**
A145NST3-84★1★	**5784**	A145NST2-84★1★	**5784**	A145NST4-84★1★	**6265**	A145NSTX-84★1★	**7175**	A145NSTP-84★1★	**5513**
A260NST3-84★1★	**11,455**	A260NST2-84★1★	**11,455**	A260NST4-84★1★	**12,940**	A260NSTX-84★1★	**15,090**	A260NSTP-84★1★	**10,919**
A460NST3-70★1★	**29,652**	A460NST2-70★1★	**29,652**	A460NST4-70★1★	**30,000**	A460NSTX-70★1★	**30,675**	—	—
A750NST3-70★1★	**40,170**	A750NST2-70★1★	**40,170**	A750NST4-70★1★	**40,875**	A750NSTX-70★1★	**42,570**	—	—

★ Overload relay suffix code. Select from the overload relay selection chart on page 3.6.
1st ★ low speed, 2nd ★ high speed

2 Speed, 2 winding
A9 - A750
Three phase

Open & enclosed

UL motor switching current	Maximum ratings – UL Listed: Maximum motor horsepower ratings				Open type		UL Type 1 (Indoor metal)	
	200/208V	230/240V	460/480V	575/600V	Catalog number	List price	Catalog number	List price
AC3	**UL rated**							
9	2	2	5	7.5	A9ST-84★2★	**$ 396**	A9ST1-84★2★	**$ 582**
11	3	3	7.5	10	A12ST-84★2★	**426**	A12ST1-84★2★	**657**
17	5	5	10	15	A16ST-84★2★	**476**	A16ST1-84★2★	**702**
28	7.5	10	20	25	A26ST-84★2★	**552**	A26ST1-84★2★	**882**
34	10	10	25	30	A30ST-84★2★	**747**	A30ST1-84★2★	**1025**
42	10	15	30	40	A40ST-84★2★	**834**	A40ST1-84★2★	**1152**
54	15	20	40	50	A50ST-84★2★	**1224**	A50ST1-84★2★	**1467**
65	20	25	50	50	A63ST-84★2★	**1587**	A63ST1-84★2★	**1632**
80	25	30	60	75	A75ST-84★2★	**1692**	A75ST1-84★2★	**1977**
95	30	30	60	75	A95ST-84★2★	**1795**	A95ST1-84★2★	**2450**
110	30	40	75	100	A110ST-84★2★	**1872**	A110ST1-84★2★	**3042**
130	40	50	100	125	A145ST-84★2★	**3069**	A145ST1-84★2★	**3642**
156	50	60	125	150	A185ST-84★2★	**4068**	A185ST1-84★2★	**4827**
192	60	75	150	200	A210ST-84★2★	**4722**	A210ST1-84★2★	**5652**
248	75	100	200	250	A260ST-84★2★	**5500**	A260ST1-84★2★	**7685**
302	100	100	250	300	A300ST-84★2★	**6340**	A300ST1-84★2★	**8142**
414	125	150	350	400	A400ST-70★2★	**6855**	A400ST1-70★2★	**15,522**
480	150	200	400	500	A460ST-70★2★	**13,560**	A460ST1-70★2★	**22,554**
590	200	250	500	600	A580ST-70★2★	**18,660**	A580ST1-70★2★	**25,872**
810	250	300	600	700	A750ST-70★2★	**20,025**	A750ST1-70★2★	**29,322**
	NEMA rated							
NEMA size	Continuous current	200V	230V	460/575V				
00	9	1.5	1.5	2	A9N00ST-84★2★	**$ 396**	A9NST1-84★2★	**$ 582**
0	18	3	3	5	A16N0ST-84★2★	**476**	A16NST1-84★2★	**702**
1	27	7.5	7.5	10	A26N1ST-84★2★	**552**	A26NST1-84★2★	**882**
2	45	10	15	25	A50N2ST-84★2★	**1224**	A50NST1-84★2★	**1467**
3	90	25	30	50	A75N3ST-84★2★	**1692**	A75NST1-84★2★	**1977**
4	135	40	50	100	A145N4ST-84★2★	**3069**	A145NST1-84★2★	**3642**
5	270	75	100	200	A260N5ST-84★2★	**5508**	A260NST1-84★2★	**7685**
6	540	150	200	400	A460N6ST-70★2★	**13,560**	A460NST1-70★2★	**22,554**
7	810	—	300	600	A750N7ST-70★2★	**20,025**	A750NST1-70★2★	**29,322**

★ Overload relay suffix code. Select from the overload relay selection chart on page 3.6.
1st ★ low speed, 2nd ★ high speed

Description

Motors that have separate windings for each speed provide more combinations of speed variations. Multi-speed starters from ABB Control are available for constant horsepower, constant torque and variable torque motors.

Constant horsepower

Motors that maintain the same horsepower regardless of speed are called constant horsepower motors. These motors are used in applications like metal working.

Constant torque

Motors that maintain constant torque at all speeds are called constant torque motors. In applications like conveyors, horsepower varies directly with speed.

Variable torque motors

Motors that produce a torque characteristic which varies as the square of the speed are called variable torque motors and are used in applications like blowers and fans.

Control transformer option

Contactor size	VA rating	List price adder
A9 – A40	45 ①	**$ 300**
A9 – A40	50	**360**
A9 – A40 (N7 & 9)	50	**630**
A50 – A75	75	**435**
A95 – A110	100	**560**
A145 – A185	150	**720**
A210 – A300	250	**795**
A400 – A460	150	**720** ③
A580 – A750	250	**795** ③

① No primary fusing provided.
② For AF50 – AF 300 starters, consult factory.
③ A400 - A750 utilizes the AF wide range coil with a lower coil consumption than A210 - A300.
④ AF400 - AF 750 only.

Coil voltage selection

All catalog numbers include a 120V coil. To select other coil voltages, substitute the code from the coil voltage selection chart for the first digit after the dash in the catalog number.

Ex.: A 240V coil is required for an A95-starter: A95ST-80★2★

D.C. operated starters

If DC operation is required, consult factory.

Factory modifications

See page 3.3

Coil voltage selection – A9 - A300 ②

	Cntr	Volts															
Hz	type	12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Coil voltage selection – A400 - A750 ②

Cntr	Volts				
Hz	type	24 - 60	48 - 130	100 - 250	250 - 500
60	AF	68	69	70	71 ④
50	AF	68	69	70	71 ④
DC	AF	68	69	70	71 ④

Control transformer voltage selection

		Volts			
Hz	Type	208/120	230 – 240/120	460 – 480/120	575 – 600/120
50/60	A/AF	0	7	8	9

For other voltages, consult factory.

Discount schedule — Open / Enclosed: AA / AAE – A9 - A110; AEA / AEAE – A145 - AF1650

2 Speed, 2 winding
A9 - A750
Three phase

UL Type 3R (Outdoor metal)		UL Type 12 (Metal dustight)		UL Type 4 (Watertight)		UL Type 4X (Stainless steel)		UL Type 1, 3R, 4, 4X & 12 (Plastic)	
Catalog Number	List Price	Catalog Number	List Price	Catalog Number	List Price	Catalog Number	List Price	Catalog Number	List Price
UL rated									
A9ST3-84★2★	**$ 702**	A9ST2-84★2★	**$ 702**	A9ST4-84★2★	**$ 915**	A9STX-84★2★	**$ 1197**	A9STP-84★2★	**$ 680**
A12ST3-84★2★	**777**	A12ST2-84★2★	**777**	A12ST4-84★2★	**990**	A12STX-84★2★	**1302**	A12STP-84★2★	**755**
A16ST3-84★2★	**822**	A16ST2-84★2★	**822**	A16ST4-84★2★	**1065**	A16STX-84★2★	**1385**	A16STP-84★2★	**837**
A26ST3-84★2★	**972**	A26ST2-84★2★	**972**	A26ST4-84★2★	**1200**	A26STX-84★2★	**1797**	A26STP-84★2★	**1032**
A30ST3-84★2★	**1115**	A30ST2-84★2★	**1115**	A30ST4-84★2★	**1388**	A30STX-84★2★	**1940**	A30STP-84★2★	**1175**
A40ST3-84★2★	**1377**	A40ST2-84★2★	**1377**	A40ST4-84★2★	**1545**	A40STX-84★2★	**2082**	A40STP-84★2★	**1302**
A50ST3-84★2★	**1835**	A50ST2-84★2★	**1835**	A50ST4-84★2★	**1988**	A50STX-84★2★	**2285**	A50STP-84★2★	**1602**
A63ST3-84★2★	**2382**	A63ST2-84★2★	**2382**	A63ST4-84★2★	**2513**	A63STX-84★2★	**3215**	A63STP-84★2★	**1767**
A75ST3-84★2★	**2885**	A75ST2-84★2★	**2885**	A75ST4-84★2★	**3090**	A75STX-84★2★	**3672**	A75STP-84★2★	**2200**
A95ST3-84★2★	**3500**	A95ST2-84★2★	**3500**	A95ST4-84★2★	**3700**	A95STX-84★2★	**3950**	A95STP-84★2★	**2650**
A110ST3-84★2★	**3702**	A110ST2-84★2★	**3702**	A110ST4-84★2★	**3863**	A110STX-84★2★	**4550**	A110STP-84★2★	**3300**
A145ST3-84★2★	**4347**	A145ST2-84★2★	**4347**	A145ST4-84★2★	**4650**	A145STX-84★2★	**5735**	A145STP-84★2★	**3919**
A185ST3-84★2★	**5285**	A185ST2-84★2★	**5285**	A185ST4-84★2★	**5740**	A185STX-84★2★	**6627**	A185STP-84★2★	**4857**
A210ST3-84★2★	**6327**	A210ST2-84★2★	**6327**	A210ST4-84★2★	**6510**	A210STX-84★2★	**7752**	A210STP-84★2★	**5899**
A260ST3-84★2★	**8427**	A260ST2-84★2★	**8427**	A260ST4-84★2★	**9150**	A260STX-84★2★	**12,065**	A260STP-84★2★	**7512**
A300ST3-84★2★	**8905**	A300ST2-84★2★	**8905**	A300ST4-84★2★	**9750**	A300STX-84★2★	**13,025**	A300STP-84★2★	**7990**
A400ST3-70★2★	**16,197**	A400ST2-70★2★	**16,197**	A400ST4-70★2★	**17,100**	A400STX-70★2★	**20,760**	—	—
A460ST3-70★2★	**23,300**	A460ST2-70★2★	**23,300**	A460ST4-70★2★	**23,700**	A460STX-70★2★	**24,320**	—	—
A580ST3-70★2★	**26,322**	A580ST2-70★2★	**26,322**	A580ST4-70★2★	**27,000**	A580STX-70★2★	**28,570**	—	—
A750ST3-70★2★	**30,297**	A750ST2-70★2★	**30,297**	A750ST4-70★2★	**30,900**	A750STX-70★2★	**32,697**	—	—
NEMA rated									
A9NST3-84★2★	**$ 702**	A9NST2-84★2★	**$ 702**	A9NST4-84★2★	**$ 915**	A9NSTX-84★2★	**$ 1197**	A9NSTP-84★2★	**$ 680**
A16NST3-84★2★	**822**	A16NST2-84★2★	**822**	A16NST4-84★2★	**1065**	A16NSTX-84★2★	**1385**	A16NSTP-84★2★	**837**
A26NST3-84★2★	**972**	A26NST2-84★2★	**972**	A26NST4-84★2★	**1200**	A26NSTX-84★2★	**1797**	A26NSTP-84★2★	**1032**
A50NST3-84★2★	**1835**	A50NST2-84★2★	**1835**	A50NST4-84★2★	**1988**	A50NSTX-84★2★	**2285**	A50NSTP-84★2★	**1602**
A75NST3-84★2★	**2885**	A75NST2-84★2★	**2885**	A75NST4-84★2★	**3090**	A75NSTX-84★2★	**3672**	A75NSTP-84★2★	**2200**
A145NST3-84★2★	**4347**	A145NST2-84★2★	**4347**	A145NST4-84★2★	**4650**	A145NSTX-84★2★	**5735**	A145NSTP-84★2★	**3919**
A260NST3-84★2★	**8427**	A260NST2-84★2★	**8427**	A260NST4-84★2★	**9150**	A260NSTX-84★2★	**12,065**	A260NSTP-84★2★	**7512**
A460NST3-70★2★	**23,300**	A460NST2-70★2★	**23,300**	A460NST4-70★2★	**23,700**	A460NSTX-70★2★	**24,320**	—	—
A750NST3-70★2★	**30,297**	A750NST2-70★2★	**30,297**	A750NST4-70★2★	**30,900**	A750NSTX-70★2★	**32,697**	—	—

★ Overload relay suffix code. Select from the overload relay selection chart on page 3.6.
1st ★ low speed, 2nd ★ high speed

Plastic enclosed, IP65
A9 - A16
Three phase & single phase

Open & enclosed – Three phase

Maximum motor horsepower ratings				Catalog number with blank cover	List price	Catalog number with reset only	List price	Catalog number with start & stop/reset	List price
208V	240V	480V	575V/600V						
2	2	5	7.5	A9SD-84★	**$ 233**	A9SD-84★R	**$ 240**	A9SD-84★A	**$ 278**
3	3	7.5	10	A12SD-84★	**248**	A12SD-84★R	**255**	A12SD-84★A	**293**
5	5	10	15	A16SD-84★	**278**	A16SD-84★R	**293**	A16SD-84★A	**330**

★ Overload Relay suffix code. Select from the overload relay selection chart on page 3.6.

Open & enclosed – Single phase

Maximum motor horsepower ratings		Catalog number with blank cover	List price	Catalog number with reset only	List price	Catalog number with start & stop/reset	List price
115V	230V						
0.50	1.00	A9SSD-84★	**$ 233**	A9SSD-84★R	**$ 240**	A9SSD-84★A	**$ 278**
0.75	2.00	A12SSD-84★	**248**	A12SSD-84★R	**255**	A12SSD-84★A	**293**
1.00	3.00	A16SSD-84★	**278**	A16SSD-84★R	**293**	A16SSD-84★A	**330**

Overload relay selection chart

For contactor sizes	Current range (motor fla)	Catalog number	Starter suffix code
A9	0.1 – 0.16	TA25DU0.16	A
A9	0.16 – 0.25	TA25DU0.25	B
A9	0.25 – 0.4	TA25DU0.4	C
A9	0.4 – 0.63	TA25DU0.63	D
A9	0.63 – 1.0	TA25DU1.0	E
A9	1.0 – 1.4	TA25DU1.4	F
A9	1.4 – 1.8	TA25DU1.8	G
A9	1.7 – 2.4	TA25DU2.4	H
A9	2.2 – 3.1	TA25DU3.1	J
A9	2.8 – 4.0	TA25DU4.0	K
A9	3.5 – 5.0	TA25DU5.0	L
A9	4.5 – 6.5	TA25DU6.5	M
A9	6.0 – 8.5	TA25DU8.5	N
A9	7.5 – 11	TA25DU11	P
A12	10 – 14	TA25DU14	Q
A16	13 – 19	TA25DU19	R

Coil voltage selection

All catalog numbers include a 120V coil. To select other coil voltages, substitute the code from the coil voltage selection chart for the first digit after the dash in the catalog number.

Ex.: A 240V coil is required for an A9 starter: A9SD-80E

D.C. operated starters

If DC operation is required, consult factory.

Coil voltage selection – A9 - A16 starters

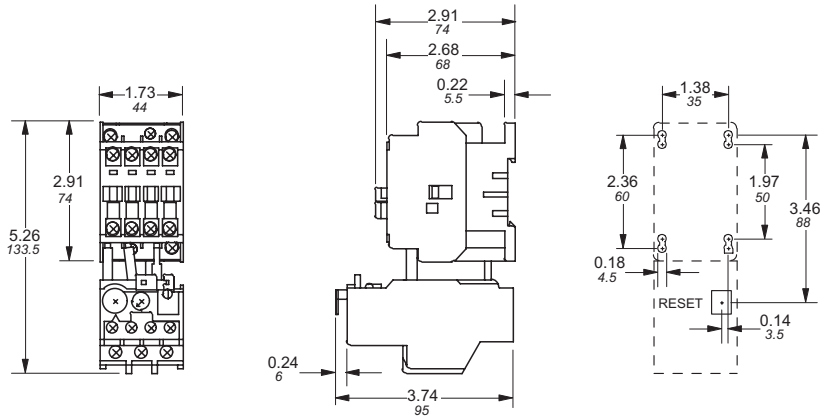
	Cntr	Volts															
Hz	type	12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

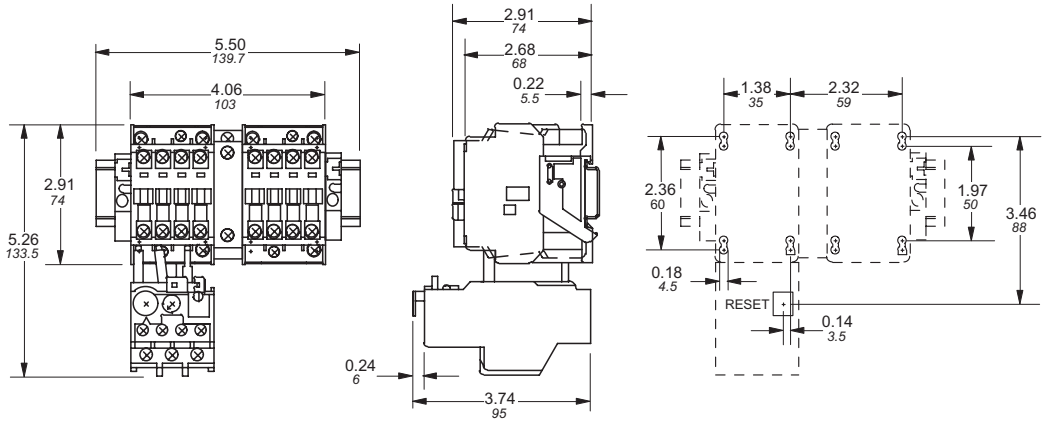
Approximate dimensions
AC/DC operated, 3 pole
A/AE9 – A/AE16

00.00
00.00
Inches
[Millimeters]

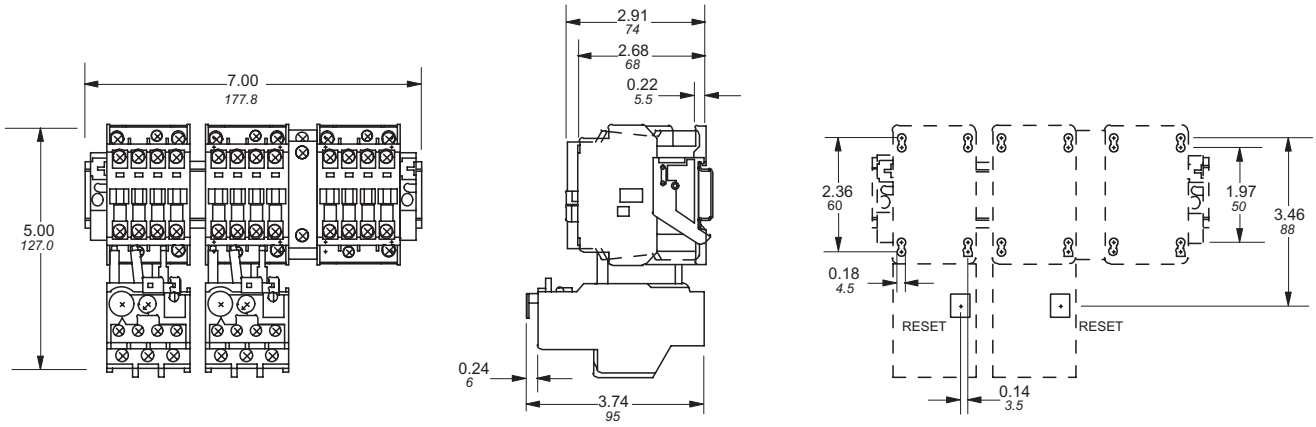
A/AE9 – A/AE16 + TA25 — Starter



A/AE9 – A/AE16 + VM5 or VE5 + TA25 — Reversing starter



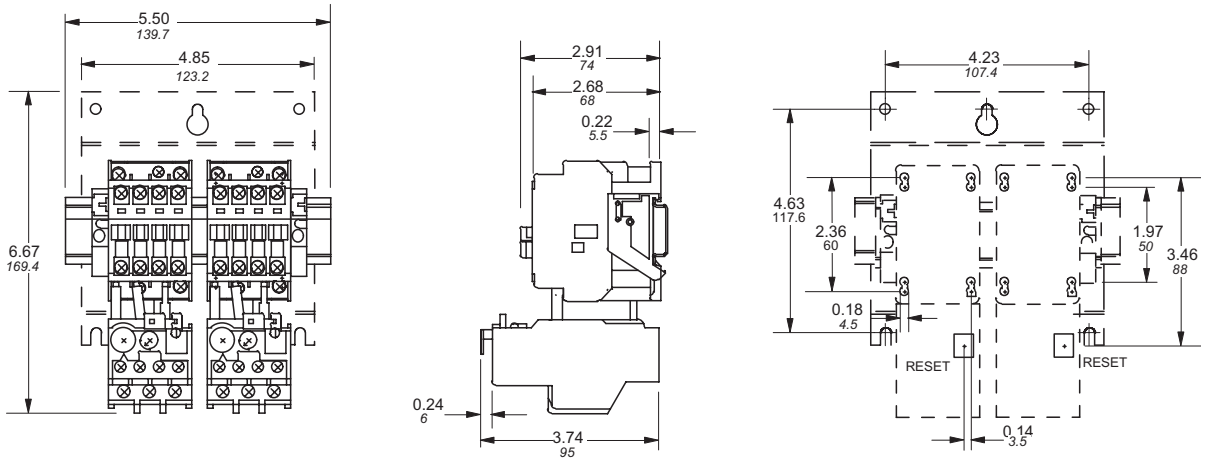
A/AE9 – A/AE16 — 2 Speed, 1 winding starter



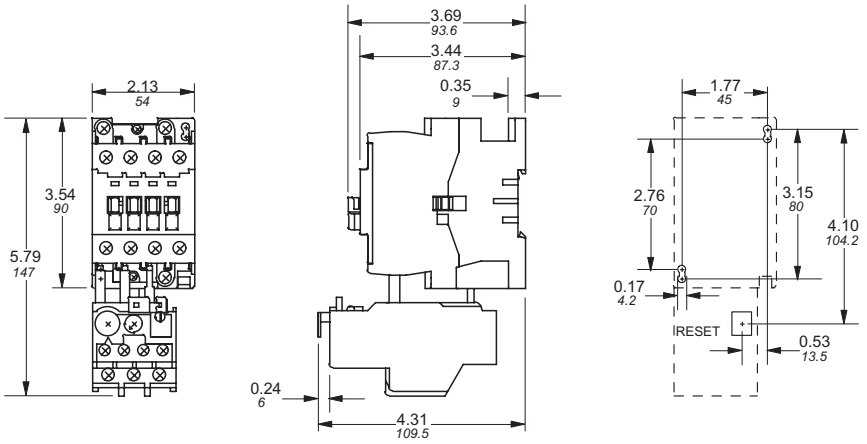
Approximate dimensions
AC/DC operated, 3 pole
A/AE9 – A/AE26

00.00 / 00.00 Inches [Millimeters]

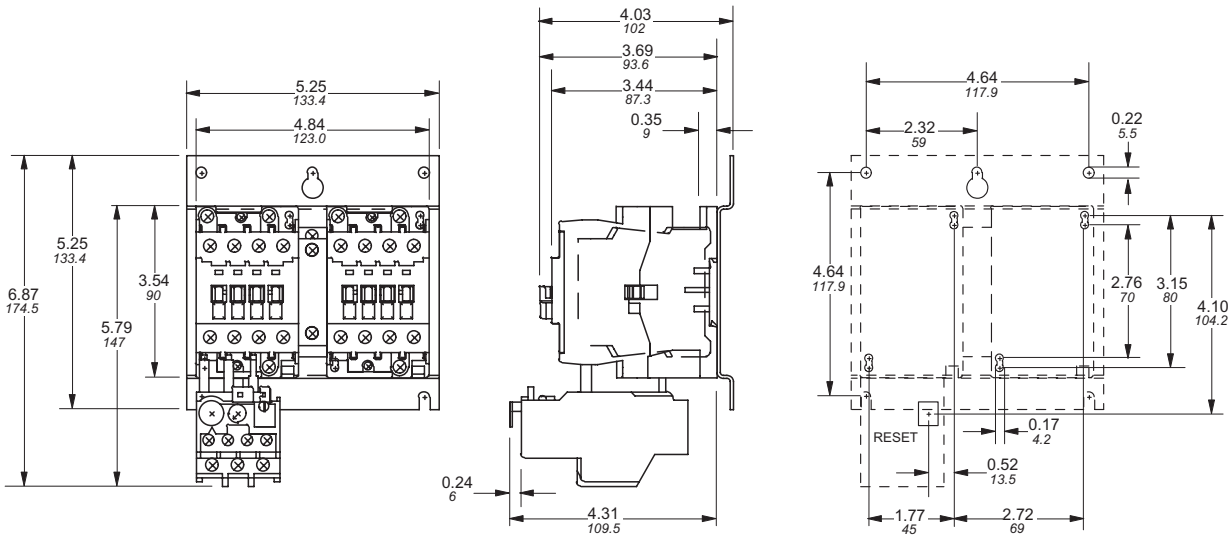
A/AE9 – A/AE16 — 2 Speed, 2 winding starter



A/AE26 + TA25 — Starter



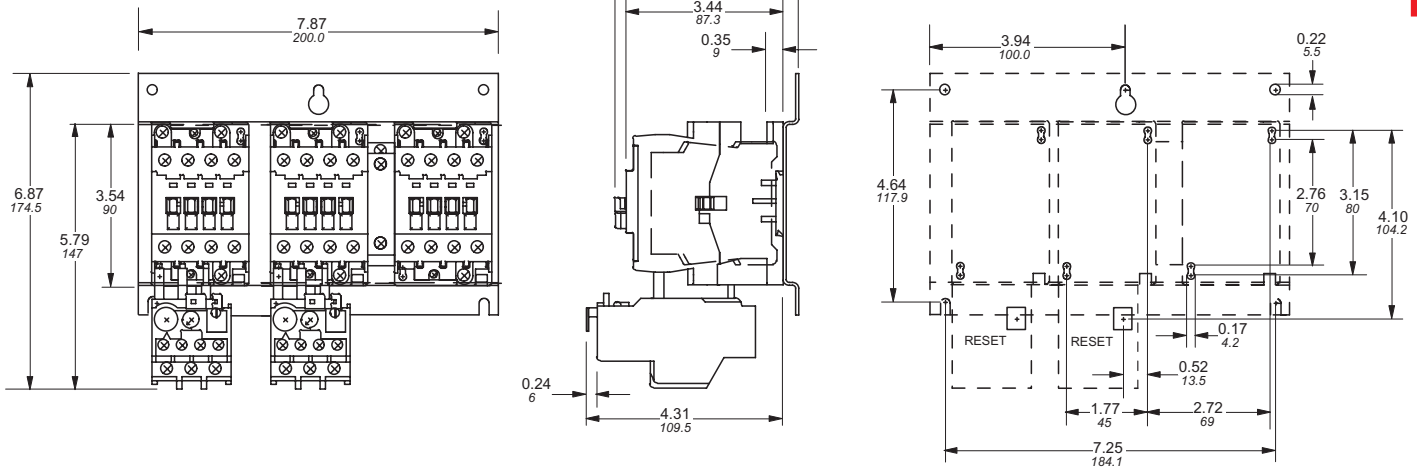
A/AE26 + VM5 or VE5 + TA25 — Reversing starter



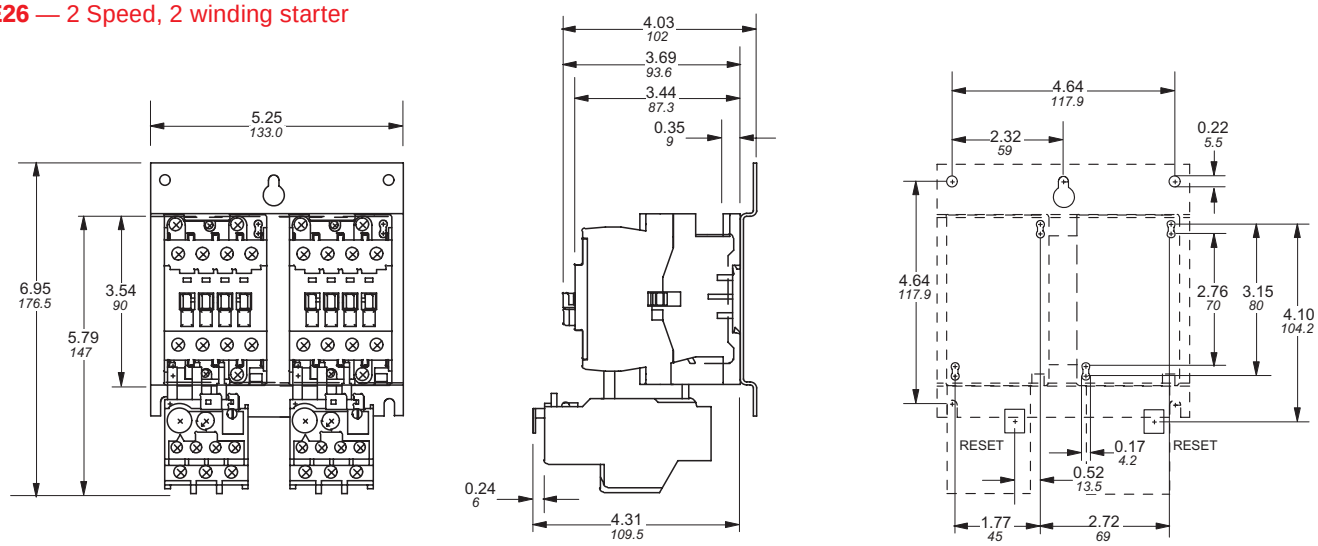
Approximate dimensions
AC/DC operated, 3 pole
A/AE26 to A/AE40

00.00 / 00.00 Inches [Millimeters]

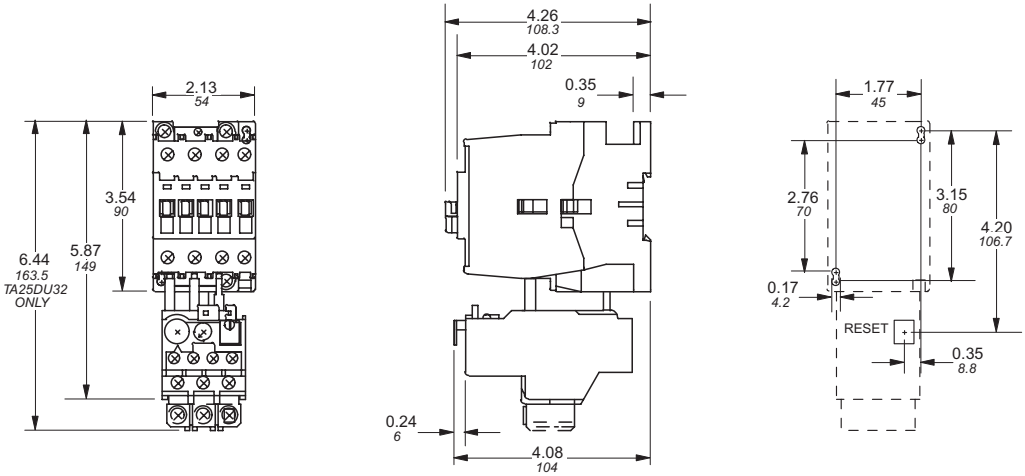
A/AE26 — 2 speed, 1 winding starter



A/AE26 — 2 Speed, 2 winding starter



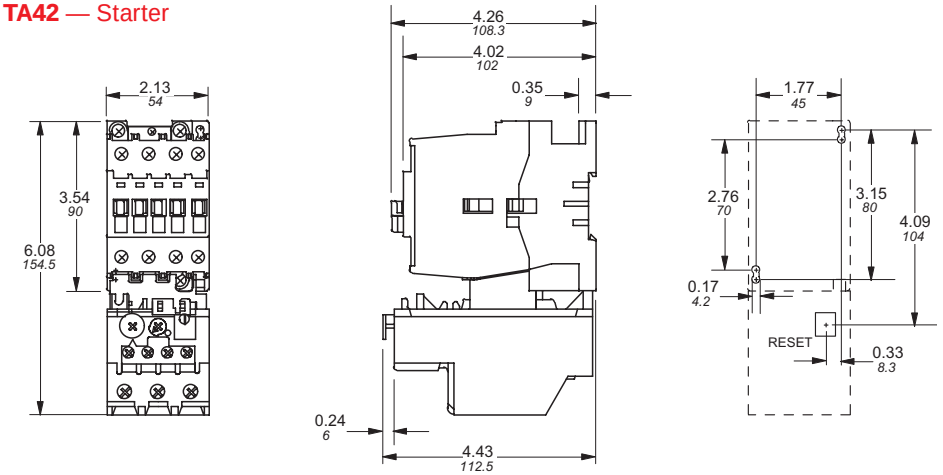
A/AE30 & A/AE40 + TA25 — Starter



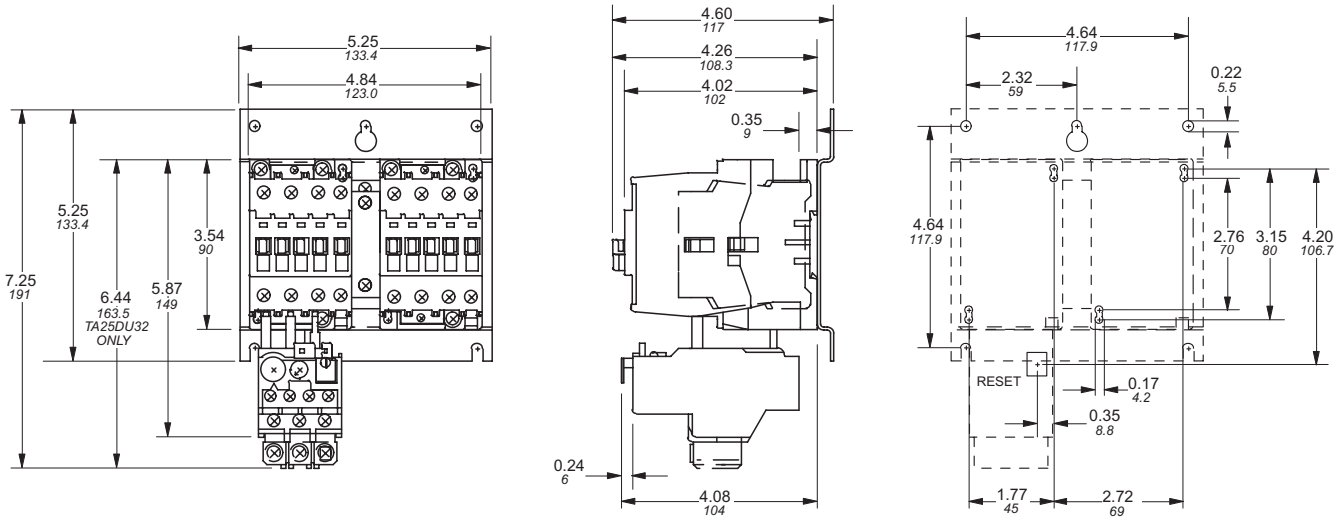
Approximate dimensions
AC/DC operated, 3 pole
A/AE30 – A/AE40

00.00 Inches
00.00 [Millimeters]

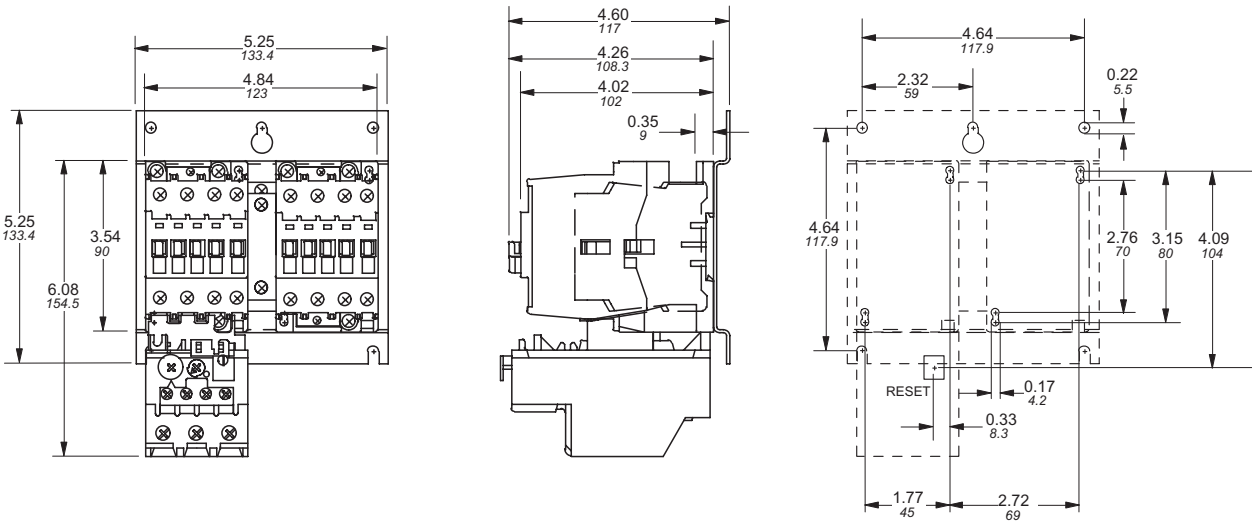
A/AE30 & A/AE40 + TA42 — Starter



A/AE30 & A/AE40 + VM5 or VE5 + TA25 — Reversing starter



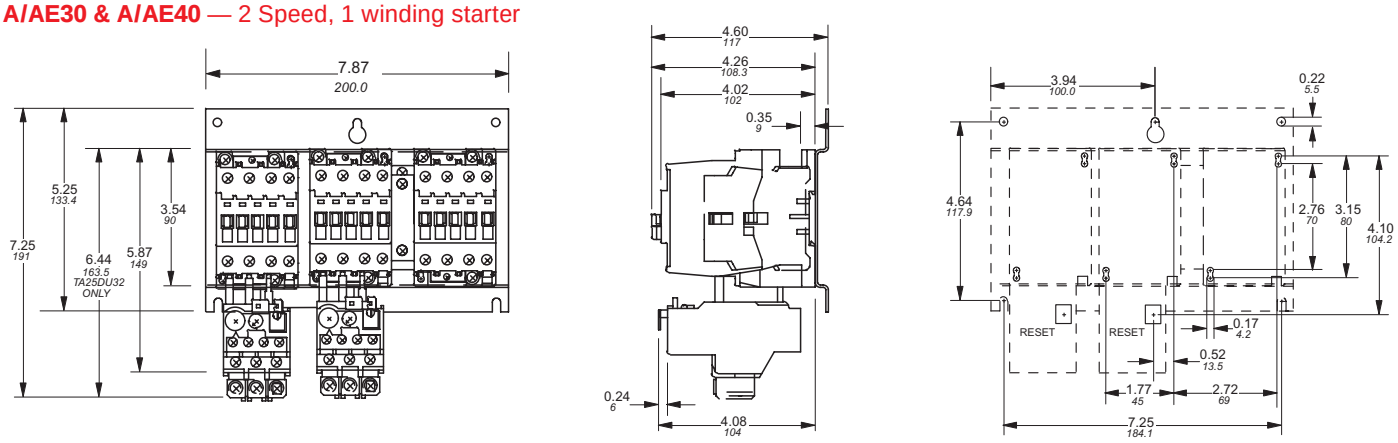
A/AE30 & A/AE40 + VM5 or VE5 + TA42 — Reversing starter



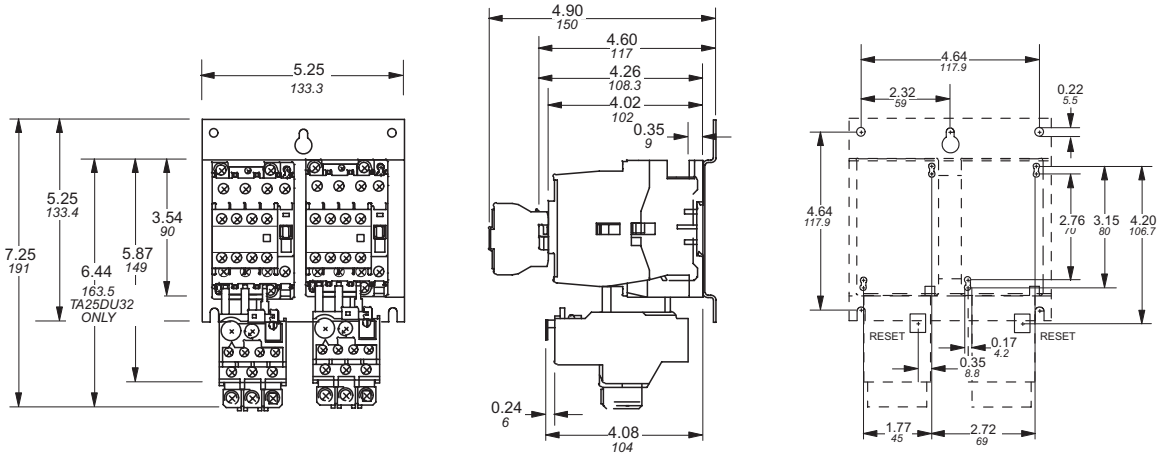
Approximate dimensions
AC/DC operated, 3 pole
A/AE30 – A/AE75

00.00 / 00.00 Inches [Millimeters]

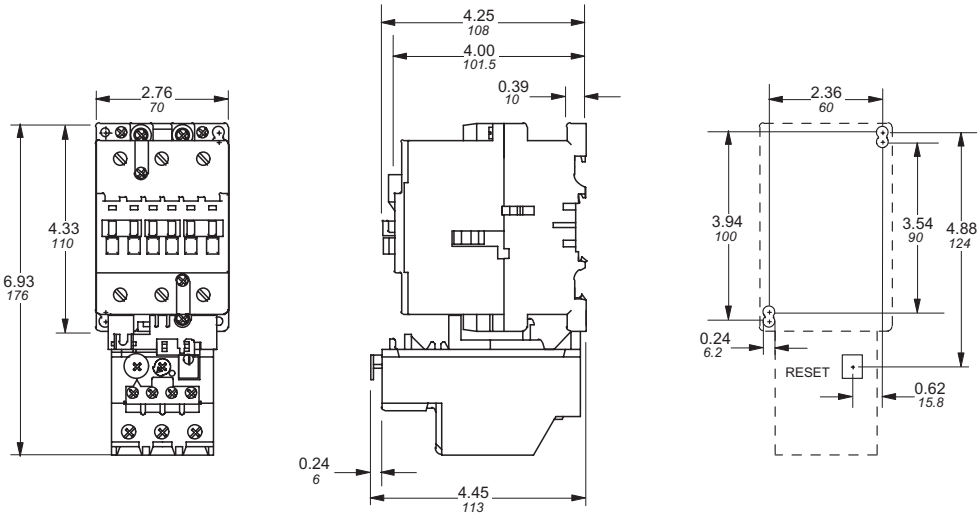
A/AE30 & A/AE40 — 2 Speed, 1 winding starter



A/AE30 & A/AE40 — 2 Speed, 2 winding starter



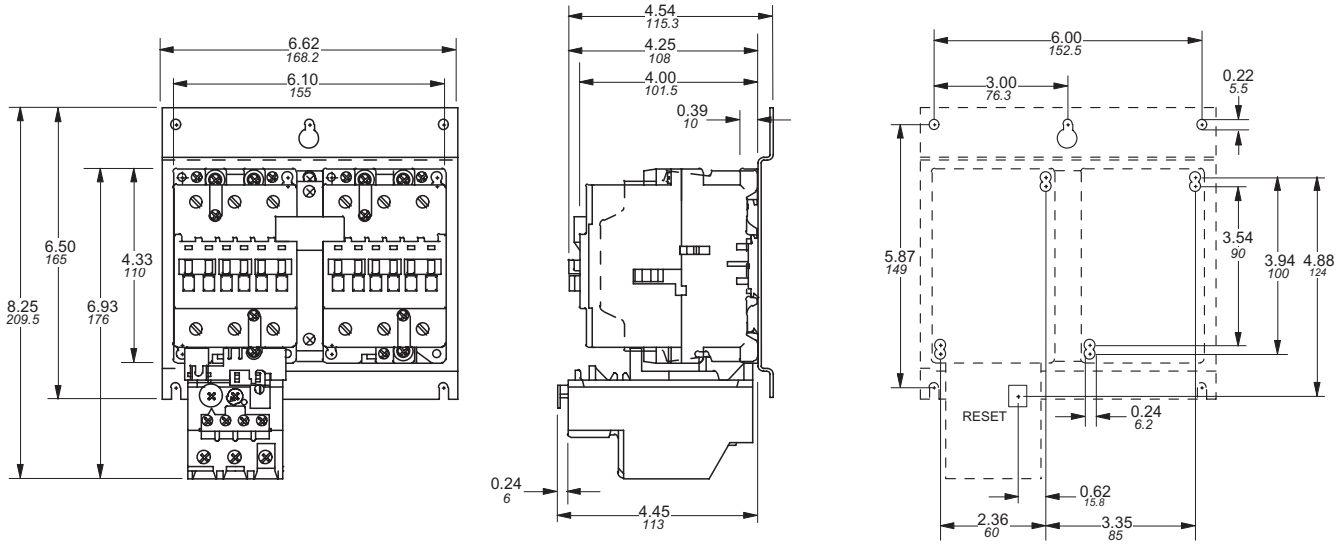
A/AE50 – A/AE75 + TA75 — Starter



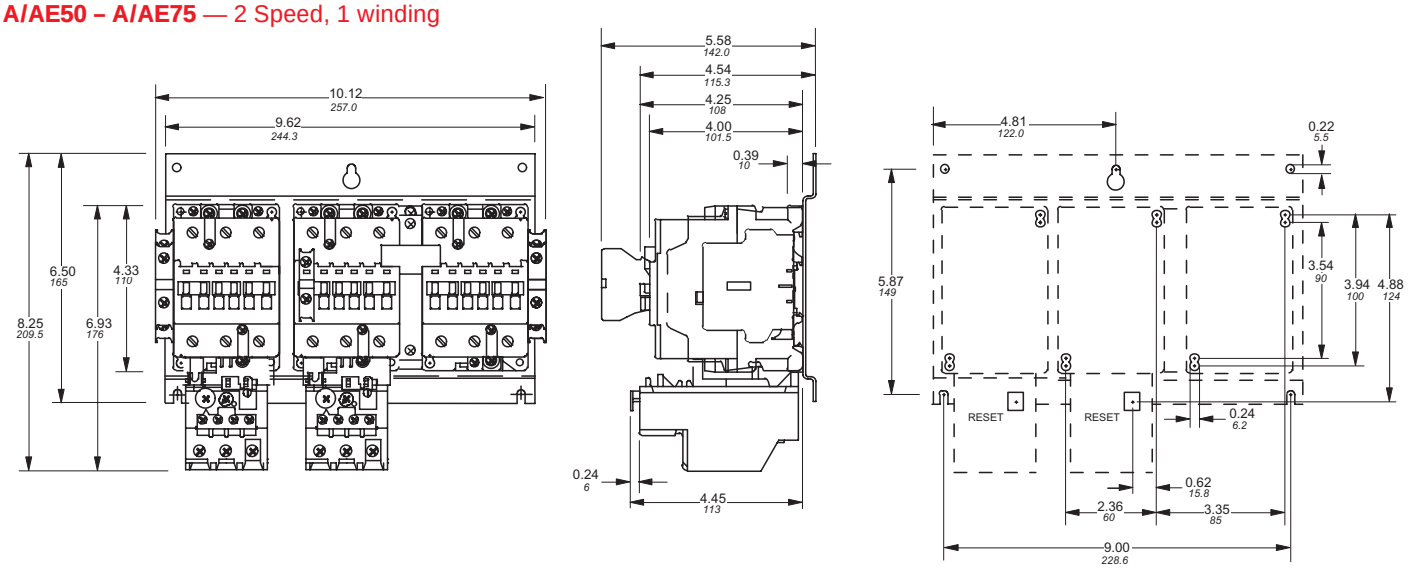
Approximate dimensions
AC/DC operated, 3 pole
A/AE50 – A/AE75

00.00 / 00.00 Inches [Millimeters]

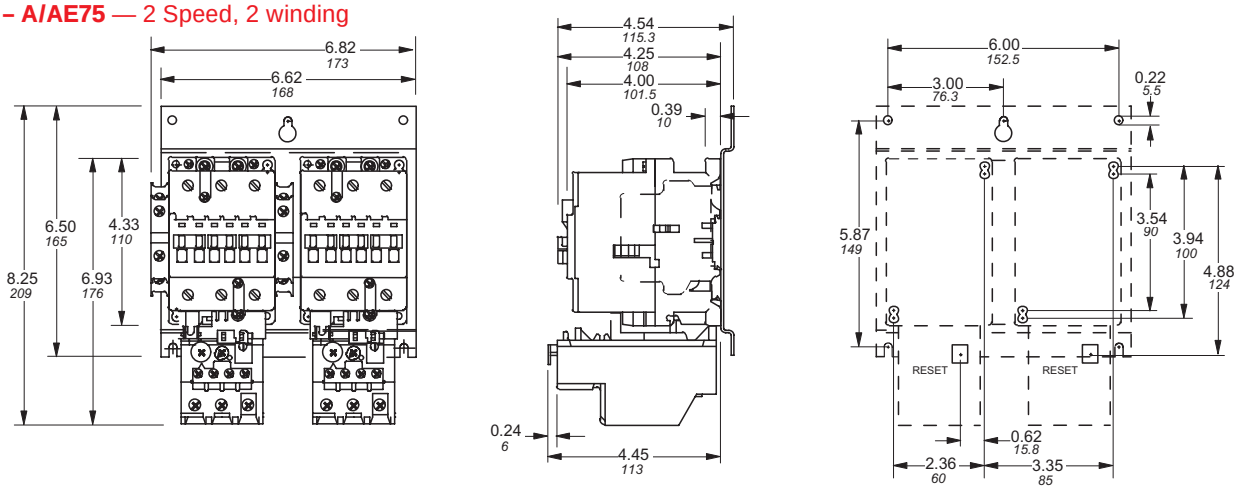
A/AE50 – A/AE75 + VM5 or VE5 + TA75 — Reversing starter



A/AE50 – A/AE75 — 2 Speed, 1 winding



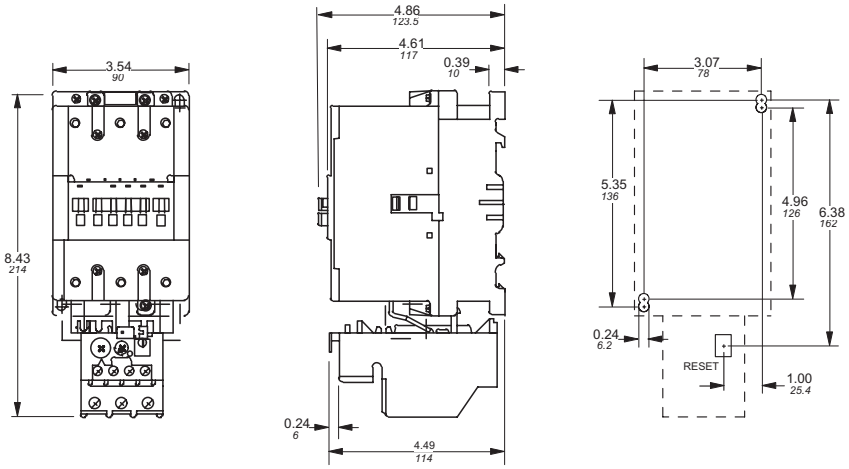
A/AE50 – A/AE75 — 2 Speed, 2 winding



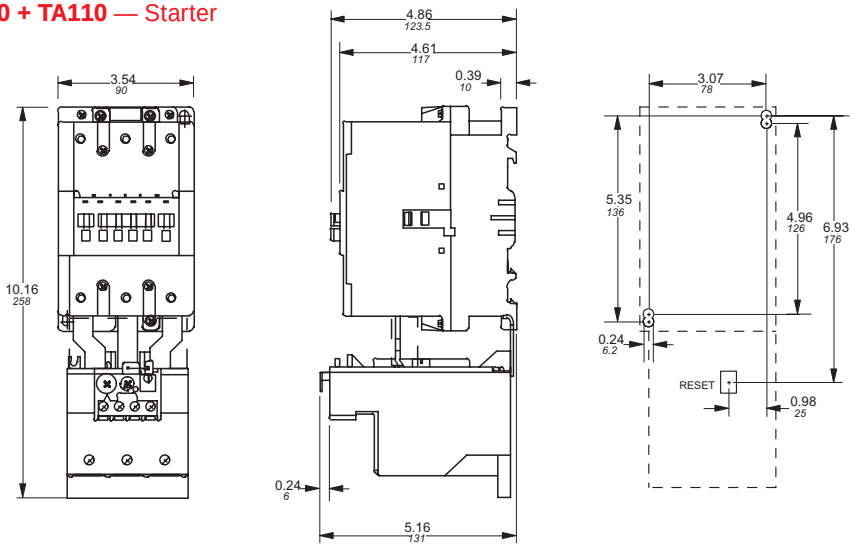
Approximate dimensions
AC/DC operated, 3 pole
A/AE/AF95 & A/AE/AF110

00.00 / 00.00 Inches [Millimeters]

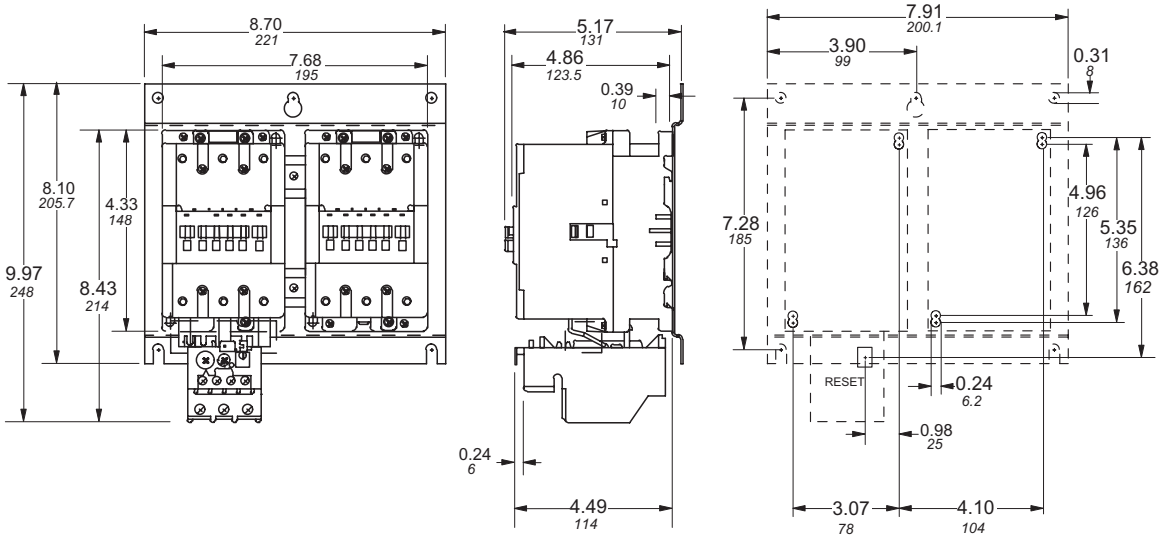
A/AE/AF95 & A/AE/AF110 + TA80 — Starter



A/AE/AF95 & A/AE/AF110 + TA110 — Starter



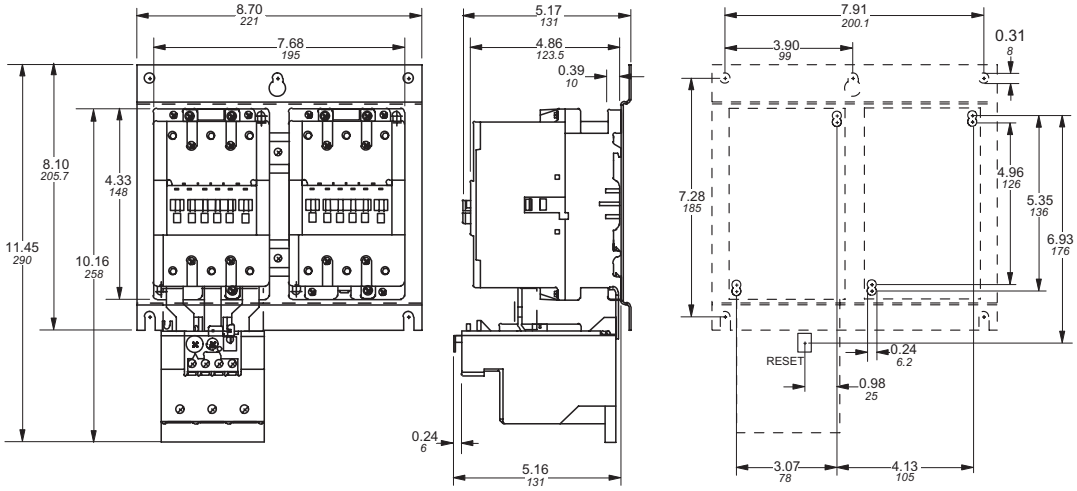
A/AE/AF95 & A/AE/AF110 + VE5 + TA80 — Reversing starter



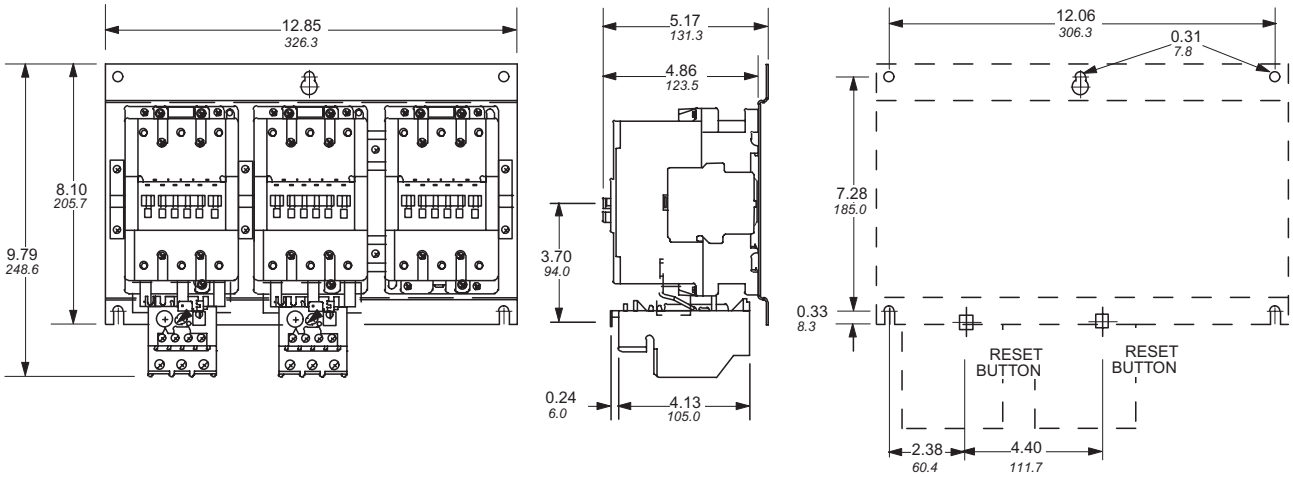
Approximate dimensions
AC/DC operated, 3 pole
A/AE/AF95 & A/AE/AF110

00.00 / 00.00 Inches [Millimeters]

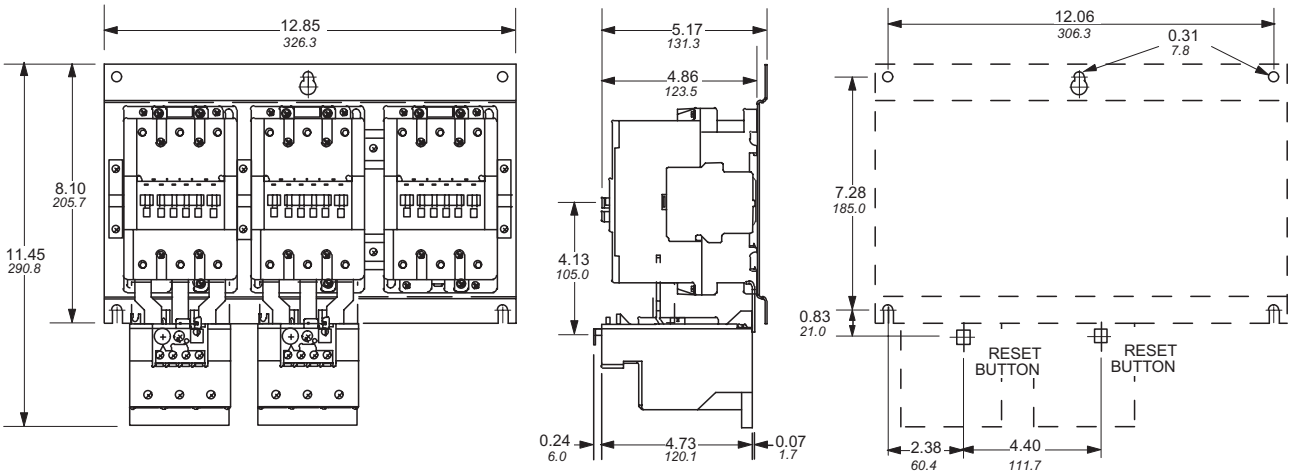
A/AE/AF95 & A/AE/AF110 + VE5 + TA110 — Reversing starter



A/AE/AF95 & A/AE/AF110 + TA80 — 2 Speed, 1 winding starter



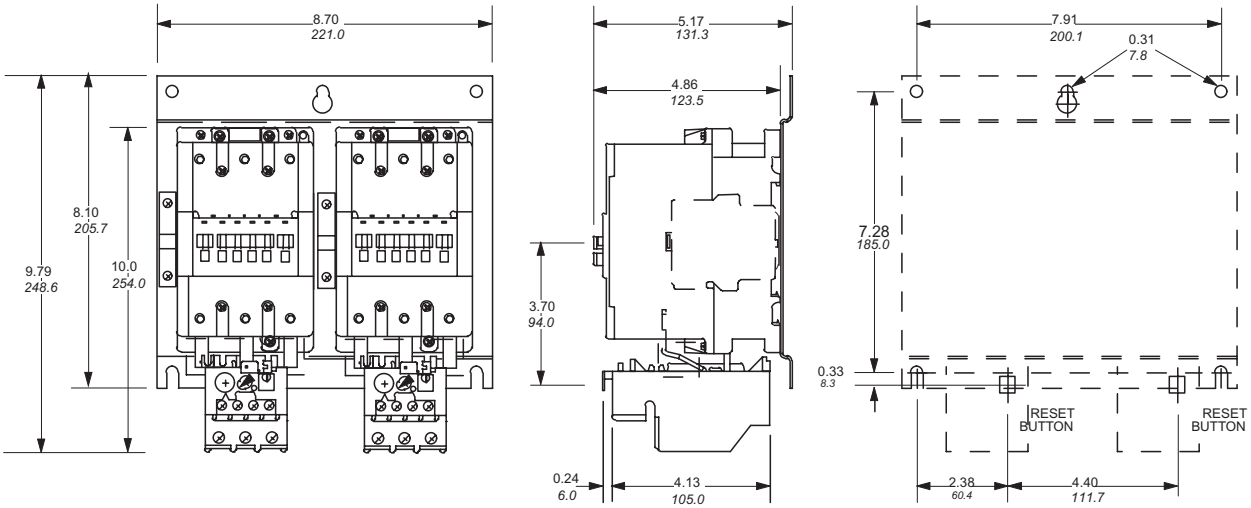
A/AE/AF95 & A/AE/AF110 + TA110 — 2 Speed, 1 winding starter



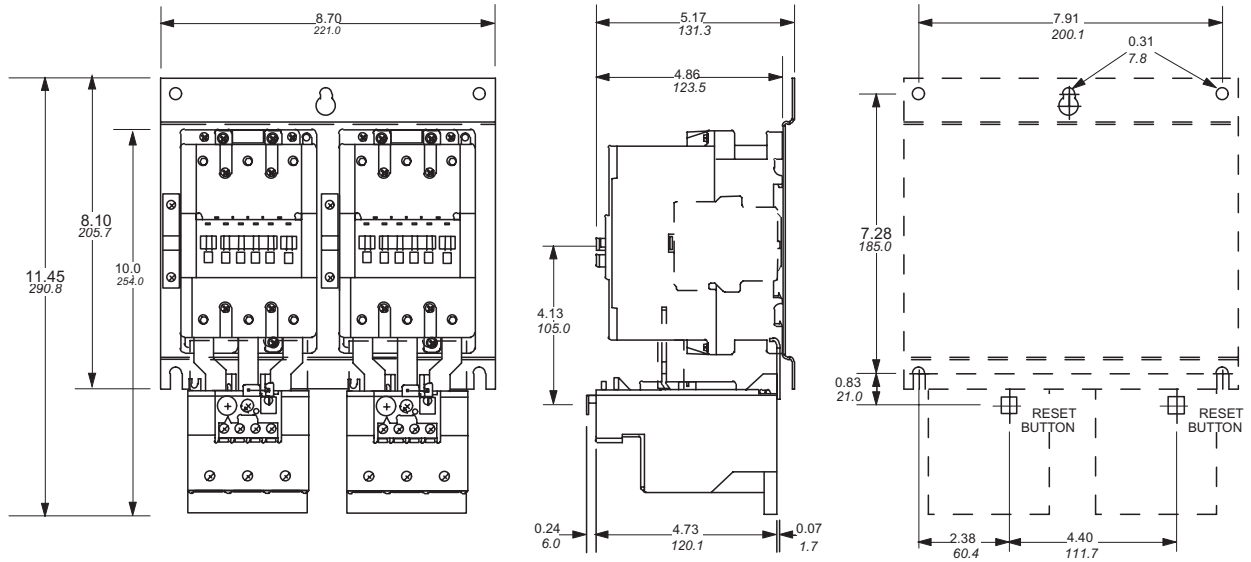
Approximate dimensions
AC/DC operated, 3 pole
A/AE/AF95 & A/AE/AF110

00.00 / 00.00 Inches [Millimeters]

A/AE/AF95 & A/AE/AF110 + TA80 — 2 Speed, 2 winding starter



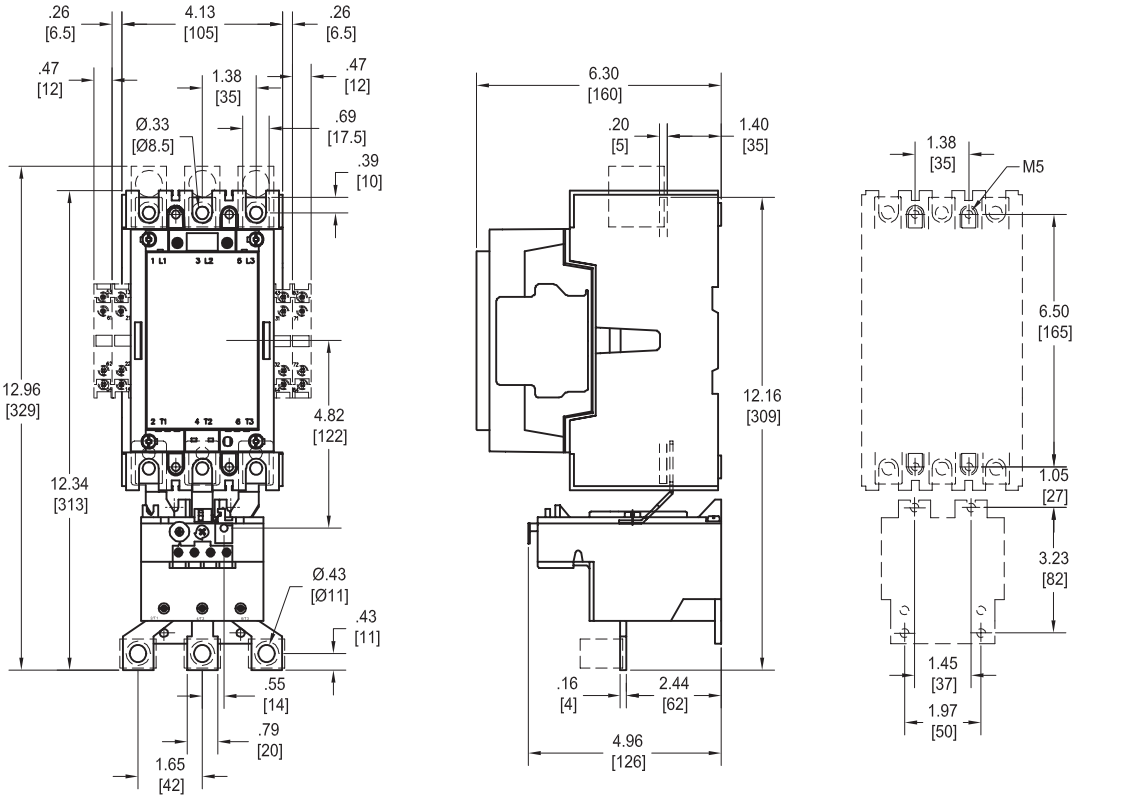
A/AE/AF95 & A/AE/AF110 + TA110 — 2 Speed, 2 winding starter



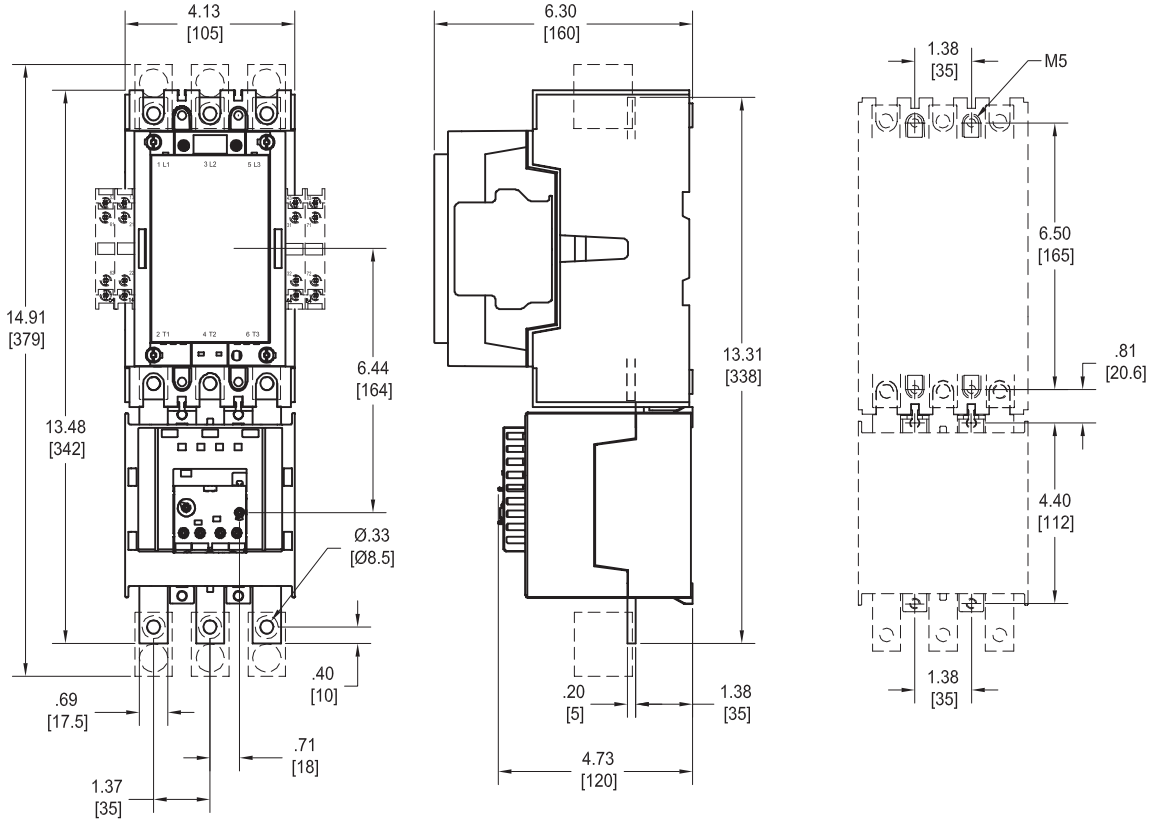
Approximate dimensions
AC/DC operated, 3 pole
A/AF145 & A/AF185

00.00 / 00.00 Inches [Millimeters]

A/AF145 – A/AF185 + TA200 — Starter



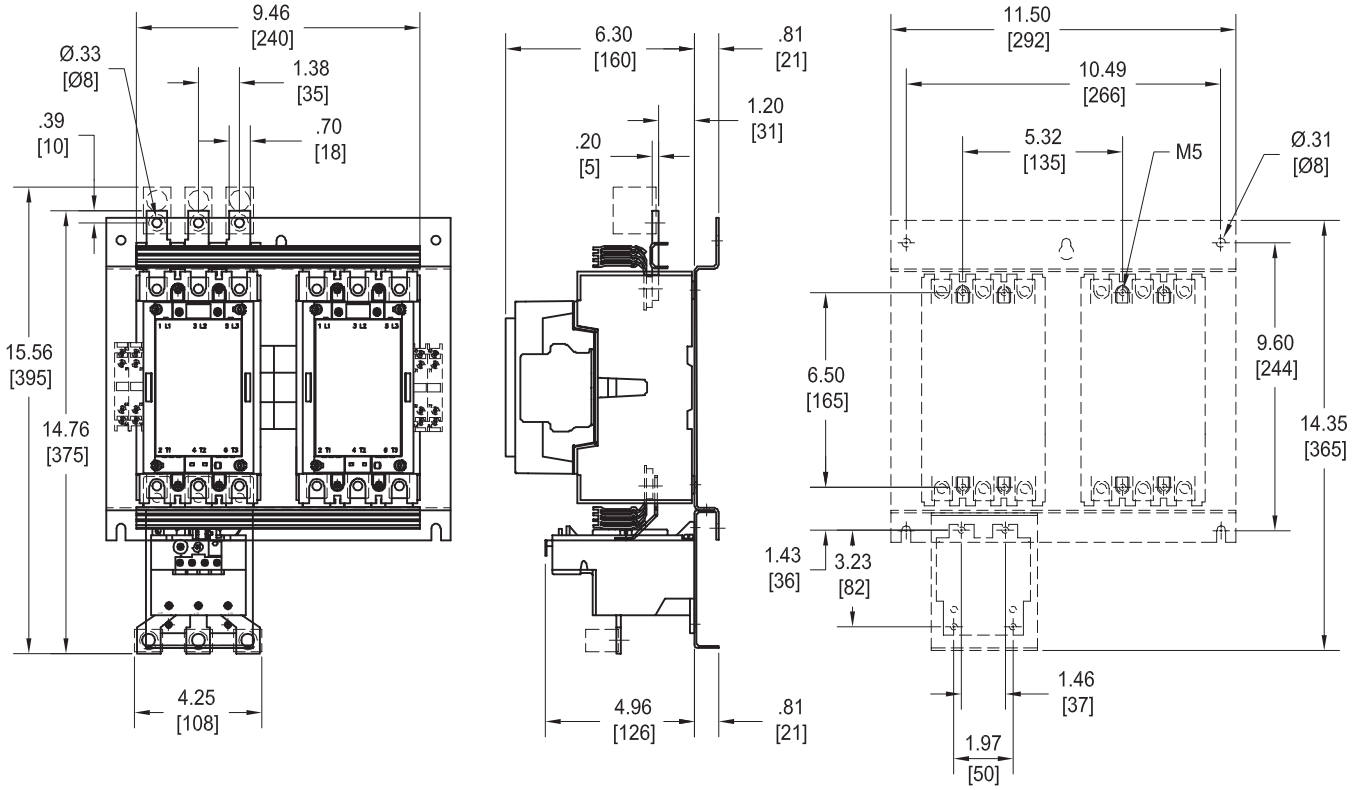
A/AF145 – A/AF185 + E200 — Starter



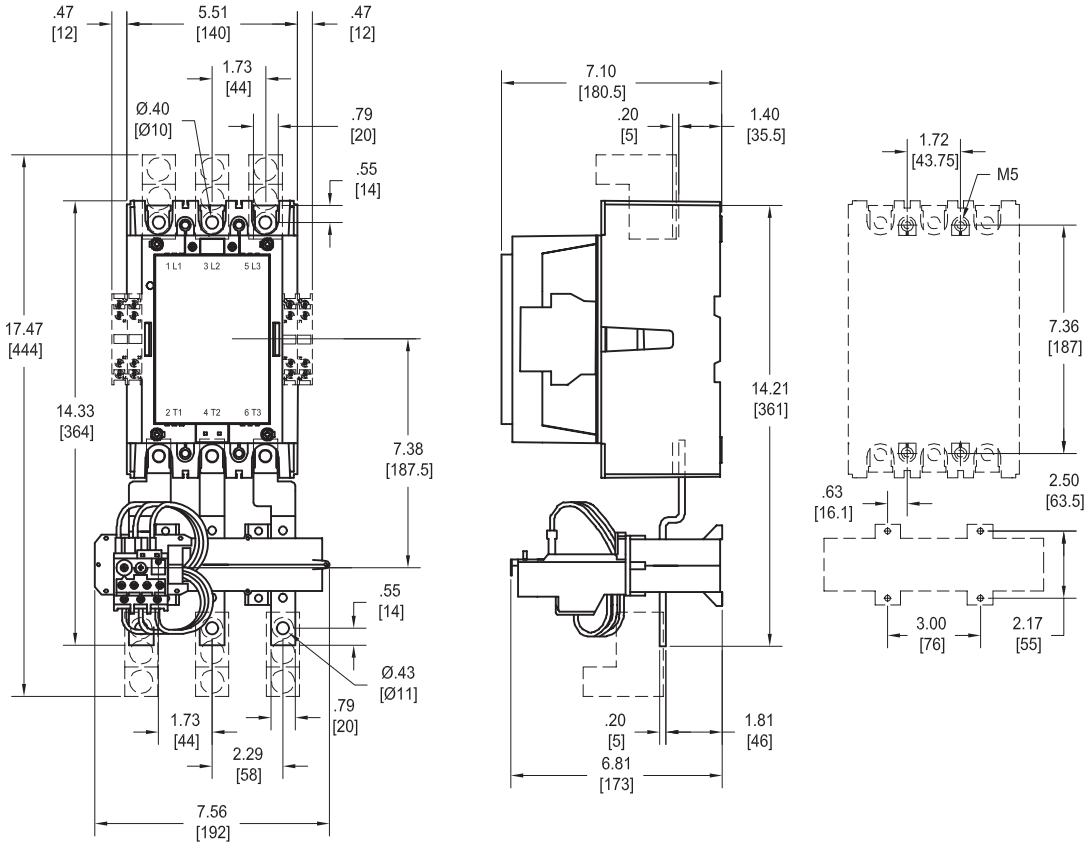
Approximate dimensions
AC/DC operated, 3 pole
A/AF145 & A/AF210

00.00 / 00.00 Inches [Millimeters]

A/AF145 – A/AF185 + TA200 – Reversing starter



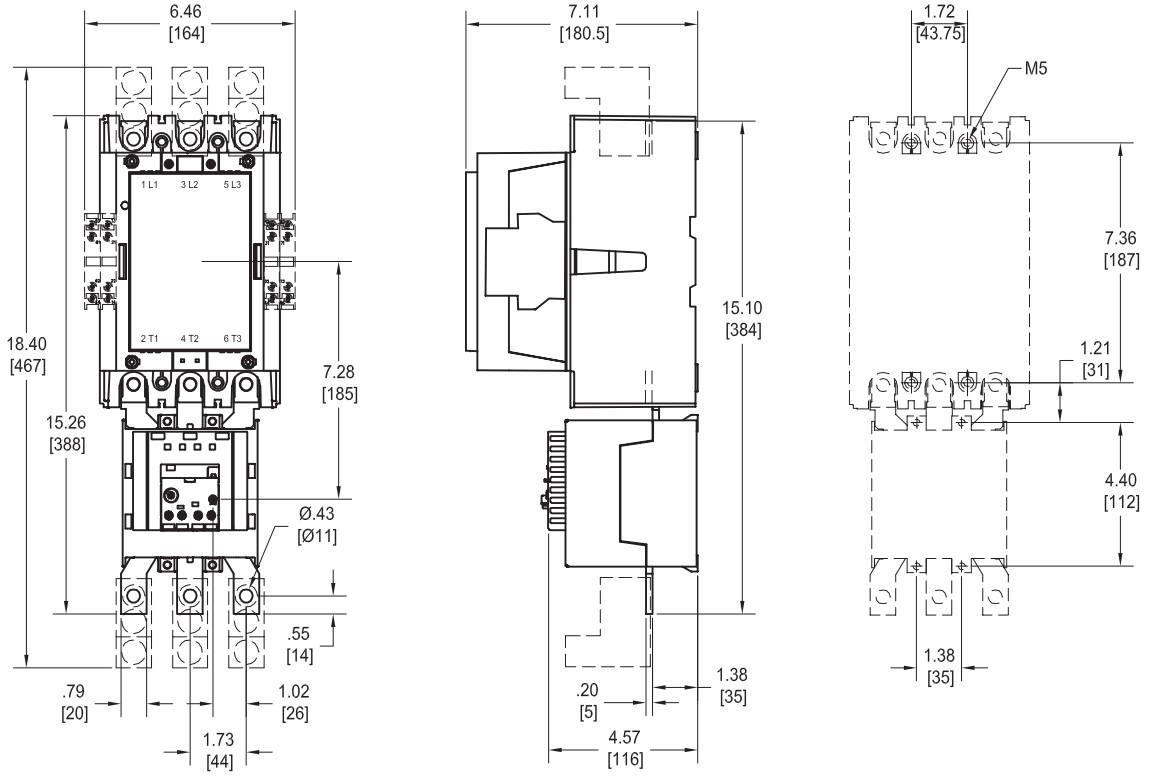
A210 – A300 + TA450



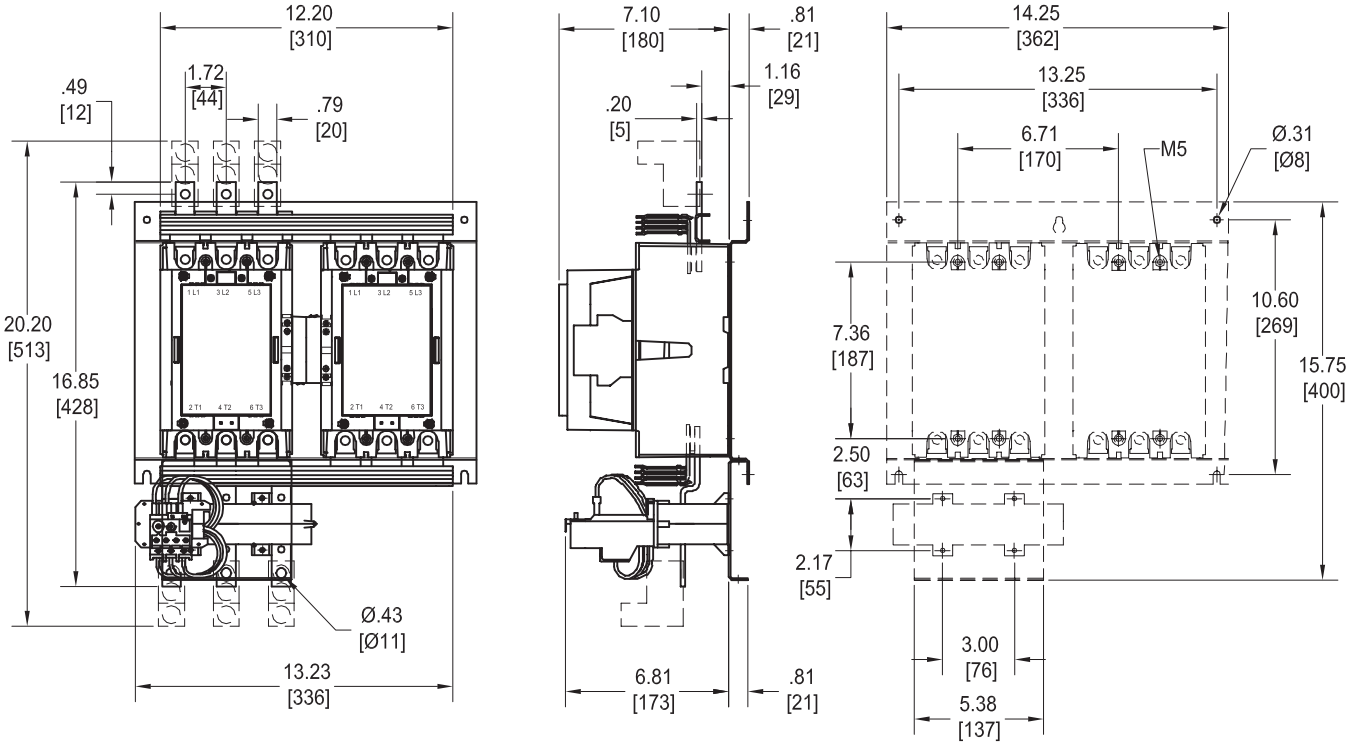
Approximate dimensions
AC/DC operated, 3 pole
A/AF210

00.00 / 00.00 Inches [Millimeters]

A210 – A300 + E320



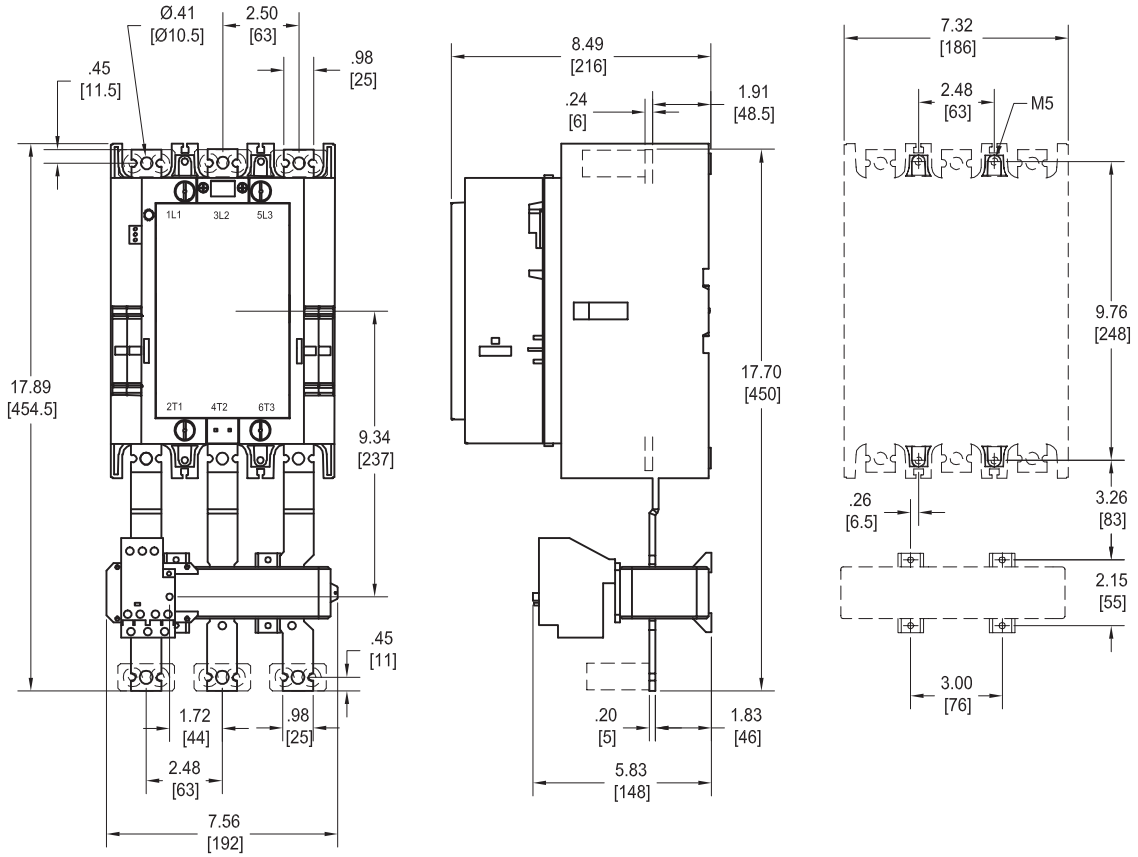
A210 – A300 + TA450 – Reversing starter



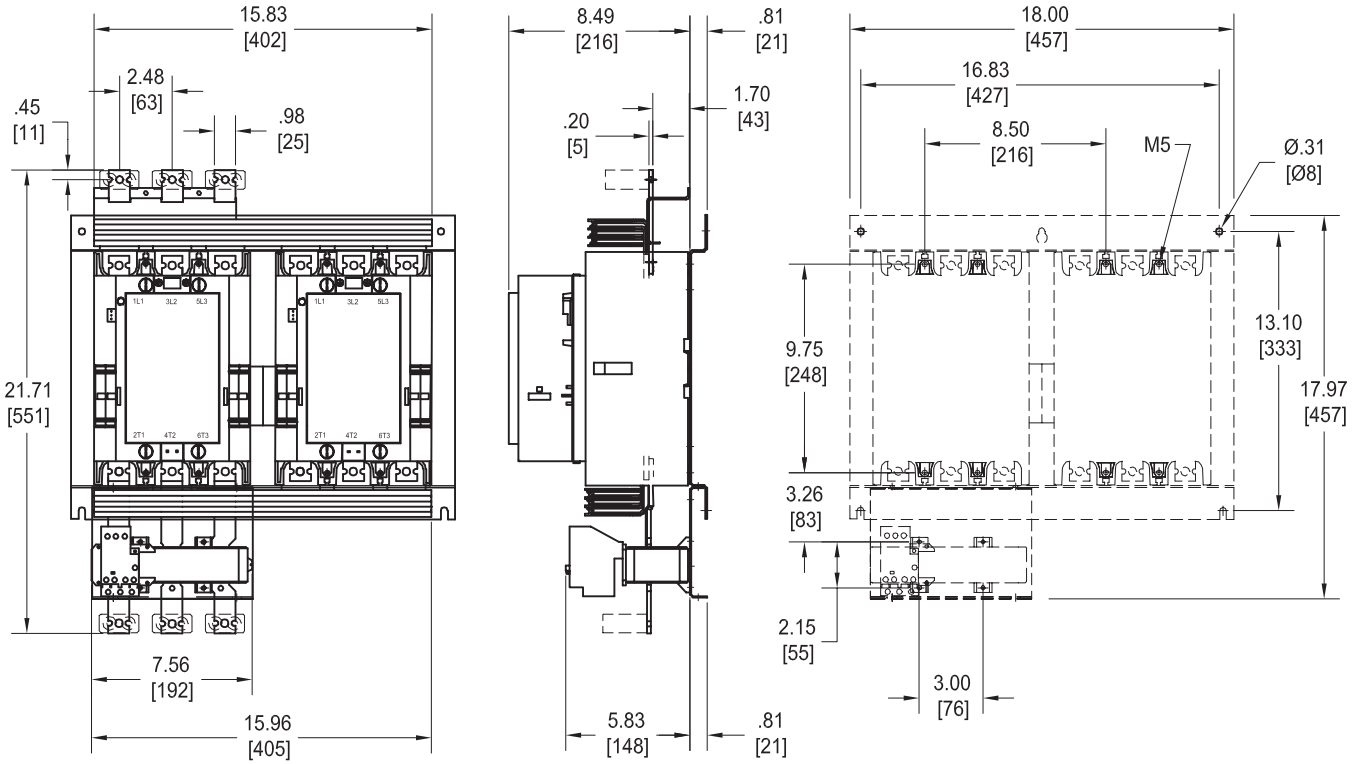
Approximate dimensions
AC/DC operated, 3 pole
A/AF400 & A/AF460

00.00 / 00.00 Inches [Millimeters]

AF400 – AF460 + E500 — Starter



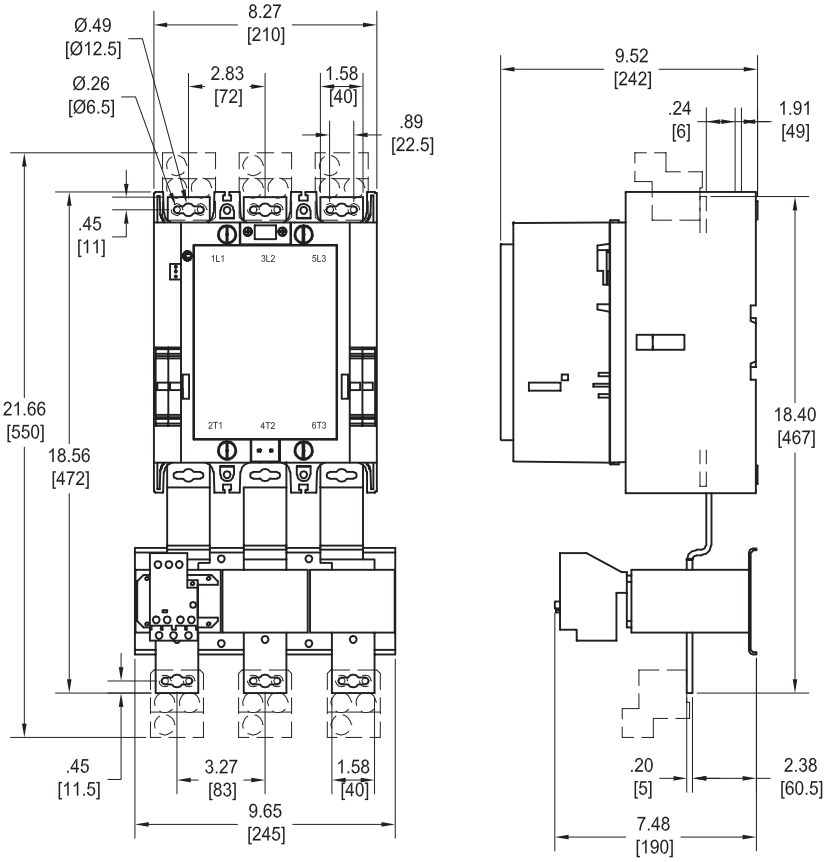
AF400 – AF460 + E500 – Reversing starter



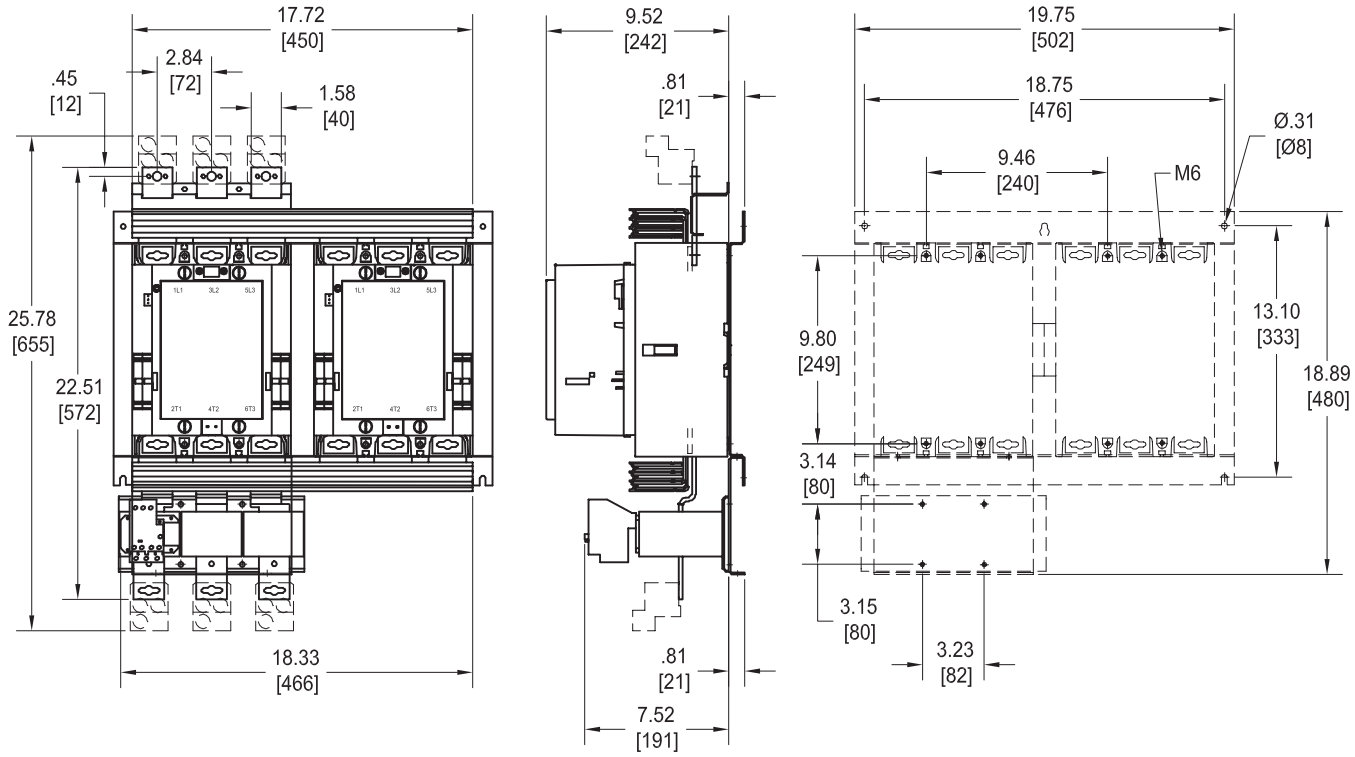
Approximate dimensions
AC/DC operated, 3 pole
A/AF580 & A/AF750

00.00 / 00.00 Inches [Millimeters]

AF580 – AF750 + E800 — Starter



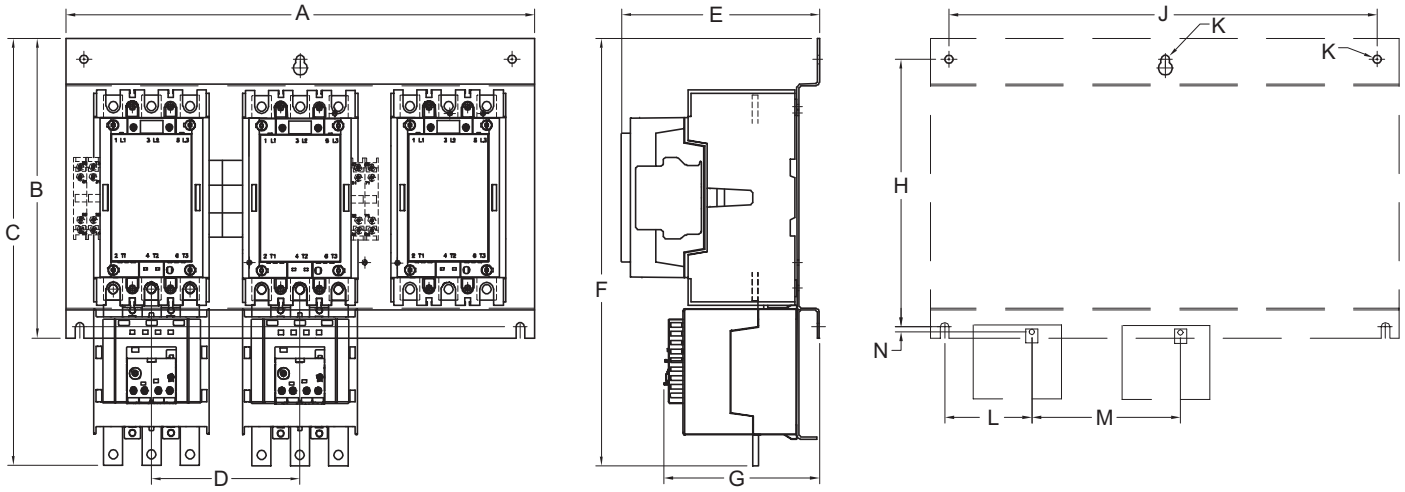
AF580 – AF750 + E800 – Reversing starter



Approximate dimensions
2 speed, 1 winding
A/AE26 – AF750, AC & DC operated, 3 pole

00.00
00.00
Inches
[Millimeters]

A26 – AF750 – 2 Speed, 1 Winding

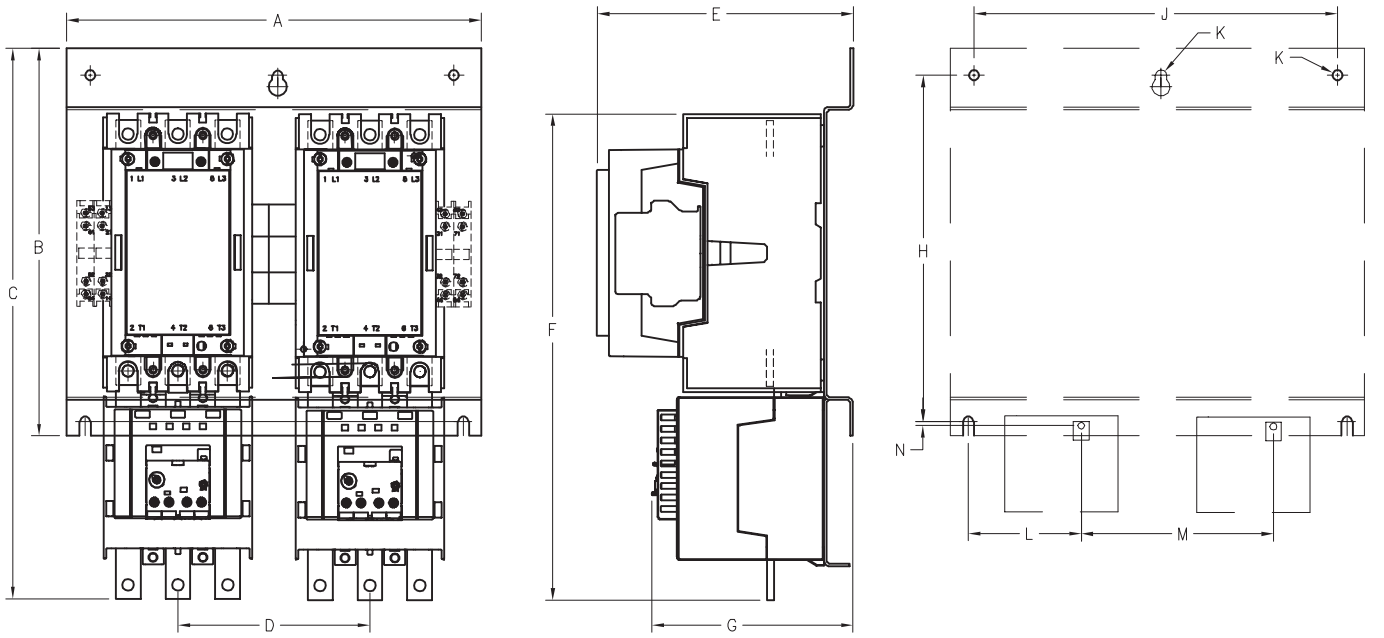


Item	A	B	C	D	E	F	G	H	J	K	L	M	N
A26	7.87 *200*	5.25 *133*	6.87 *175*	2.6 *66*	4.03 *102*	5.78 *147*	4.64 *118*	4.64 *118*	7.23 *184*	0.22 *6*	1.54 *39*	2.35 *60*	0.36 *9*
A30 - A40	7.87 *200*	5.25 *133*	7.25 *191*	2.43 *62*	4.6 *117*	5.85 *149*	4.42 *112*	4.64 *118*	7.23 *184*	0.22 *6*	1.56 *40*	2.33 *59*	0.36 *9*
A50 - A75	9.62 *244*	6.5 *165*	8.25 *210*	3.13 *80*	5.58 *142*	6.9 *175*	4.45 *113*	5.87 *149*	9 *229*	0.22 *6*	1.88 *48*	3 *76*	0.2 *5*
A95-A110+TA80	12.85 *326*	8.1 *206*	9.79 *249*	4.08 *104*	5.17 *131*	8.34 *212*	4.93 *125*	7.28 *185*	12.06 *306*	0.31 *8*	2.38 *60*	4.4 *112*	0.33 *8*
A95-A110+TA110	12.85 *326*	8.1 *206*	11.45 *291*	4 *102*	5.17 *131*	9.4 *239*	5.4 *137*	7.28 *185*	12.06 *306*	0.31 *8*	2.38 *60*	4.4 *112*	0.83 *21*
A145-A185+TA200	16.81 *427*	10.75 *273*	14.6 *371*	5.33 *135*	7.1 *180*	14.73 *374*	5.77 *147*	9.6 *244*	15.36 *390*	0.31 *8*	2.57 *65*	5.33 *135*	0.42 *11*
A145-A185+E200	16.81 *427*	10.75 *273*	15.33 *371*	5.33 *135*	7.1 *180*	15.34 *389*	5.58 *142*	9.6 *244*	15.36 *390*	0.31 *8*	– –	– –	– –
A210-A300+E320	20.92 *531*	11.75 *298*	16.98 *431*	6.71 *170*	7.92 *201*	17.02 *432*	5.6 *142*	10.6 *269*	19.62 *498*	0.31 *8*	– –	– –	– –
A400-A460+E500	26.33 *669*	14.25 *362*	19.61 *498*	4.96 *126*	9.27 *235*	19.53 *496*	6.62 *168*	13.1 *333*	25.33 *643*	0.31 *8*	– –	– –	– –
A580-A750+E800	29.75 *756*	14.25 *362*	20.2 *513*	6.54 *166*	10.3 *269*	20.25 *514*	8.33 *212*	13.1 *333*	28.75 *730*	0.31 *8*	– –	– –	– –

Approximate dimensions
2 speed, 2 winding
A/AE26 – AF750, AC & DC operated, 3 pole

00.00 / 00.00 Inches [Millimeters]

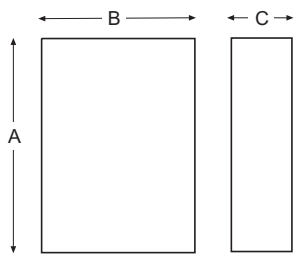
A26 – AF750 – 2 Speed, 2 Winding



Item	A	B	C	D	E	F	G	H	J	K	L	M	N
A26	5.25 *133*	5.79 *147*	6.95 *177*	2.6 *66*	4.02 *102*	5.78 *147*	4.64 *118*	4.64 *118*	4.64 *118*	0.22 *6*	1.77 *45*	2.72 *69*	0.36 *9*
A30 - A40	5.25 *133*	5.25 *133*	7.25 *191*	2.43 *62*	4.9 *150*	5.85 *149*	4.42 *112*	4.64 *118*	4.64 *118*	0.22 *6*	1.77 *45*	2.72 *69*	0.36 *9*
A50 - A75	6.62 *168*	6.5 *165*	8.25 *210*	3.42 *87*	4.54 *115*	6.9 *175*	4.82 *122*	5.87 *149*	6 *152*	0.22 *6*	2.36 *60*	335 *85*	0.2 *5*
A95-A110	8.7 *221*	8.1 *206*	11.45 *291*	4.14 *105*	5.17 *131*	9.39 *239*	5.42 *138*	7.28 *185*	7.91 *200*	0.31 *8*	2.36 *60*	4.4 *111*	0.83 *21*
A145-A185+TA200	11.5 *292*	10.75 *273*	14.6 *371*	3.31 *84*	7.03 *179*	12.69 *322*	5.7 *145*	9.6 *244*	10.09 *256*	0.31 *8*	3.13 *80*	5.33 *135*	0.51 *13*
A145-A185+E200	11.5 *292*	10.75 *273*	15.27 *388*	2.76 *70*	7.11 *181*	13.48 *342*	5.58 *142*	9.6 *244*	10.09 *256*	0.31 *8*	– –	– –	– –
A210-A300+TA450	11.5 *292*	10.75 *273*	14.35 *364.5*	2.76 *70*	7.11 *180*	14.18 *360*	6.81 *173*	9.6 *244*	10.09 *256*	0.31 *8*	– –	– –	– –
A210-A300+E320	14.25 *362*	11.75 *298*	16.98 *431*	3.45 *88*	7.92 *201*	15.29 *388*	5.6 *142*	10.6 *269*	12.84 *326*	0.31 *8*	– –	– –	– –
A400-A460+E500	18 *457*	14.25 *362*	19.61 *498*	2.48 *63*	9.3 *236*	16.68 *423*	6.62 *168*	11.32 *288*	16.83 *427*	0.31 *8*	– –	– –	– –
A580-A750+E800	19.75 *502*	14.25 *362*	20.2 *513*	3.27 *83*	10.05 *255*	17.41 *442*	8.33 *212*	13.1 *333*	18.75 *476*	0.31 *8*	– –	– –	– –

Approximate dimensions
Across the line w/CCT
Across the line, reversing w/CCT

00.00
00.00
Inches
[Millimeters]



Across the line w/CCT

Starter size	Enclosure type	A	B	C
A9 – A26	1	11	6	5
A9 – A40	3R	10	8	6
	4	10	8	6
	4X Stainless	10	8	6
	4X Plastic	10	8	7
	12	10	8	6
	7 (w/o CCT) ①	11	6	5
A30 – A75	1	13	9	7
A50 – A75	3R	14	12	8
	4	14	12	6
	4X Stainless	14	12	6
	4X Plastic	14	12	7
	12	14	12	8
A9 – A75	7 ①	12	8	6
A95 – A110	1	20	16	8
	3R	20	16	8
	4	20	16	8
	4X Stainless	20	16	8
	4X Plastic	20	16	8
	12	20	16	8
	7 ①	18	12	6
A145 – A185	1	30	24	12
	3R	30	20	8
	4	30	20	8
	4X Stainless	30	24	8
	4X Plastic	30	20	12
	12	30	20	8
	7 ①	30	12	6
A210 – A300	1	30	24	12
	3R	30	20	10
	4	30	20	10
	4X Stainless	30	24	12
	4X Plastic	30	20	12
	12	30	20	10
	7 ①	30	12	6
A400	1	36	30	12
	3R	36	24	12
	4	36	24	12
	4X Stainless	36	24	12
	4X Plastic	–	–	–
	12	36	24	12
A460	1	42	30	13
	3R	42	36	12
	4	42	36	12
	4X Stainless	42	36	12
	4X Plastic	–	–	–
	12	42	36	12
A580	1	36	30	12
	3R	36	24	12
	4	36	24	12
	4X Stainless	36	24	12
	4X Plastic	–	–	–
	12	36	24	12
A750	1	42	30	13
	3R	42	36	12
	4	42	36	12
	4X Stainless	42	36	12
	4X Plastic	–	–	–
	12	42	36	12

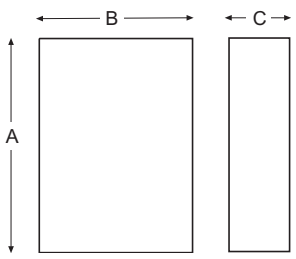
Across the line, reversing w/CCT

Starter size	Enclosure type	A	B	C
A9 – A40	1	12	10	6
	3R	14	12	8
	4	14	12	6
	4X Stainless	14	12	6
	4X Plastic	14	12	7
	12	14	12	8
A50 – A75	1	14	12	8
	3R	14	12	8
	4	14	12	6
	4X Stainless	14	12	6
	4X Plastic	14	12	7
	12	14	12	8
A95 – A110	1	20	16	8
	3R	20	16	8
	4	20	16	8
	4X Stainless	20	16	8
	4X Plastic	20	16	8
	12	20	16	8
A145 – A185	1	30	24	12
	3R	30	20	8
	4	30	20	8
	4X Stainless	30	24	8
	4X Plastic	30	20	12
	12	30	20	8
A210 – A300	1	30	24	12
	3R	30	20	10
	4	30	20	10
	4X Stainless	30	24	12
	4X Plastic	30	20	12
	12	30	20	10
A400	1	36	30	12
	3R	36	24	12
	4	36	24	12
	4X Stainless	36	24	12
	4X Plastic	–	–	–
	12	36	24	12
A460	1	42	30	13
	3R	42	36	12
	4	42	36	12
	4X Stainless	42	36	12
	4X Plastic	–	–	–
	12	42	36	12
A580	1	36	30	12
	3R	36	24	12
	4	36	24	12
	4X Stainless	36	24	12
	4X Plastic	–	–	–
	12	36	24	12
A750	1	42	30	13
	3R	42	36	12
	4	42	36	12
	4X Stainless	42	36	12
	4X Plastic	–	–	–
	12	42	36	12

① Type 7, explosion-proof inside dimensions.

Approximate dimensions
2-Speed, 1 Winding w/CCT
2-Speed, 2-Winding w/CCT

00.00 / 00.00 Inches [Millimeters]



2 Speed, 1 winding w/CCT

Starter size	Enclosure type	A	B	C
A9 – A40	1	14	12	8
	3R	14	12	8
	4	14	12	6
	4X Stainless	14	12	6
	4X Plastic	14	12	7
	12	14	12	8
A50 – A75	1	20	16	8
	3R	20	16	8
	4	20	16	8
	4X Stainless	20	16	8
	4X Plastic	20	16	8
	12	20	16	8
A95 – A110	1	20	16	8
	3R	20	16	8
	4	20	16	8
	4X Stainless	20	16	8
	4X Plastic	20	16	8
	12	20	16	8
A145 – A185	1	30	24	12
	3R	30	20	8
	4	30	20	8
	4X Stainless	30	24	8
	4X Plastic	30	20	12
	12	30	20	8
A210 – A300	1	30	24	12
	3R	30	24	12
	4	30	24	12
	4X Stainless	30	24	12
	4X Plastic	30	20	12
	12	30	24	12
A400	1	36	30	12
	3R	36	30	12
	4	36	30	12
	4X Stainless	36	30	12
	4X Plastic	–	–	–
	12	36	30	12
A460	1	42	30	13
	3R	42	36	12
	4	42	36	12
	4X Stainless	42	36	12
	4X Plastic	–	–	–
	12	42	36	12
A580 – A750	1	42	36	13
	3R	42	36	12
	4	42	36	12
	4X Stainless	42	36	12
	4X Plastic	–	–	–
	12	42	36	12

2 Speed, 2 winding w/CCT

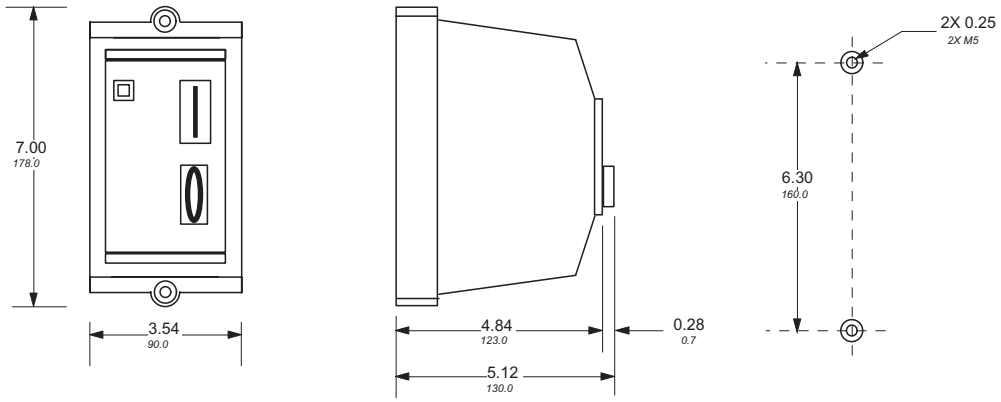
Starter size	Enclosure type	A	B	C
A9 – A40	1	12	10	6
	3R	14	12	8
	4	14	12	6
	4X Stainless	14	12	6
	4X Plastic	14	12	7
	12	14	12	8
A50 – A75	1	14	12	8
	3R	14	12	8
	4	14	12	6
	4X Stainless	14	12	6
	4X Plastic	14	12	7
	12	14	12	8
A95 – A110	1	20	16	8
	3R	20	16	8
	4	20	16	8
	4X Stainless	20	16	8
	4X Plastic	20	16	8
	12	20	16	8
A145 – A185	1	30	24	12
	3R	30	20	8
	4	30	20	8
	4X Stainless	30	24	8
	4X Plastic	30	20	12
	12	30	20	8
A210 – A300	1	30	24	12
	3R	30	20	10
	4	30	20	10
	4X Stainless	30	24	12
	4X Plastic	30	20	12
	12	30	20	10
A400	1	36	30	12
	3R	36	24	12
	4	36	24	12
	4X Stainless	36	24	12
	4X Plastic	–	–	–
	12	36	24	12
A460	1	42	30	13
	3R	42	36	12
	4	42	36	12
	4X Stainless	42	36	12
	4X Plastic	–	–	–
	12	42	36	12
A580	1	36	30	12
	3R	36	24	12
	4	36	24	12
	4X Stainless	36	24	12
	4X Plastic	–	–	–
	12	36	24	12
A750	1	42	30	13
	3R	42	36	12
	4	42	36	12
	4X Stainless	42	36	12
	4X Plastic	–	–	–
	12	42	36	12

① Type 7, explosion-proof inside dimensions.

Approximate dimensions
Plastic enclosed, IP65

00.00
00.00
Inches
[Millimeters]

Plastic enclosed, IP65

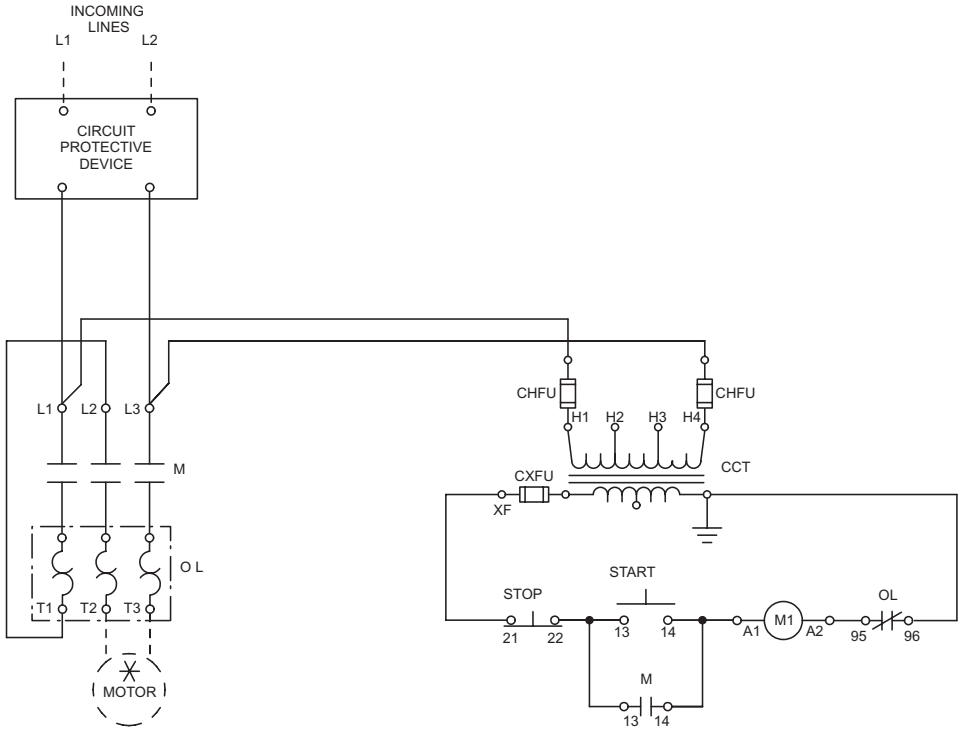


Circuit diagrams
Non-reversing, single phase
A9 – A185

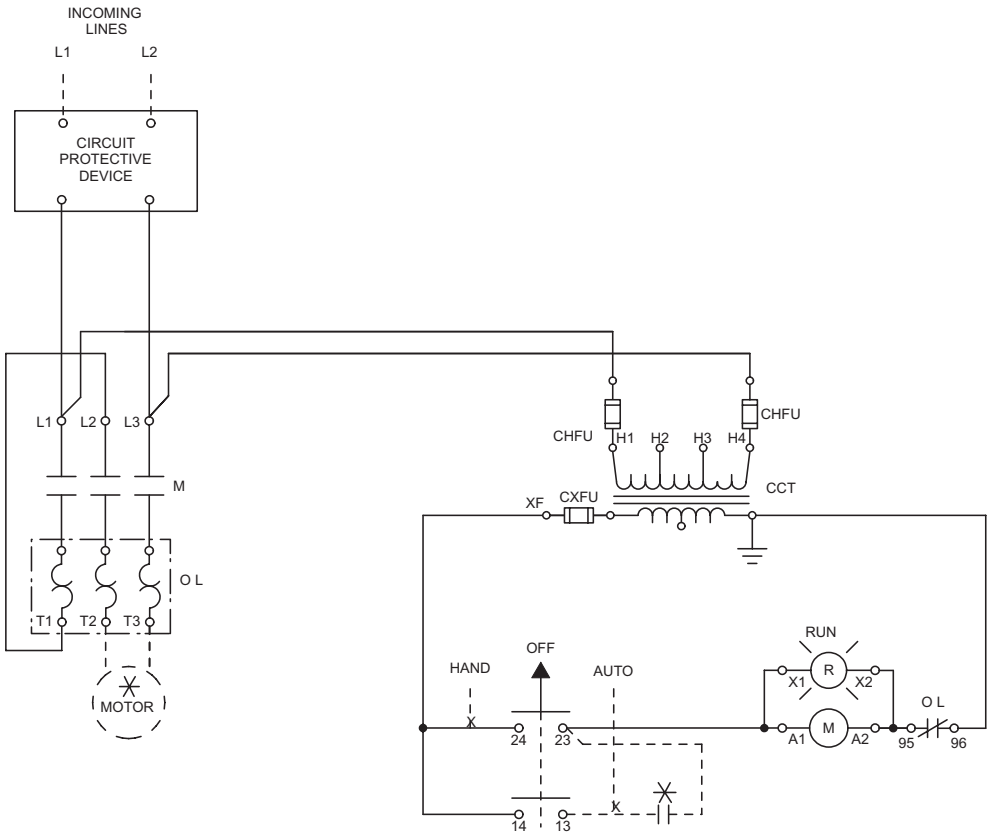
00.00 Inches
00.00 [Millimeters]

3

Non-reversing, single phase – A9 - A185 shown with control circuit transformer, START-STOP

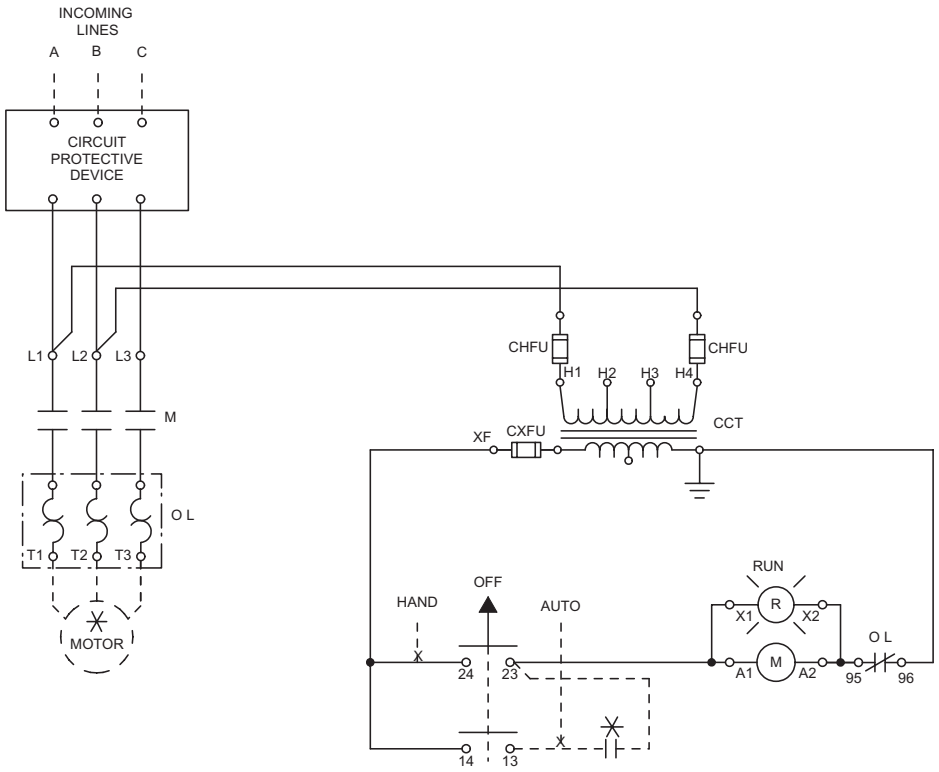


Non-reversing, single phase – A9 - A185 shown with control circuit transformer, HOA



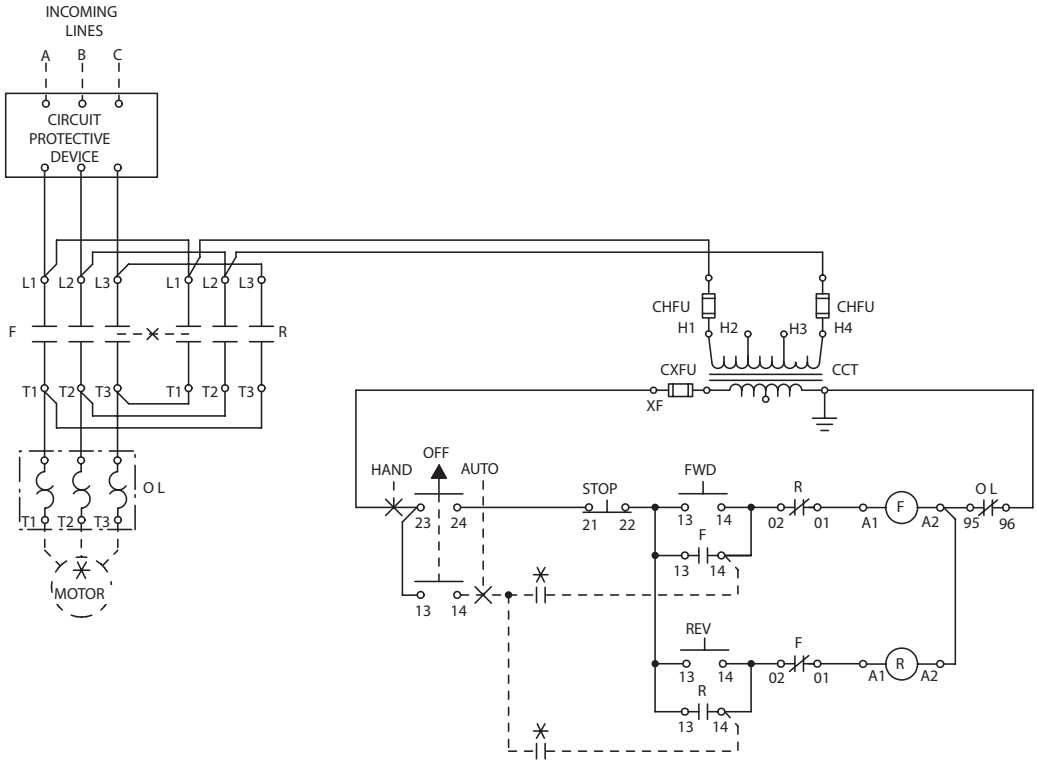
Non-reversing

A9 – A750 shown with control circuit transformer, HOA



Reversing

A9 – A750 shown with control circuit transformer, HOA, STOP, FWD, REV

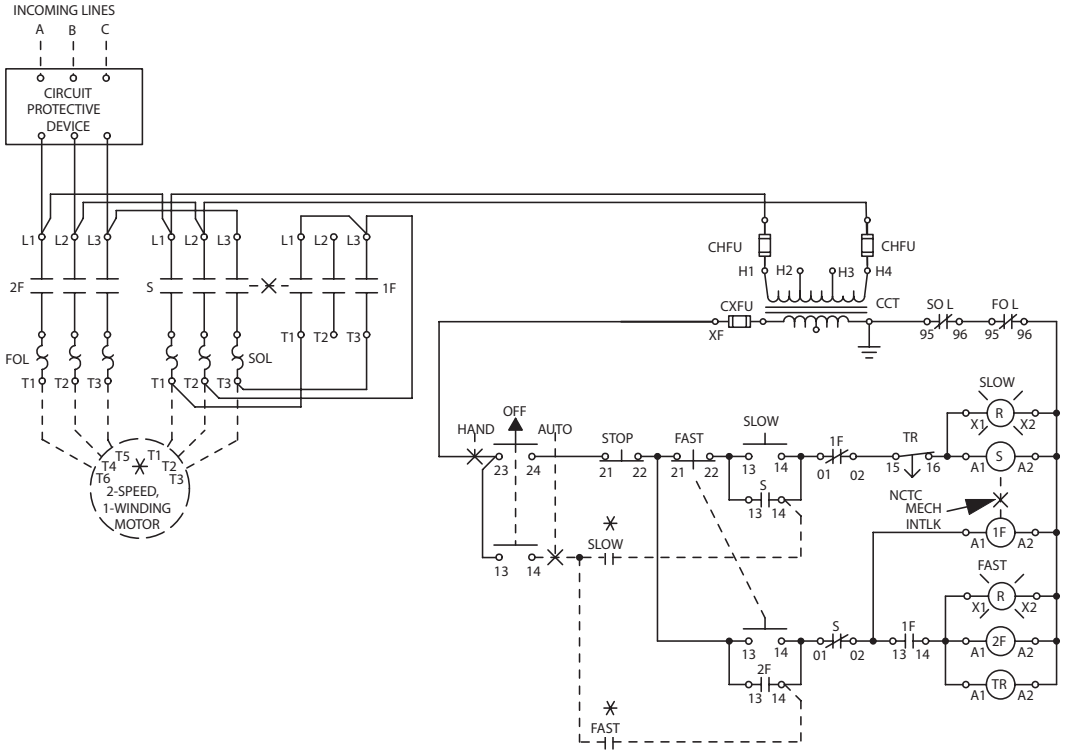


Circuit diagrams
2 Speed, 1 Winding; 2 Speed, 2 Winding
A9 – A750

00.00 Inches
00.00 [Millimeters]

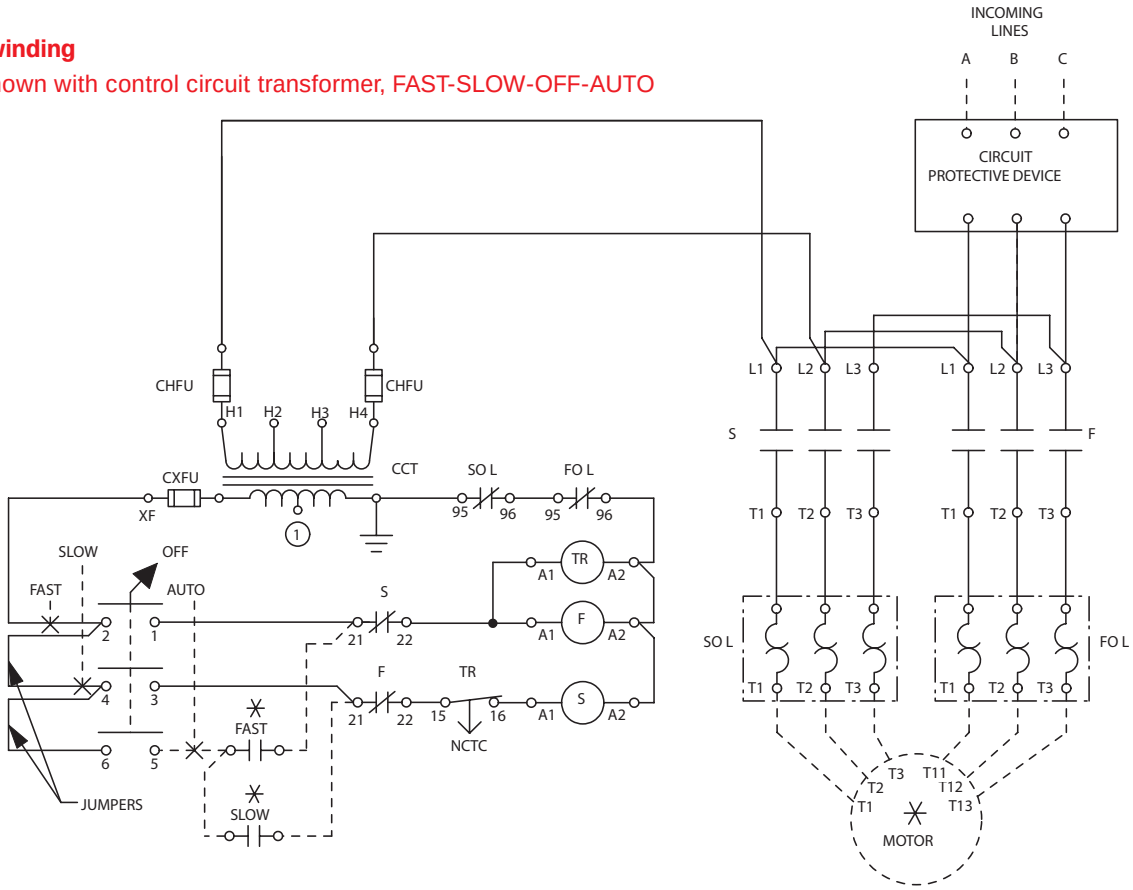
2 Speed, 1 winding — constant or variable torque, selective control

A9 – A750 shown with control circuit transformer, HOA, STOP-FAST-SLOW

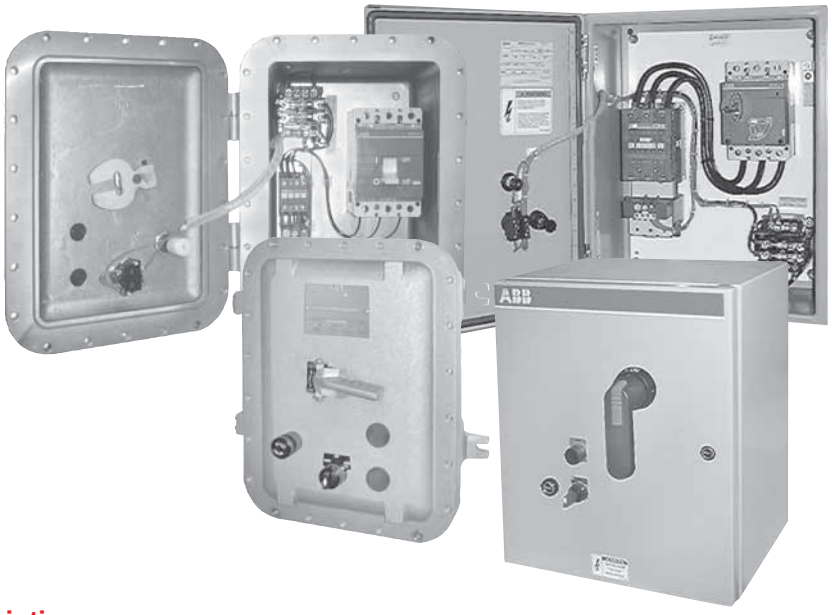


2 Speed, 2 winding

A9 – A750 shown with control circuit transformer, FAST-SLOW-OFF-AUTO



Combination starters
Enclosed
A9 – A750



Combination **Starters**

Description
A9 – A750

- Maximum UL/CSA horsepower ratings
- Available with ABB non-fusible or fusible disconnect switches and MCP, thermal magnetic or electronic trip type circuit breakers
- Compact space saving design
- Standard auxiliary contact configurations:
  - A9 – A40 1 N.O. or 1 N.C.
  - A50 – A750 1 N.O. & 1 N.C.
- Double break contact design
- Lowest possible contact bounce
- Early make & late break auxiliary contacts available
- Operates over an extended voltage range of 85% to 110% of rated control voltage
- UL listed

Overload relay protection

Starters, sizes A9–A185, have Class 10 adjustable thermal bimetallic overload relay protection as standard.

Sizes A210 – A750, have selectable Class 10, 20, 30 adjustable electronic overload relay protection as standard.

Electronic overload relay protection is available for other starter sizes.

General information
Catalog number explanation

A110 SR F 1 - 84 C 6 D A

Starter size

Starter type
S - Non-reversing
SR - Reversing
SS - Single phase, non-reversing
N - NEMA

Combination type
N - Non-fusible disconnect
F - Fusible disconnect
B - Thermal magnetic or electronic trip type circuit breaker
M - Motor Circuit Protection (MCP)

Enclosure
1 - UL Type 1
2 - UL Type 12
3 - UL Type 3R
4 - UL Type 4
X - UL Type 4X stainless steel
P - Plastic
7 - UL Type 7 & 9
Class I, Group D, Div 1 & 2
Class II, Groups E, F & G, Div 1 & 2
Class III
74 - Hazardous Type 4

Coil voltage/CCT

Overload range
See Overload Relay Selection chart, see page 3.6.

Accessories
See Factory modifications, page 3.3.

Fuse clip
6A- 30A, 600V, Class J
6B- 60A, 600V, Class J
6C- 100A, 600V, Class J
6D- 200A, 600V, Class J
6E- 400A, 600V, Class J
6F- 600A, 600V, Class J
6G- 800A, 600V, Class L
6H- 1200A, 600V, Class L

Circuit breaker amp rating (600V)

6D -15	6M-70	6W - 225	6E - 700
6E -20	6N - 80	6X - 250	6F - 800
6F -25	6P - 90	6Y - 300	6G - 900
6G -30	6R - 100	6Z - 350	6H - 1000
6H-35	6S - 125	6A - 400	6J - 1200
6J -40	6T - 150	6B - 450	
6K -50	6U - 175	6C - 500	
6L-60	6V - 200	6D - 600	

Circuit breaker amp rating (200V – 480V)

4D -15	4M-70	4W - 225	4E - 700
4E -20	4N - 80	4X - 250	4F - 800
4F -25	4P - 90	4Y - 300	4G - 900
4G -30	4R - 100	4Z - 350	4H - 1000
4H-35	4S - 125	4A - 400	4J - 1200
4J -40	4T - 150	4B - 450	
4K -50	4U - 175	4C - 500	
4L-60	4V - 200	4D - 600	

MCP amp rating (600V)

6A - 3	6D - 25	6G -	1506K	-600
6N - 1200				
6B - 5	6E - 50	6H -	2506L	-800
6C - 10	6F - 100	6J -	4006M	-1000

MCP amp rating (200V – 480V)

4A - 3	4D - 25	4G -150	4K - 600	
4N - 1200				
4B - 5	4E - 50	4H -	2504L	-800
4C - 10	4F - 100	4J -	4004M	-1200

Control cover accessories – A9-A750

Description	Control suffix ①	List price adder NEMA 1 3R 4, 4X & 12
Start-stop pushbutton	A	$ 72
Fwd-rev-stop pushbutton	B	360
2 position selector switch (Std. ON-OFF)	C	72
3 position selector switch (Std. HAND-OFF-AUTO)	D	72
Pilot light, Red, RUN (Std.)	E	135
Pilot light, Green, RUN	R	135
Pilot light suffix + V= Neon bulb	V	–
Pilot light suffix + X= LED bulb	X	–
Start-stop pushbutton & pilot light	F	207
Fwd-rev-stop pushbutton & pilot light	G	496
2 position selector switch & pilot light	H	207
3 position selector switch & pilot light	J	207
Fast-slow-stop pushbuttons	K	360
Fast-slow-stop pushbuttons & pilot light	L	495
Fast-slow-off-auto selector switch	M	150
Emergency stop	P	100
F suffix + 1NO & 1NC auxiliary contact	T	237
J suffix + 1NO & 1NC auxiliary contact	U	237
Pushbutton (standard START)	Y	36

Special modifications

Contact configuration	Suffix code ①	List price adder
Contactor		
Coil surge suppressor	S	$ 75
Auxiliary relays		
Type N control relay (4 pole)	CR	225
Electronic timer		
1.5 – 30, On Delay	TN30	300
5 – 100, On Delay	TN100	300
1.5 – 30, Off Delay	TF30	300
5 – 100, Off Delay	TF100	300
Phase failure phase reversal with over and undervoltage relays	PFPR	525
Ground fault protection	GFP	2250
For multi-speed controllers		
Compelling relay	CPR	600
Accelerating relay	ACR	600
Decelerating relay	DCR	600
Meters & metering		
Current transformer	CT	375
Ammeter (including C.T.)	AM	705
Ammeter & ammeter switch	AMS	1800
Voltmeter	VM	1200
Voltmeter & voltmeter switch	VMS	1800
Elapsed time meter	ETM	375
Operation counter	OC	560
Wattmeter	WM	3650
Miscellaneous		
Lightning arrestor	LA	320
Space heater, 100W with thermostat	SH	600

Control circuit transformer (standard VA) – A9 - A750 ②

Standard size with fused secondary			Coil suffix	Starter size	CCT VA	List price
Primary	Secondary	Hz				
				A9 – A40	45 ③	$ 300
				A9 – A40	50	360
200/208V	110V	50/60	0	A50 – A75	75	435
220/240V	110/120V	50/60	7	A95 – A110	100	560
440/480V	110/120V	50/60	8	A145 – A185	150	720
550/600V	110/120V	50/60	9	A210 – A300	250	795
				A400 – A460	150	720 ④
				A580 – A750	250	795 ④

Control circuit transformers do include two primary fuses and one secondary fuse.

Additional auxiliary contact blocks — A9 – A750

Contact configuration	Suffix code ①	A9 – A110 list price adder	A145 – A750 list price adder
1 N.O.	10	$ 20	–
1 N.C.	01	20	–
2 N.O.	20	30	–
1 N.O. & 1 N.C.	11	30	$ 30
2 N.C.	02	30	–
4 N.O.	40	60	–
3 N.O. & 1 N.C.	31	60	–
2 N.O. & 2 N.C.	22	60	60
1 N.O. & 3 N.C.	13	60	–
4 N.C.	04	60	–
3 N.O. & 3 N.C.	33	90	90

Reduced voltage & multi-speed starters — price adders

Starter size	Non-fusible switch price adder	Fusible switch price adder	MCCB or MCP price adder
A9	$ 990	$ 1008	$ 1287
A12	990	1008	1287
A16	990	1008	1287
A26	990	1008	1287
A30	990	1224	1350
A40	990	1224	1350
A50	1152	1224	1350
A63	1230	1350	1785
A75	1494	1602	1809
A95 – A110	2310	2565	2982
A145	3042	3366	4158
A185	3300	3735	4533
A210	3450	3825	6000
A260	3744	4068	6849
A300	4200	6000	8750
A400	6600	9450	9030
A460	8200	11,100	9475
A580	8400	11,800	10,200
A750	9000	12,450	12,900

Hazardous location enclosure accessories, NEMA 7 & 9

Item	Catalog ① Suffix No.	List price
3R Breather/drain	A	$ 80
Start PB green	B	180
Stop PB red	C	180
St/St dual PB	D	360
Em. Stop mush momentary	E	220
Em. Stop mush maintained	F	460
Black PB N.O. auxiliary	G	180
Black PB N.C. auxiliary	H	180
Pilot light	J	180
Illuminated PB	K	460
Push-to-test pilot light	L	450
Potentiometer	M	460
2-Pos Selector Maintained	N	260
2-Pos Selector spring L to R	P	280
2-Pos Selector spring R to L	Q	280
3-Pos Selector sw. main.	R	260
3-Pos Selector spring L to R	S	280
3-Pos Selector spring R to L	T	280
3-Pos Selector spring to C	U	280
2-Pos Selector key operated	V	450
3-Pos Selector key operated	W	450

① Add this suffix to the last digit of the catalog number.
② Consult factory if additional VA is required.
③ Does not include primary fusing.
④ A400 - A750 utilizes the AF wide range coil with a lower coil consumption than A210 - A300.

Discount schedule – Always applied to the applicable starter discounts

Non-fusible disconnect switch type
A9 - A750
Non-reversing, three phase

UL motor switching current	Maximum ratings – UL Listed: Maximum motor horsepower ratings Ⓛ 200/208V	230/240V	460/480V	575/600V	UL Type 1 (Indoor metal): Catalog number	List price	UL Type 3R (Outdoor metal): Catalog number	List price
UL rated								
9	2	2	5	7.5	A9SN1-84★	**$ 825**	A9SN3-84★	**$ 1005**
11	3	3	7.5	10	A12SN1-84★	**855**	A12SN3-84★	**1035**
17	5	5	10	15	A16SN1-84★	**885**	A16SN3-84★	**1065**
28	7.5	10	20	25	A26SN1-84★	**968**	A26SN3-84★	**1148**
34	10	10	25	30	A30SN1-84★	**1050**	A30SN3-84★	**1230**
42	10	15	30	40	A40SN1-84★	**1155**	A40SN3-84★	**1335**
54	15	20	40	50	A50SN1-84★	**1650**	A50SN3-84★	**1830**
65	20	25	50	50	A63SN1-84★	**1875**	A63SN3-84★	**2055**
80	25	30	60	75	A75SN1-84★	**2295**	A75SN3-84★	**2775**
95	30	30	60	75	A95SN1-84★	**2650**	A95SN3-84★	**3200**
110	30	40	75	100	A110SN1-84★	**2865**	A110SN3-84★	**3765**
130	40	50	100	125	A145SN1-84★	**3675**	A145SN3-84★	**4890**
156	50	60	125	150	A185SN1-84★	**4050**	A185SN3-84★	**5250**
192	60	75	150	200	A210SN1-84★	**5685**	A210SN3-84★	**7650**
248	75	100	200	250	A260SN1-84★	**6090**	A260SN3-84★	**8085**
302	100	100	250	300	A300SN1-84★	**7080**	A300SN3-84★	**8850**
414	125	150	350	400	A400SN1-70★	**11,250**	A400SN3-70★	**12,285**
480	150	200	400	500	A460SN1-70★	**17,100**	A460SN3-70★	**18,900**
590	200	250	500	600	A580SN1-70★	**20,490**	A580SN3-70★	**22,290**
810	250	300	600	700	A750SN1-70★	**21,990**	A750SN3-70★	**25,050**

NEMA size	Continuous current	200V	230V	460/575V				
NEMA rated								
00	9	1.5	1.5	2	A9NSN1-84★	**$ 825**	A9NSN3-84★	**$ 1005**
0	18	3	3	5	A16NSN1-84★	**885**	A16NSN3-84★	**1065**
1	27	7.5	7.5	10	A26NSN1-84★	**968**	A26NSN3-84★	**1148**
2	45	10	15	25	A50NSN1-84★	**1650**	A50NSN3-84★	**1830**
3	90	25	30	50	A75NSN1-84★	**2295**	A75NSN3-84★	**2775**
4	135	40	50	100	A145NSN1-84★	**3675**	A145NSN3-84★	**4890**
5	270	75	100	200	A260NSN1-84★	**6090**	A260NSN3-84★	**8085**
6	540	150	200	400	A460NSN1-70★	**17,100**	A460NSN3-70★	**18,900**
7	810	—	300	600	A750NSN1-70★	**21,990**	A750NSN3-70★	**25,050**

★ Overload relay suffix code. Select from the overload relay selection chart on page 3.6. Overload relays are required for all combination starters. If overload relay is provided by customer, substitute an "X" in place of the ★ and then substract list price of overload relay from combination starter's list price.

Example: A9SN1-84X $ 825 List
- 63 - OLR
$ 762 Net price

Coil voltage selection

All AC operated catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 starter: A75SN1-80F

To select starter with control transformer, substitute the code from the Control transformer voltage selector chart for the two digits fter the last dash in the catalog number.

Ex.: A 480V primary voltage with a 120V secondary voltage is required for an A75 starter: A75SN1-8F

Coil voltage selection – A9 - A300 ②

Hz	Cntr type	Volts 12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Coil voltage selection – A400 - A750 ②

Hz	Cntr type	Volts 24 - 60	48 - 130	100 - 250	250 - 500
60	AF	68	69	70	71 ④
50	AF	68	69	70	71 ④
DC	AF	68	69	70	71 ④

Control transformer voltage selection chart

Hz	Type	Volts 208/120	230 – 240/120	460 – 480/120	575 – 600/120
50/60	A/AF	0	7	8	9

For other voltages, consult factory.

Control transformer option

Contactor size	VA rating	List price adder
A9 – A40	45 ①	**$ 300**
A9 – A40	50	**360**
A50 – A75	75	**435**
A95 – A110	100	**560**
A145 – A185	150	**720**
A210 – A300	250	**795**
A400 – A460	150	**720** ③
A580 – A750	250	**795** ③

Factory modifications

See page 3.3

① No primary fusing provided.
② For AF50 – AF 300 starters, consult factory.
③ A400 - A750 utilizes the AF wide range coil with a lower coil consumption than A210 - A300.
④ AF400 - AF750 only.

Non-fusible disconnect switch type
A9 - A750
Non-reversing, three phase

UL Type 12 (Metal dusttight)		UL Type 4 (Watertight)		UL Type 4X (Stainless steel)		UL Type 1, 3R, 4, 4X & 12 (Plastic)	
Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price
UL rated							
A9SN2-84★	**$ 1005**	A9SN4-84★	**$ 1290**	A9SNX-84★	**$ 1600**	A9SNP-84★	**$ 945**
A12SN2-84★	**1035**	A12SN4-84★	**1320**	A12SNX-84★	**1630**	A12SNP-84★	**975**
A16SN2-84★	**1065**	A16SN4-84★	**1365**	A16SNX-84★	**1675**	A16SNP-84★	**1005**
A26SN2-84★	**1148**	A26SN4-84★	**1448**	A26SNX-84★	**1790**	A26SNP-84★	**1088**
A30SN2-84★	**1230**	A30SN4-84★	**1613**	A30SNX-84★	**2110**	A30SNP-84★	**1170**
A40SN2-84★	**1335**	A40SN4-84★	**1800**	A40SNX-84★	**2500**	A40SNP-84★	**1275**
A50SN2-84★	**1830**	A50SN4-84★	**2190**	A50SNX-84★	**3100**	A50SNP-84★	**1770**
A63SN2-84★	**2055**	A63SN4-84★	**2535**	A63SNX-84★	**3550**	A63SNP-84★	**1995**
A75SN2-84★	**2775**	A75SN4-84★	**3015**	A75SNX-84★	**4000**	A75SNP-84★	**2415**
A95SN2-84★	**3200**	A95SN4-84★	**3650**	A95SNX-84★	**4800**	A95SNP-84★	**2950**
A110SN2-84★	**3765**	A110SN4-84★	**4163**	A110SNX-84★	**5530**	A110SNP-84★	**3225**
A145SN2-84★	**4890**	A145SN4-84★	**5175**	A145SNX-84★	**6450**	A145SNP-84★	**4360**
A185SN2-84★	**5250**	A185SN4-84★	**5775**	A185SNX-84★	**7650**	A185SNP-84★	**5100**
A210SN2-84★	**7650**	A210SN4-84★	**9150**	A210SNX-84★	**12,000**	A210SNP-84★	**8300**
A260SN2-84★	**8085**	A260SN4-84★	**9600**	A260SNX-84★	**16,500**	A260SNP-84★	**8750**
A300SN2-84★	**8850**	A300SN4-84★	**10,350**	A300SNX-84★	**21,000**	A300SNP-84★	**9750**
A400SN2-70★	**12,285**	A400SN4-70★	**13,800**	A400SNX-70★	**25,800**	–	**–**
A460SN2-70★	**18,900**	A460SN4-70★	**20,700**	A460SNX-70★	**27,900**	–	**–**
A580SN2-70★	**22,290**	A580SN4-70★	**24,750**	A580SNX-70★	**32,550**	–	**–**
A750SN2-70★	**25,050**	A750SN4-70★	**26,850**	A750SNX-70★	**34,800**	–	**–**
NEMA rated							
A9NSN2-84★	**$ 1005**	A9NSN4-84★	**$ 1290**	A9NSNX-84★	**$ 1600**	A9NSNP-84★	**$ 945**
A16NSN2-84★	**1065**	A16NSN4-84★	**1365**	A16NSNX-84★	**1675**	A16NSNP-84★	**1005**
A26NSN2-84★	**1148**	A26NSN4-84★	**1448**	A26NSNX-84★	**1780**	A26NSNP-84★	**1088**
A50NSN2-84★	**1830**	A50NSN4-84★	**2190**	A50NSNX-84★	**3100**	A50NSNP-84★	**1770**
A75NSN2-84★	**2775**	A75NSN4-84★	**3015**	A75NSNX-84★	**4000**	A75NSNP-84★	**2415**
A145NSN2-84★	**4890**	A145NSN4-84★	**5175**	A145NSNX-84★	**6450**	A145NSNP-84★	**4360**
A260NSN2-84★	**8085**	A260NSN4-84★	**9600**	A260NSNX-84★	**16,500**	A260NSNP-84★	**8750**
A460NSN2-70★	**18,900**	A460NSN4-70★	**20,700**	A460NSNX-70★	**27,900**	–	**–**
A750NSN2-70★	**25,050**	A750NSN4-70★	**26,850**	A750NSNX-70★	**34,800**	–	**–**

★ Overload relay suffix code. Select from the overload relay selection chart on page 3.6. Overload relays are required for all combination starters. If overload relay is provided by customer, substitute an "X" in place of the ★ and then substract list price of overload relay from combination starter's list price.

Fusible disconnect switch type ①
A9 - A750
Non-reversing, three phase

UL motor switching current	Maximum ratings – UL Listed: Maximum motor horsepower ratings Ⓛ 200V/208V	230/240V	460/480V	575/600V	Fuse clip rating amp/volts	UL Type 1 (Indoor metal) Catalog number	List price	UL Type 3R (Outdoor metal) Catalog number	List price
UL rated									
9	2	2	5	7.5	30/600	A9SF1-84★6A	**$ 885**	A9SF3-84★6A	**$ 1065**
11	3	3	7.5	10	30/600	A12SF1-84★6A	**915**	A12SF3-84★6A	**1095**
17	5	5	10	15	30/600	A16SF1-84★6A	**945**	A16SF3-84★6A	**1125**
28	7.5	10	20	25	60/600	A26SF1-84★6B	**1020**	A26SF3-84★6B	**1230**
34	10	10	25	30	60/600	A30SF1-84★6B	**1095**	A30SF3-84★6B	**1313**
42	10	15	30	40	60/600	A40SF1-84★6B	**1185**	A40SF3-84★6B	**1418**
54	15	20	40	50	100/600	A50SF1-84★6C	**1725**	A50SF3-84★6C	**1913**
65	20	25	50	50	100/600	A63SF1-84★6C	**1980**	A63SF3-84★6C	**2138**
80	25	30	60	75	200/600	A75SF1-84★6D	**2445**	A75SF3-84★6D	**2858**
95	30	30	60	75	200/600	A95SF1-84★6D	**2590**	A95SF3-84★6D	**3290**
110	30	40	75	100	200/600	A110SF1-84★6D	**2925**	A110SF3-84★6D	**3818**
130	40	50	100	125	200/600	A145SF1-84★6E	**3735**	A145SF3-84★6E	**5183**
156	50	60	125	150	400/600	A185SF1-84★6E	**4650**	A185SF3-84★6E	**5400**
192	60	75	150	200	400/600	A210SF1-84★6E	**6870**	A210SF3-84★6E	**8850**
248	75	100	200	250	400/600	A260SF1-84★6E	**7680**	A260SF3-84★6E	**9930**
302	100	100	250	300	400/600	A300SF1-84★6E	**8100**	A300SF3-84★6E	**10,350**
414	125	150	350	400	600/600	A400SF1-70★6F	**11,895**	A400SF3-70★6F	**12,600**
480	150	–	–	–	600/600	A460SF1-70★6F	**16,890**	A460SF3-70★6F	**19,560**
480	–	200	400	500	800/600	A460SF1-70★6G	**18,750**	A460SF3-70★6G	**21,600**
590	200	250	500	600	1200/600	A580SF1-70★6H	**22,050**	A580SF3-70★6H	**25,050**
810	250	300	600	700	1200/600	A750SF1-70★6H	**23,550**	A750SF3-70★6H	**28,050**
NEMA rated									
NEMA size	Continuous current	200V	230V	460/575V					
00	9	1.5	1.5	2	30/600	A9NSF1-84★6A	**$ 885**	A9NSF3-84★6A	**$ 1065**
0	18	3	3	5	30/600	A16NSF1-84★6A	**945**	A16NSF3-84★6A	**1125**
1	27	–	7.5	10	30/600	A26NSF1-84★6A	**1020**	A26NSF3-84★6A	**1230**
1	27	7.5	–	–	60/600	A26NSF1-84★6B	**1020**	A26NSF3-84★6B	**1230**
2	45	10	15	25	60/600	A50NSF1-84★6B	**1725**	A50NSF3-84★6B	**1913**
3	90	–	–	50	100/600	A75NSF1-84★6C	**2021**	A75NSF3-84★6C	**2434**
3	90	25	30	–	200/600	A75NSF1-84★6D	**2445**	A75NSF3-84★6D	**2858**
4	135	40	50	100	200/600	A145NSF1-84★6E	**3735**	A145NSF3-84★6E	**5183**
5	270	75	100	200	400/600	A260NSF1-84★6E	**7680**	A260NSF3-84★6E	**9930**
6	540	150	–	–	600/600	A460NSF1-70★6F	**16,890**	A460NSF3-70★6F	**19,560**
6	540	–	200	400	800/600	A460NSF1-70★6G	**18,750**	A460NSF3-70★6G	**21,600**
7	810	—	300	600	1200/600	A750NSF1-70★6H	**23,550**	A750NSF3-70★6H	**28,050**

★ Overload relay suffix code. Select from the overload relay selection chart on page 3.6. Overload relays are required for all combination starters. If overload relay is provided by customer, substitute an "X" in place of the ★ and then substract list price of overload relay from combination starter's list price.

Example: A9SF1-84X6A

$ 885	List
- 63	- OLR
$ 823	Net price

Coil voltage selection

All AC operated catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 fused starter: A75SF1-**80**F6D

To select starter with control transformer, substitute the code from the Control transformer voltage selector chart for the two digits fter the last dash in the catalog number.

Ex.: A 480V primary voltage with a 120V secondary voltage is required for an A75 starter: A75SF1-8F

Coil voltage selection – A9 - A300 ③

	Cntr	Volts															
Hz	type	12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Coil voltage selection – A400 - A750 ③

	Cntr	Volts			
Hz	type	24 - 60	48 - 130	100 - 250	250 - 500
60	AF	68	69	70	71 ⑤
50	AF	68	69	70	71 ⑤
DC	AF	68	69	70	71 ⑤

Control transformer voltage selection chart

		Volts			
Hz	Type	208/120	230 – 240/120	460 – 480/120	575 – 600/120
50/60	A/AF	0	7	8	9

For other voltages, consult factory.

Control transformer option

Contactor size	VA rating	List price adder
A9 – A40	45 ①	**$ 300**
A9 – A40	50	**360**
A50 – A75	75	**435**
A95 – A110	100	**560**
A145 – A185	150	**720**
A210 – A300	250	**795**
A400 – A460	150	**720** ④
A580 – A750	250	**795** ④

Factory modifications

See page 3.3

① Power fuses are not included as standard.
② No primary fusing provided.
③ For AF50 – AF 300 starters, consult factory.
④ A400 - A750 utilizes the AF wide range coil with a lower coil consumption than A210 - A300.
⑤ AF400 - AF750 only.

Fusible disconnect switch type
A9 - A750
Non-reversing, three phase

UL Type 12 (Metal Dusttight)		UL Type 4 (Watertight)		UL Type 4X (Stainless steel)		UL Type 1, 3R, 4, 4X & 12 (Plastic)	
Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price
UL rated							
A9SF2-84★6A	**$ 1065**	A9SF4-84★6A	**$ 1350**	A9SFX-84★6A	**$ 1800**	A9SFP-84★6A	**$ 1005**
A12SF2-84★6A	**1095**	A12SF4-84★6A	**1380**	A12SFX-84★6A	**1830**	A12SFP-84★6A	**1035**
A16SF2-84★6A	**1125**	A16SF4-84★6A	**1425**	A16SFX-84★6A	**1860**	A16SFP-84★6A	**1065**
A26SF2-84★6B	**1230**	A26SF4-84★6B	**1530**	A26SFX-84★6B	**1965**	A26SFP-84★6B	**1148**
A30SF2-84★6B	**1313**	A30SF4-84★6B	**1688**	A30SFX-84★6B	**2295**	A30SFP-84★6B	**1230**
A40SF2-84★6B	**1418**	A40SF4-84★6B	**1898**	A40SFX-84★6B	**2685**	A40SFP-84★6B	**1335**
A50SF2-84★6C	**1913**	A50SF4-84★6C	**2400**	A50SFX-84★6C	**3340**	A50SFP-84★6C	**1830**
A63SF2-84★6C	**2138**	A63SF4-84★6C	**2640**	A63SFX-84★6C	**3600**	A63SFP-84★6C	**2055**
A75SF2-84★6D	**2858**	A75SF4-84★6D	**3300**	A75SFX-84★6D	**4020**	A75SFP-84★6D	**2475**
A95SF2-84★6D	**3290**	A95SF4-84★6D	**3950**	A95SFX-84★6D	**4990**	A95SFP-84★6D	**3125**
A110SF2-84★6D	**3818**	A110SF4-84★6D	**4275**	A110SFX-84★6D	**5850**	A110SFP-84★6D	**3550**
A145SF2-84★6E	**5183**	A145SF4-84★6E	**5685**	A145SFX-84★6E	**7455**	A145SFP-84★6E	**4880**
A185SF2-84★6E	**5400**	A185SF4-84★6E	**6200**	A185SFX-84★6E	**8865**	A185SFP-84★6E	**5400**
A210SF2-84★6E	**8850**	A210SF4-84★6E	**9600**	A210SFX-84★6E	**12,375**	A210SFP-84★6E	**8800**
A260SF2-84★6E	**9930**	A260SF4-84★6E	**10,950**	A260SFX-84★6E	**16,800**	A260SFP-84★6E	**10,100**
A300SF2-84★6E	**10,350**	A300SF4-84★6E	**12,000**	A300SFX-84★6E	**22,350**	A300SFP-84★6E	**11,200**
A400SF2-70★6F	**12,600**	A400SF4-70★6F	**14,663**	A400SFX-70★6F	**26,400**	–	**–**
A460SF2-70★6F	**19,560**	A460SF4-70★6F	**21,360**	A460SFX-70★6F	**26,955**	–	**–**
A460SF2-70★6G	**21,600**	A460SF4-70★6G	**23,400**	A460SFX-70★6G	**28,995**	–	**–**
A580SF2-70★6H	**25,050**	A580SF4-70★6H	**27,000**	A580SFX-70★6H	**37,350**	–	**–**
A750SF2-70★6H	**28,050**	A750SF4-70★6H	**30,000**	A750SFX-70★6H	**39,000**	–	**–**
NEMA rated							
A9NSF2-84★6A	**$ 1065**	A9NSF4-84★6A	**$ 1350**	A9NSFX-84★6A	**$ 1800**	A9NSFP-84★6A	**$ 1005**
A16NSF2-84★6A	**1125**	A16NSF4-84★6A	**1425**	A16NSFX-84★6A	**1860**	A16NSFP-84★6A	**1065**
A26NSF2-84★6A	**1230**	A26NSF4-84★6A	**1530**	A26NSFX-84★6A	**1965**	A26NSFP-84★6A	**1148**
A26NSF2-84★6B	**1230**	A26NSF4-84★6B	**1530**	A26NSFX-84★6B	**1965**	A26NSFP-84★6B	**1148**
A50NSF2-84★6B	**1913**	A50NSF4-84★6B	**2400**	A50NSFX-84★6B	**3240**	A50NSFP-84★6B	**1830**
A75NSF2-84★6C	**2434**	A75NSF4-84★6C	**2876**	A75NSFX-84★6C	**3596**	A75NSFP-84★6C	**2051**
A75NSF2-84★6D	**2858**	A75NSF4-84★6D	**3300**	A75NSFX-84★6D	**4020**	A75NSFP-84★6D	**2475**
A145NSF2-84★6E	**5183**	A145NSF4-84★6E	**5685**	A145NSFX-84★6E	**7455**	A145NSFP-84★6E	**4880**
A260NSF2-84★6E	**9930**	A260NSF4-84★6E	**10,950**	A260NSFX-84★6E	**16,800**	A260NSFP-84★6E	**10,100**
A460NSF2-70★6F	**19,560**	A460NSF4-70★6F	**21,360**	A460NSFX-70★6F	**26,955**	–	**–**
A460NSF2-70★6G	**21,600**	A460NSF4-70★6G	**23,400**	A460NSFX-70★6G	**28,995**	–	**–**
A750NSF2-70★6H	**28,050**	A750NSF4-70★6H	**30,000**	A750NSFX-70★6H	**39,000**	–	**–**

★ Overload relay suffix code. Select from the overload relay selection chart on page 3.6. Overload relays are required for all combination starters. If overload relay is provided by customer, substitute an "X" in place of the ★ and then substract list price of overload relay from combination starter's list price.

Maximum short circuit ratings for UL listed combination starters

Contactor size	Switch/fuse at 600VAC	KA at 600VAC
A9	CF30/30J	
A12	CF30/30J	
A16	CF30/30J	
A26	F60/60J	
A30	F60/60J	
A40	F100/100J	
A50	F100/100J	
A63	OES200/200J	
A75	OES200/200J	
A95	OES200/200J	200
A110	OES200/200J	
A145	OES400/400J	
A185	OES400/400J	
A210	OES400/400J	
A260	OES400/400J or OES600/600J	
A300	OES400/400J or OES600/600J	
A400	OES600/600J	
A460	OES800/800L	
A580	OETL1200W/1200L fuses	
A750	OETL1200W/1200L fuses	

Fusible disconnect switch type ①
A9 - A750
Reversing, three phase

UL motor switching current	Maximum ratings – UL Listed: Maximum motor horsepower ratings (UL) 200/208V	230/240V	460/480V	575/600V	Fuse clip rating amp/volts	UL Type 1 (Indoor metal) Catalog number	List price	UL Type 3R (Outdoor metal) Catalog number	List price
UL rated									
9	2	2	5	7.5	30/600	A9SRF1-84★6A	**$ 1140**	A9SRF3-84★6A	**$ 1320**
11	3	3	7.5	10	30/600	A12SRF1-84★6A	**1230**	A12SRF3-84★6A	**1410**
17	5	5	10	15	30/600	A16SRF1-84★6A	**1290**	A16SRF3-84★6A	**1470**
28	7.5	10	20	25	60/600	A26SRF1-84★6B	**1425**	A26SRF3-84★6B	**1635**
34	10	10	25	30	60/600	A30SRF1-84★6B	**1643**	A30SRF3-84★6B	**1860**
42	10	15	30	40	60/600	A40SRF1-84★6B	**1860**	A40SRF3-84★6B	**2093**
54	15	20	40	50	100/600	A50SRF1-84★6C	**2438**	A50SRF3-84★6C	**2625**
65	20	25	50	50	100/600	A63SRF1-84★6C	**2850**	A63SRF3-84★6C	**3008**
80	25	30	60	75	200/600	A75SRF1-84★6D	**3600**	A75SRF3-84★6D	**4013**
95	30	30	60	75	200/600	A95SRF1-84★6D	**3890**	A95SRF3-84★6D	**4700**
110	30	40	75	100	200/600	A110SRF1-84★6D	**4290**	A110SRF3-84★6D	**5183**
130	40	50	100	125	200/600	A145SRF1-84★6E	**5970**	A145SRF3-84★6E	**7418**
156	50	60	125	150	400/600	A185SRF1-84★6E	**8010**	A185SRF3-84★6E	**8760**
192	60	75	150	200	400/600	A210SRF1-84★6E	**10,905**	A210SRF3-84★6E	**12,885**
248	75	100	200	250	400/600	A260SRF1-84★6E	**12,165**	A260SRF3-84★6E	**14,415**
302	100	100	250	300	400/600	A300SRF1-84★6E	**13,560**	A300SRF3-84★6E	**15,810**
414	125	150	350	400	600/600	A400SRF1-70★6F	**17,880**	A400SRF3-70★6F	**18,585**
480	150	—	—	—	600/600	A460SRF1-70★6F	**29,175**	A460SRF3-70★6F	**32,025**
480	—	200	400	500	800/600	A460SRF1-70★6G	**31,035**	A460SRF3-70★6G	**33,885**
590	200	250	500	600	1200/600	A580SRF1-70★6H	**39,435**	A580SRF3-70★6H	**42,435**
810	250	300	600	700	1200/600	A750SRF1-70★6H	**42,285**	A750SRF3-70 ★6H	**46,785**
	NEMA rated								
NEMA size / Continuous current	200V	230V	460/575V						
00 / 9	1.5	1.5	2	30/600	A9NSRF1-84★6A	**$ 1140**	A9NSRF3-84★6A	**$ 1320**	
0 / 18	3	3	5	30/600	A16NSRF1-84★6A	**1290**	A16NSRF3-84★6A	**1470**	
1 / 27	—	7.5	10	30/600	A26NSRF1-84★6A	**1425**	A26NSRF3-84★6A	**1635**	
1 / 27	7.5	—	—	60/600	A26NSRF1-84★6B	**1425**	A26NSRF3-84★6B	**1635**	
2 / 45	10	15	25	60/600	A50NSRF1-84★6B	**2438**	A50NSRF3-84★6B	**2625**	
3 / 90	—	—	50	100/600	A75NSRF1-84★6C	**3176**	A75NSRF3-84★6C	**3589**	
3 / 90	25	30	—	200/600	A75NSRF1-84★6D	**3600**	A75NSRF3-84★6D	**4013**	
4 / 135	40	50	100	200/600	A145NSRF1-84★6E	**5970**	A145NSRF3-84★6E	**7418**	
5 / 270	75	100	200	400/600	A260NSRF1-84★6E	**12,165**	A260NSRF3-84★6E	**14,415**	
6 / 540	150	—	—	600/600	A460NSRF1-70★6F	**29,175**	A460NSRF3-70★6F	**32,025**	
6 / 540	—	200	400	800/600	A460NSRF1-70★6G	**31,035**	A460NSRF3-70★6G	**33,885**	
7 / 810	—	300	600	1200/600	A750NSRF1-70★6H	**42,285**	A750NSRF3-70★6H	**46,785**	

★ Overload relay suffix code. Select from the overload relay selection chart on page 3.6. Overload relays are required for all combination starters. If overload relay is provided by customer, substitute an "X" in place of the ★ and then substract list price of overload relay from combination starter's list price.

Example: A9SRF1-84X6A $ 1140 List
- 63 - OLR
$ 1077 Net price

Coil voltage selection

All AC operated catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 starter: A75SRF1-80FC

To select starter with control transformer, substitute the code from the Control transformer voltage selector chart for the two digits fter the last dash in the catalog number.

Ex.: A 480V primary voltage with a 120V secondary voltage is required for an A75 starter: A75SRF1-8F

Coil voltage selection – A9 - A300 ③

Hz	Cntr type	Volts 12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Coil voltage selection – A400 - A750 ③

Hz	Cntr type	Volts 24 - 60	48 - 130	100 - 250	250 - 500
60	AF	68	69	70	71 ⑤
50	AF	68	69	70	71 ⑤
DC	AF	68	69	70	71 ⑤

Control transformer voltage selection chart

Hz	Type	Volts 208/120	230 – 240/120	460 – 480/120	575 – 600/120
50/60	A/AF	0	7	8	9

For other voltages, consult factory.

Control transformer option

Contactor size	VA rating	List price adder
A9 – A40	45 ①	**$ 300**
A9 – A40	50	**360**
A50 – A75	75	**435**
A95 – A110	100	**560**
A145 – A185	150	**720**
A210 – A300	250	**795**
A400 – A460	150	**720** ④
A580 – A750	250	**795** ④

Factory modifications

See page 3.3

① Power fuses are not included as standard.
② No primary fusing provided.
③ For AF50 – AF 300 starters, consult factory.
④ A400 - A750 utilizes the AF wide range coil with a lower coil consumption than A210 - A300.
⑤ AF400 - AF750 only.

Fusible disconnect switch type
A9 - A750
Reversing, three phase

UL Type 12 (Metal dusttight)		UL Type 4 (Watertight)		UL Type 4X (Stainless steel)		UL Type 1, 3R, 4, 4X & 12 (Plastic)	
Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price
UL rated							
A9SRF2-84★6A	**$ 1320**	A9SRF4-84★6A	**$ 1425**	A9SRFX-84★6A	**$ 1955**	A9SRFP-84★6A	**$ 1275**
A12SRF2-84★6A	**1410**	A12SRF4-84★6A	**1515**	A12SRFX-84★6A	**2045**	A12SRFP-84★6A	**1365**
A16SRF2-84★6A	**1470**	A16SRF4-84★6A	**1575**	A16SRFX-84★6A	**2105**	A16SRFP-84★6A	**1425**
A26SRF2-84★6B	**1635**	A26SRF4-84★6B	**1763**	A26SRFX-84★6B	**2270**	A25SRFP-84★6B	**1560**
A30SRF2-84★6B	**1860**	A30SRF4-84★6B	**1988**	A30SRFX-84★6B	**2745**	A30SRFP-84★6B	**1778**
A40SRF2-84★6B	**2093**	A40SRF4-84★6B	**2213**	A40SRFX-84★6B	**3260**	A40SRFP-84★6B	**1995**
A50SRF2-84★6C	**2625**	A50SRF4-84★6C	**2850**	A50SRFX-84★6C	**3855**	A50SRFP-84★6C	**2573**
A63SRF2-84★6C	**3008**	A63SRF4-84★6C	**3225**	A63SRFX-84★6C	**4370**	A63SRFP-84★6C	**2985**
A75SRF2-84★6D	**4013**	A75SRF4-84★6D	**4200**	A75SRFX-84★6D	**5075**	A75SRFP-84★6D	**3735**
A95SRF2-84★6D	**4700**	A95SRF4-84★6D	**5100**	A95SRFX-84★6D	**6250**	A95SRFP-84★6D	**4125**
A110SRF2-84★6D	**5183**	A110SRF4-84★6D	**5550**	A110SRFX-84★6D	**7115**	A110SRFP-84★6D	**4600**
A145SRF2-84★6E	**7418**	A145SRF4-84★6E	**7800**	A145SRFX-84★6E	**9690**	A145SRFP-84★6E	**7600**
A185SRF2-84★6E	**8760**	A185SRF4-84★6E	**9225**	A185SRFX-84★6E	**12,225**	A185SRFP-84★6E	**9000**
A210SRF2-84★6E	**12,885**	A210SRF4-84★6E	**13,238**	A210SRFX-84★6E	**16,410**	A210SRFP-84★6E	**13,000**
A260SRF2-84★6E	**14,415**	A260SRF4-84★6E	**15,150**	A260SRFX-84★6E	**21,285**	A260SRFP-84★6E	**14,885**
A300SRF2-84★6E	**15,810**	A300SRF4-84★6E	**16,530**	A300SRFX-84★6E	**27,810**	A300SRFP-84★6E	**16,200**
A400SRF2-70★6F	**18,585**	A400SRF4-70★6F	**20,625**	A400SRFX-70★6F	**32,385**	A400SRFP-70★6F	**20,000**
A460SRF2-70★6F	**32,025**	A460SRF4-70★6F	**33,540**	A460SRFX-70★6F	**39,420**	–	**–**
A460SRF2-70★6G	**33,885**	A460SRF4-70★6G	**35,400**	A460SRFX-70★6G	**41,280**	–	**–**
A580SRF2-70★6H	**42,435**	A580SRF4-70★6H	**45,150**	A580SRFX-70★6H	**54,735**	–	**–**
A750SRF2-70★6H	**46,785**	A750SRF4-70★6H	**48,450**	A750SRFX-70★6H	**57,735**	–	**–**
NEMA rated							
A9NSRF2-84★6A	**$ 1320**	A9NSRF4-84★6A	**$ 1425**	A9NSRFX-84★6A	**$ 1955**	A9NSRFP-84★6A	**$ 1275**
A16NSRF2-84★6A	**1470**	A16NSRF4-84★6A	**1575**	A16NSRFX-84★6A	**2105**	A16NSRFP-84★6A	**1425**
A26NSRF2-84★6A	**1635**	A26NSRF4-84★6A	**1763**	A26NSRFX-84★6A	**2270**	A26NSRFP-84★6A	**1560**
A26NSRF2-84★6B	**1635**	A26NSRF4-84★6B	**1763**	A26NSRFX-84★6B	**2270**	A26NSRFP-84★6B	**1560**
A50NSRF2-84★6B	**2625**	A50NSRF4-84★6B	**2850**	A50NSRFX-84★6B	**3855**	A50NSRFP-84★6B	**2573**
A75NSRF2-84★6C	**3589**	A75NSRF4-84★6C	**3776**	A75NSRFX-84★6C	**4651**	A75NSRFP-84★6C	**3311**
A75NSRF2-84★6D	**4013**	A75NSRF4-84★6D	**4200**	A75NSRFX-84★6D	**5075**	A75NSRFP-84★6D	**3735**
A145NSRF2-84★6E	**7418**	A145NSRF4-84★6E	**7800**	A145NSRFX-84★6E	**9690**	A145NSRFP-84★6E	**7600**
A260NSRF2-84★6E	**14,415**	A260NSRF4-84★6E	**15,150**	A260NSRFX-84★6E	**21,285**	A260NSRFP-84★6E	**14,885**
A460NSRF2-70★6F	**32,025**	A460NSRF4-70★6F	**33,540**	A460NSRFX-70★6F	**39,420**	–	**–**
A460NSRF2-70★6G	**33,885**	A460NSRF4-70★6G	**35,400**	A460NSRFX-70★6G	**41,280**	–	**–**
A750NSRF2-70★6H	**46,785**	A750NSRF4-70★6H	**48,450**	A750NSRFX-70★6H	**57,735**	–	**–**

★ Overload relay suffix code. Select from the overload relay selection chart on page 3.6. Overload relays are required for all combination starters. If overload relay is provided by customer, substitute an "X" in place of the ★ and then substract list price of overload relay from combination starter's list price.

Maximum short circuit ratings for UL listed combination starters

Contactor size	Switch/fuse at 600VAC	KA at 600VAC
A9	CF30/30J	
A12	CF30/30J	
A16	CF30/30J	
A26	F60/60J	
A30	F60/60J	
A40	F100/100J	
A50	F100/100J	
A63	OES200/200J	
A75	OES200/200J	
A95	OES200/200J	200
A110	OES200/200J	
A145	OES400/400J	
A185	OES400/400J	
A210	OES400/400J	
A260	OES400/400J or OES600/600J	
A300	OES400/400J or OES600/600J	
A400	OES600/600J	
A460	OES800/800L	
A580	OETL1200W/1200L fuses	
A750	OETL1200W/1200L fuses	

Circuit breaker type ①
A9 - A750
Non-reversing, three phase

UL motor switching current	Maximum ratings – UL Listed: Maximum motor horsepower ratings Ⓤ 200/208V	230/240V	460/480V	575/600V	UL Listed 1 (Indoor metal) Catalog number	List price	UL Listed 3R (Outdoor metal) Catalog number	List price
	UL rated							
9	2	2	5	7.5	A9SM1-84★◆◆	$ 930	A9SM3-84★◆◆	$ 1110
11	3	3	7.5	10	A12SM1-84★◆◆	960	A12SM3-84★◆◆	1140
17	5	5	10	15	A16SM1-84★◆◆	990	A16SM3-84★◆◆	1170
28	7.5	10	20	25	A26SM1-84★◆◆	1073	A26SM3-84★◆◆	1253
34	10	10	25	30	A30SM1-84★◆◆	1155	A30SM3-84★◆◆	1335
42	10	15	30	40	A40SM1-84★◆◆	1260	A40SM3-84★◆◆	1440
54	15	20	40	50	A50SM1-84★◆◆	1755	A50SM3-84★◆◆	1935
65	20	25	50	50	A63SM1-84★◆◆	2070	A63SM3-84★◆◆	2160
80	25	30	60	75	A75SM1-84★◆◆	2550	A75SM3-84★◆◆	2880
95	30	30	60	75	A95SM1-84★◆◆	2750	A95SM3-84★◆◆	3125
110	30	40	75	100	A110SM1-84★◆◆	2970	A110SM3-84★◆◆	3870
130	40	50	100	125	A145SM1-84★◆◆	4020	A145SM3-84★◆◆	5235
156	50	60	125	150	A185SM1-84★◆◆	4950	A185SM3-84★◆◆	5610
192	60	75	150	200	A210SM1-84★◆◆	7080	A210SM3-84★◆◆	9045
248	75	100	200	250	A260SM1-84★◆◆	8160	A260SM3-84★◆◆	10,155
302	100	100	250	300	A300SM1-84★◆◆	8850	A300SM3-84★◆◆	10,650
414	125	150	350	400	A400SM1-70★◆◆	12,450	A400SM3-70★◆◆	12,990
480	150	200	400	500	A460SM1-70★◆◆	19,350	A460SM3-70★◆◆	21,150
590	200	250	500	600	A580SM1-70★◆◆	22,650	A580SM3-70★◆◆	24,450
810	250	300	600	700	A750SM1-70★◆◆	24,150	A750SM3-70★◆◆	27,330

★ Overload relay suffix code. Select from the overload relay selection chart on page 3.6. Overload relays are required for all combination starters. If overload relay is provided by customer, substitute an "X" in place of the ★ and then substract list price of overload relay from combination starter's list price.

◆◆ MCP or breaker rating. See codes on page 3.48.

Example: A9SM1-84X★◆◆

$ 930	List
- 63	- OLR
$ 867	Net price

Coil voltage selection

All AC operated catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 combination starter: A75SM1-80★◆◆

To select starter with control transformer, substitute the code from the Control transformer voltage selector chart for the two digits fter the last dash in the catalog number.

Ex.: A 480V primary voltage with a 120V secondary voltage is required for an A75 starter: A75SM1-8F

Coil voltage selection – A9 - A300 ③

Hz	Cntr type	Volts 12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Coil voltage selection – A400 - A750 ③

Hz	Cntr type	Volts 24 - 60	48 - 130	100 - 250	250 - 500
60	AF	68	69	70	71 ⑤
50	AF	68	69	70	71 ⑤
DC	AF	68	69	70	71 ⑤

Control transformer voltage selection chart

Hz	Type	Volts 208/120	230 – 240/120	460 – 480/120	575 – 600/120
50/60	A/AF	0	7	8	9

For other voltages, consult factory.

Factory modifications

See page 3.3

Maximum short circuit rating for UL listed combination starters

Contactor	Maximum MCP 480VAC	KA at 480VAC	MCP 600VAC	KA at 600VAC
A9	S3L050MW	35	S3L010MW	35
A12	S3L050MW	35	S3L010MW	35
A16	S3L050MW	35	—	—
A26	S3L100MW	35	S3L100MW	35
A30	S3L150MW	65	—	—
A40	S3L150MW	65	—	—
A50	S3L150MW	85	S3L150MW	35
A63	S4L250MW	85	—	—
A75	S4L250MW	85	—	—
A95	S4L250MW	85	S4L250MW	35
A110	S4L250MW	85	S4L250MW	35
A145	S5L400MW	65	S4L250MW	10
A185	S5L400MW	85	S4L250MW	10
A210	S6L800MW	85	S4L250MW	18
A260	S6L800MW	85	S5L400MW	18
A300	S6L800MW	85	S5L400MW	18
A400	S7H1200MW	85	Consult factory	
A460	S7H1200MW	85		
A580	S7H1200MW	85		
A750	S7H1200MW	85		

For thermal magnetic molded case breakers, consult factory.

Control transformer option

Contactor size	VA rating	List price adder
A9 – A40	45 ①	$ 300
A9 – A40	50	360
A50 – A75	75	435
A95 – A110	100	560
A145 – A185	150	720
A210 – A300	250	795
A400 – A460	150	720 ④
A580 – A750	250	795 ④

① MCPs are supplied as standard. Thermal magnetic/electronic trip type breakers can be supplied by substituting the letter "B" in place of the "M". List price is the same. Example: A9SB3-84★◆◆, $ 1110.00.
② No primary fusing provided.
③ For AF50 - AF300 starters, consult factory.
④ A400 - A750 utilizes the AF wide range coil with a lower coil consumption than A210 - A300.
⑤ AF400 - AF750 only.

Circuit breaker type ①
A9 - A750
Non-reversing, three phase

UL Listed 12 (Metal dustight)		UL Listed 4 (Watertight)		UL Listed 4X (Stainless steel)		UL Listed 1, 3R, 4, 4X & 12 (Plastic)		UL Listed 7 & 9 non-reversing (Explosion proof)	
Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price
UL rated									
A9SM2-84★◆◆	**$ 1110**	A9SM4-84★◆◆	**$ 1260**	A9SMX-84★◆◆	**$ 1835**	A9SMP-84★◆◆	**$ 1050**	A9SM7-84★◆◆	**$ 2660**
A12SM2-84★◆◆	**1140**	A12SM4-84★◆◆	**1290**	A12SMX-84★◆◆	**1865**	A12SMP-84★◆◆	**1080**	A12SM7-84★◆◆	**2850**
A16SM2-84★◆◆	**1170**	A16SM4-84★◆◆	**1320**	A16SMX-84★◆◆	**1895**	A16SMP-84★◆◆	**1110**	A16SM7-84★◆◆	**3030**
A26SM2-84★◆◆	**1253**	A26SM4-84★◆◆	**1410**	A26SMX-84★◆◆	**2000**	A26SMP-84★◆◆	**1193**	A26SM7-84★◆◆	**3105**
A30SM2-84★◆◆	**1335**	A30SM4-84★◆◆	**1500**	A30SMX-84★◆◆	**2330**	A30SMP-84★◆◆	**1275**	A30SM7-84★◆◆	**3480**
A40SM2-84★◆◆	**1440**	A40SM4-84★◆◆	**1635**	A40SMX-84★◆◆	**2720**	A40SMP-84★◆◆	**1380**	A40SM7-84★◆◆	**3860**
A50SM2-84★◆◆	**1935**	A50SM4-84★◆◆	**2115**	A50SMX-84★◆◆	**3275**	A50SMP-84★◆◆	**1875**	A50SM7-84★◆◆	**4150**
A63SM2-84★◆◆	**2160**	A63SM4-84★◆◆	**2438**	A63SMX-84★◆◆	**3635**	A63SMP-84★◆◆	**2100**	A63SM7-84★◆◆	**5540**
A75SM2-84★◆◆	**2880**	A75SM4-84★◆◆	**3225**	A75SMX-84★◆◆	**4055**	A75SMP-84★◆◆	**2520**	A75SM7-84★◆◆	**6850**
A95SM2-84★◆◆	**3125**	A95SM4-84★◆◆	**3800**	A95SMX-84★◆◆	**5200**	A95SMP-84★◆◆	**3250**	A95SM7-84★◆◆	**7940**
A110SM2-84★◆◆	**3870**	A110SM4-84★◆◆	**4200**	A110SMX-84★◆◆	**6050**	A110SMP-84★◆◆	**3700**	A110SM7-84★◆◆	**11,370**
A145SM2-84★◆◆	**5235**	A145SM4-84★◆◆	**5588**	A145SMX-84★◆◆	**7650**	A145SMP-84★◆◆	**5400**	A145SM7-84★◆◆	**13,595**
A185SM2-84★◆◆	**5610**	A185SM4-84★◆◆	**6300**	A185SMX-84★◆◆	**9150**	A185SMP-84★◆◆	**6150**	A185SM7-84★◆◆	**14,475**
A210SM2-84★◆◆	**9045**	A210SM4-84★◆◆	**9713**	A210SMX-84★◆◆	**12,510**	A210SMP-84★◆◆	**9500**	A210SM7-84★◆◆	**17,775**
A260SM2-84★◆◆	**10,155**	A260SM4-84★◆◆	**10,950**	A260SMX-84★◆◆	**17,250**	A260SMP-84★◆◆	**10,650**	—	—
A300SM2-84★◆◆	**10,650**	A300SM4-84★◆◆	**12,000**	A300SMX-84★◆◆	**22,800**	A300SMP-84★◆◆	**11,500**	—	—
A400SM2-70★◆◆	**12,990**	A400SM4-70★◆◆	**13,800**	A400SMX-70★◆◆	**26,850**	–	**–**	—	—
A460SM2-70★◆◆	**21,150**	A460SM4-70★◆◆	**22,500**	A460SMX-70★◆◆	**28,995**	–	**–**	—	—
A580SM2-70★◆◆	**24,450**	A580SM4-70★◆◆	**26,850**	A580SMX-70★◆◆	**36,000**	–	**–**	—	—
A750SM2-70★◆◆	**27,330**	A750SM4-70★◆◆	**30,000**	A750SMX-70★◆◆	**37,650**	–	**–**	—	—

★ Overload relay suffix code. Select from the overload relay selection chart on page 3.6. Overload relays are required for all combination starters. If overload relay is provided by customer, substitute an "X" in place of the ★ and then substract list price of overload relay from combination starter's list price.
◆◆ MCP or breaker rating. See codes on page 3.48.

Motor circuit protector data

Motor full load amperes	MCP continous rating	Suffix code ◆	Catalog number	Starter size	1.5X	2X	4X	5X	6X	7X	8X	9X	10X	11X	12X
.92 – 2.76	3	A	S3L003MW	0	—	—	12	15	18	21	24	27	30	33	36
1.53 – 4.61	5	B	S3L005MW	0	—	—	20	25	30	35	40	45	50	55	60
3.07 – 9.23	10	C	S3L010MW	0	—	—	40	50	60	70	80	90	100	110	120
7.69 – 23.08	25	D	S3L025MW	1	—	—	100	125	150	175	200	225	250	275	300
15.38 – 46.15	50	E	S3L050MW	2	—	—	200	250	300	350	400	450	500	550	600
30.77 – 92.31	100	F	S3L100MW	3	—	—	400	500	600	700	800	900	1000	1100	1200
46.15 – 138.46	150	G	S3L150MW	4	—	—	600	750	900	1050	1200	1350	1500	1650	1800
28.85 – 230.77	250	H	S4L250MW	4	375	500	1000	—	1500	—	2000	—	2500	—	3000
46.15 – 369.23	400	J	S5L400MW	5	600	800	1600	—	2400	—	3200	—	4000	—	4800
69.23 – 553.85	600	K	S6L600MW	6	900	1200	2400	—	3600	—	4800	—	6000	—	7200
92.31 – 738.46	800	L	S6L800MW	7	1200	1600	3200	—	4800	—	6400	—	8000	—	9600
115.38 – 923.07	1000	M	S7H1000MW	7	1500	2000	4000	—	6000	—	8000	—	10,000	—	12,000
138.46 – 1107.69	1200	N	S7H1200MW	7	1800	2400	4800	—	7200	—	9600	—	12,000	—	14,400

Circuit breaker type ①
A9 - A750, NEMA rated
Non-reversing, three phase

		Maximum ratings – UL Listed			UL Type 1 (Indoor metal)		UL Type 3R (Outdoor metal)	
		Maximum motor horsepower ratings Ⓛ						
		200V	230V	460/575V	Catalog number	List price	Catalog number	List price
		NEMA rated						
NEMA size	Continuous current							
00	9	1.5	1.5	2	A9NSM1-84★◆◆	**$ 930**	A9NSM3-84★◆◆	**$ 1110**
0	18	3	3	5	A16NSM1-84★◆◆	**990**	A16NSM3-84★◆◆	**1170**
1	27	7.5	7.5	10	A26NSM1-84★◆◆	**1073**	A26NSM3-84★◆◆	**1253**
2	45	10	15	25	A50NSM1-84★◆◆	**1755**	A50NSM3-84★◆◆	**1935**
3	90	25	30	50	A75NSM1-84★◆◆	**2550**	A75NSM3-84★◆◆	**2880**
4	135	40	50	100	A145NSM1-84★◆◆	**4020**	A145NSM3-84★◆◆	**5235**
5	270	75	100	200	A260NSM1-84★◆◆	**8160**	A260NSM3-84★◆◆	**10,155**
6	540	150	200	400	A460NSM1-70★◆◆	**19,350**	A460NSM3-70★◆◆	**21,150**
7	810	—	300	600	A750NSM1-70★◆◆	**24,150**	A750NSM3-70★◆◆	**27,330**

★ Overload relay suffix code. Select from the overload relay selection chart on page 3.6. Overload relays are required for all combination starters. If overload relay is provided by customer, substitute an "X" in place of the ★ and then substract list price of overload relay from combination starter's list price.

◆◆ MCP or breaker rating. See codes on page 3.48.

Example: A9NSM1-84X

$ 930	List
- 63	- OLR
$ 867	Net price

Coil voltage selection

All AC operated catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 starter: A75NSM1-80★◆◆

To select starter with control transformer, substitute the code from the Control transformer voltage selector chart for the two digits fter the last dash in the catalog number.

Ex.: A 480V primary voltage with a 120V secondary voltage is required for an A75 starter: A75SRF1-8F

Coil voltage selection – A9 - A300 ③

	Cntr	Volts															
Hz	type	12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Coil voltage selection – A400 - A750 ③

	Cntr	Volts			
Hz	type	24 - 60	48 - 130	100 - 250	250 - 500
60	AF	68	69	70	71 ⑤
50	AF	68	69	70	71 ⑤
DC	AF	68	69	70	71 ⑤

Control transformer voltage selection chart

		Volts			
Hz	Type	208/120	230 – 240/120	460 – 480/120	575 – 600/120
50/60	A/AF	0	7	8	9

For other voltages, consult factory.

Control transformer option

Contactor size	VA rating	List price adder
A9 – A40	45 ①	**$ 300**
A9 – A40	50	**360**
A50 – A75	75	**435**
A95 – A110	100	**560**
A145 – A185	150	**720**
A210 – A300	250	**795**
A400 – A460	150	**720** ④
A580 – A750	250	**795** ④

Maximum short circuit rating for UL listed combination starters

Contactor	Maximum MCP 480VAC	KA at 480VAC	MCP 600VAC	KA at 600VAC
A9	S3L050MW	35	S3L010MW	35
A12	S3L050MW	35	S3L010MW	35
A16	S3L050MW	35	—	—
A26	S3L100MW	35	S3L100MW	35
A30	S3L150MW	65	—	—
A40	S3L150MW	65	—	—
A50	S3L150MW	85	S3L150MW	35
A63	S4L250MW	85	—	—
A75	S4L250MW	85	—	—
A95	S4L250MW	85	S4L250MW	35
A110	S4L250MW	85	S4L250MW	35
A145	S5L400MW	65	S4L250MW	10
A185	S5L400MW	85	S4L250MW	10
A210	S6L800MW	85	S4L250MW	18
A260	S6L800MW	85	S5L400MW	18
A300	S6L800MW	85	S5L400MW	18
A400	S7H1200MW	85	Consult factory	
A460	S7H1200MW	85		
A580	S7H1200MW	85		
A750	S7H1200MW	85		

For thermal magnetic molded case breakers, consult factory.

Factory modifications

See page 3.3

① MCPs are supplied as standard. Thermal magnetic breakers can be supplied by substituting the letter "B" in place of the "M". List price is the same. Example: A9SB3-84★◆◆, $ 1110.00.
② No primary fusing provided.
③ For AF50 - AF300 starters, consult factory.
④ A400 - A750 utilizes the AF wide range coil with a lower coil consumption than A210 - A300.
⑤ AF400 - AF750 only.

Circuit breaker type ①
A9 - A750, NEMA rated
Non-reversing, three phase

UL Type 12 (Metal dustight)		UL Type 4 (Watertight)		UL Type 4X (Stainless steel)		UL Type 1, 3R, 4, 4X & 12 (Plastic)		UL Type 7 & 9 non-reversing (Explosion proof)	
Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price
NEMA rated									
A9NSM2-84★◆◆	**$ 1110**	A9NSM4-84★◆◆	**$ 1260**	A9NSMX-84★◆◆	**$ 1835**	A9NSMP-84★◆◆	**$ 1050**	A9NSM7-84★◆◆	**$ 2660**
A16NSM2-84★◆◆	**1170**	A16NSM4-84★◆◆	**1320**	A16NSMX-84★◆◆	**1895**	A16NSMP-84★◆◆	**1110**	A16NSM7-84★◆◆	**3030**
A26NSM2-84★◆◆	**1253**	A26NSM4-84★◆◆	**1410**	A26NSMX-84★◆◆	**2000**	A26NSMP-84★◆◆	**1193**	A26NSM7-84★◆◆	**3105**
A50NSM2-84★◆◆	**1935**	A50NSM4-84★◆◆	**2115**	A50NSMX-84★◆◆	**3275**	A50NSMP-84★◆◆	**1875**	A50NSM7-84★◆◆	**4150**
A75NSM2-84★◆◆	**2880**	A75NSM4-84★◆◆	**3225**	A75NSMX-84★◆◆	**4055**	A75NSMP-84★◆◆	**2520**	A75NSM7-84★◆◆	**6850**
A145NSM2-84★◆◆	**5235**	A145NSM4-84★◆◆	**5588**	A145NSMX-84★◆◆	**7650**	A145NSMP-84★◆◆	**5400**	A145NSM7-84★◆◆	**13,595**
A260NSM2-84★◆◆	**10,155**	A260NSM4-84★◆◆	**10,950**	A260NSMX-84★◆◆	**17,250**	A260NSMP-84★◆◆	**18,650**	—	—
A460NSM2-70★◆◆	**21,150**	A460NSM4-70★◆◆	**22,500**	A460NSMX-70★◆◆	**28,995**	–	**–**	—	—
A750NSM2-70★◆◆	**27,330**	A750NSM4-70★◆◆	**30,000**	A750NSMX-70★◆◆	**37,650**	–	**–**	—	—

★ Overload relay suffix code. Select from the overload relay selection chart on page 3.6. Overload relays are required for all combination starters. If overload relay is provided by customer, substitute an "X" in place of the ★ and then substract list price of overload relay from combination starter's list price.
◆ MCP or breaker rating. See MCP codes on page 3.50.

Motor circuit protector data

Motor full load amperes	MCP continous rating	Suffix code ◆	Catalog number	Starter size	1.5X	2X	4X	5X	6X	7X	8X	9X	10X	11X	12X
.92 – 2.76	3	A	S3L003MW	0	—	—	12	15	18	21	24	27	30	33	36
1.53 – 4.61	5	B	S3L005MW	0	—	—	20	25	30	35	40	45	50	55	60
3.07 – 9.23	10	C	S3L010MW	0	—	—	40	50	60	70	80	90	100	110	120
7.69 – 23.08	25	D	S3L025MW	1	—	—	100	125	150	175	200	225	250	275	300
15.38 – 46.15	50	E	S3L050MW	2	—	—	200	250	300	350	400	450	500	550	600
30.77 – 92.31	100	F	S3L100MW	3	—	—	400	500	600	700	800	900	1000	1100	1200
46.15 – 138.46	150	G	S3L150MW	4	—	—	600	750	900	1050	1200	1350	1500	1650	1800
28.85 – 230.77	250	H	S4L250MW	4	375	500	1000	—	1500	—	2000	—	2500	—	3000
46.15 – 369.23	400	J	S5L400MW	5	600	800	1600	—	2400	—	3200	—	4000	—	4800
69.23 – 553.85	600	K	S6L600MW	6	900	1200	2400	—	3600	—	4800	—	6000	—	7200
92.31 – 738.46	800	L	S6L800MW	7	1200	1600	3200	—	4800	—	6400	—	8000	—	9600
115.38 – 923.07	1000	M	S7H1000MW	7	1500	2000	4000	—	6000	—	8000	—	10,000	—	12,000
138.46 – 1107.69	1200	N	S7H1200MW	7	1800	2400	4800	—	7200	—	9600	—	12,000	—	14,400

Circuit breaker type ①
A9 - A750
Reversing, three phase

UL motor switching current	Maximum ratings – UL Listed: Maximum motor horsepower ratings Ⓛ 200/208V	230/240V	460/480V	575/600V	UL Type 1 (Indoor metal) Catalog number	List price	UL Type 3R (Outdoor metal) Catalog number	List price
UL rated								
9	2	2	5	7.5	A9SRM1-84★◆◆	**$ 1185**	A9SRM3-84★◆◆	**$ 1365**
11	3	3	7.5	10	A12SRM1-84★◆◆	**1275**	A12SRM3-84★◆◆	**1455**
17	5	5	10	15	A16SRM1-84★◆◆	**1335**	A16SRM3-84★◆◆	**1515**
28	7.5	10	20	25	A26SRM1-84★◆◆	**1478**	A26SRM3-84★◆◆	**1658**
34	10	10	25	30	A30SRM1-84★◆◆	**1703**	A30SRM3-84★◆◆	**1883**
42	10	15	30	40	A40SRM1-84★◆◆	**1935**	A40SRM3-84★◆◆	**2115**
54	15	20	40	50	A50SRM1-84★◆◆	**2468**	A50SRM3-84★◆◆	**2648**
65	20	25	50	50	A63SRM1-84★◆◆	**2899**	A63SRM3-84★◆◆	**3030**
80	25	30	60	75	A75SRM1-84★◆◆	**2940**	A75SRM3-84★◆◆	**4035**
95	30	30	60	75	A95SRM1-84★◆◆	**3705**	A95SRM3-84★◆◆	**5100**
110	30	40	75	100	A110SRM1-84★◆◆	**4200**	A110SRM3-84★◆◆	**5235**
130	40	50	100	125	A145SRM1-84★◆◆	**4335**	A145SRM3-84★◆◆	**7470**
156	50	60	125	150	A185SRM1-84★◆◆	**6285**	A185SRM3-84★◆◆	**8970**
192	60	75	150	200	A210SRM1-84★◆◆	**8310**	A210SRM3-84★◆◆	**13,080**
248	75	100	200	250	A260SRM1-84★◆◆	**8160**	A260SRM3-84★◆◆	**14,640**
302	100	100	250	300	A300SRM1-84★◆◆	**11,115**	A300SRM3-84★◆◆	**16,110**
414	125	150	250	400	A400SRM1-70★◆◆	**18,435**	A400SRM3-70★◆◆	**18,975**
480	150	200	400	500	A460SRM1-70★◆◆	**31,635**	A460SRM3-70★◆◆	**33,435**
590	200	250	500	600	A580SRM1-70★◆◆	**40,035**	A580SRM3-70★◆◆	**41,835**
810	250	300	600	700	A750SRM1-70★◆◆	**42,885**	A750SRM3-70★◆◆	**46,065**

★ Overload relay suffix code. Select from the overload relay selection chart on page 3.6. Overload relays are required for all combination starters. If overload relay is provided by customer, substitute an "X" in place of the ★ and then substract list price of overload relay from combination starter's list price.

Example: A9SRM1-84X — $ 1185 List; - 63 - OLR; $ 1122 Net price

◆◆ MCP or breaker rating. See codes on page 3.48.

Coil voltage selection

All AC operated catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 starter: A75SRM1-80★◆

To select starter with control transformer, substitute the code from the Control transformer voltage selector chart for the two digits fter the last dash in the catalog number.

Ex.: A 480V primary voltage with a 120V secondary voltage is required for an A75 starter: A75SRF1-8F

Factory modifications

See page 3.3

Coil voltage selection – A9 - A300 ③

Hz	Cntr type	Volts 12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Coil voltage selection – A400 - A750 ③

Hz	Cntr type	Volts 24 - 60	48 - 130	100 - 250	250 - 500
60	AF	68	69	70	71 ⑤
50	AF	68	69	70	71 ⑤
DC	AF	68	69	70	71 ⑤

Control transformer voltage selection chart

Hz	Type	Volts 208/120	230 – 240/120	460 – 480/120	575 – 600/120
50/60	A/AF	0	7	8	9

For other voltages, consult factory.

Maximum short circuit rating for UL listed combination starters

Contactor	Maximum MCP 480VAC	KA at 480VAC	MCP 600VAC	KA at 600VAC
A9	S3L050MW	35	S3L010MW	35
A12	S3L050MW	35	S3L010MW	35
A16	S3L050MW	35	—	—
A26	S3L100MW	35	S3L100MW	35
A30	S3L150MW	65	—	—
A40	S3L150MW	65	—	—
A50	S3L150MW	85	S3L150MW	35
A63	S4L250MW	85	—	—
A75	S4L250MW	85	—	—
A95	S4L250MW	85	S4L250MW	35
A110	S4L250MW	85	S4L250MW	35
A145	S5L400MW	65	S4L250MW	10
A185	S5L400MW	85	S4L250MW	10
A210	S6L800MW	85	S4L250MW	18
A260	S6L800MW	85	S5L400MW	18
A300	S6L800MW	85	S5L400MW	18
A400	S7H1200MW	85	Consult factory	
A460	S7H1200MW	85		
A580	S7H1200MW	85		
A750	S7H1200MW	85		

For thermal magnetic molded case breakers, consult factory.

Control transformer option

Contactor size	VA rating	List price adder
A9 – A40	45 ①	**$ 300**
A9 – A40	50	**360**
A50 – A75	75	**435**
A95 – A110	100	**560**
A145 – A185	150	**720**
A210 – A300	250	**795**
A400 – A460	150	**720** ④
A580 – A750	250	**795** ④

① MCPs are supplied as standard. Thermal magnetic/electronic trip type breakers can be supplied by substituting the letter "B" in place of the "M". List price is the same. Example: A9SRB1-84★◆◆, $ 740.00.
② No primary fusing provided.
③ For AF50 - AF300 starters, consult factory.
④ A400 - A750 utilizes the AF wide range coil with a lower coil consumption than A210 - A300.
⑤ AF400 - AF750 only.

Circuit breaker type ①
A9 - A750
Reversing, three phase

UL Type 12 (Metal dustight)		UL Type 4 (Watertight)		UL Type 4X (Stainless steel)		UL Type 1, 3R, 4, 4X & 12 (Plastic)	
Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price
UL rated							
A9SRM2-84★◆◆	**$ 1365**	A9SRM4-84★◆◆	**$ 1515**	A9SRMX-84★◆◆	**$ 2090**	A9SRMP-84★◆◆	**$ 1320**
A12SRM2-84★◆◆	**1455**	A12SRM4-84★◆◆	**1605**	A12SRMX-84★◆◆	**2180**	A12SRMP-84★◆◆	**1410**
A16SRM2-84★◆◆	**1515**	A16SRM4-84★◆◆	**1688**	A16SRMX-84★◆◆	**2240**	A16SRMP-84★◆◆	**1470**
A26SRM2-84★◆◆	**1658**	A26SRM4-84★◆◆	**1800**	A26SRMX-84★◆◆	**2405**	A26SRMP-84★◆◆	**1703**
A30SRM2-84★◆◆	**1883**	A30SRM4-84★◆◆	**2100**	A30SRMX-84★◆◆	**2878**	A30SRMP-84★◆◆	**1853**
A40SRM2-84★◆◆	**2115**	A40SRM4-84★◆◆	**2438**	A40SRMX-84★◆◆	**3395**	A40SRMP-84★◆◆	**2085**
A50SRM2-84★◆◆	**2648**	A50SRM4-84★◆◆	**2963**	A50SRMX-84★◆◆	**3988**	A50SRMP-84★◆◆	**2618**
A63SRM2-84★◆◆	**3030**	A63SRM4-84★◆◆	**3338**	A63SRMX-84★◆◆	**4505**	A63SRMP-84★◆◆	**3090**
A75SRM2-84★◆◆	**4035**	A75SRM4-84★◆◆	**4200**	A75SRMX-84★◆◆	**5210**	A75SRMP-84★◆◆	**3855**
A95SRM2-84★◆◆	**5100**	A95SRM4-84★◆◆	**5500**	A95SRMX-84★◆◆	**7200**	A95SRMP-84★◆◆	**4450**
A110SRM2-84★◆◆	**5235**	A110SRM4-84★◆◆	**5663**	A110SRMX-84★◆◆	**7415**	A110SRMP-84★◆◆	**4700**
A145SRM2-84★◆◆	**7470**	A145SRM4-84★◆◆	**7950**	A145SRMX-84★◆◆	**9885**	A145SRMP-84★◆◆	**7620**
A185SRM2-84★◆◆	**8970**	A185SRM4-84★◆◆	**9638**	A185SRMX-84★◆◆	**12,510**	A185SRMP-84★◆◆	**9250**
A210SRM2-84★◆◆	**13,080**	A210SRM4-84★◆◆	**13,650**	A210SRMX-84★◆◆	**16,545**	A210SRMP-84★◆◆	**13,300**
A260SRM2-84★◆◆	**14,640**	A260SRM4-84★◆◆	**15,450**	A260SRMX-84★◆◆	**21,735**	A260SRMP-84★◆◆	**15,000**
A300SRM2-84★◆◆	**16,110**	A300SRM4-84★◆◆	**18,150**	A300SRMX-84★◆◆	**28,260**	A300SRMP-84★◆◆	**17,600**
A400SRM2-70★◆◆	**18,975**	A400SRM4-70★◆◆	**21,000**	A400SRMX-70★◆◆	**32,835**	–	**–**
A460SRM2-70★◆◆	**33,435**	A460SRM4-70★◆◆	**35,850**	A460SRMX-70★◆◆	**41,280**	–	**–**
A580SRM2-70★◆◆	**41,835**	A580SRM4-70★◆◆	**45,000**	A580SRMX-70★◆◆	**53,385**	–	**–**
A750SRM2-70★◆◆	**46,065**	A750SRM4-70★◆◆	**48,338**	A750SRMX-70★◆◆	**56,385**	–	**–**

★ Overload relay suffix code. Select from the overload relay selection chart on page 3.6. Overload relays are required for all combination starters. If overload relay is provided by customer, substitute an "X" in place of the ★ and then substract list price of overload relay from combination starter's list price.
◆◆ MCP or breaker rating. See codes on page 3.48.

Motor circuit protector data

Motor full load amperes	MCP continous rating	Suffix code ◆	Catalog number	Starter size	1.5X	2X	4X	5X	6X	7X	8X	9X	10X	11X	12X
.92 – 2.76	3	A	S3L003MW	0	—	—	12	15	18	21	24	27	30	33	36
1.53 – 4.61	5	B	S3L005MW	0	—	—	20	25	30	35	40	45	50	55	60
3.07 – 9.23	10	C	S3L010MW	0	—	—	40	50	60	70	80	90	100	110	120
7.69 – 23.08	25	D	S3L025MW	1	—	—	100	125	150	175	200	225	250	275	300
15.38 – 46.15	50	E	S3L050MW	2	—	—	200	250	300	350	400	450	500	550	600
30.77 – 92.31	100	F	S3L100MW	3	—	—	400	500	600	700	800	900	1000	1100	1200
46.15 – 138.46	150	G	S3L150MW	4	—	—	600	750	900	1050	1200	1350	1500	1650	1800
28.85 – 230.77	250	H	S4L250MW	4	375	500	1000	—	1500	—	2000	—	2500	—	3000
46.15 – 369.23	400	J	S5L400MW	5	600	800	1600	—	2400	—	3200	—	4000	—	4800
69.23 – 553.85	600	K	S6L600MW	6	900	1200	2400	—	3600	—	4800	—	6000	—	7200
92.31 – 738.46	800	L	S6L800MW	7	1200	1600	3200	—	4800	—	6400	—	8000	—	9600
115.38 – 923.07	1000	M	S7H1000MW	7	1500	2000	4000	—	6000	—	8000	—	10,000	—	12,000
138.46 – 1107.69	1200	N	S7H1200MW	7	1800	2400	4800	—	7200	—	9600	—	12,000	—	14,400

Circuit breaker type ①
A9 - A750, NEMA rated
Reversing, three phase

UL motor switching current		Maximum ratings – UL Listed			UL Type 1 (Indoor metal)		UL Type 3R (Outdoor metal)	
		Maximum motor horsepower ratings Ⓛ						
		200V	230V	460/575V	Catalog number	List price	Catalog number	List price
		NEMA rated						
NEMA size	Continuous current							
00	9	1.5	1.5	2	A9NSRM1-84★◆◆	$ 1185	A9NSRM3-84★◆◆	$ 1365
0	18	3	3	5	A16NSRM1-84★◆◆	1335	A16NSRM3-84★◆◆	1515
1	27	7.5	7.5	10	A26NSRM1-84★◆◆	1478	A26NSRM3-84★◆◆	1658
2	45	10	15	25	A50NSRM1-84★◆◆	2468	A50NSRM3-84★◆◆	2648
3	90	25	30	50	A75NSRM1-84★◆◆	3705	A75NSRM3-84★◆◆	4035
4	135	40	50	100	A145NSRM1-84★◆◆	6285	A145NSRM3-84★◆◆	7470
5	270	75	100	200	A260NSRM1-84★◆◆	12,645	A260NSRM3-84★◆◆	14,640
6	540	150	200	400	A460NSRM1-70★◆◆	31,635	A460NSRM3-70★◆◆	33,435
7	810	—	300	600	A750NSRM1-70★◆◆	42,885	A750NSRM3-70★◆◆	46,065

★ Overload relay suffix code. Select from the overload relay selection chart on page 3.6. Overload relays are required for all combination starters. If overload relay is provided by customer, substitute an "X" in place of the ★ and then substract list price of overload relay from combination starter's list price.

◆◆ MCP or breaker rating. See codes on page 3.48.

Example: A9NSRM1-84X $ 1185 List
- 63 - OLR
$ 1122 Net price

Coil voltage selection

All AC operated catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 starter: A75NSRM1-80★◆◆

To select starter with control transformer, substitute the code from the Control transformer voltage selector chart for the two digits fter the last dash in the catalog number.

Ex.: A 480V primary voltage with a 120V secondary voltage is required for an A75 starter: A75SRF1-8F

Coil voltage selection – A9 - A300 ③

	Cntr	Volts															
Hz	type	12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Coil voltage selection – A400 - A750 ③

	Cntr	Volts			
Hz	type	24 - 60	48 - 130	100 - 250	250 - 500
60	AF	68	69	70	71 ⑤
50	AF	68	69	70	71 ⑤
DC	AF	68	69	70	71 ⑤

Control transformer voltage selection chart

		Volts			
Hz	Type	208/120	230 – 240/120	460 – 480/120	575 – 600/120
50/60	A/AF	0	7	8	9

For other voltages, consult factory.

Maximum short circuit rating for UL listed combination starters

Contactor	Maximum MCP 480VAC	KA at 480VAC	MCP 600VAC	KA at 600VAC
A9	S3L050MW	35	S3L010MW	35
A12	S3L050MW	35	S3L010MW	35
A16	S3L050MW	35	—	—
A26	S3L100MW	35	S3L100MW	35
A30	S3L150MW	65	—	—
A40	S3L150MW	65	—	—
A50	S3L150MW	85	S3L150MW	35
A63	S4L250MW	85	—	—
A75	S4L250MW	85	—	—
A95	S4L250MW	85	S4L250MW	35
A110	S4L250MW	85	S4L250MW	35
A145	S5L400MW	65	S4L250MW	10
A185	S5L400MW	85	S4L250MW	10
A210	S6L800MW	85	S4L250MW	18
A260	S6L800MW	85	S5L400MW	18
A300	S6L800MW	85	S5L400MW	18
A400	S7H1200MW	85	Consult factory	
A460	S7H1200MW	85		
A580	S7H1200MW	85		
A750	S7H1200MW	85		

For thermal magnetic molded case breakers, consult factory.

Factory modifications

See page 3.3

Control transformer option

Contactor size	VA rating	List price adder
A9 – A40	45 ①	$ 300
A9 – A40	50	360
A50 – A75	75	435
A95 – A110	100	560
A145 – A185	150	720
A210 – A300	250	795
A400 – A460	150	720 ④
A580 – A750	250	795 ④

① MCPs are supplied as standard. Thermal magnetic/electronic trip type breakers can be supplied by substituting the letter "B" in place of the "M". List price is the same. Example: A9SRB1-84★◆◆, $ 740.00.
② No primary fusing provided.
③ For AF50 - AF300 starters, consult factory.
④ A400 - A750 utilizes the AF wide range coil with a lower coil consumption than A210 - A300.
⑤ AF400 - AF750 only.

Circuit breaker type ①
A9 - A750, NEMA rated
Reversing, three phase

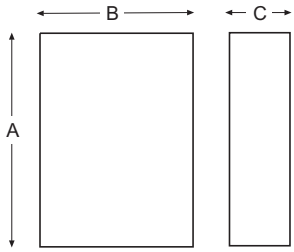
UL Listed 12 (Metal dustight)		UL Listed 4 (Watertight)		UL Listed 4X (Stainless steel)		UL Listed 1, 3R, 4, 4X & 12 (Plastic)	
Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price
NEMA rated							
A9NSRM2-84★◆◆	**$ 1365**	A9NSRM4-84★◆◆	**$ 1515**	A9NSRMX-84★◆◆	**$ 2090**	A9NSRMP-84★◆◆	**$ 1320**
A16NSRM2-84★◆◆	**1515**	A16NSRM4-84★◆◆	**1688**	A16NSRMX-84★◆◆	**2240**	A16NSRMP-84★◆◆	**1470**
A26NSRM2-84★◆◆	**1658**	A26NSRM4-84★◆◆	**1800**	A26NSRMX-84★◆◆	**2405**	A26NSRMP-84★◆◆	**1703**
A50NSRM2-84★◆◆	**2648**	A50NSRM4-84★◆◆	**2963**	A50NSRMX-84★◆◆	**3988**	A50NSRMP-84★◆◆	**2618**
A75NSRM2-84★◆◆	**4035**	A75NSRM4-84★◆◆	**4200**	A75NSRMX-84★◆◆	**5210**	A75NSRMP-84★◆◆	**3855**
A145NSRM2-84★◆◆	**7470**	A145NSRM4-84★◆◆	**7950**	A145NSRMX-84★◆◆	**9885**	A145NSRMP-84★◆◆	**7620**
A260NSRM2-84★◆◆	**14,640**	A260NSRM4-84★◆◆	**15,450**	A260NSRMX-84★◆◆	**21,735**	A260NSRMP-84★◆◆	**15,000**
A460NSRM2-70★◆◆	**33,435**	A460NSRM4-70★◆◆	**35,850**	A460NSRMX-70★◆◆	**41,280**	–	**–**
A750NSRM2-70★◆◆	**46,065**	A750NSRM4-70★◆◆	**48,338**	A750NSRMX-70★◆◆	**56,385**	–	**–**

★ Overload relay suffix code. Select from the overload relay selection chart on page 3.6. Overload relays are required for all combination starters. If overload relay is provided by customer, substitute an "X" in place of the ★ and then substract list price of overload relay from combination starter's list price.
◆◆ MCP or breaker rating. See codes on page 3.48.

Motor circuit protector data

Motor full load amperes	MCP continous rating	Suffix code ◆	Catalog number	Starter size	1.5X	2X	4X	5X	6X	7X	8X	9X	10X	11X	12X
.92 – 2.76	3	A	S3L003MW	0	—	—	12	15	18	21	24	27	30	33	36
1.53 – 4.61	5	B	S3L005MW	0	—	—	20	25	30	35	40	45	50	55	60
3.07 – 9.23	10	C	S3L010MW	0	—	—	40	50	60	70	80	90	100	110	120
7.69 – 23.08	25	D	S3L025MW	1	—	—	100	125	150	175	200	225	250	275	300
15.38 – 46.15	50	E	S3L050MW	2	—	—	200	250	300	350	400	450	500	550	600
30.77 – 92.31	100	F	S3L100MW	3	—	—	400	500	600	700	800	900	1000	1100	1200
46.15 – 138.46	150	G	S3L150MW	4	—	—	600	750	900	1050	1200	1350	1500	1650	1800
28.85 – 230.77	250	H	S4L250MW	4	375	500	1000	—	1500	—	2000	—	2500	—	3000
46.15 – 369.23	400	J	S5L400MW	5	600	800	1600	—	2400	—	3200	—	4000	—	4800
69.23 – 553.85	600	K	S6L600MW	6	900	1200	2400	—	3600	—	4800	—	6000	—	7200
92.31 – 738.46	800	L	S6L800MW	7	1200	1600	3200	—	4800	—	6400	—	8000	—	9600
115.38 – 923.07	1000	M	S7H1000MW	7	1500	2000	4000	—	6000	—	8000	—	10,000	—	12,000
138.46 – 1107.69	1200	N	S7H1200MW	7	1800	2400	4800	—	7200	—	9600	—	12,000	—	14,400

Approximate dimensions
Non-fused, across the line
Fused, across the line



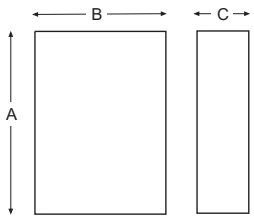
Non-fused, across the line w/CCT

Starter size	Enclosure type	A	B	C
A9 – A40	1	10	8	6
	3R	10	8	6
	4	10	8	6
	4X Stainless	10	8	6
	4X Plastic	10	8	7
	12	10	8	6
A50 – A75	1	14	12	8
	3R	14	12	8
	4	14	12	6
	4X Stainless	14	12	6
	4X Plastic	14	12	7
	12	14	12	8
A95 – A110	1	20	16	8
	3R	20	16	8
	4	20	16	8
	4X Stainless	20	16	8
	4X Plastic	20	16	8
	12	20	16	8
A145 – A185	1	30	24	12
	3R	30	20	8
	4	30	20	8
	4X Stainless	30	24	8
	4X Plastic	30	20	12
	12	30	20	8
A210 – A300	1	30	24	12
	3R	30	20	10
	4	30	20	10
	4X Stainless	30	24	12
	4X Plastic	30	20	12
	12	30	20	10
A400	1	36	30	12
	3R	36	30	10
	4	36	30	10
	4X Stainless	36	30	12
	4X Plastic	–	–	–
	12	36	30	10
A460	1	42	30	12
	3R	42	36	12
	4	42	36	12
	4X Stainless	42	36	12
	4X Plastic	–	–	–
	12	42	36	12
A580	1	36	30	12
	3R	36	30	10
	4	36	30	10
	4X Stainless	36	30	12
	4X Plastic	–	–	–
	12	36	30	10
A750	1	–	–	–
	3R	60	36	16
	4	60	36	16
	4X Stainless	60	36	16
	4X Plastic	–	–	–
	12	60	36	16

Fused, across the line w/CCT

Starter size	Enclosure type	A	B	C
A9 – A40	1	14	12	8
	3R	14	12	8
	4	14	12	6
	4X Stainless	14	12	6
	4X Plastic	14	12	7
	12	14	12	8
A50 – A75	1	20	16	8
	3R	20	16	8
	4	20	16	8
	4X Stainless	20	16	8
	4X Plastic	20	16	8
	12	20	16	8
A95 – A110	1	24	20	10
	3R	24	20	10
	4	24	20	10
	4X Stainless	24	20	10
	4X Plastic	24	20	12
	12	24	20	10
A145 – A185	1	30	24	12
	3R	30	20	10
	4	30	20	10
	4X Stainless	30	24	12
	4X Plastic	30	20	12
	12	30	20	10
A210 – A400	1	36	30	12
	3R	30	30	10
	4	30	30	10
	4X Stainless	36	30	12
	4X Plastic	40	30	14
	12	30	30	10
A460	1	42	30	12
	3R	42	36	12
	4	42	36	12
	4X Stainless	42	36	12
	4X Plastic	–	–	–
	12	42	36	12
A580 – A750	1	87	36	24
	3R	87	36	24
	4	87	36	24
	4X Stainless	–	–	–
	4X Plastic	–	–	–
	12	87	36	24

Approximate dimensions
Circuit breaker, across the line
Reversing, non-fused w/CCT



Circuit breaker, across the line

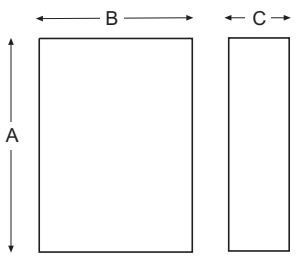
Starter size	Enclosure type	A	B	C
A9 – A40 (S3)	1	14	12	8
	3R	14	12	8
	4	16	12	8
	4X Stainless	16	12	8
	4X Plastic	14	12	7
	12	14	12	8
	7 ③	14	10	6
A50 – A75 (S3)	1	14	12	8
	3R	14	12	8
	4	16	12	8
	4X Stainless	16	12	8
	4X Plastic	14	12	7
	12	14	12	8
	7 ③	18	12	6
A95 – A110 (S3)	1	20	16	8
	3R	20	16	8
	4	20	16	8
	4X Stainless	20	16	8
	4X Plastic	20	16	8
	12	20	16	8
	7 ③	24	16	6
A145 – A185 (S3, S4) ①	1	24	20	8
	3R	24	16	8
	4	24	16	8
	4X Stainless	24	16	8
	4X Plastic	30	20	12
	12	24	16	8
	7 ③	24	16	6
A210 – A300 (S4, S5) ①	1	30	24	12
	3R	30	20	10
	4	30	20	10
	4X Stainless	30	24	12
	4X Plastic	30	20	12
	12	30	20	10
	7 ③	30	18	8
A300 (S6) ②	1	36	30	12
	3R	36	30	12
	4	36	30	12
	4X Stainless	36	30	12
	4X Plastic	33	25	12
	12	36	30	12
	7 ③	30	24	8
A400 (S6) ①	1	30	24	12
	3R	30	24	10
	4	30	24	10
	4X Stainless	30	24	12
	4X Plastic	33	25	12
	12	30	24	10
A460 – A580 (S6) ①	1	36	30	12
	3R	36	24	12
	4	36	24	12
	4X Stainless	36	24	12
	4X Plastic	–	–	–
	12	36	24	12
A580 (S7) ②	1	42	30	13
	3R	42	36	12
	4	42	36	12
	4X Stainless	42	36	12
	4X Plastic	–	–	–
	12	42	36	12
A750 (S7) ②	1	48	36	13
	3R	48	36	13
	4	48	36	13
	4X Stainless	48	36	13
	4X Plastic	–	–	–
	12	48	36	13

Reversing, non-fused w/CCT

Starter size	Enclosure type	A	B	C
A9 – A40	1	14	12	8
	3R	14	12	8
	4	14	12	6
	4X Stainless	14	12	6
	4X Plastic	14	12	7
	12	14	12	8
A50 – A75	1	20	16	8
	3R	20	16	8
	4	20	16	8
	4X Stainless	20	16	8
	4X Plastic	20	16	8
	12	20	16	8
A95 – A110	1	30	24	8
	3R	30	24	8
	4	30	24	8
	4X Stainless	30	24	8
	4X Plastic	30	30	12
	12	30	24	8
A145 – A185	1	30	24	12
	3R	30	24	8
	4	30	24	8
	4X Stainless	30	24	8
	4X Plastic	33	25	12
	12	30	24	8
A210	1	30	24	12
	3R	30	24	10
	4	30	24	10
	4X Stainless	30	24	10
	4X Plastic	33	25	12
	12	30	24	10
A260 – A300	1	36	30	12
	3R	30	30	10
	4	30	30	10
	4X Stainless	36	30	12
	4X Plastic	40	30	12
	12	30	30	10
A400 – A460	1	48	36	13
	3R	48	36	12
	4	48	36	12
	4X Stainless	48	36	12
	4X Plastic	–	–	–
	12	48	36	12
A580 – A750	1	87	36	24
	3R	87	36	24
	4	87	36	24
	4X Stainless	–	–	–
	4X Plastic	–	–	–
	12	87	36	24

① Busbars breaker-starter, bottom entry
② Cable, breaker-starter.
③ Type 7, explosion-proof inside dimensions.

Approximate dimensions
Reversing fused combination
Reversing breaker combination w/CCT



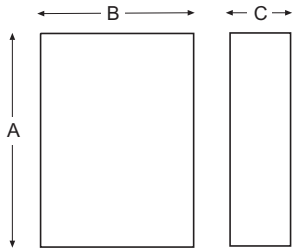
Reversing, fused combination w/CCT

Starter size	Enclosure type	A	B	C
A9 – A40	1	20	16	8
	3R	20	16	8
	4	20	16	8
	4X Stainless	20	16	8
	4X Plastic	20	16	8
	12	20	16	8
A50 – A75	1	24	20	8
	3R	24	20	8
	4	24	20	8
	4X Stainless	24	20	8
	4X Plastic	24	16	8
	12	24	20	8
A95 – A110	1	30	24	10
	3R	30	24	10
	4	30	24	10
	4X Stainless	30	24	10
	4X Plastic	30	30	12
	12	30	24	10
A145 – A210	1	36	30	12
	3R	30	30	12
	4	30	30	12
	4X Stainless	30	30	12
	4X Plastic	40	30	12
	12	30	30	12
A260 – A300	1	42	36	13
	3R	36	36	10
	4	36	36	10
	4X Stainless	36	36	12
	4X Plastic	40	30	12
	12	36	36	10
A400 – A460	1	48	36	13
	3R	48	36	12
	4	48	36	12
	4X Stainless	48	36	12
	4X Plastic	–	–	–
	12	48	36	12
A580 – A750	1	87	36	24
	3R	87	36	24
	4	87	36	24
	4X Stainless	87	36	24
	4X Plastic	–	–	–
	12	87	36	24

Reversing breaker combination w/CCT

Starter size	Enclosure type	A	B	C
A9 – A40 (S3)	1	14	12	8
	3R	14	12	8
	4	16	12	8
	4X Stainless	16	12	8
	4X Plastic	14	12	7
	12	14	12	8
A50 – A75 (S3)	1	24	20	8
	3R	24	20	8
	4	24	20	8
	4X Stainless	24	20	8
	4X Plastic	24	16	8
	12	24	20	8
A95 – A110 (S3)	1	30	24	8
	3R	30	24	8
	4	30	24	8
	4X Stainless	30	24	8
	4X Plastic	30	30	12
	12	30	24	8
A145 (S3)	1	24	20	8
	3R	24	20	8
	4	24	20	8
	4X Stainless	24	20	8
	4X Plastic	30	20	12
	12	24	20	8
A185 (S3, S4)	1	30	24	12
	3R	30	20	8
	4	30	20	8
	4X Stainless	30	24	8
	4X Plastic	30	20	12
	12	30	20	8
A210 – A300 (S4, S5)	1	30	24	12
	3R	30	24	10
	4	30	24	10
	4X Stainless	30	24	12
	4X Plastic	33	25	12
	12	30	24	10
A300 (S6)	1	36	30	12
	3R	30	30	10
	4	30	30	10
	4X Stainless	36	30	12
	4X Plastic	40	30	14
	12	30	30	10
A400 – A580 (S6, S7)	1	42	30	13
	3R	42	36	12
	4	42	30	12
	4X Stainless	42	30	12
	4X Plastic	–	–	–
	12	42	36	12
A750 (S7)	1	48	36	17
	3R	48	36	16
	4	48	36	16
	4X Stainless	48	36	16
	4X Plastic	–	–	–
	12	48	36	16

Approximate dimensions for combination starters
2 Speed, 1 winding, non-fused w/CCT
2 Speed, 1 winding, fused combination w/CCT



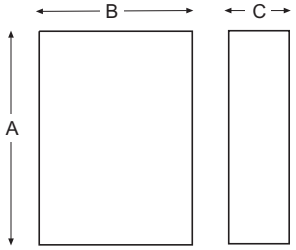
2 Speed - 1 Winding, non-fused w/CCT

Starter size	Enclosure type	A	B	C
A9 – A40	1	14	12	8
	4	14	12	8
	4X Stainless	14	12	6
	4X Plastic	14	12	7
	12	14	12	8
A50 – A75	1	20	16	8
	3R	20	16	8
	4	20	16	8
	4X Stainless	20	16	8
	4X Plastic	20	16	8
	12	20	16	8
A95 – A110	1	30	30	8
	3R	30	30	10
	4	30	30	10
	4X Stainless	30	30	10
	4X Plastic	30	30	12
	12	20	30	10
A145 – A185 (NF200)	1	36	30	8
	3R	36	30	8
	4	36	30	8
	4X Stainless	36	30	8
	4X Plastic	–	–	–
	12	36	30	8
A210 (NF200)	1	42	36	13
	3R	36	36	12
	4	36	36	12
	4X Stainless	36	36	12
	4X Plastic	–	–	–
	12	36	36	12
A260 – A300 (NF400)	1	42	36	13
	3R	42	36	13
	4	42	36	13
	4X Stainless	42	36	13
	4X Plastic	–	–	–
	12	42	36	13
A400 (NF600)	1	–	–	–
	3R	60	36	12
	4	60	36	12
	4X Stainless	60	36	12
	4X Plastic	–	–	–
	12	60	36	12
A460 (NF600) A580 (NF800) A750 (NF1200)	1	87	36	24
	3R	87	36	24
	4	–	–	–
	4X Stainless	–	–	–
	4X Plastic	–	–	–
	12	87	36	24

2 Speed - 1 Winding, fused combination w/CCT

Starter size	Enclosure type	A	B	C
A9 – A40	1	20	16	8
	3R	20	16	8
	4	20	16	8
	4X Stainless	20	16	8
	4X Plastic	20	16	8
	12	20	16	8
A50 – A75	1	30	24	12
	3R	30	24	8
	4	30	24	8
	4X Stainless	30	24	8
	4X Plastic	30	20	12
	12	30	24	8
A95 – A110	1	42	30	12
	3R	42	30	12
	4	42	30	12
	4X Stainless	42	30	12
	4X Plastic	–	–	–
	12	42	30	12
A145 – A185 (F400)	1	42	36	13
	3R	36	36	12
	4	36	36	12
	4X Stainless	36	36	12
	4X Plastic	–	–	–
	12	36	36	12
A210 (F400)	1	42	36	13
	3R	36	36	12
	4	36	36	12
	4X Stainless	36	36	12
	4X Plastic	–	–	–
	12	36	36	12
A260 – A300 (F600)	1	42	36	13
	3R	42	36	12
	4	42	36	12
	4X Stainless	42	36	12
	4X Plastic	–	–	–
	12	42	36	12
A400 (F800)	1	–	–	–
	3R	60	36	12
	4	60	36	12
	4X Stainless	60	36	12
	4X Plastic	–	–	–
	12	60	36	12
A460 (F800) A580 (NF1200 + fuse block) A750 (NF 1600 + fuse block)	1	87	36	24
	3R	87	36	24
	4	–	–	–
	4X Stainless	–	–	–
	4X Plastic	–	–	–
	12	87	36	24

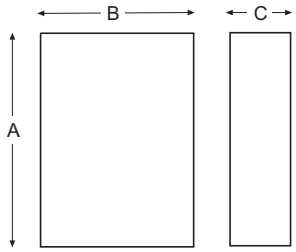
Approximate dimensions
2 Speed, 1 winding, breaker combination w/CCT



2 Speed - 1 Winding, breaker combination w/CCT

Starter size	Enclosure type	A	B	C
A9 – A40	1	14	12	8
	3R	14	12	8
	4	14	12	8
	4X Stainless	16	12	8
	4X Plastic	14	12	7
	12	14	12	8
A50 – A75	1	24	20	8
	3R	24	20	8
	4	24	20	8
	4X Stainless	24	20	8
	4X Plastic	30	20	12
	12	24	20	8
A95 – A110	1	36	30	12
	3R	36	30	12
	4	36	30	12
	4X Stainless	36	30	12
	4X Plastic	40	30	14
	12	36	30	12
A145 (S3) A185 (S3, S4)	1	36	24	8
	3R	36	24	8
	4	36	24	8
	4X Stainless	36	24	8
	4X Plastic	40	30	14
	12	36	24	8
A210 – A300 (S4, S5)	1	36	30	12
	3R	36	30	12
	4	36	30	12
	4X Stainless	36	30	12
	4X Plastic	40	30	14
	12	36	30	12
A300 (S6)	1	42	30	13
	3R	42	36	12
	4	42	36	12
	4X Stainless	42	36	12
	4X Plastic	–	–	–
	12	42	36	12
A400 (S6)	1	48	36	13
	3R	48	36	12
	4	48	36	12
	4X Stainless	48	36	12
	4X Plastic	–	–	–
	12	48	36	12
A460 (S6)	1	48	36	13
	3R	48	36	12
	4	48	36	12
	4X Stainless	48	36	12
	4X Plastic	–	–	–
	12	48	36	12
A580 (S6)	1	–	–	–
	3R	60	36	12
	4	60	36	12
	4X Stainless	60	36	12
	4X Plastic	–	–	–
	12	60	36	12
A580 – A750 (S7)	1	87	36	24
	3R	87	36	24
	4	–	–	–
	4X Stainless	–	–	–
	4X Plastic	–	–	–
	12	87	36	24

Approximate dimensions
2 Speed - 2 Winding, Non-fused w/CCT
2 Speed - 2 Winding, Fused combination w/CCT



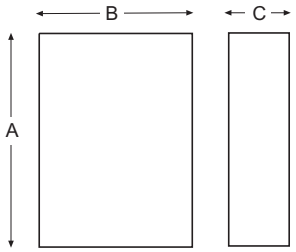
2 Speed - 2 Winding, non-fused w/CCT

Starter size	Enclosure type	A	B	C
A9 – A40	1	14	12	8
	3R	14	12	8
	4	14	12	6
	4X Stainless	14	12	6
	4X Plastic	14	12	7
	12	14	12	8
A50 – A75	1	20	16	8
	3R	20	16	8
	4	20	16	8
	4X Stainless	20	16	8
	4X Plastic	20	16	8
	12	20	16	8
A95 – A110	1	30	24	12
	3R	30	24	8
	4	30	24	8
	4X Stainless	30	24	8
	4X Plastic	30	30	12
	12	30	24	8
A145 – A185	1	30	24	8
	3R	30	24	8
	4	30	24	8
	4X Stainless	30	24	8
	4X Plastic	33	25	12
	12	30	24	8
A210	1	30	24	12
	3R	30	24	10
	4	30	24	10
	4X Stainless	30	24	10
	4X Plastic	33	25	12
	12	30	24	10
A260 – A300	1	36	30	12
	3R	30	30	10
	4	30	30	10
	4X Stainless	36	30	12
	4X Plastic	40	30	12
	12	30	30	10
A400 – A460	1	48	36	13
	3R	48	36	12
	4	48	36	12
	4X Stainless	48	36	12
	4X Plastic	–	–	–
	12	48	36	12
A580 – A750	1	87	36	24
	3R	87	36	24
	4	87	36	24
	4X Stainless	–	–	–
	4X Plastic	–	–	–
	12	87	36	24

2 Speed - 2 Winding, fused combination w/CCT

Starter size	Enclosure type	A	B	C
A9 – A40	1	20	16	8
	3R	20	16	8
	4	20	16	8
	4X Stainless	20	16	8
	4X Plastic	20	16	8
	12	20	16	8
A50 – A75	1	24	20	8
	3R	24	20	8
	4	24	20	8
	4X Stainless	24	20	8
	4X Plastic	24	16	8
	12	24	20	8
A95 – A110	1	30	24	10
	3R	30	24	10
	4	30	24	10
	4X Stainless	30	24	10
	4X Plastic	30	30	12
	12	30	24	10
	7			
A145 – A210	1	36	30	12
	3R	30	30	12
	4	30	30	12
	4X Stainless	30	30	12
	4X Plastic	40	30	12
	12	30	30	12
A260 – A300	1	42	36	13
	3R	36	36	10
	4	36	36	10
	4X Stainless	36	36	12
	4X Plastic	40	30	12
	12	36	36	10
A400 – A460	1	48	36	13
	3R	48	36	12
	4	48	36	12
	4X Stainless	48	36	12
	4X Plastic	–	–	–
	12	48	36	12
A580 – A750	1	87	36	24
	3R	87	36	24
	4	87	36	24
	4X Stainless	87	36	24
	4X Plastic	–	–	–
	12	87	36	24

Approximate dimensions
2 Speed - 2 Winding, breaker combination w/CCT



2 Speed - 2 Winding, breaker combination w/CCT

Starter size	Enclosure type	A	B	C
A9 – A40 (S3)	1	14	12	8
	3R	14	12	8
	4	16	12	8
	4X Stainless	16	12	8
	4X Plastic	14	12	7
	12	14	12	8
A50 – A75 (S3)	1	24	20	8
	3R	24	20	8
	4	24	20	8
	4X Stainless	24	20	8
	4X Plastic	24	16	8
	12	24	20	8
A95 – A110 (S3)	1	30	24	12
	3R	30	24	8
	4	30	24	8
	4X Stainless	30	24	8
	4X Plastic	30	30	12
	12	30	24	8
A145 (S3) ①	1	24	20	8
	3R	24	20	8
	4	24	20	8
	4X Stainless	24	20	8
	4X Plastic	30	20	12
	12	24	20	8
A185 (S3, S4) ①	1	30	24	12
	3R	30	20	8
	4	30	20	8
	4X Stainless	30	24	8
	4X Plastic	30	20	12
	12	30	20	8
A210 – A300 (S4, S5) ①	1	30	24	12
	3R	30	24	10
	4	30	24	10
	4X Stainless	30	24	12
	4X Plastic	33	25	12
	12	30	24	10
A300 (S6) ②	1	36	30	12
	3R	30	30	10
	4	30	30	10
	4X Stainless	36	30	12
	4X Plastic	40	30	14
	12	30	30	10
A400 – A580 (S6) ① (S7) ②	1	42	30	13
	3R	42	36	12
	4	42	30	12
	4X Stainless	42	30	12
	4X Plastic	–	–	–
	12	42	36	12
A750 (S7) ②	1	48	36	17
	3R	48	36	16
	4	48	36	16
	4X Stainless	48	36	16
	4X Plastic	–	–	–
	12	48	36	16

① Busbars breaker-starter, bottom entry
② Cable, breaker-starter.

Reduced voltage starters
Open & enclosed

Reduced voltage **Starters**

Description
- Compact, space saving design
- 8 starter frame sizes, A16 to A750
- Maximum U.L. horsepower ratings
- Mechanically interlocking as standard for wye-delta and autotransformer starters
- Incomplete sequence timer as standard for wye-delta and autotransformer starters
- Remote customer connection point at separate terminal blocks
- Double break contact design with magnetic arc chamber extinguishes arc in the shortest possible time
- NEMA sizes 0, 1, 2, 3, 4, 5, 6, 7

Overload relay protection
Starters, sizes A16 – A185, have Class 10 adjustable thermal bimetallic overload relay protection as standard.

Sizes A210 – A750, have selectable Class 10, 20, 30 adjustable electronic overload relay protection as standard.

Electronic overload relay protection is available for other starter sizes.

General information
Catalog numbering information

A110 SA F 1 - 84 C 6D 4 L A

Starter size

Starter type
SA - Autotransformer
SG - Wye-delta open transition
SY - Wye-delta closed transition
SH - Part winding
N - NEMA

Combination type
No digit - Non-combination
N - Non-Fusible disconnect
F - Fusible disconnect
B - Thermal magnetic or electronic trip type circuit breaker
M - Motor circuit protection (MCP)

Enclosure
No digit - Open
1 - UL Type 1
2 - UL Type 12
3 - UL Type 3R
4 - UL Type 4
X - UL Type 4X – stainless steel

Coil voltage
See voltage selection chart

Overload range
See overload relay selection chart, page 3.6.

Accessories
A - Start-stop pushbutton
C - 2 pos. sel. switch (off-on)
D - 3 pos. sel. switch (HOA)
E - Pilot light
F - Start-stop pushbutton & pilot light
H - 2 pos. sel. switch & pilot light
J - 3 pos. sel. switch & pilot light

Horsepower

A - 10	N - 200
B - 15	P - 250
C - 20	R - 300
D - 25	S - 350
E - 30	T - 400
F - 40	U - 500
G - 50	V - 600
H - 60	W - 700
J - 75	X - 800
K - 100	Y - 900
L - 125	Z - 1000
M - 150	

Line voltage
1 - 200 – 208V
2 - 230 – 240V
3 - 380 – 415V
4 - 460 – 480V
6 - 575 – 600V

Fuse clip
6A- 30A, 600V, Class J
6B- 60A, 600V, Class J
6C- 100A, 600V, Class J
6D- 200A, 600V, Class J
6E- 400A, 600V, Class J
6F- 600A, 600V, Class J
6G- 800A, 600V, Class L
6H- 1200A, 600V, Class L

Circuit breaker amp rating (600V)

6D -15	6M-70	6W - 225	6E - 700
6E -20	6N - 80	6X - 250	6F - 800
6F -25	6P - 90	6Y - 300	6G - 900
6G -30	6R - 100	6Z - 350	6H - 1000
6H -35	6S - 125	6A - 400	6J - 1200
6J -40	6T - 150	6B - 450	
6K -50	6U - 175	6C - 500	
6L-60	6V - 200	6D - 600	

Circuit breaker amp rating (200V – 480V)

4D -15	4M-70	4W - 225	4E - 700
4E -20	4N - 80	4X - 250	4F - 800
4F -25	4P - 90	4Y - 300	4G - 900
4G -30	4R - 100	4Z - 350	4H - 1000
4H -35	-40 - 125	4A - 400	4J - 1200
4J -40	4T - 150	4B - 450	
4K -50	4U - 175	4C - 500	
4L-60	4V - 200	4D - 600	

MCP amp rating (600V)

6A - 3	6D - 25	6G -	1506K	-600
6N - 1200				
6B - 5	6E - 50	6H -	2506L	-800
6C - 10	6F - 100	6J -	4006M	-1000

MCP amp rating (200V – 480V)

4A - 3	4D - 25	4G -150	4K - 600	
4N - 1200				
4B - 5	4E - 50	4H -	2504L	-800
4C - 10	4F - 100	4J -	4004M	-1200

Control cover accessories – A9-A750

Description	Control suffix ①	List price adder NEMA 1 3R 4, 4X & 12
Start-stop pushbutton	A	$ 72
Fwd-rev-stop pushbutton	B	360
2 position selector switch (Std. ON-OFF)	C	72
3 position selector switch (Std. HAND-OFF-AUTO)	D	72
Pilot light, Red, RUN (Std.)	E	135
Pilot light, Green, RUN	R	135
Pilot light suffix + V= Neon bulb	V	–
Pilot light suffix + X= LED bulb	X	–
Start-stop pushbutton & pilot light	F	207
Fwd-rev-stop pushbutton & pilot light	G	496
2 position selector switch & pilot light	H	207
3 position selector switch & pilot light	J	207
Fast-slow-stop pushbuttons	K	360
Fast-slow-stop pushbuttons & pilot light	L	495
Fast-slow-off-auto selector switch	M	150
Emergency stop	P	100
F suffix + 1NO & 1NC auxiliary contact	T	237
J suffix + 1NO & 1NC auxiliary contact	U	237
Pushbutton (standard START)	Y	36

Special modifications

Contact configuration	Suffix code ①	List price adder
Contactor		
Coil surge suppressor	S	$ 75
Auxiliary relays		
Type N control relay (4 pole)	CR	225
Electronic timer		
1.5 – 30, On Delay	TN30	300
5 – 100, On Delay	TN100	300
1.5 – 30, Off Delay	TF30	300
5 – 100, Off Delay	TF100	300
Phase failure phase reversal with over and undervoltage relays	PFPR	525
Ground fault protection	GFP	2250
For multi-speed controllers		
Compelling relay	CPR	600
Accelerating relay	ACR	600
Decelerating relay	DCR	600
Meters & metering		
Current transformer	CT	375
Ammeter (including C.T.)	AM	705
Ammeter & ammeter switch	AMS	1800
Voltmeter	VM	1200
Voltmeter & voltmeter switch	VMS	1800
Elapsed time meter	ETM	375
Operation counter	OC	560
Wattmeter	WM	3650
Miscellaneous		
Lightning arrestor	LA	320
Space heater, 100W with thermostat	SH	600

Control circuit transformer (standard VA) – A9 - A750 ②

Standard size with fused secondary			Coil suffix	Starter size	CCT VA	List price
Primary	Secondary	Hz				
				A9 – A40	45 ③	$ 300
				A9 – A40	50	360
200/208V	110V	50/60	0	A50 – A75	75	435
220/240V	110/120V	50/60	7	A95 – A110	100	560
440/480V	110/120V	50/60	8	A145 – A185	150	720
550/600V	110/120V	50/60	9	A210 – A300	250	795
				A400 – A460	150	720 ④
				A580 – A750	250	795 ④

Control circuit transformers do include two primary fuses and one secondary fuse.

Additional auxiliary contact blocks — A9 – A750

Contact configuration	Suffix code ①	A9 – A110 list price adder	A145 – A750 list price adder
1 N.O.	10	$ 20	–
1 N.C.	01	20	–
2 N.O.	20	30	–
1 N.O. & 1 N.C.	11	30	$ 30
2 N.C.	02	30	–
4 N.O.	40	60	–
3 N.O. & 1 N.C.	31	60	–
2 N.O. & 2 N.C.	22	60	60
1 N.O. & 3 N.C.	13	60	–
4 N.C.	04	60	–
3 N.O. & 3 N.C.	33	90	90

Reduced voltage & multi-speed starters — price adders

Starter size	Non-fusible switch price adder	Fusible switch price adder	MCCB or MCP price adder
A9	$ 990	$ 1008	$ 1287
A12	990	1008	1287
A16	990	1008	1287
A26	990	1008	1287
A30	990	1224	1350
A40	990	1224	1350
A50	1152	1224	1350
A63	1230	1350	1785
A75	1494	1602	1809
A95 – A110	2310	2565	2982
A145	3042	3366	4158
A185	3300	3735	4533
A210	3450	3825	6000
A260	3744	4068	6849
A300	4200	6000	8750
A400	6600	9450	9030
A460	8200	11,100	9475
A580	8400	11,800	10,200
A750	9000	12,450	12,900

Hazardous location enclosure accessories, NEMA 7 & 9

Item	Catalog ① Suffix No.	List price
3R Breather/drain	A	$ 80
Start PB green	B	180
Stop PB red	C	180
St/St dual PB	D	360
Em. Stop mush momentary	E	220
Em. Stop mush maintained	F	460
Black PB N.O. auxiliary	G	180
Black PB N.C. auxiliary	H	180
Pilot light	J	180
Illuminated PB	K	460
Push-to-test pilot light	L	450
Potentiometer	M	460
2-Pos Selector Maintained	N	260
2-Pos Selector spring L to R	P	280
2-Pos Selector spring R to L	Q	280
3-Pos Selector sw. main.	R	260
3-Pos Selector spring L to R	S	280
3-Pos Selector spring R to L	T	280
3-Pos Selector spring to C	U	280
2-Pos Selector key operated	V	450
3-Pos Selector key operated	W	450

① Add this suffix to the last digit of the catalog number.
② Consult factory if additional VA is required.
③ Does not include primary fusing.
④ A400 - A750 utilizes the AF wide range coil with a lower coil consumption than A210 - A300.

Discount schedule – Always applied to the applicable starter discounts

Auto-transformer, non-combination type
A16 - A750
Three phase

UL motor switching current	Maximum ratings – UL Listed Maximum motor horsepower ratings Ⓛ				Open type		UL Type 1 (Indoor metal)	
	200/208V	230/240V	460/480V	575/600V	Catalog number	List price	Catalog number	List price
UL rated								
17	5	5	10	15	A16SA-84★	**$ 3987**	A16SA1-84★	**$ 5103**
28	7.5	10	20	25	A26SA-84★	**4341**	A26SA1-84★	**5457**
42	10	15	30	40	A40SA-84★	**4698**	A40SA1-84★	**5814**
54	15	20	40	50	A50SA-84★	**4887**	A50SA1-84★	**6003**
65	20	25	50	50	A63SA-84★	**5130**	A63SA1-84★	**6246**
80	25	30	60	75	A75SA-84★	**5787**	A75SA1-84★	**6471**
95	30	30	60	75	A95SA-84★	**9300**	A95SA1-84★	**9800**
110	30	40	75	100	A110SA-84★	**9972**	A110SA1-84★	**10,694**
130	40	50	100	125	A145SA-84★	**10,863**	A145SA1-84★	**11,853**
156	50	60	125	150	A185SA-84★	**14,334**	A185SA1-84★	**16,880**
192	60	75	150	200	A210SA-84★	**17,196**	A210SA1-84★	**19,781**
248	75	100	200	250	A260SA-84★	**19,670**	A260SA1-84★	**21,668**
302	100	—	250	300	A300SA-84★	**24,042**	A300SA1-84★	**26,034**
414	125	150	350	400	A400SA-70★	**30,996**	A400SA1-70★	**32,981**
480	150	200	400	500	A460SA-70★	**35,978**	A460SA1-70★	**39,182**
590	200	250	500	600	A580SA-70★	**52,562**	A580SA1-70★	**55,898**
810	250	300	600	700	A750SA-70★	**59,250**	A750SA1-70★	**62,618**

NEMA size	Continuous current	200V	230V	460/575V				
NEMA rated								
0	18	3	3	5	A16N0SA-84★	**$ 3987**	A16NSA1-84★	**$ 5103**
1	27	7.5	7.5	10	A26N1SA-84★	**4341**	A26NSA1-84★	**5457**
2	45	10	15	25	A50N2SA-84★	**4887**	A50NSA1-84★	**6003**
3	90	25	30	50	A75N3SA-84★	**5787**	A75NSA1-84★	**6471**
4	135	40	50	100	A145N4SA-84★	**10,863**	A145NSA1-84★	**11,853**
5	270	75	100	200	A260N5SA-84★	**19,670**	A260NSA1-84★	**21,668**
6	540	150	200	400	A460N6SA-70★	**35,978**	A460NSA1-70★	**39,182**
7	810	—	300	600	A750N7SA-70★	**59,250**	A750NSA1-70★	**62,618**

★ Overload relay suffix code. Select from the overload relay selection chart on page 3.6.

Description

An autotransformer starter reduces inrush current by using a transformer in the line just ahead of the motor to step down the voltage applied to the motor terminals. By reducing the voltage, the current drawn from the line is reduced during start-up.

When the setting time on the timer has expired, the autotransformer is bypassed. The 1S contactor drops out, the run contactor closes, and the 2S contactor opens, proving full voltage to the motor.

The ABB autotransformer starter is a closed transition type, meaning that the motor remains connected to the line during the entire acceleration period.

The transformer has three taps which provide 50%, 65% and 80% of full line voltage. At delivery, the transformer is connected to the 65% tap; the inrush current will be reduced to 42% of normal; and the starting torque will be reduced to 42%.

The autotransformer starter can be used for any squirrel-cage motor.

Factory modifications

See page 3.3

Coil voltage selection

All AC operated catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 starter: A75SA-84★

Coil voltage selection – A9 - A300 ①

	Cntr	Volts															
Hz	type	12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Coil voltage selection – A400 - A750 ①

Cntr	Volts				
Hz	type	24 - 60	48 - 130	100 - 250	250 - 500
60	AF	68	69	70	71 ④
50	AF	68	69	70	71 ④
DC	AF	68	69	70	71 ④

Control transformer voltage selection chart

		Volts			
Hz	Type	208/120	230 – 240/120	460 – 480/120	575 – 600/120
50/60	A/AF	0	7	8	9

For other voltages, consult factory.

① For AF50 – AF 300 starters, consult factory.
② AF400 - AF750 only.

Auto-transformer – non-combination type
A16 - A750
Three phase

UL Type 3R (Outdoor metal)		UL Type 12 (Metal dustight)		UL Type 4 (Watertight)		UL Type 4X (Stainless steel)	
Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price
UL rated							
A16SA3-84★	**$ 5823**	A16SA2-84★	**$ 5823**	A16SA4-84★	**$ 6993**	A16SAX-84★	**$ 8550**
A26SA3-84★	**6177**	A26SA2-84★	**6177**	A26SA4-84★	**7347**	A26SAX-84★	**8888**
A40SA3-84★	**6549**	A40SA2-84★	**6549**	A40SA4-84★	**7719**	A40SAX-84★	**9375**
A50SA3-84★	**6723**	A50SA2-84★	**6723**	A50SA4-84★	**7893**	A50SAX-84★	**9600**
A63SA3-84★	**7694**	A63SA2-84★	**7694**	A63SA4-84★	**9014**	A63SAX-84★	**10,725**
A75SA3-84★	**8181**	A75SA2-84★	**8181**	A75SA4-84★	**9261**	A75SAX-84★	**10,988**
A95SA3-84★	**11,200**	A95SA2-84★	**11,200**	A95SA4-84★	**12,400**	A95SAX-84★	**13,600**
A110SA3-84★	**12,323**	A110SA2-84★	**12,323**	A110SA4-84★	**13,388**	A110SAX-84★	**14,700**
A145SA3-84★	**14,013**	A145SA2-84★	**14,013**	A145SA4-84★	**16,983**	A145SAX-84★	**18,300**
A185SA3-84★	**18,972**	A185SA2-84★	**18,972**	A185SA4-84★	**21,951**	A185SAX-84★	**24,450**
A210SA3-84★	**21,842**	A210SA2-84★	**21,842**	A210SA4-84★	**24,812**	A210SAX-84★	**27,600**
A260SA3-84★	**24,098**	A260SA2-84★	**24,098**	A260SA4-84★	**26,798**	A260SAX-84★	**29,400**
A300SA3-84★	**28,391**	A300SA2-84★	**28,391**	A300SA4-84★	**31,184**	A300SAX-84★	**33,000**
A400SA3-70★	**35,247**	A400SA2-70★	**35,247**	A400SA4-70★	**38,807**	A400SAX-70★	**41,175**
A460SA3-70★	**42,557**	A460SA2-70★	**42,557**	A460SA4-70★	**45,932**	A460SAX-70★	**50,700**
A580SA3-70★	**59,997**	A580SA2-70★	**59,997**	A580SA4-70★	**62,324**	A580SAX-70★	**68,700**
A750SA3-70★	**65,993**	A750SA2-70★	**65,993**	A750SA4-70★	**69,368**	A750SAX-70★	**75,300**
NEMA rated							
A16NSA3-84★	**$ 5823**	A16NSA2-84★	**$ 5823**	A16NSA4-84★	**$ 6993**	A16NSAX-84★	**$ 8550**
A26NSA3-84★	**6117**	A26NSA2-84★	**6177**	A26NSA4-84★	**7347**	A26NSAX-84★	**8888**
A50NSA3-84★	**6723**	A50NSA2-84★	**6723**	A50NSA4-84★	**7893**	A50NSAX-84★	**9600**
A75NSA3-84★	**8181**	A75NSA2-84★	**8181**	A75NSA4-84★	**9261**	A75NSAX-84★	**10,988**
A145NSA3-84★	**14,013**	A145NSA2-84★	**14,013**	A145NSA4-84★	**16,983**	A145NSAX-84★	**18,300**
A260NSA3-84★	**24,098**	A260NSA2-84★	**24,098**	A260NSA4-84★	**26,798**	A260NSAX-84★	**29,400**
A460NSA3-70★	**42,557**	A460NSA2-70★	**42,557**	A460NSA4-70★	**45,932**	A460NSAX-70★	**50,700**
A750NSA3-70★	**65,993**	A750NSA2-70★	**65,993**	A750NSA4-70★	**69,368**	A750NSAX-70★	**75,300**

★ Overload relay suffix code. Select from the overload relay selection chart on page 3.6.

Control transformer option

Contactor size	VA rating	List price adder
A9 – A40	45 ①	**$ 300**
A9 – A40	50	**360**
A50 – A75	75	**435**
A95 – A110	100	**560**
A145 – A185	150	**720**
A210 – A300	250	**795**
A400 – A460	150	**720** ②
A580 – A750	250	**795** ②

① No primary fusing provided.
② A400 - A750 utilizes the AF wide range coil with a lower coil consumption than A210 - A300.

Wye-delta, open transition
A26 - A750
Three phase

UL motor switching current	Maximum ratings – UL Listed: Maximum motor horsepower ratings Ⓛ 200/208V	230/240V	460/480V	575/600V	Open type: Catalog number	List price	UL Type 1 (Indoor metal): Catalog number	List price
UL rated								
28	15	15	40	40	A26SG-84★◆	**$ 3038**	A26SG1-84★◆	**$ 3092**
34	15	20	40	50	A30SG-84★◆	**3347**	A30SG1-84★◆	**3392**
42	20	25	50	60	A40SG-84★◆	**3450**	A40SG1-84★◆	**3494**
54	25	30	60	75	A50SG-84★◆	**3515**	A50SG1-84★◆	**3659**
65	30	40	75	100	A63SG-84★◆	**3615**	A63SG1-84★◆	**4704**
80	40	50	100	125	A75SG-84★◆	**4766**	A75SG1-84★◆	**5324**
95	50	60	125	150	A95SG-84★◆	**6600**	A95SG1-84★◆	**6900**
110	60	60	150	150	A110SG-84★◆	**8834**	A110SG1-84★◆	**9222**
130	75	75	150	200	A145SG-84★◆	**10,103**	A145SG1-84★◆	**11,333**
156	75	100	200	250	A185SG-84★◆	**13,133**	A185SG1-84★◆	**14,120**
192	100	125	250	300	A210SG-84★◆	**15,498**	A210SG1-84★◆	**16,500**
248	125, 150	150	300, 350	350, 400	A260SG-84★◆	**17,960**	A260SG1-84★◆	**19,958**
302	150	200	400	500	A300SG-84★◆	**25,950**	A300SG1-84★◆	**27,900**
414	200, 250	250	500	700	A400SG-70★◆	**36,000**	A400SG1-70★◆	**38,916**
480	300	300	650	850	A460SG-70★◆	**38,506**	A460SG1-70★◆	**42,710**
590	350	400	800	1000	A580SG-70★◆	**49,409**	A580SG1-70★◆	**51,018**
810	450	500	1000	1250	A750SG-70★◆	**54,401**	A750SG1-70★◆	**57,605**

NEMA size	Continuous current	200V	230V	460/575V				
NEMA rated								
1	27	10	10	15	A26N1SG-84★◆	**$ 3038**	A26NSG1-84★◆	**$ 3092**
2	45	20	25	40	A50N2SG-84★◆	**3515**	A50NSG1-84★◆	**3659**
3	90	40	50	75	A75N3SG-84★◆	**4766**	A75NSG1-84★◆	**5324**
4	135	60	75	150	A145N4SG-84★◆	**10,103**	A145NSG1-84★◆	**11,333**
5	270	150	150	300	A260N5SG-84★◆	**17,960**	A260NSG1-84★◆	**19,958**
6	540	300	350	700	A460N6SG-70★◆	**39,506**	A460NSG1-70★◆	**42,710**
7	810	500	500	1000	A750N7SG-70★◆	**54,401**	A750NSG1-70★◆	**57,605**

★ Overload Relay suffix code. Select from the overload relay selection chart on page 3.6.
◆ Horsepower and line voltage suffix code. Select from page 3.74.

Description

The wye-delta open transition starter starts the motor by closing the S and 1M contactors which energize the windings in wye. The inrush current in wye is reduced to 33% of what it would be if the motor was started with an across the line starter.

The starting time in wye is adjustable with a timer. After the elapsed time, the S contactor opens which closes the 2M contactor; there is a short period (about 50ms) when the motor is not energized; and then the motor runs full voltage in delta.

A wye-delta starter requires a wye-delta wound motor with all six leads terminated outside the motor housing.

Factory modifications

See page 3.3

Contactors and overload relays are sized at 58% of full load amps!

Coil voltage selection

All AC operated catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 starter: A75SG1-80★

Coil voltage selection – A9 - A300 ①

Hz	Cntr type	Volts 12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Coil voltage selection – A400 - A750 ①

Hz	Cntr type	Volts 24 - 60	48 - 130	100 - 250	250 - 500
60	AF	68	69	70	71 ②
50	AF	68	69	70	71 ②
DC	AF	68	69	70	71 ②

Control transformer voltage selection chart

Hz	Type	Volts 208/120	230 – 240/120	460 – 480/120	575 – 600/120
50/60	A/AF	0	7	8	9

For other voltages, consult factory.

① For AF50 - AF300 starters, consult factory.
② For AF400 - AF750 only.

Wye-delta, open transition
A26 - A750
Three phase

UL Type 3R (Outdoor Metal)		UL Type 12 (Metal Dustight)		UL Type 4 (Watertight)		UL Type 4X (Stainless Steel)	
Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price
UL rated							
A26SG3-84★◆	**$ 3992**	A26SG2-84★◆	**$ 3992**	A26SG4-84★◆	**$ 4172**	A26SGX-84★◆	**$ 4800**
A30SG3-84★◆	**4335**	A30SG2-84★◆	**4335**	A30SG4-84★◆	**4485**	A30SGX-84★◆	**5138**
A40SG3-84★◆	**4425**	A40SG2-84★◆	**4425**	A40SG4-84★◆	**4575**	A40SGX-84★◆	**5400**
A50SG3-84★◆	**4784**	A50SG2-84★◆	**4784**	A50SG4-84★◆	**4874**	A50SGX-84★◆	**5738**
A63SG3-84★◆	**5847**	A63SG2-84★◆	**5847**	A63SG4-84★◆	**5850**	A63SGX-84★◆	**6750**
A75SG3-84★◆	**6674**	A75SG2-84★◆	**6674**	A75SG4-84★◆	**7079**	A75SGX-84★◆	**8438**
A95SG3-84★◆	**7875**	A95SG2-84★◆	**7875**	A95SG4-84★◆	**8205**	A95SGX-84★◆	**9625**
A110SG3-84★◆	**10,508**	A110SG2-84★◆	**10,508**	A110SG4-84★◆	**10,950**	A110SGX-84★◆	**13,125**
A145SG3-84★◆	**12,902**	A145SG2-84★◆	**12,902**	A145SG4-84★◆	**13,865**	A145SGX-84★◆	**16,238**
A185SG3-84★◆	**14,385**	A185SG2-84★◆	**14,385**	A185SG4-84★◆	**15,150**	A185SGX-84★◆	**18,150**
A210SG3-84★◆	**18,215**	A210SG2-84★◆	**18,215**	A210SG4-84★◆	**19,035**	A210SGX-84★◆	**21,450**
A260SG3-84★◆	**22,388**	A260SG2-84★◆	**22,388**	A260SG4-84★◆	**25,088**	A260SGX-84★◆	**27,338**
A300SG3-84★◆	**30,383**	A300SG2-84★◆	**30,383**	A300SG4-84★◆	**31,538**	A300SGX-84★◆	**35,475**
A400SG3-84★◆	**41,150**	A400SG2-84★◆	**41,150**	A400SG4-84★◆	**42,816**	A400SGX-84★◆	**46,575**
A460SG3-70★◆	**46,085**	A460SG2-70★◆	**46,085**	A460SG4-70★◆	**49,460**	A460SGX-70★◆	**51,900**
A580SG3-70★◆	**54,576**	A580SG2-70★◆	**54,576**	A580SG4-70★◆	**57,783**	A580SGX-70★◆	**61,425**
A750SG3-70★◆	**60,980**	A750SG2-70★◆	**60,980**	A750SG4-70★◆	**64,355**	A750SGX-70★◆	**70,125**
NEMA rated							
A26NSG3-84★◆	**$ 3992**	A26NSG2-84★◆	**$ 3992**	A26NSG4-84★◆	**$ 4172**	A26NSGX-84★◆	**$ 4800**
A50NSG3-84★◆	**4784**	A50NSG2-84★◆	**4784**	A50NSG4-84★◆	**4874**	A50NSGX-84★◆	**5738**
A75NSG3-84★◆	**6674**	A75NSG2-84★◆	**6674**	A75NSG4-84★◆	**7079**	A75NSGX-84★◆	**8438**
A145NSG3-84★◆	**12,902**	A145NSG2-84★◆	**12,902**	A145NSG4-84★◆	**13,865**	A145NSGX-84★◆	**16,238**
A260NSG3-84★◆	**22,388**	A260NSG2-84★◆	**22,388**	A260NSG4-84★◆	**25,088**	A260NSGX-84★◆	**27,338**
A460NSG3-70★◆	**46,085**	A460NSG2-70★◆	**46,085**	A460NSG4-70★◆	**49,460**	A460NSGX-70★◆	**51,900**
A750NSG3-70★◆	**60,980**	A750NSG2-70★◆	**60,980**	A750NSG4-70★◆	**64,355**	A750NSGX-70★◆	**70,125**

★ Overload Relay suffix code. Select from the overload relay selection chart on page 3.6.
◆ Horsepower and line voltage suffix code. Select from page 3.74.

Control transformer option

Contactor size	VA rating	List price adder
A9 – A40	45 ①	**$ 300**
A9 – A40	50	**360**
A50 – A75	75	**435**
A95 – A110	100	**560**
A145 – A185	150	**720**
A210 – A300	250	**795**
A400 – A460	150	**720** ②
A580 – A750	250	**795** ②

① No primary fusing provided.
② A400 - A750 utilizes the AF wide range coil with a lower coil consumption than A210 - A300.

Wye-delta, closed transition
A26 - A750
Three phase

UL motor switching current	Maximum ratings – UL Listed Maximum motor horsepower ratings Ⓛ				Open type		UL Type 1 (Indoor metal)	
	200/208V	230/240V	460/480V	575/600V	Catalog number	List price	Catalog number	List price
UL rated								
28	15	15	30	40	A26SY-84★◆	**$ 4667**	A25SY1-84★◆	**$ 4721**
34	15	20	40	50	A30SY-84★◆	**4967**	A30SY1-84★◆	**5021**
42	20	25	50	60	A40SY-84★◆	**5198**	A40SY1-84★◆	**5342**
54	25	30	60	75	A50SY-84★◆	**5396**	A50SY1-84★◆	**5540**
65	30	40	75	100	A63SY-84★◆	**7034**	A63SY1-84★◆	**7592**
80	40	50	100	125	A75SY-84★◆	**7781**	A75SY1-84★◆	**8339**
95	50	60	125	—	A95SY-84★◆	**12,000**	A95SY1-84★◆	**13,000**
110	60	60	150	150	A110SY-84★◆	**13,108**	A110SY1-84★◆	**14,107**
130	75	75	150	200	A145SY-84★◆	**14,324**	A145SY1-84★◆	**15,323**
156	75	100	200	250	A185SY-84★◆	**20,174**	A185SY1-84★◆	**21,173**
192	100	125	250	300	A210SY-84★◆	**23,054**	A210SY1-84★◆	**25,052**
248	125, 150	150	300, 350	350, 400	A260SY-84★◆	**24,413**	A260SY1-84★◆	**26,411**
302	150	200	400	500	A300SY-84★◆	**32,063**	A300SY1-84★◆	**37,061**
414	200, 250	250	500	700	A400SY-70★◆	**39,863**	A400SY1-70★◆	**43,350**
480	300	300	650	850	A460SY-70★◆	**50,522**	A460SY1-70★◆	**53,726**
590	350	400	800	1000	A580SY-70★◆	**65,910**	A580SY1-70★◆	**68,132**
810	450	500	1000	1250	A750SY-70★◆	**71,492**	A750SY1-70★◆	**74,696**
NEMA rated								
NEMA size	Continuous current	200V	230V	460/575V				
1	27	10	10	15	A26N1SY-84★◆	**$ 4667**	A26NSY1-84★◆	**$ 4721**
2	45	20	25	40	A50N2SY-84★◆	**5396**	A50NSY1-84★◆	**5540**
3	90	40	50	75	A75N3SY-84★◆	**7781**	A75NSY1-84★◆	**8339**
4	135	60	75	150	A145N4SY-84★◆	**14,324**	A145NSY1-84★◆	**15,323**
5	270	150	150	300	A260N5SY-84★◆	**24,413**	A260NSY1-84★◆	**26,411**
6	540	300	350	700	A460N6SY-70★◆	**50,522**	A460NSY1-70★◆	**53,726**
7	810	500	500	1000	A750N7SY-70★◆	**71,492**	A750NSY1-70★◆	**74,696**

★ Overload Relay suffix code. Select from the overload relay selection chart on page 3.6.
◆ Horsepower and line voltage suffix code. Select from page 3.74.

Description

The wye-delta closed transition starter works the same way as the open transition wye-delta starter except the closed transition version utilizes a set of resistors during the transition from start to run (wye to delta connection). These resistors eliminate the open circuit and prevent transient currents.

Contactors and overload relays are sized at 58% of full load amps!

Coil voltage selection

All AC operated catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 starter: A75SY1-80★

Factory modifications

See page 3.3

Coil voltage selection – A9 - A300 ①

	Cntr	Volts															
Hz	type	12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Coil voltage selection – A400 - A750 ①

Cntr	Volts				
Hz	type	24 - 60	48 - 130	100 - 250	250 - 500
60	AF	68	69	70	71 ②
50	AF	68	69	70	71 ②
DC	AF	68	69	70	71 ②

Control transformer voltage selection chart

		Volts			
Hz	Type	208/120	230 – 240/120	460 – 480/120	575 – 600/120
50/60	A/AF	0	7	8	9

For other voltages, consult factory.

① For AF50 - AF300 starters, consult factory.
② AF400 - AF750 only.

Wye-delta, closed transition
A26 - A750
Three phase

UL Type 3R (Outdoor metal)		Type 12 (Metal dustight)		UL Type 4 (Watertight)		UL Type 4X (Stainless steel)	
Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price
UL rated							
A26SY3-84★◆	**$ 5621**	A26SY2-84★◆	**$ 5621**	A26SY4-84★◆	**$ 5801**	A26SYX-84★◆	**$ 6450**
A30SY3-84★◆	**5921**	A30SY2-84★◆	**5921**	A30SY4-84★◆	**6101**	A30SYX-84★◆	**6788**
A40SY3-84★◆	**6467**	A40SY2-84★◆	**6467**	A40SY4-84★◆	**6557**	A40SYX-84★◆	**7275**
A50SY3-84★◆	**6665**	A50SY2-84★◆	**6665**	A50SY4-84★◆	**6755**	A50SYX-84★◆	**7650**
A63SY3-84★◆	**8942**	A63SY2-84★◆	**8942**	A63SY4-84★◆	**9347**	A63SYX-84★◆	**10,163**
A75SY3-84★◆	**9689**	A75SY2-84★◆	**9689**	A75SY4-84★◆	**10,094**	A75SYX-84★◆	**11,138**
A95SY3-84★◆	**14,900**	A95SY2-84★◆	**14,900**	A95SY4-84★◆	**15,900**	A95SYX-84★◆	**17,000**
A110SY3-84★◆	**15,907**	A110SY2-84★◆	**15,907**	A110SY4-84★◆	**16,870**	A110SYX-84★◆	**18,350**
A145SY3-84★◆	**17,123**	A145SY2-84★◆	**17,023**	A145SY4-84★◆	**18,086**	A145SYX-84★◆	**19,950**
A185SY3-84★◆	**22,973**	A185SY2-84★◆	**22,973**	A185SY4-84★◆	**28,436**	A185SYX-84★◆	**30,225**
A210SY3-84★◆	**27,482**	A210SY2-84★◆	**27,482**	A210SY4-84★◆	**30,182**	A210SYX-84★◆	**32,400**
A260SY3-84★◆	**28,841**	A260SY2-84★◆	**28,841**	A260SY4-84★◆	**31,541**	A260SYX-84★◆	**33,450**
A300SY3-84★◆	**34,991**	A300SY2-84★◆	**34,991**	A300SY4-84★◆	**37,691**	A300SYX-84★◆	**40,688**
A400SY3-70★◆	**41,250**	A400SY2-70★◆	**41,250**	A400SY4-70★◆	**45,330**	A400SYX-70★◆	**48,675**
A460SY3-70★◆	**57,101**	A460SY2-70★◆	**57,101**	A460SY4-70★◆	**60,476**	A460SYX-70★◆	**66,900**
A580SY3-70★◆	**72,749**	A580SY2-70★◆	**72,749**	A580SY4-70★◆	**75,633**	A580SYX-70★◆	**83,625**
A750SY3-70★◆	**78,071**	A750SY2-70★◆	**78,071**	A750SY4-70★◆	**81,446**	A750SYX-70★◆	**88,725**
NEMA rated							
A26NSY3-84★◆	**$ 5621**	A26NSY2-84★◆	**$ 5621**	A26NSY4-84★◆	**$ 5801**	A26NSYX-84★◆	**$ 6450**
A50NSY3-84★◆	**6665**	A50NSY2-84★◆	**6665**	A50NSY4-84★◆	**6755**	A50NSYX-84★◆	**7650**
A75NSY3-84★◆	**9689**	A75NSY2-84★◆	**9689**	A75NSY4-84★◆	**10,094**	A75NSYX-84★◆	**11,138**
A145NSY3-84★◆	**17,123**	A145NSY2-84★◆	**17,023**	A145NSY4-84★◆	**18,086**	A145NSYX-84★◆	**19,950**
A260NSY3-84★◆	**28,841**	A260NSY2-84★◆	**28,841**	A260NSY4-84★◆	**31,541**	A260NSYX-84★◆	**33,450**
A460NSY3-70★◆	**57,101**	A460NSY2-70★◆	**57,101**	A460NSY4-70★◆	**60,476**	A460NSYX-70★◆	**66,900**
A750NSY3-70★◆	**78,071**	A580NSY2-70★◆	**78,071**	A750NSY4-70★◆	**81,446**	A750NSYX-70★◆	**88,725**

★ Overload Relay suffix code. Select from the overload relay selection chart on page 3.6.
◆ Horsepower and line voltage suffix code. Select from page 3.74.

Control transformer option

Contactor size	VA rating	List price adder
A9 – A40	45 ①	**$ 300**
A9 – A40	50	**360**
A50 – A75	75	**435**
A95 – A110	100	**560**
A145 – A185	150	**720**
A210 – A300	250	**795**
A400 – A460	150	**720** ②
A580 – A750	250	**795** ②

① No primary fusing provided.
② A400 - A750 utilizes the AF wide range coil with a lower coil consumption than A210 - A300.

Part winding, non-reversing
A26 - A750
Three phase

UL motor switching current	Maximum ratings – UL Listed: Maximum motor horsepower ratings 200/208V	230/240V	460/480V	575/600V	Open type: Catalog number	List price	UL Type 1 (Indoor metal): Catalog number	List price
UL rated								
28	15	15	40	40	A26SH-84★◆	**$ 1917**	A26SH1-84★◆	**$ 1971**
34	15	20	40	50	A30SH-84★◆	**2097**	A30SH1-84★◆	**2151**
42	20	25	50	60	A40SH-84★◆	**2586**	A40SH1-84★◆	**2643**
54	25	30	60	75	A50SH-84★◆	**2664**	A50SH1-84★◆	**2808**
65	30	40	75	100	A63SH-84★◆	**3305**	A63SH1-84★◆	**3458**
80	40	50	100	125	A75SH-84★◆	**3708**	A75SH1-84★◆	**3960**
95	50	60	125	150	A95SH-84★◆	**6700**	A95SH1-84★◆	**6950**
110	60	60	150	150	A110SH-84★◆	**7142**	A110SH1-84★◆	**7395**
130	75	75	150	200	A145SH-84★◆	**8001**	A145SH1-84★◆	**8469**
156	75	100	200	250	A185SH-84★◆	**10,098**	A185SH1-84★◆	**10,569**
192	100	125	250	300	A210SH-84★◆	**14,310**	A210SH1-84★◆	**14,769**
248	125, 150	150	300, 350	350, 400	A260SH-84★◆	**16,749**	A260SH1-84★◆	**17,739**
302	200, 250	200	400	500	A300SH-84★◆	**30,591**	A300SH1-84★◆	**31,590**
414	300	300	600	800	A400SH-70★◆	**36,000**	A400SH1-70★◆	**37,089**
480	300	350	700	900	A460SH-70★◆	**39,885**	A460SH1-70★◆	**42,938**
590	350	400	800	1000	A580SH-70★◆	**42,158**	A580SH1-70★◆	**51,471**
810	500	500	1100	1400	A750SH-70★◆	**50,994**	A750SH1-70★◆	**56,664**
NEMA rated								
NEMA size	Continuous current	200V	230V	460/575V				
1	27	10	10	15	A26N1SH-84★◆	**$ 1917**	A26NSH1-84★◆	**$ 1971**
2	45	20	25	40	A50N2SH-84★◆	**2664**	A50NSH1-84★◆	**2808**
3	90	40	50	75	A75N3SH-84★◆	**3708**	A75NSH1-84★◆	**3960**
4	135	75	125	150	A145N4SH-84★◆	**8001**	A145NSH1-84★◆	**8469**
5	270	150	150	350	A260N5SH-84★◆	**16,749**	A260NSH1-84★◆	**17,739**
6	540	250	300	600	A460N6SH-70★◆	**39,885**	A460NSH1-70★◆	**42,938**
7	810	400	450	900	A750N7SH-70★◆	**50,994**	A750NSH1-70★◆	**56,664**

★ Overload Relay suffix code. Select from the overload relay selection chart on page 3.6.
◆ Horsepower and line voltage suffix code. Select from page 3.74.

Part winding

The part winding starter reduces inrush current by using two different sets of windings in the motor. Therefore, part winding starters can be used only with motors having stator windings divided into two equal parts with the terminals of each part available for external connection.

The part winding starter consists of two across the line starters and a timer. The first starter is used to connect one winding of the motor across the line. The starting current from one winding will be about 50% of the starting current if both windings were connected. The starting torque is correspondingly 50%.

Because the starting torque is so low and will not increase until the second winding is connected, the motor may not begin to accelerate. Therefore, the time delay for the second winding to be energized should not be more than 4 seconds.

When the second winding is energized, the inrush current will increase depending upon the speed of the motor when the second winding is energized.

Contactors and overload relays are sized at 50% of full load amps!

Coil voltage selection

All AC operated catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 starter: A75SH1-80★

Factory modifications

See page 3.3

Coil voltage selection chart

Hz	Cntr type	Volts 12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Hz	Cntr type	Volts 24 - 60	48 - 130	100 - 250	250 - 500
60	AF	68	69	70	71 ②
50	AF	68	69	70	71 ②
DC	AF	68	69	70	71 ②

Control transformer voltage selection chart

Hz	Type	Volts 208/120	230 – 240/120	460 – 480/120	575 – 600/120
50/60	A/AF	0	7	8	9

For other voltages, consult factory

① No primary fusing provided.
② AF400 - AF750 only.

Part winding, non-reversing
A26 - A750
Three phase

UL Type 3R (Outdoor metal)		UL Type 12 (Metal dustight)		UL Type 4 (Watertight)		UL Type 4X (Stainless steel)	
Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price
UL rated							
A26SH3-84★◆	**$ 2871**	A26SH2-84★◆	**$ 2871**	A26SH4-84★◆	**$ 3051**	A26SHX-84★◆	**$ 3638**
A30SH3-84★◆	**3075**	A30SH2-84★◆	**3075**	A30SH4-84★◆	**3233**	A30SHX-84★◆	**3825**
A40SH3-84★◆	**3543**	A40SH2-84★◆	**3543**	A40SH4-84★◆	**3723**	A40SHX-84★◆	**4313**
A50SH3-84★◆	**3933**	A50SH2-84★◆	**3933**	A50SH4-84★◆	**4023**	A50SHX-84★◆	**4500**
A63SH3-84★◆	**4583**	A63SH2-84★◆	**4583**	A63SH4-84★◆	**4673**	A63SHX-84★◆	**5363**
A75SH3-84★◆	**5310**	A75SH2-84★◆	**5310**	A75SH4-84★◆	**5715**	A75SHX-84★◆	**6540**
A95SH3-84★◆	**8500**	A95SH2-84★◆	**8500**	A95SH4-84★◆	**8700**	A95SHX-84★◆	**9300**
A110SH3-84★◆	**8745**	A110SH2-84★◆	**8745**	A110SH4-84★◆	**9150**	A110SHX-84★◆	**9900**
A145SH3-84★◆	**10,269**	A145SH2-84★◆	**10,269**	A145SH4-84★◆	**11,232**	A145SHX-84★◆	**12,225**
A185SH3-84★◆	**12,369**	A185SH2-84★◆	**12,369**	A185SH4-84★◆	**13,332**	A185SHX-84★◆	**14,813**
A210SH3-84★◆	**16,569**	A210SH2-84★◆	**16,569**	A210SH4-84★◆	**17,532**	A210SHX-84★◆	**19,050**
A260SH3-84★◆	**20,169**	A260SH2-84★◆	**20,169**	A260SH4-84★◆	**22,869**	A260SHX-84★◆	**26,100**
A300SH3-84★◆	**34,020**	A300SH2-84★◆	**34,020**	A300SH4-84★◆	**36,720**	A300SHX-84★◆	**38,225**
A400SH3-70★◆	**41,589**	A400SH2-70★◆	**41,589**	A400SH4-70★◆	**42,552**	A400SHX-70★◆	**45,263**
A460SH3-70★◆	**47,438**	A460SH2-70★◆	**47,438**	A460SH4-70★◆	**48,401**	A460SHX-70★◆	**49,913**
A580SH3-70★◆	**55,971**	A580SH2-70★◆	**55,971**	A580SH4-70★◆	**56,934**	A580SHX-70★◆	**59,400**
A750SH3-70★◆	**62,064**	A750SH2-70★◆	**62,064**	A750SH4-70★◆	**62,541**	A750SHX-70★◆	**66,150**
NEMA rated							
A26NSH3-84★◆	**$ 2871**	A26NSH2-84★◆	**$ 2871**	A26NSH4-84★◆	**$ 3051**	A26NSHX-84★◆	**$ 3638**
A50NSH3-84★◆	**3933**	A50NSH2-84★◆	**3933**	A50NSH4-84★◆	**4023**	A50NSHX-84★◆	**4500**
A75NSH3-84★◆	**5310**	A75NSH2-84★◆	**5310**	A75NSH4-84★◆	**5715**	A75NSHX-84★◆	**6540**
A145NSH3-84★◆	**10,269**	A145NSH2-84★◆	**10,269**	A145NSH4-84★◆	**11,232**	A145NSHX-84★◆	**12,225**
A260NSH3-84★◆	**20,169**	A260NSH2-84★◆	**20,169**	A260NSH4-84★◆	**22,869**	A260NSHX-84★◆	**26,100**
A460NSH3-70★◆	**47,438**	A460NSH2-70★◆	**47,438**	A460NSH4-70★◆	**48,401**	A460NSHX-70★◆	**49,913**
A750NSH3-70★◆	**62,064**	A750NSH2-70★◆	**62,064**	A750NSH4-70★◆	**62,541**	A750NSHX-70★◆	**66,150**

★ Overload Relay suffix code. Select from the overload relay selection chart on page 3.6.
◆ Horsepower and line voltage suffix code. Select from page 3.74.

Control transformer option

Contactor size	VA rating	List price adder
A9 – A40	45 ①	**$ 300**
A9 – A40	50	**360**
A50 – A75	75	**435**
A95 – A110	100	**560**
A145 – A185	150	**720**
A210 – A300	250	**795**
A400 – A460	150	**720** ②
A580 – A750	250	**795** ②

① No primary fusing provided.
② A400 - A750 utilizes the AF wide range coil with a lower coil consumption than A210 - A300.

Circuit diagrams
Autotransformer & part winding

Autotransformer – HOA

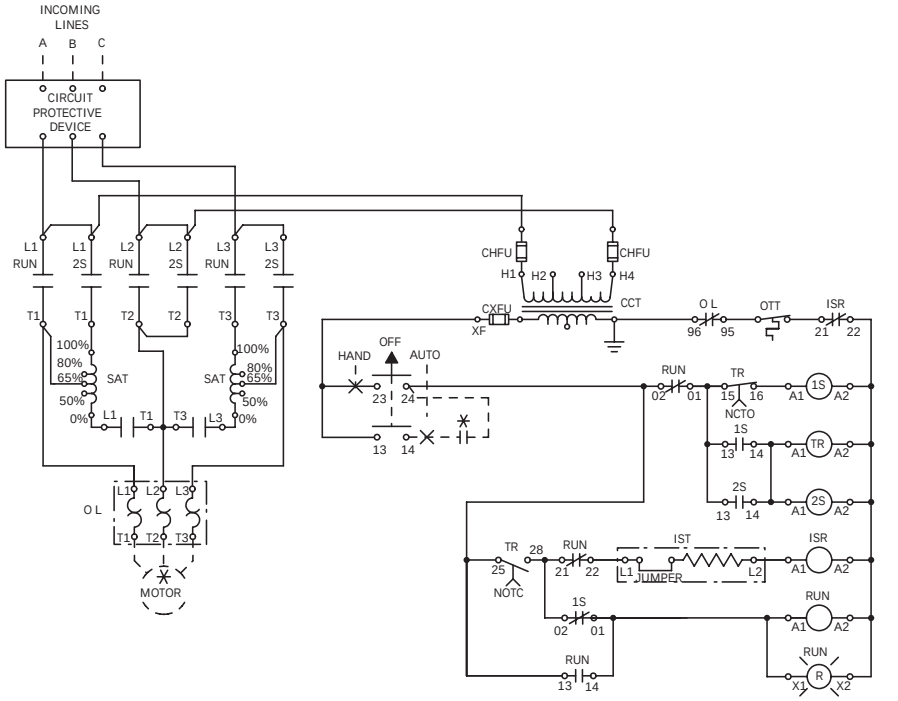
An autotransformer starter reduces inrush current by using a transformer in the line just ahead of the motor to step down the voltage applied to the motor terminals. By reducing the voltage, the current drawn from the line is reduced during start-up.

When the setting time on the timer has expired, the autotransformer is bypassed. The 1S contactor drops out, the run contactor closes, and the 2S contactor opens, proving full voltage to the motor.

The ABB autotransformer starter is a closed transition type, meaning that the motor remains connected to the line during the entire acceleration period.

The transformer has three taps which provide 50%, 65% and 80% of full line voltage. At delivery, the transformer is connected to the 65% tap; the inrush current will be reduced to 42% of normal; and the starting torque will be reduced to 42%.

The autotransformer starter can be used for any squirrel-cage motor.



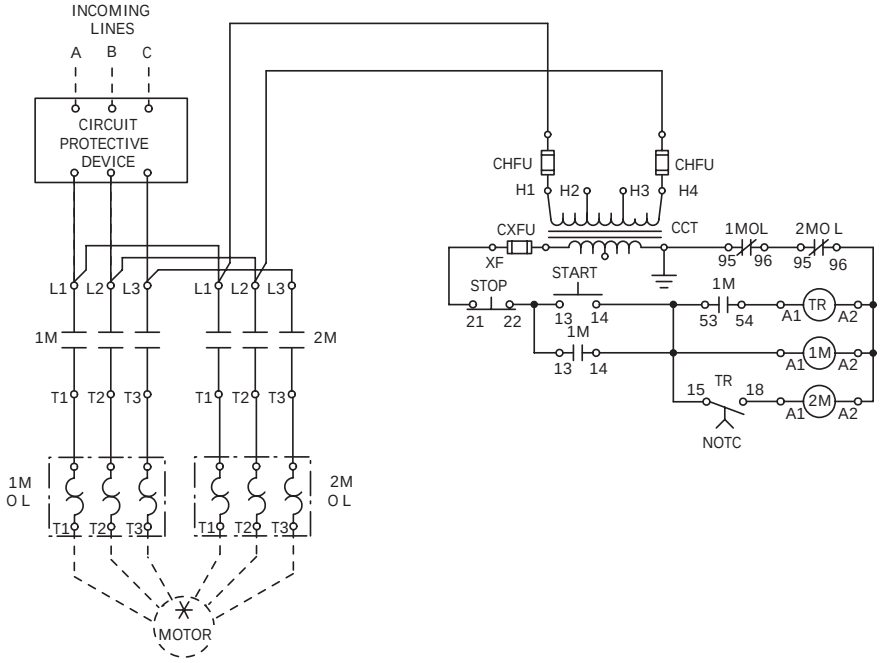
Part winding – STOP-START

The part winding starter reduces inrush current by using two different sets of windings in the motor. Therefore, part winding starters can be used only with motors having stator windings divided into two equal parts with the terminals of each part available for external connection.

The part winding starter consists of two across the line starters and a timer. The first starter is used to connect one winding of the motor across the line. The starting current from one winding will be about 50% of the starting current if both windings were connected. The starting torque is correspondingly 50%.

Because the starting torque is so low and will not increase until the second winding is connected, the motor may not begin to accelerate. Therefore, the time delay for the second winding to be energized should not be more than 4 seconds.

When the second winding is energized, the inrush current will increase depending upon the speed of the motor when the second winding is energized.

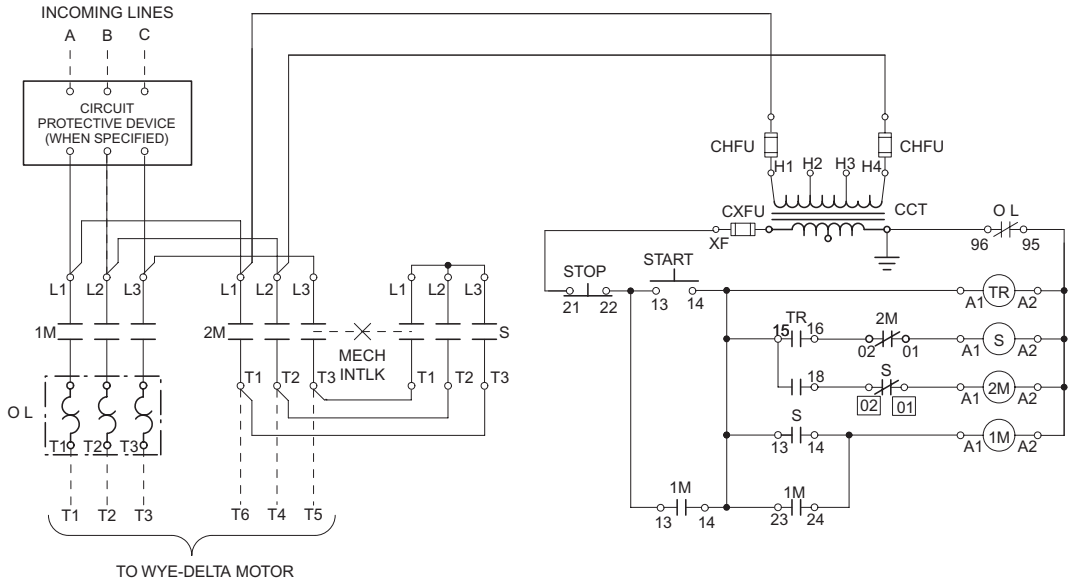


Wye-delta, open transition – STOP-START

The wye-delta open transition starter starts the motor by closing the S and 1M contactors which energize the windings in wye. The inrush current in wye is reduced to 33% of what it would be if the motor was started with an across the line starter.

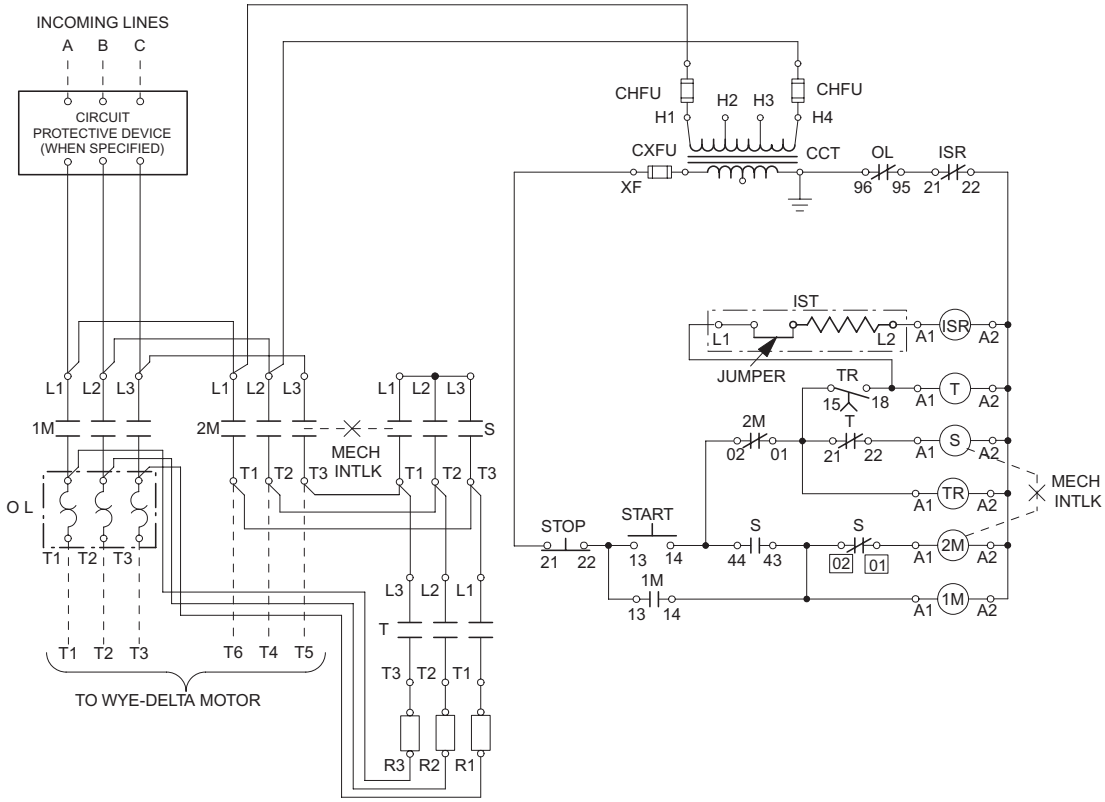
The starting time in wye is adjustable with a timer. After the elapsed time, the S contactor opens which closes the 2M contactor; there is a short period (about 50ms) when the motor is not energized; and then the motor runs full voltage in delta.

A wye-delta starter requires a wye-delta wound motor with all six leads terminated outside the motor housing.

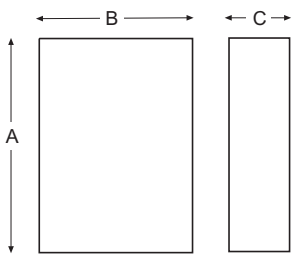


Wye-delta, closed transition – STOP-START

The wye-delta closed transition starter works the same way as the open transition wye-delta starter except the closed transition version utilizes a set of resistors during the transition from start to run (wye to delta connection). These resistors eliminate the open circuit and prevent transient currents.



Approximate dimensions
Autotransformer w/CCT
Autotransformer, non-fused combination w/CCT



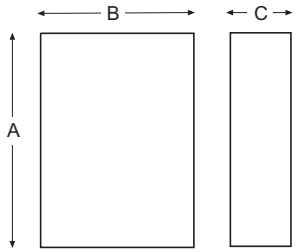
Autotransformer w/CCT

Starter size	Enclosure type	A	B	C
A9 – A40	1	20	16	8
	3R	20	16	8
	4	20	16	8
	4X Stainless	20	16	8
	4X Plastic	20	16	8
	12	20	16	8
A50 – A75	1	24	20	10
	3R	24	20	10
	4	24	20	10
	4X Stainless	24	20	10
	4X Plastic	30	20	12
	12	24	20	10
A95 – A110	1	30	24	12
	3R	30	30	12
	4	30	30	12
	4X Stainless	30	30	12
	4X Plastic	30	30	12
	12	30	30	12
A145 – A260	1	36	30	12
	3R	36	30	12
	4	36	30	12
	4X Stainless	36	30	12
	4X Plastic	–	–	–
	12	36	30	12
A300	1	48	36	17
	3R	48	36	16
	4	–	–	–
	4X Stainless	–	–	–
	4X Plastic	–	–	–
	12	48	36	16
A400 – A750	1	87	36	24
	3R	87	36	24
	4	–	–	–
	4X Stainless	–	–	–
	4X Plastic	–	–	–
	12	87	36	24

Autotransformer, non-fused combination w/CCT

Starter size	Enclosure type	A	B	C
A9 – A40	1	20	16	8
	3R	20	16	8
	4	20	16	8
	4X Stainless	20	16	8
	4X Plastic	20	16	8
	12	20	16	8
A50 – A75	1	30	24	12
	3R	30	24	8
	4	30	24	8
	4X Stainless	30	24	8
	4X Plastic	30	20	12
	12	30	24	8
A95 – A110	1	36	30	12
	3R	36	30	12
	4	36	30	12
	4X Stainless	36	30	12
	4X Plastic	–	–	–
	12	36	30	12
A145 – A260	1	36	30	12
	3R	36	30	12
	4	36	30	12
	4X Stainless	36	30	12
	4X Plastic	–	–	–
	12	36	30	12
A300	1	48	36	17
	3R	48	36	16
	4	48	36	16
	4X Stainless	–	–	–
	4X Plastic	–	–	–
	12	48	36	16
A400 – A750	1	87	36	24
	3R	87	36	24
	4	–	–	–
	4X Stainless	–	–	–
	4X Plastic	–	–	–
	12	87	36	24

Approximate dimensions
Autotransformer fused combination w/CCT
Autotransformer, breaker combination w/CCT



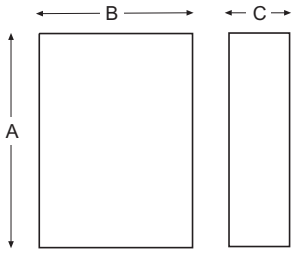
Autotransformer, fused combination w/CCT

Starter size	Enclosure type	A	B	C
A9 – A40	1	20	16	8
	3R	20	16	8
	4	20	16	8
	4X Stainless	20	16	8
	4X Plastic	20	16	8
	12	20	16	8
A50 – A75	1	30	24	12
	3R	30	24	10
	4	30	24	10
	4X Stainless	30	24	10
	4X Plastic	30	20	12
	12	30	24	10
A95 – A110	1	36	30	12
	3R	36	30	12
	4	36	30	12
	4X Stainless	36	30	12
	4X Plastic	–	–	–
	12	36	30	12
A145 – A260	1	36	30	12
	3R	36	30	12
	4	36	30	12
	4X Stainless	36	30	12
	4X Plastic	–	–	–
	12	36	30	12
A300	1	48	36	17
	3R	48	36	16
	4	48	36	16
	4X Stainless	–	–	–
	4X Plastic	–	–	–
	12	48	36	16
A400 – A750	1	87	36	24
	3R	87	36	24
	4	–	–	–
	4X Stainless	–	–	–
	4X Plastic	–	–	–
	12	87	36	24

Autotransformer, breaker combination w/CCT

Starter size	Enclosure type	A	B	C
A9 – A40	1	20	16	8
	3R	20	16	8
	4	20	16	8
	4X Stainless	20	16	8
	4X Plastic	20	16	8
	12	20	16	8
A50 – A75	1	30	24	12
	3R	30	24	10
	4	30	24	10
	4X Stainless	30	24	10
	4X Plastic	30	20	12
	12	30	24	10
A95 – A110	1	36	30	12
	3R	36	30	12
	4	36	30	12
	4X Stainless	36	30	12
	4X Plastic	–	–	–
	12	36	30	12
A145 – A260	1	36	30	12
	3R	36	30	12
	4	36	30	12
	4X Stainless	36	30	12
	4X Plastic	–	–	–
	12	36	30	12
A300	1	48	36	17
	3R	48	36	16
	4	48	36	16
	4X Stainless	–	–	–
	4X Plastic	–	–	–
	12	48	36	16
A400 – A750	1	87	36	24
	3R	87	36	24
	4	–	–	–
	4X Stainless	–	–	–
	4X Plastic	–	–	–
	12	87	36	24

Approximate dimensions
Wye-Delta, open transitionw/CCT
Wye-Delta, open transition, combination, non-fused



Wye-Delta, open transition w/CCT

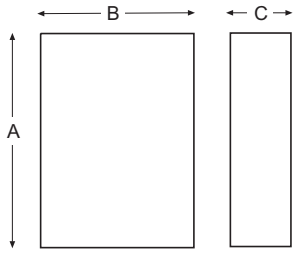
Starter size	Enclosure type	A	B	C
A9 – A40	1	14	12	8
	3R	14	12	8
	4	14	12	8
	4X Stainless	14	12	6
	4X Plastic	14	12	7
	12	14	12	8
A50 – A75	1	20	16	8
	3R	20	16	8
	4	20	16	8
	4X Stainless	20	16	8
	4X Plastic	20	16	8
	12	20	16	8
A95 – A110	1	20	16	8
	3R	20	16	8
	4	20	16	8
	4X Stainless	20	16	8
	4X Plastic	20	16	8
	12	20	16	8
A145 – A185	1	30	24	12
	3R	30	20	8
	4	30	20	8
	4X Stainless	30	24	8
	4X Plastic	30	20	12
	12	30	20	8
A210 – A300	1	30	24	12
	3R	30	24	12
	4	30	24	12
	4X Stainless	30	24	12
	4X Plastic	30	20	12
	12	30	24	12
A400	1	36	30	12
	3R	36	30	12
	4	36	30	12
	4X Stainless	36	30	12
	4X Plastic	–	–	–
	12	36	30	12
A460	1	42	30	13
	3R	42	36	12
	4	42	36	12
	4X Stainless	42	36	12
	4X Plastic	–	–	–
	12	42	36	12
A580 – A750	1	42	36	13
	3R	42	36	12
	4	42	36	12
	4X Stainless	42	36	12
	4X Plastic	–	–	–
	12	42	36	12

Wye-Delta, open transition, combination, non-fused

Starter size	Enclosure type	A	B	C
A9 – A40	1	14	12	8
	3R	14	12	8
	4	14	12	8
	4X Stainless	14	12	6
	4X Plastic	14	12	7
	12	14	12	8
A50 – A75	1	20	16	8
	3R	20	16	8
	4	20	16	8
	4X Stainless	20	16	8
	4X Plastic	20	16	8
	12	20	16	8
A95 – A110	1	36	30	8
	3R	36	30	8
	4	36	30	8
	4X Stainless	36	30	8
	4X Plastic	40	30	12
	12	36	30	8
A145 – A185 (NF400)	1	42	36	9
	3R	36	36	8
	4	36	36	8
	4X Stainless	36	36	12
	4X Plastic	–	–	–
	12	36	30	8
A210 (NF400)	1	42	36	9
	3R	36	36	12
	4	36	36	12
	4X Stainless	36	36	12
	4X Plastic	–	–	–
	12	36	36	12
A260 – A300 (NF600)	1	–	–	–
	3R	60	36	10
	4	60	36	10
	4X Stainless	60	36	10
	4X Plastic	–	–	–
	12	60	36	10
A400 (NF800) A460 (NF1200) A580 (NF1200) A750 (NF1600)	1	87	36	24
	3R	87	36	24
	4	87	36	24
	4X Stainless	–	–	–
	4X Plastic	–	–	–
	12	87	36	24

Approximate dimensions

Wye-Delta, open transition, combination, fused
Wye-Delta, open transition, combination, breaker



Wye-Delta, open transition, combination, fused

Starter size	Enclosure type	A	B	C
A9 – A40	1	14	12	8
	3R	14	12	8
	4	14	12	8
	4X Stainless	14	12	6
	4X Plastic	14	12	7
	12	14	12	8
A50 – A75	1	24	16	8
	3R	24	16	8
	4	24	16	8
	4X Stainless	24	16	8
	4X Plastic	24	16	8
	12	24	16	8
A95 – A110	1	36	30	8
	3R	36	30	8
	4	36	30	8
	4X Stainless	36	30	8
	4X Plastic	40	30	12
	12	36	30	8
A145 (F400) A185 (F600)	1	42	36	9
	3R	36	36	8
	4	36	36	8
	4X Stainless	36	36	12
	4X Plastic	–	–	–
	12	36	36	8
A210 (F600) A260 (F800)	1	–	–	–
	3R	60	36	10
	4	60	36	10
	4X Stainless	60	36	10
	4X Plastic	–	–	–
	12	60	36	10
A300 (NF1200+FB) A400 (NF1600+FB) A460(NF1600+FB) A580(NF2000+FB) A750(NF3150+FB)	1	87	36	24
	3R	87	36	24
	4	–	–	–
	4X Stainless	–	–	–
	4X Plastic	–	–	–
	12	87	36	24

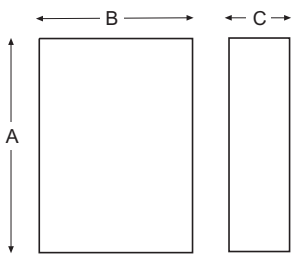
Wye-Delta, open transition, combination, breaker

Starter size	Enclosure type	A	B	C
A9 – A40	1	14	12	8
	3R	14	12	8
	4	14	12	8
	4X Stainless	16	12	6
	4X Plastic	14	12	7
	12	14	12	8
A50 – A75	1	24	20	8
	3R	24	20	8
	4	24	20	8
	4X Stainless	24	20	8
	4X Plastic	30	20	12
	12	24	20	8
A95 – A110	1	36	30	8
	3R	36	30	8
	4	36	30	8
	4X Stainless	36	30	8
	4X Plastic	40	30	12
	12	36	30	8
A145 (S6) A185 (S6)	1	42	36	9
	3R	36	36	8
	4	36	36	8
	4X Stainless	36	36	12
	4X Plastic	–	–	–
	12	36	36	8
A210 (S7) A300 (S7)	1	42	36	13
	3R	36	36	12
	4	36	36	12
	4X Stainless	36	36	12
	4X Plastic	–	–	–
	12	36	36	12
A400 (S8) A750 (S8)	1	87	36	24
	3R	87	36	24
	4	–	–	–
	4X Stainless	–	–	–
	4X Plastic	–	–	–
	12	87	36	24

Approximate dimensions

Wye-Delta, closed transition w/CCT

Wye-Delta, closed transition, combination, non-fused



Wye-Delta, closed transition w/CCT

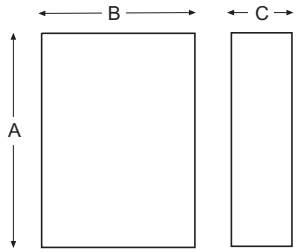
Starter size	Enclosure type	A	B	C
A9 – A40	1	20	16	8
	3R	20	16	8
	4	20	16	8
	4X Stainless	20	16	8
	4X Plastic	20	16	8
	12	20	16	8
A50 – A75	1	24	20	10
	3R	24	20	10
	4	24	20	10
	4X Stainless	24	20	10
	4X Plastic	30	20	12
	12	24	20	10
A95 – A110	1	30	24	10
	3R	30	30	12
	4	30	30	12
	4X Stainless	30	30	12
	4X Plastic	30	30	12
	12	30	30	10
A145 – A260	1	36	30	12
	3R	36	30	12
	4	36	30	12
	4X Stainless	36	30	12
	4X Plastic	–	–	–
	12	36	30	12
A300	1	48	36	17
	3R	48	36	16
	4	–	–	–
	4X Stainless	–	–	–
	4X Plastic	–	–	–
	12	48	36	16
A400 – A750	1	87	36	24
	3R	87	36	24
	4	–	–	–
	4X Stainless	–	–	–
	4X Plastic	–	–	–
	12	87	36	24

Wye-Delta, closed transition, combination, non-fused

Starter size	Enclosure type	A	B	C
A9 – A40	1	14	12	8
	3R	14	12	8
	4	14	12	8
	4X Stainless	14	12	6
	4X Plastic	14	12	7
	12	14	12	8
A50 – A75	1	20	16	8
	3R	20	16	8
	4	20	16	8
	4X Stainless	20	16	8
	4X Plastic	20	16	8
	12	20	16	8
A95 – A110	1	36	30	8
	3R	36	30	8
	4	36	30	8
	4X Stainless	36	30	8
	4X Plastic	40	30	12
	12	36	30	8
A145 – A185 (NF400)	1	42	36	9
	3R	36	36	8
	4	36	36	8
	4X Stainless	36	36	12
	4X Plastic	–	–	–
	12	36	36	8
A210 (NF400)	1	42	36	9
	3R	36	36	12
	4	36	36	12
	4X Stainless	36	36	12
	4X Plastic	–	–	–
	12	36	36	12
A260 – A300 (NF600)	1	–	–	–
	3R	60	36	10
	4	60	36	10
	4X Stainless	60	36	10
	4X Plastic	–	–	–
	12	60	36	10
A400 (NF800) A460 (NF1200) A580 (NF1200) A750 (NF1600)	1	87	36	24
	3R	87	36	24
	4	87	36	24
	4X Stainless	–	–	–
	4X Plastic	–	–	–
	12	87	36	24

Approximate dimensions

Wye-Delta, closed transition, combination, fused
Wye-Delta, closed transition, combination, breaker



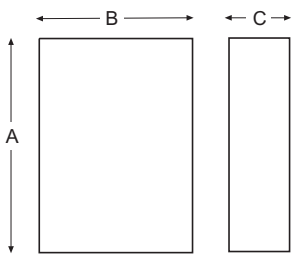
Wye-Delta, closed transition, combination, fused

Starter size	Enclosure type	A	B	C
A9 – A40	1	14	12	8
	3R	14	12	8
	4	14	12	8
	4X Stainless	14	12	6
	4X Plastic	14	12	7
	12	14	12	8
A50 – A75	1	24	16	8
	3R	24	16	8
	4	24	16	8
	4X Stainless	24	16	8
	4X Plastic	24	16	8
	12	24	16	8
A95 – A110	1	36	30	8
	3R	36	30	8
	4	36	30	8
	4X Stainless	36	30	8
	4X Plastic	40	30	12
	12	36	30	8
A145 (F400) A185 (F600)	1	42	36	9
	3R	36	36	8
	4	36	36	8
	4X Stainless	36	36	12
	4X Plastic	–	–	–
	12	36	36	8
A210 (F600) A260 (F800)	1	–	–	–
	3R	60	36	10
	4	60	36	10
	4X Stainless	60	36	10
	4X Plastic	–	–	–
	12	60	36	10
A300 (NF1200+FB) A400 (NF1600+FB) A460(NF1600+FB) A580(NF2000+FB) A750(NF3150+FB)	1	87	36	24
	3R	87	36	24
	4	–	–	–
	4X Stainless	–	–	–
	4X Plastic	–	–	–
	12	87	36	24

Wye-Delta, closed transition, combination, breaker

Starter size	Enclosure type	A	B	C
A9 – A40	1	20	16	8
	3R	20	16	8
	4	20	16	8
	4X Stainless	20	16	8
	4X Plastic	20	16	8
	12	20	16	8
A50 – A75	1	30	24	12
	3R	30	24	8
	4	30	24	8
	4X Stainless	30	24	8
	4X Plastic	30	20	12
	12	30	24	8
A95 – A110	1	36	30	8
	3R	36	30	8
	4	36	30	8
	4X Stainless	36	30	8
	4X Plastic	–	–	–
	12	36	30	8
A145 (S6) A185 (S6)	1	42	36	9
	3R	36	36	8
	4	36	36	8
	4X Stainless	36	36	12
	4X Plastic	–	–	–
	12	36	36	8
A210 (S7) A300 (S7)	1	42	36	13
	3R	36	36	12
	4	36	36	12
	4X Stainless	36	36	12
	4X Plastic	–	–	–
	12	36	36	12
A400 (S8) A460 (S8) A580 (S8) A750 (S8)	1	87	36	24
	3R	87	36	24
	4	–	–	–
	4X Stainless	–	–	–
	4X Plastic	–	–	–
	12	87	36	24

Approximate dimensions
Part winding w/CCT
Part winding, non-fused combination w/CCT



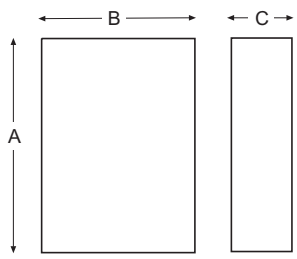
Part winding w/CTT

Starter size	Enclosure type	A	B	C
A9 – A40	1	12	10	6
	3R	14	12	8
	4	14	12	6
	4X Stainless	14	12	6
	4X Plastic	14	12	7
	12	14	12	8
A50 – A75	1	14	12	8
	3R	14	12	8
	4	14	12	6
	4X Stainless	14	12	6
	4X Plastic	14	12	7
	12	14	12	8
A95 – A110	1	20	16	8
	3R	20	16	8
	4	20	16	8
	4X Stainless	20	16	8
	4X Plastic	20	16	8
	12	20	16	8
A145 – A185	1	30	24	12
	3R	30	20	8
	4	30	20	8
	4X Stainless	30	24	8
	4X Plastic	30	20	12
	12	30	20	8
A210 – A300	1	30	24	12
	3R	30	20	10
	4	30	20	10
	4X Stainless	30	24	12
	4X Plastic	30	20	12
	12	30	20	10
A400	1	36	30	12
	3R	36	24	12
	4	36	24	12
	4X Stainless	36	24	12
	4X Plastic	–	–	–
	12	36	24	12
A460	1	42	30	13
	3R	42	36	12
	4	42	36	12
	4X Stainless	42	36	12
	4X Plastic	–	–	–
	12	42	36	12
A580	1	36	30	12
	3R	36	24	12
	4	36	24	12
	4X Stainless	36	24	12
	4X Plastic	–	–	–
	12	36	24	12
A750	1	42	30	13
	3R	42	36	12
	4	42	36	12
	4X Stainless	42	36	12
	4X Plastic	–	–	–
	12	42	36	12

Part winding, non-fused combination w/CCT

Starter size	Enclosure type	A	B	C
A9 – A40	1	14	12	8
	3R	14	12	8
	4	14	12	6
	4X Stainless	14	12	6
	4X Plastic	14	12	7
	12	14	12	8
A50 – A75	1	20	16	8
	3R	20	16	8
	4	20	16	8
	4X Stainless	20	16	8
	4X Plastic	20	16	8
	12	20	16	8
A95 – A110	1	30	24	12
	3R	30	24	8
	4	30	24	8
	4X Stainless	30	24	8
	4X Plastic	30	30	12
	12	30	24	8
A145 – A185	1	30	24	8
	3R	30	24	8
	4	30	24	8
	4X Stainless	30	24	8
	4X Plastic	33	25	12
	12	30	24	8
A210	1	30	24	12
	3R	30	24	10
	4	30	24	10
	4X Stainless	30	24	10
	4X Plastic	33	25	12
	12	30	24	10
A260 – A300	1	36	30	12
	3R	30	30	10
	4	30	30	10
	4X Stainless	36	30	12
	4X Plastic	40	30	12
	12	30	30	10
A400 – A460	1	48	36	13
	3R	48	36	12
	4	48	36	12
	4X Stainless	48	36	12
	4X Plastic	–	–	–
	12	48	36	12
A580 – A750	1	87	36	24
	3R	87	36	24
	4	87	36	24
	4X Stainless	–	–	–
	4X Plastic	–	–	–
	12	87	36	24

Approximate dimensions
Part winding, fused combination w/CCT
Part winding, breaker combination w/CCT



Part winding, fused combination w/CCT

Starter size	Enclosure type	A	B	C
A9 – A40	1	20	16	8
	3R	20	16	8
	4	20	16	8
	4X Stainless	20	16	8
	4X Plastic	20	16	8
	12	20	16	8
A50 – A75	1	24	20	8
	3R	24	20	8
	4	24	20	8
	4X Stainless	24	20	8
	4X Plastic	24	16	8
	12	24	20	8
A95 – A110	1	30	24	10
	3R	30	24	10
	4	30	24	10
	4X Stainless	30	24	10
	4X Plastic	30	30	12
	12	30	24	10
A145 – A210	1	36	30	8
	3R	30	30	8
	4	30	30	8
	4X Stainless	30	30	8
	4X Plastic	40	30	12
	12	30	30	8
A260 – A300	1	42	36	13
	3R	36	36	10
	4	36	36	10
	4X Stainless	36	36	12
	4X Plastic	40	30	12
	12	36	36	10
A400 – A460	1	48	36	13
	3R	48	36	12
	4	48	36	12
	4X Stainless	48	36	12
	4X Plastic	–	–	–
	12	48	36	12
A580 – A750	1	87	36	24
	3R	87	36	24
	4	87	36	24
	4X Stainless	87	36	24
	4X Plastic	–	–	–
	12	87	36	24

Part winding, breaker combination w/CCT

Starter size	Enclosure type	A	B	C
A9 – A40 (S3)	1	14	12	8
	3R	14	12	8
	4	16	12	8
	4X Stainless	16	12	8
	4X Plastic	14	12	7
	12	14	12	8
A50 – A75 (S3)	1	24	20	8
	3R	24	20	8
	4	24	20	8
	4X Stainless	24	20	8
	4X Plastic	24	16	8
	12	24	20	8
A95 – A110 (S3)	1	30	24	12
	3R	30	24	8
	4	30	24	8
	4X Stainless	30	24	8
	4X Plastic	30	30	12
	12	30	24	8
A145 (S3)	1	24	20	8
	3R	24	20	8
	4	24	20	8
	4X Stainless	24	20	8
	4X Plastic	30	20	12
	12	24	20	8
A185 (S3, S4)	1	30	24	12
	3R	30	20	8
	4	30	20	8
	4X Stainless	30	24	8
	4X Plastic	30	20	12
	12	30	20	8
A210 – A300 (S4, S5)	1	30	24	12
	3R	30	24	10
	4	30	24	10
	4X Stainless	30	24	12
	4X Plastic	33	25	12
	12	30	24	10
A300 (S6)	1	36	30	12
	3R	30	30	10
	4	30	30	10
	4X Stainless	36	30	12
	4X Plastic	40	30	14
	12	30	30	10
A400 – A580 (S6, S7)	1	42	30	13
	3R	42	36	12
	4	42	30	12
	4X Stainless	42	30	12
	4X Plastic	–	–	–
	12	42	36	12
A750 (S7)	1	48	36	17
	3R	48	36	16
	4	48	36	16
	4X Stainless	48	36	16
	4X Plastic	–	–	–
	12	48	36	16

Notes

Miniature controls
Index

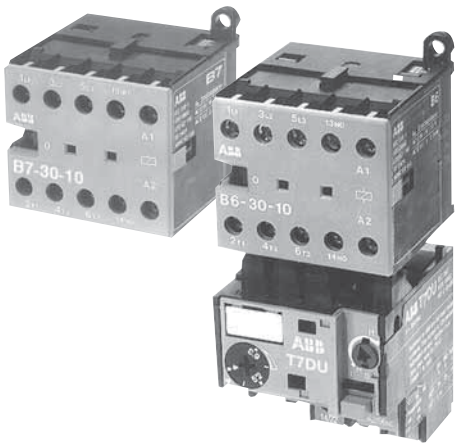
Notes

Miniature controls

Miniature controls

- Contactors
- Overload relays
- Starters
- Control relays

4



Description

General features

- Wiring terminations available include plug-on connectors, wire pins for PC board mounting and solder connections
- Low power consumption coils
- Touch safe design: All screw connection terminals are protected against accidental touch
- Slotted Pozidriv terminal screws
- Screwdriver guide holes
- Self-lifting cable clamps
- Panel or DIN rail mounting
- Terminals supplied in the open position
- Electrically noiseless operation
- Snap-on accessories
- UL Listed, file # E39231
- CSA approved, file #LR15332
- IEC, VDE & most international standards

Contactors

- B6 and BC6 miniature contactors can be used for small motors up to 1 HP, 460V
- B7 and BC7 miniature contactors can be used for small motors up to 5 HP, 460V
- Applications include use in machines, electrical appliances, building automation systems, heating systems, overhead door applications, etc.
- B6 and B7 miniature contactors are designed to be directly connected to a PLC transistor output

Interface contactors

- “Interface” mini-contactors are normally used to establish an isolation between the electronic part and the process in large automation systems

Mechanically interlocked contactors

- Compact, mechanically interlocked contactors are available
- Can be used for reversing applications

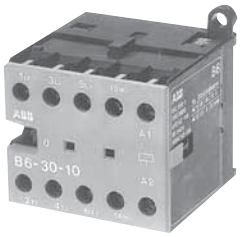
Control relays

- AC & DC operated

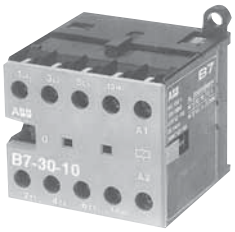
Overload relays

- 14 setting ranges from 0.11 to 10.5 amps
- Manual or automatic reset
- Phase failure compensation
- Ambient temperature compensation
- Stop and test button functions
- UL Listed, file #E149922
- CSA approved, file # LR98336

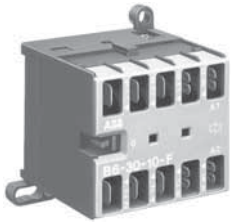
Contactors
B6 & B7, non-reversing
3 Phase



B6C-1



B7C-1


B6CFP-1


B7CSP-1

Non-reversing with screw connections

General purpose AC1	Maximum motor FLA AC3	3 Phase motor horsepower 208V	230V	460V	600V	Single phase 120V	230V	Number of power poles	Auxiliary contacts	Catalog number	List price
AC operated											
12	6.8	1	2	3	1	1/2	1	3 3 4	1 N.O. 1 N.C. —	B6C-★ B6C-★01 B6C4P-★	**$ 51**
16	9.6	2	3	5	5	1	2	3 3 4	1 N.O. 1 N.C. —	B7C-★ B7C-★01 B7C4P-★	**72**
DC operated											
12	6.8	1	2	3	1	1/2	1	3 3	1 N.O. 1 N.C.	BC6C-★ BC6C-★01	**57**
16	9.6	2	3	5	5	1	2	3 3	1 N.O. 1 N.C.	BC7C-★ BC7C-★01	**78**

Non-reversing with flat pin connections

General purpose AC1	Maximum motor FLA AC3	3 Phase motor horsepower 208V	230V	460V	600V	Single phase 120V	230V	Number of power poles	Auxiliary contacts	Catalog number	List price
AC operated											
12	6.8	1	2	3	1	1/2	1	3 3 4	1 N.O. 1 N.C. —	B6CFP-★ B6CFP-★01 B6C4PFP-★	**$ 51**
16	9.6	2	3	5	5	1	2	3 3 4	1 N.O. 1 N.C. —	B7CFP-★ B7CFP-★01 B7C4PFP-★	**72**
DC operated											
12	6.8	1	2	3	1	1/2	1	3 3	1 N.O. 1 N.C.	BC6CFP-★ BC6CFP-★01	**57**
16	9.6	2	3	5	5	1	2	3 3	1 N.O. 1 N.C.	BC7CFP-★ BC7CFP-★01	**78**

Non-reversing with soldering pin connections

General purpose AC1	Maximum motor FLA AC3	3 Phase motor horsepower 208V	230V	460V	600V	Single phase 120V	230V	Number of power poles	Auxiliary contacts	Catalog number	List price
AC operated											
12	6.8	1	2	3	1	1/2	1	3 3 4	1 N.O. 1 N.C. —	B6CSP-★ B6CSP-★01 B6C4PSP-★	**$ 51**
16	9.6	2	3	5	5	1	2	3 3 4	1 N.O. 1 N.C. —	B7CSP-★ B7CSP-★01 B7C4PSP-★	**72**
DC operated											
12	6.8	1	2	3	1	1/2	1	3 3	1 N.O. 1 N.C.	BC6CSP-★ BC6CSP-★01	**57**
16	9.6	2	3	5	5	1	2	3 3	1 N.O. 1 N.C.	BC7CSP-★ BC7CSP-★01	**78**

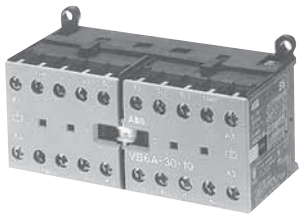
Coil voltage selection

★ Coil voltage suffix. Refer to Coil Voltage Selection Chart and substitute the desired coil voltage suffix for the ★.

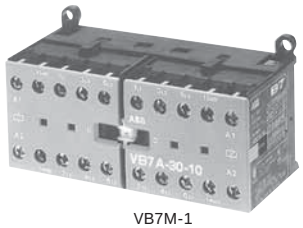
Coil voltage selection chart

	Volts								
	12	24	42	48	110/125	110/120	220	220/240	380/415
AC 40-450 Hz		F	L	G		1		2	M
DC	U	Y	V	W	P		R		

Contactors
B6 & B7, mechanically interlocked
3 Phase



VB6M-1



VB7M-1

Mechanically interlocked with screw connections

General purpose AC1	Maximum motor FLA AC3	3 Phase motor horsepower 208V	230V	460V	600V	Single phase 120V	230V	Number of power poles	Auxiliary contacts	Catalog number	List price
AC operated											
12	6.8	1	2	3	1	1/2	1	3	1 N.O. 1 N.C.	VB6M-★ VB6M-★01	**$ 104**
16	9.6	2	3	5	5	1	2	3	1 N.O. 1 N.C.	VB7M-★ VB7M-★01	**143**
DC operated											
12	6.8	1	2	3	1	1/2	1	3	1 N.O. 1 N.C.	VBC6M-★ VBC6M-★01	**105**
16	9.6	2	3	5	5	1	2	3	1 N.O. 1 N.C.	VBC7M-★ VBC7M-★01	**156**

Mechanically interlocked with flat pin connections

General purpose AC1	Maximum motor FLA AC3	3 Phase motor horsepower 208V	230V	460V	600V	Single phase 120V	230V	Number of power poles	Auxiliary contacts	Catalog number	List price
AC operated											
12	6.8	1	2	3	1	1/2	1	3	1 N.O. 1 N.C.	VB6MFP-★ VB6MFP-★01	**$ 104**
16	9.6	2	3	5	5	1	2	3	1 N.O. 1 N.C.	VB7MFP-★ VB7MFP-★01	**143**
DC operated											
12	6.8	1	2	3	1	1/2	1	3	1 N.O. 1 N.C.	VBC6MFP-★ VBC6MFP-★01	**105**
16	9.6	2	3	5	5	1	2	3	1 N.O. 1 N.C.	VBC7MFP-★ VBC7MFP-★01	**156**

Mechanically interlocked with soldering pin connections

General purpose AC1	Maximum motor FLA AC3	3 Phase motor horsepower 208V	230V	460V	600V	Single phase 120V	230V	Number of power poles	Auxiliary contacts	Catalog number	List price
AC operated											
12	6.8	1	2	3	1	1/2	1	3	1 N.O. 1 N.C.	VB6MSP-★ VB6MSP-★01	**$ 104**
16	9.6	2	3	5	5	1	2	3	1 N.O. 1 N.C.	VB7MSP-★ VB7MSP-★01	**143**
DC operated											
12	6.8	1	2	3	1	1/2	1	3	1 N.O. 1 N.C.	VBC6MSP-★ VBC6MSP-★01	**105**
16	9.6	2	3	5	5	1	2	3	1 N.O. 1 N.C.	VBC7MSP-★ VBC7MSP-★01	**156**

Coil voltage selection

★ Coil voltage suffix. Refer to Coil Voltage Selection Chart and substitute the desired coil voltage suffix for the ★.

Coil voltage selection chart

	Volts 12	24	42	48	110/125	110/120	220	220/240	380/415
AC 40-450 Hz		F	L	G		1		2	M
DC	U	Y	V	W	P		R		

Contactors [1]
B6 & B7, Interface
3 Phase

BC6-2.4

BC7-2.4

Non-reversing with screw connections

General purpose AC1	Maximum motor FLA AC3	3 Phase motor horsepower				Single phase		Number of power poles	Auxiliary contacts	Catalog number	List price
		208V	230V	460V	600V	120V	230V				
DC operated — 24VDC (1.4W low power consumption)											
12	6.8	1	2	3	1	1/2	1	3	1 N.O. 1 N.C.	BC6-1.4 BC6-01-1.4	**$ 57**
16	9.6	2	3	5	5	1	2	3	1 N.O. 1 N.C.	BC7-1.4 BC7-01-1.4	**80**
DC operated — 17 – 32VDC (2.4W low power consumption)											
12	6.8	1	2	3	1	1/2	1	3	1 N.O. 1 N.C.	BC6-2.4 BC6-01-2.4	**63**
16	9.6	2	3	5	5	1	2	3	1 N.O. 1 N.C.	BC7-2.4 BC7-01-2.4	**80**

Non-reversing with flat pin connections

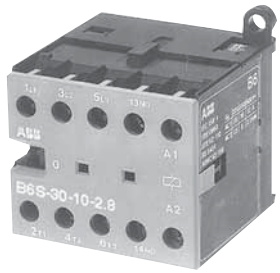
General purpose AC1	Maximum motor FLA AC3	3 Phase motor horsepower				Single phase		Number of power poles	Auxiliary contacts	Catalog number	List price
		208V	230V	460V	600V	120V	230V				
DC operated — 24VDC (1.4W low power consumption)											
12	6.8	1	2	3	1	1/2	1	3	1 N.O. 1 N.C.	BC6FP-1.4 BC6FP-01-1.4	**$ 57**
16	9.6	2	3	5	5	1	2	3	1 N.O. 1 N.C.	BC7FP-1.4 BC7FP-01-1.4	**80**
DC operated — 17 – 32VDC (2.4W low power consumption)											
12	6.8	1	2	3	1	1/2	1	3	1 N.O. 1 N.C.	BC6FP-2.4 BC6FP-01-2.4	**63**
16	9.6	2	3	5	5	1	2	3	1 N.O. 1 N.C.	BC7FP-2.4 BC7FP-01-2.4	**80**

Non-reversing with soldering pin connections

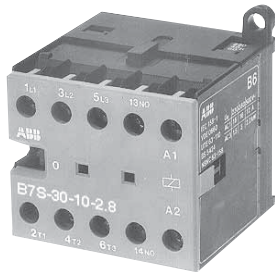
General purpose AC1	Maximum motor FLA AC3	3 Phase motor horsepower				Single phase		Number of power poles	Auxiliary contacts	Catalog number	List price
		208V	230V	460V	600V	120V	230V				
DC operated — 24VDC (1.4W low power consumption)											
12	6.8	1	2	3	1	1/2	1	3	1 N.O. 1 N.C.	BC6SP-1.4 BC6SP-01-1.4	**$ 57**
16	9.6	2	3	5	5	1	2	3	1 N.O. 1 N.C.	BC7SP-1.4 BC7SP-01-1.4	**80**
DC operated — 17 – 32VDC (2.4W low power consumption)											
12	6.8	1	2	3	1	1/2	1	3	1 N.O. 1 N.C.	BC6SP-2.4 BC6SP-01-2.4	**63**
16	9.6	2	3	5	5	1	2	3	1 N.O. 1 N.C.	BC7SP-2.4 BC7SP-01-2.4	**80**

[1] Interface contactors cannot utilize auxiliary contacts.

Contactors
for connection to PLCs ①
3 Phase

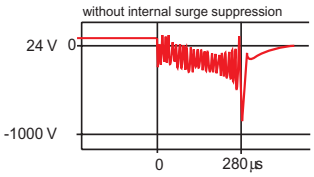


B6SC-2.8

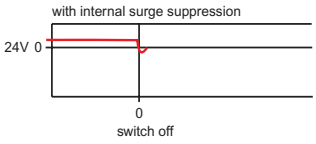


B7SC-2.8

Oscillograms
typical operation



Switching off of interface contactors BC6, BC7, coil voltage 24 VDC.



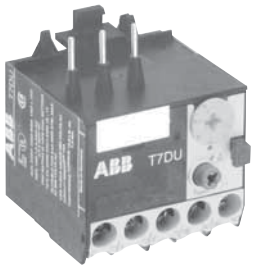
Switching off of B6S, B7S coil voltage 24VDC which provides electrically noiseless operation

Non-reversing with screw connections

General purpose AC1	Maximum motor FLA AC3	3 Phase motor horsepower 208V	230V	460V	600V	Single phase 120V	230V	Number of power poles	Auxiliary contacts	Catalog number	List price
DC operated — 24VDC (1.4W low power consumption)											
12	6.8	1	2	3	1	1/2	1	3	1 N.O. 1 N.C.	B6SC-1.7 B6SC-01-1.7	**$ 65**
16	9.6	2	3	5	5	1	2	3	1 N.O. 1 N.C.	B7SC-1.7 B7SC-01-1.7	**69**
DC operated — 17 – 32VDC (2.4W low power consumption)											
12	6.8	1	2	3	1	1/2	1	3	1 N.O. 1 N.C.	B6SC-2.8 B6SC-01-2.8	**65**
16	9.6	2	3	5	5	1	2	3	1 N.O. 1 N.C.	B7SC-2.8 B7SC-01-2.8	**69**

① Contactors for connection to PLCs cannot utilize auxiliary contacts.

Thermal overload relays
T7DU



T7DU

Thermal overload relay — for contactors B6,B7, BC6, BC7, B6S, B7S, VB6(7), VBC6(7), VB6A(7A), VBC6A(/7A)

Setting range Amps	Catalog number	List price
0.1 – 0.16	T7DU0.16	
0.16 – 0.24	T7DU0.24	
0.24 – 0.4	T7DU0.4	
0.4 – 0.6	T7DU0.6	
0.6 – 1.0	T7DU1.0	
1.0 – 1.6	T7DU1.6	**$ 48**
1.6 – 2.4	T7DU2.4	
2.4 – 4.0	T7DU4.0	
4.0 – 6.0	T7DU6.0	
6.0 – 9.0	T7DU9.0	
9.0 – 12.0	T7DU12.0	

Loading capacity of auxiliary switches

Type		T7DU	
		N.C. 95 – 96	N.O. 97 – 98
Rated operating voltage U_e/V IEC / UL508	V	500 / 300	500 / 300
Thermal current	A	6	6
Rated operating current I_e			
at AC-15 220/240 V	A	1.5	1.5
at AC-15 380/415 V	A	0.7	0.5
at AC-15 500 V	A	0.5	0.3
at DC-15 220 V	A	0.2	0.2
Pilot duty rating	AC	A300	A300
	DC	P300	P300
General use	240V	1.5A	1.5A
	600V	0.6A	0.6A

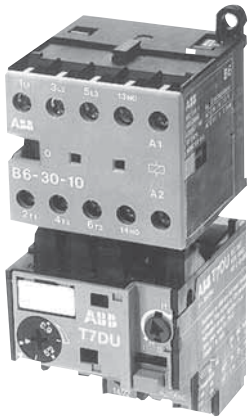
Thermal overload relay T7DU

Setting range	Short circuit protection (fuses, circuit breakers)				Resistance per phase	Joule losses per phase at upper current setting
	Coordination Type 2 (IEC)	Coordination Type 1(IEC)	600V, 5kA			
	gL/gG	gL/gG	Fuse	MCCB		
A – A	A	A			W	W
0.1 – 0.16	0.5	20	1	15A	62.3	1.6
0.16 – 0.24	1	20	1	15A	27	1.6
0.24 – 0.4	2	20	1	15A	11.7	1.9
0.4 – 0.6	2	20	1	15A	4.61	1.7
0.6 – 1.0	4	20	3	15A	1.66	1.7
1.0 – 1.6	6	20	6	15A	0.63	1.6
1.6 – 2.4	6	20	6	15A	0.27	1.6
2.4 – 4.0	10	20	15	15A	0.107	1.7
4.0 – 6.0	10	20	20	15A	0.049	1.8
6.0 – 9.0	10	20	35	15A	0.021	1.7
9.0 – 12.0	20	20	45	15A	0.010	1.4

Electronic overload relays

See pages 2.19 to 2.30.

Starters ①
B6 & B7, non-reversing
3 Phase



B6S-★★

Non-Reversing, 3 phase – Screw connections only

General purpose AC1	Maximum motor FLA AC3	3 Phase motor horsepower				Single phase		Number of power poles	Auxiliary contacts	Catalog number	List price
		208V	230V	460V	600V	120V	230V				
AC operated											
12	6.8	1	2	3	1	1/2	1	3	1 N.O. 1 N.C.	B6S-★◆ B6S-★01◆	**$ 108**
16	9.6	2	3	5	5	1	2	3	1 N.O. 1 N.C.	B7S-★◆ B7S-★01◆	**132**
DC operated											
12	6.8	1	2	3	1	1/2	1	3	1 N.O. 1 N.C.	BC6S-★◆ BC6S-★01◆	**114**
16	9.6	2	3	5	5	1	2	3	1 N.O. 1 N.C.	BC7S-★◆ BC7S-★01◆	**138**

★ Coil voltage suffix. Refer to Coil Voltage Selection chart and substitute the desired coil voltage suffix for the ★.
◆ Overload relay suffix. Refer to the Overload Relay Selection chart and substitute the desired starter suffix code for the ◆.

Reversing, 3 phase – Screw connections only

General purpose AC1	Maximum motor FLA AC3	3 Phase motor horsepower				Single phase		Number of power poles	Auxiliary contacts	Catalog number	List price
		208V	230V	460V	600V	120V	230V				
AC operated											
12	6.8	1	2	3	1	1/2	1	3	1 N.O. 1 N.C.	B6SR-★◆ B6SR-★01◆	**$ 179**
16	9.6	2	3	5	5	1	2	3	1 N.O. 1 N.C.	B7SR-★◆ B7SR-★01◆	**218**
DC operated											
12	6.8	1	2	3	1	1/2	1	3	1 N.O. 1 N.C.	BC6SR-★◆ BC6SR-★01◆	**180**
16	9.6	2	3	5	5	1	2	3	1 N.O. 1 N.C.	BC7SR-★◆ BC7SR-★01◆	**231**

★ Coil voltage suffix. Refer to Coil Voltage Selection chart and substitute the desired coil voltage suffix for the ★.
◆ Overload relay suffix. Refer to the Overload Relay Selection chart and substitute the desired starter suffix code for the ◆.

Coil voltage selection

	Volts								
	12	24	42	48	110/125	110/120	220	220/240	380/415
AC 40-450 Hz		F	L	G		1		2	M
DC	U	Y	V	W	P		R		

Overload relay selection

T7DU – Thermal overload

Catalog number	Current setting range	Starter range code
T7DU0.16	0.1 – 0.16	A
T7DU0.24	0.16 – 0.24	B
T7DU0.4	0.24 – 0.4	C
T7DU0.6	0.4 – 0.6	D
T7DU1.0	0.6 – 1.0	E
T7DU1.6	1.0 – 1.6	F
T7DU2.4	1.6 – 2.4	G
T7DU4.0	2.4 – 4.0	H
T7DU6.0	4.0 – 6.0	J
T7DU9.0	6.0 – 9.0	K
T7DU12.0	9.0 – 12.0	L

E16DU – Electronic overload

Catalog number	Current setting range	Current tripping class	Starter range code
E16DU0.32-10	0.1 – 0.32	10	A1
E16DU1.0-10	0.3 – 1.0	10	B1
E16DU2.7-10	0.9 – 2.7	10	C1
E16DU6.3-10	2.0 – 6.3	10	D1
E16DU18.9-10	5.7 – 18.9	10	E1
E16DU0.32-20	0.1 – 0.32	20	A2
E16DU1.0-20	0.3 – 1.0	20	B2
E16DU2.7-20	0.9 – 2.7	20	C2
E16DU6.3-20	2.0 – 6.3	20	D2
E16DU18.9-20	5.7 – 18.9	20	E2
E16DU0.32-30	0.1 – 0.32	30	A3
E16DU1.0-30	0.3 – 1.0	30	B3
E16DU2.7-30	0.9 – 2.7	30	C3
E16DU6.3-30	2.0 – 6.3	30	D3
E16DU18.9-30	5.7 – 18.9	30	E3

① For enclosed miniature starters, please consult factory for catalog number and pricing.

Starters ①
B6 & B7, Non-reversing
Single phase

Non-Reversing, Single phase – Screw connections only

General purpose AC1	Maximum motor FLA AC3	Single phase 120V	Single phase 230V	Number of power poles	Auxiliary contacts	Catalog number	List price
AC operated							
12	6.8	1/2	1	3	1 N.O. 1 N.C.	B6SS-★◆ B6SS-★01◆	**$ 108**
16	9.6	1	2	3	1 N.O. 1 N.C.	B7SS-★◆ B7SS-★01◆	**132**
DC operated							
12	6.8	1/2	1	3	1 N.O. 1 N.C.	BC6SS-★◆ BC6SS-★01◆	**114**
16	9.6	1	2	3	1 N.O. 1 N.C.	BC7SS-★◆ BC7SS-★01◆	**138**

★ Coil voltage suffix. Refer to Coil Voltage Selection chart and substitute the desired coil voltage suffix for the ★.
◆ Overload relay suffix. Refer to the Overload Relay Selection chart and substitute the desired starter suffix code for the ◆.

Coil voltage selection

	Volts								
	12	24	42	48	110/125	110/120	220	220/240	380/415
AC 40-450 Hz		F	L	G		1		2	M
DC	U	Y	V	W	P		R		

Overload relay selection

T7DU – Thermal overload

Catalog number	Current setting range	Starter range code
T7DU0.16	0.1 – 0.16	A
T7DU0.24	0.16 – 0.24	B
T7DU0.4	0.24 – 0.4	C
T7DU0.6	0.4 – 0.6	D
T7DU1.0	0.6 – 1.0	E
T7DU1.6	1.0 – 1.6	F
T7DU2.4	1.6 – 2.4	G
T7DU4.0	2.4 – 4.0	H
T7DU6.0	4.0 – 6.0	J
T7DU9.0	6.0 – 9.0	K
T7DU12.0	9.0 – 12.0	L

① For enclosed miniature starters, please consult factory for catalog number and pricing.

Control relays
K622 - K640
AC & DC operated

K640-1

KC631-1

Control relays with screw connections

	Contact configuration N.O.	N.C.	Catalog number	List price
AC Operated				
	4	0	K640-★	
	3	1	K631-★	**$ 48**
	2	2	K622-★	
DC Operated				
	4	0	KC640-★	
	3	1	KC631-★	**54**
	2	2	KC622-★	

Control relays with flat pin connections

	Contact configuration N.O.	N.C.	Catalog number	List price
AC Operated				
	4	0	K640FP-★	
	3	1	K631FP-★	**$ 48**
	2	2	K622FP-★	
DC Operated				
	4	0	KC640FP-★	
	3	1	KC631FP-★	**54**
	2	2	KC622FP-★	

Control relays with soldering pin connections

	Contact configuration N.O.	N.C.	Catalog number	List price
AC Operated				
	4	0	K640SP-★	
	3	1	K631SP-★	**$ 48**
	2	2	K622SP-★	
DC Operated				
	4	0	KC640SP-★	
	3	1	KC631SP-★	**54**
	2	2	KC622SP-★	

Coil voltage selection
★ Coil voltage suffix. Refer to Coil Voltage Selection Chart and substitute the desired coil voltage suffix for the ★.

Coil voltage selection chart

	Volts								
	12	24	42	48	110/125	110/120	220	220/240	380/415
AC 40-450 Hz		F	L	G		1		2	M
DC	U	Y	V	W	P		R		

Interface relays [1]
KC631 - KC640
DC operated

KC640-1.4

BC7-2.4

Interface relays with screw connections

Contact configuration N.O.	Contact configuration N.C.	Catalog number	List price
DC Operated — 24VDC (1.4W low power consumption)			
4	0	KC640-1.4	**$ 59**
3	1	KC631-1.4	
DC Operated — 17 – 32VDC (2.4W low power consumption)			
4	0	KC640-2.4	**59**
3	1	KC631-2.4	

Interface relays with flat pin connections

Contact configuration N.O.	Contact configuration N.C.	Catalog number	List price
DC Operated — 24VDC (1.4W low power consumption)			
4	0	KC640FP-1.4	**$ 59**
3	1	KC631FP-1.4	
DC Operated — 17 – 32VDC (2.4W low power consumption)			
4	0	KC640FP-2.4	**59**
3	1	KC631FP-2.4	

Interface relays with soldering pin connections

Contact configuration N.O.	Contact configuration N.C.	Catalog number	List price
DC Operated — 24VDC (1.4W low power consumption)			
4	0	KC640SP-1.4	**$ 59**
3	1	KC631SP-1.4	
DC Operated — 17 – 32VDC (2.4W low power consumption)			
4	0	KC640SP-2.4	**59**
3	1	KC631SP-2.4	

[1] Interface relays cannot utilize auxiliary contacts.

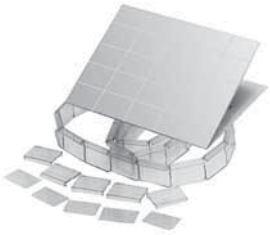
Accessories
for B6 & B7 contactors

CA6-11K

CA6-11E-F

CA6-11K-P

CAF6- 11M


BA 50

Auxiliary contact blocks

Item description	Contact configuration	Catalog number ①	List price
Side mounted auxiliary contact blocks, 1 N.O. & 1 N.C.			
Screw connection type			
• KC6 & K6 relay	1 N.O. & 1 N.C.	CA6-11K	
• B6 or BC6; B7 or BC7 4 pole contactor	1 N.O. & 1 N.C.	CA6-11E	
• B6 or BC6; B7 or BC7 3 pole contactor, 1 N.O.	1 N.O. & 1 N.C.	CA6-11M	
• B6 or BC6; B7 or BC7 3 pole contactor, 1 N.C.	1 N.O. & 1 N.C.	CA6-11N	
Flat pin connection type			
• KC6 & K6 relay	1 N.O. & 1 N.C.	CA6-11K-F	
• B6 or BC6; B7 or BC7 4 pole contactor	1 N.O. & 1 N.C.	CA6-11E-F	
• B6 or BC6; B7 or BC7 3 pole contactor, 1 N.O.	1 N.O. & 1 N.C.	CA6-11M-F	
• B6 or BC6; B7 or BC7 3 pole contactor, 1 N.C.	1 N.O. & 1 N.C.	CA6-11N-F	
Soldering pin connection type			
• KC6 & K6 relay	1 N.O. & 1 N.C.	CA6-11K-P	
• B6 or BC6; B7 or BC7 4 pole contactor	1 N.O. & 1 N.C.	CA6-11E-P	
• B6 or BC6; B7 or BC7 3 pole contactor, 1 N.O.	1 N.O. & 1 N.C.	CA6-11M-P	
• B6 or BC6; B7 or BC7 3 pole contactor, 1 N.C.	1 N.O. & 1 N.C.	CA6-11N-P	**$ 15**
Front mounted auxiliary contact blocks, 1 N.O. & 1 N.C.			
Screw connection type			
• KC6 & K6 relay	1 N.O. & 1 N.C.	CAF6-11K	
• KC6 & K6 relay	2 N.O. & 0 N.C.	CAF6-20K	
• KC6 & K6 relay	0 N.O. & 2 N.C.	CAF6-02K	
• B6 or BC6; B7 or BC7 4 pole contactor, VB(C)...	1 N.O. & 1 N.C.	CAF6-11E	
• B6 or BC6; B7 or BC7 4 pole contactor, VB(C)...	2 N.O. & 0 N.C.	CAF6-20E	
• B6 or BC6; B7 or BC7 4 pole contactor, VB(C)...	0 N.O. & 2 N.C.	CAF6-02E	
• B6 or BC6; B7 or BC7 3 pole contactor, 1 N.O., VB(C)...	1 N.O. & 1 N.C.	CAF6-11M	
• B6 or BC6; B7 or BC7 3 pole contactor, 1 N.O., VB(C)...	2 N.O. & 0 N.C.	CAF6-20M	
• B6 or BC6; B7 or BC7 3 pole contactor, 1 N.O., VB(C)...	0 N.O. & 2 N.C.	CAF6-02M	
• B6 or BC6; B7 or BC7 3 pole contactor, 1 N.C., VB(C)...	1 N.O. & 1 N.C.	CAF6-11N	
• B6 or BC6; B7 or BC7 3 pole contactor, 1 N.C., VB(C)...	2 N.O. & 0 N.C.	CAF6-20N	
• B6 or BC6; B7 or BC7 3 pole contactor, 1 N.C., VB(C)...	0 N.O. & 2 N.C.	CAF6-02N	

Soldering connection

Item description	Catalog number	List price
For mini contactors, B, BC, K, & KC	LB6	**$ 15**
For 2 pole auxiliary contacts	LB6-CA	**8**

Plunger

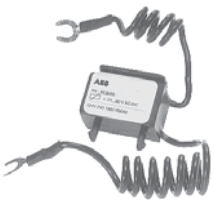
Item description	Catalog number	List price
For manual operation	BN6	**$ 15**

Identification labels

Item description	Catalog number	List price
50 clip-on label holders, 60 non-adhesive labels 50 transparent covers, 75 self adhesive labels	BA50	**$ 30**

① Miniature contactors and control relays can use either front or side mounted auxiliary blocks but not both.

Accessories
for B6 & B7 contactors



RV-BC6/...

LT6-B

Load side (T)

BSM6-30

Surge supressors

Item description	Voltage	Catalog number	List price
Varistor type surge suppressor for DC operated coils	24 – 60V 110 – 250V 200 – 420V	RV-BC6/60 RV-BC6/250 RV-BC6/380	**$ 24**

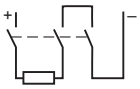
Protective cover

Item description	Catalog number	List price
For contactors B, BC, K, & KC6 with screw connection	LT6-B	**$ 15**

Reversing connection link

Item description	Catalog number	List price
For compact interlocking contactors with screw connection	BSM6-30	**$ 12**

D.C. Power Circuit Switching

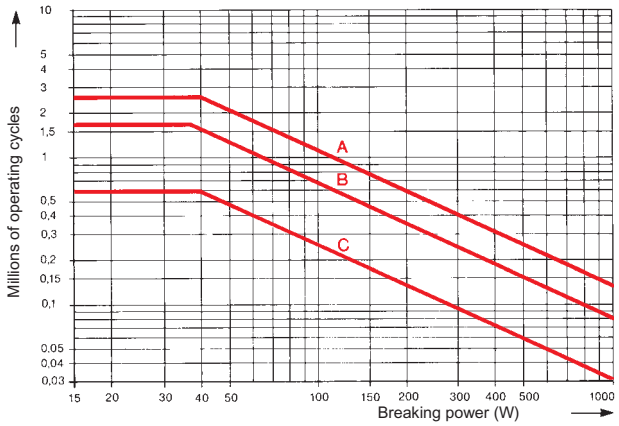
Utilization category			DC-1 L/R ≤ 1 ms	DC-3 L/R ≤ 2 ms	DC-5 L/R ≤ 7.5 ms
	24 V	**A**	16.0	16.0	16.0
	48 V	**A**	16.0	8.0	2.0
	60 V	**A**	16.0	4.0	1.25
	110 V	**A**	7.0	1.5	0.4
	220 V	**A**	0.8	0.25	0.2
	24 V	**A**	16.0	16.0	16.0
	48 V	**A**	16.0	16.0	16.0
	60 V	**A**	16.0	15.0	12.0
	110 V	**A**	16.0	7.0	2.0
	220 V	**A**	5.0	1.5	0.5
	24 V	**A**	16.0	16.0	16.0
	48 V	**A**	16.0	16.0	16.0
	60 V	**A**	16.0	16.0	16.0
	110 V	**A**	16.0	15.0	8.0
	220 V	**A**	14.0	4.0	2.0

Electrical Durability Curves for DC-1, DC-3 and DC-5

The curves below take into account the time constant L/R for each utilization category and show the electrical durability of the contactors during DC-1, DC-3 and DC-5 use for 3 poles connected in series.

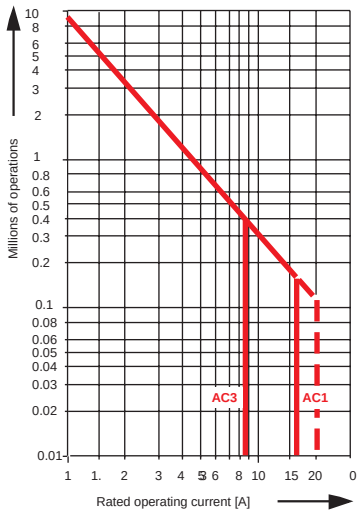
If one single pole is used, the corresponding breaking capacity (W) is reduced to 1/3 and for 2 poles connected in series it is reduced to 2/3.

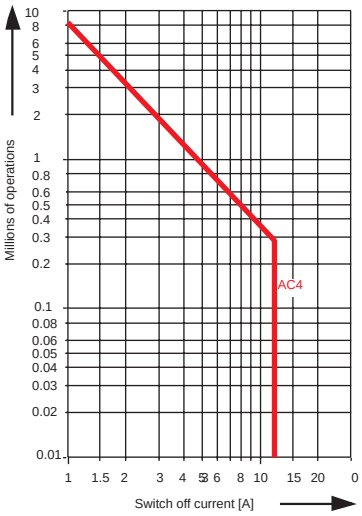
A = DC-1 3 poles in series
B = DC-3 3 poles in series
C = DC-5 3 poles in series



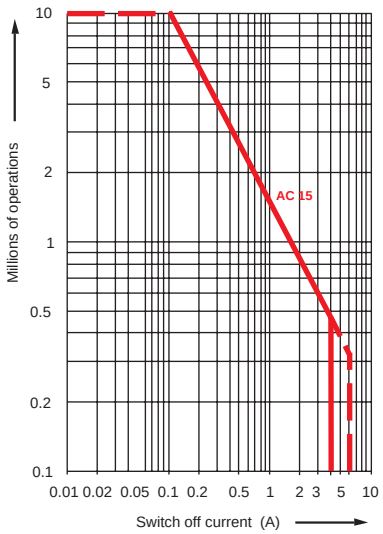
IEC Technical data
B6 Contactors & K6 control relays
Auxiliary contacts & magnetic coils

Endurance curves – B 6, BC 6, B 6S





Endurance curves – K6, KC6, CA6, CAF6



B6 contactors & K6 control relays

Rated insulating voltage		V_i	500			
Permissible ambient temperature						
Contactor without relay		°C	– 25 ... + 55			
Contactor with relay		°C	– 25 ... + 50			
Storage temperature		°C	– 40 ... + 80			
Climatic resistance	acc. to DIN 50 017 acc. to UTE C 63-100		alternating climate proof 30 cycles, version 1			
Mounting position			optional			
Mechanical endurance	10 million operations					
Max. switching frequency	AC 1	cyc./h	300			
	AC 2/AC 3	cyc./h	600			
Rated operating voltage V_e		V AC	12 to 500			
Rated operating current I_e/AC 1, AC 3			AC 1/I_e A		AC 2, AC 3	
Rated operating power			55 °C	40 °C	I_e A	P kW
	220/240 V		16	20	9	2.2
	380/440 V		16	20	9/8	4.0
	500 V		12	12	5.5	3.0
Switching times			B6	BC6	K6	KC6
Closing delay	NO	ms	20 to 26		20 to 26	
Opening delay	NO	ms	16 to 20	4 to 6	16 to 20	4 to 6
Closing delay	NC	ms	16 to 20	4 to 6	16 to 20	4 to 6
Opening delay	NC	ms	14 to 18		14 to 18	

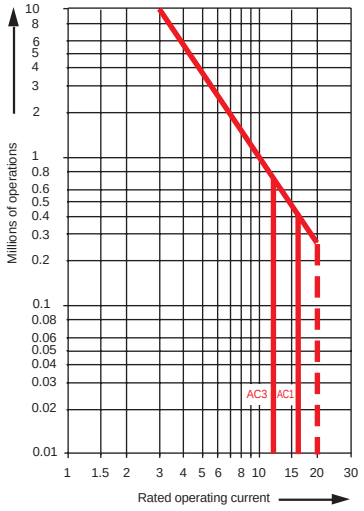
Auxiliary Contacts and Magnetic Coils

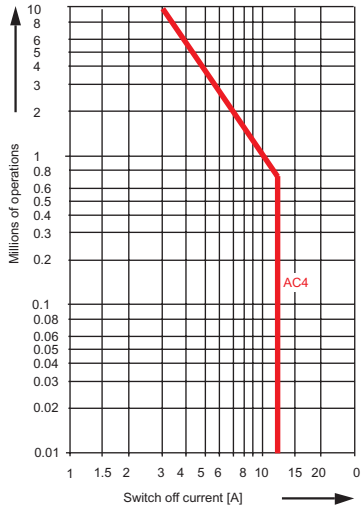
Rated operating voltage V_e	VDC VAC		12 to 240 12 to 500
Conventional rated thermal current I_{th}		A	6
Rated operating current I_e/ AC 15 at V_e			
	220/240 V	A	4
	380/440 V	A	3
	500 V	A	2
Rated operating current I_e/DC 13 at V_e			
	24 V	A	2.5
	60 V	A	1.2
	110 V	A	0.7
	220/240 V	A	0.4
Rated power of magnetic coils			
Basic contactors			closing /holding
B6 / K6, VB6	AC	VA	3.5
BC6 / KC 6, VBC6	DC	W	3.5
Interface contactors			
BC6 / KC6-1.4	DC	• 24 • V W	1.4
BC6 / KC6-2.4	DC	17 ... 32 V W	2.4

Mini contactor for connection to PLC's			cold		warm	
			I mA	P W	I mA	P W
B6 S-1.7	DC	+ 24 + V W	77	1.75	60	1.35
B6 S-2.8	DC	+17 ... 32 +V W	125	2.80	94	2.10
Coil voltage range			0.8 ...1.1x V_c			

IEC Technical data
B7 contactors
Magnetic coils

Endurance curves – B 7, BC 7, B 7S





B7 contactors

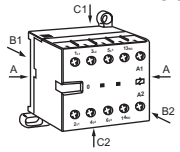
Rated insulating voltage		V_i	500
Permissible ambient temperature			
Contactor without relay		°C	– 25 ... + 55
Contactor with relay		°C	– 25 ... + 50
Storage temperature		°C	– 40 ... + 80
Climatic resistance	acc. to DIN 50 017 acc. to UTE C 63-100		alternating climate proof 30 cycles, version 1
Mounting position			optional
Mechanical endurance	10 million operations		
Max. switching frequency	AC 1 AC 2/AC 3	cyc./h cyc./h	300 600

Rated operating voltage V_e	VAC	12 to 500

Rated operating current I_e/AC 1, AC 3	AC 1/I_e A		AC 2, AC 3	
Rated operating power	55 °C	40 °C	I_e A	P kW
220/240 V	16	20	12/11	3
380/440 V	16	20	12/11	5.5
500 V	12	12	7	4

Switching times			B7	BC7
Closing delay	NO	ms	20 to 26	
Opening delay	NO	ms	16 to 20	4 to 6
Closing delay	NC	ms	16 to 20	4 to 6
Opening delay	NC	ms	14 to 18	

Shock resistance B6, B7
standard mounting position



1/2 sinusoidal shock, 10 ms:
no change in contact position

shock directions	A	B1	B2	C1	C2
contactor switched on	20 g	20 g	20 g	20 g	20 g
contactor switched off	10 g	20 g	20 g	20 g	20 g

Magnetic Coils

Coil voltage range				0.8...1.1x U_c
Rated power of magnetic coils				
Basic contactors				closing /holding
B7 / VB7	AC		VA	3.5
BC7 / VBC7	DC		W	3.5
Interface contactors				
BC7-1.4	DC	+ 24 V	W	1.4
BC7-2.4	DC	+17 ... 32 V	W	2.4

Mini contactor for connection to PLC's				cold		warm	
				I (mA)	P (W)	I (mA)	P (W)
B7 S-1.7	DC	+ 24 V		77	1.75	60	1.35
B7 S-2.8	DC	+17 ... 32 V		125	2.80	94	2.10

IEC Technical data

Switching of light fittings

The following tables show the number of lamps which can be connected per phase at 230 V/ 60 Hz. Note the following:

a) Increased current consumption for 1.1 times the rated voltage is considered.

b) Failure of about 5% of the lamps is considered since not ignited lamps additionally charge the contactor with their preheating current.

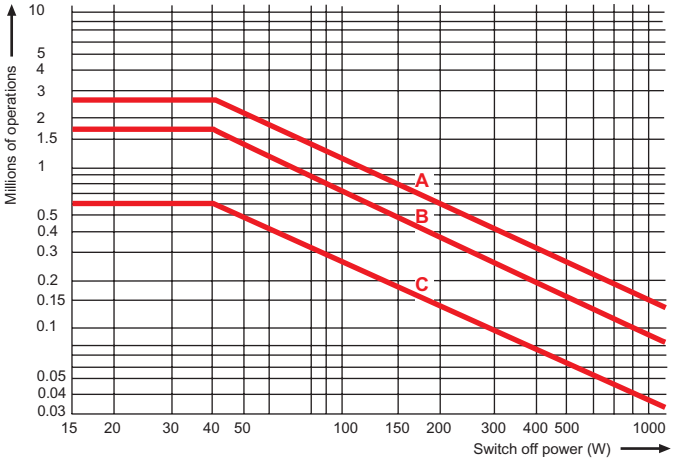
c) This data only apply to connection of the lamps at main pole terminals 1 ...8

Lamp type number phase Hz) type BC6, BC7	Lamp data		Watt	cm	Permissible of lamps per (230 V, 60 for contactor A B6, B7,
Incandescent lamps	60		0.27	20	
	100		0.45	12	
	200		0.91	6	
	300		1.36	4	
	500		2.27	2	
	1000		4.5	1	
Fluorescent lamps uncompensated	15	44	0.35	25	
	20	59	0.37	23	
	40	120	0.43	20	
	42	105	0.54	16	
	65	150	0.67	12	
	115	120	1.5	5	
	140	150	1.5	5	
Fluorescent lamps in two-lamp circuit	2 x 20	59	2 x 0.13	2 x 26	lamp
	2 x 40	120	2 x 0.22	2 x 20	pairs
	2 x 42	105	2 x 0.24	2 x 16	
	2 x 65	150	2 x 0.34	2 x 12	
	2 x 115	120	2 x 0.65	2 x 5	
	2 x 140	150	2 x 0.75	2 x 5	
Metal halogen lamps uncompensated	35		0.53	10	
	70		1.0	5	
	150		1.8	3	
	250		3.0	2	
	400		3.5	1	
Low pressure sodium vapor lamps uncompensated	35		1.5	4	
	55		1.5	4	
	90		2.4	2	
	135		3.5	2	
	150		3.3	2	
	180		3.3	2	
	200		2.3	2	
High pressure mercury vapor lamps uncompensated	150		1.8	3	
	250		3.0	2	
	330		3.7	2	
	400		4.7	1	
High pressure mercury vapor lamps uncompensated	50		0.61	10	
	80		0.8	7	
	125		1.15	5	
	250		2.15	3	
	400		3.25	2	
	700		5.40	1	

Endurance curves for DC1, DC3, DC5

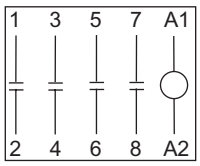
The following shows endurance curves for DC1, DC3 and DC5 for 3 poles in series. If only one current path is used, the corresponding breaking capacity is multiplied by 0.33, for two current paths by 0.66.

Varying time constants L/R (ms) have been considered.

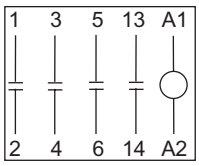


A = 3 poles in series DC 1
B = 3 poles in series DC 3
C = 3 poles in series DC 5

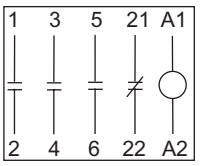
Miniature contactors



B6(7)-40-00 ...
BC6(7)-40-00 ...

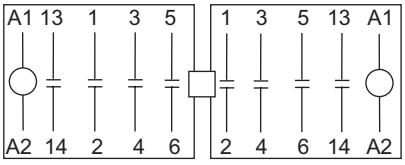


B6(7)-30-10 ...
BC6(7)-30-10 ...

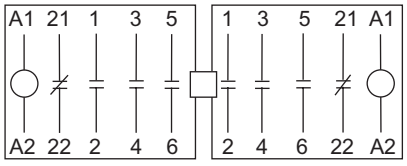


B6(7)-30-01 ...
BC6(7)-30-01 ...

Miniature mechanically interlocked contactors

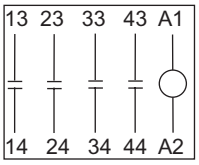


VB6(7)-30-10 ...
VBC6(7)-30-10 ...

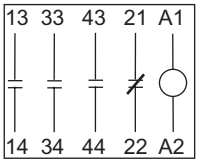


VB6(7)-30-01 ...
VBC6(7)-30-01 ...

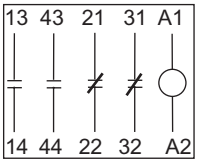
Miniature control relays



K6-40 E ...
KC6-40 E ...

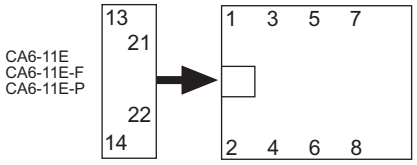


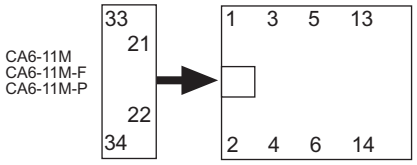
K6-31 Z ...
KC6-31 Z ...

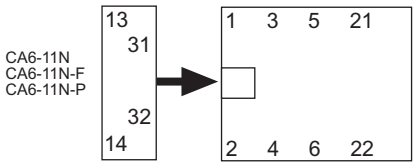


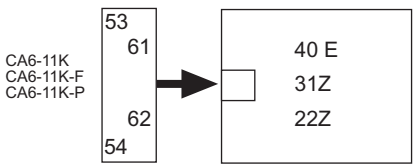
K6-22 Z ...
KC6-22 Z ...

Side mounted auxiliary contact blocks

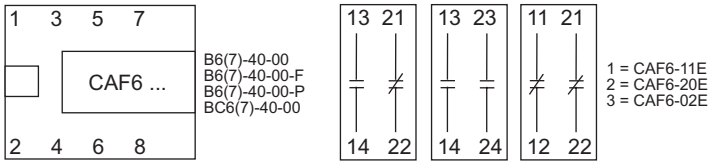


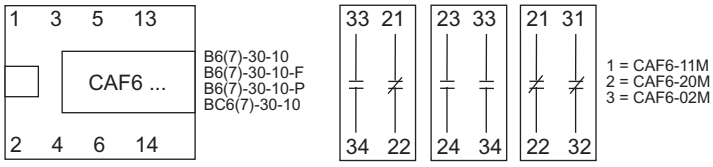


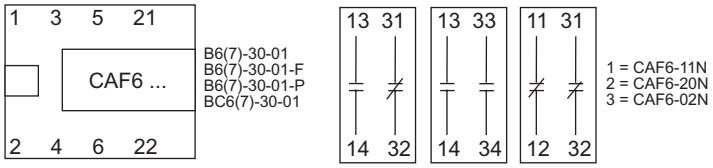


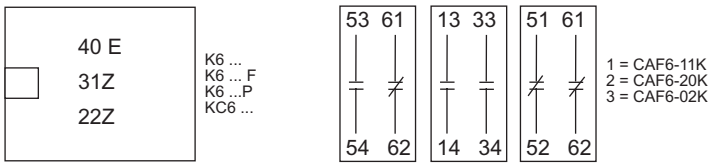


Front mounted auxiliary contact blocks









NOTE: Only side mounted type or front mounted type auxiliary contact blocks can be used at one time. Auxililiary contact blocks must not be mounted on Interface contactors, Interface control relays or contactors for connection to PLCs. Two CAF 6 front mounted auxiliary contact blocks can installed on the mechanically interlocked contactors VB(C)6(7).

IEC technical data
Overload relays

Type			T7DU
Standards: (major international and European standards)			IEC 947-4-1, UL 508 EN 60 947-4-1
Approvals, certificates			UL, CSA
Rated insulation voltage U^i acc. to IEC 158-1, IEC 947-4-1 acc. to IEC / UL 508Ui/V660V / 600V		V	690V
Impulse withstand voltage UimpkV6 acc. to IEC 947-4-1			
Permissible ambient temperature			
	• for storage	°C	-40 to 70
	• with compensated operation	°C	
	– open	°C	-25° to + 50°C
	– enclosed	°C	-25° to + 40°C
Climatic resistance according to			IEC 68-2-3, IEC 68-2-30
Mounting position			±30° from vertical position not horizontally, not upside down Side by side mounting distance, 5mm
Resistance to shock		Shock duration ms	10
*Critical shock direction A1, A2		multiple of g	10
Resistance to vibrations (±1 mm, 50 Hz)		multiple of g	—
Mounting	• on contactor		Hooking underneath the contactor, screwing on its main terminal
Terminal types and connecting capacity of main conductors (on motor side)			
	• Screw terminals (screw size)		
	• with self-disengaging clamping piece		M3.5
	• with terminal block		—
	• with busbar or cable lugs		—
	• connection cross sections		
	• single-core or stranded	Awg/mm2	2 x 18 – 14 / 2 x 0.75 – 2.5
	• flexible with connector sleeve	mm2	2 x 0.5 – 1.5
Terminals and auxiliary conductors			
	• Screw terminals (screw size)		
	• with self-disengaging clamping piece		M3.5
	• connection cross sections		
	• single-core or stranded	Awg/mm2	2 x 18 – 14 / 2 x 0.75 – 2.5
	• flexible with connector sleeve	mm2	2 x 0.5 – 1.5
Protection degree to IEC 947-1/EN 60 947-1			All terminals are safe from finger-touch and touch by the back of the hand in accordance with VDE 0106, Part 100
Power pole technical data			
Number of poles		3	
Setting ranges			see order codes
Tripping class acc. to IEC 947-4-1/EN 60 947-4-1			10A
Frequency limit		Hz	0 – 400
Switching frequency up to 15 ops./h or 60 ops./h with 40% on load factor without early tripping if starting current not higher than 6 x In and starting time not longer than 1s.			

Approvals

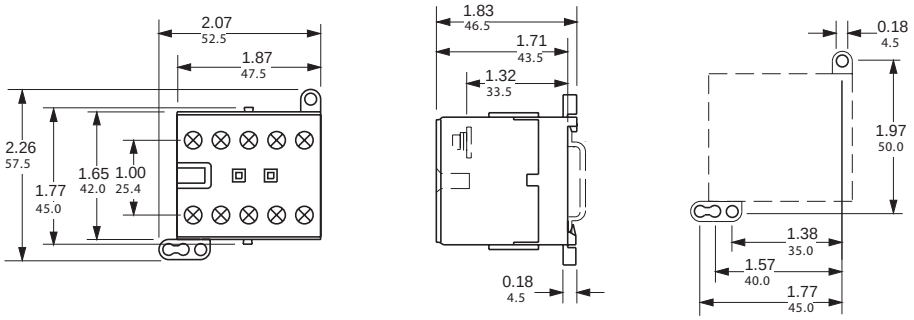
UL USA	CSA Canada	EZU Czech. Republic	PTB Germany	GL Germany	LRS Great Britain	
■	■	❑	❑	❑	❑	

Legend:
■ Standard design approved: identification plates bear the approval marks if it is mandatory
❑ Submitted for approval

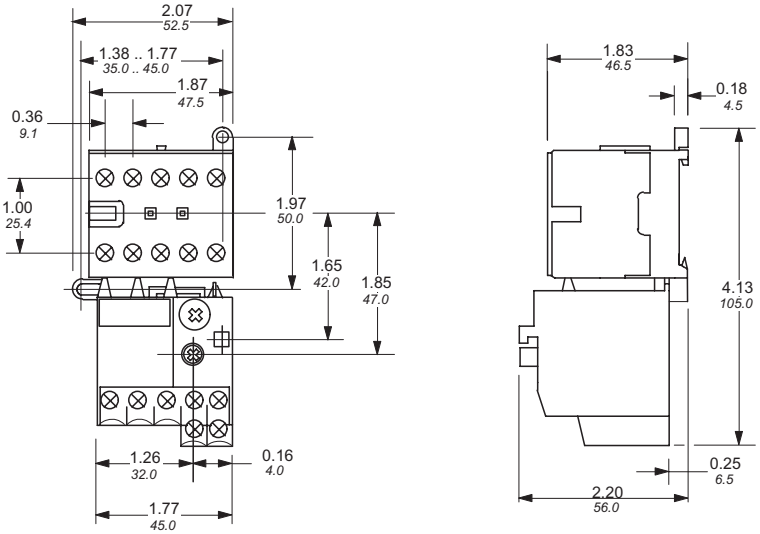
Approximate dimensions
Mini contactors & overload relays

00.00 / 00.00 Inches [Millimeters]

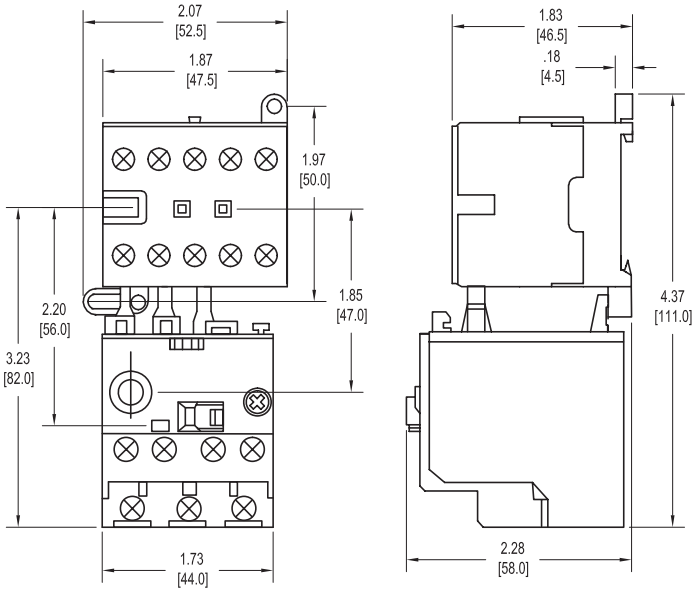
Mini contactors
AC & DC Operated – B6, BC6, B7, BC7



Mini contactor with overload relay
B6, B7 & T7DU



E16DU with B/BC6, B/BC7

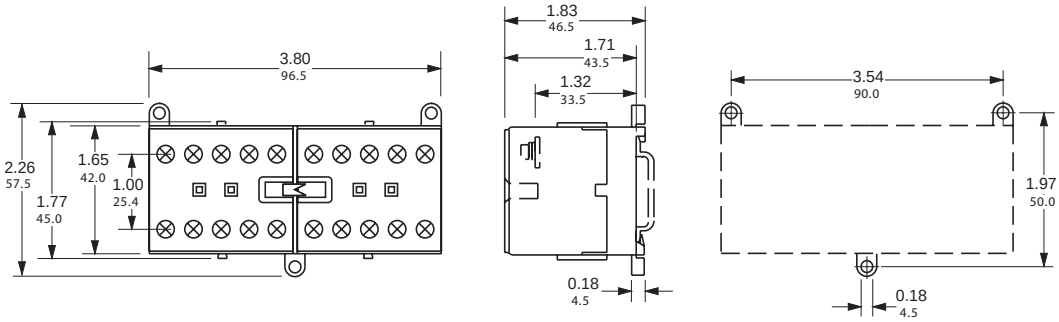


Approximate dimensions

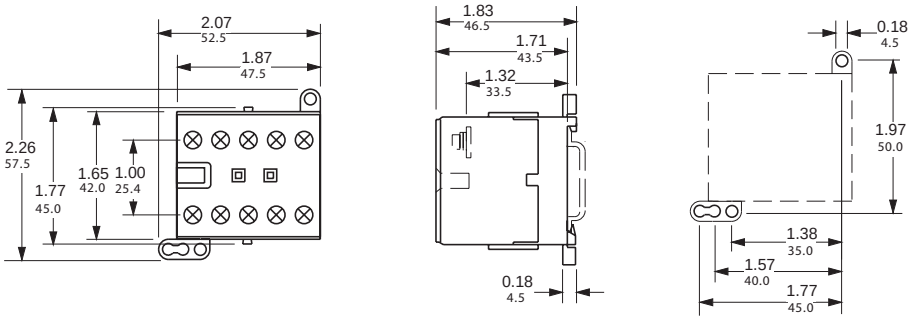
Mechanically interlocked contactors, control relays
Auxiliary contact blocks

00.00 / 00.00 Inches [Millimeters]

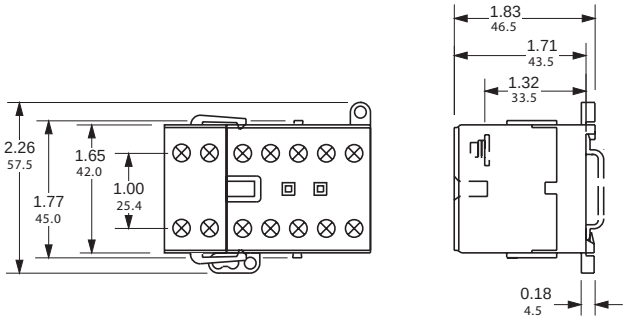
Mechanically interlocked – AC & DC Operated
VB6M, VBC6M, VB7M, VBC7M



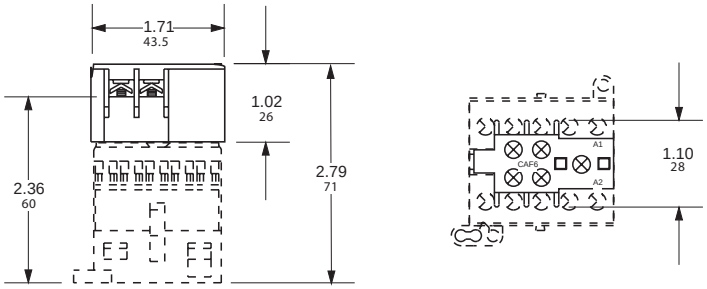
Mini control relays
AC & DC Operated – K6, KC6



Mini contactor with side mounted auxiliary contact block
B6, B7 & CA6



Mini contactor with front mounted auxiliary contact block
B6, B7 & CA6



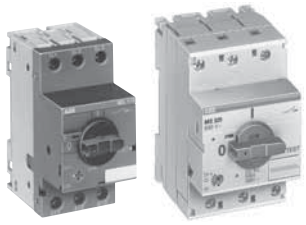
Manual motor protectors
Product index

5

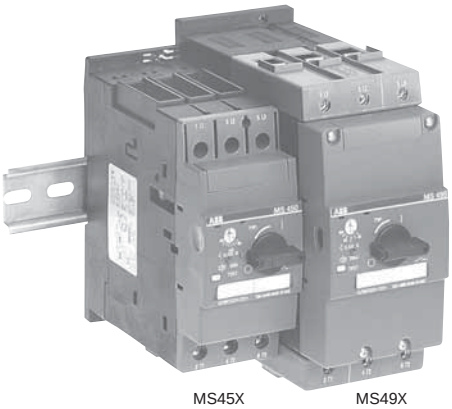
Notes

Manual motor protectors

Manual motor protectors
Type MS116
Type MS325
Type MS45X
Type MS49X



MS116 MS325



MS45X MS49X

Description

Type MS116

- Suitable for use with 3-phase motors up to 10 HP @ 480V
- UL Listed and CSA certified for Group Motor Installations
- 12 Setting ranges from 0.1 to 16 amps.
- Up to 30kA or 50kA with no back up fuse required
- 35mm DIN rail snap-on mounting
- Wide range of accessories

Type MS325

- Suitable for use with 3-phase motors up to 15 HP @ 480V
- UL Listed and CSA certified for Group Motor Installations
- 12 Setting ranges from 0.1 to 25 amps.
- Up to 50kA or 100kA with no back up fuse required
- 35mm DIN rail snap-on mounting
- Wide range of accessories

Type MS45x

- Suitable for use with 3-phase motors up to 40 HP @ 480V
- UL Listed and CSA certified for Group Motor Installations
- 14 Setting ranges from 11 to 50 amps
- Up to 100kA with no back up fuse required
- 35mm DIN rail snap-on mounting
- Wide range of accessories

Type MS49x

- Suitable for use with 3-phase motors up to 75 HP @ 480V
- UL Listed and CSA certified for Group Motor Installations
- 22 Setting ranges from 11 to 100 amps
- Up to 100kA with no back up fuse required
- 35mm DIN rail snap-on mounting
- Wide range of accessories

Single motor applications

Single motor applications employing a manual motor protector (MMP) result in a simple, compact and economical alternative to conventional magnetic motor controllers for manual operation of a single motor. Upstream short circuit and overcurrent protection in the form of fuses or a circuit breaker is required but the MMP can replace the overload relay, contactor and associated electrical components and wiring for controlling the contactor.

Group motor applications

Group motor installations offer several advantages when controlling two or more motors or other loads over conventional single motor starters. Several MMPs can be grouped together and fed from a single set of fuses or a circuit breaker. These devices can be installed together on a single DIN rail and fed power through three phase insulated busbars and a power feed terminal. Protecting this group of MMPs is a single circuit breaker or fusible switch, sized specifically for the load. Excellent coordination and short circuit protection can be achieved, as high as 50kAIC, when using the MS325 product in this manner. Close coupling adapters are offered to connect contactors to the load side of each MMP for automatic operation of each motor. If a single motor experiences an overload, the associated MMP trips and allows the other motors to continue running. Numerous accessories are available for signaling in the event of a trip, to indicate status, to provide shunt trip and for undervoltage release. The main benefits of group installation are quick, fool proof assembly, minimal wiring and a reduction of the necessary enclosure size. The only constraint is that the upstream circuit protective device must be sized specifically for the load – a highly desirable feature in order to provide the closest coordination and the greatest level of circuit protection. Article 430.53(C) of the *NEC®* specifies the requirements for group motor installations; all ABB MMPs meet these requirements.

General information

Selection

Group installation is an approach to building multi-motor control systems in accordance with Section 430-53 of the National Electrical Code. The selection of components used in group installations is a simple process which consists of several steps.

- First is the selection of the appropriate fuse as Branch Circuit Protective Device (BCPD).
- Second is the selection of the appropriate motor starter and protector.
- Third, the selected MMP must be checked for UL listing with the selected BCPD and the available short circuit current at the application location.

1. Fused disconnect

Calculate maximum fuse size according to NEC 430-53 (c). I_{max} (fuse size) = 175% x FLC (full load current for largest motor) + the sum of FLC (full load current for largest motor) + the sum of FLC values for other motors on that branch using NEC Table 430-150 on the right. Select fuse from NEC Table 240-6 below. Where I_{max} falls between two fuse ampere ratings NEC 430-53 (c) permits going to the next high ampere rating.

2. Motor protector selection

Select the proper MMP catalog number for each motor load from the following pages based on the actual motor full load current (FLA) using the “Thermal setting range” column for reference.

3. MMP Interruption ratings

Using the interruption ratings table on the next page, identify the system application voltage and interrupting capacity for the type of fuse selected in step 1 above.

NEC 240-6 Standard fuse amperes
15, 20, 25, 30, 40, 45, 50, 60, 70, 80, 90, 110, 125, 150, 175, 200, 225, 250, 300, 350, 400, 450, 500, 600, 700, 800, 1000, 1200, 1600

Examples: Select components for protecting the following 3-phase, 460VAC, squirrel cage induction motors. The nameplate data are:
1/2 HP, 1.0 FLA; 3 HP, 4.8 FLA; 5 HP, 7.6 FLA; 7.5 HP, 11 FLA;
10 HP, 14 FLA.

Example: using fused disconnect

- I_{max} = 175% x 14 + (11 + 7.6 + 4.8 + 1) = 48.9A
- Fuse rating using Table NEC 240-6 = 50A
- Minimum disconnect size = 115% x Total FLA
- NEC 430-150 table = 115% x (14+ 11 + 7.6 + 4.8 + 1) = 44.16

Disconnect for 50A fuses is ok.

NEC Table 430-150 full load current, 3ph AC motor

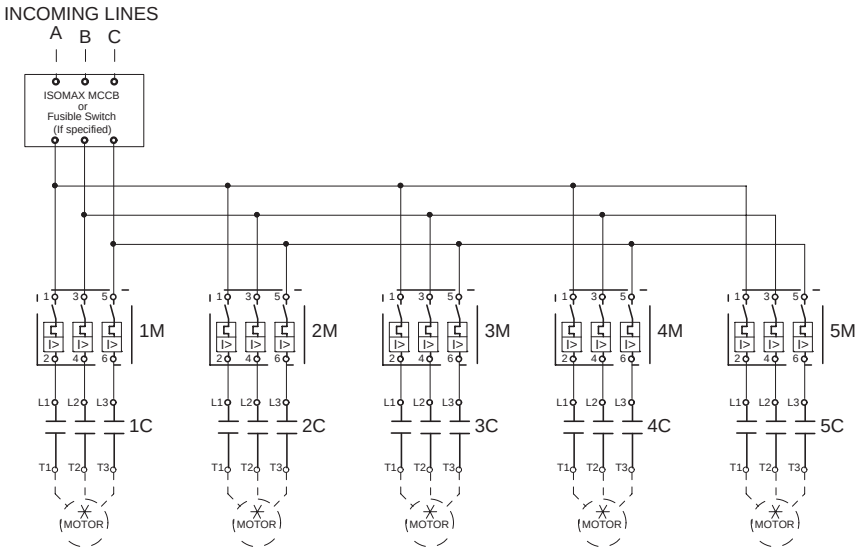
Horsepower	Induction type squirrel cage & wound rotor ①		
	230V amps	460V amps	575V amps
1/2	2	1	.8
3/4	2.8	1.4	1.1
1	3.6	1.8	1.4
1.5	5.2	2.6	2.1
2	6.8	3.4	2.7
3	9.6	4.8	3.9
5	15.2	7.6	6.1
7.5	22	11	9
10	28	14	11
15	42	21	17
20	54	27	22
25	68	34	27

Note: Refer to NEC 310-1 and NEC 430-53(d) for cable sizing.

For full load currents of 208 and 200 volt motors, increase the corresponding 230 volt motor full-load current by 10% and 15%, respectively.

MS325 data

Motor rating at 460V		MS325	Contactor
Horsepower	FLA, AC3		
1/2	1.0	MS325-1.0	A9C
3	4.8	MS325-6.3	A9C
5	7.6	MS325-9.0	A9C
7.5	11	MS325-12.5	A12C
10	14	MS325-16	A16C



① These values of full-load current are for motors running at speeds usual for belted motors and motors with normal torque characteristics. Motors built for especially low speeds or high torques may require more running current, and multispeed motors will have full-load current varying with speed, in which case the nameplate current rating shall be used.

The voltage listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120, 220 to 240, 440 to 480, and 550 to 600 volts.

Type MS116

MS116

Manual motor protectors

Thermal setting range (Amps)	Single-phase horsepower ratings ①		3-phase horsepower ratings			Catalog number	List price
	120V	240V	240V	480V	600V		
MS116							
0.10 – 0.16	—	—	—	—	—	MS116-0.16	
0.16 – 0.25	—	—	—	—	—	MS116-0.25	**$ 129**
0.25 – 0.40	—	—	—	—	—	MS116-0.40	
0.40 – 0.63	—	—	—	—	—	MS116-0.63	
0.63 – 1.0	—	—	—	1/2	1/2	MS116-1.0	
1.0 – 1.6	—	1/10	—	3/4	3/4	MS116-1.6	
1.6 – 2.5	—	1/6	1/2	1	1.5	MS116-2.5	**148.50**
2.5 – 4.0	1/8	1/3	1	2	3	MS116-4.0	
4.0 – 6.3	1/4	1/2	1.5	3	5	MS116-6.3	
6.3 – 10	1/2	1.5	3	5	7.5	MS116-10	
8.0 – 12	1/2	2	3	7.5	10	MS116-12	**172.50**
10.0 – 16	1	2	5	10	10	MS116-16	

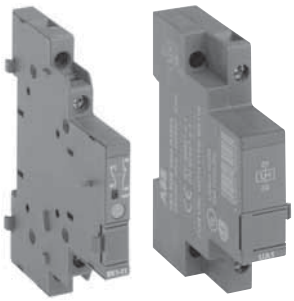
UL File # E137861

① Single phase motor ratings are based upon wiring all three poles in series.

Type MS116
Accessories


HK1-11


HKF1-11


SK1-11 UA1-120


OTPA116


12644

Auxiliary contact blocks for Type MS116 (side mount)

Contact configuration	Catalog number	List price
1 NO & 1 NC	HK1-11	
2 NO	HK1-20	**$ 33**
2 NC	HK1-02	

Auxiliary contact blocks for Type MS116 (front mount)

Contact configuration	Catalog number	List price
1 NO & 1 NC	HKF1-11	**$ 33**

Bell alarm contact blocks for Type MS116

Contact configuration	Catalog number	List price
1 NO & 1 NC	SK1-11	
2 NO	SK1-20	**$ 33**
2 NC	SK1-02	

Undervoltage trip for Type MS116

Voltage (VAC)	Catalog number	List price
24	UA1-24	
48	UA1-48	
60	UA1-60	
120	UA1-120	**$ 82.50**
230	UA1-230	
400	UA1-400	
415	UA1-415	

Undervoltage trip with 1NO & 1NC auxiliary contact for Type MS116

Voltage (VAC)	Catalog number	List price
24	UA1-HK-24	
48	UA1-HK-48	
60	UA1-HK-60	
120	UA1-HK-120	**$ 97.50**
230	UA1-HK-230	
400	UA1-HK-400	
415	UA1-HK-415	

Locking device for Type MS116

Description	Catalog number	List price
Adaptor for padlock Type SA1	MS325-SA1	**$ 15.00**
Complete padlock locking kit (adaptor, padlock & 3 keys)	MS325-SA3	**37.50**

Molded plastic enclosures for Type MS116

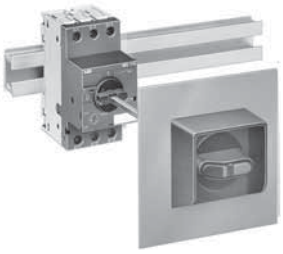
Item description	Protection level	Catalog number	List price
Gray enclosure with black handle	IP64	OTPA116L2P1	**$ 75**
Yellow enclosure with red handle	IP64	OTPA116A2P1	**75**
Gray enclosure with clear cover, 4 module	IP55	12644	**84**
Gray enclosure with clear cover, 6 module	IP55	12646	**98**
Gray enclosure with black handle	IP65	IB116-G	**75**
Yellow enclosure with red handle	IP65	IB116-Y	**75**

Plastic adaptors for enclosures for Type MS116

Description	Catalog number	List price
PG16 to 1/2NPT	PG16-1/2NPT	**$ 10**

Shunt trip for Type MS116

Voltage (VAC)	Catalog number	List price
24V	AA1-24	
110V	AA1-110	
200 – 240V	AA1-230	**$ 75**
350 – 415V	AA1-400	



OHB2AJ

S1-M1 S1-M2

PS1-2-1

Door mounting hardware for for Type MS116 ①

Description	Catalog number	List price
Shaft coupler	MSMN	$ 15
NEMA 1, 3R, 12 Black selector handle	OHB2AJ	30
NEMA 1, 3R, 12 Red, yellow selector handle	OHY2AJ	30
4.1” length shaft	OXS5X105	4
7.1” length shaft	OXS5X180	6

Power feed terminal blocks for Type MS116

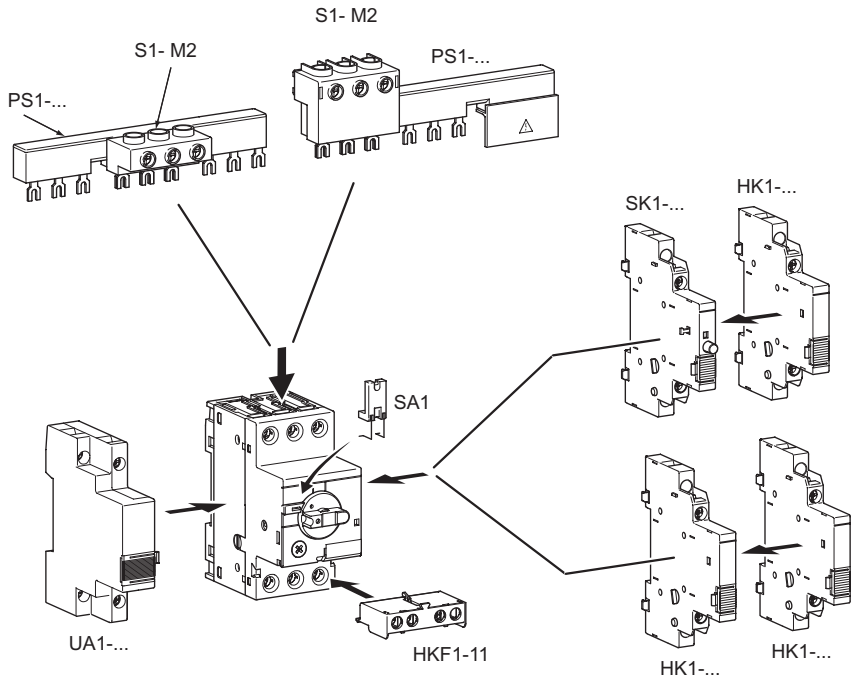
Description	Catalog number	List price
for 4 AWG wire	S1-M1	$ 24
for busbar	S1-M2	

Busbars for Type MS116

Description	Catalog number	List price
for 2 devices without auxiliary contacts	PS1-2-0	$ 24
for 3 devices without auxiliary contacts	PS1-3-0	30
for 4 devices without auxiliary contacts	PS1-4-0	36
for 5 devices without auxiliary contacts	PS1-5-0	42
for 2 devices with 1 auxiliary contact	PS1-2-1	24
for 3 devices with 1 auxiliary contact	PS1-3-1	30
for 4 devices with 1 auxiliary contact	PS1-4-1	36
for 5 devices with 1 auxiliary contact	PS1-5-1	42
for 2 devices with 2 auxiliary contacts	PS1-2-2	24
for 3 devices with 2 auxiliary contacts	PS1-3-2	30
for 4 devices with 2 auxiliary contacts	PS1-4-2	36
for 5 devices with 2 auxiliary contacts	PS1-5-2	42

Busbar for direct mounting of contactors

Description	Catalog number	List price
B6/B7	BEA7/116	$ 12.00
A9/A12/A16	BEA16/116	13.50
A26	BEA26/116	15.00
AL9 - AL16	BEA16/116AL	14.50



① Must have shaft coupler, handle and shaft for through-the-door operation.

Type MS116
Technical data

Softstarter type		MS116
Standards, approvals		UL, CSA, CE
Rated operating current	A	16
Current range	A	0.16 – 16
Number of poles		3
Frequency	Hz	50 / 60
Tripping class	A	10
Max. kAIC & 600V	kAIC	30
Mechanical life	Operations	100,000
Wire range	AWG	12 – 18
Terminal torque	in. lbs.	14
Terminal tool options		Flat screwdriver PZ2
Permissible attitude without derating	m	3000
Degree of protection		IP20
UL Listed for group installation		Yes
Self-protected Type E manual combination starter		No
Accessories		
Terminal shroud		No
Auxiliary contacts		Yes
Shunt trip		No
Trip signal contacts		Yes
UV release		Yes
Busbar		Yes
Through the door handle		Yes
Minimum enclosure size		H x W x D
Loads for accessories		
Auxiliary contact for front mounting, HKF	AC15	24 V, 3.0 A 230 V, 1.5 A
Auxiliary contact for front mounting, HKF	DC13	24 V, 1.0 A 48 / 60V, 0.7 A 110 V, 0.27 A
Auxiliary and signal contact, HK + SK	AC15	24 V, 6 A 230 V, 4 A 400 V, 3 A
Auxiliary and signal contact, HK + SK	DC13	24 V, 2 A 110 V, 0.5 A 220 V, 0.25 A 440 V, 0.1 A
Electromagnet trips		
Response value set ex-works		9.6 – 14.4 x In
Undervoltage release		
Pick-up value	% of U C	85
Drop-out value	% of U C	35 – 75
Power consumption		
Pick-up VA		Consult factory
Hold VA		Consult factory

Short-circuit protection MS 116 – Setting ranges, short-circuit strength and max. back-up fuses

Maximum rated current of the short-circuit fuses if $I_{cc} > I_{cs}$

	from	to	at 230 V AC			at 400 V AC			at 440 V AC			at 500 V AC			at 690 VAC		
			I_{cu}	I_{cs}	gL, gG	I_{cu}	I_{cs}	gL, gG	I_{cu}	I_{cs}	gL, gG	I_{cu}	I_{cs}	gL, gG	I_{cu}	I_{cs}	gL, gG
	A	A	kA	kA	A	kA	kA	A	kA	kA	A	kA	kA	A	kA	kA	A
Setting ranges	0.1	... 0.16	Short-circuit proof up to I_{cc} = 50 kA									Short-circuit proof up to I_{cc} = 30 kA					
	to																
	1.0	... 1.6															
	1.6	... 2.5							10	10	25	10	10	25	5	5	25
	2.5	... 4.0							6	6	25	6	6	25	2	2	25
	4.0	... 6.3							6	6	63	6	6	63	2	2	40
	6.3	... 10.0							6	6	63	6	6	63	2	2	50
	8.0	... 12.0	25	25	80	25	25	80	6	6	63	6	6	63	2	2	50
	10.0	... 16.0	16	16	80	16	16	80	4	4	63	4	4	63	2	2	63

Type MS116
Technical data

General purpose

MS116 range	Maximum current (600 VAC Max.)
0.1 – 0.16	0.16
0.16 – 0.25	0.25
0.25 – 0.40	0.40
0.04 – 0.63	0.63
0.63 – 1.0	1.0
1.0 – 1.6	1.6
1.6 – 2.5	2.5
2.5 – 4.0	4.0
4 – 6.3	6.3
6.3 – 10	10
8 – 12	12
10 – 16	16

Short circuit ratings

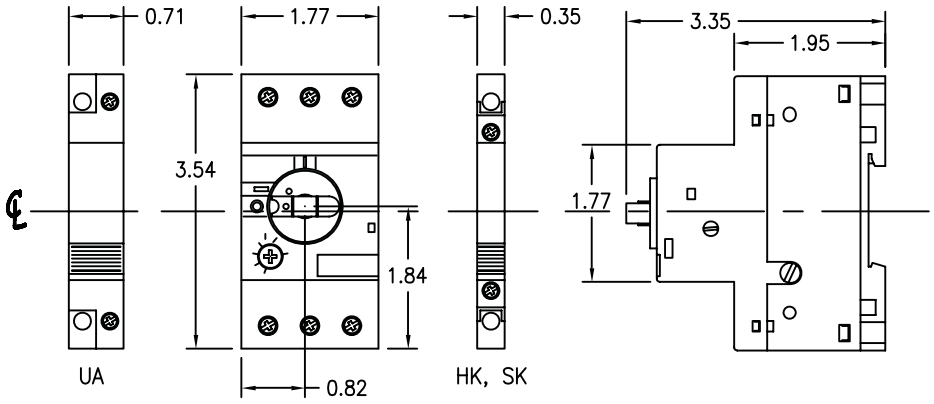
18,000 RMS symmetrical 480 VAC
5,000 RMS symmetrical 600 VAC

Maximum ratings

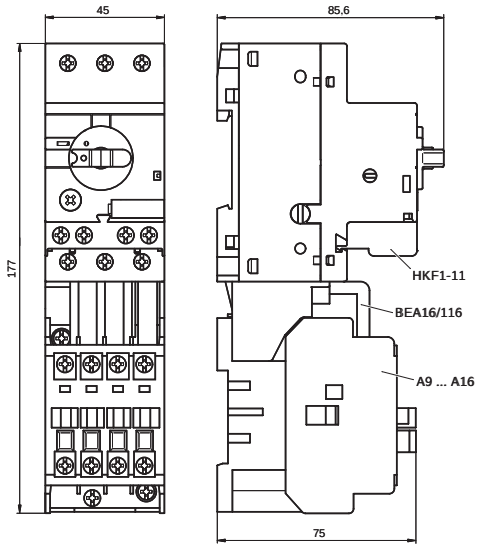
MS116 Range	Horsepower, HP, Breaking-All-Lines				
	Single phase 50/60 Hz		Three phase 50/60 Hz		
	120 VAC	240 VAC	240 VAC	480 VAC	600 VAC
0.1 – 0.16	—	—	—	—	—
0.16 – 0.25	—	—	—	—	—
0.25 – 0.40	—	—	—	—	—
0.40 – 0.63	—	—	—	—	—
0.63 – 1.0	—	—	—	1/2	1/2
1.0 – 1.6	—	1/10	—	3/4	3/4
1.6 – 2.5	—	1/6	1/2	1	1 1/2
2.5 – 4.0	1/8	1/3	1	2	3
4.0 – 6.3	1/4	1/2	1 1/2	3	5
6.3 – 10	1/2	1 1/2	3	5	7 1/2
8 – 12	1/2	2	3	7 1/2	10
10 – 16	1	2	5	10	10

Type MS116
Approximate dimensions

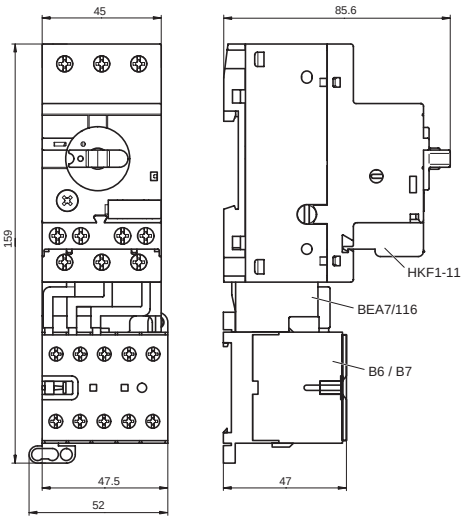
MS116



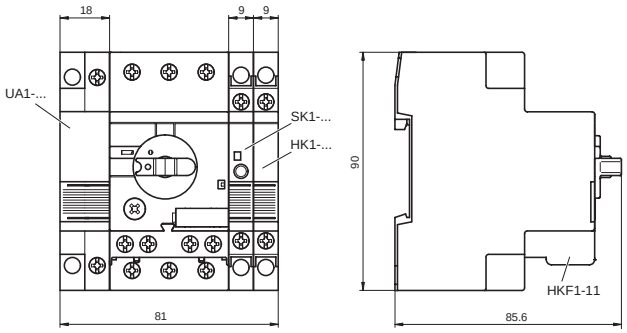
MS116 — mounted with A9 - A16 contactor



MS116 — mounted with B6/B7 minicontactor

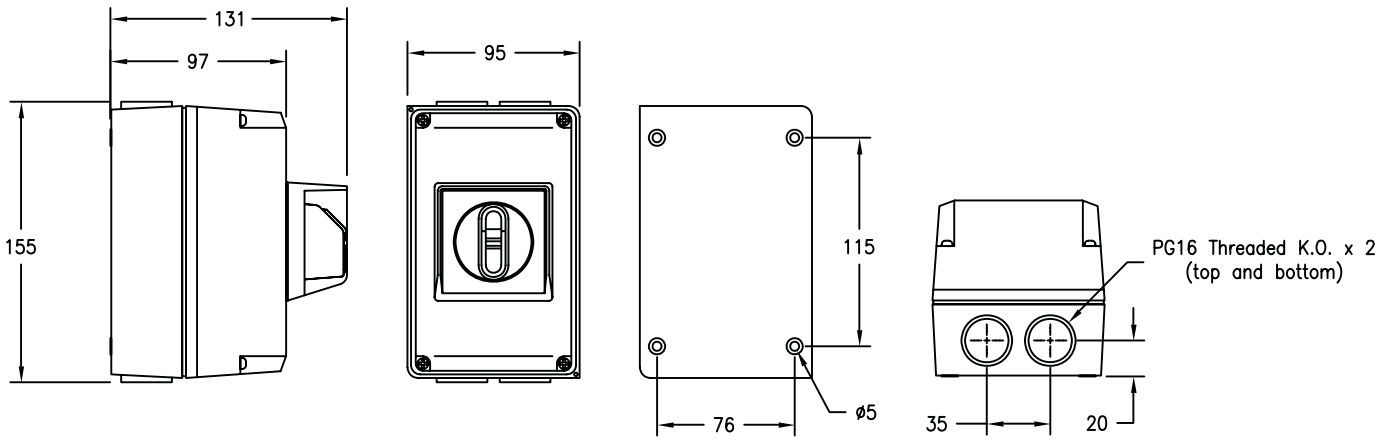


MS116 — mounted with UA1..., SK1..., HK1..., HKF1-11



Type MS116
Approximate dimensions

Molded plastic enclosures for MS116
OTPA116L2P1 and OTPA116A2P1



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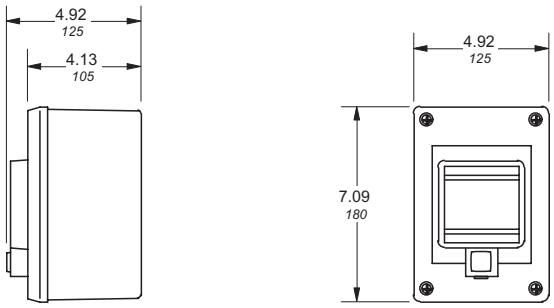

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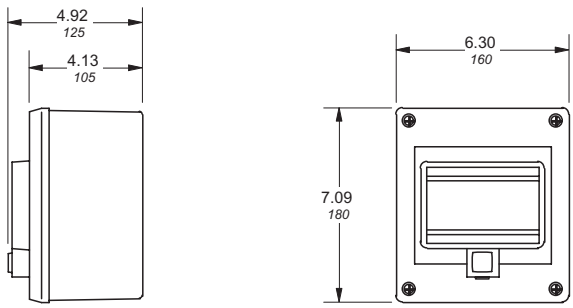


Type MS325

MS325-1.0

Manual motor protectors — Type MS325

Thermal setting range (Amps)	Single-phase horsepower ratings ① 120V	240V	3-phase horsepower ratings 240V	480V	600V		Catalog number	List price
0.10 – 0.16	—	—	—	—	—		MS325-0.16	
0.16 – 0.25	—	—	—	—	—		MS325-0.25	**$ 144**
0.25 – 0.40	—	—	—	—	—		MS325-0.40	
0.40 – 0.63	—	—	—	—	—		MS325-0.63	
0.63 – 1.0	—	—	—	1/2	1/2		MS325-1.0	
1.0 – 1.6	—	1/10	—	3/4	3/4		MS325-1.6	
1.6 – 2.5	—	1/6	1/2	1	1.5		MS325-2.5	**165**
2.5 – 4.0	1/8	1/3	1	2	3		MS325-4.0	
4.0 – 6.3	1/4	1/2	1.5	3	5		MS325-6.3	
6.3 – 9.0	1/3	1	2.5	5	7.5		MS325-9.0	
9.0 – 12.5	1/2	2	3	7.5	10		MS325-12.5	**192**
12.5 – 16	1	2.5	5	10	10		MS325-16	
16 – 20	1.5	3	5	10	15		MS325-20	**211.50**
20 – 25	2	3	7.5	15	20		MS325-25	**223.50**

MS325 UL File #E137861
Accessories UL File #E90353

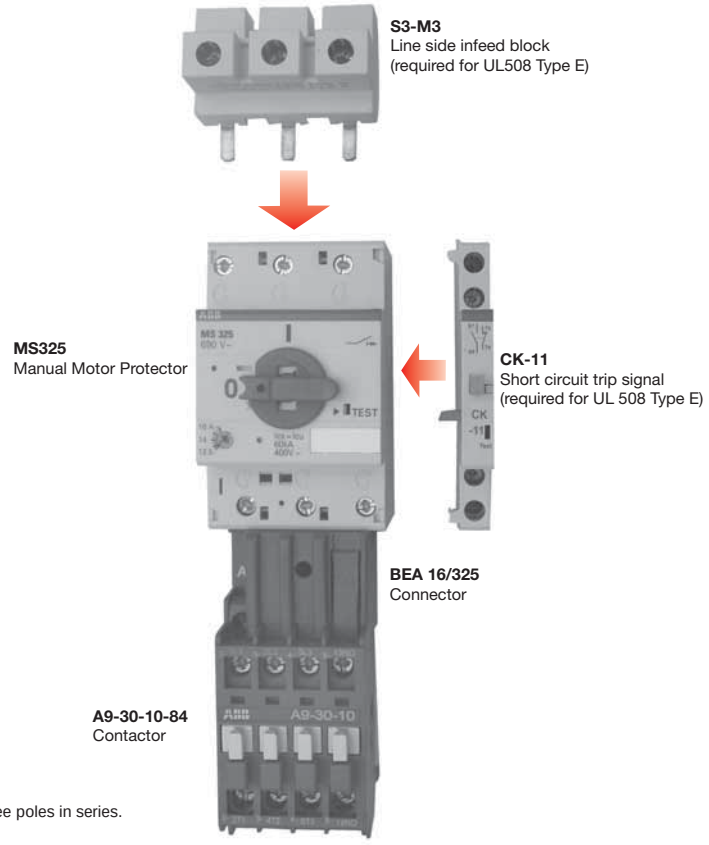
① Single phase motor ratings are based upon wiring all three poles in series.

MS325-1.0

Manual motor protectors — Type MS325

Thermal setting range (Amps)	Single-phase horsepower ratings ① 120V	240V	3-phase horsepower ratings 240V	480V	600V		Catalog number ②	List price
0.10 – 0.16	—	—	—	—	—		MS325-0.16E	
0.16 – 0.25	—	—	—	—	—		MS325-0.25E	**$ 223**
0.25 – 0.40	—	—	—	—	—		MS325-0.40E	
0.40 – 0.63	—	—	—	—	—		MS325-0.63E	
0.63 – 1.0	—	—	—	1/2	1/2		MS325-1.0E	
1.0 – 1.6	—	1/10	—	3/4	3/4		MS325-1.6E	
1.6 – 2.5	—	1/6	1/2	1	1.5		MS325-2.5E	**244**
2.5 – 4.0	1/8	1/3	1	2	3		MS325-4.0E	
4.0 – 6.3	1/4	1/2	1.5	3	5		MS325-6.3E	
6.3 – 9.0	1/3	1	2.5	5	7.5		MS325-9.0E	
9.0 – 12.5	1/2	2	3	7.5	10		MS325-12.5E	**271**
12.5 – 16	1	2.5	5	10	10		MS325-16E	
16 – 20	1.5	3	5	10	15		MS325-20E	**290**
20 – 25	2	3	7.5	15	20		MS325-25E	**302**

MS325 UL File #E137861
Accessories UL File #E90353
Class 10 overload
Short circuit rating of 18kA



① Single phase motor ratings are based upon wiring all three poles in series.
② Part includes MMP, barrier and trip signal.

Type MS325
Accessories


MS325-HK11


MS325-HKF11


MS325-UA24


MS325-AS


MS325-SA1


MS325-SA3

Auxiliary contact blocks for Type MS325 (side mount)

Item description	Catalog number	List price
1 NO & 1 NC	MS325-HK11	**$ 33**
2 NO	MS325-HK20	
2 NC	MS325-HK02	

Auxiliary contact blocks for Type MS325 (front mount)

Item description	Catalog number	List price
1 NO & 1 NC	MS325-HKF11	**$ 33**
2 NO	MS325-HKF20	

Bell alarm contact blocks for Type MS325

Item description	Catalog number	List price
1 NO	MS325-SK10	**$ 33**
1 NC	MS325-SK01	

Shunt trips for Type MS325

Item description	Catalog number	List price
110 – 240 VAC/VDC, 60 Hz	MS325-ST110	**$ 82.50**
24 – 60 VAC/DC, 60 Hz	MS325-ST24	

Undervoltage trip for Type MS325

Item description	Catalog number	List price
24V	MS325-UA24	**$ 82.50**
48V	MS325-UA48	
60V	MS325-UA60	
110V	MS325-UA110	
230V	MS325-UA230	
400V	MS325-UA400	
415V	MS325-UA415	
480V	MS325-UA480	

Remote control unit

Item description		Catalog number	List price
Electrically operated remote control unit for MS325. For use up to MS325-16 and below. Not for use with MS325-20 & MS325-25. Provided with 1 NO & 1 NC auxiliary contacts and 1NO trip signal contacts	24V AC/DC	RC325-24V	**$ 165**
	48V AC/DC	RC325-48V	
	60V AC/DC	RC325-60V	
	110V AC/DC	RC325-110V	
	230V AC/DC	RC325-230V	

NOTE: May not be used with HFK, SK, ST or UV accessories

Supporting terminal for Type MS325

Item description	Catalog number	List price
for UA or as N/LS clamp	MS325-AS	**$ 15**

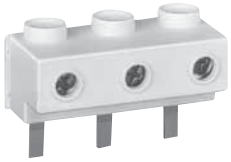
Padlocking devices for Type MS325

Item description	Catalog number	List price
Adapter for padlock type SA1	MS325-SA1	**$ 15.00**
Complete padlock kit (includes adaptor, padlock & 3 keys)	MS325-SA3	**37.50**

Type MS325
Accessories


Switch cublicle mounting kit


MS325-BB1


MS325-SM1


PS3-2-0


PS3-4-0


MS325 coupled to mini-contactor

Molded plastic enclosures for Type MS325

Item description	Protection level	Catalog number	List price
Light gray enclosure with black handle	IP64	OTPA325B2P1	**$ 75**
Light gray enclosure with red/yellow handle	IP64	OTPA325A2P1	**75**
Gray enclosure w/clear lid, 4 module	IP55	12644	**84**
Gray enclosure w/clear lid, 6 module	IP55	12646	**98**
Gray enclosure with black handle	IP65	IB325-G	**75**
Yellow enclosure with red handle	IP65	IB325-Y	**75**

NOTE: Use Discount schedule MA for IP64 & IP65 enclosures; use Discount schedule CB8 for IP55 enclosures.

Plastic adaptors for enclosures for Type MS325

Item description	Catalog number	List price
PG16 TO 1/2 NPT	PG16-1/2 NPT	**$ 10**

Selector handles for through-the-door operation for Type MS325 ①

Item description	Catalog number	List price
Shaft coupler	MSMN	**$ 15**
NEMA 1, 3R, 12 black selector handle	OHB2AJ	**30**
NEMA 1, 3R, 12 red/yellow selector handle	OHY2AJ	**30**
4.1” length shaft	OXS5X105	**4**
7.1” length shaft	OXS5X180	**6**

NOTE: Use Discount schedule MA for shaft coupler; use Discount schedule H6 for handles and shafts.

Power feed terminal blocks for Type MS325

Item description	Catalog number	List price
Standard, accepts 4 AWG wire	MS325-SM1	**$ 24**
Low profile, accepts 4 AWG wire	MS325-BB1	**25.50**

Busbars for Type MS325 ②

Item description	Catalog number	List price
for 2 devices; without auxiliary switch	PS3-2-0	**$ 24**
for 3 devices; without auxiliary switch	PS3-3-0	**30**
for 4 devices; without auxiliary switch	PS3-4-0	**33**
for 5 devices; without auxiliary switch	PS3-5-0	**39**
for 2 devices; with 1 auxiliary switch	PS3-2-1	**30**
for 3 devices; with 1 auxiliary switch	PS3-3-1	**34.50**
for 4 devices; with 1 auxiliary switch	PS3-4-1	**37.50**
for 5 devices; with 1 auxiliary switch	PS3-5-1	**42**
for 2 devices; with 2 auxiliary switches	PS3-2-2	**30**
for 4 devices, with 2 auxiliary switches	PS3-4-2	**37.50**

Busbars can be daisy chained to connect additional MS325s.

Close coupling adapters

Device	Catalog number	List price
MS325 + B6/B7 contactor MS325 + VB6/VB7 reversing contactor	BEA7/325 MS325-VB7	**$ 12.00**
MS325 + A9, A12, A16 contactor	BEA16/325	**13.50**
MS325 + A26 contactor	BEA26/325	**15.00**
AL9 - AL16	BEA16/325AL	**14.50**
AL26	BEA26/325AL	**16.00**

UL 508 Type E Accessories – Required

Device	Catalog number	List price
Line side infeed block	S3-M3	**$ 30**
Short circuit trip signal	CK-11	**49**

① Must have shaft coupler, handle and shaft for through-the-door operation.
② UL file # E167205; CSA file# LR98427M7-11

Type MS450 – MS497

MS450

MS497

Manual motor starters

	FLA adjustment range	Horsepower ratings						Weight (lbs)	Availability code	Catalog number	List price
		Single-phase①		Three-phase							
		115V	230V	200V – 208V	230V	460V	575V				
Overload tripping class 10	**MS450**										
	11 – 16	1	3	5	5	10	15	2.12	A	MS450-16	**$ 450**
	14 – 20	1.5	3	5	7.5	15	20	2.12	A	MS450-20	**450**
	18 – 25	2	5	7.5	10	20	25	2.12	A	MS450-25	**450**
	22 – 32	3	5	10	10	25	30	2.12	A	MS450-32	**450**
	28 – 40	3	7.5	15	15	30	40	2.12	A	MS450-40	**510**
	36 – 45	5	7.5	15	15	30	40	2.12	A	MS450-45	**510**
	40 – 50	5	10	15	20	40	50	2.12	A	MS450-50	**510**
	MS495										
	28 – 40	3	7.5	15	15	30	40	4.63	A	MS495-40	**562.50**
	36 – 50	5	10	15	20	40	50	4.63	A	MS495-50	**562.50**
	45 – 63	5	15	20	25	50	60	4.63	A	MS495-63	**562.50**
	57 – 75	7.5	15	25	25	60	75	4.63	A	MS495-75	**600**
	70 – 90	10	20	30	30	75	100	4.63	A	MS495-90	**615**
	80 – 100	10	25	40	40	75	100	4.63	A	MS495-100	**690**
	MS497										
	11 – 16	1	3	5	5	10	15	2.12	B	MS497-16	**450**
	14 – 20	1.5	3	5	7.5	15	20	2.12	B	MS497-20	**450**
	18 – 25	2	5	7.5	10	20	25	2.12	B	MS497-25	**450**
	22 – 32	3	5	10	10	25	30	2.12	B	MS497-32	**450**
	28 – 40	3	7.5	15	15	30	40	4.63	B	MS497-40	**562.50**
	36 – 50	5	10	15	20	40	50	4.63	B	MS497-50	**562.50**
	45 – 63	5	—	20	25	50	60	4.63	B	MS497-63	**562.50**
	57 – 75	7.5	—	25	25	60	75	4.63	B	MS497-75	**600**
	70 – 90	10	—	30	30	75	100	4.63	B	MS497-90	**615**
	80 – 100	10	—	30	40	75	100	4.63	B	MS497-100	**690**
Overload tripping class 20	**MS451**										
	11 – 16	1	3	5	5	10	15	2.12	B	MS451-16	**450**
	14 – 20	1.5	3	5	7.5	15	20	2.12	B	MS451-20	**450**
	18 – 25	2	5	7.5	10	20	25	2.12	B	MS451-25	**450**
	22 – 32	3	5	10	10	25	30	2.12	B	MS451-32	**450**
	28 – 40	3	7.5	15	15	30	40	2.12	B	MS451-40	**510**
	36 – 45	5	7.5	15	15	30	40	2.12	B	MS451-45	**510**
	40 – 50	5	10	15	20	40	50	2.12	B	MS451-50	**510**
	MS496										
	28 – 40	3	7.5	15	15	30	40	4.63	B	MS496-40	**562.50**
	36 – 50	5	10	15	20	40	50	4.63	B	MS496-50	**562.50**
	45 – 63	5	15	20	25	50	60	4.63	B	MS496-63	**562.50**
	57 – 75	7.5	15	25	25	60	75	4.63	B	MS496-75	**600**
	70 – 90	10	20	30	30	75	100	4.63	B	MS496-90	**615**
	80 – 100②	10	25	40	40	75	100	4.63	B	MS496-100	**690**

Availability code
A – Standard item, stock to two weeks lead time
B – Stock to four weeks lead time
C – 4 to 6 weeks lead time

UL File # E167205

① Single phase motor ratings are based upon wiring all three poles in series.
② Maximum motor current 95A.

Type MS450 – MS497
for UL 508 Type E Applications


MS450-16E


MS497-16E

Manual motor starters

	FLA adjustment range	Horsepower ratings						Weight (lbs)	Availability code	Catalog ③ number	List price
		Single-phase①		Three-phase							
		115V	230V	200V – 208V	230V	460V	575V				
Overload tripping class 10	**MS450**										
	11 – 16	1	3	5	5	10	15	2.12	A	MS450-16E	**$ 525**
	14 – 20	1.5	3	5	7.5	15	20	2.12	A	MS450-20E	**525**
	18 – 25	2	5	7.5	10	20	25	2.12	A	MS450-25E	**525**
	22 – 32	3	5	10	10	25	30	2.12	A	MS450-32E	**525**
	28 – 40	3	7.5	15	15	30	40	2.12	A	MS450-40E	**585**
	36 – 45	5	7.5	15	15	30	40	2.12	A	MS450-45E	**585**
	40 – 50	5	10	15	20	40	50	2.12	A	MS450-50E	**585**
	MS495										
	28 – 40	3	7.5	15	15	30	40	4.63	A	MS495-40E	**622.50**
	36 – 50	5	10	15	20	40	50	4.63	A	MS495-50E	**622.50**
	45 – 63	5	15	20	25	50	60	4.63	A	MS495-63E	**622.50**
	57 – 75	7.5	15	25	25	60	75	4.63	A	MS495-75E	**720**
	70 – 90	10	20	30	30	75	100	4.63	A	MS495-90E	**735**
	80 – 100	10	25	40	40	75	100	4.63	A	MS495-100E	**810**
	MS497										
	11 – 16	1	3	5	5	10	15	2.12	B	MS497-16E	**570**
	14 – 20	1.5	3	5	7.5	15	20	2.12	B	MS497-20E	**570**
	18 – 25	2	5	7.5	10	20	25	2.12	B	MS497-25E	**570**
	22 – 32	3	5	10	10	25	30	2.12	B	MS497-32E	**570**
	28 – 40	3	7.5	15	15	30	40	4.63	B	MS497-40E	**622.50**
	36 – 50	5	10	15	20	40	50	4.63	B	MS497-50E	**622.50**
	45 – 63	5	—	20	25	50	60	4.63	B	MS497-63E	**622.50**
	57 – 75	7.5	—	25	25	60	75	4.63	B	MS497-75E	**720**
	70 – 90	10	—	30	30	75	100	4.63	B	MS497-90E	**735**
	80 – 100	10	—	30	40	75	100	4.63	B	MS497-100E	**810**
Overload tripping class 20	**MS451**										
	11 – 16	1	3	5	5	10	15	2.12	B	MS451-16E	**525**
	14 – 20	1.5	3	5	7.5	15	20	2.12	B	MS451-20E	**525**
	18 – 25	2	5	7.5	10	20	25	2.12	B	MS451-25E	**525**
	22 – 32	3	5	10	10	25	30	2.12	B	MS451-32E	**525**
	28 – 40	3	7.5	15	15	30	40	2.12	B	MS451-40E	**585**
	36 – 45	5	7.5	15	15	30	40	2.12	B	MS451-45E	**585**
	40 – 50	5	10	15	20	40	50	2.12	B	MS451-50E	**585**
	MS496										
	28 – 40	3	7.5	15	15	30	40	4.63	B	MS496-40E	**622.50**
	36 – 50	5	10	15	20	40	50	4.63	B	MS496-50E	**622.50**
	45 – 63	5	15	20	25	50	60	4.63	B	MS496-63E	**622.50**
	57 – 75	7.5	15	25	25	60	75	4.63	B	MS496-75E	**720**
	70 – 90	10	20	30	30	75	100	4.63	B	MS496-90E	**735**
	80 – 100②	10	25	40	40	75	100	4.63	B	MS496-100E	**810**

Availability code
A – Standard item, stock to two weeks lead time
B – Stock to four weeks lead time
C – 4 to 6 weeks lead time

① Single phase motor ratings are based upon wiring all three poles in series.
② Maximum motor current 95A.
③ Catalog number includes all parts required for UL508/E applications.

Type MS450 – MS497
Accessories

HK4-11


HKS4-02


UA4-HK-220


AA4-24

Auxiliary contacts — top mount

Item description	Weight (lbs)	Packaged in quantity of	Availability code	Catalog number	List price
1 N.O. + 1 N.C. 1 changeover	.044 .044	10 10	A B	HK4-11 HK-W	**$ 36**

Auxiliary contacts — mounts on left side, max. 1

Item description	Weight (lbs)	Packaged in quantity of	Availability code	Catalog number	List price
1 N.O. + 1 N.C. 2 N.O. 2 N.C.	.066 .066 .066	2 2 2	A B B	HKS4-11 HKS4-20 HKS4-02	**$ 36**

Auxiliary release

- Only one auxiliary release per manual motor protector
- Mounts on right side of manual motor protector

Item description	Rating		Weight (lbs)	Pkg. qty.	Avail. code	Catalog number	List price
Undervoltage release	110–120V, 50–60Hz 208V, 60Hz 230–240V, 50–60Hz 400V, 50Hz 480V, 60Hz		.264 .264 .264 .264 .264	1 1 1 1 1	A A A B A	UA4-120 UA4-208 UA4-240 UA4-400 UA4-480	**$ 93**
Undervoltage release with early make contacts 2 N.O.	230V, 50Hz 400V, 50Hz 480V, 60Hz		.286 .286 .286	1 1 1	B B A	UA4-HK-230 UA4-HK-400 UA4-HK-480	**117**
Shunt trip	Voltage continuous 50 – 60Hz	Voltage 5 sec. max. 50 – 60Hz, DC					
	20 – 24	20 – 70V	.242	1	B	AA4-24	**93**
	30 – 110	70 – 190V	.242	1	A	AA4-110	
	210 – 240	190 – 330V	.242	1	B	AA4-240	
	350 – 415	330 – 500V	.242	1	B	AA4-415	

Power feed terminal blocks — for MS45X

Item description	Catalog number	List price
For feeding power to multiple MS45Xs when using busbar Accepts 10 - 1/0 AWG, 108A	S4-M1	**$ 81**

Busbars – for MS45X

Item description	Catalog number	List price
Without side mounted auxiliary devices	PS4-2-0 PS4-3-0 PS4-4-0	**$ 51** **60** **76.50**
With one side mounted auxiliary device	PS4-2-2 PS4-3-2 PS4-4-2	**58.50** **60** **84**

Close coupling adapters

Item description	Catalog number	List price
MS45X + A30, A40 MS45X + A50 MS49X + A50, A63, A75 MS495 + A95, A110	BEA40/450 BEA50/450 BEA75/495 BEA110/495	**$ 54** **63** **120** **180**

① Mounting sequence: motor protection switch, pilot switch, auxiliary switch.

Type MS450 – MS497
Accessories


KA450


SA450


DX495


SK4-11

Terminal shrouds

Item description	Weight (lbs)	Packaged in quantity of	Availability code	Catalog number	List price
for MS45x	.022	1	A	KA450 ①	**$ 15**
for MX49x	.022	1	A	KA495 ①	**18**
for MS49x	.066	1	A	KA495C ②	**21**

FLA adjustment cover

Item description	Weight (lbs)	Packaged in quantity of	Availability code	Catalog number	List price
for MS45x	.015	10	A	SA450 ③	**$ 30**

Type E Terminal — Required for UL 508 Type E Applications

Item description	Weight (lbs)	Packaged in quantity of	Availability code	Catalog number	List price
for MS49x	.550	1	B	DX495	**$ 45**

Signalling contact — indication of short-circuit trip (required for UL508 Type E applications)

Item description	Weight (lbs)	Packaged in quantity of	Availability code	Catalog number	List price
Short circuit trip 1 N.O. + 1 N.C.	.154	1	A	SK4-11	**$ 60**

Selector handles — for thru the door operation for Types MS450 & MS451④

Item description	Catalog number	List price
Shaft coupler	MSMN	**$ 15**
NEMA 1, 3R, 12 black selector handle	OHB2AJ	**30**
NEMA 1, 3R, 12 red/yellow selector handle	OHY2AJ	**30**
4.1” length shaft	OXS5X105	**4**
7.1” length shaft	OXS5X180	**6**

① Plug onto box terminals in each case.
② Plug onto housing after removing box terminals, if using cable lugs or buses.
③ Supplied only as a set of 10 scale covers.
④ Must have shaft coupler, handle and shaft for through-the-door operation.

Technical data
Type MS325
Short circuit ratings

Short circuit ratings – MS325

Range	Short Circuit rating kA, 600VAC	Maximum Fuse size A
0.1 - 0.16	5	15
0.16 - 0.25	5	15
0.25 - 0.40	5	15
0.40 - 0.63	5	15
0.63 - 1.0	5	15
1.0 - 1.6	5	15
1.6 - 2.5	5	15
2.5 - 4.0	5	15
4.0 - 6.3	5	25
6.3 - 9.0	5	35
9.0 - 12.5	5	50
12.5 - 16	5	60
16 - 20	5	80
20 - 25	5	100

Group installation short circuit ratings

MS325	5 kA		30 kA		50 kA		85kA
Current range	Fuse A	MCCB	Fuse A	MCCB	Fuse A	MCCB	Fuse A
480V ①							
0.1 - 0.16	1600	S7H1200	1600	S7H1200	1600	S7H1200	1600
0.25 - 0.40	1600	S7H1200	1600	S7H1200	1600	S7H1200	1600
0.40 - 0.63	1600	S7H1200	1600	S7H1200	1600	S7H1200	1600
0.63 - 1.0	1600	S7H1200	1600	S7H1200	1600	S7H1200	1600
1.0 - 1.6	1600	S7H1200	1600	S7H1200	1600	S7H1200	1600
1.6 - 2.5	1600	S7H1200	1600	S7H1200	1600	S7H1200	1600
2.5 - 4.0	1600	S7H1200	1600	S7H1200	1600	S7H1200	1600
4.0 - 6.3	1600	S7H1200	1600	S7H1200	600	S7H1200	—
6.3 - 9.0	1600	S7H1200	1600	S7H1200	600	S7H1200	—
9.0 - 12.5	1600	S7H1200	1600	S7H1200	400	S4H250	—
12.5 - 16	1600	S7H1200	1600	S7H1200	400	S4H250	—
16 - 20	1600	S7H1200	1600	S7H1200	400	S4H250	—
20 - 25	1600	S7H1200	1600	S7H1200	400	S4H250	—
600V ②							
0.1 - 0.16	1200	S7H1200	1200	S7H1200	1200	S7H1200	—
0.25 - 0.40	1200	S7H1200	1200	S7H1200	1200	S7H1200	—
0.40 - 0.63	1200	S7H1200	1200	S7H1200	1200	S7H1200	—
0.63 - 1.0	1200	S7H1200	1200	S7H1200	1200	S7H1200	—
1.0 - 1.6	1200	S7H1200	1200	S7H1200	1200	S7H1200	—
1.6 - 2.5	1200	S7H1200	1200	S7H1200	1200	S7H1200	—
2.5 - 4.0	1200	S7H1200	1200	S7H1200	1200	S7H1200	—
4.0 - 6.3	1200	S7H1200	1200	S7H1200	1200	S7H1200	—
6.3 - 9.0	1200	S7H1200	1200	S7H1200	250	S4H250	—
9.0 - 12.5	1200	S7H1200	1200	S7H1200	—	—	—
12.5 - 16	1200	S7H1200	1200	S7H1200	—	—	—
16 - 20	1200	S7H1200	250	S4H250	—	—	—
20 - 25	1200	S7H1200	250	S4H250	—	—	—

① Fuse: Rated 1600A, Listed Class L. All others, listed RK5. Both time delay fuses.
② Fuse: Rated 1600A, Listed Class L. All others, listed K5. Both time delay fuses.

Short-circuit protection MS325 — Setting ranges, short-circuit strength and max. back-up fuses

Maximum rated current of the short-circuit fuses if $I_{cc} > I_{cs}$

	from	to	at 230 V AC		at 400 V AC		at 440 V AC		at 500 V AC		at 690 VAC	
			I_{cs} kA	gL, aM A	I_{cs} kA	gL, aM A	I_{cs} kA	gL, aM A	I_{cs} kA	gL, aM A	I_{cs} kA	gL, aM A
	A	A	Fuse types: Diazed, l.v.h.b.c., utilisation categories: gL, aM (VDE), gL/gG (IEC)									
Setting ranges	0.1	... 0.16	Short-circuit proof No back-up fuse required up to I_{cc} = 100 kA									
	to											
	1.0	... 1.6										
	1.6	... 2.5									40	25
	2.5	... 4.0							60	35 / 40	10	40
	4.0	... 6.3					70	50	40	50	7	40
	6.3	... 9.0					50	80	30	80	5	50
	9.0	... 12.5			75	80	45	80	27	80	4.5	50
	12.5	... 16.0			60	100	40	100	25	100	4	50
	16.0	... 20.0			55	100	35	100	22	100	3.5	50
	20.0	... 25.0			50	125	30	125	20	125	3	50

Short-circuit protection MS325 — Setting ranges, short-circuit strength and max. back-up fuses

Maximum rated current of the short-circuit fuses if $I_{cc} > I_{cs}$

	from	to	at 230 V AC		at 400 V AC		at 440 V AC		at 500 V AC		at 690 VAC	
			I_{cs} kA	gL, aM A	I_{cs} kA	gL, aM A	I_{cs} kA	gL, aM A	I_{cs} kA	gL, aM A	I_{cs} kA	gL, aM A
	A	A	Fuse types: Diazed, l.v.h.b.c., utilisation categories: gL, aM (VDE), gL/gG (IEC)									
Setting ranges	0.1	... 0.16	Short-circuit proof No back-up fuse required up to I_{cc} = 50 kA									
	to											
	1.0	... 1.6										
	1.6	... 2.5									40	25
	2.5	... 4.0							60	35 / 40	10	40
	4.0	... 6.3							40	50	7	40
	6.3	... 9.0							30	80	5	50
	9.0	... 12.5					45	80	27	80	4.5	50
	12.5	... 16.0					40	100	25	100	4	50
	16.0	... 20.0					35	100	22	100	3.5	50
	20.0	... 25.0					30	125	20	125	3	50

I_{cs} = Rated service short-circuit breaking capacity, I_{cu} = Rated ultimate short-circuit capacity, I_{cc} = Prospective short-circuit current at installation location.
I_{cs} = I_{cu} in the case of MS 325 and MS 116!

Technical data
Type MS325, MS45x, MS49x

Device type		MS325	MS450	MS451	MS495	MS496	MS497
Standards, approvals		UL, CSA, CE	UL, CSA, CE	UL, CSA, CE	UL, CSA, CE	UL, CSA, CE	UL, CSA, CE
Rated operating current	A	25	50	50	100	100	100
Current range	A	0.10 - 25	11 - 50	11- 50	40 - 100	28 - 100	11 - 100
Number of poles		3	3	3	3	3	3
Frequency	Hz	50/60	50/60	50/60	50/60	50/60	50/60
Tripping class	A	10	10	20	10	20	10
Max. kAIC & 600V	kAIC	50	50	50	50	100	100
Mechanical life	Operations	100,000	50,000	50,000	50,000	50,000	50,000
Wire range	AWG	14-8	2x18-3x18-2	2x18-3x18.2	2x10-1/0; 1x10-2/0	2x10-1/0;1x10-2/0	2x10-1/0; 1x10-2/0
Terminal torque	in. lbs	14	27 – 40	27 – 40	35 – 53	35 – 53	35 – 53
Terminal tool options		flat screwdriver PZ2	flat screwdriver PZ2	flat screwdriver PZ2	hex allen 4mm	hex allen 4mm	hex allen 4mm
Permissible altitude without derating	m	3000	2000	2000	2000	2000	2000
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
UL Listed for group installation		Yes	Yes	Yes	Yes	Yes	Yes
Self-protected Type E manual combination starter		No	Yes	Yes	Yes	Yes	Yes
Accessories							
Terminal shroud		No	Yes	Yes	Yes	Yes	Yes
Auxiliary contacts		Yes	Yes	Yes	Yes	Yes	Yes
Shunt trip		Yes	Yes	Yes	Yes	Yes	Yes
Trip signal contacts		Yes	Yes	Yes	Yes	Yes	Yes
UV release		Yes	Yes	Yes	Yes	Yes	Yes
Busbar		Yes	Yes	Yes	No	No	No
Through door handle		Yes	Yes	Yes	No	No	No

Manual motor starter type		MS325	MS450/451	MS495/496/497
Auxiliary circuits				
Load rating of the auxiliary circuits				
Minimum load at:	24 VDC mA	5	5 mA at 17 VDC	
	12 VDC mA	10	—	
Rated operating at AC 15 to current I_e	24 VAC A	2.5	—	
	230 VAC A	2	3 / 0.5 / 6	
	400 VAC A	1	1.5 / — / 3 ①②	
Rated operating at DC 13 to current I_e	24 VDC A	2.5	— / — / —	
	60 VDC A	2.5	— / 0.15 / —	
	110 VDC A	0.6	0.22 / — / 0.5	
	220 VDC A	0.25	0.1 / — / 0.25	
	440 VDC A	—	— / — 0.1	
Short circuit protection				
back up fuse	gL A	10	gL / gG 10 A	
	aM A	6	—	
Release				
Device for phase failure protection		With	With	
Electromagnetic trips				
Response value set ex-works		7.5 – 12 I_n ①	10.4 I_n – 15.6 I_n	
		9 – 14 I_n ②		
		10 – 15 I_n ③		
		12.5 – 17.5 I_n ④		
Undervoltage release				
Pick-up value	% of U_c	≥ 85	≥ 85	
Drop-out value	% of U_c	35 – 75	35 – 70	
Power consumption - Pick-up	VA	0.9	20.2	
Power consumption - Hold	VA	0.9	7.2	
Open circuit shunt release				
Pick-up value	% of U_c	≥ 85	≥ 70	
Relative duty consumption	% ED	—	100 at voltages 50 / 60 Hz to Power	
Pick-up	VA	110 - 240V: 13 - 61 ③	Consult factory	
Hold	VA	—	Consult factory	

① Correction factors for other frequencies on request.
② On front side 1 chageover contact / on front side 1 NO + 1 NC / at side, 1 NO + 1 NC, 2 NO, 2 NC
③ 24 - 60V: 14.4 - 90vA

Technical data
Short circuit protection
Type MS450/451, MS495,6,7

Short-circuit protection MS450 / MS451 — Setting ranges, short-circuit strength and max. back-up fuses

Setting ranges in A	Maximum rated current of the short-circuit fuses if $I_{cu} > I_{cu}$															
	230 V AC			400 V AC			440 V AC			500 V AC			690 V AC			
	I_{cs} in kA	I_{cu} in kA	gL,gG in A	I_{cs} in kA	I_{cu} in kA	gL,gG in A	I_{cs} in kA	I_{cu} in kA	gL,gG in A	I_{cs} in kA	I_{cu} in kA	gL,gG in A	I_{cs} in kA	I_{cu} in kA	gL,gG in A	
11 ... 16	Short-circuit-proof No back-up fuse required up to I_{cc} = 100kA			25	50	100	25	50	100	6	12	63	3	5	63	
14 ... 20				25	50	125	25	50	100	6	12	80	3	5	63	
18 ... 25				25	50	125	15	30	100	6	12	80	3	5	63	
22 ... 32				25	50	125	15	30	125	5	10	100	2	4	63	
28 ... 40				25	50	160	15	30	125	5	10	100	2	4	63	
36 ... 45				25	50	160	15	30	125	5	10	100	2	4	63	
36 ... 50				25	50	160	15	30	125	5	10	100	2	4	80	

Short-circuit protection MS495 — Setting ranges, short-circuit strength and max. back-up fuses

Setting ranges in A	Maximum rated current of the short-circuit fuses if $I_{cu} > I_{cu}$															
	230 V AC			400 V AC			440 V AC			500 V AC			690 V AC			
	I_{cs} in kA	I_{cu} in kA	gL,gG in A	I_{cs} in kA	I_{cu} in kA	gL,gG in A	I_{cs} in kA	I_{cu} in kA	gL,gG in A	I_{cs} in kA	I_{cu} in kA	gL,gG in A	I_{cs} in kA	I_{cu} in kA	gL,gG in A	
28 ... 40	Short-circuit-proof No back-up fuse required up to I_{cc} = 100kA			25	50	125	20	40	125	6	12	100	6	3	63	
36 ... 50				25	50	125	20	40	125	6	12	100	6	3	80	
45 ... 63				25	50	160	20	40	160	6	12	100	6	3	80	
57 ... 75				25	50	160	20	40	160	4	8	125	5	3	100	
70 ... 90				25	50	160	20	40	160	4	8	125	5	3	125	
80 ... 100				25	50	160	20	40	160	4	8	125	5	3	125	

Short-circuit protection MS496 — Setting ranges, short-circuit strength and max. back-up fuses

Setting ranges in A	Maximum rated current of the short-circuit fuses if $I_{cu} > I_{cu}$															
	230 V AC			400 V AC			440 V AC			500 V AC			690 V AC			
	I_{cs} in kA	I_{cu} in kA	gL,gG in A	I_{cs} in kA	I_{cu} in kA	gL,gG in A	I_{cs} in kA	I_{cu} in kA	gL,gG in A	I_{cs} in kA	I_{cu} in kA	gL,gG in A	I_{cs} in kA	I_{cu} in kA	gL,gG in A	
28 ... 40	Short-circuit-proof No back-up fuse required up to I_{cc} = 100kA						25	50	160	9	18	160	6	12	80	
36 ... 50							25	50	160	7.5	15	160	5	10	100	
45 ... 63							25	50	200	7.5	15	160	4	7.5	100	
57 ... 75							25	50	200	5	10	160	3	6	125	
70 ... 90							25	50	200	5	10	160	3	6	160	
80 ... 100							25	50	200	5	10	160	3	6	160	

Short-circuit protection MS497 — Setting ranges, short-circuit strength and max. back-up fuses

Setting ranges in A	Maximum rated current of the short-circuit fuses if $I_{cu} > I_{cu}$															
	230 V AC			400 V AC			440 V AC			500 V AC			690 V AC			
	I_{cs} in kA	I_{cu} in kA	gL,gG in A	I_{cs} in kA	I_{cu} in kA	gL,gG in A	I_{cs} in kA	I_{cu} in kA	gL,gG in A	I_{cs} in kA	I_{cu} in kA	gL,gG in A	I_{cs} in kA	I_{cu} in kA	gL,gG in A	
11 .. 16	Short-circuit-proof No back-up fuse required up to I_{cc} = 100kA						25	50	100	15	30	80	7	15	63	
14 ... 20							25	50	100	15	30	80	7	15	63	
18 ... 25							25	50	100	15	30	80	7	15	63	
22 ... 32							25	50	125	11	22	100	7	15	63	
28 ... 40							25	50	160	9	18	160	6	12	80	
36 ... 50							25	50	160	7.5	15	160	5	10	100	
45 ... 63							25	50	200	7.5	15	160	4	7.5	100	
57 ... 75							25	50	200	5	10	160	3	6	125	
70 ... 90							25	50	200	5	10	160	3	6	160	
80 .. 100							25	50	200	5	10	160	3	6	160	

I_{cs} = Rated service short-circuit breaking capacity, I_{cu} = Rated ultimate short-circuit breaking capacity I_{cc} = pProspective short-circuit current at installation location.

Coordination tables

The tables below show the MS 325 manual motor starter and DLA starter combinations according to the type of coordination and motor current.

Motor power AC-3 and rated current three-phase cage motor, 1500 rpm		MS 325 manual motor starter		DLA starter type (120V coil shown)	WLA starter type (120V coil shown)	Copper cable	Max. authorized current for combination
		Type	Setting range			Minimum cross-section	
380 V 400 V kW	A		A – A			mm2	A
Coordination type I, 400 V – 50 Hz, 50 kA, normal starting							
0.37	1.2	MS 325 – 1.6	1.0 – 1.6	DLA9-30-84	WLA9-30-84	1.5	1.6
0.55	1.5	MS 325 – 1.6	1.0 – 1.6	DLA9-30-84	WLA9-30-84	1.5	1.6
0.75	2	MS 325 – 2.5	1.6 – 2.5	DLA9-30-84	WLA9-30-84	1.5	2.5
1.1	2.6	MS 325 – 4	2.5 – 4.0	DLA9-30-84	WLA9-30-84	1.5	4
1.5	3.5	MS 325 – 4	2.5 – 4.0	DLA9-30-84	WLA9-30-84	1.5	4
2.2	5	MS 325 – 6.3	4.0 – 6.3	DLA9-30-84	WLA9-30-84	1.5	6.3
3	6.6	MS 325 – 9	6.3 – 9.0	DLA9-30-84	WLA9-30-84	1.5	9
4	8.5	MS 325 – 9	6.3 – 9.0	DLA9-30-84	WLA9-30-84	1.5	9
5.5	11.5	MS 325 – 12.5	9.0 – 12.5	DLA12-30-84	WLA12-30-84	1.5	12
7.5	15.2	MS 325 – 16	12.5 – 16.0	DLA16-30-84	WLA16-30-84	2.5	16
11	22	MS 325 – 25	16.0 – 25.0	DLA26-30-84	WLA26-30-84	2.5	25

* Ambient temperature ≤ 30 °C

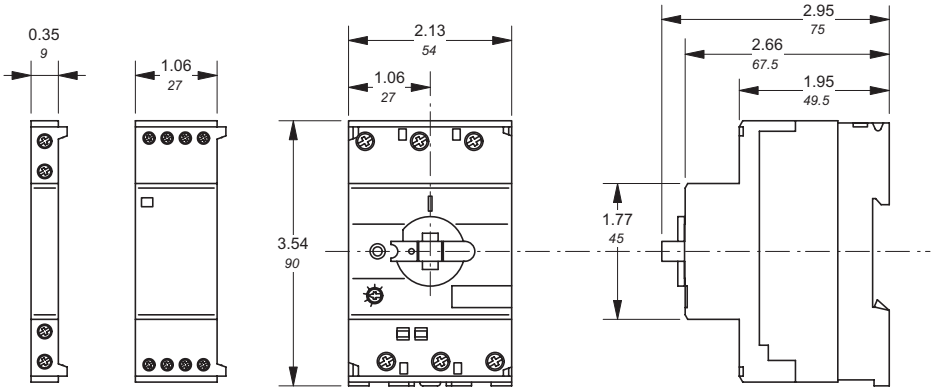
Coordination type II, 400 V – 50 Hz, 25 kA, normal starting							
0.37	1.2	MS 325 – 1.6	1.0 – 1.6	DLA9-30-84	WLA9-30-84	1.5	1.6
0.55	1.5	MS 325 – 1.6	1.0 – 1.6	DLA9-30-84	WLA9-30-84	1.5	1.6
0.75	2	MS 325 – 2.5	1.6 – 2.5	DLA9-30-84	WLA9-30-84	1.5	2.5
1.1	2.6	MS 325 – 4	2.5 – 4.0	DLA12-30-84	WLA12-30-84	1.5	4
1.5	3.5	MS 325 – 4	2.5 – 4.0	DLA26-30-84	WLA26-30-84	1.5	4
2.2	5	MS 325 – 6.3	4.0 – 6.3	DLA26-30-84	WLA26-30-84	1.5	6.3
3	6.6	MS 325 – 9	6.3 – 9.0	DLA26-30-84	WLA26-30-84	1.5	9
4	8.5	MS 325 – 9	6.3 – 9.0	DLA26-30-84	WLA26-30-84	1.5	9
5.5	11.5	MS 325 – 12.5	9.0 – 12.5	DLA26-30-84	WLA26-30-84	1.5	12.5
7.5	15.2	MS 325 – 16	12.5 – 16.0	DLA26-30-84	WLA26-30-84	2.5	16
11	22	MS 325 – 25	16.0 – 25.0	DLA26-30-84	WLA26-30-84	2.5	25

* Ambient temperature ≤ 30 °C

Approximate dimensions
MS325

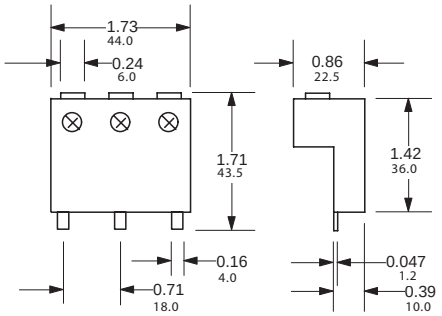
00.00 / 00.00 Inches [Millimeters]

MS325

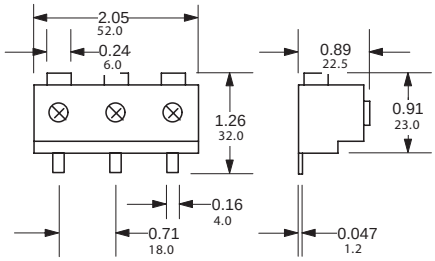


HK, SK, AS RC325 MS325

Power feed terminal blocks for MS325



Connection terminal block for busbar

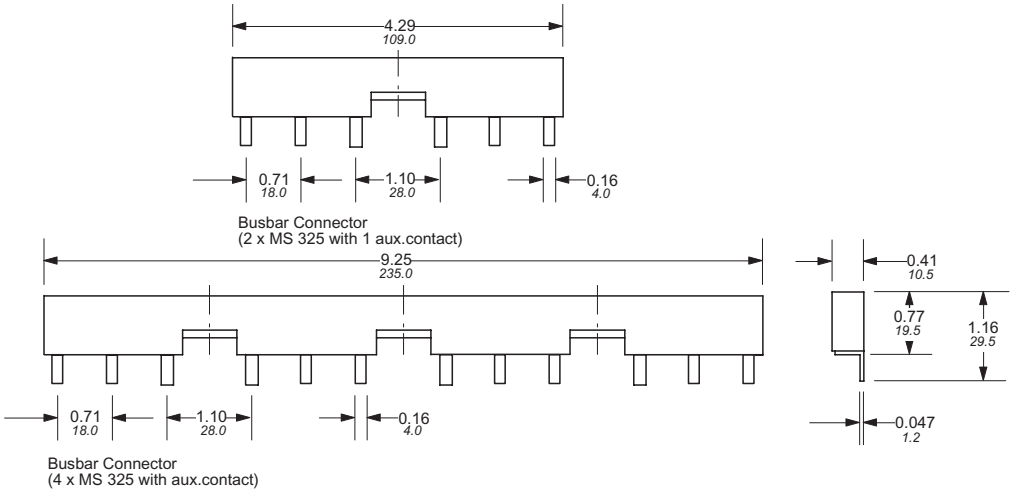


Connection terminal block for 4 AWG / 25 mm wires

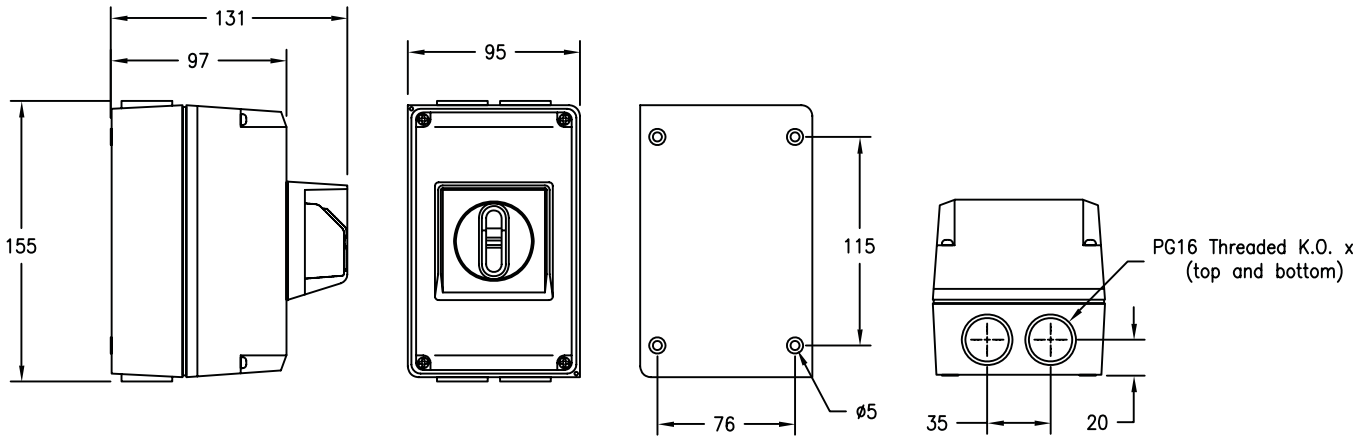
Approximate dimensions
Accessories for MS325

00.00 / 00.00 Inches [Millimeters]

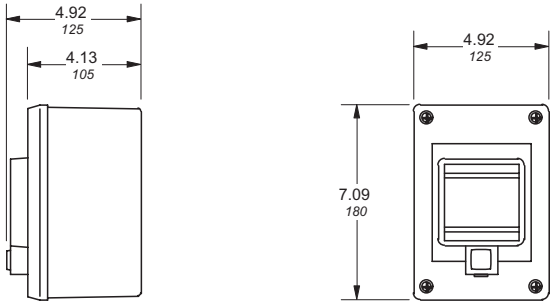
Busbar connectors for MS325



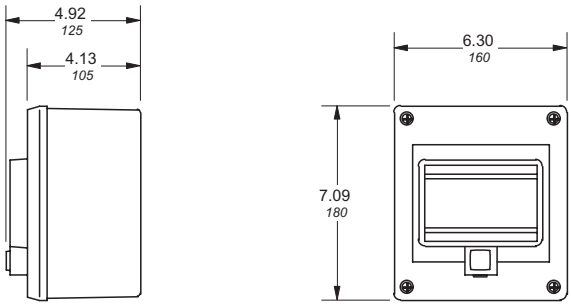
Molded plastic enclosures for MS325
OTPA325B2P1 and OTPA325A2P1



12644



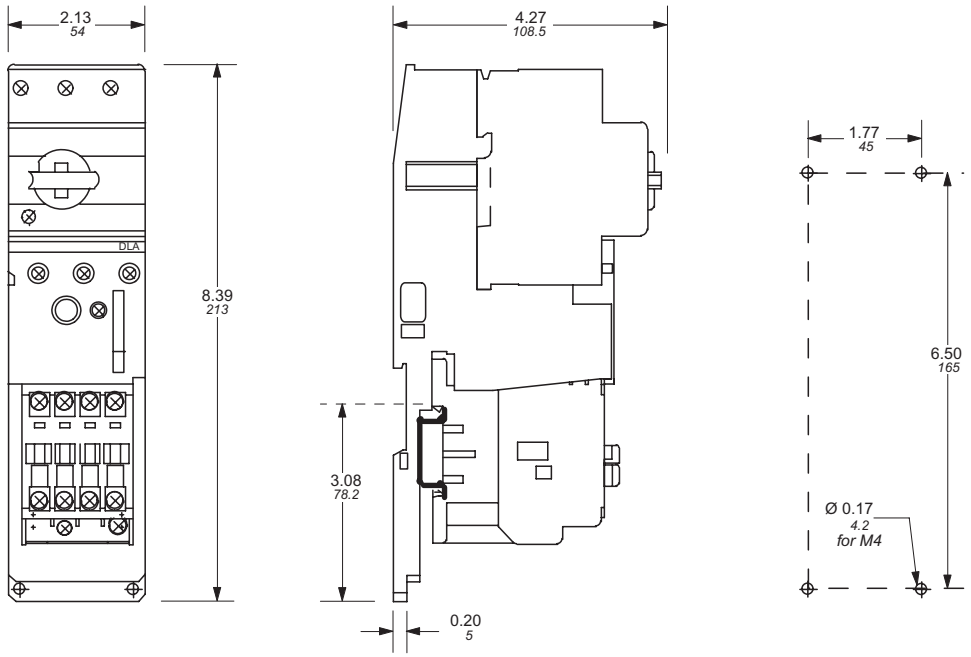
12646



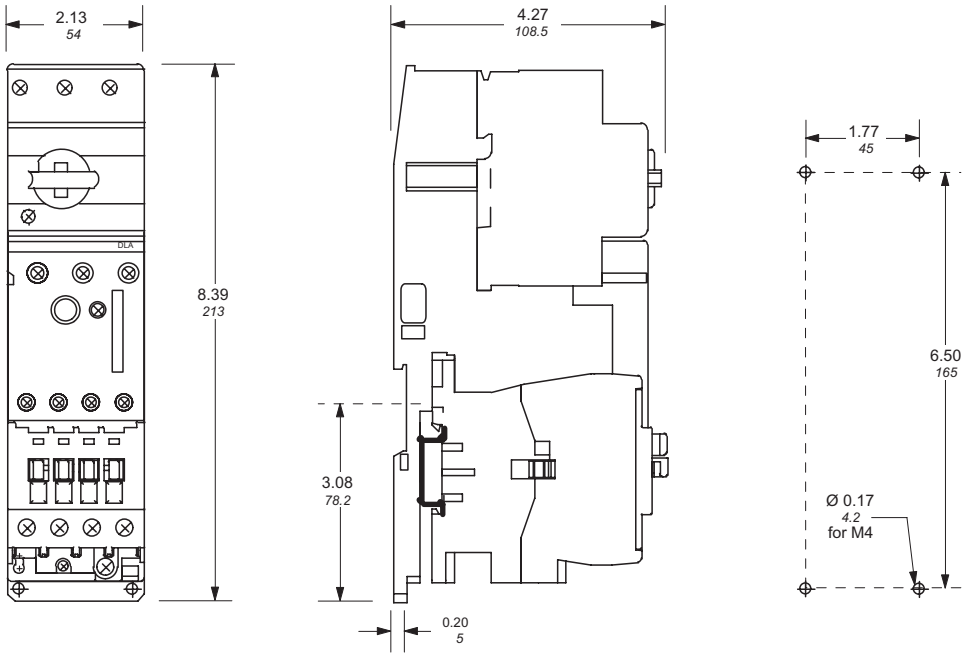
Approximate dimensions
Accessories for MS325
DLA9 – DLA26

00.00 / 00.00 Inches [Millimeters]

DLA9 – DLA16



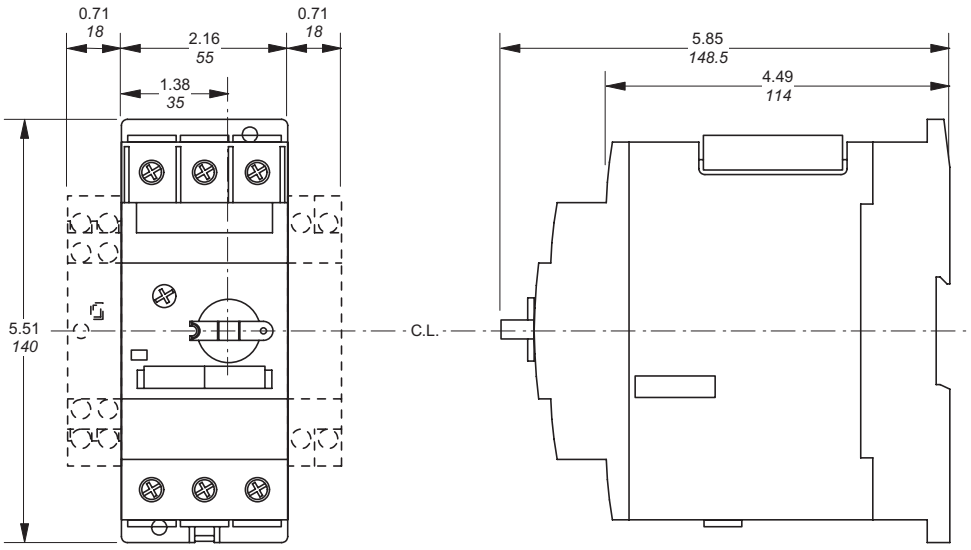
DLA26



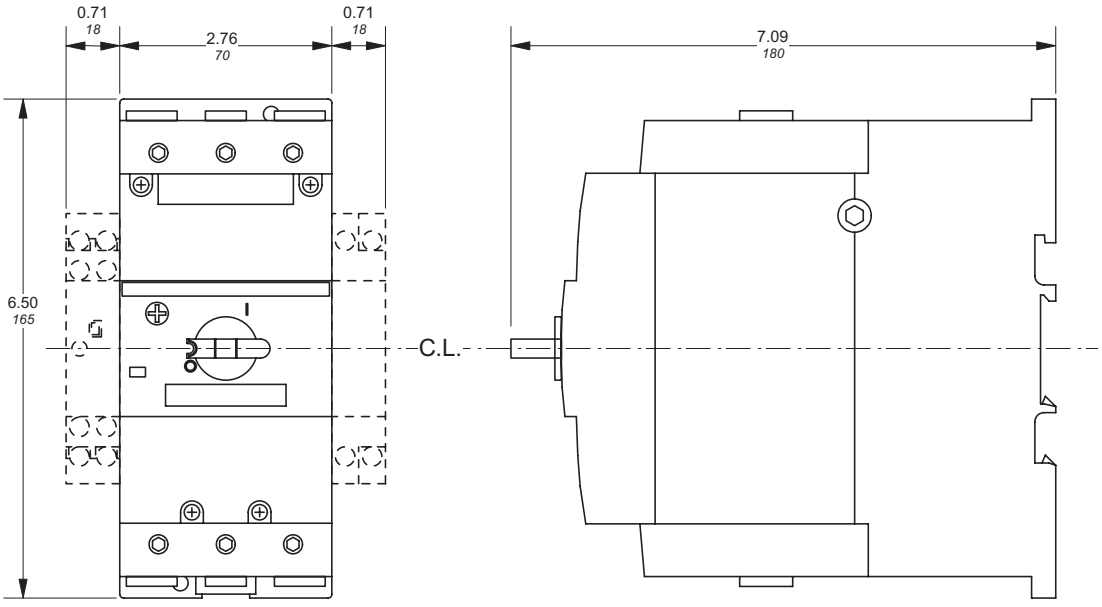
Approximate dimensions
MS450 & MS490

00.00
00.00
Inches
[Millimeters]

MS450



MS490



Notes

Softstarters
Index

Continued next page

Index

Application and description
Softstarters... the complete range

ABB offers three types of softstarters to cover every customer need from 3 A to 1800 A. The overview table at the bottom of this page shows the main characteristics of the different types. For more specific technical details and ordering data, see the following pages.

PSS03 – 25
The compact range covers motor currents from 3 to 25 A and has the following advantages:

- **Compact:** As a result of the built in bypass contacts, the softstarter becomes small. There is room for more products on a given mounting surface.
- **Easy to install:** DIN rail mounting. With clear marking for conncections and set up on the front.

PSS18 – 300
The flexible range for motor currents from 18 to 515 A offers a solution possible to adapt to almost any application:

- **Flexible:** It is possible to wire both in line with the motor or inside the motor delta. Can also be equipped with current limit.
- **Easy to set up:** With three rotary switches clearly labelled.
- **Solid state electrical circuit:** This ensures the highest reliability and reduces maintenance to a minimum, even in applications with frequent starts and stops.

PST(B)30 – 1800
The new PST Softstarter range covers motor currents from 30 to 1800 A and offers a long list of integrated functionalities:

- **Advanced integrated protections:** For the motor; integrated electronic overload relay, phase monitoring relays, high current and PTC protection. For the Softstarter; advanced thyristor protection.
- **Flexible bus communication system:** By using the ABB FieldBusPlug (FBP), you can decide at any time which bus system to select. The softstarter has a field-bus neutral interface and the ABB FieldBusPlug is the central communication element.
- **Digital text display:** With 10 languages, a menu system similar to your mobile phone, pre-programmed application settings and automatic status and event logging, it couldn't be easier to set up and operate!
- **Programmable signal relays:** gives you several possibilities for signalling warnings, faults and other events.

From 3 A to 1839 A

● Standard
O Optional
– Not available

Functionality

Advanced
PST Range

60 – 1839 A (Inside Delta)
30 – 1062 A (In Line)

Flexible
PSS Range

30 – 515 A (Inside Delta)
18 – 300 A (In Line)

Compact
PSS Range

3 – 25 A

Full load current (A)

PSS03...25	PSS18/30...300/515	PST(B)30...1050	
–	–	●	Field bus communication enabled
–	–	●	Real time clock
–	–	●	Programmable fault supervision functions
–	–	●	Programmable warning functions
–	–	●	PTC input for motor protection
–	–	●	High current protection
–	–	●	Phase imbalance /phase reversal protection
–	–	●	Locked rotor protection
–	–	●	Thyristor overtemperature protection
–	–	●	Motor overload protection
–	–	●	Shunt trip protection
			Test mode
–	O	●	Four button keypad (external keypad available from 2004)
–	●	●	
●	●	●	Current limit control
●	–	●①	In Line and Inside Delta connection
●	●	●	LED indications
			Built-in by-pass contactor
			Ramp Start/Stop

① On PSTB

Notes

Softstarters
Type PSS

General information

ABB low voltage softstarters now cover the whole range from 3A to 1250A. The new PSS line brings a wide array of benefits for smaller motors in a flexible, compact form.

Compact line

PSS03 to PSS25 softstarters are a very compact solution for starting small motors with rated current from 3 to 25A. They are suitable for 230, 400, 500 and 600V and designed for DIN rail mounting.

The built-in bypass contacts allow you to build space-saving, compact designs.

Adjustable parameters include acceleration time and initial voltage for starting and deceleration time for stopping. In addition, these units cover a control voltage range of 24 – 110 VAC/DC and 100V – 277 VAC.

UL File # E161428

Flexible line

PSS18/30 to PSS300/515 softstarters provide a flexible solution for motor starting. Rated motor currents are covered from 18A to 300A when connected in line like a traditional full voltage starter. These units can also be wired inside the motor-delta, like a wye-delta starter, covering motors up to 515A. This flexibility makes it easier than ever before to replace wye-delta starters.

The total solid state solution — with no moving contacts in the power circuit — is an attractive solution for applications with many starts per hour. Adjustable parameters include acceleration time, initial voltage and optional current limit for starting and deceleration time for stopping.

Class 10 overload protection is standard for Type PSS enclosed softstarters.

UL File # E161428

General information
Catalog number explanation

PSS Open type

PSS - 18/30 - 500 - F ③

Control voltage
F - 100V – 120V, 50/60Hz
L - 220V – 240V, 50/60Hz

Line voltage
500: 208V – 500V
690: 575V – 690V

Maximum motor current
when connected in-line

Maximum motor current
when connected inside delta

PSS Enclosed type

P 18 D F 1 - 48 A A

Soft starter
PSS enclosed

Softstarter amps
18 60 175
30 72 250
37 85 300
44 105
50 142

Connection type
L: Inline
D: Inside delta

Combination type
No digit – non-combination
F – fusible disconnect
B – thermal magnetic circuit breaker
M – magnetic only breaker
N – non-fusible disconnect

Enclosure
1 – NEMA 1
2 – NEMA 12 ②
3 – NEMA 3R ②
4 – NEMA 4 ②
X – NEMA 4x stainless steel ②

Options ①
A – Start-stop pushbutton
B – Across the line rated (AC3) contactor with emergency bypass control
C – 2 position selector switch
D – 3 position selector switch
E – Pilot light
F – Start-stop pushbutton and pilot light
H – 2 position selector switch and pilot light
J – 3 position selector switch and pilot light
M – Shunt rated (AC1) bypass contactor
W – Isolation contactor

Fuse clip
A – 30A, 600V, Class J
B – 60A, 600V, Class J
C – 100A, 600V, Class J
D – 200A, 600V, Class J
E – 400A, 600V, Class J
F – 600A, 600V, Class J
G – 800A, 600V, Class L

Circuit breaker amp ratings

D – 15	M – 70	W – 225	E – 700
E – 20	N – 80	X – 250	
F – 25	P – 90	Y – 300	
G – 30	R – 100	Z – 350	
H – 35	S – 125	A – 400	
J – 40	T – 150	B – 450	
K – 50	U – 175	C – 500	
L – 60	V – 200	D – 600	

MCP/MAG only rating

A – 3	E – 50	J – 400
B – 5	F – 100	K – 600
C – 10	G – 150	L – 800
D – 25	H – 225	

Line voltage
20: 208V 120V control voltage
23: 230V 120V control voltage
38: 380V 220V control voltage
41: 415V 220V control voltage
48: 480V 120V control voltage
60: 600V 120V control voltage

① For more options, see page 6.8
② Bypass contactor required.
③ See page 6.3 for the PSS03, PSS12 & PSS25 softstarters.

Open
3A – 25A

Type PSS03-480B

Type PSS25-480B

PSS Open type ①②

Operating voltage 50Hz – 60Hz	Maximum HP rating three phase	Maximum current amperes	Catalog number	List price
220 – 240V	0.5	3	PSS03-220B	**$ 270**
	3	12	PSS12-220B	**345**
	7.5	25	PSS25-220B	**405**
380 – 415V	1	3	PSS03-400B	**270**
	5	12	PSS12-400B	**345**
	10	25	PSS25-400B	**405**
440 – 480V	1.5	3	PSS03-480B	**270**
	7.5	12	PSS12-480B	**345**
	15	25	PSS25-480B	**405**
550 – 600V	10	12	PSS12-600B	**375**
	20	25	PSS25-600B	**445**

6

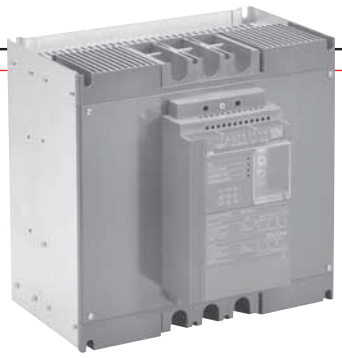
① Overload protection not included; external overload relay must be in power circuit. Use ABB TA series overload.
② See page 6.12 for single phase wiring schematic.

Open


PSS18/30


PSS50/85


PSS85/147


PSS300/515

Connected inline ①②③

Maximum motor current		Maximum horsepower						Catalog number	List price
UL	IEC	208V	240V	380V	480V	600V	Weight (lbs.)		
18	18	5 —	5 —	10 —	10 —	— 15	5	PSS18/30-500F PSS18/30-690F	**$ 620** **744**
28	30	7.5 —	10 —	15 —	20 —	— 25	5	PSS30/52-500F PSS30/52-690F	**680** **820**
34	37	10 —	10 —	20 —	25 —	— 30	5	PSS37/64-500F PSS37/64-690F	**750** **900**
40	44	10 —	10 —	25 —	30 —	— 30	5	PSS44/76-500F PSS44/76-690F	**900** **1080**
47	50	15 —	15 —	25 —	30 —	— 40	8	PSS50/85-500F PSS50/85-690F	**1120** **1345**
56	60	15 —	20 —	30 —	40 —	— 50	8.4	PSS60/105-500F PSS60/105-690F	**1325** **1590**
67	72	20 —	20 —	40 —	50 —	— 60	8.4	PSS72/124-500F PSS72/124-690F	**1460** **1750**
85	85	25 —	30 —	50 —	60 —	— 75	19	PSS85/147-500F PSS85/147-690F	**1650** **1980**
105	105	30 —	40 —	60 —	75 —	— 100	23	PSS105/181-500F PSS105/181-690F	**1700** **2040**
125	142	40 —	40 —	75 —	100 —	— 125	23	PSS142/245-500F PSS142/245-690F	**2250** **2700**
156	175	50 —	60 —	100 —	125 —	— 150	45	PSS175/300-500F PSS175/300-690F	**2900** **3395**
225	250	75 —	75 —	150 —	150 —	— 200	48.4	PSS250/430-500F PSS250/430-690F	**3400** **3965**
248	300	75 —	100 —	150 —	200 —	— 250	48.4	PSS300/515-500F PSS300/515-690F	**3950** **4530**

Connected inside delta ①②③

30	30	7.5 —	10 —	15 —	20 —	— 25	5	PSS18/30-500F PSS18/30-690F	**$ 620** **744**
48	52	15 —	15 —	30 —	30 —	— 40	5	PSS30/52-500F PSS30/52-690F	**680** **820**
58	64	20 —	20 —	30 —	40 —	— 50	5	PSS37/64-500F PSS37/64-690F	**750** **900**
69	76	20 —	25 —	40 —	50 —	— 60	5	PSS44/76-500F PSS44/76-690F	**900** **1080**
81	85	25 —	30 —	50 —	60 —	— 75	8	PSS50/85-500F PSS50/85-690F	**1120** **1345**
96	105	30 —	30 —	60 —	75 —	— 75	8.4	PSS60/105-500F PSS60/105-690F	**1325** **1590**
116	124	40 —	40 —	60 —	75 —	— 100	8.4	PSS72/124-500F PSS72/124-690F	**1460** **1750**
147	147	50 —	50 —	75 —	100 —	— 150	19	PSS85/147-500F PSS85/147-690F	**1650** **1980**
181	181	60 —	60 —	100 —	150 —	— 150	23	PSS105/181-500F PSS105/181-690F	**1700** **2040**
215	245	75 —	75 —	150 —	150 —	— 200	23	PSS142/245-500F PSS142/245-690F	**2250** **2700**
270	300	75 —	100 —	150 —	200 —	— 250	45	PSS175/300-500F PSS175/300-690F	**2900** **3395**
389	430	125 —	150 —	250 —	300 —	— 400	48.4	PSS250/430-500F PSS250/430-690F	**3400** **3965**
429	515	150 —	150 —	300 —	350 —	— 400	48.4	PSS300/515-500F PSS300/515-690F	**3950** **4530**

NOTE: Open softstarters are converted from connected inline to connected inside delta by means of a DIP switch. See circuit diagram on pages 6.13 - 6.15 for information.
① Catalog numbers are shown with 120V control. For 240V control, replace “F” with “L” in catalog number.
② Overload protection not included; external overload relay must be in power circuit. Use ABB TA series overload.
③ Current transformer not included. See page 6.8 for current transformers.

Enclosed ①
NEMA 1, 12

Connected inline

Maximum motor current		Maximum horsepower					NEMA 1, 480V		NEMA 1, 600V		NEMA 12, 480V ②		NEMA 12, 600V ②	
UL	IEC	208V	240V	380V	480V	600V	Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price
18	18	5 —	5 —	10 —	10 —	— 15	P18L1-48 —	**$ 1095** —	— P18L1-60	— **$ 1219**	P18L2-48M —	**$ 1395** —	— P18L2-60M	— **$ 1519**
25	—	— —	7.5 —	— —	15 —	— 20	P22L1-48 —	**1155** —	— P22L1-60	— **1295**	P22L2-48M —	**1480** —	— P22L2-60M	— **1620**
28	30	7.5 —	10 —	15 —	20 —	— 25	P30L1-48 —	**1155** —	— P30L1-60	— **1295**	P30L2-48M —	**1480** —	— P30L2-60M	— **1620**
34	37	10 —	10 —	20 —	25 —	— 30	P37L1-48 —	**1325** —	— P37L1-60	— **1475**	P37L2-48M —	**1725** —	— P37L2-60M	— **1875**
40	44	10 —	10 —	25 —	30 —	— 30	P44L1-48 —	**1475** —	— P44L1-60	— **1755**	P44L2-48M —	**1925** —	— P44L2-60M	— **2205**
47	50	15 —	15 —	25 —	30 —	— 40	P50L1-48 —	**1595** —	— P50L1-60	— **1820**	P50L2-48M —	**2045** —	— P50L2-60M	— **2270**
56	60	15 —	20 —	30 —	40 —	— 50	P60L1-48 —	**1860** —	— P60L1-60	— **2135**	P60L2-48M —	**2360** —	— P60L2-60M	— **2635**
67	72	20 —	20 —	40 —	50 —	— 60	P72L1-48 —	**1935** —	— P72L1-60	— **2225**	P72L2-48M —	**2485** —	— P72L2-60M	— **2775**
85	85	25 —	30 —	50 —	60 —	— 75	P85L1-48 —	**2475** —	— P85L1-60	— **2805**	P85L2-48M —	**3250** —	— P85L2-60M	— **3580**
105	105	30 —	40 —	60 —	75 —	— 100	P105L1-48 —	**2600** —	— P105L1-60	— **2940**	P105L2-48M —	**3375** —	— P105L2-60M	— **3715**
125	142	40 —	40 —	75 —	100 —	— 125	P142L1-48 —	**3350** —	— P142L1-60	— **3800**	P142L2-48M —	**4225** —	— P142L2-60M	— **4675**
156	175	50 —	60 —	100 —	125 —	— 150	P175L1-48 —	**3780** —	— P175L1-60	— **4150**	P175L2-48M —	**5180** —	— P175L2-60M	— **5550**
225	250	75 —	75 —	150 —	150 —	— 200	P250L1-48 —	**4300** —	— P250L1-60	— **4750**	P250L2-48M —	**5700** —	— P250L2-60M	— **6140**
248	300	75 —	100 —	150 —	200 —	— 250	P300L1-48 —	**4760** —	— P300L1-60	— **5215**	P300L2-48M —	**6460** —	— P300L2-60M	— **6915**

Connected inside delta

30	30	7.5 —	10 —	15 —	20 —	— 25	P18D1-48 —	**$ 1095** —	— P18D1-60	— **$ 1219**	P18D2-48M —	**$ 1395** —	— P18D2-60M	— **$ 1519**
37	—	10 —	— —	— —	25 —	— 30	P22D1-48 —	**1155** —	— P22D1-60	— **1295**	P22D2-48M —	**1480** —	— P22D2-60M	— **1620**
48	52	15 —	15 —	30 —	30 —	— 40	P30D1-48 —	**1155** —	— P30D1-60	— **1295**	P30D2-48M —	**1480** —	— P30D2-60M	— **1620**
58	64	20 —	20 —	30 —	40 —	— 50	P37D1-48 —	**1325** —	— P37D1-60	— **1475**	P37D2-48M —	**1725** —	— P37D2-60M	— **1875**
69	76	20 —	25 —	40 —	50 —	— 60	P44D1-48 —	**1475** —	— P44D1-60	— **1755**	P44D2-48M —	**1925** —	— P44D2-60M	— **2205**
81	85	25 —	30 —	50 —	60 —	— 75	P50D1-48 —	**1595** —	— P50D1-60	— **1820**	P50D2-48M —	**2045** —	— P50D2-60M	— **2270**
96	105	30 —	30 —	60 —	75 —	— 75	P60D1-48 —	**1860** —	— P60D1-60	— **2135**	P60D2-48M —	**2360** —	— P60D2-60M	— **2635**
116	124	40 —	40 —	60 —	75 —	— 100	P72D1-48 —	**1935** —	— P72D1-60	— **2225**	P72D2-48M —	**2485** —	— P72D2-60M	— **2775**
147	147	50 —	50 —	75 —	100 —	— 150	P85D1-48 —	**2475** —	— P85D1-60	— **2805**	P85D2-48M —	**3250** —	— P85D2-60M	— **3580**
181	181	60 —	60 —	100 —	150 —	— 150	P105D1-48 —	**2600** —	— P105D1-60	— **2940**	P105D2-48M —	**3375** —	— P105D2-60M	— **3715**
215	245	75 —	75 —	150 —	150 —	— 200	P142D1-48 —	**3350** —	— P142D1-60	— **3800**	P142D2-48M —	**4225** —	— P142D2-60M	— **4675**
270	300	75 —	100 —	150 —	200 —	— 250	P175D1-48 —	**3780** —	— P175D1-60	— **4150**	P175D2-48M —	**5180** —	— P175D2-60M	— **5550**
389	430	125 —	150 —	250 —	300 —	— 400	P250D1-48 —	**4300** —	— P250D1-60	— **4750**	P250D2-48M —	**5700** —	— P250D2-60M	— **6140**
429	515	150 —	150 —	300 —	350 —	— 400	P300D1-48 —	**4760** —	— P300D1-60	— **5215**	P300D2-48M —	**6460** —	— P300D2-60M	— **6915**

① All enclosed softstarters include a control power transformer and Class 10 overload.
② Includes shunt rated (AC1) bypass contactor.

Enclosed ①
NEMA 1 Combination

Connected inline

Maximum motor current		Maximum horsepower					480V with fusible disconnect switch NEMA 1		600V with fusible disconnect switch NEMA 1		480V with circuit breaker NEMA 1		600V with circuit breaker NEMA 1	
UL	IEC	208V	240V	380V	480V	600V	Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price
18	18	5 —	5 —	10 —	10 —	— 15	P18LF1-48A —	**$ 1370** —	— P18LF1-60A	— **$ 1709**	P18LB1-48E —	**$ 1370** —	— P18LB1-60E	— **$ 1709**
25	—	— —	7.5 —	— —	15 —	— 20	P22LF1-48B —	**1580** —	— P22LF1-60B	— **1835**	P22LB1-48G —	**1580** —	— P22LB1-60G	— **1835**
28	30	7.5 —	10 —	15 —	20 —	— 25	P30LF1-48B —	**1580** —	— P30LF1-60B	— **1835**	P30LB1-48J —	**1580** —	— P30LB1-60J	— **1835**
34	37	10 —	10 —	20 —	25 —	— 30	P37LF1-48B —	**1750** —	— P37LF1-60B	— **2040**	P37LB1-48K —	**1750** —	— P37LB1-60K	— **2040**
40	44	10 —	10 —	25 —	30 —	— 30	P44LF1-48C —	**2075** —	— P44LF1-60B	— **2400**	P44LB1-48L —	**2075** —	— P44LB1-60L	— **2400**
47	50	15 —	15 —	25 —	30 —	— 40	P50LF1-48C —	**2195** —	— P50LF1-60C	— **2565**	P50LB1-48N —	**2195** —	— P50LB1-60N	— **2565**
56	60	15 —	20 —	30 —	40 —	— 50	P60LF1-48C —	**2460** —	— P60LF1-60C	— **2905**	P60LB1-48N —	**2460** —	— P60LB1-60N	— **2905**
67	72	20 —	20 —	40 —	50 —	— 60	P72LF1-48C —	**2535** —	— P72LF1-60C	— **3010**	P72LB1-48R —	**2535** —	— P72LB1-60R	— **3010**
85	85	25 —	30 —	50 —	60 —	— 75	P85LF1-48D —	**3475** —	— P85LF1-60D	— **4060**	P85LB1-48S —	**3475** —	— P85LB1-60S	— **4060**
105	105	30 —	40 —	60 —	75 —	— 100	P105LF1-48D —	**3600** —	— P105LF1-60D	— **4195**	P105LB1-48T —	**3600** —	— P105LB1-60T	— **4195**
125	142	40 —	40 —	75 —	100 —	— 125	P142LF1-48D —	**4550** —	— P142LF1-60D	— **5365**	P142LB1-48V —	**4550** —	— P142LB1-60V	— **5365**
156	175	50 —	60 —	100 —	125 —	— 150	P175LF1-48E —	**5580** —	— P175LF1-60E	— **5950**	P175LB1-48X —	**5580** —	— P175LB1-60X	— **5950**
225	250	75 —	75 —	150 —	150 —	— 200	P250LF1-48E —	**6100** —	— P250LF1-60E	— **7900**	P250LB1-48Y —	**6100** —	— P250LB1-60Y	— **7900**
248	300	75 —	100 —	150 —	200 —	— 250	P300LF1-48E —	**6560** —	— P300LF1-60E	— **8360**	P300LB1-48A —	**6560** —	— P300LB1-60Z	— **8360**

Connected inside delta

30	30	7.5 —	10 —	15 —	20 —	— 25	P18DF1-48B —	**$ 1370** —	— P18DF1-60B	— **$ 1709**	P18DB1-48J —	**$ 1370** —	— P18DB1-60J	— **$ 1709**
37	—	10 —	— —	— —	25 —	— 30	P22DF1-48B —	**1580** —	— P22DF1-60B	— **1835**	P22DB1-48K —	**1580** —	— P22DB1-60K	— **1835**
48	52	15 —	15 —	30 —	30 —	— 40	P30DF1-48C —	**1580** —	— P30DF1-60C	— **1835**	P30DB1-48L —	**1580** —	— P30DB1-60N	— **1835**
58	64	20 —	20 —	30 —	40 —	— 50	P37DF1-48C —	**1750** —	— P37DF1-60C	— **2040**	P37DB1-48N —	**1750** —	— P37DB1-60N	— **2440**
69	76	20 —	25 —	40 —	50 —	— 60	P44DF1-48C —	**2075** —	— P44DF1-60C	— **2400**	P44DB1-48R —	**2075** —	— P44DB1-60R	— **2400**
81	85	25 —	30 —	50 —	60 —	— 75	P50DF1-48D —	**2195** —	— P50DF1-60D	— **2565**	P50DB1-48S —	**2195** —	— P50DB1-60S	— **2565**
96	105	30 —	30 —	60 —	75 —	— 75	P60DF1-48D —	**2460** —	— P60DF1-60D	— **2905**	P60DB1-48T —	**2460** —	— P60DB1-60S	— **2905**
116	124	40 —	40 —	60 —	75 —	— 100	P72DF1-48D —	**2535** —	— P72DF1-60D	— **3010**	P72DB1-48T —	**2535** —	— P72DB1-60T	— **3010**
147	147	50 —	50 —	75 —	100 —	— 150	P85DF1-48D —	**3475** —	— P85DF1-60E	— **4060**	P85DB1-48V —	**3475** —	— P85DB1-60X	— **4060**
181	181	60 —	60 —	100 —	150 —	— 150	P105DF1-48E —	**3600** —	— P105DF1-60E	— **4195**	P105DB1-48Y —	**3600** —	— P105DB1-60X	— **4195**
215	245	75 —	75 —	150 —	150 —	— 200	P142DF1-48E —	**4550** —	— P142DF1-60E	— **5365**	P142DB1-48Y —	**4550** —	— P142DB1-60Y	— **5365**
270	300	75 —	100 —	150 —	200 —	— 250	P175DF1-48E —	**5580** —	— P175DF1-60E	— **5950**	P175DB1-48A —	**5580** —	— P175DB1-60Z	— **5950**
389	430	125 —	150 —	250 —	300 —	— 400	P250DF1-48F —	**6100** —	— P250DF1-60F	— **7900**	P250DB1-48D —	**6100** —	— P250DB1-60D	— **7900**
429	515	150 —	150 —	300 —	350 —	— 400	P300DF1-48F —	**6560** —	— P300DF1-60F	— **8360**	P300DB1-48E —	**6560** —	— P300DB1-60D	— **8360**

① All enclosed softstarters include control power transformer and Class 10 overload.

Enclosed
Options

Connected inline

Maximum motor current		Maximum horsepower					Shunt rated (AC1) bypass or isolation contactor	Across the line rated (AC3) bypass contactor ②③	Electronic brake std. duty	Electronic brake hvy .duty	Start/Stop pushbuttons	HOA selector switch	Run pilot light	NEMA 12 adder ①	NEMA 3R adder ①	NEMA 4 adder ①	NEMA 4X adder ①
UL	IEC	208V	240V	380V	480V	600V	List price	List price	List price	List price	List price	List price	List price	List price	List price	List price	List price
18	30	5 —	5 —	10 —	10 —	— 15	**$ 150**	**$ 775**	**$ 1445**	**$ 1445**	**$ 72**	**$ 72**	**$ 135**	**$ 150**	**$ 150**	**$ 225**	**$ 675**
25	—	— —	7.5 —	— —	15 —	— 20	**175**	**850**	**1445**	**2175**	**72**	**72**	**135**	**150**	**150**	**225**	**675**
28	30	7.5 —	10 —	15 —	20 —	— 25	**175**	**850**	**1445**	**2175**	**72**	**72**	**135**	**150**	**150**	**225**	**675**
34	37	10 —	10 —	20 —	25 —	— 30	**250**	**900**	**2175**	**2175**	**72**	**72**	**135**	**150**	**150**	**225**	**675**
40	44	10 —	10 —	25 —	30 —	— 30	**300**	**950**	**2175**	**2975**	**72**	**72**	**135**	**150**	**150**	**225**	**675**
47	50	15 —	15 —	25 —	30 —	— 40	**300**	**950**	**2175**	**2975**	**72**	**72**	**135**	**150**	**150**	**225**	**675**
56	60	15 —	20 —	30 —	40 —	— 50	**350**	**1000**	**2175**	**2975**	**72**	**72**	**135**	**150**	**150**	**225**	**675**
67	72	20 —	20 —	40 —	50 —	— 60	**400**	**1100**	**2975**	**2975**	**72**	**72**	**135**	**150**	**150**	**225**	**675**
85	85	25 —	30 —	50 —	60 —	— 75	**500**	**1150**	**2975**	**5800**	**72**	**72**	**135**	**275**	**275**	**350**	**1150**
105	105	30 —	40 —	60 —	75 —	— 100	**500**	**1150**	**2975**	**5800**	**72**	**72**	**135**	**275**	**275**	**350**	**1150**
125	142	40 —	40 —	75 —	100 —	— 125	**600**	**1550**	**5800**	**5800**	**72**	**72**	**135**	**275**	**275**	**350**	**1150**
156	175	50 —	60 —	100 —	125 —	— 150	**950**	**1850**	**5800**	**6500**	**72**	**72**	**135**	**450**	**450**	**525**	**1575**
225	250	75 —	75 —	150 —	150 —	— 200	**950**	**2100**	**5800**	**6500**	**72**	**72**	**135**	**450**	**450**	**525**	**1575**
248	300	75 —	100 —	150 —	200 —	— 250	**1250**	**2700**	**6500**	**7000**	**72**	**72**	**135**	**450**	**450**	**525**	**1575**

Connected inside delta

Maximum motor current		Maximum horsepower					Shunt rated (AC1) bypass or isolation contactor	Across the line rated (AC3) bypass contactor	Electronic brake std. duty	Electronic brake hvy .duty	Start/Stop pushbuttons	HOA selector switch	Run pilot light	NEMA 12 adder ①	NEMA 3R adder ①	NEMA 4 adder ①	NEMA 4X adder ①
UL	IEC	208V	240V	380V	480V	600V	List price	List price	List price	List price	List price	List price	List price	List price	List price	List price	List price
30	30	7.5 —	10 —	15 —	20 —	— 25	**$ 150**	**$ 775**	**$ 1445**	**$ 1445**	**$ 72**	**$ 72**	**$ 135**	**$ 150**	**$ 150**	**$ 225**	**$ 675**
37	—	10 —	— —	— —	25 —	— 30	**175**	**850**	**1445**	**2175**	**72**	**72**	**135**	**150**	**150**	**225**	**675**
48	52	15 —	15 —	30 —	30 —	— 40	**175**	**850**	**1445**	**2175**	**72**	**72**	**135**	**150**	**150**	**225**	**675**
58	64	20 —	20 —	30 —	40 —	— 50	**250**	**900**	**2175**	**2175**	**72**	**72**	**135**	**150**	**150**	**225**	**675**
69	76	20 —	25 —	40 —	50 —	— 60	**300**	**950**	**2175**	**2975**	**72**	**72**	**135**	**150**	**150**	**225**	**675**
81	85	25 —	30 —	50 —	60 —	— 75	**300**	**950**	**2175**	**2975**	**72**	**72**	**135**	**150**	**150**	**225**	**675**
96	105	30 —	30 —	60 —	75 —	— 75	**350**	**1000**	**2175**	**2975**	**72**	**72**	**135**	**150**	**150**	**225**	**675**
116	124	40 —	40 —	60 —	75 —	— 100	**400**	**1100**	**2975**	**2975**	**72**	**72**	**135**	**150**	**150**	**225**	**675**
147	147	50 —	50 —	75 —	100 —	— 155	**500**	**1150**	**2975**	**5800**	**72**	**72**	**135**	**275**	**275**	**350**	**1150**
181	181	60 —	60 —	100 —	150 —	— 150	**500**	**1150**	**2975**	**5800**	**72**	**72**	**135**	**275**	**275**	**350**	**1150**
215	245	75 —	75 —	150 —	150 —	— 200	**600**	**1550**	**5800**	**5800**	**72**	**72**	**135**	**275**	**275**	**350**	**1150**
270	300	75 —	100 —	150 —	200 —	— 250	**950**	**1850**	**5800**	**6500**	**72**	**72**	**135**	**450**	**450**	**525**	**1575**
389	430	125 —	150 —	250 —	300 —	— 400	**950**	**2100**	**5800**	**6500**	**72**	**72**	**135**	**450**	**450**	**525**	**1575**
429	515	150 —	150 —	300 —	350 —	— 400	**1250**	**2700**	**6500**	**7000**	**72**	**72**	**135**	**450**	**450**	**525**	**1575**

① Bypass contactor required.
② Includes emergency bypass control.
③ Subtract AC1 List price when AC1 rating ("M"suffix) is included in the catalog numbers shown on page 6.5.

Accessories

Accessories

Item	Suffix code ①	List price adder
Softstarters		
Door mounted reset	K	**$ 72**
E-Stop	T	**72**
Start-stop pushbutton	A	**72**
2 position selector switch	C	**72**
3 position selector switch	D	**72**
Pilot light run	E	**135**
Start-stop pushbutton & pilot light	F	**207**
2 position selector switch & pilot light	H	**207**
3 position selector switch & pilot light	J	**207**
Shunt rated (AC1) bypass contactor	M	see pg 6.7
Across the line rated (AC3) contactor with emergency bypass control ⑦	B	see pg 6.7
Isolation contactor	W	see pg 6.7
Electronic brake (standard duty)	Y	see pg 6.7
Electronic brake (heavy duty)	Z	see pg 6.7
Service entrance, 3-wire	SE3	**100**
Service entrance, 4-wire	SE4	**300**
Lightning arrestor	LA	**320**
Space heater, 100W with thermostat	SH	**600**
Auxiliary relays		
Type N control relay (4 pole)	CR	**150**
Electronic timer		
1.5 – 30s On Delay	TN30	**125**
5 –100s On Delay	TN100	**125**
1.5 – 30s Off Delay	TF30	**125**
5 –100s Off Delay	TF100	**125**
Phase failure phase reversal	PFPR	**375**
Undervoltage relay	UV	**150**
Overvoltage relay	OV	**180**
Ground fault protection	GFP	**1500**
Meters & metering		
Current transformer	CT	**250**
Ammeter (including C.T.)	AM	**470**
Ammeter & ammeter switch	AMS	**1800**
Voltmeter	VM	**1200**
Voltmeter & voltmeter switch	VMS	**1800**
Elapsed time meter	ETM	**350**
Operation counter	OC	**375**
Wattmeter	WM	**2450**

Control transformers

Size	Standard VA	Price adder for extra VA	
		100VA	250VA
PSS18/30 – PSS 142/245	75	**$ 175**	**—**
PSS175/300 – PSS300/515	150	**225**	**$ 300**

Additional auxiliary contact blocks for bypass or isolation contactors

Contact configuration	Suffix code	List Price adder
1 N.O. & 1 N.C.	11	**$ 54**
2 N.O. & 2 N.C.	22	**98**
3 N.O. & 3 N.C.	33	**142**

Terminal block to increase connection capacity ③

Wire range	For softstarter	Catalog number	List price
#8 - #1 (1 per phase)	PSS18 – PSS44	PSLW-44	**$ 65**
#6 - 2/0 (1 per phase) or #4 - 1/0 (2 per phase)	PSS50 – PSS72	PSLW-72	**70**

Terminal lug kits ④

Wire range	For softstarter ⑤	Catalog number	List price
#6 - 250 MCM (1 per phase)	PSS85 – PSS142	PSLK-185	**$ 150**
#4 - 400 MCM (1 per phase)	PSS175 – PSS300	PSLK-300	**195**
#4 - 500 MCM (2 per phase)	PSS175 – PSS300	PSLK-300/2	**280**

Terminal covers (Includes line & load covers)

For softstarter	Catalog ⑥ number	List price
PSS85 – PSS142	K4LCH	**$ 16**
PSS175 – PSS300	K5LCH	**24**

Current transformers for current limit function ②

Technical data	For softstarter	Catalog number	List price
60/1 – 2 turns	PSS18/30	PSCT-60	**$ 70**
40/1 – 1 turn	PSS30/52	PSCT-40	
50/1 – 1 turn	PSS37/64	PSCT-50	
60/1 – 1 turn	PSS44/76	PSCT-60	
75/1 – 1 turn	PSS50/85	PSCT-75	**130**
75/1 – 1 turn	PSS60/105	PSCT-75	
100/1 – 1 turn	PSS72/124	PSCT-100	
125/1 – 1 turn	PSS85/147	PSCT-125	
150/1 – 1 turn	PSS105/181	PSCT-150	
200/1 – 1 turn	PSS142/245	PSCT-200	
250/1 – 1 turn	PSS175/300	PSCT-250	
400/1 – 1 turn	PSS250/430	PSCT-400	
400/1 – 1 turn	PSS300/515	PSCT-400	

① Add the suffix code after the last digit of the catalog number.
② 1 VA minimum.
③ Stranded conductors.
④ Includes line/load lugs and hardware.
⑤ Softstarters listed are provided with terminating bus tabs as standard.
⑥ Discount schedule SA.
⑦ Control includes panel mounted Norm/E-Bypass switch, START/STOP pushbutton & Class 10 external overload unless otherwise specified.

Discount schedule PSS – Terminal blocks, lug kits, & current transformers
Discount schedule PSSE – Accessories, aux contact blocks
Discount schedule SA — Terminal covers

PSS03 – PSS25 and PSS18/30 – PSS300/515

		PSS03 – PSS12	PSS25	PSS18/30 – PSS300/515
Rated insulation voltage U_z	V	630	630	690
Rated operational Voltage U_e	V	220 – 600	220 – 600	200 – 690
SCR PIV ratings				
up to 500V		1200	1200	1600
up to 600V		1600	1600	1800
Starting capacity at max. rated current I_e		5 x I_e for 5 sec	5 x I_e for 5 sec	500% for 30 sec
Number of starts per hour [1]		6	6	30 ⑥
Overload class	A	10	10	10
Service factor	%	100	100	115 110 (PSS300/515)
Ambient temperature				
During operation	°C	-20 to +50	-20 to +50	-20 to +60 ②
During storage	°C	-40 to +70	-40 to +70	-40 to +70
Degree of protection				
Main circuit		IP20	IP20	IP20 (PSS18/30-500 – PSS44/76-500) IP10 (PSS50/85-500 – PSS72/124/-500) IP10 (PSS18/30-690 – PSS72/124-690) IP00 (PSS85/147 – PSS300/515)
Supply and control circuit		IP20	IP20	IP20
Settings				
Ramp time during start	s	0.5 – 6.5	0.5 – 10	1 – 30
Ramp time during stop	s	0.5 – 8	0.5 – 20	0 – 30
Initial voltage during start	%	0 – 85	5 – 50	30 – 70
Current limit function	xI_e	No	No	1.5 – 4 ③
Switch for				
Inside delta connection ON/OFF		No	No	Yes
Signal relay				
Bypass signal		No ④	No ④	Yes
Fault signal		No	No	Yes
Rated operational voltage U_e	V	—	—	250
Rated thermal current I_{th}	A	—	—	5
Rated operational current I_e				
at AC 15 (U_e=250V)	A	—	—	1.5
Signal indication LED				
Ready to start/stand by	ON	Green	Green	Green
Ramping up/down		Yellow	Yellow (flashing)	No
Completed start ramp	T.O.R.	Yellow	Yellow	Green
General fault (internal)	F1	—	Red	Red
External fault (phase loss)	F2	—	—	Red

Size related data

Size	Type	A	Max. power loss at max I_e W	Max. SCR fuse rating (optional)	Bussman fuses	Power requirements of supply circuit VA
PSS03	TA25DU	2.2 – 3.1	—	16A	170M1359	2
PSS12	TA25DU	10 – 14	—	40A	170M1363	2
PSS25	TA25DU	18 – 25	—	50A	170M1364	5
PSS18/30	TA25DU	6 – 18	⑤	50A	170M1364	9
PSS30/52	TA25DU	10 – 30	⑤	80A	170M1366	9
PSS37/64	TA42DU	22 – 37	⑤	125A	170M1368	9
PSS44/76	TA75DU	29 – 44	⑤	160A	170M1369	9
PSS50/85	TA75DU	29 – 50	⑤	160A	170M1369	10
PSS60/105	TA75DU	29 – 60	⑤	200A	170M1370	10
PSS72/124	TA75DU	45 – 72	⑤	250A	170M1371	10
PSS85/147	TA110DU	65 – 85	⑤	315A	170M1372	36
PSS105/181	TA110DU	65 – 105	⑤	400A	170M3019	36
PSS142/245	TA200DU	100 – 142	⑤	450A	170M3020	36
PSS175/300	TA200DU	100 – 175	⑤	500A	170M3021	65
PSS250/430	TA450DU	130 – 250	⑤	700A	170M4017	65
PSS300/515	TA450DU	130 – 300	⑤	900A	170M5015	65

① When more than six starts per hour are required, contact your sales office.
② Above 40°C, up to max 60°C, reduce the rated current with 0.8% per °C.
③ Only if current transformer is connected (accessory).
④ The unit has built-in bypass contacts (AC-53b).
⑤ Total power loss: $P_{Ltot} = [3 \times I_e \times 1.0] + 50$ (W), reduced to 50W only when using by-pass.
⑥ 50% on and 50% off, 3.5 times rated current and 7 second starting time.

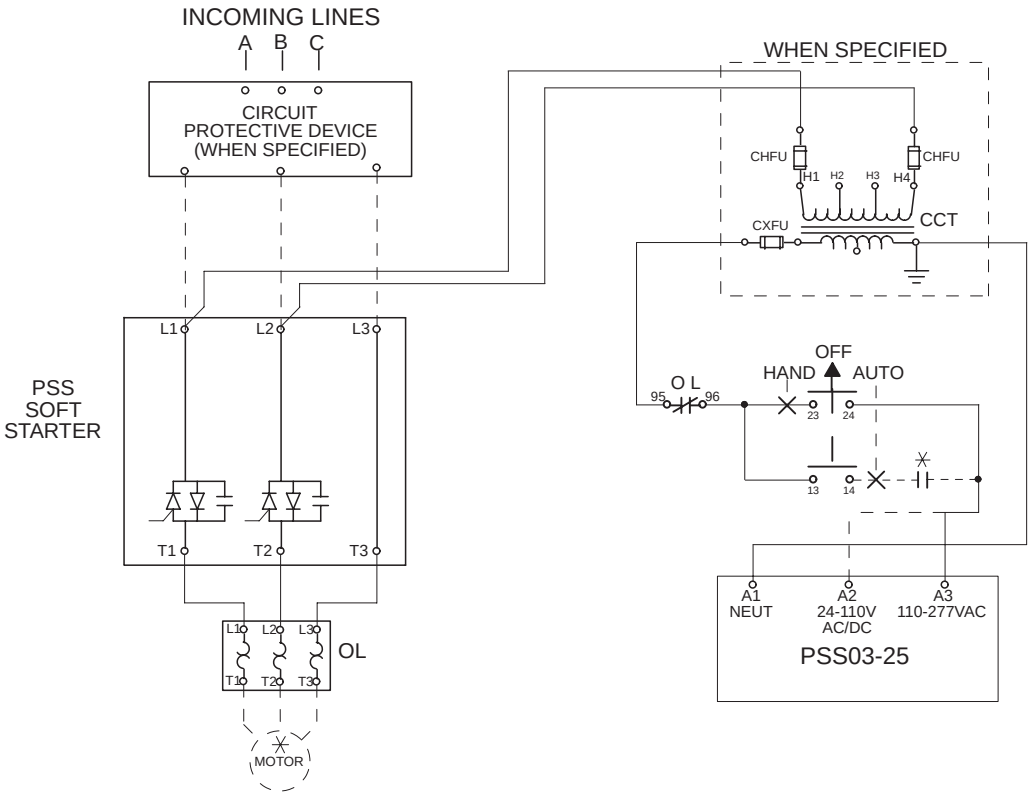
Technical data

Cross section of connection cables PSS03 – PSS25 and PSS18/30 – PSS300/515

Type PSS		PSS03 – PSS12	PSS25	PSS18/30-500 – PSS44/76-500	PSS50/85-500 – PSS72/124-500 & PSS18/30-690 – PSS72/124-690	PSS85/147-500 – PSS142/245-500 & PSS85/147-690 – PSS142/245-690	PSS175/300-500 – PSS300/515-500 & PSS175/300-690 – PSS300/515-690
Main circuit							
Connection clamp							
Rigid solid/rigid stranded	1x	AWG 12	AWG 6	AWG 4 - 8	AWG 1 - 8	—	—
Rigid solid/rigid stranded	2x	AWG 12	AWG 8	AWG 4 - 8	AWG 4 - 8	—	—
Tightening torque (for guidance only) max.	lb./in	4.3	17.5	23	40	—	—
Terminal lugs ①							
Rigid solid / rigid stranded	1x	—	—	—	—	#6 - 250 MCM	#4 - 400 MCM
Rigid solid / rigid stranded	2x	—	—	—	—	—	#4 - 500 MCM
Tightening torque (for guidance only) max.	lb./in	—	—	—	—	300	375
Connection bar							
Width and thickness	mm	—	—	—	—	17.5 x 5	20 x 5
Hole diameter	mm	—	—	—	—	8.5	10.2
Tightening torque (for guidance only) max.	lb./in	—	—	—	—	79	155
Supply and control circuit							
Connection clamp							
Rigid solid/rigid stranded	1x	AWG 12	AWG 12	AWG 12	AWG 12	AWG 12	AWG 12
Rigid solid/rigid stranded	2x	AWG 12	—	—	—	—	–
Tightening torque (for guidance only) max.	lb./in	4.3	4.3	4.3	4.3	4.3	4.3

① See accessories on page 6.8.

Circuit diagrams
PSS03 – PSS25

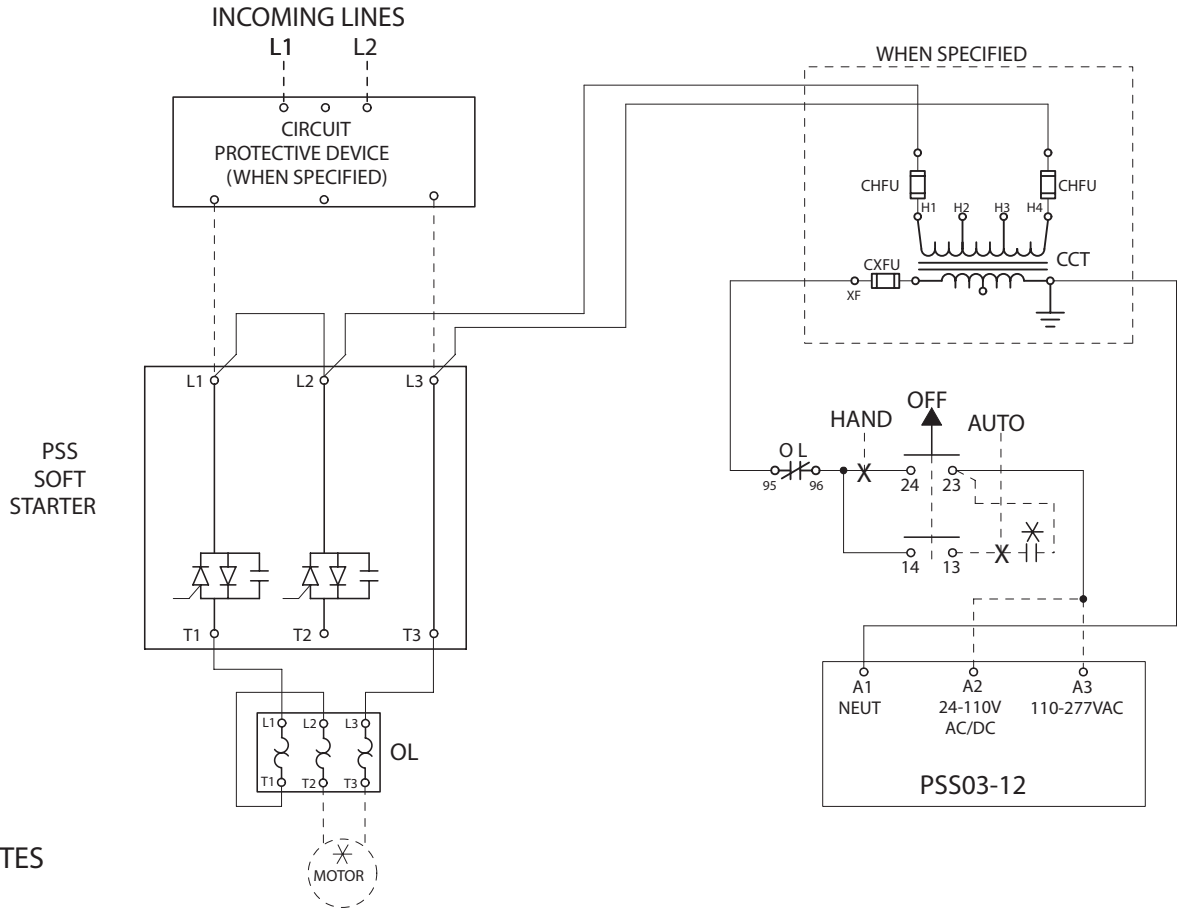


NOTES

1. ALL CONTROL WIRING TO BE 18GA.
   COLOR OF CONTROL WIRE SHALL BE
   PER VOLTAGE OF CONTACTOR COILS:
   RED - ALL AC VOLTAGES
   WHITE MAY BE USED ON THE
   GROUNDED SIDE OF THE AC
   CIRCUIT IF SPECIFIED.
   BLUE - ALL DC VOLTAGES
2. ALL DEVICES ARE SHOWN DE-ENERGIZED.
3. DO NOT USE SELECTOR SWITCHES WITH
   AUTO-RESET OVERLOAD RELAYS.

LEGEND	
CCT	CONTROL CIRCUIT TRANSFORMER
CHFU	CCT PRIMARY FUSE
CXFU	CCT SECONDARY FUSE
B	BYPASS CONTACTOR
OL	OVERLOAD RELAY
$\circ_{13}$	CONN POINT ON DEVICE WITH NUMBER
⊁	REMOTE DEVICE
⌀	CONN POINT AT TERMINAL BLOCK

Circuit diagrams
Single-Phase ①②
PSS03 – PSS12



NOTES

1. ALL CONTROL WIRING TO BE 18GA.
   COLOR OF CONTROL WIRE SHALL BE
   PER VOLTAGE OF CONTACTOR COILS:
   RED - ALL AC VOLTAGES
   WHITE MAY BE USED ON THE
   GROUNDED SIDE OF THE AC
   CIRCUIT IF SPECIFIED.
   BLUE - ALL DC VOLTAGES

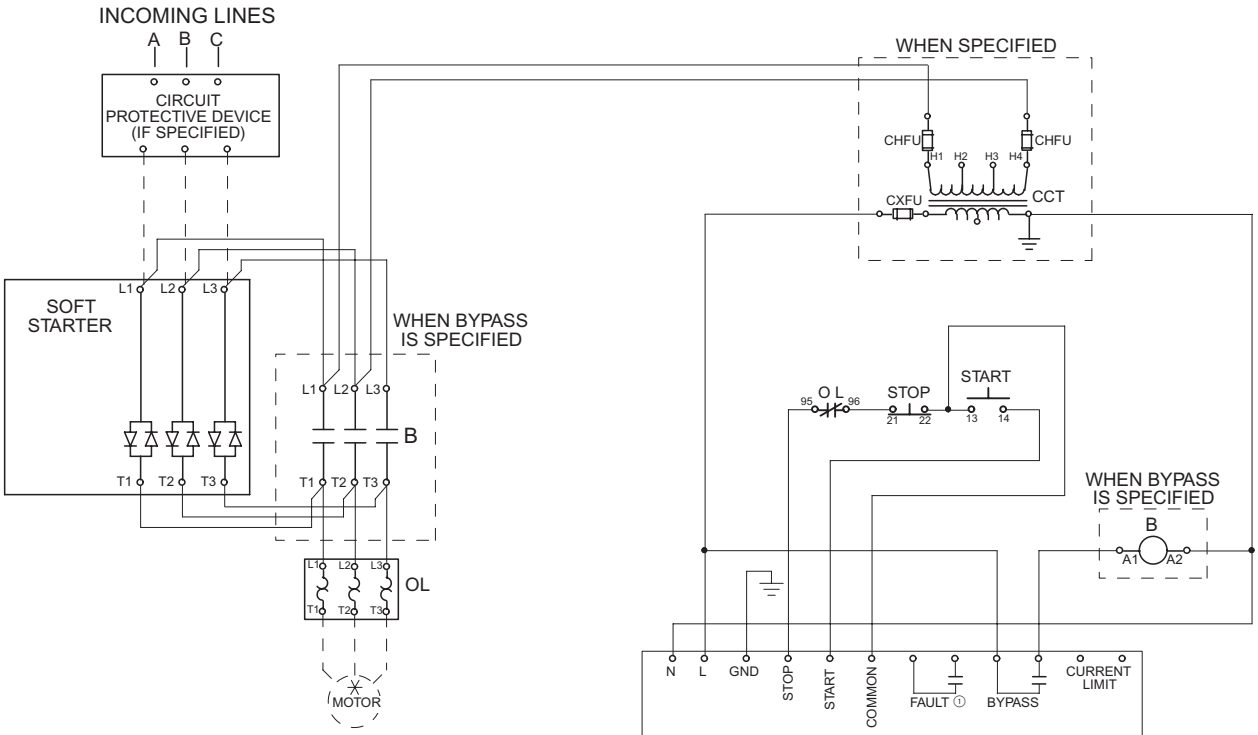
2. ALL DEVICES ARE SHOWN DE-ENERGIZED.

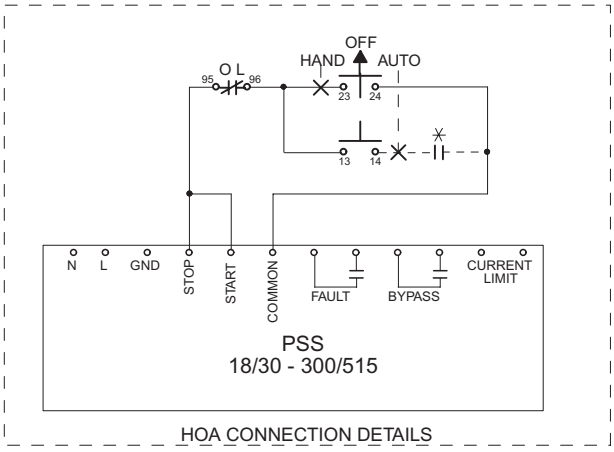
3. DO NOT USE SELECTOR SWITCHES WITH
   AUTO-RESET OVERLOAD RELAYS.

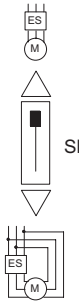
LEGEND	
CCT	CONTROL CIRCUIT TRANSFORMER
CHFU	CCT PRIMARY FUSE
CXFU	CCT SECONDARY FUSE
OL	OVERLOAD RELAY
$\circ_{13}$	CONN POINT ON DEVICE WITH NUMBER
✳	REMOTE DEVICE
∅	CONN POINT AT TERMINAL BLOCK

① Softstarter voltage rating must be the same as the network voltage.
② PSS25 cannot be used for single phase applications.

Circuit diagrams
PSS18/30 – PSS300/515, In-line motor configuration







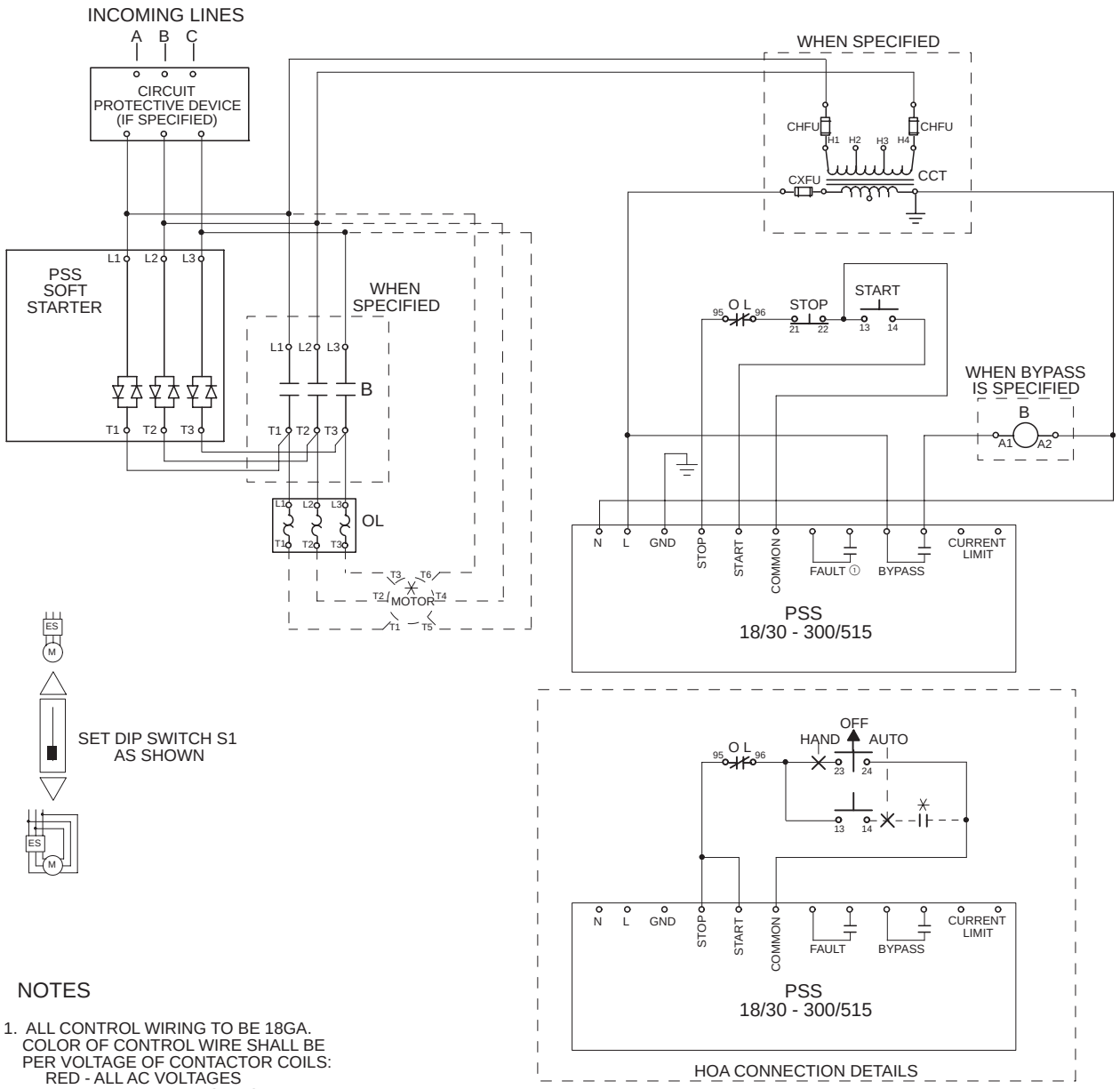
SET DIP SWITCH S1
AS SHOWN

NOTES

1. ALL CONTROL WIRING TO BE 18GA. COLOR OF CONTROL WIRE SHALL BE PER VOLTAGE OF CONTACTOR COILS:
   RED - ALL AC VOLTAGES
   WHITE MAY BE USED ON THE GROUNDED SIDE OF THE AC CIRCUIT IF SPECIFIED.
   BLUE - ALL DC VOLTAGES
2. ALL DEVICES ARE SHOWN DE-ENERGIZED.
3. DO NOT USE SELECTOR SWITCHES WITH AUTO-RESET OVERLOAD RELAYS.

LEGEND	
CCT	CONTROL CIRCUIT TRANSFORMER
CHFU	CCT PRIMARY FUSE
CXFU	CCT SECONDARY FUSE
B	BYPASS CONTACTOR
OL	OVERLOAD RELAY
°13	CONN POINT ON DEVICE WITH NUMBER
⚹	REMOTE DEVICE
⌀	CONN POINT AT TERMINAL BLOCK

Circuit diagrams
PSS18/30 – PSS300/515, Delta motor configuration



NOTES

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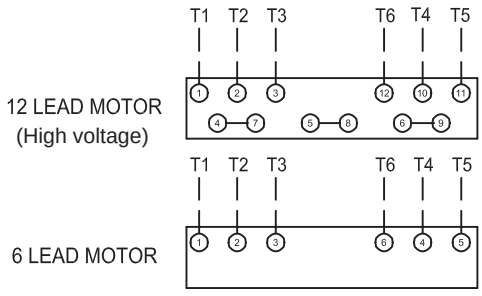
   RED - ALL AC VOLTAGES
   WHITE MAY BE USED ON THE GROUNDED SIDE OF THE AC CIRCUIT IF SPECIFIED.
   BLUE - ALL DC VOLTAGES
2. ALL DEVICES ARE SHOWN DE-ENERGIZED.
3. DO NOT USE SELECTOR SWITCHES WITH AUTO-RESET OVERLOAD RELAYS.

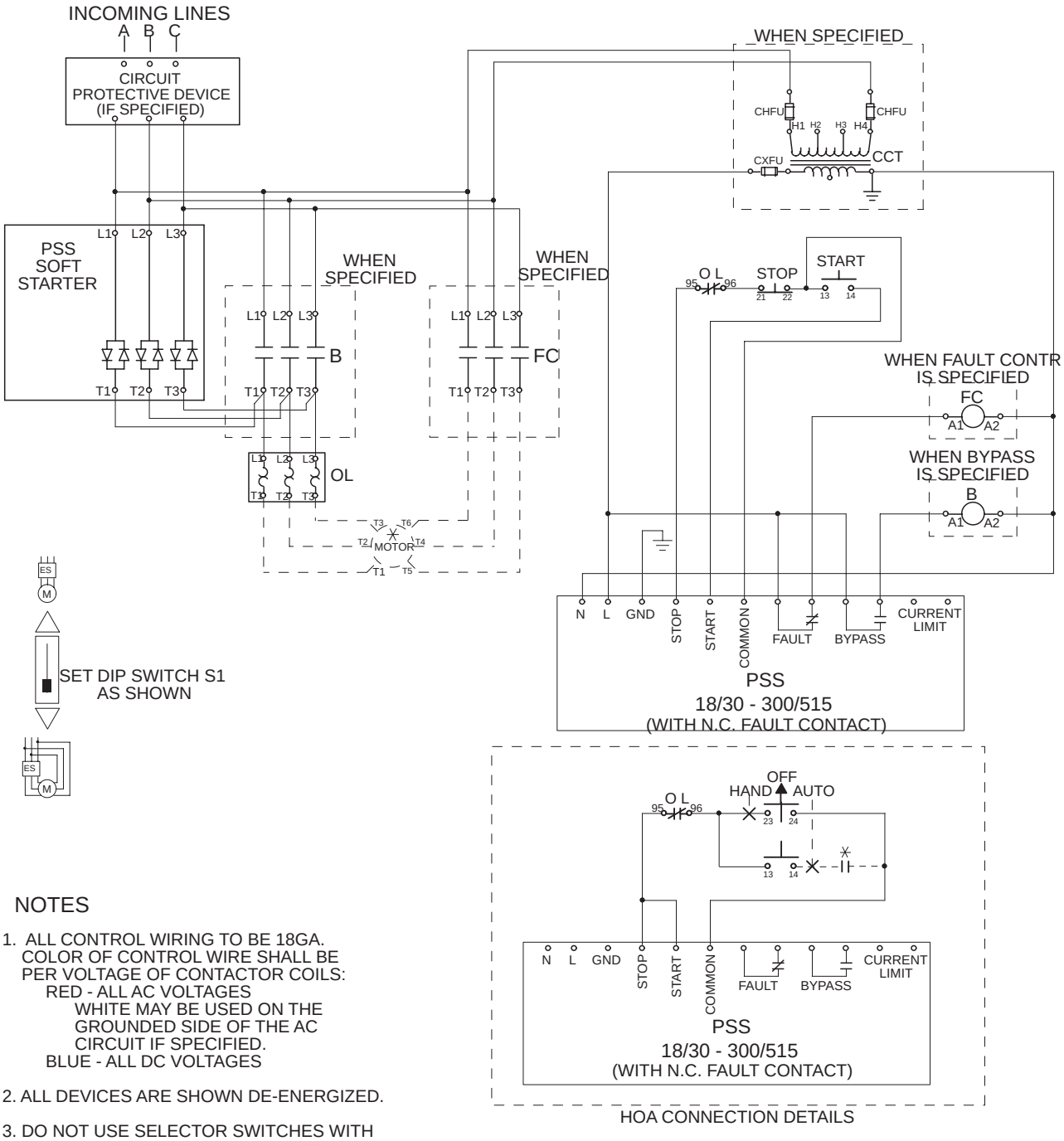
LEGEND	
CCT	CONTROL CIRCUIT TRANSFORMER
CHFU	CCT PRIMARY FUSE
CXFU	CCT SECONDARY FUSE
B	BYPASS CONTACTOR
OL	OVERLOAD RELAY
°13	CONN POINT ON DEVICE WITH NUMBER
⚹	REMOTE DEVICE
Ø	CONN POINT AT TERMINAL BLOCK

MOTOR MARKINGS ARE AS DEFINED BY NEMA MG1-2.62 FOR 12 LEAD WYE START, DELTA RUN MOTOR CONNECTIONS. ALWAYS CONFIRM CORRECT LEAD MARKINGS WITH NAMEPLATE DIAGRAMS.



Circuit diagrams

PSS18/30 – PSS300/515, Delta motor configuration
Fault contactor

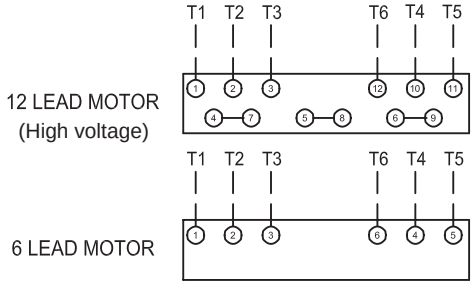


NOTES

1. ALL CONTROL WIRING TO BE 18GA. COLOR OF CONTROL WIRE SHALL BE PER VOLTAGE OF CONTACTOR COILS:
   RED - ALL AC VOLTAGES
   WHITE MAY BE USED ON THE GROUNDED SIDE OF THE AC CIRCUIT IF SPECIFIED.
   BLUE - ALL DC VOLTAGES
2. ALL DEVICES ARE SHOWN DE-ENERGIZED.
3. DO NOT USE SELECTOR SWITCHES WITH AUTO-RESET OVERLOAD RELAYS.

LEGEND	
CCT	CONTROL CIRCUIT TRANSFORMER
CHFU	CCT PRIMARY FUSE
CXFU	CCT SECONDARY FUSE
B	BYPASS CONTACTOR
OL	OVERLOAD RELAY
°13	CONN POINT ON DEVICE WITH NUMBER
⊁	REMOTE DEVICE
⌀	CONN POINT AT TERMINAL BLOCK

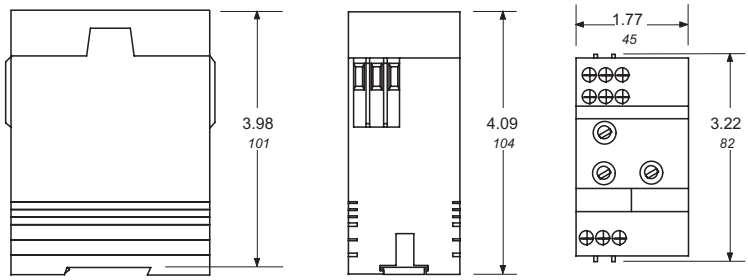
MOTOR MARKINGS ARE AS DEFINED BY NEMA MG1-2.62 FOR 12 LEAD WYE START, DELTA RUN MOTOR CONNECTIONS. ALWAYS CONFIRM CORRECT LEAD MARKINGS WITH NAMEPLATE DIAGRAMS.



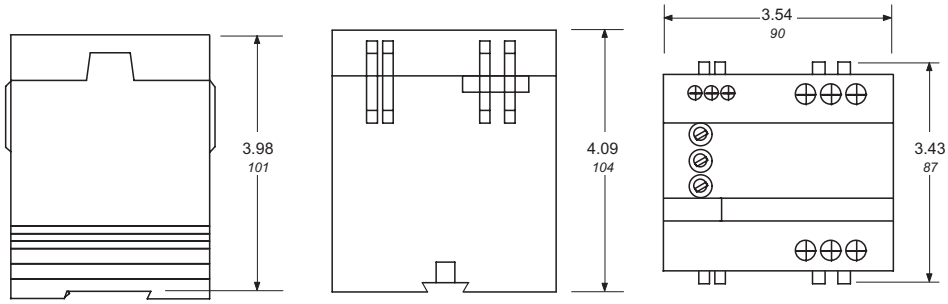
Approximate dimensions
Open, PSS03 – PSS18-72

00.00 Inches
00.00 [Millimeters]

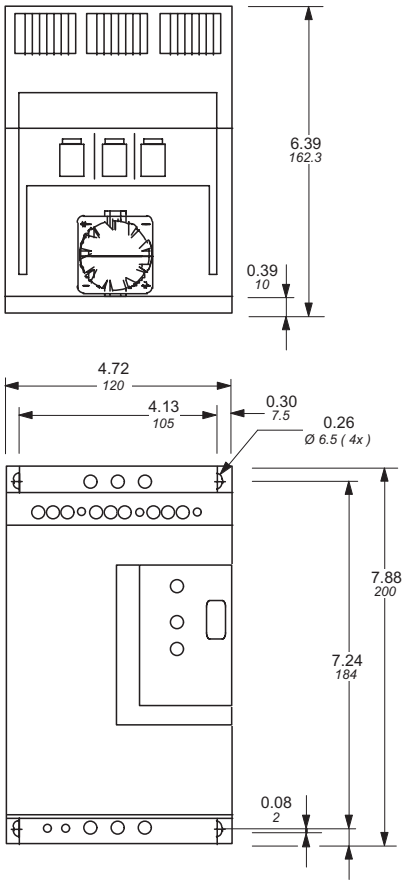
PSS03, PSS12



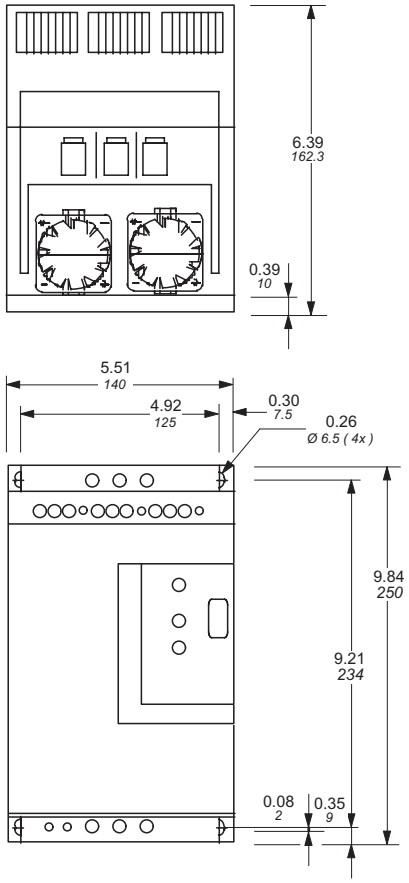
PSS25



PSS18 to PSS44 (208V – 480V)



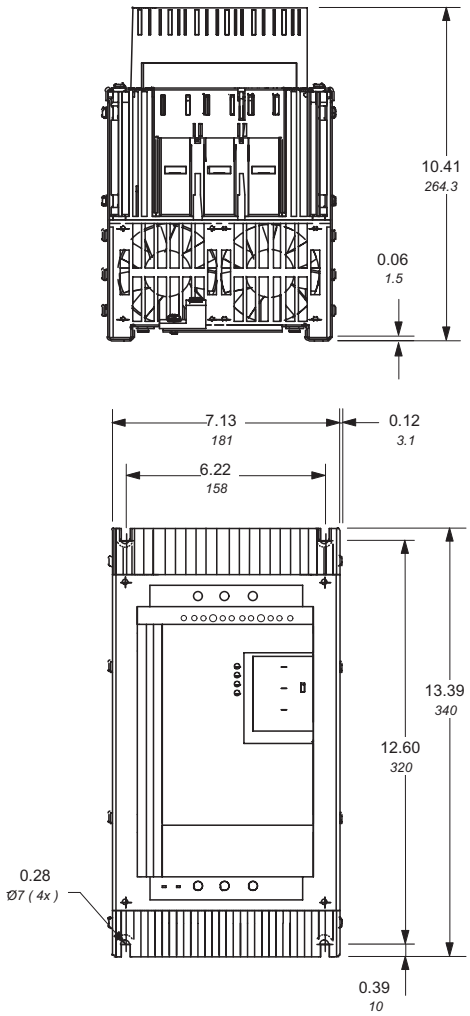
PSS18 to PSS72 (690V)
PSS50 to PSS72 (208 – 480V)



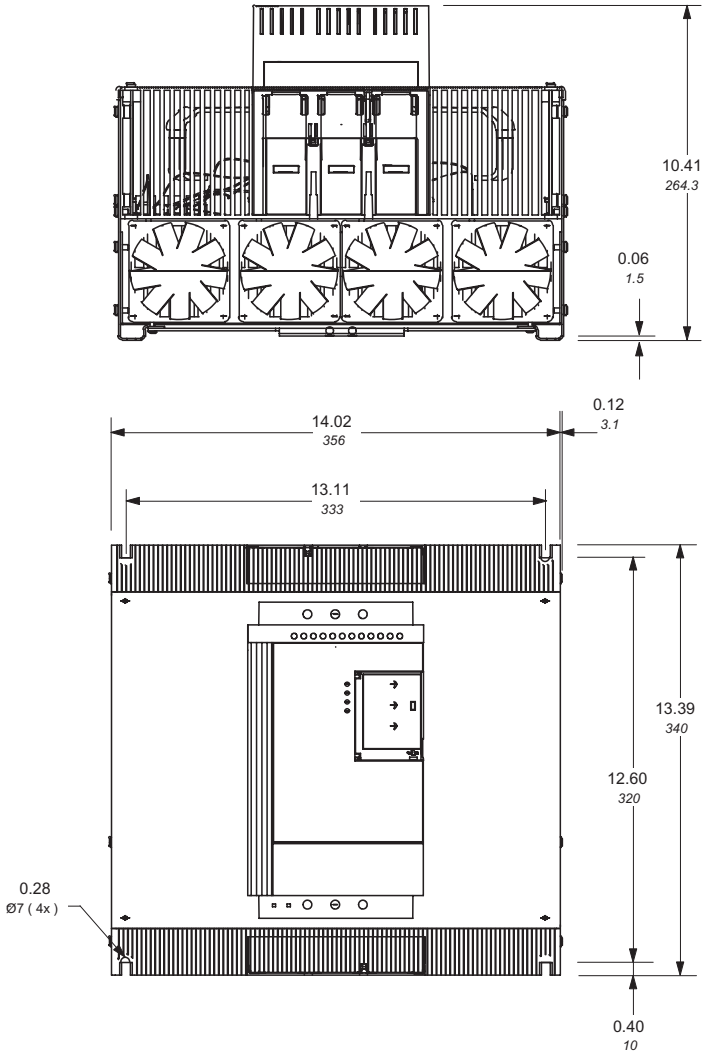
Approximate dimensions
Open, PSS85 – PSS300

00.00
00.00
Inches
[Millimeters]

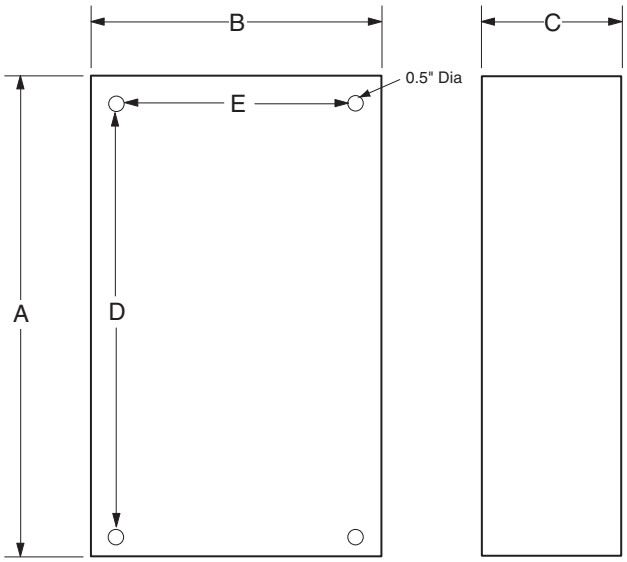
PSS85 to PSS142 (208V – 690V)



PSS175 to PSS300 (208V – 690V)



Approximate dimensions
Enclosed



208V – 500V

Softstarter type	Softstarter combination	Dimensions In-line (in.)					Dimensions Inside delta (in.)				
		A	B	C	D	E	A	B	C	D	E
PSS18/30-500 thru PSS44/76-500	Softstarter only	20	20	12	18.50	18.50	20	20	12	18.50	18.50
	Softstarter with bypass	20	20	12	18.50	18.50	20	20	12	18.50	18.50
	Softstarter with fused disconnect ①	20	20	12	18.50	18.50	20	20	12	18.50	18.50
	Softstarter with circuit breaker ①	20	20	12	18.50	18.50	20	20	12	18.50	18.50
PSS50/85-500 thru PSS72/124-500	Softstarter only	20	20	12	18.50	18.50	20	20	12	18.50	18.50
	Softstarter with bypass	20	20	12	18.50	18.50	20	20	12	18.50	18.50
	Softstarter with fused disconnect ①	20	20	12	18.50	18.50	24	20	12	22.50	18.50
	Softstarter with circuit breaker ①	20	20	12	18.50	18.50	20	20	12	18.50	18.50
PSS85/147-500 thru PSS142/245-500	Softstarter only	24	24	12	22.50	22.50	24	24	12	22.50	22.50
	Softstarter with bypass	24	24	12	22.50	22.50	24	24	12	22.50	22.50
	Softstarter with fused disconnect ①	36	30	12	34.50	28.50	36	30	12	34.50	28.50
	Softstarter with circuit breaker ①	30	24	12	28.50	22.50	30	24	12	28.50	22.50
PSS175/300-500 thru PSS300/515-500	Softstarter only	36	30	12	34.50	28.50	42	36	12	40.50	34.50
	Softstarter with bypass	36	30	12	34.50	28.50	42	36	12	40.50	34.50
	Softstarter with fused disconnect ①	48	36	16	46.50	34.50	48	36	16	46.50	34.50
	Softstarter with circuit breaker ①	42	36	12	40.50	34.50	48	36	16	46.50	34.50

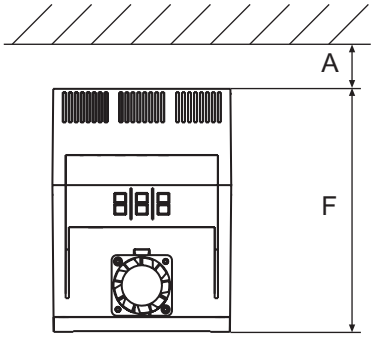
575V – 690V

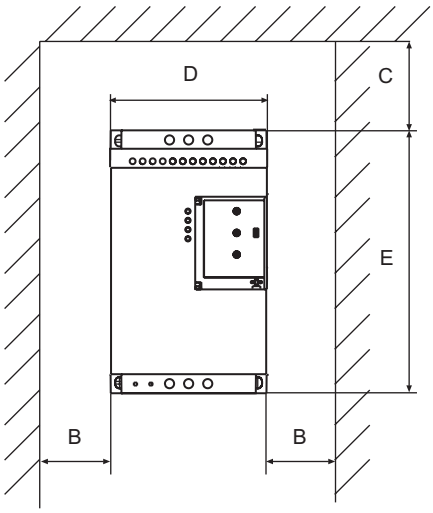
PSS18/30-690 thru PSS72/124-690	Softstarter only	20	20	12	18.50	18.50	20	20	12	18.50	18.50
	Softstarter with bypass	20	20	12	18.50	18.50	20	20	12	18.50	18.50
	Softstarter with fused disconnect ①	20	20	12	18.50	18.50	20	20	12	18.50	18.50
	Softstarter with circuit breaker ①	20	20	12	18.50	18.50	20	20	12	18.50	18.50
PSS85/147-690 thru PSS142/245-690	Softstarter only	24	24	12	22.50	22.50	24	24	12	22.50	22.50
	Softstarter with bypass	24	24	12	22.50	22.50	24	24	12	22.50	22.50
	Softstarter with fused disconnect ①	36	30	12	34.50	28.50	36	30	12	34.50	28.50
	Softstarter with circuit breaker ①	30	24	12	28.50	22.50	30	24	12	28.50	22.50
PSS175/300-690 thru PSS300/575-690	Softstarter only	36	30	12	34.50	28.50	42	36	12	40.50	34.50
	Softstarter with bypass	36	30	12	34.50	28.50	42	36	12	40.50	34.50
	Softstarter with fused disconnect ①	48	36	16	46.50	34.50	48	36	16	46.50	34.50
	Softstarter with circuit breaker ①	42	36	12	40.50	34.50	48	36	16	46.50	34.50

① Dimensions remain the same if bypass contactor is added.

Approximate dimensions
Mounting information

Minimum distance to wall / front





Approximate dimensions (in./mm)

Catalog number	Dimensions D	E	F
PSS18/30-500 – 44/76-500	4.7/120	7.9/200	6.4/163
PSS50/85-500 – 72/124-500 PSS18/30-690 – 72/124-690	5.5/140	9.8/250	6.4/163
PSS85/147-500 – 142/245-500 PSS85/147-690 – 142/245-690	7.1/181	13.4/340	10.4/265
PSS175/300-500 – 300/515-500 PSS175/300-690 – 300/515-690	14/356	13.4/340	10.4/265

Minimum distance to wall / front (in./mm)

A = .79/20
B = .39/10
C = 3.9/100 – both top and bottom

Notes

Softstarters
Type PST

Description

- Wide main voltage range, 200 - 690 VAC
- Wide control voltage range, 100 - 250 V, 50/60 Hz
- Current ratings 30 to 1050 A (In Line) and 52 - 1800 A (Inside Delta)
- Same unit can be used for both In Line and Inside Delta connection
- Premium adjustable Softstarter functions like start/stop ramp, kick start, jog, step down voltage and sequential starts
- Current limit adjustable between 200% to 500% of motor FLA
- Thermistor (PTC) supervision of motor winding
- Real time clock
- Logging of last 20 events with time stamp
- Prepared for Field-bus communication
- Programmable electronic overloads: Classes 10A, 10, 20 & 30
- Locked rotor protection
- Motor underload protection
- Phase imbalance protection
- Phase reversal protection

Softstarters
Type PST

General information
Catalog number explanation
Open & enclosed

Open

PST B 370 600 - 70

Softstarter
Type PST

Bypass
No digit – No integrated bypass
B – Integrated bypass

Current rating

UL / IEC	UL / IEC
30 – 28/30	210 – 192/210
37 – 34/37	250 – 248/250
44 – 42/44	300 – 302/300
50 – 54/50	370 – 361/370
72 – 68/72	470 – 480/470
85 – 80/85	570 – 590/570
105 – 104/105	720 – 720/720
142 – 130/142	840 – 840/840
175 – 156/175	1050 – 1062/1050

Line voltage
600 – 208/230/480/600 V
690 – 690 V ③

Control voltage
70 – 100 - 250 V, 50/60 Hz

Enclosed

T 100 D F 1 – 48 D A

Soft starter settings
T – Type PST Enclosed

Horsepower

010 – 10	125 – 125	800 – 800
015 – 15	150 – 150	900 – 900
020 – 20	200 – 200	1000 – 1000
025 – 25	250 – 250	1200 – 1200
030 – 30	300 – 300	1400 – 1400
040 – 40	350 – 350	1500 – 1500
050 – 50	400 – 400	1600 – 1600
060 – 60	450 – 450	1700 – 1700
075 – 75	500 – 500	1800 – 1800
100 – 100	600 – 600	

Connection type
L – Inline
D – Inside Delta

Combination type
No digit – non-combination
F – fusible disconnect
B – thermal magnetic circuit breaker
M – magnetic only breaker
N – non-fusible disconnect

Enclosure
1 – NEMA 1
2 – NEMA 12 ②
3 – NEMA 3R ②
4 – NEMA 4 ②
X – NEMA 4x stainless steel ②

Options ①
A – Start-stop pushbutton
B – Across the line rated (AC3) contactor with emergency bypass control
C – 2 position selector switch
D – 3 position selector switch
E – Pilot light
F – Start-stop pushbutton and pilot light
H – 2 position selector switch and pilot light
J – 3 position selector switch and pilot light
M – Shunt rated (AC1) bypass contactor
W – Isolation contactor

Fuse clip

A – 30A, 600V, Class J	H – 1200A, 600V, Class L
B – 60A, 600V, Class J	J – 1600A, 600V, Class L
C – 100A, 600V, Class J	K – 2000A, 600V, Class L
D – 200A, 600V, Class J	L – 2500A, 600V, Class L
E – 400A, 600V, Class J	M – 3000A, 600V, Class L
F – 600A, 600V, Class J	N – 4000A, 600V, Class L
G – 800A, 600V, Class L	

Circuit Breaker Amp Ratings

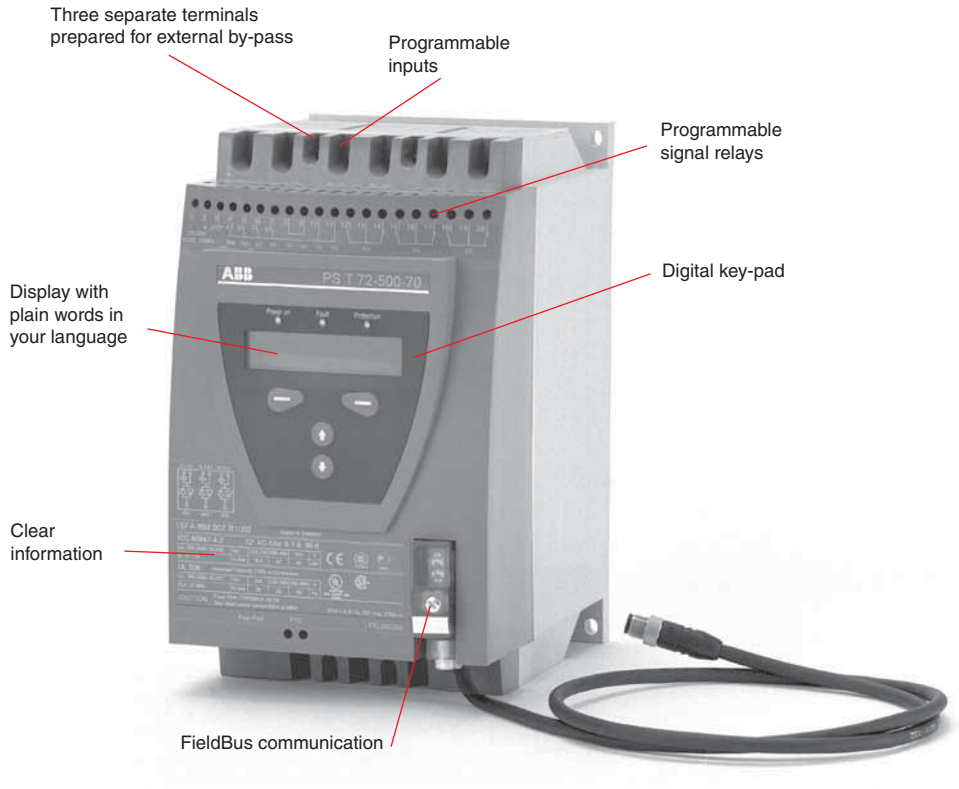
D – 15	M – 70	W – 225	E – 700	N – 3000
E – 20	N – 80	X – 250	F – 800	
F – 25	P – 90	Y – 300	G – 900	
G – 30	R – 100	Z – 350	H – 1000	
H – 35	S – 125	A – 400	J – 1200	
J – 40	T – 150	B – 450	K – 1600	
K – 50	U – 175	C – 500	L – 2000	
L – 60	V – 200	D – 600	M – 2500	

MCP/MAG Only Rating

A – 3	E – 50	J – 400
B – 5	F – 100	K – 600
C – 10	G – 150	L – 800
D – 25	H – 225	M – 1200

Line voltage
20: 208V 120V control voltage
23: 230V 120V control voltage
38: 380V 220V control voltage
41: 415V 220V control voltage
48: 480V 120V control voltage
60: 600V 120V control voltage

① For more options, see page 6.27
② Bypass contactor required when integrated bypass is not included.
③ Add 30% to the list price.

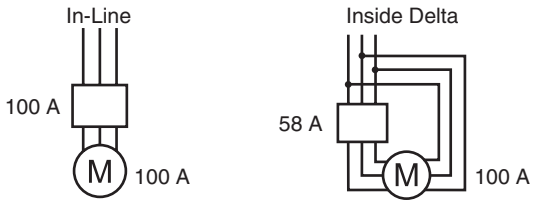


Application

The PST range is a microprocessor based softstarter designed with the latest technology for soft start and soft stop of motors. The PST Softstarter has several advanced motor protection features as standard. The four button key pad and the logic structure of the menu makes the installation, commissioning and operation easy. It is possible to choose between 12 different languages.

The PST Softstarter can be used with or without a by-pass contactor. The larger sizes, PSTB370 – PSTB1050, include a built-in by-pass contactor.

The PST Softstarter can be selected according to the rated motor power in normal duty applications like pumps, compressors, elevators, escalators, short conveyor belts and bow thrusters.



In-Line and Inside Delta connection of PST30 - 1050

Digital display

Your business is going global. Shouldn't your motor control go global, too? The PST display gives you information presented in plain words — in your language. You can choose between almost a dozen languages including English, German, Italian, Chinese, Finnish, Swedish, French, Spanish, Dutch, Russian, Turkish and Portuguese. On the PST display, you get all the information you need to set up, adjust and trouble-shoot. This makes the PST extremely easy to handle and reduces the risk of misinterpretations.

At any time, you can read output current, output voltage, number of starts, total run time and motor temperature on the display. If a fault should occur, this is also indicated on the display. The fault messages are presented in clear text in the selected language.

General information
Application and description

Four button keypad
The PST employs the same basic user concept as today's advanced mobile telephones. Using the four buttons on the keypad, you can easily adjust your own start and stop profile and motor protection functions for any type of application. There are standard settings for many common applications including pumps, conveyors, fans, mixers and compressors for quick and easy set up.

You can also set the advanced warning parameters to allow potential problems to be identified before real problems occur. A password protection function is available to prevent unauthorized changes to the programming.

Remote four button keypad
This optional remote keypad is an extended HMI (human-machine interface) for all PST(B) softstarters. The remote keypad allows you to access all functions from the PST(B) on the outside of the enclosure door.

The interface/display is exactly the same as the one on the softstarter (working in parallel with the one on the product). Used as a handheld device, it is easy to set up parallel softstarter units as you can copy data from one softstarter unit and download to another.

The keypad kit includes all necessary details for assembling: 3 screws, 10 ft. communication cable, installation instructions and a drilling plan.

The keypad has the following approvals: UL Type 1, 12, Indoor 4/4X.

Starting several motors
You can store as many as three different starting parameter sets for optimal sequence start of three different motors. You can use this function for two or three speed motors as well.

Integrated advanced motor protection
Inside the PST Softstarter, you will find useful features for advanced motor and softstarter protection, including: programmable overload protection, high current, underload, phase imbalance, phase reversal, thyristor overload protection, and bypass monitoring to ensure proper by-pass operation.

Programmable signal relays
All PST units have three programmable signal relays where each relay can signal Run, Top of Ramp or Event. The Event setting can be used to signal fault protections or warnings. The supervisory functions monitor not only software and critical softstarter functionality but also phase loss and out of frequency range.

Integrated by-pass contactor
On the larger sizes (PSTB370 – PSTB1050), there is an integrated ABB AF contactor. This gives you advantages in terms of cost-saving, (less investment in fans, cables, time), space saving (more compact soft starter; no fan that takes up space), and last but not least, energy saving. With a by-pass contactor you can reduce the power losses during normal run by 90% or more.

For the smaller PST below 370A, which are not equipped with built-in contactors, the units have double connections for the main terminals on the line side. The extra terminals are used to connect an external by-pass contactor in order to enable the integrated protection functions.

PSTB1050 with integrated by-pass contactor.

Fieldbus communication
The PST Softstarter has a built-in interface on the front for connection of the ABB FieldBusPlug used for fieldbus communication. Through this interface, it is possible to control the softstarter, achieve status information, upload and download parameters. The interface between the softstarter and the FieldBusPlug is always the same. Independently of PST Softstarter size or delivery date, it is possible to connect to any fieldbus protocol later on since this is defined in the FieldBusPlug itself. The following protocols are currently available: AS-I, DeviceNet and Profibus DP. To connect the PST Softstarter to a fieldbus system, you need the accessories described on pages 6.33 to 6.34 as well as specific software for PLC set-up, which is available on the ABB web site; see the Resources section at the bottom of the Softstarter product page at www.abb-control.com/products/softstarters.htm.

Open
In-Line, Inside Delta
7.5 – 1800 HP


PST72-600-70


PST142-600-70


PST175-600-70


PSTB370-600-70


PSTB570-600-70

Connected In-Line ①

Maximum motor current		Maximum horsepower					Weight	Catalog	List
UL	IEC	208V	240V	380V	480V	600V	(lbs.)	number	price
28	30	7.5	10	15	20	25	9	PST30-600-70	**$ 1330**
34	37	10	10	20	25	30	9	PST37-600-70	**1360**
42	44	10	15	25	30	40	11	PST44-600-70	**1390**
54	50	15	20	30	40	50	11	PST50-600-70	**1730**
68	72	20	25	40	50	60	22	PST72-600-70	**1755**
80	85	25	30	50	60	75	22	PST85-600-70	**2380**
104	105	30	40	60	75	100	27	PST105-600-70	**2410**
130	142	40	50	75	100	125	33	PST142-600-70	**3375**
156	175	50	60	100	125	150	44	PST175-600-70	**3420**
192	210	60	75	125	150	200	49	PST210-600-70	**3870**
248	250	75	100	150	200	250	49	PST250-600-70	**4350**
302	300	100	100	150	250	300	53	PST300-600-70	**4480**
361	370	125	150	200	300	350	84	PSTB370-600-70	**5660**
480	470	150	200	300	400	500	93	PSTB470-600-70	**7000**
590	570	200	250	350	500	600	97	PSTB570-600-70	**8550**
720	720	250	300	450	600	700	119	PSTB720-600-70	**9630**
840	840	300	350	500	700	800	124	PSTB840-600-70	**10,900**
1062	1050	400	450	600	900	1000	137	PSTB1050-600-70	**18,000**

Connected Inside Delta ①

Maximum motor current		Maximum horsepower					Weight	Catalog	List
UL	IEC	208V	240V	380V	480V	600V	(lbs.)	number	price
42	51	10	15	30	30	40	9	PST30-600-70	**$ 1330**
54	64	15	20	40	40	50	9	PST37-600-70	**1360**
72	76	20	25	50	50	60	11	PST44-600-70	**1390**
80	86	25	30	50	60	75	11	PST50-600-70	**1730**
104	124	30	40	75	75	100	22	PST72-600-70	**1755**
130	148	40	50	75	100	125	22	PST85-600-70	**2380**
156	181	50	60	100	125	150	27	PST105-600-70	**2410**
192	245	60	75	150	150	200	33	PST142-600-70	**3375**
248	303	75	100	200	200	250	44	PST175-600-70	**3420**
302	363	100	100	200	250	300	49	PST210-600-70	**3870**
361	433	125	150	250	300	350	49	PST250-600-70	**4350**
480	519	150	200	300	400	500	53	PST300-600-70	**4480**
590	640	200	250	400	500	600	84	PSTB370-600-70	**5660**
720	814	250	300	500	600	700	93	PSTB470-600-70	**7000**
840	987	300	350	600	700	800	97	PSTB570-600-70	**8550**
1247	1247	400	500	800	1000	1200	119	PSTB720-600-70	**9630**
1454	1454	500	600	900	1200	1500	124	PSTB840-600-70	**10,900**
1839	1818	600	700	1000	1500	1800	137	PSTB1050-600-70	**18,000**

① Different frame sizes are separated by rules.

Enclosed
NEMA 1, 12
In-Line, 5 – 1000 HP

Connected In-Line

Max. motor current		Maximum horsepower					NEMA1, 480V	NEMA1, 600V		NEMA12, 480V	NEMA12, 600V	
UL	IEC	208V	240V	380V	480V	600V	Catalog Number	Catalog Number	List Price	Catalog Number	Catalog Number	List Price
18	18	5 —	5 —	10 —	10 —	— 15	T010L1-48 —	— T015L1-60	**$ 1655**	T010L2-48M —	— T015L2-60M	**$ 1905**
28	30	7.5 —	10 —	15 —	20 —	— 25	T020L1-48 —	— T025L1-60	**1655**	T020L2-48M —	— T025L2-60M	**1930**
34	37	10 —	10 —	20 —	25 —	— 30	T025L1-48 —	— T030L1-60	**1685**	T025L2-48M —	— T030L2-60M	**2085**
42	44	10 —	15 —	25 —	30 —	— 40	T030L1-48 —	— T040L1-60	**1715**	T030L2-48M —	— T040L2-60M	**2165**
54	50	15 —	20 —	30 —	40 —	— 50	T040L1-48 —	— T050L1-60	**2055**	T040L2-48M —	— T050L2-60M	**2555**
68	72	20 —	25 —	40 —	50 —	— 60	T050L1-48 —	— T060L1-60	**2080**	T050L2-48M —	— T060L2-60M	**2630**
80	85	25 —	30 —	50 —	60 —	— 75	T060L1-48 —	— T075L1-60	**2705**	T060L2-48M —	— T075L2-60M	**3355**
104	105	30 —	40 —	60 —	75 —	— 100	T075L1-48 —	— T100L1-60	**2735**	T075L2-48M —	— T100L2-60M	**3460**
130	142	40 —	50 —	75 —	100 —	— 125	T100L1-48 —	— T125L1-60	**3875**	T100L2-48M —	— T125L2-60M	**4775**
156	175	50 —	60 —	100 —	125 —	— 150	T125L1-48 —	— T150L1-60	**3920**	T125L2-48M —	— T150L2-60M	**5170**
192	210	60 —	75 —	125 —	150 —	— 200	T150L1-48 —	— T200L1-60	**4370**	T150L2-48M —	— T200L2-60M	**5770**
248	250	75 —	100 —	150 —	200 —	— 250	T200L1-48 —	— T250L1-60	**4850**	T200L2-48M —	— T250L2-60M	**6550**
302	300	100 —	100 —	150 —	250 —	— 300	T250L1-48 —	— T300L1-60	**5080**	T250L2-48M —	— T300L2-60M	**7830**
361	370	125 —	150 —	200 —	300 —	— 350	T300L1-48M① —	— T350L1-60M①	**6260**	T300L2-48M① —	— T350L2-60M①	**6910**
414	400	— —	— —	250 —	350 —	— 400	T350L1-48M① —	— T400L1-60M①	**7700**	T350L2-48M① —	— T400L2-60M①	**8450**
480	470	150 —	200 —	300 —	400 —	— 500	T400L1-48M① —	— T500L1-60M①	**7700**	T400L2-48M① —	— T500L2-60M①	**8550**
590	570	200 —	250 —	350 —	500 —	— 600	T500L1-48M① —	— T600L1-60M①	**9350**	T500L2-48M① —	— T600L2-60M①	**10,350**
720	720	250 —	300 —	450 —	600 —	— 700	T600L1-48M① —	— T700L1-60M①	**10,830**	T600L2-48M① —	— T700L2-60M①	**11,830**
840	840	300 —	350 —	500 —	700 —	— 800	T700L1-48M① —	— T800L1-60M①	**12,900**	T700L2-48M① —	— T800L2-60M①	**14,000**
960	—	350 —	400 —	— —	800 —	— 900	T800L1-48M① —	— T900L1-60M①	**21,000**	T800L2-48M① —	— T900L2-60M①	**22,300**
1062	1050	400 —	450 —	600 —	900 —	— 1000	T900L1-48M① —	— T1000L1-60M①	**21,000**	T900L2-48M① —	— T1000L2-60M①	**22,300**

① Includes integrated shunt rated (AC1) bypass contactor as standard. For across the line rated (AC3) bypass contactors, see page 6.30.

Enclosed
NEMA 1, 12
Inside Delta, 7.5 – 1800 HP

Connected Inside Delta

Max. motor current		Maximum horsepower					NEMA1, 480V	NEMA1, 600V		NEMA12, 480V	NEMA12, 600V	
UL	IEC	208V	240V	380V	480V	600V	Catalog Number	Catalog Number	List Price	Catalog Number	Catalog Number	List Price
28	30	7.5 —	10 —	15 —	20 —	— 25	T020D1-48 —	— T025D1-60	**$ 1655**	T020D2-48M —	— T025D2-60M	**$ 1905**
34	37	10 —	10 —	20 —	25 —	— 30	T025D1-48 —	— T030D1-60	**1655**	T025D2-48M —	— T030D2-60M	**1905**
42	44	10 —	15 —	25 —	30 —	— 40	T030D1-48 —	— T040D1-60	**1655**	T030D2-48M —	— T040D2-60M	**1930**
54	50	15 —	20 —	30 —	40 —	— 50	T040D1-48 —	— T050D1-60	**1685**	T040D2-48M —	— T050D2-60M	**2085**
68	72	20 —	25 —	40 —	50 —	— 60	T050D1-48 —	— T060D1-60	**1715**	T050D2-48M —	— T060D2-60M	**2165**
80	85	25 —	30 —	50 —	60 —	— 75	T060D1-48 —	— T075D1-60	**2055**	T060D2-48M —	— T075D2-60M	**2555**
104	105	30 —	40 —	60 —	75 —	— 100	T075D1-48 —	— T100D1-60	**2080**	T075D2-48M —	— T100D2-60M	**2630**
130	142	40 —	50 —	75 —	100 —	— 125	T100D1-48 —	— T125D1-60	**2705**	T100D2-48M —	— T125D2-60M	**3355**
156	175	50 —	60 —	100 —	125 —	— 150	T125D1-48 —	— T150D1-60	**2735**	T125D2-48M —	— T150D2-60M	**3460**
192	210	60 —	75 —	125 —	150 —	— 200	T150D1-48 —	— T200D1-60	**3875**	T150D2-48M —	— T200D2-60M	**4775**
248	250	75 —	100 —	150 —	200 —	— 250	T200D1-48 —	— T250D1-60	**3920**	T200D2-48M —	— T250D2-60M	**5120**
302	300	100 —	100 —	150 —	250 —	— 300	T250D1-48 —	— T300D1-60	**4370**	T250D2-48M —	— T300D2-60M	**5770**
361	370	125 —	150 —	200 —	300 —	— 350	T300D1-48 —	— T350D1-60	**4850**	T300D2-48M —	— T350D2-60M	**6550**
414	400	— —	— —	250 —	350 —	— 400	T350D1-48 —	— T400D1-60	**5080**	T350D2-48M —	— T400D2-60M	**7830**
480	470	150 —	200 —	300 —	400 —	— 500	T400D1-48 —	— T500D1-60	**5080**	T400D2-48M —	— T500D2-60M	**7830**
590	570	200 —	250 —	350 —	500 —	— 600	T500D1-48M① —	— T600D1-60M①	**6260**	T500D2-48M① —	— T600D2-60M①	**6910**
720	720	250 —	300 —	450 —	600 —	— 700	T600D1-48M① —	— T700D1-60M①	**7700**	T600D2-48M① —	— T700D2-60M①	**8550**
840	840	300 —	350 —	500 —	700 —	— 800	T700D1-48M① —	— T800D1-60M①	**9350**	T700D2-48M① —	— T800D2-60M①	**10,350**
960	—	350 —	400 —	— —	800 —	— 900	T800D1-48M① —	— T900D1-60M①	**10,830**	T800D2-48M① —	— T900D2-60M①	**12,130**
1062	1050	400 —	450 —	600 —	900 —	— 1000	T900D1-48M① —	— T1000D1-60M①	**10,830**	T900D2-48M① —	— T1000D2-60M①	**12,130**
1247	1215	400 —	500 —	800 —	1000 —	— 1200	T1000D1-48M① —	— T1200D1-60M①	**10,830**	T1000D2-48M① —	— T1200D2-60M①	**12,130**
1454	1370	500 —	600 —	900 —	1200 —	— 1500	T1200D1-48M① —	— T1500D1-60M①	**12,900**	T1200D2-48M① —	— T1500D2-60M①	**14,650**
1839	1823	600 —	700 —	1200 —	1500 —	— 1800	T1500D1-48M① —	— T1800D1-60M①	**21,000**	T1500D2-48M① —	— T1800D2-60M①	**22,750**

① Includes integrated shunt rated (AC1) bypass contactor as standard. For across the line rated (AC3) bypass contactors, see page 6.30.

Enclosed
NEMA 1, Combination
In-Line, 5 – 1000 HP

Connected In-Line

Max. motor current		Maximum horsepower					NEMA1, 480V Circuit breaker	NEMA1, 600V Circuit breaker		NEMA1, 480V Fused disconnect	NEMA 1, 600V Fused disconnect	
UL	IEC	208V	240V	380V	480V	600V	Catalog Number	Catalog Number	List Price	Catalog Number	Catalog Number	List Price
18	18	5 —	5 —	10 —	10 —	— 15	T010LB1-48E —	— T015LB1-60E	**$ 2055**	T010LF1-48A —	— T015LF1-60A	**$ 2055**
28	30	7.5 —	10 —	15 —	20 —	— 25	T020LB1-48J —	— T025LB1-60J	**2065**	T020LF1-48B —	— T025LF1-60B	**2065**
34	37	10 —	10 —	20 —	25 —	— 30	T025LB1-48K —	— T030LB1-60K	**2110**	T025LF1-48B —	— T030LF1-60B	**2110**
42	44	10 —	15 —	25 —	30 —	— 40	T030LB1-48L —	— T040LB1-60L	**2315**	T030LF1-48C —	— T040LF1-60C	**2315**
54	50	15 —	20 —	30 —	40 —	— 50	T040LB1-48N —	— T050LB1-60N	**2655**	T040LF1-48C —	— T050LF1-60C	**2655**
68	72	20 —	25 —	40 —	50 —	— 60	T050LB1-48R —	— T060LB1-60R	**2680**	T050LF1-48C —	— T060LF1-60C	**2680**
80	85	25 —	30 —	50 —	60 —	— 75	T060LB1-48S —	— T075LB1-60S	**3705**	T060LF1-48D —	— T075LF1-60D	**3705**
104	105	30 —	40 —	60 —	75 —	— 100	T075LB1-48T —	— T100LB1-60T	**3735**	T075LF1-48D —	— T100LF1-60D	**3735**
130	142	40 —	50 —	75 —	100 —	— 125	T100LB1-48V —	— T125LB1-60V	**5075**	T100LF1-48D —	— T125LF1-60D	**5075**
156	175	50 —	60 —	100 —	125 —	— 150	T125LB1-48X —	— T150LB1-60X	**5720**	T125LF1-48E —	— T150LF1-60E	**5720**
192	210	60 —	75 —	125 —	150 —	— 200	T150LB1-48Y —	— T200LB1-60Y	**6170**	T150LF1-48E —	— T200LF1-60E	**6170**
248	250	75 —	100 —	150 —	200 —	— 250	T200LB1-48A —	— T250LB1-60Z	**6650**	T200LF1-48E —	— T250LF1-60E	**6650**
302	300	100 —	100 —	150 —	250 —	— 300	T250LB1-48B —	— T300LB1-60B	**7580**	T250LF1-48F —	— T300LF1-60F	**7580**
361	370	125 —	150 —	200 —	300 —	— 350	T300LB1-48DM① —	— T350LB1-60CM①	**8860**	T300LF1-48FM① —	— T350LF1-60FM①	**8860**
414	400	— —	— —	250 —	350 —	— 400	T350LB1-48EM① —	— T400LB1-60DM①	**11,300**	T350LF1-48FM① —	— T400LF1-60FM①	**11,300**
480	470	150 —	200 —	300 —	400 —	— 500	T400LB1-48FM① —	— T500LB1-60EM①	**11,800**	T400LF1-48GM① —	— T500LF1-60GM①	**11,800**
590	570	200 —	250 —	350 —	500 —	— 600	T500LB1-48GM① —	— T600LB1-60GM①	**14,550**	T500LF1-48HM① —	— T600LF1-60H①	**14,550**
720	720	250 —	300 —	450 —	600 —	— 700	T600LB1-48JM① —	— T700LB1-60JM①	**16,030**	T600LF1-48HM① —	— T700LF1-60H①	**16,030**
840	840	300 —	350 —	500 —	700 —	— 800	T700LB1-48KM① —	— T800LB1-60JM①	**19,400**	T700LF1-48JM① —	— T800LF1-60J①	**19,400**
960	—	350 —	400 —	— —	800 —	— 900	T800LB1-48KM① —	— T900LB1-60KM①	**27,500**	T800LF1-48JM① —	— T900LF1-60J①	**27,500**
1062	1050	400 —	450 —	600 —	900 —	— 1000	T900LB1-48KM① —	— T1000LB1-60KM①	**28,200**	T900LF1-48KM① —	— T1000LF1-60K①	**28,200**

① Includes integrated shunt rated (AC1) bypass contactor as standard. For across the line rated (AC3) bypass contactors, see page 6.30.

Enclosed
NEMA 1, Combination
Inside Delta, 7.5 – 1900 HP

Connected Inside Delta

Max. motor current		Maximum horsepower					NEMA1, 480V Circuit breaker	NEMA1, 600V Circuit breaker		NEMA1, 480V Fused disconnect	NEMA 1, 600V Fused disconnect	
UL	IEC	208V	240V	380V	480V	600V	Catalog Number	Catalog Number	List Price	Catalog Number	Catalog Number	List Price
28	30	7.5 —	10 —	15 —	20 —	— 25	T020DB1-48J —	— T025DB1-60J	**$ 2065**	T020DF1-48B —	— T025DF1-60B	**$ 2065**
34	37	10 —	10 —	20 —	25 —	— 30	T025DB1-48K —	— T030DB1-60K	**2080**	T025DF1-48B —	— T030DF1-60B	**2080**
42	44	10 —	15 —	25 —	30 —	— 40	T030DB1-48L —	— T040DB1-60L	**2255**	T030DF1-48C —	— T040DF1-60C	**2255**
54	50	15 —	20 —	30 —	40 —	— 50	T040DB1-48N —	— T050DB1-60N	**2285**	T040DF1-48C —	— T050DF1-60C	**2285**
68	72	20 —	25 —	40 —	50 —	— 60	T050DB1-48R —	— T060DB1-60R	**2315**	T050DF1-48C —	— T060DF1-60C	**2315**
80	85	25 —	30 —	50 —	60 —	— 75	T060DB1-48S —	— T075DB1-60S	**3055**	T060DF1-48D —	— T075DF1-60D	**3055**
104	105	30 —	40 —	60 —	75 —	— 100	T075DB1-48T —	— T100DB1-60T	**3080**	T075DF1-48D —	— T100DF1-60D	**3080**
130	142	40 —	50 —	75 —	100 —	— 125	T100DB1-48V —	— T125DB1-60V	**3905**	T100DF1-48D —	— T125DF1-60D	**3905**
156	175	50 —	60 —	100 —	125 —	— 150	T125DB1-48X —	— T150DB1-60X	**4535**	T125DF1-48E —	— T150DF1-60E	**4535**
192	210	60 —	75 —	125 —	150 —	— 200	T150DB1-48Y —	— T200DB1-60Y	**5675**	T150DF1-48E —	— T200DF1-60E	**5675**
248	250	75 —	100 —	150 —	200 —	— 250	T200DB1-48A —	— T250DB1-60Z	**5720**	T200DF1-48E —	— T250DF1-60E	**5720**
302	300	100 —	100 —	150 —	250 —	— 300	T250DB1-48B —	— T300DB1-60B	**6870**	T250DF1-48F —	— T300DF1-60F	**6870**
361	370	125 —	150 —	200 —	300 —	— 350	T300DB1-48D —	— T350DB1-60C	**7450**	T300DF1-48F —	— T350DF1-60F	**7450**
414	400	— —	— —	250 —	350 —	— 400	T350DB1-48E —	— T400DB1-60D	**8680**	T350DF1-48F —	— T400DF1-60F	**8680**
480	470	150 —	200 —	300 —	400 —	— 500	T400DB1-48F —	— T500DB1-60E	**9180**	T400DF1-48G —	— T500DF1-60G	**9180**
590	570	200 —	250 —	350 —	500 —	— 600	T500DB1-48GM① —	— T600DB1-60GM①	**11,460**	T500DF1-48HM① —	— T600DF1-60HM①	**11,460**
720	720	250 —	300 —	450 —	600 —	— 700	T600DB1-48JM① —	— T700DB1-60JM①	**12,900**	T600DF1-48HM① —	— T700DF1-60HM①	**12,900**
840	840	300 —	350 —	500 —	700 —	— 800	T700DB1-48KM① —	— T800DB1-60JM①	**15,850**	T700DF1-48JM① —	— T800DF1-60JM①	**15,850**
960	—	350 —	400 —	— —	800 —	— 900	T800DB1-48KM① —	— T900DB1-60KM①	**17,330**	T800DF1-48JM① —	— T900DF1-60JM①	**17,330**
1062	1050	400 —	450 —	600 —	900 —	— 1000	T900DB1-48KM① —	— T1000DB1-60KM①	**18,030**	T900DF1-48KM① —	— T1000DF1-60KM①	**18,030**
1247	1215	400 —	500 —	800 —	1000 —	— 1200	T1000DB1-48LM① —	— T1200DB1-60LM①	**20,830**	T1000DF1-48KM① —	— T1200DF1-60KM①	**20,830**
1454	1370	500 —	600 —	900 —	1200 —	— 1500	T1200DB1-48MM① —	— T1500DB1-60MM①	**22,900**	T1200DF1-48LM① —	— T1500DF1-60LM①	**22,900**
1839	1823	600 —	700 —	1200 —	1500 —	— 1800	T1500DB1-48NM① —	— T1800DB1-60NM①	**33,500**	T1500DF1-48NM① —	— T1800DF1-60NM①	**33,500**

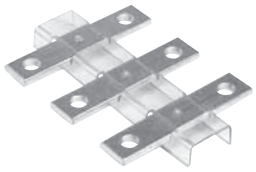
① Includes integrated shunt rated (AC1) bypass contactor as standard. For across the line rated (AC3) bypass contactors, see page 6.30.

Options

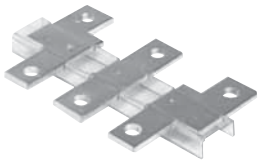
Max FLA		Shunt rated (AC1) bypass or isolation contactor	Across the line rated (AC3) ④ bypass contactor	Start/Stop pushbuttons	HOA Selector Switch	Run pilot Light	NEMA 12 adder	NEMA 3R adder	NEMA 4 adder	NEMA 4X adder
UL	IEC	List price	List price ③	List price	List price	List price	List price	List price	List price	List price
18	18	**$ 150**	**$ 775**	**$ 72**	**$ 72**	**$ 135**	**$ 100** ①	**$ 100** ①	**$ 150** ①	**$ 450** ①
28	30	**175**	**850**	**72**	**72**	**135**	**100** ①	**100** ①	**150** ①	**450** ①
34	37	**250**	**900**	**72**	**72**	**135**	**150** ①	**150** ①	**200** ①	**600** ①
42	44	**300**	**950**	**72**	**72**	**135**	**150** ①	**150** ①	**200** ①	**600** ①
54	50	**350**	**1000**	**72**	**72**	**135**	**150** ①	**150** ①	**200** ①	**600** ①
68	72	**400**	**1100**	**72**	**72**	**135**	**150** ①	**150** ①	**200** ①	**600** ①
80	85	**500**	**1150**	**72**	**72**	**135**	**150** ①	**150** ①	**225** ①	**775** ①
104	105	**550**	**1200**	**72**	**72**	**135**	**175** ①	**175** ①	**225** ①	**775** ①
130	142	**600**	**1550**	**72**	**72**	**135**	**300** ①	**300** ①	**350** ①	**1050** ①
156	150	**950**	**1850**	**72**	**72**	**135**	**300** ①	**300** ①	**350** ①	**1050** ①
192	210	**950**	**2100**	**72**	**72**	**135**	**450** ①	**450** ①	**525** ①	**1575** ①
248	250	**1250**	**2700**	**72**	**72**	**135**	**450** ①	**450** ①	**525** ①	**1575** ①
302	300	**2100**	**3500**	**72**	**72**	**135**	**650** ①	**650** ①	**775** ①	**2325** ①
361	370	—②	**4800**	**72**	**72**	**135**	**650**	**650**	**775**	**2325**
414	400	—②	**4800**	**72**	**72**	**135**	**750**	**750**	**950**	**2850**
480	470	—②	**4800**	**72**	**72**	**135**	**850**	**850**	**1025**	**3075**
590	570	—②	**6800**	**72**	**72**	**135**	**1000**	**1000**	**1300**	**3900**
720	720	—②	**7100**	**72**	**72**	**135**	**1000**	**1000**	**1300**	**3900**
840	840	—②	**10,100**	**72**	**72**	**135**	**1100**	**1100**	**1425**	**4275**
960	—	—②	**10,100**	**72**	**72**	**135**	**1300**	**1300**	**1700**	**5100**
1062	1050	—②	**14,600**	**72**	**72**	**135**	**1300**	**1300**	**1700**	**5100**
1247	1215	—②	**14,600**	**72**	**72**	**135**	**1300**	**1300**	**1700**	**5100**
1454	1370	—②	**14,600**	**72**	**72**	**135**	**1750**	**1750**	**2200**	**7000**
1839	1823	—②	**14,600**	**72**	**72**	**135**	**1750**	**1750**	**2200**	**7000**

① Must add bypass contactor.
② PSTB includes an integrated shunt rated (AC1) bypass contactor.
③ Includes emergency bypass control.
④ Subtract AC1 List price when AC1 rating ("M" code) is included in catalog numbers shown on page 6.26.

Accessories

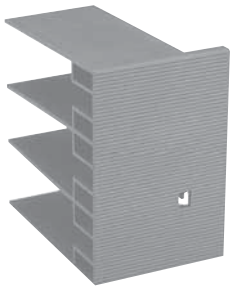


LX400



LW185

LT185-AC



LT460-AC

PSTEK

Terminal extension pieces (set of 3) ③

Softstarter Type	Dimensions Hole (mm)	Bar (mm)	Weight lbs.		Catalog number	List price
PST85 – 142	8.5	17.5 x 5	0.55		LX185	**$ 90**
PST175 – 300	10.5	20 x 5	0.77		LX300	**140**
PST370 – 470	10.5	25 x 5	1.1		LX460	**195**
PST570 – 1050	13	40 x 6	1.9		LX750	**225**

Delivered with straps to prevent them from rotating.

Terminal enlargement pieces (set of 3) ③

Softstarter Type	Dimensions Hole (mm)	Bar (mm)	Weight lbs.		Catalog number	List price
PST30 – 72	6.5	15 x 3	0.22		LW110	**$ 15**
PST85 – 142	10.5	17.5 x 5	0.55		LW185	**120**
PST175 – 300	10.5	20 x 5	0.99		LW300	**130**
PST370 – 470	10.5	25 x 5	1.6		LW460	**295**
PST570 – 1050	13	40 x 6	2.7		LW750	**355**

Delivered with straps to prevent them from rotating.

Terminal shrouds ③⑦

Softstarter Type	Required quantity	Weight lbs.		Catalog number	List price
PST85 – 142	(1) - LT185-AC & (1) LT460-AC	0.11 0.22		LT185-AC LT460-AC	**$ 10** **20**
PST85 – 142	(1) - LT185-AL & (1) LT460-AL	0.48 1.8		LT185-AL LT460-AL	**10** **20**
PST175 – 300	LT300-AC ⑤	0.15		LT300-AC	**10**
	LT300-AL ⑤	0.62		LT300-AL	**10**
PSTB370 – 470	LT460-AC	0.22		LT460-AC	**20**
	LT460-AL	1.8		LT460-AL	**20**
PSTB570 – 1050	LT750-AC	0.26		LT750-AC	**20**
	LT750-AL	1.8		LT750-AL	**20**

Control transformers

PST Amp ratings	Standard VA	Price adder for extra VA			
		100VA	250VA	500VA	750VA
9 – 68	50	**$ 175**	—	—	—
69 – 130	75	**225**	**$ 300**	—	—
131 – 480	250	**360**	**400**	**$ 500**	**$ 625**
481 – 1050	750	—	**725**	—	**975**

Terminal lug kits ①

Wire range	For softstarter ②		Catalog number	List price
#6 - 250 MCM (1 per phase)	PST85 – PST142		PSLK-185 ④⑥	**$ 150**
#4 - 400 MCM (1 per phase)	PST175 – PST300		PSLK-300 ④⑥	**195**
#4 - 500 MCM (2 per phase)	PST175 – PST300		PSLK-300/2 ④⑥	**280**
2/0 - 500 MCM (2 per phase)	PSTB370 – PSTB470		PSLK-580/2	**350**
2/0 - 500 MCM (3 per phase)	PSTB570 – PSTB1050		PSLK-750/3	**525**

Remote key pad (HMI) – 10 ft. cable included

Softstarter type	Dimensions H x W x D (inches)	Weight (lbs.)		Catalog number	List price
All PST(B)	5.43 x 5.3 x 0.9	1		PSTEK	**$ 385**

① Includes line/load lugs and hardware.
② Softstarters listed are provided with terminating bus tabs as standard.
③ Use Discount Schedule ABA.
④ Must order two sets if using bypass contactor.
⑤ Requires two sets.
⑥ Discount schedule PSS
⑦ All shrouds come in quantities of 2.

Accessories

Accessories

Item	Suffix code ①	List price adder
Softstarters		
Door mounted reset	K	**$ 72**
E-Stop	T	**72**
Start-stop pushbutton	A	**72**
2 position selector switch	C	**72**
3 position selector switch	D	**72**
Pilot light run	E	**135**
Start-stop pushbutton & pilot light	F	**207**
2 position selector switch & pilot light	H	**207**
3 position selector switch & pilot light	J	**207**
Shunt rated (AC1) bypass contactor	M	see pg 6.30
Isolation contactor	W	see pg 6.30
Across the line rated (AC3) contactor with emergency bypass control ③	B	see pg 6.30
Remote keypad	R	**485**
Service entrance, 3-wire	SE3	**100**
Service entrance, 4-wire	SE4	**300**
Lightning arrestor	LA	**320**
Space heater, 100W with thermostat	SH	**600**
Emergency bypass control for PSTB ③	X	**600**
Auxiliary relays		
Type N control relay (4 pole)	CR	**150**
Electronic timer		
1.5 – 30s On Delay	TN30	**125**
5 – 100s On Delay	TN100	**125**
1.5 – 30s Off Delay	TF30	**125**
5 – 100s Off Delay	TF100	**125**
Phase failure phase reversal ②	PFPR	**375**
Undervoltage relay	UV	**150**
Overvoltage relay	OV	**180**
Ground fault protection	GFP	**1000**
Meters & metering		
Current transformer	CT	**250**
Ammeter (including C.T.)	AM	**470**
Ammeter & ammeter switch	AMS	**1800**
Voltmeter	VM	**1200**
Voltmeter & voltmeter switch	VMS	**1800**
Elapsed time meter	ETM	**350**
Operation counter	OC	**375**
Wattmeter	WM	**2450**

Additional auxiliary contact blocks for bypass or isolation contactors

Contact configuration	Suffix code	List price adder
1 N.O. & 1 N.C.	11	**$ 54**
2 N.O. & 2 N.C.	22	**98**
3 N.O. & 3 N.C.	33	**142**

① Add the suffix code after the last digit of the catalog number.
② Included as standard in the PST.
③ Control includes panel mounted Norm/E-Bypass switch, START/STOP pushbutton & Class 10 external overload, unless otherwise specified.

Accessories
Communications
DeviceNet Fieldbus connectors & accessories


DNP21-11FBP


DNF-11FBP.050


DNM-11FBP.050


DNX11-FBP


DNM11-FBP.0


DNF11-FBP.0

DeviceNet FieldBusPlug

Designation FieldBusPlug	Cable length	Weight lbs	Type	Catalog number	List price
DeviceNet	0.25 m	.20	DNP21-FBP.025	1SAJ230000R0003	**$ 286.47**
DeviceNet	0.50 m	.22	DNP21-FBP.050	1SAJ230000R0005	**286.47**
DeviceNet	1.00 m	.29	DNP21-FBP.100	1SAJ230000R0010	**286.47**
DeviceNet	5.00 m	.79	DNP21-FBP.500	1SAJ230000R0050	**304.83**

Ready-made DeviceNet fieldbus interface with various cable lengths
- Applicable on all FBP motor starters and other devices
- Degree of protection IP65, diagnostic LED

DeviceNet round cable for bus junctions

Designation	Cable length	Weight lbs	Type	Catalog number	List price
DeviceNet round cable with female connector	0.50 m	.09	DNF11-FBP.050	1SAJ923002R0005	**$ 48.21**
DeviceNet round cable with male connector	0.50 m	.09	DNM11-FBP.050	1SAJ923003R0005	**49.96**

Ready made bus cable with an M12 connector and an open cable end.
- Applicable on all bus junctions such as DeviceNet couplers or devices with an integrated DeviceNet interface.

DeviceNet round cable for bus extension

Designation	Cable length	Weight lbs	Type	Catalog number	List price
DeviceNet extension cable	1 m	0.18	DNX11-FBP.100 ②	1SAJ923001R0010	**$ 70.93**
	3 m	0.44	DNX11-FBP.300 ②	1SAJ923001R0030	**114.96**
	5 m	0.68	DNX11-FBP.500 ③	1SAJ923001R0050	**148.74**
	100 m	12.30	DNC11-FBP.999 ③	1SAJ923004R1000	**1517.12**

DeviceNet round cable and accessories for bus extension – Bus cable & coupling accessories

Designation	Weight lbs		Type	Catalog number	List price
DeviceNet round cable male connector	.33		DNM11-FBP.0 ①	1SAJ923005R0001	**$ 108.56**
DeviceNet round cable female connector	.33		DNF11-FBP.0 ①	1SAJ923006R0001	

DeviceNet termination resistor

Designation	Weight lbs		Type	Catalog number	List price
DeviceNet termination resistor, 120 Ohm	.05		DNR11-FBP.120	1SAJ923007R0001	**$ 37.22**

To connect the PST Softstarter to a fieldbus system
You need specific software for PLC setup which is available free from the ABB Inc. web site; see the Resources section at the bottom of the Softstarter product page at www.abb-control.com/products/softstarters.htm. If you need help or advice, please contact your local ABB office.

① Includes five connectors.
② Ready made bus cable with M12 male and female connectors.
③ Cable only. Connectors not provided.

Accessories
Communications
Profibus DP Fieldbus connectors & accessories


PDP21-FBP


PDF11-FBP.050


PDM11-FBP.050


PDX11-FBP


PDM11-FBP.0


PDF11-FBP.0

Profibus DP FieldBusPlug

Designation FieldBusPlug	Cable length	Weight lbs		Type	Catalog number	List price
Profibus DP-FBP	0.25 m	.20		PDP21-FBP.025	1SAJ240000R0003	**$ 390.39**
Profibus DP-FBP	0.50 m	.22		PDP21-FBP.050	1SAJ240000R0005	**390.39**
Profibus DP-FBP	1.00 m	.29		PDP21-FBP.100	1SAJ240000R0010	**390.39**
Profibus DP-FBP	5.00 m	.79		PDP21-FBP.500	1SAJ240000R0050	**409.43**

Ready-made Profibus DP fieldbus interface with various cable lengths.
- Applicable on all FBP motor starters and other devices.
- Degree of protection IP65, diagnostic LED.

Profibus DP round cable for bus junctions

Designation	Cable length	Weight lbs	Type	Catalog number	List price
Profibus DP round cable with female connector	0.50 m	.09	PDF11-FBP.050	1SAJ924002R0005	**$ 45.70**
Profibus DP round cable with male connector	0.50 m	.09	PDM11-FBP.050	1SAJ924003R0005	

Ready made bus cable with an M12 connector an an open cable end.
- Applicable on all bus junctions such as Profibus DB couplers or devices with an integrated Profibus DB interface.

Profibus DP round cable for bus extension

Designation	Cable length	Weight lbs	Type	Catalog number	List price
Profibus DP extension cable	1 m	0.18	PDX11-FBP.100 ①	1SAJ924001R0010	**$ 64.75**
	3 m	0.44	PDX11-FBP.300 ①	1SAJ924001R0030	**99.03**
	5 m	0.68	PDX11-FBP.500 ①	1SAJ924001R0050	**133.30**
	100 m	12.30	PDC11-FBP.999 ②	1SAJ924004R1000	**1416.82**

Profibus DP accessories for bus extension

Designation	Weight lbs		Type	Catalog number	List price
Profibus DP male connector	.07		PDM11-FBP.0	1SAJ924005R0001	**$ 38.09**
Profibus DP female connector	.07		PDF11-FBP.0	1SAJ924006R0001	

Profibus DP termination resistor

Designation	Weight lbs		Type	Catalog number	List price
Profibus DP termination resistor, 150 Ohm	.02		PDR11-FBP.150	1SAJ924007R0001	**$ 251.16**

To connect the PST Softstarter to a fieldbus system
You need specific software for PLC setup which is available free from the ABB Inc. web site; see the Resources section at the bottom of the Softstarter product page at www.abb-control.com/products/softstarters.htm. If you need help or advice, please contact your local ABB office.

① Ready made bus cable with M12 male and female connectors.
② Cable only. Connectors not provided.

Accessories
Communications
Modbus RTU Fieldbus connectors & accessories


DNP21-11FBP


DNF-11FBP.050


DNM-11FBP.050


DNX11-FBP


DNM11-FBP.0


DNF11-FBP.0

Modbus FieldBusPlug

Designation FieldBusPlug	Cable length	Weight lbs	Type	Catalog number	List price
Modbus RTU-FBP	0.25 m	.20	MPR21-FBP.025	1SAJ250000R0003	**$ 333.44**
Modbus RTU-FBP	0.50 m	.22	MPR21-FBP.050	1SAJ250000R0005	**338.25**
Modbus RTU-FBP	1.00 m	.29	MPR21-FBP.100	1SAJ250000R0010	**343.32**
Modbus RTU-FBP	5.00 m	.79	MPR21-FBP.500	1SAJ250000R0050	**355.11**

Ready-made Modbus fieldbus interface with various cable lengths
- Applicable on all FBP motor starters and other devices
- Degree of protection IP65, diagnostic LED

Modbus round cable for bus junctions ②

Designation	Cable length	Weight lbs	Type	Catalog number	List price
Modbus round cable with female connector	0.50 m	.09	DNF11-FBP.050	1SAJ923002R0005	**$ 48.21**
Modbus round cable with male connector	0.50 m	.09	DNM11-FBP.050	1SAJ923003R0005	**49.96**

Ready made bus cable with an M12 connector and an open cable end.
- Applicable on all bus junctions such as Modbus couplers or devices with an integrated Modbus interface.

Modbus round cable for bus extension ②

Designation	Cable length	Weight lbs	Type	Catalog number	List price
Modbus extension cable	1 m	0.18	DNX11-FBP.100 ③	1SAJ923001R0010	**$ 70.93**
	3 m	0.44	DNX11-FBP.300 ③	1SAJ923001R0030	**114.96**
	5 m	0.68	DNX11-FBP.500 ③	1SAJ923001R0050	**148.74**
	100 m	12.30	DNC11-FBP.999 ④	1SAJ923004R1000	**1517.12**

Modbus round cable and accessories for bus extension ② – Bus cable & coupling accessories

Designation	Weight lbs		Type	Catalog number	List price
Modbus round cable male connector	.33		DNM11-FBP.0 ①	1SAJ923005R0001	**$ 108.56**
Modbus round cable female connector	.33		DNF11-FBP.0 ①	1SAJ923006R0001	

Modbus termination resistor ②

Designation	Weight lbs		Type	Catalog number	List price
Modbus termination resistor, 120 Ohm	.05		DNR11-FBP.120	1SAJ923007R0001	**$ 37.22**

To connect the PST Softstarter to a fieldbus system
You need specific software for PLC setup which is available free from the ABB Inc. web site; see the Resources section at the bottom of the Softstarter product page at www.abb-control.com/products/softstarters.htm. If you need help or advice, please contact your local ABB office.

① Includes five connectors.
② Modbus accessories are the same as DeviceNet accessories.
③ Ready made bus cable with M12 male and female connectors.
④ Cable only. Connectors not provided.

Technical data
PST30 – 300
PSTB370 – 1050

	PST30 – 300	PSTB370 – 1050
Rated insulation voltage U_i	690 V	690 V
Rated operational voltage U_e	208 – 690 V	208 – 690 V
Starting capacity		
at max rated current I_r	500% for 30 sec	500% for 30 sec
Number of starts per hour	30 ①	10 ①
Overload capability		
Overload Class	10 – 30	10 – 30
Service factor	115 %	115 % (PSTB370 – PSTB840) 100 % (PSTB1050)
Ambient temperature		
During operation	±0… +50 °C ②	±0… +50 °C ②
During storage	-25… +70 °C	-25… +70 °C
Altitudes		
Maximum altitude	4000 m ③	4000 m ③
Degree of protection		
Main circuit	IP10 (PST30 ... 72) IP00 (PST85 ... 300)	IP00 (all)
Supply and Control circuit	IP20	IP20
Main circuit		
Built in By-pass contactor	No	Yes
Cooling system - Fan cooled (thermostat controlled)	Yes	Yes
Supply circuit		
Control voltage – one range	100 ... 250 V, +10% / -15% 50/60 Hz ± 5%	100 ... 250 V +10% / -15% 50/60 Hz ± 5%
HMI for settings (Human Machine Interface)		
20 segment display	Yes	Yes
Keypad with two selection keys and two navigating keys	Yes	Yes
Plain text in 12 languages (English, German, Italian, Chinese, Finnish, Swedish, French, Spanish, Dutch, Russian, Turkish & Portuguese)	Yes	Yes
Remote HMI for settings (PSTEK) (Human Machine Interface)		
20 segment display	Yes	Yes
Keypad with two selection keys and two navigating keys	Yes	Yes
Plain text in 12 languages (English, German, Italian, Chinese, Finnish, Swedish, French, Spanish, Dutch, Russian, Turkish & Portuguese)	Yes	Yes
Approvals: UL, Type 1, 12, 4/4X		
Upload Parameters	Yes	Yes

	PST30 – 300	PSTB370 – 1050
Signal relays		
Number of programmable signal relays (Each relay can be programmed to be Run, By-pass or Event signal)	3	3
K4 – Default as Run signal	Yes	Yes
K5 – Default as By-pass signal	Yes	Yes
K6 – Default as Event signal	Yes	Yes
Rated operational voltage U_e	250 V	250 V
Rated thermal current I_{th}	5 A	5 A
Rated operational current I_e at AC-15 (U_e = 250 V)	1.5 A	1.5 A
Control circuit /Hardware inputs		
Internal 24 V DC (10 mA closed)	Yes	Yes
Start / Stop inputs	Yes	Yes
Two extra programmable inputs (Each input can be programmed to be None, Reset, Enable, Jog, DOL or Start motor 2 (or 3)).	Yes	Yes
Signal indication LED's		
Run power on – Green	Yes	Yes
Fault - Red	Yes	Yes
Protection - Yellow	Yes	Yes
Protections		
Electronic overload	Yes	Yes
Adjustable tripping classes - Class 10 A, 10, 20 and 30	Yes	Yes
Dual ramp (separate overload function for start and run)	Yes	Yes
PTC connection	Yes	Yes
Locked rotor protection	Yes	Yes
Underload protection	Yes	Yes
Phase imbalance	Yes	Yes
High current (8 x I_e)	Yes	Yes
Phase reversal protection	Yes	Yes
Warnings (pre-warning)		
High current	Yes	Yes
Low current (underload)	Yes	Yes
Overload trip	Yes	Yes
Overtemp. thyristors (SCR)	Yes	Yes
Start of several motors		
Possible to set up and start three different motors	Yes	Yes
Field bus connection		
Connection for ABB FielBusPlug	Yes	Yes
AS-I (option cable)	Yes	Yes
DeviceNet (option cable)	Yes	Yes
Profibus DP (option cable)	Yes	Yes

PSTB Integrated bypass ratings

		PSTB370	PSTB470	PSTB570	PSTB720	PSTB840	PSTB1050
Contactor type		AF260	AF300	AF400	AF580	AF750	AF750
AC3 Rating @ 480V	HP	200	250	350	500	600	600
AC3 Rating	A	248	302	414	590	720	720

① Valid for 50 % on time and 50 % off time, with 3.5 x I_e for 7 seconds. If other data is required, please contact your sales office
② Above 40 ºC up to max. 50 ºC reduce the rated current by 0.8 % per ºC.
③ When used at high altitudes above 1000 meters, consult factory.

Major possible settings and the displayed text and the set default values

Description	Text on display (Eng)	Values on display	Default value
Motor FLA	Setting I_e	9.0 ...1380 A divided into 19 overlapping ranges.	See table, page 6.38
Time for start ramp	Start Ramp	1 ... 30 s, 1 ... 120 s (Range depends on Start Range)	10 s
Time for stop ramp	Stop Ramp	0 ... 30 s, 0 ... 120 s (Range depends on Stop Range)	0 s
Initial voltage for start ramp	Init Volt	30 ... 70 %	30 %
End voltage for stop ramp	End Volt	30 ... 70 %	30 %
Step down voltage	Step Down	30 ...100 %	100 %
Level of the current limit.	Current Lim	2.0 ... 5.0 x I_e	4.0 x I_e
Selection of Kick start	Kick Start	Yes, No	No
Level of Kick start if selected	Kick Level	50 ... 100 %	50 %
Time for Kick start if selected	Kick Time	0.1 ... 1.5 s	0.2
Selectable range for start ramp	Start Range	1 ... 30 s, 1...120 s	1 ... 30 s
Selectable range for stop ramp	Stop Range	0 ... 30 s, 0 ... 120 s	0 ... 30 s
Overload protection	Overload	No, Normal, Dual	Normal
Overload Class	OL Class	10A, 10, 20, 30	10
Overload Class, Dual type, Start Class	OL Class S	10A, 10, 20, 30	10
Overload Class, Dual type, Run Class	OL Class R	10A, 10, 20, 30	10
Type of operation for overload protection	OL Op	Stop-M, Stop-A, Ind	Stop-M
Locked rotor protection	Locked Rotor	Yes, No	No
Trip level for locked rotor protection	Lock R Lev	3.0 ... 8.0 x I_e	4.0 x I_e
Trip time for locked rotor protection	Lock R Time	0.2 ... 10 s	1.0 s
Type of operation for locked rotor protection	Lock R Op	Stop-M, Stop-A, Ind	Stop-M
Underload protection	Underload	Yes, No	No
Trip level for Underload protection	Underl Lev	0.4 ... 0.8 x I_e	0.8 x I_e
Trip time for Underload protection	Underl Time	1...30 s	10 s
Type of operation for Underload protection	Underl Op	Stop-M, Stop-A, Ind	Stop-M
Phase imbalance protection	Phase Imb	Yes, No	No
Trip level for phase imbalance protection	Ph Imb Lev	10...80 %	80 %
Type of operation for phase imbalance protection	Ph Imb Op	Stop-M, Stop-A, Ind	Stop-M
High current protection	High I	Yes, No	No
Type of operation for high current protection	High I Op	Stop-M, Stop-A, Ind	Stop-M
Phase reversal protection	Phase Rev	Yes, No	No
Type of operation for phase reversal protection	Ph Rev Op	Stop-M, Stop-A, Ind	Stop-M
PTC protection	PTC	Yes, No	No
Type of operation for PTC protection	PTC Op	Stop-M, Stop-A	Stop-M
An external Bypass contactor is used	Ext ByPass	Yes, No	No
High current warning	Warn I=High	Yes, No	No
Trip level for high current warning	Wa I=H Lev	0.5 ... 5.0 x I_e	1.2 x I_e
Low current warning	Warn I=Low	Yes, No	No
Trip level for low current warning	Wa I=L Lev	0.4 ...1.0 x I_e	0.5 x I_e
Overload warning	Warn OL	Yes, No	No
Trip level for overload warning	Wa OL Lev	40...99 %	90 %
Thyristor overload warning	Warn SCR OL	Yes, No	Yes
Type of operation for phase loss fault	Ph Loss Op	Stop-M, Stop-A	Stop-M
Type of operation for by-pass fault	BP Fault Op	Stop-M, Stop-A, Ind	Stop-M
Type of operation for fieldbus fault	FB Fault Op	Stop-M, Stop-A	Stop-M
Type of operation for frequency fault	Freq F Op	Stop-M, Stop-A	Stop-M
Type of operation for heat sink over temperature fault	HS Temp Op	Stop-M, Stop-A	Stop-M
Type of operation for thyristor short circuit fault	SCR SC Op	Stop-M, Stop-A	Stop-M
Function of programmable input In_0	In0	None, Reset, Enable, Jog, DOL, Start 2	Reset
Function of programmable input In_1	In1	None, Reset, Enable, Jog, DOL, Start 3	Reset
Function of programmable relay output K4	Relay K4	Run, TOR, Event	Run
Function of programmable relay output K5	Relay K5	Run, TOR, Event	TOR
Function of programmable relay output K6	Relay K6	Run, TOR, Event	Event
Control of the softstarter with fieldbus	Fieldb Ctrl	Yes, No	No
Number of sequences for sequence start.	No of Seq	No, 2, 3	No
1st sequence, time for start ramp	Start Ramp1	1...30 s, 1...120 s (Range depends on Start Range)	10 s
1st sequence, initial voltage for start ramp	Init Volt1	30...70 %	30 %
1st sequence, current limit	Curr Lim1	2.0 ... 5.0 x I_e	4.0 x I_e
1st sequence, setting current	1st Set Ie	9.0 ... 1380 A divided into 19 overlapping ranges	See table, page 6.38
2nd sequence, time for start ramp	Start Ramp2	1...30 s, 1...120 s (Range depends on Start Range)	10 s
2nd sequence, initial voltage for start ramp	Init Volt2	30...70 %	30 %
2nd sequence, current limit	Curr Lim2	2.0 ... 5.0 x I_e	4.0 x I_e
2nd sequence, setting current	2nd Set Ie	9.0 ... 1380 A divided into 19 overlapping ranges	See table, page 6.38

Technical data
Display settings
Tripping curves

Major possible settings and the displayed text and the set default values

Description	Text on display (Eng)	Values on display	Default value
Time for start ramp	Start Ramp	1...30 s, 1...120 s (Range depends on Start Range)	10 s
Initial voltage for start ramp	Init Volt	30 ... 70 %	30 %
Current limit	Curr Lim	2.0 ... 5.0 x I_e	4.0 x I_e
Motor FLA	Set Ie	9.0 ... 1380 A divided into 19 overlapping ranges	See table, page 6.38
Language to use on display	Language	US/UK, FI, SE, PT, NL, IT, FR, ES, DE, CN	US/UK
Time for display automatic turn off	LCD Auto Off	1 ... 255 min	15 min
Password for display	Password	No, 1 ... 255	1
Type of date presentation	Date Type	ISO, CE, US	ISO
Year	Date Year	2001...2060	Individual
Month	Date Month	1 ...12	Individual
Day	Date Day	1 ... 31	Individual
Hour	Time Hour	0 ... 23	Individual
Minutes	Time Min	0 ... 59	Individual

Tripping curves for the integrated electronic overload

All units have an integrated electronic overload possible to set on four different tripping classes. Below, you will find a curve for each tripping class in cold state.

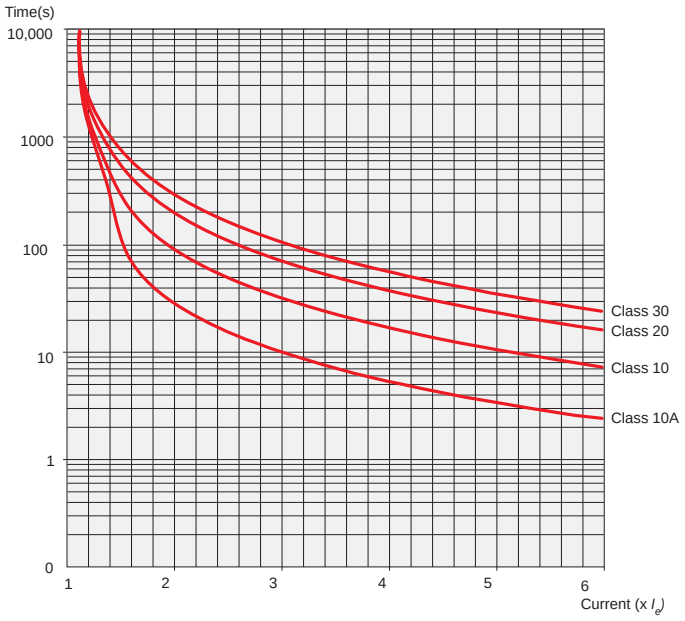


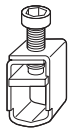
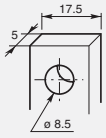
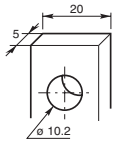
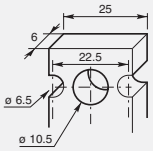
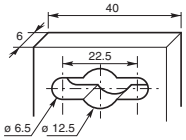
ABB FieldBusPlug
Controlling possibilities when using different field buses

Item	ASI	DeviceNet	Profibus DP
Simple control (start/stop etc)	X	X	X
Complete control	—	X	X
Simple status information	X	X	X
Detailed status information	—	X	X
Possibilities to write parameters	—	X	X
Possibilities to read parameters	—	X	—

For more detailed information, please refer to the LV021 (1SXU 132 021 M0201) Installation and Maintenance manual, available at ABB Inc. web site. See the Resources section at the bottom of the Softstarters product page at www.abb-control.com/products/softstarters.htm. Click on the Literature Library File Downloads link which will take you to the Softstarters section of the Literature Library. Right click on AC1006.9 to download the manual. If you need help or advice, please contact your local ABB office.

Technical data
PST30 – 300
PSTB370 – 1050

Cross section of connectable cables

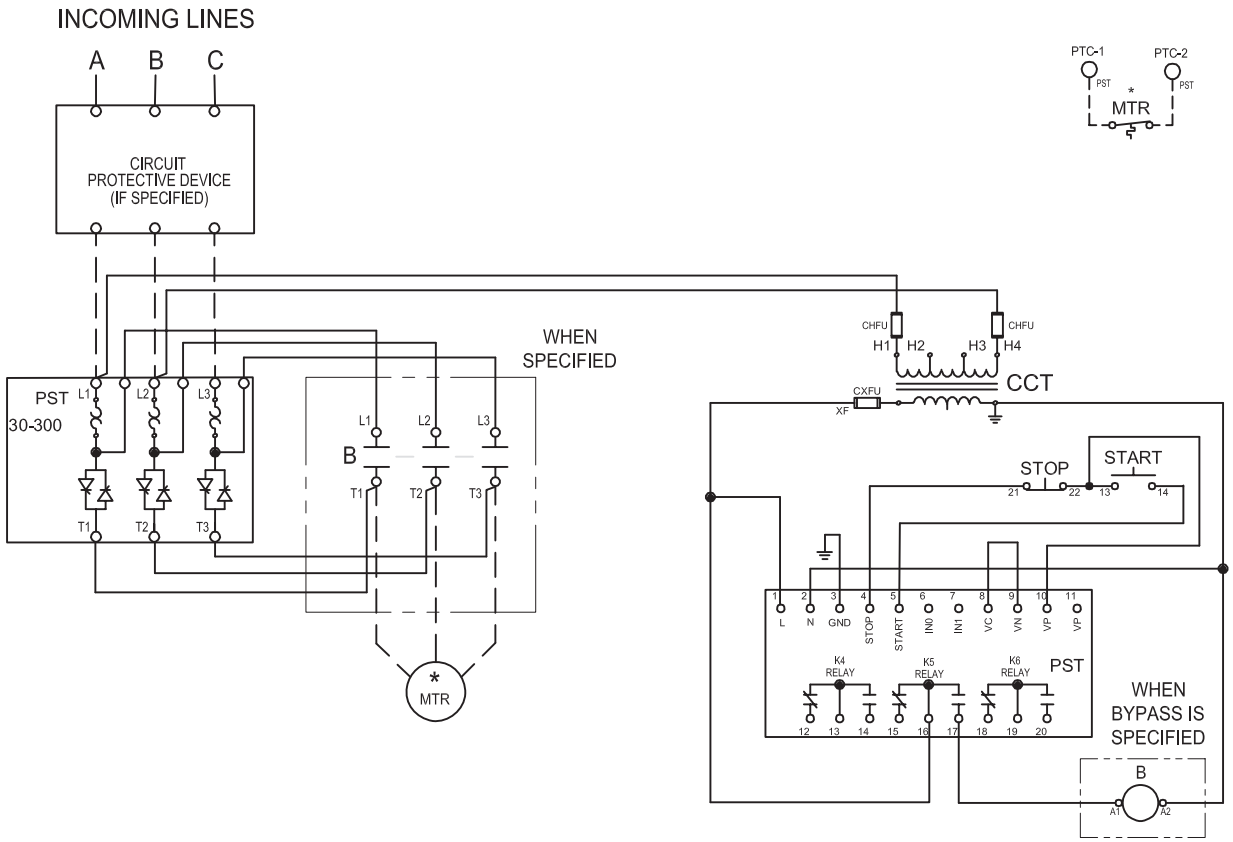
		Type of softstarter PST30 ... 72	PST85 ... 142	PST175 ... 300	PSTB370 ... 470	PSTB570 ... 1050
Main circuit						
Available terminals:	L1, L2, L3	Yes	Yes	Yes	Yes	Yes
	T1, T2, T3	Yes	Yes	Yes	Yes	Yes
(For external by-pass):	B1, B2, B3	Yes	Yes	Yes	No	No
Connection clamp						
Solid/Stranded	1 x mm^2	10 ... 95	See page 6.31	See page 6.31	See page 6.31	See page 6.31
Solid/Stranded	1 x mm^2	6 ... 35	See page 6.31	See page 6.31	See page 6.31	See page 6.31
Tightening torque (recommended), Nm		6.0	See page 6.31	See page 6.31	See page 6.31	See page 6.31
Connection bar		No				
Width and thickness	mm	–				
Hole diameter	mm	–				
Tightening torque (recommended), Nm		–	9	18	40	49
Supply and control circuit						
Connection clamp		Yes	Yes	Yes	Yes	Yes
Solid/Stranded	1 x mm^2	2.5	2.5	2.5	2.5	2.5
Solid/Stranded	1 x mm^2	1.5	1.5	1.5	1.5	1.5
Tightening torque (recommended), Nm		0.5	0.5	0.5	0.5	0.5

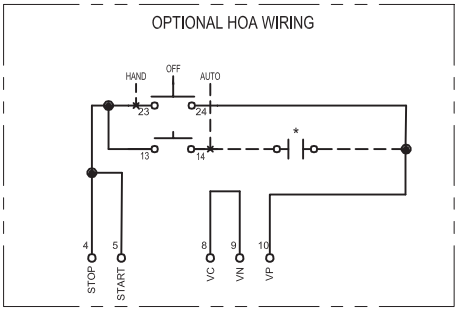
Fuse ratings and power losses

For softstarter	Recommended ABB Overload protection Type	Current range A	Max power loss at rated I_e W	Maximum fuse ratings - main circuit Bussmann fuses A	Type	Holder	Ferraz fuses A	Type	Power requirements supply circuit VA/VA pull in
PST									
PST30	Integrated	9... 35	100	80	170M1366	170H1007	100	6.6 URB 000 D08V 0100	5
PST37	Integrated	12…46	120	125	170M1368	170H1007	160	6.6 URB 000 D08V 0160	5
PST44	Integrated	15…58	140	160	170M1369	170H1007	200	6.6 URD 30 D08A 0200	5
PST50	Integrated	15…58	160	160	170M1369	170H1007	200	6.6 URD 30 D08A 0200	5
PST72	Integrated	23…86	230	250	170M1371	170H1007	315	6.6 URD 30 D08A 0315	5
PST85	Integrated	30…115	270	315	170M1372	170H1007	400	6.6 URD 30 D08A 0400	10
PST105	Integrated	38…144	325	400	170M3019	170H3004	400	6.6 URD 30 D08A 0400	10
PST142	Integrated	45…173	435	450	170M3020	170H3004	500	6.6 URD 30 D08A 0500	10
PST175	Integrated	60…230	540	500	170M3021	170H3004	550	6.6 URD 30 D08A 0550	15
PST210	Integrated	75…288	645	630	170M5012	170H3004	630	6.6 URD 31 D08A 0630	15
PST250	Integrated	75…288	765	700	170M5013	170H3004	630	6.6 URD 31 D08A 0630	15
PST300	Integrated	90…345	920	900	170M5015	170H3004	900	6.6 URD 31 D11A 0900	15
PSTB – 600V									
PSTB370	Integrated	120…460	90	700	170M5013	170H3004	630	6.6 URD 31 D08A 0630	20/480
PSTB470	Integrated	150…575	110	900	170M5015	170H3004	900	6.6 URD 31 D11A 0900	20/480
PSTB570	Integrated	180…690	105	900	170M5015	170H3004	900	6.6 URD 31 D11A 0900	25/900
PSTB720	Integrated	225…863	110	1250	170M5018	170H3004	1250	6.6 URD 33 D11A 1250	25/860
PSTB840	Integrated	300…1160	170	1500	170M5018	170H3004	1600	6.6 URD 33 D11A 1250	25/860
PSTB1050	Integrated	360…1380	170	1800	170M6020	170H3004	2000	6.6 URD 233 PLAF 2000	25/860
PSTB – 690V									
PSTB370	Integrated	120…460	90	700	170M5013	170H3004	630	6.6 URD 31 D08A 0630	20/480
PSTB470	Integrated	150…575	110	900	170M5015	170H3004	900	6.6 URD 31 D11A 0900	20/480
PSTB570	Integrated	180…690	105	900	170M5015	170H3004	900	6.6 URD 31 D11A 0900	25/900
PSTB720	Integrated	225…863	110	1250	170M6018	170H3004	1250	6.6 URD 33 D11A 1250	25/860
PSTB840	Integrated	300…1150	170	1500	170M6018	170H3004	1600	6.6 URD 33 TTFA 1600	25/860
PSTB1050	Integrated	360…1380	170	1600	170M6019	170H3004	1600	6.6 URD 33 TTFA 1600	25/860

Circuit diagrams
PST30 – PST300
In-Line

PST30 – PST300





CONNECTION TORQUE: CONSULT SOFT STARTER MANUAL FOR WIRE TORQUE SPECIFICATIONS.

PST NOTES:
1. PROG. INPUT In0 FACTORY SET FOR RESET FAULT/OL.
2. PROG. RELAY K4 FACTORY SET FOR RUN.
3. PROG. RELAY K5 FACTORY SET FOR AT SPEED.
4. PROG. RELAY K6 FACTORY SET FOR EVENT.
5. FUNCTION MOT 1 Ie MUST BE SET TO MOTOR FLA.

LEGEND	
CCT	CONTROL CIRCUIT TRANSFORMER
CHFU	CCT PRIMARY FUSE
CXFU	CCT SECONDARY FUSE
B	BYPASS CONTACTOR
PTC	THERMAL COUPLE
o 13	CONN POINT ON DEVICE WITH NUMBER
*	REMOTE DEVICE
∅	CONNECTION POINT AT TERMINAL BLOCK

NOTES
1. ALL CONTROL WIRING TO BE 14 GA. COLOR OF CONTROL WIRE SHALL BE PER VOLTAGE ON CONTACTOR COILS:

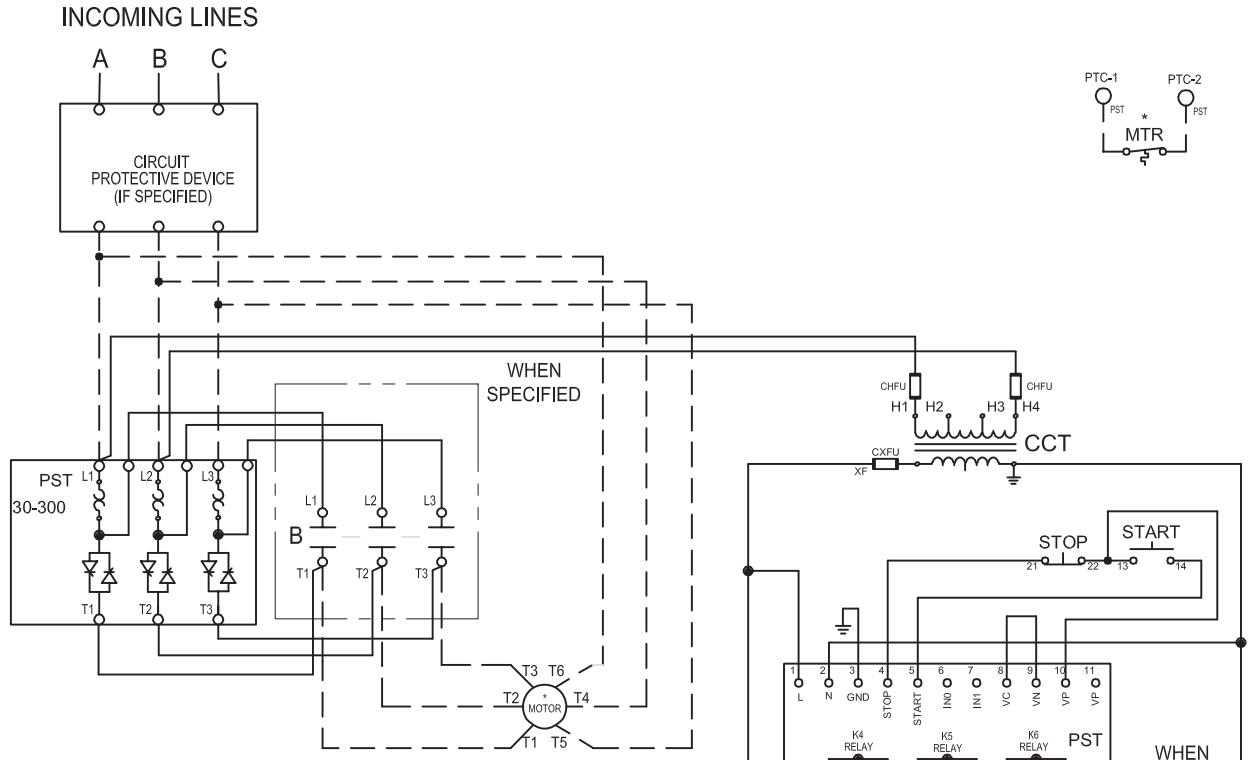
   RED-ALL AC VOLTAGES
   WHITE MAY BE USED ON THE GROUNDED SIDE OF THE AC CIRCUIT IF SPECIFIED.

   BLUE-ALL DC VOLTAGES

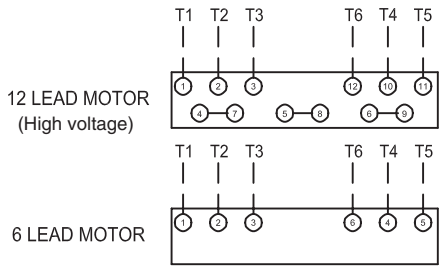
2. ALL DEVICES ARE SHOWN DE-ENERGIZED.
3. DO NOT USE SELECTOR SWITCHES WITH AUTO-RESET OVERLOAD RELAYS.

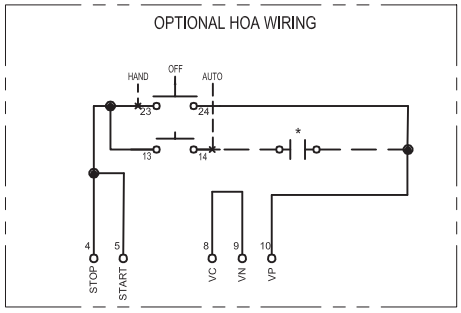
Circuit diagrams
PST30 – PST300
Inside Delta

PST30 – PST300



MOTOR MARKINGS ARE AS DEFINED BY NEMA MG1-2.62 FOR 12 LEAD WYE START, DELTA RUN MOTOR CONNECTIONS. ALWAYS CONFIRM CORRECT LEAD MARKINGS WITH NAMEPLATE DIAGRAMS.





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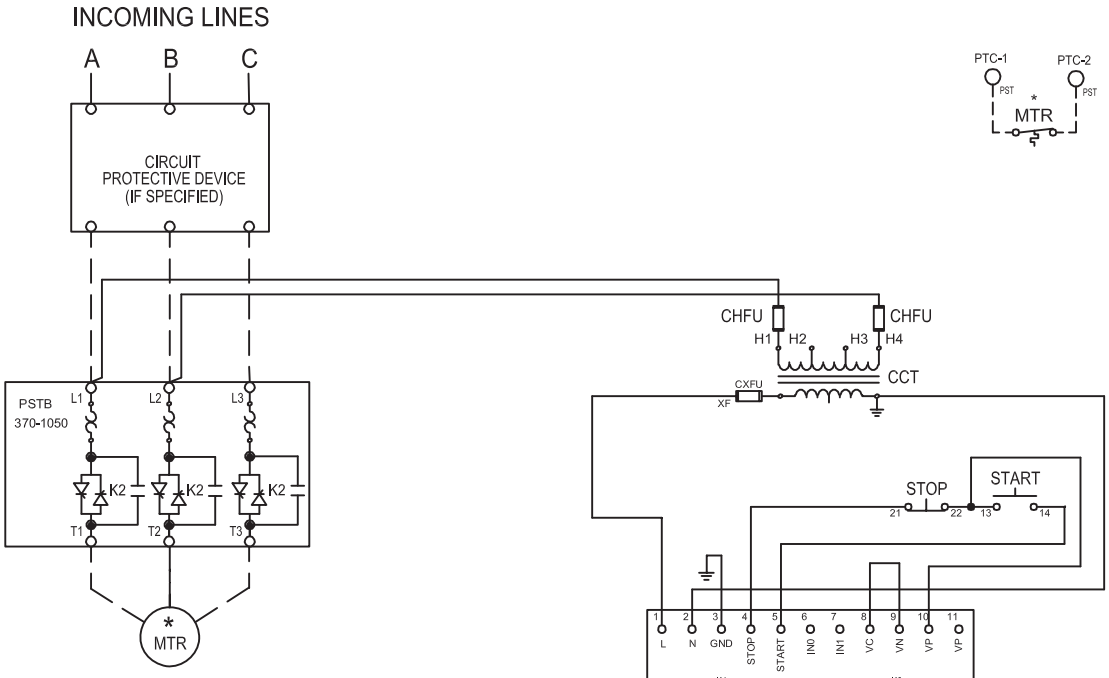
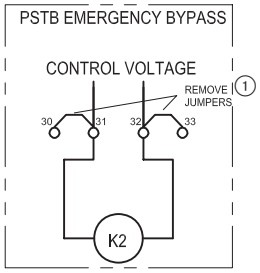
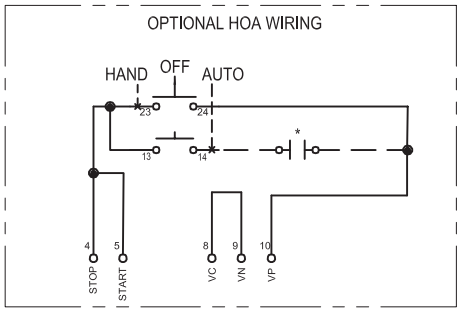
Circuit diagrams
PSTB370 – PSTB1050
In-Line







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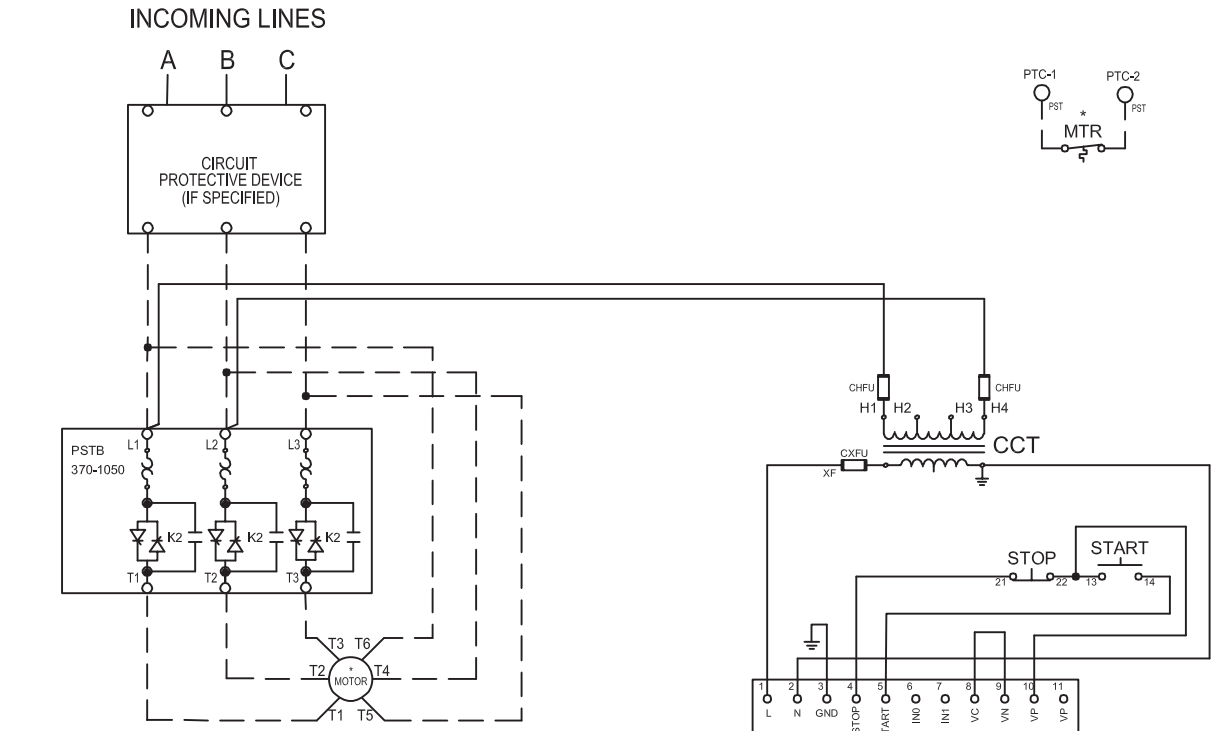
① See page 6.35 for across the line rated (AC3) contactor ratings.

Circuit diagrams
PSTB370 – PSTB1050
Inside Delta



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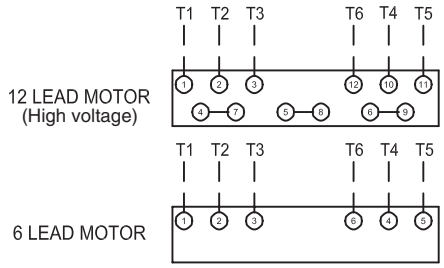

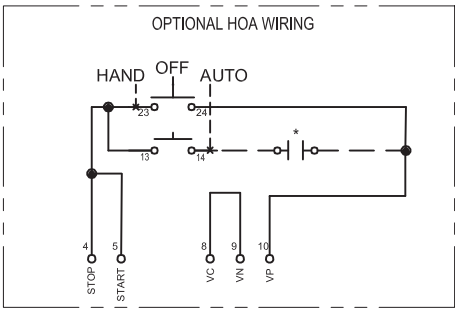

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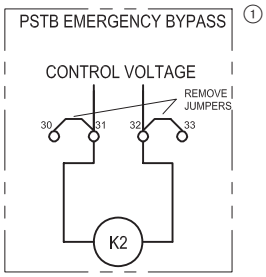

① See page 6.35 for across the line rated (AC3) contactor ratings.

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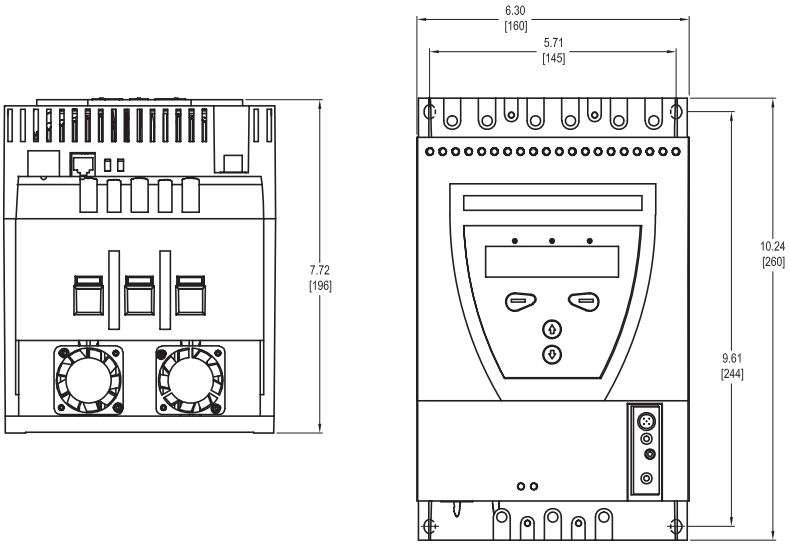
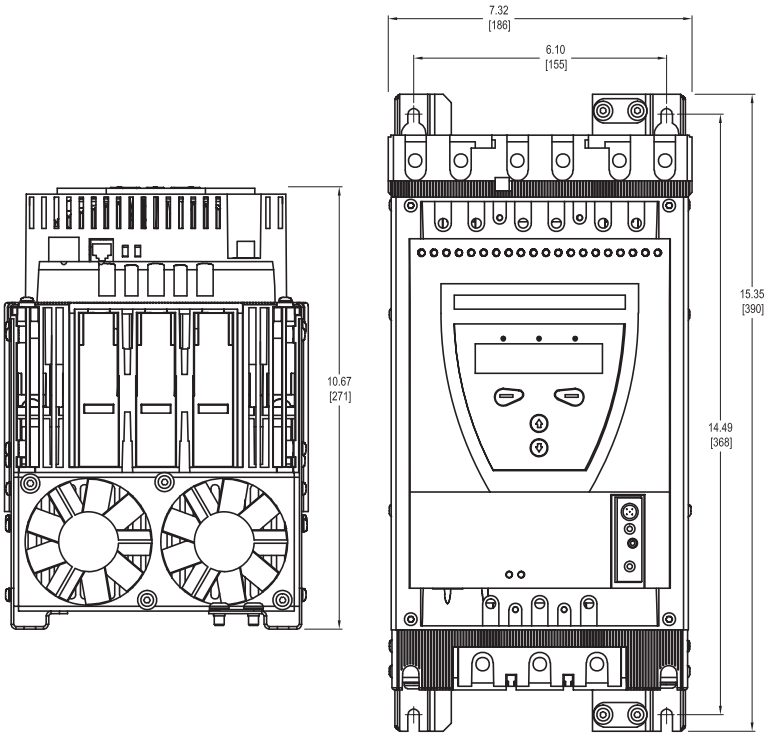
Approximate dimensions
Open
PST30 – PST142

00.00 / 00.00 Inches [Millimeters]

PST30 – PST72



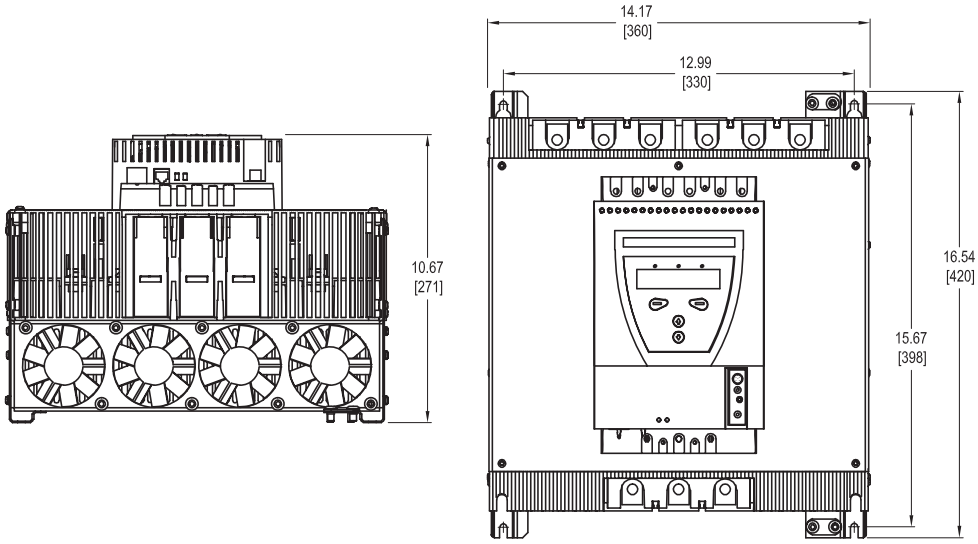
PST85 – PST142



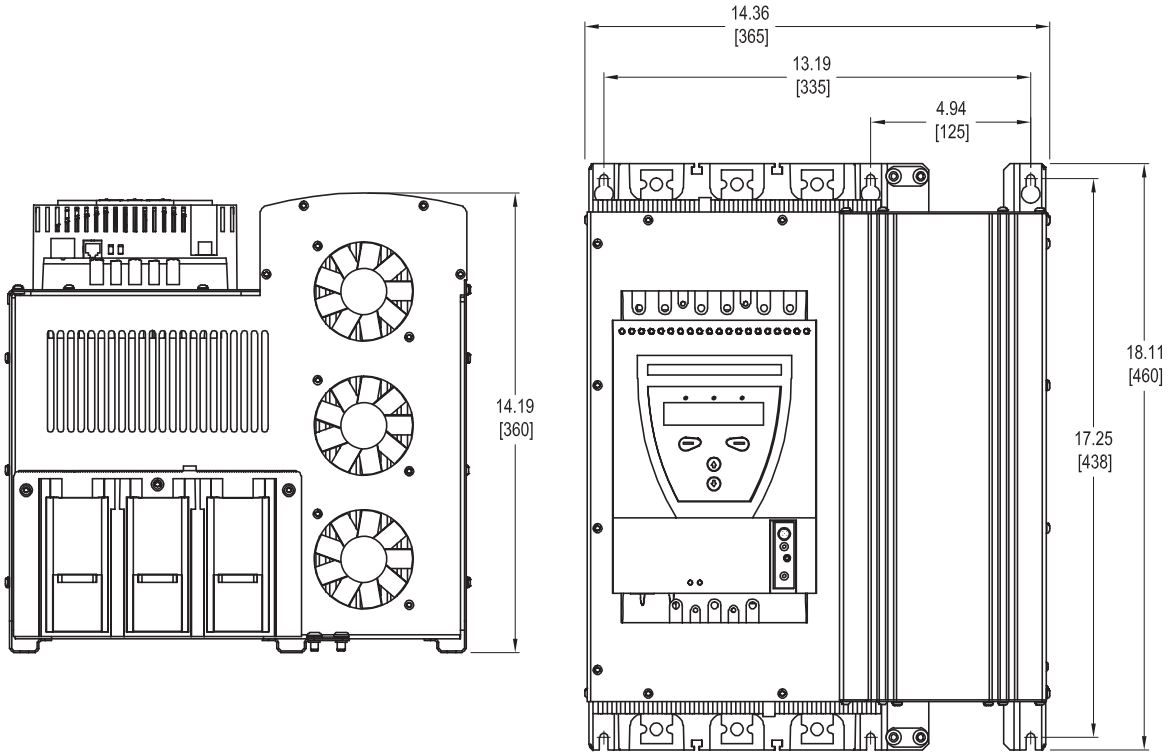
Approximate dimensions
Open
PST175 – PSTB470

00.00
00.00
Inches
[Millimeters]

PST175 – PST300



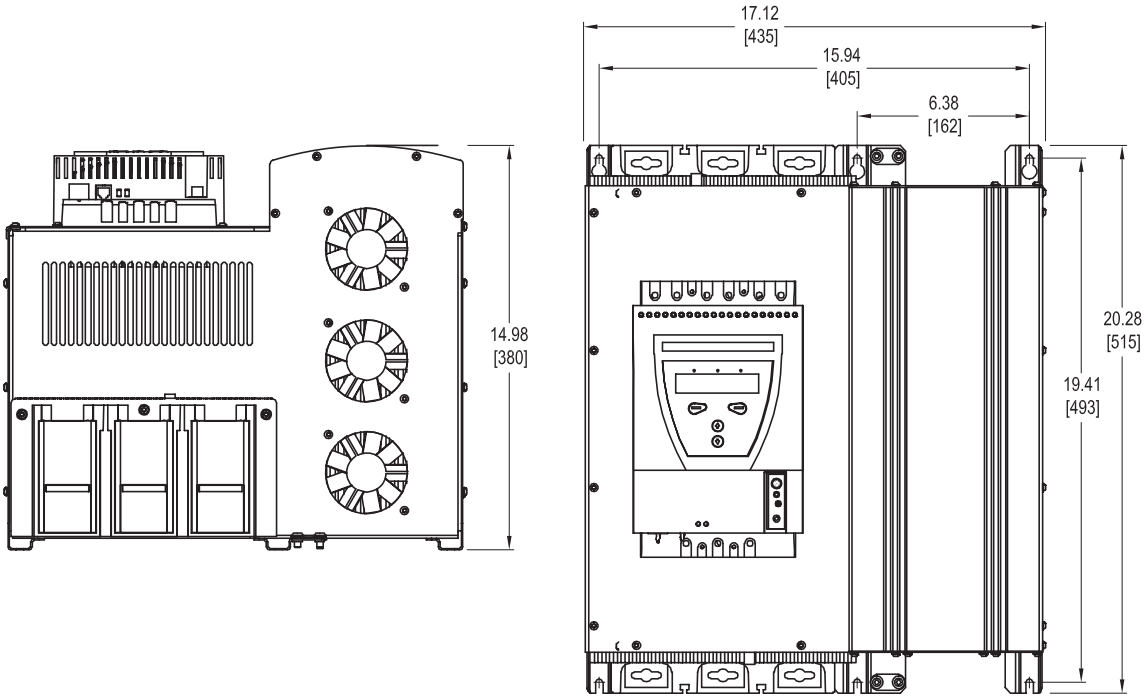
PSTB370 – PSTB470



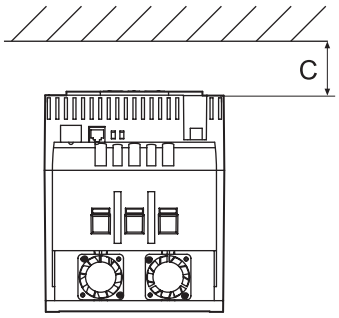
Approximate dimensions
Open
PSTB570 – PSTB1050

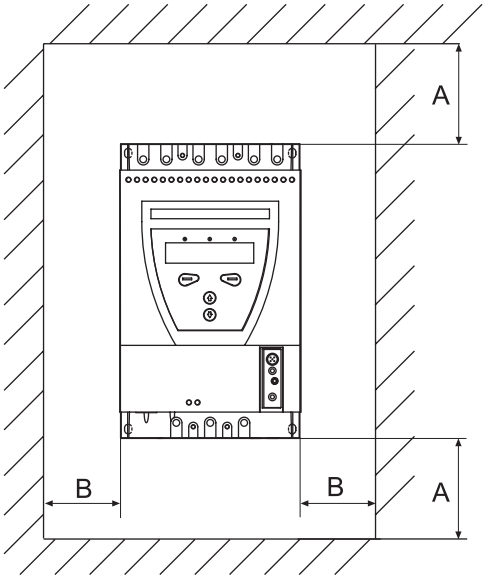
00.00 / 00.00 Inches [Millimeters]

PSTB570 – PSTB1050



Approximate dimensions
Open
Wall mounting





Softstarter type	A In. / mm	B In. / mm	C In. / mm
PST30 – 72	3.94 / 100	0.39 / 10	0.79 / 20
PST85 – 300	3.94 / 100	0.39 / 10	0.79 / 20
PST175 – 300	3.94 / 100	0.39 / 10	0.79 / 20
PSTB370 – 470	5.91 / 150	0.59 / 15	0.79 / 20
PSTB570 – 1050	5.91 / 150	0.59 / 15	0.79 / 20

Approximate dimensions
Enclosed
Horsepower to PST Softstarter type cross-reference

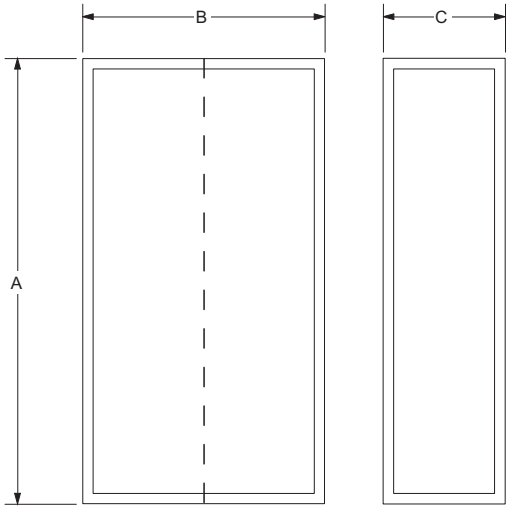
Maximum horsepower in-line

208V	240V	380V	480V	600V	PST Type
5 —	5 —	10 —	10 —	— 15	PST30
7.5 —	10 —	15 —	20 —	— 25	PST30
10 —	10 —	20 —	25 —	— 30	PST37
10 —	15 —	25 —	30 —	— 40	PST44
15 —	20 —	30 —	40 —	— 50	PST50
20 —	25 —	40 —	50 —	— 60	PST72
25 —	30 —	50 —	60 —	— 75	PST85
30 —	40 —	60 —	75 —	— 100	PST105
40 —	50 —	75 —	100 —	— 125	PST142
50 —	60 —	100 —	125 —	— 150	PST175
60 —	75 —	125 —	150 —	— 200	PST210
75 —	100 —	150 —	200 —	— 250	PST250
100 —	100 —	150 —	250 —	— 300	PST300
125 —	150 —	200 —	300 —	— 350	PSTB370
— —	— —	250 —	350 —	— 400	PSTB470
150 —	200 —	300 —	400 —	— 500	PSTB470
200 —	250 —	350 —	500 —	— 600	PSTB570
250 —	300 —	450 —	600 —	— 700	PSTB720
300 —	350 —	500 —	700 —	— 800	PSTB840
350 —	400 —	— —	800 —	— 900	PSTB1050
400 —	450 —	600 —	900 —	— 1000	PSTB1050

Maximum horsepower inside delta

208V	240V	380V	480V	600V	PST Type
7.5 —	10 —	15 —	20 —	— 25	PST30
10 —	10 —	20 —	25 —	— 30	PST30
10 —	15 —	25 —	30 —	— 40	PST30
15 —	20 —	30 —	40 —	— 50	PST37
20 —	25 —	40 —	50 —	— 60	PST44
25 —	30 —	50 —	60 —	— 75	PST50
30 —	40 —	60 —	75 —	— 100	PST72
40 —	50 —	75 —	100 —	— 125	PST85
50 —	60 —	100 —	125 —	— 150	PST105
60 —	75 —	125 —	150 —	— 200	PST142
75 —	100 —	150 —	200 —	— 250	PST175
100 —	100 —	150 —	250 —	— 300	PST210
125 —	150 —	200 —	300 —	— 350	PST250
— —	— —	250 —	350 —	— 400	PST300
150 —	200 —	300 —	400 —	— 500	PST300
200 —	250 —	350 —	500 —	— 600	PSTB370
250 —	300 —	450 —	600 —	— 700	PSTB470
300 —	350 —	500 —	700 —	— 800	PSTB570
350 —	400 —	— —	800 —	— 900	PSTB720
400 —	450 —	600 —	900 —	— 1000	PSTB720
400 —	500 —	800 —	1000 —	— 1200	PSTB720
500 —	600 —	900 —	1200 —	— 1500	PSTB840
600 —	700 —	1200 —	1500 —	— 1800	PSTB1050

Approximate dimensions
Enclosed
208V – 600V



Enclosed, 208V – 600V

Combination	In-Line A	In-Line B	In-Line C	Inside Delta A	Inside Delta B	Inside Delta C
PST30 – PST72						
Softstarter only	20	20	12	20	20	12
Softstarter with bypass	20	20	12	20	20	12
Softstarter with fused disconnect	20	20	12	24	20	12
Softstarter with circuit breaker	20	20	12	24	20	12
PST85 – PST142						
Softstarter only	24	20	12	36	24	12
Softstarter with bypass	24	20	12	36	24	12
Softstarter with fused disconnect	30	30	12	42	36	12
Softstarter with circuit breaker	24	24	12	42	36	12
PST175 – PST300						
Softstarter only	30	30	12	42	30	12
Softstarter with bypass	30	30	12	42	30	12
Softstarter with fused disconnect	36	36	12	36	36	12
Softstarter with circuit breaker	36	36	12	36	36	12

Combination	In-Line A	In-Line B	In-Line C	Inside Delta A	Inside Delta B	Inside Delta C
PSTB370 – PSTB470						
Softstarter with bypass, internal	48	36	16	48	36	16
Softstarter with fused disconnect	48	36	16	87	36	24
Softstarter with circuit breaker	48	36	16	48	36	16
PSTB570 – PSTB720						
Softstarter with bypass, internal	48	36	16	48	36	16
Softstarter with fused disconnect	87	36	24	87	36	24
Softstarter with circuit breaker	48	36	16	48	36	16
PSTB840 – PSTB1050						
Softstarter with bypass, internal	87	36	24	87	36	24
Softstarter with fused disconnect	87	48	24	87	48	24
Softstarter with circuit breaker	87	48	24	87	48	24

Notes

Softstarters
Type SSM
Medium voltage
2300 – 13,800V ①

Type SSM Softstarters

Description

- Fused disconnect switch with blown fuse indicators and door safety interlocks rated for load break/fault make with automatic grounding arm
- Inline isolation vacuum contactor sized for across-the-line motor starting (optional on "soft start only" models)
- Bi-metallic thermal overload provides backup motor protection when operating in emergency bypass mode (optional on "soft start only" models)
- 120V fused control power transformer standard in line start section (optional on "soft start only" models)
- Digital controller provides solid state overload and numerous protective features for both the motor and the soft starter
- Fiber optic firing circuit for superior electrical noise isolation
- Programmable keypad with LCD and status LEDs for easy setup and operation
- Bypass vacuum contactor sized for across-the-line (emergency) motor starting is standard on all models to guarantee cool operation in all environments and extend unit life
- Heavy duty SCR stack assemblies with ring transformer isolated circuit for reliable, hard-firing gate pulse
- Isolated low voltage compartment provides maximum protection for operating personnel
- Mechanically interlocked medium voltage compartment
- UL File # E175732 ②

① Consult factory for higher voltages.
② For softstarters rated 4160V, 400A and below.

General information

Key construction features

- Fused disconnect switch with blown fuse indicators and door safety interlocks rated for load break/fault make with automatic grounding arm
- Inline isolation vacuum contactor② sized for across-the-line motor starting (optional on "soft start only" models)
- Bi-metallic thermal overload provides backup motor protection when operating in emergency bypass mode (optional on "soft start only" models)
- 120V fused control power transformer standard in line start section (optional on "soft start only" models)
- Digital controller provides solid state overload and numerous protective features for both the motor and the soft starter
- Programmable keypad with LCD and status LEDs for easy setup and operation
- Bypass vacuum contactor② standard on all models to guarantee cool operation in all environments and extend unit life
- Heavy duty SCR stack assemblies with ring transformer isolated circuit for reliable, hard-firing gate pulse
- Isolated low voltage compartment provides maximum protection for operating personnel
- Mechanically interlocked medium voltage compartment

Heavy duty SCR power assemblies

- Rated for 500 percent overload for 60 seconds
- Field-proven design in use since 1975
- Fiber optics gate-firing circuit using “ring transformer” isolation design for superior noise immunity

Industrial “real world” packaging

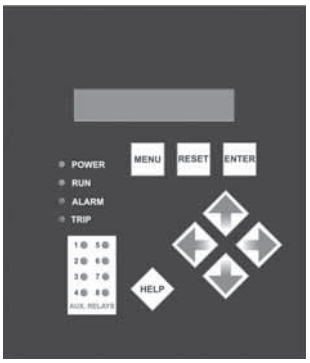
- Load break/fault make disconnect switch with door safety interlocking mechanism
- Isolated, noise-immune low voltage control compartment
- NEMA 12 enclosure with bypass vacuum contactor included as standard①②
- Extra wiring space for MV cables for easy installation

Custom engineered systems

- Available in special enclosures and lineups
- Numerous control component options including:
  - Reversing contactors
  - Motor protection relays
  - Customer specified devices
- Horizontal and custom bus interconnects
- Various motor configurations including synchronous, wound rotor and two speed

Digital microprocessor control

- Full featured for flexibility, including dual ramp and programmable custom start curves
- LCD status/alarm display and built-in programing keypad
- Serial communications port standard: RS485 with Modbus RTU protocol or RS232 with Windows interface
- In-depth motor and system protection monitors
- Monitors 18 separate parameters and maintains a nonvolatile fault memory



① 13.8 kV softstarters are rated NEMA 1.
② 13.8 kV, 600A softstarters use circuit breakers for isolation and bypass functions.

Type SSM

Custom line-up

SSM-41200-E-S

Ratings ①			Soft start with line start section		Optional soft start only ②	
Volts	Max. amps	Nominal max. HP	Catalog number	List price	Catalog number	List price
2300	200 400 600	800 1500 2500	SSM-23200-E-S SSM-23400-E-S SSM-23600-E-S	③	SSM-23200-E SSM-23400-E SSM-23600-E	③
3300	200 400 600	1000 1800 3000	SSM-33200-E-S SSM-33400-E-S SSM-33600-E-S	③	SSM-33200-E SSM-33400-E SSM-33600-E	③
4160	200 400 600	1250 2500 5000	SSM-41200-E-S SSM-41400-E-S SSM-41600-E-S	③	SSM-41200-E SSM-41400-E SSM-41600-E	③
6600/ 6900	200 400 600	2500 5000 7500	SSM-66200-E-S SSM-66400-E-S SSM-66600-E-S	③	SSM-66200-E SSM-66400-E SSM-66600-E	③
13,800	300 600	7500 15,000	SSM-138300-E-S SSM-138600-E-S	③	SSM-138300-E SSM-138600-E	③

6

Catalog number explanation

SSM - 23 200 - E - S

Softstarter
SSM — medium voltage

Voltage
23 = 2300V
33 = 3300V
41 = 4160V
66 = 6600/6900V
138 =13,800V

Amperage
200 = 200A
400 = 400A
600 = 600A

S = Switchgear line start panel

E = NEMA 12 enclosure ④⑤

① Contact factory for higher horsepower and voltage requirements.
② Must be used with customer supplied line start panel.
③ Consult factory.
④ Consult factory for other enclosure types.
⑤ 13.8 kV softstarters are rated NEMA 1.

Technical data

Type of load
Three phase medium voltage AC induction motors

AC supply voltage
2300, 3300, 4160, 6600/6900, 13,800 VAC
+10% to -10%
50/60 Hz line voltages

HP ratings ①
Up to 15,000 HP @ 13,800V (600 Amps max)

Overload rating
500% – 60 Seconds

Power circuit
Series strings of SCR power modules (2,4 or 6 matched pairs of SCRs per phase depending on voltage rating)

SCR peak inverse voltage

Amps	Line voltage	PIV rating
200 to 400	2300 V	6500
	3300 V	13,000
	4160 V	13,000
	6600/6900 V	19,500
	11-14 kV	39,000
600	2300 V	7000
	3300 V	14,000
	4160 V	14,000
	6600/6900 V	21,000
	11-14 kV	39,000

Transient voltage protection
dv/dt circuits (1 per SCR power module)

Vacuum bypass contactor ③
Standard on all models, line start rated

Ambient operating temperature
0 to 50°C (32°F to 122°F)
(Optional -20° to 50°C with heaters)

Control
Digital microprocessor controller with read-out in English text
Alphanumeric LCD display
Non-volatile memory for programming and faults
Opto-isolated inputs

Communications
RS485 with modbus RTU protocol
RS232 with Windows interface

Auxiliary contacts
FORM C, 8 Amps @ 250V

Adjustments
Motor FLA
Dual adjustments — Two independent settings for:

Initial voltage	0 – 100% of nominal voltage
Current limit	0 – 600% of motor FLA
Acceleration time	1 – 120 seconds
Deceleration time	1 – 60 seconds
Kick start	0.1 – 2.0 seconds, 10 - 100% of line voltage
Under voltage trip	70 – 95% (adjustable trip delay)
Over voltage trip	105 – 130% (adjustable trip delay)
Under current trip	20 – 90% of motor FLA (adjustable trip delay)
Over current trip	100 - 300% of motor FLA (adjustable trip delay)
Allowable re-starts	0 – 10 (adjustable time inhibit)

Motor and starter protection

Electronic overload	Inverse time, 75 – 150% of motor FLA
Electronic shear pin	Trips within 1 cycle of setpoint
Phase loss	One or more phases missing
Phase sequence	Phase sequency incorrect
Over voltage	Trips at high line setpoint
Under voltage	Trips at low line setpoint
Stall protection	Starting process is not complete
Shorted SCR	Internal fault detected
Error connection	Internal fault/motor connection
Starter over-temp	Heatsink over temperature

Metering

Current	Phase A, B, C & average current
Thermal data	Thermal capacity of motor
Power	KVA, KW, KVAR, power factor, KWH

Line start section
Load break/fault make disconnect switch with automatic grounding arm and viewing window
Fuses with blown fuse indicator
In-line vacuum contactor③
Control power transformer with fused primary/secondary
Packaged in common enclosure with soft start
Optional "Soft Start" (requires customer supplied line start panel)

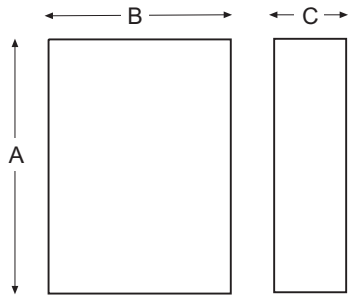
Statistical data
Total amount of run time since soft start was reset
Amount of time it took motor to start during last period
Maximum current during last start period
Total number of starts since soft start was reset
Event history for last 60 events

Elevation
1000 m / 3300 ft. without derating (contact factory for higher elevations)

Enclosure ②
NEMA 12, top and bottom entrance plates
11 gauge steel
ASA #61 gray paint with lifting eyes

① Consult factory for higher horsepower and voltage requirements.
② 13.8 kV softstarters are rated NEMA 1.
③ 13.8 kV, 600A softstarters use circuit breakers for isolation and bypass functions.

Approximate dimensions



Soft start with line start section (inches)				Optional softstart only (inches)			
Model number	A	B	C	Model number	A	B	C
SSM-23200-E-S	92	36	30	SSM-23200-E	92	36	30
SSM-23400-E-S	92	36	30	SSM-23400-E	92	36	30
SSM-23600-E-S	92	72	30	SSM-23600-E	92	36	30
SSM-33200-E-S	92	36	30	SSM-33200-E	92	36	30
SSM-33400-E-S	92	36	30	SSM-33400-E	92	36	30
SSM-33600-E-S	92	72	30	SSM-33600-E	92	36	30
SSM-41200-E-S	92	36	30	SSM-41200-E	92	36	30
SSM-41400-E-S	92	36	30	SSM-41400-E	92	36	30
SSM-41600-E-S	92	72	30	SSM-41600-E	92	36	30
SSM-66200-E-S	92	72	30	SSM-66200-E	92	36	30
SSM-66400-E-S	92	72	30	SSM-66400-E	92	36	30
SSM-66600-E-S	92	72	30	SSM-66600-E	92	72	30
SSM-138300-E-S	92	120	44	SSM-138300-E	Consult factory		
SSM-138600-E-S	92	84	96	SSM-138600-E			

Notes

Power electronic brakes
Type PEB

Softstarters
Power electronic brakes
Type PEB

Description

Electronic braking stops the load by injecting a controlled amount of DC current into a three phase AC motor. The Power Electronic Brake (PEB) Series features full-wave DC braking which can be adjusted to stop your load quickly, repeatedly and reliably...even if load conditions change.

Unlike other brakes that only provide voltage control, the PEB Series is a current regulated brake. It automatically adjusts for resistance changes in the motor windings due to any input voltage fluctuations. What does this mean? Repeatable, reliable operation every time you stop your motor.

An exceptionally accurate method of micro-processor controlled sensing determines when the motor shaft has come to a stop. Braking current is removed when the motor stops, eliminating excess braking current which means longer motor life.

Built-in jogging circuitry allows you to select the time you need for machine setup and positioning without applying DC current to the motor windings. DC current is only applied when system setup is complete... no excess current, no excess heating, no premature motor failure.

The PEB Series has a built-in feature to control a mechanical holding brake. Any fault indication automatically enables the mechanical brake for fail-safe operation.

The PEB Series has been designed and tested to meet the most stringent industry standards: UL & cUL.

UL File # E169883

General information
Catalog number explanation

PEB - 010 - 48 - 1

Maximum brake amps
010 – 10
024 – 24
050 – 50
100 – 100
200 – 200
300 – 300
400 – 400
550 – 550
800 – 800
1000 – 1000

Enclosure
No digit – Open chassis
1 – NEMA 1
2 – NEMA 12
3 – NEMA 3R
4 – NEMA 4
X – NEMA 4X

Voltage
24 – 208/240
48 – 480
60 – 600

Power electronic brakes
Open

PEB-100-48 PEB-10-48

Max amps ①	208V			240V			480V			600V			
	Horsepower		Catalog number	Horsepower		Catalog number	Horsepower		Catalog number	Horsepower		Catalog number	List price
	Std. duty	Hvy. duty		Std. duty	Hvy. duty		Std. duty	Hvy. duty		Std. duty	Hvy. duty		
10	3	1	PEB-010-24	3	1	PEB-010-24	7.5	3	PEB-010-48	10	5	PEB-010-60	**$ 755**
24	7.5	3	PEB-024-24	10	5	PEB-024-24	20	10	PEB-024-48	25	15	PEB-024-60	**1070**
50	15	7.5	PEB-050-24	20	10	PEB-050-24	40	25	PEB-050-48	50	30	PEB-050-60	**1450**
100	30	20	PEB-100-24	40	15	PEB-100-24	75	50	PEB-100-48	100	60	PEB-100-60	**2250**
200	75	40	PEB-200-24	75	50	PEB-200-24	150	100	PEB-200-48	200	125	PEB-200-60	**3900**
300	100	60	PEB-300-24	125	75	PEB-300-24	250	150	PEB-300-48	300	200	PEB-300-60	**4300**
400	150	75	PEB-400-24	150	100	PEB-400-24	350	200	PEB-400-48	400	250	PEB-400-60	**6500**
550	250	125	PEB-550-24	200	150	PEB-550-24	500	300	PEB-550-48	600	350	PEB-550-60	**8700**
800	350	200	PEB-800-24	350	200	PEB-800-24	700	450	PEB-800-48	900	500	PEB-800-60	**10,250**
1000	400	250	PEB-1000-24	400	300	PEB-1000-24	900	500	PEB-1000-48	1000	600	PEB-1000-60	**13,000**

NOTE: If duty cycle is not known, it is recommended to use the heavy duty brake since braking current can be adjusted down to meet actual load requirements.

① Never exceed the motor FLA without checking the motor manufacturers data with regards to application duty cycle.

Power electronic brakes
Enclosed, NEMA 1

Maximum Amps FLA	Maximum motor HP ratings 208V Standard Duty	208V Heavy Duty	240V Standard Duty	240V Heavy Duty	480V Standard Duty	480V Heavy Duty	600V Standard Duty	600V Heavy Duty	NEMA 1, 480V Catalog number	NEMA 1, 600V Catalog number	List price
10	3	1	3	1	7.5	3	10	5	PEB-010-48-1	PEB-010-60-1	**$ 805**
24	7.5	3	10	5	20	10	25	15	PEB-024-48-1	PEB-024-60-1	**1120**
50	15	7.5	20	10	40	25	50	30	PEB-050-48-1	PEB-050-60-1	**1650**
100	30	20	40	15	75	50	100	60	PEB-100-48-1	PEB-100-60-1	**2450**
200	75	40	75	50	150	100	200	125	PEB-200-48-1	PEB-200-60-1	**4320**
300	100	60	125	75	250	150	300	200	PEB-300-48-1	PEB-300-60-1	**4800**
400	150	75	150	100	350	200	400	250	PEB-400-48-1	PEB-400-60-1	**7000**
550	250	125	200	150	500	300	600	350	PEB-550-48-1	PEB-550-60-1	**9200**
800	350	200	350	200	700	450	900	500	PEB-800-48-1	PEB-800-60-1	**10,750**
1000	400	250	400	300	900	500	1000	600	PEB-1000-48-1	PEB-1000-60-1	**13,500**

NOTE: See below for additional enclosure styles and price adders.

Options ①

Model number	NEMA 12	NEMA 3R	NEMA 4	NEMA 4X
PEB-010	**$ 100**	**$ 100**	**$ 150**	**$ 450**
PEB-024	**100**	**100**	**150**	**450**
PEB-050	**100**	**100**	**150**	**450**
PEB-100	**100**	**100**	**150**	**450**
PEB-200	**150**	**150**	**200**	**600**
PEB-300	**300**	**300**	**350**	**1050**
PEB-400	**300**	**300**	**350**	**1050**
PEB-550	**300**	**300**	**350**	**1050**
PEB-800	**300**	**300**	**350**	**1050**
PEB-1000	**300**	**300**	**350**	**1050**

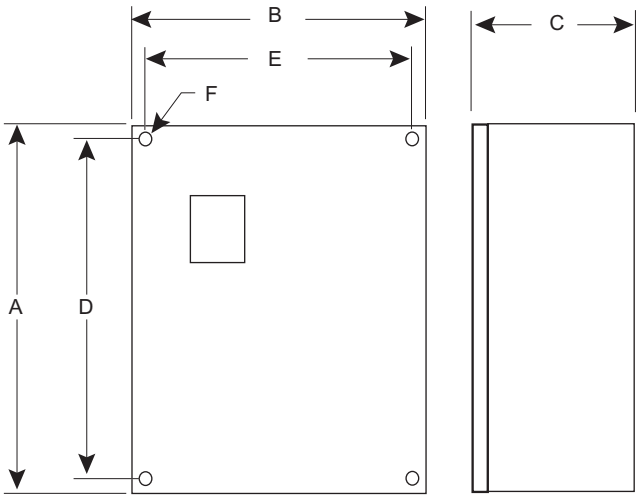
① Add to list price of NEMA 1 enclosed products and change part number appropriately.

Technical data

Item	Specification
Voltage rating	Models rated from 208 - 600V ±10% Selectable for 50/60Hz ± 2 Hz
Current ratings	10 - 1000A in 10 sizes: 10, 24, 50, 100, 200, 300, 400, 550, 800, 1000A
Output capacity	25% duty cycle at 100% unit rating
Power circuit	Full wave bridge, 4 SCRs, designed for use without isolation contactors
Transient protection	RC snubber dv/dt circuit on each SCR device
Fusing	Approved for use with existing motor starter fusing when unit is sized for motor FLA. Consult NEC for any other fusing requirements.
Control circuit	Self-powered directly from line terminals. No separate control voltage required
Control method	Microprocessor unit controls sequencing, I/O monitoring and status annunciation. Braking current is adjustable via true RMS regulated control using phase angle firing of SCRs.
Operator adjustments	Brake Time and Jog Time = 7 position binary dipswitch Brake Current = potentiometer
Adjustment ranges	Brake Jog Times = 0 - 127 seconds in 1 sec. increments Brake Current = Up to 100% unit rating
Inputs	Starter Monitor = Dry input for auxiliary contact from motor starter. Jumper selectable for N.O. or N.C. contact. Brake Disable = Dry input for N.O. contact to disable braking before or during operation. Can be wired to the starter thermal overload N.O. auxiliary contact to prevent braking of overloaded motor. Motor Power Sensor (T3) = voltage input used for sensing motor power presence in sequencing/status circuit and for zero speed sensing during braking
Outputs	Starter Coil Interlock = Two sets of FORM “C” relay contacts for use in interlocking the starter coil and/or other devices to prevent energizing as the braking power is applied. Mechanical Brake Release = N.O. relay contact for use in controlling electro-mechanical brake as a holding brake. When the PEB Series is “disabled,” this circuit controls the mechanical brake normally as if it is the only brake in the system.
Auxilliary contact ratings	5 amps, 250VAC max
LED Status indicators	Large LEDs: Braking = green; Fault = red Small LEDs: Power On, Jog/Armed, Brake Off, Disabled, Over Temp, and Wiring Error
Operating design temperature	0 - 50 °C (32-122 °F) open 0 - 40 °C (32 - 104 °F) enclosed
Ambient conditions	0 - 95% relative humidity 0 - 3300ft (1000M) elevation
Approvals	UL, cUL Listed

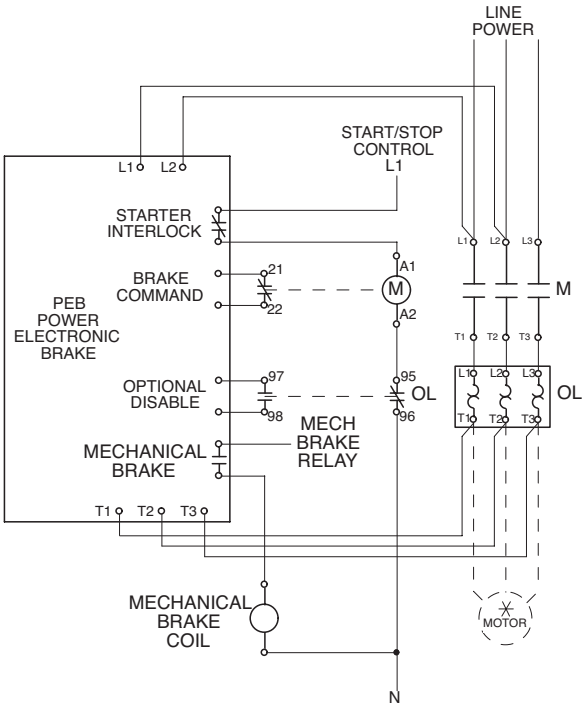
Approximate dimensions & Circuit diagram
Open

Approximate dimensions (inches)



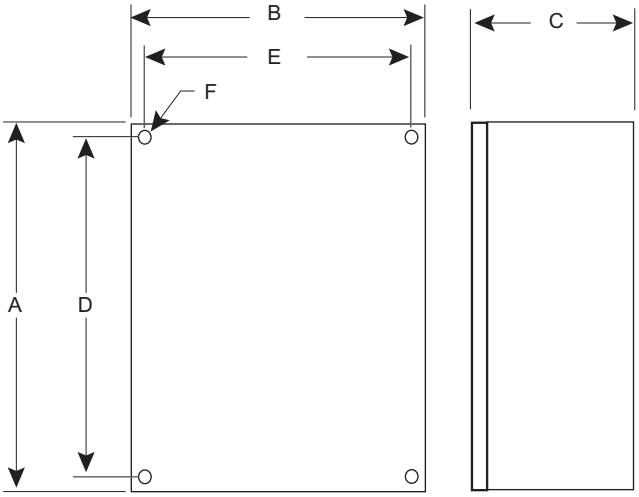
Model No.	A	B	C	D	E	F
PEB-10	8.5	7.3	6.2	8	6.9	0.21
PEB-24	8.5	7.3	6.2	8	6.9	0.21
PEB-50	10.5	7.9	7.2	10	6.8	0.22
PEB-100	10.5	7.9	7.2	10	6.8	0.22
PEB-200	16.5	10	10	15.9	9	0.28
PEB-300	16	16	10	15	15	0.5
PEB-400	16	16	10	15	15	0.5
PEB-550	16	16	10	15	15	0.5
PEB-800	16	16	10	15	15	0.5
PEB-1000	16	16	10	15	15	0.5

Circuit diagram



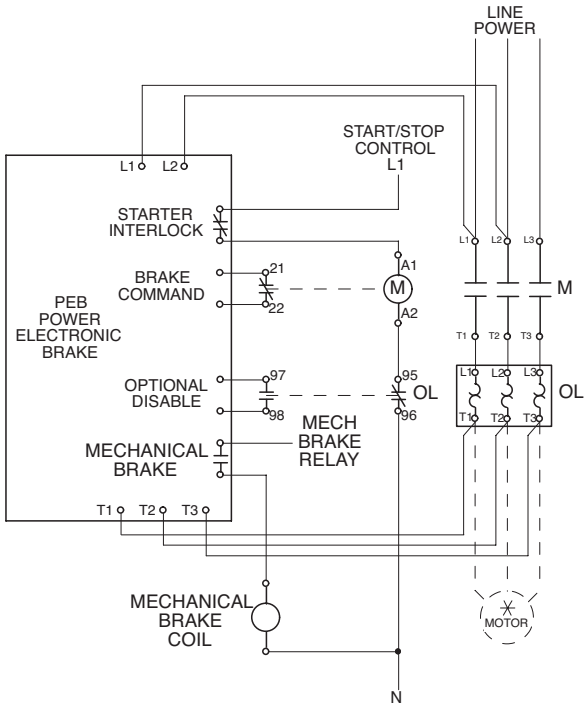
Approximate dimensions & Circuit diagram
Enclosed

Approximate dimensions (inches) ①



Model No.	A	B	C	D	E	F
PEB-10	16	12	9	14.5	10.5	0.5
PEB-24	16	12	9	14.5	10.5	0.5
PEB-50	20	16	9	18.5	14.5	0.5
PEB-100	20	16	9	18.5	14.5	0.5
PEB-200	24	20	13	22.5	18.5	0.5
PEB-300	36	24	13	34.5	22.5	0.5
PEB-400	36	24	13	34.5	22.5	0.5
PEB-550	36	24	13	34.5	22.5	0.5
PEB-800	36	24	13	34.5	22.5	0.5
PEB-1000	36	24	13	34.5	22.5	0.5

Circuit diagram



① Dimensions apply to NEMA 1, NEMA 12, NEMA 3R and NEMA 4 enclosures. Consult factory for NEMA 4X dimensions.

Notes

Relays
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Notes

Timers & controls

Timers & controls

This section features product selection guides from the Timers and Controls Catalog (SS3 Cat. # 1TRC001009C0201). Use the SS3 catalog to view the individual product pages for the series shown in these selection guides. The SS3 is available in print and on CD-ROM.

SS3 Catalog:

This 552 page catalog and application manual provides concise data and application tips unavailable elsewhere. A double indexing system speeds the selection of:

Timers
Time Delay Relays
Encapsulated Timing Modules
Universal Timers
Multifunction Timers
ProgramaCube® Timers and Counters
Voltage Monitors
Current Sensors & Monitors
Phase Monitors
Liquid Level Controls
Accessories
Alternating Relays
Vending Timers and Controls
HVAC/ Timers and Controls
Solid State Flashers
Tower & Obstruction Lighting Controls
Solid State Relays
Motion Detectors
Lamp Dimmers & Motor Speed Controls
Power Factor Monitors
Insulation Monitors

This new edition includes the complete ABB brand of DIN3 mount timers, monitoring relays, and solid state relays.

All products are manufactured within an ISO9000 quality monitoring system. All products are shipped with UL and CSA approvals, and CE certification. Quality designs and rugged encapsulated construction allow the SSAC brand products to be backed by an exclusive 10 Year Product Warranty.

Each data sheet includes complete specifications, illustrations, photos and operational information needed to select one of the over 225 product series. The SS3 is easy-to-use and can be understood by designers, technicians, service contractors and non-technical users.

The SS3 includes informative application notes along with a colorful plant tour, and information about custom product design programs.

Selection Guide
Multi-function Timers

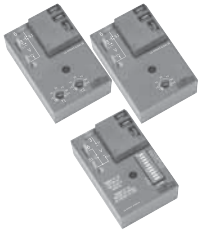
To view individual catalog pages, see Catalog SS3 (1TRC001009C0201) or www.ssac.com

	Knob or Switch Adjust Plug-in		S Series Onboard Adjust				E Series Onboard Adjust			Knob or Switch Adjust
										
Series	TRDU	TRU	CT-MFS	CT-MVS	CT-MBS	CT-MBS	CT-MFE	CT-MKE	CT-MFD	ASQU/ASTU DSQU/DSTU
Output Form	DPDT	DPDT	DPDT	DPDT	SPDT	DPDT	SPDT	Solid State	SPDT	Solid State
Function and Features										
Delay on Make (ON-delay)	•	•	•	•	•	•	•	•	•	•
Delay on Break (OFF-delay)	•	•	•	•	•	•	•		•	•
Delay on Break (Inverted)	•									
Single Shot (Pulse Former)	•	•					•		•	•
Single Shot Trailing Edge	•									
Single Shot Retriggerable (Motion Detector)	•	•								
Single Shot (Inverted)	•									
Interval (Impulse ON)	•	•	•	•	•	•	•	•	•	•
Interval, Trailing Edge (Impulse OFF)			•	•	•	•			•	
Interval/Recycling (Equal)	•									
Recycling (Pulse Generator) (Both Time Adjustable)	•									
Recycling (Equal Times ON First)	•	•	•	•	•	•	•	•	•	•
Recycling (Equal Times OFF First)		•	•	•	•	•	•	•	•	
Dual Functions										
Star Delta Motor Starting			•	•		•				
Delay on Make & Delay on Break	•									
Delay on Make & Single Shot	•									
Delay on Make & Interval	•									
Delay on Make (Accumulative) & Interval	•									
Delay on Make & Recycling (Equal)	•									
Delay on Break & Recycle (Equal)	•									
Single Shot & Recycle (Equal Times)	•									
Interval & Delay on Make	•									
General Features										
Instantaneous Contacts			•	•	•	•				
Accumulative Timing	•		•			•				
Solid State Output								•		•
Relay Output	•	•	•	•	•	•	•		•	
Knob or Onboard Adjustment		•	•		•	•	•	•	•	•
Switch Adjustment	•									•
External Adjustment			•	•	•	•				
Dimensions in	1.78 x 2.39 x 3.40		0.89 x 3.07 x 3.98				0.89 x 3.07 x 3.09		0.69 x 2.76 x 2.48	0.69 x 3.0 x 2.41
Dimensions mm	45.2 x 60.7 x 87.4		22.5 x 78 x 101				22.5 x 78 x 78.5		17.5 x 70 x 63	17.5 x 76.2 x 61.2

Selection Guide
ProgramaCube®

To view individual catalog pages,
see Catalog SS3 (1TRC001009C0201)
or www.ssac.com




Series												
Functions and Features	KSPD	KSPS	KSPU	NHPD	NHPS	NHPU	KRPD	KRPS	HRPD	HRPS	HRPU	HSPZ
Relay Output Resistive Rating							10A	10A	30A	30A	30A	
Solid State Output Rating	1A	1A	1A	6...20A	6...20A	6...20A						1A
Knob or External Adjustment or Fixed	•	•		•	•		•	•	•	•		
Accurate Switch Adjustment			•			•					•	•
Repeat Accuracy 0.5%	•	•		•	•		•	•	•	•		
Repeat Accuracy 0.1%			•			•					•	•
Single Timer Functions		•	•		•	•		•		•	•	
Accumulative Delay on Make (AM)		•	•		•	•		•		•	•	
Alternating Relay (Trailing Edge Flip-Flop) (FT)								•		•	•	
Delay on Break (B)		•	•		•	•		•		•	•	
Delay on Make (M)		•	•		•	•		•		•	•	
Interval (I)		•	•		•	•		•		•	•	
Inverted Delay on Break (UB)		•	•		•	•		•		•	•	
Inverted Single Shot (US)		•	•		•	•		•		•	•	
Leading Edge Flip-Flop (F)		•	•		•	•		•		•	•	
Recycling (RE, RD)		•	•		•	•		•		•	•	
Retriggerable Single Shot (Motion Detector) (PSD)		•	•		•	•		•		•	•	
Retriggerable Single Shot (Motion Detector) (PSE)		•	•		•	•		•		•	•	
Single Shot (S, SD)		•	•		•	•		•		•	•	
Trailing Edge Single Shot (TS)		•	•		•	•		•		•	•	
Dual Timer Functions	•			•			•		•			•
Accumulative Delay on Make/Interval (AMI)	•			•			•		•			•
Delay on Break/Recycle (BRE)	•			•			•		•			•
Delay on Make / Delay on Break (MB)	•			•			•		•			•
Delay on Make/Interval (MI)	•			•			•		•			•
Delay on Make/Recycle (MRE)	•			•			•		•			•
Delay on Make/Single Shot (MS)	•			•			•		•			•
Interval/Delay on Make (IM)	•			•			•		•			•
Interval/Recycle (IRE)	•			•			•		•			•
Recycling (RXE, RXD)	•			•			•		•			•
Single Shot/Recycle (SRE)	•			•			•		•			•
Single Shot/Lockout (SL)	•			•			•		•			•
Counter Functions			•			•					•	
Counter Pulse Output (C)			•			•					•	
Counter Interval Output (CI)			•			•					•	

New ProgramaCube® Products


KRPD


HRPD/HRID


HSPZ


ERPQ


HRPU/HRIU

Selection Guide
Solid State Timers with Relay Outputs

To view individual catalog pages, see Catalog SS3 (1TRC001009C0201) or www.ssac.com	S Series Onboard Adjust	Plug-in Switch Adjust	Plug-in Knob Adjust	E Range Onboard Adjust	D Range Onboard Adjust
					
Dedicated Function	Series	Series	Series	Series	Series
Delay on Make (ON-Delay)	CT-ERS (a) CT-ERS (i)	TDM	TRM PRLM	CT-ERE	CT-ERD
Interval (Impulse ON)	CT-VWS	TDI	TRS PRLS	CT-VWE	CT-VWD
Interval, Trailing Edge (Impulse OFF)	CT-AWS (te)			CT-AWE	
Interval, True Trailing Edge (Impulse OFF)				CT-AWE	
Recycling Equal Times	CT-EBS (e)	TRU		CT-EBE	CT-EBD
Recycling, Unequal Times (Pulse Generator)	CT-TGS	TDR			CT-TGD
Single Shot (Pulse Former)		TDS	TRS PRLS		
Delay on Break (OFF - delay)	CT-AHS CT-APS	TDB	TRB PRLB	CT-AHE	CT-AHD
True Delay on Break (OFF - delay)	CT-ARS (tb)			CT-ARE (tb)	
Delay on Make / Delay on Break	CT-EAS (i),(e) CT-EVS (a)	TDMB			
Star Delta	CT-YDAV CT-YDEW			CT-SDE CT-YDE	
Delayed Interval (Single Pulse Generator)	CT-PGS	TRDU			
Time Delay & Adjustment					
Time Delay Range	0.05 s to 300 h (!)	0.1 s to 2.8 h (!) TRDU to 1705 h	0.05 s to 10 m (!) TRU 16 h	0.1 s to 300 s (!)	.05 s to 100 h
Repeat Accuracy	≤ 0.2%	≤ 0.1%	≤ 2%	≤ 1%	≤ 0.5%
Knob Adjust			•		
Onboard Adjust	•			•	•
Switch Adjust		•			
External Adjust	Some Series		TR Series		
Factory Fixed			•		
General Features					
DIN Rail Mounting (35 mm)	•	Socket Required	Socket Required	•	•
Surface Mounting	Adaptor Required	Socket Required	Socket Required	Adaptor Required	Adaptor Required
Output Relay	SPDT or DPDT (i)	SPDT or DPDT	SPDT or DPDT	SPDT	SPDT
Resistive Rating at Contacts	4 A	10 A	10 A	4 A	6 A
	•	Socket Required	Socket Required	•	•
Screw Terminals	in	0.89 x 3.07 x 3.98	1.78 x 2.39 x 3.20	1.78 x 2.39 x 3.62	0.89 x 3.07 x 3.09	.69 x 2.76 x 2.48
Dimensions	mm	22.5 x 78 x 101	45.2 x 60.7 x 81.3	45.2 x 60.7 x 91.6	22.5 x 78 x 78.5	17.5 x 70 x 63

(a) = includes time accumulation; (e) = equal time delays; (i) = includes an instantaneous contact; (tb) = true delay on break; (te) = trailing edge triggered;
A = amps resistive rating; (!) = most series consult catalog pages

Selection Guide
Solid State Timers with Relay Outputs

To view individual catalog pages, see Catalog SS3 (1TRC001009C0201) or www.ssac.com	HR Series Onboard & External Adjust or Fixed	ERD Series Knob & External Adjust or Fixed	OR Series Knob & External Adjust or Fixed	KR Series Onboard & External Adjust or Fixed
				
Dedicated Function	Series	Series	Series	Series
Delay on Make (ON Delay)	HRDM HRPS	ERDM	ORM	KRDM KRPS
Interval (Impulse ON)	HRDI HRPS	ERDI	ORS	KRDI KRPS
Recycling Equal Times	HRD3 (e) HRPS	ERD3 (e)		KRD3 (e) KRPS
Recycling (Pulse Generator)	HRDR HRPD			KRDR KRPD
Single Shot (Pulse Former)	HRDS HRD9 (r) HRPS	ERDI	ORS	KRDS KRD9 (r)
Delay on Break (On Release)	HRDB HRPS		ORB	KRDB KRPS
Delay on Make / Delay on Break	HRPD			KRPD
Delayed Interval (Single Pulse Generator)	HRPD			KRPD
Other Functions Available	•			•
Time Delay & Adjustment				
Time Delay Range	0.1 s to 1000 m	0.1 s to 500 m (!)	0.05 to 300 s (!)	0.1 s to 1000 m
Repeat Accuracy	≤ 0.5%	≤ 0.5% to 2%	≤ 2%	≤ 0.5%
Knob Adjust		•	•	
Onboard Adjust	•			•
Switch Adjust				•
External Adjust	•	•	•	•
Factory Fixed	•	•	•	•
General Features				
DIN Rail Mounting	Adaptor Required			Adaptor Required
Surface Mounting	•	•	•	•
DPDT Relay/Resistive Rating		10 A	10 A	
SPDT Relay/Resistive Rating	SPDT 30 A	10 A	10 A	10 A
Popular AC & DC Voltages	•	•	ORB, ORS AC Only	•
Encapsulated	•	•		•
Quick Connects	•	•	•	•
Dimensions in	2.02 x 3.02 x 1.50	2.50 x 3.50 x 1.70	2.12 x 3.69 x 1.88	2.0 x 2.0 x 1.21
mm	51.3 x 76.7 x 38.1	63.5 x 88.9 x 43.2	53.9 x 93.7 x 47.8	50.8 x 50.8 x 30.7

(e) = equal time delays; (r) = retriggerable; (!) = Most series consult catalog pages

Selection Guide
Solid State Timers with Solid State Output

To view individual catalog pages, see Catalog SS3 (1TRC001009C0201) or www.ssac.com	Digi-Timer Onboard, Switch, Fixed, or External Adjust 	MicroTime Onboard or Switch Adjust 	Digi-Timer Onboard, Switch, Fixed or External Adjust 	E Range Knob Adjust 
Dedicated Function	Series	Series	Series	Series
Delay on Make (ON Delay)	TSD1 KSD1		TDU KSDU	CT-EKE
Delay on Make Normally Closed	TSD4 KSD4			
Delay on Break (OFF-delay)			TDUB	CT-AKE
Delay on Break (2 Terminal)	TSDB KSDB	ASQU/ASTU DSQU/DSTU		
Single Shot (Pulse Former)	TSD7		TDUS	
Single Shot (Motion Detector)	TSDS KSDS	ASQU/ASTU DSQU/DSTU		
Interval (Impulse ON)	KSPS (r)		TDUI	
Interval (DC Volts Only)	TSD2	ASQU/ASTU		
Interval (2 Terminal)	KSD2	DSQU/DSTU		
Recycling (Delays Separately Adjustable)	TSD6 (d)			
	TSD7			
Recycling (Equal Delays)	ESDR TSDR			
Percentage	KSDR			
Delay on Make/ Delay on Break Delay on Make/Interval	TSD3 (e) KSD3 (e)	ASQU/ASTU DSQU/DSTU		
	PT			
	KSPD			
	ESD5 KSPD			
Time Delay & Adjustment				
Typical Time Delay Range	0.1 s to 1000 m	0.1 s to 100 m	0.1 s to 170 m (!)	0.1 to 300 s
Repeat Accuracy	≤ 0.1 to 1%	≤ 0.1 to 1%	≤ 0.5%	≤ 1%
Onboard Adjustment	•	AS_U Series DS_U Series	TDU_ Series	•
Switch Adjustment				
External Adjustment	•		KSDU Series	
Factory Fixed	Except PT and KSDR Series			
General Features				
DIN Rail Mounting	Adaptor Required	•	Adaptor Required	•
Surface Mounting	•	•	•	Adaptor Required
Output Rating	1 A	0.7 A	1 A	0.7 to 0.8 A
Popular AC Voltages	•	•	•	•
Popular DC Voltages	•	•	•	CT-AKE AC Only
Screw Terminals		•		•
Quick Connects	•	•	•	
Dimensions in	2.0 x 2.0 x 1.21	0.69 x 3.0 x 2.41	2.0 x 2.0 x 1.21	0.89 x 4.09 x 3.27
mm	50.8 x 50.8 x 30.7	17.5 x 76.2 x 61.2	50.8 x 50.8 x 30.7	22.5 x 104 x 83

(d) = DC Volts Only; (e) = equal time delays; (s) = 3 or 4 channel sequencer; (!) = most series consult catalog pages; (r) = retriggerable

Selection Guide
Solid State Timers

To view individual catalog pages, see Catalog SS3 (1TRC001009C0201) or www.ssac.com	Onboard, Fixed, or External Adjust	Digi-Power Onboard, Fixed or External Adjust	Digi-Set Switch Adjust	PC Mount / Wires Fixed	Surface Mount 2.5 x 3.5
					
Dedicated Function	Series	Series	Series	Series	Series
Delay on Make (ON Delay)	TMV/TSU TS1	THDM THD1 TH1		MSM	
Delay on Make Normally Closed	TS4	THD4			
Delay on Break (OFF - delay)	TSB	THDB			EISB (ii)
Single Shot (Pulse Former)	TSS	THDS THS			
Interval (Single Pulse on Operate)	TS2	THD2 TH2			
Interval (DC Volts Only)	TS6 (d)				
Interval (2 Terminal)		THD7			
Recycling (Delays Separately Adjust)		PTHA	RS		
Recycling (Equal Delays)		THD3			SQ (s) (e)
Percentage		PTHF			
Delay on Make/ Delay on Break		NHPD			
Delay on Make/Interval		NHPD			
Other Functions Available		•			
Time Delay Adjustment					
Typical Time Delay Range	0.05 to 600 s	0.1 s to 1000 m	0.1 s to 255.75 h	0.05 to 180 s	0.2 s to 1000 m
Repeat Accuracy	≤ 0.5 to 2%	≤ 0.5%	≤ 0.1%	≤ 5%	≤ 0.5%
Onboard Adjustment	Some (!)	Most (!)			
Switch Adjustment			•		
External Adjustment	•	•			•
Factory Fixed	•	•		•	•
General Features					
DIN Rail Mounting	Adaptor Required				
Surface Mounting	•	•	•	•	•
Output Rating	1A	6, 10, or 20 A	1 A	0.5 A	1 A
Popular AC Voltages	•	•	•	•	•
Popular DC Voltages	•	Delay On Make Only	•	•	
Screw Terminals				6“ Wire Leads or PC Board Mount	
Male Quick Connects	•	•	•		
Dimensions in	2.0 x 2.0 x 1.21	2.0 x 2.0 x 1.51	3 x 2 x 1.5	0.94 x 1.5	2.5 x 3.5 x 1.22
mm	50.8 x 50.8 x 30.7	50.8 x 50.8 x 38.4	76.7 x 51.3 x 38.1	23.8 x 38.1	63.5 x 88.9 x 31

(d) = DC Volts only; (e) = equal time delays; (ii) = isolated input; (s) = 3 or 4 channel sequencer; (!) Some Series consult catalog pages

Selection Guide
Voltage Monitors

To view individual catalog pages, see Catalog SS3 (1TRC001009C0201) or www.ssac.com	Three Phase											
									Available 4th Quarter, 2005			
Functions and Features	WVM	DLM	DLA	PLM	PLMU	PLR	PLS	RLM	HLM	TVM	TVW	CM-MPS
General Features												
DIN Rail Mounting	w/a	•	•	w/s	w/s	w/s	w/s		w/a		w/a	•
Surface Mounting	•	•	•	w/s	w/s	w/s	w/s	•	•	•	•	w/a
8-Pin Plug-In				•	•	•	•					
Screw Terminals	•	•	•									•
Quick Connects								•	•	•	•	
Output												
DPDT Relay(s)			•									•
SPDT Relay	•	•		•	•	•	•	•	•	•	•	
SPST-NO												
Line V Connection												
Wired Phase-to-Phase	•	•	•	•	•	•	•	•	•	•	•	•
Universal Voltage			•		•				•			
Phase-to-Neutral												
Single Phase												
Trip Point(s) Adjustable	•	•	•	•	•	•		•	•		V	•
Trip Point(s) Fixed										•	•	
Supply Voltage Required												
Protection												
Phase Sequence	•	•	•	•	•	•	•	•	•	•	•	•
Phase Loss (!)	•	•	•	•	•	•		•	•	•	•	•
Motor (On Start Up Only)						•						
Motor (While Operating)	•	•	•	•	•			•	•	•	•	•
Undervoltage	•	•	•	•	•	•		•	•	•	•	•
Overvoltage	•	•	•		•				•	•	•	•
Unbalance (Asymmetry)	•	•	•	•	•			•	•	•	•	•
Rapid Recycling	•				•					•	•	
Time Delays & Reset												
Trip Delay	•	•	•	•	•			•	•	•	•	
Restart Delay	•				•					•	•	
Automatic Restart	•	•	•	•	•	•	•	•	•	•	•	•
Manual Reset	•											
Indicator LED(s)												
Output ON/OFF	•	•	•	•	•	•		•	•	•	•	•
Supply ON/OFF												
Fault(s)	•		•						•	•	•	•
Timing	•		•		•				•	•	•	
Dimensions in	4.4 x 6.9 x 2.4	1.97 x 2.95 x 4.33		1.78 x 2.39 x ≤ 3.2				3.12 x 4.5 x 1.35		2.0 x 2.0 x ≤ 1.86		
mm	111.8 x 175.3 x 61	50 x 75 x 110		45.2 x 60.7 x ≤ 81.3				79.3 x 114.3 x 34.3		50.8 x 50.8 x ≤ 47.2		

w/a = with adaptor; w/s = with socket; v = Line voltage adjustable on some models

! Phase loss protection for resistive and non-rotating loads. Motor protection can be affected by regenerated voltages.

Selection Guide
Voltage Monitors

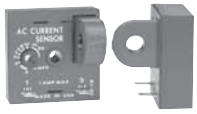
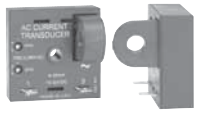
To view individual catalog pages, see Catalog SS3 (1TRC001009C0201) or www.ssac.com

	Three Phase								Single Phase			
												
Functions and Features	CM-ASN	CM-PVN	CM-PFN	CM-ASS	CM-PFS	CM-PBE	CM-PFE	CM-PVE	KVM	CM-EFN	CM-ESN	CM-ESS
General Features												
DIN Rail Mounting	•	•	•	•	•	•	•	•	w/a	•	•	•
Surface Mounting	w/a	w/a	w/a	w/a	w/a	w/a	w/a	w/a	•	w/a	w/a	w/a
8-Pin Plug-In												
Screw Terminals	•	•	•	•	•	•	•	•		•	•	•
Quick Connects									•			
Output												
DPDT Relay(s)	•	•	•		•					•	•	
SPDT Relay				•			•					•
SPST-NO						•		•	•			
Line V Connection												
Wired Phase-to-Phase	•	•	•	•	•	•	•	•				
Universal Voltage					•		•					
Phase-to-Neutral						•		•	•			
Single Phase						•		•	•	•	•	•
Trip Point(s) Adjustable	•	•				•		•	•	•	•	•
Trip Point(s) Fixed			•							•	•	•
Supply Voltage Required	•	•	•			•		•		•	•	•
Protection												
Phase Sequence	•	•	•	•	•		•					
Phase Loss (!)	•	•	•	•	•	•	•	•				
Motor (On Start Up Only)		•	•		•	•	•	•				
Motor (While Operating)	•			•								
Undervoltage		•	•			•		•	•	•	•	•
Overvoltage		•	•					•		•	•	•
Unbalance (Asymmetry)	•			•								
Rapid Recycling		•										
Time Delays & Reset												
Trip Delay	•	•	•			•		•		•	•	
Restart Delay		•	•	•						•	•	
Automatic Restart	•	•	•	•	•	•	•	•		•	•	•
Manual Reset												
Indicator LED(s)												
Output ON/OFF	•	•	•	•		•	•	•	•	•	•	•
Supply ON/OFF	•	•	•		•					•	•	•
Fault(s)	•	•	•							•		
Timing												
Dimensions in	1.77 x 3.07 x ≤ 3.98			0.886 x 3.07 x ≤ 3.98		0.886 x 3.07 x 3.09			2 x 2 x 1.21	1.77 x 3.07 x ≤ 3.98	0.886 x 3.07 x ≤ 3.98	
mm	45 x 78x ≤ 101			22.5 x 78 x ≤ 101		22.5 x 78 x 78.5			50.8 x 50.8 x 30.7	45 x 78 x ≤ 101	22.5 x 78 x ≤ 101	

w/a = with adaptor; w/s = with socket

! Phase loss protection for resistive and non-rotating loads. Motor protection can be affected by regenerated voltages.

Selection Guide
Current Monitoring

	Sensing/Control Relays			Analog Output	
To view individual catalog pages, see Catalog SS3 (1TRC001009C0201) or www.ssac.com					
	Adjustable, AC over & undercurrent trip points w/selectable response modes.	Selectable AC over or undercurrent; adjustable trip point & delay.	Low cost AC current switch; direct connection to digital PLC input; sinking or sourcing.	Current transducer; linear output proportional to the RMS AC current.	Current transducer; linear output proportional to the RMS AC current.
Series	ECSW	ECS	TCS	TCSA	DCSA
Functions and Features					
General Features					
DIN Rail Mounting			w/adaptor	w/adaptor	•
Surface Mounting	•	•	•	•	w/adaptor
Screw Terminals	•				•
Quick Connects		•	•	•	
Output					
Linear 4 to 20 mA				•	•
SPDT Relay	•	•			
1 A Solid State			•		
Monitored Current					
AC	•	•	•	•	•
DC					
Input or Output Voltage					
24 VAC	•	•			
24 … 240 V AC			Self-Powered		
110 … 130 V AC	•	•			
220 … 240 V AC	•	•			
12 & 24 V DC	•	•		Loop Powered	Loop Powered
3 … 50 V DC			Self-Powered		
Trip Range(s)					
Fixed			•		
Adjustable	•	•	•	•	•
3 mA … 1 A					
2 … 45 A fixed / 2… 20 adjustable			•		
0 … 50 A				•	•
0.5 … 50 A	•	•			
Delay(s)					
Trip Delay	•	•			
Start up Delay	•	•			
Indicator LED(s)					
Output ON/OFF	•				
Supply ON/OFF					
Fault(s)	•	•			
Timing	•				
Dimensions in	2.50 x 3.50 x 1.75		2.0 x 2.0 x 1.75		0.71 x 2.44 x 2.56
mm	63.5 x 88.9 x 44.5		50.8 x 50.8 x 44.5		18 x 62 x 65

Selection Guide
Current Monitoring

	Current Indicator	Motor Load Monitor	AC/DC Current Sensors	AC/DC Current Sensors
To view individual catalog pages, see Catalog SS3 (1TRC001009C0201) or www.ssac.com				
	Monitor AC current flow with visual indication up to 500 feet from source.	2 Relay outputs; monitors under & over loading.	AC/DC version w/selectable over or undercurrent; relay output.	AC/DC undercurrent trip points as low as 3mA; adjustable hysteresis; relay output.
Series	LCS/LPM	CM-LWN	CM-SRN	CM-SRS
Functions and Features				
General Features				
DIN Rail Mounting		•	•	•
Surface Mounting		w/adaptor	w/adaptor	w/adaptor
Screw Terminals		•	•	•
Quick Connects				
Wire Leads	•			
Output				
DPDT Relay		2 SPDT	•	
SPDT Relay				•
SPST Solid State				
Analog	•			
Monitored Current				
AC	•	•	•	•
DC			•	•
Supply Voltage				
24 VAC				•
24 … 240 V AC/DC		•	•	
42 … 48 V AC				•
110 … 130 V AC		•	•	•
220 … 240 V AC		•	•	•
380 … 415 V AC		•	•	
480 ... 500 V AC		•		
Trip Range(s)				
Fixed	•			
Adjustable		•	•	•
3 mA … 1 A			•	•
3 mA … 15 A			•	
0.5 ... 20 A		•		
0.5 … 50 A	•			
Hystersis Adjustable			•	•
Delay(s)				
Trip		•	•	
Inrush		•		
Indicator LED(s)				
Output ON/OFF		•	•	•
Supply ON/OFF		•	•	•
Fault(s)		•		
Timing				
Dimensions in	0.98 x 1.51 x 0.46	1.77 x 3.07 x ≤ 3.98	1.77 x 3.07 x ≤ 3.98	0.886 x 3.07 x ≤ 3.98
mm	24.89 x 38.35 x 11.68	45 x 78 x ≤ 101	45 x 78 x ≤ 101	22.5 x 78 x ≤ 101

Selection Guide
Liquid Level Controls

To view individual catalog pages, see Catalog SS3 (1TRC001009C0201) or www.ssac.com

	Open PC Board			Plug-in Package			DIN Mount 22.5 mm Fixed
							
	Monitor and control conductive liquid levels when filling or emptying tanks. Low cost open board design.			Monitor and control conductive liquid levels when filling or emptying tanks. Convenient plug-in packaging.			Monitor and control conductive liquid levels to prevent dry running and overflow.
Series	LLC1	LLC2	LLC8	LLC4	LLC5	LLC6	CM-ENE
Functions and Features							
General Features							
Single Probe & Common	•		•	•		•	•
Dual Probe & Common		•			•		
DIN Rail Mounting				w/socket	w/socket	w/socket	•
Surface Mounting	•	•	•	w/socket	w/socket	w/socket	w/adaptor
Plug-In Socket Required				8 pin	8 pin	11 pin	
Screw Terminals		•		w/socket	w/socket	w/socket	•
Quick Connects	•	•	•				
Output Form							
Isolated Output (2) = Two Outputs	SPDT	SPDT	SPDT	SPDT	SPDT		SP-NO
Non-Isolated Output	SPST					SPDT	
Sensing Range							
6K ... 20K Ω							
1K or 5K ... 100K Ω		•			•		•
1K or 5K ... 250K Ω	•		•	•		•	
250 Ω ... 500K Ω							
Set Point: A = Adjustable; F = Fixed	A or F	A or F	F	A or F	A or F	F	F
Trip Delay Fixed	1...60 s		1...60 s	1...60 s		1...60 s	≅ 200 ms
Probe Voltage							
12 V AC	•	•	•	•	•	•	
20 V AC or 30 V AC							•
Logic Type							
Drain/Emptying	•	•		•	•		•
Fill	•	•		•	•		
Low Level Cut Off			•			•	
Input Voltage							
24 V AC	•	•	•	•	•	•	•
24 ... 240 V AC/DC							
110 ... 130 V AC	•	•	•	•	•	•	•
220 ... 240 V AC	•	•	•	•	•	•	•
380 ... 415 V AC							
Indicator LED (s)							
Output(s) ON/OFF			•		•	•	•
Supply ON/OFF							•
Dimensions in	2.75 x 3.5 x ≤ 2.0	3.0 x 4.0 x 2.0	2.19 x 2.5 x 1.88	1.78 x 2.39 x 2.91 (LLC5 D = 3.30)			0.886 x 3.07 x 3.09
mm	69.9 x 88.9 x ≤ 50.8	76.2 x 101.6 x 50.8	55.6 x 63.5 x 47.8	45.2 x 60.7 x 73.9 (LLC5 D = 83.8)			22.5 x 78 x 78.5

Selection Guide
Liquid Level Controls

To view individual catalog pages, see Catalog SS3 (1TRC001009C0201) or www.ssac.com

	DIN Mount 22.5 mm Adjustable		DIN Mount 45 mm Adjustable		Alternating Relays & Duplexors			Insulation Monitors
								
	Monitor and control conductive liquid levels when filling or emptying tanks. Thin profile Snap-ON mounting package.		Monitor and control conductive liquid levels when filling or emptying tanks w/time-dependent features.		Provides equal run time for two loads. Automatically changes lead load upon the opening of the control switch input. Industry standard wiring.			Monitors the insulation resistance between ungrounded AC/DC systems and ground.
Series	CM-ENS	CM-ENS UP/DOWN	CM-ENN	CM-ENN UP/DOWN	ARP_1	ARP_2	ARP_3	CM-IWN C558.03
Functions and Features								
General Features								
Single Probe & Common								
Dual Probe & Common	•	•	•	•				
DIN Rail Mounting	•	•	•	•	w/socket	w/socket	w/socket	•
Surface Mounting	w/adaptor	w/adaptor	w/adaptor	w/adaptor	w/socket	w/socket	w/socket	
Plug-In Socket Required					8 pin	11 pin	8 pin	•
Screw Terminals	•	•	•	•	w/socket	w/socket	w/socket	
Quick Connects								
Output Form								
Isolated Output (2) = Two Outputs	SPDT	SPDT	(2)SPDT	(2)SPDT	SPDT	DPDT		SPDT or DPDT
Non-Isolated Output							DPDT-X	
Sensing Range								
6K ... 20K Ω								
1K or 5K ... 100K Ω	•	•		•				
1K to 500K Ω								•
250 Ω ... 500K Ω			•					
Set Point: A=Adjustable; F=Fixed	A	A	A	A				
Trip Delay Fixed	250 ms	250 ms	0.1...10s Adj	01...10s Adj				
Probe Voltage								
20 V AC or 30 V AC	•	•	•	•				
Logic Type								
Drain/Emptying	•	Selectable	•	Selectable				
Fill	•	Selectable	•	Selectable				
Alarm Levels				Low & High				
Alternating/Duplexing					•	•	•	•
Set Point Control								
24 V AC	•	•	•	•	•	•	•	
24 ... 240 V AC/DC			•	•				•
110 ... 130 V AC	•	•	•	•	•	•	•	•
220 ... 240 V AC	•	•	•	•	•	•	•	•
380 ... 415 V AC	•		•	•				
Indicator LED (s)								
Output(s) ON/OFF	•	•	•	•	Loads A/B	Loads A/B	Loads A/B	•
Supply ON/OFF	•	•	•	•				•
Dimensions in	0.886 x 3.07 x ≤ 3.98		1.77 x 3.07 x ≤ 3.98		1.78 x 2.39 x 3.20			1.77 x 3.07 x 3.98
mm	22.5 x 78 x ≤ 101		45 x 78 x ≤ 101		45.2 x 60.7 x 81.3			48 x 78 x ≤ 101

Semiconductor Contactor R100.xx and R300.xx
Solid-State Relays R111, R12x and R31x
Benefits and Advantages

R100.xx range

R100.20

R100.45

R300.xx range

R 300.20

To View Individual Catalog Pages See Catalog SS3 (1TRC001009C0201) or www.ssac.com

R111 range

R111/45

R12x range

R122/50

R31x range

R311/25

- **Compact design**
- **Zero voltage or instantaneous tripping**
- **LED display**
- **Protected against electric shock**
- **Integrated heat sink**
- **Ready for use**
- **Mounting on 35 mm DIN rail or screw mounting on plate**

Properties

- Load current range 20 A, 30 A and 45 A
- DC control
- Single-pole, thre-pole
- Switching by thyristors
- Peak inverse voltage 1200 V
- Insulation voltage > 4000 V
- Connecting terminals for 2 x 2.5 mm^2 or 1 x 4 mm^2

Special properties

- The semiconductor relay R100.45-SG is internally protected against overload with overload signaling via signaling output.
- Cables with a conductor cross section up to 1 x 25 mm^2 can be connected to the output terminals of the semiconductor relays R100.45 and R100.45-SG.

Application

- Contactless and wear-free switching of ohmic and inductive 1-phase and 3-phase AC loads with high switching frequency.

Approvals

- Depending on the device:

- **Standard design**
- **Zero voltage tripping, radio interference suppressed**
- **LED display**
- **Screw mounting or snap-on mounting with adapter for 35 mm DIN rail according to DIN EN 50022**

Properties

- R11x and R12x range - load side:
  Thyristors for AC-51 and AC-53 up to 690 V AC and 100 A
- R31x - load side:
  Alternistor for AC-51 and AC-53 up to 530 V AC and 50 A with internal RC circuit and overvoltage protection
- Electrical isolation by means of optocoupler between control circuit and load circuit
- Protection against electric shock:
  R111 and R115 range with additional terminal cover
- Control side protected against reversed polarity

Special properties of R31x range

- Screw mounting

Application

- Contactless and wear-free switching of 1-phase and 3-phase AC loads up to a power factor of cos φ = 0.5.

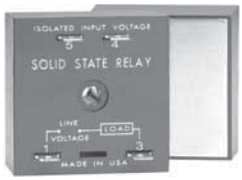
Approvals

-

To view individual catalog pages, see Catalog SS3 (1TRC001009C0201) or www.ssac.com

Selection Guide
Tower and Obstruction Lighting Controls ①

Flasher · Solid State Beacon Flasher



P/N	Voltage	Description
FS155-30RF	120 V AC	Beacon Flasher for High RF Installations, 2500 W (200 A Inrush Maximum) Meets FAA-AC NO: 150/5345-43E
FS165-30RF	230 V AC	
FS155-30T	120 V AC	Beacon Flasher for FM, TV, Chimneys, Bridges, Smoke Stacks, and Low RF Applications, 2500 W (200 A Inrush Maximum) Meets FAA-AC NO: 150/5345-43E
FS165-30T	230 V AC	
FA155-2	120 V AC	Auxiliary Unit for Synchronous Flashing of Additional Beacons, 2500 W (200 A Inrush Maximum)
FA165-2	230 V AC	
FA155	120 V AC	Auxiliary Unit Provides Alternate Operation for Constant Line Loading, 2500 W (200 A Inrush Maximum) (not shown)
FA165	230 V AC	

Photo Control · Accurate Dusk to Dawn Control

PCR10	120 V AC	Precision Photo Control Calibrated to FAA and FCC Specifications for Tower and Obstruction Lighting. Two SPST N.O. 20 A Contacts. Without Cast Aluminum Housing. Meets FAA-AC NO: 150/5345-43E
PCR12	230 V AC	
PCR11	120 V AC	As Above With Cast Aluminum Housing (as shown)
PCR13	230 V AC	

Lamp Alarm Relays · Senses Lamp Failure

SCR430T	120 V AC	Universal Light Alarm Relay. Senses the Failure of One Lamp Out of 1, 2, 3, or 4 Lamps; 116 or 620 W, 120 V AC Lamps SPDT - 10 A Isolated Alarm Contacts. Meets FAA-AC NO: 150/5345-43E
SCR630T	230 V AC	
SCR490D	120 V AC	Side Light Alarm Relay. Senses the Failure of One Lamp Out of 2, 3, 4, 5, 6, 7, 8, or 9; Steadily Burning 116 W, 120 V AC Lamps SPDT - 10 A Isolated Alarm Contacts (not shown)

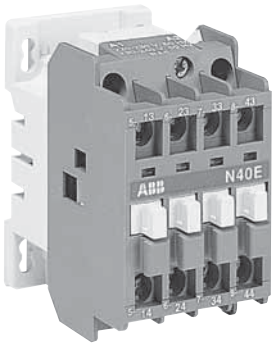
Beacon Alarm Relay · Senses Lamp Failure and Flasher Failure

FB120A	120 V AC	Flasher and Beacon Lamp Alarm Relay Senses Failure of Beacon Lamps Senses Failure of Beacon Flasher Two Line Voltage Alarm Outputs SPDT - 10 A Isolated Alarm Contacts Meets FAA-AC No: 150/5345-43E
FB230A	230 V AC	

① To view individual catalog pages, see Catalog SS3 (1TRC001009C0201) or www.ssac.com

Notes

Control relays
Type N, NE, NL & TNL
Positive safety
AC/DC operated



Positive safety relays

There are many applications where safety is very critical and it is important to use electrical equipment which ensures that dangerous machine movement cannot occur when a fault is detected with the moving contacts during the cycle which the fault is indicated.

Regulations and standards have been written to ensure that safety is maintained:

- United States — ANSI B11.19-1990, ANSI B11.20-1991
- Germany — SÜVA, ZH1/457
- France — INRS
- United Kingdom — BIA
- Switzerland — SA

The ABB Type N & NL 4 and 8 pole relays are designed with “Positive Guided” contacts and fulfill the regulations or standards shown. The relays can provide positive safety for the N.O. and N.C. contacts which assure that the N.O. contacts will not close before any N.C. contact opens. Therefore, if one of the contacts weld due to abnormal conditions in the control circuit, the other contacts will also remain in the same position as when the welding occurred. This means that the open contacts must maintain an air distance 0.5mm when the coil is energized at 110% Vc or when it is de-energized.

UL File No: E39231 (N & NL)

General information
Type N, AC operated

Description

- AC operated with laminated magnetic circuit.
- 2 versions: 4 pole or 8 pole. The width of 8 pole devices is identical to that of 4 pole devices; only the depth is increased.
- Side by side mounting possible.
- Self cleaning auxiliary contacts.
- Alone or by itself or with a 4 pole CA5 auxiliary contact block, these devices offer “positive safety” between their auxiliary contacts.

Application

Type N control relays are used for switching auxiliary circuits and control circuits.

Holes for screw mounting (screws not supplied). Distances between holes according to EN50 002.

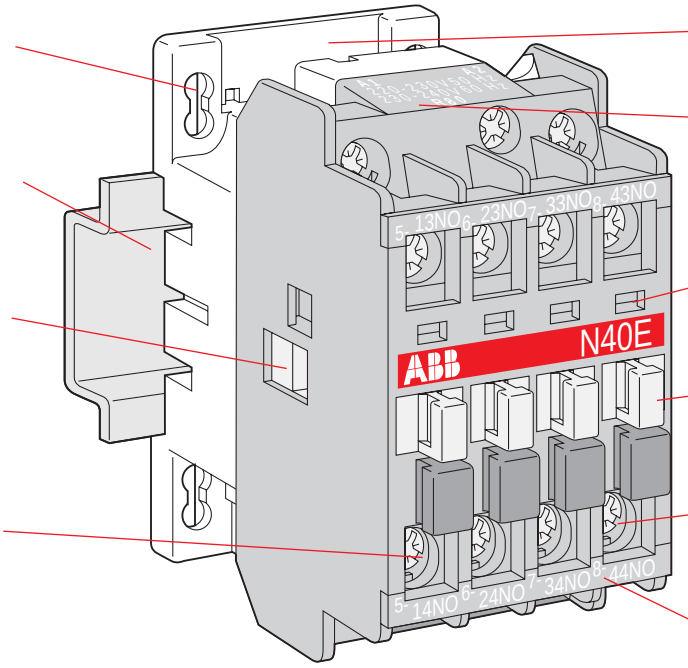
Quick mounting on 35 x 7.5mm DIN mounting rail according to IEC715 and EN50 022.

Location of side mounted accessories: mounting on right or left hand side.

Terminals delivered in open position with captive screws (screws of unused terminals should be tightened).

Screwdriver guidance for all screws makes it possible to use motorized screwdrivers.

All terminals provide protection against accidental direct contact with live parts according to VDE0106 – Part. 100 and offer IP 20 degree of protection according to IEC947-1.



Location of surge suppressors

Clear marking of coil voltages and frequencies.

Location of function marker.

Stops for attaching front mounted accessories.

All terminal screws: Posidrive (+, -) N° 2

Terminal marking according to IEC947-5-1 and EN50 011.

Catalog number explanation

N 40E–84

Frame type

Contact configuration

Coil voltage
(see coil voltage chart below)

Coil voltage selection chart

Hz	Relay type	Volts															
		12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	N		81	83	84	84		34	36	80	42		86	86	51	53	55
50	N		81	83	84				80			85	86			55	
DC	NE, NL	80	81	83	86		87		88	89							

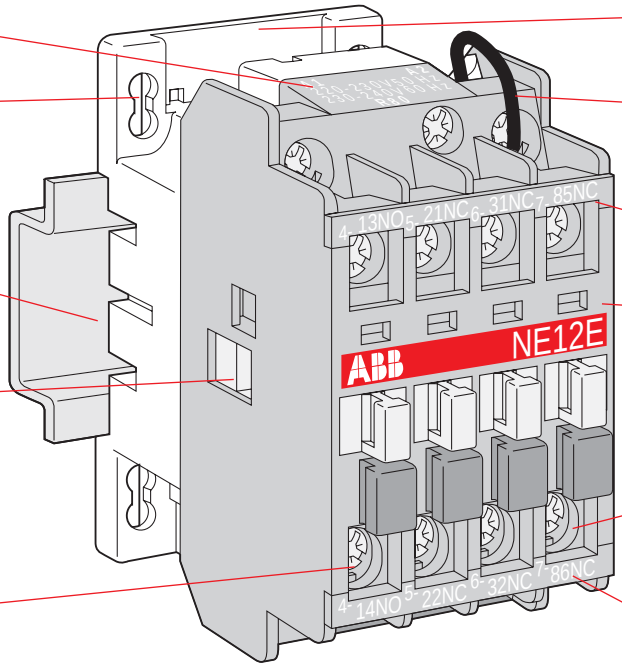
General information
Type NE, DC operated

Description

- Contactor relays with laminated magnet circuit and double-winding coil fed from a DC supply via a built-in N.C. lagging auxiliary contact.
- 1-stack version with three built-in auxiliary contacts.
- Self-cleaning auxiliary contacts
- Alone or fitted with a 4-pole CA5 auxiliry contact block, these devices offer mechanically linked contacts.
- Side by side mounting possible.

Application

NE... contactor relays are used for switching auxiliary circuits and control circuits.



Clear marking of the coil voltage

Hole for screw mounting (screws not supplied). Distances between holes according to EN50 002.

Quick mounting on 35 x 7.5mm mounting rail according to IEC 715 and EN 50 022.

Location of side mounted accessories: mounting on right or left hand side.

Terminals delivered in open position with captive screws (screws of unused terminals should be tightened).

Screwdriver guidance for all screws makes it possible to use motorized screwdrivers.

All terminals provide protection against accidental direct contact with live parts according to VDE0106 – Part. 100 and offer IP 20 degree of protection according to IEC947-1.

Location of surge suppressor.

Electrical connection between the coil and the N.C. lagging auxiliary contact.

N.C. lagging auxiliary contact path.

Location of function marker.

Stops for attaching front-mounted accessories.

All terminal screws:
Posidrive (+, -) N° 2

Terminal marking according to IEC947-5-1 and EN50 011.

Catalog number explanation

NE 12E–84

Frame type

Contact configuration

Coil voltage
(see coil voltage chart below)

Coil voltage selection chart

Hz	Relay	Volts																
	type	12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	N		81	83	84	84		34	36	80	42		86	86	51	53	55
50	N		81	83	84				80			85	86			55	
DC	NE, NL	80	81	83	86		87		88	89							

General information
Type NL & TNL, DC operated

Type NL

Description

- Magnetic circuit variants: NL types: d.c. operated with solid magnetic circuits.
- 2 versions: 4 pole or 8 pole

  The width of 8 pole devices is identical to that of 4 pole devices; only the depth is increased.
- Bifurcated auxiliary contacts.
- Alone or mounted with a 4 pole CA5 auxiliary contact block, these devices offer “positive safety” between their auxiliary contacts.

Application

Type NL control relays are used for switching auxiliary circuits and control circuits.

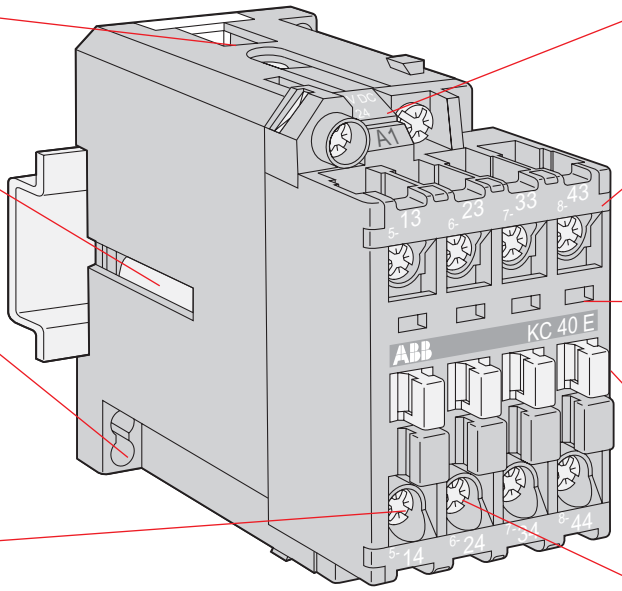
Type TNL

Description

- Magnetic circuit variants
  – NL types: D.C. operated with solid magnetic circuits.
  – TNL types: D.C. operated with solid magnetic circuit and large coil voltage range.
- 2 versions
  – 4-pole/1-stack or 8-pole/2-stack
  – The width of 8-pole devices is identical to that of 4 pole devices; only the depth is increased.
- Double sharp auxiliary contacts.
- Alone or mounted with a 4-pole CA 5 auxiliary contact block, these devices offer "positive safety" between their auxiliary contacts.

Application

Type NL and TNL control relays are used for switching auxiliary circuits and control circuits.



Location of surge suppressors.

Quick mounting on 35 x 7.5mm or 35 x 15mm DIN mounting rail according to IE715 and EN50022.

Holes for screw mounting (screws not supplied). Distances between holes according to EN50002.

Terminals delivered in open position with captive screws (screws of unused terminal should be tightened).

Screwdriver guidance for all screws makes it possible to use motorized screwdrivers.

All terminals provide protection against accidental direct contact with live parts according to VDE0106 – Part. 100.

Clear marking of coil voltages.

Terminal marking according to IEC947-5-1 and EN50 011.

Location of function marker and surge suppressor.

Stops for attaching front mounted accessories.

All terminal screws:
M 3.5, posidrive (+,-) N° 2

Catalog number explanation

(T)NL 44E–84

Frame type

Contact configuration

Coil voltage
(see coil voltage chart below.)

Coil voltage selection chart

Hz	Relay type	Volts																
		12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	N		81	83	84	84		34	36	80	42		86	86	51	53	55
50	N		81	83	84				80			85	86			55	
DC	NE, NL	80	81	83	86		87		88	89							

Type N & NL
AC & DC operated

N40E-1

NE12E-1

A.C. operated

Contact configuration N.O.	N.C.	Catalog number	List price
4	0	N40E-84	
3	1	N31E-84	**$ 60**
2	2	N22E-84	
4	4	N44E-84	
5	3	N53E-84	
6	2	N62E-84	**120**
7	1	N71E-84	
8	0	N80E-84	

Coil voltage selection

All AC operated catalog numbers include a 120VAC coil. All DC operated catalog numbers include a 110VDC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the first digit after the last dash in the catalog number.

Ex.: A 240V coil is required for an N80 control relay: N80E-80

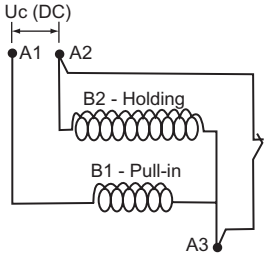
Coil voltage selection chart

Hz	Relay type	Volts 12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	N		81	83	84	84		34	36	80	42		86	86	51	53	55
50	N		81	83	84				80			85	86			55	
DC	NE, NL	80	81	83	86		87		88	89							

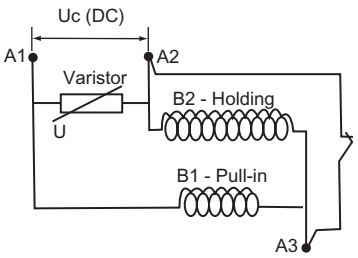
D.C. operated

Contact configuration N.O.	N.C.	Catalog number	List price
4	0	NL40E-86	
3	1	NL31E-86	**$ 72**
2	2	NL22E-86	
4	4	NL44E-86 ①	
5	3	NL53E-86	
6	2	NL62E-86	**144**
7	1	NL71E-86	
8	0	NL80E-86	
1	2	NE12E-86	
2	1	NE21E-86	**72**
3	0	NE30E-86	
4	3	NE43E-86 ①	
5	2	NE52E-86	
6	1	NE61E-86	**144**
7	0	NE70E-86	

Block diagrams for NE... contactor relay coil supply



Coil supply Uc <110 VDC



Coil supply via built-in varistor UC ≤ 110 VDC

① NE43 – NE70 and NL44 – NL62 control relays cannot accept any front mounted auxiliary contact blocks.

Type TNL
4 Pole & 8 Pole

TNL22E

7

4 Pole, 1 stack

Number of contacts 1st stack N.O.	1st stack N.C.	2nd stack N.O.	2nd stack N.C.	Weight	Catalog number	List price
2	2	–	–	0.540	TNL22E-★	
3	1	–	–	0.540	TNL31E-★	**$ 121**
4	–	–	–	0.540	TNL40E-★	

8 Pole, 2 stack

Number of contacts 1st stack N.O.	1st stack N.C.	2nd stack N.O.	2nd stack N.C.	Weight	Catalog number	List price
4	–	–	4	0.600	TNL44E-★	**$ 180**
4	–	2	2	0.600	TNL62E-★	

★ - Substitute the ★ for the coil voltage code. See the Type TNL Coil voltage Selection chart beneath the photos.

Coil characteristics

No extra tolerances applicable to the U_c min. ... max. values quoted in the Coil voltage selection table

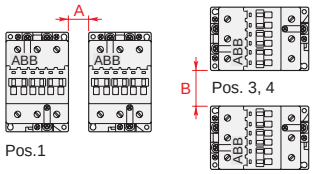
- Coil consumption at U_c max. q = 20 °C: 9 W pull-in/holding
- Replacement coils: consult us (standard coils used on NL control relays are not suitable for TNL control relays).

Coil voltage selection

Min. U_C	Max	Voltage
17	32	51
24	45	52
36	65	54
42	78	58
50	90	55
77	143	62
90	150	66
152	264	68

Mounting distance – for coil operating limits U_c min. … U_c max.

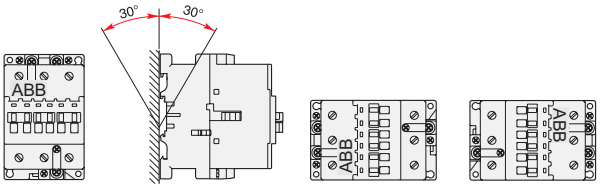
A mm	B mm	Ambient temp. °C	Max. switching frequency Operating cycles/h
2	20	≤ 20	1200
5	20	≤ 55	1200



Add-on accessories

Control relays	Max. number of auxiliary contact blocks CA5-10	CA5-01	CA5-40	CA5-31	CA5-22	CA5-04	Timer TP	Mechanical interlock	Label marker
Pos. 1, 3 or 4 TNL 40-E	4	2	1	1	1	–	–	VBC 30	BA 5-50
Pos. 1, 3 or 4 TNL 31-E	4	1	1	1	–	–	–	VBC 30	BA 5-50
Pos. 1, 3 or 4 TNL 22-E	4	–	1	–	–	–	–	VBC 30	BA 5-50
Pos. 1 ±30° TNL - all types	–	–	–	–	–	–	–	VBC 30	BA 5-50

Mounting positions



Pos. 1 Pos. 1 ± 30° Pos. 3 Pos. 4

Accessories
Type N, NL & TNL


CAL5-11


CA5-10


TP40DA


VE5-1


BA5-50

Auxiliary contact blocks

Positioning	Contacts N.O.	Contacts N.C.	Catalog number	List price
N, NE, NL, TNL (front mount)	1	—	CA5-10	$ 15
	—	1	CA5-01	
N, NL, NE, TNL (4 pole)	4	—	CA5-40N	30
	2	2	CA5-22N	
	—	4	CA5-04N	
N, NE, NL, TNL (side mount)	1	1	CAL5-11	

Pneumatic timers

Timing range		Contacts N.O.	Contacts N.C.	Catalog number	List price
N, NL	On delay 0.1 – 40s	1	1	TP40DA	$ 108
N, NL	On delay 10 – 180s	1	1	TP180DA	
NE, TNL	Off delay 0.1 – 40s	1	1	TP40IA	
NE, TNL	Off delay 10 – 180s	1	1	TP180IA	

Interlocks

Feature		Contacts N.O.	Contacts N.C.	Catalog number	List price
N, NE, NL, TNL	Mechanical/electrical	—	2	VE5-1	$ 45
N, NE, NL, TNL	Mechanical	—	—	VM5-1	21

Mechanical latches

Feature	Catalog number	List price
N, NL (4 pole only)	WB75A-★	$ 84

Coil voltage selection chart — mechanical latches

50 Hz	60 Hz	Voltage code
24	24 – 28	**01**
42	42 – 48	**02**
48	48 – 55	**03**
110	110 – 127	**04**
220 – 230	220 – 255	**06**
230 – 240	230 – 277	**05**
380 – 415	380 – 440	**07**
415 – 440	440 – 480	**08**

Identification markers

Feature	Catalog number	List price
Pack of 50	BA5-50	$ 15

Accessories
Type N, NL, NE & TNL

ZA16-84

RV5/50

RC5-1/50

Coils

Relay type	Catalog number	List price
N	ZA16-★	**$ 24**
NE	ZAE16-★	**24**

★ Select the coil voltage from the Control Relay Coil Voltage Selection chart and substitute the letter code for the ★ as the last digit in the catalog number.

Coil voltage selection chart

Hz	Relay type	Volts															
		12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	N		81	83	84	84		34	36	80	42		86	86	51	53	55
50	N		81	83	84				80			85	86			55	
DC	NE, NL	80	81	83	86		87		88	89							

Surge suppressors — for Type N control relays

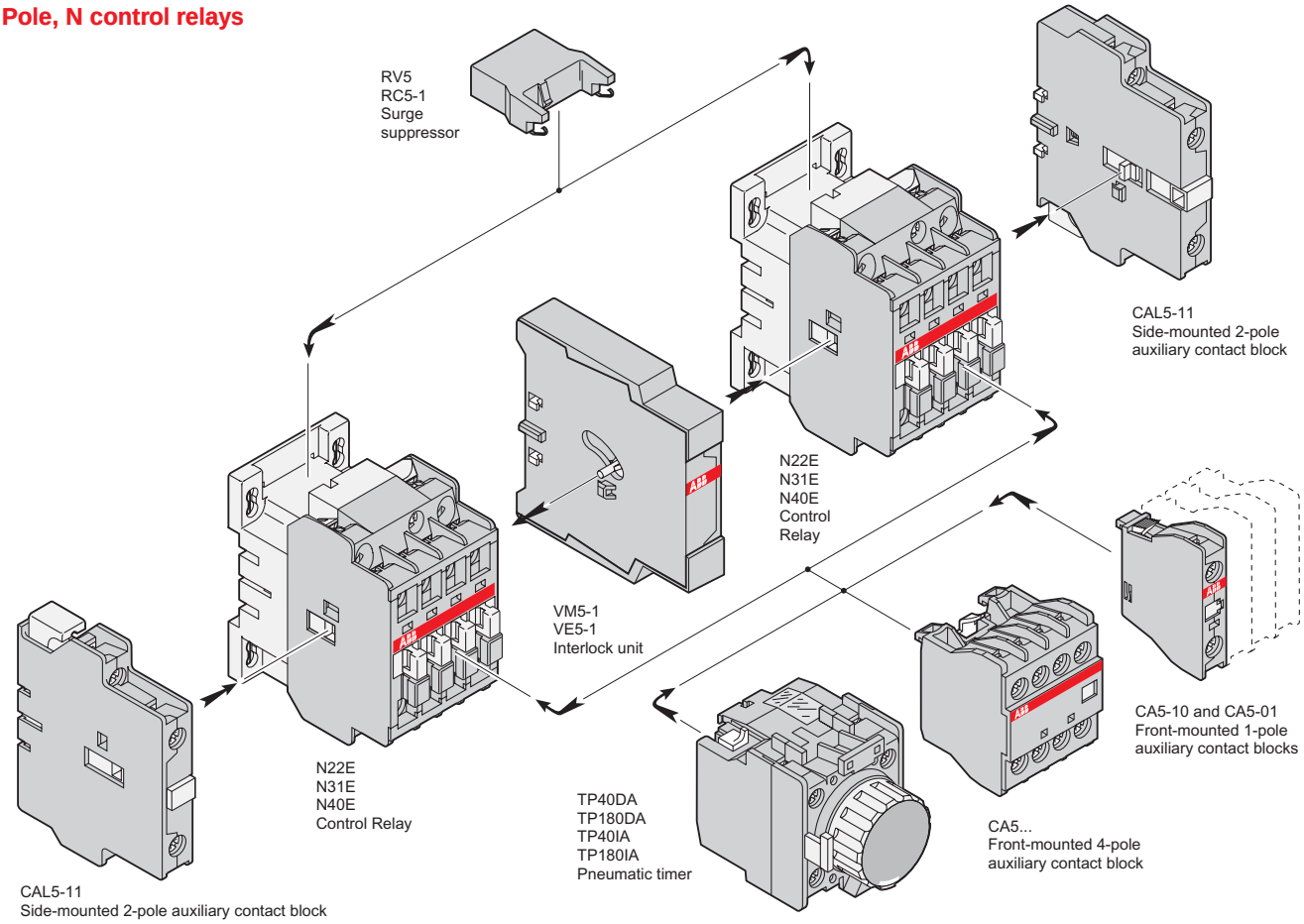
Feature	Type	Voltage range	Catalog number	List price
Varistor	N, NE NL, TNL	24 – 50 VAC/DC 50 – 133 VAC/DC 110 – 250 VAC/DC 250 – 440 VAC/DC	RV5/50 RV5/133 RV5/250 RV5/440	**$ 30**
RC	N	24 – 50 VAC 50 – 133 VAC 110 – 250 VAC 250 – 440 VAC	RC5-1/50 RC5-1/133 RC5-1/250 RC5-1/440	

Technical data

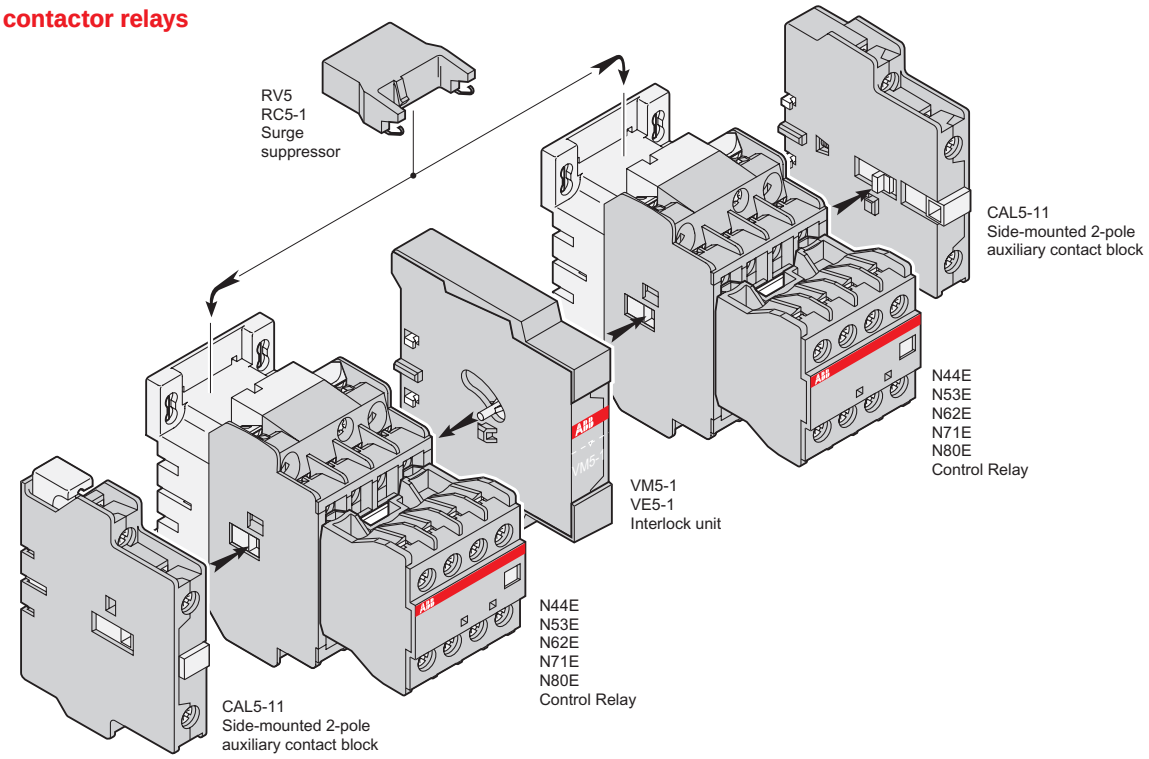
Type	Control circuit	Opening time growth factor	Residual overvoltage or clipping voltage	Remarks	
RV5/... ing				Advantages	• Good energy absorption & damp-
50	AC/DC	1.1 to 1.5	132V		• Unpolarized system
133	AC/DC	1.1 to 1.5	270V	Disadvantages	• Clipping from U_{vdr} thus voltage front up to this point
250	AC/DC	1.1 to 1.5	480V		
440	AC/DC	1.1 to 1.5	825V		
RC5-1/... or RC5-2/... RC-EH300/...	AC	1.2 to 3	2 to 3 x U_c	Advantages	• Very fast clipping • Attenuation of steep fronts and therefore, high frequencies • No operating delays

Accessory mounting information
Type N, NE, NL & TNL

4 Pole, N control relays

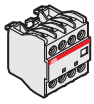
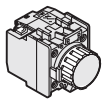
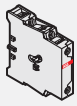


8 Pole, N contactor relays



Possible accessory combinations
Type N, NE, NL, TNL

Configurations of accessories are different depending on whether front or side mounted.

Type	Main poles	Built-in auxiliary contacts	Accessories — Front mounting: Auxiliary contact blocks 1-pole CA5-		Accessories — Front mounting: Auxiliary contact blocks 4-pole CA5-		Accessories — Front mounting: TP - A Pneumatic timer block		Accessories — Side mounting: Auxiliary contact Blocks 2-pole CAL5-11		Accessories — Side mounting: Interlock units	
												
N	①	**2 2 E**	1 to 4 **CA5-** 1-pole blocks	or	1 **CA5-** 4-pole block	or	1 **TP - A** block	+	1 to 2 **CAL5-11** blocks	or	1 **VM/E5-1** block + 1 **CAL5-11** block	
N	①	**3 1 E**										
N		**4 0 E**										
N		**4 4 E**	—		—		—	+	1 to 2 **CAL5-11** blocks	or	1 **VM/E5-1** block + 1 **CAL5-11** block	
N		**5 3 E**										
N		**6 2 E**										
N		**7 1 E**										
N		**8 0 E**										
NE	①	**2 2 E**	1 to 4 **CA5-** 1-pole blocks	or	1 **CA5-** 4-pole block	or	1 **TP - A** block	+	1 to 2 **CAL5-11** blocks	or	1 **VM/E5-1** block + 1 **CAL5-11** block	
NE	①	**3 1 E**										
NE		**4 0 E**										
NE		**4 4 E**	—		—		—	+	1 to 2 **CAL5-11** blocks	or	1 **VM/E5-1** block + 1 **CAL5-11** block	
NE		**5 3 E**										
NE		**6 2 E**										
NE		**7 1 E**										
NE		**8 0 E**										
NL	①	**2 2 E**	1 to 4 **CA5-** 1-pole blocks	or	1 **CA5-** 4-pole block	or	—	or	1 **CAL5-11** block	or	1 **VM/E5-1** block + 1 **CAL5-11** block	
NL	①	**3 1 E**										
NL		**4 0 E**										
NL		**4 4 E**	—		—		—	or	1 **CAL5-11** block	or	1 **VM/E5-1** block + 1 **CAL5-11** block	
NL		**5 3 E**										
NL		**6 2 E**										
NL		**7 1 E**										
NL		**8 0 E**										
TNL	①	**2 2 E**	1 to 4 **CA5-** 1-pole blocks	or	1 **CA5-** 4-pole block	or	—	or	1 **CAL5-11** block	or	1 **VM/E5-1** block + 1 **CAL5-11** block	
TNL	①	**3 1 E**										
TNL		**4 0 E**										
TNL		**4 4 E**	—		—		—	or	1 **CAL5-11** block	or	1 **VM/E5-1** block + 1 **CAL5-11** block	
TNL		**5 3 E**										
TNL		**6 2 E**										
TNL		**7 1 E**										
TNL		**8 0 E**										

Technical data
UL & CSA

AC inductive ratings — NEMA A600

Voltage	Continuous current	Maximum make	Maximum break
120V 240V 480V 600V	10	7200VA	720VA

DC inductive ratings — NEMA P300

Voltage	Continuous current	Maximum make	Maximum break
120V 250V 300-600V	5	138VA	138VA

AC coil consumption

In rush	Sealed
80VA	8VA

DC coil consumption

In rush	Sealed
7.0W	7.0W

AC operating time

Pickup	Dropout
10 – 20ms	10 – 20ms

DC operating time

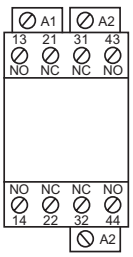
Pickup	Dropout
30 – 90ms	10 – 20ms

AC mechanical endurance
30 million operations

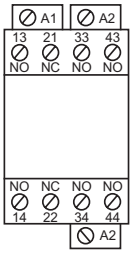
DC mechanical endurance
30 million operations

Technical data
Terminal marking and positioning
Type N

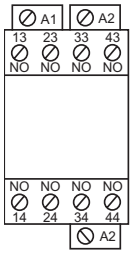
N control relays
Pole configuration schematics



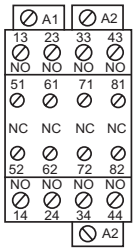
N22E



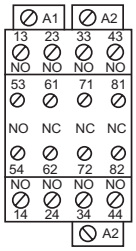
N31E



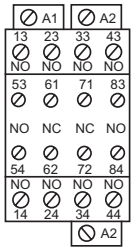
N40E



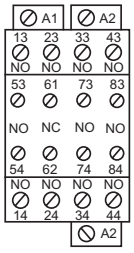
N44E



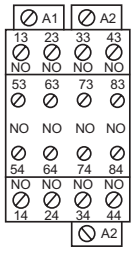
N53E



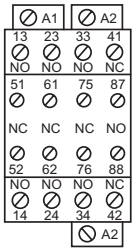
N62E



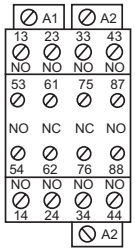
N71E



N80E

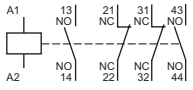


N33/11

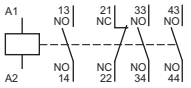


N51/11

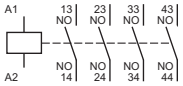
4 Pole control relay



N22E

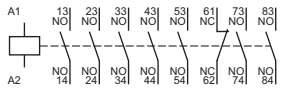


N31E

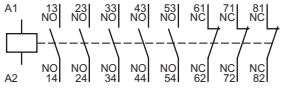


N40E

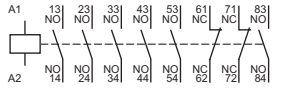
4 Pole control relay with 4 pole adder deck



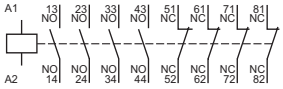
N71E



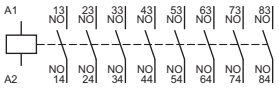
N53E



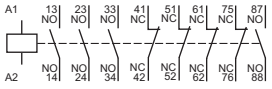
N62E



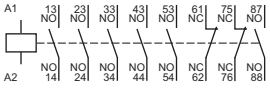
N44E



N80E

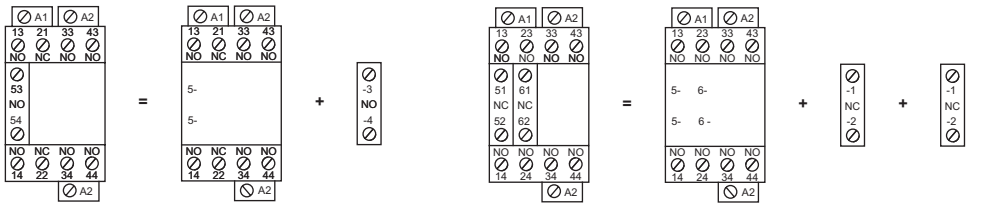


N31/11



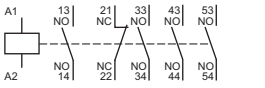
N51/11

Other possible contact combinations with auxiliary contacts added by the user

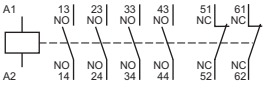


Combination 41 E = N 31 E + CA5-10

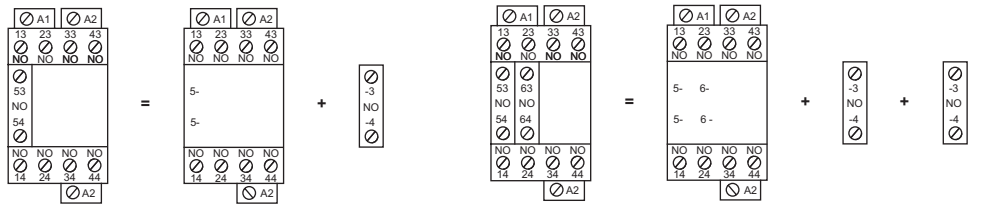
Combination 42 E = N 40 E + CA5-01 + CA5-01



Combination 41 E

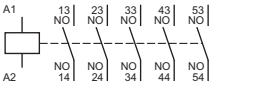


Combination 42 E

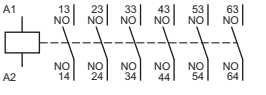


Combination 50 E = N 40 E + CA5-10

Combination 60 E = N 40 E + CA5-10 + CA5-10

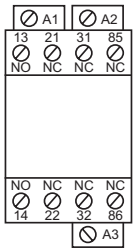


Combination 50 E

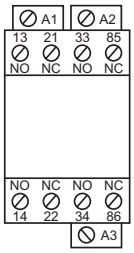


Combination 60 E

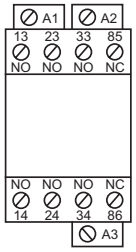
NE control relays
Pole configuration schematics



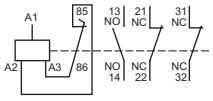
NE12E



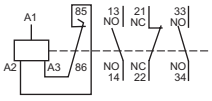
NE21E



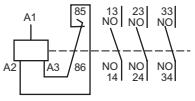
NE30E



NE12E



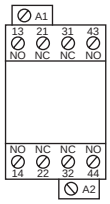
NE21E



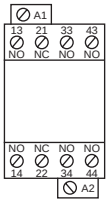
NE30E

Technical data
Terminal marking and positioning
Type NL & TNL

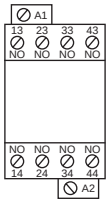
Standard devices without addition of auxiliary contacts



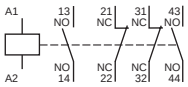
NL22E
TNL22E



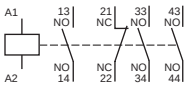
NL31E
TNL31E



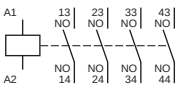
NL40E
TNL40E



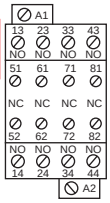
NL22E
TNL22E



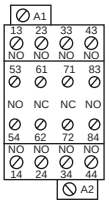
NL31E
TNL31E



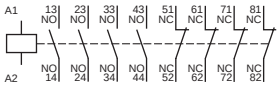
NL40E
TNL40E



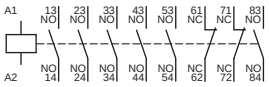
NL44E
TNL44E



NL62E
TNL62E

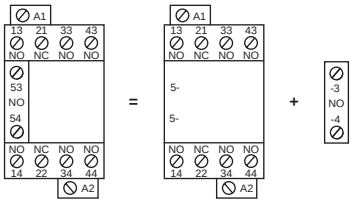


NL44E
TNL44E

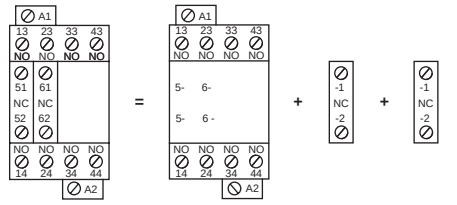


NL62E
TNL62E

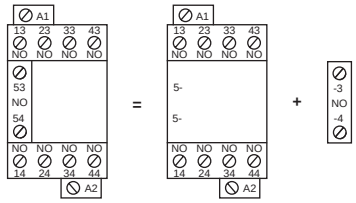
Other possible contact combinations with auxiliary contacts added by the user



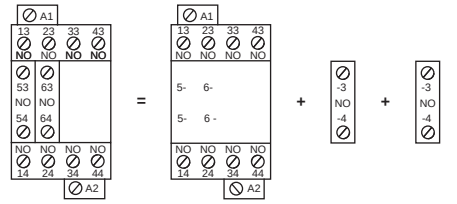
Combination 41E = **NL31E TNL31E** + **CA5-10** + **CA5-10**



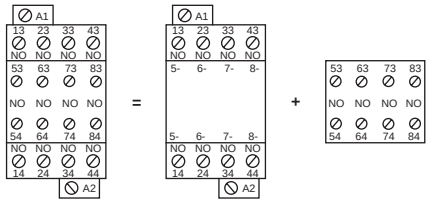
Combination 42 E = **NL40E TNL40E** + **CA5-01** + **CA5-01** + **CA5-01** + **CA5-01**



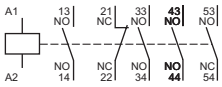
Combination 50E = **NL40E TNL40E** + **CA5-10** + **CA5-10**



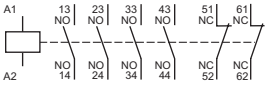
Combination 60 E = **NL40E TNL40E** + **CA5-10** + **CA5-10** + **CA5-10** + **CA5-10**



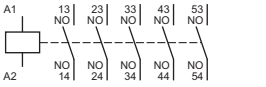
Combination 80E = **NL40E TNL40E** + **CA5-40E** + **CA5-40E**



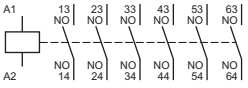
Combination 41 E



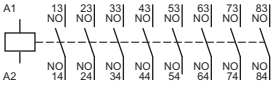
Combination 42 E



Combination 50 E



Combination 60 E

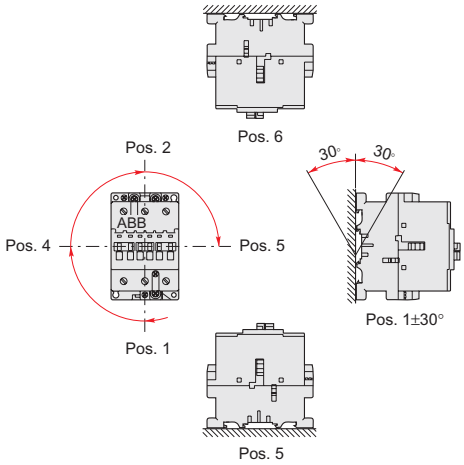


Combination 80 E

Technical data
IEC

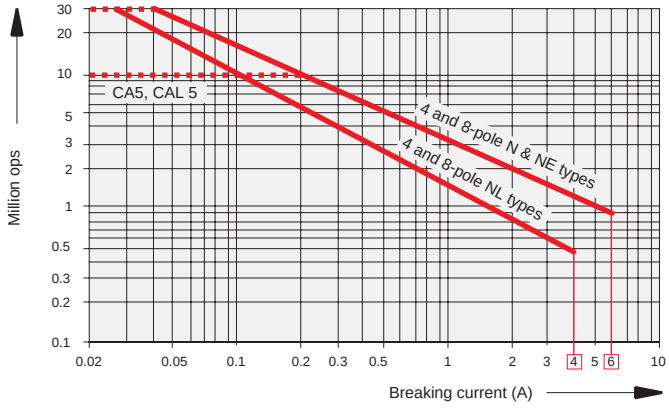
Type		NE12, NE 21, NE 30	N22, N31, N40	N44, N53, N62, N71, N80	NL22, NL31, NL40	NL44, NL62
Number of poles		3	4	8	4	8
Insulation characteristics						
Rated insulation voltage U_i						
acc. to IEC947-5-1 and VDE0110 (Gr. C)	**V**			690		
acc. to UL/CSA	**V**			600		
Rated impulse withstand voltage U_{imp}						
acc. to IEC947-5-1	**kV**			8		
General technical data						
Standards		Devices complying with international standards IEC947-5-1/947-4-1 and European standards EN60 947-5-1/60 947-4-1 Electromagnetic compatibility (EMC) according to amendment A11 to IEC947-1; EN60 947-1 and amendment 2 to IEC947-4-1				
Air temperature near contactor						
— for operation in free air:	**°C**	-40 to +55 (0.85 – 1.1 **U_c**) / +55 to +70 (**U_c**)				
— for storage:	**°C**	-60 to +80				
Climatic withstand		according to IEC68-2-30 and 68-2-11 – UTE C63-100, Specification II				
Mounting positions		Positions 1 to 5	- θ ≤ 55°C : 0.85 – 1.1 - θ = 55 - 70°C :			
(see diagrams below)		Position 6	- θ ≤ 55°C : 0.95 – 1.1 - θ > 55°C : not acceptable		unauthorized	
Operating altitude	**m**	≤ 3000				
Shock withstand according to IEC 68-2-27 and EN 60068-2-27 Mounting pos. 1 (see below)		1/2 sinusoidal shock, 11ms: no change in contact position Shock direction: A, C1, C2 : 20 g B1 : 5 g B2 : 15 g				
Mounting						
— on mounting rail		35mm according to IEC715 and EN50022				
— with screws (not supplied)		2 x M4				
Connection terminals (delivered in open position, screws of unused terminals must be tightened)		M 3.5 (+,-) posidrive 2 screw with cable clamp				
Connection capacity						
Rigid solid	**1 x AWG**	16 – 12				
	2 x AWG	16 – 12				
Degree of protection according to IEC529, IEC947-1 and EN60529						
— Pole terminals		IP20			IP20	
— Coil terminals		IP20			IP20	

Mounting positions



Electrical durability of contacts
utilization category AC – 15 according to IEC947-5-1
making current: 10 x **I_e** with cos φ = 0.7 and **U_e**
breaking current: **I_e** with cos φ = 0.4 and **U_e**

The curves opposite show the electrical durability of the control relays as well as the add-on auxiliary contact blocks in relation to the breaking current **I_c**. These curves have been drawn for resistive and inductive loads up to 690V, 40 – 60 Hz.



Technical data
IEC

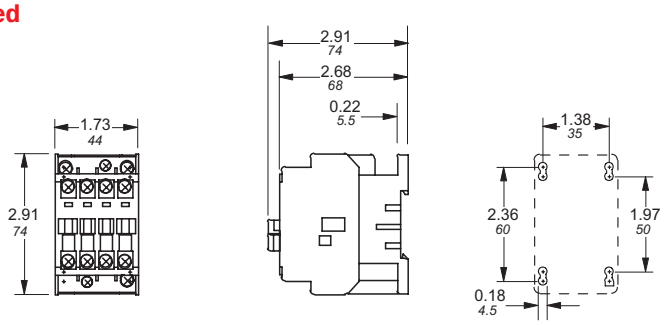
Type			NE12, NE21, NE30	N22, N31, N40	N44, N53, N62, N71, N80	NL22, NL31, NL40	NL44, NL62
Number of poles			3	4	8	4	8
Pole utilization characteristics							
Rated operational voltage U_e		V	690				
Conventional thermal current in free air I_{th}							
according to IEC947-5-1	$\theta \leq 40°C$	A	16			16	
Rated operating current I_e							
in AC-15 according to IEC947-5-1							
	24 – 127 V 50/60 Hz	A	6			6	
	230 – 240 V 50/60 Hz	A	4			4	
	400 – 415 V 50/60 Hz	A	3			3	
	500 V 50/60 Hz	A	2			2	
	690 V 50/60 Hz	A	2			2	
in DC-13 according to IEC947-5-1							
	24VDC	A/W	6/144			6/144	
	48VDC	A/W	2.8/134			2.8/134	
	72VDC	A/W	1/72			1/72	
	125VDC	A/W	0.55/69			0.55/69	
	250VDC	A/W	0.3/75			0.3/75	
Field of rated frequencies		Hz	25 – 400				
Mechanical durability in operating cycles			10 million	> 20 million		30 million	
Max. switching frequency		cycles/h	3000	6000		6000	
Electrical durability in operating cycles							
Max. switching frequency		cycles/h	1200				
Rated making capacity according to IEC947-5-1			10 x I_e /AC-15				
Rated breaking capacity according to IEC947-5-1			10 x I_e /AC-15				
gG (gl) protection fuse		A	10				
Rated short time withstand current							
at ambient temp. of 40 °C,		1.0 s		100A		50A	
in free air, from cold state		0.1 s		140A		100A	
Insulation resistance at 500 VDC			after durability test: 5 MΩ				
Min. switching capacity							
with failure rate below 10^{-6}			17V / 5mA			24V / 5mA	
Non overlapping time between N.O. and N.C. contacts		ms	≥ 2				
Power loss per pole at 6A		W	0.10			0.15	
Magnet system characteristics							
Coil operating limits $\theta \leq 40°C$			according to IEC 947-5-1 : 0.85 - 1.1 U_c				
Drop out voltage in % of U_c			10 – 30%	roughly 40 – 65%		roughly 10 – 30%	
Coil consumption (average value)							
— a.c. operation: 50 Hz pull in		VA	—	70		—	
60 Hz pull in		VA	—	80		—	
50/60 Hz① pull in		VA/VA	—	74/70		—	
50/60Hz holding		VA/W	—	8/2		—	
— d.c. operation: cold pull in		W	90	—		3	
warm holding		W	2	—		3	
Rated control voltage U_c							
— AC operation: 50/60 Hz		V	—	20 – 690		—	
— DC operation:		VDC	12 – 250	—		12 – 240	
Max. permissible short supply interruption							
without opening of contacts		ms	2	2		2	
Operating time							
between coil energization and:							
	— closing of N.O. contact	ms	10 – 16	10 – 26		100	
	— opening of N.C. contact	ms	8 — 12	7 – 21		20 – 70	
between coil de energization and:							
	— opening of N.O. contact	ms	5 — 14	4 – 11		10 – 17	
	— closing of N.C. contact	ms	11 — 17	9 – 16		16 – 27	

① 50/60 Hz coils: voltage codes 80 to 88, see page 7.5.

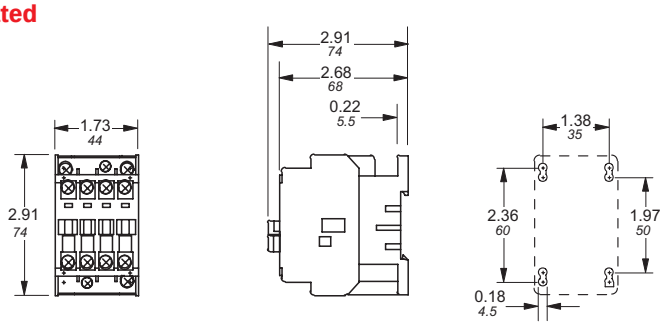
Approximate dimensions
Type N, NE, NL, & TNL
AC & DC operated

00.00 Inches
00.00 [Millimeters]

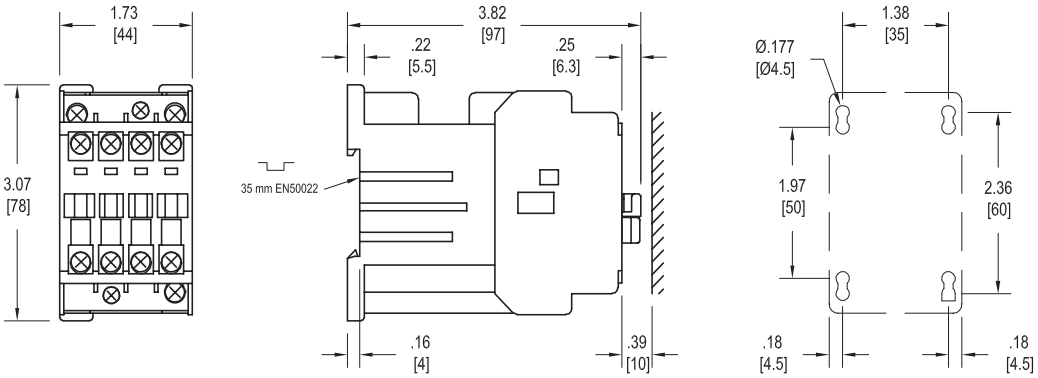
Type N, 4 Pole, AC operated



Type NE, 4 Pole, DC operated

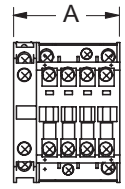


Type NL, TNL

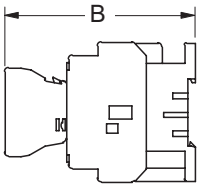


Approximate dimensions
Accessories for Type N & NE

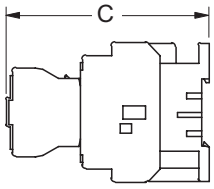
N & NE



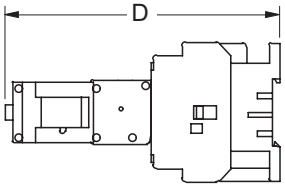
SIDE MOUNTED
AUXILIARY



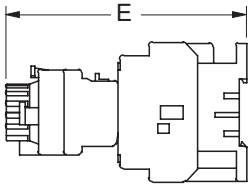
SINGLE POLE
TOP MOUNTED
AUXILIARY



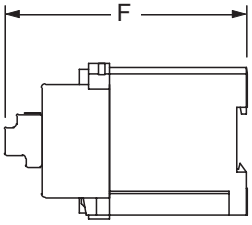
FOUR POLE
TOP MOUNTED
AUXILIARY



ON-POSITION
LATCH



PNEUMATIC
TIMER

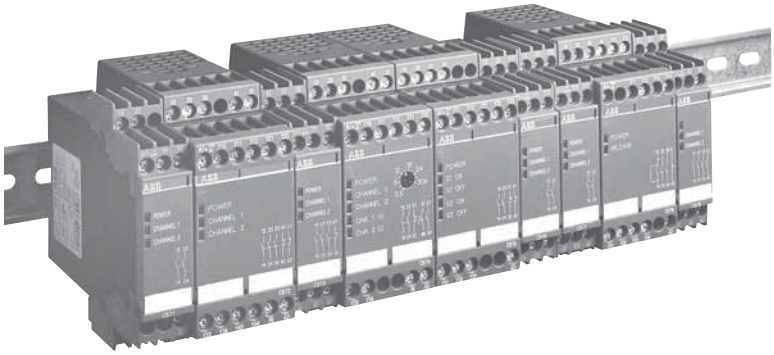


MECH INTERLOCK D.C.
OPERATED

Type		A	B	C	D	E	F
N	IN	2.20	3.96	4.21	5.71	5.00	—
	MM	*56*	*100.5*	*107*	*145*	*127*	—
NE	IN	2.20	3.96	4.21	5.71	5.00	—
	MM	*56*	*100.5*	*107*	*145*	*127*	—

Electronic relays
Safety

Electronic
Safety relays



Description

The C57x series covers 10 safety relays which perform safety functions on machines. Their fields of application extend from emergency-stop circuits through guard door monitoring functions and tread mats to presses and punches. All C57x products are UL Listed, CSA approved and bear the CE Mark.
All safety relays can be used on the basis of their classification into the risk categories to EN 954-1, they are approved by the employers' liability insurance associations and/or the German Technical Inspection Authority (TÜV) and comply with the requirements of EN 60204, Part 1.
Redundancy is achieved by series-connection of two N.O. contacts. These N.O. contacts are located in two mutually independent, positive-action, all-or-nothing relays which monitor each other by means of a special-purpose circuit.
Diversity is provided thanks to the combination of N.C. contact and N.O. contact. Cyclic monitoring of the safety circuit in each On/Off cycle ensures maximum reliability.
Thanks to the two-channel control and/or control which is immune to shorts across contacts**,** it is also possible to monitor signalling devices such as emergency-stop buttons or limit switches of the guard doors. This ensures the required level of safety even on systems subject to a high level of pollution.
In the event of a fault or error, the safe state of the system is achieved directly after opening the safety contacts. These enable circuits are N.O. contacts which open reliably in the event of fault or error and thus reliably switch off the potentially hazardous drives or machines.
Additional signalling contacts, N.C. contacts which close in the event of a fault or error or semiconductor outputs, are available, depending on the type of equipment.
Easy, reliable and fast wiring is achieved by a clear and manageable terminal designation system. This allows wiring errors to be minimized.
In addition to all these safe features, the C57x safety relays correspond to the product design of ABB's range of switchgear and control systems. They fit in perfectly with the overall design of the switch cabinet.

Type C570

C570

Voltage range		Output contacts			Safety category	Weight (oz.)	Piece per unit	Catalog number	List price
		Enable contacts		Auxiliary					
50/60Hz	VDC	Instan-taneous	Time delay						
—	24VDC							1SAR501042R0003	**$ 870**
24VAC 110VAC 230VAC	— — —	4 N.O.	—	1 N.C. 1 N.O.	3	33.86	1	1SAR501042R0002 1SAR501042R0004 1SAR501042R0005	

Description

- Single channel connection
- Feedback circuit for monitoring external contactors
- LED indicators for power and operation
- Output: 4 N.O. and 1 N.O. & 1 N.C. positively driven
- Overall width: 75mm

Application

The safety relay can be used to monitor Emergency Stop circuits and for monitoring of other protective devices (i.e., safety gates).

Type C571

C571

Voltage range		Output contacts			Safety category	Weight (oz.)	Piece per unit	Catalog number	List price
		Enable contacts		Auxiliary					
50/60Hz	VDC	Instan-taneous	Time delay						
24VAC	24VDC	2 N.O.	—	—	3, (4)①	8.47	1	1SAR501020R0001	$ 280
	24VDC	2 N.O.			3, (4)①			1SAR501020R0003	
115 VAC	—	2 N.O.			3, (4)①			1SAR501020R0004	
230 VAC	—	2 N.O.			3, (4)①			1SAR501020R0005	

Description

Emergency Stop monitor and safety gate monitor C571

- Auto-start / monitored start
- Operating voltage Vc at Emergency Stop button or limit switch
- Feedback loop for monitoring of external contactors
- LED indicators for power, channel 1 and 2
- Safety outputs: 2 N.O. contacts, positively guided
- Width of enclosure: 22.5mm

Application

Use the safety control gears C571/C573 in Emergency Stop devices as per EN418 and in safety circuits as per VDE 0113 Part 1 (11.98) and/or EN 60 204-1 (11.98), e.g., with moveable covers and guard doors. Depending on the external connections, categories 3 and 4 (with additional external measures) as per DIN EN 954-1 are achievable.

① Possible with additional external measures. The digit in parenthesis applies only if the cables and sensors are laid safely and protected mechanically.

Type C572

C572

Voltage range		Output contacts			Safety	Weight	Piece	Catalog	List
		Enable contacts		Auxiliary					
50/60Hz	VDC	Instan-taneous	Time delay		category	(oz.)	per unit	number	price
—	24VDC	—	—	—	4	0.360	1	1SAR501032R0003	**$ 520**
24VAC	—	3 N.O.	—	2 N.C.		0.450		1SAR501032R0002	
110VAC	—	3 N.O.	—	2 N.C.		0.450		1SAR501032R0004	
230VAC	—	3 N.O.	—	2 N.C.		0.360		1SAR501032R0005	

Description

Emergency Stop monitor and safety gate monitor C572

- Auto-start / monitored start
- 24 VDC at Emergency Stop button or limit switch
- Cross-short circuit detection at Emergency Stop button or limit switch
- Feedback loop for monitoring of external contactors
- LED indicators for power, channel 1 and 2
- Safety outputs: 3 NO contacts positively guided
- Signalling contacts: 2 NC contacts positively guided
- Width of enclosure: 45mm

Application

Use safety control gear C572 in Emergency Stop devices as per EN 418, in safety circuits as per VDE 0113 Part 1 (06.93) and/or EN 60 204-1 (12.97), e.g. with moveable covers and guard doors. Depending on the external connection, safety category 4 as per DIN EN 945-1 is achievable with this device.

Type C573

C573

Voltage range		Output contacts			Safety	Weight	Piece	Catalog	List
		Enable contacts		Auxiliary					
50/60Hz	VDC	Instan-taneous	Time delay		category	(oz.)	per unit	number	price
24VAC	24VDC	3 N.O.	—	1 N.C.	3, (4)①	8.47	1	1SAR501031R0001	**$ 340**

Description

- Operating voltage U_e at Emergency-Stop button or limit switch
- Single or two-channel connection
- Feedback circuit for monitoring external contactors
- LED indicators for Power, Channels 1 and 2
- Output: 3NO and 1 NC positively driven
- Overall width: 45mm

Application

The safety relays C571/C573 can be used in Emergency Stop circuits as per EN 418 and in safety circuits as per VDE 0113 Part 1 (11.98) and/or EN 60 204-1 (11.98), i.e., with movable covers and guard doors. Depending on the external connections, categories 3 and 4 (with additional external measures) as per DIN EN 954-1 are achievable.

① Possible with additional external measures. The digit in parenthesis applies only if the cables and sensors are laid safely and protected mechanically.

Type C574

C574

Voltage range		Output contacts			Safety	Weight	Piece	Catalog	List
		Enable contacts		Auxiliary					
50/60Hz	VDC	Instan-taneous	Time delay		category	(oz.)	per unit	number	price
—	24VDC	2 N.O.	2 N.O.	1 N.C.	3, (4) ①	15.87	1	1SAR503041R0003	**$ 675**
24VAC	—							1SAR503041R0002	
110VAC	—							1SAR503041R0004	
230VAC	—							1SAR503041R0005	

Description

Emergency Stop switching device and safety door monitor with time delay C574

- Single or two-channel connection
- Feedback circuit for monitoring external contactors
- LED indicators for Power, Channels 1 and 2, delayed channel 1/2
- Release time adjustable steplessly up to 30 s
- Output: 2 NO, 1 NC, 2 NO time-delayed
- Overall width: 45 mm

Application

The safety relay C574 can be used in Emergency Stop devices as per EN 418, in safety circuits as per VDE 0113 Part 1 (06.93) and/or EN 60 204-1 (12.97), such as for monitoring safety gates, or in circuits with controlled stand-still requirement (Stop Category 1). Depending on the external circuitry, this device can be used to realize Safety Category 4 instantaneous release circuits and Safety Category 3 delayed release circuits according to DIN EN 954-1.

• Delay time, 0.5 to 30 s stepless adjustment
• Auto-start

—	24VDC	2 N.O.	2 N.O.	1 N.C.	3, (4)①	15.17	1	1SAR503141R0003	
24VAC	—	2 N.O.	2 N.O.	1 N.C.	3, (4)①	21.16	1	1SAR503141R0002	
110VAC	—	2 N.O.	2 N.O.	1 N.C.	3, (4)①	21.16	1	1SAR503141R0004	**$ 675**
230VAC	—	2 N.O.	2 N.O.	1 N.C.	3, (4)①	15.17	1	1SAR503141R0005	

• Delay time, 0.05 to 3 s stepless adjustment
• Monitoring-start

—	24VDC	2 N.O.	2 N.O.	1 N.C.	3, (4)①	15.17	1	1SAR533241R0003	
24VAC	—	2 N.O.	2 N.O.	1 N.C.	3, (4)①	21.16	1	1SAR533241R0002	
110VAC	—	2 N.O.	2 N.O.	1 N.C.	3, (4)①	21.16	1	1SAR533241R0004	**$ 675**
230VAC	—	2 N.O.	2 N.O.	1 N.C.	3, (4)①	15.17	1	1SAR533241R0005	

• Auto-start

—	24VDC	2 N.O.	2 N.O.	1 N.C.	3, (4)①	15.17	1	1SAR533141R0003	
24VAC	—	2 N.O.	2 N.O.	1 N.C.	3, (4)①	21.16	1	1SAR533141R0002	
110VAC	—	2 N.O.	2 N.O.	1 N.C.	3, (4)①	21.16	1	1SAR533141R0004	**$ 675**
230VAC	—	2 N.O.	2 N.O.	1 N.C.	3, (4)①	15.17	1	1SAR533141R0005	

① Possible with additional external measures. The digit in parenthesis apply only if the cables and sensors are laid safely and protected mechanically.

Type C575

C575

Voltage range		Output contacts			Safety	Weight	Piece	Catalog	List
		Enable contacts		Auxiliary					
50/60Hz	VDC	Instan-taneous	Time delay		category	(oz.)	per unit	number	price
—	24VDC	2 N.O.	—	2 N.C.	4	12.35	1	1SAR504022R0003	**$ 780**
24VAC	—							1SAR504022R0002	
110VAC	—							1SAR504022R0004	
230VAC	—							1SAR504022R0005	

Description

Two-hand control C 575

- For activating presses (e.g. in conjunction with overtravel monitor C 578)
- 24 V DC at the two-hand control switches
- Feedback circuit for monitoring external contactors
- 5 LED circuit state indicators for Power, S1 ON, S1 OFF, S2 ON, S2 OFF
- Simultaneity monitoring: 0.5 s
- Output: 2 NO, 2 NC positively driven
- Overall width: 45 mm

Application

C575 is suitable for installation in controls for presses.

- Hydraulic presses DIN EN 693
- Eccentric and related presses EN 692
- Screw presses EN 692

Type C576

C575

Voltage range		Output contacts			Safety category	Weight (oz.)	Piece per unit	Catalog number	List price
		Enable contacts		Auxiliary					
50/60Hz	VDC	Instan-taneous	Time delay						
24VAC	24VDC	2 N.O.	—	—	4	8.47	1	1SAR501120R0001	**$ 350**

Description

Emergency Stop switching device and safety door monitor C 576

- Cross-short detection at the EMERGENCY-STOP button or limit switch
- 24 V DC at the EMERGENCY-STOP button
- Single or two-channel connection
- Feedback circuit for monitoring external contactors
- LED indicators for Power, Channel 1, Channel 2 and Power
- Output: 2 NO
- Auto-start
- Overall width: 22.5 mm

Application

The safety relay C576 can be used in safety circuits as per VDE 0113 Part 1 (11.98) or EN 60 204-1 (11.98), i.e., with movable covers and safety gates; the safety relay C577 in Emergency Stop circuits as per EN 418. Depending on external connections, category 4 as per DIN EN 954-1 is achievable.

Type C577

C575

Voltage range		Output contacts			Safety category	Weight (oz.)	Piece per unit	Catalog number	List price
		Enable contacts		Auxiliary					
50/60Hz	VDC	Instan-taneous	Time delay						
24VAC	24VDC	2 N.O.	—	—	4	8.47	1	1SAR501220R0001	**$ 350**

Description

Emergency stop switching device and safety door monitor C577

- Cross-short detection at the Emergency Stop button or limit switch
- 24 V DC at the Emergency Stop button
- Single or two-channel connection
- Feedback circuit for monitoring external contactors
- LED indicators for Power, Channel 1, Channel 2 and Power
- Output: 2 NO
- Controlled start
- Overall width: 22.5 mm

Application

The safety relay C576 can be used in safety circuits as per VDE 0113 Part 1 (11.98), or EN 60 204-1 (11.98) i.e., with movable covers and safety gates; the safety relay C577 in Emergency Stop circuits as per EN 418. Depending on external connections, category 4 as per DIN EN 954-1 is achievable.

Type C578

C575

Voltage range		Output contacts			Safety	Weight	Piece	Catalog	List
		Enable contacts		Auxiliary					
50/60Hz	VDC	Instan-taneous	Time delay		category	(oz.)	per unit	number	price
—	24VDC	3 N.O.	—	1 N.C.	4	15.87	1	1SAR505031R0003	**$ 910**
24VAC	—							1SAR505031R0002	
110VAC	—							1SAR505031R0004	
230VAC	—							1SAR505031R0005	

Description

Overtravel monitor C 578

- Cross-short detection at the EMERGENCY-STOP button or limit switch
- 24 V DC at the EMERGENCY-STOP button
- Feedback circuit for monitoring external contactors
- LED indicators for Power and Enable
- Output: 3 NO and 1 NC positively driven
- Controlled start
- Overall width: 45 mm

Application

The overtravel distance tester C578 is intended for checking the overtravel of linearly operating hydraulic, pneumatic and spindle presses in accordance with VBG 7n5.2 §11.

Type C579

C575

Voltage range		Output contacts			Safety	Weight	Piece	Catalog	List
		Enable contacts		Auxiliary					
50/60Hz	VDC	Instan-taneous	Time delay		category	(oz.)	per unit	number	price
24VAC 110VAC 230VAC	—	4 N.O.	—	—	—	8.47	1	1SAR502040R0001 1SAR502040R0004 1SAR502040R0003	**$ 390**

Description

Expansion unit for contact expansion of the safety switching devices C 579.
One enable contact of the basic device is required for connection to the expansion unit.

- 4 NO positively driven
- Overall width: 22.5 mm

Application

You can use the C579 expansion unit in combination with all the C57x basic units. It extends the number of release circuits. Depending on the external connection, category 4 as per DIN EN 954-1 is achievable with this device.

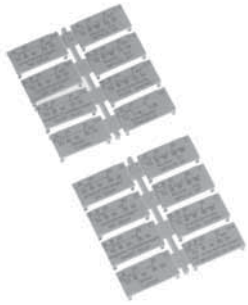
Accessories
for Type C560

Type	Description	Weight (oz.)	Pcs per unit pk	Catalog number	List price
C560.10	Cover cap sealable, for protection against unauthorized adjustment	8.47	5 sets	1SAR390000R1000	**$ 30**
C560.20	Panel mounting bracket	8.47	5 sets of two pcs ea.	1SAR390000R2000	**22**

C565-S
with positively guided contacts

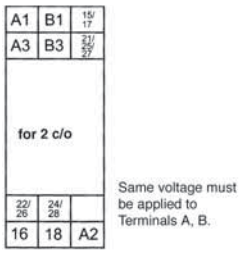
1SAR330030R0000

1SAR390000R2000

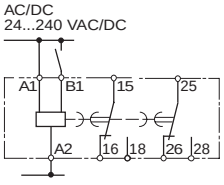


1SAR390000R4000

Terminal positioning C 565-S



Circuit diagram C 565-S



Multifunction time relay – 8 functions④, 15 time ranges, 2 c/o positively guided & gold plated

Time range with rotary switch can be set to	Supply voltage AC 50/60Hz	Supply voltage DC	Weight (oz.)	Piece per unit		Catalog number	List price
0.05s - 100h①	24 - 240V②	24 - 240V③	5.28	1		1SAR330030R0000	**$ 129.00**

Functions can be set by a rotary switch.
Separate markers allow a clearly legible and distinctive setting of the timing functions.
The markers are available as an accessory.

Accessories

Item description	Ident letter	Piece per unit		Catalog number	List price
C560.10, cover sealable For protecting against unauthorized readjustment	—	5		1SAR390000R1000	**$ 30.00**
C560.20, plug-in tab for screw mounting Mounting on panel	—	5 with 2 pieces each		1SAR390000R2000	**22.00**
C560.40, Set of labels for multifunction relay C565, full set with 16 functions ON-delay OFF-delay, with auxiliary voltage ON and OFF-delay, with auxiliary voltage Flascher, starting with OFF Impulse-ON Impulse-OFF, with auxiliary voltage Pulseformer with auxiliary voltage	 A B C D E F G	5 sets		1SAR390000R4000	**42.00**

① Switch position y no timing. To be used for testing purposes (ON/OFF function) within the installation. When voltage is applied the relay remains energized or remains de-energizes permanently.
② Operating range 0,7 to 1,25 x U_s.
③ Operating range 0,85 to 1,1 x U_s.
④ The c/o contacts are operated simultaneously, so that 8 functions can be selected (no Ym, no instantaneous contact)
⑤ Positively guided: N/C and N/O contacts are never closed both, contact distance of 22.5mm is guaranteed, minimum switching load 12V, 3mA.

Technical data

Time relay			C 565-S
Mechanical service life		operations	30 x 10^6
Rated insulated voltage (Pollution degree 3) Overvoltage categorie III acc. to DIN VDE 0110		AC V	300
Permissible ambient temperature	during operation storage	°C °C	– 25 to + 60 – 40 to + 80
Operating range of excitation ①			0.85 to 1.1 x U_s with AC; 0.8 to 1.25 x U_s with DC 0.95 to 1.05 times rated frequency
Rated power at AC 230V, 50 Hz		W VA	2 6
Rated operating currents I_e Output relay	AC-15 at AC 230V, 50 Hz AC-140; DC-13 DC-13 at DC 24V DC-13 at DC 48V DC-13 at DC 60V DC-13 at DC 110V DC-13 at DC 230V	A — A A A A A	3 ③ — 1 0.45 0.35 0.2 0.1
Fusing DIAZED ② [Utilization category gL/gG]		A	4
Switching frequency when loaded with I_e, AC 230V when loaded with contactors B6, B7, AC 230 V		 1/h 1/h	 2500 5000
Recovery time		ms	150 ④
Minimum ON period		ms	35
Setting tolerance referred to full scale value		typically ± 5%	
Repeat accuracy			≤ ± 1%
Enclosure acc. to DIN EN 60 529			IP 20 terminals IP 40 covers
Wire size	single-core stranded with wire end ferrule single-core or stranded	mm/in. mm AWG	1 x (0.5 – 4) 2 x (0.5 – 2.5) 1 x (0.5 – 2.5) 2 x (0.5 – 1.5) 2 x (20 – 14)
Terminal screws	for normal screw-driver size 3 and Pozidrive 2		M 3.5
Permissible normal position			any
Resistance to shock semi-sinusoidal acc. to IEC 60068-2-27		g/ms	15/11
Vibrostability acc. to IEC 60068-2-6		Hz/mm	10-55 / 0,35
EMV-tests by basic specification			EN 50081-1 EN 50082-2

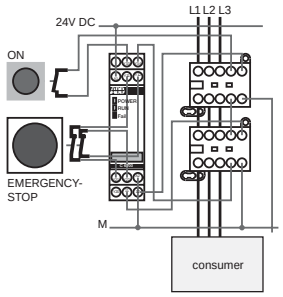
① Unless otherwise specified
② Without any welding as per IEC 60947-5-1.
③ For C565-S; open I_e=1A
④ Wide range voltage power pack; voltage dependent 10 to 250 ms.

C6700 - C6702
with soid state output

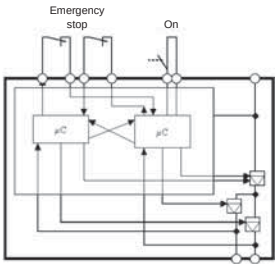
7

- Solid-state control of actuators, therfore no wear
- No contact failure at currents of 17V, 1mA
- Short circuit proof
- High switching frequencies
- 24VDC sensor supply
- Economical

Internal standard circuit diagram of a safe circuit in accordance to C 6700



Internal standard circuit diagram of safety relay C 6701with solid-state output.



Electronic safety relays with solid-state output C 67xx

- Solid-state outputs – no contacts – no wear
- Low weight & small size – Space and weight advantage
- Positively guided standard contactors operate as switching elements

C 67xx safety relays are solely used to monitor the sensors connected (e.g. limit switches resp. EMERGENCY-STOP-buttons) and actuators (positively guided standard contactors).

The basic unit C 6700 itself does not feature safe outputs. Only when the unit is used together with positively guided actuators (e.g. contactors B6, B7) the complete circuit fulfills up to category 3 to EN 954-1.
Us = 24VDC; Ue = 24VDC; Ie = 0.5ADC 13.

The safety relay C 6701 with solid-state outputs can be used directly to switch off connected devices up to category 3 or 4 to EN 954-1. Us = 24VDC; Ue = 24VDC; Ie = 1.5ADC 13.

The safety relay C 6702 with solid-state outputs can also be used to directly switch off connected devices up to category 3 to EN 954-1 and stop categories 0 and 1 at a width of 22.5 mm only.
Time delay settable from 0.05-3 or 0.5-30s. Us = 24VDC; Ue = 24VDC; Ie = 1.5ADC 13.

Type	Supply voltage V_c	Package unit piece	Weight 1 piece kg/lb		Catalog number	List Price
C 6700 C 6701 C 6702 C 6702	24VDC	1	0.150/0.33		1SAR 510 120 R 0003 1SAR 511 320 R 0003 1SAR 543 320 R 0003 1SAR 513 320 R 0003	**Consult factory**

Technical data

	C 6700	C 6701	C 6702
Permissible ambient temperature T_U			
Operation / storage		-25...+60 °C / -40...+80 °C	
Degree of protection acc. to EN 60 529		IP40, IP20 at terminals	
Rated insulation voltage V_i		50V	
Rated impulse withstand voltage V_{imp}	500V	2kV	2kV
Rated control supply voltage V_S	24VDC	24VDC	24VDC
Rated power consumption	1.5W	1.3W	1.3W
Operational voltage range	0.9...1.15 x V_S	0.9...1.15 x V_S	0.9...1.15 x V_S
Shock resistance (half-sine) acc. to IEC 60068	8g/10ms	8g/10ms	8g/10ms
Weight	150g/0.33lb	150g/0.33lb	150g/0.33lb
Recovery time after EMERGENCY STOP	min. 20ms	min. 30ms	min. 30ms
Recovery time after power failure	—	7 s	—
Release time after EMERGENCY STOP	< 30ms	min. 30ms	30ms / 0.05...3s or 0.5...30s adjustable
Recovery time after power failure	max. 25ms	—	—
Response time	—	max. 40ms	max. 40ms
Response time monitored start	< 125ms	—	—
Response time Auto-start	< 250ms	—	—
Short circuit protection	no fusing necessary	no fusing necessary	no fusing necessary

Utilization category acc. to IEC 60947-5-1:

		Rated operational voltage V_e	Rated operational current I_e
C 6700	DC-13	24V	0.5A (per output, 60 °C)
C 6701	DC-13	24V	2.0A
C 6702	DC-13	24V	2.0A

Technical data
C570 - C579

Type	C570	C571	C572	C573	C574	C575	C576	C577	C578	C579
Single-channel connection	x	x	x	x	x	x	x	x	-	x
2-channel connection	-	x	x	x	x	x	x	x	-	x
Cross-short protection	(x)①	(x)①	x	(x)①	x	x	x	x	-	-
Test certificate	BIA, SUVA	BG, SUVA, UL, CSA								
Safety category to EN 954-1	2, (3) ① , (4) ①	3, (4) ①	4	3, (4)①	4, (3)②	4	4	4	4	4
Mechanical service life	3 million operations	10 million operations								
Rated insulation voltage U_i Pollution severity 3 Overvoltage category III to DIN VDE 0110	250 V control circuit 400 V output contacts	300 V								
Rated impulse strength U_{imp} Pollution severity 3	1.5 kV control circuit 4 kV output contacts	4 kV								
Permissible ambient temperature for operation for storage	 -25 to + 55 °C -25 to + 80 °C	 -25 to +60 °C (suitable for butt-mounting design) -40 to +80 °C								
Enclosure to EN 60 529	IP20	IP20③	IP20	IP20③	IP20	IP20	IP20③	IP20③	IP20	IP20③
Shock-hazard protection to VDE 0106	Safe from finger-touch	Safe from finger-touch								
Rated power DC/AC operation at 1.0 x U_s	 6 W	1.5 W	3 W	1.5 W	4 W	3 W	1.5 W	1.5 W	4 W	1.5 W
Operating range AC operation DC operation	 0.8 to 1.1 x U_S 0.8 to 1.1 x U_S	 0.85 to 1.1 x U_S 0.85 to 1.1 x U_S								
Switching frequency	500/h at AC-15 resp. DC-13	1000/h when loaded with I_e								
Resistance to shock	 Rectangular shock: 10/5 and 6/10 g/ms Sinusoidal shock: 30/5 and 8/10 g/ms	 8 g/10 ms semi-sinusoidal to IEC 60 068								
Short-circuit protection (non-welding fusing at I_k = 1kA)	Fuse-links for Enable/signalling contacts: l.v.h.b.c., neozed and diazed utilization cats. gL/gG quick-acting Fuse supply C570: Cartridge fuse quick-acting/slow-blow, power circuit bkr. A, B, C-characteristic	Fuse-links l.v.h.b.c. Type 3NA, DIAZED Type 5SB, NEOZED Type 5SE6A Utilisation category gL/gG quick-acting								
Wire ranges Flexible with wire end ferrule Single-core	 2 x (0.5-1.5) mm² or 1 x (0.5-2.5) mm² 2 x (0.5-2.5) mm² or 1 x (0.5-4) mm²									
Tightening torque, terminal screw M3.5	0.8 to 1.2 Nm									
Electrical service life at I_e		100.000 operations								
Rated operating currents to IEC 60 947-5-1 Thermal continuous current I_{th} I_e/AC-15 I_e/DC-13	 6A up to 230 V, 4 A	 5A 115 V, 5 A 230 V, 5 A 24 V, 2 A 115 V, 0.2 A 230 V, 0.1 A								
Continuous current		Enable circuits: 2FK, 3 FK, 4FK UT 70 °C: 4 A, 3.5 A, 3 A UT 60 °C: 4.5 A, 4 A, 3.5 A UT 50 °C: 5 A, 4.5 A, 4 A								
Mounting positions	any									
Width / mm	75	22.5	45	22.5	45	45	22.5	22.5	45	22.5

① Possible with additional external measures. The figures in bracket apply only if the cables and sensors are laid safely and protected mechanically.
② Applies only to undelayed FK; category 3 applies to time-delayed FK
③ IP 20 terminals, IP 40 housing

Application examples
C6700

Applications
The C 6700 safety combination can be used in EMERGENCY STOP circuits according to EN 418 and in safety circuits according to
EN 60 204-1 (11.98), e.g. for moving covers and safety gates.
Safety catetory 3 according to DIN EN 954-1 or SIL2 according to
IEC 61508 can be achieved, depending on the external circuits.

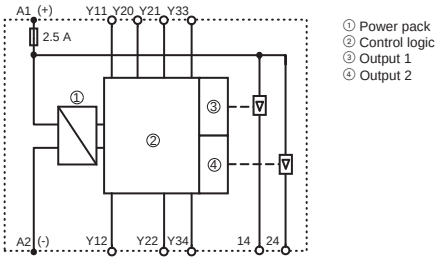
Functions and connections
The C 6700 safety relay has two solid-state outputs. Three LEDs indicate the operating state and the function. During operation, all internal circuit elements are cyclically monitored for faults.
The EMERGENCY STOP button or the position switch are connected to terminals Y11, 12 or Y21, 22. The ON button is connected in series to the NC contacts of the external actuators (feedback loop) to terminals Y33, 34 .
The C 6700 safety relay and the activated contactors K1 and K2 must have the same frame potential. Safety category 3 to EN 954-1 is achieved only in combination with 2 external actuators with positively driven feedback contacts.

Use a power pack to IEC 60536 safety class III (SELV or PELV) for power supply!

Terminal marking

Supply voltage	A1	L/+
	A2	M
Inputs	Y11, 12	Channel 1 EMERGENCY STOP or position switch
	Y21, 22	Channel 2 EMERGENCY STOP or position switch
	Y20	Single channel switch
	Y33, 34	ON button, feedback loop
Outputs	14, 24	Solid-state outputs

Internal circuit



Operation

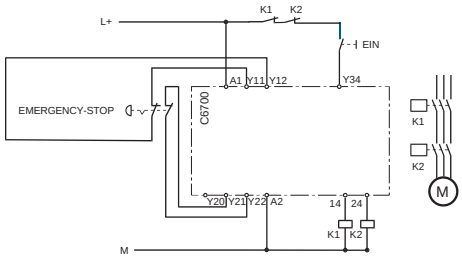
LEDs			Operation			
POWER	RUN	FAIL	PS	E-STOP	ON	Outputs
☼	☼	●	ON	non activated	activated	on
☼	●	☼		activated	non activated	off
☼	●	●		non activated	non activated	off
			Faults			
☼	●	☼	• Defect in electronic • Crossover in EMERGENCY STOP circ.			off
●	●	●	No supply voltage			

Fault clearance
1. Switch supply voltage off.
2. Clear fault or replace device.
3. Switch supply voltage back on.

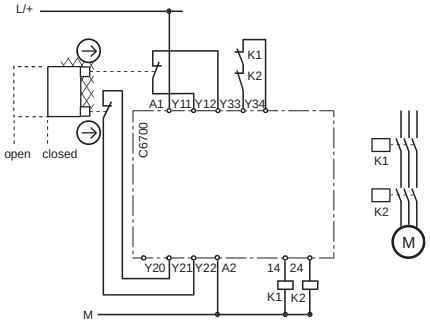
Cable length

for	2 x 1.5mm² 150nF/km	max. 2000m total cable length for sensors

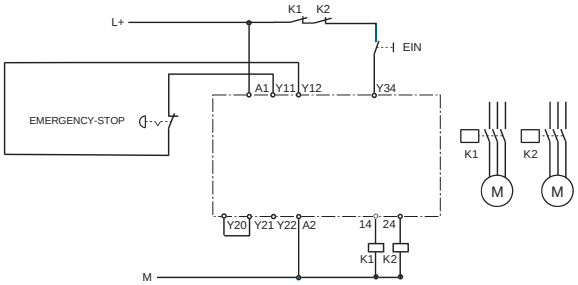
EMERGENCY STOP, single channel, with monitored start
Category 3/SIL2



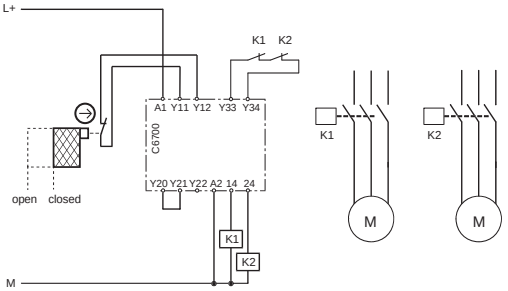
Two channel autostart for safety gate monitoring
Category 3/SIL2



EMERGENCY STOP, single channel, with monitored start
Category 2/SIL1



Single channel autostart for safety gate monitoring
Category 2/SIL1



Application examples
C6701

Application
The C 6701 safety combination can be used in EMERGENCY STOP circuits according to EN 418 and in safety circuits according to EN 60 204-1 (11.98), e.g. in movable guards and safety gates.
Depending on the external circuit elements, safety category 4 according to DIN EN 954-1 or SIL 3 according to IEC 61508 can be achieved.

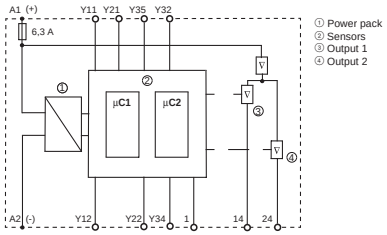
Functions and connections
The C 6701 safety combination has two reliable solid-state outputs. Three LEDs indicate the operating state and the function.
When the device is put into operation it runs through a self-test to test the correct functioning of the internal electronics. All internal circuit components are monitored for faults cyclically during operation.
The EMERGENCY STOP button and/or the position switches or light arrays are connected to terminals Y11, Y12 and Y21, Y22. The ON button is connected in series with the NC contacts of the external actuators to the supply voltage L+ (24 V DC) and to terminal Y34. The cascading input 1 is connected either via a safe output or directly to the supply voltage L+ (24 V DC).
External actuators or loads can be switched via safe outputs 14, 24.
It must be ensured that the actuators or loads and the C 6701 electronic safety combination have the same frame potential. Paralleling outputs 14 and 24 to increase the load current is not permissible.
If electronic sensors (e.g. light-array monitoring) are used, in single-channel operation, Y35 must be connected to L+ (24VDC).
For autostart operation, Y32 must be connected directly to L+ (24VDC) and Y34 must be connected to it via NC contacts of the external actuators.

⚠ **Use a power pack to IEC 60536 safety class III (SELV or PELV) for power supply!**

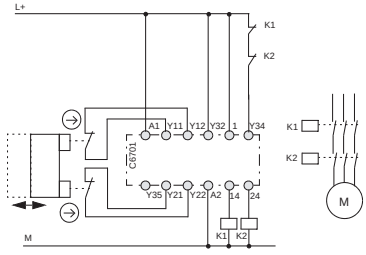
Terminal marking

Supply voltage	A1	L/+
	A2	M
Inputs	Y11, 12	Channel 1 EMERGENCY STOP or position switch
	Y21, 22	Channel 2 EMERGENCY STOP or position switch
	Y35	With / without cross circuit detection
	Y32	Autostart switch
	Y34	ON button, feedback loop
Input	1	Cascading input
Outputs	14, 24	Safe solid state outputs

Internal circuit



Safety gate monitoring, two channel, autostart
Category 4/SIL 3



① Sensor circuits open; Cross circuit between the sensors; Short circuit of sensors to frame
② Only when using circuit variant with "cross circuit detection".

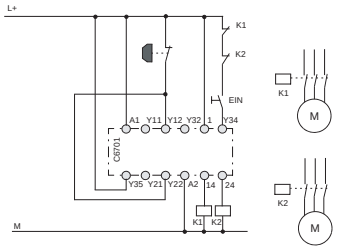
Operation

LEDs			Operation			
POWER	RUN	FAIL	PS	E-STOP	ON	Outputs
☼	☼	●	ON	non activated	activated	on
☼	●	☼		activated ①	non activated	off
☼	●	●		non activated	non activated	off
☼	●	◑ flashes	on start up self test approx. 7 sec.			
			Fault			
☼	●	◑ flashes	Defect in the electronic Change in terminal assignment during operation Short circuit to 24V ②			off
●	●	●	No supply voltage			

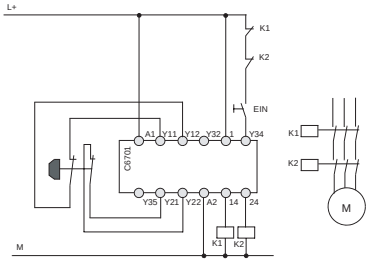
Fault clearance
1. Switch supply voltage off.
2. Clear fault or replace device.
3. Switch supply voltage back on.

Cable length
for 2 x 1.5mm² max. 2000m total cable length for 150nF/km sensors

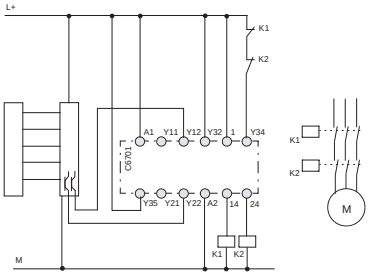
EMERGENCY STOP, single channel, monitored start
Category 2/SIL 1



EMERGENCY STOP, two channel, monitored start with additional ON button category — Category 4/SIL3

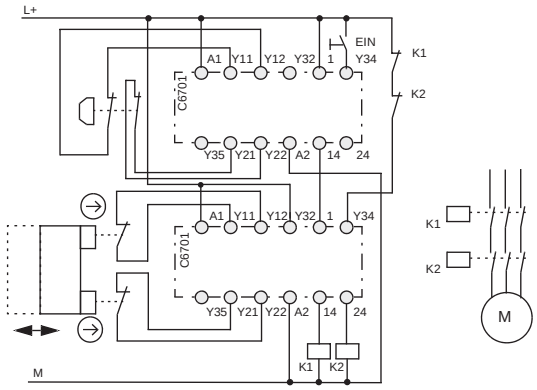


Light array monitoring, two channel, autostart category,
Category 4/SIL3

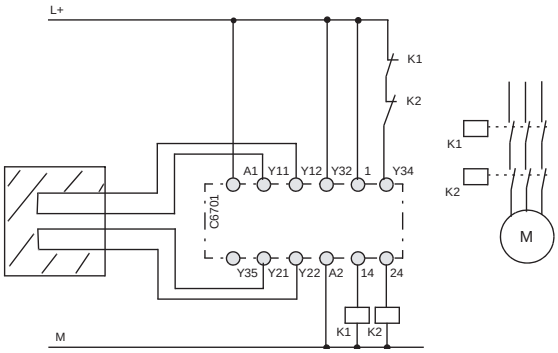


Application examples
C6702

Emergency Stop, two channel, monitored start with additional ON button and safety gate monitoring category 4/SIL 3



Safety mat, two channel, autostart category 3/SIL 2



7

Application

The C 6702 safety combination can be used in EMERGENCY STOP circuits according to EN 418 and in safety circuits according to EN 60 204-1 (11.98), e.g. in movable guards and safety gates. Depending on the external circuit elements, safety category 4 according to DIN EN 954-1 or SIL 3 according to IEC 61508 can be achieved.

Functions and connections

The C 6702 solid-state safety combination has one safe solid-state output and one time-delayed safe solid-state output. Three LEDs indicate the operating state and the function.
When the device is put into operation it runs through a self-test to test the correct functioning of the internal electronics. All internal circuit components are monitored for faults cyclically during operation.
The EMERGENCY STOP button and/or the position switches or light arrays are connected to terminals Y11, Y12 and Y21, Y22. The ON button is connected in series with the NC contacts of the external.
The cascading input 1 is connected either via a safe output or directly to the supply voltage L+ (24 V DC). External actuators or loads can be switched via safe outputs 14, 28. It must be ensured that the actuators or loads and the C 6702 electronic safety combination have the same frame potential. Paralleling outputs 14 and 28 to increase the load current is not permissible.
If electronic sensors (e.g. light-array monitoring) are used in single-channel operation, Y35 must be connected to L+ (24VDC).
For autostart operation, Y32 must be connected directly to L+ (24VDC) and Y34 must be connected to it via NC contacts of the external actuators.

⚠ Use a power pack to IEC 60536 safety class III (SELV or PELV) for power supply!

Terminal marking

Supply voltage	A1	L/+
	A2	M
Inputs	Y11, 12	Channel 1 EMERGENCY STOP or position switch
	Y21, 22	Channel 1 EMERGENCY STOP or position switch
	Y35	With / without cross circuit detection
	Y32	Autostart changeover switch
	Y34	ON button, feedback circuit
Input	1	Cascading input
Outputs	14	Safe solid state output
	28	Safe solid state output, time delayed

Operation

LEDs			Operation			
POWER	RUN	FAIL	PS	E-STOP	ON	Outputs
☼	☼	●	ON	non activated	activated	on
☼	●	☼		activated ①	non activated	off
☼	●	●		non activated	non activated	off
☼	◑ flashes	☼		activated	non activated	off/on
☼	●	◑ flashes	on start up self test approx. 7 sec.			
			Fault			
☼	●	◑ flashes	Defect in electronic Change in terminal assignment during operation Short circuit to 24V ②			off
●	●	●	No supply voltage			

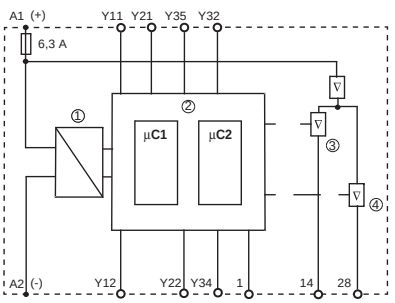
Fault clearance

1. Switch supply voltage off.
2. Clear fault or replace device.
3. Switch supply voltage back on.

Cable length

for	2 x 1.5mm² 150nF/km	max. 2000m total cable length for sensors

Internal circuit

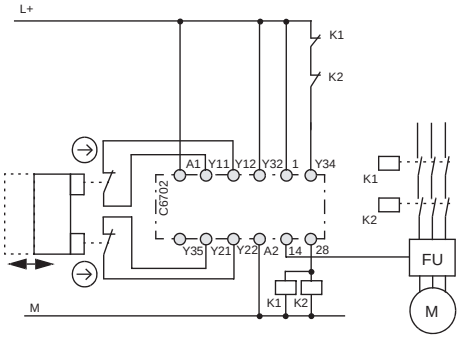


① Power pack
② Sensors
③ Output 1
④ Output 2

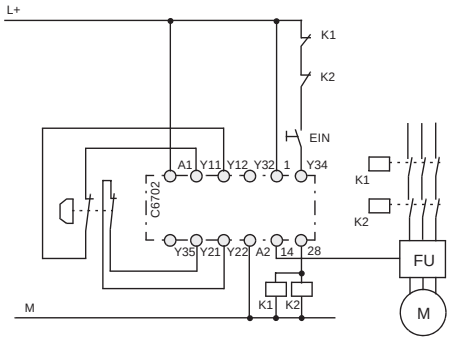
① Sensor circuits open; Cross circuit between the sensors; Short circuit of sensors to frame
② Only when using device with "cross circuit detection".

Application examples
C670x

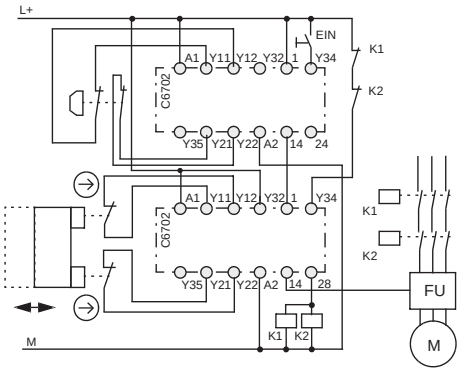
Safety gate monitoring, two-channel, autostart category 4 / SIL 3 with voltage-operated e.l.c.b. and delayed disconnection, stop category 1



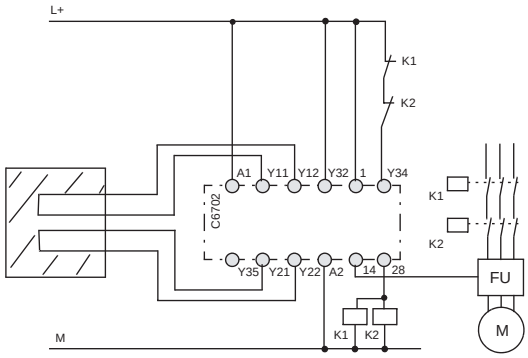
EMERGENCY STOP, two-channel, monitored start with additional ON button category 4 / SIL 3 with voltage-operated e.l.c.b. and delayed disconnection, stop category 1



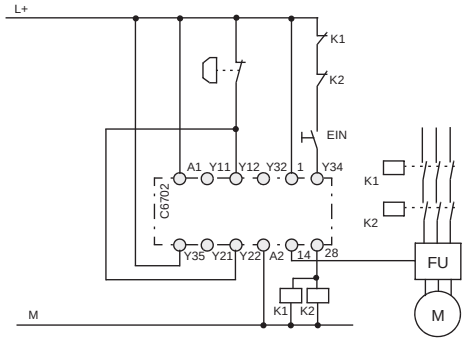
EMERGENCY STOP, two-channel, monitored start with additional ON button and safety gate monitoring, two-channel, autostart; category 4 / SIL 3



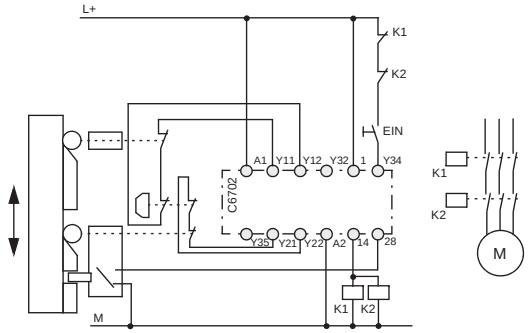
Safety mat, two-channel, autostart; category 3 SIL2



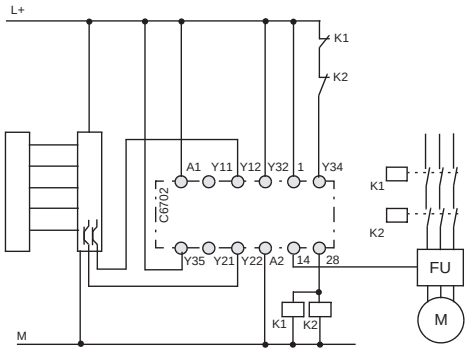
EMERGENCY STOP, single-channel, monitored start with additional ON button category 2 / SIL 1 with voltage-operated e.l.c.b. and delayed disconnection, stop category 1



EMERGENCY STOP and safety gate monitoring, two channel with tumbler, monitored start category 4 / SIL 3



Light-array monitoring, two-channel, autostart category 4 SIL 3



Personnel safety and machine protection
Risk category according to EN 954-1

Classification of a machine into categories to EN 954-1

Pursuant to the Machinery Directive 89/393/EEC, every machine must comply with the relevant directives and standards. Measures must be taken to keep the risk to persons below a tolerable extent.

In the first step, the project planner performs a risk evaluation to EN 1050 "Risk Assessment". This must take into consideration the machine's ambient conditions for instance. Any overall risk must then be assessed. This risk assessment must be conducted in such a form as to allow documentation of the procedure and the results achieved. The risks, dangers and possible technical measures to reduce risks and dangers must be stipulated in this risk assessment. After stipulating the extent of the risk, the category on the basis of which the safety circuits are to be designed is determined with the aid of EN 954-1 "Safety-Related Components of Controls".

This determined category defines the technical requirements applicable to the design of the safety equipment.

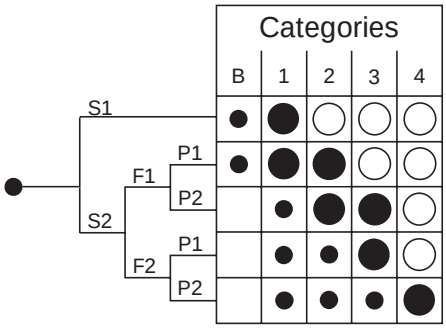
There are five categories (B, 1, 2, 3 and 4), whereby B (standing for basic category) defines the lowest risk and, thus, also the minimum requirements applicable to the controller.

Possible selection of categories pursuant to EN 954-1
Starting point for the risk assessment of the safety-related component of the controller.

S- Serious injuries
- **S1** Slight (normally reversible) injuries,
- **S2** Serious (normally irreversible) injuries, including death

F- Frequency and/or duration of the risk exposure
- **F1** Rare to frequent and/or short duration of exposure
- **F1** Frequent to sustained and/or longduration of exposure

P- Options for risk avoidance
(Generally referred to the speed and frequency at which the dangerous components moves and to the clearance from the dangerous component).
- **P1** Possible under certain conditions
- **P2** Hardly possible



B1-4 Categories for safety-related components of controls
- ● Preferred category
- ● Possible category requiring additional measures
- ○ Disproportionately extensive measures by comparison with the risk

Safety category ①	Summary of requirements	System behaviour ②	Principles for achieving safety
B	The safety-related components of controls and/or their protection devices and their components must be designed, constructed, selected, assembled and combined in compliance with the applicable standards, such that they can withstand the anticipated influences.	The occurrence of a fault may lead to loss of the safety function.	Predominantly characterised by selection of componentsl
1	The requirements of B must be complied with. Time-proven components and time-proven safety principles must be applied.	The occurrence of a fault may lead to loss of the safety function but the probability of occurrence is less than in category B.	
2	The requirements of B and the use of the time-proven safety principles must be complied with. The safety function must be checked at appropriate intervals by the machine control.	• The occurrence of a fault may lead to loss of the safety function between the inspection intervals.	Predominantly characterised by the structure
3	The requirements of B and the use of the time-proven safety principles must be complied with. Safety related components must be designed such that: • a single fault in any of these components does not lead to loss of the safety function and • the individual fault is detected, wherever feasible in an appropriate manner.	• The loss of the safety function is detected by the check/inspection. • If the single fault occurs, the safety function is always retained. • Certain faults but not all faults are detected. • An accumulation of undetected faults may lead to loss of the safety function.	
4	The requirements of B and the use of the time-proven safety principles must be complied with. Safety related components must be designed such that: • a single fault in any of these components does not lead to loss of the safety function and • the individual fault is detected at or before the next requirement applicable to the safety function or, if this is not possible an accumulation offaults may then not lead to loss of the safety function.	• If the faults occur, the safety function is always retained. • The faults are detected in good time to prevent loss of the safety function	

This mandatory classification runs likes a red thread from selection of the smallest limit switch through to the overall concept of the entire machine, whereby it is necessary to grapple with the permanent conflict between what is technically feasible and what is permitted on the basis of "pure theory".

Thus: Depending on application, not every technically feasible safety category is also permitted. For instance, in the case of contactless protection devices (light barriers etc.) only categories 2 or 4 are permitted. By contrast, in the case of tread mats, categories B to 4 can be used, depending on risk assessment, provided these categories can be reached at all owing to the design.
The 2-hand control C575 would technically also comply with the lower categories but it cannot be connected in categories 1-3.

① The categories are not intended to be applied in any specific order or hierarchical arrangements with respect to the technical-safety requirements.
② The risk assessment will indicate whether full or partial loss of the safety function(s) as the result of fault is acceptable.

Classification of a machine into categories to EN 954-1

Pursuant to the Machinery Directive 89/393/EEC, every machine must comply with the relevant Directives and Standards. Measures must be taken to keep the risk to persons below a tolerable extent.
In the first step, the project planner performs a risk evaluation to EN 1050 “Risk Assessment”. This must take into consideration the machine’s ambient conditions for instance. Any overall risk must then be assessed. This risk assessment must be conducted in such a form as to allow documentation of the procedure and the results achieved. The risks, dangers and possible technical measures to reduce risks and dangers must be stipulated in this risk assessment.
After stipulating the extent of the risk, the category on the basis of which the safety circuits are to be designed is determined with the aid of EN 954-1 “Safety-Related Components of Controls”.
This determined category defines the technical requirements applicable to the design of the safety equipment. There are five categories (B, 1, 2, 3 and 4) whereby B (standing for basic category) defines the lowest risk and, thus, also the minimum requirements applicable to the controller.

Possible selection of categories pursuant to EN 954-1
Starting point for risk assessment of the safety-related components of the control.

Description

Scope of application
Potential risks and hazards posed by a machine must be eliminated as quickly as possible in the event of danger.
For dangerous movements, the safe state is generally standstill. All safety switching devices of Series C 570 switch to de-energised state, i.e. standstill for drives, in the event of danger or fault. Standard EN 60204 demands that every machine must feature the Stop function of category 0.
Stop functions of categories 1 and/or 2 must be provided if necessary for technical-safety and/or technical-function requirements of the machine. Category-0 and category-1 stops must be operable independently of the operating mode, and a category-0 stop must have priority.
There are three categories of stop function:

Category 0:
Shut-down by immediate switch-off of the energy supply to the machine drives.

Category 1:
Controlled shut-down, whereby the energy supply to the machine drive is retained in order to achieve shut-down and the energy supply is only interrupted when shut-down has been reached.

Category 2:
A controlled shut-down in which the energy supply to the machine drive is retained.
EMERGENCY-STOP
EMERGENCY-STOP devices must have priority over all other functions. The energy supplied to the machine drives which may cause dangerous states must be switched off as quickly as possible without further risks or dangers. Resetting of the drives may not trigger a restart. The EMERGENCY-STOP must act either as a stop of category 0 or as a stop of category 1.
The basic device of the 570 Series of safety switching devices can be used for EMERGENCY-STOP applications up to maximum category 4 to EN 954-1. Depending on external wiring and cable routing of the sensors, category 3 resp. 4
to EN 954-1 must be reached.

Safety door monitoring
Pursuant to EN 1088, a distinction is made between interlocked, separating protective devices and interlocked, separating protective devices with follower. Here as well, the safety switching devices are used for EMERGENCY-STOP applications. Controls up to category 4 to EN 954-1 are possible.

Presses and punches
The two-hand control C 575 is a device on which the operator must use both hands simultaneously, thus protecting him against risks and dangers.
The overtravel monitor C 578 is used on linear-driven presses (e.g. hydraulic, pneumatic and
spindle presses) in accordance with VBG7n52.
It checks for the following only once during the test stroke:
- Correct connection of the operating controls
- External cable discontinuity
- Possible failure of the components to be monitored cyclically

The overtravel monitor can be used only in conjunction with a two-hand control. The press controllers and overtravel monitors are suitable for installation in controls for eccentric, hydraulic and spindle presses. They can be used up to category 4 to EN 954-1. Type III C to DIN 574 is possible specifically for presses.

Device construction
The safety switching device C 570 operates internally with several contactor relays. The contacts of the relays comply with the requirement in respect of positively driven operation to ZH 1/457, Edition 2, 1978. This means that NO contact and NC contact may not be closed simultaneously.
Safety relays with positively driven contacts are used in the newly developed safety switching devices C 571-C 574, C 576, C 577 , the contact expansion C 579 and on the press controllers
C 575 and C 578. This series of devices is characterised by an extremely narrow design
(22.5mm and 45 mm). Approvals and
test certificates, conventional on the market, have been issued by BG, SUVA, UL and CSA.
The function of the internal contactor relays/relays is monitored in a redundant circuit. In the event of failure of a relay, the safety switching device always switches to de-energised state. The fault is detected and the safety switching device can no longer be switched on. Using normally closed contacts and normally open contacts for the same function complies with the requirement in respect
of diversity.

Enable contacts (FK)
The safety-related function must be controlled via safe output contacts, the so-called Enable contacts. Enable contacts are always normally open contacts and switch off without delay.
Signalling contacts (MK)
Normally open contacts and normally closed contacts which may not perform safety-related functions are used as the signalling contact.
An Enable contact may also be used as a signalling contact.

Delayed Enable contacts
Drives which have a long overtravel must be decelerated in the event of danger. For this purpose, the energy supply must be maintained for electrical braking (stop category 1 to EN 60 204-1). The safety switching device C 574 also feature OFF-delayed Enable contacts, besides undelayed Enable contacts. Delay times of 0.5 to 30 s are available.
The sealable cover cap C 560.10 (see Selection data and Ordering details, Accessories) can be fitted onto C 574, C 6702 to protect against unauthorised adjustment of the set delay time.

Contact expansion
If the Enable contacts of the basic device do not suffice, positively driven contactors (e.g. B6, B7) may be used for contact expansion. One solution for increasing the number of Enable contacts, which is both simple to use and space-saving,
is the expansion unit C 579 (only 22.5mm wide).
The expansion unit C 579 provides 4 additional Enable contacts.

Expansion unit C 579
Expansion unit C 579 may not be operated separately in safety-related circuits but must be combined with a safety switching device C 57x. One Enable contact of the basic device is required for connection of an expansion unit. The category of a control with expansion units corresponds to the category of the basic device.

Mounting
Snap-on mounting on 35mm top-hat rail to
EN 50 022. Screw mounting of the safety switching devices C 57x can be implemented with two additional plug-in tabs C 560.20 (see Selection data and Ordering details, Accessories).

User Manual
A User Manual with a device description, connection diagrams and application information in several languages is enclosed with every safety switching devices of Series C 570 and C 67xx.

“Safety Engineering” Application Manual
You can find further information in the “Safety Engineering” Application Manual. It provides you with the required information on the relevant safety standards and project planning information.
The entire range of components used for safety applications is explained in this Manual, from the sensor (Emergency-Stop command devices and position switches), through evaluation units (safety switching devices C 57x and fail-safe control
AC 31 S) to the actuator (e.g. contactor for switching motors). All these components must be selected correctly in order to meet the requirements applicable to modern safety facilities.
Please order the “Safety Engineering” Application Manual
1SAC 103 201 H 0101 German
1SAC 103 201 H 0201 English

Selection guide
C570 – C6702

Selection table for ABB safety relays in accordance to risk category (EN 954-1):

Category	C 570	C 571	C 572	C 573	C 574	C 575	C 576	C 577	C 578	C 6700	C 6701	C 6702
B												
1	x	x	x	x	x		x	x		x	x	x
2	x	x	x	x	x		x	x		x	x	x
3	x①	x	x	x	x		x	x		x	x	x
4		x①	x	x①	x②	x	x	x	x		x	x

Selection table for ABB safety relays in accordance to device characteristics

Characteristics suitable for device	C 570	C 571	C 572	C 573	C 574	C 575	C 576	C 577	C 578	C 579	C 6700	C 6701	C 6702
EMERGENCY STOP	yes	yes	yes	yes	yes	—	yes	yes	—	③	yes	yes	yes
Safety gate monitoring	yes	yes	yes	yes	yes	—	yes	yes	—	③	yes	yes	yes
Tread mats	—	—	—	—	—	—	—	—	—	—	—	—	-
Two-hand control e.g. presses	—	—	—	—	—	yes	—	—	—	—	—	—	-
Feedback loop for monitoring of external contactors	yes	yes	yes	yes	yes	yes	yes	yes	—	—	yes	yes	yes
Single channel	yes	yes	yes	yes	yes	—	—	—	—	—	yes	yes	yes
Two channel	—	yes	yes	yes	—	yes	yes	yes	—	—	yes	yes	yes
Cross-short circuit monitoring	—	—	yes	—	yes	—	yes	yes	—	—	—	yes	yes
24VDC at the EMERGENCY STOP limit switch	—	—	yes	—	—	yes	yes	yes	yes	—	yes	yes	yes
Operating voltage at the EMERG. STOP limit switch	yes	yes	—	yes	yes	—	—	—	—	—	—	—	-
No. of safety outputs	4	2	3	3	2	2	2	2	—	4	2 ④	2	1
No. of time delayed safety output contacts	—	—	—	—	1	—	—	—	—	—	—	—	1
No. of signalling contacts	2	—	2	1	2	2	—	—	—	—	—	— ⑤	— ⑤
Enclosure width in mm	75	22.5	45	22.5	45	45	22.5	22.5	45	22.5	22.5	22.5	22.5
Monitoring overtravel e.g. presses	—	—	—	—	—	—	—	—	yes		—	—	—
Auto-start	yes	yes	yes	yes	yes	—	yes	—	—	—	yes	yes	yes
Controlled/monitored start	—	—	yes	—	—	—	—	yes	—	—	yes	yes	yes

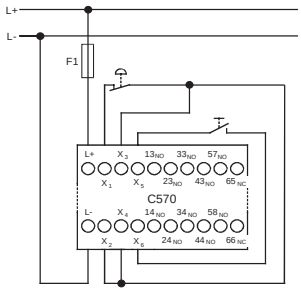
① Possible with additional external measures.
② Applies only to undelayed contact. Category 3 applies to delayed contact.
③ Contact extension
④ Solid-state outputs requirements of safety in acc. to 954-1 only in combination with positively guided contactors.
⑤ Solid-state outputs could also be used as safe messaging outputs.

Application examples
C570, C571, C573

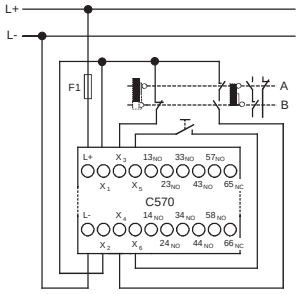
Information
The safety relays are tested by BIA. The shown external wiring diagrams / application examples are examples of use only. A risk appraisal has to be done by the user. Further application examples on request.

C570
Application
The safety relay can be used to monitor EMERGENCY STOP circuits and for monitoring of other protective devices (e.g. safety gates)

EMERGENCY-STOP circuit



Operation
Operating states indication:
"READY" indicates that the supply voltage is applied to the unit, provided that the contacts of the EMERGENCY STOP pushbutton or door safety switch are closed. "ON" lights up, when the ON button is pressed and the enabling circuits are switched through.



Safety gate monitoring (A= door open, B= door closed)

C571, C573
Application
The safety relays C 571/C 573 can be used in EMERGENCY STOP circuits as per EN 418 and in safety circuits as per VDE 0113 Part 1 (11.98) and/or EN 60 204-1 (11.98), e.g. with movable covers and guard doors. Depending on the external connections, categories 3 and 4 (with additional external measures) as per DIN EN 954-1 are achievable.

Functions and connection
The safety relay C 573 has three release circuits (safety outputs) which are configured as NO contacts and a signal circuit configured as a NC contact. The safety relay C 571 has two release (safe) circuits which are configured as NO contacts. The number of release circuits can be increased by adding one or more C 579 extension units. Three LEDs indicate the operating state and function.
When the EMERGENCY STOP button or the limit switch is unlocked and when the ON button is pressed, the internal circuits of the safety relays and the external contactors are checked for proper functioning.
Connect the EMERGENCY STOP pushbutton or the limit switch in the supply cable from A1 to +24 or L24 V. To evaluate over two channels, connect Channel 2 from A2 to 0 V or N. Connect the ON button in series with the NC contacts of the external contactor (feedback loop) between terminals Y1 and Y2.

Terminal markings

Supply voltage	A1	L/+
	A2	N/-
Sensors	Y1, Y2	ON button, feedback loop
Outputs	13, 14	Safety output 1 (n/o)
	23, 24	Safety output 2 (n/o)
	33, 34	Safety output 3 (n/o)*
	41, 42	Signal circuit 1 (n/c)*
		* with C 573 only

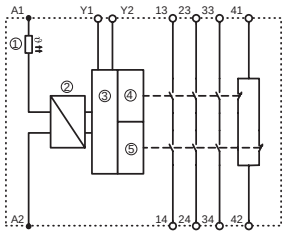
Operating states

LEDs			Operation			
POWER	Channel 1	Channel 2	PS	EMERG. STOP	ON	Safety output
☼	☼	☼	ON	non activated	activated	closed
☼	●	●		activated	non activated	open
☼	●	●		non activated	non activated	open
			Faults			
☼	☼	●	Relay fusion-welded			open
☼	●	☼	Motor contactor fusion-welded			
☼	●	●	Defects in electronic			
●	●	●	Cross or ground faults in EMERG. STOP circuit (min. fault current I_{Kmin} = 0.5A; PTC-fuse trips or supply voltage missing			

Fault clearance
1. Switch supply voltage off.
2. Clear fault or replace device.
3. Switch supply voltage back on.

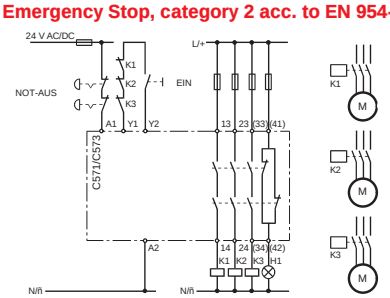
Cable length
for 2 x 1.5mm² max. 1000m (total cable length for 150 nF/km sensors and power supply lines)

IInternal circuit

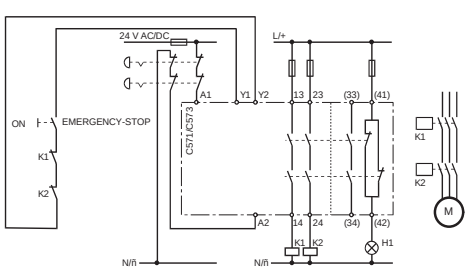


① PTC fuse
② Power pack
③ Control logic
④ Channel 1
⑤ Channel 2

Emergency Stop, category 2 acc. to EN 954-1

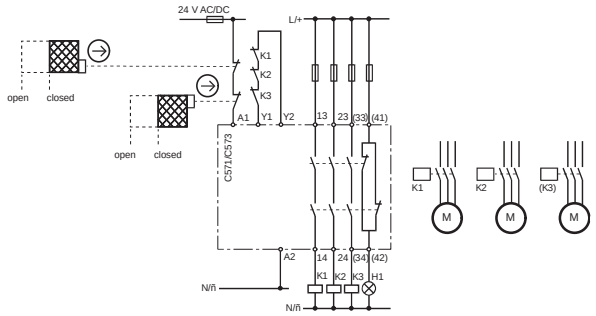


EMERGENCY STOP, category 3 and 4 acc. to EN 954-1

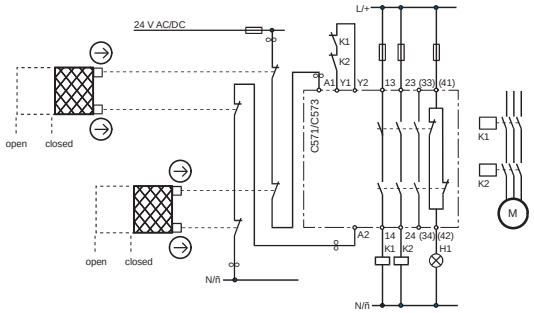


Application examples
C571-AC

Safety gate monitoring, category 2 acc. to EN 954-1



Safety gate monitoring, category 3 and 4 acc. to EN 954-1



7

Application

The safety relay C 571-AC can be used in EMERGENCY STOP circuits as per EN 418 and in safety circuits as per VDE 0113 Part 1 (11.98) and/or EN 60 204-1 (12.97), e.g. with movable covers and safety gates. Depending on the external connections, safety categories 3 and 4 as per DIN EN 954-1 are achievable.
When the safety combination is used in «automatic start» mode, automatic re-starting (as per EN 60 204-1, sections 9.2.5.4.2 and 10.8.3) must be prevented by the higher-level control system in the event of EMERGENCY STOP.

Functions and connections

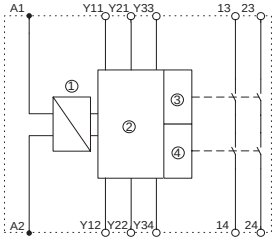
The safety relay C 571-AC has two release circuits (safety outputs) which are configured as NO contacts. The number of safety outputs can be increased by adding one or more C 579 extension modules. Three LEDs indicate the operating state and function.
When the EMERGENCY STOP button or the limit switch is unlocked and when the ON button is pressed, the internal circuits of the safety relay and the external contactors are checked for proper functioning.

Connect the EMERGENCY STOP button or the limit switch to terminals Y11, 12 and Y21, 22. The ON button is connected in series with the NC contacts of the external contactor (feedback loop) between terminals Y33, 34.

Terminal marking

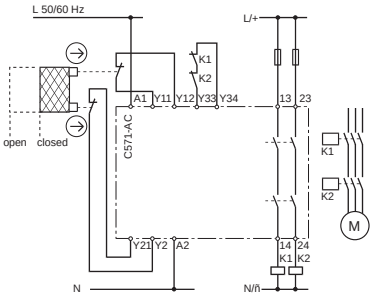
Supply voltage	A1	L
	A2	N
Sensors	Y11, 12	Channel 1 EMERGENCY STOP or limit switch
	Y21, 22	Channel 2 EMERGENCY STOP or limit switch
	Y33, 34	ON button, feedback loop
Outputs	13, 14	Safety output 1 (n/o)
	23, 24	Safety output 2 (n/o)

Internal circuit



① Power pole
② Control logic
③ Channel 1
④ Channel 2

Two channel autostart for contactor monitoring; Safety category 3 and 4 acc. to EN 954-1



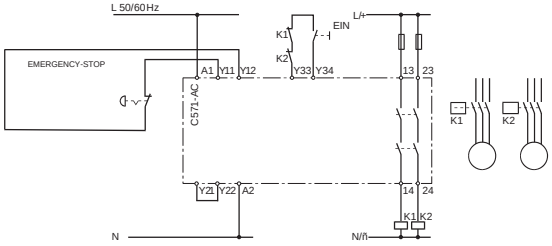
Operating states

LEDs			Operation			
POWER	Channel 1	Channel 2	PS	E-STOP	ON	Safety output
☼	☼	☼	ON	non activated	activated	closed
☼	●	●		activated	non activated	open
☼	●	●		non activated	non activated	open
			Faults			
☼	☼	●	Relay fusion-welded Motor cont.fusion-welded Defects in electronic			open
●	●	●	Cross or ground faults in EMERG. STOP circuit			

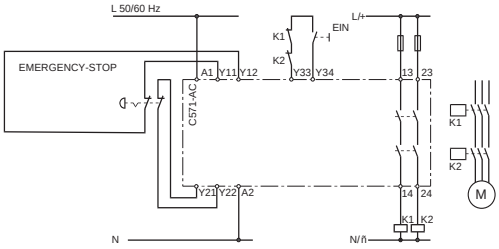
Fault clearance
1. Switch supply voltage off.
2. Clear fault or replace device.
3. Switch supply voltage back on.

Cable length
for 2 x 1.5mm² max. 1000m (total cable length for 150 nF/km sensors and power supply lines)

Single-channel EMERGENCY STOP with additional ON button Safety category 2 acc. to EN 954-1



Two-channel EMERGENCY STOP with additional ON button Safety category 3 and 4 acc. to EN 954-1



Application examples
C572

Application

The safety relay C 572 can be used in EMERGENCY STOP circuits as per EN 418, in safety circuits as per VDE 0113 Part 1 (06.93) and/or EN 60 204-1 (12.97), e.g. with movable covers and safety gates.
Depending on the external connection, safety category 4 as per DIN EN 945-1 is achievable with this device.

Functions and connections

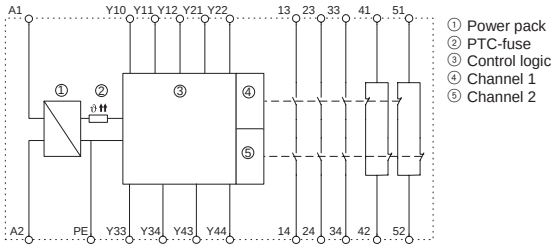
The safety relay C 572 has three release circuits (safety outputs) which are configured as NO contacts and two signal circuits configured as an NC contact. Three LEDs indicate operating state and function.
When the EMERGENCY STOP pushbutton or limit pushbutton is unlocked and the ON pushbutton is pressed, the redundant safety relays, electronic circuitry and external contactors are tested for proper functioning.
On the C 572, the ON circuit Y33, 34 is checked for short circuit. This means that a fault ist detected when Y33,34 is closed before the EMERGENCY STOP button is closed.

Terminal marking

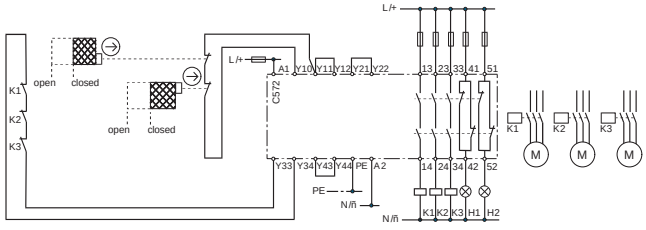
Supply voltage	A1	L/+
	A2	N/-
Outputs	13, 14	Safety output 1 (n/o)
	23, 24	Safety output 2 (n/o)
	33, 34	Safety output 3 (n/o)
	41, 42	Signal output 1 (n/c)
	51, 52	Signal output 2 (n/c)

Function	Monitored start	Monitored start / Autostart	Autostart
1-channel	ON push button at Y33, 34	Jumper from Y11 to Y12 Jumper from Y21 to Y22 EMERGENCY-STOP circuits at Y10, 11	Feedback loop or jumper to Y33, 34 and jumper from
2-channel		Jumper from Y10 to Y11 EMERGENCY-STOP circuits at Y11, 12 and Y21, 22	Y43 auf Y44 Important: Y21, 22 must be closed before or at the same time as Y11, 12

Internal circuit



Autostart for guard door monitoring; Safety category 2 acc. to EN 954-1



Operation states

LEDs			Operation			
POWER	Channel 1	Channel 2	PS	E-STOP	ON	Safety outputs
☼	☼	☼	ON	non activated	activated	closed
☼	●	●		activated	non activated	open
☼	●	●		non activated	non activated	open
			Faults			
☼	☼	●	Relay fusion-welded			open
☼	●	☼	Motor cont.fusion-welded			
☼	●	●	Defects in electronic Short circuit in ON circuit			
●	●	●	Cross or ground faults in EMERG. STOP circuit (min. fault current I_{Kmin} = 0.5A; PTC-fuse trips or supply voltage missing			

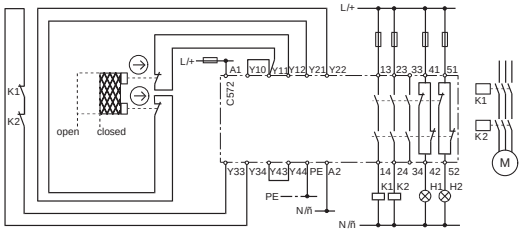
Fault clearance

1. Switch supply voltage off.
2. Clear fault or replace device.
3. Switch supply voltage back on.

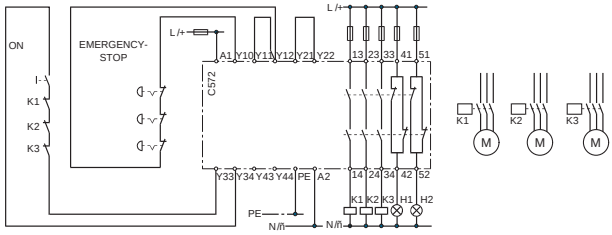
Cable length

for 2 x 1.5mm² max. 1000m (total cable length for 150 nF/km sensors and power supply lines)

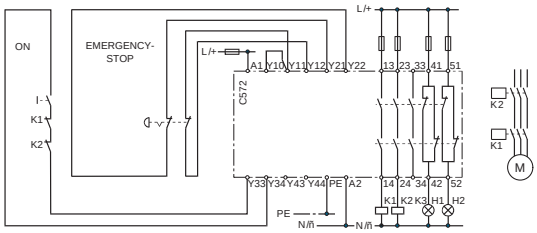
Autostart and safety gate monitoring
Safety category 4 acc. to EN 954-1



Monitored start for EMERGENCY STOP
Safety category 2 acc. to EN 954-1



Monitored start for EMERGENCY STOP
Safety category 3 and 4 ac. to EN 954-1



Application examples
C574

Application

The safety relay C 574 can be used in EMERGENCY STOP devices as per EN 418, in safety circuits as per VDE 0113 Part 1 (06.93) and/or EN 60 204-1 (12.97), such as for monitoring safety gates, or in circuits with controlled stand-still requirement (STOP Category 1).
Depending on the external circuitry, this device can be used to realize Safety Category 4 instantaneous release circuits and Safety
Category 3 delayed release circuits according to DIN EN 954-1.

Functions and connections

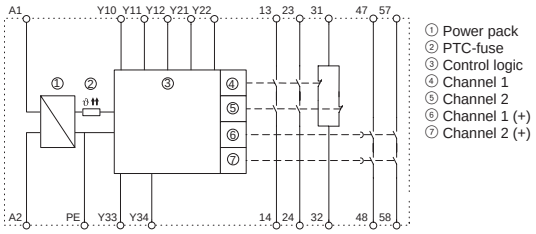
The C 574 safety relay possesses two delayed and two instantaneous release circuits (safety outputs) as NO contacts and one instantaneous signal output as NC contact. Five LEDs indicate the operating status and the functions.
The redundant safety relays, the electronics and the operated motor contactors are tested for proper functioning when the EMERGENCY STOP button or the limit switch button is unlatched, and when ON circuit Y33, Y34 is closed.
On the C 574 (monitored start), the ON circuit Y33, 34 is checked for short circuit. This means that a fault ist detected when Y33, 34 is closed before the EMERGENCY STOP button is closed.

Terminal marking

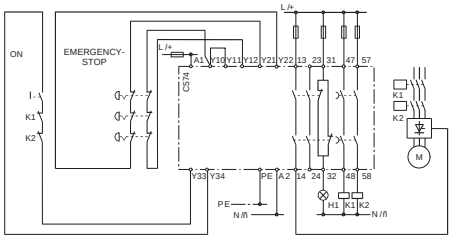
Supply voltage	A1	L/+
	A2	N/-
Output	13, 14	Safety output 1, instantaneous
	23, 24	Safety output 2, instantaneous
	31, 32	Signal output, instantaneous
	47, 48	Safety output 1, delayed (t)
	57, 58	Safety output 2, delayed (t)

Function	Monitored Start	
1-channel	ON pushbutton at Y33, 34	Jumper from Y11 toY12 Jumper from Y21 to Y22 EMERGENCY STOP circuits at Y10, 11
2-channel		Jumper from Y10 to Y11 EMERGENCY STOP circuits at Y11, 12 and Y21, 22

Internal circuit



Monitored start for EMERGENCY STOP
Safety category 3 and 4 acc. to EN 954-1



Operation

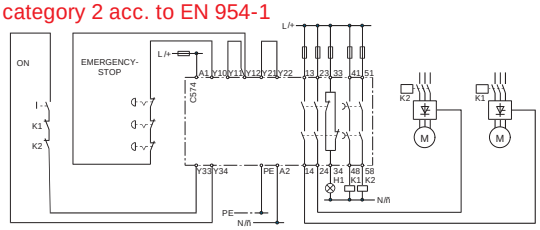
LEDs					Operation			
POWER	Ch 1	Ch 2	Ch 1	Ch 2	PS	E-STOP	ON	Safety outputs
☼	☼	☼	☼	☼	ON	non activated	activated	closed
☼	●	●	●	●		activated delay time elapsed	non activated	open
☼	●	●	●	●		non activated	non activated	open
☼	●	●	☼	☼		activated delay time elapsed	non activated	FK 1 & 2 open, FK1(t) & FK2(t) closed
					Faults			
☼	☼	●	☼	●	Relay fusion-welded			open
☼	●	☼	●	☼	Motor cont. fusion-welded			
☼	●	●	●	●	Defect in electronic Short circuit in ON circuit			
●	●	●	●	●	Cross or ground faults in emergency trip circuit (min. fault current I_{Kmin} = 0.5A; PTC fuse trips)			

Fault clearance
1. Switch supply voltage off.
2. Clear fault or replace device.
3. Switch supply voltage back on.

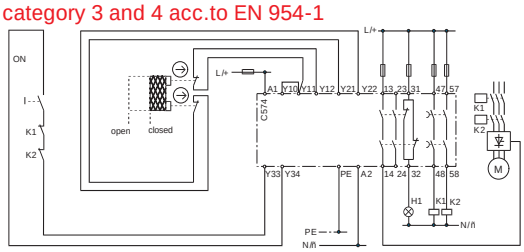
Cable length

for	2 x 1.5 mm²	max. 1000m total cable length for
	150nF/km	sensors and power supply lines)

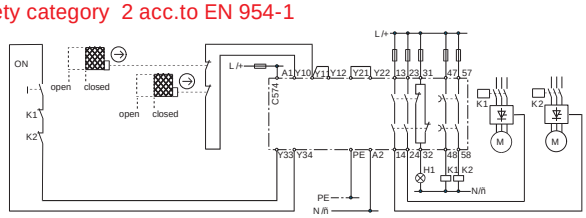
Monitored start for EMERGENCY STOP
Safety category 2 acc. to EN 954-1



Safety gate monitoring
Safety category 3 and 4 acc.to EN 954-1



Safety gate monitoring
Safety category 2 acc.to EN 954-1



Application examples
C575

Application

C 575 is suitable for installation in controls for presses.
- Hydraulic presses DIN EN 693,
- Eccentric and related presses EN 692,
- Screw presses EN 692.

Functions and connections

The two-hand control unit C 575 possesses two release circuits (safety outputs) configure as NO contacts and two signal outputs configured as NC contacts. Five LEDs indicate the operating status and the functions.

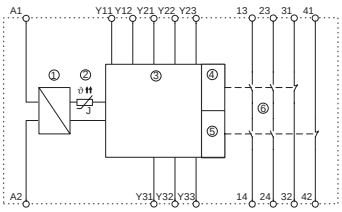
The safety outputs are closed by simultaneous operation (< 0.5s) of the push-buttons S1, S2. If one pushbutton is no longer pressed, the outputs open. They do not close again until both pushbuttons are no longer pressed and then simultaneously pressed again.

1. Operating voltage to be applied to the terminals A1 and A2.
   The operating voltage must be de-energized with the operating energy of the press.
2. Feedback loop to be closed:
   Y11, Y12 to be jumperd or connected to the NC contacts of external contactors.
3. Input circuits to be connected:
   Pushbutton S1 to terminals Y21, Y22, Y23 and pushbutton S2 to terminals Y31, Y32, Y33.

Terminal marking

Supply voltage	A1	L/+
	A2	N/-
Outputs	13, 14	Safety output 1 (n/o contact)
	23, 24	Safety output 2 (n/o contact)
	31, 32	n/c signal output
	41, 42	n/c signal output
Inputs	Y11,12	Feedback loop
	Y21, 22, 23	Pushbutton S1
	Y31, 32, 33	Pushbutton S2

Internal circuit



Operation

LEDs					Operation
POWER	S1 ON	S2 ON	Channel 1	Channel 2	Pushbutton
☼	●	●	●	●	non activated
☼	☼	●	●	●	only S1 activated
☼	●	☼	●	●	only S2 activated
☼	☼	☼	☼	☼	S1 and S2 activated

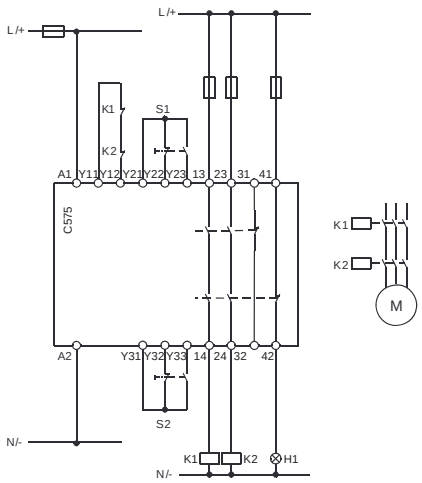
The unit cannot be started with the following faults:
- Short circuit, e.g. between the pushbuttons
- Defective relay coils
- Conductor failure
- Welded contacts

The output relays does not enegize if:
- The pushbuttons are not pressed simultaneously (< 0.5s)
- Only one pushbutton is pressed
- The feedback loop Y11, Y12 is open.

Cable length

max. 1000m for 2 x 1.5mm^2 (Total cable length for sensors and power supply lines)

External circuit S1, S2 pushbuttons on two-hand control console, H1 indicator light, K1and K2 must be positively guided contactors, Safety category 4 acc.to EN 954-1



Application examples
C576, C577

Application

The safety relay C 576 can be used in safety circuits as per VDE 0113 Part 1 (11.98) or EN 60 204-1 (11.98), e.g. with movable covers and safety gates; the safety relay C 577 in EMERGENCY STOP circuits as per EN 418. Depending on external connections, category 4 as per DIN EN 954-1 is achievable.

Functions and connections

The safety relays C 576/C 577 have two release circuits (safety outputs) configured as NO contacts. The number of release circuits can be increased by adding one or more C 579 extension units.
Three LEDs indicate operating state and function.
When the EMERGENCY STOP button or the limit switch is unlocked and when the ON button is pressed, the internal circuit of the safety relay and the external contactors are checked for proper functioning.
On the C 577, the ON circuit Y33, 34 is checked for short circuit. This means that a fault is detected when Y33, 34 is closed before the EMERGENCY STOP button is closed.
The EMERGENCY STOP button or the limit switch are connected to terminals Y11, 12, 21, 22. The ON button is connected in series to the NC contacts of the external contactors (feedback loop) to terminals Y33, 34.

Terminal marking

Supply voltage	A1	L/+
	A2	N/-
Sensors	Y11, 12	Channel 1 EMERGENCY STOP or limit switch
	Y21, 22	Channel 2 EMERGENCY STOP or limit switch
	Y33, 34	ON button, feedback loop
Outputs	13, 14	Safety output 1 (n/o contact)
	23, 24	Safety output 2 (n/o contact)

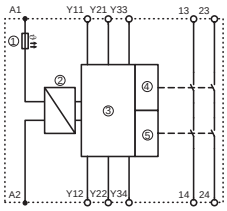
Fault clearance

1. Switch supply voltage off.
2. Clear fault or replace device.
3. Switch supply voltage back on.

Cable length

for	2 x 1.5mm²	max. 1000m total cable length for
	150nF/km	sensors and power supply lines)

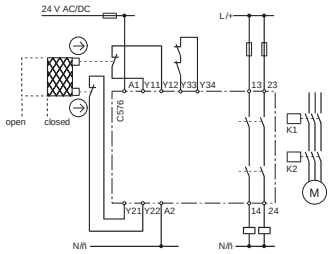
Internal circuit



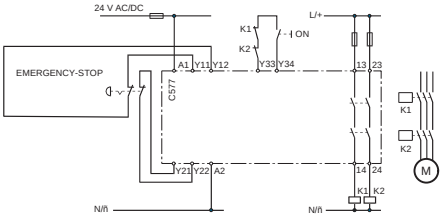
Operation

LEDs			Operation			
POWER	Channel 1	Channel 2	PS	E-Stop	ON	Safety outputs
☼	☼	☼	ON	non activated	activated	closed
☼	●	●		activated	non activated	open
☼	●	●		non activated	non activated	open
			Faults			
☼	☼	●	Relay fusion-welded Motor cont. fusion-welded			open
☼	●	☼				
☼	●	●	Defect in electronic Short circuit in ON circuit			
●	●	●	Cross or ground faults in EMERGENCY STOP circuit (min. fault current I_{Kmin}= 0.5A; PTC fuse trips)			

C 577 with monitored start for EMERGENCY STOP
Category 4 acc. to EN 954-1



C 577 with monitored start for EMERGENCY STOP
Category 4 acc. to EN 954-1



Application examples
C578

Application

The overtravel distance tester C 578 is intended for checking the overtravel of linearly operating hydraulic, pneumatic and spindle presses in accordance with VBG 7n5.2 §11.

Functions and connections

The overtravel distance tester C 578 has four safety outputs, three NO contacts and one NC contact. Two LEDs indicate the functions.
The C 578 tests the overtravel distance in connection with a position switch every time the control voltage is switched on. The permissible overtravel distance corresponds to dimension 's' of the cam that is used
to operate the position switch. Obtain dimension 's' from the press manufacturer in accordance with ZH 1/456 (published by the German central office for accident prevention and labour safety, Cologne).

Terminal marking

Supply	A1	L/+
voltage	A2	N/-
Outputs	13, 14	Safety output 1 (tool down)
	23, 24	n/o contact (tool up)
	33, 34	n/o contact (overtravel distance OK)
	41, 42	n/c contact (hydraulic pump ON)
Inputs	Y11,12, 13, 14	Feedback loop (K4)
	Y21, 22	Position switch (S4)
	Y31, 32, 33, 34	Top dead centre switch (S3)

Operation

Sequence of operations after the press has been switched on:

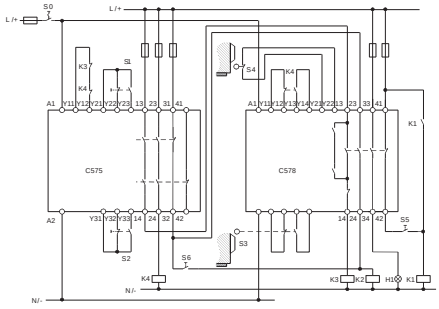
1. Switch on the hydraulic pump with S5, move plunger to top dead centre, if necessary by means of S6.
2. Operate S1, S2 on the two-hand control console until the position switch for test-cam (S4) opens.
3. Stop operating S1, S2.
4. Operate S1, S2 again: Indicator light H1 lights up if the overtravel distance is OK.
5. Stop operating S1, S2: The plunger returns to top dead centre.
6. If overtravel distance is OK, all outputs remain active until the control voltage is switched OFF.

LEDs		Operation
POWER	Release	
☼	●	Overtravel distance OK.
☼	☼	Overtravel distance incorrect or test not yet performed

Fault

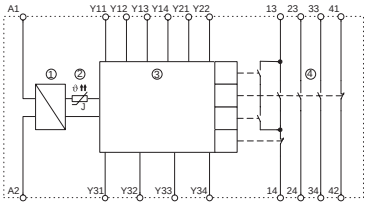
If the cam overtravels position switch S4, indicator light H1 does not light up. The hazardous part of the machine can be moved up to top dead centre only by means of S6.
The press can no longer be used for production. When this happens, notify the maintenance staff that the press needs attention.

External circuit



C 575 two hand control unit,
S0 Main switch,
S1, S2 keys at two hand control console,
S3 Position switch for top dead centre,
S4 Position switch for test cam
S5 Hydraulic pump "ON",
S6 Tool "up" (manual mode),
K1 Contactor for hydr. pump,
K2 Tool "up",
K3, K4 Tool "down",
H1 Indicator light

Internal circuit



Application examples
C579

Applications

You can use the C 579 expansion unit in combination with all the C 57x basic units. It extends the number of release circuits. Depending on the external connection, category 4 as per DIN EN 954-1 is achievable with this device.

Functions and connections

The C 579 expansion unit has four release circuits (safety circuits) configured as NO circuits.
Two LEDs indicate operating state and function. The device is controlled via any release circuit of the safety relays C 57x.
When the EMERGENCY STOP pushbutton or the limit switch is unlocked and the ON button is pressed, the internal circuit of the safety relay and the external contactors are checked for correct functioning.

Terminal marking

Supply voltage	A1	L/+
	A2	N/-
Outputs	13, 14	Safety output 1 (n/o contact)
	23, 24	Safety output 2 (n/o contact)
	33, 34	Safety output 3 (n/o contact)
	43, 44	Safety output 4 (n/o contact)
Feedback loop	51, 52	Monitoring of the extension unit

Operation

LEDs		Operation	
Channel 1	Channel 2	PS	Safety output of C 57x safety relays
☼	☼	ON	closed
●	●		open
		Faults	
●	☼		Relay fusion-welded
☼	●		Defect in electronics
●	●		Motor contactor fusion welded

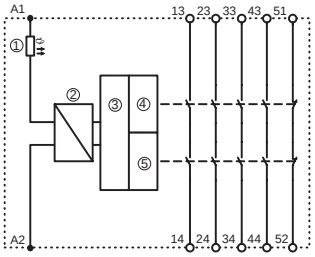
Fault clearance

1. Switch supply voltage off.
2. Clear fault or replace device.
3. Switch supply voltage back on.

Cable length

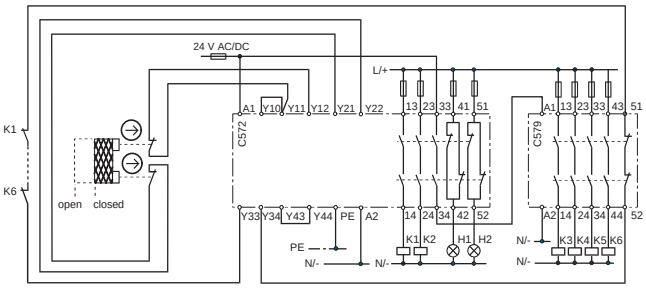
For 2 x 1.5mm² max. 1000m total cable length for 150nF/km sensors and power supply lines.

Internal circuit



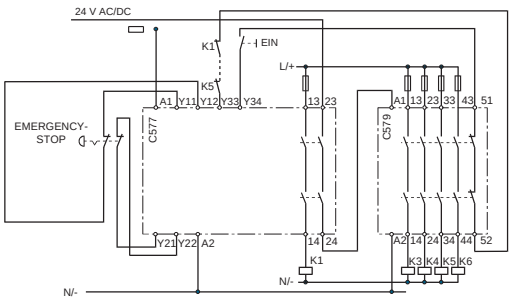
Safety gate monitoring

Safety category 4 acc. to EN 954-1

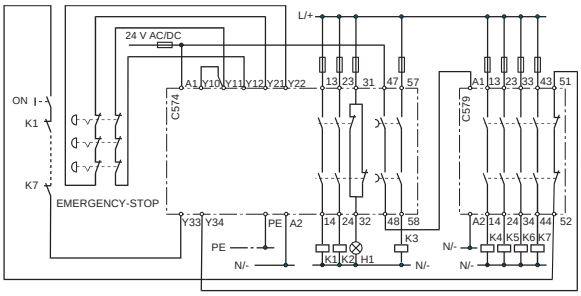


EMERGENCY STOP

Safety category 4 acc. to EN 954-1

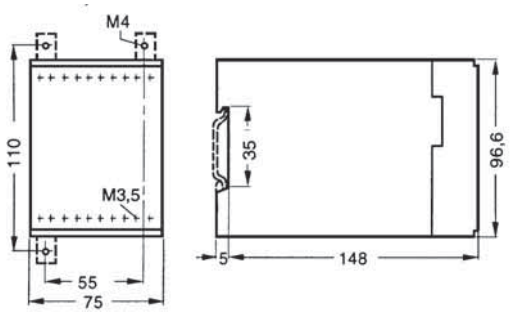


EMERGENCY STOP with time delay

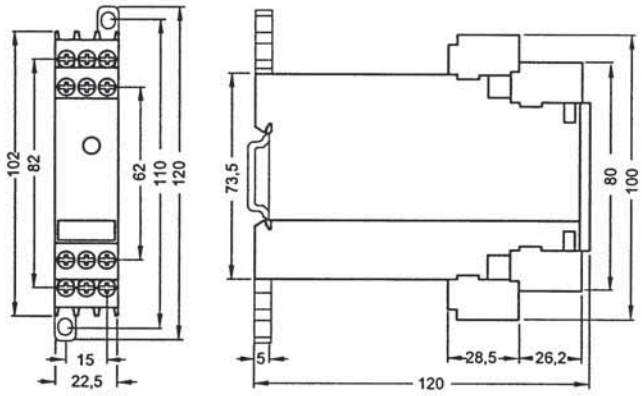


Approximate dimensions

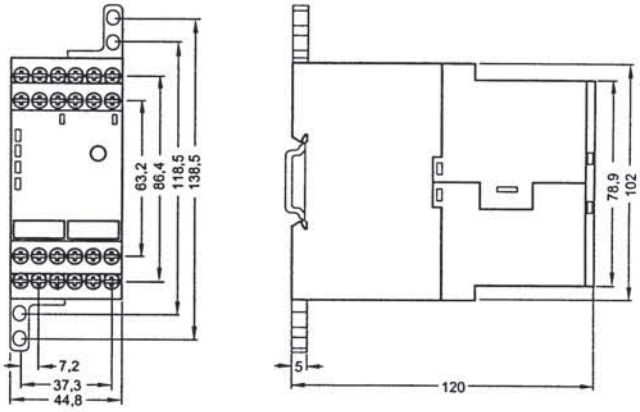
C570



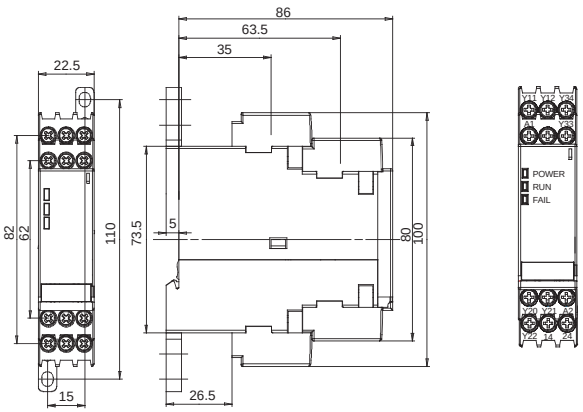
C571, C573, C576, C577, C579



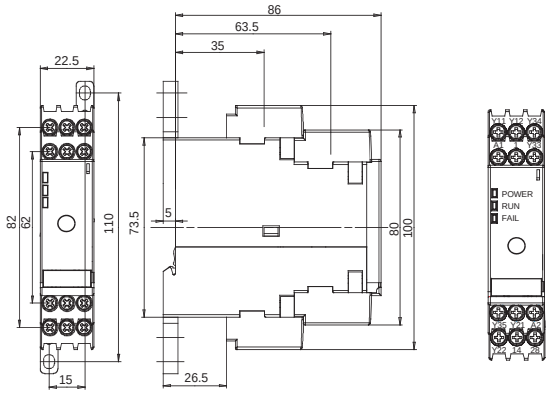
C572, C574, C575,C578



C6700 / C6701 / C6702



C565-S



Notes

Pilot devices
Index

Continued next page

Index

Modular range

Modular range

Pilot devices

General construction

- Snap-on feature reduces installation time
- Bezels: Black plastic, chrome metal. Grey plastic available as an option
- Contact block holder features rear mounting with quick-release locking mechanism for high security
- Buttons available in several colors
- Engraved text caps available
- Custom-specific markings on request
- UL File# E57057
- CSA File# LR19700

Operators

- Pushbuttons, illuminated and non-illuminated
- Double pushbuttons, illuminated and non-illuminated
- Mushroom pushbuttons, illuminated and non-illuminated , Ø 40 mm and Ø 60 mm
- Emergency stop pushbuttons, illuminated and non-illuminated, twist or pull release
- Selector switches, illuminated and non-illuminated , 2 or 3 position, short or long handle
- Key operated selector switches, 2 or 3 position
- Toggle switches, 2 or 3 position

Pilot lights

- Full voltage, resistor and transformer
- LED & filament bulbs available for illuminated pushbuttons and pilot lights

Contact blocks

- Quick-mount, quick-release contact block holder for fast and easy assembly
- NO & NC contact blocks are color coded for easy identification: Green = NO, Red = NC
- Silver tipped contacts
- Wiping action for high reliability
- Low energy gold plated contact blocks
- Base mounted contact blocks which snap onto a 35 mm DIN rail or into a plastic enclosure
- Contact block holder for three or five blocks in a single row

Additional products

- Buzzer, continuous and pulsating
- 5 kΩ and 10 kΩ potentiometers
- Definite purpose pushbuttons
- Reset pushbuttons
- Broad range of accessories

General information
Mounting

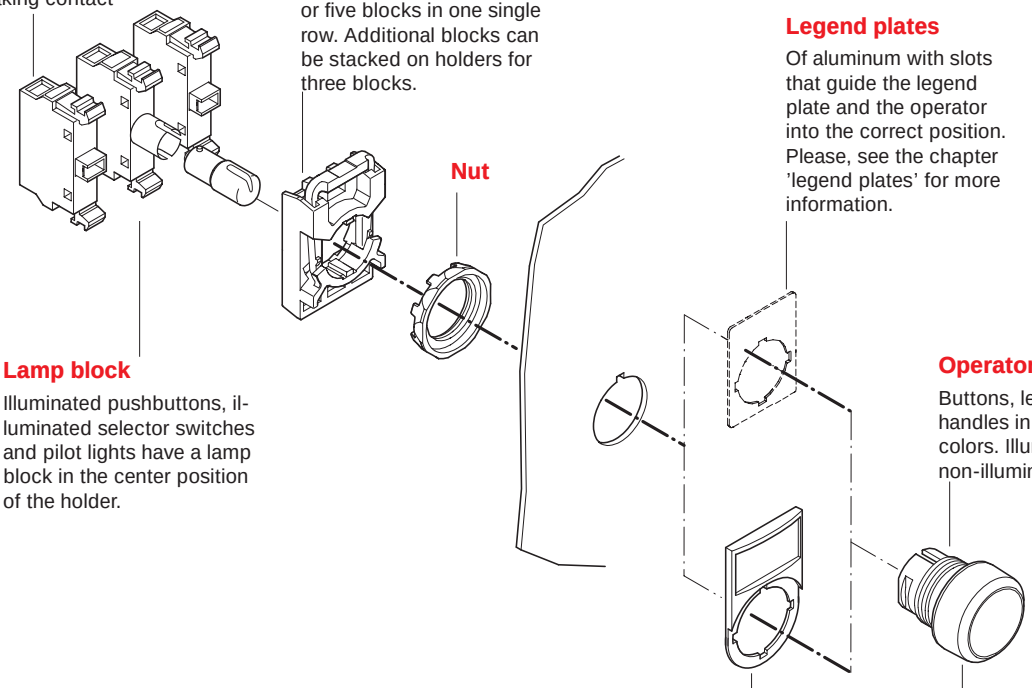
Exploded view

Contact block
Single pole with making or breaking contact

Holder
Available either for three or five blocks in one single row. Additional blocks can be stacked on holders for three blocks.

Nut

Legend plates
Of aluminum with slots that guide the legend plate and the operator into the correct position. Please, see the chapter 'legend plates' for more information.



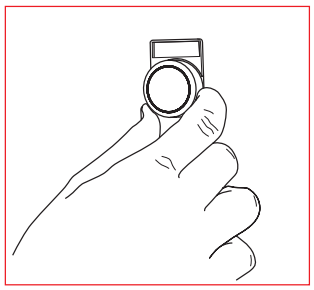
Lamp block
Illuminated pushbuttons, illuminated selector switches and pilot lights have a lamp block in the center position of the holder.

Operator
Buttons, lenses and handles in several colors. Illuminated or non-illuminated.

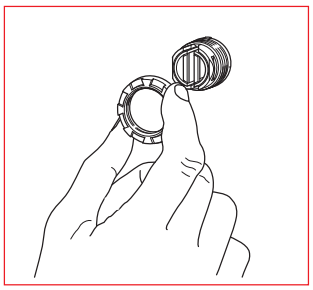
Legend plate holder
Of black plastic. Insert of brushed aluminum. Please, see the chapter 'legend plates' for more information.

Bezels
Pushbuttons, selector switches and toggle switches with bezel in black plastic, chrome metal are available.

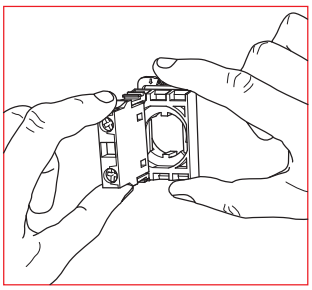
Easy to mount



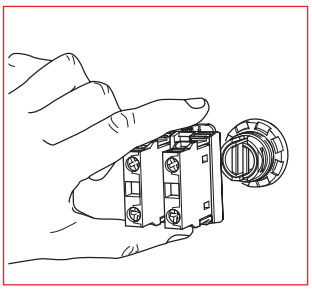
The operator is to be inserted from the front.....



...and secured at the back with a nut.

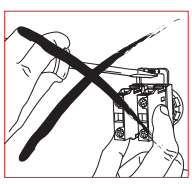


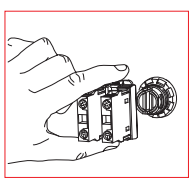
The contact blocks/lamp block are then snapped on to the holder...



...and the holder snaps on to the operator.

...and to remove

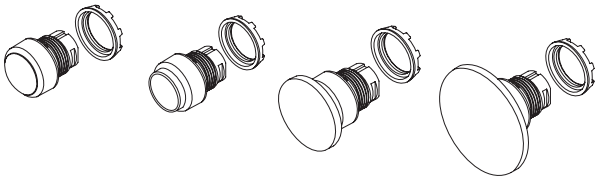




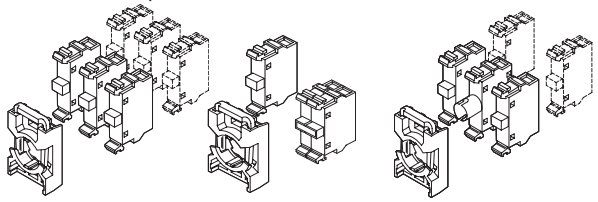
Press down the spring on the holder and pull the holder from the actuator.

Selection Guide

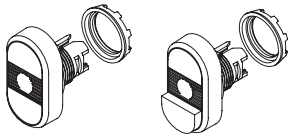
Pushbuttons and Mushroom pushbuttons



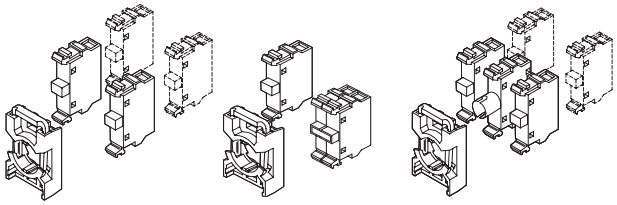
Contact block/lamp block combinations



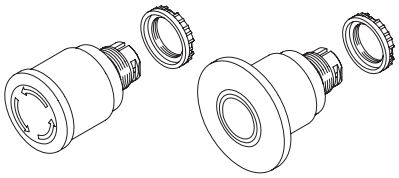
Double pushbuttons



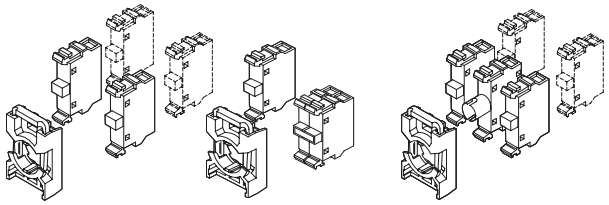
Contact block/lamp block combinations



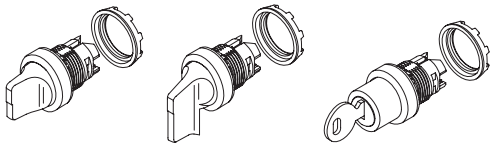
Emergency stop pushbuttons



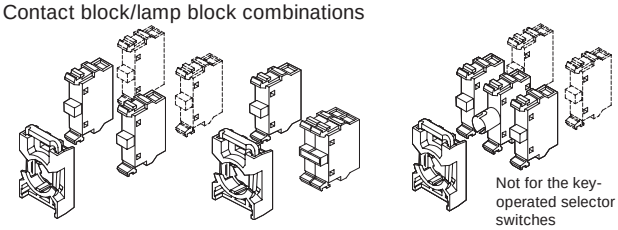
Contact block/lamp block combinations



Selector switches

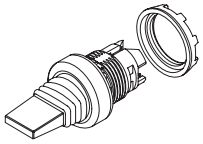


Contact block/lamp block combinations

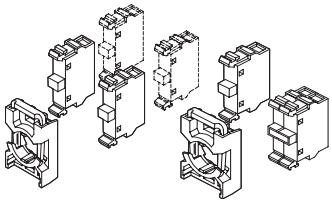


Not for the key-operated selector switches

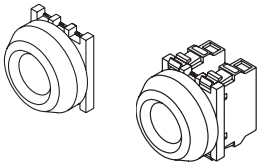
Toggle switches



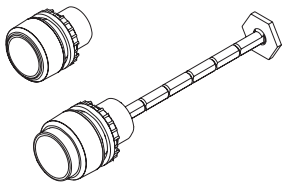
Contact block combinations



Definite purpose push-buttons

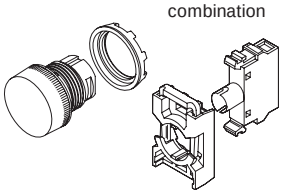


Reset pushbuttons

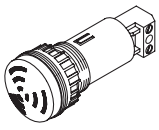


Pilot lights

Lamp block combination



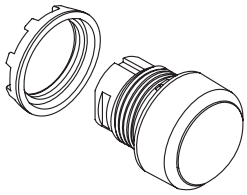
Buzzers

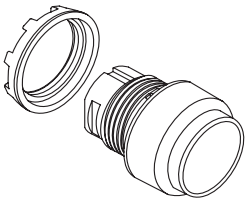


Potentiometers

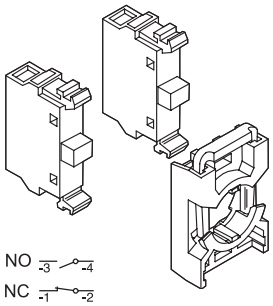
8

Flush and extended pushbuttons
Non-illuminated
Momentary and maintained





Bezel in black plastic as standard
Bezel in metal:
Replace '**1**' in the:
Cat No. MPX-1 0X
Ref Code 1SFA 611XXX R 1XXX
3 for metal bezel
4 for grey plastic



Operator ...

Description	Catalog No.	Ref. Code	List Price
with flush button			
Momentary			
Red	**MP1-10R**	1SFA 611 100 R1001	
Green	**MP1-10G**	1SFA 611 100 R1002	
Yellow	**MP1-10Y**	1SFA 611 100 R1003	
Blue	**MP1-10L**	1SFA 611 100 R1004	**$ 6.10**
White	**MP1-10W**	1SFA 611 100 R1005	
Black	**MP1-10B**	1SFA 611 100 R1006	
Clear	**MP1-10C**	1SFA 611 100 R1008	
Maintained ①			
Red	**MP2-10R**	1SFA 611 101 R1001	
Green	**MP2-10G**	1SFA 611 101 R1002	
Yellow	**MP2-10Y**	1SFA 611 101 R1003	
Blue	**MP2-10L**	1SFA 611 101 R1004	**17.30**
White	**MP2-10W**	1SFA 611 101 R1005	
Black	**MP2-10B**	1SFA 611 101 R1006	
Clear	**MP2-10C**	1SFA 611 101 R1008	
with extended button			
Momentary			
Red	**MP3-10R**	1SFA 611 102 R1001	
Green	**MP3-10G**	1SFA 611 102 R1002	
Yellow	**MP3-10Y**	1SFA 611 102 R1003	
Blue	**MP3-10L**	1SFA 611 102 R1004	**6.10**
White	**MP3-10W**	1SFA 611 102 R1005	
Black	**MP3-10B**	1SFA 611 102 R1006	
Clear	**MP3-10C**	1SFA 611 102 R1008	
Maintained ①			
Red	**MP4-10R**	1SFA 611 103 R1001	
Green	**MP4-10G**	1SFA 611 103 R1002	
Yellow	**MP4-10Y**	1SFA 611 103 R1003	
Blue	**MP4-10L**	1SFA 611 103 R1004	**17.30**
White	**MP4-10W**	1SFA 611 103 R1005	
Black	**MP4-10B**	1SFA 611 103 R1006	
Clear	**MP4-10C**	1SFA 611 103 R1008	

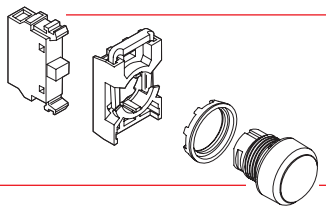
Contact blocks, and holder

Blocks	Catalog No.	Ref. Code	List Price
1 NO with holder	**MCBH-10**	1SFA 611 605 R1101	**$ 10.00**
1 NC with holder	**MCBH-01**	1SFA 611 605 R1110	**10.00**
2 NO with holder	**MCBH-20**	1SFA 611 605 R1102	**18.00**
2 NC with holder	**MCBH-02**	1SFA 611 605 R1120	**18.00**
1 NO + 1 NC with holder	**MCBH-11**	1SFA 611 605 R1111	**18.00**
1 NO without holder	**MCB-10**	1SFA 611 610 R1001	**8.00**
1 NC without holder	**MCB-01**	1SFA 611 610 R1010	**8.00**
Holder for 3 blocks	**MCBH-00**	1SFA 611 605 R1100	**2.00**

Ordering example

Requested: A modular pushbutton, momentary, with red flush button and one NO contact.

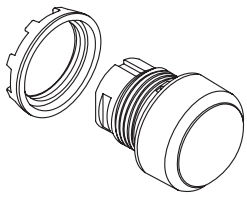
Ref.: 1 piece of MP1-10R + 1 piece of MCBH-10

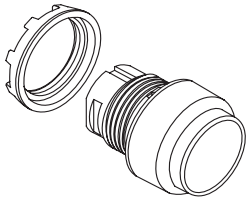


① No contact block in the center position

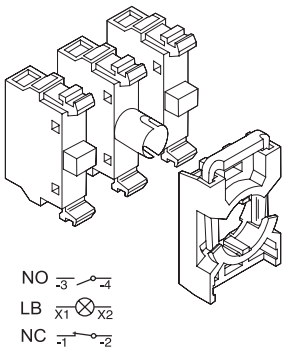
Flush and extended pushbuttons
Illuminated
Momentary and maintained

Bulb max 1.2 W





Bezel in black plastic as standard
Bezel in metal:
Replace '**1**' in the:
Catalog No. MPX-1 0X
Ref. Code 1SFA611XXX R 1XXX
3 for metal bezel
4 for grey plastic bezel



Operator ...

with flush button

Description	Catalog No.	Ref. Code	List Price
Momentary ①			
Red	**MP1-11R**	1SFA 611 100 R1101	**$ 6.10**
Green	**MP1-11G**	1SFA 611 100 R1102	
Yellow	**MP1-11Y**	1SFA 611 100 R1103	
Blue	**MP1-11L**	1SFA 611 100 R1104	
White	**MP1-11W**	1SFA 611 100 R1105	
Clear	**MP1-11C**	1SFA 611 100 R1108	
Maintained ①③			
Red	**MP2-11R**	1SFA 611 101 R1101	**17.30**
Green	**MP2-11G**	1SFA 611 101 R1102	
Yellow	**MP2-11Y**	1SFA 611 101 R1103	
Blue	**MP2-11L**	1SFA 611 101 R1104	
White	**MP2-11W**	1SFA 611 101 R1105	
Clear	**MP2-11C**	1SFA 611 101 R1108	

with extended button

Momentary ①			
Red	**MP3-11R**	1SFA 611 102 R1101	**6.10**
Green	**MP3-11G**	1SFA 611 102 R1102	
Yellow	**MP3-11Y**	1SFA 611 102 R1103	
Blue	**MP3-11L**	1SFA 611 102 R1104	
White	**MP3-11W**	1SFA 611 102 R1105	
Clear	**MP3-11C**	1SFA 611 102 R1108	
Maintained ①③			
Red	**MP4-11R**	1SFA 611 103 R1101	**17.30**
Green	**MP4-11G**	1SFA 611 103 R1102	
Yellow	**MP4-11Y**	1SFA 611 103 R1003	
Blue	**MP4-11L**	1SFA 611 103 R1004	
White	**MP4-11W**	1SFA 611 103 R1005	
Clear	**MP4-11C**	1SFA 611 103 R1108	

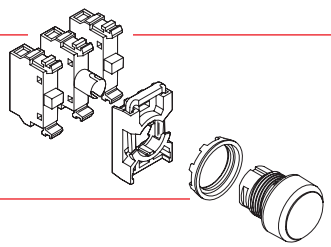
Contact blocks, lamp block and holder ②

Blocks	Catalog No.	Ref. Code	List Price
1 NO + 1 LB with holder	**MCBH-101**	1SFA 611 605 R1201	**$ 27.50**
1 NC + 1 LB with holder	**MCBH-011**	1SFA 611 605 R1210	**27.50**
2 NO + 1 LB with holder	**MCBH-201**	1SFA 611 605 R1202	**35.50**
2 NC + 1 LB with holder	**MCBH-021**	1SFA 611 605 R1220	**35.50**
1 NO + 1 NC +1 LB with holder	**MCBH-111**	1SFA 611 605 R1211	**35.50**
1 NO without holder	**MCB-10**	1SFA 611 610 R1001	**8.00**
1 NC without holder	**MCB-01**	1SFA 611 610 R1010	**8.00**
Lamp block for 2 W, max 230 V AC/DC bulb or LED	**MLB-1**	1SFA 611 620 R1001	**17.50**
Holder for 3 blocks	**MCBH-00**	1SFA 611 605 R1100	**2.00**

Ordering example

Requested: A modular pushbutton, maintained and illuminated with green flush button and one NO + one NC contact.

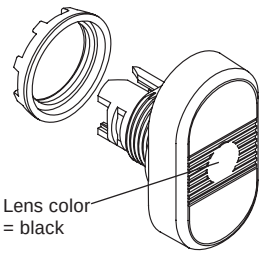
Ref.: 1 piece of MP2-11G + 1 piece of MCBH-111
Bulb - see accessories

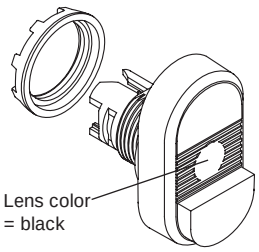


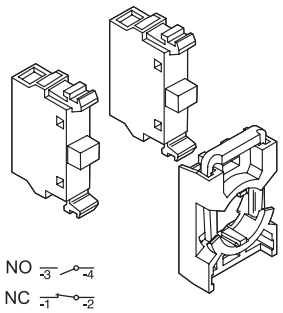
① No contact block in the center position
② Lamp block MLB-1. Bulb not included. For other lamp blocks see Accessories.
③ Bulb max 1.2 W, not included.

8

Double pushbuttons
Non-illuminated







Operator ...

Upper button Color	Upper button Text	Lower button Color	Lower button Text	Catalog No.	Ref. Code	List Price
with flush buttons ①						
Green	*No text*	Red	*No text*	**MPD1-11B**	1SFA 611 130 R1106	**$ 18.00**
	I		O	**MPD2-11B**	1SFA 611 131 R1106	**21.00**
	ON		OFF	**MPD3-11B**	1SFA 611 132 R1106	**21.00**
	START		STOP	**MPD4-11B**	1SFA 611 133 R1106	**21.00**
White	*No text*	Black	*No text*	**MPD5-11B**	1SFA 611 134 R1106	**18.00**
	I		O	**MPD6-11B**	1SFA 611 135 R1106	**21.00**
	ON		OFF	**MPD7-11B**	1SFA 611 136 R1106	**21.00**
	START		STOP	**MPD8-11B**	1SFA 611 137 R1106	**21.00**
with extended lower button ①						
Green	*No text*	Red	*No text*	**MPD12-11B**	1SFA 611 141 R1106	**18.00**
	I		O	**MPD13-11B**	1SFA 611 142 R1106	**21.00**
	ON		OFF	**MPD14-11B**	1SFA 611 143 R1106	**21.00**
	START		STOP	**MPD15-11B**	1SFA 611 144 R1106	**21.00**
White	*No text*	Black	*No text*	**MPD16-11B**	1SFA 611 145 R1106	**18.00**
	I		O	**MPD17-11B**	1SFA 611 146 R1106	**21.00**
	ON		OFF	**MPD18-11B**	1SFA 611 147 R1106	**21.00**
	START		STOP	**MPD19-11B**	1SFA 611 148 R1106	**21.00**

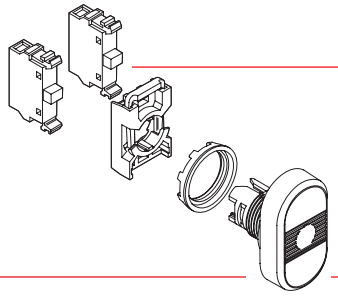
Contact blocks, and holder

Blocks	Catalog No.	Ref. Code	List Price
2 NO with holder	**MCBH-20**	1SFA 611 605 R1102	
2 NC with holder	**MCBH-02**	1SFA 611 605 R1120	**$ 18.00**
1 NO + 1 NC with holder	**MCBH-11**	1SFA 611 605 R1111	
1 NO without holder	**MCB-10**	1SFA 611 610 R1001	**8.00**
1 NC without holder	**MCB-01**	1SFA 611 610 R1010	**8.00**
Holder for 3 blocks	**MCBH-00**	1SFA 611 605 R1100	**2.00**

Ordering example – Double pushbutton

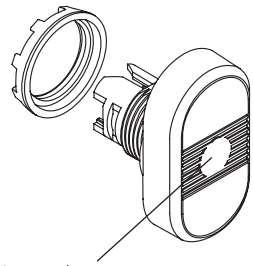
Requested: A non-illuminated double pushbutton,Green/Red, No text, with 2 NO blocks

Ref.: 1 piece of MPD1-11B + 1 piece of MCBH-20



① No contact block in the center position.

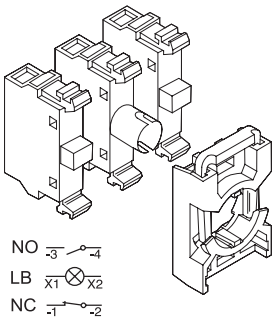
Double pushbuttons
Illuminated



Lens colors:
Red
Green
Yellow
Clear

Operator ...

Upper button Color	Upper button Text	Lower button Color	Lower button Text	Catalog No.	Ref. Code	List Price
with flush buttons ①						
Red lens						
Green	*No text*	Red	*No text*	**MPD1-11R**	1SFA 611 130 R1101	**$ 26.00**
	I		O	**MPD2-11R**	1SFA 611 131 R1101	**29.00**
	ON		OFF	**MPD3-11R**	1SFA 611 132 R1101	**29.00**
	START		STOP	**MPD4-11R**	1SFA 611 133 R1101	**29.00**
White	*No text*	Black	*No text*	**MPD5-11R**	1SFA 611 134 R1101	**26.00**
	I		O	**MPD6-11R**	1SFA 611 135 R1101	**29.00**
	ON		OFF	**MPD7-11R**	1SFA 611 136 R1101	**29.00**
	START		STOP	**MPD8-11R**	1SFA 611 137 R1101	**29.00**
Green lens						
Green	*No text*	Red	*No text*	**MPD1-11G**	1SFA 611 130 R1102	**26.00**
	I		O	**MPD2-11G**	1SFA 611 131 R1102	**29.00**
	ON		OFF	**MPD3-11G**	1SFA 611 132 R1102	**29.00**
	START		STOP	**MPD4-11G**	1SFA 611 133 R1102	**29.00**
White	*No text*	Black	*No text*	**MPD5-11G**	1SFA 611 134 R1102	**26.00**
	I		O	**MPD6-11G**	1SFA 611 135 R1102	**29.00**
	ON		OFF	**MPD7-11G**	1SFA 611 136 R1102	**29.00**
	START		STOP	**MPD8-11G**	1SFA 611 137 R1102	**29.00**
Yellow lens						
Green	*No text*	Red	*No text*	**MPD1-11Y**	1SFA 611 130 R1103	**26.00**
	I		O	**MPD2-11Y**	1SFA 611 131 R1103	**29.00**
	ON		OFF	**MPD3-11Y**	1SFA 611 132 R1103	**29.00**
	START		STOP	**MPD4-11Y**	1SFA 611 133 R1103	**29.00**
White	*No text*	Black	*No text*	**MPD5-11Y**	1SFA 611 134 R1103	**26.00**
	I		O	**MPD6-11Y**	1SFA 611 135 R1103	**29.00**
	ON		OFF	**MPD7-11Y**	1SFA 611 136 R1103	**29.00**
	START		STOP	**MPD8-11Y**	1SFA 611 137 R1103	**29.00**
Clear lens						
Green	*No text*	Red	*No text*	**MPD1-11C**	1SFA 611 130 R1108	**26.00**
	I		O	**MPD2-11C**	1SFA 611 131 R1108	**29.00**
	ON		OFF	**MPD3-11C**	1SFA 611 132 R1108	**29.00**
	START		STOP	**MPD4-11C**	1SFA 611 133 R1108	**29.00**
White	*No text*	Black	*No text*	**MPD5-11C**	1SFA 611 134 R1108	**26.00**
	I		O	**MPD6-11C**	1SFA 611 135 R1108	**29.00**
	ON		OFF	**MPD7-11C**	1SFA 611 136 R1108	**29.00**
	START		STOP	**MPD8-11C**	1SFA 611 137 R1108	**29.00**

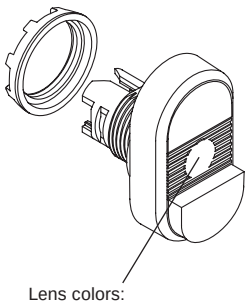


Contact blocks, lamp block and holder ②

Blocks	Catalog No.	Ref. Code	List Price
2 NO + 1 LB with holder	**MCBH-201**	1SFA 611 605 R1202	
2 NC + 1 LB with holder	**MCBH-021**	1SFA 611 605 R1220	**$ 35.50**
1 NO + 1 NC + 1 LB with holder	**MCBH-111**	1SFA 611 605 R1211	
1 NO without holder	**MCB-10**	1SFA 611 610 R1001	**8.00**
1 NC without holder	**MCB-01**	1SFA 611 610 R1010	**8.00**
Lamp block for 2 W, max 230 V AC/DC bulb or LED	**MLB-1**	1SFA 611 620 R1001	**17.50**
Holder for 3 blocks	**MCBH-00**	1SFA 611 605 R1100	**2.00**

① No contact block in the center position.
② Lamp block MLB-1. Bulb not included. For other lamp blocks see Accessories, bulb max 1.2 W.

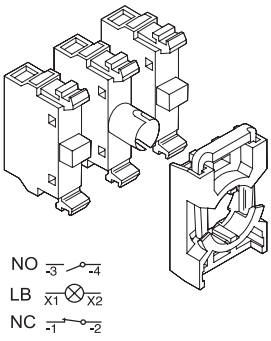
Double pushbuttons
Illuminated



Lens colors:
Red
Green
Yellow
Clear

Operator ...

Upper button Color	Upper button Text	Lower button Color	Lower button Text	Catalog No.	Ref. Code	List Price
with extended lower button ①						
Red lens						
Green	*No text*	Red	*No text*	**MPD12-11R**	1SFA 611 141 R1101	**$ 26.00**
	I		O	**MPD13-11R**	1SFA 611 142 R1101	**29.00**
	ON		OFF	**MPD14-11R**	1SFA 611 143 R1101	**29.00**
	START		STOP	**MPD15-11R**	1SFA 611 144 R1101	**29.00**
White	*No text*	Black	*No text*	**MPD16-11R**	1SFA 611 145 R1101	**26.00**
	I		O	**MPD17-11R**	1SFA 611 146 R1101	**29.00**
	ON		OFF	**MPD18-11R**	1SFA 611 147 R1101	**29.00**
	START		STOP	**MPD19-11R**	1SFA 611 148 R1101	**29.00**
Green lens						
Green	*No text*	Red	*No text*	**MPD12-11G**	1SFA 611 141 R1102	**26.00**
	I		O	**MPD13-11G**	1SFA 611 142 R1102	**29.00**
	ON		OFF	**MPD14-11G**	1SFA 611 143 R1102	**29.00**
	START		STOP	**MPD15-11G**	1SFA 611 144 R1102	**29.00**
White	*No text*	Black	*No text*	**MPD16-11G**	1SFA 611 145 R1102	**26.00**
	I		O	**MPD17-11G**	1SFA 611 146 R1102	**29.00**
	ON		OFF	**MPD18-11G**	1SFA 611 147 R1102	**29.00**
	START		STOP	**MPD19-11G**	1SFA 611 148 R1102	**29.00**
Yellow lens						
Green	*No text*	Red	*No text*	**MPD12-11Y**	1SFA 611 141 R1103	**26.00**
	I		O	**MPD13-11Y**	1SFA 611 142 R1103	**29.00**
	ON		OFF	**MPD14-11Y**	1SFA 611 143 R1103	**29.00**
	START		STOP	**MPD15-11Y**	1SFA 611 144 R1103	**29.00**
White	*No text*	Black	*No text*	**MPD16-11Y**	1SFA 611 145 R1103	**26.00**
	I		O	**MPD17-11Y**	1SFA 611 146 R1103	**29.00**
	ON		OFF	**MPD18-11Y**	1SFA 611 147 R1103	**29.00**
	START		STOP	**MPD19-11Y**	1SFA 611 148 R1103	**29.00**
Clear lens						
Green	*No text*	Red	*No text*	**MPD12-11C**	1SFA 611 141 R1108	**26.00**
	I		O	**MPD13-11C**	1SFA 611 142 R1108	**29.00**
	ON		OFF	**MPD14-11C**	1SFA 611 143 R1108	**29.00**
	START		STOP	**MPD15-11C**	1SFA 611 144 R1108	**29.00**
White	*No text*	Black	*No text*	**MPD16-11C**	1SFA 611 145 R1108	**26.00**
	I		O	**MPD17-11C**	1SFA 611 146 R1108	**29.00**
	ON		OFF	**MPD18-11C**	1SFA 611 147 R1108	**29.00**
	START		STOP	**MPD19-11C**	1SFA 611 148 R1108	**29.00**

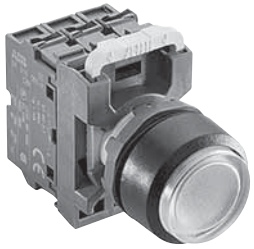


Contact blocks, lamp block and holder ②

Blocks	Catalog No.	Ref. Code	List Price
2 NO + 1 LB with holder	**MCBH-201**	1SFA 611 605 R1202	**$ 35.50**
2 NC + 1 LB with holder	**MCBH-021**	1SFA 611 605 R1220	**35.50**
1 NO + 1 NC + 1 LB with holder	**MCBH-111**	1SFA 611 605 R1211	**35.50**
1 NO without holder	**MCB-10**	1SFA 611 610 R1001	**8.00**
1 NC without holder	**MCB-01**	1SFA 611 610 R1010	**8.00**
Lamp block for 2 W, max 230 V AC/DC bulb or LED	**MLB-1**	1SFA 611 620 R1001	**17.50**
Holder for 3 blocks	**MCBH-00**	1SFA 611 605 R1100	**2.00**

① No contact block in the center position
② Lamp block MLB-1. Bulb not included. Other lamp block see Accessories, bulb max 1.2 W.

Press-to-test pushbuttons
Illuminated



MP1-MLFPT1C

Press-to-test

Type	Black plastic ring	Chrome metal ring	
	Catalog number	Catalog number	List price
Operator only ①	MP1-KLPT★	MP1-MLPT★	**$ 22.50**
Full voltage type			
6V	MP1-KLFPT6★	MP1-MLFPT6★	
12V	MP1-KLFPT7★	MP1-MLFPT7★	
24V	MP1-KLFPT8★	MP1-MLFPT8★	**46.00**
48V	MP1-KLFPT9★	MP1-MLFPT9★	
120V	MP1-KLFPT1★	MP1-MLFPT1★	
Resistor type			
120V	MP1-KLRPT1★	MP1-MLRPT1★	**54.00**
240V	MP1-KLRPT2★	MP1-MLRPT2★	
Transformer type			
120V/6V	MP1-KLTPT1★	MP1-MLTPT1★	
240V/6V	MP1-KLTPT2★	MP1-MLTPT2★	**80.00**
380V/6V	MP1-KLTPT3★	MP1-MLTPT3★	
480V/6V	MP1-KLTPT4★	MP1-MLTPT4★	
120V/24V	MP1-KLTPT5★	MP1-MLTPT5★	
240V/24V	MP1-KLTPT6★	MP1-MLTPT6★	**80.00**
380V/24V	MP1-KLTPT7★	MP1-MLTPT7★	
480V/24V	MP1-KLTPT8★	MP1-MLTPT8★	

★ Select the lens color from the "Illuminated buttons & lenses" selection chart and substitute the suffix code for the ★. The lens and bulb are included in the price.

Press-to-test (LED bulb) ②

Type	Black plastic ring	Chrome metal ring	
	Catalog number	Catalog number	List price
Full voltage type			
24V	MP1-KLFPTL8★	MP1-MLFPTL8★	**$ 55.00**
120V	MP1-KLFPTL1★	MP1-MLFPTL1★	**55.00**
230V		MP1-MLFPTL2★	**61.00**
Transformer type			
120V/24V	MP1-KLFPTL2★	MP1-MLTPTL1★	
240V/24V	MP1-KLTPTL2★	MP1-MLTPTL2★	**80.00**
380V/24V	MP1-KLTPTL3★	MP1-MLTPTL3★	
480V/24V	MP1-KLTPTL4★	MP1-MLTPTL4★	

★ Select the lens color from the "Illuminated buttons & lenses" selection chart and substitute the suffix code for the ★. The lens and bulb are included in the price.

Press-to-test (neon bulb) ③

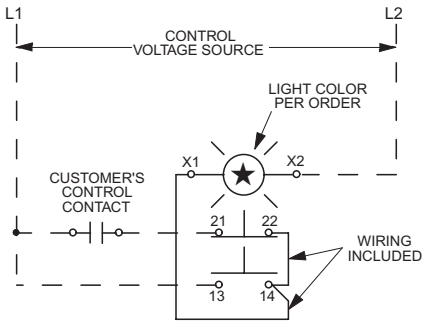
Type	Black plastic ring	Chrome metal ring	
	Catalog number	Catalog number	List price
Full voltage type			
220VAC	MP1-KLTPN2★	MP1-MLTPN2★	**$ 46.00**

★ Illuminated buttons

Button color	Suffix code
Red	R
Green	G
Yellow	Y
Blue	L
Clear	C
White	W

NOTE: White LEDs use clear lenses.

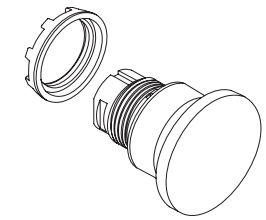
Schematic

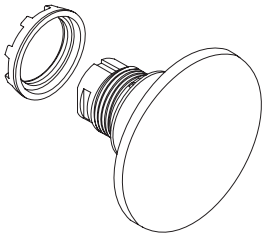


Press- to-test schematic

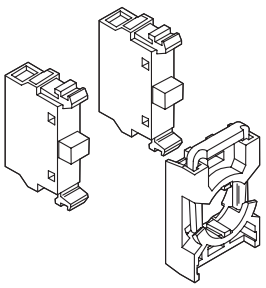
① 1 N.O. & 1 N.C. contact supplied; lamp module and bulb must be ordered separately.
② For blue or white LEDs, add $ 3 to the list price.
③ Use with red, yellow and clear lenses only. For 120VAC, consult factory.

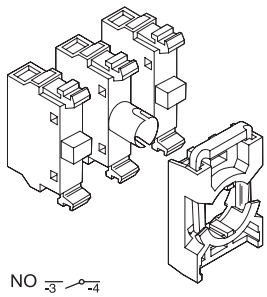
Mushroom pushbuttons
Non-illuminated and illuminated
Momentary





Bezel in black plastic as standard
Bezel in metal:
Replace '**1**' in the:
Catalog No. MPMX-1 0X
Ref. Code 1SFA611XXX R 1XXX
3 for metal bezel
4 for grey plastic bezel





NO -3 -4
LB X1 X2
NC -1 -2

Operator ...

Operator material	Button color	Catalog No.	Ref. Code	List Price
non-illuminated				
Ø 40 mm				
Plastic	Red	**MPM1-10R**	1SFA 611 124 R1001	**$ 16.00**
	Yellow	**MPM1-10Y**	1SFA 611 124 R1003	**16.00**
	Black	**MPM1-10B**	1SFA 611 124 R1006	**16.00**
Ø 60 mm				
Plastic	Red	**MPM2-10R**	1SFA 611 125 R1001	**20.00**
	Yellow	**MPM2-10Y**	1SFA 611 125 R1003	**20.00**
	Black	**MPM2-10B**	1SFA 611 125 R1006	**20.00**
illuminated ①				
Ø 40 mm				
Plastic	Red	**MPM1-11R**	1SFA 611 124 R1101	**16.00**
	Yellow	**MPM1-11Y**	1SFA 611 124 R1103	**16.00**
Ø 60 mm				
Plastic	Red	**MPM2-11R**	1SFA 611 125 R1101	**20.00**
	Yellow	**MPM2-11Y**	1SFA 611 125 R1103	**20.00**

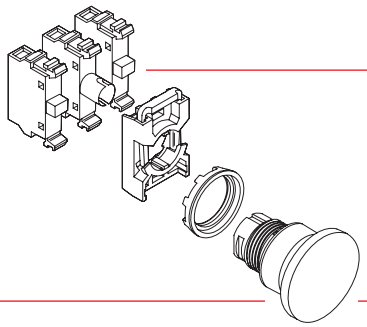
Contact blocks, lamp block and holder ②

Blocks	Catalog No.	Ref. Code	List Price
1 NO with holder	**MCBH-10**	1SFA 611 605 R1101	**$ 10.00**
1 NC with holder	**MCBH-01**	1SFA 611 605 R1110	**10.00**
2 NO with holder	**MCBH-20**	1SFA 611 605 R1102	**18.00**
2 NC with holder	**MCBH-02**	1SFA 611 605 R1120	**18.00**
1 NO + 1 NC with holder	**MCBH-11**	1SFA 611 605 R1111	**18.00**
1 NO + 1 LB with holder	**MCBH-101**	1SFA 611 605 R1201	**27.50**
1 NC + 1 LBwith holder	**MCBH-011**	1SFA 611 605 R1210	**27.50**
2 NO + 1 LB with holder)	**MCBH-201**	1SFA 611 605 R1202	**35.50**
2 NC + 1 LB with holder	**MCBH-021**	1SFA 611 605 R1220	**35.50**
1 NO + 1 NC + 1 LB with holder	**MCBH-111**	1SFA 611 605 R1211	**35.50**
1 NO without holder	**MCB-10**	1SFA 611 610 R1001	**8.00**
1 NC without holder	**MCB-01**	1SFA 611 610 R1010	**8.00**
Lamp block for 2 W, max 230 V AC/DC bulb or LED	**MLB-1**	1SFA 611 620 R1001	**17.50**
Holder for 3 blocks	**MCBH-00**	1SFA 611 605 R1100	**2.00**

Ordering example – Mushroom Pushbutton

Requested: A modular mushroom pushbutton, Ø 40 mm, illuminated, red, with one NO + one NC contact and a standard lamp block

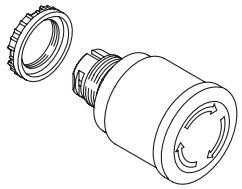
Ref.: 1 piece of MPM1-11R + 1 piece of MCBH-111
Bulb - see accessories

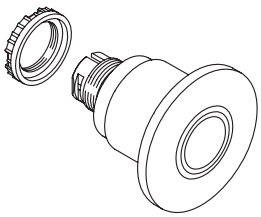


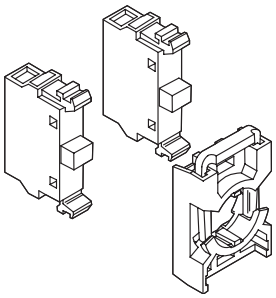
① No contact block in the center position
② Lamp block MLB-1. Bulb not included. Other lamp block see Accessories, bulb max 1.2 W.

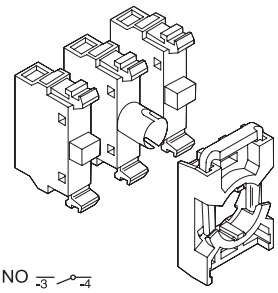
Emergency stop pushbuttons
Non-illuminated and illuminated

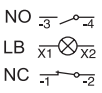
Fulfills IEC 60947-5-5











Operator ...

Operator function	Button color and material	Catalog No.	Ref. Code	List Price
non-illuminated				
Ø 40 mm				
Twist release	Red, plastic	**MPMT3-10R**	1SFA 611 510 R1001	**$ 34.00**
Pull release	Red, plastic	**MPMP3-10R**	1SFA 611 511 R1001	
Ø 60 mm				
Twist release	Red, plastic	**MPMT4-10R**	1SFA 611 513 R1001	**46.00**
Pull release	Red, plastic	**MPMP4-10R**	1SFA 611 514 R1001	
illuminated ①				
Ø 40 mm				
Twist release	Red, plastic	**MPMT3-11R**	1SFA 611 510 R1101	**34.00**
Pull release	Red, plastic	**MPMP3-11R**	1SFA 611 511 R1101	
Ø 60 mm				
Twist release	Red, plastic	**MPMT4-11R**	1SFA 611 513 R1101	**46.00**
Pull release	Red, plastic	**MPMP4-11R**	1SFA 611 514 R1101	

For compact E-Stops, see page 8.31.

Contact blocks, lamp block and holder ②

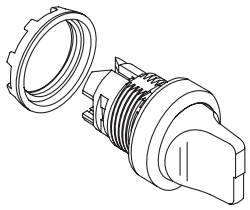
Blocks	Catalog No.	Ref. Code	List Price
1 NO with holder	**MCBH-10**	1SFA 611 605 R1101	**$ 10.00**
1 NC with holder	**MCBH-01**	1SFA 611 605 R1110	**10.00**
2 NO with holder	**MCBH-20**	1SFA 611 605 R1102	**18.00**
2 NC with holder	**MCBH-02**	1SFA 611 605 R1120	**18.00**
1 NO + 1 NC with holder	**MCBH-11**	1SFA 611 605 R1111	**18.00**
1 NO + 1 LB with holder	**MCBH-101**	1SFA 611 605 R1201	**27.50**
1 NC + 1 LB with holder	**MCBH-011**	1SFA 611 605 R1210	**27.50**
2 NO + 1 LB with holder	**MCBH-201**	1SFA 611 605 R1202	**35.50**
2 NC + 1 LB with holder	**MCBH-021**	1SFA 611 605 R1220	**35.50**
1 NO + 1 NC + 1 LB with holder	**MCBH-111**	1SFA 611 605 R1211	**35.50**
1 NO without holder	**MCB-10**	1SFA 611 610 R1001	**8.00**
1 NC without holder	**MCB-01**	1SFA 611 610 R1010	**8.00**
Lamp block for 2 W, max 230 V AC/DC bulb or LED	**MLB-1**	1SFA 611 620 R1001	**17.50**
Holder for 3 blocks	**MCBH-00**	1SFA 611 605 R1100	**2.00**

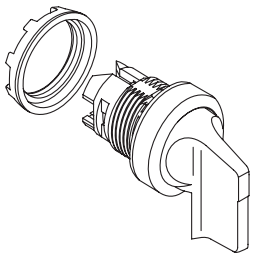
To comply with the standard, IEC 60947-5-5, a number of tests have to be conducted:

Durability test	6,050 cycles. This is not a test of mechanical life. The product has a mechanical life of 100,000 operations.
Robustness	The force 113 N applied in three axes
Conditioning	Heat and cold, moist atmosphere, and in 5 % NaC
Latching test	Impulse voltage test at 2,500 V
Resetting test	Pulling force < 50 N Turning torque < 1 Nm
Shock	15 g shock
Vibration	2 h at 50m/s²
Contacts with positive opening operation	15 g shock

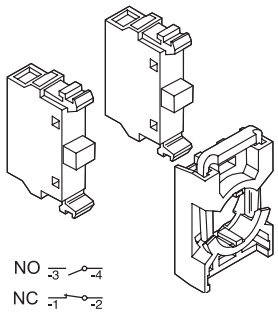
① No contact in the center position
② Lamp block MLB-1. Bulb not included. Other lamp block see Accessories, bulb max 2 W.

Two-position selector switches
Non-illuminated





Bezel in black plastic as standard
Bezel in metal:
Replace '**1**' in the:
Catalog No. M2SSX-1 0X
Ref. Code 1SFA61 XXX R 1XXX
3 for metal bezel
4 for grey plastic bezel



Contact functions

Block positions as seen from operator front.

Handle position	Left block	Right block
A (B)	O	O
C	x	x

O = not actuated (normal state)
x = actuated (state changed)

Operator ...

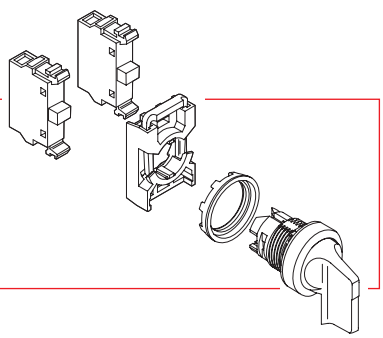
Symbol	Handle color	Catalog No.	Ref. Code	List Price
with short handle ①				
Maintained				
B C	Red	**M2SS1-10R**	1SFA 611 200 R1001	
	Black	**M2SS1-10B**	1SFA 611 200 R1006	
	Grey	**M2SS1-10U**	1SFA 611 200 R1007	
Maintained				**$ 11.00**
A C	Red	**M2SS2-10R**	1SFA 611 201 R1001	
	Black	**M2SS2-10B**	1SFA 611 201 R1006	
	Grey	**M2SS2-10U**	1SFA 611 201 R1007	
Momentary, spring return from C to B				
B C	Red	**M2SS3-10R**	1SFA 611 202 R1001	
	Black	**M2SS3-10B**	1SFA 611 202 R1006	**14.00**
	Grey	**M2SS3-10U**	1SFA 611 202 R1007	
with long handle ①				
Maintained				
B C	Red	**M2SS4-10R**	1SFA 611 203 R1001	
	Black	**M2SS4-10B**	1SFA 611 203 R1006	
	Grey	**M2SS4-10U**	1SFA 611 203 R1007	
Maintained				**11.00**
A C	Red	**M2SS5-10R**	1SFA 611 204 R1001	
	Black	**M2SS5-10B**	1SFA 611 204 R1006	
	Grey	**M2SS5-10U**	1SFA 611 200 R1007	
Momentary, spring return from C to B				
B C	Red	**M2SS6-10R**	1SFA 611 205 R1001	
	Black	**M2SS6-10B**	1SFA 611 205 R1006	**14.00**
	Grey	**M2SS6-10U**	1SFA 611 205 R1007	

Contact blocks and holder

Blocks	Catalog No.	Ref. Code	List Price
1 NO with holder	**MCBH-10**	1SFA 611 605 R1101	**$ 10.00**
1 NC with holder	**MCBH-01**	1SFA 611 605 R1110	**10.00**
2 NO with holder	**MCBH-20**	1SFA 611 605 R1102	**18.00**
2 NC with holder	**MCBH-02**	1SFA 611 605 R1120	**18.00**
1 NO + 1 NC with holder	**MCBH-11**	1SFA 611 605 R1111	**18.00**
1 NO without holder	**MCB-10**	1SFA 611 610 R1001	**8.00**
1 NC without holder	**MCB-01**	1SFA 611 610 R1010	**8.00**
Holder for 3 blocks	**MCBH-00**	1SFA 611 605 R1100	**2.00**

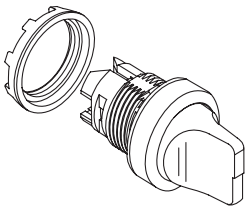
Ordering example

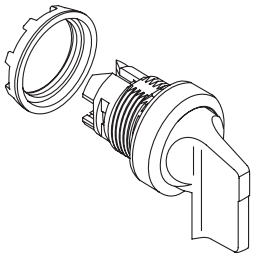
Requested: A non-illuminated modular selector switch. Black.
Maintained.
Handle positions: A and C
With 2 NC contacts
Ref.: 1 piece of M2SS2-10B + 1 pice of MCBH-02



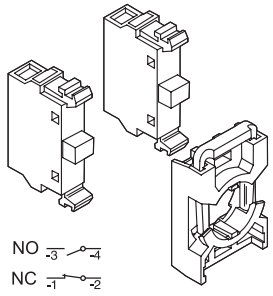
① No contact block in the center position

Three-position selector switches
Non-illuminated





Bezel in black plastic as standard
Bezel in metal:
Replace '**1**' in the:
Catalog No. M3SSX-1 0X
Ref. Code 1SFA611XXX R 1XXX
3 for metal bezel
4 for grey plastic bezel



Contact functions
Block positions as seen from operator front.

Handle position	Left block	Right block
A	x	O
B	O	O
C	O	x

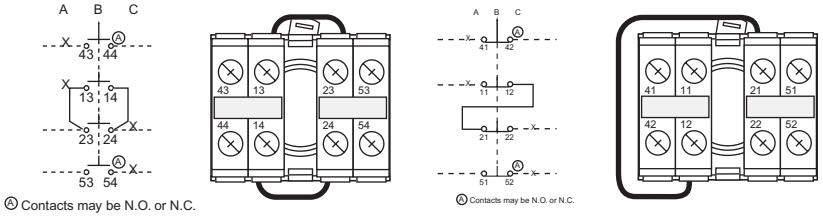
Operator ...

Symbol	Handle color	Catalog No.	Ref. Code	List Price
with short handle ①				
Maintained				
	Red	**M3SS1-10R**	1SFA 611 210 R1001	
	Black	**M3SS1-10B**	1SFA 611 210 R1006	**$ 11.00**
	Grey	**M3SS1-10U**	1SFA 611 210 R1007	
Momentary, spring return from A to B and from C to B				
	Red	**M3SS2-10R**	1SFA 611 211 R1001	
	Black	**M3SS2-10B**	1SFA 611 211 R1006	**14.00**
	Grey	**M3SS2-10U**	1SFA 611 211 R1007	
Momentary, spring return from C to B				
	Red	**M3SS3-10R**	1SFA 611 212 R1001	
	Black	**M3SS3-10B**	1SFA 611 212 R1006	**14.00**
	Grey	**M3SS3-10U**	1SFA 611 212 R1007	
Momentary, spring return from A to B				
	Red	**M3SS7-10R**	1SFA 611 216 R1001	
	Black	**M3SS7-10B**	1SFA 611 216 R1006	**14.00**
	Grey	**M3SS7-10U**	1SFA 611 216 R1007	
with long handle ①				
Maintained				
	Red	**M3SS4-10R**	1SFA 611 213 R1001	
	Black	**M3SS4-10B**	1SFA 611 213 R1006	**11.00**
	Grey	**M3SS4-10U**	1SFA 611 213 R1007	
Momentary, spring return from A to B and from C to B				
	Red	**M3SS5-10R**	1SFA 611 214 R1001	
	Black	**M3SS5-10B**	1SFA 611 214 R1006	**14.00**
	Grey	**M3SS5-10U**	1SFA 611 214 R1007	
Momentary, spring return from C to B				
	Red	**M3SS6-10R**	1SFA 611 215 R1001	
	Black	**M3SS6-10B**	1SFA 611 215 R1006	**14.00**
	Grey	**M3SS6-10U**	1SFA 611 215 R1007	
Momentary, spring return from A to B				
	Red	**M3SS8-10R**	1SFA 611 217 R1001	
	Black	**M3SS8-10B**	1SFA 611 217 R1006	**14.00**
	Grey	**M3SS8-10U**	1SFA 611 217 R1007	

Contact blocks and holder

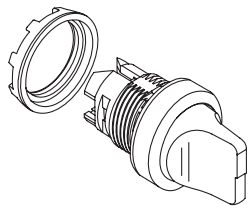
Blocks	Catalog No.	Ref. Code	List Price
1 NO with holder	**MCBH-10**	1SFA 611 605 R1101	**$ 10.00**
1 NC with holder	**MCBH-01**	1SFA 611 605 R1110	**10.00**
2 NO with holder	**MCBH-20**	1SFA 611 605 R1102	**18.00**
2 NC with holder	**MCBH-02**	1SFA 611 605 R1120	**18.00**
1 NO + 1 NC with holder	**MCBH-11**	1SFA 611 605 R1111	**18.00**
1 NO without holder	**MCB-10**	1SFA 611 610 R1001	**8.00**
1 NC without holder	**MCB-01**	1SFA 611 610 R1010	**8.00**
Holder for 3 blocks	**MCBH-00**	1SFA 611 605 R1100	**2.00**

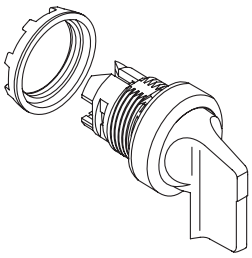
Center position connection detail



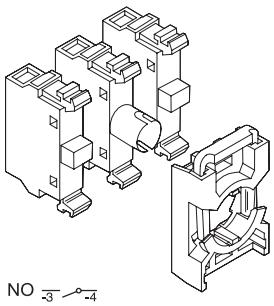
① No contact block in center position

Two-position selector switches
Illuminated





Bezel in black plastic as standard
Bezel in metal:
Replace '**1**' in the:
Catalog No. M2SSX-1 0X
Ref. Code 1SFA61 XXX R 1XXX
3 for metal bezel
4 for grey plastic bezel



Operator ...

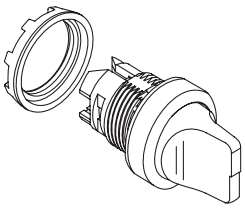
Symbol	Handle color	Catalog No.	Ref. Code	List Price
with short handle ①				
Maintained				
B C	Red	**M2SS1-11R**	1SFA 611 200 R1101	
	Green	**M2SS1-11G**	1SFA 611 200 R1102	
	Yellow	**M2SS1-11Y**	1SFA 611 200 R1103	**$ 17.00**
	Blue	**M2SS1-11L**	1SFA 611 200 R1104	
	Clear	**M2SS1-11C**	1SFA 611 200 R1108	
Maintained				
A C	Red	**M2SS2-11R**	1SFA 611 201 R1101	
	Green	**M2SS2-11G**	1SFA 611 201 R1102	
	Yellow	**M2SS2-11Y**	1SFA 611 201 R1103	**17.00**
	Blue	**M2SS2-11L**	1SFA 611 201 R1104	
	Clear	**M2SS2-11C**	1SFA 611 201 R1108	
Momentary, spring return from C to B				
B C	Red	**M2SS3-11R**	1SFA 611 202 R1101	
	Green	**M2SS3-11G**	1SFA 611 202 R1102	
	Yellow	**M2SS3-11Y**	1SFA 611 202 R1103	**26.00**
	Blue	**M2SS3-11L**	1SFA 611 202 R1104	
	Clear	**M2SS3-11C**	1SFA 611 202 R1108	
with long handle ①				
Maintained				
B C	Red	**M2SS4-11R**	1SFA 611 203 R1101	
	Green	**M2SS4-11G**	1SFA 611 203 R1102	
	Yellow	**M2SS4-11Y**	1SFA 611 203 R1103	**17.00**
	Blue	**M2SS4-11L**	1SFA 611 203 R1104	
	Clear	**M2SS4-11C**	1SFA 611 203 R1108	
Maintained				
A C	Red	**M2SS5-11R**	1SFA 611 204 R1101	
	Green	**M2SS5-11G**	1SFA 611 204 R1102	
	Yellow	**M2SS5-11Y**	1SFA 611 204 R1103	**17.00**
	Blue	**M2SS5-11L**	1SFA 611 204 R1104	
	Clear	**M2SS5-11C**	1SFA 611 204 R1108	
Momentary, spring return from C to B				
B C	Red	**M2SS6-11R**	1SFA 611 205 R1101	
	Green	**M2SS6-11G**	1SFA 611 205 R1102	
	Yellow	**M2SS6-11Y**	1SFA 611 205 R1103	**26.00**
	Blue	**M2SS6-11L**	1SFA 611 205 R1104	
	Clear	**M2SS6-11C**	1SFA 611 205 R1108	

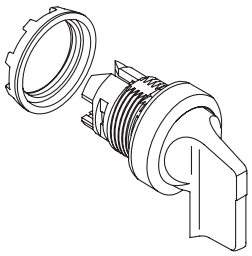
Contact blocks, lamp block and holder ②

Blocks	Catalog No.	Ref. Code	List Price
1 NO + 1 LB with holder	**MCBH-101**	1SFA 611 605 R1201	**$ 27.50**
1 NC + 1 LB with holder	**MCBH-011**	1SFA 611 605 R1210	**27.50**
2 NO + 1 LB with holder	**MCBH-201**	1SFA 611 605 R1202	**35.50**
2 NC + 1 LB with holder	**MCBH-021**	1SFA 611 605 R1220	**35.50**
1 NO + 1 NC with holder	**MCBH-111**	1SFA 611 605 R1211	**35.50**
1 NO without holder	**MCB-10**	1SFA 611 610 R1001	**8.00**
1 NC without holder	**MCB-01**	1SFA 611 610 R1010	**8.00**
Lamp block for 2 W, max 230 V AC/DC bulb or LED	**MLB-1**	1SFA 611 620 R1001	**17.50**
Holder for 3 blocks	**MCBH-00**	1SFA 611 605 R1100	**2.00**

Contact functions See Page 8.11
Ordering example See Page 8.12

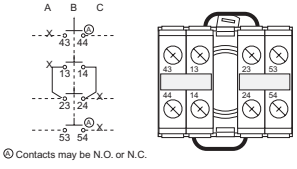
① No contact block in the center position
② Lamp block MLB-1. Bulb not included. Other lamp block see Accessories, bulb max 1.2 W.



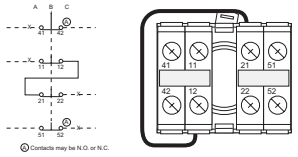


Bezel in black plastic as standard
Bezel in metal:
Replace '**1**' in the:
Catalog No. M3SSX-1 0X
Ref. Code 1SFA611XXX R 1XXX
3 for metal bezel
4 for grey plastic bezel

Center position connection detail



Ⓚ Contacts may be N.O. or N.C.



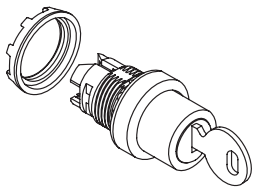
Operator ...

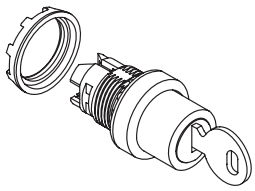
Symbol	Handle color	Catalog No.	Ref. Code	List Price
with short handle ①				
Maintained				
	Red	**M3SS1-11R**	1SFA 611 210 R1101	
	Green	**M3SS1-11G**	1SFA 611 210 R1102	
	Yellow	**M3SS1-11Y**	1SFA 611 210 R1103	**$ 17.00**
	Blue	**M3SS1-11L**	1SFA 611 210 R1104	
	Clear	**M3SS1-11C**	1SFA 611 210 R1108	
Momentary, spring return from A to B and from C to B				
	Red	**M3SS2-11R**	1SFA 611 211 R1101	
	Green	**M3SS2-11G**	1SFA 611 211 R1102	
	Yellow	**M3SS2-11Y**	1SFA 611 211 R1103	**26.00**
	Blue	**M3SS2-11L**	1SFA 611 211 R1104	
	Clear	**M3SS2-11C**	1SFA 611 211 R1108	
Momentary, spring return from C to B				
	Red	**M3SS3-11R**	1SFA 611 212 R1101	
	Green	**M3SS3-11G**	1SFA 611 212 R1102	
	Yellow	**M3SS3-11Y**	1SFA 611 212 R1103	**26.00**
	Blue	**M3SS3-11L**	1SFA 611 212 R1104	
	Clear	**M3SS3-11C**	1SFA 611 212 R1108	
Momentary, spring return from A to B				
	Red	**M3SS7-11R**	1SFA 611 216 R1101	
	Green	**M3SS7-11G**	1SFA 611 216 R1102	
	Yellow	**M3SS7-11Y**	1SFA 611 216 R1103	**26.00**
	Blue	**M3SS7-11L**	1SFA 611 216 R1104	
	Clear	**M3SS7-11C**	1SFA 611 216 R1108	
with long handle ①				
Maintained				
	Red	**M3SS4-11R**	1SFA 611 213 R1101	
	Green	**M3SS4-11G**	1SFA 611 213 R1102	
	Yellow	**M3SS4-11Y**	1SFA 611 213 R1103	**17.00**
	Blue	**M3SS4-11L**	1SFA 611 213 R1104	
	Clear	**M3SS4-11C**	1SFA 611 213 R1108	
Momentary, spring return from A to B and from C to B				
	Red	**M3SS5-11R**	1SFA 611 214 R1101	
	Green	**M3SS5-11G**	1SFA 611 214 R1102	
	Yellow	**M3SS5-11Y**	1SFA 611 214 R1103	**26.00**
	Blue	**M3SS5-11L**	1SFA 611 214 R1104	
	Clear	**M3SS5-11C**	1SFA 611 214 R1108	
Momentary, spring return from C to B				
	Red	**M3SS6-11R**	1SFA 611 215 R1101	
	Green	**M3SS6-11G**	1SFA 611 215 R1102	
	Yellow	**M3SS6-11Y**	1SFA 611 215 R1103	**26.00**
	Blue	**M3SS6-11L**	1SFA 611 215 R1104	
	Clear	**M3SS6-11C**	1SFA 611 215 R1108	
Momentary, spring return from A to B				
	Red	**M3SS8-11R**	1SFA 611 217 R1101	
	Green	**M3SS8-11G**	1SFA 611 217 R1102	
	Yellow	**M3SS8-11Y**	1SFA 611 217 R1103	**26.00**
	Blue	**M3SS8-11L**	1SFA 611 217 R1104	
	Clear	**M3SS8-11C**	1SFA 611 217 R1108	

Contact blocks, lamp block and holder See Page 8.13
Contact functions See Page 8.12
Ordering example See Page 8.12

① No contact block in the center position

Key-operated selector switches
Two and three positions





Bezel in black plastic as standard

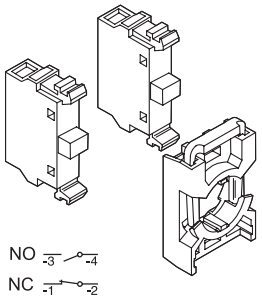
Bezel in metal:
Replace '**1**' in the:
Catalog No. MXSSKX-1 0■
Ref. Code 1SFA6112XX R 1XX■
3 for metal bezel

② **Key codes**

71 (standard)	■ =1
72	■ =2
73	■ =3
Other	(on request)

③ **Key codes**

71 (standard)	■ =1
72	■ =2



Operator ...

Symbol	The key can be removed in	Catalog No.	Ref. Code	List Price
two positions ①				
Maintained	in both positions	**M2SSK1-10■** ②	1SFA 611 280 R100■ ②	
Maintained	in position B only	**M2SSK2-10■** ②	1SFA 611 281 R100■ ②	**$ 41.00**
Momentary, spring return from C to B	in position B only	**M2SSK3-10■** ②	1SFA 611 282 R100■ ②	
three positions ①				
Maintained	in all positions	**M3SSK1-10■** ②	1SFA 611 283 R100■ ②	
Maintained	in position B only	**M3SSK2-10■** ②	1SFA 611 284 R100■ ②	
Momentary, spring return from A to B and from C to B	**in position B only**	**M3SSK3-10■** ②	**1**SFA 611 285 R100■ ②	**53.00**
Momentary, spring return from C to B	**in position A only**	**M3SSK4-10■** ③	1SFA 611 286 R100■ ③	
Momentary, spring return from C to B	**in all positions**	**M3SSK5-10■** ②	1SFA 611 287 R100■ ②	

Contact blocks and holder

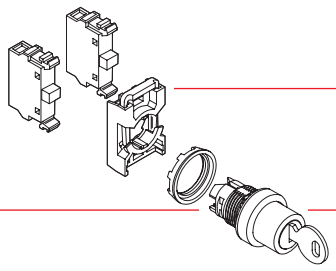
Blocks	Catalog No.	Ref. Code	List Price
2 NO with holder	**MCBH-20**	1SFA 611 605 R1102	
2 NC with holder	**MCBH-02**	1SFA 611 605 R1120	**$ 18.00**
1 NO + 1 NC with holder	**MCBH-11**	1SFA 611 605 R1111	
1 NO without holder	**MCB-10**	1SFA 611 610 R1001	**8.00**
1 NC without holder	**MCB-01**	1SFA 611 610 R1010	**8.00**
Holder for 3 blocks	**MCBH-00**	1SFA 611 605 R1100	**2.00**

Contact functions
Two positions: See Page 8.12
Three positions: See Page 8.13

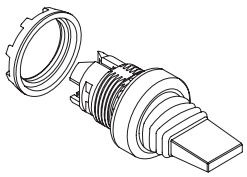
Ordering example

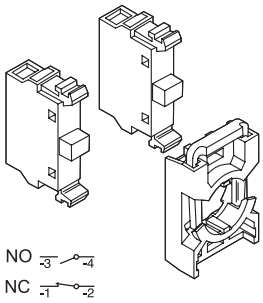
Requested: A key-operated selector switch. Three positions. Maintained. The key removeable in position B. Key code 72. With 2 NC contacts

Ref.: 1 piece of M3SSK2-102 + 1 piece of MCBH-02



① No contact block in the center position





Operator

Toggle switch with two positions

Symbol	Bezel	Catalog No.	Ref. Code	List Price
Maintained				
A / C	Black plastic	**MTS1-10B**	1SFA 611 300 R1006	**$ 18.00**
	Metal	**MTS1-30B**	1SFA 611 300 R 3006	

Toggle switch with three positions

Momentary, spring return from A to B and from C to B				
A / B / C	Black plastic	**MTS2-10B**	1SFA 611 301 R1006	**18.00**
	Metal	**MTS2-30B**	1SFA 611 301 R 3006	
Maintained				
A / B / C	Black plastic	**MTS3-10B**	1SFA 611 302 R1006	**18.00**
	Metal	**MTS3-30B**	1SFA 611 302 R 3006	

Contact blocks and holder

Blocks	Catalog No.	Ref. Code	List Price
1 NO with holder	**MCBH-10**	1SFA 611 605 R1101	**$ 10.00**
1 NC with holder	**MCBH-01**	1SFA 611 605 R1110	**10.00**
2 NO with holder	**MCBH-20**	1SFA 611 605 R1102	**18.00**
2 NC with holder	**MCBH-02**	1SFA 611 605 R1120	**18.00**
1 NO + 1 NC with holder	**MCBH-11**	1SFA 611 605 R1111	**18.00**
1 NO without holder	**MCB-10**	1SFA 611 610 R1001	**8.00**
1 NC without holder	**MCB-01**	1SFA 611 610 R1010	**8.00**
Holder for 3 blocks	**MCBH-00**	1SFA 611 605 R1100	**2.00**

Contact block functions

Block positions as seen from operator front.

Two-position maintained switch

Handle position	Left block	Right block
A	O	O
C	x	x

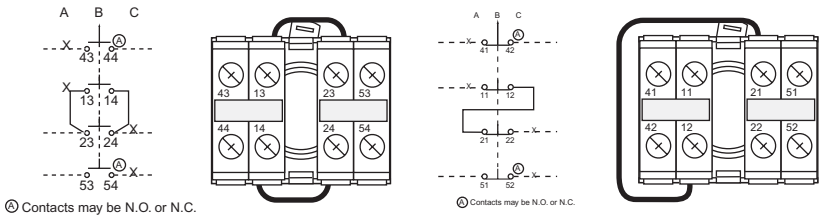
O = not actuated (normal state)
x = actuated (state changed)

Three-position switch

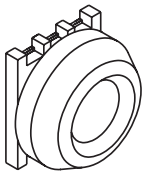
Handle position	Left block	Middle block	Right block
A	O	x	x
B	O	O	O
C	x	x	O

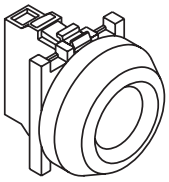
O = not actuated (normal state)
x = actuated (state changed)

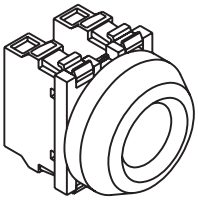
Center position connection detail

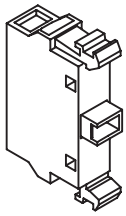


Definite purpose pushbuttons
30 mm
IP 66 Rated only









Definite purpose pushbuttons

The definite purpose pushbutton, 30 mm, is a robust and compact pushbutton for use in cold, hot, damp, oily and other tough environments.
Suitable especially for hydraulic lifts, compact pendant controllers and pushbutton stations.

Included contact blocks	Membrane color	Catalog No.	Ref. Code	List Price
1 NO + 1 NC	Black	**1SFA 616 105 R4076**	1SFA 616 105 R4076	**$ 45.00**
1 NO	Black	**1SFA 616 105 R4016**	1SFA 616 105 R4016	**37.00**
1 NC	Black	**1SFA 616 105 R4046**	1SFA 616 105 R4046	**37.00**
2 NO	Black	**1SFA 616 105 R4026**	1SFA 616 105 R4026	**45.00**
2 NC	Black	**1SFA 616 105 R4056**	1SFA 616 105 R4056	**45.00**
–	Red	**KP6-40R**	1SFA 616 105 R4001	**29.00**
–	Green	**KP6-40G**	1SFA 616 105 R4002	**29.00**
–	Black	**KP6-40B**	1SFA 616 105 R4006	**29.00**

Contact block

Description	Catalog No.	Ref. Code	List Price
1 NO	**MCB-10**	1SFA 611 610 R1001	**$ 8.00**
1 NC	**MCB-01**	1SFA 611 610 R1010	

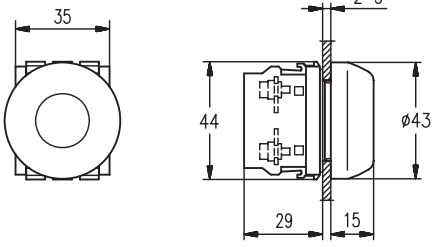
Accessories

Description	Catalog No. ①	Ref. Code	List Price
Guide washer for positioning and anti rotation	**2154 373-1**	2154 373-1	**$ 3.00**

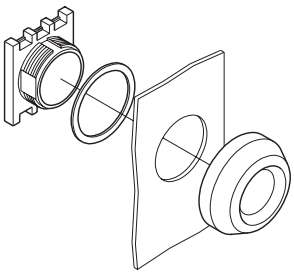
Technical data

Degree of protection	IP66
Ambient temperature	-30° ...+70°

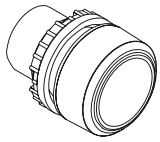
Dimensions

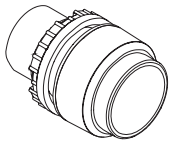


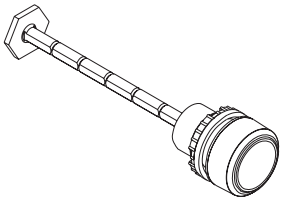
Mounting

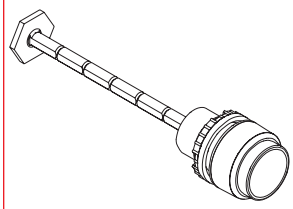


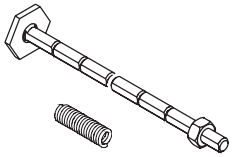
① IP66 Rating only.

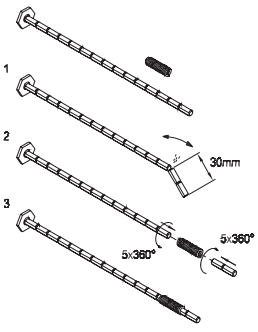












Reset pushbutton without shaft

Lens Color	Text	Catalog No.	Ref. Code	List Price
With flush button				
Red	No text	**KPR1-100R**	1SFA 616 160 R1001	**$ 8.50**
Green	No text	**KPR1-100G**	1SFA 616 160 R1002	**8.50**
	II	**KPR1-103G**	1SFA 616 160 R1032	**8.50**
Yellow	No text	**KPR1-100Y**	1SFA 616 160 R1003	**8.50**
Blue	No text	**KPR1-100L**	1SFA 616 160 R1004	**8.50**
	R	**KPR1-101L**	1SFA 616 160 R1014	**8.50**
White	No text	**KPR1-100W**	1SFA 616 160 R1005	**8.50**
	R	**KPR1-101W**	1SFA 616 160 R1015	**8.50**
	I	**KPR1-102W**	1SFA 616 160 R1025	**8.50**
	II	**KPR1-103W**	1SFA 616 160 R1035	**8.50**
Black	No text	**KPR1-100B**	1SFA 616 160 R1006	**8.50**
	RESET	**KPR1-104B**	1SFA 616 160 R1046	**12.00**
With extended button				
Red	No text	**KPR2-100R**	1SFA 616 161 R1001	
	O	**KPR2-105R**	1SFA 616 161 R1051	
White	No text	**KPR2-100W**	1SFA 616 161 R1005	**9.10**
Black	No text	**KPR2-100B**	1SFA 616 161 R1006	
	O	**KPR2-105B**	1SFA 616 161 R1056	

Reset pushbutton with shaft

The shaft can be cut to desired length

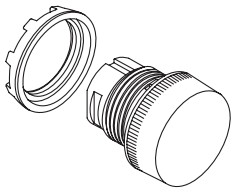
Lens Color	Text	Catalog No.	Ref. Code	List Price
With flush button				
Red	No text	**KPR3-100R**	1SFA 616 162 R1001	**$ 11.00**
Green	No text	**KPR3-100G**	1SFA 616 162 R1002	**11.00**
	II	**KPR3-103G**	1SFA 616 162 R1032	**11.00**
Yellow	No text	**KPR3-100Y**	1SFA 616 162 R1003	**11.00**
Blue	No text	**KPR3-100L**	1SFA 616 162 R1004	**11.00**
	R	**KPR3-101L**	1SFA 616 162 R1014	**11.00**
White	No text	**KPR3-100W**	1SFA 616 162 R1005	**11.00**
	R	**KPR3-101W**	1SFA 616 162 R1015	**11.00**
	I	**KPR3-102W**	1SFA 616 162 R1025	**11.00**
	II	**KPR3-103W**	1SFA 616 162 R1035	**11.00**
Black	No text	**KPR3-100B**	1SFA 616 162 R1006	**11.00**
	RESET	**KPR3-104B**	1SFA 616 162 R1046	**14.00**
	RESET	**KPR3-104BMR**	(Reset w/metal shaft)	**29.00**
With extended button				
Red	No text	**KPR4-100R**	1SFA 616 163 R1001	
	O	**KPR4-105R**	1SFA 616 163 R1051	
White	No text	**KPR4-100W**	1SFA 616 163 R1005	**12.00**
Black	No text	**KPR4-100B**	1SFA 616 163 R1006	
	O	**KPR4-105B**	1SFA 616 163 R1056	

Accessories

In applications with a long shaft, a flexible joint can be used to avoid damage to the shaft.

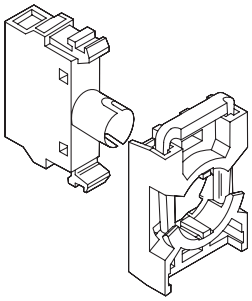
Description	Catalog No.	Ref. Code	List Price
Shaft Including fixing nut	**KA1-8046**	1SFA 616 920 R8046	**$ 2.25**
Flexible joint	**KA1-8047**	1SFA 616 920 R8047	**5.00**
Metal shaft Including fixing nut & foot	**KA1-8046MR**	—	**12.00**

Pilot lights and Buzzers

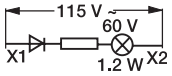
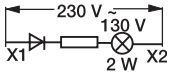


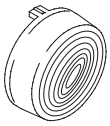
Pilot light head ①②

Lens color	Catalog No.	Ref. Code	List Price
Red	**ML1-100R**	1SFA 611 400 R1001	
Green	**ML1-100G**	1SFA 611 400 R1002	
Yellow	**ML1-100Y**	1SFA 611 400 R1003	**$ 4.50**
Blue	**ML1-100L**	1SFA 611 400 R1004	
White	**ML1-100W**	1SFA 611 400 R1005	
Clear	**ML1-100C**	1SFA 611 400 R1008	



Lamp blocks with holder ①

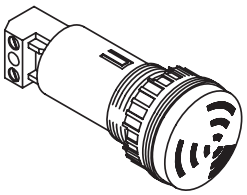
Supply voltage	Catalog No.	Ref. Code	List Price
For max. 2 W, 230 V AC and DC filament bulb or LED 	**MCBH-001**	1SFA 611 605 R1200	**$ 19.50**
115 V AC supply voltage. **For 60 V filament bulb max. 1.2 W** 	**MCBH-002**	1SFA 611 605 R1300	**23.50**
230 V AC supply voltage. **For 130 V filament bulb max. 2 W** 	**MCBH-003**	1SFA 611 605 R1400	**23.50**



Light diffusing lens

To improve illumination. *Note: Cannot be used with text cap*.

Description	Catalog No.	Ref. Code	List Price
The lens is used instead of text cap	**KA1-8005**	1SFA 616 920 R8005	**$ 3.00**

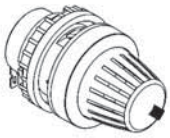


Buzzers

Black. Frequency: Approx. 2400 Hz. Loudness: Min 80 dB (A)/10 cm
Rated current: ≤ 8 mA. Service life:>5000 h

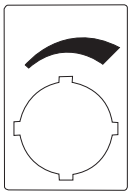
Supply voltage	Tone	Catalog No.	Ref. Code	List Price
24 V AC/DC	Continuous	**KB1-4010**	1SFA 616 401 R4010	**$ 75.00**
115 V AC/DC	Continuous	**KB1-4030**	1SFA 616 401 R4030	**75.00**
230 VAC	Continuous	**KB1-4040**	1SFA 616 401 R4040	**75.00**
24 V AC/DC	Pulsating	**KB1-4110**	1SFA 616 401 R4110	**85.00**
115 V AC/DC	Pulsating	**KB1-4130**	1SFA 616 401 R4130	**85.00**
230 V AC	Pulsating	**KB1-4140**	1SFA 616 401 R4140	**85.00**

① Bulb not included. See page 8.23
② For compact style, see page 8.33.

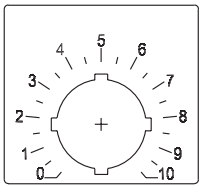


Resistor data

Element Catalog No.	Cermet
Power rating	2 W
Mechanical angle	280°
Terminals	Solder lugs
Insulation voltage	900 V
Operating temperature	-1 – +70 °C



29.6 x 44.5 mm



48.5 x 44.5 mm

Complete potentiometers

Black knob with integrated position indication and marking in white.

Description	Catalog No.	Ref. Code	List Price
- with resistor 5 kohm			
Black plastic	**KT-105B**	1SFA 616 410 R1056	**$ 90.00**
Metal	**KT-305B**	1SFA 616 410 R3056	**95.00**
- with resistor 10 kohm			
Black plastic	**KT-110B**	1SFA 616 410 R1106	**90.00**
Metal	**KT-310B**	1SFA 616 410 R3106	**95.00**

Operating knob – without resistor

Black knob with integrated position indication and marking in white.

For shaft diameter 6 - 6.35 mm.
Min. shaft length 20 mm

Description	Catalog No.	Ref. Code	List Price
Black plastic	**KT-100B**	1SFA 616 410 R1006	**$ 15.00**
Metal	**KT-300B**	1SFA 616 410 R3006	**20.00**

Legend plates

Aluminum

Description	Catalog No.	Ref. Code	List Price
Symbol - see figure	**SK 615 562-87**	SK 615 562-87	**$ 10.00**
Scale: 0 - 10	**SK 615 562-88**	SK 615 562-88	

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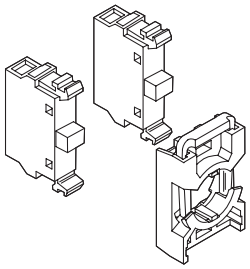
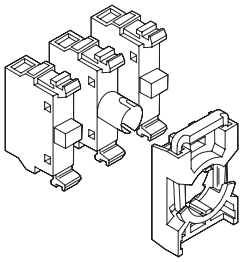
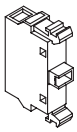
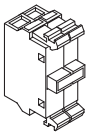
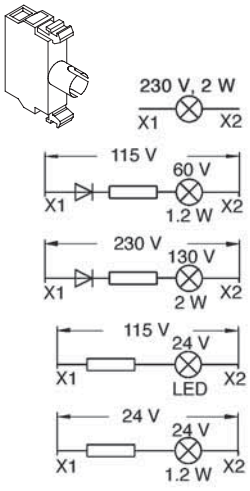
Accessories

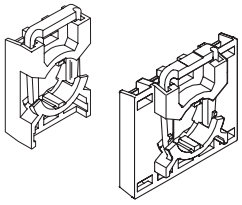












Contact blocks and lamp blocks with holder for front mounting

Max. number of blocks in holder	Included blocks	Catalog No.	Ref. Code	List Price
For non-illuminated operators				
3	1 NC	**MCBH-01**	1SFA 611 605 R1110	**$ 10.00**
3	1 NO	**MCBH-10**	1SFA 611 605 R1101	**10.00**
3	2 NC	**MCBH-02**	1SFA 611 605 R1120	**18.00**
3	2 NO	**MCBH-20**	1SFA 611 605 R1102	**18.00**
3	3 NC	**MCBH-03**	1SFA 611 605 R1130	**26.00**
3	3 NO	**MCBH-30**	1SFA 611 605 R1103	**26.00**
3	1 NO + 1 NC	**MCBH-11**	1SFA 611 605 R1111	**18.00**
3	1 NO + 2 NC	**MCBH-12**	1SFA 611 605 R1121	**26.00**
3	2 NO + 1 NC	**MCBH-21**	1SFA 611 605 R1112	**26.00**
For illuminated operators				
3	1 NC + 1 LB	**MCBH-011**	1SFA 611 605 R1210	**27.50**
3	1 NO + 1 LB	**MCBH-101**	1SFA 611 605 R1201	**27.50**
3	1 NO + 1 NC + 1 LB	**MCBH-111**	1SFA 611 605 R1211	**35.50**
3	2 NC + 1 LB	**MCBH-021**	1SFA 611 605 R1220	**35.50**
3	2 NO + 1 LB	**MCBH-201**	1SFA 611 605 R1202	**35.50**

Single contact blocks for front mounting

Included blocks	Catalog No.	Ref. Code	List Price
1 NO	**MCB-10**	1SFA 611 610 R1001	**$ 8.00**
1 NC	**MCB-01**	1SFA 611 610 R1010	**8.00**
1 NO with gold plated contacts	**MCB-10G**	1SFA 611 610 R1101	**16.00**
1 NC with gold plated contacts	**MCB-01G**	1SFA 611 610 R1110	**16.00**

Double contact block for front mounting

To be used together with MCBH5-00 when contact blocks in position 4- and 5- are needed.
Also when using MCBH-00 together with selector switch and contact block in positioon 3- is needed

Included blocks	Catalog No.	Ref. Code	List Price
2 NO	**MCB-20**	1SFA 611 610 R1002	
2 NC	**MCB-02**	1SFA 611 610 R1020	**$ 16.00**
1 NO + 1 NC	**MCB-11**	1SFA 611 610 R1011	

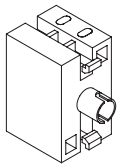
Single lamp blocks for front mounting, Ba 9s base

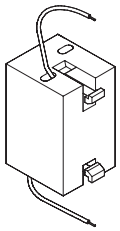
Description	Catalog No.	Ref. Code	List Price
For max. 2 W, 230 V AC and DC filament bulb or LED	**MLB-1**	1SFA 611 620 R1001	**$ 17.50**
115 V AC supply voltage. **For 60 V filament bulb max. 1.2 W**	**MLB-2**	1SFA 611 620 R1002	**21.50**
230 V AC supply voltage. **For 130 V filament bulb max. 2 W**	**MLB-3**	1SFA 611 620 R1003	**21.50**
115 V AC and DC supply voltage **For 24 V LED**	**MLB-4**	1SFA 611 620 R1004	**21.50**
24 V AC and DC supply voltage. With resistor. Intended for electronic circuits. The resistor limits the making current and protects against disturbances in the electronic circuit **For 24 V filament bulb**	**MLB-5**	1SFA 611 620 R1005	**21.50**

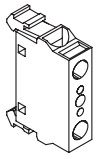
Holders

Description	Catalog No.	Ref. Code	List Price
Holders for front mounting			
For three blocks	**MCBH-00**	1SFA 611 605 R1100	**$ 2.00**
For five blocks	**MCBH5-00**	1SFA 611 601 R1100	**4.00**

Contact blocks and lamp blocks for rear mounting See Page 8.43







Transformer block

For 6 or 24 V filament bulb and 24 V LED. Rated power 1.5 W.

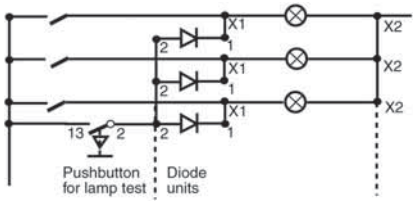
Primary voltage	Secondary voltage	Catalog No.	Ref. Code	List Price
With lamp holder for front mounting, Ba 9s base				
Intended to supply a 1.2 W filament bulb.				
110 - 127V AC	6 V AC	**KTR1-1001**	1SFA 616 950 R1001	**$ 35.00**
220 - 250 V AC	6 V AC	**KTR1-1002**	1SFA 616 950 R1002	
380 - 420 V AC	6 V AC	**KTR1-1003**	1SFA 616 950 R1003	
440 - 480 V AC	6 V AC	**KTR1-1004**	1SFA 616 950 R1004	
500 - 600 V AC	6 V AC	**KTR1-1005**	1SFA 616 950 R1005	
110 - 127 V AC	24 V AC ①	**KTR1-1011**	1SFA 616 950 R1011	
220 - 250 V AC	24 V AC ①	**KTR1-1012**	1SFA 616 950 R1012	
380 - 420 V AC	24 V AC ①	**KTR1-1013**	1SFA 616 950 R1013	
440 - 480 V AC	24 V AC ①	**KTR1-1014**	1SFA 616 950 R1014	
For illuminated operators ②				
Intended to supply a 1.2 W filament bulb mounted in lamp block MLB-1 (1SFA 611 620 R1001) only.				**35.00**
110 - 127V AC	6 V AC	**KTR1-2001**	1SFA 616 950 R2001	
220 - 250 V AC	6 V AC	**KTR1-2002**	1SFA 616 950 R2002	
380 - 420 V AC	6 V AC	**KTR1-2003**	1SFA 616 950 R2003	
440 - 480 V AC	6 V AC	**KTR1-2004**	1SFA 616 950 R2004	
500 - 600 V AC	6 V AC	**KTR1-2005**	1SFA 616 950 R2005	
110 - 127 V AC	24 V AC ①	**KTR1-2011**	1SFA 616 950 R2011	
220 - 250 V AC	24 V AC ①	**KTR1-2012**	1SFA 616 950 R2012	
380 - 420 V AC	24 V AC ①	**KTR1-2013**	1SFA 616 950 R2013	
440 - 480 V AC	24 V AC ①	**KTR1-2014**	1SFA 616 950 R2014	

Diode block

To be used if several lamps are to be connected to a common lamp-test pushbutton. A diode must be connected in series with each lamp. The diode block snaps onto the lamp block or is placed at the side.

Description	Catalog No.	Ref. Code	List Price
Diode block	**MDB-1001**	1SFA 611 630 R1001	**$ 14.00**

Diagram for lamp test with three diode block



① Can be used with LED bulb
② To be used with with directly supplied lamp blocks only.

Accessories

Filament bulbs

Ba 9s base Catalog No. of current: AC/DC. A lamp changing tool is required for changing bulb.

Description					Catalog No.	Ref. Code	List Price
Rated voltage V	Rated current mA	Rated output W	Service life h	Luminance mcd			
6	200	1.2	10 000	350	**5911 086-11**	5911 086-11	
12	100	1.2	10 000	230	**5911 086-12**	5911 086-12	
24	50	1.2	10 000	280	**5911 086-13**	5911 086-13	
30	40	1.2	10 000	250	**5911 086-4**	5911 086-4	**$ 6.00**
48	42	2	6 000	500	**5911 086-5**	5911 086-5	
60	20	1.2	5 000	190	**5911 086-14**	5911 086-14	
110	18	2	7 500	250	**5911 086-7**	5911 086-7	
130	15	2	7 500	120	**5911 086-15**	5911 086-15	

LEDs

With one diode chip mounted on a Ba 9s base. Choose the same color for the LED and the lamp cap or else use a clear lamp cap.

For white light use white LED with clear lamp cap. At DC the lamp base have to be connected to cathode (-) and the bottom contact to anode (+).

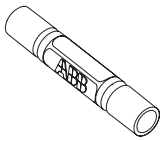
Description				Catalog No.	Ref. Code	List Price
Color	Rated current mA	Wave-length nm	Luminance mcd			
Rated voltage 12 V, DC Service life >50 000 h						
Red	15	630	250	**KA2-2011**	1SFA 616 921 R2011	
Green	15	525	1000	**KA2-2012**	1SFA 616 921 R2012	
Yellow	15	592	250	**KA2-2013**	1SFA 616 921 R2013	**$ 21.00**
Blue	15	470	450	**KA2-2014**	1SFA 616 921 R2014	
White	15	x=0.31 y=0.32	600	**KA2-2015**	1SFA 616 921 R2015	
Rated voltage 24 V, (AC)/DC ① Service life >50 000 h						
Red	15	630	250	**KA2-2021**	1SFA 616 921 R2021	
Green	15	525	800	**KA2-2022**	1SFA 616 921 R2022	
Yellow	15	592	250	**KA2-2023**	1SFA 616 921 R2023	**15.00**
Blue	15	470	400	**KA2-2024**	1SFA 616 921 R2024	
White	15	x=0.31 y=0.32	500	**KA2-2025**	1SFA 616 921 R2025	
Rated voltage 48 V, (AC)/DC ① Service life >50 000 h						
Red	12	630	200	**KA2-2041**	1SFA 616 921 R2041	
Green	12	525	1700	**KA2-2042**	1SFA 616 921 R2042	
Yellow	12	592	240	**KA2-2043**	1SFA 616 921 R2043	**21.00**
Blue	12	470	720	**KA2-2044**	1SFA 616 921 R2044	
White	12	x=0.31 y=0.32	1200	**KA2-2045**	1SFA 616 921 R2045	
Rated voltage 60 V, (AC)/DC ① Service life >50 000 h						
Red	10	630	160	**KA2-2051**	1SFA 616 921 R2051	
Green	10	525	1400	**KA2-2052**	1SFA 616 921 R2052	
Yellow	10	592	200	**KA2-2053**	1SFA 616 921 R2053	**21.00**
Blue	10	470	600	**KA2-2054**	1SFA 616 921 R2054	
White	10	x=0.31 y=0.32	1000	**KA2-2055**	1SFA 616 921 R2055	
Rated voltage 110-130 V, AC ① Service life 25 000 h						
Red	4-6	630	60-100	**KA2-2131**	1SFA 616 921 R2131	
Green	4-6	525	500-850	**KA2-2132**	1SFA 616 921 R2132	
Yellow	4-6	592	70-120	**KA2-2133**	1SFA 616 921 R2133	**15.00**
Blue	4-6	470	220-350	**KA2-2134**	1SFA 616 921 R2134	
White	4-6	x=0.31 y=0.32	350-600	**KA2-2135**	1SFA 616 921 R2135	
Rated voltage 110-130 V, AC/DC ① Service life 25 000 h						
Red	4-6	630	60-100	**KA2-2141**	1SFA 616 921 R2141	
Green	4-6	525	500-850	**KA2-2142**	1SFA 616 921 R2142	
Yellow	4-6	592	70-120	**KA2-2143**	1SFA 616 921 R2143	**21.00**
Blue	4-6	470	220-350	**KA2-2144**	1SFA 616 921 R2144	
White	4-6	x=0.31 y=0.32	350-600	**KA2-2145**	1SFA 616 921 R2145	
Rated voltage 230 V, AC ① Service life 25 000 h						
Red	4	630	60	**KA2-2221**	1SFA 616 921 R2221	
Green	4	525	500	**KA2-2222**	1SFA 616 921 R2222	
Yellow	4	592	70	**KA2-2223**	1SFA 616 921 R2223	**21.00**
Blue	4	470	220	**KA2-2224**	1SFA 616 921 R2224	
White	4	x=0.31 y=0.32	350	**KA2-2225**	1SFA 616 921 R2225	

① At AC the luminance is decreased with 30 % and there is also a slight flickering.

Flashing LED

A lamp changing tool is required for changing bulb.
Choose the same color for the LED and the lamp cap or use a clear lamp cap.
The lamp base has to be connected to cathode (-) and the bottom contact to anode (+).

Description	Catalog No.	Ref. Code	List Price
Rated voltage 24 V, rated current 25 mA, DC			
Color / **Wave length nm** / **Service life hours**			
Red 630 50 000	**4950 512-1**	4950 512-1	**$ 20.00**
Green 565 50 000	**4950 512-2**	4950 512-2	**44.25**
Yellow 585 50 000	**4950 512-3**	4950 512-3	**20.00**



Lamp changing tool

Description	Catalog No.	Ref. Code	List Price
For LEDs and for bulbs	**KA1-8072**	1SFA 616 920 R8072	**$ 10.00**

Mounting tool

Description	Catalog No.	Ref. Code	List Price
Used for tightening the sleeve	**KA1-8015**	1SFA 611 920 R8015	**$ 10.00**

Membrane of rubber

Of transparent, heat and cold resistant rubber. Does not harden at low temperature.
Gives IP 67 degree of protection. When membrane is used, remove the gasket.

For operator with	Catalog No.	Ref. Code	List Price
Flush button	**KA1-8052**	1SFA 616 920 R8052	**$ 8.00**
Extended button	**KA1-8002**	1SFA 616 920 R8002	

Emergency stop shroud

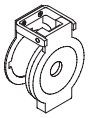
For 40 mm Emergency Stop Pushbuttons. Not for use with plastic enclosure.

Color	Catalog No.	Ref. Code	List Price
To prevent inadvertant operation. Yellow	**KA1-8053**	1SFA 616 920 R8053	**$ 16.00**

Protective ring

For flush and extended buttons

Description	Catalog No.	Ref. Code	List Price
To prevent inadvertant operation. Not together with legend plate holder.	**SK 615 512-1**	SK 615 512-1	**$ 4.00**



Protective cover

Description	Catalog No.	Ref. Code	List Price
For flush button. To prevent inadvertant operation. Not together with legend plate holder.	**KA1-8010**	1SFA 616 920 R8010	**$ 15.00**

Bezel (Packing unit 10 pieces)

Description	Catalog No.	Ref. Code	List Price
For pushbutton			
Grey, plastic	**KA1-8079**	1SFA 616 920 R8079	**$ 1.00**
Black, plastic	**KA1-8022**	1SFA 616 920 R8022	**1.00**
Metal	**KA1-8021**	1SFA 616 920 R8021	**2.50**
For selector switch			
Grey, plastic	**KA1-8077**	1SFA 616 920 R8077	**1.00**
Black, plastic	**KA1-8080**	1SFA 616 920 R8080	**1.00**
Metal	**KA1-8024**	1SFA 616 920 R8024	**2.50**
Square bezel			
Black, plastic (Packing unit 10 pieces)	**SK 616 016-2**	SK 616 016-2	**2.00**
Grey, plastic (Packing unit 10 pieces)	**KA1-8124**	1SFA 611 920 R8124	

8

Accessories

30 mm adaptors

For use when fitting the 22 mm pilot devices in 30 mm mounting holes. (1.5 – 4 mm panels)

Description	Catalog No.	Ref. Code	List Price
For use with emergency stop pushbuttons			
Black plastic.	**KA1-8027**	1SFA 616 920 R8027	**$ 8.00**
Metal.	**KA1-8028**	1SFA 616 920 R8028	**10.00**
For use with pushbuttons, selector switches, pilot lights, potentiometers and buzzers			
Black plastic.	**KA1-8029**	1SFA 616 920 R8029	**8.00**
Metal.	**KA1-8030**	1SFA 616 920 R8030	**10.00**

Adaptors

Description	Catalog No.	Ref. Code	List Price
For flush mounted pushbuttons	**KA1-8073**	1SFA 616 920 R8073	**$ 15.00**
For flush mounted selector switches	**KA1-8074**	1SFA 616 920 R8074	

Extra key

Description	Catalog No.	Ref. Code	List Price
Ronis 455 (key code 71)	**SK 616 021-71**	SK 616 021-71	
Ronis 421 (key code 72)	**SK 616 021-72**	SK 616 021-72	**$ 10.00**
Ronis 3433-E (key code 73)	**SK 616 021-73**	SK 616 021-73	

Label sheet

Description	Catalog No.	Ref. Code	List Price
For marking of contact blocks at two levels	**2949 1725-1**	2949 1725-1	**$ 10.00**

Lenses for pilot lights (Packing unit 10 pieces)

Description/Color	Catalog No.	Ref. Code	List Price
Red	**KA1-8031**	1SFA 616 920 R8031	
Green	**KA1-8032**	1SFA 616 920 R8032	
Yellow	**KA1-8033**	1SFA 616 920 R8033	**$ 2.50**
Blue	**KA1-8034**	1SFA 616 920 R8034	
White	**KA1-8035**	1SFA 616 920 R8035	

Buttons for pushbuttons (Packing unit 10 pieces)

Description	Color	Catalog No.	Ref. Code	List Price
Flush, opaque	Red	**KA1-8081**	1SFA 616 920 R8081	
	Green	**KA1-8082**	1SFA 616 920 R8082	
	Yellow	**KA1-8083**	1SFA 616 920 R8083	
	Blue	**KA1-8084**	1SFA 616 920 R8084	
	White	**KA1-8085**	1SFA 616 920 R8085	
	Black	**KA1-8086**	1SFA 616 920 R8086	
	Grey	**KA1-8087**	1SFA 616 920 R8087	
	Clear	**KA1-8088**	1SFA 616 920 R8088	
Extended, opaque	Red	**KA1-8091**	1SFA 616 920 R8091	
	Green	**KA1-8092**	1SFA 616 920 R8092	
	Yellow	**KA1-8093**	1SFA 616 920 R8093	
	Blue	**KA1-8094**	1SFA 616 920 R8094	
	White	**KA1-8095**	1SFA 616 920 R8095	
	Black	**KA1-8096**	1SFA 616 920 R8096	**$ 1.50**
	Grey	**KA1-8097**	1SFA 616 920 R8097	
	Clear	**KA1-8098**	1SFA 616 920 R8098	
Flush, transparent	Red	**KA1-8101**	1SFA 616 920 R8101	
	Green	**KA1-8102**	1SFA 616 920 R8102	
	Yellow	**KA1-8103**	1SFA 616 920 R8103	
	Blue	**KA1-8104**	1SFA 616 920 R8104	
	White	**KA1-8105**	1SFA 616 920 R8105	
	Clear	**KA1-8108**	1SFA 616 920 R8108	
Extended, transparent	Red	**KA1-8111**	1SFA 616 920 R8111	
	Green	**KA1-8112**	1SFA 616 920 R8112	
	Yellow	**KA1-8113**	1SFA 616 920 R8113	
	Blue	**KA1-8114**	1SFA 616 920 R8114	
	White	**KA1-8115**	1SFA 616 920 R8115	
	Clear	**KA1-8118**	1SFA 616 920 R8118	

22mm hole plug (UL Type 1, 3R, 4, 4X, 12)

Hole plugs are used to cover pushbutton holes in panels

Description	Catalog No.	List Price
22mm hole plug	**SK 616 502-B**	**$ 2.00**

Padlock attachment for 30mm mushroom head (twist release only)

Prevents unauthorized use of equipment. Provides space for up to 4 padlocks with the button in the depressed position. Holes fit standard 1/4” padlock.

Description	Catalog No.	List Price
Padlock attachment	**SK 615 502-D**	**$ 20.00**

Spare gasket

Description	Catalog No.	List Price
Gasket	**2152 0357-1**	**$ 1.00**

Selector switch lock

Description	Catalog No.	List Price
Selector switch lock	**CBK-XSWL**	**$ 35.00**

Selector switch guard

Description	Catalog No.	List Price
Selector switch guard	**CBK-XSWG**	**$ 8.00**

8

Technical data

E 57057

Approvals

The pushbuttons, selector switches and pilot lights are approved by:
- National approval agencies: UL, CSA and China Compulsory Product Certification

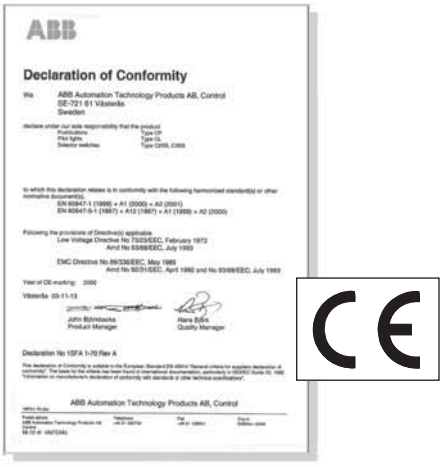
For detail information please contact ABB

Standards

IEC 60947-1	Low-voltage switchgear and controlgear - Part 1: General rules
IEC 60947-5-1	Low-voltage switchgear and controlgear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices
IEC 60947-5-5	Low-voltage switchgear and controlgear - Part 5-5: Control circuit devices and switching elements - Electrical emergency stop device with mechanical latching function
IEC 60073	Basic and safety principles for man-machine interface, marking and identification - Coding principles for indicators and actuators
IEC 60529	Degrees of protection provided by enclosures (IP Code)
EN 60947-1	Low-voltage switchgear and controlgear - Part 1: General rules
EN 60947-5-1	Low-voltage switchgear and controlgear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices
EN 60947-5-5	Low-voltage switchgear and controlgear - Part 5-5: Control circuit devices and switching elements - Electrical emergency stop device with mechanical latching function
EN 60073	Basic and safety principles for man-machine interface, marking and identification - Coding principles for indication devices and actuators
EN 60529	Degrees of protection provided by enclosures (IP Code)
EN 50013	Low-voltage switchgear and controlgear for industrial use - Terminal marking and distinctive number for particular control switches
UL 508	Industrial Control Equipment
CSA C22.2 No 14	Industrial Control Equipment

Degrees of protection

Operators	**IP**	**UL/CSA**
Pushbutton with flush or extended button, **MP**	IP 66	Type 1, 3R, 4, 4X, 12, 13
Double pushbutton, **MPD**	IP 66	Type1, 3R, 4, 4X, 12, 13
Mushroom pushbutton, momentary, **MPM**	IP 66	Type 1, 3R, 4, 4X, 12, 13
Emergency stop pushbutton, **MPMT/P**	IP 66	Type 1, 3R, 4, 4X, 12, 13
Selector switch, **M2SS/M3SS**	IP 66	Type 1, 3R, 4, 4X, 12, 13
Key operated selector switch, **M2SSK/M3SSK**	IP 66	Type 1, 3R, 4, 4X, 12
Toggle switch, **MTS2/MTS3**	IP 66	Type 1, 3R, 4, 4X, 12, 13
Definite purpose pushbutton, 30 mm, **KP6**	IP 66	–
Reset button, **KPR**	IP 66	Type 1, 3R, 4, 4X, 12, 13
Pilot lights, **ML**	IP 66	Type 1, 3R, 4, 4X, 12, 13
Buzzer, **KB**	IP 65	Type 4X
Potentiometer, **KT**	IP 66	Type 1, 3R, 4, 4X, 12, 13
Contact block & transformer block	IP 20	
Enclosures		
Plastic enclosures	IP 66	
Metallic enclosures	IP 67	



Material

No ozone depleting substances in the products.

All front parts are made of polycarbonate

Material		
PC	Polycarbonate	High impact strength, good outdoor resistance. Can withstand light acid solutions, aliphatic hydrocarbons, paraffin, alcohols, animal and vegetable greases.
PSU	Polysulphone	Can withstand high temperatures, acids, basic solutions, alkaline compounds, oils, alcohols.
PA	Polyamide	Can withstand high temperatures, aliphatic, aromatic and chlorinated hydrocarbons, esters, ketone-aldehydes, alcohols and basic solutions.
PBT		Can withstand high temperature, aliphatic and aromatic hydrocarbons, acids, basic solutions, alcohols, grease and oils
Zinc		Good corrosion resistance in inland-, sea and industrial atmosphere.
Light-alloy		Good corrosion resistance in inland-, sea and industrial atmosphere.
Rubber		Chloroprene Nitrile

Mechanical life

Operators

Pushbuttons with flush or extended button, momentary mushroom push-button	2 million operations
Selector switch, maintained mushroom pushbutton, key operated selector switch and double pushbutton	0.5 million operations
Emergency stop pushbutton	0.1 million operations
Toggle switch	1 million operations
Lockable pushbuttons	0.3 million operations

Temperature

Ambient temperature during operation	-25 to +70 °C
Exception: All pilot devices with 2 W continuously lit filament bulb	*-25 to +40 °C*
Storage temperature	-30 to +85 °C

Terminals

Plus-minus Pozidriv No.2 screw with DIN-washer.

Connectable area	min. 1 x 0.5 mm²/AWG 20 max. 2 x 2.5 mm²/2 x AWG14
Recommended torque	0.9 Nm

Tightening torque

Locking nut, M22	Min. 2 Nm Max. 2.3 Nm

Contact blocks

Mechanical endurance: 10 million operations

Self cleaning contacts of silver, NC contact with positive opening.
At voltages and currents below 24 V and 5.6 mA two contact blocks in parallel are recommended. As an alternative, gold plated contacts can be used.

Ratings as per UL, CSA, NEMA		**A600**		**Q600**
		AC		DC
Rated insulation voltage		600 V		600 V
Rated thermal current		10 A		2.5 A
Rated operational current	at 120 V	6 A	at 125 V	0.55 A
	240 V	3 A	250 V	0.27 A
	480 V	1.5 A	480 V	0.10 A
	600 V	1.2 A	600 V	0.10 A

Ratings as per IEC 60 947-5-1		
Rated insulation voltage, U_i		690 V
Rated thermal current, I_{th}		10 A
Rated operational current, I_e utilisation category AC 15,	at 120 V	8 A
	230 V	6 A
	400 V	4 A
	690 V	2 A
Rated operational current, I_e utilisation category DC 13,	at 24 V	5 A
	125 V	1.1 A
	250 V	0.55 A
Contact resistance		< 25 mΩ
Compulsory function test	at	5V, 16 mA

Max. number of contact blocks per operator ①

Pushbutton, toggle switch and mushroom pushbutton	6
Maintained pushbutton	4
Double pushbutton, selector switch, key operated selector switch and emergency stop pushbutton	4

Short circuit protection

Max. fuse at 1 kA	16 A ordinary 10 A delayed

① The contact blocks can be stacked in max. two levels on the 3- block holder. Only one level is accepted on the 5-block holder.

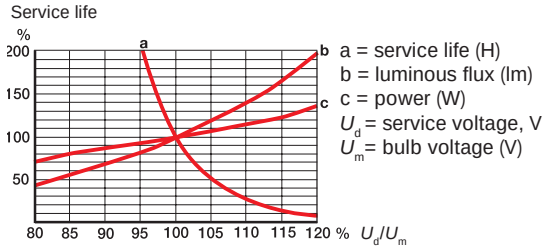
Lamp block

Ratings as per IEC 60 947-5-1

Rated insulation voltage	230 V
Base	Ba 9s
Permissible power, up to	2 W

Service life of filament bulb

Relative service life, luminous flux and power consumption at different service voltages.
It is generally true to say that bulbs for lower voltages give more light and have better vibration-withstand capability than bulbs for higher voltages.



Lamp comparison

Bulb Catalog No.	Approx. life (hours)	Shock and service immunity	High vibration temperature	Low power operating	Brightness consumption
Filament	5000 - 10 000	+	+	+	+++
LED	25 000 - 50 000	+++	++	++	++

Very good +++
Good ++
Less good +

Transformer block

Suitable for filament bulb 6 or 24 V AC and 1.2 W and LED 24 V.

Rated power	1.5 W
Rated voltage	Ratio, see Accessories page 8.25
Rated insulation voltage acc. to IEC 70 °C (DT)	Class E

Notes

Compact range

The compact range is a new competitive choice for customers with high requirements of cost efficient, easy to use and reliable products.

General construction

- ”All-in-one function”
- One Ref. code =one complete function
- Easy mounting
- Less inventory
- Broad range of accessories
- Same front design as for the modular range.
- Durable actuators in clear colors with large text and push area
- UL File# E57057
- CSA File# LR19700

Technical advantages

- High degree of protection: UL Type 1, 3R, 4, 4X, 12 & 13
- One or two built-in electrically separated contacts (1NO, 1NC, 2NO, 2NC or 1NC & 1NO)
- Contacts with wiping action
- Low built-in depth

Operators

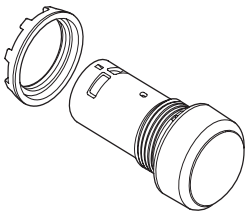
- Pushbuttons, non-illuminated
- Emergency stop pushbuttons, non-illuminated, twist, pull or key release
- Selector switches, non-illuminated, 2 or 3 position

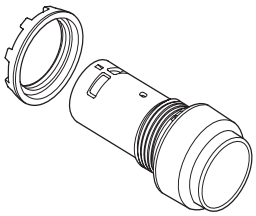
Pilot lights

- Ba 9s base for bulbs (6-130 V) or LED (12-130 V DC, 24-230 V AC)
- Pilot light with integrated LED (12-220 V DC, 24-230 V AC)

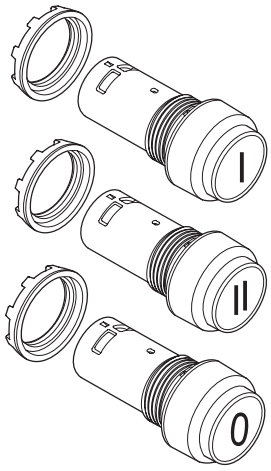
42 mm

Flush and extended pushbuttons
Non-illuminated





Bezel in black plastic as standard
Bezel in metal:
Replace '**1**' in the:
Catalog No. CPX-1 0X
Ref. Code 1SFA619XXX R 1XXX
3 for metal bezel



Codes for button colors

	Catalog No. ■	Ref. Code □
Red	**R**	**1**
Green	**G**	**2**
Yellow	**Y**	**3**
Blue	**L**	**4**
White	**W**	**5**
Black	**B**	**6**
Grey	**U**	**7**

Pushbutton with ...

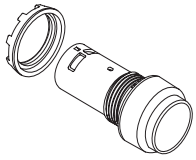
Description	Catalog No.	Ref. Code	List Price
Flush button			
Momentary			
Contacts included:			
1 NO	**CP110■-10**	1SFA 619 100 R101□	**$ 15.20**
2 NO	**CP110■-20**	1SFA 619 100 R102□	**19.90**
1 NC	**CP110■-01**	1SFA 619 100 R104□	**15.20**
2 NC	**CP110■-02**	1SFA 619 100 R105□	**19.90**
1 NO +1 NC	**CP110■-11**	1SFA 619 100 R107□	**19.90**
Maintained			
Contacts included:			
1 NO	**CP210■-10**	1SFA 619 101 R101□	**19.90**
2 NO	**CP210■-20**	1SFA 619 101 R102□	**22.50**
1 NC	**CP210■-01**	1SFA 619 101 R104□	**19.90**
2 NC	**CP210■-02**	1SFA 619 101 R105□	**22.50**
1 NO +1 NC	**CP210■-11**	1SFA 619 101 R107□	**22.50**
Extended button			
Momentary			
Contacts included:			
1 NO	**CP310■-10**	1SFA 619 102 R101□	**15.20**
2 NO	**CP310■-20**	1SFA 619 102 R102□	**19.90**
1 NC	**CP310■-01**	1SFA 619 102 R104□	**15.20**
2 NC	**CP310■-02**	1SFA 619 102 R105□	**19.90**
1 NO +1 NC	**CP310■-11**	1SFA 619 102 R107□	**19.90**
Maintained			
Contacts included:			
1 NO	**CP410■-10**	1SFA 619 103 R101□	**19.90**
2 NO	**CP410■-20**	1SFA 619 103 R102□	**22.50**
1 NC	**CP410■-01**	1SFA 619 103 R104□	**19.90**
2 NC	**CP410■-02**	1SFA 619 103 R105□	**22.50**
1 NO +1 NC	**CP410■-11**	1SFA 619 103 R107□	**22.50**
Flush button			
Momentary			
White button with black I			
Contacts included:			
1 NO	**CP1110W-10**	1SFA 619 110 R1015	**16.70**
Momentary			
White button with black II			
Contacts included:			
1 NO	**CP1210W-10**	1SFA 619 120 R1015	**16.70**
Extended button			
Momentary			
Black button with white O			
Contacts included:			
1NC	**CP3310B-01**	1SFA 619 132 R1046	**16.70**

Ordering example – Compact pushbutton

Requested: A compact pushbutton, momentary, with red extended button and one NO contact.

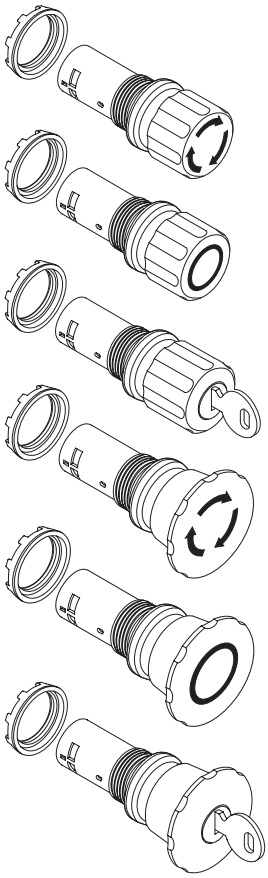
Ref.: 10 pieces of CP3-10R-10

Minimum Ref. quantity: 10 pieces
Packing: 10 pieces/plastic bag. 10 bags/box



Emergency stop pushbuttons
Non-illuminated

Fulfills IEC 60947-5-5



The emergency stops with key release are delivered with two keys.

Plastic operator

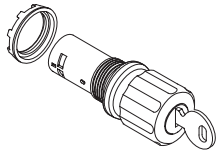
Description	Color	Catalog No.	Ref. Code	List Price
Ø 30 mm				
Twist release	Red			
Contacts included:				
1 NC		**CE3T-10R-01**	1SFA 619 500 R1041	**$ 28.00**
2 NO		**CE3T-10R-20**	1SFA 619 500 R1021	**28.00**
2 NC		**CE3T-10R-02**	1SFA 619 500 R1051	**33.60**
1 NO +1 NC		**CE3T-10R-11**	1SFA 619 500 R1071	**33.60**
Pull release	Red			
Contacts included:				
2 NC		**CE3P-10R-02**	1SFA 619 501 R1051	**33.60**
1 NO +1 NC		**CE3P-10R-11**	1SFA 619 501 R1071	**33.60**
Key release	Red			
(Key code 71, Ronis 455)				
Contacts included:				
2 NC		**CE3K1-10R-02**	1SFA 619 502 R1051	**53.40**
1 NO +1 NC		**CE3K1-10R-11**	1SFA 619 502 R1071	**53.40**
Ø 40 mm				
Twist release	Red			
Contacts included:				
1 NC		**CE4T-10R-01**	1SFA 619 550 R1041	**30.80**
2 NO		**CE4T-10R-20**	1SFA 619 550 R1021	**36.40**
2 NC		**CE4T-10R-02**	1SFA 619 550 R1051	**36.40**
1 NO +1 NC		**CE4T-10R-11**	1SFA 619 550 R1071	**36.40**
Pull release	Red			
Contacts included:				
2 NC		**CE4P-10R-02**	1SFA 619 551 R1051	**36.40**
1 NO +1 NC		**CE4P-10R-11**	1SFA 619 551 R1071	**36.40**
Key release	Red			
(Key code 71, Ronis 455)				
Contacts included:				
2 NC		**CE4K1-10R-02**	1SFA 619 552 R1051	**57.50**
1 NO +1 NC		**CE4K1-10R-11**	1SFA 619 552 R1071	**57.50**

Ordering example – Compact Emergency stop pushbutton

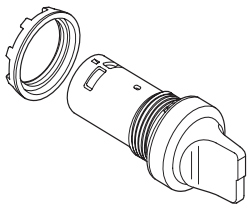
Requested: A compact emergency stop pushbutton, 30 mm, with key release and two NC contacts.

Ref.: 10 pieces of CE3K1-10R-02.

Minimum Ref. quantity: 10 pieces
Packing: 1 piece/plastic bag.



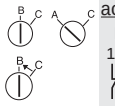
Two and three position selector switches
Non-illuminated



Contacts actuated

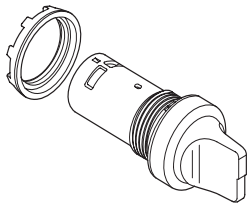
Two position selector switch

Contacts included,



actuated in position **C**

	NC	NO	NC	NO
	11	13	21	23
	12	14	22	24
1NO	–	1	–	–
2NO	–	1	–	1
1NC	1	–	–	–
2NC	1	–	1	–
1NO + 1NC	–	1	1	–



Bezel in black plastic as standard

Bezel in metal:

Replace '**1**' in the:

Catalog No. CPX-1 0X

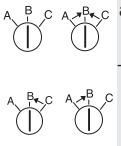
Ref. Code 1SFA619XXX R 1XXX

3 for metal bezel

Contacts actuated

Three position selector switch

Contacts included,



actuated in position:

	A		C	
	NC	NO	NC	NO
	21	23	11	13
	22	24	12	14
2NO	–	1	–	1
2NC	1	–	1	–
1NO + 1NC	1	–	–	1

Codes for handle colors

	Catalog No. ■	Ref. Code □
Red	**R**	**1**
Black	**B**	**6**
Grey	**U**	**7**

Selector switch with ...

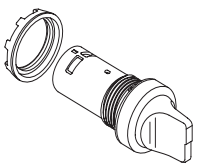
Description	Catalog No.	Ref. Code	List Price
Short handle. Two positions			
Maintained			
Contacts included:			
1 NO 	**C2SS110■-10**	1SFA 619 200 R101□	**$ 19.60**
2 NO	**C2SS110■-20**	1SFA 619 200 R102□	**27.20**
1 NC	**C2SS110■-01**	1SFA 619 200 R104□	**22.70**
2 NC	**C2SS110■-02**	1SFA 619 200 R105□	**27.20**
1 NO +1 NC	**C2SS110■-11**	1SFA 619 200 R107□	**27.20**
Maintained			
Contacts included:			
1 NO 	**C2SS210■-10**	1SFA 619 201 R101□	**16.70**
2 NO	**C2SS210■-20**	1SFA 619 201 R102□	**27.20**
1 NC	**C2SS210■-01**	1SFA 619 201 R104□	**22.70**
2 NC	**C2SS210■-02**	1SFA 619 201 R105□	**27.20**
1 NO +1 NC	**C2SS210■-11**	1SFA 619 201 R107□	**27.20**
Momentary			
Contacts included:			
1 NO 	**C2SS310■-10**	1SFA 619 202 R101□	**22.70**
2 NO	**C2SS310■-20**	1SFA 619 202 R102□	**27.20**
1 NC	**C2SS310■-01**	1SFA 619 202 R104□	**22.70**
2 NC	**C2SS310■-02**	1SFA 619 202 R105□	**27.20**
1 NO +1 NC	**C2SS310■-11**	1SFA 619 202 R107□	**27.20**
Short handle. Three positions			
Maintained			
Contacts included:			
2 NO 	**C3SS110■-20**	1SFA 619 210 R102□	
2 NC	**C3SS110■-02**	1SFA 619 210 R105□	**27.20**
1 NO + 1 NC	**C3SS110■-11**	1SFA 619 210 R107□	
Momentary			
Contacts included:			
2 NO 	**C3SS210■-20**	1SFA 619 211 R102□	
2 NC	**C3SS210■-02**	1SFA 619 211 R105□	**27.20**
1 NO + 1 NC	**C3SS210■-11**	1SFA 619 211 R107□	
Momentary			
Contacts included:			
2 NO 	**C3SS310■-20**	1SFA 619 212 R102□	
2 NC	**C3SS310■-02**	1SFA 619 212 R105□	**27.20**
1 NO + 1 NC	**C3SS310■-11**	1SFA 619 212 R107□	
Momentary			
Contacts included:			
2 NO 	**C3SS710■-20**	1SFA 619 216 R102□	
2 NC	**C3SS710■-02**	1SFA 619 216 R105□	**27.20**
1 NO + 1 NC	**C3SS710■-11**	1SFA 619 216 R107□	

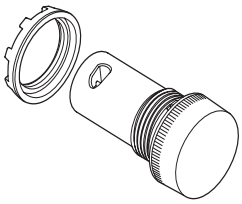
Ordering example – Compact selector switch

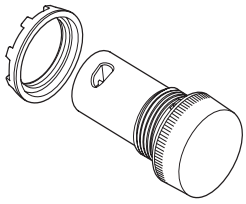
Requested: A red compact selector switch with three positions, Momentary, spring return from A to B and maintained position in C. With 2 NC contacts.

Ref.: 10 pieces of C3SS7-10R-02

Minimum Ref. quantity: 10 pieces
Packing: 10 pieces/plastic bag. 10 bags/box







Pilot light Ba 9s base, bulb not included

Description	Catalog No.	Ref. Code	List Price
Color:			
Red	**CL-100R**	1SFA 619 402 R1001	
Green	**CL-100G**	1SFA 619 402 R1002	
Yellow	**CL-100Y**	1SFA 619 402 R1003	**$ 14.00**
Blue	**CL-100L**	1SFA 619 402 R1004	
White	**CL-100W**	1SFA 619 402 R1005	
Clear	**CL-100C**	1SFA 619 402 R1008	

Pilot light with integrated LED Service life >50 000 hours

Color	Rated current mA	Lumi-nance mcd	Wave-length nm	Catalog No.	Ref. Code	List Price
Rated voltage 12 V, DC ①						
Red	30	60	625	**CL-501R**	1SFA 619 402 R5011	
Green	15	126	520	**CL-501G**	1SFA 619 402 R5012	
Yellow	30	60	590	**CL-501Y**	1SFA 619 402 R5013	**$ 25.00**
Blue	30	22	470	**CL-501L**	1SFA 619 402 R5014	
White	30	88	②	**CL-501W**	1SFA 619 402 R5015	
Rated voltage 24 V, AC/DC						
Red	15	60	625	**CL-502R**	1SFA 619 402 R5021	
Green	15	126	520	**CL-502G**	1SFA 619 402 R5022	
Yellow	15	60	590	**CL-502Y**	1SFA 619 402 R5023	**25.00**
Blue	15	22	470	**CL-502L**	1SFA 619 402 R5024	
White	15	88	②	**CL-502W**	1SFA 619 402 R5025	
Rated voltage 48 V, AC/DC						
Red	15	60	625	**CL-504R**	1SFA 619 402 R5041	
Green	15	126	520	**CL-504G**	1SFA 619 402 R5042	
Yellow	15	60	590	**CL-504Y**	1SFA 619 402 R5043	**25.00**
Blue	15	22	470	**CL-504L**	1SFA 619 402 R5044	
White	15	88	②	**CL-504W**	1SFA 619 402 R5045	
Rated voltage 60 V, AC/DC						
Red	15	60	625	**CL-505R**	1SFA 619 402 R5051	
Green	15	126	520	**CL-505G**	1SFA 619 402 R5052	
Yellow	15	60	590	**CL-505Y**	1SFA 619 402 R5053	**25.00**
Blue	15	22	470	**CL-505L**	1SFA 619 402 R5054	
White	15	88	②	**CL-505W**	1SFA 619 402 R5055	
Rated voltage 110-130 V, AC						
Red	15	60	625	**CL-513R**	1SFA 619 402 R5131	
Green	15	126	520	**CL-513G**	1SFA 619 402 R5132	
Yellow	15	60	590	**CL-513Y**	1SFA 619 402 R5133	**25.00**
Blue	15	22	470	**CL-513L**	1SFA 619 402 R5134	
White	15	88	②	**CL-513W**	1SFA 619 402 R5135	
Rated voltage 110-130 V, DC ①						
Red	15	60	625	**CL-515R**	1SFA 619 402 R5151	
Green	15	126	520	**CL-515G**	1SFA 619 402 R5152	
Yellow	15	60	590	**CL-515Y**	1SFA 619 402 R5153	**25.00**
Blue	15	22	470	**CL-515L**	1SFA 619 402 R5154	
White	15	88	②	**CL-515W**	1SFA 619 402 R5155	
Rated voltage 220 V, DC ①						
Red	15	60	625	**CL-520R**	1SFA 619 402 R5201	
Green	15	126	520	**CL-520G**	1SFA 619 402 R5202	
Yellow	15	60	590	**CL-520Y**	1SFA 619 402 R5203	**25.00**
Blue	15	22	470	**CL-520L**	1SFA 619 402 R5204	
White	15	88	②	**CL-520W**	1SFA 619 402 R5205	
Rated voltage 230 V, AC						
Red	15	60	625	**CL-523R**	1SFA 619 402 R5231	
Green	15	126	520	**CL-523G**	1SFA 619 402 R5232	
Yellow	15	60	590	**CL-523Y**	1SFA 619 402 R5233	**25.00**
Blue	15	22	470	**CL-523L**	1SFA 619 402 R5234	
White	15	88	②	**CL-523W**	1SFA 619 402 R5235	
Rated voltage 380 V, AC						
Red	15	60	625	**CL-530R**	1SFA 619 402 R5301	
Green	15	126	520	**CL-530G**	1SFA 619 402 R5302	
Yellow	15	60	590	**CL-530Y**	1SFA 619 402 R5303	**25.00**
Blue	15	22	470	**CL-530L**	1SFA 619 402 R5304	
White	15	88	②	**CL-530W**	1SFA 619 402 R5305	
Rated voltage 415 V, AC						
Red	15	60	625	**CL-541R**	1SFA 619 402 R5411	
Green	15	126	520	**CL-541G**	1SFA 619 402 R5412	
Yellow	15	60	590	**CL-541Y**	1SFA 619 402 R5413	**25.00**
Blue	15	22	470	**CL-541L**	1SFA 619 402 R5414	
White	15	88	②	**CL-541W**	1SFA 619 402 R5415	

① Care should be taken for DC supply where + and - must be correctly connected. (this is marked on the product, X1 (+) and X2 (-)).

② X=0.31, Y=0.32

Minimum Ref. quantity: 10 pieces
Packing: 10 pieces/plastic bag. 10 bags/box

Accessories

Filament bulbs

Ba 9s base Catalog No. of current: AC/DC. A lamp changing tool is required for changing bulb.

Description					Catalog No.	Ref. Code	List Price
Rated voltage V	Rated current mA	Rated output W	Service life h	Luminance mcd			
6	200	1.2	10 000	350	**5911 086-11**	5911 086-11	
12	100	1.2	10 000	230	**5911 086-12**	5911 086-12	
24	50	1.2	10 000	280	**5911 086-13**	5911 086-13	
30	40	1.2	10 000	250	**5911 086-4**	5911 086-4	**$ 6.00**
48	42	2	6 000	500	**5911 086-5**	5911 086-5	
60	20	1.2	5 000	190	**5911 086-14**	5911 086-14	
110	18	2	7 500	250	**5911 086-7**	5911 086-7	
130	15	2	7 500	120	**5911 086-15**	5911 086-15	

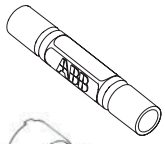
LEDs

With one diode chip mounted on a Ba 9s base. Choose the same color for the LED and the lamp cap or else use a clear lamp cap.
For white light use white LED with clear lamp cap. At DC the lamp base have to be connected to cathode (-) and the bottom contact to anode (+).

Color	Rated current mA	Wave-length nM	Luminance mcd	Catalog No.	Ref. Code	List Price
Rated voltage 12 V, DC Service life >50 000 h						
Red	15	630	250	**KA2-2011**	1SFA 616 921 R2011	
Green	15	525	1000	**KA2-2012**	1SFA 616 921 R2012	
Yellow	15	592	250	**KA2-2013**	1SFA 616 921 R2013	**$ 21.00**
Blue	15	470	450	**KA2-2014**	1SFA 616 921 R2014	
White	15	x=0.31 y=0.32	600	**KA2-2015**	1SFA 616 921 R2015	
Rated voltage 24 V, (AC)/DC ① Service life >50 000 h						
Red	15	630	250	**KA2-2021**	1SFA 616 921 R2021	
Green	15	525	800	**KA2-2022**	1SFA 616 921 R2022	
Yellow	15	592	250	**KA2-2023**	1SFA 616 921 R2023	**15.00**
Blue	15	470	400	**KA2-2024**	1SFA 616 921 R2024	
White	15	x=0.31 y=0.32	500	**KA2-2025**	1SFA 616 921 R2025	
Rated voltage 48 V, (AC)/DC ① Service life >50 000 h						
Red	12	630	200	**KA2-2041**	1SFA 616 921 R2041	
Green	12	525	1700	**KA2-2042**	1SFA 616 921 R2042	
Yellow	12	592	240	**KA2-2043**	1SFA 616 921 R2043	**21.00**
Blue	12	470	720	**KA2-2044**	1SFA 616 921 R2044	
White	12	x=0.31 y=0.32	1200	**KA2-2045**	1SFA 616 921 R2045	
Rated voltage 60 V, (AC)/DC ① Service life >50 000 h						
Red	10	630	160	**KA2-2051**	1SFA 616 921 R2051	
Green	10	525	1400	**KA2-2052**	1SFA 616 921 R2052	
Yellow	10	592	200	**KA2-2053**	1SFA 616 921 R2053	**21.00**
Blue	10	470	600	**KA2-2054**	1SFA 616 921 R2054	
White	10	x=0.31 y=0.32	1000	**KA2-2055**	1SFA 616 921 R2055	
Rated voltage 110-130 V, AC ① Service life 25 000 h						
Red	4-6	630	60-100	**KA2-2131**	1SFA 616 921 R2131	
Green	4-6	525	500-850	**KA2-2132**	1SFA 616 921 R2132	
Yellow	4-6	592	70-120	**KA2-2133**	1SFA 616 921 R2133	**15.00**
Blue	4-6	470	220-350	**KA2-2134**	1SFA 616 921 R2134	
White	4-6	x=0.31 y=0.32	350-600	**KA2-2135**	1SFA 616 921 R2135	
Rated voltage 110-130 V, AC/DC ① Service life 25 000 h						
Red	4-6	630	60-100	**KA2-2141**	1SFA 616 921 R2141	
Green	4-6	525	500-850	**KA2-2142**	1SFA 616 921 R2142	
Yellow	4-6	592	70-120	**KA2-2143**	1SFA 616 921 R2143	**21.00**
Blue	4-6	470	220-350	**KA2-2144**	1SFA 616 921 R2144	
White	4-6	x=0.31 y=0.32	350-600	**KA2-2145**	1SFA 616 921 R2145	
Rated voltage 230 V, AC ① Service life 25 000 h						
Red	4	630	60	**KA2-2221**	1SFA 616 921 R2221	
Green	4	525	500	**KA2-2222**	1SFA 616 921 R2222	
Yellow	4	592	70	**KA2-2223**	1SFA 616 921 R2223	**21.00**
Blue	4	470	220	**KA2-2224**	1SFA 616 921 R2224	
White	4	x=0.31 y=0.32	350	**KA2-2225**	1SFA 616 921 R2225	

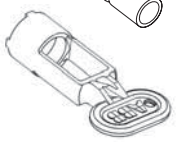
① At AC the luminance is decreased with 30 % and there is also a slight flickering.

Accessories



Lamp changing tool

Description	Catalog No.	Ref. Code	List Price
For LEDs and for bulbs	**KA1-8072**	1SFA 616 920 R8072	**$ 10.00**



Mounting tool

Description	Catalog No.	Ref. Code	List Price
Used for tightening the locking nut	**KA1-8015**	1SFA 611 920 R8015	**$ 10.00**

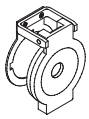
Membrane of silicone

Of transparent, heat and cold resistant silicon rubber. Does not harden at low temperature. Gives IP 67 degree of protection. When membrane is used, remove the gasket.

For operator with	Catalog No.	Ref. Code	List Price
Flush button	**KA1-8052**	1SFA 616 920 R8052	**$ 8.00**
Extended button	**KA1-8002**	1SFA 616 920 R8002	**8.00**

Protective ring

Description	Catalog No.	Ref. Code	List Price
For flush and extended pushbutton To prevent inadvertant operation. Not together with legend plate holder.	**SK 615 512-1**	SK 615 512-1	**$ 4.00**



Protective cover

Description	Catalog No.	Ref. Code	List Price
For flush button. To prevent inadvertant operation. Not together with legend plate holder.	**KA1-8010**	1SFA 616 920 R8010	**$ 15.00**

Button

Description		Catalog No.	Ref. Code	List Price
Grey, flush	(Packing unit 10 pieces)	**KA1-8087**	1SFA 616 920 R8087	**$ 1.50**
Grey, extended	(Packing unit 10 pieces)	**KA1-8097**	1SFA 616 920 R8097	**1.50**

Bezel

Description		Catalog No.	Ref. Code	List Price
For pushbutton				
Grey	(Packing unit 10 pieces)	**KA1-8079**	1SFA 616 920 R8079	**$ 1.00**
Black	(Packing unit 10 pieces)	**KA1-8022**	1SFA 616 920 R8022	**1.00**
Metal	(Packing unit 10 pieces)	**KA1-8021**	1SFA 616 920 R8021	**2.50**
For selector switch				
Grey	(Packing unit 10 pieces)	**CA1-8076**	1SFA 619 920 R8076	**1.00**
Black	(Packing unit 10 pieces)	**CA1-8077**	1SFA 619 920 R8077	**1.00**
Metal	(Packing unit 10 pieces)	**CA1-8078**	1SFA 619 920 R8078	**2.50**

Square bezel			
Black, plastic (Packing unit 10 pieces)	**SK 616 016-2**	SK 616 016-2	**2.00**
Grey, plastic (Packing unit 10 pieces)	**KA1-8124**	1SFA 611 920 R8124	**2.00**

8

Accessories

30 mm adaptors

For use when fitting the 22 mm pilot devices in 30 mm mounting holes. (1.5 – 4 mm panels)

Description	Catalog No.	Ref. Code	List Price
For use with pushbuttons, selector switches, emergency stop push-button and pilot lights			
Black plastic.	**KA1-8029**	1SFA 616 920 R8029	**$ 8.00**
Metal.	**KA1-8030**	1SFA 616 920 R8030	**10.00**

Adaptors

For flush mounted pushbutton	**KA1-8073**	1SFA 616 920 R8073	**15.00**
For flush mounted selector switches	**CA1-8075**	1SFA 619 920 R8075	

Extra key

Description	Catalog No.	Ref. Code	List Price
Ronis 455 (key code 71)	**SK 616 021-71**	SK 616 021-71	**$ 10.00**



E 57057

Approvals

The pushbuttons, selector switches and pilot lights are approved by:
- National approval agencies: UL and China Compulsory Product Certification

For detail information please contact ABB

Standards

IEC 60947-1	Low-voltage switchgear and controlgear - Part 1: General rules
IEC 60947-5-1	Low-voltage switchgear and controlgear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices
IEC 60947-5-5	Low-voltage switchgear and controlgear - Part 5-5: Control circuit devices and switching elements - Electrical emergency stop device with mechanical latching function
IEC 60073	Basic and safety principles for man-machine interface, marking and identification - Coding principles for indicators and actuators
IEC 60529	Degrees of protection provided by enclosures (IP Code)
EN 60947-1	Low-voltage switchgear and controlgear - Part 1: General rules
EN 60947-5-1	Low-voltage switchgear and controlgear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices
EN 60947-5-5	Low-voltage switchgear and controlgear - Part 5-5: Control circuit devices and switching elements - Electrical emergency stop device with mechanical latching function
EN 60073	Basic and safety principles for man-machine interface, marking and identification - Coding principles for indication devices and actuators
EN 60529	Degrees of protection provided by enclosures (IP Code)
EN 50013	Low-voltage switchgear and controlgear for industrial use - Terminal marking and distinctive number for particular control switches
UL 508	Industrial Control Equipment
CSA C22.2 No 14	Industrial Control Equipment

Degrees of protection

Pilot device	IP	UL/CSA
Compact pushbutton, **CP1, CP2, CP3, CP4**	IP66	Type 1, 3R, 4, 4X, 12, 13
Compact selector switch, **C2SS, C3SS**	IP66	Type 1, 3R, 4, 4X, 12, 13
Compact pilot light, **CL**	IP66	Type 1, 3R, 4, 4X, 12, 13
Compact emergency stop pushbutton, **CE3T,CE3P, CE4T, CE4P, CE3K1, CE4K1**	IP66	Type 1, 3R, 4, 4X, 12,13
Terminals	IP20	

Temperature

Ambient temperature during operation	-25 to +70 °C
Exception: All pilot devices with 2 W continuously lit filament bulb	-25 to +40 °C
Storage temperature	-30 to +85 °C

Tightening torque

Locking nut, M22	Min. 2 Nm Max. 2.3 Nm

Contacts

Ratings as per UL, CSA, NEMA	**C300**	**R300**
Rated insulation voltage	250 V	250 V
Rated thermal current	2.5 A	1 A
Rated operational current		
at 120 V	1.5 A	
125 V		0.22 A
240 V	0.75 A	
250 V		0.11 A
Ratings as per IEC 60947-5-1		
Rated insulation voltage, U_i	300 V	
Rated thermal current, I_{th}	5 A	
Rated operational current, I_e utilisation category AC-15		
at 120 V	1.5 A	
240 V	1 A	
Rated operational current, I_e, utilisation category DC-13,		
at 24 V	0.3 A	
125 V	0.2 A	
Short circuit protection		
Max. fuse at 1 kA	16 A ordinary 10 A delayed	
Tightening torque		
compact pushbutton & selector switch	0.8 Nm (M3)	
compact pilot light	0.9 Nm (M3.5)	
compact emergency stop pushbutton	0.8 Nm (M3)	
Terminals		
Plus-minus Pozidriv No. 2		
Compact pushbutton		
Compact selector switch		
Compact emergency stop		
Connectable area	min. 1 x 0.5 mm^2/1 x AWG22 max. 2 x 1.5 mm^2/2 x AWG14	
Compact pilot light		
Connectable area	min. 1 x 0.5 mm^2/1 x AWG20 max. 2 x 2.5 mm^2/2 x AWG14	

Material

No ozone depleting substances in the products.
All front parts are made of polycarbonate

Material	Characteristics
PC Polycarbonate	High impact strength, good outdoor resistance. Can withstand light acid solutions, aliphatic hydrocarbons, paraffin, alcohols, animal and vegetable greases.
PA Polyamide	Can withstand high temperatures, aliphatic, aromatic and chlorinated hydrocarbons, esters, ketone-aldehydes, alcohols and basic solutions.
PBT	Can withstand temperature, aliphatic and aromatic hydrocarbons, acids, basic solutions, alcohols, grease and oils
Zinc	Good corrosion resistance in inland-, sea and industrial atmosphere.
Light-alloy	Good corrosion resistance in inland-, sea and industrial atmosphere.
Rubber	Chloroprene Nitrile

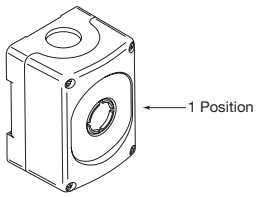
Notes

Assembled stations and enclosures

Features

- Available for 1, 2, 3, 4 & 6 operators.
- Base mounted contacts allow for easy removal of operator cover. Wiring remains with base.
- Up to 5 contact blocks can be used per operator for some combinations.
- Environmental ratings: UL/CSA Type 1, 3R, 4, 4X, 12 & 13, IP66
- Available in high impact strength polycarbonate (plastic) material.
- Rated for outdoor use.
- Enclosures can withstand light acid solutions and other chemicals.
- Metallic enclosures available.

Plastic enclosures
1, 2 & 3 seat

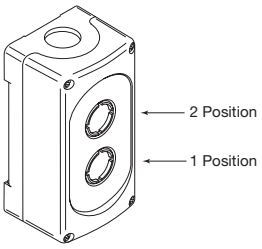


1-seat Plastic enclosures. Yellow top/light grey bottom

Description	Pos - 1	Pos - 2	Pos - 3	Pos - 4	Catalog No.	List Price
	Twist Release 40mm E	—	—	—		
Type	Stop	—	—	—		
Color	Red	—	—	—		
Contacts	2 NC	—	—	—		
Name plate	EMERGENCY STOP	—	—	—	P1-ES	$ 84.00
	Ill. Twist Release 40mm E	—	—	—		
Type	40mm E-Stop	—	—	—		
Color	Red, 120V	—	—	—		
Contacts	2 NC, 1 LB	—	—	—		
Name plate	EMERGENCY STOP	—	—	—	P1-1ES	107.50

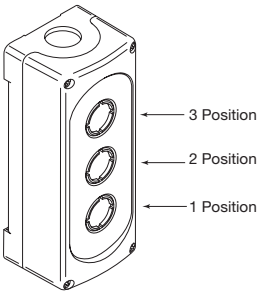
1-seat Plastic enclosure, dark grey top/light grey bottom

Description	Pos - 1	Pos - 2	Pos - 3	Pos - 4	Catalog No.	List Price
Type	3-pos sel. Main	—	—	—		
Color	Black	—	—	—		
Contacts	2 NO	—	—	—		
Name plate	HAND/OFF/AUTO	—	—	—	P1-HOA	$ 55.00



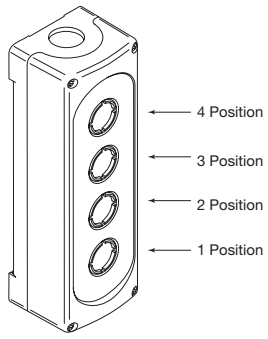
2-seat Plastic enclosure, dark grey top/light grey bottom

Description	Pos - 1	Pos - 2	Pos - 3	Pos - 4	Catalog No.	List Price
Type	Button mom, Ext.	Button mom, Flush	—	—		
Color	Red	Green	—	—		
Contacts	1 NC	1 NO	—	—		
Name plate	STOP	START	—	—	P2-SS	$ 63.20
Type	3-pos sel. Main	Pilot Light	—	—		
Color	Black	Red	—	—		
Contacts	2 NO	1 LB	—	—		
Name plate	HAND/OFF/AUTO	RUN	—	—	P2-1HOARL	90.00
Type	2-pos sel. Main	Pilot Light	—	—		
Color	Black	Red	—	—		
Contacts	1 NO	1 LB	—	—		
Name plate	ON/OFF	RUN	—	—	P2-1OORL	82.00



3-seat Plastic enclosure, dark grey top/light grey bottom

Description	Pos - 1	Pos - 2	Pos - 3	Pos - 4	Catalog No.	List Price
Type	Button mom, Ext.	Button mom, Flush	Pilot Light	—		
Color	Red	Green	Red	—		
Contacts	1 NC	1 NO	1 LB	—		
Name plate	STOP	START	RUN	—	P3-1SSRL	$ 96.70
Type	3-pos sel. Main	Pilot Light	Pilot Light	—		
Color	Black	Red	Green	—		
Contacts	2 NO	1 LB	1 LB	—		
Name plate	HAND/OFF/AUTO	RUN	OFF	—	P3-1HOARLGL	123.50
Type	2-pos sel. Main	Pilot Light	Pilot Light	—		
Color	Black	Red	Green	—		
Contacts	1 NO	1 LB	1 LB	—		
Name plate	ON/OFF	RUN	OFF	—	P3-1OORLGL	115.50
Type	3-pos sel. Main	Button mom, Flush	Pilot Light	—		
Color	Black	Green	Red	—		
Contacts	2 NO	1 NO	1 LB	—		
Name plate	HAND/OFF/AUTO	START	RUN	—	P3-1HOASRL	109.60
Type	Twist Release 40mm E Stop	3-pos sel. Main	Pilot Light	—		
Color	Red	Black	Red	—		
Contacts	2 NC	2 NO	1 LB	—		
Name plate	EMERGENCY STOP	HAND/OFF/AUTO	RUN	—	P3-1ESHOARL	145.50

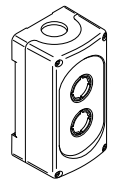
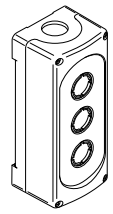
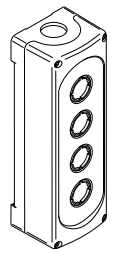
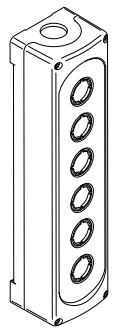


4-seat Plastic enclosure, dark grey top/light grey bottom

Description	Pos - 1	Pos - 2	Pos - 3	Pos - 4	Catalog No.	List Price
Type	Button mom., Ext.	Button mom., Flush	Pilot Light	Pilot Light		
Color	Red	Green	Green	Red		
Contacts	1 NC	1 NO	1 LB	1 LB		
Name plate	STOP	START	OFF	RUN	**P4-1SSRLGL**	**$ 134.20**
Type	3-pos sel. Main	Button mom, Flush	Pilot Light	Pilot Light		
Color	Black	Green	Green	RED		
Contacts	2 NO	1 NO	1 LB	1 LB		
Name plate	HAND/OFF/AUTO	START	OFF	RUN	**P4-1HOASRLGL**	**147.10**
Type	3-pos sel. Main	Pilot Light	Pilot Light	Pilot Light		
Color	Black	Green	Yellow	Red		
Contacts	2 NO	1 LB	1 LB	1 LB		
Name plate	HAND/OFF/AUTO	OFF	FAULT	RUN	**P4-1HOARLYLGL**	**161.00**
Type	2-pos. sel. Main	Pilot Light	Pilot Light	Pilot Light		
Color	Black	Green	Yellow	Red		
Contacts	1 NO	1 LB	1 LB	1 LB		
Name plate	ON/OFF	OFF	FAULT	RUN	**P4-1OORLYLGL**	**153.00**
Type	Twist Release 40mm E Stop	Button mom., Ext.	Button mom., Flush	Pilot Light		
Color	Red	Red	Green	Red		
Contacts	2 NC	1 NC	1 NO	1 LB		
Name plate	EMERGENCY STOP	STOP	START	RUN	**P4-1ESSSRL**	**156.20**
Type	Twist Release 40mm E Stop	3-pos. sel. Main	Pilot Light	Pilot Light		
Color	Red	Black	Green	Red		
Contacts	2 NC	2 NO	1 LB	1 LB		
Name plate	EMERGENCY STOP	HAND/OFF/AUTO	OFF	RUN	**P4-1ESHOARLGL**	**183.00**
Type	Twist Release 40mm E Stop	2-pos sel. Main	Pilot Light	Pilot Light		
Color	Red	Black	Green	Red		
Contacts	2 NC	1 NO	1 LB	1 LB		
Name plate	EMERGENCY STOP	ON/OFF	OFF	RUN	**P4-1ESOORLGL**	**175.00**

Degree of protection IP 66



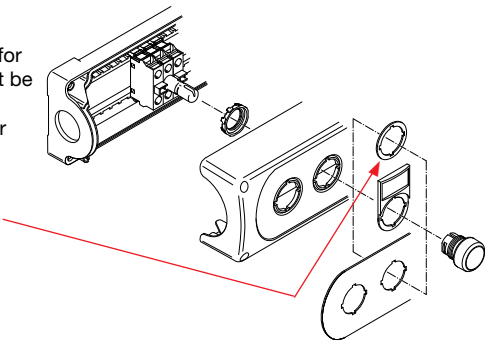





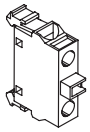
Empty plastic enclosures Now with stainless steel screws

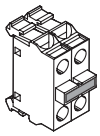
Size	Color top/bottom	Catalog No.	Ref. Code	List Price
1-seat	Dark grey/Light grey	**MEP1-0**	1SFA 611 811 R1000	**$ 28.00**
1-seat	Yellow/Light grey	**MEPY1-0**	1SFA 611 821 R1000	**28.00**
2-seat	Dark grey/Light grey	**MEP2-0**	1SFA 611 812 R1000	**32.00**
3-seat	Dark grey/Light grey	**MEP3-0**	1SFA 611 813 R1000	**36.00**
4-seat	Dark grey/Light grey	**MEP4-0**	1SFA 611 814 R1000	**44.00**
6-seat	Dark grey/Light grey	**MEP6-0**	1SFA 611 816 R1000	**52.00**

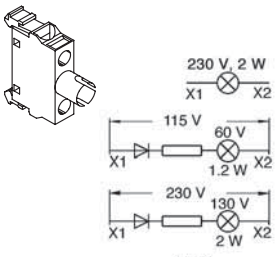
When Ordering

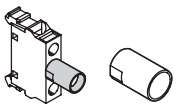
- Select operators from page 8.4 and 8.38.
  N.B. Selector switches with short handle for vertically mounted selector switches must be Ref.ed from page 8.45 - 8.46
- Select contact blocks and lamp blocks for **rear** mounting,see page 8.44.
- Accessories, see page 8.43
  N.B. **One spacer per operator** has to be Ref.ed if legend plate is not used.
  (for rear mounted pilot devices)











Contact blocks for rear mounting

Description	Catalog No.	Ref. Code	List Price
Contact block			
1NO	**MCB-10B**	1SFA 611 610 R2001	**$ 8.00**
1NC	**MCB-01B**	1SFA 611 610 R2010	
Double contact block			
2NO	**MCB-20B**	1SFA 611 610 R2002	
2NC	**MCB-02B**	1SFA 611 610 R2020	**16.00**
1NO+1NC	**MCB-11B**	1SFA 611 610 R2011	
Contact block with gold plated contacts			
1NO	**MCB-10BG**	1SFA 611 610 R2101	**16.00**
1NC	**MCB-01BG**	1SFA 611 610 R2110	
Lamp blocks			
For max. 2 W, 230 V AC and DC filament bulb or LED	**MLB-1B**	1SFA 611 620 R2001	**17.50**
115 V AC supply voltage. **For 60 V filament bulb max. 1.2 W**	**MLB-2B**	1SFA 611 620 R2002	**21.50**
230 V AC supply voltage. **For 130 V filament bulb max. 2 W**	**MLB-3B**	1SFA 611 620 R2003	**21.50**

Protective sleeve

Description	Catalog No.	Ref. Code	List Price
To make a rear mounted lamp block screen protected. IP20	**5396 0543-1**	5396 0543-1	**$ 2.00**

Earthing terminal

Description	Catalog No.	Ref. Code	List Price
For plastic enclosure.	**MA5-2005**	1SFA 611 925 R3005	**$ 2.00**

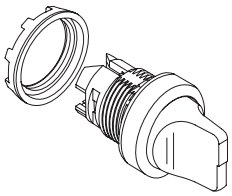
Spacer

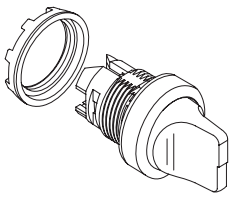
Description	Catalog No.	Ref. Code	List Price
1 mm thick. Needed when legend plates are not used in plastic enclosures. Spacer (Packing unit 10 pieces)	**SK 615 516-1**	SK 615 516-1	**$ 1.00**
Spacer for Modular emergency stop pushbutton, page ?? (Packing unit 10 pieces)	**KA1-8045**	1SFA 616 920 R 8045	**1.00**

Blanking plug (22mm)

Description	Catalog No.	Ref. Code	List Price
Black plastic	**SK 615 502-B**	SK 615 502-B	**$ 2.00**

Two position selector switches
for mounting in vertically mounted enclosures





Bezel in black plastic as standard
Bezel in metal:
Replace '**1**' in the:
Catalog No. M2SSX-1 0X
Ref. Code 1SFA611XXX R 1XXX
3 for metal bezel
4 for grey plastic bezel

Contact functions
Block positions as seen from operator front.

Handle position	Left block	Right block
A (B)	O	O
O	x	x

O = not actuated (normal state)
x = actuated (state changed)

Non-illuminated operator ... ①

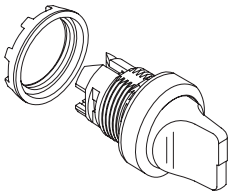
Symbol	Handle color	Catalog No.	Ref. Code	List Price
with short handle				
Maintained				
	Red	**M2SSV1-10R**	1SFA 611 220 R1001	**$ 11.00**
	Black	**M2SSV1-10B**	1SFA 611 220 R1006	
Maintained				
	Red	**M2SSV2-10R**	1SFA 611 221 R1001	**11.00**
	Black	**M2SSV2-10B**	1SFA 611 221 R1006	
Momentary, spring return from C to B				
	Red	**M2SSV3-10R**	1SFA 611 222 R1001	**14.00**
	Black	**M2SSV3-10B**	1SFA 611 222 R1006	

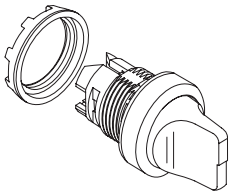
Illuminated operator ... ① ②

Symbol	Handle color	Catalog No.	Ref. Code	List Price
with short handle				
Maintained				
	Red	**M2SSV1-11R**	1SFA 611 220 R1101	**$ 17.00**
	Green	**M2SSV1-11G**	1SFA 611 220 R1102	
	Yellow	**M2SSV1-11Y**	1SFA 611 220 R1103	
Maintained				
	Red	**M2SSV2-11R**	1SFA 611 221 R1101	**17.00**
	Green	**M2SSV2-11G**	1SFA 611 221 R1102	
	Yellow	**M2SSV2-11Y**	1SFA 611 221 R1103	
Momentary, spring return from C to B				
	Red	**M2SSV3-11R**	1SFA 611 222 R1101	**26.00**
	Green	**M2SSV3-11G**	1SFA 611 222 R1102	
	Yellow	**M2SSV3-11Y**	1SFA 611 22 2 R1103	

① No contact in center position
② Lamp block for max 230 V AC/DC. Bulb not included. Other lamp block see Accessories

Three position selector switches
for mounting in vertically mounted enclosures





Bezel in black plastic as standard
Bezel in metal:
Replace '**1**' in the:
Catalog No. M3SSX-1 0X
Ref. Code 1SFA611XXX R 1XXX
3 for metal bezel
4 for grey plastic bezel

Contact functions
Block positions as seen from operator front.

Handle position	Left block	Right block
A	x	O
B	O	O
C	O	x

Non-illuminated operator ... ①

Symbol	Handle color	Catalog No.	Ref. Code	List Price
with short handle				
Maintained				
A B C	Red	**M3SSV1-10R**	1SFA 611 230 R1001	**$ 11.00**
	Black	**M3SSV1-10B**	1SFA 611 230 R1006	
Momentary, spring return from A to B and from C to B				
A B C	Red	**M3SSV2-10R**	1SFA 611 231 R1001	**14.00**
	Black	**M3SSV2-10B**	1SFA 611 231 R1006	
Momentary, spring return from C to B				
B C	Red	**M3SSV3-10R**	1SFA 611 232 R1001	**14.00**
	Black	**M3SSV3-10B**	1SFA 611 232 R1006	

Illuminated operator ... ① ②

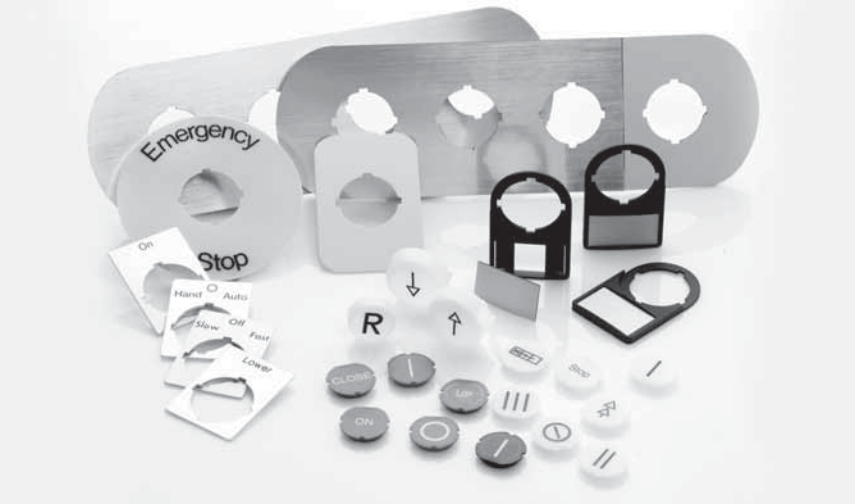
Symbol	Handle color	Catalog No.	Ref. Code	List Price
with short handle				
Maintained				
A B C	Red	**M3SSV1-11R**	1SFA 611 230 R1101	
	Green	**M3SSV1-11G**	1SFA 611 230 R1102	**$ 17.00**
	Yellow	**M3SSV1-11Y**	1SFA 611 230 R1103	
Momentary, spring return from A to B and from C to B				
A B C	Red	**M3SSV2-11R**	1SFA 611 231 R1101	
	Green	**M3SSV2-11G**	1SFA 611 231 R1102	**26.00**
	Yellow	**M3SSV2-11Y**	1SFA 611 231 R1103	
Momentary, spring return from C to B				
B C	Red	**M3SSV3-11R**	1SFA 611 232 R1001	
	Green	**M3SSV3-11G**	1SFA 611 232 R1002	**26.00**
	Yellow	**M3SSV3-11Y**	1SFA 611 232 R1003	

Contact blocks, lamp block and holder See Page 8.45

① No contact in center position
② Lamp block for max 230 V AC/DC. Bulb not included. Other lamp block see Accessories

Notes

Legend plates



8

Fixed legend plates

- Of silvergrey aluminum for:
  -pushbuttons
  -two-position selector switches
  -three-position selector switches
  -toggle switches
  -customer selected text
- Of black/white plastic. Text on one side or both sides:
  -with customer selected text

Special legend plates

- For emergency stop pushbuttons
- Legend plate with or without customer selected text
- Legend plate holders with inserts of brushed aluminum on black plastic. With or without text or symbol for:
  -pushbuttons
  -two-position selector switch
  -three position selector switch
  -customer selected text

  For plastic enclosures:
- Legend plate holders with inserts of brushed aluminum on black plastic. With or without text or symbol for push-buttons
- Legend plates of silvergrey aluminum For 1- 2-, 3- 4- or 6-seat plastic enclosures
  With or without text or symbol for:
  -pushbuttons

Text caps

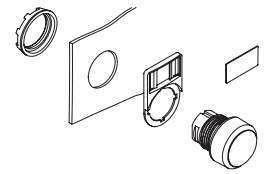
- For illuminated pushbuttons (flush or extended) and pilot lights with or without text or symbol or with customer selected text.

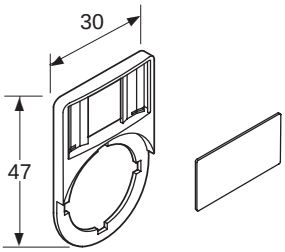
Special legend plates

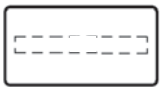
Legend plate holders with inserts

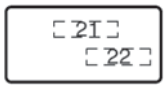
- Holder of black plastic.
- Holder of grey plastic for plastic enclosures.
- Insert of brushed aluminum on black plastic. The insert is securely retained in a pocket and can be removed.

3 mm high text in typeface Helvetica.









For two-position. selector switch

Legend plate holder (black)

Description	Catalog No.	List Price
Black	**1SFA 616 920 R8120**	**$ .70**

Inserts

Description	Catalog No.	List Price
Of brushed aluminum on black plastic Without text or symbol	**1SFA 616 920 R8121**	**$ .70**

Inserts with text/symbol

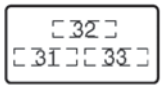
Description	Catalog No.	List Price
Of brushed aluminum on black plastic		
With text or symbol		
O	**1SFA 611 930 R1032**	**$ .70**
I	**1SFA 611 930 R1033**	
→	**1SFA 611 930 R1034**	
→→	**1SFA 611 930 R1035**	
Close	**1SFA 611 930 R1036**	
Open	**1SFA 611 930 R1037**	
On	**1SFA 611 930 R1038**	
Off	**1SFA 611 930 R1039**	
Fast	**1SFA 611 930 R1040**	
Slow	**1SFA 611 930 R1041**	
Down	**1SFA 611 930 R1042**	
Up	**1SFA 611 930 R1043**	
Start	**1SFA 611 930 R1044**	
Stop	**1SFA 611 930 R1045**	

Inserts for two-position selector switches

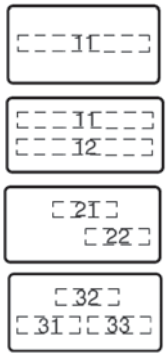
Of brushed aluminum on black plastic. Text on both sides.

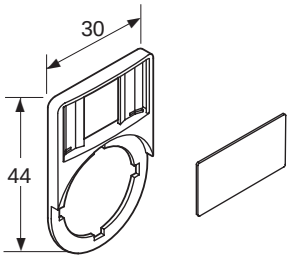
Description		Catalog No.	List Price
With text or symbol			
Pos. 21	Pos. 22		
O	I	**1SFA 611 930 R 1070**	**$ .70**
I	II	**1SFA 611 930 R 1071**	
→	→→	**1SFA 611 930 R 1072**	
Off	On	**1SFA 611 930 R 1073**	
Stop	Start	**1SFA 611 930 R 1074**	
Low	High	**1SFA 611 930 R 1075**	
Slow	Fast	**1SFA 611 930 R 1076**	
Close	Open	**1SFA 611 930 R 1077**	
Jog	Run	**1SFA 611 930 R 1078**	
Hand	Auto	**1SFA 611 930 R 1079**	

Special legend plates



For three-position selector switch





Inserts for three-position selector switches

Of brushed aluminum on black plastic. Text on both sides.

Description			Catalog No.	List Price
With text or symbol				
Pos. 31	Pos. 32	Pos. 33		
←	O	→	**1SFA 611 930 R 1080**	
→	O	→→	**1SFA 611 930 R 1081**	
I	O	II	**1SFA 611 930 R 1082**	**$ .70**
Hand	O	Auto	**1SFA 611 930 R 1083**	
Slow	Off	Fast	**1SFA 611 930 R 1084**	

Legend plate holder (grey) for plastic enclosures

Description	Catalog No.	List Price
Grey	**1SFA 611 930 R1060**	**$ .70**

Inserts

Description	Catalog No.	List Price
Of brushed aluminum on black plastic Without text or symbol	**1SFA 611 930 R1061**	**$ .70**

Inserts with text/symbol

Description	Catalog No.	List Price
Of brushed aluminum on black plastic		
With text or symbol		
O	**1SFA 611 930 R1062**	
I	**1SFA 611 930 R1063**	**$ .70**
II	**1SFA 611 930 R1064**	

8

Special legend plates

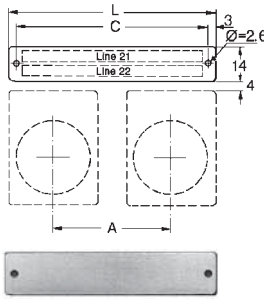
Emergency stop legend plates ①

Description/Text	Catalog No.	List Price
Black text on a yellow aluminum plate.		
Nöd Stopp	**SK 615 546-1**	
Emergency Stop	**SK 615 546-2**	
Not Aus	**SK 615 546-3**	
ARRET D'URGENCE	**SK 615 546-4**	
HÄTÄSEIS	**SK 615 546-5**	**$ 6.00**
PARADA DE EMERGENCIA	**SK 615 546-6**	
EMERGENCY STOP		
NOT AUS		
ARRET D'URGENCE	**SK 615 546-13**	
Without text	**SK 615 546-8**	

Black text on a yellow plastic plate. Quantity per package: 10 Can be used as yellow background.		
Emergency Stop	**1SFA 616 915 R1005**	**5.00**

More emergency stop legend plates on page 8.60.

Legend plates without or with customer-selected text

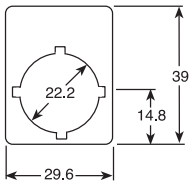


Of aluminum

Number of operations	Max. number of characters per line	Dimensions A	L	C	Without text ② Catalog No.	With text ③ Catalog No.	List Price
1	7	-	29.6	23.6	**SK 615 545-1**	**SK 615 998-1**	
2	20	30.5	60	54	**SK 615 545-2**	**SK 615 998-2**	
2	24	40	70	64	**SK 615 545-3**	**SK 615 998-3**	**$ 6.00**
3	33	30.5	90	84	**SK 615 545-4**	**SK 615 998-4**	
3	42	40	110	104	**SK 615 545-5**	**SK 615 998-5**	

① Does not work with pushbutton enclosure.
② Quantity per package: 10.
③ When ordering, please state text and position (Line 21 and Line 22). Only the initial character is upper case unless other is stated. Quantity per packkage: 1.

Legend plates
for pushbuttons



Engraved fixed legend plates, with symbols ①

Of silvergrey aluminum

Symbol	Catalog No.	List Price
O	SK 615 550-61	$ 1.50
I	SK 615 550-62	
I I	SK 615 550-63	
⇽	SK 615 562-12	
⇁	SK 615 562-18	
→→	SK 615 562-27	

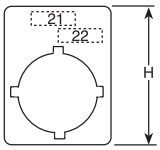
Engraved fixed legend plates, with text ①

Of silvergrey aluminum

Text	Catalog No.	List Price
English		
Close	SK 615 552-13	$ 1.50
Down	SK 615 552-14	
Emergency stop	SK 615 552-15	
Fast	SK 615 552-16	
Forward	SK 615 552-17	
In	SK 615 550-29	
Inching	SK 615 552-18	
Left	SK 615 552-39	
Lower	SK 615 552-20	
Off	SK 615 552-21	
On	SK 615 552-22	
Open	SK 615 552-23	
Out	SK 615 552-24	
Raise	SK 615 552-25	
Reset	SK 615 552-27	
Reverse	SK 615 552-28	
Right	SK 615 552-40	
Run	SK 615 552-29	
Slow	SK 615 552-30	
Start	SK 615 550-44	
Stop	SK 615 552-31	
Up	SK 615 552-32	

① Text height 3 mm.

Legend plates
for two-position selector switches



H = 39 mm

Engraved fixed legend plates, with symbols ①

Of silvergrey aluminum

Symbol/Text Pos 21	Pos. 22	Catalog No.	List Price
O	I	**SK 615 550-75**	
I	II	**SK 615 550-76**	**$ 1.50**
→	→→	**SK 615 562-72**	

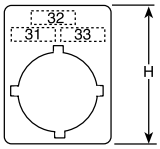
Engraved fixed legend plates, with text ①

Of silvergrey aluminum

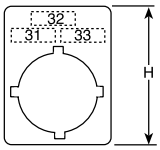
Symbol/Text Pos 21	Pos. 22	Catalog No.	List Price
English			
Hand	Auto	**SK 615 550-71**	
Jog	Run	**SK 615 552-52**	**$ 1.50**
Off	On	**SK 615 552-53**	
Stop	Start	**SK 615 552-55**	

① Text height 3 mm. Only the initial character is upper case unless other is stated.

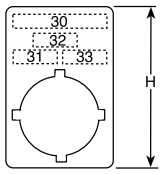
Legend plates
for three-position selector switches



H = 39 mm



H = 39 mm



H = 44.5 mm

Engraved fixed legend plates, with symbols ①

Of silvergrey aluminum

Symbol/Text Pos 31	Pos. 32	Pos. 33	Catalog No.	List Price
I	O	II	**SK 615 550-81**	
←	O	→	**SK 615 562-82**	**$ 1.50**
→	O	→→	**SK 615 562-83**	

Engraved fixed legend plates, with text ①

Of silvergrey aluminum

Symbol/Text Pos 31	Pos. 32	Pos. 33	Catalog No.	List Price
English				
Hand	O	Auto	**SK 615 550-80**	**$ 1.50**
Slow	Off	Fast	**SK 615 552-60**	

Plastic name plate blank (white/black)

Blank	39mm	**SK 616 540-2**	**1.50**
	44.5mm	**SK 616 541-2**	

Plastic name plate blank (silvergray aluminum/black)

Blank	39mm	**SK 615 540-3**	**1.50**
	44.5mm	**SK 615 541-3**	**1.50**

Aluminum name plate blank (silvergray aluminum)

Blank	39mm	**SK 615 540-1**	**1.50**
	44.5mm	**SK 615 541-1**	

8

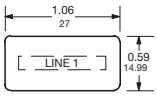
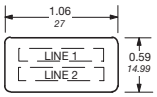
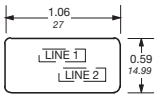
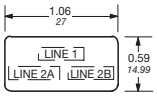
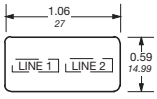
① Text height 3 mm. Only the initial character is upper case unless other is stated.

Custom engraved inserts
for legend plate holders

CBK-NPE19-01

Nameplate inserts — Brushed aluminum on black plastic ①

8

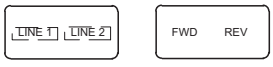
Type	Maximum letters per line	Catalog number	List price
 1 line	11	MP-NP19-01	
 2 lines	11	MP-NP19-02	
 2 position selector switch	5	MP-NP19-03	**$ 5.90**
 3 position selector switch	5	MP-NP19-04	
 2 position selector switch	5	MP-NP19-05	

General specifications

1. All characters are 1/8" high, upper & lower case. Please specify if all capital letters are desired.
2. The legend plate inserts and the fixed legend plates are silver-grey anodized aluminum.
3. All special engravings involve engraving the desired lettering into the metal surface and then treating the engraved surfaces with black ink.

EXAMPLE:

MP-NP19-05
1: FWD
2: REV

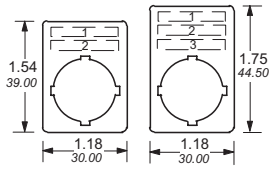
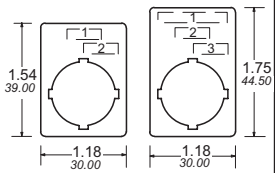
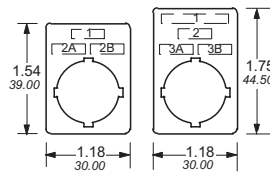
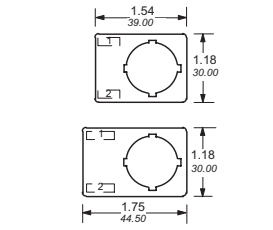
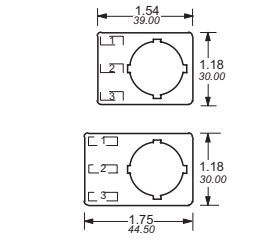


"MP-NP19" is the blank legend plate catalog number. "-05" refers to the layout of text (see dimension illustrations).

① For drilling plans, see page 8.74.
② "PW" and "PB" are the same material with either the white or black side showing.

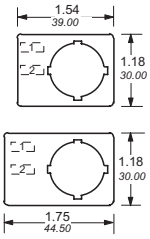
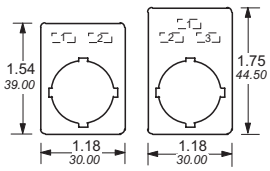
Custom engraved nameplates

Fixed nameplates — aluminum or plastic ①

Type	Maximum letters per line	Finish ②	Catalog number	List price
 Pushbuttons or pilot lights	11 39mm	A B BA W	MP-NPE28-01 MP-NPE28B-01 MP-NPE28BA-01 MP-NPE28W-01	$ 6.50
	11 44.5mm	A B BA W	MP-NPE29-01 MP-NPE29B-01 MP-NPE29BA-01 MP-NPE29W-01	
 2 Position selector switches	5 39mm	A B BA W	MP-NPE28-02 MP-NPE28B-02 MP-NPE28BA-02 MP-NPE28W-02	
	11 (line 1) 5 (line 2) 5 (line 3) 44.5mm	A B BA W	MP-NPE29-02 MP-NPE29B-02 MP-NPE29BA-02 MP-NPE29W-02	
 3 Position selector switches	5 39mm	A B BA W	MP-NPE28-03 MP-NPE28B-03 MP-NPE28BA-03 MP-NPE28W-03	
	11 (line 1) 5 (line 2) 5 (line 3A) 5 (line 3B) 44.5mm	A B BA W	MP-NPE29-03 MP-NPE29B-03 MP-NPE29BA-03 MP-NPE29W-03	
 2 Position toggle switches	4 39mm	A B BA W	MP-NPE28-04 MP-NPE28B-04 MP-NPE28BA-04 MP-NPE28W-04	
	5 44.5mm	A B BA W	MP-NPE29-04 MP-NPE29B-04 MP-NPE29BA-04 MP-NPE29W-04	
 3 Position toggle switches	39mm	A B BA W	MP-NPE28-05 MP-NPE28B-05 MP-NPE28BA-05 MP-NPE28W-05	
	44.5mm	A B BA W	MP-NPE29-05 MP-NPE29B-05 MP-NPE29BA-05 MP-NPE29W-05	

CBK-NPE28-02

Fixed nameplates — aluminum or plastic ①

Type	Maximum letters per line	Finish ②	Catalog number	List price
 Pushbuttons or pilot lights	11 39mm	A B BA W	MP-NPE28-06 MP-NPE28B-06 MP-NPE28BA-06 MP-NPE28W-016	$ 6.50
	11 44.5mm	A B BA W	MP-NPE29-06 MP-NPE29B-06 MP-NPE29BA-06 MP-NPE29W-06	
 2 Position selector switches	5 39mm	A B BA W	MP-NPE28-07 MP-NPE28B-07 MP-NPE28BA-07 MP-NPE28W-07	
	11 (line 1) 5 (line 2) 5 (line 3) 44.5mm	A B BA W	MP-NPE29-07 MP-NPE29B-07 MP-NPE29BA-07 MP-NPE29W-07	

General specifications

1. All characters are 1/8" high, upper & lower case. Please specify if all capital letters are desired.
2. The legend plate inserts and the fixed legend plates are silver-grey anodized aluminum.
3. All special engravings involve engraving the desired lettering into the metal surface and then treating the engraved surfaces with black ink.

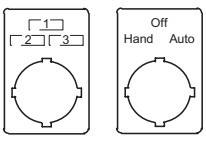
Ordering custom engraved nameplates

1. Select the desired legend plate.
2. Indicate the catalog number.
3. Write the desired words to be engraved on each line.

EXAMPLE:

MP-NPE28P-03
1: OFF
2: HAND
3: AUTO

"MP-NPE28P" is the blank legend plate catalog number. "B" indicates that the black side of the plate is to be engraved. "-03" refers to the layout of text (see dimension illustrations above).



① For drilling plans, see page 8.74.
② Finish: A = brushed aluminum; B = black plastic face with white letters; BA = plastic with brushed aluminum finish; W = white plastic face with black letters.

Engraved legend plate form
Custom engraved nameplates

ENGRAVED LEGEND PLATE FORM
MP-NP19, MP-NP19B, MP-NP19W

PAGE: _____ OF: _____

MP-NP19- ___ ___ (BRUSHED ALUMINUM)

MP-NP19B- ___ ___ (PLASTIC, BLACK FACE / WHITE LTRS)

MP-NP19W- ___ ___ (PLASTIC, WHITE FACE / BLACK LTRS)

ORIG. DATE: _____

ISSUED BY: _____

ALL CAPITALS? YES NO

REMARKS: _____

ORDER NUMBER: _____

ORDER: QTY: _____

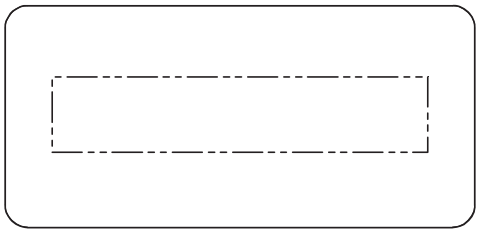
SHIPPING METHOD: _____

DUE DATE: _____ – _____ – _____

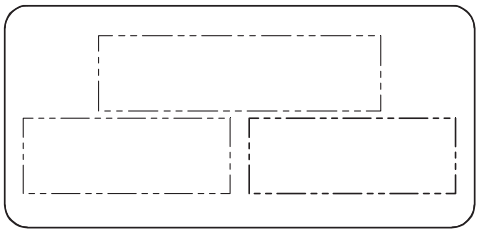
ENGRAVER: _____

Q.C. INSPECTION: _____

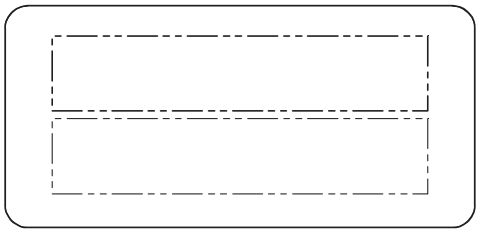
PRINT INFORMATION TO BE ENGRAVED



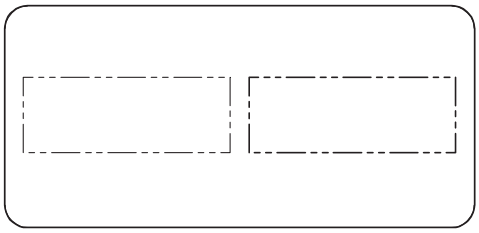
-01



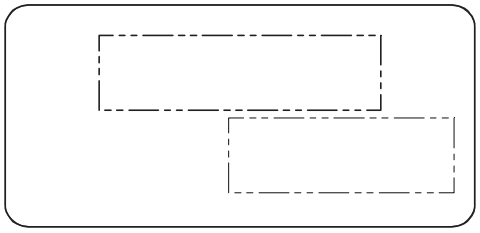
-04



-02



-05



-03

MP-NP19: REV. A
03/04/05

ENGRAVED LEGEND PLATE FORM

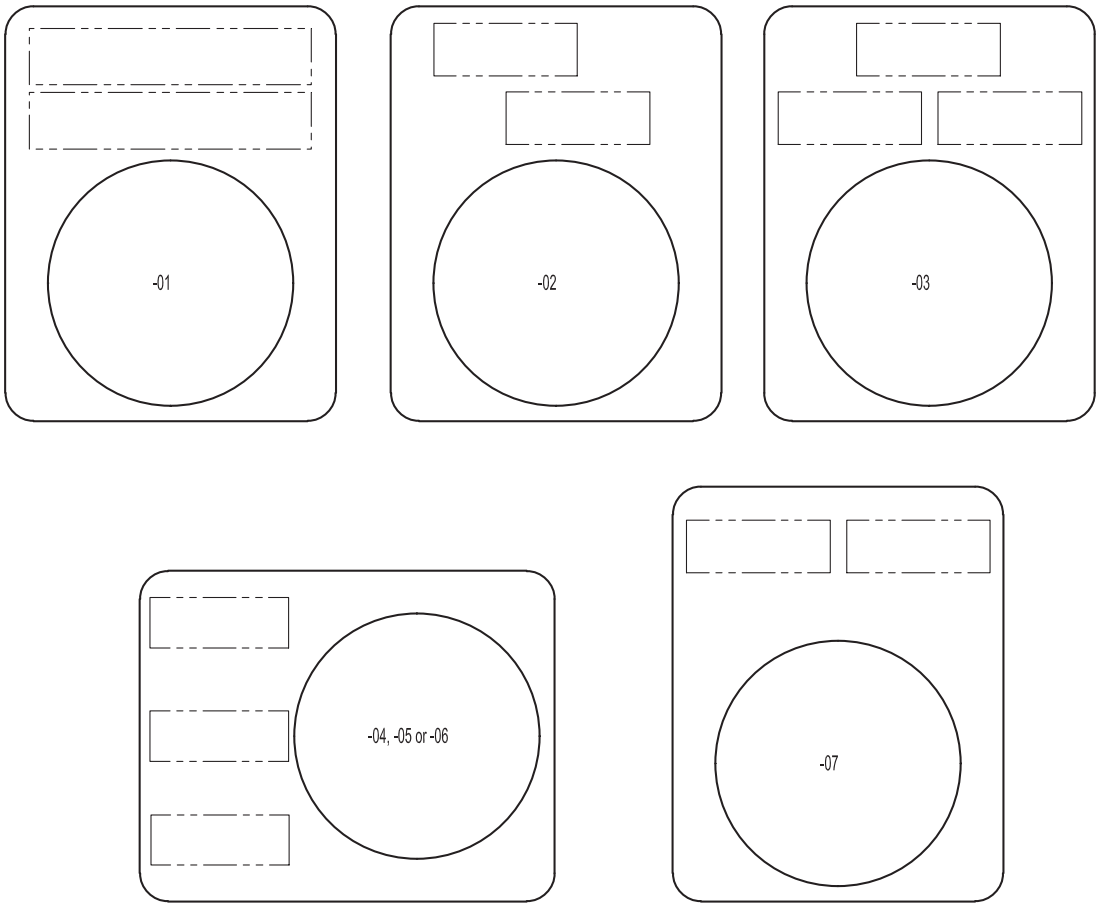
MP-NPE28, MP-NPE28P, MP-NPE28B, MP-NPE28W PAGE:____OF:_____

MP-NPE28-___ ___ (BRUSHED ALUMNINUM)
MP-NPE28BA-___ ___ (PLASTIC, BRUSHED FINISH)
MP-NPE28B-___ ___ (PLASTIC, BLACK FACE/WHITE LTRS)
MP-NPE28W-___ ___ (PLASTIC, WHITE FACE/BLACK LTRS)

ORIG. DATE:_____
ISSUED BY:_____
ALL CAPITALS? YES NO
REMARKS:_____

ORDER NUMBER:_____
ORDER: QTY:_____
SHIPPING METHOD:_____
DUE DATE:____ - ____ - ___
ENGRAVER: _____
Q.C. INSPECTION:_____

PRINT INFORMATION TO BE ENGRAVED



MP-NPE28
5/26/04

8

Engraved legend plate form
Custom engraved nameplates

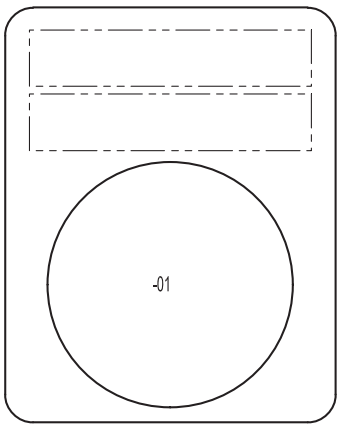
ENGRAVED LEGEND PLATE FORM

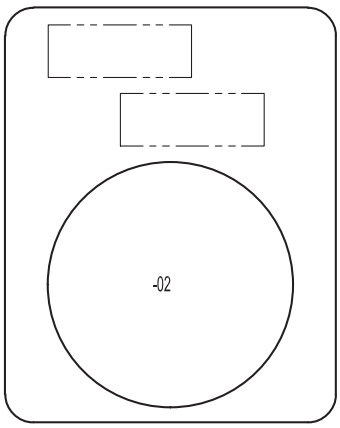
G1MP-NPE28, G1MP-NPE28P, G1MP-NPE28B, G1MP-NPE28W PAGE:____OF:_____

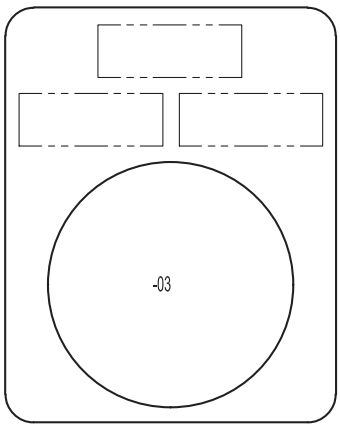
G1MP-NPE28-___ ___ (BRUSHED ALUMNINUM)
G1MP-NPE28BA-___ ___ (PLASTIC, BRUSHED FINISH)
G1MP-NPE28B-___ ___ (PLASTIC, BLACK FACE/WHITE LTRS)
G1MP-NPE28W-___ ___ (PLASTIC, WHITE FACE/BLACK LTRS)
ORIG. DATE:_ _____
ISSUED BY: _____
ALL CAPITALS? YES NO
REMARKS:_ _____

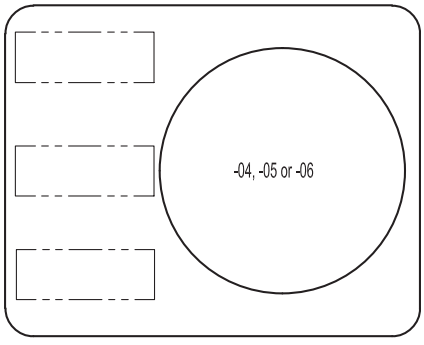
ORDER NUMBER:_____
ORDER: QTY:_____
SHIPPING METHOD:_____
DUE DATE:____ - ____ - ___
ENGRAVER: _____
Q.C. INSPECTION:_____

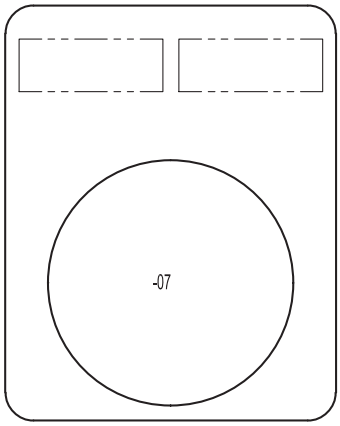
PRINT INFORMATION TO BE ENGRAVED











G1MP-NPE28
6/10/04

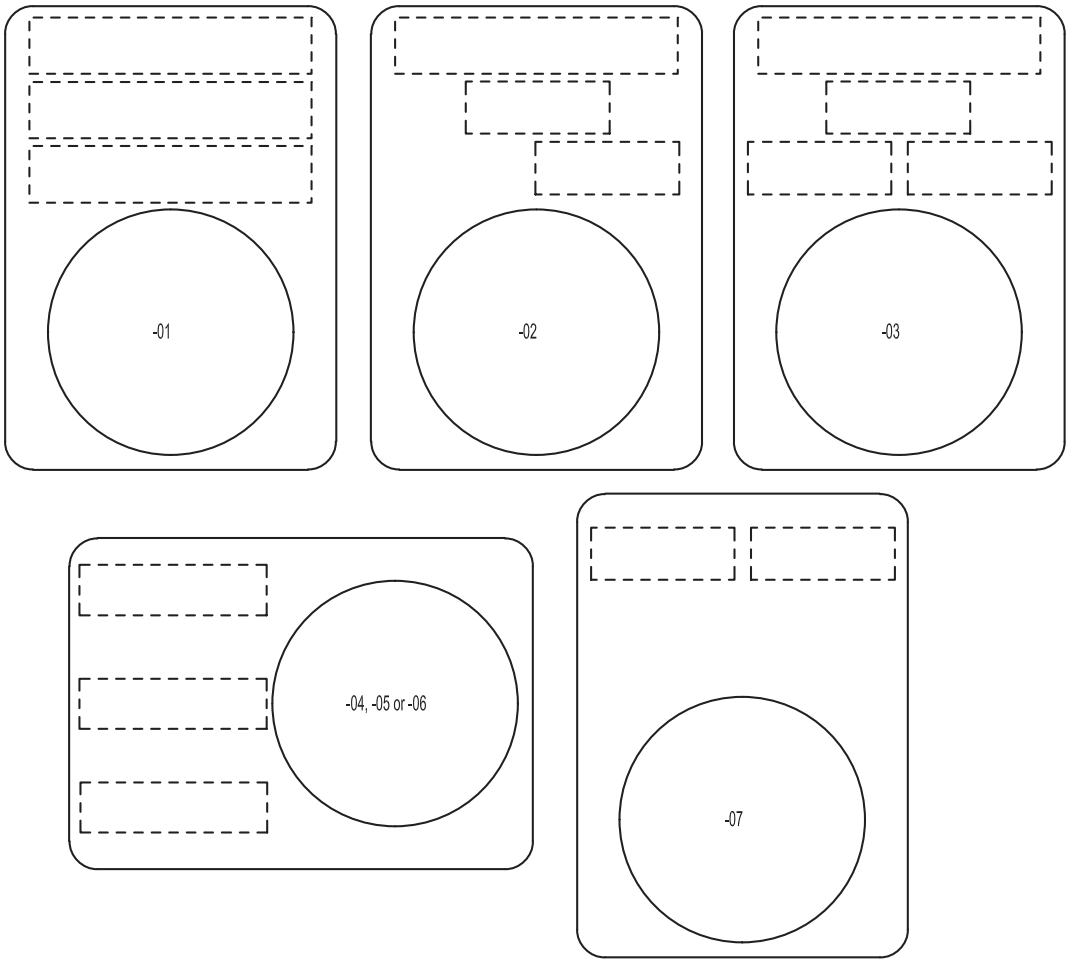
ENGRAVED LEGEND PLATE FORM

G1MP-NPE29, G1MP-NPE29P, G1MP-NPE29B, G1MP-NPE29W PAGE:____OF:_____

G1MP-NPE29-___ ___ (BRUSHED ALUMNINUM)
G1MP-NPE29BA-___ ___ (PLASTIC, BRUSHED FINISH)
G1MP-NPE29B-___ ___ (PLASTIC, BLACK FACE/WHITE LTRS)
G1MP-NPE29W-___ ___ (PLASTIC, WHITE FACE/BLACK LTRS)
ORIG. DATE:_____
ISSUED BY:_____
ALL CAPITALS? YES NO
REMARKS:_____

ORDER NUMBER:_____
ORDER: QTY:_____
SHIPPING METHOD:_____
DUE DATE:____ - ____ - ___
ENGRAVER: _____
Q.C. INSPECTION:_____

PRINT INFORMATION TO BE ENGRAVED



G1MP-NPE29
6/10/04

8

Engraved legend plate form
Custom engraved nameplates

ENGRAVED LEGEND PLATE FORM

MP-NPE29, MP-NPE29P, MP-NPE29B, MP-NPE29W PAGE:____OF:_____

MP-NPE29- ___ ___ (BRUSHED ALUMNINUM)
MP-NPE29BA- ___ ___ (PLASTIC, BRUSHED FINISH)
MP-NPE29B- ___ ___ (PLASTIC, BLACK FACE/WHITE LTRS)
MP-NPE29W- ___ ___ (PLASTIC, WHITE FACE/BLACK LTRS)
ORIG. DATE:_____
ISSUED BY:_____
ALL CAPITALS? YES NO
REMARKS:_____

ORDER NUMBER:_____
ORDER: QTY:_____
SHIPPING METHOD:_____
DUE DATE:____ - ____ - ___
ENGRAVER: _____
Q.C. INSPECTION:_____

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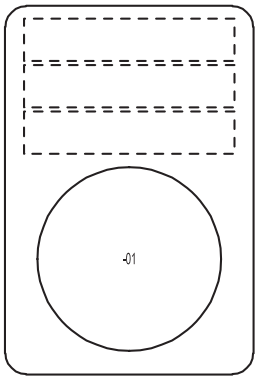
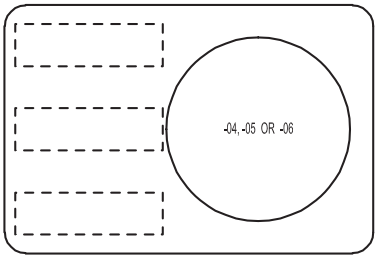
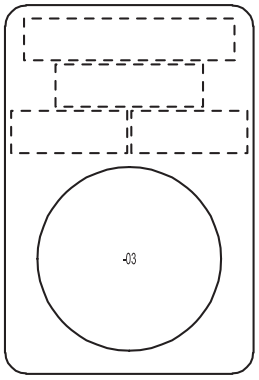
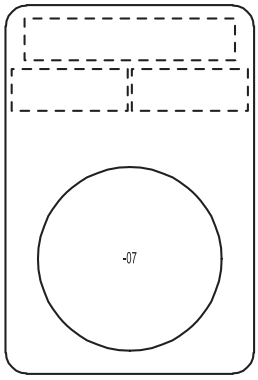
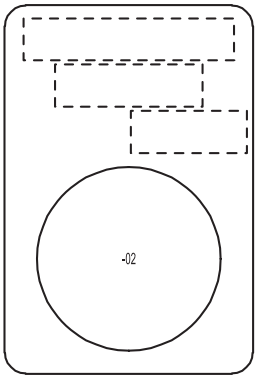






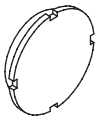




MP-NPE29
6/10/04

Text caps

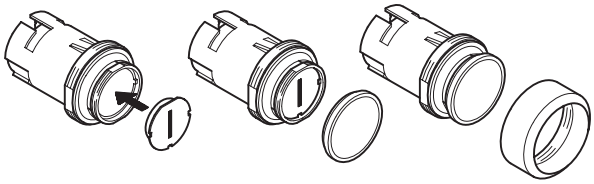
Legend	Cap color ①	Suffix code ②	Flush button catalog number	Extended button catalog number	Pilot light catalog number	List price
	White	C82	1SFA616901R9036	—	—	$ .90
Start	White	C67	1SFA616901R2030	1SFA616902R2030	1SFA616903R2030	
START	Green Black	C5 C81	1SFA616906R1042 1SFA616908R1042	— —	— —	
On	White	C68	1SFA616901R1020	1SFA616902R1020	1SFA616903R1020	
ON	White Green Black	C69 C70 C1	1SFA616901R1039 1SFA616906R1039 1SFA616908R1030	— — —	1SFA616903R1039 — —	
Off	White	C71	1SFA616901R1019	1SFA616902R1019	1SFA616903R1019	
OFF	White Red Black	C72 C73 C2	— — 1SFA616908R1040	1SFA616902R1040 1SFA616905R1040 1SFA616909R1040	— — —	
Stop	White	C74	1SFA616901R1031	1SFA616902R1031	1SFA616903R1031	
STOP	Red	C4	1SFA616904R1047	1SFA616905R1047	—	
Reset	White	C75	1SFA616901R1025	1SFA616902R1025	1SFA616903R1025	
Blank	White Green	C15 CG	1SFA616901R9000 2949 1468-2	1SFA616902R9000 2949 1469-2	1SFA616903R9000 —	
UP	Green	C11	1SFA616906R1043	—	—	
DOWN	Green	C12	1SFA616906R1044	—	—	
OPEN	White Green	C16 C19	1SFA616901R1045 1SFA616906R1045	— —	— —	
CLOSE	White Green	C17 C20	1SFA616901R1046 1SFA616906R1046	— —	— —	
REV	Green	C6	1SFA616906R1048	—	—	
FWD	Green	C7	1SFA616906R1049	—	—	
SLOW	Green	C8	1SFA616906R1050	—	—	
FAST	Green	C9	1SFA616906R1051	—	—	
JOG	Green	C10	1SFA616906R1052	—	—	
RESET	Black	C3	1SFA616908R1041	—	—	
LATCH	White	C18	1SFA616901R1053	—	—	


Flush pushbutton


Extended pushbutton


Pilot light

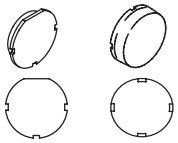
Examples of inserts


1 2 3
Insert assembly

① Illuminated pushbuttons and pilot lights must use white insert.
② For extended pushbuttons, insert “E” at the end of the catalog number. For pilot lights, insert “P” at end of the catalog number.

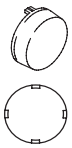
Text caps

Flush button | Extended button



Can be turned 90° or 180°

Pilot light

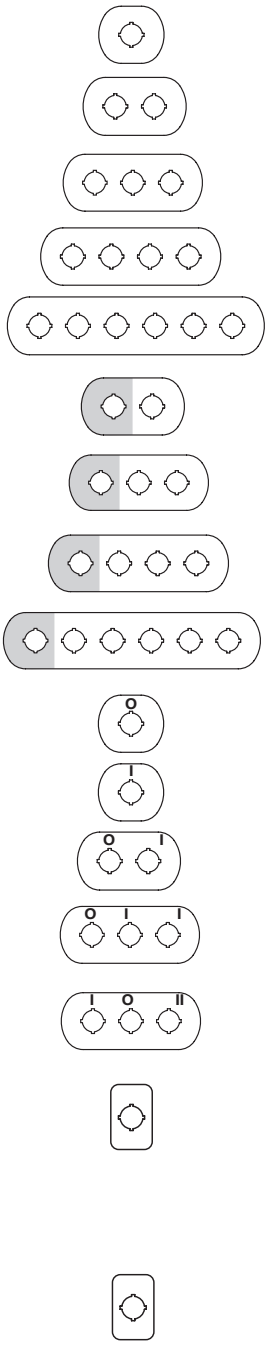


Text caps for illuminated pushbuttons and pilot lights

Text/Symbol ①	Cap color ②	Suffix	Flush button Catalog No.	Extended button Catalog No.	Pilot light Catalog No.	List Price
	White	C14	1SFA 616 901 R9006	1SFA 616 902 R9006	1SFA 616 903 R9006	
O	White	C21	1SFA 616 901 R9004	1SFA 616 902 R9004	1SFA 616 903 R9004	
	Red	C22	1SFA 616 904 R9004	1SFA 616 905 R9004	–	
	Black	C23	1SFA 616 908 R9004	–	–	
I	White	C24	1SFA 616 901 R9002	1SFA 616 902 R9002	1SFA 616 903 R9002	
	Green	C25	1SFA 616 906 R9002	–	–	
	Black	C26	1SFA 616 908 R9002	–	–	
II	White	C27	1SFA 616 901 R9003	1SFA 616 902 R9003	1SFA 616 903 R9003	
	Green	C28	1SFA 616 906 R9003	–	–	
	Black	C29	1SFA 616 908 R9003	–	–	
III	White	C30	1SFA 616 901 R9028	1SFA 616 902 R9028	–	
	Black	C31	1SFA 616 908 R9028	–	–	
+	White	C32	1SFA 616 901 R9011	1SFA 616 902 R9011	–	
	Green	C33	1SFA 616 906 R9011	–	–	
	Black	C34	1SFA 616 908 R9011	–	–	
–	White	C35	1SFA 616 901 R9012	–	–	
	Red	C36	1SFA 616 904 R9012	–	–	
	Black	C37	1SFA 616 908 R9012	–	–	
	White	C38	1SFA 616 901 R9005	1SFA 616 902 R9005	1SFA 616 903 R9005	
	Black	C39	1SFA 616 908 R9005	–	–	
	White	C40	1SFA 616 901 R9014	1SFA 616 902 R9014	–	
	Black	C41	1SFA 616 908 R9014	–	–	
	White	C42	1SFA 616 901 R9015	1SFA 616 902 R9015	–	
	Black	C43	1SFA 616 908 R9015	–	–	
	White	C44	1SFA 616 901 R9016	1SFA 616 902 R9016	–	$ .90
	Black	C45	1SFA 616 908 R9016	–	–	
	White	C46	1SFA 616 901 R9017	1SFA 616 902 R9017	–	
	Black	C47	1SFA 616 908 R9017	–	–	
	White	C47	1SFA 616 901 R9018	1SFA 616 902 R9018	–	
	Black	C48	1SFA 616 908 R9018	–	–	
	White	C49	1SFA 616 901 R9019	1SFA 616 902 R9019	–	
	Black	C50	1SFA 616 908 R9019	–	–	
	White	C51	1SFA 616 901 R9020	1SFA 616 902 R9020	–	
	Black	C52	1SFA 616 908 R9020	–	–	
	White	C53	1SFA 616 901 R9021	1SFA 616 902 R9021	–	
	Black	C54	1SFA 616 908 R9021	–	–	
	White	C55	1SFA 616 901 R9022	1SFA 616 902 R9022	–	
	Black	C56	1SFA 616 908 R9022	–	–	
	White	C57	1SFA 616 901 R9023	1SFA 616 902 R9023	–	
	Black	C58	1SFA 616 908 R9023	–	–	
	White	C59	1SFA 616 901 R9024	1SFA 616 902 R9024	–	
	Black	C60	1SFA 616 908 R9024	–	–	
	White	C61	1SFA 616 901 R9025	1SFA 616 902 R9025	–	
	Black	C62	1SFA 616 908 R9025	–	–	
	White	C63	1SFA 616 901 R9026	1SFA 616 902 R9026	–	
	Black	C64	1SFA 616 908 R9026	–	–	
	White	C65	1SFA 616 901 R9027	1SFA 616 902 R9027	–	
	Black	C66	1SFA 616 908 R9027	–	–	

① Use only white caps for illuminated pushbutton and pilot lights.
② Add “E” for extended button or “P” for pilot light.

Special legend plates
for plastic enclosures



Legend plates for plastic enclosures
For 1, 2, 3, 4 or 6-seat

Description	Catalog No.	List Price
Of silvergrey aluminum.		
1-seat	**1SFA 611 930 R1000**	**$ 12**
2-seat	**1SFA 611 930 R1002**	**15**
3-seat	**1SFA 611 930 R1003**	**18**
4-seat	**1SFA 611 930 R1004**	**21**
6-seat	**1SFA 611 930 R1005**	**27**
Of silvergrey aluminum.(Pos. 1 Yellow)		
2-seat	**1SFA 611 930 R1006**	**20**
3-seat	**1SFA 611 930 R1007**	**23**
4-seat	**1SFA 611 930 R1008**	**26**
6-seat	**1SFA 611 930 R1009**	**32**

Symbol/Text **Pos** **1 2 3**	**Catalog No.**	**List Price**
Of silvergrey aluminum.		
1-seat **OFF**	**1SFA 611 930 R1012**	**$ 17**
1-seat **ON**	**1SFA 611 930 R1013**	**17**
2-seat **OFF/ON**	**1SFA 611 930 R1014**	**20**
3-seat **OFF/ON/RUN**	**1SFA 611 930 R1015**	**23**
3-seat **HAND/OFF/AUTO**	**1SFA 611 930 R1016**	**23**

Emergency stop legend plate

Desciption/Text	Catalog No.	List Price
Black text on an yellow aluminum plate.		
Legend plate without text	**1SFA 611 930 R1010**	
Legend plate (1SFA 611 930 R1010) with text:		
Nöd stopp	**1SFA 611 930 R1017**	
Not Aus	**1SFA 611 930 R1018**	
Emergency Stop	**1SFA 611 930 R1019**	**$ 15**
ARRET D'URGENCE	**1SFA 611 930 R1020**	
Hätäseis	**1SFA 611 930 R1021**	
PARADA DE EMERGENCIA	**1SFA 611 930 R1022**	
Black text on an yellow plastic plate.		
Legend plate without text	**1SFA 611 930 R1011**	**5**
Legend plate (1SFA 611 930 R1011) with text:		
Emergency Stop	**1SFA 611 930 R1023**	**10**

Notes

Signal towers K70
Signal beacons KSB

Signal towers K70 and Signal beacons KSB offer a wide range of signal elements in all voltages and a solution for every signalling field.

Signal towers K70

- Fast mounting of signal elements using bayonet fixing.
- Easy changing of bulbs for each module without tools.
- Flexibility of signal element combination.
- Up to 5 elements possible/up to 10 elements with bracket for 2-sided mounting.
- Flashing light elements can be mounted in each module.
- Up to 5 flashing light elements possible.
- High protection rating optical and audible signal elements with IP 54.
- LED elements for long life
- Large variety of different versions
  - Permanent light, 12-240V, AC/DC
  - Blinking light, 24-230V
  - Flashing light, 24-230V
  - Audible 85db continuous or pulsating
  - LED, 24-230V

Signal beacons KSB

- Large variety of different versions:
  - Permanent light, max. 250V
  - Blinking light, 24V, AC/DC
  - Flashing light, 24-230VAC
  - LED light, 24V, AC/DC
- IP65 for outdoor use
- Available in 5 colors
- High impact polycarbonate

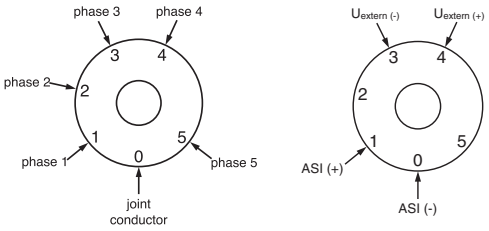
Signal towers K70
Description

Simple fitting with quick fix system

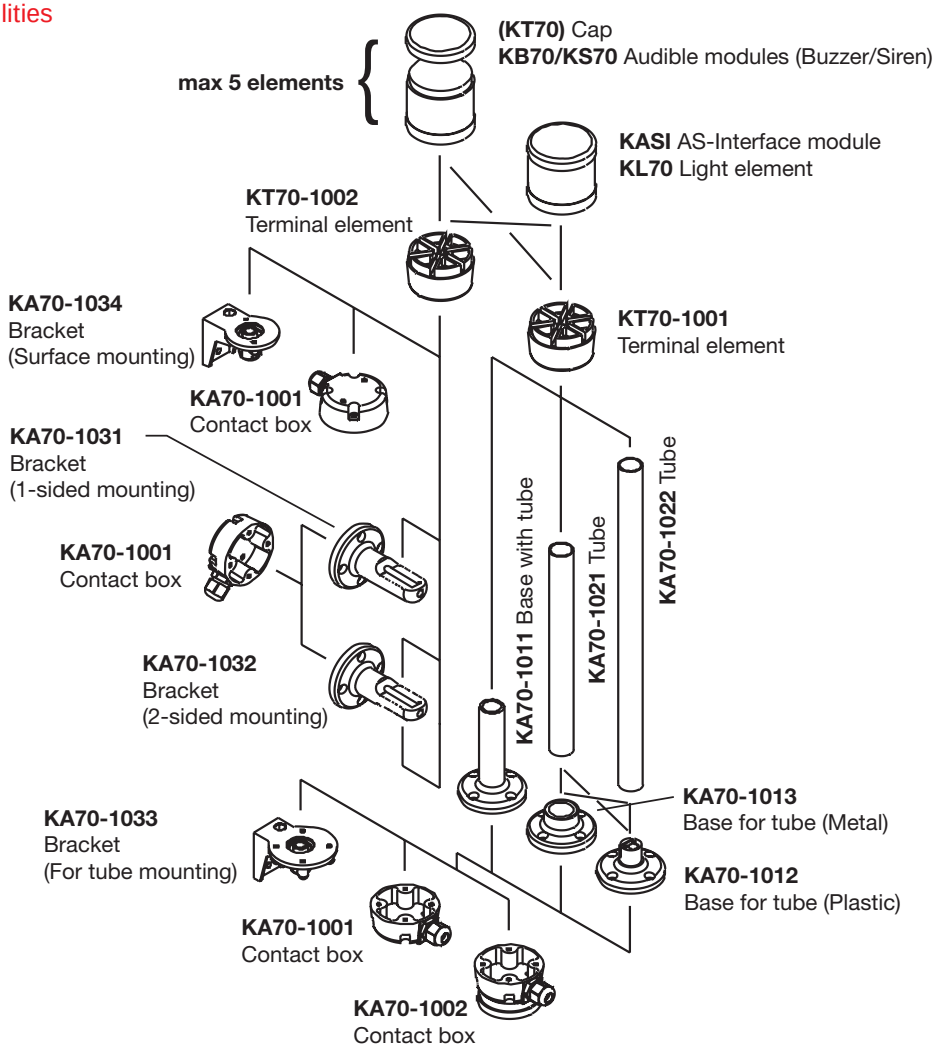
Each K 70 module is equipped with a bayonet fixing with integral contact system. The modules are fastened together by aligning the corresponding white marks then with a gentle twist they are locked into place (see the figures).

Connection plans

With AS Interface module



Combination possibilities



Optical modules

Description	Catalog No.	Ref. Code	List Price
Light element			
Permanent light, 12-240 V AC/DC. For bulb BA15d. Bulb not included.			
Red	**KL70-401R**	1SFA 616 070 R4011	**$ 36.00**
Green	**KL70-401G**	1SFA 616 070 R4012	
Yellow	**KL70-401Y**	1SFA 616 070 R4013	
Blue	**KL70-401L**	1SFA 616 070 R4014	
Clear	**KL70-401C**	1SFA 616 070 R4018	
Blinking light, 24 V AC/DC. For bulb BA15d. Bulb not included.			
Red	**KL70-302R**	1SFA 616 070 R3021	**100.00**
Green	**KL70-302G**	1SFA 616 070 R3022	
Yellow	**KL70-302Y**	1SFA 616 070 R3023	
Blue	**KL70-302L**	1SFA 616 070 R3024	
Clear	**KL70-302C**	1SFA 616 070 R3028	
Flashing light, 24 V DC. Xenon tube included. Not changeable.			
Red	**KL70-203R**	1SFA 616 070 R2031	**165.00**
Green	**KL70-203G**	1SFA 616 070 R2032	
Yellow	**KL70-203Y**	1SFA 616 070 R2033	
Blue	**KL70-203L**	1SFA 616 070 R2034	
Clear	**KL70-203C**	1SFA 616 070 R2038	
Blinking light, 115 V AC/DC. For bulb BA15d. Bulb not included.			
Red	**KL70-312R**	1SFA 616 070 R3121	**100.00**
Green	**KL70-312G**	1SFA 616 070 R3122	
Yellow	**KL70-312Y**	1SFA 616 070 R3123	
Blue	**KL70-312L**	1SFA 616 070 R3124	
Clear	**KL70-312C**	1SFA 616 070 R3128	
Flashing light, 115 V AC. Xenon tube included. Not changeable.			
Red	**KL70-113R**	1SFA 616 070 R1131	**155.00**
Green	**KL70-113G**	1SFA 616 070 R1132	
Yellow	**KL70-113Y**	1SFA 616 070 R1133	
Blue	**KL70-113L**	1SFA 616 070 R1134	
Clear	**KL70-113C**	1SFA 616 070 R1138	
Blinking light, 230 V AC/DC. For bulb BA15d. Bulb not included.			
Red	**KL70-322R**	1SFA 616 070 R3221	**100.00**
Green	**KL70-322G**	1SFA 616 070 R3222	
Yellow	**KL70-322Y**	1SFA 616 070 R3223	
Blue	**KL70-322L**	1SFA 616 070 R3224	
Clear	**KL70-322C**	1SFA 616 070 R3228	
Flashing light, 230 V AC. Xenon tube included. Not changeable.			
Red	**KL70-123R**	1SFA 616 070 R1231	**155.00**
Green	**KL70-123G**	1SFA 616 070 R1232	
Yellow	**KL70-123Y**	1SFA 616 070 R1233	
Blue	**KL70-123L**	1SFA 616 070 R1234	
Clear	**KL70-123C**	1SFA 616 070 R1238	
LED Permanent light, 24 V AC/DC. LED included. Not changeable.			
Red	**KL70-305R**	1SFA 616 070 R3051	**135.00**
Green	**KL70-305G**	1SFA 616 070 R3052	
Yellow	**KL70-305Y**	1SFA 616 070 R3053	
Blue	**KL70-305L**	1SFA 616 070 R3054	
White	**KL70-305C**	1SFA 616 070 R3058	
LED Blinking light, 24 V AC/DC. LED included. Not changeable.			
Red	**KL70-306R**	1SFA 616 070 R3061	**140.00**
Green	**KL70-306G**	1SFA 616 070 R3062	
Yellow	**KL70-306Y**	1SFA 616 070 R3063	
Blue	**KL70-305L**	1SFA 616 070 R3064	
White	**KL70-305C**	1SFA 616 070 R3068	
LED Rotating light, 24 V AC/DC. LED included. Not changeable.			
Red	**KL70-307R**	1SFA 616 070 R3071	**140.00**
Green	**KL70-307G**	1SFA 616 070 R3072	
Yellow	**KL70-307Y**	1SFA 616 070 R3073	
Blue	**KL70-305L**	1SFA 616 070 R3074	
White	**KL70-305C**	1SFA 616 070 R3078	

Signal towers K70
Accessories


KA70-1001


KA70-1002

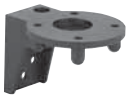

KA70-1012


KA70-1013

KA70-1021


KA70-1011


KA70-1032


KA70-1033

Description	Catalog No.	Ref. Code	List Price
Bulbs for Signal Tower K70 Bulb Ba 15d, 42 mm, Max 7 W For permanent or blinking light.			
24 V, 5 W, AC/DC	**1SFA 616 923 R1028**	1SFA 616 923 R1028	
115 V, 5 W, AC/DC	**1SFA 616 923 R1118**	1SFA 616 923 R1118	**$ 8.00**
230 V, 5 W, AC/DC	**1SFA 616 923 R1148**	1SFA 616 923 R1148	
LED bulbs for Signal Tower K70 Ba 15d. For 24 V AC/DC, 40 mA			
Color:			
Red	**KA4-1021**	1SFA 616 924 R1021	
Green	**KA4-1022**	1SFA 616 924 R1022	
Yellow	**KA4-1023**	1SFA 616 924 R1023	**175.00**
Blue	**KA4-1024**	1SFA 616 924 R1024	
White	**KA4-1025**	1SFA 616 924 R1025	
Audible modules			
Buzzer element			
85 dB, continuous or pulsating tone, adjustable			
24 V AC/DC	**KB70-3001**	1SFA 616 071 R3001	**95.00**
115 V AC/DC	**KB70-3101**	1SFA 616 071 R3101	**115.00**
230 V AC	**KB70-1201**	1SFA 616 071 R1201	**115.00**
Siren element			
Multi function, 8 diff. tones adjustable, volume adjustable 100 dB, 115 V AC	**KS70-1104**	1SFA 616 073 R1104	**155.00**
Multi function, 8 diff. tones adjustable, volume adjustable 100 dB, 230 V AC	**KS70-1204**	1SFA 616 073 R1204	**155.00**
Multi function, 7 diff. tones adjustable, volume adjustable, remote control 100 dB, 24 V DC	**KS70-2004**	1SFA 616 073 R2004	**145.00**
Multi function, 8 diff. tones adjustable, volume adjustable,100 dB, 24 V AC/DC	**KS70-3004**	1SFA 616 073 R3004	**145.00**
Continuous tone alternating 108 dB, 24 V DC	**KS70-2002**	1SFA 616 073 R2002	**100.00**
AS-Interface Module			
18,5-31,6 V AC/DC	**KASI-4101**	1SFA 616 079 R4101	**300.00**
for external voltage 18,5-31,6 V AC/DC	**KASI-4102**	1SFA 616 079 R4102	**300.00**
Terminal elements			
For tube mounting, including cap	**KT70-1001**	1SFA 616 075 R1001	**40.00**
For bracket or base, including cap	**KT70-1002**	1SFA 616 075 R1002	**40.00**
Special parts			
Contact box			
Cable exit at side	**KA70-1001**	1SFA 616 077 R1001	**23.00**
Magnetic base	**KA70-1002**	1SFA 616 077 R1002	**65.00**
Base with tube			
D=25 mm L=110 mm	**KA70-1011**	1SFA 616 077 R1011	**33.00**
Base for tube			
D=25 mm, Plastic	**KA70-1012**	1SFA 616 077 R1012	**15.00**
D=25 mm, Metal	**KA70-1013**	1SFA 616 077 R1013	**32.00**
Tube, anodized aluminum			
D=25 mm L=250 mm	**KA70-1021**	1SFA 616 077 R1021	**20.00**
D=25 mm L=400 mm	**KA70-1022**	1SFA 616 077 R1022	**27.00**
Bracket			
1-sided mounting	**KA70-1031**	1SFA 616 077 R1031	**20.00**
2-sided mounting	**KA70-1032**	1SFA 616 077 R1032	**20.00**
For tube mounting	**KA70-1033**	1SFA 616 077 R1033	**20.00**
For surface mounting	**KA70-1034**	1SFA 616 077 R1034	**20.00**

Signal Beacons KSB

Description	Catalog No.	Ref. Code	List Price
Permanent light, 12-240 V AC/DC. For bulb BA15d. Bulb not included.			
Red	**KSB-401R**	1SFA 616 080 R4011	
Green	**KSB-401G**	1SFA 616 080 R4012	
Yellow	**KSB-401Y**	1SFA 616 080 R4013	**$ 55.00**
Blue	**KSB-401L**	1SFA 616 080 R4014	
Clear	**KSB-401C**	1SFA 616 080 R4018	
Flashing light, 24 V DC. Xenon tube included. Not changeable.			
Red	**KSB-203R**	1SFA 616 080 R2031	
Green	**KSB-203G**	1SFA 616 080 R2032	
Yellow	**KSB-203Y**	1SFA 616 080 R2033	**180.00**
Blue	**KSB-203L**	1SFA 616 080 R2034	
Clear	**KSB-203C**	1SFA 616 080 R2038	
Flashing light, 115 V AC**.** Xenon tube included. Not changeable.			
Red	**KSB-113R**	1SFA 616 080 R1131	
Green	**KSB-113G**	1SFA 616 080 R1132	
Yellow	**KSB-113Y**	1SFA 616 080 R1133	**155.00**
Blue	**KSB-113L**	1SFA 616 080 R1134	
Clear	**KSB-113C**	1SFA 616 080 R1138	
Flashing light, 230 V AC. Xenon tube included. Not changeable.			
Red	**KSB-123R**	1SFA 616 080 R1231	
Green	**KSB-123G**	1SFA 616 080 R1232	
Yellow	**KSB-123Y**	1SFA 616 080 R1233	**155.00**
Blue	**KSB-123L**	1SFA 616 080 R1234	
Clear	**KSB-123C**	1SFA 616 080 R1238	
LED Permanent light, 24 V AC/DC. LED included. Not changeable.			
Red	**KSB-305R**	1SFA 616 080 R3051	
Green	**KSB-305G**	1SFA 616 080 R3052	**190.00**
Yellow	**KSB-305Y**	1SFA 616 080 R3053	
LED Blinking light, 24 V AC/DC. LED included. Not changeable.			
Red	**K SB-306R**	1SFA 616 080 R3061	
Green	**K SB-306G**	1SFA 616 080 R3062	**195.00**
Yellow	**K SB-306Y**	1SFA 616 080 R3063	
LED Rotating light, 24 V AC/DC. LED included. Not changeable.			
Red	**KSB-307R**	1SFA 616 080 R3071	
Green	**KSB-307G**	1SFA 616 080 R3072	**195.00**
Yellow	**KSB-307Y**	1SFA 616 080 R3073	

Special parts

Anti-twist device	**KASB-100**	1SFA 616 087 R1000	**8.00**

Bulbs for Signal Beacons

Max 10 W. For permanent light.

Bulb Ba15d, 52 mm:			
12 V, 7 W, AC/DC	**1SFA 616 922 R1018**	1SFA 616 922 R1018	**8.00**
24 V, 7 W, AC/DC	**1SFA 616 922 R1028**	1SFA 616 922 R1028	
115 V, 7 W, AC/DC	**1SFA 616 922 R1118**	1SFA 616 922 R1118	
220-260 V, 7-10 W, AC/DC	**1SFA 616 922 R1148**	1SFA 616 922 R1148	

Technical data
Signal Towers K70
Signal Beacons KSB

Signal Towers K70

Approvals

E 175 441

Technical specifications

Housing and accessories	Polyamide, high impact, black
Dome	Polycarbonate, transparent
Fixing	Base mounting Tube mounting, for tube ø 25 mm Bracket mounting
Socket	B 15 d, for bulb max. 7W
Connection	Screwable connection up to 2.5 mm²
Number of modules possible	max. 5
2-sided bracket	max.10 elements

Degrees of protection

Light elements	IP 54 UL Type 5
Audible elements	IP 54 UL Type 5

Electrical data

Permanent light element	12 - 240 V AC/DC		
Bulb socket B 15 d, max 7 W	Bulb not included		
Blinking light element	24 V	115 V	230 V
AC/DC	AC/DC	AC/DC	
	Bulb not included		
Starting current	< 0.5 A		
Flashing light element	24 V	115 V	230 V
	DC	AC	AC
Flash frequency	1 Hz	1 Hz	1 Hz
Flash energy	2 Ws	2 Ws	2 Ws
Life duration	4 x 10 ^{6} flashes		
Current consumption	125 mA	20 mA	35 mA
reduced for AS-Interface	80 mA		
Starting current	< 0.5 A at 24 V		
LED Permanent light element	24 V	115 V	230 V
	AC/DC	AC	AC
Current consumption	45 mA	25 mA	25 mA
Starting current	< 0.5 A at 24 V		
LED Blinking light element	24 V	115 V	230 V
	AC/DC	AC	AC
Current consumption	25 mA	25 mA	25 mA
Starting current	< 0.5 A at 24 V		
Blink frequency	c. 1 Hz	c. 1Hz	c. 1 Hz
LED Rotating light element	24 V, AC/DC		
Current consumption	70 mA		
Starting current	< 0.5 A at 24 V		
Rotation frequency	c. 120 r.p m.		
Temperature			
Ambient temperature during operations	–20 to +50 °C		

Signal Beacons KSB

Approvals

E 175 441

Technical specifications

Housing and accessories	PC/ABS-Blend, high impact, black
Dome	Polycarbonate, transparent
Fixing	Installation mounting for ø 37 mm (PG 29)
Bulb socket	B 15 d, max. 10 W
Bulb change	via rear access with bayonet mechanism (Bulb not included)
Connection	Screwable connection max. 2.5 mm²

Degrees of protection

IP 65 UL Type 5

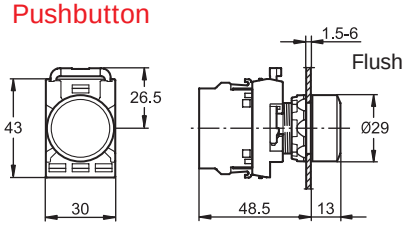
Electrical data

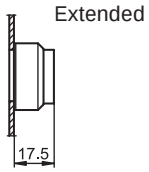
Permanent light element			
Operating voltage	max. 250 V		
Bulb socket B 15 d, max 10 W	Bulb not included		
LED version:			
Permanent light	24 V, AC/DC		
Current consumption	45 mA		
Blinking light element	24 V, AC/DC		
Current consumption	25 mA		
Rotating light element	24 V, AC/DC		
Current consumption	70 mA		
Starting current	< 0.5 A		
Flashing light element			
Operating voltage	24 V	115 V	230 V
	AC/DC	AC	AC
Flash frequency	1 Hz	1 Hz	1 Hz
Flash energy	2 Ws	2 Ws	2 Ws
Life duration	4 x 10 ^{6} flashes		
Current consumption	125 mA	20 mA	35 mA
Starting current	< 0.5 A	< 0.5 A	< 0.25 A
Temperature			
Ambient temperature during operations	–20 to +50 °C		

Approximate dimensions
Modular range

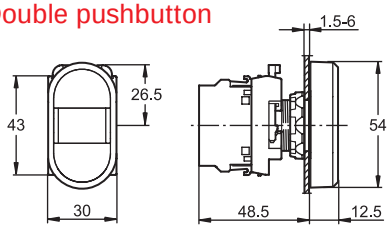
All dimensions in MM

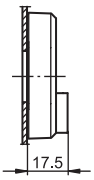
Pushbutton



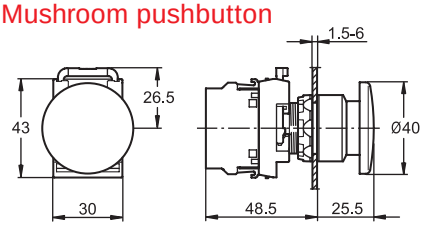


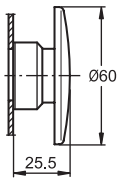
Double pushbutton



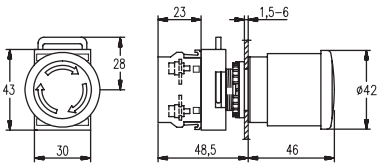


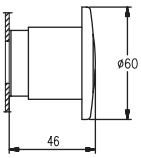
Mushroom pushbutton



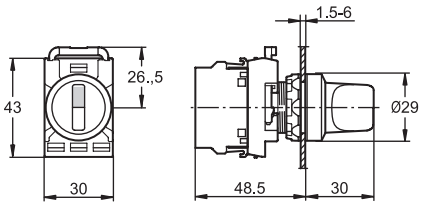


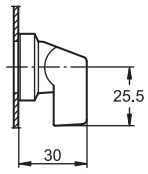
Emergency stop pushbutton



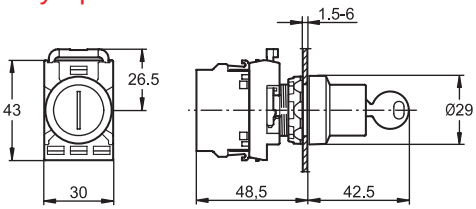


Selector switch

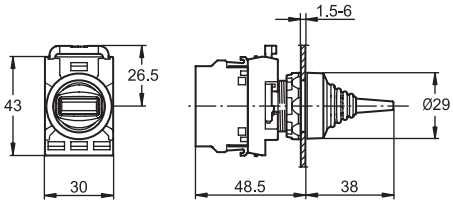




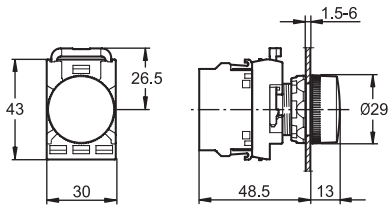
Key-operated selector switch



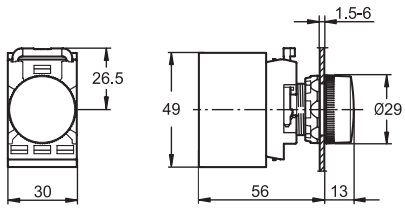
Toggle switch



Pilot light



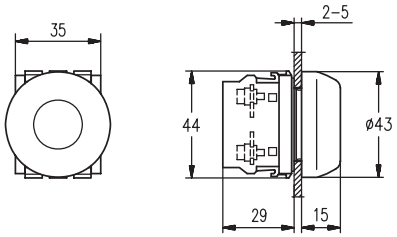
Pilot light with transformer



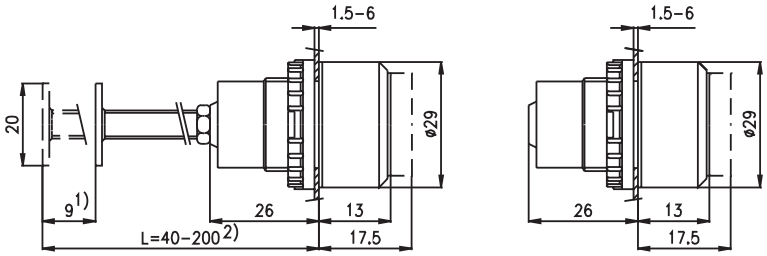
Approximate dimensions and drilling plans
Miscellaneous

All dimensions in MM

Definite purpose pushbutton

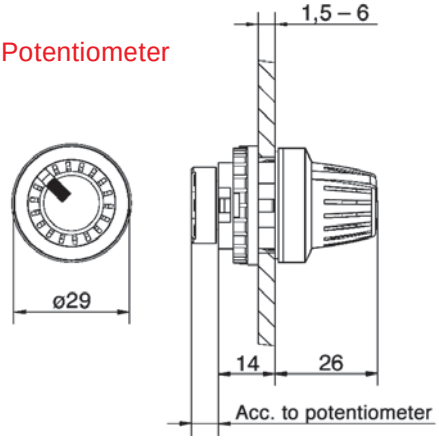


Reset pushbutton

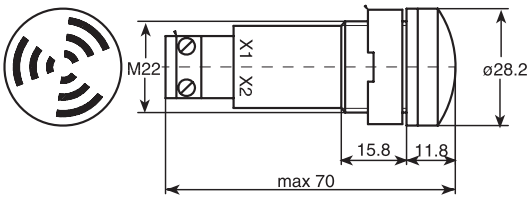


1) Length of stroke.
2) Can be cut to desired length.

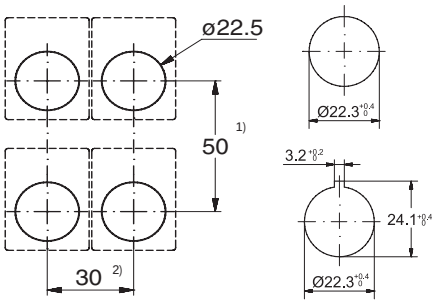
Potentiometer



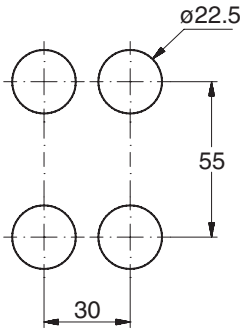
Buzzer



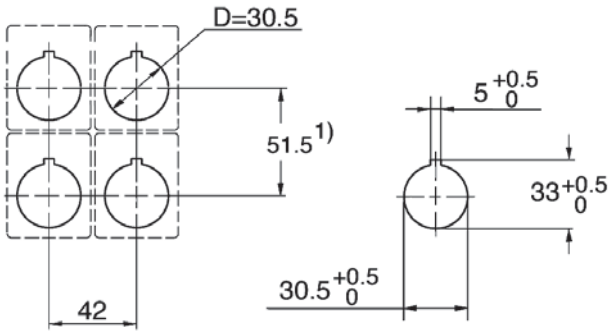
Drilling plans for pushbuttons, switches and pilot lights



Drilling plan for double pushbutton



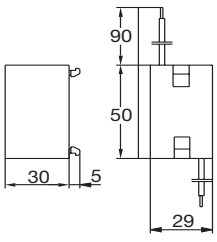
Drilling plan for 30 mm adaptor



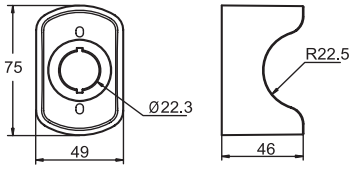
1) 55 mm when legend plate H= 44.5 mm is used.
61 mm for mushroom pushbutton with D=60 mm

2) 37 mm when legend plate with insert is used,

Transformer block



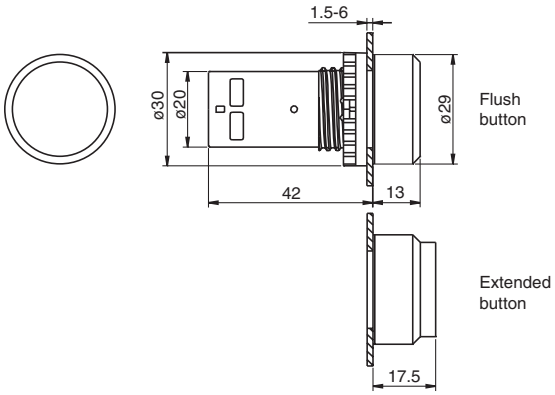
Emergency stop shroud



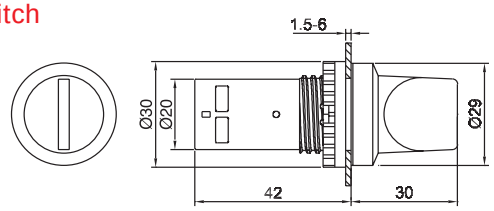
Approximate dimensions
Compact range

All dimensions in MM

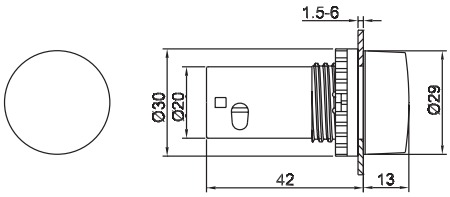
Pushbutton



Selector switch

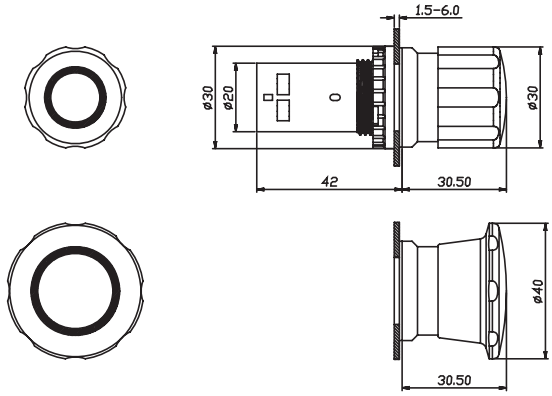


Pilot light

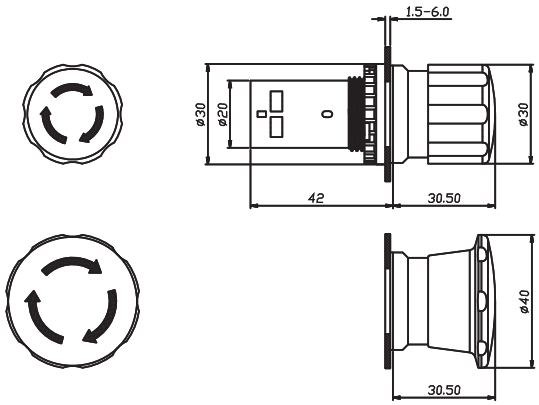


Emergency stop pushbuttons

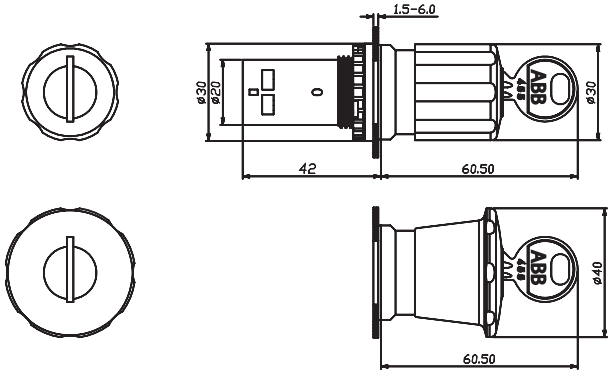
CE3P/CE4P (Pull release)



CE3T/CE4T (Twist release)



CE3K1/CE4K1



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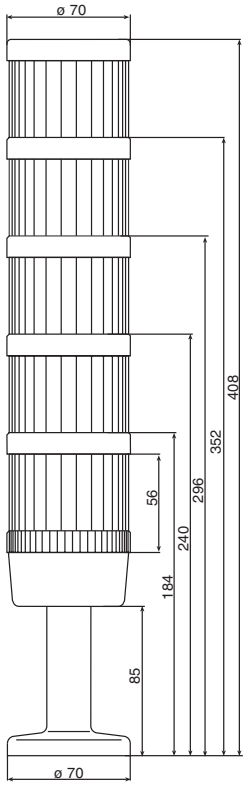
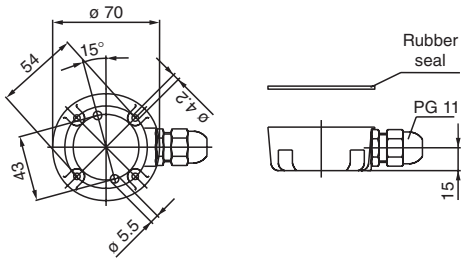
Approximate dimensions and drilling plans
Signal Towers/Signal Beacons

All dimensions in MM

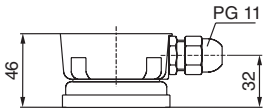
Signal Towers K 70



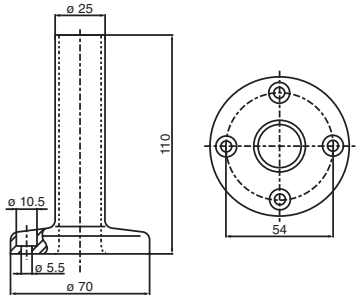
Contact box for cable exit at side



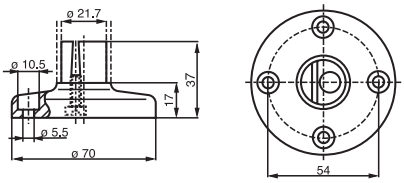
Contact box with magnetic base



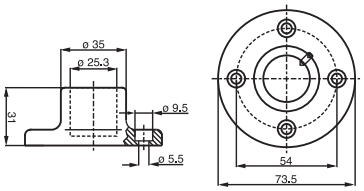
Base with integrated tube



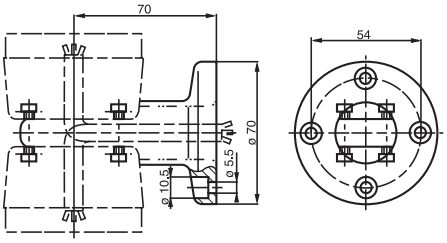
Base for tube, plastic



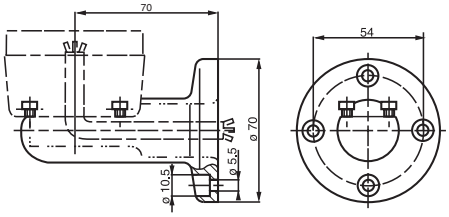
Base for tube, metal



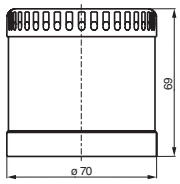
Bracket 2-sided mounting



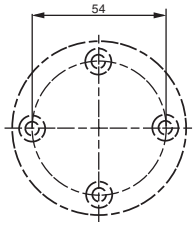
Bracket 1-sided mounting



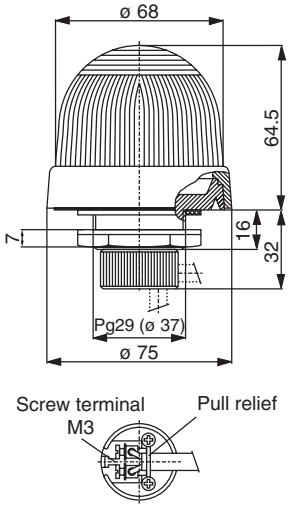
Audible module



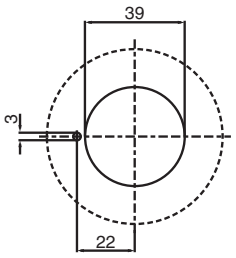
Drilling plan for Signal Towers K 70



Signal Beacons K SB

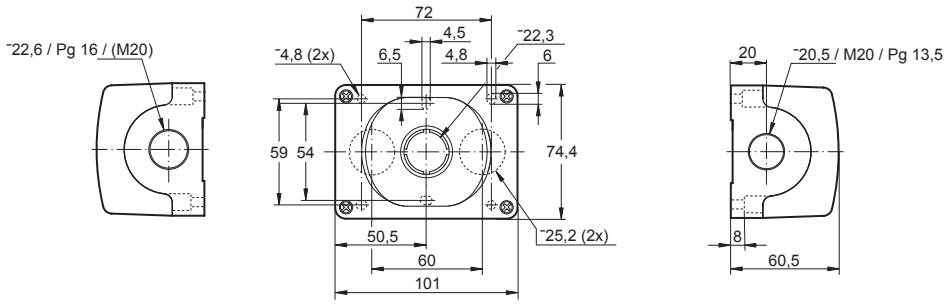


Drilling plan for Signal Beacons KSB



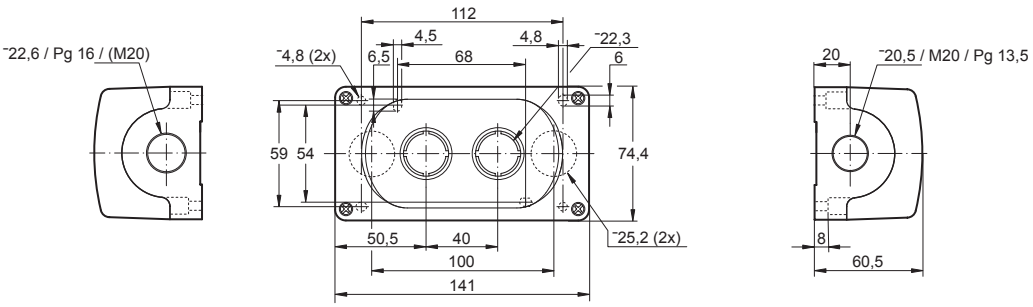
Approximate dimensions
Enclosures

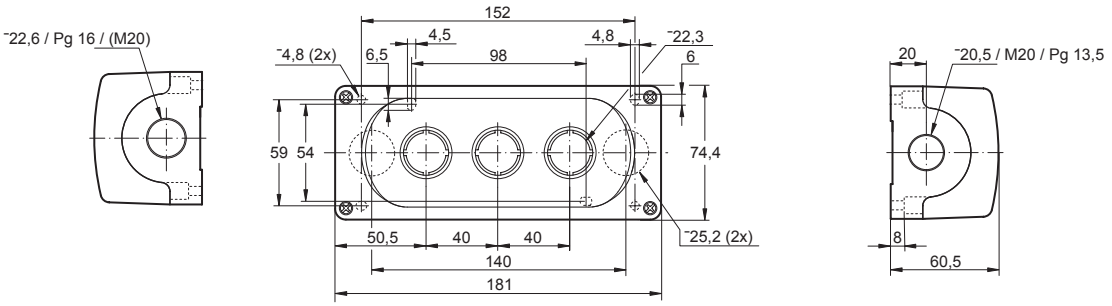
All dimensions in MM

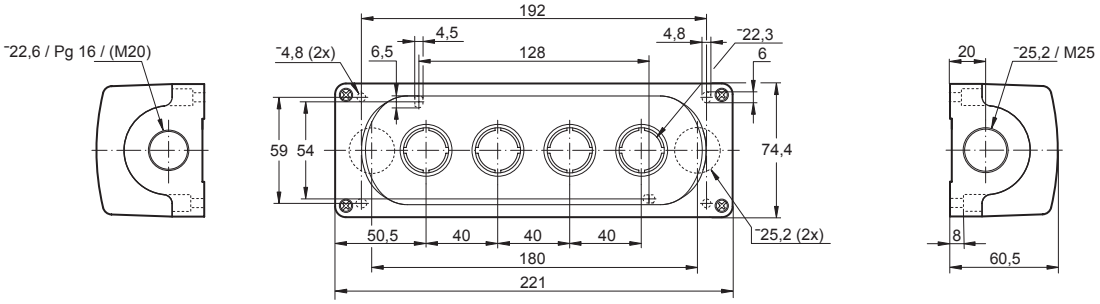


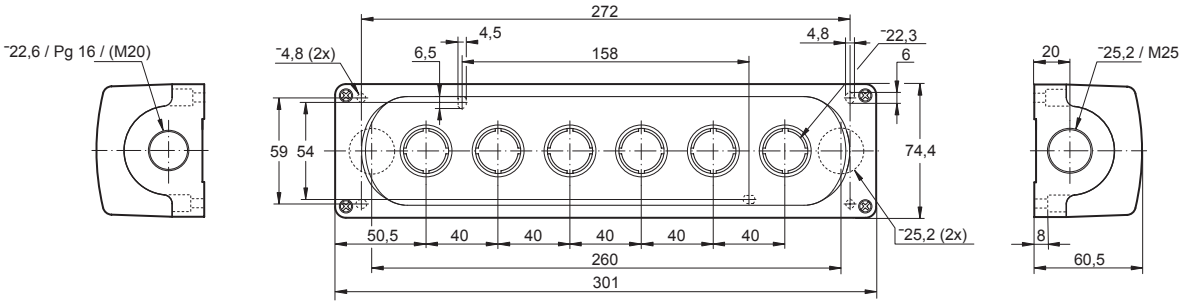
Hole diameter / Cable gland

⌀20,5 / M20, Pg13,5
⌀22,6 / Pg16, (M20)
⌀25,2 / M25









Color selection

Color selection according to IEC 60204-1

IEC 60204-1 specifies coding principles for indicators and actuators and gives recommendation regarding the use of colors. An excerpt from the standard is given below. For detailed information, see the standard.

Meaning of colors – General principles

	Meaning		
Color	**Safety of persons or environment**	**Condition of process**	**State of equipment**
RED	Danger	Emergency	Faulty
YELLOW	Warning/caution	Abnormal	Abnormal
GREEN	Safe	Normal	Normal
BLUE	Mandatory significance		
WHITE, GREY, BLACK	No specific meaning assigned		

Non-illuminated actuators

Emergency actuators
EMERGENCY-STOP / OFF actuators shall be identified by the color **RED**

STOP / OFF actuators
WHITE, **GREY** and **BLACK** are the preferred colors for STOP / OFF actuators, with the main preference being for BLACK. RED is also permitted. GREEN shall not be used.

START / ON actuators
WHITE, **GREY** and **BLACK** are the preferred colors for START / ON actuators, which cause the closing of switching devices and the equipment to start, with the main preference being for WHITE. GREEN is also permitted. RED shall not be used.

Use of WHITE and BLACK for specific meanings
Where the colors **WHITE** and **BLACK** are used to distinguish between START / ON and STOP / OFF actuators, then the color **WHITE** shall be used for START / ON actuators and the color **BLACK** shall be used for STOP / OFF actuators.

The same actuators serving for START and STOP or ON and OFF
WHITE, **GREY** and **BLACK** are the preferred colors for actuators which, when actuated several times, act alternately as a START / ON and STOP / OFF actuator.
The colors YELLOW and GREEN shall not be used. The color **RED** shall be used only in cases where the same actuator, other than a push-button, is used for both EMERGENCYSTOP / OFF and normal operation.

WHITE, **GREY** and **BLACK** are preferred colors for actuators which cause a movement while they are actuated and stop the movement when they are released (such as inching or jogging actuators). **GREEN** is also permitted. RED shall not be used.

RESET actuators
RESET actuators (used, for example, with protective relays) shall be **BLUE**, **WHITE**, **GREY** and **BLACK**, except RESET actuators which also act as STOP / OFF actuators. The color of such STOP / OFF actuators shall be in accordance with
STOP / OFF actuators above.

Explanation of type codes

Modular Pilot Devices

Pilot light

Example 1: **Type ML1-100R**

L1	Pilot Light Head

Lens color:
R = Red **W** = White
G = Green **C** = Clear
Y = Yellow
L = Blue

Operators

Example 2: **Type MP1-10Y**

P	Pushbutton
PD	Pushbutton, Double
PK	Pushbutton, Key-lockable
PM	Pushbutton, Mushroom
PMT	Pushbutton, Mushroom, Twist release
PMP	Pushbutton, Mushroom, Pull release
2SS	2-pos. Selector Switch
3SS	3-pos. Selector Switch
KB	Buzzer
KT	Potentiometer
TS	Toggle Switch

Button color:
R = Red **W**= White
G = Green **B** = Black (non-illuminated only)
Y = Yellow **C** = Clear
L = Blue **U** = Grey (non-illuminated only)

Lens color for double pushbuttons:
R = Red
G = Green
Y = Yellow
C = Clear
B = Black (non-illuminated only

Example 3: **Type M2SSK1-101**

2SSK	2-pos. Selector Switch, Key-lockable
3SSK	3-pos. Selector Switch, Key-lockable
PK	Pushbutton, Key-lockable

Key code :
1 = **71**
2 = **72**
3 = **73**

Buzzer, contact blocks, lamp block

Example 4: **Type MCBH-10**

B	Buzzer
CB	Contact Block
CBH	Contact Block with Holder
LB	Lamp Block

Contact blocks:

10	1 NO
01	1 NC
11	1 NO +1 NC
02	2 NO
20	2 NC

M= "Generation" M, Modular range

Compact Pilot Devices

Example 5: **Type CL-100R**

Example 6: **Type C2SS1-10R -10**

E	Emergency stop
L	Pilot Light
P	Pushbutton
2SS	2-pos. Selector Switch
3SS	3-pos. Selector Switch

Button color/ Lens color for compact pilot light and pushbuttons
R = Red **W**= White
G = Green **B** = Black
Y = Yellow **C** = Clear (pilot light only)
Y = Blue **U** = Grey

Button color for compact selector switch
R = Red
B = Black
U = Grey

C= Compact Range

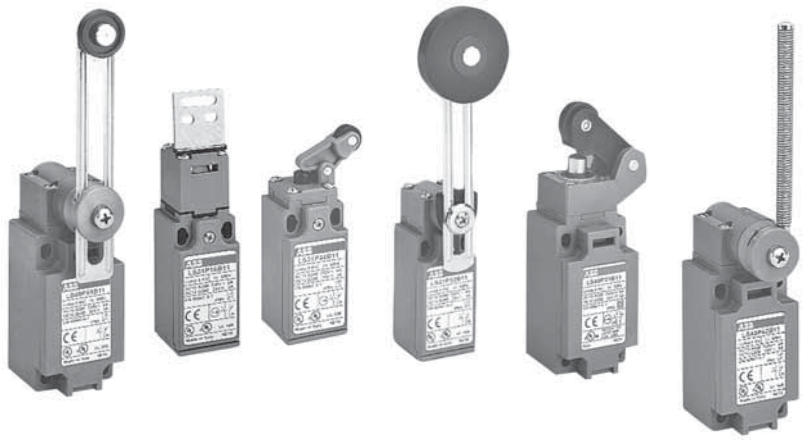
Notes

Limit switches
Index

Notes

Plastic Limit switches

Limit Switches
Plastic casing, 30mm & 40mm
Assembled
Components



Description
Limit switches are made of reinforced UL-V0 thermoplastic fiberglass, offer double insulation ⧈ and a degree of protection of IP 65 and UL Type 4.

Casings come in 2 dimensions:
- 30mm width
  - LS35P
- 40mm width
  - LS45P

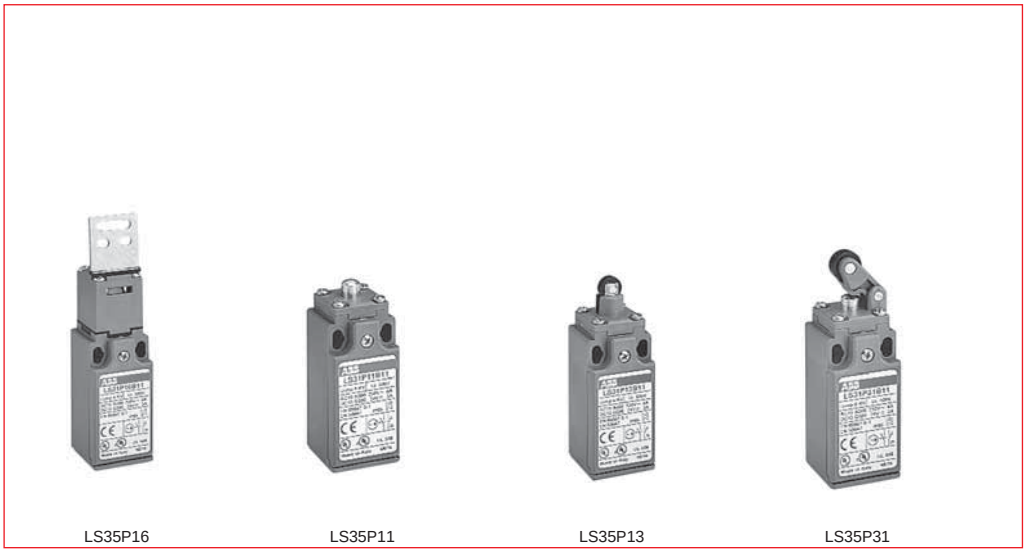
Applications
Easy to use, electromechanical limit switches offer specific qualities:
- Visible operation
- Electrically separated contacts
- Precise operating points (consistency)
- Immune to electromagnetic disturbances

Limit switches used for these mechanical applications:
- Presence/absence
- Positioning and travel limit
- Objects passing/counting

UL Listed file #E191693

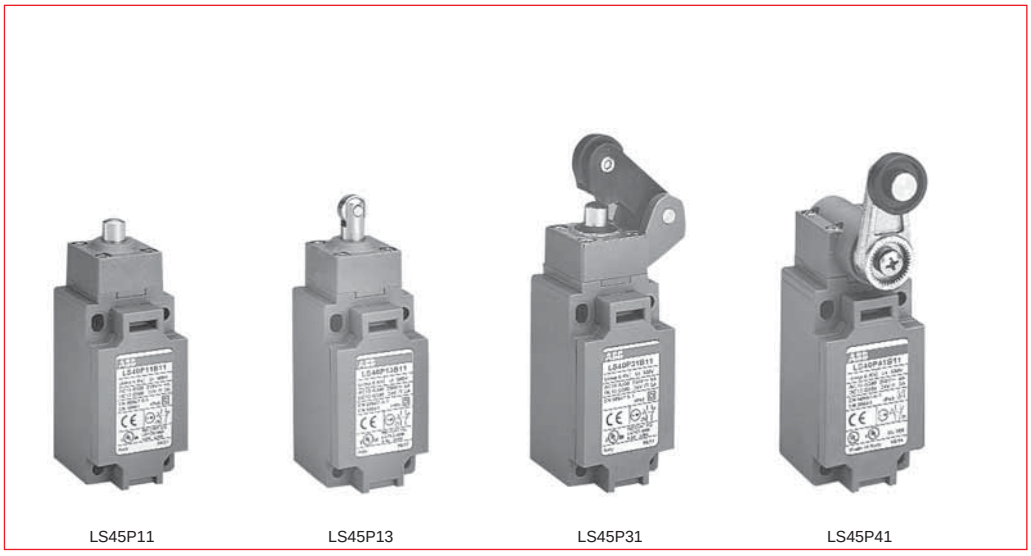
Selection guide
30mm & 40mm, IP65, UL Type 4

30mm width — LS35P



	LS35P16	LS35P11	LS35P13	LS35P31
CENELEC conformity	—	EN 50 047	EN 50 047	EN 50 047
Actuating device and actuation type	Key translation movement	Plain plunger	Roller plunger	Roller lever
Positive contact opening	⊖	⊖	⊖	⊖

40mm width — LS45P



	LS45P11	LS45P13	LS45P31	LS45P41
CENELEC conformity	EN 50 041	EN 50 041	—	EN 50 041
Actuating device and actuation type	Plain plunger	Roller plunger	Roller lever	Roller lever
Positive contact opening	⊖	⊖	⊖	⊖

Selection guide
30mm & 40mm, IP65, UL Type 4

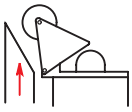
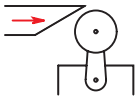
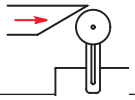
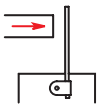
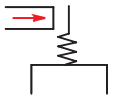

LS35P32


LS35P41


LS35P51


LS35P71


LS35P91

—	EN 50 047	—	—	—
Roller lever	Roller lever	Adjustable roller lever	Adjustable rod lever	Flexible rod
				
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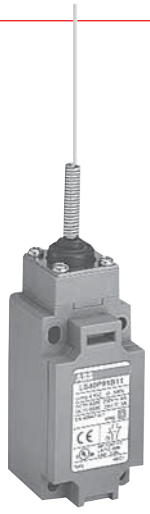
LS45P44

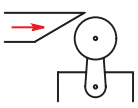
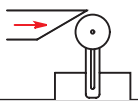
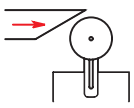
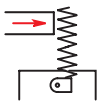
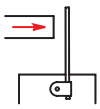
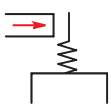

LS45P51


LS45P54


LS45P61


LS45P72


LS45P91

—	—	—	—	EN 50 041	—
Roller lever	Adjustable roller levers		Adjustable flexible and rigid rod levers		Flexible rod
					
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General information
30mm & 40mm, IP65, UL Type 4

Applications
Easy to use, electromechanical limit switches offer specific qualities:
- Visible operation
- Able to switch strong currents (10 A conventional thermal current)
- Electrically separated contacts
- Precise operating points (consistency)
- Immune to electromagnetic disturbances

Limit switches used for these mechanical applications:
- Presence/absence
- Positioning and travel limit
- Objects passing/counting

Description
Limit switches, which are made of reinforced UL-V0 thermoplastic fiberglass, offer double insulation ⧈ and a degree of protection of IP 65 and UL type 4.

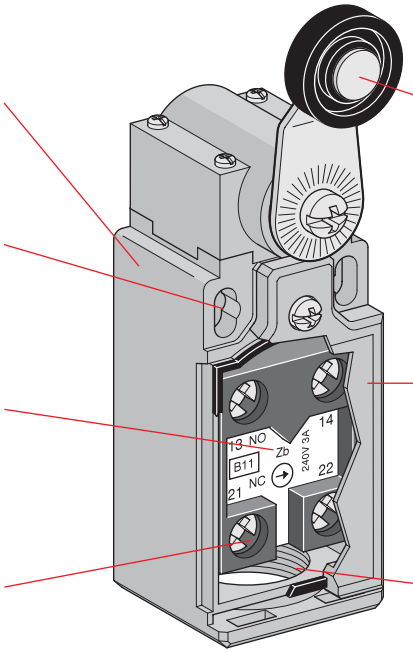
Casings come in 2 dimensions:
- 30mm width
  - LS35P
- 40mm width
  - LS45P

30 or 40mm width casings with standardized dimensions corresponding to:
- EN 50047 for 30mm width
- EN 50041 for 40mm width

Mounting the casing:
- 2 x M4 screws on top part for 30mm width
- 2 or 4 x M5 screws for 40mm width

Block of 2 contacts:
- Contact configuration: N.O. + N.C., 2 N.O., 2 N.C.
- Positive opening operation
- Snap action or slow action
- Zb shape: the 2 contacts are electrically separated

Connecting terminals:
- M3.5 (+,–) pozidriv 2 screw
- Screw head with captive cable clamp
- Markings conform with IEC 947—1, IEC 947—5—1, EN 50005 and 50013 standards



A variety of operating heads
- Plain plunger
- Roller plunger
- Roller lever, adjustable or not, etc.

Assembled using 4 x ø 3 screws for 30mm width
Assembled using 4 x ø 4 screws for 40mm width

Cover
- Closed using ø 3 screws for 30mm width
- Self clipping closure for 40mm width

One piece sealing gasket to ensure tightness

Electrical connection
- 1 x Pg 11 cable gland for LS31P
- 1 x Pg 13.5 cable gland for LS30P
- 1 x Pg 13.5 cable gland for LS40P
- 1 x 1/2" NPT cable gland for LS35P
- 1 x 1/2" NPT cable gland for LS45P

Catalog number explanation

LS 35 P 41 B 11

Limit switch

Casing width
30 = 30mm width+1 cable inlet for Pg 13.5 cable gland
31 = 30mm width+1 cable inlet for Pg 11 cable gland
35 = 30mm width+1 cable inlet for 1/2" NPT cable gland
40 = 40mm width+1 cable inlet for Pg 13.5 cable gland
45 = 40mm width+1 cable inlet for 1/2" NPT cable gland

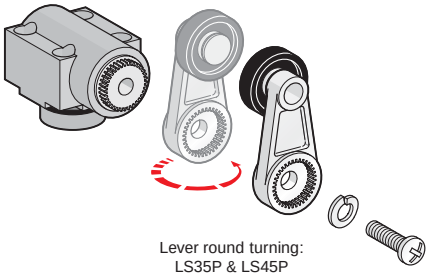
Plastic casing

Operating heads: codes 10 – 93

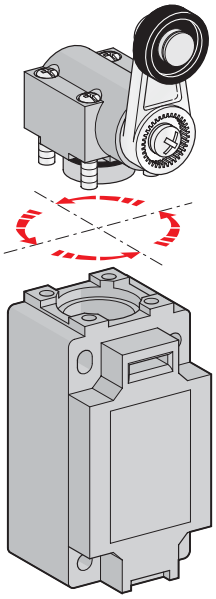
Contact block
11: 1 N.O. contact + 1 N.C. contact
20: 2 N.O. contacts
02: 2 N.C. contacts

B: Zb Snap action
L: Zb Slow action (contact dependent)
D: Zb Slow action non-overlapping late make
C: Zb Slow action overlapping early make

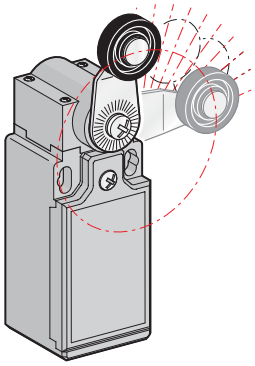
General information
Implementation
30mm & 40mm, IP65, UL Type 4



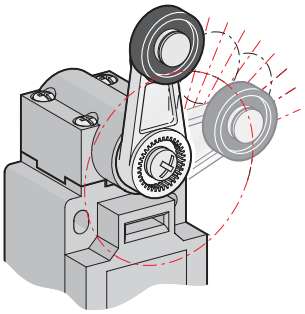
Lever round turning:
LS35P & LS45P



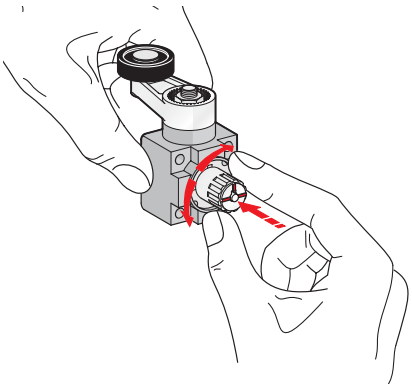
Head orientation:
LS35P & LS45P

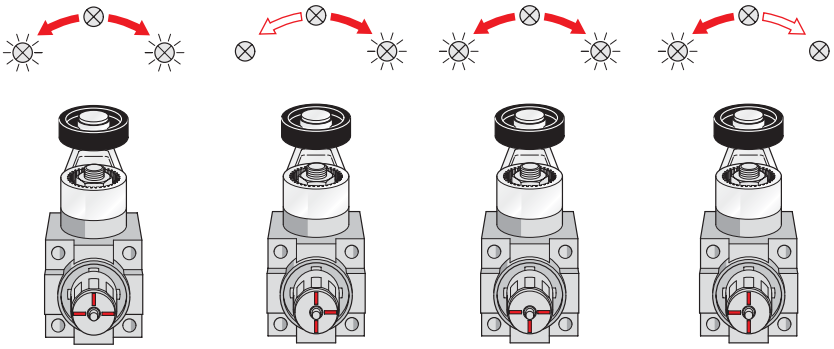


Free position adjustment
10 in 10° of lever:
LS35P



Free position adjustment
9 in 9° of lever:
LS45P





Operating mode selection only, LS45P

Assembled
30mm, IP 65, UL Type 4

Movement to be detected

Key translation, on end or lateral

On end

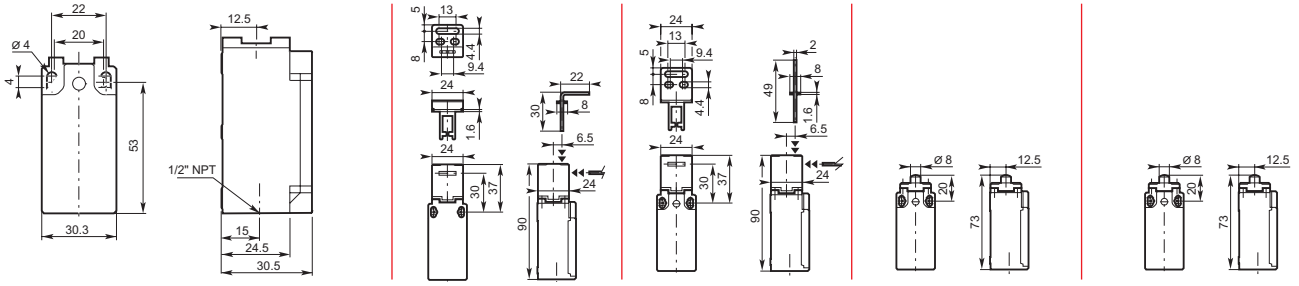
Operating head type

		Right angle key	Straight key	Plain thermoplastic plunger	Plain steel plunger
Conformity / (N.C. contact with positive opening operation)				EN 50 047	EN 50 047
Maximum actuation speed	m/s	0.5	0.5	0.5	0.5
Min. force: - actuation	N	18	18	9	9
- positive opening operation	N	60	60	44	44

9

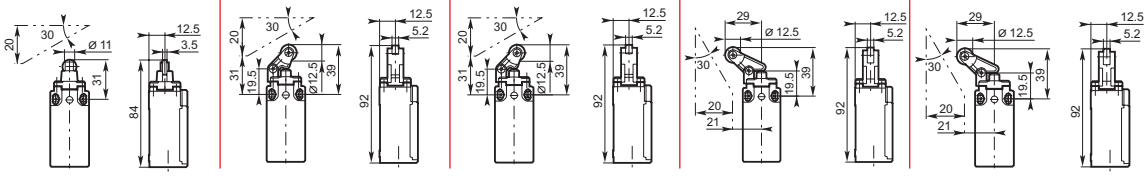
Snap action contacts	Catalog number		LS35P15B11	LS35P16B11	LS35P10B11	LS35P11B11
	List price		**$ 31**	**$ 33**	**$ 22**	**$ 22**
13 21 Zb 14 22	Operation diagram		0 1.2 2.8 6.7 9.6 mm	0 1.2 2.8 6.7 9.6 mm	0 0.8 1.9 4.5 6.5 mm	0 0.8 1.9 4.5 6.5 mm
Non-overlapping Slow action contacts	Catalog number		LS35P15D11	LS35P16D11	LS35P10D11	LS35P11D11
	List price		**33**	**35**	**23**	**23**
13 21 Zb 14 22	Operation diagram		0 2.1 4.1 9.2 mm, 3.8	0 2.1 4.1 9.2 mm, 3.8	0 1.5 2.9 6.5 mm, 2.7	0 1.5 2.9 6.5 mm, 2.7
Overlapping Slow action contacts	Catalog number		LS35P15C11	LS35P16C11	LS35P10C11	LS35P11C11
	List price		**34**	**36**	**24**	**24**
13 21 Zb 14 22	Operation diagram		0 3.7 5.7 9.2 mm, 2.1	0 3.7 5.7 9.2 mm, 2.1	0 2.6 4.0 6.5 mm, 1.5	0 2.6 4.0 6.5 mm, 1.5
Slow action contacts	Catalog number		LS35P15L02	LS35P16L02	LS35P10L02	LS35P11L02
	List price		**34**	**36**	**24**	**24**
11 21 Zb 12 22	Operation diagram		0 1.8 3.8 9.2 mm	0 1.8 3.8 9.2 mm	0 1.3 2.7 6.5 mm	0 1.3 2.7 6.5 mm
Slow action contacts	Catalog number		LS35P15L20	LS35P16L20	LS35P10L20	LS35P11L20
	List price		**34**	**36**	**24**	**24**
13 23 Zb 14 24	Operation diagram		0 1.8 9.2 mm	0 1.8 9.2 mm	0 1.3 6.5 mm	0 1.3 6.5 mm
Snap action contacts	Catalog number		LS35P15B02	LS35P16B02	LS35P10B02	LS35P11B02
	List price		**34**	**36**	**24**	**24**
11 21 Zb 12 22	Operation diagram		0 1.2 2.8 6.7 9.6 mm	0 1.2 2.8 6.7 9.6 mm	0 0.8 1.9 4.5 6.5 mm	0 0.8 1.9 4.5 6.5 mm
Weight (packing per unit)		kg	0.085	0.085	0.065	0.070

Approximate dimensions (mm)



Assembled
30mm, IP 65, UL Type 4

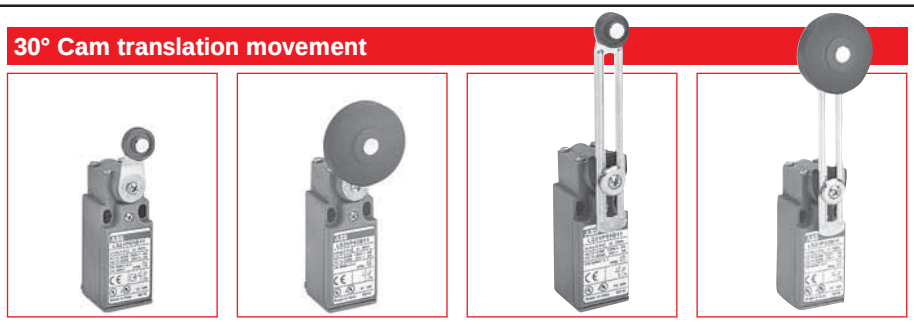
30° Cam Translat.	30° Unidirectional Cam Translation Movement			
				
Plastic roller plunger	Plastic roller lever on plastic plunger	Plastic roller lever on steel plunger	Plastic roller lever on steel plunger	Plastic roller lever on plastic plunger
EN 50 047	EN 50 047	EN 50 047		
0.3	1	1	1	1
12	7	7	3	3
41	24	24	24	24
LS35P13B11	LS35P30B11	LS35P31B11	LS35P32B11	LS35P34B11
$ 25	**$ 24**	**$ 25**	**$ 24**	**$ 25**
0 1.4 3.3 7.8 11.2 mm 21-22 13-14 11-12 21-22	0 3.0 7.1 16.9 24.4 mm 21-22 13-14 11-12 21-22	0 3.0 7.1 16.9 24.4 mm 21-22 13-14 11-12 21-22	0 2.6 6.2 14.7 21.3 mm 21-22 13-14 11-12 21-22	0 2.6 6.2 14.7 21.3 mm 21-22 13-14 11-12 21-22
LS35P13D11	LS35P30D11	LS35P31D11	LS35P32D11	LS35P34D11
26	**25**	**26**	**25**	**26**
0 2.6 5.1 11.4 mm 21-22 13-14 4.7	0 5.6 10.9 24.4 mm 21-22 13-14 10.1	0 5.6 10.9 24.4 mm 21-22 13-14 10.1	0 4.9 9.4 21.1 mm 21-22 13-14 8.8	0 4.9 9.4 21.1 mm 21-22 13-14 8.8
LS35P13C11	LS35P30C11	LS35P31C11	LS35P32C11	LS35P34C11
27	**26**	**27**	**26**	**27**
0 4.6 7.0 11.4 mm 21-22 13-14 2.6	0 9.8 15.0 24.4 mm 21-22 13-14 5.6	0 9.8 15.0 24.4 mm 21-22 13-14 5.6	0 8.5 13.0 21.1 mm 21-22 13-14 4.9	0 8.5 13.0 21.1 mm 21-22 13-14 4.9
LS35P13L02	LS35P30L02	LS35P31L02	LS35P32L02	LS35P34L02
27	**26**	**27**	**26**	**27**
0 2.3 4.7 11.4 mm 11-12 21-22	0 4.9 10.1 24.4 mm 11-12 21-22	0 4.9 10.1 24.4 mm 11-12 21-22	0 4.2 8.8 21.1 mm 11-12 21-22	0 4.2 8.8 21.1 mm 11-12 21-22
LS35P13L20	LS35P30L20	LS35P31L20	LS35P32L20	LS35P34L20
27	**26**	**27**	**26**	**27**
0 2.3 11.4 mm 13-14 23-24	0 4.9 24.4 mm 13-14 23-24	0 4.9 24.4 mm 13-14 23-24	0 4.2 21.1 mm 13-14 23-24	0 4.2 21.1 mm 13-14 23-24
LS35P13B02	LS35P30B02	LS35P31B02	LS35P32B02	LS35P34B02
27	**26**	**27**	**26**	**27**
0 1.4 3.3 7.8 11.2 mm 11-12 21-22 11-12 21-22	0 3.0 7.1 16.9 24.4 mm 11-12 21-22 11-12 21-22	0 3.0 7.1 16.9 24.4 mm 11-12 21-22 11-12 21-22	0 2.6 6.2 14.7 21.3 mm 11-12 21-22 11-12 21-22	0 2.6 6.2 14.7 21.3 mm 11-12 21-22 11-12 21-22
0.070	0.065	0.070	0.075	0.070



Assembled
30mm, IP 65, UL Type 4

Movement to be detected

30° Cam translation movement



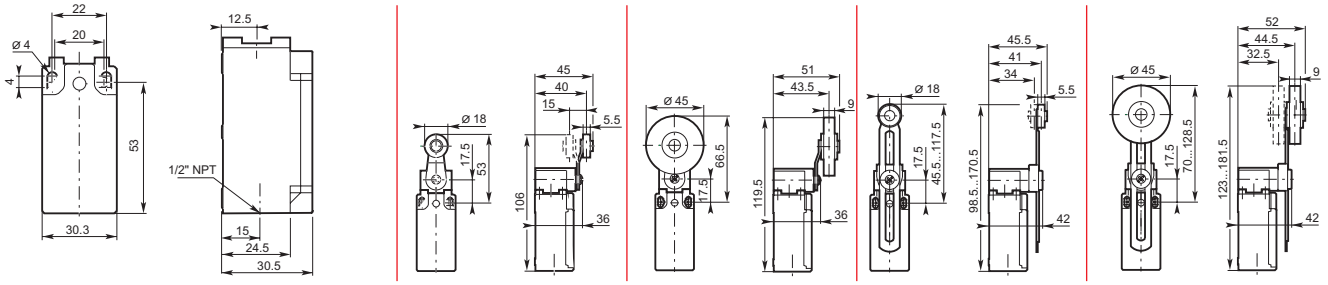
Operating head type

		Ø 18 Polyamide roller lever	Ø 45 Rubber roller lever	Adjustable Ø 18 polyamide roller lever	Adjustable Ø 45 rubber roller lever
Conformity / ⊖ (N.C. contact with positive opening operation)		EN 50 047			
Maximum actuation speed	m/s	1.5	1.5	1.5	1.5
Min. torque: - actuation	N.m	0.10	0.10	0.10	0.10
- positive opening operation	N.m	0.32	—	—	—

9 **Additional technical data**

Snap action contacts	Catalog number	LS35P41B11	LS35P42B11	LS35P51B11	LS35P52B11
13 21 Zb 14 22	List price	**$ 26**	**$ 27**	**$ 27**	**$ 28**
	Operation diagram	0 9° 23° 55° 77° 21-22 13-14 21-22 13-14	0 9° 23° 77° 21-22 13-14 21-22 13-14	0 9° 23° 77° 21-22 13-14 21-22 13-14	0 9 23 77 21-22 13-14 21-22 13-14
Non-overlapping slow action contacts	Catalog number	LS35P41D11	LS35P42D11	LS35P51D11	LS35P52D11
13 21 Zb 14 22	List price	**27**	**29**	**28**	**30**
	Operation diagram	0 18° 34° 77° 21-22 13-14 32°	0 18° 77° 21-22 13-14 32°	0 18° 77° 21-22 13-14 32°	0 18 77 21-22 13-14 32
Overlapping slow action contacts	Catalog number	LS35P41C11	LS35P42C11	LS35P51C11	LS35P52C11
13 21 Zb 14 22	List price	**28**	**30**	**29**	**30**
	Operation diagram	0 30° 49° 77° 21-22 13-14 18°	0 30° 77° 21-22 13-14 18°	0 30° 77° 21-22 13-14 18°	0 30 77 21-22 13-14 18
Slow action contacts	Catalog number	LS35P41L02	LS35P42L02	LS35P51L02	LS35P52L02
11 21 Zb 12 22	List price	**28**	**30**	**29**	**30**
	Operation diagram	0 15° 31° 77° 11-12 21-22	0 15° 77° 11-12 21-22	0 15° 77° 11-12 21-22	0 15 77 11-12 21-22
Slow action contacts	Catalog number	LS35P41L20	LS35P42L20	LS35P51L20	LS35P52L20
	List price	**28**	**30**	**29**	**30**
13 23 Zb ⊖ 14 24	Operation diagram	0 15° 77° 13-14 23-24	0 15° 77° 13-14 23-24	0 15° 77° 13-14 23-24	0 1.3 6.5 mm 13-14 23-24
Snap action contacts	Catalog number	LS35P41B02	LS35P42B02	LS35P51B02	LS35P52B02
	List price	**28**	**30**	**29**	**30**
11 21 Zb 12 22	Operation diagram	0 9° 23° 55° 77° 11-12 21-22 11-12 21-22	0 9° 23° 77° 11-12 21-22 11-12 21-22	0 9° 23° 77° 11-12 21-22 11-12 21-22	0 9° 23° 77° 11-12 21-22 11-12 21-22
Weight (packing per unit)	kg	0.090	0.120	0.100	0.130

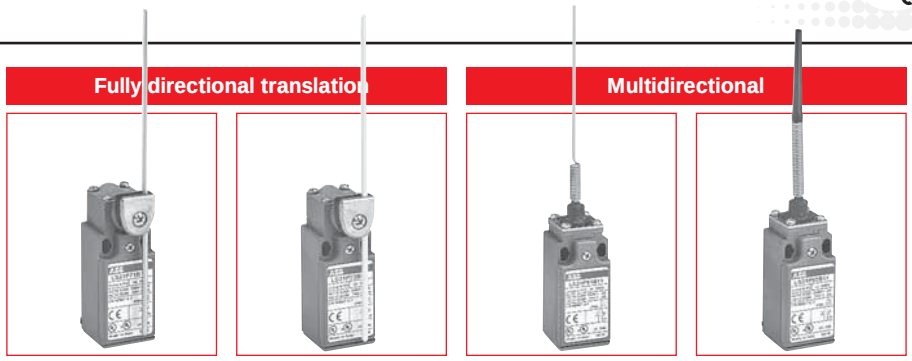
Dimensions (mm)



Assembled
30mm, IP 65, UL Type 4

Movement to be detected

Fully directional translation | **Multidirectional**



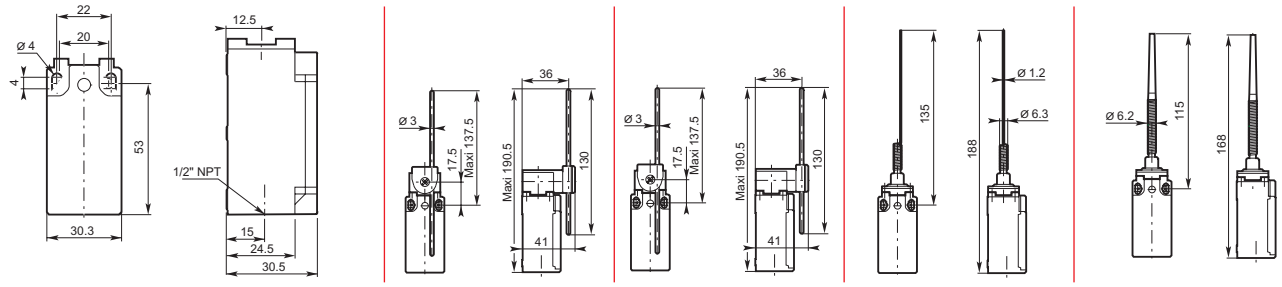
Operating head type

		Adjustable ø 3 stainless steel rod lever	Adjustable ø 3 fiber-glass rod lever	Spring rod	Flexible rod with insulated end
Conformity / ⊖ (N.C. contact with positive opening operation)					
Maximum actuation speed	m/s	1.5	1.5	1	1
Min. torque: - actuation	N.m	0.10	0.10	0.12	0.12
- positive opening operation	N.m	—	—	—	—

9

Snap action contacts 13 21 Zb 14 22	Catalog number List price	LS35P71B11 **$ 27**	LS35P72B11 **$ 27**	LS35P91B11 **$ 25**	LS35P92B11 **$ 25**
	Operation diagram	0 9° 23° 77° 21-22 13-14 21-22 13-14	0 9° 23° 77° 21-22 13-14 21-22 13-14	0 6° 16° 52° 21-22 13-14 21-22 13-14	0 6° 16° 52° 21-22 13-14 21-22 13-14
Non-overlapping Slow action contacts 13 21 Zb 14 22	Catalog number List price	LS35P71D11 **28**	LS35P72D11 **28**	LS35P91D11 **27**	LS35P92D11 **27**
	Operation diagram	0 18° 77° 21-22 13-14 32°	0 18° 77° 21-22 13-14 32°	0 12° 50° 21-22 13-14 21°	0 12° 50° 21-22 13-14 21°
Overlapping Slow action contacts 13 21 Zb 14 22	Catalog number List price	LS35P71C11 **29**	LS35P72C11 **29**	LS35P91C11 **27**	LS35P92C11 **27**
	Operation diagram	0 30° 77° 21-22 13-14 18°	0 30° 77° 21-22 13-14 18°	0 19 50 21-22 13-14 12	0 19° 50° 21-22 13-14 12°
Slow action contacts 11 21 Zb 12 22	Catalog number List price	LS35P71L02 **29**	LS35P72L02 **29**	LS35P91L02 **27**	LS35P92L02 **27**
	Operation diagram	0 15° 77° 11-12 21-22	0 15° 77° 11-12 21-22	0 10° 50° 11-12 21-22	0 10° 50° 11-12 21-22
Slow action contacts 13 23 Zb 14 24	Catalog number List price	LS35P71L20 **29**	LS35P72L20 **29**	LS35P91L20 **27**	LS35P92L20 **27**
	Operation diagram	0 15° 77° 13-14 23-24	0 15° 77° 13-14 23-24	0 10° 50° 13-14 23-24	0 10° 50° 13-14 23-24
Snap action contacts 11 21 Zb 12 22	Catalog number List price	LS35P71B02 **29**	LS35P72B02 **29**	LS35P91B02 **27**	LS35P92B02 **27**
	Operation diagram	0 9° 23° 77° 11-12 21-22 11-12 21-22	0 9° 23° 77° 11-12 21-22 11-12 21-22	0 6° 16° 52° 11-12 21-22 11-12 21-22	0 6° 16° 52° 11-12 21-22 11-12 21-22
Weight (packing per unit)	kg	0.100	0.100	0.080	0.080

Dimensions (mm)



Components
30mm, IP 65, UL Type 4

LS35P40B11

Casings with contact block and angular motion head (without actuator)

LS 35 P 40 B11

Limit Switch ..... LS

Casing width 30 mm **3**

Cable inlet
1 cable inlet for Pg 13.5 cable gland **0**
1 cable inlet for Pg 11 cable gland **1**
1 cable inlet M16 x 1.5 for ISO 16 cable gland **2**
1 cable inlet M20 x 1.5 for ISO 20 cable gland **3**
1 cable inlet by 1/2" NPT plastic adaptor **5**

Plastic casing ..... **P**

Operating heads (without actuator)
With angular movement for non-adjustable roller levers **40**
With angular movement for adjustable roller or rod levers **50**

Contacts
11 ..... **1** N.O. + **1** N.C. contacts
02 ..... **2** N.C. contacts
20 ..... **2** N.O. contacts

Snap action
B ..... Zb Snap

Dependent (slow) action
L ..... Zb Slow / Simultaneous
D ..... Zb Non-overlapping late make
C ..... Zb Overlapping early make

LSA30X41

Separate actuators (lever, key)

LS A 30 X 41

Limit Switch ..... **LS**

Actuator (lever, key) ..... **A**

Casing width: 30 mm **30**

For casing
M ..... **M**etal
P ..... **P**lastic
X ..... Plastic or metal

Reference of actuators
05, 06 ..... key
41, 42 ..... non-adjustable roller lever
51, 52 ..... adjustable roller lever
71, 72, 73, 74 ..... adjustable rod lever

LSC30XD11

Separate contact blocks

LS C 30 X D 11

Limit Switch ..... **LS**

Contact blocks ..... **C**

Casing width: 30 mm **30**

For casing:
Metal ..... **M**
Plastic ..... **P**
Plastic or metal ..... **X**

Contacts
11 ..... **1** N.O. + **1** N.C. contacts
02 ..... **2** N.C. contacts
20 ..... **2** N.O. contacts

Snap action
B ..... Zb Snap

Dependent (slow) action
L ..... Zb Slow / Simultaneous
D ..... Zb Non-overlapping late make
C ..... Zb Overlapping early make

Components
30mm, IP 65, UL Type 4

- **Casings equiped with angular motion head (without actuator)**
- **Separate actuators**
- **Separate contact blocks**

LSA30X42 ⊗

LSA30X41 ⊗ **(A Shape)**

Roller levers (non-adjustable)

LSA30X52 ⊗

LSA30X51 ⊗

Adjustable roller levers

LSA30X71 ⊗

LSA30X72 ⊗

LSA30X73 ⊗

LSA30X74 ⊗

Adjustable rod levers

9

LS35P40 casings equiped with angular motion head for roller levers (non-adjustable)

⊖ LS35P40B11, LS35P40D11, LS35P40C11, LS35P40L02, LS35P40B02

⊗ LS35P40L20

LS30P50 ... LS35P50 casings equiped with angular motion head for adjustable roller or rod levers

⊗ LS35P50B11, LS35P50D11, LS35P50C11, LS35P50L02, LS35P50L20, LS35P50B02

Contact blocks

⊖ LSC30XB11, LSC30XD11, LSC30XC11, LSC30XL02, LSC30XB02

⊗ LSC30XL20

⊖ Suitable for positive opening operation (IEC 60947-5-1 and EN 50041).

Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with ⊖ are fitted.

Components
30mm, IP 65, UL Type 4

⊖ "N.C." contact with positive opening operation or element (subassembly, head, lever) suitable for positive opening operation.

Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with ⊖ are fitted.

LS35P40B11

Casings with angular motion head for non-adjustable roller levers, delivered without actuator

Contact blocks						Positive opening operation	Actuation speed max. m/s	Unit weight kg (1 pc)	Catalog number	List price
Zb	Zb	Zb	Zb	Za	Zb					
B11	D11	C11	L02	L20	B02					
1						⊖	1.5	0.092	LS35P40B11	**$ 23**
	1					⊖	1.5	0.092	LS35P40D11	**24**
		1				⊖	1.5	0.092	LS35P40C11	**25**
			1			⊖	1.5	0.092	LS35P40L02	**25**
				1		⊗	1.5	0.092	LS35P40L20	**25**
					1	⊖	1.5	0.092	LS35P40B02	**25**

⊖ "N.C." contact with positive opening operation or element (subassembly, head, lever) suitable for positive opening operation.

Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with ⊖ are fitted.

LS35P50B11

LSA30X41

LSA30X42

LSA30X51

LSA30X71

LSA30P05

LSA30P06

LSC30XD11

LSR1305

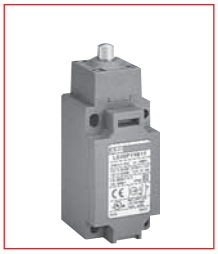
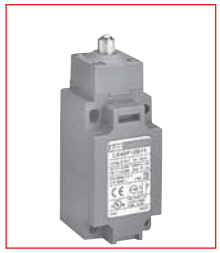
Casings with angular motion head for adjustable rod or roller levers, delivered without actuator

Contact blocks B11 (Zb)	D11 (Zb)	C11 (Zb)	L02 (Zb)	L20 (Za)	B02 (Zb)	Positive opening operation	Actuation speed max. m/s	Unit weight kg (1 pc)	Catalog number	List price
1						⊖	1.5	0.092	LS35P50B11	**$ 23**
	1					⊖	1.5	0.092	LS35P50D11	**24**
		1				⊖	1.5	0.092	LS35P50C11	**25**
			1			⊖	1.5	0.092	LS35P50L02	**25**
				1		⊖	1.5	0.092	LS35P50L20	**25**
					1	⊖	1.5	0.092	LS35P50B02	**25**
Actuators for LS35P40 (delivered with M3.5 screw)										
To be actuated by 30° cam										
ø 18mm polyamide roller lever ①						⊖	—	0.012	LSA30X41	**3**
ø 45mm rubber roller lever ①						⊖	—	0.026	LSA30X42	**5**
Actuators for LS35P50 (delivered with M3.5 screw and adaptation parts)										
To be actuated by 30° cam										
ø 18mm adjustable polyamide roller lever ①						⊖	—	0.022	LSA30X51	**5**
ø 45mm adjustable rubber roller lever ①						⊖	—	0.035	LSA30X52	**6**
To be actuated by fully directional translation movement										
ø 3mm adjustable inox rod lever, 170mm ①						⊖	—	0.021	LSA30X71	**5**
ø 3mm adjustable fiberglass rod lever, 170mm ①						⊖	—	0.015	LSA30X72	**5**
ø 6mm adjustable polyamide rod lever, 195mm ①						⊖	—	0.018	LSA30X73	**5**
ø 6mm adjustable fiberglass rod lever, 195mm ①						⊖	—	0.022	LSA30X74	**6**
Right angle key for LS35P15										
Right angle key (mounting 13mm)						⊖	—	0.013	LSA30P05	**5**
Straight key for LS35P16										
Straight key (mounting 13mm)						⊖	—	0.013	LSA30P06	**5**
Separate contact blocks										
1 NC & 1 NO 2-pole snap action						⊖	—	0.025	LSC30XB11	**14**
1 NC & 1 NO 2-pole non-overlapping slow action						⊖	—	0.025	LSC30XD11	**14**
1 NO & 1 NC 2-pole non-overlapping slow action						⊖	—	0.025	LSC30XC11	**16**
2 NC 2-pole simultaneous slow action						⊖	—	0.025	LSC30XL02	**16**
2 NO 2-pole simultaneous slow action						⊗	—	0.025	LSC30XL20	**16**
2 NC 2-pole snap action						⊖	—	0.025	LSC30XB02	**16**
1/2" NPT plastic adaptors										
1 piece						—	—	0.007	LSR1305	**5**

① Free position adjustment of lever 10° by 10° over 360°.

Assembled
40mm, IP 65, UL Type 4

Movement to be detected

On end	On end	30° Cam translation	Unidirectional
			

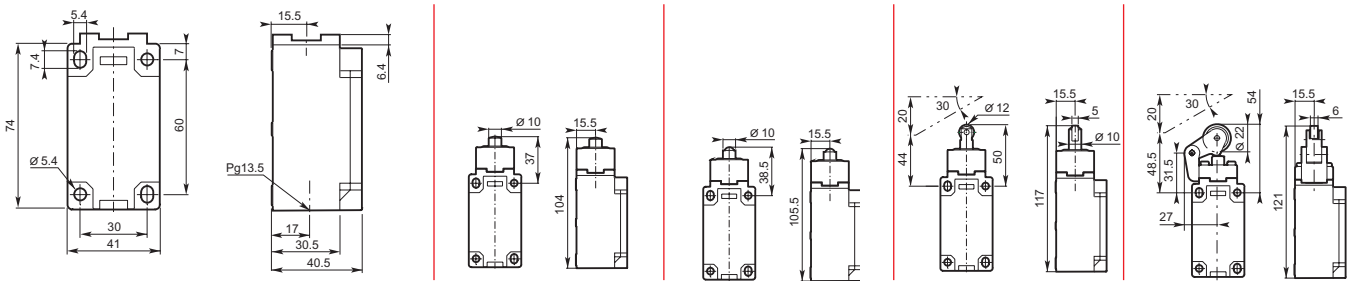
Operating head type

	Steel plain plunger	Steel ball plunger	Steel roller plunger	Polyamide roller lever
Conformity / ⊖ (N.C. contact with positive opening operation)	EN 50 041 ⊖	EN 50 041 ⊖	EN 50 041 ⊖	⊖
Maximum actuation speed m/s	0.5	0.5	0.5	1
Min. force/torque: - actuation	22 N	22 N	16 N	12 N
- positive opening operation	66 N	66 N	48 N	40 N

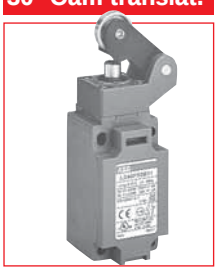
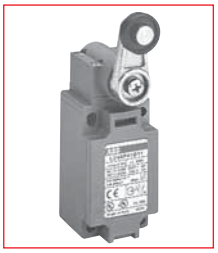
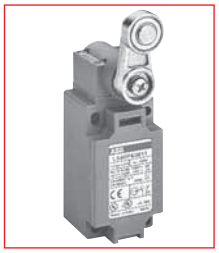
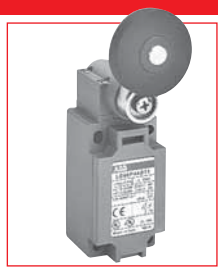
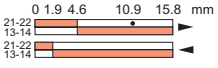
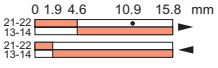
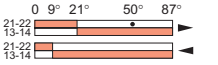
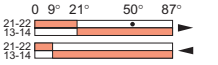
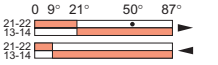
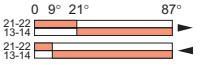
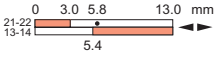
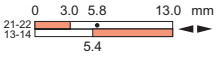
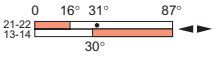
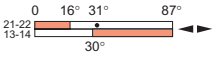
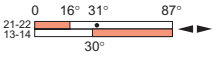
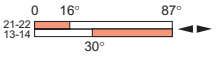
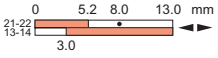
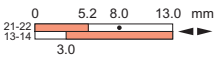
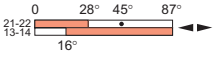
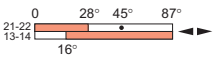
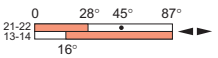
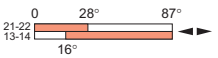
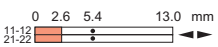
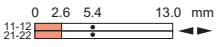
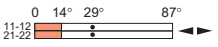
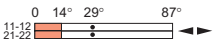
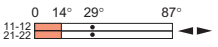
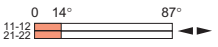
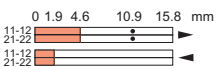
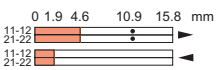
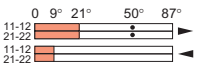
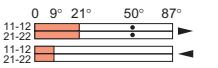
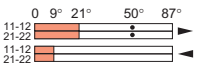
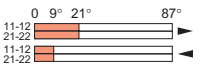
9

Snap action contacts	Catalog number	LS45P11B11	LS45P12B11	LS45P13B11	LS45P31B11
	List price	**$ 30**	**$ 32**	**$ 37**	**$ 34**
13 21 Zb 14 22	Operation diagram	0 0.8 1.9 4.5 6.5 mm	0 0.8 1.9 4.5 6.5 mm	0 1.5 3.5 8.4 12.1 mm	0 1.9 4.6 10.9 15.8 mm
Non-overlapping Slow action contacts	Catalog number	LS45P11D11	LS45P12D11	LS45P13D11	LS45P31D11
	List price	**32**	**34**	**39**	**36**
13 21 Zb 14 22	Operation diagram	0 1.5 2.9 6.5 mm, 2.7	0 1.5 2.9 6.5 mm, 2.7	0 3.5 6.8 15.2 mm, 6.3	0 3.0 5.8 13.0 mm, 5.4
Overlapping Slow action contaacts	Catalog number	LS45P11C11	LS45P12C11	LS45P13C11	LS45P31C11
	List price	**33**	**35**	**40**	**37**
13 21 Zb 14 22	Operation diagram	0 2.6 4.0 6.5 mm, 1.5	0 2.6 4.0 6.5 mm, 1.5	0 6.1 9.3 15.2 mm, 3.5	0 5.2 8.0 13.0 mm, 3.0
Slow action contacts	Catalog number	LS45P11L02	LS45P12L02	LS45P13L02	LS45P31L02
	List price	**33**	**35**	**40**	**37**
11 21 Zb 12 22	Operation diagram	0 1.3 2.7 6.5 mm	0 1.3 2.7 6.5 mm	0 3.0 6.3 15.2 mm	0 2.6 5.4 13.0 mm
Slow action contacts	Catalog number	LS45P11L20	LS45P12L20	LS45P13L20	LS45P31L20
	List price	**33**	**35**	**40**	**37**
13 23 Zb ⊗ 14 24	Operation diagram	0 1.3 6.5 mm	0 1.3 6.5 mm	0 3.0 15.2 mm	0 2.6 13.0 mm
Snap action contacts	Catalog number	LS45P11B02	LS45P12B02	LS45P13B02	LS45P31B02
	List price	**33**	**35**	**40**	**37**
11 21 Zb 12 22	Operation diagram	0 0.8 1.9 4.5 6.5 mm	0 0.8 1.9 4.5 6.5 mm	0 1.5 3.5 8.4 12.1 mm	0 1.9 4.6 10.9 15.8 mm
Weight (packing per unit)	kg	0.140	0.140	0.145	0.175

Dimensions (mm)

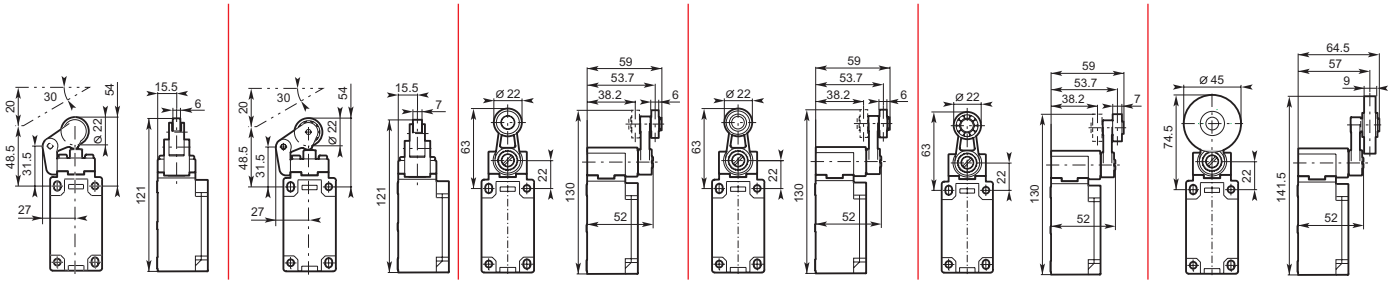


Assembled
40mm, IP 65, UL Type 4

30° Cam translat.	30° Cam translation movement				
					
Stainless steel roller lever	Ball-bearing roller lever	Ø 22 Polyamide roller lever	Ø 22 Stainless steel roller lever	Ø 22 Ball-bearing roller lever	Ø 45 Rubber roller lever
1 12 N 40 N	1 12 N 40 N	EN 50 041 1.5 0.15 N.m 0.44 N.m	EN 50 041 1.5 0.15 N.m 0.44 N.m	EN 50 041 1.5 0.15 N.m 0.44 N.m	1.5 0.15 N.m –
LS45P32B11 **$ 39**	LS45P33B11 **$ 36**	LS45P41B11 **$ 39**	LS45P42B11 **$ 47**	LS45P43B11 **$ 42**	LS45P44B11 **$ 41**
					
LS45P32D11 **42**	LS45P33D11 **38**	LS45P41D11 **42**	LS45P42D11 **50**	LS45P43D11 **45**	LS45P44D11 **44**
					
LS45P32C11 **43**	LS45P33C11 **39**	LS45P41C11 **43**	LS45P42C11 **52**	LS45P43C11 **47**	LS45P44C11 **45**
					
LS45P32L02 **43**	LS45P33L02 **39**	LS45P41L02 **43**	LS45P42L02 **52**	LS45P43L02 **47**	LS45P44L02 **45**
					
LS45P32L20 **43**	LS45P33L20 **39**	LS45P41L20 **43**	LS45P42L20 **52**	LS45P43L20 **47**	LS45P44L20 **45**
					
LS45P32B02 **43**	LS45P33B02 **39**	LS45P41B02 **43**	LS45P42B02 **52**	LS45P43B02 **47**	LS45P44B02 **45**
					
0.185	0.185	0.185	0.195	0.195	0.205

9

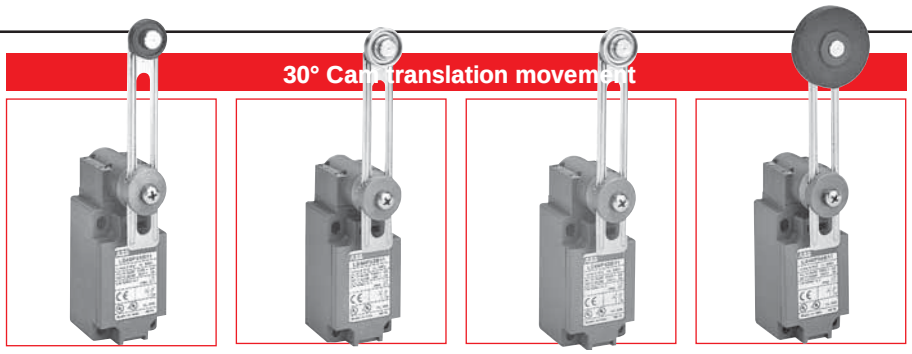
Dimensions (in mm)



Assembled
40mm, IP 65, UL Type 4

Movement to be detected

30° Cam translation movement



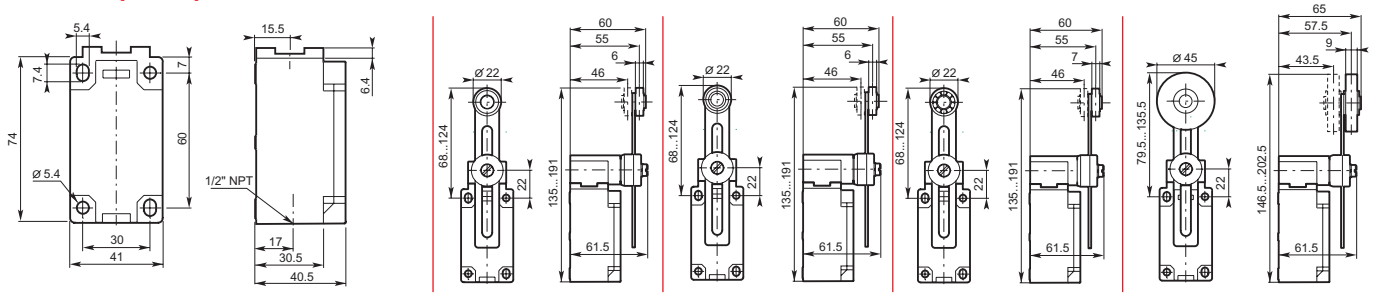
Operating head Catalog number

		Adjustable Ø 22 polyamide roller lever	Adjustable Ø 22 stainless steel roller lever	Adjustable Ø 22 stainless steel ball-bearing roller lever	Adjustable Ø 45 rubber roller lever
Conformity / (N.C. contact with positive opening operation)					
Maximum actuation speed	m/s	1.5	1.5	1.5	1.5
Min. torque: - actuation	N.m	0.15	0.15	0.15	0.15
- positive opening operation	N.m	—	—	—	—

9

Snap action contacts	Catalog number	LS45P51B11	LS45P52B11	LS45P53B11	LS45P54B11
	List price	**$ 39**	**$ 47**	**$ 43**	**$ 41**
13 21 Zb 14 22	Operation diagram	0 9° 21° 87° 21-22 13-14 21-22 13-14	0 9° 21° 87° 21-22 13-14 21-22 13-14	0 9 21 87 21-22 13-14 21-22 13-14	0 9° 21° 87° 21-22 13-14 21-22 13-14
Non-overlapping Slow action contacts	Catalog number	LS45P51D11	LS45P52D11	LS45P53D11	LS45P54D11
	List price	**42**	**50**	**46**	**44**
13 21 Zb 14 22	Operation diagram	0 16° 87° 21-22 13-14 30°	0 16° 87° 21-22 13-14 30°	0 16 87 21-22 13-14 30	0 16° 87° 21-22 13-14 30°
Overlapping Slow action contacts	Catalog number	LS45P51C11	LS45P52C11	LS45P53C11	LS45P54C11
	List price	**43**	**52**	**47**	**45**
13 21 Zb 14 22	Operation diagram	0 28° 87° 21-22 13-14 16°	0 28° 87° 21-22 13-14 16°	0 28 87 21-22 13-14 16	0 28° 87° 21-22 13-14 16°
Slow action contacts	Catalog number	LS45P51L02	LS45P52L02	LS45P53L02	LS45P54L02
	List price	**43**	**52**	**47**	**45**
11 21 Zb 12 22	Operation diagram	0 14° 87° 11-12 21-22	0 14° 87° 11-12 21-22	0 14 87 11-12 21-22	0 14° 87° 11-12 21-22
Slow action contacts	Catalog number	LS45P51L20	LS45P52L20	LS45P53L20	LS45P54L20
	List price	**43**	**52**	**47**	**45**
13 23 Zb 14 24	Operation diagram	0 14° 87° 13-14 23-24	0 14° 87° 13-14 23-24	0 14 87 13-14 23-24	0 14° 87° 13-14 23-24
Snap action contacts	Catalog number	LS45P51B02	LS45P52B02	LS45P53B02	LS45P54B02
	List price	**43**	**52**	**47**	**45**
11 21 Zb 12 22	Operation diagram	0 9° 21° 87° 11-12 21-22 11-12 21-22	0 9° 21° 87° 11-12 21-22 11-12 21-22	0 9 21 87 11-12 21-22 11-12 21-22	0 9° 21° 87° 11-12 21-22 11-12 21-22
Weight (packing per unit)	kg	0.190	0.200	0.200	0.200

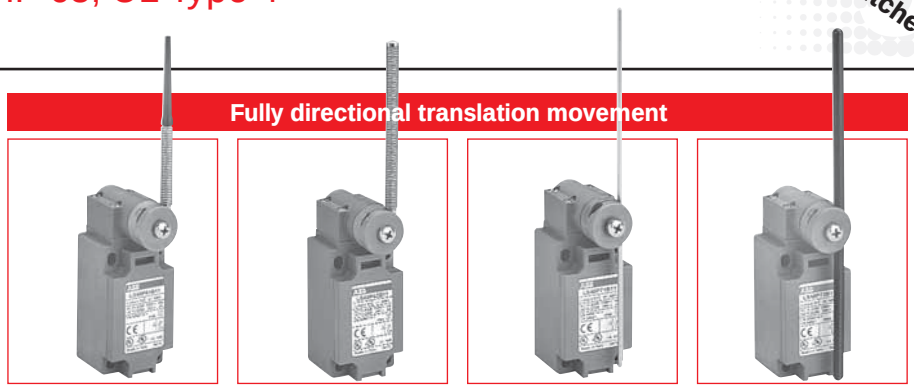
Dimensions (in mm)



Assembled
40mm, IP 65, UL Type 4

Movement to be detected

Fully directional translation movement



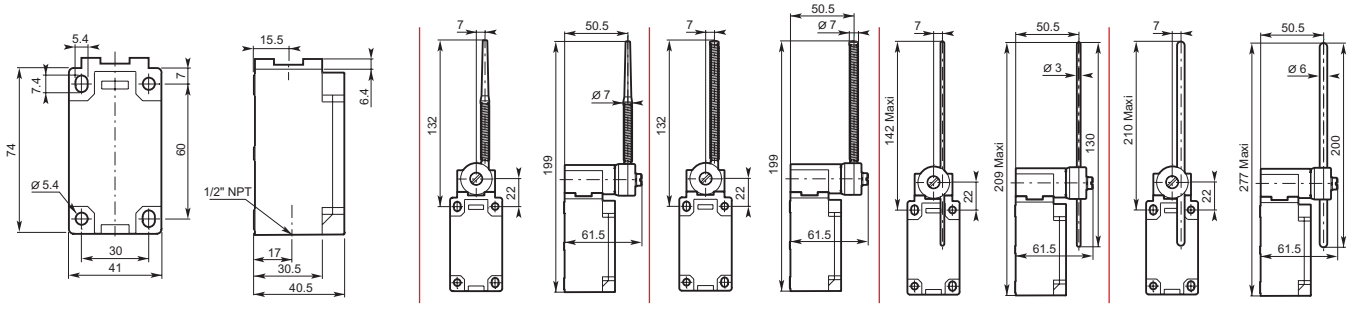
Operating head type

		Flexible lever with insulated end	Coil spring lever	Adjustable Ø 3 stainless steel rod lever	Adjustable ø 6 polyamide rod lever
Conformity / ⊖ (N.C. contact with positive opening operation)				EN 50 041	EN 50 041
Maximum actuation speed	m/s	1.5	1.5	1.5	1.5
Min. torque: - actuation	N.m	0.15	0.15	0.15	0.15
- positive opening operation	N.m	–	–	–	–

9

Snap action contacts	Catalog number	LS45P61B11	LS45P62B11	LS45P71B11	LS45P72B11
	List price	**$ 41**	**$ 41**	**$ 38**	**$ 38**
13 21 Zb 14 22	Operation diagram	0 9° 21° 87° 21-22 13-14 / 21-22 13-14	0 9° 21° 87° 21-22 13-14 / 21-22 13-14	0 9° 21° 87° 21-22 13-14 / 21-22 13-14	0 9° 21° 87° 21-22 13-14 / 21-22 13-14
Non-overlapping Slow action contacts	Catalog number	LS45P61D11	LS45P62D11	LS45P71D11	LS45P72D11
	List price	**44**	**44**	**41**	**41**
13 21 Zb 14 22	Operation diagram	0 16° 87° 21-22 13-14 30°	0 16° 87° 21-22 13-14 30°	0 16° 87° 21-22 13-14 30°	0 16° 87° 21-22 13-14 30°
Overlapping Slow action contacts	Catalog number	LS45P61C11	LS45P62C11	LS45P71C11	LS45P72C11
	List price	**46**	**45**	**43**	**42**
13 21 Zb 14 22	Operation diagram	0 28° 87° 21-22 13-14 16°	0 28° 87° 21-22 13-14 16°	0 28° 87° 21-22 13-14 16°	0 28° 87° 21-22 13-14 16°
Slow action contacts	Catalog number	LS45P61L02	LS45P62L02	LS45P71L02	LS45P72L02
	List price	**46**	**45**	**43**	**42**
11 21 Zb 12 22	Operation diagram	0 14° 87° 11-12 21-22	0 14° 87° 11-12 21-22	0 14° 87° 11-12 21-22	0 14° 87° 11-12 21-22
Slow action contacts	Catalog number	LS45P61L20	LS45P62L20	LS45P71L20	LS45P72L20
	List price	**46**	**45**	**43**	**42**
13 23 Zb 14 24	Operation diagram	0 14° 87° 13-14 23-24	0 14° 87° 13-14 23-24	0 14° 87° 13-14 23-24	0 14° 87° 13-14 23-24
Snap action contacts	Catalog number	LS45P61B02	LS45P62B02	LS45P71B02	LS45P72B02
	List price	**46**	**45**	**43**	**42**
11 21 Zb 12 22	Operation diagram	0 9° 21° 87° 11-12 21-22 / 11-12 21-22	0 9° 21° 87° 11-12 21-22 / 11-12 21-22	0 9° 21° 87° 11-12 21-22 / 11-12 21-22	0 9° 21° 87° 11-12 21-22 / 11-12 21-22
Weight (packing per unit)	kg	0.190	0.190	0.185	0.185

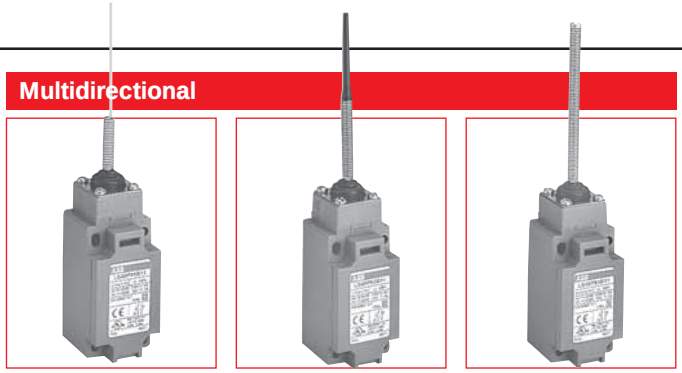
Dimensions (in mm)



Assembled
40mm, IP 65, UL Type 4

Movement to be detected

Multidirectional



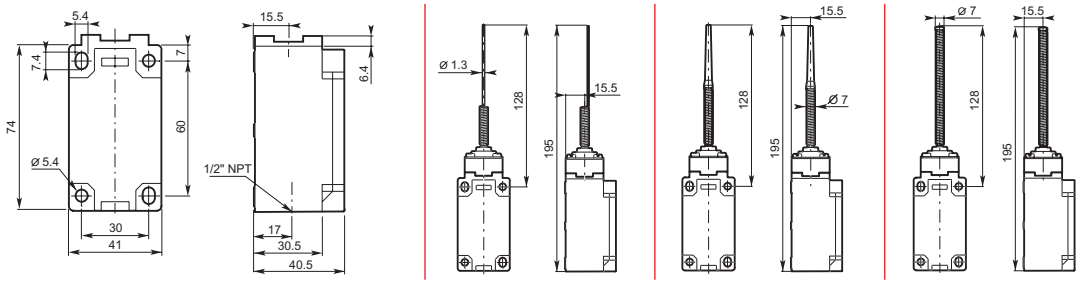
Operating head type

		Spring rod	Flexible rod with insulated end	Coil spring rod
Conformity / ⊖ (N.C. contact with positive opening operation)				
Maximum actuation speed	m/s	1	1	1
Min. torque: - actuation	N.m	0.18	0.18	0.18
- positive opening operation	N.m	–	–	–

9

Snap action contacts 13 21 Zb 14 22	Catalog number List price	LS45P91B11 **$ 32**	LS45P92B11 **$ 35**	LS45P93B11 **$ 33**
	Operation diagram	0 6° 14° 59° 21-22 13-14 21-22 13-14	0 6° 14° 59° 21-22 13-14 21-22 13-14	0 6° 14° 59° 21-22 13-14 21-22 13-14
Non-overlapping Slow action contacts 13 21 Zb 14 22	Catalog number List price	LS45P91D11 **34**	LS45P92D11 **37**	LS45P93D11 **35**
	Operation diagram	0 12° 65° 21-22 13-14 23°	0 12° 65° 21-22 13-14 23°	0 12° 65° 21-22 13-14 23°
Overlapping Slow action contacts 13 21 Zb 14 22	Catalog number List price	LS45P91C11 **35**	LS45P92C11 **38**	LS45P93C11 **37**
	Operation diagram	0 21° 65° 21-22 13-14 12°	0 21° 65° 21-22 13-14 12°	0 21° 65° 21-22 13-14 12°
Slow action contacts 11 21 Zb 12 22	Catalog number List price	LS45P91L02 **35**	LS45P92L02 **38**	LS45P93L02 **37**
	Operation diagram	0 11° 65° 11-12 21-22	0 11° 65° 11-12 21-22	0 11° 65° 11-12 21-22
Slow action contacts 13 23 Zb 14 24	Catalog number List price	LS45P91L20 **35**	LS45P92L20 **38**	LS45P93L20 **37**
	Operation diagram	0 11° 65° 13-14 23-24	0 11° 65° 13-14 23-24	0 11° 65° 13-14 23-24
Snap action contacts 11 21 Zb 12 22	Catalog number List price	LS45P91B02 **35**	LS45P92B02 **38**	c **37**
	Operation diagram	0 6° 14° 59° 11-12 21-22 11-12 21-22	0 6° 14° 59° 11-12 21-22 11-12 21-22	0 6° 14° 59° 11-12 21-22 11-12 21-22
Weight (packing per unit)	kg	0.135	0.140	0.145

Dimensions (in mm)



Bodies with contact block for rectilinear or angular motion heads

LS45P00B11

LS 45 P 00 B 11

Limit Switch ..... **LS**

Casing width 40 mm **3**

Cable inlet
1 cable inlet for Pg 13.5 cable gland **0**
1 cable inlet M20 x 1.5 for ISO 20 cable gland **3**
1 cable inlet for 1/2" NPT **5**

Plastic casing ..... **P**

Without operating head **00**

Snap action
B ..... Zb Snap

Dependent (slow) action
L ..... Zb Slow / Simultaneous
D ..... Zb Non-overlapping late make
C ..... Zb Overlapping early make

Contacts
11 ..... **1** N.O. + **1** N.C. contacts
02 ..... **2** N.C. contacts
20 ..... **2** N.O. contacts

Operating heads

LSTH41

LS T H 41

Limit Switch ..... **LS**

Operating head ..... **T**

For plastic casing 40 mm width **40**

References of heads
11 ... 14, 19 .... with rectilinear movement (plain plunger, steel ball plunger or roller plunger
31 ... 37 ..... with rectilinear movement (roller lever on steel plunger)
40 ..... with angular movement (without actuator) actuator to be ordered separately
41 ... 44 ..... with angular movement (roller lever)
50 ..... with angular movement (without actuator) actuator to be ordered separately
51 ... 54 ..... with angular movement (adjustable roller lever)
61, 62 ..... flexible lever (spring)
71, 72, 73 ..... adjustable lever (rod)
91 ... 93 ..... multidirectional angular movement (spring rod)

Separate actuators (roller lever, adjustable roller or rod levers, etc.)

LSA40X51

LS A 40 X 51

Limit Switch ..... **LS**

Actuator (roller) ..... **A**

Casing width: 40 mm **40**

For casing
M ..... **M**etal
P ..... **P**lastic
X ..... Plastic or metal

Reference of actuators
41 ... 44 ..... non-adjustable roller lever
51 ... 54 ..... adjustable roller lever
61, 62 ..... flexible lever (spring)
71, 72, 73 ..... adjustable lever (rod)

Separate contact blocks

LSC40XC11

LS C 40 X C 11

Limit Switch ..... **LS**

Contact blocks ..... **C**

Casing width: 40 mm **40**

For casing
Metal ..... **M**
Plastic ..... **P**
Plastic or metal ..... **X**

Snap action:
B ..... Zb Snap

Dependent (slow) action:
L ..... Zb Slow / Simultaneous
D ..... Zb Non-overlapping late make
C ..... Zb Overlapping early make

Contacts
11 ..... **1** N.O. + **1** N.C. contacts
02 ..... **2** N.C. contacts
20 ..... **2** N.O. contacts

Components
40mm, IP 65, UL Type 4

- **Bodies with contact block**
- **Operating heads with actuator**


LSTH37 ⊖


LSTH33 ⊖


LSTH36 ⊖


LSTH12 ⊖ (B Shape)


LSTH32 ⊖


LSTH43 ⊖ (A Shape)


LSTH19 ⊖ (C Shape)


LSTH14 ⊖ (B Shape)


LSTH35 ⊖


LSTH42 ⊖ (A Shape)


LSTH13 ⊖ (C Shape)


LSTH11 ⊖ (B Shape)


LSTH31 ⊖


LSTH41 ⊖ (A Shape)


LSTH54 ⊗


LSTH53 ⊗


LSTH52 ⊗


LSTH51 ⊗


LSTH93 ⊗

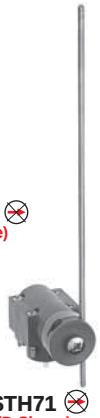

LSTH92 ⊗


LSTH91 ⊗


LSTH72 ⊗ (D Shape)


LSTH62 ⊗


LSTH61 ⊗


LSTH71 ⊗ (D Shape)

Rectilinear motion | **Angular motion**

LSTH... rectilinear motion heads

- To be actuated from end.
  With plunger (plain or with ball): LSTH11, LSTH12 and LSTH14.
- To be actuated by 30° cam translation.
  With roller plunger: LSTH13, LSTH19.
- To be actuated unidirectionally by 30° cam translation.
  With roller lever on steel plunger: LSTH31 ... LSTH37.

LSTH... angular motion heads

- To be actuated by 30° cam translation.
  With roller lever: LSTH41 ... LSTH54.
- To be actuated by fully directional translation movement.
  With rod or spring lever: LSTH61 ... LSTH72.
- To be actuated multidirectionally.
  With spring rod: LSTH91 ... LSTH93.

Bodies with contact block

⊖ LS45P00B11, LS45P00D11, LS45P00C11, LS45P00L02, LS45P00B02

⊗ LS45P00L20
Suitable for positive opening operation (IEC 60947-5-1 and EN 50041).

Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with ⊖ are fitted.

Components
40mm, IP 65, UL Type 4

- **Bodies with contact block**
- **Angular motion heads (without actuator)**
- **Separate actuators**
- **Separate contact blocks**

LSA40X44 ⊗

LSA40X43 → (A Shape)

LSA40X42 → (A Shape)

LSA40X41 → (A Shape)

LSA40X54 ⊗

LSA40X53 ⊗

LSA40X52 ⊗

LSA40X51 ⊗

LSA40X72 ⊗ (D Shape)

LSA40X71 ⊗ (D Shape)

LSA40X62 ⊗

LSA40X61 ⊗

Roller levers

LSTH40 →

LSTH40 angular motion head
For roller levers (non-adustable)
LSA40X41 ... LSA40X44

Adjustable or flexible levers

LSTH50 ⊗

LSTH50 angular motion head
For flexible or adjustable levers LSA40X51 ... LSA40X54, LSA40X61, LSA40X62, LSA40X71 and LSA40X72

Bodies with contact block

→ LS45P00B11, LS45P00D11, LS45P00C11, LS45P00L02, LS45P00B02

⊗ LS45P00L20

Contact blocks

→ LSC40XB11, LSC40XD11, LSC40XC11, LSC40XL02, LSC40XB02

⊗ LSC40XL20

→ : Suitable for positive opening operation (IEC 60947-5-1 and EN 50041)
Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with → are fitted.

Components
40mm, IP 65, UL Type 4

⊖ "N.C." contact with positive opening operation or element (subassembly, head, lever) suitable for positive opening operation.

Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with ⊖ are fitted.


LS45P00B11


LSTH11


LSTH19


LSTH31


LSTH37

Bodies with contact block for rectilinear or angular motion heads

Contact blocks B11 (Zb)	D11 (Zb)	C11 (Zb)	L02 (Zb)	L20 (Za)	B02 (Zb)	Positive opening operation	Actuation speed max. m/s	Unit weight kg (1 pc)	Catalog number	List price
1						⊖	—	0.108	LS45P00B11	**$ 23**
	1					⊖	—	0.108	LS45P00D11	**24**
		1				⊖	—	0.108	LS45P00C11	**25**
			1			⊖	—	0.108	LS45P00L02	**25**
				1		⊗	—	0.108	LS45P00L20	**25**
					1	⊖	—	0.108	LS45P00B02	**25**
Rectilinear motion heads with actuator										
To be actuated by end Steel plain plunger (zinc-plated)						⊖	0.5	0.042	LSTH11	**9**
Steel plain plunger (zinc-plated) and dust protection cup						⊖	0.5	0.043	LSTH14	**12**
Steel ball plunger						⊖	0.5	0.042	LSTH12	**11**
To be actuated by 30° cam Steel roller plunger (zinc-plated)						⊖	0.5	0.048	LSTH13	**16**
Steel roller plunger (zinc-plated) and dust protection cup						⊖	0.5	0.048	LSTH19	**19**
To be actuated unidirectionally by 30° cam ø 22mm polyamide roller lever on steel plunger (zinc-plated)						⊖	1.5	0.046	LSTH31	**15**
ø 22mm polyamide roller lever on steel plunger (zinc-plated) & dust protection cup						⊖	1.5	0.049	LSTH35	**18**
ø 22mm stainless steel roller lever on steel plunger (zinc-plated)						⊖	1.5	0.055	LSTH32	**20**
ø 22mm stainless steel roller lever on steel plunger (zinc-plated) & dust protection cup						⊖	1.5	0.058	LSTH36	**23**
ø 22mm steel ball-bearing roller lever on steel plunger (zinc-plated)						⊖	1.5	0.057	LSTH33	**17**
ø 22mm steel ball-bearing roller lever on steel plunger (zinc-plated) & dust protection cup						⊖	1.5	0.060	LSTH37	**20**

⊖ "N.C." contact with positive opening operation or element (subassembly, head, lever) suitable for positive opening operation.

Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with ⊖ are fitted.

LSTH41

LSTH51

LSTH92

LSTH40

LSA40X41

LSA40X43

Bodies with contact block for rectilinear or angular motion heads

Contact blocks	Positive opening operation	Actuation speed max. m/s	Unit weight kg (1 pc)	Catalog number	List price
Angular motion heads with actuator					
To be actuated by 30° cam					
ø 22mm polyamide roller lever ①	⊖	1.5	0.082	LSTH41	**$ 20**
ø 22mm stainless steel roller lever ①	⊖	1.5	0.091	LSTH42	**28**
ø 22mm steel ball-bearing roller lever ①	⊖	1.5	0.093	LSTH43	**23**
ø 45mm rubber roller lever ①	⊗	1.5	0.098	LSTH44	**22**
ø 22mm adjustable polyamide roller lever ①	⊗	1.5	0.088	LSTH51	**20**
ø 22mm adjustable stainless steel roller lever ①	⊗	1.5	0.098	LSTH52	**28**
ø 22mm adjustable steel ball-bearing roller lever ①	⊗	1.5	0.100	LSTH53	**24**
ø 45mm adjustable rubber roller lever ①	⊗	1.5	0.105	LSTH54	**22**
To be actuated by fully directional translation movement					
Stainless steel flexible lever with insulated end ①	⊗	1	0.083	LSTH61	**22**
Stainless steel coil spring lever ①	⊗	1	0.089	LSTH62	**22**
ø 3mm adjustable stainless steel rod lever, 195mm ①	⊗	1	0.087	LSTH71	**19**
ø 6mm adjustable polyamide rod lever, 195mm ①	⊗	1	0.083	LSTH72	**19**
ø 6mm adjustable fiberglass rod lever, 195mm ①	⊗	1	0.087	LSTH73	**20**
Multidirectional angular motion heads (to be actuated by fully directional translation movement)					
Stainless steel spring rod	⊗	1	0.046	LSTH91	**13**
Stainless steel flexible rod with insulated end	⊗	1	0.049	LSTH92	**16**
Stainless steel coil spring rod	⊗	1	0.055	LSTH93	**14**
Angular motion head without actuator for non-adjustable roller levers (delivered with M5 screw and washer)	⊖	1.5	0.050	LSTH40	**14**
Actuators for angular motion head LSTH40					
ø 22mm polyamide roller lever ①	⊖	—	0.032	LSA40X41	**6**
ø 22mm stainless steel roller lever ①	⊖	—	0.042	LSA40X42	**14**
ø 22mm steel ball-bearing roller lever ①	⊖	—	0.044	LSA40X43	**9**
ø 45mm rubber roller lever ①	⊗	—	0.050	LSA40X44	**8**

① Free position adjustment of lever 9° by 9° over 360°.

Components
40mm, IP 65, UL Type 4

⊸ "N.C." contact with positive opening operation or element (subassembly, head, lever) suitable for positive opening operation.

Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with ⊸ are fitted.

LSTH50

LSA40X72

LSA40X51

LSC40XB11

	Positive opening operation	Actuation speed max. m/s	Unit weight kg (1 pc)	Catalog number	List price
Angular motion head without actuator, for flexible or adjustable levers (delivered with M5 screw, washer & adaptation parts)	⊗	—	0.058	LSTH50	**$ 15**
Actuators for angular motion head LSTH50					
ø 22mm adjustable polyamide roller lever ①	⊗	—	0.023	LSA40X51	**5**
ø 22mm adjustable stainless steel roller lever ①	⊗	—	0.032	LSA40X52	**13**
ø 22mm adjustable steel ball-bearing roller lever ①	⊗	—	0.034	LSA40X53	**9**
ø 45mm adjustable rubber roller lever ①	⊗	—	0.039	LSA40X54	**7**
Stainless steel flexible lever with insulated end ①	⊗	—	0.017	LSA40X61	**7**
Stainless steel coil spring lever ①	⊗	—	0.023	LSA40X62	**7**
ø 3mm adjustable stainless steel rod lever, 195mm ①	⊗	—	0.014	LSA40X71	**4**
ø 6mm adjustable polyamide rod lever, 195mm ①	⊗	—	0.010	LSA40X72	**4**
ø 6mm adjustable fiberglass rod lever, 195mm ①	⊗	—	0.014	LSA40X73	**5**
Contact blocks (with adaptor)					
1 NC & 1 NO 2-pole snap action	⊸	—	0.032	LSC40XB11	**15**
1 NC & 1 NO 2-pole non-overlapping slow action	⊸	—	0.032	LSC40XD11	**15**
1 NO & 1 NC 2-pole overlapping slow action	⊸	—	0.032	LSC40XC11	**17**
2 NC 2-pole simultaneous slow action	⊸	—	0.032	LSC40XL02	**17**
2 NO 2-pole simultaneous slow action	⊗	—	0.032	LSC40XL20	**17**
2 NC 2-pole snap action	⊸	—	0.032	LSC40XB02	**17**

① Free position adjustment of lever 9° by 9° over 360°.

Technical data
IP 65, UL Type 4

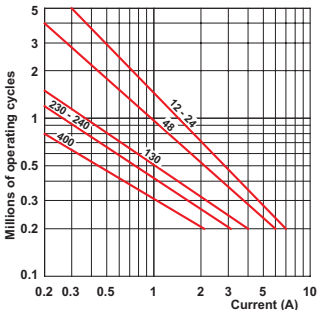
General technical data

Standards		Devices conform with international IEC 947-5-1 and European EN 60 947-5-1 standards
Certifications - Approvals		UL & CSA
Air temperature near the device (IEC) – during operation – for storage	 °C °C	 – 25 ... + 70 – 30 ... + 80
Climatic withstand		According to IEC 68-2-3 and salty mist according to IEC 68-2-11
Mounting positions		All positions are authorized
Shock withstand (according to IEC 68-2-27 and EN 60 068-2-27)		50g ① (1/2 sinusoidal shock for 11 ms) no change in contact position
Resistance to vibrations (acc. to IEC 68-2-6 and EN 60 068-2-6)		25g (10 – 500 Hz) no change in position of contacts greater than 100 µs
Protection against electrical shocks (acc. to IEC 536)		Class II
Degree of protection		UL Type 4 & IP 65
Consistency (measured over 1 million operations)		0.1 mm (upon closing point)
Minimum actuation speed	m/s	Slow action contacts 0.060 / Snap action contacts 0.001

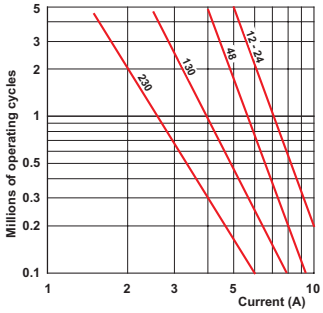
Electrical Data

Rated insulation voltage U_i - according to IEC 947-1 and EN 60-947-1 - according to UL 508 and CSA C22-2 n° 14			 500 V (degree of pollution 3) A 600, Q 600
Rated impulse withstand voltage U_{imp} (according to IEC 947-1 and EN 60 947-1)		kV	6
Conventional free air thermal current I_{th} (according to IEC 947-5-1) q ≤ 40 °C		A	10
Short-circuit protection U_e ≤ 500 V a.c. - gG (gl) type fuses		A	10
Rated operational current I_e / AC-15 (according to IEC 947-5-1)	 24 V - 50/60 Hz 130 V - 50/60 Hz 230 V - 50/60 Hz 240 V - 50/60 Hz 400 V - 50/60 Hz	 A A A A A	 10 5.5 3.1 3 1.8
I_e / DC-13 (according to IEC 947-5-1)	24 V - d.c. 110 V - d.c. 250 V - d.c.	A A A	2.8 0.6 0.27
Switching frequency		Cycles/h	3600
Load factor			0.5
Resistance between contacts		mW	25
Connecting terminals			M3.5 (+, –) pozidriv 2 screw with cable clamp
Terminal for protective conductor			– M3.5 (+, –) pozidriv 2 screw with cable clamp
Connecting capacity		1 or 2 x mm^2	0.5 ... 2.5
Terminal marking			According to EN 50 013
Mechanical durability		Millions of operations	15, 10, 5, > 1 } LS { 30, 31, 40 } P { 10 – 12; 30 – 34; 13; 41 – 44; 51– 54; 61 – 72; 91– 93; 15; 16
Electrical durability (according to IEC 947-5-1)			Utilization categories AC-15 and DC-13 (Load factor of 0.5 according to curves below)

AC-15 — Snap action



AC-15 — Slow action



DC-13		Snap action	Slow action
		Power breaking for a durability of 5 million operating cycles	
Voltage	24 V	9.5 W	12 W
Voltage	48 V	6.8 W	9 W
Voltage	110 V	3.6 W	6 W

① except for LS30/31/35 (P42): 25g

Technical data
Terminology

Double insulation ⧈

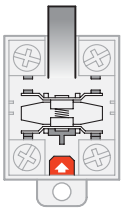
Class II materials, according to IEC 536, are designed with double insulation. This measure consists in doubling the functional insulation with an additional layer of insulation so as to eliminate the risk of electric shock and thus not having to protect elsewhere. No conductive part of “double insulated” material should be connected to a protective conductor.

Positive opening operation ⊖

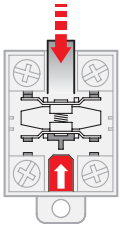
A control switch, with one or more break-contact elements, has a positive opening operation when the switch actuator ensures full contact opening of the break-contact. For the part of travel that separates the contacts, there must be a positive drive, with no resilient member (e.g. springs), between the moving contacts and the point of the actuator to which the actuating force is applied.
The positive opening operation does not deal with N.O. contacts.
Control switches with positive opening operation may be provided with either snap action or slow action contact elements. To use several contacts on the same control switch with positive opening operation, they must be electrically separated from each other, if not, only one may be used.
Every control switch with positive opening operation must be indelibly marked on the outside with the symbol: ⊖.

Snap action

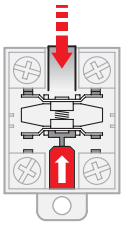
Snap action contacts are characterized by a release position that is distinct from the operating position (differential travel). Snap breaking of moving contacts is independent of the switch actuator's speed and contributes to regular electric performance even for slow switch actuator speeds.



State of rest



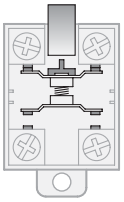
Contact change



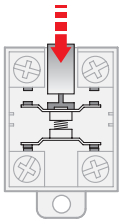
Positive opening

Slow action

Slow action contacts are characterized by a release position that is the same as the operating position. The switch actuator's speed directly conditions the travel speed of contacts.



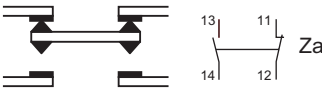
State of rest



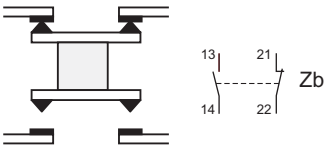
Completely closed

Contact shape according to IEC 947-5-1.

Change-over contact elements with 4 terminals must be indelibly marked with the corresponding **Za** or **Zb** symbol as in the diagrams below.



Contacts with the same polarity



The 2 moving contacts are electrically separated

Utilization category

AC-15: switching of electromagnetic loads of electromagnets using an alternating current (>72 VA).
DC-13: switching of electromagnets using a direct current.

Terminals

Limit switches with metal casings must have a terminal, for a protective conductor, that is placed inside the casing very close to the cable inlet and must be indelibly marked.

Minimum actuation force/torque

The minimum amount of force/torque that is to be applied to the switch actuator to produce a change in contact position.

Minimum force/torque to achieve positive opening operation

The minimum amount of force/torque that is to be applied to the switch actuator to ensure positive opening operation of the N.C. contact.

Technical data
Travel and operation diagrams

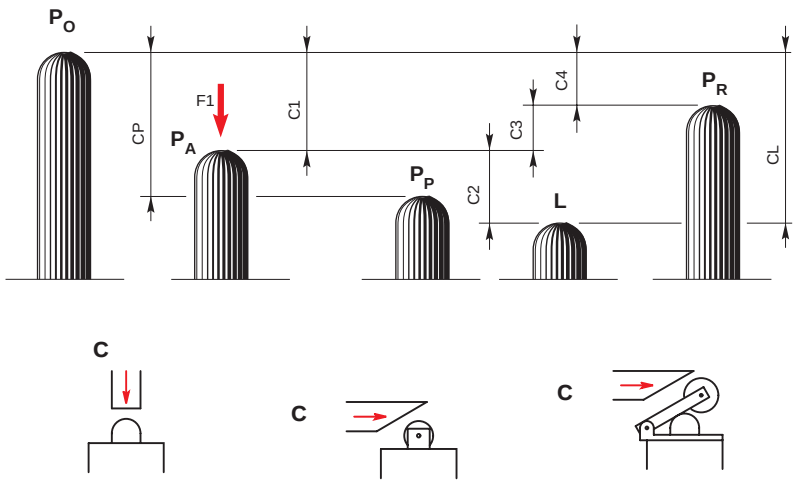


Diagram in millimeters

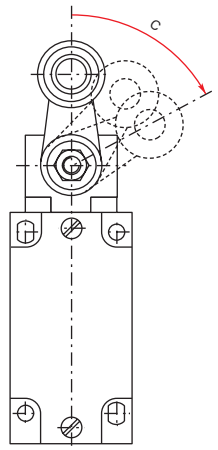


Diagram in degrees

P_O Free position
Position of the switch actuator when no external force is exerted on it.

P_A Operating position
Position of the switch actuator, under the effect of force F1, when the contacts leave their initial free position.

P_P Positive opening position
Position of the switch actuator from which positive opening is ensured.

L Max. travel position
Maximum acceptable travel position of the switch actuator under the effect of a force F1.

P_R Release position
Position of the switch actuator when the contacts return to their initial free position.

C_1 Pre-travel
Distance between the free position P_O and the operating position P_A.

C_P Positive opening travel
Minimum travel of the switch actuator, from the free position, to ensure positive opening operation of the normally closed contact.

C_2 Over-travel
Distance between the operating position P_A and the max. travel position L.

C_L Max. travel
Distance between the free position P_O and the max. travel position L.

C_3 Differential travel (C1-C4)
Travel difference of the switch actuator between the operating position P_A and the release position P_R.

C_4 Release travel
Distance between the release position P_R and the free position P_O.

Diagram for snap action contacts:

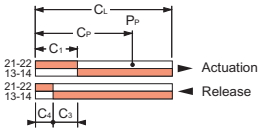
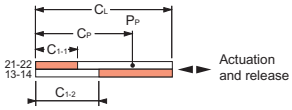


Diagram for non-overlapping slow action contacts:



Note: for slow action contacts, $C_3 = 0$, C_{1-1} = pre-travel of contact 21-22, C_{1-2} = pre-travel of contact 13-14.

Examples:

LS45M13B11
(snap action contacts)

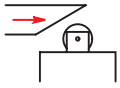
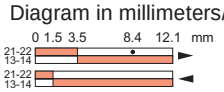


Diagram in millimeters/cam travel



LS45M41B11
(snap action contacts)

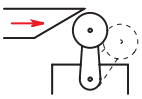
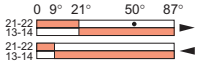


Diagram in degrees/lever rotation



LS45M11D11
(non-overlapping slow action contacts)

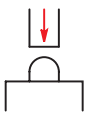
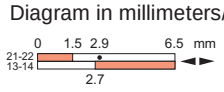
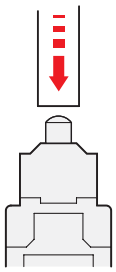


Diagram in millimeters/plunger travel

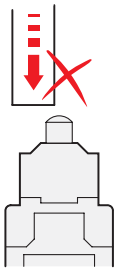


Technical data
Utilization precautions

Plain plunger

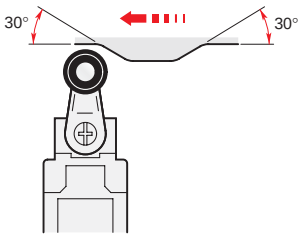


Correct

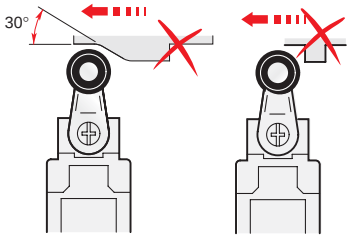


Incorrect

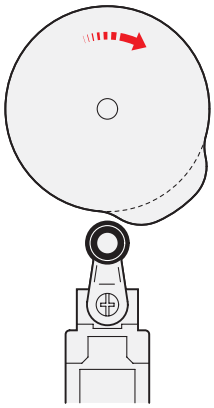
Roller plunger or roller lever



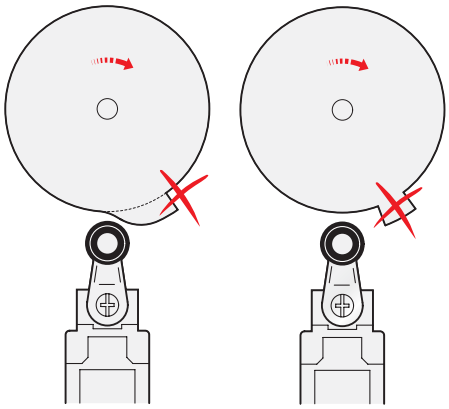
Correct



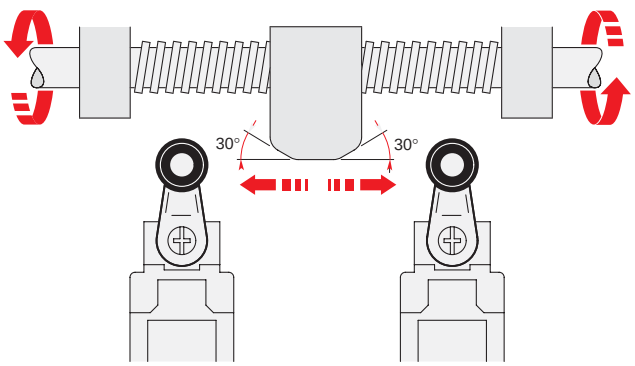
Incorrect



Correct



Incorrect

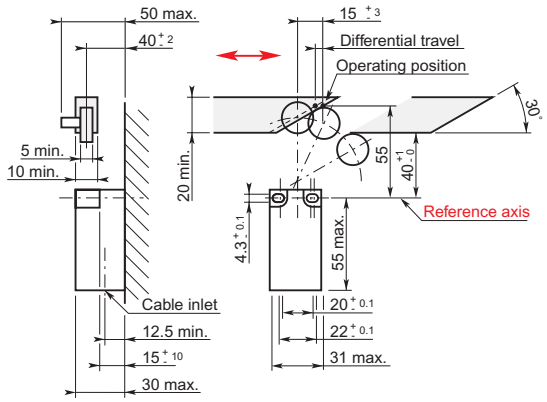


For a relatively slow movement of the switch actuator, a limit switch with a snap action contact block is preferred.

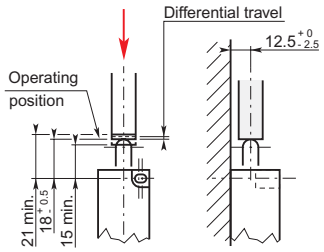
Technical data
EN 50047 standard

The European Committee for Electrotechnical Standardization (CENELEC), which groups together 18 European countries, publishes EN standards.
The present standard defines dimensions and mechanical data for limit switches (30 x 55mm).

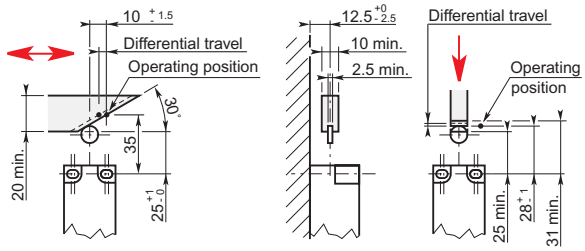
A Shape
Roller lever operating heads



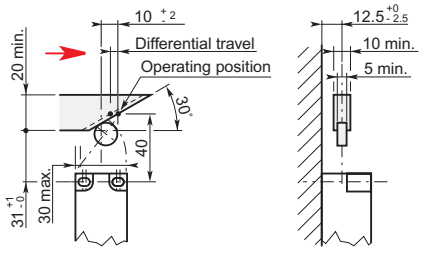
B Shape
Rounded plunger operating heads



C Shape
Roller plunger operating heads



E Shape
Roller lever operating heads

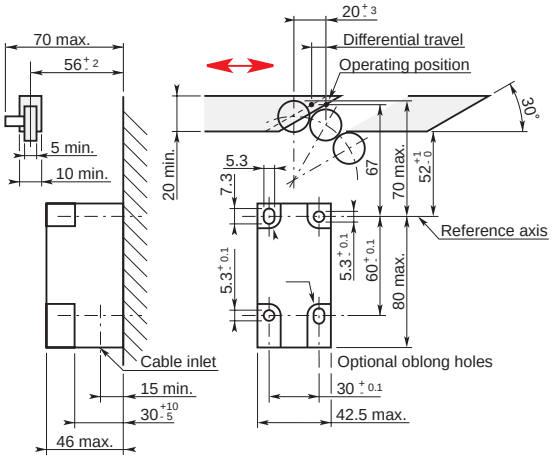


Technical data
EN 50041 standard

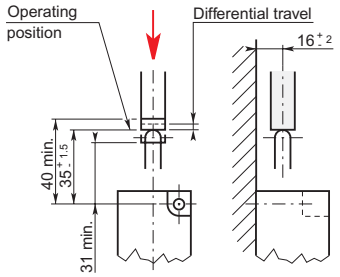
The European Committee for Electrotechnical Standardization (CENELEC), which groups together 18 European countries, publishes EN standards.

The present standard defines dimensions and mechanical data for limit switches (42.5 x 80 mm).

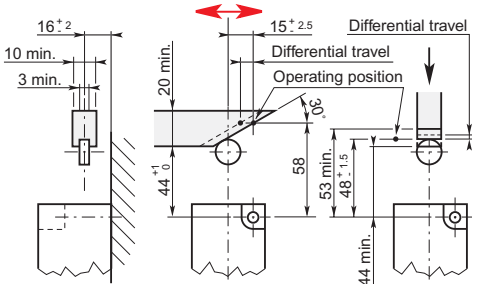
A Shape
Roller lever operating heads



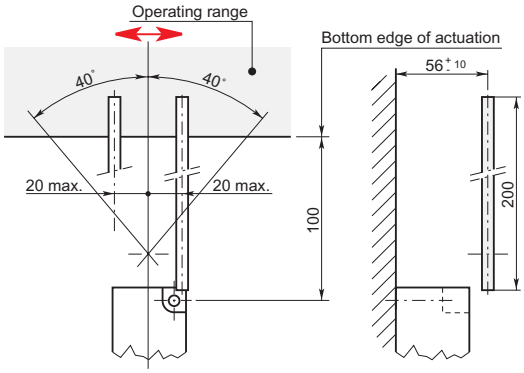
B Shape
Rounded plunger operating heads



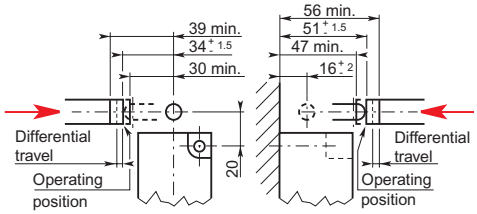
C Shape
Roller plunger operating heads



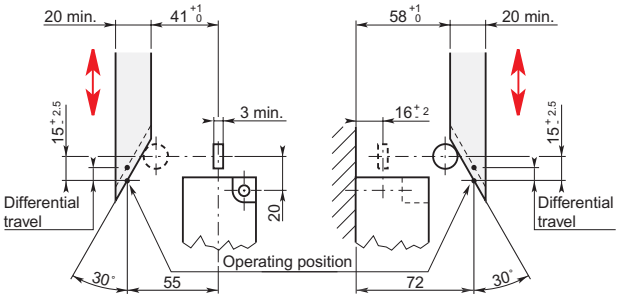
D Shape
Rod operating heads



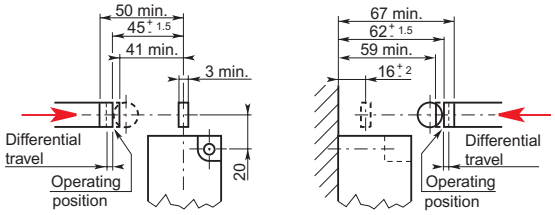
F Shape
Rounded lateral plunger operating heads



G Shape
Lateral roller plunger operating heads - Lateral actuation



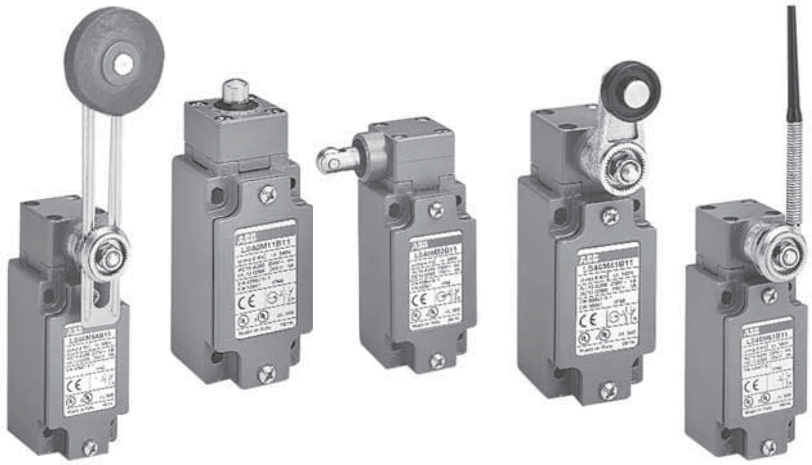
Lateral roller plunger operating heads - Front actuation



9

Metal Limit switches

Limit Switches
Metal casing, 40mm & 60mm
Assembled
Components



Description

Limit switches are made of aluminum alloy and have a degree of protection of IP 66 and UL type 4X.

The casings come in 2 dimensions:

– LS45M, 40mm width.
– LS65M, 60mm width.

UL Listed #E191693

Applications

Easy to use, electromechanical limit switches offer specific qualities:

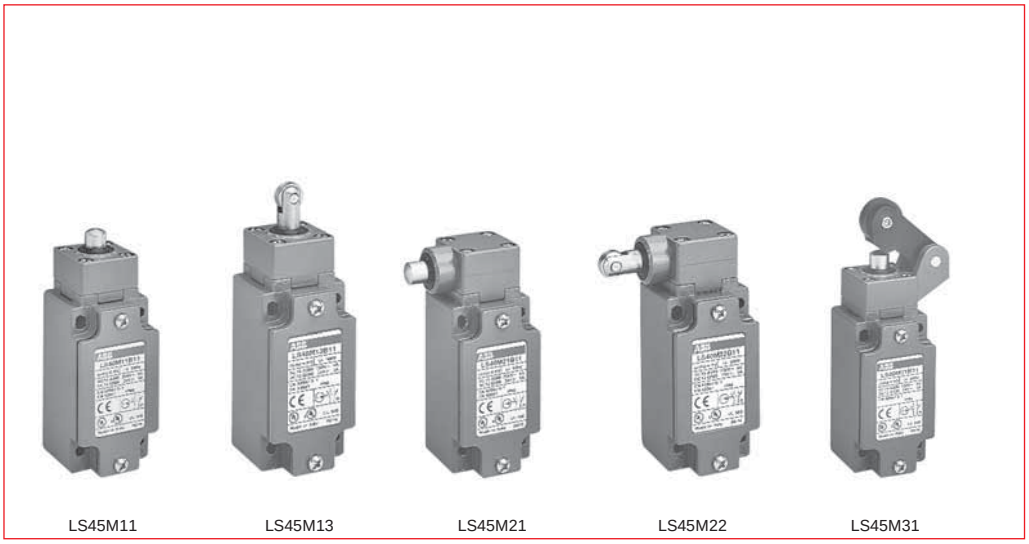
- Visible operation.
- Able to switch strong currents (10 A conventional thermal current).
- Electrically separated contacts.
- Precise operating points (consistency).
- Immune to electromagnetic disturbances.

Limit switches used for these mechanical applications:

- Presence/absence.
- Positioning and travel limit.
- Objects passing/counting.

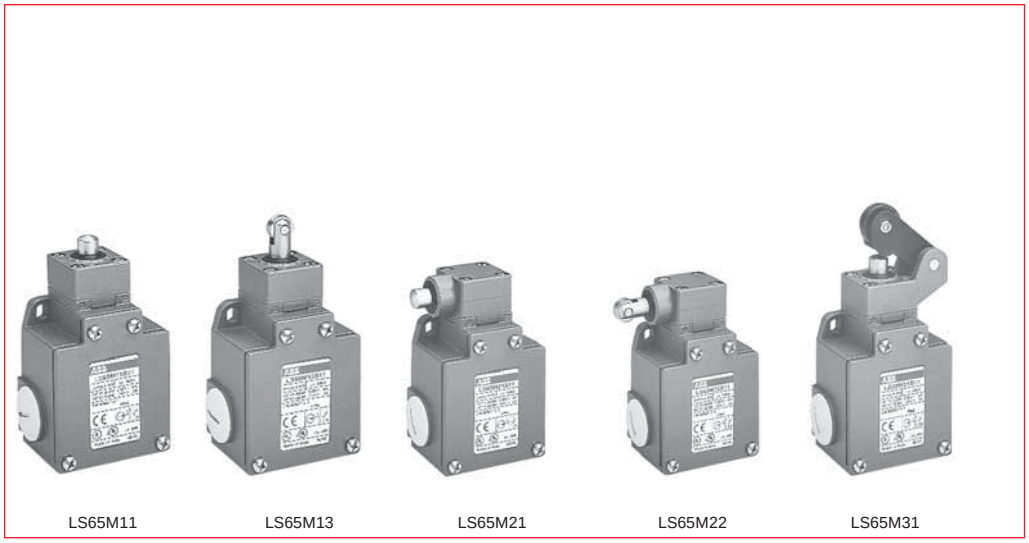
Selection guide
IP 66, UL Type 4X
40mm & 60mm

40mm width — LS45M



	LS45M11	LS45M13	LS45M21	LS45M22	LS45M31
CENELEC conformity	EN 50 041	EN 50 041	EN 50 041	EN 50 041	—
Actuating device and actuation type	Plain plunger	Roller plunger	Plain plunger	Roller plunger	Roller lever
Positive contact opening	→	→	→	→	→

60mm width — LS65M



	LS65M11	LS65M13	LS65M21	LS65M22	LS65M31
Actuating device and actuation type	Plain plunger	Roller plunger	Plain plunger	Roller plunger	Roller lever
Positive contact opening	→	→	→	→	→

Selection guide
IP 66, UL Type 4X
40mm & 60mm


LS45M41

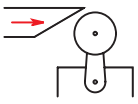
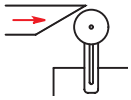
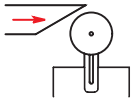
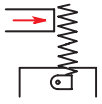
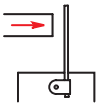
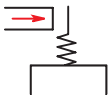

LS45M51


LS45M54


LS45M61


LS45M72


LS45M91

EN 50 041	—	—	—	EN 50 041	—
Roller lever	Adjustable roller levers		Adjustable flexible and rigid rod levers		Flexible rod
					
	—	—	—	—	—


LS65M41

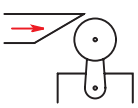
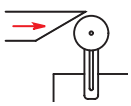
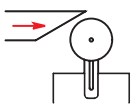
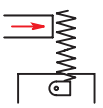
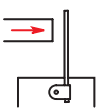
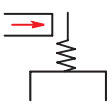

LS65M51


LS65M54


LS65M61


LS65M72


LS65M91

Roller lever	Adjustable roller levers		Adjustable flexible and rigid rod levers		Flexible rod
					
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General information
IP66, UL Type 4X
40mm & 60mm

Applications

Easy to use, electromechanical limit switches offer specific qualities:

- Visible operation.
- Able to switch strong currents (10 A conventional thermal current).
- Electrically separated contacts.
- Precise operating points (consistency).
- Immune to electromagnetic disturbances.

Limit switches used for these mechanical applications:

- Presence/absence.
- Positioning and travel limit.
- Objects passing/counting.

Description

Limit switches, which are made of aluminum alloy, have a degree of protection of IP 66 and UL Type 4X.

The casings come in 2 dimensions:

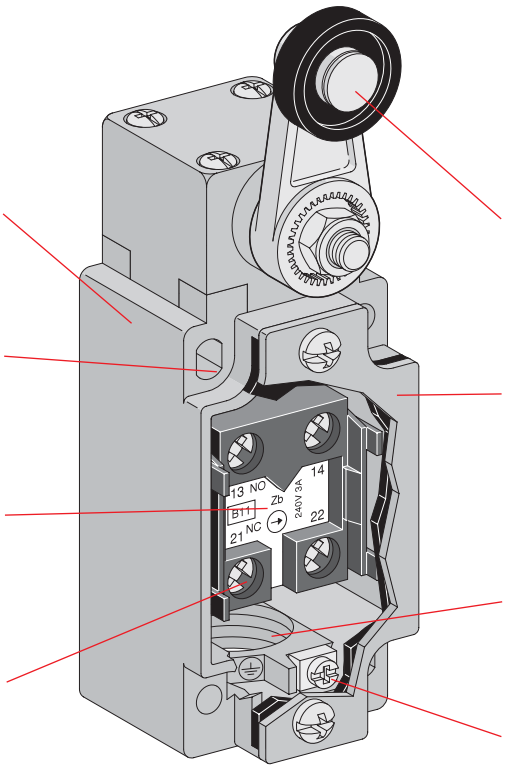
- 40mm width
  - LS40M
  - LS45M
- 60mm width
  - LS65M

Casing
- 40mm width with standardized dimensions according to EN 50041
- 60mm width

Mounting the casing
- 2 or 4 x M5 screws for 40mm width
- 2 x M5 screws for 60mm width

Block of 2 contacts
- Contact configuration: N.O. + N.C., 2 N.O., 2 N.C.
- Positive opening operation
- Snap action or slow action
- Zb shape: the 2 contacts are electrically separated

Connecting terminals
- M3.5 (+,–) pozidriv 2 screw
- Screw heads with captive cable clamp
- Markings conform with IEC 947-1, IEC 947-5-1, EN 50005 and 50013 standards



A variety of operating heads
- Plain plunger
- Roller plunger
- Roller lever, adjustable or not, etc.

Assembled using 4 x M4 screws for 40 & 60mm widths

Cover
- Closed using 2 x M4 screws for 40mm width
- Closed using 4 x M4 screws for 60mm width

One piece sealing gasket to ensure tightness

Electrical connection
- 1 x pg 13.5 cable gland for 40mm width – LS40M
- 1 x 1/2" NPT cable gland – LS45M
- 3 x pg 13.5 cable glands for 60mm width – LS60M
- 3 x 1/2" NPT cable glands for 60mm width – LS65M

Terminal for protective conductor placed near the cable inlet and marked ⏚
- M3.5 (+,–) pozidriv 2 screw
- Screw head with captive cable clamp

Catalog number explanation

LS 45 M 41 B 11

Limit switch

Casing width
40 = 40mm width+1 cable inlet for Pg13.5 cable gland
45 = 40mm width+1/2" NPT cable gland
60 = 60mm width+3 cable inlets for Pg13.5 cable glands
65 = 60mm width+3 1/2" NPT cable glands

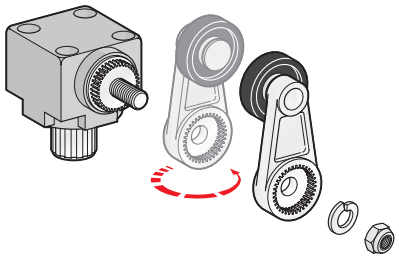
Metal casing

Operating heads: codes 11 – 93

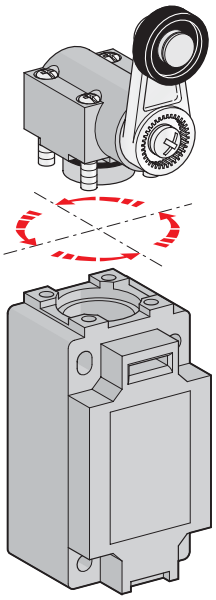
Contact block
11: 1 N.O. contact + 1 N.C. contact
20: 2 N.O. contacts
02: 2 N.C. contacts

B: Zb Snap action
L: Zb Slow action (contact dependent)
D: Zb Slow action non—overlapping late make
C: Zb Slow action overlapping early make

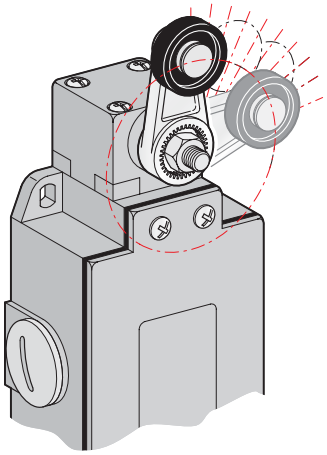
General information
Implementation
IP66, UL Type 4X, 40mm & 60mm



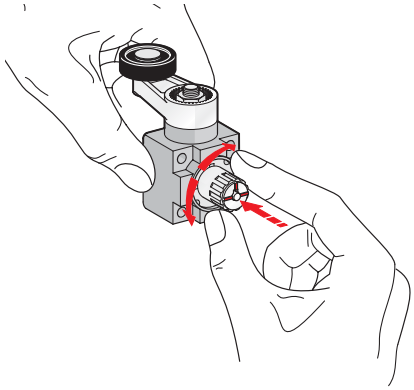
Lever round turning
LS40M, LS45M , LS60M & LS65M

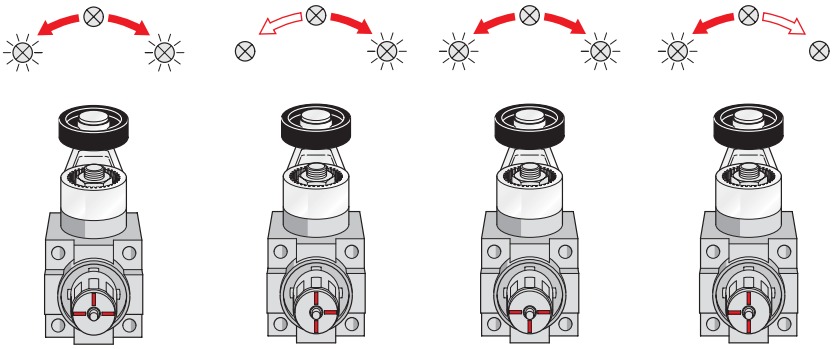


Head orientation



Free position adjustment 9 in 9° of lever



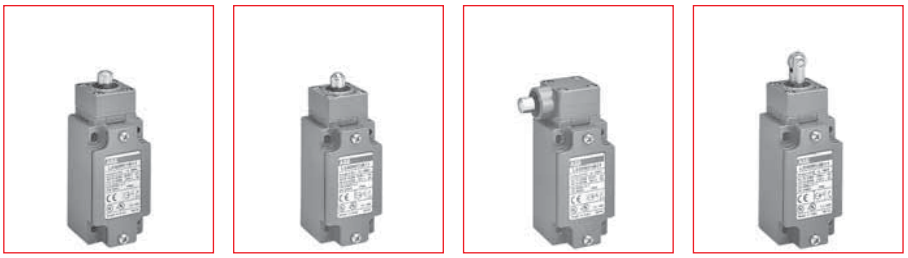


Operating mode selection

Assembled
IP66, UL Type 4X
40mm

Movement to be detected

On end | 30° Cam



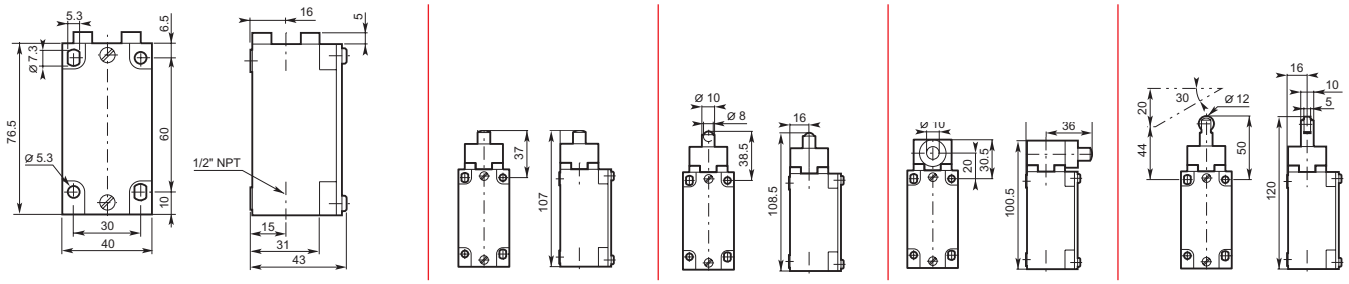
Operating head type

		Stainless steel plain plunger	Stainless steel ball plunger	Stainless steel lateral plain plunger	Stainless steel roller plunger
Conformity / (N.C. contact with positive opening operation)		EN 50 041	EN 50 041	EN 50 041	EN 50 041
Maximum actuation speed	m/s	0.5	0.5	0.5	0.5
Min. force: - actuation	N	22	22	30	16
- positive opening operation	N	66	66	70	48

9

Snap action contacts	Catalog number	LS45M11B11	LS45M12B11	LS45M21B11	LS45M13B11
	List price	**$ 38**	**$ 41**	**$ 41**	**$ 44**
13 21 Zb 14 22	Operation diagram	0 0.8 1.9 4.5 6.5 mm	0 0.8 1.9 4.5 6.5 mm	0 0.9 2.1 4.9 7.1 mm	0 1.5 3.5 8.4 12.1 mm
Non-overlapping Slow action contacts	Catalog number	LS45M11D11	LS45M12D11	LS45M21D11	LS45M13D11
	List price	**41**	**44**	**44**	**48**
13 21 Zb 14 22	Operation diagram	0 1.5 2.9 6.5 mm, 2.7	0 1.5 2.9 6.5 mm, 2.7	0 1.8 3.5 7.9 mm, 3.2	0 3.5 6.8 15.2 mm, 6.3
Overlapping Slow action contacts	Catalog number	LS45M11C11	LS45M12C11	LS45M21C11	LS45M13C11
	List price	**42**	**45**	**45**	**49**
13 21 Zb 14 22	Operation diagram	0 2.6 4.0 6.5 mm, 1.5	0 2.6 4.0 6.5 mm, 1.5	0 3.2 4.9 7.9 mm, 1.8	0 6.1 9.3 15.2 mm, 3.5
Slow action contacts	Catalog number	LS45M11L02	LS45M12L02	LS45M21L02	LS45M13L02
	List price	**42**	**45**	**45**	**49**
11 21 Zb 12 22	Operation diagram	0 1.3 2.7 6.5 mm	0 1.3 2.7 6.5 mm	0 1.6 3.3 7.9 mm	0 3.0 6.3 15.2 mm
Slow action contacts	Catalog number	LS45M11L20	LS45M12L20	LS45M21L20	LS45M13L20
	List price	**42**	**45**	**45**	**49**
13 23 Zb 14 24	Operation diagram	0 1.3 6.5 mm	0 1.3 6.5 mm	0 1.6 7.9 mm	0 3.0 15.2 mm
Snap action contacts	Catalog number	LS45M11B02	LS45M12B02	LS45M21B02	LS45M13B02
	List price	**42**	**45**	**45**	**49**
11 21 Zb 12 22	Operation diagram	0 0.8 1.9 4.5 6.5 mm	0 0.8 1.9 4.5 6.5 mm	0 0.9 2.1 4.9 7.1 mm	0 1.5 3.5 8.4 12.1 mm
Weight (packing per unit)	kg	0.240	0.240	0.260	0.240

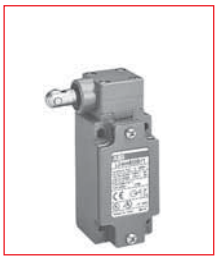
Dimensions (mm)



Assembled
IP66, UL Type 4X
40mm

Movement to be detected

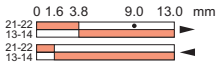
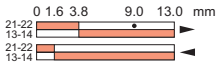
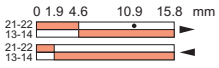
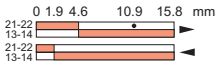
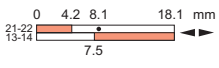
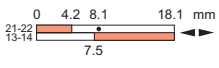
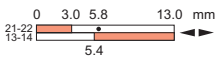
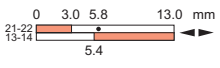
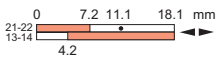
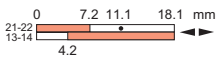
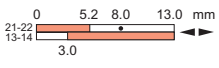
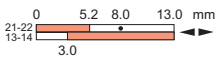
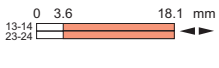
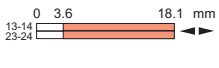
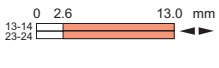
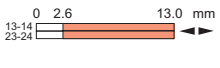
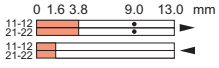
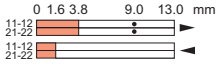
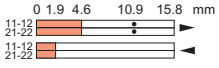
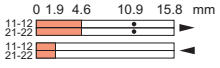
30° Cam translation movement



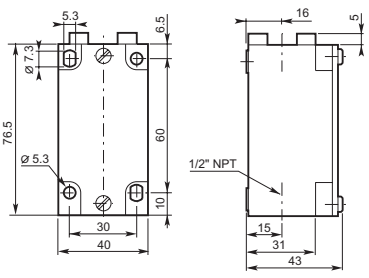

Operating head type

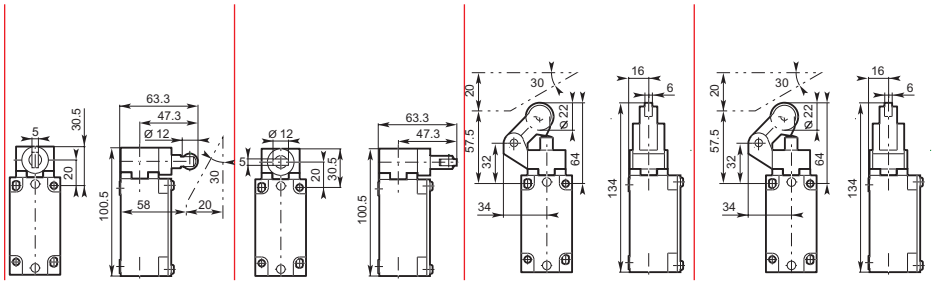
		Lateral plunger with vertical roller	Lateral plunger with horizontal roller	ø 22 Polyamide roller lever	ø 22 Stainless steel roller lever
Conformity / ⊖ (N.C. contact with positive opening operation)		EN 50 041 ⊖	EN 50 041 ⊖	⊖	⊖
Maximum actuation speed	m/s	0.5	0.5	1.5	1.5
Min. force: - actuation	N	30	30	12	12
- positive opening operation	N	70	70	40	40

9

Snap action contacts 13 21 Zb 14 22	Catalog number List price	LS45M22B11 **$ 45**	LS45M23B11 **$ 45**	LS45M31B11 **$ 43**	LS45M32B11 **$ 50**
	Operation diagram				
Non-overlapping Slow action contacts 13 21 Zb 14 22	Catalog number List price	LS45M22D11 **48**	LS45M23D11 **48**	LS45M31D11 **46**	LS45M32D11 **53**
	Operation diagram				
Overlapping Slow action contacts 13 21 Zb 14 22	Catalog number List price	LS45M22C11 **50**	LS45M23C11 **50**	LS45M31C11 **47**	LS45M32C11 **55**
	Operation diagram				
Slow action contacts 11 21 Zb 12 22	Catalog number List price	LS45M22L02 **50**	LS45M23L02 **50**	LS45M31L02 **47**	LS45M32L02 **55**
	Operation diagram				
Slow action contacts 13 23 Zb ⊗ 14 24	Catalog number List price	LS45M22L20 **50**	LS45M23L20 **50**	LS45M31L20 **47**	LS45M32L20 **55**
	Operation diagram				
Snap action contacts 11 21 Zb 12 22	Catalog number List price	LS45M22B02 **50**	LS45M23B02 **50**	LS45M31B02 **47**	LS45M32B02 **55**
	Operation diagram				
Weight (packing per unit)	kg	0.265	0.265	0.275	0.280

Dimensions (mm)





Assembled
IP66, UL Type 4X
40mm

Movement to be detected

Unidirectional | **30° Cam translation movement**



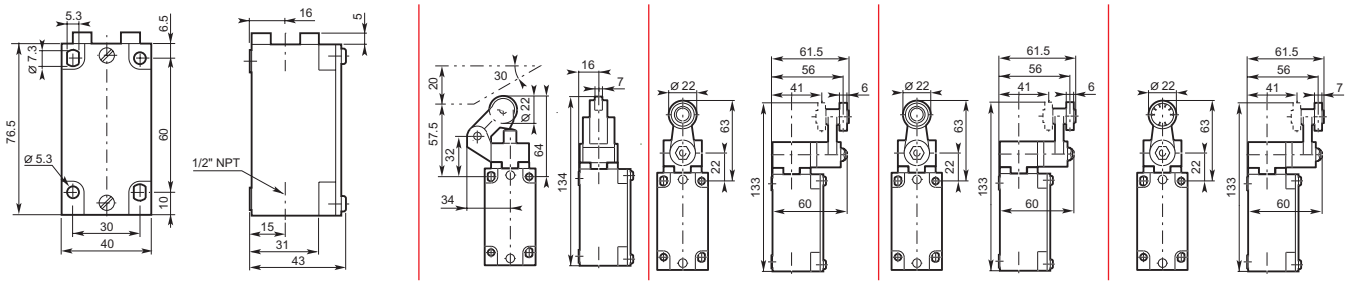

Operating head type

	ø 22 Ball-bearing roller lever	ø 22 Polyamide roller lever	ø 22 Stainless steel roller lever	ø 22 Ball-bearing roller lever
Conformity / (N.C. contact with positive opening operation)		EN 50 041	EN 50 041	EN 50 041
Maximum actuation speed m/s	1.5	1.5	1.5	1.5
Min. force/torque: - actuation	12 N	0.15 N.m	0.15 N.m	0.15 N.m
- positive opening operation	40 N	0.44 N.m	0.44 N.m	0.44 N.m

9

Snap action contacts	Catalog number	LS45M33B11	LS45M41B11	LS45M42B11	LS45M43B11
	List price	**$ 45**	**$ 50**	**$ 57**	**$ 53**
13 21 Zb 14 22	Operation diagram	0 1.9 4.6 10.9 15.8 mm	0 9° 21° 50° 87°	0 9° 21° 50° 87°	0 9° 21° 50° 87°
Non-overlapping slow action contacts	Catalog number	LS45M33D11	LS45M41D11	LS45M42D11	LS45M43D11
	List price	**49**	**53**	**61**	**57**
13 21 Zb 14 22	Operation diagram	0 3.0 5.8 13.0 mm, 5.4	0 16° 31° 87°, 30°	0 16° 31° 87°, 30°	0 16° 31° 87°, 30°
Overlapping slow action contacts	Catalog number	LS45M33C11	LS45M41C11	LS45M42C11	LS45M43C11
	List price	**50**	**55**	**63**	**58**
13 21 Zb 14 22	Operation diagram	0 5.2 8.0 13.0 mm, 3.0	0 28° 45° 87°, 16°	0 28° 45° 87°, 16°	0 28° 45° 87°, 16°
Slow action contacts	Catalog number	LS45M33L02	LS45M41L02	LS45M42L02	LS45M43L02
	List price	**50**	**55**	**63**	**58**
11 21 Zb 12 22	Operation diagram	0 2.6 5.4 13.0 mm	0 14° 29° 87°	0 14° 29° 87°	0 14° 29° 87°
Slow action contacts	Catalog number	LS45M33L20	LS45M41L20	LS45M42L20	LS45M43L20
	List price	**50**	**55**	**63**	**58**
13 23 Zb 14 24	Operation diagram	0 2.6 13.0 mm	0 14° 87°	0 14° 87°	0 14° 87°
Snap action contacts	Catalog number	LS45M33B02	LS45M41B02	LS45M42B02	LS45M43B02
	List price	**50**	**55**	**63**	**58**
11 21 Zb 12 22	Operation diagram	0 1.9 4.6 10.9 15.8 mm	0 9° 21° 50° 87°	0 0.9 2.1 4.9 7.1 mm	0 9° 21° 50° 87°
Weight (packing per unit)	kg	0.280	0.280	0.280	0.280

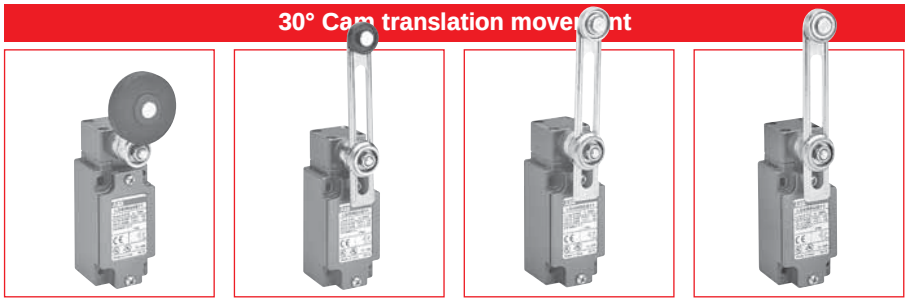
Dimensions (mm)



Assembled
IP66, UL Type 4X
40mm

Movement to be detected

30° Cam translation movement

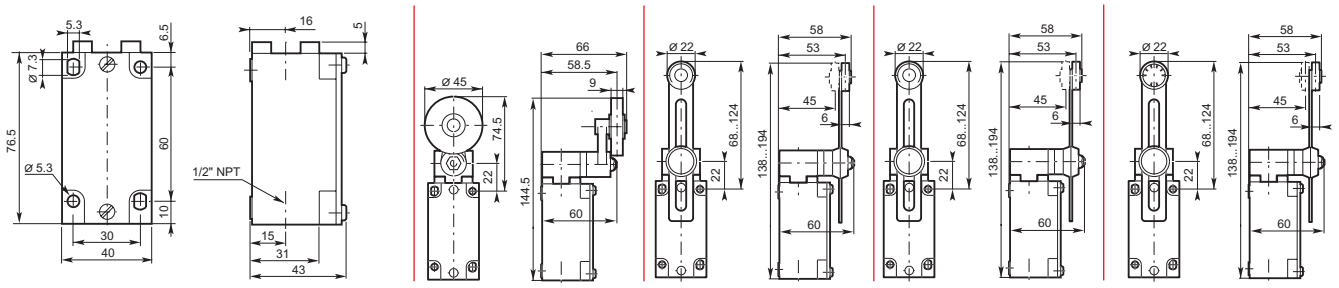


Operating head type

		ø 45 Rubber roller lever	Adjustable ø 22 polyamide roller lever	Adjustable ø 22 stainless steel roller lever	Adjustable ø 22 stainless steel ball-bearing roller lever
Conformity / (N.C. contact with positive opening operation)					
Maximum actuation speed	m/s	1.5	1.5	1.5	1.5
Min. torque: - actuation	N.m	0.15	0.15	0.15	0.15
- positive opening operation	N.m	–	–	–	–

Snap action contacts	Catalog number	LS45M44B11	LS45M51B11	LS45M52B11	LS45M53B11
	List price	**$ 51**	**$ 51**	**$ 59**	**$ 55**
13 21 Zb 14 22	Operation diagram	0 9° 21° 87° 21-22 13-14 / 21-22 13-14	0 9° 21° 87° 21-22 13-14 / 21-22 13-14	0 9° 21° 87° 21-22 13-14 / 21-22 13-14	0 9° 21° 87° 21-22 13-14 / 21-22 13-14
Non-overlapping slow action contacts	Catalog number	LS45M44D11	LS45M51D11	LS45M52D11	LS45M53D11
	List price	**55**	**55**	**63**	**59**
13 21 Zb 14 22	Operation diagram	0 16° 87° 21-22 13-14 30°	0 16° 87° 21-22 13-14 30°	0 16° 87° 21-22 13-14 30°	0 16° 87° 21-22 13-14 30°
Overlapping slow action contacts	Catalog number	LS45M44C11	LS45M51C11	LS45M52C11	LS45M53C11
	List price	**57**	**57**	**65**	**61**
13 21 Zb 14 22	Operation diagram	0 28° 87° 21-22 13-14 16°	0 28° 87° 21-22 13-14 16°	0 28° 87° 21-22 13-14 16°	0 28° 87° 21-22 13-14 16°
Slow action contacts	Catalog number	LS45M44L02	LS45M51L02	LS45M52L02	LS45M53L02
	List price	**57**	**57**	**65**	**61**
11 21 Zb 12 22	Operation diagram	0 14° 87° 11-12 21-22	0 14° 87° 11-12 21-22	0 14° 87° 11-12 21-22	0 14° 87° 11-12 21-22
Slow action contacts	Catalog number	LS45M44L20	LS45M51L20	LS45M52L20	LS45M53L20
	List price	**57**	**57**	**65**	**61**
13 23 Zb 14 24	Operation diagram	0 14° 87° 13-14 23-24	0 14° 87° 13-14 23-24	0 14° 87° 13-14 23-24	0 14° 87° 13-14 23-24
Snap action contacts	Catalog number	LS45M44B02	LS45M51B02	LS45M52B02	LS45M53B02
	List price	**57**	**57**	**65**	**61**
11 21 Zb 12 22	Operation diagram	0 9° 21° 87° 11-12 21-22 / 11-12 21-22	0 9° 21° 87° 11-12 21-22 / 11-12 21-22	0 9° 21° 87° 11-12 21-22 / 11-12 21-22	0 9° 21° 87° 11-12 21-22 / 11-12 21-22
Weight (packing per unit)	kg	0.310	0.290	0.300	0.300

Dimensions (mm)



Assembled
IP66, UL Type 4X
40mm

Movement to be detected

30° Cam

Fully directional translation movement

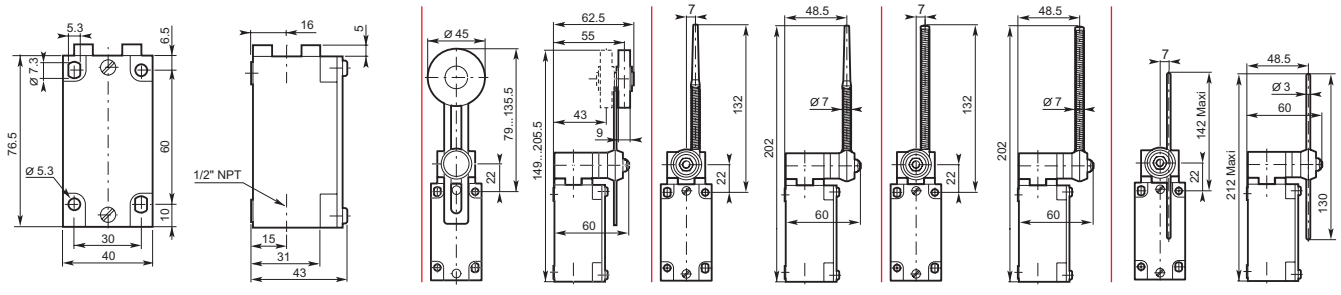
Operating head type

		Adjustable ø 45 rubber roller lever	Flexible lever with insulated end	Coil spring lever	Adjustable ø 3 stainless steel rod lever
Conformity / ⊖ (N.C. contact with positive opening operation)					EN 50 041
Maximum actuation speed	m/s	1.5	1.5	1.5	0.5
Min. torque: - actuation	N.m	0.15	0.15	0.15	0.15
- positive opening operation	N.m	–	–	–	–

9

Snap action contacts	Catalog number	LS45M54B11	LS45M61B11	LS45M62B11	LS45M71B11
	List price	**$ 53**	**$ 50**	**$ 50**	**$ 47**
13 21 Zb 14 22	Operation diagram	0 9° 21° 87° 21-22 13-14 21-22 13-14	0 9° 21° 87° 21-22 13-14 21-22 13-14	0 9° 21° 87° 21-22 13-14 21-22 13-14	0 9° 21° 87° 21-22 13-14 21-22 13-14
Non-overlapping Slow action contacts	Catalog number	LS45M54D11	LS45M61D11	LS45M62D11	LS45M71D11
	List price	**57**	**53**	**53**	**51**
13 21 Zb 14 22	Operation diagram	0 16° 87° 21-22 13-14 30°	0 16° 87° 21-22 13-14 30°	0 16° 87° 21-22 13-14 30°	0 16° 87° 21-22 13-14 30°
Overlapping Slow action contacts	Catalog number	LS45M54C11	LS45M61C11	LS45M62C11	LS45M71C11
	List price	**58**	**55**	**55**	**53**
13 21 Zb 14 22	Operation diagram	0 28° 87° 21-22 13-14 16°	0 28° 87° 21-22 13-14 16°	0 28° 87° 21-22 13-14 16°	0 28° 87° 21-22 13-14 16°
Slow action contacts	Catalog number	LS45M54L02	LS45M61L02	LS45M62L02	LS45M71L02
	List price	**58**	**55**	**55**	**53**
11 21 Zb 12 22	Operation diagram	0 14° 87° 11-12 21-22	0 14° 87° 11-12 21-22	0 14° 87° 11-12 21-22	0 14° 87° 11-12 21-22
Slow action contacts	Catalog number	LS45M54L20	LS45M61L20	LS45M62L20	LS45M71L20
	List price	**58**	**55**	**55**	**53**
13 23 Zb ⊗ 14 24	Operation diagram	0 14° 87° 13-14 23-24	0 14° 87° 13-14 23-24	0 14° 87° 13-14 23-24	0 14° 87° 13-14 23-24
Snap action contacts	Catalog number	LS45M54B02	LS45M61B02	LS45M62B02	LS45M71B02
	List price	**58**	**55**	**55**	**53**
11 21 Zb 12 22	Operation diagram	0 9° 21° 87° 11-12 21-22 11-12 21-22	0 9° 21° 87° 11-12 21-22 11-12 21-22	0 9° 21° 87° 11-12 21-22 11-12 21-22	0 9° 21° 87° 11-12 21-22 11-12 21-22
Weight (packing per unit)	kg	0.315	0.290	0.295	0.285

Dimensions (mm)



Assembled
IP66, UL Type 4X
40mm

Movement to be detected

Translation (cont.) | **Multidirectional**

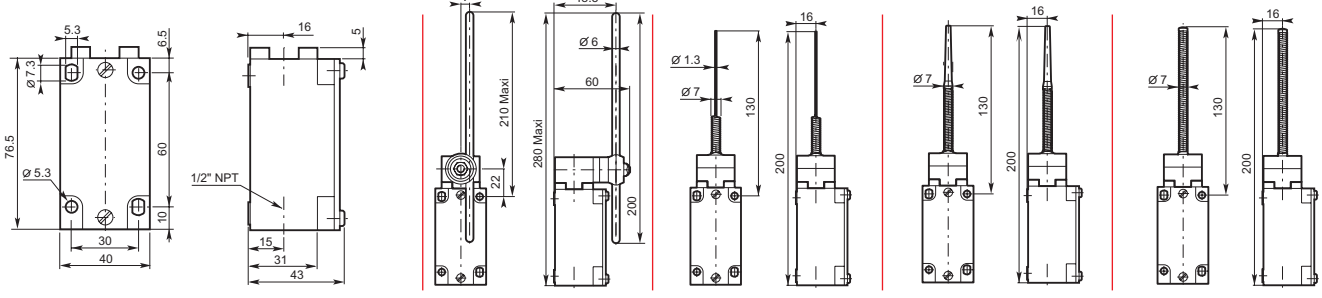



Operating head type

		Adjustable Ø 6 polyamide rod lever	Spring rod	Flexible rod with insulated end	Coil spring rod
Conformity / ⊕ (N.C. contact with positive opening operation)		EN 50 041			
Maximum actuation speed	m/s	1.5	1	1	1
Min. torque: - actuation	N.m	0.15	0.18	0.18	0.18
- positive opening operation	N.m	–	–	–	–

Snap action contacts 13 21 Zb 14 22	Catalog number	LS45M72B11	LS45M91B11	LS45M92B11	LS45M93B11
	List price	**$ 47**	**$ 41**	**$ 43**	**$ 42**
	Operation diagram	0 9° 21° 87° / 21-22 13-14 / 21-22 13-14	0 6° 14° 59° / 21-22 13-14 / 21-22 13-14	0 6° 14° 59° / 21-22 13-14 / 21-22 13-14	0 6° 14° 59° / 21-22 13-14 / 21-22 13-14
Non-overlapping Slow action contacts 13 21 Zb 14 22	Catalog number	LS45M72D11	LS45M91D11	LS45M92D11	LS45M93D11
	List price	**50**	**43**	**46**	**45**
	Operation diagram	0 16° 87° / 21-22 13-14 / 30°	0 12° 65° / 21-22 13-14 / 23°	0 12° 65° / 21-22 13-14 / 23°	0 12° 65° / 21-22 13-14 / 23°
Overlapping Slow action contacts 13 21 Zb 14 22	Catalog number	LS45M72C11	LS45M91C11	LS45M92C11	LS45M93C11
	List price	**52**	**45**	**47**	**47**
	Operation diagram	0 28° 87° / 21-22 13-14 / 16°	0 21° 65° / 21-22 13-14 / 12°	0 21° 65° / 21-22 13-14 / 12°	0 21° 65° / 21-22 13-14 / 12°
Slow action contacts 11 21 Zb 12 22	Catalog number	LS45M72L02	LS45M91L02	LS45M92L02	LS45M93L02
	List price	**52**	**45**	**47**	**47**
	Operation diagram	0 14° 87° / 11-12 21-22	0 11° 65° / 11-12 21-22	0 11° 65° / 11-12 21-22	0 11° 65° / 11-12 21-22
Slow action contacts 13 23 Zb ⊗ 14 24	Catalog number	LS45M72L20	LS45M91L20	LS45M92L20	LS45M93L20
	List price	**52**	**45**	**47**	**47**
	Operation diagram	0 14° 87° / 13-14 23-24	0 11° 65° / 13-14 23-24	0 11° 65° / 13-14 23-24	0 11° 65° / 13-14 23-24
Snap action contacts 11 21 Zb 12 22	Catalog number	LS45M72B02	LS45M91B02	LS45M92B02	LS45M93B02
	List price	**52**	**45**	**47**	**47**
	Operation diagram	0 9° 21° 87° / 11-12 21-22 / 11-12 21-22	0 6° 14° 59° / 11-12 21-22 / 11-12 21-22	0 6° 14° 59° / 11-12 21-22 / 11-12 21-22	0 6° 14° 59° / 11-12 21-22 / 11-12 21-22
Weight (packing per unit)	kg	0.285	0.235	0.235	0.235

Dimensions (mm)



Components
IP66, UL Type 4X
40mm

LS45M00B11


LSTE41


LSA40X54

LSC40XB11

Bodies with contact block for rectilinear or angular motion heads

LS 45 M 00 B 11

Limit Switch ..... **LS**

Casing width: 40 mm **4**

Cable inlet:
1 cable inlet for Pg 13.5 cable gland **0**
1 cable inlet M20 x 1.5 for ISO 20 cable gland **3**
1 cable inlet for 1/2" NPT **5**

Metal casing ..... **M**

Without operating head **00**

Contacts
11 .....**1** N.O. + **1** N.C. contacts
02 .....**2** N.C. contacts
20 .....**2** N.O. contacts

Snap action
B .....Zb Snap

Dependent (slow) action
L .....Zb Slow / Simultaneous
D .....Zb Non-overlapping late make
C .....Zb Overlapping early make

Operating heads

LS T E 41

Limit Switch ..... **LS**

Operating head ..... **T**

For Metal casing 40 mm or 60 mm width ..... **E**

References of heads:
11 ... 13 .....with rectilinear movement (plain plunger, steel ball plunger or roller plunger
21 ... 23 .....with rectilinear movement (with lateral plain or roller plunger)
31 ... 33 .....with rectilinear movement (with roller lever on steel plunger)
40 .....with angular movement (without actuator) actuator to be ordered separately
41 ... 44 .....with angular movement (roller lever)
50 .....with angular movement (without actuator)
51 ... 54 .....with angular movement (adjustable roller lever)
61, 62 .....flexible lever (spring)
71, 72, 73 ...adjustable lever (rod)
91 ... 93 .....multidirectional angular movement (spring rod)

Separate actuators (Roller lever, adjustable roller or rod levers, etc.)

LS A 40 X 54

Limit Switch ..... **LS**

Actuator (roller) ..... **A**

Casing width: 40 mm **40**

For casing:
M ..... **M**etal
P ..... **P**lastic
X ..... Plastic or metal

Reference of actuators:
41 ... 44 .....non-adjustable roller lever
51 ... 54 .....adjustable roller lever
61, 62 .....flexible lever (spring)
71, 72, 73 .....adjustable lever (rod)

Separate contact blocks

LS C 40 X B 11

Limit Switch ..... **LS**

Contact blocks ..... **C**

Casing width: 40 mm **40**

For casing:
Metal ..... **M**
Plastic ..... **P**
Plastic or metal ..... **X**

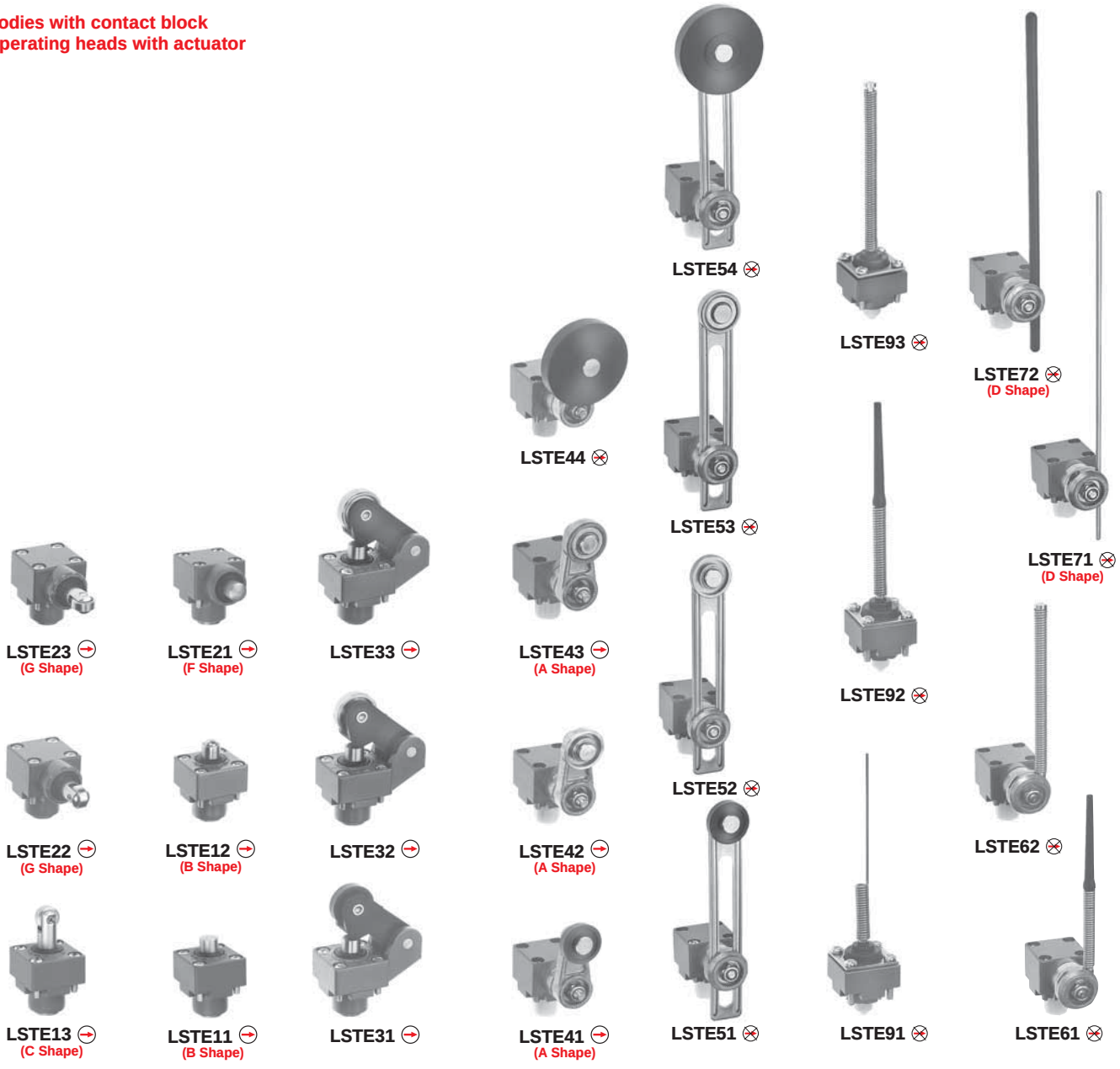
Contacts
11 .....**1** N.O. + **1** N.C. contacts
02 .....**2** N.C. contacts
20 .....**2** N.O. contacts

Snap action:
B .....Zb Snap

Dependent (slow) action:
L .....Zb Slow / Simultaneous
D .....Zb Non-overlapping late make
C .....Zb Overlapping early make

Components
IP66, UL Type 4X
40mm

- **Bodies with contact block**
- **Operating heads with actuator**



LSTE... rectilinear motion heads

- To be actuated from end. With plunger (plain, lateral plain or ball): LSTE11, LSTE12 and LSTE21.
- To be actuated by 30° cam translation.
  With roller plunger: LSTE13, LSTE22 and LSTE23.
- To be actuated unidirectionally by 30° cam translation.
  With roller lever on stainless steel plunger:
  LSTE31 ... LSTE33.

LSTE... angular motion heads

- To be actuated by 30° cam translation.
  With roller lever: LSTE41 ... LSTE54.
- To be actuated by fully directional translation movement.
  With rod or spring lever: LSTE61 ... LSTE72.
- To be actuated multidirectionally.
  With spring rod: LSTE91 ... LSTE93.

Bodies with contact block

⊖ LS45M00B11, LS45M00D11, LS45M00C11, LS45M00L02, LS45M00B02

⊗ LS45M00L20

⊖ : Suitable for positive opening operation (IEC 60947-5-1 and EN 50041).

Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with ⊖ are fitted.

Components
IP66, UL Type 4X
40mm

- **Bodies with contact blocks**
- **Angular motion heads (without actuator)**
- **Separate actuators**
- **Separate contact blocks**

LSA40X44 ⊗

LSA40X43 →

LSA40X42 →

LSA40X41 →

LSA40X54 ⊗

LSA40X53 ⊗

LSA40X71 ⊗

LSA40X72 ⊗

LSA40X52 ⊗

LSA40X62 ⊗

LSA40X51 ⊗

LSA40X61 ⊗

Roller levers

LSTE40 →

LSTE40 angular motion head
For roller levers (non-adustable)
LSA40X41 ... LSA40X44

Adjustable or flexible levers

LSTE50 ⊗

LSTE50 angular motion head
For flexible or adjustable levers LSA40X51 ... LSA40X54, LSA40X61, LSA40X62, LSA40X71 and LSA40X72.

Bodies with contact block

→ LS45M00B11, LS45M00D11, LS45M00C11, LS45M00L02, LS45M00B02

⊗ LS45M00L20

Contact blocks

→ LSC40XB11, LSC40XD11, LSC40XC11, LSC40XL02, LSC40XB02

⊗ LSC40XL20

→ : Suitable for positive opening operation (IEC 60947-5-1)
Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with → are fitted.

Components
IP66, UL Type 4X
40mm

"N.C." contact with positive opening operation or element (subassembly, head, lever) suitable for positive opening operation.

Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with ⊖ are fitted.


LS40M00B11


LSTE11


LSTE21


LSTE13


LSTE22


LSTE32

Contact blocks Zb Zb Zb Zb Zb Zb B11 D11 C11 L02 L20 B02	Positive opening operation	Actuation speed max. m/s	Unit weight kg (1 pc)	Catalog number	List price
Bodies with contact block for rectilinear or angular motion heads					
1	⊖	—	0.168	LS45M00B11	**$ 28**
1	⊖	—	0.168	LS45M00D11	**29**
1	⊖	—	0.168	LS45M00C11	**30**
1	⊖	—	0.168	LS45M00L02	**30**
1	⊗	—	0.168	LS45M00L20	**30**
1	⊖	—	0.168	LS45M00B02	**30**
Rectilinear motion heads with actuator					
To be actuated from end					
Stainless steel plain plunger	⊖	0.5	0.077	LSTE11	**14**
Stainless steel ball plunger	⊖	0.5	0.076	LSTE12	**17**
Stainless steel lateral plain plunger	⊖	0.5	0.093	LSTE21	**17**
To be actuated by 30° cam					
Stainless steel roller plunger	⊖	0.5	0.084	LSTE13	**20**
Stainless steel lateral plunger with vertical roller	⊖	0.5	0.098	LSTE22	**21**
Stainless steel lateral plunger with horizontal roller	⊖	0.5	0.098	LSTE23	**21**
To be actuated unidirectionally by 30° cam					
ø 22mm polyamide roller lever on stainless steel plunger	⊖	1.5	0.111	LSTE31	**19**
ø 22mm stainless steel roller lever on stainless steel plunger	⊖	1.5	0.121	LSTE32	**26**
ø 22mm steel ball-bearing roller lever on stainless steel plunger	⊖	1.5	0.122	LSTE33	**21**

Components
IP66, UL Type 4X
40mm

⊕ "N.C." contact with positive opening operation or element (subassembly, head, lever) suitable for positive opening operation.

Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with ⊕ are fitted.

LSTE41

LSTE52

LSTE72 LSTE91

LSTE40

LSA40X41

	Positive opening operation	Actuation speed max. m/s	Unit weight kg (1 pc)	Catalog number	List price
Angular motion heads with actuator					
To be actuated by 30° cam					
ø 22mm polyamide roller lever ①	⊕	1.5	0.134	LSTE41	**$ 26**
ø 22mm stainless steel roller lever ①	⊕	1.5	0.142	LSTE42	**34**
ø 22mm steel ball-bearing roller lever ①	⊕	1.5	0.145	LSTE43	**29**
ø 45mm rubber roller lever ①	⊗	1.5	0.162	LSTE44	**28**
ø 22mm adjustable polyamide roller lever ①	⊗	1.5	0.152	LSTE51	**27**
ø 22mm adjustable stainless steel roller lever ①	⊗	1.5	0.161	LSTE52	**35**
ø 22mm adjustable steel ball-bearing roller lever ①	⊗	1.5	0.163	LSTE53	**31**
ø 45mm adjustable rubber roller lever ①	⊗	1.5	0.168	LSTE54	**29**
To be actuated by fully directional translation movement					
Stainless steel flexible lever with insulated end ①	⊗	1	0.145	LSTE61	**29**
Stainless steel coil spring lever ①	⊗	1	0.152	LSTE62	**29**
ø 3mm stainless steel rod lever, 195mm ①	⊗	1	0.150	LSTE71	**26**
ø 6mm polyamide rod lever, 195mm ①	⊗	1	0.145	LSTE72	**26**
ø 6mm fiberglass rod lever, 195mm ①	⊗	1	0.149	LSTE73	**27**
Multidirectional angular motion heads (to be actuated by fully directional translation movement)					
Stainless steel spring rod	⊗	1	0.066	LSTE91	**17**
Stainless steel flexible rod with insulated end	⊗	1	0.068	LSTE92	**19**
Stainless steel coil spring rod	⊗	1	0.075	LSTE93	**18**
Angular motion head without actuator, for non-adjustable roller levers (delivered with M5 nylstop nut)					
	⊕	1.5	0.102	LSTE40	**20**
Actuators for angular motion head LSTE40					
ø 22mm polyamide roller lever ①	⊕	—	0.032	LSA40X41	**6**
ø 22mm stainless steel roller lever ①	⊕	—	0.042	LSA40X42	**14**
ø 22mm steel ball-bearing roller lever ①	⊕	—	0.044	LSA40X43	**9**
ø 45mm rubber roller lever ①	⊗	—	0.050	LSA40X44	**8**

① Free position adjustment of lever 9° by 9° over 360°

⊖ "N.C." contact with positive opening operation or element (subassembly, head, lever) suitable for positive opening operation.

Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with ⊖ are fitted.

LSTE41

LSTE52

LSTE72 LSTE91

LSTE40

LSA40X41

	Positive opening operation	Actuation speed max. m/s	Unit weight kg (1 pc)	Catalog number	List price
Angular motion heads with actuator					
To be actuated by 30° cam					
ø 22mm polyamide roller lever ①	⊖	1.5	0.134	LSTE41	**$ 26**
ø 22mm stainless steel roller lever ①	⊖	1.5	0.142	LSTE42	**34**
ø 22mm steel ball-bearing roller lever ①	⊖	1.5	0.145	LSTE43	**29**
ø 45mm rubber roller lever ①	⊗	1.5	0.162	LSTE44	**28**
ø 22mm adjustable polyamide roller lever ①	⊗	1.5	0.152	LSTE51	**27**
ø 22mm adjustable stainless steel roller lever ①	⊗	1.5	0.161	LSTE52	**35**
ø 22mm adjustable steel ball-bearing roller lever ①	⊗	1.5	0.163	LSTE53	**31**
ø 45mm adjustable rubber roller lever ①	⊗	1.5	0.168	LSTE54	**29**
To be actuated by fully directional translation movement					
Stainless steel flexible lever with insulated end ①	⊗	1	0.145	LSTE61	**29**
Stainless steel coil spring lever ①	⊗	1	0.152	LSTE62	**29**
ø 3mm stainless steel rod lever, 195mm ①	⊗	1	0.150	LSTE71	**26**
ø 6mm polyamide rod lever, 195mm ①	⊗	1	0.145	LSTE72	**26**
ø 6mm fiberglass rod lever, 195mm ①	⊗	1	0.149	LSTE73	**27**
Multidirectional angular motion heads (to be actuated by fully directional translation movement)					
Stainless steel spring rod	⊗	1	0.066	LSTE91	**17**
Stainless steel flexible rod with insulated end	⊗	1	0.068	LSTE92	**19**
Stainless steel coil spring rod	⊗	1	0.075	LSTE93	**18**
Angular motion head without actuator, for non-adjustable roller levers (delivered with M5 nylstop nut)					
	⊖	1.5	0.102	LSTE40	**20**
Actuators for angular motion head LSTE40					
ø 22mm polyamide roller lever ①	⊖	—	0.032	LSA40X41	**6**
ø 22mm stainless steel roller lever ①	⊖	—	0.042	LSA40X42	**14**
ø 22mm steel ball-bearing roller lever ①	⊖	—	0.044	LSA40X43	**9**
ø 45mm rubber roller lever ①	⊗	—	0.050	LSA40X44	**8**

① Free position adjustment of lever 9° by 9° over 360°

Components
IP66, UL Type 4X
40mm

⊖ "N.C." contact with positive opening operation or element (subassembly, head, lever) suitable for positive opening operation.

Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with ⊖ are fitted.

LSTE50

LSA40X52

LSA40X71

LSA40X61

LSC40XB11

	Positive opening operation	Actuation speed max. m/s	Unit weight kg (1 pc)	Catalog number	List price
Angular motion head without actuator, for flexible or adjustable levers (delivered with M5 nylstop nut & adaptation parts)					
	⊗	1 - 1.5 ②	0.121	LSTE50	**$ 22**
Actuators for angular motion head LSTE50					
ø 22mm adjustable polyamide roller lever ①	⊗	—	0.023	LSA40X51	**5**
ø 22mm adjustable stainless steel roller lever ①	⊗	—	0.032	LSA40X52	**13**
ø 22mm adjustable steel ball-bearing roller lever ①	⊗	—	0.034	LSA40X53	**9**
ø 45mm adjustable rubber roller lever ①	⊗	—	0.039	LSA40X54	**7**
Stainless steel flexible lever with insulated end ①	⊗	—	0.017	LSA40X61	**7**
Stainless steel coil spring lever ①	⊗	—	0.023	LSA40X62	**7**
ø 3mm adjustable stainless steel rod lever, 195mm ①	⊗	—	0.014	LSA40X71	**4**
ø 6mm adjustable polyamide rod lever, 195mm ①	⊗	—	0.010	LSA40X72	**4**
ø 6mm adjustable fiberglass rod lever, 195mm ①	⊗	—	0.014	LSA40X73	**5**
Contact blocks (with adaptor)					
1 NC & 1 NO 2-pole snap action	⊖	—	0.032	LSC40XB11	**15**
1 NC & 1 NO 2-pole non-overlapping slow action	⊖	—	0.032	LSC40XD11	**15**
1 NO & 1 NC 2-pole overlapping slow action	⊖	—	0.032	LSC40XC11	**17**
2 NC 2-pole simultaneous slow action	⊖	—	0.032	LSC40XL02	**17**
2 NO 2-pole simultaneous slow action	⊗	—	0.032	LSC40XL20	**17**
Bipolar 2 NC 2-pole snap action	⊖	—	0.032	LSC40XB02	**17**

① Free position adjustment of lever 9° by 9° over 360°
② According to lever.

Assembled
IP66, UL Type 4X
60mm

Movement to be detected

On end

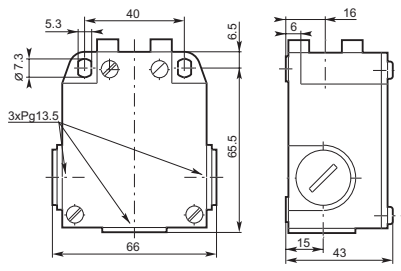


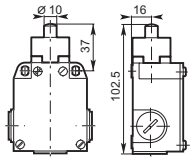
Operating head type

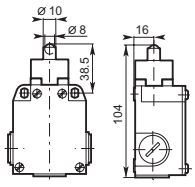
		Stainless steel plain plunger	Stainless steel ball plunger	Stainless steel lateral plain plunger
Conformity / ⊖ (N.C. contact with positive opening operation)				
Maximum actuation speed	m/s	0.5	0.5	0.5
Min. force: - actuation	N	22	22	30
- positive opening operation	N	66	66	70

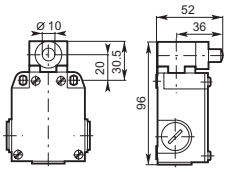
Snap action contacts 13 21 Zb 14 22	Catalog number List price	LS65M11B11 **$ 40**	LS65M12B11 **$ 42**	LS65M21B11 **$ 42**
	Operation diagram	0 0.8 1.9 4.5 6.5 mm 21-22 13-14 21-22 13-14	0 0.8 1.9 4.5 6.5 mm 21-22 13-14 21-22 13-14	0 0.9 2.1 4.9 7.1 mm 21-22 13-14 21-22 13-14
Non-overlapping Slow action contacts 13 21 Zb 14 22	Catalog number List price	LS65M11D11 **43**	LS65M12D11 **45**	LS65M21D11 **45**
	Operation diagram	0 1.5 2.9 6.5 mm 21-22 13-14 2.7	0 1.5 2.9 6.5 mm 21-22 13-14 2.7	0 1.8 3.5 7.9 mm 21-22 13-14 3.2
Overlapping Slow action contacts 13 21 Zb 14 22	Catalog number List price	LS65M11C11 **44**	LS65M12C11 **47**	LS65M21C11 **47**
	Operation diagram	0 2.6 4.0 6.5 mm 21-22 13-14 1.5	0 2.6 4.0 6.5 mm 21-22 13-14 1.5	0 3.2 4.9 7.9 mm 21-22 13-14 1.8
Slow action contacts 11 21 Zb 12 22	Catalog number List price	LS65M11L02 **44**	LS65M12L02 **47**	LS65M21L02 **47**
	Operation diagram	0 1.3 2.7 6.5 mm 11-12 21-22	0 1.3 2.7 6.5 mm 11-12 21-22	0 1.6 3.3 7.9 mm 11-12 21-22
Slow action contacts 13 23 Zb ⊗ 14 24	Catalog number List price	LS65M11L20 **44**	LS65M12L20 **47**	LS65M21L20 **47**
	Operation diagram	0 1.3 6.5 mm 13-14 23-24	0 1.3 6.5 mm 13-14 23-24	0 1.6 7.9 mm 13-14 23-24
Snap action contacts 11 21 Zb 12 22	Catalog number List price	LS65M11B02 **44**	LS65M12B02 **47**	LS65M21B02 **47**
	Operation diagram	0 0.8 1.9 4.5 6.5 mm 11-12 21-22 11-12 21-22	0 0.8 1.9 4.5 6.5 mm 11-12 21-22 11-12 21-22	0 0.9 2.1 4.9 7.1 mm 11-12 21-22 11-12 21-22
Weight (packing per unit)	kg	0.265	0.265	0.280

Dimensions (mm)





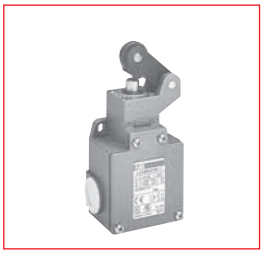
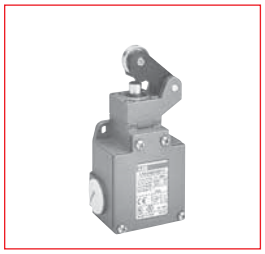




Assembled
IP66, UL Type 4X
60mm

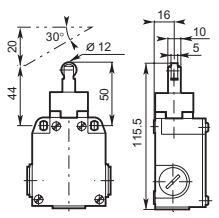
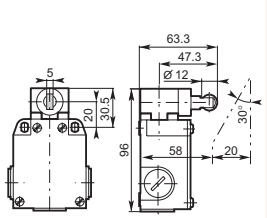
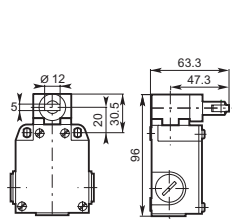
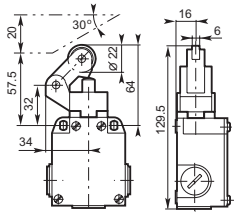
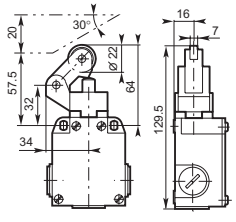
30° Cam translation movement



Stainless steel roller plunger	Lateral plunger with vertical roller	Lateral plunger with horizontal roller	ø 22 Polyamide roller lever	ø 22 Stainless steel roller lever
0.5 16 48	0.5 30 70	0.5 30 70	1.5 12 40	1.5 12 40
LS65M13B11 **$ 46**	LS65M22B11 **$ 47**	LS65M23B11 **$ 47**	LS65M31B11 **$ 44**	LS65M32B11 **$ 51**
LS65M13D11 **49**	LS65M22D11 **50**	LS65M23D11 **50**	LS65M31D11 **47**	LS65M32D11 **55**
LS65M13C11 **51**	LS65M22C11 **52**	LS65M23C11 **52**	LS65M31C11 **49**	LS65M32C11 **57**
LS65M13L02 **51**	LS65M22L02 **52**	LS65M23L02 **52**	LS65M31L02 **49**	LS65M32L02 **57**
LS65M13L20 **51**	LS65M22L20 **52**	LS65M23L20 **52**	LS65M31L20 **49**	LS65M32L20 **57**
LS65M13B02 **51**	LS65M22B02 **52**	LS65M23B02 **52**	LS65M31B02 **49**	LS65M32B02 **57**
0.270	0.280	0.280	0.290	0.300

Dimensions (mm)

Assembled
IP66, UL Type 4X
60mm

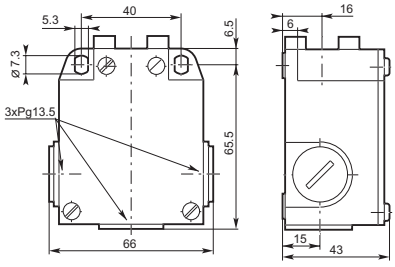
Movement to be detected

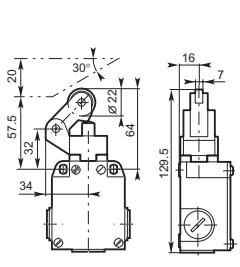
Unidirectional	30° Cam translation movement	
		

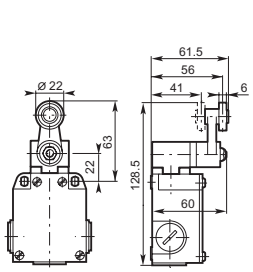
Operating head type

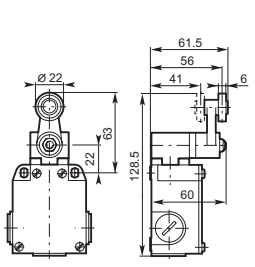
		Ball-bearing roller lever	ø 22 Polyamide roller lever	ø 22 Stainless steel roller lever
Conformity / ⊖ (N.C. contact with positive opening operation)				
Maximum actuation speed	m/s	1.5	1.5	1.5
Min. force/torque: - actuation		12 N	0.15 N.m	0.15 N.m
- positive opening operation		40 N	0.44 N.m	0.44 N.m
Snap action contacts	Catalog number	LS65M33B11	LS65M41B11	LS65M42B11
	List price	**$ 47**	**$ 51**	**$ 58**
13 21 Zb 14 22	Operation diagram	0 1.9 4.6 10.9 15.8 mm; 21-22 13-14; 21-22 13-14	0 9° 21° 50° 87°; 21-22 13-14; 21-22 13-14	0 9° 21° 50° 87°; 21-22 13-14; 21-22 13-14
Non-overlapping Slow action contacts	Catalog number	LS65M33D11	LS65M41D11	LS65M42D11
	List price	**51**	**55**	**63**
13 21 Zb 14 22	Operation diagram	0 3.0 5.8 13.0 mm; 21-22 13-14; 5.4	0 16° 31° 87°; 21-22 13-14; 30°	0 16° 31° 87°; 21-22 13-14; 30°
Overlapping Slow action contacts	Catalog number	LS65M33C11	LS65M41C11	LS65M42C11
	List price	**52**	**57**	**65**
13 21 Zb 14 22	Operation diagram	0 5.2 8.0 13.0 mm; 21-22 13-14; 3.0	0 28° 45° 87°; 21-22 13-14; 16°	0 28° 45° 87°; 21-22 13-14; 16°
Slow action contacts	Catalog number	LS65M33L02	LS65M41L02	LS65M42L02
	List price	**52**	**57**	**65**
11 21 Zb 12 22	Operation diagram	0 2.6 5.4 13.0 mm; 11-12 21-22	0 14° 29° 87°; 11-12 21-22	0 14° 29° 87°; 11-12 21-22
Slow action contacts	Catalog number	LS65M33L20	LS65M41L20	LS65M42L20
	List price	**52**	**57**	**65**
13 23 Zb ⊗ 14 24	Operation diagram	0 2.6 13.0 mm; 13-14 23-24	0 14° 87°; 13-14 23-24	0 14° 87°; 13-14 23-24
Snap action contacts	Catalog number	LS65M33B02	LS65M41B02	LS65M42B02
	List price	**52**	**57**	**65**
11 21 Zb 12 22	Operation diagram	0 1.9 4.6 10.9 15.8 mm; 11-12 21-22; 11-12 21-22	0 9° 21° 50° 87°; 11-12 21-22; 11-12 21-22	0 9° 21° 50° 87°; 11-12 21-22; 11-12 21-22
Weight (packing per unit)	kg	0.300	0.300	0.305

Dimensions (mm)



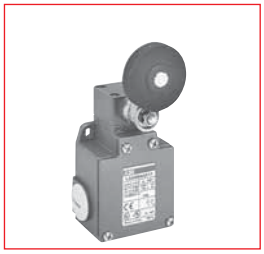






Assembled
IP66, UL Type 4X
60mm

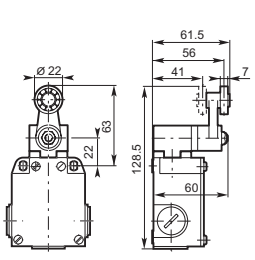
30° Cam translation movement

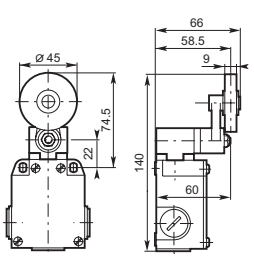



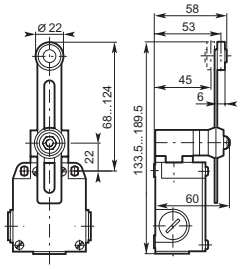

ø 22 Ball-bearing roller lever	ø 45 Rubber roller lever	Adjustable ø 22 polyamide roller lever	Adjustable ø 22 stainless steel roller lever	Adjustable ø 22 stainless steel ball-bearing roller lever
1.5	1.5	1.5	1.5	1.5
0.15 N.m	0.15 N.m	0.15 N.m	0.15 N.m	0.15 N.m
0.44 N.m	–	–	–	–

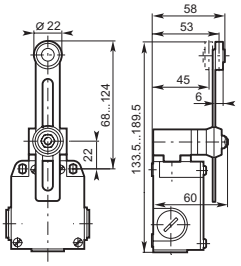
9

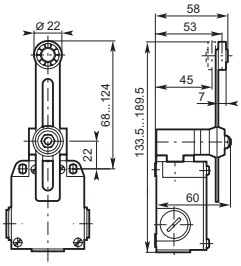
LS65M43B11 **$ 54**	LS65M44B11 **$ 53**	LS65M51B11 **$ 53**	LS65M52B11 **$ 60**	LS65M53B11 **$ 56**
LS65M43D11 **58**	LS65M44D11 **56**	LS65M51D11 **57**	LS65M52D11 **65**	LS65M53D11 **60**
LS65M43C11 **60**	LS65M44C11 **58**	LS65M51C11 **59**	LS65M52C11 **67**	LS65M53C11 **62**
LS65M43L02 **60**	LS65M44L02 **58**	LS65M51L02 **59**	LS65M52L02 **67**	LS65M53L02 **62**
LS65M43L20 **60**	LS65M44L20 **58**	LS65M51L20 **59**	LS65M52L20 **67**	LS65M53L20 **62**
LS65M43B02 **60**	LS65M44B02 **58**	LS65M51B02 **59**	LS65M52B02 **67**	LS65M53B02 **62**
0.305	0.330	0.315	0.325	0.325











Assembled
IP66, UL Type 4X
60mm

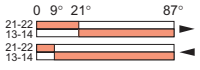
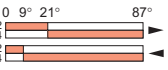
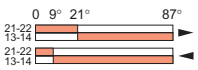
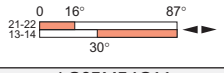
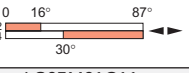
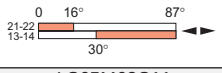
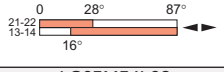
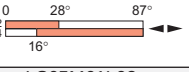
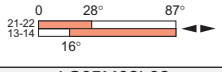
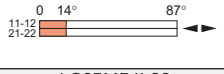
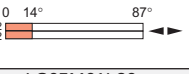
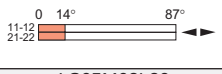
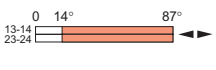
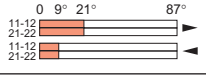
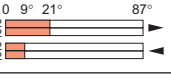
Movement to be detected

30° Cam (cont.)

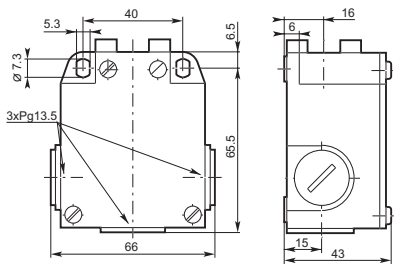
Fully directional translation movement

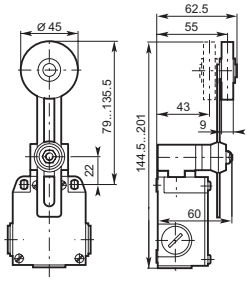
Operating head type

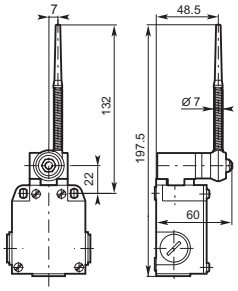
		Adjustable ø 45 rubber roller lever	Flexible lever with insulated end	Coil spring lever
Conformity / ⊖ (N.C. contact with positive opening operation)				
Maximum actuation speed	m/s	1.5	1.5	1.5
Min. torque: - actuation	N.m	0.15	0.15	0.15
- positive opening operation	N.m	–	–	–

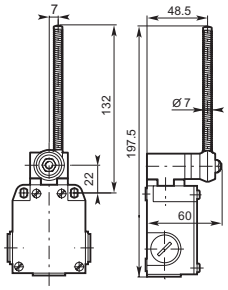
Snap action contacts 13 21 / 14 22 Zb	Catalog number	LS65M54B11	LS65M61B11	LS65M62B11
	List price	**$ 54**	**$ 52**	**$ 51**
	Operation diagram			
Non-overlapping Slow action contacts 13 21 / 14 22 Zb	Catalog number	LS65M54D11	LS65M61D11	LS65M62D11
	List price	**58**	**55**	**55**
	Operation diagram			
Overlapping Slow action contacts 13 21 / 14 22 Zb	Catalog number	LS65M54C11	LS65M61C11	LS65M62C11
	List price	**60**	**57**	**57**
	Operation diagram			
Slow action contacts 11 21 / 12 22 Zb	Catalog number	LS65M54L02	LS65M61L02	LS65M62L02
	List price	**60**	**57**	**57**
	Operation diagram			
Slow action contacts 13 23 / 14 24 Zb	Catalog number	LS65M54L20	LS65M61L20	LS65M62L20
	List price	**60**	**57**	**57**
	Operation diagram			
Snap action contacts 11 21 / 12 22 Zb	Catalog number	LS65M54B02	LS65M61B02	LS65M62B02
	List price	**60**	**57**	**57**
	Operation diagram			
Weight (packing per unit)	kg	0.335	0.320	0.325

Dimensions (mm)



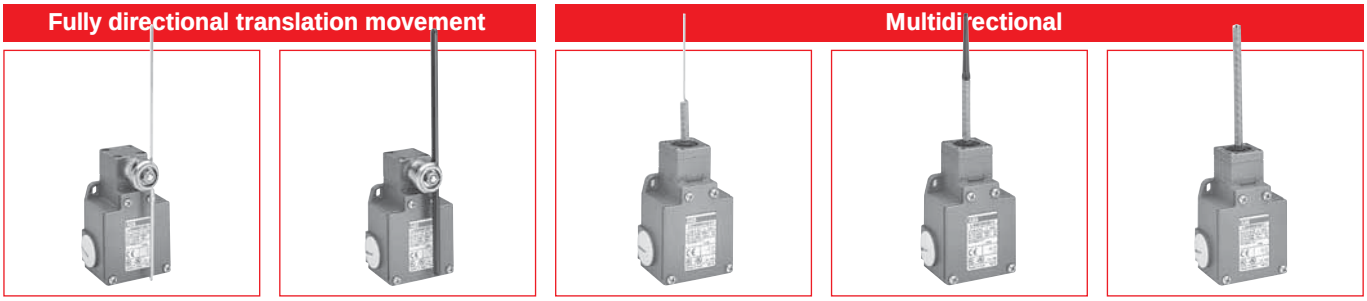




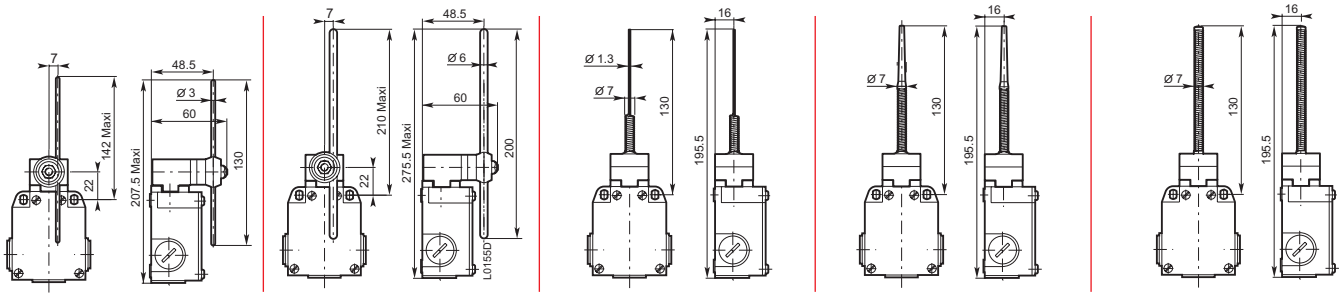


Assembled
IP66, UL Type 4X
60mm

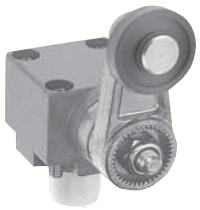
Fully directional translation movement | **Multidirectional**



Adjustable ø 3 stainless steel rod lever	Adjustable ø 6 polyamide rod lever	Spring rod	Flexible rod with insulated end	Coil spring rod
1.5 0.15 –	1 0.15 –	1 0.18 –	1 0.18 –	1 0.18 –
LS65M71B11 **$ 49**	LS65M72B11 **$ 49**	LS65M91B11 **$ 42**	LS65M92B11 **$ 44**	LS65M93B11 **$ 44**
LS65M71D11 **53**	LS65M72D11 **52**	LS65M91D11 **45**	LS65M92D11 **47**	LS65M93D11 **47**
LS65M71C11 **54**	LS65M72C11 **54**	LS65M91C11 **47**	LS65M92C11 **49**	LS65M93C11 **48**
LS65M71L02 **54**	LS65M72L02 **54**	LS65M91L02 **47**	LS65M92L02 **49**	LS65M93L02 **48**
LS65M71L20 **54**	LS65M72L20 **54**	LS65M91L20 **47**	LS65M92L20 **49**	LS65M93L20 **48**
LS65M71B02 **54**	LS65M72B02 **54**	LS65M91B02 **47**	LS65M92B02 **49**	LS65M93B02 **48**
0.315	0.315	0.255	0.260	0.255

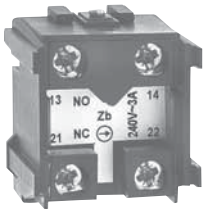


LS65M00B11



LSTE41

LSA40X51



LSC40XD11

Bodies with contact block for rectilinear or angular motion heads

LS 65 M 00 B11

Limit Switch ..... **LS**

Casing width: 60 mm **6**

Cable inlet:
3 cable inlets for Pg 13.5 cable gland **0**
3 cable inlets M20 x 1.5 for ISO 20 cable gland **3**
3 cable inlets for 1/2" NPT **5**

Metal casing ..... **M**

Without operating head **00**

Contacts
11 .....**1** N.O. + **1** N.C. contacts
02 .....**2** N.C. contacts
20 .....**2** N.O. contacts

Snap action:
B .....Zb Snap

Dependent (slow) action:
L .....Zb Slow / Simultaneous
D .....Zb Non-overlapping late make
C .....Zb Overlapping early make

Operating heads

LS T E 41

Limit Switch ..... **LS**

Operating head ..... **T**

For Metal casing: 40 mm or 60 mm width ..... **E**

References of heads:
11 ... 13 .....with rectilinear movement (plain plunger, steel .....ball plunger and roller plunger
21 ... 23 .....with rectilinear movement (with lateral plain or .....roller plunger)
31 ... 33 .....with rectilinear movement (with roller lever on steel .....plunger)
40 .....with angular movement (without actuator) actuator .....to be ordered separately
41 ... 44 .....with angular movement (roller lever)
50 .....with angular movement (without actuator)
51 ... 54 .....with angular movement (adjustable roller lever)
61, 62 .....flexible lever (spring)
71, 72, 73 ...adjustable lever (rod)
91 ... 93 .....multidirectional angular movement (spring rod)

Separate actuators (Roller lever, adjustable roller or rod levers, etc.)

LS A 40 X 51

Limit Switch ..... **LS**

Actuator (roller) ..... **A**

Casing width: 40 mm **40**
The reference 40 is common to all casings (LS40P, LS40M and LS60M)

For casing:
M ..... Metal
P ..... Plastic
X ..... Plastic or metal

Reference of actuators:
41 ... 44 .....non-adjustable roller lever
51 ... 54 .....adjustable roller lever
61, 62 .....flexible lever (spring)
71, 72, 73 .....adjustable lever (rod)

Separate contact blocks

LS C 40 X D 11

Limit Switch ..... **LS**

Contact blocks ..... **C**

Casing width: 40 mm **40**
The reference 40 is common to all casings (LS40P, LS40M and LS60M)

For casing:
Metal ..... **M**
Plastic ..... **P**
Plastic or metal ..... **X**

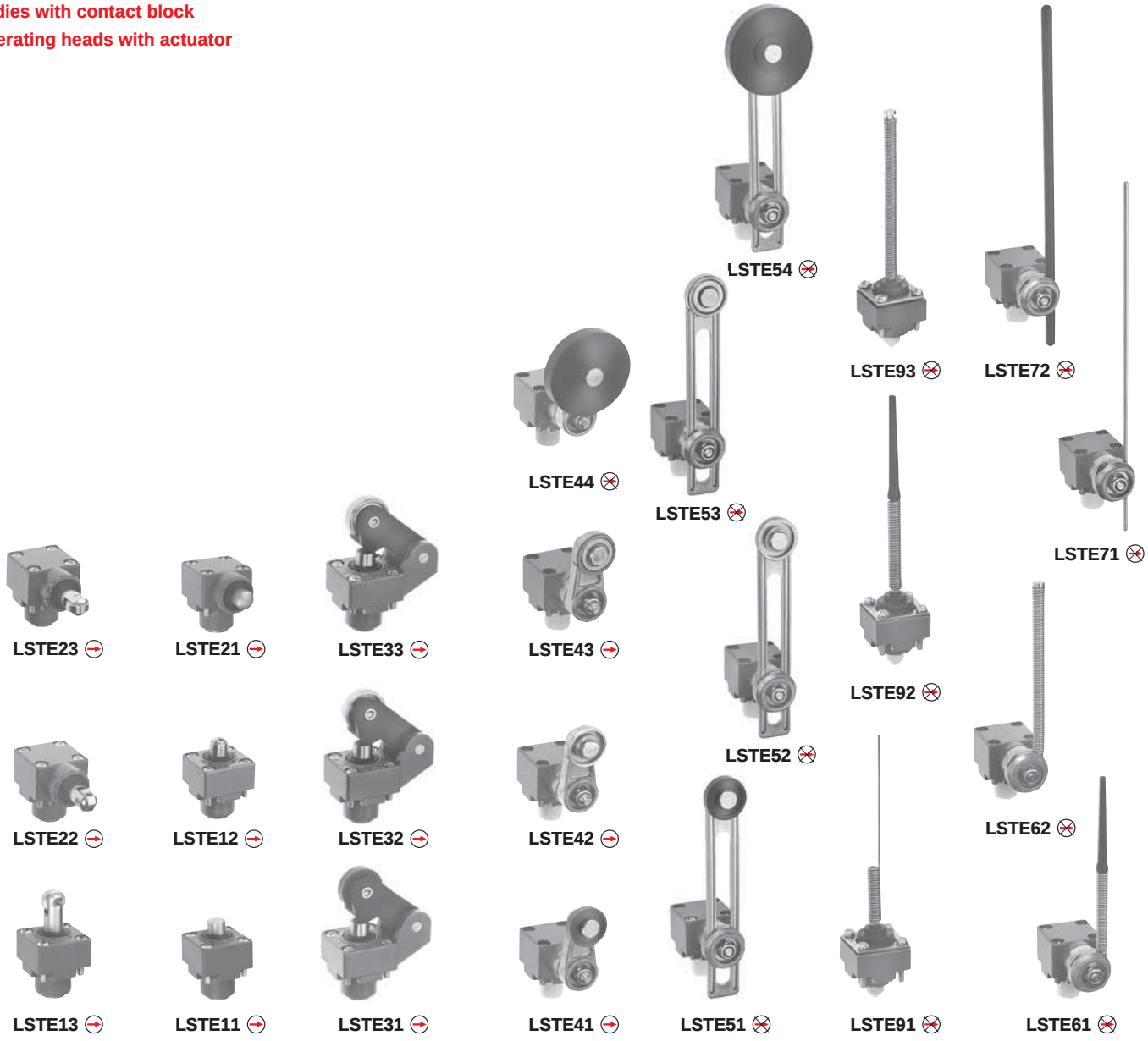
Contacts
11 .....**1** N.O. + **1** N.C. contacts
02 .....**2** N.C. contacts
20 .....**2** N.O. contacts

Snap action:
B .....Zb Snap

Dependent (slow) action:
L .....Zb Slow / Simultaneous
D .....Zb Non-overlapping late make
C .....Zb Overlapping early make

Components
IP66, UL Type 4X
60mm

- **Bodies with contact block**
- **Operating heads with actuator**



LSTE... rectilinear motion heads

- To be actuated from end. With plunger (plain, lateral plain or ball): LSTE11, LSTE12 and LSTE21.
- To be actuated by 30° cam translation. With roller plunger: LSTE13, LSTE22 and LSTE23.
- To be actuated unidirectionally by 30° cam translation. With roller lever on stainless steel plunger: LSTE31 ... LSTE33.

LSTE... angular motion heads

- To be actuated by 30° cam translation. With roller lever: LSTE41 ... LSTE54.
- To be actuated by fully directional translation movement. With rod or spring lever: LSTE61 ... LSTE72.
- To be actuated multidirectionally. With spring rod: LSTE91 ... LSTE93.

Bodies with contact block

→	LS65M00B11, LS65M00D11, LS65M00C11, LS65M00L02, LS65M00B02
⊗	LS65M00L20

→: Suitable for positive opening operation (IEC 60947-5-1).

Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with → are fitted.

Components
IP66, UL Type 4X
60mm

- **Bodies with contact blocks**
- **Angular motion heads (without actuator)**
- **Separate actuators**
- **Separate contact blocks**

LSA40X44 ⊗

LSA40X43 ⊖

LSA40X42 ⊖

LSA40X41 ⊖

LSA40X54 ⊗

LSA40X53 ⊗

LSA40X52 ⊗

LSA40X51 ⊗

LSA40X72 ⊗

LSA40X71 ⊗

LSA40X62 ⊗

LSA40X61 ⊗

Roller levers

LSTE40 ⊖

Adjustable or flexible levers

LSTE50 ⊗

LSTE50 angular motion head
For flexible or adjustable levers LSA40X51 ... LSA40X54, LSA40X61, LSA40X62, LSA40X71 and LSA40X72.

LSTE40 angular motion head
For roller levers (non-adustable)
LSA40X41 ... LSA40X44

Bodies with contact block

⊖	LS65M00B11, LS65M00D11, LS65M00C11, LS65M00L02, LS65M00B02
⊗	LS65M00L20

Contact blocks

⊖	LSC40XB11, LSC40XD11, LSC40XC11, LSC40XL02, LSC40XB02
⊗	LSC40XL20

⊖ : Suitable for positive opening operation (IEC 60947-5-1)
Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with ⊖ are fitted.

Components
IP66, UL Type 4X
60mm

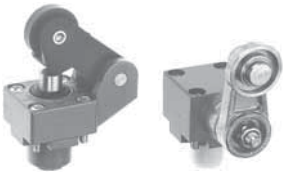
"N.C." contact with positive opening operation or element (subassembly, head, lever) suitable for positive opening operation.

Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with ⊖ are fitted.

LS60M00B11

LSTE11 LSTE13

LSTE12 LSTE23



LSTE31 LSTE42

LSTE54 LSTE52

Contact blocks B11	D11	C11	L02	L20	B02	Positive opening operation	Actuation speed max. m/s	Unit weight kg (1 pc)	Catalog number	List price
Bodies with contact block for rectilinear or angular motion heads										
1						⊖	—	0.198	LS65M00B11	**$ 30**
	1					⊖	—	0.198	LS65M00D11	**31**
		1				⊖	—	0.198	LS65M00C11	**32**
			1			⊖	—	0.198	LS65M00L02	**32**
				1		⊗	—	0.198	LS65M00L20	**32**
					1	⊖	—	0.198	LS65M00B02	**32**
Rectilinear motion heads										
To be actuated from end										
Stainless steel plain plunger						⊖	0.5	0.077	LSTE11	**14**
Stainless steel ball plunger						⊖	0.5	0.076	LSTE12	**17**
Stainless steel lateral plain plunger						⊖	0.5	0.093	LSTE21	**17**
To be actuated by 30° cam										
Stainless steel roller plunger						⊖	0.5	0.084	LSTE13	**20**
Stainless steel lateral plunger with vertical roller						⊖	0.5	0.098	LSTE22	**21**
Stainless steel lateral plunger with horizontal roller						⊖	0.5	0.098	LSTE23	**21**
To be actuated unidirectionally by 30° cam										
ø 22mm polyamide roller lever on stainless steel plunger						⊖	1.5	0.111	LSTE31	**19**
ø 22mm stainless steel roller lever on stainless steel plunger						⊖	1.5	0.121	LSTE32	**26**
ø 22mm steel ball-bearing roller lever on stainless steel plunger						⊖	1.5	0.122	LSTE33	**21**
Angular motion heads with actuator										
To be actuated by 30° cam										
ø 22mm polyamide roller lever ①						⊖	1.5	0.134	LSTE41	**26**
ø 22mm stainless steel roller lever ①						⊖	1.5	0.142	LSTE42	**34**
ø 22mm steel ball-bearing roller lever ①						⊖	1.5	0.145	LSTE43	**29**
ø 45mm rubber roller lever ①						⊗	1.5	0.162	LSTE44	**28**
ø 22mm adjustable polyamide roller lever ①						⊗	1.5	0.152	LSTE51	**27**
ø 22mm adjustable stainless steel roller lever ①						⊗	1.5	0.161	LSTE52	**35**
ø 22mm steel ball-bearing roller lever ①						⊗	1.5	0.163	LSTE53	**31**
ø 45mm adjustable rubber roller lever ①						⊗	1.5	0.168	LSTE54	**29**

① Free position adjustment of lever 9° by 9° over 360°.

Components
IP66, UL Type 4X
60mm

"N.C." contact with positive opening operation or element (subassembly, head, lever) suitable for positive opening operation.

Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with ⊖ are fitted.


LSTE61


LSTE71


LSTE93


LSTE40


LSA40X42


LSTE50


LSA40X53


LSA40X62

Contact blocks Zb Zb Zb Zb Zb Zb B11 D11 C11 L02 L20 B02	Positive opening operation	Actuation speed max. m/s	Unit weight kg (1 pc)	Catalog number	List price
To be actuated by fully directional translation movement					
Stainless steel flexible lever with insulated end ①	⊖	1	0.145	LSTE61	**$ 29**
Stainless steel coil spring lever ①	⊖	1	0.152	LSTE62	**29**
ø 3mm adjustable stainless steel rod lever, 195mm ①	⊖	1	0.150	LSTE71	**26**
ø 3mm adjustable polyamide rod lever, 195mm ①	⊖	1	0.145	LSTE72	**26**
ø 6mm adjustable fiberglass rod lever, 195mm ①	⊖	1	0.149	LSTE73	**27**
Multidirectional angular motion head (to be actuated by fully directional translation movement)					
Stainless steel spring rod	⊗	1	0.066	LSTE91	**17**
Stainless steel flexible rod with insulated end	⊗	1	0.068	LSTE92	**19**
Stainless steel coil spring rod	⊗	1	0.075	LSTE93	**18**
Angular motion head without actuator, for non-adjustable roller levers (delivered with M5 nylstop nut)					
	⊖	1.5	0.102	LSTE40	**20**
Actuator for angular motion head LSTE40					
ø 22mm polyamide roller lever ①	⊖	—	0.032	LSA40X41	**6**
ø 22mm stainless steel roller lever ①	⊖	—	0.042	LSA40X42	**14**
ø 22mm steel ball-bearing roller lever ①	⊖	—	0.044	LSA40X43	**9**
ø 45mm rubber roller lever ①	⊗	—	0.050	LSA40X44	**8**
Angular motion head without actuator for flexible or adjustable levers (delivered with M5 nylstop nut & adaptation parts)					
	⊗	1 - 1.5 ②	0.121	LSTE50	**22**
Actuators for angular motion head LSTE50					
ø 22mm adjustable polyamide roller lever ①	⊗	—	0.023	LSA40X51	**5**
ø 22mm adjustable stainless steel roller lever ①	⊗	—	0.032	LSA40X52	**13**
ø 45mm adjustable steel ball-bearing roller lever ①	⊗	—	0.034	LSA40X53	**9**
ø 45mm adjustable rubber roller lever ①	⊗	—	0.039	LSA40X54	**7**
Stainless steel flexible lever with insulated end ①	⊗	—	0.017	LSA40X61	**7**
Stainless steel coil spring lever ①	⊗	—	0.023	LSA40X62	**7**
ø 3mm adjustable stainless steel rod lever, 195mm ①	⊗	—	0.014	LSA40X71	**4**
ø 6mm adjustable polyamide rod lever, 195mm ①	⊗	—	0.010	LSA40X72	**4**
ø 6mm adjustable fiberglass rod lever, 195mm ①	⊗	—	0.014	LSA40X73	**5**

① Free position adjustment of lever 9° by 9° over 360°.
② According to lever.

Components
IP66, UL Type 4X
60mm

⊖ "N.C." contact with positive opening operation or element (subassembly, head, lever) suitable for positive opening operation.

Warning! The positive opening operation of limit switch is only guaranteed if the elements noted with ⊖ are fitted.

LSC40XB11

Contact blocks Zb Zb Zb Zb Zb Zb B11 D11 C11 L02 L20 B02	Positive opening operation	Actuation speed max. m/s	Unit weight kg (1 pc)	Catalog number	List price
Contact blocks (with adaptor)					
1 NC & 1 NO 2-pole snap action	⊖	—	0.032	LSC40XB11	**$ 15**
1 NC & 1 NO 2-pole non-overlapping slow action	⊖	—	0.032	LSC40XD11	**15**
1 NO & 1 NC 2-pole overlapping slow action	⊖	—	0.032	LSC40XC11	**17**
2 NC 2-pole simultaneous slow action	⊖	—	0.032	LSC40XL02	**17**
2 NO 2-pole simultaneous slow action	⊗	—	0.032	LSC40XL20	**17**
2 NC 2-pole snap action	⊖	—	0.032	LSC40XB02	**17**

① Free position adjustment of lever 9° by 9° over 360°.

Technical data
IP 65, UL Type 4

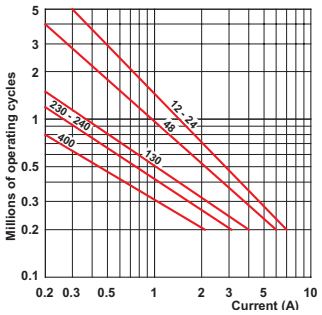
General technical data

Standards		Devices conform with international IEC 947-5-1 and European EN 60 947-5-1 standards
Certifications - Approvals		UL & CSA
Air temperature near the device (IEC) – during operation – for storage	 °C °C	 – 25 ... + 70 – 30 ... + 80
Climatic withstand		According to IEC 68-2-3 and salty mist according to IEC 68-2-11
Mounting positions		All positions are authorized
Shock withstand (according to IEC 68-2-27 and EN 60 068-2-27)		50g ① (1/2 sinusoidal shock for 11 ms) no change in contact position
Resistance to vibrations (acc. to IEC 68-2-6 and EN 60 068-2-6)		25g (10 – 500 Hz) no change in position of contacts greater than 100 µs
Protection against electrical shocks (acc. to IEC 536)		Class I
Degree of protection		UL Type 4X & IP 66
Consistency (measured over 1 million operations)		0.05 mm (upon closing point)
Minimum actuation speed	m/s	Slow action contacts 0.060 / Snap action contacts 0.001

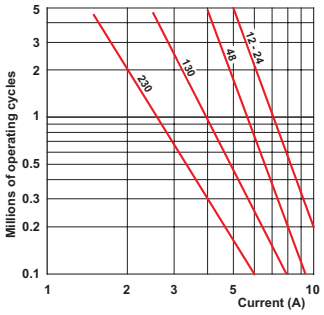
Electrical Data

Rated insulation voltage U_i - according to IEC 947-1 and EN 60-947-1 - according to UL 508 and CSA C22-2 n° 14			 500 V (degree of pollution 3) A 600, Q 600
Rated impulse withstand voltage U_{imp} (according to IEC 947-1 and EN 60 947-1)		kV	6
Conventional free air thermal current I_{th} (according to IEC 947-5-1) q ≤ 40 °C		A	10
Short-circuit protection U_e ≤ 500 V a.c. - gG (gl) type fuses		A	10
Rated operational current I_e / AC-15 (according to IEC 947-5-1)	 24 V - 50/60 Hz 130 V - 50/60 Hz 230 V - 50/60 Hz 240 V - 50/60 Hz 400 V - 50/60 Hz	 A A A A A	 10 5.5 3.1 3 1.8
I_e / DC-13 (according to IEC 947-5-1)	24 V - d.c. 110 V - d.c. 250 V - d.c.	A A A	2.8 0.6 0.27
Switching frequency		Cycles/h	3600
Load factor			0.5
Resistance between contacts		mW	25
Connecting terminals			M3.5 (+, –) pozidriv 2 screw with cable clamp
Terminal for protective conductor			M3.5 (+, –) pozidriv 2 screw with cable clamp
Connecting capacity		1 or 2 x mm^2	0.5 ... 2.5
Terminal marking			According to EN 50 013
Mechanical durability		Millions of operations	30, 25, 10 } LS { 40, 60 } M { 11– 13; 21 – 23; 31 – 33; 41 – 44; 51 – 54; 61 – 72; 91 – 93
Electrical durability (according to IEC 947-5-1)			Utilization categories AC-15 and DC-13 (Load factor of 0.5 according to curves below)

AC-15 — Snap action



AC-15 — Slow action



DC-13		Snap action	Slow action
		Power breaking for a durability of 5 million operating cycles	
Voltage	24 V	9.5 W	12 W
Voltage	48 V	6.8 W	9 W
Voltage	110 V	3.6 W	6 W

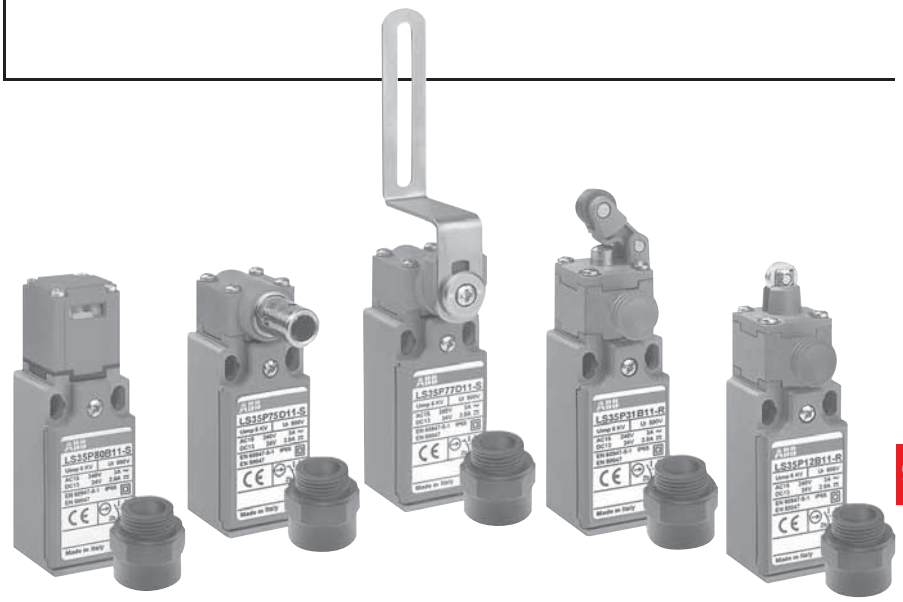
① except for LS30/31/35 (P42): 25g

Notes

Safety

Limit switches

Safety limit switches
Latch key
Rotative axis
Latch & manual reset



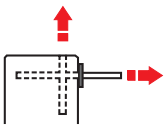
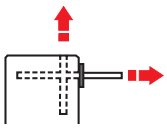
Description of Red Safety Range

30mm limit switches for safety applications, conforming to the IEC/EN 60947-5-1, EN1088 and EN954-1 standards, are available with a red casing in three types:

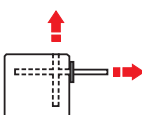
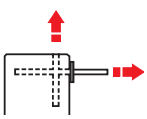
- **Latch key** – The key being straight or with a right angle, with or without shock absorber.
- **Stainless steel rotative axis** – Some limit switches come with a flush mounting lever. They offer double insulation with plastic casing (UL Type 4 (IP65)) and mechanical positive drive.
- **Latch & manual reset range** – These models offer double insulation with a grey plastic casing (UL type 4 (IP65)). Available actuators include plunger, roller plunger, roller lever on plunger and rotary lever.

Selection guide
IP65, UL Type 4
30mm Plastic casing

30mm width — LS35P

CENELEC conformity	LS35P80...-S	LS35P81...-S
Actuating device and actuation type	Translation with small latch (key) and adjustable head	Translation with small latch (key) and pivoting head
		
Positive contact opening		

30mm width — LS35P

CENELEC conformity	LS35P80...-S	LS35P81...-S
Actuating device and actuation type	Galvanized steel rotative axis	Stainless steel rotative axis
		
Positive contact opening		

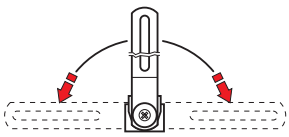
Selection guide
IP65, UL Type 4
30mm Plastic casing

30mm width — LS35P

CENELEC conformity	LSA30P03	LSA30P04	LSA30P05	LSA30P06	LSA30P07	LSA30P08	LSA30P09
	Right angle key	Straight key	Right angle key	Straight key	Right angle key shock absorber	Straight key shock absorber	Adjustable angle key
	22mm	22mm	13mm	13mm	15mm	15mm	40mm

30mm width — LS35P

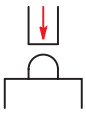
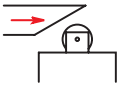
CENELEC conformity	LS35P77...-S
Actuating device and actuation type	Galvanized steel flush mounting right angle lever



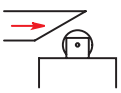
Positive contact opening	

Selection guide
IP65, UL Type 4, latch & manual reset
30mm Plastic casing

30mm width — LS35P

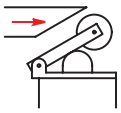
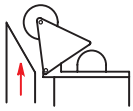
	LS35P11...-R	LS35P12...-R
CENELEC conformity		
Actuating device and actuation type	Galvanized steel plain plunger	Galvanized steel roller plunger
		
Positive contact opening		

30mm width — LS35P

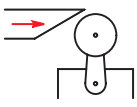
	LS35P13...-R
CENELEC conformity	
Actuating device and actuation type	Galvanized steel plain plunger
	
Positive contact opening	

Selection guide
IP65, UL Type 4, latch & manual reset
30mm Plastic casing

30mm width — LS35P

CENELEC conformity	LS35P31...-R	LS35P12...-R
Actuating device and actuation type	Plastic roller on galvanized steel plunger	Plastic roller lever on galvanized steel plunger
		
Positive contact opening	⊖	⊖

30mm width — LS35P

CENELEC conformity	LS35P13...-R
Actuating device and actuation type	Galvanized steel plain plunger
	
Positive contact opening	⊖

Notes

Latch key safety limit switches

Description

Safety limit switches with small latch (key), made of fibre-glass reinforced UL-V0 thermoplastic material, offer double insulation and a degree of protection IP65. They are equipped with 1 N.C. + 1 N.O. or 2 N.C. contact blocks with dependent action and positive opening operation of the "N.C." contact(s).

Applications

Easy to use, the limit switches with small latch (key) offer specific qualities:

- Visible operation.
- Capability for strong current switching (conventional thermal current 10 A).
- Opening guaranteed of the "N.C." contact(s) when the small latch is withdrawn from the limit switch.
- Contact blocks with dependent action and positive opening operation of the "N.C." normally closed contact(s) (symbol ⊖).
- Electrically separated contacts (Zb shape).
- Precision on operation positions (consistency).
- Immunity to electromagnetic disturbances.

These specific features make the limit switches ideal for monitoring and protection of industrial machines without inertia in which downtime is less than access time to the dangerous area. Use on sliding or pivoting protectors (covers, cases, doors, grids, etc.).

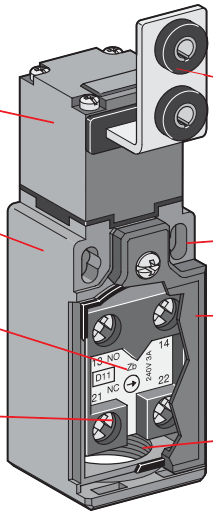
- They contribute to protection of operators working on dangerous machines, by opening the control circuit. Withdrawal of the small latch (key) by opening the mobile protector causes immediate stopping of the machine drive.
- Associated with other standard limit switches and safety switching devices, they produce automatic control circuits meeting standard EN 954-1.
- They comply with the requirements of European Directives (Low Voltage, Machines and Electromagnetic Compatibility) and are conform to European and international standards.

2 operating head options:
- Adjustable every 90° (4 x ø 3 screws with (+,-) pozidriv 1 head)
- Pivoting from 0° to 360° (1 x M3 screw with Phillips head No. 1)

Casing
- 30 mm wide with standardised dimensions corresponding to EN 50047

Blocks of 2 contacts
- Contact configuration: 1 N.O. + 1 N.C. or 2 N.C.
- Positive opening operation ⊖
- Contact dependent action
- Zb shape: the 2 contacts are electrically separated

Connecting terminals
- M3.5 screw with (+,-) posidriv 2 head
- Screw heads with captive cable clamps
- Marking conform to IEC 60947-1, IEC 60947-5-1, EN 50005 and EN 50013 standards



7 small latch (key) options to be ordered separately:
- Right angle key (13 or 22 mm fixing)
- Straight key (13 or 22 mm fixing)
- Straight key or right angle key with shock absorber
- Adjustable right angle key

Casing fixing
- 2 x M4 screws in the top part

Cover
- Closure by 1 x ø 3 screw with (+,-) pozidriv 1 head
  Gasket made in one part to prevent tightness breaks

Electrical connection in various options:
- 1 x Pg 13.5 cable gland for LS30P
- 1 x Pg 11 cable gland for LS31P
- 1 x 1/2" NPT adaptor delivered not mounted for LS35P

Catalog explanation

Example : **LS 35 P 80 D11 – S**

Limit Switch ..... LS

Casing width: 30 mm 3

Cable inlet:
1 cable inlet for Pg 13.5 cable gland 0
1 cable inlet for Pg 11 cable gland 1
1 x 1/2" NPT (adaptor) cable inlet 5

Plastic casing ..... P

Operating heads:
Adjustable every 90° 80
Continuously pivoting from 0° to 360° 81

Snap action:
B ..... Zb Snap

Dependent (slow) action:
L ..... Zb Slow / Simultaneous
D ..... Zb Non-overlapping late make
C ..... Zb Overlapping early make

Contact types:
11 ..... 1 N.O. + 1 N.C. contacts
02 ..... 2 N.C. contacts

S ..... Safety device

Latch key safety limit switches
30mm

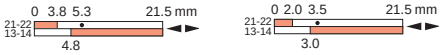
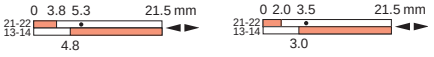
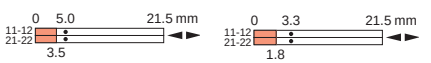
Movement to be detected

Small Latch (Key), Front or Vertical Translation



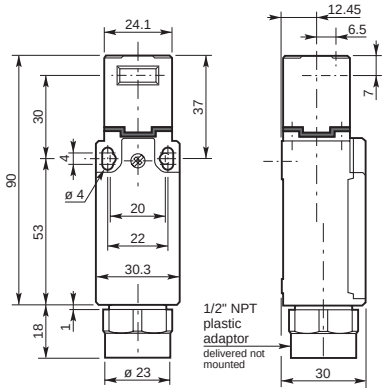

Casing

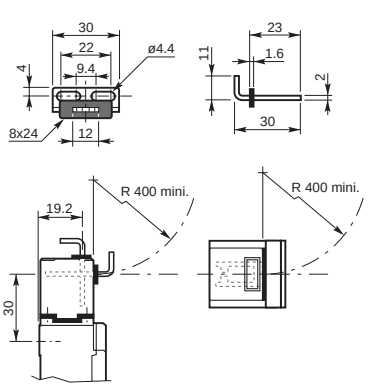
- Plastic
- 30 mm width
- Degree of protection IP65

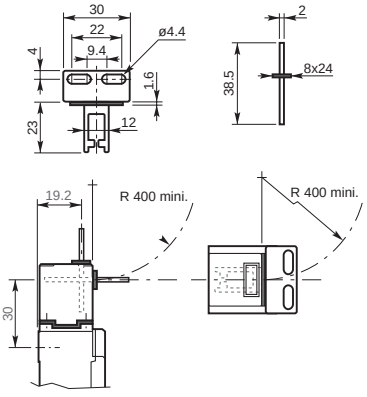
Actuator		**Right angle key** (22 mm mounting)	**Straight key** (22 mm mounting)
NC contact with positive opening operation		⊖	⊖
Actuation speed: maximal / minimal	m/s	0.5 / 0.01	0.5 / 0.01
Min. force: – for insertion of the key	N	15	15
– for extraction of the key	N	10	10
– positive opening operation	N	30	30
Non-overlapping slow action contacts 	Catalog number	LS35P80D11-S	LS35P80D11-S
	List price	**$ 43**	**$ 43**
	Operation diagram		
Overlapping slow action contacts 	Catalog number	LS35P80C11-S	LS35P80C11-S
	List price	**43**	**43**
	Operation diagram		
Simultaneous slow action contacts 	Catalog number	LS35P80L02-S	LS35P80L02-S
	List price	**43**	**43**
	Operation diagram		
Weight with 1/2" NPT adaptor (packing per unit) kg		0.087	0.087
Small Latch (Key)			
To order separately	Catalog number	LSA30P03	LSA30P04
	List price	**5**	**5**
Weight (packing per unit) kg		0.009	0.009

Accessories, special contact arrangement or particular function: please consult us.

Dimensions (in mm)





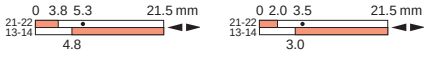
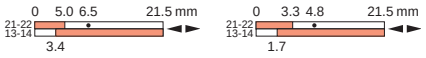
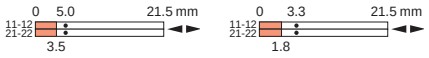
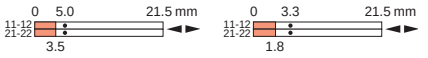
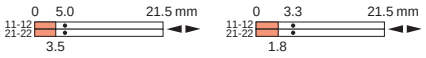


Latch key safety limit switches
30mm

Small latch (key), front or vertical translation

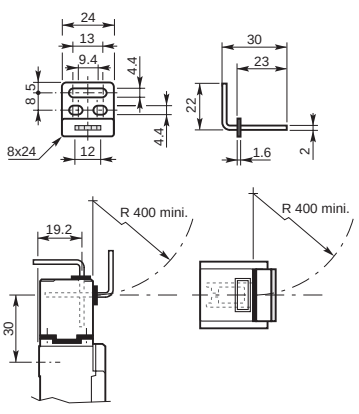


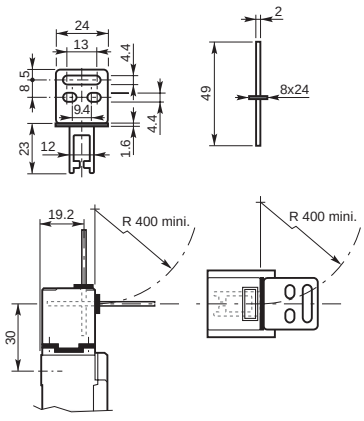


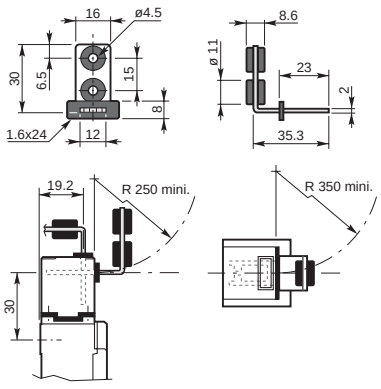

Right angle key (13mm mounting)	**Straight key** (13mm mounting)	**Right angle key with shock absorber**
0.5 / 0.01 15 10 30	0.5 / 0.01 15 10 30	0.5 / 0.01 15 10 30
LS35P80D11-S **$ 43**	LS35P80D11-S **$ 43**	LS35P80D11-S **$ 43**
		
LS35P80C11-S **43**	LS35P80C11-S **43**	LS35P80C11-S **43**
		
LS35P80L02-S **43**	LS35P80L02-S **43**	LS35P80L02-S **43**
		
0.087	0.011	0.014
LSA30P05 **5**	LSA30P06 **5**	LSA30P07 **9**
0.011	0.011	0.014

Accessories, special contact arrangement or particular function: please consult us.

Dimensions (in mm)



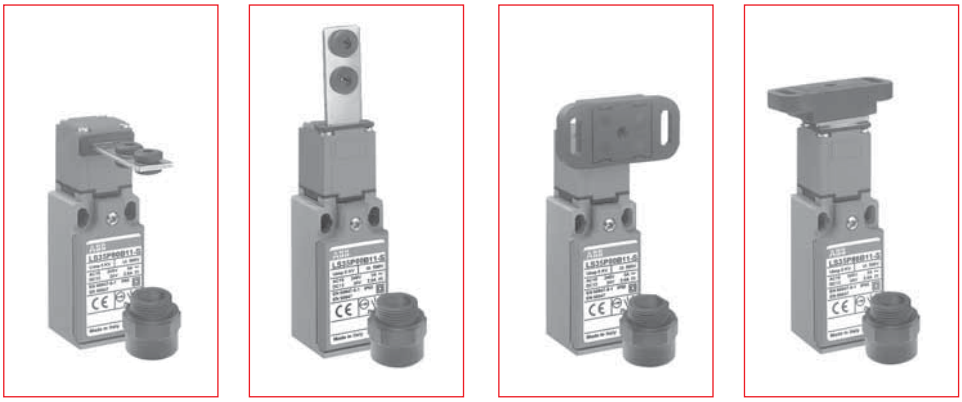




Latch key safety limit switches
30mm

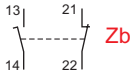
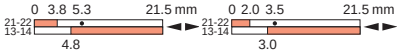
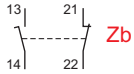
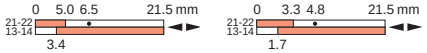
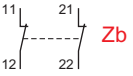
Movement to be detected

Small Latch (Key), Front or Vertical Translation



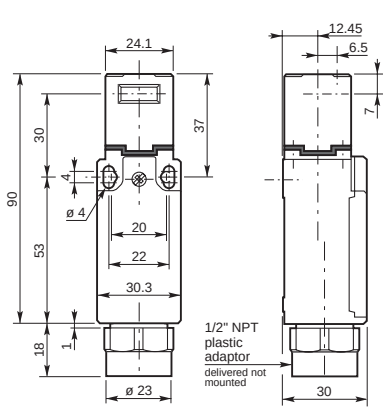
Casing

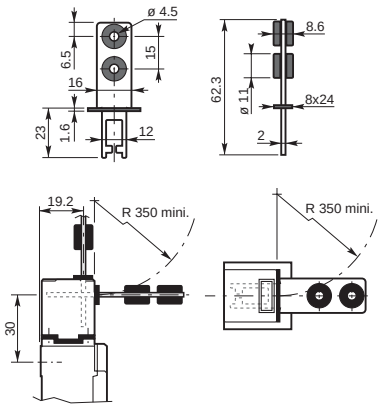
- Plastic
- 30 mm width
- Degree of protection IP65

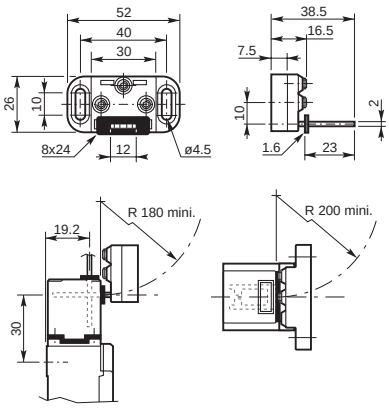
Actuator		**Right angle key** (22 mm mounting)	**Straight key** (22 mm mounting)
NC contact with positive opening operation		⊖→	⊖→
Actuation speed: maximal / minimal	m/s	0.5 / 0.01	0.5 / 0.01
Min. force: – for insertion of the key	N	15	15
– for extraction of the key	N	10	10
– positive opening operation	N	30	30
Non-overlapping slow action contacts	Catalog number	LS35P80D11-S	LS35P80D11-S
	List price	**$ 43**	**$ 43**
	Operation diagram		
Overlapping slow action contacts	Catalog number	LS35P80C11-S	LS35P80C11-S
	List price	**43**	**43**
	Operation diagram		
Simultaneous slow action contacts	Catalog number	LS35P80L02-S	LS35P80L02-S
	List price	**43**	**43**
	Operation diagram		
Weight with 1/2" NPT adaptor (packing per unit)	kg	0.087	0.087
Small Latch (Key)			
To order separately	Catalog number	LSA30P08	LSA30P09
	List price	**9**	**11**
Weight (packing per unit)	kg	0.014	0.022

Accessories, special contact arrangement or particular function: please consult us.

Dimensions (in mm)







Notes

Latch key safety limit switches
30mm

Movement to be detected

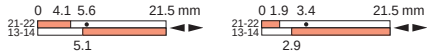
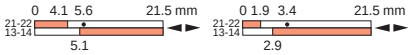
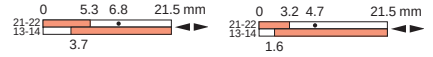
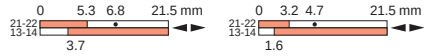
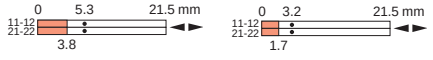
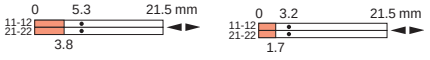
Small Latch (Key), Front or Vertical Translation




Casing

- Plastic
- 30 mm width
- Degree of protection IP65

Actuator

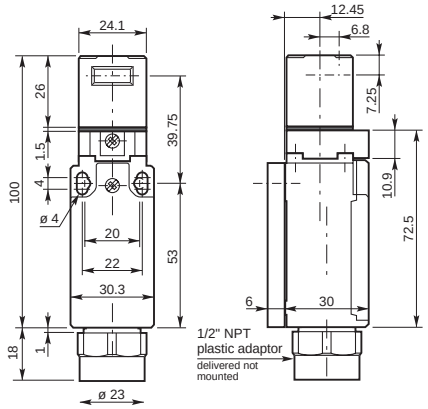
			Right angle key (22 mm mounting)	**Straight key** (22 mm mounting)
"N.C." contact with positive opening operation			⊖	⊖
Actuation speed: maximal / minimal		m/s	0.5 / 0.01	0.5 / 0.01
Min. force: – for insertion of the key		N	15	15
– for extraction of the key		N	10	10
– positive opening operation		N	30	30
Non-overlapping slow action contacts 13 21 Zb 14 22	Catalog number		LS35P81D11-S	LS35P81D11-S
	List price		**$ 52**	**$ 52**
	Operation diagram			
Overlapping slow action contacts 13 21 Zb 14 22	Catalog number		LS35P81C11-S	LS35P81C11-S
	List price		**52**	**52**
	Operation diagram			
Simultaneous slow action contacts 11 21 Zb 12 22	Catalog number		LS35P81L02-S	LS35P81L02-S
	List price		**52**	**52**
	Operation diagram			
Weight with 1/2" NPT adaptor (packing per unit)		kg	0.097	0.097

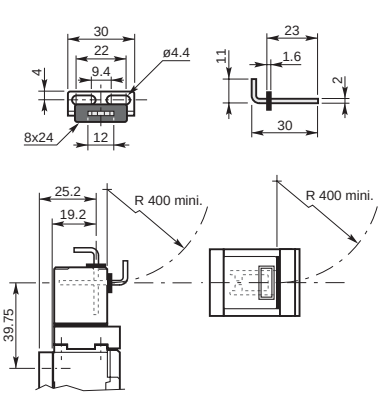
Small Latch (Key)

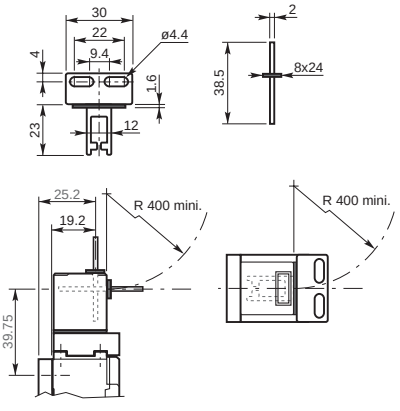
To order separately	Catalog number		LSA30P03	LSA30P04
	List price		**5**	**5**
Weight (packing per unit)		kg	0.009	0.009

Accessories, special contact arrangement or particular function: please consult us.

Dimensions (in mm)

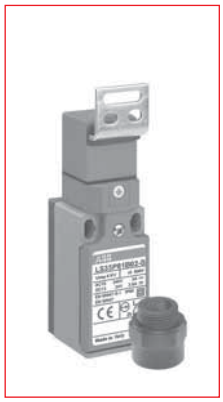
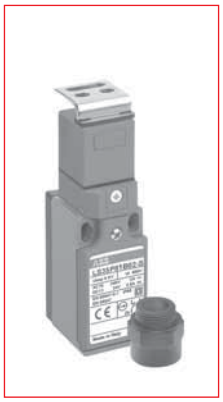


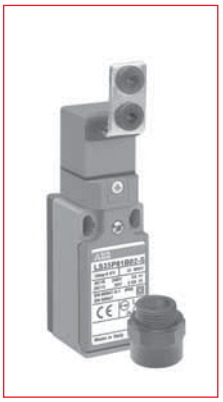


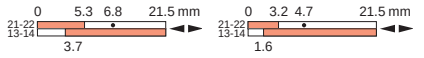
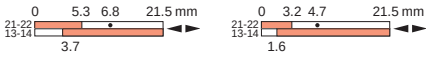
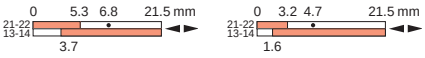
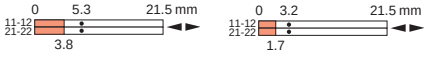
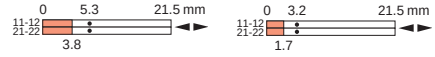


Latch key safety limit switches
30mm

Small Latch (Key), Front or Vertical Translation

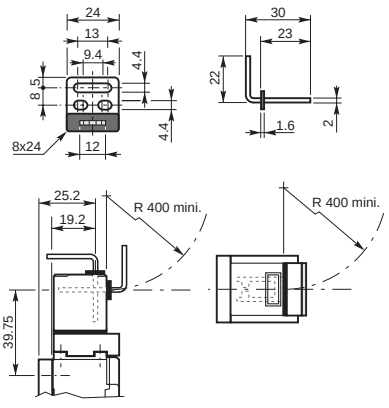



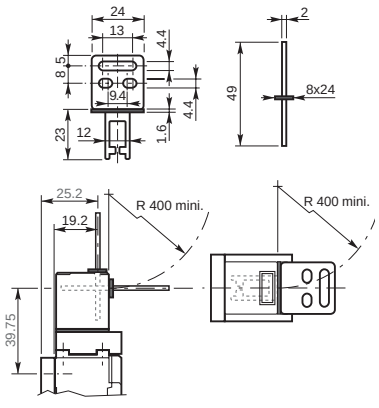



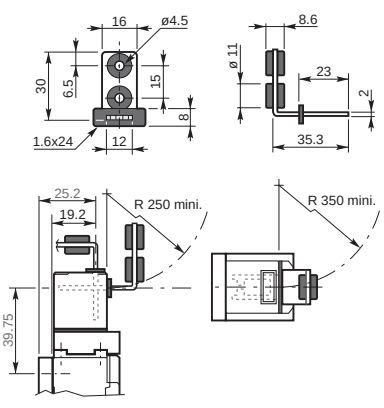

Right angle key (13 mm fixing)	Straight key (13 mm fixing)	Right angle key with shock absorber
0.5 / 0.01 15 10 30	0.5 / 0.01 15 10 30	0.5 / 0.01 15 10 30
LS35P81D11-S **$ 52**	LS35P81D11-S **$ 52**	LS35P81D11-S **$ 52**
		
LS35P81C11-S **52**	LS35P81C11-S **52**	LS35P81C11-S **52**
		
LS35P81L02-S **52**	LS35P81L02-S **52**	LS35P81L02-S **52**
		
0.097	0.097	0.097
LSA30P05 **5**	LSA30P06 **5**	LSA30P07 **9**
0.011	0.011	0.014

Accessories, special contact arrangement or particular function: please consult us.

Dimensions (in mm)







Latch key safety limit switches
30mm

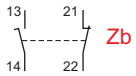
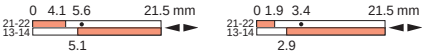
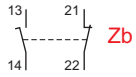
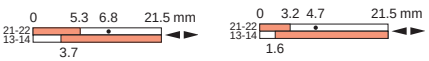
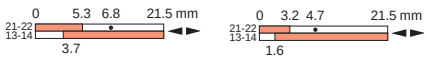
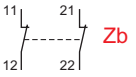
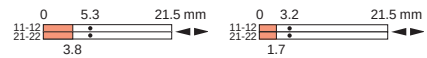
Movement to be detected

Small Latch (Key), Front or Vertical Translation



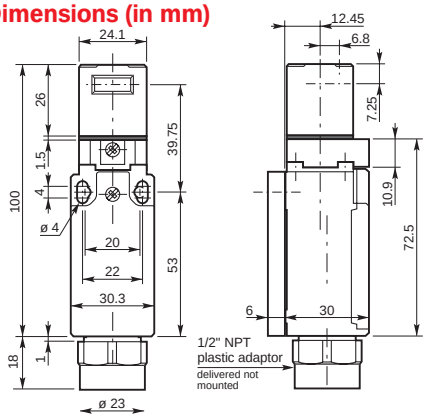

Casing

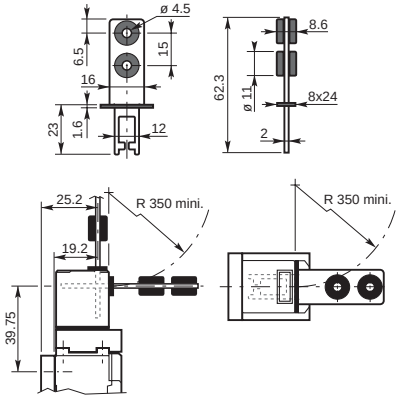
- Plastic
- 30 mm width
- Degree of protection IP65

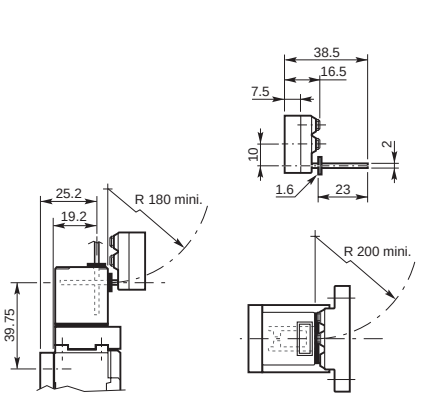
Actuator		Straight key with shock absorber	Adjustable angle key
"N.C." contact with positive opening operation ⊖		⊖	⊖
Actuation speed: maximal / minimal	m/s	0.5 / 0.01	0.5 / 0.01
Min. force: – for insertion of the key	N	15	15
– for extraction of the key	N	10	10
– positive opening operation	N	30	30
Non-overlapping slow action contacts	Catalog number	LS35P81D11-S	LS35P81D11-S
	List price	**$ 52**	**$ 52**
	Operation diagram		
Overlapping slow action contacts	Catalog number	LS35P81C11-S	LS35P81C11-S
	List price	**52**	**52**
	Operation diagram		
Simultaneous slow action contacts	Catalog number	LS35P81L02-S	LS35P81L02-S
	List price	**52**	**52**
	Operation diagram		
Weight with 1/2" NPT adaptor (packing per unit) kg		0.097	0.097
Small Latch (Key)			
To order separately	Catalog number	LSA30P08	LSA30P09
	List price	**9**	**11**
Weight (packing per unit)	kg	0.014	0.022

Accessories, special contact arrangement or particular function: please consult us.

Dimensions (in mm)





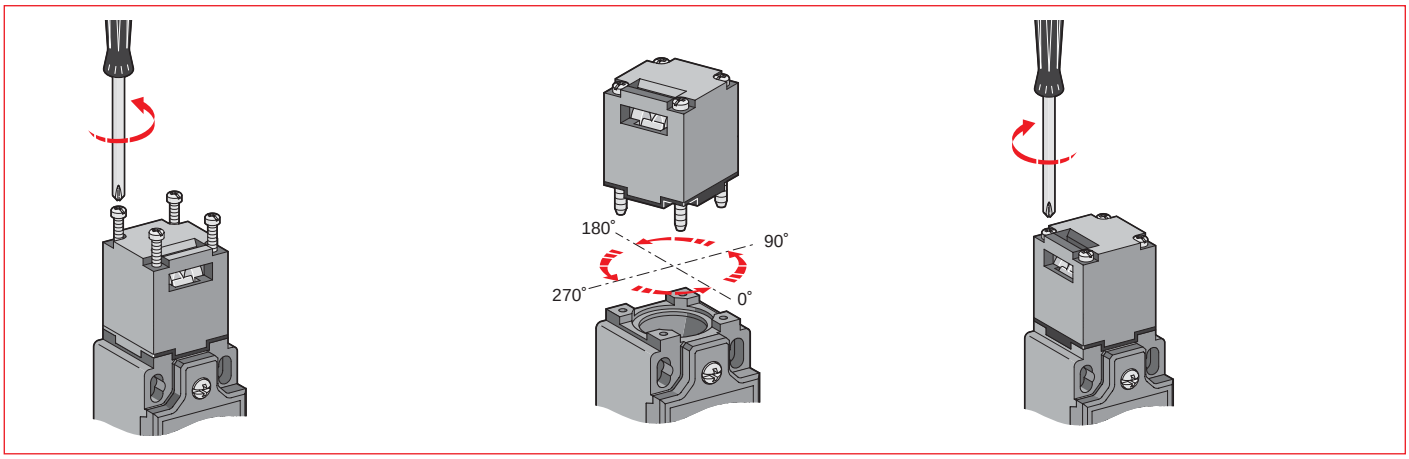


Latch key safety limit switches
Technical data

Implementation

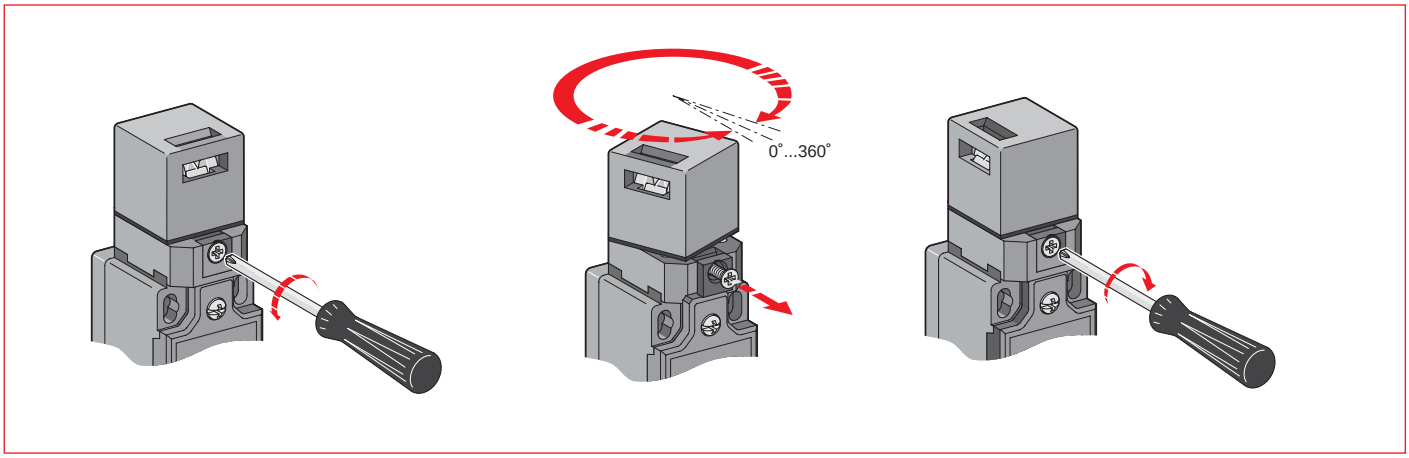
Limit switches with small latch (key) LS30P80...-S, LS31P80...-S and LS35P80...-S

- Head adjustment every 90°.

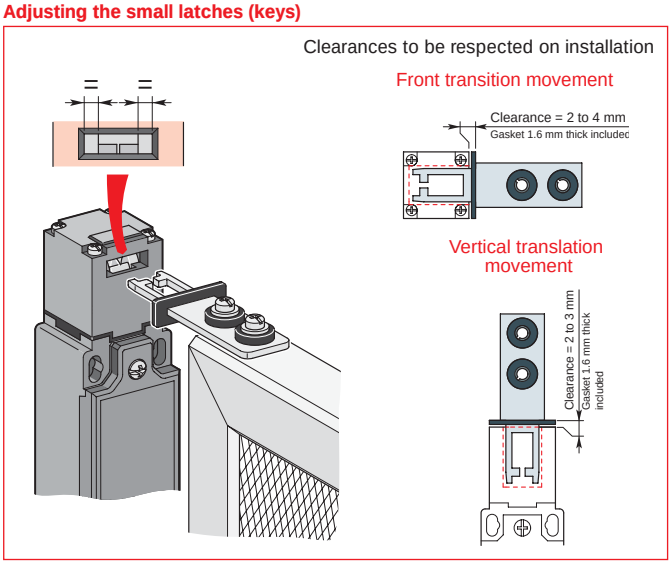


Limit switches with small latch (key) LS30P81...-S, LS31P81...-S and LS35P81...-S

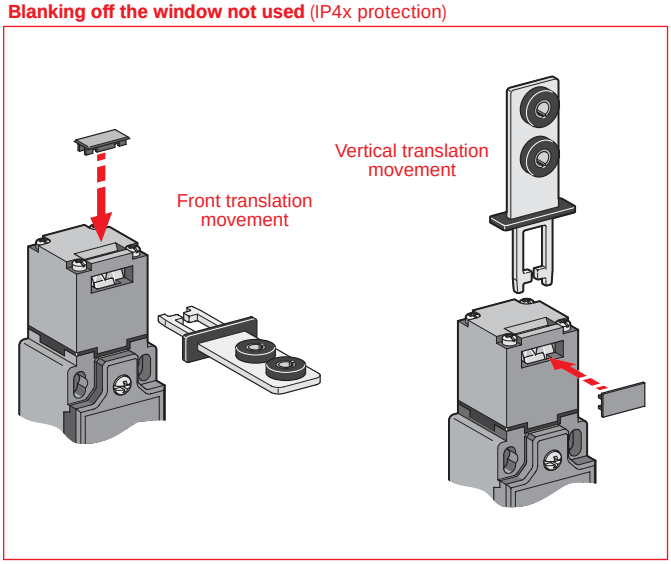
- Pivoting head continuous between 0° to 360°.



Adjusting the small latches (keys)



Blanking off the window not used (IP4x protection)



Notes

Rotative axis limit switches

Description

Safety limit switches made of fibre-glass reinforced UL-V0 thermoplastic material, with rotative axis or flush mounting right angle lever, offer double insulation and a degree of protection IP65. They are equipped with 1 N.C. + 1 N.O. or 2 N.C. contact blocks with dependent action and positive opening operation of the "N.C." contact(s).

Applications

Easy to use, the limit switches with rotative axis or lever offer specific qualities:

- Visible operation.
- Capability for strong current switching (conventional thermal current 10 A).
- Opening of the "N.C." contact(s) for a very small rotation angle: 7°.
- Contact blocks with dependent action and positive opening operation of the "N.C." normally closed contact(s) (symbol ⊖).
- Electrically separated contacts (Zb shape).
- Precision on operating positions (consistency).
- Immunity to electromagnetic disturbances.

These specific features make the limit switches ideal for monitoring and protection of light industrial machines without inertia equipped with angular movement protectors (doors, hinged grids, rotative covers or cases, etc.). Detection by the rotative axis or by means of a lever.

- Opening of the mobile protector guarantees operator protection by immediately stopping the machine drive.
- These switches are suitable for conformity of the existing installed machine base, as they can be mounted on protection devices already installed.
- Associated with other standard limit switches and safety switching devices, they produce automatic control circuits meeting standard EN 954-1.
- They comply with the requirements of European Directives (Low Voltage, Machines and Electromagnetic Compatibility) and are conform to European and international standards.

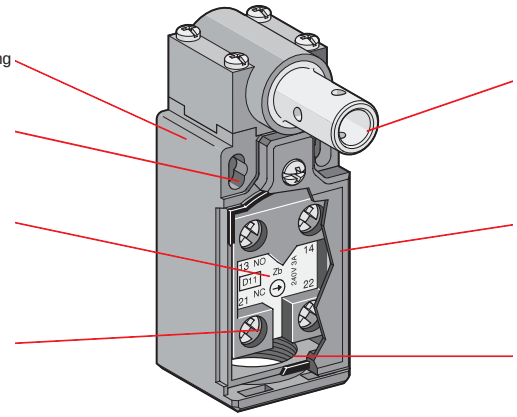
9

Casing
- 30 mm wide with standardised dimensions corresponding to EN 50047

Casing fixing
- 2 x M4 screws in the top part

Blocks of 2 contacts
- Contact configuration: 1 N.O. + 1 N.C. or 2 N.C.
- Positive opening operation ⊖
- Contact dependent action
- Zb shape: the 2 contacts are electrically separated

Connecting terminals
- M3.5 screw with (+,-) posidriv 2 head
- Screw heads with captive cable clamps
- Marking conform to IEC 60947-1, IEC 60947-5-1, EN 50005 and EN 50013 standards



3 operating head options:
- Galvanised steel rotative axis
- Stainless steel rotative axis
- Galvanised steel flush mounting right angle lever

Assembly by 4 x ø 3 screws with (+,-) pozidriv 1 head

Cover
- Closure by 1 x ø 3 screw with (+,-) pozidriv 1 head

Gasket made in one part to prevent tightness breaks

Electrical connection in various options:
- 1 x Pg 13.5 cable gland for LS30P
- 1 x Pg 11 cable gland for LS31P
- 1 x 1/2" NPT adaptor delivered not mounted for LS35P

Catalog number explanation

Example : **LS 35 P 75 D11 S**

Limit Switch ..... LS

Casing width: 30 mm 3

Cable inlet:
1 cable inlet for Pg 13.5 cable gland 0
1 cable inlet for Pg 11 cable gland 1
1 x 1/2" NPT (adaptor) cable inlet 5

Plastic casing ..... P

Operating heads:
Galvanised steel rotative axis 75
Stainless steel rotative axis 76
Galvanised steel flush mounting right angle lever 77

Snap action:
B ..... Zb Snap

Dependent (slow) action:
L ..... Zb Slow / Simultaneous
D ..... Zb Non-overlapping late make
C ..... Zb Overlapping early make

Contact types:
11 ..... 1 N.O. + 1 N.C. contacts
02 ..... 2 N.C. contacts

S ..... Safety device

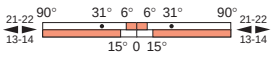
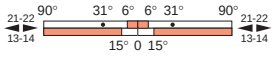
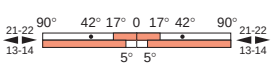
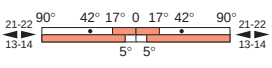
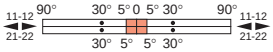
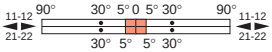
Rotative axis safety limit switches
30mm

Movement to be detected

Angular Around Rotative Axis

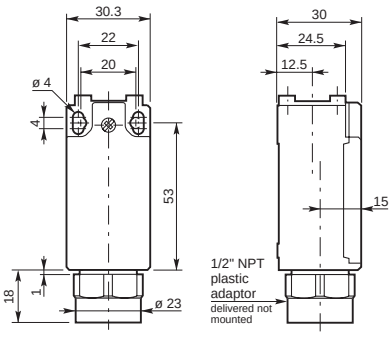
Casing
- Plastic
- 30 mm width
- Degree of protection IP65

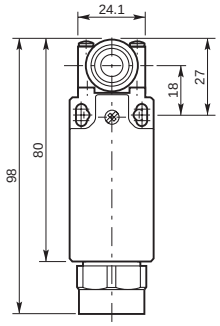
9

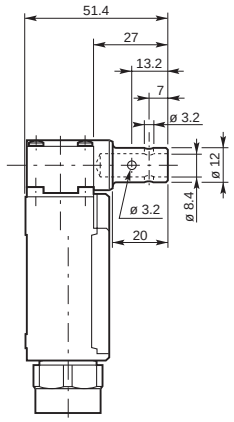
Actuator		Galvanized steel rotative axis	Stainless steel rotative axis
"N.C." contact with positive opening operation		⊖	⊖
Actuation speed: maximal / minimal	m/s	0.5 / 0.01	0.5 / 0.01
Min. torque: – actuation	N.m	0.12	0.12
– positive opening operation	N.m	0.60	0.60
Non-overlapping slow action contacts	Catalog number	LS35P75D11-S	LS35P76D11-S
	List price	**$ 51**	**$ 57**
13 21 Zb 14 22	Operation diagram		
Overlapping slow action contacts	Catalog number	LS35P75C11-S	LS35P76C11-S
	List price	**51**	**$ 57**
13 21 Zb 14 22	Operation diagram		
Simultaneous slow action contacts	Catalog number	LS35P75L02-S	LS35P76L02-S
	List price	**51**	**$ 57**
11 21 Zb 12 22	Operation diagram		
Weight with 1/2" NPT adaptor (packing per unit) kg		0.097	0.097

Accessories, special contact arrangement or particular function: please consult us.

Dimensions (in mm)







Rotative axis safety limit switches
30mm

Movement to be detected

Angular with Lever

Casing

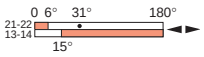
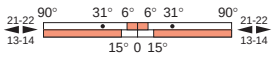
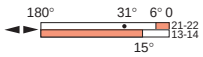
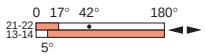
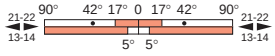
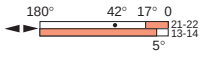
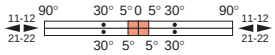
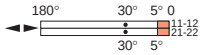
- Plastic
- 30 mm width
- Degree of protection IP65

Lever adjusted to the left (by user)

Lever in central position (factory assembled)

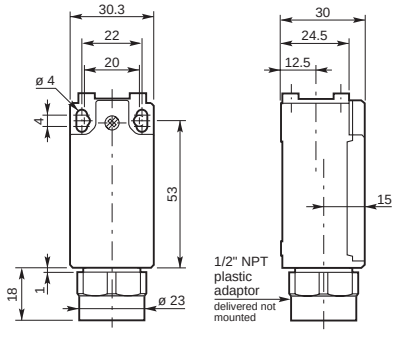
Lever adjusted to the right (by user)

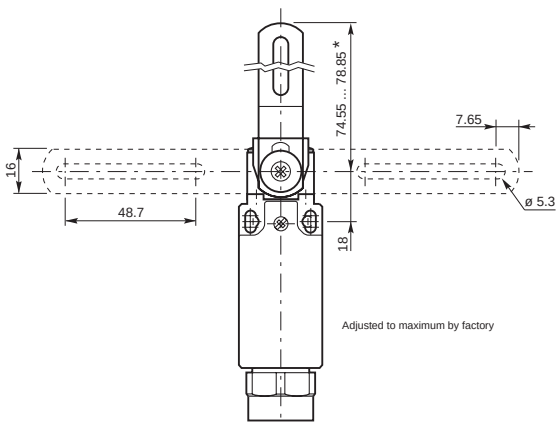
9

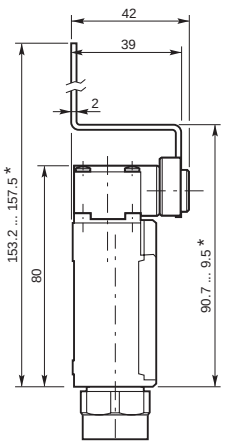
Actuator		Galvanized steel flush mounting right angle lever		
"N.C." contact with positive opening operation ⊖		⊖		
Actuation speed: maximal / minimal	m/s	0.5 / 0.01		
Min. torque: – actuation	N.m	0.12		
– positive opening operation	N.m	0.60		
Non-overlapping slow action contacts	Catalog number		LS35P77D11-S	
	List price		**$ 52**	
	Operation diagram			
Overlapping slow action contacts	Catalog number		LS35P77C11-S	
	List price		**52**	
	Operation diagram			
Simultaneous slow action contacts	Catalog number		LS35P77L02-S	
	List price		**52**	
	Operation diagram			
Weight with 1/2" NPT adaptor (packing per unit) kg			0.117	

Accessories, special contact arrangement or particular function: please consult us.

Dimensions (in mm)







Rotative axis safety limit switches
Technical data

General Data

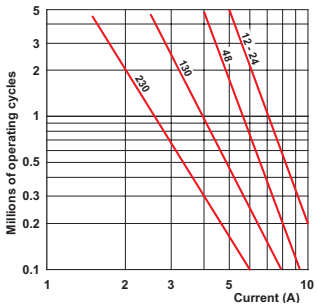
Standards		IEC 60947-1, IEC 60947-5-1, EN 60947-1, EN 60947-5-1, UL 508, and CSA C22-2 No. 14
Certifications - Approvals		UL and CSA
Air temperature near the device – during operation – for storage	 °C °C	 -25 ... +70 -30 ... +80
Climatic withstand		According to IEC 68-2-3 and salty mist according to IEC 68-2-11
Mounting positions		All positions are authorised
Shock withstand (according to IEC 68-2-27 and EN 60068-2-27) (1/2 sinusoidal shock for 11 ms) no change in contact position	g	Limit switch with small latch (key): 10 g Limit switch with rotative axis or lever: 40 g
Resistance to vibrations	g	5 g (10 ... 500 Hz) no change in position of contacts > 100 µs
Protection against electrical shocks (acc. to IEC 536)		Class II
Degree of protection (according to IEC 529 and EN 60529)		UL Type 4 & IP65
Minimum actuation speed	m/s	Slow action contacts 0.060 / Snap action contacts 0.001

Electrical Data

Rated insulation voltage U_i – according to IEC 60947-1 and EN 60947-1 – according to UL 508, CSA C22-2 No. 14			V	 690 (degree of pollution 3) A600, Q600
Rated impulse withstand voltage U_{imp} (according to IEC 60947-1 and EN 60947-1)			kV	6
Conventional free air thermal current I_{th} (according to IEC 60947-5-1 and EN 60947-5-1) (0 ≤ 40 °C)			A	10
Short-circuit protection - gG type fuses			A	10
Rated operational current I_e / AC-15	– acc. to IEC 60947-5-1	24 V - 50/60 Hz 130 V - 50/60 Hz 230 V - 50/60 Hz 240 V - 50/60 Hz 400 V - 50/60 Hz	 A A A A A	 10 5.5 3.1 3 1.8
	– according to UL 508, CSA C22 No.14			A600
I_e / DC-13	– acc. to IEC 60947-5-1	24 V - d.c. 110 V - d.c. 250 V - d.c.	A A A	2.8 0.6 0.27
	– according to UL 508, CSA C22 No.14	Q600		
Positivity				Contacts with positive opening operation as per IEC 60947-5-1 chapter 3 and EN 60947-5-1
Resistance between contacts			mΩ	25
Mechanical durability		Millions of operations		> 1 million of operating cycles
Max. switching frequency		Cycles/h		600
Electrical durability (according to IEC 60947-5-1 appendice C)				Utilization categories AC-15 and DC-13 (see curves and values below)
– Max. switching frequency – Load factor		Cycles/h		3600 0.5

Electrical durability for AC-15 utilization category

Slow action



Electrical durability for DC-13 utilization category

Slow action

Power breaking for a durability of 5 million operating cycles

Voltage	24 V	12 W
Voltage	48 V	9 W
Voltage	110 V	6 W

Rotative axis safety limit switches
Technical data
Specifications, directives, standards & EC conformity

Definitions
The ABB limit switches listed in this catalogue are developed and manufactured according to the rules set out in IEC international publications and EN European standards. In most countries, the devices are not subject to further obligation for approval. In some countries, however, the law stipulates obligation for approval.

Specifications
- **International Specifications**
  The International Electrotechnical Commission, IEC, which is part of the International Standards Organization, ISO, publishes IEC publications which act as a basis for the world market.
- **European Specifications**
  The European Committee for Electrotechnical Standardization (CENELEC), grouping 18 European countries, publishes EN standards for low voltage industrial apparatus. These European standards vary very little from IEC international standards and use a similar numbering system. The same is true of national standards. Contradicting national standards are withdrawn.
- **Harmonized European Specifications**
  The European Committees for Standardization (CEN and CENELEC), grouping 18 European countries, publish EN standards relating to safety of machinery.
- **Specifications in Canada and the USA**
  These are equivalent, but differ markedly from IEC, UTE, VDE and BS specifications.
  UL Underwriters Laboratories (USA)
  CSA Canadian Standards Association (Canada)

Remark concerning the label issued by the UL (USA). Two levels of acceptance between devices must be distinguished:

"Recognized" Authorized to be included in equipment, if the equipment in question has been entirely mounted and wired by qualified personnel. They are not valid for use as "General purpose products" as their possibilities are limited.
They bear the mark: LR.

"Listed" Authorized to be included in equipment and for separate sale as "General purpose products" components in the USA.
They bear the mark: UL.

European Directives
The guarantee of free movement of goods within the European Community assumes elimination of any regulatory differences between the member states. European Directives set up common rules that are included in the legislation of each state while contradictory regulations are cancelled.
There are three main directives:
- **Low Voltage Directive 73/23/EEC**, amended by Directive 93/68/EEC concerning electrical equipment from 50 to 1000 V a.c. and from 75 to 1500 VDC. This specifies that compliance with the requirements that it sets out is acquired once the equipment conforms to the standards harmonized at European level: EN 60947-1 and EN 60947-5-1 for limit switches.
- **Machines Directives - 89/392/EEC, 91/368/EEC, 93/44/EEC, 93/68/EEC** - defining main safety and health requirements concerning design and manufacture of the machines and other equipment including safety components in European Union countries.
- **Electromagnetic Compatibility Directive 89/336/EEC**, amended by Directive 92/31/EEC and Directive 93/68/EEC concerning all electrical devices likely to create electromagnetic disturbances.

Signification of CE marking:
CE marking must not be confused with a quality label.
CE marking placed on a product is proof of conformity with the European Directives concerning the product.
CE marking is part of an administrative procedure and guarantees free movement of the product within the European Community.

Standards
- **International standards**

IEC 60947-1	Low-voltage switchgear and controlgear – Part 1: General Rules (NFC 63-001).
IEC 60947-5-1	Low-voltage switchgear and controlgear – Part 5: Control circuit devices and switching elements – Section 1: Electromechanical control circuit devices (NFC 63-146) – Chapter 3: Special requirements for control switches with positive opening operation.
IEC 60204-1	Electrical equipment of industrial machines – Part 1: General requirements (≈ NFC 79-130).
IEC 60204-2	Electrical equipment of industrial machines – Part 2: Item designation and examples of drawings, diagrams, tables and instructions (Appendices D and E of Publications IEC 60204-1).

- **European Standards**

EN 50005	Low-voltage switchgear and controlgear for industrial use – Terminal marking and distinctive number: General rules (NFC 63-030).
EN 50013	Low-voltage switchgear and controlgear for industrial use – Terminal marking and distinctive number for particular control switches (NFC 63-033).
EN 50041	Low-voltage switchgear and controlgear for industrial use – Control switches – Position switches 42.5 x 80 – Dimensions and characteristics.
EN 50047	Low-voltage switchgear and controlgear for industrial use – Control switches – Position switches 30 x 55 – Dimensions and characteristics.
EN 60947-1	Low-voltage switchgear and controlgear for industrial use – Part 1: General rules (NFC 63-001).
EN 60947-5-1	Low-voltage switchgear and controlgear for industrial use – Part 5: Control circuit devices and switching elements – Section 1: Electromechanical control circuit devices (NFC 63-146) – Chapter 3: Special requirements for control switches with positive opening operation.

- **Harmonized European Standards**
  These standards are common to all European Union and EFTA (European Free Trade Association) countries. They were prepared (prEN project) and written (EN final text) by the European standardization committees CEN or CENELEC.
  Harmonized European standards were drawn up to allow definition of the rules and technical means to be used to satisfy the main safety requirements on machines and thus guarantee conformity with the Machines Directive.
  Compliance with a harmonized European standard is presumption of conformity with the relevant Directive.
  European standards relating to machine safety are divided into groups (A, B and C types).

Type A standards:	basic standards: setting out design principles and the general aspects valid for all machine types.
EN 292-1	Safety of machinery – Basic concepts, general principles for design – Part 1: Basic terminology, methodology.
EN 292-2 and EN 292-2/A1	Safety of machinery – Basic concepts, general principles for design – Part 2: Technical principles and specifications.
EN 1050	Safety of machinery – Principles for risk assessment.
Type B standards:	group standards:
B1: dealing with specific safety aspects.	
EN 60204-1	Safety of machinery – Electrical equipment of machines – Part 1: General requirements.
EN 954-1	Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design.
B2: dealing with components and devices determining safety.	
EN 1088	Safety of machinery – Interlocking devices associated with guards – Principles for design and selection.
Type C standards:	specific standards or standards per machine family giving detailed safety specifications applicable to a machine or to a group of machines.
EN 81-1	Safety rules for the construction and installations of lifts – Part 1: Electric lifts.

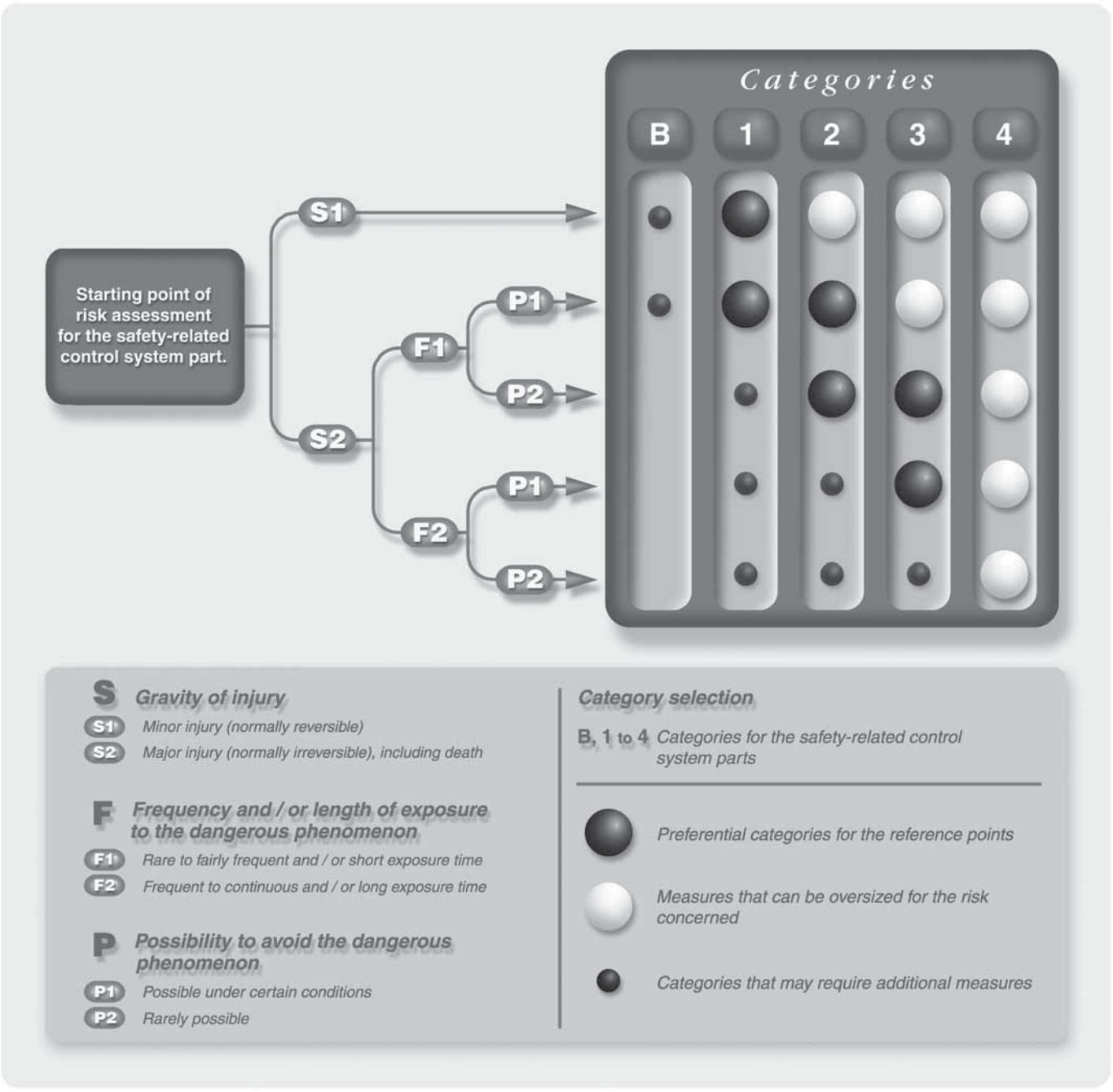
Content of the "EC" Declaration of Conformity for Safety Components
The "EC" Declaration of Conformity is intended to certify that the safety component complies with the main safety and health requirements of Machines Directive 89/392/EEC.
It must contain the following information:
- the name and address of the manufacturer or his representative established in the European Community,
- the description of the safety component (brand, type, serial number, etc.),
- the safety function performed by the safety component if this is not obvious from the description,
- when needed, the name and address of the notified organisation and the number of the type "CE" certificate,
- when needed, the name and address of the notified organisation to which the file has been sent as per article 8, paragraph 2, point c), first hyphen,
- when needed, the name and address of the notified organisation who performed the check referred to in article 8, paragraph 2, point c), second hyphen,
- when needed, the reference to the harmonized standards,
- when needed, the national technical standards and specifications used,
- identification of the signatory authorized to hire the manufacturer or his representative established in the European Community.

Rotative axis safety limit switches
Technical data
Risk assessment & determination of control system categories

Classification of a machine into categories to EN 954-1

Pursuant to the Machinery Directive 89/392/EEC, every machine must comply with the relevant Directives and standards. Measures must be taken to keep the risk to persons below a tolerable extent.

In the first step, the project planner performs a risk evaluation to EN 1050 "Risk Assessment". This must take into consideration the machine's ambient conditions for instance. Any overall risk must then be assessed. This risk assessment must be conducted in such a form as to allow documentation of the procedure and the result achieved. The risk, dangers and possible technical measures to reduce risks and dangers must be stipulated in this risk assessment. After stipulating the extent on the risk, the category on the basis of which the safety circuits are to be designed is determined with the aid of EN 954-1 "Safety-Related Components of Controls". This determined category defines the technical requirements applicable to the design of the safety equipment. There are five categories (B, 1, 2, 3 and 4) whereby B (standing for basic category) defines the lowest risk and, thus, also the minimum requirements applicable to the controller.



Rotative axis safety limit switches
Technical data
Control system categories as per EN 954-1

The main aim of all machine designers is to guarantee that the faults on safety-related control system parts or external disturbances cannot result in a dangerous situation or a dangerous event on the machine.

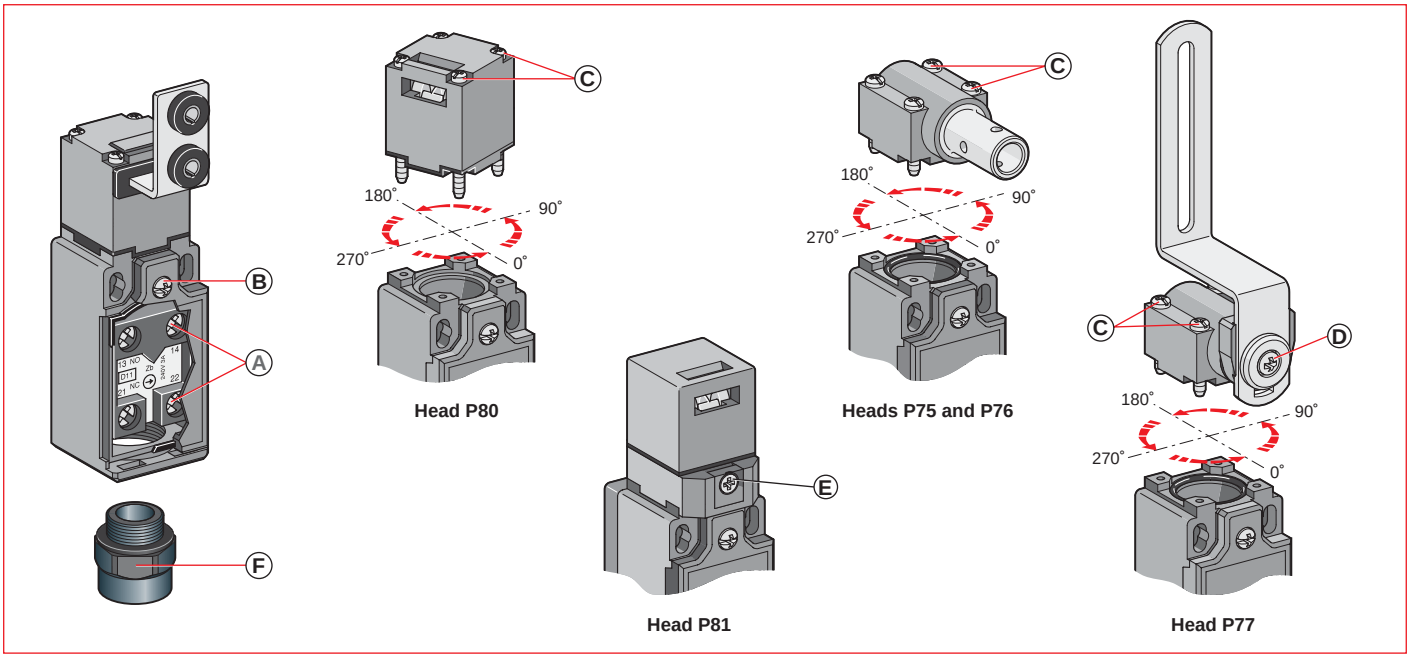
The summarising table below determines the category of the safety-related control system parts.

Categories	Summary of control system requirements	Control system behavior	Main principle for ensuring safety
B	The parts of the safety-related control system and / or its devices must be designed, manufactured, selected, mounted and combined according to proper procedures so as to withstand expected influences.	If a fault occurs, it may lead to possible loss of the safety function.	By selection of components conforming to relevant standards.
1	The requirements formulated in category B are combined with use of tried and tested safety components and principles.	– Occurrence of a fault may lead to possible loss of the safety function, but this is less probable than in category B.	By choice and use of safety components and principles.
2	The requirements formulated in category B and use of tried and tested safety principles apply. The safety function(s) must be tested regularly by the machine control system. Test frequency must be adapted to the machine and to its application.	– Occurrence of a fault may lead to possible loss of the safety function between the periodic test intervals. – Loss of the safety function is detected at each test.	By improvement of safety circuit structure.
3	The requirements formulated in category B and use of tried and tested safety principles apply. The control system must be designed so that: a) a single fault in the control does not lead to loss of the safety function and… (see paragraph b). b) if this is reasonably feasible, the single fault must be detected by appropriate technical means.	– When a single fault occurs, the safety function is always guaranteed. – Some faults will be detected, but not all. – Accumulation of undetected faults may lead to loss of the safety function.	By improvement of safety circuit structure.
4	The requirements formulated in category B and use of tried and tested safety principles must be applied. The control system must be designed so that: a) a single fault in the control does not lead to loss of the safety function and… (see paragraph b). b) if possible the single fault must be detected as soon as or before the next tripping of the safety function or... (see paragraph c). c) if this was not possible, an accumulation of faults must not lead to loss of the safety function.	– When faults occur, the safety function is always guaranteed. – The faults will be detected in time to prevent loss of the safety function.	By improvement of safety circuit structure.

Important: The safety categories apply to the entire control system and not to the individually considered safety components.

Rotative axis safety limit switches
Technical data

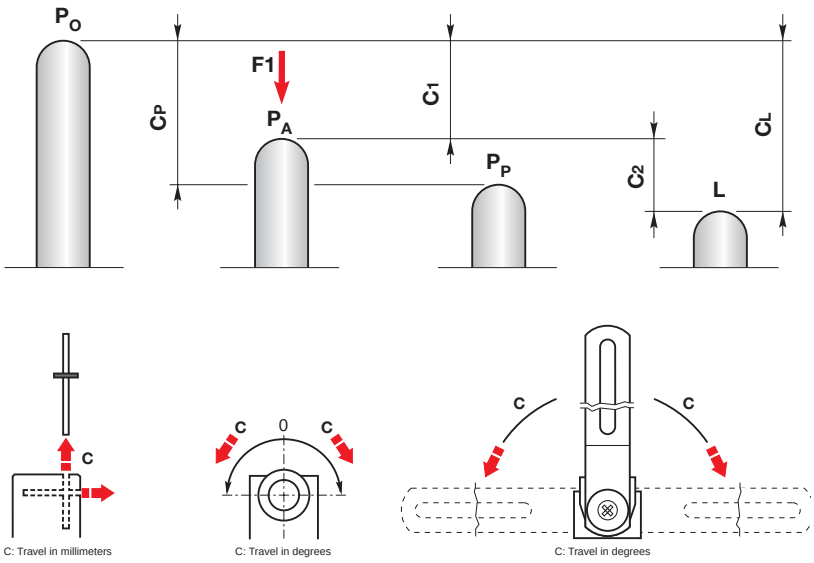
Tightening torques

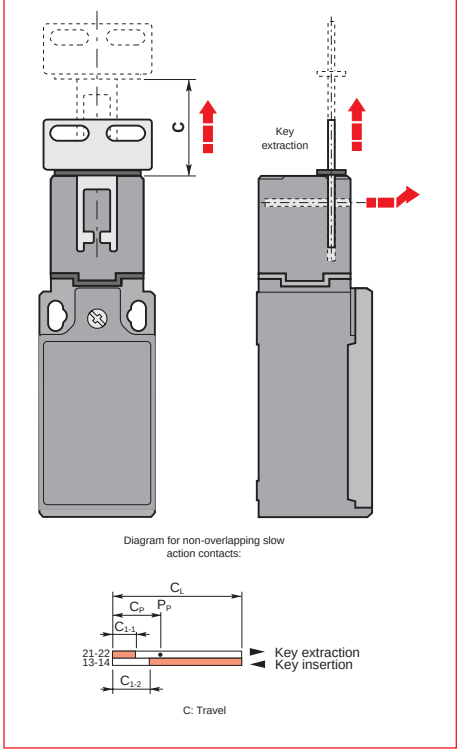


	A		B		C		D		E		F	
	Contact block connecting terminals		Closing the cover		Assembling the operating head		Assembling the flush mounting right angle lever		Adjusting the pivoting head		Cable inlet by 1/2" NPT adaptor	
Screws	M3.5 ± pozidriv 2		ø3 ± pozidriv 1		ø3 ± pozidriv 1		M3.5 pozidriv 2		M3 Philips No. 1		–	
Tightening torque	Recommended N.m / lb.in	Max. N.m	Recommended N.m / lb.in	Max. N.m	Recommended N.m / lb.in	Max. N.m	Recommended N.m / lb.in	Max. N.m	Recommended N.m / lb.in	Max. N.m	Recommended N.m / lb.in	Max. N.m
Limit switches												
LS35P80...-S	0.8 / 7	0.9	0.5 / 4.3	0.8	0.5 / 4.3	0.8	–	–	–	–	17 / 150	18
LS35P81...-S	0.8 / 7	0.9	0.5 / 4.3	0.8	–	–	–	–	0.3 / 2.63	0.5	17 / 150	18
LS35P75...-S	0.8 / 7	0.9	0.5 / 4.3	0.8	0.5 / 4.3	0.8	–	–	–	–	17 / 150	18
LS35P76...-S	0.8 / 7	0.9	0.5 / 4.3	0.8	0.5 / 4.3	0.8	–	–	–	–	17 / 150	18
LS35P77...-S	0.8 / 7	0.9	0.5 / 4.3	0.8	0.5 / 4.3	0.8	0.5 / 4.3	0.8	–	–	17 / 150	18

Connecting data of contact blocks		
Connecting terminals		M3.5 (+,–) pozidriv 2 screw with cable clamp
Connecting capacity	1 or 2 x mm^2 / AWG	0.5 mm^2 / AWG 20 to 2.5 mm^2 / AWG 14
Terminal marking		According to EN 50013

Rotative axis safety limit switches
Technical data





P_O Free position:
position of the switch actuator when no external force is exerted on it.

P_A Operating position:
position of the switch actuator, under the effect of force F1, when the contacts leave their initial free position.

P_P Positive opening position:
position of the switch actuator from which positive opening is ensured.

L Max. travel position:
maximum acceptable travel position of the switch actuator under the effect of a force F1.

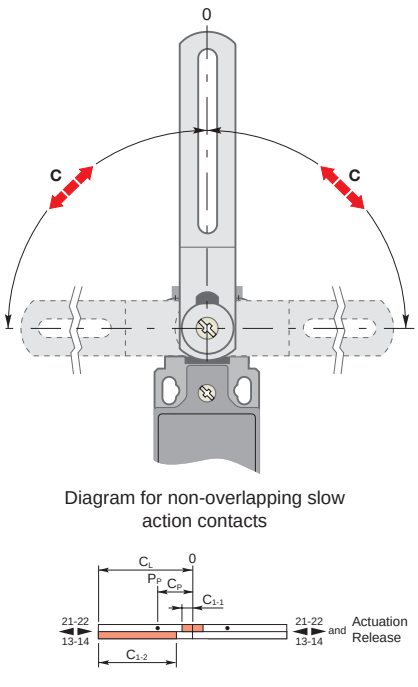
C_1 Pre-travel (average travel):
distance between the free position P_O and the operating position P_A.

C_P Positive opening travel:
minimum travel of the switch actuator, from the free position, to ensure positive opening operation of the normally closed contact (N.C.).

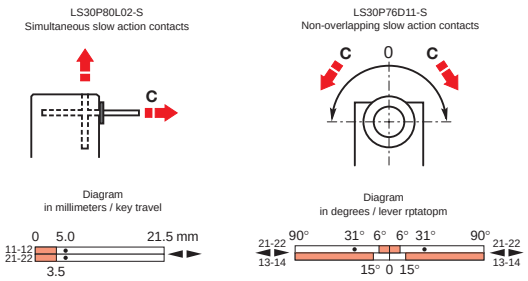
C_2 Over-travel (average travel):
distance between the operating position P_A and the max. travel position L.

C_L Max. travel (maximum travel):
distance between the free position P_O and the max. travel position L.

Note: C_{1-1} = pre-travel of contact 21-22,
C_{1-2} = pre-travel of contact 13-14.



Examples:



Rotative axis safety limit switches
Technical data
Terminology

Double Insulation

Class II materials, according to IEC 536, are designed with double insulation. This measure consists in doubling the functional insulation with an additional layer of insulation so as to eliminate the risk of electric shock and thus not having to protect elsewhere. No conductive part of "double insulated" material should be connected to a protective conductor.

Positive Opening Operation

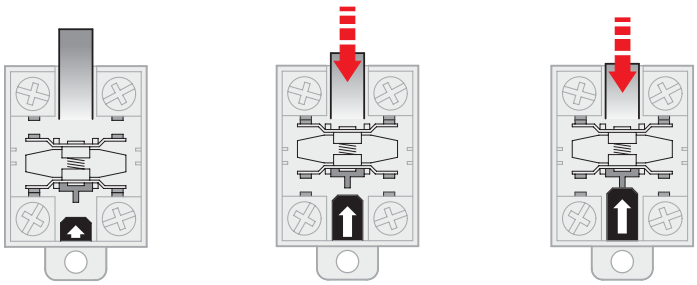
A control switch, with one or more break-contact elements, has a positive opening operation when the switch actuator ensures full contact opening of the break-contact. For the part of travel that separates the contacts, there must be a positive drive, with no resilient member (e.g. springs), between the moving contacts and the point of the actuator to which the actuating force is applied.

Control switches with positive opening operation may be provided with either snap action or slow action contact elements. To use several contacts on the same control switch with positive opening operation, they must be electrically separated from each other, if not, only one may be used.

Every control switch with positive opening operation must be indelibly marked on the outside with the symbol:

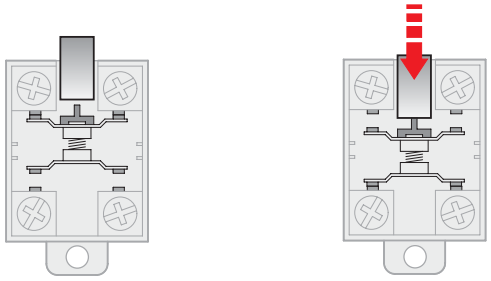
Snap Action

Snap action contacts are characterised by a release position that is distinct from the operating position (differential travel). Snap breaking of moving contacts is independent of the switch actuator's speed and contributes to regular electric performance even for slow switch actuator speeds.

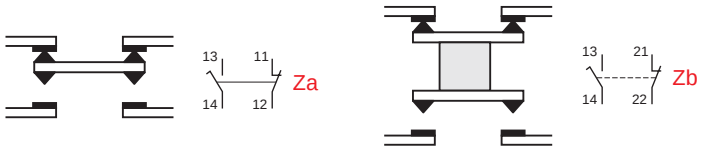


Slow Action

Slow action contacts are characterised by a release position that is the same as the operating position. The switch actuator's speed directly conditions the travel speed of contacts.



Contact shape according to IEC 60947-5-1.
Change-over contact elements with 4 terminals must be indelibly marked Za or Zb.
See figure opposite for contact representation.



Utilization category

AC-15: switching of electromagnetic loads of electromagnets using an alternating current (>72 VA).
DC-13: switching of electromagnets using a direct courant.

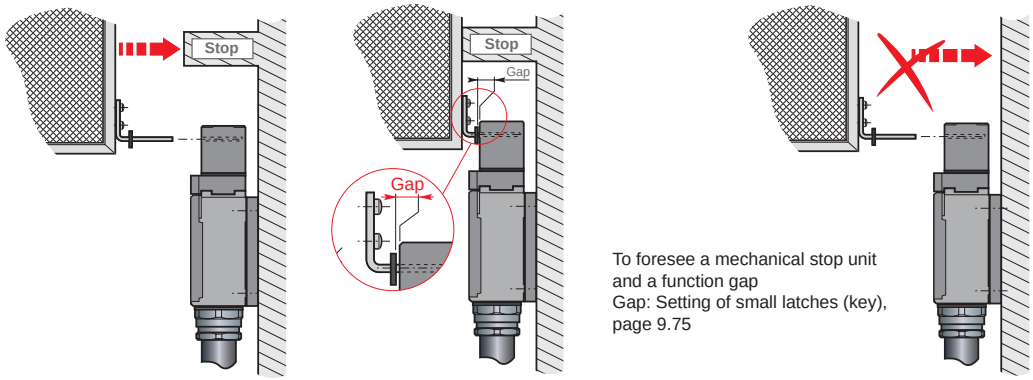
Minimum actuation force / torque

The minimum amount of force/torque that is to be applied to the switch actuator to produce a change in contact position.

Minimum force / torque to achieve positive opening operation

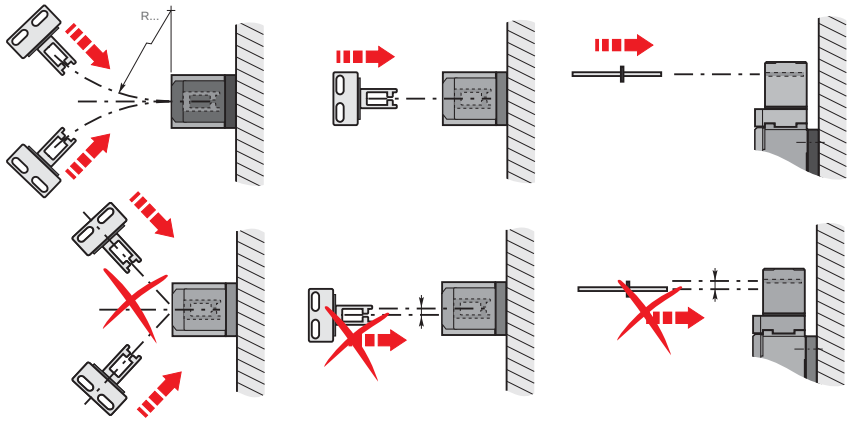
The minimum amount of force/torque that is to be applied to the switch actuator to ensure positive opening operation of the N.C. contact.

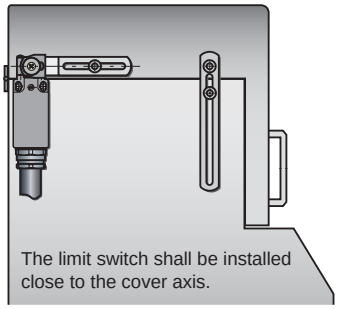
Rotative axis safety limit switches
Technical data
Utilization cautions



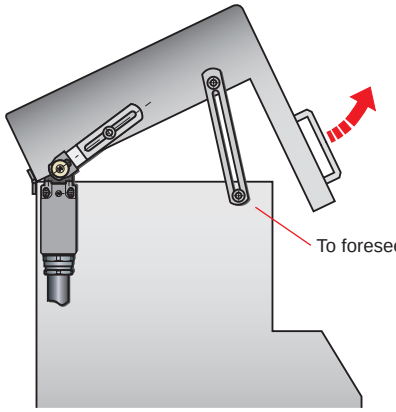
To foresee a mechanical stop unit and a function gap
Gap: Setting of small latches (key), page 9.75

The small latch (key) shall be presented in the axis of the control head.



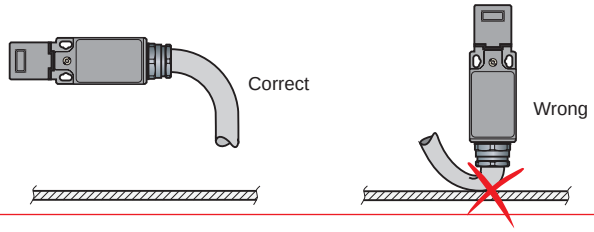


The limit switch shall be installed close to the cover axis.

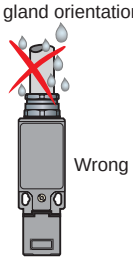


To foresee a stop gear

Curve of connecting cable



Cable gland orientation

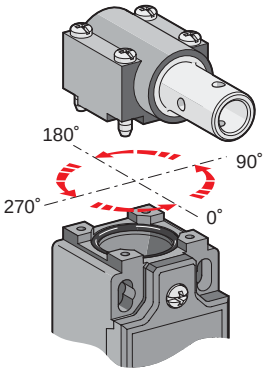


Rotative axis safety limit switches
Technical data

Implementation

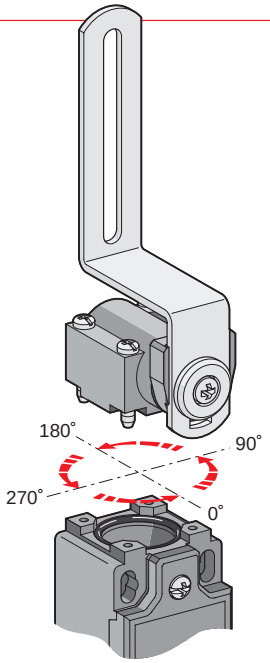
Limit switches with rotative axis
LS35P75...-S, LS35P76...-S

- Head adjustment every 90°

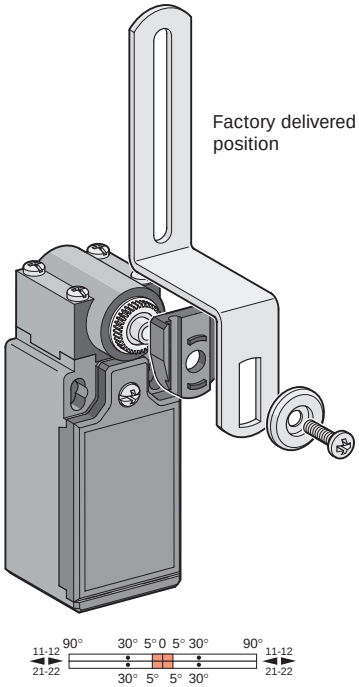


Limit switches with flush mounting right angle lever
LS35P77...-S

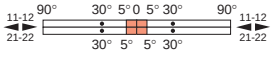
- Head adjustment every 90°

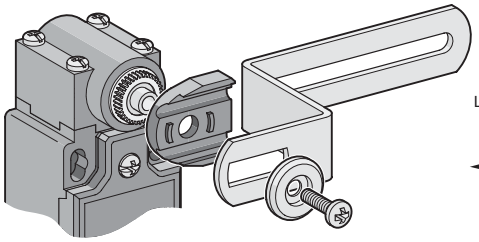


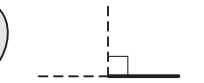
Each lever adjustment has a specific operation diagram.
(In these exxamples, the diagrams correspond to an L02 contact block.)



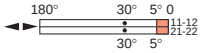
Factory delivered position



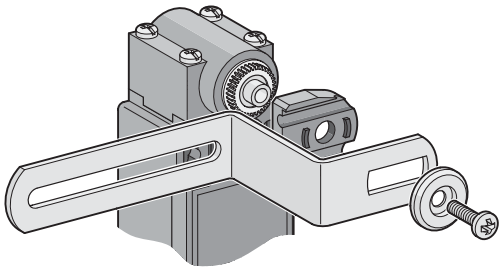


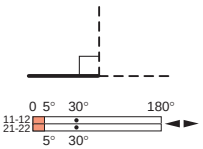


Lever adjusted to the right



Lever adjustment by the user





Latch & manual reset Safety limit switches

Description

Limit switches with latch and manual reset are equipped with operating heads with plunger, roller plunger or roller lever, used to detect rectilinear or angular movements.
Made of fibre-glass reinforced UL-V0 thermoplastic material, they offer double insulation and a degree of protection IP65.
Limit switches with latch and manual reset are equipped with 1 N.C. + 1 N.O. or 2 N.C. contact blocks with positive opening operation of the "N.C." contact(s). After actuating the control device and overshooting the latching point, the N.C. safety contact(s) remain in the open position. Return to the initial operating state takes place by voluntary action on the reset button.

Applications

Easy to use, the limit switches for safety applications with latch and manual reset offer specific qualities:

- Visible operation (fault memorisation).
- Capability for strong current switching (conventional thermal current 10 A).
- Contact blocks with positive opening operation of the "N.C." normally closed contact(s) (symbol ⊖).
- Electrically separated contacts (Zb shape).
- Precision on operating positions (consistency).
- Immunity to electromagnetic disturbances.

These specific features make the limit switches ideal for detection and monitoring of faults in hoisting machines, electric lifts, freight elevators, escalators, conveyor belts, etc.
Limit switches with latch and manual reset comply with the requirements of standard EN 81-1: safety rules for the construction and installations of electric lifts. In this application they detect or monitor: cabin overtravel, cabin speed by means of a speed limiting device, energisation of the parachute block on detection of excessive speed with respect to the set-point value, etc.

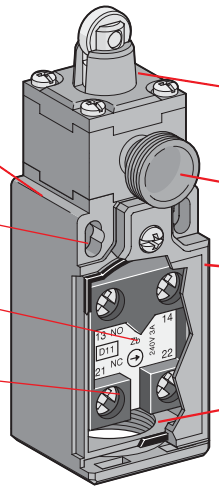
They comply with the requirements of European Directives (Low Voltage, Machines and Electromagnetic Compatibility) and are conform to European and international standards.

Casing
- 30 mm wide with standardized dimensions corresponding to EN 50047

Casing fixing
- 2 M4 screws in the top part

Blocks of 2 contacts
- Contact configuration: 1 N.O. + 1 N.C. or 2 N.C.
- Positive opening operation ⊖
- Snap or dependent action
- Zb shape: the 2 contacts are electrically separated

Connecting terminals
- M3.5 screw with (+,-) posidriv 2 head
- Screw heads with captive cable clamps
- Marking conform to IEC 60947-1, IEC 60947-5-1, EN 50005 and EN 50013 standards



4 operating head options:
- Plain plunger
- Roller plunger
- Roller lever on plunger
- Rotative roller lever

Assembly by 4 x ø 3 screws with (+,-) pozidriv 1 head

Blue manual reset button

Cover
- Closure by 1x ø 3 screw with (+,-) pozidriv 1 head

Gasket made in one part to prevent tightness breaks

Electrical connection in various options:
- 1 x Pg 13.5 cable gland for LS30P
- 1 x Pg 11 cable gland for LS31P
- 1 x 1/2" NPT adaptor delivered not mounted for LS35P

Catalog number explanation

Example: **LS 35 P 13 D11 R**

Limit Switch ..... **LS**

Casing width: 30 mm **3**

Cable inlet:
1 cable inlet for Pg 13.5 cable gland **0**
1 cable inlet for Pg 11 cable gland **1**
1 x 1/2" NPT (adaptor) cable inlet **5**

Plastic casing ..... **P**

Operating heads:
Galvanised steel plain plunger..... **11**
Galvanised steel roller plunger **12**
Plastic roller plunger **13**
Plastic roller lever on plunger (hori. act.) **31**
Plastic roller lever on plunger (ver. act.)..... **32**
Rotative lever with plastic roller..... **41**

Snap action:
B .....Zb Snap

Dependent (slow) action:
L .....Zb Slow / Simultaneous
D .....Zb Non-overlapping late make
C .....Zb Overlapping early make

Contact types:
11 ..... **1** N.O. + **1** N.C. contacts
02 ..... **2** N.C. contacts

R .....**Reset Device**

Latch & manual reset
30mm

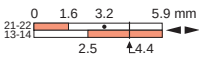
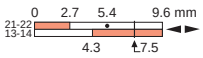
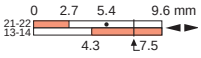
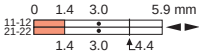
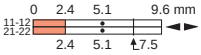
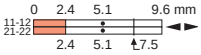
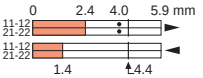
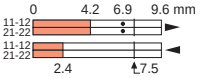
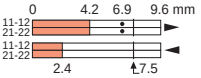
Movement to be detected

	On End	On End or 30° Cam Translation	
			

Casing

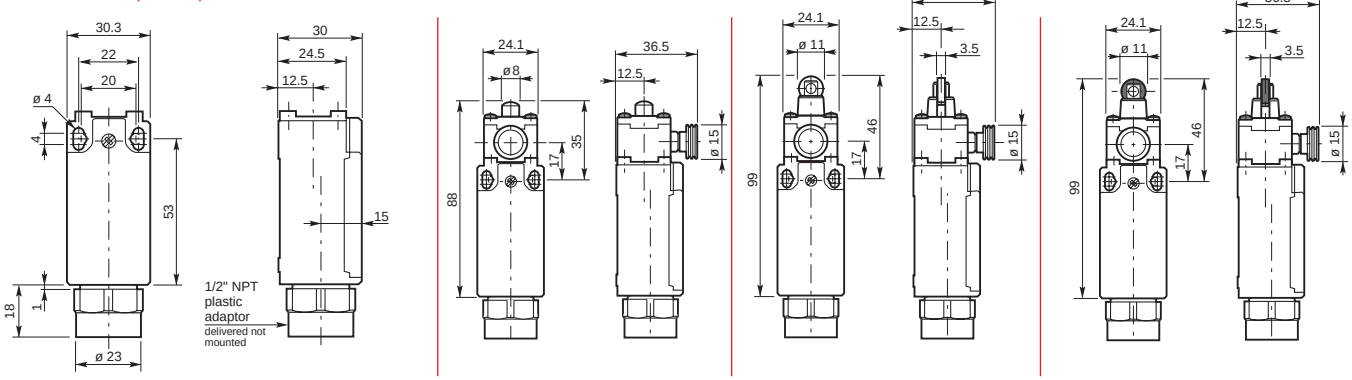
- Plastic
- 30 mm width
- Degree of protection IP65

Actuator

			Galvanized steel plain plunger	Galvanized steel roller plunger	Plastic roller plunger
"N.C." contact with positive opening operation			⊖	⊖	⊖
Maximum actuation speed		m/s	0.5	0.3	0.3
Min. force: – actuation		N	9	12	12
– positive opening operation		N	44	41	41
Non-overlapping slow action contacts	Catalog number		LS35P11D11-R	LS35P12D11-R	LS35P13D11-R
	List price		**$ 39**	**$ 43**	**$ 41**
13 21 Zb 14 22	Operation diagram				
Simultaneous slow action contacts	Catalog number		LS35P11L02-R	LS35P12L02-R	LS35P13L02-R
	List price		**39**	**43**	**41**
11 21 Zb 12 22	Operation diagram				
Snap action contacts	Catalog number		LS35P11B02-R	LS35P12B02-R	LS35P13B02-R
	List price		**39**	**43**	**41**
11 21 Zb 12 22	Operation diagram				
Weight (packing per unit)		kg	0.097	0.102	0.097

Accessories, special contact arrangement or particular function: please consult us.

Dimensions (in mm)



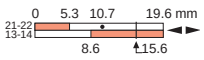
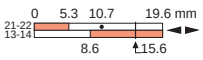
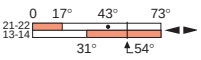
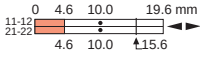
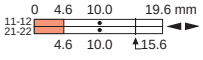
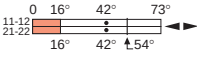
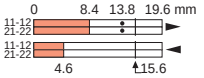
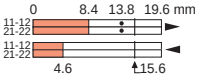
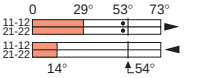
Latch & manual reset
30mm

Movement to be detected

Casing
- Plastic
- 30 mm width
- Degree of protection IP65

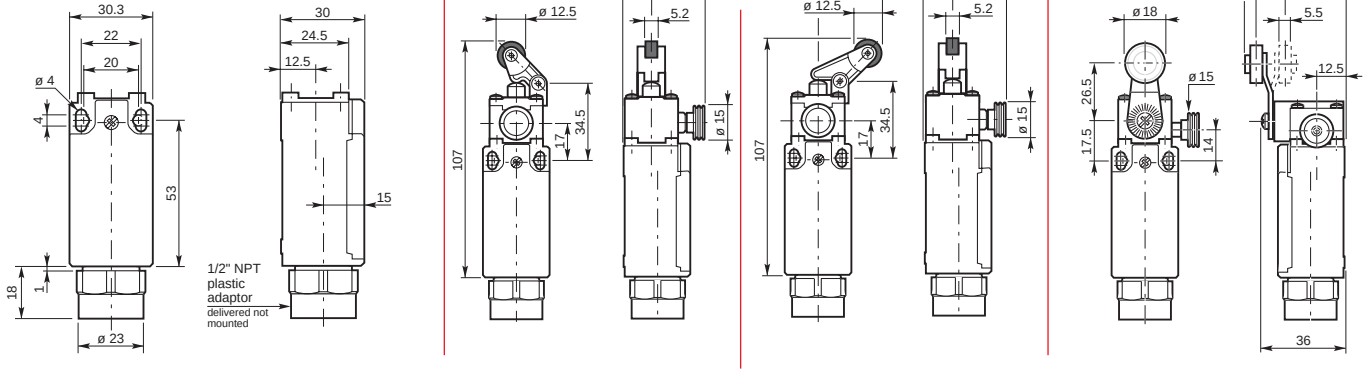
	30° Unidirectional Cam Translation Movement		30° Cam Translation
			

Actuator

		Plastic roller lever on galvanized steel plunger	Plastic roller lever on galvanized steel plunger	Rotary lever with plastic roller
"N.C." contact with positive opening operation		⊖	⊖	⊖
Maximum actuation speed	m/s	1	1	1.5
Min. force / torque: – actuation		7 N	3 N	0.10 N.m
– positive opening operation		24 N	24 N	0.32 N.m
Non-overlapping slow action contacts	Catalog number	LS35P31D11-R	LS35P32D11-R	LS35P41D11-R
	List price	**$ 43**	**$ 43**	**$ 43**
13 21 Zb 14 22	Operation diagram			
Simultaneous slow action contacts	Catalog number	LS35P31L02-R	LS35P32L02-R	LS35P41L02-R
	List price	**43**	**43**	**43**
11 21 Zb 12 22	Operation diagram			
Snap action contacts	Catalog number	LS35P31B02-R	LS35P32B02-R	LS35P41B02-R
	List price	**43**	**43**	**43**
11 21 Zb 12 22	Operation diagram			
Weight with 1/2" NPT adaptor (packing per unit)	kg	0.102	0.102	0.102

Accessories, special contact arrangement or particular function: please consult us.

Dimensions (in mm)



Latch & manual reset
Technical data

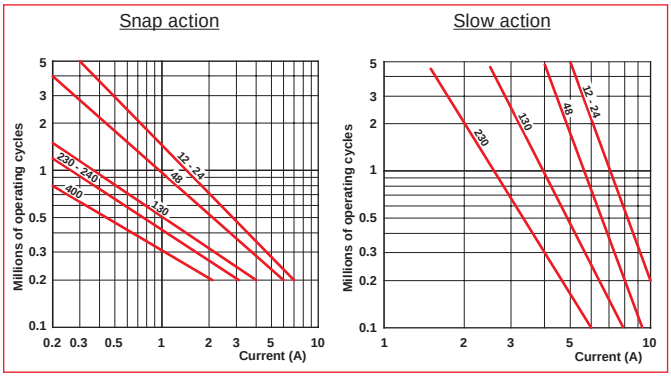
General Data

Standards		IEC 60947-1, IEC 60947-5-1, EN 60947-1, EN 60947-5-1, UL 508, CSA C22-2 No.14
Certifications - Approvals		UL and CSA
Air temperature near the device		
– during operation	°C	-25 ... +70
– for storage	°C	-30 ... +80
Climatic withstand		According to IEC 68-2-3 and salty mist according to IEC 68-2-11
Mounting positions		All positions are authorised
Shock withstand (according to IEC 68-2-27 and EN 60068-2-27)	g	50 g (1/2 sinusoidal shock for 11 ms) no change in contact position
Resistance to vibrations (acc. to IEC 68-2-6 and EN 60068-2-6)	g	25 g (10 ... 500 Hz) no change in position of contacts > 100 µs
Protection against electrical shocks (acc. to IEC 536)		Class II
Degree of protection (according to IEC 529 et EN 60529)		IP65
Consistency		0.1 mm upon closing points
Minimum actuation speed	m/s	Slow action contacts 0.060 / Snap action contacts 0.001

Electrical Data

Rated insulation voltage U_i				
– according to IEC 60947-1 and EN 60947-1			V	690 (degree of pollution 3)
– according to UL 508, CSA C22-2 No.14				A600, Q600
Rated impulse withstand voltage U_{imp} (according to IEC 60947-1 and EN 60947-1)			kV	6
Conventional free air thermal current I_{th} (according to IEC 60947-5-1 and EN 60947-5-1) (Ø ≤ 40 °C)			A	10
Short-circuit protection gG type fuses			A	10
Rated operational current				
I_e / AC-15	– acc. to IEC 60947-5-1	24 V - 50/60 Hz	A	10
		130 V - 50/60 Hz	A	5.5
		230 V - 50/60 Hz	A	3.1
		240 V - 50/60 Hz	A	3
		400 V - 50/60 Hz	A	1.8
	– according to UL 508, CSA C22 No.14			A600
I_e / DC-13	– according to IEC 60947-5-1	24 V - d.c.	A	2.8
		110 V - d.c.	A	0.6
		250 V - d.c.	A	0.27
	– according to UL 508, CSA C22 No.14	Q600		
Positivity				Contacts with positive opening operation as per IEC 60947-5-1 chapter 3 and EN 60947-5-1
Resistance between contacts			mΩ	25
Mechanical durability			Millions of operations	> 1 million of operating cycles
Max. switching frequency			Cycles/h	600
Electrical durability (according to IEC 60947-5-1 appendice C)				Utilization categories AC-15 and DC-13 (see curves and values below)
– Max. switching frequency			Cycles/h	3600
– Load factor				0.5

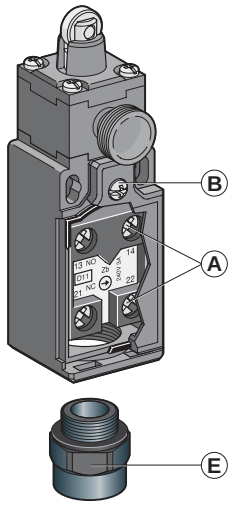
Electrical durability for AC-15 utilization category

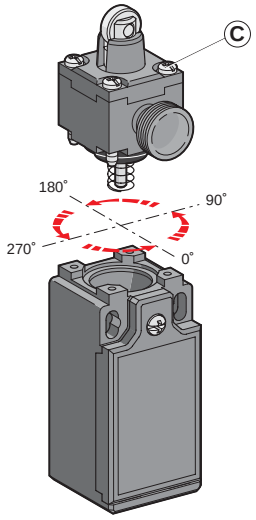


Electrical durability for DC-13 utilization category

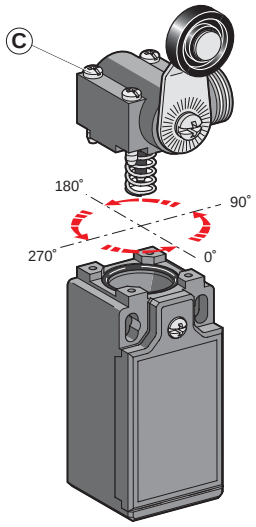
		Snap action	Slow action
		Power breaking for a durability of 5 million operating cycles	
Voltage	24 V	9.5 W	12 W
Voltage	48 V	6.8 W	9 W
Voltage	110 V	3.6 W	6 W

Tightening Torques

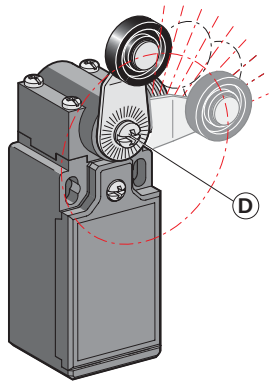




Heads P11, P12, P13, P31 and P32



Head P41



Roller lever

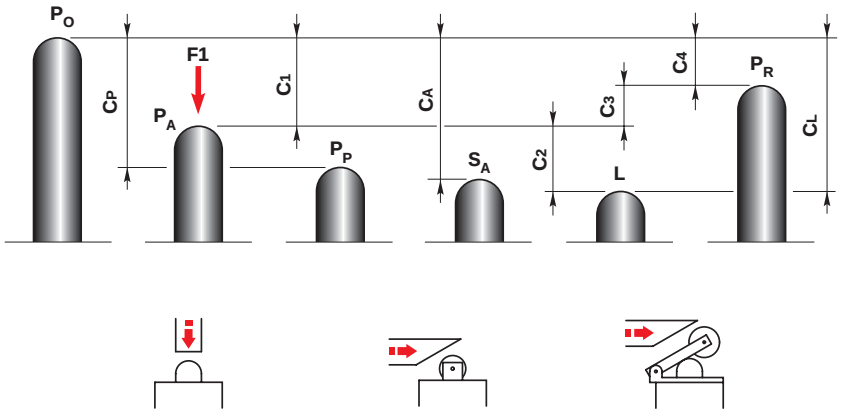
	A		B		C		D		E	
	Contact block connecting terminals		Closing the cover		Assembling the operating head		Assembling or adjusting the lever with plastic roller		Cable inlet by 1/2" NPT adaptor	
Screws	M3.5 ± pozidriv 2		ø3 ± pozidriv 1		ø3 ± pozidriv 1		ø4 ± Philips No. 2		–	
Tightening torque	Recommended N.m / lb.in	Max. N.m	Recommended N.m / lb.in	Max. N.m	Recommended N.m / lb.in	Max. N.m	Recommended N.m / lb.in	Max. N.m	Recommended N.m / lb.in	Max. N.m
Limit switches										
LS35P11...-R	0.8 / 7	0.9	0.5 / 4.3	0.8	0.5 / 4.3	0.8	–	–	17 / 150	18
LS35P12...-R	0.8 / 7	0.9	0.5 / 4.3	0.8	0.5 / 4.3	0.8	–	–	17 / 150	18
LS35P13...-R	0.8 / 7	0.9	0.5 / 4.3	0.8	0.5 / 4.3	0.8	–	–	17 / 150	18
LS35P31...-R	0.8 / 7	0.9	0.5 / 4.3	0.8	0.5 / 4.3	0.8	–	–	17 / 150	18
LS35P32...-R	0.8 / 7	0.9	0.5 / 4.3	0.8	0.5 / 4.3	0.8	–	–	17 / 150	18
LS35P41...-R	0.8 / 7	0.9	0.5 / 4.3	0.8	0.5 / 4.3	0.8	0.5 / 4.3	0.8	17 / 150	18

Connecting data of contact blocks

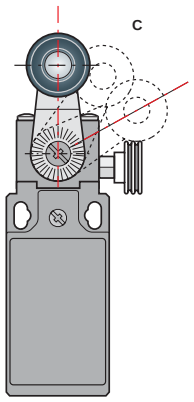
Connecting terminals		M3.5 (+,–) pozidriv 2 screw with cable clamp
Connecting capacity	1 or 2 x mm^2 / AWG	0.5 mm^2 / AWG 20 to 2.5 mm^2 / AWG 14
Terminal marking		According to EN 50013

Latch & manual reset
Technical data

Travel and operation diagrams



C: Travel in millimeters



C: Travel in degrees

P_O Free position:
position of the switch actuator when no external force is exerted on it.

P_A Operating position:
position of the switch actuator, under the effect of force F1, when the contacts leave their initial free position.

P_P Positive opening position:
position of the switch actuator from which positive opening is ensured.

S_A Latching point:
point of no return of the switch actuator beyond which the opened status of the (N.C.) contact(s) is maintained. Unlocking will only occur after deliberate action on the reset button.

L Max. travel position:
maximum acceptable travel position of the switch actuator under the effect of a force F1.

P_R Release position:
position of the switch actuator when the contacts return to their initial free position.

C_1 Pre-travel (average travel):
distance between the free position P_O and the operating position P_A.

C_P Positive opening travel:
minimum travel of the switch actuator, from the free position, to ensure positive opening operation of the normally closed contact (N.C.).

C_A Latching travel (average travel):
distance between the free position P_O and the latching point S_A.

C_2 Over-travel (average travel):
distance between the operating position P_A and the max. travel position L.

C_L Max. travel (maximum travel):
distance between the free position P_O and the max. travel position L.

C_3 Differential travel (C_1-C_4) (average travel):
travel difference of the switch actuator between the operating position P_A and the release position P_R.

C_4 Release travel (average travel):
distance between the release position P_R and the free position P_O.

Diagram for snap action contacts:

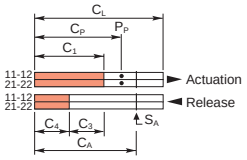
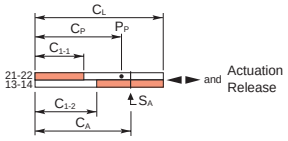


Diagram for non-overlapping slow action contacts:



Contacts position

Note: for slow action contacts, $C_3 = 0$, C_{1-1} = pre-travel of contact 21-22, C_{1-2} = pre-travel of contact 13-14.

Examples:

LS30P13D11-R
non-overlapping slow action contacts

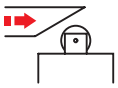
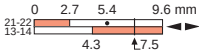


Diagram in millimetres / cam travel



LS30P41L02-R
simultaneous slow action contacts

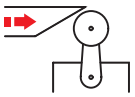
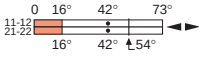


Diagram in degrees / lever rotation



LS30P11B02-R
snap action contacts

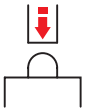
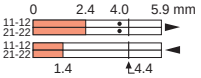


Diagram in millimetres / plunger travel



Double Insulation

Class II materials, according to IEC 536, are designed with double insulation. This measure consists in doubling the functional insulation with an additional layer of insulation so as to eliminate the risk of electric shock and thus not having to protect elsewhere. No conductive part of "double insulated" material should be connected to a protective conductor.

Positive Opening Operation

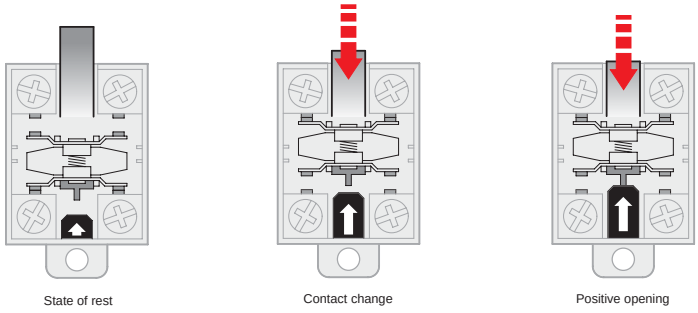
A control switch, with one or more break-contact elements, has a positive opening operation when the switch actuator ensures full contact opening of the break-contact. For the part of travel that separates the contacts, there must be a positive drive, with no resilient member (e.g. springs), between the moving contacts and the point of the actuator to which the actuating force is applied.

Control switches with positive opening operation may be provided with either snap action or slow action contact elements. To use several contacts on the same control switch with positive opening operation, they must be electrically separated from each other, if not, only one may be used.

Every control switch with positive opening operation must be indelibly marked on the outside with the symbol:

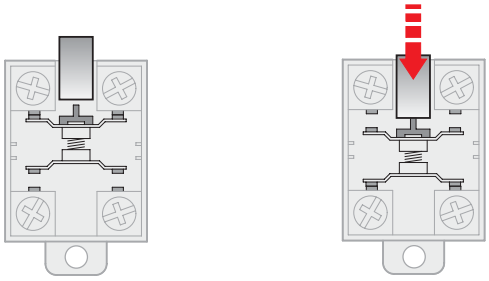
Snap Action

Snap action contacts are characterised by a release position that is distinct from the operating position (differential travel). Snap breaking of moving contacts is independent of the switch actuator's speed and contributes to regular electric performance even for slow switch actuator speeds.

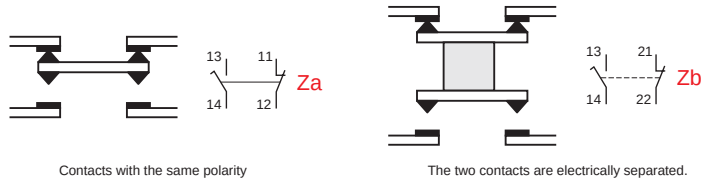


Slow Action

Slow action contacts are characterised by a release position that is the same as the operating position. The switch actuator's speed directly conditions the travel speed of contacts.



Contact shape according to IEC 60947-5-1.
Change-over contact elements with 4 terminals must be indelibly marked Za or Zb.
See figure opposite for contact representation.



Utilization category

AC-15: switching of electromagnetic loads of electromagnets using an alternating current (>72 VA).
DC-13: switching of electromagnets using a direct courant.

Minimum actuation force / torque

The minimum amount of force/torque that is to be applied to the switch actuator to produce a change in contact position.

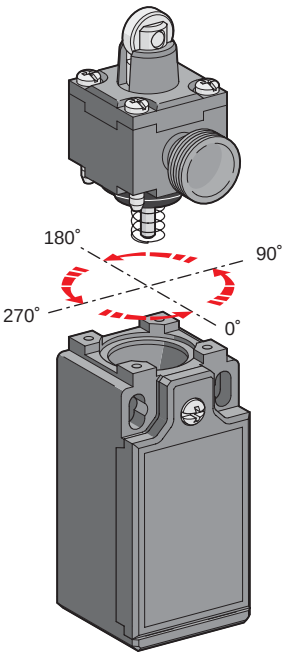
Minimum force / torque to achieve positive opening operation

The minimum amount of force/torque that is to be applied to the switch actuator to ensure positive opening operation of the N.C. contact.

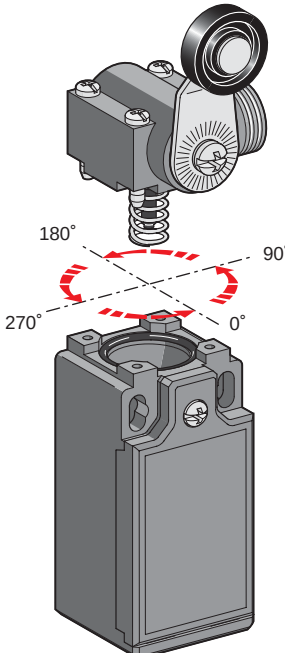
Implementation

Limit switches with latch and manual reset
LS35P...-R.

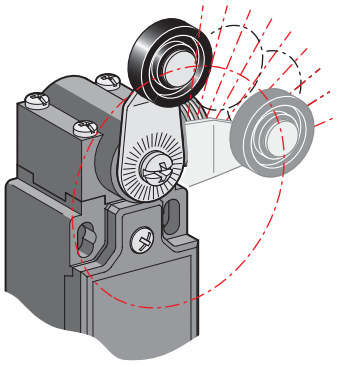
● Adjustment of the heads reference P11, P12, P13, P31 and P32.



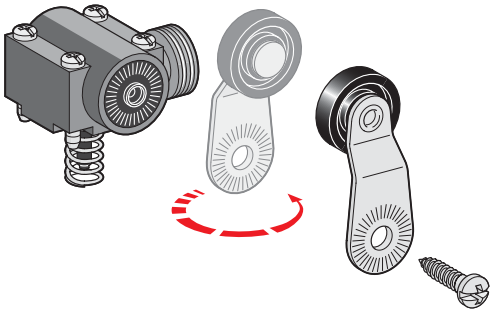
● Adjustment of the head reference P41.



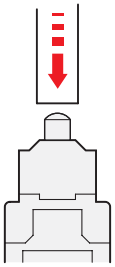
● Angular adjustment 10° in 10° of the lever on head P41.



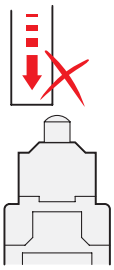
● Lever round turning on head P41.



Plain plunger

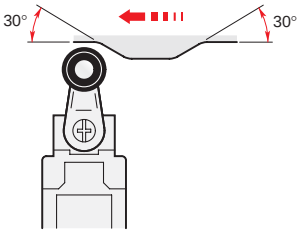


Correct

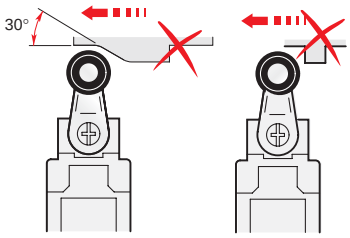


Incorrect

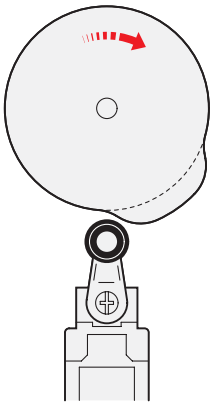
Roller plunger or roller lever



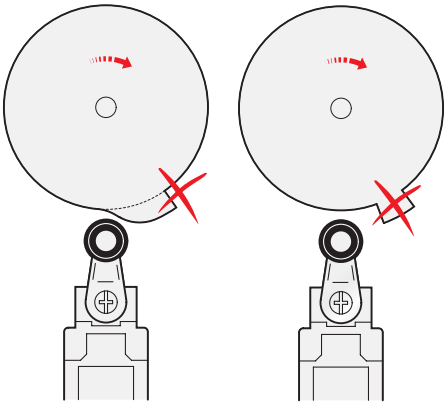
Correct



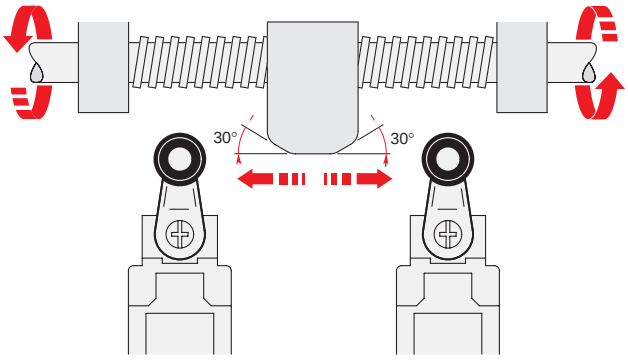
Incorrect



Correct

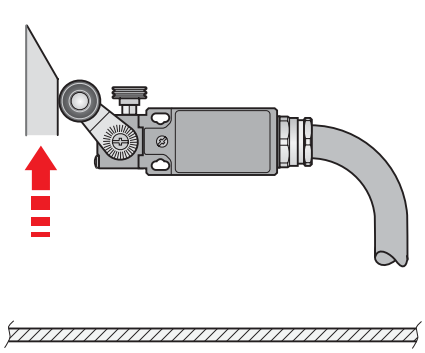


Incorrect

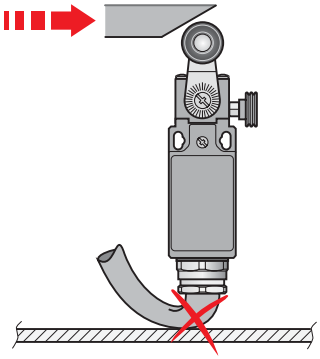


Latch & manual reset
Technical data
Utilization precautions

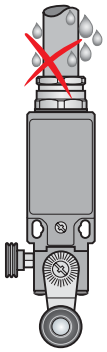
Curve of connecting cable / cable gland orientation



Correct



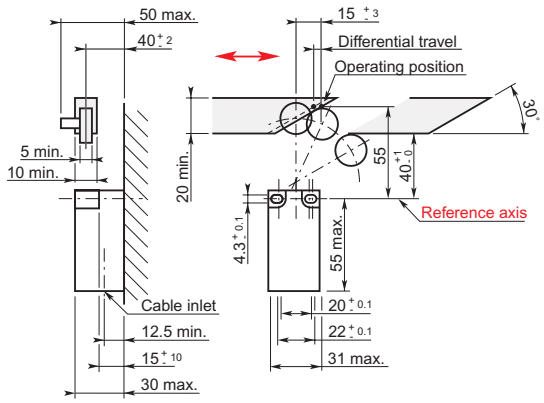
Incorrect



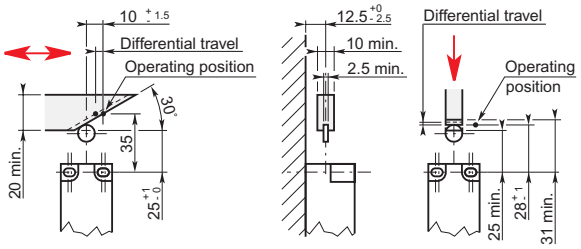
Latch & manual reset
Technical data
EN 50047 standard

The European Committee for Electrotechnical Standardization (CENELEC), which groups together 18 European countries, publishes EN standards. The present standard defines dimensions and mechanical data for limit switches (30mm x 55mm).

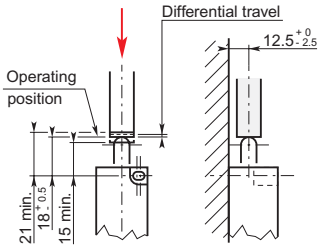
A Shape
Roller lever operating heads



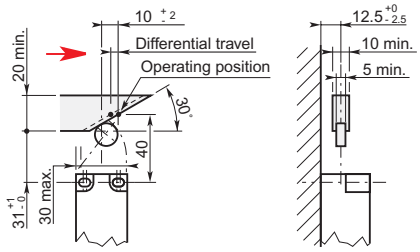
C Shape
Roller plunger operating heads



B Shape
Rounded plunger operating heads



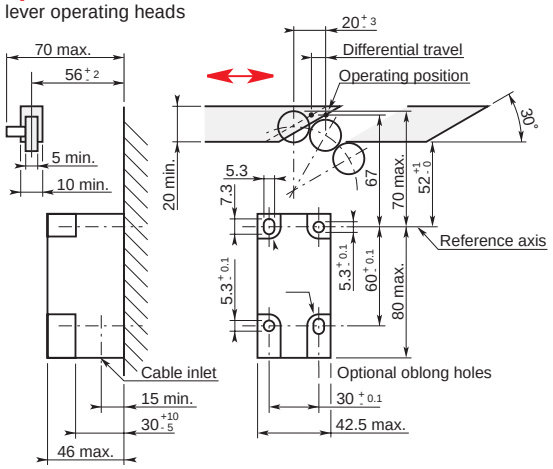
E Shape
Roller lever operating heads



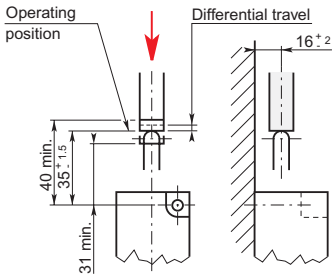
Latch & manual reset
Technical data
EN 50041 standard

The European Committee for Electrotechnical Standardization (CENELEC), which groups together 18 countries, publishes EN standards. The present standard defines dimensions and mechanical data for limit switches (42.5 x 80 mm).

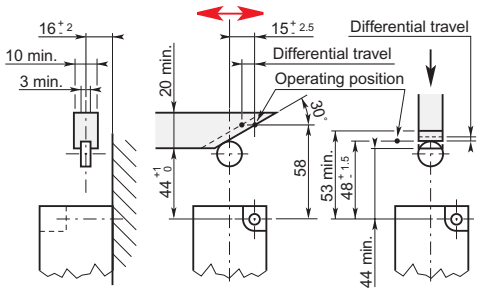
A Shape
Roller lever operating heads



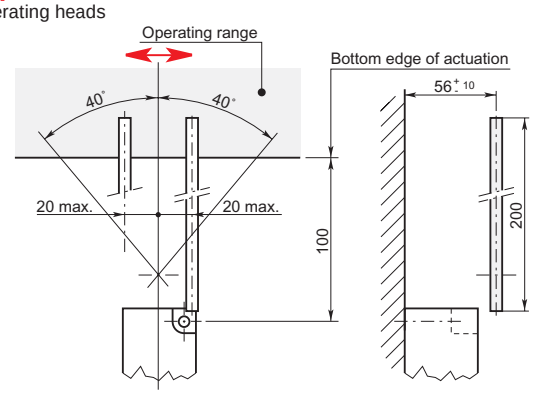
B Shape
Rounded plunger operating heads



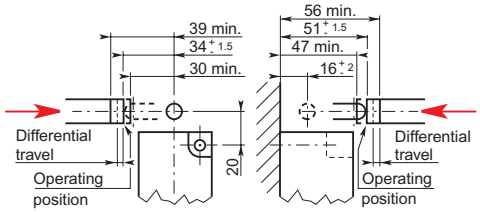
C Shape
Roller plunger operating heads



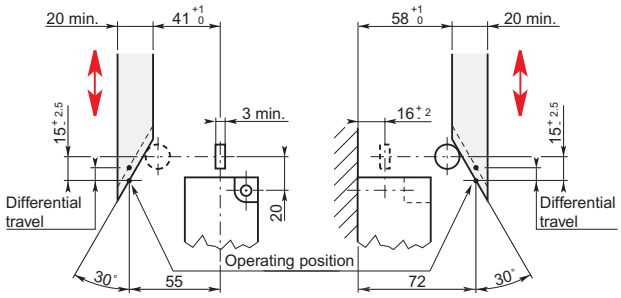
D Shape
Rod operating heads



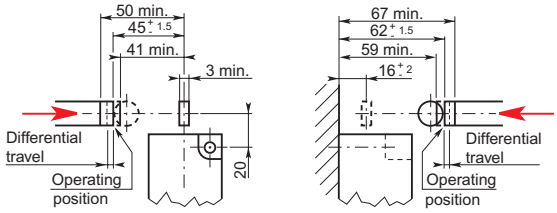
F Shape
Rounded lateral plunger operating heads



G Shape
Lateral roller plunger operating heads – Lateral actuation

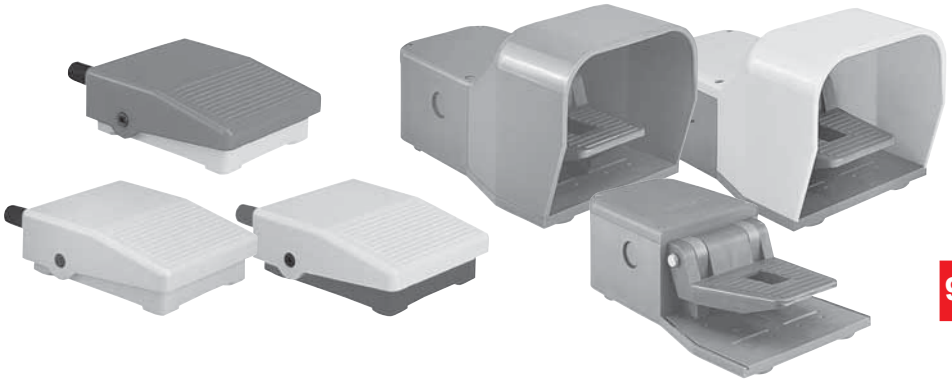


Lateral roller plunger operating heads – Front actuation



Foot switches

Plastic Foot switches



Description of Mini foot switches

- Reduced dimensions: 100 x 75 x 34 mm.
- Materials: cover and base made of self-extinguishing ABS.
- Color choice: black or grey base; black, grey, yellow or red cover.

Description of foot switches with covers

- Dimensions: 285 x 140 x 145.
- Materials: base, cover and pedal made of shock resistant Bayblend® FR 90 material (alloyed polycarbonate and ABS).
- Color choice: grey base; grey, yellow or red cover.
- Variations: grey base, half-red cover. Especially used for emergency stop function.

Note: this emergency stop function must never contain the «locked in neutral position» device.

UL Listed file #E191693

Application

Foot switch-operated machines such as: shearing machines, folding machines, spinning lathes, machine tools, wrapping machines, riveting presses, etc.

Foot switches with covers come in three operation formats:

- **Free movement:** contact position follows pedal movement: actuated when the pedal is pushed down, released when pedal is in a state of rest.
- **Foot switch locked in neutral position:** same operation as above, after unlocking the pedal with the end of the foot.
- **Foot switch latched in low position:** same operation as free movement, except that a state of rest is obtained only after having unlatched the pedal with the end of the foot.

General information
IPM Mini foot switches, IPS Foot switches with covers
Description

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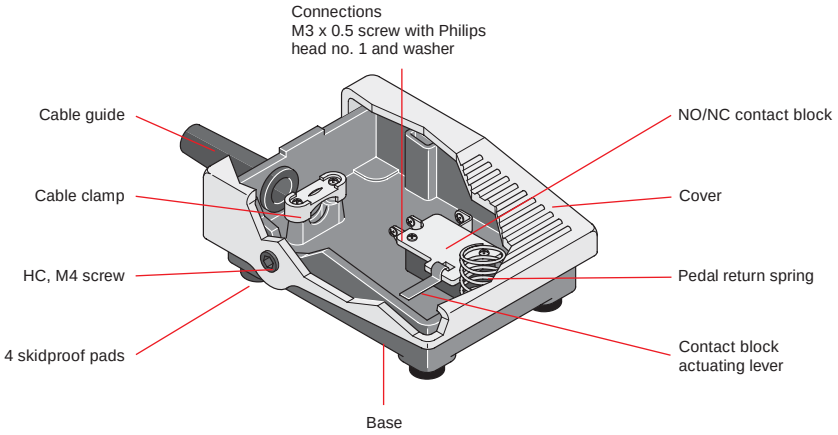

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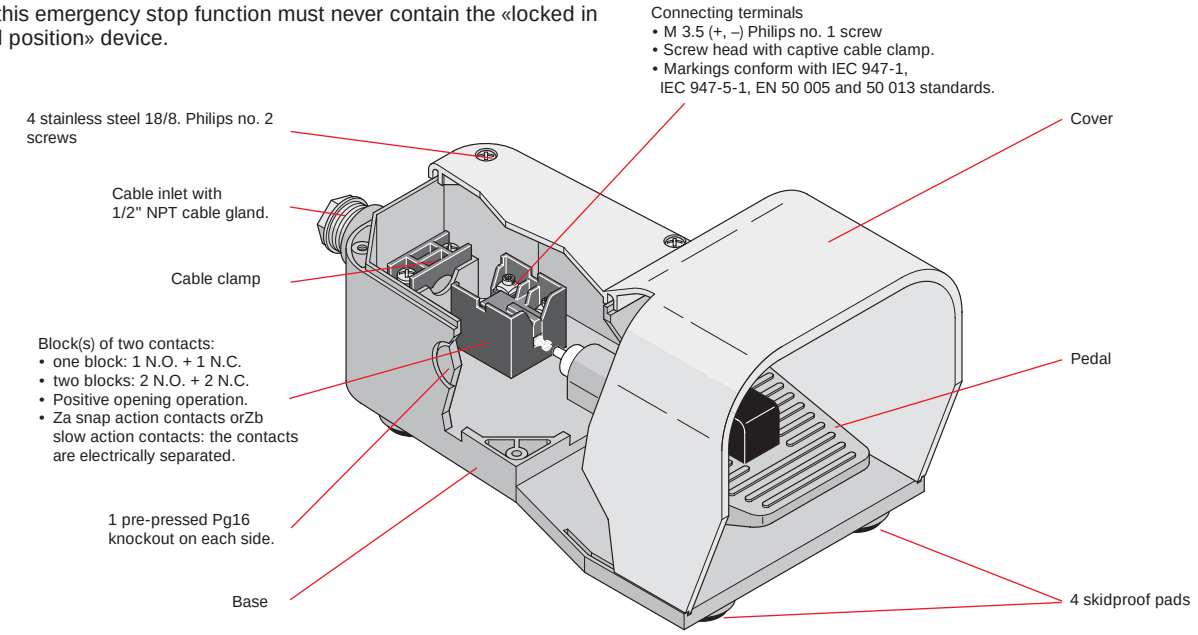
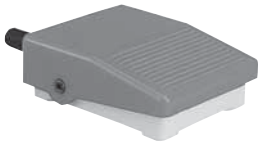
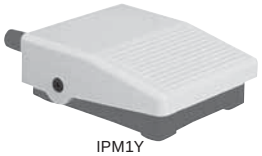


Comment: Foot switches with covers can be assembled on a plate and equipped with a transportation handle. Upon request, instead of the handle an emergency stop button can be installed above a tube that allows for connection cable passage.

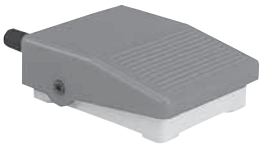
Foot switches
Mini foot switches


IPM1R


IPM1Y


IPM1G


IPM1B


IPM1R

IPM Mini foot switches

NC / NO / C N.O. + N.C. contact block	Cover color	Unit weight in kg Packing 1 piece	Catalog number	List price
Black base				
1	Yellow	0.130	IPM1Y	**$ 28**
1	Grey	0.130	IPM1G	
1	Black	0.130	IPM1B	
1	Red	0.130	IPM1R	
Grey base				
1	Yellow	0.130	IPM2Y	**28**
1	Grey	0.130	IPM2G	
1	Black	0.130	IPM2B	
1	Red	0.130	IPM2R	

Catalog number explanation

IPM 1 Y

Mini foot switch

Base color
1 - black
2 - grey

Cover color
Y - yellow
G - grey
B - black
R - red

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Foot switches
Foot switches with covers


IPSY1A11


IPSR1A11


IPSG1A11


IPSZ1A11

IPS foot switches

Contact blocks: Snap action Za	Contact blocks: Snap action Za Za	Contact blocks: Non-overlapping slow action Zb	Contact blocks: Non-overlapping slow action Zb Zb	Unit weight in kg Packing 1 piece	Catalog number	List price
Free movement						
1	—	—	—	1.100	IPS★1A11	**$ 76**
—	—	1	—	1.100	IPS★1D11	**76**
—	1 + 1	—	—	1.100	IPS★1A22	**88**
—	—	—	1 + 1	1.100	IPS★1D22	**88**
Locked in neutral position						
1	—	—	—	1.100	IPS★2A11	**83**
—	—	1	—	1.100	IPS★2D11	**83**
—	1 + 1	—	—	1.100	IPS★2A22	**91**
—	—	—	1 + 1	1.100	IPS★2D22	**91**
Latched in low position						
1	—	—	—	1.100	IPS★3A11	**81**
—	—	1	—	1.100	IPS★3D11	**81**
—	1 + 1	—	—	1.100	IPS★3A22	**93**
—	—	—	1 + 1	1.100	IPS★3D22	**93**
Free movement foot switch with half-red cover						
1	—	—	—	0.800	IPSZ1A11	**85**
—	—	1	—	0.800	IPSZ1D11	**85**
—	1 + 1	—	—	0.800	IPSZ1A22	**97**
—	—	—	1 + 1	0.800	IPSZ1D22	**97**
Foot switch latched in low position with half-red cover						
1	—	—	—	0.800	IPSZ3A11	**90**
—	—	1	—	0.800	IPSZ3D11	**90**
—	1 + 1	—	—	0.800	IPSZ3A22	**102**
—	—	—	1 + 1	0.800	IPSZ3D22	**102**

Color code

To select a foot switch color, substitute the appropriate color code for the ★ in the catalog number

Yellow	Y
Grey	G
Red	R

Catalog number explanation

IPS Y 1 A 11

Plain foot switch with cover

Cover color
Y - yellow
G - grey
R - red
Z - half-red cover ①

1 - Free movement
2 - Foot switch locked in neutral position
3 - Foot switch latched in low position

A - Za Snap action
D - Zb Slow action non-overlapping late make

Contact blocks
11 - 1 N.O. contact + 1 N.C. contact
22 - 2 N.O. contacts + 2 N.C. contacts

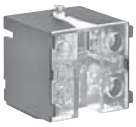
① Incompatible with locked in neutral position function.

Components
Double Insulation - Protection Cover in ABS - IP65

⊖ "N.C." contact with positive opening operation.

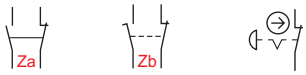
IPSXG

IPSXZ



IPSXCA11

IPSXCD11

Contact blocks  B11 D11 C11	Positive opening operation	Catalog number	List price
Protection cover for foot switch			
Grey cover	—	IPSXG	
Yellow cover	—	IPSXY	**$ 28**
Red cover	—	IPSXR	
Half red cover	—	IPSXZ	
Contact block for IPS... foot switches			
1NC & 1NO (Za) snap action			
1 — —	⊖	IPSXCA11	**17**
1NC & 1NO (Zb) slow action non-overlapping late make			
— 1 —	⊖	IPSXCD11	**17**

9

Technical data

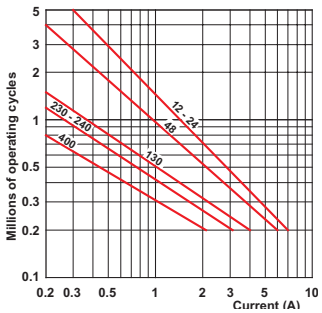
General technical data

		Mini foot switch	Foot switch with cover
Standards		IEC 1058-1	IEC 947-5-1
Certifications & Approvals		—	UL - CSA - BG
Air temperature near the device – during operation – for storage	 °C °C	 – 10 ... + 70 – 25 ... + 80	 – 10 ... + 70 – 30 ... + 80
Climatic withstand		—	according to IEC 68-2-3 and salty mist according to IEC 68-2-11
Shock withstand (according to IEC 68-2-27 and EN 60 068-2-27)	g	—	50g (1/2 sinusoidal shock for 11 ms) no change in contact position
Degree of protection (according to IEC 529 and EN 60 529)		IP 40	IP 65
Actuation torque	N.m	1.2	0.25
Operating angle	Degree	2 to 4	15
Cable inlet		Cable guide ø min. 6mm; ø max. 8.5 mm	Pg 16

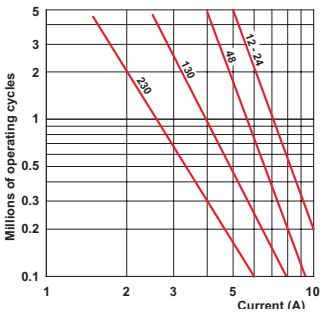
Electrical data

Rated insulation voltage U_i		V	250	500 (according to IEC 947-1 and EN 60-947-1) Degree of pollution 3
Rated impulse withstand voltage U_{imp} (according to IEC 947-1 and EN 60 947-1)		kV	1	6
Conventional free air thermal current I_{th} (q < 40 °C)		A	15	10 (according to IEC 947-1)
Short-circuit protection U_e < 500 V a.c. - gG (gl) type fuses		A	10	10
Rated operational current		A A	3 (250 V a.c.) 0.06 (230 V d.c.)	A 600 (according to UL 508 and CSA C22-2 n° 14) Q 600 (according to UL 508 and CSA C22-2 n° 14)
AC-15 acc. to IEC 947-5-1	24 V	A	—	10
	130 V	A	—	5.5
	230 V	A	—	3.1
	240 V	A	—	3
	400 V	A	—	1.8
DC-13 acc. to IEC 947-5-1	24 V	A	—	2.8
	110 V	A	—	0.6
	250 V	A	—	0.27
Resistance between contacts		mΩ	30	25
Connecting terminals			M3 x 0.5 screw with Philips head no. 1 and washer	M3.5 (+, –) screw with Philips head no. 1 with cable clamp
Positive opening operation (according to IEC 947-5-1)			—	⊖
Connecting capacity		1 or 2 x mm²	—	0.5 – 2.5
Terminal marking			—	According to EN 50 013
Mechanical durability		Millions of operations	10	30
Electrical durability		Operations	100,000	According to IEC 947-5-1, utilization categories AC-15 and DC-13 (Load factor of 0.5 according to curves below)

AC-15 — Snap action



AC-15 — Slow action

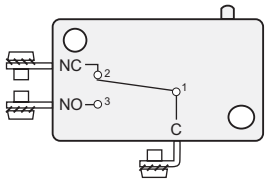


DC-13		Snap action	Slow action
		Power breaking for a durability of 5 million operating cycles	
Voltage	24 V	9.5 W	12 W
Voltage	48 V	6.8 W	9 W
Voltage	110 V	3.6 W	6 W

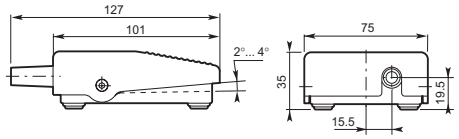
IPM Mini foot switches

Base color		Yellow cover	Grey cover	Black cover	Red cover
Black base	Catalog number	IPM1Y	IPM1G	IPM1B	IPM1R
Grey base	Catalog number	IPM2Y	IPM2G	IPM2B	IPM2R
Weight (packing per unit)	kg	0.130	0.130	0.130	0.130

N.O. + N.C. Contact block



Dimensions (mm)



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Technical data & approximate dimensions
Foot switches with covers

IPS Foot switches

		Free movement	Locked in neutral position	Latched in low position
Snap action contacts 13 11 Za 14 12	Catalog number	IPS1A11	IPS2A11	IPS3A11
	⊖ (Positive opening operation of the N.C. contact)	⊖	⊖	⊖
Snap action contacts 13 11 Za 14 12 13 11 Za 14 12	Catalog number	IPS1A22	IPS2A22	IPS3A22
	⊖ (Positive opening operation of the N.C. contact)	⊖	⊖	⊖
Non-overlapping Slow action contacts 13 21 Zb 14 22	Catalog number	IPS1D11	IPS2D11	IPS3D11
	⊖ (Positive opening operation of the N.C. contact)	⊖	⊖	⊖
Non-overlapping Slow action contacts 13 21 Zb 14 22 13 21 Zb 14 22	Catalog number	IPS1D22	IPS2D22	IPS3D22
	⊖ (Positive opening operation of the N.C. contact)	⊖	⊖	⊖
Weight (packing per unit)	kg	1.10	1.10	1.10

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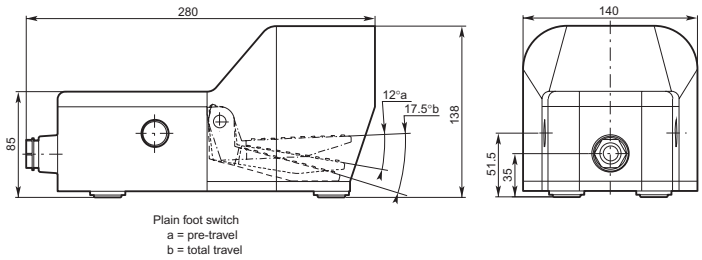
Dimensions (mm)



Plain foot switch
a = pre-travel
b = total travel

Sensors
Index

Notes

Sensors

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Sensors

Inductive sensors

SIF1,5-M8N-V2-PO

SIN4-M12N-C1-PO

Type	Catalog number	Pack. size/ pieces	Weight 1 piece kg
Inductive Sensors			
SIF0,8-Z4N-V2-PO	1SAF 104 211 R 1000	1	0.020
SIF0,8-Z4N-C8-PO	1SAF 104 411 R 1000	1	0.010
SIF1,5-Z6N-U2-PO	1SAF 106 211 R 1000	1	0.030
SIF1,5-Z6N-C8-PO	1SAF 106 411 R 1000	1	0.010
SIF1,5-M8N-V2-PO	1SAF 108 111 R 1000	1	0.050
SIF1,5-M8N-V2-NO	1SAF 108 111 R 3000	1	0.044
SIF1,5-M8S-U2-PO	1SAF 109 211 R 1000	1	0.040
SIF1,5-M8S-C1-PO	1SAF 108 511 R 1000	1	0.030
SIF1,5-M8E-C1-PO	1SAF 108 511 R 1001	1	0.035
SIF1,5-M8E-C1-NO	1SAF 108 511 R 3001	1	0.035
SIN2-M8N-V2-PO	1SAF 108 122 R 1000	1	0.040
SIN2-M8N-V2-NO	1SAF 108 122 R 3000	1	0.040
SIN2-M8S-U2-PO	1SAF 109 222 R 1000	1	0.040
SIN2-M8N-C1-PO	1SAF 108 522 R 1000	1	0.030
SIN2-M8N-C1-NO	1SAF 108 522 R 3000	1	0.030
SIN3-M8N-V2-PO	1SAF 108 123 R 1000	1	0.050
SIN3-M8N-C8-PO	1SAF 108 423 R 1000	1	0.030
SIF2-M12N-V2-PO	1SAF 112 111 R 1000	1	0.030
SIF2-M12N-V2-PK	1SAF 112 111 R 1200	1	0.074
SIF2-M12N-V2-NO	1SAF 112 111 R 3000	1	0.030
SIF2-M12N-V2-NK	1SAF 112 111 R 3200	1	0.074
SIF2-M12N-V2-DO	1SAF 112 111 R 5000	1	0.040
SIF2-M12N-V2-AO	1SAF 112 111 R 6000	1	0.085
SIF2-M12S-V2-PO	1SAF 113 211 R 1000	1	0.030
SIF2-M12N-C1-PO	1SAF 112 511 R 1000	1	0.020
SIF2-M12N-C1-NO	1SAF 112 511 R 3000	1	0.020
SIF2-M12S-C1-PO	1SAF 113 511 R 1000	1	0.020
SIF2-M12E-C1-PO	1SAF 112 511 R 1001	1	0.065
SIF2-M12E-V2-AC	1SAF 112 111 R 6100	1	0.125
SIN4-M12N-V2-PO	1SAF 112 122 R 1000	1	0.030
SIN4-M12N-V2-PK	1SAF 112 122 R 1200	1	0.074
SIN4-M12N-V2-NO	1SAF 112 122 R 3000	1	0.030
SIN4-M12N-V2-NK	1SAF 112 122 R 3200	1	0.074
SIN4-M12N-V2-DO	1SAF 112 122 R 5000	1	0.040
SIN4-M12S-V2-PO	1SAF 113 122 R 1000	1	0.030
SIN4-M12N-V2-AO	1SAF 112 122 R 6000	1	0.085
SIN4-M12N-C1-PO	1SAF 112 522 R 1000	1	0.020
SIN4-M12S-C1-PO	1SAF 113 522 R 1000	1	0.020
SIN4-M12N-C1-NO	1SAF 112 522 R 3000	1	0.020
SIN6-M12N-V2-PO	1SAF 112 123 R 1000	1	0.090
SIN6-M12N-C1-PO	1SAF 112 523 R 1000	1	0.020

- Output signal
- Connection
- Type of housing
- Operating distance

SIF5-M18N-V2-PO

SIF5-M18N-C1-PO

Inductive Sensors

Type	Catalog number	Pack. size/ pieces	Weight 1 piece kg
SIF5-M18N-V2-PO	1SAF 118 111 R 1000	1	0.100
SIF5-M18N-V2-NO	1SAF 118 111 R 3000	1	0.100
SIF5-M18N-V2-NK	1SAF 118 111 R 3200	1	0.120
SIF5-M18N-V2-PK	1SAF 118 111 R 1200	1	0.120
SIF5-M18N-V2-DO	1SAF 118 111 R 5000	1	0.120
SIF5-M18N-V2-AO	1SAF 118 111 R 6000	1	0.130
SIF5-M18N-V2-AC	1SAF 118 111 R 6100	1	0.130
SIF5-M18N-C1-PO	1SAF 118 511 R 1000	1	0.060
SIF5-M18N-C1-NO	1SAF 118 511 R 3000	1	0.060
SIF5-M18E-C1-PO	1SAF 118 511 R 1001	1	0.125
SIF5-M18E-C1-NO	1SAF 118 511 R 3001	1	0.125
SIN8-M18N-V2-PO	1SAF 118 122 R 1000	1	0.100
SIN8-M18N-V2-PK	1SAF 118 122 R 1200	1	0.120
SIN8-M18N-V2-NO	1SAF 118 122 R 3000	1	0.100
SIN8-M18N-V2-NK	1SAF 118 522 R 3200	1	0.120
SIN8-M18N-V2-DO	1SAF 118 122 R 5000	1	0.120
SIN8-M18N-V2-AO	1SAF 118 122 R 6000	1	0.130
SIN8-M18N-V2-AC	1SAF 118 122 R 6100	1	0.130
SIN8-M18N-C1-PO	1SAF 118 522 R 1000	1	0.060
SIN8-M18N-C1-NO	1SAF 118 522 R 3000	1	0.060
SIN8-M18E-C1-PO	1SAF 118 522 R 1001	1	0.235
SIN12-M18N-V2-PO	1SAF 118 123 R 1000	1	0.120
SIN12-M18N-C1-PO	1SAF 118 523 R 1000	1	0.060
SIF10-M30N-V2-PO	1SAF 130 111 R 1000	1	0.120
SIF10-M30N-V2-PK	1SAF 130 111 R 1200	1	0.130
SIF10-M30N-V2-NO	1SAF 130 111 R 3000	1	0.120
SIF10-M30N-V2-NK	1SAF 130 111 R 3200	1	0.130
SIF10-M30N-V2-DO	1SAF 130 111 R 5000	1	0.200
SIF10-M30N-V2-AO	1SAF 130 111 R 6000	1	0.280
SIF10-M30N-V2-AC	1SAF 130 111 R 6100	1	0.280
SIF10-M30N-C1-PO	1SAF 130 511 R 1000	1	0.130
SIF10-M30N-C1-NO	1SAF 130 511 R 3000	1	0.130
SIF10-M30E-C1-PO	1SAF 130 511 R 1001	1	0.129
SIN15-M30N-V2-PO	1SAF 130 122 R 1000	1	0.120
SIN15-M30N-V2-PK	1SAF 130 122 R 1200	1	0.130
SIN15-M30N-V2-NO	1SAF 130 122 R 3000	1	0.120
SIN15-M30N-V2-NK	1SAF 130 122 R 3200	1	0.130
SIN15-M30N-V2-AO	1SAF 130 122 R 6000	1	0.280
SIN15-M30N-V2-AC	1SAF 130 122 R 6100	1	0.280
SIN15-M30N-C1-PO	1SAF 130 522 R 1000	1	0.120
SIN15-M30N-C1-NO	1SAF 130 522 R 3000	1	0.120
SIN15-M30E-C1-PO	1SAF 130 522 R 1001	1	0.131

- Output signal
- Connection
- Type of housing
- Operating distance

Inductive & capacitive sensors

SIF15-Q40N-T-PO

Inductive Sensors

Type	Catalog number	Pack. size/ pieces	Weight 1 piece kg
SIF2-B28N-V0,1-PO	1SAF 123 111 R 1000	1	0.010
SIF2-B28N-V0,1-N0	1SAF 123 111 R 3000	1	0.010
SIF6-B45N-U2-PO	1SAF 125 111 R 1000	1	0.100
SIF15-Q40N-T-PO	1SAF 144 811 R 1000	1	0.280
SIF15-Q40N-T-PK	1SAF 144 811 R 1200	1	0.280
SIF15-Q40N-T-NO	1SAF 144 811 R 3000	1	0.280
SIF15-Q40N-C1-PO	1SAF 144 511 R 1000	1	0.280
SIF20-Q40N-T-PO	1SAF 144 822 R 1000	1	0.280
SIN20-Q40N-T-AK	1SAF 144 822 R 6200	1	0.280
SIN30-Q40N-T-PO	1SAF 144 823 R 1000	1	0.280
SIN30-Q40N-T-PK	1SAF 144 823 R 1200	1	0.280
SIN30-Q40N-T-AK	1SAF 144 823 R 6200	1	0.280
SIF20-Q40S-C1-PO	1SAF 145 812 R 1000	1	0.140
SIF20-Q40T-C1-PO	1SAF 146 812 R 1000	1	0.140
SIF20-Q40T-C1-PK	1SAF 146 812 R 1200	1	0.140
SIN30-Q40S-C1-PO	1SAF 145 823 R 1000	1	0.140
SIN30-Q40T-C1-PK	1SAF 146 823 R 1200	1	0.140
SIF40-Q80N-T-PK	1SAF 148 811 R 1200	1	0.460
SIN50-Q80N-T-PO	1SAF 148 822 R 1000	1	0.415
SIN50-Q80N-T-PK	1SAF 148 822 R 1200	1	0.415
SIF5-M18N-V2-M	1SAF 118 112 R 8000	1	0.170

- Output signal
- Connection
- Type of housing
- Operating distance

SCF10-M30N-V2-AO

Capacitive Sensors

Type	Catalog number	Pack. size/ pieces	Weight 1 piece kg
SCF10-M30N-V2-PO	1SAF 230 111 R 1000	1	0.280
SCF10-M30N-C1-PO	1SAF 230 511 R 1000	1	0.148
SCF10-M30N-V2-AO	1SAF 230 111 R 6000	1	0.270
SCF10-M30N-V2-PK	1SAF 230 111 R 1200	1	0.240
SCF10-M30N-C1-PK	1SAF 230 511 R 1200	1	0.140

- Output signal
- Connection
- Type of housing
- Operating distance

SOD500-B45N-C1-PKS

Photoelectric Sensors

Type		Catalog number	Pack. size/ pieces	Weight 1 piece kg
SOT 20M -	B75N-T-KK	1SAF 320 750 R 1100	1	0.190
SOR 1500 -	M18N-C1-PO	1SAF 318 542 R 1001	1	0.100
SOR 4000 -	M18N-C1-PO	1SAF 318 542 R 1002	1	0.110
SOD 200 -	M18N-C1-PO	1SAF 318 553 R 1000	1	0.070
SOR 2000 -	B26N-U2-PO	1SAF 323 242 R 1000	1	0.070
SOD 400 -	B26N-U2-PO	1SAF 323 253 R 1000	1	0.100
SOR 5000 -	B75N-T-POS	1SAF 328 842 R 1000	1	0.200
SOR 5000 -	B75N-T-KK	1SAF 328 842 R 1100	1	0.110
SOD 500 -	B45N-C1-PKS	1SAF 325 553 R 1210	1	0.060
SOD 500 -	B45N-C1-NKS	1SAF 325 553 R 3210	1	0.060
SOR 6000 -	B45N-C1-PKS	1SAF 325 545 R 1210	1	0.060
SOR 6000 -	B45N-C1-NKS	1SAF 325 545 R 3210	1	0.060
SOT 15M -	B45N- C1-PKS	1SAF 325 586 R 1210	1	0.120
SOT 15M -	B45N- C1-NKS	1SAF 325 586 R 3210	1	0.120
SORG 2000 -	B45N- C1-PKS	1SAF 325 543 R 1210	1	0.060
SORG 2000 -	B45N- C1-NKS	1SAF 325 543 R 3210	1	0.060
SOD 800 -	B75N-T-POS	1SAF 328 853 R 1000	1	0.200
SOD 2000 -	B75N-T-KK	1SAF 328 853 R 1100	1	0.110

- Output signal
- Connection
- Type of housing
- Operating distance

Photoelectric Sensors with Waveguides

Type		Catalog number	Pack. size/ pieces	Weight 1 piece kg
SOLX-	B50N-C8-PKS	1SAF 325 160 R 1000	1	0.120
SOLD 50-	B50N-PVM6	1SAF 325 152 R 0001	1	0.020
SOLD15-	B50N-PVM3	1SAF 325 151 R 0001	1	0.020
SOLT150-	B50N-PVM4	1SAF 325 163 R 0001	1	0.011
SOLT150-	B50N-PVM3	1SAF 325 163 R 0002	1	0.011

SUD500-M30N-C1-M

Ultrasonic Sensors

Type	Catalog number	Pack. size/ pieces	Weight 1 piece kg
SUD 500-M30N-C1-POS	1SAF 430 651 R 1002	1	0.200
SUD2000-M30N-C1-POS	1SAF 430 653 R 1002	1	0.200
SUD4000-M30N-C1-POS	1SAF 430 654 R 1002	1	0.210
SUD6000-M30N-C1-POS	1SAF 430 655 R 1002	1	0.400
SUD 500-M30N-C1-NOS	1SAF 430 651 R 3002	1	0.200
SUD2000-M30N-C1-NOS	1SAF 430 653 R 3002	1	0.200
SUD4000-M30N-C1-NOS	1SAF 430 654 R 3002	1	0.210
SUD6000-M30N-C1-NOS	1SAF 430 655 R 3002	1	0.400
SUD 500-M30N-C1-M	1SAF 430 551 R 8002	1	0.220
SUD2000-M30N-C1-M	1SAF 430 553 R 8002	1	0.220
SUD4000-M30N-C1-M	1SAF 430 554 R 8002	1	0.300
SUD6000-M30N-C1-M	1SAF 430 555 R 8002	1	0.400

- Output signal
- Connection
- Type of housing
- Operating distance

Technical data & Approximate dimensions
Inductive sensors, small & cylindrical

Inductive Sensors, small, cylindrical

Operating distance S_n, mounting			**0.8 mm flush**	**0.8 mm flush**	**1.5 mm flush**	**1.5 mm flush**
PNP	NO		SIF0,8-Z4N-V2-PO	SIF0,8-Z4N-C8-PO	SIF1,5-Z6N-U2-PO	SIF1,5-Z6N-C8-PO
	NC					
	Antivalent					
NPN	NO					
	Antivalent					
DC 2-wire	NO					
AC	NO					
	NC					
	Antivalent					
Switching distance		[mm]	0 ... 0.648	0 ... 0.648	0 ... 1.215	0 ... 1.215
Reduction factor r_{V2A} 0.85 0.85 0.70.7						
r_{AL} 0,45 0.45 0.25 0.25						
r_{Cu} 0.40.40.20.2						
Operating voltage		[V]	10 ... 30	10 ... 30	10 ... 60	10 ... 60
Operating current		[mA]	200	200	100	100
Switching frequency		[Hz]	3000	3000	500	500
Idle current / residual current		[mA]	10	10	15	15
Line voltage drop		[V]	22233			
Short circuit protection			clocking	clocking	clocking	clocking
Inverse polarity protection			yes	yes	yes	yes
Indication	output signal		LED yellow	LED yellow	LED yellow	-
	voltage		-	-	-	-
Operating temperature range		[°C]	-25 ... 70	-25 ... 70	-25 ... 70	-25 ... 70
In compliance with			EN60947-5-2	EN60947-5-2	EN60947-5-2	EN60947-5-2
Protection class acc. to IEC 60529			IP67	IP67	IP67	IP67
Connection type			2 m, PVC-cable	Connector M8	2 m, PUR-cable	Connector M8
Conductor diameter			0.14 mm²	-	0.14 mm²	-
Housing material			stainless steel	stainless steel	stainless steel	stainless steel
Front face			PBT (Crastin)	PBT (Crastin)	PBT (Crastin)	PBT (Crastin)
Drawing No.			LS008002	LS000001	FZ015003	FZ015004

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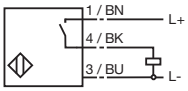
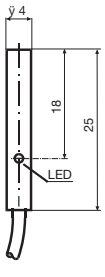
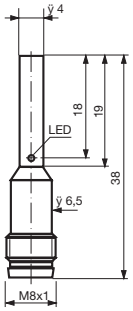
Output signals

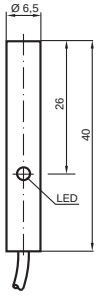
Output PO

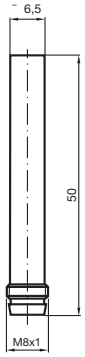


Dimensions in mm







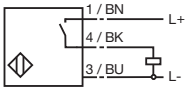


Inductive Sensors, with thread M 8 x 1

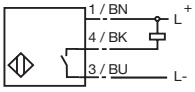
Operating distance S_n, mounting			**1.5 mm flush**	**1.5 mm flush**	**1.5 mm flush**
PNP	NO		SIF1,5-M8N-V2-PO	SIF1,5-M8S-U2-PO	SIF1,5-M8S-C1-PO
	NC				
	Antivalent				
NPN	NO		SIF1,5-M8N-V2-NO		
	Antivalent				
DC 2-wire	NO				
AC	NO				
	NC				
	Antivalent				
Switching distance		[mm]	0 ... 1.215	0 ... 1.215	0 ... 1.215
Reduction factor		r_{V2A}	0.75	0.7	0.75
		r_{AL}	0.45	0.25	0.45
		r_{Cu}	0.35	0.2	0.35
Operating voltage		[V]	10 ... 30	10 ... 60	10 ... 30
Operating current		[mA]	100	100	100
Switching frequency		[Hz]	1500	500	1500
Idle current / residual current		[mA]	15	15	15
Line voltage drop		[V]	3	3	3
Short circuit protection			clocking	clocking	clocking
Inverse polarity protection			yes	yes	yes
Indication		output signal	LED yellow	LED yellow	LED yellow
		voltage	-	-	-
Operating temperature range		[°C]	-25 ... 70	-25 ... 70	-25 ... 70
In compliance with			EN60947-5-2	EN60947-5-2	EN60947-5-2
Protection class acc. to IEC 60529			IP67	IP67	IP67
Connection type			2 m, PVC-cable	2 m, PUR-cable	Connector M12
Conductor diameter			0,14 mm²	0,14 mm²	-
Housing material			nickel-plated brass	stainless steel	nickel-plated brass
Front face			PBT (Crastin)	PBT (Crastin)	PBT (Crastin)
Drawing No.			FZ015013	FZ015015	FZ015009

Output signals

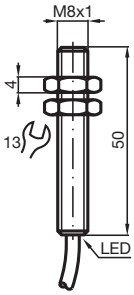
Output PO

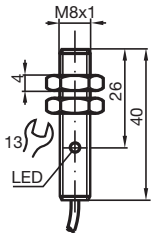


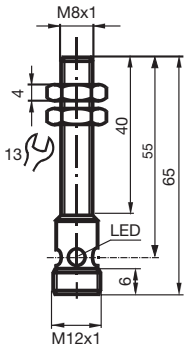
Output NO



Dimensions in mm







Technical data & Approximate dimensions
Inductive sensors, M 8 x 1 thread

Inductive Sensors, with thread M 8 x 1

Operating distance S_n, mounting			1.5 mm flush	1.5 mm flush
PNP	NO		SIF1,5-M8E-C1-PO	
	NC			
	Antivalent			
NPN	NO			SIF1,5-M8E-C1-NO
	Antivalent			
DC 2-wire	NO			
AC	NO			
	NC			
	Antivalent			
Switching distance		[mm]	0 ... 1.215	0 ... 1.215
Reduction factor		r_{V2A}	0.7	0.67
		r_{AL}	0.25	0.24
		r_{Cu}	0.2	0.21
Operating voltage [V]			10 ... 60	10 ... 60
Operating current [mA]			100	100
Switching frequency		[Hz]	500	5000
Idle current / residual current		[mA]	15	10
Line voltage drop		[V]	3	2.6
Short circuit protection			clocking	clocking
Inverse polarity protection			yes	yes
Indication	output signal		LED yellow	LED yellow
	voltage		-	-
Operating temperature range		[°C]	-25 ... 70	-25 ... 70
In compliance with			EN60947-5-2	EN60947-5-2
Protection class acc. to IEC 60529			IP67	IP67
Connection type			Connector M12	Connector M12
Conductor diameter			-	-
Housing material			stainless steel	stainless steel
Front face			PBT (Crastin)	PBT (Crastin)
Drawing No.			EZ015009	EZ015020

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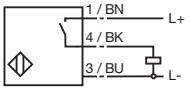
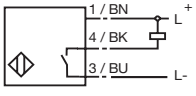
Output signals

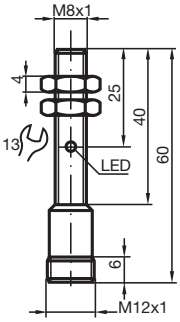
Output PO

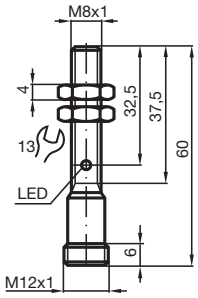


Output NO



Dimensions in mm





Inductive sensors, with thread M 8 x 1

Operating distance S_n, mounting			**2 mm non-flush**	**2 mm non-flush**	**2 mm non-flush**	**3 mm quasi flush**
PNP	NO		SIN2-M8N-V2-PO	SIN2-M8S-U2-PO	SIN2-M8N-C1-PO	SIN3-M8N-V2-PO
	NC					
	Antivalent					
NPN	NO		SIN2-M8N-V2-NO		SIN2-M8N-C1-NO	
	Antivalent					
DC 2-wires	NO					
AC	NO					
	NC					
	Antivalent					
Switching distance		[mm]	0 ... 1.62	0 ... 1.62	0 ... 1.62	0 ... 2.43
Reduction factor		r_{V2A}	0.75	0.7	0.75	0.77
		r_{AL}	0.45	0.4	0.45	0.36
		r_{Cu}	0.35	0.35	0.35	0.27
Operating voltage		[V]	10 ...30	10...60	10 ... 30	10 ... 30
Operating current		[mA]	100	100	100	200
Switching frequency		[Hz]	1500	400	1500	1000
Idle current / residual current		[mA]	15	15	15	10
Line voltage drop		[V]	3	3	3	2
Short circuit protection			clocking	clocking	clocking	no
Inverse polarity protection			yes	yes	yes	yes
Indication	output signal		LED yellow	LED yellow	Multi-hole-LED yellow	LED yellow
	voltage		-	-	-	-
Operating temperature range		[°C]	-25 ... 70	-25 ... 70	-25 ... 70	-25 ... 70
In compliance with			EN60947-5-2	EN60947-5-2	EN60947-5-2	EN60947-5-2
Protection class acc. to IEC 60529			IP67	IP67	IP67	IP67
Connection type			2 m, PVC-cable	2 m, PUR-cable	Connector M12	2 m, PVC-cable
Conductor diameter			0.14 mm²	0.14 mm²	-	0.14 mm²
Housing material			nickel-plated brass	stainless steel	nickel-plated brass	chrome-plated brass
Front face			PBT (Crastin)	PBT (Crastin)	PBT (Crastin)	PBT (Crastin)
Drawing No.			FZ020038	FZ020002	FZ015032	FZ030001

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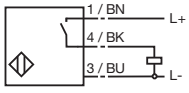
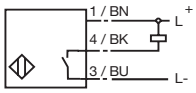
Output signals

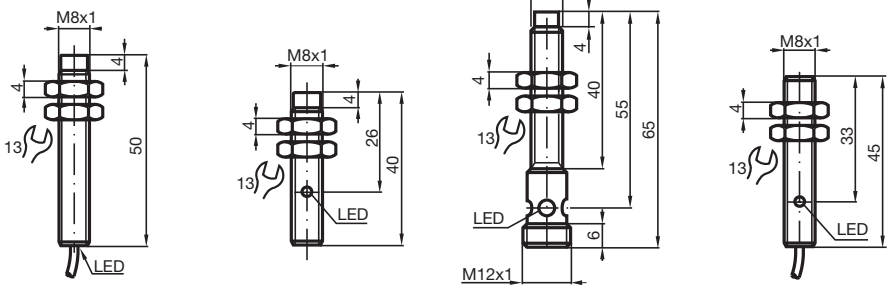
Output PO



Output NO



Dimensions in mm



Technical data & Approximate dimensions
Inductive sensors, M 8 x 1 thread

Inductive sensors, with thread M 8 x 1

Operating distance S_n, mounting			3 mm quasi flush
PNP	NO		SIN3-M8N-C8-PO
	NC		
	Antivalent		
NPN	NO		
	Antivalent		
DC 2-wire	NO		
AC	NO		
	NC		
	Antivalent		
Switching distance		[mm]	0 ... 2.43
Reduction factor		r_{V2A}	0.77
		r_{AL}	0.36
		r_{Cu}	0.27
Operating voltage		[V]	10 ... 30
Operating current		[mA]	200
Switching frequency		[Hz]	1000
Idle current / residual current		[mA]	10 / -
Line voltage drop [V]		2	
Short circuit protection		no	
Inverse polarity protection		yes	
Indication	output signal		LED yellow
	voltage		-
Operating temperature range		[°C]	-25 ... 70
In compliance with			EN60947-5-2
Protection class acc. to IEC 60529			IP67
Connection type			Connector M8
Conductor diameter			-
Housing material			chrome-plated brass
Front face			PBT (Crastin)
Drawing No.			FZ030002

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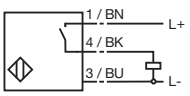
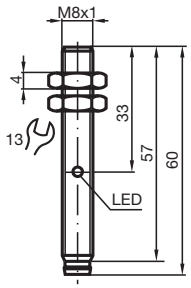
Output signals

Output PO



Dimensions in mm

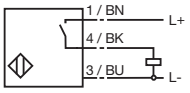


Inductive sensors, with thread M 12 x 1

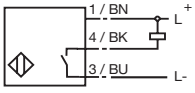
Operating distance S_n, mounting			**2 mm flush**	**2 mm flush**	**2 mm flush**
PNP	NO		SIF2-M12N-V2-PO		
	NC				
	Antivalent			SIF2-M12N-V2-PK	
NPN	NO		SIF2-M12N-V2-NO		
	Antivalent			SIF2-M12N-V2-NK	
DC 2-wire	NO				SIF2-M12N-V2-DO
AC	NO				
	NC				
	Antivalent				
Switching distance		[mm]	0 ... 1.62	0 ... 1.62	0 ... 1.62
Reduction factor		r_{V2A}	0.7	0.66	0.67
		r_{AL}	0.3	0.25	0.18
		r_{Cu}	0.2	0.15	0.12
Operating voltage		[V]	10 ... 30	10 ... 30	6 ... 60
Operating current		[mA]	200	200	4 ... 100
Switching frequency		[Hz]	1500	1000	2000
Idle current / residual current		[mA]	17	20	0.7
Line voltage drop		[V]	3	3	6
Short circuit protection			clocking	clocking	no
Inverse polarity protection			yes	yes	yes
Indication	output signal		LED yellow	LED yellow	LED yellow
	voltage		-	-	-
Operating temperature range		[°C]	-25 ... 70	-25 ... 70	-25 ... 70
In compliance with			EN60947-5-2	EN60947-5-2	EN60947-5-2
Protection class acc. to IEC 60529			IP67	IP67	IP67
Connection type			2 m, PVC-Kabel	2 m, PVC-Kabel	2 m, PVC-Kabel
Conductor diameter			0.14 mm²	0.14 mm²	0.,14 mm²
Housing material			nickel-plated brass	nickel-plated brass	nickel-plated brass
Front face			PBT (Crastin)	PBT (Crastin)	PBT (Crastin)
Drawing No.			FZ020010	FZ020044	FZ020020

Output signals

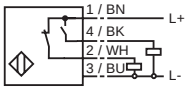
Output PO



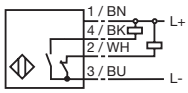
Output NO



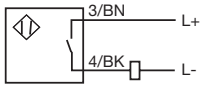
Output PK



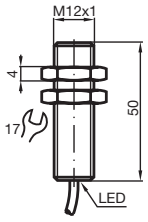
Output NK

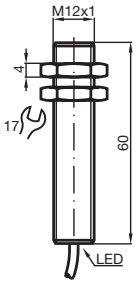


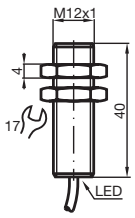
Output DO



Dimensions in mm







Technical data & Approximate dimensions
Inductive sensors, M 12 x 1 thread

Inductive sensors, with thread M 12 x 1

Operating distance S_n, mounting			2 mm flush	2 mm flush
PNP	NO		SIF2-M12E-C1-PO	
	NC			
	Antivalent			
NPN	NO			
	Antivalent			
DC 2-wire	NO			
AC	NO			
	NC			SIF2-M12E-V2-AC
	Antivalent			
Switching distance		[mm]	0 ... 1.62	0 ... 1.62
Reduction factor		r_{V2A}	0.7	0.65
		r_{AL}	0.23	0.15
		r_{Cu}	0.21	0.1
Operating voltage		[V]	10 ... 60	20 ... 253
Operating current		[mA]	200	
Switching frequency		[Hz]	300025	
Idle current / residual current		[mA]	11	0,8
Line voltage drop		[V]	3	5
Short circuit protection			clocking	no
Inverse polarity protection			yes	no
Indication	output signal		LED yellow	LED red
	voltage		-	-
Operating temperature range		[°C]	-25 ... 70	-25 ... 70
In compliance with			EN60947-5-2	EN60947-5-2
Protection class acc. to IEC 60529			IP67	IP67
Connection type			Connector M12	2 m, PVC-cable
Conductor diameter			-	0.34 mm²
Housing material			stainless steel	stainless steel
Front face			PBT (Crastin)	PBT (Crastin)
Drawing No.			EZ020014	FZ020014

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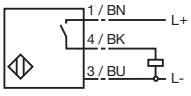
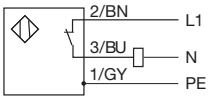
Output signals

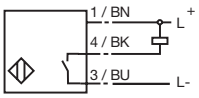
Output PO



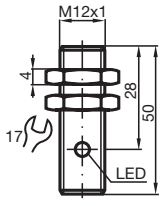
Output AC

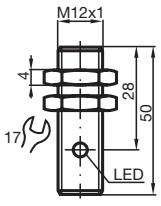


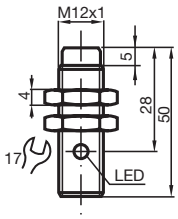
Output NO



Dimensions in mm







Technical data & Approximate dimensions
Inductive sensors, M 12 x 1 thread

Inductive Sensors, with thread M 12 x 1

Operating distance S_n, mounting			**2 mm flush**	**2 mm flush**	**2 mm flush**	**2 mm flush**
PNP	NO			SIF2-M12S-V2-PO	SIF2-M12N-C1-PO	SIF2-M12S-C1-PO
	NC					
	Antivalent					
NPN	NO				SIF2-M12N-C1-NO	
	Antivalent					
DC 2-wire	NO					
AC	NO					
	NC		SIF2-M12N-V2-AO			
	Antivalent					
Switching distance		[mm]	0 ... 1.62	0 ... 1.62	0 ... 1.62	0 ... 1.62
Reduction factor		r_{V2A}	0.65	0.7	0.7	0.7
		r_{AL}	0.15	0.3	0.3	0.3
		r_{Cu}	0.1	0.2	0.2	0.2
Operating voltage		[V]	20 ...253	10...301	0 ...301	0...30
Operating current		[mA]	5...200	100	200	100
Switching frequency		[Hz]	2510001	500	1000	
Idle current / residual current		[mA]	0,815 / -17 / -15 / -			
Line voltage drop		[V]	5	3	3	3
Short circuit protection			no	clocking	clocking	clocking
Inverse polarity protection			no	yes	yes	yes
Indication	output signal		LED red	LED yellow	Multi-hole LED yellow	LED yellow
	voltage		-	-	-	-
Operating temperature range		[°C]	-25 ... 70	-25 ... 70	-25 ... 70	-25 ... 70
In compliance with			EN60947-5-2	EN60947-5-2	EN60947-5-2	EN60947-5-2
Protection class acc. to IEC 60529			IP67	IP67	IP67	IP67
Connection type			2 m, PVC-cable	2 m, PVC-cable	Connector M12	Connector M12
Conductor diameter				0.34 mm²	0.14 mm²	- -
Housing material			stainless steel	nickel-plated brass	nickel-plated brass	nickel-plated brass
Front face			PBT (Crastin)	PBT (Crastin)	PBT (Crastin)	
Drawing No.			FZ0200017	WZ000003	FZ020046	WZ060002

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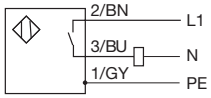
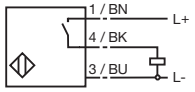
Output signals

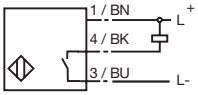
Output AO



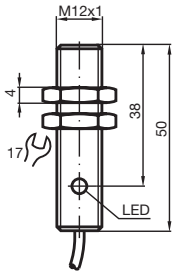
Output PO

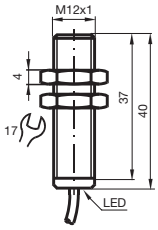


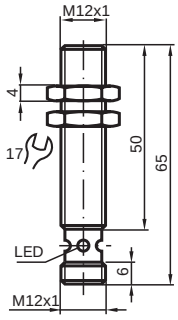
Output NO

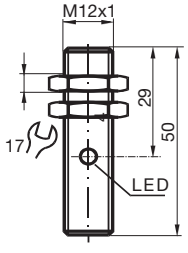


Dimensions in mm









Technical data & Approximate dimensions
Inductive sensors, M 12 x 1 thread

Inductive Sensors, with thread M 12 x 1

Operating distance S_n, mounting			**4 mm non-flush**	**4 mm non-flush**	**4 mm non-flush**	**4 mm non-flush**
PNP	NO		SIN4-M12N-V2-PO			SIN4-M12S-V2-PO
	NC					
	Antivalent			SIN4-M12N-V2-PK		
NPN	NO		SIN4-M12N-V2-NO			
	Antivalent			SIN4-M12N-V2-NK		
DC 2-wire	NO				SIN4-M12N-V2-DO	
AC	NO					
	NC					
	Antivalent					
Switching distance		[mm]	0 ... 3.24	0 ... 3.24	0 ... 3.24	0 ... 3.24
Reduction factor		r_{V2A}	0.8	0.75	0.74	0.75
		r_{AL}	0.5	0.45	0.37	0.45
		r_{Cu}	0.4	0.4	0.36	0.4
Operating voltage		[V]	10 ... 30	10 ... 30	6 ... 60	10 ... 30
Operating current		[mA]	200	200	4 ... 100	200
Switching frequency		[Hz]	1200	1000	2000	1500
Idle current / residual current		[mA]	17	20	--	0.715
Line voltage drop		[V]	3	3	6	3
Short circuit protection			clocking	clocking	no	clocking
Inverse polarity protection			yes	yes	yes	yes
Indication	output signal		LED yellow	LED yellow	LED yellow	LED yellow
	voltage		-	-	-	-
Operating temperature range		[°C]	-25 ... 70	-25 ... 70	-25 ... 70	-25 ... 70
In compliance with			EN60947-5-2	EN60947-5-2	EN60947-5-2	EN60947-5-2
Protection class acc. to IEC 60529			IP67	IP67	IP67	IP67
Connection type			2 m, PVC-cable	2 m, PVC-cable	2 m, PVC-cable	2 m, PVC-cable
Conductor diameter			0.14 mm²	0.14 mm²	0.14 mm²	0.14 mm²
Housing material			nickel-plated brass	nickel-plated brass	nickel-plated brass	nickel-plated brass
Front face			PBT (Crastin)	PBT (Crastin)	PBT (Crastin)	PBT (Crastin)
Drawing No.			FZ040005	FZ040021	FZ040013	WZ000002

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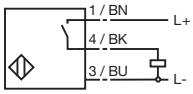
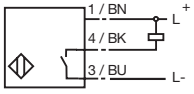
Output signals

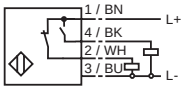
Output PO



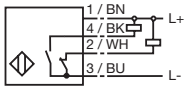
Output NO



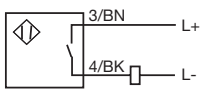
Output PK



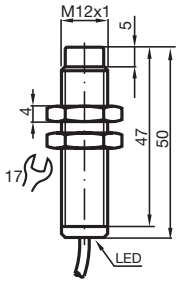
Output NK

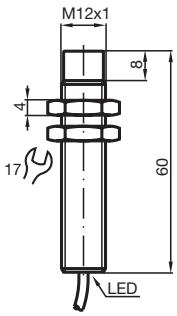


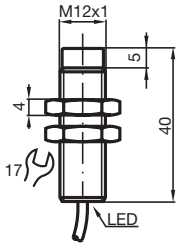
Ausgang DO

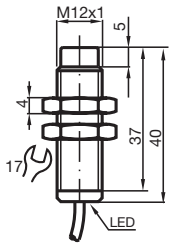


Dimensions in mm







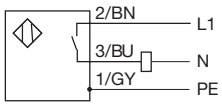


Inductive Sensors, with thread M 12 x 1

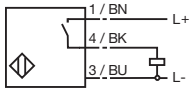
Operating distance S_n, mounting			**4 mm non-flush**	**4 mm non-flush**	**4 mm non-flush**
PNP	NO			SIN4-M12N-C1-PO	SIN4-M12S-C1-PO
	NC				
	Antivalent				
NPN	NO			SIN4-M12N-C1-NO	
	Antivalent				
DC 2-wire	NO				
AC	NO		SIN4-M12N-V2-AO		
	NC				
	Antivalent				
Switching distance		[mm]	0 ... 3.24	0 ... 3.24	0 ... 3.24
Reduction factor		r_{V2A}	0.8	0.8	0.75
		r_{AL}	0.45	0.5	0.45
		r_{Cu}	0.4	0.4	0.4
Operating voltage		[V]	20 ... 253	10 ... 301	0 ... 30
Operating current		[mA]	5 ... 200	200	100
Switching frequency		[Hz]	251	200	800
Idle current / residual current		[mA]	- / 0.8	17 / -	15 / -
Line voltage drop		[V]	5	3	3
Short circuit protection			no	taktend	taktend
Inverse polarity protection			no	yes	yes
Indication		output signal	LED red	Multi-hole LED yellow	LED yellow
		voltage	-	-	-
Operating temperature range		[°C]	-25 ... 70	-25 ... 70	-25 ... 70
In compliance with			EN60947-5-2	EN60947-5-2	EN60947-5-2
Protection class acc. to IEC 60529			IP67	IP67	IP67
Connection type			2 m, PVC-cable	Connector M12	Connector M12
Conductor diameter			0.34 mm²	-	-
Housing material			stainless steel	nickel-plated brass	nickel-plated brass
Front face			PBT (Crastin)	PBT (Crastin)	PBT (Crastin)
Drawing No.			FZ040009	FZ040028	FZ040008

Output signals

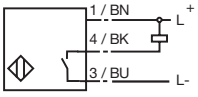
Output AO



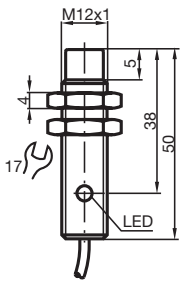
Output PO

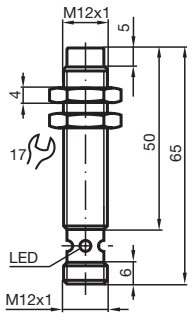


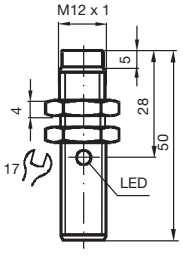
Output NO



Dimensions in mm







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Technical data, Approximate dimensions
Inductive sensors, M 12 x 1 thread

Inductive sensors, with thread M 12 x 1

Operating distance S_n, mounting			**6 mm quasi flush**	**6 mm quasi flush**
PNP	NO		SIN6-M12N-V2-PO	SIN6-M12N-C1-PO
	NC			
	Antivalent			
NPN	NO			
	Antivalent			
DC 2-wire	NO			
AC	NO			
	NC			
	Antivalent			
Switching distance		[mm]	0 ... 4.86	0 ... 4.86
Reduction factor		r_{V2A}	0.67	0.67
		r_{AL}	0.28	0.28
		r_{Cu}	0.2	0.2
Operating voltage		[V]	10 ... 30	10 ... 30
Operating current		[mA]	200	200
Switching frequency		[Hz]	800	800
Idle current / residual current		[mA]	10	10
Line voltage drop		[V]	22	
Short circuit protection			no	no
Inverse polarity protection			yes	yes
Indication		output signal	LED yellow	LED yellow
		voltage	-	-
Operating temperature range		[°C]	-25 ... 70	-25 ... 70
In compliance with			EN 60947-5-2	EN 60947-5-2
Protection class acc. to IEC 60529			IP 67	IP 67
Connection type			2 m, PVC-cable	Connector M12
Conductor diameter			0.34 mm²	-
Housing material			chrome-plated brass	chrome-plated brass
Front face			PBT (Crastin)	PBT (Crastin)
Drawing No.			FZ060001	FZ060002

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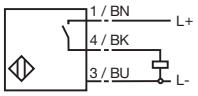
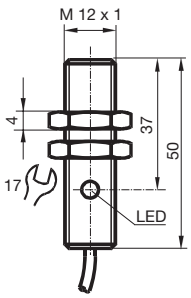
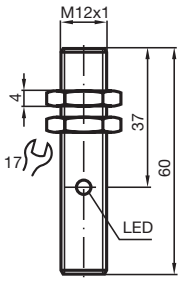
Output signals

Output PO



Dimensions in mm





Technical data, Approximate dimensions
Inductive sensors, M 18 x 1 thread

Inductive sensors, with thread M 18 x 1

Operating distance S_n, mounting			**5 mm flush**	**5 mm flush**	**5 mm flush**	**5 mm flush**
PNP	NO		SIF5-M18N-V2-PO			
	NC					
	Antivalent			SIF5-M18N-V2-PK		
NPN	NO		SIF5-M18N-V2-NO			
	Antivalent			SIF5-M18N-V2-NK		
DC 2-wire	NO				SIF5-M18N-V2-DO	
AC	NO					SIF5-M18N-V2-AO
	NC					SIF5-M18N-V2-AC
	Antivalent					
Switching distance		[mm]	0 ... 4.05	0 ... 4.05	0 ... 4.05	0 ... 4.05
Reduction factor		r_{V2A}	0.7	0.66	0.72	0.62
		r_{AL}	0.3	0.25	0.34	0.2
		r_{Cu}	0.3	0.15	0.31	0.15
Operating voltage		[V]	10 ... 30	10 ... 30	6 ... 60	20 ... 253
Operating current		[mA]	200	200	4...100	200
Switching frequency		[Hz]	800	800	1500	20
Idle current / residual current		[mA]	20 / -	20 / -	- / 0,7	- / 1,7
Line voltage drop		[V]	3	3	6	8
Short circuit protection			clocking	clocking	no	no
Inverse polarity protection			yes	yes	yes	no
Indication	output signal		LED yellow	LED yellow	LED yellow	LED yellow
	voltage		-	-	-	-
Operating temperature range		[°C]	-25 ... 70	-25 ... 70	-25 ... 70	-25 ... 70
In compliance with			EN 60947-5-2	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
Protection class acc. to IEC 60529			IP 67	IP 67	IP 67	IP 67
Connection type			2 m, PVC-cable	2 m, PVC-cable	2 m, PVC-cable	2 m, PVC-cable
Conductor diameter			0.14 mm²	0.34 mm²	0.34 mm²	0.34 mm²
Housing material			nickel-plated brass	nickel-plated brass	nickel-plated brass	nickel-plated brass
Front face			PBT (Crastin)	PBT (Crastin)	PBT (Crastin)	PBT (Crastin)
Drawing No.			FZ050008	FZ050020	FZ050008	FZ050020

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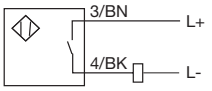
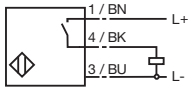
Output signals

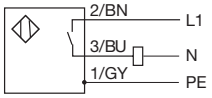
Output DO



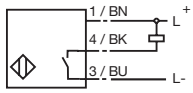
Output PO



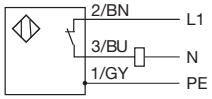
Output AO



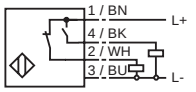
Output NO



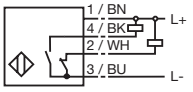
Output AC



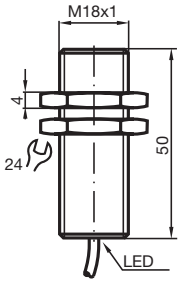
Output PK

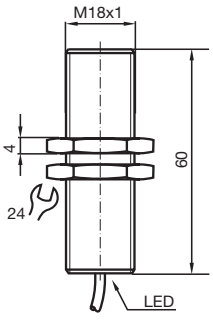


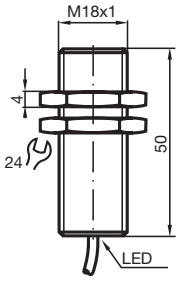
Output NK

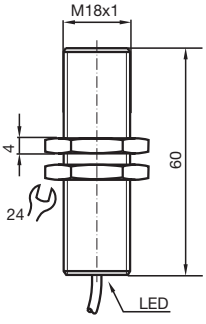


Dimensions in mm









Technical data, Approximate dimensions
Inductive sensors, M 18 x 1 thread

Inductive sensors, with thread M 18 x 1

Operating distance S_n, mounting			5 mm flush	8 mm non-flush	8 mm non-flush
PNP	NO		SIF5-M18N-C1-PO	SIN8-M18N-V2-PO	
	NC				
	Antivalent				SIN8-M18N-V2-PK
NPN	NO		SIF5-M18N-C1-NO	SIN8-M18N-V2-NO	
	Antivalent				SIN8-M18N-V2-NK
DC 2-wire	NO				
AC	NO				
	NC				
	Antivalent				
Switching distance		[mm]	0 ... 4.05	0 ... 6.48	0 ... 6.48
Reduction factor		r_{V2A}	0.7	0.7	0.75
		r_{AL}	0.3	0.5	0.45
		r_{Cu}	0.3	0.4	0.4
Operating voltage		[V]	10 ... 30	10 ... 30	10 ... 30
Operating current		[mA]	200	200	200
Switching frequency		[Hz]	800	500	700
Idle current / residual current		[mA]	20	18	20
Line voltage drop		[V]	3	3	3
Short circuit protection			clocking	clocking	
Inverse polarity protection			yes	yes	yes
Indication	output signal		Mulit-hole LED yellow	LED yellow	LED yellow
	voltage		-	-	-
Operating temperature range		[°C]	-25 ... 70	-25 ... 70	-25 ... 70
In compliance with			EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
Protection class acc. to ICE 60529			IP 67	IP 67	IP 67
Connection type			Connector M12	2m, PVC-cable	2m, PVC-cable
Conductor diameter			-	0.34 mm²	0.34 mm²
Housing material			nickel-plated brass	nickel-plated brass	nickel-plated brass
Front face			PBT (Crastin)	PBT (Crastin)	PBT (Crastin)
Drawing No.			FZ050032	FZ080003	FZ080013

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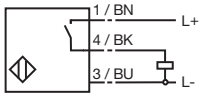
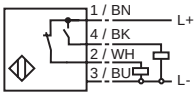
Output signals

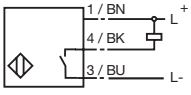
Output PO



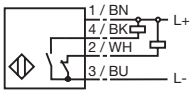
Output PK



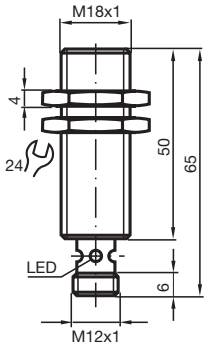
Output NO

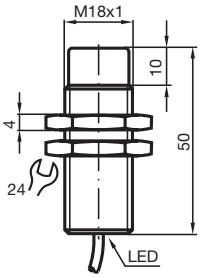


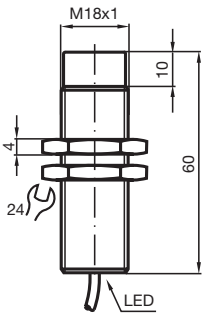
Output NK



Dimensions in mm







Technical data, Approximate dimensions
Inductive sensors, M 18 x 1 thread

Inductive sensors, with thread M 18 x 1

Operating distance S_n, mounting			**8 mm non-flush**	**8 mm non-flush**	**8 mm non-flush**	**12 mm quasi flush**
PNP	NO				SIN8-M18N-C1-PO	SIN12-M18N-V2-PO
	NC					
	Antivalent					
NPN	NO				SIN8-M18N-C1-NO	
	Antivalent					
DC 2-wire	NO		SIN8-M18N-V2-DO			
AC	NO			SIN8-M18N-V2-AO		
	NC			SIN8-M18N-V2-AC		
	Antivalent					
Switching distance		[mm]	0 ... 6.5	0 ... 6.5	0 ... 6.48	0 ... 9.72
Reduction factor		r_{V2A}	0.73	0.72	0.7	0.63
		r_{AL}	0.43	0.42	0.5	0.26
		r_{Cu}	0.42	0.4	0.4	0.2
Operating voltage		[V]	6 ... 60	20 ... 253	10 ... 30	10 ... 30
Operating current		[mA]	4 ... 100	200	200	200
Switching frequency		[Hz]	1000	20	500	500
Idle current / residual current		[mA]	- / 0.7	- / 1.7	18 / -	10 / -
Line voltage drop		[V]	6	8	3	2
Short circuit protection			no	no	clocking	no
Inverse polarity protection			yes	no	yes	yes
Indication	output signal		LED yellow	LED yellow	Multi-hole LED yellow	LED yellow
	voltage		-	-	-	-
Operating temperature range		[°C]	-25 ... 70	-25 ... 70	-25 ... 70	-25 ... 70
In compliance with			EN 60947-5-2	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
Protection class acc. to ICE 60529			IP 67	IP 67	IP 67	IP 67
Connection type			2 m, PVC-cable	2 m, PVC-cable	Connector M12	2 m, PVC-cable
Conductor diameter			0.34 mm²	0.34 mm²	-	0.5 mm²
Housing material			nickel-plated brass	nickel-plated brass	nickel-plated brass	chrome-plated brass
Front face			PBT (Crastin)	PBT (Crastin)	PBT (Crastin)	PBT (Crastin)
Drawing No.			FZ080003	FZ080010	FZ080020	FZ120001

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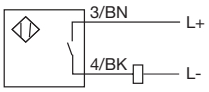
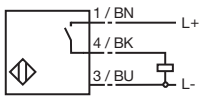
Output signals

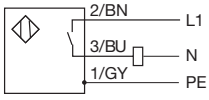
Output DO



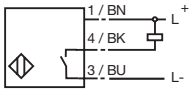
Output PO



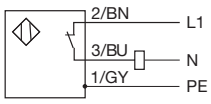
Output AO



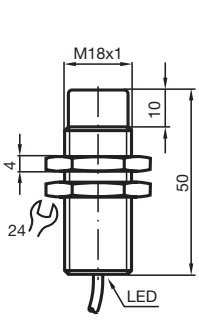
Output NO

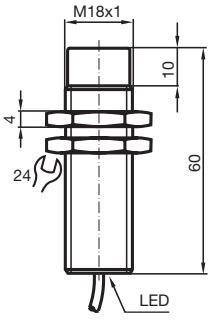


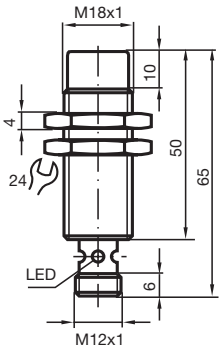
Output AC

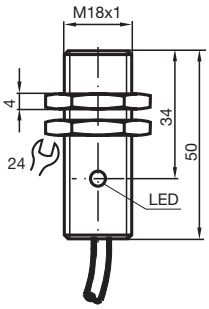


Dimensions in mm









Technical data, Approximate dimensions
Inductive sensors, M 18 x 1 thread

Inductive sensors, with thread M 18 x 1

Operating distance S_n, mounting			**12 mm quasi flush**
PNP	NO		SIN12-M18N-C1-PO
	NC		
	Antivalent		
NPN	NO		
	Antivalent		
DC 2-wire	NO		
AC	NO		
	NC		
	Antivalent		
Switching distance		[mm]	0 ... 9.72
Reduction factor		r_{V2A}	0.63
		r_{AL}	0.26
		r_{Cu}	0.2
Operating voltage		[V]	10 ... 30
Operating current		[mA]	200
Switching frequency		[Hz]	500
Idle current / residual current		[mA]	10 / -
Line voltage drop		[V]	2
Short circuit protection		no	
Inverse polarity protection		yes	
Indication		output signal	LED yellow
		voltage	-
Operating temperature range		[°C]	-25 ... 70
In compliance with			EN 60947-5-2
Protection class acc. to ICE 60529			IP 67
Connection type			Connector M12
Conductor diameter			-
Housing material			chrome-plated brass
Front face			PBT (Crastin)
Drawing No.			FZ120002

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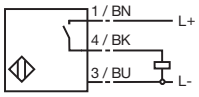
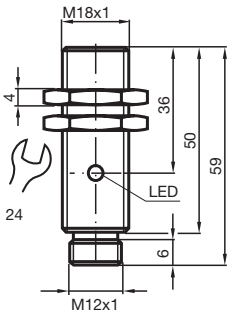
Output signals

Output PO



Dimensions in mm

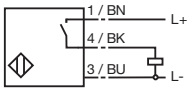


Inductive sensors, with thread M 18 x 1

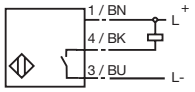
Operating distance S_n, mounting			**5 mm flush**	**8 mm non-flush**
PNP	NO		SIF5-M18E-C1-PO	SIN8-M18E-C1-PO
	NC			
	Antivalent			
NPN	NO		SIF5-M18E-C1-NO	
	Antivalent			
DC 2-wire	NO			
AC	NO			
	NC			
	Antivalent			
Switching distance		[mm]	0 ... 4.05	0 ... 6.48
Reduction factor		r_{V2A}	0.62	0.72
		r_{AL}	0.2	0.42
		r_{Cu}	0.15	0.4
Operating voltage		[V]	10 ... 60	10 ... 60
Operating current		[mA]	200	200
Switching frequency		[Hz]	1500	1000
Idle current / residual current		[mA]	8.5	8.5
Line voltage drop		[V]	33	
Short circuit protection			clocking	clocking
Inverse polarity protection			yes	yes
Indication		output signal	LED yellow	LED yellow
		voltage	-	-
Operating temperature range		[°C]	-25 ... 70	-25 ... 70
In compliance with			EN 60947-5-2	EN 60947-5-2
Protection class acc. to ICE 60529			IP 67	IP 67
Connection type			Connector M12	Connector M12
Conductor diameter			-	-
Housing material			stainless steel	stainless steel
Front face			PBT (Crastin)	PBT (Crastin)
Drawing No.			EZ050013	SIN8-M18E-C1-PO

Output signals

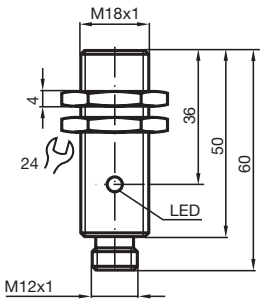
Output PO

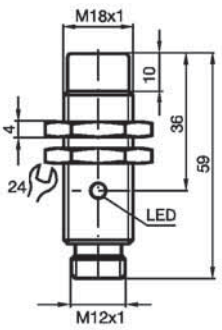


Output NO



Dimensions in mm





Technical data, Approximate dimensions
Inductive sensors, M 30 x 1.5 thread

Inductive sensors, with thread M 30 x 1,5

Operating distance S_n, mounting			10 mm flush	10 mm flush	10 mm flush	10 mm flush
PNP	NO		SIF10-M30N-V2-PO			
	NC					
	Antivalent			SIF10-M30N-V2-PK		
NPN	NO		SIF10-M30N-V2-NO			
	Antivalent			SIF10-M30N-V2-NK		
DC 2-wire	NO				SIF10-M30N-V2-DO	
AC	NO					SIF10-M30N-V2-AO
	NC					SIF10-M30N-V2-AC
	Antivalent					
Switching distance		[mm]	0 ... 8.1	0 ... 8.1	0 ... 8.1	0 ... 8.1
Reduction factor		r_{V2A}	0.8	0.66	0.7	0.71
		r_{AL}	0.3	0.25	0.3	0.29
		r_{Cu}	0.3	0.15	0.25	0.26
Operating voltage		[V]	10 ... 30	10 ... 30	6 ... 60	20 ... 253
Operating current		[mA]	200	2004 ...	1005 ...	200
Switching frequency		[Hz]	200	200	700	200
Idle current / residual current		[mA]	20 / -	20 / -	- / 0.7	- /1.7
Line voltage drop		[V]	3	3	6	8
Short circuit protection			clocking	clocking	no	no
Inverse polarity protection			yes	yes	yes	no
Indication	output signal		LED yellow	LED yellow	LED yellow	LED yellow
	voltage		-	-	-	-
Operating temperature range		[°C]	-25 ... 70	-25 ... 70	-25 ... 70	-25 ... 70
In compliance with			EN 60947-5-2	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
Protection class acc. to ICE 60529			IP 67	IP 67	IP 67	IP 67
Connection type			2 m, PVC-Kabel	2 m, PVC-Kabel	2 m, PVC-Kabel	2 m, PVC-Kabel
Conductor diameter			0.34 mm^2	0.34 mm^2	0.34 mm^2	0.34 mm^2
Housing material			nickel-plated brass	nickel-plated brass	nickel-plated brass	nickel-plated brass
Front face			PBT (Crastin)	PBT (Crastin)	PBT (Crastin)	PBT (Crastin)
Drawing No.			FZ100007	FZ100021	FZ100007	FZ100021

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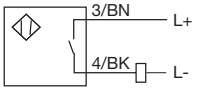
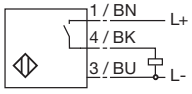
Output signals

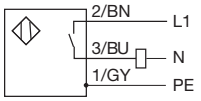
Output DO



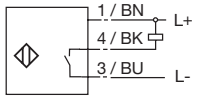
Output PO



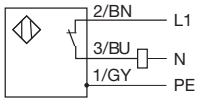
Output AO



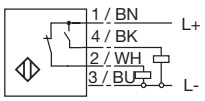
Output NO



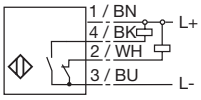
Output AC



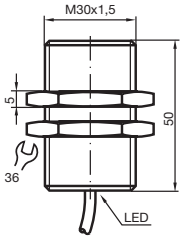
Output PK

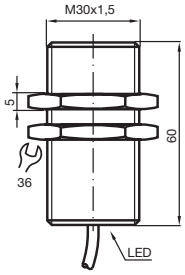


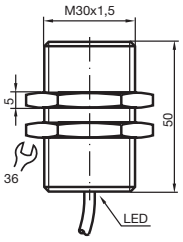
Output NK

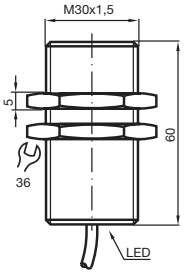


Dimensions in mm









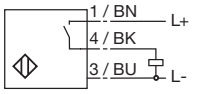
Technical data, Approximate dimensions
Inductive sensors, M 30 x 1.5 thread

Inductive sensors, with thread M 30 x 1,5

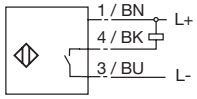
Operating distance S_n, mounting			**10 mm flush**	**15 mm non-flush**	**15 mm non-flush**
PNP	NO		SIF10-M30N-C1-PO	SIN15-M30N-V2-PO	
	NC				
	Antivalent				SIN15-M30N-V2-PK
NPN	NO		SIF10-M30N-C1-NO	SIN15-M30N-V2-NO	
	Antivalent				SIN15-M30N-V2-NK
DC 2-wire	NO				
AC	NO				
	NC				
	Antivalent				
Switching distance		[mm]	0 ... 8.1	0 ... 12.15	0 ... 12.15
Reduction factor		r_{V2A}	0.8	0.8	0.75
		r_{AL}	0.3	0.5	0.45
		r_{Cu}	0.3	0.4	0.4
Operating voltage		[V]	10 ... 30	10 ... 30	10 ... 30
Operating current		[mA]	200	200	200
Switching frequency		[Hz]	200	200	200
Idle current / residual current		[mA]	20 / -	15 / -	20 / -
Line voltage drop		[V]	3	3	3
Short circuit protection	clocking	clocking	clocking		
Inverse polarity protection	yes	yes	yes		
Indication		output signal	Multi hole LED yellow	LED yellow	LED yellow
		voltage	-	-	-
Operating temperature range		[°C]	-25 ... 70	-25 ... 70	-25 ... 70
In compliance with			EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
Protection class acc. to ICE 60529			IP 67	IP 67	IP 67
Connection type			Connector M12	2m, PVC-cable	2m, PVC-cable
Conductor diameter			-	0.34 mm²	0.34 mm²
Housing material			nickel-plated brass	nickel-plated brass	nickel-plated brass
Front face			PBT (Crastin)	PBT (Crastin)	PBT (Crastin)
Drawing No.			FZ100035	FZ150003	FZ150014

Output signals

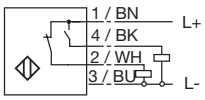
Output PO



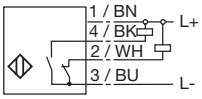
Output NO



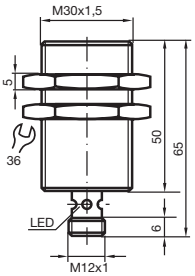
Output PK

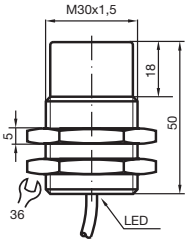


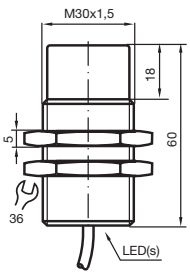
Output NK



Dimensions in mm







Technical data, Approximate dimensions
Inductive sensors, M 30 x 1.5 thread

Inductive sensors, with thread M 30 x 1,5

Operating distance S_n, mounting			15 mm non-flush	15 mm non-flush
PNP	NO			SIN15-M30N-C1-PO
	NC			
	Antivalent			
NPN	NO			SIN15-M30N-C1-NO
	Antivalent			
DC 2-wire	NO			
AC	NO		SIN15-M30N-V2-AO	
	NC		SIN15-M30N-V2-AC	
	Antivalent			
Switching distance		[mm]	0 ... 12.2	0 ... 12.15
Reduction factor		r_{V2A}	0.82	0.8
		r_{AL}	0.43	0.5
		r_{Cu}	0.41	0.4
Operating voltage		[V]	20 ... 253	10 ... 30
Operating current		[mA]	5 ... 200	200
Switching frequency		[Hz]	20	200
Idle current / residual current		[mA]	- / 1.7	20 / -
Line voltage drop		[V]	8	3
Short circuit protection			no	clocking
Inverse polarity protection		no	yes	
Indication		output signal	LED yellow	Multi-hole LED yellow
		voltage	-	-
Operating temperature range		[°C]	25 ... 70	-25 ... 70
In compliance with			EN 60947-5-2	EN 60947-5-2
Protection class acc. to ICE 60529			IP 67	IP 67
Connection type			2 m, PVC-cable	Connector M12
Conductor diameter			0.34 mm²	-
Housing material			nickel-plated brass	nickel-plated brass
Front face			PBT (Crastin)	PBT (Crastin)
Drawing No.			FZ 150014	FZ 150027

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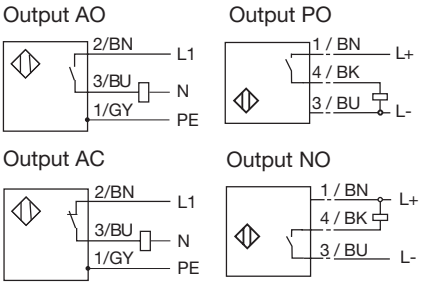
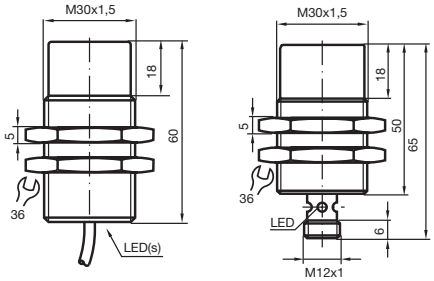
Output signals



Dimensions in mm

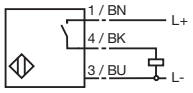


Inductive sensors, with thread M 30 x 1,5

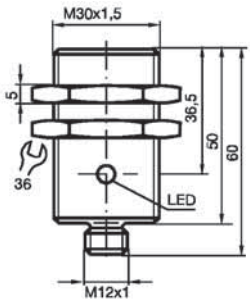
Operating distance S_n, mounting			**15 mm flush**	**15 mm non-flush**
PNP	NO		SIF10-M30E-C1-PO	SIN15-M30E-C1-PO
	NC			
	Antivalent			
NPN	NO			
	Antivalent			
DC 2-wire	NO			
AC	NO			
	NC			
	Antivalent			
Switching distance		[mm]	0 ... 8.1	0 ... 12.15
Reduction factor		r_{V2A}	0.72	0.71
		r_{AL}	0.34	0.4
		r_{Cu}	0.32	0.38
Operating voltage		[V]	10 ... 60	10 ... 60
Operating current		[mA]	200	200
Switching frequency		[Hz]	650	500
Idle current / residual current		[mA]	9	12
Line voltage drop		[V]	2.8	2.8
Short circuit protection			clocking	clocking
Inverse polarity protection			yes	yes
Indication	output signal		LED yellow	LED yellow
	voltage		-	-
Operating temperature range		[°C]	-25 ... 70	-25 ... 70
In compliance with			EN 60947-5-2	EN 60947-5-2
Protection class acc. to ICE 60529			IP 67	IP 67
Connection type			Connector M12	Connector M12
Conductor diameter			-	-
Housing material			stainless steel	stainless steel
Front face			PBT (Crastin)	PBT (Crastin)
Drawing No.			SIF10-M30E-C1-PO	SIN15-M30E-C1-PO

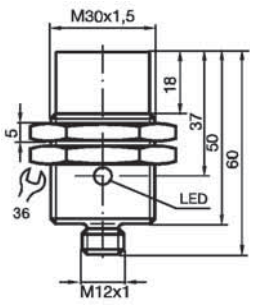
Output signals

Output PO



Dimensions in mm





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Technical data, Approximate dimensions
Inductive sensors , block & square housings

Inductive sensors, Block and square housings

Operating distance S_n, mounting			**2 mm flush**	**6 mm flush**
PNP	NO		SIF2-B28N-V0,1-PO	SIF6-B45N-U2-PO
	NC			
	Antivalent			
NPN	NO		SIF2-B28N-V0,1-NO	
	Antivalent			
DC 2-wire	NO			
AC	NO			
	NC			
	Antivalent			
Switching distance		[mm]	0 ... 1.62	0 ... 4.8
Reduction factor		r_{V2A}	0.7	0.7
		r_{AL}	0.35	0.22
		r_{Cu}	0.2	0.2
Operating voltage		[V]	10 ... 30	10 ... 60
Operating current		[mA]	100	200
Switching frequency		[Hz]	1000	500
Idle current / residual current		[mA]	15 / -	20 / _
Line voltage drop		[V]	3	3
Short circuit protection			clocking	clocking
Inverse polarity protection			yes	yes
Indication		output signal	LED yellow	LED yellow
		voltage	-	-
Operating temperature range		[°C]	-25 ... 70	-25 ... 70
In compliance with			EN 60947-5-2	EN 60947-5-2
Protection class acc. to ICE 60529			IP 67	IP 67
Connection type			0.1 m, PVC-cable	2 m, PUR-cable
Conductor diameter			0.14 mm²	0.34 mm²
Housing material			PBT (Crastin)	PBT (Crastin)
Front face			PBT (Crastin)	PBT (Crastin)
Drawing No.			FQ030001	FF00001

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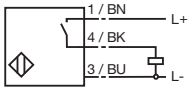
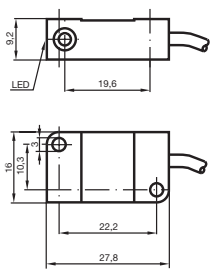
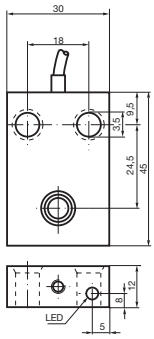
Output signals

Output PO



Dimensions in mm





Inductive sensors, Block- and square housings

Operating distance S_n, mounting			**15 mm flush**	**15 mm flush**	**20 mm flush**	**20 mm non-flush**
PNP	NO		SIF15-Q40N-T-PO	SIF15-Q40N-C1-PO	SIF20-Q40N-T-PO	
	NC					
	Antivalent		SIF15-Q40N-T-PK			
NPN	NO		SIF15-Q40N-T-NO			
	Antivalent					
DC 2-wire	NO					
AC	NO					
	NC					
	Antivalent					SIN20-Q40N-T-AK
Switching distance		[mm]	0 ... 12.15	0 ... 12,15	0 ... 16,2	0 ... 16.2
Reduction factor		r_{V2A}	0.75	0.75	0.8	0.8
		r_{AL}	0.3	0.3	0.3	0.35
		r_{Cu}	0.25	0.25	0.3	0.35
Operating voltage		[V]	10 ... 60	20 ... 253	10 ... 60	20 ...253
Operating current		[mA]	200	8 ... 500	200	8 ... 500
Switching frequency		[Hz]	150	20	150	20
Idle current / residual current		[mA]	10 / -- / 1.9510 / -- / 1.95			
Line voltage drop		[V]	2.8	12	2.8	12
Short circuit protection			clocking	no	clocking	no
Inverse polarity protection			yes	no	yes	no
Indication	output signal		LED yellow	LED yellow	LED yellow	LED yellow
	voltage		-	-	-	-
Operating temperature range		[°C]	-25 ... 70	-25 ... 70	-25 ... 70	-25 ... 70
In compliance with			EN 60947-5-2	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
Protection class acc. to ICE 60529			IP 68	IP 68	IP 68	IP 68
Connection type			terminal connection	Connector M12	terminal connection	terminal connection
Conductor diameter			up to 2,5 mm²	up to 2,5 mm²	up to 2,5 mm²	up to 2,5 mm²
Housing material			PBT (Crastin)	PBT (Crastin)	PBT (Crastin)	PBT (Crastin)
Front face			PBT (Crastin)	PBT (Crastin)	PBT (Crastin)	PBT (Crastin)
Drawing No.			CV150002	CV150002	CV150002	CV150002

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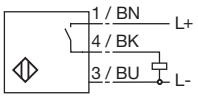
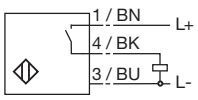
Output signals

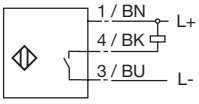
Output PO



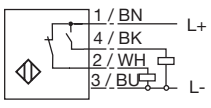
Output PO



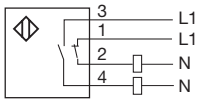
Output NO



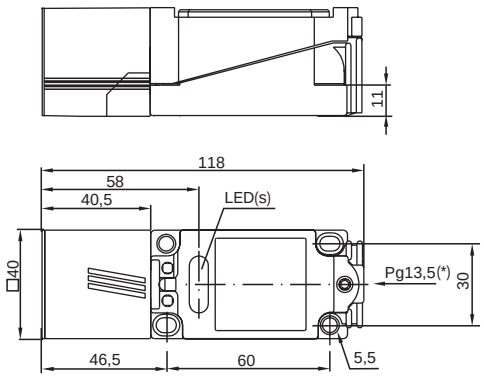
Output PK



Output AK



Dimensions in mm



(*) Cable inlet acc. to new standard henceforth in M20

Technical data, Approximate dimensions
Inductive sensors , block & square housings

Inductive sensors, Block- and square housings

Operating distance S_n, mounting			30 mm non-flush	30 mm non-flush
PNP	NO		SIN30-Q40N-T-PO	
	NC			
	Antivalent		SIN30-Q40N-T-PK	
NPN	NO			
	Antivalent			
DC 2-wire	NO			
AC	NO			
	NC			
	Antivalent			SIN30-Q40N-T-AK
Switching distance		[mm]	0 ... 24.3	0 ... 24.3
Reduction factor		r_{V2A}	0.8	0.8
		r_{AL}	0.45	0.45
		r_{Cu}	0.4	0.4
Operating voltage		[V]	10 ... 60	20 ... 253
Operating current		[mA]	200	8 ... 500
Switching frequency		[Hz]	100	20
Idle current / residual current		[mA]	10 / -	- / 1.95
Line voltage drop		[V]	2,8	12
Short circuit protection			clocking	no
Inverse polarity protection			yes	no
Indication	output signal		LED yellow	LED yellow
	voltage		-	-
Operating temperature range		[°C]	-25 ... 70	-25 ... 70
In compliance with			EN 60947-5-2	EN 60947-5-2
Protection class acc. to ICE 60529			IP 68	IP 68
Connection type			terminal connection	terminal connection
Conductor diameter			up to 2.5 mm²	up to 2.5 mm²
Housing material			PBT (Crastin)	PBT (Crastin)
Front face			PBT (Crastin)	PBT (Crastin)
Drawing No.			CV150002	CV150002

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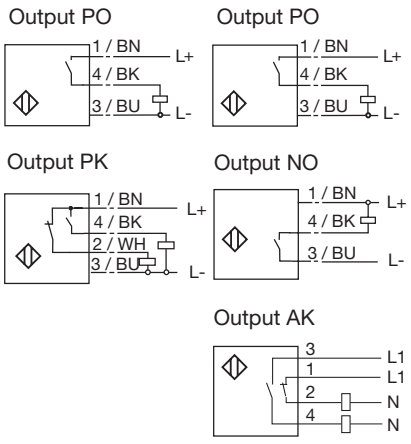
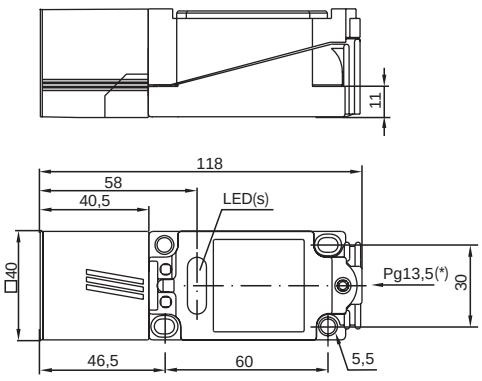
Output signals



Dimensions in mm



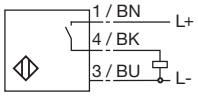
(*) Cable inlet acc. to new standard henceforth in M20

Inductive sensors, Block and square housings

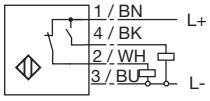
Operating distance S_n, mounting			**20 mm, flush**	**30 mm, non-flush**	**20 mm, flush**	**30 mm non-flush**
PNP	NO		SIF20-Q40S-C1-PO	SIN30-Q40S-C1-PO	SIF20-Q40T-C1-PO	
	NC					
	Antivalent				SIF20-Q40T-C1-PK	SIN30-Q40T-C1-PK
NPN	NO					
	Antivalent					
DC 2-wire	NO					
AC	NO					
	NC					
	Antivalent					
Switching distance		[mm]	0 ... 16,2	0 ... 24,3	0 ... 16,2	0 ... 24,3
Reduction factor		r_{V2A}	0.85	0.85	0.85	0.85
		r_{AL}	0.4	0.5	0.4	0.5
		r_{Cu}	0.35	0.45	0.35	0.45
Operating voltage		[V]	10 ... 30	10 ... 30	10 ... 30	10 ... 30
Operating current		[mA]	200	200	200	200
Switching frequency		[Hz]	150	150	150	150
Idle current / residual current		[mA]	20 / -	20 / -	20 / -	20 / -
Line voltage drop		[V]	3	3	3	3
Short circuit protection			clocking	clocking	clocking	clocking
Inverse polarity protection			yes	yes	yes	yes
Indication		output signal	Multi-hole LED yellow	Multi-hole LED yellow	LED yellow	LED yellow
		voltage	-	-	-	-
Operating temperature range		[°C]	-25 ... 70	-25 ... 70	-25 ... 70	-25 ... 70
In compliance with			EN 60947-5-2	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
Protection class acc. to ICE 60529			IP 67	IP 67	IP 67	IP 67
Connection type			Connector M12	Connector M12	Connector M12	Connector M12
Conductor diameter			-	-	-	-
Housing material			PBT (Crastin)	PBT (Crastin)	PBT (Crastin)	PBT (Crastin)
Front face			PBT (Crastin)	PBT (Crastin)	PBT (Crastin)	PBT (Crastin)
Drawing No.			CV150006	CV150006	CV150007	CV150007

Output signals

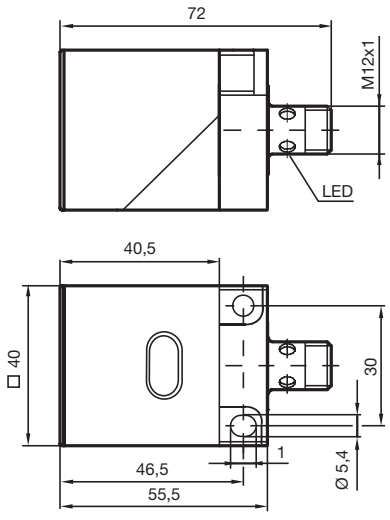
Output PO

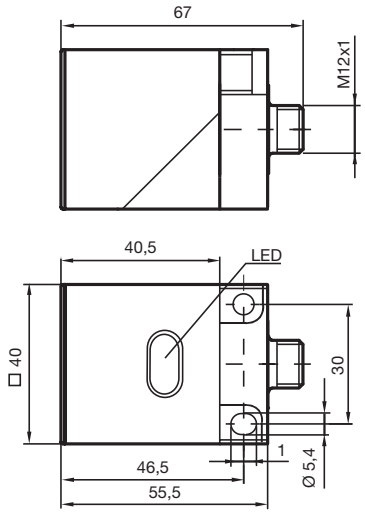


Output PK



Dimensions in mm





Technical data, Approximate dimensions
Inductive sensors, block & square housings

Inductive sensors, Block- and square housings

Operating distance S_n, mounting			**40 mm flush**	**50 mm non-flush**
PNP	NO			SIN50-Q80N-T-PO
	NC			
	Antivalent		SIF40-Q80N-T-PK	SIN50-Q80N-T-PK
NPN	NO			
	Antivalent			
DC 2-wire	NO			
AC	NO			
	NC			
	Antivalent			
Switching distance		[mm]	0 ... 32.4	0 ... 40.5
Reduction factor		r_{V2A}	0.83	0.85
		r_{AL}	0.38	0.4
		r_{Cu}	0.38	0.3
Operating voltage		[V]	10 ... 60	10 ... 60
Operating current		[mA]	200	200
Switching frequency		[Hz]	100	100
Idle current / residual current		[mA]	20 / -20 / -	
Line voltage drop		[V]	3	3
Short circuit protection			clocking	clocking
Inverse polarity protection			yes	yes
Indication		output signal	LED yellow	LED yellow
		voltage	LED green	LED green
Operating temperature range		[°C]	-25 ... 7	-25 ... 70
In compliance with			EN 60947-5-2	EN 60947-5-2
Protection class acc. to ICE 60529			IP 67	IP 67
Connection type			terminal connection	terminal connection
Conductor diameter			up to 2.5 mm²	up to 2.5 mm²
Housing material			PBT (Crastin)	PBT (Crastin)
Front face			PBT (Crastin)	PBT (Crastin)
Drawing No.			CFP40001	CFP40002

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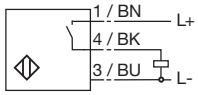
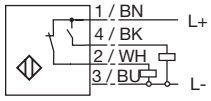
Output signals

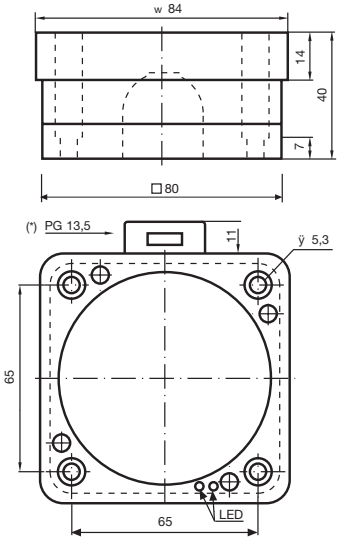
Output PO



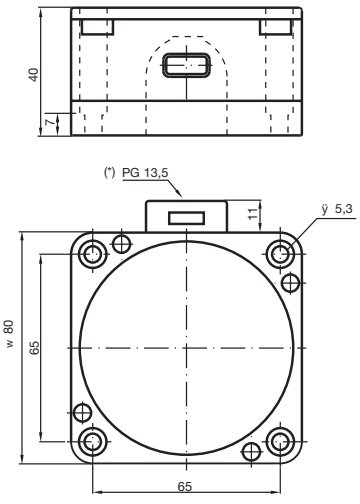
Output PK



Dimensions in mm



(*) Cable input according to new norm henceforth in M20

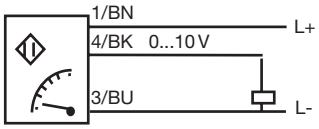


(*) Cable input according to new norm henceforth in M20

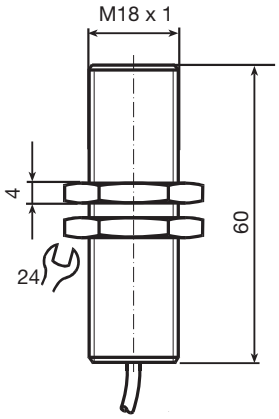
Inductive sensors: Analog sensor

Metering range		2 mm... 5mm
Type		**SIF5-M18N-V2-M**
Operating voltage	V	15...30
Compensation tolerance zero-point	%	±2
Frequency limit (3 dB)	Hz	ca. 110
Reproducability	µm	6
Output signal	mA	0...20
Load resistance	Ω	0... 500
Output ripple		ca. ± 0.15% of final value
Inverse polarity protection		yes
Temperature drift		ca. ± 0.1%K of final value
Idle current	mA	8
Operating temperature range	°C	-10... 70
In compliance with		EN 60947-5-2
Protection class acc. to IEC 60529		IP 67
Connection type		2 m PVC - cable
Conductor diameter		0.5mm²
Housing material		nickel-plated brass
Front face		PBT (Crastin)
Drawing No.		WZ000004

Output signals



Approximate dimensions



Technical data, Approximate dimensions
Capacitive sensors, M 30 x 1.5 thread

Capacitive sensors, with thread M 30 x 1,5

Operating distance S_n, mounting			10 mm flush	10 mm flush	10 mm flush
PNP	NO		SCF10-M30N-V2-PO	SCF10-M30N-C1-PO	
	NC				
	Antivalent		SCF10-M30N-V2-PK	SCF10-M30N-C1-PK	
NPN	NO				
	Antivalent				
DC 2-Draht	NO				
AC	NO				SCF10-M30N-V2-AO
	NC				
	Antivalent				
Switching distance		[mm]	1 ... 10	1 ... 10	1 ... 10
Reduction factor		r_{V2A}	-	-	-
		r_{AL}	-	-	-
		r_{Cu}	-	-	-
Operating voltage		[V]	10 ... 60	10 ... 60	20 ... 253
Operating current		[mA]	200	200	200
Switching frequency		[Hz]	10	10	10
Idle current / residual current		[mA]	20 / 0.5	20 / 0.5	- / 1.5
Line voltage drop		[V]	2,8	2,8	8
Short circuit protection			clocking	clocking	no
Inverse polarity protection			yes	yes	yes
Indication		output signal	LED yellow	LED yellow	LED yellow
		voltage	-	-	-
Operating temperature range		[°C]	-25 ... 70	-25 ... 70	-25 ... 70
In compliance with			EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
Protection class acc. to ICE 60529			IP 67	IP 67	IP 67
Connection type			2 m, PVC-cable	Connector	2 m, PVC-cable
Conductor diameter			0.75 mm²	-	0.75 mm²
Housing material			stainless steel	stainless steel	stainless steel
Front face			PBT (Crastin)	PBT (Crastin)	PBT (Crastin)
Drawing No.			LS100018	LS100019	LS100018

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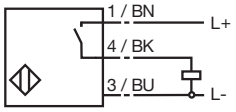
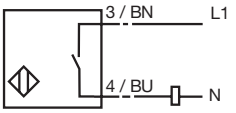
Output signals

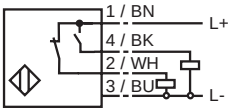
Output PO



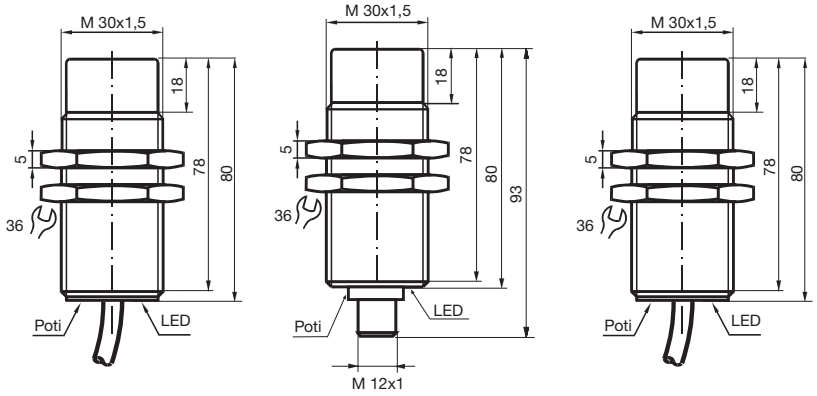
Output AO



Output PK



Approximate dimensions

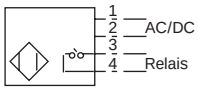


Photoelectric sensors: Through beam sensors

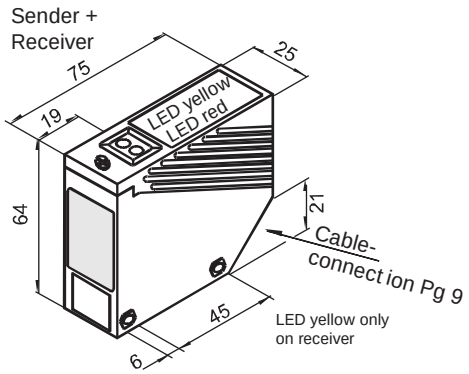
Device identification	STO20M-B75N-T-KK
Sensing range	**20,000 mm**
Output	DC, PNP
Operating data	
Polarized	No
Reference value	through beam photoelectric sensor
Range setting	with potentiometer
Switching frequency (1:1) / response time	25 Hz / ≤ ms
Readiness delay	≤ 50
Range hyteresis	–
Detectable object	opaque
Operating mode	Light ON/dark ON, selectable
LED yellow	only receiver: Output status
LED red	rec.: stability control output, send.: net on
Type of light	IR-light 940 mm
External light limit (daylight / halogen light)	≤ 10,000 Lux / ≤ 7,500 Lux
Operating temperature range	-25°C... +55°C
Storage temperature range	-40°C... +55°C
Electrical data	
Operating voltage	12... 240 VDC ± 10% 24... 240 VAC ± 10%: 50...60 Hz
Idle current	—
Output	NC / NO
Rated operational current	relay: ≤ 240 VAC, ≤ 30 VDC, ≤ 3A
Line voltage drop	–
Stability control output	–
Rated operational current	–
Short-circuit and overload protection	no
Inverse polarity protection	no
Mechanical data	
Protection class acc. to EN 60529	IP 65
Optical system	PMMA lenses, pole filter
Permissible shock and vibration resistance	shock b ≤ 30 g, T ≤ 11ms; vibrations f ≤ 55 Hz, a ≤ 1 mm
Connection type	Terminal compartment, cable ø 10 mm
Weight	emitter: 90 g; receiver: 100g
In compliance with	EN 60 947-5-2
Drawing No.	CO000008

Output signals

Receiver
Output KK



Approximate dimensions



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Technical data, Approximate dimensions
Photoelectric sensors, Through beam

Photoelectric sensors: Through beam sensors

Device identification	SOT15M-B45N-C1-PKS	SOT15M-B45N-C1-NKS
Sensing range	**2,000 mm ... 15,000 mm**	**2,000 mm ... 15,000 mm**
Output	DC, PNP	DC, NPN
Operating data		
Polarized	no	no
Reference value	receiver	receiver
Range setting	with +/- keys	with +/- keys
Switching frequency (1:1) / response time	max. 1 kHz / ≤ 3 ms	max. 1 kHz / ≤ 3 ms
Readiness delay	< 400 ms, with switch-on standardisation	< 400 ms, with switch-on standardisation
Range hyteresis	–	–
Detectable object:	opaque, reflective	opaque, reflective
LED red	stability control output flashing 2 Hz, fault indication in teach-in mode 1,5 s	stability control output flashing 2 Hz, fault indication in teach-in mode 1,5 s
LED yellow	switching condition	switching condition
LED green	operating status, in teach-in mode flashing	operating status, in teach-in mode flashing
Type of light	visible red light 660 mm	visible red light 660 mm
External light limit (daylight / halogen light)	≤ 10,000 Lux / ≤ 7,500 Lux	≤ 10,000 Lux / ≤ 7,500 Lux
Operating temperature range	-25 °C ... +55 °C	-25 °C ... +55 °C
Storage temperature range	-40 °C ... +55 °C	-40 °C ... +55 °C
Electrical data		
Operating voltage	10 VDC ... 30 VDC ±10%	10 VDC ... 30 VDC ±10%
Idle current	ca. 25 mA per device	ca. 25 mA per device
Rated operational current	200 mA per device	200 mA per device
Line voltage drop	≤ 2,5 V	≤ 2,5 V
Input voltage	for control / test: < 2 V off / > 7 V on	for control / test: < 2 V off / > 7 V on
Short-ciucuit and overload protection	yes	yes
Inverse polarity protection	yes	yes
Mechanical data		
Protection class acc. to EN 60529	> IP 67, materials approved for use in food production	> IP 67, materials approved for use in food production
Optical system	PMMA lenses	PMMA lenses
Permissible shock- and vibration resistance	shock b ≤ 30 g, T ≤ 11 ms; vibrations f ≤ 55 Hz, a ≤ 1mm	shock b ≤ 30 ≤, T ≤ 11 ms; vibrations f ≤ 55 Hz, a ≤ 1mm
Connection type	Connector M12 x 1, 5 - pole, 90 ° pivoting	Connector M12 x 1, 5 - pole, 90 ° pivoting
Weight	60 g per device	60 g per device
In compliance with	EN 60 947-5-2	EN 60 947-5-2
Housing material	PBT (Crastin), plug and dovetail AlSi	PBT (Crastin), plug and dovetail AlSi

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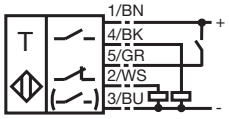
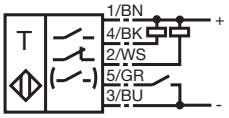
Output signals

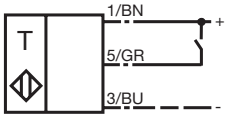
PKS



Receiver

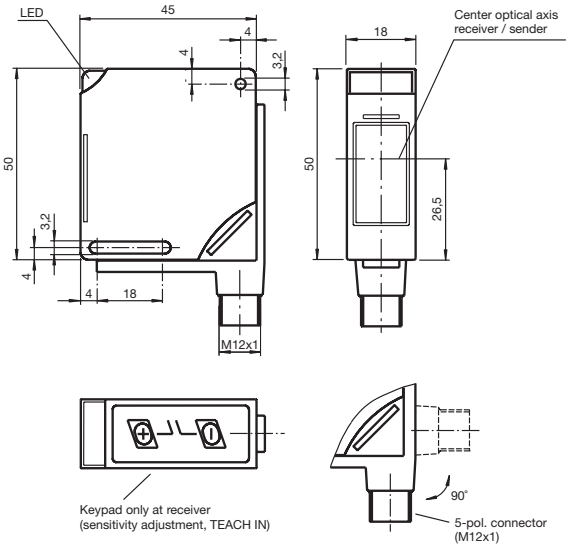
NKS





Sender

Approximate dimensions

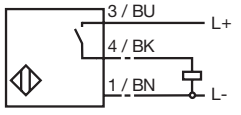


Photoelectric sensors: Retroreflective sensors

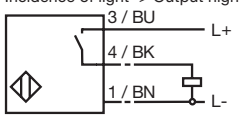
Device identification	SOR1500-M18N-C1-PO	SOR4000-M18N-C1-PO
Sensing range	**1,500 mm**	**4,000 mm**
Output	DC, PNP	DC, PNP
Operating data		
Polarized	yes	yes
Reference value	Retroreflector 50mm x 50mm	Retroreflector 50mm x 50mm
Range setting	with potentiometer	with potentiometer
Switching frequency (1:1) / response time	300 Hz / ≤ 1,5 ms	≤ 500 Hz
Readiness delay	≤ 50 ms	≤ 25 ms
Range hyteresis	–	–
Detectable object:	opaque, reflective	opaque, reflective
Mode of operation	Light ON/dark ON, selectable by wiring	Light ON/dark ON, selectable electronicallysss
LED yellow	switching condition	switching condition
LED red	–	–
Type of light	red light 660 nm	red light 660 nm
External light limit (daylight / halogen light)	≤ 10,000 Lux / ≤ 3,000 Lux	≤ 10,000 Lux / ≤ 3,000 Lux
Operating temperature range	-25°C ... +55°C	-25°C ... +55°C
Storage temperature range	-40°C ... +70°C	-40°C ... +70°C
Electrical data		
Operating voltage	10 VDC ... 30 VDC, ripple 10%$_{ss}$	10 VDC ... 30 VDC
Idle current	≤ 20 mA	≤ 25 mA
Output	NC/NO	NC/NO
Rated operational current	100 mA	100 mA
Line voltage drop	≤ 2,5 V	≤ 2,5 V
Stability control output	–	–
Rated operational current	–	–
Short-ciucuit and overload protection	yes	yes
Inverse polarity protection	yes	yes
Mechanical data		
Protection class acc. to EN 60529	IP 67	IP 67
Optical system	PMMA lenses, pole filter	PMMA lenses, pole filter
Permissible shock-	shock b ≤ 30 g, T ≤ 11 ms	shock b ≤ 30 g, T ≤ 11 ms
and vibration resistance	vibrations f ≤ 55 Hz, a ≤ 1mm	vibrations f ≤ 55 Hz, a ≤ 1mm
Connection type	Connector M12	Connector M12
Housing material	nickel-plated brass	nickel-plated brass
Weight	45 g	45 g
In compliance with	EN 60 947-5-2	EN 60 947-5-2
Drawing No.	CO000001A	CO000001B

Output signals

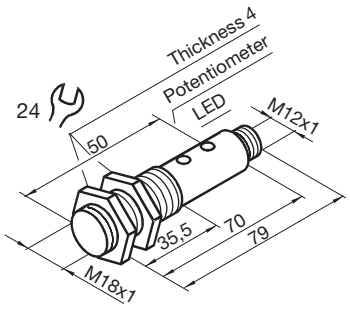
Output PO
Incidence of light–> Output high

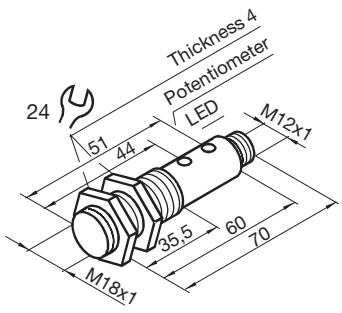


Output PO
Incidence of light–> Output high



Approximate dimensions





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Technical data, Approximate dimensions
Photoelectric sensors, Retroflective

Photoelectric sensors: Retroreflective sensors

Device identification	SOR2000-B26N-U2-PO
Sensing range	**2,000 mm**
Output	DC, PNP
Operating data	
Polarized	no
Reference value	Retroreflector 50mm x 50mm
Range setting	with potentiometer
Switching frequency (1:1) / response time	500 Hz / ≤ 1 ms
Readiness delay	≤ 30 ms
Range hyteresis	–
Detectable object:	opaque
Operating mode	Light ON/dark ON, selectable
LED yellow	switching condition
LED red	stability control output
Type of light	IR-light 950 nm
External light limit (daylight / halogen light)	≤ 20,000 Lux / ≤ 5,000 Lux
Operating temperature range	-25°C ... +70°C
Storage temperature range	-25°C ... +70°C
Electrical data	
Operating voltage	10 VDC ... 30 VDC, ripple 10%$_{ss}$
Idle current	≤ 30 mA
Output	NC/NO
Rated operational current	200 mA
Line voltage drop	≤ 2,5 V
Stability control output	–
Rated operational current	–
Short-ciucuit and overload protection	yes
Inverse polarity protection	yes
Mechanical data	
Protection class acc. to EN 60529	IP67
Optical system	PC lenses
Permissible shock	shock b ≤ 30 g, T ≤ 11 ms
and vibration resistance	vibrations f ≤ 55 Hz, a ≤ 1mm
Connection type	2 m cable, 3 x 0.14mm2 , PUR black
Housing material	PBT (Crastin)
Weight	20 g
In compliance with	EN 60 947-5-2
Drawing No.	CO000003

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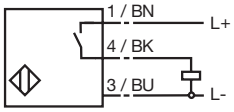
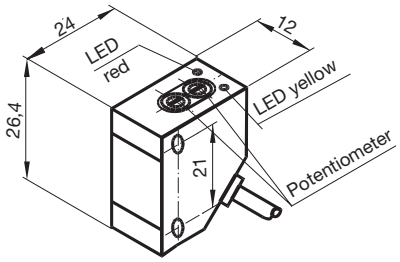
Output signals

Ouput PO

Output low / high:
Selection with Potentiometer



Approximate dimensions



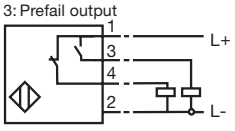
Photoelectric sensors: Retroreflective sensors

Device identification	SOR5000-B75N-T-POS	SOR5000-B75N-T-KK
Sensing range	**5,000 mm**	**5,000 mm**
Output	DC, PNP	DC, PNP
Operating data		
Polarized	yes	yes
Reference value	Retroreflector 50mm x 50mm	Retroreflector 50mm x 50mm
Range setting	with potentiometer	with potentiometer
Switching frequency (1:1) / response time	300 Hz / ≤ 15 ms	25 Hz / ≤ 20 ms
Readiness delay	≤ 50 ms	≤ 50 ms
Range hyteresis	–	–
Detectable object:	opaque, reflective	opaque, reflective
Mode of operation	Light ON/dark ON, switchable	Light ON/dark ON, switchable
LED yellow	switching condition	switching condition
LED red	stability control output	stability control output
Type of light	red light 660 nm	red light 660 nm
External light limit (daylight / halogen light)	≤ 10,000 Lux / ≤ 7,500 Lux	≤ 10,000 Lux / ≤ 7,500 Lux
Operating temperature range	-25°C ... +55°C	-25°C ... +55°C
Storage temperature range	-40°C ... +55°C	-40°C ... +55°C
Electrical data		
Operating voltage	10 VDC ... 30 VDC, ripple 10%$_{ss}$	12 ... 240 VDC ±10% 24 ... 240 VAC ±10%, 50 ... 60 Hz
Idle current	≤ 35 mA	–
Output	NC/NO	NC/NO
Rated operational current	200 mA	relay: ≤ 240 VAC, 30 VDC, ≤ 3A
Line voltage drop	≤ 3 V	–
Stability control output	NO	–
Rated operational current	200 mA short-ciucuit/overload proof	–
Short-ciucuit and overload protection	yes	no
Inverse polarity protection	yes	no
Mechanical data		
Protection class acc. to EN 60529	IP 66	IP 66
Optical system	PMMA lenses, polarisation filter	PMMA lenses, polarisation filter
Permissible shock-	shock b ≤ 30 g, T ≤ 11 ms	shock b ≤ 30 g, T ≤ 11 ms
and vibration resistance	vibrations f ≤ 55 Hz, a ≤ 1mm	vibrations f ≤ 55 Hz, a ≤ 1 mm
Connection type	Terminal compartment, cable ø 10 mm	Terminal compartment, cable ø 10 mm
Housing material	PBT (Crastin)	PBT (Crastin)
Weight	100 g	110 g
In compliance with	EN 60 947-5-2	EN 60 947-5-2
Drawing No.	CO000006	CO000006

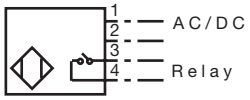
Output signals

Output POS

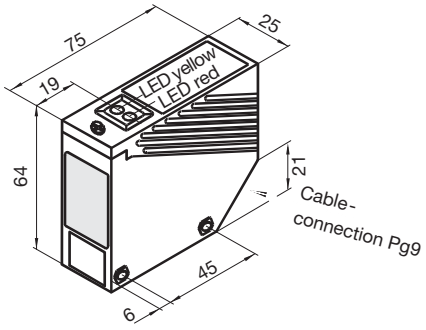
4: Switchin output low / high reversable
3: Prefail output



Output KK



Approximate dimensions



Technical data, Approximate dimensions
Photoelectric sensors, Retroflective

Photoelectric sensors: Retroreflective sensors

Device identification	SOR6000-B45N-C1-PKS	SOR6000-B45N-C1-NKS
Sensing range	**0 mm ... 4,000 mm with 50 x 50 mm² Reflector** **0 mm ... 6,000 mm with 100 x 100 mm² Reflector**	**0 mm ... 4,000 mm with 50 x 50 mm² Reflector** **0 mm ... 6,000 mm with 100 x 100 mm² Reflector**
Output	DC, PNP	DC, NPN
Operating data		
Polarized	no	no
Reference value	included reflector 50 x 50 mm² alternativly 100 x 100 mm² reflector	included reflektor 50 x 50 mm² alternativly 100 x 100 mm² reflector
Range setting	with +/- keys	with +/- keys
Switching frequency (1:1) / response time	max. 1 kHz / ≤ 3 ms	max. 1 kHz / ≤ 3 ms
Readiness delay	< 80 ms, with Einschaltnorm	< 80 ms, with Einschaltnorm
Range hyteresis	adjustable	adjustable
Detectable object:	opaque, reflective	opaque, reflective
LED red	Stability control output flashing 2 Hz, Fault indication in teach-in mode 1,5 s	Stability control output flashing 2 Hz, Fault indication in teach-in mode 1,5 s
LED yellow	switching condition	switching condition
LED green	operating status, in teach-in mode flashing	operating status, in teach-in mode flashing
Type of light	visible red light 660 mm	visible red light 660 mm
External light limit (daylight / halogen light)	≤ 10,000 Lux / ≤ 7,500 Lux	≤ 10,000 Lux / ≤ 7,500 Lux
Operating temperature range	-25 °C ... +55 °C	-25 °C ... +55 °C
Storage temperature range	-40 °C ... +55 °C	-40 °C ... +55 °C
Electrical data		
Operating voltage	10 VDC ... 30 VDC ±10%	10 VDC ... 30 VDC ±10%
Idle current	ca. 25 mA	ca. 25 mA
Rated operational current	200 mA	200 mA
Line voltage drop	≤ 2,5 V	≤ 2,5 V
Input voltage	for control / test: < 2 V off / > 7 V on	for control / test: < 2 V off / > 7 V on
Short-ciucuit and overload protection	yes	yes
Inverse polarity protection	yes	yes
Mechanical data		
Protection class acc. to EN 60529	> IP 67, materials approved for use in food production	> IP 67, materials approved for use in food production
Optical system	PMMA lenses	PMMA lenses
Permissible shock- and vibration resistance	shock b ≤ 30 g, T ≤ 11 ms vibrations f ≤ 55 Hz, a ≤ 1 mm	shock b ≤ 30 g, T ≤ 11 ms vibrations f ≤ 55 Hz, a ≤ 1 mm
Connection type	Connector M12 x 1, 5 - pole, 90 ° pivoting	Connector M12 x 1,5-pole, 90 ° pivoting
Housing material	PBT (Grastin), plug and dovetail AlSi	PBT (Grastin), plug and dovetail AlSi
Weight	60 g	110 g
In compliance with	EN 60 947-5-2	EN 60 947-5-2

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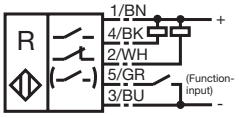
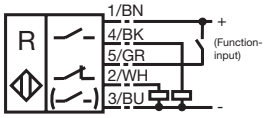
Output signals

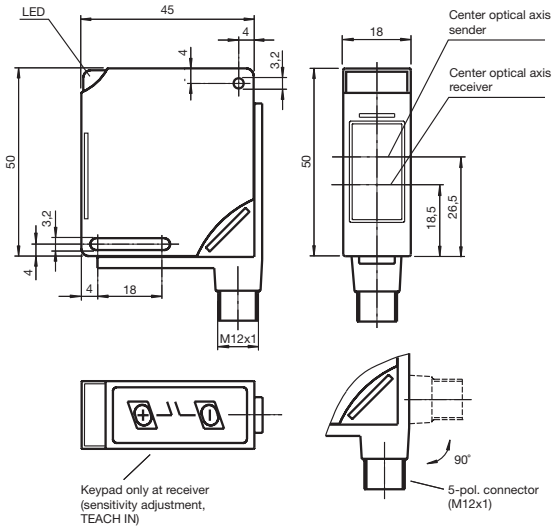
NKS



PKS



Approximate dimensions



Technical data, Approximate dimensions
Photoelectric sensors, Retroflective

Photoelectric sensors: Retroreflective sensors for the detection of transparent objects

Device identification	SORG2000-B45N-C1-PKS	SORG2000-B45N-C1-NKS
Sensing range	**0 mm ... 2,000 mm with 50 x 50 mm² reflector**	**0 mm ... 2,000 mm with 50 x 50 mm² reflector**
Output	DC, PNP	DC, NPN
Operating data		
Polarized	yes	yes
Reference value	Reflector 50 x 50 mm²	Reflektor 50 x 50 mm²
Range setting	with +/- keys	with +/- keys
Switching frequency (1:1) / response time	max. 1 kHz / ≤ 3 ms	max. 1 kHz / ≤ 3 ms
Readiness delay	< 80 ms, with Einschaltnorm	< 80 ms, with Einschaltnorm
Range hyteresis	adjustable	adjustable
Detectable object:	opaque, transparent (z.B. Klarglas, PET, Folien)	opaque, transparent (z.B. Klarglas, PET, Folien)
LED red	Stability control output flashing 2 Hz, Fault indication in teach-in mode 1,5 s	Stability control output flashing 2 Hz, Fault indication in teach-in mode 1,5 s
LED yellow	switching condition	switching condition
LED green	operating status, in teach-in mode flashing	operating status, in teach-in mode flashing
Type of light	visible red light 660 mm	visible red light 660 mm
External light limit (daylight / halogen light)	≤ 10,000 Lux / ≤ 7,500 Lux	≤ 10,000 Lux / ≤ 7,500 Lux
Operating temperature range	-25 °C ... +55 °C	-25 °C ... +55 °C
Storage temperature range	-40 °C ... +55 °C	-40 °C ... +55 °C
Electrical data		
Operating voltage	10 VDC ... 30 VDC ±10%	10 VDC ... 30 VDC ±10%
Idle current	ca. 25 mA	ca. 25 mA
Rated operational current	200 mA	200 mA
Line voltage drop	≤ 2,5 V	≤ 2,5 V
Input voltage	for control / test: < 2 V off / > 7 V on	for control / test: < 2 V off / > 7 V on
Short-ciucuit and overload protection	yes	yes
Inverse polarity protection	yes	yes
Mechanical data		
Protection class acc. to EN 60529	> IP 67, materials approved for use in food production	> IP 67, materials approved for use in food production
Optical system	PMMA lenses	PMMA lenses
Permissible shock- and vibration resistance	shock b ≤ 30 g, T ≤ 11 ms vibrations f ≤ 55 Hz, a ≤ 1mm	shock b ≤ 30 ≤, T ≤ 11 ms vibrations f ≤ 55 Hz, a ≤ 1mm
Connection type	Connector M12 x 1, 5 - pole,	Connector M12 x 1, 5 - pole,
90 ° schwenkbar	90 ° pivoting	
Housing material	PBT (Grastin), plug and dovetail AlSi	PBT (Grastin), plug and dovetail AlSi
Weight	60 g	60 g
In compliance with	EN 60 947-5-2	EN 60 947-5-2

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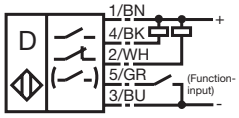
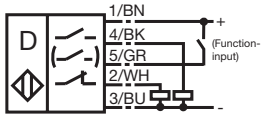
Output signals

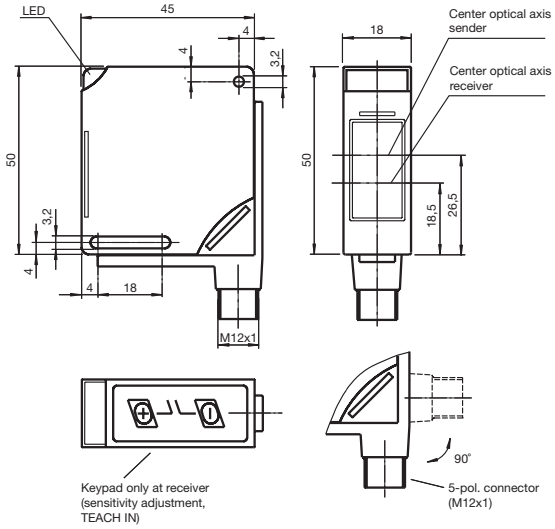
NPN



PNP



Approximate dimensions



Technical data, Approximate dimensions
Photoelectric sensors, Diffuse Retroflective

Photoelectric sensors: Diffuse Reflective sensors

Device identification	SOD200-M18N-C1-PO	SOD400-B26N-U2-PO
Sensing range	**200 mm**	**400 mm**
Output	DC, PNP	DC, PNP
Operating data		
Polarized	no	no
Reference value	white 200mm x 200mm	white 100mm x 100mm
Range setting	with potentiometer	with potentiometer
Switching frequency (1:1) / response time	300 Hz / ≤ 1,5 ms	500 Hz / ≤ 1 ms
Readiness delay	≤ 50 ms	≤ 30 ms
Range hyteresis	≤ 15 %	≤ 15 %
Detectable object:	opaque	opaque, transparent
Operating mode	Light ON/dark ON, selectable by wiring	Light ON/dark ON, switchable
LED yellow	switching condition	switching condition
LED red	–	stability control output
Type of light	IR-light 940 nm	IR-light 950 nm
External light limit (daylight / halogen light)	≤ 10,000 Lux / ≤ 3,000 Lux	≤ 20,000 Lux / ≤ 5,000 Lux
Operating temperature range	-25°C ... +55°C	-25°C ... +70°C
Storage temperature range	-40°C ... +70°C	-25°C ... +70°C
Electrical data		
Operating voltage	10 VDC ... 30 VDC, ripple 10%$_{ss}$	10 VDC ... 30 VDC, ripple 10%$_{ss}$
Idle current	≤ 20 mA	≤ 30 mA
Output	NC / NO	NC/NO
Rated operational current	100 mA	200 mA
Line voltage drop	≤ 2,5 V	≤ 2,5 V
Stability control output	–	–
Rated operational current	–	–
Short-ciucuit and overload protection	yes	yes
Inverse polarity protection	yes	yes
Mechanical data		
Protection class acc. to EN 60529	IP 67	IP 67
Optical system	PC lenses	PC lenses
Permissible shock-	shock b ≤ 30 g, T ≤ 11 ms	shock b ≤ 30 g, T ≤ 11 ms
and vibration resistance	vibrations f ≤ 55 Hz, a ≤ 1 mm	vibrations f ≤ 55 Hz, a ≤ 1 mm
Connection type	Connector M12	2m cable PUR black, 3 x 0.14 mm^2
Housing material	nickel-plated brass	PBT (Crastin)
Weight	45 g	20 g
In compliance with	EN 60 947-5-2	EN 60 947-5-2
Drawing No.	CO000001	CO000003

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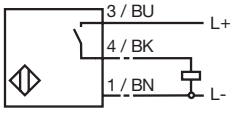
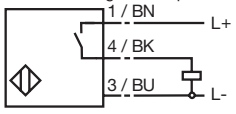
Output signals

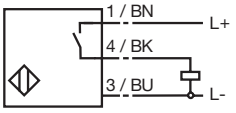
Output PO
Incidence of light–> Output high



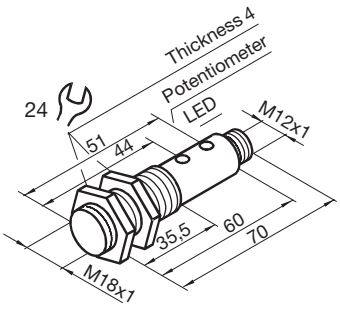
Output PO
Incidence of light–> Output low

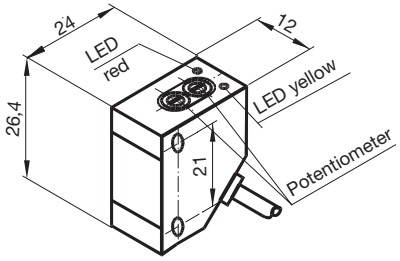


Ouput PO
Output low / high:
Selection with Potentiometer



Approximate dimensions





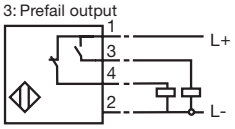
Photoelectric sensors: Diffuse Reflective sensors

Device identification	**SOD800-B75N-T-POS**
Sensing range	**800 mm**
Output	DC, PNP
Operating data	
Polarized	no
Reference value	white 100mm x 100mm
Range setting	with potentiometer
Switching frequency (1:1) / response time	300 Hz / ≤ 15 ms
Readiness delay	≤ 50 ms
Range hyteresis	≤ 15 %
Detectable object:	opaque, transparent
Operating mode	Light ON/dark ON, switchable
LED yellow	switching condition
LED red	stability control output
Type of light	IR-light 940 nm
External light limit (daylight / halogen light)	≤ 10,000 Lux / ≤ 7,500 Lux
Operating temperature range	-25°C ... +70°C
Storage temperature range	-40°C ... +80°C
Electrical data	
Operating voltage	10 VDC ... 30 VDC, ripple 10%$_{ss}$
Idle current	≤ 25 mA
Output	NC/NO
Rated operational current	200 mA short cicuit/overload proof
Line voltage drop	≤ 3 V
Stability control output	NO
Rated operational current	10 mA
Short-ciucuit and overload protection	yes
Inverse polarity protection	yes
Mechanical data	
Protection class acc. to EN 60529	IP 66
Optical system	PMMA lenses
Permissible shock-	shock b ≤ 30 g, T ≤ 11 ms
and vibration resistance	vibrations f ≤ 55 Hz, a ≤ 1mm
Connection type	Terminal compartment, cable ø 10 mm
Housing material	PBT (Crastin)
Weight	100 g
In compliance with	EN 60 947-5-2
Drawing No.	CO000006

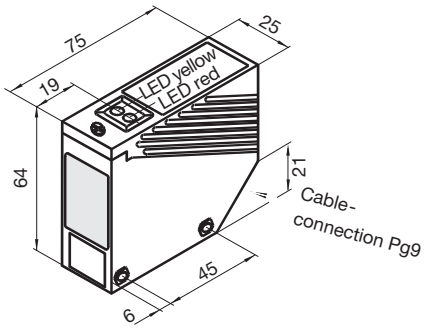
Output signals

Output POS

4: Switchin output low / high reversable
3: Prefail output



Approximate dimensions



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Technical data, Approximate dimensions
Photoelectric sensors, Diffuse Retroflective

Photoelectric sensors: Diffuse Reflective sensors

Device identification	**SOD2000-B75N-T-KK**
Sensing range	**2,000 mm**
Output	DC, PNP
Operating data	
Polarized	no
Reference value	white 200mm x 200mm
Range setting	with potentiometer
Switching frequency (1:1) / response time	300 Hz / ≤ 1,5 ms
Readiness delay	≤ 50 ms
Range hyteresis	≤ 15 %
Detectable object	opaque, transparent
Operating mode	Light ON/dark ON, switchable
LED yellow	switching condition
LED red	stability control output
Type of light	IR-light 940 mm
External light limit (daylight / halogen light)	≤ 10,000 Lux / ≤ 7,500 Lux
Operating temperature range	-25°C ... +55°C
Storage temperature range	-40°C ... +55°C
Electrical data	
Operating voltage	12 ...240 VDC. ±10% 24 ... 240 VAC, ±10%; 50 ... 60 Hz
Idle current	–
Output	NC/NO
Rated operational current	relay: ≤ 240 VAC, ≤ 30 VDC, ≤ 3 A
Line voltage drop	–
Stability control output	–
Rated operational current	–
Short-ciucuit and overload protection	no
Inverse polarity protection	no
Mechanical data	
Protection class acc. to EN 60529	IP 66
Optical system	PMMA lenses
Permissible shock- and vibration resistance	shock b ≤ 30 g, T ≤ 11 ms vibrations f ≤ 55 Hz, a ≤ 1mm
Connection type	Terminal compartment, cable ø 10 mm
Weight	110 g
In compliance with	EN 60 947-5-2
Drawing No.	CO000007

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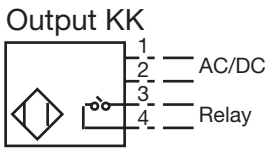
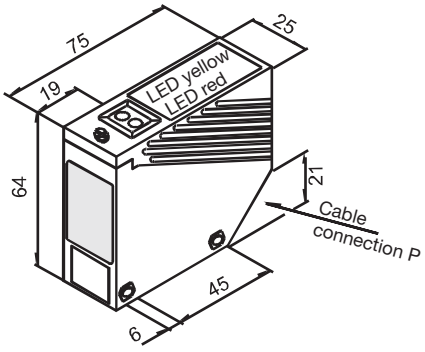
Output signals



Approximate dimensions



Photoelectric sensors: Diffuse Reflective sensors

Device identification	**SOD500-B45N-C1-PKS**	**SOD500-B45N-C1-NKS**
Sensing range		
Output	DC, PNP	DC, NPN
Operating data		
Polarized	no	no
Reference value	standard white 100 x 100 mm²	standard white 100 x 100 mm²
Range setting	with +/- keys	with +/- keys
Switching frequency (1:1) / response time	max. 1 kHz / ≤ 3 ms	max. 1 kHz / ≤ 3 ms
Readiness delay	< 80 ms, with activation standard	< 80 ms, with activation standard
Range hyteresis	adjustable	adjustable
Detectable object:	opaque	opaque
LED red	stability control output flashing2 Hz, Fault indication in learning mode 1,5 s	stability control output flashing 2 Hz, Fault indication in learning mode 1,5 s
LED yellow	switching condition	switching condition
LED green	Operation indication, flashing in teach-in mode	Operation indication, flashing in teach-in mode
Type of light	visible red light 660 mm	visible red light 660 mm
External light limit (daylight / halogen light)	≤ 10,000 Lux / ≤ 7,500 Lux	≤ 10,000 Lux / ≤ 7,500 Lux
Operating temperature range	-25 °C ... +55 °C	-25 °C ... +55 °C
Storage temperature range	-40 °C ... +55 °C	-40 °C ... +55 °C
Electrical data		
Operating voltage	10 VDC ... 30 VDC ±10%	10 VDC ... 30 VDC ±10%
Idle current	ca. 25 mA	ca. 25 mA
Rated operational current	200 mA	200 mA
Line voltage drop	≤ 2,5 V	≤ 2,5 V
Input voltage	for control/ test: < 2 V off / > 7 V on	for control/ test: < 2 V off / > 7 V on
Short-ciucuit and overload protection	yes	yes
Inverse polarity protection	yes	yes
Mechanical data		
Protection class acc. to EN 60529	> IP 67, materials approved for use in food production	> IP 67, materials approved for use in food production
Optical system	PMMA lenses	PMMA lenses
Permissible shock- and vibration resistance	shock b ≤ 30 g, T ≤ 11 ms vibrationsf ≤ 55 Hz, a ≤ 1 mm	shock b ≤ 30 g, T ≤ 11 ms vibrationsf f ≤ 55 Hz, a ≤ 1 mm
Connection	Connector M12 x 1. 5 - pole, 90 ° pivoting	Connector M12 x 1.5-pole, 90 ° pivoting
Housing material	PBT (Grastin), plug and dovetail AlSi	PBT (Grastin), plug and dovetail AlSi
Weight	60 g	60 g
In compliance with	EN 60 947-5-2	EN 60 947-5-2

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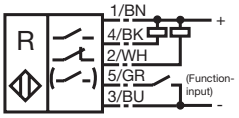
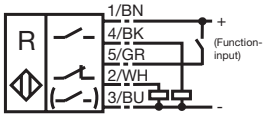
Output signals

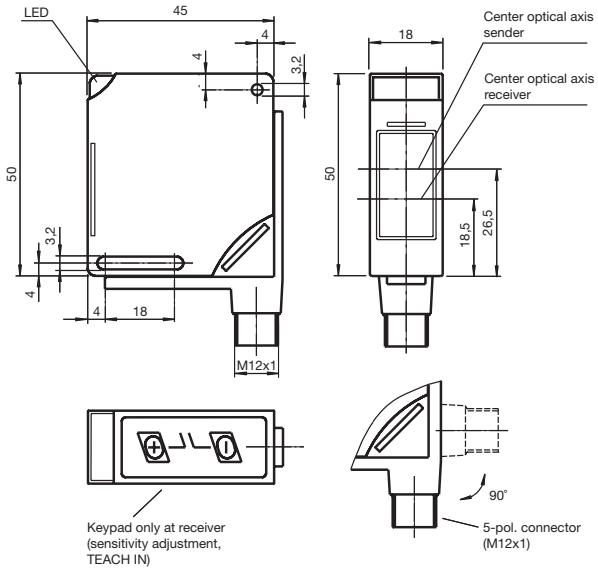
NKS



PKS



Approximate dimensions



Technical data, Approximate dimensions

Fiber-optic photoelectric sensors, Diffuse reflective & thru beam

Fibre-optic photoelectric sensors: diffuse-reflective and thru-beam

Device identification	SOLX-B50N-C8-PKS
Output	**DC, PNP**
Sensing ranges with optical waveguides	
Diffuse-reflective	
SOLD50-B50N-PVM6: 50 mm	**50 mm**
SOLD15-B50N-PVM3: 15 mm	**15 mm**
Thru-beam	
SOLT150-B50N-PVM4: 150 mm	**150 mm**
SOLT150-B50N-PVM3: 150 mm	**150 mm**
Reference target	white object 50mm x 50mm
Centered/ right angle	
Range setting	with potentiometer
Switching rate (mark:space1:1)	200 Hz / 1.5 kHz switchable
no stability control at 1,5 kHz	
Response time at 200 Hz / 1.5 kHz	2.5 ms / 0.3 ms
Readiness delay	20 ms
Repeatability	≤ 0,5 % of sensing range
Detectable object	depending on fibre-optic waveguide type
Operating mode	Light ON/dark ON selectable
Pulse prolongation (als Lichttaster)	20 ms ± 20 %, switchable
Protection against mutual interaction	2 pulse frequencies, selectable
LED yellow	ouput status
DUAL-LED green	Power on
LED red, blinking at 2 Hz	Stability control indication (dynamic)
Type of light	red light 660 nm
External light limits: daylight/ halogen light	≤ 40 000 Lux / ≤ 30 000 Lux
Operating temperature range	-25°C.... +70°C
Storage temperature range	-40°C... +80°C
Elektrical data	
Operational voltage	10 VDC... 30 VDC, ripple 10% $_{ss}$
Idle current	≤ 30 mA
Switch output	NO/NC, switchable
Rated operational current	200 mA
Line voltage drop	≤ 2.5 V
Stability control output	NO (dynamical)
Rated operational current	10 mA, short-circuit/overload proof
Short-circuit and overload predectionyes	
Reverse polarity predection	yes
Mechanical data	
Predection class acc. to EN 60529	IP 63
Permissible shock-	shock b ≤ 30 g, T ≤ 11 ms
and vibration loading	vibrations f ≤ 55 Hz, a ≤ 1 mm
Mounting	DIN rail
Connection	C8-connection, 4 pin
Housing material	PBT (Crastin)
Weight	80 g
In compliance with	EN 60 947-5-2

Programming via encoding switch

Switch output:	NO/ NC
Pulse frequency:	frequency 1 / frequency 2
Pulse prolongation:	0 ms / 20 ms ±20% only for diffuse-reflective op.
Switching rate:	200 Hz / 1,5 kHz

Encoding switch	Switch output	Pulse freq.	Pulse prolong.1)	Switching rate
0	NO	1	0 ms	200 Hz
1	NO	1	0 ms	1.5 kHz
2	NO	1	20 ms	200 Hz
3	NO	1	20 ms	1.5 kHz
4	NO	2	0 ms	200 Hz
5	NO	2	0 ms	1.5 kHz
6	NO	2	20 ms	200 Hz
7	NO	2	20 ms	1.5 kHz
8	NC	1	0 ms	200 Hz
9	NC	1	0 ms	1.5 kHz
A	NC	1	20 ms	200 Hz
B	NC	1	20 ms	1.5 kHz
C	NC	2	0 ms	200 Hz
D	NC	2	0 ms	1.5 kHz
E	NC	2	20 ms	200 Hz
F	NC	2	20 ms	1.5 kHz

1) only for diffuse-reflective operation

Plastic fibre-optic waveguides for Type B50N:

The length of the fibre-optic waveguides is 2 m. A cutting tool is also supplied. The minimum bending radius is 15 mm. The fibre-optice waveguide may not be bent in the area of 15 mm at the sensor and waveguide head. The fibre-optic waveguides must be pressed into the sensor's opening, whereby slight resistance will be felt. Fix the fibre-optic waveguide in positions with the screw.

Fibre-optic waveguides for diffuse mode

Reference target 50mm x 50mm white

SOLD50-B50N-PVM6

Nominal range: 50 mm

SOLD15-B50N-PVM3

Nominal range 15 mm

Fibre-optic waveguides for thru-beam mode

SOLT150-B50N-PVM4 (1 set = 2 pieces)

Nominal range 150 mm

SOLT150-B50N-PVM3 (1 set = 2 pieces)

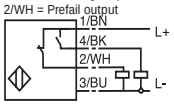
Nominal range 150 mm

Output signals

Output POS

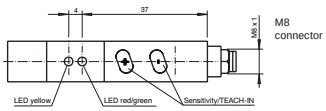
4/BK = Switching output

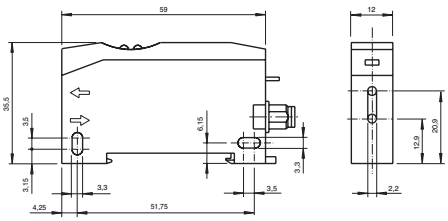
2/WH = Prefail output



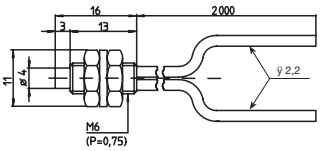
Dimensions in mm

SOLX-B50N-C8-PKS

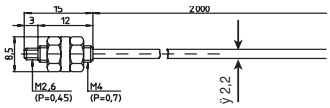




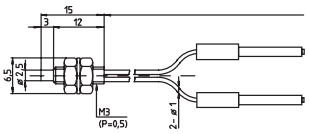
SOLD50-B50N-PVM6



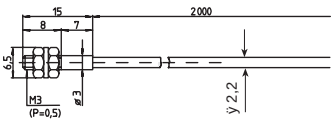
SOLT150-B50N-PVM4



SOLD15-B50N-PVM3



SOLT150-B50N-PVM3



Tuning on target object, Series B45
Photoelectric sensors

Dynamic TEACH-IN for moving objects

If necessary, press the "+"- und "-"- keys at the same time for 5 s (until the green LED flashes once). The sensor is now "unlocked".

Move the objects to be detected (one object should be enough) through the sensing range in the desired distance. The green LED will flash with a higher frequency (4 Hz) for a short period of time. The teach-in has been sucessful when an object is within the sensing range and the LED flashes with its original frequency again.

Note
It might happen that the change in frequency is not always noticable.

Press the "+"- und "-"- keys at the same time (about 1 s) until the red LED is turned off. The sensor now is in the "teach in" mode and anounces that through a flashing (2 Hz) green LED.

To conclude the TEACH-IN you now have to press either the "+"- or the "-"- key. This way the sensor returns to "normal mode".

Static TEACH-IN of objects with a set distance

If necessary, press the "+"- und "-"- keys at the same time for 5 s (until the green LED flashes once). The sensor is now "unlocked".

The green LED will flash with a higher frequency (4 Hz) for a short period of time. The teach-in has been sucessful when the LED flashes with its original frequency again.

Move the objects to be detected into the sensing range in the desired distance.
Press the "+"- und "-"- keys at the same time (about 1 s) until the red LED is turned off. The sensor now is in the "teach in" mode and anounces that through a flashing (2 Hz) green LED.

Note
The sensor is not yet unlocked if the red LED does not start flashing when pressing the keys.

To conclude the TEACH-IN you now have to press either the "+"- or the "-"- key. This way the sensor returns to "normal mode".

OPUS software set

This program is a multi-lingual user interface for the read-in and editing the parameters of photoelectric sensors of series B45. It is a menu-driven program that contains numerous help- and support functions.
The sensors communicate with the PC using an photoelectric-serial interface.
The program shows, which sensor is connected. The program data used as well as the parameters obtained from the sensor can be saved on hard drive or disc, printed out and exported to a database for external use.
The software opens up a variety of setting options for sensors:

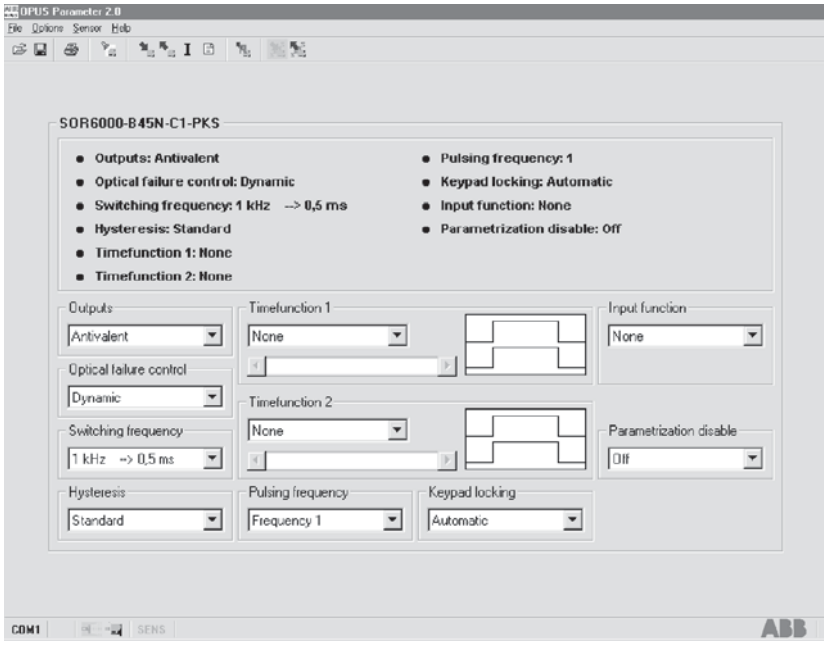
- Choosing the output function: NO/NC
- Type of stability control: dynamic/static
- Switching frequency: 1.5 kHz ... 20 Hz
- Hystereses: small/standard/large
- Readiness delay: none/ 0.1 s ... 25.5 s
- Falling delay/ impulse extension/wiper function
- 3 different pulse frequencies
- Key-lock: off/automatic/always
- Choice of kind of function input: test-/logical-input/div.
- Set-up lock: on/off
- Default read-in/reset

Requirements:

The OPUS parameterization software runs on every PC or Laptop using Windows 3.x, 95 or later that has a free interface for the connection to the sensors.

Included:

- 2 disks 3,5”, 1.44 MB for the installation of the OPUS software
- One B45 combi clip
- Manual



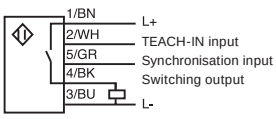
Ultrasonic sensors (switch output)

Device identification:	**SUD500-M30N-C1-POS (...-NOS)**	**SUD2000-M30N-C1-POS (...-NOS)**
Sensing range: **Output signal:**	**60...500 mm (NOS), 30...500 mm (POS)** **PNP, NO (NPN, NO)**	**200...2000 mm (NOS), 80...2000 mm (POS)** **PNP, NO (NPN, NO)**
Characteristics:		
Standard test target (min. flat surface) Beam divergence angle Transducer frequency	100 mm x 100 mm approx. 5 ° at -3 dB approx. 375 kHz	100 mm x 100 mm v. 5 ° at -3 dB approx. 175 kHz
Response time Hysteresis Repeatability Temperature drift	approx. 38 ms ≤ 1 % of set operating distance ≤ 1 % 0,2 % / K	approx. 145 ms ≤ 1 % of set operating distance ≤ 1 % 0,2 % / K
Electrical data:		
Operating voltageU_B / ripple Reverse polarity protection Rated operational current Switch output (PNP-output)	20 ... 30 VDC / +/- 10 % $_{ss}$ yes ≤ 60 mA 200 mA, U_B -3V short-circuit/overload proof	20 ... 30 VDC / +/- 10 % $_{ss}$ yes ≤ 60 mA 200 mA, U_B -3V short-circuit/overload proof
Teach-in input (2/WH):	near switch point-U_B near switch point-U_B near switch point	far switch point+U_B far switch point+U_B far switch point
Synchronisation input (5/GR) for continuous measurement	≤ 1s low level or open input	≥ 1s low level or open input
Synchronisation (used for 2 or more sensors) Measuring time/ switching rateapprox. Change of output signals after: Synchronisation pulse / pause length Synchronisation input levels (5/GR) / impedance:	Start with falling edge 6,5 ms/ ≤ 13Hz 5 impulses / ≥ 60 ms ≥ 100 µs / ≥ 100 µs≥ Low P. 0...1 V, High P. 5V ...+U_B ca. 27 kΩ	Start with falling edge approx. 25 ms / ≤ 3,4 Hz 5 impulses / ≥ 150 ms 100 µs / ≥ 100 µs Low P. 0...1 V, High P. 5V ...+U_B ca. 27 kΩ
Indicators: LED green LED red LED yellow	Power on, Teach-in function, object detected Fault, object uncertain Output status indicator, Teach-in function, no object detected	Power on, Teach-in function, object detected Fault, object uncertain Output status indicator, Teach-in function, no object detected
Mechanical data:		
Operating temperature range Storage temperature range Protection class acc. to DIN 40 050	-25°C ... +70°C -40°C ... +85°C IP 65	-25°C ... +70°C -40°C ... +85°C IP 65
Housing material	nickel-plated brass	nickel-plated brass
Transducer material	Epoxy resin/hollow glass bead composite expanded PUR (Polyurethan)	Epoxy resin/hollow glass bead composite expanded PUR (Polyurethan)
Cover and head	PBT (Crastin)	PBT (Crastin)
Permissible shock- and vibration resistance	b ≤ 30 g, T ≤ 11 ms f ≤ 55 Hz, a ≤ 1 mm	b ≤ 30 g, T ≤ 11 ms f ≤ 55 Hz, a ≤ 1mm
Connection In compliance with Drawing No.	Connector M12 EN 60974-5-2 CU000001	Connector M12 EN 60974-5-2 CU000001

10

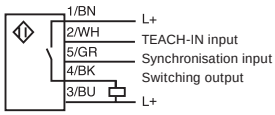
Output signals

Output POS

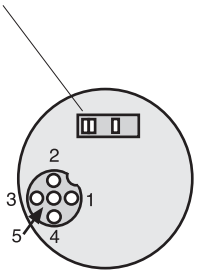


LS000013

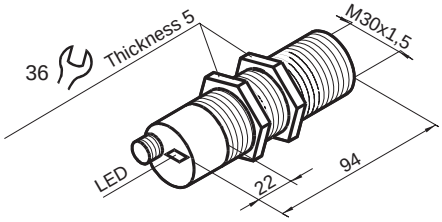
Output NOS



Connector side of sensor
LEDs: green / red / yellow



Dimensions in mm



LS000013A

Technical data, Approximate dimensions
Ultrasonic sensors (switch output)

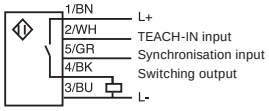
Ultrasonic sensors (switch output)

Device identification:	**SUD4000-M30N-C1-POS (...-NOS)**	**SUD6000-M30N-C1-POS (...-NOS)**
Sensing range: **Output signal:**	**500...4000 mm (NOS), 200...4000 mm (POS)** **PNP, NO (NPN, NO)**	**800...6000 mm (NOS), 350...6000 mm (POS)** **PNP, NO (NPN, NO)**
Characteristics:		
Standard test target (min. flat surface) Beam divergence angle Transducer frequency	100 mm x 100 mm approx. 5 ° at -3 dB approx. 85 kHz	100 mm x 100 mm approx. 5° at -3 dB approx. 65 kHz
Response time Hysteresis Repeatability Temperature drift	approx. 280 ms ≤ 1 % of set operating distance ≤ 1 % 0.2 % / K	approx. 480 ms ≤ 1 % of set operating distance ≤ 1 % 0.2 % / K
Electrical data:		
Operating voltageU_B / ripple Reverse polarity protection Rated operational current Switch output (PNP-output)	20 ... 30 VDC / +/- 10 % $_{ss}$ yes ≤ 60 mA 200 mA, U_B -3V short-circuit/overload proof	20 ... 30 VDC / +/- 10 % $_{ss}$ yes ≤ 60 mA 200 mA, U_B -3V short-circuit/overload proof
Synchronisation input (5/GR) for continuous measurement	≥ 1s low level or open input	≤ 1s low level or open input
Synchronisation (used for s2 or more sensors) Measuring time/ switching rateca. Change of output signals after: Synchronisation pulse / pause length Synchronisation input levels (5/GR) / impedance	Start with falling edge 48 ms / ≤ 1,7 Hzca. 5 impulses / ≥ 265 ms ≥ 100 µs / ≥ 100 µs Low P. 0...1 V, High P. 5V ...+U_B approx. 27 kΩ	Start with falling edge 66 ms / ≤ 1,2 Hz 5 impulses / ≥ 355 ms ≤ 100 µs / ≥ 100 µs Low P. 0...1 V, High P. 5V ...+U_B approx. 27 kΩ
Indicators: LED green LED red LED yellow	Power on, Teach-in function, object detected Fault, object uncertain Output status indicator, Teach-in function, no object detectednt	Power on, Teach-in function, object detected Fault, object uncertain Output status indicator, Teach-in function, no object detected
Mechanical data:		
Operating temperature range Storage temperature range Protection class acc. to DIN 40 050	-25°C ... +70°C -40°C ... +85°C IP 65	-25 °C ... +70 °C -40 °C ... +85 °C IP 65
Housing material	nickel-plated brass	nickel-plated brass
Transducer material	Epoxy resin/hollow glass bead composite expanded PUR (Polyurethan)	Epoxy resin/hollow glass bead composite expanded PUR (Polyurethan)
Cover and head	PBT (Crastin)	PBT (Crastin)
Permissible shock- and vibration resistance	b ≤ 30g, T ≤ 11 ms f ≤ 55 Hz, a ≤ 1 mm	b ≤ 30 g, T ≤ 11 ms f ≤ 55 Hz, a ≤ 1 mm
Connection In compliance with	Connector M12 EN 60974-5-2	Round Connector M12 EN 60974-5-2
Drawing No.	CU000002	CU000003

10

Output signals

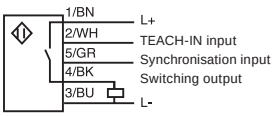
Output POS



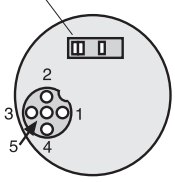
LS000013

Connector side of sensor
LEDs: green / red / yellow

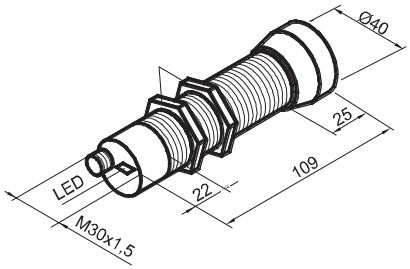
Output NOS

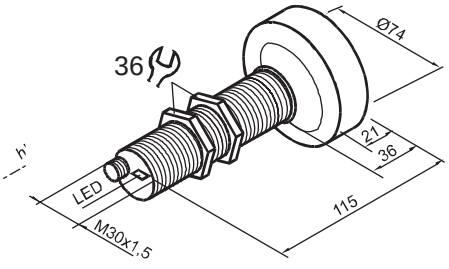


LS000013A



Dimensions in mm





Ultrasonic sensors (switch output)

Setting the switching points:
The ultrasonic sensor is provided with a swith output with 2 teachable switch points. These are set by applying the supply voltage $-U_B$ or $+U_B$ at the tech-in input. The supply voltage should be applied to the teach-in input for at least 1 s. During the teach-in process, the LEDs indicate whether the sensor has detected the target. Teh switch points A1 and A2 are taught by voltage $-U_B$ and $+U_B$ respectively.

Five different modes can be set:

1. Window mode, NO function
2. Window mode, NC function
3. One switch point, NO function
4. One switch point, NC function
5. Detection of presence of an object

1. Teach-in Window mode, NO function
- Set object at near switch point
- Teach in switch point A1 with-U_B
- Set object at far switch point
- Teach in switch point A2 with $+U_B$

2. Teach-in Window mode, NC function
- Set object at near switch point
- Teach in switch point A2 with+U_B
- Set object at far switch point
- Teach in switch point A1 with -U_B

3. Teach-in one switch point, NO function
- Set object at near switch point
- Teach in switch point A2 with+U_B
- Cover sensor with the palm of your hand or remove all objects from the detection range of sensor
- Teach in switch point A1 with -U_B

4. Teach-in one switch point, NC function
- Set object at near switch point
- Teach in switch point A1 with -U_B
- Cover sensor with the palm of your hand or remove all objects from the detection range of sensor
- Teach in switch point A2 with+U_B

Indication as a function of operating condition	LED green	LED red	LED yellow
Teach-in switch point			
Object detected	flashing	off	off
No object detected	flashing	off	off
Object uncertain (teach-in invalid)	off	flashing	off
Normal operation	off	off	output status
Fault (e.g. compressed air)	off	flashing	last status

Mode of operation of the switch output depending on setting

Window mode, NO function

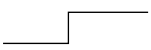
A1 < A2:

Window mode, NC function

A2 < A1:

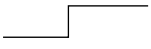
one switch point, NO function

A1 -> ∞:



one switch point, NC function

A2->∞:



A,->∞, A2->∞: Detection for presence of object

Object detected: switch output closed / no object detected: switch output open

5. Teach-in detection of presence of object
- Cover sensor with the palm of your hand or remove all objects from the detection range of sensor
- Teach in switch point A1 with -U_B
- Teach in switch point A2 with+U_B

Presetting the switch points:
A1: near range
A2: nominal range

Synchronisation:
The sensor features a synchronisation input in order to supress mutual interference. If the input is not connected, the sensor operates with an internally generated pulse rate. The sensor can be synchronised by applying a square-wave voltage. A synchronisation pulse at the synchonisation input enables one measuring cycle to be completed. The pulse width mus be greater than 100 µs. The measuring cycle commences with the falling edge. The state of the switch output changes after the switching threshold has been exceeded five times, as determined internally by five measurements. A low level 1 s or an open synchronisation input result in normal operation of the sensor. Synchronisation cannot be carried out during teach-in and vice versa.

Two operating modes are possible:
1. Multiple sensors are controlled with the same synchronising signal but the sensors operate on the same pulse
2. The synchronising pulses are fed cyclically to only one sensor at one time. The sensors operate in multiplex mode. A high level at the synchonisation input deactivates the sensor.

Accessory: Programming device SZP2>PROG
The programming device ZP2>PROG is available as accessory for the easy programming of ultrasonic sensors with switch output. The device is equipped with a 2 m cable, whose connector/socket can be placed between the connector of the ultrasonic sensor and its connection cable. The sensing range of the sensor can be memorized with two keys A1 and A2. Otherwise follow the teach-in process according to the description above.

Technical data:
Dimensions:
H x W x D [mm]: 22 x 39 x 69
Electric connection:
2 m cable with device connector and socket M12

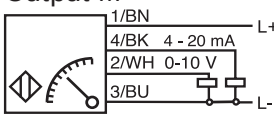
Technical data, Approximate dimensions
Ultrasonic sensors (analog output)

Ultrasonic sensors (Analog outputs)

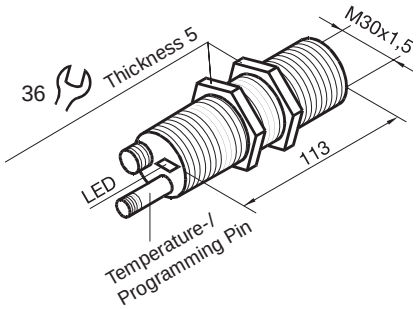
Device identification:	SUD500-M30N-C1-M	SUD2000-M30N-C1-M
General data		
Sensing range	30 ... 500 mm	80 ... 2000 mm
Operating range	50 ... 500 mm	120 ... 2000 mm
Blind zone	0 ... 30 mm	0 ... 80 mm
Standard test target	100 mm x 100 mm	
Transducer frequency	approx. 380 kHz	approx. 180 kHz
Response time	21 ms minimum 63 ms default	65 ms minimum 195 ms default
Indicator/Operating elements		
LED green	permanent: Power on flashing: standbyor teach-in function: object detected	
LED yellow 1	permanent: object in operating range flashing: teach-in function	
LED yellow 2	permanent: object in sensing range flashing: teach-in function	
LED red	permanent: temperature-/program plug not plugged in flashing: fault or teach-in function object not detected	
Temperature-/program plugs	temperature compensation, teach-in of operating range , switching of output functions	
Electrical data		
Operating voltage	10 ... 30 V DC , ripple 10 %ss	
Power consumption Po	≤ 900 mw	
In-/Output		
synchronisation	bidirectional 0-level: $-U_B$...+1 V 1 -level: +4 V...$+U_B$ input impedancy: > 12 KΩ synchronisation impulse: ≥ 100 µs synchronisation impulse pause: ≥2 ms	
Synchronisation frequency		
Common mode	≤ 95 Hz	≤ 30 Hz
Multiplex mode	≤ 95/n Hz, n = number of sensors	≤ 30/n Hz, n = number of sensors
Output		
Output type	1 current output: 4 ... 20 mA 1 voltage output: 0 ... 10 V	
Resolution	Evaluation limit [mm]/4000,	
	but ≤ 0.05 mm	but ≤ 0.35 mm
Characteristic deviation	≤ 0,2 % of final value	
Reproducability	≤ 0,1 % of final value	
Load impedancy	current output: ≤ 500 Ohm voltage output: ≥1000 Ohm	
Temperature influence	≤ 2 % of final value (with temperature compensation) ≤ 0.2 %/K (without temperature compensation)	
Norms		
In compliance with	EN 60947-5-2	
Ambient conditions		
Ambient temperature	-25 ... 70 °C (248 ... 343 K)	
Storage temperature	-40 ... 85 -°C (233 ... 358 K)	
Mechanical Data		
Protection Class	IP65	
Connection	ConnectorVl 5 (M12 x 1), 5-pole	
Material		
Housing	stainless steel 1.4303 plastic parts PBT	
Transducer	Epoxy resin/hollow glass bead composite; expanded PUR (polyurethane)	

Output signals

Output M



Dimensions in mm

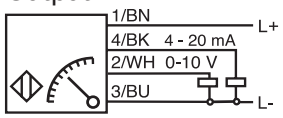


Ultrasonic sensors (Analog outputs)

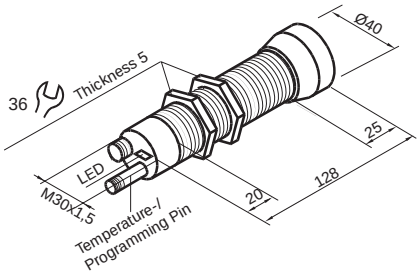
Device identification:	SUD4000-M30N-C1-M	SUD6000-M30N-C1-M
General data		
Sensing range	200 ... 4000 mm	350 ... 6000 mm
Operating range	240 ... 4000 mm	400 ... 2000 mm
Blind zone	0 ... 200 mm	0 ... 350 mm
Standard test target	100 mm x 100 mm	
Transducer frequency	ca. 85 kHz	ca. 65 kHz
Response time	145 ms minimum 440 ms default	285 ms minimum 850 ms default
Indicator/Operating elements		
LED green	permanent: Power on flashing: standbyor teach-in function: object detected	
LED yellow 1	permanent: object in operating range flashing: teach-in function	
LED yellow 2	permanent: object in sensing range flashing: teach-in function	
LED red	permanent: temperature-/program plug not plugged in flashing: fault or teach-in function object not detected	
Temperature-/program plug	temperature compensation, teach-in of operating range , switching of output functions	
Electrical data		
Operating voltage	10 ... 30 V DC , ripple 10 %ss	
Power consumption Po	≤ 900 mw	
In-/Output		
synchronisation	bidirectional 0-level: $-U_B$...+1 V 1 -level: +4 V...$+U_B$ Eingangsimpedanz: > 12 KΩ synchronisation impulse: ≥100 µs synchronisation impulse pause: ≥ 2 ms	
Synchronisation frequence		
Common mode operation	≤ 13 Hz	≤ 7 Hz
Multiplex operation	≤ 13/n Hz, n = number of sensors	≤ 7/n Hz, n = number of sensors
Output		
Output type	1 current output: 4 ... 20 mA 1 voltage output: 0 ... 10 V	
Resolution	evaluation limit [mm]/4000, but ≤ 0,35 mm	
Characteristic deviation	≤ 0,2 %of final value	
Reproducability	≤ 0,1 % of final value	
Load impedancy	current output: ≤ 500 Ohm voltage output: ≥1000 Ohm	
Temperature influence	≤ 2 % of final value (with temperature compensation) ≤ 0,2 %/K (without temperatur compensation)	
Norms		
In compliance with	EN 60947-5-2	
Ambient conditions		
Ambient temperature	-25 ... 70 °C (248 ... 343 K)	
Storage temperature	-40 ... 85 -°C (233 ... 358 K)	
Mechanical Data		
Protection Class	IP65	
Connection	Connector VI 5 (M12 x 1), 5-pole	
Material		
Housing	stainless steel 1.4303 plastic parts PBT	
Transducer	Epoxy resin/hollow glass bead composite; expanded PUR (polyurethane)	

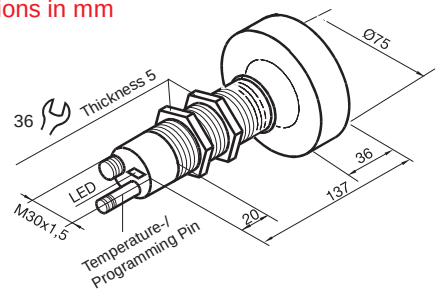
Output signals

Output M



Dimensions in mm





Technical data
Ultrasonic sensors (analog output)

Ultrasonic sensors (analog output)

Description of the sensor funktions

This ultrasonic senosr is equipped with a four-pin temerature/teach-in plug, which can bei inserted in four different positions. These positions have the significances shown in the table

Plug position	Significance
A1	Teach-in evaluation limit A1
A2	Teach-in evaluation limit A2
E2/E3	Rising/falling ramp Output characteristics of the voltage output go through the zero point
T	Temperature compensation

Description of the teach-in procedure

Teach-in of program evaluation limit 1 resp. 2
- Disconnect the supply voltage
- Disconnect the plug
- Connect the supply voltage (reset)
- Set target on desired switch position
- Insert and then remove program plug into Position A1 resp. A2
- This triggers the teach-in of the evaluation limits A1 resp. A2

Note

The values of the object position will be memorized with the removal of the temperature/teach-in plug.

You can supervise the teach-in process with the LEDs. The green LED flashes if the object has been detected, the red LED flashes, when no object has been detected.

Insert plug into position T to end the teach-in prozess and to save the taught-in distance. The sensor goes back to normal operation.

Teach-in of analog functions

Disconnect the supply voltage
Disconnect the plug
Connect the supply voltage (reset)
Insert teach-in plug in position E2/E3
Repeated plug-ins allow for the programming of 3 different operation modes in cyclical sequence:
1) rising ramp, LED A2 flashes
2) falling ramp, LED A1 flashes
3) zero point straight line

LED A1 and A2 flash
Insert plug into position T to end the teach-in process and to save the taught-in distance.
The sensor goes back to normal operation.

Note

If the temperature/teach-in plug is not inserted into the T-position the sensor will go back to normal operation (with the values saved last) without temperature compensation.

Synchronisation

The sensor is equipped with a synchron-isation input for the suppression of inter-ferences. If this input is not on-line the sensor uses with an internally produced clock-speed. The sensor can be synchron-ised by impressing a square wave voltage.
A falling range will lead to the emission of a single ultrasonic impulse. A low level ≈1s or an open synchonisation input will lead to the normal operation mode.
A high-level ≈1 s will lead to the stand-by operation mode of the sensor (green LED “ON”). The outputs remain in the status they where in before.

While teaching-in the sensors can not be synchronised and vice versa.

Different modes of operation are possible:
1. 2 (or up to 5) sensors can be synchronized by connecting their respective synchronisation inputs. This way the sensors emit ultrasonic impulses in turn.
2. Several sensors are controlled by the same synchronisation signal. The sensors operate in common mode
3. The synchronisations impulses are cyclically fed to one sensor at a time. The sensors operate in multiplex mode.
4. A high-level at the synchronisation input deactivates the sensor

The response time of a sensor increases in synchronised mode since the synchronisation also increases the measuring cycle time.

Note

If you don’t want to use the synchron-isation make sure that either the syn-chronisation input is grounded or that
the sensor is operated with a 4-pole connection cable.

Default

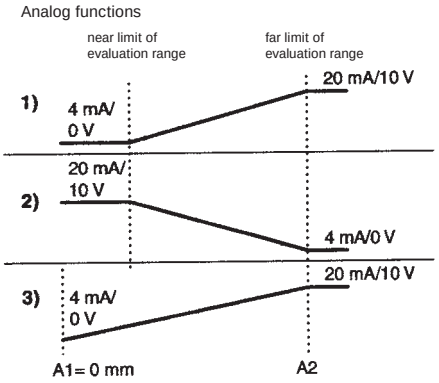
A1:	Close-up range
A2:	Nominal range
Direction of action:	rising ramp

LED-indicator/Analog output

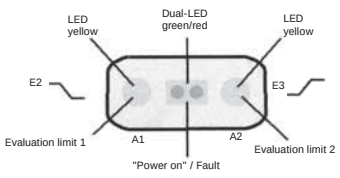
Indications depending on operating mode	Dual LED green	Dual LED red	LED yellow A1	LED yellow A2	Analog output
Teach-in evaluation limit 1 Object detected Object not detected	 flashing off	 off flashing	 flashing flashing	 off off	un-changed
Teach-in evaluation limit 2 Object detected Object not detected	 flashing off	 off flashing	 off off	 flashing flashing	un-changed
Teach-in operation mode (E2/E3) rising ramp falling ramp zero-point straight-line	 on on on	 off off off	 off flashing flashing (common mode)	un-flashing off flashing (common mode)	changed
Normal operation temperature compensated Plug disconn./shorted	 on off	 off on	on, if object in evaluation range	on, if object in evaluation range	Analog value
Standby	flashing	off	last status	last status	unchanged
Fault (e.g. compressed air)	off	flashing	last status	last status	unchanged or fault value

Progamming of the analog output

Analog functions



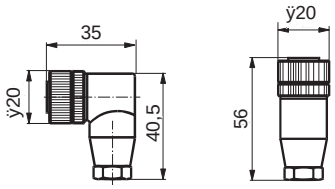
LED-Window

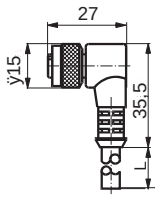


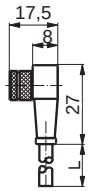
Approximate dimensions
Ultrasonic sensors (analog output)

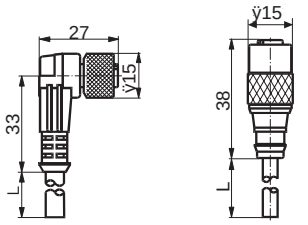
Accessories

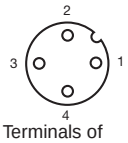
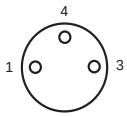
Dimension in mm









SZC1>4POL-0	Socket M12 angled 4 pin	Terminals of plug on Sensor
SZC1/4POL-0	Socket M12 straight 4 pin	 (cannot be used on ultrasonic sensors)
SZC1>U5-3POL-LED0	Cable socket M12 angled Cable 5 m, PUR, 3 polig, LED 1 – 3 LED 4 – 3	Terminals of plug on sensor 1 - BN 3 - BU 4 - BK (not available: 2–WH and 5 – GR)
SZC8>U5-3POL-LED0	Cable socket M8 angled Cable 5 m, PUR, 3 pin, LED 1 – 3 LED 4 – 3	Terminals of plug on sensor 1 - BN 3 - BU 4 - BK 
SZC1>V5-4POL-0	Cable socketM12 angled Cable 5 m, PVC	Terminals 1 - BN 2 - WH
SZC1/V5-4POL-0	Cable socketM12 straight Cable 5 m, PVC	3 - BU 4 - BK

Accessories
Catalog numbering system


MB-5 Kit


ST-1


RFL-1


SZP2>PROG


OPUS-Software

Type	Catalog number	Pack. size/ pieces	Weight 1 piece kg
Accessories			
SZP2>PROG	1SAF 912 030 R 7000	1	0.020
SZC1>4POL-0	1SAF 912 020 R 4000	1	0.050
SZC1/4POL-0	1SAF 912 010 R 4000	1	0.050
SZC1>U5-3POL-LED0	1SAF 912 225 R 3100	1	0.200
SZC8>U5-3POL-LED0	1SAF 908 225 R 3100	1	0.200
SZC1>V5-4POL-0	1SAF 912 125 R 4000	1	0.200
SZC1/V5-4POL-0	1SAF 912 115 R 4000	1	0.200
MB5-Kit	1SAF 950 988 R 9403	1	0.100
ST-1	1SAF 950 988 R 9401	1	0.141
RFL-1	1SAF 950 988 R 9402	1	0.120
OPUS-Software	1SAF 950 988 R 9404	1	0.020
MH04-Mounting tool	1SAF 950 988 R 9405	1	0.282

Catalog numbering system
Inductive / Capacitive / Photoelectric and Ultrasonic Sensors

Type of Sensor
SI = Inductive
SC = Capacitive
SO = Photoelectric
SU = Ultrasonic
SOL = Light guide

Installation method
F = flush mounting (inductive and capacitive)
N = non-flush mounting (inductive and capacitiv)
R = Retroreflective
D = Diffuse reflective (photoelectric and ultrasonic)
T = Through beam (photoelectric)

Sensing range
in mm

Housing
Z = cylindrical
M = Thread
Q = block with square front
B = block

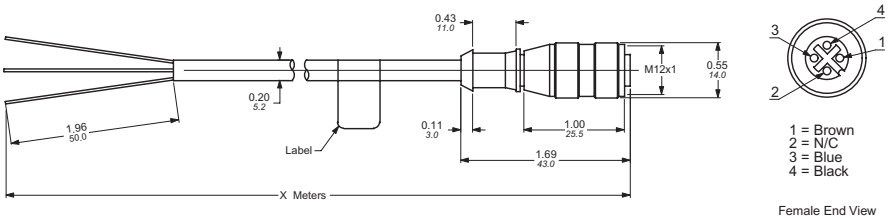
4, 6 = diameter (mm)
8, 12, 18, 30 = diameter (mm)
30, 40, 80 = diagonal (mm)
26, 40, 45, 75 = corner distance (mm)

N = normal type lenght
S = short type lenght
T = short type lenght
E = stainless steel

Connections
V2 = PVC, 2m cable
U2 = PUR, 2m Kable
C1 = M12 connector with 3-5 pins
C3 = M12 connector, AC
C8 = M8 connector with 3 pins
T = Terminal connection

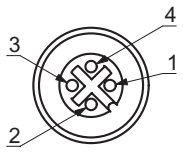
Output signals
PO = 24 VDC, 3-wire PNP, NO
PC = 24 VDC, 3-wire PNP, NC
PK = 24 VDC, 4-wire PNP, NO/NC combination
NO = 24 VDC, 3-wire NPN, NO
NK = 24 VDC, 4-wire NPN, NO/NC combination
DO = 24 VDC, 2-wire , NO
AO = 230 VAC, 2-wire , NO
AC = 230 VAC, 2-wire , NC
AK = 230 VAC, 4-wire , NO/NC combination.
KK = 12 ... 240 VDC / 24 ... 240 VAC, 4-wire PNP, Relais output
M = analog signal

SI F2 M12N V2 PO


0.43
11.0
0.20
5.2
M12x1
0.55
14.0
1.96
50.0
Label
0.11
3.0
1.00
25.5
1.69
43.0
X Meters
4
3
1
2
1 = Brown
2 = N/C
3 = Blue
4 = Black
Female End View

Connectors & cables
C1 Micro style
3 Wire straight

Wire type		3 Wire straight	3 Wire straight
Catalog number List price		C1-3WS-V2 **$ 14.40**	C1-3WS-V4 **$ 17.40**
Cable length	meters	2	4
Number of conductors		3	3
Conductor colors		1 - Brown 2 - NC 3 - Blue 4 - Black	1 - Brown 2 - NC 3 - Blue 4 - Black
Wire size		20 AWG	20 AWG
Coupling nut		Nickel-plated brass	Nickel-plated brass
Connector		Thermoplastic PUR	Thermoplastic PUR
Contacts		Gold-plated brass	Gold-plated brass
Cable		Oil resistant gray PVC jacket 250V, 105C UL recognized CSA certified	Oil resistant gray PVC jacket 250V, 105C UL recognized CSA certified
Conductors		High flex stranding, PVC insulation	High flex stranding, PVC insulation
Temperature	°F	-40 ... +221	-40 ... +221
Protection	IEC	IP68	IP68
LED output indication		—	—



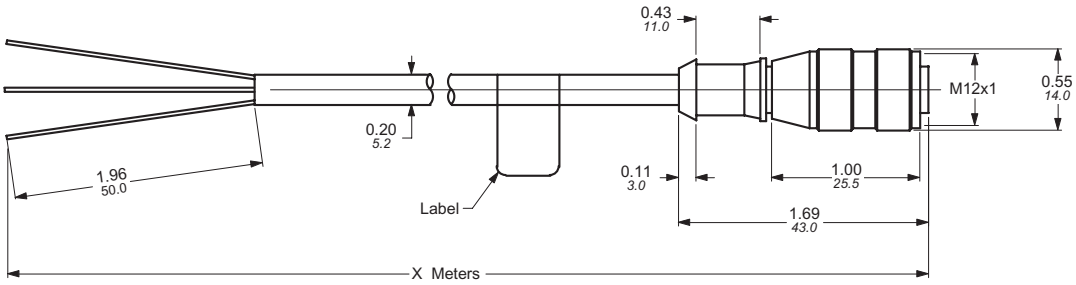
1 = Brown
2 = N/C
3 = Blue
4 = Black

Female End View

10

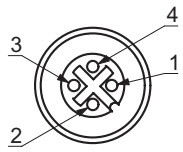
Approximate dimensions

C1-3WS-V2
C1-3WS-V4



Connectors & cables
C1 Micro style
3 Wire 90°

Wire type		3 Wire 90°	3 Wire 90°
Catalog number List price		C1-3W9-V2 **$ 14.40**	C1-3W9-V4 **$ 17.40**
Cable length	meters	2	4
Number of conductors		3	3
Conductor colors		1 - Brown 2 - NC 3 - Blue 4 - Black	1 - Brown 2 - NC 3 - Blue 4 - Black
Wire size		20 AWG	20 AWG
Coupling nut		Nickel-plated brass	Nickel-plated brass
Connector		Thermoplastic PUR	Thermoplastic PUR
Contacts		Gold-plated brass	Gold-plated brass
Cable		Oil resistant gray PVC jacket 250V, 105C UL recognized CSA certified	Oil resistant gray PVC jacket 250V, 105C UL recognized CSA certified
Conductors		High flex stranding, PVC insulation	High flex stranding, PVC insulation
Temperature	°F	-40 ... +221	-40 ... +221
Protection	IEC	IP68	IP68
LED output indication		—	—



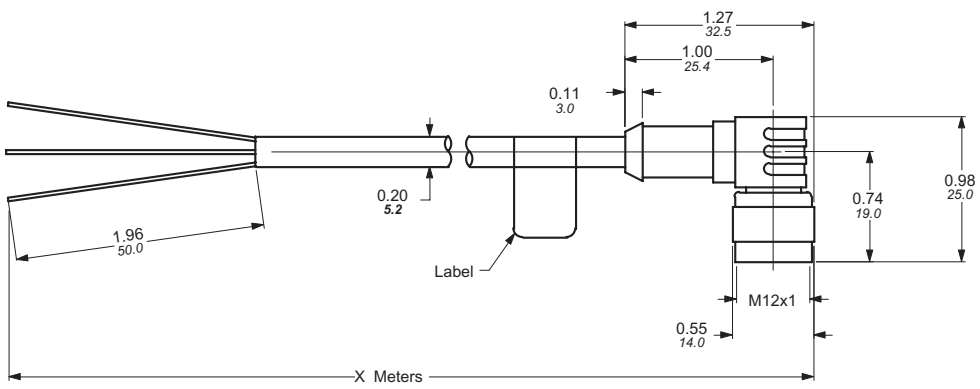
1 = Brown
2 = N/C
3 = Blue
4 = Black

Female End View

10

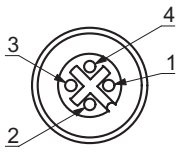
Approximate dimensions

C1-3W9-V2
C1-3W9-V4



Connectors & cables
C1 Micro style
3 Wire 90° PNP, NPN

Wire type		3 Wire 90° PNP	3 Wire 90° NPN
Catalog number List price		C1-3W9LP-V2 **$ 25.90**	C1-3W9LN-V2 **$ 25.90**
Cable length	meters	2	2
Number of conductors		3	3
Conductor colors		1 - Brown 2 - NC 3 - Blue 4 - Black	1 - Brown 2 - NC 3 - Blue 4 - Black
Wire size		22 AWG	22 AWG
Coupling nut		Nickel-plated brass	Nickel-plated brass
Connector		Thermoplastic PUR	Thermoplastic PUR
Contacts		Gold-plated brass	Gold-plated brass
Cable		Oil resistant gray PVC jacket 300V, 90C	Oil resistant gray PVC jacket 300V, 90C
Conductors		High flex stranding, PVC insulation	High flex stranding, PVC insulation
Temperature	°F	-40 ... +221	-40 ... +221
Protection	IEC	IP68	IP68
LED output indication		PNP	NPN



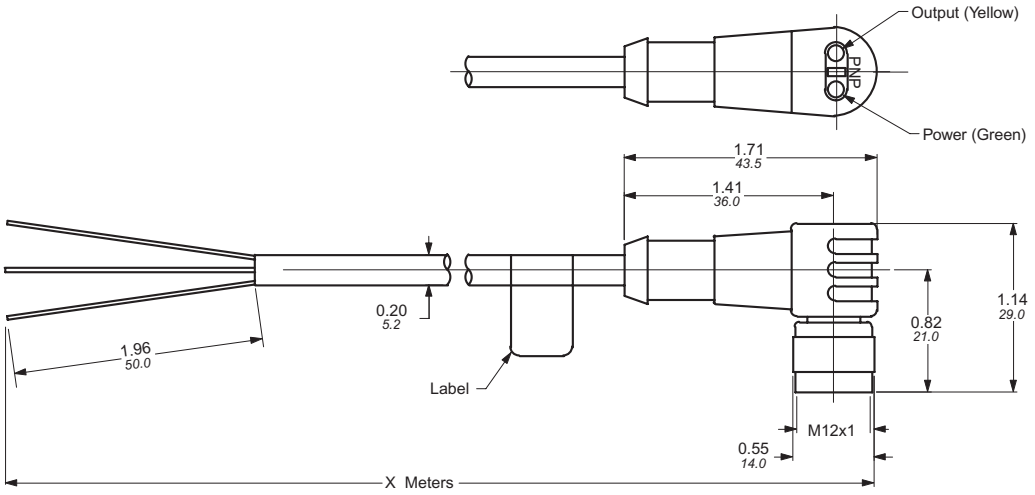
1 = Brown
2 = N/C
3 = Blue
4 = Black

Female End View

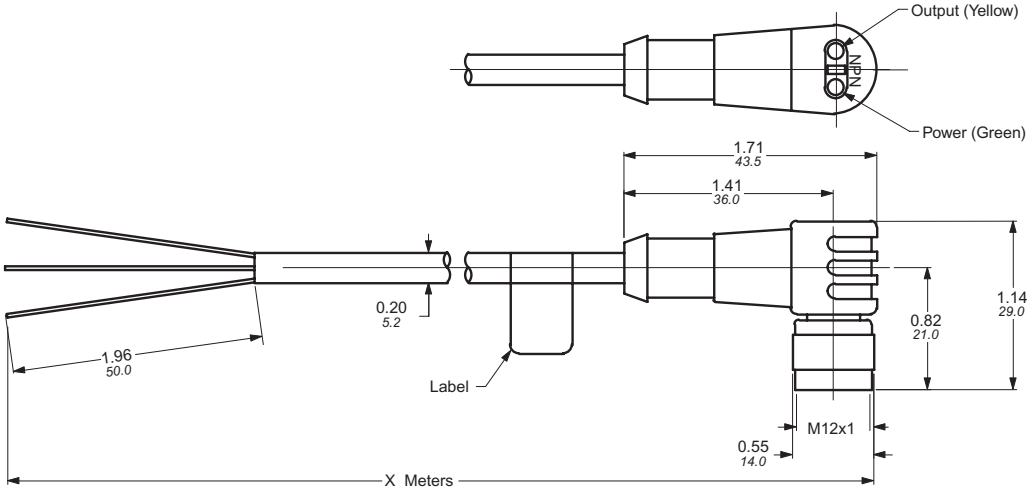
10

Approximate dimensions

C1-3W9LP-V2

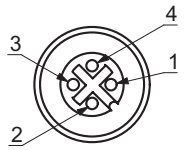


C1-3W9LN-V2



Connectors & cables
C1 Micro style
4 Wire straight

Wire type		4 Wire straight	4 Wire straight
Catalog number List price		C1-4WS-V2 **$ 16.60**	C1-4WS-V4 **$ 20.30**
Cable length	meters	2	4
Number of conductors		4	4
Conductor colors		1 - Brown 2 - White 3 - Blue 4 - Black	1 - Brown 2 - White 3 - Blue 4 - Black
Wire size		22 AWG	22 AWG
Coupling nut		Nickel-plated brass	Nickel-plated brass
Connector		Thermoplastic PUR	Thermoplastic PUR
Contacts		Gold-plated brass	Gold-plated brass
Cable		Oil resistant gray PVC jacket 300V, 105C UL recognized CSA certified	Oil resistant gray PVC jacket 300V, 90C UL recognized CSA certified
Conductors		High flex stranding, PVC insulation	High flex stranding, PVC insulation
Temperature	°F	-40 ... +221	-40 ... +221
Protection	IEC	IP68	IP68
LED output indication		—	—



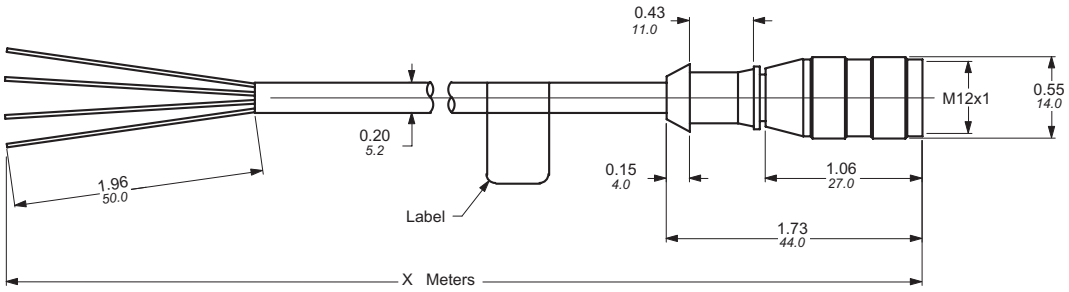
1 = Brown
2 = White
3 = Blue
4 = Black

Female End View

10

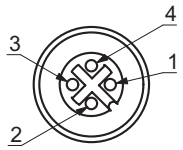
Approximate dimensions

C1-4WS-V2
C1-4WS-V4



Connectors & cables
C1 Micro style
4 Wire 90°

Wire type		4 Wire 90°	4 Wire 90°
Catalog number List price		C1-4W9-V2 **$ 16.60**	C1-4W9-V4 **$ 20.30**
Cable length	meters	2	4
Number of conductors		4	4
Conductor colors		1 - Brown 2 - White 3 - Blue 4 - Black	1 - Brown 2 - White 3 - Blue 4 - Black
Wire size		22 AWG	22 AWG
Coupling nut		Nickel-plated brass	Nickel-plated brass
Connector		Thermoplastic PUR	Thermoplastic PUR
Contacts		Gold-plated brass	Gold-plated brass
Cable		Oil resistant gray PVC jacket 300V, 105C UL recognized CSA certified	Oil resistant gray PVC jacket 300V, 105C UL recognized CSA certified
Conductors		High flex stranding, PVC insulation	High flex stranding, PVC insulation
Temperature	°F	-40 ... +221	-40 ... +221
Protection	IEC	IP68	IP68
LED output indication		—	—



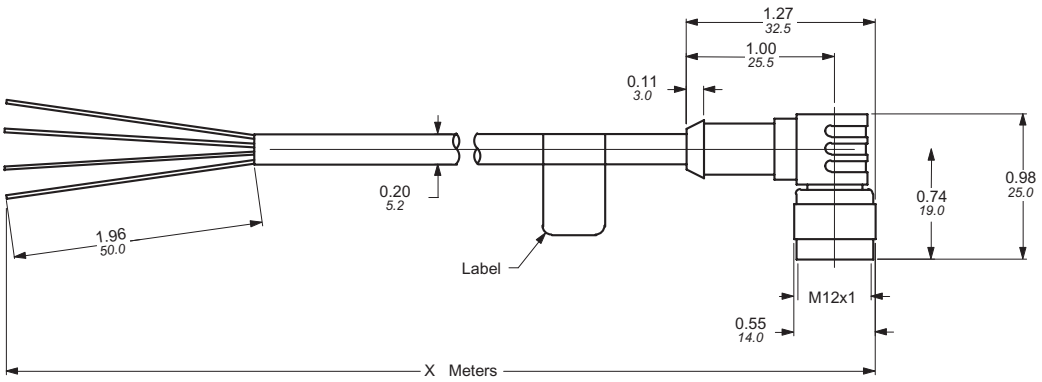
1 = Brown
2 = White
3 = Blue
4 = Black

Female End View

10

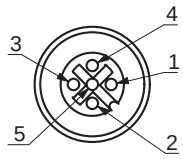
Approximate dimensions

C1-4W9-V2
C1-4W9-V4



Connectors & cables
C1 Micro style
5 Wire straight

Wire type		5 Wire straight	5 Wire straight
Catalog number List price		C1-5WS-V2 **$ 17.70**	C1-5WS-V4 **$ 22.50**
Cable length	meters	2	4
Number of conductors		5	5
Conductor colors		1 - Brown 2 - White 3 - Blue 4 - Black 5 - Grey	1 - Brown 2 - White 3 - Blue 4 - Black 5 - Grey
Wire size		22 AWG	22 AWG
Coupling nut		Nickel-plated brass	Nickel-plated brass
Connector		Thermoplastic PUR	Thermoplastic PUR
Contacts		Gold-plated brass	Gold-plated brass
Cable		Oil resistant gray PVC jacket 300V, 105C UL recognized CSA certified	Oil resistant gray PVC jacket 300V, 105C UL recognized CSA certified
Conductors		High flex stranding, PVC insulation	High flex stranding, PVC insulation
Temperature	°F	-40 ... +221	-40 ... +221
Protection	IEC	IP68	IP68
LED output indication		—	—



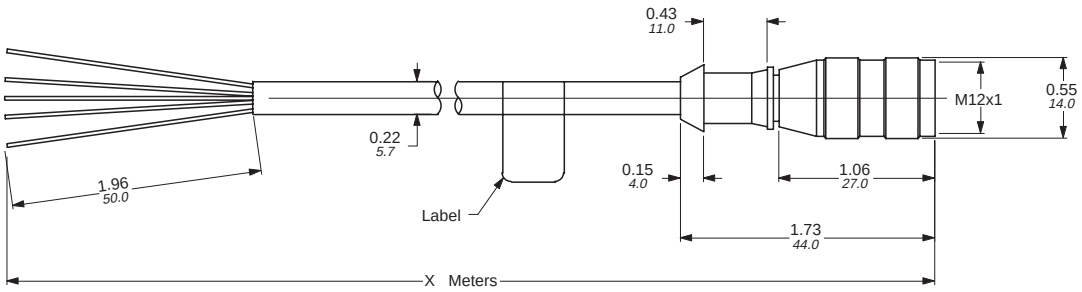
1 = Brown
2 = White
3 = Blue
4 = Black
5 = Grey

Female End View

10

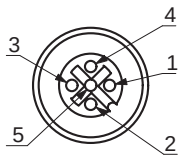
Approximate dimensions

C1-5WS-V2
C1-5WS-V4



Connectors & cables
C1 Micro style
5 Wire 90°

Wire type		5 Wire 90°	5 Wire 90°
Catalog number List price		C1-5W9-V2 **$ 17.70**	C1-5W9-V4 **$ 22.50**
Cable length	meters	2	4
Number of conductors		5	5
Conductor colors		1 - Brown 2 - White 3 - Blue 4 - Black 5 - Grey	1 - Brown 2 - White 3 - Blue 4 - Black 5 - Grey
Wire size		22 AWG	22 AWG
Coupling nut		Nickel-plated brass	Nickel-plated brass
Connector		Thermoplastic PUR	Thermoplastic PUR
Contacts		Gold-plated brass	Gold-plated brass
Cable		Oil resistant gray PVC jacket 300V, 90C UL recognized CSA certified	Oil resistant gray PVC jacket 300V, 90C UL recognized CSA certified
Conductors		High flex stranding, PVC insulation	High flex stranding, PVC insulation
Temperature	°F	-40 ... +221	-40 ... +221
Protection	IEC	IP68	IP68
LED output indication		—	—



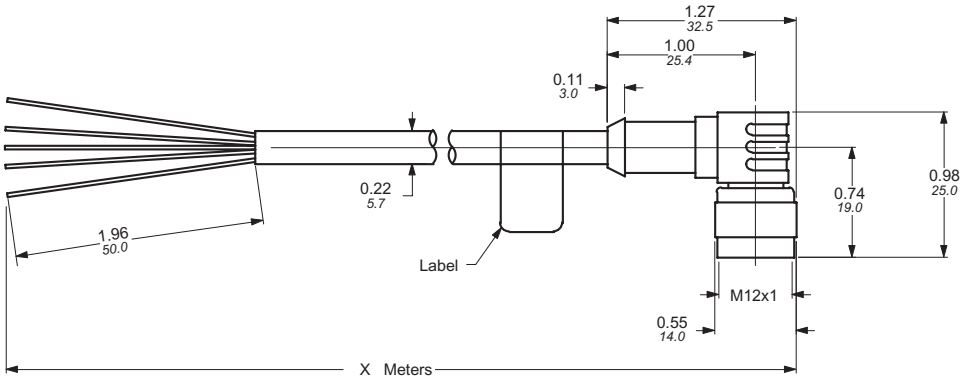
1 = Brown
2 = White
3 = Blue
4 = Black
5 = Grey

Female End View

10

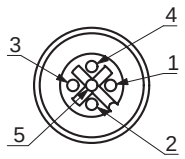
Approximate dimensions

C1-5W9-V2
C1-5W9-V4



Connectors & cables
C1 Micro style
Custom wire straight

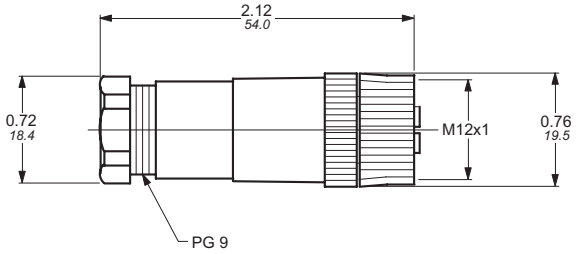
Wire type		Custom wire straight	Custom wire straight
Catalog number List price		C1-XWS **$ 23.70**	C1-XW9 **$ 23.70**
Cable length	meters	Customer supplies cable	Customer supplies cable
Number of conductors		Custom build from 1-5 wire cable	Custom build from 1-5 wire cable
Conductor colors		— — — — —	— — — — —
Coupling nut		PBT	PBT
Contacts		Nickel-plated brass	Nickel-plated brass
Maximum wire size		18 AWG	18 AWG
Cable grip range	mm	4 - 8	4 - 8
Temperature	°F	-40 ... +185	-40 ... +185
Protection	IEC	IP67	IP67
LED output indication		—	—



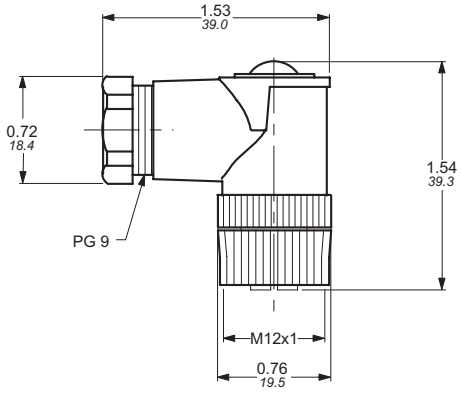
Female end view

Approximate dimensions

C1-XWS

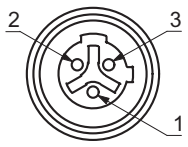


C1-XW9



Connectors & cables
C2 Micro style
3 Wire straight

Wire type		3 Wire straight	3 Wire straight
Catalog number List price		C2-3WS-V2 **$ 19.80**	C2-3WS-V6 **$ 29.10**
Cable length	meters	2	6
Number of conductors		3	3
Conductor colors		1 - Green 2 - Red/Black 3 - Red/White	1 - Green 2 - Red/Black 3 - Red/White
Wire size		22 AWG	22 AWG
Coupling nut		Nickel-plated brass	Nickel-plated brass
Connector		Thermoplastic PUR	Thermoplastic PUR
Contacts		Gold-plated brass	Gold-plated brass
Cable		Oil resistant gray PVC jacket 300V, 105C UL recognized CSA certified	Oil resistant gray PVC jacket 300V, 105C UL recognized CSA certified
Conductors		High flex stranding, PVC insulation	High flex stranding, PVC insulation
Temperature	°F	-13 ... +221	-13 ... +221
Protection	IEC	IP67	IP67
LED output indication		—	—



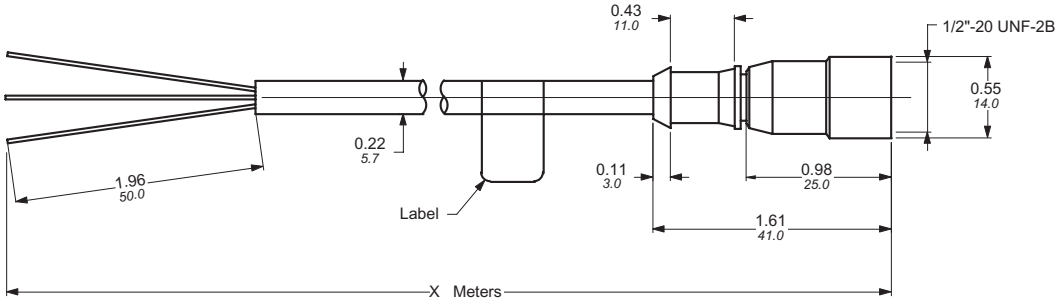
1 = Green
2 = Red/Black
3 = Red/White

Female End View

10

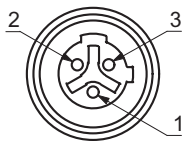
Approximate dimensions

C2-3WS-V2
C2-3WS-V6



Connectors & cables
C2 Micro 1/2“ – 20 style
3 Wire 90°

Wire type		3 Wire 90°	3 Wire 90°
Catalog number List price		C2-3W9-V2 **$ 19.80**	C2-3W9-V6 **$ 29.10**
Cable length	meters	2	6
Number of conductors		3	3
Conductor colors		1 - Green 2 - Red/Black 3 - Red/White	1 - Green 2 - Red/Black 3 - Red/White
Wire size		22 AWG	22 AWG
Coupling nut		Nickel-plated brass	Nickel-plated brass
Connector		Thermoplastic PUR	Thermoplastic PUR
Contacts		Gold-plated brass	Gold-plated brass
Cable		Oil resistant gray PVC jacket 300V, 105C UL recognized CSA certified	Oil resistant gray PVC jacket 300V, 105C UL recognized CSA certified
Conductors		High flex stranding, PVC insulation	High flex stranding, PVC insulation
Temperature	°F	-13 ... +221	-13 ... +221
Protection	IEC	IP67	IP67
LED output indication		—	—

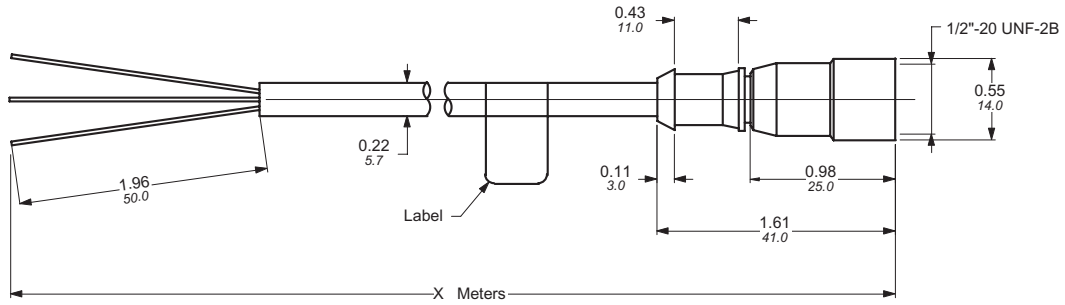


1 = Green
2 = Red/Black
3 = Red/White

Female End View

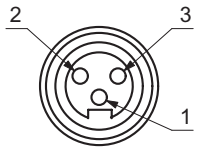
Approximate dimensions

C2-3W9-V2
C2-3W9-V6



Connectors & cables
C7 Mini style
3 Wire straight

Wire type		3 Wire straight	3 Wire straight
Catalog number List price		C7-3WS-V2 **$ 17.60**	C7-3WS-V6 **$ 29.00**
Cable length	meters	2	6
Number of conductors		3	3
Conductor colors		1 - Green 2 - Black 3 - White	1 - Green 2 - Black 3 - White
Wire size		16 AWG	16 AWG
Coupling nut		Nickel-plated brass	Nickel-plated brass
Connector		Thermoplastic PUR	Thermoplastic PUR
Contacts		Gold-plated brass	Gold-plated brass
Cable		Oil resistant gray PVC jacket 600V, 105C UL recognized CSA certified	Oil resistant gray PVC jacket 600V, 105C UL recognized CSA certified
Conductors		High flex stranding, PVC insulation	High flex stranding, PVC insulation
Temperature	°F	-40 ... +221	-40 ... +221
Protection	IEC	IP67	IP67
LED output indication		—	—



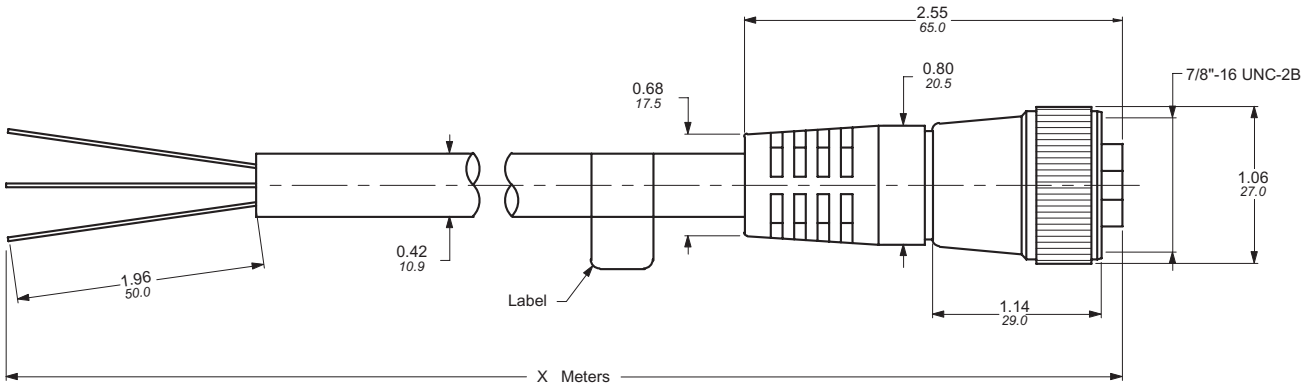
1 = Green
2 = Black
3 = White

Female End View

10

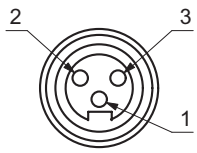
Approximate dimensions

C7-3WS-V2
C7-3WS-V6



Connectors & cables
C7 Mini style
3 Wire 90°

Wire type		3 Wire 90°	3 Wire 90°
Catalog number List price		C7-3W9-V2 **$ 17.60**	C7-3W9-V6 **$ 29.00**
Cable length	meters	2	6
Number of conductors		3	3
Conductor colors		1 - Green 2 - Black 3 - White	1 - Green 2 - Black 3 - White
Wire size		16 AWG	16 AWG
Coupling nut		Nickel-plated brass	Nickel-plated brass
Connector		Thermoplastic PUR	Thermoplastic PUR
Contacts		Gold-plated brass	Gold-plated brass
Cable		Oil resistant gray PVC jacket 600V, 105C UL recognized CSA certified	Oil resistant gray PVC jacket 600V, 105C UL recognized CSA certified
Conductors		High flex stranding, PVC insulation	High flex stranding, PVC insulation
Temperature	°F	-40 ... +221	-40 ... +221
Protection	IEC	IP67	IP67
LED output indication		—	—



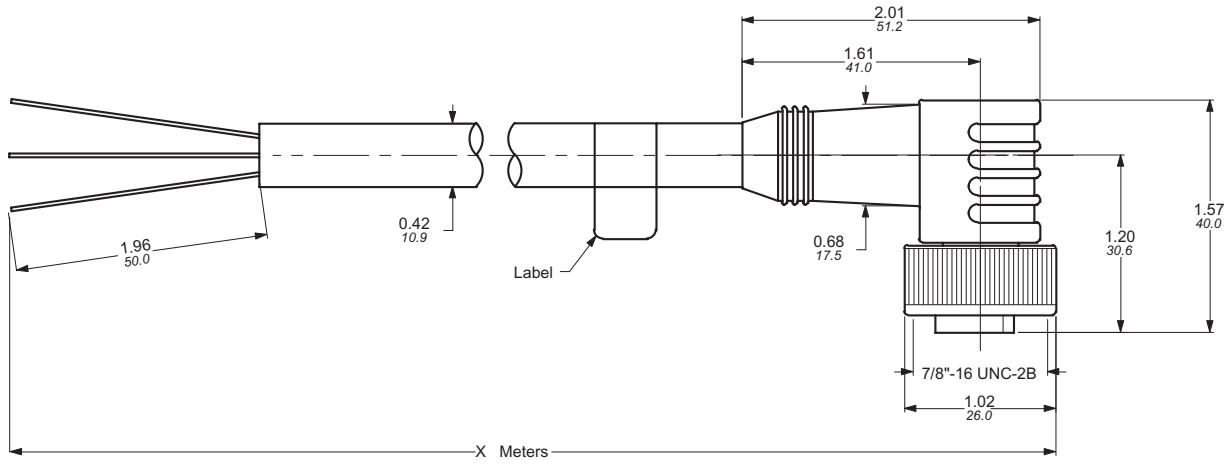
1 = Green
2 = Black
3 = White

Female End View

10

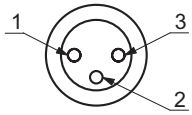
Approximate dimensions

C7-3W9-V2
C7-3W9-V6



Connectors & cables
C8 Nano style
3 Wire straight

Wire type		3 Wire straight	3 Wire straight
Catalog number List price		C8-3WS-V2 **$ 13.50**	C8-3WS-V6 **$ 22.70**
Cable length	meters	2	6
Number of conductors		3	3
Conductor colors		1 - Brown 2 - Black 3 - Blue	1 - Brown 2 - Black 3 - Blue
Wire size		24 AWG	24 AWG
Coupling nut		Nickel-plated brass	Nickel-plated brass
Connector		Thermoplastic PUR	Thermoplastic PUR
Contacts		Gold-plated brass	Gold-plated brass
Cable		Oil resistant gray PVC jacket 300V, 105C	Oil resistant gray PVC jacket 300V, 105C
Conductors		High flex stranding, PVC insulation	High flex stranding, PVC insulation
Temperature	°F	-40 ... +194	-40 ... +194
Protection	IEC	IP67	IP67
LED output indication		—	—



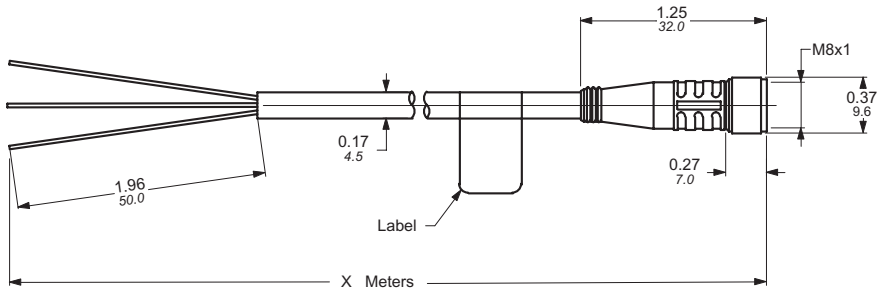
1 = Brown
2 = Black
3 = Blue

Female End View

10

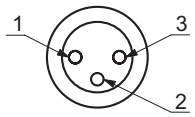
Approximate dimensions

C8-3WS-V2
C8-3WS-V6



Connectors & cables
C8 Nano style
3 Wire 90°

Wire type		3 Wire 90°	3 Wire 90°
Catalog number List price		C8-3W9-V2 **$ 13.50**	C8-3W9-V6 **$ 22.70**
Cable length	meters	2	6
Number of conductors		3	3
Conductor colors		1 - Brown 2 - Black 3 - Blue	1 - Brown 2 - Black 3 - Blue
Wire size		24 AWG	24 AWG
Coupling nut		Nickel-plated brass	Nickel-plated brass
Connector		Thermoplastic PUR	Thermoplastic PUR
Contacts		Gold-plated brass	Gold-plated brass
Cable		Oil resistant gray PVC jacket 300V, 105C	Oil resistant gray PVC jacket 300V, 105C
Conductors		High flex stranding, PVC insulation	High flex stranding, PVC insulation
Temperature	°F	-40 ... +194	-40 ... +194
Protection	IEC	IP67	IP67
LED output indication		—	—



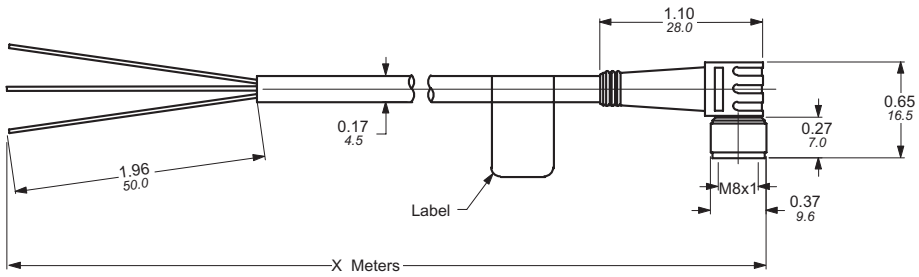
1 = Brown
2 = Black
3 = Blue

Female End View

10

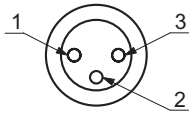
Approximate dimensions

C8-3W9-V2
C8-3W9-V6



Connectors & cables
C8 Nano style
3 Wire 90° PNP, NPN

Wire type		3 Wire 90° PNP	3 Wire 90° NPN
Catalog number List price		C8-3W9LP-V2 **$ 28.20**	C8-3W9LN-V2 **$ 28.20**
Cable length	meters	2	2
Number of conductors		3	3
Conductor colors		1 - Brown 2 - Black 3 - Blue	1 - Brown 2 - Black 3 - Blue
Wire size		24 AWG	24 AWG
Coupling nut		Nickel-plated brass	Nickel-plated brass
Connector		Thermoplastic PUR	Thermoplastic PUR
Contacts		Gold-plated brass	Gold-plated brass
Cable		Oil resistant gray PVC jacket 300V, 105C	Oil resistant gray PVC jacket 300V, 105C
Conductors		High flex stranding, PVC insulation	High flex stranding, PVC insulation
Temperature	°F	-40 ... +194	-40 ... +194
Protection	IEC	IP68	IP68
LED output indication		PNP	NPN



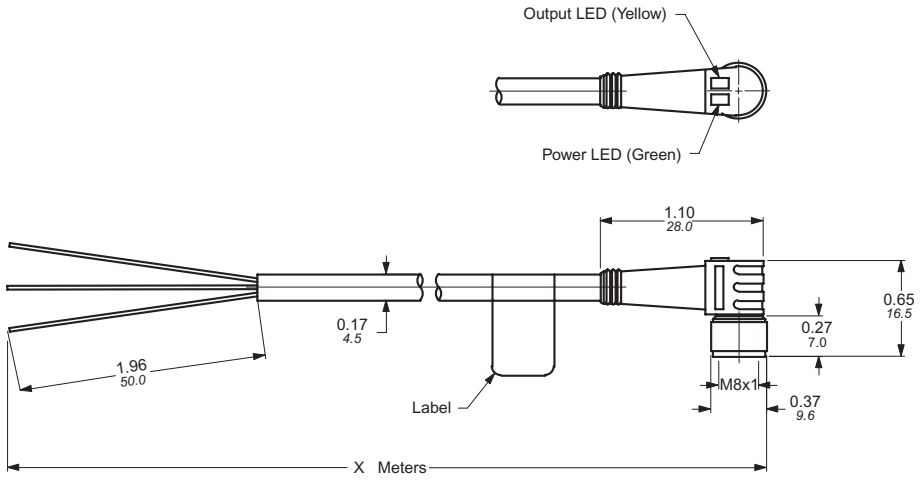
1 = Brown
2 = Black
3 = Blue

Female End View

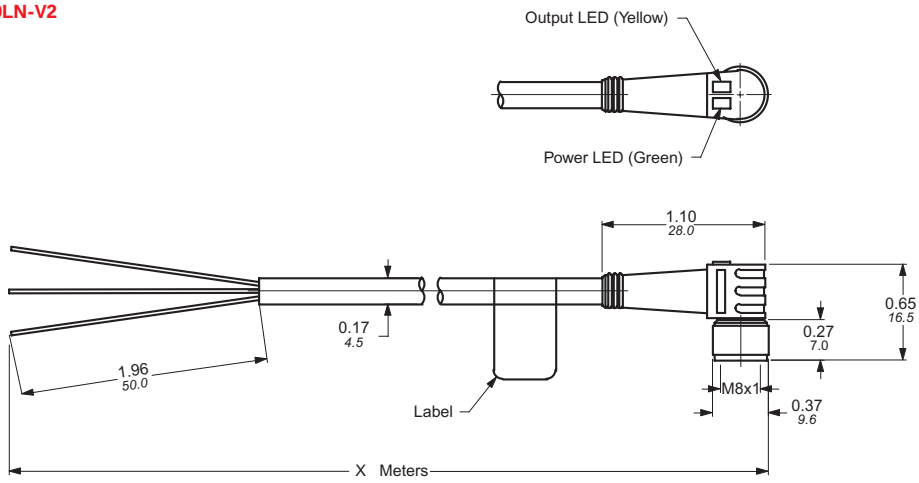
10

Approximate dimensions

C8-3W9LP-V2



C8-3W9LN-V2



Wireless proximity switches

General information
Catalog numbering system

Description

Wireless proximity switches work according to the induction principle. In contrast to conventional proximity switches these do not require any cable connection between sensor and machine control system. An electromagnetic field that is produced by two power supplies with a pair of primary loops respectively supplies all proximity switches within a production line with the energy needed for their sensory functions as well as the radio communication. The proximity switches transmit their signals per radio communication to an input module which to this end is connected to a pair of antennas.

Design

Wireless proximity switches consist of the sensor head and the communication module, which receives its power from the electromagnetic field. Communication with the input module takes place according to the standard ETS300328 in the 2.4 GHz band. Up to 120 sensors can be allocated to one input module delivering their proximity changes within typically 20ms (REALTIME SUITED). The input module transmits the sensor signals to the machine control system via an ABB FieldBusPlug. A continuous function messaging of each wireless proximity switch ensures an immediate detection of failures.

Energy transfer

The electromagnetic field used for the power transfer is produced by two pairs of primary loops. The two pairs of primary loops supply a volume of 1m x 1m x 1m up to 3m x 3m x 3m which can be enlarged modularly. Up to 360 wireless proximity switches can be used within this space.

Advantages of the wireless proximity switches:

- high flexibilty in use
- reduced engineering
- short commissioning times
- high reliability and availability of the production system

Catalog numbering system

Type of sensor

WSI = Wireless sensor inductive

Mounting type

F = flush-mounted
N = non flush-mounted

Nominal switching distance S_n

0.15	= 1.,5 mm	nominal switching distance
0.20	= 2.0 mm	nominal switching distance
0.40	= 4.0 mm	nominal switching distance
0.50	= 5.0 mm	nominal switching distance
0.80	= 8.0 mm	nominal switching distance
0.100	= 10.0 mm	nominal switching distance
0.150	= 15.0 mm	nominal switching distance

Housing

M = Metric **8**, 12, 18, 30 = diameter in mm **N** = Normal overall lenght

WSI F 015 M8N

Wireless proximity switches

WSIN150-M30N

WSIX100-B50N

WDI100-120FBP

WAT100

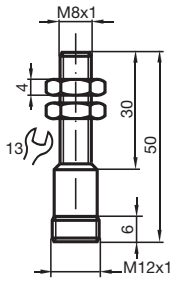
WPC100-N

Type	Catalog number	Packing unit piece/meter	Weight 1 piece kg
Sensor heads			
WSIF015-M8N	1SAF108911R3000	1	0.025
WSIN020-M8N	1SAF108921R3000	1	0.025
WSIF020-M12N	1SAF112911R3000	1	0.030
WSIN040-M12N	1SAF112921R3000	1	0.025
WSIF050-M18N	1SAF118911R3000	1	0.060
WSIN080-M18N	1SAF118921R3000	1	0.055
WSIF100-M30N	1SAF130911R3000	1	0.140
WSIF150-M30N	1SAF130921R3000	1	0.120
Communication module one per sensor head			
WSIX100-B50N	1SAF900100R3000	1	0.125
Power supply			
WPU100-24	1SAF900200R0001	1	15.000
Input module			
WDI100-120FBP	1SAF900300R0001	1	0.410
Antennas for input module			
WAT100-R	1SAF900600R0001	1	0.100
WAT100-L	1SAF900600R0002	1	0.100
Antenna cable for input module			
WAC100-N03	1SAF900600R1030	3 m	0.370
WAC100-N05	1SAF900600R1050	5 m	0.600
Antenna fitting			
WAM100-N	1SAF900900R0001	1	0.095
Primary loop			
WPC100-N10	1SAF900800R1100	10 m	1.280
WPC100-N11	1SAF900800R1110	11 m	1.410
WPC100-N12	1SAF900800R1120	12 m	1.535
WPC100-N13	1SAF900800R1130	13 m	1.665
WPC100-N14	1SAF900800R1140	14 m	1.790
WPC100-N15	1SAF900800R1150	15 m	1.920
WPC100-N16	1SAF900800R1160	16 m	2.050
WPC100-N17	1SAF900800R1170	17 m	2.175
WPC100-N18	1SAF900800R1180	18 m	2.305
WPC100-N19	1SAF900800R1190	19 m	2.430
WPC100-N20	1SAF900800R1200	20 m	2.550
WPC100-N21	1SAF900800R1210	21 m	2.690
WPC100-N22	1SAF900800R1220	22 m	2.815
WPC100-N23	1SAF900800R1230	23 m	2.945
WPC100-N24	1SAF900800R1240	24 m	3.070
WPC100-N12	1SAF900800R1250	25 m	3.200
WPC100-N26	1SAF900800R1260	26 m	3.330
WPC100-N27	1SAF900800R1270	27 m	3.455
WPC100-N28	1SAF900800R1280	28 m	3.585

Technical data
Sensor heads WSIF..., WSIN...

Sensor heads

Switching distance S_n, mounting		1,5 mm flush-mounted	2 mm non flush-mounted	2 mm flush-mounted	4 mm non flush-mounted
Type		M8x1 flush-mounted	M8x1 non flush-mounted	M12x1 flush-mounted	M12x1 non flush-mounted
Identification		WSIF015-M8N	WSIN020-M8N	WSIF020-M12N	WSIN040-M12N
Switching distance	[mm]	0 ... 1.21	0 ... 1.62	0 ... 1.62	0 ... 3.24
Reduction factor r_{V2A} 0.75 0.75 0.75 0.8					
r_{Al} 0.40.40.30.45					
r_{Cu} 0.40.40.250.4					
Nominal signal transfer rate	1/s	5 (signal changes per second, typically 20ms)			
Hystereses H	[%]	≤ 10	≤ 10	≤ 10	≤ 10
Reproducibility	[%]	≤ 10	≤ 10	≤ 10	≤ 10
Temperature drift	[%]	± 10	± 10	± 10	± 10
Short circuit protection		no, because usage only in connection with the communication module.			
Reverse polarity protection		no, because usage only in connection with the communication module.			
Indication		see communication module			
Operating temperature range	[°C]	-25 ... +70			
Storage temperature range	[°C]	-40 ... +70			
Permissible shock and vibration loading		shock b ≤ 30g, T ≤ 11ms			
Protection class acc. to IEC 60529		IP67			
In compliance with		EN 60 947-5-2			
Connection		M12 connector for one communication module			
Housing material		Nickel plated brass			
Sensing face		PBT (Crastin)			
Starting torque recommended/maximum	[Nm]	3/5	3/5	10/15	10/15
Drawing number		120025	120026	117740	118943



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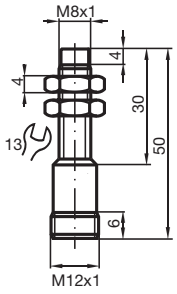

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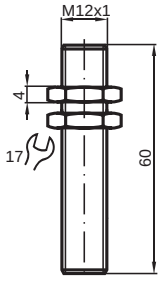
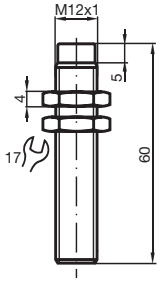


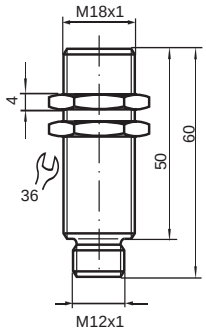
117740



118943

Sensor heads

Switching distance S_n, mounting		5 mm flush-mounted	8 mm non flush-mounted	10 mm flush-mounted	15 mm non flush-mounted
Type		M18x1 flush-mounted	M18x1 non flush-mounted	M30x1.5 flush-mounted	M30x1.5 non flush-mounted
Identification		WSIF050-M18N	WSIN080-M18N	WSIF100-M30N	WSIN150-M30N
Switching distance	[mm]	0 ... 4.05	0 ... 6.5	0 ... 8.1	0 ... 12.15
Reduction factor					
r_{V2A}	0	.750	.750	.750	.7
r_{AL}	0	.350	.450	.450	.45
r_{Cu}	0	.30	.40	.250	.35
Nominal signal transfer rate1/s5 (signal changes per second, typically 20ms)					
Hystereses H	[%]	≤ 10	≤ 10	≤ 10	≤ 10
Reproducibility	[%]	≤ 10	≤ 10	≤ 10	≤ 10
Temperature drift	[%]	± 10	± 10	± 10	± 10
Short circuit protection		no, because usage only in connection with the communication module.			
Reverse polarity protection		no, because usage only in connection with the communication module.			
Indicationsee communication module					
Operating temperature range	[°C]	-25 ... +70			
Storage temperature range	[°C]	-40 ... +70			
Permissible shock and vibration loadingshock	b	≤ 30g, T ≤ 11ms			
Protection class acc.		IEC 60529IP67			
In compliance with		EN 60 947-5-2			
Connection		M12 connector for one communication module			
Housing material		Nickel plated brass			
Sensing face		PBT (Crastin)			
Starting torque recommended/maximum	[Nm]	30/50	30/50	30/100	30/100
Drawing number			120027	120029	120030 120031



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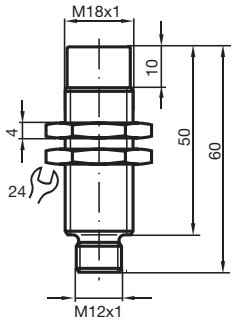

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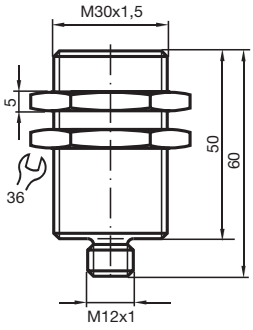

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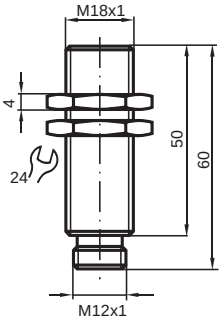


120031

Technical data
Communication module

Short description

The communication module is attached to one of the eight heads of an inductive sensor as if it were a conventional sensor plug. The communication module for all sensor head variations is identical.

The communication module receives its energy for the sensor functions and radio communication with the input module from an electromagnetic field.

Type	WSIX100-B50N
Nominal signal transfer rate 1/s	5 (signal changes per second)
Latency (99,9%)	20 ms (max. 34 ms) until the signal is available on the fieldbus
Switch status	LED, yellow
Operating status	LED, green
Operation	1 foil push-button
Operating temperatur range	-25 ... +55 °C
Storage temperatur range	-40 ... +70 °C
Permissable shock and vibration loading	shock b ≤ 30g, T ≤ 11 ms
Protection class in acc. with IEC 60529	IP67
In compliance with	EN 60 947-5-2
Connection	Connector M12 with connecting nut for sensor heads for wireless proximity switches
Housing material	Bergamit A700 (PA6.6 not fortified)
Power consumption	≤ 6 mW
Frequency of the power transfer	120 kHz
Frequency band	2,4 GHz ISM band in accordance with ETSI standard ETS 300 328
Maximum number of communication modules in one machine cell (3x3x3 m^3)	360
Maximum transfer rate	10 m/s
Error rate	10^{-9}
Range for communication	5 m
Frequency change	Frequency hopping method
Address storage	Adresses cannot be lost

Technical data
Input module

Short description

One input module transmits the information of up to 120 wireless position sensors to the machine control. The sensor signals reach the input module via two antennas and are then transfered to the machine control system via a FieldBusPlug.

Communication takes place in the 2.4 GHz band according to the standard ETS 300 328. A frequency hopping process with varying frequency sequences is used for reliable data transfer.

Every 500 ms the input module expects a status report of all its assigned sensors . This way the input module monitors the correct functioning of the sensors.

Additionally, the input module is equipped with functions for the configuration and diagnosis of wireless position sensors.

Type	**WDI100-120FBP**
Number of inputs	120 digital inputs for wireless position sensors 120 valid-status signals for wireless position sensors
Frequency band (communication)	2.4 GHz ISM band in acc. with ETSI standard ETS 300 328
Frequency-/antenna change	Frequency hopping method with varying frequency sequences Alternation between emitting- and receiving antenna
Error rate (per input)	10^{-9}
Latency (99,9 %)	20 ms (max. 34 ms) until the signal is available on the fieldbus
Range (of antenna)	5 m
Maximum number of input modules per machine cell	3
Operating display	- LCD-Display, double-spaced with 16 characters each - 4 foil push-buttons
Electrical connection	- 2 coaxial connectors: antenna cable - 1 connector: interface to ABB-FieldBusPlug - 1 set of screw terminals: 24 VDC supply
Protection class in acc. with IEC 60529	IP20
Supply voltage	24 V DC (+20%,-15%)
Operating temperature range	0 ... +50°C
Storage temperature range	-25 ... +70°C
Permissible humidity for operation	+50 ... +95 %, without bedewing
Dimensions (h x w x d)	140 mm x 120 mm x 85 mm
Mounting	- DIN-rail in acc. with DIN EN 50022 - Mounting holes for screws up to 4 mm diameter

Technical data
Power supply

Short description

The power supply WPU100 provides the energy for the generation of an electromagnetic field of 120 kHz with the help of the connected primary loops. This again supplies the wireless position sensors. The installation in pairs generates a two-dimensional, rotating, electromagnetic field.

Type	**WPU100-24**
Output frequency	120 kHz
Output voltage	up to 700 V at the connected primary loops
Output current	4 ... 24 A adjustable in 16 stages
Permissable inductivity at output	0,011 ... 0,058 mH (primary loops including feed line)
Control elements	1 green LED, System ready 2 red LEDs for signalling of errors 16-stage rotary switch for the selection of output current 1 DIL-switch for phase selection (0°/90°) 1 DIL-switch for the selection of operating mode (Master/Slave)
Electrical connection	2 terminals for the electrical connection of primary loops 1 terminal: synchronisation input 1 terminal: synchronisation output 1 terminal: supply voltage
Synchronisation	Automatic synchronisation with a second power supply for the generation of a two-dimensional, rotating electromagnetic field
Supply voltage	120 ... 230 V AC (+10%, -15%), (50 ... 60 Hz (±5%))
Power consumption	100 ... 700 W
Operating temperature range	0 ... +45°C
Storage temperature range	-25 ... +70°C
Protection class in acc. with IEC 60529	IP67
Mounting	4 mounting holes for srew mounting
Dimensions (h x w x d)	400 mm x 310 mm x 150 mm
Weight	15 kg
Suitable synchronized wires	screened twisted-pair-cable, screen applied one-sided
Suitable primary loops	Solely the prepacked primary loops that are offered within this product range

Technical data
Antenna
Primary loops

Short description

The antennas WAT100 transmit and receive the signals between an input module and the wireless proximity switches.
Two antennas with varying polarisation are connected to each input module.

Type	**WAT100-R, WAT100-L**
Frequency range	2.4 ... 2.5 GHz
Polarisation	Right- resp. leftcircular polarized (-R, -L)
Impedancy	50 Ω
Dimensions (h x w x d)	101 mm x 95 mm x 32 mm
Antenna cable	Prepacked coaxial cable (length: 3 m and 5 m)
Accessories	Antenna mounting kit

Short description

The primary loops WPC100 emit an electromagnetic field of 120kHz with the help of the connected power supply for wireless position sensors. The installation in pairs generates a two-dimensional, rotating electromagnetic field.

Type	**WPC100-N**
Rated voltages	1000 V AC, suitable for installation in acc. with VDE100-520
Total diameter	9.4 ± 0.5 mm
Total cross section	6.6 mm^2
Properties	Halogene-free, bio-diesel resistant, UV-resistant
Conductor insulation	Silicone (Si/Y); wall thickness 1.3 mm; colour: red
Exterior insulation	TPE/U (thermoplastic polyurethan); wall thickness 1.3 mm; colour: light grey
Availabe types	prepacked cable (cable shoes on both ends) for the connection to the power supply for wireless position sensors Lengths between 10 m and 28 m, graduation 1 m

Notes

Cam switches
Index

Notes

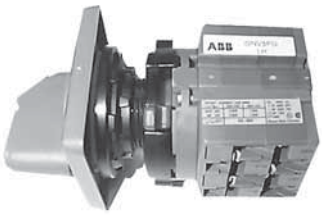
Cam switches

Type OM, ON, & OL

Cam switches

Cam switches OM, ON & OL (10A, 25A, 40A, 80A, 125A, 160A & 200A)

Complete range of standard and special cam switches for door and base mounting



Complete delivery includes handle and frontplate. Snap-on mounting of contact block with interlocking

Protected terminals and interconnections. Selflifting plus-minus screws for fast assembly.

11

Handle, color black or grey. Padlockable handle, color black or red-yellow.

Keylock and cylinder lock solutions

Enlosed cam switches. Water and dustproof IP 65. NEMA4 X for outdoor use.

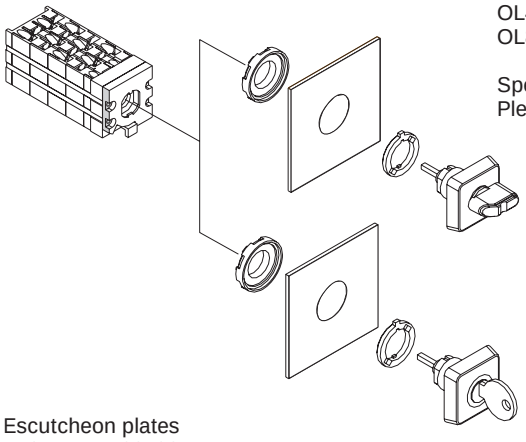
General Information

Door mounting cam switches

- IP 65
- NEMA 4X outdoor (ON, OL40)
- Key operated switch, IP54
- OM, Miniature
- ON, Normal
- OL, Large

Door drilling
OM: Ø 16.5mm / Ø 22.5mm
ON: Ø 22.5mm / Ø 30.5mm
OL40: Ø 22.5mm / Ø 30.5mm

Maximum panel thickness 5.5 mm.
The black handle with square escutcheon plate marked for switch type is supplied with the switch body. Optional adaptor ring available for 30.5 mm hole.



Escutcheon plates

OM	30x30
ON	48x48
OL40	48x68

DIN-rail mounting

- P 44
- ON, Modular

Number of contacts

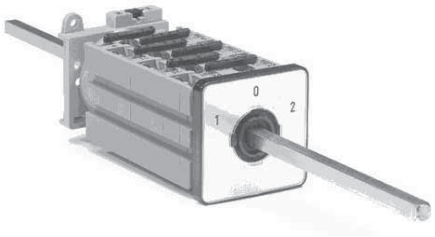
OM:	16 contacts
ON:	20 contacts
ON_M:	6 contacts
OL40:	20 contacts
OL80, 125, 160, 200:	24 contacts

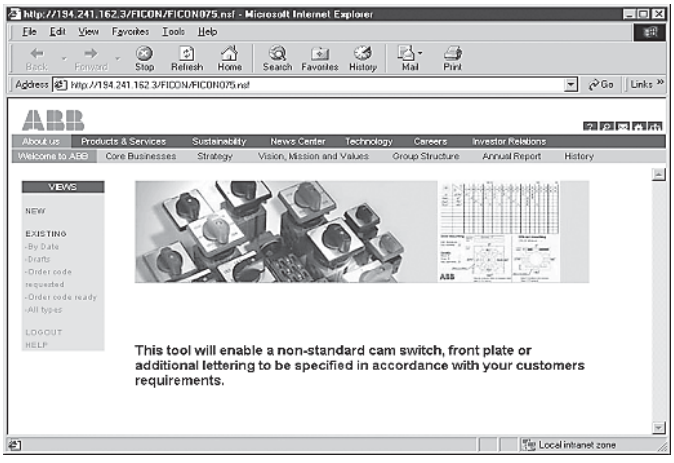
Special switches up to 60 contacts
Please consult with us.

Features:

- Complete delivery for easy purchasing and assembly
- Standard delivery with black handle, alt. grey or red yellow handle
- Small panel size: front space in side to side mounting 30 mm or 50 mm up to 25 A
- Finger protected terminals and interconnections (IP20, VBG4)
- Self lifting screws, terminal screws for fast cabling
- Double break silver contacts with 0,35 µm gold grid ensure a high breaking capacity and reliable connection.

  Also available with solid golden contacts for extremely difficult circumstances. Have to be ordered separately, please add G to the type, e.g; OMA 1 PBG.
- Fast special engraving service available
- Metallic shaft as special version
- Fast-on terminals available as special version





User guiding CamWeb Configurator for special cam switches

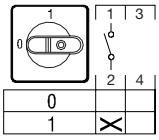
The user guiding CamWeb Configurator generates automatically the new cam switch type and sends order code for non-standard cam switches and front plates.

The global order code enables fast and failure free EDI-orders as standard switch from the first time.

The path to the configurator through ABB home pages:
www.abb.com or inside.abb_
Product&Services
Low Voltage Products
Switches&Fusegear
Switches
Cam Switches – CamLine
Special Cam Switches

You may also use the direct internet URL:
http://194.241.162.3/FICON/FICON075.nsf

ON-OFF Switches ①



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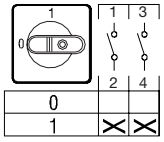

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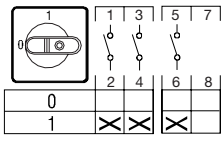

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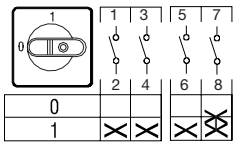

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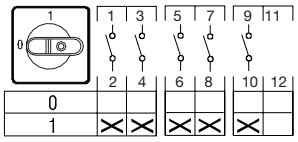

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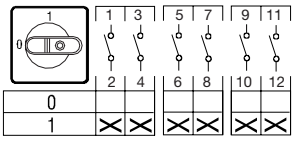


O_A6_

Black handle and frontplate with standard text are included. The type and the ordering number are for one piece. Special engraved front-plates to be ordered as separate items.

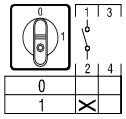
Function	Number of poles	Rated thermal current [A]	Weight [kg]	Catalog number	List price
Rotating angle 90°, O-position: 9 o´clock					
Miniature, door mounted					
0 - 1	1	10	0.04	OMA1PB	**$ 51**
	2	10	0.04	OMA2PB	**59**
	3	10	0.05	OMA3PB	**90**
0 - 1	4	10	0.05	OMA4PB	**124**
	5	10	0.06	OMA5PB	**135**
	6	10	0.06	OMA6PB	**210**
Normal, door mounted					
0 - 1	1	25	0.08	ONA1PB	**53**
	2	25	0.09	ONA2PB	**66**
	3	25	0.10	ONA3PB	**102**
0 - 1	4	25	0.11	ONA4PB	**135**
	5	25	0.12	ONA5PB	**142**
	6	25	0.12	ONA6PB	**237**
Large, door mounted					
0 - 1	1	40	0.13	OL40A1PB	**100**
	2	40	0.17	OL40A2PB	**119**
	3	40	0.21	OL40A3PB	**136**
0 - 1	4	40	0.25	OL40A4PB	**150**
	5	40	0.29	OL40A5PB	**172**
	6	40	0.33	OL40A6PB	**191**
Modular, DIN-rail mounted					
0 - 1	1	25	0.09	ONA1M	**50**
	2	25	0.10	ONA2M	**66**
	3	25	0.11	ONA3M	**102**
	6	25	0.12	ONA6M	**237**
Key operated, withdrawable in both positions, rotating angle 90°, O-position: 9 o´clock ②					
Miniature, door mounted					
0 - 1	1	10	0.06	OMA1KB	**66**
	3	10	0.07	OMA3KB	**123**
Normal, door mounted 90°					
0 - 1	1	25	0.11	ONA1KB	**78**
	3	25	0.13	ONA3KB	**130**

Packing sizes:
OM 130 x 100 x 120 [mm]
ON, OL 250 x 100 x 110 [mm]

① 80, 125, 160 & 200A sizes will be available 1st Qtr, 2006. Consult factory for availability.
② Different withdrawability of key is also possible to be ordered as special switch.

Standard delivery with black handle. Available also as an optional extra with grey handle, please change in type designation B to G, eg. OMA1PB would be OMA1PG with grey handle.

ON - OFF switches ①
Change-over switches ①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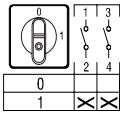
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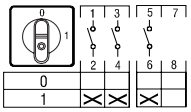
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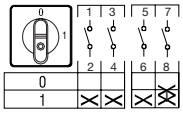
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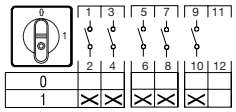
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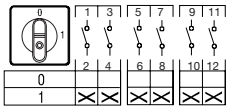
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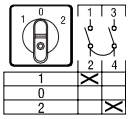
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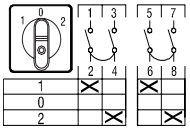
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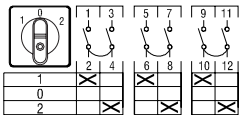
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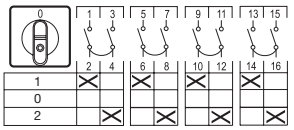

O_U4_

ON - OFF switches

Black handle and frontplate with standard text are included. The type and the ordering number are for one piece, package quantity is 10 pcs. Special engraved frontplates to be ordered as separate items.

Function	Number of poles	Rated thermal current [A]	Weight [kg]	Catalog number	List price
Rotating angle 90°, O-position: 12 o´clock					
Miniature, door mounted					
0 - 1	1	10	0.04	OMA01PB	**$ 51**
	2	10	0.04	OMA02PB	**59**
	3	10	0.05	OMA03PB	**90**
0 - 1	4	10	0.05	OMA04PB	**124**
	5	10	0.06	OMA05PB	**135**
	6	10	0.06	OMA06PB	**215**
Normal, door mounted					
0 - 1	1	25	0.08	ONA01PB	**53**
	2	25	0.09	ONA02PB	**66**
	3	25	0.10	ONA03PB	**102**
0 - 1	4	25	0.11	ONA04PB	**135**
	5	25	0.12	ONA05PB	**142**
	6	25	0.12	ONA06PB	**237**
Modular, DIN-rail mounted					
0 - 1	1	25	0.09	ONA01M	**50**
	2	25	0.10	ONA02M	**66**
	3	25	0.11	ONA03M	**102**
	6	25	0.12	ONA06M	**237**
Key operated, withdrawable in both positions, rotating angle 90°, O-position: 12 o´clock					
Miniature, door mounted					
0 - 1	1	10	0.06	OMA01KB	**116**
	3	10	0.07	OMA03KB	**123**
Normal, door mounted					
0 - 1	1	25	0.11	ONA01KB	**140**
	3	25	0.13	ONA03KB	**130**

Change-over switches

Black handle and frontplate with standard text are included. The type and the ordering number are for one piece, package quantity is 10 pcs. Special engraved frontplates to be ordered as separate items.

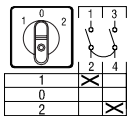
Function	Number of poles	Rated thermal current [A]	Weight [kg]	Catalog number	List price
Rotating angle 60° - 0 - 60°					
Miniature, door mounted					
1 - 0 - 2	1	10	0.05	OMU1PB	**56**
	2	10	0.06	OMU2PB	**85**
	3	10	0.06	OMU3PB	**124**
	4	10	0.07	OMU4PB	**143**
Normal, door mounted					
1 - 0 - 2	1	25	0.09	ONU1PB	**65**
	2	25	0.11	ONU2PB	**88**
	3	25	0.13	ONU3PB	**135**
	4	25	0.14	ONU4PB	**150**
Large, door mounted					
1 - 0 - 2	1	40	0.17	OL40U1PB	**114**
	2	40	0.25	OL40U2PB	**139**
	3	40	0.33	OL40U3PB	**189**
	4	40	0.41	OL40U4PB	**244**
Modular, DIN-rail mounted					
1 - 0 - 2	1	25	0.09	ONU1M	**65**
	2	25	0.11	ONU2M	**88**
	3	25	0.13	ONU3M	**135**
	4	25	0.14	ONU4M	**150**

Packing sizes: OM 130 x 100 x 120 [mm]
ON, OL 250 x 100 x 110 [mm]

① 80, 125, 160 & 200A sizes will be available 1st Qtr, 2006. Consult factory for availability.

Standard delivery with black handle. Available also as an optional extra with grey handle, please change in type designation B to G, eg. OMA1PB would be OMA1PG with grey handle.

Change-over switches ①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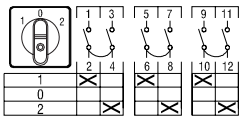
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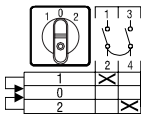
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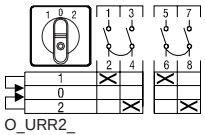
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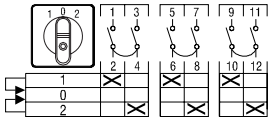
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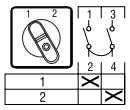
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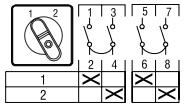
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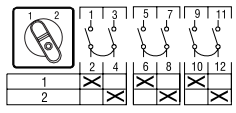
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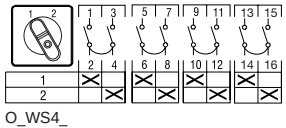
O_WS4_

Black handle and frontplate with standard text are included. The type and the ordering number are for one piece. Special engraved frontplates to be ordered as separate items.

Function	Number of poles	Rated thermal current [A]	Weight [kg]	Catalog number	List price
Key operated, with 0-position, withdrawable in all positions					
Miniature, door mounted					
1 - 0 - 2	1	10	0.07	OMU1KB	**$ 107**
	3	10	0.08	OMU3KB	**159**
Normal, door mounted					
1 - 0 - 2	1	25	0.12	ONU1KB	**131**
	3	25	0.13	ONU3KB	**179**
1_R - 0 - 2_R , with two sided spring return					
Miniature, door mounted					
1_R - 0 - 2_R	1	10	0.05	OMURR1PB	**63**
	3	10	0.06	OMURR3PB	**130**
Normal, door mounted					
1_R - 0 - 2_R	1	25	0.09	ONURR1PB	**79**
	2	25	0.11	ONURR2PB	**153**
	3	25	0.12	ONURR3PB	**142**
Large, door mounted					
1_R - 0 - 2_R	1	45	0.17	OL40URR1PB	**133**
	2	45	0.25	OL40URR2PB	**144**
	3	45	0.33	OL40URR3PB	**189**
Modular, DIN-rail mounted					
1_R - 0 - 2_R	1	25	0.09	ONURR1M	**89**
Without 0-position					
Miniature, door mounted					
1 - 2	1	10	0.09	OMWS1PB	**58**
	2	10	0.11	OMWS2PB	**79**
	3	10	0.13	OMWS3PB	**103**
	4	10	0.14	OMWS4PB	**119**
Normal, door mounted					
1 - 2	1	25	0.09	ONWS1PB	**66**
	2	25	0.11	ONWS2PB	**90**
	3	25	0.13	ONWS3PB	**124**
	4	25	0.14	ONWS4PB	**144**
Large, door mounted					
1 - 2	1	40	0.17	OL40WS1PB	**122**
	2	40	0.25	OL40WS2PB	**150**
	3	40	0.33	OL40WS3PB	**200**
	4	40	0.41	OL40WS4PB	**244**
Modular, DIN-rail mounted					
1 - 2	1	25	0.09	ONWS1M	**66**
	2	25	0.11	ONWS2M	**90**
	3	25	0.13	ONWS3M	**124**
	4	25	0.14	ONWS4M	**166**

Packing sizes: OM 130 x 100 x 120 [mm]
ON, OL 250 x 100 x 110 [mm]

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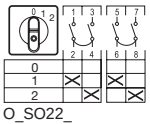
① 80, 125, 160 & 200A sizes will be available 1st Qtr, 2006. Consult factory for availability.

Standard delivery with black handle. Available also as an optional extra with grey handle, please change in type designation B to G, eg. OMA1PB would be OMA1PG with grey handle.

Multi-step switches ①


O_SO21_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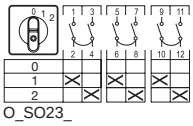
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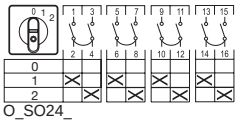
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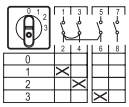
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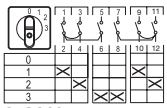
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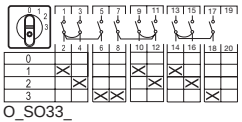
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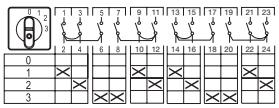
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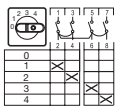
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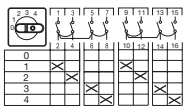
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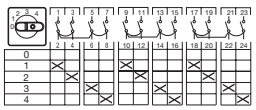

O_SO43_

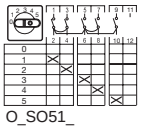
Black handle and frontplate with standard text are included. The type and the ordering number are for one piece. Special engraved frontplates to be ordered as separate items.

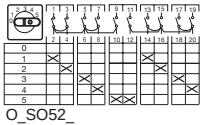
Function	Number of poles	Rated thermal current [A]	Weight [kg]	Catalog number	List price
2- step, with O-position					
Miniature, door mounted					
0 - 1 - 2	1	10	0.04	OMSO21PB	**$ 58**
	2	10	0.05	OMSO22PB	**79**
	3	10	0.06	OMSO23PB	**98**
	4	10	0.07	OMSO24PB	**113**
Normal, door mounted					
0 - 1 - 2	1	25	0.10	ONSO21PB	**68**
	2	25	0.12	ONSO22PB	**82**
	3	25	0.13	ONSO23PB	**111**
	4	25	0.14	ONSO24PB	**135**
Modular, DIN-Rail mounted					
0 - 1 - 2	1	25	0.10	ONSO21M	**68**
3- step, with O-position					
Miniature, door mounted					
0 - 1 - 2 - 3	1	10	0.05	OMSO31PB	**68**
	2	10	0.06	OMSO32PB	**96**
	3	10	0.07	OMSO33PB	**107**
	4	10	0.08	OMSO34PB	**160**
Normal, door mounted					
0 - 1 - 2 - 3	1	25	0.10	ONSO31PB	**83**
	2	25	0.12	ONSO32PB	**101**
	3	25	0.13	ONSO33PB	**113**
	4	25	0.14	ONSO34PB	**159**
Large, door mounted					
0 - 1 - 2 - 3	1	45	0.41	OL40SO31PB	**133**
Modular, DIN-rail mounted					
0 - 1 - 2 - 3	1	25	0.11	ONSO31M	**83**
3- step, without O-position					
Miniature, door mounted					
1 - 2 - 3	1	10	0.05	OMST31PB	**74**
	2	10	0.06	OMST32PB	**98**
	3	10	0.07	OMST33PB	**133**
	4	10	0.08	OMST34PB	**170**
Normal, door mounted					
1 -2 -3	1	25	0.10	ONST31PB	**78**
	2	25	0.12	ONST32PB	**111**
	3	25	0.13	ONST33PB	**154**
	4	25	0.14	ONST34PB	**192**
Modular, DIN-rail mounted					
1 -2 -3	1	25	0.10	ONST31M	**78**
4- step, with O-position					
Miniature, door mounted					
0 - 1 - 2 - 3 - 4	1	10	0.05	OMSO41PB	**79**
	2	10	0.06	OMSO42PB	**98**
	3	10	0.07	OMSO43PB	**126**
Normal, door mounted					
0 - 1 - 2 - 3 - 4	1	25	0.11	ONSO41PB	**85**
	2	25	0.12	ONSO42PB	**119**
	3	25	0.13	ONSO43PB	**132**
4- step, without O-position					
Miniature, door mounted					
1 - 2 - 3 - 4	1	10	0.05	OMST41PB	**85**
	2	10	0.06	OMST42PB	**124**
	3	10	0.07	OMST43PB	**198**
Normal, door mounted					
1 - 2 - 3 - 4	1	25	0.11	ONST41PB	**90**
	2	25	0.12	ONST42PB	**136**
	3	25	0.13	ONST43PB	**215**

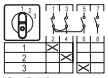
Packing sizes: OM 130 x100 x 120 [mm]
ON, OL 250 x 100 x 110 [mm]

① 80, 125, 160 & 200A sizes will be available 1st Qtr, 2006. Consult factory for availability.
Standard delivery with black handle. Available also as an optional extra with grey handle, please change in type designation B to G, eg. OMA1PB would be OMA1PG with grey handle.

Multi-step switches ①


O_SO51_


O_SO52_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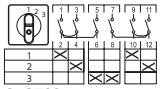
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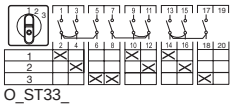
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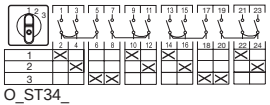
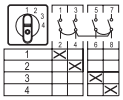

O_ST34_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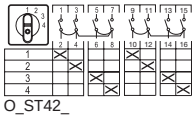
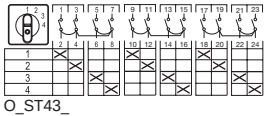
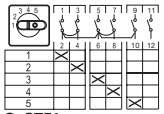

O_ST42_


O_ST43_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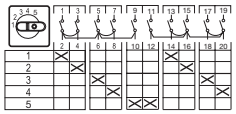
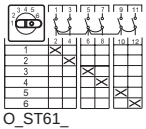
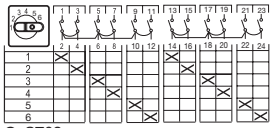
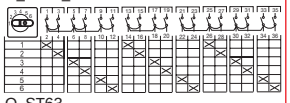

O_ST52_


O_ST61_


O_ST62_


O_ST63_

Black handle and frontplate with standard text are included. The type and the ordering number are for one piece, package quantity is 10 pcs.
Special engraved frontplates to be ordered as separate items.

Function	Number of poles	Rated thermal current [A]	Weight [kg]	Catalog number	List price
5- step, with O-position					
Miniature, door mounted					
0 - 1 - 2 - 3 - 4 - 5	1	10	0.06	OMSO51PB	**$ 102**
	2	10	0.08	OMSO52PB	**147**
Normal, door mounted					
0 - 1 - 2 - 3 - 4 - 5	1	25	0.12	ONSO51PB	**119**
	2	25	0.14	ONSO52PB	**166**
5- step, without O-position					
Miniature, door mounted					
1 - 2 - 3 - 4 - 5	1	10	0.06	OMST51PB	**117**
	2	10	0.08	OMST52PB	**155**
Normal, door mounted					
1 - 2 - 3 - 4 - 5	1	25	0.12	ONST51PB	**135**
	2	25	0.14	ONST52PB	**165**
6-step with 0-position					
Normal, door mounted					
1-2-3-4-5-6	1	25	0.115	ONSO61PB	**145**
	2	25	0.19	ONSO62PB	**234**
	3	25	0.265	ONSO63PB	**323**
Large, door mounted					
1-2-3-4-5-6	1	40	0.185	OL40SO61PB	**267**
	2	40	0.305	OL40SO62PB	**424**
	3	40	0.425	OL40SO63PB	**658**
6-step without 0-position					
Normal, door mounted					
1-2-3-4-5-6	1	25	0.115	ONST61PB	**167**
	2	25	0.19	ONST62PB	**267**
	3	25	0.265	ONST63PB	**357**
Large, door mounted					
1-2-3-4-5-6	1	40	0.185	OL40ST61PB	**267**
	2	40	0.305	OL40ST62PB	**412**
	3	40	0.425	OL40ST63PB	**613**

Packing sizes: OM 130 x 100 x 120 [mm]
ON, OL 250 x 100 x 110 [mm]

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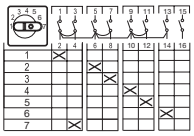
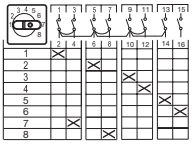
① 80, 125, 160 & 200A sizes will be available 1st Qtr, 2006. Consult factory for availability.

Standard delivery with black handle. Available also as an optional extra with grey handle, please change in type designation B to G, eg. OMA1PB would be OMA1PG with grey handle.

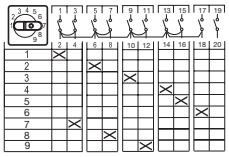
Multi-step switches ①



O_ST71_



O_ST81_



O_ST91_

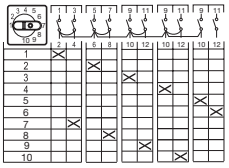
Black handle and frontplate with standard text are included. The type and the ordering number are for one piece, package quantity is 10 pcs. Special engraved frontplates to be ordered as separate items.

Function	Number of poles	Rated thermal current [A]	Weight [kg]	Catalog number	List price
7-step with 0-position					
Normal, door mounted					
1-2-3-4-5-6-7	1	25	0.14	ONSO71PB	**$ 199**
Large, door mounted					
1-2-3-4-5-6-7	1	40	0.3	OL40SO71PB	**289**
7-step without 0-position					
Normal, door mounted					
1-2-3-4-5-6-7	1	25	0.14	ONST71PB	**167**
Large, door mounted					
1-2-3-4-5-6-7	1	40	0.3	OL40ST71PB	**290**
8-step with 0-position					
Normal, door mounted					
1-2-3-4-5-6-7-8	1	25	0.145	ONSO81PB	**233**
Large, door mounted					
1-2-3-4-5-6-7-8	1	40	0.148	OL40SO81PB	**311**
8-step without 0-position					
Normal, door mounted					
1-2-3-4-5-6-7-8	1	25	0.145	ONST81PB	**233**
Large, door mounted					
1-2-3-4-5-6-7-8	1	40	0.148	OL40ST81PB	**311**
9-step with 0-position					
Normal, door mounted					
1-2-3-4-5-6-7-8-9	1	25	0.165	ONSO91PB	**278**
Large, door mounted					
1-2-3-4-5-6-7-8-9	1	40	0.265	OL40SO91PB	**334**
9-step without 0-position					
Normal, door mounted					
1-2-3-4-5-6-7-8-9	1	25	0.165	ONST91PB	**200**
Large, door mounted					
1-2-3-4-5-6-7-8-9	1	40	0.265	OL40ST91PB	**345**

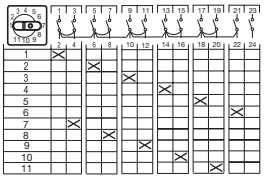
① 80, 125, 160 & 200A sizes will be available 1st Qtr, 2006. Consult factory for availability.

Standard delivery with black handle. Available also as an optional extra with grey handle, please change in type designation B to G, eg. OMA1PB would be OMA1PG with grey handle.

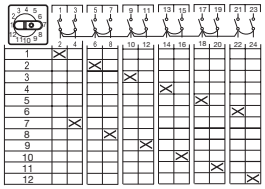
Multi-step switches ①



O_ST101_



O_ST111_



O_ST121_

Black handle and frontplate with standard text are included. The type and the ordering number are for one piece, package quantity is 10 pcs. Special engraved frontplates to be ordered as separate items.

Function	Number of poles	Rated thermal current [A]	Weight [kg]	Catalog number	List price
10-step with 0-position					
Normal, door mounted					
1-2-3-4-5-6-7-8-9-10	1	25	0.17	ONSO101PB	**$ 212**
Large, door mounted					
1-2-3-4-5-6-7-8-9-10	1	40	0.27	OL40SO101PB	**357**
10-step without 0-position					
Normal, door mounted					
1-2-3-4-5-6-7-8-9-10	1	25	0.17	ONST101PB	**223**
Large, door mounted					
1-2-3-4-5-6-7-8-9-10	1	40	0.27	OL40ST101PB	**357**
11-stop with 0-position					
Normal, door mounted					
1-2-3-4-5-6-7-8-9-10-11	1	25	0.19	ONSO111PB	**245**
Large, door mounted					
1-2-3-4-5-6-7-8-9-10-11	1	40	0.305	OL40SO111PB	**390**
11-step without 0-position					
Normal, door mounted					
1-2-3-4-5-6-7-8-9-10-11	1	25	0.19	ONST111PB	**245**
Large, door mounted					
1-2-3-4-5-6-7-8-9-10-11	1	40	0.305	OL40ST111PB	**401**
12-step without 0-position					
Normal, door mounted					
1-2-3-4-5-6-7-8-9-10-11-12	1	25	0.195	ONST121PB	**267**
Large, door mounted					
1-2-3-4-5-6-7-8-9-10-11-12	1	40	0.31	OL40ST121PB	**379**

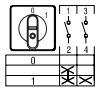
Packing sizes: OM 130 x 100 x 120 [mm]
ON, OL 250 x 100 x 110 [mm]

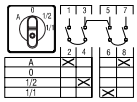
11

① 80, 125, 160 & 200A sizes will be available 1st Qtr, 2006. Consult factory for availability.

Standard delivery with black handle. Available also as an optional extra with grey handle, please change in type designation B to G, eg. OMA1PB would be OMA1PG with grey handle.

Motor control switches


O_SE158_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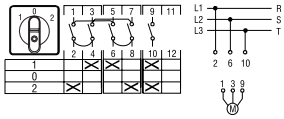
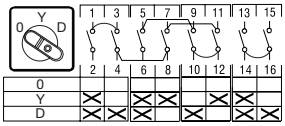
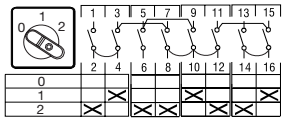

O_W3_


O_SD_


O_P12_

Pumpstart switches

Miniature, door mounted

Function	Number of poles	Rated thermal current [A]	Weight [kg]	Catalog number	List price
0 - 1	1	10	0.04	OMSE158PB	**$ 78**
Normal, door mounted					
0 - 1	1	25	0.09	ONSE158PB	**79**
Modular, DIN-rail mounted					
0 - 1	1	25	0.09	ONSE158M	**100**

Ventilation switches

Black handle and frontplate with standard text are included. The type and the ordering number are for one piece, package quantity is 10 pcs. Special engraved frontplates to be ordered as separate items.

Function	Number of poles	Rated thermal current [A]	Motor rating [kW/400V]	Weight [kg]	Catalog number	List price
Miniature, door mounted						
A - 0 - 1/2 - 1/1	2	10	7.5	0.06	OMST301PB	**$ 74**
Normal, door mounted						
A - 0 - 1/2 - 1/1	2	25	7.5	0.11	ONST301PB	**78**
Modular, DIN-rail mounted						
A - 0 - 1/2 - 1/1	2	25	7.5	0.11	ONST301M	**78**
Large, door mounted						
A - 0 - 1/2 - 1/1	2	40	15	0.21	OL40ST301PB	**139**

Reversing switches

Black handle and frontplate with standard text are included. The type and the ordering number are for one piece, package quantity is 10 pcs.. Special engraved frontplates to be ordered as separate items.

Normal, door mounted						
1 - 0 - 2	3	25	7.5	0.10	ONW3PB	**130**
Large, door mounted						
1 - 0 - 2	3	40	15	0.21	OL40W3PB	**233**

Star-delta switches

Normal, door mounted						
0 - Y - ΔΔ	3	25	7.5	0.12	ONSDEPB	**222**
Large, door mounted						
0 - Y - Δ	3	40	15	0.21	OL40SDEPB	**368**

Pole-change switches (Dahlander)

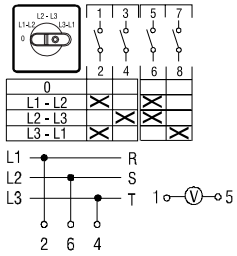
Winding for 2 speeds, one direction, 0 - A - AYY

Normal, door mounted						
0 - 1 - 2	3	25	7.5	0.12	ONP12PB	**234**
Large, door mounted						
0 - 1 - 2	3	40	15	0.25	OL40P12PB	**312**

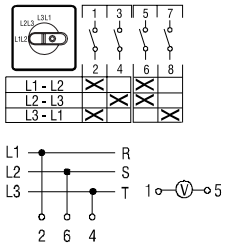
Packing sizes: OM 130 x 100 x 120 [mm]
ON, OL 250 x 100 x 110 [mm]

Standard delivery with black handle. Available also as an optional extra with grey handle, please change in type designation B to G, eg. OMA1PB would be OMA1PG with grey handle.

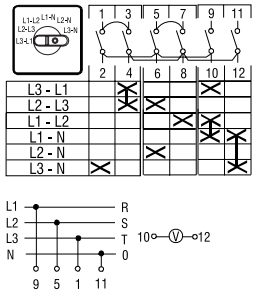
Voltmeter switches



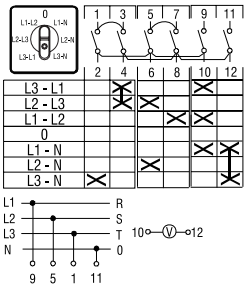
O_V3_



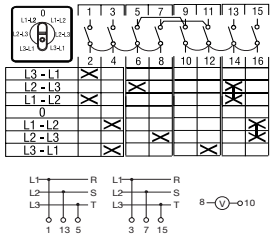
O_VN3_



O_VN30_



O_V30_



O_V32

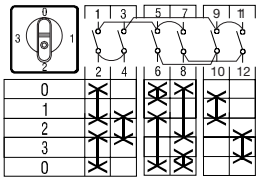
Black handle and frontplate with standard text are included. The type and the ordering number are for one piece, package quantity is 10 pcs. Special engraved frontplates to be ordered as separate items.

Function	Number of stages	Rated thermal current [A]	Weight kg	Catalog number	List price
4 Positions, 3 phase -3 wire, with 0-position					
Miniature, door mounted					
0, L1-L2,L2-L3,L3-L1	2	10	0.06	OMV3PB	**$ 79**
Normal, door mounted					
0, L1-L2,L2-L3,L3-L1	2	25	0.11	ONV3PB	**86**
Modular, DIN-rail mounted					
0, L1-L2,L2-L3,L3-L1	2	25	0.11	ONV3M	**86**
3 Positions, 3 phase -3 wire, without 0-position					
Miniature, door mounted					
L1-L2,L2-L3,L3-L1	2	10	0.06	OMVN3PB	**79**
Normal, door mounted					
L1-L2,L2-L3,L3-L1	2	25	0.11	ONVN3PB	**113**
Modular, DIN-rail mounted					
L1-L2,L2-L3,L3-L1	2	25	0.11	ONVN3M	**113**
7 Positions, 3 phase to phase 3 phase to neutral, without 0-position					
Miniature, door mounted					
L1-L3,L2-L3,L1-L2 L1-N,L2-N,L3-N	3	10	0.08	OMVN30PB	**128**
Normal, door mounted					
L1-L3,L2-L3,L1-L2 L1-N,L2-N,L3-N	3	25	0.12	ONVN30PB	**113**
Modular, DIN-rail mounted					
L1-L3,L2-L3,L1-L2 L1-N,L2-N,L3-N	M	25	0.12	ONVN30M	**113**
7 Positions, 3 phase to phase 3 phase to neutral, with 0-position					
Miniature, door mounted					
L1-L3,L2-L3,L1-L2,0 L1-N,L2-N,L3-N	3	10	0.12	OMV30PB	**102**
Normal, door mounted					
L1-L3,L2-L3,L1-L2,0 L1-N,L2-N,L3-N	3	25	0.12	ONV30PB	**113**
Modular, DIN-rail mounted					
L1-L3,L2-L3,L1-L2,0 L1-N,L2-N,L3-N	3	25	0.12	ONV30M	**113**
7 Positions, 3 phase to phase voltages for 2 circuits, with 0 postition					
Miniature, door mounted					
L1-L3,L2-L3,L1-L2,0 L1-L3,L2-L3,L1-L2	4	10	0.14	OMV32PB	**159**
Normal, door mounted					
L1-L3,L2-L3,L1-L2,0 L1-L3,L2-L3,L1-L2	4	25	0.14	ONV32PB	**192**

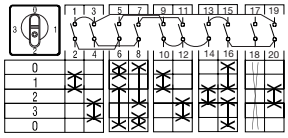
Packing sizes: OM 130 x 100 x 120 [mm]
ON 250 x 100 x 110 [mm]

Standard delivery with black handle. Available also as an optional extra with grey handle, please change in type designation B to G, eg. OMA1PB would be OMA1PG with grey handle.

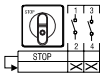
Ammeter switches



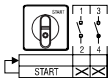
O_AU31



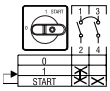
O_AU32



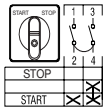
O_SA2_



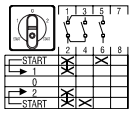
O_SE2_



O_SEA10_



ONSEA1PB



O_UR139_

Black handle and frontplate with standard text are included. The type and the ordering number are for one piece, package quantity is 10 pcs. Special engraved frontplates to be ordered as separate items.

Function	Number of stages	Rated thermal current [A]	Weight kg	Catalog number	List price
For 3 current transformer circuits, with 0-position					
Miniature, door mounted					
Single pole	3	10	0.12	OMAU31PB	**$ 102**
Normal, door mounted					
Single pole	3	25	0.12	ONAU31PB	**113**
2 pole or direct measurement in 3 phases	5	25	0.15	ONAU32PB	
Modular, DIN-rail mounted					
Single pole	4	25	0.12	ONAU31M	**244**
Stop switches					
Black handle and frontplate with standard text are included. The type and the ordering number are for one piece, package quantity is 10 pcs. Special engraved frontplates to be ordered as separate items.					
Miniature, door mounted, with spring return, contacts N.C.					
0_R-Stop	2	10	0.04	OMSA2PB	**56**
Normal, door mounted, with spring return, contacts N.C.					
0_R-Stop	2	25	0.09	ONSA2PB	**66**
Start switches					
Black handle and frontplate with standard text are included. The type and the ordering number are for one piece, package quantity is 10 pcs. Special engraved frontplates to be ordered as separate items. With spring return.					
Miniature, door mounted, with spring return.					
0_R-Start	1	10	0.04	OMSE2PB	**56**
0-1_R-Start	1	10	0.05	OMSEA10PB	
Normal, door mounted, with spring return.					
Stop-Start	1	25	0.04	ONSEA1PB	**83**
0_R-Start	1	25	0.04	ONSE2PB	**83**
0-1_R-Start	1	25	0.09	ONSEA10PB	**66**
Start-1_R-0-2_R-Start	1	25	0.09	ONUR139PB	**159**
Modular, DIN-rail mounted, with spring return					
0-1_R-Start	1	25	0.09	ONSEA10M	**89**
Start-1_R-0-2_R-Start	1	25	0.09	ONUR139M	**159**

Packing sizes: OM 130 x 100 x 120 [mm]
ON 250 x 100 x 110 [mm]

Standard delivery with black handle. Available also as an optional extra with grey handle, please change in type designation B to G, eg. OMA1PB would be OMA1PG with grey handle.

Accessories


OMPB1


OMPG1


ONPB1


ONPG1


OMXB1


ONXB1


ONZ20B


OMF101 ONF101


ONFM101


OMFB72


ONFB72


OMK95


ONK95


OMX99


ONX99


ONZ10L_


OMNX80


ONX30

The type and the ordering number are for one piece.

Color	For cam switches type	Packing quantities	Weight kg	Catalog number	List price
Handle with blank front plate without engraving					
Black	OM_, Mini	5	0.05	OMPB1	**$ 51**
Grey	OM_, Mini		0.05	OMPG1	
Black	ON_Normal, OL40	5	0.08	ONPB1	**60**
Grey	ON_Normal, OL40		0.08	ONPG1	
Handle with round escutcheon plate					
Black	OM_, Mini	5	0.02	OMXB1	**66**
Black, nose-type	OM_, Mini		0.02	OMXNB1	**66**
Black	ON_Normal, OL40		0.02	ONXB1	**72**
Padlockable handle					
For max 2 padlocks with 6 mm bail diameter or for max 3 padlocks with 4 mm bail diameter, 90 degrees.					
Black	ON_Normal, OL40	5	0.06	ONZ20B	**41**
Red yellow	ON_Normal, OL40		0.06	ONZ20RY	**28**
Front ring only					
Black	OM_, Mini	10	0.01	OMX99	**13**
Black	ON_, Normal		0.01	ONX99	
Front plate, blank without engraving ①					
Silver	OM_, Mini	10	0.003	OMF101	**7**
Silver	ON_, Normal		0.003	ONF 101	**8**
Yellow	ON_ Normal, OL40		0.003	ONFY 101	**17**
Grey	ON_, Modular		0.003	ONFM 101	**17**
Additional lettering plate, without engraving, black engraving from front side ②					
Black frame	OM_, Mini	5	0.01	OMFB72	**12**
Black frame	ON_, Normal, OL40		0.01	ONFB72	**12**
Grey frame	OM_, Mini		0.01	OMFG72	**12**
Grey frame	ON_, Normal		0.01	ONFG72	**13**
Spare key					
2 pcs	OM_, Mini	2	0.01	OMK95	**56**
3 pcs	ON_, Normal, OL40		0.01	ONK95	**68**

Protective rear cover

Transparent, IP 42 protection

Number of chambers	Contats	For cam switches type	Packing quantities	Weight kg	Catalog number	List price
1-2	2-4	ON_, Normal	1	0.02	ONZ10L2	**$ 39**
3-4	6-8	ON_, Normal		0.04	ONZ10L4	**52**
5-6	10-12	ON_, Normal		0.06	ONZ10L6	**69**

Nut spanner for mounting the handle to the door					
Black	OM_, Mini ON_, Normal	1	0.02	OMNX80	**30**
Adaptor ring for 30 mm door drilling					
Black	ON_, Normal	10	0.01	ONX30	**10**

① Special front plate for standard switches: order as separate position. Attach specification in electronic format or paper. Eg. ONF 101/TEXT
② Additional lettering plate with engraving: order as separate position. Attach specification in electronic format or paper. The text can also be typed as comment. Eg. ONFB 72/TEXT Pumping station

Accessories
Available for special cam switches

ONZ74_

O_Z31_

O_Z21_

The type and the ordering number are for one piece.
Special cam switches to be specified by CAMWEB conficurator.

Base mounting switches

Base mounting kit includes base for DIN-rail mounting, shaft adaptor and 200 mm shaft for cutting up to 250 mm panel depth. Can be supplied also as optional extra.

Depth[mm]	For cam switches	Catalog number	List Price
250	ON_Normal	ONZ74	**$ 38**

Cylinder interlock

To lock all pre-determined positions with a safety key (2 pcs)
Available for special cam switches only. Special configuration with CAMWEB.

	OL_Large	OLZ31	**368**

Pushbutton interlock

To release all pre-determined positions while pushed. Special configuration with CAMWEB.

	OL_Large	OLZ21	**167**

Technical data ①
According to IEC / 60947-3-4-5

IEC ratings				OM_	ON_	OL40
Resistive and inductive load						
AC ratings						
Impulse withstand voltage	U_{imp}		kV	-	-	6
Rated operating voltage U_e	IEC		V	500	690	690
Isolation conditions acc. to VDE			V	250	400	690
Rated thermal current I_{th}	**IEC**		**A**	**10**	**25**	**45**
Rated short circuit current (prospective)			kA	1	10	10
Max back up fuse link			A	10	25	40
Short time current carrying capacity		3s	A	-	100	360
		10s	A	-	60	200
		30s	A	-	32	120
		60s	A	-	30	80
Rated operational current I_e			A	10	25	45
Non- or slightly inductive load	AC1	380 V	A	10	25	45
Switching of resistive loads	AC21	400 V	A	10	25	45
Switching of magnetic drives relays, valves, traction magnets						
	AC11	220-240 V	A	2.5	5.5	14
		380-440	A	-	3.5	6
		500 V	A	-	4.5	7
Mixed resistive and inductive load, pf. 0,7	AC22	220-500 V	A	10	20	40
		660-690 V	A	-	20	40
DC ratings						
Switching capacity DC rated voltage with resistive circuits (T ≤1ms)	DC1	24 V	A	10	10	45
		40 V	A	6	10	20
		60 V	A	2.5	3	5
		110 V	A	0.7	0.8	1
		220 V	A	0.3	0.32	0.3
		440 V	A	-	0.22	0.25
Switching capacity DC rated voltage with inductive circuits (T < 50 ms)				-		
	DC1	24 V	A	6	10	45
		30 V	A	3	4.5	11
		40 V	A	1	1.7	4
		60 V	A	0.7	0.7	1.5
		110 V	A	0.3	0.3	0.4
Motor ratings						
AC ratings						
Rated operational power	AC2	220-240 V	kW	2.5	3.5	11
3-phase		380-440 V	kW	-	6	18.5
Starting of slip-ring, switching off		500 V	kW	-	6	18.5
		660-690 V	kW	-	6	18.5
Rated operational power	AC3	220-240 V	kW	1.8	2.2	7.5
3-phase, 3-pole		380-440 V	kW	2.2	5.5	11
Direct starting of squirrel cage motors, switching off running motors		500 V	kW	-	4	11
		660-690 V	kW	-	4	11
1-phase		110 V	kW	0.3	0.4	2.5
		220-240 V	kW	0.55	0.75	4
		400 V	kW	0.75	1.3	5.5
Rated operational power	AC23	220-240 V	kW	1.8	2.6	7.5
3-phase, 3-pole		**380-440 V**	**kW**	**3.0**	**7.5**	**15**
Occasional switching of motors or other highly-inductive devices load		500 V	kW	-	4.8	15
		660-690 V	kW	-	4.8	17
1-phase		110 V	kW	0.37	0.5	2.5
		220-240 V	kW	0.75	0.9	4
		380-440 V	kW	1.1	1.5	7.5

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① 80, 125, 160 & 200A sizes will be available 1st Qtr, 2006. Consult factory for availability.

Technical data
UL/CSA

UL and CSA ratings				OM_	ON_	OL_40	OL80	OL125	OL160	OL200
UL 508 Manual Motor Controller file number E 63822										
Maximum operating voltage			VAC	300	600	600	600	600	600	600
Ampere rating	Pilot duty	CSA/UL category		A300	A600	A600	A600	A600	A600	A600
	General use	CSA/UL	A	10	25	40	80	125	160	200
Rated power (HP)	120V		HP	1	1	5	10	15	15	32
3-phase	240V		HP	1	1	10	30	40	40	64
	480V		HP	-	2	20	40	50	50	120
	600V		HP	-	5	23	40	50	50	120
1-phase	120V		HP	0.33	.05	2	7.5	10	10	—
	240V		HP	0.75	1	3	15	20	20	—
	480V		HP	-	2	10	—	—	—	—
	600V		HP	-	3	10	—	—	—	—
Short circuit ratings										
Maximum prospective fault current			kA	1	10	10	10	10	10	10
Maximum fuse size			A	16	35(RK5)	50(RK3)	100(RK5)	150(RK5)	200(RK5)	—
Switching frequency			cycles/h	150	150	150	150	150	150	—
Connecting screws			M	2.5	3.5	5	5	5	5	10
Max. cable cross section			mm^2	1.5	4	6	70	70	70	150
			AGW	14	14-12	14-8(Cu75)	12-2/0	12-2/0	12-2/0	300 kcmil

11

Approvals:

UL-Approval, file number EG 63822
CSA-Approval
Lloyds Register of Shipping
Det Norske Veritas (DNV)
Germanischer Lloyd (GL)
Ghost R

Standards:

IEC 60947-3
EN 60947-3
UL 508
CSA C22.2 No14

ON_, Normal

ON_M, Modular


OM_, Miniature

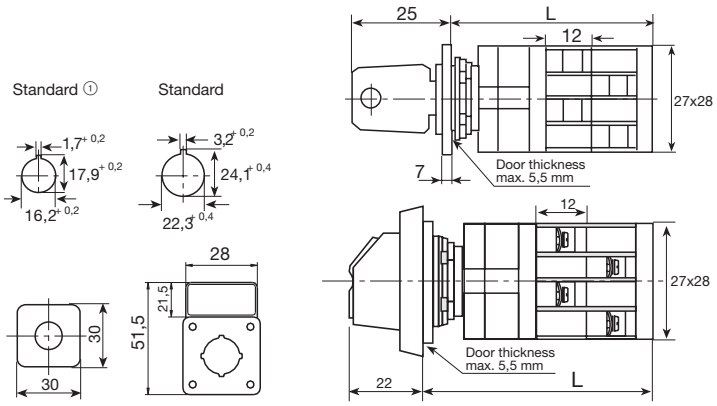
OL_, Large

OM_, Key operated

Approximate dimensions
OM, ON and OL switches

Dimensions in mm.
Remark: Terminal screws on top and bottom side.

OM, Miniature

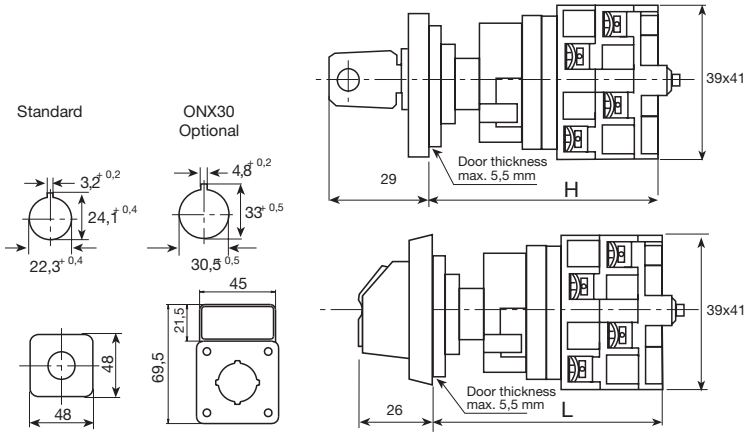


L number of contact chambers

1	2	3	4	5	6	7	8
45	57	69	81	90	105	11	138

11

ON, Normal



L number of contact chambers

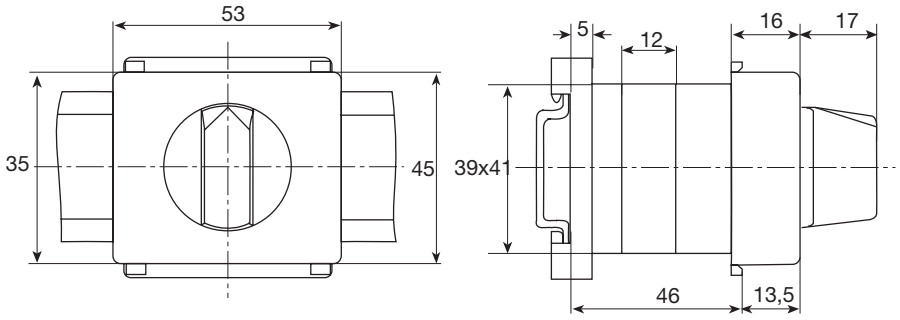
	1	2	3	4	5	6	7	8	9	10
L	54	66	78	90	102	114	126	138	150	162
H	62	76	86	98	110	122	134	146	159	171

① 22mm adaptor ring can be removed and become 16mm.

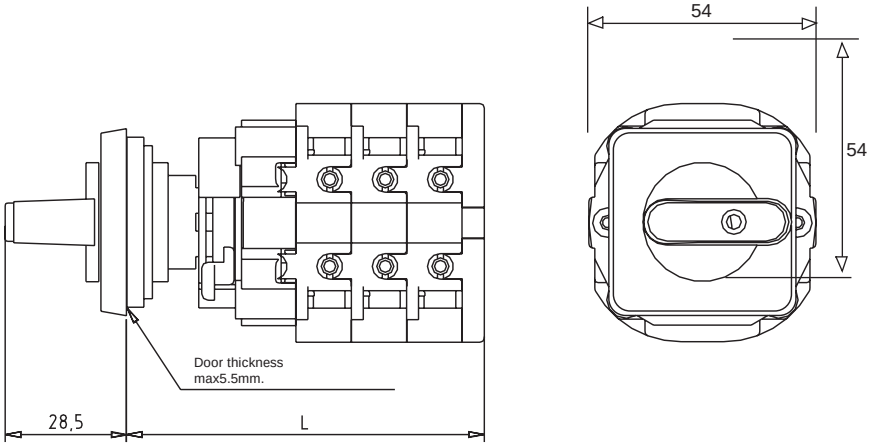
Approximate dimensions
ON and OL cam switches

Dimensions in mm.

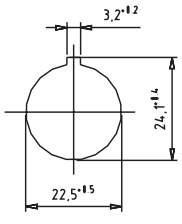
ON, Modular



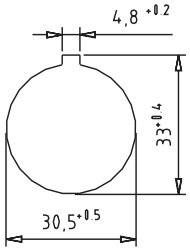
OL, Large



Standard



ONX30 (Optional)

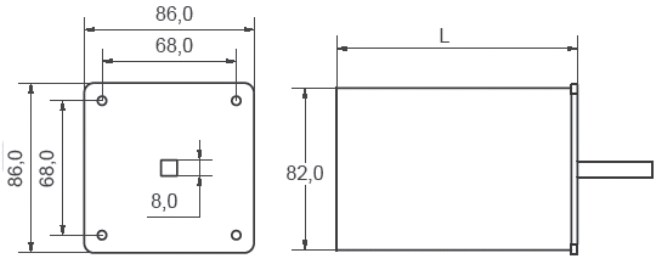


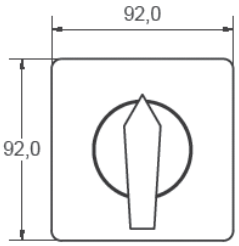
L number of contact chambers

1	2	3	4	5	6	7	8	9	10
59	72	85	98	111	124	137	150	163	176

Approximate dimensions
OL Cam switches

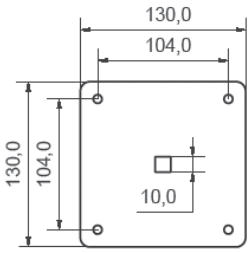
OL 80, OL125, & OL150

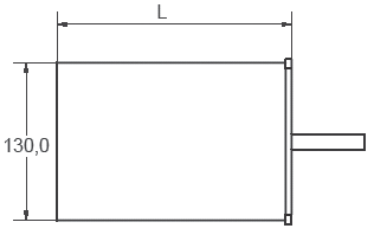


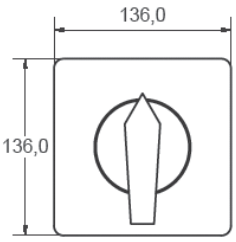


No. of Contacts	Length l
1 - 2	66
3 - 4	94
5 - 6	122
7 - 8	150
9 - 10	178
11 - 12	206
13 - 14	234
15 - 16	262

OL 200







No. of Contacts	Length L
1 - 2	120
3 - 4	181
5 - 6	242
7 - 8	303
9 - 10	364
11 - 12	425
13 - 14	486
15 - 16	547

Contact plan

Special cam switches, contact plan

Company_____

Phone/Fax nr._____

Name_____

Type_____

Project number_____

Customer´s number_____

Quantity:_____pcs

Handled by:_____

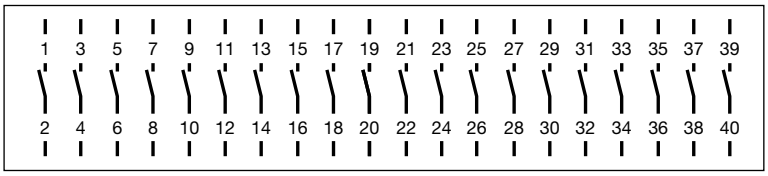
Date:_____

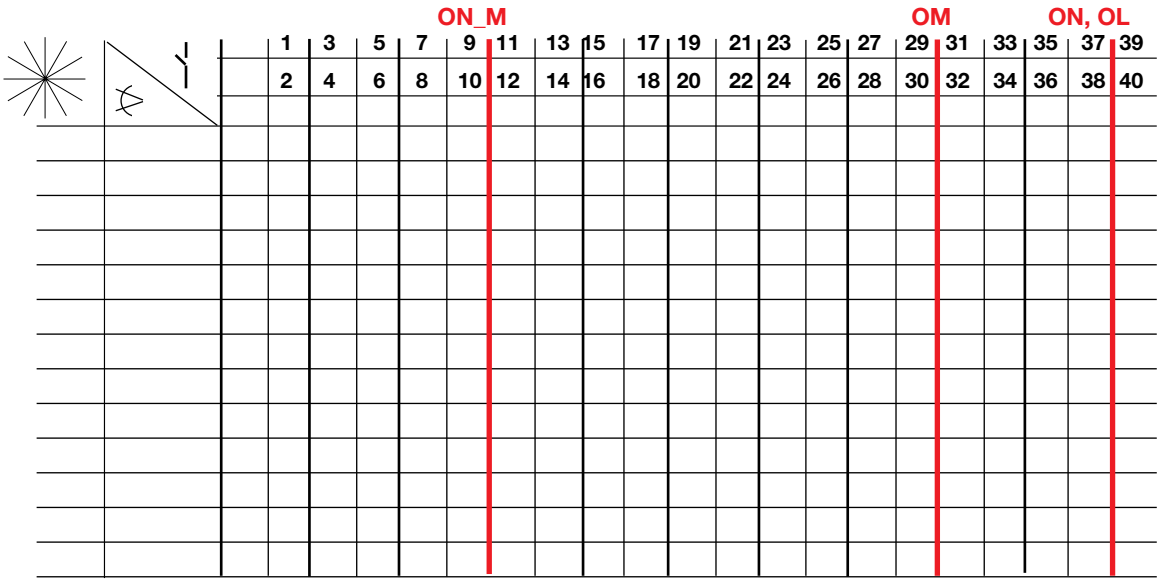
Interconnection between contacts
Contact closed

Contact closed between positions

Early make/Late break
(at least 60° between steps)

Automatic spring return (step max 60°)

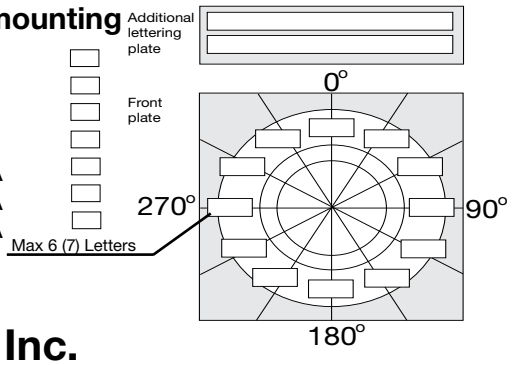




	Normal	Padlockable _X20	Key operated _K	Enclosed _E_6 IP65	Cylinder locking	Pusbutton locking
Black _B						
Grey_G						
Red-yellow_RY						

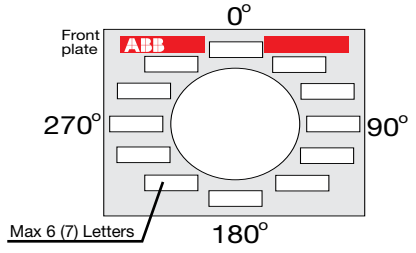
Door mounting

OM, 10A
ON, 25A
OL, 40A
OL, 80A
OL, 125A
OL, 160A
OL, 200A



DIN-rail mounting

ON_M, Modular



Max 3 chambers = 6 contacts
[Max 6 (7) Letters]

ABB Inc.

Enclosed rotary cam switches

Enclosed cam switches

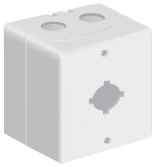

ONA_EPB


ONA3EKP


ONA_EZB


OTU16B3M6


OTC2_M25


OTC3_M25


OTC4_M25


OTC36LM25

The type and the ordering number are for one piece, the package quantity is four pieces.

Neutral and earth terminal, 6mm^2 included

Number of poles	Function	Size of ① enclosure	Weight [kg]	Catalog number	List price
ON-OFF switches, IP65					
2	0 - 1	96x96x70	0.3	ONA2EPB	**$ 227**
3	0 - 1	96x96x70	0.3	ONA3EPB	**247**
4	0 - 1	96x96x70	0.3	ONA4EPB	**245**
5	0 - 1	96x96x85	0.3	ONA5EPB	**279**
6	0 - 1	96X96X85	0.3	ONA6EPB	**301**
8	0 - 1	96X96X108	0.3	ONA8EPB	**379**
9	0 - 1	96X96X138	0.3	ONA9EPB	**400**
ON - OFF switches, padlockable handle, IP65					
2	0 - 1	96x96x70	0.3	ONA2EZB	**279**
3	0 - 1	96x96x70	0.3	ONA3EZB	**312**
4	0 - 1	96x96x70	0.3	ONA4EZB	**334**
5	0 - 1	96x96x85	0.3	ONA5EZB	**357**
6	0 - 1	96X96X85	0.3	ONA6EZB	**379**
8	0 - 1	96X96X108	0.3	ONA8EZB	**401**
9	0 - 1	96X96X138	0.3	ONA9EPB	**446**
ON - OFF switches, key type, IP54					
3	0 - 1	96x96x100	0.3	ONA3EKB	**379**
Change-over switches					
1	1 - 0 - 2	96x96x100	0.3	ONU1EPB	**222**
Reversing switches					
3	1 - 0 - 2	96x96x100	0.3	ONW3EPB	**311**
Star delta switches					
25	0 - Y -ΔΔ	305x215x185	0.3	ONSDEPB	**222**
40	0 - Y -ΔΔ	305x215x185	0.4	OL40SDEPB	

Enclosures

Anonymous enclosures

The enclosures can accomodate cam switches for door mounting and OT-switches for door and base mounting, see following pages. Includes fastening rings.

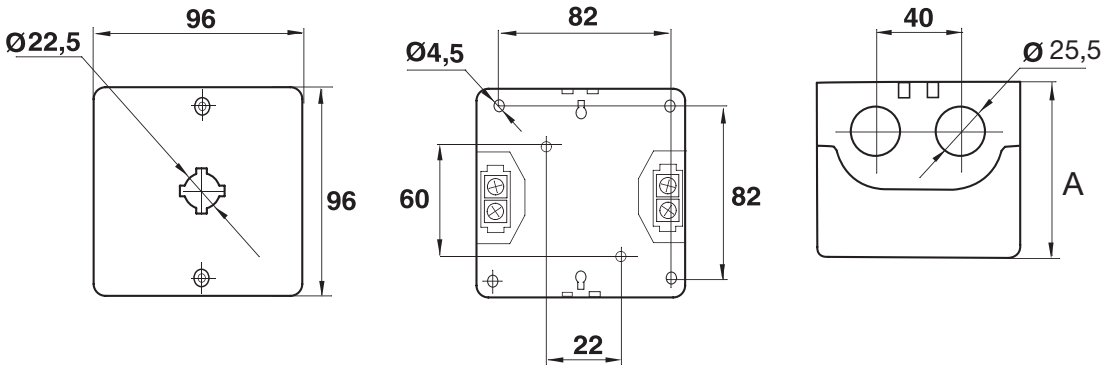
Neutral and earth terminal, 6mm^2, included

Number of contacts	Protection- Class	Size of enclosure	Weight [kg]	Catalog number	List price
ON-OM: 4 contacts, 2 stages, OL: 2 contacts, 1 stage					
	IP 54	96x96x70	0.2	OTC25M25	**$ 45**
	IP 65	96x96x70	0.2	OTC26M25	**49**
ON-OM: 6 contacts, 3 stages, OL: 4 contacts, 2 stages					
	IP54	96x96x84.5	0.2	OTC35M25	**53**
	IP65	96x96x84.5	0.2	OTC36M25	**56**
ON-OM: 10 contacts, 5 stages, OL: 6 contacts, 3 stages					
	IP 54	96x96x108	0.2	OTC45M25	**65**
	IP 65	96x96x108	0.2	OTC46M25	**69**
ON-OM: 6 contacts, 3 stages, wide, OL: 4 contacts, 2 stages					
	IP 65	161x100x80	0.2	OTC36LM25	**67**
	NEMA 4x	161x100x80	0.2	OTC36NPT3/4	**67**

① The height without handle.
Special enclosed cam switches conficurated by CAMWEB tool.

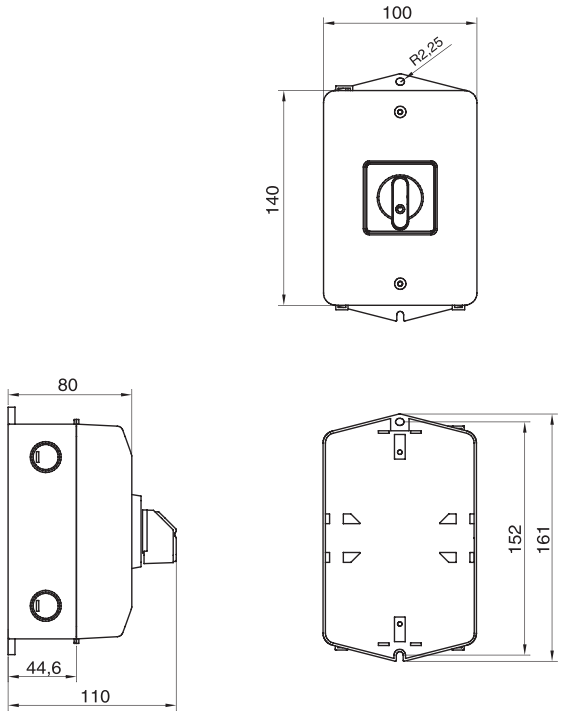
Approximate dimensions
Enclosed cam switches

OTC_



Catalog number	A/mm outside	A/mm inside
OTC2_M25	70	61
OTC3_M25	84.5	75.5
OTC4_M25	108	99

OTC36LM25



Notes

Transformers
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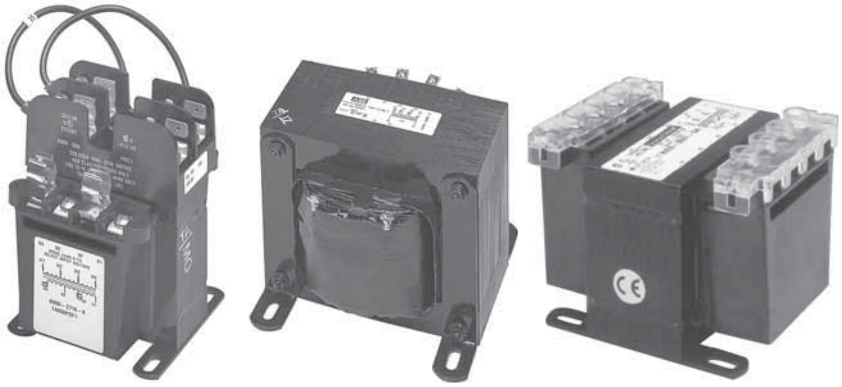
Notes

Transformers



Description

- Epoxy encapsulated coils up through 750VA
- Epoxy resin impregnated coils 1 kVA to 5 kVA
- Provides stepped down voltages for machine tool control devices and industrial control panels
- Laminations of high quality silicon steel
- Minimum core loss
- Optimized performance
- Copper magnet wire providing the highest quality and efficient operation
- Molded-in terminals
- 55° C rise, Class 10 insulation system
- 50/60 Hz
- UL File # E175311
- CSA File #LR27533
- IP 20 Touch safe covers available as an option
- Transformers with CE Mark available

Transformers

General information
Catalog number explanation

T 4 100 PS F1 /C

Industrial control transformer

Primary voltage rating ①
4 - 460V, 230V & 208V
6 - 575V & 600V

VA rating
045 = 45VA 350 = 350VA
050 = 50VA 500 = 500VA
075 = 75VA 750 = 750VA
100 = 100VA 1K = 1000VA
150 = 150VA 1.5K = 1500VA
200 = 200VA 2K = 2000VA
250 = 250VA 3K = 3000VA
300 = 300VA 5K = 5000VA

Option
Add $15 to list price

IP 20 Terminal covers
Meets finger safe or touch safe requirements for IEC specification 529. Available 50VA thru 750VA

Secondary voltage(s) ②
F = 24V
1 = 115V
F1 = 115/24V dual secondary ②

Fuse blocks
P = primary fuse block (2 pole Class CC, less fuses)
S = secondary fuse clip (13/32" x 1 1/2", less fuse)

Example: **T4100PSF1**
- ABB Industrial control transformer
- Primary voltage: 460V, 230V and 208V
- 100 VA rating
- Primary & secondary fuse blocks provided
- Secondary voltage 115/24V
- Optional IP 20 terminal covers

TC 4 100 F1

Industrial control transformer in compliance with CE

Primary voltage rating ①
2 - 240V & 120V
3 - 415V, 400V & 380V
4 - 460V, 230V & 208V
6 - 575V & 600V

VA rating
050 = 50VA
075 = 75VA
100 = 100VA
150 = 150VA
200 = 200VA
250 = 250VA
300 = 300VA
350 = 350VA
500 = 500VA
750 = 750VA

Secondary voltage(s) ②
F = 24V
1 = 115V
2 = 220V
F1 or 21 = dual secondary

Example: **TC4100F1**
- ABB Industrial control CE compliant transformer
- Primary voltage: 460V, 230V and 208V
- 100 VA rating
- Secondary voltage 115/24V

① Consult factory for applications with different voltages.
② Whenever both secondary voltages are to be used at the same time, remove the secondary fuse clip and use a separate mounted 2 pole fuse block.

Regulation

Selecting a transformer for industrial control circuit applications requires knowledge of the following terms:

INRUSH VA is the product of load voltage (V) multiplied by the current (A) that is required during circuit start-up. It is calculated by adding the inrush VA requirements of all devices (contactors, timers, relays, pilot lights, solenoids, etc.), which will be energized together. Inrush VA requirements are best obtained from the component manufacturer.

SEALED VA is the product of load voltage (V) multiplied by the current (A) that is required to operate the circuit after initial start-up or under normal operating conditions. It is calculated by adding the sealed VA requirements of all electrical components of the circuit that will be energized at any given time. Sealed VA requirements are best obtained from the component manufacturer. Sealed VA is also referred to as steady state VA.

PRIMARY VOLTAGE is the voltage available from the electrical distribution system and its operational frequency, which is connected to the transformer supply voltage terminals.

SECONDARY VOLTAGE is the voltage required for load operation which is connected to the transformer load voltage terminals.

Once the circuit variables have been determined, transformer selection is a simple 5-step process as follows:

1. Determine the application inrush VA by using the following industry accepted formula:

$$\text{Application inrush VA} = \sqrt{(\text{INRUSH VA})^2 + (\text{SEALED VA})^2}$$

2. Refer to the Regulation Data chart. If the primary voltage is basically stable and does not vary by more than 5% from nominal, the 90% secondary voltage column should be used. If the primary voltage varies between 5 and 10% of nominal, the 95% secondary voltage column should be used.

3. After determining the proper secondary voltage column, read down until a value equal to or greater than the application inrush VA is found. In no case should a figure less than the Application Inrush VA be used.

4. Read left to the Transformer VA rating column to determine the proper transformer for this application. As a final check, make sure that the Transformer VA rating is equal to or greater than the total sealed requirements. If not, select a transformer with a VA rating equal to or greater than the total sealed VA.

5. Refer to transformer selection pages to determine the proper catalog number based on the transformer VA, and primary and secondary voltage requirements.

Inrush

Industrial control circuits and motor control loads typically require more current when they are initially energized than under normal operating conditions. This period of high current demand, referred to as inrush, may be as great as ten times the current required under steady state (normal) operation conditions and can last up to 40 milliseconds.

A transformer in a circuit subject to inrush will typically attempt to provide the load with the required current during the inrush period. However, it will be at the expense of the secondary voltage stability by allowing the voltage to the load to decrease as the current increases. This period of secondary voltage instability, resulting from increased current, can be of such a magnitude that the transformer is unable to supply sufficient voltage to energize the load.

This transformer must therefore be designed and constructed to accommodate the high inrush current, while maintaining secondary voltage stability. According to NEMA standards, the secondary voltage should typically be at 85% of the rated voltage.

Industrial Control Circuit Transformers by ABB Control Inc. are specifically designed and built to provide adequate voltage to the load while accommodating the high current levels present at inrush. These transformers deliver excellent secondary voltage regulation and meet or exceed the standards established by NEMA, ANSI, UL and CSA. Their hearty construction and excellent electrical characteristics assure reliable operation of electromagnetic devices and trouble-free performance.

Regulation Data Chart

Transformer VA rating	Inrush VA at 20% power factor		
	95% secondary voltage	90% secondary voltage	85% secondary voltage
25	100	130	150
50	170	200	240
75	310	410	540
100	370	540	730
150	780	930	1150
200	810	1150	1450
250	1400	1900	2300
300	1900	2700	3850
350	3100	3650	4800
500	4000	5300	7000
750	8300	11000	14000
1000 ①	15000	21000	27000
1000 ②	9000	13000	18500
1500	10500	15000	205000
2000	17000	25500	34000
3000	24000	36000	47500
5000	55000	92500	115000

To comply with NEMA standards, which require all magnetic devices to operate successfully at 85% of rated voltage, the 90% secondary voltage column is most often used in selecting a transformer.

NOTE
For UL overcurrent protection, see page 12.11

① For units with class 105°C insulation systems.
② For units with class 180°C insulation systems.

General information

IEC-742

The requirements for industrial control circuit transformers to be used in the European Common Market are identified by the International Electrotechnical Commission (IEC) and specified under IEC-742, Non-Short Circuit Proof Isolating Transformers, under the Low Voltage Directive 73/23/EEC. Manufacturers of control transformers indicate compliance with these requirements by placing a CE mark on the product.

In addition to being able to handle the inrush requirements of industrial control circuits and motor loads, transformers built to the requirements of IEC-742 will exhibit several major construction differences from those manufactured in accordance with UL506. These construction differences will typically increase not only the physical size of the transformer when compared to those built only to UL requirements, but the inrush capability as well.

- The winding insulation thickness requirements, depending upon electrical currents, are comparable layer to layer for IEC-742 versus UL506. Winding to winding insulation requirements, however, may be twice that for IEC-742 compared to UL506.

- The electrical clearances between current carrying parts are one-third greater to comply with IEC-742 requirements for units up to 250VA with voltages up to 440 volts ac.

- The dielectric strength (hipot) test voltages are twice as long in duration to comply with IEC-742 compared to UL506 for all units and up to one-and-a-half times greater in magnitude on smaller VA sizes.

- Transformers manufactured to IEC-742 requirements will have a minimum of 10% higher overload capacity than those manufactured only to UL506 requirements.

l IEC-742 requires that transformers in a failure mode under excessive current (10 times the unit rating) must not exhibit flame or molten material. There is no comparable requirement under UL506.

While no requirement exists in IEC-742 for the electrical connections to be either finger safe or touch proof, the specification does state that IF a transformer is supplied with a cover to prevent incidental contact with current carrying parts, that cover must utilize two separate methods or places of securing it to the component, with neither being dependent upon the other. Additionally, one of these methods MUST require a tool to remove it.

IEC-529

The requirements for finger-safe or touch-proof electrical connections are identified by the International Electrotechnical Commission (IEC) under specification 529, Classification of Degrees of Protection Provided by Enclosures. These various degrees of protection are identified and differentiated by IP ratings.

A variety of IP ratings are defined in IEC-529 ranging from IP00, which provides no protection from contact, to IP68, which identifies dust-proof and water-proof protection. Optionally, IP ratings may contain additional and supplementary designators. The IP specification which most closely approximates protection to a human finger is IP20. This IP rating would be the most common degree of touch-proof connection for electrical components such as transformers.

IEC-529 protection requirements would most commonly apply to products which fall under the requirements of the Machinery Directive 89/392/EEC, as opposed to the Low Voltage Directive 73/23/EEC, which covers components such as control transformers. Over time, however, users subject to the requirements of the Machinery Directive and/or IEC-529 have expanded their interpretation of finger-safe or touch-proof electrical connections to include the components of the equipment, such as transformers.

CB Scheme

A CE mark indicates compliance to the applicable requirements of a particular product as outlined by the International Electrotechnical Commission (IEC) and by mutual agreement is recognized throughout the European Union. By itself, however, the CE mark may not necessarily be accepted as evidence of product compliance in countries outside of the European Union. Additionally, even countries within the European Union may require their own country's approval mark in addition to the CE mark. To that end, a system of mutual recognition and reciprocal acceptance has been developed which would allow product acceptance outside of the European Union and the ability to obtain the approval mark of countries within it.

The official title for this mutual acceptance agreement is The Scheme of the IECEE for Recognition of Results of Testing to Standards for Safety of Electrical Equipment (CB Scheme for short). The basis of the CB Scheme is a CB Test Certificate providing evidence that representative samples of a particular product have been tested to a particular IEC standard and successfully passed the required tests.

Each country participating in the CB Scheme, currently over 50, including East and West Europe, the Middle and Far East, and the Pacific Rim, has a representative agency, referred to as a National Certification Body, in the IECEE. Each participant has agreed that they will accept the test results of other members if such results are based on a reasonably harmonized IEC standard. Thus, by utilizing the CB Scheme, a manufacturer of product carrying a CE mark may be able to have that product accepted throughout the world, or obtain additional listing marks, with no further product testing being required.

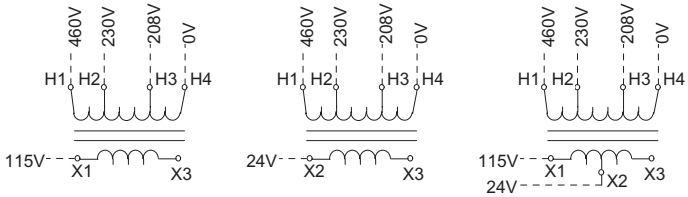
To utilize the CB Scheme, a manufacturer must present the appropriate test reports, along with a CB Test Certificate prepared by the National Certification Body responsible for the original product listing, to the National Certification Body of the country to which the product is being supplied. At such time as the reports are accepted, the product manufacturer may place the certification mark of the country on the product without the need for additional testing.

T4050PSF1

T4750PS1

T41K1

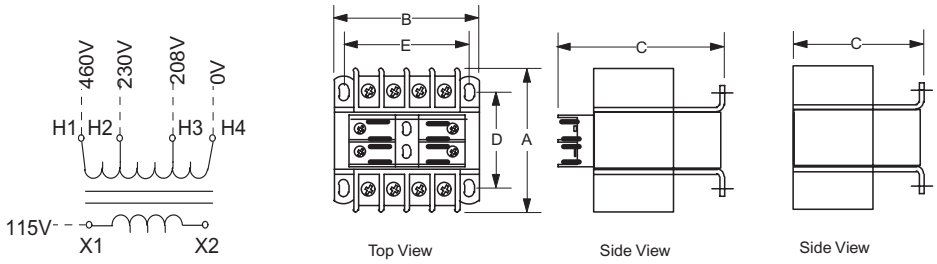
Primary voltage — 460/230/208V, 480/240V, 440/220/200V
Secondary voltage — 115/24V ②, 120/25V, 110/23V



VA rating	Catalog number	List price	Output amps 24/115	Dimensions (inches • *mm*) A	B	C	D	E	mounting slots	Approx. wt. Lbs • kg
45	T4045SF1	**$ 39.00**	1.90 / 0.39	3 1/4 • *83*	3 • *76*	2 9/16 • *65*	2 1/4 • *57*	2 1/2 • *64*	13/64 x 3/8 • *5 x 10*	3.4 • *1.6*
50	T4050PSF1	**45.00**	2.08 / 0.44	3 1/4 • *83*	3 • *76*	3 15/16 • *100*	2 1/4 • *57*	2 1/2 • *64*	13/64 x 3/8 • *5 x 10*	3.4 • *1.6*
75	T4075PSF1	**50.00**	3.13 / 0.65	3 1/2 • *89*	3 3/8 • *86*	3 15/16 • *100*	2 1/2 • *64*	2 13/16 • *71*	13/64 x 3/8 • *5 x 10*	4.8 • *2.2*
100	T4100PSF1	**55.00**	4.17 / 0.87	3 5/8 • *92*	3 3/4 • *95*	4 1/4 • *108*	2 1/2 • *64*	3 1/8 • *79*	13/64 x 3/8 • *5 x 10*	5.9 • *2.7*
150	T4150PSF1	**59.00**	6.25 / 1.30	4 3/8 • *111*	3 3/4 • *95*	4 9/16 • *116*	3 1/4 • *83*	3 1/8 • *79*	13/64 x 3/8 • *5 x 10*	7.9 • *3.6*
200	T4200PSF1	**70.00**	8.33 / 1.74	4 1/2 • *114*	4 1/2 • *114*	5 3/16 • *132*	3 • *76*	3 3/4 • *95*	13/64 x 3/8 • *5 x 10*	10.6 • *4.8*
250	T4250PSF1	**78.00**	10.42 / 2.17	5 1/4 • *133*	4 1/2 • *114*	5 3/16 • *132*	3 3/4 • *95*	3 3/4 • *95*	13/64 x 3/8 • *5 x 10*	13.9 • *6.3*
300	T4300PSF1	**85.00**	12.50 / 2.61	5 1/8 • *130*	5 1/4 • *133*	6 1/8 • *156*	3 7/8 • *98*	4 3/8 • *111*	5/16 x 11/16 • *8 x 17*	15.5. • *7.1*
350	T4350PSF1	**92.00**	14.58 / 3.04	5 3/8 • *137*	5 1/4 • *133*	6 1/8 • *156*	4 1/8 • *105*	4 3/8 • *111*	5/16 x 11/16 • *8 x 17*	16.8 • *7.6*
500	T4500PSF1	**123.00**	20.84 / 4.35	6 7/8 • *175*	5 1/4 • *133*	6 1/8 • *156*	5 1/4 • *133*	4 3/8 • *111*	5/16 x 11/16 • *8 x 17*	23.4 • *10.6*

NOTE: Primary & secondary fuse block provided as standard (except for the 45VA unit where only the secondary fuse clip is provided.

Primary voltage — 460/230/208V, 480/240V, 440/220/200V
Secondary voltage — 115V, 120V, 110V



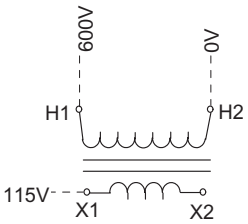
VA rating	Catalog number	List price	Output amps	Dimensions (inches • *mm*) A	B	C	D	E	mounting slots	Approx. wt. Lbs • kg
750①	T4750PS1	**$ 145.00**	6.52	7 3/8 • *187*	5 1/4 • *133*	6 1/8 • *156*	5 3/4 • *146*	4 3/8 • *111*	5/16 x 11/16 • *8 x 17*	30.0 • *13.6*
1000	T41K1	**160.00**	8.70	7 1/8 • *181*	6 3/8 • *162*	5 3/8 • *137*	4 1/2 • *114*	5 5/16 • *135*	5/16 x 11/16 • *8 x 17*	29.2 • *13.3*
1500	T41.5K1	**230.00**	13.04	7 1/2 • *191*	6 3/4 • *171*	5 11/16 • *144*	4 7/16 • *113*	6 1/16 • *154*	9/32 x 9/16 • *7 x 14*	33.5 • *15.2*
2000	T42K1	**280.00**	17.39	8 1/4 • *210*	6 3/4 • *171*	5 11/16 • *144*	5 1/4 • *133*	6 1/16 • *154*	9/32 x 9/16 • *7 x 14*	42.5 • *19.3*
3000	T43K1	**395.00**	26.09	8 9/16 • *217*	9 • *229*	7 1/2 • *191*	5 3/4 • *147*	7 1/2 • *191*	7/16 x 3/4 • *11 x 19*	77.0 • *35.0*
5000	T45K1	**660.00**	43.48	10 1/2 • *267*	9 • *229*	10 3/16 • *259*	6 1/2 • *165*	6 1/2 • *165*	7/16 x 3/4 • *11 x 19*	102 • *46.4*

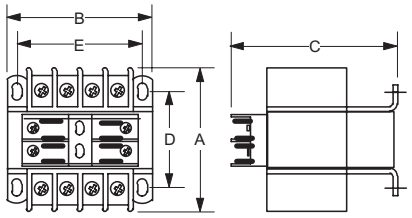
① Primary & secondary fuse block provided as standard (750VA unit, only).
② Whenever both secondary voltages are to be used at the same time, remove the secondary fuse clip and use a separate mounted 2 pole fuse block.

Transformers

T6045S1

Primary voltage — 600/575/550V
Secondary voltage — 120/115/110V





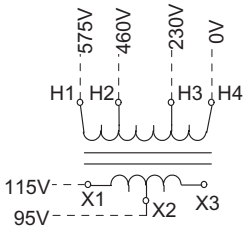
Top View Side View

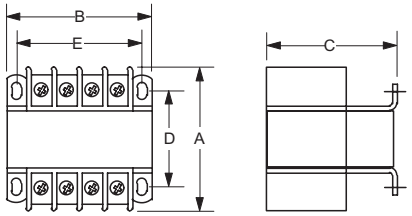
VA rating	Catalog number	List price	Output amps	Dimensions (inches • *mm*) A	B	C	D	E	mounting slots	Approx. wt. Lbs • kg
45	T6045S1	**$ 41.00**	0.43	3 • *76*	3 • *76*	2 9/16 • *65*	2 • *51*	2 1/2 • *64*	13/64 x 3/8 • *5 x 10*	2.7 • *1.2*
50	T6050PS1	**47.00**	0.43	3 • *76*	3 • *76*	3 15/16 • *100*	2 • *51*	2 1/2 • *64*	13/64 x 3/8 • *5 x 10*	2.7 • *1.2*
75	T6075PS1	**52.00**	0.65	3 1/2 • *89*	3 • *76*	3 15/16 • *100*	2 1/2 • *64*	2 1/2 • *64*	13/64 x 3/8 • *5 x 10*	3.6 • *1.6*
100	T6100PS1	**58.00**	0.87	3 3/8 • *86*	3 3/8 • *86*	4 1/4 • *108*	2 3/8 • *60*	2 13/16 • *71*	13/64 x 3/8 • *5 x 10*	4.2 • *1.9*
150	T6150PS1	**73.00**	1.30	4 • *102*	3 3/4 • *95*	4 9/16 • *116*	2 7/8 • *73*	3 1/8 • *79*	13/64 x 3/8 • *5 x 10*	6.8 • *3.1*
200	T6200PS1	**87.00**	1.74	4 • *102*	4 1/2 • *114*	5 3/16 • *132*	2 1/2 • *64*	3 3/4 • *95*	13/64 x 3/8 • *5 x 10*	8.4 • *3.8*
250	T6250PS1	**92.00**	2.17	4 3/8 • *111*	4 1/2 • *114*	5 3/16 • *132*	2 7/8 • *73*	3 3/4 • *95*	13/64 x 3/8 • *5 x 10*	10.0 • *4.6*
300	T6300PS1	**102.00**	2.61	4 3/4 • *121*	4 1/2 • *114*	5 3/16 • *132*	3 1/4 • *83*	3 3/4 • *95*	13/64 x 3/8 • *5 x 10*	11.3 • *5.1*
350	T6350PS1	**106.00**	3.04	5 1/4 • *133*	4 1/2 • *114*	5 3/16 • *132*	3 3/4 • *95*	3 3/4 • *95*	13/64 x 3/8 • *5 x 10*	13.6 • *6.2*
500	T6500PS1	**132.00**	4.35	5 3/8 • *137*	5 1/4 • *133*	6 1/8 • *156*	4 1/8 • *105*	4 3/8 • *111*	5/16 x 11/16 • *8 x 17*	16.8 • *7.6*
750	T6750PS1	**175.00**	6.52	7 • *178*	5 1/4 • *133*	6 1/8 • *156*	5 3/4 • *146*	4 3/8 • *111*	5/16 x 11/16 • *8 x 17*	25.7 • *11.7*

NOTE: Primary & secondary fuse block provided as standard (except for the 45VA unit where only the secondary fuse clip is provided.

T61K1

Primary voltage — 575/460/230V
Secondary voltage — 115 - 95V





Top View Side View

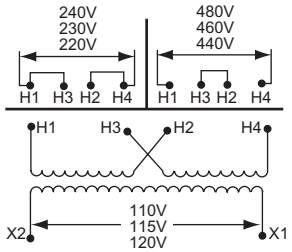
VA rating	Catalog number	List price	Output amps	Dimensions (inches • *mm*) A	B	C	D	E	mounting slots	Approx. wt. Lbs • kg
1000	T61K1	**$ 220.00**	8.70	7 1/8 • *184*	6 3/8 • *162*	5 3/8 • *137*	4 1/2 • *114*	5 5/16 • *135*	5/16 x 11/16 • *8 x 17*	29.2 • *13.3*
1500	T61.5K1	**258.00**	13.04	8 1/4 • *210*	6 3/4 • *171*	5 11/16 • *144*	5 1/4 • *133*	6 1/16 • *154*	9/32 x 9/16 • *7 x 14*	33.5 • *15.2*
2000	T62K1	**319.00**	17.39	7 9/16 • *192*	9 • *229*	7 9/16 • *192*	4 3/16 • *106*	6 1/2 • *165*	7/16 x 3/4 • *11 x 19*	42.5 • *19.3*
3000	T63K1	**622.00**	26.09	8 5/8 • *219*	9 • *229*	7 9/16 • *192*	5 1/4 • *133*	6 1/2 • *165*	7/16 x 3/4 • *11 x 19*	63.7 • *29.0*
5000	T65K1	**1222.00**	43.48	13 1/2 • *343*	9 • *229*	10 3/16 • *259*	8 1/4 • *210*	6 1/2 • *165*	7/16 x 3/4 • *11 x 19*	102 • *46.4*

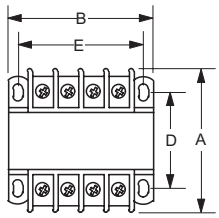
NOTE: No integral fusing capability.

Transformers with CE Mark

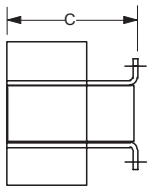
TC40501

Primary voltage - 240/480V, 230/460V, 220/440V
Secondary voltage - 120V, 115V, 110V





Top View



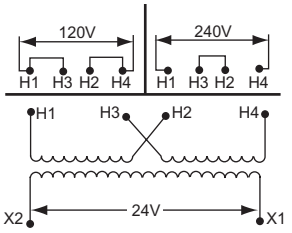
Side View

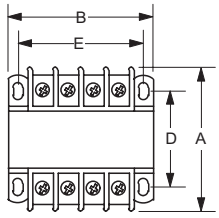
VA rating	Catalog number	List price	Output amps	Dimensions (inches • *mm*) A	B	C	D	E	Mounting slots	Approx. wt. Lbs • kg
50	TC40501	**$ 55**	0.43	$3_{3/8}$ • *86*	3 • *76*	3 • *76*	$2_{1/2}$ • *64*	$2_{1/2}$ • *64*	$_{.203}$X$_{.460}$ • *5.1x11.7*	3.5 • *1.6*
75	TC40751	**62**	0.65	$3_{1/2}$ • *89*	$3_{3/8}$ • *86*	$3_{1/4}$ • *83*	$2_{1/2}$ • *64*	$2_{13/16}$ • *71*	$_{.203}$X$_{.460}$ • *5.1x11.7*	4.8 • *2.2*
100	TC41001	**72**	0.87	$3_{5/8}$ • *92*	$3_{3/4}$ • *95*	$3_{1/2}$ • *89*	$2_{1/2}$ • *64*	$3_{1/8}$ • *79*	$_{.203}$X$_{.460}$ • *5.1x11.7*	5.9 • *2.7*
150	TC41501	**88**	1.30	4 • *102*	$4_{1/2}$ • *114*	4 • *102*	$2_{1/2}$ • *64*	$3_{3/4}$ • *95*	$_{.203}$X$_{.460}$ • *5.1x11.7*	8.5 • *3.9*
200	TC42001	**101**	1.74	$4_{1/2}$ • *114*	$4_{1/2}$ • *114*	4 • *102*	$3_{3/16}$ • *81*	$3_{3/4}$ • *95*	$_{.203}$X$_{.460}$ • *5.1x11.7*	10.6 • *4.8*
250	TC42501	**120**	2.17	$4_{3/4}$ • *121*	$4_{1/2}$ • *114*	4 • *102*	$3_{3/16}$ • *81*	$3_{3/4}$ • *95*	$_{.203}$X$_{.460}$ • *5.1x11.7*	11.3 • *5.1*
300	TC43001	**130**	2.61	$5_{1/4}$ • *133*	$4_{1/2}$ • *114*	4 • *102*	$3_{3/4}$ • *95*	$3_{3/4}$ • *95*	$_{.203}$X$_{.460}$ • *5.1x11.7*	13.2 • *6.0*
350	TC43501	**154**	3.04	5 • *127*	$5_{1/4}$ • *133*	$4_{1/2}$ • *114*	$3_{3/4}$ • *95*	$4_{3/8}$ • *111*	$_{.312}$X$_{.687}$ • *8x17.5*	14.9 • *6.8*
500	TC45001	**168**	4.35	6 • *152*	$5_{1/4}$ • *133*	$4_{1/2}$ • *114*	4 • *102*	$4_{3/8}$ • *111*	$_{.312}$X$_{.687}$ • *8x17.5*	21.0 • *9.5*
750	TC47501	**242**	6.52	$7_{3/8}$ • *187*	$5_{1/4}$ • *133*	$4_{1/2}$ • *114*	$5_{3/4}$ • *146*	$4_{3/8}$ • *111*	$_{.312}$X$_{.687}$ • *8x17.5*	29.8 • *13.6*

Note: No integral fusing capability. Supplied with touch-safe terminal covers installed.

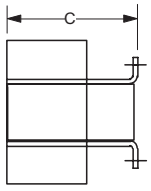
TC2050F

Primary voltage - 120/240V
Secondary voltage - 24V





Top View



Side View

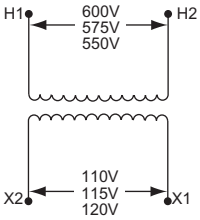
VA rating	Catalog number	List price	Output amps	Dimensions (inches • *mm*) A	B	C	D	E	Mounting slots	Approx. wt. Lbs • kg
50	TC2050F	**$ 57**	2.08	$3_{1/4}$ • *83*	3 • *76*	3 • *76*	$2_{1/4}$ • *57*	$2_{1/2}$ • *64*	$_{.203}$X$_{.460}$ • *5.1x11.7*	3.4 • *1.6*
75	TC2075F	**64**	3.13	$3_{1/4}$ • *83*	$3_{3/8}$ • *86*	$3_{1/4}$ • *83*	$2_{1/4}$ • *57*	$2_{13/16}$ • *71*	$_{.203}$X$_{.460}$ • *5.1x11.7*	4.2 • *1.9*
100	TC2100F	**76**	4.17	$3_{5/8}$ • *92*	$3_{3/4}$ • *95*	$3_{1/2}$ • *89*	$2_{1/2}$ • *64*	$3_{1/8}$ • *79*	$_{.203}$X$_{.460}$ • *5.1x11.7*	5.9 • *2.7*
150	TC2150F	**101**	6.25	4 • *102*	$4_{1/2}$ • *114*	4 • *102*	$2_{1/2}$ • *64*	$3_{3/4}$ • *95*	$_{.203}$X$_{.460}$ • *5.1x11.7*	8.5 • *3.9*
200	TC2200F	**114**	8.33	$4_{3/8}$ • *111*	$4_{1/2}$ • *114*	4 • *102*	$2_{13/16}$ • *71*	$3_{3/4}$ • *95*	$_{.203}$X$_{.460}$ • *5.1x11.7*	10.0 • *4.6*
250	TC2250F	**125**	10.42	$4_{3/4}$ • *121*	$4_{1/2}$ • *114*	4 • *102*	$3_{3/16}$ • *81*	$3_{3/4}$ • *95*	$_{.203}$X$_{.460}$ • *5.1x11.7*	11.3 • *5.1*
300	TC2300F	**139**	12.50	$5_{1/8}$ • *130*	$4_{1/2}$ • *114*	4 • *102*	$3_{3/4}$ • *95*	$3_{3/4}$ • *95*	$_{.203}$X$_{.460}$ • *5.1x11.7*	13.2 • *6.0*
350	TC2350F	**161**	14.58	5 • *127*	$5_{1/4}$ • *133*	$4_{1/2}$ • *114*	$3_{3/4}$ • *95*	$4_{3/8}$ • *111*	$_{.312}$X$_{.687}$ • *8x17.5*	14.9 • *6.8*
500	TC2500F	**179**	20.83	$5_{1/2}$ • *140*	$5_{1/4}$ • *133*	$4_{1/2}$ • *114*	$4_{1/4}$ • *108*	$4_{3/8}$ • *111*	$_{.312}$X$_{.687}$ • *8x17.5*	19.2 • *8.7*
750	TC2750F	**267**	31.25	$7_{3/8}$ • *187*	$5_{1/4}$ • *133*	$4_{1/2}$ • *114*	$5_{3/4}$ • *146*	$4_{3/8}$ • *111*	$_{.312}$X$_{.687}$ • *8x17.5*	29.8 • *13.6*

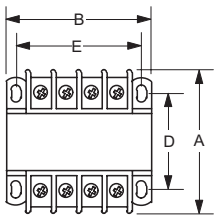
Note: No integral fusing capability. Supplied with touch-safe terminal covers installed.

Transformers with CE Mark

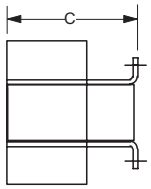
Primary voltage - 550/575/ 600V
Secondary voltage - 110/115/120V

TC60501





Top View



Side View

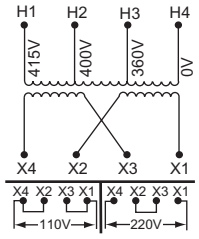
VA rating	Catalog number	List price	Output amps	Dimensions (inches • *mm*) A	B	C	D	E	Mounting slots	Approx. wt. Lbs • kg
50	TC60501	**$ 56**	0.43	$3_{3/8}$ • *86*	3 • *76*	3 • *76*	$2_{1/2}$ • *64*	$2_{1/2}$ • *64*	$_{.203}X_{.460}$ • *5.1x11.7*	3.5 • *1.6*
75	TC60751	**63**	0.65	$3_{1/2}$ • *89*	$3_{3/8}$ • *86*	$3_{1/4}$ • *83*	$2_{1/2}$ • *64*	$2_{13/16}$ • *71*	$_{.203}X_{.460}$ • *5.1x11.7*	4.8 • *2.2*
100	TC61001	**76**	0.87	$3_{5/8}$ • *92*	$3_{3/4}$ • *95*	$3_{1/2}$ • *89*	$2_{1/2}$ • *64*	$3_{1/8}$ • *79*	$_{.203}X_{.460}$ • *5.1x11.7*	5.9 • *2.7*
150	TC61501	**100**	1.30	4 • *102*	$4_{1/2}$ • *114*	4 • *102*	$2_{1/2}$ • *64*	$3_{3/4}$ • *95*	$_{.203}X_{.460}$ • *5.1x11.7*	8.5 • *3.9*
200	TC62001	**113**	1.74	$4_{1/2}$ • *114*	$4_{1/2}$ • *114*	4 • *102*	$3_{3/16}$ • *81*	$3_{3/4}$ • *95*	$_{.203}X_{.460}$ • *5.1x11.7*	10.6 • *4.8*
250	TC62501	**124**	2.17	$4_{3/4}$ • *121*	$4_{1/2}$ • *114*	4 • *102*	$3_{3/16}$ • *81*	$3_{3/4}$ • *95*	$_{.203}X_{.460}$ • *5.1x11.7*	11.3 • *5.1*
300	TC63001	**137**	2.61	$5_{1/4}$ • *133*	$4_{1/2}$ • *114*	4 • *102*	$3_{3/4}$ • *95*	$3_{3/4}$ • *95*	$_{.203}X_{.460}$ • *5.1x11.7*	13.2 • *6.0*
350	TC63501	**160**	3.04	5 • *127*	$5_{1/4}$ • *133*	$4_{1/2}$ • *114*	$3_{3/4}$ • *95*	$4_{3/8}$ • *111*	$_{.312}X_{.687}$ • *8x17.5*	14.9 • *6.8*
500	TC65001	**178**	4.35	6 • *152*	$5_{1/4}$ • *133*	$4_{1/2}$ • *114*	$4_{3/4}$ • *121*	$4_{3/8}$ • *111*	$_{.312}X_{.687}$ • *8x17.5*	21.0 • *9.5*
750	TC67501	**264**	6.52	$7_{3/8}$ • *187*	$5_{1/4}$ • *133*	$4_{1/2}$ • *114*	$5_{3/4}$ • *146*	$4_{3/8}$ • *111*	$_{.312}X_{.687}$ • *8x17.5*	29.8 •*13.6*

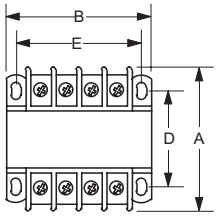
Note: No integral fusing capability. Supplied with touch-safe terminal covers installed.

12

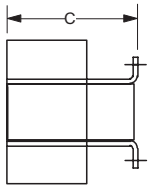
Primary voltage - 380/400/415V
Secondary voltage - 110/220V

TC305021





Top View



Side View

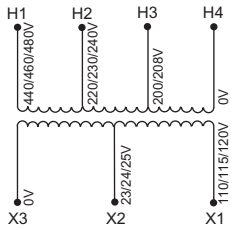
VA rating	Catalog number	List price	Output amps	Dimensions (inches • *mm*) A	B	C	D	E	Mounting slots	Approx. wt. Lbs • kg
50	TC305021	**$ 81**	.46/.23	$3_{1/2}$ • *89*	3 • *76*	3 • *76*	$2_{1/2}$ • *64*	$2_{1/2}$ • *64*	$_{.203}X_{.460}$ • *5.1x11.7*	3.5 • *1.6*
75	TC307521	**83**	.68/.34	$3_{1/2}$ • *89*	$3_{3/8}$ • *86*	$3_{1/4}$ • *83*	$2_{1/2}$ • *64*	$2_{13/16}$ • *71*	$_{.203}X_{.460}$ • *5.1x11.7*	4.8 • *2.2*
100	TC310021	**94**	.91/.46	$3_{5/8}$ • *92*	$3_{3/4}$ • *95*	$3_{1/2}$ • *89*	$2_{1/2}$ • *64*	$3_{1/8}$ • *79*	$_{.203}X_{.460}$ • *5.1x11.7*	5.9 • *2.7*
150	TC315021	**120**	1.37/.69	4 • *102*	$4_{1/2}$ • *114*	4 • *102*	$2_{1/2}$ • *64*	$3_{3/4}$ • *95*	$_{.203}X_{.460}$ • *5.1x11.7*	8.5 • *3.9*
200	TC320021	**133**	1.82/.91	$4_{1/2}$ • *114*	$4_{1/2}$ • *114*	4 • *102*	$3_{3/16}$ • *81*	$3_{3/4}$ • *95*	$_{.203}X_{.460}$ • *5.1x11.7*	10.6 • *4.8*
250	TC325021	**154**	2.28/1.14	$4_{3/4}$ • *121*	$4_{1/2}$ • *114*	4 • *102*	$3_{3/16}$ • *81*	$3_{3/4}$ • *95*	$_{.203}X_{.460}$ • *5.1x11.7*	11.3 • *5.1*
300	TC330021	**178**	2.72/1.36	$5_{1/4}$ • *133*	$4_{1/2}$ • *114*	4 • *102*	$3_{3/4}$ • *95*	$3_{3/4}$ • *95*	$_{.203}X_{.460}$ • *5.1x11.7*	13.2 • *6.0*
350	TC335021	**193**	3.18/1.59	$5_{1/2}$ • *140*	$4_{1/2}$ • *114*	4 • *102*	$4_{1/16}$ • *103*	$3_{3/4}$ • *95*	$_{.203}X_{.460}$ • *5.1x11.7*	15.2 • *6.9*
500	TC350021	**210**	4.55/2.27	6 • *152*	$5_{1/4}$ • *133*	$4_{1/2}$ • *114*	$4_{3/4}$ • *121*	$4_{3/8}$ • *111*	$_{.312}X_{.687}$ • *8x17.5*	21.0 • *9.5*
750	TC375021	**260**	6.82/3.41	$7_{3/8}$ • *187*	$5_{1/4}$ • *133*	$4_{1/2}$ • *114*	$5_{3/4}$ • *146*	$4_{3/8}$ • *111*	$_{.312}X_{.687}$ • *8x17.5*	29.8 •*13.6*

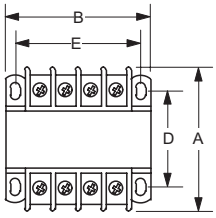
Note: No integral fusing capability. Supplied with touch-safe terminal covers installed.

Transformers with CE Mark

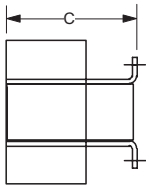
TC4050F1

Primary voltage - 200/220/440V, 208/230/460V, 240/480V
Secondary voltage - 23/110V, 24/115V, 25/120V





Top View



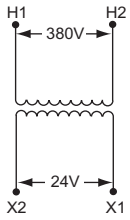
Side View

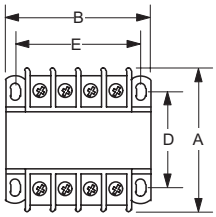
VA rating	Catalog number	List price	Output amps	Dimensions (inches • *mm*) A	B	C	D	E	Mounting slots	Approx. wt. Lbs • kg
50	TC4050F1	**$ 62**	2.08/.44	$3_{1/4}$ • *83*	$3_{3/8}$ • *86*	$3_{1/4}$ • *83*	$2_{1/4}$ • *57*	$2_{13/16}$ • *71*	$_{.203}$X$_{.460}$ • *5.1x11.7*	4.2 • *1.6*
75	TC4075F1	**70**	3.13/.65	$3_{5/8}$ • *92*	$3_{3/4}$ • *95*	$3_{1/2}$ • *89*	$2_{1/2}$ • *64*	$3_{1/8}$ • *79*	$_{.203}$X$_{.460}$ • *5.1x11.7*	5.9 • *2.7*
100	TC4100F1	**91**	4.17/.87	$4_{3/8}$ • *111*	$3_{3/4}$ • *95*	$3_{1/2}$ • *89*	$3_{3/16}$ • *81*	$3_{1/8}$ • *79*	$_{.203}$X$_{.460}$ • *5.1x11.7*	7.9 • *3.6*
150	TC4150F1	**109**	6.25/1.3	$4_{3/8}$ • *111*	$4_{1/2}$ • *114*	4 • *102*	$2_{13/16}$ • *71*	$3_{3/4}$ • *95*	$_{.203}$X$_{.460}$ • *5.1x11.7*	10.0 • *4.6*
200	TC4200F1	**127**	8.33/1.74	5 • *127*	$4_{1/2}$ • *114*	4 • *102*	$3_{7/16}$ • *87*	$3_{3/4}$ • *95*	$_{.203}$X$_{.460}$ • *5.1x11.7*	12.8 • *5.8*
250	TC4250F1	**146**	10.42/2.17	$5_{1/2}$ • *140*	$4_{1/2}$ • *114*	4 • *102*	$4_{1/16}$ • *103*	$3_{3/4}$ • *95*	$_{.203}$X$_{.460}$ • *5.1x11.7*	15.2 • *6.9*
300	TC4300F1	**172**	12.5/2.61	$5_{3/8}$ • *137*	$5_{1/4}$ • *133*	$4_{1/2}$ • *114*	$4_{1/8}$ • *105*	$4_{3/8}$ • *111*	$_{.312}$X$_{.687}$ • *8x17.5*	16.8 • *7.6*
350	TC4350F1	**178**	14.58/3.04	$5_{1/2}$ • *140*	$5_{1/4}$ • *133*	$4_{1/2}$ • *114*	$4_{1/4}$ • *108*	$4_{3/8}$ • *111*	$_{.312}$X$_{.687}$ • *8x17.5*	19.2 • *8.7*
500	TC4500F1	**204**	20.84/4.35	$7_{1/4}$ • *184*	$5_{1/4}$ • *133*	$4_{1/2}$ • *114*	6 • *153*	$4_{3/8}$ • *111*	$_{.312}$X$_{.687}$ • *8x17.5*	27.0 • *12.3*

Note: No integral fusing capability. Supplied with touch-safe terminal covers installed.

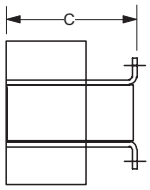
TC3050F

Primary voltage - 380V
Secondary voltage - 24V





Top View



Side View

VA rating	Catalog number	List price	Output amps	Dimensions (inches • *mm*) A	B	C	D	E	Mounting slots	Approx. wt. Lbs • kg
50	TC3050F	**$ 57**	2.08	$3_{1/4}$ • *83*	3 • *76*	3 • *76*	$2_{1/4}$ • *57*	$2_{1/2}$ • *64*	$_{.203}$X$_{.460}$ • *5.1x11.7*	3.5 • *1.6*
75	TC3075F	**64**	3.13	$3_{1/4}$ • *83*	$3_{3/8}$ • *86*	$3_{1/4}$ • *83*	$2_{1/4}$ • *57*	$2_{13/16}$ • *71*	$_{.203}$X$_{.460}$ • *5.1x11.7*	4.2 • *1.9*
100	TC3100F	**76**	4.17	$3_{5/8}$ • *92*	$3_{3/4}$ • *95*	$3_{1/2}$ • *89*	$2_{1/2}$ • *64*	$3_{1/8}$ • *79*	$_{.203}$X$_{.460}$ • *5.1x11.7*	5.9 • *2.7*
150	TC3150F	**101**	6.25	$4_{1/8}$ • *105*	$3_{3/4}$ • *95*	$3_{1/2}$ • *89*	3 • *76*	$3_{1/8}$ • *79*	$_{.203}$X$_{.460}$ • *5.1x11.7*	7.3 • *3.3*
200	TC3200F	**114**	8.33	$4_{1/4}$ • *108*	$4_{1/2}$ • *114*	4 • *102*	$2_{13/16}$ • *71*	$3_{3/4}$ • *95*	$_{.203}$X$_{.460}$ • *5.1x11.7*	9.6 • *4.4*
250	TC3250F	**125**	10.42	$4_{3/4}$ • *121*	$4_{1/2}$ • *114*	4 • *102*	$3_{3/16}$ • *81*	$3_{3/4}$ • *95*	$_{.203}$X$_{.460}$ • *5.1x11.7*	11.3 • *5.1*
300	TC3300F	**139**	12.50	$5_{1/4}$ • *130*	$4_{1/2}$ • *114*	4 • *102*	$3_{3/4}$ • *95*	$3_{3/4}$ • *95*	$_{.203}$X$_{.460}$ • *5.1x11.7*	13.2 • *6.0*
350	TC3350F	**161**	14.58	5 • *127*	$5_{1/4}$ • *133*	$4_{1/2}$ • *114*	$3_{3/4}$ • *95*	$4_{3/8}$ • *111*	$_{.312}$X$_{.687}$ • *8x17.5*	14.9 • *6.8*
500	TC3500F	**179**	20.83	$5_{1/2}$ • *140*	$5_{1/4}$ • *133*	$4_{1/2}$ • *114*	$4_{1/4}$ • *108*	$4_{3/8}$ • *111*	$_{.312}$X$_{.687}$ • *8x17.5*	19.2 • *8.7*
750	TC3750F	**267**	31.25	$7_{3/8}$ • *187*	$5_{1/4}$ • *133*	$4_{1/2}$ • *114*	$5_{3/4}$ • *146*	$4_{3/8}$ • *111*	$_{.312}$X$_{.687}$ • *8x17.5*	29.8 • *13.6*

Note: No integral fusing capability. Supplied with touch-safe terminal covers installed.

Technical data
Transformer terminology and FAQs

What is a transformer?
A transformer is a passive electrical device which is designed to change one voltage to another by magnetic induction.

What is an isolation transformer?
An isolation transformer, also referred to as an insulating transformer, is one where the primary and secondary windings are separate, as opposed to an autotransformer where the primary and secondary share a common winding.

What is a control transformer?
A control transformer is an isolation transformer designed to provide a high degree of secondary voltage stability (regulation) during a short period overload condition typically referred to as inrush. Control transformers are also referred to as Industrial Control Transformers, Machine Tool Transformers or Control Power Transformers (CPTs).

Can a control transformer be reversed connected?
A control transformer can be reverse connected. However, the output voltage will be less than nameplate due to the compensation factor of the windings.

Can a single phase transformer be used with a three phase source?
A single phase transformer can be used with a three phase source by connecting the primary leads to any two wires of the three phase system. The transformer output will be single phase.

Can a transformer be used at higher frequencies?
A transformer designed for 50/60HZ operation can be utilized at frequencies up to 400 HZ. However, at 400 HZ, the inrush capability will be reduced.

What is regulation?
Regulation is the change in output voltage when the load is reduced from rated value (full load) to zero (no load) with input voltage remaining constant.

Can transformers be used at ambients other than 40°C?
Transformers may be used at ambients less than 40°C at full nameplate capacity. For ambients above 40°C, they must be derated as follows:

Max. ambient temperature	Max. percent of load	
	180°C Units	105°C Units
40°C	100%	100%
50°C	90%	78%
60°C	79%	50%

What is the effect of altitude on a transformer?
A transformer may be used at full nameplate capacity up to 3300 feet (1000 meters). Above that altitude, the capacity of the transformer should be derated by 0.3% for each 300 feet of elevation above 3300 feet.

What is the effect of load on a control transformer?
A control transformer is designed to provide rated output voltage at full VA. As the load decreases, the output voltage will go up. Conversely, increases in load will result in lower output voltages. Typically, the smaller the VA size of the unit, the greater difference there is between no-load and full-load voltage.

What is temperature class?
Temperature class is the rating of the transformer insulation system. It is determined by adding the ambient temperature, temperature rise and hottest spot temperature. The standard insulation system classification per UL506, are as follows:

Ambient temperature	Average winding temperature rise*	Hot spot temperature	Temperature class
40°c	55°C	10°C	105°C
40°c	80°C	10°C	130°C
40°c	100°C	15°C	155°C
40°c	120°C	20°C	180°C

*Measured by change-in-resistance method

What is temperature rise?
Temperature rise is the difference between the average temperature of the transformer windings and the ambient temperature.

What is hot spot?
The hot spot is an allowance selected to approximate the difference between the highest temperature inside the transformer coil and the average temperature of the transformer coil.

Is one insulation system better than another?
One insulation system is not necessarily better than another. Each will typically provide a comparable life expectancy. The choice of an insulation system depends upon application, performance and cost considerations.

Why is a control transformer needed?
A control transformer is required to supply voltage to a load which requires significantly more current when initially energized than under normal steady state operating conditions. A control transformer is designed to provide secondary voltage stability under a short period of specific overload referred to as inrush.

Are control transformers current limiting?
A control transformer is not current limiting and will allow as much current to pass through as is demanded by the load. As such, a secondary overcurrent device should be utilized.

Will a control transformer regulate output voltage?
Control transformers are not voltage regulating. Because voltage changes are a function of the transformer's turns ratio, variations in input voltage will be proportionally reflected to the output.

What is duty cycle?
Duty cycle is the period and duration when a transformer will be loaded. The transformer is designed to run continuously at full load without exceeding the temperature limits. Transformers may also be operated for short time duty. Depending upon the time and cycle of the maximum load, the transformer VA size may be smaller than for continuous duty.

What is the value of encapsulation in control transformers?
Encapsulating the coils of a control transformer will help to protect the unit from moisture, dust, dirt and industrial contaminants. Encapsulation helps provide maximum protection in hostile environments while allowing the unit to run cooler than a non-encapsulated unit.

What effect does a control transformer have on electrical disturbances found on the line?
Because a control transformer has isolated primary and secondary windings, it will provide some degree of "clean-up" with regard to electrical noise, spikes, surges and transients. It will not, however, provide the same degree of power conditioning found in products designed for that purpose.

Technical data
UL Overcurrent protection
Primary & secondary

Overcurrent protection on both the primary and secondary sides of transformers are specified in UL508 and the National Electrical Code. The maximum acceptable ratings are shown below. Due to the high inrush currents present when a transformer is initially energized, it is recommended that the primary fuse be time delay, to prevent nuisance trips during startup.

Maximum acceptable rating of primary overcurrent protection

Primary voltage	VA Rating 25	50	75	100	150	200	250	300	350	500	750
115	6/10 (1)	1-1/4 (2)	1-8/10 (3-2/10)	2-1/2 (4)	3-1/2 (6-1/4)	5 (8)	5	6-1/4	7-1/2	10	15
120	6/10 (1)	1-1/4 (2)	1-8/10 (3)	2-1/4 (4)	3-1/2 (6-1/4)	5 (8)	5	6-1/4	7	10	15
200	3/10 (6/10)	3/4 (1-1/4)	1-1/8 (1-8/10)	1-1/2 (2-1/2)	2-1/4 (3-1/2)	3 (5)	3-1/2 (6-1/4)	4-1/2 (7-1/2)	5 (8)	6-1/4	9
208	3/10 (6/10)	6/10 (1-1/8)	1 (1-8/10)	1-4/10 (2-1/4)	2 (3-1/2)	2-8/10 (4-1/2)	3-1/2 (6)	4 (7)	5 (8)	6	9
220	3/10 (1/2)	6/10 (1-1/8)	1 (1-6/10)	1-1/4 (2-1/4)	2 (3-2/10)	2-1/2 (4-1/2)	3-2/10 (5-6/10)	4 (6-1/4)	4-1/2 (7-1/2)	5-6/10	8
230	3/10 (1/2)	6/10 (1)	8/10 (1-6/10)	1-1/4 (2)	1-8/10 (3-2/10)	2-1/2 (4)	3-2/10 (5)	3-1/2 (6-1/4)	4-1/2 (7-1/2)	5	8
240	3/10 (1/2)	6/10 (1)	8/10 (1-1/2)	1-1/4 (2)	1-8/10 (3)	2-1/4 (4)	3 (5)	3-1/2 (6-1/4)	4 (7)	5	7-1/2
277	1/4 (4/10)	1/2 (8/10)	8/10 (1-1/4)	1 (1-8/10)	1-6/10 (2-1/2)	2 (3-1/2)	2-1/2 (4-1/2)	3-2/10 (5)	3-1/2 (6-1/4)	5 (9)	6-1/4
380	3/16 (3/10)	3/10 (6/10)	1/2 (8/10)	3/4 (1-1/4)	1-1/8 (1-8/10)	1-1/2 (2-1/2)	1-8/10 (3-2/10)	2-1/4 (3-1/2)	2-1/2 (4-1/2)	3-1/2 (6-1/4)	5-6/10 (9)
400	3/16 (3/10)	3/10 (6/10)	1/2 (8/10)	3/4 (1-1/4)	1-1/8 (1-8/10)	1-1/2 (2-1/2)	1-8/10 (3)	2-1/4 (3-1/2)	2-1/2 (4)	3-1/2 (6-1/4)	5-6/10 (9)
415	15/100 (3/10)	3/10 (6/10)	1/2 (8/10)	6/10 (1-1/8)	1 (1-8/10)	1-4/10 (2-1/4)	1-8/10 (3)	2 (3-1/2)	2-1/2 (4)	3-1/2 (6)	5 (9)
440	15/100 (1/4)	3/10 (1/2)	1/2 (8/10)	6/10 (1-1/8)	1 (1-6/10)	1-1/4 (2-1/4)	1-6/10 (2-8/10)	2 (3-2/10)	2-1/4 (3-1/2)	3-2/10 (5-6/10)	5 (8)
460	15/100 (1/4)	3/10 (1/2)	4/10 (8/10)	6/10 (1)	8/10 (1-6/10)	1-1/4 (2)	1-6/10 (2-1/2)	1-8/10 (3-2/10)	2-1/4 (3-1/2)	3-2/10 (5)	4-1/2 (8)
480	15/100 (1/4)	3/10 (1/2)	4/10 (3/4)	6/10 (1)	8/10 (1-1/2)	1-1/4 (2)	1-1/2 (2-1/2)	1-8/10 (3)	2 (3-1/2)	3 (5)	4-1/2 (7-1/2)
550	1/8 (2/10)	1/4 (4/10)	4/10 (6/10)	1/2 (8/10)	8/10 (1-1/4)	1 (1-8/10)	1-1/4 (2-1/4)	1-6/10 (2-1/2)	1-8/10 (3)	2-1/2 (4-1/2)	4 (6-1/4)
575	1/8 (2/10)	1/4 (4/10)	3/10 (6/10)	1/2 (8/10)	3/4 (1-1/4)	1 (1-6/10)	1-1/4 (2)	1-1/2 (2-1/2)	1-8/10 (3)	2-1/2 (4)	3-1/2 (6-1/4)
600	1/8 (2/10)	2/10 (4/10)	3/10 (6/10)	1/2 (8/10)	3/4 (1-1/4)	8/10 (1-6/10)	1-1/4 (2)	1-1/2 (2-1/2)	1-6/10 (2-8/10)	2-1/4 (4)	3-1/2 (6-1/4)

If the rated primary current is less than 2 amps, the maximum rating of the overcurrent device is 300% for power circuits, shown above, or 500% for control circuits, shown above in (brackets). If the rated primary current is 2 amps or more, the maximum rating of the overcurrent device is 250%.
All figures assume secondary overcurrent protection per UL/NEC.
Reference: NEC 430 - 72(c) exception #2, 450-3(b) 1 & 2, UL508 32.7, UL845 11.16 & 11.17.

Maximum acceptable rating of secondary overcurrent protection

Secondary voltage	VA Rating 25	50	75	100	150	200	250	300	350	500	750
23	1-8/10	3-1/2	5	7	10	12	15	20	20	30	45
24	1-6/10	3-2/10	5	6-1/4	10	12	15	20	20	30	40
25	1-6/10	3-2/10	5	6-1/4	10	12	15	15	20	25	40
90	4/10	8/10	1-1/4	1-8/10	2-1/2	3-1/2	4-1/2	5	6-1/4	9	12
95	4/10	8/10	1-1/4	1-6/10	2-1/2	3-1/2	4	5	6	8	12
100	4/10	8/10	1-1/4	1-6/10	2-1/2	3-2/10	4	5	5-6/10	8	12
110	3/10	3/4	1-1/8	1-1/2	2-1/4	3	3-1/2	4-1/2	5	7-1/2	10
115	3/10	6/10	1	1-4/10	2	2-8/10	3-1/2	4	5	7	10
120	3/10	6/10	1	1-1/4	2	2-1/2	3-2/10	4	4-1/2	6-1/4	10
220	15/100	3/10	1/2	3/4	1-1/8	1-1/2	1-8/10	2-1/4	2-1/2	3-1/2	5-6/10
230	15/100	3/10	1/2	6/10	1	1-4/10	1-8/10	2	2-1/2	3-1/2	5
240	15/100	3/10	1/2	6/10	1	1-1/4	1-6/10	2	2-1/4	3-2/10	5

If the rated secondary current is less than 9 amps, the maximum rating of the overcurrent device is 167%; 9 amps or more, the maximum rating of the overcurrent device is 125%. If 125% does not correspond to a standard fuse rating, the next highest standard rating may be used.
Reference: NEC 430 - 72(c) exception #2, 450-3(b) 1 & 2, UL508 32.7, UL845 11.16 & 11.17.

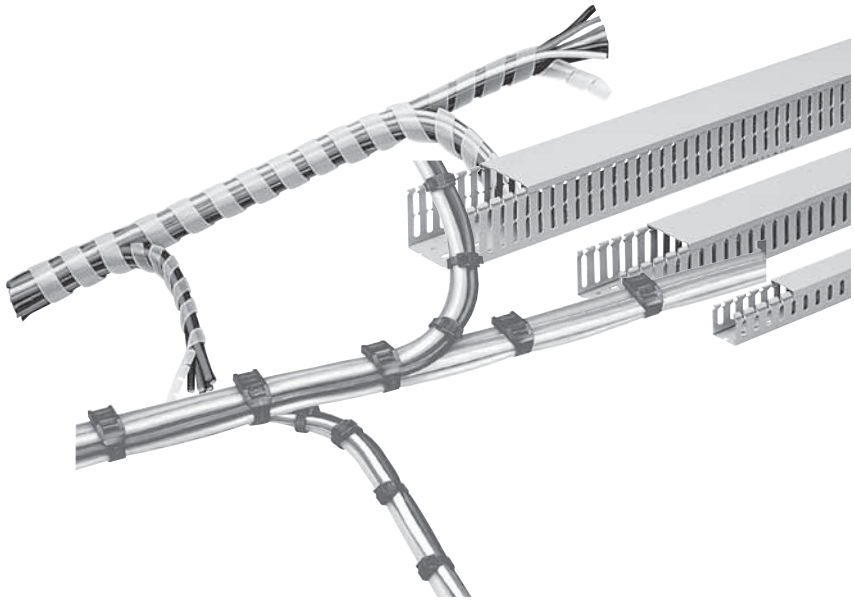
Notes

Cable management systems
Index

Notes

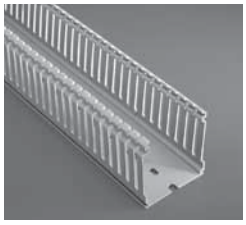
Cable management systems

Cable management systems
Wire duct
Cable ties
Spiral wrap

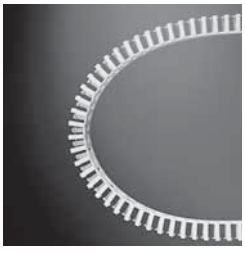


General information

Those requiring considerable space for cables will find their needs met by ABB cable management systems, now also available in the 100 mm height and in a choice of six different base sizes (25, 40, 60, 80, 100 and 150 mm). New wiring ducts join the established designs (with heights between 17 and 80 mm), bringing to 28 the total size combinations offered, all available with 8 – 12 mm and 4 – 6 mm slots.



Less complicated work brings installers and panel builders faster solutions thanks to the new top profile of the ribs.



The new flexible thermoplastic wiring ducts solve every electrical switchboard and distribution switchboard wiring problem.

The best solution for hinged panels and doors are our new flexible thermoplastic cable management systems (available in seven sizes), which are ideal for every situation in which wiring is subject to flexion or torsion.

A new design of cable management systems with circular knockouts in the sides to facilitate branch connections using rigid and corrugated conduits has also been introduced for environments in which cables require greater protection against external agents (elevator rooms are a typical example).

New wiring ducts with circular knockouts in the sides are available for any specific kind of branch connections.

The updated range is completed by installation accessories and tools: plastic rivets, wire stops, label tags, new wiring ducts bases, a new rivet gun and shears.

The top profile of the ribs of these wiring ducts has been redesigned to make it easier to open and close the cover and to ensure even more secure engagement.

All in one movement: thanks to the controlled splaying of the sides, gentle pressure is all it takes to fix the cover on the duct, forming a perfect seal in all conditions, even in environments that reach high temperatures.

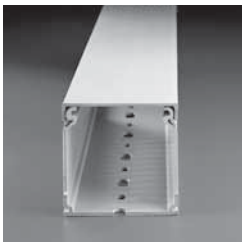
To release it, simply press the ribs inwards with one hand.

continued next page

General information
Wire duct, cable ties, spiral wrap

The cover can't slide in vertical sections, nor is the bottom rib affected by the weight of the cables in horizontal sections.

The exceptional care with which ABB wiring ducts are manufactured also ensures a clean internal finish. Because there aren't any plastic burrs you can work hour after hour without your hands suffering the consequences.

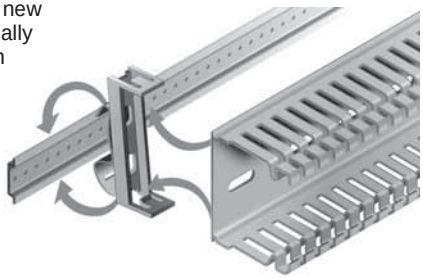


All the space cables need with the new wiring ducts available in the 100 mm height and six different base sizes.

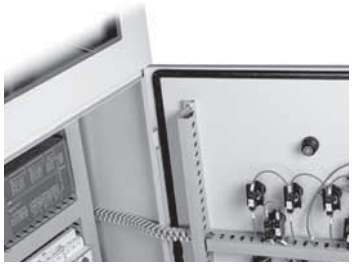
The dimensions and resilience of the ribs on ABB cable management systems ensure they can be moved apart many times during the wiring phase. But when you need to remove the rib to create openings for letting cables in or out, the special knockouts allow you to make an instant clean break. The base of the wall also features knockouts that make it possible to cut the edge when you want to make level branch connections.

The 80 and 100 mm high versions feature cable holder moldings in the middle of the straight sections of the ribs.

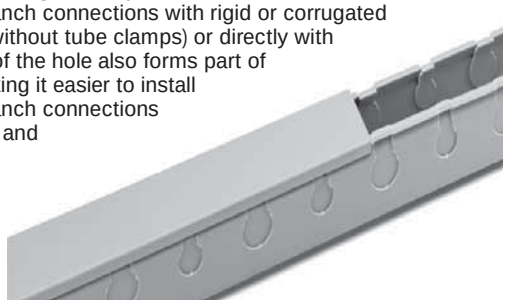
The new ABB cable management systems are in a class of their own when it comes to ease of installation. In fact they have been made for snap-on installation to a new accessory that's been specially designed for fast fitting both to DIN rails and base plates. The new bottom profile of the wiring ducts has been changed and no longer needs drilling or rivets. Thanks to this new accessory, mounting and removal both take no more than a click.



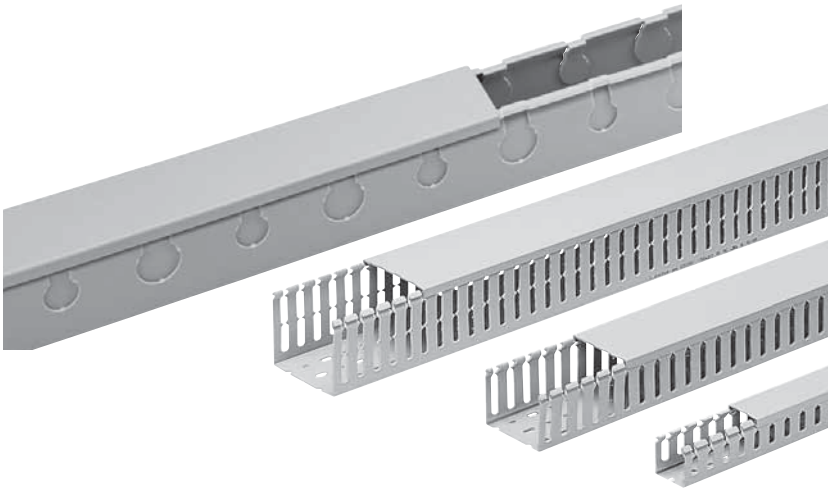
How do you connect the switchgears installed on switchboard doors? Our new flexible cable management systems can be bent or twisted without breaking and allow you to solve all manner of connection problems where hinged moving parts are concerned. They are quick and easy to use: the offset position of the ribs and the way they are angled slightly downwards makes it easier to insert and extract the cables. These new ducts save time and energy compared to traditional coiled designs. When you need to add new cables, change and inspect them or carry out maintenance, the operations required are simple and take next to no time at all. Simply pull out the cables or feed in new ones without having to unwind or rewind the coils. The flexible wiring ducts are supplied as standard with ready-fitted double-sided adhesive tape offering high adhesion on steel. And you can, of course, naturally fit them using screws and rivets as well. They engage in special slots on the bottom that are orientated in two axes to enable the position of the ducts to be adjusted.



In those cases in which it's advantageous to protect cables from dust (IP 40) while retaining maximum installation flexibility, we designed these new cable management systems with circular knockouts in the sides for branch connections with rigid or corrugated conduits (with or without tube clamps) or directly with cables. The neck of the hole also forms part of the knockout, making it easier to install the cables and branch connections in any work phase and conditions.



Wiring duct



Description

ABB wiring ducts are now also available in the 100 mm height and in a choice of six different base sizes (25, 40, 60, 80, 100 and 150 mm). These new wiring ducts join the established designs (with heights between 17 and 80 mm), bringing to 28 the total size combinations offered, all available with 8 – 12 mm and 4 – 6 mm slots.

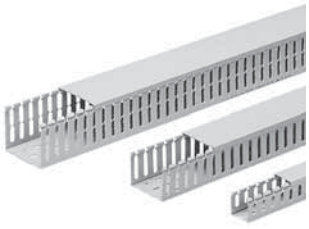
Flexible thermoplastic wiring ducts (available in seven sizes)are ideal for every situation in which wiring is subject to flexion or torsion.

A new design of wiring ducts with circular knockouts in the sides to facilitate branch connections using rigid and corrugated conduits has also been introduced for environments in which cables require greater protection against external agents (elevator rooms are a typical example).

The updated range is completed by installation accessories and tools: plastic rivets, wire stops, label tags, new wiring ducts bases, a new rivet gun and shears.

The 80 and 100 mm high versions feature cable holder moldings in the middle of the straight sections of the ribs.

Wiring duct, gray
Standard; 8 – 12 mm slot
High density; 4 – 6 mm slot

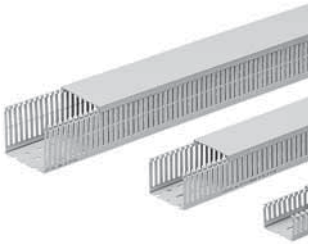


05019

Standard; 8 – 12 mm slot, gray

Dimensions W x H (mm)	Dimensions W x H (in)	Meters per package	Feet per package	Pieces per ① package	Catalog ①② number	List price per package	List price per 2M piece	List price per foot
15 x 17	1/2 x 5/8	46	151	23	05019	**$ 345.00**	**$ 15.00**	**$ 2.29**
25 x 30	1 x 1 1/4	58	190.5	29	05033	**565.50**	**19.50**	**2.97**
40 x 30	1 1/2 x 1 3/4	40	131.5	20	05035	**500.00**	**25.00**	**3.81**
60 x 30	2 1/4 x 1 1/4	52	171	26	05037	**734.50**	**28.25**	**4.31**
25 x 40	1 x 1 1/2	48	157.5	24	05043	**570.00**	**23.75**	**3.62**
40 x 40	1 1/2 x 1 1/2	30	98.5	15	05045	**397.50**	**26.50**	**4.04**
60 x 40	2 1/4 x 1 1/2	40	131	20	05047	**590.00**	**29.50**	**4.50**
80 x 40	3 x 1 1/2	32	105	16	05049	**604.00**	**37.75**	**5.75**
100 x 40	4 x 1 1/2	24	79	12	05051	**474.00**	**39.50**	**6.02**
120 x 40	4 3/4 x 1 1/2	20	66	10	05053	**432.50**	**43.25**	**6.59**
25 x 60	1 x 2 1/4	34	111.5	17	05063	**442.00**	**26.00**	**3.96**
40 x 60	1 1/2 x 2 1/4	22	72	11	05065	**319.00**	**29.00**	**4.42**
60 x 60	2 1/4 x 2 1/4	32	105	16	05067	**488.00**	**30.50**	**4.65**
80 x 60	3 x 2 1/4	24	79	12	05069	**468.00**	**39.00**	**5.94**
100 x 60	4 x 2 1/4	20	66	10	05071	**430.00**	**43.00**	**6.55**
120 x 60	4 3/4 x 2 1/4	14	46	7	05073	**343.00**	**49.00**	**7.47**
25 x 80	1 x 3	28	92	14	05083	**451.50**	**32.25**	**4.91**
40 x 80	1 1/2 x 3	36	118	18	05085	**634.50**	**35.25**	**5.37**
60 x 80	2 1/4 x 3	24	79	12	05087	**456.00**	**38.00**	**5.79**
80 x 80	3 x 3	16	52	8	05089	**364.00**	**45.50**	**6.93**
100 x 80	4 x 3	16	52	8	05091	**394.00**	**49.25**	**7.51**
120 x 80	4 3/4 x 3	12	39	6	05093	**336.00**	**56.00**	**8.53**
25 x 100	1 x 4	20	65.5	10	05094	**377.50**	**37.75**	**5.75**
40 x 100	1 1/2 x 4	28	92	14	05095	**567.00**	**40.50**	**6.17**
60 x 100	2 1/4 x 4	20	66	10	05096	**432.50**	**43.25**	**6.59**
80 x 100	3 x 4	14	46	7	05097	**371.00**	**53.00**	**8.08**
100x 100	4 x 4	8	26	4	05098	**236.00**	**59.00**	**8.99**
150 x 100	6 x 4	8	26	4	05099	**372.00**	**93.00**	**14.17**

NOTE: Sold in package quantity only. Order quantity must equal quantity shown in "pieces per package" column. Example: For 05019, 23 pieces must be ordered to get package quantity.



05119

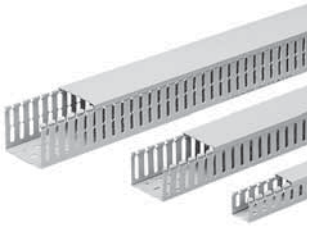
High density; 4 – 6 mm slot, gray

Dimensions W x H (mm)	Dimensions W x H (in)	Meters per package	Feet per package	Pieces per ① package	Catalog ①② number	List price per package	List price per 2M piece	List price per foot
15 x 17	1/2 x 5/8	46	151	23	05119	**$ 345.00**	**$ 15.00**	**$ 2.29**
25 x 30	1 x 1 1/4	58	190.5	29	05133	**565.50**	**19.50**	**2.97**
40 x 30	1 1/2 x 1 3/4	40	131.5	20	05135	**500.00**	**25.00**	**3.81**
60 x 30	2 1/4 x 1 1/4	52	171	26	05137	**734.50**	**28.25**	**4.31**
25 x 40	1 x 1 1/2	48	157.5	24	05143	**570.00**	**23.75**	**3.62**
40 x 40	1 1/2 x 1 1/2	30	98.5	15	05145	**397.50**	**26.50**	**4.04**
60 x 40	2 1/4 x 1 1/2	40	131	20	05147	**590.00**	**29.50**	**4.50**
80 x 40	3 x 1 1/2	32	105	16	05149	**604.00**	**37.75**	**5.75**
100 x 40	4 x 1 1/2	24	79	12	05151	**474.00**	**39.50**	**6.02**
120 x 40	4 3/4 x 1 1/2	20	66	10	05153	**432.50**	**43.25**	**6.59**
25 x 60	1 x 2 1/4	34	111.5	17	05163	**442.00**	**26.00**	**3.96**
40 x 60	1 1/2 x 2 1/4	22	72	11	05165	**319.00**	**29.00**	**4.42**
60 x 60	2 1/4 x 2 1/4	32	105	16	05167	**488.00**	**30.50**	**4.65**
80 x 60	3 x 2 1/4	24	79	12	05169	**468.00**	**39.00**	**5.94**
100 x 60	4 x 2 1/4	20	66	10	05171	**430.00**	**43.00**	**6.55**
120 x 60	4 3/4 x 2 1/4	14	46	7	05173	**343.00**	**49.00**	**7.47**
25 x 80	1 x 3	28	92	14	05183	**451.50**	**32.25**	**4.91**
40 x 80	1 1/2 x 3	36	118	18	05185	**634.50**	**35.25**	**5.37**
60 x 80	2 1/4 x 3	24	79	12	05187	**456.00**	**38.00**	**5.79**
80 x 80	3 x 3	16	52	8	05189	**364.00**	**45.50**	**6.93**
100 x 80	4 x 3	16	52	8	05191	**394.00**	**49.25**	**7.51**
120 x 80	4 3/4 x 3	12	39	6	05193	**336.00**	**56.00**	**8.53**
25 x 100	1 x 4	20	65.5	10	05194	**377.50**	**37.75**	**5.75**
40 x 100	1 1/2 x 4	28	92	14	05195	**567.00**	**40.50**	**6.17**
60 x 100	2 1/4 x 4	20	66	10	05196	**432.50**	**43.25**	**6.59**
80 x 100	3 x 4	14	46	7	05197	**371.00**	**53.00**	**8.08**
100x 100	4 x 4	8	26	4	05198	**236.00**	**59.00**	**8.99**
150 x 100	6 x 4	8	26	4	05199	**372.00**	**93.00**	**14.17**

NOTE: Sold in package quantity only. Order quantity must equal quantity shown in "pieces per package" column. Example: For 05119, 23 pieces must be ordered to get package quantity.

① Sold in package quantity only. Order quantity must equal quantity shown in "pieces per package" column.
② Wire duct cover included.

Wiring duct, white
Standard; 8 – 12mm slot
High density; 4 – 6mm slot

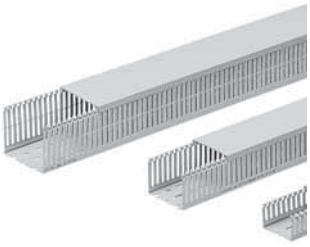


1SL5019A00

Standard; 8 – 12 mm slot

Dimensions W x H (mm)	Dimensions W x H (in)	Meters per package	Feet per package	Pieces per ① package	Catalog ①② number	List price per package	List price per 2M piece	List price per foot
15 x 17	1/2 x 5/8	46	151	23	1SL5019A00	**$ 345.00**	**$ 15.00**	**$ 2.29**
25 x 30	1 x 1 1/4	58	190.5	29	1SL5033A00	**565.50**	**19.50**	**2.97**
40 x 30	1 1/2 x 1 3/4	40	131.5	20	1SL5035A00	**500.00**	**25.00**	**3.81**
60 x 30	2 1/4 x 1 1/4	52	171	26	1SL5037A00	**734.50**	**28.25**	**4.31**
25 x 40	1 x 1 1/2	48	157.5	24	1SL5043A00	**570.00**	**23.75**	**3.62**
40 x 40	1 1/2 x 1 1/2	30	98.5	15	1SL5045A00	**397.50**	**26.50**	**4.04**
60 x 40	2 1/4 x 1 1/2	40	131	20	1SL5047A00	**590.00**	**29.50**	**4.50**
80 x 40	3 x 1 1/2	32	105	16	1SL5049A00	**604.00**	**37.75**	**5.75**
100 x 40	4 x 1 1/2	24	79	12	1SL5051A00	**474.00**	**39.50**	**6.02**
120 x 40	4 3/4 x 1 1/2	20	66	10	1SL5053A00	**432.50**	**43.25**	**6.59**
25 x 60	1 x 2 1/4	34	111.5	17	1SL5063A00	**442.00**	**26.00**	**3.96**
40 x 60	1 1/2 x 2 1/4	22	72	11	1SL5065A00	**319.00**	**29.00**	**4.42**
60 x 60	2 1/4 x 2 1/4	32	105	16	1SL5067A00	**488.00**	**30.50**	**4.65**
80 x 60	3 x 2 1/4	24	79	12	1SL5069A00	**468.00**	**39.00**	**5.94**
100 x 60	4 x 2 1/4	20	66	10	1SL5071A00	**430.00**	**43.00**	**6.55**
120 x 60	4 3/4 x 2 1/4	14	46	7	1SL5073A00	**343.00**	**49.00**	**7.47**
25 x 80	1 x 3	28	92	14	1SL5083A00	**451.50**	**32.25**	**4.91**
40 x 80	1 1/2 x 3	36	118	18	1SL5085A00	**634.50**	**35.25**	**5.37**
60 x 80	2 1/4 x 3	24	79	12	1SL5087A00	**456.00**	**38.00**	**5.79**
80 x 80	3 x 3	16	52	8	1SL5089A00	**364.00**	**45.50**	**6.93**
100 x 80	4 x 3	16	52	8	1SL5091A00	**394.00**	**49.25**	**7.51**
120 x 80	4 3/4 x 3	12	39	6	1SL5093A00	**336.00**	**56.00**	**8.53**
25 x 100	1 x 4	20	65.5	10	1SL5094A00	**377.50**	**37.75**	**5.75**
40 x 100	1 1/2 x 4	28	92	14	1SL5095A00	**567.00**	**40.50**	**6.17**
60 x 100	2 1/4 x 4	20	66	10	1SL5096A00	**432.50**	**43.25**	**6.59**
80 x 100	3 x 4	14	46	7	1SL5097A00	**371.00**	**53.00**	**8.08**
100 x 100	4 x 4	8	26	4	1SL5098A00	**236.00**	**59.00**	**8.99**
150 x 100	6 x 4	8	26	4	1SL5099A00	**372.00**	**93.00**	**14.17**

NOTE: Sold in package quantity only. Order quantity must equal quantity shown in "pieces per package" column.
Example: For 1SL5019A00, 23 pieces must be ordered to get package quantity.



1SL5119A00

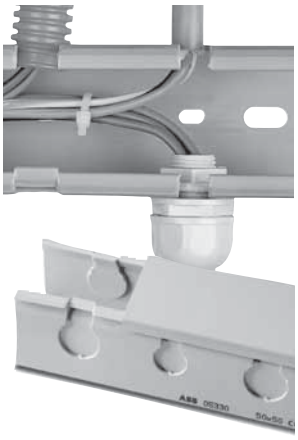
High density; 4 – 6 mm slot

Dimensions W x H (mm)	Dimensions W x H (in)	Meters per package	Feet per package	Pieces per ① package	Catalog ①② number	List price per package	List price per 2M piece	List price per foot
15 x 17	1/2 x 5/8	46	151	23	1SL5119A00	**$ 345.00**	**$ 15.00**	**$ 2.29**
25 x 30	1 x 1 1/4	58	190.5	29	1SL5133A00	**565.50**	**19.50**	**2.97**
40 x 30	1 1/2 x 1 3/4	40	131.5	20	1SL5135A00	**500.00**	**25.00**	**3.81**
60 x 30	2 1/4 x 1 1/4	52	171	26	1SL5137A00	**734.50**	**28.25**	**4.31**
25 x 40	1 x 1 1/2	48	157.5	24	1SL5143A00	**570.00**	**23.75**	**3.62**
40 x 40	1 1/2 x 1 1/2	30	98.5	15	1SL5145A00	**397.50**	**26.50**	**4.04**
60 x 40	2 1/4 x 1 1/2	40	131	20	1SL5147A00	**590.00**	**29.50**	**4.50**
80 x 40	3 x 1 1/2	32	105	16	1SL5149A00	**604.00**	**37.75**	**5.75**
100 x 40	4 x 1 1/2	24	79	12	1SL5151A00	**474.00**	**39.50**	**6.02**
120 x 40	4 3/4 x 1 1/2	20	66	10	1SL5153A00	**432.50**	**43.25**	**6.59**
25 x 60	1 x 2 1/4	34	111.5	17	1SL5163A00	**442.00**	**26.00**	**3.96**
40 x 60	1 1/2 x 2 1/4	22	72	11	1SL5165A00	**319.00**	**29.00**	**4.42**
60 x 60	2 1/4 x 2 1/4	32	105	16	1SL5167A00	**488.00**	**30.50**	**4.65**
80 x 60	3 x 2 1/4	24	79	12	1SL5169A00	**468.00**	**39.00**	**5.94**
100 x 60	4 x 2 1/4	20	66	10	1SL5171A00	**430.00**	**43.00**	**6.55**
120 x 60	4 3/4 x 2 1/4	14	46	7	1SL5173A00	**343.00**	**49.00**	**7.47**
25 x 80	1 x 3	28	82	14	1SL5183A00	**451.50**	**32.25**	**4.91**
40 x 80	1 1/2 x 3	36	118	18	1SL5185A00	**634.50**	**35.25**	**5.37**
60 x 80	2 1/4 x 3	24	79	12	1SL5187A00	**456.00**	**38.00**	**5.79**
80 x 80	3 x 3	16	52	8	1SL5189A00	**364.00**	**45.50**	**6.93**
100 x 80	4 x 3	16	52	8	1SL5191A00	**394.00**	**49.25**	**7.51**
120 x 80	4 3/4 x 3	12	39	6	1SL5193A00	**336.00**	**56.00**	**8.53**
25 x 100	1 x 4	20	65.5	10	1SL5194A00	**377.50**	**37.75**	**5.75**
40 x 100	1 1/2 x 4	28	92	14	1SL5195A00	**567.00**	**40.50**	**6.17**
60 x 100	2 1/4 x 4	20	66	10	1SL5196A00	**432.50**	**43.25**	**6.59**
80 x 100	3 x 4	14	46	7	1SL5197A00	**371.00**	**53.00**	**8.08**
100x 100	4 x 4	8	26	4	1SL5198A00	**236.00**	**59.00**	**8.99**
150 x 100	6 x 4	8	26	4	1SL5199A00	**372.00**	**93.00**	**14.17**

NOTE: Sold in package quantity only. Order quantity must equal quantity shown in "pieces per package" column.
Example: For 1SL5119A00, 23 pieces must be ordered to get package quantity.

① Sold in package quantity only. Order quantity must equal quantity shown in "pieces per package" column.
② Wire duct cover included.

Wiring duct
Specialty products



05330

05400

18372

Wiring duct with knockouts

Wiring duct with 18mm 1/2" and 23mm 3/4"knockouts, gray

Dimensions W x H (mm)	Dimensions W x H (in)	Meters per package	Feet per package	Pieces per package ①	Catalog number ①②	List price per package ①	List price per 2M piece	List price per foot
50 x 50	2 x 2	36	118	18	05330	**$ 738.00**	**$ 41.00**	**$ 6.25**
100 x 60	4 x 1 1/2	18	59	9	05331	**450.00**	**45.00**	**7.50**

NOTE: Sold in package quantity only. Order quantity must equal quantity shown in "pieces per package" column. Example: For 05330, 18 pieces must be ordered to get package quantity.

Flexible wiring duct

Flexible wiring duct – (500mm), White

Dimensions W x H (mm)	Dimensions W x H (in)	Meters per package	Feet per package	Pieces per ① package	Catalog number ①	List price per package	List price per piece	List price per foot
12.5 x 12.5	1/2 x 1/2	56	184	112	05400	**$ 1344.00**	**$ 12.00**	**$ 7.32**
16 x 16	5/8 x 5/8	42	138	84	05402	**1134.00**	**13.50**	**8.23**
20 x 20	3/4 x 3/4	56	184	112	05405	**1820.00**	**16.25**	**9.91**
25 x 25	1 x 1	35	115	70	05410	**1260.00**	**18.00**	**10.97**
30 x 30	1 3/4 x 1 3/4	25	82	50	05415	**1075.00**	**21.50**	**13.11**
40 x 40	1 1/2 x 1 1/2	25	82	50	05420	**1375.00**	**27.50**	**16.76**
50 x 50	2 x 2	16	52	32	05425	**1064.00**	**33.25**	**20.27**

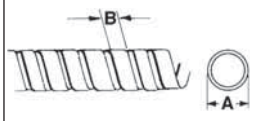
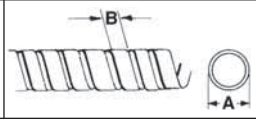
NOTE: Sold in package quantity only. Order quantity must equal quantity shown in "pieces per package" column. Example: For 05400, 112 pieces must be ordered to get package quantity.

Flexible wiring duct – UL Recognized (19.5"), Gray

Dimensions Inside dia. (mm)	Dimensions Inside dia. (in.)	Meters per package	Feet per package	Pieces per package	Catalog number	List price per package	List price per piece	List price per foot
10	.39	350	1148	700	T-10 ③	**$ 7700.00**	**$ 11.00**	**$ 6.77**
20	.79	175	574	350	T-20 ③	**4112.50**	**11.75**	**7.23**
30	1.18	100	328	200	T-30 ③	**2550.00**	**12.75**	**7.85**
40	1.58	50	164	100	T-40 ③	**1450.00**	**14.50**	**8.92**

Spiral wrap

Spiral wrap

Height Dim A in [mm]	Width Dim B in [mm]	Diameter (mm) Min. in [mm]	Diameter (mm) Max. in [mm]		Length per roll (meters)	Length per roll (feet)	Catalog number	List price
Translucent polyethelene								
.12 [3]	.2 [5]	.08 [2]	.47 [12]		50	164	18370	**$ 60.00**
.24 [6]	.31 [8]	.2 [5]	2.20 [56]		25	82	18372	**40.75**
.39 [10]	.43 [11]	.47 [12]	3.94 [100]		25	82	18374	**56.50**
.47 [12]	.51 [13]	.55 [14]	5.12 [130]		25	82	18376	**92.00**
Self-extinguishing polyethelene								
.12 [3]	.2 [5]	.08 [2]	.47 [12]		50	164	18380	**70.00**
.24 [6]	.31 [8]	.2 [5]	2.20 [56]		25	82	18382	**52.50**
.39 [10]	.43 [11]	.47 [12]	3.94 [100]		25	82	18384	**84.00**
.47 [12]	.51 [13]	.55 [14]	5.12 [130]		25	82	18386	**117.25**

① Sold in package quantity only. Order quantity must equal quantity shown in "pieces per package" column.
② Wire duct cover included.
③ T10 has a square body; T20 - T40 has a round body.

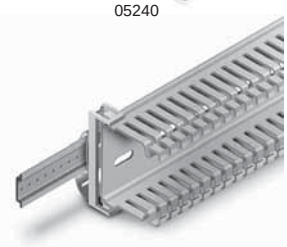
Wiring duct
Tools and Accessories


05214


05210


05224


05240


05250


05265


05266

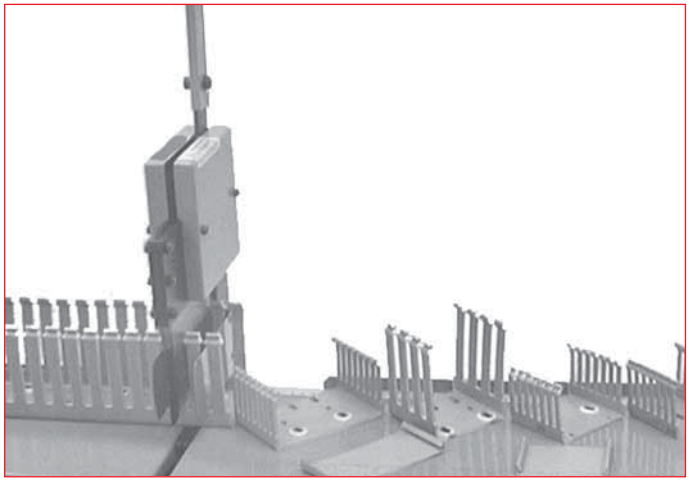
Item	Pieces per package	Catalog number	List price per package
Plastic rivet, 4 mm (to be used with plastic ducting base)	100	05214	**$ 30**
Plastic rivet, 6 mm, (to be used with plastic ducting base)	100	05216	**36**
Plastic ducting base	100	05210	**150**
Plastic wire stops for 8 – 12 mm slot 40 mm bases	100	05224	**100**
Plastic wire stops for 8 – 12 mm slot 60 mm bases	100	05226	**125**
Plastic wire stops for 8 – 12 mm slot 80 mm bases	100	05228	**150**
Plastic wire stops for 8 – 12 mm slot 100 mm bases	100	05230	**200**
Plastic label for 8 – 12 mm slot	100	05240	**240**
Rapid clip for DIN rail for 25 mm base	20	05250	**100**
Rapid clip for DIN rail for 40 mm base	20	05252	**80**
Rapid clip for DIN rail for 60 mm base	20	05254	**90**
Rapid clip for DIN rail for 80 mm base	20	05256	**100**
Rapid clip for DIN rail for 100 mm base	20	05258	**105**
Rapid clip for DIN rail for 120 mm base	20	05260	**110**
Rapid clip for DIN rail for 150 mm base	20	05262	**115**
Wire duct hand cutting tool	1	05265	**150**
Rivet gun	1	05266	**200**
Adhesive tape, 6 mm wide x 50 m long	1	05930	**65**
Adhesive tape, 9 mm wide x 50 m long	1	05932	**95**

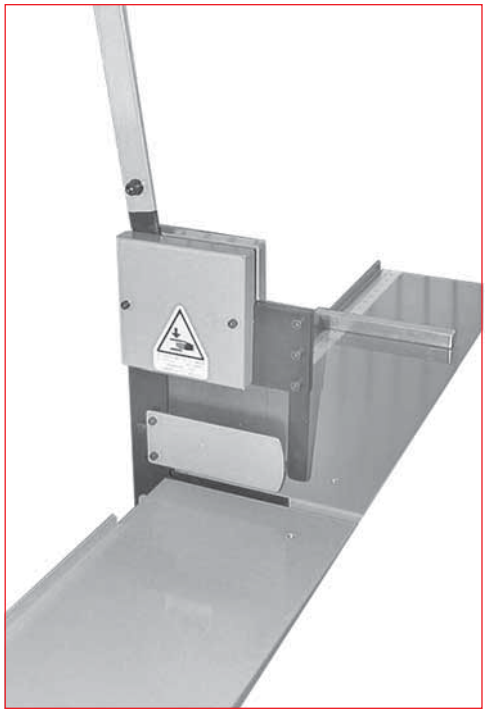
Wiring duct covers

Dimensions Width mm	Color	Meters per package	Feet per package	Pieces per package	Catalog number	List price per package	List price per 2M piece	List price per foot
15	Gray	200	656	100	05300	**$ 400.00**	**$ 4.00**	**$ 0.61**
25	Gray	60	197	30	05302	**144.00**	**4.80**	**0.73**
40	Gray	40	131	20	05304	**170.00**	**8.50**	**1.30**
60	Gray	24	79	12	05306	**159.00**	**13.25**	**2.02**
80	Gray	16	52	8	05308	**164.00**	**20.50**	**3.12**
100	Gray	48	157	24	05310	**576.00**	**24.00**	**3.66**
120	Gray	36	118	18	05312	**621.00**	**34.50**	**5.26**
150	Gray	28	92	14	05314	**637.00**	**45.50**	**6.93**
15	White	200	656	100	1SL5300A00	**400.00**	**4.00**	**0.61**
25	White	60	197	30	1SL5302A00	**144.00**	**4.80**	**0.73**
40	White	40	131	20	1SL5304A00	**170.00**	**8.50**	**1.30**
60	White	24	79	12	1SL5306A00	**159.00**	**13.25**	**2.02**
80	White	16	52	8	1SL5308A00	**164.00**	**20.50**	**3.12**
100	White	48	157	24	1SL5310A00	**576.00**	**24.00**	**3.66**
120	White	36	118	18	1SL5312A00	**621.00**	**34.50**	**5.26**
150	White	28	92	14	1SL5314A00	**637.00**	**45.50**	**6.93**

NOTE: Sold in package quantity only. Order quantity must equal quantity shown in "pieces per package" column. Example: For 05300, 100 pieces must be ordered to get package quantity.

Wiring duct
Tools
Wiring duct cutter – Industrial grade





Description

Description	Catalog number	List price
Wire duct cutting machine - Industrial grade	XUS001628	**$ 800**
Replacement blade	XUS001629	**300**

Technical Features

- Length: 1450 mm
- Height: 950 mm
- Depth: 260 mm
- Blade length: 130 mm (maximum wire duct cutting width is 120 mm (5.0 in))
- Blade life: 250,000 cuts
- Blade life is based on usage of traditional PVC wiring duct. Use of halogen-free wiring or any other wiring duct containing abrasive material dramatically reduces the blade life
- Bench mounting material not included.

Wiring duct
Tools
Wiring duct cutter – Production grade

Description

Description	Catalog number	List price
Wire duct cutting machine - Production grade	XUS002518	**$ 1200**
Replacement blade	XUS002519	**495**

Technical Features

- Length: 1290 mm
- Height: 785 mm
- Depth: 285 mm
- Blade length: 136 mm (maximum wire duct cutting width is 120 mm (5.0 in))
- Blade life: 400,000 cuts
- Blade life is based on usage of traditional PVC wiring duct. Use of halogen-free wiring or any other wiring duct containing abrasive material dramatically reduces the blade life
- Calibrated scale
- Bench mounting material not included.

Wiring duct
Technical data
Wire capacity, 18 - 750 AWG

18 - 1 AWG

ABB wiring duct code				Nominal	Nominal	Usable	Maximum number of wires according to AGW and cable section (mm^2)										
Gray 4/6 slot	Gray 8/12 slot	White 4/6 slot	White 8/12 slot	duct size (mm)	duct size (inches)	areas (mm^2)	18 *0.82*	16 *1.3*	14 *2.1*	12 *3.3*	10 *5.3*	8 *8.4*	6 *13.3*	4 *21.2*	3 *26.7*	2 *33.6*	1 *42.4*
05119	05019	1SL5119A00	1SL5019A00	15x17	1/2x5/8	110	67	42	26	16	10	6	4	2	2	1	1
05133	05033	1SL5133A00	1SL5033A00	25x30	1x1 1/4	490	298	188	116	74	46	29	18	11	9	7	5
05135	05035	1SL5135A00	1SL5035A00	40X30	1 1/2X1 1/4	890	542	342	211	134	83	52	33	20	16	13	10
05137	05037	1SL5137A00	1SL5037A00	60x30	2 1/4x1 1/4	1430	871	550	340	216	134	85	53	33	26	21	16
05143	05043	1SL5143A00	1SL5043A00	25X40	1X1 1/2	710	432	273	169	107	66	42	26	16	13	10	8
05145	05045	1SL5145A00	1SL5045A00	40x40	1 1/2x1 1/2	1260	768	484	300	190	118	75	47	29	23	18	14
05147	05047	1SL5147A00	1SL5047A00	60x40	2 1/4x1 1/2	2000	1219	769	476	303	188	119	75	47	37	29	23
05149	05049	1SL5149A00	1SL5049A00	80X40	3X1 1/2	2710	1652	1042	645	410	255	161	101	63	50	40	31
05151	05051	1SL5151A00	1SL5051A00	100X40	4X1 1/2	3460	2109	1330	823	524	326	205	130	81	64	51	40
05153	05053	1SL5153A00	1SL5053A00	120X40	4 3/4X1 1/2	4200	2560	1615	1000	636	396	250	157	99	78	62	49
05163	05063	1SL5163A00	1SL5063A00	25X60	1 X 2 1/4	1120	682	430	266	169	105	66	42	26	20	16	13
05165	05065	1SL5165A00	1SL5065A00	40X60	1 1/2X2 1/4	1970	1201	757	469	298	185	117	74	46	36	29	23
05167	05067	1SL5167A00	1SL5067A00	60X60	2 1/4X2 1/4	3060	1865	1176	728	463	288	182	115	72	57	45	36
05169	05069	1SL5169A00	1SL5069A00	80X60	3X2 1/4	4190	2554	1611	997	634	395	249	157	98	78	62	49
05171	05071	1SL5171A00	1SL5071A00	100X60	4X2 1/4	5320	3243	2046	1266	806	501	316	200	125	99	79	62
05173	05073	1SL5173A00	1SL5073A00	120X60	4 3/4X2 1/4	6330	3859	2434	1507	959	597	376	237	149	118	94	74
05183	05083	1SL5183A00	1SL5083A00	25X80	1X3	1540	939	592	366	233	145	91	57	36	28	22	18
05185	05085	1SL5185A00	1SL5085A00	40X80	1 1/2X3	2670	1628	1026	635	404	251	158	100	62	50	39	31
05187	05087	1SL5187A00	1SL5087A00	60X80	2 1/4X3	4140	2524	1592	985	627	390	246	155	97	77	61	48
05189	05089	1SL5189A00	1SL5089A00	80X80	3X3	5650	3445	2173	1345	856	533	336	212	133	105	84	66
05191	05091	1SL5191A00	1SL5091A00	100X80	4X3	7170	4371	2757	1707	1086	676	426	269	169	134	106	84
05193	05093	1SL5193A00	1SL5093A00	120X80	4 3/4X3	8570	5225	3296	2040	1298	808	510	322	202	160	127	101
05194	05094	1SL5194A00	1SL5094A00	25X100	1X4	1970	1201	757	469	298	185	117	74	46	36	29	23
05195	05095	1SL5195A00	1SL5095A00	40X100	1 1/2X4	3410	2079	1311	811	516	321	202	128	80	63	50	40
05196	05096	1SL5196A00	1SL5096A00	60X100	2 1/4X4	5300	3231	2038	1261	803	500	315	199	125	99	78	62
05197	05097	1SL5197A00	1SL5097A00	80X100	3X4	7190	4384	2765	1711	1089	678	427	270	169	134	106	84
05198	05098	1SL5198A00	1SL5098A00	100X100	4X4	9110	5554	3503	2169	1380	859	542	342	214	170	135	107
05199	05099	1SL5199A00	1SL5099A00	150X100	6X4	13,740	8378	5284	3271	2081	1296	817	516	324	257	204	162

1/0 - 750 AWG

13

ABB wiring duct code				Nominal	Nominal	Usable	Maximum number of wires according to AGW and cable section (mm^2)										
Gray 4/6 slot	Gray 8/12 slot	White 4/6 slot	White 8/12 slot	duct size (mm)	duct size (inches)	areas (mm^2)	1/0 *53.5*	2/0 *67.4*	3/0 *85*	4/0 *107.2*	250 *127*	300 *152*	350 *177*	400 *203*	500 *253*	600 *304*	750 *380*
05119	05019	1SL5119A00	1SL5019A00	15x17	1/2x5/8	110	1	0	0	0	0	0	0	0	0	0	0
05133	05033	1SL5133A00	1SL5033A00	25x30	1x1 1/4	490	4	3	2	2	1	1	1	1	0	0	0
05135	05035	1SL5135A00	1SL5035A00	40X30	1 1/2X1 1/4	890	8	6	5	4	3	2	2	2	1	1	1
05137	05037	1SL5137A00	1SL5037A00	60x30	2 1/4x1 1/4	710	13	10	8	6	5	4	4	3	2	2	1
05143	05043	1SL5143A00	1SL5043A00	25X40	1X1 1/2	710	6	5	4	3	2	2	2	1	1	1	0
05145	05045	1SL5145A00	1SL5045A00	40x40	1 1/2x1 1/2	1260	11	9	7	5	4	4	3	3	2	2	1
05147	05047	1SL5147A00	1SL5047A00	60x40	2 1/4x1 1/2	2000	18	14	11	9	7	6	5	4	3	3	2
05149	05049	1SL5149A00	1SL5049A00	80X40	3X1 1/2	2710	25	20	15	12	10	8	7	6	5	4	3
05151	05051	1SL5151A00	1SL5051A00	100X40	4X1 1/2	3460	32	25	20	16	13	11	9	8	6	5	4
05153	05053	1SL5153A00	1SL5053A00	120X40	4 3/4X1 1/2	4200	39	31	24	19	16	13	11	10	8	6	5
05163	05063	1SL5163A00	1SL5063A00	25X60	1 X 2 1/4	1120	10	8	6	5	4	3	3	2	2	1	1
05165	05065	1SL5165A00	1SL5065A00	40X60	1 1/2X2 1/4	1970	18	14	11	9	7	6	5	4	3	3	2
05167	05067	1SL5167A00	1SL5067A00	60X60	2 1/4X2 1/4	3060	28	22	18	14	12	10	8	7	6	5	4
05169	05069	1SL5169A00	1SL5069A00	80X60	3X2 1/4	4190	39	31	24	19	16	13	11	10	8	6	5
05171	05071	1SL5171A00	1SL5071A00	100X60	4X2 1/4	5320	49	39	31	24	20	17	15	13	10	8	7
05173	05073	1SL5173A00	1SL5073A00	120X60	4 3/4X2 1/4	6330	59	46	37	29	24	20	17	15	12	10	8
05183	05083	1SL5183A00	1SL5083A00	25X80	1X3	1540	14	11	9	7	6	5	4	3	3	2	2
05185	05085	1SL5185A00	1SL5085A00	40X80	1 1/2X3	2670	24	19	15	12	10	8	7	6	5	4	3
05187	05087	1SL5187A00	1SL5087A00	60X80	2 1/4X3	4140	38	30	24	19	16	13	11	10	8	6	5
05189	05089	1SL5189A00	1SL5089A00	80X80	3X3	5650	52	41	33	26	22	18	15	13	11	9	7
05191	05091	1SL5191A00	1SL5091A00	100X80	4X3	7170	67	53	42	33	28	23	20	17	14	11	9
05193	05093	1SL5193A00	1SL5093A00	120X80	4 3/4X3	8570	80	63	50	39	33	28	24	21	16	14	11
05194	05094	1SL5194A00	1SL5094A00	25X100	1X4	1970	18	14	11	9	7	6	5	4	3	3	2
05195	05095	1SL5195A00	1SL5095A00	40X100	1 1/2X4	3410	31	25	20	15	13	11	9	8	6	5	4
05196	05096	1SL5196A00	1SL5096A00	60X100	2 1/4X4	5300	49	39	31	24	20	17	14	13	10	8	6
05197	05097	1SL5197A00	1SL5097A00	80X100	3X4	7190	67	53	42	33	28	23	20	17	14	11	9
05198	05098	1SL5198A00	1SL5098A00	100X100	4X4	9110	85	67	53	42	35	29	25	22	18	14	11
05199	05099	1SL5199A00	1SL5099A00	150X100	6X4	13,740	128	101	80	64	54	45	38	33	27	22	18

Wiring duct
Technical data
Wire capacity, 800 - 1000 AWG

800 - 1000 AWG

ABB wiring duct code				Nominal	Nominal	Usable	Maximum number of wires according to AGW and cable section (mm²)	
Gray 4/6 slot	Gray 8/12 slot	White 4/6 slot	White 8/12 slot	duct size (mm)	duct size (inches)	areas (mm²)	800 *405*	1000 *508*
05119	05019	1SL5119A00	1SL5019A00	15x17	1/2x5/8	110	0	0
05133	05033	1SL5133A00	1SL5033A00	25x30	1x1 1/4	490	0	0
05135	05035	1SL5135A00	1SL5035A00	40X30	1 1/2X1 1/4	890	1	0
05137	05037	1SL5137A00	1SL5037A00	60x30	2 1/4x1 1/4	1430	1	1
05143	05043	1SL5143A00	1SL5043A00	25X40	1X1 1/2	710	0	0
05145	05045	1SL5145A00	1SL5045A00	40x40	1 1/2x1 1/2	1260	1	1
05147	05047	1SL5147A00	1SL5047A00	60x40	2 1/4x1 1/2	2000	2	1
05149	05049	1SL5149A00	1SL5049A00	80X40	3X1 1/2	2710	3	2
05151	05051	1SL5151A00	1SL5051A00	100X40	4X1 1/2	3460	4	3
05153	05053	1SL5153A00	1SL5053A00	120X40	4 3/4X1 1/2	4200	5	4
05163	05063	1SL5163A00	1SL5063A00	25X60	1 X 2 1/4	1120	1	1
05165	05065	1SL5165A00	1SL5065A00	40X60	1 1/2X2 1/4	1970	2	1
05167	05067	1SL5167A00	1SL5067A00	60X60	2 1/4X2 1/4	3060	3	3
05169	05069	1SL5169A00	1SL5069A00	80X60	3X2 1/4	4190	5	4
05171	05071	1SL5171A00	1SL5071A00	100X60	4X2 1/4	5320	6	5
05173	05073	1SL5173A00	1SL5073A00	120X60	4 3/4X2 1/4	6330	7	6
05183	05083	1SL5183A00	1SL5083A00	25X80	1X3	1540	1	1
05185	05085	1SL5185A00	1SL5085A00	40X80	1 1/2X3	2670	3	2
05187	05087	1SL5187A00	1SL5087A00	60X80	2 1/4X3	4140	5	4
05189	05089	1SL5189A00	1SL5089A00	80X80	3X3	5650	6	5
05191	05091	1SL5191A00	1SL5091A00	100X80	4X3	7170	8	7
05193	05093	1SL5193A00	1SL5093A00	120X80	4 3/4X3	8570	10	8
05194	05094	1SL5194A00	1SL5094A00	25X100	1X4	1970	2	1
05195	05095	1SL5195A00	1SL5095A00	40X100	1 1/2X4	3410	4	3
05196	05096	1SL5196A00	1SL5096A00	60X100	2 1/4X4	5300	6	5
05197	05097	1SL5197A00	1SL5097A00	80X100	3X4	7190	8	7
05198	05098	1SL5198A00	1SL5098A00	100X100	4X4	9110	11	8
05199	05099	1SL5199A00	1SL5099A00	150X100	6X4	13,740	16	13

Wiring duct
Technical data

- Gray color — RAL 7030
- White color — RAL 9016
- Plastic insulating, shock-proof, self-extinguishing material in compliance with
  UL 94 VO Standard and resistant to abnormal heat and fire up to 960° (glow wire test) in compliance with IEC 695-2-1 Standard. UL File # E125800
- Minimum storage/transport temperature -5°C
- Minimum installation and usage temperature -15°C
- Maximum usage temperature +60°C.
- Resistance to acids, oils and greases
- No burr, rounded-off inner edges
- New rib profile makes it easy to open and close the cover and guarantees that it clips on more safely
- Designed to snap onto the Fix-O-rapid special accessory, suitable to be fastened both to DIN rail and base plate
- The ribs are cut using a special pressing process (rounding of the edges) producing wiring ducts completely free of burr and rough edges
- The dimensions and resilence of the ribs ensure repeated splaying during cabling
- Controlled splaying of sides to ensure a perfect seal of the cover in the vertical sections and at high temperatures
- Double trimming line, one at the base of the ribs so that they can be removed by bending them outwards, and one at the base of the lateral sides so that the edge can be cut when two wiring ducts are branched
- Cable holder moldings half-way up the straight section of the ribs in 80 and 100 mm high wiring ducts
- Cover can be opened without having to use a special tool
- Can be mounted on horizontal or vertical surfaces even when the cover is on the bottom
- Standard 2 meter length
- Industrial application

Wiring duct
Technical data
Resistance to chemical agents

Chemical	Concentration	Temp. °C	Resistance
Acetic acid, hydrous	10%	50	①
Acetic acid`	60%	50	①
Acetone	Traces	20	②
Acetone	100%	20	②
Acqua regia		20	①
Ammonia concentrate	88%	50	①
Ammonia, dry gas	100%	50	①
Ammonia, liquid	100%	20	③
Aniline, pure	100%	20	②
Arsenic acid, hydrous	concentrated	20	①
Barium hydroxide, hydr.	—	50	①
Beer	commercial	20	①
Benzene	—	20	②
Benzoic acid	—	20	③
Borax, hydrous	thinned	50	①
Boric acid, hydrous	thinned	50	①
Brandy	commercial	20	①
Bromide liquid	—	20	②
Butane gaseous	—	20	①
Butadiene	50%	50	①
Butarol	—	20	①
Butryic acid, hydrous	20%	20	①
Calcium chloride	—	50	①
Camphor oil	—	20	①
Carbon tetrachloride	—	20	③
Chlorine gaseous, dry	100%	20	①
Chlorine gaseous, moist	20%	20	③
Chlorine water	saturated	20	③
Chromic acid, hydrous	—	50	①
Citric acid, hydrous	—	50	①
Copper sulphate, hydrous	thinned	50	①
Diesel oil	—	20	①
Ethyl-alcohol	100% (in water)	20	①
Formaldehyde, hydrous	40%	50	①

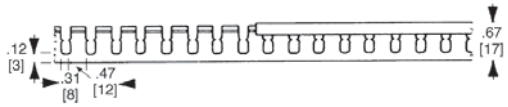
Chemical	Concentration	Temp. °C	Resistance
Formic acid	100%	20	①
Freon 12	—	20	①
Gasoline	—	50	①
Glycerine, hydrous	—	50	①
Hydrochloric acid	saturated	50	①
Hydrogen	—	50	①
Linseed oil	—	50	①
Lubricating oils	—	50	①
Mineral oil	—	50	①
Molasses	—	20	④
Oils and fats	commercial	50	①
Oil of turpentine	commercial	20	①
Ozone	—	20	①
Paraffin wax	—	50	①
Photographic developer	commercial	50	①
Photographic emulsions	—	50	①
Potassium permanganate	6%	20	①
Propane, liquid	—	20	①
Salicylic acid	—	50	①
Sea water	—	50	①
Soda, hydrous	satured	50	①
Sodium chloride	thinned	50	①
Spirits, all types	—	20	①
Sulphur	—	50	①
Sulphuric acid, hydrous	40%	50	①
Tannic acid	—	50	①
Tetrahydrofuran	—	20	②
Toluene	—	20	②
Urea, hydrous	—	50	①
Urine	—	50	①
Vinegar	commercial	50	①
Water	—	50	①
Wines, red & white	commercial	20	①
Zinc sulphate, hydrous	thinned	50	①

① Resistant
② Not sufficiently resistant
③ Resistant in certain conditions
④ Resistance to this product has been determined from the resistance to chemical products of similar composition

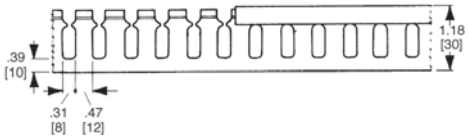
Wiring duct
Approximate dimensions

00.00 / 00.00 Inches [Millimeters]

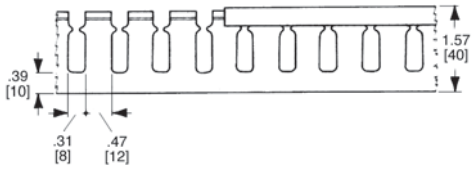
.31 – .47" [8-12 mm] slot
.87" [17 mm] height



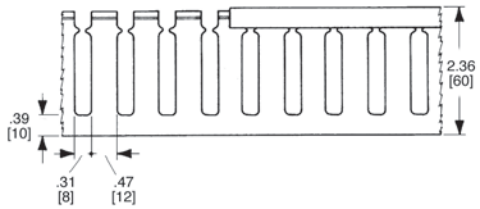
1.18" [30 mm] height



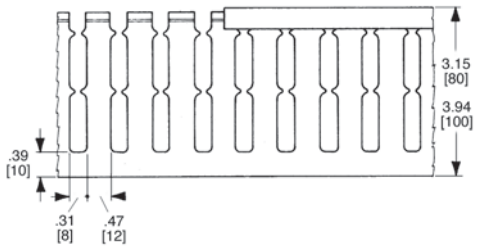
1.57" [40 mm] height



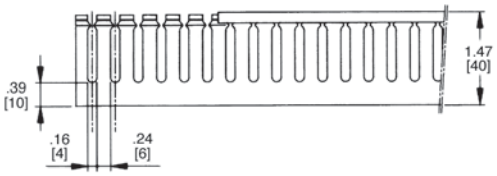
2.36" [60 mm] height



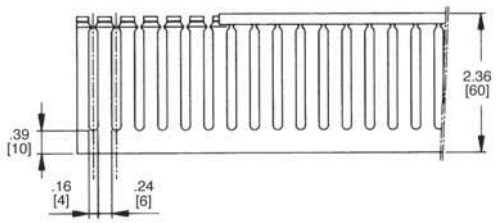
3.15", 3.94" [80 mm,100 mm] height



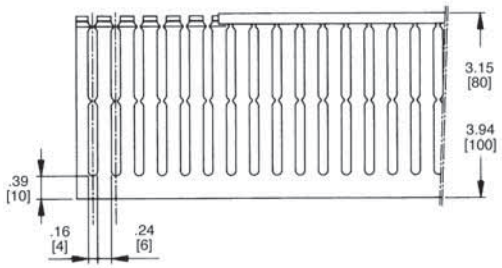
.16 – .24" [4 – 6 mm] slot
1.47" [40 mm] height



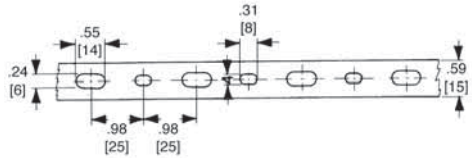
2.36" [60 mm] height



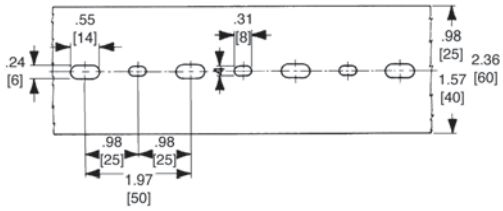
3.15", 3.94" [80 mm,100 mm] height



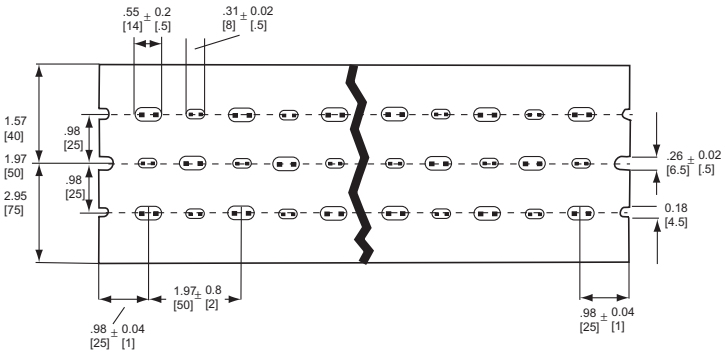
.16 – .24" [4 – 6 mm] & .31 – .47" [8 – 12 mm] spacing
.59" [15 mm width]



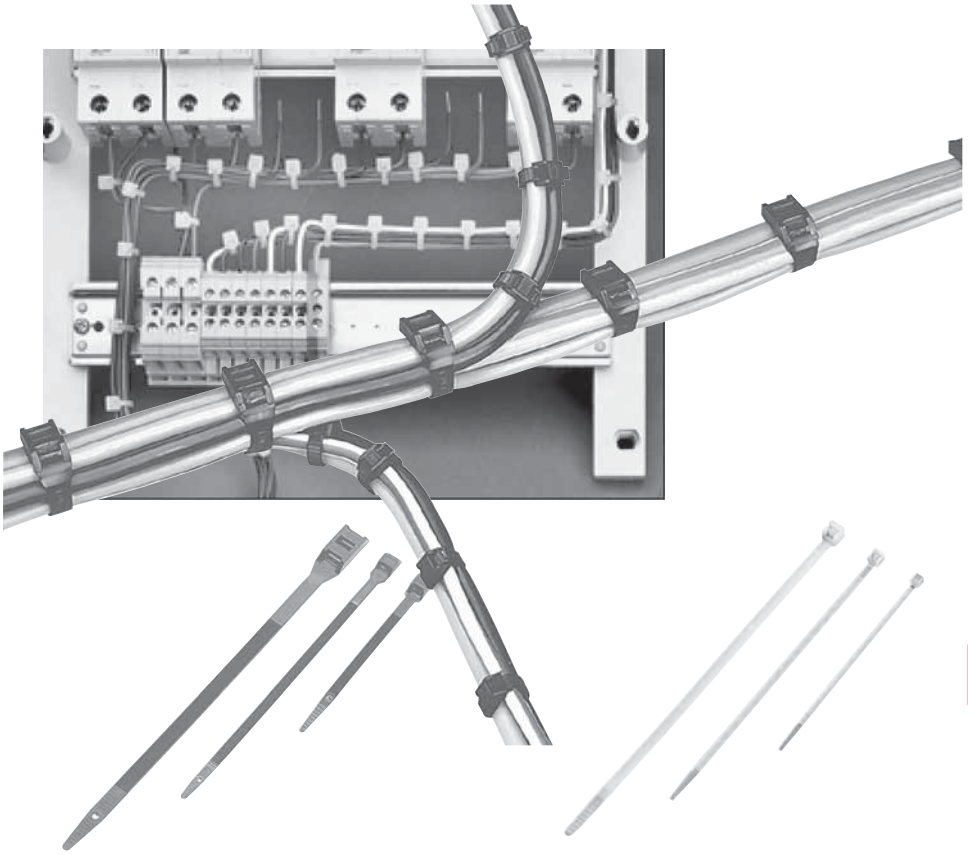
.98", 1.57", 2.36" [25, 40, 60 mm] width



1.57", 1.97", 2.95" [80, 100, 150 mm] width



Cable ties



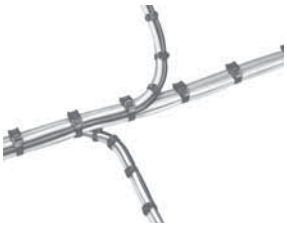
Features

- Easy to install and remove.
- Provides protection to the wire bundle.
- Available in white and black

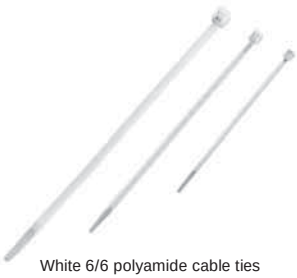
Applications

- Fast and economical grouping of wire bundles.
- Joining groups of wires and/or tubing.
- Flexible connections between door and panel

Cable ties



Sample cable tie installations



White 6/6 polyamide cable ties

Black 6/6 polyamide cable ties

Black 12 polyamide cable ties

Cable ties

Item L x W ②	Minimum tensile strength (lbs.)	Pieces per① package	Catalog number ①	List price per package
White (6/6 polyamide)				
3.94" (100 mm) x .10" (2.5 mm)	24		18010	**$ 6.50**
5.31" (135 mm) x .10" (2.5 mm)	24		18011	**7.00**
6.30" (160 mm) x .10" (2.5 mm)	24		18013	**8.00**
5.51 (140 mm) x .14" (3.5 mm)	44		18012	**8.00**
7.87" (200 mm) x .14" (3.5 mm)	44		18014	**9.00**
11.02" (280 mm) x .14" (3.5 mm)	44		18017	**12.00**
7.09" (180 mm) x .17" (4.5 mm)	61		18015	**10.25**
11.02" (280 mm) x .17" (4.5 mm)	61	100	18018	**19.00**
14.17" (360 mm) x .17" (4.5 mm)	61		18020	**23.00**
7.87" (200 mm) x .30" (7.5 mm)	143		18024	**22.00**
11.02" (280 mm) x .30" (7.5 mm)	143		18026	**28.00**
14.17" (360 mm) x .30" (7.5 mm)	143		18028	**34.00**
16.92" (430 mm) x .35" (9 mm)	176		18034	**46.00**
21.65" (550 mm) x .35" (9 mm)	176		18036	**55.00**
30.71" (780 mm) x .35" (9 mm)	176		18038	**75.00**
White (6/6 bulk)				
3.94" (100 mm) x .10" (2.5 mm)	24		18060	**55.00**
5.31" (135 mm) x .10" (2.5 mm)	24		18061	**60.00**
6.30" (160 mm) x .10" (2.5 mm)	24	1000	18063	**70.00**
5.51 (140 mm) x .14" (3.5 mm)	44		18062	**70.00**
7.87" (200 mm) x .14" (3.5 mm)	44		18064	**80.00**
Black (6/6 polyamide)				
3.94" (100 mm) x .10" (2.5 mm)	24		18110	**6.75**
5.31" (135 mm) x .10" (2.5 mm)	24		18111	**7.25**
6.30" (160 mm) x .10" (2.5 mm)	24		18113	**8.50**
5.51 (140 mm) x .14" (3.5 mm)	44		18112	**8.25**
7.87" (200 mm) x .14" (3.5 mm)	44		18114	**9.50**
11.02" (280 mm) x .14" (3.5 mm)	44		18117	**13.00**
7.09" (180 mm) x .17" (4.5 mm)	61	100	18115	**10.75**
11.02" (280 mm) x .17" (4.5 mm)	61		18118	**20.50**
14.17" (360 mm) x .17" (4.5 mm)	61		18120	**25.00**
7.87" (200 mm) x .30" (7.5 mm)	143		18124	**24.00**
11.02" (280 mm) x .30" (7.5 mm)	143		18126	**31.00**
14.17" (360 mm) x .30" (7.5 mm)	143		18128	**37.00**
16.92" (430 mm) x .35" (9 mm)	176		18134	**48.00**
21.65" (550 mm) x .35" (9 mm)	176		18136	**57.00**
30.71" (780 mm) x .35" (9 mm)	176		18138	**77.00**
Black (6/6 bulk)				
3.94" (100 mm) x .10" (2.5 mm)	24		18160	**57.00**
5.31" (135 mm) x .10" (2.5 mm)	24		18161	**63.00**
6.30" (160 mm) x .10" (2.5 mm)	24	1000	18163	**77.00**
5.51 (140 mm) x .14" (3.5 mm)	44		18162	**77.00**
7.87" (200 mm) x .14" (3.5 mm)	44		18164	**85.00**
Black (12 polyamide)				
4.53" (115 mm) x .24" (6 mm)	55		18210	**21.00**
6.89" (175 mm) x .24" (6 mm)	55		18212	**24.00**
4.53" (115 mm) x .35" (9 mm)	88	100	18218	**32.00**
7.09" (180 mm) x .35" (9 mm)	110		18220	**36.00**
10.43" (265 mm) x .35" (9 mm)	110		18222	**42.00**
14.17" (360 mm) x .35" (9 mm)	110		18224	**55.00**

① Sold in package quantity only.
② 25.4mm = 1 inch

Cable ties
Accessories


18250


18252


18270


18280


18282


18290

Cable tie accessories

Item	Pieces per ① package	Catalog number ①	List price per package
Self-adhesive base for cable ties (clear)	50	18250	**$ 18.00**
Self-adhesive base for cable ties (black)	50	18251	**18.00**
Screw mounted base for cable ties (clear)	100	18252	**14.00**
Screw mounted base for cable ties (black)	100	18253	**14.00**
Cable tie cutter	1	18270	**150.00**
Screw mounted base for cable ties	25	18280	**13.00**
Push-in base for cable ties	25	18282	**20.00**
Outer cable tie cutter	1	18290	**80.00**

① Sold in package quantity only.

Cable ties
Technical data & approximate dimensions

General features
- Manufactured in 6/6 nylon; Colorless for general uses
- Better stored at mild temperatures, away from heat and excessively dry conditions
- Black cable ties are UV resistant; excellent for outdoor applications

Thermal properties
- Suitable for use at temperatures from -40° to +110°C
- Softening point VICAT VST/B/50-DIN 53460 over 200°C

Electrical characteristics
- Dielectric endurance 50,000 V/mm

Chemical characteristics
- Good resistance to bases, oil, grease, hydrocarbons, acetone, chlorales
- Limited concentrated acid resistance
- Dissolved by phenol and formic acid

Mechanical characteristics
• Bending point	DIN 53452	110 M Pa
• Load point	DIN 53457	2800 M Pa
• Resilience	DIN 53453	6-8 KJ/m^2
• Yield point	DIN 53456	80 M Pa
• Stretch point	DIN 53455	35%
• Hardness	DIN 53456	125 N/mm^2

White polyamide Catalog number	Black polyamide Catalog number	Size L in [mm]	Size D in [mm]	Tightening diameter Minimum in [mm]	Tightening diameter Maximum in [mm]	Minimum tightness (N)	Minimum tightness (lbs.)	Pcs Unit/pack
18010	18110	3.94 [100]	.1 [2.5]	.08 [2]	.94 [24]	11	24	100/8000
18013	18113	6.29 [160]	.1 [2.5]	.08 [2]	1.65 [42]	11	24	100/5000
18012	18112	5.51 [140]	.14 [3.5]	.1 [2.5]	1.42 [36]	20	44	100/5000
18011	18111	5.31 [135]	.1 [2.5]	.08 [2]	1.38 [35]	11	24	100/6000
18014	18114	7.87 [200]	1.4 [3.5]	.1 [2.5]	1.38 [35]	20	44	100/4000
18015	18115	7.09 [180]	.18 [4.5]	.12 [3]	1.77 [45]	28	61	100/3000
18017	18117	11.02 [280]	1.4 [3.5]	.1 [2.5]	3.15 [80]	20	44	100/3000
18018	18118	11.02 [280]	.18 [4.5]	.2 [5]	3.0 [76]	28	61	100/2500
18020	18120	14.37 [360]	.18 [4.5]	.2 [5]	3.98 [101]	28	61	100/1500
18024	18124	7.87 [200]	.3 [7.5]	.2 [5]	2 [51]	65	143	100/2000
18026	18126	11.02 [280]	.3 [7.5]	.2 [5]	3.0 [76]	65	143	100/1000
18034	18134	16.93 [430]	.35 [9.0]	.2 [5.0]	4.33 [110]	80	176	100/2000
18036	18136	21.65 [550]	.35 [9.0]	.2 [5.0]	5.51 [140]	80	176	100/2000
18038	18138	30.71 [780]	.35 [9.0]	.2 [5.0]	7.48 [190]	80	176	100/800
18028	18128	14.17 [360]	.3 [7.5]	.2 [5.0]	4.02 [102]	65	143	100/2000

Cable ties
Technical data & approximate dimensions

General features
- Manufactured in 12 nylon
- Moisture absorption less than 1%
- Black cable ties are UV resistant; excellent for outdoor applications

Thermal properties
- Suitable for use at temperatures from -30° to +80°C
- Softening point VICAT VST/B/50-DIN 53460 over 160°C

Electrical characteristics
- Dielectric endurance 28,000 V/mm

Chemical characteristics
- Good resistance to bases, oil, grease, hydrocarbons, acetone, chlorales
- Limited resistance to nitric and chromic acid

Mechanical characteristics

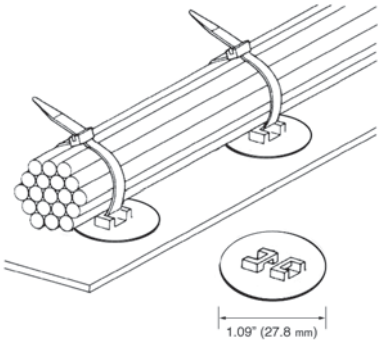
• Bending point	DIN 53452	20 M Pa
• Load point	DIN 53457	420 M Pa
• Breaking load point	DIN 53455	61 M Pa
• Resilience 20°C	DIN 53453	KJ/m not broken
• Yield point	DIN 53456	24 M Pa
• Stretch point	DIN 53455	37%
• Hardness	G2 Shore D	

Black polyamide Catalog number	Size L In [mm]	Size D in [mm]	Tightening diameter Minimum in [mm]	Tightening diameter Maximum in [mm]	Minimum tightness (N)	Minimum tightness (lbs.)	Pcs Unit/pack
18210	4.53 [115]	.24 [6]	.2 [5]	.79 [20]	25	55	100/3000
18212	6.89 [175]	.24 [6]	.39 [10]	1.57 [40]	25	55	100/2000
18218	4.53 [115]	.35 [9]	.2 [5]	.79 [20]	40	88	100/2000
18220	7.09 [180]	.35 [9]	.39 [10]	1.77 [45]	50	110	100/2000
18222	10.43 [265]	.35 [9]	.59 [15]	2.75 [70]	50	110	100/1000
18224	14.17 [360]	.35 [9]	.98 [25]	3.94 [100]	50	110	100/800

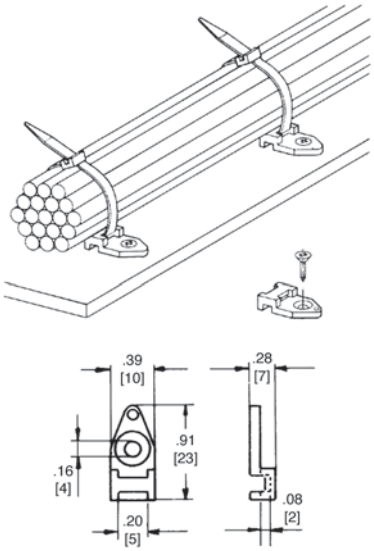
Cable ties
Approximate dimensions

00.00 / 00.00 Inches [Millimeters]

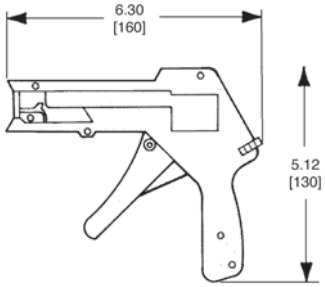
18250 & 18251
Self-adhesive base for cable ties



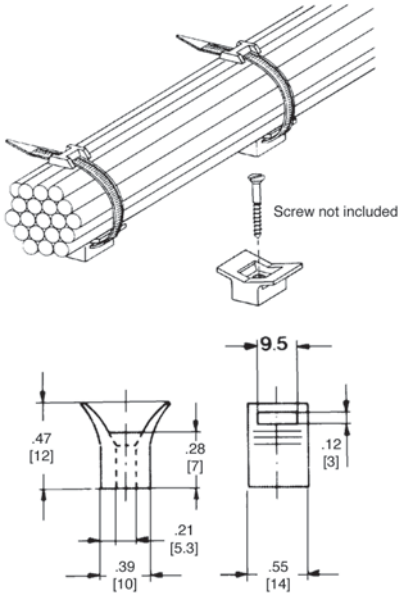
18252 & 18253
Screw-mounted base for cable ties



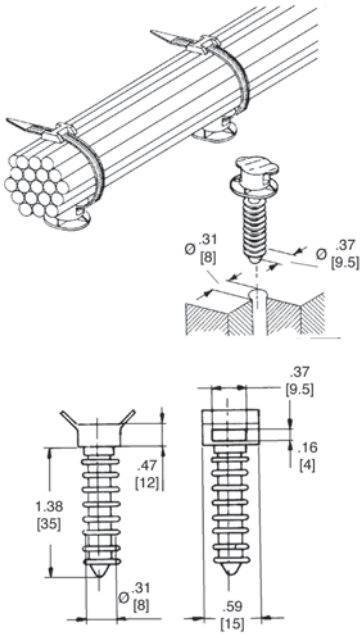
18270
Cable tie cutter



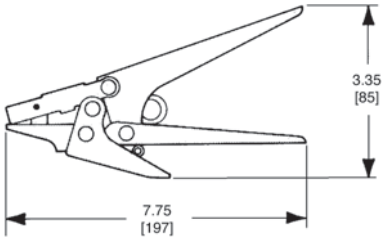
18280
Screw-mounted base for cable ties



18282
Push-in base for cable ties



18270
Cable tie cutter



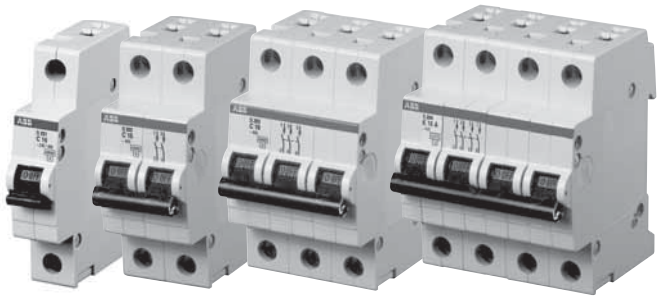
System pro M compact
Modular DIN rail products
Index

Continued next page

Index

S200 Miniature circuit breakers

System pro M compact
Miniature circuit breakers
S200, S200P, S200U, S200UP



Description

The S2 Series of miniature circuit breakers offer a compact solution to protection requirements. The S2 devices are current limiting, DIN rail mounted and can offer a good equivalent to fused systems.

The S2 is available with application-specific trip characteristics to provide maximum circuit protection. The breakers offer thermal-magnetic trip protection according to B, C, D, K and Z characteristics.

For the worldwide market, the breakers carry UL, CSA, IEC, CE and many other agency approvals and certifications.

Features

- Current limiting
- Fast breaking time (2.5 – 3.5 msec)
- Unique bus connection system
- Wide range of accessories
- Available with variable depth handle mechanism
- Optional Z curve for SCR protection
- CE certified and marked
- DIN rail or front panel mounting
- Finger safe terminals
- Multi-function terminals
- Suitable for reverse feed
- 480Y/277VAC and 500VDC versions
- **UL489 Listed - branch circuit protective device. UL file # E212323**
- **UL1077 Recognized - supplemental protective device. UL file # E76126**

UL Approved Miniature Molded Case Circuit Breakers and Supplemental Protectors

General information

General information

Miniature circuit breakers (MCBs) are used throughout the world in all types of electrical installations. ABB MCBs are approved for use by Underwriters Laboratories in systems rated up to 600VAC/VDC. Devices are also certified per CSA.

MCBs are approved per IEC-898 and VDE 0641, and certified under IEC-947 and VDE 0660 standards for use in systems rated up to 690VAC.

MCBs can be applied to 16 2/3Hz – 400Hz and DC power systems.

Special direct current version MCBs include a permanent magnet for DC fault current interruption. These "UC" versions are rated 250/500VDC under UL1077/CSA 22.2 No. 235.

Continuous current ratings are as low as 0.2 amperes and up to 125 amperes maximum.

MCBs are of compact size and can be quickly mounted on standard 35mm DIN rail or can be front mounted by use of a front mounting kit.

MCBs include line and load side terminals for conductors from 18 through 4AWG (0.75 – 25mm^2) for 63 amperes.

MCBs can also be connected via busbar conductors which can be either upper or lower mounted for top feed or bottom feed. Dual function terminals allow busbars to be connected with main incoming line conductors without separate lugs.

Accessories

Auxiliary devices can be added to the, S200 series MCBs:

- Shunt trips
- Auxiliary contacts
- Bell alarm contacts
- Aux/bell alarm contacts
- Undervoltage release

Accessory device modules can be field mounted to all above listed ABB MCBs. Auxiliary contacts are also available for the S500 series MCB.

Applications

MCBs can be used for equipment protection, in commercial appliances, protection of control circuits against overcurrent faults, computer equipment and other computer peripheral devices.

UL 489

S200U and S200UP MCBs are listed as molded case circuit breakers for use as branch circuit protective devices. Miniature MCCBs and accessories are listed under UL file E212323.

UL 1077

S200 and S200P MCBs are recognized as supplementary protectors and are intended for use as overcurrent protection within an appliance or other electrical equipment where branch circuit overcurrent protection is already provided or not required. MCBs and accessories are recognized under UL File E76126.

CSA C22.2

MCBs and accessories are certified under CSA C22.2 No. 235 per File LR98793.

Tripping characteristics

Time-current curves

ABB miniature circuit breakers are available with different trip characteristics, allowing for maximum system protection.

B Characteristic

Available with the S200 and S500 series has rated currents of 6 through 63 amperes in 10 steps. The "B" time-current curve is designed primarily for use in cable protection applications. Instantaneous tripping occurs between approximately 3 to 5 times rated current in 50/60Hz systems. This quick trip curve maximizes protection of control circuits under low short circuit fault levels that could damage control wiring.

C Characteristic

Available in the S200 and S500 series with rated currents up through 63 amperes and the S290 series with rated currents of 80, 100 and 125 amperes. The "C" time-current curve is designed for medium magnetic start-up currents. Instantaneous tripping occurs between 5 and 10 times rated current in 50/60 Hz systems.

D Characteristic

The new magnetic trip action has an instantaneous trip between 10 and 20 times the breaker rating. Thus, the S200 and S500-D can be a good protective solution for applications involving high in-rush transformers, motors and other high inductive systems. It is also suitable for any application where a high instantaneous trip point is desired.

K Characteristic

The "K" time-current characteristic considers high magnetic start-up currents from motors, transformers and other equipment. Instantaneous tripping occurs between 8 and 12 times rated current in 50/60Hz systems. The "K" characteristic is available up through 63 amperes.

The "K" curve offers the best protection for the broadest range of electrical systems. The higher magnetic trip settings maximizes protection while allowing for higher in-rush currents during system start-up. Available in S200P, S200U, S200UP and S500.

Z Characteristic

Also available up through 63 amperes, the "Z" characteristic offers instantaneous tripping between 2 and 3 times rated current in 50/60Hz systems. This trip characteristic is available in the S200P, S200U and S200UP series with both the 480Y/277VAC and 250/500VDC ratings.

Many applications require a very low short circuit trip setting in order to protect semiconductor or other sensitive devices and the "Z" trip characteristic may provide maximum protection and service in these applications.

General information
Interruption ratings
Trip characteristics overview

Interruption ratings

Voltage	Rated interrupting capacity	Rated current	MCB type	Comment
120 VAC	10kA	0.5 - 63A	S200-B,C,D	
		0.5 - 63A	S200-K	
		0.2 - 63A	S200P-K, Z	
		0.2 - 63A	S200U-K, Z	
		0.2 - 25A	S200UP-K, Z	
	18kA	32 - 63A	S500-B,C,D	
		26 - 45A	S500-K	
	30kA	6 - 25A	S500-B,C,D	
		0.15 - 25A	S500-K	
240 VAC	6kA	0.5 - 63A	S200-B,C,D	Single pole
		0.5 - 63A	S200-K	Single pole
	10kA	0.5 - 63A	S200-B,C,D	Multi pole
		0.5 - 63A	S200-K	Multi pole
		0.2 - 63A	S200P-K,Z	Single pole
		0.2 - 63A	S200P-K,Z	Multi pole
		0.2 - 63A	S200U-K,Z	Single pole
		0.2 - 63A	S200U-K,Z	Multi pole
		0.2 - 25A	S200UP-K,Z	Single pole
		0.2 - 25A	S200UP-K,Z	Multi pole
	18kA	32 - 63A	S500-B,C,D	
		26 - 45A	S500-K	
	30kA	6 - 25A	S500-B,C,D	
		0.15 - 25A	S500-K	
277 VAC	6kA	0.5 - 63A	S200-B,C,D	
		0.5 - 63A	S200-K	
	10KA	0.2 - 63A	S200P-K,Z	
		0.2 - 25A	S200UP-K,Z	
480Y/277 VAC	6kA	0.5 - 63A	S200-B,C,D	
		0.5 - 63A	S200-K	
	10KA	0.2 - 63A	S200P-K,Z	
		0.2 - 25A	S200UP-K,Z	
60 VDC	10kA	0.5 - 63A	S200-B,C,D	Single pole
		0.5 - 63A	S200-K	Single pole
125 VDC	10kA	0.5 - 63A	S200-B,C,D	Multi pole
		0.5 - 63A	S200-K	Multi pole
		0.2 - 63A	S280UC-K,Z	Single pole
250 VDC	4.5kA	0.2 - 63A	S280UC-K,Z	Single pole
500 VDC	4.5kA	0.2 - 63A	S280UC-K,Z	Multi pole

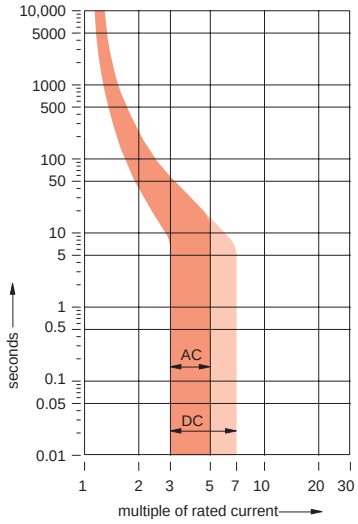
Trip characteristics overview

Curve	Magnetic characteristic ①	Thermal characteristic	Series
B	3 - 5X	1.13 1.45X	S200, S500
C	5 - 10X	1.13 1.45X	S200, S290, S500
D	10 - 20X	1.13 1.45X	S200, S500
K	8 - 12X	1.05 1.20X	S200, S500
Z	2 - 3X	1.05 1.20X	S200

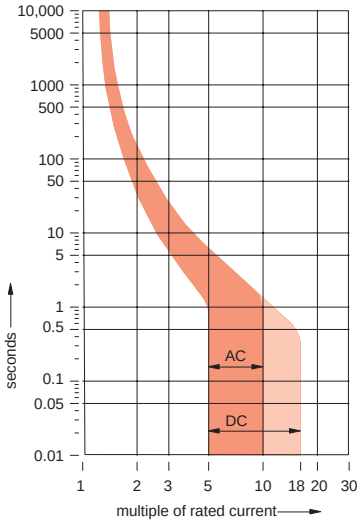
① All values are relative to MCB's ampere rating.

General information
Tripping curves

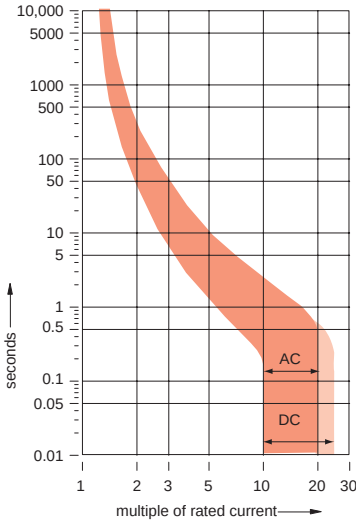
B



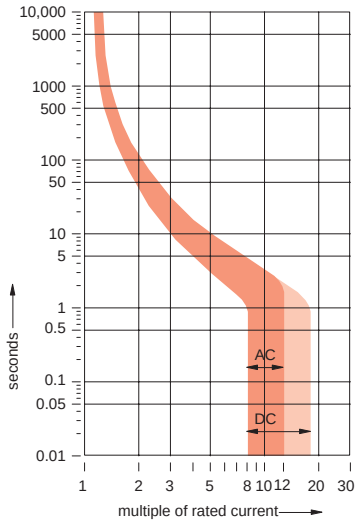
C



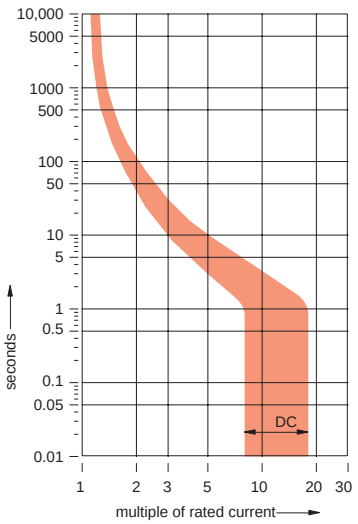
D



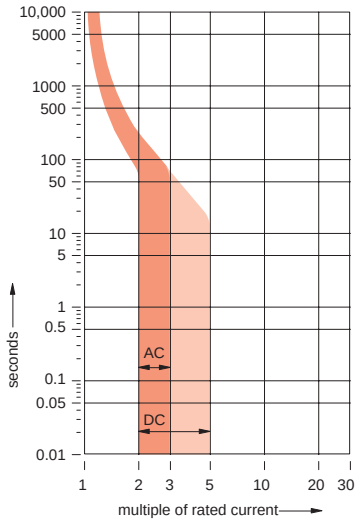
K



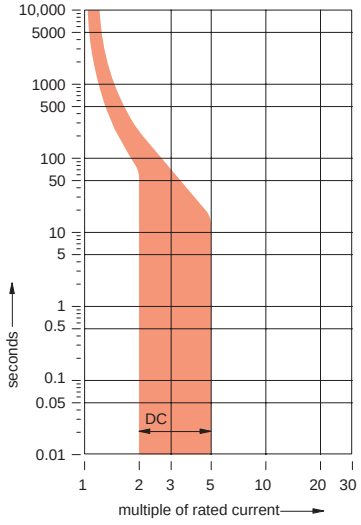
UC-K

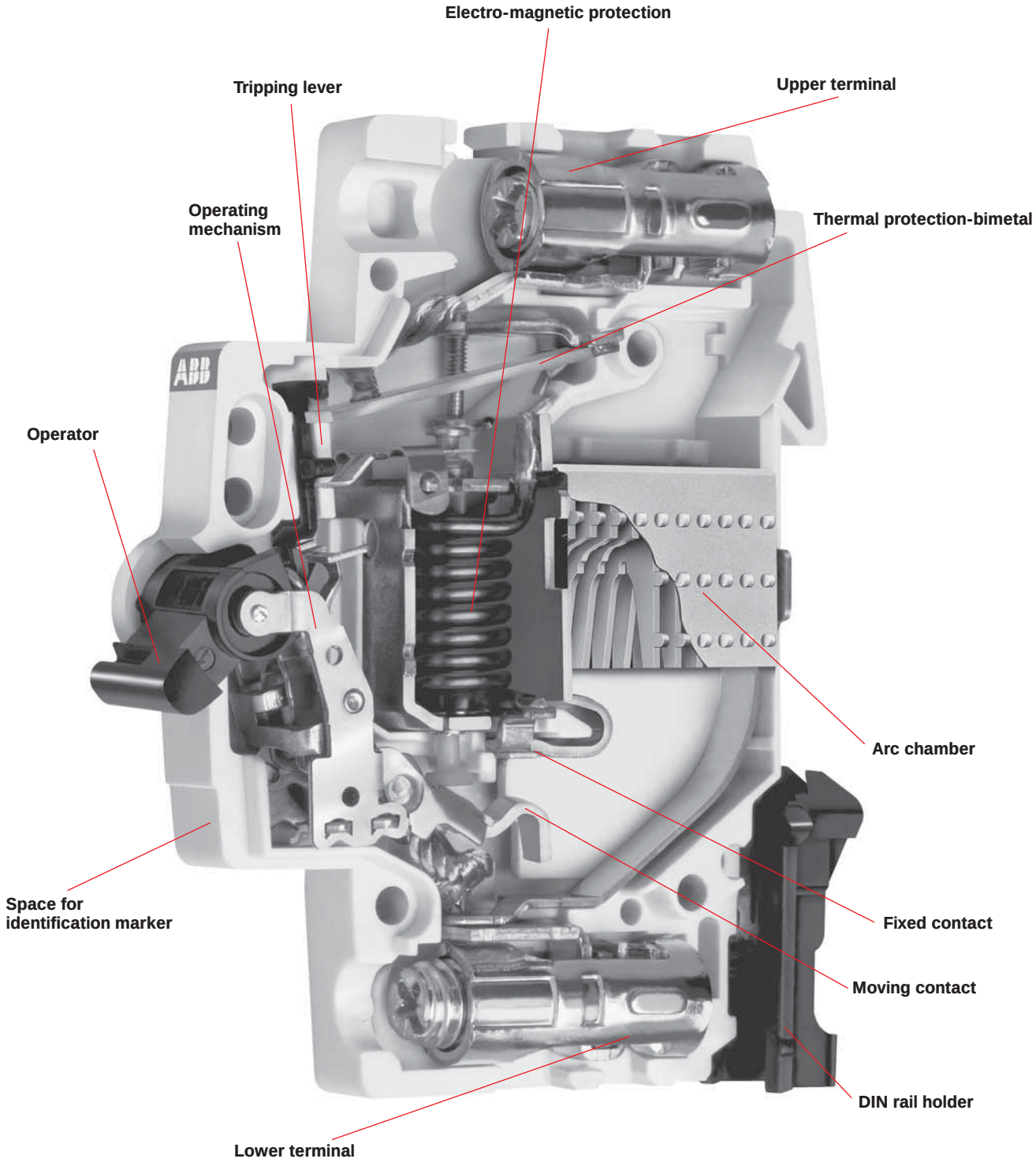


Z



UC-Z




Electro-magnetic protection
Tripping lever
Upper terminal
Operating mechanism
Thermal protection-bimetal
Operator
Arc chamber
Space for identification marker
Fixed contact
Moving contact
DIN rail holder
Lower terminal

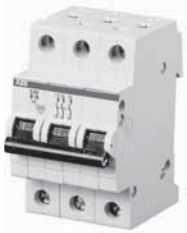
S200
480Y/277 VAC
Supplemental protectors

B

UL 1077 CSA C22.2 No. 235
VDE 0641 IEC-898
Cable protection

S201-B, 1 pole

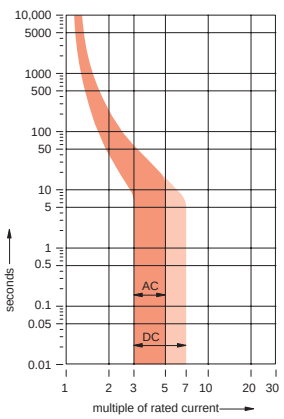
S202-B, 2 pole
S201-BNA, 1 P+N



S203-B, 3 pole

S204-B, 4 pole
S203-BNA, 3P+N

B



Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
1 pole					
6	S201-B6	**$ 36**	A	10	4.5
10	S201-B10	**36**			
13	S201-B13	**36**			
16	S201-B16	**36**			
20	S201-B20	**38**			
25	S201-B25	**38**			
32	S201-B32	**40**			
40	S201-B40	**42**			
50	S201-B50	**48**			
63	S201-B63	**56**			
1 pole + neutral					
6	S201-B6NA	**62**	B	5	9.0
10	S201-B10NA	**62**			
13	S201-B13NA	**62**			
16	S201-B16NA	**62**			
20	S201-B20NA	**68**			
25	S201-B25NA	**72**			
32	S201-B32NA	**74**			
40	S201-B40NA	**76**			
50	S201-B50NA	**90**			
63	S201-B63NA	**102**			
2 pole					
6	S202-B6	**78**	A	5	9.0
10	S202-B10	**78**			
13	S202-B13	**78**			
16	S202-B16	**78**			
20	S202-B20	**86**			
25	S202-B25	**88**			
32	S202-B32	**94**			
40	S202-B40	**98**			
50	S202-B50	**112**			
63	S202-B63	**128**			

Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
3 pole					
6	S203-B6	**$ 118**	A	1	13.5
10	S203-B10	**118**			
13	S203-B13	**118**			
16	S203-B16	**118**			
20	S203-B20	**130**			
25	S203-B25	**132**			
32	S203-B32	**142**			
40	S203-B40	**148**			
50	S203-B50	**170**			
63	S203-B63	**194**			
3 pole + neutral					
6	S203-B6NA	**142**	B	1	18.0
10	S203-B10NA	**142**			
13	S203-B13NA	**142**			
16	S203-B16NA	**142**			
20	S203-B20NA	**162**			
25	S203-B25NA	**168**			
32	S203-B32NA	**176**			
40	S203-B40NA	**184**			
50	S203-B50NA	**212**			
63	S203-B63NA	**240**			
4 pole					
6	S204-B6	**156**	B	1	18.0
10	S204-B10	**156**			
13	S204-B13	**156**			
16	S204-B16	**156**			
20	S204-B20	**172**			
25	S204-B25	**176**			
32	S204-B32	**188**			
40	S204-B40	**196**			
50	S204-B50	**224**			
63	S204-B63	**256**			

Delivery Class

A - Standard item, stock to 2 weeks lead time
B - Stock to 4 weeks lead time
C - 6 to 8 week lead time

S200
480Y/277 VAC
Supplemental protectors

System pro M
S200 Series

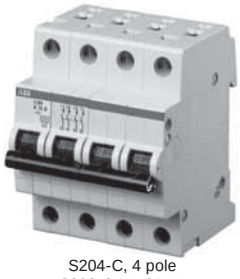
C

UL 1077 CSA C22.2 - NO. 235
VDE 0641 IEC-898
Cable & equipment protection

S201-C, 1 pole

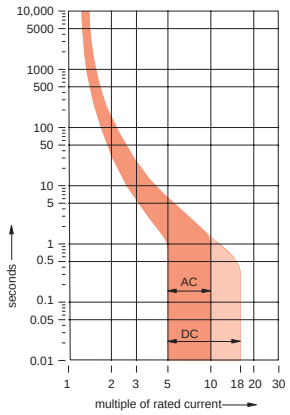
S202-C, 2 pole
S201-CNA, 1P+N

S203-C, 3 pole



S204-C, 4 pole
S203-CNA, 3P+N

C



1 pole

Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
0.5	S201-C0.5	$ 42			
1	S201-C1	42			
1.6	S201-C1.6	42			
2	S201-C2	42			
3	S201-C3	42			
4	S201-C4	42			
6	S201-C6	42			
8	S201-C8	42			
10	S201-C10	42	A	10	4.5
13	S201-C13	42			
16	S201-C16	42			
20	S201-C20	42			
25	S201-C25	46			
32	S201-C32	48			
40	S201-C40	52			
50	S201-C50	60			
63	S201-C63	68			

1 pole + neutral

Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
0.5	S201-C0.5NA	84			
1	S201-C1NA	84			
1.6	S201-C1.6NA	84			
2	S201-C2NA	84			
3	S201-C3NA	84			
4	S201-C4NA	84			
6	S201-C6NA	84			
8	S201-C8NA	84	B	5	9.0
10	S201-C10NA	84			
13	S201-C13NA	84			
16	S201-C16NA	84			
20	S201-C20NA	84			
25	S201-C25NA	88			
32	S201-C32NA	90			
40	S201-C40NA	96			
50	S201-C50NA	112			
63	S201-C63NA	130			

2 pole

Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
0.5	S202-C0.5	96			
1	S202-C1	96			
1.6	S202-C1.6	96			
2	S202-C2	96			
3	S202-C3	96			
4	S202-C4	96			
6	S202-C6	96			
8	S202-C8	96	A	5	9.0
10	S202-C10	96			
13	S202-C13	96			
16	S202-C16	96			
20	S202-C20	96			
25	S202-C25	106			
32	S202-C32	106			
40	S202-C40	116			
50	S202-C50	136			
63	S202-C63	152			

3 pole

Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
0.5	S203-C0.5	$ 138			
1	S203-C1	138			
1.6	S203-C1.6	138			
2	S203-C2	138			
3	S203-C3	138			
4	S203-C4	138			
6	S203-C6	138			
8	S203-C8	138			
10	S203-C10	138	A	1	13.5
13	S203-C13	138			
16	S203-C16	138			
20	S203-C20	138			
25	S203-C25	156			
32	S203-C32	158			
40	S203-C40	174			
50	S203-C50	200			
63	S203-C63	228			

3 pole + neutral

Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
0.5	S203-C0.5NA	200			
1	S203-C1NA	200			
1.6	S203-C1.6NA	200			
2	S203-C2NA	200			
3	S203-C3NA	200			
4	S203-C4NA	200			
6	S203-C6NA	200			
8	S203-C8NA	200	B	1	18.0
10	S203-C10NA	200			
13	S203-C13NA	200			
16	S203-C16NA	200			
20	S203-C20NA	200			
25	S203-C25NA	206			
32	S203-C32NA	212			
40	S203-C40NA	224			
50	S203-C50NA	204			
63	S203-C63NA	304			

4 pole

Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
0.5	S204-C0.5	218			
1	S204-C1	218			
1.6	S204-C1.6	218			
2	S204-C2	218			
3	S204-C3	218			
4	S204-C4	218			
6	S204-C6	218			
8	S204-C8	218	B	1	18.0
10	S204-C10	218			
13	S204-C13	218			
16	S204-C16	218			
20	S204-C20	218			
25	S204-C25	234			
32	S204-C32	238			
40	S204-C40	260			
50	S204-C50	300			
63	S204-C63	338			

Delivery Class

A - Standard item, stock to 2 weeks lead time
B - Stock to 4 weeks lead time
C - 6 to 8 week lead time

14

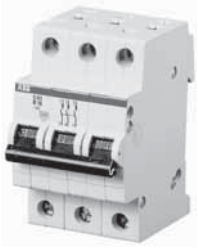
S200
480Y/277 VAC
Supplemental protectors

D

UL 1077 CSA C22.2
VDE 0641 IEC-898
Cable & equipment protection

S201-D, 1 pole

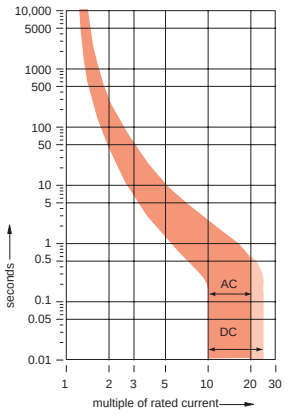
S202-D, 2 pole



S203-D, 3 pole

14

D



Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
1 pole					
0.5	S201-D0.5	**$ 42**			
1	S201-D1	**42**			
1.6	S201-D1.6	**42**			
2	S201-D2	**42**			
3	S201-D3	**42**			
4	S201-D4	**42**			
6	S201-D6	**42**			
8	S201-D8	**42**			
10	S201-D10	**42**	A	10	4.5
13	S201-D13	**42**			
16	S201-D16	**42**			
20	S201-D20	**42**			
25	S201-D25	**46**			
32	S201-D32	**48**			
40	S201-D40	**52**			
50	S201-D50	**60**			
63	S201-D63	**68**			
2 pole					
0.5	S202-D0.5	**96**			
1	S202-D1	**96**			
1.6	S202-D1.6	**96**			
2	S202-D2	**96**			
3	S202-D3	**96**			
4	S202-D4	**96**			
6	S202-D6	**96**			
8	S202-D8	**96**			
10	S202-D10	**96**	A	5	9.0
13	S202-D13	**96**			
16	S202-D16	**96**			
20	S202-D20	**96**			
25	S202-D25	**106**			
32	S202-D32	**106**			
40	S202-D40	**116**			
50	S202-D50	**136**			
63	S202-D63	**152**			

Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
3 pole					
0.5	S203-D0.5	**$ 138**			
1	S203-D1	**138**			
1.6	S203-D1.6	**138**			
2	S203-D2	**138**			
3	S203-D3	**138**			
4	S203-D4	**138**			
6	S203-D6	**138**			
8	S203-D8	**138**	A	1	13.5
10	S203-D10	**138**			
13	S203-D13	**138**			
16	S203-D16	**138**			
20	S203-D20	**138**			
25	S203-D25	**156**			
32	S203-D32	**158**			
40	S203-D40	**174**			
50	S203-D50	**200**			
63	S203-D63	**228**			

S200
480Y/277 VAC
Supplemental protectors

System pro M
S200 Series

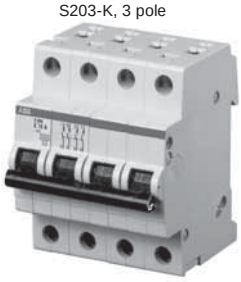
K

UL 1077 CSA C22.2 - NO. 235
VDE 0641 IEC-898
Cable & equipment protection

S201-K, 1 pole

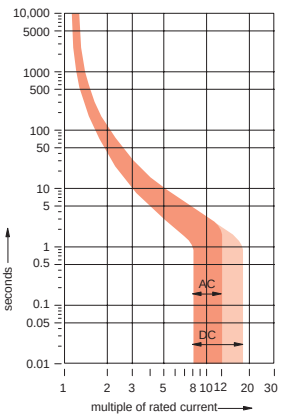
S202-K, 2 pole
S201-KNA, 1P+N

S203-K, 3 pole



S204-K, 4 pole
S203-KNA, 3P+N

K



1 pole

Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
0.5	S201-K0.5	**$ 42**			
1	S201-K1	**42**			
1.6	S201-K1.6	**42**			
2	S201-K2	**42**			
3	S201-K3	**42**			
4	S201-K4	**42**			
5	S201-K5	**42**			
6	S201-K6	**42**			
8	S201-K8	**42**			
10	S201-K10	**42**			
13	S201-K13	**42**	A	10	4.5
15	S201-K15	**42**			
16	S201-K16	**42**			
20	S201-K20	**42**			
25	S201-K25	**46**			
30	S201-K30	**48**			
32	S201-K32	**48**			
40	S201-K40	**52**			
50	S201-K50	**60**			
60	S201-K60	**68**			
63	S201-K63	**68**			

1 pole + neutral

Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
0.5	S201-K0.5NA	**84**			
1	S201-K1NA	**84**			
1.6	S201-K1.6NA	**84**			
2	S201-K2NA	**84**			
3	S201-K3NA	**84**			
4	S201-K4NA	**84**			
6	S201-K6NA	**84**			
8	S201-K8NA	**84**			
10	S201-K10NA	**84**	B	5	9.0
13	S201-K13NA	**84**			
16	S201-K16NA	**84**			
20	S201-K20NA	**84**			
25	S201-K25NA	**88**			
32	S201-K32NA	**90**			
40	S201-K40NA	**96**			
50	S201-K50NA	**112**			
63	S201-K63NA	**130**			

2 pole

Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
0.5	S202-K0.5	**96**			
1	S202-K1	**96**			
1.6	S202-K1.6	**96**			
2	S202-K2	**96**			
3	S202-K3	**96**			
4	S202-K4	**96**			
5	S202-K5	**96**			
6	S202-K6	**96**			
8	S202-K8	**96**			
10	S202-K10	**96**	A	5	9.0
13	S202-K13	**96**			
15	S202-K15	**96**			
16	S202-K16	**96**			
20	S202-K20	**96**			
25	S202-K25	**106**			
30	S202-K30	**106**			
32	S202-K32	**106**			
40	S202-K40	**116**			
50	S202-K50	**136**			
60	S202-K60	**152**			
63	S202-K63	**152**			

3 pole

Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
0.5	S203-K0.5	**$ 138**			
1	S203-K1	**138**			
1.6	S203-K1.6	**138**			
2	S203-K2	**138**			
3	S203-K3	**138**			
4	S203-K4	**138**			
5	S203-K5	**138**			
6	S203-K6	**138**			
8	S203-K8	**138**			
10	S203-K10	**138**			
13	S203-K13	**138**	A	1	13.5
15	S203-K15	**138**			
16	S203-K16	**138**			
20	S203-K20	**138**			
25	S203-K25	**156**			
30	S203-K30	**158**			
32	S203-K32	**158**			
40	S203-K40	**174**			
50	S203-K50	**200**			
60	S203-K60	**228**			
63	S203-K63	**228**			

3 pole + neutral

Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
0.5	S203-K0.5NA	**200**			
1	S203-K1NA	**200**			
1.6	S203-K1.6NA	**200**			
2	S203-K2NA	**200**			
3	S203-K3NA	**200**			
4	S203-K4NA	**200**			
6	S203-K6NA	**200**			
8	S203-K8NA	**200**			
10	S203-K10NA	**200**	B	1	18.0
13	S203-K13NA	**200**			
16	S203-K16NA	**200**			
20	S203-K20NA	**200**			
25	S203-K25NA	**206**			
32	S203-K32NA	**212**			
40	S203-K40NA	**224**			
50	S203-K50NA	**264**			
63	S203-K63NA	**304**			

4 pole

Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
0.5	S204-K0.5	**218**			
1	S204-K1	**218**			
1.6	S204-K1.6	**218**			
2	S204-K2	**218**			
3	S204-K3	**218**			
4	S204-K4	**218**			
6	S204-K6	**218**			
8	S204-K8	**218**	B	1	18.0
10	S204-K10	**218**			
13	S204-K13	**218**			
16	S204-K16	**218**			
20	S204-K20	**218**			
25	S204-K25	**234**			
32	S204-K32	**238**			
40	S204-K40	**260**			
50	S204-K50	**300**			
63	S204-K63	**338**			

Delivery Class

A - Standard item, stock to 2 weeks lead time
B - Stock to 4 weeks lead time
C - 6 to 8 week lead time

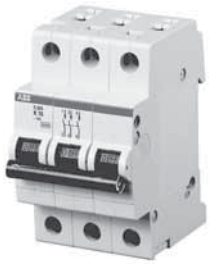
14

S200P
480Y/277 VAC
Supplemental protectors

K UL 1077 CSA C22.2 - NO. 235
VDE 0660
Cable & equipment protection


S201P-K, 1 pole


S202P-K, 2 pole


S203P-K, 3 pole

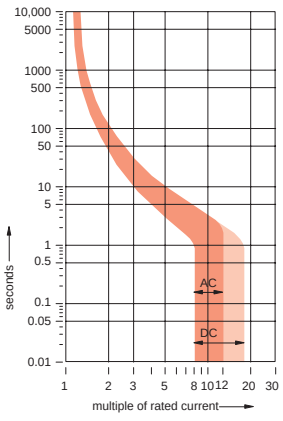
Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
1 pole					
0.2	S201P-K0.2	**$ 54**			
0.3	S201P-K0.3	**54**			
0.5	S201P-K0.5	**54**			
0.75	S201P-K0.75	**54**			
1	S201P-K1	**54**			
1.6	S201P-K1.6	**54**			
2	S201P-K2	**54**			
3	S201P-K3	**54**			
4	S201P-K4	**54**			
6	S201P-K6	**54**			
8	S201P-K8	**54**	A	10	4.6
10	S201P-K10	**54**			
13	S201P-K13	**54**			
16	S201P-K16	**54**			
20	S201P-K20	**54**			
25	S201P-K25	**56**			
32	S201P-K32	**58**			
40	S201P-K40	**64**			
50	S201P-K50	**70**			
63	S201P-K63	**80**			
2 pole					
0.2	S202P-K0.2	**128**			
0.3	S202P-K0.3	**128**			
0.5	S202P-K0.5	**128**			
0.75	S202P-K0.75	**128**			
1	S202P-K1	**128**			
1.6	S202P-K1.6	**128**			
2	S202P-K2	**128**			
3	S202P-K3	**128**			
4	S202P-K4	**128**			
6	S202P-K6	**128**	A	5	9.2
8	S202P-K8	**128**			
10	S202P-K10	**128**			
13	S202P-K13	**128**			
16	S202P-K16	**128**			
20	S202P-K20	**128**			
25	S202P-K25	**130**			
32	S202P-K32	**134**			
40	S202P-K40	**134**			
50	S202P-K50	**162**			
63	S202P-K63	**182**			

Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
3 pole					
0.2	S203P-K0.2	**$ 194**			
0.3	S203P-K0.3	**194**			
0.5	S203P-K0.5	**194**			
0.75	S203P-K0.75	**194**			
1	S203P-K1	**194**			
1.6	S203P-K1.6	**194**			
2	S203P-K2	**194**			
3	S203P-K3	**194**			
4	S203P-K4	**194**			
6	S203P-K6	**194**	A	1	13.9
8	S203P-K8	**194**			
10	S203P-K10	**194**			
13	S203P-K13	**194**			
16	S203P-K16	**194**			
20	S203P-K20	**194**			
25	S203P-K25	**196**			
32	S203P-K32	**200**			
40	S203P-K40	**214**			
50	S203P-K50	**246**			
63	S203P-K63	**280**			

Delivery Class

A - Standard item, stock to 2 weeks lead time
B - Stock to 4 weeks lead time
C - 6 to 8 week lead time

K



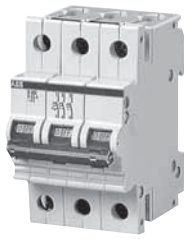
S280 (W)
480Y/277 VAC
Supplemental protectors

System pro M S200 Series

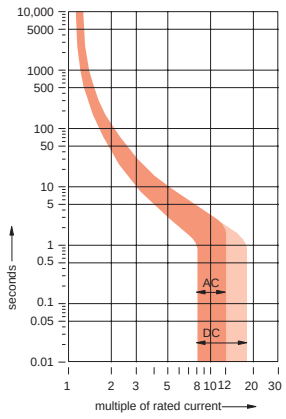
K UL 1077 CSA C22.2 - NO. 235
VDE 0660
Cable & equipment protection


S281-KW, 1 pole


S282-KW, 2 pole


S283-KW, 3 pole

K



Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
1 pole					
0.2	S281-K0.2W	**$ 54**			
0.3	S281-K0.3W	**54**			
0.5	S281-K0.5W	**54**			
0.75	S281-K0.75W	**54**			
1	S281-K1W	**54**			
1.6	S281-K1.6W	**54**			
2	S281-K2W	**54**			
3	S281-K3W	**54**			
4	S281-K4W	**54**			
6	S281-K6W	**54**			
8	S281-K8W	**54**	B	10	4.6
10	S281-K10W	**54**			
13	S281-K13W	**54**			
16	S281-K16W	**54**			
20	S281-K20W	**54**			
25	S281-K25W	**56**			
32	S281-K32W	**58**			
40	S281-K40W	**64**			
50	S281-K50W	**70**			
63	S281-K63W	**80**			
2 pole					
0.2	S282-K0.2W	**128**			
0.3	S282-K0.3W	**128**			
0.5	S282-K0.5W	**128**			
0.75	S282-K0.75W	**128**			
1	S282-K1W	**128**			
1.6	S282-K1.6W	**128**			
2	S282-K2W	**128**			
3	S282-K3W	**128**			
4	S282-K4W	**128**			
6	S282-K6W	**128**	B	5	9.2
8	S282-K8W	**128**			
10	S282-K10W	**128**			
13	S282-K13W	**128**			
16	S282-K16W	**128**			
20	S282-K20W	**128**			
25	S282-K25W	**130**			
32	S282-K32W	**134**			
40	S282-K40W	**134**			
50	S282-K50W	**162**			
63	S282-K63W	**182**			

Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
3 pole					
0.2	S283-K0.2W	**$ 194**			
0.3	S283-K0.3W	**194**			
0.5	S283-K0.5W	**194**			
0.75	S283-K0.75W	**194**			
1	S283-K1W	**194**			
1.6	S283-K1.6W	**194**			
2	S283-K2W	**194**			
3	S283-K3W	**194**			
4	S283-K4W	**194**			
6	S283-K6W	**194**	B	3	13.9
8	S283-K8W	**194**			
10	S283-K10W	**194**			
13	S283-K13W	**194**			
16	S283-K16W	**194**			
20	S283-K20W	**194**			
25	S283-K25W	**196**			
32	S283-K32W	**200**			
40	S283-K40W	**214**			
50	S283-K50W	**246**			
63	S283-K63W	**280**			

Delivery Class

A - Standard item, stock to 2 weeks lead time
B - Stock to 4 weeks lead time
C - 6 to 8 week lead time

For use with ring tongue terminal connectors

14

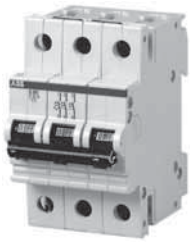
S280UC
500 VDC
Supplemental protectors

K

UL 1077 VDE 0660
CSA 22.2 No. 235
Cable and Equipment Protection

S281UC-K, 1 pole

S282UC-K, 2 pole



S283UC-K, 3 pole

Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
1 pole					
0.2	S281UC-K0.2	**$ 104**			
0.3	S281UC-K0.3	**104**			
0.5	S281UC-K0.5	**104**			
0.75	S281UC-K0.75	**104**			
1	S281UC-K1	**104**			
1.6	S281UC-K1.6	**104**			
2	S281UC-K2	**104**			
3	S281UC-K3	**104**			
4	S281UC-K4	**104**			
6	S281UC-K6	**104**	B	10	4.6
8	S281UC-K8	**104**			
10	S281UC-K10	**104**			
16	S281UC-K16	**104**			
20	S281UC-K20	**104**			
25	S281UC-K25	**108**			
32	S281UC-K32	**110**			
40	S281UC-K40	**116**			
50	S281UC-K50	**136**			
63	S281UC-K63	**152**			
2 pole					
0.2	S282UC-K0.2	**242**			
0.3	S282UC-K0.3	**242**			
0.5	S282UC-K0.5	**242**			
0.75	S282UC-K0.75	**242**			
1	S282UC-K1	**242**			
1.6	S282UC-K1.6	**242**			
2	S282UC-K2	**242**			
3	S282UC-K3	**242**			
4	S282UC-K4	**242**	B	5	9.2
6	S282UC-K6	**242**			
8	S282UC-K8	**242**			
10	S282UC-K10	**242**			
16	S282UC-K16	**242**			
20	S282UC-K20	**242**			
25	S282UC-K25	**248**			
32	S282UC-K32	**256**			
40	S282UC-K40	**266**			
50	S282UC-K50	**312**			
63	S282UC-K63	**348**			

Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
3 pole					
0.2	S283UC-K0.2	**$ 370**			
0.3	S283UC-K0.3	**370**			
0.5	S283UC-K0.5	**370**			
0.75	S283UC-K0.75	**370**			
1	S283UC-K1	**370**			
1.6	S283UC-K1.6	**370**			
2	S283UC-K2	**370**			
3	S283UC-K3	**370**			
4	S283UC-K4	**370**	B	3	13.9
6	S283UC-K6	**370**			
8	S283UC-K8	**370**			
10	S283UC-K10	**370**			
16	S283UC-K16	**370**			
20	S283UC-K20	**370**			
25	S283UC-K25	**382**			
32	S283UC-K32	**408**			
40	S283UC-K40	**448**			
50	S283UC-K50	**472**			
63	S283UC-K63	**534**			

Delivery Class

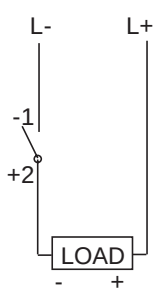
A - Standard item, stock to 2 weeks lead time
B - Stock to 4 weeks lead time
C - 6 to 8 week lead time

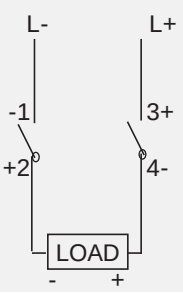
Direct current applications

The S280UC differs from standard miniature circuit breakers in that the UC versions include a permanent magnet which aids in the extinguishing of the arc during medium and high level faults. It is necessary to observe the correct polarity and current direction when connecting the UC breakers. Two examples of correct connection are shown below.

Maximum voltage between leads

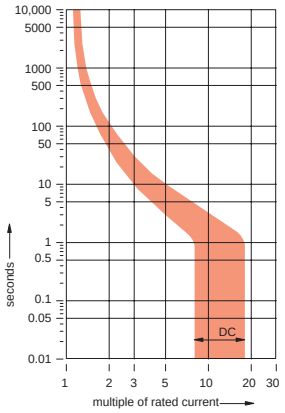
250VDC	500VDC
Single Pole S281UC	Two Pole S282UC





Termination points are marked on all UC type MCBs, points one (1) and four (4) are negative and points two (2) and three (3) are positive. Four pole breakers are also available for voltage reversal applications.

UC-K



14

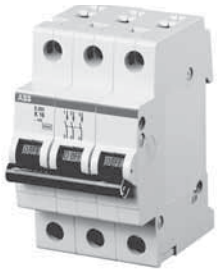
S200P & S280UC
480Y/277 VAC & 500 VDC
Supplemental protectors

Z

UL 1077 VDE 0660
CSA 22.2 No. 235
Fast trip characteristic

S201P-Z, 1 pole

S202P-Z, 2 pole



S203P-Z, 3 pole

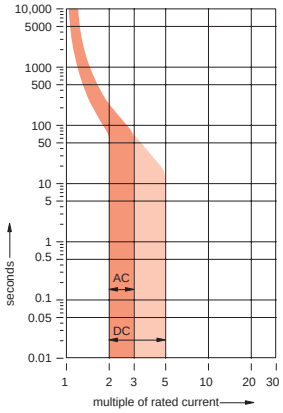
480Y/277 VAC

Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
1 pole					
0.5	S201P-Z0.5	**$ 70**			
1	S201P-Z1	**70**			
1.6	S201P-Z1.6	**70**			
2	S201P-Z2	**70**			
3	S201P-Z3	**70**			
4	S201P-Z4	**70**			
6	S201P-Z6	**70**			
8	S201P-Z8	**70**	B	10	4.5
10	S201P-Z10	**70**			
16	S201P-Z16	**70**			
20	S201P-Z20	**70**			
25	S201P-Z25	**70**			
32	S201P-Z32	**74**			
40	S201P-Z40	**78**			
50	S201P-Z50	**88**			
63	S201P-Z63	**100**			
2 pole					
0.5	S202P-Z0.5	**162**			
1	S202P-Z1	**162**			
1.6	S202P-Z1.6	**162**			
2	S202P-Z2	**162**			
3	S202P-Z3	**162**			
4	S202P-Z4	**162**			
6	S202P-Z6	**162**			
8	S202P-Z8	**162**	B	5	9.2
10	S202P-Z10	**162**			
16	S202P-Z16	**162**			
20	S202P-Z20	**162**			
25	S202P-Z25	**170**			
32	S202P-Z32	**170**			
40	S202P-Z40	**176**			
50	S202P-Z50	**206**			
63	S202P-Z63	**232**			
3 pole					
0.5	S203P-Z0.5	**244**			
1	S203P-Z1	**244**			
1.6	S203P-Z1.6	**244**			
2	S203P-Z2	**244**			
3	S203P-Z3	**244**			
4	S203P-Z4	**244**			
6	S203P-Z6	**244**			
8	S203P-Z8	**244**	B	1	13.9
10	S203P-Z10	**244**			
16	S203P-Z16	**244**			
20	S203P-Z20	**244**			
25	S203P-Z25	**248**			
32	S203P-Z32	**254**			
40	S203P-Z40	**266**			
50	S203P-Z50	**306**			
63	S203P-Z63	**344**			

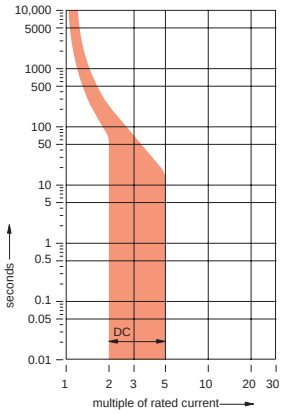
500 VDC

Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
1 pole					
0.5	S281UC-Z0.5	**$ 168**			
1	S281UC-Z1	**168**			
1.6	S281UC-Z1.6	**168**			
2	S281UC-Z2	**168**			
3	S281UC-Z3	**168**			
4	S281UC-Z4	**168**			
6	S281UC-Z6	**168**			
8	S281UC-Z8	**168**			
10	S281UC-Z10	**168**	B	10	4.6
16	S281UC-Z16	**168**			
20	S281UC-Z20	**168**			
25	S281UC-Z25	**170**			
32	S281UC-Z32	**176**			
40	S281UC-Z40	**188**			
50	S281UC-Z50	**216**			
63	S281UC-Z63	**242**			
2 pole					
0.5	S282UC-Z0.5	**390**			
1	S282UC-Z1	**390**			
1.6	S282UC-Z1.6	**390**			
2	S282UC-Z2	**390**			
3	S282UC-Z3	**390**			
4	S282UC-Z4	**390**			
6	S282UC-Z6	**390**			
8	S282UC-Z8	**390**			
10	S282UC-Z10	**390**	B	5	9.2
16	S282UC-Z16	**390**			
20	S282UC-Z20	**390**			
25	S282UC-Z25	**398**			
32	S282UC-Z32	**410**			
40	S282UC-Z40	**426**			
50	S282UC-Z50	**498**			
63	S282UC-Z63	**558**			
3 pole					
0.5	S283UC-Z0.5	**594**			
1	S283UC-Z1	**594**			
1.6	S283UC-Z1.6	**594**			
2	S283UC-Z2	**594**			
3	S283UC-Z3	**594**			
4	S283UC-Z4	**594**			
6	S283UC-Z6	**594**			
8	S283UC-Z8	**594**	B	3	13.9
10	S283UC-Z10	**594**			
16	S283UC-Z16	**594**			
20	S283UC-Z20	**594**			
25	S283UC-Z25	**603**			
32	S283UC-Z32	**612**			
40	S283UC-Z40	**657**			
50	S283UC-Z50	**756**			
63	S283UC-Z63	**855**			

Z



UC-Z



Delivery Class

A - Standard item, stock to 2 weeks lead time
B - Stock to 4 weeks lead time
C - 6 to 8 week lead time

S200U
240 VAC
Miniature MCCBs

K UL 489 CSA C22.2 - NO. 5
VDE 0660
Cable & equipment protection

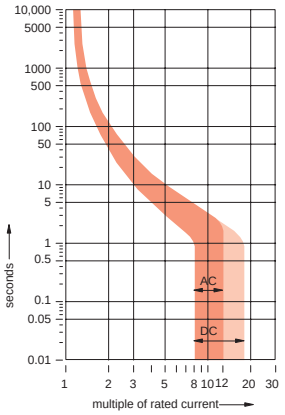

S201U-K, 1 pole


S202U-K, 2 pole


S203U-K, 3 pole


S204U-K, 4 pole

K



Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
1 pole					
0.2	S201U-K0.2	**$ 54**			
0.3	S201U-K0.3	**54**			
0.5	S201U-K0.5	**54**			
0.75	S201U-K0.75	**54**			
1	S201U-K1	**54**			
1.6	S201U-K1.6	**54**			
2	S201U-K2	**54**			
3	S201U-K3	**54**			
4	S201U-K4	**54**			
5	S201U-K5	**54**			
6	S201U-K6	**54**			
8	S201U-K8	**54**			
10	S201U-K10	**54**	A	10	4.6
13	S201U-K13	**54**			
15	S201U-K15	**54**			
16	S201U-K16	**54**			
20	S201U-K20	**54**			
25	S201U-K25	**56**			
30	S201U-K30	**58**			
32	S201U-K32	**58**			
40	S201U-K40	**64**			
50	S201U-K50	**70**			
60	S201U-K60	**80**			
63	S201U-K63	**80**			
2 pole					
0.2	S202U-K0.2	**128**			
0.3	S202U-K0.3	**128**			
0.5	S202U-K0.5	**128**			
0.75	S202U-K0.75	**128**			
1	S202U-K1	**128**			
1.6	S202U-K1.6	**128**			
2	S202U-K2	**128**			
3	S202U-K3	**128**			
4	S202U-K4	**128**			
5	S202U-K5	**128**			
6	S202U-K6	**128**			
8	S202U-K8	**128**	A	5	9.2
10	S202U-K10	**128**			
13	S202U-K13	**128**			
15	S202U-K15	**128**			
16	S202U-K16	**128**			
20	S202U-K20	**128**			
25	S202U-K25	**130**			
30	S202U-K30	**134**			
32	S202U-K32	**134**			
40	S202U-K40	**134**			
50	S202U-K50	**162**			
60	S202U-K60	**182**			
63	S202U-K63	**182**			

Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
3 pole					
0.2	S203U-K0.2	**$ 194**			
0.3	S203U-K0.3	**194**			
0.5	S203U-K0.5	**194**			
0.75	S203U-K0.75	**194**			
1	S203U-K1	**194**			
1.6	S203U-K1.6	**194**			
2	S203U-K2	**194**			
3	S203U-K3	**194**			
4	S203U-K4	**194**			
5	S203U-K5	**194**			
6	S203U-K6	**194**			
8	S203U-K8	**194**			
10	S203U-K10	**194**	A	1	13.9
13	S203U-K13	**194**			
15	S203U-K15	**194**			
16	S203U-K16	**194**			
20	S203U-K20	**194**			
25	S203U-K25	**196**			
30	S203U-K30	**200**			
32	S203U-K32	**200**			
40	S203U-K40	**214**			
50	S203U-K50	**246**			
60	S203U-K60	**280**			
63	S203U-K63	**280**			
4 pole					
0.2	S204U-K0.2	**265**			
0.3	S204U-K0.3	**265**			
0.5	S204U-K0.5	**265**			
0.75	S204U-K0.75	**265**			
1	S204U-K1	**265**			
1.6	S204U-K1.6	**265**			
2	S204U-K2	**265**			
3	S204U-K3	**265**			
4	S204U-K4	**265**			
5	S204U-K5	**265**			
6	S204U-K6	**265**			
8	S204U-K8	**265**			
10	S204U-K10	**265**	B	1	18.0
13	S204U-K13	**265**			
15	S204U-K15	**265**			
16	S204U-K16	**265**			
20	S204U-K20	**265**			
25	S204U-K25	**275**			
30	S204U-K30	**285**			
32	S204U-K32	**285**			
40	S204U-K40	**314**			
50	S204U-K50	**343**			
60	S204U-K60	**392**			
63	S204U-K63	**392**			

Delivery Class

A - Standard item, stock to 2 weeks lead time
B - Stock to 4 weeks lead time
C - 6 to 8 week lead time

UL489 listed as branch circuit protective device

14

S200U
240 VAC
Miniature MCCBs

System pro M S200 Series

Z UL 489 CSA C22.2 - NO. 5
VDE 0660
Cable & equipment protection

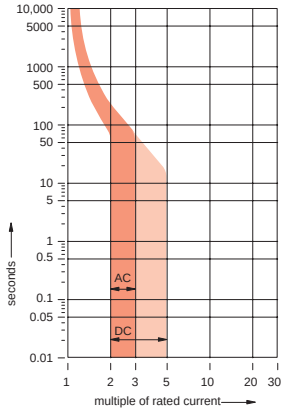

S201U-Z, 1 pole


S202U-Z, 2 pole


S203U-Z, 3 pole


S204U-Z, 4 pole

Z



Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
1 pole					
0.5	S201U-Z0.5	**70**			
0.75	S201U-Z0.75	**70**			
1	S201U-Z1	**70**			
1.6	S201U-Z1.6	**70**			
2	S201U-Z2	**70**			
3	S201U-Z3	**70**			
4	S201U-Z4	**70**			
5	S201U-Z5	**70**			
6	S201U-Z6	**70**			
8	S201U-Z8	**70**			
10	S201U-Z10	**70**	A	10	4.6
15	S201U-Z15	**70**			
16	S201U-Z16	**70**			
20	S201U-Z20	**70**			
25	S201U-Z25	**70**			
30	S201U-Z30	**74**			
32	S201U-Z32	**74**			
40	S201U-Z40	**78**			
50	S201U-Z50	**88**			
60	S201U-Z60	**100**			
63	S201U-Z63	**100**			
2 pole					
0.5	S202U-Z0.5	**162**			
0.75	S202U-Z0.75	**162**			
1	S202U-Z1	**162**			
1.6	S202U-Z1.6	**162**			
2	S202U-Z2	**162**			
3	S202U-Z3	**162**			
4	S202U-Z4	**162**			
5	S202U-Z5	**162**			
6	S202U-Z6	**162**			
8	S202U-Z8	**162**			
10	S202U-Z10	**162**	A	5	9.2
15	S202U-Z15	**162**			
16	S202U-Z16	**162**			
20	S202U-Z20	**162**			
25	S202U-Z25	**170**			
30	S202U-Z30	**170**			
32	S202U-Z32	**170**			
40	S202U-Z40	**176**			
50	S202U-Z50	**206**			
60	S202U-Z60	**232**			
63	S202U-Z63	**232**			

Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
3 pole					
0.5	S203U-Z0.5	**244**			
0.75	S203U-Z0.75	**244**			
1	S203U-Z1	**244**			
1.6	S203U-Z1.6	**244**			
2	S203U-Z2	**244**			
3	S203U-Z3	**244**			
4	S203U-Z4	**244**			
5	S203U-Z5	**244**			
6	S203U-Z6	**244**			
8	S203U-Z8	**244**			
10	S203U-Z10	**244**	A	1	13.9
15	S203U-Z15	**244**			
16	S203U-Z16	**244**			
20	S203U-Z20	**244**			
25	S203U-Z25	**248**			
30	S203U-Z30	**254**			
32	S203U-Z32	**254**			
40	S203U-Z40	**266**			
50	S203U-Z50	**306**			
60	S203U-Z60	**344**			
63	S203U-Z63	**344**			
4 pole					
0.5	S204U-Z0.5	**343**			
0.75	S204U-Z0.75	**343**			
1	S204U-Z1	**343**			
1.6	S204U-Z1.6	**343**			
2	S204U-Z2	**343**			
3	S204U-Z3	**343**			
4	S204U-Z4	**343**			
5	S204U-Z5	**343**			
6	S204U-Z6	**343**			
8	S204U-Z8	**343**			
10	S204U-Z10	**343**	B	1	18.0
15	S204U-Z15	**343**			
16	S204U-Z16	**343**			
20	S204U-Z20	**343**			
25	S204U-Z25	**343**			
30	S204U-Z30	**363**			
32	S204U-Z32	**363**			
40	S204U-Z40	**382**			
50	S204U-Z50	**431**			
60	S204U-Z60	**490**			
63	S204U-Z63	**490**			

Delivery Class

A - Standard item, stock to 2 weeks lead time
B - Stock to 4 weeks lead time
C - 6 to 8 week lead time

UL489 listed as branch circuit protective device

14

S200UP
480Y/277 VAC
Miniature MCCBs

K UL 489 CSA C22.2 - NO. 5
VDE 0660
Cable & equipment protection

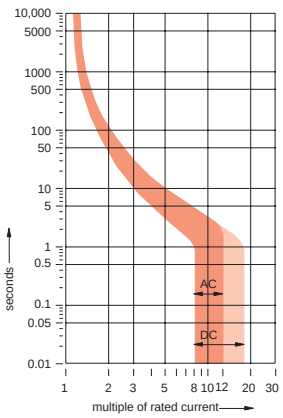

S201UP-K, 1 pole


S202UP-K, 2 pole


S203UP-K, 3 pole


S204UP-K, 4 pole

K



Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
1 pole					
0.2	S201UP-K0.2	**$ 90**			
0.3	S201UP-K0.3	**90**			
0.5	S201UP-K0.5	**90**			
0.75	S201UP-K0.75	**90**			
1	S201UP-K1	**90**			
1.6	S201UP-K1.6	**90**			
2	S201UP-K2	**90**			
3	S201UP-K3	**90**			
4	S201UP-K4	**90**			
5	S201UP-K5	**90**			
6	S201UP-K6	**90**			
8	S201UP-K8	**90**	A	10	4.6
10	S201UP-K10	**90**			
13	S201UP-K13	**90**			
15	S201UP-K15	**90**			
16	S201UP-K16	**90**			
20	S201UP-K20	**90**			
25	S201UP-K25	**90**			
2 pole					
0.2	S202UP-K0.2	**210**			
0.3	S202UP-K0.3	**210**			
0.5	S202UP-K0.5	**210**			
0.75	S202UP-K0.75	**210**			
1	S202UP-K1	**210**			
1.6	S202UP-K1.6	**210**			
2	S202UP-K2	**210**			
3	S202UP-K3	**210**			
4	S202UP-K4	**210**			
5	S202UP-K5	**210**			
6	S202UP-K6	**210**	A	5	9.2
8	S202UP-K8	**210**			
10	S202UP-K10	**210**			
13	S202UP-K13	**210**			
15	S202UP-K15	**210**			
16	S202UP-K16	**210**			
20	S202UP-K20	**210**			
25	S202UP-K25	**210**			

Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
3 pole					
0.2	S203UP-K0.2	**$ 320**			
0.3	S203UP-K0.3	**320**			
0.5	S203UP-K0.5	**320**			
0.75	S203UP-K0.75	**320**			
1	S203UP-K1	**320**			
1.6	S203UP-K1.6	**320**			
2	S203UP-K2	**320**			
3	S203UP-K3	**320**			
4	S203UP-K4	**320**			
5	S203UP-K5	**320**			
6	S203UP-K6	**320**	A	1	13.9
8	S203UP-K8	**320**			
10	S203UP-K10	**320**			
13	S203UP-K13	**320**			
15	S203UP-K15	**320**			
16	S203UP-K16	**320**			
20	S203UP-K20	**320**			
25	S203UP-K25	**320**			
4 pole					
0.2	S204UP-K0.2	**440**			
0.3	S204UP-K0.3	**440**			
0.5	S204UP-K0.5	**440**			
0.75	S204UP-K0.75	**440**			
1	S204UP-K1	**440**			
1.6	S204UP-K1.6	**440**			
2	S204UP-K2	**440**			
3	S204UP-K3	**440**			
4	S204UP-K4	**440**			
5	S204UP-K5	**440**			
6	S204UP-K6	**440**	B	1	18.0
8	S204UP-K8	**440**			
10	S204UP-K10	**440**			
13	S204UP-K13	**440**			
15	S204UP-K15	**440**			
16	S204UP-K16	**440**			
20	S204UP-K20	**440**			
25	S204UP-K25	**440**			

Delivery Class

A - Standard item, stock to 2 weeks lead time
B - Stock to 4 weeks lead time
C - 6 to 8 week lead time

UL489 listed as branch circuit protective device

S200UP
480Y/277 VAC
Miniature MCCBs

System pro M
S200 Series

Z

UL 489 CSA C22.2 - NO. 5
VDE 0660
Cable & equipment protection

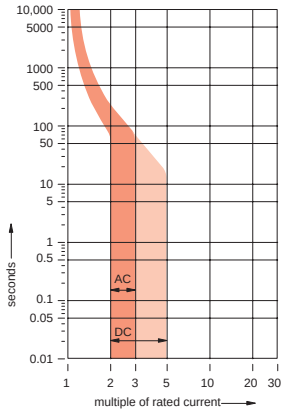

S201UP-Z, 1 pole


S202UP-Z, 2 pole


S203UP-Z, 3 pole


S204UP-Z, 4 pole

Z



Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
1 pole					
0.5	S201UP-Z0.5	**115**			
0.75	S201UP-Z0.75	**115**			
1	S201UP-Z1	**115**			
1.6	S201UP-Z1.6	**115**			
2	S201UP-Z2	**115**			
3	S201UP-Z3	**115**			
4	S201UP-Z4	**115**			
5	S201UP-Z5	**115**			
6	S201UP-Z6	**115**			
8	S201UP-Z8	**115**	A	10	4.6
10	S201UP-Z10	**115**			
15	S201UP-Z15	**115**			
16	S201UP-Z16	**115**			
20	S201UP-Z20	**115**			
25	S201UP-Z25	**115**			
2 pole					
0.5	S202UP-Z0.5	**270**			
0.75	S202UP-Z0.75	**270**			
1	S202UP-Z1	**270**			
1.6	S202UP-Z1.6	**270**			
2	S202UP-Z2	**270**			
3	S202UP-Z3	**270**			
4	S202UP-Z4	**270**			
5	S202UP-Z5	**270**			
6	S202UP-Z6	**270**	A	5	9.2
8	S202UP-Z8	**270**			
10	S202UP-Z10	**270**			
15	S202UP-Z15	**270**			
16	S202UP-Z16	**270**			
20	S202UP-Z20	**270**			
25	S202UP-Z25	**270**			

Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
3 pole					
0.5	S203UP-Z0.5	**400**			
0.75	S203UP-Z0.75	**400**			
1	S203UP-Z1	**400**			
1.6	S203UP-Z1.6	**400**			
2	S203UP-Z2	**400**			
3	S203UP-Z3	**400**			
4	S203UP-Z4	**400**			
5	S203UP-Z5	**400**			
6	S203UP-Z6	**400**	A	1	13.9
8	S203UP-Z8	**400**			
10	S203UP-Z10	**400**			
15	S203UP-Z15	**400**			
16	S203UP-Z16	**400**			
20	S203UP-Z20	**400**			
25	S203UP-Z25	**400**			
4 pole					
0.5	S204UP-Z0.5	**564**			
0.75	S204UP-Z0.75	**564**			
1	S204UP-Z1	**564**			
1.6	S204UP-Z1.6	**564**			
2	S204UP-Z2	**564**			
3	S204UP-Z3	**564**			
4	S204UP-Z4	**564**			
5	S204UP-Z5	**564**			
6	S204UP-Z6	**564**	B	1	18.0
8	S204UP-Z8	**564**			
10	S204UP-Z10	**564**			
15	S204UP-Z15	**564**			
16	S204UP-Z16	**564**			
20	S204UP-Z20	**564**			
25	S204UP-Z25	**564**			

Delivery Class

A - Standard item, stock to 2 weeks lead time
B - Stock to 4 weeks lead time
C - 6 to 8 week lead time

UL489 listed as branch circuit protective device

14

S290
480Y/277 VAC

C

VDE 0660
Cable and equipment protection

S291-C80

S290-H11

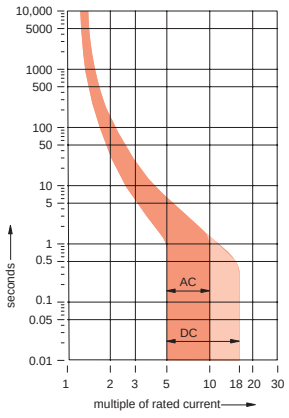
480 VAC

Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
1 pole					
80	S291-C80	**$ 138**			
100	S291-C100	**144**	B	6	9.2
125	S291-C125	**192**			
2 pole					
80	S292-C80	**340**			
100	S292-C100	**364**	B	3	18.4
125	S292-C125	**568**			
3 pole					
80	S293-C80	**536**			
100	S293-C100	**548**	B	2	27.6
125	S293-C125	**732**			
4 pole					
80	S294-C80	**740**			
100	S294-C100	**756**	B	1	36.8
125	S294-C125	**948**			
Auxiliary contact					
	S290-H11	**72**	B	1	1.75
Bell alarm					
	S290-S	**112**	B	1	1.75
Shunt trip					
	S290-A1	**144**	B	1	6.2
For field mounting, left side, 110V – 415VAC					
	S290-A2	**144**	B	1	6.2
For field mounting, left side, 24 – 48VDC					

Delivery Class

A - Standard item, stock to 2 weeks lead time
B - Stock to 4 weeks lead time
C - 6 to 8 week lead time

C



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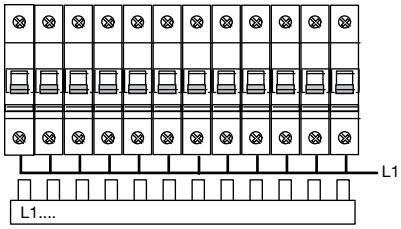
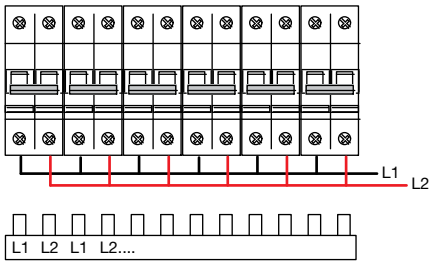


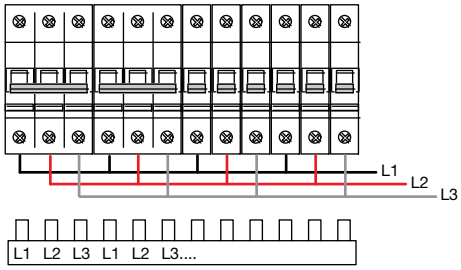
For use on:	Amp rating	Number of poles	Busbar length (mm)	End cap catalog number	Catalog number	List price	Delivery class	Suggested order qty. quantity	Weight (ozs)
S200 & S200P ①	63 80	60 60	988 988	PS-END0 PS-END0	PS1/60 PS1/60/16	**$ 36** **46**	A	1	9 14
S200U & S200UP ②③	80	6 12 18	108 216 324	– – –	PS1/6/16BP PS1/12/16BP PS1/18/16BP	**30** **60** **90**	B	1	1.4 2.9 4.3

2 Phase



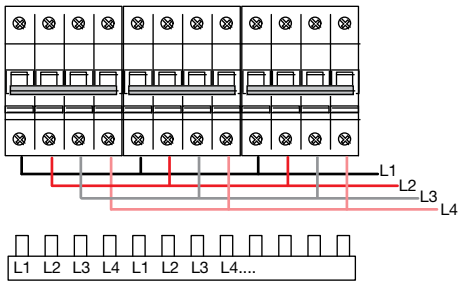
For use on:	Amp rating	Number of poles	Busbar length (mm)	End cap catalog number	Catalog number	List price	Delivery class	Suggested order qty. quantity	Weight (ozs)
S200 & S200P ①	63 80	58 58	1035 1035	PS-ENDSP PS-ENDSP	PS2/58SP PS2/58/16SP	**$ 122** **152**	A	1	11 18
S200U & S200UP ②③	80	6 12 18	108 216 324	– – –	PS2/6/16BP PS2/12/16BP PS2/18/16BP	**40** **80** **120**	B	1	1.8 3.7 5.5

3 Phase



For use on:	Amp rating	Number of poles	Busbar length (mm)	End cap catalog number	Catalog number	List price	Delivery class	Suggested order qty. quantity	Weight (ozs)
S200 & S200P ①	63 80	60 60	1065 1065	PS-ENDSP PS-ENDSP	PS3/60SP PS3/60/16SP	**$ 130** **176**	A	1	12 20
S200U & S200UP ②③	80	6 12 18	108 216 324	– – –	PS3/6/16BP PS3/12/16BP PS3/18/16BP	**44** **88** **132**	B	1	2 4 6

4 Phase



For use on:	Amp rating	Number of poles	Busbar length (mm)	End cap catalog number	Catalog number	List price	Delivery class	Suggested order qty. quantity	Weight (ozs)
S200 & S200P	80	60	1056	PS-END1SP	PS4/60/16SP	**$ 236**	B	1	22

Delivery Class

A - Standard item, stock to 2 weeks lead time
B - Stock to 4 weeks lead time
C - 6 to 8 week lead time

NOTE

ALL BUS BARS MAY BE CENTER FED IN ORDER TO DOUBLE THE AMPACITY RATING

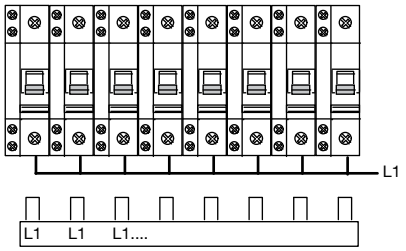
NOTE

BUS BARS MAY BE USED ON LINE OR LOAD SIDE OF MCBS

① UL Approved for use on UL1077 miniature circuit breakers. UL File #E76126
② UL approved for use on UL 489 miniature circuit breakers. UL File # E250145
③ UL 489 bus bars may not be cut.

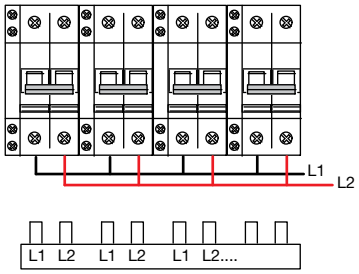
Accessories
Busbars

1 Phase with 1 auxiliary



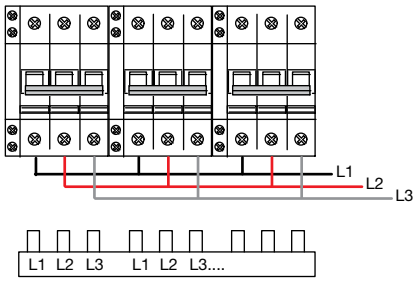
For use on:	Amp rating	Number of poles	Busbar length (mm)	End cap catalog number	Catalog number	List price	Delivery class	Suggested order qty. quantity	Weight (ozs)
S200 & S200P	63 80	38 38	1044 1044	PS-END0 PS-END0	PS1/38H PS1/38/16H	**$ 50** **56**	B	1	7.4 10.1

2 Phase with 1 auxillary



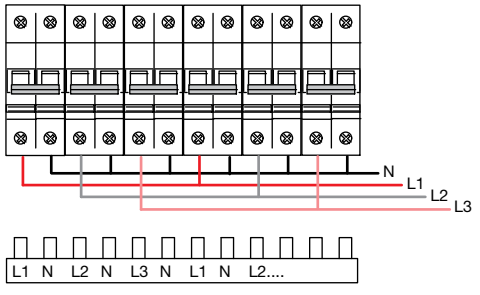
For use on:	Amp rating	Number of poles	Busbar length (mm)	End cap catalog number	Catalog number	List price	Delivery class	Suggested order qty. quantity	Weight (ozs)
S200 & S200P	80	48	1065	PS-ENDSP	PS2/48/16SP	**$ 174**	B	1	23.3

3 Phase with 1 auxillary



For use on:	Amp rating	Number of poles	Busbar length (mm)	End cap catalog number	Catalog number	List price	Delivery class	Suggested order qty. quantity	Weight (ozs)
S200 & S200P	80	39	980	PS-ENDSP	PS3/39/16SP	**$ 158**	B	1	22.6

3 Phase + N, for use with 2 pole MCB's on 3 phase / 4W system



For use on:	Amp rating	Number of poles	Busbar length (mm)	End cap catalog number	Catalog number	List price	Delivery class	Suggested order qty. quantity	Weight (ozs)
S200 & S200P	80	58	1048	PS-END1SP	PS4/58/16NSP	**$ 238**	B	1	30.8

Insulated busbar assembly contains 4 separate circuits for use with 1+N or 2 pole MCBs.

Delivery Class

A - Standard item, stock to 2 weeks lead time
B - Stock to 4 weeks lead time
C - 6 to 8 week lead time

NOTE

ALL BUS BARS MAY BE CENTER FED IN ORDER TO DOUBLE THE AMPACITY RATING

NOTE

BUS BARS MAY BE USED ON LINE OR LOAD SIDE OF MCBS

Accessories

S2C-H6R

S2C-S/H6R

S2C-A_

S2C-UA_

Electrical accessories	For use on:	Catalog number	List price	Delivery class	Suggested order quantities	Wgt. oz. (1 pc.)
Auxiliary contacts						
For field mounting: right side Form C 1 NO / 1 NC	S200 & S200P	S2C-H6R	**$ 36**	A	1	1.4
	S200U S200UP	S2C-H6RU				

The auxiliary contacts will signal whether the breaker is in the ON or OFF position. The contacts are rated 2A/277 VAC and 1.5A/125 VDC. Minimum operating voltage is 24 VAC/VDC.
Wire size: 18 AWG to 16 AWG.

Bell alarm						
For field mounting, right side	S200 & S200P	S2C-S/H6R	**48**	A	1	1.4
	S200U S200UP	S2C-S6RU				

The bell alarm includes a set of contacts that will only signal when the breaker has tripped. Typically the contacts would be connected to an alarm or bell to signal the operator that an overcurrent trip has occured. The bell alarm also includes a test button for testing the alarm contacts without opening the breaker. The contact is rated 2A/277 VAC and 1.5A/125 VDC. Minimum operating voltage is 24 VAC/VDC.

* Combination bell alarm/auxiliary contact

Shunt trip						
For field mounting, right side A1: 12-60 VAC (12-60VDC) A2: 110-415 VAC (110-250 VDC)	S200 & S200P	S2C-A1 S2C-A2	**138**	A	1	5.2
	S200U & S200UP	S2C-A1U S2C-A2U				

For remote tripping of breaker, a shunt trip device can be added to the MCB. The solenoid device opens the breaker after control voltage is applied. Shunt trips are available for on control system voltage (12-415 VAC/VDC).

Undervoltage release						
For field mounting, right side						
12 VDC	S200 & S200P	S2C-UA12	**216**	A	1	5.2
24 VAC		S2C-UA24				
48 VAC		S2C-UA48				
110 VAC		S2C-UA110				
220 VAC		S2C-UA230				
415 VAC		S2C-UA400				

When control voltage drops below approximately 50% of rated voltage, the UVR opens the breaker. The breaker can not be operated unless proper control voltage is first applied to the UVR coil. Similar in size and mounting to the shunt trip accessory.

Factory mounting

All accessories may be easily mounted in the field. For factory mounting of any accessory devices, add $30 list to total price per breaker. To create complete catalog number, take suffix of accessory device following "S2C-" and add suffix to end of breaker part number. Multiple suffixes must be added in alphabetical order.

Example: S202-K20A1 $ 264 (2 pole, 20A breaker with type A1 shunt trip) S202-K20 @ $96 + S2C-A1 @ $138 + factory mounting @ $30 = $264

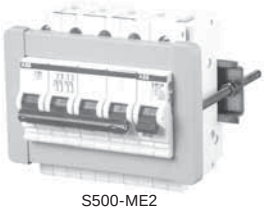
S202-K20A2H6R $ 300 (2 pole, 20A breaker with type A2 shunt trip and H6R aux. contacts) S202-K20 @ $96 + S2C-A1 @ $138 + S2C-H6R @ $36 + factory mounting @ $30 = $300

Auxiliary contacts and shunt trips may be mounted in combination.

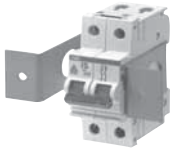
Delivery Class

A - Standard item, stock to 2 weeks lead time
B - Stock to 4 weeks lead time
C - 6 to 8 week lead time

Accessories
S200


S500-ME2


MB-CL


MB-3PD


SA1


SA2


12404


S2C-DH


SMR-39

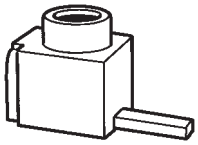
Electrical accessories	Catalog number	List price	Delivery class	Suggested order quantities	Wgt. oz. (1 pc.)
Front mounting kit					
For 2 poles	S500-ME1	**$ 60**	A	1	2.1
For 2 – 5 poles	S500-ME2	**70**			2.9
For 2 – 10 poles	S500-ME3	**80**			3.6
Optional rear terminals	S500-K1	**16**			1.5
Includes flange, mounting rail and hardware.					
Front mounting clip					
For 1 – 4 poles	MB-CL	**35**	A	1	2
Simple mounting clip for up to four module mounting.					
Front mounting bracket					
For 1 – 3 poles	MB-3PD	**35**	A	1	2.5
For flush mounting of three pole MCBs: includes hardware.					
Locking device					
Adaptor only	SA1	**9**	A	10	0.7
Padlock only w/ 2 keys	SA2	**19**			0.1
Allows breaker to be locked in ON or OFF position.					
Labeling accessory					
1 sheet = 40 blank labels	BS	**74**	A	1	—
1 sheet = 40 numbered labels	BS1/40	**74**			
Adhesive labels mount on front face of components.					
Enclosure, IP40					
For 2 modules	12402	**32**	B	1	2.0
For 4 modules	12404	**45**			2.8
For 6 modules	12406	**56**			3.4
For 8 modules	12408	**66**			4.1
For additional protection against accidental contact. Includes integrated mounting rail.					
Enclosure, IP55					
For 4 modules	12644	**84**	A	1	8.1
For 6 modules	12646	**98**			10.8
For 10 modules	12650	**126**			20.4
For 20 modules	12652	**210**			41.0
Molded plastic complete with mounting rail and knock-outs for cable entries.					
Blanking plates					
Single pole (set of 10)	BP-1P	**6**	A	1	—
Twelve pole (snap-off, set of 1)	BP-12P	**7**	—	—	—
Handle mechanism					
	S2C-DH	**76**	A	1	9.2
For use with 2, 3 and 4 pole S2 MCBs and disconnect switch handles with 5mm shaft.					
DIN rail					
Universal mounting	SMR-39	**21**	A	1	8
35mm DIN rails are available in 39-inch strips (1 meter).					

Delivery Class

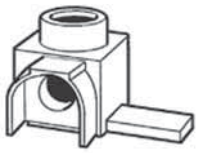
A - Standard item, stock to 2 weeks lead time
B - Stock to 4 weeks lead time
C - 6 to 8 week lead time

SZ-BSK

SZ-ESK2



SZ-AST55_



SZ-AST50_

Busbar accessories

Description		Catalog number	List price	Delivery class	Suggested order qty.	Weight ounce qty. (2 pc.)
Busbar end caps	2 & 3 phase 4 phase	PS-ENDSP PS-END1SP	**$ 2**	A	10	—
Busbar tooth covers (shrouds unused portion of busbar)		SZ-BSK	**4**	A	10	—
Busbar mounted terminal block, 1 pole, for use on all busbars. Wire size: 14 AWG to 2 AWG		SZ-ESK2	**10**	A	1	1.0

Electrical accessories

Item	Catalog number	List price	Delivery class	Suggested order quantities	Wgt. oz. (1 pc.)
Posidrive tools					
Screwdriver, #1	SD-PZ1	**$ 40**	A	1	4
Screwdriver, #2	SD-PZ2	**40**	A	1	4
Bit, #1	BIT-PZ1	**4**	A	1	4
Bit, #2	BIT-PZ2	**4**	A	1	4

Connection terminals

Cross section AWG/mm²	For use on:	Catalog number	List price	Delivery class	Suggested order quantities	Wgt. oz. (1 pc.)
1/0 (50mm²) Straight	S200 & S200P	SZ-AST55I	**$ 15**	B	10	0.5
1/0 (50mm²) 90°		SZ-AST50I	**15**		10	0.5
1/0 (50mm²) Straight	S200U & S200UP	SZ-AST55U	**15**	B	10	0.5
1/0 (50mm²) 90°		SZ-AST50U	**15**		10	0.5

Ring tongue accessories

Description	For use on	Catalog number	List price	Delivery class	Suggested order qty. qty. (2 pc.)	Weight ounce
Ring tongue terminal	S200 & S200P S200U & S200UP	SZ-AST55UPRT	**$ 5**	A	10	0.5
Plug		S2C-P	**N/C**	A	10	—

Factory mounting

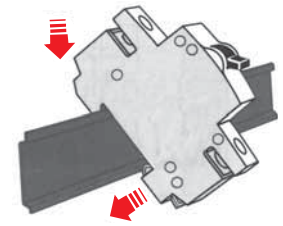
Ring tongue connection terminals may be easily mounted in the field. For factory mounting, add $5 list per connector. To create a complete catalog number, add the suffix as defined below:

Top & bottom: S201 - K20W	**$ 62**	**(**Single pole, 20A breaker with 2 ring tongue terminals) **S201-K20 @ $42 +** SZ-AST55UPRT times 2 @ $5 + factory mounting times 2 @ $5 = $62
Bottom only: S201 - K20BW	**$ 52**	**(**Single pole, 20A breaker with 1 ring tongue terminal) **S201-K20 @ $42 +** SZ-AST55UPRT @ $5 + factory mounting @ $5 = $52
Top only, S201 - K20TW	**$ 52**	**(**Single pole, 20A breaker with 1 ring tongue terminal) **S201-K20 @ $42 +** SZ-AST55UPRT @ $5 + factory mounting @ $5 = $52

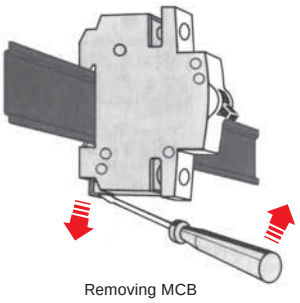
Delivery Class

A - Standard item, stock to 2 weeks lead time
B - Stock to 4 weeks lead time
C - 6 to 8 week lead time

Technical data
Mounting and operating instructions



Mounting MCB



Removing MCB

Mounting
Universal mounting position using snap-on mounting to standard 35x7.5mm DIN rail.

Miniature circuit breakers (MCBs) can also be mounted to front of door using a panel cut-out with breaker handle protruding through panel opening for external operation. Special front mounting kit page 23.

Connection
Terminals are suitable for solid or flexible conductors from 18 to 4 AWG (0.75 to 25mm^2) with no busbar connected. When maximum busbar size of 36 mm^2 is used, maximum cable is 6 AWG (16 mm^2).

Maximum tightening torque of 17.5 in-lb (2 Nm) for line/load terminals and 4.5 in-lb (0.5Nm) for accessory device terminals.

Operation
MCBs are switched on by moving the handle to the upper position. Stamped onto the handle switch, a “I” is visible confirming that the breaker is closed.

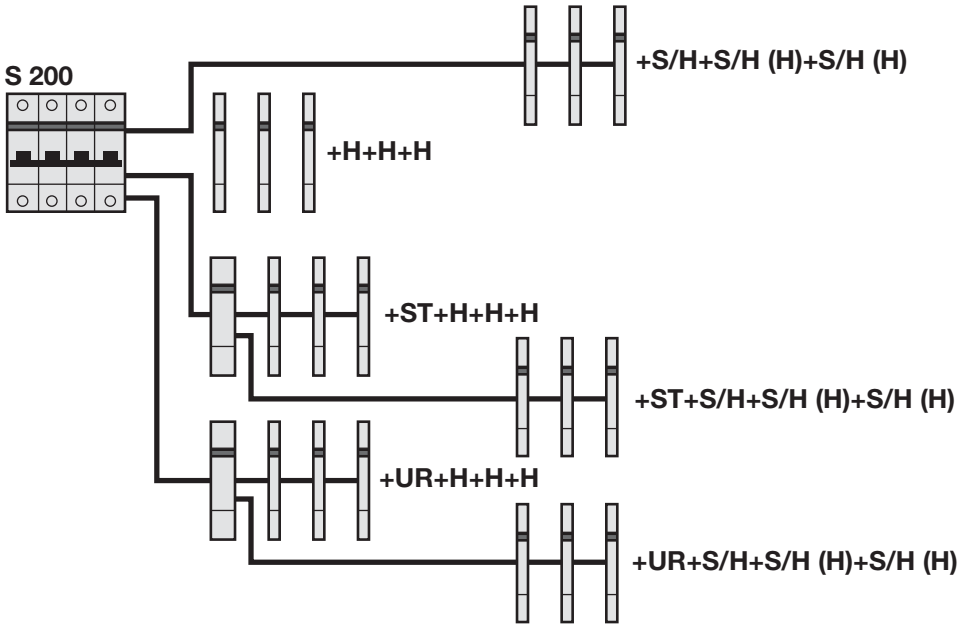
The MCBs are “trip-free,” if the handle is being forced to the “ON” position, the breaker will still trip under fault conditions.

The “O” marking indicates that the breaker is in the “OFF” position. The MCB is now open and the load is disconnected from line power.

When a breaker has tripped, the MCB handle should first be set to the full “OFF” position to make certain the trip mechanism has been reset. Once the fault has been determined and cleared the MCB can again be switched “ON”.

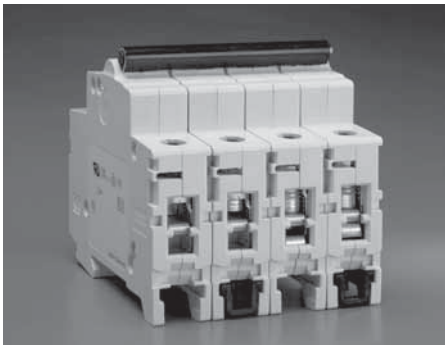
Maintenance
ABB miniature circuit breakers require no special maintenance; only normal electrical system maintenance procedures are required.

Possible mounting arrangements of MCB accessories

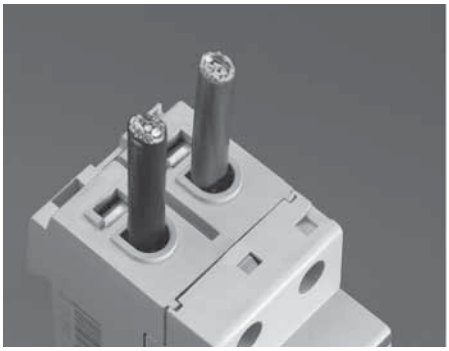


Legend

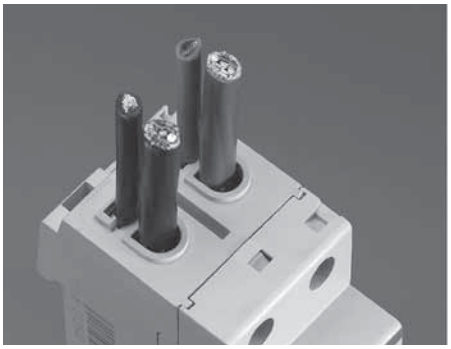
Auxiliary contact	**H**
Bell alarm/Auxiliary contact	**S/H**
Bell alarm/Auxiliary contact used as auxiliary contact	**S/H (H)**
Shunt trip	**ST**
Undervoltage release	**UR**



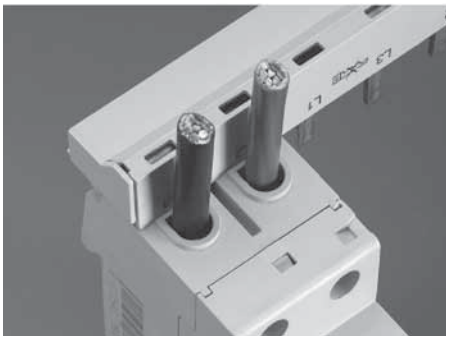
Top and bottom dual function terminals provided in open position for connection to busbars or cable.



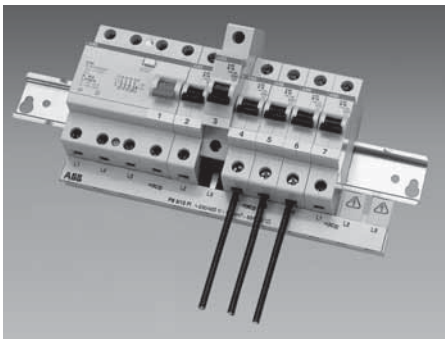
Terminals allow for connection of cable 18-4 AWG [top row] and 18-8 AWG [bottom row].



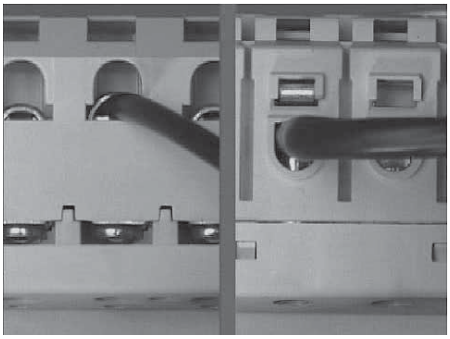
Two slots per terminal offer the ability to connect, independently, two conductors. This may be cables or bus bar.



Top and bottom terminals may be bussed together with single phase or multi-phase busbars as shown. Both line and load side terminals can be bus bar connected.



Easy removal of devices from an assembly when using bus bar in the bottom, load side terminals.



Conductors may only be inserted into open terminals, preventing mis-wiring and potential problems.

Technical data

Item	S200-B	S200-C, -D	S200-K	S200P-K
Approvals:				
UL	1077	1077	1077	1077
CSA	C22.2 — No.235	C22.2 — No. 235	C22.2 — No. 235	—
VDE	0641, 0660	0660	0660	0660
IEC	898, 947	898, 947	898, 947	898, 947
No. of poles:	1,2,3,4 1+N,3+N	1,2,3, 1+N,3+N	1,2,3,4, 1+N,3+N	1,2,3,4,1+N,3+N
Tripping characteristic:	B	C,D	K	K
Rated currents:	6 to 63A	0.5 to 63A	0.5 to 63A	0.2 to 63A
Minimum operating voltage:	12V	12V	12V	12V
UL/CSA rated voltage & interrupting capacity	Single pole / Multi pole	Single pole / Multi pole	Single pole / Multi pole	Single pole / Multi pole
120VAC	10kA / —	10kA / —	10kA / —	10kA / —
240VAC	6kA / 10kA	6kA / 10kA	6kA / 10kA	10kA / 10kA
277VAC	6kA / —	6kA / —	6kA / —	10kA / —
277/480 VAC	— / 6kA	— / 6kA	— / 6kA	— / 10kA
60VDC	10kA / 10kA	10kA / 10kA	10kA / 10kA	— / —
125VDC	— / 10kA	— / 10kA	— / 10kA	— / —
Frequency:	50/60Hz (See below)	50/60Hz (see below)	50/60Hz (see below)	50/60Hz (see below)
Rated voltage				
IEC single pole	240/415VAC 60VDC	240/415VAC 60VDC	240/415VAC 60VDC	240/415VAC 60VDC
IEC multi-pole	415VAC 110VDC	415VAC 110VDC	415VAC 110VDC	415VAC 110VDC
Protection category:	IP20	IP20	IP20	IP20
Depth of unit per DIN 43880:	68mm	68mm	68mm	68mm
Mounting position:	optional	optional	optional	optional
Standard mounting:	35mm DIN rail	35mm DIN rail	35mm DIN rail	35mm DIN rail
Main and shunt trip terminals:				
Wire size	18-4 AWG [top] 18-8 [bottom]	18-4 AWG [top] 18-8 [bottom]	18-4 AWG [top] 18-8 [bottom]	18-4 AWG [top] 18-8 [bottom]
Torque	17.5 in-lbs.	17.5 in-lbs.	17.5 in-lbs.	17.5 in-lbs.
Tool	#2 Posidrive	#2 Posidrive	#2 Posidrive	#2 Posidrive
Accessory terminals				
Wire size	18-16 AWG	18-16 AWG	18-16 AWG	18-16 AWG
Torque	4.5 in-lbs.	4.5 in-lbs.	4.5 in-lbs.	4.5 in-lbs.
Tool	#1 Posidrive	#1 Posidrive	#1 Posidrive	#1 Posidrive
Service life at rated load:	I_n < 32 A, 20,000 operations I_n > 32 A, 10,000 operations	I_n < 32 A, 20,000 operations I_n > 32 A, 10,000 operations	I_n < 32 A, 20,000 operations I_n > 32 A, 10,000 operations	I_n < 32 A, 20,000 operations I_n > 32 A, 10,000 operations
Ambient temperatures: Storage temperatures	-25°C to +70°C -40°C to + 70°C	-25°C to +70°C -40°C to + 70°C	-25°C to +70°C -40°C to + 70°C	-25°C to +70°C -40°C to + 70°C
Shock resistance:	30g minimum of 2 impacts, shock duration of 13ms	30g minimum of 2 impacts, shock duration of 13ms	30g minimum of 2 impacts, shock duration of 13ms	30g minimum of 2 impacts, shock duration of 13ms
Vibration resistance:	5g, 20 cycles, 5 Hz, 150 Hz @ 0.8 ~ I_n	5g, 20 cycles, 5 Hz, 150 Hz @ 0.8 ~ I_n	5g, 20 cycles, 5 Hz, 150 Hz @ 0.8 ~ I_n	5g, 20 cycles, 5 Hz, 150 Hz @ 0.8 ~ I_n
Disconnecting neutral rating:	6kA switching	6kA switching	6kA switching	—

Influence of frequency on electro-magnetic trips

Magnetic trip values shown on trip curves are valid for 50/60Hz applications. For frequencies other than 50/60Hz, the magnetic (instantaneous) trip values are increased by the factor given below:

	16 2/3 - 60Hz	100Hz	200Hz	400Hz	DC
Approx. factor	1	1.1	1.2	1.5	1.5

Thermal tripping is independent of frequency.

Technical data

Item	S280UC-K		S200P-Z		S280UC-Z		S290-C
Approvals:							
UL	1077		1077		1077		—
CSA	—		—		—		—
VDE	0660		0660		0660		0660
IEC	898,947		898, 947		898, 947		898
No. of poles:	1,2,3		1,2,3,4		1,2,3		1,2,3,4
Tripping characteristic:	K		Z		Z		C
Rated currents:	0.2 to 63A		0.5 to 63A		0.5 to 63A		80 to 125A
Minimum operating voltage:	12V		12V		12V		12V
UL/CSA rated voltage & interrupting capacity	Single pole	Multi pole	Single pole	Multi pole	Single pole	Multi pole	
120VAC	10kA	—	10kA	—	10kA	—	—
240VAC	10kA	10kA	10kA	10kA	10kA	10kA	—
277VAC	10kA	—	10kA	—	10kA	—	—
277/480 VAC	—	4.5kA for 0.2-40A 5kA for 50-63A	—	10kA	—	4.5kA for 0.2-40A 5kA for 50-63A	—
60VDC	10kA	10kA	—	—	10kA	10kA	—
125VDC	10kA	10kA	—	—	10kA	10kA	—
250VDC	4.5kA	4.5kA	—	—	4.5kA	4.5kA	—
500VDC	—	4.5kA	—	—	—	4.5kA	—
Frequency:	50/60Hz (see below)		50/60 Hz (see below)		50/60Hz (see below)		50/60Hz (see below)
Rated voltage							
IEC single pole	240/415VAC 220VDC		240/415VAC 60VDC		240/415VAC 220VDC		230/440VAC 60VDC
IEC multi-pole	415VAC 440VDC		415VAC 110VDC		415VAC 440VDC		440VAC 110VDC
Protection category:	IP20		IP20		IP20		IP20
Depth of unit per DIN 43880:	68mm		68mm		68mm		70mm
Mounting position:	optional		optional		optional		optional
Standard mounting:	35mm DIN rail		35mm DIN rail		35mm DIN-rail		35mm DIN-rail
Main and shunt trip terminals:							
Wire size	0.2-40A 50A & above	18-4 AWG 18-2 AWG	18-4 AWG [top] 18-8 AWG [bottom]		0.5-40A 18-2 AWG	18-4 AWG	80-125A 14-1/0 AWG
Torque	17.5 in-lbs.		17.5 in-lbs.		17.5 in-lbs.		17.5 in-lbs.
Tool	#2 Posidrive		#2 Posidrive		#2 Posidrive		#2 Posidrive
Accessory terminals							
Wire size	18-16 AWG		18-16 AWG		18-16 AWG		18-16 AWG
Torque	4.5 in-lbs.		4.5 in-lbs.		4.5 in-lbs.		4.5 in-lbs.
Tool	#1 Posidrive		#1 Posidrive		#1 Posidrive		#1 Posidrive
Service life at rated load:	I_n < 32 A, 20,000 operations I_n > 32 A, 10,000 operations		I_n < 32 A, 20,000 operations I_n > 32 A, 10,000 operations		I_n < 32 A, 20,000 operations I_n > 32 A, 10,000 operations		10,000 operations —
Ambient temperatures: Storage temperatures	-25°C to +55°C -40°C to + 70°C		-25°C to +70°C -40°C to + 70°C		-25°C to +55°C -40°C to + 70°C		-5°C to +45°C -40°C to + 70°C
Shock resistance:	30g minimum of 2 impacts, shock duration of 13ms		30g minimum of 2 impacts, shock duration of 13ms		30g minimum of 2 impacts, shock duration of 13ms		30g minimum of 2 impacts, shock duration of 13ms
Vibration resistance:	5g, 20 cycles, 5 Hz, 150 Hz @ 0.8 ~ I_n		5g, 20 cycles, 5 Hz, 150 Hz @ 0.8 ~ I_n		5g, 20 cycles, 5 Hz, 150 Hz @ 0.8 ~ I_n		60m/s², at 10 – 150 Hz

Influence of frequency on electro-magnetic trips

Magnetic trip values shown on trip curves are valid for 50/60Hz applications.
For frequencies other than 50/60Hz, the magnetic (instantaneous) trip values are increased by the factor given below:

	16 2/3 - 60Hz	100Hz	200Hz	400Hz	DC
Approx. factor	1	1.1	1.2	1.5	1.5

Thermal tripping is independent of frequency.

Technical data

Item	S200U-K	S200U-Z	S200UP-K	S200UP-Z
Approvals:				
UL	489	489	489	489
CSA	C22.2 No.5	C22.2 No.5	C22.2 No.5	C22.2 No.5
VDE	0660	0660	0660	0660
IEC	898,947	898, 947	898, 947	898
No. of poles:	1,2,3,4	1,2,3,4	1,2,3,4	1,2,3,4
Tripping characteristic:	K	Z	K	Z
Rated currents:	0.2 to 63A	0.2 to 63A	0.2 to 25A	0.2 to 25A
Minimum operating voltage:	12V	12V	12V	12V
UL/CSA rated voltage & interrupting capacity				
120VAC	10kA	10kA	10kA	10kA
240VAC	10kA	10kA	10kA	10kA
277VAC	10kA	10kA		
480/277 VAC	—	—	10kA	10kA
Frequency:	50/60Hz (see below)	50/60 Hz (see below)	50/60Hz (see below)	50/60Hz (see below)
Rated voltage				
IEC single pole	240/415VAC 220VDC	240/415VAC 60VDC	240/415VAC 220VDC	240/415VAC 220VDC
IEC multi-pole	415VAC 440VDC	415VAC 110VDC	415VAC 440VDC	415VAC 440VDC
Protection category:	IP20	IP20	IP20	IP20
Depth of unit per DIN 43880:	68mm	68mm	68mm	68mm
Mounting position:	optional	optional	optional	optional
Standard mounting:	35mm DIN rail	35mm DIN rail	35mm DIN-rail	35mm DIN-rail
Main and shunt trip terminals:				
Wire size	18-4 AWG [top] 18-8 AWG [bottom]	18-4 AWG [top] 18-8 AWG [bottom]	18-4 AWG [top] 18-8 AWG [bottom]	18-4 AWG [top] 18-8 AWG [bottom]
Torque	17.5 in-lbs.	17.5 in-lbs.	17.5 in-lbs.	17.5 in-lbs.
Tool	#2 Posidrive	#2 Posidrive	#2 Posidrive	#2 Posidrive
Accessory terminals				
Wire size	18-16 AWG	18-16 AWG	18-16 AWG	18-16 AWG
Torque	4.5 in-lbs.	4.5 in-lbs.	4.5 in-lbs.	4.5 in-lbs.
Tool	#1 Posidrive	#1 Posidrive	#1 Posidrive	#1 Posidrive
Service life at rated load:	I_n < 32 A, 20,000 operations I_n > 32 A, 10,000 operations	I_n < 32 A, 20,000 operations I_n > 32 A, 10,000 operations	I_n < 32 A, 20,000 operations I_n > 32 A, 10,000 operations	I_n < 32 A, 20,000 operations I_n > 32 A, 10,000 operations
Ambient temperatures:	-25°C to +70°C	-25°C to +70°C	-25°C to +70°C	-25°C to +70°C
Storage temperatures	-40°C to + 70°C	-40°C to + 70°C	-40°C to + 70°C	-40°C to + 70°C
Shock resistance:	30g minimum of 2 impacts, shock duration of 13ms	30g minimum of 2 impacts, shock duration of 13ms	30g minimum of 2 impacts, shock duration of 13ms	30g minimum of 2 impacts, shock duration of 13ms
Vibration resistance:	5g, 20 cycles, 5 Hz, 150 Hz @ 0.8 ~ I_n	5g, 20 cycles, 5 Hz, 150 Hz @ 0.8 ~ I_n	5g, 20 cycles, 5 Hz, 150 Hz @ 0.8 ~ I_n	5g, 20 cycles, 5 Hz, 150 Hz @ 0.8 ~ I_n

Influence of frequency on electro-magnetic trips

Magnetic trip values shown on trip curves are valid for 50/60Hz applications. For frequencies other than 50/60Hz, the magnetic (instantaneous) trip values are increased by the factor given below:

	16 2/3 - 60Hz	100Hz	200Hz	400Hz	DC
Approx. factor	1	1.1	1.2	1.5	1.5

Thermal tripping is independent of frequency.

Comparison of IEC and AWG wire sizes

mm	AWG (mm)	Amps / UL	Amps / IEC
1.0	—	—	8
—	16 (1.3)	10	—
1.5	—	—	12
—	14 (2.1)	15	—
2.5	—	—	20
—	12 (3.3)	20	—
4	—	—	25
—	10 (5.3)	30	—
6	—	—	32
—	8 (8.4)	50	—
10	—	—	50
—	6 (13.3)	65	—
16	—	—	65
—	4 (21.2)	85	—
25	—	—	85
—	3 (26.7)	100	—
—	2 (33.6)	115	—
35	—	—	115

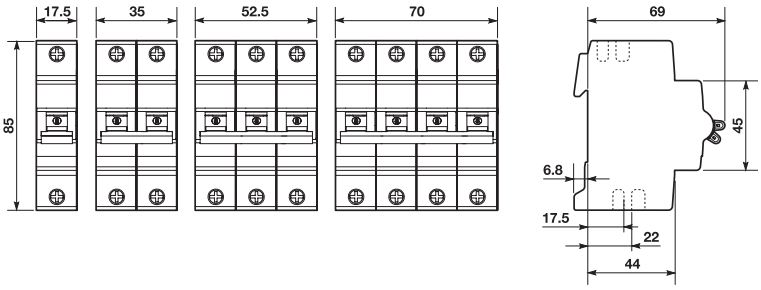
Ampacities for AWG wire are based on copper cable rated 75° C, except for 16AWG which is based on 60° C wire. Taken from UL508 Table 52.2.

Consult applicable standards for futher detail and information.

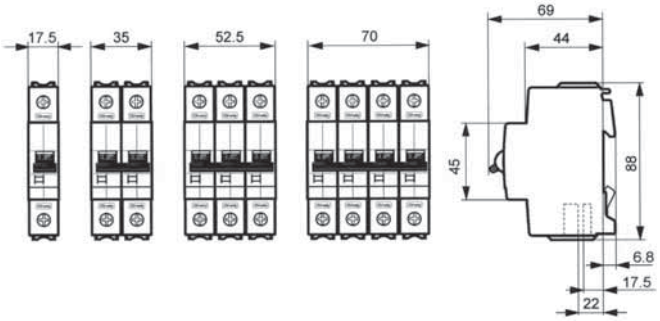
Approximate dimensions
S200, S200P, S200U, S200UP

00.00
00.00 Inches
[Millimeters]

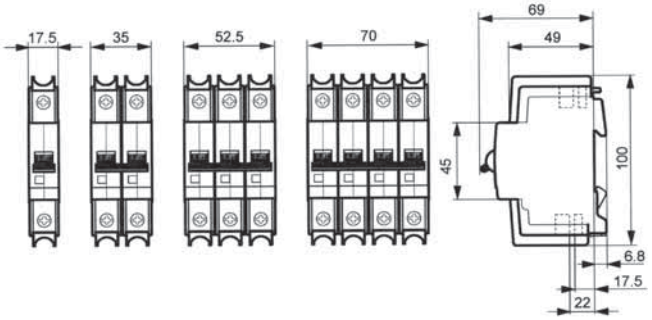
S200 & S200P



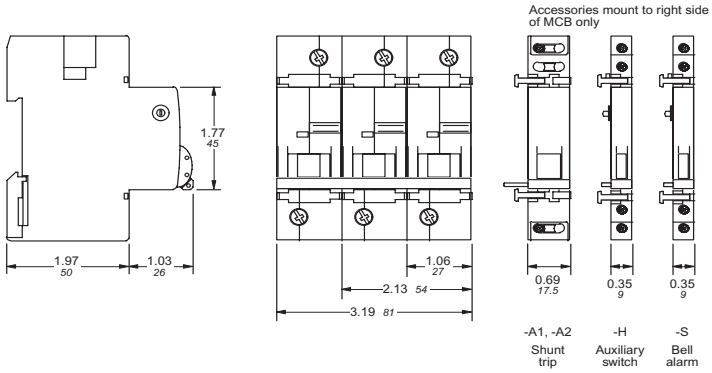
S200U



S200UP



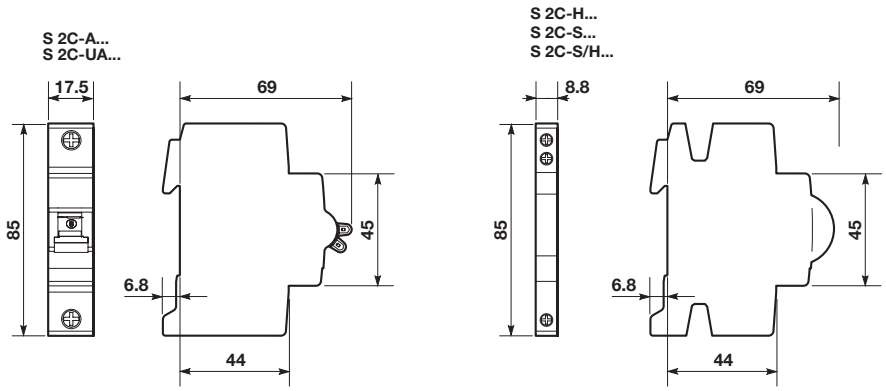
S290



14

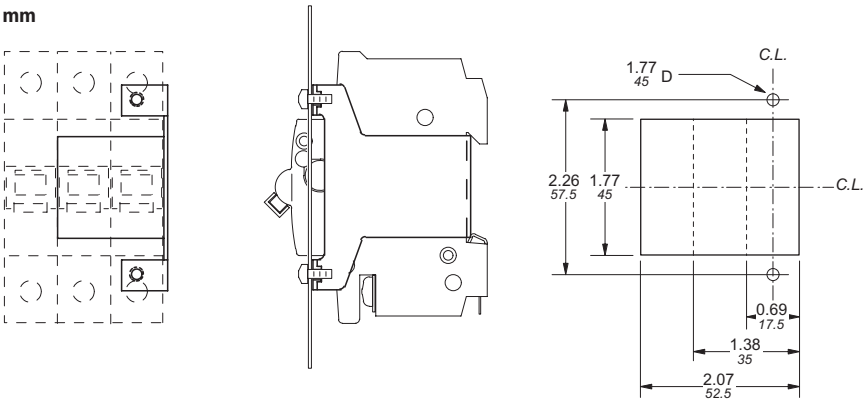
Accessories

mm

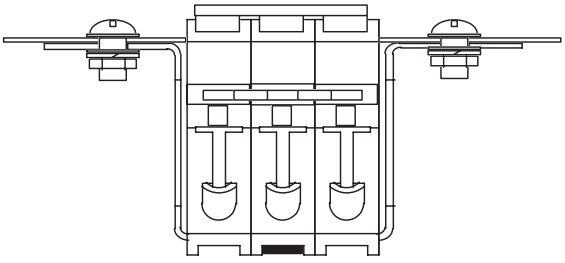


MB-CL
Front mounting clip

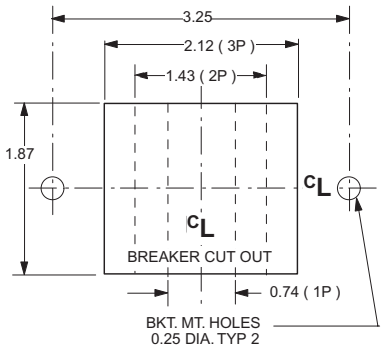
mm



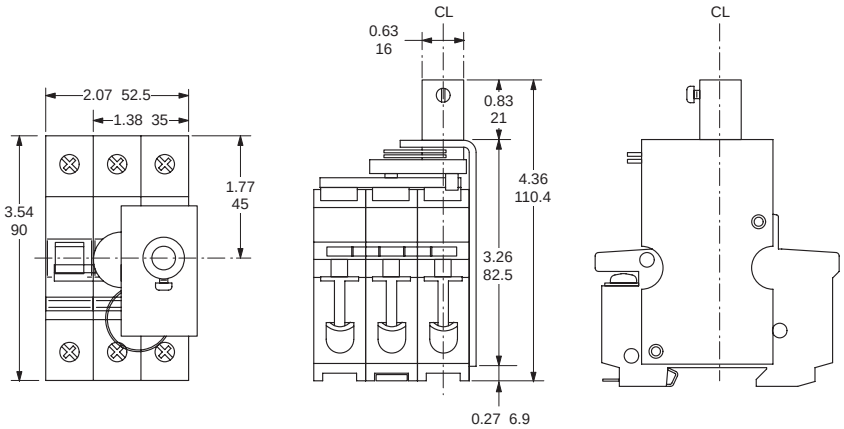
MB-3PD
Front mounting bracket



in



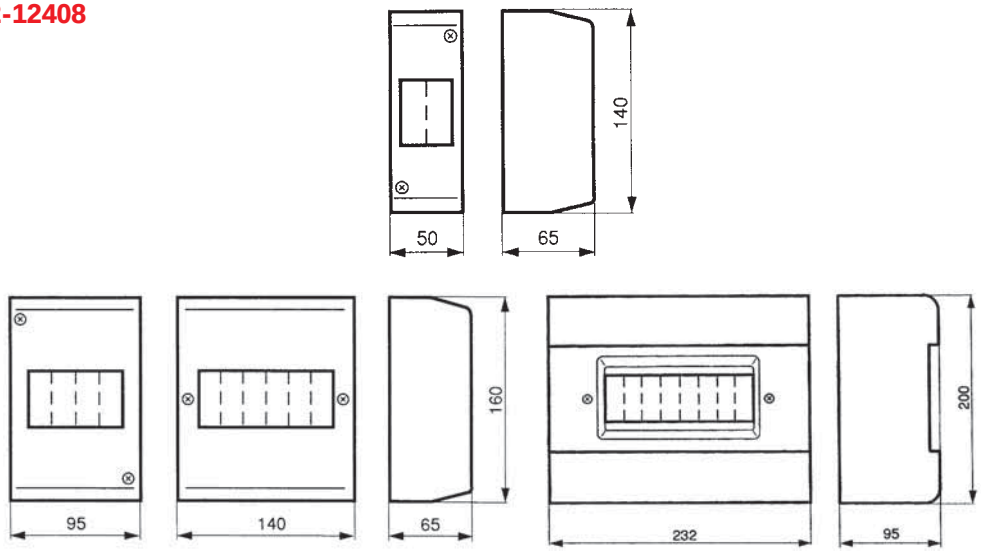
S2C-DH
Handle mechanism



Approximate dimensions
Accessories

00.00 / 00.00 Inches [Millimeters]

12402-12408



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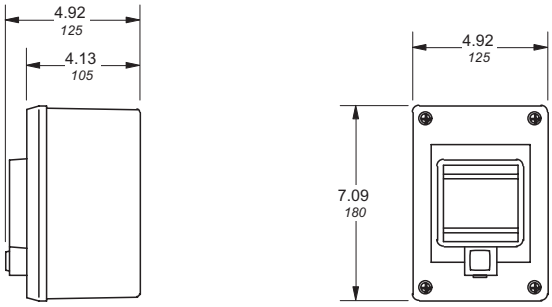
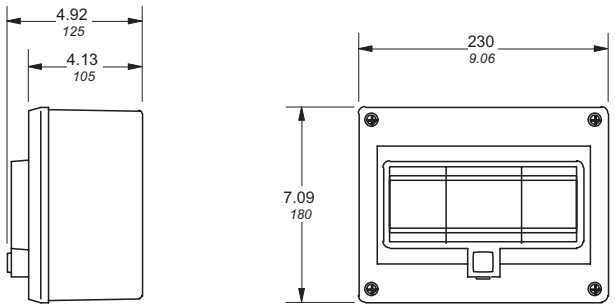


12650



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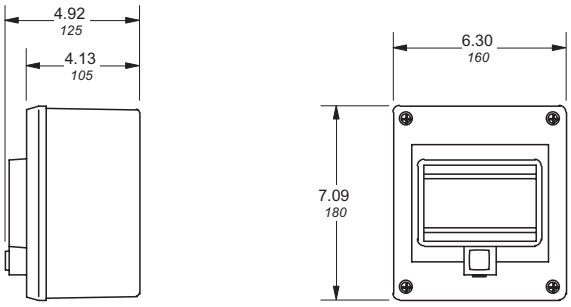

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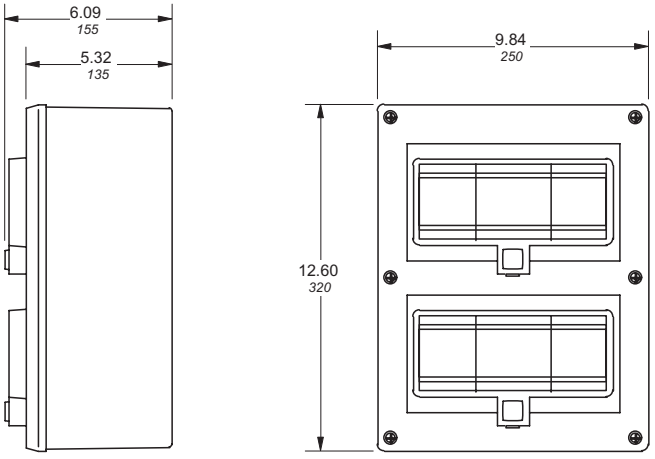


Cross-reference

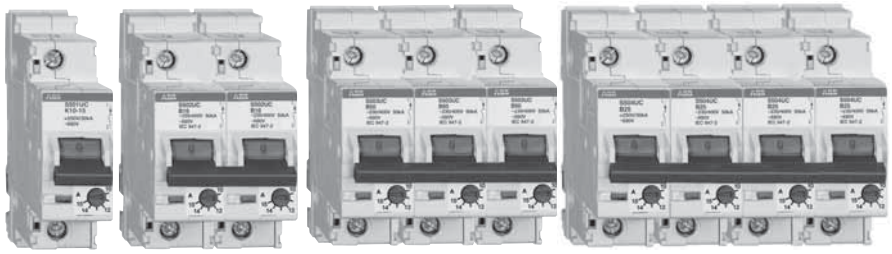
Older version	Suggested replacement series	Physical comparison	Electrical comparison
S260-B	S200-B	Same pole spacing	Same trip characteristic
S260-C	S200-C	Same pole spacing	Same trip characteristic
S260-D	S200-D	Same pole spacing	Same trip characteristic
S270-K	S200-K	Same pole spacing	Same trip characteristic
S280-K	S200P-K	Same pole spacing	Same trip characteristic
S280-Z	S200P-Z	Same pole spacing	Same trip characteristic
S280U-K	S200U-K	Same pole spacing	Same trip characteristic
S280UX-K	S200U-K	Smaller pole spacing	Same trip characteristic

Many older styles of ABB miniature circuit breakers have been replaced by new and improved versions. Many of these newer styles can be directly interchanged, both electrically and physically, with the older version. There are also many international styles of ABB circuit breakers which are not normal stock items and may be interchanged with stocked ABB versions.

Notes

S500 Miniature circuit breakers

System pro M compact
Miniature Circuit Breakers
S500 Series



Description

Increasing energy requirements result in larger short-circuit currents which place heavy demands on protective switchgear regarding safety, reliability and switching capacities.

The S500 heavy-duty circuit breaker fulfills these requirements by virtue of its technical features. It is equipped with a thermal and/or electromagnetic release to protect circuits, motors, switchgear and systems from the effects of overload and short-circuit currents.

For the worldwide market, the S500 breakers carry UL, CSA, IEC, CE and many other agency approvals.

Features

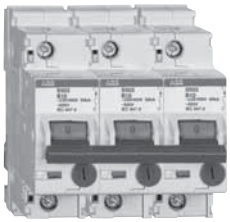
- High breaking capacity
- Energy-limiting
- Current-limiting
- Extremely fast breaking time
- Optimal selectivity
- Various versions for special applications
- Compact dimensions, DIN cap size
- Easy and quick to install
- Easy to connect; finger safe terminals
- Wide range of accessories
- UL 1077 recognized 600VAC and 500VDC versions

UL File # E167556

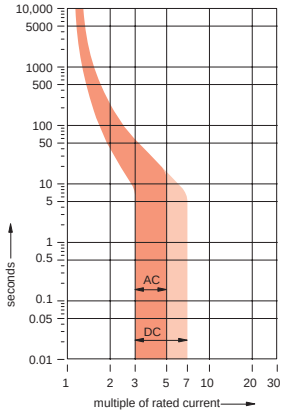
S500
600Y/277 VAC


S501-C16


S502-C6


S503-C10

B



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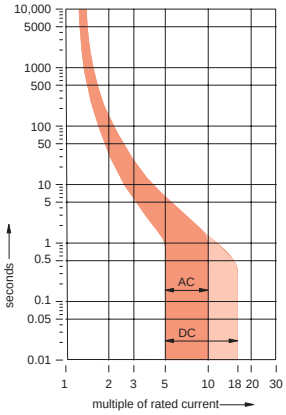


B
UL 1077 CSA C22.2
VDE 0641 IEC 947-2

Rated current	Catalog number	List price	Delivery class	Weight (oz.) 1 pc
1 pole				
6	S501-B6	**$ 168**	B	8.90
10	S501-B10	**168**		
13	S501-B13	**168**		
16	S501-B16	**168**		
20	S501-B20	**168**		
25	S501-B25	**168**		
32	S501-B32	**168**		
40	S501-B40	**168**		
50	S501-B50	**186**		
63	S501-B63	**202**		
2 pole				
6	S502-B6	**328**	B	17.85
10	S502-B10	**328**		
13	S502-B13	**328**		
16	S502-B16	**328**		
20	S502-B20	**328**		
25	S502-B25	**328**		
32	S502-B32	**328**		
40	S502-B40	**328**		
50	S502-B50	**362**		
63	S502-B63	**392**		
3 pole				
6	S503-B6	**478**	B	25.36
10	S503-B10	**478**		
13	S503-B13	**478**		
16	S503-B16	**478**		
20	S503-B20	**478**		
25	S503-B25	**478**		
32	S503-B32	**478**		
40	S503-B40	**478**		
50	S503-B50	**526**		
63	S503-B63	**574**		

C
UL 1077 CSA C22.2
VDE 0641 IEC 947-2

Rated current	Catalog number	List price	Delivery class	Weight (oz.) 1 pc
1 pole				
6	S501-C6	**$ 168**	B	8.90
10	S501-C10	**168**		
13	S501-C13	**168**		
16	S501-C16	**168**		
20	S501-C20	**168**		
25	S501-C25	**168**		
32	S501-C32	**168**		
40	S501-C40	**168**		
50	S501-C50	**184**		
63	S501-C63	**202**		
2 pole				
6	S502-C6	**328**	B	17.85
10	S502-C10	**328**		
13	S502-C13	**328**		
16	S502-C16	**328**		
20	S502-C20	**328**		
25	S502-C25	**328**		
32	S502-C32	**328**		
40	S502-C40	**328**		
50	S502-C50	**362**		
63	S502-C63	**392**		
3 pole				
6	S503-C6	**478**	B	25.36
10	S503-C10	**478**		
13	S503-C13	**478**		
16	S503-C16	**478**		
20	S503-C20	**478**		
25	S503-C25	**478**		
32	S503-C32	**478**		
40	S503-C40	**478**		
50	S503-C50	**526**		
63	S503-C63	**574**		

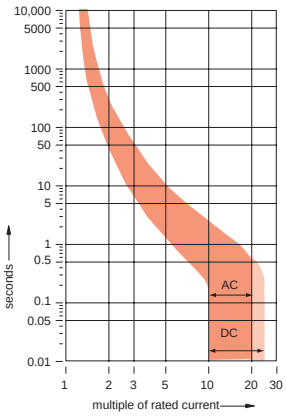
D
UL 1077 CSA C22.2
VDE 0641 IEC 947-1

Rated current	Catalog number	List price	Delivery class	Wgt. oz. (1 Pc.)
1 pole				
13	S501-D13	**$ 190**	B	8.90
16	S501-D16	**190**		
20	S501-D20	**190**		
25	S501-D25	**190**		
32	S501-D32	**190**		
40	S501-D40	**190**		
50	S501-D50	**210**		
63	S501-D63	**226**		
2 pole				
13	S502-D13	**372**	B	17.85
16	S502-D16	**372**		
20	S502-D20	**372**		
25	S502-D25	**372**		
32	S502-D32	**372**		
40	S502-D40	**372**		
50	S502-D50	**408**		
63	S502-D63	**442**		
3 pole				
13	S503-D13	**544**	B	25.36
16	S503-D16	**544**		
20	S503-D20	**544**		
25	S503-D25	**544**		
32	S503-D32	**544**		
40	S503-D40	**544**		
50	S503-D50	**600**		
63	S503-D63	**646**		

Delivery Class

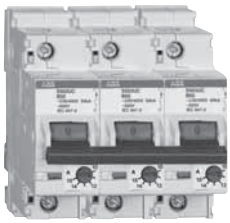
A - Standard item, stock to 2 weeks lead time
B - Stock to 4 weeks lead time
C - 6 to 8 week lead time

D



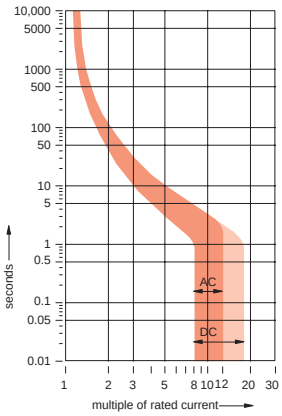
S501-D20

S502-D13



S503-K6

K



K UL 1077 CSA C22.2 VDE 0641 IEC-898

Rated current	Catalog number	List price	Delivery class	Wgt. oz. (1 Pc.)
1 pole				
0.1 – 0.15	S501-K0.15	**$ 182**		
0.14 – 0.21	S501-K0.21	**182**		
0.2 – 0.3	S501-K0.3	**182**		
0.28 – 0.42	S501-K0.42	**182**		
0.38 – 0.58	S501-K0.58	**182**		
0.53 – 0.8	S501-K0.8	**182**		
0.73 – 1.1	S501-K1.1	**182**		
1 – 1.5	S501-K1.5	**182**		
1.4 – 2.1	S501-K2.1	**182**		
2 – 3	S501-K3	**182**		
2.8 – 4.2	S501-K4.2	**182**	B	8.90
3.8 – 5.8	S501-K5.8	**182**		
5.3 – 8	S501-K8	**182**		
7.3 – 11	S501-K11	**182**		
10 – 15	S501-K15	**182**		
14 – 20	S501-K20	**182**		
18 – 26	S501-K26	**182**		
23 – 32	S501-K32	**202**		
29 – 37	S501-K37	**202**		
34 – 41	S501-K41	**226**		
38 – 45	S501-K45	**226**		
2 pole				
0.1 – 0.15	S502-K0.15	**356**		
0.14 – 0.21	S502-K0.21	**356**		
0.2 – 0.3	S502-K0.3	**356**		
0.28 – 0.42	S502-K0.42	**356**		
0.38 – 0.58	S502-K0.58	**356**		
0.53 – 0.8	S502-K0.8	**356**		
0.73 – 1.1	S502-K1.1	**356**		
1 – 1.5	S502-K1.5	**356**		
1.4 – 2.1	S502-K2.1	**356**		
2 – 3	S502-K3	**356**	B	17.85
2.8 – 4.2	S502-K4.2	**356**		
3.8 – 5.8	S502-K5.8	**356**		
5.3 – 8	S502-K8	**356**		
7.3 – 11	S502-K11	**356**		
10 – 15	S502-K15	**356**		
14 – 20	S502-K20	**356**		
18 – 26	S502-K26	**356**		
23 – 32	S502-K32	**392**		
29 – 37	S502-K37	**392**		
34 – 41	S502-K41	**442**		
38 – 45	S502-K45	**442**		
3 pole				
0.1 – 0.15	S503-K0.15	**518**		
0.14 – 0.21	S503-K0.21	**518**		
0.2 – 0.3	S503-K0.3	**518**		
0.28 – 0.42	S503-K0.42	**518**		
0.38 – 0.58	S503-K0.58	**518**		
0.53 – 0.8	S503-K0.8	**518**		
0.73 – 1.1	S503-K1.1	**518**		
1 – 1.5	S503-K1.5	**518**		
1.4 – 2.1	S503-K2.1	**518**		
2 – 3	S503-K3	**518**	B	25.36
2.8 – 4.2	S503-K4.2	**518**		
3.8 – 5.8	S503-K5.8	**518**		
5.3 – 8	S503-K8	**518**		
7.3 – 11	S503-K11	**518**		
10 – 15	S503-K15	**518**		
14 – 20	S503-K20	**518**		
18 – 26	S503-K26	**518**		
23 – 32	S503-K32	**574**		
29 – 37	S503-K37	**574**		
34 – 41	S503-K41	**644**		
38 – 45	S503-K45	**828**		

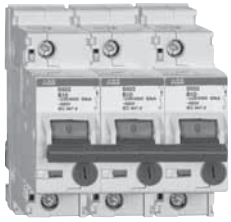
Delivery Class

A - Standard item, stock to 2 weeks lead time
B - Stock to 4 weeks lead time
C - 6 to 8 week lead time

S500UC
600Y/277 VAC
600 VDC


S501UC-B40


S502UC-B16


S503UC-B50

B

UL 1077 CSA C22.2
VDE 0660

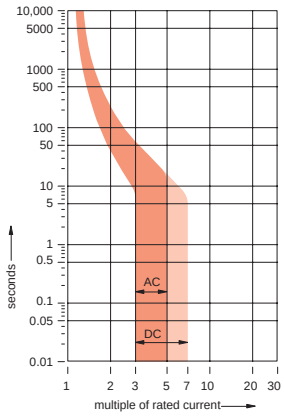
Rated current	Catalog number	List price	Delivery class	Weight (oz.) 1 pc
1 pole				
6	S501UC-B6	**$ 226**	C	8.90
10	S501UC-B10	**226**		
13	S501UC-B13	**226**		
16	S501UC-B16	**226**		
20	S501UC-B20	**226**		
25	S501UC-B25	**226**		
32	S501UC-B32	**226**		
40	S501UC-B40	**226**		
50	S501UC-B50	**258**		
63	S501UC-B63	**292**		
2 pole				
6	S502UC-B6	**442**	C	17.85
10	S502UC-B10	**442**		
13	S502UC-B13	**442**		
16	S502UC-B16	**442**		
20	S502UC-B20	**442**		
25	S502UC-B25	**442**		
32	S502UC-B32	**442**		
40	S502UC-B40	**442**		
50	S502UC-B50	**502**		
63	S502UC-B63	**568**		

Rated current	Catalog number	List price	Delivery class	Weight (oz.) 1 pc
3 pole				
6	S503UC-B6	**$ 646**	C	25.36
10	S503UC-B10	**646**		
13	S503UC-B13	**646**		
16	S503UC-B16	**646**		
20	S503UC-B20	**646**		
25	S503UC-B25	**646**		
32	S503UC-B32	**646**		
40	S503UC-B40	**646**		
50	S503UC-B50	**734**		
63	S503UC-B63	**832**		
4 pole				
6	S504UC-B6	**908**	C	35.75
10	S504UC-B10	**908**		
13	S504UC-B13	**908**		
16	S504UC-B16	**908**		
20	S504UC-B20	**908**		
25	S504UC-B25	**908**		
32	S504UC-B32	**908**		
40	S504UC-B40	**908**		
50	S504UC-B50	**1030**		
63	S504UC-B63	**1164**		

Delivery Class

A - Standard item, stock to 2 weeks lead time
B - Stock to 4 weeks lead time
C - 6 to 8 week lead time

B

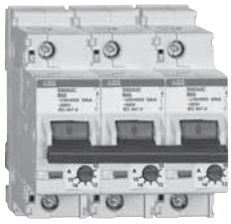


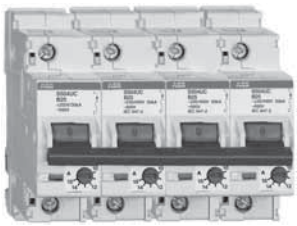
S500 UC
600Y/277 VAC
600 VDC

System pro M S500 Series

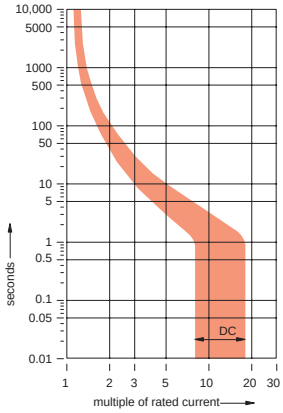

S501UC-K0.15


S502UC-K0.15


S503UC-K0.15


S504UC-K0.15

UC-K



K UL 1077 CSA C22.2
VDE 0660

Rated current	Catalog number	List price	Delivery class	Weight (oz.) 1 pc
1 pole				
0.1 – 0.15	S501UC-K0.15	**$ 250**		
0.14 – 0.21	S501UC-K0.21	**250**		
0.2 – 0.3	S501UC-K0.3	**250**		
0.28 – 0.42	S501UC-K0.42	**250**		
0.38 – 0.58	S501UC-K0.58	**250**		
0.53 – 0.8	S501UC-K0.8	**250**		
0.73 – 1.1	S501UC-K1.1	**250**		
1 – 1.5	S501UC-K1.5	**250**		
1.4 – 2.1	S501UC-K2.1	**250**		
2 – 3	S501UC-K3	**250**		
2.8 – 4.2	S501UC-K4.2	**250**	C	8.90
3.8 – 5.8	S501UC-K5.8	**250**		
5.3 – 8	S501UC-K8	**250**		
7.3 – 11	S501UC-K11	**250**		
10 – 15	S501UC-K15	**250**		
14 – 20	S501UC-K20	**250**		
18 – 26	S501UC-K26	**250**		
23 – 32	S501UC-K32	**286**		
29 – 37	S501UC-K37	**286**		
34 – 41	S501UC-K41	**320**		
38 – 45	S501UC-K45	**320**		
2 pole				
0.1 – 0.15	S502UC-K0.15	**488**		
0.14 – 0.21	S502UC-K0.21	**488**		
0.2 – 0.3	S502UC-K0.3	**488**		
0.28 – 0.42	S502UC-K0.42	**488**		
0.38 – 0.58	S502UC-K0.58	**488**		
0.53 – 0.8	S502UC-K0.8	**488**		
0.73 – 1.1	S502UC-K1.1	**488**		
1 – 1.5	S502UC-K1.5	**488**		
1.4 – 2.1	S502UC-K2.1	**488**	C	17.85
2 – 3	S502UC-K3	**488**		
2.8 – 4.2	S502UC-K4.2	**488**		
3.8 – 5.8	S502UC-K5.8	**488**		
5.3 – 8	S502UC-K8	**488**		
7.3 – 11	S502UC-K11	**488**		
10 – 15	S502UC-K15	**488**		
14 – 20	S502UC-K20	**488**		
18 – 26	S502UC-K26	**488**		
23 – 32	S502UC-K32	**558**		
29 – 37	S502UC-K37	**558**		
34 – 41	S502UC-K41	**622**		
38 – 45	S502UC-K45	**622**		

Rated current	Catalog number	List price	Delivery class	Weight (oz.) 1 pc
3 pole				
0.1 – 0.15	S503UC-K0.15	**$ 712**		
0.14 – 0.21	S503UC-K0.21	**712**		
0.2 – 0.3	S503UC-K0.3	**712**		
0.28 – 0.42	S503UC-K0.42	**712**		
0.38 – 0.58	S503UC-K0.58	**712**		
0.53 – 0.8	S503UC-K0.8	**712**		
0.73 – 1.1	S503UC-K1.1	**712**		
1 – 1.5	S503UC-K1.5	**712**		
1.4 – 2.1	S503UC-K2.1	**712**		
2 – 3	S503UC-K3	**712**		
2.8 – 4.2	S503UC-K4.2	**712**	C	25.36
3.8 – 5.8	S503UC-K5.8	**712**		
5.3 – 8	S503UC-K8	**712**		
7.3 – 11	S503UC-K11	**712**		
10 – 15	S503UC-K15	**712**		
14 – 20	S503UC-K20	**712**		
18 – 26	S503UC-K26	**712**		
23 – 32	S503UC-K32	**814**		
29 – 37	S503UC-K37	**814**		
34 – 41	S503UC-K41	**910**		
38 – 45	S503UC-K45	**910**		
4 pole				
0.1 – 0.15	S504UC-K0.15	**996**		
0.14 – 0.21	S504UC-K0.21	**996**		
0.2 – 0.3	S504UC-K0.3	**996**		
0.28 – 0.42	S504UC-K0.42	**996**		
0.38 – 0.58	S504UC-K0.58	**996**		
0.53 – 0.8	S504UC-K0.8	**996**		
0.73 – 1.1	S504UC-K1.1	**996**		
1 – 1.5	S504UC-K1.5	**996**		
1.4 – 2.1	S504UC-K2.1	**996**		
2 – 3	S504UC-K3	**996**	C	35.75
2.8 – 4.2	S504UC-K4.2	**996**		
3.8 – 5.8	S504UC-K5.8	**996**		
5.3 – 8	S504UC-K8	**996**		
7.3 – 11	S504UC-K11	**996**		
10 – 15	S504UC-K15	**996**		
14 – 20	S504UC-K20	**996**		
18 – 26	S504UC-K26	**996**		
23 – 32	S504UC-K32	**1142**		
29 – 37	S504UC-K37	**1142**		
34 – 41	S504UC-K41	**1276**		
38 – 45	S504UC-K45	**1276**		

Delivery Class

A - Standard item, stock to 2 weeks lead time
B - Stock to 4 weeks lead time
C - 6 to 8 week lead time

14

Accessories

S500-H11
Auxiliary contacts

S500-RD3

S500-K2

S500-BB38

Auxiliary contacts

Electrical accessories	Catalog number	List price	Delivery class	Wgt. oz. (1pc.)
1 N.O./1 N.C.	S500-H11			
2 N.O.	S500-H20	**$ 84**	B	2.14
2 N.C.	S500-H02			

For field mounting left side

Bell alarm with auxiliary contacts

Electrical accessories	Catalog number	List price	Delivery class	Wgt. oz. (1pc.)
1 N.O./1 N.C.	S500-S11			
2 N.O.	S500-S20	**92**	B	2.14
2 N.C.	S500-S02			

For field mounting left side

Handle mechanism

Electrical accessories	Catalog number	List price	Delivery class	Wgt. oz. (1pc.)
	S500-RD3	**100**	B	6.5

For use with 1-4 pole S500 MCBs and disconnect switch selector handles with 5mm shafts

Front mounting kit

Electrical accessories	Catalog number	List price	Delivery class	Wgt. oz. (1pc.)
For 1 pole	S500-ME1	**60**		2.1
1 to 3 poles	S500-ME2	**70**	A	2.9
1 to 7 poles	S500-ME3	**80**		3.6

Power feed terminal – Accepts into 2/0 AWG

Electrical accessories	Catalog number	List price	Delivery class	Wgt. oz. (1pc.)
	S500-K2	**25**	A	2

Suggested order quantity is 5.

Busbars – 3 phase L1, L2, L3

Amp rating	Number of poles	Busbar length (mm)	End cap catalog number	Catalog number	List price	Delivery class	Suggested order qty. quantity	Weight (ozs)
150	3 x 8	650	—	S500-BB38	**$ 182**	**A**	**1**	**1**
	4 x 4	435	—	S500-BB44	**142**			
	3 x 13	1055	—	S500-BB313	**274**			

Busbar end caps

Electrical accessories	Catalog number	List price	Delivery class	Wgt. oz. (1pc.)
	S500-EK	$ **25**	A	10

Undervoltage release

Electrical accessories	Catalog number suffix	List price	Delivery class	Wgt. oz. (1pc.)
12 V	UA12			
24 V	UA24			
48 V	UA48	**$ 266**	B	5.71
110 V	UA110			
230 V	UA230			
500 V	UA500			

Factory mount only.

Shunt trip

Electrical accessories	Catalog number suffix	List price	Delivery class	Wgt. oz. (1pc.)
12 V	AL12			
24 V	AL24			
48 V	AL48	**224**	B	5.71
110 V	AL110			
230 V	AL230			
500 V	AL500			

Factory mount only.

Delivery Class

A - Standard item, stock to 2 weeks lead time
B - Stock to 4 weeks lead time
C - 6 to 8 week lead time

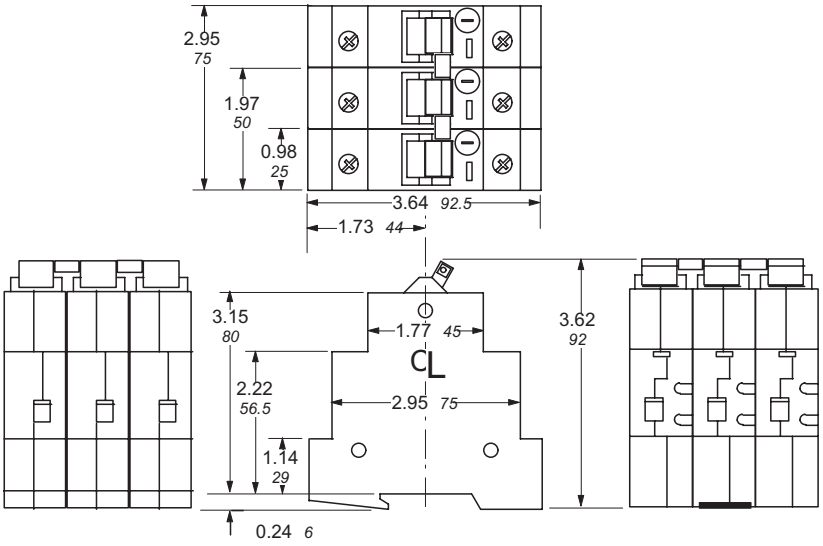
Item	S500-B, C, D	S500-K
Approvals:		
UL	1077	1077
CSA	C22.2 - No.235	C22.2 - No. 235
VDE	0641/6.78	0641/6.78
IEC	947-2	—
No. of poles:	1,2,3, +N, +NA	1,2,3, +N, +NA
Tripping characteristic:	B.C.D.	K
Rated currents:	6 to 63A	0.1 to 45A
Rated voltage:		
UL/CSA single pole	277VAC	277VAC
UL/CSA multi pole	600YVAC	600YVAC
IEC single pole	690VAC	690VAC
Rated interrupting capacity:		
Single pole	6-25A – 30KA/240VAC 14KA/277VAC	0.15-25A – 30KA/240VAC 14KA/277VAC
	32-63A – 18KA/240VAC 14KA/277VAC	26-45A – 18KA/240VAC 14KA/277VAC
Multi-pole	6-63A – 14KA/480VAC 6KA/600VAC	0.15-45A – 14KA/480VAC 6KA/600VAC
Frequency:	50/60 Hz	50/60Hz
Mounting position:	optional	optional
Standard mounting:	35mm DIN rail	35mm DIN rail
Terminals:	Conductors from 16-4AWG (1-25sq mm)	Conductors from 16-4AWG (1-25sq mm)
Service life at rated load:	20,000 operations	20,000 operations
Calibration temperature:	40°C	40°C

Item	S500UC-B, K			
Approvals:				
UL	1077			
CSA	C22.2			
VDE	0660			
No. of poles:	1,2,3, 4			
Tripping characteristic:	B, K			
Rated currents:	B: 6 to 63A K: 0.15 to 45A			
Rated voltage:				
UL single pole	277VAC/250VDC			
UL multi pole	600VAC/600VDC			
IEC multi pole	690VAC/750VDC			
Rated interrupting capacity:	B single pole:			
	6 – 25A	18KA/240VAC	14KA/277VAC	30KA/250VDC
	32 – 63A	30KA/240VAC	14KA/277VAC	30KA/250VDC
	B two-pole:			
	6 – 63A	14KA/480VAC	6KA/600VAC	30KA/500VDC
	B three-pole:			
	6 – 63A	14KA/480VAC	6KA/600VAC	30KA/600VDC
	K single pole:			
	0.15 – 25A	30KA/240VAC	14KA/277VAC	30KA/250VDC
	32 – 45A	18KA/240VAC	14KA/277VAC	30KA/250VDC
	K two-pole:			
	0.15 – 45A	14KA/480VAC	6KA/600VAC	30KA/500VDC
	K three-pole:			
	0.5 – 45A	14KA/480VAC	6KA/600VAC	30KA/600VDC
Frequency:	50/60Hz			
Mounting position:	optional			
Standard mounting:	35mm DIN-rail			
Terminals:	Conductors from 16 to 4AWG (1-25sq mm)			
Service life at rated load:	20,000 operations			

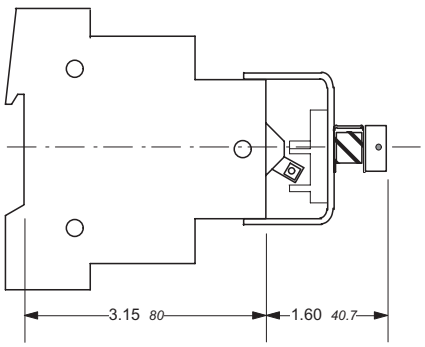
Approximate dimensions

00.00
00.00
Inches
[Millimeters]

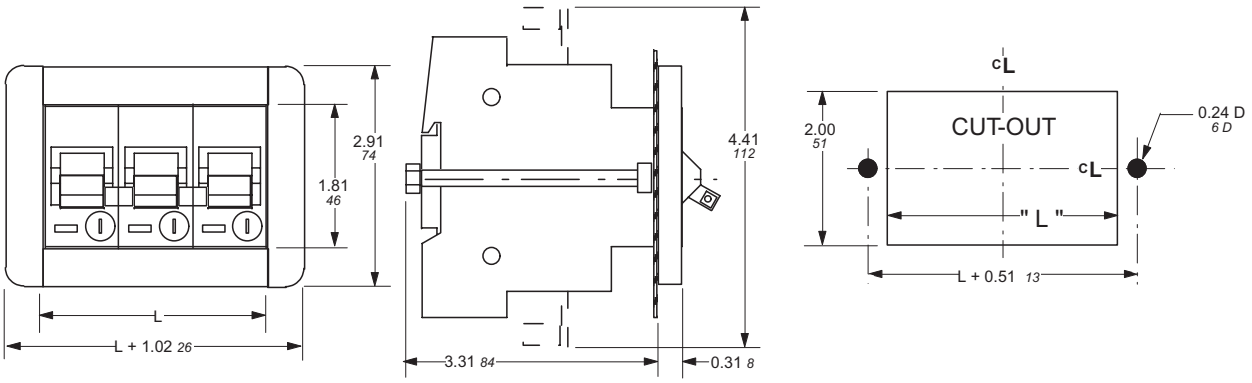
S500



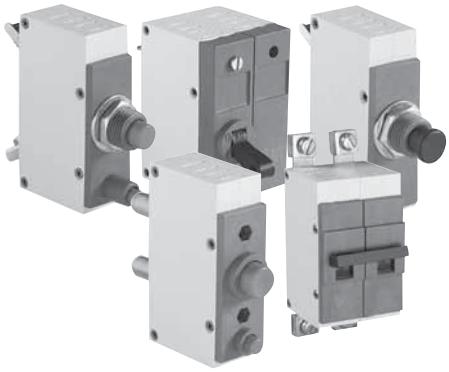
S500-RD3 Handle mechanism



S500 Front mounting kit



Galaxie circuit breakers
GD, GH, GN & GV



Description

Galaxie circuit breakers are door mounted for AC and DC applications. The breakers offer thermal-magnetic and magnetic-only trip protection.

For the worldwide market, the Galaxie breakers carry UL, CSA, IEC, CE and many other agency approvals and certifications.

Features

- Convenient actuators: Switch type, rocker switch & pushbutton
- Various termination mountings
- Tropicalization protection
- 480Y/277 VAC
- UL 1077 Recognized – supplemental protective device. UL File # E75741.

Series GD, GH, GN & GV
Circuit breakers

GD, GH, GN & GV Series circuit breakers
Fitted, unpluggable or projecting type

Catalog number explanation

Circuit Breakers

SERIES

- **GD** Standard Galaxie AC 240/415 V 50/60 Hz can be used at 48 V DC max.
- **GH** High rupturing capacity Galaxie AC 240/415 V 50/60 Hz
- **GN** Special Galaxie 100 V DC max.
- **GV** Special Galaxie 150 V DC max.
- **GA** Severe environment Galaxie (i.e. military use) consult us

VERSIONS

U	One-pole	(1 protected pole)
B	Two-pole	(2 protected poles)
T	Three-pole	(3 protected poles)
Q	Four-pole	(4 protected poles)
1+N	Two-pole	(1 protected pole + neutral)
3+N	Four-pole	(3 protected poles + neutral)

RATING (In : Amps)

0.1 - 0.2 - 0.3 - 0.5 - 1 - 1.5 - 2 - 2.5 - 3 - 4 - 5 **6** - 8 - **10** - 12 - **13** - **16** - **20** - **25** - 30 - **32**
Heavy duty types : ratings according to NF EN60 898 Other ratings, consult us.

MODELS

- **L** Thermal-magnetic - Curve B according to NF EN60 898
- **U** Thermal-magnetic - Curve C according to NF EN60 898
- **D** Thermal-magnetic - Curve D according to NF EN60 898 Ratings 6 to 32 A
- **S** Thermal-magnetic (series GN and GV only) according to NF F 62001
- **T** Thermal (except series GH)

FASTENINGS AND OPERATIONS ①

00 - 01 - 02 - 03 - 04 - 05 - 06 - 07 - 08 - 09

TERMINATIONS ①

00 - 01 - 02 - 03 - 07 - 08 - 09 - 33 - 43

OPTIONS

RATING ENGRAVED

- J On resetting button

METAL THREADED BUSHING

- W For fastening and operations 6-7-8. Tightening torque : 3 Nm max. (compulsory with option K)

CIRCUIT BREAKER SERIES GD MODEL D ②

- R With adjustable thermal protection (Not possible with option K)

MECHANICAL IMPACT

- V 50 g
- E 100 G

TROPICALIZATION

- T (Compulsory with option E 100)

THERMAL PROTECTION

- C Temperature compensated from + 20°C to + 60°C
- K Temperature compensated from - 40°C to + 85°C series GD, GH and GA (Compulsory with Option W)

AUXILIARY CONTACT FOR POSITION SIGNALLING O/F

- P1 on 1 pole
- P2 on 2 poles
- P3 on 3 poles
- P4 on 4 poles

① See next page
② Series GD, Model D only

EXAMPLE :

1 Circuit breaker Series : Galaxie standard AC - Version : 2 protected poles - Rating : 10 A - Model : magnetic-thermal, curve C - Fastenings and operations : Threaded bushing flush type 2 buttons - Terminations : Screws and back connectors - With Options Auxiliary for position signalling O/F : on 2 poles - Tropicalization has reference **GDB10U0703 P2T**

GD	**B**	**10**	**U**	**07**	**03**	**P2**	**-**	**T**	**-**	**-**	**-**	**-**

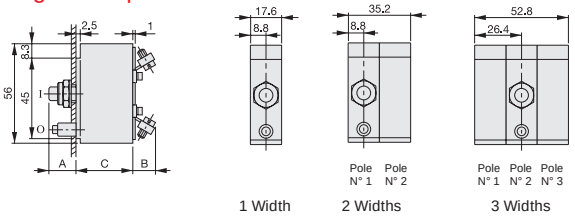
Technical data

CE	UL, CSA : For list of certified products : consult us		Circuit breakers NF F62 001 : consult us	
Characteristics	**SERIES GD**	**SERIES GH**	**SERIES GN**	**SERIES GV**
Rated voltage				
1 + neutral version	240 V AC (50/60 Hz)			
One pole version	240/415 V AC (50/60 Hz)	240/415 V AC (50/60 Hz)		
Multipole version	415 V AC (50/60 Hz)	415 V AC (50/60 Hz)		
One pole and two pole version	48 V DC max.		100 V DC max.	150 V DC max.
Interrupting capacity				
According to standard IEC 898	3 000 A	4 500 A (models U and D: rating ≥ 5 A)		
		4 500 A (model L: rating ≥ 10 A)		
According to standard NF F62 001	1 000 A (48 V DC max.)		500 A	1 000 A (48 V DC max.)
	10 In cal. < 5 A ; 20 In cal > 5 A		10 In cal. < 5 A ; 20 In cal > 5 A	10 In cal. < 5 A ; 20 In cal > 5 A
Other characteristics				
Life, number of cycles (On+Off)	4 000	4 000	4 000	4 000
Dielectric withstanding voltage	2 000 V rms	2 000 V rms	2 000 V rms	2 000 V rms
Tripping curves (1) (2) S	Curve B : 3 In < S < 5 In - Curve C : 5 In < S < 10 In - Curve D : 10 In < S < 20 In < 14 In		Nominal current 0.1 to 2 A : 5 In < S < 10 In - 3 to 32 A : 7 In < S	
Mechanical shock				
	30 g.	30 g.	30 g.	30 g.
Ambient temperature				
	-5° C to 40° C	-5° C to 40° C	-25° C to + 70° C	-25° C to + 70° C

Approximate dimensions

00.00 Millimeters

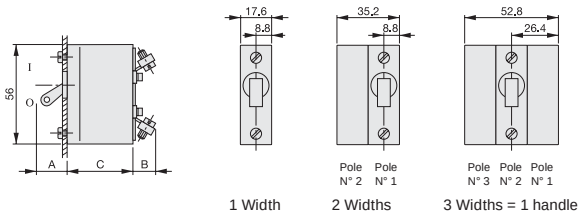
Fastenings and operations Nº 00 - 01 - 02 - 03 - 04 - 06 - 07 - 08



Fastenings / Operations	00	01	02	03	04	05	06	07	08	09
Size A	8	8	8	8	8	17,5	15	15	21	28
Size C	32	32	32	32	32	37	32	32	32	32

Terminations	00	01	02	03	33	43		07	08	09
Size B	15	4	4	12	4	4		4	4	11

Fastenings and operations Nº 05 - 09



Four-pole circuit breaker :

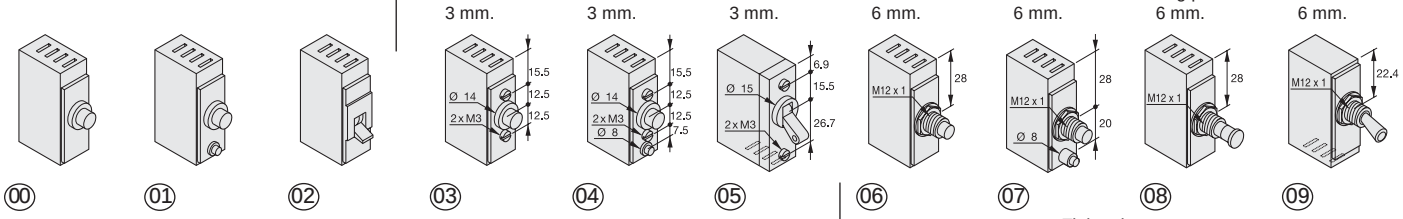
Fastening and operation Nº 05 only

NOTE :
Neutral on pole N° 1
any
Fastenings and operations

Fastenings and operations (3 poles max. except 02 : 2 poles and 05 : 4 poles)

PROJECTION MOUNTING

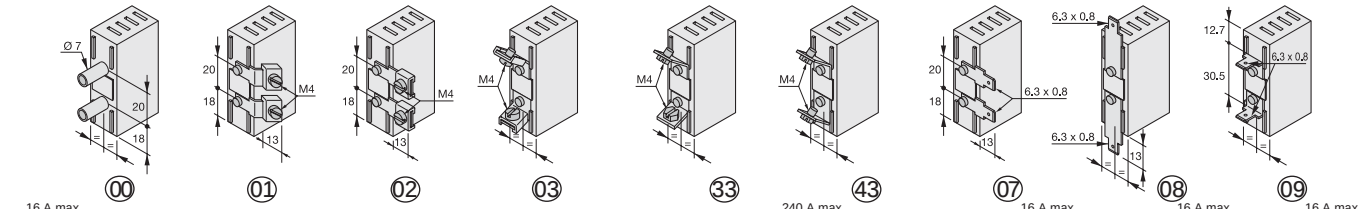
SCREW FLUSH MOUNTING Maximum thickness of mounting panel :



Tightening torque :

1,8 Nm max. | 1,8 Nm max. | 1,8 Nm max. | 3 Nm max.

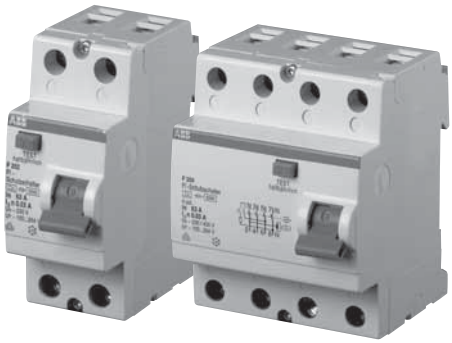
Terminations



16 A max. Except Fastening 08 | 2 poles max. | 2 poles max. | 240 A max. | 16 A max. 2 poles max. | 16 A max. | 16 A max.

Residual current devices
F200 – F670

System pro M compact
Residual current devices
F200, F670 series



2 Pole 4 Pole

Description

RCDs provide ground fault equipment protection by monitoring the leakage of current to ground. The F200 and F670 series will trip when ground faults are detected in excess of the GF trip rating of the device. These devices provide GF protection only and are used in series with standard MCBs which provide overload and short circuit protection. The F200 and F670 series can be used as a main device providing GF protection for several MCB branch devices.

The F200 and F670 series are UL1053 recognized for use in 480Y/277VAC applications.

The F202 and F672 is for use in single phase/two wire or two wire systems. The F204 and F674 is for use in three phase/four wire systems.

The F200 and F670 series RCDs replace the F360, F370 and F660 series with no change in fit, form or function.

The F200 and F670 have a profile similar to the S2 MCBs and can be used with the MCB busbars.

F200 & F670

F202, F672

F204, F674

Residual current devices

Breaker		GF trip level	Rated current	Catalog number	List price	Delivery class	Suggested order qty	Wgt. oz (1 Pc.)
F202 F672	Two pole 480Y/277VAC	10mA	16	F202AC-16/0.01	**$ 500**			
		30mA	25	F202AC-25/0.03	**300**			
			40	F202AC-40/0.03	**400**			
			63	F202AC-63/0.03	**550**			
			80	F672-80/0.03	**1600**			
			100	F672-100/0.03	**2200**			
		100mA	25	F202AC-25/0.1	**300**			
			40	F202AC-40/0.1	**400**	B	1	13.8
			63	F202AC-63/0.1	**550**			
			80	F672-80/0.1	**1600**			
			100	F672-100/0.1	**2200**			
		300mA	25	F202AC-25/0.3	**300**			
			40	F202AC-40/0.3	**400**			
			63	F202AC-63/0.3	**550**			
			80	F672-80/0.3	**1300**			
			100	F672-100/0.3	**1800**			
F204 F674	Four pole 480Y/277VAC	30mA	25	F204AC-25/0.03	**350**			
			40	F204AC-40/0.03	**450**			
			63	F204AC-63/0.03	**600**			
			80	F674-80/0.03	**1300**			
			100	F674-100/0.03	**1800**			
			125	F674-125/0.03	**1800**			
		100mA	25	F204AC-25/0.1	**350**			
			40	F204AC-40/0.1	**450**			
			63	F204AC-63/0.1	**600**			
			80	F674-80/0.1	**1300**			
			100	F674-100/0.1	**1800**	B	1	19.0
			125	F674-125/0.1	**1800**			
		300mA	25	F204AC-25/0.3	**350**			
			40	F204AC-40/0.3	**450**			
			63	F204AC-63/0.3	**600**			
			80	F674-80/0.3	**1200**			
			100	F674-100/0.3	**1600**			
			125	F674-125/0.3	**1600**			
		500mA	25	F204AC-25/0.5	**450**			
			40	F204AC-40/0.5	**600**			
			63	F204AC-63/0.5	**650**			

Above devices are UL 1053 recognized and IEC 1008 approved.

Delivery Class

A - Standard item, stock to 2 weeks lead time
B - Stock to 4 weeks lead time
C - 6 to 8 week lead time

Accessories
F200 ①


S2C-H6R


S2C-S/H6R


S2C-A_


S2C-UA_

Electrical accessories	For use on:	Catalog number	List price	Delivery class	Suggested order quantities	Wgt. oz. (1 pc.)
Auxiliary contacts						
For field mounting: right side Form C 1 NO/ 1 NC	F200	S2C-H6R	**$ 36**	A	1	1.4

The auxiliary contacts will signal whether the breaker is in the ON or OFF position. The contacts are rated 2A/277 VAC and 1.5A/125 VDC. Minimum operating voltage is 24 VAC/VDC.
Wire size: 18 AWG to 16 AWG.

Bell alarm						
For field mounting, right side	F200	S2C-S/H6R	**48**	A	1	1.4

The bell alarm includes a set of contacts that will only signal when the breaker has tripped. Typically the contacts would be connected to an alarm or bell to signal the operator that an overcurrent trip has occured. The bell alarm also includes a test button for testing the alarm contacts without opening the breaker. The contact is rated 2A/277 VAC and 1.5A/125 VDC. Minimum operating voltage is 24 VAC/VDC.

* Combination bell alarm/auxiliary contact

Shunt trip						
For field mounting, right side A1: 12-60 VAC (12-60VDC) A2: 110-415 VAC (110-250 VDC)	F200	S2C-A1 S2C-A2	**138**	A	1	5.2

For remote tripping of breaker, a shunt trip device can be added to the MCB. The solenoid device opens the breaker after control voltage is applied. Shunt trips are available for on control system voltage (12-415 VAC/VDC).

Undervoltage release						
For field mounting, right side						
12 VDC	F200	S2C-UA12	**216**	A	1	5.2
24 VAC		S2C-UA24				
48 VAC		S2C-UA48				
110 VAC		S2C-UA110				
220 VAC		S2C-UA230				
380 VAC		S2C-UA400				

When control voltage drops below approximately 50% of rated voltage, the UVR opens the breaker. The breaker can not be operated unless proper control voltage is first applied to the UVR coil. Similar in size and mounting to the shunt trip accessory.

Factory mounting

All accessories can be easily mounted in the field. For factory mounting of any accessory devices, add $30 list to total price per breaker. To create complete catalog number, take suffix of accessory device following “S2C-” and add suffix to end of breaker part number. Multiple suffixes must be added in alphabetical order.

Delivery Class

A - Standard item, stock to 2 weeks lead time
B - Stock to 4 weeks lead time
C - 6 to 8 week lead time

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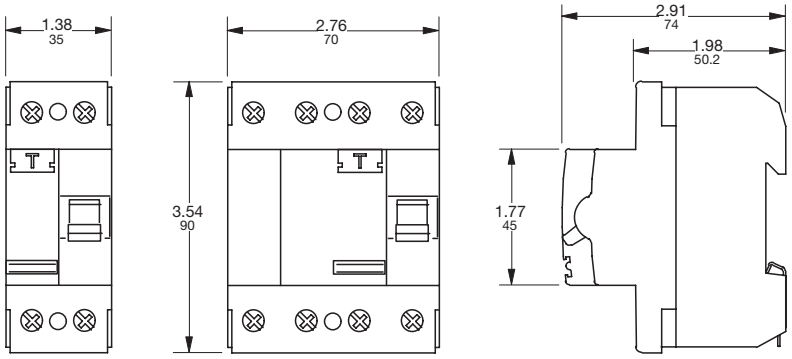
① Please consult factory for F670 accessories.

Technical data
F200, F670

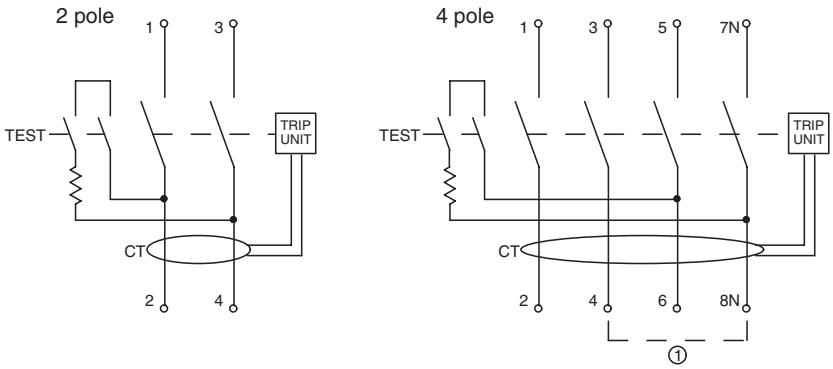
	F200AC	F670
Electrical features		
Standards	UL 1053 & IEC 61008	UL1053 & IEC 61008
Poles	2P, 4P	2P, 4P
Rated current In	16,25,40,63 AMPS	2P- 80,100 4P- 80,100,125
Rated Voltage Ui	480Y/277 VAC	480Y/277 VAC
Max operating voltage of curcuit test	254 (440 for F200 left neutral)	254 (440 for left neutral)
Min operating voltage of circuit test	110 (195 for F200 left neutral)	110 (195 for left neutral)
Rated Frequency	50…60 Hz	50…60 Hz
Rated conditional	50…60 Hz	50…60 Hz
Short-circuit current	10 KA	10 KA
Rated residual breaking capacity	1 KA	2 KA
Rated impulse withstand voltage (1.2/50) Uimp	6 KV	6 KV
Power- frequency voltage dielectric strength	2.5 KV	2.5 KV
Surge current resistance acc. To VDE 0432 Part 2 (wave 8/20)	250 AMPS	250 AMPS
Mechanical features		
Toggle	Blue sealable in ON-OFF position	Blue sealable in ON-OFF position
Contact position indicator	yes	yes
Electrical Life	10000	10000
Mechanical life	20000	20000
Ambient temperature	-25°C… +55°C	-25°C… +55°C
Storage temp.	-40°C… +70°C	-40°C… +70°C
Installation		
Terminal Type	failsafe bidirectional cylinder-lift terminal at top and bottom (shock protected)	
Terminal size top/bottom per cable	6 AWG Max.	6 AWG Max.
Tightening torque	17.5 in-lb max.	17.5 in-lb max.
mounting	35mm din rail by means of fast clip	35mm din rail by means of fast clip
Connection	From top & bottom	From top & bottom
Withdraw from busbar	Possible without the use of tools	Possible without the use of tools
Approximate dimensions		
2 Pole mm	85x69x35 MM	85x69x35 MM
4 Pole mm	85x69x70 MM	85x69x70 MM
Weight		
2 Pole g	200g	200g
4 Pole g	350g	350g
Combination with auxiliary elements		
Auxiliary contact	yes	yes
signal contact/ auxiliary switch	yes	yes
shunt trip	yes	yes
undervoltage release	yes	yes

Approximate dimensions
Circuit diagrams
F200, F670

Approximate dimensions



Circuit diagrams



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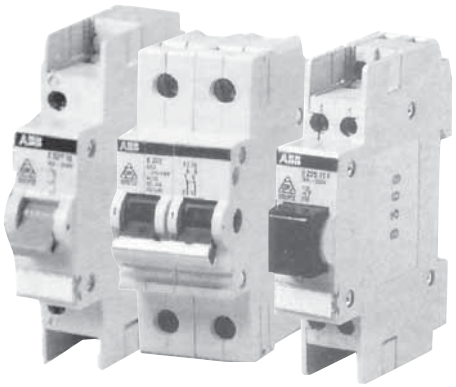
① To use on 3p/3w systems, add jumper between 4 and 8N for operation of test button.

Notes

System pro M compact
Modular DIN rail components
E220 - E270 Series



Description

- Safe connection by box terminals
- Captive screws with Pozidrive slotted head, Pozidrive system, Gr. 1
- Snap-on labels available
- Quick mounting with snap-on clip, easily accessible and detachable at the bottom
- Protection against unintentional direct touch
- System approach for control and circuit protection
- Compact size that dimensionally matches the S2 MCB series
- Control and pilot functions can be along side protective devices
- DIN rail mounted with 45mm front opening
- For use in auxiliary and logic devices
- Provide additional user functions for system control and operation
- Include pushbuttons, indicating lights and selector switches
- ABB System Pro M compatibility
- Most devices are both UL 508 recognized and are IEC compliant
- Labeled with the CE Mark

E221 & E222 Switches, 240VAC
16 & 25A

E221-10

Type	Rated current	Catalog number	List price	Delivery schedule	Suggested order qtys	Weight (Oz.) 1 piece
Switches						
1 N.O. + 1 N.C.	16	E221-11	**$ 90**			
2 N.O. + 2 N.C.	16	E221-22	**177**	B	10	2.46
3 N.O. + 1 N.C.	16	E221-31	**177**			
1 N.O.	16	E221-10	**59**			1.94
2 N.O.	16	E221-20	**110**	B	10	2.12
3 N.O.	16	E221-30	**120**			2.29
4 N.O.	16	E221-40	**159**			2.47
1 N.O. + 1 N.C.	25	E222-11	**140**			2.47
1 N.O.	25	E222-10	**107**			1.94
2 N.O.	25	E222-20	**141**	B	10	2.12
3 N.O.	25	E222-30	**159**			2.29
4 N.O.	25	E222-40	**239**			2.47
Form “C” switches						
1 Change-over contact	16	E221-6	**69**	B	10	2.12
2 Change-over contacts	16	E221-6/2	**125**			2.47
1 Change-over contact	25	E222-6	**128**	B	10	2.12
Form “C” switches (I-O-II, Hand-OFF-Automatic)						
1 Pole	16	E221-4	**99**	B	10	2.12
2 Pole	16	E221-4/2	**147**			2.47
1 Pole	25	E222-4	**150**	B	10	2.12

Note: Above devices are UL 508 recognized and IEC certified.
A300 pilot duty UL file # E171252

Delivery Class

A - Standard item, stock to 2 weeks lead time
B - Stock to 4 weeks lead time
C - 6 to 8 week lead time

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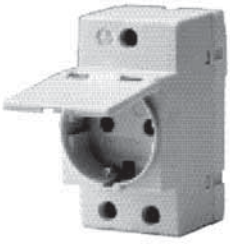
E225 - E229, E10 Pilot devices


E225-11F


E227-10E


E233-120/60


E1175


E1175-C

Type	Catalog number	List price	Delivery schedule	Pack units pcs.	Weight (Oz.) 1 piece
Pushbutton, 1 N.O. + 1 N.C. contact					
Grey	E225-11B				
Red	E225-11C				
Green	E225-11D	**$ 75**	A	10	1.94
Yellow	E225-11E				
Black	E225-11F				
Blue	E225-11G				
Illuminated pushbutton, 1 N.O. contact with lamp, 120 VAC					
Clear	E227-10B/110				
Red	E227-10C/110				
Green	E227-10D/110	**100**	A	10	1.94
Yellow	E227-10E/110				
Blue	E227-10G/110				
Pilot light with lamp, 120 VAC					
Clear	E229-B/110				
Red	E229-C/110				
Green	E229-D/110	**93**	A	10	1.59
Yellow	E229-E/110				
Blue	E229-G/110				
Lamps					
24 VAC/DC	E10/24				
120 VAC/DC	E10/110	**24**	A	1	0.14
220 VAC/DC	E10/220				

Note: Above devices are UL 508 recognized and IEC certified. UL file # E171252

Special features

- Safe connection via box terminals
- Captive screws with Phillips/Slotted head, Posidriv system, Gr. 1
- Snap-on labels available
- Protection against unintentional touch acc. to DIN VDE 0106 Part 100
- Lenses and pushbuttons in six colors

Elapsed time meter

Type	Catalog number	List price	Delivery schedule	Pack units pcs.	Weight (KG) 1 piece
24 VAC, 60 Hz	E233-24/60		B		
120 VAC, 60 Hz	E233-120/60	**$ 130**	A	1	0.045
240 VAC, 60 Hz	E233-240/60		B		

- Non-resettable
- 100,000 hours (99999.99)

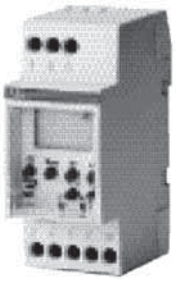
UL file #171252

Sockets

Type	Catalog number	List price	Delivery schedule	Pack units pcs.	Weight (KG) 1 piece
Socket, 250 VAC, 50/60 Hz Italian standard	E1173	**$ 57**	B	1	0.2
Socket, 250 VAC, 50/60 Hz French standard	E1174	**$ 57**	B	1	0.2
Socket, 250 VAC, 50/60 Hz Schuko standard	E1175	**$ 57**	B	1	0.2
Socket w/cover, 250 VAC, 50/60 Hz Schuko standard	E1175-C	**$ 57**	B	1	0.2

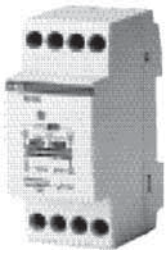
Delivery Class

A - Standard item, stock to 2 weeks lead time
B - Stock to 4 weeks lead time
C - 6 to 8 week lead time



DTS7/1

VLMD-1-2



TM15/12

Measuring instruments

Type	Catalog number	List price	Delivery schedule	Pack units pcs.	Weight (KG) 1 piece
Digital timer, 230 VAC, 50/60 Hz	DTS7/1	**$ 422**	B	1	0.3
Voltmeter 600 VAC, 50-400 Hz	VLMD-1-2	**510**	B	1	0.3
Ammeter 15-20-25-40-60A, 250-400-600A, 50-400 Hz	AMTD-1	**510**	B	1	0.3
Transformer, 230 VAC, 50/60 Hz 4-8-12 VAC sec	TM15/12	**135**	B	1	0.3

Technical data

Components for quick mounting onto DIN rails (35mm)

Mounting depth:	68mm
Mounting width:	1, 2, 3 and 4 pole switches = 17.5mm (= 1 module)

E220 Switches, 16 & 25A

Switching capacity:	1.25 I_n, 1.1U_n, cos j = 0.6
Short-circuit withstanding capacity:	3 kA, 380V, cos j = 0.9
Toggle sealable:	In ON and OFF positions
Connection cross-sections:	Up to 1 x 6mm² or 2 x 2.5mm²
Rated AC voltage:	240 VAC UL/CSA (E171252)
	250/440 VAC IEC

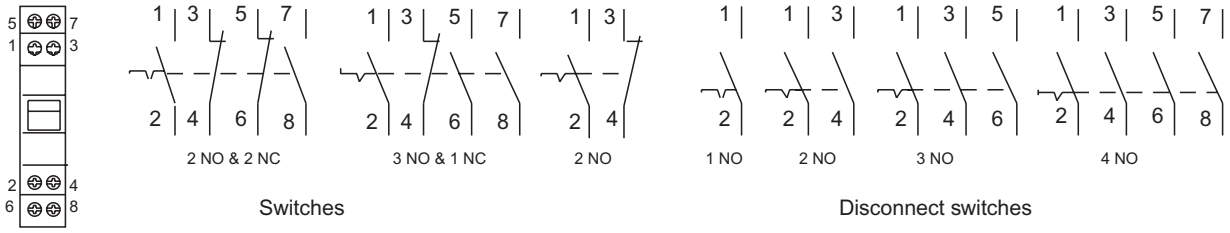
E240/270 Disconnect switches, 45, 63, 80, & 100A

Switching capacity:	1.25 I_n, 1.1U_n, cos j = 0.3
Short-circuit withstanding capacity:	E240 = 10kA, E270 = 25kA RMS
Connection cross-sections:	E240 up to 25mm²
	E270 up to 50mm²
Rated AC voltage:	240/400/415 VAC

E Series components for quick mounting onto DIN rails (35mm)

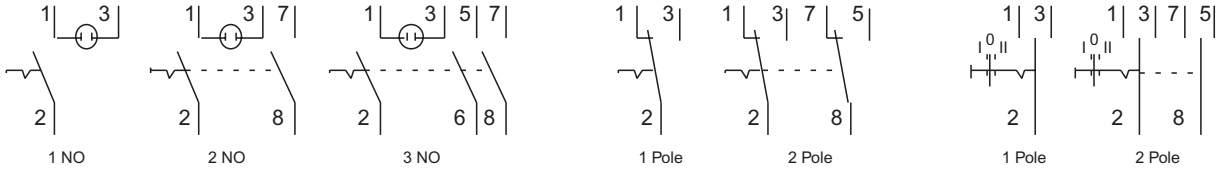
Mounting depth	68mm
Mounting width:	17.5mm (=1 module)
Color:	RAL 7035, grey
Connection cross sections:	Up to 1 X 6mm² or 2 X 2.5mm²
Rated current:	16A
Rated voltage:	250 VAC IEC
Rated voltage:	240 VAC UL/CSA (E171252)

Terminal markings



Switches

Disconnect switches

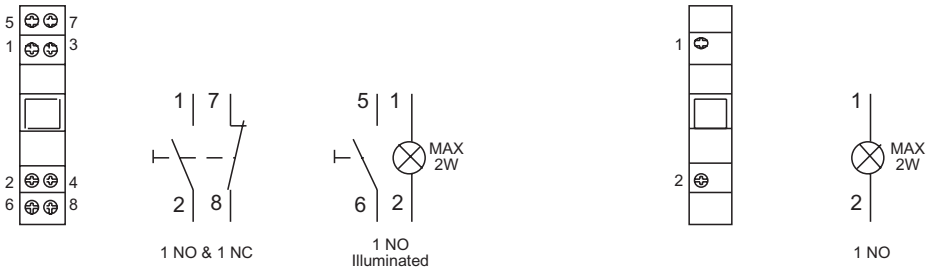


Illuminated pushbutton

Form "C" switches

Form "C" switches
(Hand - OFF- Auto)

Terminal assignments for pushbuttons and indicator lights



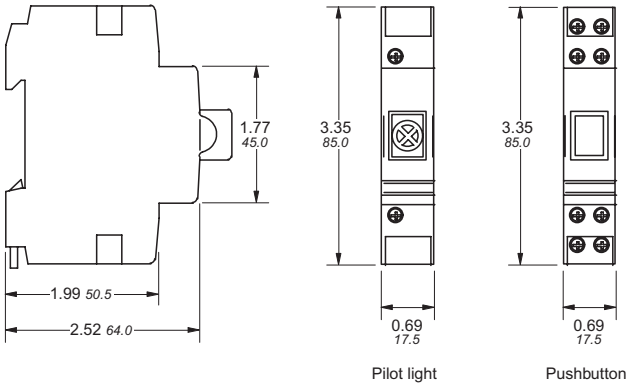
Pushbutton

Pilot light

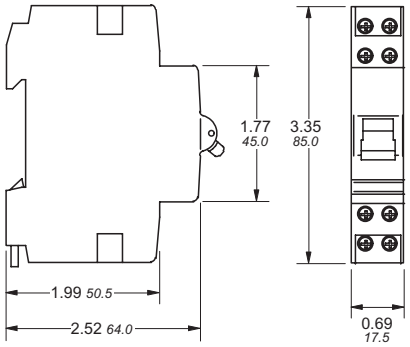
Approximate dimensions

00.00
00.00
Inches
[Millimeters]

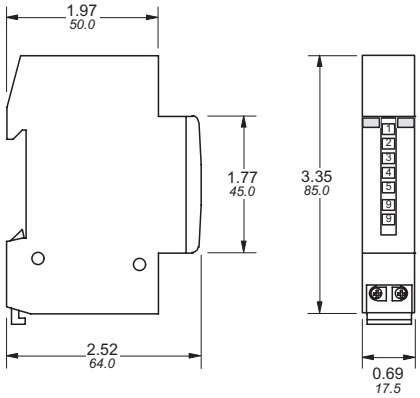
E220



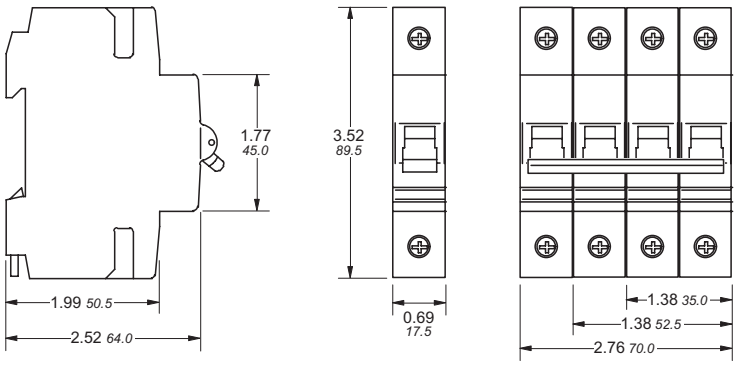
E220, 16 & 25A



E233

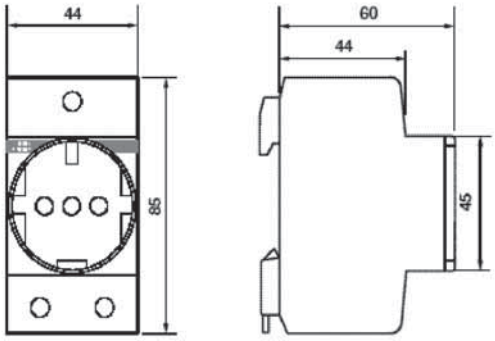


E240/270

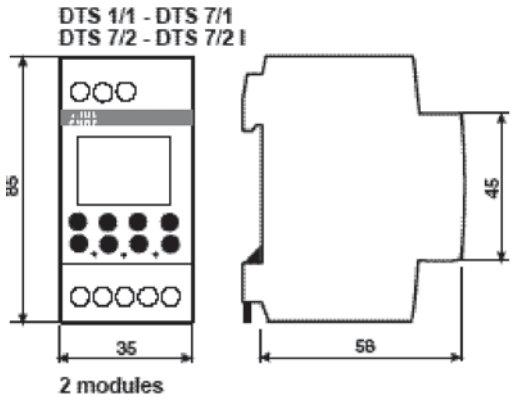


Approximate dimensions

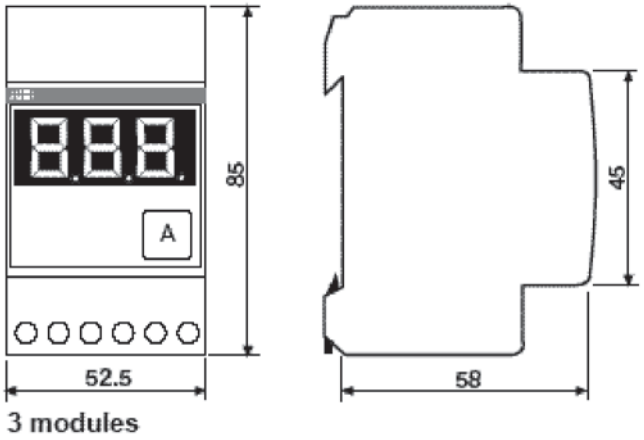
E1173 - E1175



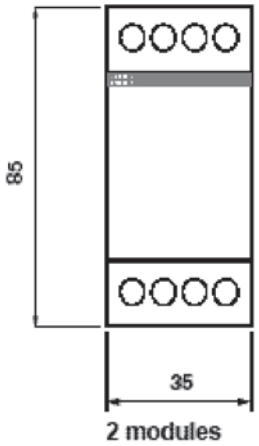
DTS



VLMD, AMTD



TMS



Transient voltage surge supressors
TVSS, OVR range

Description

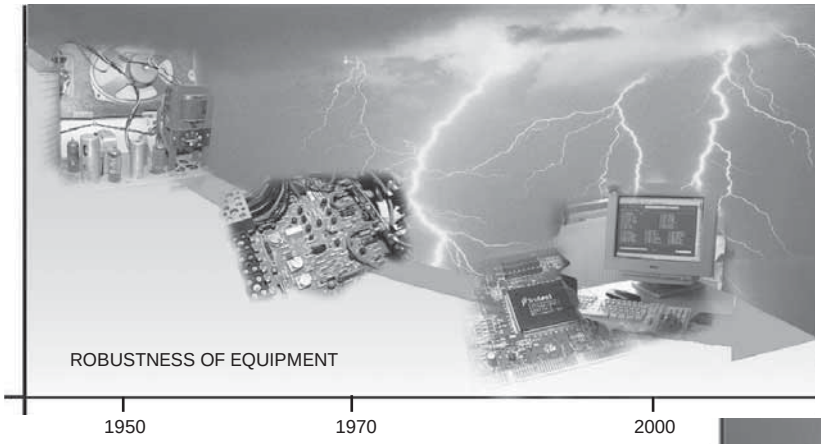
- Compact
- DIN rail mounting
- Broad range
- 1, 2, 3, & 4 pole versions
- Replaceable plug cartridges
- Finger safe
- 15, 40, 65 & 100 kA versions
- Three position visual status indication
- Auxiliary contact for remote signalling
- UL 1449, File # E238957 & E22406

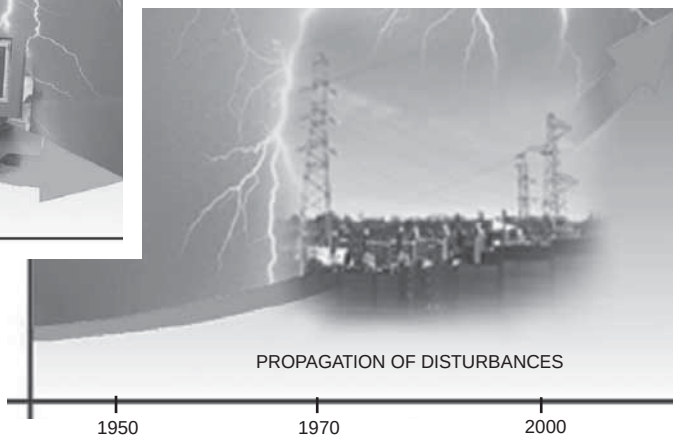
General points on lightning and its risks
Causes of transient overvoltages

The most serious consequences of lightning are the death of people and farm animals, and the destruction of equipment: telephone lines, transformers connected to the electrical distribution network, electrical meters, household appliances, etc.
At the same time, the growing amount of equipment incorporating very sensitive electronic devices increases the number of incidences linked to lightning.

Within companies, if office automation equipment or machines (in factories) are put out of action, it nearly always leads to operating losses, the cost of which is much more than that of the damaged equipment.

For example, if a bank's computers are no longer operational, it suffers large operating losses. For the general public, the damage is mainly material: computer, household appliances, home cinema, etc.





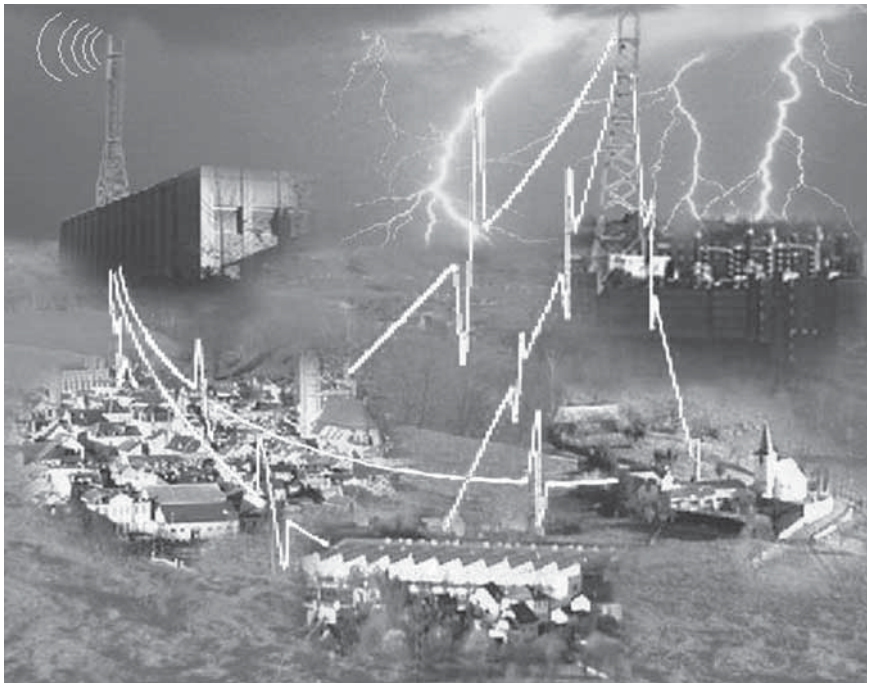
Causes of transient overvoltages

A transient overvoltage is a voltage peak with a maximum duration of less than one millisecond. There are two possible causes of overvoltages on electrical networks:
- natural causes (lightning),
- other causes due to equipment or switching devices.

Natural overvoltages on low voltage networks are caused by direct lightning strikes. The high level of energy contained in a direct lightning strike on a lightning conductor or an overhead low voltage line leads to considerable damage of the installation. The overvoltage can be over 20 times the nominal voltage.

Operating or switching overvoltages linked to a network's equipment create overvoltages of a lower level (3 to 5 times the nominal voltage) but occur much more frequently, thus causing premature ageing of the equipment.

Three categories of overvoltage propagate on low voltage networks:
- direct lightning strikes,
- indirect effects of lightning strikes,
- operating or switching overvoltages.



Propagation of overvoltages by electrical networks (power and low current)

General points on lightning and its risks
Causes of transient overvoltages

Overvoltages due to direct lightning strikes

These can take two forms:

• When lightning **strikes a lightning conductor or the roof of a building** which is earthed, the lightning current is dissipated into the ground. The impedance of the ground and the current flowing through it create large difference of potential: this is the overvoltage. This overvoltage then propagates throughout the building via the cables, damaging equipment along the way.

• When lightning **strikes an overhead low voltage line**, the latter conducts high currents which penetrate into the building creating large overvoltages. The damage caused by this type of overvoltage is usually spectacular (e.g. fire in the electrical switchboard causing the destruction of buildings and industrial equipment) and results in explosions.

Direct lightning strike on a lightning conductor or the roof of a building

Direct lightning strike on an overhead line

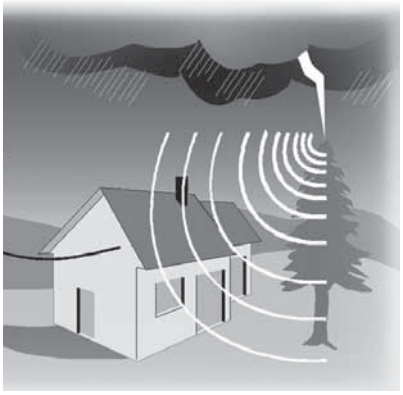
Overvoltages due to the indirect effects of lightning strikes

The overvoltages previously mentioned are also found when lightning strikes in the vicinity of a building, due to the increase in potential of the ground at the point of impact. The electromagnetic fields created by the lightning current generate inductive and capacitive coupling, leading to other overvoltages.

Within a radius up to several kilometres, the electromagnetic field caused by lightning in clouds can also create sudden increases in voltage.

Although less spectacular than in the previous case, irreparable damage is also caused to so called sensitive equipment such as fax machines, computer power supplies and safety and communication systems.

Increase in ground potential



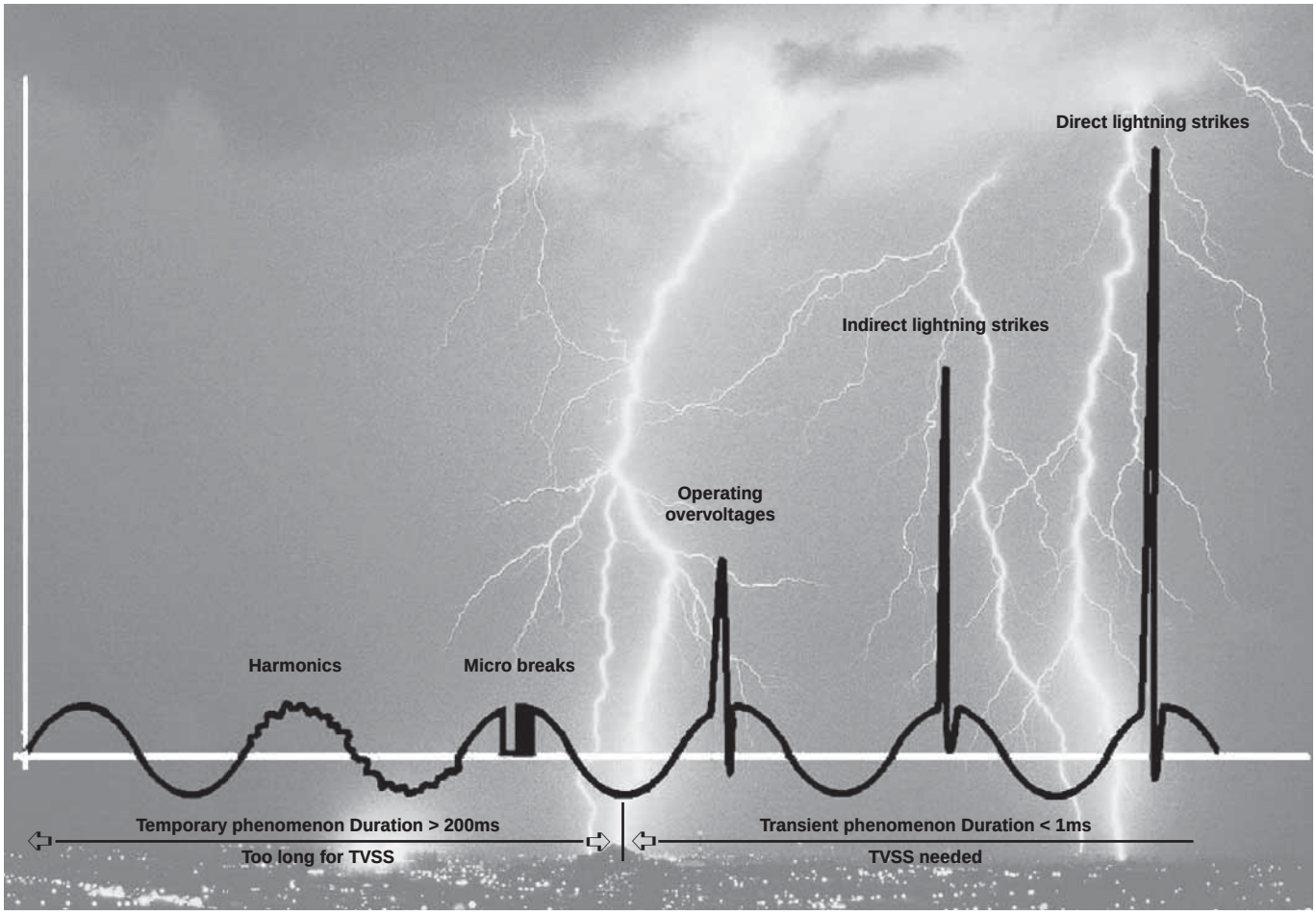
Magnetic field

Electrostatic field

Different types of surges

Equipment containing electronic switching components is also likely to generate electrical disturbances comparable to overvoltages.
The consequences of which on sensitive equipment, albeit not visible, are no less detrimental: premature ageing and unpredictable or fleeting breakdowns.

Operating overvoltages are produced when reactive or capacitive equipment is switched on and off.
Furthermore, interrupting factory production, lighting or transformers can generate overvoltages which will themselves cause greater damage to nearby electrical equipment.



Representation of the various disturbances on electrical networks

Different type of power supply disturbances

- Atmospheric discharges
- Industrial interferences
- Switching operations on the power distribution system

Main effects

- Destruction of the equipment
- Premature aging
- Incorrect operations

OVR Range
Main features

TVSSs protect installations by limiting transient overvoltages and run-off lightning currents for electric and electronic equipment.
They are divided into three families:

• **Type 2 TVSSs** provide protection for equipment against transient over-voltage and they are installed in the Main Switch Board (MSB), or in the Sub-Distribution Board (SDB).

In addition to the standard TVSSs, two options are available: the Safety reserve system and the remote indication (TS), in order to ensure a preventive maintenance of the installation.

ABB TVSS (OVR range) offer the same “plus” advantages of the other System pro M compact devices, in order to get a perfect compati-bility with all the modular range of products.

All these TVSS products comply with the international standard IEC 61643-1 and the European standard EN 61643-11.

They also comply with UL 1449 and CSA C22.2.

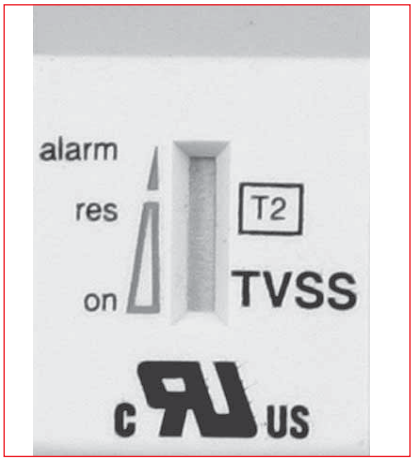
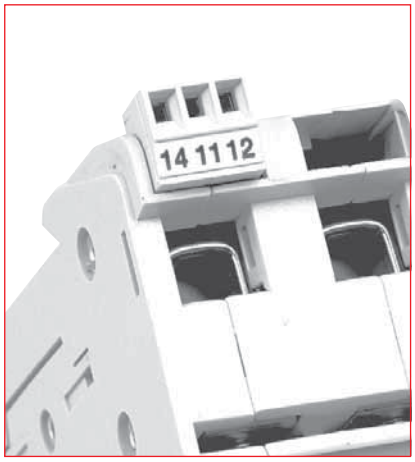
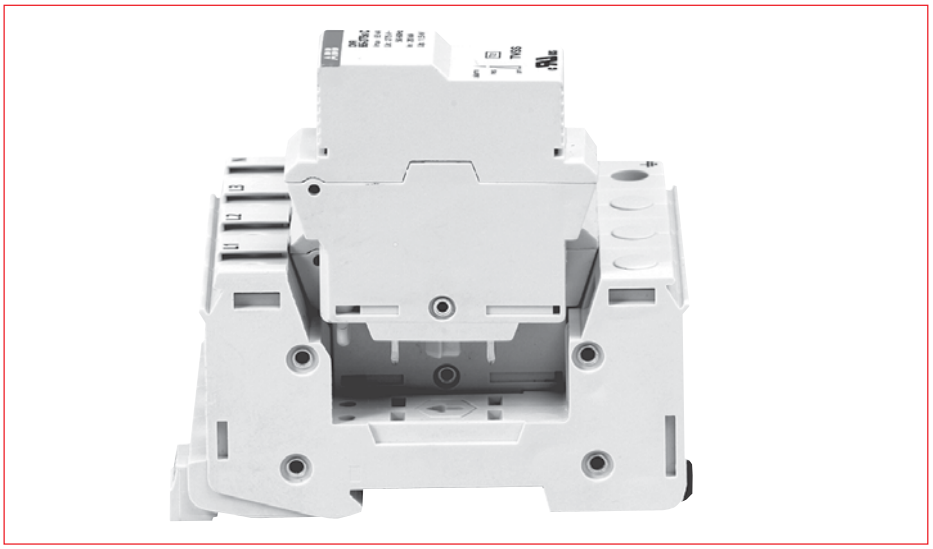
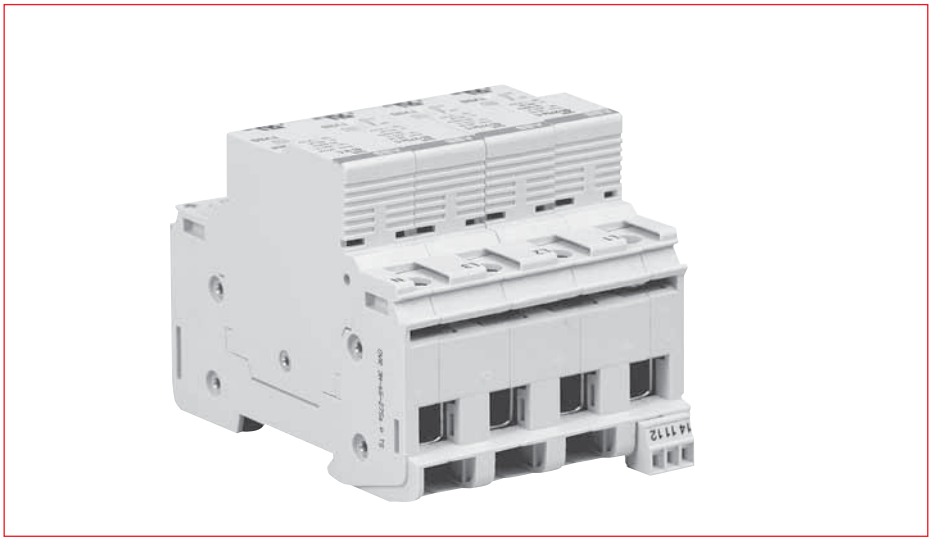


ABB safety reserve system



Contact for alarm connection


Pluggable unit / replacement modules


DIN rail unit, easy installation and wiring

Technical data
OVR range

Technical Features				Type 2
Electrical features	Standards			IEC 61643-1 / EN 61643-11 / UL1499 / CSA
	Type / test class			T2 / II
	Poles			1P / 1P+N / 3P / 3P+N / 4P
	Types of networks			TNS - TT - TNC - IT / Wye / Delta
	Type of current			A.C.
	Nominal voltage Un		V	All US network voltages
	Max. cont. operating voltage Uc	(L-N / L-PE / N-PE)	V	150 / 275 / 320 / 440 / 550 / 660
	Voltage protection level Up at In	(L-N / L-PE / N-PE)	kV	0.6 / 1.2 / 1.4 / 1.8 / 2.5 / 2.9
	Nominal discharge current In (8/20)		kA	5 / 15 / 20 / 30
	Maximal discharge current Imax (8/20)		kA	15 / 40 / 65 / 100
	Impulse current limp (10/350)		kA	/
	Follow current If_i		kA	None
	Operating current Ic		mA	< 1
	Short circuit withstand Icc		kA	50
	Disconnector			
	gG - gL fuse		A	16 - 25
	curve C circuit breaker		A	10 - 40
	curve K circuit breaker			
Mechanical features	Stocking temperature		°C	-40 to +80
	Operating temperature		°C	-40 to +80
	Degree of protection			IP 20
	Fire resistance according to UL 94			V2
	Material of Housing			PC grey RAL 7035
	Maximal altitude		m	2000
	Integrated thermal disconnector			Yes
	State indicator			Yes
	Compatibility with OVR Sign			Yes
	Safety reserve			Option
	TS remote indicator			Option
Installation	Wire range L/N			
	solid wire		mm^2	2.5 ... 25
	stranded wire		mm^2	2.5 ... 16
	Stripping length L/N		mm	12.5
	Tightening torque L/N		Nm	2
	Wire range PE			
	solid wire		mm^2	2.5 ... 25
	stranded wire		mm^2	2.5 ... 16
	Stripping length PE		mm	12.5
	Tightening torque PE		Nm	2
Dimensions and weight	Pole dimensions (H x D x W)		mm	85 x 58 x 17.5
	Pole weight		g	120
Technical Features of the integrated auxiliary contact				
Electrical features	Contact complement			1NO (1 make contact), 1NC (1 normally closed contact)
	Min. load			12V D.C. - 10 mA
	Max. load			250V A.C. - 1A
Installation	Connection cross-section		mm^2	1.5

OVR Range
Single pole

Transient voltage surge suppressor

Function: TVSS provides protection for equipment against transient overvoltage (indirect lightning strike) that occur on the electrical network (mains); the maximum discharge current (Imax) ranges from 15 to 100 kA per pole, based on MOV technology.

Application: residential, commercial, industrial
Standard: CEI 61643-1 / EN 61643-11 / UL 1449 / CSA
8/20 current wave

Type 2 - Surge Protection Devices – Single pole

Max Discharge Current (KA)	Nominal Voltage (V)	MOV Voltage (V)	Voltage Protection Level Up (KV)	Catalog number	List price
15	120	150	.06	OVR 15 150 OVR 15 150 s P	**$ 230** **350**
	230	275	1.2	OVR 15 275 OVR 15 275 P TS	**220** **340**
	277	320	1.4	OVR 15 320	**220**
	400	440	1.8	OVR 15 440 OVR 15 440 P	**220** **350**
	480	550	2.5	OVR 15 550	**275**
	600	660	2.9	OVR 15 660	**290**
40	120	150	0.6	OVR 40 150 s P OVR 40 150 s P TS	**440** **510**
	230	275	1.2	OVR 40 275 P OVR 40 275 s P OVR 40 275 s P TS	**320** **345** **400**
	277	320	1.4	OVR 40 320 P OVR 40 320 s P OVR 40 320 s P TS	**320** **350** **405**
	400	440	1.8	OVR 40 440 OVR 40 440 s P OVR 40 440 s P TS	**285** **350** **400**
	480	550	2.5	OVR 40 550 OVR 40 550 s	**435** **475**
	600	660	2.9	OVR 40 660 s	**490**
65	120	150	0.6	OVR 65 150 s P	**395**
	230	275	1.2	OVR 65 275 s P OVR 65 275 s P TS	**490** **565**
	277	320	1.4	OVR 65 320 s P OVR 65 320 s P TS	**495** **520**
	400	440	1.8	OVR 65 440 s P OVR 65 440 s P TS	**465** **530**
	480	550	2.5	OVR 65 550 s	**600**
	600	660	2.9	OVR 65 660 s	**675**
100	230	275	1.2	OVR 100 275 s P OVR 100 275 s P TS	**830** **955**
	277	320	1.4	OVR 100 320 s P OVR 100 320 s P TS	**890** **1025**
	400	440	1.8	OVR 100 440 s OVR 100 440 s P OVR 100 440 s P TS	**800** **870** **1005**

OVR 1N 65 275 s P TS

Network
1N Single phase (left), neutral (right)
3N Three phase (left), neutral (right)
N1 Neutral (left), single phase (right)
N3 Neutral (left), three phases (right)
3L Three poles
4L Four poles
Nothing Single pole

Max. discharge current 8/20
I_{max} (kA) 15, 40, 65, 100

Max. continuous operating voltage
U_c (V) 660, 550, 440, 385, 320, 275, 150, 75

s with safety reserve

P Pluggable unit
Nothing: Single block

TS Integrated remote indication

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OVR TVSS
Multi-pole

Transient voltage surge suppressor

Function: TVSS provides protection for equipment against transient overvoltage (indirect lightning strike) that occur on the electrical network (mains); the maximum discharge current (Imax) ranges from 15 to 100 kA per pole, based on MOV technology.

Application: residential, commercial, industrial
Standard: CEI 61643-1 / EN 61643-11 / UL 1449 / CSA
8/20 current wave

Max Discharge Current (KA)	Nominal Voltage (V)	MOV Voltage (V)	Voltage Protection Level Up (KV)	Catalog number	List price
15	120	150	0.6	OVR 1N 15 150 OVR 1N 15 150 s P TS OVR 3N 15 150	**$ 365** **665** **625**
	230	275	1.2	OVR 3L 15 275 P OVR 3N 15 275	**625** **690**
	277	320	1.4	OVR 3N 15 320	**980**
40	120	150	0.6	OVR 1N 40 150 s P OVR 1N 40 150 s P TS OVR 3N 40 150 s P TS	**665** **935** **1160**
	230	275	1.2	OVR 3N 40 275 s P OVR 3L 40 275 s P	**1120** **950**
	277	320	1.4	OVR 3N 40 320 P OVR 3N 40 320 s P OVR 3N 40 320 s P TS	**1175** **1250** **1450**
	400	440	1.8	OVR 3N 40 440 s P	**1290**
65	120	150	0.6	OVR 1N 65 150 s P OVR 3N 65 150 s P OVR 3N 65 150 s P TS	**1000** **1535** **1640**
	230	275	1.2	OVR 3L 65 275 s P OVR 3N 65 275 s P	**1045** **1280**
	277	320	1.4	OVR 3N 65 320 s P OVR 3N 65 320 s P TS	**1650** **1900**
	400	440	1.8	OVR 3N 65 440 s P OVR 4L 65 440 s	**1245** **1320**
100	277	320	1.4	OVR 3N 100 320 s P	**3200**
				OVR 3N 100 320 s P TS	**3600**

14

OVR 1N 65 275 s P TS

Network
1N Single phase (left), neutral (right)
3N Three phase (left), neutral (right)
N1 Neutral (left), single phase (right)
N3 Neutral (left), three phases (right)
3L Three poles
4L Four poles
Nothing Single pole

Max. discharge current 8/20
I_{max} (kA) 15, 40, 65, 100

TS Integrated remote indication

P Pluggable unit
Nothing: Single block

s with safety reserve

Max. continuous operating voltage
U_c (V) 660, 550, 440, 385, 320, 275, 150, 75

OVR Range
Very low voltage transmission lines protection

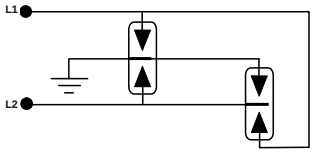
OVR TC 06 V

OVR TC 200 FR

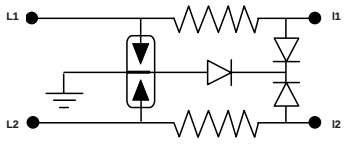
Transmission line surge arresters (OVR TC) provide protection against transient overvoltages for equipment connected to telephone lines (digital or analog) & current loops.

Standards Info:
Modular low current surge arresters comply with IEC 61643-21 / UL 1449.

Schematic diagrams



OVR TC 200 V in parallel

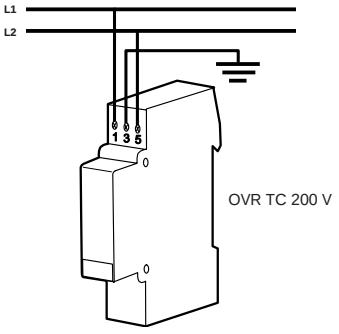


OVR TC / xx V / 200 FR in series

Dimensions

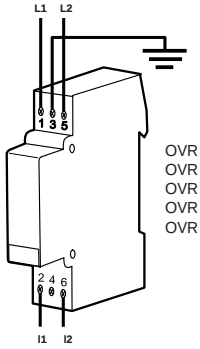
Dimensions (mm)	W	H	D
OVR TC (all models)	17.5	85	63

Connection



OVR TC 200 V

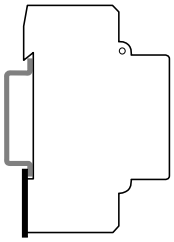
OVR TC 200 V in parallel



OVR TC 200 FR
OVR TC 48 V
OVR TC 24 V
OVR TC 12 V
OVR TC 06 V

OVR TC / xx V / 200 FR in series

Fixing



Simply clips onto DIN rail.

Pratical info:
Telecom and dataline protection surge arresters are installed in electrical switchboards or enclosures using DIN rail.

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Technical data

Electrical characteristics	6 V OVR TC 06 V	12 V OVR TC 12 V	24 V OVR TC 24 V	48 V OVR TC 48 V	200 V OVR TC 200 V	200 V OVR TC 200 FR
Types of network	Communication	Communication	Communication	Communication	Communication	Communication
Number of pairs	1	1	1	1	1	1
Type of protection	Series	Series	Series	Series	Parallel	Series
Type of current	Low currents	Low currents	Low currents	Low currents	Low currents	Low currents
Nominal voltage: U_n	6 V	12 V	24 V	48 V	200 V	200 V
Max cont operating voltage: U_c	7 V	14 V	27 V	53 V	220 V	220 V
Voltage protection level: U_p at I_n	15 V	20 V	35 V	70 V	700 V	300 V
Nominal discharge current: I_n (8/20)	5 kA	5 kA	5 kA	5 kA	5 kA	5 kA
Maximum discharge current: I_{max} (8/20)	10 kA	10 kA	10 kA	10 kA	10 kA	10 kA
Bandwidth	10 MHz	2 MHz	4 MHz	6 MHz	100 MHz	3 MHz
Operating current: I_c	20 mA	20 mA	20 mA	20 mA	-	20 mA
Degree of protection	IP 203	IP 203	IP 203	IP 203	IP 203	IP 203
50 Hz withstand (15 mn)	10 A	10 A	10 A	10 A	-	10 A
Mechanical characteristics						
L/N connection terminals:						
– solid wire			0.5 ... 2.5 mm²			
– stranded wire			0.5 ... 2.5 mm²			
PE connection terminal:						
– solid wire			0.5 ... 2.5 mm²			
– stranded wire			0.5 ... 2.5 mm²			
Integrated thermal disconnector		Yes			No	Yes
End of life indicator		Yes			No	Yes
Compatibility with OVR Sign		Yes			No	Yes
Miscellaneous characteristics						
Storage temperature			-40 °C to +80 °C			
Operating temperature			-40 °C to +80 °C			
Maximum altitude			2000 m			
Case material			PC grey RAL 7032			
Insulating material			UL94 V0 classification			
Reference standard			IEC 61643-21 / UL 1449			
Weight			150 g			

Installation rules
Principles of coordination for TVSS

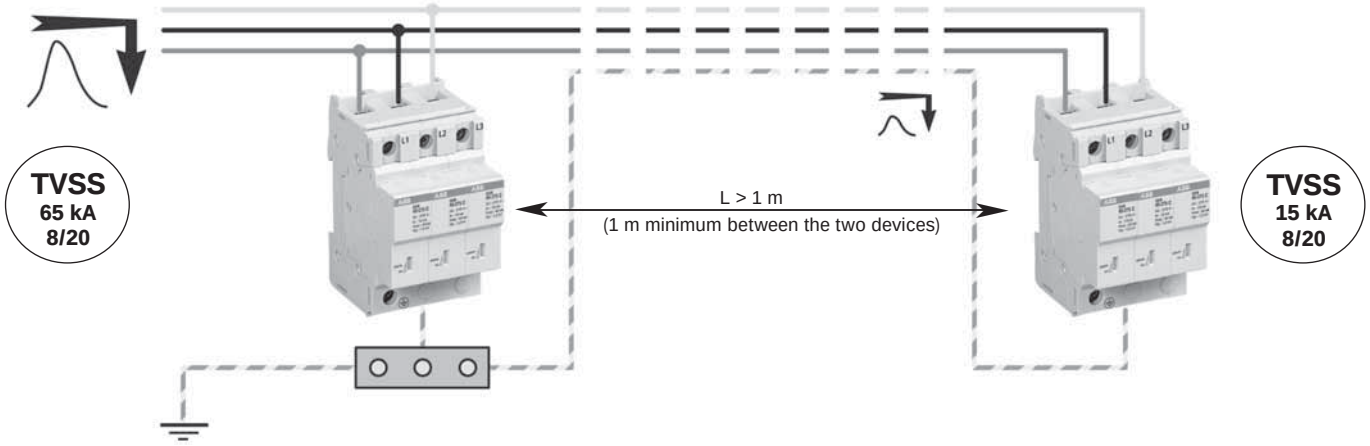
The first surge arrester does not provide effective protection for the whole installation by itself.
Certain electrical phenomena can double the protection's residual voltage if cable lengths exceed 10m.
Surge arresters must be coordinated when they are installed refer to the tables below.

Coordination required if:
The first surge arrester does not reach the protection voltage ($\mathbf{U_p}$) by itself.
The first surge arrester is more than 10m away from the equipment to be protected.

The first surge arrester diverts most of the current to the ground and the remaining surge current is diverted to the ground by the second surge arrester.

The value of this remaining surge current gets lower as the distance between both surge arresters gets longer. The lower is the current going through the last surge arrester, the lower is the voltage protection level applied to the downstream equipment.

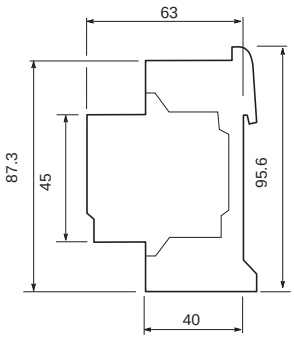
Coordination between Type 2 TVSS units



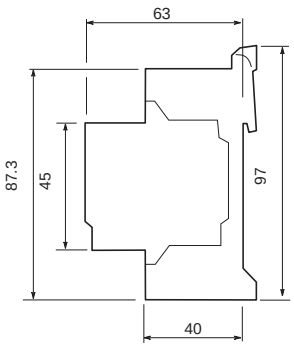
Approximate dimensions
OVR range

Transient voltage surge suppressor

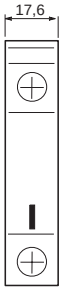
TVSS without TS



TVSS with TS

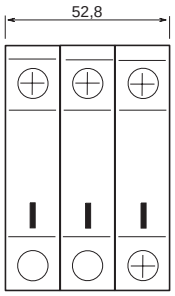


1 pole



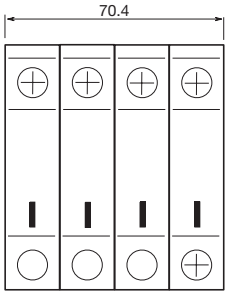
OVR 15 275 P
OVR 15 440 P
OVR 40 275 P
OVR 40 275 s P TS
OVR 40 440 P
OVR 40 440 s P TS
OVR 65 275 s P TS
OVR 65 440 s P TS

3 poles



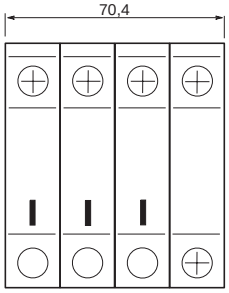
OVR 3L 15 275 P
OVR 3L 40 275 P
OVR 3L 40 275 s P TS
OVR 3L 65 275 s P TS

4 poles



OVR 4L 15 275 P
OVR 4L 40 275 P
OVR 4L 40 275 s P TS
OVR 4L 65 275 s P TS

3 poles + Neutral



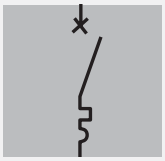
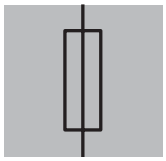
OVR 3N 15 275 P
OVR 3N 40 275 P
OVR 3N 40 275 s P TS
OVR 3N 65 275 s P TS

Technical details
Installation rules for TVSS choice of associated breaking devices (fuse/circuit breaker)

Choice of disconnector

Surge arresters must be associated with upstream short-circuit protection and residual current protection against indirect contact (usually already present in the installation)

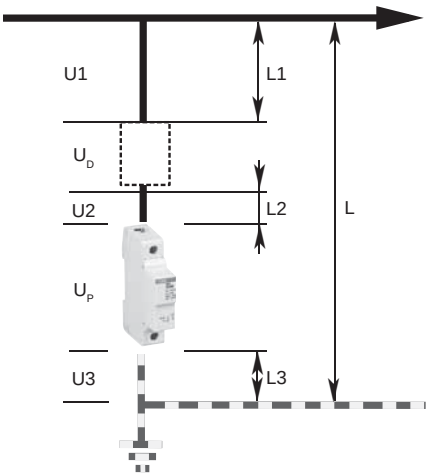
	Function	Application
	Protection against fault currents	The breaking device associated with the surge arrester can be either a circuit breaker or a fuse. Its rating should take into consideration the surge arrester's characteristics and the short-circuit current of the installation.
	Thermal protection	Thermal protection is integrated into the surge arrester.

Maximum circuit-breaker or fuse protection rating depending on I_{max} and I_{imp} of the surge arrester.		
TVSS surge arresters	Circuit-breaker (curve K)	Fuse (gG)
100 kA (8/20)		
• I_{cc} = 300 A to 1 kA	40 A	25 A
• I_{cc} = 1 kA to 7 kA	40 A	25 A
• I_{cc} = 7 kA and above	40 A	25 A
TVSS surge arresters	Circuit-breaker (curve C)	Fuse (gG)
65 kA (8/20)		
• I_{cc} = 300 A to 1 kA	30 A	20 A
• I_{cc} = 1 kA to 7 kA	32 A to 40 A	40 A
• I_{cc} = 7 kA and above	32 A to 63 A	63 A
40 kA (8/20)		
• I_{cc} = 300 A to 1 kA	25 A	16 A
• I_{cc} = 1 kA to 7 kA	25 A	25 A
• I_{cc} = 7 kA and above	25 A to 50 A	50 A
15 kA (8/20)		
• I_{cc} = 300 A to 1 kA	10 A to 25 A	16 A
• I_{cc} = 1 kA to 7 kA	10 A to 32 A	16 A
• I_{cc} = 7 kA and above	10 A to 40 A	25 A to 40 A

Technical details
Cabling and installation of Surge Protection Devices in an electrical panel

50 cm rule

Remember that a 10 kA lightning current passing through a 1 m length of cable generates 1000 Volts. Equipment protected by a surge arrester is subjected to a voltage equal to the sum of the U_p voltage of the surge arrester, U_d of its disconnector and the sum of the inductive voltages of connecting cables (**U1**+**U2**+**U3**).
It is therefore essential that the total length (L = L1+L2+L3) of the connecting cables is as short as possible (0.50 m).



If this length (L = L1 + L2+L3) exceeds 0.50m, it is necessary to carry out one of the following:

- Reduce this length by moving the connection terminals.
- Choose a surge arrester with a lower U_p value.
- Install a second, coordinated surge arrester near the device to be protected so as to adapt the combined U_p value to the impulse withstand of the equipment to be protected.

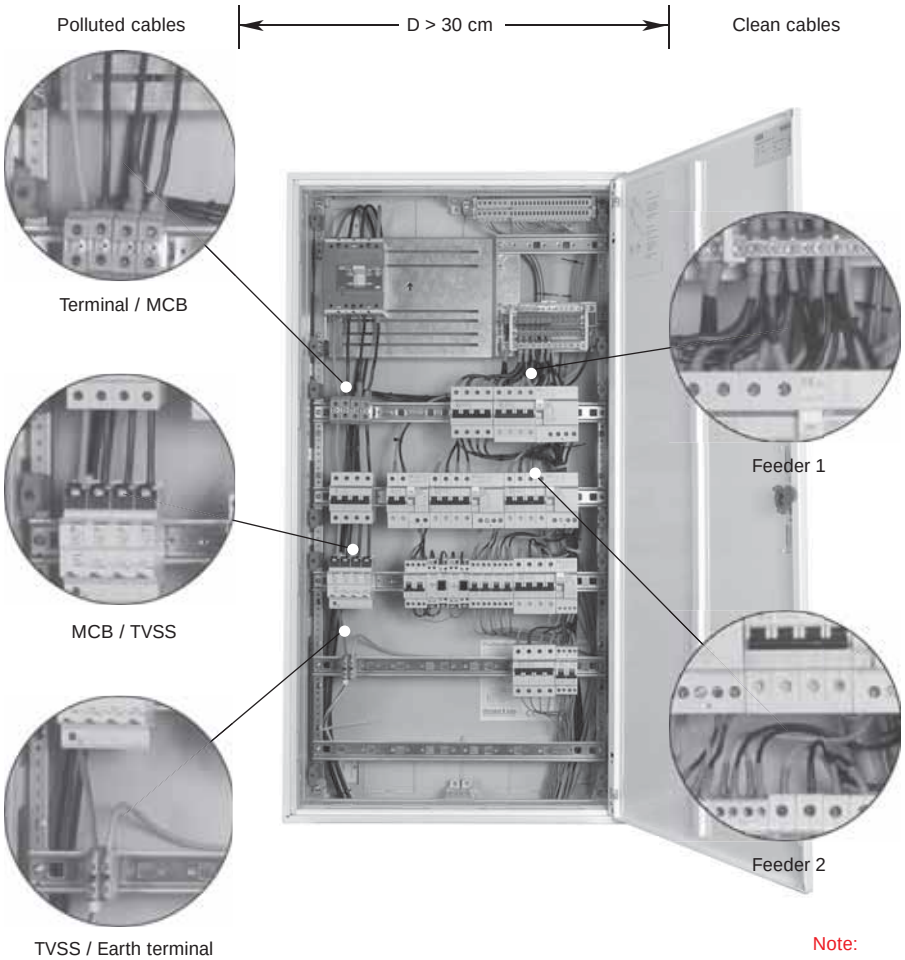
Wiring ring surfaces

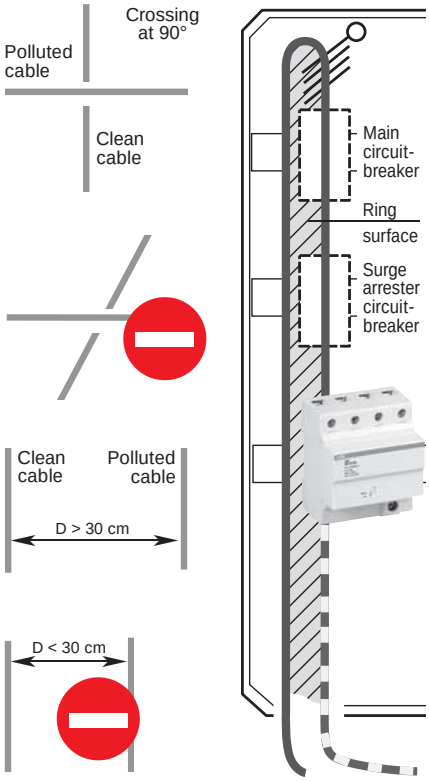
The wires must be arranged in such a way that they are as close to each other as possible (see adjacent diagram) to avoid overvoltages induced by a ring surface between phases, the neutral and the PE conductor.

Routing of clean cables and polluted cables

During installation, lay clean cables (protected) and polluted cables as shown in the adjacent diagrams.

To avoid magnetic coupling between the different cable types (clean and polluted), it is strongly advised that they are kept apart (> 30 cm) and if a crossing cannot be avoided, it should be at right angles (90°).





Equipotential grounding:

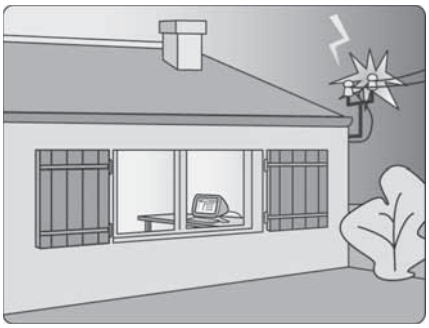
It is critical to check the earth equipotentiality of the various items of equipment.

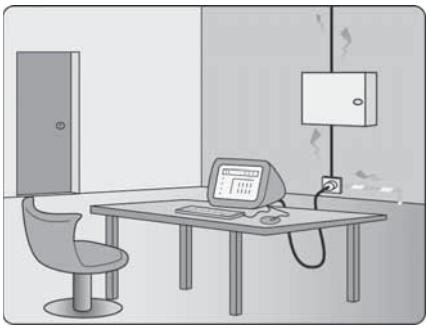
Note:

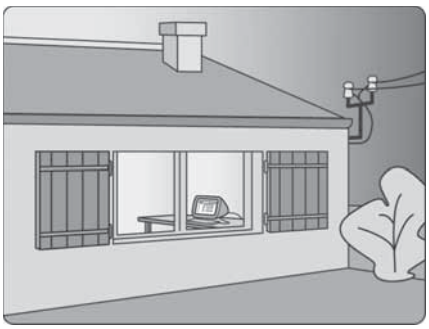
The cross-section of the connecting cables is calculated according to the local short-circuit current level (where the surge arrester is installed). It must be equal to the cross-section of the installation's upstream cables.

The minimum cross-section for the earth conductor is 4 mm² if there is not a lightning conductor and 10 mm² if there is a lightning conductor.

Application sheets
OVR Surge Protection Devices







Operating principle

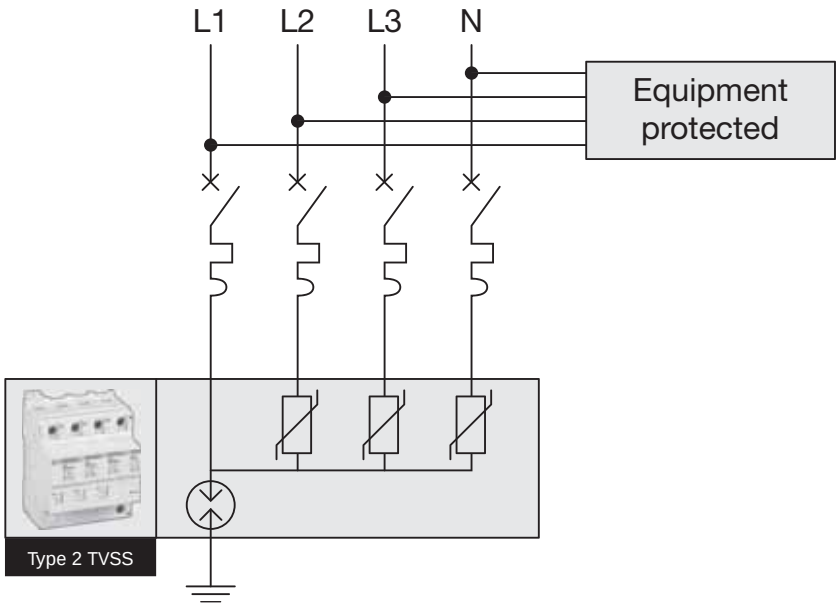
The Surge Protection Devices (TVSS), suitable for residential, commercial and industrial applications, are designed to limit transient overvoltage and run-off lightning currents.

Application environments

The Surge Protection Devices (TVSS) are necessary in any environment where the lightning risk exists (direct lightning strike / overvoltage).

Example of installation

As shown in the diagrams, one of the possible applications is to protect the equipment (TV, computer, ...) against overvoltage thanks to a Surge Protection Device (TVSS) which ensures the protection in common mode (Ph-PE / N-PE) and differential mode (Ph-N).



General points on lightning and its risks

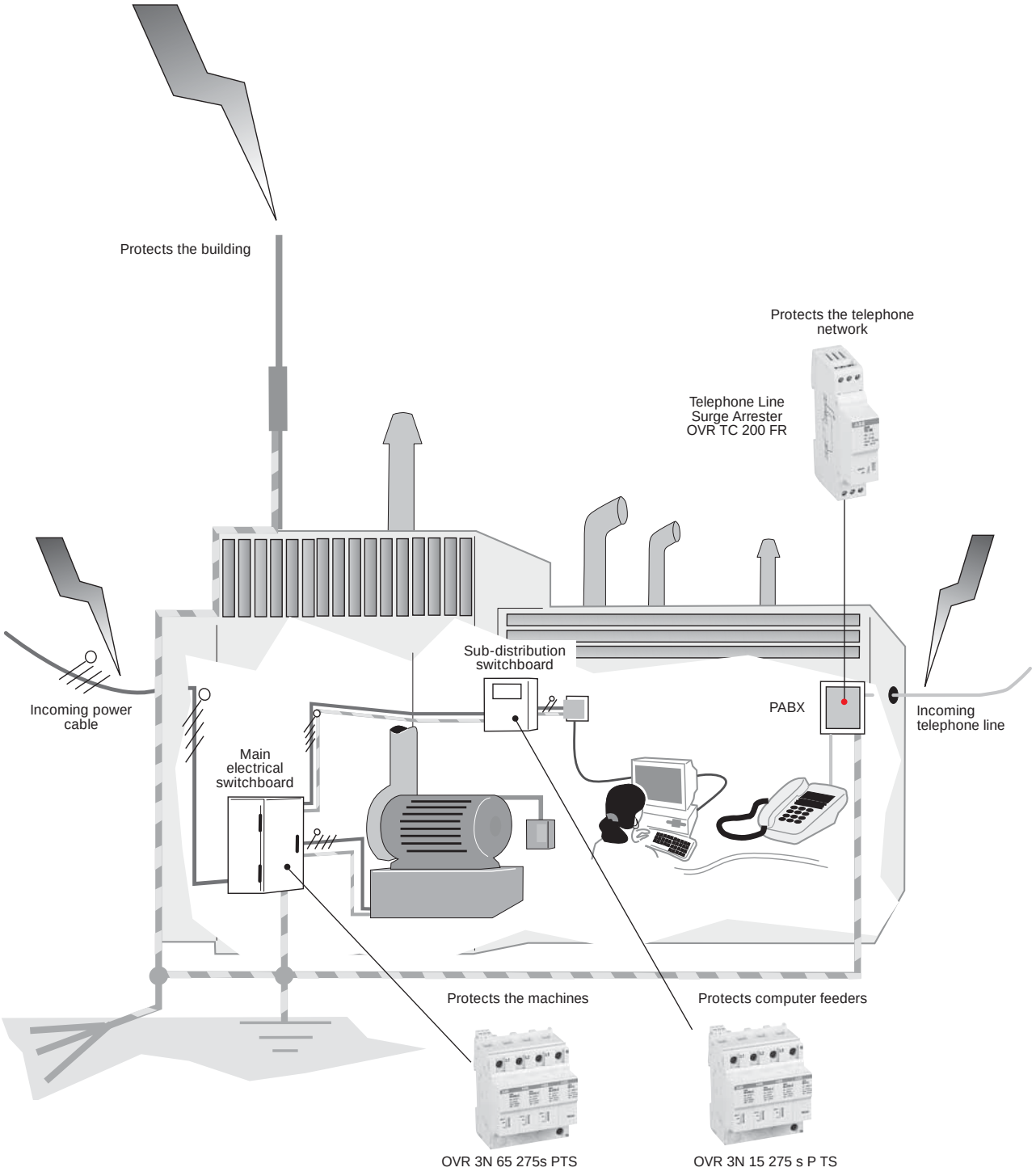
Diagram of an installation protected against lightning and its indirect effects

The 100KA or 65KA surge arrester (depending on the lightning risk) fitted in the installation's main incoming electrical switchboard, is capable of deviating the energy of a direct lightning strike. This is the first stage of the electrical network's protection.

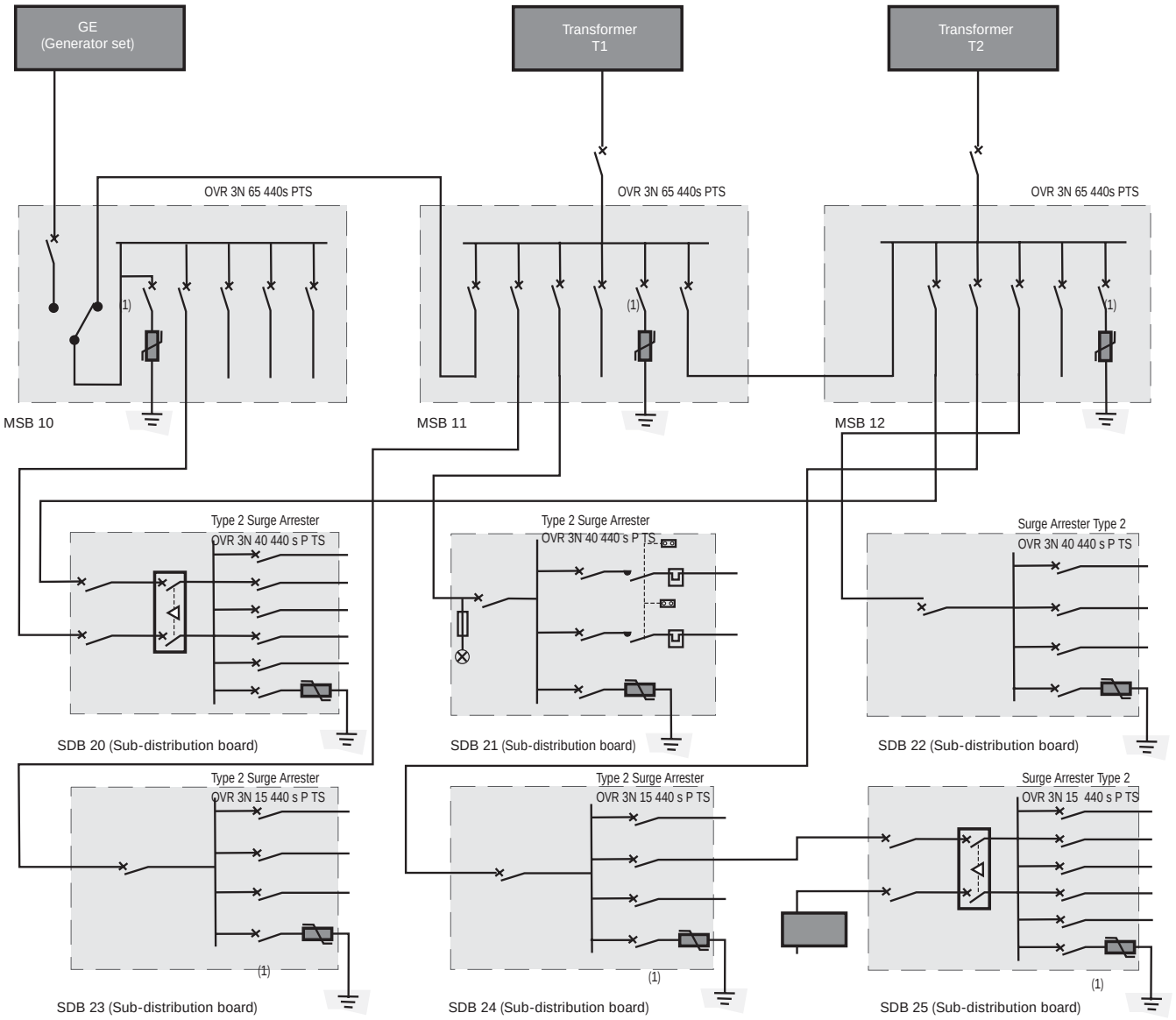
The behaviour of the cables, subjected to a transient signal, limits the effectiveness of a surge arrester to 10 m of cable. It is therefore necessary to use one or more surge arresters in the installation in order to obtain the required level of protection for the equipment.

Here, a 40KA or 15KA surge arrester (depending on the lightning risk) should be used in coordination with the incoming surge arrester. This is the second stage of the protection.

Finally, if there is a risk of overvoltage on the electrical network, this risk also exists for the auxiliary wiring network. The appropriate protection is a surge arrester designed to protect telephone or data transmission lines (**OVR TC**). This is fitted in series on the network.



Selection
Example of a protected industrial installation



The above diagram is an example of an industrial application located in an area where the lightning strike density (Ng) is 1.2 lightning strikes per km² and per year:

- the building is protected by a lightning conductor.
- the lightning conductor's earthing strip is connected to the installation's earth network.
- the earthing system is IT (with distributed neutral) and then TNS for the sub-distribution boards.
- main switch boards (MSB) 10, 11 and 12 are fitted with Type 2 surge arresters OVR 3N 65 440 s PTS.
- sub-distribution boards (SDB) 20, 21 and 22 are fitted with Type 2 surge arresters OVR 3N 40 440 s P TS.
- sub-distribution boards (SDB) 23, 24 and 25 are fitted with Type 2 surge arresters OVR 3N 15 440 s P TS.

Terminology of electrical characteristics

Surge arrester:
Device designed to limit transient overvoltages and run-off lightning currents. It consists of at least one non-linear component. It must comply with European standard EN 61643-11.

1.2/50 wave:
Standardized overvoltage waveform created on networks and which adds to the network's voltage.

8/20 wave:
Current waveform which passes through equipment when subjected to an overvoltage.

Type 2 surge arrester:
Surge arrester designed to run-off energy caused by an overvoltage comparable to that of an indirect lightning strike or an operating overvoltage. It has successfully passed testing to the standard with the 8/20 wave (class II test).

U_p:
Voltage protection level / Let through voltage
Parameter characterising surge arrester operation by the level of voltage limitation between its terminals and which is selected from the list of preferred values in the standard. This value is greater than the highest value obtained during voltage limitation measurements (at In).

I_n:
Nominal discharge current.
Peak current value of an 8/20 waveform (15 times) flowing in the surge arrester. It is used to determine the **U_p** value of the surge arrester.

I_{max}:
Maximum discharge current for class II testing.
Peak current value of an 8/20 waveform flowing in the surge arrester with an amplitude complying with the class II operating test sequence. **I_{max}** is greater than **I_n**.

U_n:
Nominal AC voltage of the network : nominal voltage between phase and neutral (AC rms value).

Type 2 Surge Arresters
I_{max}: current wave

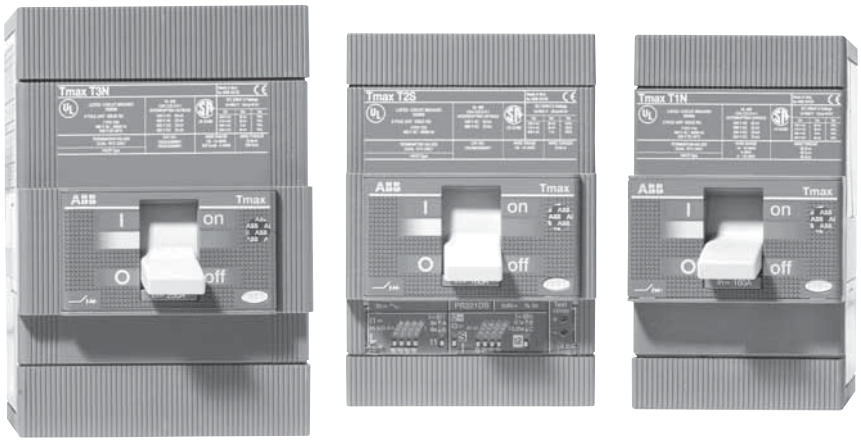
Molded case circuit breakers
Index

Notes

Tmax

Molded case circuit breakers

Tmax
Molded case circuit breakers



Introduction

ABB is once again demonstrating its commitment to new product development and its superiority in product performance. Never before has the industry seen such high performance, versatility and standardization in a range of molded case circuit breakers.

The ABB Tmax has been developed to complement the performance-proven Isomax line of circuit breakers. This new breaker, with a range up to 600A, has several very big features that go along with its very small size:

- Double insulation – this construction characteristic allows for the UL Listed field installation of internal accessories without exposure to the power poles.
- Positive operation – all molded case breakers from ABB ensure that the toggle indicates the precise position of the moving contacts. This guarantees safe and reliable signaling by the device.
- Installation – Tmax Series can be installed in panels and switchboards in either the horizontal or vertical planes while being fed from either end without any derating of their performance characteristics.
- Two ranges of accessories – in the pursuit of standardization, all Tmax internal and external accessories can be utilized across the entire range from 15A to 600A.
- Interrupt ratings at 480VAC up to 150kAIC.
- Compact size
- UL Listed and IEC rated for global application and acceptance.

The ABB Tmax has the performance and accessories to satisfy all industry requirements in the 600VAC to 600VDC ranges. A single pole molded case version is available for the first time.

Frame sizes — five basic sizes

The ABB Tmax series includes five basic frame sizes as well as the T1 single pole with the range rated from 15A to 600A at 480VAC. The various versions carry the following interrupting capacities:

- **B** Basic breaking capacity
- **N** Normal breaking capacity
- **S** Standard breaking capacity
- **H** High breaking capacity
- **L** Limiting capacity
- **V** Very high breaking capacity

Derived versions

- T2, T4 & T5 circuit breakers with LS/I electronic trip units
- Switch disconnectors in T1, T3, T4 and T5 frames
- Circuit breakers for motor circuit protection (MCPs)
- Circuit breakers for direct current

ABB Tmax versions

- Fixed: all models
- Plug-in: T2, T3, T4 and T5 UL
- UL File #E93565 (breakers and MCPs)
  #E116596 (Accessories)
  #E116595 (Molded case switches)

General information
Circuit breakers for power distribution
T1 – T3


T1


T2


T3

				Tmax T1 1P	Tmax T1	Tmax T2	Tmax T3
UL 489 CSA C22.2							
Frame size			A	100	100	100	225
Number of poles			Nr	1	3, 4	3, 4	3, 4
Rated voltage	AC (50-60 Hz)		V	277	600Y / 347V	480	600Y/347V
	DC		V		500		500
Interrupting ratings				**B**	**N**	**S H**	**N S**
	AC 240 V		kA		50 ②	65 100	50 65
	277 V		kA	18 ①			
	480 V		kA		22 ②	35 65	25 35
	600Y/347		kA		10		10 10
	600 V		kA				
	DC 250 V - 2 poles in series		kA		25		25 35
	500 V - 3 poles in series		kA		25		25 35
	500 V - 2 poles in series		kA				
	600 V - 3 poles in series		kA				
Trip units		TMF		■	■	■	■
		TMD/TMA					
		ELT				■	
		MA				■	■
Versions		MCCB		■	■	■	■
		MCS			■		■
		MCP				■	■
IEC 60947-2							
Rated uninterrupted current, Iu			A	160	160	160	250
Number of poles			Nr	1	3,4	3,4	3,4
Rated service voltage, Ue		AC (50-60 Hz)	V	240	690	690	690
		DC	V	125	500	500	500
Rated ultimate short circuit breaking capacity, Icu				**B**	**B C N**	**N S H L**	**N S**
	AC (50-60 Hz)	220/230 V	kA	25	25 40 50	65 85 100 120	50 85
		380/415 V	kA		16 25 36	36 50 70 85	36 50
		440 V	kA		10 15 22	30 45 55 75	25 40
		500 V	kA		8 10 15	25 30 36 50	20 30
		690 V	kA		3 4 6	6 7 8 10	5 8
	DC	250 V - 2 poles in series	kA		16 25 36	36 50 70 85	36 50
		250 V - 3 poles in series	kA		20 30 40	40 55 85 100	40 55
		500 V - 2 poles in series	kA				
		500 V - 3 poles in series	kA		16 25 36	36 50 70 85	36 50
		750 V - 3 poles in series	kA				
Trip units		TMF		■			
		TMD/TMA			■	■	■
		ELT				■	
		MF				■	
		MA				■	■
UL 489 CSA C22.2 and IEC 60947-2							
Dimensions		H	in/mm	5.12/130	5.12/130	5.12/130	5.9/150
		W 1p or 3p	in/mm	1/25.4	3/76	3.54/90	4.13/105
		W 4p	in/mm		4/102	4.72/120	5.51/140
		D	in/mm	2.76/70	2.76/70	2.76/70	2.76/70
Mechanical life			No. operations	25,000	25,000	25,000	25,000
			No. Hourly operations	240	240	240	240
			No. operations	8000	8000	8000	8000
			No. hourly operations	120	120	120	120
Weights (Fixed 3P)			Lbs.	1.06	2.34	2.86	5.45

① In15A = 10kA @ 277 VAC
② In15A = 35kA @ 240 VAC, 14 kA @ 480 VAC
TMF = Thermomagnetic trip unit with fixed thermal and magnetic threshold
TMD = Thermomagnetic trip unit with adjustable thermal threshold and fixed magnetic threshold.


T4


T5

				Tmax T4					Tmax T5				
UL 489 CSA C22.2													
Frame size			A	250					600				
Number of poles			Nr	3, 4					3, 4				
Rated voltage	AC (50-60 Hz)		V	600					600				
	DC		V	600					600				
Interrupting ratings				**N**	**S**	**H**	**L**	**V**	**N**	**S**	**H**	**L**	**V**
	AC 240 V		kA	65	100	150	200	200	65	100	150	200	200
	277 V		kA										
	480 V		kA	25	35	65	100	150	25	35	65	100	150
	600 V		kA	18	25	35	65	100	18	25	35	65	100
	DC 250 V - 2 poles in series		kA										
	500 V - 3 poles in series		kA										
	500 V - 2 poles in series		kA	25	35	50	65	100	25	35	50	65	100
	600 V - 3 poles in series		kA	16	25	35	50	65	16	25	35	50	65
Trip units		TMF				■							
		TMD/TMA				■					■		
		ELT				■					■		
		MA											
Versions		MCCB				■					■		
		MCS				■					■		
		MCP				■					■		
IEC 60947-2													
Rated uninterrupted current, Iu			A	250 - 320					400 - 630				
Number of poles			Nr	3, 4					3, 4				
Rated service voltage, Ue		AC (50-60 Hz)	V	690					690				
		DC	V	750					750				
Rated ultimate short circuit breaking capacity, Icu				**N**	**S**	**H**	**L**	**V**	**N**	**S**	**H**	**L**	**V**
	AC (50-60 Hz)	220/230 V	kA	70	85	100	200	300	70	85	100	200	300
		380/415 V	kA	36	50	70	120	200	36	50	70	120	200
		440 V	kA	30	40	65	100	180	30	40	65	100	180
		500 V	kA	25	30	50	85	150	25	30	50	85	150
		690 V	kA	20	25	40	70	80	20	25	40	70	80
	DC	250 V - 2 poles in series	kA	36	50	70	120	200	36	50	70	120	200
		250 V - 3 poles in series	kA										
		500 V - 2 poles in series	kA	25	36	50	70	100	25	36	50	70	100
		500 V - 3 poles in series	kA										
		750 V - 3 poles in series	kA	16	25	36	50	70	16	25	36	50	70
Trip units		TMF											
		TMD/TMA				■					■		
		ELT				■					■		
		MF											
		MA				■							
UL 489 CSA C22.2 and IEC 60947-2													
Dimensions		H	in/mm	8.07/205					8.07/205				
		W 1p or 3p	in/mm	4.13/105					5.51/140				
		W 4p	in/mm	5.51/140					7.24/184				
		D	in/mm	4.07/103.5					4.07/103.5				
Mechanical life			No. operations	20,000					20,000				
			No. Hourly operations	240					120				
			No. operations	8000 (250A)–6000 (320A)					7000 (400A)–5000 (630A)				
			No. hourly operations	120					60				
Weights (Fixed 3P)			Lbs.	6.18					8.55				

TMA = thermomagnetic trip unit with adjustable thermal and magnetic threshold
MF = Magnetic fixed trip unit
MA = Magnetic adjustable trip unit
ELT = Electronic trip unit

General information

Circuit breakers for specific applications in accordance with IEC 60947-2


T1


T2


T3

				Tmax T1 1P	Tmax T1	Tmax T2	Tmax T3
Circuit breakers for distribution AC-DC							
Rated uninterupted circuit			A	160	160	160	225
Number of poles			Nr	1	3, 4	3, 4	3, 4
Rated voltage	AC 50-60 Hz		V	240	690	690	690
			kA rms	**B**	**B C N**	**N S H L**	**N S**
	380/415 VAC		kA rms	25 ①	16 25 36	36 50 70 85	36 50
	440 VAC		kA rms		10 15 22	30 45 55 75	25 40
	690 VAC		kA rms		3 4 6	6 7 8 10	5 8
Ics/Icu @ 380/415 VAC %					100 100 50	100 100 100 75	75 50
Dimensions fixed version (3p)	H		in-mm	5.12 - 130	5.12 - 130	5.12 - 130	5.0 - 150
	W		in-mm	1 - 25.4	3 - 76	3.54 - 90	4.13 - 105
	D		in-mm	2.76 - 70	2.76 - 70	2.76 - 70	2.76 - 70
Circuit breakers for motor protection							
Iu			A			160	250
Poles						3	3
In			A			1 - 100	100 - 200
Ue			V			690	690
Trip unit	Adjustable magnetic only	(6 - 12xin)				■	■
	Electronic	PR221DS-I				■	
		PR222/MP (IEC 60947-4-1)					
		PR212/P-I					
		PR212/MP (IEC 60947-4-1)					
Switch-disconnectors							
Poles			Nr		3, 4		3, 4
Ith			A		160		250
Ue			V		690		690
Uimp			kV		8		8
Ui			V		800		800
Icm			kA		2.8		5.3
Icw (1s)			kA		2		3.6

15

① For In 16A and In 20A: Icu @ 220/230 VAC = 16 kA

General information

Circuit breakers for specific applications in accordance with IEC 60947-2

T4

T5

				Tmax T4					Tmax T5				
Circuit breakers for distribution AC-DC													
Rated uninterrupted current			A	250					400 - 630				
Number of poles			Nr	3, 4					3, 4				
Rated voltage	AC (50-60 Hz)		V	690					690				
Icu			kA rms	**N**	**S**	**H**	**L**	**V**	**N**	**S**	**H**	**L**	**V**
	380/415 VAC		kA rms	36	50	70	120	200	36	50	70	120	200
	440 VAC		kA	30	40	65	100	180	30	40	65	100	180
	480 V		kA	20	25	40	70	80	20	25	40	70	80
	690 VAC		kA	20	25	40	70	80	20	25	40	70	80
Ics/Icu @ 380/415 VAC				100	100	100	100	100	100	100	100	100	100
Dimensions fixed version (3p)													
	H		in-mm	8.07/205					8.07 - 205				
	W		in-mm	4.13/105					5.51/140				
	D		in-mm	4.07/103.5					4.07/103.5				
Circuit breakers for motor protection													
Iu			A	250					400				
Poles				3					3				
In				80 - 250					320 - 400				
Ue			V	690					690				
Trip unit	Adjustable magnetic only (6 - 12xin)			■									
	Electronic	PR221DS-I		■					■				
		PR222/MP (IEC 60947-4-1)		■					■				
		PR212P-I											
		PR212/MP (IEC 60947-4-1)											
Switch-disconnectors													
Poles			Nr	3/4					3/4				
Ith				250 - 320					400 - 630				
Ue			V	690					690				
Uimp			kV	8					8				
Ui			V	800					800				
Icm			kA	5.3					5.3				
Icw (1s)			kA	3.6					6				

15

① For In 16A and In 20A: Icu @ 220/230 VAC = 16 kA

General information
Catalog number explanation

T3 S 080 T W - 4 xxx

Accessories (added in alpha-numeric order) ①
A = Auxiliary Switch
S_ = Shunt trip with voltage code
U_ = Undervoltage release with voltage code

Number of poles
-1 = 1 pole (T1 only)
-4 = 4 pole
None = 3 pole

Type connectors
W = None
L = Lugs included

Trip unit function
B = LS/I (AC only)
D = Molded Case Switch (MCS)
T = Thermal-magnetic – 10X Mag
M = Magnetic only (MCP)
E5 = Electronic MCP (AC only)
C = LSI (AC only)
E = LSIG (AC only)

Current rating
015 = 15A
080 = 80A
100 = 100A
225 = 225A
250 = 250A
400 = 400A

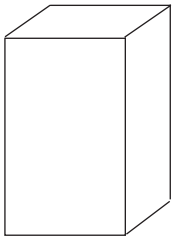
Interrupting rating class
B = Basic
N = Normal
S = Standard
H = High
L = Limiting
V = Very high

Frame size
T1 = 100A
T2 = 100A
T3 = 225A
T4 = 250A
T5 = 600A

① Consult ABB for factory installed accessories.

T1
100A, 600Y/347
Standard thermal-magnetic

T1



H x W x D
5.12" x 3.00" x 2.76"

General
The T1 breaker family ranges from 15 through 100 amperes. The T1 trip units are non-interchangeable and use the very latest technology in electromagnetic relays for overcurrent trip protection. Thermal overload protection is provided by heat sensitive bimetals. Short circuit protection for the breaker is accomplished using a precise magnetic coil. State of the art construction in contacts and arcing chambers aid in limiting damaging fault currents through the protected circuits.

Versions
The T1 frame is available in two versions:
- T = Thermal-magnetic, fixed
- D = Molded case switch

Performance levels
The T1 breaker has two performance levels available:
- B = 277V Single pole
- N = 600Y / 347V Three pole

Number of poles
The UL/CSA version of the T1 is available in single, three and four pole versions. IEC versions of the T1 are also available with the same dimensions up to 160 amperes.

Accessory mounting
The T1 frame is double insulated allowing for UL/CSA factory or field installation of internal accessories. No extra control cables are required for field installation. Shunt trips or UVR's mount in the left cavity and auxiliary contacts with bell alarm mount in the right cavity.

Reverse feeding
All versions of the T1 family are suitable for reverse feed applications.

Molded case switches
UL489 switches include no overcurrent protection except for a high instantaneous trip mechanism for self protection.

UL489 / CSA C22.2 Interrupting capacity (kA RMS)

Voltage	Continuous rating	B (1 pole)	N
240VAC	15 – 100A	—	50 ①
277VAC	15A 20 – 100A	10 18	— —
480VAC	15A 20 – 100A	— —	14 22
600Y/347VAC	15 – 100A	—	10
250VDC 2 pole series	15 – 100A	—	25
500VDC 3 pole series	15 – 100A	—	25

IEC-947 Interrupting capacity (kA RMS)

Voltage	Continuous rating	B (1 pole)	N
230V	15 – 100A	25	50
415V	15 – 100A	—	36
440V	15 – 100A	—	22
500V	15 – 100A	—	15
690V	15 – 100A	—	6
250VDC 2 pole series	15 – 100A	—	36
500VDC 3 pole series	15 – 100A	—	36

① In 15A 35kA @ 240VAC.

T1
100A, 600Y/347
Standard thermal-magnetic

T1N TMF

Breaker	IC at 480VAC	Rating	Magnetic trip	3 pole, 600Y/347VAC/500VDC catalog number	List price
T1N	14kA	15A	1000A	T1N015TL①	**$ 402**
	22kA	20A	1000A	T1N020TL	**402**
		25A	1000A	T1N025TL	**402**
		30A	1000A	T1N030TL	**402**
		40A	1000A	T1N040TL	**402**
		50A	1500A	T1N050TL	**402**
		60A	1500A	T1N060TL	**402**
		70A	1500A	T1N070TL	**479**
		80A	1500A	T1N080TL	**479**
		90A	1500A	T1N090TL	**479**
		100A	1500A	T1N100TL	**479**

T1B TMF — Single pole

Breaker	IC at 277VAC	Rating	Magnetic trip	1 pole, 277VAC catalog number	List price
T1B	10kA	15A	1000A	T1B015TL-1	**$ 230**
	18kA	20A	1000A	T1B020TL-1	**230**
		25A	1000A	T1B025TL-1	**230**
		30A	1000A	T1B030TL-1	**230**
		40A	1000A	T1B040TL-1	**230**
		50A	1500A	T1B050TL-1	**230**
		60A	1500A	T1B060TL-1	**230**
		70A	1500A	T1B070TL-1	**262**
		80A	1500A	T1B080TL-1	**262**
		90A	1500A	T1B090TL-1	**262**
		100A	1500A	T1B100TL-1	**262**

T1N-D — Molded case switch

Breaker	Interrupting capacity ②	Rating	Magnetic trip	480VAC/500VDC catalog number	List price
T1-D	240V, 50kA	100A	1000A	T1N100DL	**$ 431**

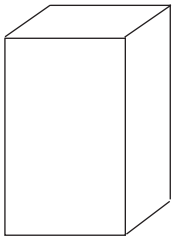
T1N TMF — 100% Rated standard thermal-magnetic

Breaker	IC at 480VAC	Rating	Magnetic trip	3 pole 600Y/347 500VDC catalog number	List price
T1N	14kA	15 ①	1000A	T1NQ015TL	**$ 442**
	22kA	20	1000A	T1NQ020TL	
		25	1000A	T1NQ025TL	
		30	1000A	T1NQ030TL	
		40	1000A	T1NQ040TL	
		50	1500A	T1NQ050TL	
		60	1500A	T1NQ060TL	
		70	1500A	T1NQ070TL	**527**
		80	1500A	T1NQ080TL	
		90	1500A	T1NQ090TL	
		100	1500A	T1NQ100TL	

① Rated 277/480Y for 15A.
② With fuse or MCCB protected circuit.

T2
100A, 480V
Thermal-magnetic/electronic

T2



H x W x D
5.12" x 3.54" x 2.76"

General
The T2 breaker family ranges from 10 through 100 amperes. The T2 trip units are non-interchangeable and use the very latest technology in electromagnetic relays for overcurrent trip protection as well as a version with microprocessor-based electronic trip unit. Thermal overload protection is provided by heat sensitive bimetals. State of the art construction in contacts and arcing chambers aid in limiting damaging fault currents through the protected circuits.

Versions
The T2 frame is available in four versions:
- T = Thermal-magnetic, fixed
- B = Adjustable LS/I electronic
- M = Magnetic only (MCP)
- E5 = Electronic instantaneous only (MCP)

Trip functions
These tripping functions are available:
- L = Long time
- S = Short time
- I - Instantaneous

Performance levels
The T2 breaker has two performance levels available:
- S = Standard
- H = High

Number of poles
The UL/CSA version of the T2 is available in three and four pole versions. IEC versions of the T2 are also available with the same dimensions up to 160 amperes.

Accessory mounting
The T2 frame is double insulated allowing for UL/CSA factory or field installation of internal accessories. No extra control cables are required for field installation. Shunt trips or UVR's mount in the left cavity and auxiliary contacts with bell alarm mount in the right cavity.

Reverse feeding
All versions of the T2 family are suitable for reverse feed applications.

UL489 / CSA C22.2 Interrupting capacity (kA RMS)

Voltage	Continuous rating	S	H
240VAC	15 – 100A	65	100
480VAC	15 – 100A	35	65

IEC-947 Interrupting capacity (kA RMS)

Voltage	Continuous rating	S	H
230V	15 – 100A	85	100
415V	15 – 100A	50	70
440V	15 – 100A	45	55
500V	15 – 100A	30	36
690V	15 – 100A	7	8
250VDC 2 pole series	15 – 100A	50	70
500VDC 3 pole series	15 – 100A	50	70

T2
100A, 480V
Thermal-magnetic/electronic

T2 — 100A TMF

Breaker	IC at 480VAC	Rating	Magnetic trip	3 pole, 480VAC catalog number	List price
T2S	35kA	15A	500A	T2S015TW	**$ 690**
		20A	500A	T2S020TW	**690**
		25A	500A	T2S025TW	**690**
		30A	500A	T2S030TW	**690**
		40A	500A	T2S040TW	**690**
		50A	500A	T2S050TW	**690**
		60A	600A	T2S060TW	**690**
		70A	700A	T2S070TW	**793**
		80A	800A	T2S080TW	**793**
		90A	900A	T2S090TW	**793**
		100A	1000A	T2S100TW	**793**

Breaker	IC at 480VAC	Rating	Magnetic trip	3 pole, 480VAC catalog number	List price
T2H	65kA	15A	500A	T2H015TW	**$ 942**
		20A	500A	T2H020TW	**942**
		25A	500A	T2H025TW	**942**
		30A	500A	T2H030TW	**942**
		40A	500A	T2H040TW	**942**
		50A	500A	T2H050TW	**942**
		60A	600A	T2H060TW	**942**
		70A	700A	T2H070TW	**1153**
		80A	800A	T2H080TW	**1153**
		90A	900A	T2H090TW	**1153**
		100A	1000A	T2H100TW	**1153**

T2 — 100A frame electronic trip unit (AC only)

Breaker	IC at 480VAC	Trip unit type	CT rating	3 pole, 480VAC catalog number	List price
T2S	35kA	PR221DS-LS/I	25A	T2S025BW	**$ 1240**
			60A	T2S060BW	**1240**
			100A	T2S100BW	**1343**
T2H	65kA	PR221DS-LS/I	25A	T2H025BW	**1492**
			60A	T2H060BW	**1492**
			100A	T2H100BW	**1703**

T2 — 100A frame magnetic only (MCP)

Breaker	IC at 480VAC	Trip unit type	Rating	Adjustment range	3 pole, 480VAC catalog number	List price
T2S	35kA	Mag only	20A	120 - 240	T2S020MW	**$ 598**
			50A	300 - 600	T2S050MW	**670**
			100A	600 – 1200	T2S100MW	**804**
T2H	65kA	Mag only	20A	120 - 240	T2H020MW	**673**
			50A	300 - 600	T2H050MW	**754**
			100A	600 – 1200	T2H100MW	**904**

T2 — 100A frame instantaneous only, electronic (MCP - AC only)

Breaker	IC at 480VAC	Trip unit type	Rating	Adjustment range	3 pole, 480VAC catalog number	List price
T2S	35kA	Instantaneous only	25A	25 - 250	T2S025E5W	**$ 1178**
			60A	60 - 600	T2S060E5W	**1178**
			100A	100 - 1000	T2S100E5W	**1276**
T2H	65kA	Instantaneous only	25A	25 - 250	T2H025E5W	**1417**
			60A	60 - 600	T2H060E5W	**1417**
			100A	100 - 1000	T2H100E5W	**1618**

T2
100A, 480V, 100% rated
Thermal-magnetic/electronic

T2 – 100A TMF, 100% rated

Breaker	IC at 480VAC	Rating	Magnetic trip	3 pole, 480VAC catalog number	List price
T2S	35kA	15A	500A	T2SQ015TW	**$ 760**
		20A	500A	T2SQ020TW	
		25A	500A	T2SQ025TW	
		30A	500A	T2SQ030TW	
		40A	500A	T2SQ040TW	
		50A	500A	T2SQ050TW	
		60A	600A	T2SQ060TW	
		70A	700A	T2SQ070TW	**872**
		80A	800A	T2SQ080TW	
		90A	900A	T2SQ090TW	
		100A	1000A	T2SQ100TW	

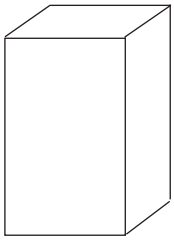
Breaker	IC at 480VAC	Rating	Magnetic trip	3 pole, 480VAC catalog number	List price
T2H	65kA	15A	500A	T2HQ015TW	**$ 1025**
		20A	500A	T2HQ020TW	
		25A	500A	T2HQ025TW	
		30A	500A	T2HQ030TW	
		40A	500A	T2HQ040TW	
		50A	500A	T2HQ050TW	
		60A	600A	T2HQ060TW	
		70A	700A	T2HQ070TW	**1268**
		80A	800A	T2HQ080TW	
		90A	900A	T2HQ090TW	
		100A	1000A	T2HQ100TW	

T2 – 100A frame electronic trip unit (AC only)

Breaker	IC at 480VAC	Trip unit type	CT rating	3 pole, 480VAC catalog number	List price
T2S	35kA	PR221DS-LS/I	25A	T2SQ025BW	**$ 1363**
			60A	T2SQ060BW	
			100A	T2SQ100BW	**1477**
T2H	65kA	PR221DS-LS/I	25A	T2HQ025BW	**1640**
			60A	T2HQ060BW	
			100A	T2HQ100BW	**1873**

T3
600Y/347V
Thermal-magnetic

T3



H x W x D
5.9" x 4.13" x 2.76"

General
The T3 breaker family ranges from 60 through 225 amperes. The T3 trip units are non-interchangeable and use the very latest technology in electromagnetic relays for overcurrent trip protection. Thermal overload protection is provided by heat sensitive bimetals. Short circuit protection begins at 10 times the thermal rating of the breaker using a precise magnetic coil. State of the art construction in contacts and arcing chambers aid in limiting damaging fault currents through the protected circuits.

Versions
The T3 frame is available in three versions:
- T = Thermal-magnetic, fixed
- M = Magnetic only (MCP)
- D = Molded case switch

Performance levels
The T3 breaker has two performance levels available:
- N = Normal
- S = Standard

Number of poles
The UL/CSA version of the T3 is available in three and four pole versions. IEC versions of the T3 are also available with the same dimensions up to 250 amperes.

Accessory mounting
The T3 frame is double insulated allowing for UL/CSA factory or field installation of internal accessories. No extra control cables are required for field installation. Shunt trips or UVR's mount in the left cavity and auxiliary contacts with bell alarm mount in the right cavity.

Reverse feeding
All versions of the T3 family are suitable for reverse feed applications.

Molded case switches
UL489 switches include no overcurrent protection except for a high instantaneous trip mechanism for self protection.

UL489 / CSA C22.2 Interrupting capacity (kA RMS)

Voltage	Continuous rating	N	S
240VAC	60 – 225A	50	65
480VAC	60 – 225A	25	35
600Y/347VAC	60 – 225A	10	10
250VDC 2 pole series	60 – 225A	25	35
500VDC 3 pole series	60 – 225A	25	35

IEC-947 Interrupting capacity (kA RMS)

Voltage	Continuous rating	N	S
230V	60 – 225A	50	85
415V	60 – 225A	36	50
440V	60 – 225A	25	40
500V	60 – 225A	20	30
690V	60 – 225A	5	8
250VDC 2 pole series	60 – 225A	36	50
500VDC 3 pole series	60 – 225A	36	50

T3
225A, 600Y/347V
Thermal-magnetic trip units

T3 — 225A Frame TMF

Breaker	IC at 480VAC	Rating	Magnetic trip	3 pole, 480VAC/500VDC catalog number	List price
T3N	25kA	60A	600A	T3N060TW	**$ 615**
		70A	700A	T3N070TW	**740**
		80A	800A	T3N080TW	**740**
		90A	900A	T3N090TW	**740**
		100A	1000A	T3N100TW	**740**
		125A	1250A	T3N125TW	**1560**
		150A	1500A	T3N150TW	**1560**
		175A	1750A	T3N175TW	**1560**
		200A	2000A	T3N200TW	**1560**
		225A	2250A	T3N225TW	**1560**

Breaker	IC at 480VAC	Rating	Magnetic trip	3 pole, 480VAC/500VDC catalog number	List price
T3S	35kA	60A	600A	T3S060TW	**$ 790**
		70A	700A	T3S070TW	**970**
		80A	800A	T3S080TW	**970**
		90A	900A	T3S090TW	**970**
		100A	1000A	T3S100TW	**970**
		125A	1250A	T3S125TW	**2160**
		150A	1500A	T3S150TW	**2160**
		175A	1750A	T3S175TW	**2160**
		200A	2000A	T3S200TW	**2160**
		225A	2250A	T3S225TW	**2160**

T3 — 225A frame magnetic only, (MCP)

Breaker	IC at 480VAC	Trip unit type	Rating	Adjustment range	3 pole, 480VAC catalog number	List price
T3S	35kA	Mag only	100A	600 – 1200	T3S100MW	**$ 1074**
			125A	750 - 1500	T3S125MW	**1108**
			150A	900 - 1800	T3S150MW	**1299**
			200A	1200 - 2400	T3S200MW	**1382**

T3S-D — Molded case switch

Breaker	Interrupting ① capacity	Rating	Magnetic trip	3 pole, 480VAC/500VDC catalog number	List price
T3S-D	240V, 65kA	150A	1500A	T3S150DW	**$ 1078**
	480V, 35kA	225A	2250A	T3S225DW	**1515**

15

① With fuse or MCCB protected circuit.

T3
225A, 600Y/347V, 100% rated
Thermal-magnetic trip units

T3 – 225A Frame TMF, 100% rated

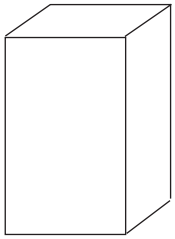
Breaker	IC at 480VAC	Rating	Magnetic trip	3 pole, 600/347V VAC/500VDC catalog number	List price
T3N	25kA	60A	600A	T3NQ060TW	**$ 656**
		70A	700A	T3NQ070TW	**812**
		80A	800A	T3NQ080TW	
		90A	900A	T3NQ090TW	
		100A	1000A	T3NQ100TW	
		125A	1250A	T3NQ125TW	**1717**
		150A	1500A	T3NQ150TW	
		175A	1750A	T3NQ175TW	
		200A	2000A	T3NQ200TW	
		225A	2250A	T3NQ225TW	

Breaker	IC at 480VAC	Rating	Magnetic trip	3 pole, 600/347VVAC/500VDC catalog number	List price
T3S	35kA	60A	600A	T3SQ060TW	**$ 778**
		70A	700A	T3SQ070TW	**1065**
		80A	800A	T3SQ080TW	
		90A	900A	T3SQ090TW	
		100A	1000A	T3SQ100TW	
		125A	1250A	T3SQ125TW	**2399**
		150A	1500A	T3SQ150TW	
		175A	1750A	T3SQ175TW	
		200A	2000A	T3SQ200TW	
		225A	2250A	T3SQ225TW	

① With fuse or MCCB protected circuit.

T4
250A, 600V
Electronic and thermal magnetic trip units

T3



H x W x D
8.07" x 4.13" x 4.07"

General
The T4 breaker is a 250 amp frame with either a microprocessor based over current protective trip system or a thermal magnetic trip unit. As an electronic breaker, the T4 is available in 100A, 150A and 250A frames. The T4 is available as a thermal magnetic unit from 20A to 250A.

Versions
To meet all application requirements, the T4 is available in the following versions:
- T = Thermal-magnetic, fixed
- B = Selectable & adjustable LI or LS
- C = Adjustable LSI
- E = Adjustable LSIG
- D = Molded Case Switch
- E5 = Electronic instantaneous only (MCP)

Trip functions
These trip functions are available:
- L = Long time
- S = Short time
- I = Instantaneous
- G = Ground fault

Performance levels
Each version is also available in different maximum fault interrrupting levels:

- N = Normal
- S = Standard
- H = High
- L = Extra high
- V = Very high

Number of poles
The T4 is available as a 3 and 4 pole breaker. Estimate 4 pole pricing by adding 35% to the 3 pole price and contact your ABB sales person for details.

Accessory mounting
Internal accessories are UL/CSA approved for both factory and field installation. No extra control connectors are required for field connection. Shunt trips and UVRs mount in the left cavity and auxiliary contacts and bell alarms mount in the right cavity.

Reverse feeding
All versions of the T4 family are suitable for reverse feed applications.

UL489 / CSA C22.2 Interrupting capacity (kA RMS)

Voltage	N	S	H	L	V
240VAC	65	100	150	200	200
480VAC	25	35	65	100	150
600VAC	18	25	35	65	100
500VDC ①	25	35	50	65	100
600VDC ②	16	25	35	50	65

IEC-947 Interrupting capacity (kA RMS)

Voltage	N	S	H	L	V
230VAC	70	85	100	200	300
415VAC	36	50	70	120	200
440VAC	30	40	65	100	180
500VDC	25	30	50	85	150
690VDC	20	25	40	70	80

① 2 poles in series.
② 3 poles in series.

T4
250A, 600V
Electronic trip units (AC only)

100A Frame (40 - 100A adjustable range)

Breaker	Ic at 480VAC kA	Trip Unit	3 Pole, 600V Catalog number	List price
T4N	25	PR221 LS/I PR222 LSI PR222 LSIG	T4N100BW T4N100CW T4N100EW	**$ 1903** **2540** **3330**
T4S	35	PR221 LS/I PR222 LSI PR222 LSIG	T4S100BW T4S100CW T4S100EW	**2370** **3164** **4148**
T4H	65	PR221 LS/I PR222 LSI PR222 LSIG	T4H100BW T4H100CW T4H100EW	**4498** **4845** **5877**
T4L	100	PR221 LS/I PR222 LSI PR222 LSIG	T4L100BW T4L100CW T4L100EW	**5954** **6063** **7091**
T4V	150	PR221 LS/I PR222 LSI PR222 LSIG	T4V100BW T4V100CW T4V100EW	**8555** **9213** **9957**

150A Frame (60 - 150A adjustable range)

Breaker	Ic at 480VAC kA	Trip Unit	3 Pole, 600V Catalog number	List price
T4N	25	PR221 LS/I PR222 LSI PR222 LSIG	T4N150BW T4N150CW T4N150EW	**$ 2050** **2737** **3588**
T4S	35	PR221 LS/I PR222 LSI PR222 LSIG	T4S150BW T4S150CW T4S150EW	**2542** **3394** **4449**
T4H	65	PR221 LS/I PR222 LSI PR222 LSIG	T4H150BW T4H150CW T4H150EW	**4633** **5024** **6094**
T4L	100	PR221 LS/I PR222 LSI PR222 LSIG	T4L150BW T4L150CW T4L150EW	**6174** **6288** **7354**
T4V	150	PR221 LS/I PR222 LSI PR222 LSIG	T4V150BW T4V150CW T4V150EW	**8872** **9555** **10,326**

250A Frame (100 - 250A adjustable range)

Breaker	Ic at 480VAC kA	Trip Unit	3 Pole, 600V Catalog number	List price
T4N	25	PR221 LS/I PR222 LSI PR222 LSIG	T4N250BW T4N250CW T4N250EW	**$ 2112** **2819** **3696**
T4S	35	PR221 LS/I PR222 LSI PR222 LSIG	T4S250BW T4S250CW T4S250EW	**2573** **3435** **4503**
T4H	65	PR221 LS/I PR222 LSI PR222 LSIG	T4H250BW T4H250CW T4H250EW	**4713** **5127** **6219**
T4L	100	PR221 LS/I PR222 LSI PR222 LSIG	T4L250BW T4L250CW T4L250EW	**6300** **6416** **7504**
T4V	150	PR221 LS/I PR222 LSI PR222 LSIG	T4V250BW T4V250CW T4V250EW	**9053** **9750** **10,537**

T4
250A, 600V
Thermal magnetic trip units

20A - 250A Frame

Breaker	IC at 480VAC kA	Rating	Magnetic trip	3 pole, 600VAC/600VDC Catalog number	List price
T4N	25	20A	500	T4N020TW	**$ 1517**
		30A	500	T4N030TW	**1517**
		40A	500	T4N040TW	**1517**
		50A	500	T4N050TW	**1517**
		80A	400-800	T4N080TW	**1547**
		100A	500-1000	T4N100TW	**1547**
		125A	625-1250	T4N125TW	**1667**
		150A	750-1500	T4N150TW	**1667**
		200A	1000-2000	T4N200TW	**1667**
		250A	1250-2500	T4N250TW	**1717**
T4S	35	20A	500	T4S020TW	**1887**
		30A	500	T4S030TW	**1887**
		40A	500	T4S040TW	**1887**
		50A	500	T4S050TW	**1887**
		80A	400-800	T4S080TW	**1927**
		100A	500-1000	T4S100TW	**1927**
		125A	625-1250	T4S125TW	**2067**
		150A	750-1500	T4S150TW	**2067**
		200A	1000-2000	T4S200TW	**2067**
		250A	1250-2500	T4S250TW	**2092**
T4H	65	20A	500	T4H020TW	**3617**
		30A	500	T4H030TW	**3617**
		40A	500	T4H040TW	**3617**
		50A	500	T4H050TW	**3617**
		80A	400-800	T4H080TW	**3657**
		100A	500-1000	T4H100TW	**3657**
		125A	625-1250	T4H125TW	**3767**
		150A	750-1500	T4H150TW	**3767**
		200A	1000-2000	T4H200TW	**3767**
		250A	1250-2500	T4H250TW	**3832**
T4L	100	20A	500	T4L020TW	**5915**
		30A	500	T4L030TW	**5915**
		40A	500	T4L040TW	**5915**
		50A	500	T4L050TW	**5915**
		80A	400-800	T4L080TW	**5965**
		100A	500-1000	T4L100TW	**5965**
		125A	625-1250	T4L125TW	**5995**
		150A	750-1500	T4L150TW	**5995**
		200A	1000-2000	T4L200TW	**5995**
		250A	1250-2500	T4L250TW	**6110**
T4V	150	20A	500	T4V020TW	**6780**
		30A	500	T4V030TW	**6780**
		40A	500	T4V040TW	**6780**
		50A	500	T4V050TW	**6780**
		80A	400-800	T4V080TW	**6817**
		100A	500-1000	T4V100TW	**6817**
		125A	625-1250	T4V125TW	**6847**
		150A	750-1500	T4V150TW	**6847**
		200A	1000-2000	T4V200TW	**6847**
		250A	1250-2500	T4V250TW	**6887**

Molded case switch

Type	Amps	Magnetic trip	3 Pole, 600V Catalog number	List price
T4H-D	250	3000	T4H250DW	**$ 2154**
T4L-D	250	3000	T4L250DW	**3419**
T4V-D	250	3000	T4V250DW	**3842**

T4
250A, 600V, 100% Rated
Electronic trip units (AC only)

100A Frame (40 - 100A adjustable range)

Breaker	Ic at 480VAC kA	Trip Unit	3 Pole, 600V Catalog number	List price
T4N	25	PR221 LS/I PR222 LSI PR222 LSIG	T4NQ100BW T4NQ100CW T4NQ100EW	**$ 2124** **2835** **3716**
T4S	35	PR221 LS/I PR222 LSI PR222 LSIG	T4SQ100BW T4SQ100CW T4SQ100EW	**2645** **3531** **4629**
T4H	65	PR221 LS/I PR222 LSI PR222 LSIG	T4HQ100BW T4HQ100CW T4HQ100EW	**5020** **5383** **6530**
T4L	100	PR221 LS/I PR222 LSI PR222 LSIG	T4LQ100BW T4LQ100CW T4LQ100EW	**6616** **6737** **7879**
T4V	150	PR221 LS/I PR222 LSI PR222 LSIG	T4VQ100BW T4VQ100CW T4VQ100EW	**9506** **10,237** **11,063**

150A Frame (60 - 150A adjustable range)

Breaker	Ic at 480VAC kA	Trip Unit	3 Pole, 600V Catalog number	List price
T4N	25	PR221 LS/I PR222 LSI PR222 LSIG	T4NQ150BW T4NQ150CW T4NQ150EW	**$ 2288** **3055** **4004**
T4S	35	PR221 LS/I PR222 LSI PR222 LSIG	T4SQ150BW T4SQ150CW T4SQ150EW	**2837** **3788** **4965**
T4H	65	PR221 LS/I PR222 LSI PR222 LSIG	T4HQ150BW T4HQ150CW T4HQ150EW	**5171** **5582** **6771**
T4L	100	PR221 LS/I PR222 LSI PR222 LSIG	T4LQ150BW T4LQ150CW T4LQ150EW	**6860** **6987** **8171**
T4V	150	PR221 LS/I PR222 LSI PR222 LSIG	T4VQ150BW T4VQ150CW T4VQ150EW	**9858** **10,616** **11,473**

250A Frame (100 - 250A adjustable range)

Breaker	Ic at 480VAC kA	Trip Unit	3 Pole, 600V Catalog number	List price
T4N	25	PR221 LS/I PR222 LSI PR222 LSIG	T4NQ250BW T4NQ250CW T4NQ250EW	**$ 2357** **3146** **4125**
T4S	35	PR221 LS/I PR222 LSI PR222 LSIG	T4SQ250BW T4SQ250CW T4SQ250EW	**2872** **3834** **5025**
T4H	65	PR221 LS/I PR222 LSI PR222 LSIG	T4HQ250BW T4HQ250CW T4HQ250EW	**5260** **5697** **6910**
T4L	100	PR221 LS/I PR222 LSI PR222 LSIG	T4LQ250BW T4LQ250CW T4LQ250EW	**7000** **7129** **8338**
T4V	150	PR221 LS/I PR222 LSI PR222 LSIG	T4VQ250BW T4VQ250CW T4VQ250EW	**10,058** **10,833** **11,708**

T4
250A, 600V, 100% rated thermal-magnetic trip units
Magnetic only MCPs

30A - 250A Frame

Breaker	IC at 480 VAC kA	Rating	Magnetic trip	3 pole, 600VAC/600VDC Catalog number	List price
T4N	25	20A	500	T4NQ020TW	**$ 1673**
		30A	500	T4NQ030TW	**1673**
		40A	500	T4NQ040TW	**1673**
		50A	500	T4NQ050TW	**1673**
		80A	400-800	T4NQ080TW	**1706**
		100A	500-1000	T4NQ100TW	**1706**
		125A	625-1250	T4NQ125TW	**1839**
		150A	750-1500	T4NQ150TW	**1839**
		200A	1000-2000	T4NQ200TW	**1839**
		250A	1250-2500	T4NQ250TW	**1894**
T4S	35	20A	500	T4SQ020TW	**2081**
		30A	500	T4SQ030TW	**2081**
		40A	500	T4SQ040TW	**2081**
		50A	500	T4SQ050TW	**2081**
		80A	400-800	T4SQ080TW	**2125**
		100A	500-1000	T4SQ100TW	**2125**
		125A	625-1250	T4SQ125TW	**2280**
		150A	750-1500	T4SQ150TW	**2280**
		200A	1000-2000	T4SQ200TW	**2280**
		250A	1250-2500	T4SQ250TW	**2307**
T4H	65	20A	500	T4HQ020TW	**3990**
		30A	500	T4HQ030TW	**3990**
		40A	500	T4HQ040TW	**3990**
		50A	500	T4HQ050TW	**3990**
		80A	400-800	T4HQ080TW	**4034**
		100A	500-1000	T4HQ100TW	**4034**
		125A	625-1250	T4HQ125TW	**4155**
		150A	750-1500	T4HQ150TW	**4155**
		200A	1000-2000	T4HQ200TW	**4155**
		250A	1250-2500	T4HQ250TW	**4227**
T4L	100	20A	500	T4LQ020TW	**6524**
		30A	500	T4LQ030TW	**6524**
		40A	500	T4LQ040TW	**6524**
		50A	500	T4LQ050TW	**6524**
		80A	400-800	T4LQ080TW	**6579**
		100A	500-1000	T4LQ100TW	**6579**
		125A	625-1250	T4LQ125TW	**6612**
		150A	750-1500	T4LQ150TW	**6612**
		200A	1000-2000	T4LQ200TW	**6612**
		250A	1250-2500	T4LQ250TW	**6739**
T4V	150	20A	500	T4VQ020TW	**7478**
		30A	500	T4VQ030TW	**7478**
		40A	500	T4VQ040TW	**7478**
		50A	500	T4VQ050TW	**7478**
		80A	400-800	T4VQ080TW	**7519**
		100A	500-1000	T4VQ100TW	**7519**
		125A	625-1250	T4VQ125TW	**7552**
		150A	750-1500	T4VQ150TW	**7552**
		200A	1000-2000	T4VQ200TW	**7552**
		250A	1250-2500	T4VQ250TW	**7569**

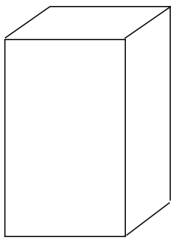
Magnetic-only MCPs

T4 - 250A Frame magnetic only (MCP - AC only)

Breaker	IC at 480VAC	Trip unit type	Rating	Adjustment range	3 pole, 600VAC Catalog number	List price
T4N	25kA	Instantaneous only	100A	100-1000	T4N100E5W	**$ 1808**
			150A	150-1500	T4N150E5W	**1948**
			250A	250-2500	T4N250E5W	**2006**
T4S	35kA	Instantaneous only	100A	100-1000	T4S100E5W	**2252**
			150A	150-1500	T4S150E5W	**2415**
			250A	250-2500	T4S250E5W	**2444**
T4H	65kA	Instantaneous only	100A	100-1000	T4H100E5W	**4273**
			150A	150-1500	T4H150E5W	**4401**
			250A	250-2500	T4H250E5W	**4477**
T4L	100kA	Instantaneous only	100A	100-1000	T4L100E5W	**5656**
			150A	150-1500	T4L150E5W	**5865**
			250A	250-2500	T4L250E5W	**5985**

T5
600A, 600V
Electronic and thermal magnetic trip units

T5



H x W x D
8.07" x 5.51" x 4.07"

General
The T5 breaker is a 600 amp frame with either a microprocessor based over current protective trip system or a thermal magnetic trip unit. As an electronic breaker, the T5 is available in 300A, 400A and 600A frames. The T5 is available as a thermal magnetic unit of 300A or 400A.

Versions
To meet all application requirements, the T5 is available in the following versions:
- T = Thermal-magnetic
- B = Selectable & adjustable LI or LS
- C = Adjustable LSI
- E = Adjustable LSIG
- D = Molded Case Switch
- E5 = Electronic instantaneous only (MCP)

Trip functions
These trip functions are available:
- L = Long time
- S = Short time
- I = Instantaneous
- G = Ground fault

Performance levels
Each version is also available in different maximum fault interrrupting levels:

- N = Normal
- S = Standard
- H = High
- L = Extra high
- V = Very high

Number of poles
The T5 is available as a 3 and 4 pole breaker. Estimate 4 pole pricing by adding 35% to the 3 pole price and contact your ABB sales person for details.

Accessory mounting
Internal accessories are UL/CSA approved for both factory and field installation. No extra control connectors are required for field connection. Shunt trips and UVRs mount in the left cavity and auxiliary contacts and bell alarms mount in the right cavity.

Reverse feeding
All versions of the T5 family are suitable for reverse feed applications.

UL489 / CSA C22.2 Interrupting capacity (kA RMS)

Voltage	N	S	H	L	V
240VAC	65	100	150	200	200
480VAC	25	35	65	100	150
600VAC	18	25	35	65	100
500VDC ①	25	35	50	65	100
600VDC ②	16	25	35	50	65

IEC-947 Interrupting capacity (kA RMS)

Voltage	N	S	H	L	V
230VAC	70	85	100	200	300
415VAC	36	50	70	120	200
440VAC	30	40	65	100	180
500VDC	25	30	50	85	150
690VDC	20	25	40	70	80

① 2 poles in series.
② 3 poles in series.

T5
600A, 600V
Electronic trip units (AC only)

300A Frame

Breaker	Ic at 480VAC kA	Trip Unit	3 Pole, 600V Catalog number	List price
T5N	25	PR221 LS/I PR222 LSI PR222 LSIG	T5N300BW T5N300CW T5N300EW	**$ 3260** **3865** **4965**
T5S	35	PR221 LS/I PR222 LSI PR222 LSIG	T5S300BW T5S300CW T5S300EW	**3350** **3945** **5138**
T5H	65	PR221 LS/I PR222 LSI PR222 LSIG	T5H300BW T5H300CW T5H300EW	**5395** **5893** **7148**
T5L	100	PR221 LS/I PR222 LSI PR222 LSIG	T5L300BW T5L300CW T5L300EW	**6860** **7375** **8625**
T5V	150	PR221 LS/I PR222 LSI PR222 LSIG	T5V300BW T5V300CW T5V300EW	**10,406** **11,206** **12,111**

400A Frame

Breaker	Ic at 480VAC kA	Trip Unit	3 Pole, 600V Catalog number	List price
T5N	25	PR221 LS/I PR222 LSI PR222 LSIG	T5N400BW T5N400CW T5N400EW	**$ 3260** **3865** **4965**
T5S	35	PR221 LS/I PR222 LSI PR222 LSIG	T5S400BW T5S400CW T5S400EW	**3350** **3945** **5138**
T5H	65	PR221 LS/I PR222 LSI PR222 LSIG	T5H400BW T5H400CW T5H400EW	**5395** **5893** **7148**
T5L	100	PR221 LS/I PR222 LSI PR222 LSIG	T5L400BW T5L400CW T5L400EW	**6860** **7375** **8625**
T5V	150	PR221 LS/I PR222 LSI PR222 LSIG	T5V400BW T5V400CW T5V400EW	**10,406** **11,206** **12,111**

600A Frame

Breaker	Ic at 480VAC kA	Trip Unit	3 Pole, 600V Catalog number	List price
T5N	25	PR221 LS/I PR222 LSI PR222 LSIG	T5N600BW T5N600CW T5N600EW	**$ 5750** **6460** **8360**
T5S	35	PR221 LS/I PR222 LSI PR222 LSIG	T5S600BW T5S600CW T5S600EW	**5910** **6595** **8645**
T5H	65	PR221 LS/I PR222 LSI PR222 LSIG	T5H600BW T5H600CW T5H600EW	**8170** **8805** **10,890**
T5L	100	PR221 LS/I PR222 LSI PR222 LSIG	T5L600BW T5L600CW T5L600EW	**9860** **10,440** **12,630**
T5V	150	PR221 LS/I PR222 LSI PR222 LSIG	T5V600BW T5V600CW T5V600EW	**13,550** **14,375** **16,350**

T5
400A, 600V
Thermal magnetic trip units ①

300A - 400A Frames

Breaker	IC at 480VAC kA	Rating	Magnetic trip	3 pole, 600VAC/600VDC Catalog number	List price
T5N	25	300A 400A	1500-3000 2000-4000	T5N300TW T5N400TW	**$ 2612**
T5S	35	300A 400A	1500-3000 2000-4000	T5S300TW T5S400TW	**2880**
T5H	65	300A 400A	1500-3000 2000-4000	T5H300TW T5H400TW	**4950**
T5L	100	300A 400A	1500-3000 2000-4000	T5L300TW T5L400TW	**6400**
T5V	150	300A 400A	1500-3000 2000-4000	T5V300TW T5V400TW	**9873**

Molded case switch

Type	Amps	Magnetic trip	3 Pole, 600V Catalog number	List price
T5H-D	400	5000	T5H400DW	**$ 4585**
T5H-D	600	6000	T5H600DW	**6550**
T5L-D	600	6000	T5L600DW	**8350**
T5V-D	600	6000	T5V600DW	**11,575**

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① 600A not available with thermal magnetic trip unit.

T5
400A, 600V, 100% Rated ①

Electronic trip units (AC only)

300A Frame

Breaker	Ic at 480VAC kA	Trip Unit	3 Pole, 600V Catalog number	List price
T5N	25	PR221 LS/I PR222 LSI PR222 LSIG	T5NQ300BW T5NQ300CW T5NQ300EW	**$ 3628** **4302** **5526**
T5S	35	PR221 LS/I PR222 LSI PR222 LSIG	T5SQ300BW T5SQ300CW T5SQ300EW	**3729** **4391** **5719**
T5H	65	PR221 LS/I PR222 LSI PR222 LSIG	T5HQ300BW T5HQ300CW T5HQ300EW	**6005** **6559** **7956**
T5L	100	PR221 LS/I PR222 LSI PR222 LSIG	T5LQ300BW T5LQ300CW T5LQ300EW	**7635** **8208** **9600**
T5V	150	PR221 LS/I PR222 LSI PR222 LSIG	T5VQ300BW T5VQ300CW T5VQ300EW	**11,582** **12,473** **13,480**

400A Frame

Breaker	Ic at 480VAC kA	Trip Unit	3 Pole, 600V Catalog number	List price
T5N	25	PR221 LS/I PR222 LSI PR222 LSIG	T5NQ400BW T5NQ400CW T5NQ400EW	**$ 3628** **4302** **5526**
T5S	35	PR221 LS/I PR222 LSI PR222 LSIG	T5SQ400BW T5SQ400CW T5SQ400EW	**3729** **4391** **5719**
T5H	65	PR221 LS/I PR222 LSI PR222 LSIG	T5HQ400BW T5HQ400CW T5HQ400EW	**6005** **6559** **7956**
T5L	100	PR221 LS/I PR222 LSI PR222 LSIG	T5LQ400BW T5LQ400CW T5LQ400EW	**7635** **8208** **9600**
T5V	150	PR221 LS/I PR222 LSI PR222 LSIG	T5VQ400BW T5VQ400CW T5VQ400EW	**11,582** **12,473** **13,480**

Thermal magnetic trip units

300A - 400A Frames

Breaker	IC at 480VAC kA	Rating	Magnetic trip	3 pole, 600VAC/600VDC Catalog number	List price
T5N	25	300A 400A	1500-3000 2000-4000	T5NQ300TW T5NQ400TW	**$ 2888**
T5S	35	300A 400A	1500-3000 2000-4000	T5SQ300TW T5SQ400TW	**3185**
T5H	65	300A 400A	1500-3000 2000-4000	T5HQ300TW T5HQ400TW	**5475**
T5L	100	300A 400A	1500-3000 2000-4000	T5LQ300TW T5LQ400TW	**7078**
T5V	150	300A 400A	1500-3000 2000-4000	T5VQ300TW T5VQ400TW	**10,920**

① 600A not available in 100% rated frame.

T5
400A, 600V ①
Magnetic only, MCP

T5 - 400A Frame magnetic only (MCP - AC only)

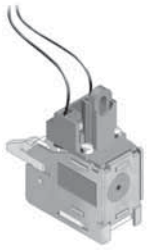
Breaker	IC at 480VAC	Trip unit type	Rating	Adjustment range	3 pole, 600VAC Catalog number	List price
T5N	25kA	Instantaneous only	300A 400A	300-3000 400-4000	T5N300E5W T5N400E5W	**$ 3097**
T5S	35kA	Instantaneous only	300A 400A	300-3000 400-4000	T5S300E5W T5S400E5W	**3183**
T5H	65kA	Instantaneous only	300A 400A	300-3000 400-4000	T5H300E5W T5H400E5W	**5125**
T5L	100kA	Instantaneous only	300A 400A	300-3000 400-4000	T5L300E5W T5L400E5W	**6517**

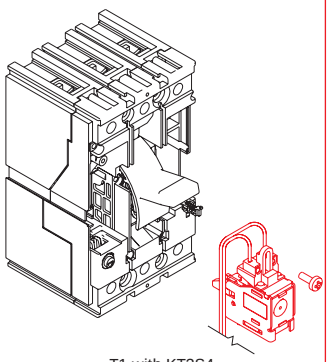
T5 - 600A Frame magnetic only (MCP - AC only)

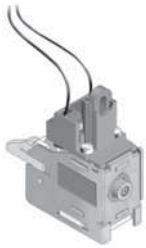
Breaker	IC at 480VAC	Trip unit type	Rating	Adjustment range	3 pole, 600VAC Catalog number	List price
T5N	25kA	Instantaneous only	600A	600-6000	T5N600E5W	**$ 5615**
T5S	35kA	Instantaneous only	600A	600-6000	T5S600E5W	**5770**
T5H	65kA	Instantaneous only	600A	600-6000	T5H600E5W	**7761**
T5L	100kA	Instantaneous only	600A	600-6000	T5L600E5W	**9370**

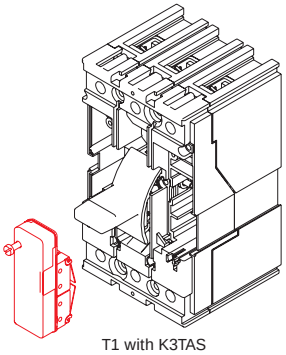
① 600A Not available with thermal magnetic trip unit.

Accessories
Electrical
T1 - T3


KT3S4


T1 with KT3S4


KT3U2


T1 with K3TAS


KT3M1

Shunt trips

Voltage	Factory installation: Catalog number suffix ①	Factory installation: List price adder	Field installation: Catalog number T1 – T3	Field installation: List price
480 – 500VAC	S1		KT3S1	
220/250VAC/DC	S2		KT3S2	
380 – 440VAC	S3		KT3S3	
110 – 125VAC/DC	S4	**$ 535**	KT3S4	**$ 490**
48 – 60VAC/DC	S7		KT3S7	
24 – 30VAC/DC	S8		KT3S8	
12VDC	S9		KT3S9	

For remote opening of circuit breaker and includes internal cut-off switch to protect solenoid. All shunt trips are left pole mounted and can not be used with undervoltage releases. All shunt trips are approved for use in ground fault systems.

Electrical specifications

Voltage	AC VA	DC Watts
24, 120, 240	50	50
48 - 60	60	60
480 - 500	55	—

Undervoltage releases

Voltage	Factory installation: Catalog number suffix ①	Factory installation: List price adder	Field installation: Catalog number T1 – T3	Field installation: List Price
480 – 500VAC	U1		KT3U1	
220 – 250VAC/DC	U2		KT3U2	
380 – 440VAC	U3		KT3U3	
110 – 125VAC/DC	U4	**$ 535**	KT3U4	**$ 490**
60VAC/DC	U5		KT3U5	
48VAC/DC	U7		KT3U7	
24 – 30VAC/DC	U8		KT3U8	

Will trip circuit breaker when connected voltage drops to 35 – 70% of undervoltage release voltage rating. Will allow circuit breaker to close (ON) when voltage is approximately 85% of rated voltage. All undervoltage releases are left pole mounted and can not be used with shunt trips.

Electrical specifications

Voltage	AC VA	DC Watts
24	1.5	1.5
48 - 60	1	1
120	2	2
220 - 250	2.5	2.5
480 - 500	4	—

Auxiliary contacts — T1 - T3

Contacts	Factory installation: Catalog number suffix	Factory installation: List price adder	Field installation: Catalog number	Field installation: List Price
1 Form C + 1 BA	A	**$ 433**	KT3AS	**$ 380**
3 Form C + 1 BA	A3	**770**	KT3AS3	**725**
T2 PR221DS 1 Form C + 1 BA	A	**433**	KT2AS-E	**380**
3 form C + 1 BA 24VDC	A3AU	**770**	KT3AS3-AU	**725**

Electrical operators

Voltage	Field installation: Catalog number	Field installation: List Price
48 – 60VAC/DC	KT3M1	**$ 850**
110 – 250VAC/DC	KT3M2	

Electrical specifications

Voltage range	Inrush power
85 - 110% rated voltage	2500VA / 1000W

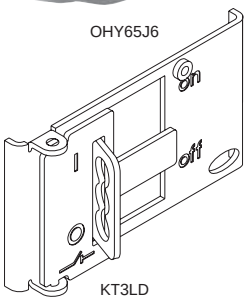
① For factory installation add suffix given to end of circuit breaker catalog number per accessory format.

Accessories
Mechanical
T1 - T3


KT3RH

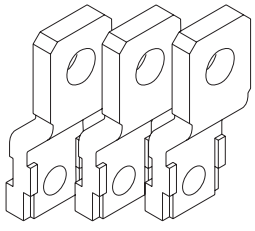
OHB65J6

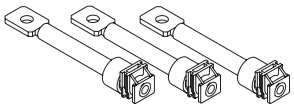
OHY65J6



KT3LD


KT3100-3


KT2EF-3


KT2R-3

Direct mount rotary operator handle

	Catalog number	List price
Direct mount rotary	KT3RH	**$ 146**

Variable depth rotary handles

Frame	Mechanism catalog number	List price	Shaft catalog number	List price	Handle catalog number	List price
NEMA 1, 3R, 12						
Tmax	KT3VD-M	**$ 72**	OXP6X430 ①	**$ 28**	OHY65J6 ① OHB65J6 ①	**$ 80**
NEMA 4, 4X						
Tmax	KT3VD-M	**72**	OXP6X430 ①	**28**	OHY80L6 ① OHB80L6 ①	**130**
NEMA 1						
Tmax	KT3VD-M	**72**	KT3VD-S	**35**	KT3VD-H	**87**

Locking device

	Catalog number	List price
Locking device, open/closed	KT3LD	**$ 35**
Locking device, open	KT3LDO	**35**

Lugs

For breakers	Amps	Wire size	Set of 3 catalog number	List price	Set of 4 catalog	List price number
Standard cable lugs						
T1	100	14AWG-1/0	Integral	—	Integral	—
T2	100	14AWG-1/0	KT2100-3	**$ 9**	KT2100-4	**$ 12**
T3	60	14AWG -2AWG	KT3060-3	**9**	KT3060-4	**12**
	100	14AWG -1/0	KT3100-3	**9**	KT3100-4	**12**
	150	2AWG-4/0	KT3150-3	**12**	KT3150-4	**18**
	225	4AWG-300kcmil	KT3225-3	**18**	KT3225-4	**24**

Standard cable lug kits with power controls taps

For breakers	Amps	Wire size	Set of 3 Catalog number	Set of 3 List price	Set of 4 Catalog number	Set of 4 List price
T3	100	14AWG - 1/0	KT3100-3C	**$ 16**	KT3100-4C	**$ 19**
	150	2AWG - 4/0	KT3150-3C	**16**	KT3150-4C	**19**
	225	4AWG - 350kcmil	KT3225-3C	**25**	KT3225-4C	**31**

Extended front terminals

For breakers	Amps	Set of 3 Catalog number	Set of 3 List price adder	Set of 4 Catalog number	Set of 4 List Price
T2	100	KT2EF-3	**$ 26**	KT2EF-4	**$ 35**
T3	225	KT3EF-3	**33**	KT3EF-4	**44**

Rear terminals

For breakers	Amps	Set of 3 Catalog number	Set of 3 List price adder	Set of 4 Catalog number	Set of 4 List Price
T2	100	KT2R-3	**$ 78**	KT2R-4	**$ 105**
T3	225	KT3R-3	**98**	KT3R-4	**131**

Distribution cable lug kit	Amps	Set of 3 Wire range	Set of 3 Catalog number	Set of 3 List Price
T3	225	(6) #14-6	KT3TN	**$ 125**

OHB 65 J 6

Color
B = Black
Y = Red/Yellow

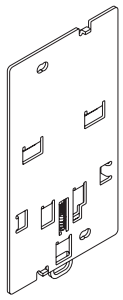
Physical size (length in mm)

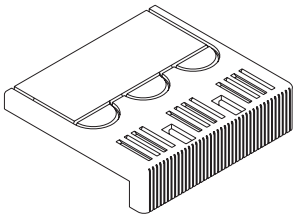
Shaft size (diameter in mm)

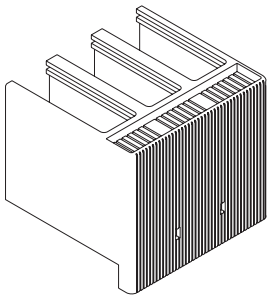
J = Type 1, 3R, 12
L = Type 1, 3R, 12, 4, 4X

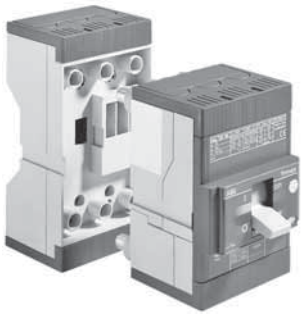
① Use Discount Schedule H6.

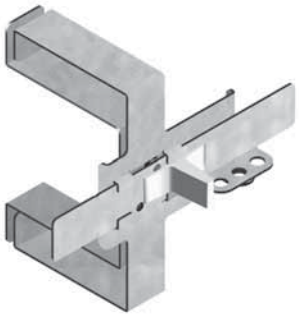
Accessories
Mechanical
T1 - T3


KT2DIN


KT1LTC-3


KT1HTC-3


KT2PFF + KT2PMK (on back of breaker) + breaker


KT3MIF2

DIN Rail mounting kits — 35mm DIN ①

For breakers	Catalog number	List price
T1 / T2	KT2DIN	**$ 33**
T3	KT3DIN	**41**

Terminal covers for fixed breakers

Low Profile

For breakers	Low profile 3-pole		Low profile 4-pole	
	Catalog number	List price	Catalog number	List Price
T1	KT1LTC-3	**$ 35**	KT1LTC-4	**$ 47**
T2	KT2LTC-3	**40**	KT2LTC-4	**54**
T3	KT3LTC-3	**50**	KT3LTC-4	**68**

High Profile

For breakers	High profile 3-pole		High profile 4-pole	
	Catalog number	List price	Catalog number	List Price
T1	KT1HTC-3	**$ 37**	KT1HTC-4	**$ 50**
T2	KT2HTC-3	**43**	KT2HTC-4	**58**
T3	KT3HTC-3	**53**	KT3HTC-4	**72**

Kit consists of two pieces.

Plug-in kits for T2 and T3 ②

For breakers	Moving part		Fixed part	
	Catalog number	List price	Catalog number	List Price
T2 — 3-Pole	KT2PMK	**$ 171**	KT2PFF	**$ 238**
T3 — 3-Pole	KT3PMK	**190**	KT3PFF	**264**

Fixed parts accept the same cable and rear terminal kits as the circuit breakers.

Sliding bar interlock — front mounted

For breakers	For 2 breakers		For 3 breakers	
	Catalog number	List price	Catalog number	List Price
T1 – T3	KT3MIF2	**$ 625**	KT3MIF3	**$ 844**

Plug connectors

Item	3 Way	6 Way	12 Way	Catalog number	List price
Shunt trip or UVR	■			KT3PC-3	**$ 18**
1 form C + 1BA auxiliary contact		■		KT3PC-6	**21**
3 form C + 1BA auxiliary contact			■	KT3PC-12	**24**

Cable kits

Item	Catalog number	List price
2 Cables, 2M	KT3PC-2CK	**$ 18**
6 Cables, 2M	KT3PC-6CK	**24**
12 Cables, 2M	KT3PC-12CK	**30**

① For use with 15mm high DIN rail.
② Plug connectors and cable kit required when mounting accessories.

External accessories
Flange handle operators
T1 – T3

Flange handle — Cable linkage

Breaker	NEMA Type	Mechanism only	List price	Cable only	Cable length	List price	Handle only	List price
T1/T2	1,3R,12	KT2FPM	**$ 123**	K5C036	36” (91cm)	**$ 114**	K5FCH	**$ 213**
T1/T2	4,4X	KT2FPM		K5C048	48” (122cm)	**146**	K5FCH4	**243**
T3	1,3R,12	KT3FPM		K5C060	60” (152cm)	**160**	K5FCH	**213**
T3	4,4X	KT3FPM		K5C072	72” (183cm)	**175**	K5FCH4	**243**

Notes: For complete assembly; mechanism, cable and handle are required.
All cables mount onto the right side of the breaker.
Handle can be mounted on the right or left side.

Door hardware kits — T1 - T5 Cable operated

Item	Catalog number	List price
Door hardware kit, right hand, 2 point latch for enclosures less than 40 inches high	KDH2R	**$ 200**
Door hardware kit, right hand, 3 point latch for enclosures 40 inches high or greater	KDH3R	**225**

Enclosure depths

Minimum

Breaker	Depth (inches)
T1 - T3	8

Maximum

Maximum depth is determined by cable length.

Shunt trips (Standard)

Voltage	Factory installation		Field installation	
	Catalog number suffix ①	List price adder	Catalog number T4 – T5	List price
480 – 500VAC	S1		KT5S1	
220/250VAC/DC	S2		KT5S2	
380 – 440VAC	S3		KT5S3	
110 – 125VAC/DC	S4	**$ 535**	KT5S4	**$ 490**
48 – 60VAC/DC	S7		KT5S7	
24 VAC/DC	S8		KT5S8	
12VDC	S9		KT5S9	

Shunt trip (Permanent supply)

Voltage	Factory installation		Field installation	
	Catalog number suffix ①	List price adder	Catalog number T4 – T5	List price
110 – 120 VAC	SP4	**$ 535**	KT5SP4	**$ 490**
24 – 30 VAC/DC	SP8		KT5SP8	

Undervoltage release

Voltage	Factory installation		Field installation	
	Catalog number suffix ①	List price adder	Catalog number T4 – T5	List Price
480 – 500 VAC	U1		KT5U1	
220 – 250 VAC/DC	U2		KT5U2	
380 – 440 VAC	U3		KT5U3	
110 – 125 VAC/DC	U4	**$ 535**	KT5U4	**$ 490**
60 VAC/DC	U5		KT5U5	
48 VAC/DC	U7		KT5U7	
24 VAC/DC	U8		KT5U8	

Auxiliary contacts

Contacts	Factory installation		Field installation	
	Catalog number suffix	List price adder	Catalog number	List Price
1 Form C + 1 BA, 250 VAC/VDC	A	**$ 433**	KT5AS	**$ 380**
3 Form C + 1 BA, 250 VAC/VDC	A3	**770**	KT5AS3	**725**
3 Form C + 1 BA, 24 VDC	A3AU	**770**	KT5AS3-AU	**725**

Stored energy motor operator

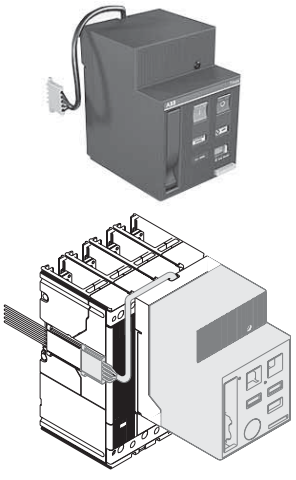
Voltage	Field installation	
	Catalog number	List Price
220 – 250 VAC/DC	KT5M2	**$ 2385**
110 – 125 VAC/DC	KT5M4	
48 – 60 VDC	KT5M7	
24 VDC	KT5M8	

Stored energy motor operator – Contact remote/manual operation

Contacts	Factory installation		Field installation	
	Catalog number suffix	List price adder	Catalog number	List Price
1 Form C	MA	**$ 265**	KT5MA	**$ 220**

Adapters ②

Item	6 Way	10 Way	12 Way	Catalog number	List price
1 Form C + 1BA	■			KT5ADP-6	**$ 24**
Shunt trip / UVR	■			KT5ADP-6	**24**
Stored energy motor operator		■		KT5ADP-10	**30**
Stored energy motor operator plus shunt trip/UVR		■		KT5ADP-10	**30**
3 Form C + 1BA			■	KT5ADP-12	**35**



KT5M2

① For factory installation add suffix given to end of circuit breaker catalog number per accessory format.
2 Required when mounting accessories on plug-in/drawout breakers

Accessories
Mechanical
T4 - T5

KT5RH

Direct mount rotary operator handle

Item	Catalog number	List Price
Direct mount rotary handle (for fixed and plug-in breakers) Direct mount rotary handle (for withdrawable breakers)	KT5RH KT5RHW	**$ 135**

Variable depth rotary handles

Item	Catalog number	List Price
Mechanism	KT5VD-M	**$ 65**
NEMA 1, 12, 3R Handle (Black)	OHB95J10 ①	**80**
NEMA 1, 12, 3R Handle (Grey)	OHG95J10 ①	**80**
NEMA 4, 4X Handle (Black)	OHB95L10 ①	**120**
NEMA 4, 4X Handle (Grey)	OHG95L10 ①	**120**
Shaft (148mm / 5.8 in)	OXP10X148 ①	**24**
Shaft (225mm / 8.9 in)	OXP10X225 ①	**26**
Shaft (500mm / 19.7 in)	OXP10X500 ①	**32**
NEMA 1 Handle, square profile Shaft (500mm/19.7in)	KT5VD-H KT5VD-S	**87**

Locking devices

	Catalog number	List price
Locking device	KT5FLD	**$ 40**
Locking device draw out	KT5FLDW	**55**

KT4PMK (on back of breaker)

KT4PFVR

Plug-in kits

Contacts	Breaker adapter kit		Plug-in base	
	Catalog number suffix	List price adder	Catalog number	List Price
T4, 3 pole with extended front terminal T4, 3 pole with rear horizontal terminal T4, 3 pole with rear vertical terminal	KT4PMK	**$ 250**	KT4PFEF KT4PFHR KT4PFVR	**$ 710** **766** **766**
T5, 3 pole with extended front terminal T5, 3 pole with rear horizontal terminal T5, 3 pole with rear vertical terminal	KT5PMK	**350**	KT5PFEF KT5PFHR KT5PFVR	**810** **866** **866**

KT4WMK (on back of breaker)

KT5WFVR

Draw-out kits

Contacts	Breaker adapter kit		Plug-in base	
	Catalog number suffix	List price adder	Catalog number	List price
T4, 3 pole with extended front terminal T4, 3 pole with rear horizontal terminal T4, 3 pole with rear vertical terminal	KT4WMK	**$ 290**	KT4WFEF KT4WFHR KT4WFVR	**$ 816** **1021** **1021**
T5, 3 pole with extended front terminal T5, 3 pole with rear horizontal terminal T5, 3 pole with rear vertical terminal	KT5WMK	**407**	KT5WFEF KT5WFHR KT5WFVR	**931** **1154** **1154**

Standard cable lugs

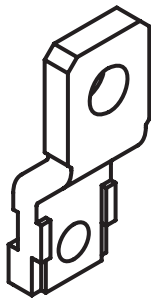
For breakers	Amps	Wire size	Set of 2 catalog number	List price	Set of 3 catalog number	List price	Set of 4 catalog number	List price
T4	100 250	14 AWG-1/0 6 AWG - 350 kcmil	KT4100-2 KT4250-2	**$ 6** **20**	KT4100-3 KT4250-3	**$ 9** **30**	KT4100-4 KT4250-4	**$ 12** **40**
T5	300 400	250kcmil - 500 kcmil (2) 3/0 - 250 kcmil	KT5300-2 KT5400-2	**30** **30**	KT5300-3 KT5400-3	**45** **45**	KT5300-4 KT5400-4	**60** **60**
T5	600	(2) 3/0 - 500 kcmil	KT5600-2	**TBD**	KT5600-3	**TBD**	KT5600-4	**TBD**

Standard cable lug kits with power control taps

For breakers	Amps	Wire size	Set of 2 catalog number	List price	Set of 3 catalog number	List price	Set of 4 catalog number	List price
T4	100 250	14 AWG-1/0 6 AWG - 350 kcmil	KT4100-2C KT4250-2C	**$ 10** **24**	KT4100-3C KT4250-3C	**$ 15** **36**	KT4100-4C KT4250-4C	**$ 20** **48**
T5	300 400	250 kcmil - 500 kcmil (2) 3/0 - 250 kcmil	KT5300-2C KT5400-2C	**34** **34**	KT5300-3C KT5400-3C	**51** **51**	KT5300-4C KT5400-4C	**68** **68**

① Use Discount schedule SH

Accessories
Mechanical
T4 - T5



KT4EF-_

Extended front terminals

Breaker	Amps	Set of three		Set of four	
		Catalog number suffix	List price adder	Catalog number	List Price
T4 T5	250 400	KT4EF-3 KT5EF-3	**$ 55** **115**	KT4EF-4 KT5EF-4	**$ 73** **155**

Rear terminals

Breaker	Amps	Set of three		Set of four	
		Catalog number suffix	List price adder	Catalog number	List Price
T4 T5	250 400	KT4R-3 KT5R-3	**$ 60** **122**	KT4R-4 KT5R-4	**$ 80** **163**

Distribution cable lug kit

Breaker	Amps	Wire range	Set of 3 catalog number	List price
T4 T5	250 400	(6) #14-6 (6) #14-1/0	KT4TN KT5TGD	**$ 125** **240**

Terminal covers for fixed breakers

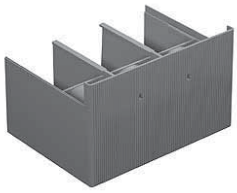
KT4LTC-3

Low profile

For breakers	Low profile 3-pole		Low profile 4-pole	
	Catalog number	List price	Catalog number	List price
T4 T5	KT4LTC-3 KT5LTC-3	**$ 55** **60**	KT4LTC-4 KT5LTC-4	**$ 74** **81**

High profile

For breakers	High profile 3-pole		High profile 4-pole	
	Catalog number	List price	Catalog number	List price
T4 T5	KT4HTC-3 KT5HTC-3	**$ 58** **63**	KT4HTC-4 KT5HTC-4	**$ 78** **85**



KT4HTC-3

Mechanical interlock plate — complete assembly consists of one frame and one plate

Interlock frame	Catalog number	List price
Mechanical interlock horizontal frame Mechanical interlock vertical frame	KT5MIR-HB KT5MIR-VB	**$ 490** **588**

Plate type				Catalog number	List price
A	T4 (F-P-W)	+	T4 (F-P-W)	KT5MIR-PA	**$ 210**
B	T4 (F-P-W)	+	T5 400 (F-P-W) or T5 630 (F)	KT5MIR-PB	
C	T4 (F-P-W)	+	T5 630 (P-W)	KT5MIR-PC	
D	T5 400 (F-P-W) or T5 630 (F)	+	T5 400 (F-P-W) or 630 (F)	KT5MIR-PD	
E	T5 400 (F-P-W) or T5 630 (F)	+	T5 630 (P-W)	KT5MIR-PE	
F	T5 630 (P-W)	+	T5 630 (P-W)	KT5MIR-PF	

External accessories
Flange handle operators
T4 & T5

Flange handle — Cable linkage

Breaker	NEMA Type	Mechanism only	List price	Cable only	Cable length	List price	Handle only	List price
T4	1, 3R, 12	KT4FPM	**$ 148**	K5C036	36” (91cm)	**$ 114**	K5FCH	**$ 213**
T4	4, 4X	KT4FPM		K5C048	48” (122cm)	**146**	K5FCH4	**243**
T5	1, 3R, 12	KT5FPM	**193**	K5C060	60” (152cm)	**160**	K5FCH	**213**
T5	4, 4X	KT5FPM		K5C060	72” (183cm)	**175**	K5FCH4	**243**
–	–	–	–	K5C084	84” (213cm)	**204**	–	–
–	–	–	–	K5C096	96” (244cm)	**221**	–	–
–	–	–	–	K5C108	108” (274cm)	**238**	–	–
–	–	–	–	K5C120	120” (305cm)	**256**	–	–

Notes: For complete assembly; mechanism, cable and handle are required.
All cables mount onto the right side of the breaker.
Handle can be mounted on the right or left side.

Door hardware kits – T4 & T5 Cable operated

Item	Catalog number	List price
Door hardware kit, right hand, 2 point latch for enclosures less than 40 inches high	KDH2R	**$ 200**
Door hardware kit, right hand, 3 point latch for enclosures 40 inches high or greater	KDH3R	**225**

Enclosure depths

Minimum

Breaker	Depth (inches)
T4 & T5	8

Maximum

Maximum depth is determined by cable length.

Enclosures
Type 1 & 3R/12


T3E-1


T4E-3R12 ③

Enclosures (Price does not include circuit breaker; order as a separate item.) ④

NEMA designation	Breaker type	Enclosure maximum rating AL cables	Enclosure maximum rating CU cables	Approximate dimensions① H x W x D (inches)	Catalog number	List price
Type 1 ①	T1	100A	100A	15 x 8.5 x 4	T1E-1	**$ 267**
	T2	100A	100A	15 x 8.5 x 4	T2E-1	**267**
	T3	175A	225A	20 x 11 x 4	T3E-1	**315**
	T4	200A	250A	26 x 15 x 6.25	T4E-1 ②	**407**
	T5	325A	400A	26 x 15 x 6.25	T5E-1 ②	**435**
Type 3R/12③	T1	100A	100A	15 x 8.5 x 7	T1E-3R12	**407**
	T2	100A	100A	15 x 8.5 x 7	T2E-3R12	**407**
	T3	175A	225A	20 x 11 x 7	T3E-3R12	**527**
	T4	200A	250A	26 x 15 x 9	T4E-3R12	**625**
	T5	325A	400A	26 x 15 x 9	T5E-3R12	**767**

Neutral kits

Breaker type	Neutral cable capacity and wire range	Neutral kit catalog number	List price
T1 – T2	Neutral #14-1/0 Bonding Lug #14-1/0	T2NK125	**$ 140**
T3	Neutral #6-250 kcmil Bonding Lug #14-1/0	T3NK225	**150**
T4	Neutral #6-250 kcmil Bonding Lug #14-1/0 kcmil	T4NK250	**200**
T5	Neutral (2) #6-250 kcmil Bonding Lug #14-1/0 kcmil	T5NK400	**295**

NOTE: The list price adder for factory installation of an enclosed circuit breaker is 50% of the enclosure list price.

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Description

Type 1

- General purpose indoor enclosure intended for use in normal environments to provide a degree of protection against contact with enclosed equipment.
- Sheet steel, surface mount.
- Breaker is front-operable and can be padlocked via a separately ordered padlock device.
- Available through 400A, 600VAC
- (SUSE) suitable for use as service equipment.

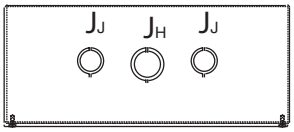
Type 3R/12

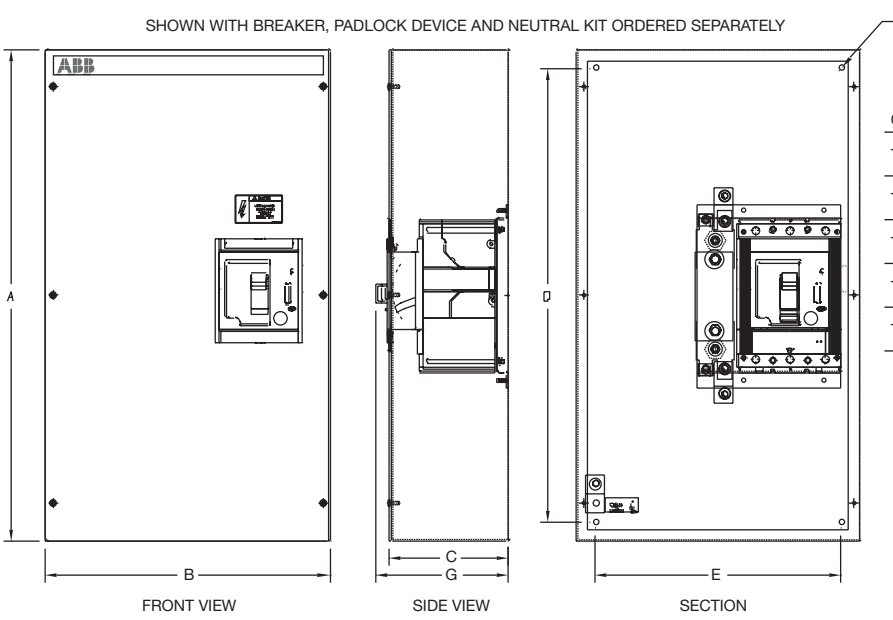
- Type 3R is intended for outdoor use providing protection against rain, sleet or snow.
- Type 12 is for use in indoor atmospheres to provide a degree of protection against circulating dust, lint, sawdust, falling dirt and dripping non-corrosive liquids.
- Surface-mounted, sheet steel enclosure.
- Breaker can be operated via **separately ordered** handle mechanism; door is interlocked with mechanism.
- Available through 400A, 600VAC.
- (SUSE) suitable for use as service equipment.

① Padlocking provision must be ordered separately.
② Must order KT5FLD (padlock device) separately.
③ Variable depth rotary handle must be ordered separately.
④ Consult ABB for breakers installed in enclosures.

Enclosures
Approximate dimensions, T1 – T5
NEMA 1, 3R & 12

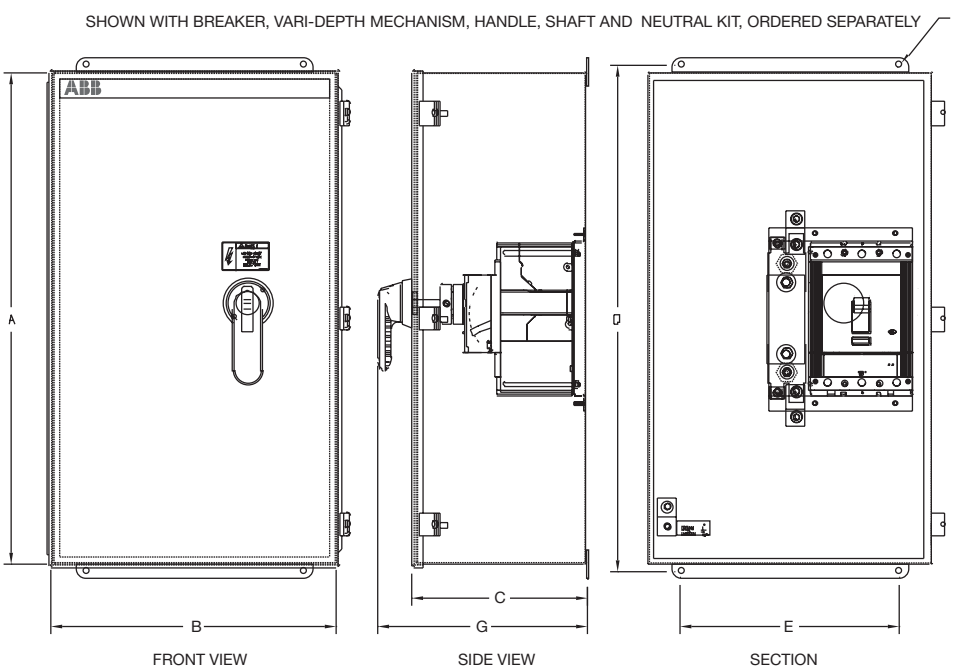
NEMA 1





Cat. #	A	B	C	D	E	F	G	H	J
T1E-1	15.00 *381*	8.50 *216*	4.00 *102*	13.00 *330*	6.50 *165*	0.281 *7*	4.93 *125*	1, 1-1/4 *25, 32*	3/4, 1 *19, 25*
T2E-1	15.00 *381*	8.50 *216*	4.00 *102*	13.00 *330*	6.50 *165*	0.281 *7*	4.93 *125*	1, 1-1/4 *25, 32*	3/4, 1 *19, 25*
T3E-1	20.00 *508*	11.00 *279*	4.00 *102*	18.00 *457*	9.00 *229*	0.281 *7*	4.93 *125*	1, 1-1/4 *25, 32*	3/4, 1 *19, 25*
T4E-1	26.00 *660*	15.00 *381*	6.25 *159*	24.00 *610*	13.00 *330*	0.281 *7*	7.01 *178*	1, 1-1/4 *25, 32*	3/4, 1 *19, 25*
T5E-1	26.00 *660*	15.00 *381*	6.25 *159*	24.00 *610*	13.00 *330*	0.281 *7*	7.01 *178*	1, 1-1/4 *25, 32*	3/4, 1 *19, 25*

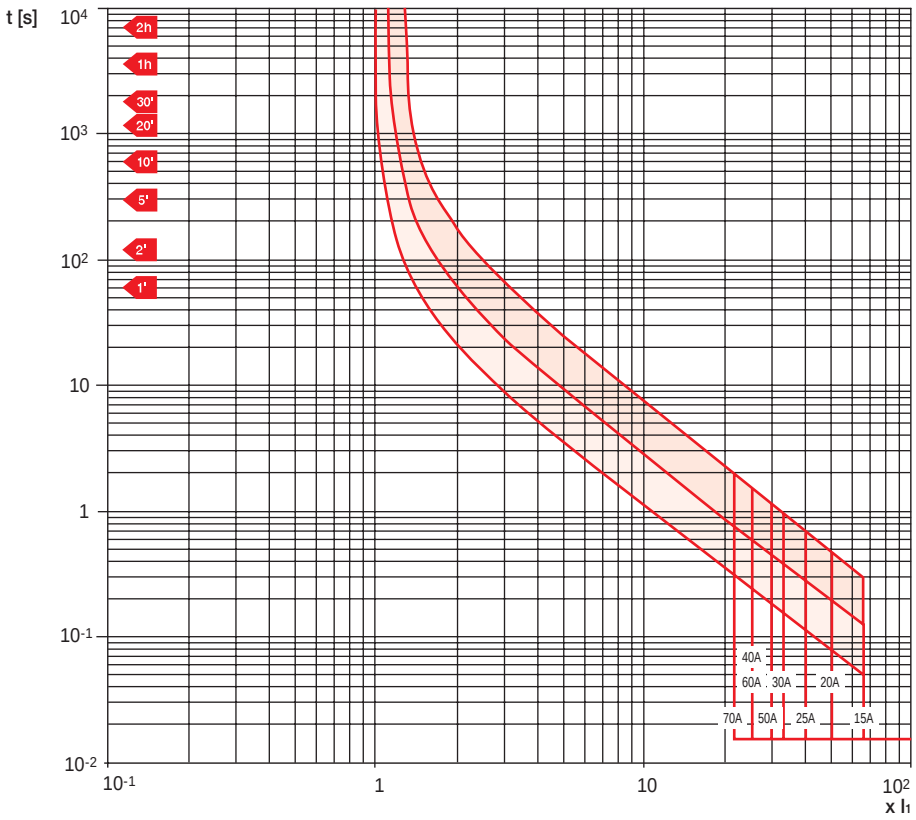
NEMA 3R, 12



Cat. #	A	B	C	D	E	F	G
T1E-3R12	15.00 *381*	8.50 *216*	7.00 *178*	15.75 *400*	5.00 *127*	0.313 *8*	9.06 *230*
T2E-3R12	15.00 *381*	8.50 *216*	7.00 *178*	15.75 *400*	5.00 *127*	0.313 *8*	9.06 *230*
T3E-3R12	20.00 *508*	11.00 *279*	7.00 *178*	20.75 *527*	7.50 *191*	0.313 *8*	9.06 *230*
T4E-3R12	26.00 *660*	15.00 *381*	9.00 *229*	26.75 *679*	11.50 *292*	0.313 *8*	11.06 *281*
T5E-3R12	26.00 *660*	15.00 *381*	9.00 *229*	26.75 *679*	11.50 *292*	0.313 *8*	11.06 *281*

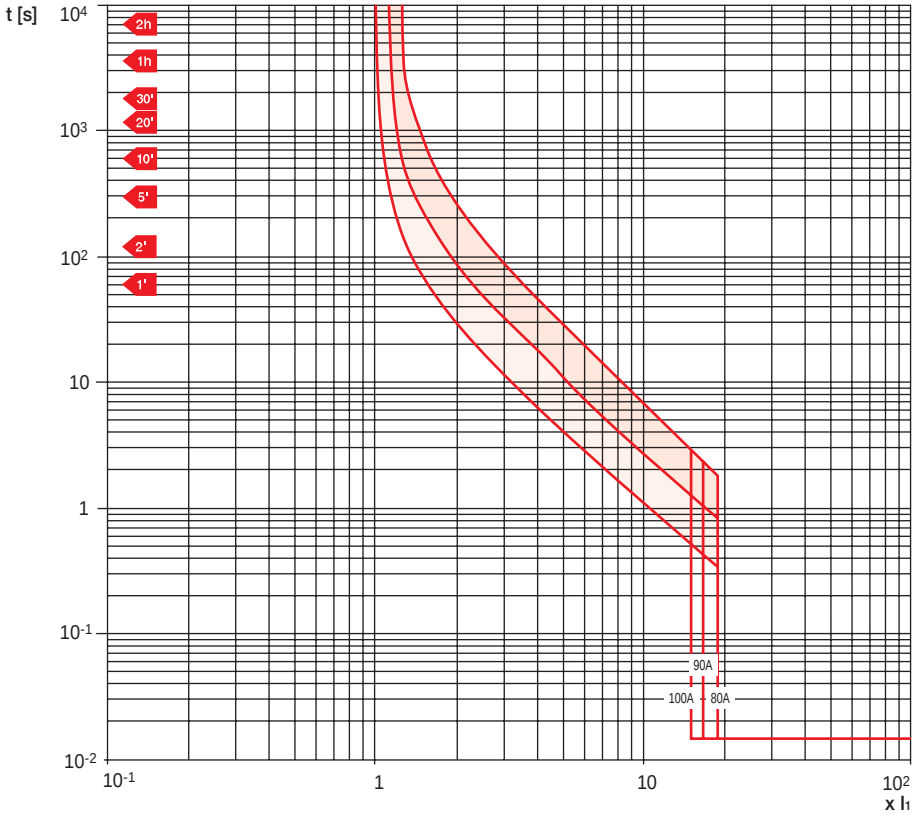
T1 100-T1 100 1P TMF

In = 15 ÷ 70 A



T1 100-T1 100 1P TMF

In = 80 ÷ 100 A



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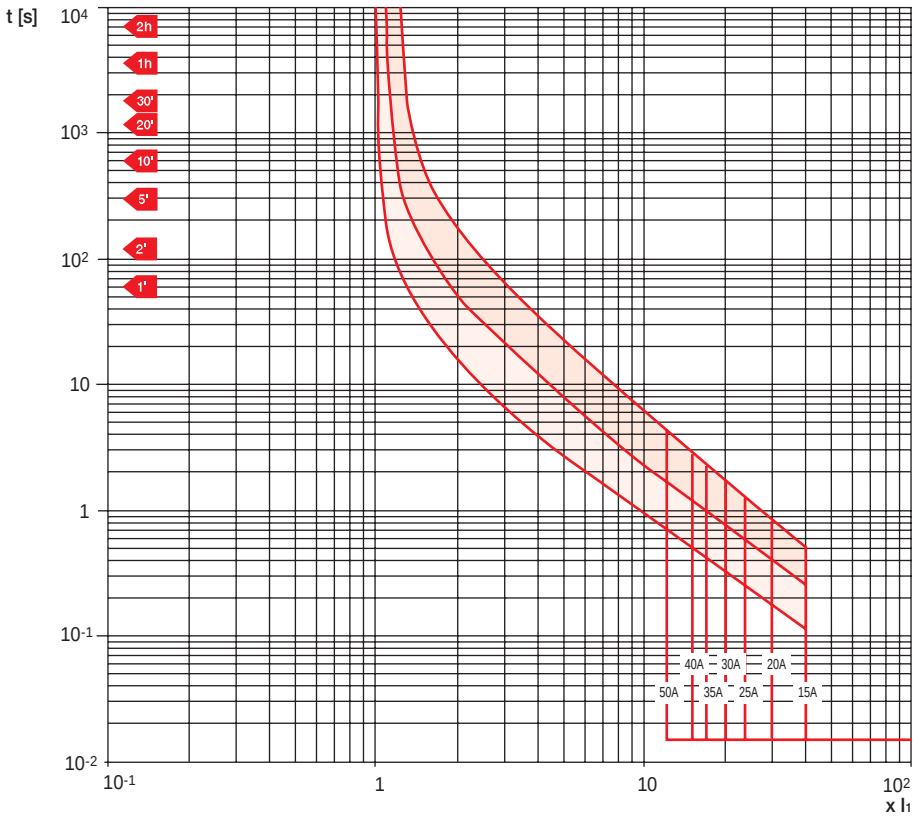
Trip curves for distribution
Circuit breakers w/thermagnetic trip units
Tmax T2

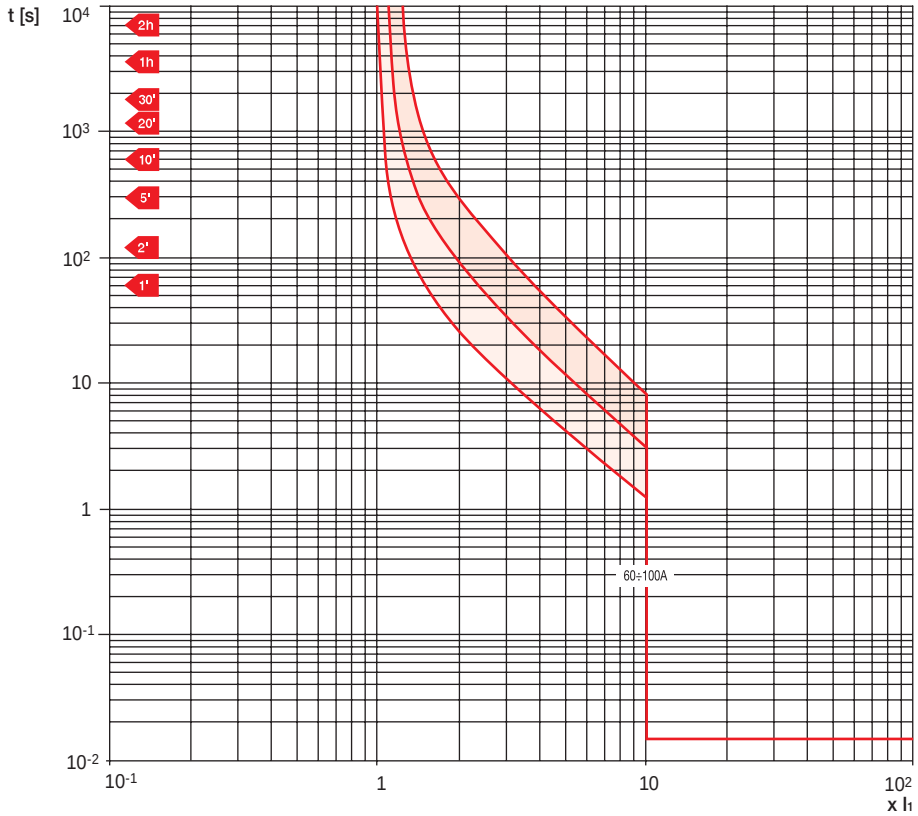
T2 100 TMF

In = 15 ÷ 50 A



T2 100 TMF

In = 60 ÷ 100 A



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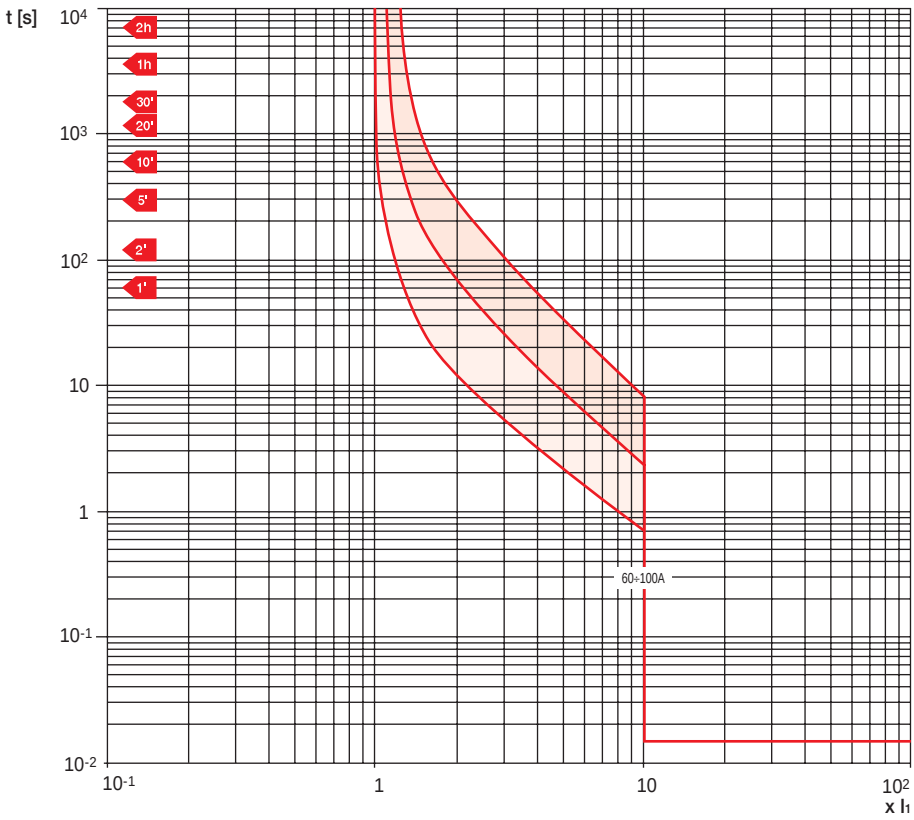
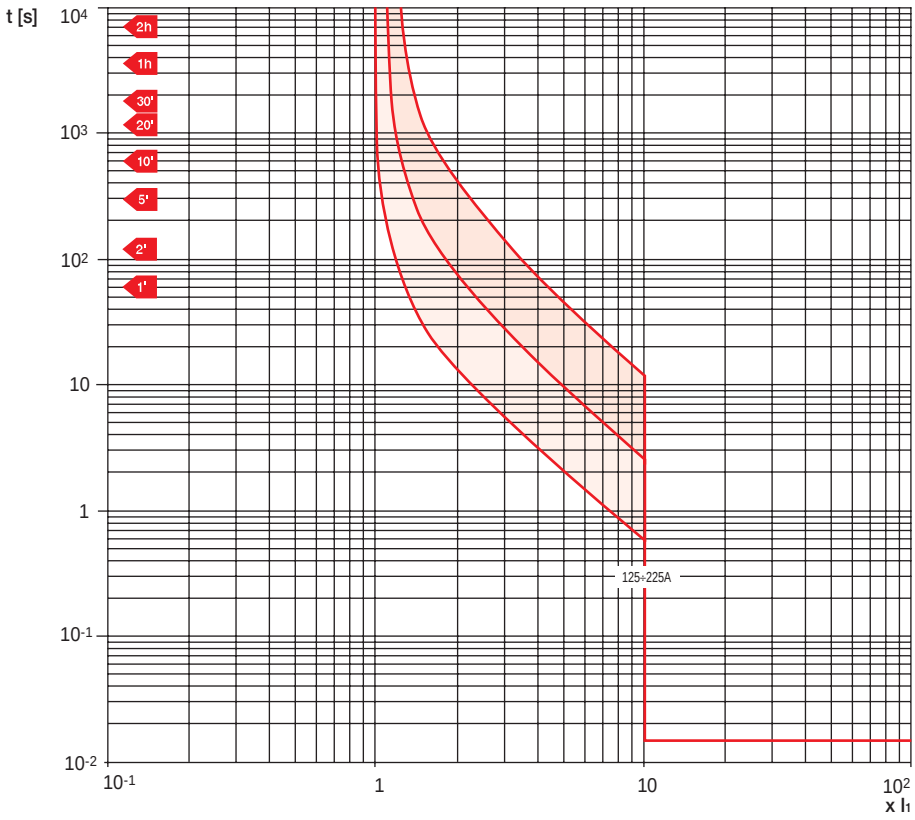
T3 225 TMF

In = 60 ÷ 100 A



T3 225 TMF

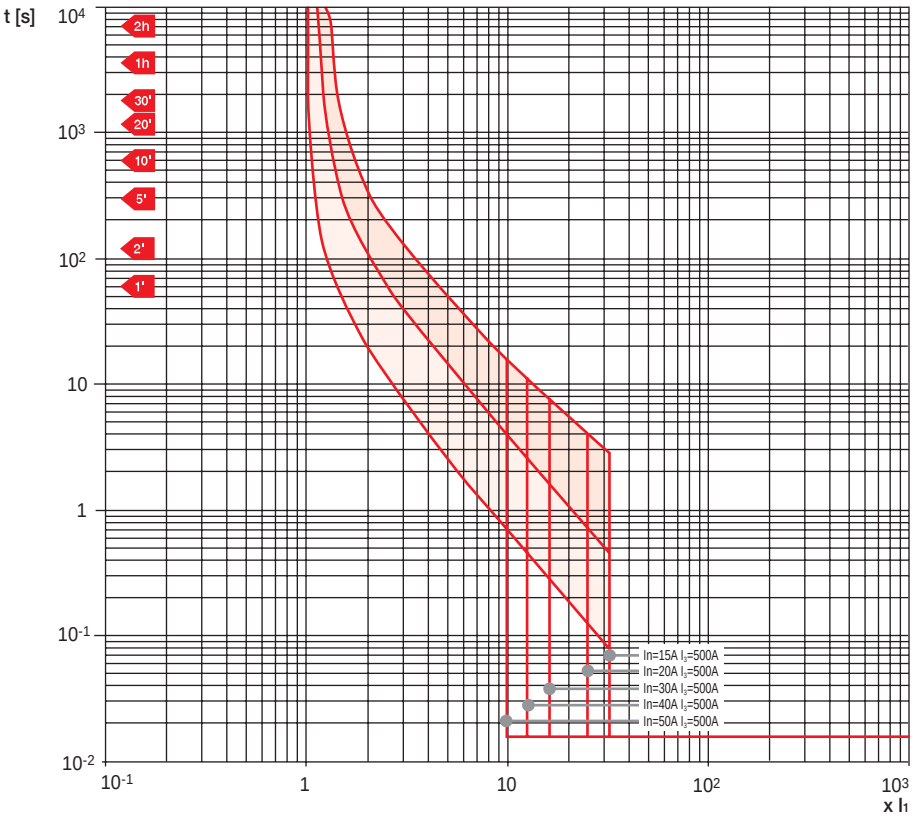
In = 125 ÷ 225 A



Trip curves for distribution
Circuit breakers w/thermagnetic trip units
Tmax T4

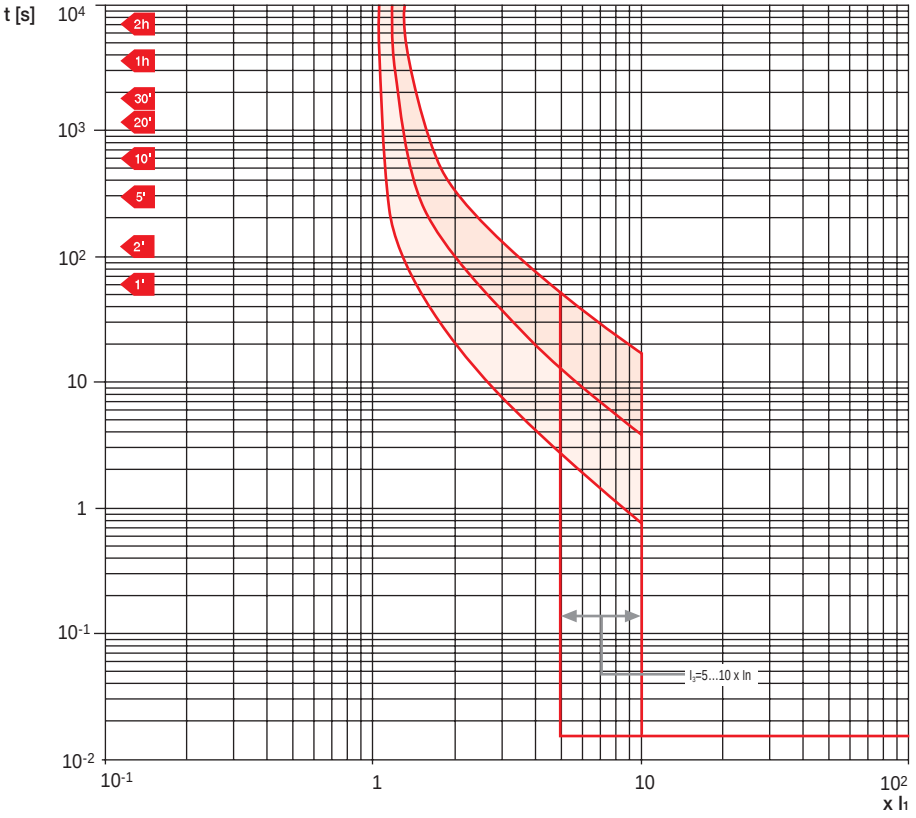
T4 250 TMF/TMD

In = 20 ÷ 50 A
In = 15, 20 TMF
In = 30, 40, 50 TMD



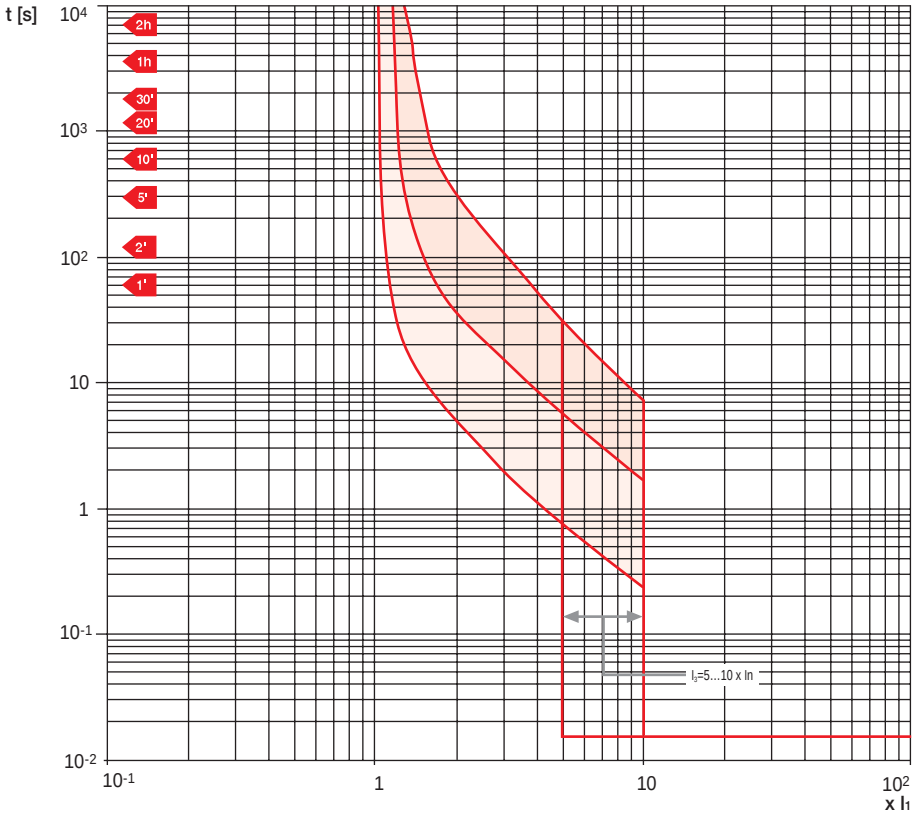
T4 250 TMA

In = 80 ÷ 250 A



T5 400 TMA

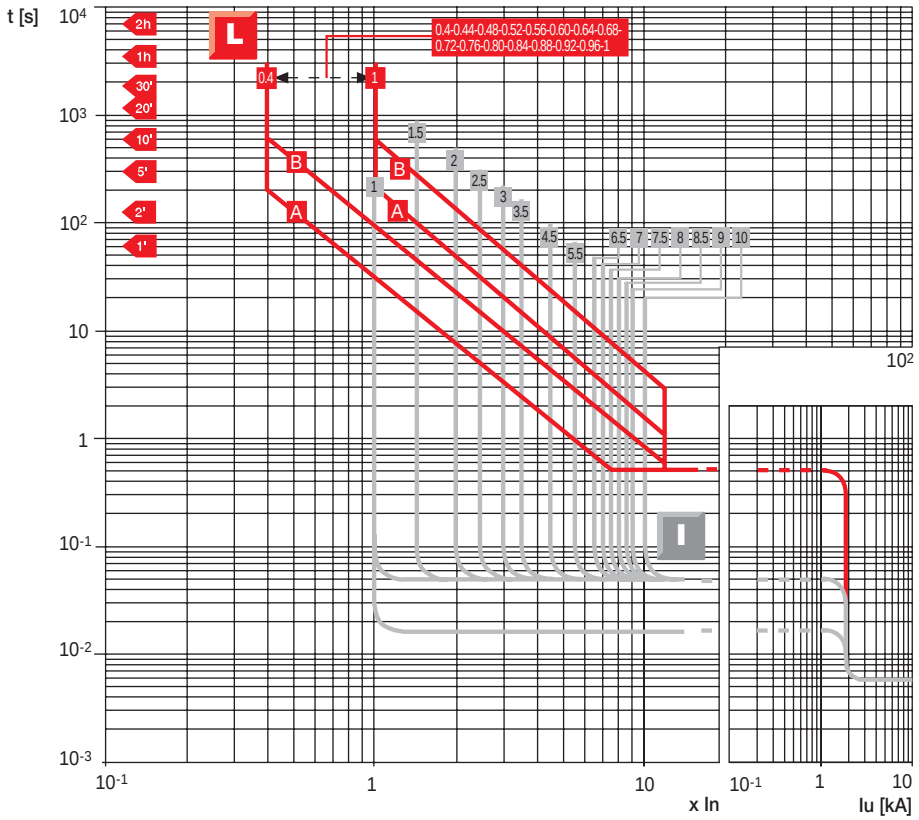
In = 300 ÷ 400 A



Trip curves for distribution
Circuit breakers w/electronic trip units
Tmax T2

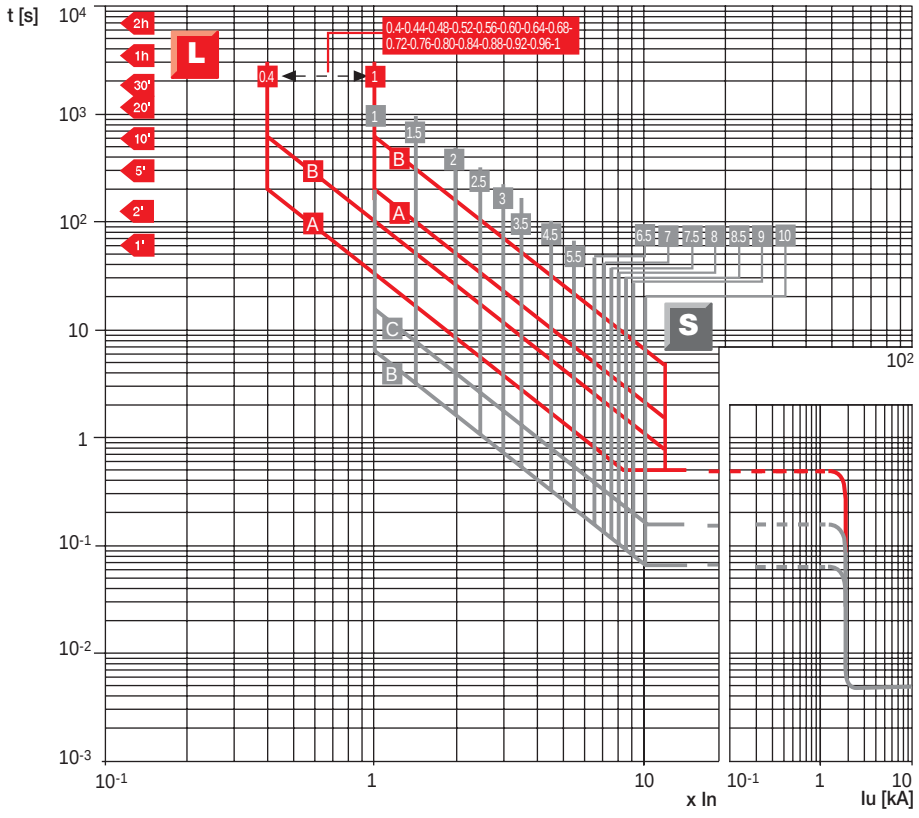
T2 100
PR221DS-LS

L-I Functions



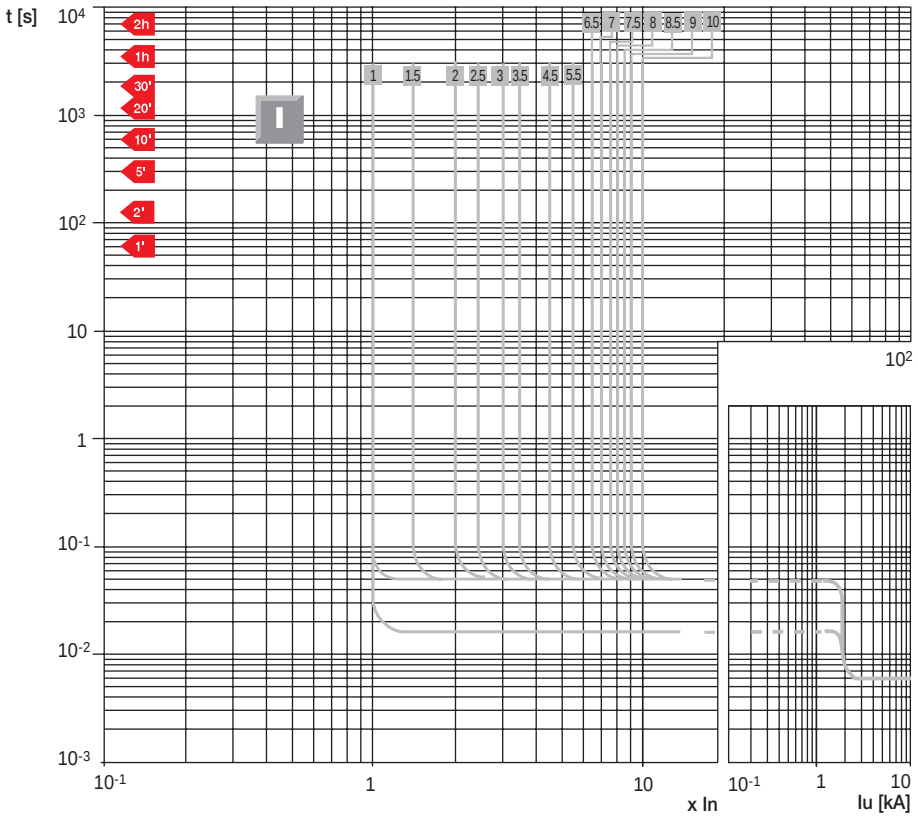
T2 100
PR221DS-LS

L-I Functions



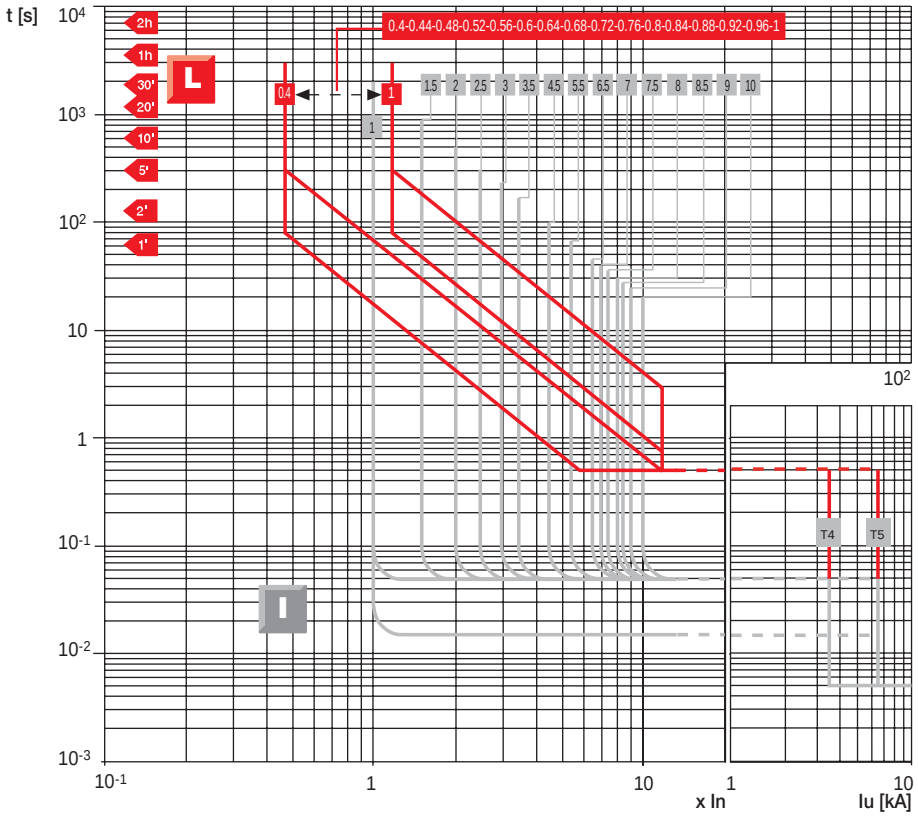
T2 100
PR221DS-I

I Function



T4 250 - T5 600
PR221DS

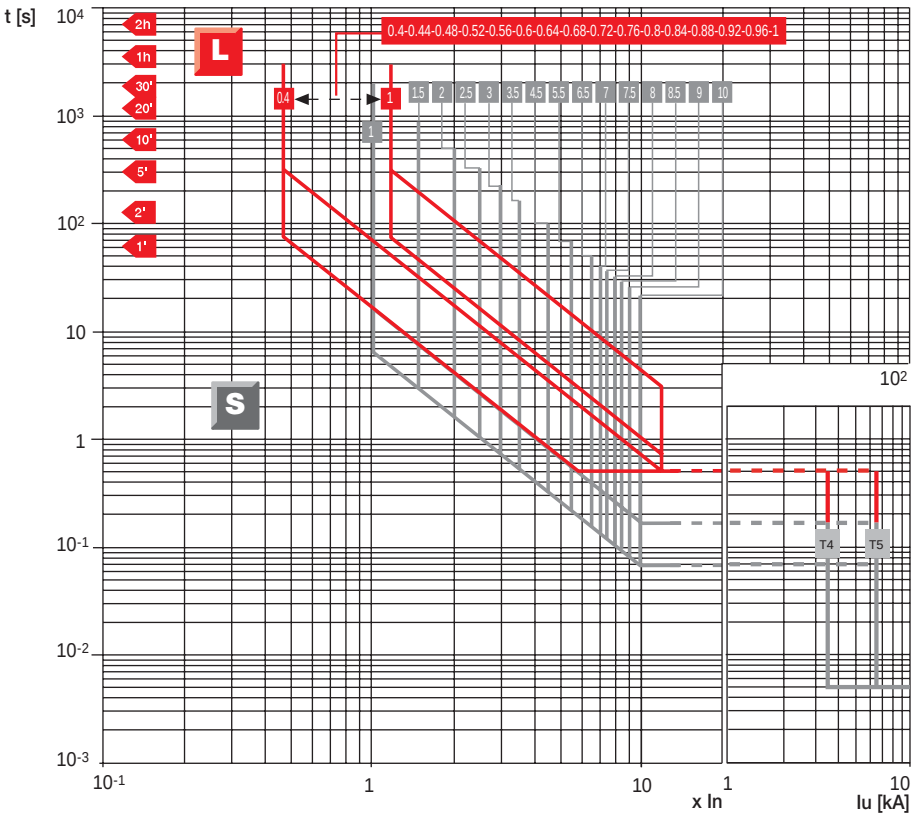
L-I Functions



Trip curves for distribution
Circuit breakers w/electronic trip units
Tmax T4 & T5

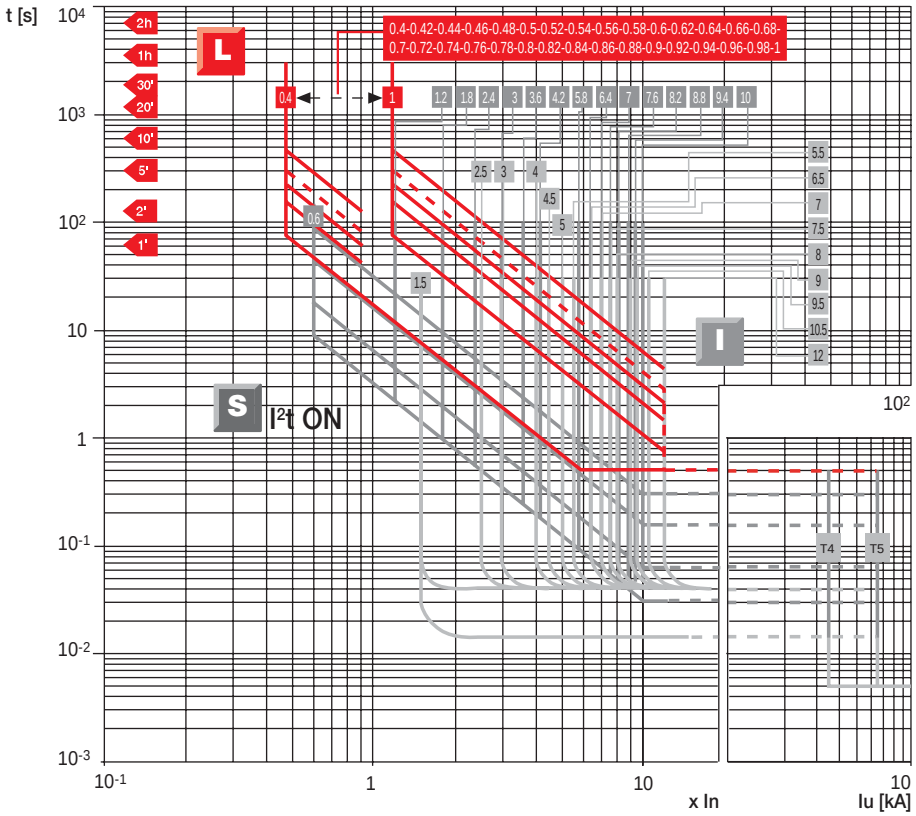
T4 250 - T5 600 PR221DS

L-S Functions



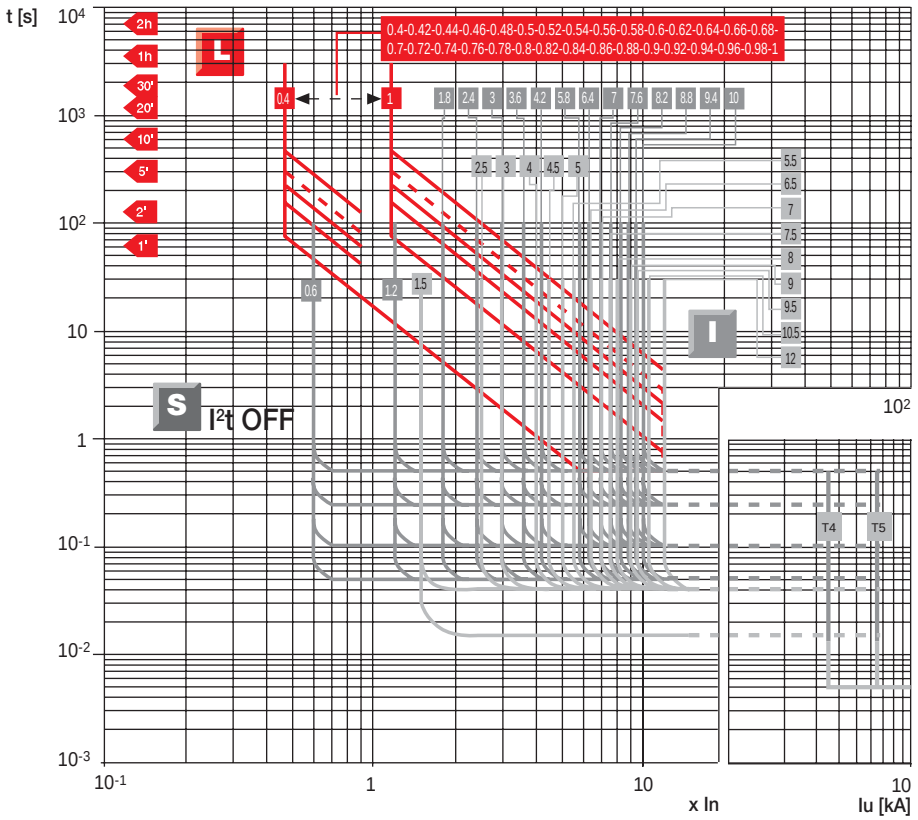
T4 250 - T5 600 PR222DS/P and PR222DS/PD

L-S-I Functions
(I^2t const = ON)



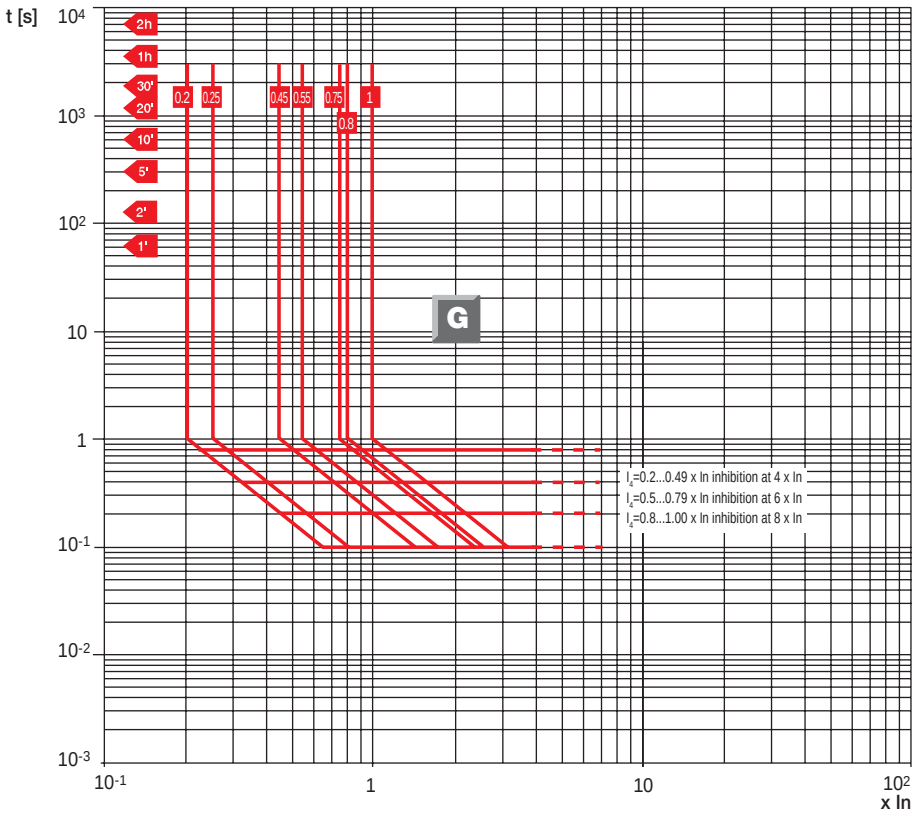
T4 250 - T5 600 PR222DS/P and PR222DS/PD

L-S-I Functions
(I^2t const = OFF)



T4 250 - T5 600 PR222DS/P and PR222DS/PD

G Function



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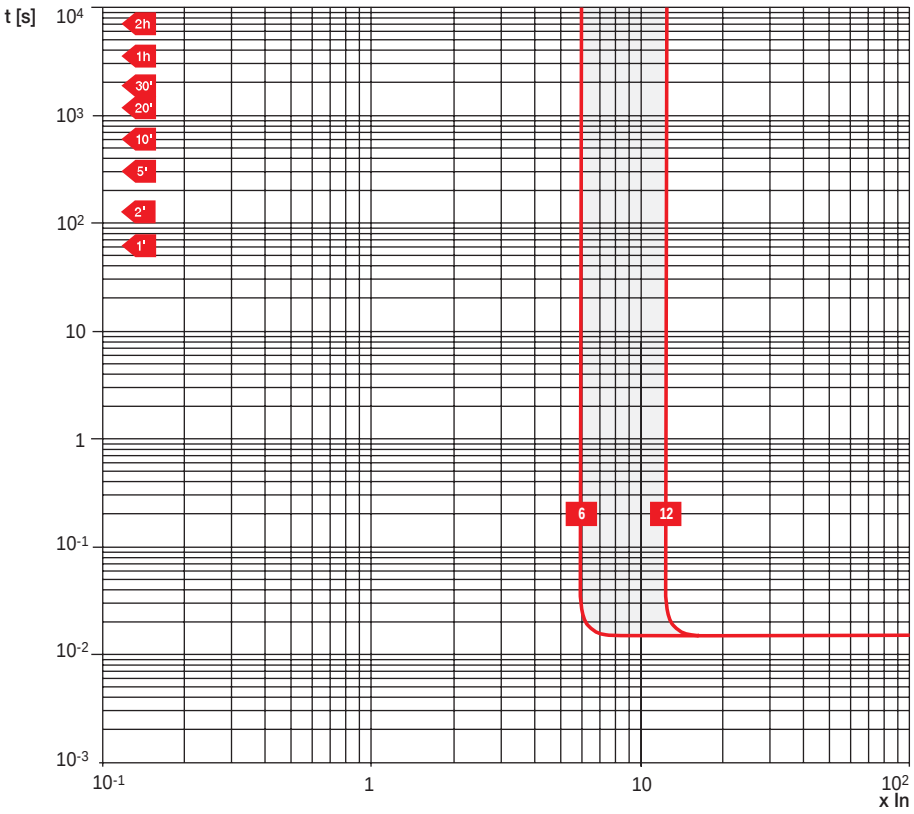
Trip curves for MCP
Circuit breakers w/magnetic only trip units
Tmax T2 & T3

T2-T3 100 MCP

Adjustable magnetic only trip unit
I_3 = 6...12 x In

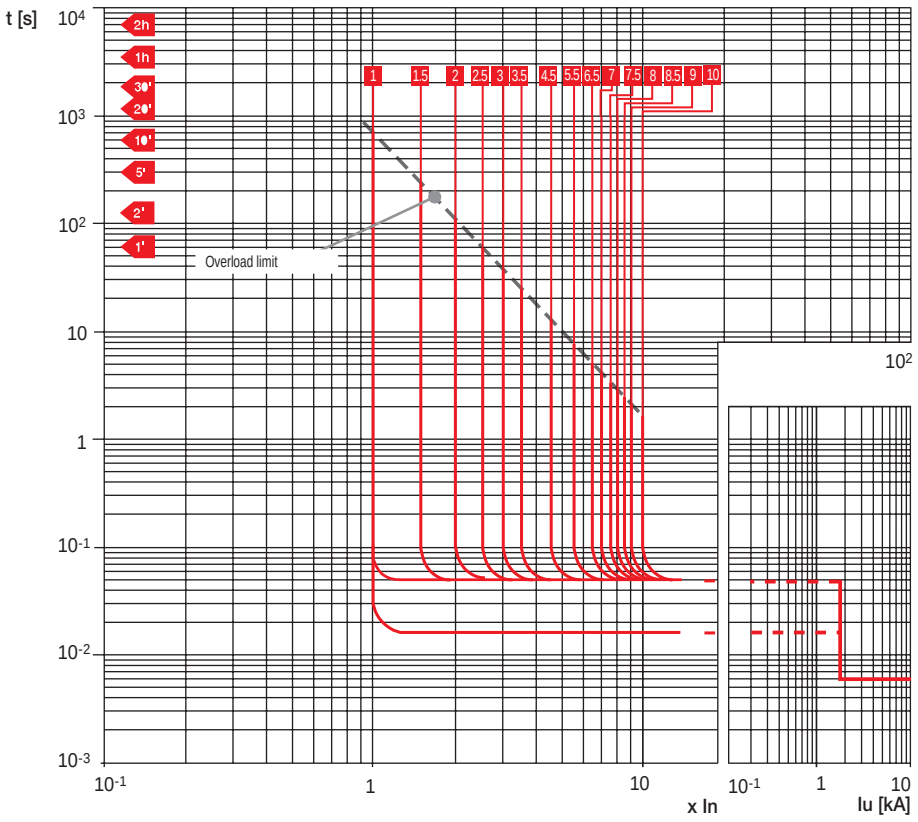


Trip curves for MCP

Circuit breakers w/PR221DS-I electronic trip unit
Tmax T2, T4 & T5

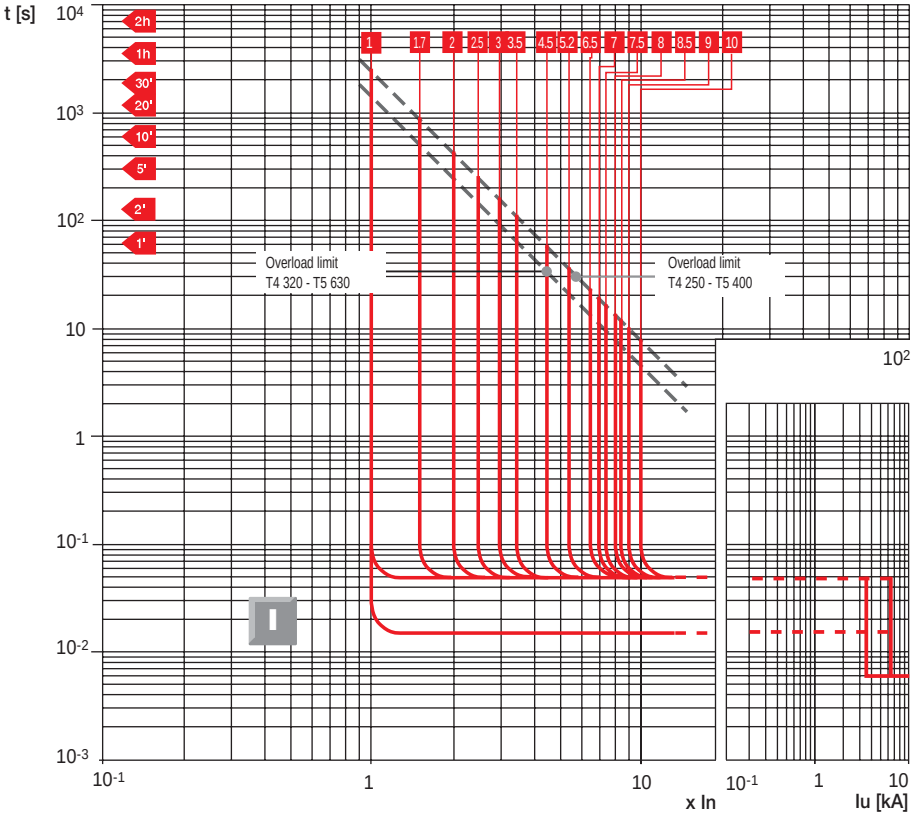
T2 100
PR221DS-I

I Function



T4 250 - T5 600
PR221DS-I

I Function



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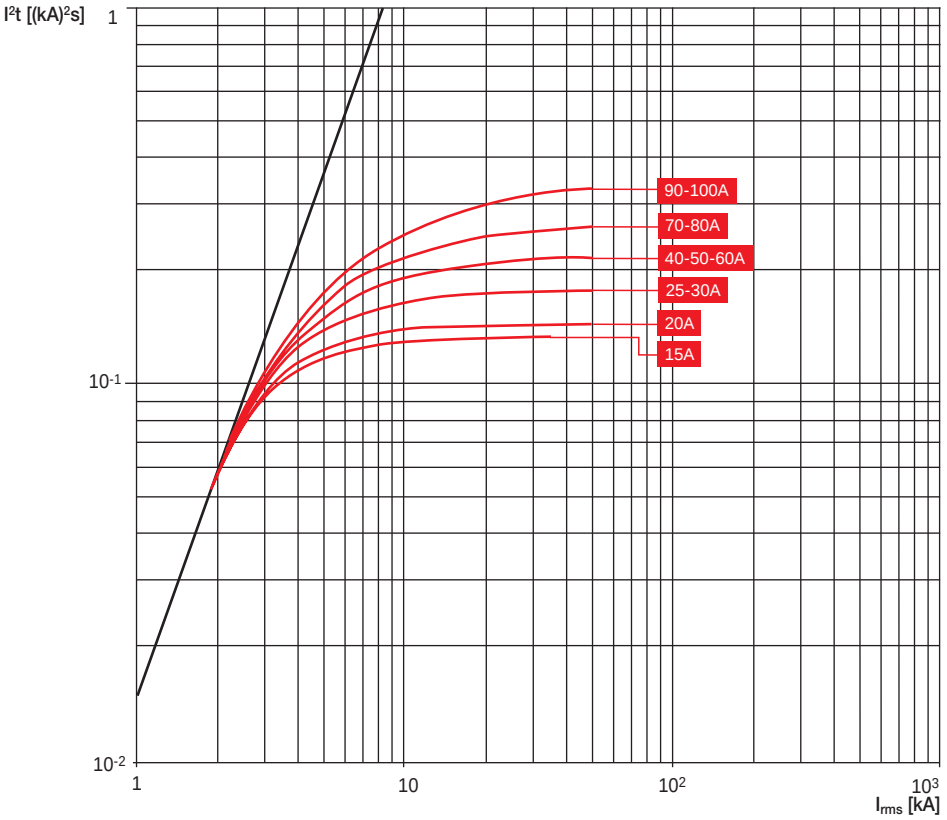
Specific let-through energy curves
Tmax T1 & T2, 240V

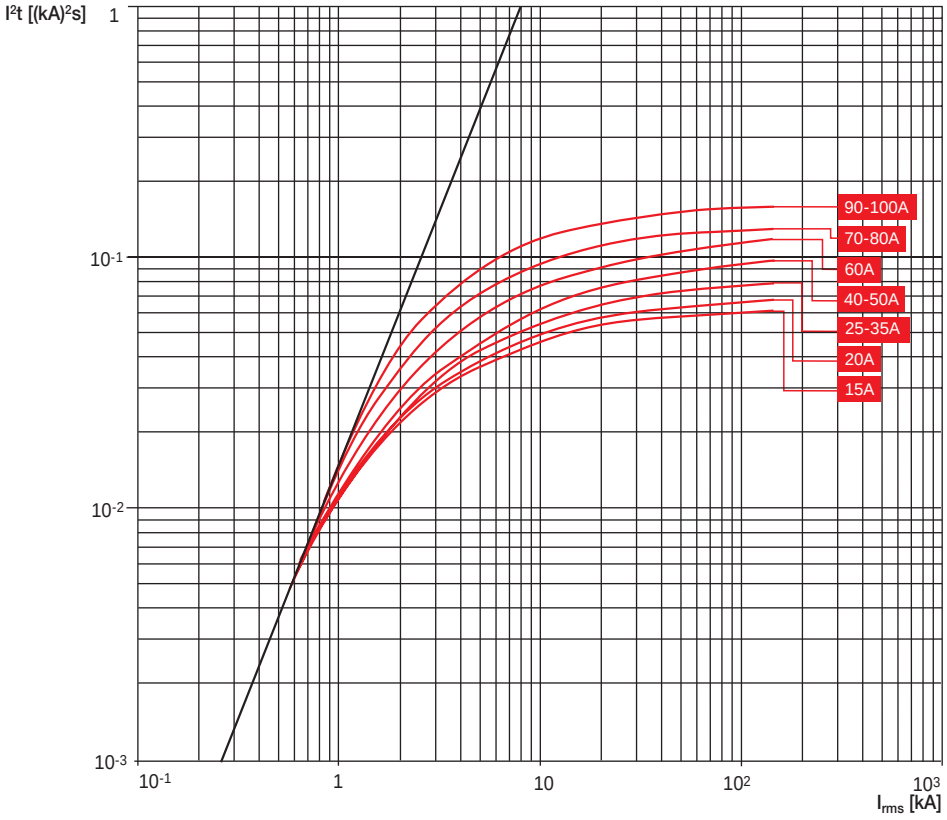
T1 100

240 V



T2 100

240 V



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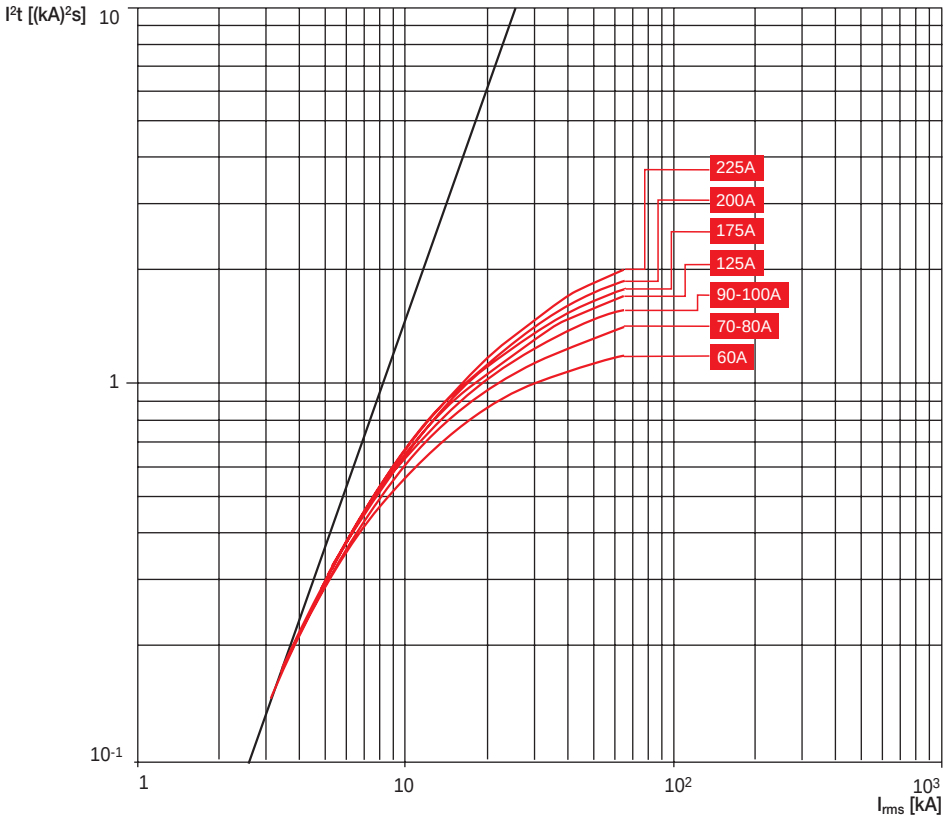
Specific let-through energy curves
Tmax T3 & T4, 240V

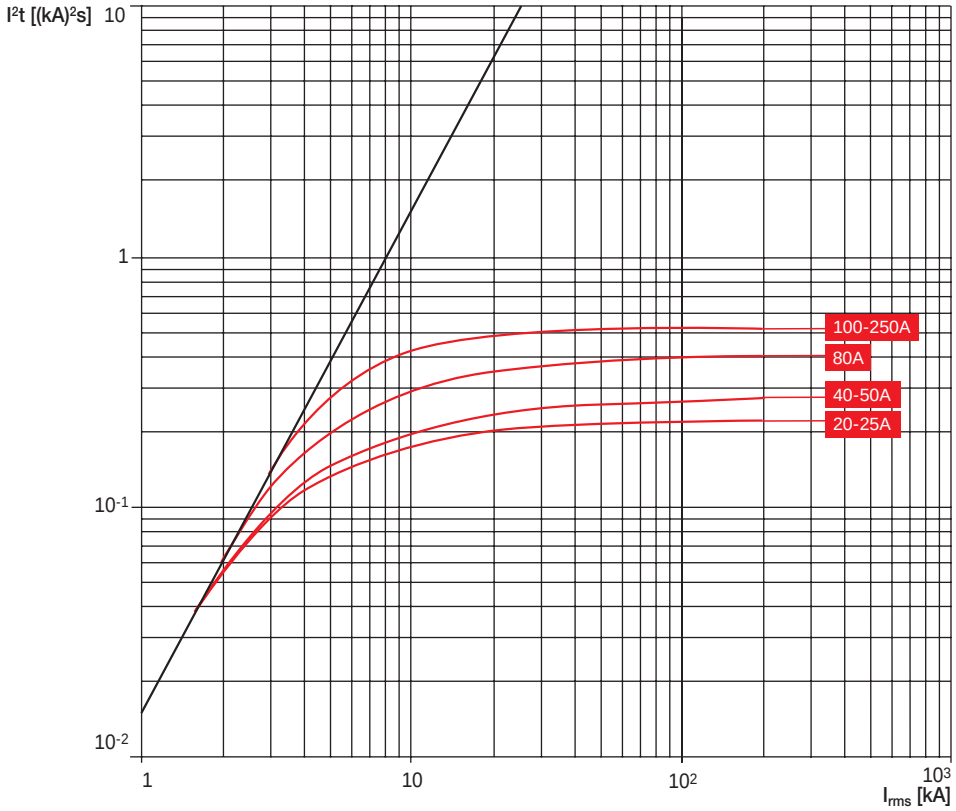
T3 225

240 V



T4 250

240 V



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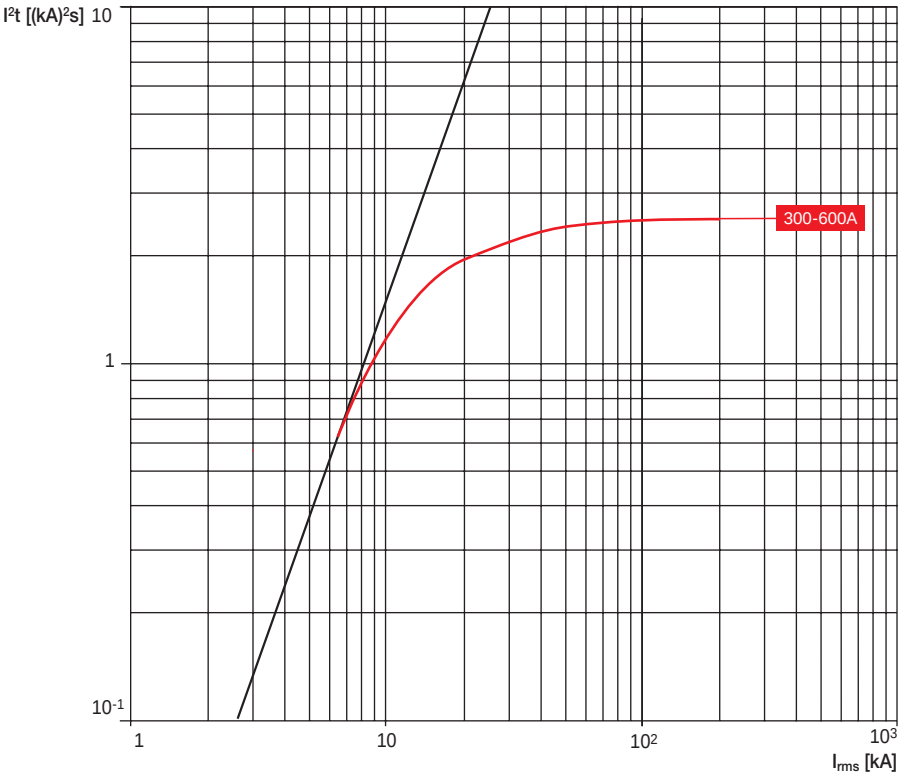
Specific let-through energy curves
Tmax T5, 240V

T5 600

240 V

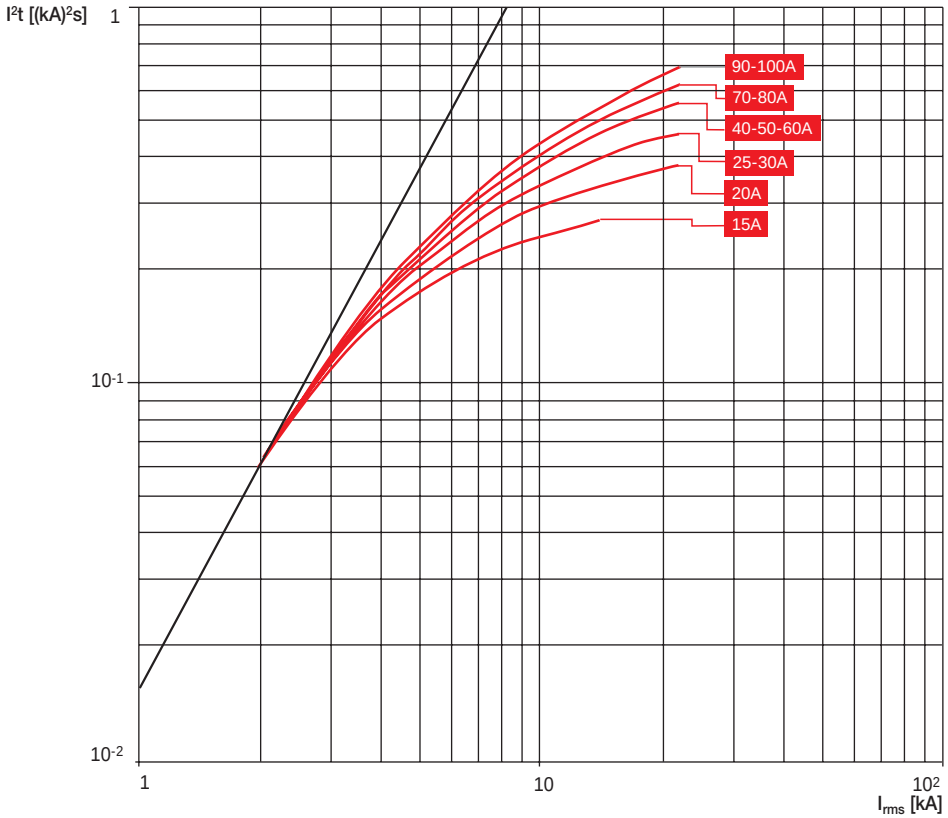
* Please ad ABB for 600 A availability



Specific let-through energy curves
Tmax T1 & T2, 480V

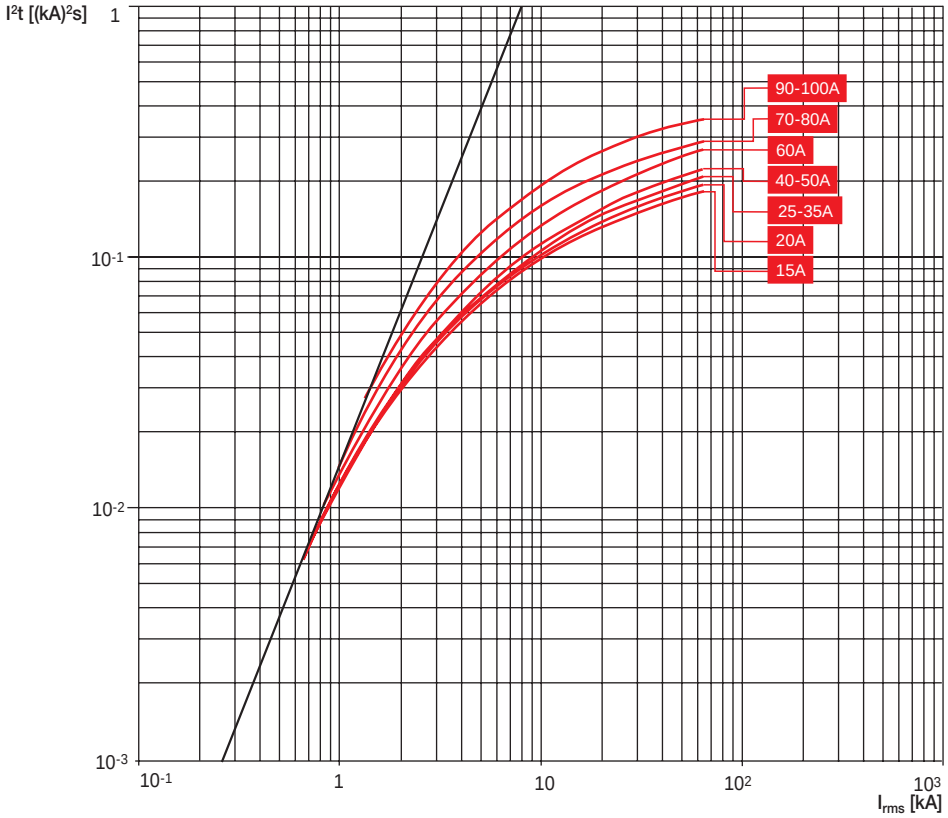
T1 100

480 V



T2 100

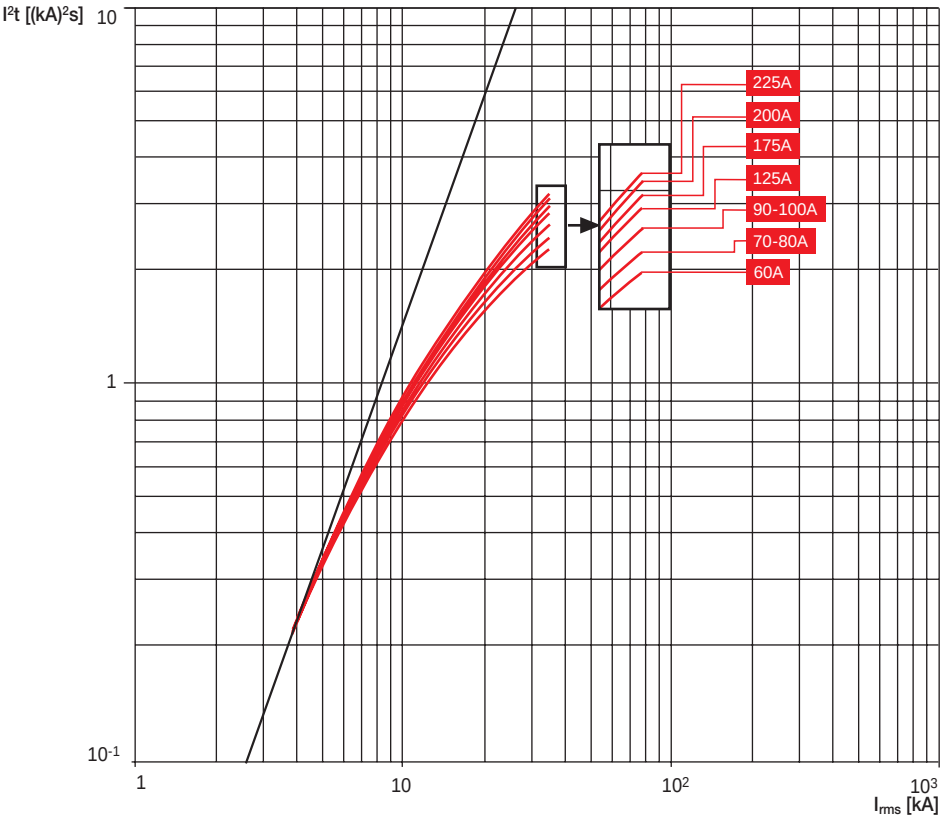
480 V



Specific let-through energy curves
Tmax T3 & T4, 480V

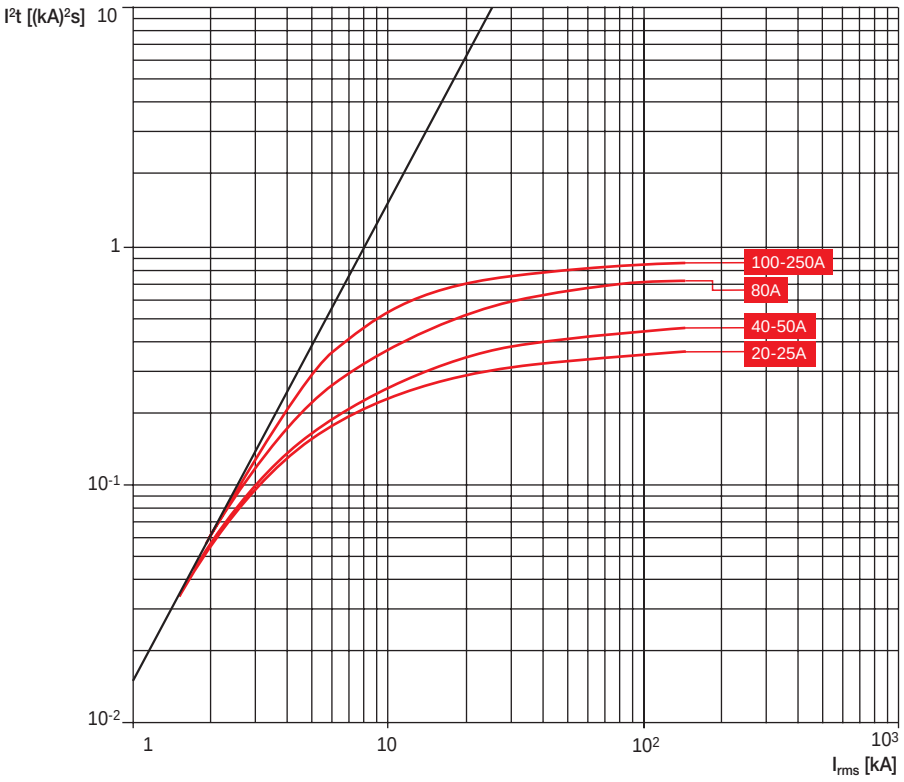
T3 225

480 V



T4 250

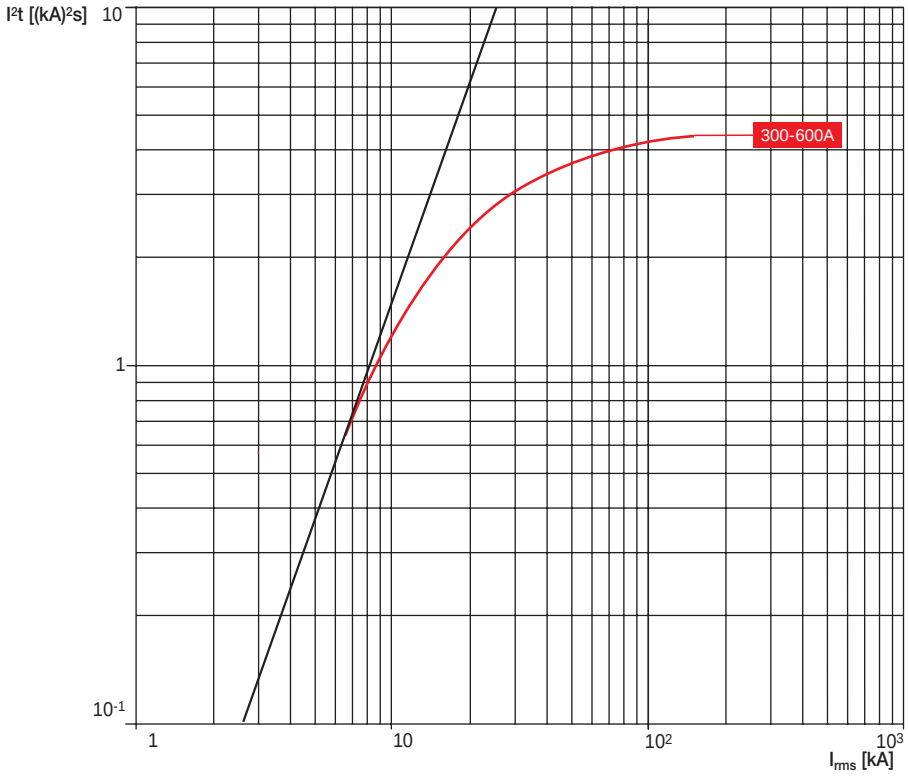
480 V



Specific let-through energy curves
Tmax T5, 480V

T5 600

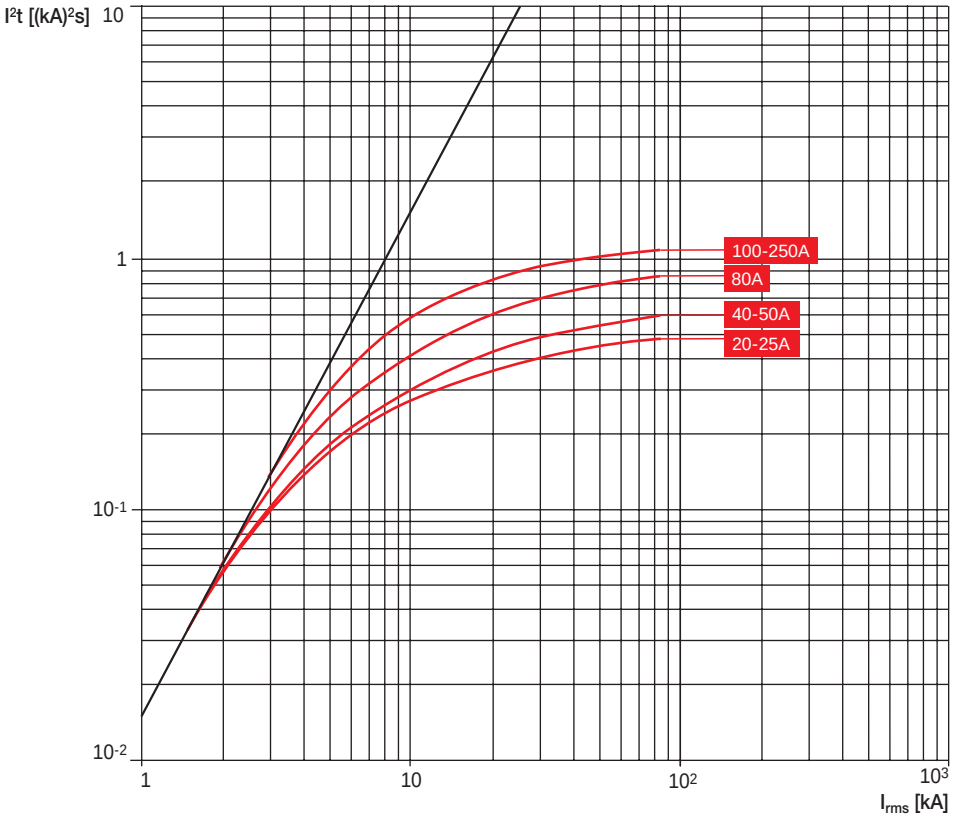
480 V



Specific let-through energy curves
Tmax T4 & T5, 600V

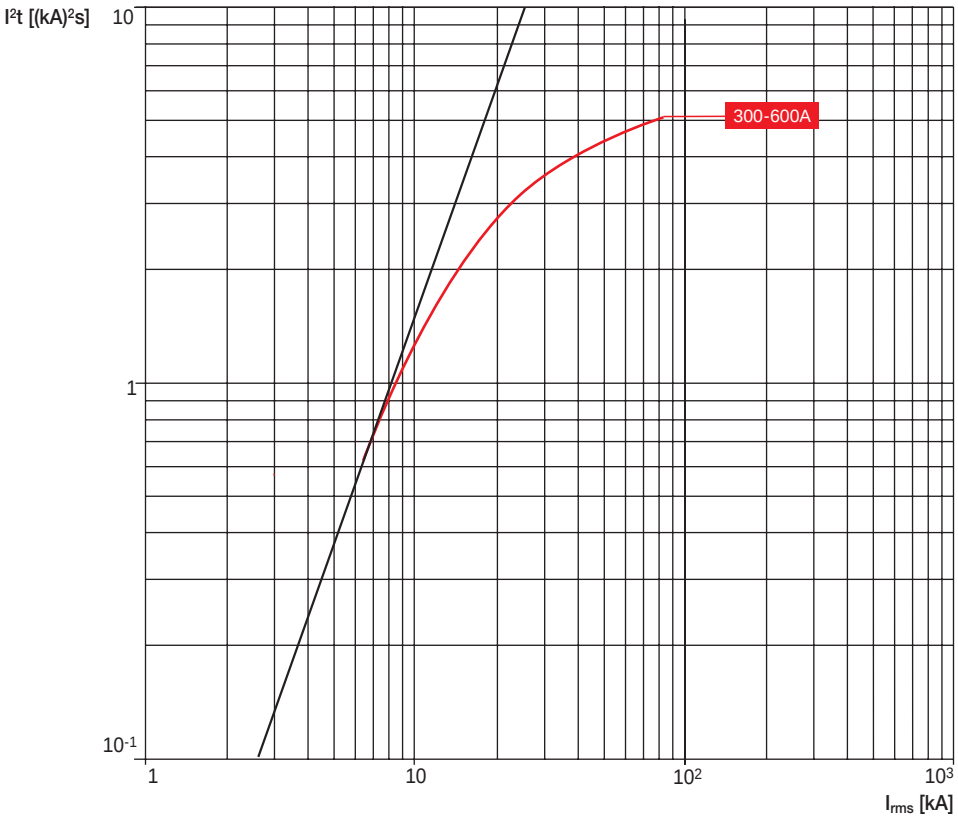
T4 250

600 V



T5 600

600 V



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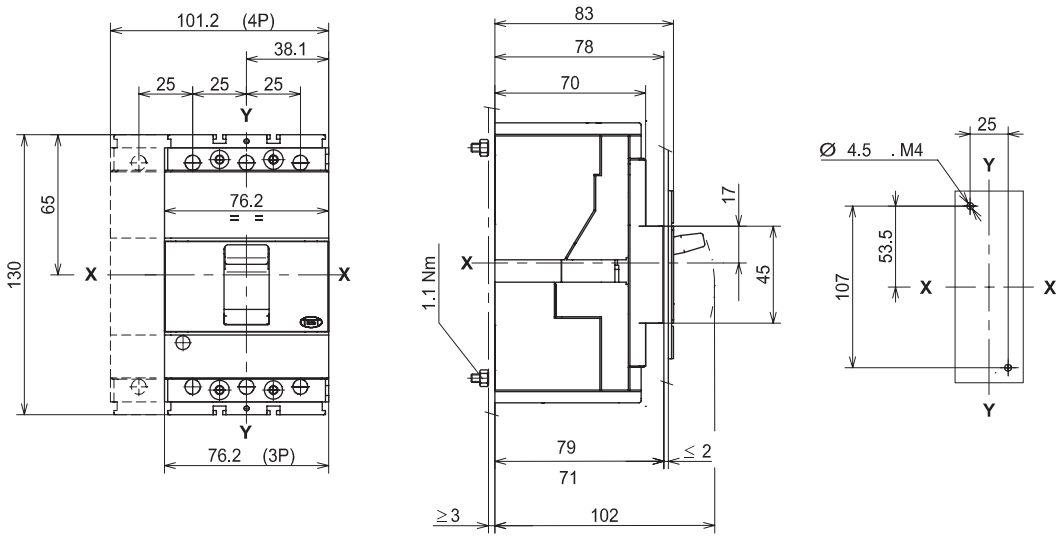
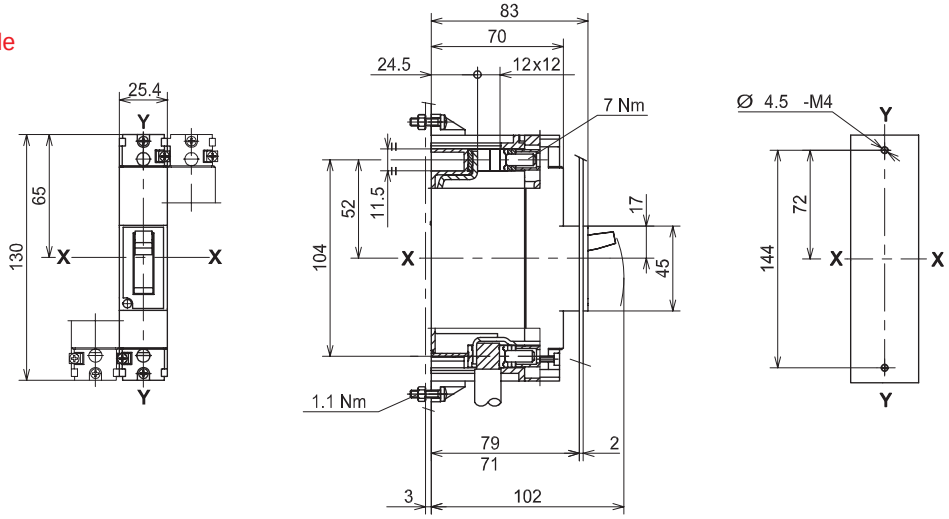
Approximate dimensions
T1 & T2

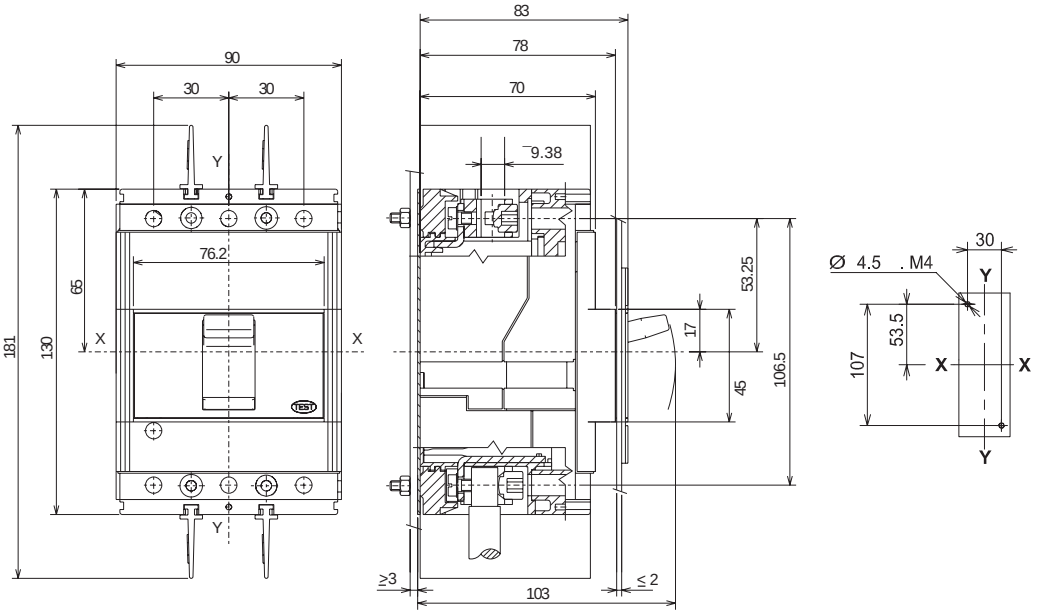
T1 — 3 pole



T1 — Single pole



T2 — 2 & 3 pole



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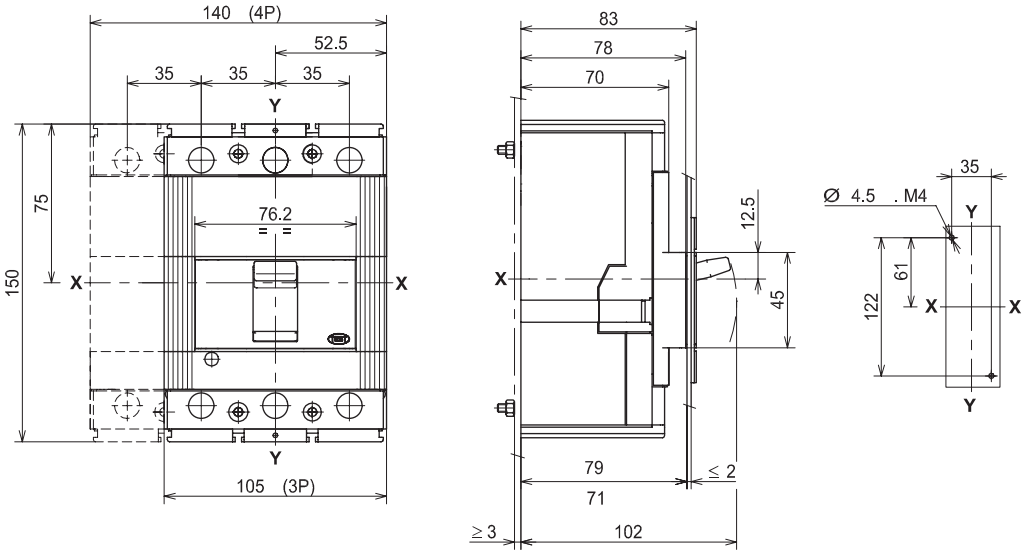
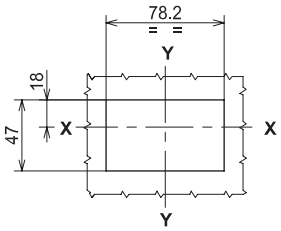
Approximate dimensions
T3

T3 — 2 & 3 pole



Door cut-out for Tmax without faceplate



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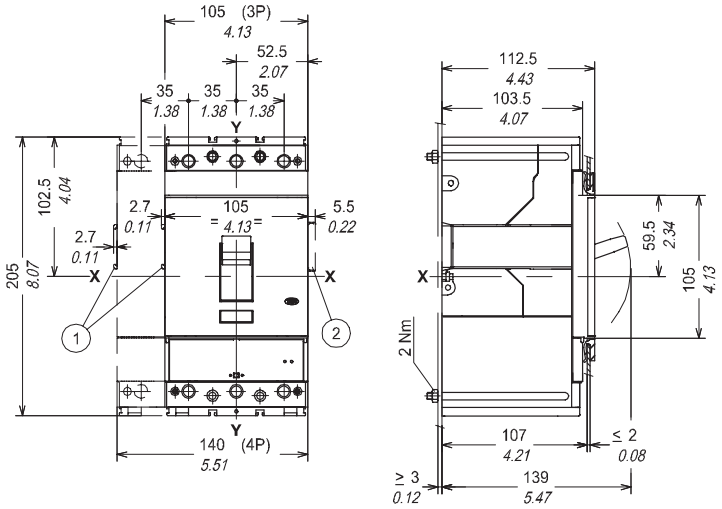
Fixed circuit breaker

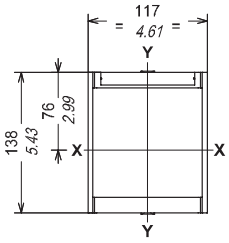
Caption

(1) Overall dimensions with cabled accessories mounted (SOR-C, UVR-C, RC221-222)

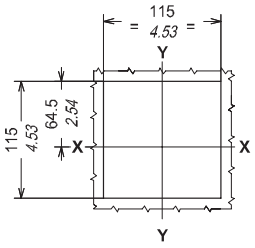
(2) Overall dimensions with cabled auxiliary contacts mounted (only 3Q 1SY)



Flange for compartment door

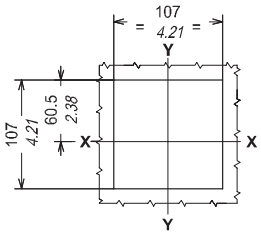


Drilling templates of the compartment door



3-4 POLES

With flange

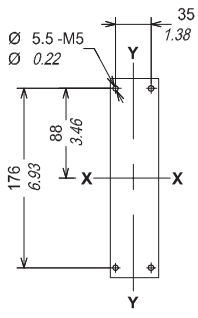


3-4 POLES

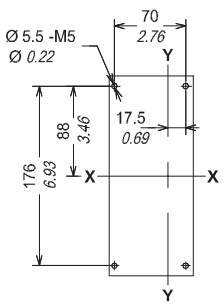
Without flange

Drilling templates for support sheet

For front terminals

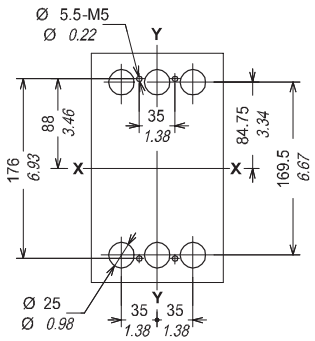


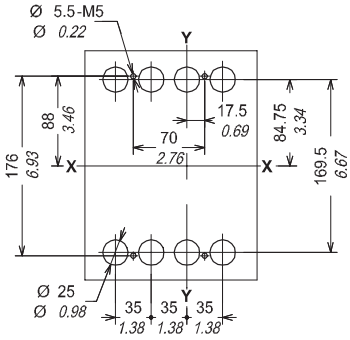
3 POLES



4 POLES

For rear terminals





Approximate dimensions
T5

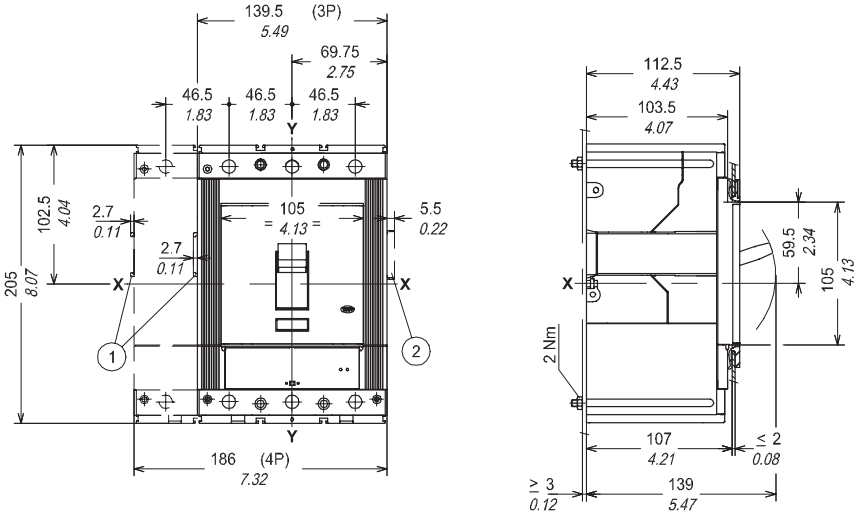
Fixed circuit breaker

Caption

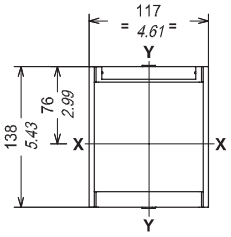
(1) Overall dimensions with cabled accessories mounted (SOR-C, UVR-C, RC221-222)

(2) Overall dimensions with cabled auxiliary contacts mounted (only 3Q 1SY)

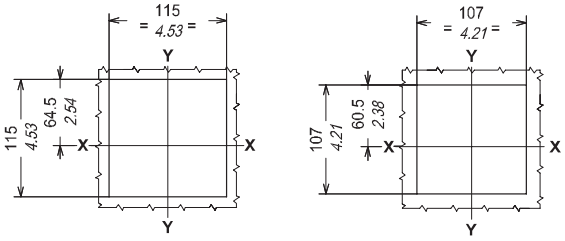
Fixing on sheet



Flange for compartment door



Drilling templates of the compartment door

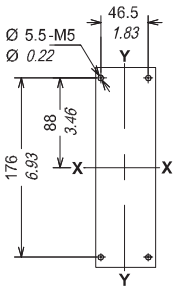


With flange (3-4 POLES)

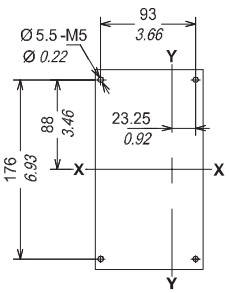
Without flange (3-4 POLES)

Drilling templates for support sheet

For front terminals

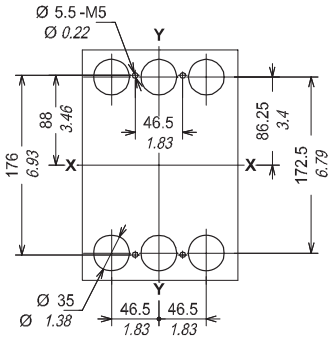


3 POLES

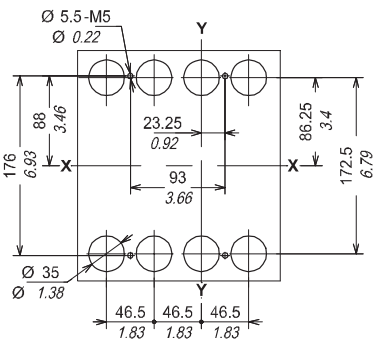


4 POLES

For rear terminals



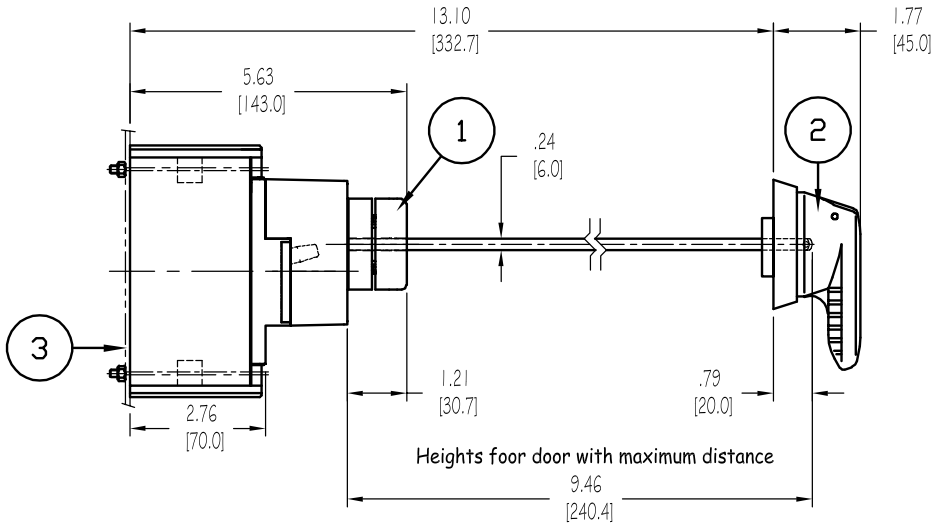
3 POLES



4 POLES

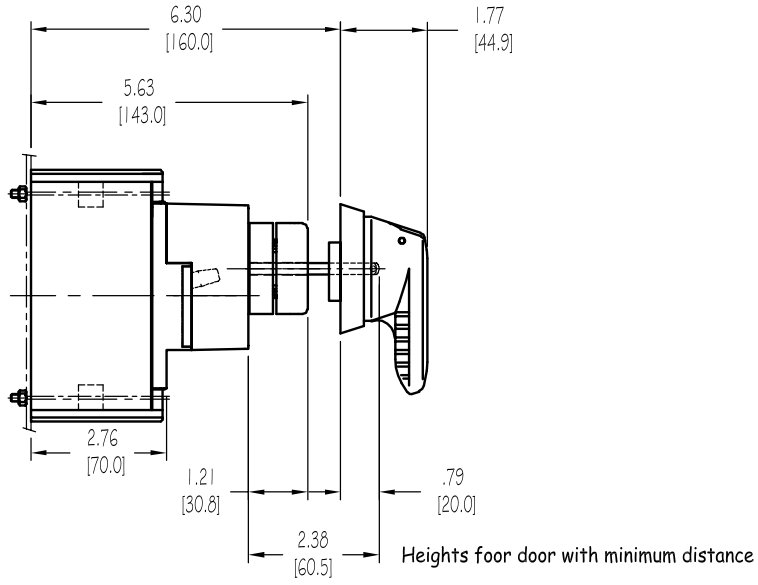
Approximate dimensions
T1 - T3 variable depth mechanism with OHB handle

Pistol handle operating mechanism on the compartment door



Caption

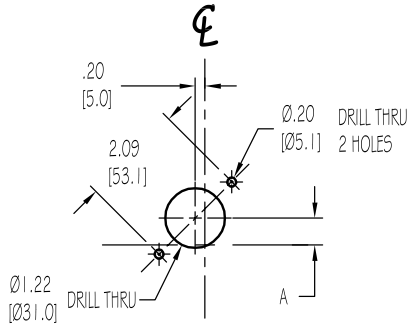
1. Transmission unit
2. Pistol handle operating mechanism on the compartment door
3. Insulating plate



Drilling template of the compartment door

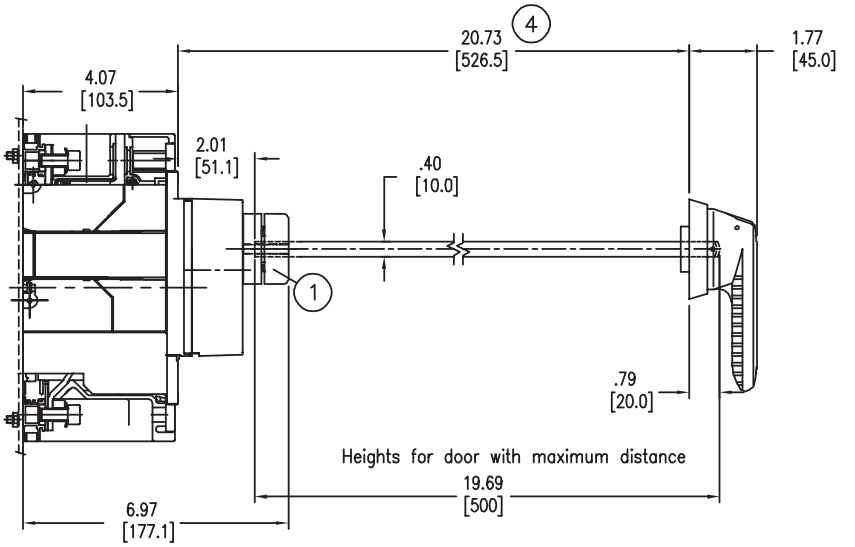
A

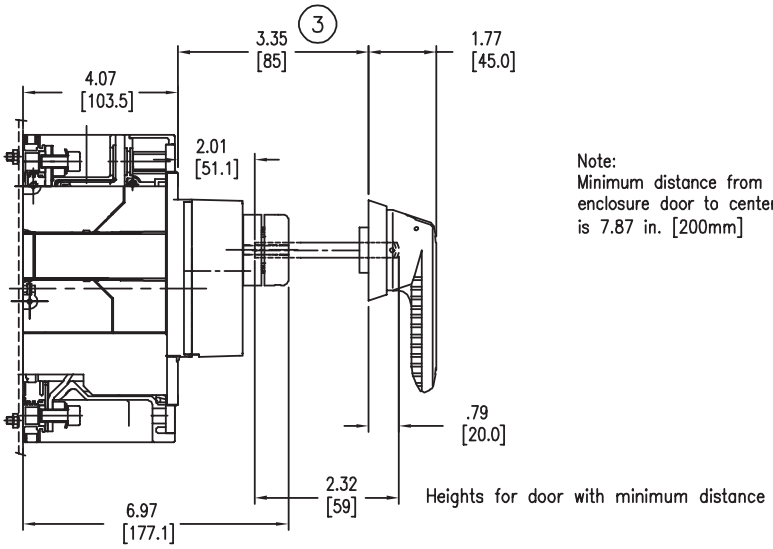
T1 - T2	T3
0.55 [13.97]	0.37 [9.4]



Approximate dimensions
T4 - T5 variable depth mechanism with OHB handle

Pistol handle operating mechanism on the compartment door



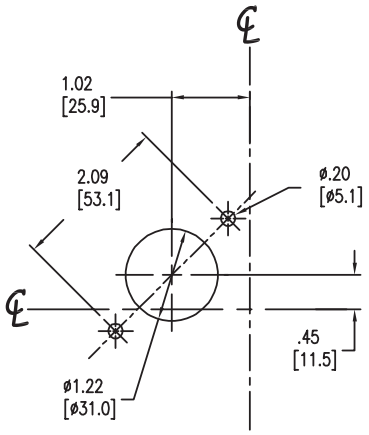


Note:
Minimum distance from hinge of enclosure door to center of shaft is 7.87 in. [200mm]

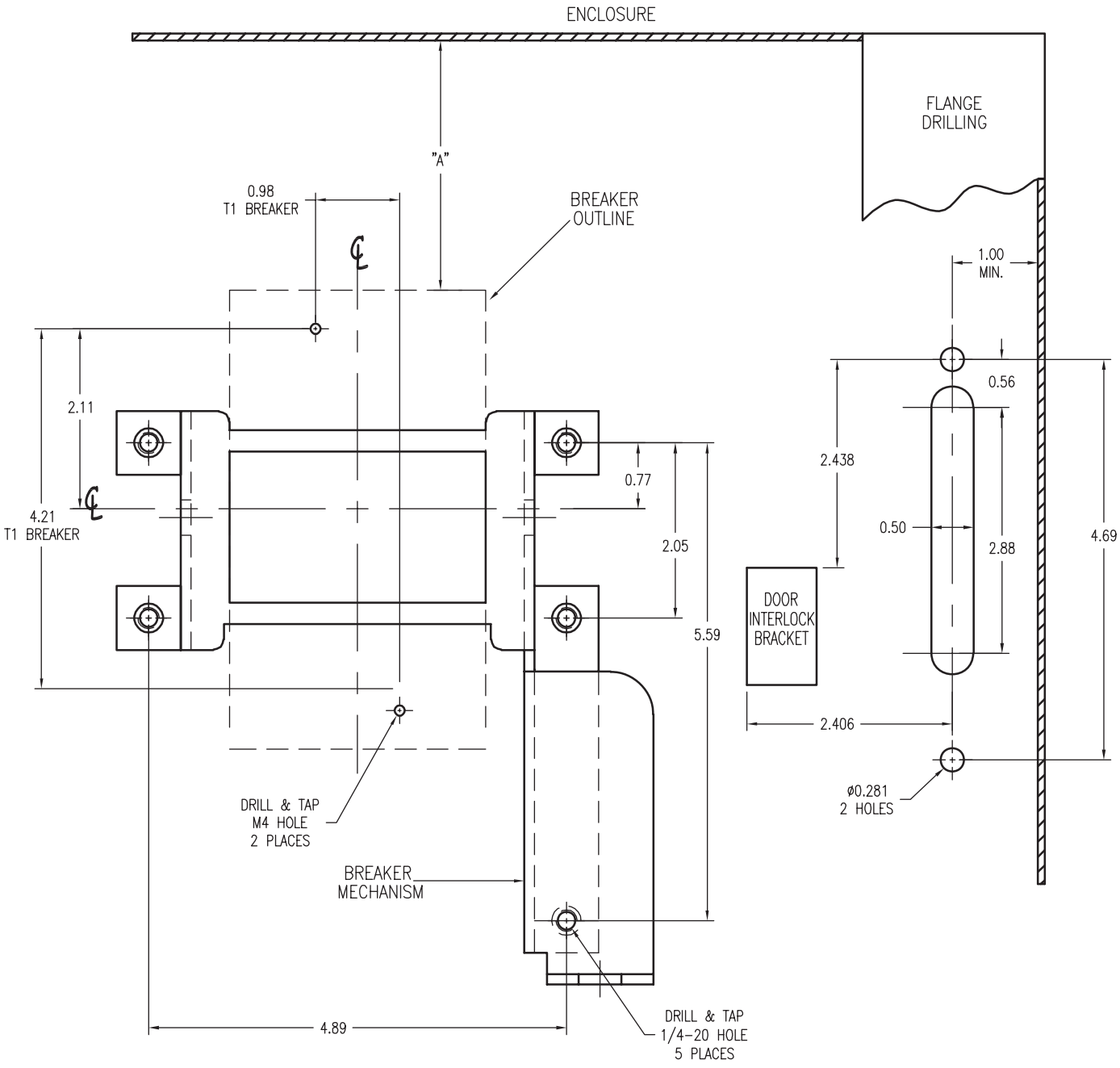
Caption

1. Transmission unit
2. Pistol handle operating mechanism on the compartment door
3. Minimum distance from the front door with accessory
4. Maximum distance from the front door with accessory

Drilling template of the compartment door

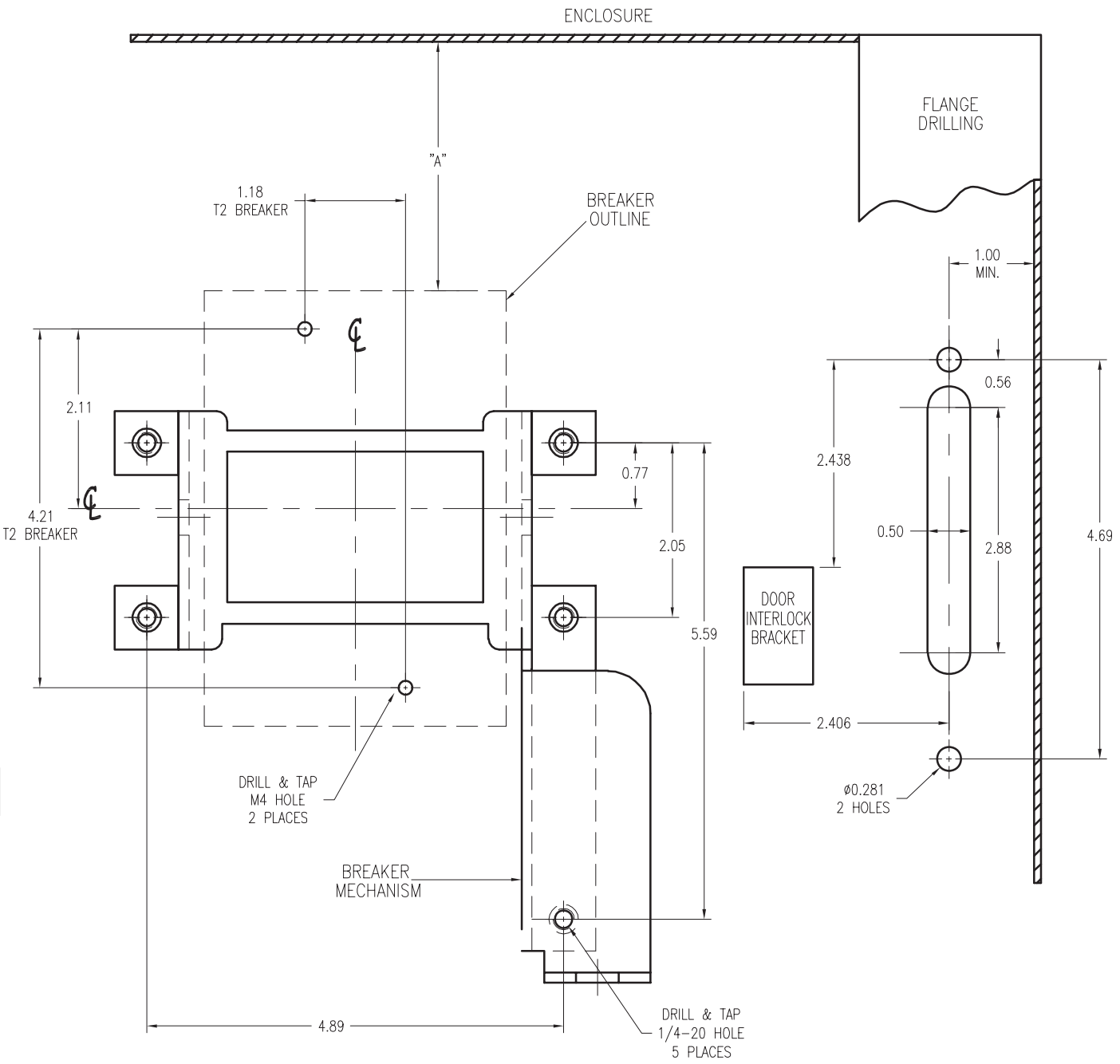


Approximate dimensions
T1 Flange handle, cable operated



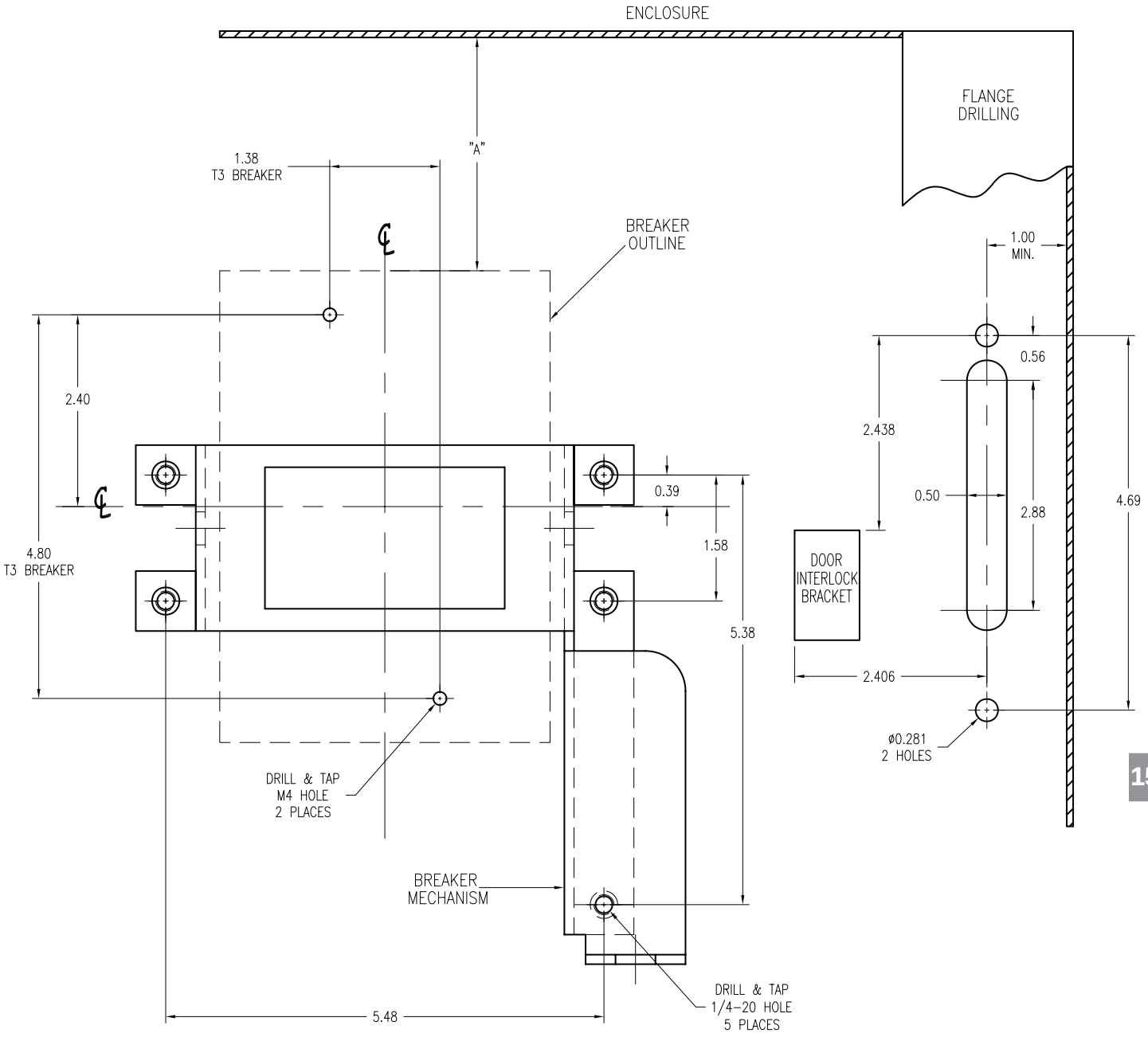
NOTES:
1. "A" DIM. IS THE WIRING BENDING SPACE AS REQUIRED BY THE NATIONAL ELECTRIC CODE.
2. THE MINIMUM BEND READIUS OF THE CABLE IS 3 INCHES.

Approximate dimensions
T2 Flange handle, cable operated

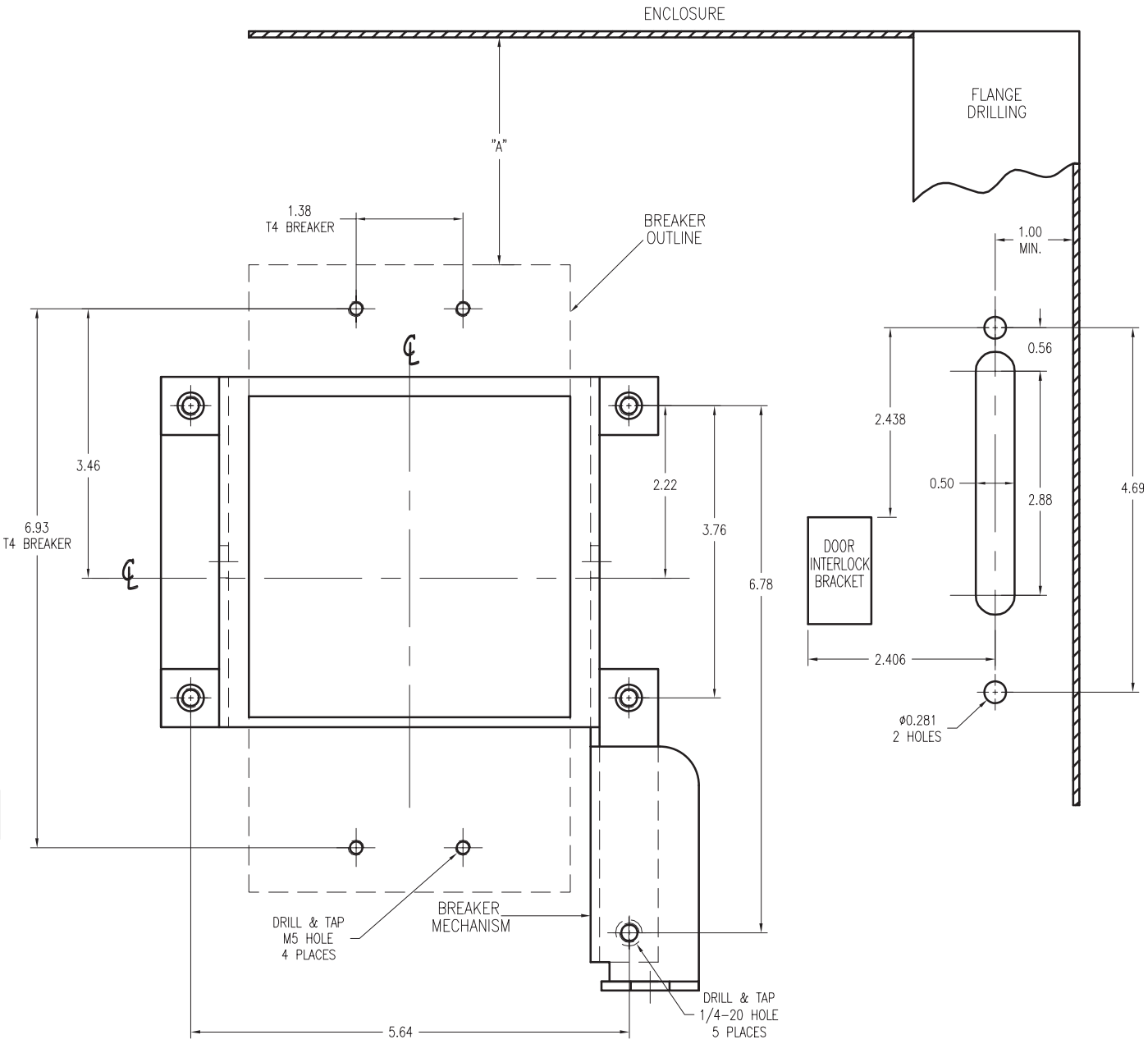


NOTES:
1. "A" DIM. IS THE WIRING BENDING SPACE AS REQUIRED BY THE NATIONAL ELECTRIC CODE.
2. THE MINIMUM BEND READIUS OF THE CABLE IS 3 INCHES.

Approximate dimensions
T3 Flange handle, cable operated

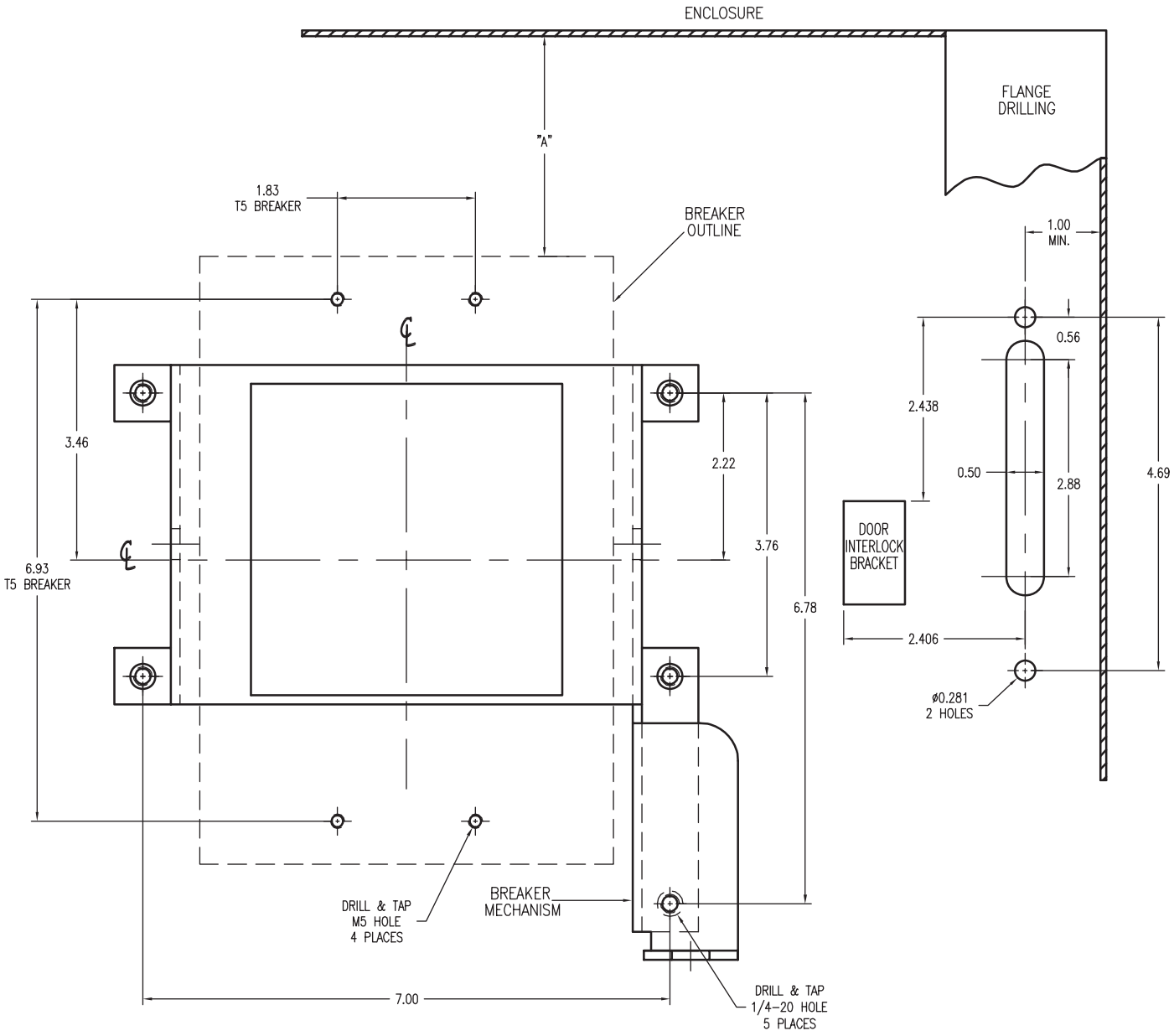


Approximate dimensions
T4 Flange handle, cable operated



NOTES:
1. "A" DIM. IS THE WIRING BENDING SPACE AS REQUIRED BY THE NATIONAL ELECTRIC CODE.
2. THE MINIMUM BEND READIUS OF THE CABLE IS 3 INCHES.

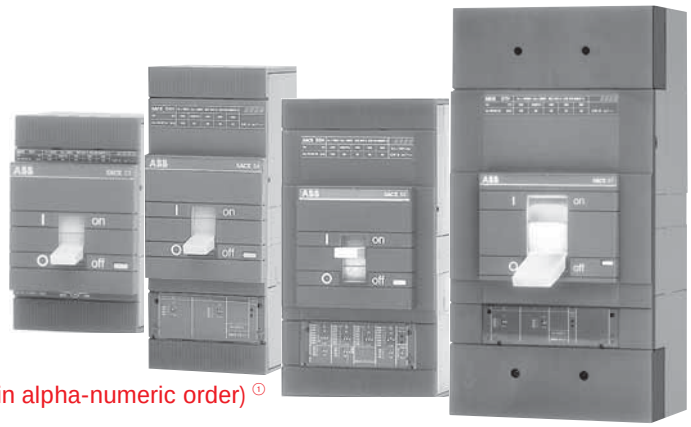
Approximate dimensions
T5 Flange handle, cable operated



NOTES:
1. "A" DIM. IS THE WIRING BENDING SPACE AS REQUIRED BY THE NATIONAL ELECTRIC CODE.
2. THE MINIMUM BEND READIUS OF THE CABLE IS 3 INCHES.

Notes

Isomax
Molded case circuit breakers
S3 – S8



S4 N 250 B W - 2 xxx

Accessories (added in alpha-numeric order) ①
A = Auxiliary Switch
BA = Bell Alarm
BA3 = Bell Alarm (S6/S7 only)
S_ = Shunt trip with voltage code
U_ = Undervoltage release with voltage code

Number of poles
-2 = 2 pole
-4 = 4 pole
None = 3 pole

Type connectors
W = None

Trip unit function
B = LI
C = LSI
D = Molded Case Switch (MCS)
E = LSIG
T = Thermal-magnetic – 10X Mag
G = Thermal-magnetic – 2.5 - 3X Mag ②
F = LSIG/K
H = LSIG/D
J = LSIG/DT
K = LSIG/DTK
M = Magnetic only (MCP)

Current rating
015 = 15A
250 = 250A
400 = 400A
1200 = 1200A

Interrupting rating class
B = Basic (240VAC)
N = Normal
H = High
L = Extra High
BQ = Basic, 100% rated
NQ = Normal, 100% rated
HQ = High, 100% rated
LQ = Extra High, 100% rated
D = Special molded case switch

(No trip IEC)

Frame size
S3 = 150 / 225A
S4 = 250A
S5 = 400A
S6 = 600 / 800A
S7 = 1200A

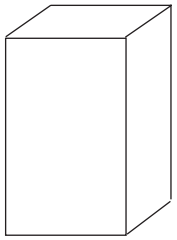
① Consult ABB for factory installed accessories.
② Consult ABB for availability.

15

S3
150/225A
Standard thermal-magnetic

S3B

S3N S3H S3L


H x W x D
6.70" x 4.13" x 4.07"

Standard S3 package includes complete circuit breaker and mounting hardware. Order cable lugs as a separate item, standard copper/ aluminum (Cu/Al) lugs are no charge when ordered with breaker.

General
The S3 breaker family ranges from 15 through 225 amperes. The S3 trip mechanisms are non-interchangeable and use sensitive electromagnetic relays for overcurrent trip protection. Heat sensitive bimetals are used for thermal overcurrent protection. Short circuit current protection begins at 10 times the thermal rating of the breaker and uses a magnetic coil principle.

Versions
To meet all application needs, the S3 is available in various versions:

T =Thermal-magnetic
Q =100% UL rated
D = Molded case switch
M = Magnetic only (MCP)
G = 3X Mag (100 - 225A 3-pole only)

Performance level
Each version is also available in different maximum fault interrupting levels

B = 240VAC
N = Normal
H = High
L = Extra high

Number of poles
In UL/CSA form, the S3 is available in two pole or three pole versions, both with the same dimensions. A four pole version is also available in UL/ IEC form. For price estimate, add 35% to list price of selected version three pole breaker, contact ABB Control for details.

15

Accessory mounting
Internal accessories are UL/CSA approved for both factory or field installation. Accessories require control cable connectors. Shunt trips or UVR's mount in the left cavity. Auxiliary or bell alarm switches mount in the right cavity.

Reverse feeding
All versions of the S3 family are suitable for reverse feed applications.

Molded case switches
UL489 switches include no overcurrent protection except for a high instantaneous trip mechanism for self protection. IEC type molded case switches with no trip protection are also available.

UL/CSA Interrupting capacity (kA RMS)
UL489 / CSA C22.2

Voltage	N	H	L
240VAC	65	100	150
480VAC	25	50	85①
600VAC	14	14	25
500VDC	35	50	65
600VDC	20	35	50

IEC-947 Interrupting capacity (kA RMS)

Voltage	N	H	L
230VAC	65	100	170
380/400/415VAC	35	65	85
440VAC	30	50	65
500VAC	25	40	50
690VAC	14	18	20
500VDC	35	50	65
750VDC	20	35	50

① 15-30A are 65kA at 480VAC

S3
150/225A
Standard thermal-magnetic

S3B

Breaker	IC at 240VAC	Rating	Magnetic trip	2 pole, 240VAC catalog number	List price	3 pole, 240VAC catalog number	List price
S3B	**150kA**	175A 200A 225A	1750A 2000A 2250A	S3B175TW-2 S3B200TW-2 S3B225TW-2	**$ 460**	S3B175TW S3B200TW S3B225TW	**$ 590**

S3N

Breaker	IC at 480VAC	Rating	Magnetic trip	2 pole, 600VAC/500VDC catalog number	List price	3 pole, 600VAC/DC catalog number	List price
S3N	**25kA**	15A 20A 25A 30A 35A 40A 50A 60A	500A 500A 500A 500A 500A 500A 500A 600A	S3N015TW-2 S3N020TW-2 S3N025TW-2 S3N030TW-2 S3N035TW-2 S3N040TW-2 S3N050TW-2 S3N060TW-2	**$ 316**	S3N015TW S3N020TW S3N025TW S3N030TW S3N035TW S3N040TW S3N050TW S3N060TW	**$ 413**
		70A 80A 90A 100A	700A 800A 900A 1000A	S3N070TW-2 S3N080TW-2 S3N090TW-2 S3N100TW-2	**407**	S3N070TW S3N080TW S3N090TW S3N100TW	**504**
		125A 150A 175A① 200A① 225A①	1250A 1500A 1750A 2000A 2250A	S3N125TW-2 S3N150TW-2 S3N175TW-2 S3N200TW-2 S3N225TW-2	**911**	S3N125TW S3N150TW S3N175TW S3N200TW S3N225TW	**1131**

S3H

Breaker	IC at 480VAC	Rating	Magnetic trip	2 pole, 600VAC/500VDC catalog number	List price	3 pole, 600VAC/DC catalog number	List price
S3H	**50kA**	15A 20A 25A 30A 35A 40A 50A 60A	500A 500A 500A 500A 500A 500A 500A 600A	S3H015TW-2 S3H020TW-2 S3H025TW-2 S3H030TW-2 S3H035TW-2 S3H040TW-2 S3H050TW-2 S3H060TW-2	**$ 527**	S3H015TW S3H020TW S3H025TW S3H030TW S3H035TW S3H040TW S3H050TW S3H060TW	**$ 619**
		70A 80A 90A 100A	700A 800A 900A 1000A	S3H070TW-2 S3H080TW-2 S3H090TW-2 S3H100TW-2	**617**	S3H070TW S3H080TW S3H090TW S3H100TW	**702**
		125A 150A 175A① 200A① 225A①	1250A 1500A 1750A 2000A 2250A	S3H125TW-2 S3H150TW-2 S3H175TW-2 S3H200TW-2 S3H225TW-2	**1376**	S3H125TW S3H150TW S3H175TW S3H200TW S3H225TW	**1586**

S3L

Breaker	IC at 480VAC	Rating	Magnetic trip	2 pole, 600VAC/500VDC catalog number	List price	3 pole, 600VAC/DC catalog number	List price
S3L	**65k**	15A 20A 25A 30A	500A 500A 500A 500A	S3L015TW-2 S3L020TW-2 S3L025TW-2 S3L030TW-2	**$ 634**	S3L015TW S3L020TW S3L025TW S3L030TW	**$ 824**
		35A 40A 50A 60A	500A 500A 500A 600A	S3L035TW-2 S3L040TW-2 S3L050TW-2 S3L060TW-2	**634**	S3L035TW S3L040TW S3L050TW S3L060TW	**824**
	85kA	70A 80A 90A 100A	700A 800A 900A 1000A	S3L070TW-2 S3L080TW-2 S3L090TW-2 S3L100TW-2	**816**	S3L070TW S3L080TW S3L090TW S3L100TW	**1010**
		125A 150A	1250A 1500A	S3L125TW-2 S3L150TW-2	**1818**	S3L125TW S3L150TW	**2260**
	65kA	175A① 200A① 225A①	1750A 2000A 2250A	S3L175TW-2 S3L200TW-2 S3L225TW-2	**1818**	S3L175TW S3L200TW S3L225TW	**2260**

① 480VAC maximum

S3
150/225A
100% UL rated

S3NQ

Breaker	IC at 480VAC	Rating	Magnetic trip	3 pole 600VAC/DC catalog number	List price
S3NQ	**25kA**	15A 20A 25A 30A 35A 40A 50A 60A	500A 500A 500A 500A 500A 500A 500A 600A	S3NQ015TW S3NQ020TW S3NQ025TW S3NQ030TW S3NQ035TW S3NQ040TW S3NQ050TW S3NQ060TW	**$ 459**
		70A 80A 90A 100A	700A 800A 900A 1000A	S3NQ070TW S3NQ080TW S3NQ090TW S3NQ100TW	**560**
		125A 150A 175A① 200A① 225A①	1250A 1500A 1750A 2000A 2250A	S3NQ125TW S3NQ150TW S3NQ175TW S3NQ200TW S3NQ225TW	**1257**

S3HQ

Breaker	IC at 480VAC	Rating	Magnetic trip	3 pole catalog number	List price
S3HQ	**50kA**	15A 20A 25A 30A 35A 40A 50A 60A	500A 500A 500A 500A 500A 500A 500A 600A	S3HQ015TW S3HQ020TW S3HQ025TW S3HQ030TW S3HQ035TW S3HQ040TW S3HQ050TW S3HQ060TW	**$ 688**
		70A 80A 90A 100A	700A 800A 900A 1000A	S3HQ070TW S3HQ080TW S3HQ090TW S3HQ100TW	**780**
		125A 150A 175A① 200A① 225A①	1250A 1500A 1750A 2000A 2250A	S3HQ125TW S3HQ150TW S3HQ175TW S3HQ200TW S3HQ225TW	**1762**

S3LQ

Breaker	IC at 480VAC	Rating	Magnetic trip	3 pole catalog number	List price
S3LQ	**65kA**	15A 20A 25A 30A	500A 500A 500A 500A	S3LQ015TW S3LQ020TW S3LQ025TW S3LQ030TW	**$ 916**
	85kA	35A 40A 50A 60A	500A 500A 500A 600A	S3LQ035TW S3LQ040TW S3LQ050TW S3LQ060TW	
		70A 80A 90A 100A	700A 800A 900A 1000A	S3LQ070TW S3LQ080TW S3LQ090TW S3LQ100TW	**1123**
		125A 150A 175A① 200A① 225A①	1250A 1500A 1750A 2000A 2250A	S3LQ125TW S3LQ150TW S3LQ175TW S3LQ200TW S3LQ225TW	**2511**

Note: When applied correctly, UL tested 100% equipment rated breakers may be applied at full rating rather than on the sizing rules of the NEC where breakers and cable are sized based on actual continuous load current divided by 80%. This 100% rating can save the user the cost of larger cable or bus bar. Please consult the NEC for details and other design factors needed for this application.

① 480VAC maximum

S3
150/225A, 600VAC

Magnetic only (MCP)

Magnetic only circuit breakers are instantaneous trip only devices which are Underwriters Laboratories Recognized. MCPs must be used with some other device that will provide overload protection.

Type	Interruption capacity	Amps	Magnetic trip	3 pole catalog number	List price
S3N	240VAC 35kA 480VAC 18kA 600VAC 10kA	3 5 10	12 – 36 20 – 60 40 – 120	S3N003MW S3N005MW S3N010MW	**$ 568**
	240VAC 35kA 480VAC 18kA 600VAC 10kA	25	100 – 300	S3N025MW	
	240VAC 75kA 480VAC 35kA 600VAC 14kA	50 100 125 150	200 – 600 400 – 1200 500 – 1500 600 – 1500	S3N050MW S3N100MW S3N125MW S3N150MW	**633** **763** **929** **929**

Type	Interruption capacity	Amps	Magnetic trip	3 pole catalog number	List price
S3L	240VAC 50kA 480VAC 25kA 600VAC 10kA	3 5 10	12 – 36 20 – 60 40 – 120	S3L003MW S3L005MW S3L010MW	**$ 710**
	240VAC 50kA 480VAC 25kA 600VAC 10kA	25	100 – 300	S3L025MW	
	240VAC 150kA 480VAC 85kA 600VAC 25kA	50 100 125 150	200 – 600 400 – 1200 500 – 1500 600 – 1500	S3L050MW S3L100MW S3L125MW S3L150MW	**710** **843** **1910** **1910**
	480VAC 65kA	200 ②	800 – 2400	S3L200MW	**1910**

Molded case switches

Type	Interruption capacity ③	Amps	Magnetic trip	3 pole catalog number	List price
S3B-D	240VAC 150KA	225	2250A	S3B225DW	**$ 410**
S3H-D	240VAC 100kA 480VAC 50kA 600VAC 14kA 500VDC 65kA 600VDC 50kA	150 225 ②	1500A 2250A	S3H150DW S3H225DW	**892** **1254**
Non-UL switches without overcurrent protection	Withstand rating				
	600VAC 6.5kA	100 160 250	none none none	S3D100W S3D160W S3D250W	**531** **892** **1393**

Connection options

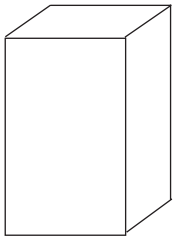
Type	Wire range	Amps①	Set of 2 catalog number	List price	Set of 3 catalog number	List price
CU/AL front lugs	14AWG – 2AWG	60	K3TA-2	**$ 4**	K3TA	**$ 6**
CU/AL front lugs	14AWG – 1/0	100	K4TB-2	**4**	K4TB	**6**
CU/ALfront lugs	2AWG – 4/0	150	K4TC-2	**4**	K4TC	**6**
CU/AL front lugs	4AWG – 300kcmil	225	K4TD-2	**10**	K4TD	**15**
					Set of 6 catalog number	
CU front lugs (saddle)	14AWG – 250kcmil	250	—	—	K4TES	**30**
CU rear lugs	6AWG – 250kcmil	250	—	—	K4TER	
Extended front bar	–	250	—	—	K4ET-250	**46**

① Suggested lugs for circuit breaker up to amps shown. Cable size and type determine maximum amperage.
② 480VAC maximum.
③ With fuse or MCCB protected circuit.

Discount schedule SM – S3 MCPs only
Discount schedule S3 – Circuit breakers
Discount schedule SA – Lugs

S4
250A, 600VAC
Electronic trip type

S4


H x W x D
10.0" x 4.13" x 4.07"

Standard S4 package includes complete circuit breaker and mounting hardware. Order cable lugs or other connection scheme as a separate item.

General
The S4 breaker family is a 250A frame utilizing a microprocessor based overcurrent protective trip system. In the 250A version, the trip unit is adjustable from 100A up to 250A without the addition of any parts or rating plugs. As standard, the S4 includes adjustable long time function for overload protection and adjustable instantaneous function for short circuit protection.

Versions
To meet all application needs, the S4 is available in various versions:

B = Adjustment LI
C = Adjustment LSI
E = Adjustment LSIG
Q = 100% UL rated
D = Molded case switch
M = Magnetic only (MCP)

Trip functions
These tripping functions are available:

L = Long time
S = Short time
I = Instantaneous
G = Ground fault

Performance level
Each version is also available in different maximum fault interrupting levels:

N = Normal
H = High
L = Extra high

Number of poles
In UL/CSA form, the S4 is available in two pole or three pole versions, both with the same dimensions. A four pole version is also available in UL/IEC form. For price estimate, add 35% to list price of selected version three pole breaker, contact ABB Control for details.

Accessory mounting
Internal accessories are UL/CSA approved for both factory or field installation. Accessories require control cable connectors. Shunt trips or UVR's mount in the left cavity. Auxiliary or bell alarm switches mount in the right cavity.

Reverse feeding
All versions of the S4 family are suitable for reverse feed applications.

Molded case switches
UL489 switches include no overcurrent protection except for a high instantaneous trip mechanism for self protection.

UL/CSA Interrupting capacity (kA RMS)
UL489 / CSA C22.2

Voltage	N	H	L
240VAC	65	150	200
480VAC	25	65	100
600VAC	18	22	35

IEC-947 Interrupting capacity (kA RMS)

Voltage	N	H	L
230VAC	65	150	200
380/400/415VAC	35	65	100
440VAC	30	50	80
500VAC	25	40	65
690VAC	18	22	30

S4
250A, 600VAC
Electronic trip type

The S4 breaker family uses two available microprocessor based internal trip units. The standard **PR211** trip unit includes adjustments for long time current pick-up and instantaneous current trip point.

The optional **PR212** trip unit includes adjustments for long time current pick-up/delay, short time pick-up/delay I^2t (on/off), instantaneous current trip point and further optional ground fault protection.

100A Frame (40 – 100A adjustable continuous range)

Breaker	IC at 480VAC	Trip type	Adjustment	2 pole catalog number	List price	3 pole catalog number	List price
S4N	25kA	PR211 PR212 PR212	LI LSI LSIG	S4N100BW-2 S4N100CW-2 —	**$ 1073** **1679** —	S4N100BW S4N100CW S4N100EW	**$ 1347** **1913** **2813**
S4H	65kA	PR211 PR212 PR212	LI LSI LSIG	S4H100BW-2 S4H100CW-2 —	**2572** **3138** —	S4H100BW S4H100CW S4H100EW	**3030** **3596** **4496**
S4L	100kA	PR211 PR212 PR212	LI LSI LSIG	S4L100BW-2 S4L100CW-2 —	**3159** **3725** —	S4L100BW S4L100CW S4L100EW	**3950** **4516** **5416**

250A Frame (100 – 250A adjustable continuous range)

Breaker	IC at 480VAC	Trip type	Adjustment	2 pole catalog number	List price	3 pole catalog number	List price
S4N	25kA	PR211 PR212 PR212	LI LSI LSIG	S4N250BW-2 S4N250CW-2 —	**$ 1073** **1679** —	S4N250BW S4N250CW S4N250EW	**$ 1347** **1913** **2813**
S4H	65kA	PR211 PR212 PR212	LI LSI LSIG	S4H250BW-2 S4H250CW-2 —	**2572** **3138** —	S4H250BW S4H250CW S4H250EW	**3030** **3596** **4496**
S4L	100kA	PR211 PR212 PR212	LI LSI LSIG	S4L250BW-2 S4L250CW-2 —	**3159** **3725** —	S4L250BW S4L250CW S4L250EW	**3950** **4516** **5416**

Trip settings

Adjustment	Trip function	Range	Individual settings
L	Long time pick-up Long time delay	0.4 – 1.0 3.0 – 18 sec.	0.4-0.5-0.55-0.6-0.65-0.7-0.75-0.8-0.85-0.875-0.9-0.925-0.95-0.975-1.0 x Frame rating PR212 A - B - C - D
S	Short time pick-up Short time delay	1.0 – 10.0 0.05 – 0.5 sec.	Off-1.0-2.0-3.0-4.0-6.0-8.0-10.0 x Frame rating A - B - C - D (I^2t On-Off)
I	Instantaneous trip	1.5 – 12.0	1.5-2.0-4.0-6.0-8.0-10.0-12.0 x Frame rating
G	Ground fault Ground fault delay	0.2 – 1.0 0.1 – 0.8 sec.	Off-0.2-0.3-0.4-0.6-0.8-0.9-1.0 x Frame rating A - B - C - D

Continuous amperage settings (long time adjustment) – PR211

Frame	Set points								
	0.4	0.5	0.6	0.7	0.8	0.9	0.95	1.0	Setting
100A	40	50	60	70	80	90	95	100	Amps
250A	100	125	150	175	200	225	237	250	Amps

S4
250A, 600 VAC
100% UL rated

When applied correctly, UL tested 100% equipment rated breakers may be applied at full rating rather than on the sizing rules of the NEC where breakers and cable are sized based on actual continuous load current divided by 80%. This 100% rating can save the user the cost of larger cable or bus bar. Please consult the NEC for details and other design factors needed for this application.

100A Frame (40 – 100A adjustable continuous range)

Breaker	IC at 480VAC	Trip type	Adjustment	3 pole catalog number	List price
S4N	25kA	PR211 PR212 PR212	LI LSI LSIG	S4NQ100BW S4NQ100CW S4NQ100EW	**$ 1482** **2104** **3094**
S4H	65kA	PR211 PR212 PR212	LI LSI LSIG	S4HQ100BW S4HQ100CW S4HQ100EW	**3333** **3956** **4946**
S4L	100kA	PR211 PR212 PR212	LI LSI LSIG	S4LQ100BW S4LQ100CW S4LQ100EW	**4345** **4968** **5958**

250A Frame (100 – 250A adjustable continuous range)

Breaker	IC at 480VAC	Trip type	Adjustment	3 pole catalog number	List price
S4N	25kA	PR211 PR212 PR212	LI LSI LSIG	S4NQ250BW S4NQ250CW S4NQ250EW	**$ 1482** **2104** **3094**
S4H	65kA	PR211 PR212 PR212	LI LSI LSIG	S4HQ250BW S4HQ250CW S4HQ250EW	**3333** **3956** **4946**
S4L	100kA	PR211 PR212 PR212	LI LSI LSIG	S4LQ250BW S4LQ250CW S4LQ250EW	**4345** **4968** **5958**

Trip settings

Adjustment	Trip function	Range	Individual settings
L	Long time pick-up Long time delay	0.4 – 1.0 3.0 – 18 sec.	0.4-0.5-0.55-0.6-0.65-0.7-0.75-0.8-0.85-0.875-0.9-0.925-0.95-0.975-1.0 x Frame rating PR212 A - B - C - D
S	Short time pick-up Short time delay	1.0 – 10.0 0.05 – 0.5 sec.	Off-1.0-2.0-3.0-4.0-6.0-8.0-10.0 x Frame rating A - B - C - D (I^2t On-Off)
I	Instantaneous trip	1.5 – 12.0	1.5-2.0-4.0-6.0-8.0-10.0-12.0 x Frame rating
G	Ground fault Ground fault delay	0.2 – 1.0 0.1 – 0.8 sec.	Off-0.2-0.3-0.4-0.6-0.8-0.9-1.0 x Frame rating A - B - C - D

S4
250A, 600VAC

Magnetic only (MCP)

All S4 magnetic only breakers utilize the electronic PR211 trip unit with an adjustable range of 1.5 to 12 times frame rating. Both two and three pole MCPs are 600VAC rated.

Type	Amps	Interruption capacity	Adjustment range	2 pole 600VAC catalog number	List price	3 pole 600VAC catalog number	List price
S4N	100 250	240VAC 65kA 480VAC 25kA 600VAC 18kA	150 – 1200A 375 – 3000A	S4N100MW-2 S4N250MW-2	**$ 1073**	S4N100MW S4N250MW	**$ 1347**
S4H	100 250	240VAC 150kA 480VAC 65kA 600VAC 22kA	150 – 1200A 375 – 3000A	S4H100MW-2 S4H250MW-2	**2572**	S4H100MW S4H250MW	**3030**
S4L	100 250	240VAC 200kA 480VAC 100kA 600VAC 35kA	150 – 1200A 375 – 3000A	S4L100MW-2 S4L250MW-2	**3159**	S4L100MW S4L250MW	**3950**

Molded case switch

Type	Interruption capacity ②	Amps	Magnetic trip	3 pole catalog number	List price
S4H-D	240VAC 150kA 480VAC 65kA 600VAC 22kA	250	3000A	S4H250DW	**$ 1215**

Neutral GF current transformer (required for 4 wire GF systems)

Amps	Catalog number	List price
100 250	K4NCT-100 K4NCT-250	**$ 250**

Connection options

Type	Wire range	Amps ①	Set of 2 catalog number	List price	Set of 3 catalog number	List price
CU/AL front lugs	14AWG – 1/0	100	K4TB-2	**$ 4**	K4TB	**$ 6**
CU/AL front lugs	2AWG – 4/0	150	K4TC-2	**4**	K4TC	**6**
CU/AL front lugs	4AWG – 300kcmil	225	K4TD-2	**10**	K4TD	**15**
CU/AL front lugs	6AWG – 350kcmil	250	K4TE-2	**20**	K4TE	**30**
					Set of 6 catalog number	
CU front lugs (saddle)	14AWG – 250kcmil	250	—	—	K4TES	**30**
CU rear lugs	6AWG – 250kcmil	250	—	—	K4TER	
Extended front bar	—	250	—	—	K4ET-250	**46**

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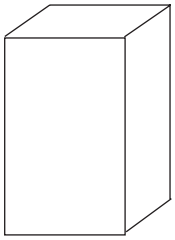
① Suggested lugs for a circuit breaker up to the amps shown. Cable size and type determine maximum amperage.
② With fuse or MCCB protected circuit.

S5
400A, 600V
Electronic and thermal-magnetic trip types

S5



H x W x D
10.0" x 5.51" x 4.07" (a)
13.62" x 5.51" x 4.07" (b)

Standard S5 package includes complete circuit breaker and mounting hardware. Order cable lugs or other connection scheme as a separate item.

(a) With K5TF cable lugs, breaker is 10.0" tall.
(b) With K5TG cable lugs, terminal covers are provided and breaker is 13.62" tall.

General
The S5 breaker family is a 400A frame utilizing a microprocessor-based overcurrent protective trip system. In the 400A version, the trip unit is adjustable from 160A up to 400A without the addition of any parts or rating plugs. As standard the S5 includes adjustable long time function for overload protection and adjustable instantaneous function for short circuit protection.

Versions
To meet all application needs, the S5 is available in various versions:

B = Adjustment LI
C = Adjustment LSI
E = Adjustment LSIG
Q = 100% UL rated
D = Molded case switch
M = Magnetic only (MCP)
T = Thermal magnetic
G = 2.5 Mag (3-pole only)

Trip functions
These tripping functions are available:

L = Long time
S = Short time
I = Instantaneous
G = Ground fault

Performance level
Each version is also available in different maximum fault interrupting levels

N = Normal
H = High
L = Extra high

Number of poles
In UL/CSA version, the S5 is available in two pole or three pole version, both with the same dimensions. A four pole version is also available in UL/IEC form. For price estimate, add 35% to list price of selected version three pole breaker, contact ABB Control for details.

Accessory mounting
Internal accessories are UL/CSA approved for both factory or field installation. Accessories require control cable connectors. Shunt trips or UVR's mount in the left cavity. Auxiliary or bell alarm switches mount in the right cavity.

Reverse feeding
All versions of the S5 family are suitable for reverse feed applications.

Molded case switches
UL489 switches include no overcurrent protection except for a high instantaneous trip mechanism for self protection.

UL/CSA Interrupting capacity (kA RMS)
UL489 / CSA C22.2

Voltage	N	H	L
240VAC	65	150	200
480VAC	35	65	100
600VAC	22	22	35
500VDC①	35	50	65
600VDC①	20	35	50

IEC-947 Interrupting capacity (kA RMS)

Voltage	N	H	L
230VAC	65	100	200
380/400/415VAC	35	65	100
440VAC	30	50	80
500VAC	25	40	65
690VAC	20	25	30

① Thermal magnetic only.

S5
400A, 600 VAC
Electronic and thermal-magnetic trip types

The S5 breaker family uses two available microprocessor based internal trip units. The standard **PR211** trip unit includes adjustments for long time current pick-up and instantaneous current trip point.

The optional **PR212** trip unit includes adjustments for long time current pick-up/delay, short time pick-up/delay, I^2t (on/off), instantaneous current trip point and further optional ground fault protection.

400A Frame (160 – 400A adjustable continuous range)

Breaker	IC at 480VAC	Trip	Adjustment	2 pole, 600VAC catalog number	List price	3 pole, 600VAC catalog number	List price
S5N	35kA	PR211 PR212 PR212	LI LSI LSIG	S5N400BW-2 S5N400CW-2 —	**$ 1798** **2464** —	S5N400BW S5N400CW S5N400EW	**$ 2151** **2817** **3717**
S5H	65kA	PR211 PR212 PR212	LI LSI LSIG	S5H400BW-2 S5H400CW-2 —	**3285** **3951** —	S5H400BW S5H400CW S5H400EW	**3654** **4320** **5220**
S5L	100kA	PR211 PR212 PR212	LI LSI LSIG	S5L400BW-2 S5L400CW-2 —	**3945** **4611** —	S5L400BW S5L400CW S5L400EW	**4733** **5399** **6299**

Trip settings

Adjustment	Trip function	Range	Individual settings
L	Long time pick-up Long time delay	0.4 – 1.0 3.0 – 18 sec.	0.4-0.5-0.55-0.6-0.65-0.7-0.75-0.8-0.85-0.875-0.9-0.925-0.95-0.975-1.0 x Frame rating PR212 A - B - C - D
S	Short time pick-up Short time delay	1.0 – 10.0 0.05 – 0.5 sec.	Off-1.0-2.0-3.0-4.0-6.0-8.0-10.0 x Frame rating A - B - C - D (I^2t On-Off)
I	Instantaneous trip	1.5 – 12.0	1.5-2.0-4.0-6.0-8.0-10.0-12.0 x Frame rating
G	Ground fault Ground fault delay	0.2 – 1.0 0.1 – 0.8 sec.	Off-0.2-0.3-0.4-0.6-0.8-0.9-1.0 x Frame rating A - B - C - D

Continuous amperage settings (long time adjustment) – PR211

Frame	Set points								
	0.4	0.5	0.6	0.7	0.8	0.9	0.95	1.0	Setting
400A	160	200	240	280	320	360	380	400	Amps

S5 thermal-magnetic breakers, for AC and DC applications

Breaker	IC at 500VDC	Rating	Magnetic trip	2 pole, 600VAC/500VDC catalog number	List price	3 pole, 600VAC/DC catalog number	List price
S5N	35kA	300A (210 – 300A) 400A (280 – 400A)	3000A 4000A	S5N300TW-2 S5N400TW-2	**$ 1798**	S5N300TW S5N400TW	**$ 2151**
S5H	50kA	300A (210 – 300A) 400A (280 – 400A)	3000A 4000A	S5H300TW-2 S5H400TW-2	**3285**	S5H300TW S5H400TW	**3654**
S5L	65kA	300A (210 – 300A) 400A (280 – 400A)	3000A 4000A	S5L300TW-2 S5L400TW-2	**3945**	S5L300TW S5L400TW	**4733**

S5
400A, 600 VAC
100% UL rated, electronic trip type

When applied correctly, UL tested 100% equipment rated breakers may be applied at full rating rather than on the sizing rules of the NEC where breakers and cable are sized based on actual continuous load current divided by 80%. This 100% rating can save the user the cost of larger cable or bus bar. Please consult the NEC for details and other design factors needed for this application.

400A Frame (160 – 400A adjustable continuous range)

Breaker	IC at 480VAC	Trip type	Adjustment	3 pole, 600VAC catalog number	List price
S5N	35kA	PR211 PR212 PR212	LI LSI LSIG	S5NQ400BW S5NQ400CW S5NQ400EW	**$ 2366** **3099** **4089**
S5H	65kA	PR211 PR212 PR212	LI LSI LSIG	S5HQ400BW S5HQ400CW S5HQ400EW	**4019** **4752** **5742**
S5L	100kA	PR211 PR212 PR212	LI LSI LSIG	S5LQ400BW S5LQ400CW S5LQ400EW	**5206** **5939** **6929**

Trip settings

Adjustment	Trip function	Range	Individual settings
L	Long time pick-up Long time delay	0.4 – 1.0 3.0 – 18 sec.	0.4-0.5-0.55-0.6-0.65-0.7-0.75-0.8-0.85-0.875-0.9-0.925-0.95-0.975-1.0 x Frame rating PR212 A - B - C - D
S	Short time pick-up Short time delay	1.0 – 10.0 0.05 – 0.5 sec.	Off-1.0-2.0-3.0-4.0-6.0-8.0-10.0 x Frame rating A - B - C - D (I^2t On-Off)
I	Instantaneous trip	1.5 – 12.0	1.5-2.0-4.0-6.0-8.0-10.0-12.0 x Frame rating
G	Ground fault Ground fault delay	0.2 – 1.0 0.1 – 0.8 sec.	Off-0.2-0.3-0.4-0.6-0.8-0.9-1.0 x Frame rating A - B - C - D

S5
400A, 600VAC

Magnetic only (MCP)

All S5 magnetic only breakers utilize the electronic PR211 trip unit with an adjustable range of 1.5 to 12 times frame rating. Both two and three pole MCP's are 600VAC rated.

Type	Amps	Interruption capacity		Adjustment range	2 pole 600VAC catalog number	List price	3 pole 600VAC catalog number	List price
S5N	400	240 VAC 480VAC 600VAC	65kA 35kA 22kA	600 – 4800A	S5N400MW-2	**$ 1798**	S5N400MW	**$ 2151**
S5H	400	240VAC 480VAC 600VAC	150kA 65kA 22kA	600 – 4800A	S5H400MW-2	**3285**	S5H400MW	**3654**
S5L	400	240VAC 480VAC 600VAC	200kA 100kA 35kA	600 – 4800A	S5L400MW-2	**3945**	S5L400MW	**4733**

Molded case switch

Switch	Interruption capacity ③		Amps	Magnetic trip	3 pole catalog number	List price
S5H-D	240VAC 480VAC 600VAC 600VDC	150kA 65kA 22kA 50kA	400A	5000A	S5H400DW	**$ 1994**

Neutral GF current transformer (required for 4 wire GF systems)

Amps	Catalog number	List price
400	K5NCT-400	**$ 250**

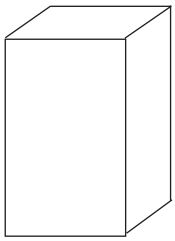
Connection options

Type	Wire range	Amps ②	Set of 2 catalog number	List price	Set of 3 catalog number	List price
CU/AL front lugs CU/AL front lugs	250kcmil – 500kcmil (2) 3/0 – 250kcmil	300 400	K5TF-2 K5TG-2①	**$ 30**	K5TF K5TG①	**$ 45**
					Set of 6 catalog number	
CU front lugs (saddle)	250kcmil – 500kcmil	400	—	—	K5TGS	**90**
CU rear lugs	250kcmil – 500kcmil	400	—	—	K5TGR	
Extended front bar	—	400	—	—	K5ET-400	**114**

① Including lug cover.
② Suggested lugs for a circuit breaker up to amps shown. Cable size and type determine maximum amperage.
③ With fuse or MCCB protected circuit.

S6
600A / 800A, 600V
Electronic and thermal-magnetic trip type

S6



H x W x D
10.55" x8.27" x 4.07" (a)
14.25" x 8.27" x 4.07" (b)

Standard S6 package includes complete circuit breaker and mounting hardware. Order cable lugs or other connection scheme as a separate item.

(a) With K6TH cable lugs breaker is 10.55" tall.
(b) With K6TJ cable lugs, terminal covers are provided and breaker is 14.25" tall.

General
The S6 breaker family is an 800A frame with a 600A and 800A version, both utilizing a microprocessor based overcurrent protective trip system. Both versions are adjustable from 40% to 100% of rating without the addition of any parts or rating plugs. As standard, the S6 includes adjustable long time function for overload protection and adjustable instantaneous function for short circuit protection.

Versions
To meet all application needs, the S6 is available in various versions:
- B = Adjustment LI
- C = Adjustment LSI
- E = Adjustment LSIG
- Q = 100% UL rated
- D = Molded case switch
- M = Magnetic only (MCP)
- T = Thermal magnetic
- G = 2.5 Mag (3-pole only)

Trip functions
These tripping functions are available:
- L = Long time
- S = Short time
- I = Instantaneous
- G = Ground fault

Performance level
Each version is also available in different maximum fault interrupting levels
- N = Normal
- H = High
- L = Extra high

Number of poles
In UL/CSA version, the S6 is available as in two pole or three pole version, both with the same dimensions. A four pole version is also available in UL/IEC form. For price estimate, add 35% to list price of selected version three pole breaker, contact ABB Control for details.

Accessory mounting
Internal accessories are UL/CSA approved for both factory or field installation. Accessories require control cable connectors. Shunt trips or UVR's mount in the left cavity. Auxiliary or bell alarm switches mount in the right cavity.

Reverse feeding
All versions of the S6 family are suitable for reverse feed applications.

Molded case switches
UL489 switches include no overcurrent protection except for a high instantaneous trip mechanism for self protection. IEC type molded case switches with no trip protection are also available.

UL/CSA Interrupting capacity (kA RMS)
UL489 / CSA C22.2

Voltage	N	H	L
240VAC	65	150	200
480VAC	50	65	100
600VAC	25	35	42
500VDC①	35	50	65
600VDC①	20	25	50

IEC-947 Interrupting capacity (kA RMS)

Voltage	N	H	L
230VAC	65	100	200
380/400/415VAC	35	65	100
440VAC	30	50	80
500VAC	25	40	65
690VAC	20	25	35

Catalog Number number	Rating	Magnetic trip
S6N600GW	3 pole, 600 Amp thermal magnetic, Im=2.5 x Ith	1500A
S6N800GW	3 pole, 800 Amp thermal magnetic, Im=2.5 x Ith	2000A

① Thermal magnetic only.

S6
600A / 800A, 600 VAC
Electronic and thermal magnetic trip type

The S6 breaker family uses two available microprocessor based internal trip units. The standard **PR211** trip unit includes adjustments for long time current pick-up and instantaneous current trip point.

The optional **PR212** trip unit includes adjustments for long time current pick-up/ delay, short time pick-up/delay, I^2t (on/off), instantaneous current trip point and further optional ground fault protection.

600A Frame (240 – 600A adjustable continuous range)

Breaker	IC at 480VAC	Trip type	Adjustment	2 pole, 600VAC catalog number	List price	3 pole, 600VAC catalog number	List price
S6N	50kA	PR211 PR212 PR212	LI LSI LSIG	S6N600BW-2 S6N600CW-2 —	**$ 2847** **4237** —	S6N600BW S6N600CW S6N600EW	**$ 3608** **4998** **6998**
S6H	65kA	PR211 PR212 PR212	LI LSI LSIG	S6H600BW-2 S6H600CW-2 —	**4275** **5665** —	S6H600BW S6H600CW S6H600EW	**5271** **6661** **8661**
S6L	100kA	PR211 PR212 PR212	LI LSI LSIG	S6L600BW-2 S6L600CW-2 —	**5481** **6871** —	S6L600BW S6L600CW S6L600EW	**6482** **7872** **8972**

800A Frame (320 – 800A adjustable continuous range)

Breaker	IC at 480VAC	Trip type	Adjustment	2 pole, 600VAC catalog number	List price	3 pole, 600VAC catalog number	List price
S6N	50kA	PR211 PR212 PR212	LI LSI LSIG	S6N800BW-2 S6N800CW-2 —	**$ 3842** **5232** —	S6N800BW S6N800CW S6N800EW	**$ 4802** **6192** **8192**
S6H	65kA	PR211 PR212 PR212	LI LSI LSIG	S6H800BW-2 S6H800CW-2 —	**5275** **6665** —	S6H800BW S6H800CW S6H800EW	**6465** **7855** **9855**
S6L	100kA	PR211 PR212 PR212	LI LSI LSIG	S6L800BW-2 S6L800CW-2 —	**6476** **7866** —	S6L800BW S6L800CW S6L800EW	**7676** **9066** **11,066**

Trip settings

Adjustment	Trip function	Range	Individual settings
L	Long time pick-up Long time delay	0.4 – 1.0 3.0 – 18 sec.	0.4-0.5-0.55-0.6-0.65-0.7-0.75-0.8-0.85-0.875-0.9-0.925-0.95-0.975-1.0 x Frame rating PR212 A - B - C - D
S	Short time pick-up Short time delay	1.0 – 10.0 0.05 – 0.5 sec.	Off-1.0-2.0-3.0-4.0-6.0-8.0-10.0 x Frame rating A - B - C - D (I^2t On-Off)
I	Instantaneous trip	1.5 – 12.0	1.5-2.0-4.0-6.0-8.0-10.0-12.0 x Frame rating
G	Ground fault Ground fault delay	0.2 – 1.0 0.1 – 0.8 sec.	Off-0.2-0.3-0.4-0.6-0.8-0.9-1.0 x Frame rating A - B - C - D

Continuous amperage settings (long time adjustment) — PR211

Frame	Set points								
	0.4	0.5	0.6	0.7	0.8	0.9	0.95	1.0	Setting
600A	240	300	360	420	480	540	570	600	Amps
800A	320	400	480	560	640	720	760	800	Amps

S6 thermal-magnetic breakers, for AC and DC applications

Breaker	IC at 500VDC	Rating	Magnetic trip	2 pole, 600VAC /500DC catalog number	List price	3 pole, 600VAC/DC catalog number	List price
S6N	35kA	600A (420 – 600A) 800A (560 – 800A)	6000A 8000A	S6N600TW-2 S6N800TW-2	**$ 2847** **3842**	S6N600TW S6N800TW	**$ 3608** **4802**
S6H	50kA	600A (420 – 600A) 800A (560 – 800A)	6000A 8000A	S6H600TW-2 S6H800TW-2	**4275** **5275**	S6H600TW S6H800TW	**5271** **6465**
S6L	65kA	600A (420 – 600A) 800A (560 – 800A)	6000A 8000A	S6L600TW-2 S6L800TW-2	**5481** **6476**	S6L600TW S6L800TW	**6482** **7676**

S6
600A / 800A, 600 VAC
100% UL rated, electronic trip type

When applied correctly, UL tested 100% equipment rated breakers may be applied at full rating rather than on the sizing rules of the NEC where breakers and cable are sized based on actual continuous load current divided by 80%. This 100% rating can save the user the cost of larger cable or bus bar. Please consult the NEC for details and other design factors needed for this application.

600A Frame (240 – 600A adjustable continuous range)

Breaker	IC at 480VAC	Trip type	Adjustment	3 pole 600VAC catalog number	List price
S6N	50kA	PR211 PR212 PR212	LI LSI LSIG	S6NQ600BW S6NQ600CW S6NQ600EW	**$ 3969** **5498** **7698**
S6H	65kA	PR211 PR212 PR212	LI LSI LSIG	S6HQ600BW S6HQ600CW S6HQ600EW	**5798** **7327** **9527**
S6L	100kA	PR211 PR212 PR212	LI LSI LSIG	S6LQ600BW S6LQ600CW S6LQ600EW	**7130** **8659** **9869**

800A Frame (320 – 800A adjustable continuous range)

Breaker	IC at 480VAC	Trip type	Adjustment	3 pole 600VAC catalog number	List price
S6N	50kA	PR211 PR212 PR212	LI LSI LSIG	S6NQ800BW S6NQ800CW S6NQ800EW	**$ 5282** **6811** **9011**
S6H	65kA	PR211 PR212 PR212	LI LSI LSIG	S6HQ800BW S6HQ800CW S6HQ800EW	**7112** **8641** **10,841**
S6L	100kA	PR211 PR212 PR212	LI LSI LSIG	S6LQ800BW S6LQ800CW S6LQ800EW	**8444** **9973** **12,173**

Trip settings

Adjustment	Trip function	Range	Individual settings
L	Long time pick-up Long time delay	0.4 – 1.0 3.0 – 18 sec.	0.4-0.5-0.55-0.6-0.65-0.7-0.75-0.8-0.85-0.875-0.9-0.925-0.95-0.975-1.0 x Frame rating PR212 A - B - C - D
S	Short time pick-up Short time delay	1.0 – 10.0 0.05 – 0.5 sec.	Off-1.0-2.0-3.0-4.0-6.0-8.0-10.0 x Frame rating A - B - C - D (I^2t On-Off)
I	Instantaneous trip	1.5 – 12.0	1.5-2.0-4.0-6.0-8.0-10.0-12.0 x Frame rating
G	Ground fault Ground fault delay	0.2 – 1.0 0.1 – 0.8 sec.	Off-0.2-0.3-0.4-0.6-0.8-0.9-1.0 x Frame rating A - B - C - D

S6
600A / 800A

Magnetic only (MCP)

All S6 magnetic only breakers utilize the electronic PR211 trip unit with an adjustable range of 1.5 to 12 times frame rating. Both two and three pole MCPs are 600VAC rated.

Type	Amps	Interruption capacity		Adjustment range	2 pole 600VAC catalog number	List price	3 pole 600VAC catalog number	List price
S6N	600 800	240VAC 480VAC 600VAC	65kA 50kA 25kA	900 – 7200A 1200 – 9600A	S6N600MW-2 S6N800MW-2	**$ 2847** **3842**	S6N600MW S6N800MW	**$ 3608** **4802**
S6H	600 800	240VAC 480VAC 600VAC	150kA 65kA 35kA	900 – 7200A 1200 – 9600A	S6H600MW-2 S6H800MW-2	**4275** **5270**	S6H600MW S6H800MW	**5271** **6465**
S6L	600 800	240VAC 480VAC 600VAC	200kA 100kA 42kA	900 – 7200A 1200 – 9600A	S6L600MW-2 S6L800MW-2	**5481** **6476**	S6L600MW S6L800MW	**6482** **7676**

Molded case switches

Type	Interruption capacity ③		Amps	Magnetic trip	3 pole catalog number	List price
S6H-D	240VAC 480VAC 600VAC 600VDC	200kA 100kA 42kA 50kA	— 600 800 —	— 10,000A 10,000A —	— S6H600DW S6H800DW —	— **$ 3275** **4248** —
Non-UL, switches without overcurrent protection	Withstand rating		400 630 800	none none none	S6D400W S6D630W S6D800W	**3275** **3275** **4248**
	600VAC	15kA				

Neutral current transformer (required for 4 wire GF systems)

Amps	Catalog number	List price
600 800	K6NCT-600 K6NCT-800	**$ 250**

Connection options

Type	Wire range	Amps ②	Set of 2 catalog number	List price	Set of 3 catalog number	List price
CU/AL front lugs CU/AL front lugs	(2) 250kcmil – 500kcmil (3) 2/0 – 400kcmil	600 800	K6TH-2 K6TJ-2 ①	**$ 50** **90**	K6TH ① K6TJ ①	**$ 75** **135**
					Set of 6 catalog number	
CU rear lugs CU rear lugs	(2) 250kcmil – 350kcmil (3) 250 – 350kcmil	600 800	— —	— —	K6THR K6TJR	**150** **170**
Extended front bar Extended front bar	— —	600 800	— —	— —	K6ET-600 K6ET-800	**150** **170**

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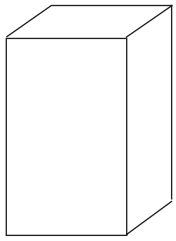
① Includes lug cover.
② Suggested lugs for a circuit breaker up to amps shown. Cable size and type determine maximum amperage.
③ With fuse or MCCB protected circuit.

S7
1200A, 600 VAC
Electronic trip type

S7



H x W x D
15.98" x 8.27" x 5.45"

Standard S7 package includes complete circuit breaker and mounting hardware. Order cable lugs or other connection scheme as a separate item.

General
The S7 breaker family is a 1200A frame utilizing a microprocessor based overcurrent protective trip system. In the 1200A version, the trip unit is adjustable from 480A up to 1200A without the addition of any parts or rating plugs. As standard, the S7 includes adjustable long time function for overload protection and adjustable instantaneous function for short circuit protection.

Versions
To meet all application needs, the S7 is available in various versions:

B = Adjustment LI
C = Adjustment LSI
E = Adjustment LSIG
Q = 100% UL rated
D = Molded case switch
M = Magnetic only (MCP)

Trip functions
These tripping functions are available:

L = Long time
S = Short time
I = Instantaneous
G = Ground fault

Performance level
Each version is also available in different maximum fault interrupting levels

H = High
L = Extra high (IEC only)

Number of poles
In UL/CSA version, the S7 is available as in two pole or three pole version, both with the same dimensions. A four pole version is also available in a UL/IEC form. For price estimate, add 35% to list price of selected three pole, contact ABB Control.

Accessory mounting
Internal accessories are UL/CSA approved for both factory or field installation. Accessories require control cable connectors. Shunt trips or UVR's mount in the left cavity. Auxiliary or bell alarm switches mount in the right cavity.

Reverse feeding
All versions of the S7 family are suitable for reverse feed applications.

Molded case switches
UL489 switches include no overcurrent protection except for a high instantaneous trip mechanism for self protection. IEC type molded case switches with no trip protection are also available.

UL/CSA Interrupting capacity (kA RMS)
UL489 / CSA C22.2

Voltage	H	
240VAC	100	
480VAC	65	
600VAC	50	

IEC-947 Interrupting capacity (kA RMS)

Voltage	H	L
230VAC	100	200
380/400/415VAC	65	100
440VAC	55	80
500VAC	45	70
690VAC	25	35

① Consult factory

S7
1200A, 600 VAC
Electronic trip type

The S7 breaker family uses two available microprocessor based internal trip units. The standard **PR211** trip unit includes adjustments for long time current pick-up and instantaneous current trip point.

The optional **PR212** trip unit includes adjustments for long time current pick-up/ delay, short time pick-up/delay, I^2t (on/off), instantaneous current trip point and further optional ground fault protection.

1000A Frame (400 – 1000A adjustable continuous range)

Breaker	IC at 480VAC	Trip type	Adjustment	2 pole, 600VAC catalog number	List price	3 pole, 600VAC catalog number	List price
S7H	65kA	PR211 PR212 PR212	LI LSI LSIG	S7H1000BW-2 S7H1000CW-2 —	**$ 6959** **8039** —	S7H1000BW S7H1000CW S7H1000EW	**$ 7724** **8804** **10,604**

1200A Frame (480 – 1200A adjustable continuous range)

Breaker	IC at 480VAC	Trip type	Adjustment	2 pole, 600VAC catalog number	List price	3 pole, 600VAC catalog number	List price
S7H	65kA	PR211 PR212 PR212	LI LSI LSIG	S7H1200BW-2 S7H1200CW-2 —	**$ 6959** **8039** —	S7H1200BW S7H1200CW S7H1200EW	**$ 7724** **8804** **10,604**

Trip settings

Adjustment	Trip function	Range	Individual settings
L	Long time pick-up Long time delay	0.4 – 1.0 3.0 – 18 sec.	0.4-0.5-0.55-0.6-0.65-0.7-0.75-0.8-0.85-0.875-0.9-0.925-0.95-0.975-1.0 x Frame rating PR212 A - B - C - D
S	Short time pick-up Short time delay	1.0 – 10.0 0.05 – 0.5 sec.	Off-1.0-2.0-3.0-4.0-6.0-8.0-10.0 x Frame rating A - B - C - D (I^2t On-Off)
I	Instantaneous trip	1.5 – 12.0	1.5-2.0-4.0-6.0-8.0-10.0-12.0 x Frame rating
G	Ground fault Ground fault delay	0.2 – 1.0 0.1 – 0.8 sec.	Off-0.2-0.3-0.4-0.6-0.8-0.9-1.0 x Frame rating A - B - C - D

Continuous amperage settings (long time adjustment) – PR211

Frame	Set points								
	0.4	0.5	0.6	0.7	0.8	0.9	0.95	1.0	Setting
1000A	400	500	600	700	800	900	950	1000	Amps
1200A	480	600	720	840	960	1080	1140	1200	Amps

① Consult factory.

S7
1200A, 600VAC
UL 100% rated

When applied correctly, UL tested 100% equipment rated breakers may be applied at full rating rather than on the sizing rules of the NEC where breakers and cable are sized based on actual continuous load current divided by 80%. This 100% rating can save the user the cost of larger cable or bus bar. Please consult the NEC for details and other design factors needed for this application.

1000A Frame (400 – 1000A adjustable continuous range)

Breaker	IC at 480VAC	Trip type	Adjustment	3 pole catalog number	List price
S7H	65kA	PR211 PR212 PR212	LI LSI LSIG	S7HQ1000BW S7HQ1000CW S7HQ1000EW	**$ 8495** **9684** **11,664**

1200A Frame (480 – 1200A adjustable continuous range)

Breaker	IC at 480VAC	Trip type	Adjustment	3 pole catalog number	List price
S7H	65kA	PR211 PR212 PR212	LI LSI LSIG	S7HQ1200BW S7HQ1200CW S7HQ1200EW	**$ 8495** **9684** **11,664**

Trip settings

Adjustment	Trip function	Range	Individual settings
L	Long time pick-up Long time delay	0.4 – 1.0 3.0 – 18 sec.	0.4-0.5-0.55-0.6-0.65-0.7-0.75-0.8-0.85-0.875-0.9-0.925-0.95-0.975-1.0 x Frame rating PR212 A - B - C - D
S	Short time pick-up Short time delay	1.0 – 10.0 0.05 – 0.5 sec.	Off-1.0-2.0-3.0-4.0-6.0-8.0-10.0 x Frame rating A - B - C - D (I^2t On-Off)
I	Instantaneous trip	1.5 – 12.0	1.5-2.0-4.0-6.0-8.0-10.0-12.0 x Frame rating
G	Ground fault Ground fault delay	0.2 – 1.0 0.1 – 0.8 sec.	Off-0.2-0.3-0.4-0.6-0.8-0.9-1.0 x Frame rating A - B - C - D

① Consult factory.

Magnetic only (MCP)

All S7 magnetic only breakers utilize the electronic PR211 trip unit with an adjustable range of 1.5 to 12 times frame rating. Both two and three pole MCPs are 600VAC rated.

Type	Amps	Interruption capacity		Adjustment range	2 pole catalog number	List price	3 pole catalog number	List price
S7H	1000 1200	240VAC 480VAC 600VAC	100kA 65kA 50kA	1500 – 12,000A 1800 – 14,400A	S7H1000MW-2 S7H1200MW-2	**$ 6959**	S7H1000MW S7H1200MW	**$ 7724**

Molded case switches

Type	Interruption capacity ②		Amps	Magnetic trip	3 pole catalog number	List price
S7H-D	240VAC 480VAC 600VAC 600VDC	100kA 65kA 50kA 12kA	1000 1200	20,000A 20,000A	S7H1000DW S7H1200DW	**$ 7300**
Non-UL, switches without overcurrent protection	Withstand rating 600VAC	25kA	1000 1250	— —	S7D1000W S7D1250W	

Neutral current transformer (required for 4 wire GF systems)

Amps	Catalog number	List price
1000 1200	K7NCT-1000 K7NCT-1200	**$ 250**

Connection options

Type	Wire range	Amps ①	Set of 2 catalog number	List price	Set of 3 catalog number	List price
CU/AL front lugs	(4) 4/0 – 500kcmil	1200	K7TK-2	**$ 120**	K7TK	**$ 180**
Extended front bar	—	1200	—	—	Set of 6 catalog number K7ET-1250	**240**

① Suggested lugs for a circuit breaker up to amps shown. Cable size and type determine maximum amperage.
② With fuse or MCCB protected circuit.

S8
1600 / 2000 / 2500A
Insulated case circuit breaker

Description

- Insulated case type molded case circuit breaker with manually operated stored energy mechanism. Optional electric charging motor available
- Three cycle closing time for use in generator synchronizing applications.
- Electric spring charging mechanism rated for over 5,000 operations
- Three different frame ratings, 1600, 2000 and 2500 amperes. All are same compact physical size.
- Solid state trip units are available in four different configurations including adjustments for long time, short time, instantaneous and ground fault.
- Standard interrupting rating of 100kA at 480VAC.
- Short time withstand rating of 35kA at 600VAC for one second when breaker ordered with adjustable short time trip.
- Breaker includes charging handle for manual energizing of closing/opening springs
- Built-in ground fault (LSIG) for use with four-wire systems requires neutral GF sensor. Meets NEC ground fault requirements for service entrance applications.
- Internal accessories include electric charging motor, shunt trips, a combination auxiliary/bell alarm switch, and an undervoltage release.
- Breakers are suitable for use in reverse feed applications.
- Wide range of adjustments on trip settings, trip unit includes cover to prevent tampering.
- Front indicators for contact position.
- Uses convenient mounting pads for ease of installation in enclosures.
- Internal accessories are prewired to terminal block mounted on right side of breaker.
- Trip signal contact option indicates when breaker has tripped due to overcurrent.
- Canadian Standards Association certification under C22.2 No. 5 under File LR90467 for both breakers and internal accessories.
- In compliance with IEC947 including 690VAC. Breakers are labeled with both UL/CSA and IEC ratings.
- Breakers are Underwriters Laboratories listed under Standard UL 489 for molded case circuit breakers per File E93565, internal accessories are per File E116596.

S8 2500A

Catalog number information

S8V **16** **E** **W** **X** **X** **X** **X** **X** **X**

Frame size

Current rating
16 - 1600A
20 - 2000A
25 - 2500A

Trip
C - LSI
E - LSIG
M - I
D - Molded case switch

Connection scheme
W - Without connectors
R - Rear connectors, line & load
L - Cable terminals, line & load
D - Rear connectors, line side only
E - Rear connectors, load side only
S - Cable terminals, line side only
V - Cable terminals, load side only
H - Cable terminals, line side; rear connectors, load side
J - Rear connectors, line side; cable terminals, load side
M - K8TM lugs, line and load side

Closing coil
1 - 480VAC
2 - 240VAC
3 - 208VAC
4 - 120VAC
5 - 250VDC
6 - 125VDC
7 - 48VDC
8 - 24VAC/VDC
0 - None

Contacts
A - Aux switches
B - Trip Signal
P - Both
0 - None

Motor
2 - 240,208VAC/250VDC
4 - 120VAC/125VDC
7 - 48VDC
8 - 24 – 30 VAC/VDC
0 - None

Shunt trip
1 - 480VAC
2 - 240,208VAC/250VDC
3 - 24VAC/30VDC
4 - 120VAC/125VDC
7 - 48VAC/48VDC
8 - 24VDC
0 - None

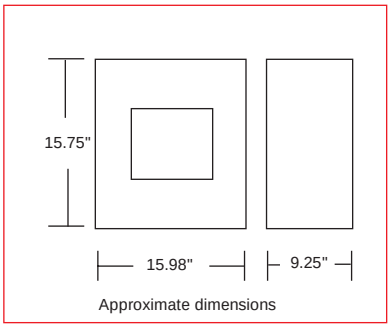
UV release
1 - 480VAC
2 - 240VAC
4 - 120VAC
5 - 250VDC
6 - 125VDC
7 - 48VDC
8 - 24VDC
0 - None

Accessories
D - Locking button device (open)
L - Key lock (open)
X - None

Breaker catalog numbers

The breaker catalog number must be completed. Please note that variations can affect price.

S8
1600 / 2000 / 2500A
Insulated case circuit breaker



Approximate dimensions

Description

Breaker is shipped complete with installed trip unit and accessories. Cable terminals or rear T connectors can be included if desired. For four-wire systems an external neutral ground fault sensor must be ordered separately.

Trip functions

L – Long time pick-up and delay
S – Short time pick-up and delay
I – Instantaneous trip
G – Ground fault pick-up and delay

3 pole, 600VAC maximum ①

Maximum continuous rating				1600A		2000A		2500A	
Breaker	IC at 480VAC	Trip type	Adjustment	Catalog number	List price	Catalog number	List price	Catalog number	List price
S8V	100kA	PR212	LSI	S8V16CW	**$ 12,540**	S8V20CW	**$ 14,427**	S8V25CW	**$ 21,561**
			LSIG	S8V16EW	**14,505**	S8V20EW	**16,561**	S8V25EW	**24,487**
			I	S8V16MW	**11,267**	S8V20MW	**12,988**	S8V25MW	**20,916**
			MCS	S8V16DW	**9620**	S8V20DW	**10,999**	S8V25DW	**16,267**

UL/CSA Interrupting capacity (kA RMS)

UL489 / CSA C22.2

Voltage	V
240VAC	125
480VAC	100
600VAC	85
600VDC ②	25

IEC-947 Interrupting capacity (kA RMS)

Voltage	V
230VAC	120
300/400/415VAC	120
440VAC	100
500VAC	70
690VAC	50

Trip settings

Adjustment	Trip function	Range	Individual settings
L	Long time pick-up Long time delay	0.4 – 1.0 3.0 – 18 sec.	0.4-0.5-0.6-0.7-0.8-0.9-0.95-1.0 x Frame rating PR212 A - B - C - D
S	Short time pick-up Short time delay	1.0 – 10.0 0.05 – 0.5 sec.	Off-1.0-2.0-3.0-4.0-6.0-8.0-10.0 x Frame rating A - B - C - D (I^2t On-Off)
I	Instantaneous trip	1.5 – 12.0	1.5-2.0-4.0-6.0-8.0-10.0-12.0 x Frame rating
G	Ground fault Ground fault delay	0.2 – 1.0 0.1 – 0.8 sec.	Off-0.2-0.3-0.4 x Frame rating A - B - C - D

Continuous amperage settings (long time adjustment)

Frame	Set points								
	0.4	0.5	0.6	0.7	0.8	0.9	0.95	1.0	Setting
1600A	640	800	960	1120	1280	1440	1520	1600	Amps
2000A	800	1000	1200	1400	1600	1800	1900	2000	Amps
2500A	1000	1250	1500	1750	2000	2250	2375	2500	Amps

UL 100% equipment rated circuit breakers

Circuit breakers and cable are sized per the National Electric Code on a basis of actual continuous load current divided by 80%. For example, a 360 ampere load should be connected by cable capable of handling 450 amperes (360A / 0.80 = 450A) and therefore be protected by a 450 ampere rated circuit breaker. Other factors may need to be considered when sizing breakers in special applications.

When applied correctly, UL-tested 100% equipment rated breakers may be applied at full rating, therefore saving the user the cost of larger cable or bus. Using the example above, the 360 ampere load could be used with cable capable of handling 360 amperes (360A / 1.00 = 360A) and only a 400 ampere rated circuit breaker (400A is next available size CB).

1600A, S8 Frame
100% rated

Catalog number	List price
S8VQ16CW	**$ 13,168**
S8VQ16EW	**15,231**

2000A, S8 Frame
100% rated

Catalog number	List price
S8VQ20CW	**$ 15,148**
S8VQ20EW	**17,390**

① Three pole breakers are listed and approved for use in two pole applications with center-pole not connected.
② Applies to MCS only.

S8
1600A, 2000A & 2500A
Accessories

Internal accessories
(Must be factory mounted for UL/CSA)

Item	Type	Factory installed catalog number suffix	List price
Closing coil	480VAC 240VAC 208VAC 120VAC 250VDC 125VDC 48VDC 24VAC/VDC	1 2 3 4 5 6 7 8	**$ 575**
Electric motor (inc. spring charged signal contact)	240,208VAC & 250VDC 120VAC/125VDC 48VDC 24 – 30VAC/VDC	2 4 7 8	**3217**
Shunt trip	480VAC 240,208VAC & 250VDC 24VAC/30VDC 120VAC/125VDC 48VAC/48VDC 24VDC	1 2 3 4 7 8	**518**
Undervoltage release	480VAC 240VAC 120VAC 250VDC 125VDC 48VDC 24VDC	1 2 4 5 6 7 8	**518**
Aux. contacts	2A/1B	A	**396**
Trip signal	1A/1B	B	**192**
Combo. aux. & trip contacts	2A/1B Aux & 1A/1B Trip	P	**588**
Padlockable button cover (open)	—	D	**144**
Key lock (open)	—	L	**155**

Connection accessories (includes sets of 3)

Item	Type	Catalog number	List price
Cable terminals			
1600A Max.	1/0 – 750kcmil (4)	K8TL	**$ 274**
2500A Max.	1/0 – 750kcmil (6)	K8TM	**315**
Rear T conn.	2500A Max.	K8RT2500	**855**

Neutral ground fault current transformer

Item	Type	Catalog number	List price
Ground Fault Neutral CT	1600A 2000A 2500A	K8NCT-1600 K8NCT-2000 K8NCT-2500	**$ 888**

Note: Neutral GF CT required for proper GF operation.

Door flange

Item	Catalog number	List price
Face plate	K8FP	**$ 25**

Closing coil
Required for closing breaker electrically, the coil voltage must be specified at the time of order entry.

Internal accessory ratings

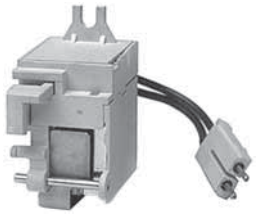
Accessory type	Voltage	Rating
Shunt trip	All	100VA/120Watts
Undervoltage releases	AC/DC	30VA (12 Watts/ 10VA (4 Watts)
Auxiliary contacts	240VAC 125VDC 250VDC	10A Max. 0.3A Max. 0.15A Max
Closing coil	AC/DC	30VA / 40VA

Stored energy electric motor operators

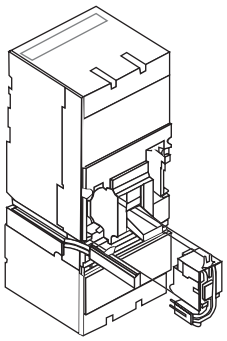
E.O.	Type	Inrush (VA)	Normal (watts)	Closing time	Opening time	Resetting time
MS8	Stored energy	1000	230	0.05s	0.035s	9.0s

Mechanical life of 10,000 cycles at 20 operations per hour.

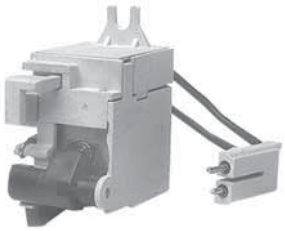
Electrical accessories
Shunt trip, undervoltage release
S3 – S7



K5S1



S5 with K5S2



K5U1

K6C-SUP

Shunt trips

Voltage	Factory installation		Field installation		
	Catalog number suffix ①	List price adder	Catalog numbers S3 – S4 – S5	S6 – S7	List price
480VAC/250VDC	S1		K5S1	K7S1	
240VAC	S2		K5S2	K7S2	
120VAC/125VDC	S4	**$ 430**	K5S4	K7S4	**$ 415**
48VDC	S7		K5S7	K7S7	
24VAC/VDC	S8		K5S8	K7S8	
12VDC	S9		K5S9	K7S9	

Low power shunt trips

Voltage	Factory installation		Field installation		
	Catalog number suffix ①	List price adder	Catalog numbers S3 – S4 – S5	S6 – S7	List price
24VDC	SA	**$ 430**	K5SA	K7SA	**$ 415**
120VAC	SB		K5SB	K7SB	

For remote opening of circuit breaker and includes internal cut-off switch to protect solenoid. All shunt trips are left pole mounted and can not be used with UVRs. Except for 12VDC, all shunt trips are approved for use in GF systems. Shunt trips must be ordered with correct connector.

Shunt trip connectors (required)

Type circuit breaker	Voltage	Factory installation ①	Field kit catalog number S3 – S4 – S5 – S6	Field kit catalog number S7	List price
Fixed mounted	All	included	K6C-SU	K7C-SU	**$ 15**
Plug-in/Draw-out	All	included	K6C-SUP	K7C-SUP	

Electrical specifications – shunt trips (standard)

V	24, 120, 240, 480VAC ~ 50/60 Hz 12, 24, 48, 125, 250 VDC –
For S3-S5 P For S6-S7	100 VA~/120W– Instantaneous duty 150 VA~/150W–

Undervoltage releases

Voltage	Factory installation		Field installation		
	Catalog number suffix ①	List price adder	Catalog numbers S3 – S4 – S5	S6 – S7	List price
480VAC	U1		K5U1	K7U1	
240VAC	U2		K5U2	K7U2	
120VAC	U4		K5U4	K7U4	
24VAC	U3	**$ 430**	K5U3	K7U3	**$ 415**
250VDC	U5		K5U5	K7U5	
125VDC	U6		K5U6	K7U6	
48VDC	U7		K5U7	K7U7	
24VDC	U8		K5U8	K7U8	

Will trip CB when connected voltage drops to 35-70% of UVR voltage rating. Will allow CB to close (ON) when voltage is approximately 85% of rated voltage. All UVRs are left pole mounted and can not be used with shunt trips. UVRs must be ordered with correct connector.

Undervoltage release connectors (required)

Type circuit breaker	Voltage	Factory installation ①	Field kit catalog number S3 – S4 – S5 – S6	Field kit catalog number S7	List price
Fixed mounted	All	included	K6C-SU	K7C-SU	**$ 15**
Plug-in/Draw-out	All	included	K6C-SUP	K7C-SUP	

Electrical specifications – UVR & low power shunt trips

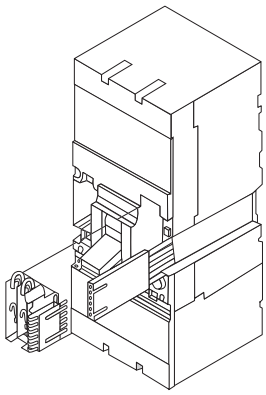
V	24, 120, 240, 480 VAC ~ 50/60 Hz 24, 48, 125, 250 VDC –
For S3-S5 P For S6-S7	6 VA~/3W– Continuous duty 10 VA~/4W–

① For factory installation add suffix given to end of circuit breaker catalog number per accessory format.

Electrical accessories
Auxiliary contacts
S3 – S7


K5AS


K6C-ABP


S5 with K6C-AB

Auxiliary contacts — S3 – S7

Contacts	Factory installation		Field installation		
	Catalog number suffix ①	List price adder	Catalog numbers S3 – S4 – S5	Catalog numbers S6 – S7	List price
2 Form Cs	A	**$ 275**	K5AS	K7AS	**$ 260**
1 BA & 1 C 1 B BA & 1A+1B	BA BA3	**365**	K5BA —	K7BA K7BA-3	**350**

The auxiliary contacts are accessory contacts for the indication of circuit breaker open-closed or tripped. Bell alarm contacts (B.A.) can be used to indicate circuit breaker tripping. All contacts are right pole mounted.

Auxiliary contact connectors (required) — S3 – S7

Type circuit breaker	Voltage	Factory installation①	Field kit catalog number S3 – S4 –- S5 – S6	Field kit catalog number S7	List price
Fixed mounted Plug-in/Draw-out	All All	included included	K6C-AB K6C-ABP	K7C-AB K7C-ABP	**$ 15**

Electrical specifications

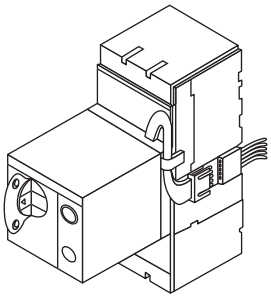
Voltage	Maximum contact amperage rating
125 VDC	0.3 A
250 VDC	0.15 A
250 VAC	6 A

N.O. = contact is open as circuit breaker is open
N.C. = contact is closed when circuit breaker is open
B.A. = will open/close only when circuit breaker trips

① For factory installation add suffix given to end of circuit breaker catalog number per accessory format.
② Not UL approved for field installation.

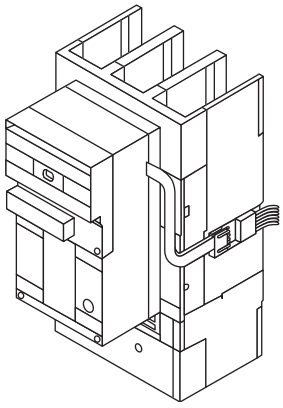
Electrical accessories
Motor operators, stored energy motor operators S3 – S7


K5M2


S4 with K5M2


K6C-M


K6M2


S7 with K7M4

Motor operator

Voltage	Catalog number S3 – S4 – S5	List price
240VAC/250VDC 120VAC/125VDC 48VDC 24VDC	K5M2 K5M4 K5M7 K5M8	**$ 678**

For remote control of circuit breaker opening and closing.
Complete with manual operating lever, padlock device and emergency opening push-button.
When ordering the connector always specify type and version of the circuit-breaker.
The following options are also available:
– key lock for open position
– key lock for open position of two or more circuit breakers (using the same key for groups of circuit breakers)

Motor operator connectors (required)

Type circuit breaker	Voltage	Field kit catalog number S3 – S4 – S5	List price
Fixed mounted Plug-in/Draw-out	All All	K6C-M K6C-MP	**$ 15**

Electrical specifications

V	120, 240VAC ~ 50/60 Hz 24, 48, 125, 250 VDC –
P inrush P normal Close time	500 VA~/500W– 350 VA~/500W– 0.1 s
Open time	0.1 s

Stored-energy motor operator

Voltage	Catalog number S6	Catalog number S7	List price
240VAC/250VDC 120VAC/125VDC 48VDC 24VDC	K6M2 K6M4 K6M7 K6M8	K7M2 K7M4 K7M7 K7M8	**$ 2407**

- Stored-energy motor operator with springs automatically pre-loaded by motor.
- Complete with shunt opening and closing release, and compartment door flange.
- When ordering the connector always specify type and version of the circuit-breaker.
- The following options are also available:
  – key lock for open position
  – key lock for open position of two or more circuit-breakers (using the same key for groups of circuit-breakers).

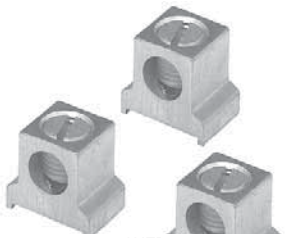
Stored-energy motor operator connectors (required)

Type circuit breaker	Voltage	Field kit catalog number S6	Field kit catalog number S7	List price
Fixed mounted Plug-in/Draw-out	All All	K6C-M K6C-MP	K7C-M K7C-MP	**$ 15**

Electrical specifications

V	120, 240 VAC ~ 50/60 Hz 24, 48, 125, 250 VDC –
P inrush P normal Close time	660 VA~/600W– 180 VA~/180W– 0.09 s
Open time	1.2 s
Reset time	2.0 s

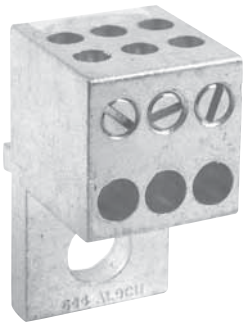
External accessories
Lugs and termination kits
S3 – S7


K4TB


K4ET-250


K4TES


K4TER


K4TN

Standard cable lug kits

For breakers	Amps①	Wire range	Set of 2 catalog number	List price	Set of 3 catalog number	List price
S3	60	14AWG – 2AWG	K3TA-2	**$ 4**	K3TA	**$ 6**
S3 – S4	100	14AWG – 1/0	K4TB-2	**4**	K4TB	**6**
S3 – S4	150	2AWG – 4/0	K4TC-2	**4**	K4TC	**6**
S3 – S4 – S5	225	4AWG – 300kcmil	K4TD-2	**10**	K4TD	**15**
S4	250	6AWG – 350kcmil	K4TE-2	**20**	K4TE	**30**
S5	300	250kcmil – 500kcmil	K5TF-2	**30**	K5TF	**45**
S5	400	(2) 3/0 – 250kcmil	K5TG-2②	**30**	K5TG②	**45**
S6	600	(2) 250kcmil – 500kcmil	K6TH-2	**50**	K6TH	**75**
S6	800	(3) 2/0 – 400kcmil	K6TJ-2②	**90**	K6TJ②	**135**
S7	1200	(4) 4/0 – 500kcmil	K7TK-2	**120**	K7TK	**180**

Standard cable lugs, for use on line and load side of circuit breaker. Suitable for use with Cu or Al. Special versions available with taps and screws for control wire connection. Note: S6 and S7 lugs are Al9Cu (90°C); all others Al7Cu (75°C).

Standard cable lug kits with control power taps

For breakers	Amps①	Wire range	Set of 2 catalog number	List price	Set of 3 catalog number	List price
S3 – S4	100	14AWG – 1/0	K4TB-2C	**$ 8**	K4TBC	**$ 12**
S3 – S4	150	2AWG – 4/0	K4TC-2C	**8**	K4TCC	**12**
S3 – S4 – S5	225	4AWG – 300kcmil	K4TD-2C	**14**	K4TDC	**21**
S4	250	6AWG – 350kcmil	K4TE-2C	**24**	K4TEC	**36**
S5	300	250kcmil – 500kcmil	K5TF-2C	**34**	K5TFC	**51**
S5	400	(2) 3/0 – 250kcmil	K5TG-2C②	**34**	K5TGC②	**51**
S6	600	(2) 250kcmil – 500kcmil	K6TH-2C	**54**	K6THC	**81**
S6	800	(3) 2/0 – 400kcmil	K6TJ-2C②	**94**	K6TJC②	**141**
S7	1200	(4) 4/0 – 500kcmil	K7TK-2C	**124**	K7TKC	**186**

Extended front termination kits

Suitable for use with	Maximum amps	Set of 6 catalog number	List price
S3 – S4	250	K4ET-250	**$ 46**
S5	400	K5ET-400	**114**
S6	630	K6ET-600	**150**
S6	800	K6ET-800	**170**
S7	1250	K7ET-1250	**240**

For adding onto standard circuit breaker front terminals, extending available connection area for user termination. Suitable for spaded cable or bus connection. S3 – S5 include terminal covers.

Saddle cable lug kits (Cu cable only)

Suitable for use with	Max amps	Wire range	Set of 6 catalog number	List price
S3 – S4	250	14AWG – 250kcmil	K4TES	**$ 30**
S5	400	250kcmil – 500kcmil	K5TGS	**90**

These special non-aluminum cable lugs are for use with copper cable. Lugs are intended for use with copper cable or where non-aluminum connectors are required (marine, salt or corrosive environments).

Rear cable lug kits (Cu cable only)

Suitable for use with	Max amps	Wire range	Set of 6 catalog number	List price
S3 – S4	250	6AWG – 250kcmil	K4TER	**$ 30**
S5	400	250kcmil – 500kcmil	K5TGR	**90**
S6	600	(2) 2/0 – 350kcmil	K6THR	**150**
S6	800	(3) 250kcmil – 350kcmil	K6TJR	**170**

For use where cable connection from the back-rear of the breaker is desired.

Distribution cable lug kit

Suitable for use with	Max amps	Wire range	Set of 3 catalog number	List price
S3 – S4	250	(6) #14 - 6	K4TN	**$ 125**
S5	400	(6) #14 - 1/0	K5TGD	**240**

① Suggested lugs for circuit breaker up to amps shown. Cable size and type determine maximum amperes.
② Includes required lug covers.

External accessories
Rotary and variable depth handle operators
S3– S7


K5RH


OHB65J10


OHB95J10


OHB125J10


K5VD-M, K5VD-S12, K5VD-H

Rotary handle operating mechanism

Frame	Catalog number	List price
S3 – S4 – S5	K5RH	**$ 108**
S6	K6RH	**124**
S7	K7RH	**145**

Mounts directly onto breaker. Includes door interlock to prevent CB door opening while CB is in ON position. Padlock provision included to padlock CB in open position. Can also be key locked with optional cylinder lock assembly. Door interlock bracket must be ordered separately, if required. See page 15.62.

Variable depth rotary handles

New pistol type 1, 3R, 12

Frame	Catalog number mechanism	List price	Shaft catalog number (length in inches)	List price	Handle catalog number (length in inches)	List price
S3–S4–S5	K5VD-M	**49**	OXP10X148 (5.8)	**$ 24 26 32**	OHB95J10 (3.7) OHG95J10 (3.7)	**80**
S6	K6VD-M	**80**	OXP10X225 (8.9) OXP10X500 (19.7)		OHB125J10 (4.9) OHG125J10 (4.9)	**90**
S7	K7VD-M	**80**			OHB175J10 (6.9) OHG175J10 (6.9)	**100**

Pistol type 4, 4X

Frame	Catalog number mechanism	List price	Shaft catalog number (length in inches)	List price	Handle catalog number (length in inches)	List price
S3–S4–S5	K5VD-M	**49**	OXP10X148 (5.8)	**$ 24 26 32**	OHB95L10 (3.7) OHG95L10 (3.7)	**120**
S6	K6VD-M	**80**	OXP10X225 (8.9) OXP10X500 (19.7)		OHB125L10 (4.9) OHG125L10 (4.9)	**130**
S7	K7VD-M	**80**			OHB175L10 (6.9) OHG175L10 (6.9)	**140**

Square type 1

S3–S4–S5	K5VD-M	**49**	K5VD-S12	**$ 24**	K5VD-H	$ **25**
S6	K6VD-M	**80**	K7VD-S20	**27**	K7VD-H	**28**
S7	K7VD-M	**80**			K7VD-H	**28**

NOTE: Complete assembly requires a mechanism, shaft and handle.

Variable depth shaft support

For frames	Catalog number	List price
S3 – S4 – S5	K5VD-LSS	**$ 25**

New pistol handle catalog number explanation

OHB 125 J 10

- 10 — Shaft size (diameter in mm)
- J — J = Type 1, 3R, 12; L = Type 1, 3R, 4, 4X, 12
- 125 — Physical size (length in mm)
- OHB — Color: B = black, G = gray, Y = yellow / red

External accessories
Flange handle operators
S3 – S6


K7FHD-HS12

Flange handle
Solid shaft linkage

Breaker	NEMA type	Complete handle kit	List price	Mechanism only	List price	Shaft only	Shaft length	List price	Handle only	List price
S3	1,3R,12	K3FHD-12S12 K3FHD-17S12 K3FHD-22S12	**240** **248** **255**	K3FHD-M	**128**	K7FHD-S12 K7FHD-S17 K7FHD-S22	12 17 22.5	**19** **27** **34**	K7FHD-HS12	**93**
	4, 4X	K3FHD-12S4 K3FHD-17S4 K3FHD-22S4	**280** **288** **295**			K7FHD-S12 K7FHD-S17 K7FHD-S22	12 17 22.5	**19** **27** **34**	K7FHD-HS4	**133**
S4	1,3R,12	K4FHD-12S12 K4FHD-17S12 K4FHD-22S12	**240** **248** **255**	K4FHD-M	**128**	K7FHD-S12 K7FHD-S17 K7FHD-S22	12 17 22.5	**19** **27** **34**	K7FHD-HS12	**93**
	4, 4X	K4FHD-12S4 K4FHD-17S4 K4FHD-22S4	**280** **288** **295**			K7FHD-S12 K7FHD-S17 K7FHD-S22	12 17 22.5	**19** **27** **34**	K7FHD-HS4	**133**
S5	1,3R,12	K5FHD-12S12 K5FHD-17S12 K5FHD-22S12	**240** **248** **255**	K5FHD-M	**128**	K7FHD-S12 K7FHD-S17 K7FHD-S22	12 17 22.5	**19** **27** **34**	K7FHD-HS12	**93**
	4, 4X	K5FHD-12S4 K5FHD-17S4 K5FHD-22S4	**280** **288** **295**			K7FHD-S12 K7FHD-S17 K7FHD-S22	12 17 22.5	**19** **27** **34**	K7FHD-HS4	**133**
S6	1,3R,12	K6FHD-12S12 K6FHD-17S12 K6FHD-22S12	**523** **531** **538**	K6FHD-M	**411**	K7FHD-S12 K7FHD-S17 K7FHD-S22	12 17 22.5	**19** **27** **34**	K7FHD-HS12	**93**
	4, 4X	K6FHD-12S4 K6FHD-17S4 K6FHD-22S4	**563** **571** **578**			K7FHD-S12 K7FHD-S17 K7FHD-S22	12 17 22.5	**19** **27** **34**	K7FHD-HS4	**133**

Available as complete kits including flange handle, shaft and breaker operating mechanism. Mechanism mounts directly onto breaker and shaft can be cut to the desired length for the breaker enclosure. Door is interlocked with the handle when the breaker is in the closed (ON) position; handles include interlock defeater for emergency override. Handle can be padlocked in the open (OFF) position. Can be field converted for left hand mounting.

Door hardware kits — Solid shaft linkage & cable operated

Item	Catalog number	List price
Door hardware kit, right hand, 2 point latch for enclosures less than 40 inches high	FH-DHK	**$ 150**
Roller for 3 point latch, add to FH-DHK	FH-3RL	**30**

Enclosure depths
Minimum

Breaker	Depth (inches)
S3 - S5	10
S6	11

Maximum

For maximum depth, add 4 inches to the shaft length

① Cable not included.

External accessories
Flange handle operators
S3 – S7

K7FCH

Flange handle
Cable linkage

Breaker	NEMA type	Mechanism only	List price	Cable only	Cable length	List price	Handle only	List price
S3-S4	1,3R,12	K4FPM	**110**	K5C036	36" (91cm)	**114**	K5FCH	**213**
				K5C048	48" (122cm)	**146**		
	4, 4X	K4FPM	**110**	K5C060	60" (152cm)	**160**	K5FCH4	**243**
				K5C072	72" (183cm)	**175**		
S5	1,3R,12	K5FPM	**128**	K5C084	84" (213cm)	**204**	K5FCH	**213**
				K5C096	96" (244cm)	**221**		
	4, 4X	K5FPM	**128**	K5C108	108" (274cm)	**238**	K5FCH4	**243**
				K5C120	120" (305cm)	**256**		
S6	1,3R,12	K6FPM	**220**	K7C048	48" (122cm)	**190**	K7FCH	**310**
	4, 4X	K6FPM	**220**	K7C060	60" (152cm)	**220**	K7FCH4	**415**
				K7C072	72" (183cm)	**256**		
S7	1,3R,12	K7FPM	**220**	K7C084	84" (213cm)	**270**	K7FCH	**310**
				K7C096	96" (244cm)	**320**		
	4, 4X	K7FPM	**220**	K7C120	120" (305cm)	**350**	K7FCH4	**415**

Notes: For complete assembly; mechanism, cable and handle are required.
All cables mount onto the right side of the breaker.
Handle can be mounted on the right or left side.

Door hardware kits — S3 - S7 Cable operated

Item	Catalog number	List price
Door hardware kit, right hand, 2 point latch for enclosures less than 40 inches high	KDH2R	**$ 200**
Door hardware kit, right hand, 3 point latch for enclosures 40 inches high or greater	KDH3R	**225**

Enclosure depths
Minimum

Breaker	Depth (inches)
S3 - S6	8
S7	10

Maximum
Maximum depth is determined by cable length.

External accessories
S3 – S7

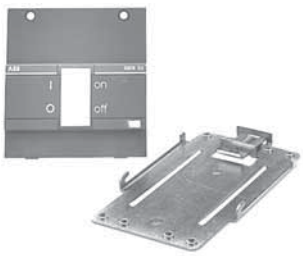
K5LD


K7KL


K6LC


K6LCH


K6LC-S



K3DMB

Front locking device

Item	Catalog number	List price
S3 – S4 – S5	K5LD	$ **14**
S6	K6LD	**16**
S7	K7LD	**20**
S3 – S4 – S5	K5LDW ①	**14**
S6	K6LDW ①	**16**
S7	K7LDW ①	**20**

Mounts directly onto front of CB. Includes padlock device for locking CB in open position. Can be used as a manual handle block, with padlock or with optional key lock accessory. Optional door interlock kit that will prevent CB door from opening while CB is in the closed (ON) position.

Door interlock bracket

Item	Catalog number S3 – S7	List price
Bracket	K7DB	**$ 5**

Key locks

Accessory	Keys	Catalog number		List price
		S3 – S4 – S5	S6 – S7	
Electric operator	different	K5KL-EO	K7KL-EO	**$ 25**
	same	K5KL-EO-2	K7KL-EO-2	
Rotary HM & locking device	different	K7KL	K7KL	
	same	K7KL-2	K7KL-2	

Keyed cylinder locks are available for mounting onto Isomax electric operators, rotary handle mechanisms and front locking devices. Key locks can be for one individual circuit breaker (different keys in each order) or for two circuit breakers using the same key.

Terminal covers for fixed circuit breakers

Frame	Low profile catalog number	List price	High profile catalog number	List price
S3 – S4	K4LC	**8**	K4LCH	**$ 16**
S5	K5LC	**12**	K5LCH	**24**
S6	K6LC	**18**	K6LCH	**32**
S7	K7LC	**40**	—	**–**

Both high and low types are available for fixed circuit-breakers. Covers provide IP40 degree of protection for fixed mounted circuit breakers. Lug covers are required and included as standard with S5 **400A** and S6 **800A** cable lug kits. Covers up to S6 can be sealed with lug cover seal shown in next section.

Terminal cover seals

Suitable for use with breakers	Used with LC covers	List price
S3 – S4 – S5 – S6	K6LC-S	**$ 5**

These screws prevent the terminal covers from being removed.

DIN rail mounting kits

Suitable for use with breakers	Catalog number	List price
S3	K3DMB	**$ 24**
S4	K4DMB	**26**
S5	K5DMB	**38**

Kit consists of mounting bracket to fix S3-S5 breakers onto **75mm DIN rail (EN 50023 rail)** and includes 45mm high front face plate to match up with miniature circuit breakers and manual motor starters. S1 breaker mounts on 35mm DIN rail.

Mechanical interlock plate

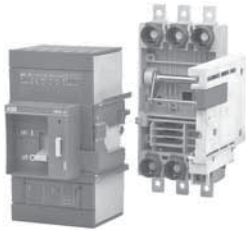
Frame	Horizontal catalog number	List price	Vertical catalog number	List price
S3	K3MI-H	**$ 570**	K3MI-V	**$ 570**
S4	K4MI-H	**570**	K4MI-V	**570**
S5	K5MI-H	**590**	K5MI-V	**590**
S6	K6MI-H	**620**	K6MI-V	**620**
S7	K7MI-H	**630**	K7MI-V	**630**

Provides for mounting of two similar breakers on a single mounting plate. CBs are interlocked via a “walking beam” type interlock, preventing breakers from being ON or closed at the same type. Both breakers can be OFF or tripped. MIP is available in two versions, one with breakers mounted horizontally and then also a version for vertical mounting of breakers.

① Required for drawout breakers.

Accessories
S3 – S7
IEC

K4RC



Rear plug-in & drawout circuit breakers

K7TUT

Rear connected stud kits①

For breakers	Max. amps	Set of 6 catalog number	List price
S3 – S4	250	K4RC	**$ 87**
S5	400	K5RC	**225**
S6	800	K6RC	**280**
S7	1200	K7RC	**340**

Provides means to connect breakers directly onto rear bus bars.

Rear plug-in and draw-out circuit breakers

Isomax breakers are available in both rear plug-in and complete draw-out configurations. Plug-in breakers can be rear bus, front bus or front cable connected and are available up to the S5 400A size. The draw-out configuration uses a unique racking system and is available for all breakers from S3 through S7.

Plug-in (3 pole)①

	Separate kits fixed and movable						Complete plug-in kits Includes both fixed and movable portion			
	Movable kit		Fixed base kit							
Frame	Movable	List price	Front bus	List price	Rear conn.	List price	Front bus	List price	Rear conn.	List price
S3	K4PMK	**203**	K3PFF	**190**	K3PFR	**230**	K3PF	**393**	K3PR	$ **433**
S4	K4PMK	**203**	K4PFF	**203**	K4PFR	**243**	K4PF	**406**	K4PR	**446**
S5	K5PMK	**238**	K5PFF	**278**	K5PFR	**278**	K5PF	**516**	K5PR	**516**

Draw-out (3 pole) ①③

	Separate kits fixed and movable						Complete draw-out kits Includes both fixed and movable portion			
	Movable kit		Fixed base kit							
Frame	Movable	List price	Front bus	List price	Rear conn.	List price	Front bus	List price	Rear conn.	List price
S3	K4WMK	**$ 203**	K3WFF	**$ 230**	K3WFR	**$ 270**	K3WF	**$ 433**	K3WR	**$ 473**
S4	K4WMK	**203**	K4WFF	**283**	K4WFR	**323**	K4WF	**486**	K4WR	**526**
S5	K5WMK	**278**	K5WFF	**318**	K5WFR	**318**	K5WF	**596**	K5WR	**596**
S6 Horiz	K6WMK	**523**	K6WFF	**1346**	K6WFR-H	**1346**	K6WF	**1869**	K6WR-H	**1869**
S6 Vert	K6WMK	**523**	K6WFF	**1346**	K6WFR-V	**1346**	K6WF	**1869**	K6WR-V	**1869**
S7 Horiz	K7WMK	**821**	K7WFF	**2111**	K7WFR-H	**2111**	K7WF	**2932**	K7WR-H	**2932**
S7 Vert	K7WMK	**821**	K7WFF	**2111**	K7WFR-V	**2111**	K7WF	**2932**	K7WR-V	**2932**

Movable kit = parts needed to modify standard CB to movable type.
Fixed base kit = fix mount onto panel.
Ext Fr bus = fixed base with line and load side extended front bus connectors. (FF)
Rear Conn. = fixed base with line and load side rear bus connectors. (FR)
Complete kit = includes all parts required for plug-in or draw-out connection; does not include CB.
Plug-in = open breaker can be physically removed from fixed base without disconnecting cable or bus from fixed base. (P)
Draw-out = also known as withdrawable, breaker can be removed from fixed base via a through the door crank. Includes ON, TEST and OFF position. (W)

Four pole versions (plug-in and/or draw-out)

Take the above list prices times 1.35 for four (4) pole versions and add "-4" to the end of the catalog number.

Draw-out crank

Isomax frames	Catalog number	List price
S3 – S7	K7WCR	**$ 20**

Cable termination kits (3 pole only)①

Compression type cable lug kit used to modify extended front bus connectors for direct cable connection.

Frame	Set of 6	List price
S3	K4FCT	**$ 72**
S4	K4FCT	**72**
S5	K5FCT	**86**

Hand-held test kit (for all electronic trip types)

Isomax frames	Catalog number	List price
S4 – S5 – S6 – S7	K7TUT	**$ 210**

Isomax hand-held test kit is used to both test and exercise microprocessor trip units in breakers S4 through S7. Unit includes test forks that insert into the test plugs on all Isomax microprocessor trip units. Tester generates 15VDC signal that performs diagnostic on electronic trip functions and will confirm test by tripping the CB. Will not test S3 nor any molded case switch versions.

① IEC ratings only.
② Front cable connection.
③ Requires front locking device to prevent drawout while breaker is closed.

Enclosures
Type 1 & 3R/12

Description

Type 1
- General purpose indoor enclosure intended for use in normal environments to provide a degree of protection against contact with enclosed equipment.
- Sheet steel, surface mount.
- Breaker is front-operable and can be padlocked via front hasp.
- Available through 2500A, 600VAC
- UL Listed for use as service entrance equipment (SUSE), per UL file E116374.

Type 3R/12
- Type 3R is intended for outdoor use providing protection against rain, sleet or snow.
- Type 12 is for use in indoor atmospheres to provide a degree of protection against circulating dust, lint, sawdust, falling dirt and dripping non-corrosive liquids.
- Surface-mounted, sheet steel enclosure.
- Breaker can be operated via **separately ordered** handle mechanism; door is interlocked with mechanism.
- Available through 2500A, 600VAC.
- UL Listed for use as service entrance equipment (SUSE), per UL file E116374.

Type 7/9
- Cast from copper-free aluminum (max. 0.025 copper content)
- Stainless steel shotblasted or sandblasted natural finish
- Standard conduit openings in top and bottom
- Breaker is operated from front handle and can be padlocked
- NEC Class I Groups D, Div. 1 & 2
  NEC Class II Groups E, F & G, Div 1 & 2
  NEC Class III
- External machined flange joint design
- Integral cast mounting feet
- Machined flange for ease of hinge installation
- Ground lug
- Cast mounting pan bosses
- All enclosures suitable for drilling & tapping
- UL panel listed per UL File # E183868

Enclosures
Type 1 & 3R/12


S3E-1


S4E-3R12 ③

Enclosures (Price does not include circuit breaker; order as a separate item.) ④

NEMA designation	Breaker type	Enclosure maximum rating AL cables	Enclosure maximum rating CU cables	Approximate dimensions① H x W x D (inches)	Catalog number	List price
Type 1	S3	150A	225A	22 x 12 x 4.5	S3E-1	**235**
	S4	225A	250A	30 x 17.5 x 4.5	S4E-1	**305**
	S5	400A	400A	30 x 17.5 x 4.5	S5E-1	**305**
	S6	800A	800A	44 x 22 x 6	S6E-1	**685**
	S7	1000A	1200A	44 x 22 x 6	S7E-1	**685**
	S8	2500A	2500A	88 x 36 x 24	S8ES250-1	**5285**
Type 3R/12③	S1	100A	100A	14 x 10 x 8.8	S1E-3R12	**305**
	S2 ②	125A	125A	16 x 11 x 8	S2E-3R12	**305**
	S3	150A	225A	22 x 12 x 9	S3E-3R12	**395**
	S4	225A	250A	30 x 17.5 x 9	S4E-3R12	**575**
	S5	400A	400A	30 x 17.5 x 9	S5E-3R12	**575**
	S6	800A	800A	44 x 22 x 11	S6E-3R12	**905**
	S7	1000A	1200A	44 x 22 x 11	S7E-3R12	**905**
	S8	2500A	2500A	88 x 36 x 24	S8ES250-3R12	**5285**

Neutral kits

Breaker type	Neutral cable capacity and wire range	Neutral kit catalog number	List price
S3	Neutral #6-250 kcmil Bonding Lug #14-1/0	S3NK225	**135**
S4	Neutral #6-250 kcmil Bonding Lug #14-1/0 kcmil	S4NK250	**155**
S5	Neutral (2) #6-250 kcmil Bonding Lug #14-1/0 kcmil	S5NK400	**260**
S6	Neutral (2) #2-600 kcmil Bonding Lug #6-250 kcmil	S6NK800	**350**
S7	Neutral (4) #2-600 kcmil Bonding Lug #6-250 kcmil	S7NK1200	**535**
S8	Neutral (6) #1/0-750 kcmil Bonding Lug (2) #2-600 kcmil	—	included

NOTE: The list price adder for factory installation of an enclosed circuit breaker is 50% of the enclosure list price.

① Enclosures may not meet size requirement for UL 100% rated breakers.
② Not UL approved.
③ Variable depth rotary handle must be ordered separately (S1 - S7).
④ Consult ABB for breakers installed in enclosures.

Enclosures
Type 7/9

S5N400BW7

Explosion-proof enclosures
(Price does not include circuit breaker; order as a separate item for factory assembly.)

NEMA designation	Breaker type	Enclosure max. rating	Approximate dimensions H x W x D (inches)	Catalog number suffix	List price adder
Type 7/9	S3	Cu only 100A	17 x 10 x 8.65	7	**$ 2100**
	S3	Cu only 225A	22.5 x 11.5 x 8.77	7	**2850**
	S4	Cu only 250A	25 x 18 x 9.92	7	**4700**
	S5	Cu only 400A	30 x 17 x 9.25	7	**6600**
	S6	Cu only 600A	35 x 17 x 11	7	**8600**
	S6	Cu only 800A	41 x 17 x 11	7	**10,450**
	S7	Cu only 1200A	51 x 17 x 13	7	**22,450**

To order a breaker in an explosion-proof enclosure, add the suffix "7" to the end of the catalog number and add the list price adder to the list price of the breaker.

Example: **S5N400BW7**
S5N400BW breaker.....$ 2151
Explosion proof enclosure.....6600
Total.....$ 8751

Additional options

NEMA 4XStainless steel boltsCaptive boltsDrain

NEMA designation	Breaker type	Enclosure max. rating	Cat. no. adder	List price adder	Cat. no. adder	List price adder	Cat. no. adder	List price adder	Cat. no. adder	List price adder
Type 7/9	S3	Cu only 100A	-X	**$ 130**	-S	**$ 20**	-B	**$ 145**	-D	
	S3	Cu only 225A	-X	**145**	-S	**25**	-B	**170**	-D	
	S4	Cu only 250A	-X	**145**	-S	**45**	-B	**355**	-D	
	S5	Cu only 400A	-X	**175**	-S	**60**	-B	**415**	-D	**$ 110**
	S6	Cu only 600A	-X	**250**	-S	**60**	-B	**465**	-D	
	S6	Cu only 800A	-X	**315**	-S	**60**	-B	**535**	-D	
	S7	Cu only 1200A	-X	**430**	-S	**80**	-B	**600**	-D	

To add additional options, simply add the suffix to the end of the catalog number.

Example: **S5N400BW7XSD**
S5N400BW breaker.....$ 2151
Explosion proof enclosure.....6600
NEMA 4X.....175
Stainless steel bolts.....60
Drain.....110
Total.....$ 9096

Catalog number information — Type 7/9

S4 N 250 B W 7 - 2 xxx

Frame size
S3 = 150 / 225A
S4 = 250A
S5 = 400A
S6 = 600 / 800A
S7 = 1200A

Interrupting rating class
B = Basic (240VAC)
N = Normal
H = High
L = Extra high
D = Special molded case switch

Current rating
015 = 15A
250 = 250A
400 = 400A
600 = 600A
800 = 800A
1200 = 1200A

Trip unit function
B = LI
C = LSI
D = Molded case switch (MCS)
E = LSIG
T = Thermal-magnetic
F = LSIG/K
H = LSIG/D
J = LSIG/DT
K = LSIG/DTK
M = Magnetic only (MCP)

Type connectors
W = None **L** = Lugs

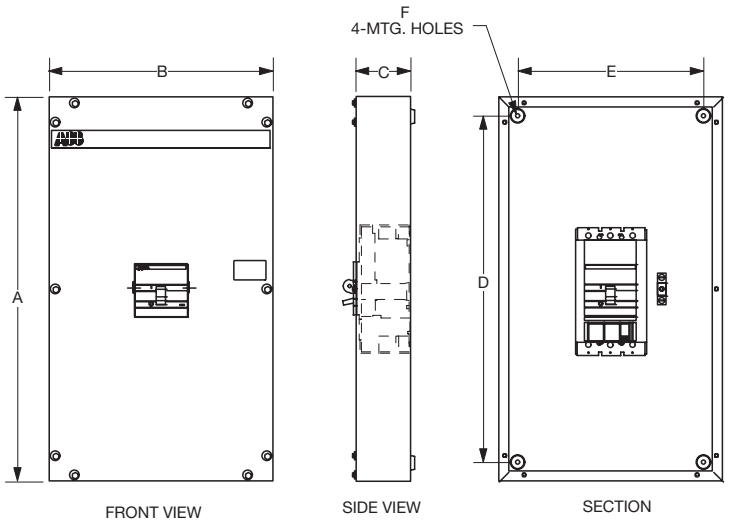
NEMA enclosure 7/9

Number of poles
-2 = 2 pole
-4 = 4 pole
None = 3 pole

Accessories (added in alpha-numeric order)
A = Auxiliary switch
B = Captive bolts
BA = Bell alarm
BA3 = Bell alarm (S6/S7 only)
D = Breather/drain
H = Fixed rotary handle mounted on CB
S_ = Shunt trip with voltage code
S = Stainless steel bolts
U_ = Undervoltage release with voltage code
X = NEMA 7/9/4X

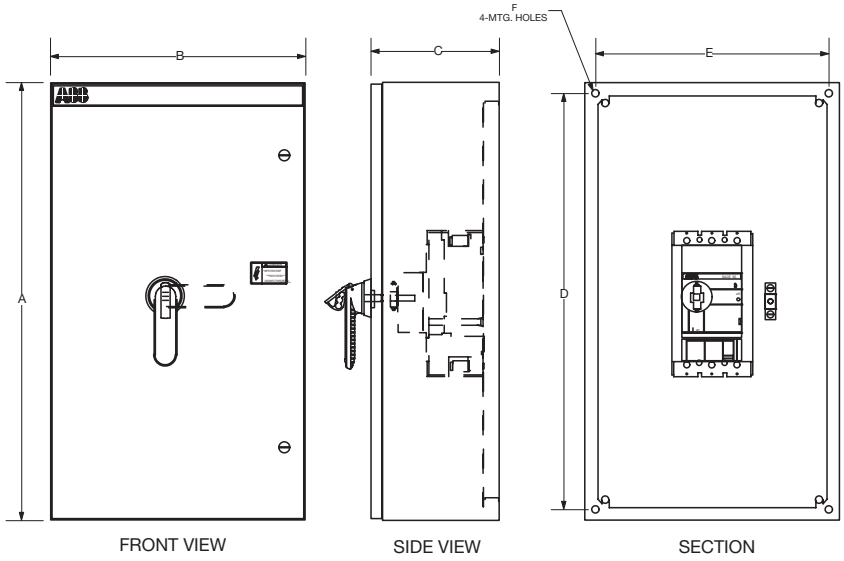
Enclosures
Approximate dimensions
S3 – S7, NEMA 1, 3R & 12

NEMA 1



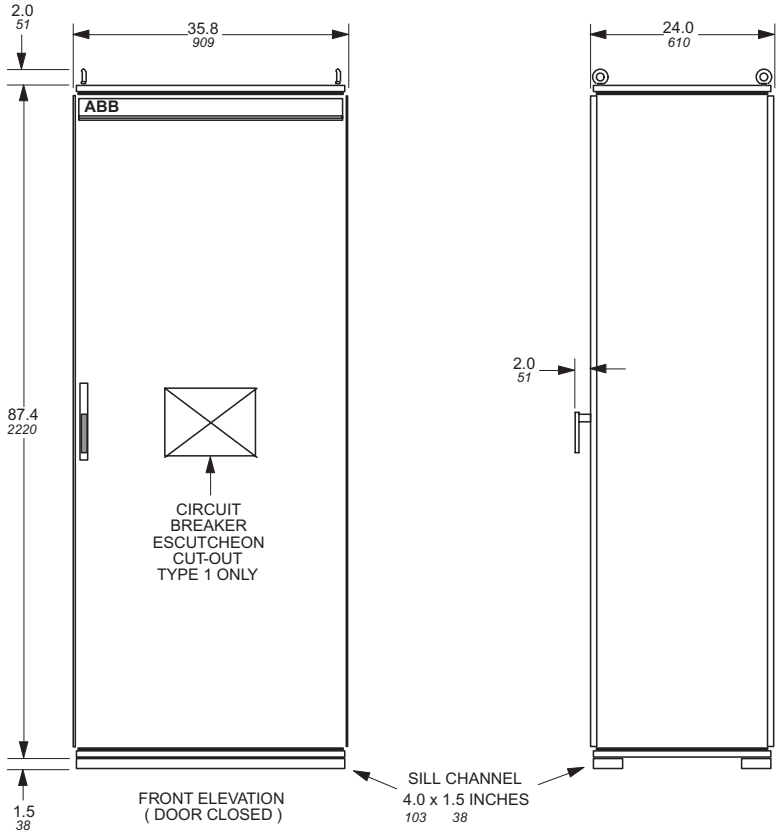
Cat. #	A	B	C	D	E	F
S3E-1	22.0 *559.0*	12.0 *305.0*	4.25 *108.0*	19.0 *482.0*	9.0 *229.0*	0.312 *7.93*
S4E-1	30.0 *762.0*	17.5 *444.5*	4.25 *108.0*	27.0 *686.0*	14.5 *368.5*	0.312 *7.93*
S5E-1	30.0 *762.0*	17.5 *444.5*	4.25 *108.0*	27.0 *686.0*	14.5 *368.5*	0.312 *7.93*
S6E-1	44.0 *1118.0*	22.0 *559.0*	5.75 *146.0*	41.0 *1041.5*	19.0 *483.0*	0.312 *7.93*
S7E-1	44.0 *1118.0*	22.0 *559.0*	5.75 *146.0*	41.0 *1041.5*	19.0 *483.0*	0.312 *7.93*

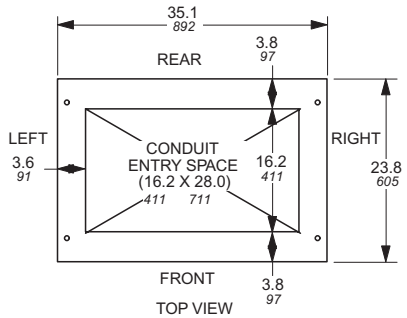
NEMA 3R, 12



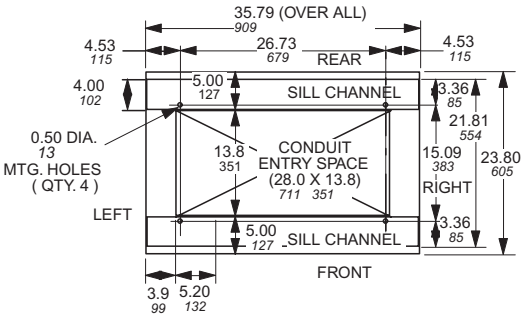
Cat. #	A	B	C	D	E	F
S3E-3R12	22.0 *559.0*	12.0 *305.0*	8.8 *224.0*	20.5 *520.5*	10.5 *267.0*	0.50 *13.7*
S4E-3R12	30.0 *762.0*	17.5 *444.5*	8.8 *224.0*	28.5 *724.0*	16.0 *406.5*	0.50 *13.7*
S5E-3R12	30.0 *762.0*	17.5 *444.5*	8.8 *224.0*	28.5 *724.0*	16.0 *406.5*	0.50 *13.7*
S6E-3R12	44.0 *1118.0*	22.0 *559.0*	10.8 *274.5*	42.5 *1080.0*	20.5 *521.0*	0.50 *13.7*
S7E-3R12	44.0 *1118.0*	22.0 *559.0*	10.8 *274.5*	42.5 *1080.0*	20.5 *521.0*	0.50 *13.7*

Enclosures
Approximate dimensions
S8, NEMA 1, 3R & 12





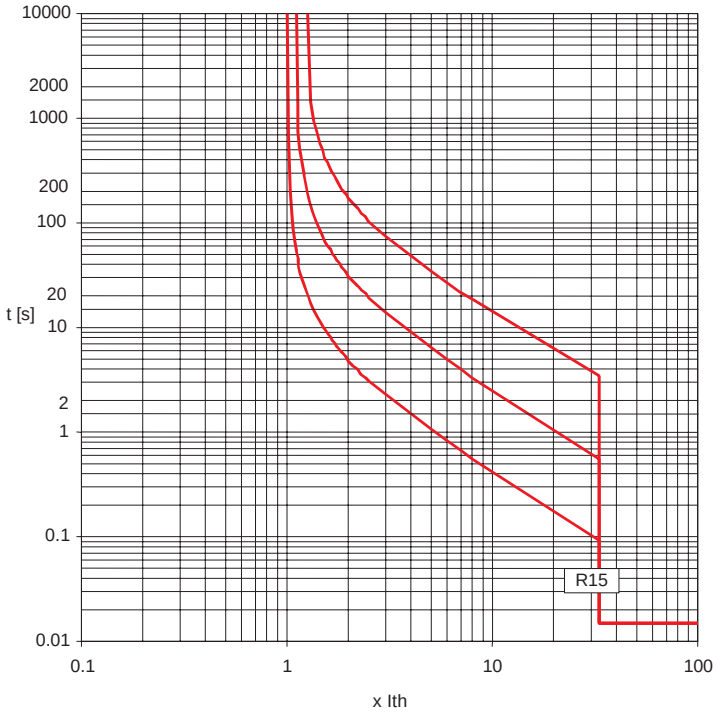
TOP VIEW
ENCLOSURE ROOF
(SOLID REMOVABLE ROOF PANEL)



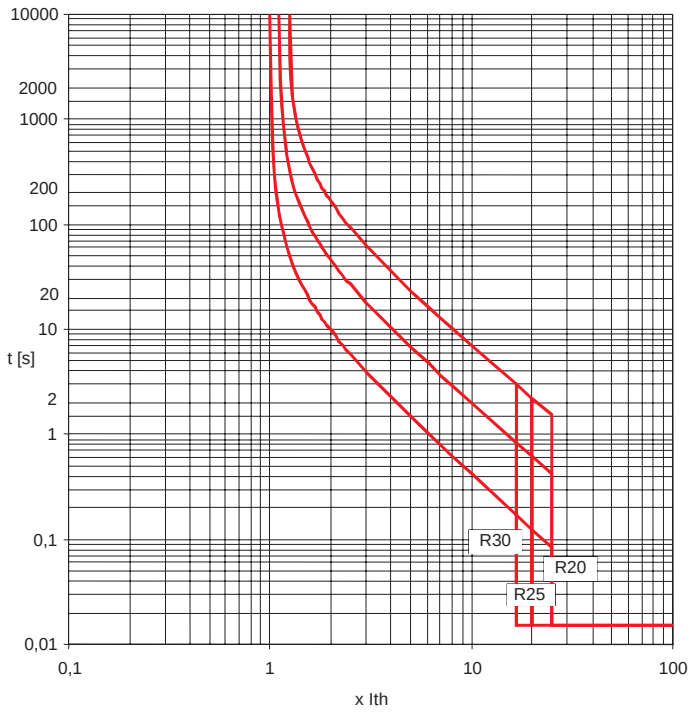
BOTTOM VIEW
ENCLOSURE FLOOR
(SOLID NON-MOVABLE FLOOR PANEL)

Protective releases
Thermal-magnetic overcurrent release
Time-current curves, S3

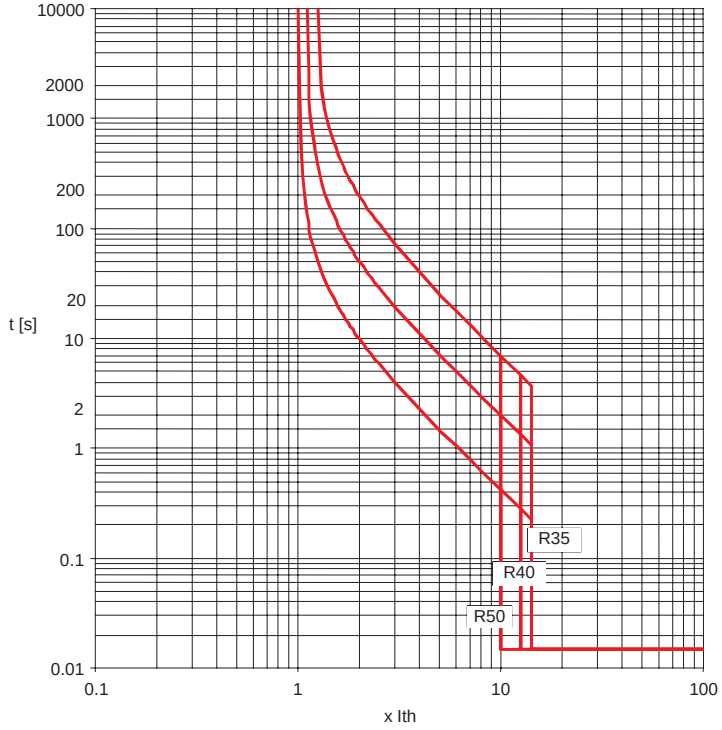
S3, R15



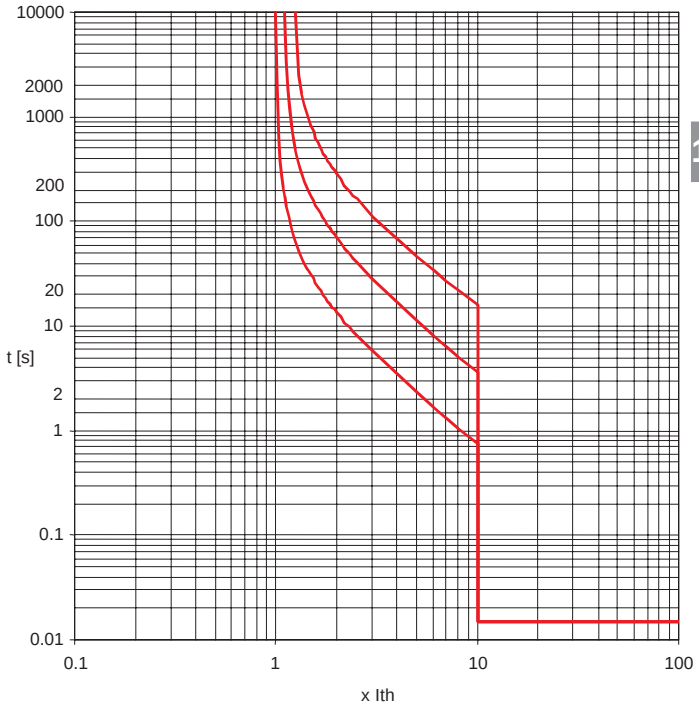
S3, R20-R30



S3, R35-R50



S3, R50-R100

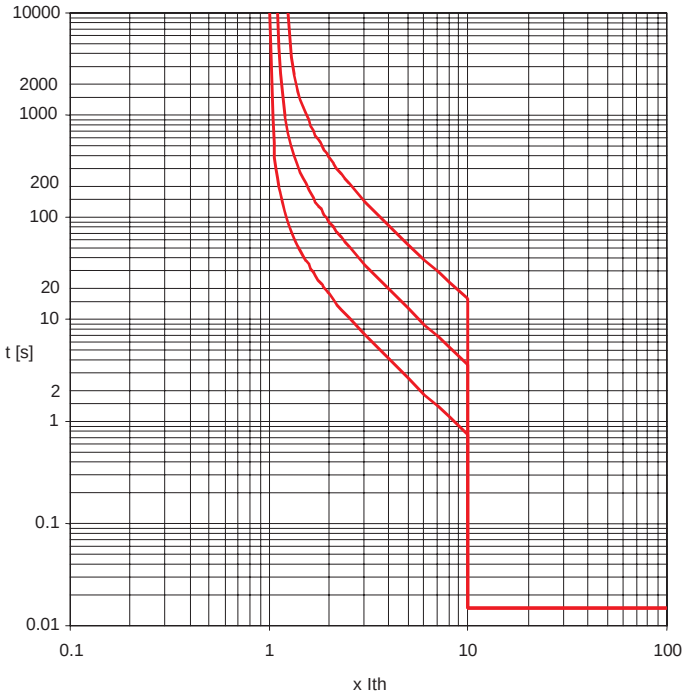


15

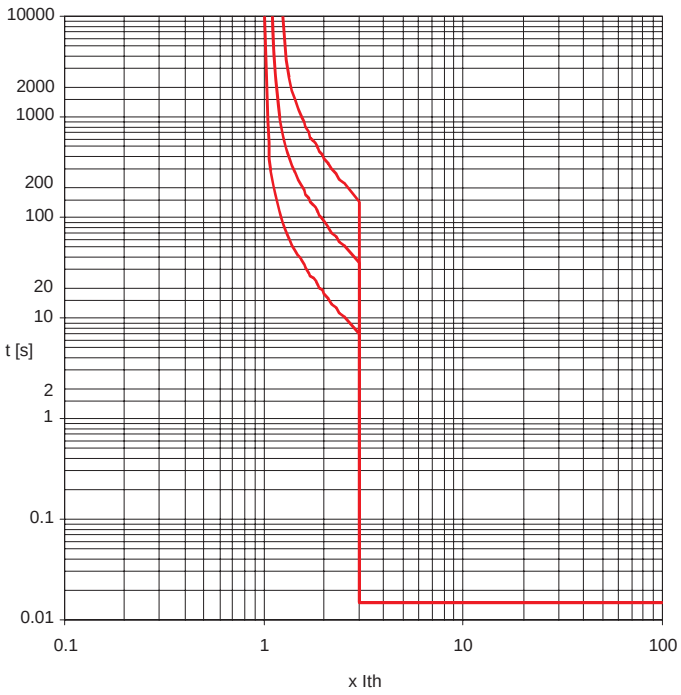
① Direct current may shift tripping characteristic. Consult ABB.

Protective releases
Thermal-magnetic overcurrent release
Time-current curves, S3

S3, R125-R225 – 10X Im



S3, R150-R225 – 3X Im



S5 400 TMD

In = 300 - 400 A
I_3 = 2.5 In

Consult factory

S5 400 TMD

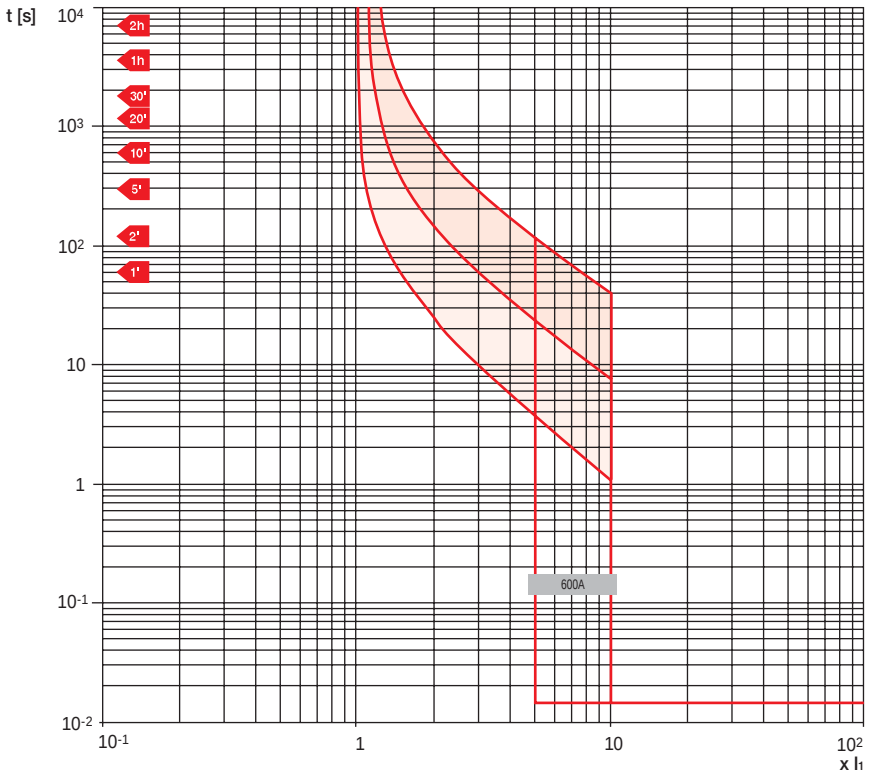
In = 300 - 400 A
I_3 = 5 ÷ 10 In

Consult factory

Trip curves for distribution
Circuit breakers w/thermomagnetic trip units
Isomax S6

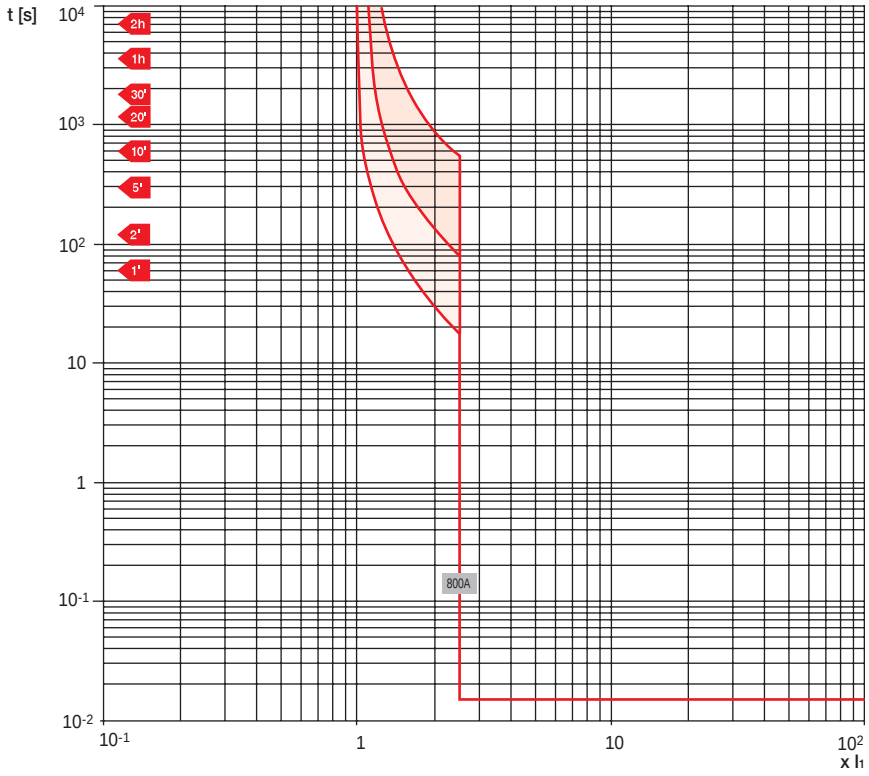
S6 600 TMD

In = 800 A
I_3 = 5 ÷ 10 In



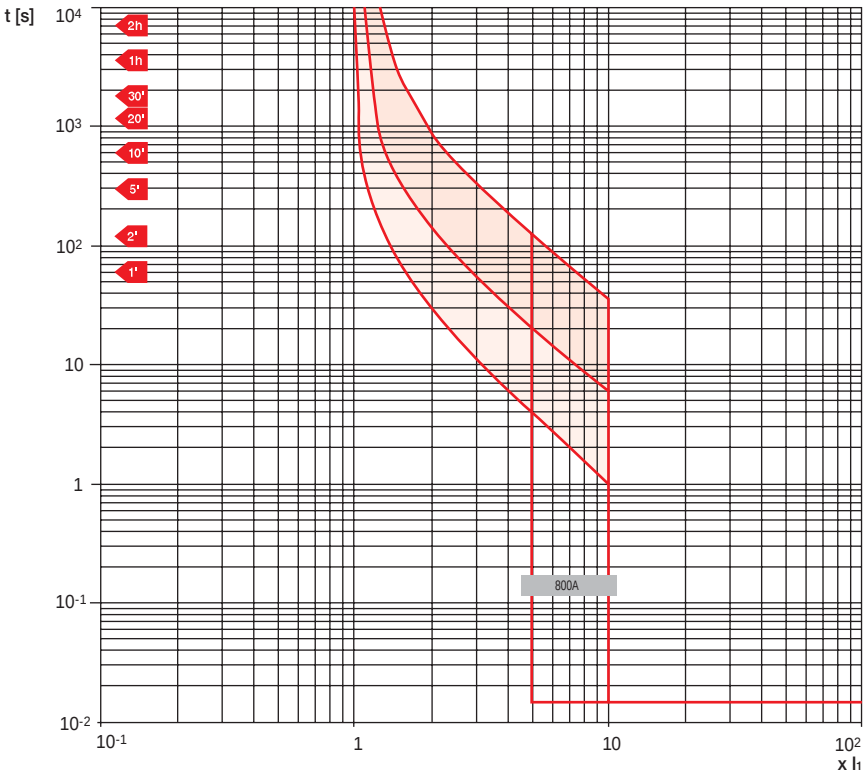
S6 800 TMD

In = 800 A
I_3 = 2.5 In



S6 800 TMD

In = 800 A
I_3 = 5 ÷ 10 In



Protective releases
Microprocessor trip release
S4, S5, S6, S7, S8

Microprocessor based overcurrent relays for alternating current for S4, S5, S6 and S7 circuit-breakers

The microprocessor based overcurrent relays (actual RMS) for Isomax S circuit-breakers offer a wide range of current and trip time settings.

They are available in two versions:

PR211/P with overcurrent protection «L» and instant short circuit protection «I». Available with functions «L», «I», or «L+I». L function includes adjustable long-time pick-up and long-time delay.

PR212/P with overcurrent protection «L», selective short circuit protection «S», instant short circuit protection «I» and ground fault protection «G». Available with functions «L+S+I» or «L+S+I+G». Functions «S», «I» and «G» can be excluded manually by means of the trip current threshold selector (OFF position). In its most complete configuration, i.e. with functions «L+S+I+G», the PR212/P relay can be combined, on request, with the following units:

PR212/D — dialog unit

Essential for two-way communication with electrical plant management systems. When the unit is present, it is possible to choose between the manually set parameters (LOC), and the parameters set by the electrical plant control system (REM) by means of the appropriate selector. The dialog unit must be supplied with an auxiliary voltage of 24 V d.c.

The following information is made available through the dialog unit on the field bus:

- protection parameters
- current values of phases, neutral and ground
- circuit-breaker state
- number of operations of circuit-breaker
- interrupted currents
- state of the overcurrent relay with indication of:
  - normal operation
  - pre-alarm (0.9 x I1)
  - overcurrent function «L»
  - trip function «S»
  - trip function «I»
  - trip function «G».

It is possible to provide and/or modify the protection parameters and the circuit-breaker opening/closing controls. In the event of a serial communication error, the overcurrent relay operates in accordance with the last parameters set and in any event always in accordance with the manually programmed setting. The same occurs in the event of a dialog unit fault, and in the absence of auxiliary supply.

The dialog unit is external for circuit breakers S4 and S5 and is located inside the relay box for circuit breakers S6 and S7.

The external dialog unit is connected by means of a cable for supply and communication with the PR212/P protection relay.

The standard version of the dialog interface has the following specifications:

- hardware: EIA RS485 serial transmission line
- communication protocol: ABB Modbus
- transmission speed: 150 – 19200 baud (bit/s).

PR212/K — signalling unit

Can be connected directly to the PR212/P protection relay and provides contacts for the protection unit trip and alarm signals: pre-alarm, overcurrent function «L», trip functions «S», «I» and «G», trip by relay and internal communication error with PR212/P.

PR212/T — actuator unit

Can be installed only if the dialog unit is present, and by means of suitable relays, controls the opening and closing of the circuit-breaker. In order that opening and closing can be actuated, the circuit-breaker must be equipped with a motor operator (direct-acting for S4 and S5; stored energy type for S6 and S7).

Note

The K and T units are always external.

Other important features of the microprocessor based relays are as follows:

- protection of neutral with programmable automatic adjustment, executed by the manufacturer, to 50% (standard) or 100% (on request) of the current value selected for the phases. The optional version has no code in this catalog;
- reliable operation also when one phase only is live;
- individual and simultaneous adjustment on the three phases and neutral;
- no need for auxiliary supply;
- trip specifications not affected by the ambient temperature;
- consistency of specifications and reliability including in contaminated environments;
- signalling of tripped relay (available for all versions) by means of voltage-free contact for 24 V d.c. or a.c. circuits maximum 3 W.

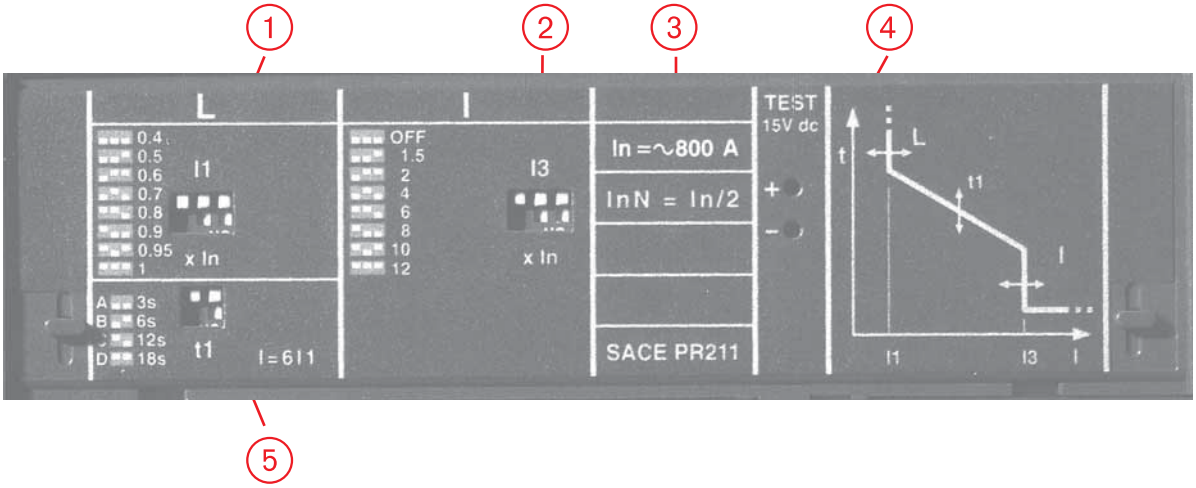
Circuit-breaker rated current change according to ambient temperature. The tripping characteristics of Isomax S4 – S8 with electronic trip units are unaffected by ambient temperatures from -25°C to +70°C.

Protective releases
Microprocessor based overcurrent relays, PR211 for S4, S5, S6 & S7 breakers

Protective functions and set values

Protection against	Trip	Symbol	Set values (manual adjustment in steps)
Overload	Long delay	L	I1 = 0.4-0.5-0.6-0.7-0.8-0.9-0.95-1 x In t1 = 4 curves A,B,C,D
Short-circuit	Instantaneous adjustment	I	I3 = 1.5-2-4-6-8-10-12 x In

PR211



Key

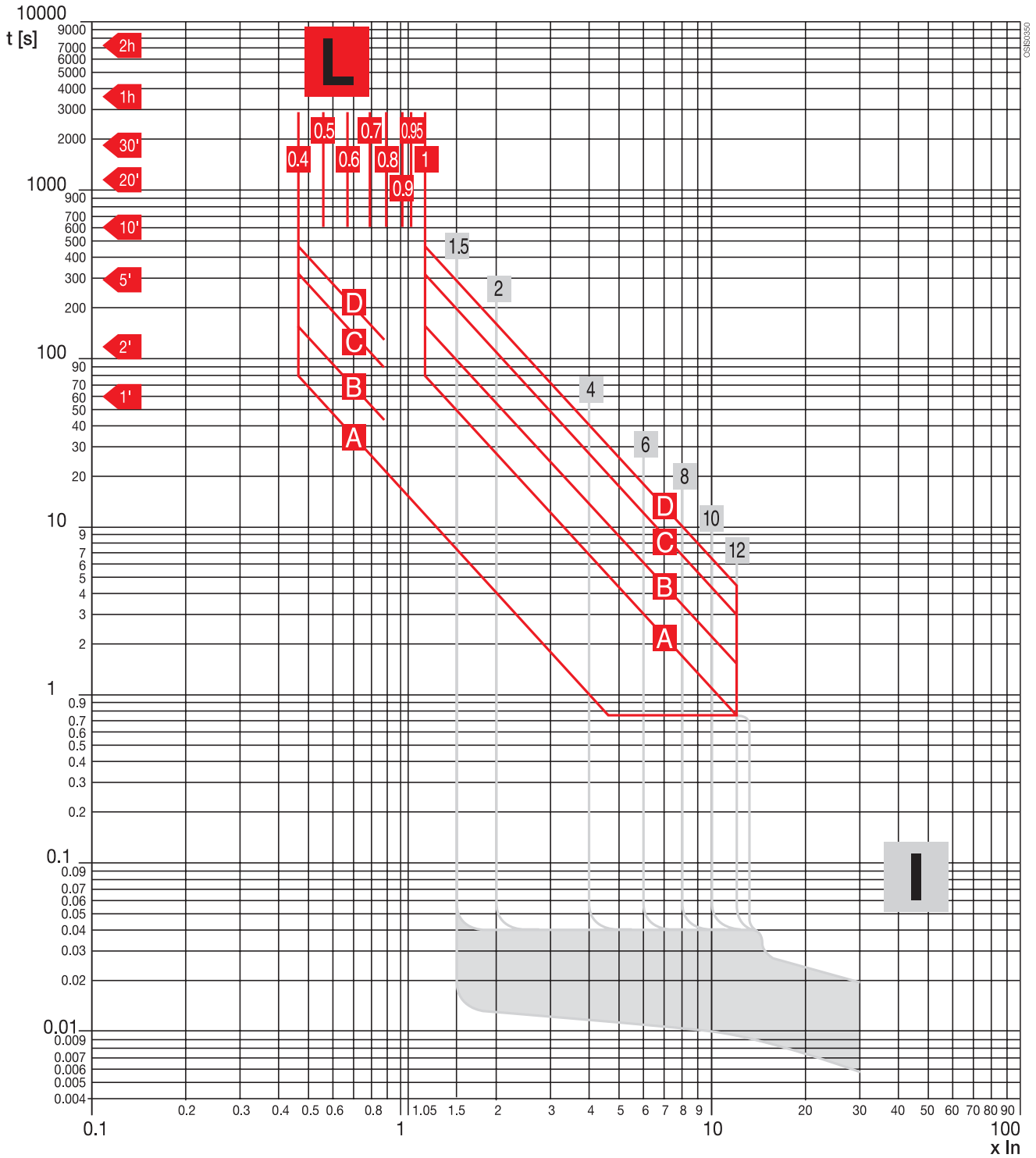
1 Dip-switch for function L setting (I1)
2 Dip-switch for function I setting (I3)
3 Rated current of current transformers
4 15 V d.c. input for release functioning check
5 Function L trip time setting dip switch (T1)

Rated and setting currents

Circuit-breaker		Current transformer	Functions	
	Iu-A	In-A	L (I1) A (0.4 – 1 x In)	I (I3) A (1.5 – 12 x In)
S4	250	100	40 – 100	150 – 1200
		250	100 – 250	375 – 3000
S5	400	300	120 – 300	450 – 3600
		400	160 – 400	600 – 4800
S6	600/800	600	240 – 600	900 – 7200
		800	320 – 800	1200 – 9600
S7	1200	1000	400 – 1000	1000 – 12,000
		1200	480 – 1200	1800 – 14,400

Protective releases
Microprocessor based overcurrent relays, PR211
Time-current curves, S4 – S7

Function L - I



Key

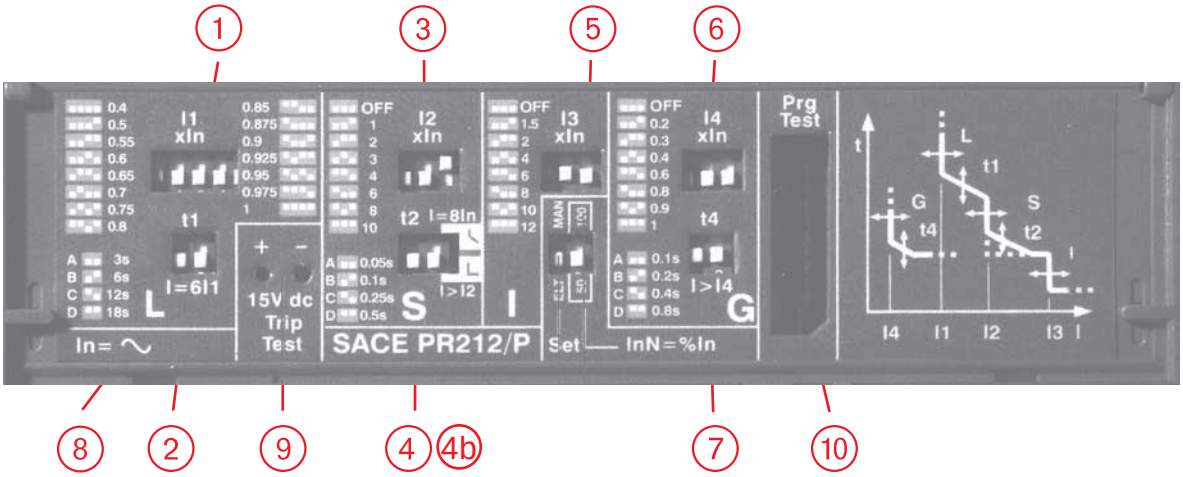
In = Rated current of current transformers
t = Tripping time

Protective releases
Microprocessor based overcurrent relays, PR212
Protection functions and set values, S4 – S8

Protection functions and set values

Protection against	Overload	Short-circuit	Short circuit	Earth fault
Trip	Long delay	Inverse or definite short delay	Instantaneous adjustable	Inverse short delay
Symbol	L	S	I	G ①
Set values (manual adjustment in steps	I1 = 0.4-0.5-0.55-0.6-0.65-0.7-0.75 0.8-0.85-0.875-0.9-0.925-0.95-0.975-1 x In t1 = 4 curves A – D	I2 = 1-2-3-4-6-8-10 OFF x In t2 = 4 curves A – D	I3 = 1.5-2-4-6-8-10-12	I4 = 0.2-0.3-0.4-0.7-0.8-0.9-1 t4 = 4 curves A – D
Set values (electronic adjustment)	I1 = 0.4 - 1 x In t1 = 3 - 18s	I2 = 1 … 10 OFF x In t2 = 0.05 – 0.5	I3 = 1.5-12 OFF x In	I4 = 0.2 – 1 OFF x In t4 = 0.1 – 0.8s

PR212



Key

1 Function L setting dip-switch (I1)
2 Function L trip time setting dip-switch (t1)
3 Function S setting dip-switch (I2)
4 Function S trip time setting dip-switch (t2)
4b Fixed/variable trip time selection dip-switch
5 Function I setting dip-switch (I3)
6 Function G setting dip-switch (I4)
7 Function G trip time setting dip-switch (t4)
8 Rated current of current transformers
9 15 V d.c. input for release functioning check
10 Socket for connecting SACE PR010/T test unit

15

① S8 it = 0.2 - 0.4

Protective releases
Rated and setting currents, PR212
S4 – S8

Rated and setting currents

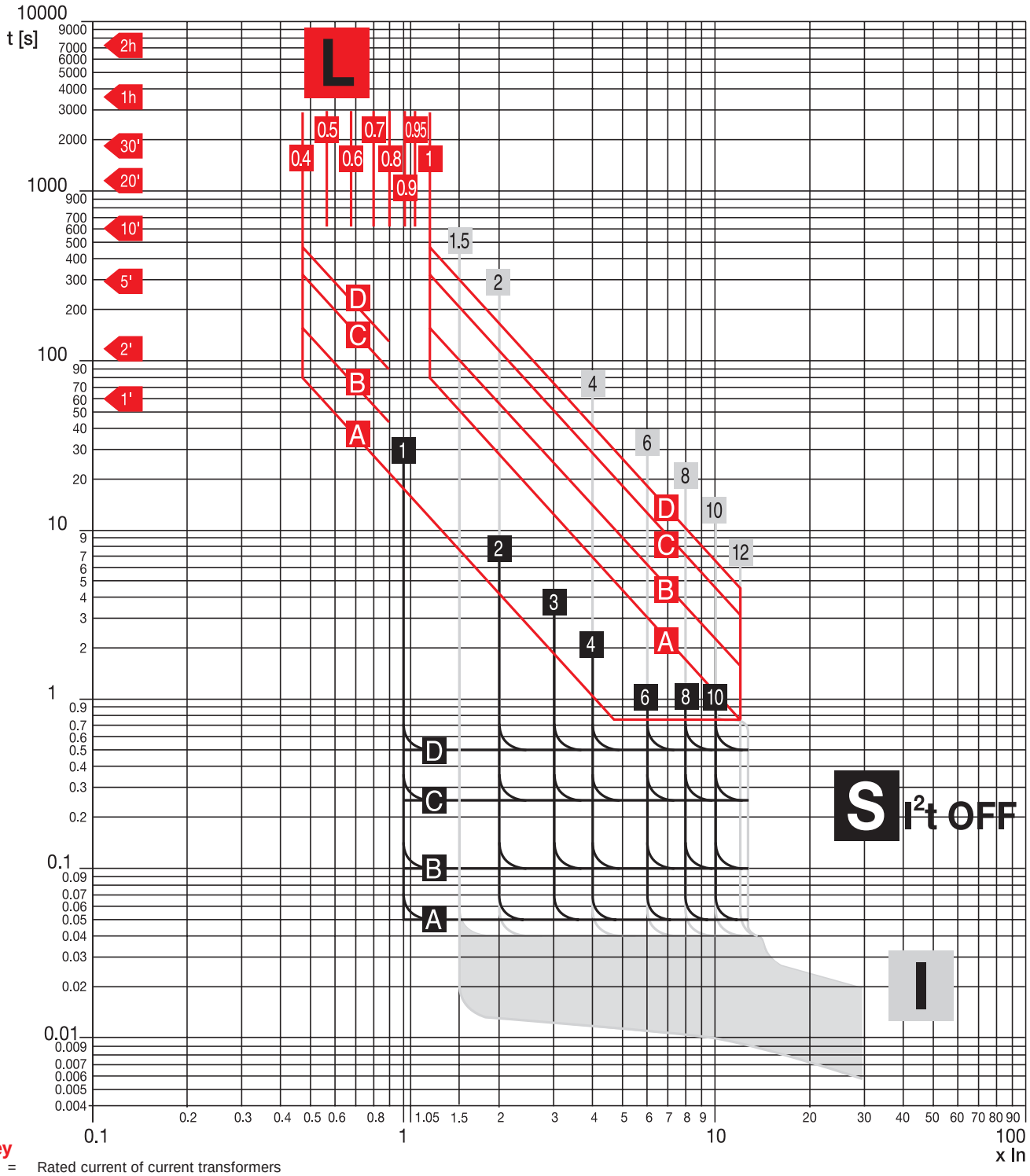
Circuit breaker		Current transformer	Functions			
Iu		In-A	L(I1) A (0.4 – 1.0 x In)	S (I1) A (1 – 10 x In)	I (I3) A (1.5 – 12 x In)	G (I4) A (0.2 – 1 x In) / S8 (0.2 – 0.4)
S4	250	100	40 – 100	100 – .1000	150 – 1200	20 – 100
		250	100 – 250	250 – .2500	375 – 3000	50 – 250
S5	400	300	120 – 300	300 – .3000	450 – 3600	60 – 300
		400	160 – 400	400 – .4000	600 – 4800	80 – 400
S6	600	600	240 – 600	600 – .6000	900 – 7200	120 – 600
	800	800	320 – 800	800 – .8000	1200 – 9600	160 – 800
S7	1200	1000	400 – 1000	1000 – .10,000	1500 – 12,000	200 – 1000
		1200	480 – 1200	1200 – .12,000	1800 – 14,400	240 – 1200
		1600	640 – 1600	1600 – .16,000	2400 – 19,200	320 – 640
S8	1600 – 2500	2000	800 – 2000	2000 – .20,000	3000 – 24,000	400 – 800
		2500	1000 – 2500	2500 – .25,000	3750 – 30,000	500 – 1000

Key

Iu = Rated uninterrupted current of circuit-breaker
In = Rated current of current transformers
I1 = Current setting value for relay overload protection
I2 = Current setting value for relay short-circuit selective protection
I3 = Current setting value for relay instantaneous short-circuit protection
I4 = Current setting value for earth fault protection

Protective releases
Microprocessor based overcurrent relays, PR212
Time-current curves, S4 – S8

Function L - S - I

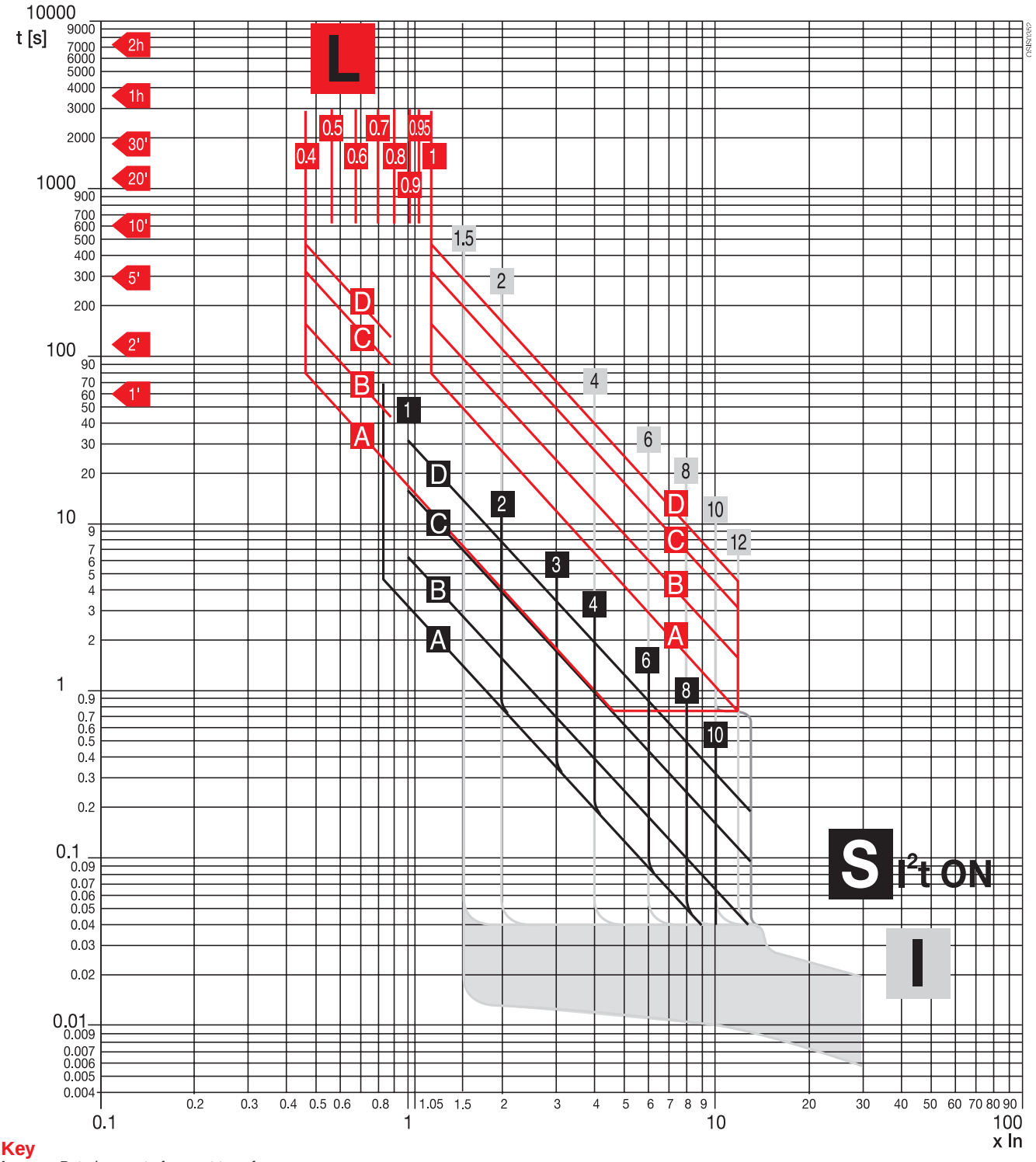


Key

In = Rated current of current transformers
t = Tripping time

Protective releases
Microprocessor based overcurrent relays, PR212
Time-current curves, S4 – S8

Function L - S - I

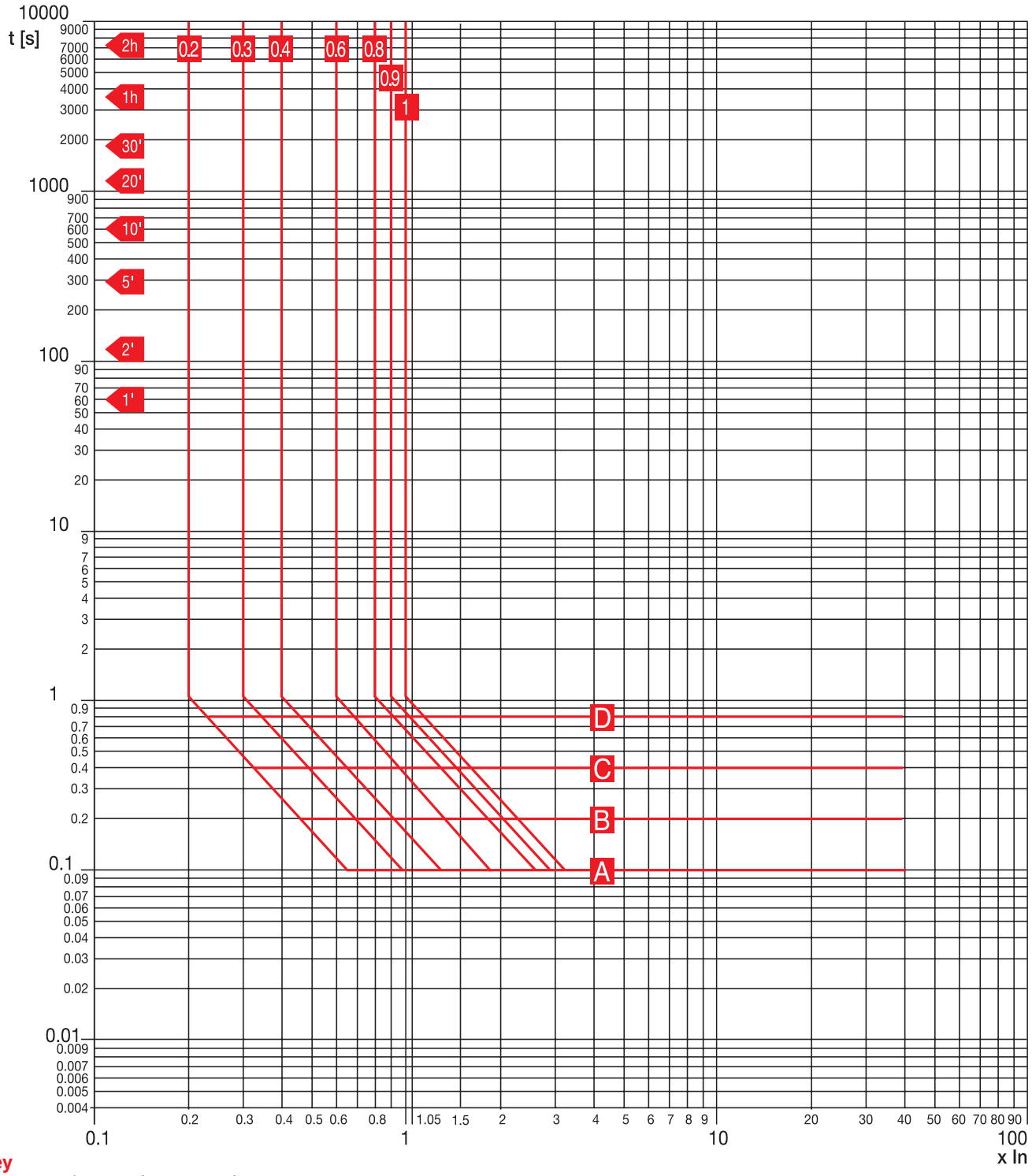


Key

In = Rated current of current transformers
t = Tripping time

Protective releases
Microprocessor based overcurrent relays, PR212
Time-current curves, S4 – S8

Function G[1]



Key

In = Rated current of current transformers
t = Tripping time

[1] S8 maximum setting is 0.4 per NEC guidelines.

Motor horsepower ratings
Magnetic trip
1/2HP @ 575V to 100HP @ 575V

Horsepower per NEC 430-50				Motor full	Isomax	MCP	Approximate trip setting % of MFLA						
208V	230V	460V	575V	Load amps	Type	Rating	1.5X	2X	4X	6X	8X	10X	12X
					Magnetic trip		%	%	%	%	%	%	%
			1/2	0.9	S3	3	—	—	1300	2000	2700	3400	4000
		1/2		1.1	S3	3	—	—	1100	1600	2200	3700	3300
			3/4	1.3	S3	3	—	—	900	1400	1800	2300	2800
		3/4		1.6	S3	3	—	—	800	1100	1500	1900	2300
			1	1.7	S3	3	—	—	700	1100	1400	1800	2100
		1		2.1	S3	5	—	—	1000	1400	1900	2400	2900
	1/2			2.2	S3	5	—	—	900	1400	1800	2300	2700
1/2			1 1/2	2.4	S3	5	—	—	800	1300	1700	2100	2500
			2	2.7	S3	5	—	—	700	1100	1500	1900	2200
		1 1/2		3	S3	5	—	—	700	1000	1300	1700	2000
	3/4			3.2	S3	5	—	—	600	900	1300	1600	1900
		2		3.4	S3	5	—	—	600	900	1200	1500	1800
3/4				3.5	S3	10	—	—	1100	1700	2300	2900	3400
			3	3.9	S3	10	—	—	1000	1500	2100	2600	3100
	1			4.2	S3	10	—	—	1000	1400	1900	2400	2900
1				4.6	S3	10	—	—	900	1300	1700	2200	2600
		3		4.8	S3	10	—	—	800	1300	1700	2100	2500
	1 1/2			6	S3	10	—	—	700	1000	1300	1700	2000
			5	6.1	S3	10	—	—	700	1000	1300	1600	2000
1 1/2				6.6	S3	10	—	—	600	900	1200	1500	1800
	2			6.8	S3	10	—	—	600	900	1200	1500	1800
				7.5	S3	25	—	—	1300	2000	2700	3300	4000
2		5		7.6	S3	25	—	—	1300	2000	2600	3300	3900
			7 1/2	9	S3	25	—	—	1100	1700	2200	2800	3300
	3			9.6	S3	25	—	—	1000	1600	2100	2600	3100
3				10.6	S3	25	—	—	900	1400	1900	2400	2800
		7 1/2	10	11	S3	25	—	—	900	1400	1800	2300	2700
		10		14	S3	25	—	—	700	1000	1400	1800	2100
	5			15.2	S3	25	—	—	700	1000	1300	1600	2000
5				16.7	S3	25	—	—	600	900	1200	1500	1800
			15	17	S3	25	—	—	600	900	1200	1500	1800
		15		21	S3	50	—	—	1000	1400	1900	2400	2800
	7 1/2		20	22	S3	50	—	—	900	1400	1800	2300	2700
7 1/2				24.2	S3	50	—	—	800	1200	1700	2100	2500
		20	25	27	S3	50	—	—	700	1100	1500	1900	2200
	10			28	S3	50	—	—	700	1100	1400	1800	2100
10				30.8	S3	50	—	—	600	1000	1300	1600	1900
			30	32	S3	50	—	—	600	900	1300	1600	1900
		25		34	S3	50	—	—	600	900	1200	1500	1800
		30		40	S3	100	—	—	1000	1500	2000	2500	3000
			40	41	S3	100	—	—	1000	1500	2000	2400	2900
	15			42	S3	100	—	—	1000	1400	1900	2400	2900
15				46.2	S3	100	—	—	900	1300	1700	2200	2600
		40	50	52	S3	100	—	—	800	1200	1500	1200	2300
	20			54	S3	100	—	—	700	1100	1500	1900	2200
20				59.4	S3	100	—	—	700	1000	1300	1700	2000
			60	62	S3	100	—	—	600	100	1300	1600	1900
		50		65	S3	100	—	—	600	900	1200	1500	1800
	25			68	S3	100	—	—	600	900	1200	1500	1800
25				74.8	S3	150	—	—	800	1200	1600	2000	—
		60	75	77	S3	150	—	—	800	1200	1600	1900	—
	30			80	S3	150	—	—	800	1100	1500	1900	—
30				88	S3	150	—	—	700	1000	1400	1700	—
		75		96	S3	150	—	—	600	900	1300	1600	—
			100	99	S3	150	—	—	600	900	1200	1500	—

Motor horsepower ratings
Electronic trip
40HP @ 230V to 500HP @ 460V

Horsepower per NEC 430-50				Motor full Load amps	Isomax Type	MCP Rating	Approximate trip setting % of MFLA						
208V	230V	460V	575V				1.5X	2X	4X	6X	8X	10X	12X
					Electronic trip		%	%	%	%	%	%	%
	40			104	S4	250	350	500	1000	1400	1900	2400	2900
40				114	S4	250	350	450	900	1300	1800	2200	2600
		100		124	S4	250	300	400	800	1200	1600	2000	2400
			125	125	S4	250	300	400	800	1200	1600	2000	2400
	50			130	S4	250	300	400	800	1200	1500	1900	2300
50				143	S4	250	250	350	700	1000	1400	1700	2100
			150	144	S4	250	250	350	700	1000	1400	1700	2100
	60			154	S4	250	250	300	600	1000	1300	1600	1900
		125		156	S4	250	250	300	600	1000	1300	1600	1900
60				169	S4	250	200	300	600	900	1200	1500	1800
		150		180	S5	400	350	450	900	1300	1800	2200	2700
	75			192	S5	400	300	400	800	1300	1700	2100	2500
75				211	S5	400	300	400	800	1100	1500	1900	2300
		200		240	S5	400	250	350	700	1000	1300	1700	2000
			250	242	S5	400	250	350	700	1000	1300	1700	2000
	100			248	S5	400	250	300	600	1000	1300	1600	1900
100				273	S6	600	350	450	900	1300	1800	2200	2600
			300	289	S6	600	300	400	800	1200	1700	2100	2500
		250		302	S6	600	300	400	800	1200	1600	2000	2400
	125			312	S6	600	300	400	800	1200	1500	1900	2300
			350	336	S6	600	250	350	700	1100	1400	1800	2100
125				343	S6	600	250	350	700	1100	1400	1700	2100
	150			360	S6	600	250	350	700	1000	1300	1700	2000
		300		361	S6	600	250	350	700	1000	1300	1700	2000
			400	362	S6	600	250	300	600	900	1300	1600	1900
150				396	S6	600	250	300	600	900	1200	1500	1800
			450	412	S6	800	300	400	800	1200	1600	1900	2300
		350		414	S6	800	300	400	800	1200	1600	1900	2300
			500	472	S6	800	250	350	700	1000	1400	1700	2000
		400		477	S6	800	250	350	700	1000	1300	1700	2000
	200			480	S6	800	250	350	700	1000	1300	1700	2000
		450		515	S6	800	250	300	600	900	1200	1600	1900
200				528	S6	800	250	300	600	900	1200	1500	1800
		500		590	S7	1000	250	350	700	1000	1400	1700	2000

Notes

Power breakers
Index

Notes

Emax

Power breakers

Emax power breakers

ABB's Emax series of low voltage power circuit breakers embodies over half a century's experience and technological development in power circuit breakers. The Emax offers a series of breakers that is totally innovative in its technological design, ease of installation and use, making it the ideal solution for the growing requirements of designers, switchboard and switchgear manufacturers, installers, OEMs and users.

The Emax power circuit breakers are UL Listed and meet the ANSI Standard for low voltage power circuit breakers.

ABB Emax power circuit breakers are available in five different models (four sizes) with rated continuous current from 800A to 5000A and rated short-circuit current range from 42kA to 125kA (480V).

Technical catalog 1SDC200003 D0201 is available upon request.

General information
UL general ratings and specifications


E1


E2


E3

Circuit breaker type			E1	E2		E3			
Performance level			**B-A**	**B-A**	**N-A**	**N-A**	**S-A**	**H-A**	**V-A**
Rated continuous current, UL1066		A	800	1600	1200	2000	1200	1200	1200
File # E194191		A	1200	—	1600	2500	1600	1600	1600
		A	—	—	—	—	2000	2000	2000
		A	—	—	—	—	2500	2500	2500
Rated short circuit current	240VAC	kA	42	42	65	65	85	85	100
	480VAC	kA	42	42	50	50	65	85	100
	600VAC	kA	35	42	50	50	65	65	85
Rated short time current		kA	35	42	50	50	65	65	65
Trip units									
PR111/P-A			•	•	•	•	•	•	•
PR112/P-A			•	•	•	•	•	•	•
Operation times									
Make time (max)		ms	80	80	80	80	80	80	80
Break time (I<ST current)(max)		ms	70	70	70	70	70	70	70
Break time (I>ST current)(max)		ms	30	30	30	30	30	30	30
Overall dimensions, 3 pole									
Fixed:	H=418mm / 16.46in D=302mm / 11.89in W (3 poles)	mm/in	296/11.65	296/11.65		404/15.91			
Drawout:	H=461mm / 18.15in D=396.5mm / 15.61in W (3 poles)	mm/in	324/12.76	324/12.76		432/17.01			
Weights (CB with releases, RH terminals and CTs, accessories excluded)									
Fixed 3 pole		Kg/lbs	42/93	46/101		68/150			
Drawout 3 pole		Kg/lbs	65/143	72/159		100/220			
Overall dimensions, 4 pole									
Fixed:	H=418mm / 16.46in D=302mm / 11.89in W (4 poles)	mm/in	386/15.20	386/15.20		530/20.87			
Drawout:	H=461mm / 18.15in D=396.5mm / 15.61in W (4 poles)	mm/in	414/16.30	414/16.30		558/21.97			
Weights (CB with releases, RH terminals and CTs, accessories excluded)									
Fixed 4 pole		Kg/lbs	50/110	55/121		80/176			
Drawout 4 pole		Kg/lbs	80/176	89/196		125/275			

Specifications common to the entire range

Rated max voltage	635VAC
Rated voltage	600VAC
Test voltage (1min 50/60Hz)	2.2kV
Frequency	50-60Hz
Service temperature	-5... +70°C
Storage temperature	-40... +70°C
Number of poles	3/4
Versions	Fixed/Drawout

General information
UL general ratings and specifications

E4

E6

Circuit breaker type			E4			E6	
Performance level			**S-A**	**H-A**	**V-A**	**H-A**	**V-A**
Rated continuous current, UL 1066		A	3200	3200	3200	4000	4000
File # E194191		A	3600	3600	3600	5000	5000
		A	—	—	—	—	—
		A	—	—	—	—	—
Rated short circuit current	240VAC	kA	85	100	100	125	125
	480VAC	kA	65	85	100	85	125
	600VAC	kA	65	85	85	85	85
Rated short time current		kA	65	85	85	100	100
Trip units							
PR111/P-A			•	•	•	•	•
PR112/P-A			•	•	•	•	•
Operation times							
Make time (max)		ms	80	80	80	80	80
Break time (I<ST current)(max)		ms	70	70	70	70	70
Break time (I>ST current)(max)		ms	30	30	30	30	30
Overall dimensions, 3 pole							
Fixed:	H=418mm / 16.46in D=302mm / 11.89in W (3 poles)	mm/in		566/22.28		782/30.79	
Drawout:	H=461mm / 18.15in D=396.5 / 15.61in W (3 poles)	mm/in		594/23.39		810/31.89	
Weights (CB with releases, RH terminals and CTs, accessories excluded)							
Fixed 3 poles		Kg/lbs		95/209		140/309	
Drawout 3 poles		Kg/lbs		147/324		210/463	
Overall dimensions, 4 pole							
Fixed:	H=418mm / 16.46in D=302mm / 11.89in W (4 poles)	mm/in		656/25.83		908/35.75	
Drawout:	H=461mm / 18.15in D=396.5 / 15.61in W (4 poles)	mm/in		684/26.93		936/36.85	
Weights (CB with releases, RH terminals and CTs, accessories excluded)							
Fixed 4 pole		Kg/lbs		115/253		170/374	
Drawout 4 pole		Kg/lbs		190/418		260/573	

Specifications common to the entire range

Rated max voltage	635VAC
Rated voltage	600VAC
Test voltage (1min 50/60Hz)	2.2kV
Frequency	50-60Hz
Number of poles	3/4
Versions	Fixed/Drawout

General information
Catalog number information
Emax breaker, UL

E 1 S 16 X X X X X X X X X X

Accessories: X = none
A = mechanical counter
B = button guard
F = A & B

Accessories: X = none
A = mechanical trip indicator
B = mechanical trip indicator & bell alarm
C = padlock provision (open)
D = keylock (open)
E = position lock
F = access pos. lock
G = A & C
H = A & D
J = A & E
K = A & F
L = A, C & E
M = A, C & F
N = B & C
P = B & D
Q = B & E
R = B & F
S = B, C & E
T = B, C & F
U = C & E
V = C & F
W = D & E
Y = D & F

Undervoltage trip: 0 = none
50/60Hz & VDC: A = 24VDC, B = 30V, C = 48V, D = 60V, E = 110 – 120V, F = 125 – 127V, G = 220 – 240V, H = 250V, J = 380 – 400VAC, K = 440 – 480VAC
Second shunt trip: L = 24VDC, M = 30V, N = 48V, P = 60V, Q = 110 – 120V, R = 125 – 127V, S = 220 – 240V, T = 250V, U = 380 – 400VAC, V = 440 – 480VAC

Shunt trip: 0 = none
50/60Hz & VDC: A = 24VDC, B = 30V, C = 48V, D = 60V, E = 110 – 120V, F = 125 – 127V, G = 220 – 240V, H = 250V, J = 380 – 400VAC, K = 440 – 480VAC

Spring charging motor: (includes spring charged signal, P/N does not show)
0 = none, A = 24 – 30VAC/VDC, B = 48 – 60VAC/VDC, C = 110-130VAC/VDC, D = 220 – 250VAC/VDC, E = spring charged signal only

Contacts:
A = 4 aux, B = 10 aux, C = 15 aux, D = UV energ. N.O.
E = UV energ.NC, F = A & D, G = A & E, H = B & D
J = B & E, K = C & D, L = C & E

Closing coil: 0 = none
50/60Hz & VDC: A = 24VDC, B = 30, C = 48, D = 60, E = 110 – 120, F = 125 – 127, G = 220 – 240, H = 250, J = 380 – 400VAC, K = 440 – 480VAC

Terminal types: (1st letter is upper terminal, 2nd letter is lower terminal)
H = rear horz ②., V = rear vert. ①
H = HH, V = VV
A = HV, B = VH

Trip unit: A = PR111/P, LI, B = PR111/P, LSI, C = PR111/P, LSIG
D = non-automatic, E = PR112/P, LSI, F = PR112/P, LSIG
G = PR112/PD, LSI, H = PR112/PD, LSIG, N = PR113/P
P = PR113/PD

Version: B = fixed breaker, UL; D = withdrawable breaker, UL, less cradle

Max. ampere rating: 02 = 250, 04 = 400, 08 = 800, 10 = 1000, 12 = 1200, 16 = 1600, 20 = 2000, 25 = 2500, 32 = 3200, 36 = 3600, 40 = 4000, 50 = 5000

Breaking capacity: B = basic, N = normal, S = standard, H = high, V = very high

Frame size: 1 = 1, 3P; 2 = 2, 3P; 3 = 3, 3P; 4 = 4, 3P; 6 = 6, 3P; A = 1, 4P; B = 2, 4P, C = 3, 4P; D = 4, 4P; F = 6, 4P

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① Will be shipped separately.
② For withdrawable breakers, use "H".
③ Not available with PR112 trip units. External 15A auxiliary kit can be used.

General information
Catalog number information
Emax, cradle (fixed part) UL

E 1 X 12 X X X

Accessories: X = none
A = Shutter padlock

Contacts: 0 = none,
A = 5 position auxiliaries
B = 10 position auxiliaries

Terminal types: (1st letter is upper terminal, 2nd letter is lower terminal)
H = rear horz., V = rear vert.
H = HH, V = VV
A = HV, B = VH

Max. ampere rating: UL: 12 = 1200 (E1); 16 = 1600 (E2); 20 = 2000 (E3); 25 = 2500 (E3); 36 = 3600 (E4); 50 = 5000 (E6)

Version: K = cradle, UL
V = cradle for E3V

Frame size: 1 = 1, 3P; 2 = 2, 3P; 3 = 3, 3P; 4 = 4, 3P; 6 = 6, 3P;
A = 1, 4P; B = 2, 4P; C = 3, 4P; D = 4, 4P; F = 6, 4P

General information
Standard features

Fixed breaker		Drawout breaker	
Manual operated	Electrically operated	Manual operated	Electrically operated
T.U. — PR111/P, LI Aux. SW., 4 Spring charged indicator Flange Accessory support Terminal block Lifting plate	T.U — PR111/P, LI Motor operator Closing coil Shunt trip Aux. SW., 4 Spring charged indicator Flange Accessory support Terminal block Lifting plate	T.U. — PR111/P, LI Aux. SW., 4 Spring charged indicator Flange Crank Accessory support Sliding contacts Anti-insertion lock Lifting plate	T.U. — PR111/P, LI Motor operator Closing coil Shunt trip Aux. SW., 4 Spring charged indicator Flange Crank Accessory support Sliding contacts Anti-insertion lock Lifting plate

NOTE: Switches provided standard without 4 auxiliary contacts.

Fixed breakers, 3 pole
UL

Fixed breakers

Circuit breaker type	Frame amps	Interrupting ratings kA, 480V	Manually operated	Electrically operated	Set of three vertical terminals
E1B-A08	800	42	**$ 6815**	**$ 9176**	**$ 644**
E1B-A12	1200	42	**7321**	**9682**	**644**
E2N-A12	1200	50	**7819**	**10,180**	**690**
E3S-A12	1200	65	**8780**	**11,141**	**790**
E3H-A12	1200	85	**9048**	**11,409**	**790**
E3V-A12	1200	100	**9953**	**12,314**	**790**
E2B-A16	1600	42	**7871**	**10,232**	**690**
E2N-A16	1600	50	**9082**	**11,443**	**690**
E3S-A16	1600	65	**9797**	**12,158**	**790**
E3H-A16	1600	85	**10,352**	**12,713**	**790**
E3V-A16	1600	100	**11,387**	**13,748**	**790**
E3N-A20	2000	50	**10,032**	**12,393**	**790**
E3S-A20	2000	65	**11,053**	**13,414**	**790**
E3H-A20	2000	85	**13,602**	**15,963**	**790**
E3V-A20	2000	100	**14,962**	**17,323**	**790**
E3N-A25	2500	50	**14,778**	**17,139**	**790**
E3S-A25	2500	65	**16,451**	**18,812**	**790**
E3H-A25	2500	85	**17,708**	**20,069**	**790**
E3V-A25	2500	100	**19,479**	**21,840**	**790**
E4S-A32	3200	65	**21,102**	**23,463**	**1664**
E4H-A32	3200	85	**21,566**	**23,927**	**1664**
E4V-A32	3200	100	**24,047**	**26,408**	**1664**
E4S-A36	3600	65	**23,939**	**26,300**	**1664**
E4H-A36	3600	85	**27,302**	**29,663**	**1664**
E4V-A36	3600	100	**28,666**	**31,027**	**1664**
E6H-A40	4000	85	**31,528**	**33,889**	**2783**
E6V-A40	4000	125	**43,932**	**46,293**	**2783**
E6H-A50	5000	85	**43,221**	**45,582**	**2783**
E6V-A50	5000	125	**51,684**	**54,045**	**2783**

Standard features – manually operated UL breaker

- Rear horizontal terminals
- PR111 trip unit with LI protection functions
- Manual mechanical close and open pushbuttons
- CB open/closed mechanical indicator
- Spring charged/discharged mechanical indicator
- 2NO & 2NC auxiliary contacts for open/closed position indication
- Lifting plates
- Current transformers
- Terminal box

Fixed breakers, 4 pole
UL

Fixed breakers

Circuit breaker type	Frame amps	Interrupting ratings kA, 480V	Manually operated	Electrically operated	Set of four vertical terminals
E1B-A08	800	42	**$ 9200**	**$ 11,561**	**$ 837**
E1B-A12	1200	42	**9883**	**12,244**	**837**
E2N-A12	1200	50	**10,556**	**12,917**	**897**
E3S-A12	1200	65	**11,853**	**14,214**	**1027**
E3H-A12	1200	85	**12,215**	**14,576**	**1027**
E3V-A12	1200	100	**13,436**	**15,797**	**1027**
E2B-A16	1600	42	**10,626**	**12,987**	**897**
E2N-A16	1600	50	**12,261**	**14,622**	**897**
E3S-A16	1600	65	**13,226**	**15,587**	**1027**
E3H-A16	1600	85	**13,975**	**16,336**	**1027**
E3V-A16	1600	100	**15,373**	**17,734**	**1027**
E3N-A20	2000	50	**13,543**	**15,904**	**1027**
E3S-A20	2000	65	**14,922**	**17,283**	**1027**
E3H-A20	2000	85	**18,363**	**20,724**	**1027**
E3V-A20	2000	100	**20,199**	**22,560**	**1027**
E3N-A25	2500	50	**19,950**	**22,311**	**1027**
E3S-A25	2500	65	**22,209**	**24,570**	**1027**
E3H-A25	2500	85	**23,906**	**26,267**	**1027**
E3V-A25	2500	100	**26,296**	**28,657**	**1027**
E4S-A32	3200	65	**28,488**	**30,849**	**2163**
E4H-A32	3200	85	**29,114**	**31,475**	**2163**
E4V-A32	3200	100	**32,463**	**34,824**	**2163**
E4S-A36	3600	65	**32,318**	**34,679**	**2163**
E4H-A36	3600	85	**36,858**	**39,219**	**2163**
E4V-A36	3600	100	**38,699**	**41,060**	**2163**
E6H-A40	4000	85	**42,563**	**44,924**	**3618**
E6V-A40	4000	125	**59,308**	**61,669**	**3618**
E6H-A50	5000	85	**58,348**	**60,709**	**3618**
E6V-A50	5000	125	**69,773**	**72,134**	**3618**

Standard features – manually operated UL breaker

- Rear horizontal terminals
- PR111 trip unit with LI protection functions
- Manual mechanical close and open pushbuttons
- CB open/closed mechanical indicator
- Spring charged/discharged mechanical indicator
- 2NO & 2NC auxiliary contacts for open/closed position indication
- Lifting plates
- Current transformers
- Terminal box

Neutral pole rating

- E1 – E3 = 100% rating
- E4 – E6 = 50% rating

Withdrawable breakers, 3 pole
UL

Withdrawable breakers

Circuit breaker type	Frame amps	Interrupting ratings kA, 480V	Moving part only		Fixed part only	
			Manually operated	Electrically operated	RH terminals	Set of three vertical terminals
E1B-A08	800	42	**$ 7383**	**$ 9744**	**$ 2281**	**$ 644**
E1B-A12	1200	42	**8375**	**10,736**	**2281**	**644**
E2N-A12	1200	50	**8814**	**11,175**	**2400**	**690**
E3S-A12	1200	65	**9220**	**11,581**	**2925**	**790**
E3H-A12	1200	85	**9633**	**11,994**	**2925**	**790**
E3V-A12	1200	100	**10,596**	**12,957**	**2925**	**790**
E2B-A16	1600	42	**9320**	**11,681**	**2400**	**690**
E2N-A16	1600	50	**10,483**	**12,844**	**2400**	**690**
E3S-A16	1600	65	**10,931**	**13,292**	**2925**	**790**
E3H-A16	1600	85	**11,445**	**13,806**	**2925**	**790**
E3V-A16	1600	100	**12,590**	**14,951**	**2925**	**790**
E3N-A20	2000	50	**11,386**	**13,747**	**2925**	**790**
E3S-A20	2000	65	**12,700**	**15,061**	**2925**	**790**
E3H-A20	2000	85	**14,262**	**16,623**	**2925**	**790**
E3V-A20	2000	100	**15,688**	**18,049**	**2925**	**790**
E3N-A25	2500	50	**17,767**	**20,128**	**2925**	**790**
E3S-A25	2500	65	**20,315**	**22,676**	**2925**	**790**
E3H-A25	2500	85	**22,622**	**24,983**	**2925**	**790**
E3V-A25	2500	100	**24,884**	**27,245**	**2925**	**790**
E4S-A32	3200	65	**23,800**	**26,161**	**6259**	**1664**
E4H-A32	3200	85	**24,447**	**26,808**	**6259**	**1664**
E4V-A32	3200	100	**25,863**	**28,224**	**6259**	**1664**
E4S-A36	3600	65	**26,863**	**29,224**	**6259**	**1664**
E4H-A36	3600	85	**30,865**	**33,226**	**6259**	**1664**
E4V-A36	3600	100	**31,948**	**34,309**	**6259**	**1664**
E6H-A40	4000	85	**34,676**	**37,037**	**7398**	**2783**
E6V-A40	4000	125	**46,570**	**48,931**	**7398**	**2783**
E6H-A50	5000	85	**46,402**	**48,763**	**7398**	**2783**
E6V-A50	5000	125	**57,078**	**59,439**	**7398**	**2783**

Standard features – electrically operated breaker
Moving part

- PR111 trip unit with LI protection feature
- Spring charging motor
- Shunt trip
- Closing coil
- Manual mechanical close and open pushbuttons
- CB open/closed mechanical indicator
- Spring charged/discharged mechanical indicator
- 2NO & 2NC auxiliary contacts for open-closed position indication
- Lifting plates
- Current transformers
- Racking device with closed door
- Circuit breaker racking position indicator
- Sliding contacts
- Fail safe device (not available with YU)

Standard features – electrically operated breaker
Fixed part

- Safety shutters
- Rear horizontal terminals
- Sliding contacts
- Anti-insertion lock
- Ground connection

Withdrawable breakers, 4 pole
UL

Withdrawable breakers

Circuit breaker type	Frame amps	Interrupting ratings kA, 480V	Moving part only		Fixed part only	
			Manually operated	Electrically operated	RH terminals	Set of four vertical terminals
E1B-A08	800	42	**$ 9967**	**$ 12,328**	**$ 3079**	**$ 837**
E1B-A12	1200	42	**11,306**	**13,667**	**3079**	**837**
E2N-A12	1200	50	**11,899**	**14,260**	**3240**	**897**
E3S-A12	1200	65	**12,447**	**14,808**	**3949**	**1027**
E3H-A12	1200	85	**13,005**	**15,366**	**3949**	**1027**
E3V-A12	1200	100	**14,305**	**16,666**	**3949**	**1027**
E2B-A16	1600	42	**12,582**	**14,943**	**3240**	**897**
E2N-A16	1600	50	**14,152**	**16,513**	**3240**	**897**
E3S-A16	1600	65	**14,757**	**17,118**	**3949**	**1027**
E3H-A16	1600	85	**15,451**	**17,812**	**3949**	**1027**
E3V-A16	1600	100	**16,996**	**19,357**	**3949**	**1027**
E3N-A20	2000	50	**15,371**	**17,732**	**3949**	**1027**
E3S-A20	2000	65	**17,145**	**19,506**	**3949**	**1027**
E3H-A20	2000	85	**19,254**	**21,615**	**3949**	**1027**
E3V-A20	2000	100	**21,179**	**23,540**	**3949**	**1027**
E3N-A25	2500	50	**23,985**	**26,346**	**3949**	**1027**
E3S-A25	2500	65	**27,425**	**29,786**	**3949**	**1027**
E3H-A25	2500	85	**30,540**	**32,901**	**3949**	**1027**
E3V-A25	2500	100	**33,594**	**35,955**	**3949**	**1027**
E4S-A32	3200	65	**32,130**	**34,491**	**8450**	**2163**
E4H-A32	3200	85	**33,003**	**35,364**	**8450**	**2163**
E4V-A32	3200	100	**34,915**	**37,276**	**8450**	**2163**
E4S-A36	3600	65	**36,265**	**38,626**	**8450**	**2163**
E4H-A36	3600	85	**41,668**	**44,029**	**8450**	**2163**
E4V-A36	3600	100	**43,130**	**45,491**	**8450**	**2163**
E6H-A40	4000	85	**46,813**	**49,174**	**9987**	**3618**
E6V-A40	4000	125	**62,870**	**65,231**	**9987**	**3618**
E6H-A50	5000	85	**62,643**	**65,004**	**9987**	**3618**
E6V-A50	5000	125	**77,055**	**79,416**	**9987**	**3618**

Standard features – electrically operated breaker
Moving part

- PR111 trip unit with LI protection feature
- Spring charging motor
- Shunt trip
- Closing coil
- Manual mechanical close and open pushbuttons
- CB open/closed mechanical indicator
- Spring charged/discharged mechanical indicator
- 2NO & 2NC auxiliary contacts for open-closed position indication
- Lifting plates
- Current transformers
- Racking device with closed door
- Circuit breaker racking position indicator
- Sliding contacts
- Fail safe device (not available with YU)

Standard features – electrically operated breaker
Fixed part

- Safety shutters
- Rear horizontal terminals
- Sliding contacts
- Anti-insertion lock
- Ground connection

Neutral pole rating

- E1 – E3 = 100% rating
- E4 – E6 = 50% rating

Non-automatic air circuit breakers
Fixed switches (without trip unit & c.t.s.), 3 pole
UL

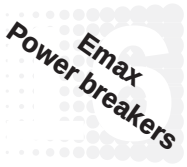
Fixed switches

Circuit breaker type	Frame amps	Interrupting ratings kA, 480V	Manually operated	Electrically operated	Set of three vertical terminals
E1B-A/MS08	800	42	**$ 5086**	**$ 7447**	**$ 644**
E1B-A/MS12	1200	42	**5592**	**7953**	**644**
E2N-A/MS12	1200	50	**6090**	**8451**	**690**
E3S-A/MS12	1200	65	**6944**	**9305**	**790**
E2B-A/MS16	1600	42	**6142**	**8503**	**690**
E2N-A/MS16	1600	50	**7353**	**9714**	**690**
E3S-A/MS16	1600	65	**7961**	**10,322**	**790**
E3N-A/MS20	2000	50	**8196**	**10,557**	**790**
E3S-A/MS20	2000	65	**9217**	**11,578**	**790**
E3N-A/MS25	2500	50	**12,942**	**15,303**	**790**
E3S-A/MS25	2500	65	**14,615**	**16,976**	**790**
E4S-A/MS32	3200	65	**18,733**	**21,094**	**1664**
E4H-A/MS32	3200	85	**19,197**	**21,558**	**1664**
E4S-A/MS36	3600	65	**21,570**	**23,931**	**1664**
E4H-A/MS36	3600	85	**24,933**	**27,294**	**1664**
E6H-A/MS40	4000	85	**28,946**	**31,307**	**2783**
E6H-A/MS50	5000	85	**40,639**	**43,000**	**2783**

Standard features – manually operated UL switch

- Rear horizontal terminals
- Manual mechanical close and open pushbuttons
- CB open/closed mechanical indicator
- Spring charged/discharged mechanical indicator
- Lifting plates
- Terminal box

Non-automatic air circuit breakers
Fixed switches (without trip unit & c.t.s.), 4 pole UL



Fixed switches

Circuit breaker type	Frame amps	Interrupting ratings kA, 480V	Manually operated	Electrically operated	Set of four vertical terminals
E1B-A/MS08	800	42	**$ 6866**	**$ 9227**	**$ 644**
E1B-A/MS12	1200	42	**7549**	**9910**	**644**
E2N-A/MS12	1200	50	**8222**	**10,583**	**690**
E3S-A/MS12	1200	65	**9374**	**11,735**	**790**
E2B-A/MS16	1600	42	**8292**	**10,653**	**690**
E2N-A/MS16	1600	50	**9927**	**12,288**	**690**
E3S-A/MS16	1600	65	**10,747**	**13,108**	**790**
E3N-A/MS20	2000	50	**11,065**	**13,426**	**790**
E3S-A/MS20	2000	65	**12,443**	**14,804**	**790**
E3N-A/MS25	2500	50	**17,472**	**19,833**	**790**
E3S-A/MS25	2500	65	**19,730**	**22,091**	**790**
E4S-A/MS32	3200	65	**25,290**	**27,651**	**1664**
E4H-A/MS32	3200	85	**25,916**	**28,277**	**1664**
E4S-A/MS36	3600	65	**29,120**	**31,481**	**1664**
E4H-A/MS36	3600	85	**33,660**	**36,021**	**1664**
E6H-A/MS40	4000	85	**39,077**	**41,438**	**2783**
E6H-A/MS50	5000	85	**54,863**	**57,224**	**2783**

Standard features – manually operated UL switch

- Rear horizontal terminals
- Manual mechanical close and open pushbuttons
- CB open/closed mechanical indicator
- Spring charged/discharged mechanical indicator
- Lifting plates
- Terminal box

Neutral pole rating

- E1 – E3 = 100% rating
- E4 – E6 = 50% rating

Non-automatic air circuit breakers
Withdrawable switches (without trip unit & c.t.s.), 3 pole UL

Withdrawable switches

Circuit breaker type	Frame amps	Interrupting ratings kA, 480V	Moving part only		Fixed part only	
			Manually operated	Electrically operated	RH terminals	Set of three vertical terminals
E1B-A/MS08	800	42	**$ 5654**	**$ 8015**	**$ 2281**	**$ 644**
E1B-A/MS12	1200	42	**6646**	**9007**	**2281**	**644**
E2N-A/MS12	1200	50	**7085**	**9446**	**2400**	**690**
E3S-A/MS12	1200	65	**7384**	**9745**	**2925**	**790**
E2B-A/MS16	1600	42	**7591**	**9952**	**2400**	**690**
E2N-A/MS16	1600	50	**8754**	**11,115**	**2400**	**690**
E3S-A/MS16	1600	65	**9095**	**11,456**	**2925**	**790**
E3N-A/MS20	2000	50	**9550**	**11,911**	**2925**	**790**
E3S-A/MS20	2000	65	**10,864**	**13,225**	**2925**	**790**
E3N-A/MS25	2500	50	**15,931**	**18,292**	**2925**	**790**
E3S-A/MS25	2500	65	**18,479**	**20,840**	**2925**	**790**
E4S-A/MS32	3200	65	**21,431**	**23,792**	**6259**	**1664**
E4H-A/MS32	3200	85	**22,078**	**24,439**	**6259**	**1664**
E4S-A/MS36	3600	65	**24,494**	**26,855**	**6259**	**1664**
E4H-A/MS36	3600	85	**28,496**	**30,857**	**6259**	**1664**
E6H-A/MS40	4000	85	**32,094**	**34,455**	**7398**	**2783**
E6H-A/MS50	5000	85	**43,820**	**46,181**	**7398**	**2783**

Standard features – manually operated switch
Moving part

- Manual mechanical close and open pushbuttons
- Circuit breaker open/closed mechanical indicator
- Spring charged/discharged mechanical indicator
- Lifting plates
- Racking device with closed door
- Circuit breaker racking position indicator
- Sliding contacts
- Fail-safe device (not available with YU)

Standard features – manually operated switch
Fixed part

- Safety shutters
- Rear horizontal terminals
- Sliding contacts
- Anti-insertion lock
- Ground connection

Non-automatic air circuit breakers
Withdrawable switches (without trip unit & c.t.s.), 4 pole UL

Withdrawable switches

Circuit breaker type	Frame amps	Interrupting ratings kA, 480V	Moving part only		Fixed part only	
			Manually operated	Electrically operated	RH terminals	Set of four vertical terminals
E1B-A/MS08	800	42	**$ 7633**	**$ 9994**	**$ 3079**	**$ 837**
E1B-A/MS12	1200	42	**8972**	**11,333**	**3079**	**837**
E2N-A/MS12	1200	50	**9565**	**11,926**	**3240**	**897**
E3S-A/MS12	1200	65	**9968**	**12,329**	**3949**	**1027**
E2B-A/MS16	1600	42	**10,248**	**12,609**	**3240**	**897**
E2N-A/MS16	1600	50	**11,818**	**14,179**	**3240**	**897**
E3S-A/MS16	1600	65	**12,278**	**14,639**	**3949**	**1027**
E3N-A/MS20	2000	50	**12,893**	**15,254**	**3949**	**1027**
E3S-A/MS20	2000	65	**14,666**	**17,027**	**3949**	**1027**
E3N-A/MS25	2500	50	**21,507**	**23,868**	**3949**	**1027**
E3S-A/MS25	2500	65	**24,947**	**27,308**	**3949**	**1027**
E4S-A/MS32	3200	65	**28,932**	**31,293**	**8450**	**2163**
E4H-A/MS32	3200	85	**29,805**	**32,166**	**8450**	**2163**
E4S-A/MS36	3600	65	**33,067**	**35,428**	**8450**	**2163**
E4H-A/MS36	3600	85	**38,470**	**40,831**	**8450**	**2163**
E6H-A/MS40	4000	85	**43,327**	**45,688**	**9987**	**3618**
E6H-A/MS50	5000	85	**59,157**	**61,518**	**9987**	**3618**

Standard features – manually operated switch
Moving part

- Manual mechanical close and open pushbuttons
- Circuit breaker open/closed mechanical indicator
- Spring charged/discharged mechanical indicator
- Lifting plates
- Racking device with closed door
- Circuit breaker racking position indicator
- Sliding contacts
- Fail-safe device (not available with YU)

Standard features – manually operated switches
Fixed part

- Safety shutters
- Rear horizontal terminals
- Sliding contacts
- Anti-insertion lock
- Ground connection

Neutral pole rating

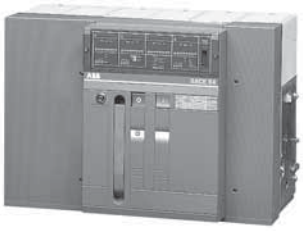
- E1 – E3 = 100% rating
- E4 – E6 = 50% rating

General information
IEC general ratings and specifications ②


E1


E2


E3


E4

Circuit breaker type				E1	E2			E3			
Performance level				B	B	N	L	N	S	H	L
Rated uninterrupted current (at 40°C)	Iu		A	800	1600	1250	1250	2500	1250	1250	2000
breaking capacity			A	1250	2000	1600	1600	3200	1600	1600	2500
			A	—	—	2000	—	—	2000	2000	—
			A	—	—	—	—	—	2500	2500	—
			A	—	—	—	—	—	3200	3200	—
Capacity of neutral pole on four-pole circuit breakers			%Iu	100	100	100	100	100	100	100	100
Rated ultimate short-circuit	Icu	220/230/380/400/415V~	kA	40	40	65	130	65	75	100	130
breaking capacity		440V~	kA	40	40	65	110	65	75	100	110
		500/660/690V~	kA	36	40	55	85	65	75	85	85
		600V~	kA	—	—	—	—	—	—	100	—
		250V— (switches)	kA	36	40	55	—	65	75	75	—
Rated duty short-circuit	Ics	220/230/380/400/415V~	kA	40	40	65	130	65	75	85	130
breaking capacity		440V~	kA	40	40	65	110	65	75	85	110
		500/660/690V~	kA	36	40	55	65	65	75	85	65
		250V— (switches)	kA	36	40	55	—	65	75	75	—
Rated short-time withstand current	Icw	(1S)	kA	36	40	55	10	65	75	75	15
Rated short-circuit making	Icm	220/230//380/400/415V~	kA	84	84	143	286	143	165	220	286
capacity (peak value)		440V~	kA	84	84	143	242	143	165	220	242
		500/660/690V~	kA	75.6	84	121	187	143	165	187	187
Utilization category (in accordance with CEI EN 60947-2)				B	B	B	A	B	B	B	A
Isolation behavior (in accordance with CEI EN 60947-2)				•	•	•	•	•	•	•	•
Overcurrent protection											
Microprocessor-based releases for a.c. applications				•	•	•	•	•	•	•	•
Operating time											
Closing time (max)			ms	80	80	80	80	80	80	80	80
Break time for I<Icw (max) ①			ms	70	70	70	70	70	70	70	70
Break time for I>Icw (max)			ms	30	30	30	12	30	30	30	12
Dimensions											
Fixed: H=418mm D=302mm L(3/4 poli)=			mm	296/386	296/386			404/530			
Withdrawable: H=461mm D=396.5mm L(3/4 poli)=			mm	324/414	324/414			432/558			
Weights											
(circuit-breaker complete with releases and CT, excluding accessories)											
Fixed 3/4 pole			kg	42/50	46/55	46/55	45/53	68/80	68/80	68/80	67/79
Withdrawable 3/4 pole (including fixed part)			kg	65/80	72/89	72/89	70/87	100/125	100/125	100/125	100/120

Circuit-breaker type				E1B		E2 B-N			E2L		E3 N-S-H				
Rated uninterupted current (at 40°C)	Iu		A	800	1250	1250	1600	2000	1250	1600	1250	1600	2000	2500	3200
Mechanical life with regular routine maintenance		No. operations x 1000		25	25	25	25	25	20	20	20	20	20	20	20
Frequency	f	Operations per hour		60	60	60	60	60	60	60	60	60	60	60	60
Electrical life (440V~)		No. operations x 1000		10	10	15	12	10	4	3	12	10	9	8	6
Frequency	f	Operations per hour		30	30	30	30	30	20	20	20	20	20	20	20

① Without intentional delays.
② Consult factory for drawings.

General information
IEC general ratings and specifications

E6

Specifications common to the entire range

Voltages		
Rated service voltage	Ue	690~ / 250– V
Rated insulation voltage	Ui	1000 V
Rated impulse withstand voltage	Uimp	12 kV
Service temperature		-5 …+70 °C
Storage temperature		-40 …+70 °C
Frequency	f	50–60 Hz
Number of poles		3–4
Versions		Fixed / Withdrawable

Circuit breaker type				E4		E6	
Performance level				**S**	**H**	**H**	**V**
Rated uninterrupted current (at 40°C) Iu			A	4000	3200	5000	3200
			A	—	4000	6300	4000
			A	—	—	—	5000
			A	—	—	—	6300
			A	—	—	—	—
Capacity of neutral poles on four-pole circuit breakers			%Iu	50	50	50	50
Rated ultimate short-circuit breaking capacity	Icu	220/230/380/400/415V~	kA	75	100	100	150
		440V~	kA	75	100	100	150
		500/660/690V~	kA	75	85	75	85
		600V~	kA	—	100	—	—
		250V— (switches)	kA	75	100	100	100
Rated duty short-circuit breaking capacity	Ics	220/230/380/400/415V~	kA	75	100	100	125
		440V~	kA	75	100	100	125
		500/660/690V~	kA	75	85	100	100
		250V— (switches)	kA	75	100	100	100
Rated short-time withstand current	Icw		(1S)kA	75	100	100	100
Rated short-circuit making capacity (peak value)	Icm	220/230/380/400/415V~	kA	165	220	220	330
		440V~	kA	165	220	220	330
		500/660/690V~	kA	165	187	165	187
Utilization category (in accordance with CEI EN 60947-2)				B	B	B	B
Isolation behavior (in accordance with CEI EN 60947-2)				•	•	•	•
Overcurrent protection							
Microprocessor-based releases for a.c. applications				•	•	•	•
Operating time							
Closing time (max)			ms	80	80	80	80
Break time for I<Icw (max)①			ms	70	70	70	70
Break time for I>Icw (max)			ms	30	30	30	30
Dimensions							
Fixed: H=418mm D=302mm L(3/4 poli)=			mm	566/656		782/908	
Withdrawable: H=461mm D=396.5mm L(3/4 poli)=			mm	594/684		810/936	
Weights							
(circuit-breaker complete with releases and CT, excluding accessories)							
Fixed 3/4 pole			kg	95/115	95/115	140/170	140/170
Withdrawable 3/4 pole (including fixed part)			kg	147/190	147/190	210/260	210/260

Circuit-breaker type			E3L		E4 S-H		E6 H-V			
Rated uninterupted current (at 40°C)	Iu	(A)	2000	2500	3200	4000	3200	4000	5000	6300
Mechanical life with regular routine maintenance		(No. operations x 1000)	15	15	15	15	12	12	12	12
Frequency	f	(Operations per hour)	60	60	60	60	60	60	60	60
Electrical life (440V~)		(Operations x 1000)	2	1.8	7	5	5	4	3	2
Frequency	f	(Operations per hour)	20	20	10	10	10	10	10	10

① Without intentional delays.
② Consult factory for drawings.

General information
Catalog number information
IEC

E 1 S 16 X X X X X X X X X X

Accessories: X = none
A = mechanical counter
B = button guard
F = A & B

Accessories: X = none
A = mechanical trip indicator
B = mechanical trip indicator & bell alarm
C = padlock provision (open)
D = keylock (open)
E = position lock
F = access pos. lock
G = A & C
H = A & D
J = A & E
K = A & F
L = A, C & E
M = A, C & F
N = B & C
P = B & D
Q = B & E
R = B & F
S = B, C & E
T = B, C & F
U = C & E
V = C & F
W = D & E
Y = D & F

Undervoltage trip: 0 = none
50/60Hz & VDC: A = 24VDC, B = 30V, C = 48V, D = 60V, E = 110 – 120V, F = 125 – 127V, G = 220 – 240V, H = 250V, J = 380 – 400VAC, K = 440 – 480VAC
Second shunt trip: L = 24VDC, M = 30V, N = 48V, P = 60V, Q = 110 – 120V, R = 125 – 127V, S = 220 – 240V, T = 250V, U = 380 – 400VAC, V = 440 – 480VAC

Shunt trip: 0 = none
50/60Hz & VDC: A = 24VDC, B = 30, C = 48, D = 60, E = 110 – 120, F = 120 – 127, G = 220 – 240, H = 240 - 250, J = 380 – 400VAC, K = 440 – 480VAC

Spring charging motor: (includes spring charged signal, P/N does not show)
0 = none, A = 24 – 30VAC/VDC, B = 48 – 60VAC/VDC, C = 110-130VAC/VDC, D = 220 – 250VAC/VDC, E = spring charged signal only

Contacts:
A = 4 aux
B = 10 aux
C = 15 aux
D = UV energ. N.O.
E = UV energ.NC
F = A & D
G = A & E
H = B & D
J = B & E
K = C & D
L = C & E

Closing coil: 0 = none
50/60Hz & VDC: A = 24VDC, B = 30, C = 48, D = 60, E = 110 – 120, F = 120 – 127, G = 220 – 240, H = 240 - 250, J = 380 – 400VAC, K = 440 – 480VAC

Terminal types: (Ist letter is upper terminal, 2nd letter is lower terminal) ①
H = rear horz., V = rear vert., F = front, L = rear flat
H = HH, V = VV, F = FF, L = LL,
A = HV, B = VH, C = HF, D = FH, E = HL, G = LH, J = VF, K = FV, M = VL, N = LV, P = FL, Q = LF

Trip unit: A = PR111/P, LI
B = PR111/P, LSI
C = PR111/P, LSIG
D = non-automatic
E = PR112/P, LSI
F = PR112/P, LSIG
G = PR112/PD, LSI
H = PR112/PD, LSIG
N = PR113/P
P = PR113/PD

Version: F = fixed breaker, IEC; W = withdrawable breaker, IEC, less cradle

Max. ampere rating: 02 = 250, 04 = 400, 08 = 800, 10 = 1000, 12 = 1250, 16 = 1600, 20 = 2000, 25 = 2500, 32 = 3200, 40 = 4000, 50 = 5000, 63 = 6300

Breaking capacity: B = basic, N = normal, S = standard, H = high, V = very high, L = limiting

Frame size: 1 = 1, 3P; 2 = 2, 3P; 3 = 3, 3P; 4 = 4, 3P; 6 = 6, 3P; A = 1, 4P; B = 2, 4P; C = 3, 4P; D = 4, 4P; F = 6, 4P

① For withdrawable breakers, use "H".
② Not available with PR112 trip units; use external 15 auxiliary kit.

General information
Catalog number information
Cradle (fixed part), IEC

E 1 X 12 X X X

Accessories: X = none
A = Shutter padlock

Contacts: 0 = none
A = 5 position auxiliaries
B = 10 position auxiliaries

Terminal types: (Ist letter is upper terminal, 2nd letter is lower terminal.)
H = rear horz., V = rear vert., F = front, L = rear flat
H = HH, V = VV, F = FF, L = LL,
A = HV, B = VH, C = HF, D = FH, E = HL, G = LH, J = VF, K = FV, M = VL, N = LV,
P = FL, Q = LF

Max. ampere rating: IEC: 12 = 1250 (E1); 20 = 2000 (E2); 32 = 3200 (E3); 40 = 4000 (E4); 63 = 6300 (E6)

Version: C = cradle, IEC

Frame size: 1 = 1, 3P; 2 = 2, 3P; 3 = 3, 3P; 4 = 4, 3P; 6 = 6, 3P
A = 1, 4P; B = 2, 4P; C = 3, 4P; D = 4, 4P; F = 6, 4P

General information
Standard features

Fixed breaker		Drawout breaker	
Manual operated	Electrically operated	Manual operated	Electrically operated
T.U. — PR111/P, LI Aux. SW., 4 Spring charged indicator Flange Accessory support Terminal block Lifting plate	T.U — PR111/P, LI Motor operator Closing coil Shunt trip Aux. SW., 4 Spring charged indicator Flange Accessory support Terminal block Lifting plate	T.U. — PR111/P, LI Aux. SW., 4 Spring charged indicator Flange Crank Accessory support Sliding contacts Anti-insertion lock Lifting plate	T.U. — PR111/P, LI Motor operator Closing coil Shunt trip Aux. SW., 4 Spring charged indicator Flange Crank Accessory support Sliding contacts Anti-insertion lock Lifting plate

NOTE: Switches provided standard without 4 auxiliary contacts.

Fixed breakers, 3 poles
IEC

Fixed breakers

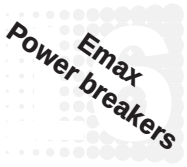
Circuit breaker type	Frame amps	Interrupting ratings kA, 415V	Manually operated	Electrically operated	Set of three vertical terminals	Set of three front terminals
E1B08	800	40	**$ 6027**	**$ 8388**	**$ 644**	**$ 367**
E1B12	1250	40	**6656**	**9017**	**644**	**367**
E2N12	1250	65	**7314**	**9675**	**690**	**888**
E3S12	1250	75	**7808**	**10,169**	**790**	**1232**
E3H12	1250	100	**8036**	**10,397**	**790**	**1232**
E2L12	1250	130	**10,066**	**12,427**	**690**	**888**
E2B16	1600	40	**7293**	**9654**	**690**	**888**
E2N16	1600	65	**8014**	**10,375**	**690**	**888**
E3S16	1600	75	**8700**	**11,061**	**790**	**1232**
E3H16	1600	100	**9232**	**11,593**	**790**	**1232**
E2L16	1600	130	**11,422**	**13,783**	**690**	**888**
E2B20	2000	40	**8509**	**10,870**	**690**	**888**
E2N20	2000	65	**9024**	**11,385**	**690**	**888**
E3S20	2000	75	**9817**	**12,178**	**790**	**1232**
E3H20	2000	100	**11,762**	**14,123**	**790**	**1232**
E3L20	2000	130	**13,425**	**15,786**	**790**	**1232**
E3N25	2500	65	**13,870**	**16,231**	**790**	**1232**
E3S25	2500	75	**15,242**	**17,603**	**790**	**1232**
E3H25	2500	100	**16,948**	**19,309**	**790**	**1232**
E3L25	2500	130	**19,454**	**21,815**	**790**	**1232**
E3N32	3200	65	**17,963**	**20,324**	**790**	**1232**
E3S32	3200	75	**18,662**	**21,023**	**790**	**1232**
E3H32	3200	100	**20,217**	**22,578**	**790**	**1232**
E4H32	3200	100	**22,085**	**24,446**	**1664**	**1696**
E6V32	3200	150	**36,328**	**38,689**	**2783**	**2464**
E4S40	4000	75	**26,873**	**29,234**	**1664**	**1696**
E4H40	4000	100	**30,645**	**33,006**	**1664**	**1696**
E6V40	4000	150	**42,739**	**45,100**	**2783**	**2464**
E6H50	5000	100	**42,047**	**44,408**	**2783**	**2464**
E6V50	5000	150	**50,281**	**52,642**	**2783**	**2464**
E6H63	6300	100	**50,456**	**52,817**	**2783**	**2464**
E6V63	6300	150	**60,337**	**62,698**	**2783**	**2464**

Standard features – manually operated breaker

Fixed breaker

- Rear horizontal terminals
- PR111 trip unit with LI protection functions
- Manual mechanical close and open pushbuttons
- CB open/closed mechanical indicator
- Spring charged/discharged mechanical indicator
- 2NO & 2NC auxiliary contacts for open-closed position indication
- Lifting plates
- Current transformers
- Terminal box

Fixed breakers, 4 poles
IEC



Fixed breakers

Circuit breaker type	Frame amps	Interrupting ratings kA, 415V	Manually operated	Electrically operated	Set of four vertical terminals	Set of four front terminals
E1B08	800	40	**$ 7475**	**$ 9836**	**$ 837**	**$ 489**
E1B12	1250	40	**8293**	**10,654**	**837**	**489**
E2N12	1250	65	**9148**	**11,509**	**897**	**1183**
E3S12	1250	75	**9306**	**11,667**	**1027**	**1643**
E3H12	1250	100	**9591**	**11,952**	**1027**	**1643**
E2L12	1250	130	**12,725**	**15,086**	**897**	**1183**
E2B16	1600	40	**9121**	**11,482**	**897**	**1183**
E2N16	1600	65	**10,059**	**12,420**	**897**	**1183**
E3S16	1600	75	**10,413**	**12,774**	**1027**	**1643**
E3H16	1600	100	**10,550**	**12,911**	**1027**	**1643**
E2L16	1600	130	**14,488**	**16,849**	**897**	**1183**
E2B20	2000	40	**10,701**	**13,062**	**897**	**1183**
E2N20	2000	65	**11,371**	**13,732**	**897**	**1183**
E3S20	2000	75	**11,795**	**14,156**	**1027**	**1643**
E3H20	2000	100	**13,621**	**15,982**	**1027**	**1643**
E3L20	2000	130	**17,093**	**19,454**	**1027**	**1643**
E3N25	2500	65	**17,671**	**20,032**	**1027**	**1643**
E3S25	2500	75	**19,454**	**21,815**	**1027**	**1643**
E3H25	2500	100	**21,672**	**24,033**	**1027**	**1643**
E3L25	2500	130	**24,930**	**27,291**	**1027**	**1643**
E3N32	3200	65	**22,992**	**25,353**	**1027**	**1643**
E3S32	3200	75	**23,900**	**26,261**	**1027**	**1643**
E3H32	3200	100	**27,307**	**29,668**	**1027**	**1643**
E4H32	3200	100	**28,351**	**30,712**	**2163**	**2260**
E6V32	3200	150	**45,410**	**47,771**	**3618**	**3286**
E4S40	4000	75	**34,610**	**36,971**	**2163**	**2260**
E4H40	4000	100	**39,516**	**41,877**	**2163**	**2260**
E6V40	4000	150	**53,424**	**55,785**	**3618**	**3286**
E6H50	5000	100	**52,558**	**54,919**	**3618**	**3286**
E6V50	5000	150	**62,852**	**65,213**	**3618**	**3286**
E6H63	6300	100	**63,070**	**65,431**	**3618**	**3286**
E6V63	6300	150	**75,422**	**77,783**	**3618**	**3286**

Standard features – manually operated breaker

Fixed breaker

- Rear horizontal terminals
- PR111 trip unit with LI protection functions
- Manual mechanical close and open pushbuttons
- CB open/closed mechanical indicator
- Spring charged/discharged mechanical indicator
- 2NO & 2NC auxiliary contacts for open-closed position indication
- Lifting plates
- Current transformers
- Terminal box

Neutral pole rating

- E1 – E3 = 100% rating
- E4 – E6 = 50% rating ①

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① Consult factory for special 100% neutral pole rating.

Withdrawable breakers, 3 poles
IEC

Withdrawable breakers

Circuit breaker type	Frame amps	Interrupting ratings kA, 415V	Moving part only		Fixed part		
			Manually operated	Electrically operated	RH terminals	Set of three vertical terminals	Set of three front terminals
E1B08	800	40	**$ 6501**	**$ 8862**	**$ 2281**	**$ 644**	**$ 367**
E1B12	1250	40	**7757**	**10,118**	**2281**	**644**	**367**
E2N12	1250	65	**8626**	**10,987**	**2400**	**690**	**888**
E3S12	1250	75	**8760**	**11,121**	**2925**	**790**	**1232**
E3H12	1250	100	**8897**	**11,258**	**2925**	**790**	**1232**
E2L12	1250	130	**12,180**	**14,541**	**2400**	**690**	**888**
E2B16	1600	40	**9097**	**11,458**	**2400**	**690**	**888**
E2N16	1600	65	**10,234**	**12,595**	**2400**	**690**	**888**
E3S16	1600	75	**10,674**	**13,035**	**2925**	**790**	**1232**
E3H16	1600	100	**11,100**	**13,461**	**2925**	**790**	**1232**
E2L16	1600	130	**15,920**	**18,281**	**2400**	**690**	**888**
E2B20	2000	40	**10,987**	**13,348**	**2400**	**690**	**888**
E2N20	2000	65	**11,182**	**13,543**	**2400**	**690**	**888**
E3S20	2000	75	**11,361**	**13,722**	**2925**	**790**	**1232**
E3H20	2000	100	**13,256**	**15,617**	**2925**	**790**	**1232**
E3L20	2000	130	**17,817**	**20,178**	**2925**	**790**	**888**
E3N25	2500	65	**15,220**	**17,581**	**2925**	**790**	**1232**
E3S25	2500	75	**17,896**	**20,257**	**2925**	**790**	**1232**
E3H25	2500	100	**19,528**	**21,889**	**2925**	**790**	**1232**
E3L25	2500	130	**22,892**	**25,253**	**2925**	**790**	**1232**
E3N32	3200	65	**22,337**	**24,698**	**2925**	**790**	**1232**
E3S32	3200	75	**23,340**	**25,701**	**2925**	**790**	**1232**
E3H32	3200	100	**23,724**	**26,085**	**2925**	**790**	**1232**
E4H32	3200	100	**23,842**	**26,203**	**6259**	**1664**	**1696**
E6V32	3200	150	**38,539**	**40,900**	**7398**	**2783**	**2464**
E4S40	4000	75	**30,399**	**32,760**	**6259**	**1664**	**1696**
E4H40	4000	100	**34,540**	**36,901**	**6259**	**1664**	**1696**
E6V40	4000	150	**45,340**	**47,701**	**7398**	**2783**	**2464**
E6H50	5000	100	**45,541**	**47,902**	**7398**	**2783**	**2464**
E6V50	5000	150	**53,341**	**55,702**	**7398**	**2783**	**2464**
E6H63	6300	100	**64,163**	**66,524**	**7398**	**2783**	**2464**
E6V63	6300	150	**78,427**	**80,788**	**7398**	**2783**	**2464**

Standard features – electrically operated breaker
Moving part

- PR111 trip unit with LI protection functions
- Spring charging motor
- Shunt trip
- Closing coil
- Manual mechanical close and open pushbuttons
- CB open/closed mechanical indicator
- Spring charged/discharged mechanical indicator
- 2NO & 2NC auxiliary contacts for open-closed position indication
- Lifting plates
- Current transformers
- Racking device with closed door
- Circuit breaker racking position indicator
- Sliding contacts

Standard features – electrically operated breaker
Fixed part

- Safety shutters
- Rear horizontal terminals
- Sliding contacts
- Anti-insertion lock
- Ground connection

Withdrawable breakers, 4 poles
IEC

Withdrawable breakers

Circuit breaker type	Frame amps	Interrupting ratings kA, 415V	Moving part only		Fixed part		
			Manually operated	Electrically operated	RH terminals	Set of four vertical terminals	Set of four front terminals
E1B08	800	40	**$ 7717**	**$ 10,078**	**$ 2572**	**$ 837**	**$ 489**
E1B12	1250	40	**10,649**	**13,010**	**2572**	**837**	**489**
E2N12	1250	65	**11,372**	**13,733**	**3192**	**897**	**1183**
E3S12	1250	75	**11,906**	**14,267**	**3890**	**1027**	**1643**
E3H12	1250	100	**12,229**	**14,590**	**3890**	**1027**	**1643**
E2L12	1250	130	**15,402**	**17,763**	**3192**	**897**	**1183**
E2B16	1600	40	**11,395**	**13,756**	**3192**	**897**	**1183**
E2N16	1600	65	**12,873**	**15,234**	**3192**	**897**	**1183**
E3S16	1600	75	**12,472**	**14,833**	**3890**	**1027**	**1643**
E3H16	1600	100	**13,304**	**15,665**	**3890**	**1027**	**1643**
E2L16	1600	130	**20,264**	**22,625**	**3192**	**897**	**1183**
E2B20	2000	40	**13,851**	**16,212**	**3192**	**897**	**1183**
E2N20	2000	65	**15,661**	**18,022**	**3192**	**897**	**1183**
E3S20	2000	75	**14,873**	**17,234**	**3890**	**1027**	**1643**
E3H20	2000	100	**16,784**	**19,145**	**3890**	**1027**	**1643**
E3L20	2000	130	**22,714**	**25,075**	**3890**	**1027**	**1643**
E3N25	2500	65	**20,380**	**22,741**	**3890**	**1027**	**1643**
E3S25	2500	75	**22,816**	**25,177**	**3890**	**1027**	**1643**
E3H25	2500	100	**24,938**	**27,299**	**3890**	**1027**	**1643**
E3L25	2500	130	**29,312**	**31,673**	**3890**	**1027**	**1643**
E3N32	3200	65	**29,555**	**31,916**	**3890**	**1027**	**1643**
E3S32	3200	75	**29,893**	**32,254**	**3890**	**1027**	**1643**
E3H32	3200	100	**32,017**	**34,378**	**3890**	**1027**	**1643**
E4H32	3200	100	**32,589**	**34,950**	**8324**	**2163**	**2260**
E6V32	3200	150	**49,722**	**52,083**	**9839**	**3618**	**3286**
E4S40	4000	75	**41,350**	**43,711**	**8324**	**2163**	**2260**
E4H40	4000	100	**44,409**	**46,770**	**8324**	**2163**	**2260**
E6V40	4000	150	**58,496**	**60,857**	**9839**	**3618**	**3286**
E6H50	5000	100	**58,680**	**61,041**	**9839**	**3618**	**3286**
E6V50	5000	150	**68,820**	**71,181**	**9839**	**3618**	**3286**
E6H63	6300	100	**82,888**	**85,249**	**9839**	**3618**	**3286**
E6V63	6300	150	**101,432**	**103,793**	**9839**	**3618**	**3286**

Standard features – electrically operated breaker
Moving part

- PR111 trip unit with LI protection functions
- Spring charging motor
- Shunt trip
- Closing coil
- Manual mechanical close and open pushbuttons
- CB open/closed mechanical indicator
- Spring charged/discharged mechanical indicator
- 2NO & 2NC auxiliary contacts for open-closed position indication
- Lifting plates
- Current transformers
- Racking device with closed door
- Circuit breaker racking position indicator
- Sliding contacts

Standard features – electrically operated breaker
Fixed part

- Safety shutters
- Rear horizontal terminals
- Sliding contacts
- Anti-insertion lock
- Ground connection

Neutral pole rating

- E1 – E3 = 100% rating
- E4 – E6 = 50% rating ①

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① Consult factory for special 100% neutral pole rating.

Non-automatic air circuit breaker
Fixed switches (Without trip unit & c.t.s.), 3 pole
IEC

Fixed switches, 3 pole

Circuit breaker type	Frame amps	Manually operated	Electrically operated	Set of three vertical terminals	Set of three front terminals
E1B/MS08	800	**$ 4298**	**$ 6659**	**$ 644**	**$ 367**
E1B/MS12	1250	**4927**	**7288**	**644**	**367**
E2N/MS12	1250	**5585**	**7946**	**690**	**888**
E3S/MS12	1250	**5972**	**8333**	**790**	**1232**
E2B/MS16	1600	**5564**	**7925**	**690**	**888**
E2N/MS16	1600	**6285**	**8646**	**690**	**888**
E3S/MS16	1600	**6864**	**9225**	**790**	**1232**
E2B/MS20	2000	**6780**	**9141**	**690**	**888**
E2N/MS20	2000	**7295**	**9656**	**690**	**888**
E3S/MS20	2000	**7981**	**10,342**	**790**	**1232**
E3N/MS25	2500	**12,034**	**14,395**	**790**	**1232**
E3S/MS25	2500	**13,406**	**15,767**	**790**	**1232**
E3N/MS32	3200	**16,127**	**18,488**	**790**	**1232**
E3S/MS32	3200	**16,826**	**19,187**	**790**	**1232**
E4S/MS40	4000	**24,504**	**26,865**	**1664**	**1696**
E4H/MS40	4000	**28,276**	**30,637**	**1664**	**1696**
E6H/MS50	5000	**39,465**	**41,826**	**2783**	**2464**
E6H/MS63	6300	**47,874**	**50,235**	**2783**	**2464**

Standard features – manually operated switch

- Rear horizontal terminals
- Manual mechanical close and open pushbuttons
- Circuit breaker open/closed mechanical indicator
- Spring charged/discharged mechanical indicator
- Lifting plates
- Terminal box

Non-automatic air circuit breaker
Fixed switches (Without trip unit & c.t.s.), 4 pole IEC

Fixed switches, 4 pole

Circuit breaker type	Frame amps	Manually operated	Electrically operated	Set of four vertical terminals	Set of four front terminals
E1B/MS08	800	**$ 5533**	**$ 7894**	**$ 837**	**$ 489**
E1B/MS12	1250	**6351**	**8712**	**837**	**489**
E2N/MS12	1250	**7206**	**9567**	**897**	**1183**
E3S/MS12	1250	**7221**	**9582**	**1027**	**1643**
E2B/MS16	1600	**7179**	**9540**	**897**	**1183**
E2N/MS16	1600	**8117**	**10,478**	**897**	**1183**
E3S/MS16	1600	**8328**	**10,689**	**1027**	**1643**
E2B/MS20	2000	**8759**	**11,120**	**897**	**1183**
E2N/MS20	2000	**9429**	**11,790**	**897**	**1183**
E3S/MS20	2000	**9710**	**12,071**	**1027**	**1643**
E3N/MS25	2500	**15,586**	**17,947**	**1027**	**1643**
E3S/MS25	2500	**17,369**	**19,730**	**1027**	**1643**
E3N/MS32	3200	**20,907**	**23,268**	**1027**	**1643**
E3S/MS32	3200	**21,815**	**24,176**	**1027**	**1643**
E4S/MS40	4000	**31,815**	**34,176**	**2163**	**2260**
E4H/MS40	4000	**36,721**	**39,082**	**2163**	**2260**
E6H/MS50	5000	**49,479**	**51,480**	**3618**	**3286**
E6H/MS63	6300	**59,991**	**62,352**	**3618**	**3286**

Standard features – manually operated switch

- Rear horizontal terminals
- Manual mechanical close and open pushbuttons
- Circuit breaker open/closed mechanical indicator
- Spring charged/discharged mechanical indicator
- Lifting plates
- Terminal box

Neutral pole rating

- E1 – E3 = 100% rating
- E4 – E6 = 50% rating ①

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① Consult factory for special 100% neutral pole rating.

Non-automatic air circuit breaker
Withdrawable switches (Without trip unit & c.t.s.), 3 pole IEC

Withdrawable switches, 3 pole

Circuit breaker type	Ampere frame amps	Moving part only		Fixed part RH terminals	Set of 3 vertical terminals	Set of 3 front terminals
		Manually operated	Electrically operated			
E1B/MS08	800	**$ 4772**	**$ 7133**	**$ 2281**	**$ 644**	**$ 367**
E1B/MS12	1250	**6028**	**8389**	**2281**	**644**	**367**
E2N/MS12	1250	**6897**	**9258**	**2400**	**690**	**888**
E3S/MS12	1250	**6924**	**9285**	**2925**	**790**	**1232**
E2B/MS16	1600	**7368**	**9729**	**2400**	**690**	**888**
E2N/MS16	1600	**8505**	**10,866**	**2400**	**690**	**888**
E3S/MS16	1600	**8838**	**11,199**	**2925**	**790**	**1232**
E2B/MS20	2000	**9258**	**11,619**	**2400**	**690**	**888**
E2N/MS20	2000	**9453**	**11,814**	**2400**	**690**	**888**
E3S/MS20	2000	**9525**	**11,886**	**2925**	**790**	**1232**
E3N/MS25	2500	**13,384**	**15,745**	**2925**	**790**	**1232**
E3S/MS25	2500	**16,060**	**18,421**	**2925**	**790**	**1232**
E3N/MS32	3200	**20,501**	**22,862**	**2925**	**790**	**1232**
E3S/MS32	3200	**21,540**	**23,865**	**2925**	**790**	**1232**
E4S/MS40	4000	**28,030**	**30,391**	**6259**	**1664**	**1696**
E4H/MS40	4000	**32,171**	**34,532**	**6259**	**1664**	**1696**
E6H/MS50	5000	**42,959**	**45,320**	**7398**	**2783**	**2464**
E6H/MS63	6300	**61,581**	**63,942**	**7398**	**2783**	**2464**

Standard features – manually operated switch

Moving part

- Manual mechanical close and open pushbuttons
- Circuit breaker open/closed mechanical indicator
- Spring charged/discharged mechanical indicator
- Lifting plates
- Racking device with closed door
- Circuit breaker racking position indicator
- Sliding contacts

Standard features – manually operated switch

Fixed part

- Safety shutters
- Rear horizontal terminals
- Sliding contacts
- Anti-insertion lock
- Ground connection

Non-automatic air circuit breaker
Withdrawable switches (Without trip unit & c.t.s.), 4 pole IEC

Withdrawable switches, 4 pole

Circuit breaker type	Ampere frame amps	Moving part only		Fixed part RH terminals	Set of 4 vertical terminals	Set of 4 front terminals
		Manually operated	Electrically operated			
E1B/MS08	800	**$ 5775**	**$ 8136**	**$ 2572**	**$ 837**	**$ 489**
E1B/MS12	1250	**8707**	**11,068**	**2572**	**837**	**489**
E2N/MS12	1250	**9430**	**11,791**	**3192**	**897**	**1183**
E3S/MS12	1250	**9821**	**12,182**	**3890**	**1027**	**1643**
E2B/MS16	1600	**9453**	**11,814**	**3192**	**837**	**1183**
E2N/MS16	1600	**10,931**	**13,292**	**3192**	**897**	**1183**
E3S/MS16	1600	**10,387**	**12,748**	**3890**	**1027**	**1643**
E2B/MS20	2000	**11,909**	**14,270**	**3192**	**837**	**1183**
E2N/MS20	2000	**13,719**	**16,080**	**3192**	**897**	**1183**
E3S/MS20	2000	**12,788**	**15,149**	**3890**	**1027**	**1643**
E3N/MS25	2500	**18,295**	**20,656**	**3890**	**1027**	**1643**
E3S/MS25	2500	**20,731**	**23,092**	**3890**	**1027**	**1643**
E3N/MS32	3200	**27,470**	**29,831**	**3890**	**1027**	**1643**
E3S/MS32	3200	**27,808**	**30,169**	**3890**	**1027**	**1643**
E4S/MS40	4000	**38,555**	**40,916**	**8324**	**2163**	**2260**
E4H/MS40	4000	**41,614**	**43,975**	**8324**	**2163**	**2260**
E6H/MS50	5000	**55,601**	**57,962**	**9839**	**3618**	**3286**
E6H/MS63	6300	**79,809**	**82,170**	**9839**	**3618**	**3286**

Standard features – manually operated switch
Moving part

- Manual mechanical close and open pushbuttons
- Circuit breaker open/closed mechanical indicator
- Spring charged/discharged mechanical indicator
- Lifting plates
- Racking device with closed door
- Circuit breaker racking position indicator
- Sliding contacts

Standard features – manually operated switch
Fixed part

- Safety shutters
- Rear horizontal terminals
- Sliding contacts
- Anti-insertion lock
- Ground connection

Neutral pole rating

- E1 – E3 = 100% rating
- E4 – E6 = 50% rating ①

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① Consult factory for special 100% neutral pole rating.

Air circuit breakers
Installed optional features
UL & IEC

1. – 20. Options for trip units

Item	Factory installation list price adder	Field installation catalog number	Field install. list price
1. Trip unit PR111/P-A LI (UL version)	—	PR111/P-A-LI	**$ 1089**
2. Trip unit PR111/P-A LSI (UL version)	**$ 515**	PR111/P-A-LSI	**1604**
3. Trip unit PR111/P-A LSIG (UL version)	**1208**	PR111/P-A-LSIG	**2297**
4. Trip unit PR112/P-A LSI (UL version)	**2210**	PR112/P-A-LSI	**3299**
5. Trip unit PR112/P-A LSIG (UL version)	**2904**	PR112/P-A-LSIG	**3993**
6. Trip unit PR112/PD-A LSI (UL version)	**6890**	PR112/PD-A-LSI	**7979**
7. Trip unit PR112/PD-A LSIG (UL version)	**7583**	PR112/PD-A-LSIG	**8672**
8. Trip unit PR113/P-A-LSIG (UL version)	**7323**	PR113/P-A-LSIG	**8412**
9. Trip unit PR113/PD-A-LSIG (UL version)	**12,002**	PR113/PD-A-LSIG	**13,091**
10. Trip unit PR111/P LI (IEC version)	—	PR111/P-LI	**1089**
11. Trip unit PR111/P LSI (IEC version)	**515**	PR111/P-LSI	**1604**
12. Trip unit PR111/P LSIG (IEC version)	**1208**	PR111/P-LSIG	**2297**
13. Trip unit PR112/P LSI (IEC version)	**2210**	PR112/P-LSI	**3299**
14. Trip unit PR112/P LSIG (IEC version)	**2904**	PR112/P-LSIG	**3993**
15. Trip unit PR112/PD LSI (IEC version)	**6890**	PR112/PD-LSI	**7979**
16. Trip unit PR112/PD LSIG (IEC version)	**7583**	PR112/PD-LSIG	**8672**
17. Trip unit PR113/PLSIG (IEC version)	**7323**	PR113/P-LSIG	**8412**
18. Trip unt PR113/PDLSIG (IEC version)	**12,002**	PR113/PD-LSIG	**13,091**
19. Mechanical trip indication (manual reset)	**188**	KE6TSM	**188**
20. Mechanical trip indication and bell alarm	**348**	KE6TBA	**348**

21. – 27. Electrical and mechanical accessories

Item	Factory installation list price adder	Field installation catalog number	Field installation list price
21a. Shunt trip coil (included in the electrically operated breaker)			
Rated voltage			
24V		KE6S0	
30V		KE6S9	
48V		KE6S8	
60V		KE6S7	
110/120V	**$ 374**	KE6S6	**$ 374**
125/127V		KE6S5	
220/240V		KE6S4	
250V		KE6S3	
380/400V		KE6S2	
440/480V		KE6S1	
21b. Second shunt trip coil (includes accessory support) ①			
24V		KE6S0-2	
30V		KE6S9-2	
48V		KE6S8-2	
60V		KE6S7-2	
110/120V	**456**	KE6S6-2	**456**
125/127V		KE6S5-2	
220/240V		KE6S4-2	
250V		KE6S3-2	
380/400V		KE6S2-2	
440/480V		KE6S1-2	
22.Closing coil (included in the electrically operated breaker)			
Rated voltage			
24V		KE6C0	
30V		KE6C9	
48V		KE6C8	
60V		KE6C7	
110/120V	**374**	KE6C6	**374**
125/127V		KE6C5	
220/240V		KE6C4	
250V		KE6C3	
380/400V		KE6C2	
440/480V		KE6C1	
23. Spring charging motor with limit switch and electrical indication charged spring (included in the electrically operated breaker)			
Rated voltage			
24/30V		KE6M9	
48/60V	**1613**	KE6M7	**1613**
100/130V		KE6M5	
220/250V		KE6M3	
Spring charged signal only	**73**	KE6SC	**73**

① Order as alternative to UV trip.

	Item	Factory installation list price adder	Field installation catalog number	Field installation list price
24.	**Instantaneous under voltage trip release**			
	Rated voltage			
	24V		KE6U0	
	30V		KE6U9	
	48V		KE6U8	
	60V		KE6U7	
	110/120V	**$ 456**	KE6U6	**$ 456**
	125/127V		KE6U5	
	220/240V		KE6U4	
	250V		KE6U3	
	380/400V		KE6U2	
	440/480V		KE6U1	
25.	**Energized undervoltage release signalling contact**			
	Auxiliary contact normally open	**82**	KE6UE10	**82**
	Auxiliary contact normally closed		KE6UE01	
26.	**Auxiliary contacts for breakers**			
	Rated 5A-250VAC / 0.3A –125VDC			
	26a. 2NO +2NC	**–**	KE6A4	**297**
	26b. 5NO + 5NC (not available with PR112)	**753**	KE6A10	**1050**
	26c. 15 additional auxiliary contacts for field installation on fixed breakers (connected to breaker with flexible cable) ①	**1507**	KE6A15	**1507**
	26d. 15 additional auxiliary contacts for field installation on withdrawable breakers (connected to breaker with flexible cable) ①	**1507**	KE6A15-W	**1507**
27.	**Auxiliary contacts for switches**			
	27a. 2NO + 2NC	**297**	KE6A4	**297**
	27b. 5NO + 5NC	**1050**	KE6A10	**1050**

28. – 29. Electrical and mechanical accessories

	Item	Factory installation list price adder	Field installation catalog number	Field installation list price
28.	**Auxiliary contacts for service/test/disconnected position indication**			
	Cradle mounted			
	28a. 5 auxiliary contacts	**377**	KE6PS1	**377**
	28b. 10 auxiliary contacts for E1/2 3 pole	**753**	KE2PS3	**753**
	28c. 10 auxiliary contacts for E1/2 4 pole	**753**	KE2PS4	**753**
	28d. 10 auxiliary contacts for E3 3 pole	**753**	KE3PS3	**753**
	28e. 10 auxiliary contacts for E3 4 pole	**753**	KE3PS4	**753**
	28f. 10 auxiliary contacts for E4/6 3/4 pole	**753**	KE6PS2	**753**
29.	**Mechanical operation counter**	**418**	KE6MC	**418**

① Order as alternative to various types of interlock and kirk key lock. For mounting on fixed breaker, also requires accessory 32 (KE6MLP).

Air circuit breakers
Installed optional features
UL & IEC

30. – 35. Locks and interlocks

Item		Factory installation list price adder	Field installation catalog number	Field installation list price
30.	**Button guard**	**$ 48**	KE6PG	**$ 48**
31.	**Key lock in open position**			
	31a. Key lock N. 3004222 ①		KE6KL2	
	31b. Key lock N. 0025431		KE6KL3	
	31c. Key lock N. 0233424	**202**	KE6KL4	**202**
	31d. Key lock N. 0335452		KE6KL5	
	31e. Key lock different keys		KE6KL1	
32.	**Padlocking button cover (padlocks not supplied)**	**162**	KE6PD1	**162**
33.	**Key and padlocking device to lock the breaker in disconnected, test or connected position (position lock)**			
	33a. Key + padlocking N3004222 ①		KE6PL2	
	33b. Key + padlocking N0025451		KE6PL3	
	33c. Key + padlocking N0233424	**202**	KE6PL4	**202**
	33d. Key + padlocking N0335452		KE6PL5	
	33e. Key + padlocking different keys		KE6PL1	
34.	**Accessory to lock the breaker in test or disconnected position only** ②			
	Position lock	**212**	KE6PLA	**212**
35.	**Padlocking device for the safety shutters on the cradle**			
	Cradle padlock	**43**	KE6SP	**43**

① Keylock number when factory installed is N3004222.
② Also requires position lock (accessory 29).

36a. Neutral current transformer (required for 4 wire ground fault systems)

For breaker	Amps	Catalog number	List price
E1 – E2	250A 400A 800A 1000A 1200A 1250A 1600A	KE2NCT-250 KE2NCT-400 KE2NCT-800 KE2NCT-1000 KE2NCT-1200 KE2NCT-1200① KE2NCT-1600	**$ 406**
E3	250A 400A 800A 1000A 1200A 1250A 1600A 2000A 2500A	KE3NCT-250 KE3NCT-400 KE3NCT-800 KE3NCT-1000 KE3NCT-1200 KE3NCT-1250 ① KE3NCT-1600 KE3NCT-2000 KE3NCT-2500	**414**
E4	1600A 2000A 2500A 3200A 3600A 4000A	KE4NCT-1600 KE4NCT-2000 KE4NCT-2500 KE4NCT-3200 KE4NCT-3600 KE4NCT-4000 ①	
E6	3200A 4000A 5000A 6300A	KE6NCT-3200 ① KE6NCT-4000 KE6NCT-5000 KE6NCT-6300 ①	

36b. Current transformer sets (sets of three)

For breaker	Amps	Catalog number	List price
E1 – E2	250A 400A 800A 1000A 1200A 1250A 1600A	KE2CT250 KE2CT400 KE2CT800 KE2CT1000 KE2CT1200 KE2CT1250 ① KE2CT1600	**$ 840**
E3	250A 400A 800A 1000A 1200A 1250A 1600A 2000A 2500A	KE3CT250 KE3CT400 KE3CT800 KE3CT1000 KE3CT1200 KE3CT1250 ① KE3CT1600 KE3CT2000 KE3CT2500	**1090**
E4	1600A 2000A 2500A 3200A 3600A 4000A	KE4CT1600 KE4CT2000 KE4CT2500 KE4CT3200 KE4CT3600 KE4CT4000 ①	**1640**
E6	3200A 4000A 5000A 6300A	KE6CT3200 KE6CT4000 KE6CT5000 KE6CT6300 ①	**2188**

① IEC only.

External accessories
Mechanical interlocks[1]

37. Mechanical interlocks (base plate for fixed circuit breaker)

For breaker	Interlock type	Catalog number	List price
E1 – E6	All	KE6MLP	**$ 241**

NOTE: order for fixed circuit breaker only; order one accessory for each fixed breaker.

38. Interlock for fixed circuit breaker/fixed part of withdrawable circuit breaker (cable attachment plate)

For breaker	Interlock type	Catalog number	List price
E1 – E6	A, B, D C	KE6MLA KE6MLC	**$ 628**

NOTE: order one accessory for each fixed circuit breaker/fixed part of withdrawable circuit breaker

39. Interlock for fixed circuit breaker/moving part of withdrawable circuit breaker (internal interlocking shaft)

For breaker	Interlock type	Catalog number	List price
E1 – E2 E3 E4, 3 pole E4, 4 pole/ E6, 3 pole E6, 4 pole	All	KE2ML KE3ML KE4ML-3 KE6ML-3 KE6ML-4	**$ 145**

NOTE: order one accessory for each fixed circuit breaker/mobile part of withdrawable circuit breaker

40. Interlock cables

For breaker	Interlock type	Horizontal Catalog number	Vertical Catalog number	List price
E1 – E6	A	KE6MLC-HA	KE6MLC-VA	**$ 97**
	B	KE6MLC-HB	KE6MLC-VB	**193**
	C	KE6MLC-HC	KE6MLC-VC	**193**
	D	KE6MLC-HD	KE6MLC-VD	**193**

NOTE: order one type of cable for each interlock

[1] Order as an alternative to the Accessory number 15 auxiliary contact (see page 16.27) and kirk key lock.

41. Electronic time delay for undervoltage release ①

	Item	Delay	Field installation catalog number	List price
41.	**Time delay**			
	Voltage			
	24/30V		KE6TL9	
	48V		KE6TL8	
	60V	0.5-1-1.5-2-3.5 s	KE6TL7	**$ 428**
	110/125V		KE6TL5	
	220/250V		KE6TL3	

42. Transparent front cover (IP54)

		For breaker	Catalog number	List price
42.	**Cover**	E1 – E6	KE6DC	**$ 557**

43. Kirk key lock adaptor plate (in open position) ②

	For breaker	Catalog number	List price
43.	**Kirk key lock adaptor plate**		
	43a. E1 – E2 fixed breaker, 3-4 pole	KE6KKB-E2F	**$ 1436**
	43b. E1 – E2 withdrawable breaker, 3-4 pole	KE6KKB-E2W	**1195**
	43c. E3 fixed breaker, 3-4 pole	KE6KKB-E3F	**1436**
	43d. E3 withdrawable breaker, 3-4 pole	KE6KKB-E3W	**1195**
	43e. E4 fixed breaker, 3 pole	KE6KKB-E4F	**1436**
	43f. E4 withdrawable breaker, 3 pole	KE6KKB-E4W	**1195**
	43g. E6 fixed breaker, 3 pole	KE6KKB-E6F	**1436**
	43h. E6 withdrawable breaker, 3 pole	KE6KKB-E6W	**1195**
	43i. E4 fixed breaker, 4 pole	KE6KKB-E4F-F	**1436**
	43j. E4 withdrawable breaker, 4 pole	KE6KKB-E4W-4	**1195**
	43k. E6 fixed breaker, 4 pole	KE6KKB-E6F-4	**1436**
	43l. E6 withdrawable breaker, 4 pole	KE6KKB-E6W-4	**1195**

NOTE: Provision for kirk lock (kirk key lock not included; use lock Type F – 1 inch bolt projection in withdrawn position).

44. Kit for converting fixed breaker with rear horizontal terminals to rear vertical (set of three terminals)

	Item	Catalog number	List price
44.	**Conversion kit**		
	44a. 1/2 3p F HR > F VR E1-A	KE1FHRVR	**$ 644**
	44b. 1/2 3p F HR > F VR E2-A	KE2FHRVR	**690**
	44c. 1/2 3p F HR > F VR E3-A (12, 16, 20)	KE3FHRVR	**790**
	44d. 1/2 3p F HR > F VR E3-A (25)	KE3F25HRVR	**790**
	44e. 1/2 3p F HR > F VR E4-A	KE4FHRVR	**1664**
	44f. 1/2 3p F HR > F VR E6-A	KE6FHRVR	**2783**

45. – 47. Test kits

	Item	Catalog number	List price
45.	Hand-held test kit (for PR111 only)	K7TUT	**$ 210**
46.	Hand-held battery unit for PR112	PR120/B	**275**
47.	Test and configuration unit SACE PR010/T	PR010/T	**12,500**

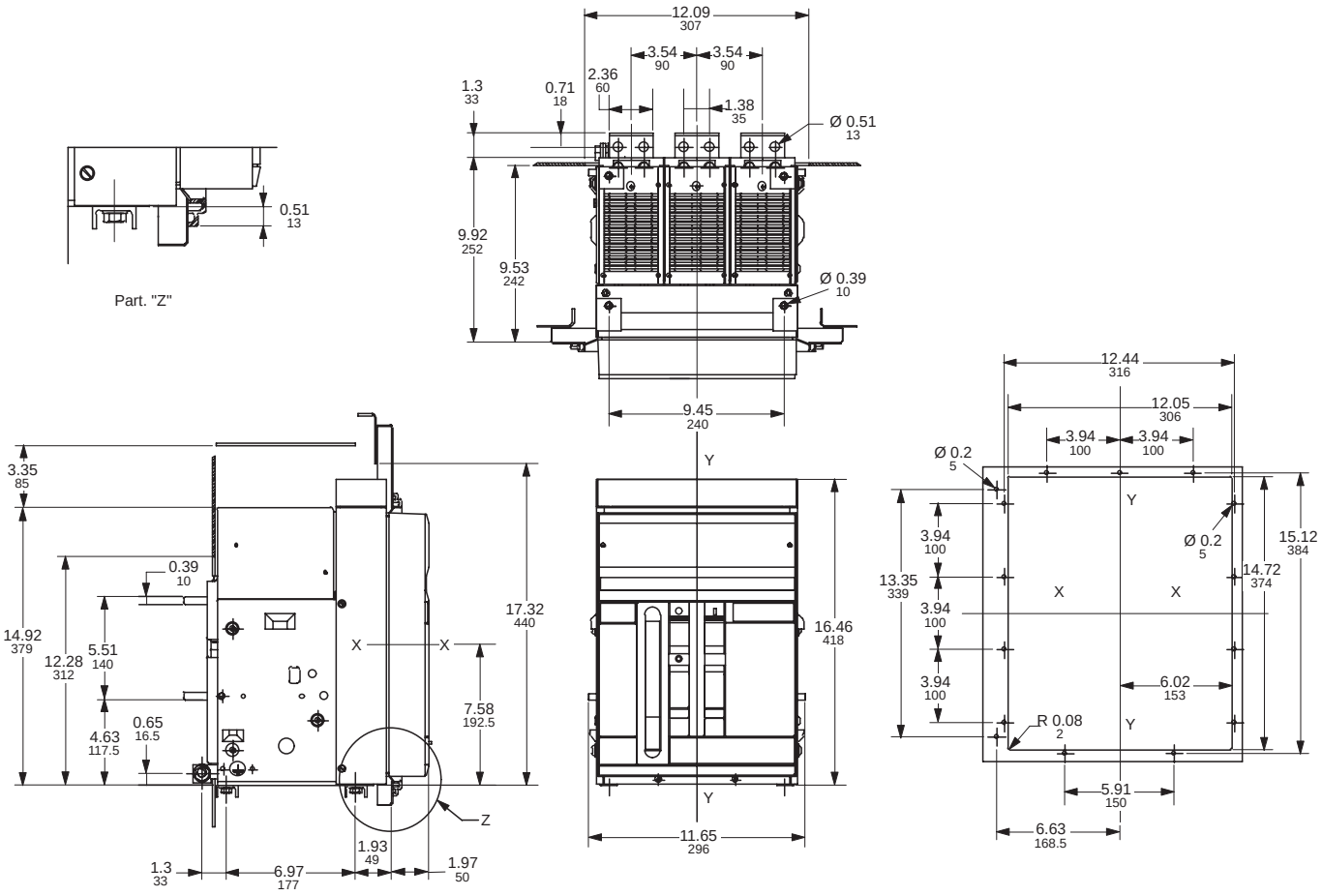
48. – 55. Spare parts

	Item	Catalog number	List price
48.	Racking crank	1SDA038092R1	**$ 122**
49.	Door escutcheon	1SDA038096R1	**153**
50.	Terminal board for fixed circuit breaker	1SDA038342R1	**722**
51.	Support plate for auxiliary releases	1SDA038339R1	**244**
52.	Sliding contacts for the moving part	1SDA038328R1	**946**
53.	Sliding contacts for the fixed part	1SDA038362R1	**793**
54.	Lifting plates	1SDA038093R1	**224**
55.	Transparent cover for the trip unit	1SDA045724R1	**61**

① IEC only.
② Kirk key not provided. Order as an alternative to the various types of interlocks and auxiliary contacts (see Accessory 26c and 26d on page 16.27).

Approximate dimensions (for UL version)

E1, fixed with horizontal rear terminals
3 pole



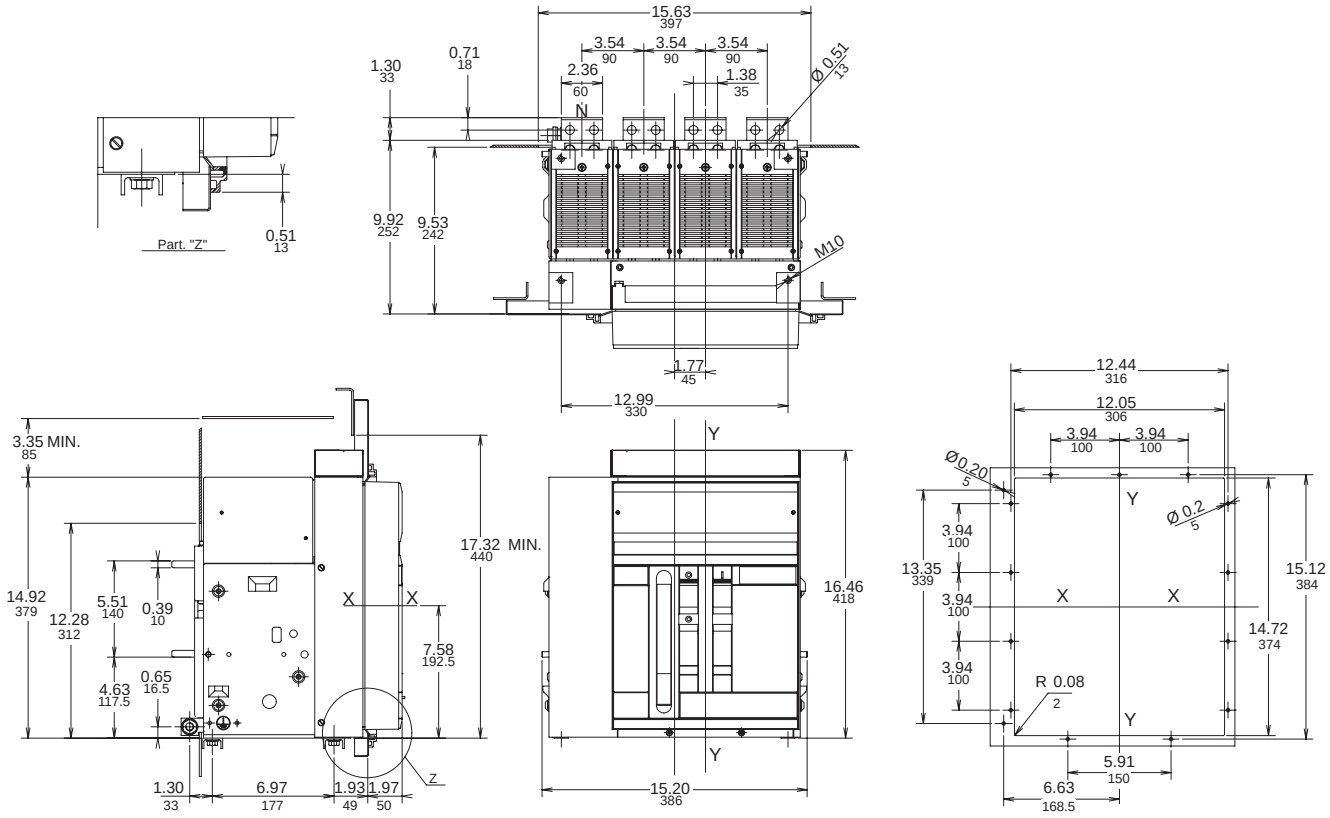
16

Approximate dimensions (for UL version)

E1, fixed with horizontal rear terminals

4 pole

00.00
00.00
Inches
[Millimeters]

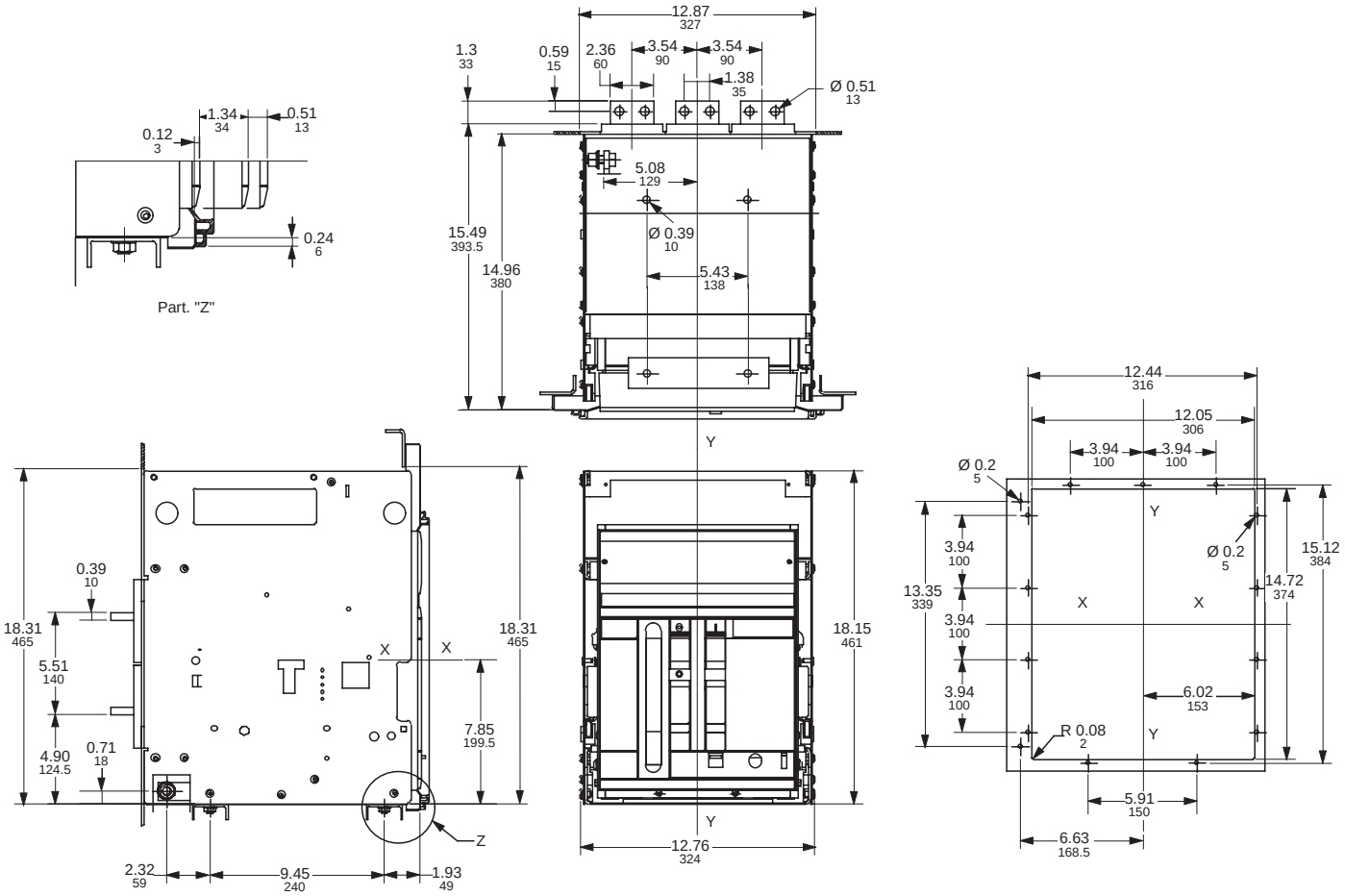


16

Approximate dimensions (for UL version)

E1, withdrawable with horizontal rear terminals
3 pole

00.00
00.00
Inches
[Millimeters]



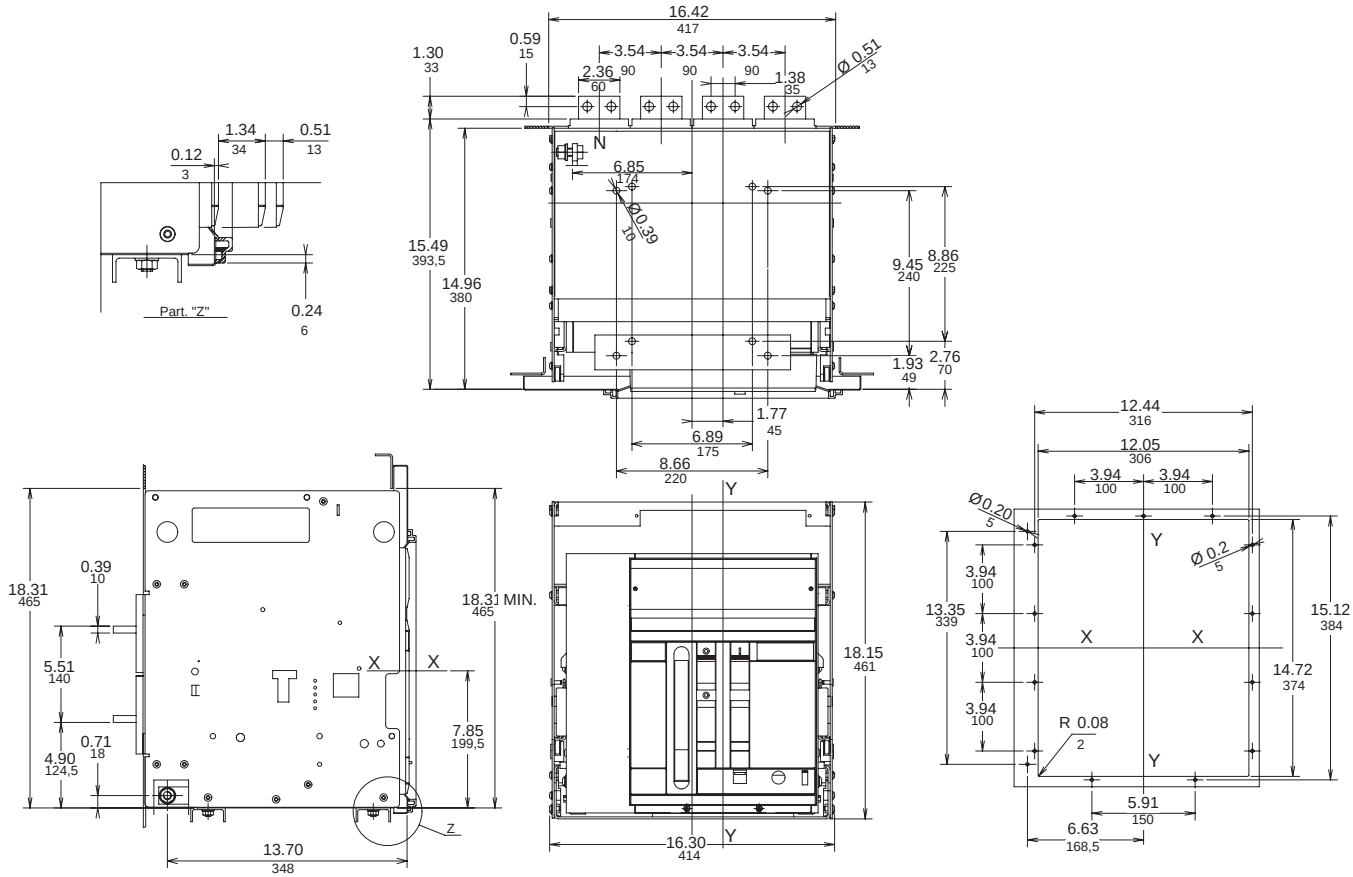
16

Approximate dimensions (for UL version)

E1, withdrawable with horizontal rear terminals

4 pole

00.00
00.00
Inches
[Millimeters]



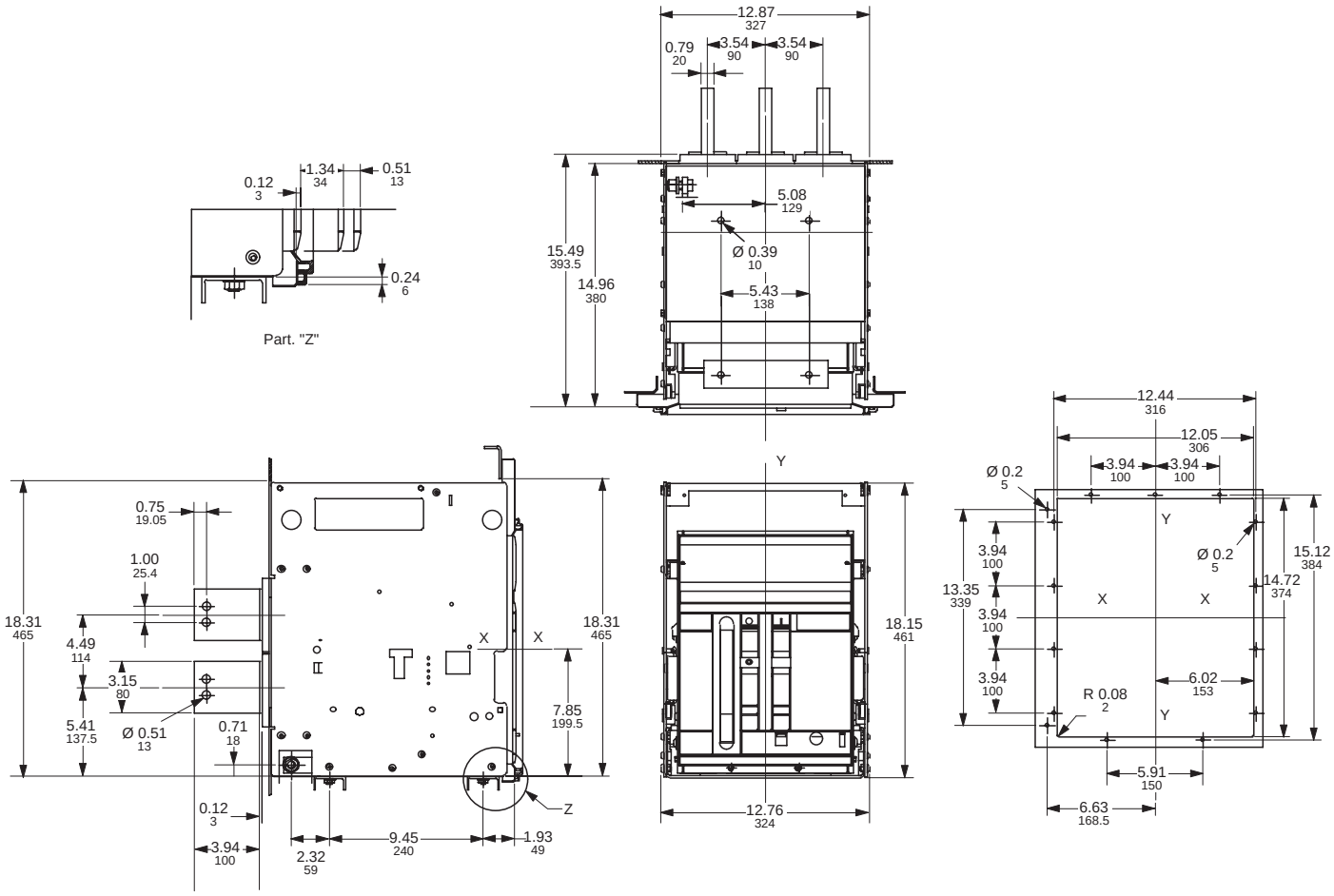
16

Approximate dimensions (for UL version)

E1 - E2, withdrawable with vertical rear terminals

3 pole

00.00
00.00 Inches
[Millimeters]



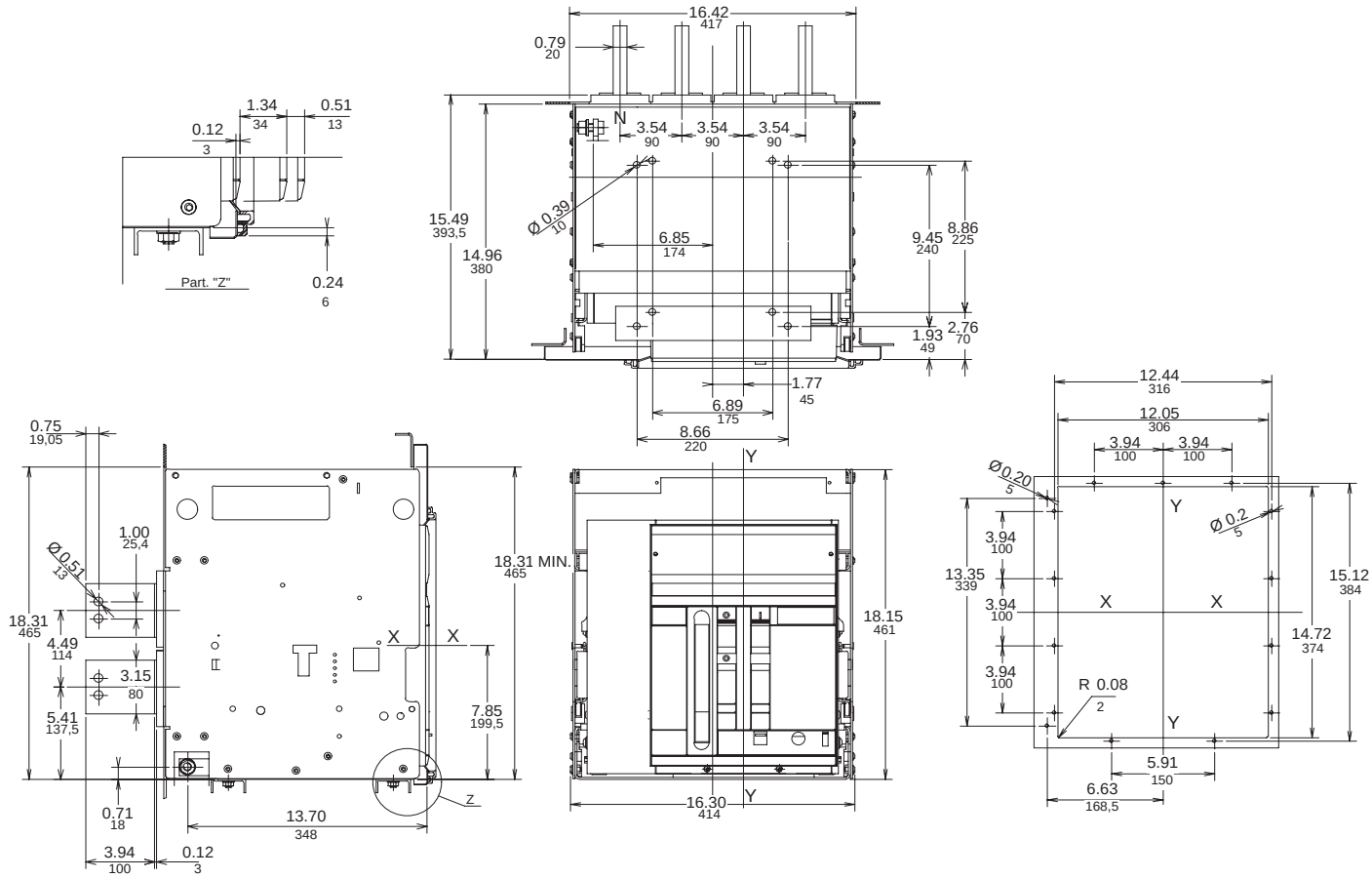
16

Approximate dimensions (for UL version)

E1 - E2, withdrawable with vertical rear terminals

4 pole

00.00
00.00
Inches
[Millimeters]



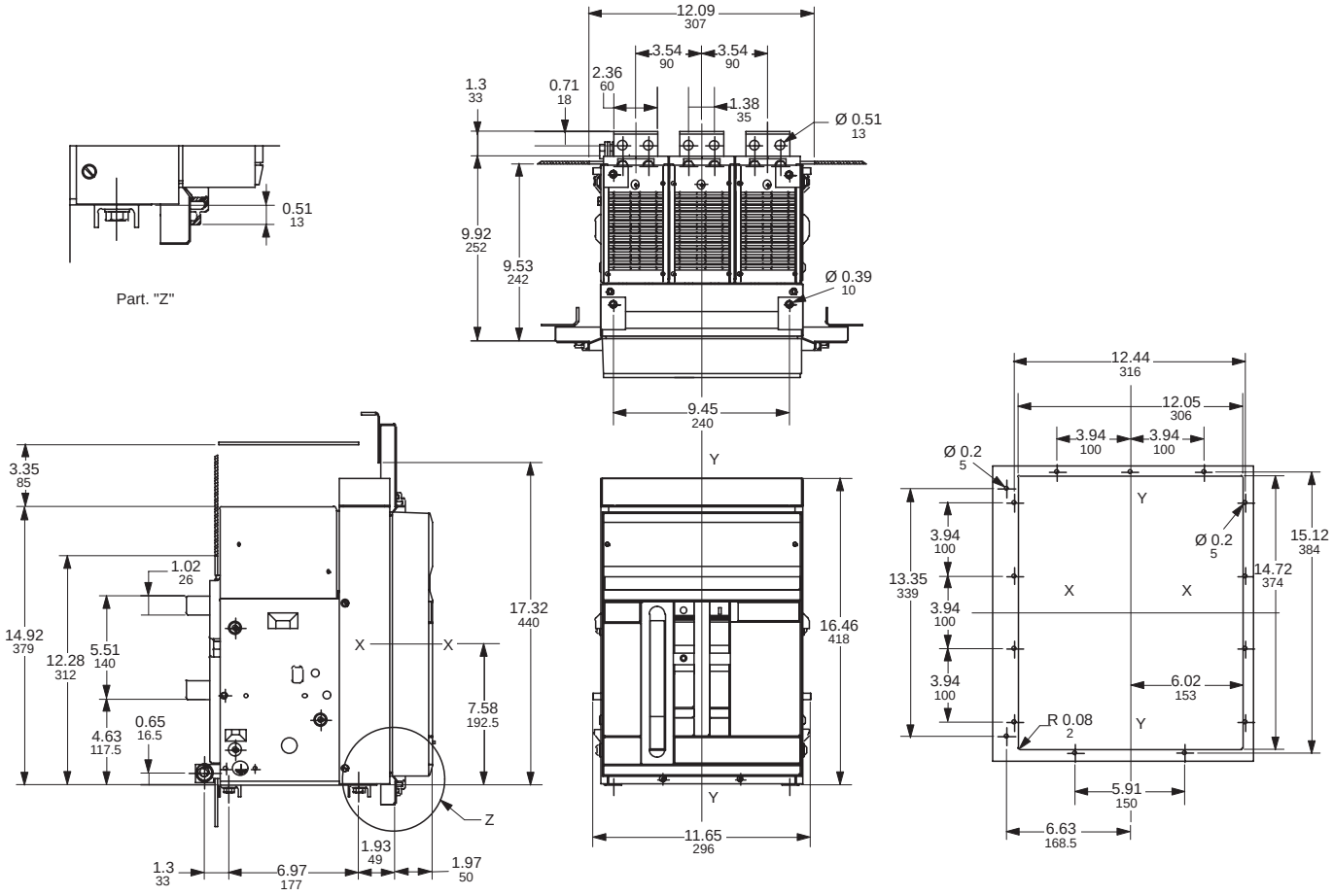
16

Approximate dimensions (for UL version)

E2, fixed with horizontal rear terminals

3 pole

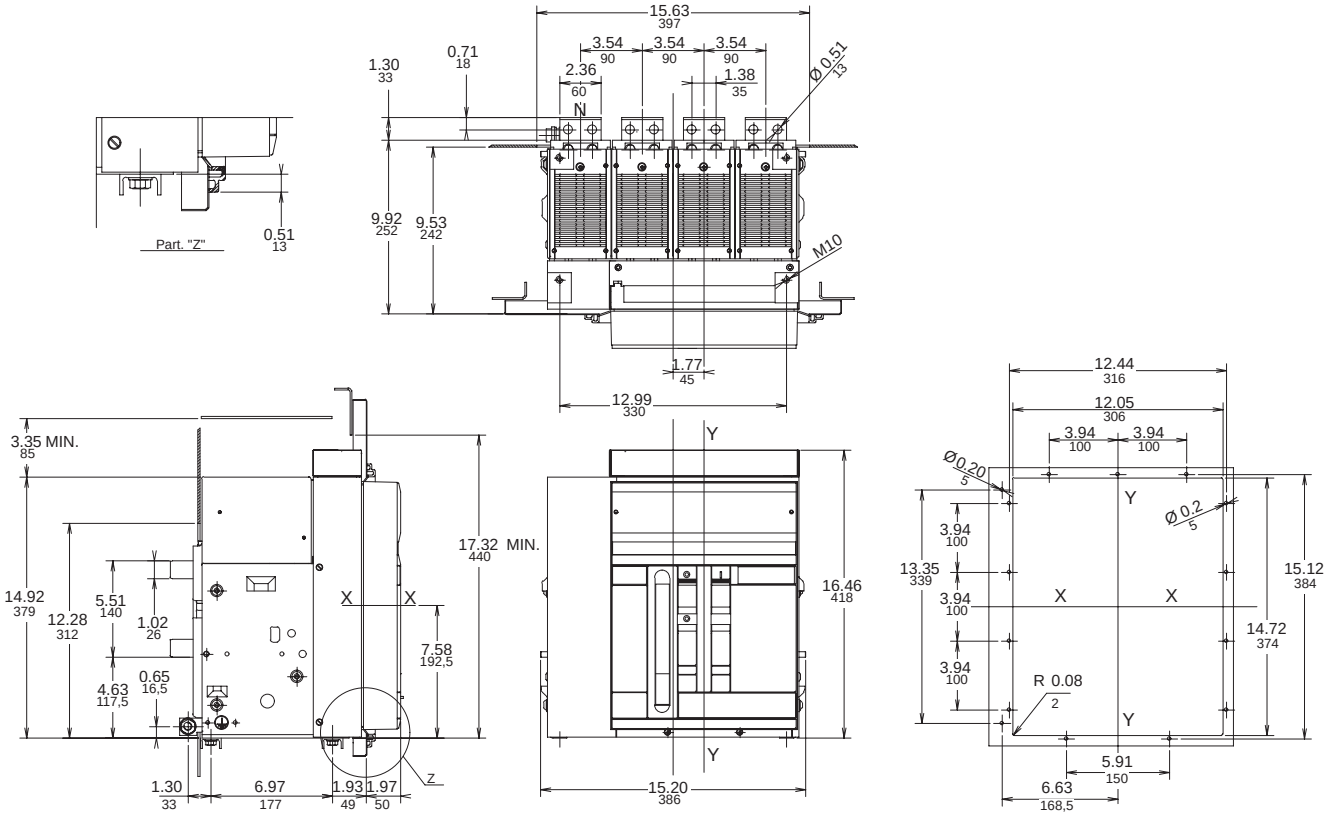
00.00
00.00
Inches
[Millimeters]



16

Approximate dimensions (for UL version)
E2, fixed with horizontal rear terminals
4 pole

00.00
00.00
Inches
[Millimeters]

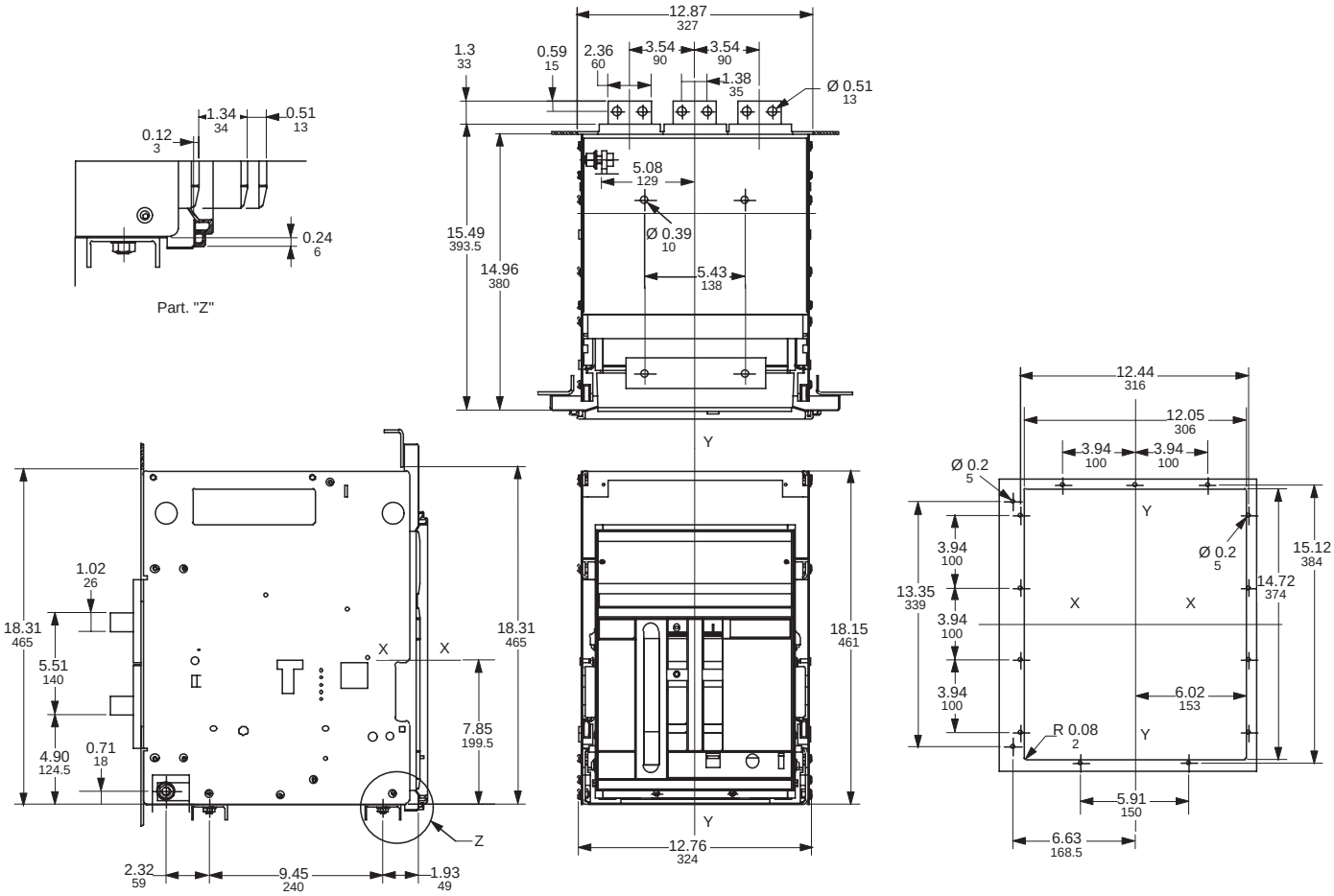


16

Approximate dimensions (for UL version)

E2, withdrawable with horizontal rear terminals
3 pole

00.00
00.00
Inches
[Millimeters]



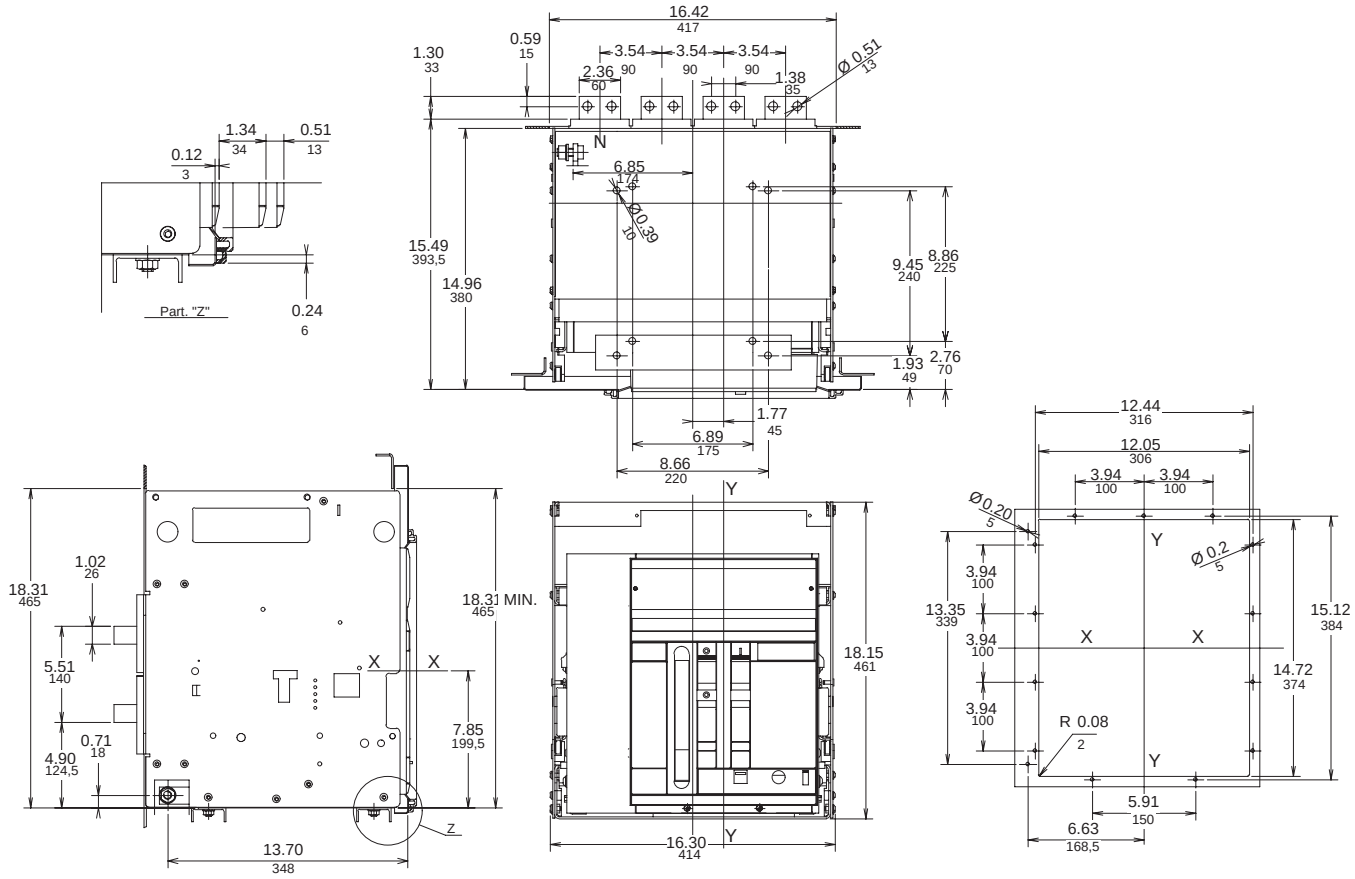
16

Approximate dimensions (for UL version)

E2, withdrawable with horizontal rear terminals

4 pole

00.00
00.00
Inches
[Millimeters]

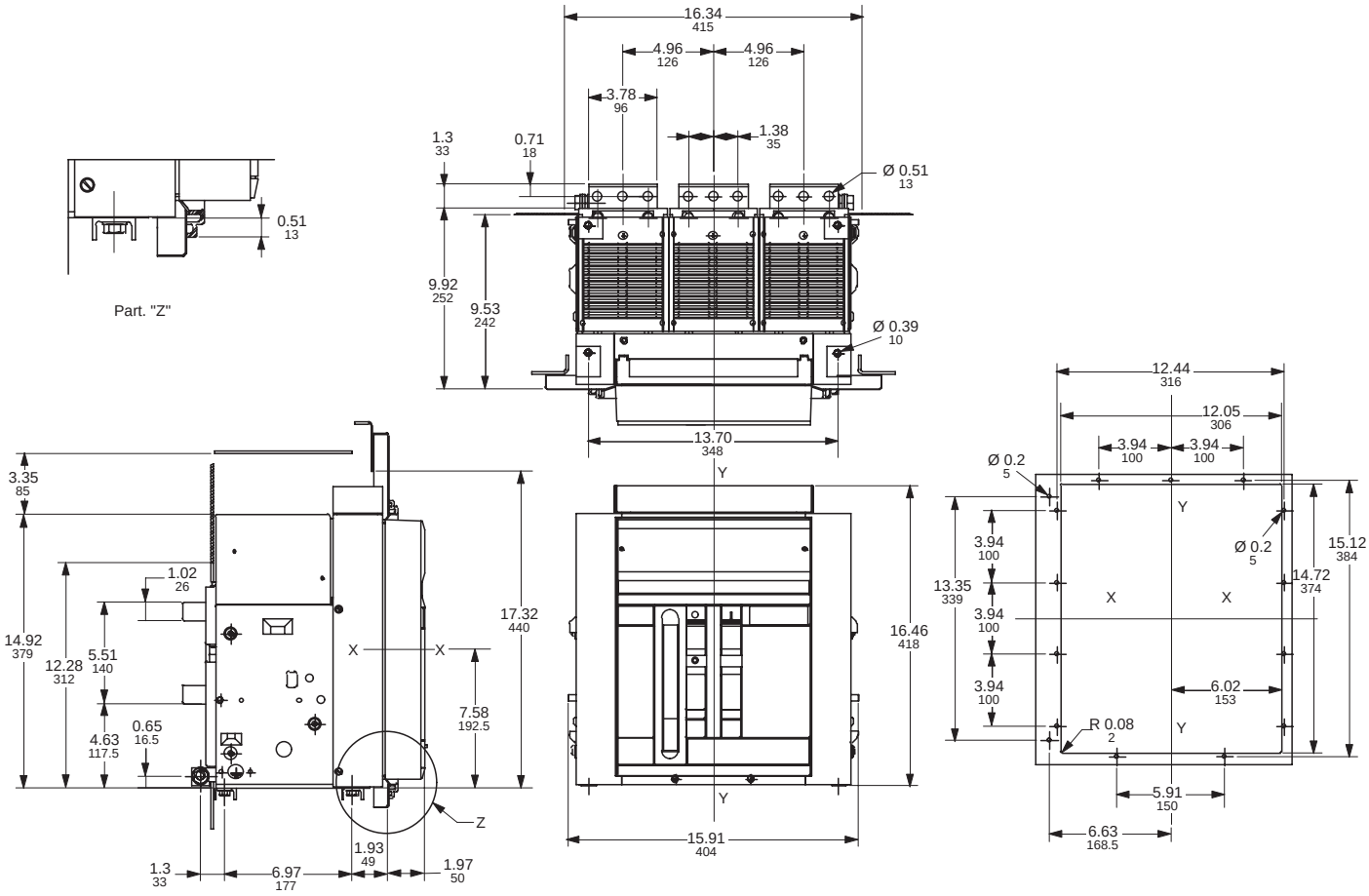


16

Approximate dimensions (for UL version)

E3, fixed with horizontal rear terminals
3 pole

00.00
00.00
Inches
[Millimeters]



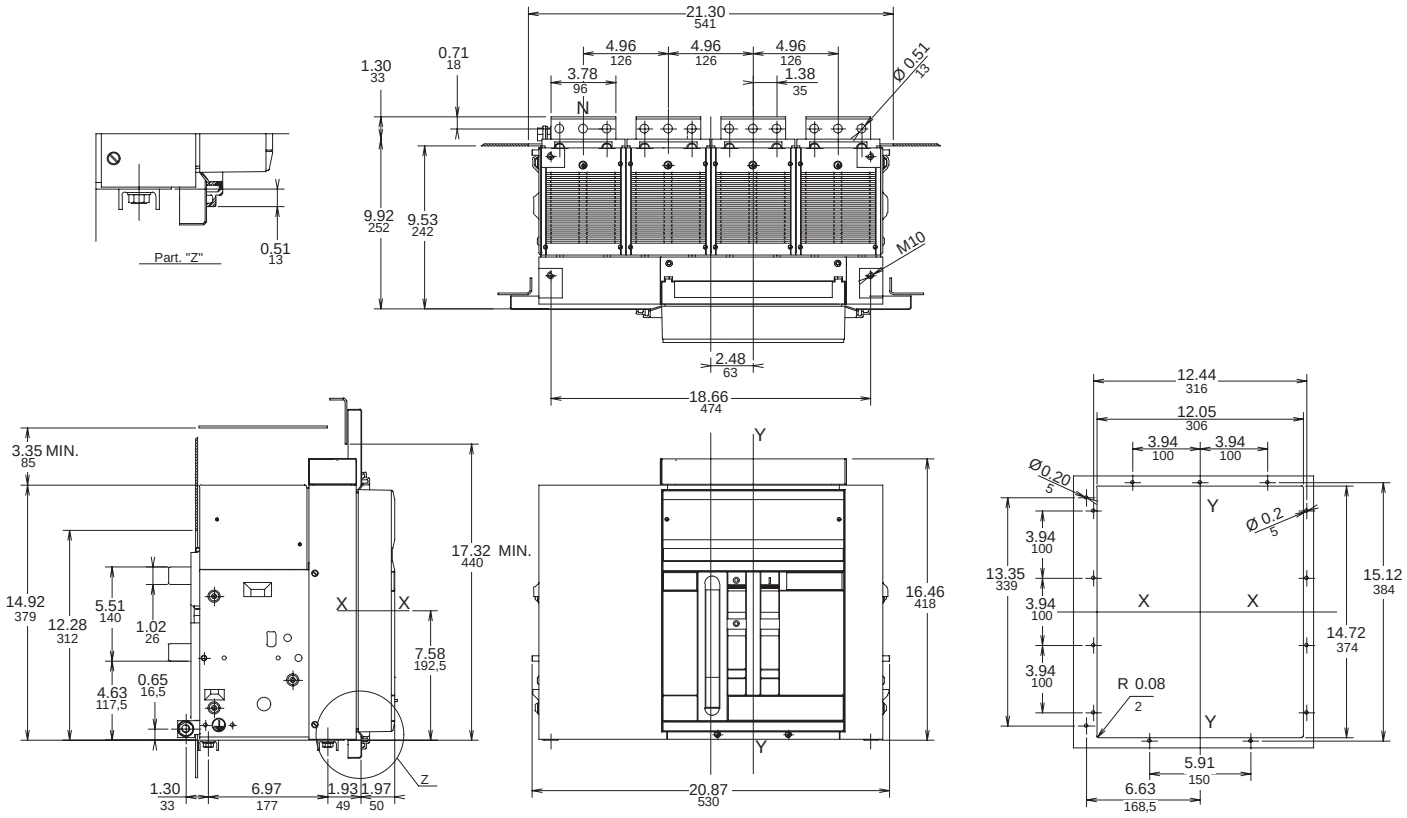
16

Approximate dimensions (for UL version)

E3, fixed with horizontal rear terminals

4 pole

00.00
00.00
Inches
[Millimeters]

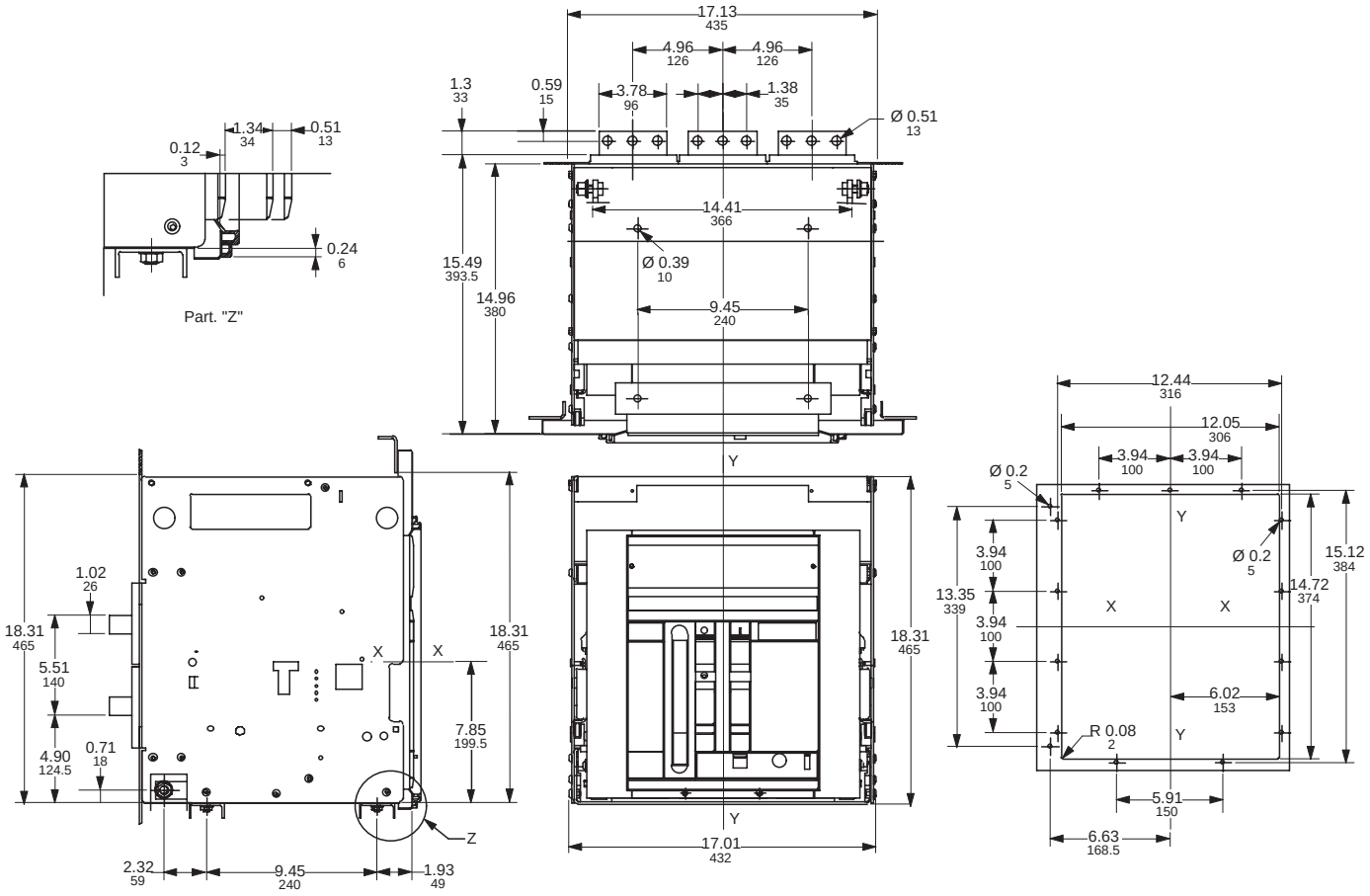


16

Approximate dimensions (for UL version)

E3, withdrawable with horizontal rear terminals
3 pole

00.00
00.00
Inches
[Millimeters]

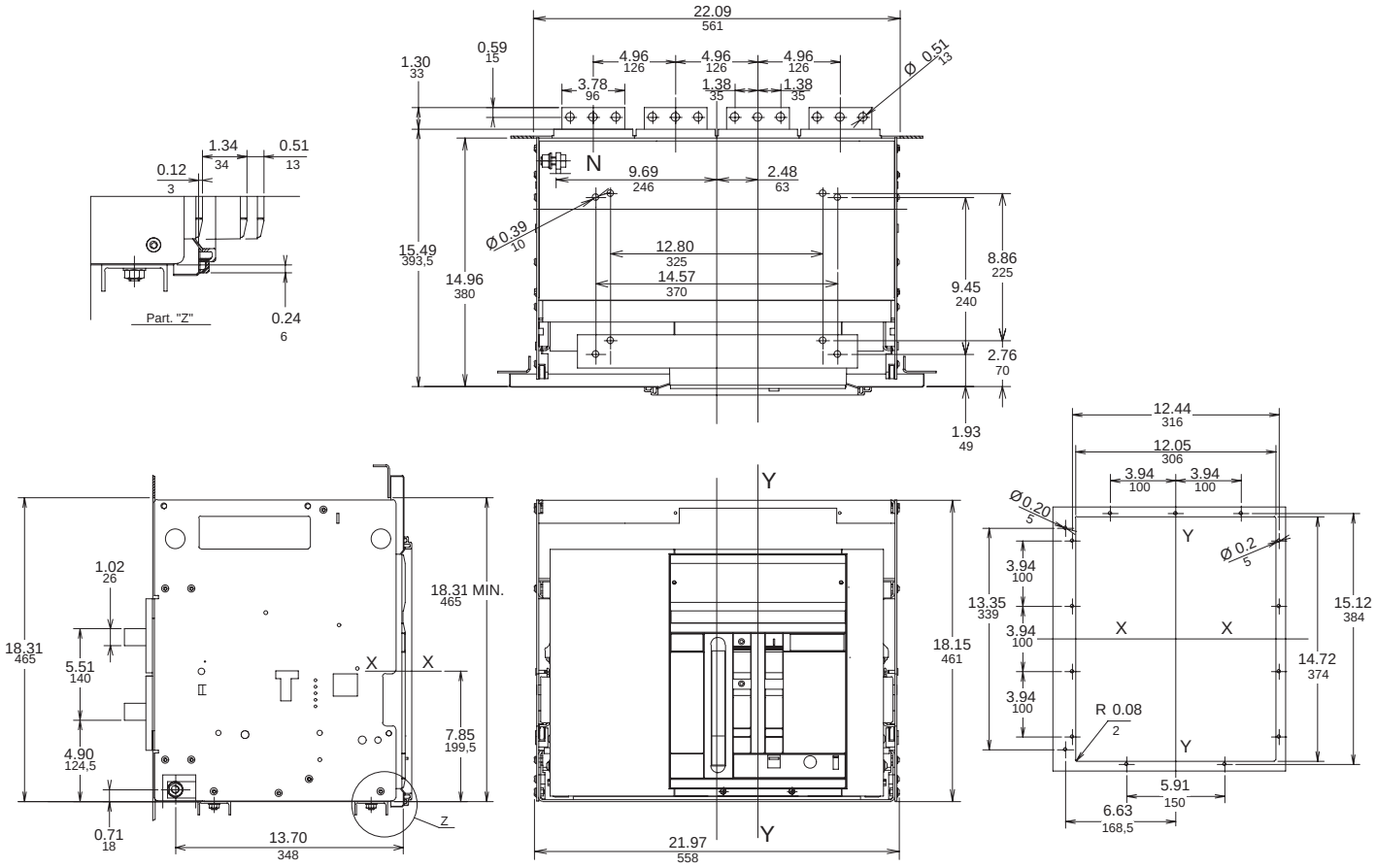


16

Approximate dimensions (for UL version)

E3, withdrawable with horizontal rear terminals
4 pole

00.00
00.00
Inches
[Millimeters]

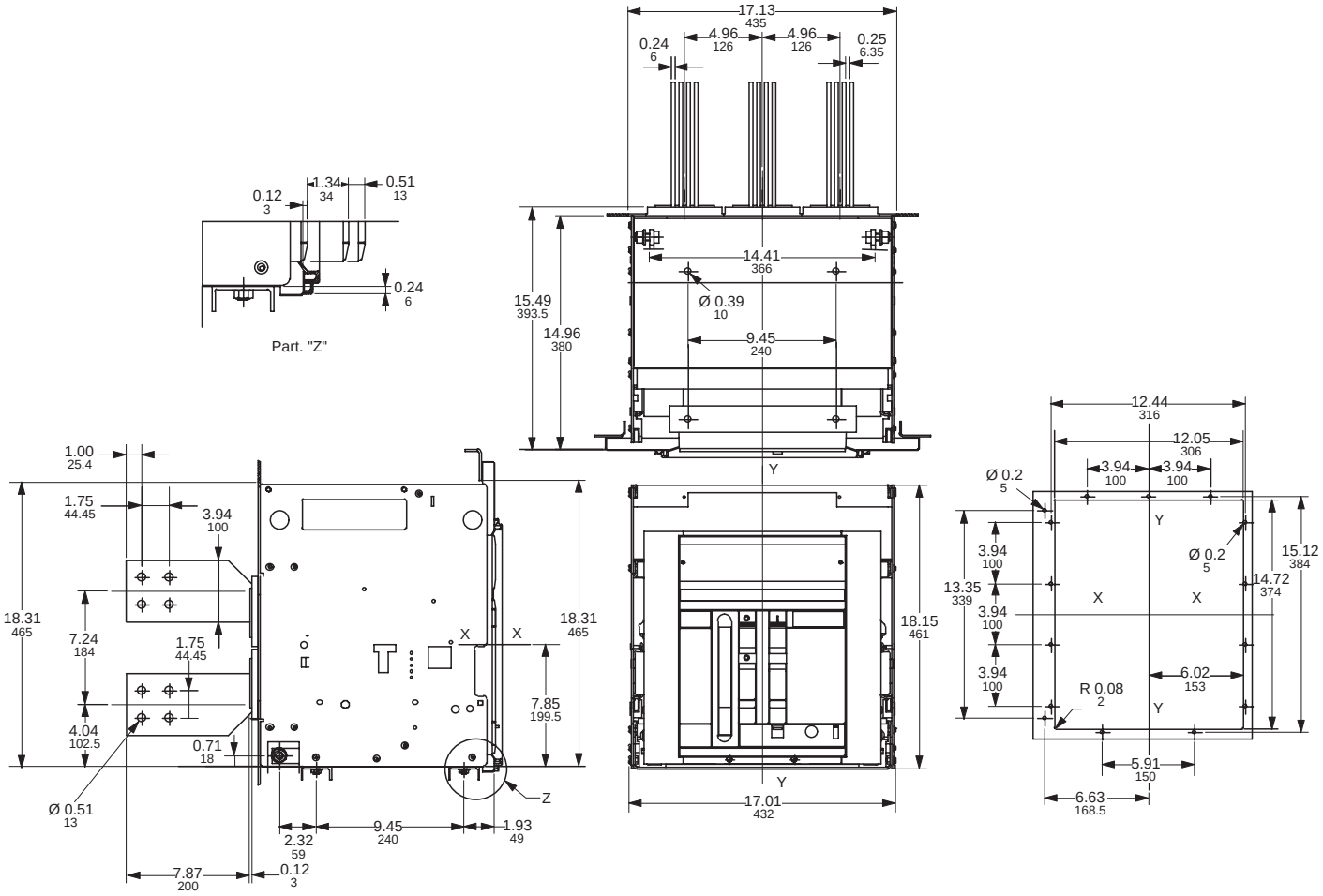


16

Approximate dimensions (for UL version)

E3 (2500A), withdrawable with vertical rear terminals
3 pole

00.00
00.00
Inches
[Millimeters]

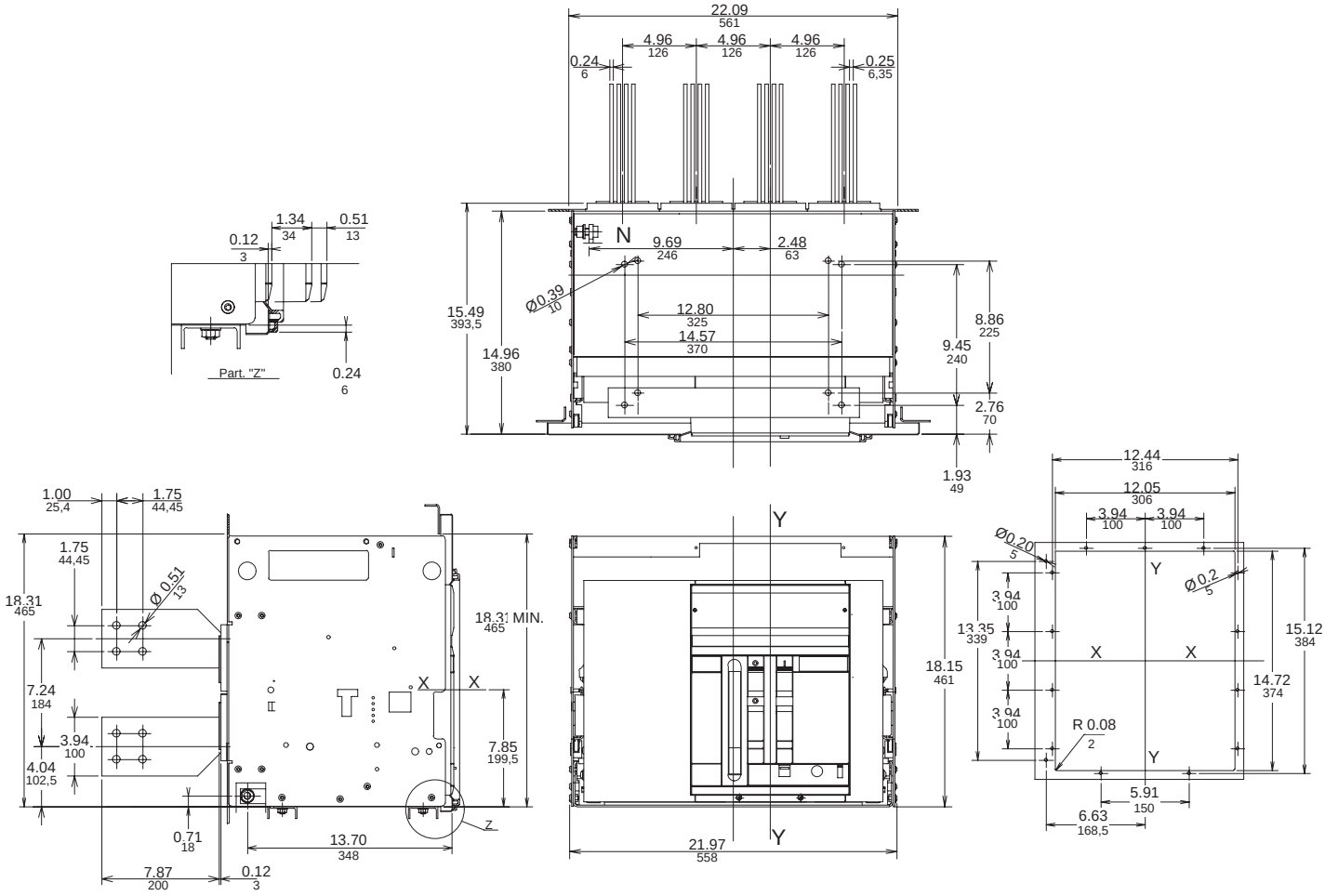


16

Approximate dimensions (for UL version)

E3 (2500A), withdrawable with vertical rear terminals
4 pole

00.00 / 00.00 Inches [Millimeters]

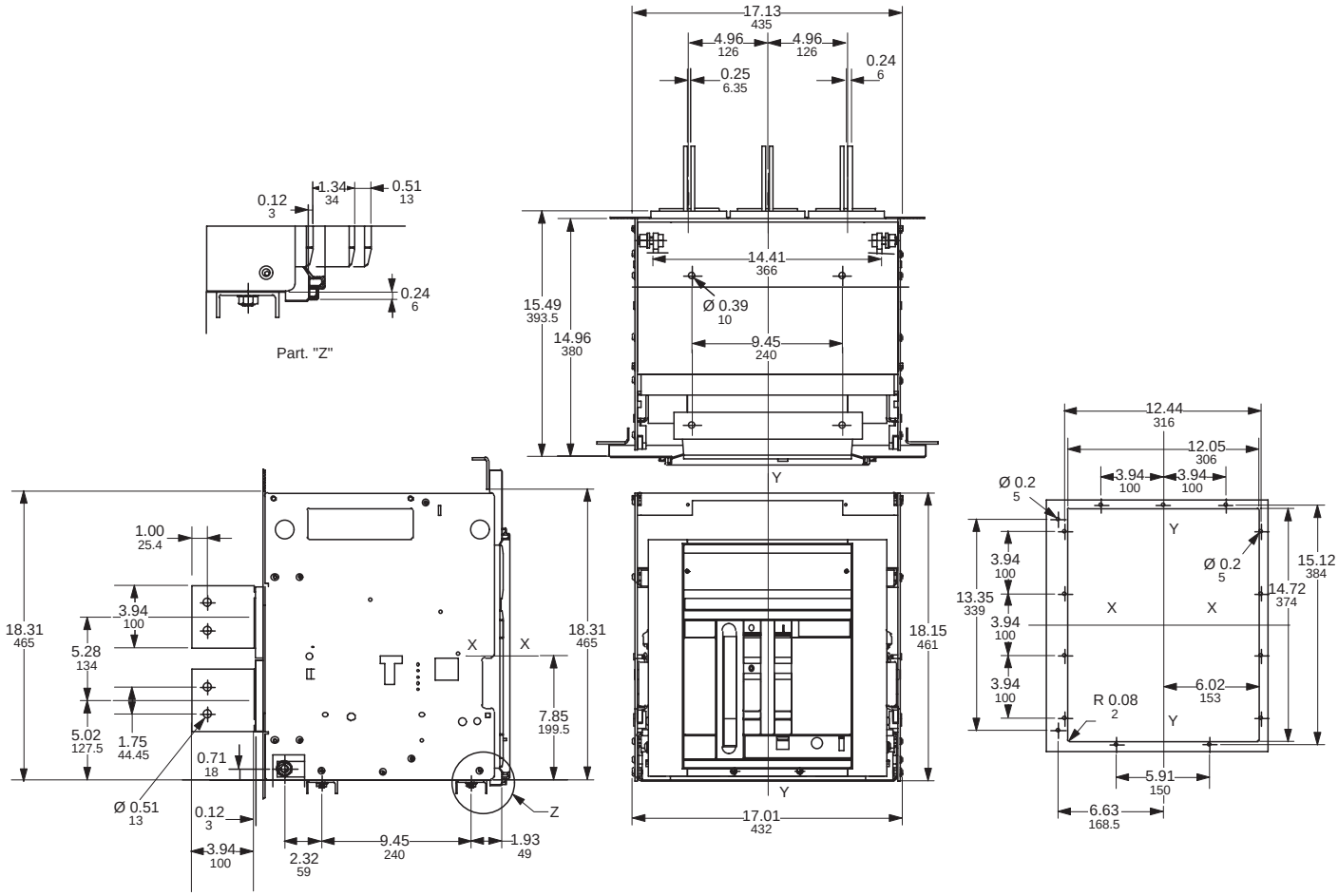


16

Approximate dimensions (for UL version)

E3 (1200A/1600A/2000A), withdrawable with Vertical rear terminals, 3 pole

00.00
00.00
Inches
[Millimeters]

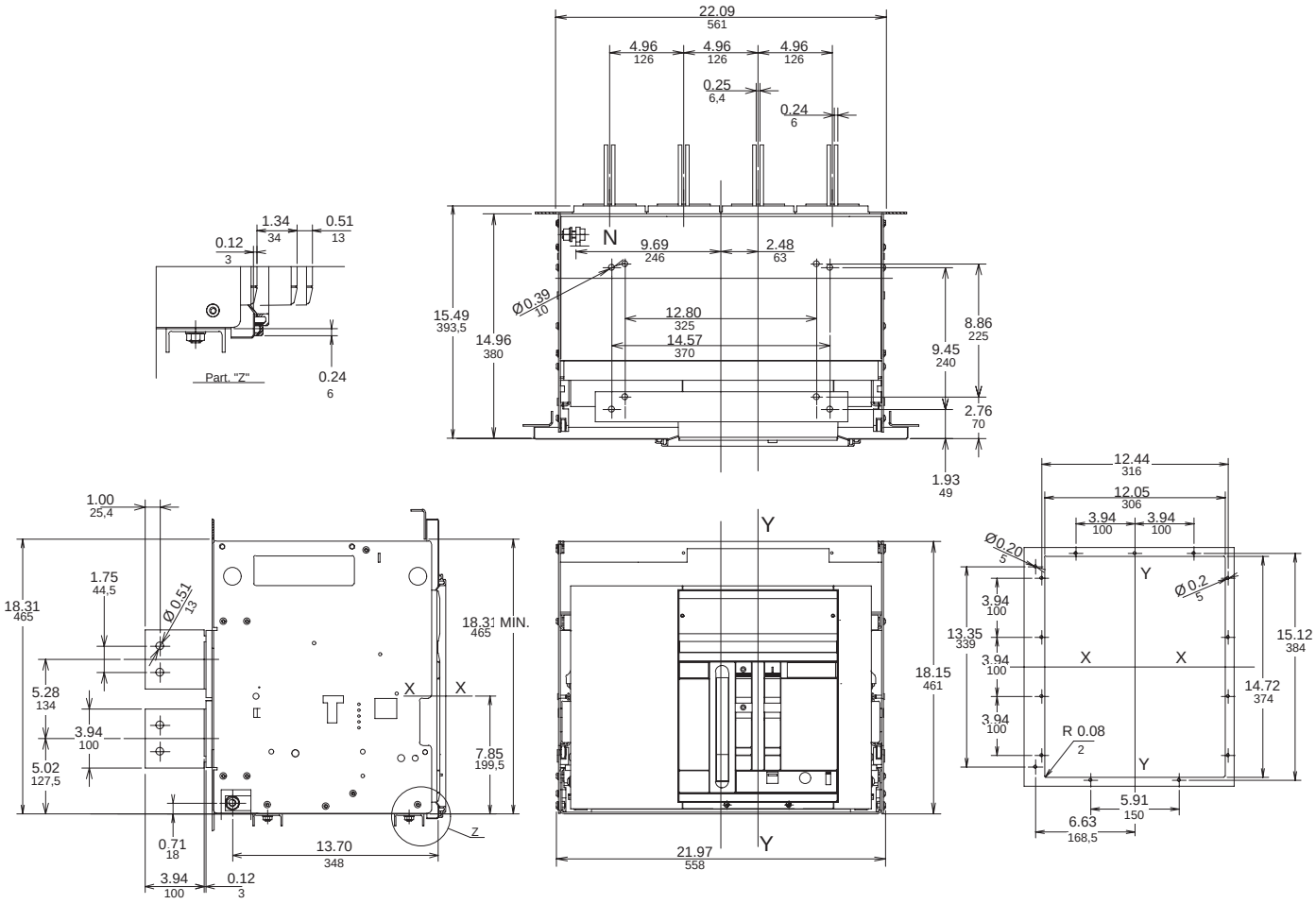


16

Approximate dimensions (for UL version)

E3 (1200A/1600A/2000A), withdrawable with Vertical rear terminals, 4 pole

00.00 / 00.00 Inches [Millimeters]



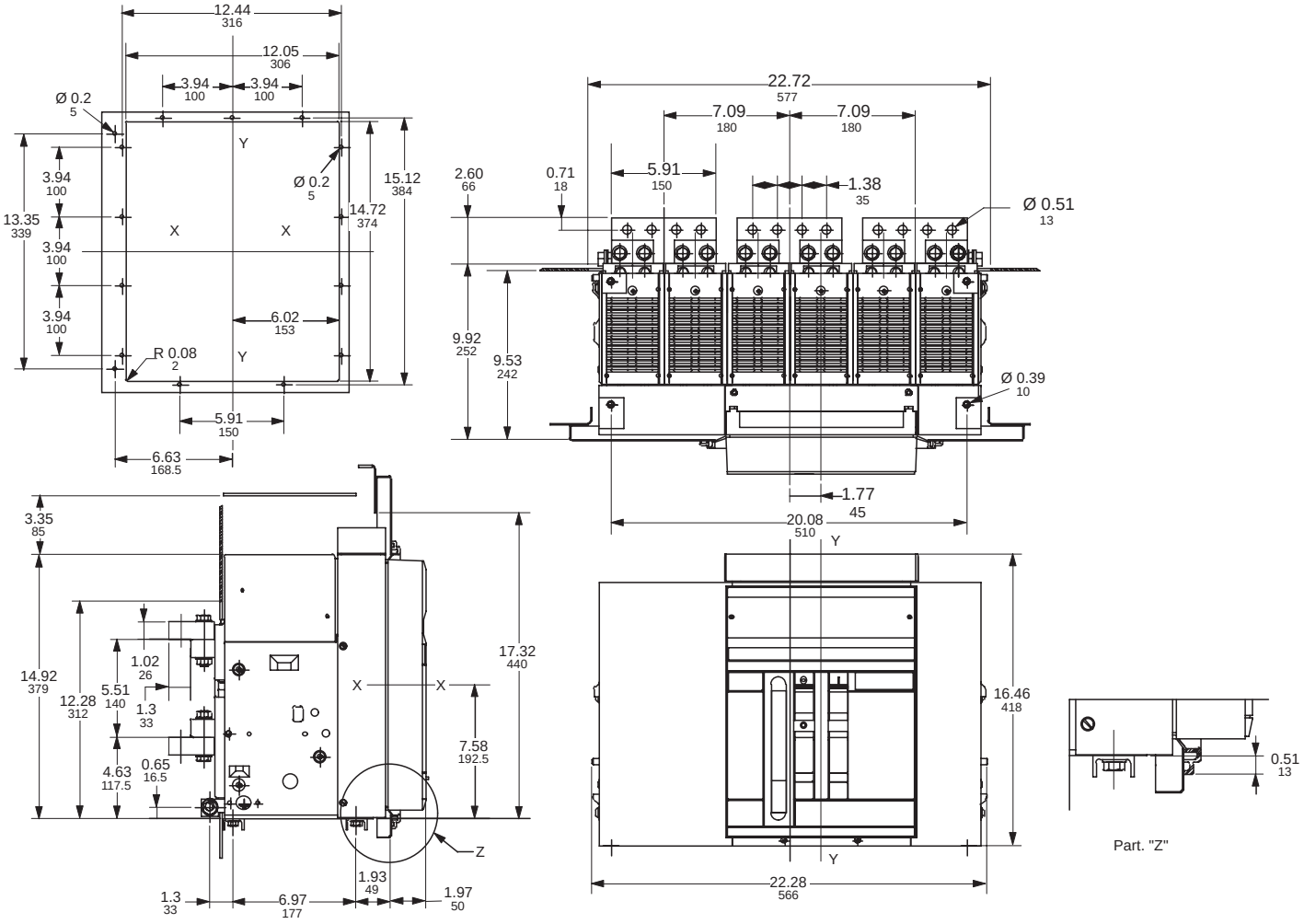
16

Approximate dimensions (for UL version)

E4, fixed with horizontal rear terminals

3 pole

00.00
00.00 Inches
[Millimeters]



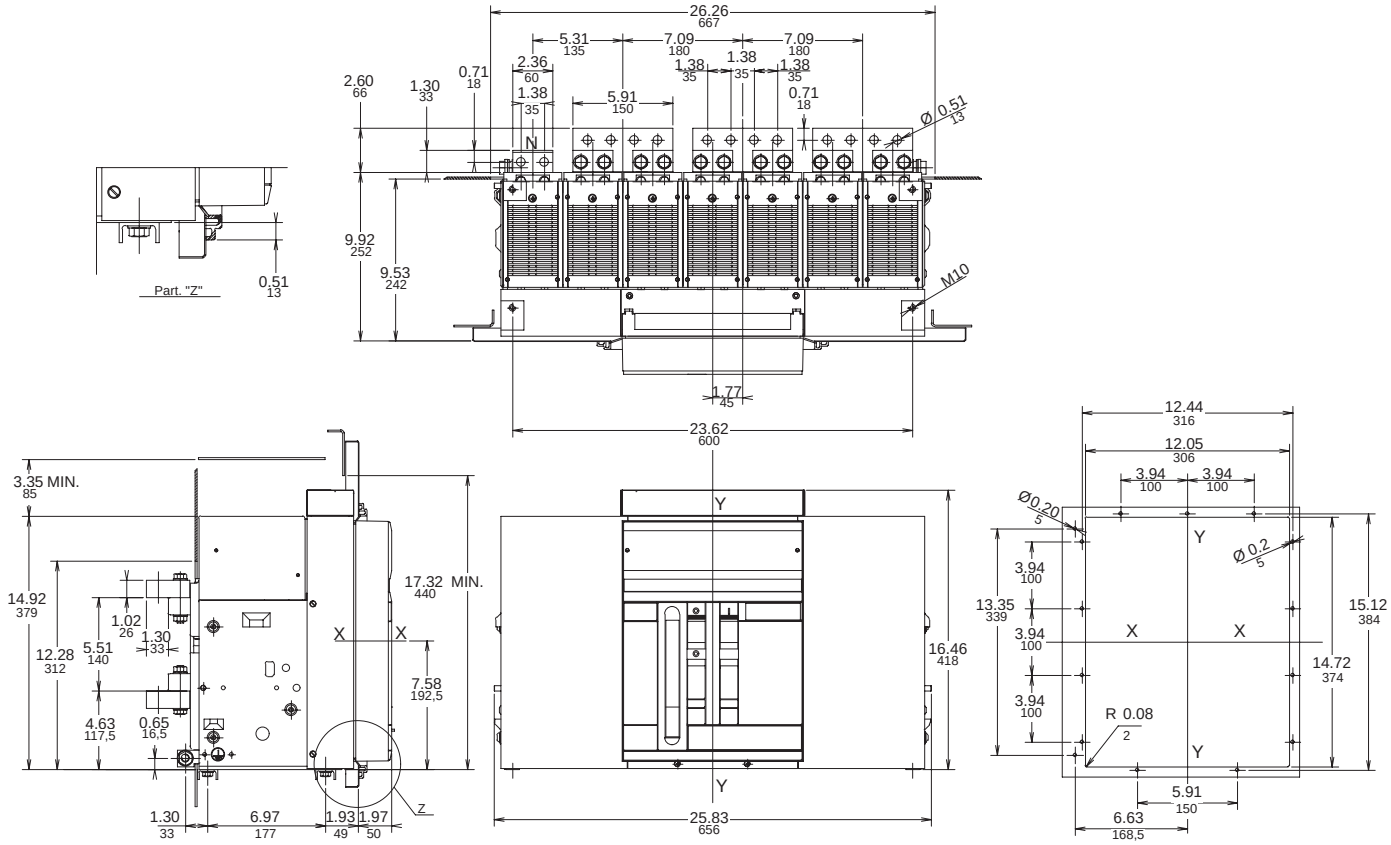
16

Approximate dimensions (for UL version)

E4, fixed with horizontal rear terminals

4 pole

00.00 / 00.00 Inches [Millimeters]

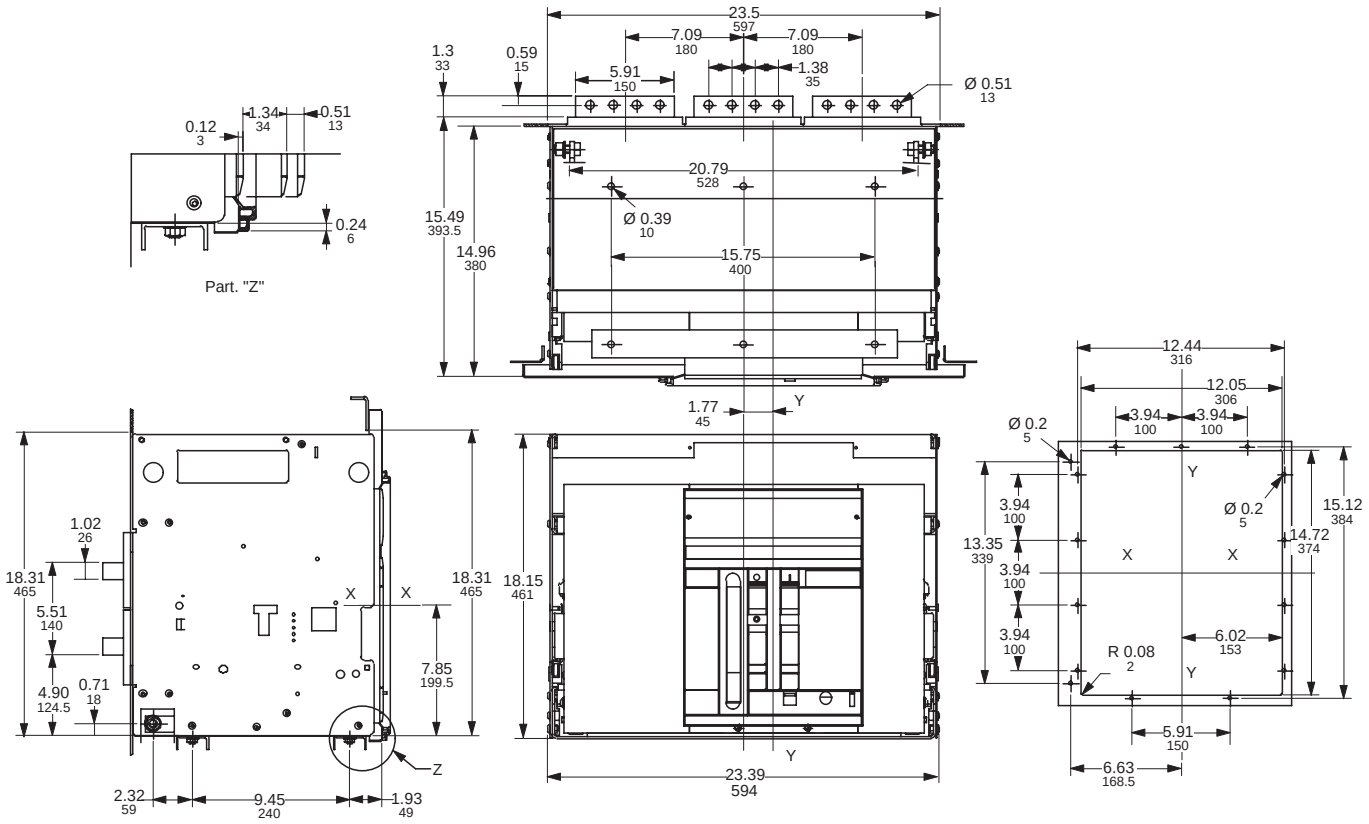


16

Approximate dimensions (for UL version)

E4, withdrawable with horizontal rear terminals
3 pole

00.00 Inches
00.00 [Millimeters]

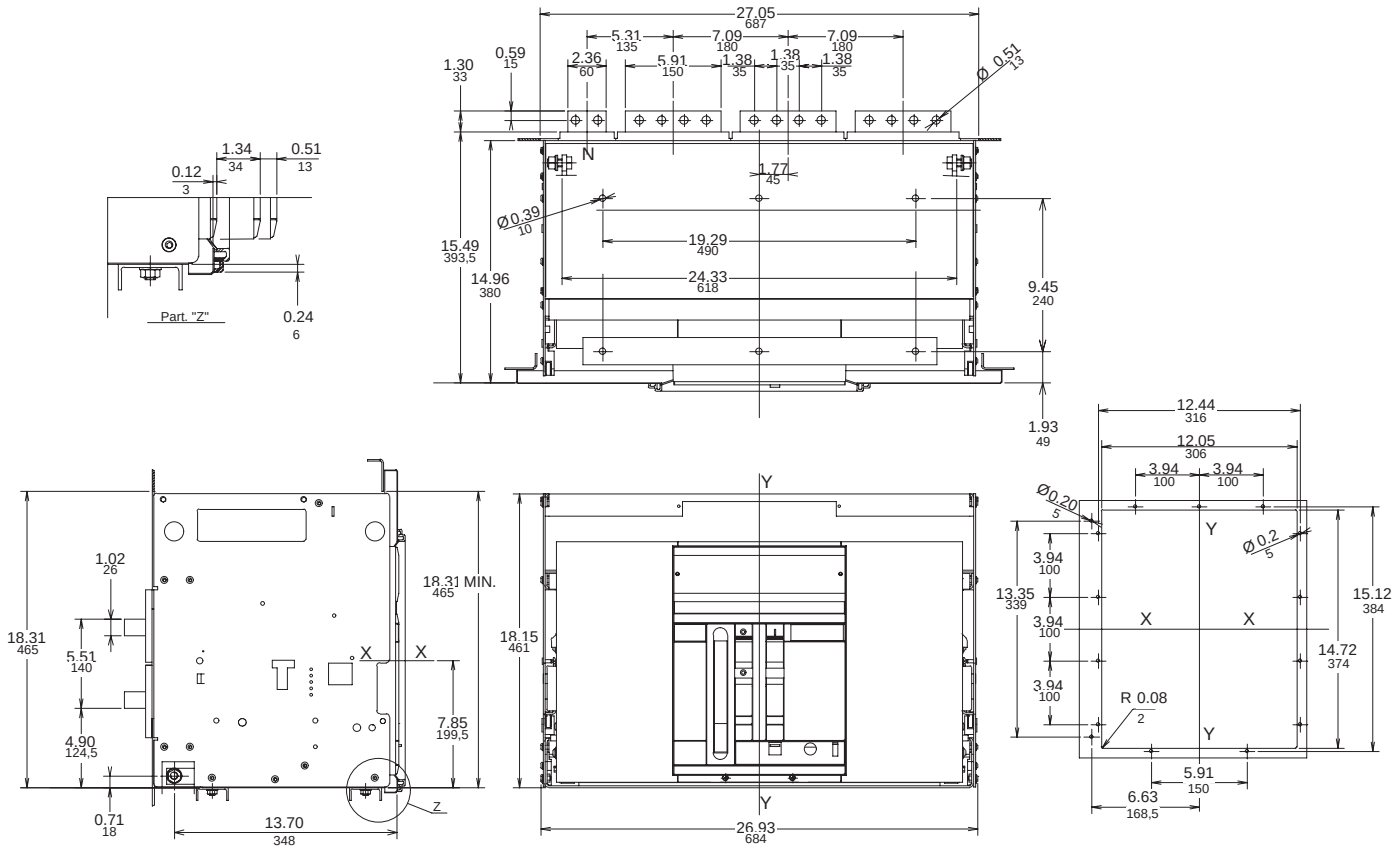


16

Approximate dimensions (for UL version)

E4, withdrawable with horizontal rear terminals
4 pole

00.00 / 00.00 Inches [Millimeters]

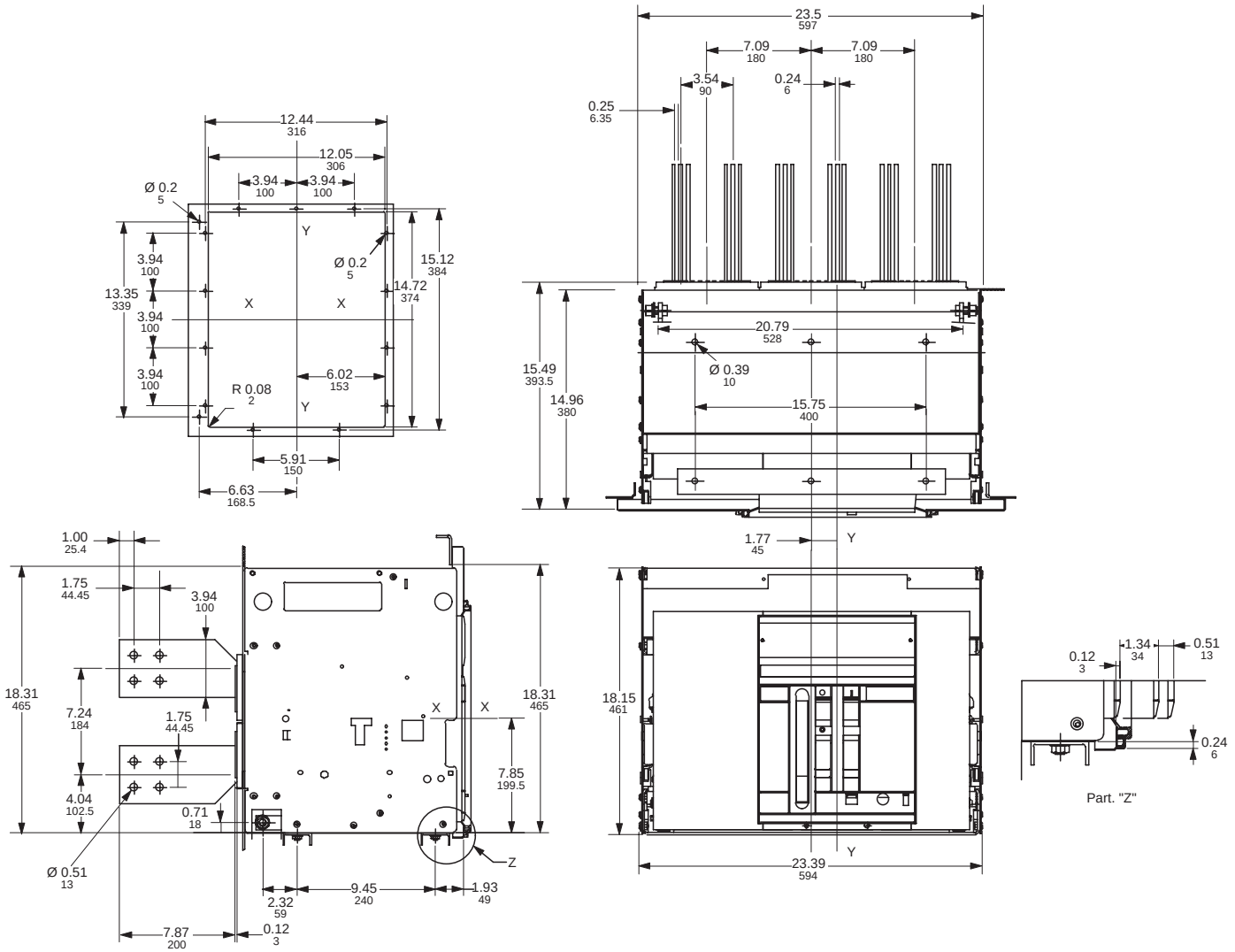


16

Approximate dimensions (for UL version)

E4, withdrawable with vertical rear terminals
3 pole

00.00 Inches
00.00 [Millimeters]



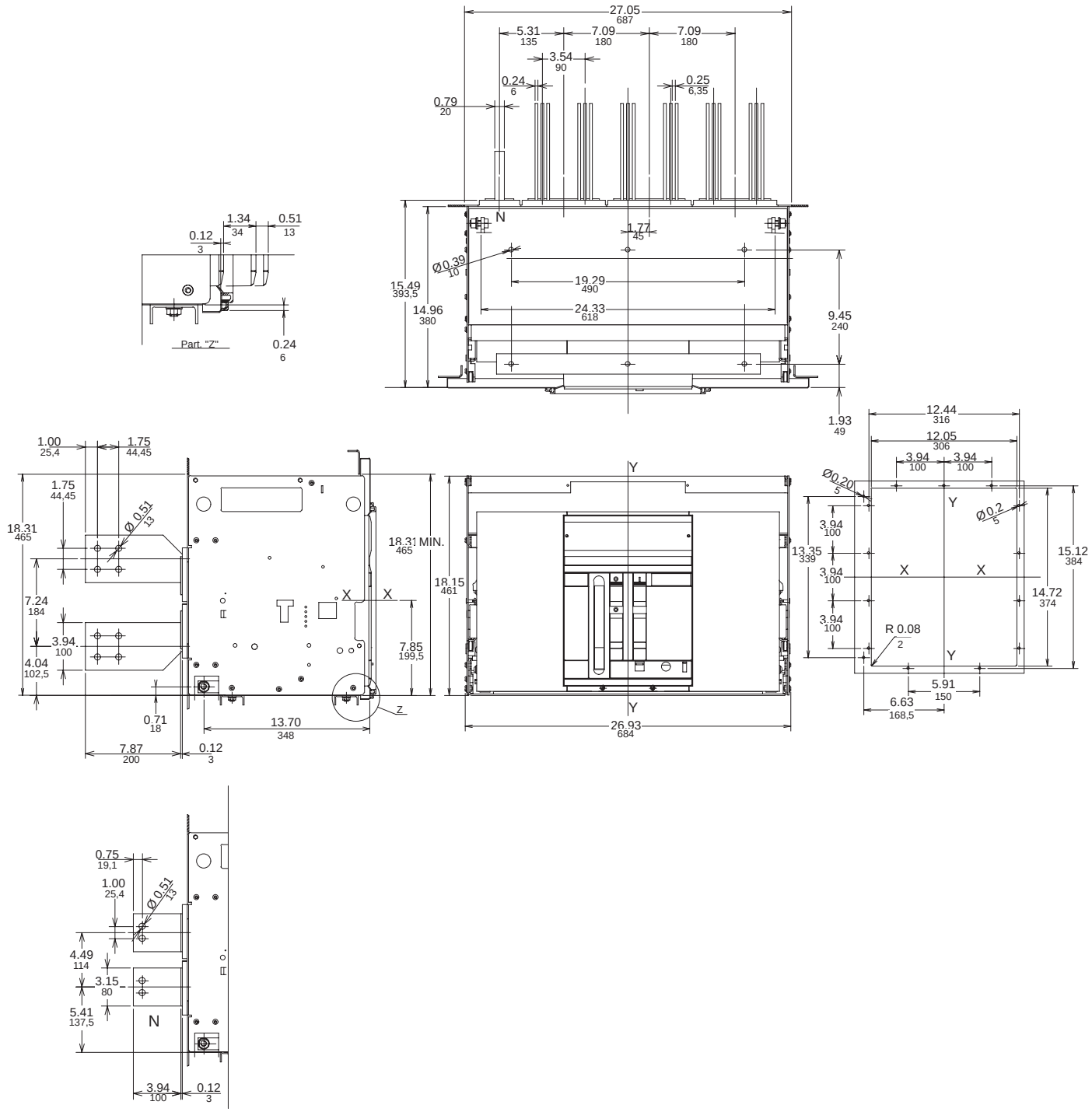
16

Approximate dimensions (for UL version)

E4, withdrawable with vertical rear terminals

4 pole

00.00 / 00.00 Inches [Millimeters]



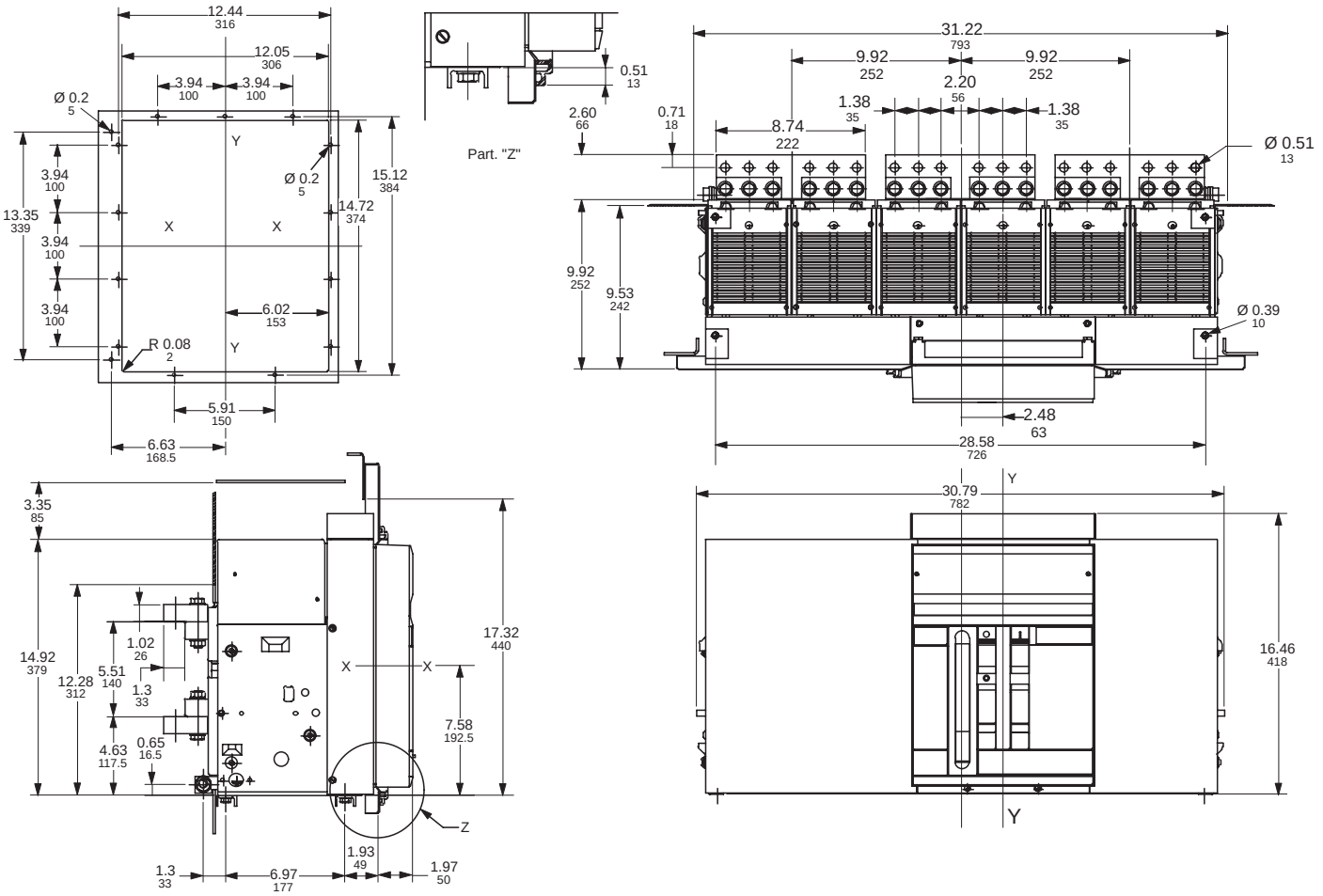
16

Approximate dimensions (for UL version)

E6, fixed with horizontal rear terminals

3 pole

00.00 / 00.00 Inches [Millimeters]



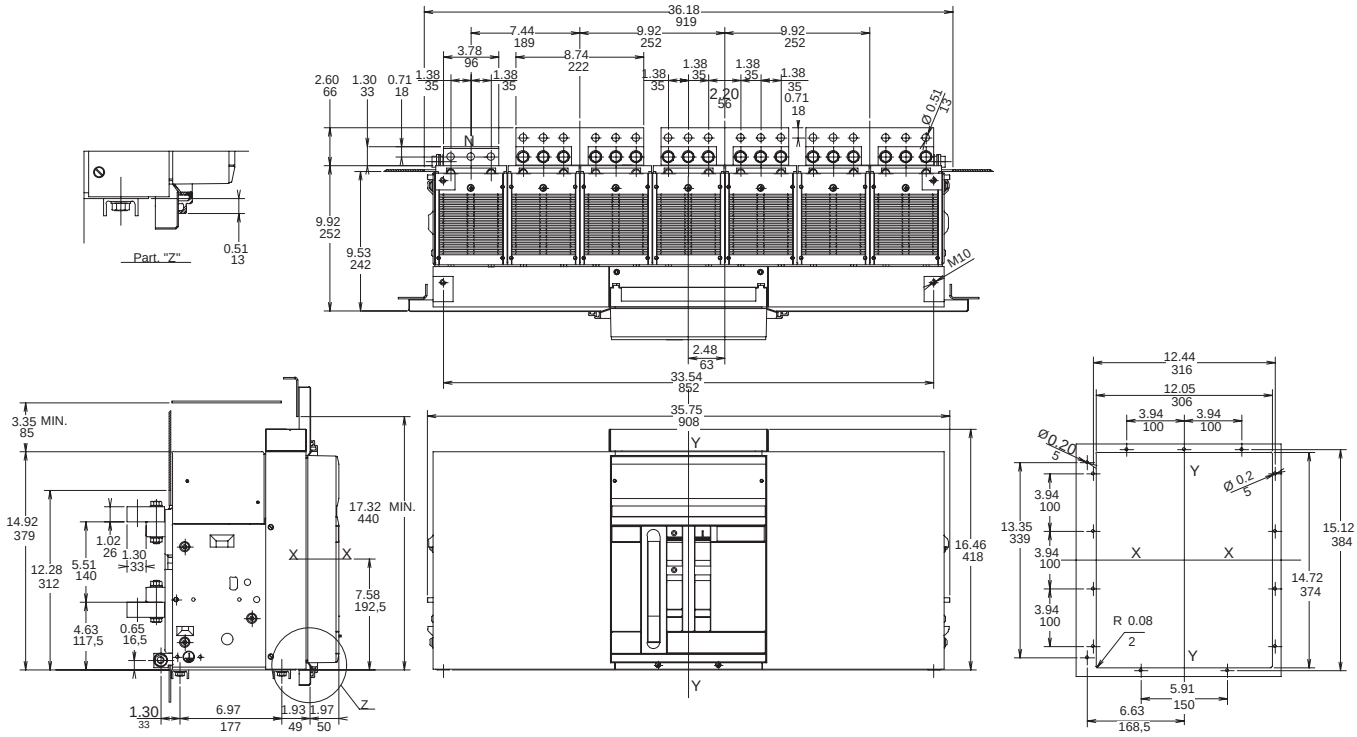
16

Approximate dimensions (for UL version)

E6, fixed with horizontal rear terminals

4 pole

00.00
00.00
Inches
[Millimeters]

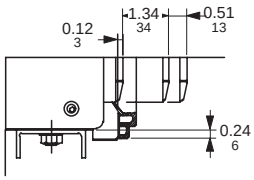


16

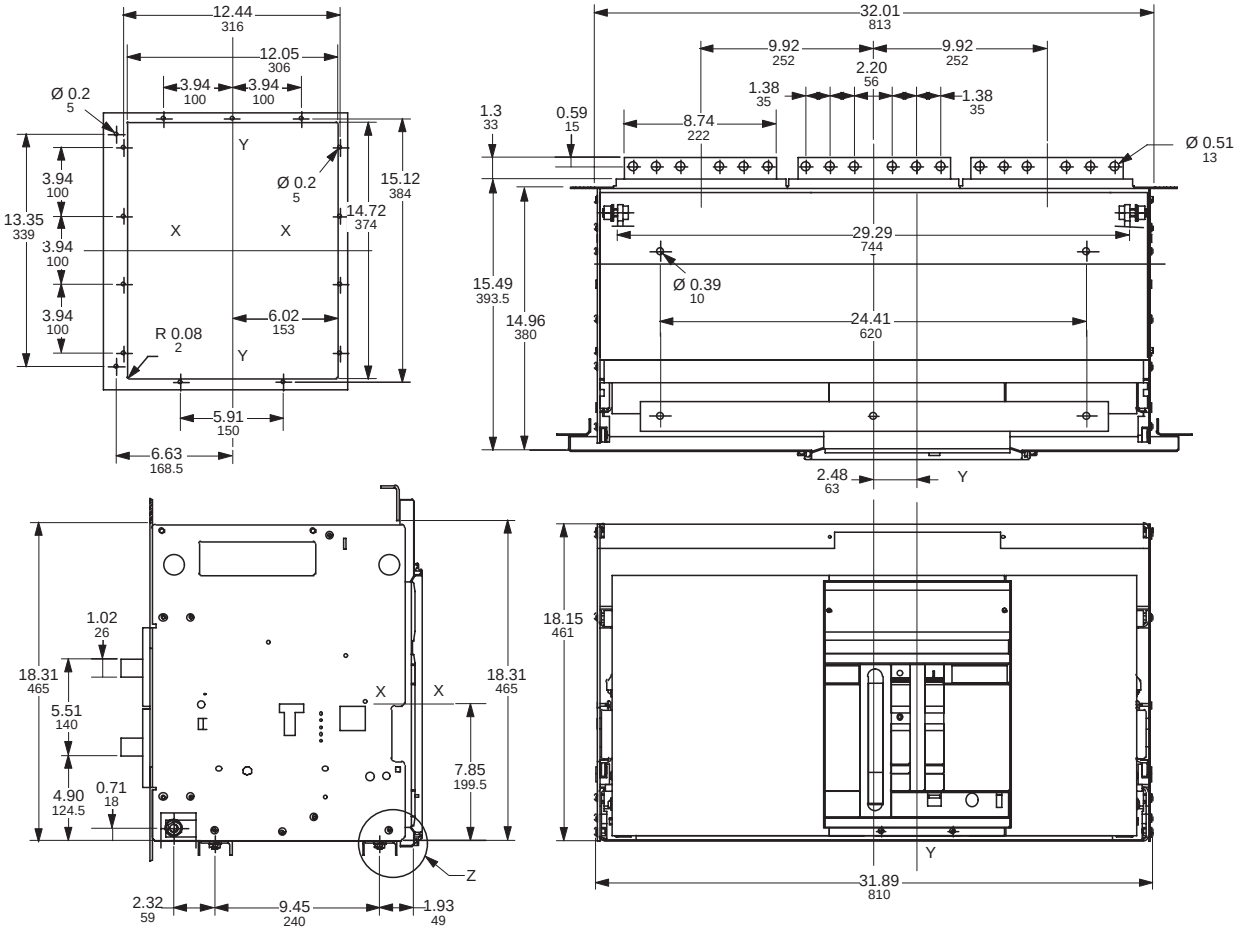
Approximate dimensions (for UL version)

E6, withdrawable with horizontal rear terminals
3 pole

00.00
00.00
Inches
[Millimeters]



Part. "Z"

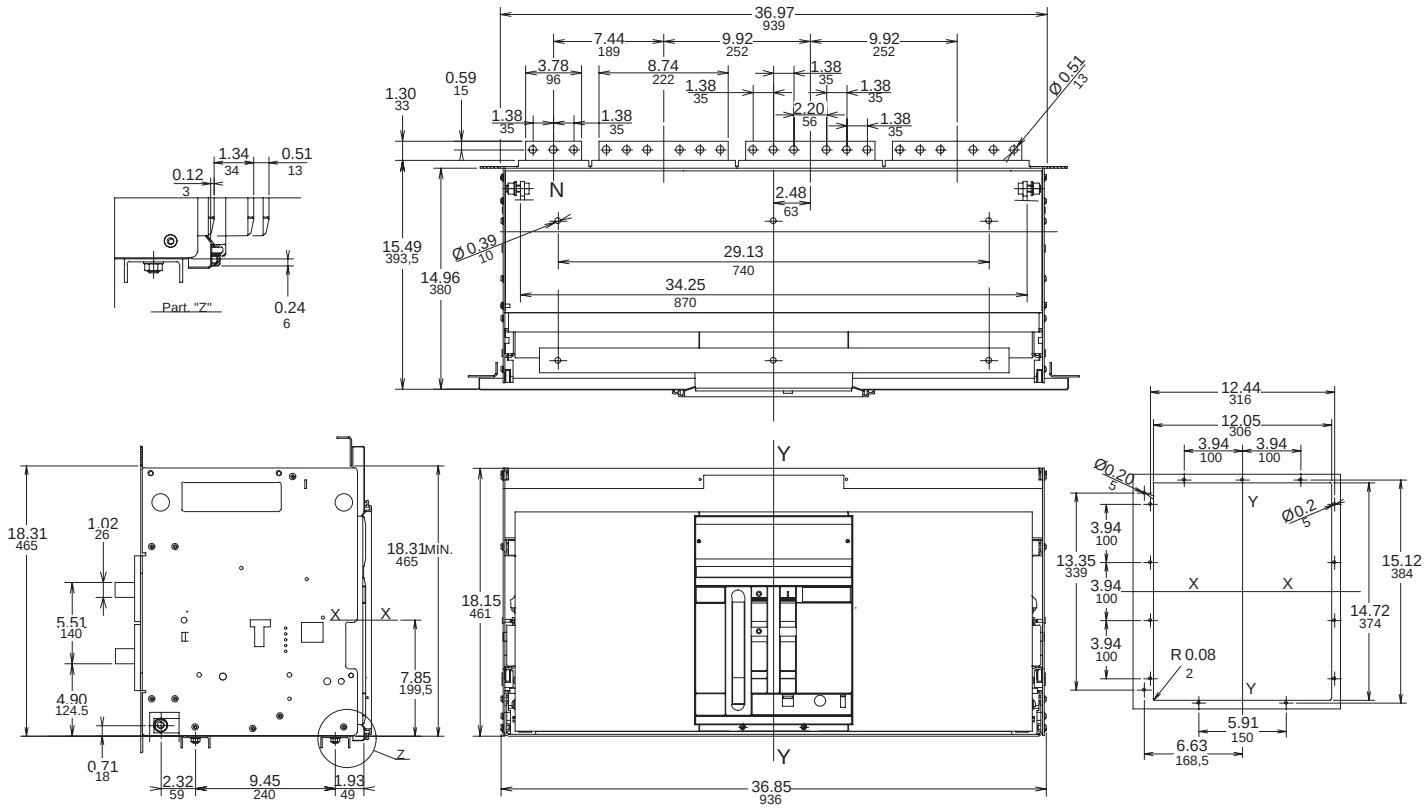


16

Approximate dimensions (for UL version)

E6, withdrawable with horizontal rear terminals
4 pole

00.00 / 00.00 Inches [Millimeters]

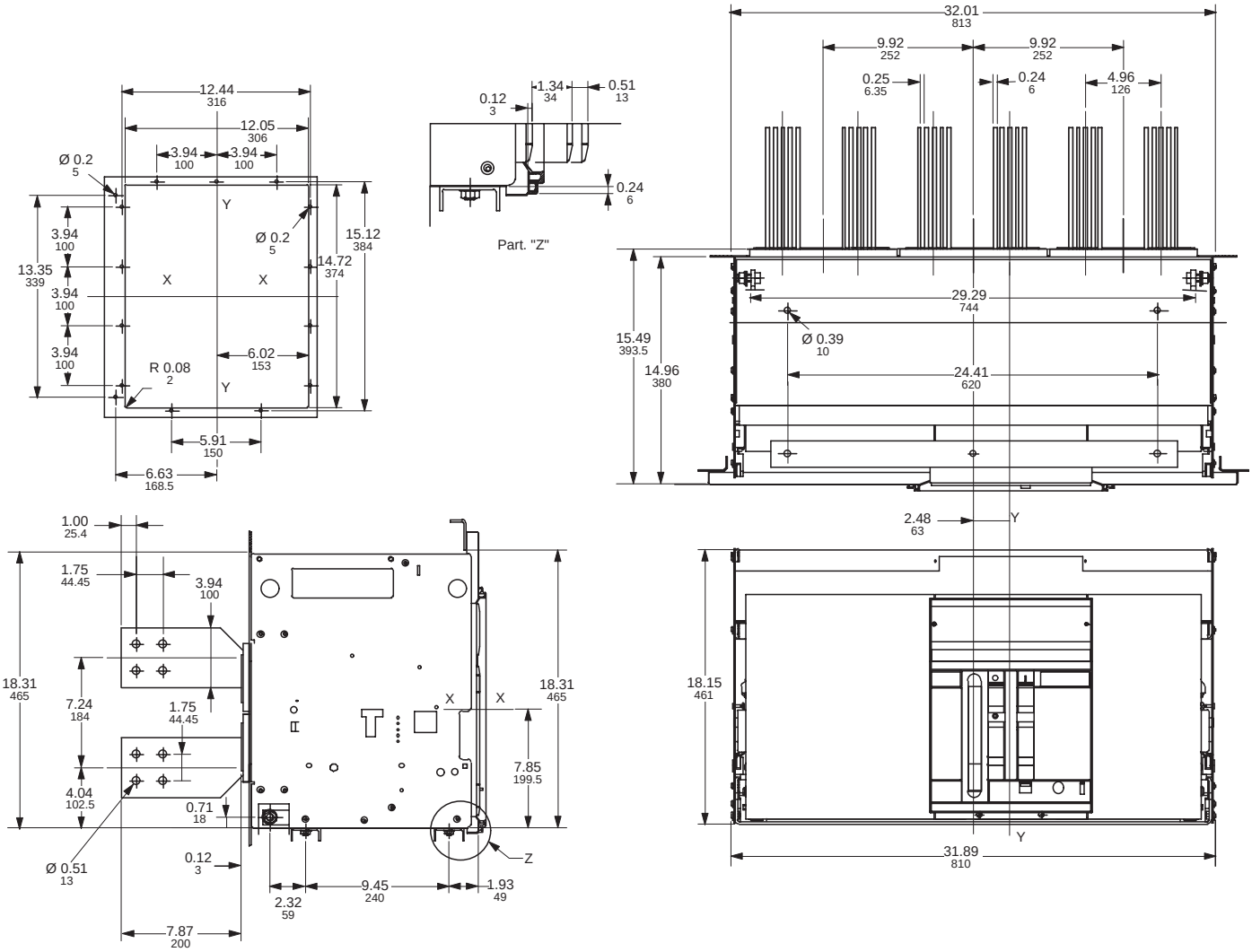


16

Approximate dimensions (for UL version)

E6, withdrawable with vertical rear terminals
3 pole

00.00 Inches
00.00 [Millimeters]



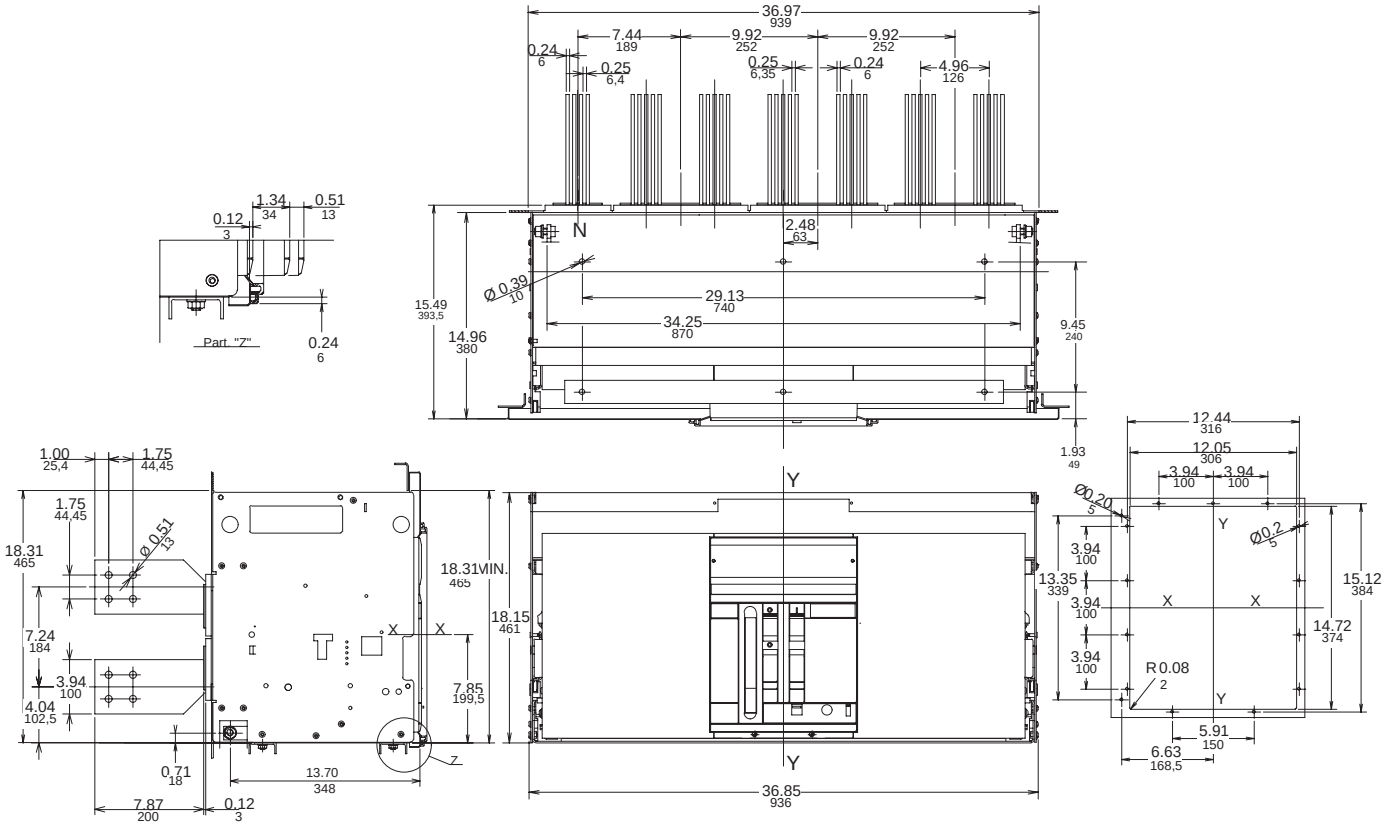
16

Approximate dimensions (for UL version)

E6, withdrawable with vertical rear terminals

4 pole

00.00
00.00
Inches
[Millimeters]



16

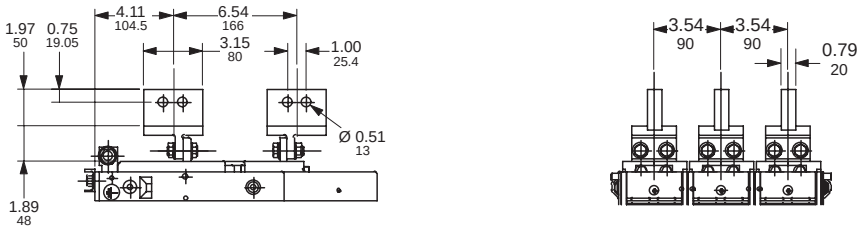
Approximate dimensions (for UL version)

E1 - E6, fixed with vertical rear terminals

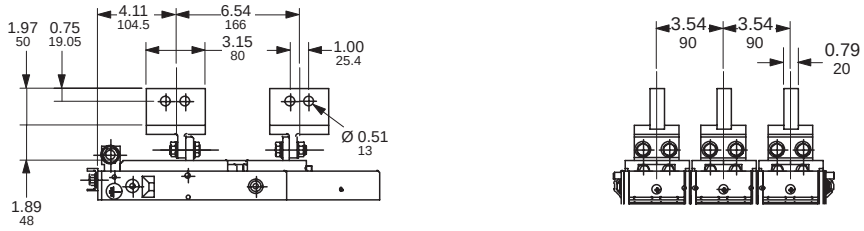
3 pole

00.00
00.00
Inches
[Millimeters]

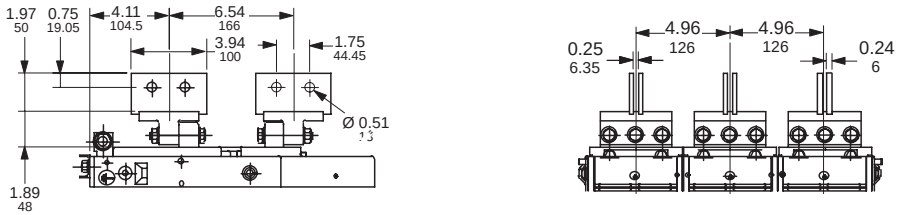
E1



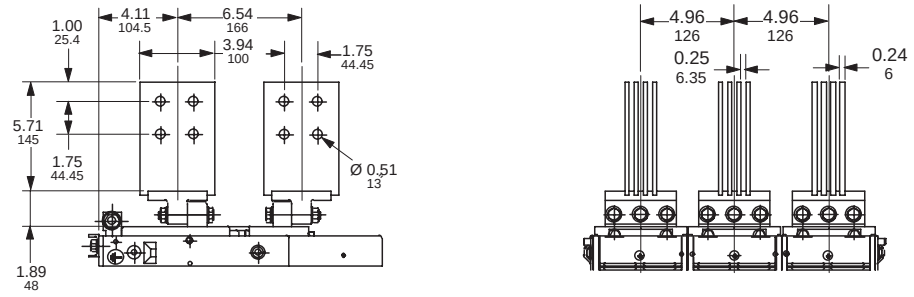
E2



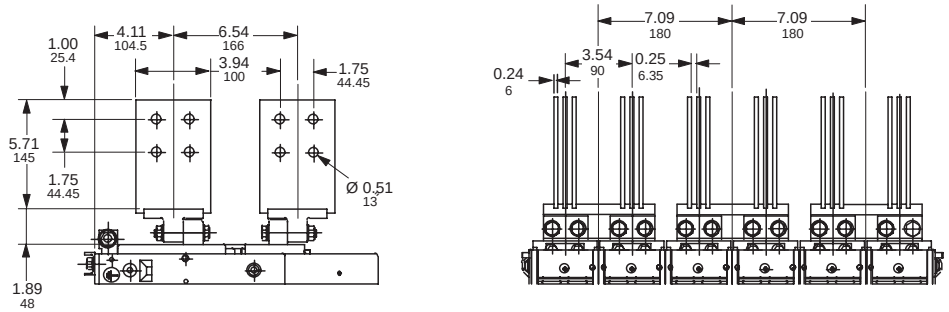
E3 (1200A - 2000A)



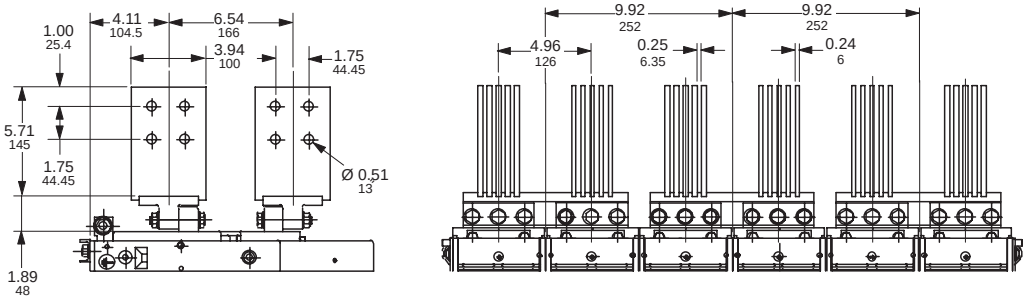
E3 (2500A)



E4



E6



16

Approximate dimensions (for UL version)

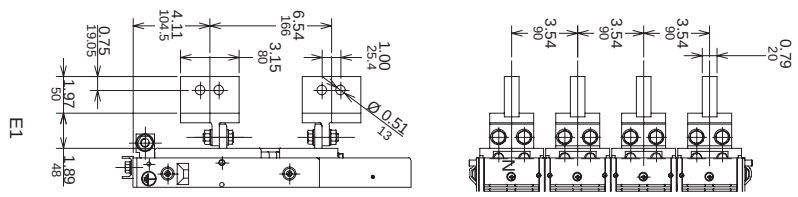
E1 - E6, fixed with vertical rear terminals

4 pole

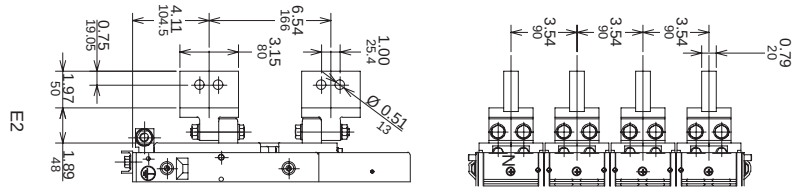
00.00
00.00
Inches
[Millimeters]

Emax Power breakers

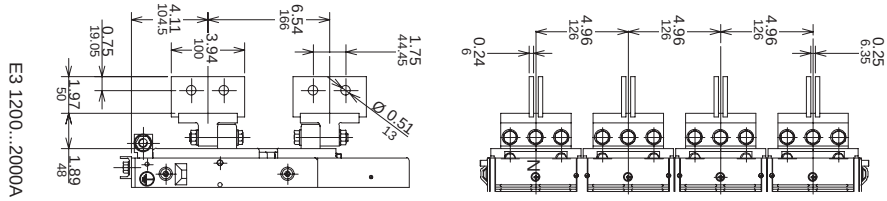
E1



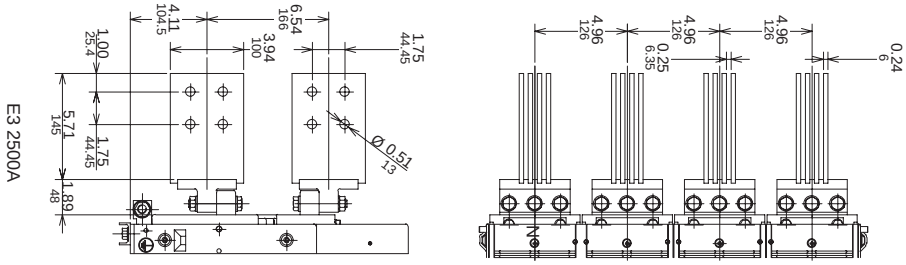
E2



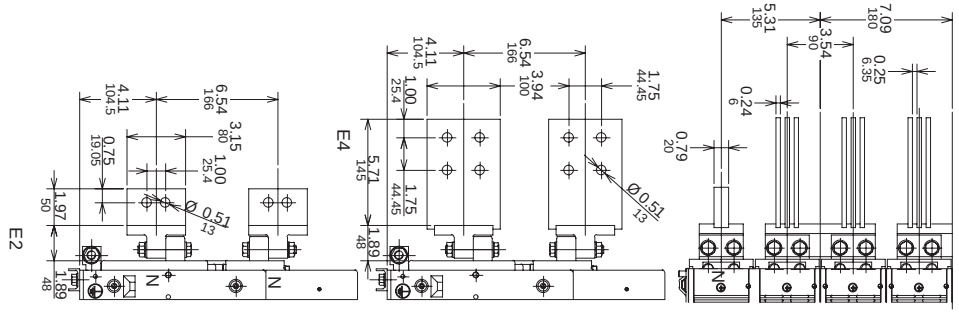
E3 (1200A - 2000A)



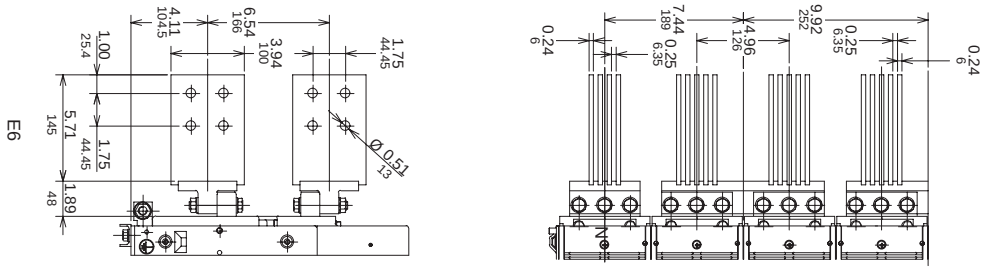
E3 (2500A)



E4



E6



16

Notes

Power distribution systems
Product index

Notes

Switchboard MaxSB
Low Voltage Products and Systems

New / Experienced
Building on years of experience in supplying low voltage distribution equipment all over the world ABB opens a new approach to what a switchboard can be and how it can better serve the user, the design engineer and the contractor.

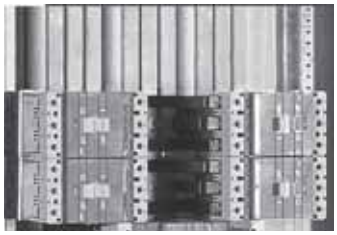
Fresh / Familiar
ABB builds on the familiar look of a switchboard with group mounted molded case circuit breakers and fixed or draw out main breakers. Fresh ideas are incorporated with features such as a slotted vertical bus design, a full hinged door that incorporates the breaker cover plates, and a modular frame enclosure system.

Unique / Reliable
Unique design features such as the slotted bus, and hinged door make this switchboard new. Plated copper bus, bolted bus connections, a frame enclosure structure, and ABB's proven breaker technology make this ABB switchboard highly reliable. Quality is a standard feature in ABB switchboards. A list of expensive options is not needed to ensure the highest quality standards are met.

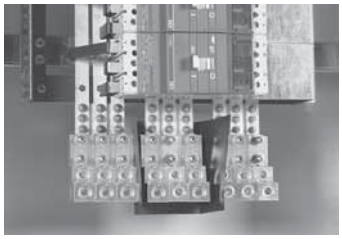
Features
- Hinged door and large wire ways save time and money in field wiring.
- Unique bus layout delivers the freedom to locate feeder breakers independent of any hole pattern.
- Plated copper bus used in all three phases and neutral.
- Copper ground bus extends full width of switchboard.
- Horizontal bus up to 5000 Amps
- Vertical bus up to 3000 Amps
- Group mounted feeder breakers ranging from 15 amps to 1200 Amps
- Main breakers up to 5000 Amps
- Strong frame construction isolates bus and breaker assemblies from enclosure "skin". Durable dry paint finish. Four inch base and lifting eyes are standard.

Switchboard MaxSB

Switchboard MaxSB
General information



Unique hole-less bus bar arrangement allows you to install feeder breakers in any location vertically. Less time less hassle.



Easy access to incoming terminals. Less time less hassle

5000 amp Mains and 3000 amp vertical bus designs enable this switchboard to distribute power in the largest low voltage applications. A multi-layered bus design and modular enclosure system provide the flexibility to provide an 800 amp free-standing switchboard that has an extremely small foot print.

Precise / Flexible

ABB's switchboard uses a frame-based enclosure system. Unlike self-supporting enclosures the frame supports the bus bar and breaker assemblies. Front panels, sidewalls, and rear panels are also supported by the frame structure. This design offers a number of advantages over self-supporting enclosure systems. Damaged walls and panels can be easily replaced without the need to disassemble interior bus or breaker assemblies. The modular nature of ABB's frame enclosure system makes it easy to expand the switchboard by adding sections as system requirements change. Simply remove a side wall and butt the new section against the old. Overlapping horizontal bus design makes for a simple and accurate splice connection.

Custom / Standard

Wouldn't it be nice to have the freedom to layout a switchboard in such a way that it compliments the application and site requirements? Would you benefit from the freedom to locate breakers as you choose? Wouldn't you like to add custom features like a dust-proof enclosure, or a full glass door for added security and an enhanced appearance in high visibility sites?
ABB's standard switchboard design makes these and other custom like features affordable.

Industrial / Commercial

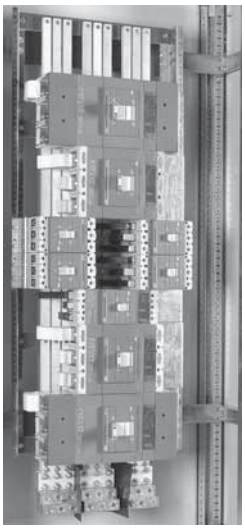
The Operations Manager wants reliability, the specifying engineer wants a product he can believe in, the service department demands maintainability, the CFO wants value and the contractor wants a supplier and product that is easy to work with and on time delivery. One company can match all of these requirements; ABB.

The Operations Manager and specifying engineer appreciate features such as plated copper bus and bolted bus connections. A frame-based enclosure system delivers strength, expandability and simplifies repairs. The complete system is designed and tested to meet or exceed UL requirements.

The maintenance department enjoys a hinged door that makes it easy for qualified personnel to access the cabinet to maintain and service ABB's switchboards. Connections are located so that you can actually get to them. A framed enclosure construction and bus design make this switchboard easy to expand as requirements change.

Contractors save on installation time with easy to access terminals, increased cable area and a design that makes it easy to add breakers and accessories in the field.

① 15-30A are 65kA at 480VAC

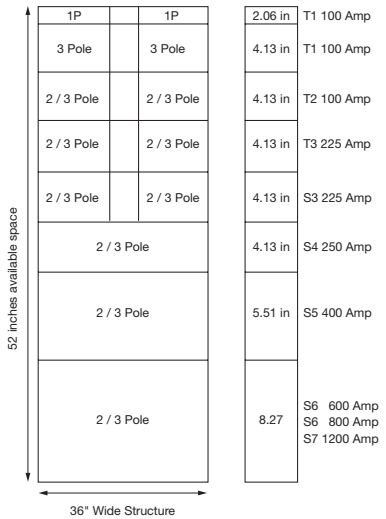


Feeder Breakers

Frame	Poles	Space Inches	KAIC 277	KAIC 240	KAIC 480	Trip Frame Rating Amps
T1B	1	1.0	18②			15
T1N	3	3.0		50	22③	15
T2S	2/3	3.54		65	35	15
T2H	2/3	3.54		100	65	15
T3N	2/3	4.13		50	25	15
T3S	2/3	4.13		65	35	15
S3N	2/3	4.13		65	25	15
S3H	2/3	4.13		100	50	15
S3L	2/3	4.13		150	85①	15
						70 80 90 100
T1B	1	1.0	18			20
T1N	3	3.0		50	22	20
T2S	2/3	3.54		65	35	20
T2H	2/3	3.54		100	65	20
T3N	2/3	4.13		50	25	20
T3S	2/3	4.13		65	35	20
S3N	2/3	4.13		65	25	20
S3H	2/3	4.13		100	50	20
S3L	2/3	4.13		150	85	20
						125 150 175 200 225
T3N	2/3	4.13		50	25	25
T3S	2/3	4.13		65	35	25
S3N	2/3	4.13		65	25	25
S3H	2/3	4.13		100	50	25
S3L	2/3	4.13		150	85	25
						250 Electronic - adjustable 40 - 250
S4N	2/3	4.13		65	25	40
S4H	2/3	4.13		150	65	40
S4L	2/3	4.13		200	100	40
						400 Electronic - adjustable 160 - 400
S5N	2/3	5.51		65	35	50
S5H	2/3	5.51		150	65	50
S5L	2/3	5.51		200	100	50
						600 Electronic - adjustable 240 - 600
S6N	2/3	8.27		65	50	60
S6H	2/3	8.27		150	65	60
S6L	2/3	8.27		200	100	60
						800 Electronic - adjustable 320 - 800
S6N	2/3	8.27		65	50	60
S6H	2/3	8.27		150	65	60
S6L	2/3	8.27		200	100	60
						1200 Electronic - adjustable 480 - 1200
S7H	2/3	8.27		100	65	60

① S3L	15-30A	65kA@480V
② T1B	15A	10kA@277V
③ T1N	15A	35kA@240V 14kA@480V

Maximum switchboard rating = 100kA



T4 = 4.14
T5 = 5.51
T4 & T5 = 5.61 DBL MT

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Molded case circuit breakers
Tmax
T1 100 A - T2 100A - T3 225 A


T1 100A


T2 100A


T3 225A

Tmax T2 can be fitted with the latest generation in electronic trip units. This is the first time that a circuit-breaker of this size can benefit from electronic protection, and the setting flexibility it provides.

UL 489 CSA 22.2

Circuit breakers				Tmax T1 1p	Tmax T1	Tmax T2	Tmax T3
Maximum frame continuous current 40°C Iu			[A]	100	100	100	225
Number of poles			[Nr]	1	3/4	2/3/4	2/3/4
Rated operational voltage (AC) 50-80Hz Ue			[V]	277	480	480	480
Short circuit interrupting capacity, Icu				B	N	S H	N S
	AC	240V	[kA]		50	65 100	50 65
		277V	[kA]	18①			
		480V	[kA]		22②	35 65	25 35
	DC	250V 2 poles in series	[kA]		25		25 35
		500V 3 poles in series	[kA]		25		25 35
Relays			TM	-	-	–	-
			PR22 1DS			–	
			MA			–	-
Versions			MCCB	-	-	–	-
			MCS		-		-
			MCP			–	-

IEC 60047-2

Circuit breakers				Tmax T1 1p	Tmax T1			Tmax T2				Tmax T3	
Rated uninterrupted current Iu			[A]	160	160			160				250	
Number of poles			[Nr]	1	3/4			3/4				3/4	
Rated service voltage, Ue	AC	50-60Hz	[V]	240	690			690				690	
	DC		[V]	125	500			500				500	
Rated ultimate short circuit breaking capacity , Icu				B	B	C	N	N	S	H	L	N	S
	AC	220/230V	[kA]	25	25	40	50	65	85	100	120	50	85
		380/415	[kA]		16	25	36	36	50	70	85	36	50
		440V	[kA]		10	15	22	30	45	55	75	25	40
		500V	[kA]		8	10	15	25	30	36	50	20	30
		690V	[kA]		3	4	6	6	7	8	10	5	8
	DC	250V 2 poles in series	[kA]		16	25	36	35	50	70	85	36	50
		250V 2 poles in series	[kA]		20	30	40	40	55	85	100	40	55
		500V 2 poles in series	[kA]		16	25	36	36	50	70	85	36	50
Trip units			Fixed thermal magnetic	–		–				–			–
			Fixed thermal magnetic							–			
			PR221/DS										
			Fixed magnetic							–			
			Adjustable magnetic							–			–
Dimensions			H [in/mm]	5.12/130	5.12/130			5.12/130				5.9/150	
			W 1p or 3p [in/mm]	1/25.4	3/76			3.54/90				4.13/105	
			W 4p [in/mm]		4/102			4.72/122				5.5/140	
			D [in/mm]	2.76/70	2.76/70			2.76/70				2.76/70	
Mechanical life			[No operations]	25000	25000			25000				25000	
			[No hourly operations]	240	240			240				120	
Electrical life			[No operations]	8000	8000			8000				8000	
			[No hourly operations]	120	120			120				120	

① 15A : 10kA@277Vac
② 15A : 35kA@240Vac; 14kA@480Vac

Molded case circuit breakers
Isomax
S3B - S3 - S4

S3B

S3

S4

Isolation of control accessories and power poles allows for the safe addition / replacement of shunt trips, auxiliaries, bell alarm and under voltage relays.

Circuit breaker type				S3B	S3						S4		
Maximum frame continuous rated current		40° C	A	225	150			225			250		
Rated operational voltage		50/60Hz	V	240	600			480			600		
Test voltage		1 min. 50/60 Hz	V	3000	3000			3000			3000		
Rated impulse withstand voltage			kV	6	6			6			8		
Poles			No.	2/3	2/3/4			2/3/4			2/3/4		
Performance level				B	N	H	L	N	H	L	N	H	L
		240VAC		150	65	100	150	65	100	150	65	100	150
UL/CSA short-circuit		480VAC		–	25	50	85②	25	50	65	65	150	200
Interrupting capacity		600VAC	kA RMS	–	14	14	25	–	–	–	18	32	35
UL 489, File #E93565		500VDC	①	50	35	50	65	25	35	50	–	–	–
CSA, File #LR90467		600VDC	①	–	20	35	50	–	–	–	–	–	–
		202/230VAC		150	65	100	170	65	100	170	65	100	200
IEC-947 rated ultimate		380/400/415VAC		–	35	65	85	35	65	85	35	65	100
Short-circuit	Icu	440VAC	kA RMS	–	30	50	65	30	50	65	30	50	80
Breaking capacity		500VAC		–	25	40	50	25	40	50	25	40	65
		660/690VAC		–	14	18	20	14	18	20	18	22	30
Overcurrent trip unit/relay													
Thermal-magnetic				•		•			•			–	
Microprocessor-based				–		–			–			•	
Dialogue unit				–		–			–			•	
Interchangeability				–		–			–			•	
Version — Terminals													
Fixed — front or rear				•		•			•			•	
Plug-in — front or rear				•		•			•			•	
Withdrawable — front or rear				•		•			•			•	
Dimensions (fixed circuit-breaker)													
2P & 3P (H x W x D)			in	6.70 x 4.13 x 4 .07	6.70 x 4.13 x 4 .07			6.70 x 4.13 x 4 .07			10.0 x 4.13 x 4 .07		
4P (H x W x D)			in	6.70 x 5.51 x 4 .07	6.70 x 5.51 x 4 .07			6.70 x 5.51 x 4 .07			10.0 x 5.51 x 4 .07		
Mechanical duration													
operations			No.	25,000	25,000			25,000			25,000		
frequency			ops./hour	240	120			120			120		
Weights (fixed 3P)			lbs.	6.75	6.75			6.75			8.8		

① For use with thermal - magnetic trip only:
500 VDC, 2 poles in series
600 VDC, 3 poles in series
② 15-30A units are 65kA at 480VAC

Molded case circuit breakers
Isomax
S3B - S3 - S4


S5


S6


S6


S7


S8


K4TB

Circuit breaker type

			S5	S6		S7	S8
Maximum frame continuous rated current	40° C	A	400	600	800	1200	1600/2000/2500
Rated operational voltage	50/60Hz	V	600	600	600	600	600
Test voltage	1 min. 50/60 Hz	V	3000	3000	3000	3000	3000
Rated impulse withstand voltage		kV	8	8	8	8	8
Poles		No.	2/3/4	2/3/4	2/3/4	2/3/4	3
Performance level			N H L	N H L	N H L	H	V
UL/CSA short-circuit Interrupting capacity UL 489, File #E93565 CSA, File #LR90467	240VAC	kA RMS	65 150 200	65 150 200	65 150 200	100	120
	480VAC		35 65 100	50 65 100	50 65 100	65	100
	600VAC		22 22 35	25 35 42	25 35 42	50	85
	500VDC	①	35 50 65	35 50 65	35 50 65	–	–
	600VDC	①	20 35 50	20 35 50	20 35 50	–	–
IEC-947 rated ultimate Short-circuit Breaking capacity	202/230VAC	kA RMS	65 100 200	65 100 200	65 100 200	100	120
	380/400/415VAC		35 65 100	35 65 100	35 65 100	65	120
Icu	440VAC		30 50 80	30 50 680	30 50 80	55	100
	500VAC		25 40 65	25 40 65	25 40 65	45	70
	660/690VAC		20 25 30	20 25 35	20 25 35	25	50
Overcurrent trip unit/relay							
Thermal-magnetic			•	•	•	–	–
Microprocessor-based			•	•	•	•	•
Dialogue unit			•	•	•	•	•
Interchangeability			•	•	•	•	•
Version — Terminals							
Fixed — front or rear			•	•	•	•	•
Plug-in — front or rear			•	•	•	–	–
Withdrawable — front or rear			•	•	•	•	–
Dimensions (fixed circuit-breaker)							
2P & 3P (H x W x D)		in	10.0 x 5.51 x 4 .07	10.55 x 8.27 x 4 .07	14.25 x 8.27 x 4.07	15.98 x 8.27 x 5.45	15.75 x 15.98 x 9.25
4P (H x W x D)		in	10.0 x 7.24 x 4 .07	10.55 x 11.0 x 4 .07	14.25 x 11.0 x 4.07	15.98 x 11.0 x 5.45	
Mechanical duration operations		No.	20,000	20,000	20,000	10,000	10,00
frequency		ops./hour	120	120	120	120	20
Weights (fixed 3P)		lbs.	11.0	21.0	22.0	37.5	135

Standard cable lug kits

For breakers	Amps	Wire range	Catalog number
S3	60	14AWG - 2AWG	K3TA
S3 - S4	100	14AWG - 1/0	K4TB
S3 - S4	150	14AWG - 4/0	K4TC
S3 - S4 - S5	225	4AWG - 300kcmil	K4TD
S4	250	6AWG - 350kcmil	K4TE
S5	300	250kcmil - 500kcmil	K5TF
S5	400	(2) 3/0 - 250kcmil	K5TG
S6	600	(2) 250kcmil - 250Kcmil	K5TH
S6	800	(3) 2/0 - 400kcmil	K6TJ
S7	1200	(4) 4/0 - 400kcmil	K7TK
S8	1600	(4) 1/0 - 750kcmil	K8TL
S8	2500	(6) 1/0 - 750kcmil	K8TM

Standard cable lugs, for use on load side of circuit breaker. Suitable for use with Cu or Al. Special versions available with taps and screw for control wire connection. Note: S6 and S7 lugs are Al9Cu (90°); all others AL7Cu (75°C). Must use wire based on 75°C ampacity.

Air circuit breakers
Emax
E1 - E2 - E3 - E4 - E6

E1 E2 E3 E4 E6

Circuit breaker type

				E1	E2		E3				E4			E6	
Performance level				B-A	B-A	N-A	N-A	S-A	H-A	V-A	S-A	H-A	V-A	H-A	V-A
Rated continuous current			A	800	1600	1200	2000	1200	1200	1200	3200	3200	3200	4000	4000
File #E194191			A	1200	–	1600	2500	1600	1600	1600	3600	3600	3600	5000	5000
			A	–	–	–	–	2000	2000	2000	–	–	–	–	–
			A	–	–	–	–	2500	2500	2500	–	–	–	–	–
Rated short circuit current	240VAC		kA	42	42	65	65	85	85	100	85	100	100	125	125
	480VAC		kA	42	42	50	50	65	85	100	65	85	100	85	125
	600VAC		kA	35	42	50	50	65	65	85	65	85	85	85	85
Rated short time current			kA	35	42	50	50	65	65	65	65	85	85	100	100
Trip units															
PR111/P-A				•	•	•	•	•	•	•	•	•	•	•	•
PR112/P-A				•	•	•	•	•	•	•	•	•	•	•	•
PR113/P-A				•	•	•	•	•	•	•	•	•	•	•	•
Operation times															
Make time (max)			ms	80	80	80	80	80	80	80	80	80	80	80	80
Break time (I<ST current)(max)			ms	70	70	70	70	70	70	70	70	70	70	70	70
Break time (I>ST current)(max)			ms	30	30	30	30	30	30	30	30	30	30	30	30
Overall dimensions, 3 pole															
Fixed: H=418mm / 16.46in															
D=302mm / 11.89in															
W (3 poles)			mm/in	296/11.65	296/11.65		404/15.91				566/22.28			782/30.79	
Drawout: H=461mm / 18.15in															
D=396.5mm / 15.61 in															
W (3 poles)			mm/in	324/12.76	324/12.76		432/17.01				594/23.39			810/31.89	
Weights (CB with releases, RH terminals and CTs, accessories excluded)															
Fixed 3 poles			Kg/lbs	452/93	46/101		68/150				95/209			140/309	
Drawout 3 poles			Kg/lbs	65/143	72/159		100/220				147/324			210/463	
Overall dimensions, 4 pole															
Fixed: H=418mm / 16.46in															
D=302mm / 11.89in															
W (4 poles)			mm/in	386/15.20	386/15.20		530/20.87				656/25.83			908/35.75	
Drawout: H=461mm / 18.15in															
D=396.5mm / 15.61in															
W (4 poles)			mm/in	414/16.30	414/16.30		558/21.97				684/26.93			936/36.85	
Weights (CB with releases, RH terminals and CTs, accessories excluded)															
Fixed 4 poles			Kg/lbs	50/110	55/121		80/176				115/253			170/374	
Drawout 4 poles			Kg/lbs	80/176	89/196		125/275				190/418			260/573	

Specifications common to the entire range	
Rated max voltage	635 VAC
Rated voltage	600VAC
Test voltage (1 min 50/60Hz)	2.2k
Frequency	50/60Hz
Number of poles	3/4
Versions	Fixed/Drawout

Lugs: Main Breakers and Main Lugs Only

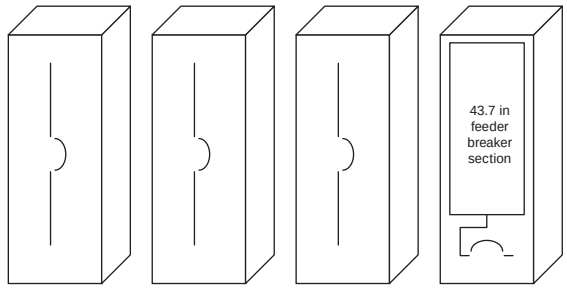
Frames	Lug size	Wire size	Catalog number
E1	(4)	#2-600kcmil	KE1CLK 4600
E2	(4)	#2-600kcmil	KE2CLK 4600
E3	(6)	#2-600kcmil	KE3CLK 6600
E4	(10)	#2-600kcmil	KE4CLK 10600
E5	(12)	#2-600kcmil	KE6CLK 12600

ABB's Emax air circuit breaker is available with three trip units models. From the PR111 that offers only the basic protection functions to the PR113 that offers protection, multi-meter capability, and communication capability there is a trip unit for every application.

Air circuit breakers
Emax
E1 - E2 - E3 - E4 - E6

Typical layouts

Mains



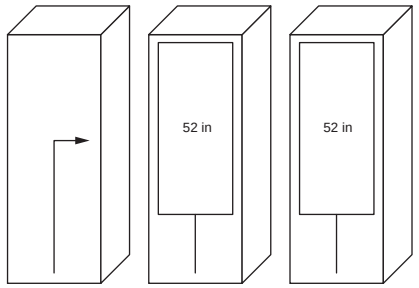
4000 - 5000 Amps
W/D/H: 45" / 33"/ 88"

3000 Amps
37.3" / 33"/ 88"

2000 - 2500 Amps
29.5" / 33"/ 88"

800 - 1200 Amps*
37.3" / 14.25"/ 88"

Mains Lugs Only and Feeder Breaker Sections



2500 - 5000 Amps
W/D/H: 29.5" / 25"/ 88"

800 - 1600 Amps
37.3" / 14.25"/ 88"

2000 - 2500 Amps
37.3" / 25"/ 88"

* 25" deep enclosure required as a minimum for multiple sections with horizontal bus.

ATLV MaxSG
Low Voltage Metal Enclosed Switchgear

Standard Line-Up of MaxSG Metal Enclosed Low Voltage switchgear with instrumentation and Emax Power Circuit Breakers.

MaxSG Switchgear

ABB MaxSG switchgear is a further continuation in the development of innovative products from ABB, a world-wide leader in development and production of low voltage switchgear. MaxSG is industrial duty equipment built to ANSI standards. MaxSG is designed to use 100% rated Emax circuit breakers and follows the vision of ABB products in providing customers with advanced solutions to meet the needs associated with the mechanical, electrical and thermal stress of today's manufacturing environment.

The MaxSG Metal-Enclosed Low Voltage Switchgear offers many advantages that include:

Modular frame arrangements

Optional barriers for increased personnel protection

Efficient and flexible designs

Standard connections to a full range of ABB products

MaxSG is available with the following nominal ratings:

- 600Vac max
- 5000Aac max
- 50/60 Hz
- 2200Vac RMS Dielectric
- 125kA Symmetrical Short Circuit Withstand Rating
- Seismic Qualification Zones 1 -4

MaxSG can accommodate four Emax Power Circuit Breaker frame types:

E2 1200-1600A: B-A N-A
E3 1200-2500A: N-A, S-A, H-A, V-A
E4 3200-3600A: S-A, H-A, V-A
E6 4000-5000A : H-A, V-A

ABB MaxSG switchgear and the use of these breakers will allow a full range of selectivity, coordination, and short circuit withstand capability.

MaxSG vertical sections are offered in 23.6" (600mm), 31.5" (800mm), and 39.4" (1000mm) widths and will allow four 2000A circuit breakers to be placed in one vertical section maximizing power supply capability and minimizing floor space. In addition MaxSG offers depths of 65"(1650mm) and 75" (1900mm) to provide maximum available cable area.

ABB MaxSG switchgear and Emax circuit breakers have been designed and conformance tested to meet and exceed the industry requirements of ANSI C37.13, C37.16, C37.17 and UL 1066 for the breaker elements and ANSI C37.20.1, C37.51 and UL1558 for the switchgear assembly.

MaxSG and ABB will fill the customer's needs from general application through a full range of special applications including electrical protection, transfer/coordination, and extreme environmental applications.

ATLV MaxSG

ATLV MaxSG
Features

Closed-Door Draw out Capability (standard)
MaxSG offers the ability to rack the breaker from the “CONNECT” position through the “TEST” position and to the “DISCONNECT” position while the breaker compartment door remains stationary and closed providing maximum convenience and personnel safety.

Draw out Padlock Provision
Allows the Emax breaker to be padlocked in the “CONNECT”, “TEST” or “DISCONNECT” position providing an added degree of safety.

Breaker Rejection Feature (standard)
Prevents breakers with lower short circuit/continuous current ratings from being inserted into the breaker compartment.

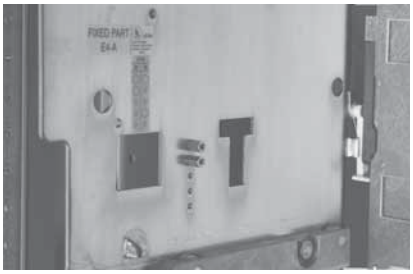
Safety Shutters (standard)
Safety shutters to prevent accidental contact with live bus are a standard on all breakers. In addition a padlock feature is available to lock the shutters in the closed position for an added degree of safety.

Breaker Insertion / Withdrawal Interlock (standard)
Interlocks prevent racking of the breaker while the main contacts are closed.

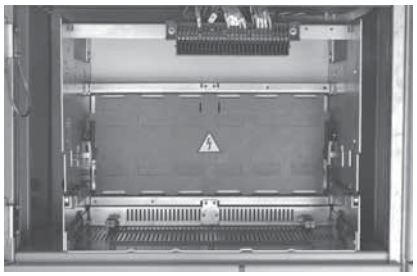
Kirk Key Interlocks
Allows the breaker to be locked open when in the connected position. Typical mechanical breaker interlocking can be achieved with this feature. Single and double barrel locks are available in the breaker compartment.

Overhead Lift Device
A rail mounted hoist is installed on top of the equipment for lifting the breakers into and out of the breaker cubicles.

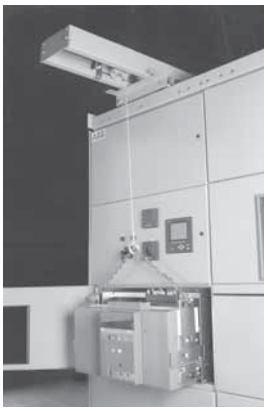
True Closed Door Draw out Capability



Emax breaker rejection feature.



Safety shutters standard in every Breaker cubicle.



MaxSG overhead lift device.

Bus Design
All horizontal and vertical bus are rated for ANSI and UL standard temperature rise requirements of maximum 65°C rise over an ambient temperature of 40°C.

Bus Insulation Systems
Bare bus is provided as standard in all MaxSG switchgear. The configuration provides horizontal isolation barriers at all tiebreakers for added protection in the event of a fault. An insulated bus system that completely insulates the bus with thermo-contractile flame resistant tubing is also available. At connection joints an adhesive coated low voltage tape or optional flexible boots are supplied for customer inspection and maintenance.

Bus Bracing
Steel supported polyester type fingerplates provide bus bracing. Bus bracing is available from 50kA to 125kA symmetrical ratings.

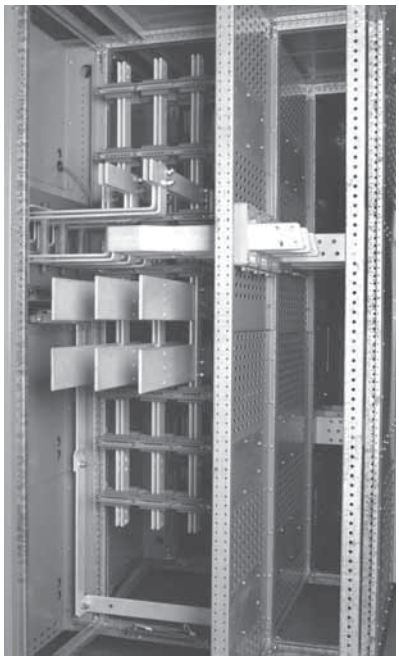
Rear Barriers
Steel main bus barriers are available to completely isolate the rear cable compartment area from the main bus for added personnel safety. Steel inter-compartment barriers are also available to isolate each vertical section.

Silver Plated Bus (Standard)
All bus is copper with a silver plated surface. Tin plated bus is offered as an option.

Ground Bus
A ground bus is supplied over the entire length of the switchgear and is conveniently located for customer connections.

MaxSG main bus designed with the end user in mind.

Optional rear main bus barriers, providing a completely isolated cable compartment.



ATLV MaxSG
Structural design

Basic Structure
The basic structure of the switchgear is a rigid platform constructed of 12gA steel. Lifting is available through floor jacks.

Hinges
Doors are attached with semi-concealed hinges allowing rugged support for equipment mounting and providing protection against non-authorized removal of doors with the use of tamper resistant hardware.

Standard bolted rear cover and optional hinged rear door.

Rear Covers/ Doors
Rear bolted covers with tap type screws provide easy removal and installation in the field. Optional full height hinged doors are also available on request.

Rear Cable Space
Conduit entries meet and exceed all applicable NEC requirements. Extended rear compartment space is available as an option to allow extra space if desired.

Paint and Finish
MaxSG uses an electro-static powder coat finish that meets and exceeds IEEE C37.20.1 coating qualification requirements. ANSI 61 light gray is offered as a standard.

Rear cable area.

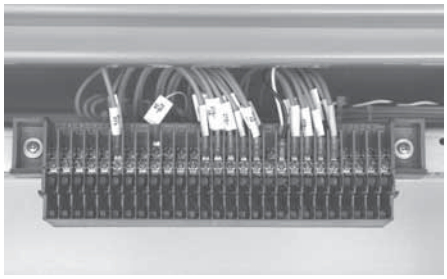
Secondary Terminations
Customer secondary terminations are located above the circuit breaker providing ample room for customer connection routing and termination. Spare terminal points can be located in the front of the gear in an instrument compartment.

Instrument compartments
When additional devices are required separate instrument compartments are supplied. Voltage transformers, when specified, are also mounted in the instrument compartments with their primary and secondary fuse protection.

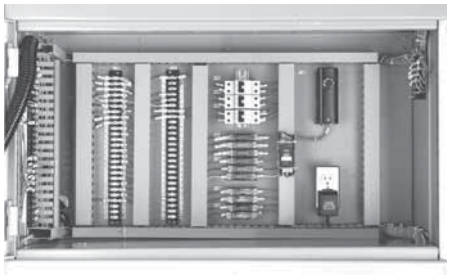
Intercubicle Wiring
Intercubicle wiring is done on terminal strips located in a wire way on top of the equipment. This allows for quick and easy access when installing or expanding the MaxSG switchgear.

Wire Designation
Heat shrink permanent marking origin destination wire tags are offered as a standard on all MaxSG switchgear.

Control Wiring
#14 gA SIS wiring is standard. Wiring is offered with the standard insulated locking fork and optional ring type terminals.



Customer secondary terminal locations.



Instrument compartment

ATLV MaxSG
Dimensional data

Section sizing
The basic MaxSG switchgear is 87” (2200mm) in height, 90.2” (2290mm) to the top of the wiring and 98.9” (2511mm) over the top of the overhead lifting device, and 65” (1650mm) deep. The width of the vertical section is determined by the breaker type and frame size.

Table: Section Sizing

Breaker Frame Size	Breaker Cubicle Height	Min. Section Width	Minimum Equipment Depth	Optional Equipment Depth
1200-2000A	20.7" 525mm	23.6" 600mm	65" 1650mm	75" 1900mm
2500A-3600A	20.7" 525mm	31.5" 800mm	65" 1650mm	75" 1900mm
4000A-5000A	20.7" 525mm	39.4" 1000mm	65" 1650mm	75" 1900mm

MaxSG weights
The process for determining the cumulative weight for MaxSG switchgear is to add the weights for each vertical section of equipment and add the total weight of the breakers to be installed.

Table: MaxSG Switchgear Section Weights

Section Width	Weight (lbs.)
23.6”	971
31.5”	1155
39.4”	1381

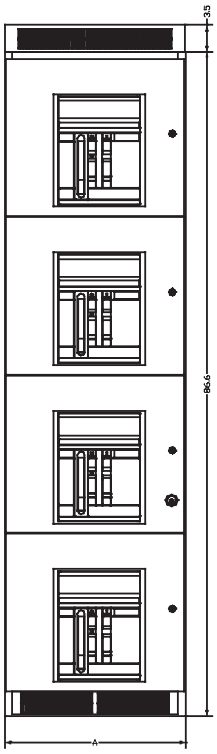
* 257lbs to be added for end panels

Table: Emax Breaker Weights

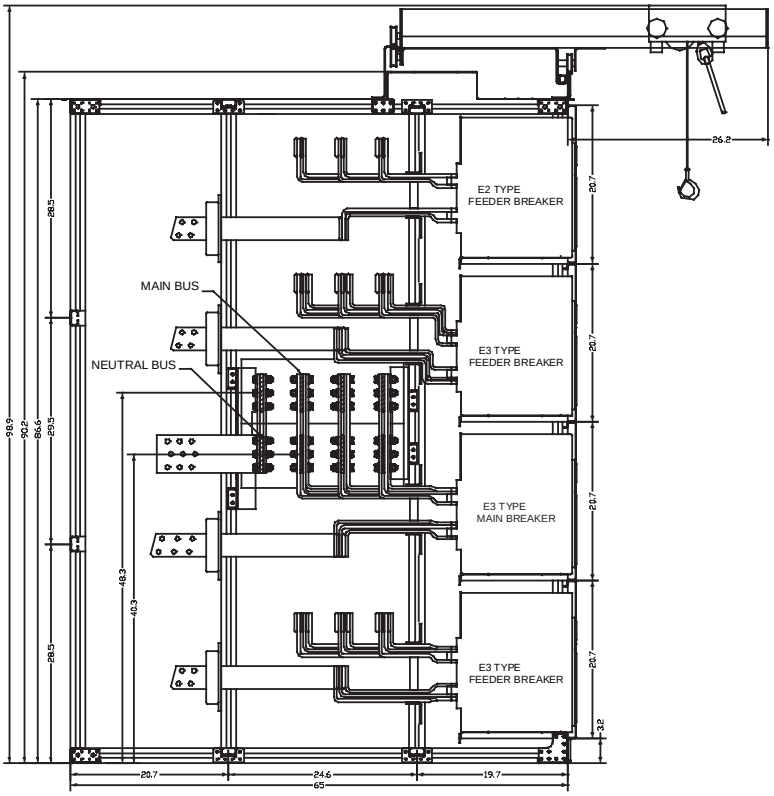
Breaker type	Weight (lbs.)
E2	159
E3	220
E4	324
E6	463

MaxSG rules for layouts and sizing
- Main and tie breakers must be placed in the “C” compartment.
- One breaker can be placed below a main breaker.
- One breaker can be placed below a tie breaker.
- Instrument compartments are 20.7” (525mm) or 41.4" (1050mm) in height.
- Miniature control switches, miniature volt/ammeters, and indicating lights can be mounted on breaker compartment doors.
- Liquid cooled transformers require a 15” transition section.
- A maximum of four breakers can be placed in a vertical section.
- The factory should be consulted to determine if cabling arrangements will allow UL service entrance.
- The factory should be consulted for special applications such as fire pump breakers.

MaxSG elevation and section view

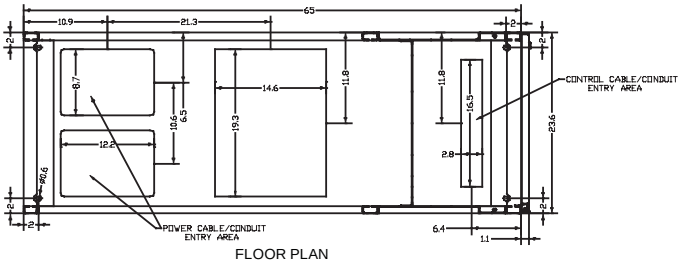


FRONT VIEW

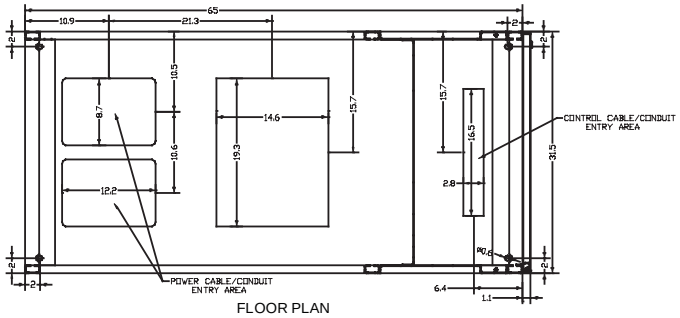


SIDE SECTION

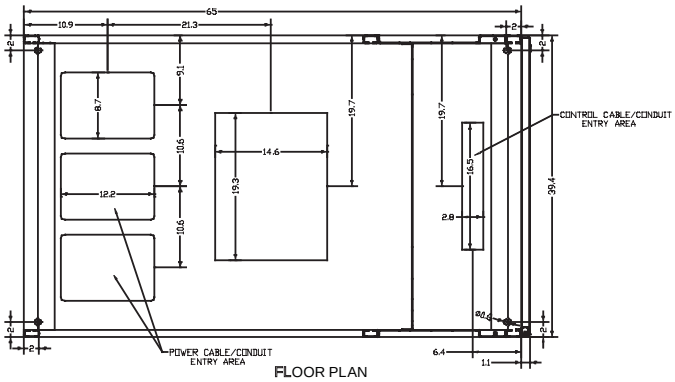
MaxSG base plan drawings



FLOOR PLAN



FLOOR PLAN



FLOOR PLAN

17

ATLV MaxSG
Air circuit breakers


E2


E3


E4


E6

Circuit breaker type

			E2		E3				E4			E6	
Performance level			B-A	N-A	N-A	S-A	H-A	V-A	S-A	H-A	V-A	H-A	V-A
Rated continuous current		A	1600	1200	2000	1200	1200	1200	3200	3200	3200	4000	4000
File #E194191		A	–	1600	2500	1600	1600	1600	3600	3600	3600	5000	5000
		A	–	–	–	2000	2000	2000	–	–	–	–	–
		A	–	–	–	2500	2500	2500	–	–	–	–	–
Rated short circuit current	240VAC	kA	42	65	65	85	85	100	85	100	100	125	125
	480VAC	kA	42	50	50	65	85	100	65	85	100	85	125
	600VAC	kA	42	50	50	65	65	85	65	85	85	85	85
Rated short time current		kA	42	50	50	65	65	65	85	85	85	100	100
Trip units													
PR111/P-A			•	•	•	•	•	•	•	•	•	•	•
PR112/P-A			•	•	•	•	•	•	•	•	•	•	•
PR113/P-A			•	•	•	•	•	•	•	•	•	•	•
Operation times													
Make time (max)		ms	80	80	80	80	80	80	80	80	80	80	80
Break time (I<ST current)(max)		ms	70	70	70	70	70	70	70	70	70	70	70
Break time (I>ST current)(max)		ms	30	30	30	30	30	30	30	30	30	30	30
Overall dimensions, 3 pole													
W (3 poles)		mm/in	296/11.65		404/15.91				566/22.28			782/30.79	
Drawout: H=461mm / 18.15in													
D=396.5mm / 15.61in													
W (3 poles)		mm/in	324/12.76		432/17.01				594/23.39			810/31.89	
Weights (CB with releases, RH terminals and CTs, accessories excluded)													
Drawout 3 poles		Kg/lbs	72/159		100/220				147/324			210/463	

Specifications common to the entire range	
Rated max voltage	635 VAC
Rated voltage	600VAC
Test voltage (1 min 50/60Hz)	2.2kV
Frequency	50/60Hz
Number of poles	3
Versions	Drawout

17

ABB's Emax air circuit breaker is available with three trip units models. From the PR111 that offers only the basic protection functions to the PR113 that offers protection, multi-meter capability, and communication capability there is a trip unit for every application.

* For additional information on Emax circuit breakers and related products see catalogs listed below:

* Emax Catalog: 1SDC200003D0201

* MaxSB Catalog: AC1800

Disconnect switches
Product index

Continued next page

Index

Enclosed disconnect switches, cont.

Disconnect switches

SwitchLine Non-fusible

SwitchLine
Non-fusible disconnect switches
16A – 3150A, 600V

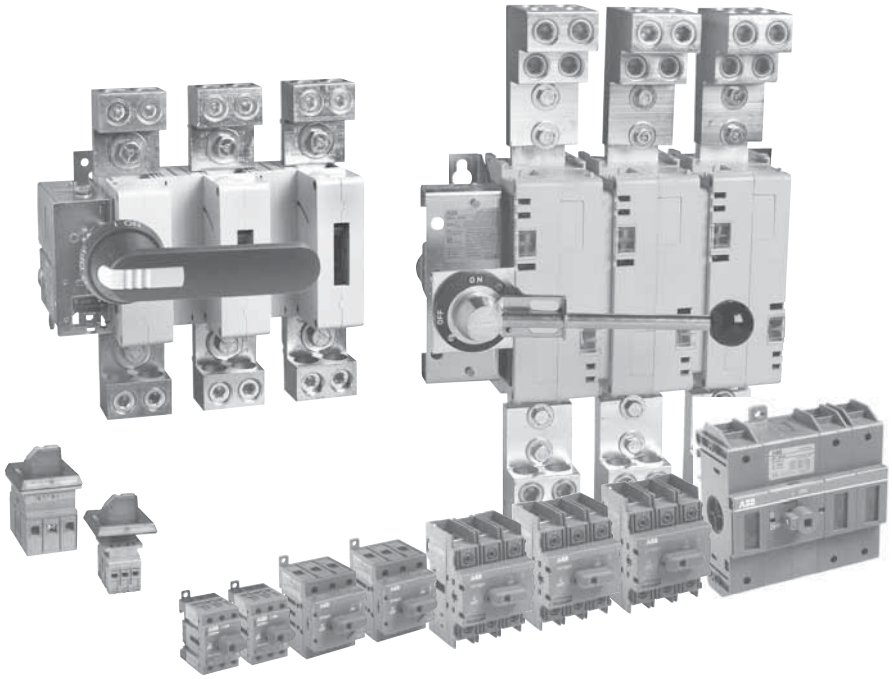
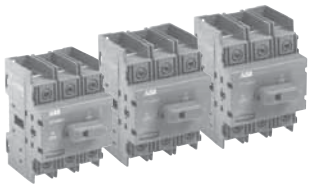


ABB SwitchLine includes 16 different amperage sizes from 16A to 3150A. The basic construction provides flexibility, safety, and high performance in an extremely compact size. ABB SwitchLine is a perfect choice for all switching applications from industrial motor control to construction safety switches.

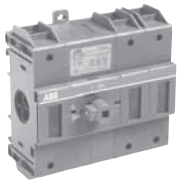
General information
Selection guide
OT16E3 – OT160E3

OT16E3 OT25E3 OT32E3

OT45E3 OT63E3



OT30E3 OT60E3 OT100E3



OT160E3

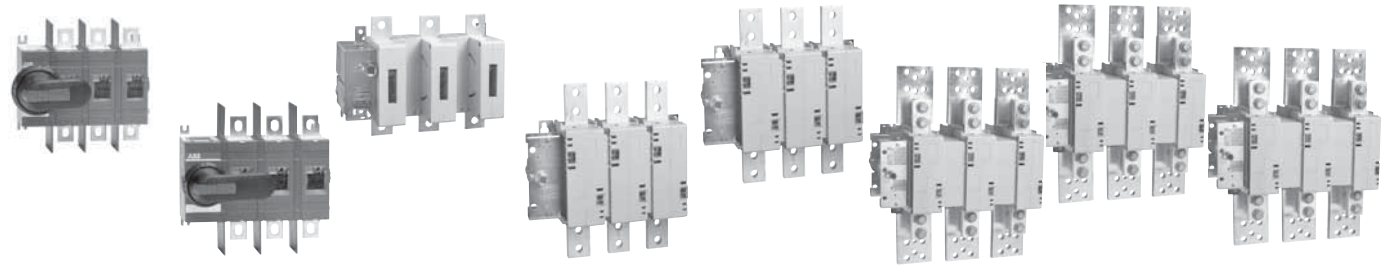
Catalog number	3 pole	OT16E3	OT25E3	OT32E3	OT45E3	OT63E3	OT30E3	OT60E3	OT100E3	OT160E3
General purpose amp rating	**A**	**16**	**25**	**40**	**60**	**80**	**30**	**60**	**100**	**125**
Catalog reference	Page #	18.10	18.10	18.10	18.10	18.10	18.10	18.10	18.10	18.20
Approvals ①										
	2 pole	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	UL98
	3 pole	UL508	UL508	UL508	UL508	UL508	UL98	UL98	UL98	UL98
	4 pole	UL508	UL508	UL508	UL508	UL508	UL98	UL98	UL98	UL98
Technical ratings – UL,CSA ②										
Max operating voltage	V	600	600	600	600	600	600	600	600	600
Max horsepower rating										
Three phase										
200 – 208V	HP	3	7.5	10	15	20	10	20	25	30
240V	HP	5	7.5	10	15	20	10	20	30	40
480V	HP	10	15	20	30	40	20	40	50	75
600V	HP	10	20	25	30	40	30	40	50	100
Single phase										
120V	HP	1	1.5	2	2	2	2	3	5	7.5
240V	HP	2	3	5	5	5	5	7.5	15	20
Technical ratings – IEC②										
Rated insulation and operational voltage. AC20 and DC20	V	750	750	750	750	750	750	750	750	750
Rated thermal current, I_{th}										
AC 20/DC 20 open	A	25	32	40	63	80	40	63	115	200
AC 20/DC 20 enclosed	A	25	32	40	63	80	40	63	115	160
AC 21A ≤500V	A	16	25	32	63	80	40	63	100	160
≤690V	A	16	25	32	63	80	40	63	100	160
Rated operational power AC23										
400/415V	kW	7.5	9	11	22	37	15	18.5	37	75
690V	kW	7.5	9	11	15	18.5	15	15	37	75
Physical characteristics										
Weight ③ 3 pole	lb	0.24	0.24	0.24	0.59	0.59	0.79	0.79	0.79	2.42
Dimension 3 pole H	in	2.68	2.68	2.68	3.60	3.60	3.94	3.94	3.94	5.00
W	in	1.38	1.38	1.38	2.07	2.07	2.76	2.76	2.76	4.96
D	in	2.20	2.20	2.20	2.85	2.85	2.95	2.95	2.95	2.93
Accessories										
Terminal lug kit		Integral	Integral	Integral	Integral	Integral	Integral	Integral	Integral	Integral
Terminal shroud		•	•	•	•	•	•	•	•	—
Auxiliary contact		•	•	•	•	•	•	•	•	•
Handle UL/NEMA type										
Type 1, 3R, 12		•	•	•	•	•	•	•	•	•
Type 1, 3R, 4, 4X, 12		•	•	•	•	•	•	•	•	•
Handle type										
Selector		•	•	•	•	•	•	•	•	—
Pistol		•	•	•	•	•	•	•	•	•
Conversion kits										
6 pole		•	•	•	•	•	•	•	•	•
Transfer		•	•	•	•	•	•	•	•	•
Bypass		•	•	•	•	•	•	•	•	•
Mechanical interlock		•	•	•	•	•	•	•	•	•
Electrical interlock		—	—	—	—	—	—	—	—	—

• = Available
— = Not available

UL listed, CSA approved, IEC rated, CE marked

① UL listed switches are also CSA approved.
② For complete technical information please see page 18.43 – 18.74.
③ Switch only.

General information
Selection guide
OT200 – OT400 & OETL-NF600A – OETL-NF3150



OT200U03 OT400U03 OETL-NF600ASW OETL-NF800ASW OETLNF1200SW OETL-NF1600SW OETL-NF2000SW OETL-NF3150SW

Catalog number	3 pole	OT200U03	OT400UO3	OETL-NF600A	OETL-NF800A	OETL-NF1200	OETL-NF1600	OETL-NF2000	OETL-NF3150
General purpose amp rating	**A**	**200**	**400**	**600**	**800**	**1200**	**1600**	**2000**	**3150**
Catalog reference	Page #	18.23	18.26	18.26	18.26	18.30	18.30	18.30	18.30
Approvals①									
	2 pole	UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC	IEC
	3 pole	UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC	IEC
	4 pole	IEC	UL98 & IEC	UL98 & IEC	IEC	IEC	IEC	IEC	IEC
Technical ratings – UL,CSA ②									
Max operating voltage	V	600	600	600	600	600	600	600	600
Max horsepower rating									
Three phase									
200 – 208V	HP	60	100	150	200	—	—	—	—
240V	HP	75	125	200	250	—	—	—	—
480V	HP	150	250	400	500	—	—	—	—
600V	HP	200	350	500	600	—	—	—	—
Single phase									
120V	HP	—	—	—	—	—	—	—	—
240V	HP	—	—	—	—	—	—	—	—
Technical ratings – IEC ②									
Rated insulation and operational voltage. AC20 and DC20	V	1000	1000	1000	1000	1000	1000	1000	1000
Rated thermal current, I_{th}									
AC 20/DC 20 open	A	250	400	800	1250	1600	2500	2500	3150
AC 20/DC 20 enclosed	A	250	400	720	1250	1600	2300	2300	2600
AC 21A ≤500V	A	250	400	800	1250	1600	2500④	2500④	3150④
≤690V	A	250	400	800	1250	1600	2500④	2500④	3150④
Rated operational power AC23									
400/415V	kW	132	220	355	400	400	400	400	400
690V	kW	240	355	355	—	—	—	—	—
Physical characteristics									
Weight ③ 3 pole	lb	2.9	5.7	13.66	35.9	38.55	127.7	127.7	127.7
Dimension 3 pole H	in	6.69	8.66	11.77	19.09	19.09	25.04	25.04	25.04
W	in	6.67	8.7	11.93	14.29	14.29	18.43	18.43	18.43
D	in	3.30	3.35	5.12	4.92	4.92	10.67	10.67	10.67
Accessories									
Terminal lug kit		OZXA-200	OZXA-400	OZXA-27	OZXA-30	OZXA-28	OZXA-28	OZXA-28/2	OZXA-28/2
Terminal shroud		•	•	•	•	•	—	—	—
Auxiliary contact		•	•	•	•	•	•	•	•
Handle UL/NEMA type									
Type 1, 3R, 12		•	•	•	•	•	•	•	•
Type 1, 3R, 4, 4X, 12		•	•	•	•	•	•	•	•
Handle type									
Selector		—	—	—	—	—	—	—	—
Pistol		•	•	•	•	•	•	•	•
Conversion kits									
6 pole		•	•	•	•	•	—	—	—
Transfer		•	•	•	•	•	—	—	—
Bypass		•	•	•	•	•	—	—	—
Mechanical interlock		•	•	•	•	•	•	•	•
Electrical interlock		•	•	•	•	•	•	•	•

S = Standard feature
• = Available
— = Not available

UL listed, CSA approved, IEC rated, CE marked

① UL listed switches are also CSA approved.
② For complete technical information please see page 18.43 – 18.74.
③ Switch only
④ IEC 947-3 Utilization Category B, Infrequent operation

General information

Versatility

ABB SwitchLine non-fusible disconnect switches are designed to offer maximum versatility in many ways.

Broad range

SwitchLine is seventeen amperage sizes from 16A – 3150A. All sizes are compact, heavy duty, 600V disconnect switches. Many sizes are available in 2, 3, 4, 6, and 8 pole configurations.

Compact size

The SwitchLine's compact dimensions allow panel size reduction in new applications or easily retrofit into space-sensitive existing installations.

International acceptance

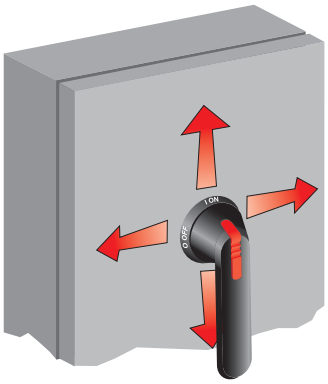
UL listed, CSA approved, IEC rated, CE marked, and most other international standards.

UL98 (CSA 22.2 No.4) — UL File # E101914, CSA File #LR58077
For OT30, OT60, OT100, OT160, OT200, OT400, OETL-NF600 – OETL-NF2000 switches, OH_ pistol grip handles
Suitable for use as motor disconnects or industrial control panel disconnects on service entrance equipment, panelboards, switchboards, industrial control equipment, motor control centers, etc. and are horsepower rated and ampere rated.

UL508 (CSA 22.2 No. 14) — UL File # E63822, CSA File #LR58247
For OT16 – OT63 switches, OH_ selector handles
Suitable for use in equipment or machinery as motor controllers & motor disconnects and are horsepower and ampere rated.

IEC
Tested in accordance to IEC 947-1 and 3, IEC 664, IEC 269, and IEC 204

CE
Compliance with the European Machine Directive IEC 204 (EN 60204)



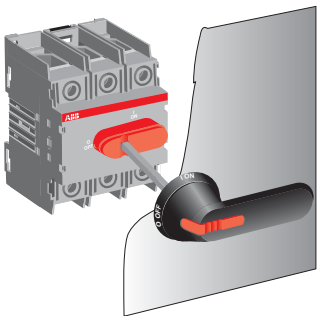
Installation options

Rotary through the door: available in all sizes, 16A – 3150A

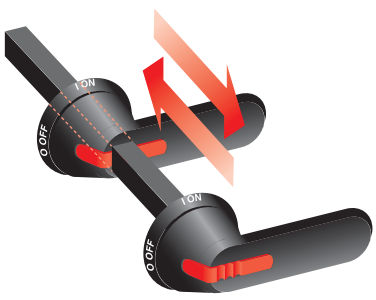
Flange: versions available in 30A, 60A, 100A, & 200A sizes

A rotary disconnect switch may be installed nearly anywhere in a control panel — mounting is not limited to the upper right hand corner of the panel.

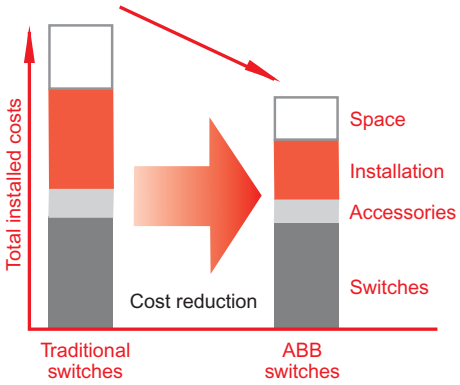
Mount the switch where it conveniently fits in your panel and simply install the handle on the door, in line with the switch. The switch and handle are mechanically linked through an easily adjusted shaft. This allows fast and easy installation into panels of different depths and layouts.



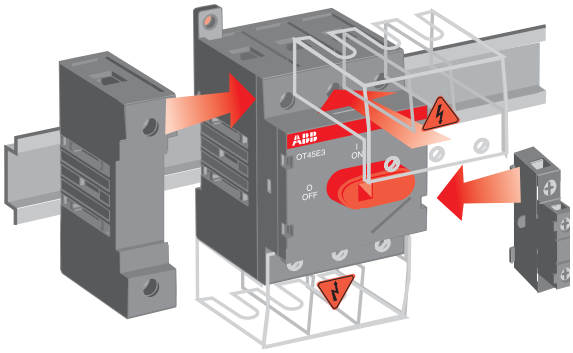
Rotary through the door installation



Easily adjusted shaft

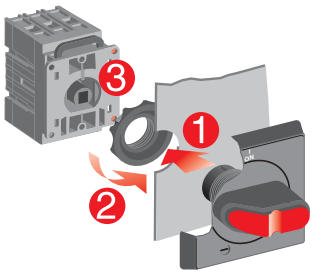


Lower installed costs



Broad range of accessories

- Handles — UL/NEMA type 1, 3R, 4, 4X, 12; IP54, 65, 66
- Auxiliary contacts available for every switch size
- Additional power poles
- Additional terminal poles (neutrals & grounds)
- Terminal shrouds
- 6 & 8 pole mechanisms
- Transfer mechanisms
- Bypass mechanisms
- Mechanical interlock mechanisms
- Electro-mechanical interlock mechanisms
- Motor operators

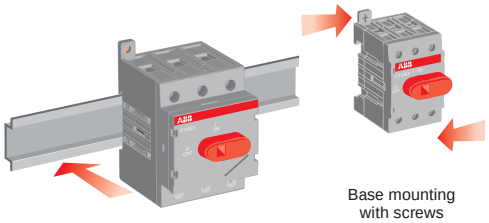


Door mounting

Mounting

SwitchLine disconnect switches offer several mounting possibilities:

- Door mounting on an enclosure door or sidewall, 16A – 125A
- DIN rail mounting, 16A – 125A
- Base mounting with screws, 16A – 3150A

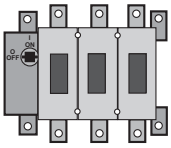


Base mounting with screws

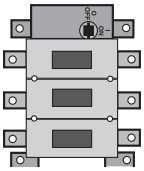
DIN rail mounting

Mounting positions

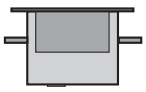
SwitchLine disconnect switches may be mounted in any position:



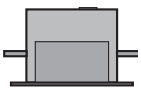
Vertical



Horizontal



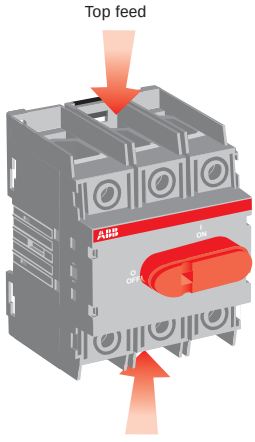
Ceiling

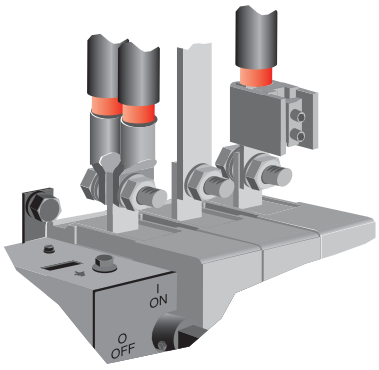


Floor

Incoming power feeds

SwitchLine disconnect switches can be used equally well with either top or bottom incoming power feeds.





Terminal connections

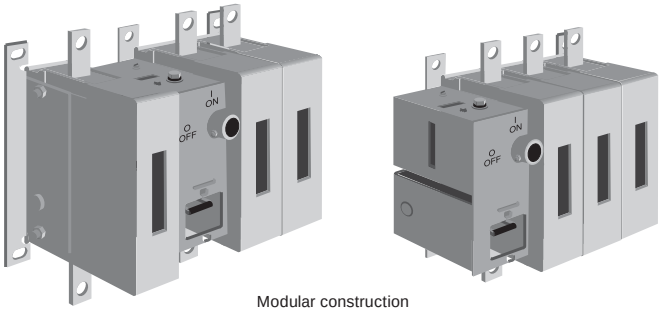
Versatile connecting possibilities, 200A – 3150A:

- Ring tongue crimp on lugs
- Direct bus
- Terminal lugs

General information

Modular construction ①

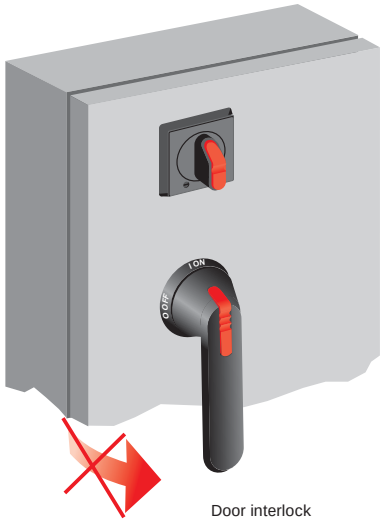
Modular switch construction allows the operating mechanism to be placed at either end of the switch or anywhere in-between, 125A – 3150A.



Modular construction

Finger proof

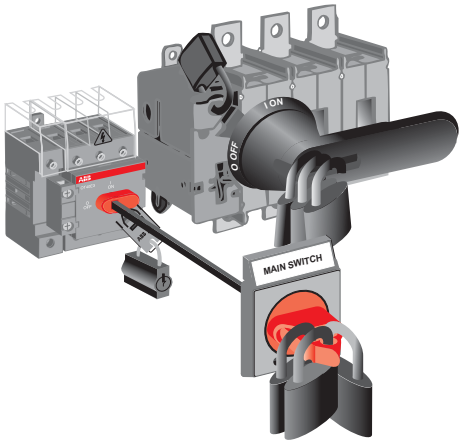
Dead-front construction plus terminal shrouds reduce the risk of touching live parts, improving the safety and reliability of the installation.



Door interlock

Door interlock

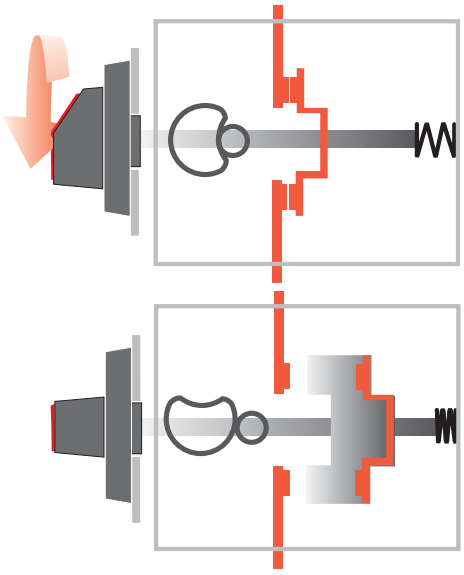
The handle and shaft provide a door interlock; the door can not be opened when the switch is in the “ON” position. NOTE: Some handles provide a method for qualified personnel to circumvent the door interlock. This is commonly referred to as a “defeater” mechanism.



Handle and mechanism padlocked OFF

Padlockable

Handles can be padlocked in the “OFF” position with up to three padlocks: Additionally, the switch mechanism can be directly padlocked in the “OFF” position when the door is open. NOTE: Some handles can be ordered with the ability to padlock in both the “ON” & “OFF” positions, please consult your ABB sales office.

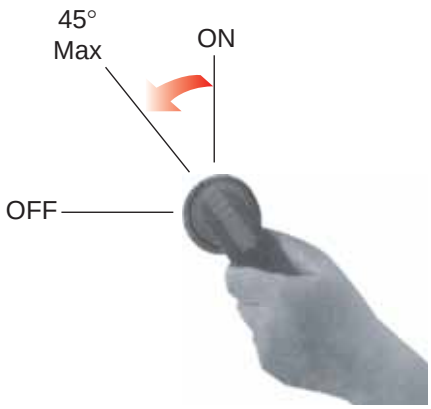


Positive opening operation

Positive opening operation

All switches operate according to the “positive opening operation” principle. This means the contacts are opened and closed by a driven mechanism, a solid moving bridge, not merely springs. This provides reliable position indication to the user; if the switch is in the “OFF” position, the contacts are open.

① Please consult ABB sales office for additional information.



Welded contact protection

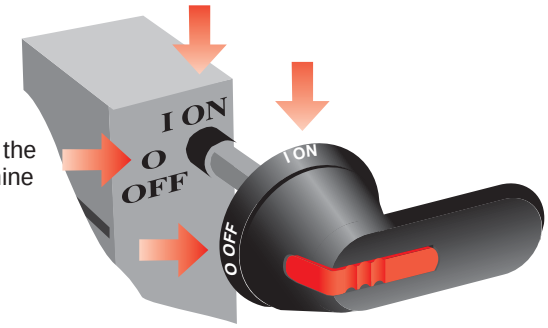
Positive opening operation safeguards users in case of welded contacts due to an overload or short circuit.

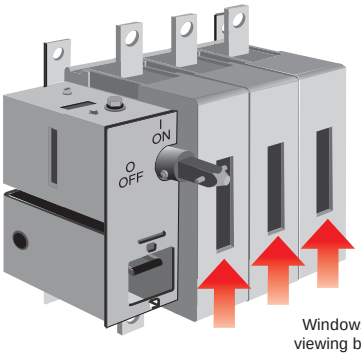
The switch can not reach the “OFF” position unless the contacts are truly open. If any or all of the contacts are welded shut, the switch mechanism will only allow the handle to operate a maximum of 45º. This safeguards personnel by:

- alerting them a problem has occurred
- maintaining the door interlock and
- not allowing a padlock to be inserted.

Clear position indication

All switches and handles have clear “ON” and “OFF” designations. Whether the door is open or closed, it is possible to simply look at the switch and determine if the switch is “ON” or “OFF”.





Windows for viewing blades

Visible blades

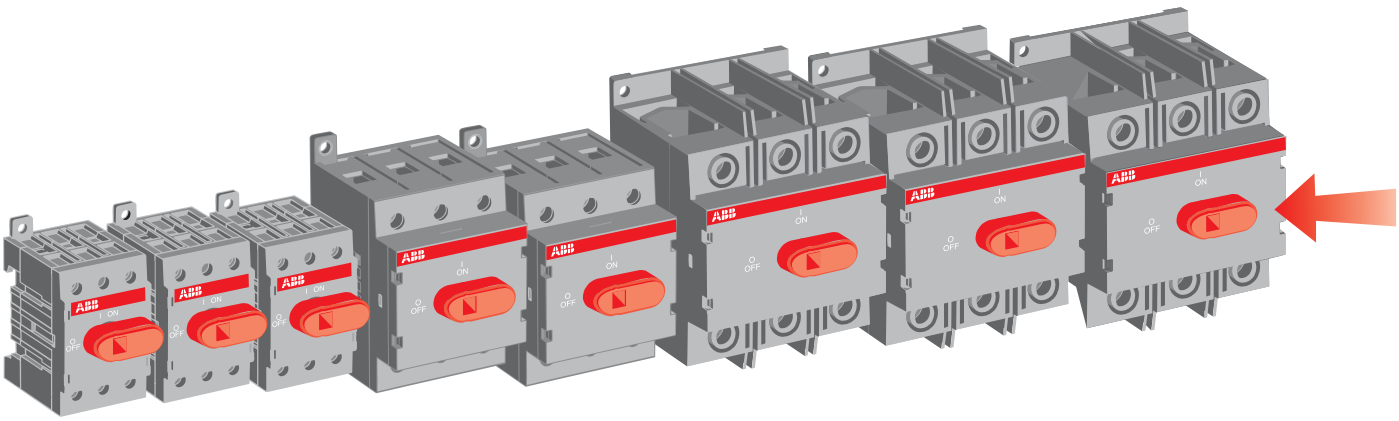
Visible blades offer additional safety from 125A — 1200A.

Track resistant material

Excellent track resistant material, CTI > 600V, IEC 112, reduces the risk of flashover between phases in even the most severe circumstances.

Constant control

The OT16E3 to OT100E3 provide the user with constant control over the power circuit. Whether the enclosure door is open or closed, qualified personnel have the ability to manually operate the switch. This is most meaningful when qualified personnel are working with the enclosure door open: In case of an emergency down-stream, the main three phase power can be disconnected immediately using the red, direct mounted handle.



Kits
16A – 3150A, 600V, 3 pole①

Each kit includes:
- 1 three pole① switch
- 1 handle
- 1 shaft
- 1 terminal lug kit

Kit

Kits with base & DIN rail mounted switches and selector handles

	UL general purpose amp rating	IEC AC21 amp rating	Maximum horsepower rating						Kit catalog number	List price
			Single phase		Three phase					
			120V	240V	200V – 208V	240V	480V	600V		
UL 508	16	16	1	2	3	5	10	10	OT16B2A1-180	**$ 100**
	25	25	1.5	3	7.5	7.5	15	20	OT25B2A1-180	**106**
	40	40	2	5	10	10	20	25	OT32B2A1-180	**110**
	60	63	2	5	15	15	30	30	OT45B2A1-180	**134**
	80	80	2	5	20	20	40	40	OT63B2A1-180	**154**
UL 98	30	40	2	5	10	10	20	30	OT30B2A1-180	**184**
	60	63	3	7.5	20	20	40	40	OT60B2A1-180	**209**
	100	115	5	15	25	30	50	50	OT100B2A1-180	**234**

Kits with base and/or DIN rail mounted switches and pistol handles

	UL general purpose amp rating	IEC AC21 amp rating	Maximum horsepower rating						Kit catalog number	List price
			Single phase		Three phase					
			120V	240V	200V – 208V	240V	480V	600V		
UL 508	16	16	1	2	3	5	10	10	OT16B6-170	**$ 162**
	25	25	1.5	3	7.5	7.5	15	20	OT25B6-170	**168**
	40	40	2	5	10	10	20	25	OT32B6-170	**172**
	60	63	2	5	15	15	30	30	OT45B6-170	**196**
	80	80	2	5	20	20	40	40	OT63B6-170	**216**
UL 98	30	40	2	5	10	10	20	30	OT30B6-170	**246**
	60	63	3	7.5	20	20	40	40	OT60B6-170	**271**
	100	115	5	15	25	30	50	50	OT100B6-170	**296**
	125	160	7.5	20	30	40	75	100	OT160B6-210	**516**
	200	250	—	—	60	75	150	200	OTK200B8-210	**796**
	400	630	—	—	100	125	250	350	OTK400B4-280	**1736**
	600	800	—	—	150	200	400	500	OT600B4-280	**2706**
	800	1250	—	—	200	250	500	600	OT800B4-280	**5066**
	1200	1600	—	—	—	—	—	—	OT1200B4-280	**7926**
	1600	2500	—	—	—	—	—	—	OT1600M8-325	**17,630**
	2000	2500	—	—	—	—	—	—	OT2000M8-325	**19,430**
	—	3150	—	—	—	—	—	—	OT3150M8-325	**21,130**

Kits with door mounted switches

	UL general purpose amp rating	IEC AC21 amp rating	Maximum horsepower rating						Kit catalog number	List price
			Single phase		Three phase					
			120V	240V	200V – 208V	240V	480V	600V		
UL 508	16	16	1	2	3	5	10	10	OT16ET3S	**$ 98**
	25	25	1.5	3	7.5	7.5	15	20	OT25ET3S	**104**
	40	40	2	5	10	10	20	25	OT32ET3S	**108**
	60	63	2	5	15	15	30	30	OT45ET3S	**132**
	80	80	2	5	20	20	40	40	OT63ET3S	**152**
UL 98	30	40	2	5	10	10	20	30	OT30ET3S	**182**
	60	63	3	7.5	20	20	40	40	OT60ET3S	**207**
	100	115	5	15	25	30	50	50	OT100ET3S	**232**
	30	40	2	5	10	10	20	30	OT30ET3P	**254**
	60	63	3	7.5	20	20	40	40	OT60ET3P	**279**
	100	115	5	15	25	30	50	50	OT100ET3P	**304**
	125	160	7.5	20	30	40	75	100	OT160ET3P	**640**

① Four poles are available — please reference accessories pages 18.12 & 18.21.
② Shaft is not required with door mounted switch, except OT160ET3.
③ 16A – 125A switches include standard integral terminal lugs.
④ Available as a kit using the standard base mount switch and a door mount bracket.

Discount schedule H1: NF, 16A – 100A
Discount schedule H2: NF, 125A – 800A
Discount schedule H3: NF, 1200A – 3150A

Kit components
16A – 3150A, 600V, 3 pole①

Each kit includes:
- 1 three pole ① switch
- 1 handle
- 1 shaft
- 1 terminal lug kit

Kit

Kit components ② for base & DIN rail mounted switches with selector handles

	Switch		Handle ④			Shaft			Terminal lugs		
Kit catalog number	Catalog number	NEMA type	Marking	De-feat-able	Catalog number	Mounting depth⑤ (inches)	Length (inches/mm)	Catalog number	Wire size	Wire type	Catalog number
OT16B2A1-180	OT16E3	1,3R,12	O/I & Off/On	—	OHB2AJ1	7.4 – 8.1	7.1/180	OXS5X180	#18 – 8	Cu	Integral
OT25B2A1-180	OT25E3	1,3R,12	O/I & Off/On	—	OHB2AJ1	7.4 – 8.1	7.1/180	OXS5X180	#18 – 8	Cu	Integral
OT32B2A1-180	OT32E3	1,3R,12	O/I & Off/On	—	OHB2AJ1	7.4 – 8.1	7.1/180	OXS5X180	#18 – 8	Cu	Integral
OT45B2A1-180	OT45E3	1,3R,12	O/I & Off/On	—	OHB2AJ1	8.1 – 8.7	7.1/180	OXS5X180	#14 – 1	Cu	Integral
OT63B2A1-180	OT63E3	1,3R,12	O/I & Off/On	—	OHB2AJ1	8.1 – 8.7	7.1/180	OXS5X180	#14 – 1	Cu	Integral
OT30B2A1-180	OT30E3	1,3R,12	O/I & Off/On	—	OHB2AJ1	7.6 – 8.6	7.1/180	OXS5X180	#14 – 4	Cu	Integral
OT60B2A1-180	OT60E3	1,3R,12	O/I & Off/On	—	OHB2AJ1	7.6 – 8.6	7.1/180	OXS5X180	#14 – 4	Cu	Integral
OT100B2A1-180	OT100E3	1,3R,12	O/I & Off/On	—	OHB2AJ1	7.6 – 8.6	7.1/180	OXS5X180	#8 – 1/0	Cu	Integral

Kit components ② for base and/or DIN rail mounted switches with pistol handles

	Switch		Handle ④			Shaft			Terminal lugs		
Kit catalog number	Catalog number	NEMA type	Marking	De-feat-able	Catalog number	Mounting depth⑤ (inches)	Length (inches/mm)	Catalog number	Wire size	Wire type	Catalog number
OT16B6-170	OT16E3	1,3R,12	O/I & Off/On	Yes	OHB65J5	7.0 – 7.5	6.7/170	OXP5X170	#18 – 8	Cu	Integral
OT25B6-170	OT25E3	1,3R,12	O/I & Off/On	Yes	OHB65J5	7.0 – 7.5	6.7/170	OXP5X170	#18 – 8	Cu	Integral
OT32B6-170	OT32E3	1,3R,12	O/I & Off/On	Yes	OHB65J5	7.0 – 7.5	6.7/170	OXP5X170	#18 – 8	Cu	Integral
OT45B6-170	OT45E3	1,3R,12	O/I & Off/On	Yes	OHB65J5	7.7 – 8.1	6.7/170	OXP5X170	#14 – 1	Cu	Integral
OT63B6-170	OT63E3	1,3R,12	O/I & Off/On	Yes	OHB65J5	7.7 – 8.1	6.7/170	OXP5X170	#14 – 1	Cu	Integral
OT30B6-170	OT30E3	1,3R,12	O/I & Off/On	Yes	OHB65J5	7.2 – 8.2	6.7/170	OXP5X170	#14 – 4	Cu	Integral
OT60B6-170	OT60E3	1,3R,12	O/I & Off/On	Yes	OHB65J5	7.2 – 8.2	6.7/170	OXP5X170	#14 – 4	Cu	Integral
OT100B6-170	OT100E3	1,3R,12	O/I & Off/On	Yes	OHB65J5	7.2 – 8.2	6.7/170	OXP5X170	#8 – 1/0	Cu	Integral
OT160B6-210	OT160E3	1,3R,12	O/I & Off/On	Yes	OHB65J6	7.3 – 8.5	8.3/210	OXP6X210	#8 – 1/0	Cu	Integral
OTK200B8-210	OT200U03	1,3R,12	O/I & Off/On	Yes	OHB80J6	7.4 – 9.6	8.3/210	OXP6X210	#4 – 300 kcmil	Cu/Al	OZXA-200
OTK400B4-280	OT400U03	1,3R,12	O/I & Off/On	Yes	OHB145J12	10.2 – 13.4	11.0/280	OXP12X280	#2 – 600 kcmil	Cu/Al	OZXA-400
OT600B4-280	OETL-NF600ASW	1,3R,12	O/I & Off/On	Yes	OHB145J12	10.2 – 14.5	11.0/280	OXP12X280	(2)#2 – 600 kcmil	Cu/Al	OZXA-27
OT800B4-280	OETL-NF800ASW	1,3R,12	O/I & Off/On	Yes	OHB145J12	11.6 – 15.3	11.0/280	OXP12X280	(2)#2 – 600 kcmil	Cu/Al	OZXA-30
OT1200B4-280	OETL-NF1200SW	1,3R,12	O/I & Off/On	Yes	OHB145J12	11.6 – 15.3	11.0/280	OXP12X280	(4)#2 – 600 kcmil	Cu/Al	OZXA-28
OT1600M8-325	OETL-NF1600SW	1,3R,4,4X,12	Off/On	—	YASDA-8	13.4 – 23.1	12.8/325	OXP12X325	(4)#2 – 600 kcmil	Cu/Al	OZXA-28
OT2000M8-325	OETL-NF2000SW	1,3R,4,4X,12	Off/On	—	YASDA-8	13.4 – 23.1	12.8/325	OXP12X325	(8)#2 – 600 kcmil	Cu/Al	OZXA-28/2
OT3150M8-325	OETL-NF3150SW	1,3R,4,4X,12	Off/On	—	YASDA-8	13.4 – 23.1	12.8/325	OXP12X325	(8)#2 – 600 kcmil	Cu/Al	OZXA-28/2

Kit components ② for door mounted switches

	Switch		Handle ④			Shaft			Terminal lugs		
Kit catalog number	Catalog number	NEMA type	Marking	De-feat-able	Catalog number	Mounting depth (inches)	Length (inches/mm)	Catalog number	Wire size	Wire type	Catalog number
OT16ET3S	OT16ET3	1,3R,12	O/I & Off/On	—	OHB2PJ	No shaft required			#18 – 8	Cu	Integral
OT25ET3S	OT25ET3	1,3R,12	O/I & Off/On	—	OHB2PJ	No shaft required			#18 – 8	Cu	Integral
OT32ET3S	OT32ET3	1,3R,12	O/I & Off/On	—	OHB2PJ	No shaft required			#18 – 8	Cu	Integral
OT45ET3S	OT45ET3	1,3R,12	O/I & Off/On	—	OHB2RJ	No shaft required			#14 – 1	Cu	Integral
OT63ET3S	OT63ET3	1,3R,12	O/I & Off/On	—	OHB2RJ	No shaft required			#14 – 1	Cu	Integral
OT30ET3S	OT30ET3	1,3R,12	O/I & Off/On	—	OHB2RJ	No shaft required			#14 – 4	Cu	Integral
OT60ET3S	OT60ET3	1,3R,12	O/I & Off/On	—	OHB2RJ	No shaft required			#14 – 4	Cu	Integral
OT100ET3S	OT100ET3	1,3R,12	O/I & Off/On	—	OHB2RJ	No shaft required			#8 – 1/0	Cu	Integral
OT30ET3P	OT30ET3	1,3R,12	O/I & Off/On	—	OHB65J5	Includes OHZX6 adapter			#14 – 4	Cu	Integral
OT60ET3P	OT60ET3	1,3R,12	O/I & Off/On	—	OHB65J5	Includes OHZX6 adapter			#14 – 4	Cu	Integral
OT100ET3P	OT100ET3	1,3R,12	O/I & Off/On	—	OHB65J5	Includes OHZX6 adapter			#8 – 1/0	Cu	Integral
OT160ET3P	OT160ET3	1,3R,12	Off/On	—	OHB65J6	—	5.2/130	OXP6X130	#8 – 1/0	Cu	Integral

If other handles or shafts are desired, please order from the individual component pages 18.10, 18.11, 18.20, 18.23, 18.27 and 18.31.

① Other pole configurations available; please see individual components.
② For more information please see individual components.
③ 16A – 125A switches include standard integral terminal lugs.
④ Handles are black and accept three padlocks. For other handles see individual components.
⑤ Mounting depth is the distance from the outside of door to the disconnect switch mounting plate. Shaft can be cut to desired length.
⑥ Consists of standard base mounted switch with door mount conversion bracket.

16A – 100A, Base & DIN rail mounted

For a complete assembly, please select one of each:

1 switch
1 handle
1 shaft


OT63E3

+


OXS5X180

+


OHB2AJ1


OT16E3
OT25E3
OT32E3


OT30E3
OT60E3
OT100E3


OHB1AH1


OHB3AH1


OHY2AJ


OXS5X__

16 – 100 Amp switches, 600V, 3 pole①

	UL general purpose amp rating	IEC AC21 amp rating	Maximum horsepower rating						Terminal lugs		Catalog number	List price
			Single phase		Three phase							
			120V	240V	200V	240V	480V	600V	Wire size	Wire type		
UL 508	16	16	1	2	3	5	10	10	#18 – 8	Cu	OT16E3	**$ 66**
	25	25	1.5	3	7.5	7.5	15	20	#18 – 8	Cu	OT25E3	**72**
	40	40	2	5	10	10	20	25	#18 – 8	Cu	OT32E3	**76**
	60	63	2	5	15	15	30	30	#14 – 1	Cu	OT45E3	**100**
	80	80	2	5	20	20	40	40	#14 – 1	Cu	OT63E3	**120**
UL 98	30	40	2	5	10	10	20	30	#14 – 4	Cu	OT30E3	**150**
	60	63	3	7.5	20	20	40	40	#14 – 4	Cu	OT60E3	**175**
	100	115	5	15	25	30	50	50	#8 – 1/0	Cu	OT100E3	**200**

Selector handles — for use with shafts ☐ .20 x .20" (☐ 5x5mm)

UL/NEMA type	IEC type	Color	Defeat-able	Padlock-able	Weight (lbs)	Catalog number	List price
A							
1	IP54	Black	—	—	0.09	OHB1AH1②	**$ 22**
1	IP54	Red/Yel	—	—	0.09	OHY1AH1②	**22**
1	IP54	Black	—	Yes	0.12	OHB3AH1②	**24**
1	IP54	Red/Yel	—	Yes	0.12	OHY3AH1②	**24**
1,3R,12	IP65	Black	—	Yes	0.16	OHB2AJ1	**28**
1,3R,12	IP65	Red/Yel	—	Yes	0.16	OHY2AJ1	**28**
1,3R,12	IP65	Black	Yes	Yes	0.16	OHB2AJ	**30**
1,3R,12	IP65	Red/Yel	Yes	Yes	0.16	OHY2AJ	**30**

Shafts — for use with OH selector handles ☐ .20 x .20" (☐ 5x5mm)

Shaft length inches/mm	Mounting depth③ in inches					Weight (lbs)	Catalog number	List price
	OT16E3 OT25E3 OT32E3		OT45E3 OT63E3		OT30E3 OT60E3 OT100E3			
	OH_1_ & OH_3_	OH_2_	OH_1_ & OH_3_	OH_2_	OH_2_			
3.3/85	4.2 – 5.0	3.6 – 4.3	4.9 – 5.6	4.4 – 5.0	3.9 – 4.9	0.04	OXS5X85	**$ 4**
4.1/105	5.0 – 5.8	4.4 – 5.1	5.7 – 6.4	5.1 – 5.8	4.7 – 5.7	0.04	OXS5X105	**4**
4.7/120	5.6 – 6.4	5.0 – 5.8	6.3 – 7.0	5.7 – 6.4	5.3 – 6.3	0.05	OXS5X120	**4**
5.1/130	6.0 – 6.7	5.4 – 6.1	6.7 – 7.4	6.1 – 6.8	5.6 – 6.7	0.05	OXS5X130	**6**
7.1/180	7.1 – 8.7	7.4 – 8.1	8.6 – 9.4	8.1 – 8.7	7.6 – 8.6	0.08	OXS5X180	**6**
9.8/250	10.7 – 11.5	10.1 – 10.8	11.4 – 12.1	10.9 – 11.5	10.4 – 11.4	0.10	OXS5X250	**12**
13/330	13.8 – 14.6	13.3 – 14.0	14.6 – 15.3	14.0 – 14.7	13.5 – 14.5	0.14	OXS5X330	**20**

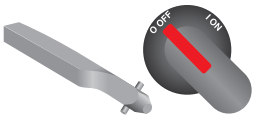
① A snap on fourth pole may be added — please reference accessories pg 18.12.
② Not suitable for use with OT30E3, OT60E3, OT100E3.
③ Mounting depth is the distance from the outside of door to the disconnect switch mounting plate. Shaft can be cut to desired length.

16A – 100A, Base & DIN rail mounted
Handles & shafts

OHB__J5
OHB__L5

OHY J5

OXP5X__



OXP5X__/45

CXBY68135

CXBY68306

CXBY68419/1

OTZS1

OHY7

Pistol handles — for use with shafts ☐ .20 x .20" (☐ 5 x 5 mm)

UL/NEMA type	IEC type	Color	Marking	Length inches/ mm	Defeatable	Padlockable	Weight (lbs.)	Catalog number	List price
1,3R,12	IP65	Black	O/I & Off/On	1.8/45	Yes	Yes	0.28	OHB45J5	**$ 70**
1,3R,12	IP65	Red/Yel	O/I & Off/On	1.8/45	Yes	Yes	0.28	OHY45J5	**70**
1,3R,12	IP65	Black	O/I & Off/On	2.6/65	Yes	Yes	0.29	OHB65J5	**80**
1,3R,12	IP65	Red/Yel	O/I & Off/On	2.6/65	Yes	Yes	0.29	OHY65J5	**80**
1,3R,12,4,4X	IP66	Black	O/I & Off/On	2.6/65	Yes	Yes	0.29	OHB65L5	**120**
1,3R,12,4,4X	IP66	Red/Yel	O/I & Off/On	2.6/65	Yes	Yes	0.29	OHY65L5	**120**

Shafts — for use with pistol handles ☐ .20 x .20" (☐ 5 x 5 mm)

Mounting depth① (inches)

Shaft length (inches/mm)	OT16E3 OT25E3 OT32E3	OT45E3 OT63E3	OT30E3 OT60E3 OT100E3	Weight (lbs.)	Catalog number	List price
5.9/150	6.2 – 6.7	6.9 – 7.4	6.4 – 7.4	0.07	OXP5X150	**$ 14**
6.7/170	7.0 – 7.5	7.7 – 8.1	7.2 – 8.1	0.08	OXP5X170	**16**
10.4/265	10.7 – 11.3	11.4 – 11.9	10.9 – 11.9	0.12	OXP5X265	**18**
15.8/400	16.0 – 16.6	16.8 – 17.2	16.2 – 17.2	0.18	OXP5X400	**30**
19.7/500	20.0 – 20.5	20.7 – 21.1	20.1 – 21.1	0.23	OXP5X500	**42**

Twisted shafts — Rotates handle 45° ☐ .20 x .20" (☐ 5 x 5 mm)

Mounting depth① (inches)

Shaft length (inches/mm)	OT16E3 OT25E3 OT32E3	OT45E3 OT63E3	OT30E3 OT60E3 OT100E3	Weight (lbs.)	Catalog number	List price
5.9/150	6.2 – 6.7	6.9 – 7.4	6.4 – 7.4	0.07	OXP5X150-45	**$ 14**
6.7/170	7.0 – 7.5	7.7 – 8.1	7.2 – 8.1	0.08	OXP5X170-45	**16**
10.4/265	10.7 – 11.3	11.4 – 11.9	10.9 – 11.9	0.12	OXP5X265-45	**18**
15.8/400	16.0 – 16.6	16.8 – 17.2	16.2 – 17.2	0.18	OXP5X400-45	**30**
19.7/500	20.0 – 20.5	20.7 – 21.1	20.1 – 21.1	0.23	OXP5X500-45	**42**

Replacement knob — mounts directly to switch; no shaft necessary

UL/NEMA Type	Color	For use on:	Length (inches)	Padlockable	Catalog number	List price
1	Red	OT16, OT25, OT32	1.0	—	CXBY68135	**$ 8**
1	Red	OT30, OT45 – OT100	1.4	—	CXBY68306	**12**
1	Red	OT30, OT45 – OT100	1.6	Yes ②	CXBY68419/1	**14**
Metal collar		OT16 – OT100	—	—	OTZS1	**13**
Set screw		OT16 – OT100	—	—	FLSWM5X8AY	**2** ③

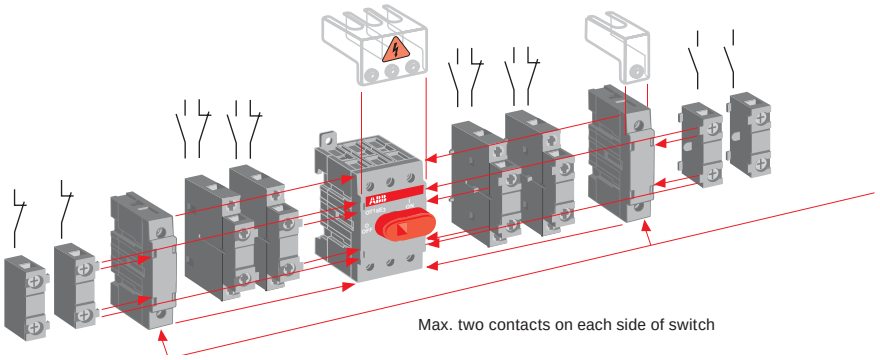
Modular adapter cover — for OT16, OT25, OT32

Item	For use	Length (inches)	Padlockable (inches)	Catalog number	List price
Adapter cover	OT16, OT25 OT32	—	Yes	OHY7	**$ 28**

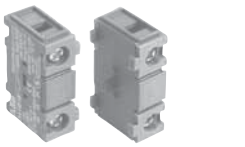
A padlock can be used with the adapter cover.

① Mounting depth is the distance from the outside of door to the disconnect switch mounting plate. Shaft can be cut to desired length.
② .1875" (3/16") diameter shackle required.
③ Set screw FLSWM5X8AY needed with replacement knobs CXBY__.

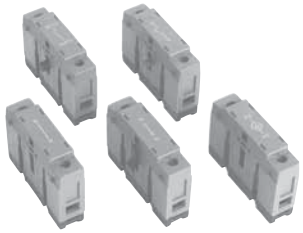
16A – 100A, Base & DIN rail mounted
Accessories



Max. two contacts on each side of switch



OA1G__



OTP_32EP

OTP_63EP

OTP_125EP

Auxiliary contacts ① — snap-on mounting

Description	For use on:	Weight (lbs.)	AC thermal amp rating	AC rated voltage	Catalog number	List price
1 N.O. mounts on right side of switch only	OT16 – OT100	0.07	10	600	OA1G10	**$ 20**
1 N.O. mounts on left side of switch only	OT16E3C – OT100E3C	0.07	10	600	OA7G10	**20**
1 N.C. mounts on left side of switch only	OT16 – OT100	0.07	10	600	OA1G01	**20**
1 N.C. mounts on right side of switch only	OT16E3C – OT100E3C	0.07	10	600	OA3G01	**20**
1 N.O. & 1 N.C. mounts on left or right side of switch	OT16 – OT100	0.07	10	600	OA2G11	**40**

Power poles

- **Only one power pole per switch**
- **Mounts on left or right side of switch**

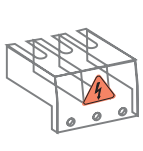
Description	For use on:	Weight (lbs.)	AC thermal amp rating	AC rated voltage	Catalog number	List price
Fourth pole ②	OT16, OT25, OT32	0.07	40	600	OTPS32EP	**$ 36**
	OT45, OT63	0.13	80	600	OTPS63EP	**44**
	OT30, OT60	0.31	60	600	OTPS60EP	**54**
	OT100	0.31	100	600	OTPS125EP	**54**
Late-break/early-make ②	OT16, OT25, OT32	0.07	40	600	OTPL32EP	**36**
	OT45, OT63	0.13	80	600	OTPL63EP	**44**
	OT30, OT60, OT100	0.31	100	600	OTPL125EP	**54**

Terminal poles

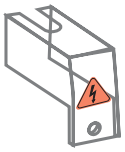
- **Switch accepts one terminal pole per side**
- **Mounts on left or right side of switch**

Description	For use on:	Weight (lbs.)	AC thermal amp rating	AC rated voltage	Catalog number	List price
Solid neutral ②	OT16, OT25, OT32	0.07	40	600	OTPN32EP	**$ 20**
	OT45, OT63	0.13	80	600	OTPN63EP	**36**
	OT30, OT60, OT100	0.31	100	600	OTPN125EP	**50**
Detachable neutral ②	OT16, OT25, OT32	0.07	40	600	OTPD32EP	**28**
	OT45, OT63	0.13	80	600	OTPD63EP	**36**
	OT30, OT60	0.31	60	600	OTPD60EP	**50**
	OT100	0.31	100	600	OTPD125EP	**54**
Ground terminal ②	OT16, OT25, OT32	0.07	40	600	OTPE32EP	**20**
	OT45, OT63	0.13	80	600	OTPE63EP	**36**
	OT30, OT60, OT100	0.31	100	600	OTPE125EP	**50**

① UL File # E83510
② Switch accepts one power pole or one terminal pole per side. Only one power pole per switch.



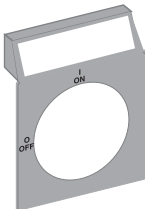
OTS32T3
OTS63T3
OTS125T3



OTS32T1
OTS63T1
OTS125T1

DS-SA1

STL-ST



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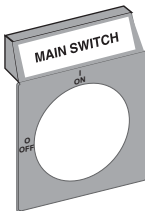

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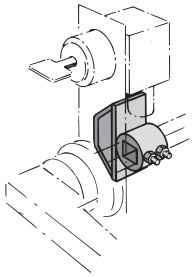
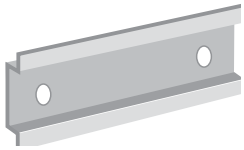


OETL-ZW16



DIN RAIL

Terminal shrouds ① — snap on mounting for line or load side

Description	For use on:	Weight (lbs.)		Catalog number	List price
3 pole includes one shroud for line or load side	OT16, OT25, OT32 OT45, OT63 OT30, OT60, OT100	0.02 0.02 0.02		OTS32T3 OTS63T3 OTS125T3	**$ 8** **12** **20**
4th pole includes one shroud for line or load side	OTP_32EP OTP_63EP OTP_125EP	0.02 0.02 0.02		OTS32T1 OTS63T1 OTS125T1	**4** **6** **10**

Padlocking adapter

Description	For use on:	Weight (lbs.)		Catalog number	List price
Adapter for one padlock with a max. 0.137" shackle	OT30, OT45 - OT100	0.02		DS-SA1	**$ 10**
Padlock for DS-SA1	OT30, OT45 - OT100	0.22		DS-SA2	**28**
Adapter and padlock	OT30, OT45 - OT100	0.24		DS-SA3	**38**

Labelling accessories

Description	For use on:		Package quantity	Catalog number	List price
1 Pkg. of label carriers 1 Pkg of blank description labels	OT30, OT45 – OT100		100 pieces 315 pieces	STL-ST ST-E	**$ 74** **12**

Legend plates for selector handles

Description	For use on:		Catalog number	List price
Blank plate				
Black	OH_1_ & OH_3_		OPB1	**$ 6**
Yellow	OH_1_ & OH_3_		OPY1	**6**
Black	OH_2_		OPB2	**8**
Yellow	OH_2_		OPY2	**8**
Plate marked with: MAIN SWITCH				
Black	OH_1_ & OH_3_		OPB1EN1	**10**
Yellow	OH_1_ & OH_3_		OPY1EN1	**10**
Black	OH_2_		OPB2EN1	**12**
Yellow	OH_2_		OPY2EN1	**12**

Locking accessories

Description	For use on:	Weight (lbs.)		Catalog number	List price
Cam attachment for Kirk Key, Castell, Lowe & Fletcher and Ronis interlock. For adapting to the interlock system. The interlock is not included.	5, 6 & 8mm shafts	0.29		OETL-ZW16	**$ 190**

DIN rail

Description	For use on:	Weight (lbs.)	Length inches/mm	Catalog number	List price
35mm DIN Rail	OT16 – OT100	2.96	39.4/1000	DIN RAIL	**$ 52**

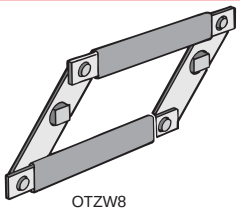
Shaft support

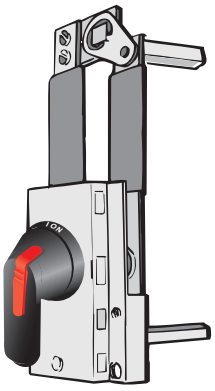
Description	For use on:	Weight (lbs.)		Catalog number	List price
Shaft support	OT16 – OT100	0.30		OETL-ZX58	**$ 14**

The shaft support is used for disconnects installed in deep enclosures.

① All disconnects are IP20 touch safe as standard. Terminal shrouds provide an additional level of protection.

16A – 100A, Base & DIN rail mounted
Accessories


OTZW8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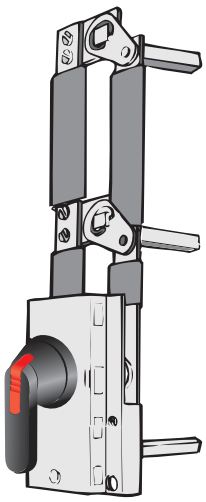
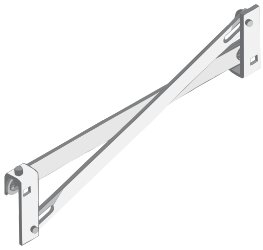

OTZW17


OETL-ZW24

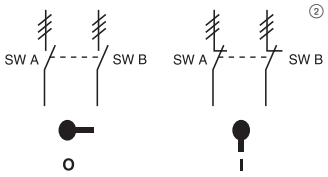
Conversion mechanisms

- **For use with Base and DIN rail mounted switches only**
- **Switches are not included**

Description	For use on:	Weight (lbs.)	UL/NEMA type	Catalog number	List price
6 or 8 pole	OT16 – OT100	0.33	—	OTZW8	**$ 60**
Transfer	OT16 – OT100	1.87	1,3R,12	OTZW6	**240**
Transfer	OT16 – OT100	1.87	1,3R, 4, 4X,12	OTZW6X	**280**
Bypass	OT16 – OT100	1.54	1,3R,12	OTZW17	**340**
Bypass	OT16 – OT100	1.54	1,3R, 4, 4X,12	OTZW17X	**380**
Mechanical interlock	OT16 – OT100	0.33	—	OETL-ZW24	**80**

6 or 8 pole — OTZW8

6 (8) pole mechanism allows two switches controlled by one handle to open or close simultaneously.
Equipment required for a complete installation:
- One conversion mechanism
- Two disconnect switches (see page 18.10)
- One handle① (see page 18.10 – 18.11)
- One shaft (see page 18.10 – 18.11)

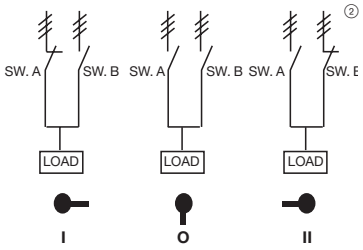


	POS. O	POS. I
SW. A	O	X
SW. B	O	X

X = Closed
O = Open

Transfer — OTZW6, OTZW6X

Transfer mechanism manually transfers between two power sources using two switches and a center OFF position.
A 3-position handle is included:
OHB80J6E011 (UL Type 1, 3R & 12) or
OHB80L6E011 (UL Type 1, 3R, 4, 4X, 12)
Shafts included. Equipment required for a complete installation:
- One conversion mechanism
- Two disconnect switches (see page 18.10.)

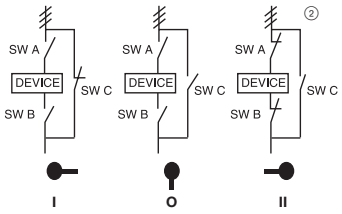


	POS. I	POS. O	POS. II
SW. A	X	O	O
SW. B	O	O	X

X = Closed
O = Open

Bypass — OTZW17, OTZW17X

Bypass mechanism operates three switches: Two switches in series and one changeover switch to allow power bypass.
A 3-position handle is included:
OHB80J6E011 (UL Type 1, 3R & 12) or
OHB80L6E011 (UL Type 1, 3R, 4, 4X, 12)
Shafts included.Equipment required for a complete installation:
- One conversion mechanism
- Three disconnect switches (see page 18.10.)

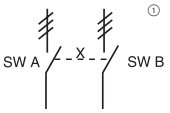


	POS. I	POS. O	POS. II
SW. A	O	O	X
SW. B	O	O	X
SW. C	X	O	O

X = Closed
O = Open

Mechanical interlock — OETL-ZW24

Mechanical interlock mechanism prevents both switches from being in the ON position at the same time.
Equipment required for a complete installation:
- One conversion mechanism
- Two disconnect switches (see page 18.10)
- Two handles (see page 18.10 – 18.11)
- Two shafts (see page 18.10 – 18.11)



	SW. A POS. I	SW. B POS. I
SW. A	X	O
SW. B	O	X

X = Closed
O = Open

Drawing and mounting information found on pg 18.69

① OT16E3 – OT32E3 can use a selector or pistol handle. All other sizes must use a pistol handle.

② = Three poles

16A – 100A, Base & DIN rail mounted
6 Pole switches

For a complete assembly, please select one of each:

1 switch
1 handle
1 shaft


OT45E6 +


OXP6X210 +


OHY_J6


OT45E6


OHB__J6


OHY__J6


OXP5X__

16 – 100 Amp switches, 600V, 6 pole ①

	UL general purpose amp rating	IEC AC21 amp rating	Maximum horsepower ratings: Single phase 120V	Single phase 240V	Three phase 200V	Three phase 240V	Three phase 480V	Three phase 600V	Terminal lugs: Wire size	Terminal lugs: Wire type	Shaft size (mm)	Catalog number	List price
UL 508	16	16	1	2	3	5	10	10				OT16E6	**$ 192**
	25	25	1.5	3	7.5	7.5	15	20	#18 – 8	Cu	5	OT25E6	**204**
	40	40	2	5	10	10	20	25				OT32E6	**212**
	60	63	2	5	15	15	30	30				OT45E6	**260**
	80	80	2	5	20	20	40	40	#14 – 1	Cu	6	OT63E6	**300**
UL 98	30	40	2	5	10	10	20	30	#14 – 4			OT30E6	**360**
	60	63	3	7.5	20	20	40	40	#14 – 4	Cu	6	OT60E6	**410**
	100	115	5	15	25	30	50	50	#8 – 1/0			OT100E6	**460**

Pistol handles — 5 & 6mm, for use with 6-pole switches

UL/NEMA type	IEC type	Color	Length in/mm	Marking	Defeat-able	Padlock-able	Weight (lbs)	Shaft size (mm)	Catalog number	List price
1, 3R, 12	IP65	Black Red/Yel	2.6/65	O/I & Off/On	Yes	Yes	0.29	5	OHB65J5 OHY65J5	**$ 80**
1, 3R, 4, 4X, 12	IP66	Black Red/Yel	2.6/65	O/I & Off/On	Yes	Yes	0.29	5	OHB65L5 OHY65L5	**120**
1, 3R, 12	IP65	Black Red/Yel Black Red/Yel	2.6/65 2.6/65 3.1/80 3.1/80	O/I & Off/On	Yes	Yes	0.29 0.29 0.30 0.30	6	OHB65J6 OHY65J6 OHB80J6 OHY80J6	**80** **80** **90** **90**
1, 3R, 4, 4X, 12	IP66	Black Red/Yel	3.1/80	O/I & Off/On	Yes	Yes	0.30	6	OHB80L6 OHY80L6	**130**

Shafts —5 & 6mm, for use with 6 pole switches

Shaft length (inches/mm)	Mounting depth② (inches): OT16E6 OT25E6 OT32E6	OT45E6 OT63E6	OT30E6 OT60E6 OT100E6	Weight (lbs)	Shaft size (mm)	Catalog number	List price
5mm— for use with OT16, OT25 & OT32							
5.9/160	7.2	—	—	0.07	5	OXP5X150	**$ 14**
6.7/170	8.0	—	—	0.08		OXP5X170	**16**
10.4/265	11.7	—	—	0.12		OXP5X265	**18**
15.8/400	17.0	—	—	0.18		OXP5X400	**30**
19.7/500	21.0	—	—	0.23		OXP5X500	**42**
6mm— for use with OT45, OT63, OT30E6, OT60E6 & OT100E6							
5.2/130	—	6.6	6.7	0.08	6	OXP6X130	**12**
5.9/150	—	7.4	7.5	0.09		OXP6X150	**12**
8.3/210	—	9.7	9.8	0.13		OXP6X210	**16**
11.4/290	—	12.9	13.0	0.18		OXP6X290	**20**
14.2/360	—	15.6	15.7	0.23		OXP6X360	**24**
16.9/430	—	18.4	18.5	0.27		OXP6X430	**28**

① A snap-on power pole may be added to build a 7 or 8 pole switch; please reference accessories, page 18.12.
② Mounting depth is the distance from the outside of door to the disconnect switch mounting surface. Shaft can be cut to desired length.

16A – 100A, Base & DIN rail mounted
3 Pole transfer switches

For a complete assembly, please select one of each:

1 switch
1 handle
1 shaft


OT45E3C

+


OXP5X170

+

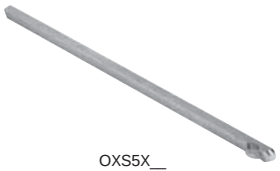

OHB_J5


OT45E3C


OHB2AJE011


OHB__J5


OHY__J5


OXS5X__

16 – 100 Amp – 600V, 3 Pole transfer switches ①

	UL general purpose amp rating	IEC AC21 amp rating	Maximum horsepower ratings: Single phase 120V	Single phase 240V	Three phase 200V	Three phase 240V	Three phase 480V	Three phase 600V	Terminal lugs: Wire size	Terminal lugs: Wire type	Shaft size (mm)	Catalog number	List price
UL 508	16	16	1	2	3	5	10	10	#18 – 8	Cu	5	OT16E3C	**$ 258**
	25	25	1.5	3	7.5	7.5	15	20				OT25E3C	**270**
	40	40	2	5	10	10	20	25				OT32E3C	**288**
	60	63	2	5	15	15	30	30	#14 – 1	Cu	5	OT45E3C	**328**
	80	80	2	5	20	20	40	40				OT63E3C	**368**
UL 98	30	40	2	5	10	10	20	30	#14 – 4			OT30E3C	**428**
	60	63	3	7.5	20	20	40	40	#14 – 4	Cu	5	OT60E3C	**478**
	100	115	5	15	25	30	50	50	#8 – 1/0			OT100E3C	**514**

Selector handles — 5mm, for use with transfer switches; marked I/ON - O/OFF - II/ON

UL/NEMA type	IEC type	Color	Defeatable	Padlockable	Weight (lbs.)	Catalog number	List price
1, 3R, 12	IP65	Black Red/Yel	Yes	Yes	0.16	OHB2AJE011② OHY2AJE011②	**$ 40**

Shafts for selector handles —5mm, for use with transfer switches

Shaft length (inches/mm)	Mounting depth② (inches): OT16E3C OT25E3C OT32E3C	OT45E3C OT63E3C	OT30E3C OT60E3C OT100E3C	Weight (lbs)	Shaft size (mm)	Catalog number	List price
3.3/85	3.6 - 4.3	4.4 - 5.0	3.9 - 4.9	0.04		OXS5X85	**$ 4**
4.1/105	4.4 - 5.1	5.1 - 5.8	4.7 - 5.7	0.04		OXS5X105	**4**
4.7/120	5.0 - 5.8	5.7 - 6.4	5.3 - 6.3	0.05		OXS5X120	**4**
5.1/150	5.4 - 6.1	6.1 - 6.8	5.6 - 6.7	0.05	5	OXS5X150	**6**
7.1/180	7.4 - 8.1	8.1 - 8.7	7.6 - 8.6	0.08		OXS5X180	**6**
9.8/250	10.1 - 10.8	10.9 - 11.5	10.4 - 11.4	0.1		OXS5X250	**12**
13/330	13.3 - 14.0	14.0 - 14.7	13.5 - 14.5	0.14		OXS5X330	**20**

Pistol handles — 5mm, for use with transfer switches; marked I/ON - O/OFF - II/ON

UL/NEMA type	IEC type	Color	Length in/mm	Defeat-able	Padlock-able	Weight (lbs)	Shaft size (mm)	Catalog number	List price
1, 3R, 12	IP65	Black Red/Yel	2.6/65	Yes	Yes	0.29	5	OHB65J5E011 OHY65J5E011	**$ 90**
1, 3R, 4, 4X, 12	IP66	Black Red/Yel	2.6/65	Yes	Yes	0.29	5	OHB65L5E011 OHY65L5E011	**130**

Shafts for pistol handles —5mm, for use with transfer switches

Shaft length (inches/mm)	Mounting depth② (inches): OT16E3 OT25E3 OT32E3	OT45E3 OT63E3	OT30E3 OT60E3 OT100E3	Weight (lbs)	Shaft size (mm)	Catalog number	List price
5.9/160	7.2	7.4	7.5	0.07		OXP5X150	**$ 14**
6.7/170	8.0	8.2	8.3	0.08		OXP5X170	**16**
10.4/265	11.7	11.9	12.0	0.12	5	OXP5X265	**18**
15.8/400	17.0	17.2	17.3	0.18		OXP5X400	**30**
19.7/500	21.0	21.2	21.3	0.23		OXP5X500	**42**

① A snap on power pole may be added to build a 4 pole transfer switch; please reference accessories and auxiliary contact information on page 18.12.
② Not suitable for use with OT30E3C, OT60E3C, OT100E3C.
③ Mounting depth is the distance from the outside of door to the disconnect switch mounting plate. Shaft can be cut to desired length.

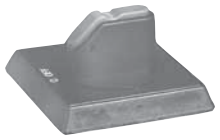
16A – 100A, Door mounted

For a complete assembly, please order one of each:

1 switch

1 handle

OT45ET3



OHB2RJ

OT16ET3
OT25ET3
OT32ET3

OHY1__

OHB3__

OHB2__

OHY2__

16 – 100 Amp switches, 600V, 3 pole①②

	UL general purpose amp rating	IEC AC21 amp rating	Maximum horsepower rating: Single phase 120V	Single phase 240V	Three phase 200V	Three phase 240V	Three phase 480V	Three phase 600V	Terminal lugs: Wire size	Terminal lugs: Wire type	Catalog number	List price
UL 508	16	16	1	2	3	5	10	10	#18 – 8	Cu	OT16ET3	**$ 70**
UL 508	25	25	1.5	3	7.5	7.5	15	20	#18 – 8	Cu	OT25ET3	**76**
UL 508	40	40	2	5	10	10	20	25	#18 – 8	Cu	OT32ET3	**80**
UL 508	60	63	2	5	15	15	30	30	#14 – 1	Cu	OT45ET3	**104**
UL 508	80	80	2	5	20	20	40	40	#14 – 1	Cu	OT63ET3	**124**
UL 98	30	40	2	5	10	10	20	30	#14 – 4	Cu	OT30ET3	**154**
UL 98	60	63	3	7.5	20	20	40	40	#14 – 4	Cu	OT60ET3	**179**
UL 98	100	115	5	15	25	30	50	50	#8 – 1/0	Cu	OT100ET3	**204**

Selector handles

UL/NEMA type	IEC type	Color	Defeat-able	Padlock-able	Weight (lbs)	Catalog number	List price
All marked both O/I & Off/On							
Snap-on mounting — for use on OT16, 25, 32ET3							
1	IP54	Black	—	—	0.10	OHB1PH	**$ 22**
1	IP54	Red/Yel	—	—	0.10	OHY1PH	**22**
1	IP54	Black	—	Yes	0.13	OHB3PH	**24**
1	IP54	Red/Yel	—	Yes	0.13	OHY3PH	**24**
1,3R,12	IP65	Black	—	Yes	0.17	OHB2PJ	**28**
1,3R,12	IP65	Red/Yel	—	Yes	0.17	OHY2PJ	**28**
Screw mounting — for use on OT16 – OT100. For OT30, OT60, OT100 use OH_2_ only							
1	IP54	Black	—	—	0.11	OHB1RH	**22**
1	IP54	Red/Yel	—	—	0.11	OHY1RH	**22**
1	IP54	Black	—	Yes	0.14	OHB3RH	**24**
1	IP54	Red/Yel	—	Yes	0.14	OHY3RH	**24**
1,3R,12	IP65	Black	—	Yes	0.18	OHB2RJ	**28**
1,3R,12	IP65	Red/Yel	—	Yes	0.18	OHY2RJ	**28**

Door mounted switches do not provide door interlock

Pistol grip handle adapter

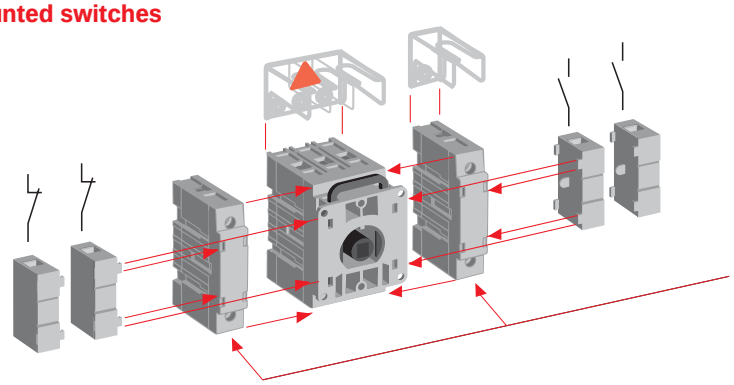
Description	For use on:	Weight (lbs)	Catalog number	List price
Adapter piece for pistol grip handle	OT30, OT60, OT100	0.18	OHZX6	**$ 20**

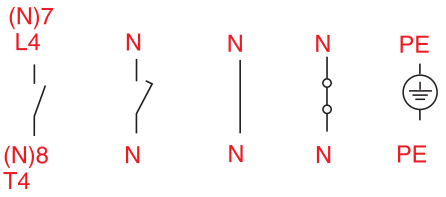
Includes hardware and a shaft. For pistol grip handles.

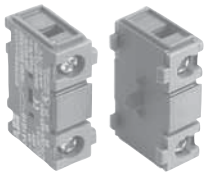
① A snap on fourth pole may be added — please reference accessories pg 18.18.
② Door mounted switches do not require shafts.

16A – 100A, Door mounted
Accessories

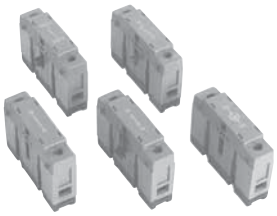
Door mounted switches



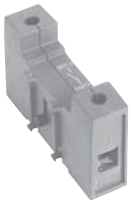




OA1G__



OTP_32ED



OTP_63ED

Auxiliary contacts ① — snap-on mounting

Description	For use on:	Weight (lbs)	AC thermal amp rating	AC rated voltage	Catalog number	List price
1 N.O. mounts on righthand side of switch	OT16 – OT100	0.07	10	600	OA1G10	**$ 20**
1 N.C. mounts on lefthand side of switch		0.07	10	600	OA1G01	**20**

Max. two contacts on each side of switch.

Power poles

- **Only one power pole per switch**
- **Mounts on left or right side of switch**

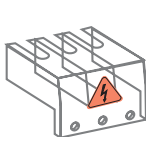
Description	For use on:	Weight (lbs)	AC thermal amp rating	AC rated voltage	Catalog number	List price
Fourth pole②	OT16, OT25, OT32	0.07	40	600	OTPS32ED	**$ 36**
	OT45, OT63	0.13	80	600	OTPS63ED	**44**
	OT30, OT60, OT100	0.20	100	600	OTPS125ED	**54**
Late-break/early-make②	OT16, OT25, OT32	0.07	40	600	OTPL32ED	**36**
	OT45, OT63	0.13	80	600	OTPL63ED	**44**
	OT30, OT60, OT100	0.20	100	600	OTPL125ED	**54**

Terminal poles

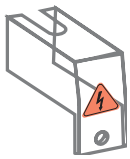
- **Switch accepts one terminal pole per side**
- **Mounts on left or right side of switch**

Description	For use on:	Weight (lbs)	AC thermal amp rating	AC rated voltage	Catalog number	List price
Solid neutral ②	OT16, OT25, OT32	0.07	40	600	OTPN32ED	**$ 20**
	OT45, OT63	0.13	80	600	OTPN63ED	**36**
	OT30, OT60, OT100	0.20	100	600	OTPN125ED	**50**
Detachable neutral ②	OT16, OT25, OT32	0.07	40	600	OTPD32ED	**28**
	OT45, OT63	0.13	80	600	OTPD63ED	**36**
	OT30, OT60, OT100	0.20	100	600	OTPD125ED	**50**
Ground terminal ②	OT16, OT25, OT32	0.07	40	600	OTPE32ED	**20**
	OT45, OT63	0.13	80	600	OTPE63ED	**36**
	OT30, OT60, OT100	0.20	100	600	OTPE125ED	**50**

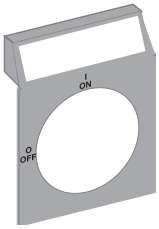
① UL File # E83510
② Switch accepts one power pole or one terminal pole per side. Only one power pole per switch.



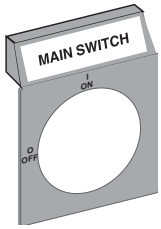
OTS32T3
OTS63T3
OTS125T3



OTS32T1
OTS63T1
OTS125T1



OP_



OP_EN1

CXBY68140

Terminal shrouds* — snap-on mounting for line or load side

Description	For use on:	Weight (lbs)		Catalog number	List price
3 pole	OT16, OT25, OT32	0.02		OTS32T3	**$ 8**
includes one shroud	OT45, OT63	0.02		OTS63T3	**12**
for line or load side	OT30, OT60, OT100	0.02		OTS125T3	**20**
4th pole	OTP_32ED	0.02		OTS32T1	**4**
includes one shroud	OTP_63ED	0.02		OTS63T1	**6**
for line or load side	OTP_125ED	0.02		OTS125T1	**10**

All disconnects are IP20 touch safe as standard. Terminal shrouds provide an additional level of protection.

Legend plates for selector handles

Description	For use on:		Catalog number	List price
Blank plate				
Black	OH_1_ & OH_3_		OPB1	**$ 6**
Yellow	OH_1_ & OH_3_		OPY1	**6**
Black	OH_2_		OPB2	**8**
Yellow	OH_2_		OPY2	**8**
Plate marked with: MAIN SWITCH				
Black	OH_1_ & OH_3_		OPB1EN1	**10**
Yellow	OH_1_ & OH_3_		OPY1EN1	**10**
Black	OH_2_		OPB2EN1	**12**
Yellow	OH_2_		OPY2EN1	**12**

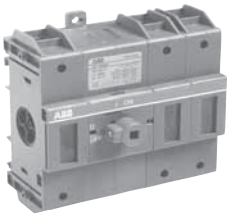
Locking clip (replacement part)

Description	For use on:		Catalog number	List price
Door mounted switch handle locking clip	OT16, OT25, OT32		CXBY68140	**$ 11**

125A

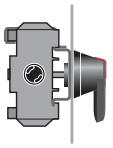
For a complete assembly, please select one of each:

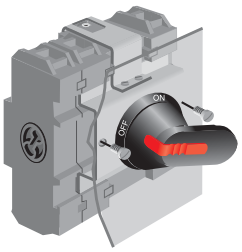
1 switch
1 handle
1 shaft


OT160E3


OXP6X210


OHB65J6

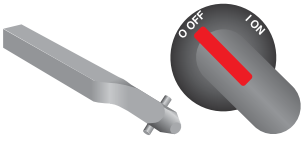



OT160ET3


OHB__J6


OHY__J6


OXP6X__


OXP6X__/45

125 Amp Base & DIN rail mounted switches①, 600V

UL general purpose amp rating	IEC AC21 amp rating	Maximum horsepower rating – Three phase 200V	208V	240V	480V	600V	Terminal lugs – Wire size	Wire type	Catalog number	List price
2 pole 125	160	—	—	—	—	—	#8 – 1/0	Cu	**2 pole** OT160E2	**$ 380**
3 pole 125	160	30	30	40	75	100	#8 – 1/0	Cu	**3 pole** OT160E3	**420**

125 Amp Door mounted switch①, 600V, 3 pole

UL general purpose amp rating	IEC AC21 amp rating	Maximum horsepower rating – Three phase 200V	208V	240V	480V	600V	Terminal lugs – Wire size	Wire type	Catalog number	List price
125	160	30	30	30	75	100	#8 – 1/0	Cu	OT160ET3	**$ 548**

Pistol handles — for use with ☐ .24 x .24" (☐ 6 x 6 mm)

UL/NEMA type	IEC type	Color	Length in/mm	Marking	Defeatable	Padlockable	Weight (lbs)	Catalog number	List price
1, 3R, 12	IP65	Black	2.6/65	O/I & Off/On	Yes	Yes	0.29	OHB65J6	**$ 80**
1, 3R, 12	IP65	Red/Yel	2.6/65	O/I & Off/On	Yes	Yes	0.29	OHY65J6	**80**
1, 3R, 12	IP65	Black	3.1/80	O/I & Off/On	Yes	Yes	0.30	OHB80J6	**90**
1, 3R, 12	IP65	Red/Yel	3.1/80	O/I & Off/On	Yes	Yes	0.30	OHY80J6	**90**
1, 3R, 4, 4X, 12	IP66	Black	3.1/80	O/I & Off/On	Yes	Yes	0.30	OHB80L6	**130**
1, 3R, 4, 4X, 12	IP66	Red/Yel	3.1/80	O/I & Off/On	Yes	Yes	0.30	OHY80L6	**130**

Shafts — for use with pistol handles ☐ .24 x .24" (☐ 6 x 6 mm)

Shaft length inches/mm	H	Mounting depth ② in inches	Weight (lbs)	Catalog number	List price
5.2/130		4.3 – 6.0	0.08	OXP6X130	**$ 12**
5.9/150		5.0 – 6.7	0.09	OXP6X150	**12**
8.3/210		7.4 – 9.1	0.13	OXP6X210	**16**
11.4/290		10.5 – 12.2	0.18	OXP6X290	**20**
14.2/360		13.3 – 15.0	0.23	OXP6X360	**24**
16.9/430		16.0 – 17.8	0.27	OXP6X430	**28**

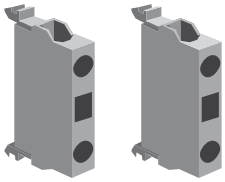
Twisted shafts — Rotates handle 45° ☐ .24 x .24" (☐ 6 x 6 mm)

Shaft length inches/mm	H	Mounting depth ② in inches	Weight (lbs)	Catalog number	List price
5.2/130		4.3 – 6.0	0.08	OXP6X130-45	**$ 12**
8.3/210		7.4 – 9.1	0.13	OXP6X210-45	**16**
11.4/290		10.5 – 12.2	0.18	OXP6X290-45	**20**
14.2/360		13.3 – 15.0	0.23	OXP6X360-45	**24**

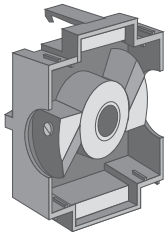
Direct mount handle

Item	Weight (lbs)	Catalog number	Lis price
Mounts directly on switch. No shaft necessary.	0.05	OHB13	**$ 22**

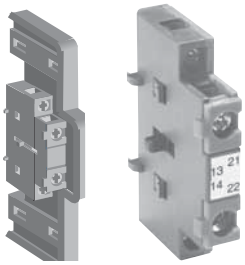
① A snap on fourth pole may be added – please reference accessories page 18.21.
② Mounting depth is the distance from the outside of the door to the disconnect switch mounting plate. Shaft can be cut to desired length.



OBEA-10 OBEA-01

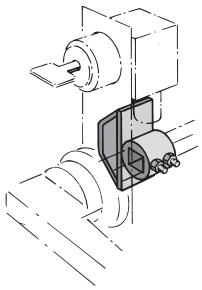


OEZNP1

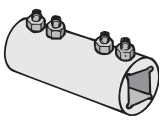


OAZX1 OA2G11

OTP_160EP



OETL-ZW16



OETL-ZX167
OETL-ZX95

Auxiliary contacts, top mounted

- Accepts four contacts maximum, mounting base always required

Description	For use with:	Weight (lbs)	AC thermal amp rating	AC rated voltage	Catalog number	List price
1 N.O. 1 N.C.	OEZNP1 OT160	0.07	10 10	600 600	OBEA-10 OBEA-01	**$ 28** **28**
1 N.O. gold plated① 1 N.C. gold plated①	OEZNP1 OT160	0.07	10 10	600 600	OBEA-10AU OBEA-01AU	**56** **56**
Mounting base – required for OBEA_	OBEA__	0.06	—	—	OEZNP1	**20**

Auxiliary contacts, side mounted

- Accepts four contacts maximum

Description	For use on:	Weight (lbs)	AC thermal amp rating	AC rated voltage	Catalog number	List price
1 N.O. & 1 N.C. Mounting base – required for OA2G11	OT160 OT160	0.07 0.06	10 —	600 —	OA2G11 OAZX1	**$ 40** **20**

Max. two contacts on each side of switch. One mounting base required for each side of switch

Numbering stickers ②

Description	For use on:	Package qty.		Catalog number	List price
1 Pkg. of blank labels for OBEA-10, 1 N.O.	OT160	10		OBEA-ZX10	**$ 32**
1 Pkg. of blank labels for OBEA-01, 1 N.C.	OT160	10		OBEA-ZX01	**32**

Power pole — for use with base or door mounted switch

- Only one power pole per switch
- Mounts on left or right side of switch

Description	For use on:	Weight (lbs)	AC thermal amp rating	AC rated voltage	Catalog number	List price
Fourth pole	OT160	0.66	125	600	OTPS160EP	**$ 100**

Terminal poles — for use with base or door mounted switch

- Switch accepts one terminal pole per side
- Mounts on left or right side of switch

Description	For use on:	Weight (lbs)	AC thermal amp rating	AC rated voltage	Catalog number	List price
Detachable neutral mounts on side of switch or DIN rail	OT160	0.66	125	600	OTPN160EP	**$ 100**
Ground terminal	OT160	0.66	125	600	OTPE160EP	**100**

Locking accessories

Description	For use on:	Weight (lbs)		Catalog number	List price
Cam attachment for Kirk Key, Castell, Lowe & Fletcher and Ronis interlock. For adapting to the interlock system The interlock is not included.	5, 6 & 8mm shafts	0.29		OETL-ZW16	**$ 190**

Handle support bracket

Description	For use on:	Weight (lbs)		Catalog number	List price
Allows pistol handle to be directly mounted to switch behind the door	OT160	0.33		OHZX5	**$ 24**

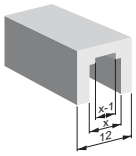
Shaft extension couplers

Description	For use on:	Weight (lbs)		Catalog number	List price
Joins two shafts together for applications where extended length is required	for 6mm shafts for 12mm shafts	0.26 0.26		OESA-ZX167 OETL-ZX95	**$ 56** **100**

① Type _AU for low energy applications. The contacts are gold-plated. AC & DC ratings — Maximum: A600 & P600. Minimum: 12V, 1mA; 5V, 2mA

② Required if several contact blocks are used in the same installation.

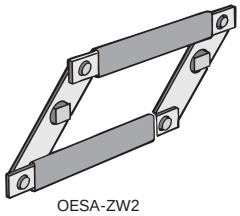
125A
Accessories



OETL-ZK19
(X = 6mm)

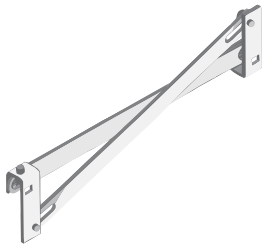
CXBY68005

OTZS2



OESA-ZW2

OESA-ZW1



OTZW10

Shaft adapter

Description	For use on:	Weight (lbs)		Catalog number	List price
Adapts one end of a 5 or 6mm shaft to 12mm Use with shaft extension coupler	5 & 6mm shafts	0.20		OETL-ZK19	**$ 40**

Power pole interlock (replacement part)

Description	For use on:	Weight (lbs)		Catalog number	List price
Interlocks a power pole with an adjacent power pole	OT160	0.05		CXBY68005	**$ 12**

Replacement collar (optional replacement for knob)

Description	For use on:	Weight (lbs)		Catalog number	List price
Red knob (like original) for locking shaft in place ** re-use original set screw **	OT160	0.05		CXBY68100	**$ 2**
Metal collar replaces original red knob for locking shaft in place ** re-use original set screw **	OT160	0.05		OTZS2	**13**

Conversion mechanisms

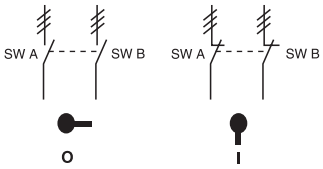
- **For use with Base and Din rail mounted switches only**
- **Switches are not included**

Description	For use on:	Weight (lbs.)	UL/NEMA type	Catalog number	List price
6 or 8 pole	OT160	1.52	—	OESA-ZW2	**$ 220**
Transfer		2.20	Type 1,3R,12	OESA-ZW1	**300**
Transfer		2.20	Type 1,3R,4,4X,12	OESA-ZW1X	**340**
Mechanical interlock		0.55	—	OTZW10	**100**

6 or 8 pole — OESA-ZW2

6 (8) pole mechanism allows two switches controlled by one handle, to open or close simultaneously.
Equipment required for a complete installation:

- Includes OHB145J12 handle
- One conversion mechanism
- Two disconnect switches
- Two shafts (see page 18.20)



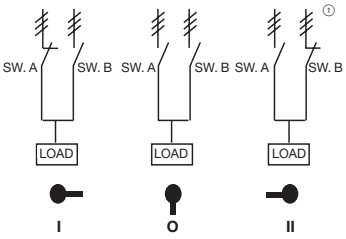
	POS. O	POS. I
SW. A	O	X
SW. B	O	X

X = Closed
O = Open

Transfer — OESA-ZW1

Transfer mechanism manually transfers between two power sources using two switches and a center OFF position.
A 3 position handle is included.
OHB80J6E011 (UL Type 1, 3R & 12) or OHB80L6E011 (UL Type 1, 3R, 4, 4X, 12) Shafts included. Equipment required for a complete installation:

- One conversion mechanism
- Two disconnect switches (see page 18.20)



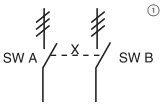
	POS. I	POS. O	POS. II
SW. A	X	O	O
SW. B	O	O	X

X = Closed
O = Open

Mechanical interlock — OTZW10

Mechanical interlock mechanism prevents both switches from being in the ON position at the same time.
Equipment required for a complete installation:

- One conversion mechanism
- Two disconnect switches (see page 18.20)
- Two handles (see page 18.20)
- Two shafts (see page 18.20)



	SW. A POS. I	SW. B POS. I
SW. A	X	O
SW. B	O	X

X = Closed
O = Open

Drawing and mounting information found on pg 18.70

① = Three poles

For a complete assembly, please select one of each:

- 1 switch
- 1 handle
- 1 shaft
- 1 terminal lug kit


OT200U03 +


OXP6X210 +

OHB80J6 +

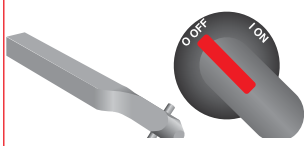

OZXA-200


OT200U03

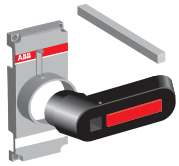
OHB__J6

OHY__J6


OXP6X__



OXP6X360-45


OTV250EK

200 Amp switches, 600V

UL general purpose amp rating	IEC AC21 Amp rating	Maximum horsepower rating, Three phase 200V	208V	240V	480V	600V	Catalog number	List price
2 pole 200	250	—	—	—	—	—	OT200U02 OT200U11	**$ 560**
3 pole 200		60	60	75	150	200	OT200U03 OT200U12	**620**
4 pole 200							OT200U04 OT200U13 OT200U22	**780**

Pistol handles — for use with shafts ☐ .24 x .24" (☐ 6 x 6mm)

UL/NEMA type	IEC type	Color	Length mm	Marking	Defeat-able	Padlock-able	Weight (lbs)	Catalog number	List price
1,3R,12 1,3R,12	IP65 IP65	Black Red/Yel	3.1/80 3.1/80	O/I & Off/On O/I & Off/On	Yes Yes	Yes Yes	0.30 0.30	OHB80J6 OHY80J6	**$ 90**
1,3R,4,4X,12 1,3R,4,4X,12	IP66 IP66	Black Red/Yel	3.1/80 3.1/80	O/I & Off/On O/I & Off/On	Yes Yes	Yes Yes	0.30 0.30	OHB80L6 OHY80L6	**130**

Shafts for use with pistol grip handles ☐ .24 x .24" (☐ 6 x 6mm)

Length in / mm	Mounting depth ① in inches OT200U	Weight lbs	Catalog number	List price
5.1 / 130	4.3 - 6.5	0.08	OXP6X130	**$ 12**
5.9 / 150	5.0 - 7.2	0.10	OXP6X150	**12**
8.3 / 210	7.4 - 9.6	0.13	OXP6X210	**16**
11.4 / 290	10.5 - 12.7	0.18	OXP6X290	**20**
14.2 / 360	13.3 - 15.5	0.23	OXP6X360	**24**
16.9 / 430	16 - 18.2	0.28	OXP6X430	**28**

Twisted shafts — Rotates handle 45° ☐ .24 x .24" (☐ 6 x 6mm)

Shaft length (inches/mm)	Mounting depth ① in inches OT200	Weight lbs	Catalog number	List price
5.2 / 130	4.29 - 6.85	0.08	OXP6X130-45	**$ 12**
8.3 / 210	7.44 - 10.0	0.13	OXP6X210-45	**16**
11.4 / 290	10.59 - 13.15	0.18	OXP6X290-45	**20**
14.2 / 360	13.34- 15.9	0.23	OXP6X360-45	**24**

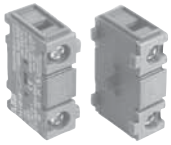
Direct mount handle Test-OFF ON

Item	Weight lbs	Catalog number	List price
Up to 3 padlocks in OFF-position. Includes shaft and mechanism	.22	OTV250EK OTVY250EK	**$ 105**

① Mounting depth is the distance from the outside of the door to the disconnect switch mounting plate. Shaft can be cut to desired length.

200A
Accessories

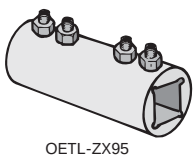

OZXA-200


OA1G__


OEA28


OTS250G1L/3


OTS250G1S/3


OETL-ZX95

Terminal lug kits

For use on	Wire size	Wire type	Lugs /kit	Weight lbs.	Catalog number	List price
OT200_	#4 - 300kcmil #4 - 300kcmil (6) 14-6 AWG	Cu /Al	6 3 3	.5 0.25 0.25	OZXA-200 OZXA-200/3P OZXA-206	**$ 80** **40** **180**

Auxilliary contacts blocks

Mounting on the left side of the switch: Max 8 auxilliary contact blocks with the OEA28 module
Mounting under the mechanism cover: Max 4 auxilliary contact blocks

Function	Protection degree	Weight lbs	Catalog number	List price
1 NO 1 NC	IP20	0.07	OA1G10 OA3G01	**$ 20**

Module for auxilliary contacts

Description	Weight lbs	Catalog number	List price
Screw mounting to the left side of the switch	0.1	OEA28	**$ 50**

Terminal poles

Description	For use on:	Weight lbs	AC thermal amp rating	AC rated voltage	Catalog number	List price
Mounting separately on baseplate, protected construction	OT200	0.57	200	600	OXN250	**Consult factory**

Terminal shrouds

Snap-on mounting, grey plastic, IP30. Transparent shrouds available on request.
Includes 3 shrouds for either line or load side

For use with:	Description	Number of poles	Weight lbs	Catalog number	List price
OT200_	Long type Short type Long type Short type	3 3 4 4	0.20 0.13 0.26 0.18	OTS250G1L/3 OTS250G1S/3 OTS250G1L/4 OTS250G1S/4	**$ 50** **50** **65** **61**

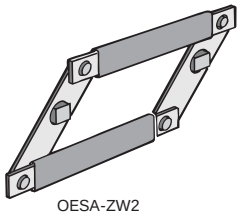
Shaft extension coupler

Description	For use on:	Weight (lbs.)		Catalog number	List price
Joins two shafts together for applications where extended length is required	6mm shafts 12mm shafts	0.26		OESA-ZX167 OETL-ZX95	**$ 56** **100**

Shaft adapter

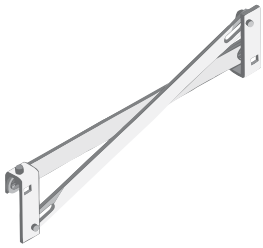
Description	For use on:	Weight (lbs.)		Catalog number	List price
Adapts one end of a 5 or 6mm shaft to a 12mm shaft. Use with shaft extension coupler.	5 or 6mm shafts	0.20		OETL-ZK19	**$ 40**

① UL File E83510

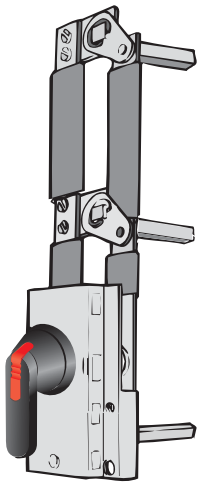


OESA-ZW2

OESA-ZW1



OTZW10



OTZW26

Conversion mechanisms

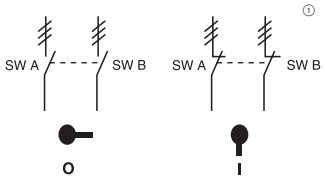
- **For use with Base and Din rail mounted switches only**
- **Switches are not included**

Description	For use on:	Weight (lbs.)	UL/NEMA type	Catalog number	List price
6 or 8 pole	OT200	1.52	—	OESA-ZW2	**$ 220**
Transfer		2.20	Type 1,3R,12	OTZW25	**790**
Transfer		2.20	Type 1,3R,4,4X,12	OTZW25X	**840**
Mechanical interlock		0.55	—	OTZW10	**100**
Bypass	OS200	7.28	1, 3R, 12	OTZW26	**950**

6 or 8 pole — OESA-ZW2

6 (8) pole mechanism allows two switches controlled by one handle, to open or close simultaneously.
Equipment required for a complete installation:

- Includes OHB145J12 handle
- One conversion mechanism
- Two disconnect switches
- Two shafts (see page 18.23)



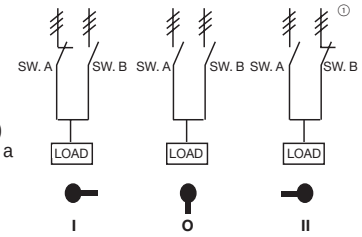
	POS. O	POS. I
SW. A	O	X
SW. B	O	X

X = Closed
O = Open

Transfer — OTZW25, OTZW25X

Transfer mechanism manually transfers between two power sources using two switches and a center OFF position.
A 3 position handle is included.
OHB80J6E011 (UL Type 1, 3R & 12) or OHB80L6E011 (UL Type 1, 3R, 4, 4X, 12) Shafts included. Equipment required for a complete installation:

- One conversion mechanism
- Two disconnect switches (see page 18.23)



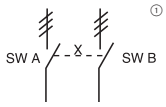
	POS. I	POS. O	POS. II
SW. A	X	O	O
SW. B	O	O	X

X = Closed
O = Open

Mechanical interlock — OTZW10

Mechanical interlock mechanism prevents both switches from being in the ON position at the same time.
Equipment required for a complete installation:

- One conversion mechanism
- Two disconnect switches (see page 18.23)
- Two handles (see page 18.23)
- Two shafts (see page 18.23)



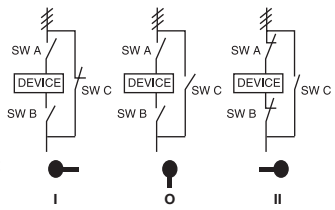
	SW. A POS. I	SW. B POS. I
SW. A	X	O
SW. B	O	X

X = Closed
O = Open

Bypass — OTZW26

Bypass mechanism operates three switches: Two switches in series and one changeover switch to allow power bypass.
A 3-position handle is included: OHB-145J12E011 (Type 1,3R & 12) or OHB145L12E011 (Type 1, 3R, 4, 4X, 12) Shafts included.
Equipment required for a complete installation:

- One conversion mechanism
- Three disconnect switches (see page 18.87)



	POS. I	POS.O	POS.II
SW. A	O	O	X
SW. B	O	O	X
SW. C	X	O	O

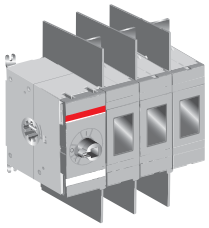
X = Closed
O = Open

① = Three poles

400A – 800A

For a complete assembly, please select one of each:

- 1 switch
- 1 handle
- 1 shaft
- 1 terminal lug kit


OT400U03


OXP12X280

+


OHB145J12

+

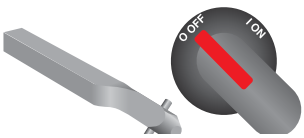

OZXA-400

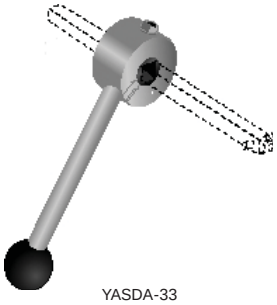

OETL-NF600ASW


OETL-NF800ASW


OHB_J12


OXP12X__




YASDA-33

UL general purpose amp rating	IEC AC21 amp rating	Maximum horsepower rating 200V	208V	240V	480V	600V	Catalog number	List price
2 pole								
400	630	—	—	—	—	—	OT400U02	**$ 1280**
400	630	—	—	—	—	—	OT400U011	**1280**
600	800	—	—	—	—	—	OETL-NF600A2SW	**2000**
800	1250	—	—	—	—	—	OETL-NF800A2SW	**2600**
3 pole								
400	630	100	100	125	250	350	OT400U03	**1420**
400	630	100	100	125	250	350	OT400U12	**1420**
600	800	150	150	200	400	500	OETL-NF600ASW	**2200**
800	1250	200	200	250	500	600	OETL-NF800ASW	**4200**
4 pole								
400	630	100	100	125	250	350	OT400UO4	**1800**
400	630	100	100	125	250	350	OT400U13	**1800**
400	630	100	100	125	250	350	OT400U22	**1800**
600	800	150	150	200	400	500	OETL-NF600A4SW	**2800**
—	1250	200	200	250	500	600	OETL-NF800A4SW	**5200**

Pistol handles — for use with shafts ☐ .47 x .47" (☐ 12 x 12 mm)

UL/NEMA type	IEC type	Color	Length in/mm	Marking	Defeat-able	Padlock-able	Weight (lbs)	Catalog number	List price
1,3R,12	IP65	Blk	4.9/125	O/I & Off/On	Yes	Yes	0.39	OHB125J12	**$ 90**
1,3R,12	IP65	R/Y	4.9/125	O/I & Off/On	Yes	Yes	0.39	OHY125J12	**90**
1,3R,12	IP65	Blk	5.7/145	O/I & Off/On	Yes	Yes	0.39	OHB145J12	**90**
1,3R,12	IP65	R/Y	5.7/145	O/I & Off/On	Yes	Yes	0.39	OHY145J12	**90**
1,3R,12	IP65	Blk	6.9/175	O/I & Off/On	Yes	Yes	0.41	OHB175J12	**100**
1,3R,12	IP65	R/Y	6.9/175	O/I & Off/On	Yes	Yes	0.41	OHY175J12	**100**
1,3R,4,4X,12	IP66	Blk	5.7/145	O/I & Off/On	Yes	Yes	0.39	OHB145L12	**130**
1,3R,4,4X,12	IP66	R/Y	5.7/145	O/I & Off/On	Yes	Yes	0.39	OHY145L12	**130**
1,3R,4,4X,12	IP66	Blk	6.9/175	O/I & Off/On	Yes	Yes	0.41	OHB175L12	**140**
1,3R,4,4X,12	IP66	R/Y	6.9/175	O/I & Off/On	Yes	Yes	0.41	OHY175L12	**140**
1,3R,4,4X,12	IP65	Metal	8.7/220	Off/On	—	Yes	1.50	YASDA-8	**190**

Shafts — for use with pistol handles ☐ .47 x .47" (☐ 12 x 12 mm)

Shaft length inches/mm	H Mounting depth ① in inches	Weight (lbs)	Catalog number	List price
11.0/280	10.2 – 14.5	0.77	OXP12X280	**$ 36**
12.8/325	12.0 – 16.3	0.90	OXP12X325	**40**
15.6/395	14.8 – 19.1	1.10	OXP12X395	**44**
18.3/465	17.5 – 21.9	1.32	OXP12X465	**48**
21.1/535	20.3 – 24.6	1.54	OXP12X535	**52**

Twisted shafts — Rotates handle 45° ☐.47 x .47" (☐ 12 x 12 mm)

Shaft length inches/mm	H Mounting depth① in inches	Weight (lbs)	Catalog number	List price
11.0/280	10.2 – 14.5	0.77	OXP12X280-45	**$ 36**
12.8/325	12.0 – 16.3	0.90	OXP12X325-45	**40**
18.3/465	17.5 – 21.9	1.32	OXP12X465-45	**48**

Direct mount handle

Item	Weight (lbs)	Catalog number	List price
Mounts on shaft.	.78	YASDA-33	**$ 150**

① Mounting depth is the distance from the outside of the door to the disconnect switch mounting plate. Shaft can be cut to desired length.

400A – 800A
Accessories

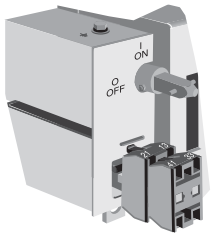

OZXA-400


OZXA-27

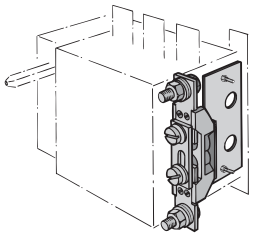

OZXA-30

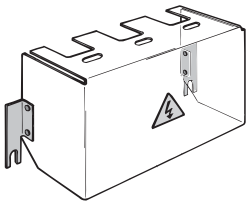

OZXA-175/400

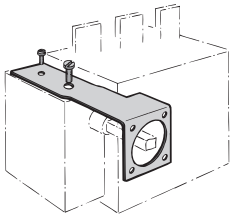

OZXA-32



OZXK-1, -2, -3, -4, -5, -6


OESA-ZX85


OETL, -ZX94, -ZX800A


OHZX1, OHZX3

Terminal lug kits

For use on:	Wire size	Kit weight (lbs.)	Wire type	Terminal lugs per kit	Kit catalog number	List price
OT400	#2 – 600 kcmil	0.50	Cu/Al	6	OZXA-400	**$ 190**
OT400	#2 – 600 kcmil	0.50	Cu/Al	3	OZXA-400/3P	**95**
OT400	(6) #14 – 6 AWG	0.50	Cu/Al	3	OZXA-406	**270**
OETL-NF600A	(2) #2 – 600 kcmil	4.62	Cu/Al	6	OZXA-27	**380**
OETL-NF600A	(2) #2 – 600 kcmil	2.31	Cu/Al	3	OZXA-27/3P	**190**
OETL-NF800A	(2) #2 – 600 kcmil	6.90	Cu/Al	6	OZXA-30	**740**
OETL-NF800A	(2) #2 – 600 kcmil	3.45	Cu/Al	3	OZXA-30/3P	**370**
OETL-NF800A ①	(8) 2/0 + (2)#2 600 kcmil	6.90	Cu/Al	3	OZXA-32	**600**
OETL-NF600 ①	(12) #14 – 6	1.10	Cu/Al	3	OZXA-175/400	**270**

Auxilliary contacts blocks

Mounting on the left side of the switch: Max 8 auxilliary contact blocks with the OEA28 module
Mounting under the mechanism cover: Max 4 auxilliary contact blocks

Function	For use on	Protection degree	Weight lbs	Catalog number	List price
1 NO 1 NC	OT400	IP20	0.07	OA1G10 OA3G01	**$ 20**

Module for auxilliary contacts

Description		Catalog number	List price
Screw mounting to the left side of the switch	0.1	OEA28	**$ 50**

Auxiliary contacts ②

Description	For use on:	Weight (lbs)	AC thermal amp rating	AC rated voltage	Catalog number	List price
1 N.O. + 1 N.C.	OETL-NF600 – OETL-NF800A	0.20	10	600	OZXK-1	**$ 100**
2 N.O. + 2 N.C.		0.26	10	600	OZXK-2	**170**
4 N.O. + 4 N.C		0.40	10	600	OZXK-3	**340**
2 N.O.		0.18	10	600	OZXK-4	**100**
4 N.O.		0.25	10	600	OZXK-5	**170**
8 N.O.		0.40	10	600	OZXK-6	**340**

Terminal poles

Description	For use on:	Weight (lbs)	AC thermal amp rating	AC rated voltage	Catalog number	List price
Detachable neutral link mounts seperately on baseplate (protected construction)	OT400	1.54	400	600	OXN400	**Consult factory**
Detachable neutral mounts on side of switch or DIN rail	OETL-NF600A	1.04	400	600	OESA-ZX85	**150**

Terminal shrouds – OT400 (Snap-on mounting, grey plastic, IP30)

Description	For use with:	Number of poles	Weight lbs	Catalog number	List price
Long type	OT400_	3	0.33	OTS400G1L/3	**$ 113**
Short type		3	0.20	OTS400G1S/3	**106**
Long type		4	0.44	OTS400G1L/4	**140**
Short type		4	0.26	OTS400G1S/4	**130**

NOTE: Transparent shrouds available upon request.

Terminal shrouds – OETL-NF600A – OETL-NF800A

Description	For use on:	Weight (lbs)	Catalog number	List price
Includes one shroud for line or load side	OETL-NF600A OETL-NF800A	0.66 0.88	OETL-ZX94 OETL-ZX800A	$ **130** **180**

Direct mount handle – Test-OFF ON

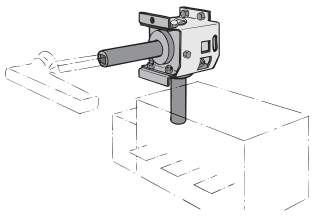
Item	Weight lbs	Catalog number	List price
Up to 3 padlocks in OFF-position. Includes shaft and mechanism	.44	OTV400EK OTVY400EK	**$ 130**

Handle support bracket

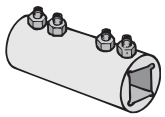
Description	For use on:	Weight (lbs)		Catalog number	List price
Allows handle to be directly mounted to switch behind the door	OETL-NF600	0.51		OHZX1	**$ 24**
	OETL-NF800A	0.88		OHZX3	**30**

① A load side distribution lug eliminates the need to purchase, install and wire a separate distribution block.
② UL File E57057

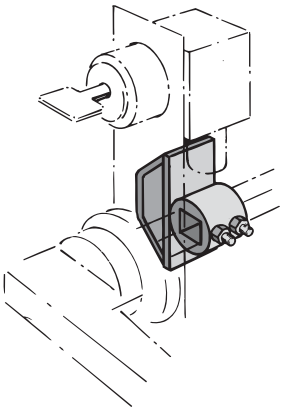
400A – 800A
Accessories



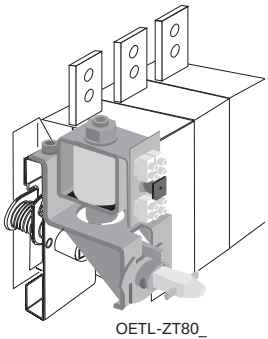
OETL-ZX108



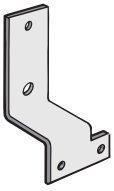
OETL-ZX95



OETL-ZW5



OETL-ZT80_



OETL-ZT100

90° angle kit

Description	For use on:	Weight (lbs)	Catalog number	List price
Converts switch mechanism from front operation to side operation	OT400, OETL-NF600A OETL-NF800A	4.63	OETL-ZX108	**$ 794**

Shaft extension coupler

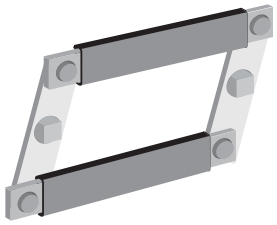
Description	For use on:	Weight (lbs)	Catalog number	List price
Joins two shafts together for applications where extended length is required	12mm shafts	0.26	OETL-ZX95	**$ 100**

Locking accessories

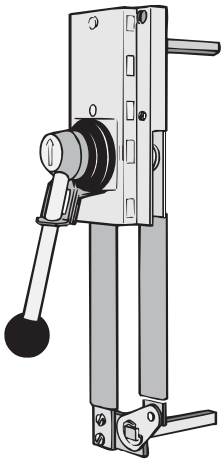
Description	For use on:	Weight (lbs)	Catalog number	List price
Cam attachment for Kirk Key, Castell, Lowe & Fletcher and Ronis interlock. For adapting to the interlock system The interlock is not included.	12mm shafts	0.29	OETL-ZW5	**$ 190**
Electrical interlock ① Closed circuit principle for interlocking the switch movement. When the coil circuit is dead, A-types cannot be operated to ON-position and L-types cannot be operated to ON- or OFF-position. Coil voltages 110VAC, 220VAC, 24VDC, 48VDC, 60 VDC, 110VDC, 220VDC, P = 15W U = 0.7 – 1.1 Un (U = coil voltage, Un = nominal voltage) 	OT400 OETL-NF600 – OETL-NF800A	2.42	OETL-ZT 80A★ OETL-ZT 80L★	**1280** **1220**
Mounting bracket	OETL-NF600	0.40	OETL-ZT100	**40**

★ – Coil voltage

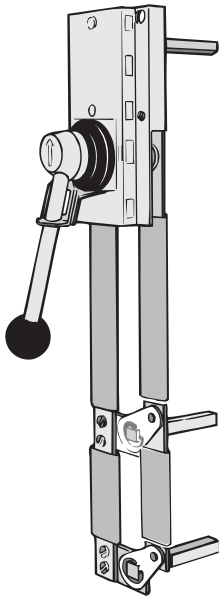
① OETL-ZT100 mounting bracket required for OETL-NF600



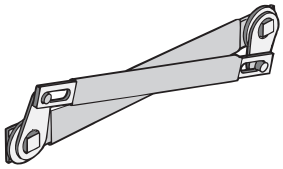
OETL-ZW9



OETL-ZW12



OETL-ZW13

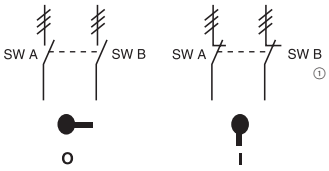


OETL-ZW3, -ZW14, -ZW15

Conversion mechanisms
- **Switches are not included**

Description	For use on:	Weight (lbs)	UL/NEMA type	Catalog number	List price
6 or 8 pole	OT400, & OETL-NF600 – OETL-NF800A	2.42	—	OETL-ZW9	**$ 260**
Transfer		10.1	1,3R,4,4X,12	OETL-ZW12	**560**
Bypass		8.81	1,3R,4,4X,12	OETL-ZW13	**560**
Mechanical interlock		1.26	—	OETL-ZW3	**140**
		1.15	—	OETL-ZW14	**140**
		2.64	—	OETL-ZW15	**160**

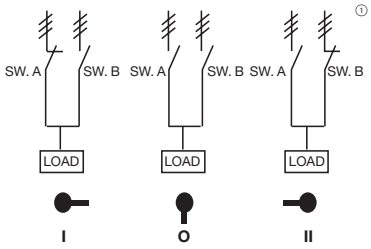
6 or 8 pole — OETL-ZW9
6 (8) pole mechanism allows two switches controlled by one handle to open or close simultaneously.
Equipment required for a complete installation:
- One conversion mechanism
- Two disconnect switches (see page 18.26)
- One handle (see page 18.26)
- Two shafts (see page 18.26)



	POS.O	POS.I
SW. A	O	X
SW. B	O	X

X = Closed
O = Open

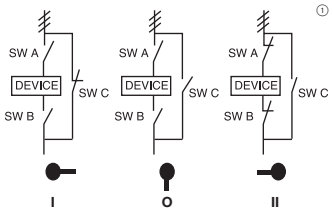
Transfer — OETL-ZW12
Transfer mechanism manually transfers between two power sources using two switches and a center OFF position. A 3 position handle is included. YASDA-21 (UL Type 1, 3R, 4, 4X, 12). Shafts included.
Equipment required for a complete installation:
- One conversion mechanism
- Two disconnect switches (see page 18.26)



	POS. I	POS.O	POS.II
SW. A	X	O	O
SW. B	O	O	X

X = Closed
O = Open

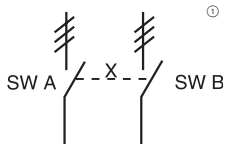
Bypass — OETL-ZW13
Bypass mechanism operates three switches: Two switches in series and one changeover switch to allow power bypass. A 3 position handle is included. YASDA-6 (UL Type 1, 3R, 4, 4X, 12). Shafts included.
Equipment required for a complete installation:
- One conversion mechanism
- Three disconnect switches (see page 18.26)



	POS. I	POS.O	POS.II
SW. A	O	O	X
SW. B	O	O	X
SW. C	X	O	O

X = Closed
O = Open

Mechanical interlock — OETL-ZW3, OETL-ZW14, OETL-ZW15
Mechanical interlock mechanism prevents both switches from being in the ON position at the same time.
Equipment required for a complete installation:
- One conversion mechanism
- Two disconnect switches (see page 18.26)
- Two shafts (see page 18.26)
- Two handles (see page 18.26)



	SW. A POS. I	SW. B POS. I
SW. A	X	O
SW. B	O	X

X = Closed
O = Open

Drawing and mounting information found on pg 18.71 & 18.72

① = Three poles

1200A – 3150A

For a complete assembly please select one of each:

- 1 switch
- 1 handle
- 1 shaft
- 1 terminal lug kit


OETL-NF1200ASW

+


OXP12X280

+


OHB175J12

+


OZXA-28


OETL-NF1600SW
OETL-NF2000SW
OETL-NF3150SW


OHB_J12


OHY_J12


YASDA-8


OXP12X__

1200 – 3150 Amp switches, 600V

UL general purpose amp rating	IEC AC21 amp rating	Maximum horsepower rating	Catalog number	List price
2 pole			**2 pole**	
1200	1600		OETL-NF12002SW	**$ 6200**
1600	2500		OETL-NF16002SW	**14,800**
2000	2500		OETL-NF20002SW	**15,500**
–	3150		OETL-NF31502SW	**17,000**
3 pole		The US National Electric Code does not specify HP ratings for switches this large. Please select a switch based on 115% of application FLA. For example: a motor with an FLA of 800A would require a 1200A switch: 800A x 115% = 920A, the closest higher rated switch is 1200A.	**3 pole**	
1200	1600		OETL-NF1200SW	**6800**
1600	2500		OETL-NF1600SW	**16,400**
2000	2500		OETL-NF2000SW	**17,200**
—	3150		OETL-NF3150SW	**18,900**
4 pole			**4 pole**	
—	1600		OETL-NF12004SW	**8600**
—	2500		OETL-NF16004SW	**20,500**
—	2500		OETL-NF20004SW	**21,500**
—	3150		OETL-NF31504SW	**23,600**

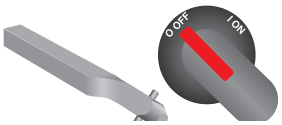
Pistol handles — for use with shaft ☐ .47 x .47" (☐ 12 x 12mm)

UL/NEMA type	IEC type	Color	Length mm	Marking	Defeat-able	Padlock-able	Weight (lbs)	Catalog number	List price
For use with OETL-NF1200									
1,3R,12	IP65	Black	5.7/145	O/I & Off/On	Yes	Yes	0.39	OHB145J12	**$ 90**
1,3R,12	IP65	Red/Yel	5.7/145	O/I & Off/On	Yes	Yes	0.39	OHY145J12	**90**
1,3R,12	IP65	Black	6.9/175	O/I & Off/On	Yes	Yes	0.41	OHB175J12	**100**
1,3R,12	IP65	Red/Yel	6.9/175	O/I & Off/On	Yes	Yes	0.41	OHY175J12	**100**
1,3R,4,4X,12	IP66	Black	5.7/145	O/I & Off/On	Yes	Yes	0.39	OHB145L12	**130**
1,3R,4,4X,12	IP66	Red/Yel	5.7/145	O/I & Off/On	Yes	Yes	0.39	OHY145L12	**130**
1,3R,4,4X,12	IP66	Black	6.9/175	O/I & Off/On	Yes	Yes	0.41	OHB175L12	**140**
1,3R,4,4X,12	IP65	Red/Yel	6.9/175	O/I & Off/On	Yes	Yes	0.41	OHY175L12	**140**
1,3R,4,4X,12	IP65	Metal	8.7/220	Off/On	—	Yes	1.50	YASDA-8	**190**
For use with OETL-NF1600 – OETL-NF3150									
1,3R,4,4X,12	IP65	Metal	8.7/220	Off/On	—	Yes	1.50	YASDA-8	**190**

Shafts — for use with pistol handles ☐ .47 x .47" (☐ 12 x 12 mm)

Shaft length inches/mm	H Mounting depth① in inches	Weight (lbs)	Catalog number	List price
For use with OETL-NF1200				
11.0/280	11.6 – 15.3	0.77	OXP12X280	**$ 36**
12.8/325	13.7 – 17.1	0.90	OXP12X325	**40**
15.6/397	16.2 – 19.9	1.10	OXP12X395	**44**
18.3/465	18.9 – 22.6	1.32	OXP12X465	**48**
21.1/535	21.7 – 25.4	1.54	OXP12X535	**52**
For use with OETL-NF1600 – OETL-NF3150				
12.8/325	13.7 – 17.1	0.90	OXP12X325	**40**
15.6/397	16.2 – 19.9	1.10	OXP12X395	**44**
18.3/465	18.9 – 22.6	1.32	OXP12X465	**48**
21.1/535	21.7 – 25.4	1.54	OXP12X535	**52**

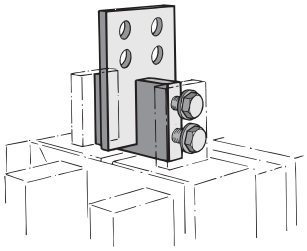
① Mounting depth is the distance from the outside of the door to the disconnect switch mounting plate. Shaft can be cut to desired length.



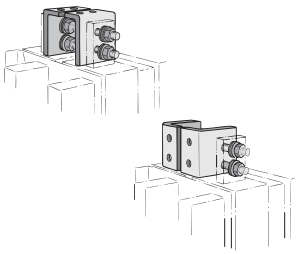
OESA-ZK__/45

OZXA-32

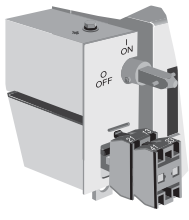
OZXA-28
OZXA-28/2



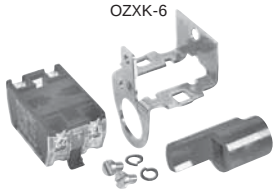
OETL-ZX115



OETLZX114



OZXK-1
OZXK-6



OZXK-1

Twisted shafts – Rotates handle 45° ☐ .47 x .47" (☐ 12 x 12 mm)

Shaft length inches/mm	H Mounting depth ① in inches	Weight (lbs)	Catalog number	List price
For use with OETL-NF1200				
11.0/280	11.6 – 15.3	0.77	OXP12X280-45	**$ 36**
12.8/325	13.7 – 17.1	0.90	OXP12X325-45	**40**
18.3/465	18.9 – 22.6	1.32	OXP12X465-45	**48**
For use with OETL-NF1600 – OETL-NF3150				
12.8/325	16.2 – 19.9	0.90	OXP12X325-45	**40**
18.3/465	18.9 – 22.6	1.32	OXP12X465-45	**48**

Terminal lug kits

For use on:	Wire size	Kit weight (lbs.)	Wire type	Terminal lugs per kit	Kit catalog number	List price
OETL-NF1200 & OETL-NF1600	(4) #2 – 600 kcmil	10.44	Cu/Al	6	OZXA-28	**$ 1000**
OETL-NF1200 & OETL-NF1600	(4) #2 – 600 kcmil	5.22	Cu/Al	3	OZXA-28/3P	**500**
OETL-NF1200 & OETL-NF1600②	(8) 2/0 + (2) #2 600kcmil	10.44	Cu/Al	3	OZXA-32	**600**
OETL-NF2000 & OETL-NF3150	(8) #2 – 600kcmil	20.88	Cu/Al	12	OZXA-28/2	**2000**

OZXA-32 Power distribution lugs eliminate the need to purchase a separate distribution block

Busbar connections

Description	For use on:	Weight (lbs)		Catalog number	List price
Vertical ③, back or edgewise mounting	OETL-NF1600 – OETL-NF3150	46.2 31.0		OETL-ZX115 OETL-ZX114	**$ 3920** **2820**

Auxiliary contacts

Description	For use on:	Weight (lbs)	AC thermal amp rating	AC rated voltage	Catalog number	List price
1 N.O. + 1 N.C.	OETL-NF1200 – OETL-NF31500	0.20	10	600	OZXK-1	**$ 100**
2 N.O. + 2 N.C.		0.26	10	600	OZXK-2	**170**
4 N.O. + 4 N.C.		0.40	10	600	OZXK-3	**340**
2 N.O.		.18	10	600	OZXK-4	**100**
4 N.O.		0.25	10	600	OZXK-5	**170**
8 N.O.		0.40	10	600	OZXK-6	**340**

Terminal shrouds

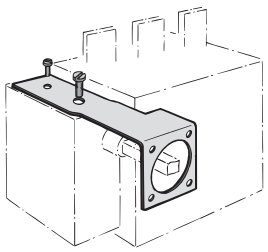
Description	For use on:	Weight (lbs)		Catalog number	List price
Includes one shroud for line or load side	OETL-NF1200	1.20		OETL-ZX119	**$ 220**

Direct mount handle

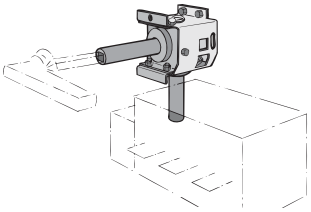
Item	Catalog number	Lis price
Mounts on shaft.	YASDA-34	**$ 180**

① Mounting depth is the distance from the outside of the door to the disconnect switch mounting plate. Shaft can be cut to desired length.
② A load side distribution lug eliminates the need to purchase, install and wire a separate distribution block.
③ Provided as standard with OETL-NF1600, OETL-NF2000 and OETL-NF3150.

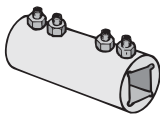
1200A – 3150A
Accessories



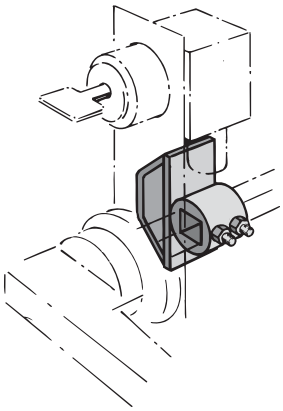
OHZX3



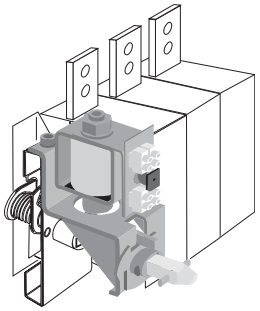
OETL-ZX108



OETL-ZX95



OETL-ZW5



OETL-ZT80

Handle support bracket

Description	For use on:	Weight (lbs)		Catalog number	List price
Allows handle to be directly mounted to switch behind the door	OETL-NF1200 – OETL-NF3150	0.88		OHZX3	**$ 30**

90° angle kit

Description	For use on:	Weight (lbs)		Catalog number	List price
Converts switch mechanism from front operation to side operation	OETL-NF1200 – OETL-NF3150	4.63		OETL-ZX108	**$ 794**

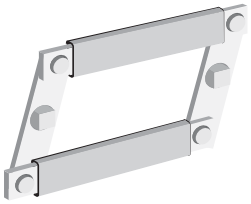
Shaft extension coupler

Description	For use on:	Weight (lbs)		Catalog number	List price
Joins two shafts together for applications where extended length is required	12mm shafts	0.26		OETL-ZX95	**$ 100**

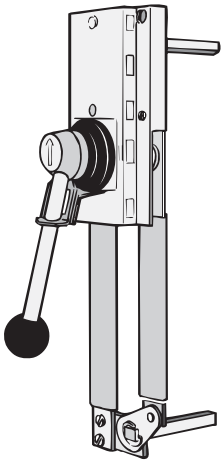
Locking accessories

Description	For use on:	Weight (lbs)		Catalog number	List price
Cam attachment for Kirk Key, Castell, Lowe & Fletcher and Ronis interlock. For adapting to the interlock system The interlock is not included.	12mm shafts	0.29		OETL-ZW5	**$ 190**
Electrical interlock Closed circuit principle for interlocking the switch movement. When the coil circuit is dead, A-types cannot be operated to ON-position and L-types cannot be operated to ON- or OFF-position. Coil voltages 110VAC, 220VAC, 24VDC, 48VDC, 60 VDC, 110VDC, 220VDC, P = 15W U = 0.7 – 1.1 Un (U= coil voltage, Un = nominal voltage) 	OETL-NF1200 OETL-NF3150	2.42		OETL-ZT80A/★ OETL-ZT80L/★	**1280** **1220**

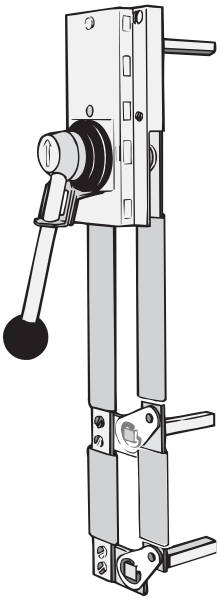
★ = Coil voltage



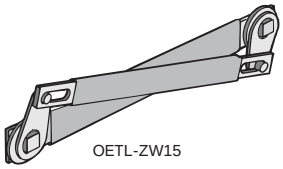
OETL-ZW9



OETL-ZW12



OETL-ZW13

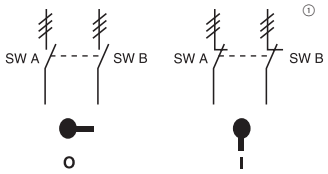


OETL-ZW15

Conversion mechanisms
- **Switches are not included**

Description	For use on:	Weight (lbs)	UL/NEMA type	Catalog number	List price
6 or 8 pole Transfer Bypass	OETL-NF1200	2.42 10.1 8.81	— 1,3R,4,4X,12 1,3R,4,4X,12	OETL-ZW9 OETL-ZW12 OETL-ZW13	**$ 260** **560** **560**
Mechanical interlock	OETL-NF1200 – OETL-NF3150	2.64	—	OETL-ZW15	**160**

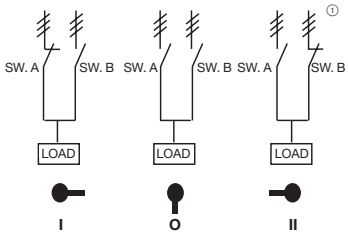
6 or 8 pole — OETL-ZW9
6 (8) pole mechanism allows two switches controlled by one handle to open or close simultaneously.
Equipment required for a complete installation:
- One conversion mechanism.
- Two disconnect switches (see page 18.30)
- One handle (see page 18.30)
- Two shafts (see page 18.30)



	POS. O	POS.I
SW. A	O	X
SW. B	O	X

X = Closed
O = Open

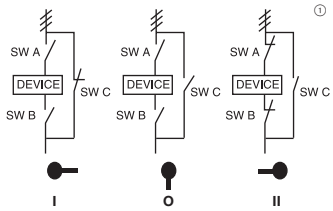
Transfer — OETL-ZW12
Transfer mechanism manually transfers between two power sources using two switches and a center OFF position. A 3 position handle is included. YASDA-21 (Type 1, 3R, 4, 4X, 12). Shafts included.
Equipment required for a complete installation:
- One conversion mechanism
- Two disconnect switches (see page 18.30)



	POS. I	POS.O	POS.II
SW. A	X	O	O
SW. B	O	O	X

X = Closed
O = Open

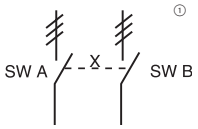
Bypass — OETL-ZW13
Bypass mechanism operates three switches: Two switches in series and one changeover switch to allow power bypass. A 3 position handle is included. YASDA-6 (Type 1, 3R, 4, 4X, 12). Shafts included.
Equipment required for a complete installation:
- One conversion mechanism
- Three disconnect switches (see page 18.30)



	POS. I	POS.O	POS.II
SW. A	O	O	X
SW. B	O	O	X
SW. C	X	O	O

X = Closed
O = Open

Mechanical interlock —OETL-ZW15
Mechanical interlock mechanism prevents both switches from being in the "ON" position at the same time. Handles are not included.
Equipment required for a complete installation:
- One conversion mechanism
- Two disconnect switches (see page 18.30)
- Two shafts (see page 18.30)
- Two handles (see page 18.30)



	SW. A POS. I	SW. B POS. I
SW. A	X	O
SW. B	O	X

X = Closed
O = Open

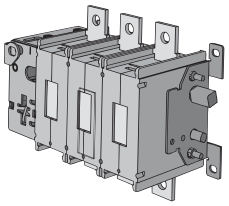
Drawing and mounting information found on pg 18.71 & 18.72

① = Three poles

Other configurations
Side operated
30A – 800A[1][2]

For a complete assembly, please select one of each:

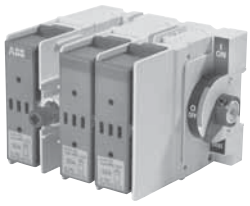
- 1 switch
- 1 handle
- 1 shaft
- 1 terminal lug kit



OETL-NF200A-S +

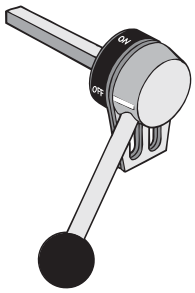
OXP8X240 +

OHB80J8TE00S



OSNF30-S

OHY__J__



OETL-ZX74

OXP5X170
OXP8X240
OXP12X325

OZXA-24

OZXA-25

OZXA-26

OZXA-27

Side operated switches — 3 pole

UL general purpose amp rating	IEC AC21 amp rating	Maximum horsepower rating, Three phase 200V	208V	240V	480V	600V	Weight (lbs)	Catalog number	List Price
30	32	5	7.5	7.5	15	20	1.90	OSNF30-S	**$ 380**
60	63	15	15	15	30	50	3.90	OSNF60-S	**560**
100	125	25	25	30	60	75	4.50	OSNF100-S	**660**
200	250	60	60	75	150	200	6.61	OETL-NF200A-S	**780**
400	630	100	100	125	250	350	13.66	OETL-NF400-S	**1500**
600	800	150	150	200	400	500	13.66	OETL-NF600A-S	**2400**

Handles

UL/NEMA type		Color	Length inches/mm	Marking	Defeat-able	Padlock-able	Weight (lbs)	Catalog number	List price
For use with OSNF30-S									
1, 12, 3R		Black	2.65/65	O/I & Off/On	Yes	Yes	0.29	OHB65J5	**$ 80**
1, 12, 3R		Red/Yel	2.65/65	O/I & Off/On	Yes	Yes	0.29	OHY65J5	
For use with OSNF60-S — OSNF100-S									
1, 12, 3R		Black	3.1/80	O/I & Off/On	Yes	Yes	0.30	OHB80J6	**80**
1, 12, 3R		Red/Yel	3.1/80	O/I & Off/On	Yes	Yes	0.30	OHY80J6	
For use with OETL-NF200A-S									
1, 12, 3R		Black	3.1/80	O/I & Off/On	Yes	Yes	0.30	OHB80J8	**80**
1, 12, 3R		Red/Yel	3.1/80	O/I & Off/On	Yes	Yes	0.30	OHY80J8	
For use with OETL-400DM1 — OETL-NF600A-S									
1, 12, 3R		Black	4.9/145	O/I & Off/On	Yes	Yes	0.39	OHB145J12	**80**
1, 12, 3R		Red/Yel	4.9/145	O/I & Off/On	Yes	Yes	0.39	OHY145J12	**80**
1, 12, 3R		Metal	4.9/145	Off/On	Yes	Yes	1.50	OETL-ZX74	**190**

Shafts

For use with:	Length inches/mm	Description	Weight (lbs)	Catalog number	List price
OSNF30-S	6.7/170	.20 x .20" (5 x 5mm)	0.08	OXP5X170	**$ 16**
OSNF60-S – OSNF100-S	8.3/210	.24 x .24" (6 x 6mm)	0.10	OXP6X210	**16**
OETL-NF175-S – OETL-NF200A-S	9.5/240	.31 x .31" (8 x 8mm)	0.26	OXP8X240	**24**
OETL-NF400-S – OETL-NF600A-S	12.8/325	.47 X .47" (12 X 12mm)	0.90	OXP12X325	**40**

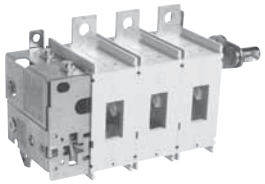
Terminal lug kits

For use on:	Wire size	Weight	Wire type	Lugs per kit	Catalog number	List price
OSNF30-S	#18 – 8	—	Cu	—	Integral	—
OSNF60-S	#14 – 4	—	Cu	—	Integral	—
OSNF100-S	#14 – 2/0	0.43	Cu/Al	6	OZXA-24	**$ 24**
OETL-NF200A-S	#6 – 300 kcmil	0.93	Cu/Al	6	OZXA-25	**80**
OETL-NF400-S	#2 – 600 kcmil	3.520	Cu/Al	6	OZXA-26	**190**
OETL-NF600A-S	(2) #2 – 600 kcmil	4.62	Cu/Al	6	OZXA-27	**380**

① Side operated switches available through 800A as IEC rated.
② Please consult factory for additional information.

Flange operated disconnect switches
Shaft operated non-fusible
30A - 200A

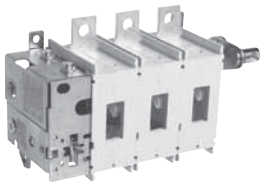
For a complete assembly, please select one of each.


Switch


Handle


Shaft


Lug kit (as required)


OETL-NF200A-F


DSFHN-HS12


DSFHS-12

30A -200A Flange operated non fusible switches (Shaft) - 3 pole

UL general purpose amp rating	Maximum horsepower rating					Catalog number	List price
	Three phase						
	200V	208V	240V	480V	600V		
30	10	10	10	20	30	OT30E3-F	**$ 500**
60	20	20	20	40	40	OT60E3-F	**590**
100	25	25	25	50	40	OT100E3-F	**690**
200	60	60	75	150	200	OETL-NF200A-F	**890**

Flange handles for use with OT30_, OT60_, OT100_ and OETL-NF200_

UL/ NEMA type	Marking	Defeatable	Padlockable	Catalog number	List price
1, 3R, 12	OFF/ON	Yes	Yes	DSFHN-HS12	**$ 156**
4, 4X	OFF/ON	Yes	Yes	DSFHN-HS4	**240**

Shafts

For use with:	Maximum enclosure depth (inches)	Catalog number	List price
OT30_ - OT100_	16	OTFS-16	**$ 25**
OT30_ - OT100_	24	OTFS-24	**30**
OETL-NF200A-F	16	DSFHS-12	**28**
OETL-NF200A-F	21	DSFHS-17	**40**
OETL-NF200A-F	26.5	DSFHS-22	**52**

Flange operated fusible and non-fusible disconnect switches

ABB's solution for complying with the new NFPA79 requirements is Flange Operated Fusible and Non-fusible Disconnect Switches.

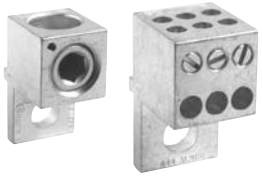
New 2002 NFPA 79 changes requires main disconnecting means to be operable without the use of accessory tools or devices, independent of door position. This code also includes an interlocking provision to prevent the closing of disconnects while the enclosure door is open, unless an interlock is operated by a deliberate action.

The flange operated disconnect switches are available as ridged shaft or flexible cable operated versions. The cable operated version allows you to install the disconnect switch anywhere in the enclosure depending on the length of the cable. Cables are available in lengths up to 84 inches.

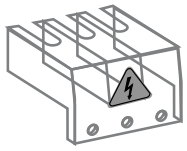
The designs are cost-effective NFPA 79 solutions offering quick and easy installation.

Discount schedule H1: NF16A - 100A
Discount schedule H2: NF125A - 800A
Discount schedule H6: Handles, shafts, accessories and lug kits
Discount schedule SH: Door hardware kits

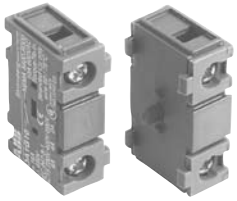
Flange operated disconnect switches
Shaft operated non-fusible
30A - 200A



OZXA-25 OZXA-175



OTS125T3



OA1G__

Terminal lug kit and accessories

For use on:	Description	Wire size	Wire type	Qty.	Catalog number	List price
OT30E3-F OT60E3-F OT100E3-F	Lug Lug Lug	#14 - #4 #14 - #4 #8 - 1/0	Cu Cu Cu	-- -- --	Integral Integral Integral	-- -- --
OETL-NF200A-F OETL-NF200A-F OETL-NF200A-F	Lug Distribution Lug	#6 - 300kcmil (6) #14 - #6 #6 - 300kcmil	Cu/Al Cu/Al Cu/Al	6 3 3	OZXA-25 OZXA-175 OZXA-25/3P	**$ 80** **180** **40**
OT30_ - OT100_ OETL-NF200A-F	Shroud Shroud	Includes one shroud for line or load side Includes one set of shrouds for line or load side		1 1	OTS125T3 OETL-ZX200A	**20** **94**
OT30_ - OT100_	Aux. Contact	1 NO 1 NC 1 NO + 1 NC		1 1 1	OA1G10 OA1G01 OA2G11	**20** **20** **40**
OETL-NF200A-F	Aux. Contact	1 NO + 1 NC		1	OZXK-12	**72**

Door hardware NEMA 12

Item	Catalog number	List price
Safety door latch, 2 point, door less than 40” high	KDH2R	**$ 200**
Safety door latch, 3 point, door less than 40” high	KDH3R	**225**

For additional technical information and accessories, please consult the AC1000 Product Selector catalog, section 18 or the factory

Flange operated disconnect switches
Cable operated non-fusible
125A - 1200A

For a complete assembly, please select one of each.

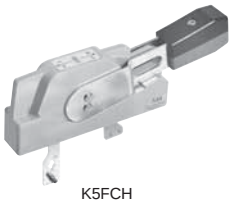

Switch


Handle


Cable


Lug kit (as required)


OT200U03-FC


K5FCH


K5C0__

125A - 1200A Non-fusible flange cable operating kit

UL general purpose amp rating A	Maximum horsepower rating Three phase 200V-208V	240V	480V	600V	Poles	Catalog number	List price
125	30	40	75	100	3	OT160E3-FC	**$ 820**
200	60	75	150	200	3	OT200U03-FC	**1020**
400	100	125	250	350	3	OT400U03-FC	**1920**
600	150	200	400	500	3	OETL-NF600A-FC	**2700**
800	200	250	500	600	3	OETL-NF800A-FC	**4900**
1200	--	--	--	--	3	OETL-NF1200-FC	**7500**

Flange handle

For use with:	NEMA type	Catalog number	List price
OT160_- OT200_ OT400_, OETL-NF600_ – OETL-NF1200_	1, 3R, 12	K5FCH K7FCH	**$ 213** **310**
OT160_- OT200_ OT400_, OETL-NF600_ – OETL-NF1200_	4, 4X	K5FCH4 K7FCH4	**243** **415**

Cable

For use with:	Cable length (inches)	Catalog number	List price
OT160_ - OT200_	36 48 60 72	K5C036 K5C048 K5C060 K5C072	**$ 114** **146** **160** **175**
OT400, OETL-NF600_ – OETL-NF1200_	48 60 72 84	K7C048 K7C060 K7C072 K7C084	**190** **220** **256** **270**

Discount schedule H2: NF125A - 800A
Discount schedule H6: Handles, shafts, accessories and lug kits
Discount schedule H3: NF1200A - 3150A
Discount schedule SH: Door hardware kits

Flange operated disconnect switches
Cable operated non-fusible
125A - 1200A

OZXA-200

OZXA-400

OZXA-175/400

Terminal lug kits

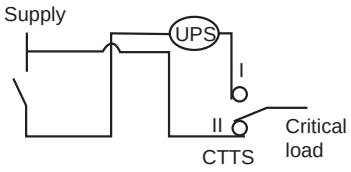
For use on :	Wire size	Wire type		Lugs / kit	Catalog number	List price
OT160_	8-1/0 AWG	Cu	--	--	Integral	--
OT200_	#4 - 300 kcmil (6) 14-6 AWG	Cu/Al Cu/Al	-- Distribution Lug	3 3	OZXA-200 OZXA-206	**$ 80** **40**
OT400_	#2 - 600 kcmil #2 - 600 kcmil (6) 14-6 AWG	Cu/Al Cu/Al Cu/Al	-- -- Distribution Lug	6 3 3	OZXA-400 OZXA-400/3P OZXA-406	**190** **95** **270**
OETL-NF600 – OETL-NF800	#2 - 600 kcmil #2 - 600 kcmil (12) 14-6 AWG	Cu/Al Cu/Al Cu/Al	-- -- Distribution Lug	6 3 3	OZXA-27 OZXA-27/3P OZXA-175/400	**380** **190** **270**
OETL-NF1200	(4) #2-600 kcmil (8) 2/0 + (2) #2-600 kcmil	Cu/Al Cu/Al Cu/Al	-- -- Distribution Lug	6 3 3	OZXA-28 OZXA-28/3P OZXA-32	**1000** **500** **600**

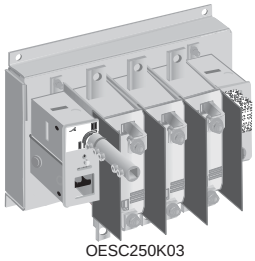
Door hardware NEMA 12

Item	Catalog number	List price
Safety door latch, 2 point, door less than 40” high	KDH2R	**$ 200**
Safety door latch, 3 point, door less than 40” high	KDH3R	**225**

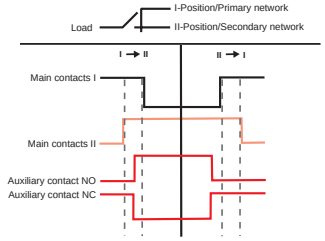
For additional technical information and accessories, please consult pages 18.21 - 18.68.

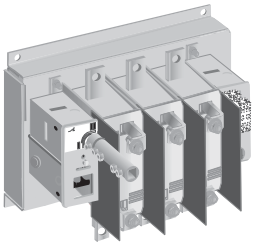
Maintenance bypass switches for UPS
250A – 500A



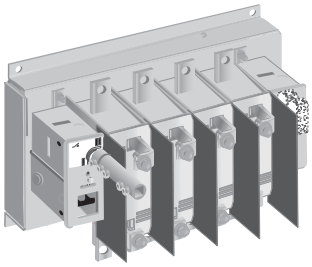


OESC250K03





OESC250K03



OESC250K04, OESC250K04N2

OZXK-1

Description

The OESC range is a "make before break" or Closed Transition Transfer Switch type that guarantees a transfer from the static switch to the power line as manual bypass switch and back again without any interruption. This ensures equipment is powered, even when maintenance work is carried out. The OESC switches are available with double rated neutral to withstand the thermal overload from the harmonics normally produced by the UPS and added up in the neutral conductor. The range is UL508 recognized.

General character and use

OESC switches are open type and manually operated. They are intended for use as maintenance switches in UPS applications. The unit is inded to switch between normal and maintenance positions, with an over lapping time (closed transition) of a minimum of 8 msec.

Bypass switches — 3-pole, I-II indication

UL general purpose amp rating	IEC AC22 amp rating	Voltage AC	Isc rms ① kA	Weight lbs		Catalog number	List price
250	250	480	50	26.5		OESC250K03	**Consult factory**
500	500	480	50	26.5		OESC500K03	

The switch includes a black handle OHB175J12E16, a shaft OXP12X325 and bolt set for the cable connections.

Bypass switches — 4-pole, I-II indication

UL general purpose amp rating	IEC AC22 amp rating	Voltage AC	Isc rms ① kA	Weight lbs		Catalog number	List price
250	250	480	50	32.2		OESC250K04	**Consult factory**
500	500	480	50	32.2		OESC500K04	

The switch includes a black handle OHB175J12E16, a shaft OXP12X325 and bolt set for the cable connections.

Bypass switches — 4-pole, with double rated neutral, I-II indication

UL general purpose amp rating	IEC AC22 amp rating	Voltage AC	Isc rms ① kA	Weight lbs		Catalog number	List price
250	250	480	50	33.5		OESC250K04N2	**Consult factory**
400	400	480	50	33.5		OESC400K04N2	

The switch includes a black handle OHB175J12E16, a shaft OXP12X325 and bolt set for the cable connections.

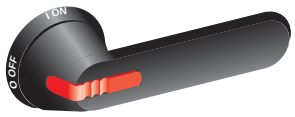
Auxiliary contacts — Early break, late make ②

Description	For use on:	Weight (lbs)	AC thermal amp rating	AC rated voltage	Catalog number	List price
1 N.O. + 1 N.C.	OETL-NF400 – OETL-NF800A	0.20	10	600	OZXK-1	**$ 100**
2 N.O. + 2 N.C.		0.26	10	600	OZXK-2	**170**
4 N.O. + 4 N.C		0.40	10	600	OZXK-3	**340**
2 N.O.		0.18	10	600	OZXK-4	**100**
4 N.O.		0.25	10	600	OZXK-5	**170**
8 N.O.		0.40	10	600	OZXK-6	**340**

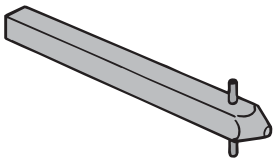
The auxiliary contacts are of the early break type which means that the NO auxiliary contacts break before the main contacts open.

① Isc rms 50kA, 480VAC with 600A Class J fuses (600 VAC / 200kA)
② UL File E57057

Maintenance bypass switches for UPS
250A – 500A



OHB175J12E16



OXP12X280

External handles — I-II indication

UL/NEMA Type	IEC type	Color	Length	Defeatable	Padlockable	Weight	Catalog number	List price
1, 3R, 12	IP65	Black	6.9 / 175	Yes	Yes	0.41	OHB175J12E16	**Consult factory**

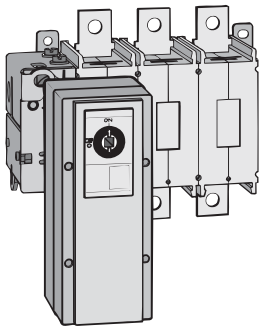
The handles are equipped with door interlock in II-position; when padlocked, the door interlock is in the I-position. Padlockings with 3 padlocks, bail diameter from 5 - 10mm.

Shafts — for use with pistol handles ☐ .47 x .47" (☐ 12 x 12 mm)

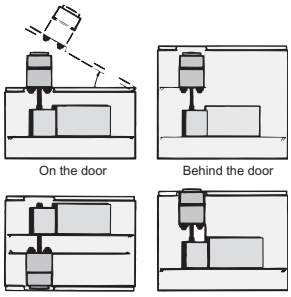
Shaft length inches/mm	H Mounting depth ① in inches	Weight (lbs)	Catalog number	List price
11.0/280	10.2 – 14.5	0.77	OXP12X280	**$ 36**
12.8/325	12.0 – 16.3	0.90	OXP12X325	**40**
15.6/395	14.8 – 19.1	1.10	OXP12X395	**44**
18.3/465	17.5 – 21.9	1.32	OXP12X465	**48**
21.1/535	20.3 – 24.6	1.54	OXP12X535	**52**

Other configurations
Motor operators[1] for 400A – 3150A

OEMO__



OEMO__



Mounting options

Motor operators[1] — Function I/O (On/Off)

For use on:	Voltage	Weight (lbs.)	Catalog number	List price
OT400 – OETL-NF600	24 VDC/AC 48 VDC/AC 110 VAC 220 VAC 220 VDC 230 VAC 240 VAC	14.0	OEMO002/24VDCAC OEMO002/48VDCAC OEMO002/110VAC OEMO002/220VAC OEMO002/220VDC OEMO002/230VAC OEMO002/240VAC	**$ 6514**
OETL-NF800 – OETL-NF1200	24 VDC/AC 48 VDC/AC 110 VAC 110 VDC 220 VAC 220 VDC 230 VAC 240 VAC	14.0	OEMO003/24VDCAC OEMO003/48VDCAC OEMO003/110VAC OEMO003/110VDC OEMO003/220VAC OEMO003/220VDC OEMO003/230VAC OEMO003/240VAC	**7644**
OETL-NF1600 – OETL-NF3150	24 VDC/AC 48 VDC/AC 110 VAC 220 VAC 220 VDC 230 VAC 240 VAC	14.0	OEMO004/24VDCAC OEMO004/48VDCAC OEMO004/110VAC OEMO004/220VAC OEMO004/220VDC OEMO004/230VAC OEMO004/240VAC	**9180**

Motor operators[1] — Function I/O/II (I-OFF-II)

For use on:	Voltage	Weight (lbs.)	Catalog number	List price
OT400 – OETL-NF600	24 VDC/AC 48 VDC/AC 110 VAC 220 VAC 220 VDC 240 VAC	14.0	OEMO202/24VDCAC OEMO202/48VDCAC OEMO202/110VAC OEMO202/220VAC OEMO202/220VDC OEMO202/240VAC	**$ 7644**
OETL-NF800 – OETL-NF1200	24 VDC/AC 48 VDC/AC 110 VAC 220 VAC 240 VAC	14.0	OEMO303/24VDCAC OEMO303/48VDCAC OEMO303/110VAC OEMO303/220VAC OEMO303/240VAC	**9490**

Mounting kit for OEMO motor operator

For use on:	Package (lbs.)		Catalog number	List price
OT400 – OETL-NF600 OETL-NF800 – OETL-NF1200	1 1		OEMOZX1 OEMOZX2	**$ 400**

[1] IEC rated only.

Technical data
OT16E3 – OT160E3
UL & CSA

UL & CSA

Catalog number	3 pole	OT16E3	OT25E3	OT32E3	OT45E3	OT63E3	OT30E3	OT60E3	OT100E3	OT160E3
Approvals①	2 pole	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	UL98 & IEC
	3 pole	UL508 & IEC	UL508 & IEC	UL508 & IEC	UL508 & IEC	UL508 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC
	4 pole	UL508 & IEC	UL508 & IEC	UL508 & IEC	UL508 & IEC	UL508 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC
General purpose amp rating -40° to 40°C										
pf = 0.7 – 0.8	**A**	**16**	**25**	**40**	**60**	**80**	**30**	**60**	**100**	**125**
Max. operating voltage	V	600	600	600	600	600	600	600	600	600
Max. horsepower rating/motor FLA current,										
pf = 0.4 – 0.5										
Three phase 200V – 208V	HP/A	3/10.6	7.5/24.2	10/30.8	15/46.2	20/60.0	10/30.8	20/60.0	25/75.0	30/88.0
240V	HP/A	5/15.2	7.5/22.0	10/28.0	15/42.0	20/54.0	10/28.0	20/54.0	30/80.0	40/104.0
480V	HP/A	10/14.0	15/21.0	20/27.0	30/40.0	40/52.0	20/27.0	40/52.0	50/65.0	75/96.0
600V	HP/A	10/11.0	20/22.0	25/27.0	30/32.0	40/41.0	30/32.0	40/41.0	50/52.0	100/99.0
Single phase 120V	HP/A	1/16	1.5/20	2/24	2/24.0	2/24.0	2/24.0	3/34.0	5/56.0	7.5/80
240V	HP/A	2/13.2	3/18.7	5/30.8	7.5/40.0	10/57.5	5/28.0	7.5/40.0	15/68.0	20/88.0
Short circuit rating with fuse										
Fuse type CC	kA	10 —	10 —	10 —	— —	— —	— —	— —	— —	—
Fuse type J	kA	10 10	10 10	10 10	100 —	100 —	50 —	50 —	50 —	100
Fuse type T	kA	10 10	10 10	10 10	100 —	100 —	50 —	50 —	50 —	—
Fuse type RK1	kA	10 —	10 —	10 —	— —	— —	— —	— —	— —	—
Fuse type RK5	kA	5 5	5 5	5 5	10 5	10 5	— —	— —	— —	—
Fuse type L	kA	— —	— —	— —	— —	— —	— —	— —	— —	—
Fuse type H	kA	— —	— —	— —	— 5	— 5	— —	— —	— —	—
Maximum fuse size	A	30 60④	30 60④	30 60④	100 150	100 150	60 —	150 —	150 —	200
Short circuit rating with MCCB	kA	—	—	—	—	—	—	—	—	25
Endurances										
Min. Electrical endurance, pf = 0.75 – 0.80	operation cycles	6000	6000	6000	6000	6000	6000	6000	6000	6000
Min. Electrical endurance, pf = 0.40 – 0.50	operation cycles	1000	1000	1000	1000	1000	②	②	②	②
Mechanical endurance	operations	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	16,000
Physical characteristics										
Weight, switches 3 pole	lb	0.24	0.24	0.24	0.59	0.59	0.79	0.79	0.79	2.42
4 pole	lb	0.33	0.33	0.33	0.77	0.77	1.10	1.10	1.10	2.86
Dimension, switches 3 pole H	in	2.68	2.68	2.68	3.60	3.60	3.94	3.94	3.94	5.00
W	in	1.38	1.38	1.38	2.07	2.07	2.76	2.76	2.76	4.96
D	in	2.20	2.20	2.20	2.85	2.85	2.95	2.95	2.95	2.93
Shaft set screw tightening torque	lb. in.	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9
Shaft size — square ☐	in	.20 x .20	.20 x .20	.20 x .20	.20 x .20	.20 x .20	.20 x .20	.20 x .20	.20 x .20	.24 x .24
	mm	5 x 5	5 x 5	5 x 5	5 x 5	5 x 5	5 x 5	5 x 5	5 x 5	6 x 6
Switch operating torque for rotary 3 pole switches	lb. in.	8.8	8.8	8.8	10.5	10.5	17.5	17.5	17.5	52.5
Terminal lug kits		Not required	Not required	Not required	Not required	Not required	Not required	Not required	Not required	Not required
Wire range	AWG	#18 – 8	#18 – 8	#18 – 8	#14 – 1	#14 – 1	#14 – 4	#14 – 4	#8 – 1/0	#8 – 1/0
Torque:										
Wire tightening	lb. in.	7	7	7	18	18	55	55	55	70
Lug mounting	lb. in.	Integral	Integral	Integral	Integral	Integral	Integral	Integral	Integral	Integral
Auxiliary contacts		OA1G_ _	OA1G_ _	OA1G_ _	OA1G_ _	OA1G_ _	OA1G_ _	OA1G_ _	OA1G_ _	OBEA_ _
NEMA ratings, AC		A600	A600	A600	A600	A600	A600	A600	A600	A600
AC rated voltage	VAC	600	600	600	600	600	600	600	600	600
AC thermal rated current	A	10	10	10	10	10	10	10	10	10
AC maximum volt-ampere making	VA	7200	7200	7200	7200	7200	7200	7200	7200	7200
AC maximum volt-ampere breaking	VA	720	720	720	720	720	720	720	720	720
NEMA ratings, DC		R300	R300	R300	R300	R300	R300	R300	R300	P600
DC rated voltage	VDC	300	300	300	300	300	300	300	300	600
DC thermal rated current	A	1	1	1	1	1	1	1	1	5
DC maximum make-break	VA	28	28	28	28	28	28	28	28	138
Torque: Wire tightening	lb. in	7	7	7	7	7	7	7	7	7
Wire range	AWG	#18 – 14	#18 – 14	#18 – 14	#18 – 14	#18 – 14	#18 – 14	#18 – 14	#18 – 14	#22 – 14

① UL Listed switches are also CSA Approved.
② UL98 overload test, 50 operations, pf 0.40 – 0.50 at 2x FLA.
③ Multi-tap lug available, please see pg. 18.24 and 18.27.
④ Fuse size 70A for RK5

Technical data
OT200U03 – OETL-NF3150
UL & CSA

UL & CSA

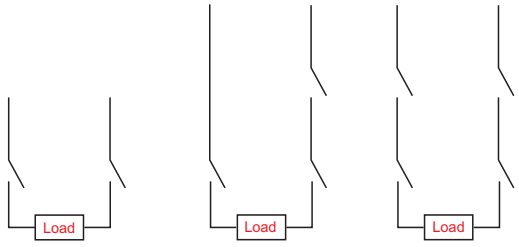
Catalog number	3 pole	OT200U03	OT400U03	OETL-NF600A	OETL-NF800A	OETL-NF1200	OETL-NF1600	OETL-NF2000	OETL-NF3150 ⑤
Approvals①	2 pole 3 pole 4 pole	UL98 & IEC UL98 & IEC IEC	UL98 & IEC UL98 & IEC UL98 & IEC	UL98 & IEC UL98 & IEC UL98 & IEC	UL98 & IEC UL98 & IEC IEC	UL98 & IEC UL98 & IEC IEC	UL98 & IEC UL98 & IEC IEC	UL98 & IEC UL98 & IEC IEC	IEC IEC IEC
General purpose amp rating -40° to 40°C pf = 0.7 – 0.8	**A**	**200**	**400**	**600**	**800**	**1200**	**1600**	**2000**	**3150**
Max. operating voltage	V	600	600	600	600	600	600	480	—
Max. horsepower rating/Max. motor FLA current, pf = 0.4 – 0.5									
Three phase 200 – 208V	HP/A	60/160.0	100/273.0	150/396.0	200/528.0	—	—	—	—
240V	HP/A	75/192.0	125/312.0	200/480.0	250/602.0	—	—	—	—
480V	HP/A	150/180.0	250/302.0	400/477.0	500/590.0	—	—	—	—
600V	HP/A	200/192.0	350/336.0	500/472.0	600/576	—	—	—	—
Single phase 120V	HP/A	—	—	—	—	—	—	—	—
240V	HP/A	—	—	—	—	—	—	—	—
Short circuit rating with fuse									
Fuse type CC	kA	—	—	—	—	—	—	—	—
Fuse type J	kA	100	100	100	—	—	—	—	—
Fuse type T	kA	—	—	100	—	—	—	—	—
Fuse type RK1	kA	—	—	—	—	—	—	—	—
Fuse type RK5	kA	—	—	100	—	—	—	—	—
Fuse type L	kA	—	—	—	100	100	100	100	—
Fuse type H	kA	—	—	—	—	—	—	—	—
Maximum fuse size	A	350	600	600	1200	1200	2000	2000	—
Short circuit rating with MCCB	kA	15	30	50	50	50	65	65	—
Endurances									
Min. Electrical endurance, pf = 0.75 – 0.80	operation cycles	6000	1000	1000	500	500	500	500	400
Min. Electrical endurance, pf = 0.40 – 0.50	operation cycles	②	②	②	②	②	②	②	②
Mechanical endurance	operations	20,000	20,000	10,000	10,000	10,000	6000	6000	6000
Physical characteristics									
Weight, switches 3 pole	lb	2.9	5.7	13.66	35.9	38.55	127.7	127.7	127.7
4 pole	lb	3.5	6.8	16.74	45.15	49.56	149.7	149.7	149.7
Dimension, switches 3 pole H	in	5.9	6.9	8.54	14.65	14.65	21.5	21.5	21.5
W	in	6.7	8.7	11.69	14.25	14.25	18.11	18.11	18.11
D	in	2.8	3.4	5.12	4.92	4.92	10.67	10.67	10.67
Shaft set screw tightening torque	lb. in.	14-17.7	—	—	—	—	—	—	—
Shaft size — square □	in	.24 x .24	.47 x .47	.47 x .47	.47 x .47	.47 x .47	.47 x .47	.47 x .47	.47 x .47
	mm	6 x 6	12 x 12	12 x 12	12 x 12	12 x 12	12 x 12	12 x 12	12 x 12
Switch operating torque for rotary 3 pole switches	lb. in.	62	142	184	184	184	438	438	438
Terminal lug kits		OZXA-200	OZXA-400	OZXA-27	OZXA-30	OZXA-28	OZXA-28	OZXA-28/2	OZXA-28/2
Wire range	AWG	#4-300kcmil③	#2-600kcmil③	(2)#2-600kcmil③	(2)#2-600kcmil③	(4)#2-600kcmil	(4)#2-600kcmil	(8)#2-600kcmil	(8)#2-600kcmil
Torque:									
Wire tightening	lb. in.	200	375	500	375	375	375	375	375
Lug mounting	lb. in.	72	240	480	230	230	230	230	230
Auxiliary contacts		OZXK-_ _	OZXK-_ _	OZXK-_ _	OZXK-_ _	OZXK-_ _	OZXK-_ _	OZXK-_ _	OZXK-_ _
NEMA ratings, AC		A600	A600	A600	A600	A600	A600	A600	A600
AC rated voltage	VAC	600	600	600	600	600	600	600	600
AC thermal rated current	A	10	10	10	10	10	10	10	10
AC maximum volt-ampere making	VA	7200	7200	7200	7200	7200	7200	7200	7200
AC maximum volt-ampere breaking	VA	720	720	720	720	720	720	720	720
NEMA ratings, DC		P600	P600	P600	P600	P600	P600	P600	P600
DC rated voltage	VDC	600	600	600	600	600	600	600	600
DC thermal rated current	A	5	5	5	5	5	5	5	5
DC maximum make-break	VA	138	138	138	138	138	138	138	138
Torque: Wire tightening	lb. in	7	7	7	7	7	7	7	7
Wire range	AWG	#22 – #14	#22 – #14	#22 – #14	#22 – #14	#22 – #14	#22 – #14	#22 – #14	#22 – #14

① UL Listed switches are also CSA Approved.
② UL98 overload test, 50 operations, pf 0.40 – 0.50 at 2x FLA.
③ Multi-tap lug available, please see pg. 18.24 and 18.27.
④ Fuse size 70A for RK5
⑤ IEC rated only.

Technical data
OT16E3 – OT160E3
IEC

IEC

Catalog number		3 pole	OT16E3	OT25E3	OT32E3	OT45E3	OT63E3	OT30E3	OT60E3	OT100E3	OT160E3
Rated insulation and operation		40°C									
voltage, AC20 and DC20		V	750	750	750	750	750	750	750	750	750
Rated impulse withstand voltage		kV	8	8	8	8	8	8	8	8	12
Rated thermal current, I_{th}											
AC 20/DC 20	open ①	A	25	32	40	63	80	40	63	115	200
	40°C enclosed	A	25	32	40	63	80	40	63	115	160
	60°C enclosed	A	25	32	40	63	80	40	63	115	160
Rated operational currents											
AC 21A	≤500V	A	**16**	**25**	**40**	**63**	**80**	**40**	**63**	**100**	**160**
	≤690V	A	16	25	40	63	80	40	63	100	160
	≤1000V	A	—	—	—	—	—	—	—	—	—
AC 22A	≤500V	A	16	25	40	63	80	40	63	100	160
	≤690V	A	16	25	40	63	80	40	63	100	160
	≤1000V	A	—	—	—	—	—	—	—	—	—
AC 23A	≤415V	A	16	20	23	45	75	40	63	80	135
	≤500V	A	16	20	23	45	58	40	60	60	125
	≤690V	A	10	11	12	20	20	40	40	40	80
	≤1000V	A	—	—	—	—	—	—	—	—	—
Rated operational currents/poles in series											
DC21A	48V	A	16/1	25/1	32/1	45/1	63/1	40/1	63/1	100/1	160/1
	110V	A	16/2	25/2	32/2	45/2	63/2	40/2	63/2	100/2	160/1
	220V	A	16/3	25/3	32/3	45/4	63/4	40/4	63/4	100/4	160/2
	440V	A	16/4	25/6	32/6	③	③	③	③	③	160/3
	750V	A	16/8	25/8	32/8	③	③	③	③	③	160/4
DC22A	48V	A	16/1	25/1	32/1	45/1	63/1	40/1	63/1	100/1	160/1
	110V	A	16/2	25/2	32/2	45/2	63/2	40/2	63/2	100/2	160/1
	220V	A	16/3	25/3	32/4	45/4	63/4	40/4	63/4	63/4	160/2
	440V	A	16/6	25/8	③	③	③	③	③	③	160/3
	750V	A	16/8	25/8	③	③	③	③	③	③	③
DC23A	48V	A	16/1	25/1	32/1	45/1	63/1	40/1	63/1	100/1	160/1
	110V	A	16/2	25/2	32/2	45/2	63/2	40/2	63/2	100/2	160/1
	220V	A	16/4	25/4	32/4	45/4	63/4	40/4	63/4	63/4	160/2
	440V	A	10/4	③	③	③	③	③	③	③	160/3
	750V	A	16/8	③	③	③	③	③	③	③	③
Rated operational power											
AC23A	230V	kW	3	4	5.5	11	22	7.5	11	22	45
	400/415V	kW	7.5	9	11	22	37	15	18.5	37	75
	500V	kW	7.5	9	11	22	37	15	18.5	37	75
	690V	kW	7.5	9	11	15	18.5	15	15	37	75
Short-circuit current		kA	50	50	50	50	50	50	50	50	100
with back-up fuses of size		A	25	32	40	63	80	100	100	100	200



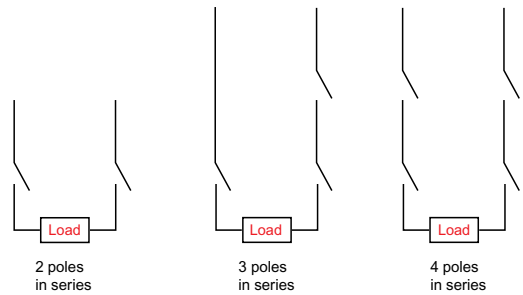
2 poles in series | 3 poles in series | 4 poles in series

① The ambient air temperature does not exceed +40°C and its average over a period of 24 hours does not exceed +35°C according to IEC 947.
② IEC 947-3, utilization category B, infrequent operation.
③ Not available at time of printing, please consult factory.

Technical data
OT200U03 – OETL-NF3150
IEC

IEC

Catalog number	3 pole		OT200U03	OT400UO3	OETL-NF600A	OETL-NF800A	OETL-NF1200	OETL-NF1600	OETL-NF2000	OETL-NF3150
Rated insulation and operational	40°C									
voltage, AC20 and DC20		V	1000	1000	1000	1000	1000	1000	1000	1000
Rated impulse withstand voltage		kV	12	12	12	8	8	8	8	8
Rated thermal current, I_{th}										
AC 20/DC 20	open①	A	250	400	800	1250	1600	2500	3150	
	40°C enclosed	A	250	400	720	1250	1600	2300	2300	2600
	60°C enclosed	A	—	—	600	1000	1250	1950	1950	2300
Rated operational currents										
AC 21A	≤500V	A	**250**	**400**	**800**	**1250**	**1600**	**2500**②	**2500**②	**3150**②
	≤690V	A	250	400	800	1250	1600	2500②	2500②	3150②
	≤1000V	A	—	—	630	—	—	—	—	—
AC 22A	≤500V	A	250	400	800	1250	1600	1600②	1600②	1600②
	≤690V	A	250	400	800	—	—	—	—	—
	≤1000V	A	—	—	400	—	—	—	—	—
AC 23A	≤415V	A	250	400	720	800	800	800②	800②	800②
	≤500V	A	250	400	600	800	800	800②	800②	800②
	≤690V	A	250	400	350	—	—	—	—	—
	≤1000V	A	—	—	200	—	—	—	—	—
Rated operational currents/poles in series										
DC21A	48V	A	250/1	630/2	800/2	1250/2	1600/2	2500/2	2500/2	3150/2
	110V	A	250/2	630/2	800/2	1250/2	1600/2	2500/2	2500/2	3150/2
	220V	A	250/2	630/2	800/2	1250/2	1600/2	2500/2	2500/2	3150/2
	440V	A	250/3	630/3	800/3	1250/3	1600/3	2500/3	2500/3	3150/2
	750V	A	250/4	—	—	—	—	—	—	—
DC22A	48V	A	250/1	630/2	800/2	1250/2	1600/2	2500/2	2500/2	3150/2
	110V	A	250/2	630/2	800/2	1250/2	1600/2	2500/2	2500/2	3150/2
	220V	A	250/2	630/2	800/2	1250/2	1600/2	2500/2	2500/2	3150/2
	440V	A	250/3	630/3	800/3	—	—	—	—	—
	750V	A	250/4	—	—	—	—	—	—	—
DC23A	48V	A	250/1	630/2	—	—	—	—	—	—
	110V	A	250/2	630/2	—	—	—	—	—	—
	220V	A	250/2	630/2	—	—	—	—	—	—
	440V	A	250/3	—	—	—	—	—	—	—
	750V	A	250/4	—	—	—	—	—	—	—
Rated operational power										
AC23A	230V	kW	75	110	200	250	250	250	250	250
	400/415V	kW	132/140	220/230	355	400	400	400	400	400
	500V	kW	170	280	400	450	450	450	450	450
	690V	kW	240	355	355	—	—	—	—	—
Short-circuit current		kA	100	100	100	50/50④	50/50④	50/63④	50/63④	50/63④
with back-up fuses of size		A	400	800	800	—	—	—	—	—



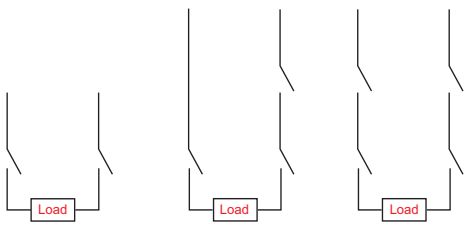
2 poles in series | 3 poles in series | 4 poles in series

① The ambient air temperature does not exceed +40°C and its average over a period of 24 hours does not exceed +35°C according to IEC 947.
② IEC 947-3, utilization category B, infrequent operation.
③ Not available at time of printing, please consult factory.
④ 690V / 500V

Technical data
OT16E3 – OT160E3
IEC

IEC

Catalog number	3 pole		OT16E3	OT25E3	OT32E3	OT45E3	OT63E3	OT30E3	OT60E3	OT100E3	OT160E3
Rated voltage, U^e		V/V	415/690	415/690	415/690	415/690	415/690	415/690	415/690	415/690	500/690
Rated conditional short-circuit current		kA	50	50	50	50	50	50	50	50	100/50
Max. allowed fuse size, type OFAA		A	25	32	40/32	63/50	80	100	100	100	200
Max. allowed cut-off current, peak value		kA	6.5/4	6.5/4	6.5/4	8.3/6.7	11	18/10	18/10	18/10	30/25
Rated short-circuit making capacity, prospective peak value, I^{cm}		kA	0.7	0.7	0.7	1.4	1.4	3.6	3.6	3.6	12
Rated short time withstand current,											
RMS I^{cw}	0.2s	kA	—	—	—	—	—	—	—	—	7
RMS I^{cw}	1.0s	kA	0.5	0.5	0.5	1	1	2.5	2.5	2.5	4
AC breaking capacity											
pf = 0.35	≤415V	A	128	160	184	240	304	320	504	640	1080
	≤500V	A	128	160	184	240	256	320	480	480	1000
	≤690V	A	80	88	96	160	160	320	320	320	640
DC breaking capacity/poles in series											
L/R = 15ms, 3 pole in series											
	≤48V	A	64/1	100/1	128/1	180/1	252/1	160/1	252/1	400/1	640/1
	≤110V	A	64/2	100/2	128/2	180/2	252/2	160/2	252/2	400/2	640/1
	≤220V	A	64/3	100/4	128/4	180/4	180/4	160/4	252/4	252/4	640/2
	≤440V	A	①	①	①	①	①	①	①	①	640/3
	≤750V	A	①	①	①	①	①	①	①	①	①
Capacitor ratings	≤400/415V	kVar	①	①	①	①	①	①	①	①	①
Physical characteristics											
Electrical endurance at rated operational current, pf = 0.65		operation cycles	3000	3000	3000	3000	3000	3000	3000	3000	1000
Mechanical endurance		operations	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	16,000
Weight	3 pole	kg	0.11	0.11	0.11	0.27	0.27	0.36	0.36	0.36	1.1
	4 pole	kg	0.15	0.15	0.15	0.35	0.35	0.5	0.5	0.5	1.3
Dimension	3 pole	H mm	68	68	68	91.5	91.5	100	100	100	127
		W mm	35	35	35	52.5	52.5	70	70	70	126
		D mm	56	56	56	72.5	72.5	75	75	75	74.5
Power loss per pole		W	0.3	0.6	1	1.4	2.8	1	1.6	4	6.5
Shaft size — square □		mm	5 X 5	5 x 5	5 x 5	5 x 5	5 x 5	5 x 5	5 x 5	5 x 5	6 x 6
Switch operating torque for rotary 3 pole switches		Nm	1	1	1	1.2	1.2	2	2	2	6
Suitable conductor cross section Cu		mm2	0.75 – 10	0.75 – 10	0.75 – 10	1.5 – 25	1.5 – 25	1.5 – 25	1.5 – 25	10 – 70	10 – 70
Bolt size			—	—	—	—	—	—	—	—	—
Auxiliary contacts			OA1G_ _	OA1G_ _	OA1G_ _	OA1G_ _	OA1G_ _	OA1G_ _	OA1G_ _	OA1G_ _	OBEA_ _
Ratings according to IEC 947-5-1											
Rated voltage, U^i		VAC	690	690	690	690	690	690	690	690	690
Thermal current, I^{th}		A	16	16	16	16	16	16	16	16	10
AC12/DC12 I^e, A	U^e =120V	A	—	—	—	—	—	—	—	—	8/—
	125V	A	—	—	—	—	—	—	—	—	—/1.1
	240V	A	6 ②	6 ②	6 ②	6 ②	6 ②	6 ②	6 ②	6 ②	6/—
	250V	A	—	—	—	—	—	—	—	—	—/0.55
	400V	A	4 ②	4 ②	4 ②	4 ②	4 ②	4 ②	4 ②	4 ②	4/—
	415V	A	—	—	—	—	—	—	—	—	4/—
	440V	A	—	—	—	—	—	—	—	—	—/0.31
	480V	A	—	—	—	—	—	—	—	—	3/—
	500V	A	—	—	—	—	—	—	—	—	3/0.27
	600V	A	—	—	—	—	—	—	—	—	—/0.2
	690V	A	2 ②	2 ②	2 ②	2 ②	2 ②	2 ②	2 ②	2 ②	2/—



2 poles in series | 3 poles in series | 4 poles in series

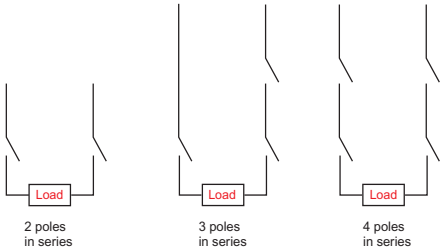
① Not available at time of printing, please consult factory.
② AC15, according to IEC947-5-1.

Technical data
OT200U03 – OETL-NF3150
IEC

IEC

Catalog number	3 pole		OT200U03	OT400U03	OETL-NF600A	OETL-NF800A	OETL-NF1200	OETL-NF1600	OETL-NF2000	OETL-NF3150
Rated voltage, U_e		V/V	500/690	500/690	500/690	500/690	500/690	500/690	500/690	500/690
Rated conditional short-circuit current		kA	100/80	100/80	100/50	50	50	63/50	63/50	63/50
Max. allowed fuse size, type OFAA		A	315/355	500/500	800	—	—	—	—	—
Max. allowed cut-off current, peak value		kA	40.5/40.5	615/59	70/63	—	—	—	—	—
Rated short-circuit making capacity, prospective peak value, I_{cm}500/690V		kA	30	65	80	105	105	140/105	140/105	140/105
Rated short time withstand current,										
RMS I_{cw}	0.2s	kA	15	28	38	—	—	—	—	—
RMS I_{cw}	1.0s	kA	8	15	17	50 ②	50 ②	80 ②	80 ②	80 ②
AC breaking capacity										
pf = 0.35	≤415V	A	2000	3200	5760	6400	6400	6400	6400	6400
	≤500V	A	2000	3200	4800	6400	6400	6400	6400	6400
	≤690V	A	2000	3200	2800	2500 ③	2500 ③	4800 ④	4800 ④	4800 ④
DC breaking capacity/poles in series										
L/R = 15ms, 3 pole in series										
	48V	A	1000/2	①	①	①	①	①	①	①
	110V	A	1000/2	①	①	①	①	①	①	①
	220V	A	1000/2	1600/2	2000/2	1900/2	2600/2	2600/2	2600/2	2600/2
	440V	A	1000/3	1600	2000	①	①	①	①	①
	750V	A	1000/4	①	①	①	①	①	①	①
Capacitor ratings	400/415V	kVar	—	—	330	①	①	①	①	①
Rated capacitor duty		kA	—	—	500	①	①	①	①	①
Physical characteristics										
Electrical endurance at rated operational current, pf = 0.65		operation cycles	1000	1000	500	500	500	100 ⑤	100 ⑤	100 ⑤
Mechanical endurance		operations	20,000	16,000	10,000	10,000	10,000	6000	6000	6000
Weight	3 pole	kg	1.2	2.2	6.2	16.3	17.5	37	37	37
	4 pole	kg	1.6	2.6	7.6	20.5	22.5	47	47	47
Dimension	3 pole	H mm	162	216	216	372	372	546	546	546
		W mm	219	260	304	363	363	468	468	468
		D mm	92.5	130	130	125	125	271	271	271
Power loss per one pole		W	6.5	10	40	40	67	90	90	140
Shaft size — square □		mm	6 x 6	12 x 12	12 x 12	12 x 12	12 x 12	12 x 12	12 x 12	12 x 12
Switch operating torque for rotary 3 pole switches		Nm	7	16	21	21	21	50	50	50
Suitable conductor cross section Cu		mm^2	—	—	—	—	—	—	—	—
Bolt size			8 x 25	10 x 30	12 x 40	12 x 60	12 x 60	12 x 60	12 x 60	12 x 60
Auxiliary contacts			OA_G_	OA_G_	OZXK-_ _	OZXK-_ _	OZXK-_ _	OZXK-_ _	OZXK-_ _	OZXK-_ _
Ratings according to IEC 947-5-1										
Rated voltage, U_i		VAC	690	690	690	690	690	690	690	690
Thermal rated current, I_{th}		A	16	16	10	10	10	10	10	10
AC12/DC12 I_e, A U_e =	120V	A	—	—	8/—	8/—	8/—	8/—	8/—	8/—
	125V	A	—	—	—/1.1	—/1.1	—/1.1	—/1.1	—/1.1	—/1.1
	240V	A	6/—	6/—	6/—	6/—	6/—	6/—	6/—	6/—
	250V	A	—	—	—/0.55	—/0.55	—/0.55	—/0.55	—/0.55	—/0.55
	400V	A	4/—	4/—	4/—	4/—	4/—	4/—	4/—	4/—
	415V	A	—	—	4/—	4/—	4/—	4/—	4/—	4/—
	440V	A	—	—	—/0.31	—/0.31	—/0.31	—/0.31	—/0.31	—/0.31
	480V	A	—	—	3/—	3/—	3/—	3/—	3/—	3/—
	500V	A	—	—	3/0.27	3/0.27	3/0.27	3/0.27	3/0.27	3/0.27
	600V	A	—	—	—/0.2	—/0.2	—/0.2	—/0.2	—/0.	2—/0.2
	690V	A	2/—	2/—	2/—	2/—	2/—	2/—	2/—	2/—

① Not available at time of printing, please consult factory.
② Maximum distance between busbar support and switch terminal 70mm.
③ pf 0.95.
④ pf 0.65.
⑤ IEC 947-3, utilization category B, infrequent operation.



Selecting switches
per NEC & IEC

Selecting switches per NEC

Article 430 of the US National Electric Code includes two methods for properly sizing disconnect switches:

1. Single motor application

A properly sized disconnect switch for a single motor will:

a) have an ampere rating greater than or equal to 115 percent of the rated motor full load current; or,

b) have a HP rating greater than or equal to the rated motor HP (at applied voltage) if the disconnect switch under consideration is HP rated.

2. Combination load application

A properly sized disconnect switch for a combination load will be selected by adding all the simultaneous individual loads in the circuit under consideration.

Using motor nameplate information, load information, and tables from section 430 of the NEC, determine one equivalent full load current and one equivalent locked rotor current. The equivalent locked rotor current can be used with table 430-151 to determine an equivalent HP rating. Select a disconnect switch:

a) greater than or equal to 115 percent of the equivalent full load current; and,

b) greater than or equal to the equivalent HP rating.

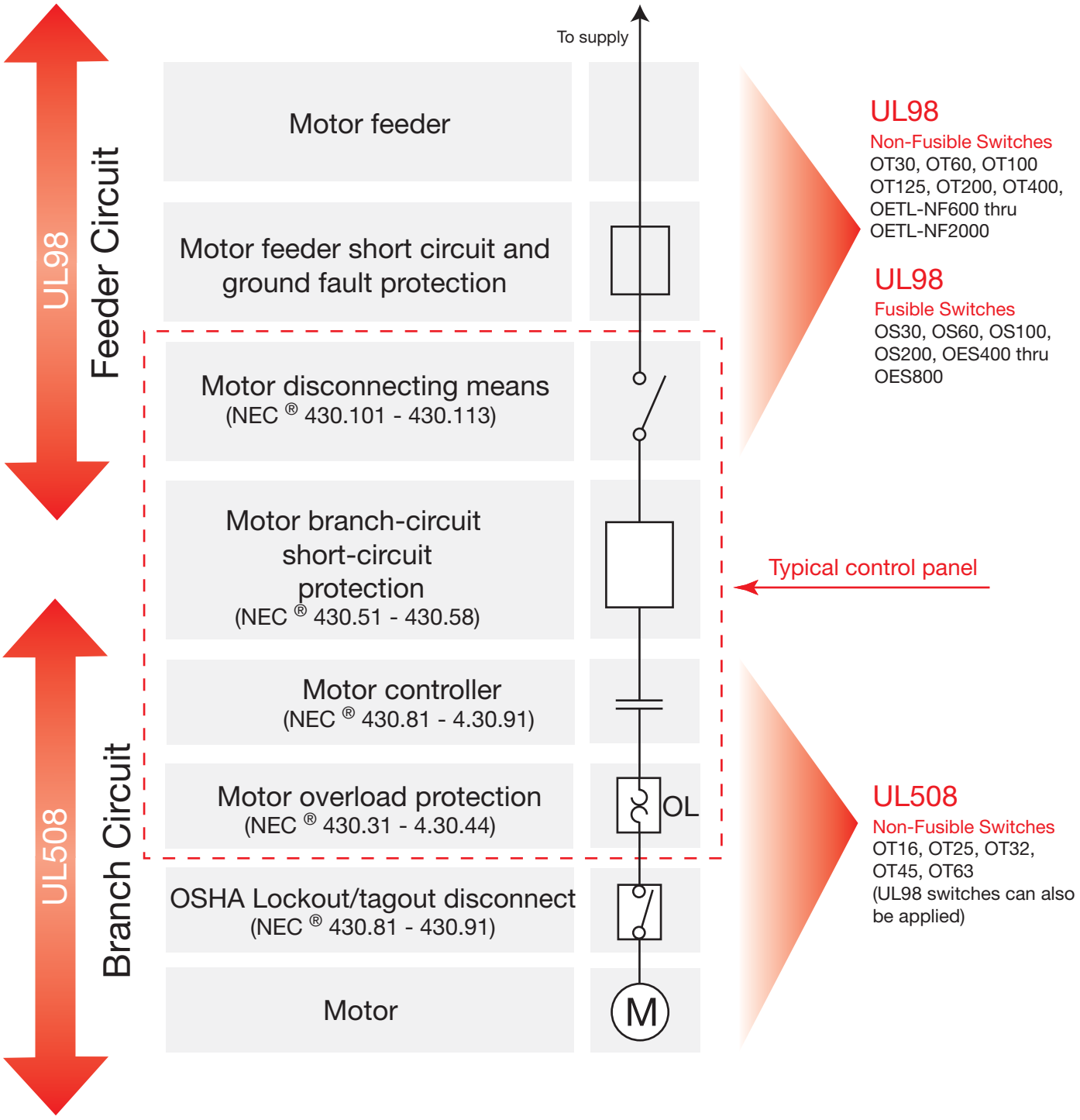
Selecting switches per IEC

Utilization categories

Nature of current	Utilization category		Typical applications
	Frequent operation	Infrequent operation	
Alternating current	AC-20A	AC-20B	• Connecting and disconnecting under no-load conditions
	AC-21A	AC-21B	• Switching of resistive loads including moderate overloads (PF > 0.95)
	AC-22A	AC-22B	• Switching of mixed resistive and inductive loads, including moderate overloads (PF > 0.65)
	AC-23A	AC-23B	• Switching of motor loads or other highly inductive loads (PF > 0.45 below 100A; PF > 0.35 above 100A)
Direct current	DC-20A	DC-20B	• Connecting and disconnecting under no-load conditions
	DC-21A	DC-21B	• Switching of resistive loads including moderate overloads (L/R < 1ms)
	DC-22A	DC-22B	• Switching of mixed resistive and inductive loads, including moderate overloads e.g., shunt motors (L/R < 2.5ms)
	DC-23A	DC-23B	• Switching of highly inductive loads e.g., series motors (L/R < 15ms)
Mechanical endurance	Number of operations	Number of operations	
100A 315A >315A	10,000 8000 2000	2000 1600 400	

• Category AC-23 includes occasional switching of individual motors. The switching of capacitors of tungsten filament lamps shall be subject to agreement between manufacturer and user.

Use of UL98 & UL508 Disconnects
According to *NEC* ® Article 430



Definitions

AC – Alternating current — Current that reverses its direction of flow twice per cycle.

Ambient temperature — Temperature of the air surrounding the unit.

Amp rating — The basic unit of measurement for electric current (columbs / seconds).

Conventional thermal current I_{th} — Value of the current the disconnect switch can withstand with poles in closed position, in free air for an eight hour duty, without the temperature rise of its various parts exceeding the limits specified by the standards.

Cycle duration — Total time of the on-load + off-load period.

DC – Direct current — Current that flows in only one direction.

Electrical endurance — Number of on-load operating cycles.

IEC environmental protection type — see page 18.52.

Full load amp current FLA — The current required by a motor to produce full-load torque at the motor's rated speed.

Inductive load — An electrical load characterized by having significant inrush (5 to 6 times FLA for typical design-B AC induction motors).

kW — Kilowatts (1000 watts)

Lockout/Tagout — Means of removing power from electrical equipment during inspection, service or repair.

Make / Break — ON / OFF

Mechanical endurance — Number of off-load operating cycles.

Poles in series — Means of connection poles using wires or bus bars to increase breaking capacity of load.

Power factor — The relationship between working power and total power consumed. Power factor measures how effectively electrical power is being used.

Rated insulation U_i — Voltage value which designates the unit and to which dielectric tests, clearance and creepage distances are referred.

Rated operating current I_e —Current value stated by the manufacturer and taking into account the rated operating voltage U_e, the rated frequency, the rated duty, the utilization category, the electrical contact life and the type of protective enclosure.

Rated operating voltage U_e — Voltage value to which utilization characteristics of the disconnect switch are referred, i.e. phase-to-phase voltage in 3 phase circuits.

Rated short circuit making capacity I_{cm}— The rated short-circuit making capacity of a disconnect switch, a disconnector or a switch-disconnector is the value assigned to equipment at the rated operational voltage, frequency (if any) and specified power-factor for AC or time constant for DC. It is expressed as the maximum prospective peak current under prescribed conditions.

Rated short time withstand current I_{cw} — The rated short-time withstand current of a disconnect switch, a disconnector or a switch-disconnector is the value that the equipment can carry without damage, under the test conditions specified in the relevant product standard. The value of the rated short-time withstand current shall be not less than twelve times the maximum rated operational current unless otherwise stated by manufacturer and the duration of the current shall be 1 s.

Resistive load — An electrical load characterized by not having any significant inrush current.

Short circuit protection coordination — Co-ordination types "1" and "2" are defined in IEC 947-4-1.
Type 1 coordination — There has to be no discharge of parts beyond the enclosure. Damage to the contactor and the overload is acceptable.
Type 2 coordination — No damage to the overload relay or other parts has occurred, except that welding of contactor or starter contacts is permitted, if they are easily separated.

Time constant — Ratio of inductance to the resistance: L/R = mH/Ohm = ms.

Torque — The force that produces rotation. It is commonly measured in pound-feet (lb-ft). Torque applies to such things as motor operations, handle rotations, wire tightening.

NEMA environmental protection type — see page 18.51.

Volt — The unit of electrical potential difference and electromotive force.

NEMA Environmental ratings

Introduction

An enclosure is a surrounding case constructed to provide a degree of protection to personnel against accidental contact with the enclosed equipment and to provide a degree of protection to the enclosed equipment against specified environmental conditions.

A brief description of the more common types of enclosures used by the electrical industry relating to their environmental capabilities follows. Refer to NEMA Standards Publication for more information regarding applications, features and design tests.

Individual NEMA product Standards Publications or third party certification standards may contain additional requirements for product testing and performance.

Definitions pertaining to nonhazardous locations

Type 1

Enclosures are intended for indoor use primarily to provide a degree of protection against limited amounts of falling dirt. (NEMA Standard 7-15-1991.)

Type 3R

Enclosures are intended for outdoor use primarily to provide a degree of protection against rain, sleet and damage from external ice formation. (NEMA Standard 7-15-1991.)

Type 4

Enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water, hose-directed water and damage from external ice formation. (NEMA Standard 1-10-1979.)

Type 4X

Enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, hose-directed water and damage from external ice formation. (NEMA Standard 1-10-1979)

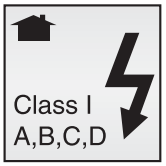
Type 12

Enclosures are intended for indoor use primarily to provide a degree of protection against circulating dust, falling dirt, and dripping noncorrosive liquids. (NEMA Standard 7-15-1991.)

Type 13

Enclosures are intended for indoor use primarily to provide a degree of protection against dust, spraying of water, oil and noncorrosive coolant. (NEMA Standard 1-10-1979.)

Definitions pertaining to hazardous locations

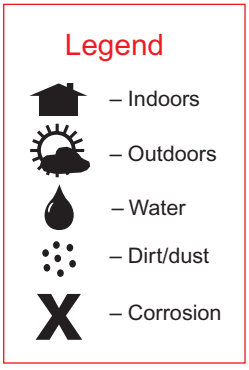


Type 7

Enclosures are intended for indoor use in locations classified as Class I, Groups, A, B, C, or D, as defined in the National Electrical Code. (NEMA Standard 7-15-1991.)

Type 9

Enclosures are intended for indoor use in locations classified as Class II, Groups E, F, or G, as defined in the National Electrical Code. (NEMA Standard 7-15-1991.)



IEC Environmental ratings

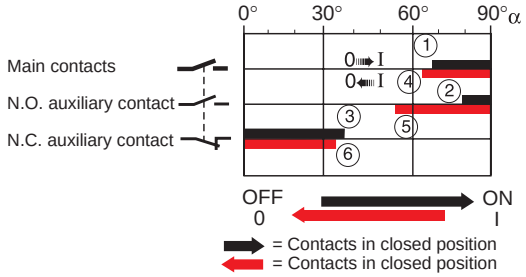
IP ratings

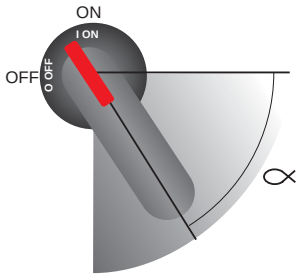
indicate the degree of protection against dust, liquids and impacts. The IP degrees of protection are defined by the French standard NFC 20-010. To rate a device's degrees of protection, the letters IP are followed by up to three numbers. These numbers are defined as follows:

first number protection against solid objects	second number protection against liquids	third number protection against mechanical impacts
IP 0 no protection	IP 0 no protection	IP 0 no protection
1 protected against solid objects over 50mm (e.g. accidental touch by hands.)	1 protected against vertically falling rain or condensation	1 impact 0,225 joule 150g falling from 15 cm
2 protected against solid objects over 12 mm (e.g. fingers)	2 protected against direct sprays of water up to 15° from vertical	2 impact 0,375 joule 250g falling from15 cm
3 protected against solid objects over 2.5 mm (tools & wires)	3 protected against sprays to 60° from vertical	3 impact 0,50 joule 250g falling from 20cm
4 protected against solid objects over 1mm (small tools & small wires)	4 protected against water sprayed from all directions	5 impact 2,00 joule 500g falling from 40 cm
5 protected against dust (no harmful deposit)	5 protected against low pressure jets of water from all directions	7 impact 6,00 joule 1.5kg falling from 40 cm
6 totally protected against dust	6 protected from strong jets of water (e.g. for use on ship decks)	9 impact 20,00 joule 5 kg falling from 40 cm
	7 protected against the effects of immersion between 15cm and 1m	

Auxiliary contact timing diagrams
OT16 – OT100

Legend





Contacts closing

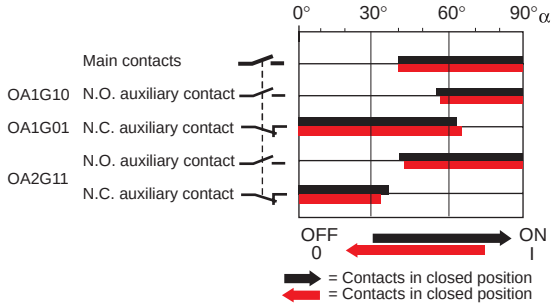
① Main contacts close
② N.O. auxiliary contacts close
③ N.C. auxiliary contacts open

Contacts opening

④ Main contacts open
⑤ N.O. auxiliary contacts open
⑥ N.C. auxiliary contacts close

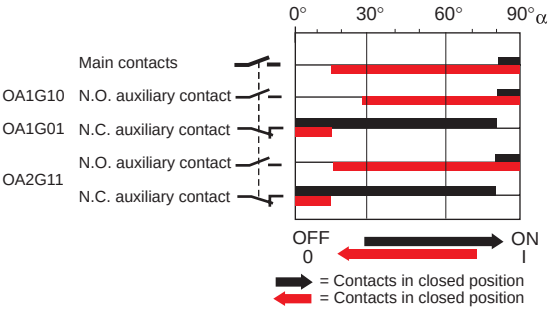
OT16, OT25, OT32

Catalog number	Auxiliary contact	Contact configuration
OT16, OT25, OT32	OA1G10 OA1G01 OA2G11	1 N.O. 1 N.C. 1 N.O. & 1 N.C.



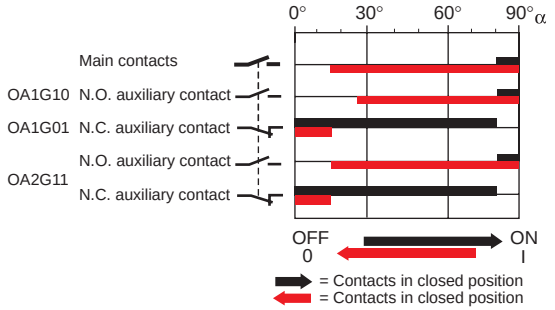
OT45, OT63

Catalog number	Auxiliary contact	Contact configuration
OT45, OT63	OA1G10 OA1G01 OA2G11	1 N.O. 1 N.C. 1 N.O. & 1 N.C.



OT30, OT60, OT100

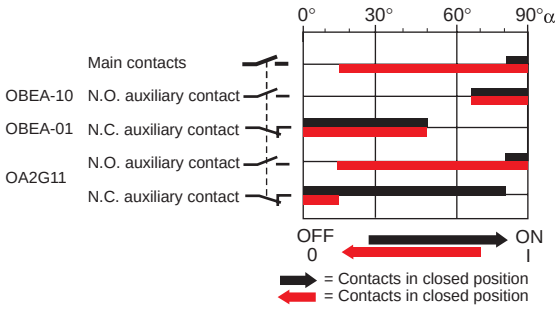
Catalog number	Auxiliary contact	Contact configuration
OT30, OT60, OT100	OA1G10 OA1G01 OA2G11	1 N.O. 1 N.C. 1 N.O. & 1 N.C.



Auxiliary contact timing diagrams
OT160 – OT400

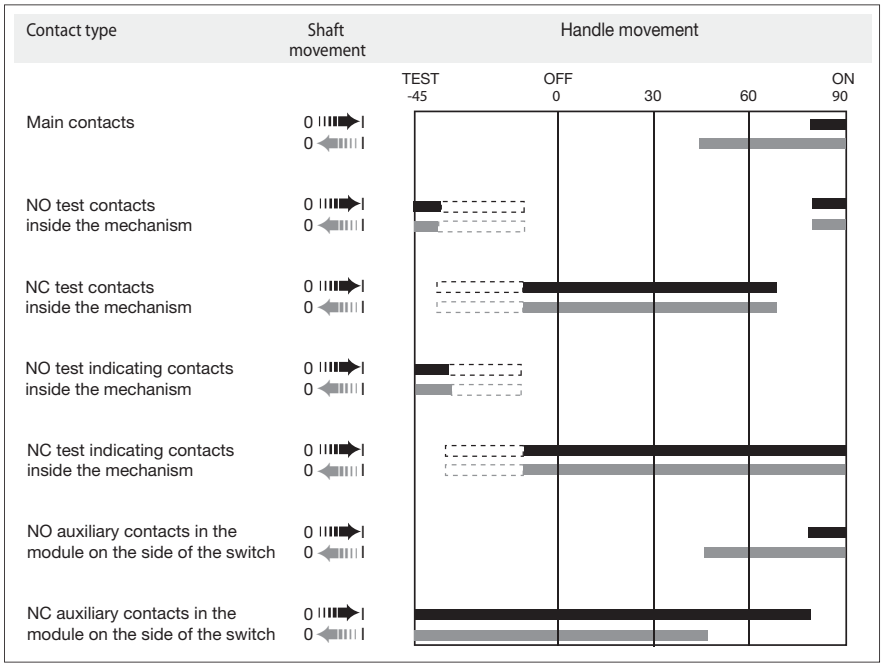
OT160E3

Catalog number	Auxiliary contact	Contact configuration
OT160E3	OBEA-10 OBEA-01 OA2G11	1 N.O. 1 N.C. 1 N.O. & 1 N.C.



OT200U03 – OT400U03

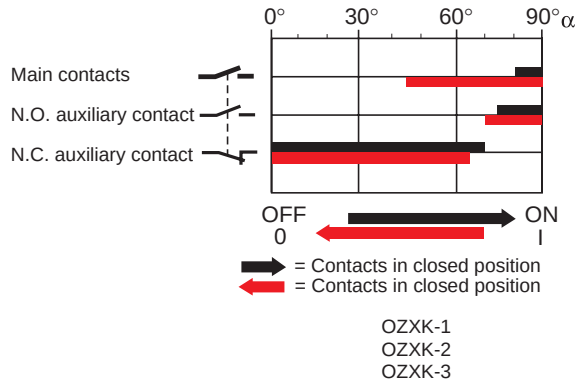
Catalog number	Auxiliary contact	Contact configuration
OT200U03 – OT400U03	OA1G10 OA3G01	1 N.O. 1 N.C.



Auxiliary contact timing diagrams
OETL-NF600 – OETL-NF3150

OETL-NF600A

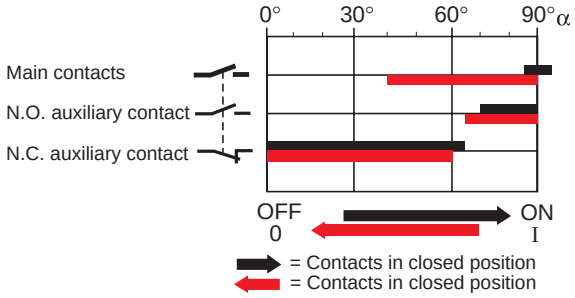
Catalog number	Auxiliary contact	Contact configuration form C
OETL-NF600A	OZXK-1 OZXK-2 OZXK-3	1 N.O. & 1 N.C. 2 N.O. & 2 N.C. 4 N.O. & 4 N.C.



OZXK-1
OZXK-2
OZXK-3

OETL-NF800A – OETL-NF3150

Catalog number	Auxiliary contact	Contact configuration
OETL-NF800A – OETL-NF3150	OZXK-1 OZXK-2 OZXK-3	1 N.O. & 1 N.C. 2 N.O. & 2 N.C. 4 N.O. & 4 N.C.

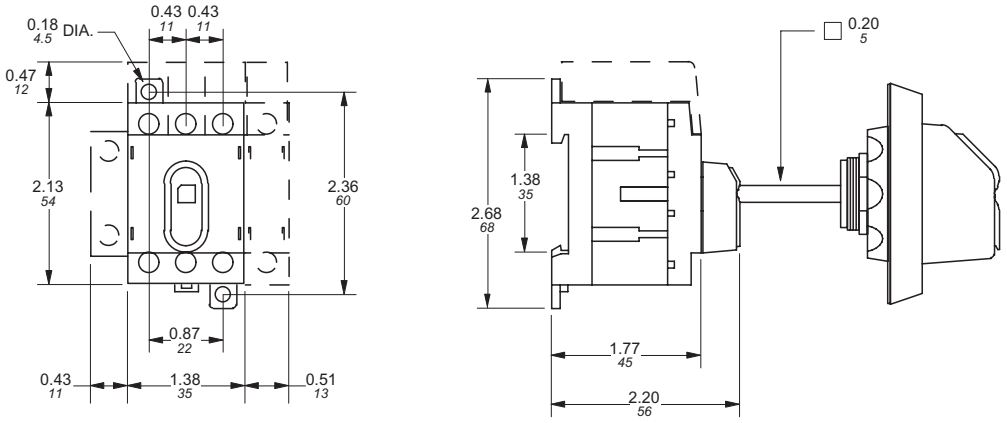


OZXK-1
OZXK-2
OZXK-3

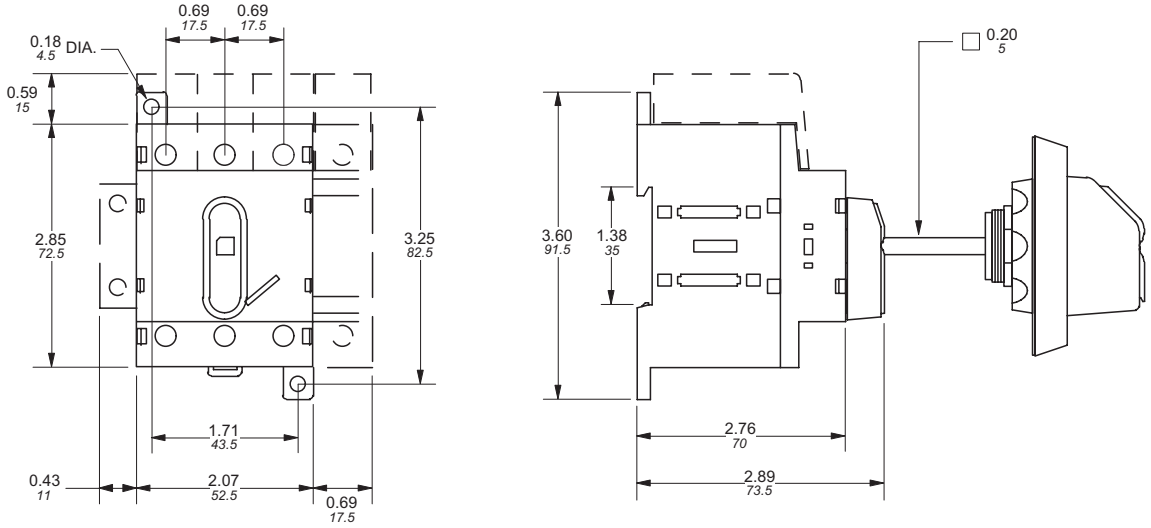
Approximate dimensions
OT16E3 – OT100E3
Base & DIN rail mounted switches

00.00 / 00.00 Inches [Millimeters]

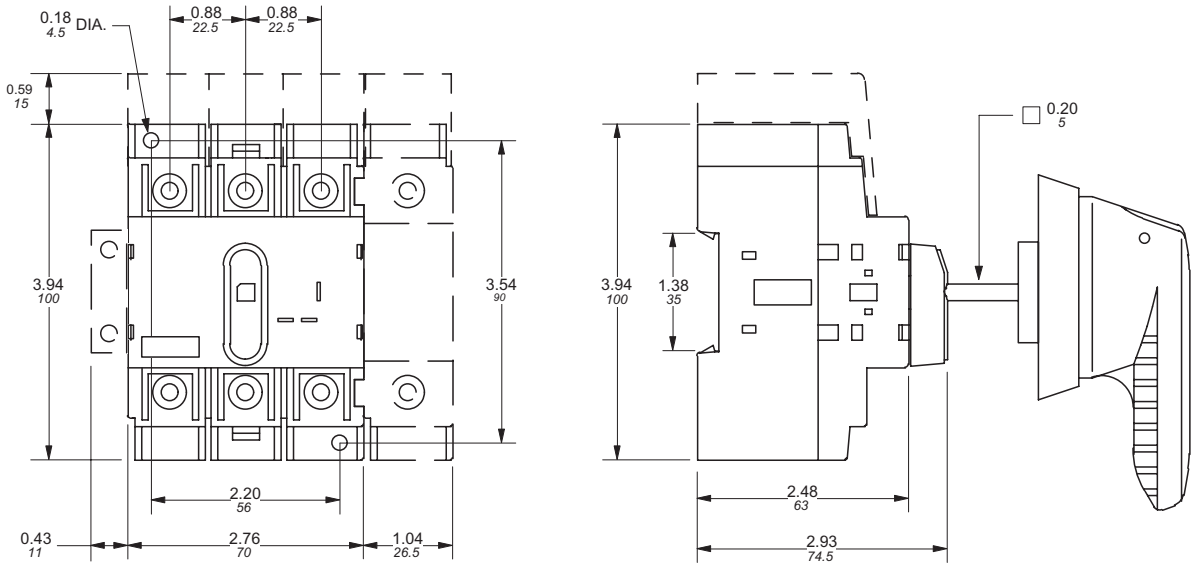
OT16E3, OT25E3, OT32E3 — base & DIN rail mounted switch



OT45E3, OT63E3 — base & DIN rail mounted switch



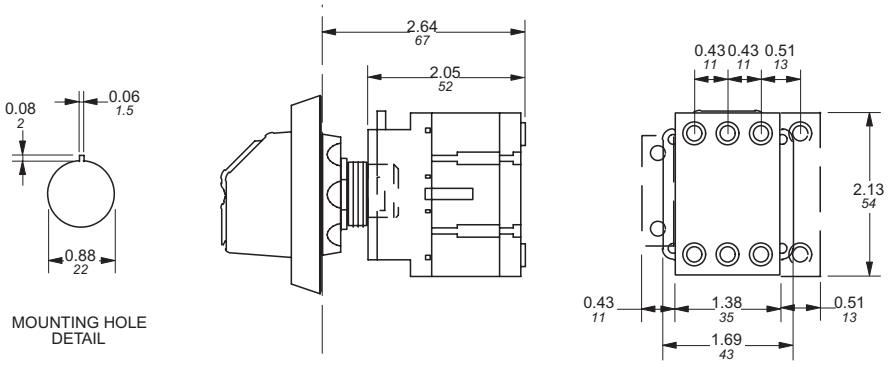
OT30E3, OT60E3, OT100E3 — base & DIN rail mounted switch



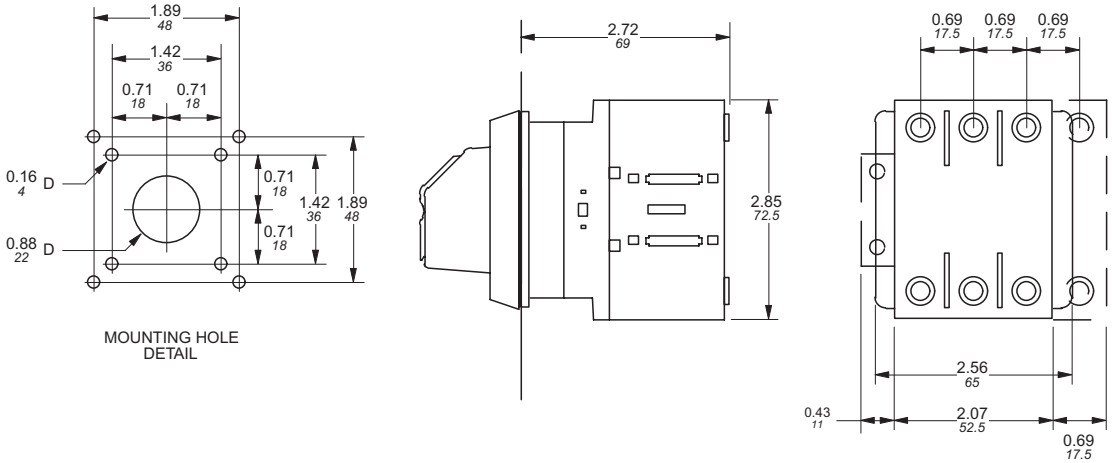
Approximate dimensions
OT16ET3 – OT100ET3
Door mounted switches

00.00 / 00.00 Inches [Millimeters]

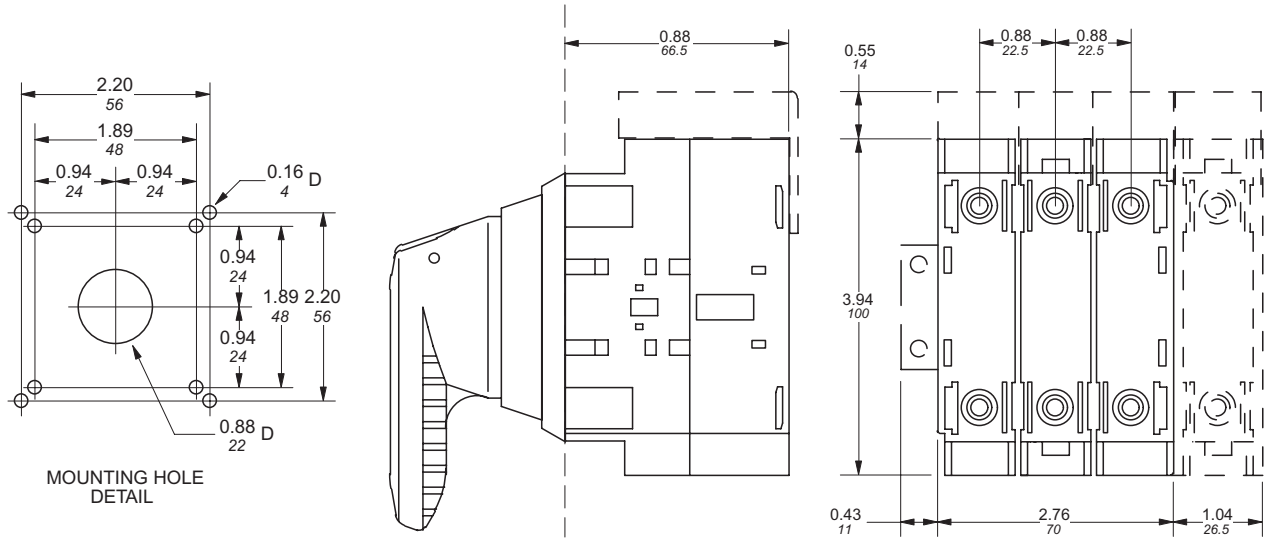
OT16ET3, OT25ET3, OT32ET3 — door mounted switch



OT45ET3, OT63ET3 — door mounted switch



OT30ET3, OT60ET3, OT100ET3 — door mounted switch

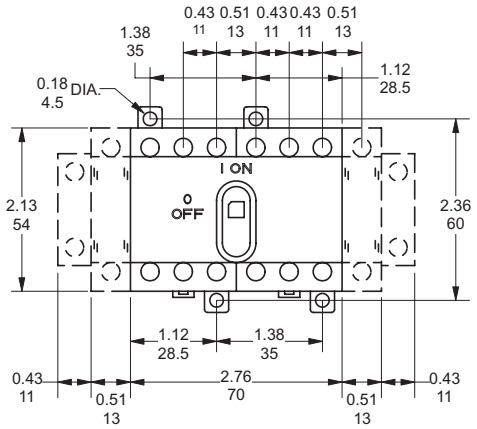


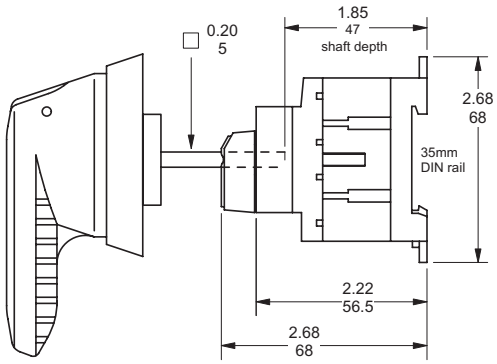
18

Approximate dimensions
OT16E6 & E8 – OT100E6 & E8
6-pole switches

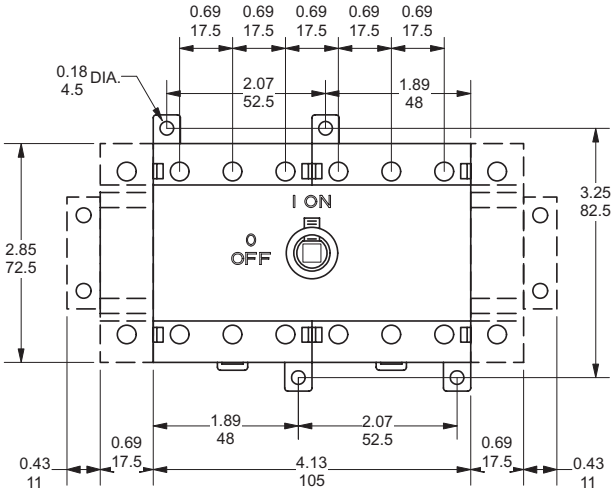
00.00 / 00.00 Inches [Millimeters]

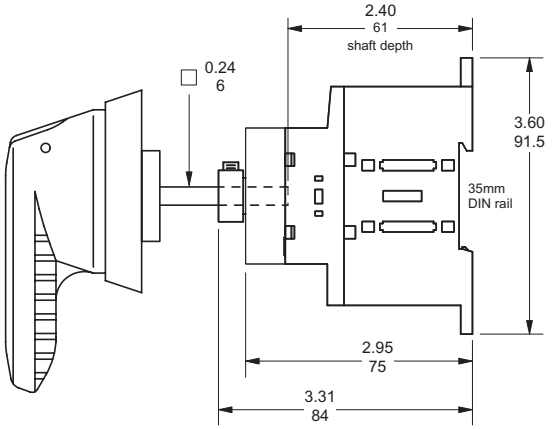
OT16, 25, 32E6 & E8 — 6 Pole switches



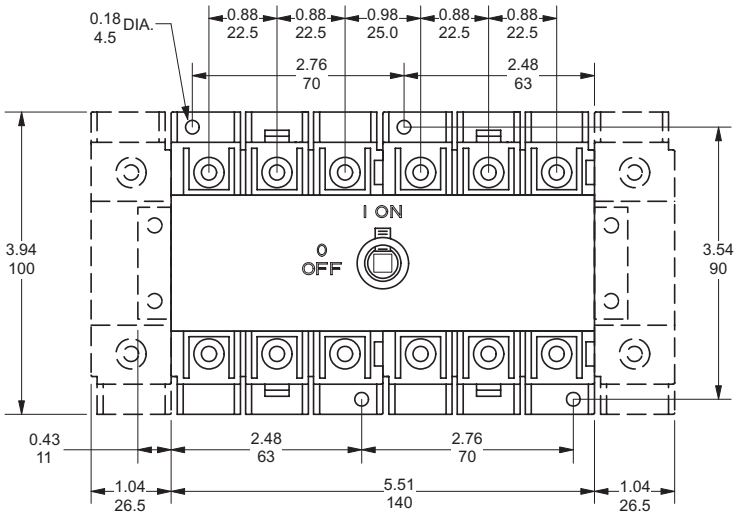


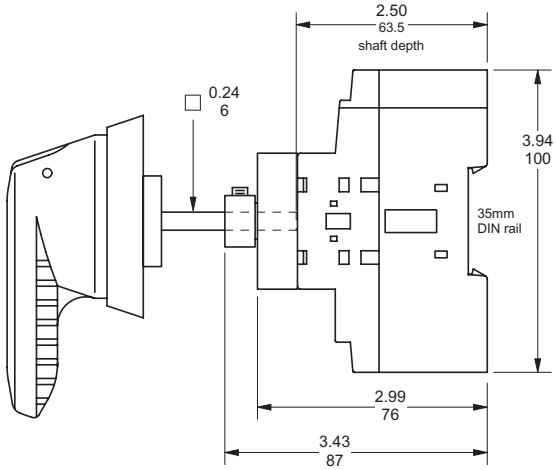
OT45, 63E6 & E8 — 6 Pole switches





OT100E6 & E8 — 6 Pole switches

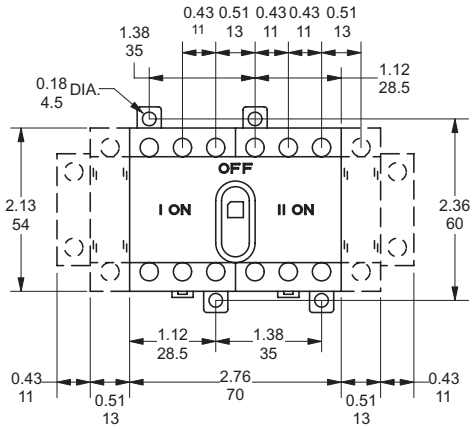


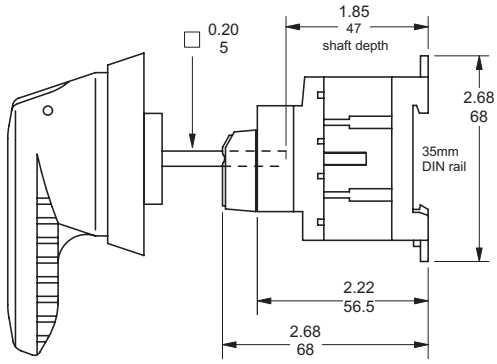


Approximate dimensions
OT16E3C & E4C – OT100E3C & E4C
Transfer switches

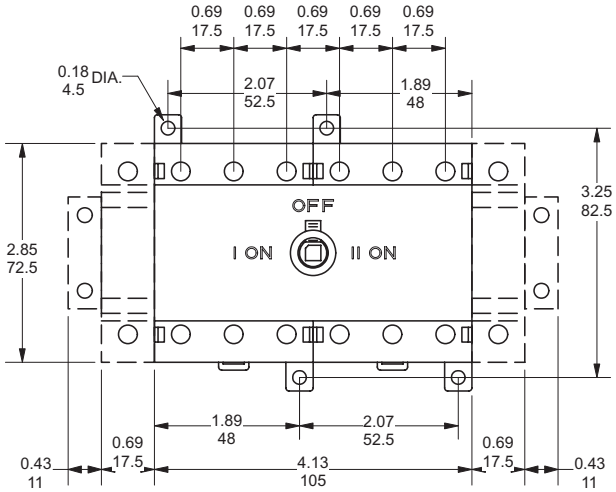
00.00 / 00.00 Inches [Millimeters]

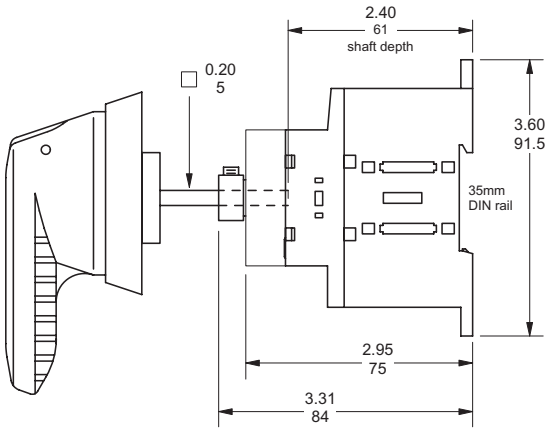
OT16, 25, 32E3C & E4C – Transfer switches



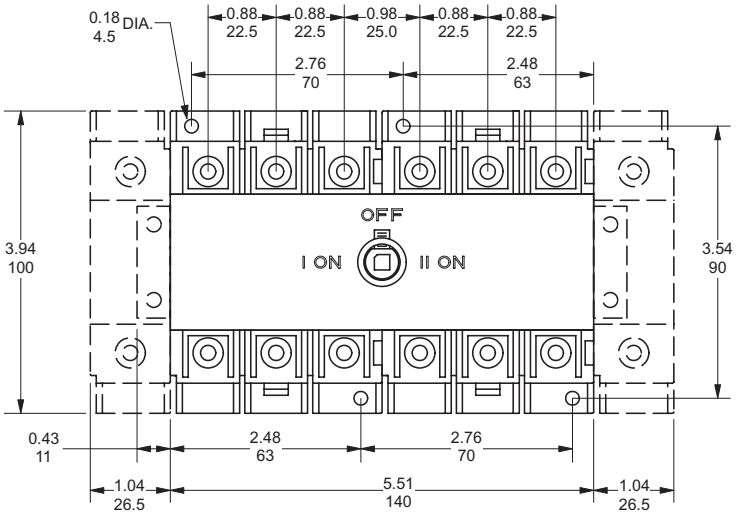


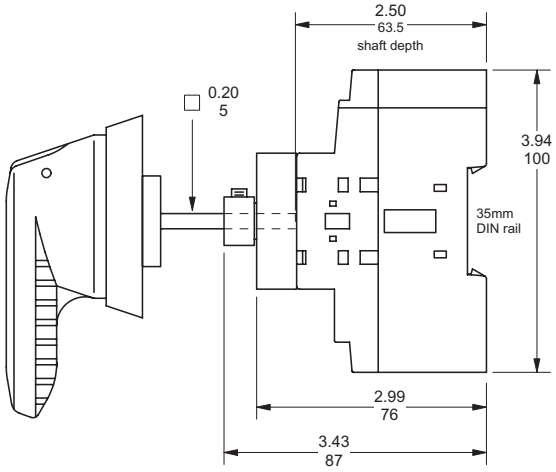
OT45, 63E3C & E4C – Transfer switches





OT100E3C & E4C – Transfer switches



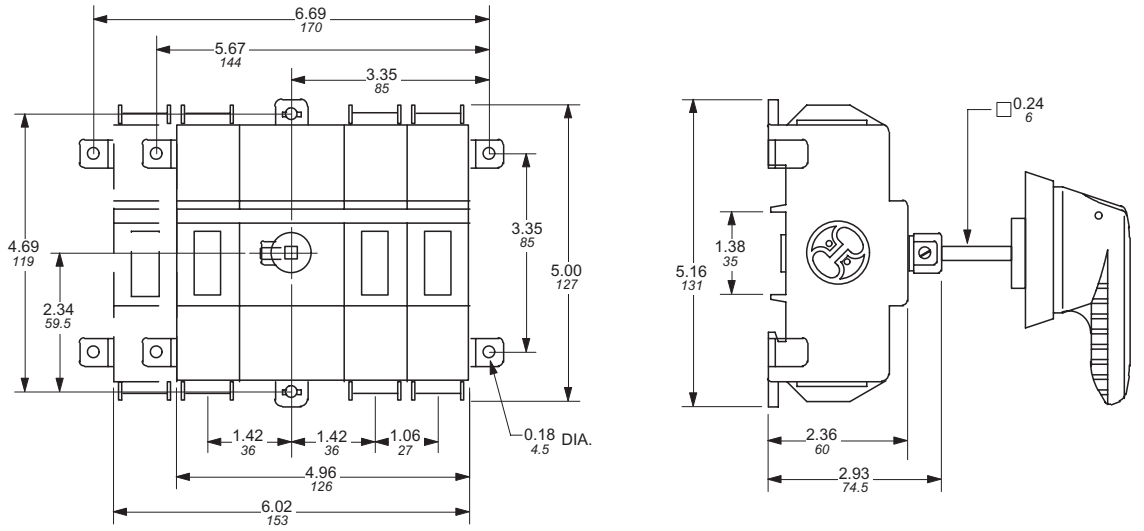


18

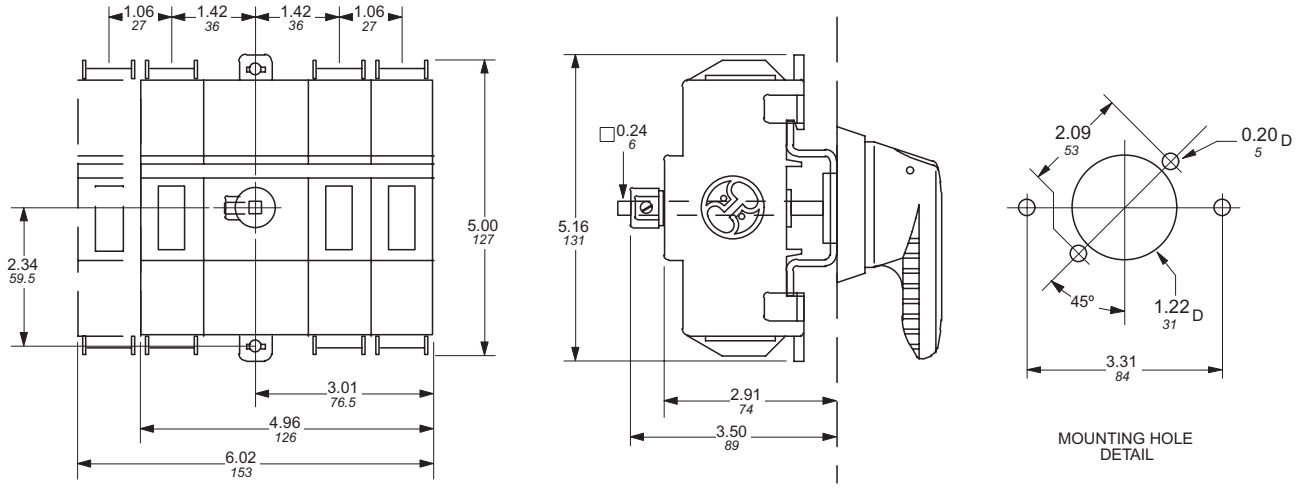
Approximate dimensions
OT160E3 & OT160ET3

00.00 / 00.00 Inches [Millimeters]

OT160E3 — base & DIN rail mounted switch



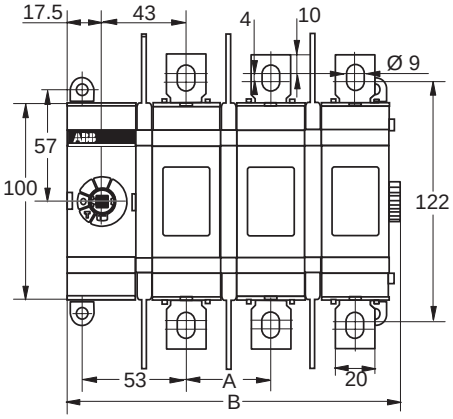
OT160ET3 — Door mounted switch

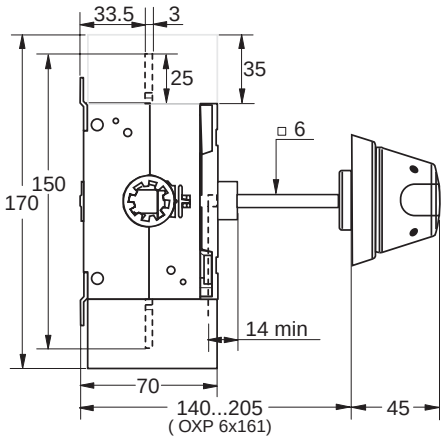


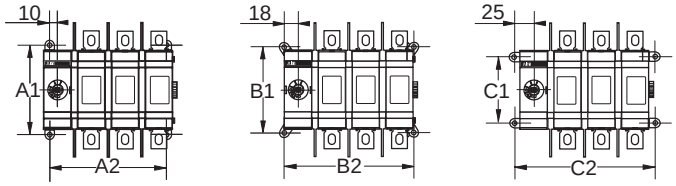
Approximate dimensions
OT200_

←00.00→ Millimeters

OT200U02, -03, -04

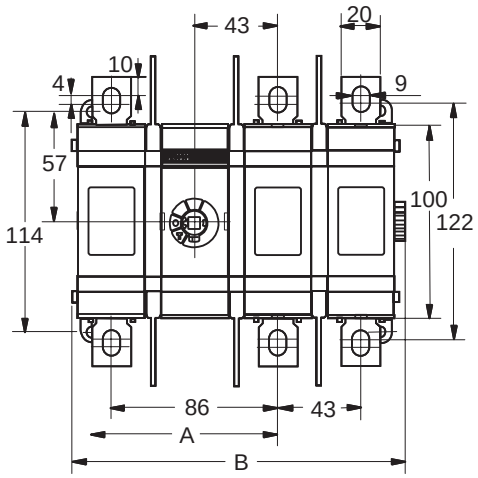


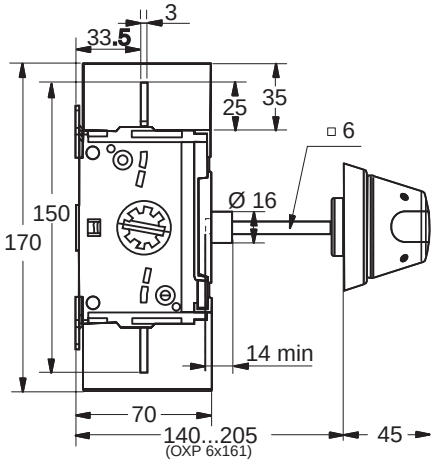


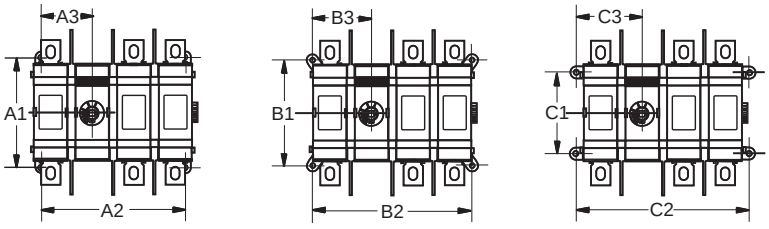


	0T200 (mm)		
	U02	U03	U04
A	43	43	43
B	126.5	169.5	212.5
A1	114	114	114
A2	106	149	192
B1	109.5	109.5	109.5
B2	122	165	208
C1	84	84	84
C2	136	179	222

OT200U11, -12, -13, -22





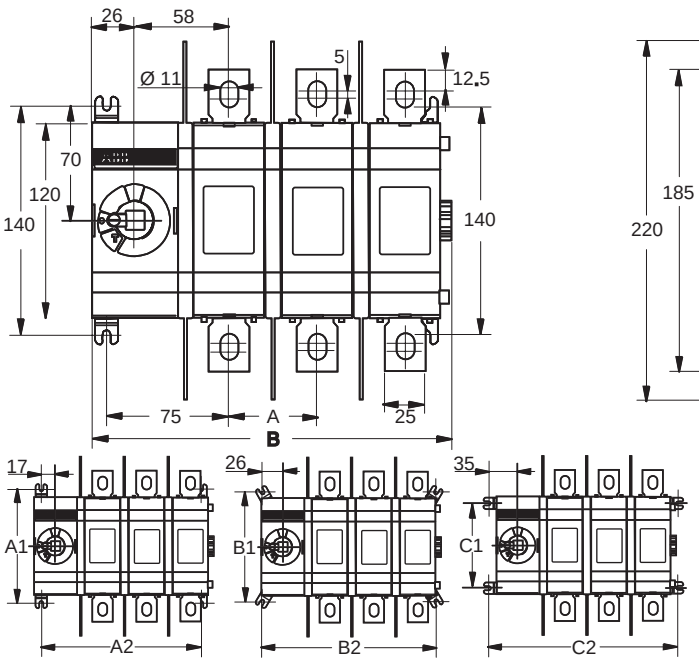


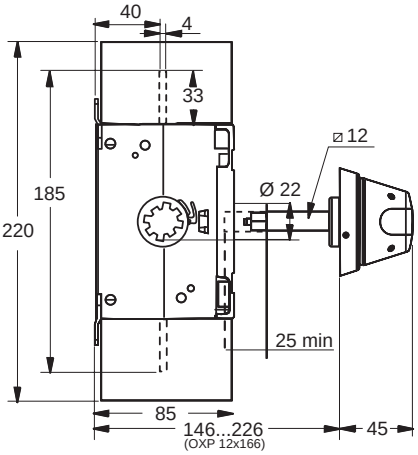
	0T200 (mm)			
	U11	U12	U13	U22
A	96	96	96	139
B	131.5	174.5	217.5	217.5
A1	114	114	114	114
A2	106	149	192	192
A3	53	53	53	96
B1	109.5	109.5	109.5	109.5
B2	122	165	208	208
B3	61	61	61	104
C1	84	184	84	84
C2	136	179	222	222
C3	68	68	68	111

Approximate dimensions
OT400_

00.00 Millimeters

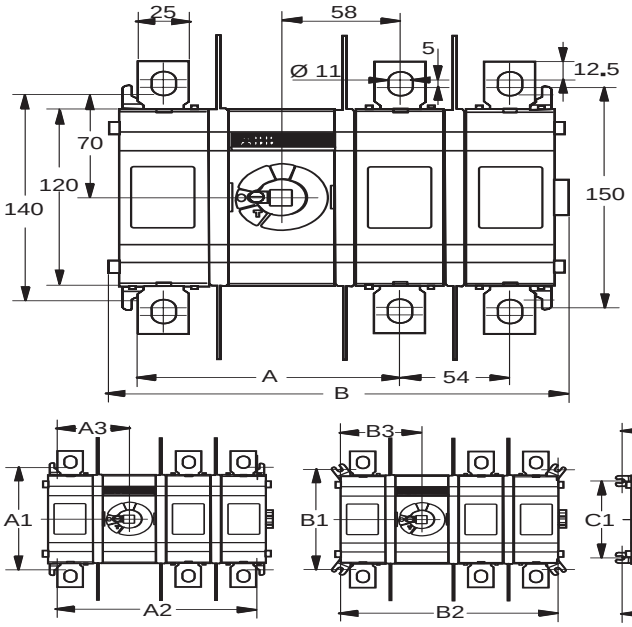
OT400U02, -03, -04

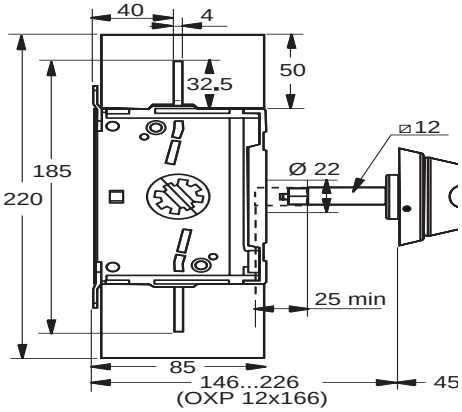




	OT400 (mm)		
	U02	U03	U04
A	54	54	54
B	167	221	275
A1	140	140	140
A2	142	196	250
B1	135	135	135
B2	160	214	268
C1	104	104	104
C2	178	232	286

OT400U11, -12, -13, -22



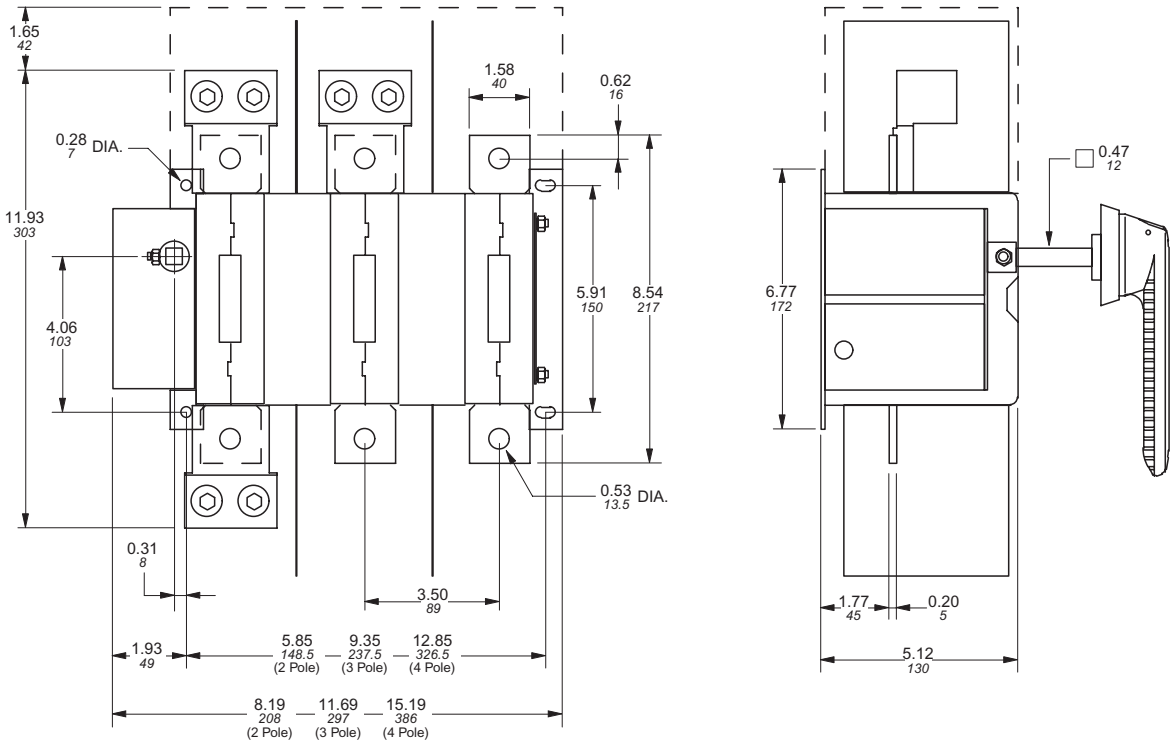


	OT400 (mm)			
	U11	U12	U13	U22
A	129	129	129	183
B	172	226	280	280
A1	140	140	140	140
A2	142	196	250	250
A3	71	71	71	125
B1	135	135	135	135
B2	160	214	268	268
B3	80	80	80	134
C1	104	104	104	104
C2	178	232	286	286
C3	89	89	89	143

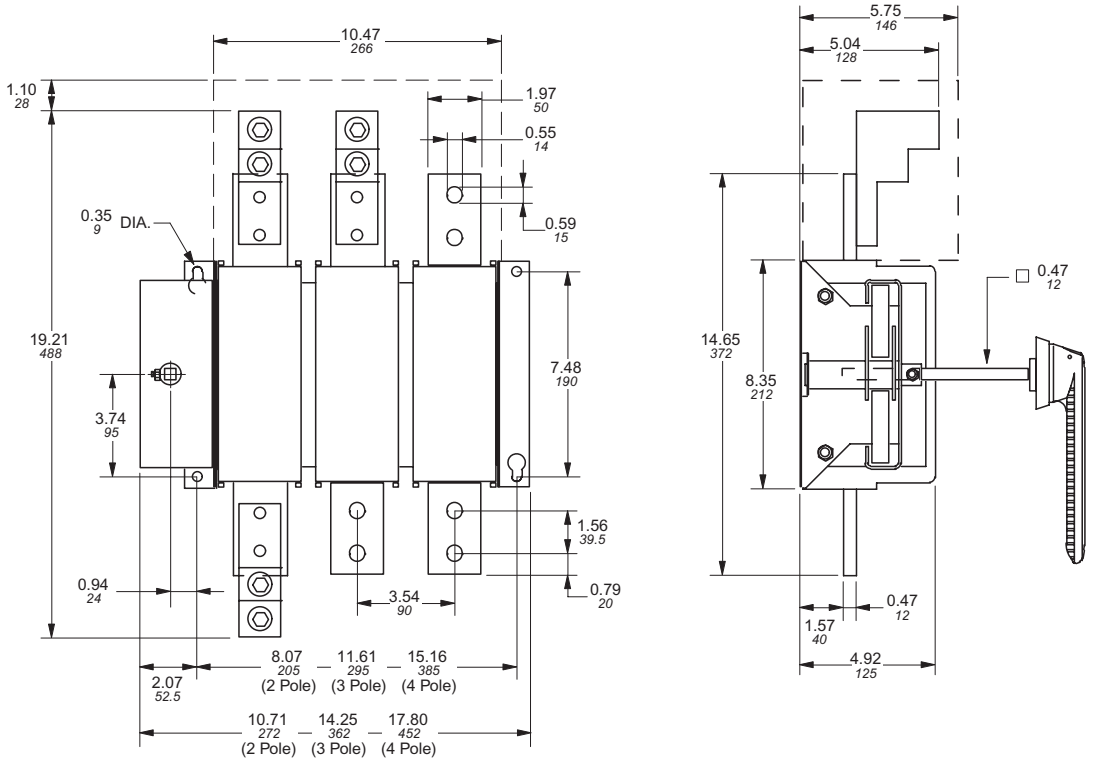
Approximate dimensions
OETL-NF600A – OETL-NF800A

00.00 / 00.00 Inches [Millimeters]

OETL-NF600A



OETL-NF800A

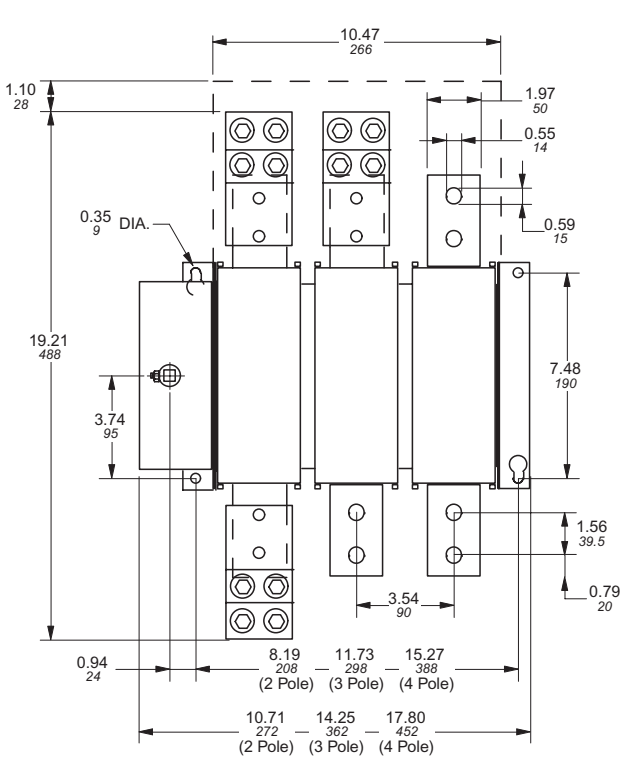


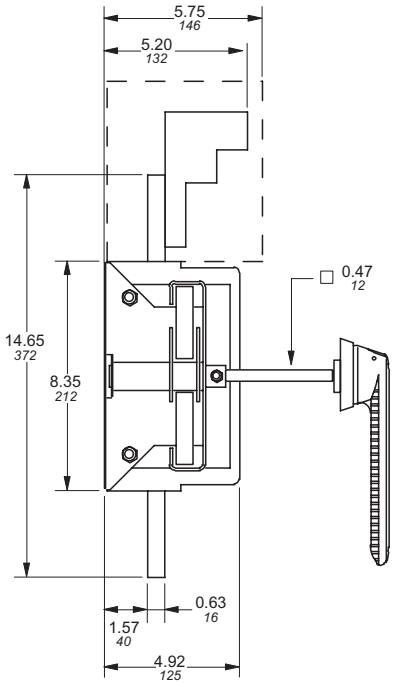
18

Approximate dimensions
OETL-NF1200 – OETL-NF1600

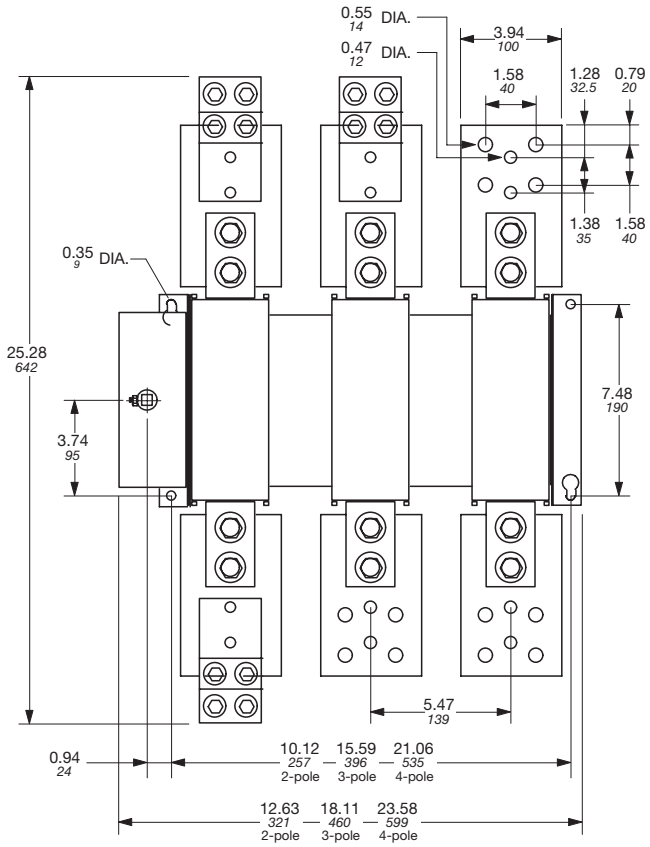
00.00 / 00.00 Inches [Millimeters]

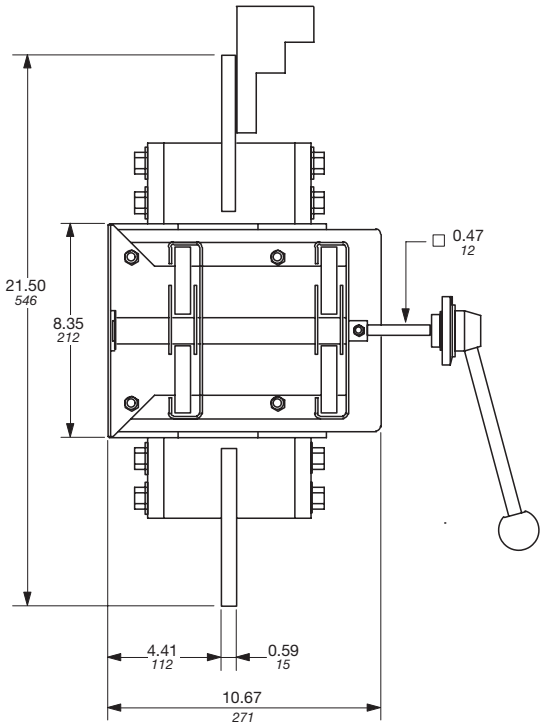
OETL-NF1200





OETL-NF1600

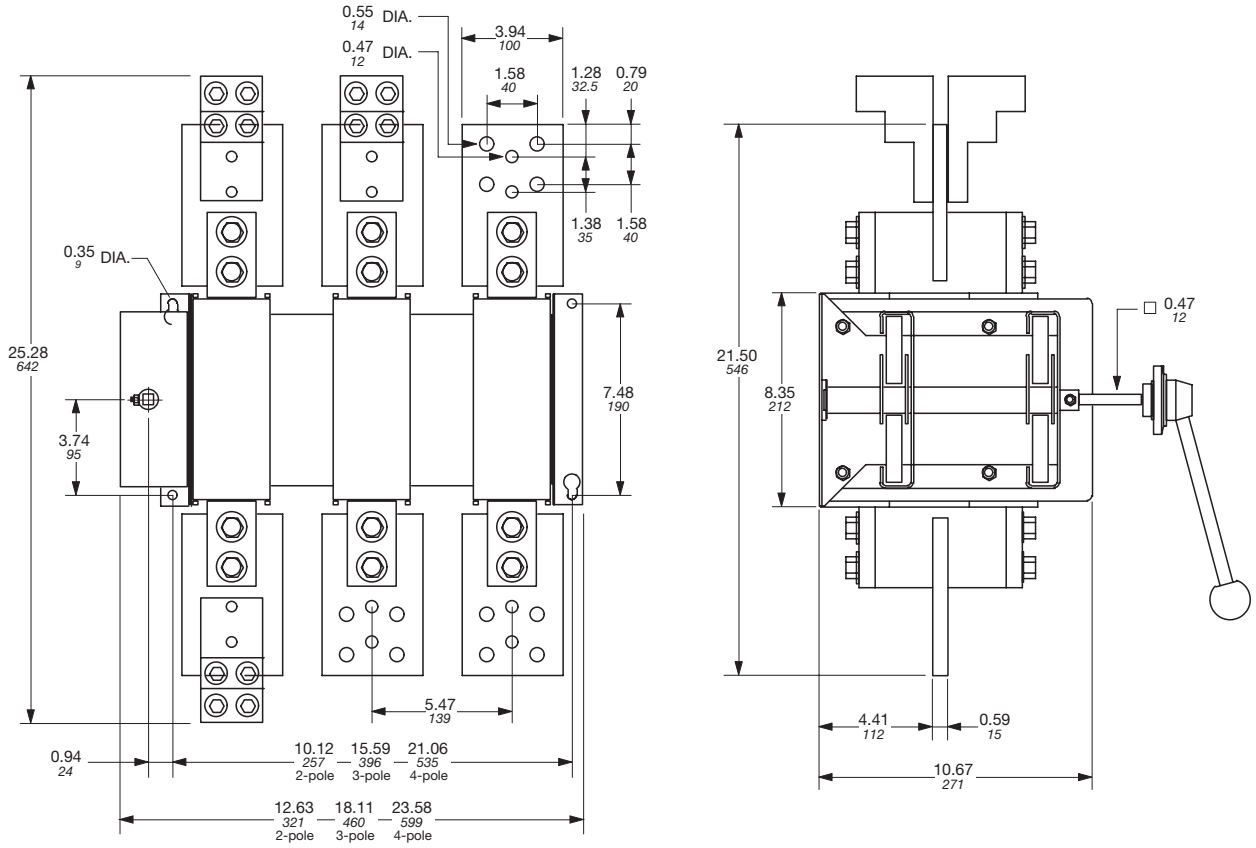




Approximate dimensions
OETL-NF2000 – OETL-NF3150

00.00 / 00.00 Inches [Millimeters]

OETL-NF2000 – OETL-NF3150

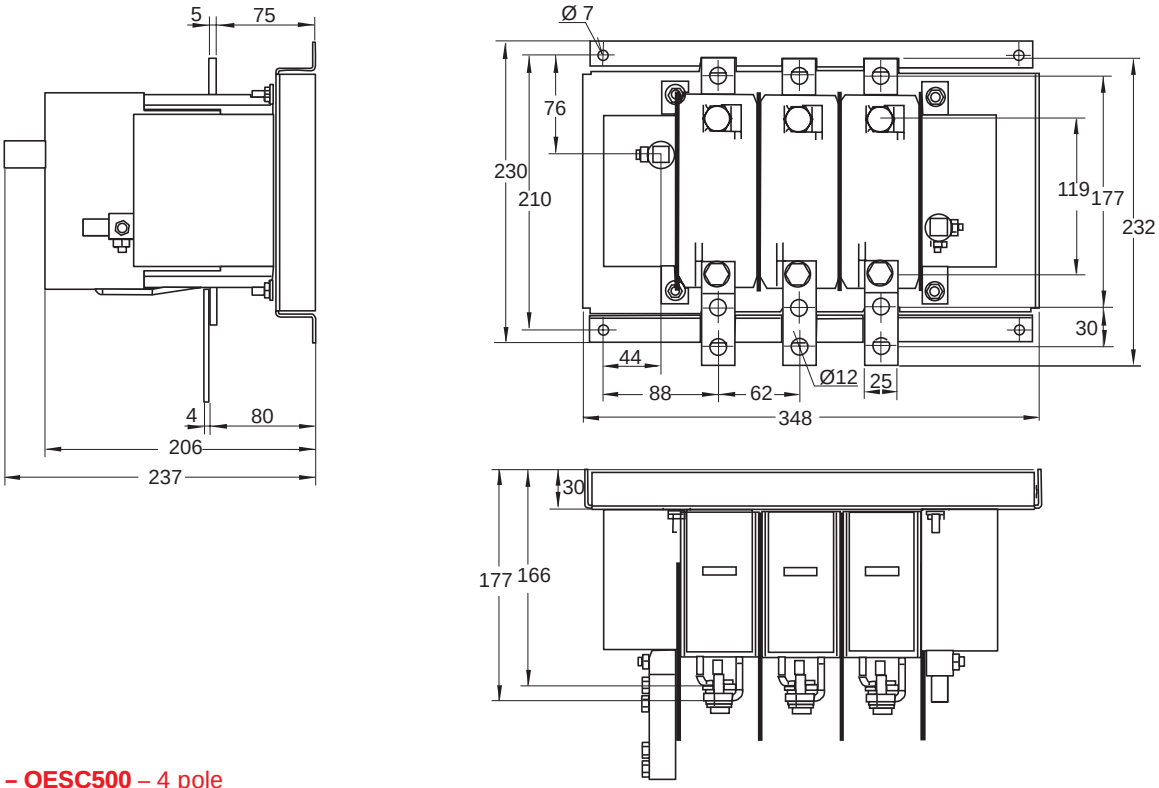


18

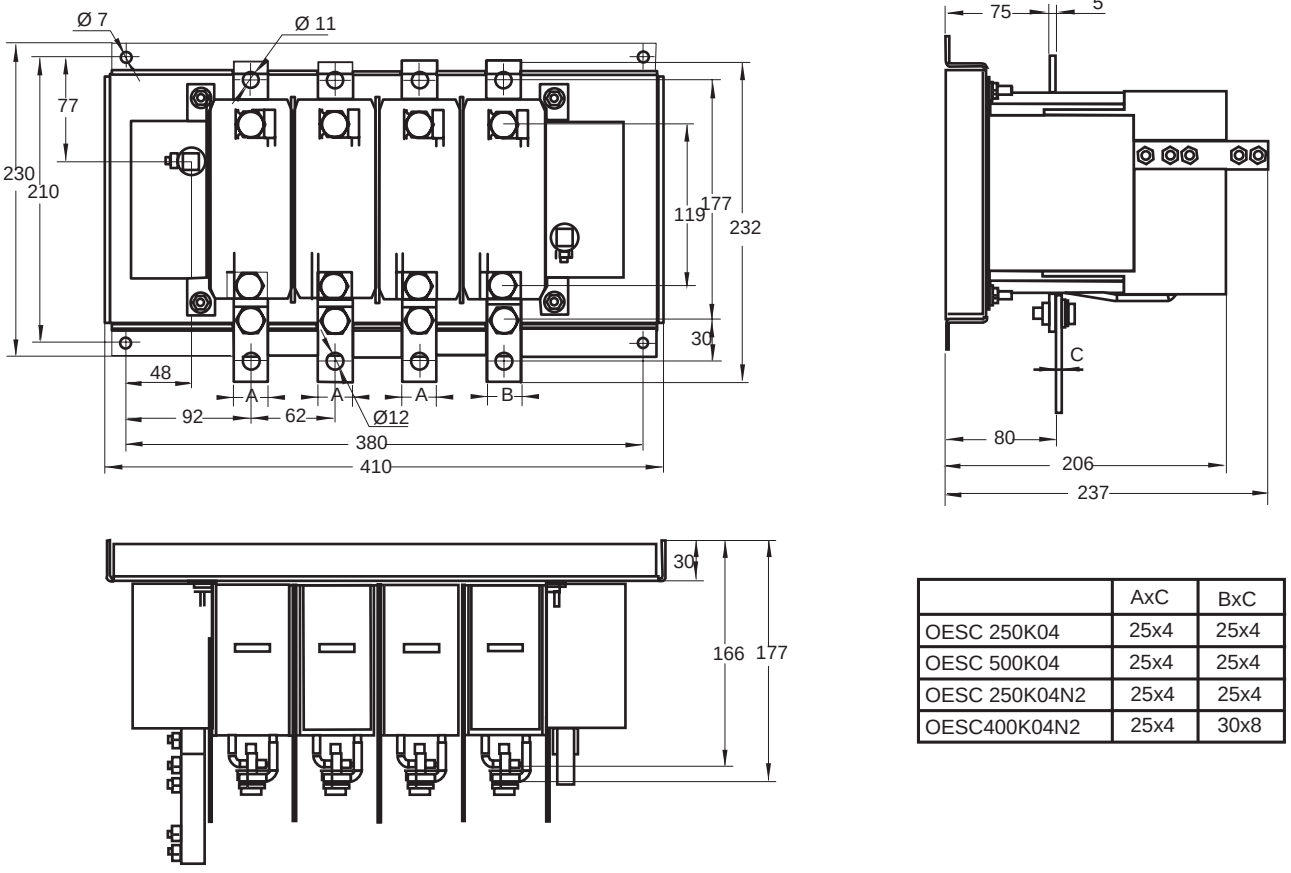
Approximate dimensions
OESC250 — OESC500

00.00 Millimeters

OESC250 – OESC500 – 3 pole



OESC250 – OESC500 – 4 pole

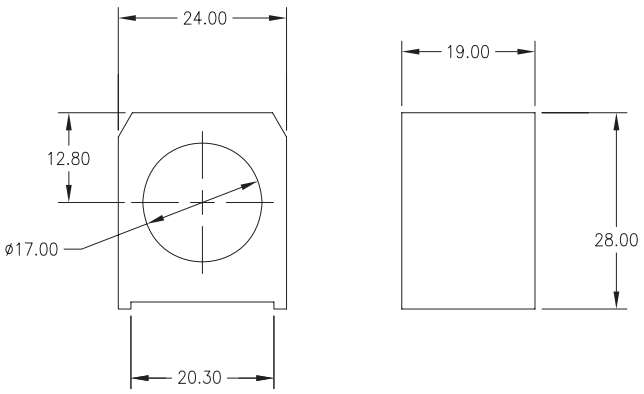


	AxC	BxC
OESC 250K04	25x4	25x4
OESC 500K04	25x4	25x4
OESC 250K04N2	25x4	25x4
OESC400K04N2	25x4	30x8

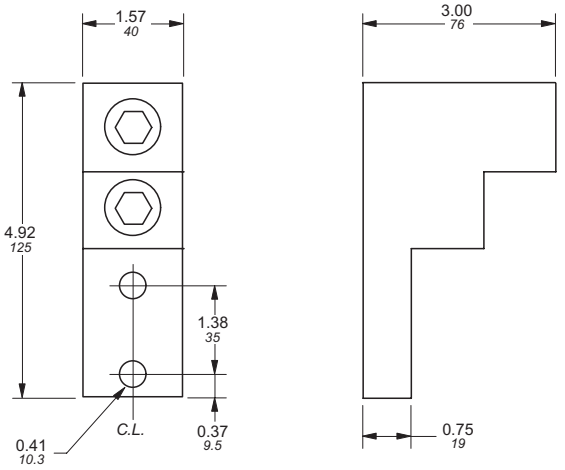
Approximate dimensions
for Terminal lugs

00.00
00.00
Inches
[Millimeters]

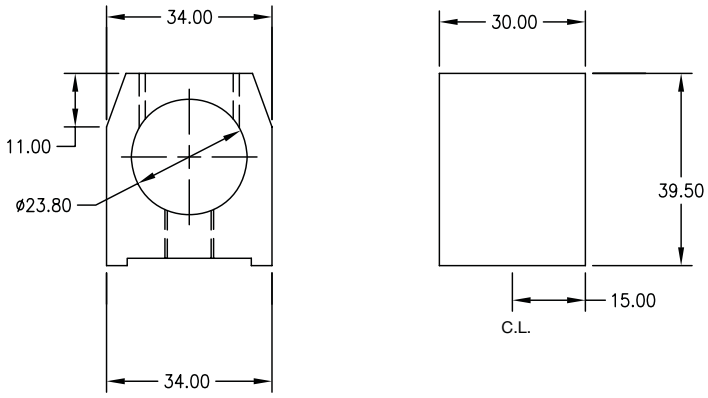
OZXA-200



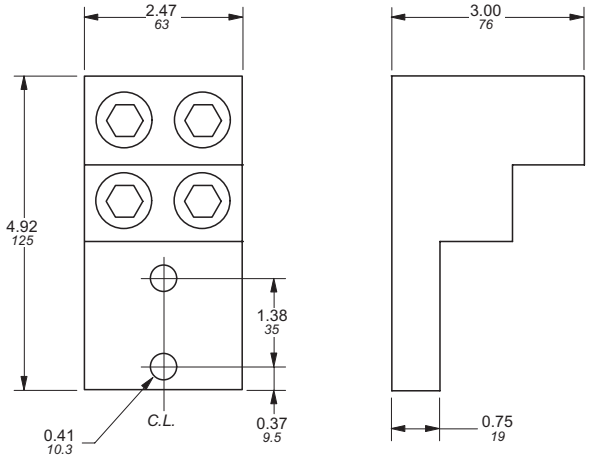
OZXA-30 — for use with 800A switches



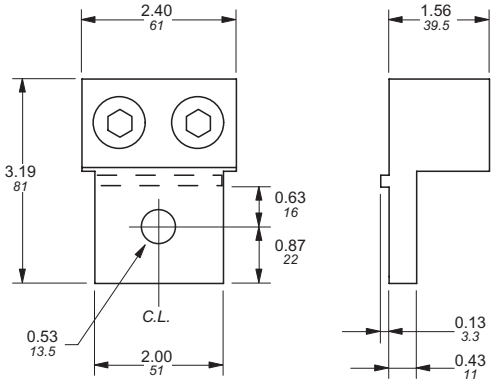
OZXA-400



OZXA-28 & OZXA-28/2 — for use with 1200A – 3150A switches



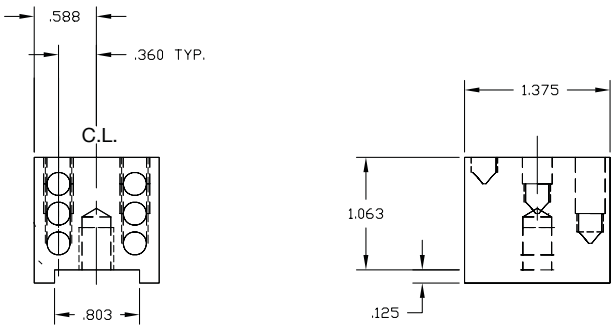
OZXA-27 — for use with 600A switches



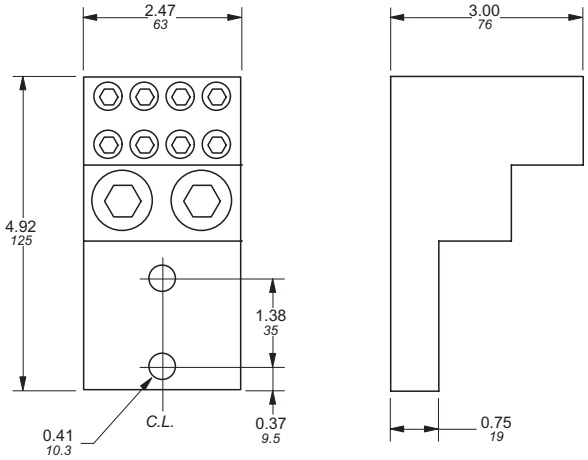
Approximate dimensions
for Terminal lugs

00.00 / 00.00 Inches [Millimeters]

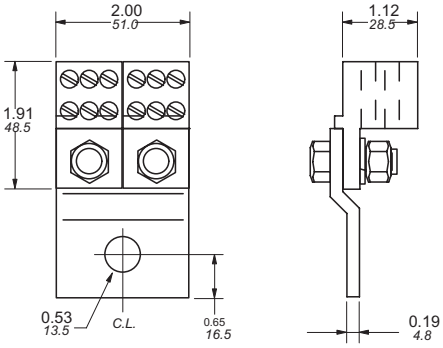
OZXA-406 – for use with 400A switches



OZXA-32 – for use with 800A - 1600A switches



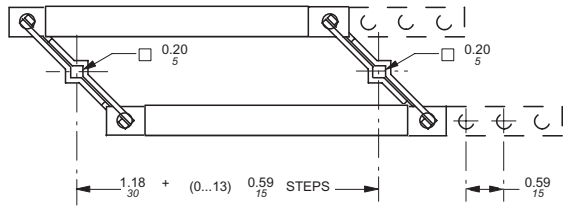
OZXA-175/400 – for use with 600A switches



Approximate dimensions
for 16A – 100A conversion mechanisms

00.00 / 00.00 Inches [Millimeters]

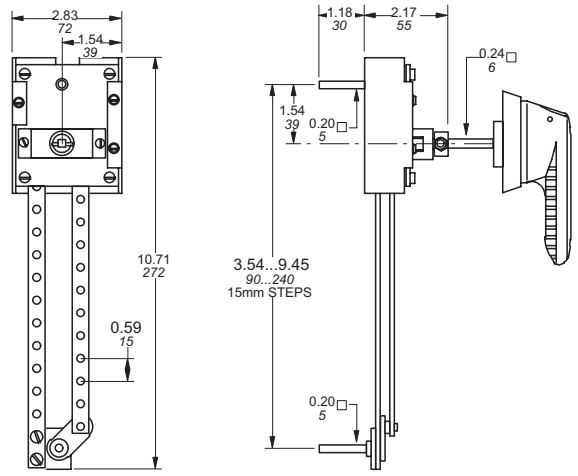
6 or 8 pole — OTZW8



For installation of 6 or 8 pole, transfer and bypass mechanisms, the following minimum and maximum mounting dimensions are given below.

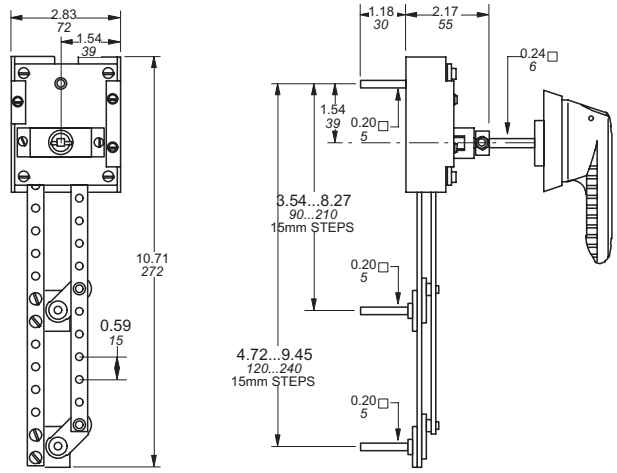
OTZW8 in combination with:	Minimum inches/mm	Maximum inches/mm
OT16E3, OT25E3, OT32E3	3.07/78	N/A
OT45E3, OT63E3	3.74/95	N/A
OT30E3, OT60E3, OT100E3	3.82/97	N/A

Transfer switch — OTZW6, OTZW6X



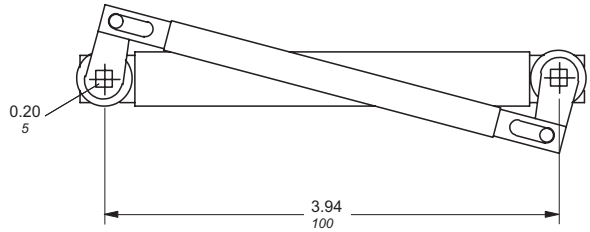
OTZW6, OTZW6X in combination with:	Minimum inches/mm	Maximum① inches/mm
OT16E3, OT25E3, OT32E3	4.61/117	6.57/167
OT45E3, OT63E3	5.31/135	7.28/185
OT30E3, OT60E3, OT100E3	4.84/123	6.81/173

Bypass switch — OTZW17, OTZW17X



OTZW17, OTZW17X in combination with:	Minimum inches/mm	Maximum① inches/mm
OT16E3, OT25E3, OT32E3	4.61/117	6.57/167
OT45E3, OT63E3	5.31/135	7.28/185
OT30E3, OT60E3, OT100E3	4.84/123	6.81/173

Mechanical interlock — OETL-ZW24



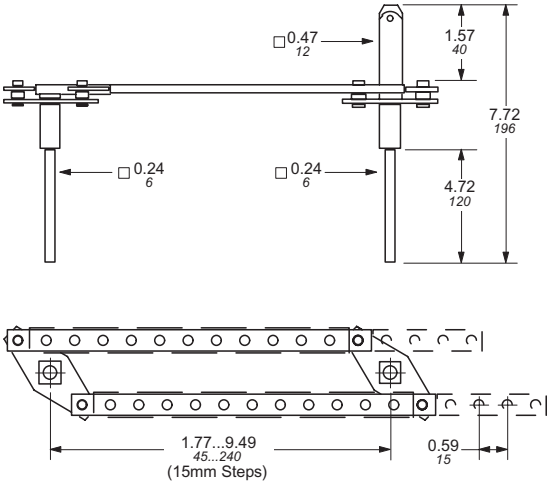
OETL-ZW24 in combination with:	Minimum inches/mm	Maximum① inches/mm
OT16E3, OT25E3, OT32E3	3.39 / 86	—
OT45E3, OT63E3	4.09 / 104	—
OT30E3, OT60E3, OT100E3	4.13 / 105	—

① Deeper enclosures will require a longer shaft. Please select a 5mm shaft from page 18.10 - 18.11.

Approximate dimensions
for 125 – 200A conversion mechanisms

00.00 / 00.00 Inches [Millimeters]

6 or 8 pole — OESA-ZW2

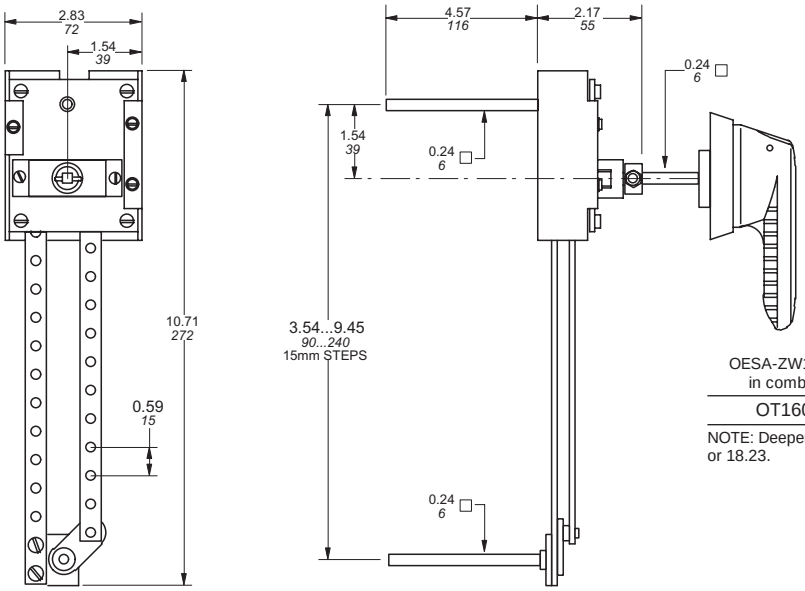


For installation of 6 or 8 pole, transfer and bypass mechanisms, the following minimum and maximum mounting dimensions are given below.

OESA-ZW2 in combination with:	Minimum inches/mm	Maximum inches/mm
OT160 - OT200	5.35/136	9.49/241

NOTE: Deeper enclosures will require a longer shaft. Please select a 12mm shaft from page 18.26 and an OETL-ZX95 shaft extension coupler from page 18.28.

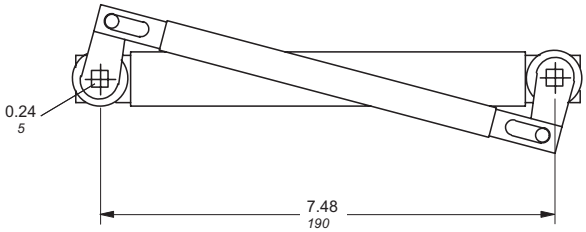
Transfer switch — OESA-ZW1, OESA-ZW1X



OESA-ZW1, OESA-ZW1X in combination with:	Minimum inches/mm	Maximum inches/mm
OT160 - OT200	4.61/117	6.57/167

NOTE: Deeper enclosures will require a longer shaft. Please select a 6mm shaft from page 18.20 or 18.23.

Mechanical interlock — OTZW10



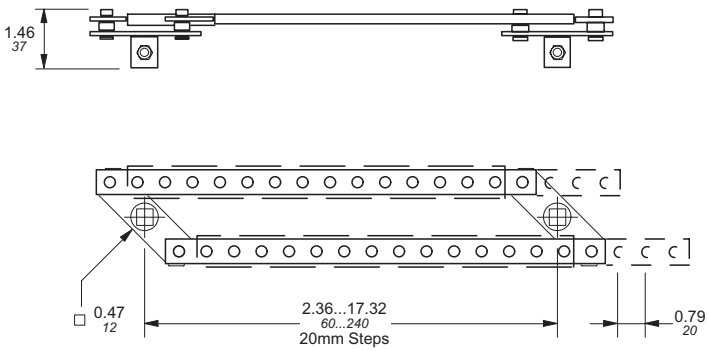
OTZW10 in combination with:	Minimum inches/mm	Maximum inches/mm
OT160 - OT200	4.13 / 105	—

NOTE: Deeper enclosures will require a longer shaft. Please select a 6mm shaft from page 18.20 or 18.23.

Approximate dimensions
for 400A – 1200A conversion mechanisms

00.00 / 00.00 Inches [Millimeters]

6 or 8 pole — OETL-ZW9

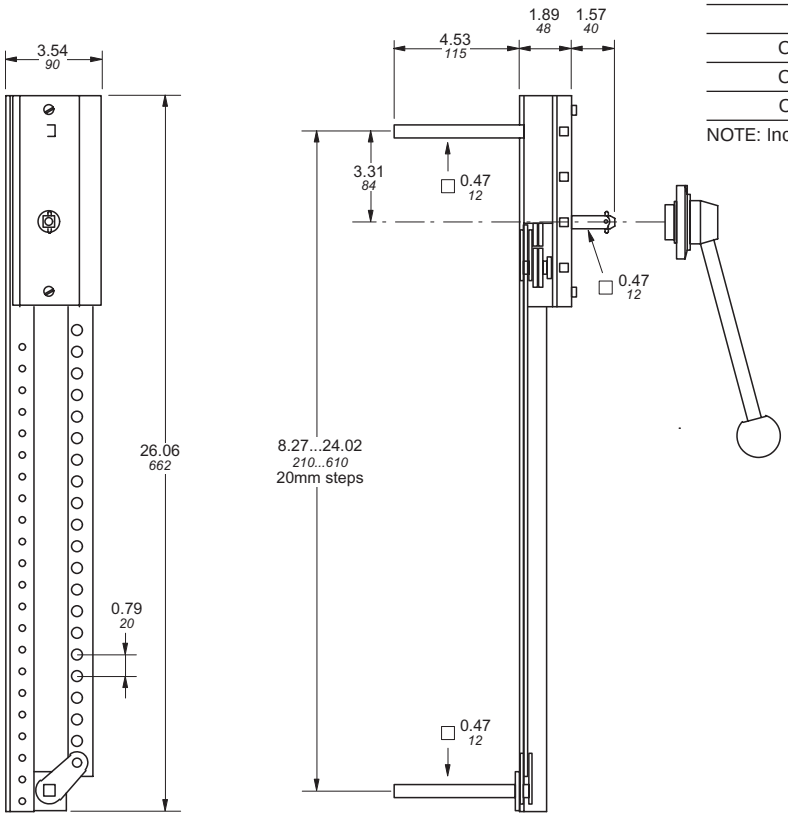


For installation of 6 or 8 pole, transfer and bypass mechanisms, the following minimum and maximum mounting dimensions are given below.

OETL-ZW9 in combination with:	Minimum inches/mm	Maximum inches/mm
OT400	7.52/191	N/A
OETL-NF600A	7.52/191	N/A
OETL-NF800A	7.52/191	N/A
OETL-NF1200	7.52/191	N/A

NOTE: Handle not included

Transfer switch — OETL-ZW12



OETL-ZW12 in combination with:	Minimum inches/mm	Maximum① inches/mm
OT400	8.19/208	11.73/298
OETL-NF600A	8.19/208	11.73/298
OETL-NF800A	8.19/208	11.73/298
OETL-NF1200	8.19/208	11.73/298

NOTE: Includes YASDA-21 handle

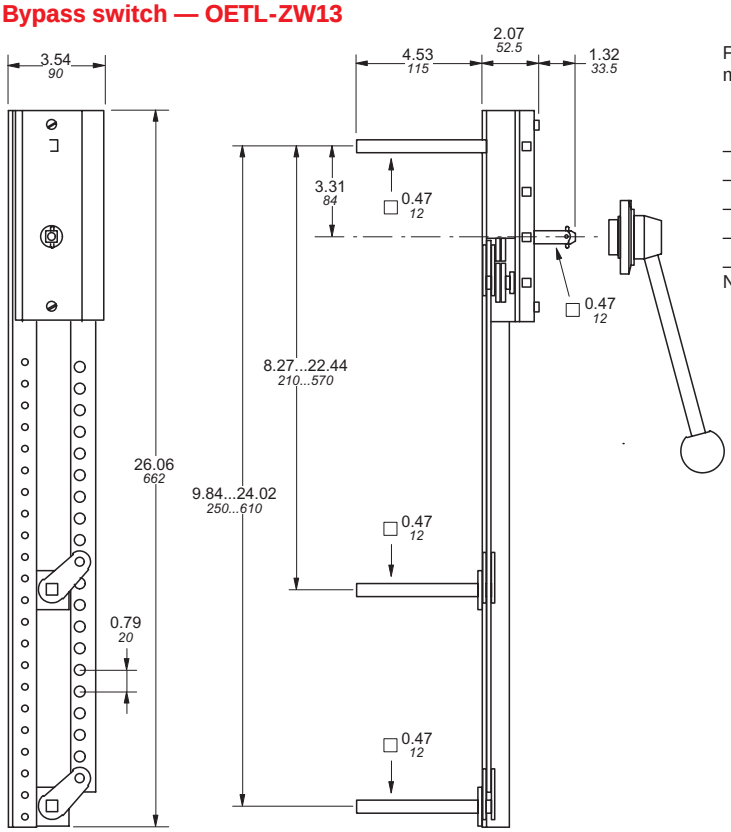
18

① Deeper enclosures will require a longer shaft. Please select a 12mm shaft from page 18.26 and an OETL-ZX95 shaft extension coupler from pg. 18.28.

Approximate dimensions
for 400A – 3150A conversion mechanisms

00.00 / 00.00 Inches [Millimeters]

Bypass switch — OETL-ZW13

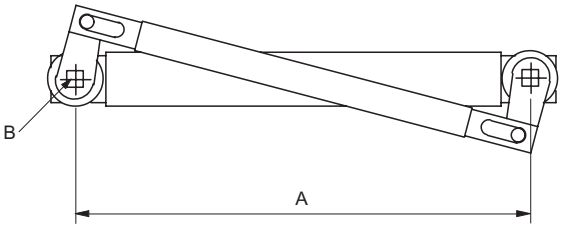


For installation of 6 or 8 pole, transfer and bypass mechanisms, the following minimum and maximum mounting dimensions are given below.

OETL-ZW12 in combination with:	Minimum inches/mm	Maximum① inches/mm
OT400	8.19/208	11.73/298
OETL-NF600A	8.19/208	11.73/298
OETL-NF800A	8.19/208	11.73/298
OETL-NF1200	8.19/208	11.73/298

NOTE: Includes YASDA-21 handle

Mechanical interlock — OETL-ZW3, OETL-ZW14, OETL-ZW15



Dimensions in Inches & *mm*

	A	B
OETL-ZW3	11.81 *300.0*	0.47 *12.0*
OETL-ZW14	9.84 *250.0*	0.47 *12.0*
OETL-ZW15	19.69 *500.0*	0.47 *12.0*

OETL-ZW3, 14 & 15 in combination with:	Minimum inches/mm	Maximum① inches/mm
OT400 & OETL-NF600	6.50/165	—
OETL-NF800 – OETL-NF1200	6.30/160	—
OETL-NF1600 – OETL-NF3150	12.00/305	—

NOTE: Handle(s) not included.

NOTE: OETL-ZW15 is the only mechnical interlock OETL-NF1200 – OETL-NF3150 can use.

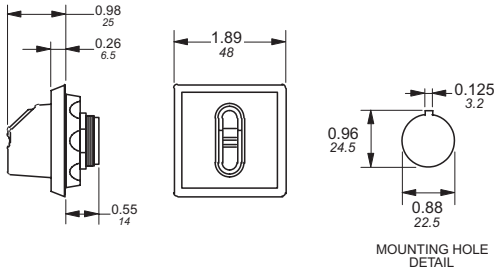
① Deeper enclosures will require a longer shaft. Please select a 12mm shaft from page 18.26 and an OETL-ZX95 shaft extension coupler from page 18.28.

Approximate dimensions
for Handles

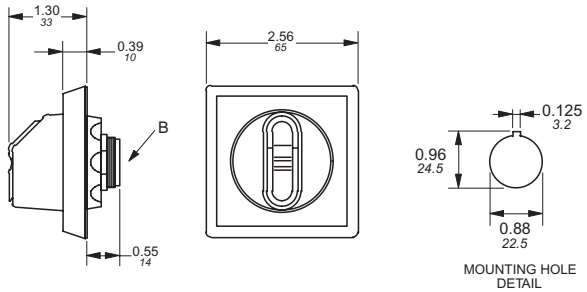
00.00
00.00
Inches
[Millimeters]

Selector handles for base and DIN rail mounted switches

OH_1AH1 & OH_3AH1

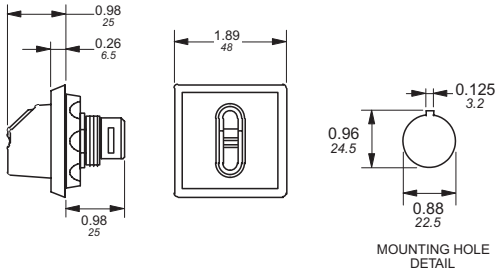


OH_2A_

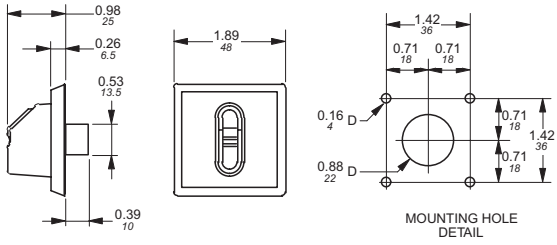


Selector handles for door mounted switches

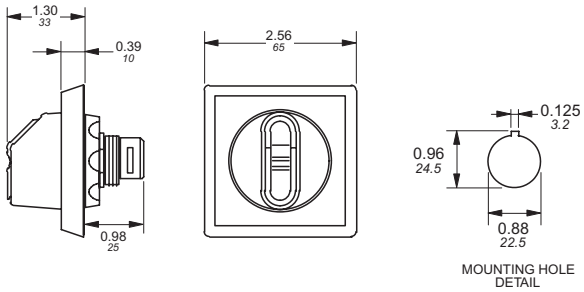
OH_1P_ & OH_3P_



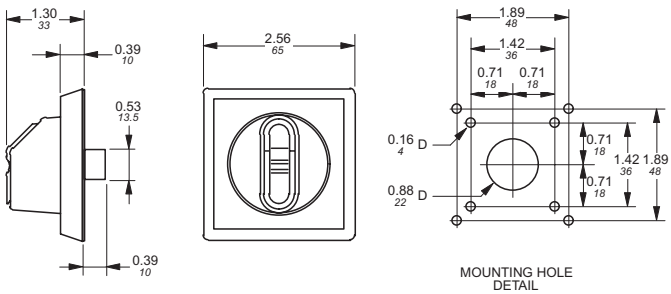
OH_1R_ & OH_3R_



OH_2P_



OH_2R_

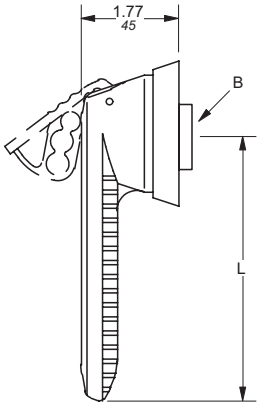


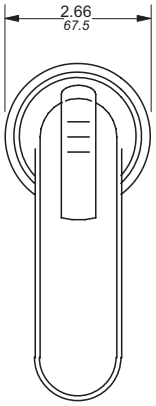
18

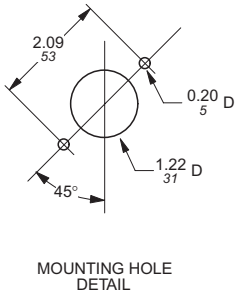
Approximate dimensions
for Handles

00.00 / 00.00 Inches [Millimeters]

Pistol handles



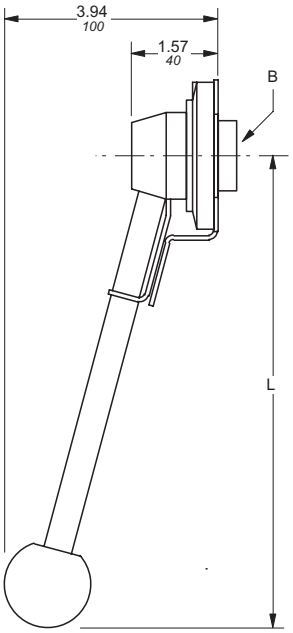


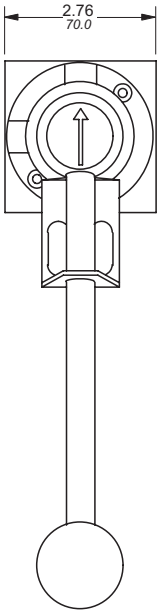


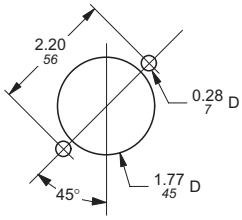
MOUNTING HOLE DETAIL

A Catalog number	L Inches/ mm	□B Shaft size Inches/ mm	NEMA / UL Type
OH_45J5 OH_65J5	1.8/45 2.6/65	0.20/5 0.20/5	1, 3R, 12 1, 3R, 12
OH_45J6 OH_65J6 OH_80J6	1.8/45 2.6/65 3.1/80	0.24/6 0.24/6 0.24/6	1, 3R, 12 1, 3R, 12 1, 3R, 12
OH_65J8 OH_80J8	2.6/65 3.1/80	0.31/8 0.31/8	1, 3R, 12 1, 3R, 12
OH_125J12 OH_145J12 OH_175J12	4.9/125 5.7/145 6.9/175	0.47/12 0.47/12 0.47/12	1, 3R, 12 1, 3R, 12 1, 3R, 12
OH_65L5	2.6/65	0.20/5	1, 3R, 4, 4X, 12
OH_80L6	3.1/80	0.24/6	1, 3R, 4, 4X, 12
OH_80L8	3.1/80	0.31/8	1, 3R, 4, 4X, 12
OH_145L12 OH_175L12	5.7/145 6.9/175	0.47/12 0.47/12	1, 3R, 4, 4X, 12 1, 3R, 4, 4X, 12

__ = Handle color, B (Black) or Y (Red/Yellow)







MOUNTING HOLE DETAIL

A catalog number	L inches/mm	□B Shaft size inches/mm	NEMA Type
YASDA-7	8.66/220	0.47/12	1, 3R, 4, 4X, 12
YASDA-8	8.66/220	0.47/12	1, 3R, 4, 4X, 12
YASDA-21	8.66/220	0.47/12	1, 3R, 4, 4X, 12
YASDA-6	12.60/320	0.47/12	1, 3R, 4, 4X, 12

Disconnect switches

PowerLine Fusible

PowerLine
Compact, heavy duty
Fusible disconnect switches
30A – 800A, 600V

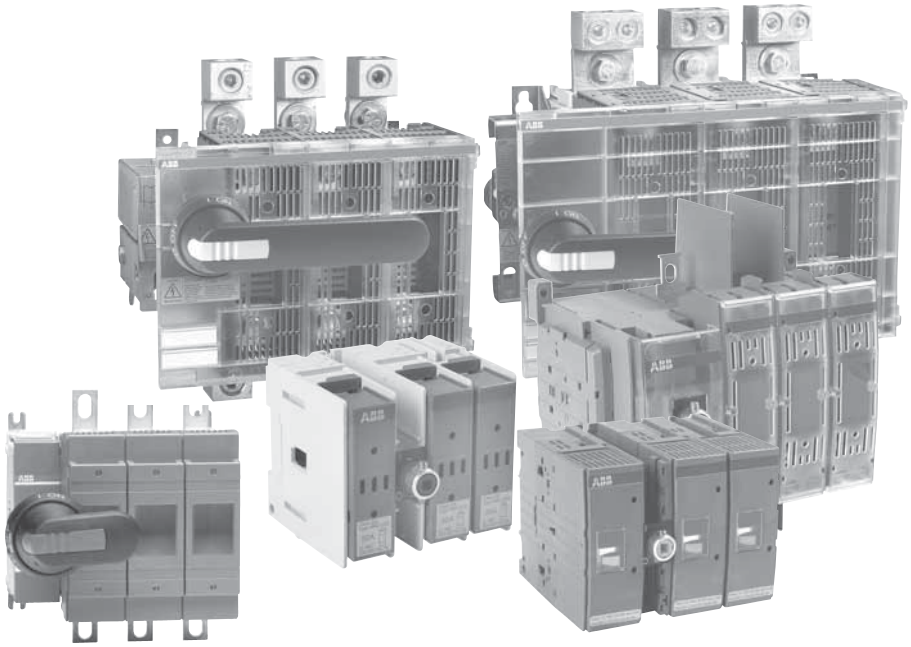
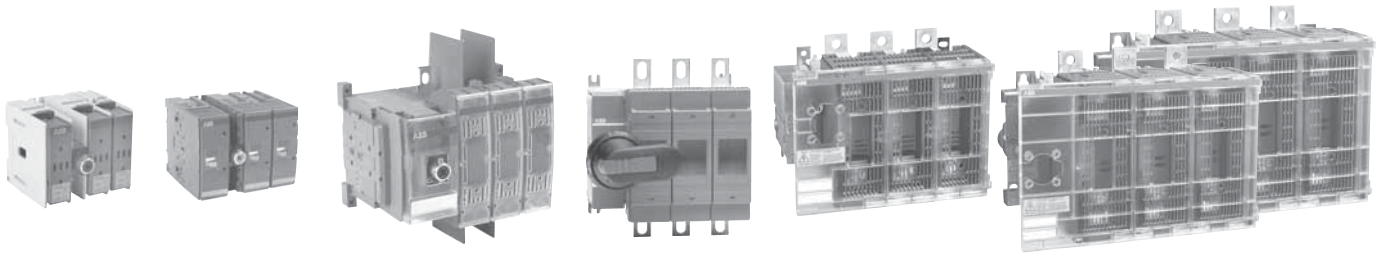


ABB PowerLine includes seven different amperage sizes from 30A to 800A. All PowerLine fusible switches are designed to meet customer requirements in terms of high interrupting capacity and long electrical life while occupying little more panel space than the appropriate fuses. The basic construction provides flexibility and high performance in an extremely compact size. ABB PowerLine switches are a perfect choice to withstand the heat and humidity of the tropics, the extreme cold of the arctic and any rugged industrial environment you may have.

General information
Selection guide
OS30ACC12 – OES800L3



OS30A_12 OS60J12 OS100J03 OS200J03 OES400J3 OES600J3 OES800L3

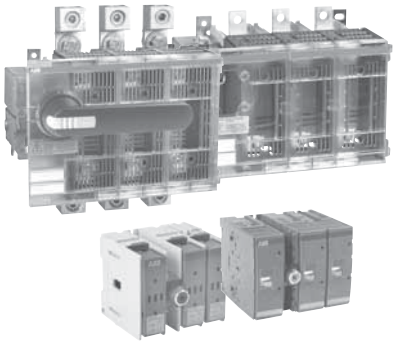
Catalog number 3 pole			OS30ACC12	OS30AJ12	OS60J12	OS100J03	OS200J03	OES400J3	OES600J3	OES800L3
General purpose amp rating		**A**	**30**	**30**	**60**	**100**	**200**	**400**	**600**	**800**
Catalog reference		Page #	18.83	18.83	18.87	18.87	18.87	18.91	18.91	18.91
Approvals ①										
	2 pole		N/A	N/A	N/A	UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC
	3 pole		UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC
	4 pole		UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC
Technical ratings (UL,CSA)										
Max operating voltage		V	600	600	600	600	600	600	600	600
Max horsepower rating Three phase										
	200 – 208V	HP	5/7.5	5/7.5	15	25	50	100/125	150	200
	240V	HP	7.5	7.5	15	30	60	125	200	250
	480V	HP	15	15	30	60	125	250	400	500
	600V	HP	20	20	50	75	150	350	500	600
Single phase										
	120V	HP	2	2	—	—	—	—	—	—
	240V	HP	3	3	—	—	—	—	—	—
UL fuse class			CC	J	J	J	J	J,T	J,T	L
Technical ratings (IEC)										
Rated insulation and operational voltage. AC20 and DC20		V	1000	1000	1000	1000	1000	1000	1000	1000
Rated thermal current, I_{th}										
AC 20/DC 20	open	A	32	32	63	160	200	400	630	800
AC 20/DC 20	enclosed	A	32	32	63	160	200	400	600	720
AC 21A	≤500V	A	32	32	63	160	200	400	630	800
	≤690V	A	32	32	63	160	200	400	630	800
Rated operational power AC23										
	400/415V	kW	14/15	14/15	30	80/90	110	210/230	315/340	350/380
	690V	kW	25	25	60	132	200	330	540	600
Physical characteristics										
Weight	3 pole switch	lb	1.54	1.54	2.86	3.30	5.9	17.18	37.44	37.44
	4 pole	lb	1.98	1.98	3.52	3.96	7.5	19.38	46.26	46.26
Dimension	3 pole H	in	3.66	3.60	3.94	5.67	6.5	8.90	10.10	10.10
	W	in	4.15	4.15	5.63	7.07	7.1	11.26	14.80	14.80
	D	in	4.10	4.10	5.04	5.10	5.2	8.07	9.17	9.17
Accessories										
Double break contacts			S	S	S	S	S	S	S	S
Fuse cover			S	S	S	S	S	S	S	S
Terminal lug kit			Integral	Integral	Integral	OZXA-24	OZXA-200	OZXA-26	OZXA-27	OZXA-27
Terminal shroud			Not required	Not required	Not required	•	•	•	•	•
Auxiliary contact			•	•	•	•	•	•	•	•
Handle UL/NEMA type										
Type 1, 3R, 12			•	•	•	•	•	•	•	•
Type 1, 3R, 4, 4X, 12			•	•	•	•	•	•	•	•
Conversion kit										
6 pole			•	•	•	•	•	•	•	•
Transfer			•	•	•	•	•	•	•	•
Bypass			—	—	•	•	•	•	•	•
Mechanical interlock			•	•	•	•	•	•	•	•
Electrical interlock			—	—	—	—	—	•	•	•

S = Standard
• = Available
— = Not available

UL listed, CSA approved, IEC rated, CE marked, CCC certified

① UL listed switches are also CSA approved.

General information



Versatility

ABB PowerLine fusible disconnect switches are designed to offer maximum versatility in many ways.

Broad range

PowerLine is seven amperage sizes from 30A – 800A. All sizes are compact, heavy duty, 600V disconnect switches. Many sizes are available in 2, 3, 4, 6, and 8 pole configurations.

Compact size

The PowerLine's unique compact dimensions allow panel size reduction in new applications or easily retrofits into space-sensitive existing applications. The entire switch occupies little more panel space than the appropriate fuses.

International acceptance

PowerLine fusible switches are available with a wide range of fuse clip options:

UL	USA	CSA	Canada
DIN	Europe	BS	United Kingdom
NFC	France	Ultra-rapid	

As well as the corresponding approvals: UL listed, CSA approved, IEC rated, CE marked, and most other international standards.

UL98 (CSA 22.2 No.4) — UL File # E101914, CSA File #LR58077

For 30A – 800A switches, OH__ pistol grip handles

Suitable for use as motor disconnects or industrial control panel disconnects on service entrance equipment, panelboards, switchboards, industrial control equipment, motor control centers, etc. and are horsepower rated and ampere rated.

IEC

Tested in accordance to IEC 947-1 and 3, IEC 664, IEC 269, and IEC 204

CE

Compliance with the European Machine Directive IEC 204 (EN 60204)

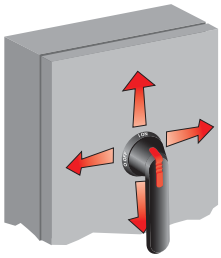
Installation options

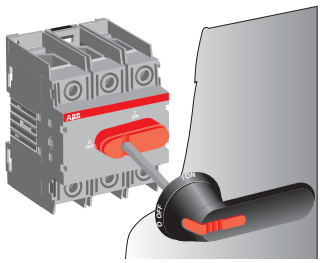
Rotary through the door: available in all sizes, 30A – 800A

Flange: versions available in 30A to 800A sizes

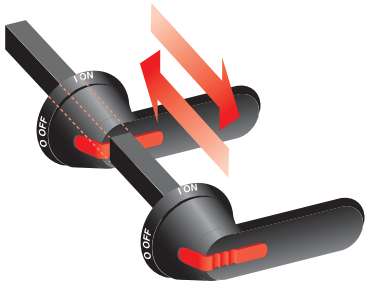
A rotary disconnect switch may be installed nearly anywhere in a control panel — mounting is not limited to the upper right hand corner of the panel.

Mount the switch where it conveniently fits in your panel and simply install the handle on the door, in line with the switch. The switch and handle are mechanically linked through an easily adjusted shaft. This allows fast and easy installation into panels of different depths and layouts.

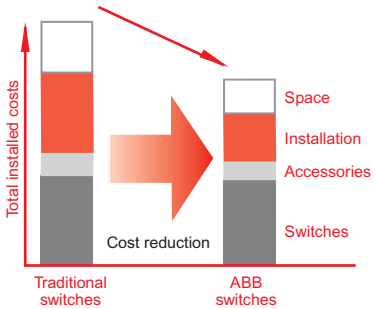




Rotary through the door installation



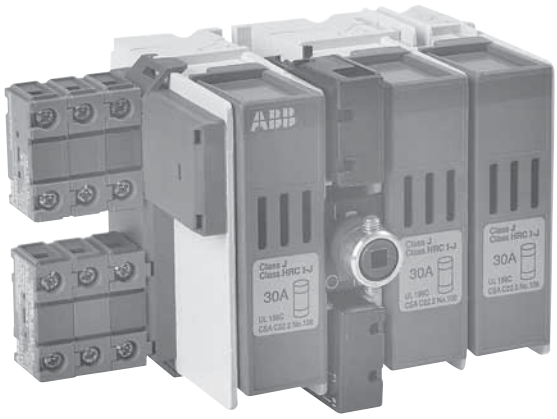
Easily adjusted shaft

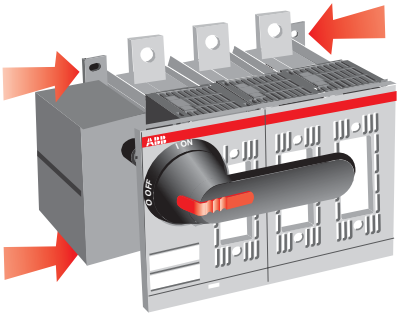


General information

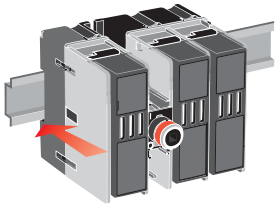
Broad range of accessories

- Handles — UL/NEMA type 1, 3R, 4, 4X, 12
  IP 54, 65, 66
- Auxiliary contacts available for every switch size
- Additional terminal poles (neutrals & grounds)
- Terminal shrouds
- 6 & 8 pole mechanisms
- Transfer mechanisms
- Bypass mechanisms
- Mechanical interlock mechanisms
- Electro-mechanical interlock mechanisms
- Motor operators





Base mounting with screws



DIN rail mounting

Mounting

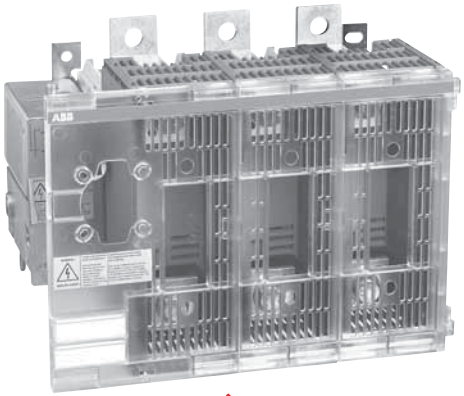
PowerLine disconnect switch mounting possibilities:

- DIN rail mounting — OS30, OS60 & OS100
- Base mounting with screws

Top feed

Incoming power feeds

All PowerLine disconnect switches can be used equally well with either top or bottom incoming power feeds.

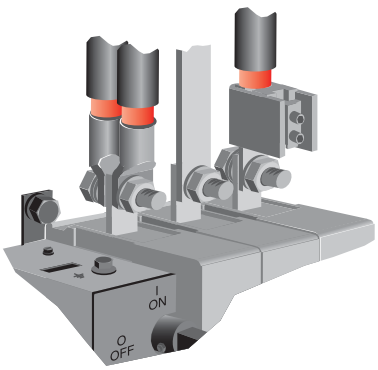


Bottom feed

Terminal connections

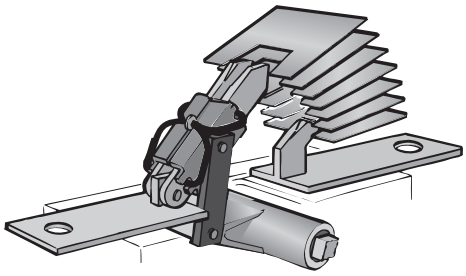
Versatile connecting possibilities, 100A – 800A:

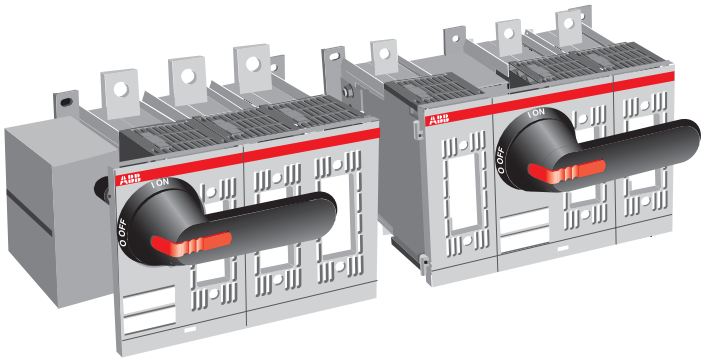
- Ring tongue crimp on lugs
- Direct bus
- Terminal lugs



High performance

The mechanism is quick-make/quick-break, meaning the contacts operate independently of the speed and force at which the handle is operated. This, in combination with unique, patented self-cleaning contacts, provides a long, reliable, electrical life.



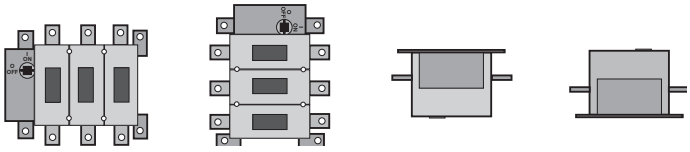


Modular construction①

Modular switch construction allows the operating mechanism to be placed at either end of the switch or anywhere in-between, 100A – 800A.

Mounting positions

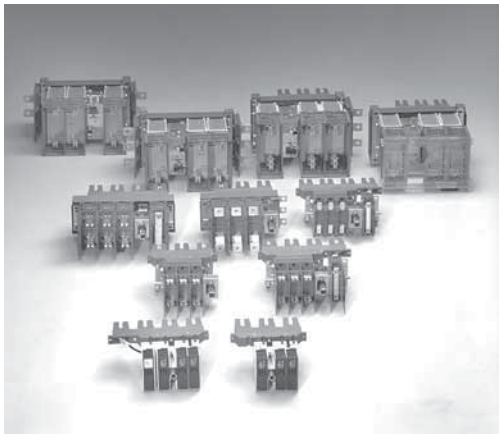
PowerLine disconnect switches may be mounted in any position:



Vertical | Horizontal | Ceiling | Floor

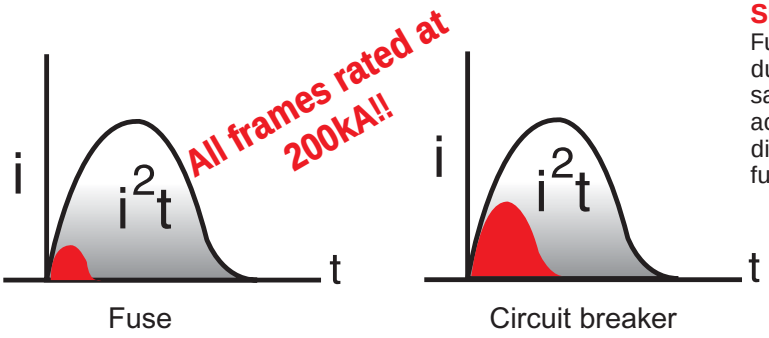
Unique terminal locations①

- Side connections
- Rear connections
- Bus stabs



① Please consult ABB sales office for additional information

General information



Superior short circuit protection

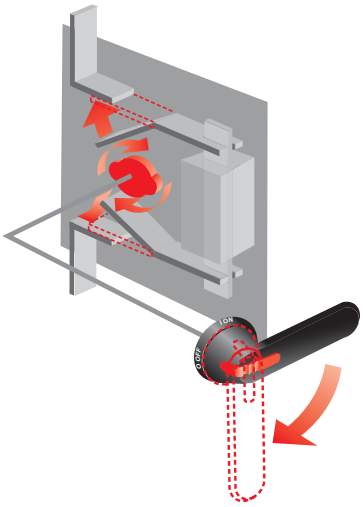
Superior short circuit protection

Fuses efficiently limit the peak let-through current, i^2t, during a fault better than any other product, contributing to safety and reliability. Selectivity and coordination are easily accomplished with fused protection. PowerLine fusible disconnect switches accept a wide range of North American fuses:

Class CC	30A
Class J	30A – 600A
Class L	800A
Class T	400A – 800A

Fuse isolation

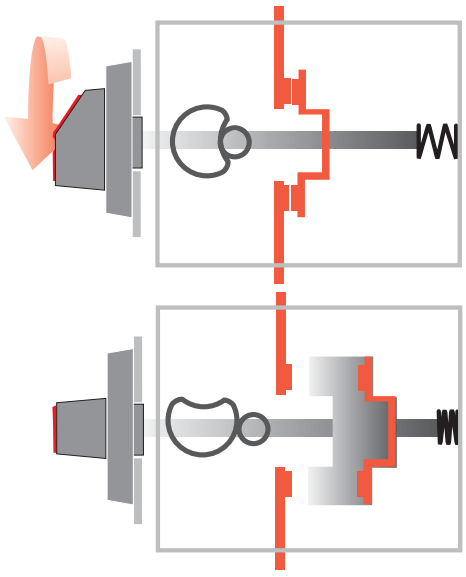
PowerLine switches contain contacts on both sides of the fuse. The fuses are totally isolated in the “OFF” position, reducing the risk of shock to authorized personnel — even if the switch has been back fed.



Fuse isolation

Finger proof

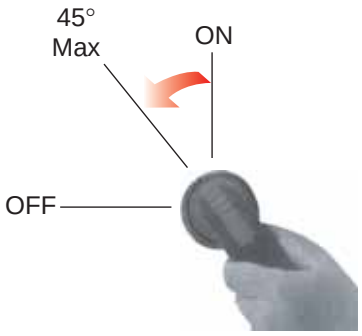
Dead-front construction plus terminal shrouds reduce the risk of touching live parts, improving the safety and reliability of the installation.



Positive opening operation

Positive opening operation

All switches operate according to the “positive opening operation” principle. This means the contacts are opened and closed by a driven mechanism, a solid moving bridge, not merely springs. This provides reliable position indication to the user; if the switch is in the “OFF” position, the contacts are open.

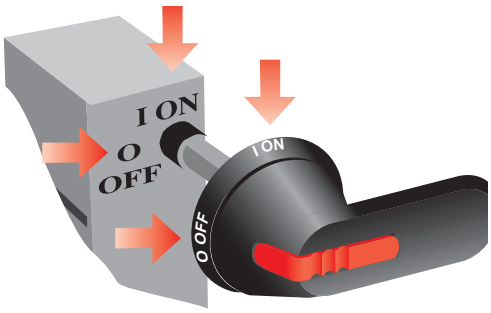


Welded contact protection

Positive opening operation safeguards users in case of welded contacts due to an overload or short circuit.

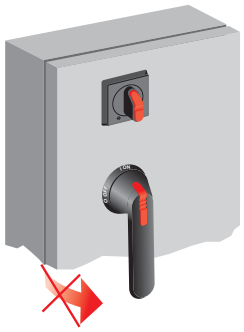
The switch can not reach the “OFF” position unless the contacts are truly open. If any or all of the contacts are welded shut, the switch mechanism will only allow the handle to operate a maximum of 45°. This safeguards personnel by:

- alerting them a problem has occurred
- maintaining the door interlock and
- not allowing a padlock to be inserted.



Clear position indication

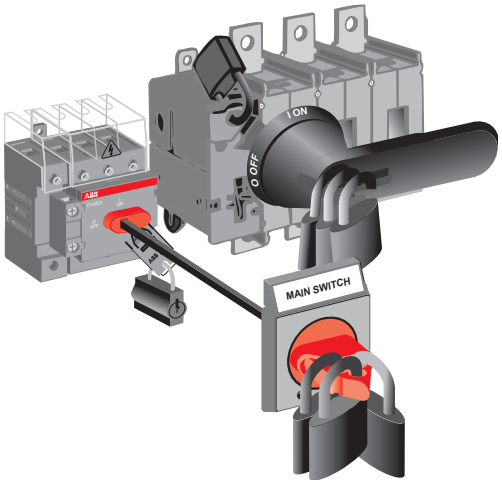
All switches and handles have clear “ON” and “OFF” designations. Whether the door is open or closed, it is possible to simply look at the switch and determine if the switch is “ON” or “OFF”.



Door interlock

Door interlock

The handle and shaft provide door interlock, the door can not be opened when the switch is in the “ON” position. NOTE: Some handles provide a method for qualified personnel to circumvent the door interlock. This is commonly referred to as a “defeater” mechanism.



Handle and mechanism padlocked OFF

Padlockable

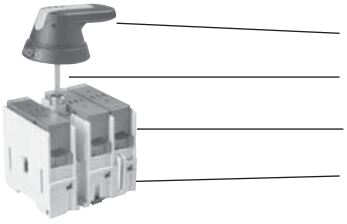
Handles can be padlocked in the “OFF” position with up to three padlocks; additionally, the switch mechanism can be directly padlocked in the “OFF” position when the door is open. NOTE: Some handles can be ordered with the ability to padlock in both the “ON” & “OFF” positions. Please consult your ABB sales office for ordering information.

Track resistant material

Excellent track resistant material, CTI > 600V, IEC 112, reduces the risk of flashover between phases in even the most severe circumstances.

Kits
30A – 800A, 600V, 3 pole ①
UL fuse class J, CC, T, L

Each kit includes:
- 1 three pole switch
- 1 handle
- 1 shaft
- 1 terminal lug kit



Kit

Kits with selector handles

UL general purpose amp rating	UL Fuse type 600V	Maximum horsepower rating Three phase 200V	208V	240V	480V	600V	Kit catalog number	List price
30	J	5	7.5	7.5	15	20	OSJ30B2A1-180	**$ 314**
30	CC	5	7.5	7.5	15	20	OSC30B2A1-180	**314**

Kits with pistol handles

UL general purpose amp rating	UL Fuse type 600V	Maximum horsepower rating Three phase 200V	208V	240V	480V	600V	Kit catalog number	List price
30	J	5	7.5	7.5	15	20	OSJ30B6-150	**$ 374**
30	CC	5	7.5	7.5	15	20	OSC30B6-150	**374**
60	J	15	15	15	30	50	OSJ60B6-150	**472**
100	J③	25	25	30	60	75	OSJ100B8-150	**646**
200	J	50	50	60	125	150	OSKJ200B8-290	**1566**
400	J③	100	125	125	250	350	OSJ400B4-280	**2176**
600	J③	150	150	200	400	500	OSJ600B4-280	**3406**
800	L	200	200	250	500	600	OSL800B4-280	**5266**

Components for kits with selector handles

Kit catalog number	Switch	Handle ④				Shaft			Terminal lugs		
	Catalog number	NEMA type	Marking	Handle Defeatable	Mounting catalog number	Length depth⑤ (inches)	Shaft (inches/mm)	Catalog number	Wire size	Wire type	Catalog number
OSJ30B2A1-180	OS30AJ12	1, 3R, 12	I/O & Off/On	—	OHB2AJ1	6.3 - 9.5	7.1/180	OXS5X180	#18 – 8	Cu	Integral
OSC30B2A1-180	OS30ACC12	1, 3R, 12	I/O & Off/On	—	OHB2AJ1	6.3 - 9.5	7.1/180	OXS5X180	#18 – 8	Cu	Integral

Components for kits with pistol handles

Kit catalog number	Switch	Handle ④				Shaft			Terminal lugs		
	Catalog number	NEMA type	Marking	Handle Defeatable	Mounting catalog number	Length depth⑤ (inches)	Shaft (inches/mm)	Catalog number	Wire size	Wire type	Catalog number
OSJ30B6-150	OS30AJ12	1, 3R, 12	I/O & Off/On	Yes	OHB65J5	5.3 - 8.3	5.9/150	OXP5X150	#18 – 8	Cu	Integral
OSC30B6-150	OS30ACC12	1, 3R, 12	I/O & Off/On	Yes	OHB65J5	5.3 - 8.3	5.9/150	OXP5X150	#18 – 8	Cu	Integral
OSJ60B6-150	OS60J12	1, 3R, 12	I/O & Off/On	Yes	OHB65J6	5.5 - 8.5	5.9/150	OXP6X150	#14 – 4	Cu	Integral
OSJ100B8-150	OS100J03	1, 3R, 12	I/O & Off/On	Yes	OHB80J6	5.5 - 8.5	5.9/150	OXP6X150	#14 – 2/0	Cu/Al	OZXA-24
OSKJ200B8-290	OS200J03	1, 3R, 12	I/O & Off/On	Yes	OHB80J6	10.5 - 12.7	11.4/290	OXP6X290	#6 – 300kcmil	Cu/Al	OZXA-200
OSJ400B4-280	OES400J3	1, 3R, 12	I/O & Off/On	Yes	OHB145J12	7.9 - 12.2	11.0/280	OXP12X280	#2 – 600kcmil	Cu/Al	OZXA-26
OSJ600B4-280	OES600J3	1, 3R, 12	I/O & Off/On	Yes	OHB145J12	11.2 - 14.0	11.0/280	OXP12X280	(2) #2 – 600kcmil	Cu/Al	OZXA-27
OSL800B4-280	OES800J3	1, 3R, 12	I/O & Off/On	Yes	OHB145J12	11.2 - 14.0	11.0/280	OXP12X280	(2) #2 – 600kcmil	Cu/Al	OZXA-27

If other handles or shafts are desired, please order from the individual component pages 18.83 – 18.92.

① Other pole configurations available. Please see the individual component pages.
② 30A and 60-A fusible switches include standard integral terminal lugs.
③ J type fuse clips are standard. If 600V Type "T" fuse clips are desired, please select a fuse adapter kit from the individual component pages.
④ All handles are black and accept three padlocks. For others, please see the individual component pages.
⑤ Mounting depth is the distance from the outside of the door to the disconnect switch mounting plate. Shaft can be cut to desired length.

30A, Base & DIN rail mounted
UL fuse Class J,CC

For a complete assembly, please select one of each:
- 1 switch
- 1 handle
- 1 shaft


OS30AJ12 +

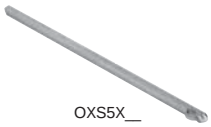

OXS5X180 +


OHB2AJ1


OS30A__12


OHB2__


OHY2__


OXS5X__

30 Amp switches, 600V

UL general purpose amp rating	UL Fuse type 600V	Maximum horsepower rating Terminal lugs Three phase 200V	208V	240V	480V	600V	Wire size	Wire type	Catalog number	List price
3 pole									**3 pole**	
30	J	5	7.5	7.5	15	20	#18 – 8	Cu	OS30AJ12	**$ 280**
30①	CC	5	7.5	7.5	15	20	#18 – 8	Cu	OS30ACC12	
4 pole									**4 Pole**	
30	J	5	7.5	7.5	15	20	#18 – 8	Cu	OS30AJ22F	**350**
30①	CC	5	7.5	7.5	15	20	#18 – 8	Cu	OS30ACC22F	

Selector handles — for use with shafts ☐ .20 x .20" (☐ 5 x 5 mm)

UL/NEMA type	IEC type	Color	Defeat-able	Padlock-able	Weight (lbs.)	Catalog number	List price
Al							
1,3R,12	IP65	Black	—	Yes	0.16	OHB2AJ1	**$ 28**
1,3R,12	IP65	Red/Yel	—	Yes	0.16	OHY2AJ1	**28**
1,3R,12	IP65	Blk	Yes	Yes	0.16	OHB2AJ	**30**
1,3R,12	IP65	Red/Yel	Yes	Yes	0.16	OHY2AJ	**30**

Shafts — for use with OH_2_ selector handles ☐ .20 x .20" (☐ 5 x 5 mm)

Shaft length (inches/mm)	H Mounting depth① (in inches)	Weight (lbs.)	Catalog number	List price
3.3/85	5.5 – 5.7	0.04	OXS5X85	**$ 4**
4.1/105	5.5 – 6.5	0.04	OXS5X105	**4**
4.7/120	5.5 – 7.1	0.05	OXS5X120	**4**
5.1/130	5.5 – 7.5	0.05	OXS5X130	**6**
7.1/180	6.3 – 9.4	0.08	OXS5X180	**6**
9.8/250	9.1 – 12.2	0.10	OXS5X250	**12**
13.0/330	12.2 – 15.4	0.14	OXS5X330	**20**

① Rejection style fuses only.

30A, Base & DIN rail mounted
Handles & shafts

For a complete assembly, please select one of each:
- 1 switch
- 1 handle
- 1 shaft


OS30AJ12

+


OXP5X170

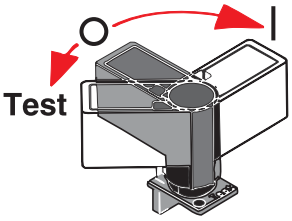
+

OHB65J5

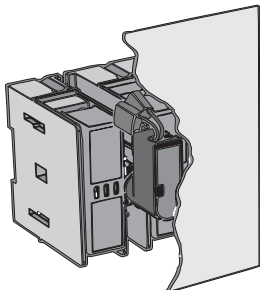
OHB_J5

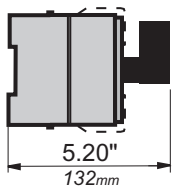
OHY_J5


OXP5X__



OHB5


OHB5 Mounted



OHB5 Mounted depth

Pistol handles — for use with shafts □ .20 x .20" (□ 5 x 5 mm)

UL/NEMA type	IEC type	Color	Marking	Length inches/mm	Defeat-able	Padlock-able	Weight (lbs.)	Catalog number	List price
1,3R,12	IP65	Black	O/I & Off/On	1.8/45	Yes	Yes	0.28	OHB45J5	**$ 70**
1,3R,12	IP65	R/Y	O/I & Off/On	1.8/45	Yes	Yes	0.28	OHY45J5	**70**
1,3R,12	IP65	Black	O/I & Off/On	2.6/65	Yes	Yes	0.29	OHB65J5	**80**
1,3R,12	IP65	R/Y	O/I & Off/On	2.6/65	Yes	Yes	0.29	OHY65J5	**80**
1,3R,4,4X,12	IP65	Black	O/I & Off/On	2.6/65	Yes	Yes	0.29	OHB65L5	**120**
1,3R,4,4X,12	IP65	R/Y	O/I & Off/On	2.6/65	Yes	Yes	0.29	OHY65L5	**120**
1,3R,12	IP65	Black	Off/On/Test	2.6/65	Yes	Yes	0.29	OHB65J5T ①	**100**
1,3R,12	IP65	R/Y	Off/On/Test	2.6/65	Yes	Yes	0.29	OHY65J5T ①	**100**

Shafts — for use with pistol handles □ .20 x .20" (□ 5 x 5 mm)

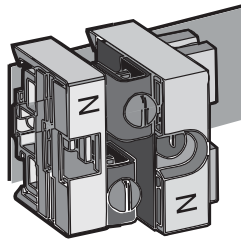
Shaft length (inches/mm)	 Mounting depth (in inches)	Weight (lbs.)	Catalog number	List price
5.9/150	4.9 – 8.9	0.07	OXP5X150	**$ 14**
6.7/170	5.9 – 9.7	0.08	OXP5X170	**16**
10.4/265	9.5 – 13.4	0.12	OXP5X265	**18**
15.8/400	15.0 – 18.7	0.18	OXP5X400	**30**
19.7/500	20.5 – 22.6	0.23	OXP5X500	**42**

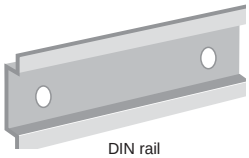
Direct mount handle — mounts directly to switch, no shaft necessary

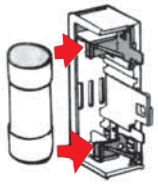
UL/NEMA type	Color	Marking	Length mm	Padlockable	Weight (lbs.)	Catalog number	List price
1	Blk	O/I/Test	50	Yes	0.10	OHB5	**$ 60**

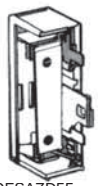
① The OS30_ switch has a TEST position, accessed by rotating the mechanism 45° counterclockwise from the OFF position. In the TEST position, optional auxiliary contacts, OA4B1C, are actuated but the main switch contacts are not.

OS30AJ12 with auxiliaries


OESA-ZX171


DIN rail


OESAZD28
OESAZD48


OESAZD55


CXBY67121

Auxiliary contacts ①

Description	For use on:	Weight (lbs)	AC thermal amp rating	AC rated voltage	Catalog number	List price
Form C 1 N.O. & 1 N.C. (2 maximum)	OS30_ for direct mounting to switch	0.04	6	250	OA4B1C	**$ 40**
1 N.O. 1 N.C. (6 maximum)	OS30_ OSZ4 mounting base required	0.03	NEMA A600,P600		OA1G10 OA3G01	**20**

Mounting base

Description	For use with:	Weight (lbs)		Catalog number	List price
Mounting base	OA1G10, OA3G01	0.08		OSZ4	**$ 20**

Terminal pole

Description	For use on:	Weight (lbs)	AC thermal amp rating	AC rated voltage	Catalog number	List price
Detachable neutral mounts on side of switch or DIN rail	OS30_	0.45	30	600	OESA-ZX171	**$ 40**

DIN rail

Description	For use on:	Weight (lbs.)	Length inches/mm	Catalog number	List price
35mm DIN Rail	OS30_	2.96	39.4/1000	DIN RAIL	**$ 52**

Fuse carriers (replacement part)

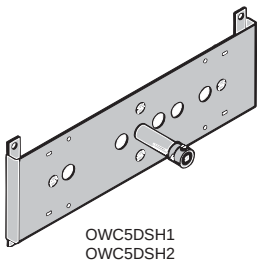
Description	For use on:		Catalog number	List price
CC fuse carrier J fuse carrier	OS30CC_ OS30AJ_		OESAZD48 OESAZD28	**$ 50**
Solid link carrier②	OS30_		OESAZD55	

Terminal cover (replacement part)

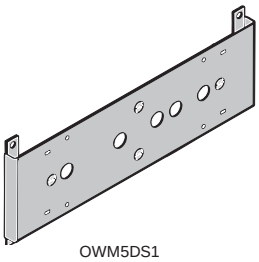
Description	For use on:		Catalog number	List price
Covers terminal below fuse carrier	OS30_		CXBY67121	**$ 10**

① UL File # E83510
② Solid link installed in carrier.

30A, Base & DIN rail mounted
Accessories



OWC5DSH1
OWC5DSH2

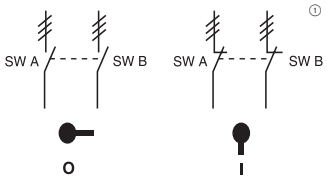


OWM5DS1
OWM5DS2
OWP5DS1
OWP5DS2

Conversion mechanisms
- **Switches are not included**

Description	For use on:	Weight (lbs)	UL/NEMA type	Catalog number	List price
6 pole	OS30A_12	1.74	—	OWP5DS1	**$ 220**
8 pole	OS30A_22	1.90	—	OWP5DS2	**240**
Transfer					
3 pole	OS30A_12	2.11	1,3R,12	OWC5DSH1	**300**
3 pole	OS30A_12	2.11	1,3R,4,4X,12	OWC5DSH1X	**340**
4 pole	OS30A_12	2.30	1,3R,12	OWC5DSH2	**300**
4 pole	OS30A_22	2.30	1,3R,4,4X,12	OWC5DSH2X	**340**
Mechanical interlock					
3 pole	OS30A_12	1.74	—	OWM5DS1	**190**
4 pole	OS30A_22	1.90	—	OWM5DS2	**190**

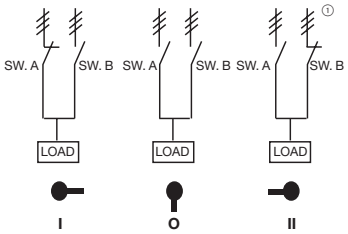
6 or 8 pole — OWP5DS1,OWP5DS2
6 (8) pole mechanism allows two switches, controlled by one handle, to open or close simultaneously.
Equipment required for a complete installation:
- One conversion mechanism
- Two disconnect switches (see pg. 18.83)
- One handle (see pg.18.83 – 18.84)
- One 5 mm shaft (see pg. 18.83 – 18.84)



	POS. O	POS. I
SW. A	O	X
SW. B	O	X

X = Closed
O = Open

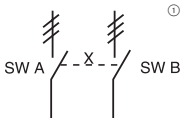
Transfer — OWC5DSH1, OWC5DSH2, OWC5DSH1X, OWC5DSH2X
Transfer mechanism manually transfers between two power sources using two switches and a center OFF position. A 3 position handle is included.
OHB65J5E011 (UL Type 1,3R,12) or
OHB65L5E011 (UL Type 1,3R,4,4X,12)
Equipment required for a complete installation:
- One conversion mechanism
- Two disconnect switches (see pg. 18.83)
- One 5 mm shaft (see pg. 18.84)



	POS. I	POS. O	POS. II
SW. A	X	O	O
SW. B	O	O	X

X = Closed
O = Open

Mechanical interlock — OWM5DS1, OWM5DS2
Mechanical interlock mechanism prevents both switches from being in the "ON" position at the same time.
Equipment required for a complete installation:
- One conversion mechanism
- Two disconnect switches (from pg. 18.83)
- Two handles (from pgs. 18.83 – 18.84)
- Two 5 mm shafts (from pgs. 18.83 – 18.84)



	SW. A POS. I	SW. B POS. I
SW. A	X	O
SW. B	O	X

X = Closed
O = Open

Drawing and mounting information found on pg 18.122

① = Three poles

60A – 200A
Base & DIN rail mounted
UL fuse class J, T

For a complete assembly, please select one of each:

- 1 switch
- 1 handle
- 1 shaft
- 1 terminal lug kit


OS60J12

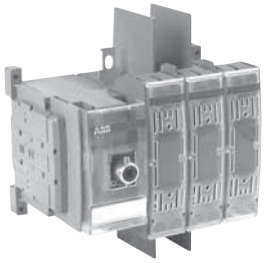
+


OXP6X210

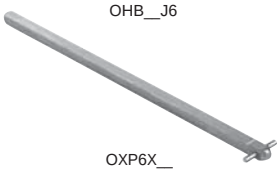
+

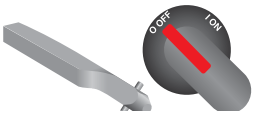

OHB65J6


OS60J12

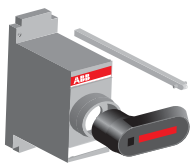

OS100J03


OHB__J6


OXP6X__


OXP6X__-45


OHB4


OSV250

60 – 200 Amp switches, 600V

UL general purpose amp rating	UL Fuse type 600V	Maximum horsepower rating – Three phase 200V	208V	240V	480V	600V	Catalog number	List price
2 pole								
200	J	—	—	—	—	—	OS200J02 OS200J11	**$ 1240**
3 pole								
60	J	15	15	15	30	50	OS60J12	**380**
100	J	25	25	30	60	75	OS100J03	**520**
200	J	50	50	60	125	150	OS200J03	**1380**
200	J	50	50	60	125	150	OS200J12	**1380**
4 pole								
60	J	15	15	15	30	50	OS60J22F	**490**
100	J	25	25	30	60	75	OS100J04F	**660**
200	J	50	50	60	125	150	OS200J04	**1725**
200	J	50	50	60	125	150	OS200J13	**1725**
200	J	50	50	60	125	150	OS200J22	**1725**

Pistol handles — ☐ .24 x .24" (☐ 6 x 6mm)

UL/NEMA type	IEC type	Color	Length in/mm	Marking	De-featable	Pad-lockable	Weight (lbs.)	Catalog number	List price
1,3R,12	IP65	Black	2.6/65	O/I & Off/On	Yes	Yes	0.29	OHB65J6	**$ 80**
1,3R,12	IP65	Red/Yel	2.6/65	O/I & Off/On	Yes	Yes	0.29	OHY65J6	**80**
1,3R,12	IP65	Black	3.1/80	O/I & Off/On	Yes	Yes	0.30	OHB80J6	**90**
1,3R,12	IP65	Red/Yel	3.1/80	O/I & Off/On	Yes	Yes	0.30	OHY80J6	**90**
1,3R,4,4X,12	IP65	Black	3.1/80	O/I & Off/On	Yes	Yes	0.30	OHB80L6	**130**
1,3R,4,4X,12	IP65	Red/Yel	3.1/80	O/I & Off/On	Yes	Yes	0.30	OHY80L6	**130**

Shafts — ☐ .24 x .24" (☐ 6 x 6mm)

Shaft length (inches/mm)	H Mounting depth (inches)	Weight (lbs.)		Catalog number	List price
5.9/150	5.0 – 8.5	0.09		OXP6X150	**$ 12**
8.3/210	7.4 – 11.0	0.13		OXP6X210	**16**
11.4/290	10.5 – 14.0	0.18		OXP6X290	**20**
14.2/360	13.3 – 16.8	0.23		OXP6X360	**24**
16.9/430	16 – 19.7	0.27		OXP6X430	**28**

Twisted shafts — Rotates handle 45° ☐ .24 x .24" (☐ 6 x 6mm)

Shaft length (inches/mm)	H Mounting depth (inches)	Weight (lbs.)		Catalog number	List price
5.1/130	4.3 – 7.8	0.08		OXP6X130-45	**$ 12**
8.3/210	7.4 – 11.0	0.13		OXP6X210-45	**16**
11.4/290	10.5 – 14.0	0.18		OXP6X290-45	**20**
14.2/360	13.3 – 16.8	0.23		OXP6X360-45	**24**

Direct mount handle — mounts directly to switch, no shaft necessary

For use on	Color	Marking	Length mm	Padlockable	Weight (lbs.)	Catalog number	List price
OS60 - OS100	Black	O/I	50	Yes	0.10	OHB4	**$ 60**
OS200	Black Red/Yel	O/I	—	Yes	0.30	OSV200BK OSVY200BK	**130**

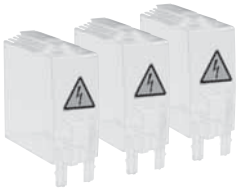
60A – 200A
Accessories


OZXA-24


OA1G10, OA3G01


OSC60J1


CXBY68362


OSS160T3


OHZX10


OEA28


OSS200G1S/3


OSS200G1L/3

Terminal lug kits – OS60 & OS100

For use on:	Wire size	Kit weight (lbs)	Wire type	Terminal lugs per kit	Catalog number	List price
OS60J_	#14 – 4	—	Cu	—	Integral	—
OS100J_	#14 – 2/0	0.43	Cu/Al	6	OZXA-24	**$ 24**

Terminal lug kits – OS200

For use on	Wire size	Wire type	Description	Lugs /kit	Catalog number	List price
OS200_	#4 - 300kcmil #4 - 300kcmil (6) 14-6 AWG	Cu /Al	— — Distribution lug	6 3 3	OZXA-200 OZXA-200/3P OZXA-206	**$ 80** **40** **180**

Auxiliary contacts

Description	For use on:	Weight	Catalog number	List price
1 N.O. 1 N. C.	OS60 - OS100	.07	OA1G10 OA3G01	**$ 20**
1 N.O. 1 N. C.	OS200	.07	OA1G10 OA3G01	

Module for auxiliary contacts

Description	Weight	Catalog number	List price
Screw mounting to the left side of the switch	0.1	OEA28	**$ 50**

Mounting on the left side of the switch :Max 8 auxiliary contact blocks with the OEA28 module
Mounting under the mechanism cover: Max 4 auxiliary contact blocks

Replacement parts

Description	For use on:	Catalog number	List price
Removable fuse carrier	OS60J12 OS60J22F	OSC60J3 OSC60J4	**$ 60** **80**
Transparent fuse cover	OS100	CXBY68362	**20**
Fuse cover	OS200	CXBY68674	**20**
Phase barrier		CXBY68794	**15**

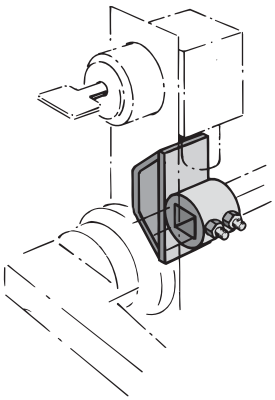
Terminal shrouds

For use on:	Description	Number of poles	Weight lbs	Catalog number	List price
OS100		1 3	0.04	OSS160T1 OSS160T3	**$ 20** **60**
OS200_	Long type Short type Long type Short type	3 3 4 4	0.20 0.13 0.26 0.18	OSS200G1L/3 OSS200G1S/3 OSS200G1L/4 OSS200G1S/4	**50** **50** **65** **61**

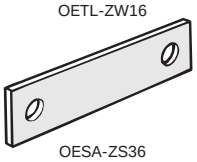
Snap-on mounting, grey plastic, IP3X Transparent shrouds available on request.

Shaft Guide

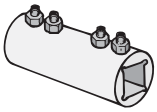
Description	Catalog number	List price
Fits all pistol grip handles, mounts on the inside of the enclosure door with provided hardware	OHZX10	**$ 12**



OETL-ZW16

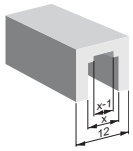


OESA-ZS36

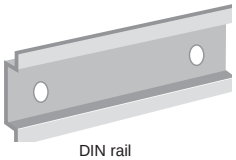


OESA-ZX167
OETL-ZX95

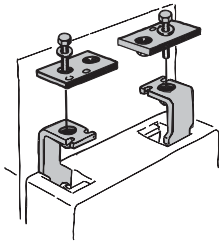
OSZ1



OETL-ZK19
(X=6MM)



DIN rail



OESA-ZX1-J1T6

Locking accessories

Description	For use on:	Weight (lbs)		Catalog number	List price
Cam attachment for Kirk Key, Castell, Lowe & Fletcher and Ronis interlock. Cam attachment for adapting to the interlock system. The interlock is not included.	OS60 – OS200	0.25		OETL-ZW16	**$ 190**

Shorting bars

Description	For use on:		AC thermal amp rating	AC rated voltage	Catalog number	List price
Dummy fuse	OS60		60	600	OESA-ZD54	**$ 50**
Solid links: Metal strap	OS100 OS200		100 400	600 600	OESA-ZS36 OESA-ZK98	**24** **23**

Shaft extension coupler

Description	For use on:	Weight (lbs)			Catalog number	List price
Joins two shafts together for applications where extended length is required	6mm shafts 12mm shafts	0.26 0.26			OESA-ZX167 OETL-ZX95	**$ 56** **100**

Shaft adapter

Description	For use on:	Weight (lbs)			Catalog number	List price
Adapts one end of a 6mm shaft to 12mm. Use with shaft extension coupler	6mm shafts	0.20			OETL-ZK19	**$ 40**

Terminal poles

Description	For use on:	Weight (lbs)	AC thermal amp rating	AC rated voltage	Catalog number	List price
Detachable neutral mounts on side of switch or DIN rail	OS60 OS100 OS200	0.13 0.31 .88	63 125 200	600 600 600	OSZ1 OSZ2 OXN250	**$ 50** **50** ①

DIN rail

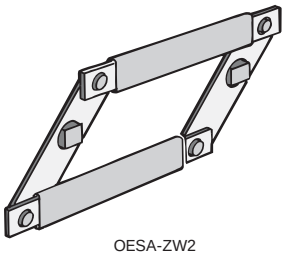
Description	For use on:	Weight (lbs.)	Length inches/mm	Catalog number	List price
35mm DIN Rail	OS60	2.36	39.4/1000	DIN RAIL	**$ 52**

"T" type fuse adapter kit

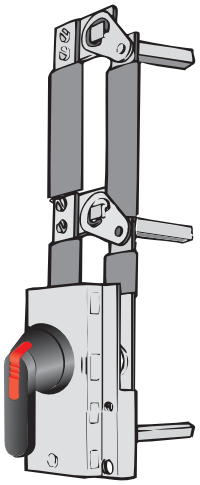
Description	For use on:		Catalog number	List price
100A, 600V, 3 pole	OS100		OS100-J1T6	**$ 60**

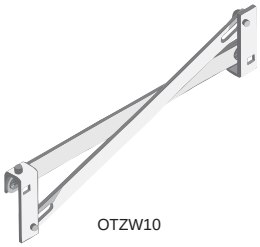
① Consult factory.

60A – 200A
Accessories


OESA-ZW2


OESA-ZW1

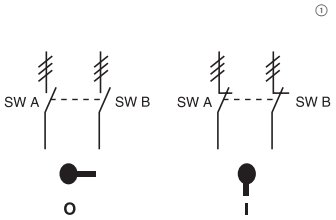

OTZW26


OTZW10

Conversion mechanisms
- Switches are not included

Description	For use on:	Weight (lbs)	UL/NEMA type	Catalog number	List price
6 and 8 pole	OS60 – OS200	1.52	—	OESA-ZW2	**$ 220**
Transfer	OS60 – OS100	2.20	1,3R,12	OESA-ZW1	**300**
Transfer	OS60 – OS100	2.20	1,3R,4,4X,12	OESA-ZW1X	**340**
Mechanical interlock	OS60 – OS200	0.55	—	OTZW10	**100**
Transfer	OS200	6.17	1,3R,12	OTZW25	**790**
Transfer	OS200	6.17	1,3R,4,4X,12	OTZW25X	**840**
Bypass	OS200	7.28	1,3R,12	OTZW26	**950**

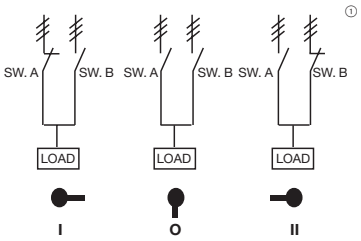
6 or 8 pole — OESA-ZW2
6 (8) pole mechanism allows two switches controlled by one handle, to open or close simultaneously. OHB145J12 handle included.
Equipment required for a complete installation:
- One conversion mechanism
- Two disconnect switches (see pg. 18.87)



	POS. O	POS. I
SW. A	O	X
SW. B	O	X

X = Closed
O = Open

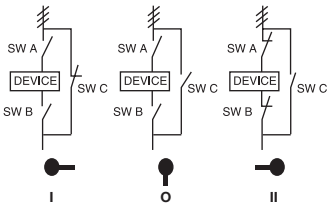
Transfer — OESA-ZW1, OESA-ZW1X, OTZW25, OTZW25X
Transfer mechanism manually transfers between two power sources using two switches and a center OFF position. A 3-position handle is included.
OHB145J12E011 (UL Type 1,3R,12) or
OHB145L12E011 (UL Type 1,3R4,4X,12)
Shafts included .
Equipment required for a complete installation:
- One conversion mechanism
- Two disconnect switches (see pg. 18.87)



	POS. I	POS. O	POS. II
SW. A	X	O	O
SW. B	O	O	X

X = Closed
O = Open

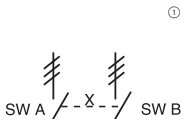
Bypass — OTZW26
Bypass mechanism operates three switches: Two switches in series and one changeover switch to allow power bypass.
A 3-position handle is included:
OHB145J12E011 (Type 1,3R & 12) or
OHB145L12E011 (Type 1, 3R, 4, 4X, 12)
Shafts included.
Equipment required for a complete installation:
- One conversion mechanism
- Three disconnect switches (see page 18.87)



	POS. I	POS.O	POS.II
SW. A	O	O	X
SW. B	O	O	X
SW. C	X	O	O

X = Closed
O = Open

Mechanical interlock — OTZW10
Mechanical interlock mechanism prevents both switches from being in the "ON" position at the same time.
Equipment required for a complete installation:
- One conversion mechanism
- Two disconnect switches (see pg. 18.87)
- Two handles (see pg. 18.87)
- Two shafts (see pg. 18.87)



	SW. A POS. I	SW. B POS. I
SW. A	X	O
SW. B	O	X

X = Closed
O = Open

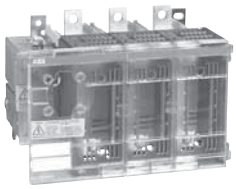
Drawing and mounting information found on pg 18.123

① = Three poles

400A – 800A
UL fuse class J, T, L

For a complete assembly, please select one of each:

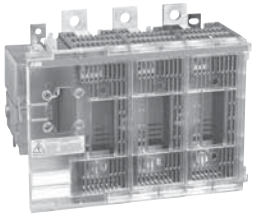
- 1 switch
- 1 handle
- 1 shaft
- 1 terminal lug kit


OES400J3 +


OXP12X280 +


OHB145J12 +

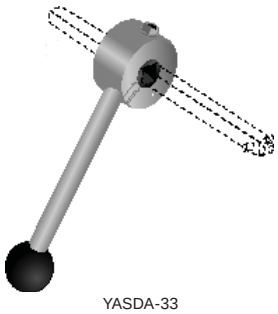

OZXA-26


OES400J3


OES600J3
OES800L3


OHB__J12


OHY__J12


YASDA-33

200 – 800 Amp switches, 600V

UL general purpose amp rating	UL Fuse type 600V	Maximum horsepower rating Three phase 200V	208V	240V	480V	600V	Catalog number	List price
2 pole								
400	J	—	—	—	—	—	OES400J2	$ **1680**
600	J	—	—	—	—	—	OES600J2	**2600**
800	L	—	—	—	—	—	OES800L2	**4280**
3 pole								
400	J	100	125	125	250	350	OES400J3	**1860**
600	J	150	150	200	400	500	OES600J3	**2900**
800	L	200	200	250	500	600	OES800L3	**4760**
4 pole								
400	J	100	125	125	250	350	OES400J4	**2320**
600	J	150	150	200	400	500	OES600J4	**3620**
800	L	200	200	250	500	600	OES800L4	**5950**

Pistol handles — ☐ .47 x .47" (☐ 12 x 12mm)

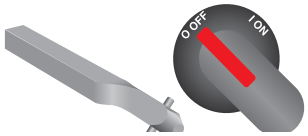
UL/NEMA type	IEC type	Color	Length inches/mm	Marking	Defeatable	Padlockable	Weight (lbs)	Catalog number	List price
1,3R,12	IP65	Black	4.9/125	O/I & Off/On	Yes	Yes	0.39	OHB125J12	**$ 90**
1,3R,12	IP65	Red/Yel	4.9/125	O/I & Off/On	Yes	Yes	0.39	OHY125J12	**90**
1,3R,12	IP65	Black	5.7/145	O/I & Off/On	Yes	Yes	0.39	OHB145J12	**90**
1,3R,12	IP65	Red/Yel	5.7/145	O/I & Off/On	Yes	Yes	0.39	OHY145J12	**90**
1,3R,12	IP65	Black	6.9/175	O/I & Off/On	Yes	Yes	0.41	OHB175J12	**100**
1,3R,12	IP65	Red/Yel	6.9/175	O/I & Off/On	Yes	Yes	0.41	OHY175J12	**100**
1,3R,4,4X,12	IP65	Black	5.7/145	O/I & Off/On	Yes	Yes	0.39	OHB145L12	**130**
1,3R,4,4X,12	IP65	Red/Yel	5.7/145	O/I & Off/On	Yes	Yes	0.39	OHY145L12	**130**
1,3R,4,4X,12	IP65	Black	6.9/175	O/I & Off/On	Yes	Yes	0.41	OHB175L12	**140**
1,3R,4,4X,12	IP65	Red/Yel	6.9/175	O/I & Off/On	Yes	Yes	0.41	OHY175L12	**140**
1,3R,4,4X,12	IP65	Metal	8.7/220	Off/On	—	Yes	1.50	YASDA-8	**190**

Direct mount handles

Item	Weight (lbs)	Catalog number	List price
Mounts to 12mm shaft	0.78	YASDA-33	**$ 155**

400A – 800A
Accessories

OXP12X__

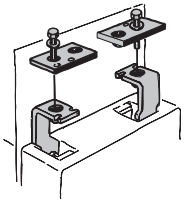


OXP12X__-45

OZXA-26

OZXA-27

OZXA-175/400



OESA-ZX1-J_

Shafts — ☐ .47 x .47" (☐ 12 x 12mm)

Shaft length inches/mm	H Mounting depth① in inches	Weight (lbs)	Catalog number	List price
For use on OES400				
8.7/220	7.9 – 12.2	0.61	OXP12X220	**$ 28**
9.8/250	9.1 – 13.4	0.70	OXP12X250	**32**
11.0/280	10.2 – 14.5	0.77	OXP12X280	**36**
12.8/325	12.0 – 16.3	0.90	OXP12X325	**40**
15.6/395	14.8 – 19.1	1.10	OXP12X395	**44**
18.3/465	17.5 – 21.9	1.32	OXP12X465	**48**
21.1/535	20.3 – 24.6	1.54	OXP12X535	**52**
For use on OES600 – OES800				
9.8/250	10.0 – 12.8	0.70	OXP12X250	**32**
11.0/280	11.2 – 14.0	0.77	OXP12X280	**36**
12.8/325	13.0 – 15.8	0.90	OXP12X325	**40**
15.6/395	15.8 – 18.6	1.10	OXP12X395	**44**
18.3/465	18.5 – 21.3	1.32	OXP12X465	**48**
21.1/535	21.1 – 24.1	1.54	OXP12X535	**52**

Twisted shafts — Rotates handle 45° ☐ .47 x .47" (☐12 x 12mm)

Shaft length (inches/mm)	H Mounting depth (inches)	Weight (lbs.)	Catalog number	List price
For use on OES400				
11.0/280	10.2 – 14.5	0.77	OXP12X280-45	**$ 36**
12.8/325	12.0 – 16.3	0.90	OXP12X325-45	**40**
18.3/465	17.5 – 21.9	1.32	OXP12X465-45	**48**
For use on OES600 - OES800				
11.0/280	11.2 – 14.0	0.77	OXP12X280-45	**36**
12.8/325	13.0 – 15.8	0.90	OXP12X325-45	**40**
18.3/465	18.5 – 21.3	1.32	OXP12X465-45	**48**

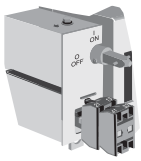
Terminal lug kit

For use on:	Wire size	Kit weight (lbs)	Wire type	Terminal lugs per kit	Catalog number	List price
OES400	#2 – 600 kcmil	3.50	Cu/Al	6	OZXA-26	$ **190**
OES400	#2 – 600 kcmil	1.75	Cu/Al	3	OZXA-26/3P	**95**
OES400	(2) #2 – 500 kcmil	—	Cu/Al	6	OZXA-33	**375**
OES600 – OES800	(12)#14 – 6 kcmil	1.10	Cu/Al	3	OZXA-175/400	**270**
OES600 – OES800	(2) #2 – 600 kcmil	4.62	Cu/Al	6	OZXA-27	**380**
OES600 – OES800	(2) #2 – 600 kcmil	2.31	Cu/Al	3	OZXA-27/3P	**190**

"T" type fuse adapter kit

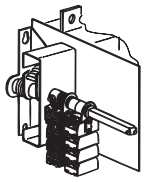
For use on:	For use with	AC thermal amp rating	AC rated voltage	Poles	Catalog number	List price
OES400	600V Class T fuse	400	600	3	OESA-ZX1-J4T6	$ **140**
OES600	600V Class T fuse	600	600	3	OESA-ZX1-J6T6	**240**
OES800	300 & 600V Class T fuse	800	600	3	OESA-ZX1-L8T6	**280**

① Mounting depth is the distance from the outside of the door to the disconnect switch mounting plate. Shaft can be cut to desired length.



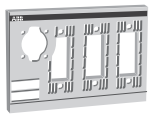
OZXK-_

400A Switches

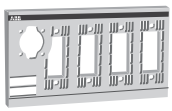


600A & 800A Switches

OESA-ZX271
OESA-ZX216

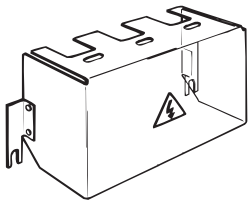


OESA-ZX272
OESA-ZX196

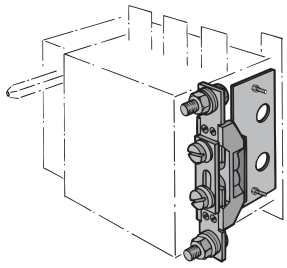


OESA-ZX273
OESA-ZX197

OESA-ZX204



OESA-ZX70
OESA-ZX123
OESA-ZX125



OESA-ZX85
OESA-ZX88

Auxiliary contacts ①

Description	For use on:	Weight (lbs)	AC thermal amp rating	AC rated voltage	Catalog number	List price
1 N.O. + 1 N.C.	OES400 – OES800	0.20	10	600	OZXK-1	**$ 100**
2 N.O. + 2 N.C.		0.26	10	600	OZXK-2	**170**
4 N.O. + 4 N.C.		0.40	10	600	OZXK-3	**340**
2 N.O.		0.18	10	600	OZXK-4	**100**
4 N.O.		0.25	10	600	OZXK-5	**170**
8 N.O.		0.40	10	600	OZXK-6	**340**

Fuse covers (replacement part)

Description	For use on:	Weight (lbs)		Catalog number	List price
2 pole	OES400	0.30		OESA-ZX271	**$ 140**
3 pole		0.40		OESA-ZX272	**200**
4 pole		0.53		OESA-ZX273	**270**
2 pole	OES600 – OES800	0.40		OESA-ZX216	**180**
3 pole		0.50		OESA-ZX196	**260**
4 pole		0.67		OESA-ZX197	**350**

Fuse cover interlock

Description	For use on:		Catalog number	List price
Prevents the fuse cover from being opened when the switch is in the ON position	OES400 – OES800		OESA-ZX204	**$ 90**

Terminal shroud

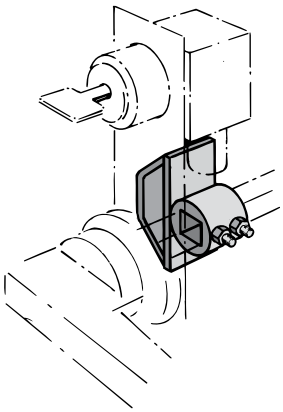
Description	For use on:	Weight (lbs)		Catalog number	List price
Includes one terminal shroud for line or load side	OES400	0.13		OESA-ZX123	$ **110**
	OES600 – OES800	0.11		OESA-ZX125	**160**

Terminal pole

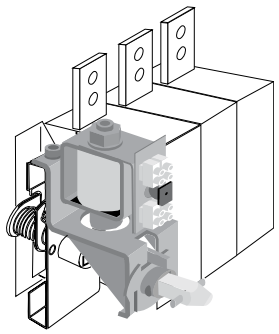
Description	For use on:	Weight (lbs)	AC thermal amp rating	AC rated voltage	Catalog number	List price
Detachable neutral mounts on side of switch or DIN rail	OES400	1.04	400	600	OESA-ZX85	**$ 150**
	OES600 – OES800	1.19	800	600	OESA-ZX88	**160**

① UL file #E57057

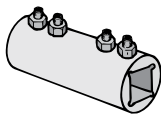
400A – 800A
Accessories



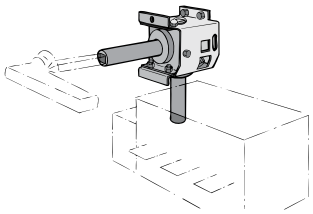
OETL-ZW5



OETL-ZT80

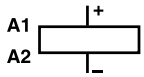


OETL-ZX95



OETL-ZX108

Locking accessories

Description	For use on:	Weight (lbs)		Catalog number	List price
Cam attachment for Kirk Key, Castell, Lowe & Fletcher and Ronis interlock. For adapting to the interlock system. The interlock is not included.	OES400 – OES800	0.29		OETL-ZW5	**$ 190**
Electrical interlock Closed circuit principle for interlocking the switch movement. When the coil circuit is dead, A-types cannot be operated to ON-position and L-types cannot be operated to ON- or OFF-position. Coil voltages 110VAC, 220VAC, 24VDC, 48VDC, 60 VDC 110VDC, 220VDC, P = 15W  	OES600 – OES800	2.42		OETL-ZT80A OETL-ZT80L	**1280** **1220**

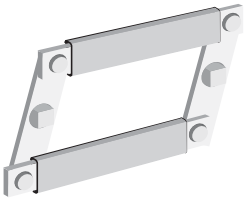
★ - Coil voltage

Shaft extension coupler

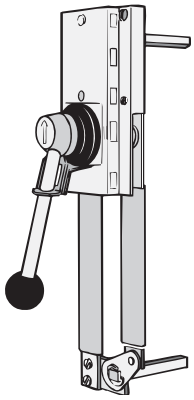
Description	For use on:	Weight (lbs)		Catalog number	List price
Joins two shafts together for applications where extended length is required	12mm shafts	0.26		OETL-ZX95	**$ 100**

90° angle kit

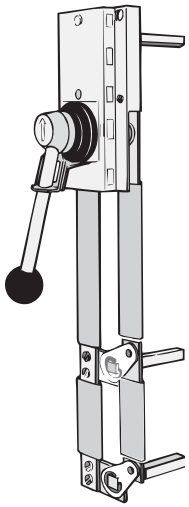
Description	For use on:	Weight (lbs)		Catalog number	List price
Converts switch mechanism from front operation to side operation	OES400 – OES800	4.63		OETL-ZX108	**$ 794**



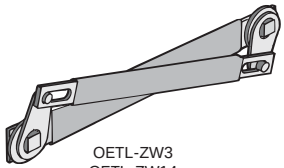
OETL-ZW9



OETL-ZW12



OETL-ZW13



OETL-ZW3
OETL-ZW14
OETL-ZW15

Conversion mechanisms

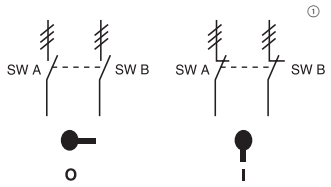
- Switches are not included

Description	For use on:	Weight (lbs)	UL/NEMA type	Catalog number	List price
6 or 8 pole Transfer Bypass	OES400 – OES800	2.42 10.1 8.81	— 1,3R,4,4X,12 1,3R,4,4X,12	OETL-ZW9 OETL-ZW12 OETL-ZW13	**$ 260** **560** **560**
Mechanical interlock	OES400 – OES800	1.26 1.15 2.64	— — —	OETL-ZW3 OETL-ZW14 OETL-ZW15	**140** **140** **160**

6 or 8 pole — OETL-ZW9

6 (8) pole mechanism allows two switches controlled by one handle, to open or close simultaneously.
Equipment required for a complete installation:

- One conversion mechanism
- Two disconnect switches (see pg. 18.91)
- One handle (see pg. 18.91)
- Two shafts (see pg. 18.92)



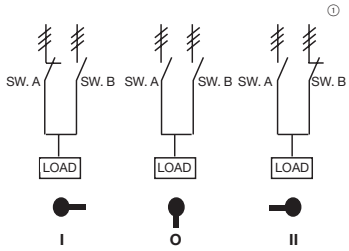
	POS. O	POS. I
SW. A	O	X
SW. B	O	X

X = Closed
O = Open

Transfer — OETL-ZW12

Transfer mechanism manually transfers between two power sources using two switches and a center OFF position. A 3 position handle is included. YASDA-21 (UL Type 1, 3R, 4, 4X & 12).
Equipment required for a complete installation:

- One conversion mechanism
- Two disconnect switches (see pg. 18.91)
- Two OETL-ZX95 shaft extension couplers (see pg. 18.94)
- Two shafts (see pg. 18.92)



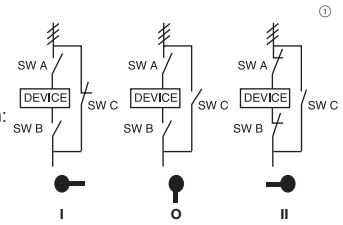
	POS. I	POS. O	POS. II
SW. A	X	O	O
SW. B	O	O	X

X = Closed
O = Open

Bypass — OETL-ZW13

Bypass mechanism operates three switches: Two switches in series and one changeover switch to allow power bypass. A 3 position handle is included. YASDA-6 (UL Type 1, 3R, 4, 4X & 12).
Equipment required for a complete installation:

- One conversion mechanism
- Three disconnect switches (see pg. 18.91)
- Three OETL-ZX95 shaft extension couplers (see pg. 18.94)
- Three shafts (see pg. 18.92)



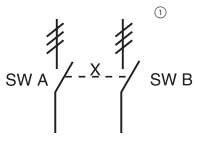
	POS. I	POS. O	POS. II
SW. A	O	O	X
SW. B	O	O	X
SW. C	X	O	O

X = Closed
O = Open

Mechanical interlock — OETL-ZW3, OETL-ZW14, OETL-ZW15

Mechanical interlock mechanism prevents both switches from being in the "ON" position at the same time.
Equipment required for a complete installation:

- One conversion mechanism
- Two disconnect switches (see pg. 18.91)
- Two handles see page 18.91)
- Two shafts (see pg. 18.92)



	SW. A POS. I	SW. B POS. I
SW. A	X	O
SW. B	O	X

X = Closed
O = Open

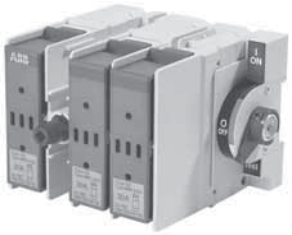
Drawing and mounting information found on pg 18.124 & 18.125

① = Three poles

Other configurations
Side operated ①
30A – 400A, UL fuse class J,CC,T

For a complete assembly, please select one of each:

- 1 switch
- 1 handle
- 1 shaft
- 1 terminal lug

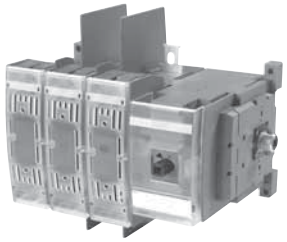


OS30A_S_ +

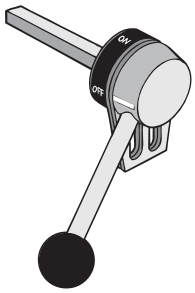
OXP5X170 +

OHY65J5TE00S

OS60JS30



OS100JS30



OETL-ZX74

OZXA-25

Side operated switches — 3 pole

UL general purpose amp rating	UL fuse type 600V	Maximum horsepower rating, Three phase 200V	208V	240V	480V	600V	Weight (lbs)	Catalog number	List price
30	J	5	7.5	7.5	15	20	1.54	OS30AJS30	**$ 360**
30	CC	5	7.5	7.5	15	20	1.54	OS30ACCS30	**360**
60	J	15	15	15	30	50	3.52	OS60JS30	**540**
100	J①	25	25	30	60	75	3.97	OS100JS30	**640**
200	J①	50	50	60	125	150	15.21	OES200J3-S	**1800**
400	J①	100	125	125	250	350	17.20	OES400J3-S	**2600**

Handles

UL/NEMA type	IEC type	Color	Length inches/mm	Marking	Defeat-able	Padlock-able	Weight	Catalog number	List price
For use with O									
1, 3R, 12	IP65	Black	2.6/65	OFF/ON	Yes	Yes	0.29	OHB65J5	**$ 80**
1, 3R, 12	IP65	Red/Yel	2.6/65	OFF/ON	Yes	Yes	0.29	OHY65J5	
1, 3R, 12	IP65	Black	3.1/80	OFF/ON	Yes	Yes	0.30	OHB80J6	**90**
1, 3R, 12	IP65	Red/Yel	3.1/80	OFF/ON	Yes	Yes	0.30	OHY80J6	
For use with O									
1, 3R, 12	IP65	Black	4.9/145	OFF/ON	Yes	Yes	0.39	OHB145J12	**80**
1, 3R, 12	IP65	Red/Yel	4.9/145	OFF/ON	Yes	Yes	0.39	OHY145J12	
1, 3R, 12	IP65	Metal	4.9/145	OFF/ON	No	Yes	1.50	OETL-ZX74	**190**

Shafts

For use with:	Length (inches/mm)	Description	Weight (lbs.)	Catalog number	List price
OS30AJS30 & OS30ACCS30	6.7/170	0.20 x 0.20" (5 x 5mm)	0.08	OXP5X170	**$ 16**
OS60JS30 & OS100JS30	6.7/170	0.24 x 0.24" (6 x 6mm)	0.08	OXP6X210	**16**
OES200J3-S & OES400J3-S	12.8/325	0.47 x 0.47" (12 x 12mm)	0.90	OXP12X325	**40**

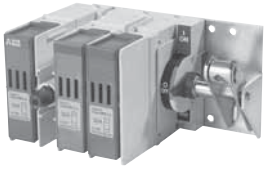
Terminal lug kit

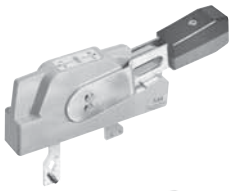
For use on:	Wire size	Kit weight (lbs)	Wire type	Lugs per kit	Catalog number	List price
OS30AJS30 & OS30ACCS30	#18 – 8	—	Cu	—	Integral	—
OS60JS30	#14 – 4	—	Cu	—	Integral	—
OS100JS30	#14 – 2/0	0.43	Cu/Al	6	OZXA-24	**$ 24**
OES200J3-S	#6 – 300 kcmil	0.93	Cu/Al	6	OZXA-25	**80**
OES400J3-S	#2 – 600 kcmil	3.50	Cu/Al	6	OZXA-26	**190**

① J type fuse clips are standard. If 600V Type "T" fuse clips are desired, please order the "T" type fuse adapter kit.

Flange operated disconnect switches
Shaft operated fusible
30A - 100A

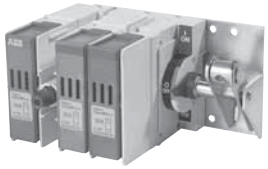
For a complete assembly, please select one of each.

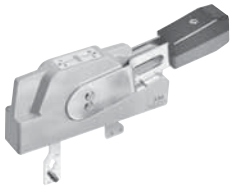

Switch


Handle


Shaft


Lug kit (as required)


OS30AJF30




DSFHN-HS__


DSFHS-__

30A -100A Flange operated fusible switches (Shaft) - 3 pole

UL general purpose amp rating A	UL fuse type 600V	Maximum horsepower rating Three phase 200V	208V	240V	480V	600V	Catalog number	List price
30	J	5	7.5	7.5	15	20	OS30AJF30	**$ 500**
30	CC	5	7.5	7.5	15	20	OS30ACCF30	**500**
60	J	15	15	15	30	50	OS60JF30	**590**
100	J	25	25	30	60	75	OS100JF30	**690**

Flange handles

UL/ NEMA type	Marking	Defeatable	Padlockable	Catalog number	List price
1, 3R, 12	OFF/ON	Yes	Yes	DSFHN-HS12	**$ 156**
4, 4X	OFF/ON	Yes	Yes	DSFHN-HS4	**240**

Shafts

For use with:	Maximum enclosure depth (inches)	Catalog number	List price
OS30_ - OS100_	16	DSFHS-12	**$ 28**
	21	DSFHS-17	**40**
	26.5	DSFHS-22	**52**

Flange operated fusible and non-fusible disconnect switches

ABB's solution for complying with the new NFPA79 requirements is Flange Operated Fusible and Non-fusible Disconnect Switches.

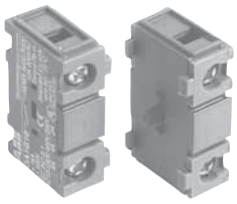
New 2002 NFPA 79 changes requires main disconnecting means to be operable without the use of accessory tools or devices, independent of door position. This code also includes an interlocking provision to prevent the closing of disconnects while the enclosure door is open, unless an interlock is operated by a deliberate action.

The flange operated disconnect switches are available as ridged shaft or flexible cable operated versions. The cable operated version allows you to install the disconnect switch anywhere in the enclosure depending on the length of the cable. Cables are available in lengths up to 84 inches.

The designs are cost-effective NFPA 79 solutions offering quick and easy installation.

Flange operated disconnect switches
Shaft operated fusible
30A - 100A

OZXA-24



OA1G__

OS30AJ12 with auxiliaries

OSS160T3

Terminal lug kits and accessories

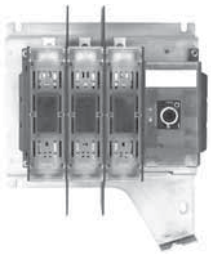
For use on:	Description	Wire size	Wire type	Qty.	Catalog number	List price
OS30_ OS60_ OS100_	Lug Lug Lug	#18 - #8 #14 - #4 #14 - 2/0	Cu Cu Cu/Al	-- -- 6	Integral Integral OZXA-24	**--** **--** **$ 24**
OS30_- OS100_	Aux. Contact Aux. Contact	1 NO 1 NC		1 1	OA1G10 OA3G01	**20** **20**
OS30_	Adapter	Needed for mounting aux. Contacts on OS30_		1	OSZ4	**20**
OS100_	Shroud	Includes one set of 3 for use on line or load side		1	OSS160T3	**60**

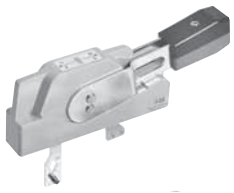
Door hardware NEMA 12

Item	Catalog number	List price
Safety door latch, 2 point, door less than 40” high	KDH2R	**$ 200**
Safety door latch, 3 point, door less than 40” high	KDH3R	**225**

For additional technical information and accessories, please consult the AC1000 Product Selector catalog, section 18 or the factory

Flange operated disconnect switches
Cable operated fusible
30A - 800A

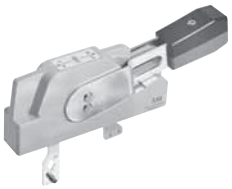

Switch kit


Handle


Cable


Lug kit (as required)


OS100J03-FC


K5FCH__


K5C0__

30A - 800A Fusible flange cable operating kit

UL general purpose amp rating A	UL fuse type 600V	Maximum horsepower rating Three phase 200V-208V	240V	480V	600V	Poles	Catalog number	List price
30	CC	5/7.5	7.5	15	20	3	OS30ACC12-FC	**$ 680**
30	J	5/7.6	7.6	15	20	3	OS30AJ12-FC	**680**
60	J	15	15	30	50	3	OS60J12-FC	**780**
100	J/T	25	30	60	75	3	OS100J03-FC	**920**
200	J	50	60	125	150	3	OS200J03-FC	**1780**
400	J/T	100	125	250	350	3	OES400J3-FC	**2360**
600	J/T	150	200	400	500	3	OES600J3-FC	**3600**
800	L	200	250	500	600	3	OES800L3-FC	**5460**

Flange handle

For use with:	NEMA type	Catalog number	List price
OS30_ - OS200J03_ OES400_ - OES800_	1, 3R, 12	K5FCH K7FCH	**$ 213** **310**
OS30_ - OS200J03_ OES400_ - OES800_	4, 4X	K5FCH4 K7FCH4	**243** **415**

Cable

For use with:	Cable length (inches)	Catalog number	List price
OS30_ - OS200J03_	36 48 60 72	K5C036 K5C048 K5C060 K5C072	**$ 114** **146** **160** **175**
OES400_ - OES800_	48 60 72 84	K7C048 K7C060 K7C072 K7C084	**190** **220** **256** **270**

Discount schedule H3: F 30A - 100A
Discount schedule H6: Handles, shafts, accessories and lug kits
Discount schedule H5: F 200A - 800A
Discount schedule SH: Door hardware kits

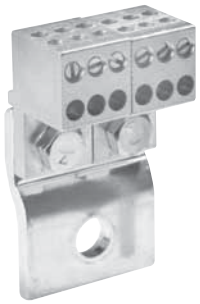
Flange operated disconnect switches
Cable operated fusible
30A - 800A

OZXA-200

OZXA-26

OZXA-27

OZXA-175



OZXA-175/400

Terminal lug kit

For use on :	Wire size	Wire type		Lugs / kit	Catalog number	List price
OS30_	#18 - 8/0	Cu	--	--	Integral	**--**
OS60J03_	#14 - 4	Cu	--	--	Integral	**--**
OS100J03_	#14 - 2/0	Cu/Al	--	6	OZXA-24	**$ 24**
OS200_	#4 - 300 kcmil	Cu/Al	--	6	OZXA-200	**80**
	#4-300 kcmil	Cu/Al	--	3	OZXA-200/3P	**40**
	(6)#14 - 6 AWG	Cu/Al	Distribution Lug	3	OZXA-206	**180**
OES400_	#2 - 600 kcmil	Cu/Al	--	6	OZXA-26	**190**
	#2 - 600 kcmil	Cu/Al	--	3	OZXA-26/3P	**95**
	#2 - 500 kcmil	Cu/Al	--	6	OZXA-33	**375**
OES600-OES800	(12)#14 - 6 kcmil	Cu/Al	Distribution Lug	3	OZXA-175/400	**270**
	(2)#2 - 600 kcmil	Cu/Al	--	6	OZXA-27	**380**
	(2)#2 - 600 kcmil	Cu/Al	--	3	OZXA-27/3P	**190**

Door hardware NEMA 12

Item	Catalog number	List price
Safety door latch, 2 point, door less than 40” high	KDH2R	**$ 200**
Safety door latch, 3 point, door less than 40” high	KDH3R	**225**

For additional technical information and accessories, please consult pages 18.83 - 18.121.

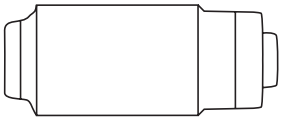
Discount schedule H3: F 30A - 100A
Discount schedule H6: Handles, shafts, accessories and lug kits
Discount schedule H5: F 200A - 800A
Discount schedule SH: Door hardware kits

Other configurations
Global concept disconnect switches
30A – 60A

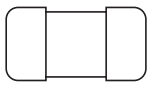
For a complete assembly, please select one of each:

- 1 fusible disconnect body
- 1 set of fuse carriers
- 1 shaft
- 1 handle

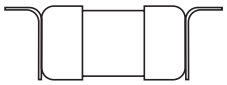
OS63X12 + OSC__ + OX_ + OH_

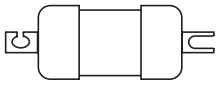


DIN Neozed 0_



NFC Style





BS88

NOTE: Handles and shafts — see pages 18.83 – 18.84 for OS32_ and page 18.87 for OS63_.

About the global concept …

Customers in Boston and Berlin?

Do your customers in Boston prefer UL Class J fuses and your customers in Berlin specify DIN standard fuses? No problem!

ABB Global concept fusible disconnect switches offer the flexibility to design a panel using a common disconnect body. When the panel destination is known, simply insert the appropriate fuse carrier.

Global concept = common disconnect body + an assortment of fuse carriers.

High volumes with various fuse types — Global concept.

Fusible disconnect bodies — 30A & 60A

UL general purpose amp rating	IEC AC21 amp rating	Description	Technical ratings	Weight (lbs)	Catalog number	List price
30	32	3 pole	See pages 18.109 – 18.111	1.40	OS32M12	$ 130
		4 pole		1.70	OS32M22F	150
		3 pole + neutral		1.70	OS32M22N1①	200
		3 pole, side operation		1.40	OS32MS30	210
		4 pole, side operation		1.70	OS32MS40F	270
		3 pole + neutral, side operation		1.70	OS32MS40N1①	320
60	63	3 pole	See pages 18.109 – 18.111	2.40	OS63X12	$ 230
		4 pole		2.80	OS63X22F	290
		3 pole + neutral		2.80	OS63X22N1①	340
		3 pole, side operation		2.40	OS63XS30	390
		4 pole, side operation		2.80	OS63XS40F	450
		3 pole + neutral, side operation		2.80	OS63XS40N1①	500

Fuse carriers for 3 pole units and units with neutral ②

For use on:	Fuse type	Technical ratings	Weight (lbs)	Catalog number	List price
OS32M_	UL J 30A	See pages 18.109 – 18.111	0.48	OSC30AJ3	$ 150
	UL CC 30A			OSC30ACC3	
	DIN Neozed D01			OSC16D301	
	DIN Neozed D02			OSC35D302	
	NFC 10x38			OSC25F310	
	NFC 14x51			OSC32F314	
	BS88 A1			OSC32B3A1	
	BS88 A2			OSC32B3A2	
	BS88 E1			OSC32B3E1	
	BS88 F1			OSC32B3F1	
OS63X_	UL J 60A	See pages 18.109 – 18.111	0.60	OSC60J3	
	NFC 14x51			OSC50F3	
	NFC 22x58			OSC63F3	
	BS88 A2, A3 CSA C30, C60			OSC63B3	
	DIN 000, 00			OSC63D3	

Fuse carriers for 4 pole units ③

For use on:	Fuse type	Technical ratings	Weight (lbs)	Catalog number	List price
OS32M_	UL J 30A	See pages 18.109 – 18.111	0.64	OSC30AJ4	$ 200
	UL CC 30A			OSC30ACC4	
	DIN Neozed D01			OSC16D401	
	DIN Neozed D02			OSC35D402	
	NFC 10x38			OSC25F410	
	NFC 14x51			OSC32F414	
	BS88 A1			OSC32B4A1	
	BS88 A2			OSC32B4A2	
	BS88 E1			OSC32B4E1	
	BS88 F1			OSC32B4F1	
OS63X_	UL J 60A	See pages 18.109 – 18.111	0.80	OSC60J4	
	NFC 14x51			OSC50F4	
	NFC 22x58			OSC63F4	
	BS88 A2, A3 CSA C30, C60			OSC63B4	
	DIN 000, 00			OSC63D4	

① N1-versions will be delivered with neutral carrier.
② Part number includes 3 pieces of fuse carriers.
③ Part number includes 4 pieces of fuse carriers.

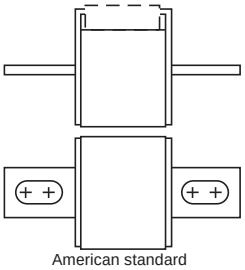
Discount schedule H4: F, 30A – 100A
Discount schedule H5: F, 200A – 600A
Discount schedule H6: Handles, shafts, accessories

Other configurations
High speed fuse pattern
Special type fuses

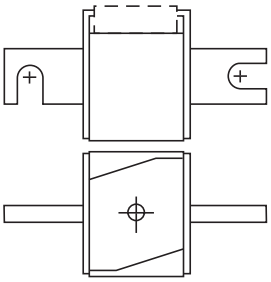
For a complete assembly, please select one of each:

- 1 switch body
- 1 adapter kit
- 1 shaft
- 1 handle

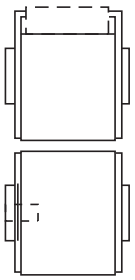
OESA_R_ + OESAZX_ + OXP_ + OH_



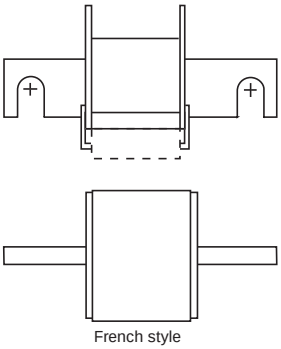
American standard



DIN 43653



Flush end



French style

Selecting switch bodies and adapter kits

Please select switch body and adapter kit according to your fuses. Switch body alone can not be used — an adapter kit is always needed.

Switch bodies — 200A through 800A

UL general purpose amp rating	Maximum horsepower rating, Three phase				Max. allowed fuse power dissipation at rated current	Weight (lbs)	Catalog number	List price
	208V	240V	480V	600V				
3 pole								
200	50	60	125	150	22W	15.21	OES200R03	**$ 1220**
400	125	125	250	350	45W	17.20	OES400R03	**1740**
600	150	200	400	500	60W	37.48	OES600R03	**2640**
800	200	250	500	600	65W	37.48	OES800R03	**4590**
4 pole								
200	50	60	125	150	22W	17.4	OES200R04	**1510**
400	125	125	250	350	45W	19.4	OES400R04	**2140**
600	150	200	400	500	60W	46.3	OES600R04	**3270**
800	200	250	500	600	65W	46.3	OES800R04	**5710**

Fuse adapter kits — for switches OES200 – OES400

Fuse standard	For 3 pole switch		For 4 pole switch	
	Catalog number	List price	Catalog number	List price
American standard	OESAZX1-S4 OESAZX1-S5	**$ 220**	OESAZX1-S4/4 OESAZX1-S5/4	**$ 290**
DIN80 (DIN43653) DIN80 sizes 00 and 000 (DIN 43653) DIN110 (DIN43653) DIN140 (DIN43653)	OESAZX1-S7 OESAZX1-S9 OESAZX1-S2 OESAZX1-S6		OESAZX1-S7/4 OESAZX1-S9/4 OESAZX1-S2/4 OESAZX1-S6/4	
Flush-end, 70mm body Flush-end, 50mm body	OESAZX1-S8 OESAZX1-S3		OESAZX1-S8/4 OESAZX1-S3/4	
French French with micro switches	OESAZX1-S10 OESAZX1-S11		OESAZX1-S10/4 OESAZX1-S11/4	

Fuse adapter kits — for switches OES600 – OES800

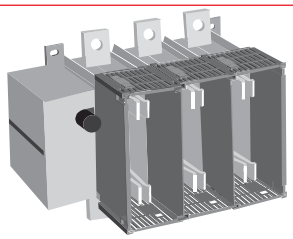
Fuse standard	For 3 pole switch		For 4 pole switch	
	Catalog number	List price	Catalog number	List price
American standard DIN80, DIN 110, DIN 140 (DIN43653) Flush-end, 50mm and 70mm body French French with micro switches	OESAZX2-S4 OESAZX2-S2 OESAZX2-S3 OESAZX2-S5 OESAZX2-S6	**$ 400**	OESAZX2-S4/4 OESAZX2-S2/4 OESAZX2-S3/4 OESAZX2-S5/4 OESAZX2-S6/4	**$ 530**

Handles and shafts — see pages 18.91 – 18.92.

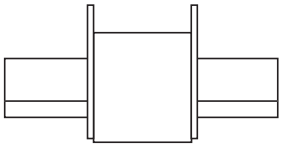
Selecting the right fusible disconnect for HSF fuses may be difficult. Due to UL restrictions it is not possible to give a general fuse selection table for your use. Therefore we ask you to contact ABB Inc., Wichita Falls, in application issues. Information needed is nominal current of the application and catalog number of the fuse.

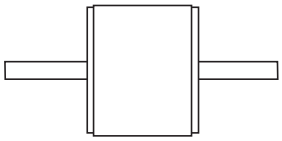
Other configurations
High speed fuse pattern
Standard switches

For a complete assembly, please select one switch catalog number which includes:

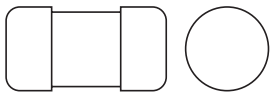


Switch body +  shaft +  handle





DIN 43620



NFC Style

Selecting switch bodies

There are some HSF fuses that fit in standard pattern fusible disconnects, no adapter kits needed.

DIN-style fusible disconnects — 32A through 800A①

UL general purpose amp rating	AC23A rated operational power in kW				Fuse type	Weight (lbs.)	Catalog number	List price
	230V	400V	500V	690V				
3 pole								
30	9	15	22	30	DIN 000, 00	2.9	OS32RD12	**$ 500**
60	18.5	30	37	60	DIN 000, 00	2.9	OS63RD12	**500**
100	45	80	110	132	DIN 000, 00	3.3	OS160RD03	**700**
100	45	80	110	132	DIN 43653: 000/80	3.3	OS160RD0380	**700**
200	70	132	170	230	DIN 0, 1	16.1	OESA250RD3	**1380**
400	110	210	280	330	DIN 0, 1, 2	18.3	OESA400RD3	**1860**
600	180	315	400	540	DIN 3	35.2	OESA630RD3	**2900**
800	200	350	470	600	DIN 3	39.6	OESA800RD3	**4760**
4 pole								
30	9	15	22	30	DIN 000, 00	3.5	OS32RD22	**660**
60	18.5	30	37	60	DIN 000, 00	3.5	OS63RD22	**660**
100	45	80	110	132	DIN 000, 00	4.0	OS160RD04	**930**
100	45	80	110	132	DIN 43653: 000/80	4.0	OS160RD0480	**930**
200	70	132	170	230	DIN 0, 1	18.1	OESA250RD4	**1840**
400	110	210	280	330	DIN 0, 1, 2	20.7	OESA400RD4	**2480**
600	180	315	400	540	DIN 3	46.3	OESA630RD4	**3860**
800	200	350	470	600	DIN 3	52.9	OESA800RD4	**6340**

NFC-style fusible disconnects — 25A through 125A②

UL general purpose amp rating	AC23A rated operational power in kW				Fuse type	Weight (lbs.)	Catalog number	List price
	230V	400V	500V	690V				
3 pole								
30	6	11	14	22	NFC 10x38	1.54	OS25RF1210	**$ 400**
30	8	14	18	25	NFC 14x51	1.54	OS32RF1214	**400**
60	18.5	30	37	60	NFC 14x51	2.90	OS63RF1214	**500**
100	37	60	80	110	NFC 22x58	3.30	OS125RF0322	**700**
100	45	80	110	132	NFC 27x60	3.30	OS160RF0327	**700**
4 pole								
30	6	11	14	22	NFC 10x38	2.00	OS25RF2210	**530**
30	8	14	18	25	NFC 14x51	2.00	OS32RF2214	**530**
60	18.5	30	37	60	NFC 14x51	3.50	OS63RF2214	**660**
100	37	60	80	110	NFC 22x58	4.00	OS125RF0422	**930**
100	45	80	110	132	NFC 27x60	4.00	OS160RF0427	**930**

Selecting the right fusible disconnect for HSF fuses may be difficult. Due to UL restrictions it is not possible to give a general fuse selection table for your use. Therefore we ask you to contact ABB Control Inc., Wichita Falls, regarding application issues.

① OS32 – OS160 include handle OHB65J6 and shaft OXP6X161.
OESA250 – OESA400 include handle OHB125J12 and shaft OXP12X250.
OESA630 – OESA800 include handle OHB145J12 and shaft OXP12X250.

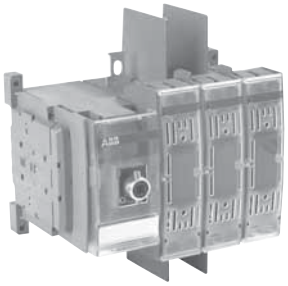
② OS25 – OS32 include handle OHB65J5 and shaft OXP5X150.
OS50 – OS125 include handle OHB65J6 and shaft OXP6X161.

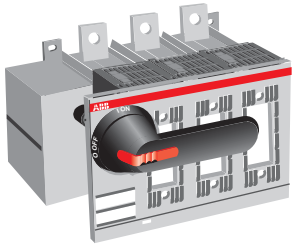
Discount schedule H4: F, 30A – 100A
Discount schedule H5: F, 200A – 600A
Discount schedule H6: Handles, shafts, accessories

Other configurations
BS fuse pattern ①
20A – 800A


OS32B12A1


OS63B12


OS160


OESA200B3PL1

BS fuse pattern switches (20A – 32A)
Handle and shaft included

Catalog number	Number of poles	Rated op. current/ Rated op. power 415V	Rated op. current/ Rated op. power 690V	Fuse type and size	Fuse standard
OS20B12A1 OS20B22A1N1 OS20B22A1F	3 3 + non-fused neutral 4	20 A 10 kW	20A 15 kW	A1 20 A	BS 88-2 IEC 269-2-1
OS32B12A1 OS32B22A1N1 OS32B22A1F	3 3 + non-fused neutral 4	32 A 15 kW	32A 25 kW	A1 32 A	
OS32B12A2 OS32B22A2N1	3 3 + non-fused neutral	32 A 15 kW	32A 25 kW	A2 32 A	
OS32B12F1 OS32B22F1N1	3 3 + non-fused neutral	32 A 15 kW	32A 25 kW	F1 32 A	BS 88-6

BS pattern switches (32A – 800A)
Handle and shaft included
Fuse covers included for 200A – 800A

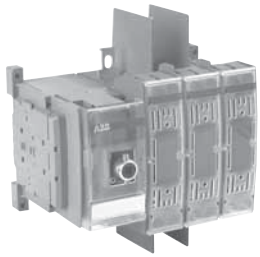
Catalog number	Number of poles	Rated operational voltage AC23/[V]	I_{th} (open) [A]	Rated operational current/ Rated operational power in category AC23A, IEC947 [A/kW] 230V	400V	415V	500V	690V	Weight with package [kg]
OS32B12 OS32B22N1	3 4②	500	32	32/7.5	32/11	32/15	32/15	—	1.3 1.6
OS63B12 OS63B22N1	3 4②	690	63	63/15	63/30	63/30	63/30	401/30	1.3 1.6
OS100B12 OS100B13 OS100B01 OS100B11	3 4② 1 2	690	125	100/30	100/55	100/55	100/70	501/45	1.5 1.8 0.9 1.9
OS160B12 OS160B13 OS160B01 OS160B11	3 4 1 2	690	160	100/30	100/55	100/55	100/70	50①/45	1.5 1.8 0.9 1.2
OESA200B3PL1 OESA200B4PL1 OESA200B1PL1 OESA200B2PL1	3 4② 1 2	690	200	200/57	200/100	200/110	200/140	200/180	7.1 8.2 5.1 6.1
OESA250B3PL1 OESA250B4PL1	3 4②	690	250	250/70	250/132	250/140	250/170	250/230	7.1 8.2
OESA315B3PL1 OESA315B4PL1 OESA315B1PL1 OESA315B2PL1	3 4② 1 2	690	315	315/90	315/100	315/100	315/220	315/290	7.9 8.9 5.9 6.9
OESA400B3PL1 OESA400B4PL1 OESA400B1PL1 OESA400B2PL1	3 4② 1 2	690	400	400/110	400/210	400/230	400/280	400/330	8.3 9.4 6.3 7.3
OESA630B3PL1 OESA630B4PL1 OESA630B1PL1 OESA630B2PL1	3 4② 1 2	690	630	630/180	630/315	630/340	630/400	630/540	16.0 21.0 6.5 11.0
OESA800B3PL1 OESA800B4PL1 OESA800B1PL1 OESA800B2PL1	3 4② 1 2	690	800	800/200	800/350	800/380	720/470	720/600	18.0 24.0 6.7 12.3

BS fuses are widely used in UK, South-Africa, Australia and Hong Kong

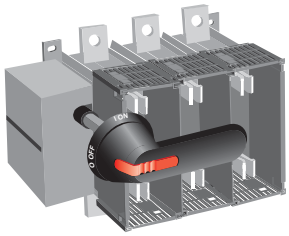
① Please consult factory for additional information.
② The fourth pole is provided with a solid link which can be replaced with a fuse.

Other configurations
DIN fuse pattern①
32A – 800A

OS63D12



OS160



OESA250P3PL

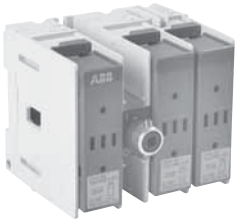
DIN pattern switches (32A – 800A)
Handle and shaft included

Rated Catalog number voltage	Number of poles	opera-tional	I_{th} (open)	Rated operational current/ Rated operational power in category AC23A, IEC947 [A/kW]					Weight with pack-age [kg]
		AC23/[V]	[A]	230V	400V	415V	550V	690V	
OS32D12	3	690	32	32/7.5	32/11	32/15	32/15	—	1.3
OS32D22N1	3 + non-fused neutral								1.6
OS32D22F	4								1.6
OS63D12	3	690	63	63/15	63/30	63/30	63/30	40/30	1.3
OS63D22N1	3 + non-fused neutral								1.6
OS63D22F	4								1.6
OS125D12	3	690	125	100/30	100/55	100/55	100/70	50/45	1.5
OS125D22N1	3 + non-fused neutral								1.8
OS125D22F	4								1.8
OS125D01	1								0.9
OS125D11	2								1.2
OS160D12	3	690	160	100/30	100/55	100/55	100/70	50/45	1.5
OS160D22N1	3 + non-fused neutral								1.8
OS160D22F	4								1.8
OS160D01	1								0.9
OS160D11	2								1.2
OESA250D3PL	3	690	250	250/70	250/132	250/140	250/170	250/230	7.3
OESA250D4PL	3 + non-fused neutral								8.2
OESA250DF4PL	4								8.2
OESA250D1PL	1								5.5
OESA250D2PL	2								6.4
OESA400D3PL	3	690	400	400/110	400/210	400/230	400/280	400/330	8.3
OESA400D4PL	3 + non-fused neutral								9.4
OESA400DF4PL	4								9.4
OESA400D1PL	1								6.3
OESA400D2PL	2								7.3
OESA630D3PL	3	690	630	630/180	630/315	630/340	630/400	630/540	16.0
OESA630D4PL	3 + non-fused neutral								21.0
OESA630DF4PL	4								21.0
OESA630D1PL	1								6.5
OESA630D2PL	2								11.0
OESA800D3PL	3	690	800	800/200	800/350	800/380	720/470	720/600	18.0
OESA800D4PL	3 + non-fused neutral								24.0
OESA800DF4PL	4								24.0
OESA800D1PL	1								8.5
OESA800D2PL	2								13.0

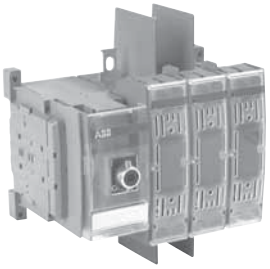
DIN fuses are mainly used in continental Europe (excluding France below 125A), Asia, Africa and South-America

① Please consult factory for additional information.

Other configurations
NFC fuse pattern
63A – 125A, 14x51 & 22x58


OS32F1214


OS63F12


OS125F03

NFC fuse pattern switches (cylinder) (10x38) (14x51)
Handle and shaft included

Catalog number	Number of poles	Rated op. current/ Rated op. power 415V	690V	Fuse type and size	Fuse standard
OS25F1210 OS25F2210N1 OS25F2210F	3 3 + non-fused neutral 4	25 A 12 kW	25A 22 kW	10 x 38 25 A	IEC 269-2-1
OS32F1214 OS32F2214N1 OS32F2214F	3 3 + non-fused neutral 4	32 A 15 kW	32A 25 kW	14 x 51 32 A	IEC 269-2-1

NFC fuse pattern (cylinder fuse links), (14x51 & 22x58)
Handle and shaft included

Catalog number	Number of poles	Rated operational voltage AC23/[V]	I_{th} (open) [A]	Rated operational power in category AC23A, IEC947 [A/kW] 230V	400V	415V	550V	690V	Weight with package [kg]
OS50F12	3	690	50	50/15	50/25	50/25	50/33	50/45	1.3
OS50F22F	4	690	50	50/15	50/25	50/25	50/33	50/45	1.6
OS63F12	3	690	63	63/18.5	63/30	63/30	63/37	63/60	1.3
OS63F22F	4	690	63	63/18.5	63/30	63/30	63/37	63/60	1.6
OS100F03	3	690	125	100/30	100/45	100/55	100/60	100/90	2.2
OS100F04F	4								2.8
OS100F04N1	3 + non-fuse N								2.8
OS125F03	3	690	125	125/37	125/60	125/60	125/80	125/110	1.3
OS125F04F	4	690							1.6
OS125F04N1	3 + non-fuse N	690							1.6

NFC fuses are used in France and in French speaking Africa

① Please consult factory for additional information.

Fuse monitors

OFM_

Fuse monitors

For switch size	Rated voltage	Weight (lbs.)	Catalog number	List price
OS30-100 and OES400-800	100 - 240 380 - 600	0.31 0.31	OFM240 OFM600	**$ 290**
OS200	100 - 240 380 - 600	0.35	OFS240 OFS600	

Suitable for 3 phase circuits. Includes 1 N.O. & 1 N.C. auxiliary contacts and red & green LED lights.

Mounting accessories

For switch size	Crimp terminal size (mm)		Catalog number	List price
OS30 - 200 OES400 - 800	2.8 - 0.8 6.3 - 0.8		OFMZX2 OFMZX4	**$ 20** **70**

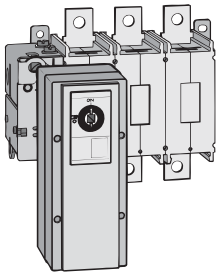
Includes 6 crimp terminals.

Description

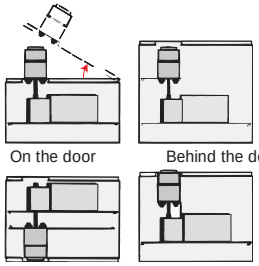
- Indicates single phasing
- Operates with all fuse types
- No need for external supply voltage
- Wide voltage range, 100-240VAC and 380-600VAC
- UL Listed, EMC tested
- Fuse monitor is automatically reset after the blown fuses have been replaced
- One trip contact, one alarm contact and two LEDs (red and green)
- Phase imbalance immune
- Compact size
- Snap-on and screw-on mounting for OS disconnects
- Suitable to be used as a standalone device

Motor operators[1]
for 400A – 800A

OEMO__



OEMO__



Mounting options

Motor operators[1] — 2 position, I/O, ON/OFF

For use on:	Voltage	Weight (lbs.)	Catalog number	List price
OES400	24 VDC/AC 48 VDC/AC 220 VAC 220 VDC 230 VAC 240 VAC	14.0	OEMO002/24VDCAC OEMO002/48VDCAC OEMO002/220VAC OEMO002/220VDC OEMO002/230VAC OEMO002/240VAC	**$ 6514**
OES600 – OES800	24 VDC/AC 48 VDC/AC 220 VAC 220 VDC 230 VAC 240 VAC	14.0	OEMO003/24VDCAC OEMO003/48VDCAC OEMO003/220VAC OEMO003/220VDC OEMO003/230VAC OEMO003/240VAC	**7644**

Motor operators[1] — 3 position, I/O/II

For use on:	Voltage	Weight (lbs.)	Catalog number	List price
OES400	24 VDC/AC 48 VDC/AC 220 VAC 220 VDC 240 VAC	14.0	OEMO202/24VDCAC OEMO202/48VDCAC OEMO202/220VAC OEMO202/220VDC OEMO202/240VAC	**$ 7644**
OES600 – OES800	24 VDC/AC 48 VDC/AC 220 VAC 240 VAC	14.0	OEMO303/24VDCAC OEMO303/48VDCAC OEMO303/220VAC OEMO303/240VAC	**9490**

OEMO 202_ – 303_ motor operators require a transfer mechanism.

Mounting kit for OEMO motor operator

For use on:	Package (pcs.)		Catalog number	List price
OES400 OES600 – OES800	1 1		OEMOZX1 OEMOZX2	**$ 400**

[1] Not UL listed

UL & CSA

Catalog number	3 pole	OS30A_12	OS60J12	OS100J03	OS200J03	OES400J3	OES600J3	OES800L3
Approvals ①	2 pole	N/A	N/A	IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC
	3 pole	UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC
	4 pole	UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC	UL98 & IEC
Technical ratings	-40° to 40°C							
General purpose amp rating pf = 0.7 – 0.8	A	**30**	**60**	**100**	**200**	**400**	**600**	**800**
Max operating voltage	V	600	600	600	600	600	600	600
Max horsepower rating/ Max motor FLA current pf = 0.4 – 0.5								
Three phase								
200 – 208V	HP/A	5/16.8 – 7.5/24.2	15/46.2	25/75.0	50/143.0	100/273 – 125/344	150/396	200/528
240V	HP/A	7.5/22.0	15/42.0	30/80.0	60/145.0	125/312.0	200/480.0	250/602.0
480V	HP/A	15/21.0	30/40.0	60/77.0	125/156.0	250/302.0	400/477.0	500/590.0
600V	HP/A	20/22.0	50/52.0	75/77.0	150/144.0	350/336.0	500/472.0	600/ —
Single phase								
120V	HP/A	2/24.0	—	—	—	—	—	—
240V	HP/A	3/17.0	—	—	—	—	—	—
Short circuit rating with fuse	kA	200	200	200	100	200	200	200
UL Fuse size	A	30	60	100	200	400	600	800
UL Fuse type		J/CC	J	J/T	J/T	J/T	J/T	L
Endurances								
Min. Electrical endurance, pf = 0.75 – 0.80	operation cycles	6000	6000	6000	6000	1000	1000	500
Mechanical endurance	operation	20,000	20,000	20,000	20,000	12,000	10,000	7000
Physical characteristics								
Weight	3 pole lb	1.54	2.86	3.30	5.9	17.18	37.44	37.44
	4 pole lb	1.98	3.52	3.96	7.5	19.38	46.26	46.26
Dimension 3 pole	H in	3.66	3.94	5.67	6.5	8.90	10.10	10.10
	W in	4.15	5.63	7.07	7.1	11.26	14.80	14.80
	D in	4.10	5.04	5.10	5.2	8.07	9.17	9.17
Shaft size square □	in	.20	.24 x .24	.24 x .24	.24 x .24	.47 x .47	.47 x .47	.47 x .47
	mm	5 x 5	6 x 6	6 x 6	6 x 6	12 x 12	12 x 12	12 x 12
Switch operating torque for rotary 3 pole switches	lb. in.	26.6	35.5	70.9	195	195	248	248
Terminal lug kits		Integral	Integral	OZXA-24	OZXA-200	OZXA-26	OZXA-27	OZXA-27
Wire range	AWG	#18 – 8	#14 – 4	#14 – 2/0	#4 – 300kcmil	#2 – 600kcmil	(2) #2 – 600 kcmil	(2) #2 – 600 kcmil
Torque:								
Wire tightening	lb. in.	17	30	120	275	500	500	500
Lug mounting	lb. in.	N/A	N/A	50	150	480	480	480

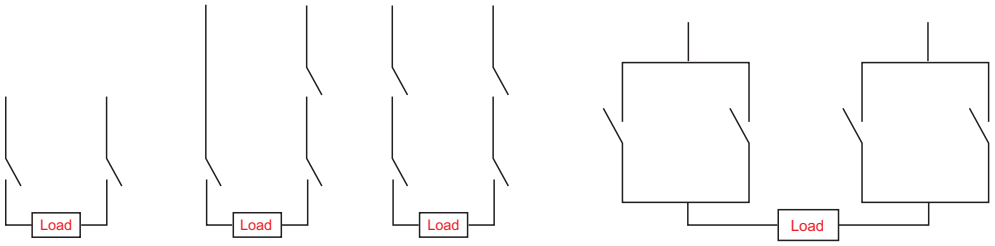
Auxiliary contacts		OA4G_	OA1/3G_	OA_G_	OA_G_	OA_G_	OZXK-__	OZXK-__	OZXK-__
NEMA ratings, AC		—	A600	A600	A600	A600	A600	A600	A600
AC rated voltage	VAC	250	600	600	600	600	600	600	600
AC thermal rated current	A	6	10	10	10	10	10	10	10
AC maximum volt ampere making	VA	—	7200	7200	7200	7200	7200	7200	7200
AC maximum volt ampere breaking	VA	—	720	720	720	720	720	720	720
NEMA ratings, DC		—	P300	R300	R300	R300	P600	P600	P600
DC rated voltage	VDC	—	300	300	300	300	600	600	600
DC thermal rated current	A	—	1	1	1	1	5	5	5
DC maximum make break current	A	—	28	28	28	28	138	138	138
Torque:									
Wire tightening	lb. in.	7		7	7	7	7	7	7
Wire range	AWG	#22 – 14/#18 – 14		#18 – 14	#18 – 14	#18 – 14	#20 – 12	#20 – 12	#20 – 12

① The following UL Listed switches are also CSA approved.

Technical data
OS30A_12 – OES800L3
IEC

IEC

Catalog number	3 pole	OS30A_12	OS60J12	OS100J03	OS200J03	OES400J3	OES600J3	OES800L3
Technical ratings	-40° to 40°C							
Rated insulation voltage Pollution degree 3 ⑥	V	1000	1000	1000	1000	1000	1000	1000
Dielectric strength 50Hz/60Hz, 1 min	kV	10	10	10	10	10	10	10
Rated impulse withstand voltage	kV	12	12	12	12	12	12	12
Rated thermal current, I_{th}/ max. fuse power dissipation ①								
AC 20/DC 20 open ②	A/W	32/3.5	63/7.5	160/12	200/17	400/45	630/60	800/65
40°C enclosed	A/W	32/3.5	63/7.5	160/10, 135/12	200/17	400/34, 360/37	600/45, 570/50	720/55
Enclosed with solid links	A/W	32	85	175	280	450	700	900
with minimum cable cross section Cu	mm²	6	16	70	95	240	2 x 185	2 x 240
Rated operational voltage AC 20 and DC 20V		1000	1000	1000	1000	1000	1000	1000
AC Rated operational currents								
AC 21A ≤500V	A	32	63	160	200	400	630	800
≤690V	A	32	63	160	200	400	630	800
AC 22A ≤500V	A	32	63	160	200	400	630	800
≤690V	A	32	63	160	200	400	630	800
AC 23A ≤500V	A	32	63 ⑤	160 ⑤	200	400	630	720
≤690V	A	32	63 ⑤	160 ⑤	200	400	630	720
DC Rated operational currents/poles in series								
DC21A 48V	A	32/2 ③	④	④	200/1	400/2	630/2	800/2
110V	A	32/2	④	④	200/1	400/2	630/2	800/2
220V	A	32/2	④	④	200/1	400/2	630/2	800/2
440V	A	32/4	63/4	160/3	200/2	400/2	630/2	800/2
750V	A	—	④	④	180/4	400/3	630/3	800/3
1000V	A	—	④	④	—	400/4	630/4	800/4
DC22A 48V	A	32/2 ③	④	④	200/1	400/2	630/2	800/2
110V	A	32/2	④	④	200/1	400/2	630/2	800/2
220V	A	32/2	④	④	200/1	400/2	630/2	800/2
440V	A	32/4	63/4	160/3	200/2	400/2	630/2	800/2
750V	A	—	④	④	180/4	400/3	630/3	800/3
1000V	A	—	④	④	—	400/4	630/4	800/4
DC23A 48V	A	32/2 ③	④	④	200/1	400/2	630/2	800/2
110V	A	32/2	④	④	200/1	400/2	630/2	800/2
220V	A	32/2	④	④	200/1	400/2	630/2	800/2
440V	A	32/4	63/4	160/3	200/2	400/2	630/2	800/2
750V	A	—	④	④	180/4	400/3	630/3	800/3
1000V	A	—	④	④	—	—	630/4	800/4
Rated operational power AC23A								
230V	kW	8	18.5	45	60	110	180	200
400V	kW	14	30	80	110	210	315	350
415V	kW	15	30	90	110	230	340	380
500V	kW	18	37	110	140	280	400	470
690V	kW	25	60	132	190	330	540	600



2 poles in series | 3 poles in series | 4 poles in series | 2 + 2 parallel contacts in series

① Ambient temperature 60°C: derating 20 percent. Mounting on ceiling: derating 10 percent. Mounting on wall, horizontal fuses: derating 8 percent.
② The ambient air temperature does not exceed +40°C and its average over a period of 24h does not exceed +35°C according to IEC 947.
③ For 30A switches, use 2 + 2 parallel contacts in series.
④ Available on request.
⑤ IEC 947-3, utilization category B, infrequent operation.
⑥ Pollution degree 3: Conductive pollution occurs, or dry, non-conductive pollution occurs, which becomes conductive due to condensation.

IEC

Catalog number	3 pole		OS30A_12		OS60J12	OS100J03	OS200J03	OES400J3	OES600J3	OES800L3
Rated breaking capacity										
in category AC-23A	500V	A	256		504	1280	1600	3200	5760	5760
	690V	A	256		504	1280	1600	3200	5760	5760
Rated breaking capacity/poles in series										
in category DC-23	<220V	A	128/2		—	—	1000/2	1600/2	3200/2	3200/2
	440V	A	128/4		—	—	1000/2	1600/2	3200/2	3200/2
	500 – 750V	A	—		—	—	1000/3	1600/3	3200/3	3200/3
	1000V	A	—		—	—	—	—	3200/4	3200/4
Rated conditional short-circuit current r.m.s. ③										
	80 kA, 415V	kA	9		17	22	35	40	75	75
	100 kA, 500 V	kA	7.5		17	22	37.5	40	75	75
	50 kA, 690 V	kA	6		13	15	35	35	60	60
Rated short time withstand current, 1s.		kA	1		2.5	5	8	10	16	16
Rated capacitor power										
The capacitor rating of the fusible disconnect switch is limited by the fuse link										
	400 V	kVar	15		30	—	—	180	250	310
	415V	kVar	15		32	—	—	200	270	340
	690V	kVar	25		50	—	—	325	450	550
Power loss/pole										
with rated current, without fuse		W	2		4	9	8	30	55	77
Mechanical endurance		operations	20,000		20,000	20,000	20,000	16,000	10,000	10,000
Fuse types, IEC 269-2		DIN 43620	—		000, 00	000, 00	—	0 – 2	3	3
		NFC	10 x 38, 14 x 51		14 x 51, 22 x 58	22 x 58	—	0 – 2	3	—
		BS 88	A1, A2, F1		A2 – A3	A2 – A4	B1 – B2	B1 – B4	C1 – C2	C1 – C3
size/distance of link bolts			M4/44.5(A1) M5/73(A2)		M5/73	M5/73 M8/94	M6/111	M8/111	M10/133, 184	M10/133, 184
Physical characteristics										
Weight	3 pole	kg	0.7		1.3	1.5	2.6	7.8	17.0	17.0
	4 pole	kg	0.9		1.6	1.8	7.9	8.8	21.0	21.0
Dimension	3 pole	H mm	93		100	144	198.5	226	282	282
		W mm	106		143	179	181.5	286	376	376
		D mm	104		120	129	132	205	233	233
Shaft size		square □ mm	5 x 5		6 x 6	6 x 6	6 x 6	12 x 12	12 x 12	12 x 12
Terminals										
Built-in terminal size		mm^2	0.5 – 10		2.5 – 25	—	—	—	—	—
Terminal bolt size, metric thread diameter x length		mm	—		—	M6 x 20	M8 x 25	M10 x 40	M12 x 40	M12 x 40
Terminal bolt tightening torque		Nm	2		3.5	6 – 9	15 – 22	30 – 44	50 – 75	50 – 75
Fuse-links bolts tightening torque		Nm	2		3.5	3.5 – 5	4	15	40	40
Operating torque		Nm	3		4	8	7	22	28	28
Auxiliary contacts			OA4G_ ①	OA1/3G ②	OA_G_ ②	OA_G_ ②	OA_G_ ②	OZXK-_	OZXK-_	OZXK-_
Ratings according to IEC 947-5-1										
Rated voltage, U_i		VAC	690	690	690	690	690	690	690	690
Thermal current, I_{th}		A	10	16	16	16	16	10	10	10
AC12 / DC12, I_e	U_e=24V	A	— / 6	—	—	—	—	—	—	—
	120V	A	— / 6	—	—	—	—	8 / —	8 / —	8 /—
	125V	A	—	—	—	—	—	—/ 1.1	—/ 1.1	— / 1.1
	230V	A	—	6 / —	6 / —	6 / —	6 / —	6 / —	6 / —	6 / —
	250V	A	3 / 0.1	—	—	—	—	— / 0.55	— / 0.55	— / 0.55
	400V	A	—	4 / —	4 / —	4 / —	4 / —	4 / —	4 / —	4 / —
	415V	A	—	—	—	—	—	4 / —	4 / —	4 / —
	440V	A	2 / —	—	—	—	—	— / 0.31	— / 0.31	— / 0.31
	480V	A	—	—	—	—	—	3 / —	3 / —	3 / —
	500V	A	—	—	—	—	—	3 / 0.27	3 / 0.27	3 / 0.27
	600V	A	—	—	—	—	—	— / 0.2	— / 0.2	— / 0.2
	690V	A	—	2 / —	2 / —	2 / —	2 / —	2 / —	2 / —	2 / —

① AC15 / DC12, according to IEC 947-5-1
② AC15, according to IEC 947-5-1
③ Values shown are corresponding max. allowed cut-off current, peak-values per single phase fuse tests.

Selecting switches
per NEC & IEC

Selecting switches per NEC

Article 430 of the US National Electric Code includes two methods for properly sizing disconnect switches:

1. Single motor application

A properly sized disconnect switch for a single motor will:

a) have an ampere rating greater than or equal to 115 percent of the rated motor full load current; or,

b) have a HP rating greater than or equal to the rated motor HP (at applied voltage) if the disconnect switch under consideration is HP rated.

2. Combination load application

A properly sized disconnect switch for a combination load will be selected by adding all the simultaneous individual loads in the circuit under consideration.

Using motor nameplate information, load information, and tables from section 430 of the NEC, determine one equivalent full load current and one equivalent locked rotor current. The equivalent locked rotor current can be used with table 430-151 to determine an equivalent HP rating. Select a disconnect switch:

a) greater than or equal to 115 percent of the equivalent full load current; and,

b) greater than or equal to the equivalent HP rating.

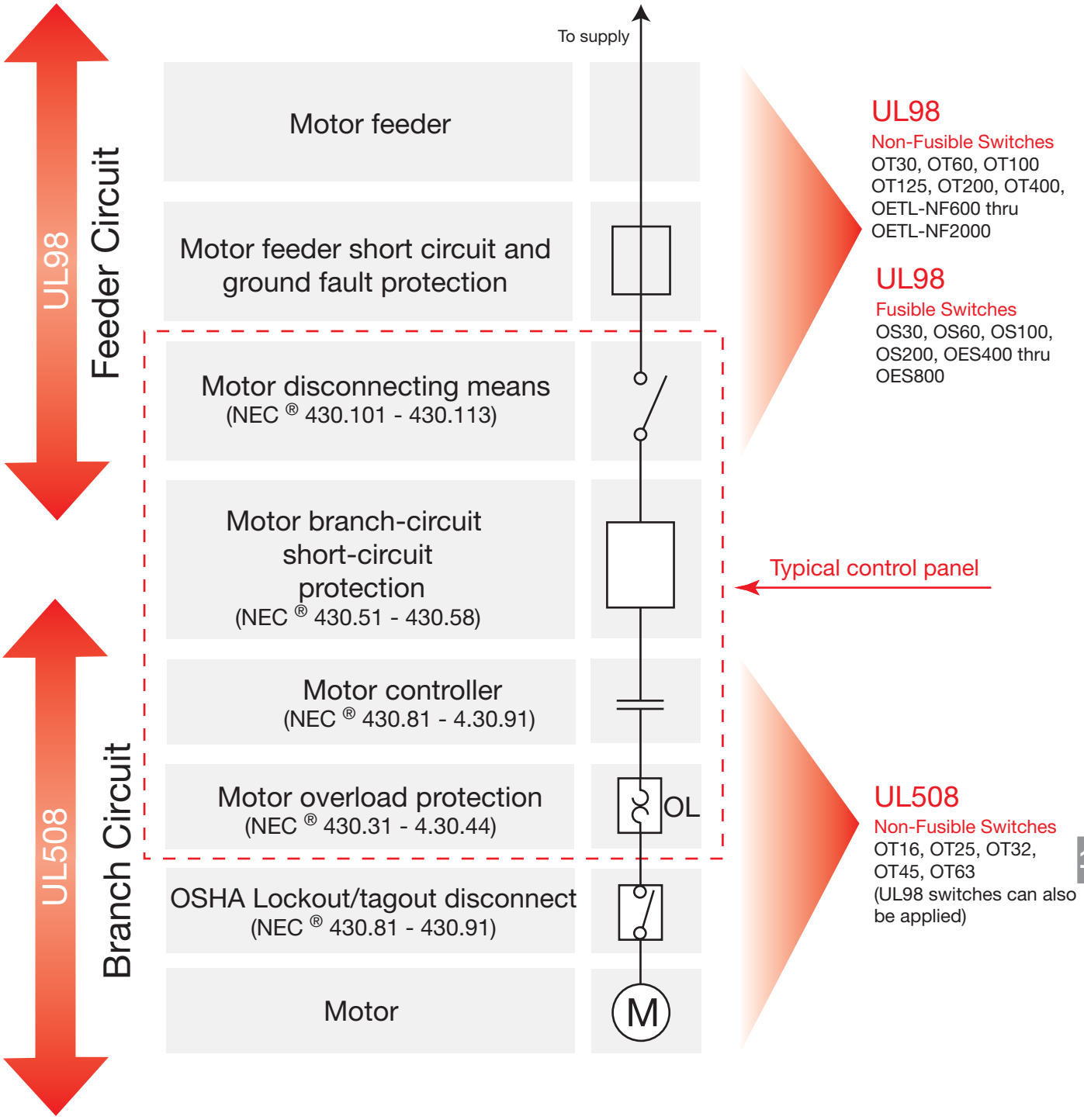
Selecting switches per IEC

Utilization categories

Nature of current	Utilization category		Typical applications
	Frequent operation	Infrequent operation	
Alternating current	AC-20A	AC-20B	• Connecting and disconnecting under no-load conditions
	AC-21A	AC-21B	• Switching of resistive loads including moderate overloads (PF > 0.95)
	AC-22A	AC-22B	• Switching of mixed resistive and inductive loads, including moderate overloads (PF > 0.65)
	AC-23A	AC-23B	• Switching of motor loads or other highly inductive loads (PF > 0.45 below 100A; PF > .35 above 100A
Direct current	DC-20A	DC-20B	• Connecting and disconnecting under no-load conditions
	DC-21A	DC-21B	• Switching of resistive loads including moderate overloads (L/R < 1ms)
	DC-22A	DC-22B	• Switching of mixed resistive and inductive loads, including moderate overloads, e.g., shunt motors (L/R < 2.5ms)
	DC-23A	DC-23B	• Switching of highly inductive loads, e.g., series motors (L/R < 15ms)
Mechanical endurance	Number of operations	Number of operations	
100A	10,000	2000	
315A	8000	1600	
>315A	2000	400	

• Category AC-23 includes occasional switching of individual motors. The switching of capacitors of tungsten filament lamps shall be subject to agreement between manufacturer and user.

Use of UL98 & UL508 Disconnects



Definitions

AC – Alternating current — Current that reverses its direction of flow twice per cycle.

Ambient temperature — Temperature of the air surrounding the unit.

Amp rating — The basic unit of measurement for electric current (columbs / seconds).

Conventional thermal current I_{th} — Value of the current the disconnect switch can withstand with poles in closed position, in free air for an eight hour duty, without the temperature rise of its various parts exceeding the limits specified by the standards.

Cycle duration — Total time of the on-load + off-load period.

DC – Direct current — Current that flows in only one direction.

Electrical endurance — Number of on-load operating cycles.

IEC environmental protection type — see page 18.52.

Full load amp current FLA — The current required by a motor to produce full-load torque at the motor's rated speed.

Inductive load — An electrical load characterized by having significant inrush (5 to 6 times FLA for typical design-B AC induction motors).

kW — Kilowatts (1000 watts)

Lockout/Tagout — Means of removing power from electrical equipment during inspection, service or repair.

Make / Break — ON / OFF

Mechanical endurance — Number of off-load operating cycles.

Poles in series — Means of connection poles using wires or bus bars to increase breaking capacity of load.

Power factor — The relationship between working power and total power consumed. Power factor measures how effectively electrical power is being used.

Rated insulation U_i — Voltage value which designates the unit and to which dielectric tests, clearance and creepage distances are referred.

Rated operating current I_e — Current value stated by the manufacturer and taking into account the rated operating voltage U_e, the rated frequency, the rated duty, the utilization category, the electrical contact life and the type of protective enclosure.

Rated operating voltage U_e — Voltage value to which utilization characteristics of the disconnect switch are referred, i.e. phase-to-phase voltage in 3 phase circuits.

Rated short circuit making capacity I_{cm} — The rated short-circuit making capacity of a disconnect switch, a disconnector or a switch-disconnector is the value assigned to equipment at the rated operational voltage, frequency (if any) and specified power-factor for AC or time constant for DC. It is expressed as the maximum prospective peak current under prescribed conditions.

Rated short time withstand current I_{cw} — The rated short-time withstand current of a disconnect switch, a disconnector or a switch-disconnector is the value that the equipment can carry without damage, under the test conditions specified in the relevant product standard. The value of the rated short-time withstand current shall be not less than twelve times the maximum rated operational current unless otherwise stated by manufacturer and the duration of the current shall be 1 s.

Resistive load — An electrical load characterized by not having any significant inrush current.

Short circuit protection co-ordination — Co-ordination types "1" and "2" are defined in IEC 947-4-1.

Type 1 co-ordination — There has to be no discharge of parts beyond the enclosure. Damage to the contactor and the overload is acceptable.

Type 2 co-ordination — No damage to the overload relay or other parts has occured, except that welding of contactor or starter contacts is permitted, if they are easily separated.

Time constant — Ratio of inductance to the resistance: L/R = mH/Ohm = ms.

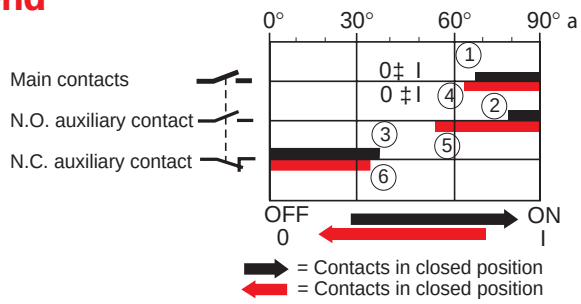
Torque — The force that produces rotation. It is commonly measured in pound-feet (lb-ft). Torque applies to such things as motor operations, handle rotations, wire tightening.

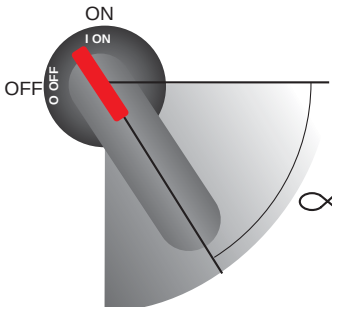
UL environmental protection type — see page 18.51.

Volt — The unit of electrical potential difference and electromotive force.

Auxiliary contact timing diagrams
OS30_ – OS100

Legend



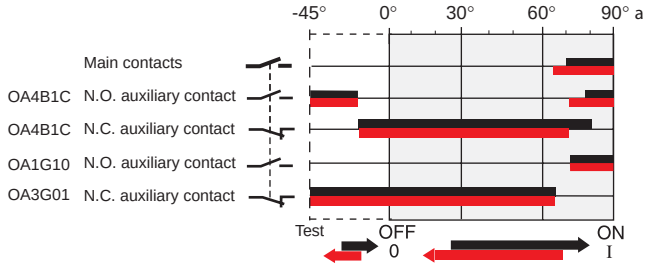


Contacts closing
① Main contacts close
② N.O. auxiliary contacts close
③ N.C. auxiliary contacts open

Contacts opening
④ Main contacts open
⑤ N.O. auxiliary contacts open
⑥ N.C. auxiliary contacts close

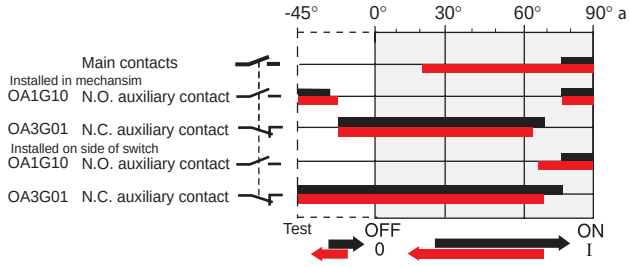
OS30_

Catalog number	Auxiliary contact	Contact configuration
OS30_	OA4B1C OA1G10 OA3G01	1 N.O. & 1 N.C. 1 N.O. 1 N.C.



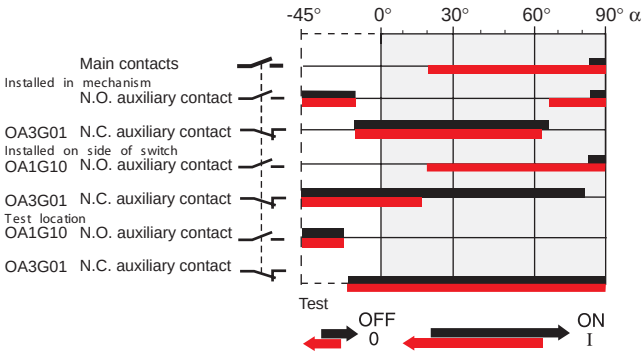
OS60

Catalog number	Auxiliary contact	Contact configuration
OS60	OA1G10 OA3G01	1 N.O. 1 N.C.



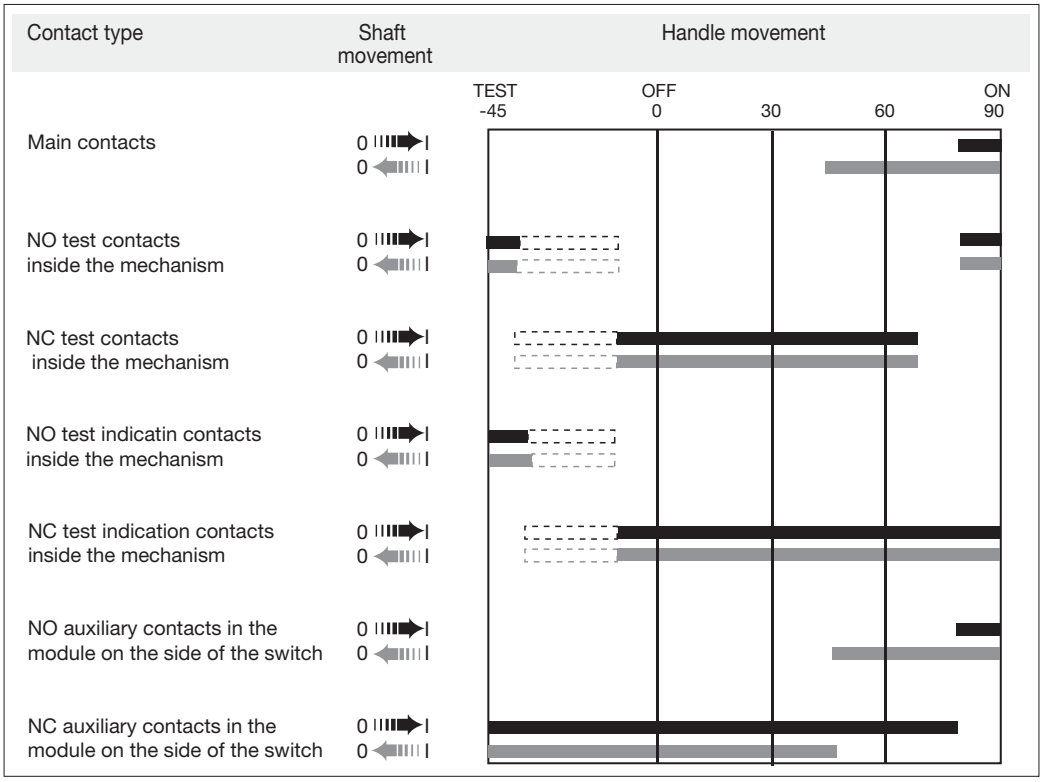
OS100

Catalog number	Auxiliary contact	Contact configuration
OS100	OA1G10 OA3G01	1 N.O. 1 N.C.



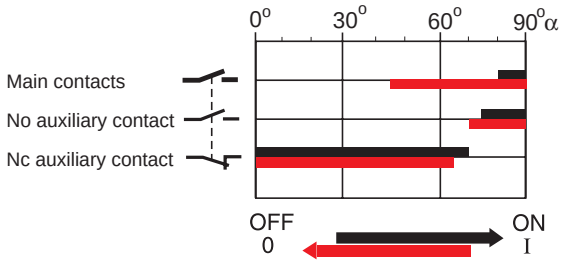
Auxiliary contact timing diagrams
OS200 – OES800

OS200



OES400

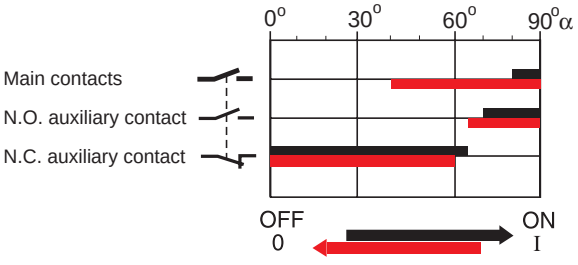
Catalog number	Auxiliary contact	Contact configuration
OES400	OZXK-1	1 N.O. & 1 N.C.
	OZXK-2	2 N.O. & 2 N.C.
	OZXK-3	4 N.O. & 4 N.C.
	OZXK-4	2 N.O.
	OZXK-5	4 N.O.
	OZXK-6	8 N.O.



OZXK-1
OZXK-2
OZXK-3
OZXK-4
OZXK-5
OZXK-6

OES600 & OES800

Catalog number	Auxiliary contact	Contact configuration
OES600 – OES800	OZXK-1	1 N.O. & 1 N.C.
	OZXK-2	2 N.O. & 2 N.C.
	OZXK-3	4 N.O. & 4 N.C.
	OZXK-4	2 N.O.
	OZXK-5	4 N.O.
	OZXK-6	8 N.O.

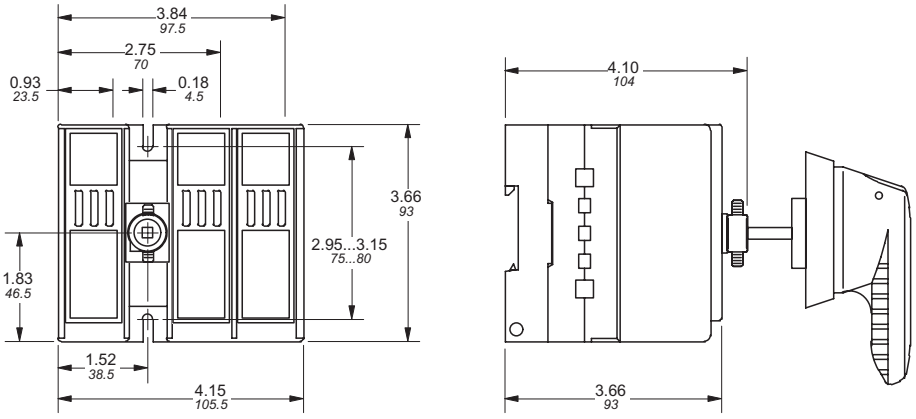


OZXK-1
OZXK-2
OZXK-3
OZXK-4
OZXK-5
OZXK-6

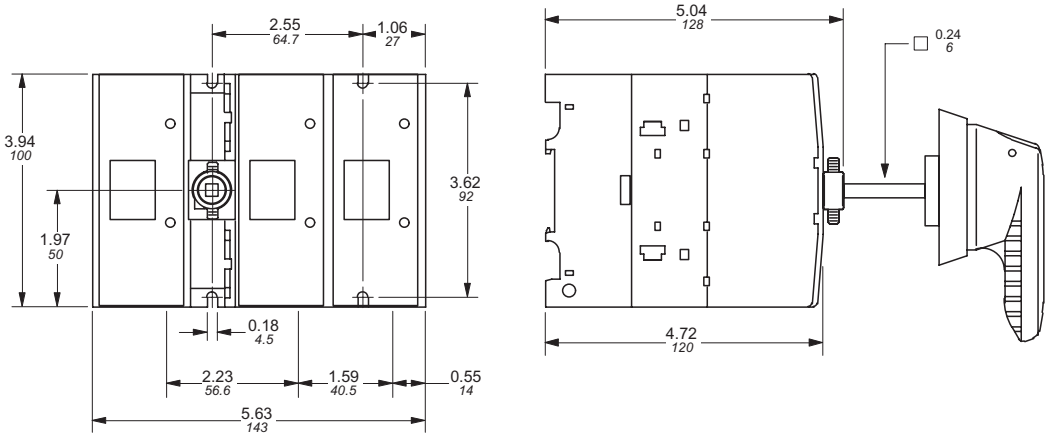
Approximate dimensions
OS30A_ – OS60_

00.00 / 00.00 Inches [Millimeters]

OS30AJ12 & OS30ACC12



OS60J12

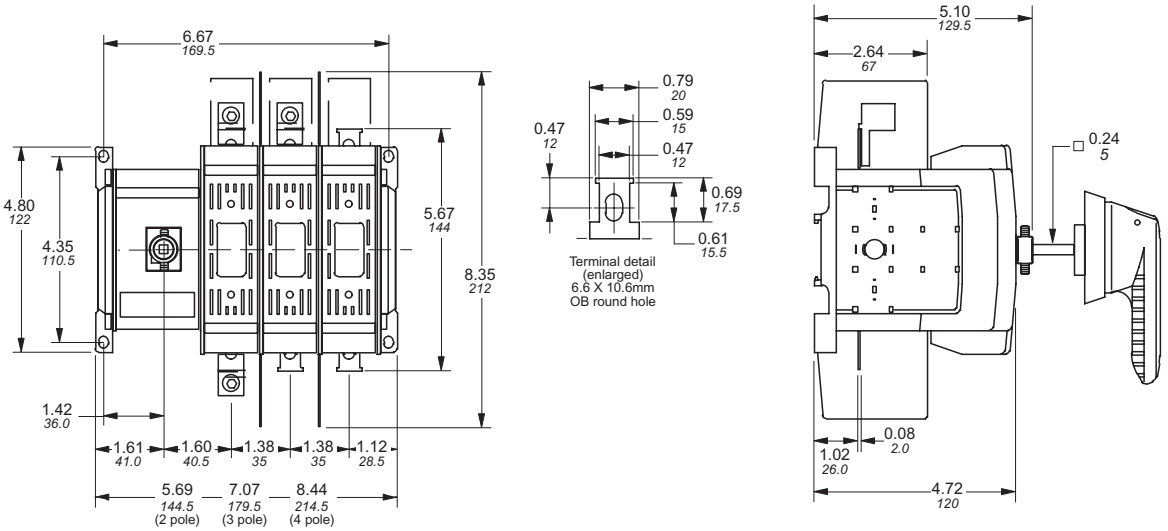


18

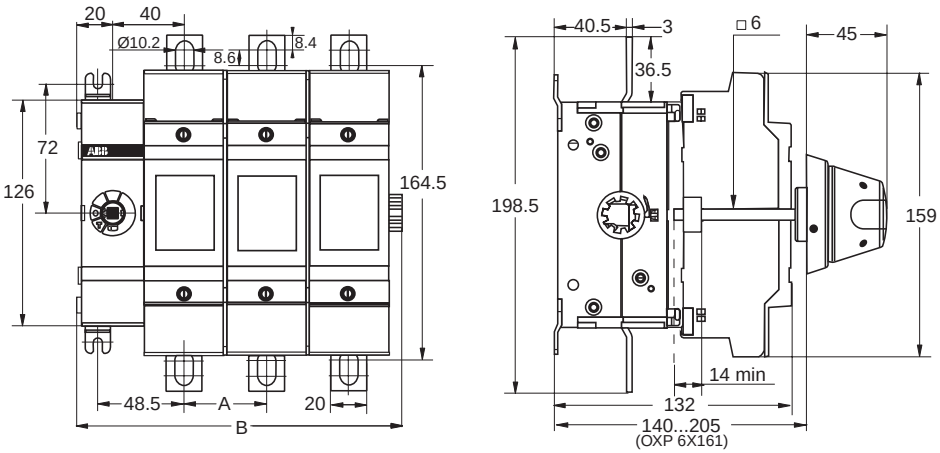
Approximate dimensions
OS100_ – OS200_

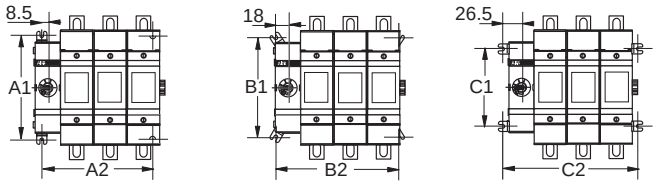
00.00 / 00.00 Inches [Millimeters]

OS100J03



OS200J02, -03, -04



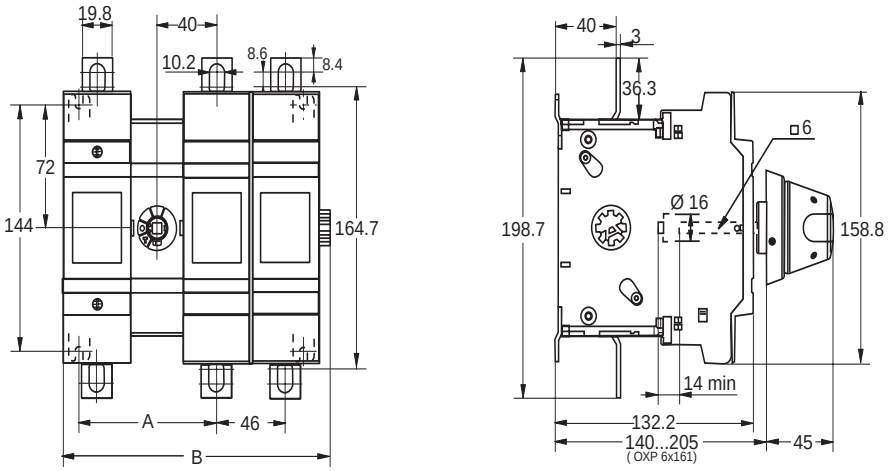


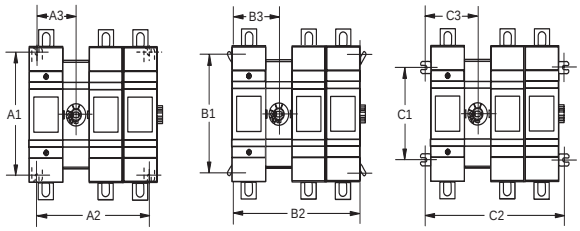
	OS200 (mm)		
	J02	J03	J04
A	46	46	46
B	135.5	181.5	222.75
A1	144	144	144
A2	106.5	152.5	198.5
B1	138.5	138.5	138.5
B2	125.5	171.5	217.5
C1	108	108	108
C2	142.5	188.5	234.5

Approximate dimensions
OS200_ – OES200_

00.00 Millimeters

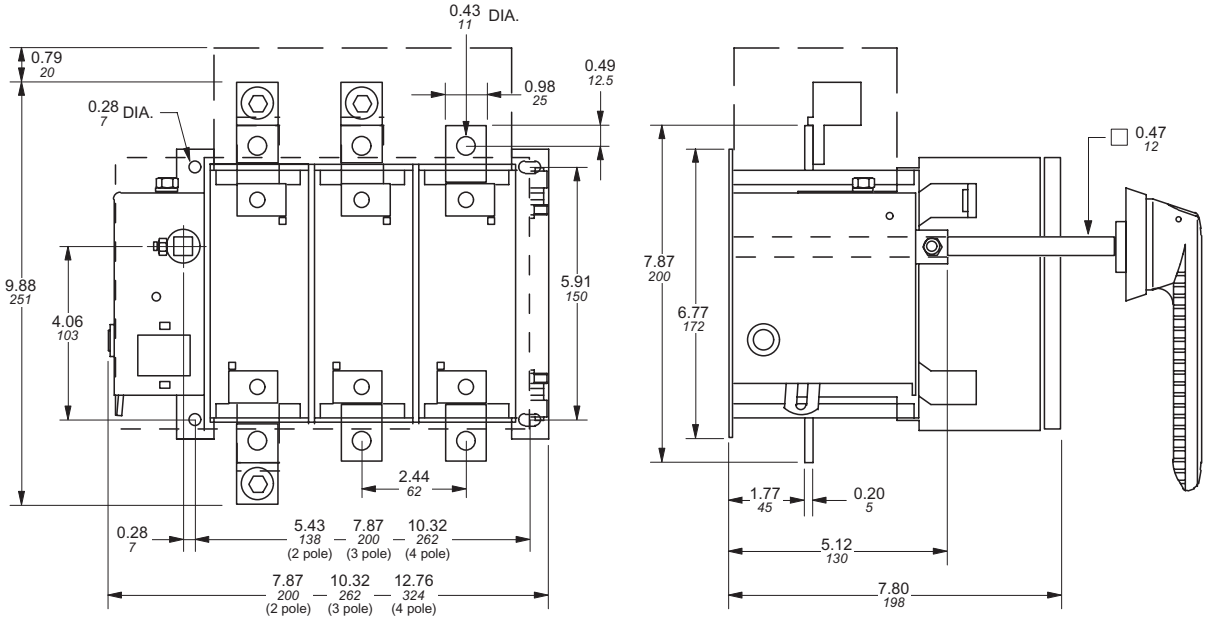
OS200J11, -12, -13, -22





	OS200 (mm)			
	J11	J12	J13	J22
A	92	92	92	138
B	132.1	178.1	224.1	224.1
A1	144	144	144	144
A2	104	150	196	196
A3	52	52	52	98
B1	109.4	109.4	109.4	109.4
B2	105.9	140.9	140.9	175.9
B3	61.5	61.5	61.5	107.5
C1	108	108	108	108
C2	140	186	232	232
C3	70	70	70	116

OES200R03

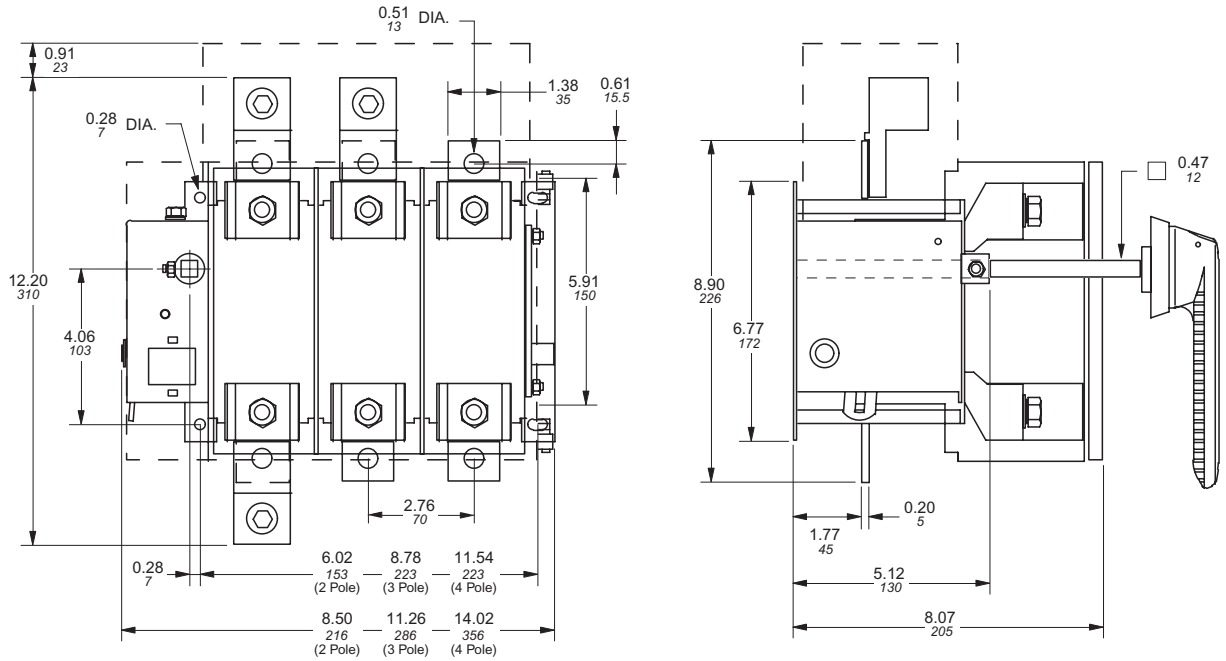


18

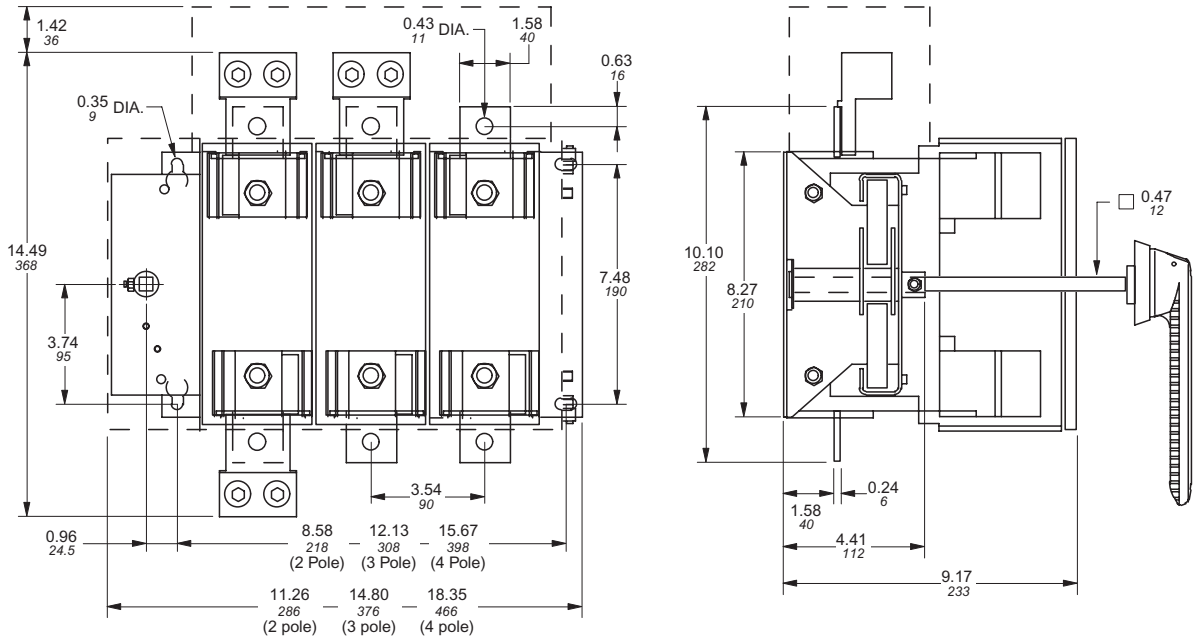
Approximate dimensions
OES400_ – OES800_

00.00 / 00.00 Inches [Millimeters]

OES400J3, OES400R03



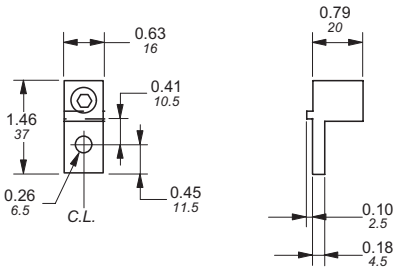
OES600J3 & OES800L3; OES600R03 & OES800R03



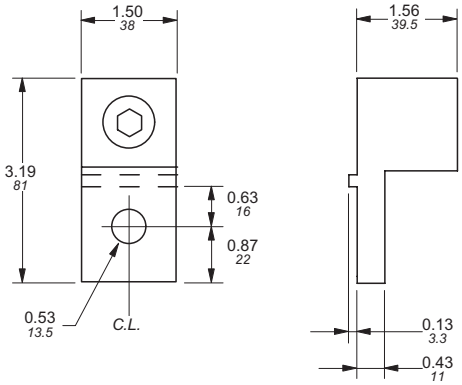
Approximate dimensions
for Terminal lugs

00.00 / 00.00 Inches [Millimeters]

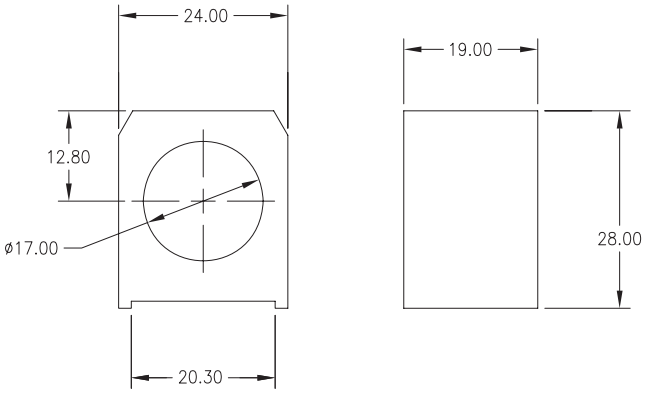
OZXA-24 — for use with 100A switches



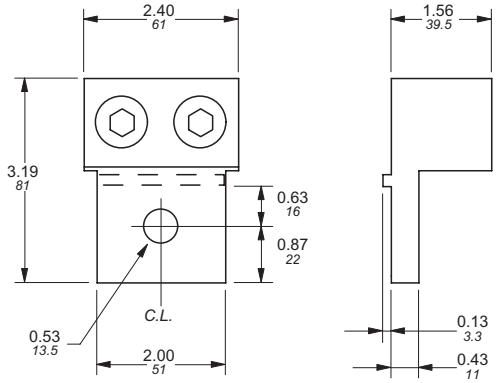
OZXA-26 — for use with 400A switches



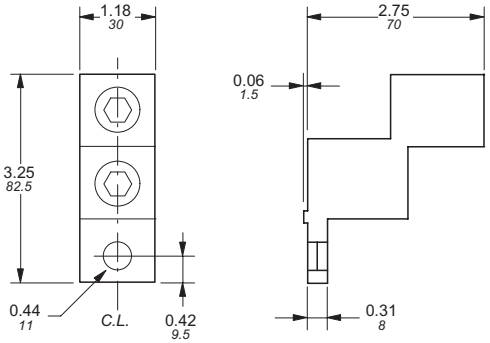
OZXA-200 — for use with 200A switches



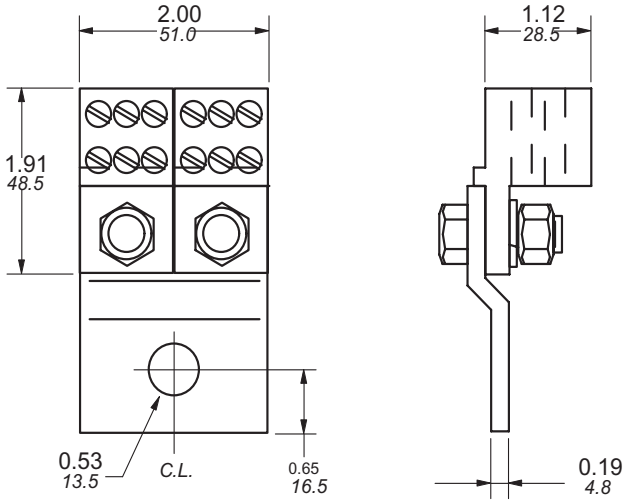
OZXA-27 — for use with 600A switches



OZXA-33 — for use with 400A switches



OZXA-175/400 — for use with 600-800A switches

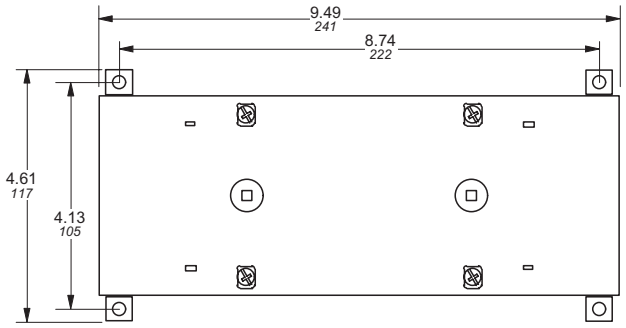


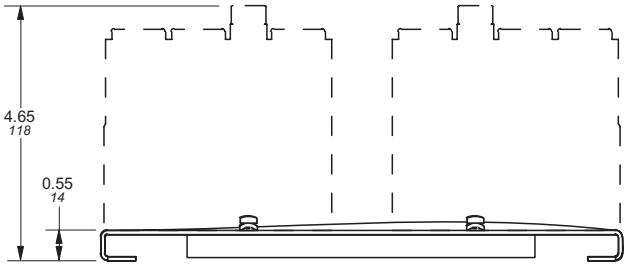
18

Approximate dimensions
for 30A Conversion mechanisms

00.00 / 00.00 Inches [Millimeters]

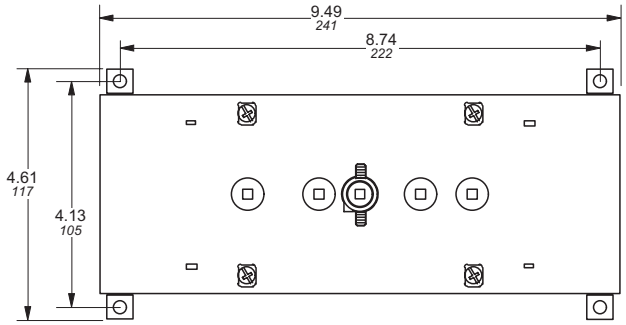
6 pole — OWP5DS1

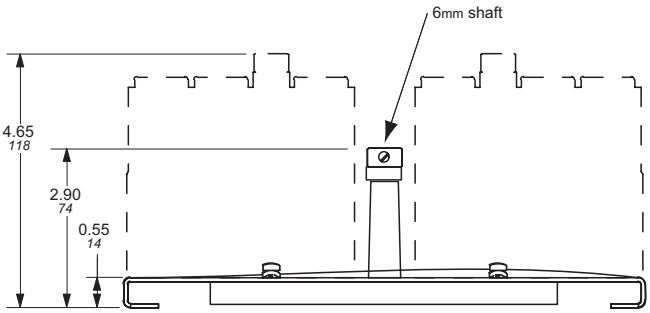




OWP5DS1_ in combination with:	Minimum inches/mm	Maximum ① inches/mm
OS30_	5.51 / 140	n/a

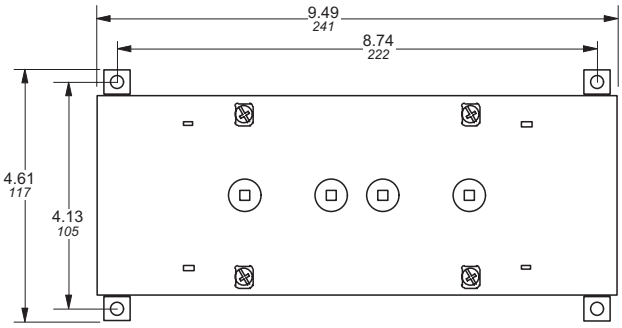
3 pole transfer switch — OWC5DSH1, OWC5DSH1X

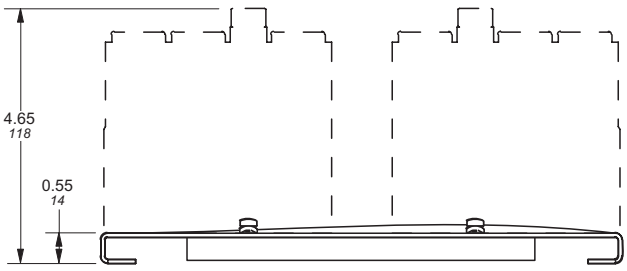




OWC5DSH1_ in combination with:	Minimum inches/mm	Maximum ① inches/mm
OS30_	5.51 / 140	n/a

Mechanical interlock — OWM5DS1



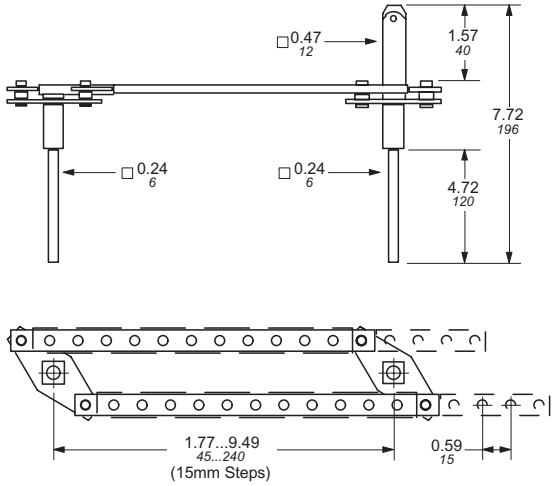


OWM5DS1 in combination with:	Minimum inches/mm	Maximum inches/mm
OS30_	5.51 / 140	n/a

Approximate dimensions
for 60A – 100A conversion mechanisms

00.00 / 00.00 Inches [Millimeters]

6 or 8 pole — OESA-ZW2

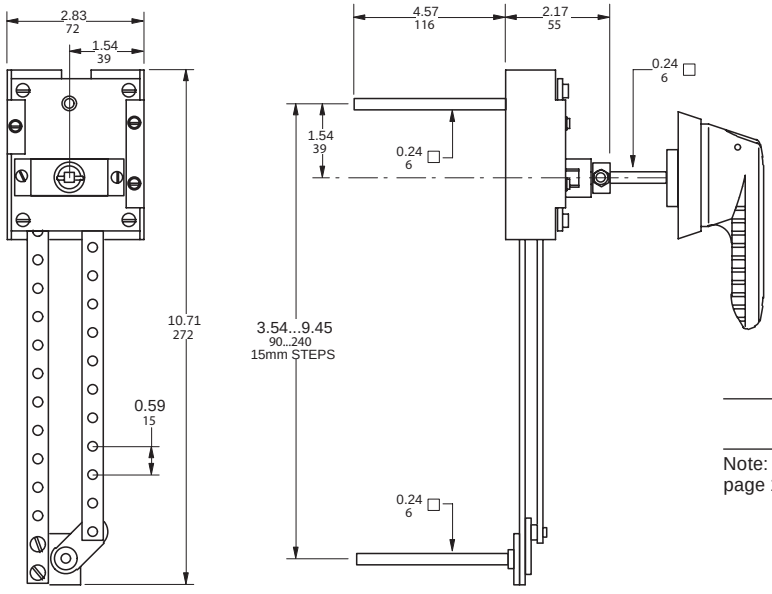


For installation of 6 or 8 pole and transfer mechanisms, the following minimum and maximum mounting dimensions are given below.

OESA-ZW2 in combination with:	Minimum inches/mm	Maximum ① inches/mm
OS60	6.89/175	10.83/275
OS100	6.89/175	10.83/275

Note: Deeper enclosures will require a longer shaft, please select a 12mm shaft from page 18.92, and an OETL-ZX95 shaft extension coupler from page 18.94.

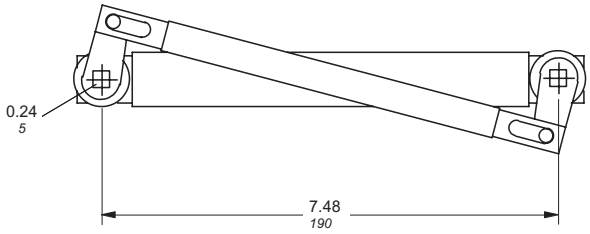
Transfer switch — OESA-ZW1 & OESA-ZW1X



OESA-ZW1 in combination with:	Minimum inches/mm	Maximum ① inches/mm
OS60	7.87/200	13.23/336
OS100	8.27/210	13.23/336

Note: Deeper enclosures will require a longer shaft, please select a 6mm shaft from page 18.87.

Mechanical interlock — OTZW10



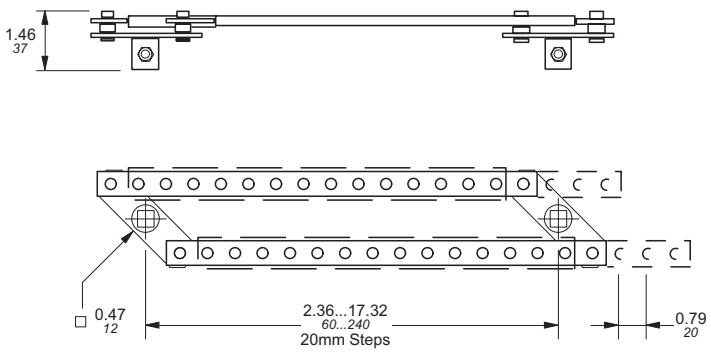
OTZW10 in combination with:	Minimum inches/mm	Maximum ① inches/mm
OS60 - OS 200	6.3 / 160	—

Note: Deeper enclosures will require a longer shaft, please select a 6mm shaft from page 18.87.

Approximate dimensions
for 400A – 800A conversion mechanisms

00.00 / 00.00 Inches [Millimeters]

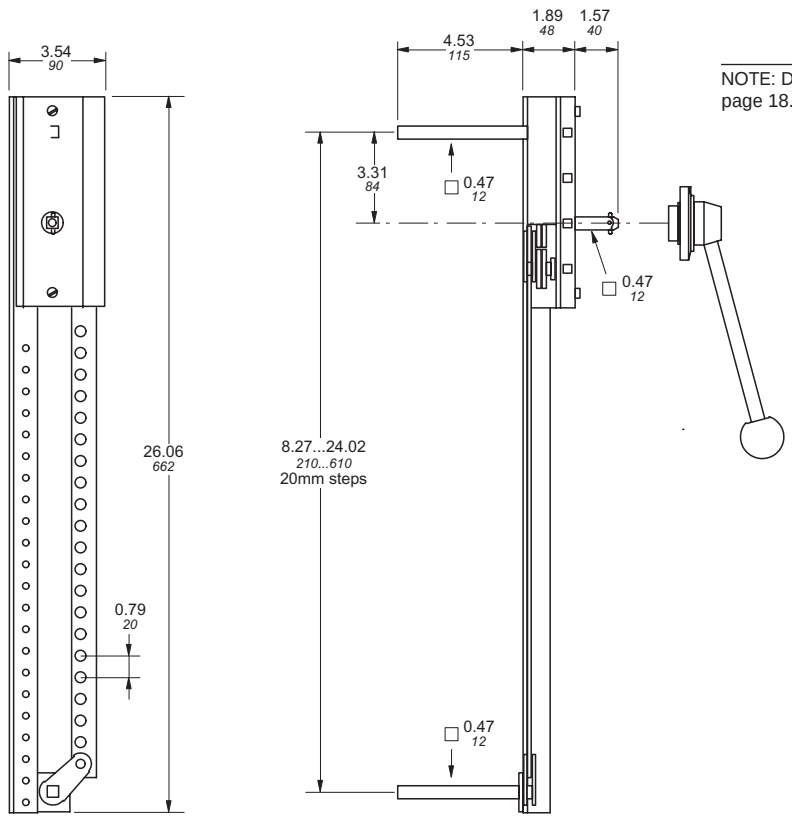
6 or 8 pole — OETL-ZW9



For installation of 6 or 8 pole and transfer mechanisms, the following minimum and maximum mounting dimensions are given below.

OETL-ZW9 in combination with:	Minimum inches/mm	Maximum ① inches/mm
OES400	9.84/250	N/A
OES600	11.02/280	N/A
OES800	11.02/280	N/A

Transfer switch — OETL-ZW12



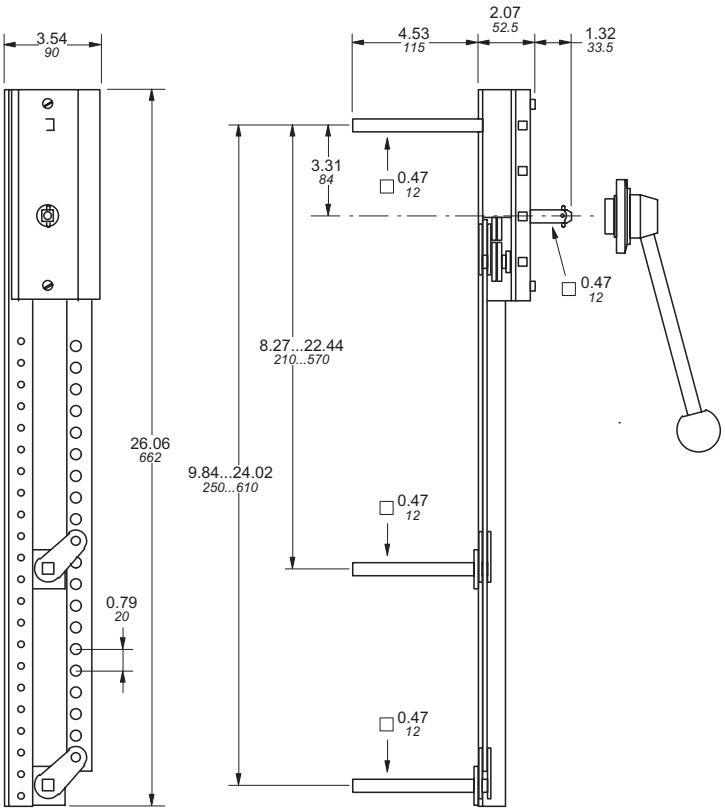
OETL-ZW12 in combination with:	Minimum inches/mm	Maximum① inches/mm
OES400	10.82/275	N/A
OES600	11.81/300	N/A
OES800	11.81/300	N/A

NOTE: Deeper enclosures require a longer shaft. Select a 12mm shaft from page 18.92 and an OETLZX95 shaft extension coupler from page 18.94.

Approximate dimensions
for 400A – 800A conversion mechanisms

00.00 / 00.00 Inches [Millimeters]

Bypass switch — OETL-ZW13



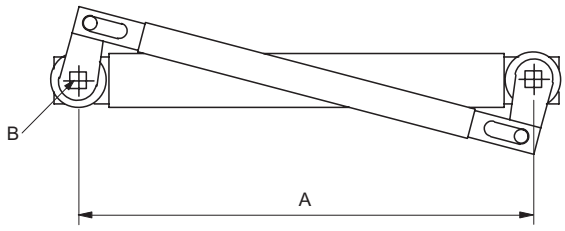
For installation of bypass and mechanical interlock mechanisms, the following minimum and maximum mounting dimensions are given below.

OETL-ZW13 in combination with:	Minimum inches/mm	Maximum ① inches/mm
OES400	11.61/295	N/A
OES600	12.80/325	N/A
OES800	12.80/325	N/A

Includes YASDA-21 handle.

NOTE: Deeper enclosures require a longer shaft. Select a 12mm shaft from page 18.92 and an OETLZX95 shaft extension coupler from page 18.94.

Mechanical interlock — OETL-ZW3, OETL-ZW14 & OETL-ZW15



Dimensions in Inches & *mm*

	A	B
OETL-ZW3	11.81 *300.0*	0.47 *12.0*
OETL-ZW14	9.84 *250.0*	0.47 *12.0*
OETL-ZW15	19.69 *500.0*	0.47 *12.0*

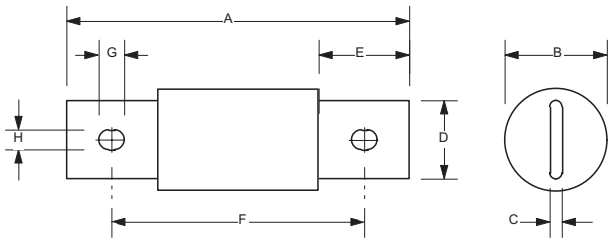
OETL-ZW3, 14, 15 in combination with:	Minimum inches/mm	Maximum ① inches/mm
OES400	9.45/240	N/A
OES600	10.43/265	N/A
OES800	10.43/265	N/A

Handle(s) not included.

Approximate dimensions
for Fuses

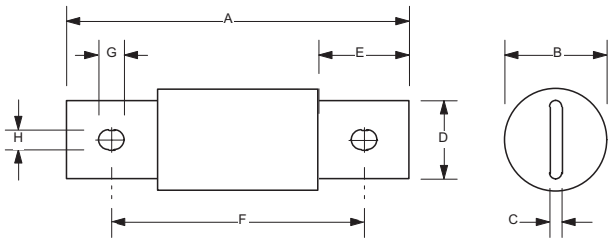
00.00 / 00.00 Inches [Millimeters]

Class J (600V)



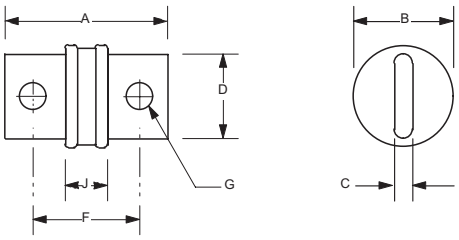
Ampere rating	A	B	C	D	E	F	G	H
1 – 30	2.25	.81	—	—	—	—	—	—
31 – 60	2.38	1.06	—	—	—	—	—	—
61 – 100	4.62	1.12	.12	.75	1	3.62	.38	.28
101 - 200	5.75	1.62	.19	1.12	1.38	4.38	.38	.28
201 - 400	7.12	2.12	.25	1.62	1.88	5.25	.53	.41
401 600	8.00	2.5	.38	2.00	2.12	6.00	.69	.53

Class L (600V)



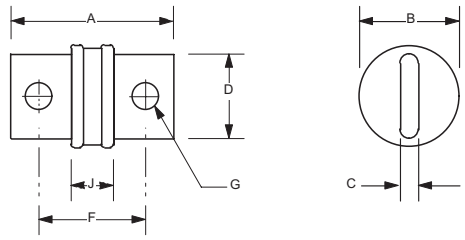
Ampere rating	A	B	C	D	E	F	G	H
200 - 600	8.62	2.00	.31	1.62	2.41	6.25	1.12	.62
601 - 800	8.62	2.50	.38	2.00	2.41	6.25	1.12	.62

Class T (300V)



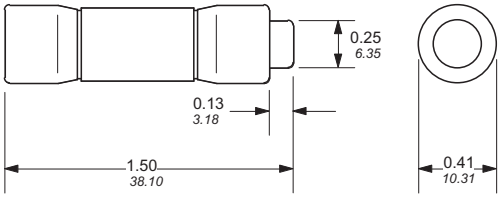
Ampere rating	A	B	C	D	F	G	J
1 – 30	.88	.41	—	—	—	—	—
31 – 60	.88	.56	—	—	—	—	—
61 – 100	2.16	.81	.12	.75	1	3.62	.38
101 - 200	2.45	1.06	.19	1.12	1.38	4.38	.38
201 - 400	2.75	1.33	.25	1.62	1.88	5.25	.53
401 - 600	3.06	1.62	.31	2.00	2.12	6.00	.69
601 - 800	3.38	2.08	.38	1.75	2.22	.55	.88

Class T (600V)



Ampere rating	A	B	C	D	F	G	J
1 – 30	1.50	.56	—	—	—	—	—
35 – 60	1.56	.81	—	—	—	—	—
70 – 100	2.95	—	.12	.75	2.36	.28	1.64
110 - 200	3.25	—	.19	.88	2.50	.34	1.66
225 - 400	3.62	—	.25	1.00	2.69	.41	1.64
450 - 600	3.98	—	.31	1.25	2.95	.48	1.78
601 - 800	4.37	—	.38	1.75	3.17	.55	1.88

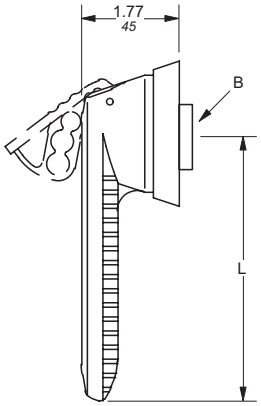
Class CC (600V) — Rejection type

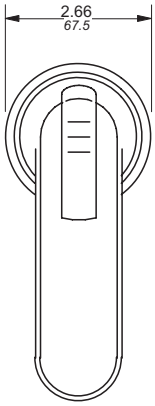


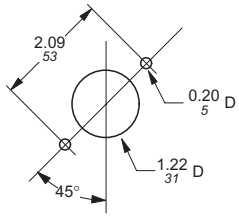
Approximate dimensions
Handles

00.00 / 00.00 Inches [Millimeters]

Pistol handles



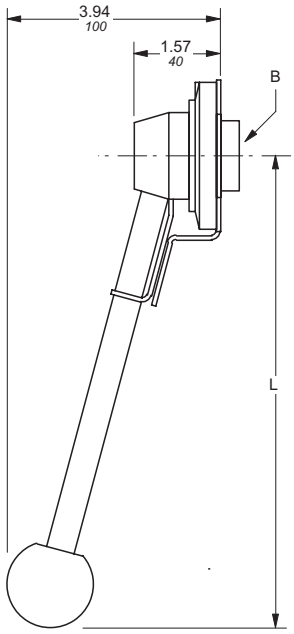


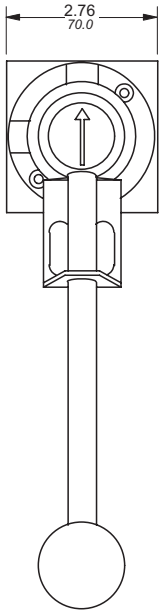


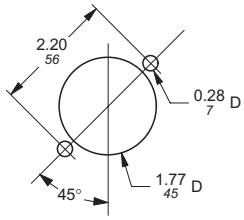
MOUNTING HOLE DETAIL

L Catalog number	Inches/ mm	☐B Shaft size Inches/ mm	UL / NEMA Type
OH_45J5	1.8/45	0.20/5	1, 3R, 12
OH_65J5	2.6/65	0.20/5	1, 3R, 12
OH_45J6	1.8/45	0.24/6	1, 3R, 12
OH_65J6	2.6/65	0.24/6	1, 3R, 12
OH_80J6	3.1/80	0.24/6	1, 3R, 12
OH_65J8	2.6/65	0.31/8	1, 3R, 12
OH_80J8	3.1/80	0.31/8	1, 3R, 12
OH_125J12	4.9/125	0.47/12	1, 3R, 12
OH_145J12	5.7/145	0.47/12	1, 3R, 12
OH_175J12	6.9/175	0.47/12	1, 3R, 12
OH_65L5	2.6/65	0.20/5	1, 3R, 4, 4X, 12
OH_80L6	3.1/80	0.24/6	1, 3R, 4, 4X, 12
OH_80L8	3.1/80	0.31/8	1, 3R, 4, 4X, 12
OH_145L12	5.7/145	0.47/12	1, 3R, 4, 4X, 12
OH_175L12	6.9/175	0.47/12	1, 3R, 4, 4X, 12

__ = Handle color, B (Black) or Y (Red/Yellow)



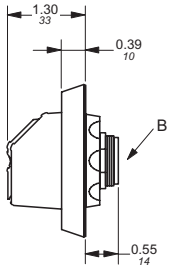


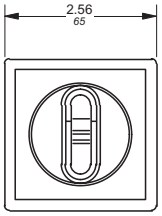


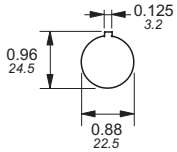
MOUNTING HOLE DETAIL

Catalog number	L Inches/ mm	☐B Shaft size Inches/ mm	UL / NEMA Type
YASDA-7	8.66/220	0.47/12	1, 3R, 4, 4X, 12
YASDA-8	8.66/220	0.47/12	1, 3R, 4, 4X, 12
YASDA-21	8.66/220	0.47/12	1, 3R, 4, 4X, 12
YASDA-6	12.60/320	0.47/12	1, 3R, 4, 4X, 12

OH_2A_







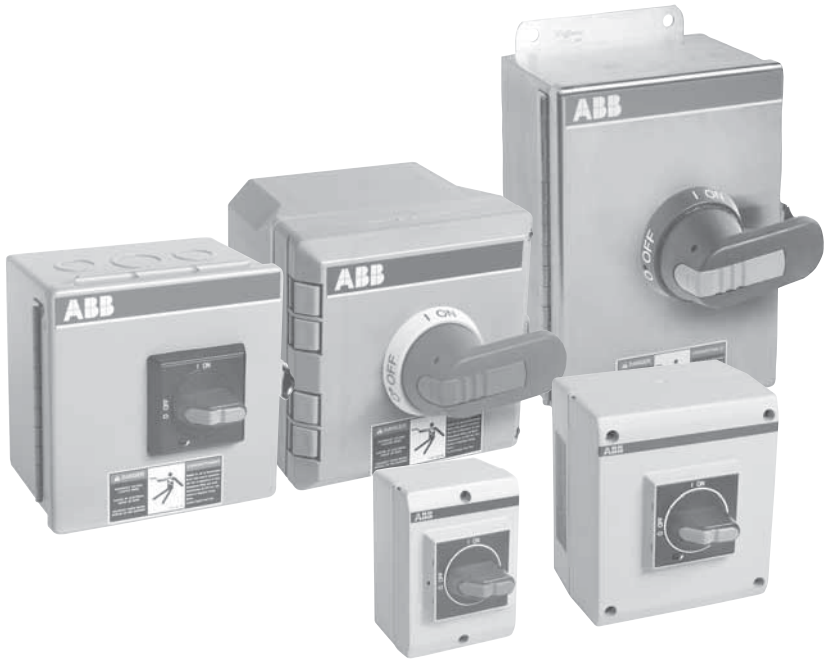
MOUNTING HOLE DETAIL

Catalog number UL Type 1, 3R, 12	Defeatable	☐B Shaft size Inches/ mm
OHB2AJ1	No	0.20/5
OHY2AJ1	No	0.20/5
OHB2AJ	Yes	0.20/5
OHY2AJ	Yes	0.20/5

Notes

SafeLine Enclosed Disconnect switches

SafeLine
Compact, heavy duty
Enclosed disconnect switches
16A – 3150A Non-fusible
30A – 3000A Fusible



SafeLine enclosed disconnect switches are designed to meet customer requirements in terms of safety, ease of installation, space savings and operational convenience. They are available in a wide range of amperage ratings, are UL approved and NEMA rated to satisfy rugged industrial environments.

Suitable for use as:
- OSHA Lockout/Tagout disconnects
- Safety switches
- Load break switches
- Isolators

General information
Non-fusible

NF 16 E - 3P BJ A 11

Disconnect switch type
NF = Non-fusible
FC = UL Fused Class CC, (30A)
FJ = UL Fused Class J, (30A – 600A)
FL = UL Fused Class L, (800A)
FT = UL Fused Class T, (100A – 800A)
F* = Fused Class *special customer requirements

Disconnect switch frame size
Non-Fusible switches
16 25 30 32 45 60
63 100 125 200 400 600
800 1200 1600 2000 3150

Fusible switches
30 60 100 200 400 600
800 1200 - 3000 – consult factory

Environmental rating
1 = Type 1
2 = Type 12
3 = Type 3R
4 = Type 4
X = Type 4, 4X stainless steel
P = Type 3R, 4, 4X plastic
K = Type 3R, 12 plastic
E = European rated IP65,
7 = Type 7 & 9 Class I; Div. 1 & 2; Group C, & D
Class II; Div. 1 & 2; Group E, F, & G
74 = Type 4, 7, & 9
* = Special customer requirements

Accessories
10 = 1 N.O. auxiliary contact
01 = 1 N.C. auxiliary contact
11 = 1 N.O. & 1 N.C. auxiliary contacts
22 = 2 N.O. & 2 N.C. auxiliary contacts
A = Start/Stop pushbuttons
C = 2 Position selector switch
D = 3 Position selector switch
E = Pilot light, "Red/Run"
N = Neutral terminal
G = Ground terminal, isolated ①
U = Service entrance, 3-wire ②
V = Service entrance, 4-wire
* = Special customer requirements

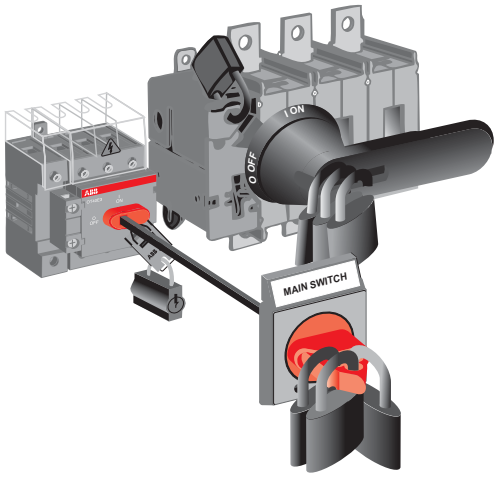
Series

Handle type
the appropiate handle is provided for each enclosure in accordance with the application.
B_ = black
Y_ = Red/Yel

Poles or conversion mechanisms
2P = 2 poles
3P = 3 poles
4P = 4 poles
6P = 6 poles
3T = 3 pole transfer
4T = 4 pole transfer
3B = 3 pole by-pass
3M = 3 pole mechanical interlock

OSHA

Suitable for use as OSHA Lockout/tagout disconnect when applied in accordance with part IV, Department of Labor Occupational Safety and Health Administrations, 29 CFR Part 1910, Control of Hazardous Energy Source (Lockout/Tagout): Final Rule.



Handle and mechanism padlocked OFF

Padlockable

Handles can be padlocked in the “OFF” position with up to three padlocks: Additionally, the switch mechanism can be directly padlocked in the “OFF” position when the door is open. NOTE: Some handles can be ordered with the ability to padlock in both the “ON” & “OFF” positions, please consult your ABB sales office. When the handle is padlocked, the enclosure cannot be opened.

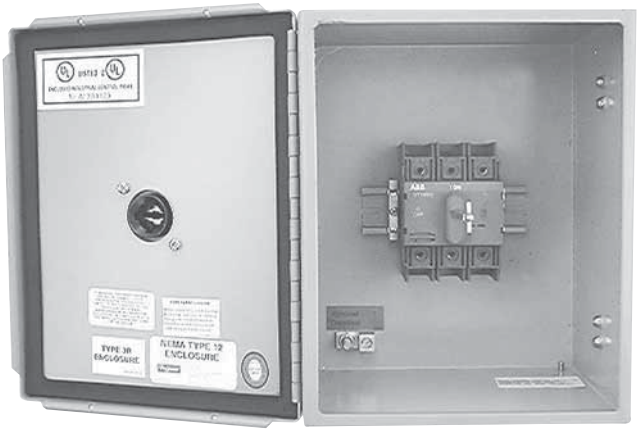
① All enclosed switches are provided with a ground lug. See page 18.143.
② Only for UL 98 switches

Non-Fusible

UL Listed to UL 508 and UL 98.
CSA aproved
IEC rated
CE marked

Snap on accessories include additional poles, auxiliary contacts, etc.

Enclosures available in plastic, metal, or stainless steel in NEMA 1, 3R, 12, 4X, 7 & 9 environmental categories



Modern appearance

Quick make, quick brake mechanism

Heavy duty disconnect, 600VAC

Extremely compact size

Finger-proof construction. No hazardous exposed parts

3/4/6/8 pole constructions; transfer switches and by-pass switches available

Fusible

UL Listed to UL 98 standards.
CSA aproved
IEC rated
CE marked

Snap on accessories include fuse monitors, auxiliary contacts, etc.

Enclosures available in plastic, metal, or stainless steel in NEMA 1, 3R, 12, 4X, 7 & 9 environmental categories

Fuse carriers available for US standards, BS, DIN, NFC standard and for various high speed fuse patterns

Modern appearance

Quick make, quick brake mechanism

Heavy duty disconnect, 600VAC, 200kA, I_{SC}

Extreme compact size as fuse crriers are decked above contacts

Double contacts enabling feed from any direction and preventing back feed

Finger-proof construction. No hazardous exposed parts

3/4/6/8 pole constructions; transfer switches and by-pass switches available

Lockable

Clear position indications:
- I-ON
- O-OFF

Door interlocked when handle padlocked to OFF position

Handle padlockable with up to three padlocks

Door interlocked when handle is in ON position. Door interlock can be defeated by authorized personnel.

Pilot devices can be added

General information
NEMA Environmental ratings

Introduction
An enclosure is a surrounding case constructed to provide a degree of protection to personnel against accidental contact with the enclosed equipment and to provide a degree of protection to the enclosed equipment against specified environmental conditions.

A brief description of the more common types of enclosures used by the electrical industry relating to their environmental capabilities follows.

Refer to NEMA Standards Publication for more information regarding applications, features and design tests.

Individual NEMA product Standards Publications or third party certification standards may contain additional requirements for product testing and performance.

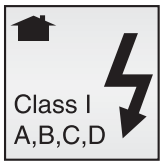
Definitions pertaining to nonhazardous locations

Type 1

Enclosures are intended for indoor use primarily to provide a degree of protection against limited amounts of falling dirt. (NEMA Standard 7-15-1991.)

Type 4X

Enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, hose-directed water and damage from external ice formation. (NEMA Standard 1-10-1979)



Type 7

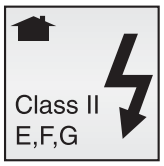
Enclosures are intended for indoor use in locations classified as Class I, Groups, A, B, C, or D, as defined in the National Electrical Code. (NEMA Standard 7-15-1991.)

Type 3R

Enclosures are intended for outdoor use primarily to provide a degree of protection against rain, sleet and damage from external ice formation. (NEMA Standard 7-15-1991.)

Type 12

Enclosures are intended for indoor use primarily to provide a degree of protection against circulating dust, falling dirt, and dripping noncorrosive liquids. (NEMA Standard 7-15-1991.)



Type 9

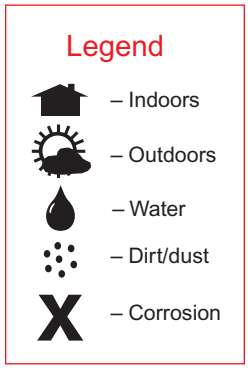
Enclosures are intended for indoor use in locations classified as Class II, Groups E, F, or G, as defined in the National Electrical Code. (NEMA Standard 7-15-1991.)

Type 4

Enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water, hose-directed water and damage from external ice formation. (NEMA Standard 1-10-1979.)

Type 13

Enclosures are intended for indoor use primarily to provide a degree of protection against dust, spraying of water, oil and noncorrosive coolant. (NEMA Standard 1-10-1979.)



IP ratings

indicate the degree of protection against dust, liquids and impacts. The IP degrees of protection are defined by the French standard NFC 20-010. To rate a device's degrees of protection, the letters IP are followed by up to three numbers. These numbers are defined as follows:

first number protection against solid objects	second number protection against liquids	third number protection against mechanical impacts
IP 0 — no protection	IP 0 — no protection	IP 0 — no protection
1 — protected against solid objects over 50mm (e.g. accidental touch by hands.)	1 — protected against vertically falling rain or condensation	1 — impact 0.225 joule 150g falling from 15cm
2 — protected against solid objects over 12mm (e.g. fingers)	2 — protected against direct sprays of water up to 15° from vertical	2 — impact 0.375 joule 250g falling from15cm
3 — protected against solid objects over 2.5mm (tools & wires)	3 — protected against sprays to 60° from vertical	3 — impact 0.50 joule 250g falling from 20cm
4 — protected against solid objects over 1mm (small tools & small wires)	4 — protected against water sprayed from all directions	5 — impact 2.00 joule 500g falling from 40cm
5 — protected against dust (no harmful deposit)	5 — protected against low pressure jets of water from all directions	7 — impact 6.00 joule 1.5kg falling from 40cm
6 — totally protected against dust	6 — protected from strong jets of water (e.g. for use on ship decks)	9 — impact 20.00 joule 5 kg falling from 40cm
	7 — protected against the effects of immersion between 15cm and 1m	

3 pole
16A – 3150A

NF32X-3PB6C

NF63X-3PB6A

3 Pole, 600V, 16A – 80A
Selector handle

UL general purpose amp rating	NEMA 1 Catalog number	NEMA 1 List price	NEMA 3R Catalog number	NEMA 3R List price	NEMA 4 Catalog number	NEMA 4 List price	NEMA 4X Stainless Catalog number	NEMA 4X Stainless List price
UL 508								
16	NF161-3PBJC	**$ 185**	NF163-3PBJC	**$ 259**				
25	NF251-3PBJC	**190**	NF253-3PBJC	**264**	Not available with selector handle		Not available with selector handle	
40	NF321-3PBJC	**205**	NF323-3PBJC	**279**				
60	NF451-3PBJB	**245**	NF453-3PBJB	**320**				
80	NF631-3PBJA	**280**	NF633-3PBJA	**354**				

3 Pole, 600V, 16A – 3150A
Pistol handle

UL general purpose amp rating	NEMA 1 Catalog number	NEMA 1 List price	NEMA 3R Catalog number	NEMA 3R List price	NEMA 4 Catalog number	NEMA 4 List price	NEMA 4X Stainless Catalog number	NEMA 4X Stainless List price
UL 508								
16	NF161-3PB6C	**$ 235**	NF163-3PB6C	**$ 309**	NF164-3PB6A	**$ 475**	NF16X-3PB6C ②	**$ 585**
25	NF251-3PB6C	**240**	NF253-3PB6C	**314**	NF254-3PB6A	**480**	NF25X-3PB6C ②	**590**
40	NF321-3PB6C	**255**	NF323-3PB6C	**329**	NF324-3PB6A	**495**	NF32X-3PB6C ②	**605**
60	NF451-3PB6B	**295**	NF453-3PB6B	**370**	NF454-3PB6B	**525**	NF45X-3PB6B	**635**
80	NF631-3PB6A	**330**	NF633-3PB6A	**404**	NF634-3PB6A	**550**	NF63X-3PB6A	**660**
UL 98								
30	NF301-3PB6B	**510**	NF303-3PB6B	**780**	NF304-3PB6B	**1090**	NF30X-3PB6B	**1200**
60	NF601-3PB6B	**560**	NF603-3PB6B	**830**	NF604-3PB6B	**1140**	NF60X-3PB6B	**1250**
100	NF1001-3PB6B	**610**	NF1003-3PB6B	**880**	NF1004-3PB6B	**1190**	NF100X-3PB6B	**1300**
125	NF1251-3PB6A	**1100**	NF1253-3PB6A	**1400**	NF1254-3PB8A	**2800**	NF125X-3PB8A	**3500**
200	NF2001-3PB8B	**1300**	NF2003-3PB8B	**1650**	NF2004-3PB8B	**3520**	NF200X-3PB8B	**4400**
400	NF4001-3PB4B	**2600**	NF4003-3PB4B	**2800**	NF4004-3PB4B	**6400**	NF400X-3PB4B	**8000**
600	NF6001-3PB4A	**4800**	NF6003-3PB4A	**5000**	NF6004-3PB4A	**9600**	NF600X-3PB4A	**12,000**
800	NF8001-3PB4A	**8000**	NF8003-3PB4A	**9400**	NF8004-3PB4A	**15,200**	NF800X-3PB4A	**19,000**
1200	NF12001-3PB4A	**10,000**	NF12003-3PB4A	**11,800**	NF12004-3PB4A	**18,000**	NF1200X-3PB4A	**22,500**
1600	NF16001-3P8A	**19,000**	NF16003-3P8A	**20,800**	NF16004-3P8A	**30,400**	NF1600X-3P8A	**38,000**
2000	NF20001-3P8A	**23,000**	NF20003-3P8A	**25,000**	NF20004-3P8A	**35,200**	NF2000X-3P8A	**44,000**
3150 ①	NF31501-3P8A	**28,000**	NF31503-3P8A	**30,000**	NF31504-3P8A	**39,200**	NF3150X-3P8A	**49,000**

NOTE: All enclosed switches are provided with a black handle; however, most handles can be substituted with a red and yellow handle if desired. Please substitute the handle suffix code (2nd and 3rd from last characters) with the red/yellow handle catalog number suffix from page 18.130. There is no additional price adder for changing to a red/yellow handle of equal ratings and style.

EXAMPLE: A red/yellow selector handle for an NF161-3PBJA can be substituted for the black selector handle by using the "YJ" suffix instead of the "BJ" suffix, new catalog #NF161-3PYJA.

① IEC rated only.
② New Washdown.

3 Pole
16A – 3150A

NF25P-3PY6A


NF16E-3PBJA


NF16E-3PBJB

3 Pole, 600V, 16A – 80A
Selector handle

UL general purpose amp rating	NEMA Enclosure type						IEC Enclosure type	
	12 Plastic		12		7 & 9		IP65 Plastic	
	Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price
UL 508								
16	NF16P-3PBJA	$ 295	NF162-3PBJC	$ 259	—	—	NF16E-3PBJA	$ 185
16, oversize	—	—	—	—	—	—	NF16E-3PBJB	210
25	NF25P-3PBJA	300	NF252-3PBJC	264	—	—	NF25E-3PBJA	190
25, oversize	—	—	—	—	—	—	NF25E-3PBJB	215
40	NF32P-3PBJA	315	NF322-3PBJC	279	—	—	NF32E-3PBJA	225
40, oversize	—	—	—	—	—	—	NF32E-3PBJB	230
60	NF45P-3PBJB	350	NF452-3PBJB	320	—	—	NF45E-3PBJA	245
80	NF63P-3PBJA	380	NF632-3PBJA	354	—	—	NF63E-3PBJA	275

3 Pole, 600V, 16A – 3150A
Pistol handle

UL general purpose amp rating	NEMA Enclosure type						IEC Enclosure type	
	4X Plastic		12		7 & 9		IP65 Plastic	
	Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price
UL 508								
16	NF16P-3PB6A	$ 345	NF162-3PB6C	$ 309	NF167-3P	$ 1900	NF16E-3PB4B	$ 235
25	NF25P-3PB6A	350	NF252-3PB6C	314	NF257-3P	1925	NF25E-3PB4B	240
40	NF32P-3PB6A	365	NF322-3PB6C	329	NF327-3P	1950	NF32E-3PB4B	255
60	NF45P-3PB6B	400	NF452-3PB6B	370	NF457-3P	3600	NF45E-3PB4B	295
80	NF63P-3PB6A	430	NF632-3PB6A	400	NF637-3P	3630	NF63E-3PB4B	325
UL 98								
30	NF30P-3PB6B	875	NF302-3PB6B	780	NF307-3P	4150	NF30E-3PB6A	560
60	NF60P-3PB6B	925	NF602-3PB6B	830	NF607-3P	4200	NF60E-3PB6A	610
100	NF100P-3PB6B	975	NF1002-3PB6B	880	NF1007-3P	4250	NF100E-3PB6A	660
125	NF125P-3PB8A	3000	NF1252-3PB6A	1400	—	—	NF125E-3PB6A	1100
200	NF200P-3PB8B	4000	NF2002-3PB8B	1600	—	—	—	—
400	NF400P-3PB4B	6000	NF4002-3PB4B	2900	—	—	—	—
600	NF600P-3PB4A	10,000	NF6002-3PB4A	5100	—	—	—	—
800	NF800P-3PB4A	16,000	NF8002-3PB4A	8400	—	—	—	—
1200	NF1200P-3PB4A	19,000	NF12002-3PB4A	10,400	—	—	—	—
1600	NF1600P-3P8A	31,000	NF16002-3P8A	19,400	—	—	—	—
2000	NF2000P-3P8A	37,000	NF20002-3P8A	23,400	—	—	—	—
3150 ②	NF3150P-3P8A	42,000	NF31502-3P8A	28,400	—	—	—	—

① Please consult factory for pricing and availability
② IEC rated only.

Switch ratings, handle ratings
16A – 3150A

Switch ratings, 16 – 3150 Amps, 600V

	UL General purpose amp rating	Maximum horsepower rating							Wire size for terminal lugs	For wire type	Approval
		Single phase			Three phase						
		120V	200V	240V	200V – 208V	240V	480V	600V			
UL 508	16	1	2	2	3	5	10	10	#18 – 8	Cu	CSA, UL
	25	1.5	3	3	7.5	7.5	15	20	#18 – 8	Cu	CSA, UL
	40	2	5	5	10	10	20	25	#18 – 8	Cu	CSA, UL
	60	2	5	5	15	15	30	30	#14 – 1	Cu	CSA, UL
	80	2	5	5	20	20	40	40	#14 – 1	Cu	CSA, UL
UL 98	30	2	5	5	10	10	20	30	#14 – 4	Cu	CSA, UL
	60	3	7.5	7.5	20	20	40	40	#14 – 4	Cu	CSA, UL
	100	5	15	15	25	30	50	50	#8 – 1/0	Cu	CSA, UL
	125	7.5	20	20	30	30	75	100	#8 – 1/0	Cu	CSA, UL
	200	—	—	—	60	75	150	200	#6 – 300 kcmil	Cu	CSA, UL
	400	—	—	—	100	125	250	350	#2 – 600 kcmil	Cu	CSA, UL
	600	—	—	—	150	200	400	500	(2) #2 – 600 kcmil	Cu	CSA, UL
	800	—	—	—	200	250	500	600	(2) #2 – 600 kcmil	Cu/Al	CSA, UL
	1200	—	—	—	—	—	—	—	(4) #2 – 600 kcmil	Cu/Al	CSA, UL
	1600	—	—	—	—	—	—	—	(4) #2 – 600 kcmil	Cu/Al	CSA, UL
	2000	—	—	—	—	—	—	—	(8) #2 – 600 kcmil	Cu/Al	CSA, UL
	3150 ①	—	—	—	—	—	—	—	(8) #2 – 600 kcmil	Cu/Al	IEC

Handle ratings, 16 – 3150 Amps, 600V

Amperage range	Style type	NEMA	Color	Marking	Defeatable	Padlockable	Catalog number suffix	Catalog number
16 – 100	Selector	1,3R,12	Black	O/I & OFF/ON	Yes	Yes	BJ	OHB2AJ
	Selector	1,3R,12	Red/Yel				YJ	OHY2AJ
	Pistol	1,3R,12	Black				B6	OHB65J5
	Pistol	1,3R,12	Red/Yel				Y6	OHY65J5
	Pistol	1,3R,4,4X,12	Black				B6	OHB65L5
	Pistol	1,3R,4,4X,12	Red/Yel				Y6	OHY65L5
125 - 200	Pistol	1,3R,12	Black	O/I & OFF/ON	Yes	Yes	B6	OHB65J6
		1,3R,12	Red/Yel				Y6	OHY65J6
		1,3R,4,4X,12	Black				B8	OHB80L6
		1,3R,4,4X,12	Red/Yel				Y8	OHY80L6
400 – 3150	Pistol	1,3R,12	Black	O/I & OFF/ON	Yes	Yes	B4	OHB145J12
		1,3R,12	Red/Yel		Yes		Y4	OHY145J12
		1,3R,12	Black		Yes		B7	OHB175J12
		1,3R,12	Red/Yel		Yes		Y7	OHY175J12
		1,3R,4,4X,12	Black		Yes		B4	OHB145L12
		1,3R,4,4X,12	Red/Yel		Yes		Y4	OHY145L12
		1,3R,4,4X,12	Black		Yes		B7	OHB175L12
		1,3R,4,4X,12	Red/Yel		Yes		Y7	OHY175L12
		1,3R,4,4X,12	Metal		No		8	YASDA-8
16 – 200	Pistol	1,3R,12	Black	I/O/II	Yes	Yes	B8	OHB80J6E011
		1,3R,4,4X,12						OHB80L6E011
400	Pistol	1,3R,12	Black	I/O/II	Yes	Yes	B4	OHB145J12E011
		1,3R,4,4X,12						OHB145L12E011
400 – 3150	Pistol	1,3R,12	Black	I/O/II	Yes	Yes	B7	OHB175J12E011
	Pistol	1,3R,4,4X,12	Black		Yes		B7	OHB175L12E011
	Metallic	1,3R,4,4X,12	Metal		No		21	YASDA-21
	Metallic	1,3R,4,4X,12	Metal		No		6	YASDA-6

① IEC rated only.

2 pole
125A – 3150A

2 Pole, 600V, 125A – 3150A

UL general purpose amp rating	NEMA Enclosure type 1 Catalog number	1 List price	3R Catalog number	3R List price	4 Catalog number	4 List price	4X Stainless Catalog number	4X Stainless List price
125	NF1251-2PB6A	$ 825	NF1253-2PB6A	$ 1050	NF1254-2PB8A	$ 2100	NF125X-2PB8A	$ 2625
200	NF2001-2PB8B	1170	NF2003-2PB8B	1485	NF2004-2PB8B	3170	NF200X-2PB8B	3960
400	NF4001-2PB4B	2340	NF4003-2PB4B	2520	NF4004-2PB4B	5750	NF400X-2PB4B	7200
600	NF6001-2PB4A	4320	NF6003-2PB4A	4500	NF6004-2PB4A	8640	NF600X-2PB4A	10,800
800	NF8001-2PB4A	7200	NF8003-2PB4A	8460	NF8004-2PB4A	13,680	NF800X-2PB4A	17,100
1200	NF12001-2PB4A	9000	NF12003-2PB4A	10,620	NF12004-2PB4A	16,200	NF1200X-2PB4A	20,250
1600	NF16001-2P8A	17,100	NF16003-2P8A	18,720	NF16004-2P8A	27,360	NF1600X-2P8A	34,200
2000	NF20001-2P8A	20,700	NF20003-2P8A	22,500	NF20004-2P8A	31,680	NF2000X-2P8A	39,600
3150	NF31501-2P8A	25,200	NF31503-2P8A	27,000	NF31504-2P8A	35,280	N3150X-2P8A	44,100

UL98

2 Pole, 600V, 125A – 3150A

UL general purpose amp rating	NEMA Enclosure type 4X Plastic Catalog number	4X Plastic List price	12 Catalog number	12 List price
125	NF125P-2PB8A	$ 2250	NF1252-2PB6A	$ 1050
200	NF200P-2PB8B	3600	NF2002-2PB8B	1440
400	NF400P-2PB4B	5400	NF4002-2PB4B	2610
600	NF600P-2PB4A	9000	NF6002-2PB4A	4590
800	NF800P-2PB4A	14,400	NF8002-2PB4A	7560
1200	NF1200P-2PB4A	17,100	NF12002-2PB4A	9360
1600	NF1600P-2P8A	28,000	NF16002-2P8A	17,460
2000	NF2000P-2P8A	33,300	NF20002-2P8A	21,060
3150 ①	NF3150P-2P8A	37,800	NF31502-2P8A	25,560

UL 98

16A – 100A switches are not available in 2 pole versions, use 3 pole.

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① IEC rated only.

4 pole
16A – 3150A

4 Pole, 600V, 16A – 3150A

NEMA Enclosure type

UL general purpose amp rating	1		3R		4		4X Stainless	
	Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price
UL508 16	NF161-4PB6C	$ 295	NF163-4PB6C	$ 369	NF164-4PB6A	$ 530	NF16X-4PB6C	$ 665
25	NF251-4PB6C	300	NF253-4PB6C	374	NF254-4PB6A	535	NF25X-4PB6C	670
40	NF321-4PB6C	310	NF323-4PB6C	384	NF324-4PB6A	545	NF32X-4PB6C	680
60	NF451-4PB6B	360	NF453-4PB6B	434	NF454-4PB6B	570	NF45X-4PB6B	700
80	NF631-4PB6A	410	NF633-4PB6A	484	NF634-4PB6A	595	NF63X-4PB6A	740
UL98 30	NF301-4PB6B	650	NF303-4PB6B	988	NF304-4PB6B	1200	NF30X-4PB6B	1525
60	NF601-4PB6B	700	NF603-4PB6B	1038	NF604-4PB6B	1250	NF60X-4PB6B	1575
100	NF1001-4PB6B	750	NF1003-4PB6B	1088	NF1004-4PB6B	1300	NF100X-4PB6B	1625
125	NF1251-4PB6A	1375	NF1253-4PB6A	1675	NF1254-4PB6A	3500	NF125X-4PB8A	4375
200	NF2001-4PB8B	1625	NF2003-4PB8B	2063	NF2004-4PB8B	4400	NF200X-4PB8B	5500
400	NF4001-4PB4B	3250	NF4003-4PB4B	3500	NF4004-4PB4B	8000	NF400X-4PB4B	10,000
600	NF6001-4PB4A	6000	NF6003-4PB4A	6250	NF6004-4PB4A	12,000	NF600X-4PB4A	15,000
800	NF8001-4PB4A	10,000	NF8003-4PB4A	11,750	NF8004-4PB4A	19,000	NF800X-4PB4A	23,750
1200	NF12001-4PB4A	12,500	NF12003-4PB4A	14,750	NF12004-4PB4A	22,500	NF1200X-4PB4A	28,125
1600	NF16001-4P8A	23,750	NF16003-4P8A	26,000	NF16004-4P8A	38,800	NF1600X-4P8A	47,500
2000	NF20001-4P8A	28,750	NF20003-4P8A	31,250	NF20004-4P8A	44,000	NF2000X-4P8A	55,000
3150 ①	NF31501-4P8A	35,000	NF31503-4P8A	37,500	NF31504-4P8A	49,000	NF3150X-4P8A	61,250

4 Pole, 600V, 16A – 3150A

NEMA Enclosure type

UL general purpose amp rating	4X Plastic		12		7 & 9		IP65 Plastic	
	Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price
UL508 16	NF16P-4PB6A	$ 405	NF162-4PB6C	$ 369	NF167-4P	$ 2025	NF16E-4PBJB	$ 245
25	NF25P-4PB6A	410	NF252-4PB6C	374	NF257-4P	2050	NF25E-4PBJB	250
40	NF32P-4PB6A	420	NF322-4PB6C	384	NF327-4P	2075	NF32E-4PBJB	265
60	NF45P-4PB6B	465	NF452-4PB6B	434	NF457-4P	3700	NF45E-4PBJA	300
80	NF63P-4PB6A	510	NF632-4PB6A	484	NF637-4P	3730	NF63E-4PBJA	410
UL 98 30	NF30P-4PB6B	1100	NF302-4PB6B	925	NF307-4P	4300	NF30E-4PB4B	650
60	NF60P-4PB6B	1150	NF602-4PB6B	975	NF607-4P	4350	NF60E-4PB4B	700
100	NF100P-4PB6B	1200	NF1002-4PB6B	1025	NF1007-4P	4400	NF100E-4PB4B	750
125	NF125P-4PB8A	3750	NF1252-4PB6A	1750	—	—	—	—
200	NF200P-4PB8B	5000	NF2002-4PB8B	2000	—	—	—	—
400	NF400P-4PB4B	7500	NF4002-4PB4B	3625	—	—	—	—
600	NF600P-4PB4A	12,500	NF6002-4PB4A	6375	—	—	—	—
800	NF800P-4PB4A	20,000	NF8002-4PB4A	10,500	—	—	—	—
1200	NF1200P-4PB4A	23,750	NF12002-4PB4A	13,000	—	—	—	—
1600	NF1600P-4P8A	38,500	NF16002-4P8A	24,250	—	—	—	—
2000	NF2000P-4P8A	46,250	NF20002-4P8A	29,240	—	—	—	—
3150 ①	NF3150P-4P8A	52,500	NF31502-4P8A	35,500	—	—	—	—

① IEC rated only.

6 Pole, 600V, 16A – 1200A

NEMA Enclosure type

	UL general purpose amp rating	1		3R		4		4X Stainless	
		Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price
UL508	16	NF161-6PB6C	**$ 580**	NF163-6PB6C	**$ 728**	NF164-6PB6A	**$ 1080**	NF16X-6PB6C	**$ 1350**
	25	NF251-6PB6C	**590**	NF253-6PB6C	**738**	NF254-6PB6A	**1090**	NF25X-6PB6C	**1360**
	40	NF321-6PB6C	**610**	NF323-6PB6C	**758**	NF324-6PB6A	**1110**	NF32X-6PB6C	**1380**
	60	NF451-6PB6B	**690**	NF453-6PB6B	**838**	NF454-6PB6B	**1140**	NF45X-6PB6B	**1430**
	80	NF631-6PB6A	**770**	NF633-6PB6A	**918**	NF634-6PB6A	**1185**	NF63X-6PB6A	**1480**
UL98	30	NF301-6PB6B	**1230**	NF303-6PB6B	**1770**	NF304-6PB6B	**2110**	NF30X-6PB6B	**2660**
	60	NF601-6PB6B	**1280**	NF603-6PB6B	**1820**	NF604-6PB6B	**2160**	NF60X-6PB6B	**2710**
	100	NF1001-6PB6B	**1330**	NF1003-6PB6B	**1870**	NF1004-6PB6B	**2210**	NF100X-6PB6B	**2760**
	125	NF1251-6PB2A	**2200**	NF1253-6PB2A	**2800**	NF1254-6PB4A	**5600**	NF125X-6PB4A	**7000**
	200	NF2001-6PB4B	**2950**	NF2003-6PB4B	**3650**	NF2004-6PB4B	**7320**	NF200X-6PB4B	**9150**
	400	NF4001-6P8B	**5860**	NF4003-6P8B	**5960**	NF4004-6P8B	**13,090**	NF400X-6P8B	**16,360**
	600	NF6001-6P8A	**9960**	NF6003-6P8A	**10,360**	NF6004-6P8A	**19,490**	NF600X-6P8A	**24,360**
	800	NF8001-6P8A	**16,360**	NF8003-6PB4A	**19,800**	NF8004-6P8A	**30,690**	NF800X-6P8A	**38,360**
	1200	NF12001-6P8A	**20,360**	NF12003-6PB4A	**23,960**	NF12004-6P8A	**36,290**	NF1200X-6P8A	**45,360**

6 Pole, 600V, 16A – 1200A

NEMA Enclosure type

	UL general purpose amp rating	4X Plastic		12		7 & 9		IP65 Plastic	
		Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price
UL508	16	NF16P-6PB6A	**$ 800**	NF162-6PB6C	**$ 728**	NF167-6P	**$ 3750**	NF16E-6PBJB	**$ 410**
	25	NF25P-6PB6A	**810**	NF252-6PB6C	**738**	NF257-6P	**3775**	NF25E-6PBJB	**420**
	40	NF32P-6PB6A	**830**	NF322-6PB6C	**758**	NF327-6P	**3800**	NF32E-6PBJB	**450**
	60	NF45P-6PB6B	**930**	NF452-6PB6B	**838**	NF457-6P	**4275**	NF45E-6PBJB	**520**
	80	NF63P-6PB6A	**1030**	NF632-6PB6A	**918**	NF637-6P	**4325**	NF63E-6PBJB	**770**
UL 98	30	NF30P-6PB6B	**1900**	NF302-6PB6B	**1670**	—	**—**	NF30E-6PB6B	**1230**
	60	NF60P-6PB6B	**1950**	NF602-6PB6B	**1720**	—	**—**	NF60E-6PB6B	**1280**
	100	NF100P-6PB6B	**2000**	NF1002-6PB6B	**1770**	—	**—**	NF100E-6PB6B	**1330**
	125	NF125P-6PB4A	**6000**	NF1252-6PB4A	**2800**	—	**—**	—	**—**
	200	NF200P-6PB4B	**8350**	NF2002-6PB4B	**3550**	—	**—**	—	**—**
	400	NF400P-6P8B	**12,360**	NF4002-6P8B	**6160**	—	**—**	—	**—**
	600	NF600P-6P8A	**20,360**	NF6002-6P8A	**10,560**	—	**—**	—	**—**
	800	NF800P-6P8A	**32,360**	NF8002-6P8A	**17,800**	—	**—**	—	**—**
	1200	NF1200P-6P8A	**38,360**	NF12002-6P8A	**21,800**	—	**—**	—	**—**

① ⋕ = Three poles

3 pole transfer switches
16A – 1200A

3 Pole, 600V, 16A – 1200A

		NEMA Enclosure type							
		1		3R		4		4X Stainless	
	UL general purpose amp rating	Catalog number	List price	Catalog number	List price	Catalog number	List price	Catalog number	List price
UL508	16	NF161-3TB8A	$ 760	NF163-3TB8A	$ 908	NF164-3TB8A	$ 1200	NF16X-3TB8A	$ 1850
	25	NF251-3TB8A	770	NF253-3TB8A	918	NF254-3TB8A	1230	NF25X-3TB8A	1880
	40	NF321-3TB8A	790	NF323-3TB8A	954	NF324-3TB8A	1260	NF32X-3TB8A	1950
	60	NF451-3TB8B	870	NF453-3TB8B	1018	NF454-3TB8B	1340	NF45X-3TB8B	3500
	80	NF631-3TB8A	950	NF633-3TB8A	1098	NF634-3TB8A	1420	NF63X-3TB8A	3600
UL98	30	NF301-3TB8B	1410	NF303-3TB8B	1830	NF304-3TB8B	2400	NF30X-3TB8B	3900
	60	NF601-3TB8B	1460	NF603-3TB8B	1880	NF604-3TB8B	2450	NF60X-3TB8B	3950
	100	NF1001-3TB8B	1510	NF1003-3TB8B	1930	NF1004-3TB8B	2500	NF100X-3TB8B	4000
	125	NF1251-3TB8A	2380	NF1253-3TB8A	2980	NF1254-3TB8A	3500	NF125X-3TB8A	5000
	200	NF2001-3TB4B	3150	NF2003-3TB4B	3850	NF2004-3TB4B	7480	NF200X-3TB4B	9350
	400	NF4001-3TB4B	5960	NF4003-3TB4B	6160	NF4004-3TB4B	13,250	NF400X-3TB4B	16,560
	600	NF6001-3TB4A	10,260	NF6003-3TB4A	10,660	NF6004-3TB4A	19,730	NF600X-3TB4A	24,660
	800	NF8001-3TB4A	16,660	NF8003-3TB4A	19,460	NF8004-3TB4A	30,920	NF800X-3TB4A	38,660
	1200	NF12001-3TB4A	20,660	NF12003-3TB4A	24,260	NF12004-3TB4A	36,530	NF1200X-3TB4A	45,660

3 Pole, 600V, 16A – 1200A

		NEMA Enclosure type			
		4X Plastic		12	
	UL general purpose amp rating	Catalog number	List price	Catalog number	
UL508	16	NF16P-3TB8A	$ 1000	NF162-3TB8A	$ 908
	25	NF25P-3TB8A	1040	NF252-3TB8A	918
	40	NF32P-3TB8A	1100	NF322-3TB8A	938
	60	NF45P-3TB8B	1180	NF452-3TB8B	1018
	80	NF63P-3TB8A	1260	NF632-3TB8A	1098
UL 98	30	NF30P-3TB8B	2000	NF302-3TB8B	1730
	60	NF60P-3TB8B	2050	NF602-3TB8B	1830
	100	NF100P-3TB8B	2100	NF1002-3TB8B	1930
	125	NF125P-3TB8A	3200	NF1252-3TB8A	2980
	200	NF200P-3TB4B	8550	NF2002-3TB4B	3750
	400	NF400P-3TB4B	12,560	NF4002-3TB4B	6460
	600	NF600P-3TB4A	20,660	NF6002-3TB4A	10,760
	800	NF800P-3TB4A	32,660	NF8002-3TB4A	17,460
	1200	NF1200P-3TB4A	38,660	NF12002-3TB4A	21,460

3 pole bypass switches
16A – 1200A

3 Pole, 600V, 16A – 1200A

	UL general purpose amp rating	NEMA Enclosure type 1 Catalog number	1 List price	3R Catalog number	3R List price	4 Catalog number	4 List price	4X Stainless Catalog number	4X Stainless List price
UL508	16	NF161-3BB8A	$ 1045	NF163-3BB8A	$ 1267	NF164-3BB8A	$ 1480	NF16X-3BB8A	$ 3740
	25	NF251-3BB8A	1060	NF253-3BB8A	1282	NF254-3BB8A	1540	NF25X-3BB8A	3820
	40	NF321-3BB8A	1090	NF323-3BB8A	1297	NF324-3BB8A	1600	NF32X-3BB8A	3900
	60	NF451-3BB8B	1215	NF453-3BB8B	1312	NF454-3BB8B	1750	NF45X-3BB8B	4050
	80	NF631-3BB8A	1340	NF633-3BB8A	1432	NF634-3BB8A	1850	NF63X-3BB8A	4150
UL98	30	NF301-3BB8B	1970	NF303-3BB8B	2300	NF304-3BB8B	2800	NF30X-3BB8B	4800
	60	NF601-3BB8B	2070	NF603-3BB8B	2400	NF604-3BB8B	2900	NF60X-3BB8B	4900
	100	NF1001-3BB8B	2170	NF1003-3BB8B	2500	NF1004-3BB8B	3000	NF100X-3BB8B	5000
	125	—	—	—	—	—	—	—	—
	200	—	—	—	—	—	—	—	—
	400	NF4001-3B6B	8460	NF4003-3B6B	9060	NF4004-3B6B	19,750	NF400X-3B6B	24,660
	600	NF6001-3B6A	15,060	NF6003-3B6A	15,660	NF6004-3B6A	29,330	NF600X-3B6A	36,660
	800	NF8001-3B6A	24,660	NF8003-3B6A	28,860	NF8004-3B6A	46,130	NF800X-3B6A	57,660
	1200	NF12001-3B6A	30,660	NF12003-3B6A	36,060	NF12004-3B6A	55,040	NF1200X-3B6A	68,800

3 Pole, 600V, 16A – 1200A

	UL general purpose amp rating	NEMA Enclosure type 4X Plastic Catalog number	4X Plastic List price	12 Catalog number	12 List price
UL508	16	NF16P-3BB8A	$ 1300	NF162-3BB8A	$ 1267
	25	NF25P-3BB8A	1325	NF252-3BB8A	1282
	40	NF32P-3BB8A	1350	NF322-3BB8A	1297
	60	NF45P-3BB8B	1420	NF452-3BB8B	1312
	80	NF63P-3BB8A	1550	NF632-3BB8A	1432
UL 98	30	NF30P-3BB8B	2400	NF302-3BB8B	2300
	60	NF60P-3BB8B	2500	NF602-3BB8B	2400
	100	NF100P-3BB8B	2600	NF1002-3BB8B	2500
	125	—	—	—	—
	200	—	—	—	—
	400	NF400P-3B6B	18,660	NF4002-3B6B	9360
	600	NF600P-3B6A	30,660	NF6002-3B6A	15,960
	800	NF800P-3B6A	48,660	NF8002-3B6A	25,860
	1200	NF1200P-3B6A	57,660	NF12002-3B6A	31,860

3 pole mechanically interlocked switches
16A – 1200A

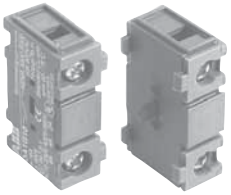
3 Pole, 600V, 16A – 1200A

	UL general purpose amp rating	NEMA Enclosure type 1 Catalog number	1 List price	3R Catalog number	3R List price	4 Catalog number	4 List price	4X Stainless Catalog number	4X Stainless List price
UL508	16	NF161-3MB6A	$ 640	NF163-3MB6A	$ 788	NF164-3MB6A	$ 1120	NF16X-3MB6A	$ 1410
	25	NF251-3MB6A	650	NF253-3MB6A	798	NF254-3MB6A	1160	NF25X-3MB6A	1420
	40	NF321-3MB6A	670	NF323-3MB6A	818	NF324-3MB6A	1170	NF32X-3MB6A	1440
	60	NF451-3MB6B	750	NF453-3MB6B	908	NF454-3MB6B	1200	NF45X-3MB6B	1490
	80	NF631-3MB6A	830	NF633-3MB6A	978	NF634-3MB6A	1245	NF63X-3MB6A	1540
UL98	30	NF301-3MB6B	1290	NF303-3MB6B	1830	NF304-3MB6B	2170	NF30X-3MB6B	2700
	60	NF601-3MB6B	1340	NF603-3MB6B	1880	NF604-3MB6B	2210	NF60X-3MB6B	2770
	100	NF1001-3MB6B	1390	NF1003-3MB6B	1930	NF1004-3MB6B	2270	NF100X-3MB6B	2800
	125	NF1251-3MB6A	2260	NF1253-3MB6A	2860	NF1254-3MB8A	5660	NF125X-3MB8A	7060
	200	NF2001-3MB8B	3010	NF2003-3MB8B	3710	NF2004-3MB8B	7380	NF200X-3MB8B	9210
	400	NF4001-3MB4B	5920	NF4003-3MB4B	6030	NF4004-3MB4B	13,150	NF400X-3MB4B	16,420
	600	NF6001-3MB4A	10,020	NF6003-3MB4A	10,420	NF6004-3MB4A	19,550	NF600X-3MB4A	24,420
	800	NF8001-3MB4A	16,420	NF8003-3MB4A	19,860	NF8004-3MB4A	30,750	NF800X-3MB4A	38,420
	1200	NF12001-3MB4A	20,420	NF12003-3MB4A	24,020	NF12004-3MB4A	36,350	NF1200X-3MB4A	45,420

3 Pole, 600V, 16A – 1200A

	UL general purpose amp rating	NEMA Enclosure type 4X Plastic Catalog number	4X Plastic List price	12 Catalog number	12 List price
UL508	16	NF16P-3MB6A	$ 860	NF162-3MB6A	$ 788
	25	NF25P-3MB6A	870	NF252-3MB6A	798
	40	NF32P-3MB6A	890	NF322-3MB6A	818
	60	NF45P-3MB6B	990	NF452-3MB6B	908
	80	NF63P-3MB6A	1090	NF632-3MB6A	978
UL 98	30	NF30P-3MB6B	1900	NF302-3MB6B	1830
	60	NF60P-3MB6B	1950	NF602-3MB6B	1880
	100	NF100P-3MB6B	2000	NF1002-3MB6B	1930
	125	NF125P-3MB8A	6000	NF1252-6PB6A	2860
	200	NF200P-3MB8B	8350	NF2002-3MB8B	3710
	400	NF400P-3MB4B	12,360	NF4002-3MB4B	6030
	600	NF600P-3MB4A	20,360	NF6002-3MB4A	10,420
	800	NF800P-3MB4A	32,360	NF8002-3MB4A	19,860
	1200	NF1200P-3MB4A	38,360	NF12002-3MB4A	24,020

Accessories ①



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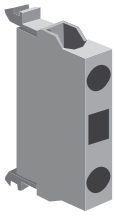

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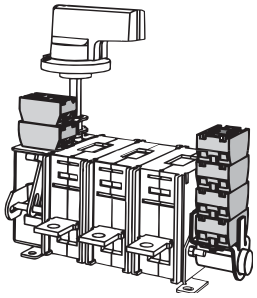
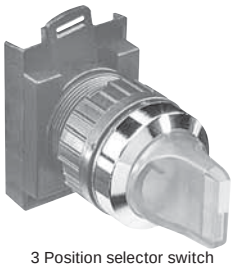


OZXK_



3 Position selector switch

Pilot light

Auxiliary contacts

For use on:	Contact configuration	Catalog number	Installation suffix	Installed list price adder
16A – 100A	1 N.O. 1 N.C. 1 N.O. & 1 N.C.	OA1G10 OA1G01 OA2G11	add “10” suffix add “01” suffix add "11" suffix	**$ 30** **30** **60**
125A	1 N.O. 1 N.C.	OBEA10 OBEA01	add “10” suffix add “01” suffix	**50** **50**
200A	1 N.O. & 1 N.C. 2 N.O. & 2 N.C.	OZXK-12 OZXK-13	add “11” suffix add “22” suffix	**102** **160**
400A – 3150A	1 N.O. & 1 N.C. 2 N.O. & 2 N.C.	OZXK-1 OZXK-2	add “11” suffix add “22” suffix	**130** **200**

Accessories ①

For use on:	Description		Installation suffix	Installed list price adder
OT16, 25,32	Neutral or isolated ground block		N or G	**$ 30**
OT45, 63	Neutral or isolated ground block		N or G	**54**
OT30, 60, 100	Neutral or isolated ground block		N or G	**75**
OT160	Neutral or isolated ground block		N or G	**150**
200A – 1200A	Neutral block		N	**210**
1600A – 3150A	Neutral block		N	**350**
30A – 1200A	Service entrance, 3 wire		U	**100**
30A – 1200A	Service entrance, 4 wire		V	**200**
16A – 3150A	Start/stop pushbuttons		A	**68**
	2 position selector switch		C	**68**
	3 position selector switch		D	**78**
	Pilot light “red/run”		E	**110**
	Ammeter 1 phase ②		AM	**940**
	Voltmeter ②		VM	**2300**

Ground lugs

All enclosed switches are provided with a standard integral ground lug.

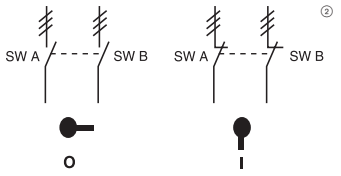
Switch size	Ground lug Wire size
16A – 100A	(2) #14
200A – 400A	#6 – 250 mcm
600A – 1200A	#2 – 600 mcm
2000A – 3150A	(2) #2 – 600 mcm

① Please consult factory for special customer requirements.
② Current transformers included.

Technical data
Other configuration descriptions

Conversion mechanisms

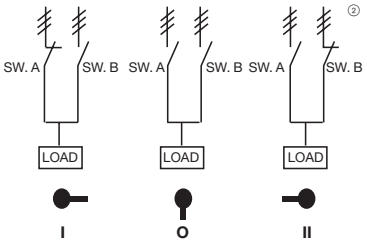
6 or 8 pole
6 (8) pole mechanism allows two switches controlled by one handle to open or close simultaneously.



	POS. O	POS.I
SW. A	O	X
SW. B	O	X

X = Closed
O = Open

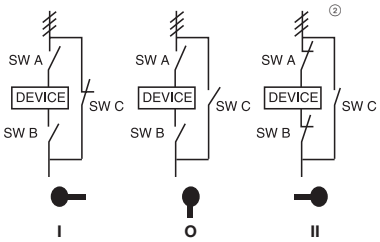
Transfer①
Transfer mechanism manually transfers between two power sources using two switches and a center "OFF" position.



	POS. I	POS.O	POS.II
SW. A	X	O	O
SW. B	O	O	X

X = Closed
O = Open

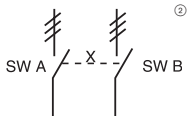
Bypass①
Bypass mechanism operates three switches: Two switches in series and one changeover switch to allow power bypass.



	POS. I	POS.O	POS.II
SW. A	O	O	X
SW. B	O	O	X
SW. C	X	O	O

X = Closed
O = Open

Mechanical interlock
Mechanical interlock mechanism prevents both switches from being in the ON position at the same time.



	SW. A POS. I	SW. B POS. O
SW. A	X	O
SW. B	O	X

X = Closed
O = Open

① Transfer and bypass enclosed switches include the load side bussed or cabled together, and all switches come standard with ground lugs.
② ⫽ = Three poles

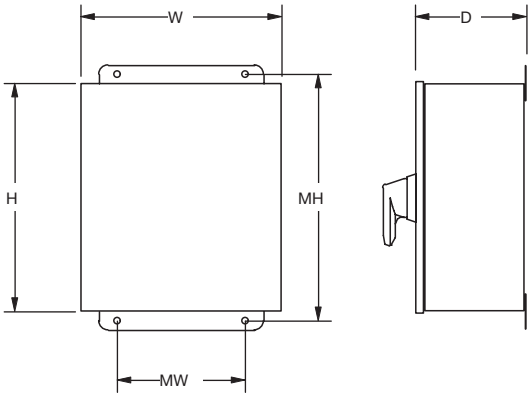
Approximate dimensions
2, 3, & 4 Pole ③
16A – 3150A NF

Non-Fusible

Frame size	Enclosure type	H height	W width	D depth	MH mtg. height	MW mtg. width	Weight
OT16_ OT25_ OT32_	1	7.0	5.0	3.0	4.0	4.0	4.0
	3R	7.0	5.0	3.0	7.75	3.0	4.0
	4	6.0	6.0	4.0	6.75	4.0	4.0
	4X SS	7.0	5.0	3.0	7.75	3.0	4.0
	4X Plastic	6.0	6.0	5.9	6.75	4.0	4.0
	12	7.0	5.0	3.0	7.75	3.0	4.0
	IP65 (A)	4.8	3.4	2.4	4.17	2.80	1.0
	IP65 (B)	5.9	5.1	2.4	5.35	4.57	1.0
OT45_ OT63_ OT30_ OT60_	1	8.0	6.0	4.0	7.0	5.0	6.0
	3R	8.0	6.0	4.0	8.75	4.0	6.0
	4	8.0	6.0	4.0	8.75	4.0	6.0
	4X SS	8.0	6.0	4.0	8.75	4.0	6.0
	4X Plastic	8.0	6.0	5.9	8.75	4.0	6.0
	12	8.0	6.0	4.0	8.75	4.0	6.0
	IP65 (A)	7.9	5.7	3.6	7.24	5.16	4.0
	IP65 (B)	15.8	7.9	5.5	14.8	6.93	4.0
OT100	1	10.0	8.0	6.0	7.0	7.0	9.0
	3R	10.0	8.0	6.0	10.75	6.0	9.0
	4	10.0	8.0	6.0	10.75	6.0	9.0
	4X SS	10.0	8.0	6.0	10.75	6.0	9.0
	4X Plastic	10.0	8.0	5.9	10.75	6.0	9.0
	12	10.0	8.0	6.0	10.75	6.0	9.0
	IP65 (A)	7.9	5.7	3.6	7.24	5.16	4.0
	IP65 (B)	15.8	7.9	5.5	14.8	6.93	4.0
OT160	1	14.0	12.0	8.0	11.0	9.0	20
	3R	14.0	12.0	8.0	14.75	10.0	20
	4	14.0	12.0	8.0	14.75	10.0	20
	4X SS	14.0	12.0	8.0	14.75	10.0	20
	4X Plastic	14.0	12.0	8.0	14.75	10.0	12
	12	14.0	12.0	8.0	14.75	10.0	20

Frame size	Enclosure type	H height	W width	D depth	mtg. height	MW mtg. width	Weight
OT200	1	24.0	16.0	8.0	25.5	14.5	50
	3R	24.0	16.0	8.0	25.5	14.5	50
	4	24.0	16.0	8.0	25.5	14.5	50
	4X SS	24.0	16.0	8.0	25.5	14.5	50
	4X Plastic	24.0	16.0	10.0	25.5	14.5	40
	12	24.0	16.0	8.0	25.5	14.5	50
OT400 – OETL-NF600	1	44.0	22.0	11.0	45.5	20.5	120
	3R	44.0	22.0	11.0	45.5	20.5	120
	4	1	1	1	1	1	1
	4X SS	42.0	36.0	12.0	43.5	34.5	130
	4X Plastic	1	1	1	1	1	1
	12	44.0	22.0	11.0	45.5	20.5	120
OETL-NF800A OETL-NF1200	1	60.0	36.0	12.0	61.5	34.5	200
	3R	60.0	36.0	12.0	61.5	34.5	200
	4	60.0	36.0	12.0	61.5	34.5	200
	4X SS	60.0	36.0	12.0	61.5	34.5	200
	4X Plastic	1	1	1	1	1	1
	12	60.0	36.0	12.0	61.5	34.5	200
OETL-NF1600 OETL-NF2000 OETL-NF3150	1	90.0	36.0	24.0	(2)	(2)	600
	3R	90.0	36.0	24.0	(2)	(2)	600
	4	1	1	1	1	1	1
	4X SS	1	1	1	1	1	1
	4X Plastic	1	1	1	1	1	1
	12	90.0	36.0	24.0	2	2	600

1 Please consult factory, enclosures are sized to suit specific customer needs.
2 Enclosure is free standing.
3 Some 4-pole switches require larger enclosures. Please consult factory.



Approximate dimensions
for enclosed 6-pole transfer & mechanical interlock switches 16A – 3150A NF

Non-fusible – 6 Pole

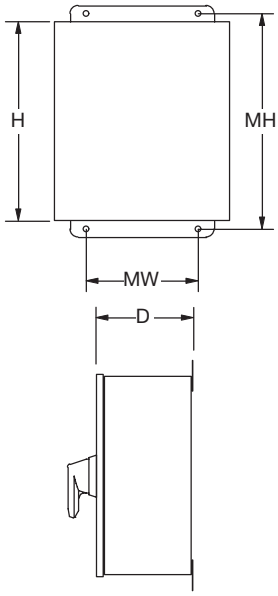
Frame size	Enclosure type	H height	W width	D depth	MH mtg. height	MW mtg. width	Weight (lbs.)
OT16 OT25 OT32	1	7.0	5.0	3.0	4.0	4.0	4.0
	3R	7.0	5.0	3.0	7.75	3.0	4.0
	4	6.0	6.0	4.0	6.75	4.0	4.0
	4X SS	7.0	5.0	3.0	7.75	3.0	4.0
	4X Plastic	6.0	6.0	5.9	6.75	4.0	4.0
	12	7.0	5.0	3.0	7.75	3.0	4.0
	IP65 (A)	5.9	5.1	3.4	5.35	4.57	1.2
	IP65 (B)	–	–	–	–	–	–
OT45 OT63	1	10.0	8.0	5.0	7.0	7.0	6.0
	3R	10.0	8.0	5.0	10.75	6.0	6.0
	4	10.0	8.0	6.0	10.75	6.0	6.0
	4X SS	10.0	8.0	5.0	10.75	6.0	6.0
	4X Plastic	10.0	8.0	7.9	10.75	6.0	6.0
	12	10.0	8.0	5.0	10.75	6.0	6.0
	IP65 (A)	7.9	5.7	4.0	7.18	5.10	1.5
	IP65 (B)	–	–	–	–	–	–
OT30 OT60 OT100	1	10.0	8.0	5.0	7.0	7.0	9.0
	3R	10.0	8.0	5.0	10.75	6.0	9.0
	4	10.0	8.0	6.0	10.75	6.0	9.0
	4X SS	10.0	8.0	5.0	10.75	6.0	9.0
	4X Plastic	10.0	8.0	7.9	0.0	0.0	9.0
	12	10.0	8.0	5.0	10.75	6.0	9.0
	IP65 (A)	–	–	–	–	–	–
	IP65 (B)	–	–	–	–	–	–
OT160	1	14.0	12.0	8.0	11.0	9.0	20
	3R	14.0	12.0	8.0	14.75	10.0	20
	4	14.0	12.0	8.0	14.75	10.0	20
	4X SS	14.0	12.0	8.0	14.75	10.0	20
	4X Plastic	14.0	12.0	8.0	0.0	0.0	20
	12	14.0	12.0	8.0	14.75	10.0	20
OT200	3R	24.0	24.0	10.0	25.5	22.5	60
	4	24.0	24.0	10.0	25.5	22.5	60
	4X SS	24.0	24.0	10.0	25.5	22.5	60
	4X Plastic	24.0	16.0	10.0	25.5	22.5	60
	12	24.0	24.0	10.0	25.5	22.5	60
OT400 – OETL-NF600A	1	48.0	36.0	12.0	49.5	34.5	160
	3R	48.0	36.0	12.0	49.5	34.5	160
	4	48.0	36.0	12.0	49.5	34.5	160
	4X SS	48.0	36.0	12.0	49.5	34.5	160
	4X Plastic	①	①	①	①	①	①
	12	48.0	36.0	12.0	49.5	34.5	160
OETL-NF800A OETL-NF1200	1	60.0	36.0	12.0	61.5	34.5	240
	3R	60.0	36.0	12.0	61.5	34.5	240
	4	60.0	36.0	12.0	61.5	34.5	240
	4X SS	60.0	36.0	12.0	61.5	34.5	240
	4X Plastic	①	①	①	①	①	①
	12	60.0	36.0	12.0	61.5	34.5	240
OETL-NF1600 OETL-NF2000 OETL-NF3150	1	90.0	36.0	24.0	2	2	600
	3R	90.0	36.0	24.0	2	2	600
	4	①	①	①	①	①	①
	4X SS	①	①	①	①	①	①
	4X Plastic	①	①	①	①	①	①
	12	90.0	36.0	24.0	②	②	600

① Please consult factory; enclosures can be custom sized to suit specific needs
② Enclosure is free standing.

Transfer and mechanical interlock

Frame size	Enclosure type	H height	W width	D depth	MH mtg. height	MW mtg. width	Weight (lbs.)
OT16 OT25 OT32	1	6.0	6.0	4.0	3.0	5.0	4.0
	3R	6.0	6.0	4.0	6.75	4.0	4.0
	4	6.0	6.0	4.0	6.75	4.0	4.0
	4X SS	6.0	6.0	4.0	6.75	4.0	4.0
	4X Plastic	6.0	6.0	5.9	6.75	4.0	4.0
	12	6.0	6.0	4.0	6.75	4.0	4.0
	IP65 (A)	5.9	5.1	3.4	5.35	4.57	1.2
	IP65 (B)	–	–	–	–	–	–
OT45 OT63	1	10.0	8.0	5.0	7.0	7.0	6.0
	3R	10.0	8.0	5.0	10.75	6.0	6.0
	4	10.0	8.0	6.0	10.75	6.0	6.0
	4X SS	10.0	8.0	5.0	10.75	6.0	6.0
	4X Plastic	10.0	8.0	7.9	10.75	6.0	6.0
	12	10.0	8.0	5.0	10.75	6.0	6.0
	IP65 (A)	7.9	5.7	4.0	7.18	5.10	1.5
	IP65 (B)	–	–	–	–	–	–
OT30 OT60 OT100	1	10.0	8.0	5.0	7.0	7.0	9.0
	3R	10.0	8.0	5.0	10.75	6.0	9.0
	4	10.0	8.0	6.0	10.75	6.0	9.0
	4X SS	10.0	8.0	5.0	10.75	6.0	9.0
	4X Plastic	10.0	8.0	7.9	0.0	0.0	9.0
	12	10.0	8.0	5.0	10.75	6.0	9.0
	IP65 (A)	–	–	–	–	–	–
	IP65 (B)	–	–	–	–	–	–
OT160	1	14.0	12.0	8.0	11.0	9.0	20
	3R	14.0	12.0	8.0	14.75	10.0	20
	4	14.0	12.0	8.0	14.75	10.0	20
	4X SS	14.0	12.0	8.0	14.75	10.0	20
	4X Plastic	14.0	12.0	8.0	0.0	0.0	20
	12	14.0	12.0	8.0	14.75	10.0	20
OT200	3R	24.0	24.0	10.0	25.5	22.5	60
	4	24.0	24.0	10.0	25.5	22.5	60
	4X SS	24.0	24.0	10.0	25.5	22.5	60
	4X Plastic	24.0	16.0	10.0	25.5	22.5	60
	12	24.0	24.0	10.0	25.5	22.5	60
OT400 – OETL-NF600A	1	48.0	36.0	12.0	49.5	34.5	160
	3R	48.0	36.0	12.0	49.5	34.5	160
	4	48.0	36.0	12.0	49.5	34.5	160
	4X SS	48.0	36.0	12.0	49.5	34.5	160
	4X Plastic	①	①	①	①	①	①
	12	48.0	36.0	12.0	49.5	34.5	160
OETL-NF800A OETL-NF1200	1	60.0	36.0	12.0	61.5	34.5	240
	3R	60.0	36.0	12.0	61.5	34.5	240
	4	60.0	36.0	12.0	61.5	34.5	240
	4X SS	60.0	36.0	12.0	61.5	34.5	240
	4X Plastic	①	①	①	①	①	①
	12	60.0	36.0	12.0	61.5	34.5	240
OETL-NF1600 OETL-NF2000 OETL-NF3150	1	90.0	36.0	24.0	②	②	600
	3R	90.0	36.0	24.0	②	②	600
	4	①	①	①	①	①	①
	4X SS	①	①	①	①	①	①
	4X Plastic	①	①	①	①	①	①
	12	90.0	36.0	24.0	②	②	600

① Please consult factory; enclosures can be custom sized to suit specific needs
② Enclosure is free standing.



3 Pole
30A – 800A

FJ30X-3PB6B

3 Pole①, 600V, 30A – 800A

UL general purpose amp rating	Fuse type	NEMA Enclosure type: 1 Catalog number	1 List price	3R Catalog number	3R List price	4 Catalog number	4 List price	4X Stainless Catalog number	4X Stainless List price
30	J	FJ301-3PB6B	$ 560	FJ303-3PB6B	$ 600	FJ304-3PB6B	$ 1100	FJ30X-3PB6B	$ 1400
30	CC	FC301-3PB6B		FC303-3PB6B		FC304-3PB6B		FC30X-3PB6B	
60	J②	FJ601-3PB6B	660	FJ603-3PB6B	860	FJ604-3PB8B	1300	FJ60X-3PB8B	1800
100	J②	FJ1001-3PB8B	960	FJ1003-3PB8B	1140	FJ1004-3PB8B	2800	FJ100X-3PB8B	3800
200	J②	FJ2001-3PB8C	2200	FJ2003-3PB8C	2400	FJ2004-3PB8C	3900	FJ200X-3PB8C	5000
400	J②	FJ4001-3PB4B	3800	FJ4003-3PB4B	4200	FJ4004-3PB4B	7700	FJ400X-3PB4B	10,800
600	J②	FJ6001-3PB4B	5300	FJ6003-3PB4B	6800	FJ6004-3PB4B	11,000	FJ600X-3PB4B	16,000
800	L	FL8001-3PB4B	9500	FL8003-3PB4B	11,200	FL8004-3PB4B	16,000	FL800X-3PB4B	21,000

UL 98

3 Pole①, 600V, 30A – 800A

UL general purpose amp rating	Fuse type	NEMA Enclosure type: 4X Plastic Catalog number	4X Plastic List price	12 Catalog number	12 List price
30	J	FJ30P-3PB6B	$ 1040	FJ302-3PB6B	$ 600
30	CC	FC30P-3PB6B		FC302-3PB6B	
60	J②	FJ60P-3PB8B	1300	FJ602-3PB6B	860
100	J②	FJ100P-3PB8B	2800	FJ1002-3PB8B	1140
200	J②	FJ200P-3PB8C	4400	FJ2002-3PB8C	2400
400	J②	FJ400P-3PB4B	8400	FJ4002-3PB4B	4200
600	J②	FJ600P-3PB4B	13,600	FJ6002-3PB4B	6200
800	L	FL800P-3PB4B	17,400	FL8002-3PB4B	9800

UL 98

NOTE: All enclosed switches are provided with a black handle; however, most handles can be substituted with a red / yellow handle if desired. Please substitute the handle suffix code (2nd and 3rd from last characters) with the red/yellow handle catalog number suffix from page 18.130. There is no additional price adder for changing to a red/yellow handle of equal ratings and style.

EXAMPLE: A red/yellow pistol handle for an FJ301-3PB6B can be substituted for the black pistol handle by using the "Y6" suffix instead of the "B6" suffix, new catalog number: FJ301-3PY6B.

① Fusible switches are UL listed to the UL98 standard.
② 600V T type fuse clips may be substituted at no charge. Please change the second character of the catalog number from "J" to "T."

Switch and handle ratings
30A – 800A

Switch ratings

UL general purpose amp rating	Maximum horsepower rating								Wire size for terminal lugs	For wire type	Approval ①
	Single phase			Three phase							
	120V	200V	240V	200V	208V	240V	480V	600V			
30	2	3	5	5	7.5	7.5	15	20	#18 – 8	Cu	CSA, UL
60	3	7.5	10	15	15	15	30	50	#14 – 4	Cu	CSA, UL
100	5	10	15	25	25	30	60	75	#14 – 2/0	Cu/Al	CSA, UL
200	—	—	—	50	50	60	125	150	#6 – 300 kcmil	Cu/Al	CSA, UL
400	—	—	—	100	125	125	250	350	#2 – 600 kcmil	Cu/Al	CSA, UL
600	—	—	—	150	150	200	400	500	(2) #2 – 600 kcmil	Cu/Al	CSA, UL
800	—	—	—	200	200	250	500	600	(2) #2 – 600 kcmil	Cu/Al	CSA, UL

Handle ratings

Amperage range	Style type	NEMA	Color	Marking	Defeatable	Padlockable	Catalog number suffix	Catalog number
30	Selector	1,3R,12	Black	O/I & OFF/ON	Yes	Yes	BJ	OHB2AJ
	Selector	1,3R,12	Red/Yel				YJ	OHY2AJ
	Pistol	1,3R,12	Black				B6	OHB65J5
	Pistol	1,3R,12	Red/Yel				Y6	OHY65J5
	Pistol	1,3R,4,4X,12	Black				B6	OHB65L5
	Pistol	1,3R,4,4X,12	Red/Yel				Y6	OHY65L5
60 – 200	Pistol	1,3R,12	Black	O/I & OFF/ON	Yes	Yes	B6	OHB65J6
		1,3R,12	Red/Yel				Y6	OHY65J6
		1,3R,12	Black				B8	OHB80J6
		1,3R,12	Red/Yel				Y8	OHB80J6
		1,3R,4,4X,12	Black				B8	OHB80L6
		1,3R,4,4X,12	Red/Yel				Y8	OHY80L6
400 – 800	Pistol	1,3R,12	Black	O/I & OFF/ON	Yes	Yes	B4	OHB145J12
		1,3R,12	Red/Yel		Yes		Y4	OHY145J12
		1,3R,12	Black		Yes		B7	OHB175J12
		1,3R,12	Red/Yel		Yes		Y7	OHY175J12
		1,3R 4,4X,12	Black		Yes		B4	OHB145L12
		1,3R,4,4X,12	Red/Yel		Yes		Y4	OHY145L12
		1,3R 4,4X,12	Black		Yes		B7	OHB175L12
		1,3R,4,4X,12	Red/Yel		Yes		Y7	OHY175L12
		1,3R,4,4X,12	Metal		No		8	YASDA-8
30	Pistol	1,3R,12	Black	I/O/II	Yes	Yes	B6	OHB65J6E011
		1,3R,4,4X,12						OHB65L6E011
60 – 200	Pistol	1,3R,12	Black	I/O/II	Yes	Yes	B8	OHB80J6E011
		1,3R,4,4X,12						OHB80L6E011
400 – 800	Pistol	1,3R,12	Black	I/O/II	Yes	Yes	B4	OHB145J12E011
	Pistol	1,3R,4,4X,12	Black		Yes		B4	OHB145L12E011
	Pistol	1,3R,12	Black		Yes		B7	OHB175J12E011
	Pistol	1,3R,4,4X,12	Black		Yes		B7	OHB175L12E011
	Metallic	1,3R,4,4X,12	Metal		No		21	YASDA-21
	Metallic	1,3R,4,4X,12	Metal		No		6	YASDA-6

① Fusible switches are UL listed to the UL98 standard.

2 Pole, 600V, 30A – 800A

NEMA Enclosure type

UL general purpose amp rating	Fuse type	1 Catalog number	1 List price	3R Catalog number	3R List price	4 Catalog number	4 List price	4X Stainless Catalog number	4X Stainless List price
30	J	—	—	—		—	—	—	—
30	CC	—	—	—		—	—	—	—
60	J	—	—	—		—	—	—	—
100	J	FJ1001-2PB8B	$ 864	FJ1003-2PB8B	$ 1026	FJ1004-2PB8B	$ 2735	FJ100X-2PB8B	$ 3420
200	J	FJ2001-2PB8C	1980	FJ2003-2PB8C	2160	FJ2004-2PB8C	3600	FJ200X-2PB8C	4500
400	J	FJ4001-2PB4B	3420	FJ4003-2PB4B	3780	FJ4004-2PB4B	7775	FJ400X-2PB4B	9720
600	J	FJ6001-2PB4B	4770	FJ6003-2PB4B	6120	FJ6004-2PB4B	11,520	FJ600X-2PB4B	14,400
800	L	FL8001-2PB4B	8550	FL8003-2PB4B	10,080	FL8004-2PB4B	15,120	FL800X-2PB4B	18,900

NEMA Enclosure type

UL general purpose amp rating	Fuse type	4X Plastic Catalog number	4X Plastic List price	12 Catalog number	12 List price
30	J	—	—	—	—
30	CC	—	—	—	—
60	J	—	—	—	—
100	J	FJ100P-2PB8B	$ 2520	FJ1002-2PB8B	$ 1026
200	J	FJ200P-2PB8C	3960	FJ2002-2PB8C	2160
400	J	FJ400P-2PB4B	7560	FJ4002-2PB4B	3780
600	J	FJ600P-2PB4B	12,240	FJ6002-2PB4B	5580
800	L	FL800P-2PB4B	15,660	FL8002-2PB4B	8820

4 Pole, 600V, 30A – 800A

NEMA Enclosure type

UL general purpose amp rating	Fuse type	1 Catalog number	1 List price	3R Catalog number	3R List price	4 Catalog number	4 List price	4X Stainless Catalog number	4X Stainless List price
30	J	FJ301-4PB6B	$ 700	FJ303-4PB6B	$ 750	FJ304-4PB6B	$ 1375	FJ30X-4PB6B	$ 1750
30	CC	FC301-4PB6B		FC303-4PB6B		FC304-4PB6B		FC30X-4PB6B	
60	J	FJ601-4PB6B	825	FJ603-4PB6B	1075	FJ604-4PB8B	1800	FJ60X-4PB8B	2250
100	J	FJ1001-4PB8B	1200	FJ1003-4PB8B	1425	FJ1004-4PB8B	3800	FJ100X-4PB8B	4750
200	J	FJ2001-4PB8C	2750	FJ2003-4PB8C	3000	FJ2004-4PB8C	5000	FJ200X-4PB8C	6250
400	J	FJ4001-4PB4B	4750	FJ4003-4PB4B	5250	FJ4004-4PB4B	10,800	FJ400X-4PB4B	13,500
600	J	FJ6001-4PB4B	6625	FJ6003-4PB4B	8500	FJ6004-4PB4B	16,000	FJ600X-4PB4B	20,000
800	L	FL8001-4PB4B	11,875	FL8003-4PB4B	14,000	FL8004-4PB4B	21,000	FL800X-4PB4B	26,250

NEMA Enclosure type

UL general purpose amp rating	Fuse type	4X Plastic Catalog number	4X Plastic List price	12 Catalog number	12 List price
30	J	FJ30P-4PB6B	$ 1300	FJ302-4PB6B	$ 750
30	CC	FC30P-4PB6B		FC302-4PB6B	
60	J	FJ60P-4PB8B	1625	FJ602-4PB6B	1075
100	J	FJ100P-4PB8B	3500	FJ1002-4PB8B	1425
200	J	FJ200P-4PB8C	5500	FJ2002-4PB8C	3000
400	J	FJ400P-4PB4B	10,500	FJ4002-4PB4B	5250
600	J	FJ600P-4PB4B	17,000	FJ6002-4PB4B	7750
800	L	FL800P-4PB4B	21,750	FL8002-4PB4B	12,250

6 Pole & Mechanically interlocked switches
30 – 800A

6 Pole, 600V, 30A – 800A

NEMA Enclosure type

UL general purpose amp rating	Fuse type	1 Catalog number	1 List price	3R Catalog number	3R List price	4 Catalog number	4 List price	4X Stainless Catalog number	4X Stainless List price
30	J	FJ301-6PB6B	$ 1300	FJ303-6PB6B	$ 1400	FJ304-6PB6B	$ 2150	FJ30X-6PB6B	$ 3020
30	CC	FC301-6PB6B		FC303-6PB6B		FC304-6PB6B		FC30X-6PB6B	
60	J	FJ601-6PB4B	1450	FJ603-6PB4B	1600	FJ604-6PB4B	2450	FJ60X-6PB4B	3820
100	J	FJ1001-6PB4B	2000	FJ1003-6PB4B	2200	FJ1004-6PB4B	3375	FJ100X-6PB4B	7820
200	J	—	—	—	—	—	—	—	—
400	J	FJ4001-6P8B	7350	FJ4003-6P8B	8050	FJ4004-6P8B	15,950	FJ400X-6P8B	22,160
600	J	FJ6001-6P8B	10,050	FJ6003-6P8B	13,000	FJ6004-6P8B	23,450	FJ600X-6P8B	32,560
800	L	FL8001-6P8B	17,600	FL8003-6P8B	20,600	FL8004-6P8B	30,650	FL800X-6P8B	42,560

NEMA Enclosure type

UL general purpose amp rating	Fuse type	4X Plastic Catalog number	4X Plastic List price	12 Catalog number	12 List price
30	J	FJ30P-6PB6B	$ 1575	FJ302-6PB6B	$ 1480
30	CC	FC30P-6PB6B		FC302-6PB6B	
60	J	FJ60P-6PB4B	1820	FJ602-6PB4B	1850
100	J	FJ100P-6PB4B	2475	FJ1002-6PB4B	2350
200	J	—	—	—	—
400	J	FJ400P-6PB8B	15,600	FJ4002-6PB8B	8050
600	J	FJ600P-6P8B	25,000	FJ6002-6P8B	11,600
800	L	FL800P-6P8B	31,800	FL8002-6P8B	18,150

Mechanically interlocked, 600V, 30A — 800A

NEMA Enclosure type

UL general purpose amp rating	Fuse type	1 Catalog number	1 List price	3R Catalog number	3R List price	4 Catalog number	4 List price	4X Stainless Catalog number	4X Stainless List price
30	J	FJ301-3MB6B	$ 1420	FJ303-3MB6B	$ 1560	FJ304-3MB6B	$ 2400	FJ30X-3MB6B	$ 3500
30	CC	FC301-3MB6B		FC303-3MB6B		FC304-3MB6B		FC30X-3MB6B	
60	J	FJ601-3MB6B	1620	FJ603-3MB6B	1780	FJ604-3MB8B	2750	FJ60X-3MB8B	4050
100	J	FJ1001-3MB8B	2220	FJ1003-3MB8B	2440	FJ1004-3MB8B	3750	FJ100X-3MB8B	5500
200	J	FJ2001-3MB8C	4960	FJ2003-3MB8C	5360	FJ2004-3MB8C	8450	FJ200X-3MB8C	10,560
400	J	FJ4001-3MB4B	8160	FJ4003-3MB4B	8960	FJ4004-3MB4B	17,730	FJ400X-3MB4B	22,160
600	J	FJ6001-3MB4B	11,160	FJ6003-3MB4B	14,460	FJ6004-3MB4B	26,050	FJ600X-3MB4B	32,560
800	L	FL8001-3MB4B	19,560	FL8003-3MB4B	22,960	FL8004-3MB4B	34,050	FL800X-3MB4B	42,560

NEMA Enclosure type

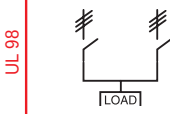
UL general purpose amp rating	Fuse type	4X Plastic Catalog number	4X Plastic List price	12 Catalog number	12 List price
30	J	FJ30P-3MB6B	$ 1750	FJ302-3MB6B	$ 1650
30	CC	FC30P-3MB6B		FC302-3MB6B	
60	J	FJ60P-3MB8B	2020	FJ602-3MB6B	2020
100	J	FJ100P-3MB8B	2750	FJ1002-3MB8B	2580
200	J	FJ200P-3MB8C	9300	FJ2002-3MB8C	5360
400	J	FJ400P-3MB4B	17,360	FJ4002-3MB4B	8960
600	J	FJ600P-3MB4B	27,760	FJ6002-3MB4B	12,960
800	L	FL800P-3MB4B	35,360	FL8002-3MB4B	20,160

Transfer and bypass switches
30 – 800A

3 Pole Transfer switch, 600V, 30A – 800A

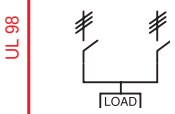
NEMA Enclosure type

UL general purpose amp rating	Fuse type	1 Catalog number	1 List price	3R Catalog number	3R List price	4 Catalog number	4 List price	4X Stainless Catalog number	4X Stainless List price
30	J	FJ301-3TB6B	$ 1420	FJ303-3TB6B	$ 1560	FJ304-3TB6B	$ 2400	FJ30X-3TB6B	$ 3500
30	CC	FC301-3TB6B		FC303-3TB6B		FC304-3TB6B		FC30X-3TB6B	
60	J	FJ601-3TB8B	1620	FJ603-3TB8B	1780	FJ604-3TB8B	2750	FJ60X-3TB8B	4050
100	J	FJ1001-3TB8B	2220	FJ1003-3TB8B	2440	FJ1004-3TB8B	3750	FJ100X-3TB8B	5500
200	J	FJ2001-3TB8C	4960	FJ2003-3TB8C	5360	FJ2004-3TB8C	8450	FJ200X-3TB8C	10,560
400	J	FJ4001-3TB4B	8160	FJ4003-3TB4B	8960	FJ4004-3TB4B	17,730	FJ400X-3TB4B	22,160
600	J	FJ6001-3TB4B	11,160	FJ6003-3TB4B	14,460	FJ6004-3TB4B	26,050	FJ600X-3TB4B	32,560
800	L	FL8001-3TB4B	19,560	FL8003-3TB4B	22,960	FL8004-3TB4B	34,050	FL800X-3TB4B	42,560



NEMA Enclosure type

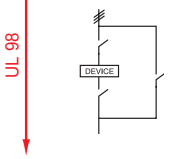
UL general purpose amp rating	Fuse type	4X Plastic Catalog number	4X Plastic List price	12 Catalog number	12 List price
30	J	FJ30P-3TB6B	$ 1750	FJ302-3TB6B	$ 1650
30	CC	FC30P-3TB6B		FC302-3TB6B	
60	J	FJ60P-3TB8B	2020	FJ602-3TB8B	2020
100	J	FJ100P-3TB8B	2750	FJ1002-3TB8B	2580
200	J	FJ200P-3TB8C	9300	FJ2002-3TB8C	5360
400	J	FJ400P-3TB4B	17,360	FJ4002-3TB4B	8960
600	J	FJ600P-3TB4B	27,760	FJ6002-3TB4B	12,960
800	L	FL800P-3TB4B	35,360	FL8002-3TB4B	20,160



3 Pole Bypass switch, 600V, 30A – 800A

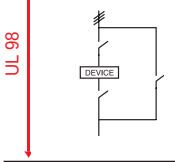
NEMA Enclosure type

UL general purpose amp rating	Fuse type	1 Catalog number	1 List price	3R Catalog number	3R List price	4 Catalog number	4 List price	4X Stainless Catalog number	4X Stainless List price
30	J	FJ301-3BB8B	$ 1850	FJ303-3BB8B	$ 2050	FJ304-3BB8B	$ 3150	FJ30X-3BB8B	$ 4550
30	CC	FC301-3BB8B		FC303-3BB8B		FC304-3BB8B		FC30X-3BB8B	
60	J	—	—	—	—	—	—	—	—
100	J	—	—	—	—	—	—	—	—
200	J	FJ2001-3B8C	9000	FJ2003-3B8C	9800	FJ2004-3B8C	16,000	FJ200X-3B8C	19,950
400	J	FJ4001-3B6B	15,300	FJ4003-3B6B	16,800	FJ4004-3B6B	34,000	FJ400X-3B6B	42,500
600	J	FJ6001-3B6B	21,100	FJ6003-3B6B	27,000	FJ6004-3B6B	50,300	FJ600X-3B6B	62,800
800	L	FL8001-3B6B	37,500	FL8003-3B6B	44,100	FL8004-3B6B	65,800	FL800X-3B6B	82,300



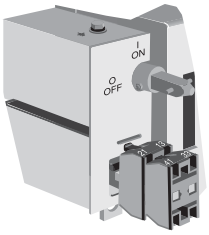
NEMA Enclosure type

UL general purpose amp rating	Fuse type	4X Plastic Catalog number	4X Plastic List price	12 Catalog number	12 List price
30	J	FJ30P-3BB6B	$ 2250	FJ302-3BB6B	$ 2150
30	CC	FC30P-3BB6B		FC302-3BB6B	
60	J	—	—	—	—
100	J	—	—	—	—
200	J	FJ200P-3B8C	17,600	FJ2002-3B8C	9800
400	J	FJ400P-3B6B	33,100	FJ4002-3B6B	16,800
600	J	FJ600P-3B6B	53,500	FJ6002-3B6B	24,600
800	L	FL800P-3B6B	73,500	FL8002-3B6B	38,700



Accessories ①②

OESA-ZX157



OZXK-1
OZXK-2

3 Position selection switch

Pilot light

Auxiliary contacts

For use on:	Contact configuration	Catalog number	Installation suffix	Installed list price adder
30A	1 N.O. + 1 N. C. 2 N.O. + 2 N.C.	OA4B1C	add “11” suffix add “22” suffix	**$ 70** **110**
60A – 100A	1 N.O. 1 N.C.	OA1G10 OA3G01	add “10” suffix add “01” suffix	**30**
200A – 800A	1 N.O. & 1 N.C. 2 N.O. & 2 N.C.	OZXK-1 OZXK-2	add “11” suffix add “22” suffix	**130** **200**

Accessories ①②

For use on:	Description	Installation suffix	Installed list price adder
30A 60A – 100A 200A – 400A 600A – 800A	Neutral block Neutral block Neutral block Neutral block	N N N N	**$ 40** **50** **150** **160**
30A – 200A	Service entrance, 3 wire Service entrance, 4 wire	U V	**75** **125**
400A – 800A	Service entrance, 3 wire Service entrance, 4 wire	U V	**150** **200**
30A – 800A	Start/stop pushbuttons 2 position selector switch 3 position selector switch Pilot light "red/run" Ammeter 1 phase ③ Voltmeter ③	A C D E AM VM	**68** **68** **78** **110** **940** **2300**

Ground lugs

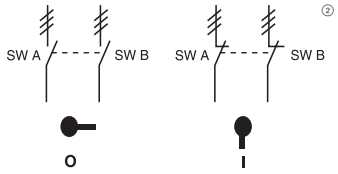
All enclosed switches are provided with a standard integral ground lug.

Switch size	Ground lug wire size
30 –100	#14 – 1
200 – 800	#6 – 250 MCM

① Additional accessories can be found on pages 18.83 – 18.95.
② Please consult factory for special customer requirements.
③ Current transformers included.

Conversion mechanisms

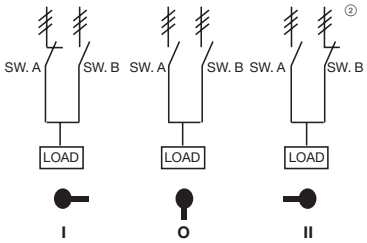
6 or 8 pole
6 (8) pole mechanism allows two switches controlled by one handle to open or close simultaneously.



	POS. O	POS.I
SW. A	O	X
SW. B	O	X

X = Closed
O = Open

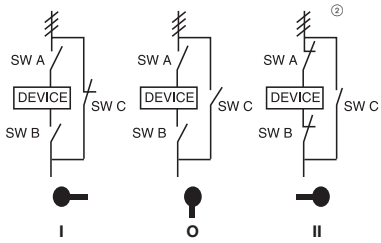
Transfer①
Transfer mechanism manually transfers between two power sources using two switches and a center "OFF" position.



	POS. I	POS.O	POS.II
SW. A	X	O	O
SW. B	O	O	X

X = Closed
O = Open

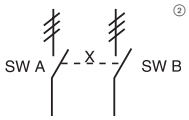
Bypass①
Bypass mechanism operates three switches: Two switches in series and one changeover switch to allow power bypass.



	POS. I	POS.O	POS.II
SW. A	O	O	X
SW. B	O	O	X
SW. C	X	O	O

X = Closed
O = Open

Mechanical interlock
Mechanical interlock mechanism prevents both switches from being in the ON position at the same time.



	SW. A POS. I	SW. B POS. O
SW. A	X	O
SW. B	O	X

X = Closed
O = Open

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① Transfer and bypass enclosed switches include the load side bussed or cabled together, and all switches come standard with ground lugs.
② = Three poles

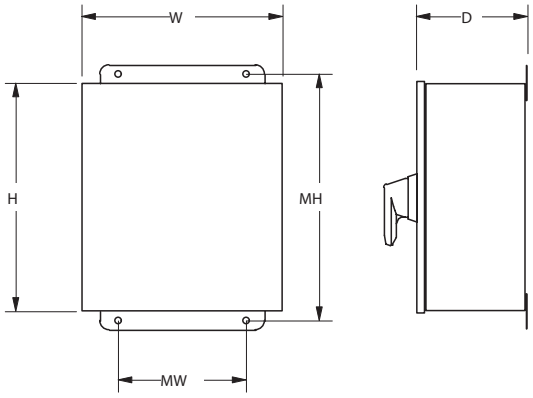
Approximate dimensions
2, 3, & 4 Pole ③
30A – 800A F

Fusible

Frame size	Enclosure type	H height	W width	D depth	MH mtg. height	MW mtg. width	Weight (lbs.)
OS30_	1	10.0	8.0	6.0	7.0	7.0	12
	3R	10.0	8.0	6.0	10.75	6.0	12
	4	10.0	8.0	6.0	10.75	6.0	12
	4X SS	10.0	8.0	6.0	10.75	6.0	12
	4X Plastic	10.0	8.0	5.9	10.75	6.0	8.0
	12	10.0	8.0	6.0	10.75	6.0	12
OS60_	1	10.0	8.0	6.0	7.0	7.0	13
	3R	10.0	8.0	6.0	10.75	6.0	13
	4	10.0	8.0	6.0	10.75	6.0	13
	4X SS	10.0	8.0	6.0	10.75	6.0	13
	4X Plastic	10.0	8.0	5.9	10.75	6.0	9.0
	12	10.0	8.0	6.0	10.75	6.0	13
OS100_	1	14.0	12.0	8.0	11.0	9.0	22
	3R	14.0	12.0	8.0	14.75	10.0	22
	4	14.0	12.0	8.0	14.75	10.0	22
	4X SS	14.0	12.0	8.0	14.75	10.0	22
	4X Plastic	14.0	12.0	8.0	14.75	10.0	16
	12	14.0	12.0	8.0	14.75	10.0	22
OS200_	1	24.0	20.0	10.0	25.5	18.5	75
	3R	24.0	20.0	10.0	25.5	18.5	75
	4	24.0	20.0	10.0	25.5	18.5	75
	4X SS	24.0	20.0	10.0	25.5	18.5	75
	4X Plastic	①	①	①	①	①	①
	12	24.0	20.0	10.0	25.5	18.0	75

Frame size	Enclosure type	H height	W width	D depth	MH mtg. height	MW mtg. width	Weight (lbs.)
OES400_	1	44.0	22.0	11.0	45.5	20.5	150
	3R	44.0	22.0	11.0	49.5	20.5	150
	4	48.0	24.0	12.0	49.5	22.5	150
	4X SS	48.0	24.0	12.0	49.5	22.5	150
	4X Plastic	①	①	①	①	①	①
	12	44.0	22.0	11.0	45.5	20.5	150
OES600_	1	44.0	22.0	11.0	45.5	20.5	150
	3R	44.0	22.0	11.0	49.5	20.5	150
	4	48.0	24.0	12.0	49.5	22.5	150
	4X SS	48.0	24.0	12.0	49.5	22.5	150
	4X Plastic	①	①	①	①	①	①
	12	44.0	22.0	11.0	45.5	20.5	150
OES800_	1	48.0	24.0	12.0	49.5	22.5	170
	3R	48.0	24.0	12.0	49.5	22.5	170
	4	48.0	24.0	12.0	49.5	22.5	170
	4X SS	48.0	24.0	12.0	49.5	22.5	170
	4X Plastic	①	①	①	①	①	①
	12	48.0	24.0	12.0	49.5	22.5	170

① Please consult factory, enclosures are sized to suit specific customer needs.
② Enclosure is free standing.
③ Some 4-pole switches require larger enclosures. Please consult factory.



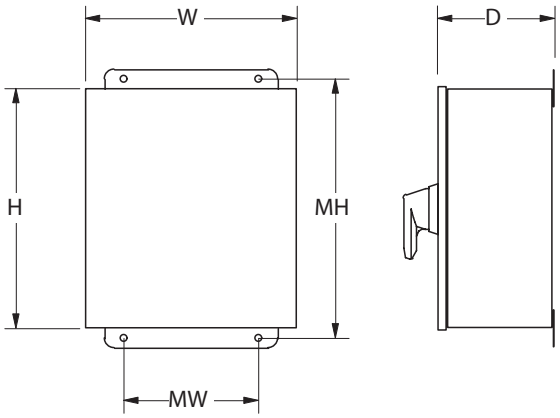
Approximate dimensions
for enclosed 6-pole transfer & mechanical interlock switches, 30A – 800A F

Fusible

Frame size	Enclosure type	H height	W width	D depth	MH mtg. height	MW mtg. width	Weight (lbs.)
OS30_	1	14.0	12.0	8.0	11.0	9.0	22
	3R	14.0	12.0	8.0	14.75	10.0	22
	4	14.0	12.0	8.0	14.75	10.0	22
	4X SS	14.0	12.0	8.0	14.75	10.0	22
	4X Plastic	14.0	12.0	8.0	14.75	10.0	16
	12	14.0	12.0	8.0	14.75	10.0	22
OS60_	1	20.0	20.0	8.0	21.5	18.5	60
	3R	20.0	20.0	8.0	21.5	18.5	60
	4	20.0	20.0	8.0	21.5	18.5	60
	4X SS	20.0	20.0	8.0	21.5	18.5	60
	4X Plastic	24.0	16.0	10.0	–	–	60
	12	20.0	20.0	8.0	21.5	18.5	60
OS100_	1	20.0	20.0	8.0	21.5	18.5	60
	3R	20.0	20.0	8.0	21.5	18.5	60
	4	20.0	20.0	8.0	21.5	18.5	60
	4X SS	20.0	20.0	8.0	21.5	18.5	60
	4X Plastic	24.0	16.0	10.0	21.5	18.5	60
	12	20.0	20.0	8.0	21.5	18.5	60
OS200_	1	36.0	30.0	12.0	37.5	28.5	100
	3R	36.0	30.0	12.0	37.5	28.5	100
	4	36.0	30.0	12.0	37.5	28.5	100
	4X SS	36.0	30.0	12.0	37.5	28.5	100
	4X Plastic	①	①	①	①	①	①
	12	36.0	30.0	12.0	37.5	28.5	100

Frame size	Enclosure type	H height	W width	D depth	MH mtg. height	MW mtg. width	Weight (lbs.)
OES400_	1	48.0	36.0	16.0	49.5	34.5	220
	3R	48.0	36.0	16.0	49.5	34.5	220
	4	48.0	36.0	16.0	49.5	34.5	220
	4X SS	48.0	36.0	16.0	49.5	34.5	220
	4X Plastic	①	①	①	①	①	①
	12	48.0	36.0	16.0	49.5	34.5	220
OES600_	1	48.0	36.0	16.0	49.5	34.5	230
	3R	48.0	36.0	16.0	49.5	34.5	230
	4	48.0	36.0	16.0	49.5	34.5	230
	4X SS	48.0	36.0	16.0	49.5	34.5	230
	4X Plastic	①	①	①	①	①	①
	12	48.0	36.0	16.0	49.5	34.5	230
OES800_	1	48.0	36.0	16.0	49.5	34.5	230
	3R	48.0	36.0	16.0	49.5	34.5	230
	4	48.0	36.0	16.0	49.5	34.5	230
	4X SS	48.0	36.0	16.0	49.5	34.5	230
	4X Plastic	①	①	①	①	①	①
	12	48.0	36.0	16.0	49.5	34.5	230

① Please consult factory; enclosures can be custom sized to suit specific needs
② Enclosure is free standing.



Notes

Arc Guard Systems
Index

Notes

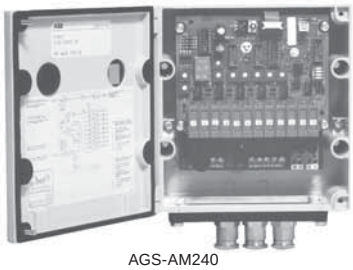
Arc Guard Systems • Current sensing unit • Arc monitor

Arc Guard Systems
Arc monitor
Current sensing unit
Accessories

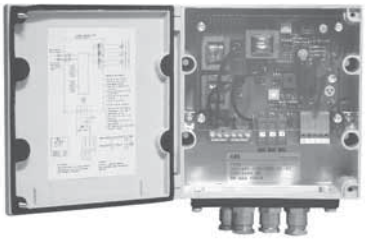
Arc monitor
- Available for AC and DC power
- Photodiodes for sensing light
- The two output stages are triacs triggered via a pulse transformer
- Two separate relay outputs
- A switch is included for selection of automatic relay resetting
- A digital display, visible through the window in the door, is lighted when the triac outputs are activated and shows which detector has caused tripping
- Terminals are provided for connection of the arc monitor's own power supply and for connections to the circuit-breaker trip coil
- The power consumption of the unit is approximately 6 watts

Current sensing unit
- Has terminals for a number of different supply voltages
- Connects to current transformers located at suitable positions in the busbar system of the installation to be monitored
- Incorporates a selector switch and potentiometer for testing and checking purposes
- Power consumption approximately 11 W
- Optical signal transmission
- Can be connected in series using optical cables
- LEDs indicate when the current exceeds approximately 70% and 100% of the set value
- The unit can be either 1, 2 or 3-phase connected (to one, two or three current transformers)
- Imposes insignificant load on the current transformers, approximately. 0.7 VA, so current transformers that are also applied for other purposes can often be used

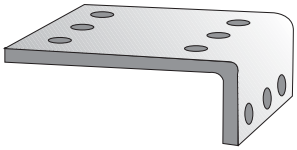
Ordering information



AGS-AM240



AGS-CS240



AGS-MB

AGS-FMS

Arc monitor

Power supply voltage	Catalog number	List price
60 – 220 VDC and 60 – 240 VAC, 50 – 60 Hz 24 – 48 VDC	AGS-AM240 AGS-AM48	**$ 3843**

Receives the light signal sent by the detector via fiberoptic cables and sends a trip signal to the upstream circuit breaker within 1-2 ms. The DC powered design has reverse polarity protection.

Current sensing unit

Power supply voltage	Catalog number	List price
24, 48, 60, 110, 125 and 220 VDC 110 – 125 VAC and 240 VAC, 50 – 60 Hz	AGS-CS240	**$ 2452**

Provides a safeguard against nuisance tripping by requiring both a rapid change in current as well as a signal from the light detector before a trip signal can be transmitted to the upstream circuit.

Detectors with optical plastic cable ①

Cable length	Catalog number	List price
2m	AGS-DP2	**$ 212**
4m	AGS-DP4	**235**
6m	AGS-DP6	**260**
8m	AGS-DP8	**289**
10m	AGS-DP10	**314**
15m	AGS-DP15	**381**
20m	AGS-DP20	**448**
30m	AGS-DP30	**591**

The detectors transfer light from the arc via the fiberoptic cable to the Arc Monitor.

Optical fiber cable — plastic (provided with plug-in socket terminals) ①

Cable length	Catalog number	List price
0.5m	AGS-CP.5	**$ 84**
1m	AGS-CP1	**92**
2m	AGS-CP2	**105**
4m	AGS-CP4	**134**
6m	AGS-CP6	**160**
8m	AGS-CP8	**189**
10m	AGS-CP10	**214**
15m	AGS-CP15	**281**
20m	AGS-CP20	**356**

For connection between units: • current sensing unit to arc monitor • arc monitor to arc monitor.

Mounting bracket

Application	Catalog number	List price
For mounting detectors. Detectors are secured to the bracket by means of cable straps.	AGS-MB	**$ 10**

Flush mounting set

Application	Catalog number	List price
For arc monitor and current sensing unit mounting in switchgear front.	AGS-FMS	**$ 128**

① Detectors and optical cables using fiber glass can be supplied upon request — consult factory for pricing.

General description
Arc Guard System
Arc monitor
Current sensing unit

Function
The purpose of the arc guard system is to quickly disconnect the energy source if an arcing fault should occur. The watchful eye of the arc monitor detects any large increase in light intensity. The detector transfers light from the arc through a state-of-the-art solid state electronics package. Within an interval of one to two milliseconds, the detector sends a trip signal to the disconnecting upstream circuit breaker located in the switchgear, bypassing delays caused by the selective features of relaying schemes. This protects your equipment and personnel.

Current sensing unit
The detectors can also be sensitive to other forms of intense light, such as camera flashes, lightning, direct sunlight, switching arcs in circuit breakers and other large apparatus. By combining the arc monitor with a current sensing unit set just over the normal operating level, a current dependent condition is introduced which prevents triggering from irrelevant light sources. This prevents nuisance tripping the switchgear and causing an unintentional power outage.

Insensitivity to interference
A switchgear environment is often subjected to extreme electromagnetic interference, especially during an arcing fault. High currents in the busbars and cables, switching arcs in contactors and circuit breakers generate fields that interfere with communication between relays and meters. Fiber optic cables eliminate the risk of electromagnetic interference. All communication between the detectors, arc monitor and the current sensing unit are through fiber optics. Fiber optic signal transmission makes the systems immune to interference.

System security
The arc guard system is a product that seldom (or never!) has to take action, but which must then always operate with absolute dependability. Its performance should be checked after installation and subsequently at certain intervals, e.g. once a year. The design of the system makes it easy to check. The procedure is described in the instructions provided with the equipment.

Approvals
- Underwriters Laboratories
  File #E155370
- Factory Mutual system
  Reference FMRC J.I. 1B1A4.AF
- Lloyds Register of Shipping
  Cert. #97/00189
- Det Norske Veritas
  Cert. #A-6702
- Germanischer Lloyd
  Cert. #99.342-97
- CE Marked
- Earthquake tested according to ANSI / IEEE C37.98 – 1987
- Y2K compliant
- US Coast Guard ①
- American Bureau of Shipping ①

① Certificate number pending. Call factory for more information.

General description
Arc monitor with detectors

Introduction
The two units of the Arc Guard System™, arc monitor, and the current sensing unit are each built into a light-alloy enclosure provided with a hinged door.
Communication between the units and between arc monitor and detectors is through optical cables.

Optical fiber cables
The optical fiber cables cannot be cut or joined and they must be run in smooth curves during installation. Optical fiber cables and detectors with optical fiber cables are available in certain standard lengths, see page 2. Greater lengths than these can be quoted on request.

Detectors
Each detector consists of a lens arrangement for collecting light. An optical fiber cable is connected to the lens. The detector monitors a large space angle. The polar diagram should be regarded as three-dimensional since the detector is sensitive to light from all directions, with the exception of a small area behind the detector.

Factory testing has shown that arc light reflected between metallic surfaces is also sufficient to cause tripping. However, we do recommend one detector per each enclosed switchgear compartment.

The detectors are connected to the arc monitor by means of plug-in sleeve terminals.

A maximum of nine detectors can be connected to an arc monitor. If more detectors are required, up to twelve units may be connected in parallel.

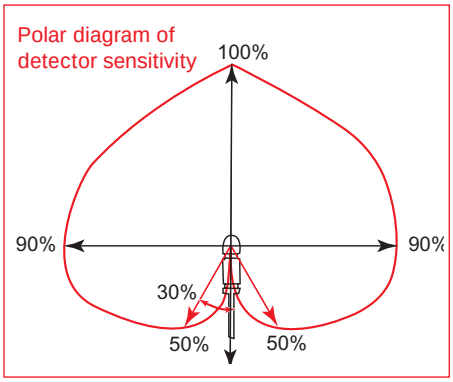
Arc monitor
- Available for AC and DC power
- Photodiodes are used for sensing light.
- The two output stages are triacs triggered via a pulse transformer. In this way, detectors and output stage are electrically isolated from other electronic equipment.
- The arc monitor has two separate relay outputs. Each relay has one change-over (Form C) contact function. Relay K1 is used for EXTERNAL TRIP indication and relay K2 is used for POWER ON indication.
- A switch is included for selection of automatic relay resetting (after approximately 200 ms) or manual resetting of relay K1.
- A digital display, visible through the window in the door, is lighted when the triac outputs are activated and shows which detector has caused tripping. The display and relay are reset using a pushbutton accessible from the outside. The arc monitor can trip even if it is not reset.
- Terminals are provided for connection of the arc monitor's own power supply and for connections to the circuit-breaker trip coil. There are units for plug-in connection of optical fiber cables from the detectors and for communication with any current sensing unit.
- The power consumption of the unit is approximately 6 watts. Energy is stored in the unit for operation up to 200ms should the supply voltage fail, which is sufficient to activate the output even if voltage disappears in conjunction with the short circuit for which the arc monitor operates.

Tripping of several breakers
For tripping several breakers an additional relay is often required. This must be as fast as possible so as not to delay tripping and thus make damage worse.

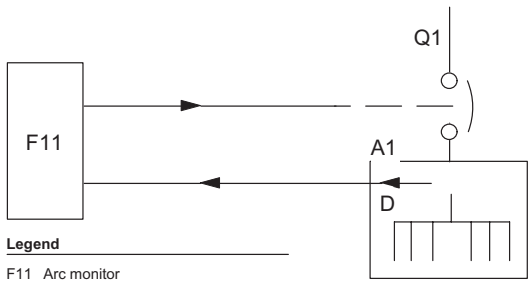
For DC supply, ABB's relay type RXMS (Cat. No. RK 216 263-...) with 4 ms pickup time is suitable. Where a greater load capacity is required this relay can be connected in parallel with relay type RXMH (Cat. No. RK 223 067-...).

The current to the intermediate relay must be interrupted since the triacs of the arc monitor have no breaking capacity for DC. This can be done by having a pushbutton or time-lag relay break the circuit or by connecting the signal relay contact K1 of the arc monitor in parallel with the triacs. Then activate automatic reset inside arc monitor (DIP-switch S1.2).

Arc monitor



Arc monitor with detectors



Legend

F11	Arc monitor
D	Detectors
Q1	Circuit breaker
A1	Switchgear or distribution equipment

General description
Current sensing unit

Description
• Has terminals for a number of different supply voltages.
• Connects to current transformers located at suitable positions in the busbar system of the installation to be monitored.
• The unit incorporates a selector switch and potentiometer for testing and checking purposes.
• Power consumption is approximately 11 W.
• Optical signal transmission
• If several current sensing units are needed, these can be connected in series using optical cables.
• LEDs indicate when the current exceeds approximately 70% and 100% of the set value.

Connection to current transformers
The unit is to be connected to current transformers with a rated secondary current of 1, 2 or 5 A .

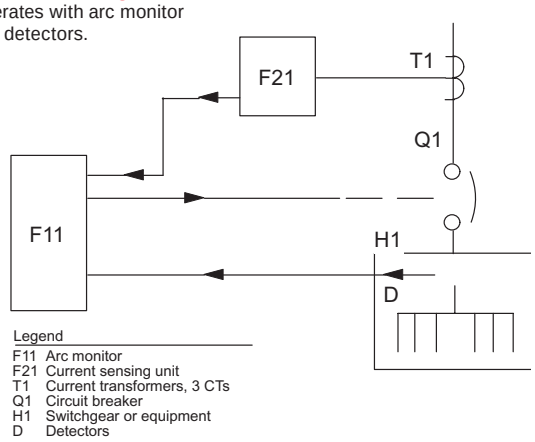
Note that current transformers for relay protection are to be used since these do not saturate as quickly as ordinary current transformers. To minimize the operating time, the current transformers should not saturate until twice the set current has been reached.

The unit can be either 1, 2 or 3-phase connected (to one, two or three current transformers). However, in three-phase systems single-phase connection should be avoided. Even though arcs generally spread to all three phases, valuable time may be lost before the current rises to the trip value if the arc is struck in one of the phases in which the current is not sensed by the unit.

The unit imposes insignificant load on the current transformers, approximately. 0.7 VA, so current transformers that are also applied for other purposes can often be used.

Current sensing unit

Current sensing unit
Operates with arc monitor and detectors.



Technical data
Arc monitor
Current sensing unit

Arc monitor

Triac outputs (Static outputs)		disconnectible terminals
Largest load current:		
Continuously		0.7 A
For 200 ms		30 A
Smallest recommended load current		
(temperature ≥ 25° C)		DC 45 mA at stated polarity AC 80 mA
(temperature ≥ -25° C)		DC 80 mA at stated polarity
Residual current, I_r at 220	VAC	8 mA
	at DC	0.5 mA The output is connected in parallel with 10 ohm in series with 0.1 µF
For other voltages	AC	*Ir* = V x f x 0.0006 (mA) V = voltage f = frequency
Peak withstand voltage		600 V
Power supply voltage		Max. 250 V
Signal relay outputs		
Thermal rated current, I_{th}		5 A
Rated operational current, I_e		
Utilization category per IEC 947-5-1:		
AC 15	V_e= 250 V	1.5 A
DC 13	V_e= 48 V	1.0 A
	110 V	0.4 A
	220 V	0.2 A
Optical inputs		Quantity
For light detectors		9
From Current Sensing Unit or other Arc Monitor		1
Optical outputs		
To other Arc Monitor		1
Indications		
Operating voltage available		Decimal point on digital display lights up relay K2 energizes.
Upon tripping		Digital display lights up.The display shows which detector was activated (1 – 9). Relay K1 energizes
Control devices/settings:		
External (on door)		
Pushbutton		
- Reset button		Manual resetting
Internal (on the printed circuit board)		
Change-over switch		
- Switching on and off of Current sensing unit		On/Off
- Manual reset of signal relay		On/Off
Trimming potentiometers		
- Sensitivity setting		*Normally not to be adjusted*
Supply voltage:		See ordering information
Permitted variation		+/-20 % at DC +/-10 % at AC
Internal fuse		0.8 A delayed (5 x 20 mm)
Main fuse		max 10 A fast
Power consumption		6 W
Ambient temperature		-25°C thru +55 °C
Operating times:		
From detection to switched on triac outputs		approx. 1 ms (dependent on light intensity)
From detection to making relay contact		< 10 ms
Current conditions from input to output		< 0.3 ms (with 1 m optical cable)
Degree of protection		NEMA 1 / IP54
Start-up time for power on		< 50 ms at 60V for AGS-AM240 < 50 ms at 24V for AGS-AM48

Current sensing unit

Rated current	
Reconnectible, for connection of external current transformers	
with secondary rated current	1, 2 or 5 A
Load on the external current transformers	0.2 VA connected for 1 A 0.7 VA connected for 5 A
The current sensing unit withstands a maximum of:	
Continuously	1 × rated current
For 1 second	15 × rated current
Optical outputs:	
To arc monitor/current sensing unit	Quantity: 2
Optical inputs:	
From other current sensing unit	Quantity: 1
Indications:	
• Signal to arc monitor or current sensing unit	Green LED lights up for normal current level (< set overcurrent level)
• Pre-warning	Yellow LED lights up for normal current, switched off at > 70% of set overcurrent level
• Test position	Red LED
Control devices/settings:	
(on the printed circuit board)	
Change-over switch	
Test position	On/Off
Optical input is used or not	On/Off
Trimming potentiometers	
Setting of overcurrent level	0.5 – 4.5 x rated current
Simulation of overcurrent level in test position	
Supply voltage	See ordering information
Permitted variation	+/-20 % at DC +/-10 % at 110-127 VAC +10 % -15 % at 230 VAC
Power consumption	1 W at 24 V 11 W at 220 V
Ambient temperature	-25°C thru + 55 °C
Operating times	
From overcurrent occurring to actuating optical outputs:	
At currents >=2 x set overcurrent level	
3-phase supply.	< 2 ms
1-phase supply.	< 8 ms
Current conditions from optical input to optical outputs	< 0.3 ms
Degree of protection	NEMA 1 / IP54
Detector spectrum	400 – 850 nm, short plastic fiber 400 – 720 nm, long plastic fiber
Interference testing	According to EMC publications IEC1000 and Low Voltage Directive 73/23/EEC, the product is CE-marked.

Detector and optical fiber cable

Ambient temperature	
Continuous	-25...+70 °C
Short-time	-25...+85 °C
Smallest bending radius	
Optical cable of plastic fiber	
after installation	45 mm
while handling	10 mm
Material	
PMMA with a sheath of PE and PVC	

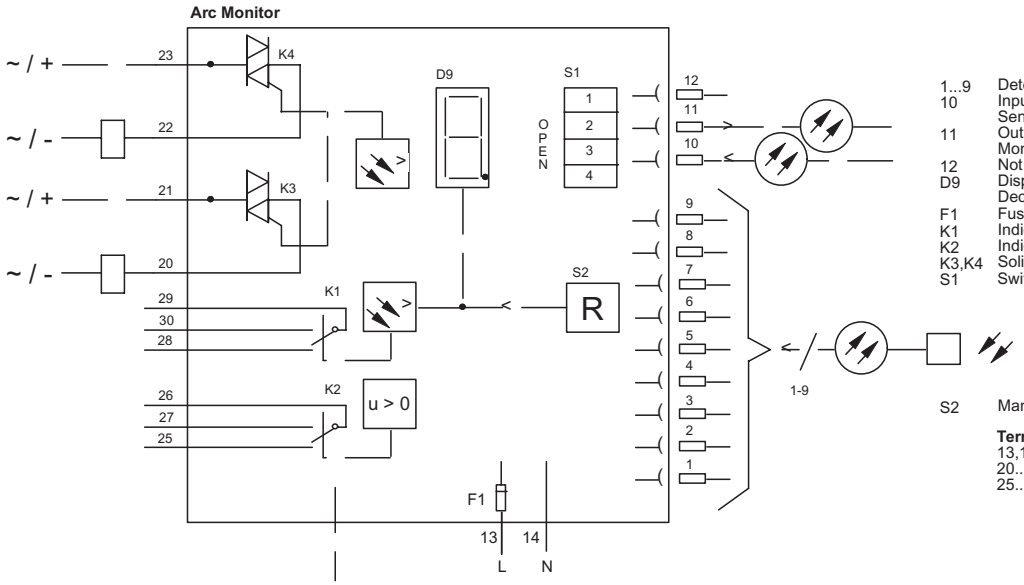
Terminals

	Terminal	Cross section of connectible cables AWG ① / mm^2
Arc monitor	13, 14, 25 – 30	10 / 4
	20 – 23	12 / 2.5
Current sensing unit	1 – 6	10 / 4
	10 – 14	12 / 2.5

① AWG estimated.

Circuit diagrams
Arc monitor
Current sensing unit

Arc monitor



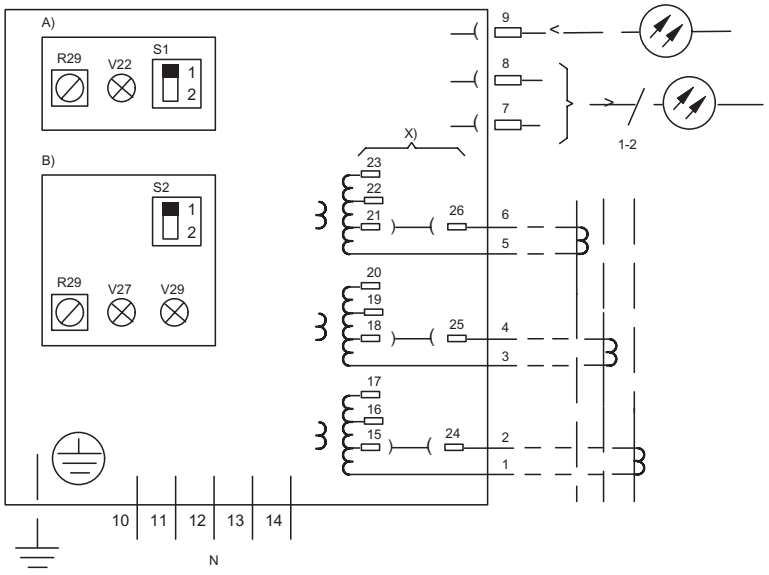
1...9 Detector input
10 Input current signal from a Current Sensing Unit or another Arc Monitor
11 Output current signal to another Arc Monitor
12 Not used
D9 Display for activated detector
Decimal point lights up during operation.
F1 Fuse for supply voltage
K1 Indication Arc Monitor has tripped
K2 Indication Arc Monitor in operation
K3,K4 Solid state trip contacts for circuit breaker
S1 Switch for:
1 Closed: Current signal used,
OPEN: Current signal not used

2 Closed: Manual reset K1 (via S2)
OPEN: Automatic reset K1 after 200ms

3 and 4 not used
S2 Manual reset button for K1 and D9

Terminals
13,14 Power Supply
20...23 Solid state trip contacts
25...30 Indication contacts

Current sensing unit



A) Testing facilities:

R29 Simulating a test current
S1 **1**= Test position
2= Operation position
V22 **Red On**= S1 in test position
Off = S1 in operation position

B) Setting facilities:

R21 Overcurrent setting
S2 **1**= Input 9 not used
2= Input 9 used
V27 **Yellow ON**= Load current less than 70% of set overcurrent level
OFF= Load current more than 70% of overcurrent level
V29 **Green ON** = Load current less than set overcurrent level
OFF = Load current more than set overcurrent level

X) Current range bridge connections:

1A: 24-17, 25-20, 26-23
2A: 24-16, 25-19, 26-22
5A: 24-15, 25-18, 26-21 On delivery

Terminals

1...6 Current transformer terminals
7...8 Outout current signal to another
9 Input current signal from another Current Sensing unit

Power supply terminals

10 and 12 24 V DC
11 and 12 60 V DC
11 and 12 48 V DC Interconnection 11-13
13 and 12 110 V-125 V AC/DC
14 and 12

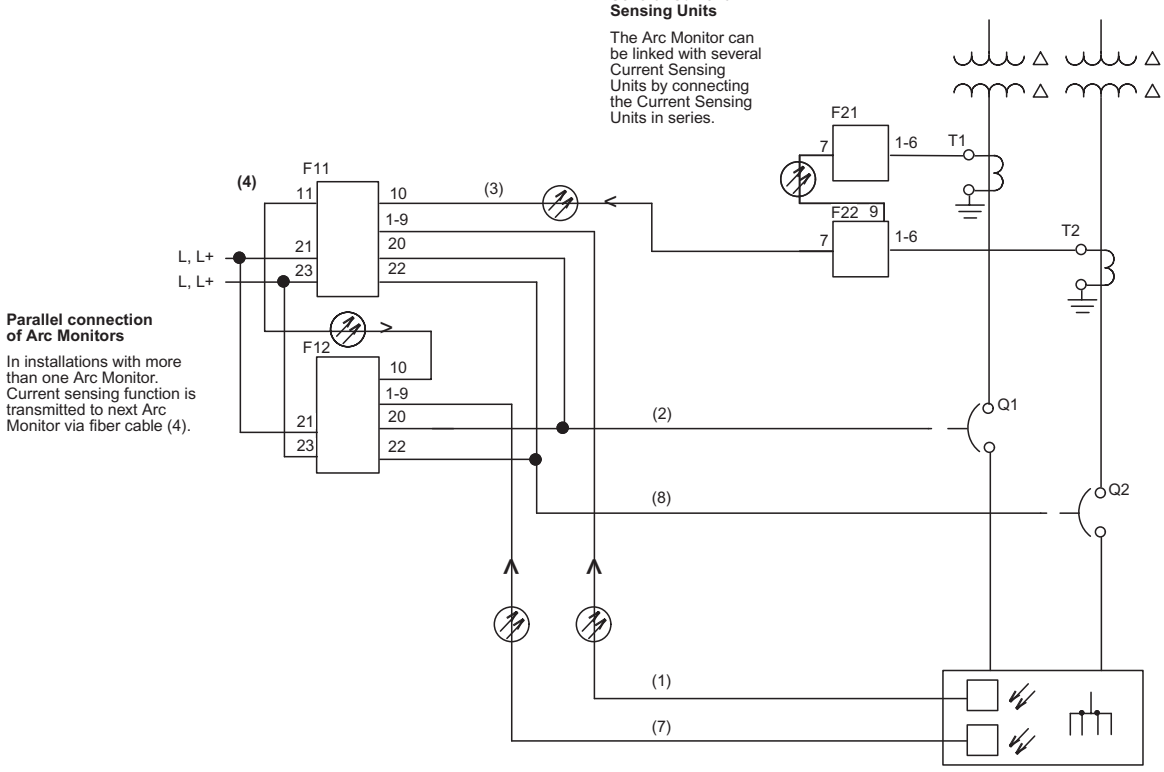
Arc Guard System with two separated circuit-breakers

Several Current Sensing Units

The Arc Monitor can be linked with several Current Sensing Units by connecting the Current Sensing Units in series.

Parallel connection of Arc Monitors

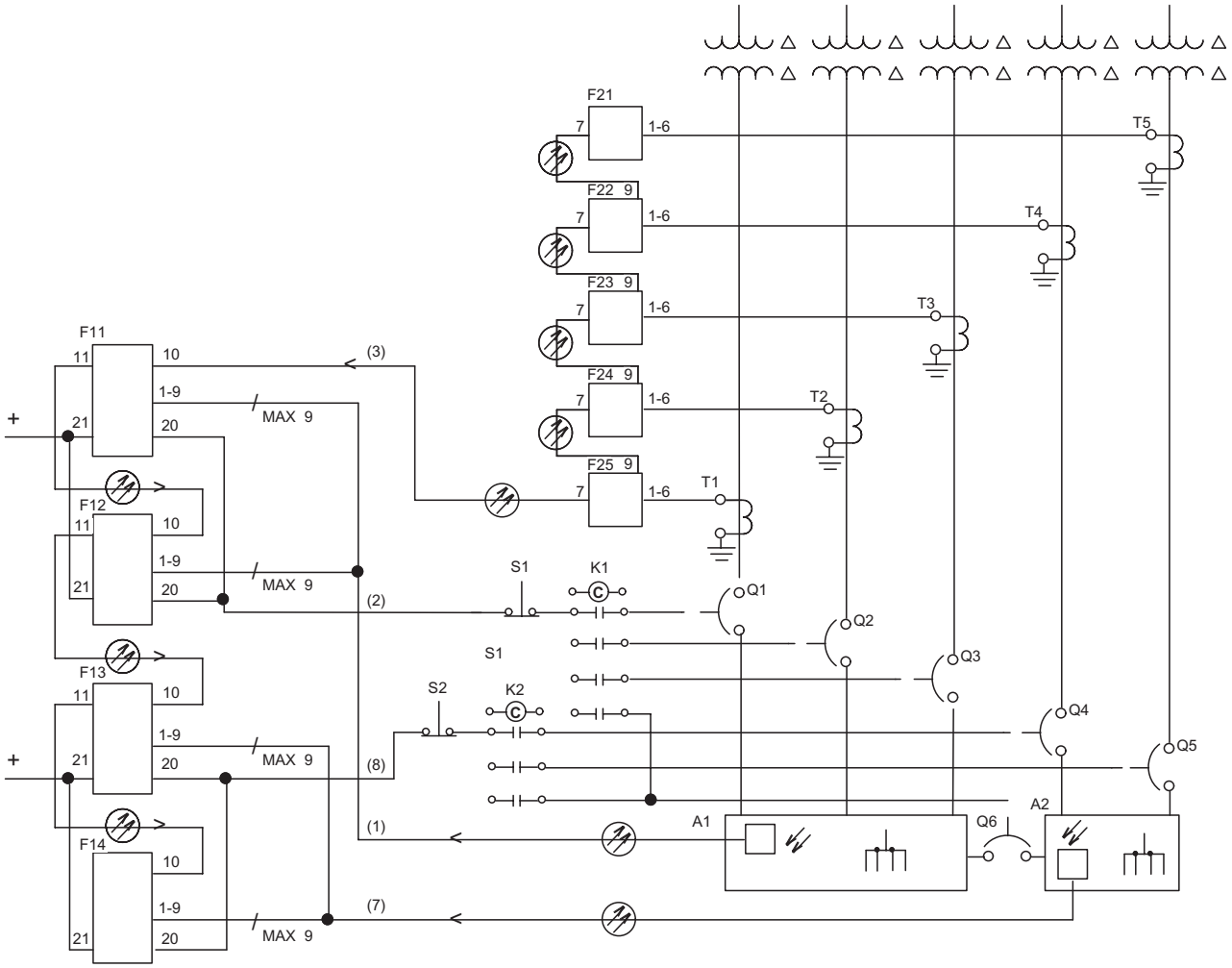
In installations with more than one Arc Monitor. Current sensing function is transmitted to next Arc Monitor via fiber cable (4).



A1	Switchgear or similar
F11...F12	Arc Monitor
F21...F22	Current Sensing Unit
Q1, Q2	Circuit breaker
T1, T2	Current transformers
(1), (7)	Detector cables (optical fiber cable)
(3)	Trip circuit for circuit breaker (electric cable, separately powered)
(4)	Current signal is transmitted to second Arc Monitor via optical cable

Circuit diagrams
Arc Guard System application

Arc Guard System with current measuring in five incoming feeders

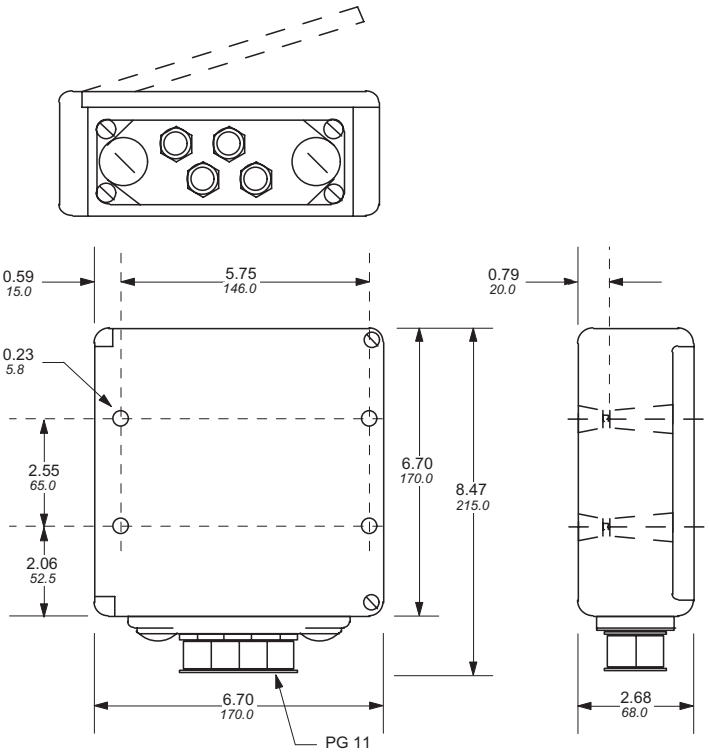


A1, A2	Switchgear or similar	Q6	Bus coupler
F11...F14	Arc monitor	(1), (7)	Detector cables (optical fiber cable)
F21...F25	Current sensing unit	(2), (8)	Trip circuit for circuit breaker (electric cable, separately powered)
K1, K2	Fast tripping relay		
T1...T5	Current transformers	(3)	Current signal to Arc monitor (optical fiber cable)
Q1...Q5	Circuit breaker		

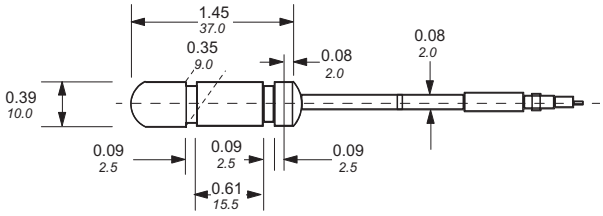
Approximate dimensions
Arc Guard System

Arc monitor
Current sensing unit

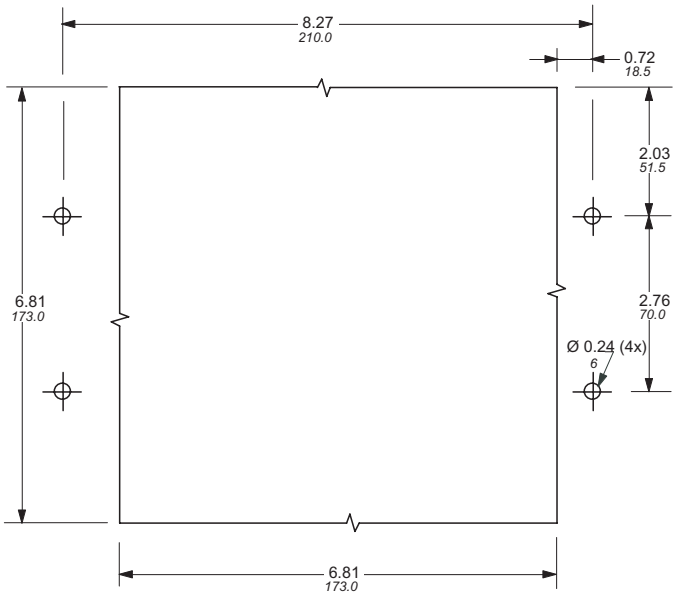
A flange with 6 tapped holes (size 18.6 mm) 4 cable glands (sealing diameter 5.5 – 8.5 mm) and 2 plastic blank plugs are supplied.



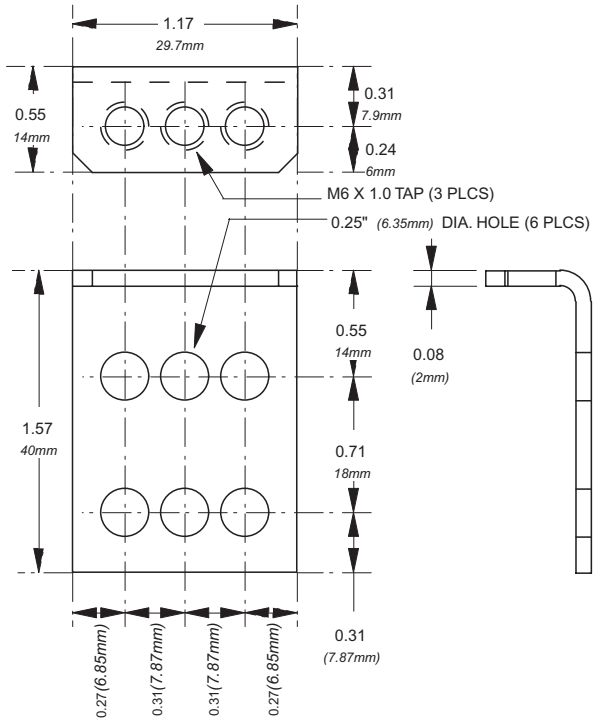
Detector with optical cable



Front panel cut-out



Bracket for fiber optic sensors



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Notes

Low Voltage Network Quality
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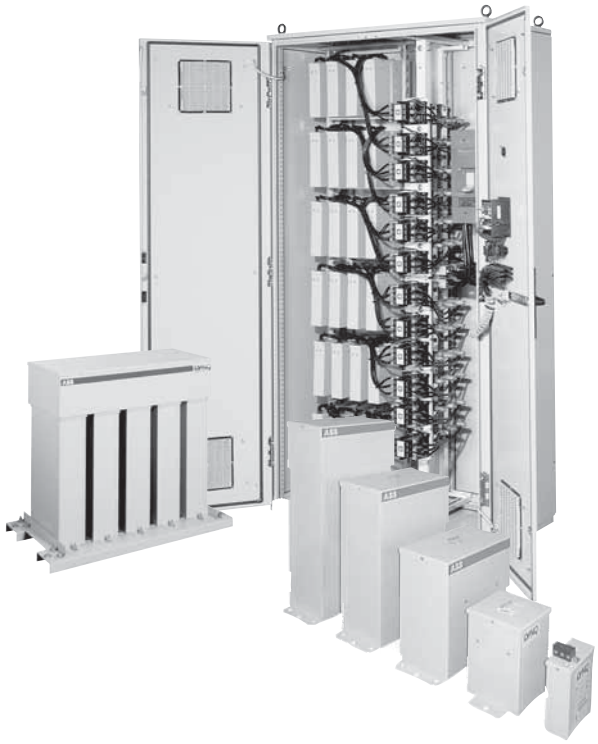
Notes

Low Voltage Network Quality

Low Voltage Network Quality

Power factor correction
Harmonic filtering
Dynamic flicker compensation



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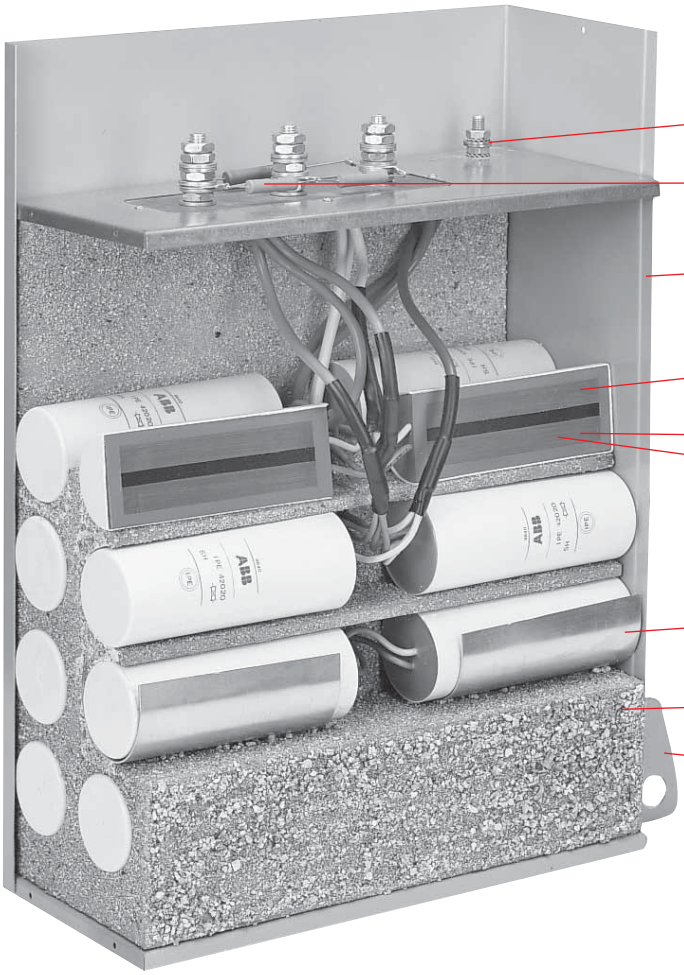
General information
General description & capacitor construction



Large terminals for easy cable connections

Built-in discharge resistors

Heavy duty enclosure

Metallized film design

Internally Protected Elements (IPE) & self-healing design

Low losses

Thermal equalizer for low element temperature

Dry granulated vermiculite insulation

Easy mounting, low weight

Principal Components of a 3-Phase Capacitor

The principal components of a 3-phase ABB capacitor include:

1. Sequential Protection System:

• Self-Healing Capacitor Elements
One or more self-healing capacitor elements are installed for each phase. These elements are connected in Y or Δ. In case of dielectric breakdown, the fault is cleared by evaporation of the metalized layer around the breakdown with negligible loss of capacitance and continued operation of the capacitor!

• Internally Protected Elements
A unique Sequential Protection System including the IPE design (IPE - internally protected elements) ensures that each individual element can be disconnected from the circuit at the end of the element's life.

• Nonflammable Dry Vermiculite Filler
Vermiculite is a dry, granular insulating material that is solid, inert and fire proof. This material fills all open spaces in the enclosure to isolate the capacitor elements and exclude free oxygen.

2. Discharge Resistors
Discharge resistors (one for each phase) are sized to ensure safe discharge of the capacitor to less than 50 volts in one minute or less as required by the NEC.

3. Terminal Studs
Large terminal studs are located inside the enclosure at the top of the capacitor for quick and easy cable connections.

4. Enclosure
All ABB enclosures are made of welded heavy gauge steel. Available enclosure types include Indoor NEMA 1, Outdoor Raintight, and Indoor Dusttight. (RAL 7032, Beige)

What is a Metallized-Film Element?

Metallized-film is a microscopically thin layer of conducting material (called an electrode), usually aluminum or zinc on an underlying layer of insulating film. The electrode thickness averages only .01 microns while insulating (polypropylene) film ranges from 5 to 10 microns in thickness depending upon the design voltage of the capacitor (the higher the voltage rating, the thicker the insulating film).

Advantages of Metallized-Film Elements

There are two electrode layers separated by one layer of insulating film. Thousands of these layers are tightly wound around a core in such a manner that the edge of one electrode is exposed on one side of the element and the edge of the other electrode is exposed on the other side of the element. See Fig. 1 & 2.

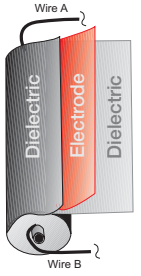


Fig. 1

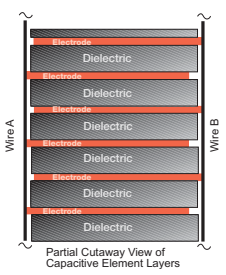


Fig.2

Wires are then connected to each side of the element. The element is enclosed in a container and then filled with a hardening protective sealant.

1. Self-Healing Design
Self-healing refers to a process where a short circuit between electrodes vaporizes the electrode around the fault (see Fig. 14) until the fault is eliminated. The element continues to function with negligible loss of performance (see Fig. 15).

2. Low Internal Losses
Due to the high dielectric efficiency of the metallized-film, the internal losses are extremely low. ABB metallized-film design losses are limited to .5 watts per kvar including the losses across the discharge resistors.

3. Small Element Size
Due to the thin electrode and dielectric, metallized-film elements are small and compact in size resulting in smaller, more powerful capacitors.

The capacitance of any element design is inversely proportional to the separation between electrodes. In other words, if the separation between conducting surfaces is cut in half, the effective capacitance is doubled in addition to reducing the physical size of the element by half.

More About Self Healing Elements

"Self-healing" is a characteristic which is unique to metallized electrode capacitors. All capacitors normally experience insulation breakdown as a result of the accumulated effect of temperature, voltage stress, impurities in the insulating medium, etc. When this happens in a non-"metallized" design,

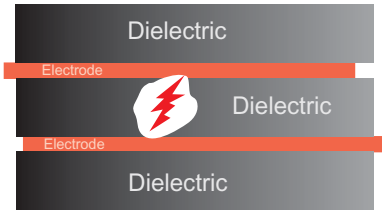


Fig. 3. Two electrodes short circuit through a fault in a dielectric layer.

the electrodes are short-circuited and the capacitor ceases its production of reactive power. In an ABB metallized-film unit, however, these individual insulation breakdowns do not mean the shutdown of the capacitor. The faults self-heal themselves and the capacitor continues operation.

The conducting electrode is very thin; when a short circuit develops as a result of a fault in the insulating dielectric, the thin electrode vaporizes around the area of the fault. This vaporization continues until sufficient separation exists between the faulted electrodes to overcome the voltage level. Fig. 15 illustrates the process of self-healing.

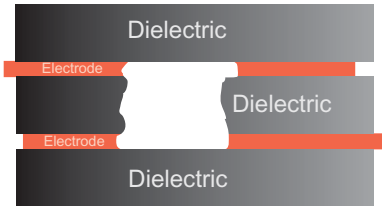


Fig. 4 illustrates "self-healing". The electrode layers in the area where they were short circuiting have been vaporized, thereby eliminating the short circuit.

The entire process of self-healing takes "microseconds" and the amount of electrode which is lost is negligible in comparison to the total surface area of the element. The result is the metallized-film unit may self-heal hundreds of times during its long life and still retain virtually all of its rated capacitance.

The IPE Sequential Protection System

ABB 's metallized-film self healing capacitor elements will have a longer life than their conventional foil design counterparts for the above reason. However, accumulated effects of time, temperature, voltage stress, etc., eventually effect capacitor life.

ABB's sequential protection system featuring patented Internally Protected Elements (IPE) design provides increased protection to facilities and personnel not available from other capacitor designs. This proven design allows for self-healing throughout the life of the capacitor to insure the maximum length of reliable service and still provide short circuit protection in each element when self-healing can no longer continue. This is accomplished by a combination of unique winding construction and an internal fuse link (See Fig. 5) within each element which

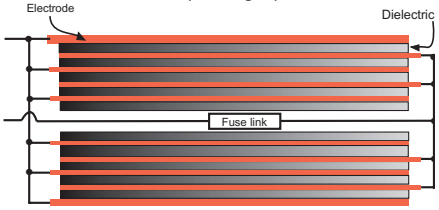


Fig. 5

safely and selectively disconnects each individual element. ABB capacitors do not rely on mechanical pressure interrupters and additional line fuses have disadvantages associated with that kind of construction.

What are Discharge Resistors?

As all the capacitor elements store electrical power like a battery, the capacitor will maintain a near full charge even when not energized. As this is a potentially dangerous condition to unsuspecting plant personnel that might be inspecting the capacitor terminals and wiring, discharge resistors are connected between all of the terminals. When the capacitor is shut off, these discharge resistors drain the capacitor elements of their stored electrical charge. It is recommended, however, that capacitor terminals should ALWAYS be short-circuited before touching the terminals.

What is the Significance of Dry Type Design?

ABB low voltage capacitors contain no free liquids and are filled with a unique nonflammable granular material called vermiculite. Environmental and personnel concerns associated with leakage or flammability of conventional oil-filled units are eliminated; and kvar for kvar, vermiculite filled units weigh 30% to 60% less than their oil filled counterparts.

Vermiculite is routinely used in the United States as an insulating material in the walls and ceilings of new buildings. Its properties have been extensively documented and recognized as an ideal material for safety and environmental considerations.

General information
Options for correcting power factor

Options for Correcting Power Factor

There are three primary methods of correcting power factor:

• Individual Capacitor Units - One capacitor unit for each inductive load.

• Banks of Capacitor Units - Large Capacitor System connected to the line at some central point in the distribution system.

• Combination of Above - Where individual capacitors are installed on the larger inductive loads and banks are installed on main feeders or switchboards, etc.

Individual Capacitor Units

Power factor correction is best achieved with individual capacitor units located directly at the inductive load (in most cases a motor). This has many of the advantages of capacitor bank installations including some advantages capacitor bank installations cannot offer.

Advantages of individual capacitor units:

• Increased Distribution System Capacity - Only individual capacitor units can improve power consumption efficiency throughout the entire distribution system all the way to the load! Therefore, where wiring is being overloaded by induction motors, increased system capacity can be obtained by reducing the load and adding individual power factor correction units.

• Stabilized Voltage Levels - Voltage drops to individual inductive load are reduced thereby decreasing heat damage caused by excessive currents.

• Lower Losses - When individual capacitor units are installed directly at the terminals of an inductive load such as a motor or transformer, the line losses are reduced.

• Capacitor & Load Can Be Switched ON/OFF Together This ensures that the motor cannot operate without the capacitor; and also ensures that the capacitor only operates when needed.

Fixed and Automatic Capacitor Banks

Group installation of capacitors is achieved in two ways:

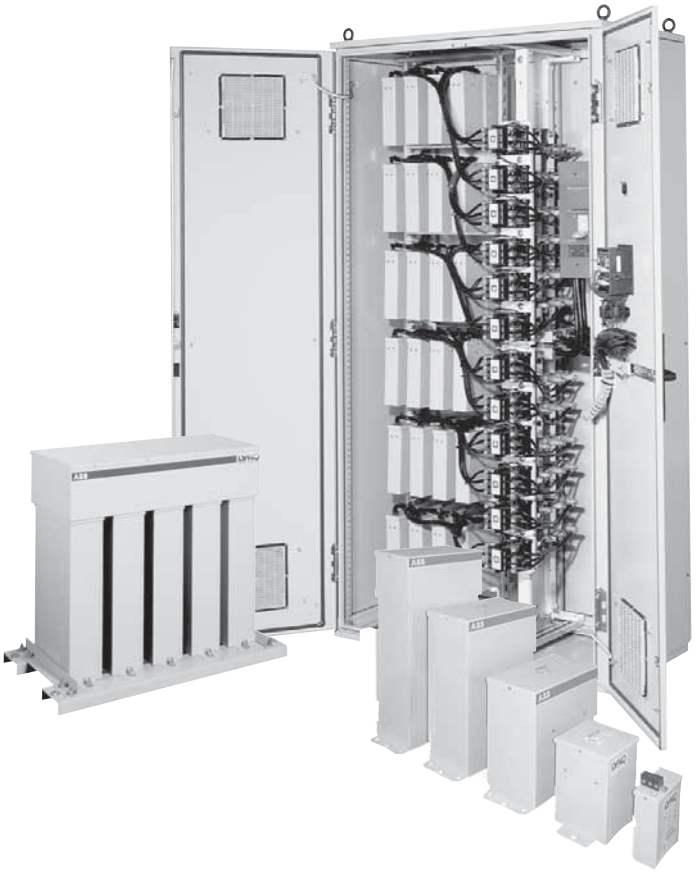
• Fixed Capacitor Banks - Individual capacitors racked in a common enclosure with no switching or stepping capability.

• Automatic Capacitor Banks - Individual capacitors racked in a common enclosure with switching capability. The capacitors are turned on and off by a micro-processor based controller. The controller also provides network data and alarm conditions to the user. Network data consists of power factor, volts, amps and harmonic distortion.

Advantages of fixed or automatic bank systems

• More Economical - Capacitor banks are more economical than individual capacitor units when the main reason for power factor correction is to reduce utility power bills and/or reduce the current in primary feeders from a main generator or transformer. Large banks or racks of capacitors are installed at the main switchboard or at the substation thereby increasing power factor and obtaining the advantages of lower power consumption.

• Lower Installation Costs - The cost of installing one fixed or automatic capacitor bank unit will be less than installing a number of individual capacitors at inductive loads.



• Switching - Automatic capacitor banks can switch all or part of the capacitance automatically depending on load requirements. This way, only as much power factor correction as needed for the given load is provided. (This switching capability is a primary advantage over fixed capacitor banks where over-capacitance, leading power factor and resulting overvoltages can occur should the load decrease.)

• Monitoring - Automatic capacitor bank controllers provide network data and alarm conditions to the user. Network data consists of power factor, volts, amps and harmonic distortions.

Sizing Capacitors at the Motor Load

When the determination is made that power factor correction capacitors ARE a good investment for a particular electrical system, you need to know:

- How many capacitors are needed?
- What sizes are appropriate?

The capacitor provides a local source of reactive current. With respect to inductive motor load, this reactive power is the magnetizing or “no-load current“ which the motor requires to operate.

A capacitor is properly sized when its full load current rating is 90% of the no-load current of the motor. This 90% rating avoids overcorrection and the accompanying problems such as overvoltages.

One Selection Method:Using Formulas

If no-load current is known . . .

The most accurate method of selecting a capacitor is to take the no-load current of the motor, and multiply by .90 (90%). Take this resulting figure, turn to the appropriate catalog page, and determine which kvar size is needed, catalog number, enclosure type, and price.

EXAMPLE: Size a capacitor for a 100hp, 460V 3-phase motor which has a full load current of 124 amps and a no-load current of 37 amps.

1. Multiply the no-load current figure of 37 amps by 90%.

37 no load amps X 90% = 33 no load amps

2. Turning to the catalog page for 480 volt, 3-phase capacitors, find the closest amp rating to, but NOT OVER 33 amps. See Table 1, sample catalog pricing chart. Per the sample chart the closest amperage is 32.5 amps. The proper capacitor unit, then is 27 kvar and the appropriate catalog number depends on the type enclosure desired.

NOTE: The formula method corrects power factor to approximately .95

If the no load current is not known . . .

If the no-load current is unknown, a reasonable estimate for 3-phase motors is to take the full load amps and multiply by 30%. Then take that figure and multiply times the 90% rating figure being used to avoid overcorrection and overvoltages. EXAMPLE: Size a capacitor for a 75hp, 460V 3-phase motor which has a full load current of 92 amps and an unknown no-load current.

1. First, find the no-load current by multiplying the full load current times 30%.
   92 (full load amps) X 30% = 28 estimated no-load amps
2. Multiply 28 no-load amps by 90%.
   28 no-load amps X 90% = 25 no-load amps
3. Now examine the capacitor pricing and selection chart for 480 volt, 3-phase capacitors. Refer again to Table 1. Here it will be seen that the closest capacitor to 25 amps full load current without going over is a 20 kvar unit, rated at 24.1 amps.
4. The correct selection, then, is 20 kvar!

TABLE 1
480 VOLT, 60 Hz., 3-Phase

Enclosure Size	kvar Rating	Rated Current Per Phase	Approx. Shipping We ight (Lbs.)	Indoor – Nema 1 Catalog Number	Outdoor – Nema 3R Catalog Number	Indoor – Nema 12 Catalog Number
	1.5	1.8	8	C484G1.5	C484R1.5	C484D1.5
	2	2.4	8	C484G2	C484R2	C484D2
	2.5	3.0	8	C484G2	C484R2.5	C484D2.5
	3	3.6	8	C484	C484R2	C484D3
		4.8				
			13	C484G17.5		
	18	21.7	13	C484G18	C484R18	C484D18
	19	22.8	13	C484G19	C484R19	C484D19
	20	24.1	13	C484G20	C484R20	C484D20
	21	25.3	13	C484G21	C484R21	C484D21
	22	26.5	13	C484G22	C484R22	C484D22
	22.5	27.1	13	C484G22.5	C484	C484D22
	24	28.9	13	C484G24		
	25			G25		

General information
Sizing capacitors at the motor load
Using charts

An Alternate Selection Method — Using Charts

TABLE 2: Suggested Maximum Capacitor Ratings for T-Frame NEMA Class B Motors

Induction motor rating (HP)	NOMINAL MOTOR SPEED											
	3600 R/MIN		1800 R/MIN		1200 R/MIN		900 R/MIN		720 R/MIN		600 R/MIN	
	Capacitor rating (kvar)	Line current reduction (%)	Capacitor rating (kvar)	Line current reductions (%)	Capacitor rating (kvar)	Line current reduction (%)	Capacitor rating (kvar)	Line current reduction (%)	Capacitor rating (kvar)	Line current reduction (%)	Capacitor rating (kvar)	Line current reduction (%)
3	1.5	14	1.5	23	2.5	28	3	38	3	40	4	40
5	2	14	2.5	22	3	26	4	31	4	40	5	40
7.5	2.5	14	3	20	4	21	5	28	5	38	6	45
10	4	14	4	18	5	21	6	27	7.5	36	8	38
15	5	12	5	18	6	20	7.5	24	8	32	10	34
20	6	12	6	17	7.5	19	9	23	12	25	18	30
25	7.5	12	7.5	17	8	19	10	23	12	25	18	30
30	8	11	8	16	10	19	14	22	15	24	22.5	30
40	12	12	13	15	16	19	18	21	22.5	24	25	30
50	15	12	18	15	20	19	22.5	21	24	24	30	30
60	18	12	21	14	22.5	17	26	20	30	22	35	28
75	20	12	23	14	25	15	28	17	33	14	40	19
100	22.5	11	30	14	30	12	35	16	40	15	45	17
125	25	10	36	12	35	12	42	14	45	15	50	17
150	30	10	42	12	40	12	52.5	14	52.5	14	60	17
200	35	10	50	11	50	10	65	13	68	13	90	17
250	40	11	60	10	62.5	10	82	13	87.5	13	100	17
300	45	11	68	10	75	12	100	14	100	13	120	17
350	50	12	75	8	90	12	120	13	120	13	135	15
400	75	10	80	8	100	12	130	13	140	13	150	15
450	80	8	90	8	120	10	140	12	160	14	160	15
500	100	8	120	9	150	12	160	12	180	13	180	15

Applies to three-phase, 60Hz motors when switched with capacitors as a single unit.

Another method of selecting the proper capacitor employs the use of only a selection chart shown in Table 2 or 3. These tables take other variables such as motor RPM into consideration in making recommendations for capacitor applications. They are convenient because they only require that the user know the horsepower and RPM of the motor. Both tables estimate the percentage reduction in full load current drawn by the motor as a result of the capacitor's installation.

WARNING!

Never oversize capacitors or exceed 1.0 power factor or resulting problems with the motor can occur!!

If calculations or a kvar determination chart indicate a kvar rating not found in a pricing and selection chart, always refer to the next lower kvar rating!

EXAMPLE: A manufacturer needs to determine the proper capacitors required for a 1200 RPM, 75HP T-Frame NEMA class B motor.
1. First find 75 in the horsepower column of the chart.
2. Locate the 1200 RPM capacitor rating (kvar) column. Note the figure of 25 kvar.
3. Now refer to the appropriate pricing and selection chart Table 1, page 19.5. The appropriate kvar rating is 25 kvar. Depending on the desired enclosure, the price and catalog number can then be easily determined.

NOTE

Using the above charts for selecting capacitors will correct power factor to approximately .95.

TABLE 3: Suggested Maximum Capacitor Ratings for U-Frame NEMA Class B Motors

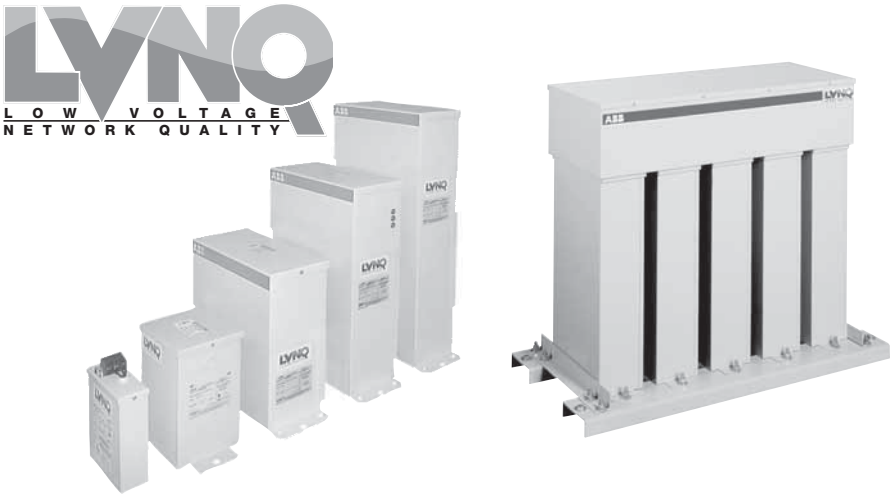
NEMA Motor Design A or B
Normal Starting Torque
Normal Running Current

H.P. Rating	3600 RPM		1800 RPM		1200 RPM		900 RPM		720 RPM		600 RPM	
	kvar	%AR	kvar	%AR	kvar	%AR	kvar	%AR	kvar	%AR	kvar	%AR
3	1.5	14	1.5	15	1.5	20	2	27	2.5	35	3.5	41
5	2	12	2	13	2	17	3	25	4	32	4.5	37
7.5	2.5	11	2.5	13	2	15	4	22	5.5	30	6	34
10	3	10	3	11	3.5	14	5	21	6.5	27	7.5	31
15	4	9	4	10	5	13	6.5	18	8	23	9.5	27
20	5	9	5	10	5	11	7.5	18	10	20	10	25
25	5	6	5	8	7.5	11	7.5	13	10	20	10	21
30	5	5	5	8	7.5	11	10	15	15	22	15	25
40	7.5	8	10	8	10	10	15	16	15	18	15	20
50	10	7	10	8	10	9	15	12	20	15	25	22
60	10	6	10	8	15	10	15	11	20	15	25	20
75	15	7	15	8	15	9	20	11	30	15	40	20
100	20	8	20	8	25	9	30	11	40	14	45	18
125	20	6	25	7	30	9	30	10	45	14	50	17
150	30	6	30	7	35	9	40	10	50	17	60	17
200	40	6	40	7	45	8	55	11	60	12	75	17
250	45	5	45	6	60	9	70	10	75	12	100	17
300	50	5	50	6	75	9	75	9	80	12	105	17

Applies to three-phase, 60Hz motors when switched with capacitors as a single unit.

Individual & fixed capacitor banks

Individual & fixed bank
Capacitors



Description

- **High reliability**
  Well proven features of ABB dry type power factor correction capacitor technology are incorporated into individual and fixed bank designs.
- **Very low losses**
  Capacitor total losses are less than 0.5 watts per kvar.
- **Discharge mechanism**
  Carbon filament or wire-wound resistors sized to automatically discharge the capacitor to less than 50 volts in under one minute.
- **Tolerance on capacitance**
  0%, +15%
- **Overcurrent tolerance**
  135% of rated current, continuously
- **Overvoltage tolerance**
  110% of rated voltage, continuously
- **Standard ambient temperature range**
  -40°C to +40°C (-40°F to +104°F)
- **Internal cables and insulation**
  All internal conductors utilize stranded, tin plated copper wire. Insulation is fire-retardant, rated 105°C (220°F).
- **Complete environmental acceptability**
  ABB capacitors have a dry type dielectric with no free liquid and do not pose any risk of leakage or pollution of the environment. Therefore, employee safety training and maintenance of Material Safety Data Sheets are not required with these capacitors.
- **Unique sequential protection system**
  Patented system ensures that each individual capacitor element is selectively and reliably disconnected from the circuit at the end of its life.

continued next page

General information
Catalog numbering explanation

Fuse protection
- ABB capacitors are provided with patented IPE (Internally Protected Elements) which is an integral and important part of the Sequential Protection System. Additional fuses are NOT required for protection of ABB capacitor elements, but external overcurrent protection may be needed for the installation in order to meet the National Electric Code requirements concerning protection of the conductors feeding the capacitors.

Long life
Low losses and the self-healing properties of ABB capacitor elements help to guarantee the long operating life of individual and fixed capacitor banks from ABB.

Safety
Vermiculite, a nonflammable and nontoxic material, safely absorbs any energy produced within the capacitor enclosure.

Approvals
- UL, CE and CSA approved
  - UL File #E135667
  - CSA File #LR88616
- Complies with applicable requirements of IEC, NEC®, NEMA CP-1, ANSI and IEEE std. 18.

Factory modifications
- Mounting brackets
- Terminal connected fuses & blown fuse indication
- State indication

NOTE: National Electric Code® and NEC® are registed trademarks of the National Fire Protection Association, Inc., Quincy, MA 02269

ABB Capacitor catalog numbering system

C 48 4 G 2.5 - 2LF

- **Factory modifications**
- **kvar rating**
- **Enclosure type – *G*=NEMA 1, *R*=NEMA 3R, *D*=NEMA 12**
- **Enclosure size – *4*=43, *5*=53, *6*=63, *8*=83, *9*=93**
- **Voltage – *20*=208V, *24*=240V, *48*=480V, *60*=600V**
- **Capacitor type – *C*=Individual, *F*=Fixed bank, *P*=Pump jack**

Individual capacitors
3 phase ①
240 Volt, 60 Hz

ABB's standard capacitor is suitable for general power factor correction applications, for connection directly at the reactive source.
Features include:

- Dry, environmentally safe construction
- Self healing capability
- Patented **I**nternal **P**rotected **E**lements
- NEMA 1, 3R, 12
- Easy electrical connection to large terminals
- Convenient grounding lug
- Mounting feet for easy installation
- Suitable for floor or wall mounting

240 Volt, 60 Hz — 3-Phase

Enclosure size	kvar rating	Rated current per phase (amps)	Approx. shipping weight (lbs.)	Enclosure type: Indoor – NEMA 1 Catalog number	Indoor – NEMA 1 List price	Outdoor – NEMA 3R Catalog number	Outdoor – NEMA 3R List price	Indoor – NEMA 12 Catalog number	Indoor – NEMA 12 List price
43	1	2.4	8	C244G1	**$ 134**	C244R1	**$ 145**	C244D1	**$ 145**
	1.5	3.6	8	C244G1.5	**139**	C244R1.5	**150**	C244D1.5	**150**
	2	4.8	8	C244G2	**144**	C244R2	**155**	C244D2	**155**
	2.5	6.0	8	C244G2.5	**161**	C244R2.5	**172**	C244D2.5	**172**
	3	7.2	8	C244G3	**168**	C244R3	**179**	C244D3	**179**
	3.5	8.4	8	C244G3.5	**177**	C244R3.5	**188**	C244D3.5	**188**
	4	9.6	8	C244G4	**193**	C244R4	**204**	C244D4	**204**
	5	12.0	8	C244G5	**203**	C244R5	**214**	C244D5	**214**
	6	14.4	8	C244G6	**225**	C244R6	**236**	C244D6	**236**
	7	16.8	8	C244G7	**257**	C244R7	**268**	C244D7	**268**
	7.5	18.0	8	C244G7.5	**263**	C244R7.5	**274**	C244D7.5	**274**
	8	19.2	8	C244G8	**268**	C244R8	**279**	C244D8	**279**
	9	21.7	8	C244G9	**278**	C244R9	**289**	C244D9	**289**
	10	24.1	8	C244G10	**289**	C244R10	**300**	C244D10	**300**
	11	26.5	13	C244G11	**305**	C244R11	**316**	C244D11	**316**
	12	28.9	13	C244G12	**332**	C244R12	**343**	C244D12	**343**
	12.5	30.1	13	C244G12.5	**342**	C244R12.5	**353**	C244D12.5	**353**
	14	33.7	8	C244G14	**353**	C244R14	**364**	C244D14	**364**
	15	36.1	8	C244G15	**375**	C244R15	**386**	C244D15	**386**
	17	40.8	22	C244G17	**407**	C244R17	**418**	C244D17	**418**
	20	48.1	22	C244G20	**449**	C244R20	**460**	C244D20	**460**
53	22.5	54.1	23	C245G22.5	**471**	C245R22.5	**482**	C245D22.5	**482**
	25	60.1	23	C245G25	**503**	C245R25	**514**	C245D25	**514**
	30	72.2	23	C245G30	**556**	C245R30	**568**	C245D30	**568**
	35	84.2	25	C245G35	**610**	C245R35	**621**	C245D35	**621**
	40	96.2	25	C245G40	**696**	C245R40	**707**	C245D40	**707**
63	45	108.3	34	C246G45	**813**	C246R45	**825**	C246D45	**825**
	50	120.3	34	C246G50	**888**	C246R50	**899**	C246D50	**899**
	55	132.3	37	C246G55	**1124**	C246R55	**1135**	C246D55	**1135**
	60	144.3	37	C246G60	**1177**	C246R60	**1188**	C246D60	**1188**
	70	168.4	39	C246G70	**1298**	C246R70	**1309**	C246D70	**1309**
	80	192.6	43	C246G80	**1435**	C246R80	**1446**	C246D80	**1446**

Capacitor state indication system

240V kvar	LEDs catalog number suffix	List price
1 – 15		**$ 91**
17 – 30	-2LE	**102**
35 – 60	-2LF	**113**
70 – 80		**225**

The capacitor state indication system consists of two yellow LED lights which illuminate only when the capacitor is energized and functioning at 65% or more of its rated kvar capacity.

The two light system will indicate a failure in any one of the three phases of the capacitor.

208 Volt availability

For 208 volt applications, derate the 240V capacitors. The kvar at 208V will be .75 times the kvar at 240V.

NOTE: ABB's patented IPE design eliminates the need for additional overcurrent protection when capacitors are electrically connected on the load side of a motor starter circuit breaker or fusible disconnect switch.

Optional mounting for individual capacitors

Type	Enclosure sizes	Catalog number
Wall mounting kit ②	43-93	WM83K
Rack mounting style enclosure	53-93	Cat # suffix -RM

① For single phase capacitors, please consult your ABB representative.
② When the wall mounting kit is used with enclosure sizes 63, 83 & 93, it is recommended to order the rack style enclosure.

Individual capacitors
3-phase ①
480 Volt, 60 Hz

480 Volt, 60 Hz — 3-Phase

Enclosure size	kvar rating	Rated current per phase (amps)	Approx. shipping weight (lbs.)	Enclosure type					
				Indoor – NEMA 1		Outdoor – NEMA 3R		Indoor – NEMA 12	
				Catalog number	List price	Catalog number	List price	Catalog number	List price
43	1.5	1.8	8	C484G1.5	**$ 134**	C484R1.5	**$ 145**	C484D1.5	**$ 145**
	2	2.4	8	C484G2	**139**	C484R2	**150**	C484D2	**150**
	2.5	3.0	8	C484G2.5	**144**	C484R2.5	**155**	C484D2.5	**155**
	3	3.6	8	C484G3	**150**	C484R3	**161**	C484D3	**161**
	4	4.8	8	C484G4	**152**	C484R4	**163**	C484D4	**163**
	5	6.0	8	C484G5	**161**	C484R5	**172**	C484D5	**172**
	6	7.2	8	C484G6	**171**	C484R6	**182**	C484D6	**182**
	7.5	9.0	8	C484G7.5	**187**	C484R7.5	**198**	C484D7.5	**198**
	8	9.6	8	C484G8	**193**	C484R8	**204**	C484D8	**204**
	9	10.8	8	C484G9	**203**	C484R9	**214**	C484D9	**214**
	10	12.0	8	C484G10	**214**	C484R10	**225**	C484D10	**225**
	12	14.4	13	C484G12	**225**	C484R12	**236**	C484D12	**236**
	12.5	15.0	13	C484G12.5	**230**	C484R12.5	**241**	C484D12.5	**241**
	13	15.6	13	C484G13	**241**	C484R13	**252**	C484D13	**252**
	13.5	16.2	13	C484G13.5	**246**	C484R13.5	**257**	C484D13.5	**257**
	14	16.8	8	C484G14	**251**	C484R14	**262**	C484D14	**262**
	15	18.0	8	C484G15	**257**	C484R15	**268**	C484D15	**268**
	16	19.2	13	C484G16	**262**	C484R16	**273**	C484D16	**273**
	17	20.4	13	C484G17	**268**	C484R17	**279**	C484D17	**279**
	17.5	21.0	13	C484G17.5	**273**	C484R17.5	**284**	C484D17.5	**284**
	18	21.7	13	C484G18	**278**	C484R18	**289**	C484D18	**289**
	19	22.8	13	C484G19	**284**	C484R19	**295**	C484D19	**295**
	20	24.1	13	C484G20	**294**	C484R20	**305**	C484D20	**305**
	21	25.3	13	C484G21	**310**	C484R21	**321**	C484D21	**321**
	22	26.5	13	C484G22	**316**	C484R22	**327**	C484D22	**327**
	22.5	27.1	13	C484G22.5	**321**	C484R22.5	**332**	C484D22.5	**332**
	24	28.9	13	C484G24	**332**	C484R24	**343**	C484D24	**343**
	25	30.1	13	C484G25	**337**	C484R25	**348**	C484D25	**348**
	27	32.5	13	C484G27	**353**	C484R27	**364**	C484D27	**364**
	30	36.1	13	C484G30	**369**	C484R30	**380**	C484D30	**380**
53	32.5	39.1	14	C485G32.5	**385**	C485R32.5	**397**	C485D32.5	**397**
	35	42.1	23	C485G35	**412**	C485R35	**423**	C485D35	**423**
	37.5	45.1	23	C485G37.5	**428**	C485R37.5	**439**	C485D37.5	**439**
	40	48.1	23	C485G40	**444**	C485R40	**456**	C485D40	**456**
	42.5	51.1	23	C485G42.5	**460**	C485R42.5	**472**	C485D42.5	**472**
	45	54.1	25	C485G45	**476**	C485R45	**588**	C485D45	**588**
	47.5	57.1	25	C485G47.5	**487**	C485R47.5	**498**	C485D47.5	**498**
	50	60.1	25	C485G50	**492**	C485R50	**504**	C485D50	**504**
63	52.5	63.1	37	C486G52.5	**514**	C486R52.5	**525**	C486D52.5	**525**
	55	66.2	37	C486G55	**530**	C486R55	**541**	C486D55	**541**
	57.5	69.2	37	C486G57.5	**551**	C486R57.5	**562**	C486D57.5	**562**
	60	72.2	37	C486G60	**562**	C486R60	**573**	C486D60	**573**
	62.5	75.2	37	C486G62.5	**578**	C486R62.5	**589**	C486D62.5	**589**
	65	78.2	37	C486G65	**599**	C486R65	**610**	C486D65	**610**
	70	84.2	39	C486G70	**621**	C486R70	**632**	C486D70	**632**
	75	90.2	39	C486G75	**685**	C486R75	**696**	C486D75	**696**
	77.5	93.2	39	C486G77.5	**728**	C486R77.5	**739**	C486D77.5	**739**
83	80	96.2	56	C488G80	**749**	C488R80	**760**	C488D80	**760**
	85	102.2	56	C488G85	**792**	C488R85	**803**	C488D85	**803**
	87.5	105.2	56	C488G87.5	**835**	C488R87.5	**846**	C488D87.5	**846**
	90	108.3	56	C488G90	**872**	C488R90	**883**	C488D90	**883**
	95	114.3	56	C488G95	**904**	C488R95	**915**	C488D95	**915**
	100	120.3	56	C488G100	**920**	C488R100	**931**	C488D100	**931**
	105	126.3	59	C488G105	**1030**	C488R105	**1041**	C488D105	**1041**
	110	132.3	61	C488G110	**1033**	C488R110	**1053**	C488D110	**1093**
	115	138.3	76	C488G115	**1105**	C488R115	**1116**	C488D115	**1116**
	120	144.3	76	C488G120	**1128**	C488R120	**1139**	C488D120	**1139**

Mounting options

For mounting options, see page 20.9. Base mounting is standard.

Capacitor state indication

See page 20.11.

NOTE: ABB's patented IPE design eliminates the need for additional overcurrent protection when capacitors are electrically connected on the load side of a motor starter circuit breaker or fusible disconnect switch.

① For single phase capacitors, please consult your ABB representative.

Individual capacitors
3 phase ①
600 Volt, 60 Hz

Low Voltage Network Quality

600 Volt, 60 Hz — 3 phase

Enclosure size	kvar rating	Rated current per phase (amps)	Approx. shipping weight (lbs.)	Enclosure type					
				Indoor – NEMA 1		Outdoor – NEMA 3R		Indoor – NEMA 12	
				Catalog number	List price	Catalog number	List price	Catalog number	List price
43	2.2	1.9	8	C604G2.2	**$ 144**	C604R2.2	**$ 155**	C604D2.2	**155**
	3	2.9	8	C604G3	**150**	C604R3	**161**	C604D3	**161**
	4	3.8	8	C604G4	**155**	C604R4	**166**	C604D4	**166**
	5	4.8	8	C604G5	**166**	C604R5	**177**	C604D5	**177**
	7.5	7.2	8	C604G7.5	**203**	C604R7.5	**214**	C604D7.5	**214**
	10	9.6	8	C604G10	**225**	C604R10	**236**	C604D10	**236**
	14	13.5	8	C604G14	**246**	C604R14	**257**	C604D14	**257**
	15	14.4	8	C604G15	**251**	C604R15	**262**	C604D15	**262**
	17.5	16.8	13	C604G17.5	**289**	C604R17.5	**300**	C604D17.5	**300**
	20	19.2	13	C604G20	**305**	C604R20	**316**	C604D20	**316**
	25	24.1	13	C604G25	**332**	C604R25	**343**	C604D25	**343**
	30	28.9	13	C604G30	**364**	C604R30	**375**	C604D30	**375**
53	35	33.7	25	C605G35	**417**	C605R35	**428**	C605D35	**428**
	40	38.5	25	C605G40	**449**	C605R40	**460**	C605D40	**460**
	45	43.3	25	C605G45	**492**	C605R45	**503**	C605D45	**503**
	50	48.1	35	C605G50	**535**	C605R50	**546**	C605D50	**546**
63	60	57.7	37	C606G60	**589**	C606R60	**600**	C606D60	**600**
	70	67.4	39	C606G70	**642**	C606R70	**653**	C606D70	**653**
	75	72.2	39	C606G75	**696**	C606R75	**707**	C606D75	**707**
	80	77.0	39	C606G80	**770**	C606R80	**781**	C606D80	**781**
83	90	86.6	54	C608G90	**877**	C608R90	**888**	C608D90	**888**
	95	91.4	54	C608G95	**910**	C608R95	**921**	C608D95	**921**
	100	96.2	56	C608G100	**963**	C608R100	**974**	C608D100	**974**
	105	101.0	59	C608G105	**992**	C608R105	**1003**	C608D105	**1003**
	110	105.8	61	C608G110	**1050**	C608R110	**1061**	C608D110	**1061**
	115	110.7	76	C608G115	**1074**	C608R115	**1085**	C608D115	**1085**
	120	115.5	76	C608G120	**1092**	C608R120	**1103**	C608D120	**1103**
	125	120.3	76	C608G125	**1275**	C608R125	**1286**	C608D125	**1286**
	130	125.1	76	C608G130	**1342**	C608R130	**1353**	C608D130	**1353**
	135	129.9	76	C608G135	**1355**	C608R135	**1366**	C608D135	**1366**

Capacitor state indication system

480V & 600V kvar	LEDs catalog number suffix	List price
1 – 30		**$ 91**
32.5 – 60	-2LE	**102**
62.5 – 100	-2LF	**112**
105 – 135		**225**

The capacitor state indication system consists of two yellow LED lights which illuminate only when the capacitor is energized and functioning at 65% or more of its rated kvar capacity.

The two light system will indicate a failure in any one of the three phases of the capacitor.

NOTE: ABB's patented IPE design eliminates the need for additional overcurrent protection when capacitors are electrically connected on the load side of a motor starter circuit breaker or fusible disconnect switch.

Mounting options

For mounting options, see page 20.9. Base mounting is standard.

① For single phase capacitors, please consult your ABB representative

Low Voltage Network Quality

Individual capacitors
with fuses and blown fuse indicators, 3 phase 240 Volt, 60 Hz

ABB low voltage capacitors are fully protected by the three levels of protection offered by the patented Sequential Protection System which includes dry self-healing capacitors, internally protected elements and the dry non-flammable vermiculite filler. However, some users have traditionally requested external fuses and blown fuse indicators, so these modified units are offered for those applications.

Features include:

- Dry, environmentally safe construction
- Self healing capability
- Patented **I**nternal **P**rotected **E**lements
- NEMA 1, 3R, 12
- Easy electrical connection to large terminals
- Convenient grounding lug
- Mounting feet for easy installation
- Suitable for floor or wall mounting
- Includes three fuses and three blown fuse indication lamps

240 Volt, 60 Hz — 3 phase

Enclosure size	kvar rating	Rated current per phase (amps)	Fuse amps/ type	Approx. shipping weight (lbs.)	Enclosure type					
					Indoor – NEMA 1		Outdoor – NEMA 3R		Indoor – NEMA 12	
					Catalog number	List price	Catalog number	List price	Catalog number	List price
43	1	2.4	6/CC	8	C244G1-3FI	**$ 203**	C244R1-3FI	**$ 214**	C244D1-3FI	**$ 214**
	1.5	3.6	10/CC	8	C244G1.5-3FI	**219**	C244R1.5-3FI	**230**	C244D1.5-3FI	**230**
	2	4.8	12/CC	8	C244G2-3FI	**225**	C244R2-3FI	**236**	C244D2-3FI	**236**
	2.5	6.0	15/CC	8	C244G2.5-3FI	**230**	C244R2.5-3FI	**241**	C244D2.5-3FI	**241**
	3	7.2	20/CC	8	C244G3-3FI	**235**	C244R3-3FI	**246**	C244D3-3FI	**246**
	3.5	8.4	20/CC	8	C244G3.5-3FI	**246**	C244R3.5-3FI	**257**	C244D3.5-3FI	**257**
	4	9.6	25/CC	8	C244G4-3FI	**268**	C244R4-3FI	**279**	C244D4-3FI	**279**
	5	12.0	30/CC	8	C244G5-3FI	**289**	C244R5-3FI	**300**	C244D5-3FI	**300**
	6	14.4	45/T	8	C244G6-3FI	**300**	C244R6-3FI	**311**	C244D6-3FI	**311**
	7	16.8	50/T	8	C244G7-3FI	**321**	C244R7-3FI	**332**	C244D7-3FI	**332**
	7.5	18.0	60/T	8	C244G7.5-3FI	**332**	C244R7.5-3FI	**343**	C244D7.5-3FI	**343**
	8	19.2	60/T	8	C244G8-3FI	**353**	C244R8-3FI	**364**	C244D8-3FI	**364**
	9	21.7	50/KGJ	14	C245G9-3FI	**375**	C245R9-3FI	**386**	C245D9-3FI	**386**
	10	24.1	50/KGJ	14	C245G10-3FI	**396**	C245R10-3FI	**407**	C245D10-3FI	**407**
	11	26.5	60/KGJ	14	C245G11-3FI	**417**	C245R11-3FI	**428**	C245D11-3FI	**428**
	12	28.9	60/KGJ	14	C245G12-3FI	**449**	C245R12-3FI	**460**	C245D12-3FI	**460**
	12.5	30.1	60/KGJ	14	C245G12.5-3FI	**471**	C245R12.5-3FI	**482**	C245D12.5-3FI	**482**
	14	33.7	75/KGJ	14	C245G14-3FI	**492**	C245R14-3FI	**503**	C245D14-3FI	**503**
53	15	36.1	80/KGJ	14	C246G15-3FI	**503**	C246R15-3FI	**514**	C246D15-3FI	**514**
	17	40.9	80/KGJ	23	C246G17-3FI	**556**	C246R17-3FI	**567**	C246D17-3FI	**567**
	20	48.1	125/KGJ	23	C246G20-3FI	**589**	C246R20-3FI	**600**	C246D20-3FI	**600**
	22.5	54.2	125/KGJ	23	C246G22.5-3FI	**642**	C246R22.5-3FI	**653**	C246D22.5-3FI	**653**
	25	60.1	150/KGJ	23	C246G25-3FI	**696**	C246R25-3FI	**707**	C246D25-3FI	**707**
	30	72.2	175/KGJ	23	C246G30-3FI	**803**	C246R30-3FI	**814**	C246D30-3FI	**814**
	35	84.2	200/KGJ	23	C246G35-3FI	**883**	C246R35-3FI	**894**	C246D35-3FI	**894**
	40	96.2	225/KGJ	25	C246G40-3FI	**1017**	C246R40-3FI	**1028**	C246D40-3FI	**1028**
63	45	108.3	250/KGJ	34	C248G45-3FI	**1124**	C248R45-3FI	**1135**	C248D45-3FI	**1135**
	50	120.3	250/KGJ	34	C248G50-3FI	**1231**	C248R50-3FI	**1242**	C248D50-3FI	**1242**
	55	132	250/KGJ	37	C248G55-3FI	**1311**	C248R55-3FI	**1322**	C248D55-3FI	**1322**
	60	144.3	250/KGJ	37	C248G60-3FI	**1418**	C248R60-3FI	**1429**	C248D60-3FI	**1429**

208 Volt availability

For 208 volt applications, derate the 240V capacitors. The kvar at 208V will be .75 times the kvar at 240V.

NOTE: ABB's patented IPE design eliminates the need for additional overcurrent protection when capacitors are electrically connected on the load side of a motor starter circuit breaker or fusible disconnect switch.

Optional mounting for individual capacitors

Type	Enclosure sizes	Catalog number
Wall mounting kit ①	43-93	WM83K
Rack mounting style enclosure ①	53-93	Cat # suffix -RM

① When the wall mounting kit is used with enclosure sizes 63, 83 & 93, it is recommended to order the rack style enclosure.

Individual capacitors
with fuses and blown fuse indicators, 3 phase 480 Volt, 60 Hz

Low Voltage Network Quality

480 Volt, 60 Hz — 3 phase

Enclosure size	kvar rating	Rated current per phase (amps)	Fuse amps/ type	Approx. shipping weight (lbs.)	Enclosure type					
					Indoor – NEMA 1		Outdoor – NEMA 3R		Indoor – NEMA 12	
					Catalog number	List price	Catalog number	List price	Catalog number	List price
43	1.5	1.8	5/CC	8	C484G1.5-3FI	$ 209	C484R1.5-3FI	$ 220	C484D1.5-3FI	$ 220
	2	2.4	6/CC	8	C484G2-3FI	211	C484R2-3FI	222	C484D2-3FI	222
	2.5	3.0	8/CC	8	C484G2.5-3FI	214	C484R2.5-3FI	225	C484D2.5-3FI	225
	3	3.6	10/CC	8	C484G3-3FI	216	C484R3-3FI	227	C484D3-3FI	227
	4	4.8	12/CC	8	C484G4-3FI	219	C484R4-3FI	230	C484D4-3FI	230
	5	6.0	15/CC	8	C484G5-3FI	221	C484R5-3FI	232	C484D5-3FI	232
	6	7.2	20/CC	8	C484G6-3FI	230	C484R6-3FI	241	C484D6-3FI	241
	7.5	9.0	25/CC	8	C484G7.5-3FI	257	C484R7.5-3FI	268	C484D7.5-3FI	268
	8	9.6	25/CC	8	C484G8-3FI	273	C484R8-3FI	284	C484D8-3FI	284
	9	10.8	30/CC	8	C484G9-3FI	284	C484R9-3FI	295	C484D9-3FI	295
	10	12.0	30/CC	8	C484G10-3FI	294	C484R10-3FI	305	C484D10-3FI	305
	12	14.4	45/T	13	C484G12-3FI	300	C484R12-3FI	311	C484D12-3FI	311
	12.5	15.0	45/T	13	C484G12.5-3FI	305	C484R12.5-3FI	316	C484D12.5-3FI	316
	13	15.6	50/T	13	C484G13-3FI	310	C484R13-3FI	321	C484D13-3FI	321
	13.5	16.2	50/T	13	C484G13.5-3FI	312	C484R13.5-3FI	323	C484D13.5-3FI	323
	14	16.8	50/T	8	C484G14-3FI	316	C484R14-3FI	327	C484D14-3FI	327
	15	18.0	60/T	8	C484G15-3FI	326	C484R15-3FI	337	C484D15-3FI	337
	16	19.2	60/T	13	C484G16-3FI	332	C484R16-3FI	343	C484D16-3FI	343
53	17	20.4	50/KGJ	14	C485G17-3FI	342	C485R17-3FI	353	C485D17-3FI	353
	17.5	21.0	50/KGJ	14	C485G17.5-3FI	353	C485R17.5-3FI	364	C485D17.5-3FI	364
	18	21.7	50/KGJ	14	C485G18-3FI	364	C485R18-3FI	375	C485D18-3FI	375
	19	22.8	50/KGJ	14	C485G19-3FI	375	C485R19-3FI	386	C485D19-3FI	386
	20	24.1	50/KGJ	14	C485G20-3FI	385	C485R20-3FI	396	C485D20-3FI	396
	21	25.3	60/KGJ	14	C485G21-3FI	391	C485R21-3FI	402	C485D21-3FI	402
	22	26.5	60/KGJ	14	C485G22-3FI	396	C485R22-3FI	407	C485D22-3FI	407
	22.5	27.1	60/KGJ	14	C485G22.5-3FI	407	C485R22.5-3FI	418	C485D22.5-3FI	418
	24	28.9	60/KGJ	14	C485G24-3FI	417	C485R24-3FI	428	C485D24-3FI	428
	25	30.1	75/KGJ	14	C485G25-3FI	428	C485R25-3FI	439	C485D25-3FI	439
	27	32.5	75/KGJ	14	C485G27-3FI	449	C485R27-3FI	460	C485D27-3FI	460
63	30	36.1	80/KGJ	14	C486G30-3FI	482	C486R30-3FI	493	C486D30-3FI	493
	32.5	39.1	100/KGJ	14	C486G32.5-3FI	508	C486R32.5-3FI	519	C486D32.5-3FI	519
	35	42.1	100/KGJ	23	C486G35-3FI	535	C486R35-3FI	546	C486D35-3FI	546
	37.5	45.1	100/KGJ	23	C486G37.5-3FI	546	C486R37.5-3FI	557	C486D37.5-3FI	557
	40	48.1	125/KGJ	23	C486G40-3FI	556	C486R40-3FI	567	C486D40-3FI	567
	42.5	51.1	125/KGJ	23	C486G42.5-3FI	589	C486R42.5-3FI	600	C486D42.5-3FI	600
	45	54.1	125/KGJ	25	C486G45-3FI	621	C486R45-3FI	632	C486D45-3FI	632
	47.5	57.1	125/KGJ	25	C486G47.5-3FI	642	C486R47.5-3FI	653	C486D47.5-3FI	653
	50	60.1	150/KGJ	25	C486G50-3FI	663	C486R50-3FI	674	C486D50-3FI	674
83	52.5	63.1	150/KGJ	37	C488G52.5-3FI	685	C488R52.5-3FI	696	C488D52.5-3FI	696
	55	66.2	150/KGJ	37	C488G55-3FI	706	C488R55-3FI	717	C488D55-3FI	717
	57.5	69.2	150/KGJ	37	C488G57.5-3FI	728	C488R57.5-3FI	739	C488D57.5-3FI	739
	60	72.2	175/KGJ	37	C488G60-3FI	738	C488R60-3FI	749	C488D60-3FI	749
	62.5	75.2	175/KGJ	37	C488G62.5-3FI	765	C488R62.5-3FI	776	C488D62.5-3FI	776
	65	78.2	175/KGJ	37	C488G65-3FI	770	C488R65-3FI	781	C488D65-3FI	781
	70	84.2	200/KGJ	39	C488G70-3FI	792	C488R70-3FI	803	C488D70-3FI	803
	75	90.2	200/KGJ	41	C488G75-3FI	813	C488R75-3FI	824	C488D75-3FI	824
	77.5	93.2	200/KGJ	41	C486G77.5-3FI	829	C488R77.5-3FI	840	C488D77.5-3FI	840
93	80	96.2	225/KGJ	56	C489G80-3FI	856	C489R80-3FI	867	C489D80-3FI	867
	85	102.2	225/KGJ	56	C489G85-3FI	910	C489R85-3FI	921	C489D85-3FI	921
	87.5	105.2	225/KGJ	56	C489G87.5-3FI	936	C489R87.5-3FI	948	C489D87.5-3FI	948
	90	108.3	225/KGJ	56	C489G90-3FI	963	C489R90-3FI	974	C489D90-3FI	974
	95	114.3	250/KGJ	56	C489G95-3FI	1000	C489R95-3FI	1012	C489D95-3FI	1012
	100	120.3	250/KGJ	56	C489G100-3FI	1033	C489R100-3FI	1044	C489D100-3FI	1044
	105	126.3	250/KGJ	59	C489G105-3FI	1376	C489R105-3FI	1387	C489D105-3FI	1387
	110	132.3	250/KGJ	61	C489G110-3FI	1410	C489R110-3FI	1421	C489D110-3FI	1421
	115	138.3	250/KGJ	76	C489G115-3FI	1451	C489R115-3FI	1462	C489D115-3FI	1462
	120	144.3	300/KGJ	76	C489G120-3FI	1495	C489R120-3FI	1506	C489D120-3FI	1506

NOTE: ABB's patented IPE design eliminates the need for additional overcurrent protection when capacitors are electrically connected on the load side of a motor starter circuit breaker or fusible disconnect switch.

Mounting options

For mounting options, see page 20.12. Base mounting is standard.

Individual capacitors
with fuses and blown fuse indicators, 3 phase 600 Volt, 60 Hz

600 Volt, 60 Hz — 3 phase

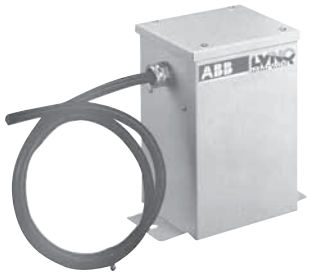
Enclosure size	kvar rating	Rated current per phase (amps)	Fuse amps/ type	Approx. shipping weight (lbs.)	Enclosure type					
					Indoor – NEMA 1		Outdoor – NEMA 3R		Indoor – NEMA 12	
					Catalog number	List price	Catalog number	List price	Catalog number	List price
43	2.2	2.1	6/CC	8	C604G2.2-3FI	**$ 225**	C604R2.2-3FI	**$ 236**	C604D2.2-3FI	**$ 236**
	3	2.9	8/CC	8	C604G3-3FI	**230**	C604R3-3FI	**241**	C604D3-3FI	**241**
	4	3.8	10/CC	8	C604G4-3FI	**235**	C604R4-3FI	**246**	C604D4-3FI	**246**
	5	4.8	12/CC	8	C604G5-3FI	**246**	C604R5-3FI	**257**	C604D5-3FI	**257**
	7.5	7.2	20/CC	8	C604G7.5-3FI	**278**	C604R7.5-3FI	**289**	C604D7.5-3FI	**289**
	10	9.6	25/CC	8	C604G10-3FI	**300**	C604R10-3FI	**311**	C604D10-3FI	**311**
	14	13.5	40/T	13	C604G14-3FI	**321**	C604R14-3FI	**332**	C604D14-3FI	**332**
	15	14.4	45/T	13	C604G15-3FI	**332**	C604R15-3FI	**343**	C604D15-3FI	**343**
	17.5	16.8	50/T	13	C604G17.5-3FI	**375**	C604R17.5-3FI	**386**	C604D17.5-3FI	**386**
	20	19.2	60/T	13	C604G20-3FI	**428**	C604R20-3FI	**439**	C604D20-3FI	**439**
53	25	24.1	50/KGJ	14	C605G25-3FI	**449**	C605R25-3FI	**460**	C605D25-3FI	**460**
	30	28.9	60/KGJ	14	C605G30-3FI	**503**	C605R30-3FI	**514**	C605D30-3FI	**514**
63	35	33.7	75/KGJ	25	C606G35-3FI	**556**	C606R35-3FI	**567**	C606D35-3FI	**567**
	40	38.5	80/KGJ	25	C606G40-3FI	**615**	C606R40-3FI	**626**	C606D40-3FI	**626**
	45	43.3	100/KGJ	25	C606G45-3FI	**642**	C606R45-3FI	**653**	C606D45-3FI	**653**
	50	48.1	125/KGJ	35	C606G50-3FI	**696**	C606R50-3FI	**707**	C606D50-3FI	**707**
83	60	57.7	125/KGJ	37	C608G60-3FI	**749**	C608R60-3FI	**760**	C608D60-3FI	**760**
	70	67.4	150/KGJ	39	C608G70-3FI	**803**	C608R70-3FI	**814**	C608D70-3FI	**814**
	75	72.3	175/KGJ	39	C608G75-3FI	**829**	C608R75-3FI	**840**	C608D75-3FI	**840**
	80	77.0	175/KGJ	39	C608G80-3FI	**910**	C608R80-3FI	**921**	C608D80-3FI	**921**
93	90	86.6	200/KGJ	56	C609G90-3FI	**1000**	C609R90-3FI	**1011**	C609D90-3FI	**1011**
	95	91.4	200/KGJ	56	C609G95-3FI	**1022**	C609R95-3FI	**1033**	C609D95-3FI	**1033**
	100	96.2	225/KGJ	56	C609G100-3FI	**1043**	C609R100-3FI	**1054**	C609D100-3FI	**1054**
	105	101.0	250/KGJ	59	C609G105-3FI	**1421**	C609R105-3FI	**1432**	C609D105-3FI	**1432**
	110	105.8	250/KGJ	61	C609G110-3FI	**1461**	C609R110-3FI	**1472**	C609D110-3FI	**1472**
	115	110.7	250/KGJ	76	C609G115-3FI	**1510**	C609R115-3FI	**1521**	C609D115-3FI	**1521**
	120	115.5	250/KGJ	76	C609G120-3FI	**1548**	C609R120-3FI	**1559**	C609D120-3FI	**1559**
	125	120.3	250/KGJ	76	C609G125-3FI	**1688**	C609R125-3FI	**1699**	C609D125-3FI	**1699**
	130	125.1	250/KGJ	76	C609G130-3FI	**1758**	C609R130-3FI	**1769**	C609D130-3FI	**1769**
	135	129.1	250/KGJ	76	C609G135-3FI	**1774**	C609R135-3FI	**1785**	C609D135-3FI	**1785**

NOTE: ABB's patented IPE design eliminates the need for additional overcurrent protection when capacitors are electrically connected on the load side of a motor starter circuit breaker or fusible disconnect switch.

Mounting options

For mounting options, see page 20.12. Base mounting is standard.

Individual capacitors
Pump jack
240 & 480 Volt, 60 Hz



P244R2.5

The CLMD-PJ capacitor is ideally suited for oil-field pumping units and other outdoor applications. Standard features include:

- Outdoor, weatherproof enclosure
- 4 feet of 10 gauge, 4-conductor wire for ease of installation
- Convenient pole-mounting design
- Lightweight, totally dry construction

Steel enclosure — 240 Volt, 60 Hz, 3 phase

Enclosure size	kvar rating	Approx. weight (lbs.)	Catalog number	List price
	2.5	8	P244R2.5	**$ 219**
	3.5	8	P244R3.5	**241**
	5	8	P244R5	**283**
43	10	8	P244R10	**305**
	12.5	13	P244R12.5	**364**
	14	8	P244R14	**412**
	15	8	P244R15	**433**

208 Volt availability

For 208 volt applications, derate the 240V capacitors. The kvar at 208V will be .75 times the kvar at 240V.

Steel enclosure – 480 Volt, 60 Hz, 3 phase

Enclosure size	kvar rating	Approx. weight (lbs.)	Catalog number	List price
	1.5	8	P484R1.5	**$ 193**
	2	8	P484R2	**198**
	3	8	P484R3	**209**
	4	8	P484R4	**219**
	5	8	P484R5	**230**
	6	8	P484R6	**241**
	7.5	8	P484R7.5	**246**
43	10	8	P484R10	**257**
	15	8	P484R15	**289**
	20	13	P484R20	**369**
	21	13	P484R21	**380**
	22.5	13	P484R22.5	**401**
	25	13	P484R25	**423**
	27	13	P484R27	**444**
	30	13	P484R30	**476**

NOTE: ABB's patented IPE design eliminates the need for additional overcurrent protection when capacitors are electrically connected on the load side of a motor starter circuit breaker or fusible disconnect switch.

Low Voltage Network Quality

Individual capacitors
Type CLMD-13
208, 240, 480 & 600 Volt, 60 Hz

C11G0.8

The CLMD-13 capacitor is ideally suited for use in motor control centers, control panels and other indoor applications. Standard features include:

- Indoor, steel enclosure
- Easy electrical connection by means of a terminal block mounted on top of the capacitor enclosure (#4 — #18GA)
- Convenient ground lug mounted on top of the capacitor enclosure
- Mounting feet for easy installation
- Lightweight, small dimensions, totally dry construction
- Options and accessories include remote state indication

208 Volt, 60 Hz, 3 phase

Enclosure size	kvar rating	Rated current per phase (amps)	Approx. shipping weight (lbs)	Enclosure type Indoor — NEMA 1 Catalog number	List price
13	0.8	2.2	6	C201G0.8	**$ 123**
	1.1	3.1	6	C201G1.1	**128**
	2	5.6	6	C201G2	**150**
	2.5	6.9	6	C201G2.5	**161**
	3	8.3	6	C201G3	**177**
	4	11.1	6	C201G4	**198**
	5	13.9	6	C201G5	**241**
	7.5	20.8	6	C201G7.5	**273**

240 Volt, 60 Hz, 3 phase

Enclosure size	kvar rating	Rated current per phase (amps)	Approx. shipping weight (lbs)	Enclosure type Indoor — NEMA 1 Catalog number	List price
13	1	2.4	6	C241G1	**$ 118**
	1.5	3.6	6	C241G1.5	**123**
	2	4.8	6	C241G2	**128**
	2.5	6.0	6	C241G2.5	**144**
	3.5	8.4	6	C241G3.5	**161**
	5	12.0	6	C241G5	**171**
	7.5	18.0	6	C241G7.5	**219**
	10	24.1	6	C241G10	**257**

480 Volt, 60 Hz, 3 phase

Enclosure size	kvar rating	Rated current per phase (amps)	Approx. shipping weight (lbs)	Enclosure type Indoor — NEMA 1 Catalog number	List price
13	0.9	1.1	6	C481G0.9	**$ 118**
	1.5	1.8	6	C481G1.5	**128**
	2	2.4	6	C481G2	**134**
	2.5	3.0	6	C481G2.5	**139**
	3.5	4.2	6	C481G3.5	**155**
	4	4.8	6	C481G4	**157**
	5	6.0	6	C481G5	**166**
	6	7.2	6	C481G6	**171**
	7.5	9.0	6	C481G7.5	**177**
	8	9.6	6	C481G8	**182**
	9	10.8	6	C481G9	**187**
	10	12.0	6	C481G10	**193**
	14	16.8	6	C481G14	**203**
	15	18.0	6	C481G15	**214**
	17	20.4	6	C481G17	**225**

600 Volt, 60 Hz, 3 phase

Enclosure size	kvar rating	Rated current per phase (amps)	Approx. shipping weight (lbs)	Enclosure type Indoor — NEMA 1 Catalog number	List price
13	2	1.9	6	C601G2	**$ 144**
	3	2.9	6	C601G3	**150**
	4	3.8	6	C601G4	**156**
	5	4.8	6	C601G5	**166**
	7.5	7.2	6	C601G7.5	**177**
	10	9.6	6	C601G10	**193**
	15	14.4	6	C601G15	**219**

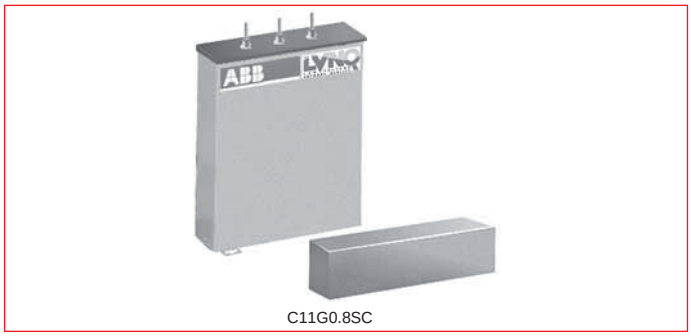
Options

Type	Catalog number suffix ①	List price adder
Remote state indication two LEDs	-2L	**$ 65**

NOTE: ABB's patented IPE design eliminates the need for additional overcurrent protection when capacitors are electrically connected on the load side of a motor starter circuit breaker or fusible disconnect switch.

① Add suffix to end of catalog number.

Individual capacitors
Type CLMD-13SC, Stud connected
208, 240, 480 & 600 Volt, 60 Hz



C11G0.8SC

The CLMD-13SC (Stud Connected) capacitor is ideally suited for use in motor control centers, control panels and other indoor applications. Standard features include:

- Indoor, steel enclosure with cover
- Three stud terminals for electrical connection or capacitor parallel bus bar connection
- Mounting feet for easy capacitor installation
- Lightweight, small dimensions, totally dry construction

208 Volt, 60 Hz, 3 phase

Enclosure size	kvar rating	Rated current per phase (amps)	Approx. shipping weight (lbs)	Enclosure type Indoor — NEMA 1 Catalog number	List price
13	0.8	2.2	6	C201G0.8SC	**$ 136**
	1.1	3.1	6	C201G1.1SC	**141**
	2	5.6	6	C201G2SC	**152**
	2.5	6.9	6	C201G2.5SC	**163**
	3	8.3	6	C201G3SC	**179**
	4	11.1	6	C201G4SC	**211**
	5	13.9	6	C201G5SC	**254**
	7.5	20.8	6	C201G7.5SC	**286**

240 Volt, 60 Hz, 3 phase

Enclosure size	kvar rating	Rated current per phase (amps)	Approx. shipping weight (lbs)	Enclosure type Indoor — NEMA 1 Catalog number	List price
13	1	2.4	6	C241G1SC	**$ 130**
	1.5	3.6	6	C241G1.5SC	**147**
	2	4.8	6	C241G2SC	**141**
	2.5	6.0	6	C241G2.5SC	**157**
	3.5	8.4	6	C241G3.5SC	**173**
	5	12.0	6	C241G5SC	**184**
	7.5	18.0	6	C241G7.5SC	**232**
	10	24.1	6	C241G10SC	**270**

480 Volt, 60 Hz, 3 phase

Enclosure size	kvar rating	Rated current per phase (amps)	Approx. shipping weight (lbs)	Enclosure type Indoor — NEMA 1 Catalog number	List price
13	0.9	1.1	6	C481G0.9SC	**$ 130**
	1.5	1.8	6	C481G1.5SC	**141**
	2	2.4	6	C481G2SC	**147**
	2.5	3.0	6	C481G2.5SC	**152**
	3.5	4.2	6	C481G3.5SC	**168**
	4	4.8	6	C481G4SC	**170**
	5	6.0	6	C481G5SC	**179**
	6	7.2	6	C481G6SC	**184**
	7.5	9.0	6	C481G7.5SC	**189**
	8	9.6	6	C481G8SC	**195**
	9	10.8	6	C481G9SC	**200**
	10	12.0	6	C481G10SC	**205**
	14	16.8	6	C481G14SC	**216**
	15	18.0	6	C481G15SC	**227**
	17	20.4	6	C481G17SC	**238**

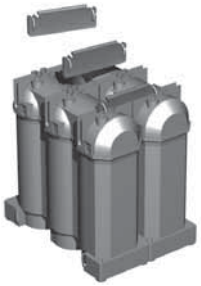
600 Volt, 60 Hz, 3 phase

Enclosure size	kvar rating	Rated current per phase (amps)	Approx. shipping weight (lbs)	Enclosure type Indoor — NEMA 1 Catalog number	List price
13	2	1.9	6	C601G2SC	**$ 147**
	3	2.9	6	C601G3SC	**163**
	4	3.8	6	C601G4SC	**168**
	5	4.8	6	C601G5SC	**179**
	7.5	7.2	6	C601G7.5SC	**189**
	10	9.6	6	C601G10SC	**205**
	15	14.4	6	C601G15SC	**232**

NOTE: ABB's patented IPE design eliminates the need for additional overcurrent protection when capacitors are electrically connected on the load side of a motor starter circuit breaker or fusible disconnect switch.

Individual capacitors
Type LVCS
240, 480 & 600 Volt, 60 Hz

20.032.86349


20.910.86783

Description
The LVCS is a compact and powerful capacitor ready for connection. It offers high modularity, unmatched performances and a state of the art integrated protection system. The LVCS wide power and voltage ranges allow its use for all power factor correction systems with or without reactors.

- High power density – small dimensions
- Modular design for easy and quick assembly of power modules
- Indoor enclosure
- Innovative integrated protection system
- Double casing insulation
- Built-in discharge devices
- Fully automated manufacturing process
- Complies with international standards, CE marked, UL recognized and CSA certified

240 Volt, 60 Hz, 3 phase

kvar rating	Rated current per phase (amps)	Approx. weight unpacked (lbs.)	Catalog number	List price
6.3	15.2	5.5	20.032.86349	**$ 192**
10.0	24.1	5.5	20.032.86350	**249**
12.5	30.1	5.5	20.032.86351	**295**

480 Volt, 60 Hz, 3 phase

kvar rating	Rated current per phase (amps)	Approx. weight unpacked (lbs.)	Catalog number	List price
10.0	12.0	5.5	20.032.86363	**$ 187**
12.5	15.0	5.5	20.032.86364	**204**
15.0	18.0	5.5	20.032.86365	**198**
20.0	24.1	5.5	20.032.86366	**237**
25.0	30.1	5.5	20.032.86367	**269**

600 Volt, 60 Hz, 3 phase

kvar rating	Rated current per phase (amps)	Approx. weight unpacked (lbs.)	Catalog number	List price
10.0	9.6	5.5	20.032.86370	**$ 200**
12.5	12.0	5.5	20.032.86371	**219**
20.0	19.2	5.5	20.032.86372	**238**
25.0	24.1	5.5	20.032.86373	**286**

Interconnection bars

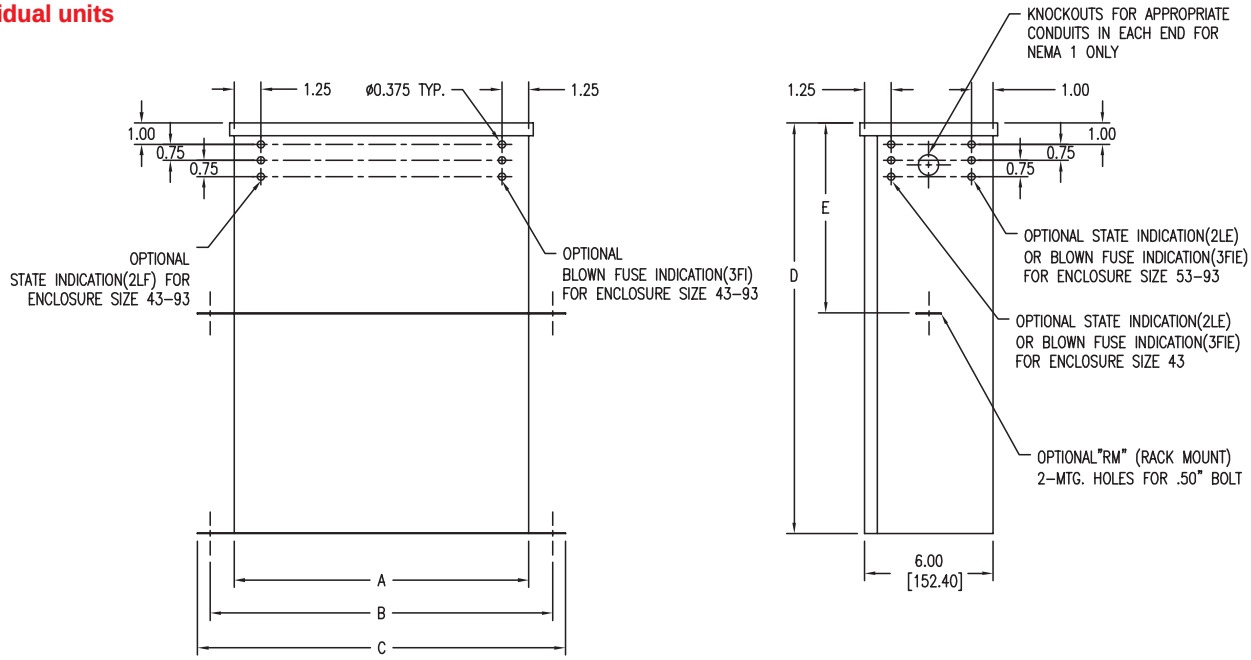
Item	Catalog number	List price
Set of 3	20.910.86783	**$ 10**
Set of 30	20.910.86784	**30**

Approximate dimensions
Individual capacitors

Low Voltage Network Quality

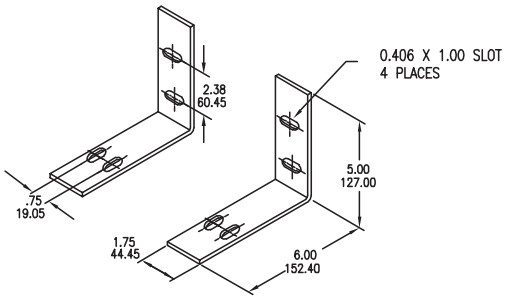
←00.00→ Inches

Individual units

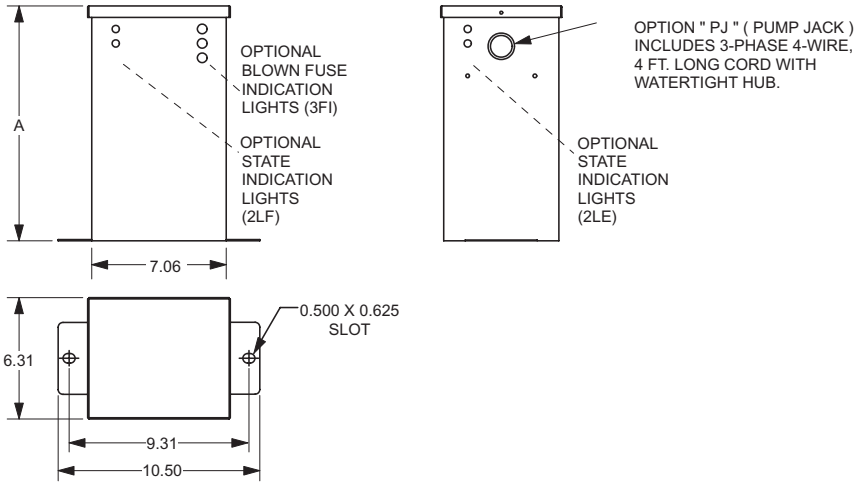


INDIVIDUAL CAPACITOR UNITS						
ENCLOSURE SIZE	A	B	C	D	CONDUIT KNOCKOUT SIZES	RM E
43	7.06 179.0	9.31 236.5	10.50 267.0	10.93 278.0	.50 – .75 12.7 – 19.0	N/A
53	13.75 349.0	16.00 406.0	17.18 436.0	12.31 312.0	.75 – 1.0 19.05 – 25.4	5.00 127.0
63	13.75 349.0	16.00 406.0	17.18 436.0	19.18 487.0	1.0 – 1.25 25.4 – 31.75	8.87 225.0
83	13.75 349.0	16.00 406.0	17.18 436.0	26.56 675.0	1.25 – 1.50 31.75 – 38.0	8.87 225.0
93	13.75 349.0	16.00 406.0	17.18 436.0	30.56 776.0	–	8.87 225.0

WALL MOUNTING BRACKET KIT (WM83K)
FOR ENCLOSURE SIZES 43, 53, 63, 83, 93



Pump jack capacitor – Steel, enclosure size 43

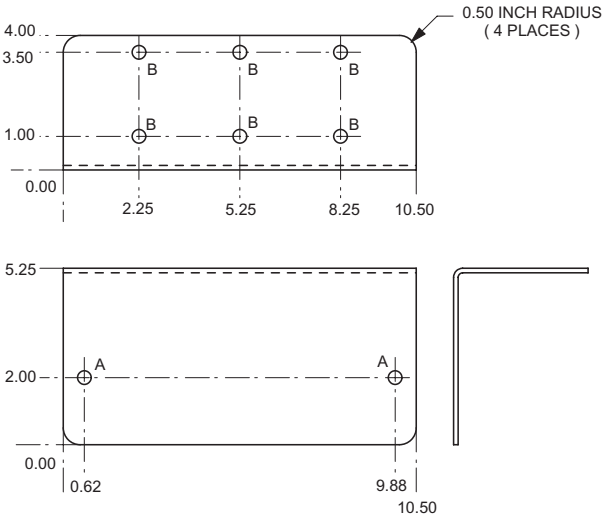


20

Approximate dimensions
Individual capacitors

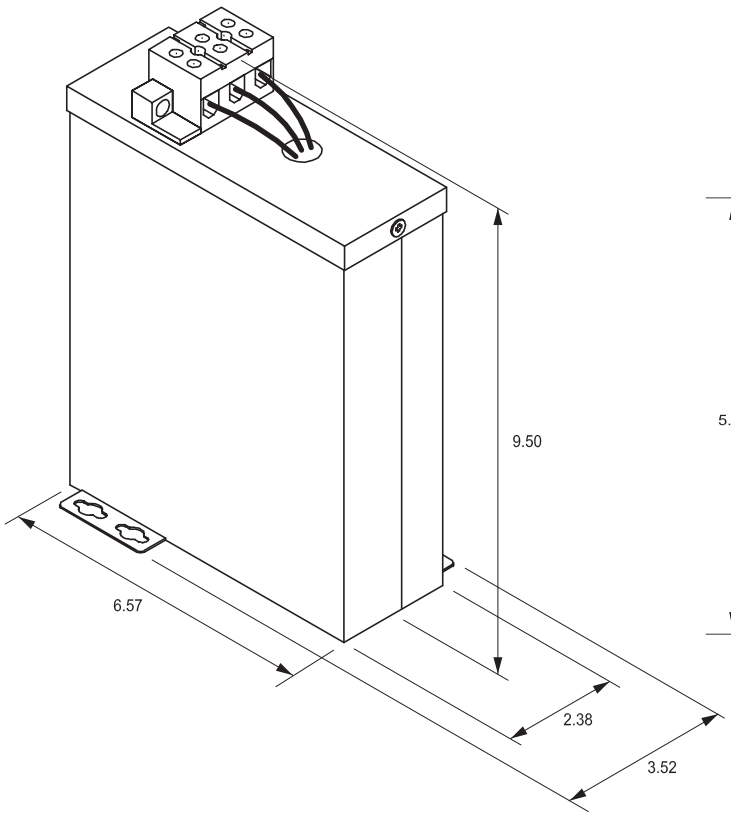
00.00 Inches

Pole mounting bracket for “PJ” (pump jack) capacitors

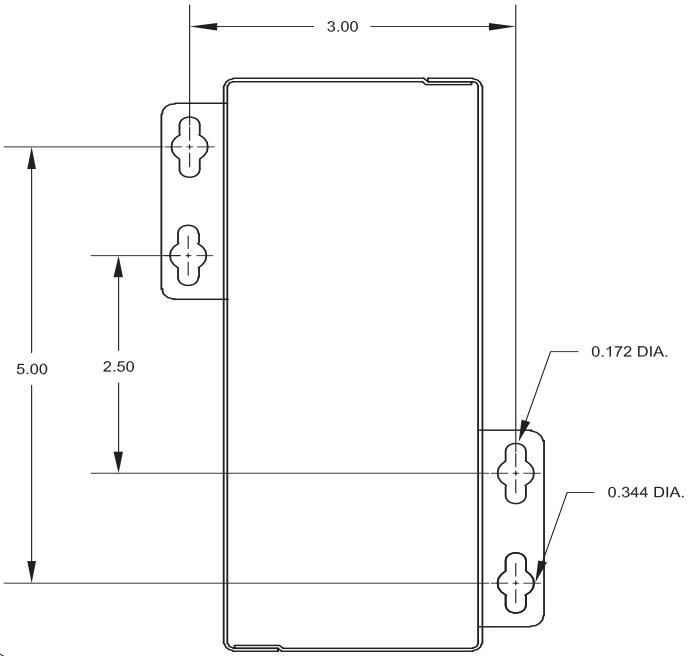


HOLE CHART		
SYMBOL	SIZE	USAGE
A	0.406	CAPACITOR MTG.
B	0.406	BRACKET MTG.

CLMD-13



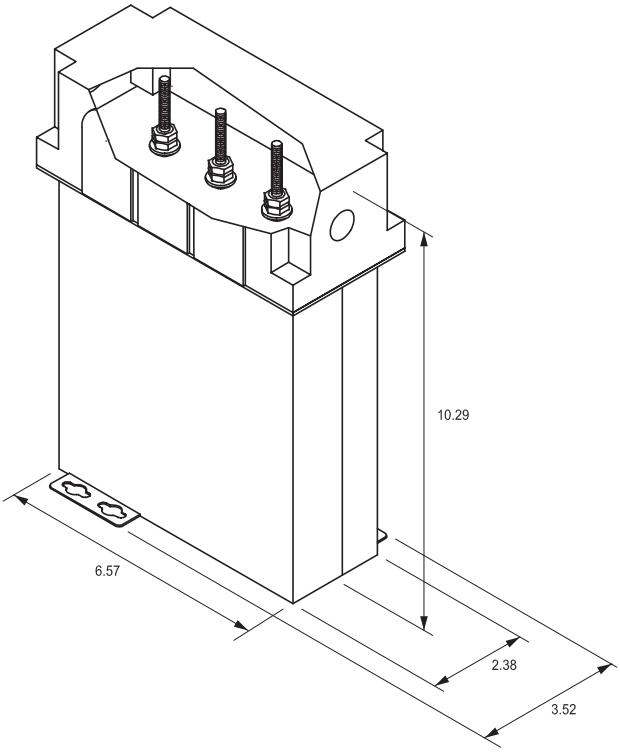
CLMD-13 Drill plan



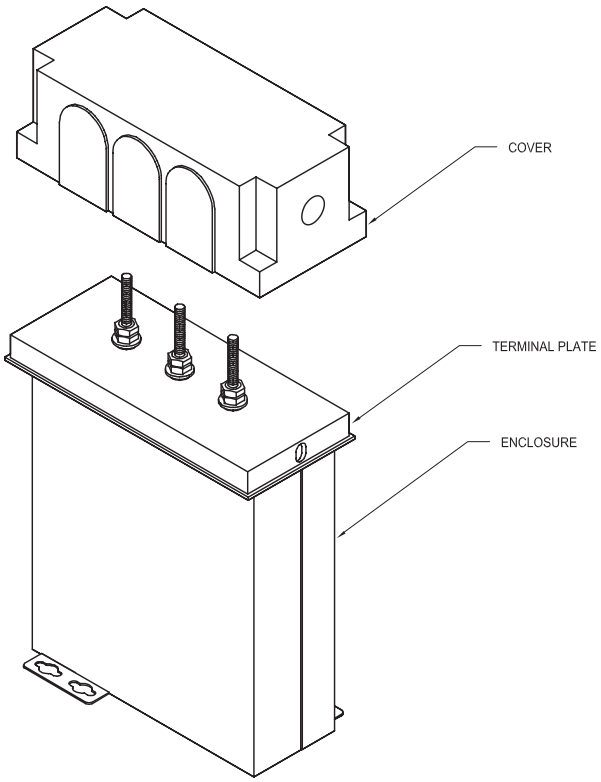
Approximate dimensions
Individual capacitors

←00.00→ Inches

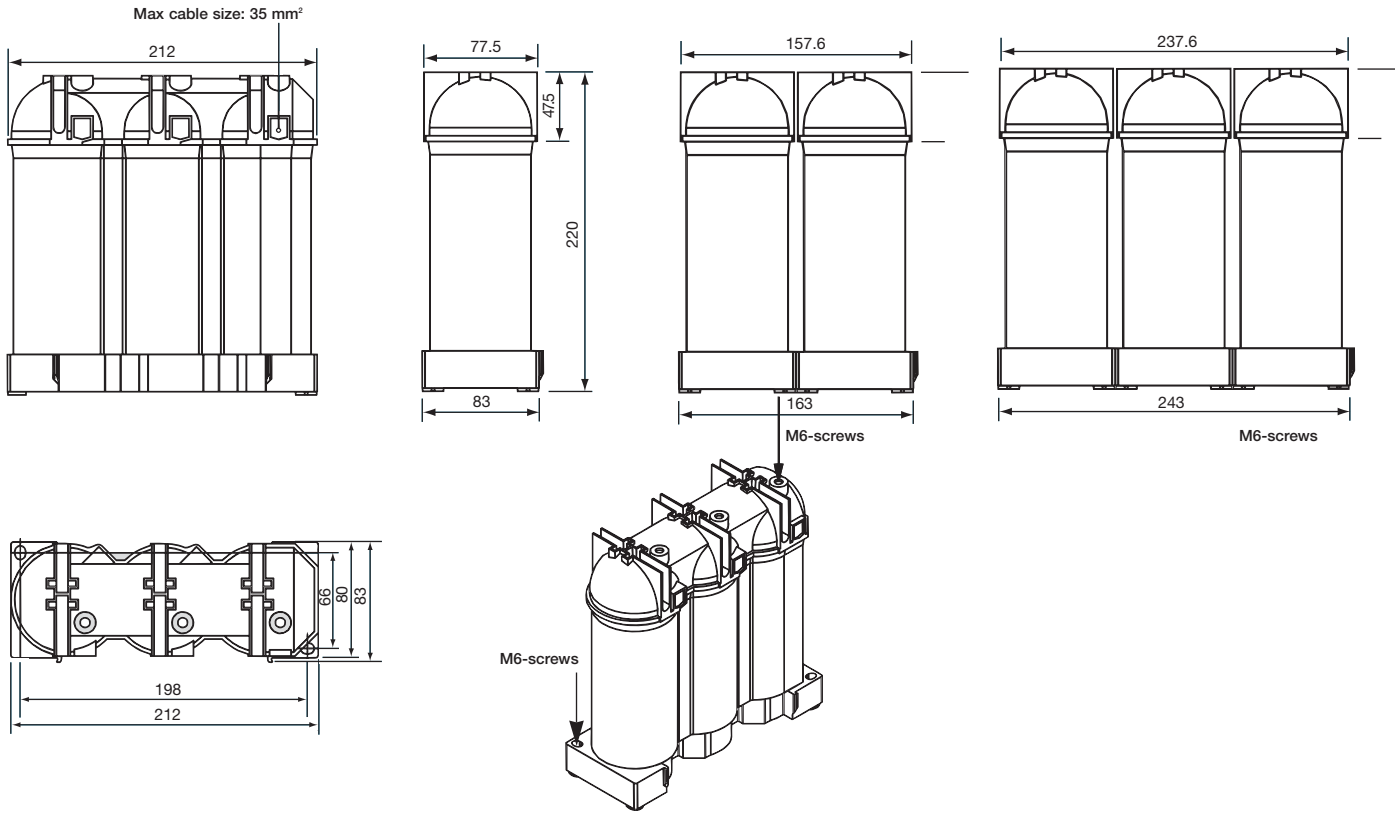
CLMD-13SC — stud connected



CLMD-13SC — expanded view



Approximate dimensions
Individual capacitors
Type LVCS



Fixed capacitor banks
3 phase, Internally Protected Elements
240 & 480 Volt, 60 Hz

Low Voltage Network Quality

F26G250

Suitable for direct compensation where fixed power factor correction is desired.

Features include:

- Dry environmentally safe construction
- Self healing capability
- Patented Internal Protected Elements
- Individual capacitors connected by bus bar
- Indoor, dusttight or raintight enclosure
- NEMA 1, 3R, 12
- Easy mounting
- Easy electrical connection to large terminals
- Convenient grounding lug

240 Volt, 60 Hz — 3 phase

Enclosure size	kvar rating ①	Qty / kvar	Approx. shipping weight (lbs.)	Enclosure type: Indoor – NEMA 1 Catalog number	Indoor – NEMA 1 List price	Outdoor – NEMA 3R Catalog number	Outdoor – NEMA 3R List price	Indoor – NEMA 12 Catalog number	Indoor – NEMA 12 List price
63	70	2/35	155	F246G70	**$ 1375**	F246R70	**$ 1815**	F246D70	**$ 1424**
	80	1/35, 1/40	155	F246G80	**1552**	F246R80	**1600**	F246D80	**1600**
	90	2/45	155	F246G90	**1766**	F246R90	**1815**	F246D90	**1815**
	100	2/50	155	F246G100	**1873**	F246R100	**1922**	F246D100	**1922**
	110	2/55	155	F246G110	**2087**	F246R110	**2136**	F246D110	**2136**
	120	2/60	155	F246G120	**2247**	F246R120	**2296**	F246D120	**2296**
	130	1/40, 2/45	235	F246G130	**2461**	F246R130	**2510**	F246D130	**2510**
	150	3/50	235	F246G150	**2622**	F246R150	**2671**	F246D150	**2671**
	160	1/50, 3/55	155	F246G160	**2996**	F246R160	**3045**	F246D160	**3045**
	180	3/60	235	F246G180	**3210**	F246R180	**3259**	F246D180	**3259**
	200	4/50	310	F246G200	**3745**	F246R200	**3794**	F246D200	**3794**
	250	5/50	370	F246G250	**4815**	F246R250	**4864**	F246D250	**4864**
	300	5/60	370	F246G300	**5457**	F246R300	**5506**	F246D300	**5506**

480 Volt, 60 Hz — 3 phase

Enclosure size	kvar rating ①	Qty / kvar	Approx. shipping weight (lbs.)	Enclosure type: Indoor – NEMA 1 Catalog number	Indoor – NEMA 1 List price	Outdoor – NEMA 3R Catalog number	Outdoor – NEMA 3R List price	Indoor – NEMA 12 Catalog number	Indoor – NEMA 12 List price
63	125	1/55, 1/70	125	F486G125	**$ 1300**	F486R125	**$ 1349**	F486D125	**$ 1349**
	130	2/65	125	F486G130	**1375**	F486R8130	**1424**	F486D130	**1424**
	140	2/70	125	F486G140	**1428**	F486R140	**1476**	F486D140	**1476**
	150	2/75	125	F486G150	**1450**	F486R150	**1499**	F486D150	**1499**
83	160	2/80	155	F488G160	**1519**	F488R160	**1567**	F488D160	**1567**
	175	2/87.5	155	F488G175	**1621**	F488R175	**1669**	F488D175	**1669**
	180	2/90	155	F488G180	**1733**	F488R180	**1781**	F488D180	**1781**
	200	2/100	155	F488G200	**1840**	F488R200	**1888**	F488D200	**1888**
63	220	1/70, 2/75	200	F486G220	**1980**	F486R220	**2029**	F486D220	**2029**
	225	3/75	200	F486G225	**2081**	F486R225	**2129**	F486D225	**2129**
83	240	3/80	235	F488G240	**2161**	F488R240	**2209**	F488D240	**2209**
	250	1/90, 2/80	235	F488G250	**2327**	F488R250	**2375**	F488D250	**2375**
	260	2/90, 1/80	235	F488G260	**2461**	F488R260	**2510**	F488D260	**2510**
	280	1/00, 2/90	235	F488G280	**2568**	F488R280	**2617**	F488D280	**2617**
	300	3/100	235	F488G300	**2675**	F488R300	**2724**	F488D300	**2724**
	350	4/87.5	310	F488G350	**2996**	F488R350	**3045**	F488D350	**3045**
	360	4/90	310	F488G360	**3210**	F488R360	**3259**	F488D360	**3259**
	400	4/100	310	F488G400	**3638**	F488R400	**3687**	F488D400	**3687**
	450	5/90	370	F488G450	**4334**	F488R450	**4383**	F488D450	**4383**
	475	5/95	370	F488G475	**4601**	F488R475	**4650**	F488D475	**4650**
	500	5/100	370	F488G500	**4815**	F488R500	**4864**	F488D500	**4864**
	600	6/100	450	F488G600	**5457**	F488R600	**5506**	F488D600	**5506**

208 Volt availability

For 208 volt applications, derate the 240V capacitors. The kvar at 208V will be .75 times the kvar at 240V.

NOTE: ABB's patented IPE design eliminates the need for additional overcurrent protection when capacitors are electrically connected on the load side of a motor starter circuit breaker or fusible disconnect switch.

① For additional kvar ratings not listed above, please consult factory.

Fixed capacitor banks
3 Phase, Internally Protected Elements
600Volt, 60Hz

600 volt, 60Hz — 3 phase

Enclosure size	kvar rating ①	Qty / kvar	Approx. shipping weight (lbs.)	Enclosure type: Indoor – NEMA 1 Catalog number	Indoor – NEMA 1 List price	Outdoor – NEMA 3R Catalog number	Outdoor – NEMA 3R List price	Indoor – NEMA 12 Catalog number	Indoor – NEMA 12 List price
63	160	2/80	155	F606G160	**$ 1605**	F606R160	**$ 1653**	F606D160	**$ 1653**
83	200	2/100	155	F608G200	**1926**	F608R200	**1974**	F608D200	**1974**
63	240	3/80	195	F606G240	**2354**	F606R240	**2402**	F606D240	**2402**
83	270	3/90	230	F608G270	**2675**	F608R270	**2723**	F608D270	**2723**
	300	3/100	230	F608G300	**2889**	F608R300	**2937**	F608D300	**2937**
63	320	4/80	250	F606G320	**3050**	F606R320	**3098**	F606D320	**3098**
83	350	4/87.5	275	F608G350	**3210**	F608R350	**3258**	F608D350	**3258**
	360	4/90	275	F608G360	**3371**	F608R360	**3419**	F608D360	**3419**
	400	4/100	275	F608G400	**3959**	F608R400	**4007**	F608D400	**4007**
	500	5/100	375	F608G500	**5564**	F608R500	**5612**	F608D500	**5612**
	600	6/100	450	F608G600	**6420**	F608R600	**6468**	F608D600	**6468**

Capacitor state indication system

240V kvar	480V & 600V kvar	Catalog number suffix	List price adder
90 – 120	125 – 200		**$ 225**
130 – 180	210 – 300		**338**
200	320 – 400	-2LE	**449**
250 – 300	450 – 500		**562**
—	600		**674**

The capacitor state indication system consists of two yellow LED lights which illuminate only when the capacitor is energized and functioning at 65% or more of its rated kvar capacity.

The two light system will indicate a failure in any one of the three phases of the capacitor.

Wall mounting assemblies

Type	Catalog number	List price adder
Wall mounting kit, 2 – 6 units per bank	FBWM	**$ 500**

NOTE: ABB's patented IPE design eliminates the need for additional overcurrent protection when capacitors are electrically connected on the load side of a motor starter circuit breaker or fusible disconnect switch.

① For additional kvar ratings not listed above, please consult factory.

Fixed capacitor banks
3 Phase, 240 & 480 Volt, 60 Hz
with three fuses and blown fuse indicators

Low Voltage Network Quality

F26G250-3FI

ABB low voltage capacitors are fully protected by the three levels of protection offered by the patented Sequential Protection System which includes dry self-healing capacitors, internally protected elements and the dry non-flammable vermiculite filler. However, some users have traditionally requested external fuses and blown fuse indicators, so these modified units are offered for those applications.

Features include:

- Dry, environmentally safe construction
- Self healing capability
- Patented **I**nternal **P**rotected **E**lements
- Individual capacitors connected by bus bar
- NEMA 1, 3R, 12
- Easy mounting
- Easy electrical connection to large terminals
- Convenient grounding lug
- Each individual capacitor includes three fuses and three blown fuse indication lamps

240 Volt, 60 Hz — 3 phase

Enclosure size	kvar rating①	Qty / kvar	Approx. shipping weight (lbs.)	Enclosure type: Indoor – NEMA 1 Catalog number	Indoor – NEMA 1 List price	Outdoor – NEMA 3R Catalog number	Outdoor – NEMA 3R List price	Indoor – NEMA 12 Catalog number	Indoor – NEMA 12 List price
63	70	2/35	135	F246G70-3FI	**$ 1625**	F246R70-3FI	**$ 1673**	F246D70-3FI	**$ 1673**
	80	2/40	135	F246G80-3FI	**1846**	F246R80-3FI	**1894**	F246D80-3FI	**1894**
	90	2/45	135	F246G90-3FI	**2087**	F246R90-3FI	**2135**	F246D90-3FI	**2135**
	100	2/50	135	F246G100-3FI	**2408**	F246R100-3FI	**2456**	F246D100-3FI	**2456**
	110	2/55	135	F246G110-3FI	**2568**	F246R110-3FI	**2616**	F246D110-3FI	**2616**
	120	2/60	135	F246G120-3FI	**2729**	F246R120-3FI	**2777**	F246D120-3FI	**2777**
	130	1/40, 2/45	235	F246G130-3FI	**2943**	F246R130-3FI	**2991**	F246D130-3FI	**2991**
	150	3/50	235	F246G150-3FI	**3210**	F246R150-3FI	**3258**	F246D150-3FI	**3258**
	160	1/50, 3/55	155	F246G160-3FI	**3424**	F246R160-3FI	**3472**	F246D160-3FI	**3472**
	180	3/60	235	F246G180-3FI	**3745**	F246R180-3FI	**3793**	F246D180-3FI	**3793**
	200	4/50	310	F246G200-3FI	**4173**	F246R200-3FI	**4221**	F246D200-3FI	**4221**
	250	5/50	370	F246G250-3FI	**5243**	F246R250-3FI	**5291**	F246D250-3FI	**5291**
	300	5/60	370	F246G300-3FI	**5778**	F246R300-3FI	**5826**	F246D300-3FI	**5826**

480 Volt, 60 Hz — 3 phase

Enclosure size	kvar rating①	Qty / kvar	Approx. shipping weight (lbs.)	Enclosure type: Indoor – NEMA 1 Catalog number	Indoor – NEMA 1 List price	Outdoor – NEMA 3R Catalog number	Outdoor – NEMA 3R List price	Indoor – NEMA 12 Catalog number	Indoor – NEMA 12 List price
63	125	1/55, 1/70	135	F486G125-3FI	**$ 1525**	F486R125-3FI	**$ 1573**	F486D125-3FI	**$ 1573**
	130	2/65	135	F486G130-3FI	**1578**	F486R130-3FI	**1626**	F486D130-3FI	**1626**
	140	2/70	135	F486G140-3FI	**1605**	F486R140-3FI	**1653**	F486D140-3FI	**1653**
	150	2/75	135	F486G150-3FI	**1685**	F486R150-3FI	**1733**	F486D150-3FI	**1733**
83	160	2/80	155	F488G160-3FI	**1766**	F488R160-3FI	**1814**	F488D160-3FI	**1814**
	175	2/87.5	155	F488G175-3FI	**1873**	F488R175-3FI	**1921**	F488D175-3FI	**1921**
	180	2/90	155	F488G180-3FI	**1926**	F488R180-3FI	**1974**	F488D180-3FI	**1974**
	200	2/100	155	F488G200-3FI	**2033**	F488R200-3FI	**2081**	F488D200-3FI	**2081**
63	220	1/70, 2/75	200	F486G220-3FI	**2274**	F486R220-3FI	**2322**	F486D220-3FI	**2322**
	225	3/75	200	F486G225-3FI	**2434**	F486R225-3FI	**2482**	F488D225-3FI	**2482**
83	240	3/80	235	F488G240-3FI	**2515**	F488R240-3FI	**2563**	F488D240-3FI	**2563**
	250	1/90, 2/80	235	F488G250-3FI	**2675**	F488R250-3FI	**2723**	F488D250-3FI	**2723**
	260	2/90, 1/80	235	F488G260-3FI	**2782**	F488R260-3FI	**2830**	F488D260-3FI	**2830**
	280	1/100, 2/90	235	F488G280-3FI	**2889**	F488R280-3FI	**2937**	F488D280-3FI	**2937**
	300	3/100	235	F488G300-3FI	**2996**	F488R300-3FI	**3044**	F488D300-3FI	**3044**
	350	4/87.5	310	F488G350-3FI	**3531**	F488R350-3FI	**3579**	F488D350-3FI	**3579**
	360	4/90	310	F488G360-3FI	**3692**	F488R360-3FI	**3740**	F488D360-3FI	**3740**
	400	4/100	310	F488G400-3FI	**4173**	F488R400-3FI	**4221**	F488D400-3FI	**4221**
	450	5/90	370	F488G450-3FI	**4869**	F488R450-3FI	**4917**	F488D450-3FI	**4917**
	475	5/95	370	F488G475-3FI	**5243**	F488R475-3FI	**5291**	F488D475-3FI	**5291**
	500	5/100	370	F488G500-3FI	**5564**	F488R500-3FI	**5612**	F488D500-3FI	**5612**
	600	6/100	450	F488G600-3FI	**6099**	F488R600-3FI	**6147**	F488D600-3FI	**6147**

208 Volt availability

For 208 volt applications, derate the 240V capacitors. The kvar at 208V will be .75 times the kvar at 240V.

NOTE: ABB's patented IPE design eliminates the need for additional overcurrent protection when capacitors are electrically connected on the load side of a motor starter circuit breaker or fusible disconnect switch.

① For additional kvar ratings not listed above, please consult factory.

Fixed capacitor banks
3 phase, 600 Volt, 60 Hz
with three fuses and blown fuse indicators

600 volt, 60Hz — 3 phase

Enclosure size	kvar rating①	Qty / kvar	Approx. shipping weight (lbs.)	Enclosure type: Indoor – NEMA 1 Catalog number	Indoor – NEMA 1 List price	Outdoor – NEMA 3R Catalog number	Outdoor – NEMA 3R List price	Indoor – NEMA 12 Catalog number	Indoor – NEMA 12 List price
63	160	2/80	155	F606G160-3FI	**$ 1819**	F606R160-3FI	**$ 1867**	F606D160-3FI	**$ 1867**
83	200	2/100	155	F608G200-3FI	**2140**	F608R200-3FI	**2188**	F608D200-3FI	**2188**
63	240	3/80	195	F606G240-3FI	**2675**	F606R240-3FI	**2723**	F606D240-3FI	**2723**
83	270 300	3/90 3/100	230 230	F608G270-3FI F608G300-3FI	**2943** **3210**	F608R270-3FI F608R300-3FI	**2991** **3258**	F608D270-3FI F608D300-3FI	**2991** **3258**
63	320	4/80	250	F606G320-3FI	**3424**	F606R320-3FI	**3472**	F606D320-3FI	**3472**
83	350 360 400 500 600	4/87.5 4/90 4/100 5/100 6/100	275 275 275 375 450	F608G350-3FI F608G360-3FI F608G400-3FI F608G500-3FI F608G600-3FI	**3745** **4013** **4280** **6420** **7490**	F608R350-3FI F608R360-3FI F608R400-3FI F608R500-3FI F608R600-3FI	**3793** **4061** **4328** **6468** **7538**	F608D350-3FI F608D360-3FI F608D400-3FI F608D500-3FI F608D600-3FI	**3793** **4061** **4328** **6468** **7538**

Capacitor state indication system

240V kvar	480V & 600V kvar	Catalog number suffix	List price adder
90 – 120	125 – 200		**$ 225**
130 – 180	210 – 300		**337**
200	320 – 400	-2LE	**449**
250 – 300	450 – 500		**562**
—	600		**674**

The capacitor state indication system consists of two yellow LED lights which illuminate only when the capacitor is energized and functioning at 65% or more of its rated kvar capacity.

The two light system will indicate a failure in any one of the three phases of the capacitor.

Wall mounting assemblies ②

Type	Catalog number	List price adder
Wall mounting kit, 2 – 6 units per bank	FBWM	**$ 500**

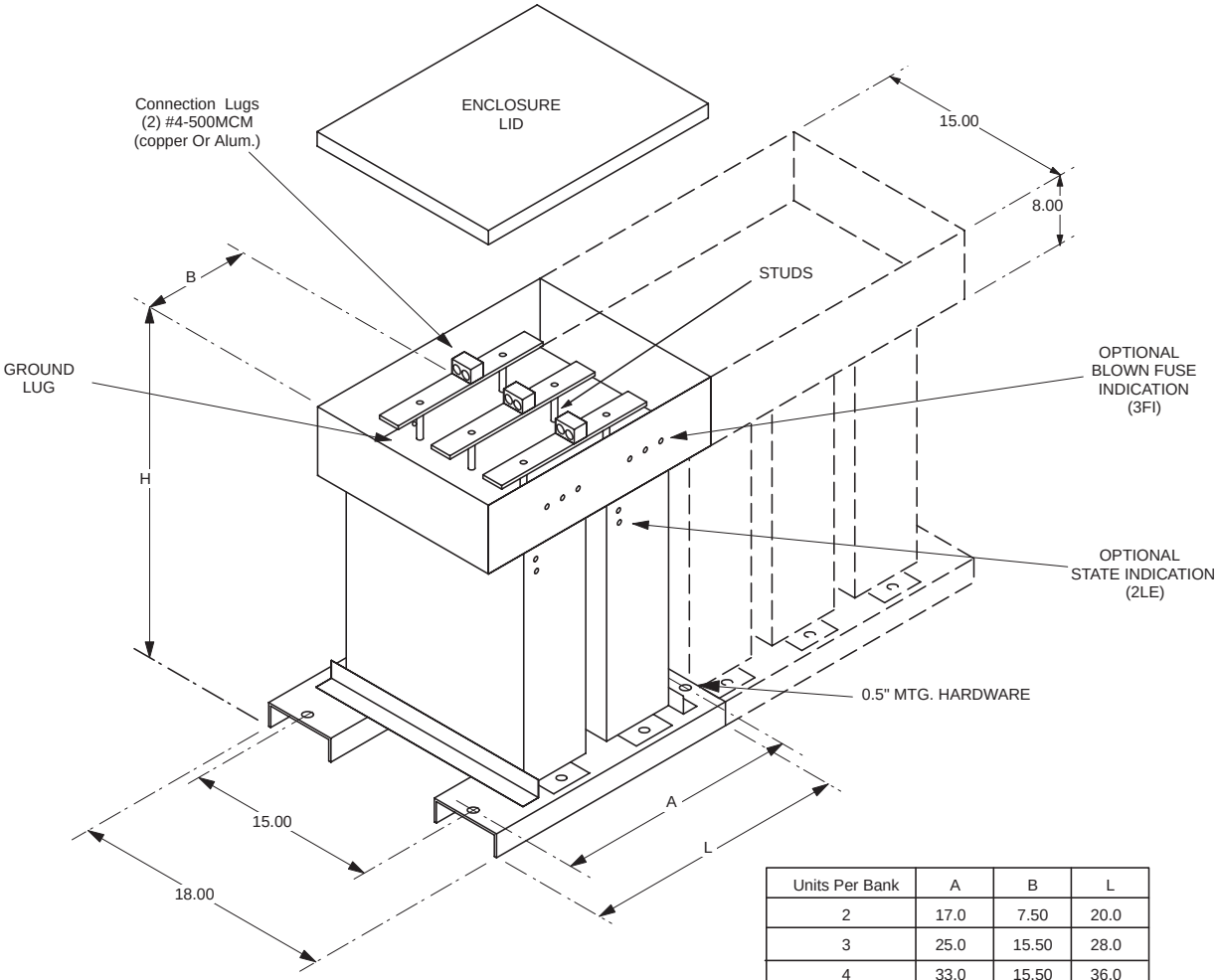
NOTE: ABB's patented IPE design eliminates the need for additional overcurrent protection when capacitors are electrically connected on the load side of a motor starter circuit breaker or fusible disconnect switch.

① For additional kvar ratings not listed above, please consult factory.

Approximate dimensions
Fixed capacitor banks

←00.00→ Inches

Fixed capacitor banks



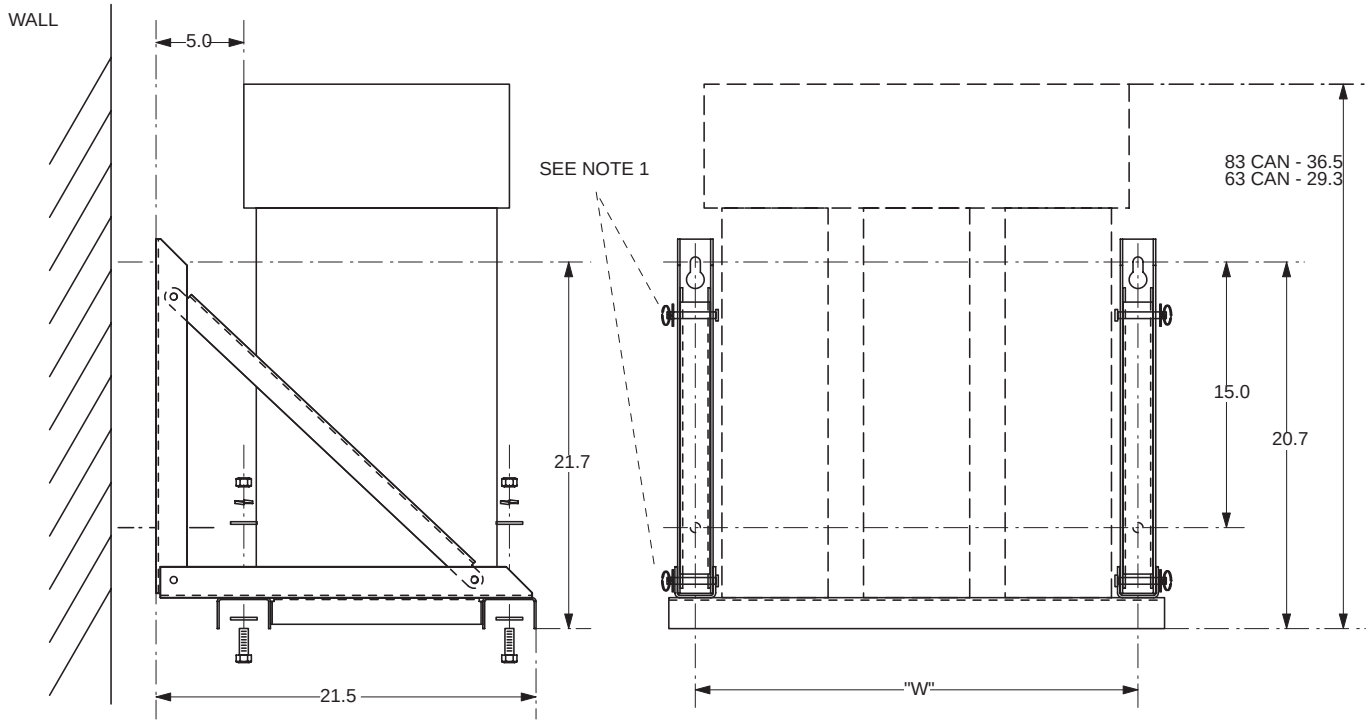
Units Per Bank	A	B	L
2	17.0	7.50	20.0
3	25.0	15.50	28.0
4	33.0	15.50	36.0
5	41.0	15.50	44.0
6	49.0	22.50	52.0

Unit Size	H
CLMD-53	22.50
CLMD-63	29.50
CLMD-83	36.50

Approximate dimensions
Fixed capacitor banks

00.00 Inches

Fixed bank wall mounting



NOTE 1: POSITION SPLIT RINGS TOWARD OUTSIDE OF BANK

NO. OF CAPS	MTG WIDTH "W"
2	17.0
3	25.0
4	33.0
5	41.0
6	49.0

MOUNT CAPACITOR ASSEMBLY TO WALL USING FOUR (4) 1/2" BOLTS. "KEY HOLE" MOUNTING HOLES ARE PROVIDED AT TOP OF MOUNTING BRACKETS.

WALL MOUNTING BRACKETS ARE ATTACHED TO FIXED BANK USING FOUR (4) 1/2-13 X 1.25" BOLTS AS SHOWN. TORQUE HARDWARE TO 50 LBS-FT.

AutoBank 300 & 1200

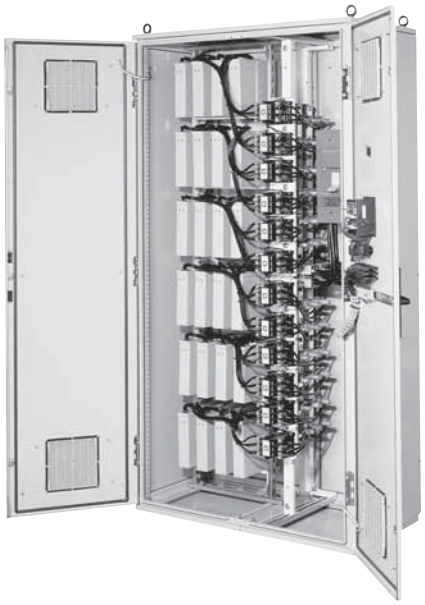


ABB 300 & 1200
Automatic banks

ABB provides the complete solution to automatic power factor correction by packaging proven ABB components. ABB capacitors, contactors, power factor controllers, circuit breakers, fusible disconnects, and ABB pushbuttons together provide a system of the highest quality. ABB capacitors provide exceptional performance using an environmentally safe dry type design. ABB provides a complete range of contactors designed for capacitor switching. ABB's power factor controller offers an easy-to-use microprocessor-based controller with built-in power factor meter. A variety of disconnect options are available, including ABB circuit breakers, fusible and non-fusible switches.

• **Modularity**
The modular design allows for the installation of additional power and switch modules as well as various options. Additional units may be connected in parallel. The number of capacitors and contactors included in the power modules depends on the automatic capacitor bank total power and the possible requirement for anti-resonance reactors.

• **Options**
Anti-resonance reactors, filters, blown fuse indication, push to test blown fuse indication, non-fused and fused disconnect switches and circuit breakers are optional equipment items that can be factory installed in the automatic capacitor bank.

• **Approvals**
ABB AutoBanks can be UL Panel Listed (UL File # E105450) per application.

• **High reliability**
The ABB AutoBank incorporates the well-proven features of ABB dry type power factor correction capacitor technology. The use of an ABB power factor controller and endurance-tested ABB contactors ensure the highest reliability of the equipment.

• **Very low losses**
Capacitor total losses are less than 0.5 watts per kvar. AutoBank total losses (without reactors), including accessories such as power factor controller and contactors are less than 1.5 watts per kvar.

• **Complete environmental acceptability**
ABB capacitors have a dry type dielectric with no free liquid and do not pose any risk of leakage or pollution of the environment.

• **Unique sequential protection system**
3 phase ABB capacitors are included with AutoBank products. These ABB capacitors utilize a patented Sequential protection System which ensures that each individual capacitor element is selectively and reliably disconnected from the circuit at the end of its life.

• **Long life**
Low losses and the self-healing properties of ABB capacitor elements help to ensure long operating life.

General information
Autobanks
Catalog number explanation

• Safety
ABB capacitors are manufactured with vermiculite, a nonflammable and nontoxic material. The dry vermiculite safely absorbs any energy produced within the capacitor enclosure and prevents any fire hazard in case of failure. Unique cooling fins are fitted to surround each capacitor element providing effective heat dissipation.

• ABB power factor controller
ABB microprocessor-based and programmable Power Factor Controllers (PFCs) provide for the setting of the target power factor and the sensitivity of the system regulation. The PFCs maintain the selected power factor by switching on or off one or more capacitor steps depending on the load conditions of the system.

• Compact design ensures quick installation
The AutoBank has compact overall dimensions, top or bottom cable entry access, and lifting eyes aid in fast, efficient handling and installation.

Harmonic effect on capacitors
Combinations of capacitors and system reactances form series and parallel tuned circuits at certain frequencies. When harmonic sources are added to the system, this can result in higher than rated currents or higher than rated voltages on the system components.

AutoBanks can be designed to operate in harmonic environments. Tuning reactors are added to keep the capacitor currents within rated values and keep system voltages to desired levels. Tuning frequencies of the AutoBank can be designed to suit your system requirements. Please consult factory.

Contents
Standard ABB AutoBank products include:
- 1 to 12 capacitor steps, three phase
- Incoming line termination (unless other disconnecting means is specified)
- Capacitor stage indicator lights
- Power on light
- One ABB power factor controller equipped with:
  - Programmable thresholds which allow protection of the capacitor bank from over and undervoltage, overtemperature and excessive harmonic distortion
  - Full graphics LCD display
  - Manual/automatic control
  - Indication of capacitive or inductive load and the number of steps energized
  - Measures and monitors kW, kVA, kVAr, Vrms, Arms, Temperature, THDV(%), THDI(%), Hz, power factor, voltage harmonics V2-V49(%), current harmonics I2-I49(%), alarm
  - Customizable switching sequence, linear or circular - normal or integral - direct or progressive switching strategies available
  - Automatic adaptation to network phase rotation and C.T. terminals
- ABB contactors
- Discharge resistors
- Power fuses
- Control fuses
- Multi-tap CT range 500/5 – 4000/5 in 500/5 increments. Window size 4" x 7"

Technical data
Rated voltage: 240 – 600V, 50/60 Hz, 3 phase

Standard kvar steps: 25, 50 & 100 kvar (other kvar step sizes available)

Control voltage: 120V, 60 Hz

Power factor setting: Between 0.70 capacitive and 0.7 inductive

C/k setting: Between 0.05 and 1A

Operation: Automatic or manual with step indication. LED indication of the number of capacitors energized and the capacitive or inductive demand.

Discharge resistors included

Dielectric losses: Less than 0.2 watt/kvar

Capacitor total losses: Less than 0.5 watt/kvar

Automatic bank total losses (without reactors) including accessories such as contactors and PF controller): Less than 1.5 watt/kvar

ABB dry type self-healing capacitors

Capacitor dielectric test:
- Between terminals and container: 3.0 kV, 60 seconds.

Capacitor automatic bank test:
- Functional test
- Dielectric test

Enclosures:
- NEMA 1, 3R and Dustproof (RAL 7032, Beige)

Top or bottom cable entry

Dimensions: Per application

Ambient temperature: -40°C to +40°C

Installation: Lifting eyes are provided. Installation instructions are supplied with each unit.

NOTICE

Placement and orientation of the current transformer are very important for the correct operation of the automatic capacitor bank.

ABB capacitor catalog numbering system

A 4 G 600 C 6 A 2 P

- **F = blown fuse indication, P** = *BFI with push to test*
- **Harmonic tuning** (Consult factory)
- **Switching sequence:** ***A*** *1:1:1:1,* ***B*** *1:2:2:2,* ***C*** *1:2:4:4,* ***D****-1:1:2:2*
- **Number of capacitors**
- **Disconnecting means –** ***B*** = *terminal,* ***C*** = *circuit breaker,* ***D*** **= non-fused disconnect switch,** ***F*** **= fused disconnect switch**
- **kvar rating**
- **Enclosure type –** ***G*** = *indoor,* ***R*** = *outdoor,* ***D*** = *dust proof*
- **Voltage –** ***2*** = *240,* ***4*** = *480,* ***6*** = *600*
- **Model –** ***A*** = *1200,* ***AA*** = *300*

AutoBank 300
240, 480 & 600 Volt, 60 Hz

Low Voltage Network Quality

Description
Automatic power factor correction system in a compact design.

- Ratings: 240V: 25 – 150 kvar
  480V: 50 – 300 kvar
  600V: 100 – 300 kvar
- Size: 66"H x 32"W x 20"D
- Fusing: Each step and each phase
- Proven ABB Components:
  ABB dry-type capacitors
  ABB micro-processor based controller
  ABB contactors rated for capacitive switches
- CT Split core multi-tap CT provided with each AutoBank
- Options: ABB main circuit breaker
  Blown fuse indication
  Push-to-test blown fuse indication
  Outdoor enclosure
  Dustproof enclosure

240 Volt

kvar	Approximate weight (lbs)	Indoor		Outdoor		Dustproof	
		Catalog number	List price	Catalog number	List price	Catalog number	List price
25	600	AA2G25B5A		AA2R25B5A		AA2D25B5A	
50	600	AA2G50B5A		AA2R50B5A		AA2D50B5A	
75	600	AA2G75B6A	**Consult factory**	AA2R75B6A	**Consult factory**	AA2D75B6A	**Consult factory**
100	600	AA2G100B8A		AA2R100B8A		AA2D100B8A	
125	600	AA2G125B10A		AA2R125B10A		AA2D125B10A	
150	600	AA2G150B12A		AA2R150B12A		AA2D150B12A	

480 Volt

kvar	Approximate weight (lbs)	Indoor		Outdoor		Dustproof	
		Catalog number	List price	Catalog number	List price	Catalog number	List price
50	600	AA4G50B3B		AA4R50B3B		AA4D50B3B	
75	600	AA4G75B5A		AA4R75B5A		AA4D75B5A	
100	600	AA4G100B5A		AA4R100B5A		AA4D100B5A	
125	600	AA4G125B5A		AA4R125B5A		AA4D125B5A	
150	600	AA4G150B6A	**Consult factory**	AA4R150B6A	**Consult factory**	AA4D150B6A	**Consult factory**
175	600	AA4G175B7A		AA4R175B7A		AA4D175B7A	
200	600	AA4G200B8A		AA4R200B8A		AA4D200B8A	
225	600	AA4G225B9A		AA4R225B9A		AA4D225B9A	
250	600	AA4G250B10A		AA4R250B10A		AA4D250B10A	
300	600	AA4G300B12A		AA4R300B12A		AA4D300B12A	

600 Volt

kvar	Approximate weight (lbs)	Indoor		Outdoor		Dustproof	
		Catalog number	List price	Catalog number	List price	Catalog number	List price
100	600	AA6G100B5A		AA6R100B5A		AA6D100B5A	
125	600	AA6G125B5A		AA6R125B5A		AA6D125B5A	
150	600	AA6G150B6A		AA6R150B6A		AA6D150B6A	
175	600	AA6G175B7A	**Consult factory**	AA6R175B7A	**Consult factory**	AA6D175B7A	**Consult factory**
200	600	AA6G200B8A		AA6R200B8A		AA6D200B8A	
225	600	AA6G225B9A		AA6R225B9A		AA6D225B9A	
250	600	AA6G250B10A		AA6R250B10A		AA6D250B10A	
300	600	AA6G300B12A		AA6R300B12A		AA6D300B12A	

For other kvar sizes, number of steps, or options, please consult your local ABB Control representative.

NOTE: ABB automatic banks can be designed for harmonic environments. Please consult the factory concerning harmonic issues.

Low Voltage
Network Quality

AutoBank 1200
480 & 600 Volt, 60 Hz

Description

Modular design delivers sought after features:
- 480V & 600V units
- Compact size
- Easy installation & start-up
  - Bottom & top cable entry
  - Simple to operate ABB controller
- Copper bus bar
- Fusing of each step and in each phase
- Proven ABB components
  - ABB dry type capacitors
  - ABB micro-processor based controller
  - ABB contactors rated for capacitor switching
- Options
  - ABB circuit breakers or fusible & non-fusible disconnect switches
  - Blown fuse indication
  - Push to test
  - Outdoor enclosures
  - Dustproof enclosures
- Consult factory for other sizes
- CT: split core, multi-tap current transformers provided with each AutoBank

480 Volt

kvar	Approximate weight (lbs)	Indoor		Outdoor		Dustproof	
		Catalog number	List price	Catalog number	List price	Catalog number	List price
100	1000	A4G100B2A		A4R100B2A		A4D100B2A	
125	1000	A4G125B3B		A4R125B3B		A4D125B3B	
150	1000	A4G150B3A		A4R150B3A		A4D150B3A	
175	1000	A4G175B4B		A4R145B4B		A4D175B4B	
200	1000	A4G200B4A		A4R200B4A		A4D200B4A	
225	1000	A4G225B5B		A4R225B5B		A4D225B5B	
250	1000	A4G250B5A		A4R250B5A		A4D250B5A	
300	1000	A4G300B6A		A4R300B6A		A4D300B6A	
350	1000	A4G350B7A	**Consult factory**	A4R350B7A	**Consult factory**	A4D350B7A	**Consult factory**
400	1200	A4G400B8A		A4R400B8A		A4D400B8A	
450	1200	A4G450B9A		A4R450B9A		A4D450B9A	
500	1200	A4G500B10A		A4R500B10A		A4D500B10A	
550	1200	A4G550B11A		A4R550B11A		A4D550B11A	
600	1200	A4G600B12A		A4R600B12A		A4D600B12A	
650	1900	A4G650B7B		A4R650B7B		A4D650B7B	
700	1900	A4G700B7A		A4R700B7A		A4D700B7A	
800	1900	A4G800B8A		A4R800B8A		A4D800B8A	
900	1900	A4G900B9A		A4R900B9A		A4D900B9A	
1000	2100	A4G1000B10A		A4R1000B10A		A4D1000B10A	
1100	2100	A4G1100B11A		A4R1100B11A		A4D1100B11A	
1200	2100	A4G1200B12A		A4R1200B12A		A4D1200B12A	

600 Volt

kvar	Approximate weight (lbs)	Indoor		Outdoor		Dustproof	
		Catalog number	List price	Catalog number	List price	Catalog number	List price
100	1000	A6G100B2A		A6R100B2A		A6D100B2A	
125	1000	A6G125B3B		A6R125B3B		A6D125B3B	
150	1000	A6G150B3A		A6R150B3A		A6D150B3A	
175	1000	A6G175B4B		A6R175B4B		A6D175B4B	
200	1000	A6G200B4A		A6R200B4A		A6D200B4A	
225	1000	A6G225B5B		A6R225B5B		A6D225B5B	
250	1000	A6G250B5A		A6R250B5A		A6D250B5A	
300	1000	A6G300B6A		A6R300B6A		A6D300B6A	
350	1000	A6G350B7A		A6R350B7A		A6D350B7A	
400	1200	A6G400B8A	**Consult factory**	A6R400B8A	**Consult factory**	A6D400B8A	**Consult factory**
450	1200	A6G450B9A		A6R450B9A		A6D450B9A	
500	1200	A6G500B10A		A6R500B10A		A6D500B10A	
550	1200	A6G550B11A		A6R550B11A		A6D550B11A	
600	1200	A6G600B12A		A6R600B12A		A6D600B12A	
650	1800	A6G650B7B		A6R650B7B		A6D650B7B	
700	1800	A6G700B7A		A6R700B7A		A6D700B7A	
800	1800	A6G800B8A		A6R800B8A		A6D800B8A	
900	1800	A6G900B9A		A6R900B9A		A6D900B9A	
1000	2100	A6G1000B10A		A6R1000B10A		A6D1000B10A	
1100	2100	A6G1100B11A		A6R1100B11A		A6D1100B11A	
1200	2100	A6G1200B12A		A6R1200B12A		A6D1200B12A	

Factory modifications
Approximate dimensions
AutoBank

←00.00→ Inches

Current transformers (split core)

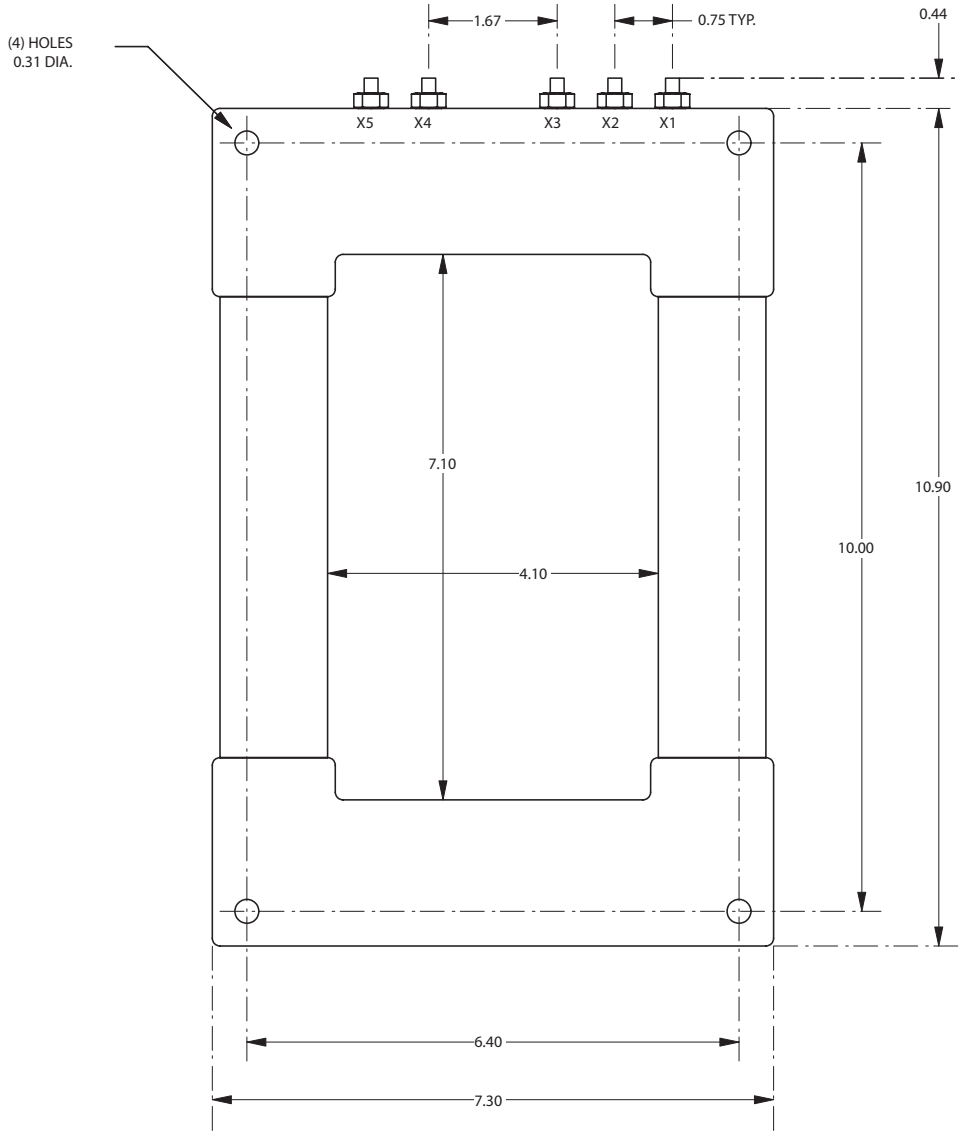
This split core current transformer is designed for use with automatic capacitor banks. The primary current will be determined by:

$$I = \frac{\text{kVA x 1000}}{\text{V x 1.732}}$$

The kVA value should represent the peak quarterhour demand. Split core current transformers are designed for assembly to an existing electrical installation without the need for dismantling the primary bus or cables. The portion of the transformer marked “this end removable” can be disassembled and then reassembled around the conductors that require current monitoring. The current transformer must have its secondary terminals short-circuited or the load connected before energizing the primary circuit.

Multi-tap split core current transformers provided with each AutoBank.

Approximate dimensions



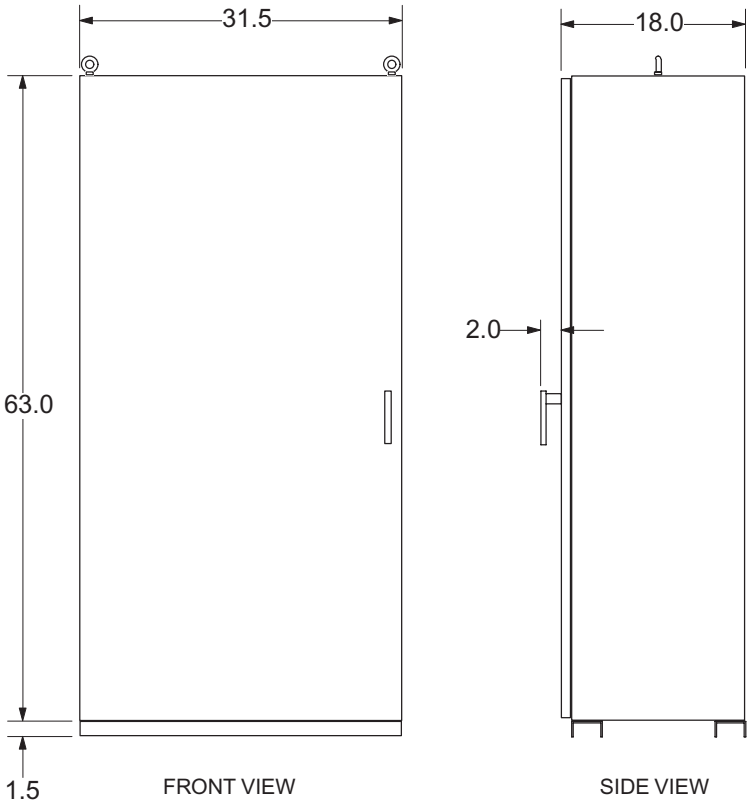
OVERALL DIMENSIONS: HEIGHT = 11.34, WIDTH = 7.30, DEPTH = 1.63

RATIO	TAPS
500:5	X1 - X2
1000:5	X3 - X4
1500:5	X2 - X3
2000:5	X1 - X3
2500:5	X2 - X4
3000:5	X1 - X4
3500:5	X2 - X5
4000:5	X1 - X5

20

Approximate dimensions
AutoBank 300

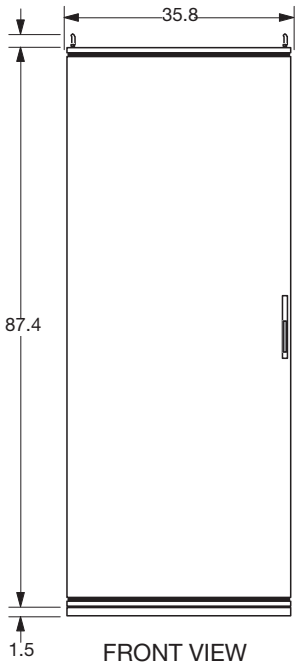
00.00 Inches



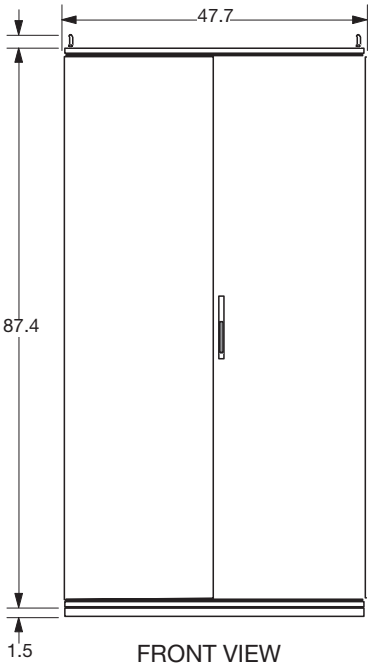
Approximate dimensions
AutoBank 1200

Low Voltage Network Quality

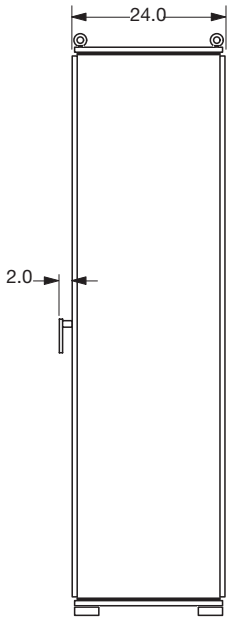
00.00 Inches



FRONT VIEW



FRONT VIEW



SIDE VIEW

	OVERALL WIDTH			
KVAR	MAIN LUGS	CIRCUIT BREAKER	FUSED SWITCH	NON-FUSED SWITCH
100	36	36	36	36
125	36	36	36	36
150	36	36	36	36
175	36	36	36	36
200	36	36	36	36
225	36	36	36	36
250	36	36	36	36
300	36	36	36	36
350	36	36	48	48
400	36	36	48	48
450	48	48	72	72
500	48	48	—	72
550	48	48	—	72
600	48	48	—	72
650	72	72	—	84
700	72	84	—	84
800	72	84	—	84
900	84	96	—	96
1000	84	96	—	96
1100	84	96	—	120
1200	84	96	—	120

Notes

DynaComp

One cycle response, transient-free capacitor switching with no limit to the number of operations

Typical Applications

- Any critical loads which cannot be interrupted by transients:
  - Hospitals
  - Airports
  - Computer networking centers
  - High technology manufacturing operations
  - Others

- Loads which require extremely rapid switching (less than one cycle, 16.7 ms) reactive compensation:
  - Welders
  - Elevators
  - DC winches (off-shore oil platforms)
  - Mining drag lines
  - Mining conveyors
  - Rolling mills
  - Cranes (Port Authority)
  - Ski lift drives
  - Stamping
  - Saw mills
  - Light rail transit systems
  - Others

Product Description

The ABB Dynamic Response Compensator or DynaComp is a capacitor or filter circuit switched by solid state power electronic devices without any moving parts. It is the ultimate solution to the most demanding applications in rapid power factor compensation, filtering or transient control.

Reactive load switching which causes disturbances on the network or where very rapid compensation or filtering is required are major applications for DynaComp.

DynaComp's solid state switching concept, combined with the well proven features of ABB power capacitor technology, provides the following exceptional advantages:

- **Dynamic response time and ultra-rapid switching**

DynaComp's solid state switching allows it to achieve dynamic response times in the range of one cycle. A typical application of DynaComp is for lifting devices requiring rapidly varying amounts of reactive power. By installing a DynaComp close to a crane or an elevator, voltage drops can be minimized and disturbances on other equipment avoided. Simultaneously, the reactive power will be efficiently compensated locally, an impossible task with conventional equipment. The principle applies to many other types of equipment with sudden large reactive power requirements such as large motors, welders, large injection molding machines, etc.

General information
DynaComp

• Transient free switching
DynaComp does not disturb sensitive networks or sensitive equipment. The switching operation is executed by solid state devices, whose main advantage is to enable transient free switching with no wearing parts.

• Frequent switching capability
The absence of moving parts ensures DynaComp a high reliability without limitation of the number of switching applications. Welding and lifting devices are typical applications of loads requiring large amounts of reactive power with a frequent switching cycle. Switching events in the range of over 100,000 times per day are achievable with DynaComp

• High reliability
DynaComp incorporates the well proven features of ABB dry type power factor capacitor technology. Thyristor switching uses no moving parts. The DynaComp can be UL panel listed per application.

• Versatility & Options
DynaComp's electronic solid state switching is applicable to capacitor banks and detuned or tuned filter banks. An important advantage with filter applications is the improvement in rapidly switching of the filter bank. The DynaComp can be provided with an ABB main breaker or main fused or non-fused disconnect switch.

• Modularity & Expansion
Although DynaComp products must be designed for individual applications, they can be constructed rapidly due to their modular design. Additional units may be connected in parallel, allowing for the same reliable switching functions.

• Safety
ABB capacitors are filled with vermiculite, a nonflammable and nontoxic material. The dry vermiculite safely absorbs any energy produced within the capacitor enclosure and prevents any fire hazard in case of failure. Unique cooling fins are fitted to surround each capacitor element and to provide effective heat dissipation.

• Long life
The absence of moving parts and the self-healing properties of ABB capacitor elements ensure the DynaComp's long life.

• Unique Sequential Protection System
The ABB patented Sequential Protection System ensures that each individual capacitor element is selectively and reliably disconnected from the circuit at the end of its life.

• Complete environmental acceptability
ABB capacitors have a dry type dielectric with no free liquid and do not pose any risk of leakage or pollution of the environment.

• ABB VAR controller
ABB microprocessor-based and programmable VAR controller maintains VAR flows to desired levels.

• Compact design ensures quick installation
DynaComp's compact overall dimensions, standard top entry cable access, and lifting eyes aid in fast, efficient handling and installation.

Harmonic Effect on Capacitors

Combinations of capacitors and system reactances form series and parallel tuned circuits at certain frequencies. When harmonic sources are added to the system, this can result in higher than rated currents or higher than rated voltages on the system components.

DynaComp can be designed to operate in harmonic environments. Tuning reactors are added to keep the capacitor currents within rated values and keep system voltages to desired levels. Tuning frequencies of the DynaComp can be designed to suit your system requirements. Please consult factory.

Contents

DynaComp products include:
- Incoming line termination (unless other disconnecting means is specified.)
- One or more capacitor steps, single or three phase
- One ABB RVT-D controller equipped with:
  - Automatic no-voltage release
  - Menu driven interface w/LCD display
  - Icon indicating a capacitive or inductive load add the number of steps energized.
  - Circular or linear switching
- ABB capacitors
- One DynaSwitch per capacitor step
- Discharge resistors
- Power fuses
- Control fuses
- Multi-tap CT range: 500/5 – 4000/5 in 500/5 increments. Window size 4” x 7”.

Technical Data

Rated voltage
Up to 240-600V, 50/60Hz, single or 3 phase

Capacitor step rating
Up to 400 kvar at 480V

Operation: Automatic or manual with step indication. LED indication of the number of capacitors energized and the capacitive or inductive demand.

Discharge resistors included.

ABB dry type self-healing capacitors.

Enclosures:
NEMA 1, 3R &
Dustproof

Dimensions: Per application

Ambient temp.: -40°C to +40°C

Installation: Lifting eyes are provided. Installation instructions are supplied with each unit.

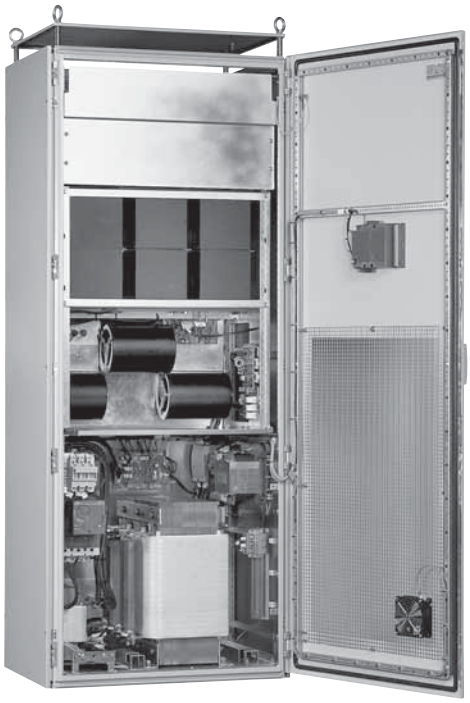
Catalog Numbering System

D 4 G 500 C 10 A 2

- **Harmonic tuning** (consult factory)
- **Switching sequence** - A 1:1:1:1 B 1:2:2:2 C 1:2:4:4 D 1:2:4:8:8
- **Number of capacitors**
- **Disconnect means** - ***C***=*Circuit Breaker,* ***D***=*Non-fused disconnect switch,* ***F***=*Fused disconnect switch*
- **kvar rating**
- **Enclosure type** - ***G***=*NEMA 1,* ***R***=*NEMA 3R,* ***D***=*Dust proof*
- **Voltage** - ***2*** *= 240V,* ***4*** *= 480V,* ***6*** *= 600V*
- **Model** - ***D***=*DynaComp*

PowerIT LV Active Filter
Type PQF

Power^{IT} Active Filter
Type PQF



Typical application
Power distribution systems which require multiple harmonic elimination or power factor correction.

Product description
The power quality filters developed by ABB are active filters offering unprecedented ability to eliminate harmonics from the network. The PQF eliminates harmonics in a controlled way. It is easy to expand and adapt to changes in the network. The PQF monitors the line current in real time and processes the measured harmonics as digital signals in a high-power DSP (Digital Signal Processor). The output of the DSP controls PWM (Pulse Width Modulated) power modules that through line reactors inject harmonic currents with exactly the opposite phase to those that are to be filtered. The net effect is an elimination of the harmonics and a clean sine-wave as seen by the feeding transformer. The PQF is UL approved (UL File # E254288).

PQF sizing information
Consult your local ABB representative or the factory for assistance in sizing your PQF filter.

General information
Power quality filter

Harmonics and power quality

Harmonics caused by non-linear electrical loads such as variable speed drives, rectifiers, UPS's, computers, etc., are a growing problem both for electricity suppliers and users.

Harmonics can lead to serious problems:
- overheating of cables, motors and transformers
- damage to sensitive equipment
- tripping of circuit breakers
- blowing of fuses
- premature aging of the installation

The ABB solution: PQF power quality filters

The ABB Power Quality Filter offers unprecedented ability to clean the network from harmonics. The PQF actively eliminates the harmonics present in the supply system in a controlled way. It is insensitive to large network impedance changes due to change in network topology like paralleling of sources, or switching between mains supply and generator operation.

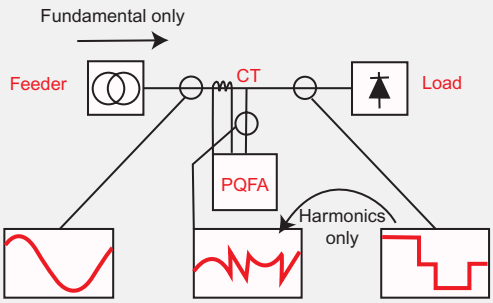
The PQF monitors the line current in real time and processes the measured harmonics as digital signals in a high-power multi-DSP (Digital Signal Processor) based system. The digital controller generates Pulse Width Modulated (PWM) signals that drive IGBT power modules which through line reactors inject harmonic currents in the network with exactly the opposite phase to the components that are to be filtered.

The PQF also offers communication facilities with the customer's existing communication network. This feature which uses Modbus RTU, allows the PQF to be easily monitored and controlled from a remote location. The Modbus communication feature can be used by means of an RS-232 to RS-485 converter (optional).

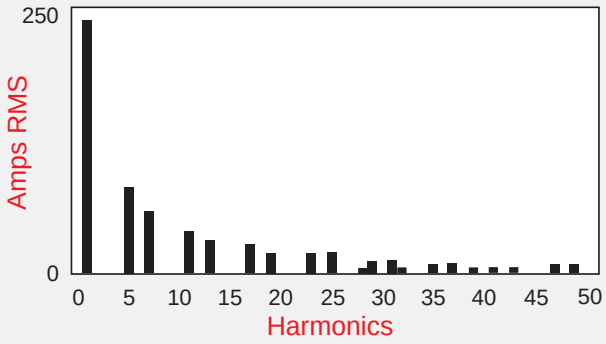
Advantages of the PQF

- Filters up to 20 harmonics simultaneously
- Filters up to the 50th harmonic
- Harmonic attenuation factor better than 97%
- Fulfilment of International Guidelines like G5/4, IEEE 519, etc
- Filters with closed loop control for best accuracy
- Is not overloadable
- Has a programmable filtering strategy and free choice of harmonics selection
- Fault and event logging with real time stamp
- Direct connection up to 690V
- Top or bottom cable entry (optional for PQFI)
- Easy commissioning – Auto-detection of CT Polarity
- May filter without generation of reactive power
- May generate reactive power and control power factor
- May balance the load current across the phases
- Has programmable task priorities
- Does not require detailed network analysis
- Does not require special CTs
- Is easy to extend on site
- Comes factory tested
- Auto-adaptation to network impedance changes
- Optical fibre isolation between power and control stages
- Programmable stand-by and re-start functions
- Programmable digital I/O interface
- Modbus RTU communication compatible
- Two sets of compensation parameters for different load type compensation.

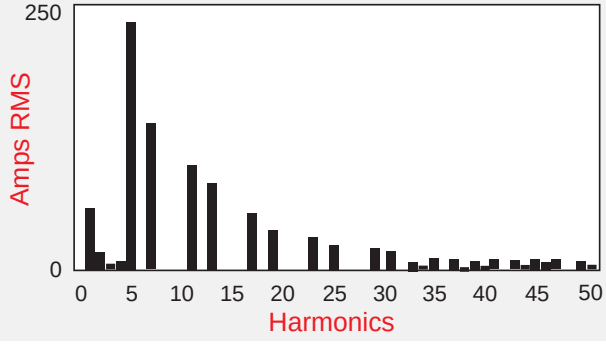
Principle of operation



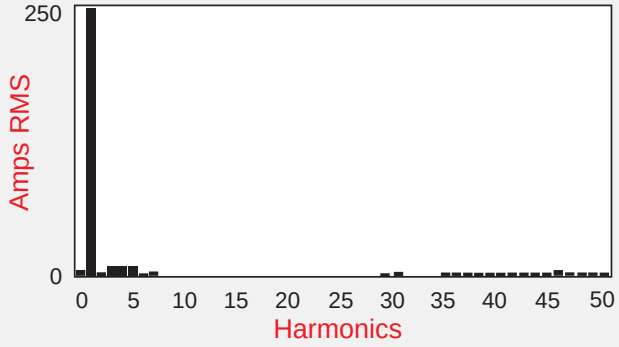
Line current – Initial situation



Filter current – Filter running



Line current – Filter running



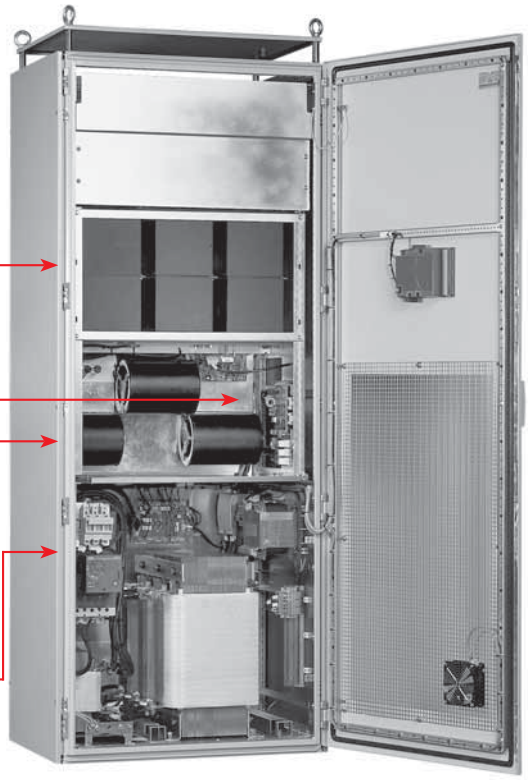
Power electronics
- PWM converter with DC capacitors
- IGBT technology

PQF-Manager
- Versatile user interface

Digital Control (DSP)
- Programmable filtering characteristics
- Perfect multi-tuning to selected harmonics
- Not overloadable
- Programmable power factor correction
- Load balancing feature
- Zero-Q filtering capability
- Programmable task priorities

Forced air cooling

Breaker and auxiliaries



PQF ratings and capabilities

Power modules for the PQF are available with voltage ratings up to 600V for 50 or 60 Hz. The maximum thermal rating of a single cubicle is 450 A rms. Absolute harmonic filtering capability also depends on the content of higher harmonics with the filtering capability following common load spectra. The reactive power compensation capacity per module is given by the thermal rating.

On site extensions are easily made by adding cubicle sections to a maximum of eight cubicles. Several PQF may operate together on the same network.

Systems for 50 Hz and 60 Hz applications can filter 20 different harmonics from the 2nd to the 50th harmonic.

Selected harmonics can be filtered completely, or to a predescribed level defined in absolute or relative terms.

Reactive power compensation may be chosen and controlled to a desired power factor.

The PQF is programmed through the PQF-Manager graphical user interface. Optional PQF-Link software enables users to program the active filter through an RS232 port using a standard PC.

UL File # E254288

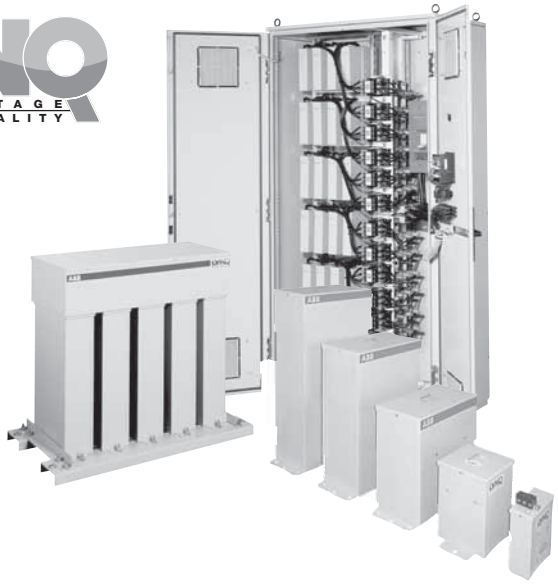
The PQF-Manager

The PQF-Manager is the Graphical User Interface provided in all the PQF types as a standard accessory. It offers direct control, programming, monitoring capabilities without a PC, communication facilities and detailed fault and event logging with real time stamp. The PQF-Manager (144 x 144 mm), fitted in the front panel of the PQF with its large LCD screen display (64 x 132 pixel) makes operating the filter very convenient.

20

Notes

Application manual
Dry type power factor correction capacitors



Index

General information

Basic Concepts

Most loads on an electrical distribution system can be categorized into three types:

- Resistive
- Inductive
- Capacitive

On modern systems, the most common is the inductive load. Typical examples include transformers, fluorescent lighting and AC induction motors.

A common characteristic of these inductive loads is that they utilize a winding in order to operate. This winding produces an electromagnetic field which allows the motor or transformer to function and requires a certain amount of electrical power to maintain this electromagnetic field.

All inductive load require two kinds of power to function properly:

- Active power (kW) - actually performs the work
- Reactive power (kvar) - sustains the electro–magnetic field

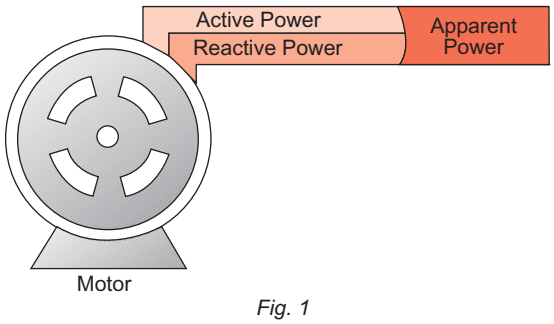


Fig. 1

One common example of reactive power can be seen in an unloaded AC motor. When all load is removed from the motor, one might expect the no-load current to drop near zero. In truth, however, the no-load current will generally show a value between 25% and 30% of full load current. This is because of the continuous demand for magnetizing current by any inductive load.
Active power is the total power indicated on a wattmeter. Apparent power is the combination of reactive and active power.

What is Power Factor?

Power factor is the relationship between working (active) power and total power consumed (apparent power). Essentially, power factor is a measurement of how effectively electrical power is being used. The higher the power factor, the more effectively electrical power is being used.

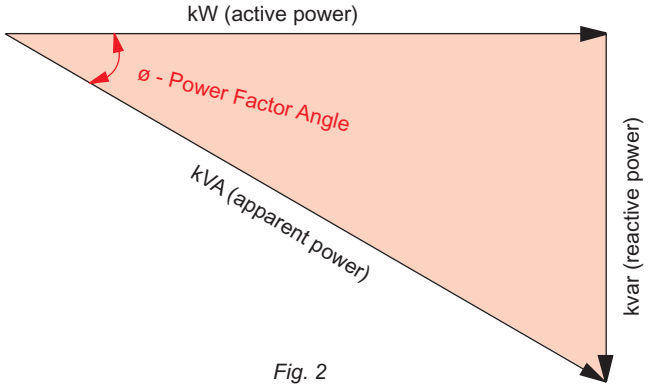


Fig. 2

Fig. 2

A distribution system's operating power is composed of two parts: Active (working) power and reactive (non-working magnetizing) power. The ACTIVE power performs the useful work . . . the REACTIVE power does not. It's only function is to develop magnetic fields required by inductive devices.

Generally, power factor decreases (phi increases) with increased motor load. This geometric relationship of apparent power to active power is traditionally expressed by the right triangle relationship of:

Cos phi = p.f. = kW/kVA

Why Improve Low Power Factor?

Low power factor means poor electrical efficiency. The lower the power factor, the higher the apparent power drawn from the distribution network.

When low power factor is not corrected, the utility must provide the nonworking reactive power IN ADDITION to the working active power. This results in the use of larger generators, transformers, bus bars, wires, and other distribution system devices that otherwise would not be necessary. As the utility's capital expenditures and operating costs are going to be higher, they are going to pass these higher expenses to industrial users in the form of power factor penalties.

Advantages of Improving Low Power Factor — Saving Money!!

- High power factor eliminates utility power factor penalties.
- High power factor reduces the heating losses of transformers and distribution equipment, prolonging life of the equipment.
- High power factor stabilizes voltage levels.
- Increased system capacity

Figure 3 illustrates the relationship of power factor to total current consumed. With a power factor of 1.0 given a constant load, the 100% figure represents the required useful current.

As the power factor drops from 1.0 to .9, power is used less effectively. Therefore, 10% more current is required to handle the same load.

A power factor of .7 requires approximately 43% more current; and a power factor of .5 requires approximately 100% (twice as much!!) to handle the same load.

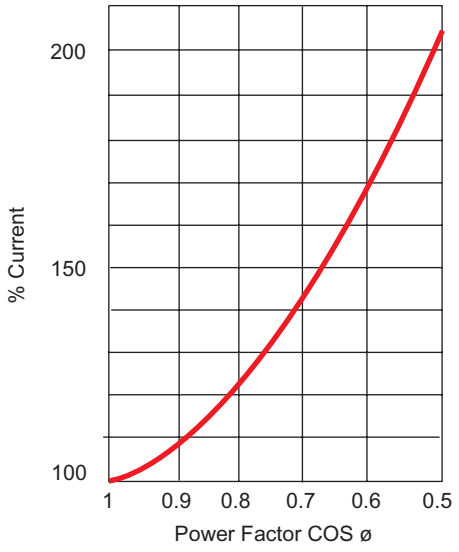


Fig. 3

How Power Factor Correction Capacitors Solve the Problem of Low Power Factor

Lower power factor is a problem that can be solved by adding power factor correction capacitors to the plant distribution system. As illustrated in Fig. 4, power factor correction capacitors work as reactive current generators "providing" needed reactive power (kvar) to the power supply. By supplying their own source of reactive power, the industrial user frees the utility from having to supply it; therefore, the total amount of apparent power (kVA) supplied by the utility will be less.

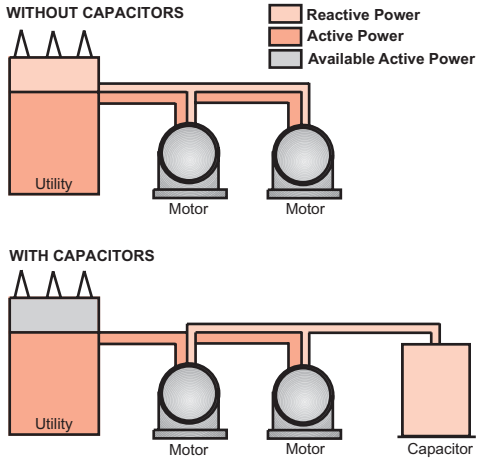


Fig. 4

Power factor correction capacitors reduce the total current drawn from the distribution system and subsequently increase system capacity by raising the power factor level.

Capacitor Rating

Power factor correction capacitors are rated in electrical units called "vars". One var is equivalent to one volt ampere of reactive power. Vars are units of measurement for indicating how much reactive power the capacitor will supply.

As reactive power is usually measured in thousands of vars, the letter "k" (abbreviation for "kilo", meaning thousands) precedes the var creating the more familiar "kvar" term.

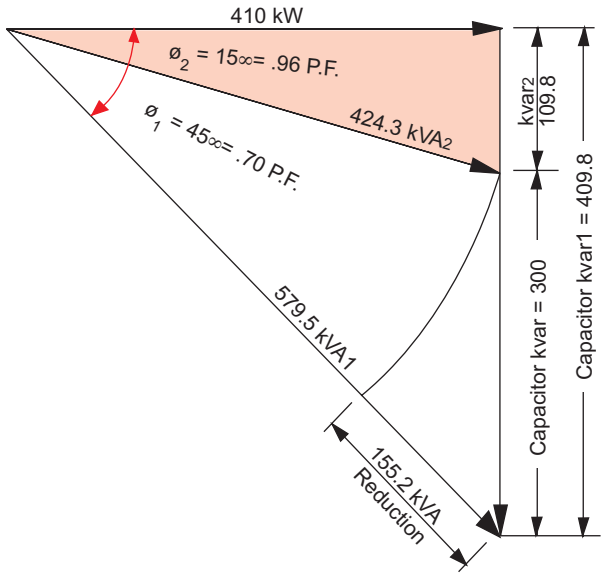


Fig. 5

The capacitor kvar rating shows how much reactive power the capacitor will supply. Each unit of the capacitor's kvar will decrease the inductive reactive power demand (magnetizing demand) by the same amount.

EXAMPLE:

A low voltage network requires 410 kW active power at full load, and the power factor is measured to be .70. Therefore, the system's full load consumption of apparent power is 579.5 kVA. If 300 kvar of capacitive reactive power is installed, the power factor will rise to .96 and the kVA demand will be reduced from 579.5 to 424.3 kVA. See Fig. 5.

Capacitor installation locations

Where Should Power Factor Correction Capacitors Be installed in a distribution system?

As shown in Fig. 6, several options exist for the connection of power factor correction capacitors on the low voltage distribution system.

Option A: On the secondary of the overload relay

Advantages: This is the most efficient location since the reactive power (kvar) is produced at the same spot where it is consumed. Line losses and voltage drop are minimized. The capacitor is switched automatically by the motor starter, so it is only energized when the motor is running. No separate switching device or overcurrent protection is required because of the presence of the motor starter components.

Care must be taken in setting the overload relay since the capacitor will bring about a reduction in amps through the overload. Therefore, to give the same protection to the motor, the overload relay's trip setting should be readjusted or the heater elements should be resized. Refer to page 6.12 for line current reduction in percent of FLA.

Option B: Between the contactor and the overload relay

The advantages are the same as Option A except the overload relay can now be set to the full load amps as shown on the motor nameplate. This mounting location is normally preferred by motor control center and switchgear builders since the overload setting is simplified.

Option C: Between the circuit breaker and the contactor

Advantages: Since the capacitor is not switched by the contactor, it can act as a central kvar source for several motors fed by the same circuit breaker. This location is recommended for jogging, plugging and reversing applications.

Since the capacitor remains energized even when the motor or motors are not running, there exists the possibility of overcorrection and leading power factor during lightly loaded periods. Losses are higher than with Options A & B as the reactive current must be carried further.

LOCATIONS FOR CAPACITORS IN MOTOR CIRCUITS

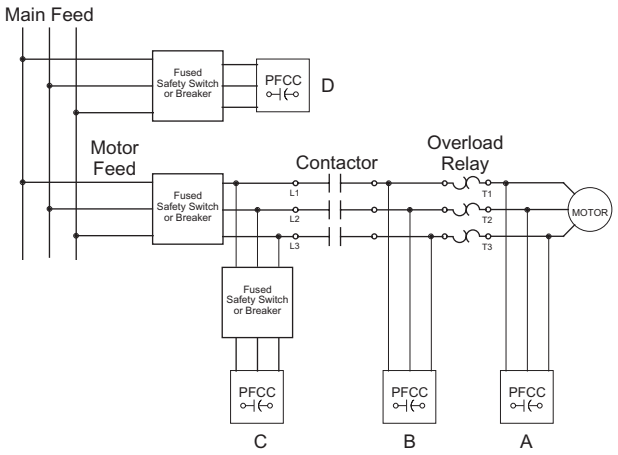


Fig. 6

Option D: As a central compensation source connected to the main distribution bus

Advantages: Of the four options, this is the most cost efficient because it uses a few large kvar capacitors rather than many small units.

A primary disconnect must be provided for switching and overcurrent protection. As with Option C, a real possibility of overcompensation exists during lightly loaded periods unless some form of automatic control is incorporated. Automatic control can be provided by ABB automatic capacitor banks.

Application and Installation

Temperature and Ventilation

Capacitors should be located in areas where the surrounding ambient temperature does not exceed 40° C and where there is adequate ventilation. As capacitors always operate at full load and generate heat of their own, maximum heat dissipation must be provided to ensure long operating life.

Line frequency and operating voltage are factors that can cause capacitor temperature to rise.

- **Line Frequency** - Assuming the line frequency of the capacitor matches the frequency of the incoming service, line frequency is not a concern since it is constant in modern power systems.

- **Operating Voltage** - Capacitor overheating at a normal operating voltage and with adequate ventilation seldom occurs. However, when the voltage exceeds 110% of the capacitor rating, overheating and resultant damage can happen.

When the operating voltage exceeds 110% of the capacitor's rated voltage, the line voltage should be reduced or the capacitor taken off line.

This overvoltage problem is exactly why, when determining the required kvar capacitance for a distribution system, a person should always "undersize" a capacitor's kvar rating... too much capacitance means overvoltage... too much overvoltage means excessive heat... and excessive heat can be damaging to the capacitor unit!!!

Special Applications

Care should be taken when power factor correction capacitors are used in the following applications:

- Plugging and jogging applications
- Frequent starts
- Crane or elevator motors where the load may drive the motor
- Multi-speed motors
- Motors involving open transition reduced voltage starting
- Reversing starters if they reverse more frequently than once per minute

Discharging Time

Power factor capacitors need a minimum of one minute to discharge. Afterwards, it is always recommended that the terminals be short-circuited to ground before touching.

Typical Capacitor Specifications

The following guidelines can be used when specifying capacitors.

SPECIFICATIONS FOR CAPACITORS

600 Volts and Below

Furnish and install where indicated power factor correction capacitors of the size, voltage rating, and enclosure type shown on the drawings.

(OPTIONAL) All motors of _____ horsepower and above shall have individual power factor correction capacitors energized with the motor.

All capacitors shall be the self healing metallized-film type filled with vermiculite, a dry NONFLAMMABLE filler material; oil-filled capacitors will not be acceptable. Discharge resistors shall be provided to automatically discharge the capacitor to less than 50 volts within one minute after de-energization. An internal ground lug shall be provided. The capacitors shall withstand 135% of rated current continuously, 110% of rated voltage continuously; and an ambient temperature range of -40°C to +40°C.

Losses shall be less than 0.5 watts per kvar. Each element shall be individually protected and the enclosure shall be filled with a dry, non-toxic, nonflammable insulating material. The capacitors shall be UL Listed and CSA approved. Capacitors shall be ABB or equivalent.

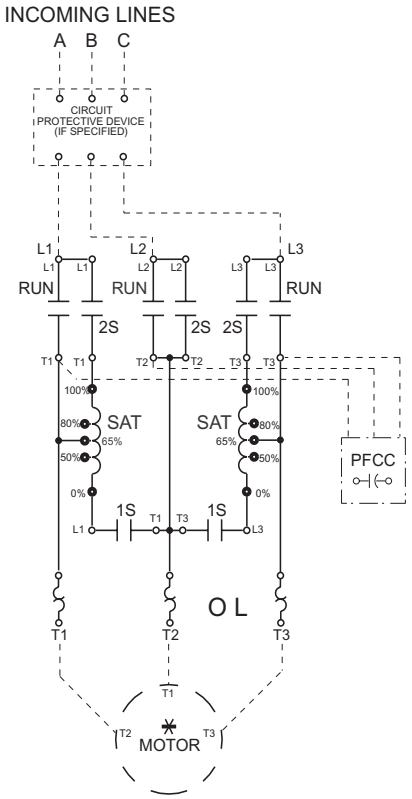
ABB contactor kvar ratings

Contactor	208V	240V	480V	600V	Max amps
UA26	3.5	4.0	8.0	10.0	10
UA30	7.0	8.0	16.5	20.5	20
UA50	10.5	12.5	25.0	31.0	30
UA75	21.5	25.0	50.0	62.0	60
UA95	25.0	29.0	58.0	72.0	70
UA110	28.5	33.0	66.0	83.0	80
A145	43	50	100	125	120
A185	57	66	133	166	160
A210	66	77	153	192	185
A260	75	87	174	218	210
A300	88	101	203	254	245
AF400	119	137	274	343	330
AF460	142	164	329	410	396
AF580	178	205	411	514	495
AF750	214	247	495	618	595

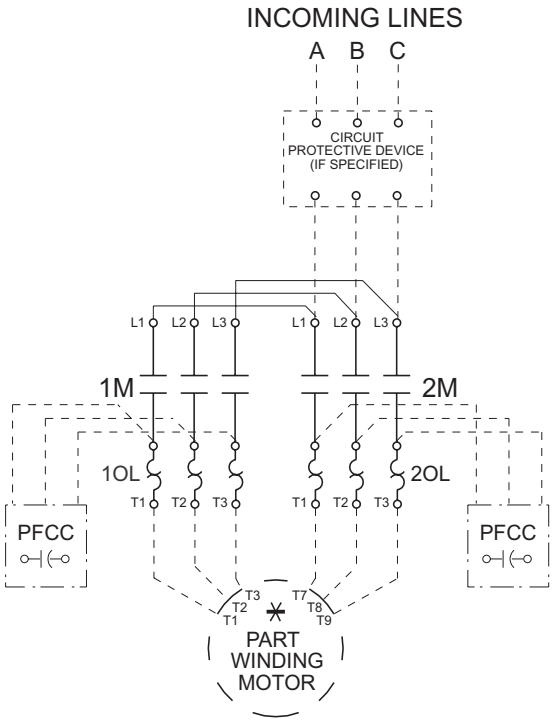
Application and installation
Wiring diagrams for Autotransformer, part-winding, wye-delta, multi-speed

Power Factor Correction Capacitor connection locations

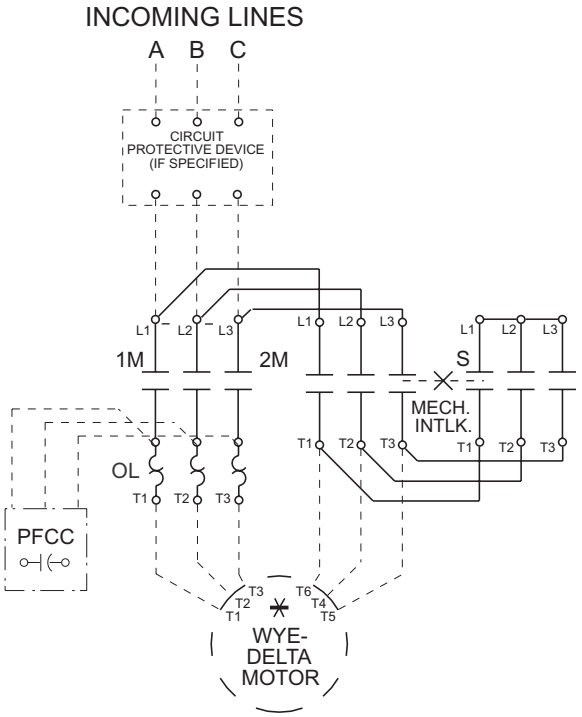
Autotransformer



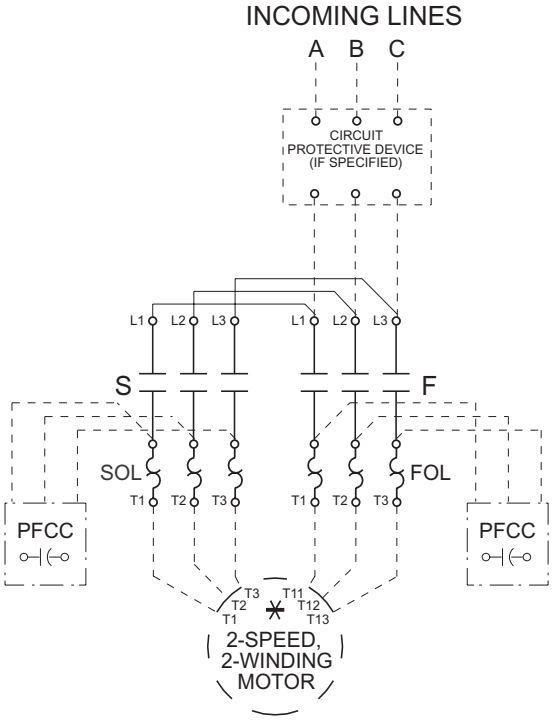
Part-winding



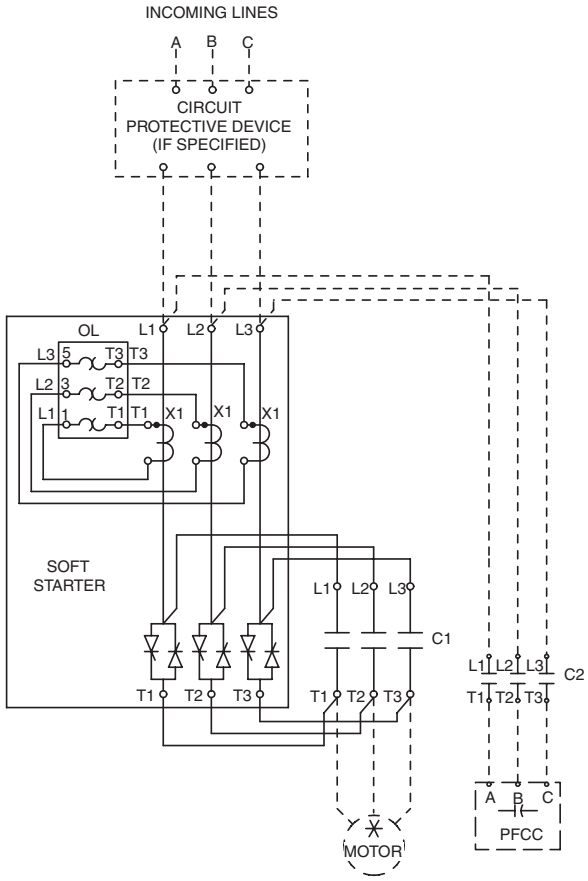
Wye-delta

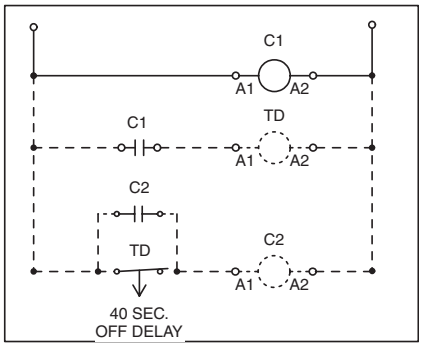


2 Speed, 2 winding



Softstarter





BYPASS CONTACTOR
CONTROL CIRCUIT

Harmonic phenomena

Problems Created by Harmonics

- Excessive heating and failure of capacitors, capacitor fuses, transformers, motors, fluorescent lighting ballasts, etc.
- Nuisance tripping of circuit breaker or blown fuses
- Presence of the third harmonic & multiples of the 3rd harmonic in neutral grounding systems may require the derating of neutral conductors
- Noise from harmonics that lead to erroneous operation of control system components
- Damage to sensitive electronic equipment
- Electronic communications interference

Any device with non-linear operating characteristics can produce harmonics in your power system. If you are currently using equipment that can cause harmonics or have experienced harmonic related problems, capacitor reactor or filter bank equipment may be the solution. The following is a discussion of harmonics; the characteristics of the problem; and a discussion of our solution.

Origins of Harmonic Distortion

The ever increasing demand of industry and commerce for stability, adjustability and accuracy of control in electrical equipment led to the development of relatively low cost power diodes, thyristors, SCRs and other power semi-conductors. Now used widely in rectifier circuits for U.P.S. systems, static converters and A.C. & D.C. motor control, these modern devices replace the mercury arc rectifiers of earlier years and create new and challenging conditions for the power engineer of today.

Although solid state devices, such as the thyristor, have brought significant improvements in control designs and efficiency, they have the disadvantage of producing harmonic currents.

Harmonic currents can cause a disturbance on the supply network and adversely affect the operation of other electrical equipment including power factor correction capacitors.

We are concentrating our discussions on harmonic current sources associated with solid state power electronics but there are actually many other sources of harmonic currents. These sources can be grouped into three main areas:

1. Power electronic equipment: Variable speed drives (AC VFD's, DC drives, PWM drives, etc.); UPS systems, rectifiers, switch mode power supplies, static converters, thyristor systems, diode bridges, SCR controlled induction furnaces and SCR controlled systems.

2. Arcing equipment: Arc furnaces, welders, lighting (mercury vapor, fluorescent)

3. Saturable devices: Transformers, motors, generators, etc. The harmonic amplitudes on these devices are usually insignificant compared to power electronic and arcing equipment, unless saturation occurs.

Waveform

Harmonics are sinusoidal waves that are integral multiples of the fundamental 60 Hz waveform (i.e., 1st harmonic =

60 Hz; 5th harmonic = 300 Hz). All complex waveforms can be resolved into a series of sinusoidal waves of various frequencies, therefore any complex waveform is the sum of a number of odd or even harmonics of lesser or greater value. Harmonics are continuous (steady-state) disturbances or distortions on the electrical network and are a completely different subject or problem from line spikes, surges, sags, impulses, etc., which are categorized as transient disturbances.

Transient problems are usually solved by installing suppression or isolation devices such as surge capacitors, isolation transformers or M.O.V.s. These devices will help solve the transient problems but will not affect the mitigation of low order harmonics or solve harmonic resonance problems.

Harmonic Content

Thyristor and SCR converters are usually referred to by the number of DC current pulses they produce each cycle. The most commonly used are 6 pulse and 12 pulse.

There are many factors that can influence the harmonic content but typical harmonic currents, shown as a percentage of the fundamental current, are given in the below table. Other harmonics will always be present, to some degree, but for practical reasons they have been ignored.

Order of harmonic	Typical percentage of harmonic current	
	6 Pulse	12 pulse
1	100	100
5	20	–
7	14	–
11	9	9
13	8	8
17	6	–
19	5	–
23	4	4
25	4	4

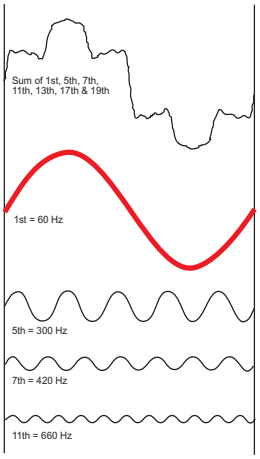


Fig. 7

Harmonic Overloading of Capacitors

The impedance of a circuit dictates the current flow in that circuit. As the supply impedance is generally considered to be inductive, the network impedance increases with frequency while the impedance of a capacitor decreases. This causes a greater proportion of the currents circulating at frequencies above the fundamental supply frequency to be absorbed by the capacitor, and all equipment associated with the capacitor.

In certain circumstances, harmonic currents can exceed the value of the fundamental (60 Hz) capacitor current. These harmonic problems can also cause an increased voltage across the dielectric of the capacitor which could exceed the maximum voltage rating of the capacitor, resulting in premature capacitor failure.

Harmonic Resonance

The circuit or selective resonant frequency is reached when the capacitor reactance and the supply reactance are equal.

Whenever power factor correction capacitors are applied to a distribution network, which combines capacitance and inductance, there will always be a frequency at which the capacitors are in parallel resonance with the supply.

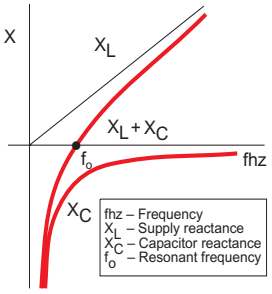


Fig. 8

If this condition occurs on, or close to, one of the harmonics generated by solid state control equipment, then large harmonic currents can circulate between the supply network and the capacitor equipment. These currents are limited only by the damping resistance in the circuit. Such currents will add to the

harmonic voltage disturbance in the network causing an increased voltage distortion.

This results in a higher voltage across the capacitor and excessive current through all capacitor components. Resonance can occur on any frequency, but in general, the resonance we are concerned with is on, or close to, the 5th, 7th, 11th and 13th harmonics for 6 pulse systems. See Fig. 8.

Avoiding Resonance

There are a number of ways to avoid resonance when installing capacitors. In larger systems it may be possible to install them in a part of the system that will not result in a parallel resonance with the supply. Varying the kvar output rating of the capacitor bank will alter the resonant frequency. With capacitor switching there will be a different resonant frequency for each step. Changing the number of switching steps may avoid resonance at each step of switching. See Fig. 9.

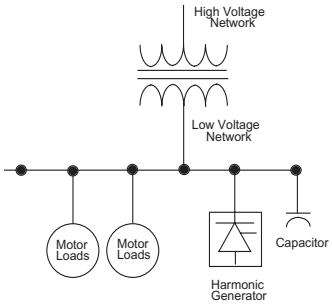
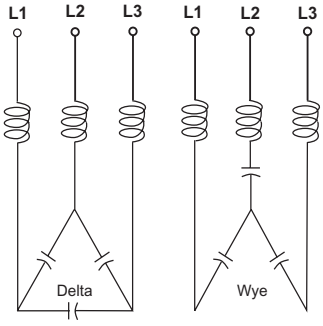


Fig. 9

Overcoming Resonance

If resonance cannot be avoided, an alternative solution is required. A reactor must be connected in series with each capacitor such that the capacitor/reactor combination is inductive at the critical frequencies but capacitive at the fundamental frequency. To achieve this, the capacitor and series connected reactor must have a tuning frequency below the lowest critical order of harmonic, which is usually the 5th. This means the tuning frequency is in the range of 175 Hz to 270 Hz, although the actual frequency will depend upon the magnitude and order of the harmonic currents present.



Detuned Capacitor/Reactor Systems

Fig. 10

The addition of a reactor in the capacitor circuit increases the fundamental voltage across the capacitor. Therefore, care should be taken when adding reactors to existing capacitors. See Fig. 10.

Reduction of Harmonic Distortion

Harmonic currents can be significantly reduced in an electrical system by using a harmonic filter.

In its basic form, a filter consists of a capacitor connected in series with a reactor tuned to a specific harmonic frequency. In theory, the impedance of the filter is zero at the tuning frequency; therefore, the harmonic current is absorbed by the filter. This, together with the natural resistance of the circuit, means that only a small level of harmonic current will flow in the network.

Types of Filters

The effectiveness of any filter design depends on the reactive output of the filter, tuning accuracy and the impedance of the network at the point of connection.

Harmonics below the filter tuning frequency will be amplified. The filter design is important to ensure that distortion is not amplified to unacceptable levels. Where there are several harmonics present, a filter may reduce some harmonics while increasing others. A filter for the 7th harmonic creates a parallel resonance in the vicinity of the 5th harmonic with magnifi-cation of the existing 5th harmonic; therefore, a 7th harmonic filter requires a 5th harmonic filter. See Fig. 11. Consequently, it is often necessary to use a multiple filter design where each filter is tuned to a different frequency. Experience is extremely important in the design of such filters to ensure:

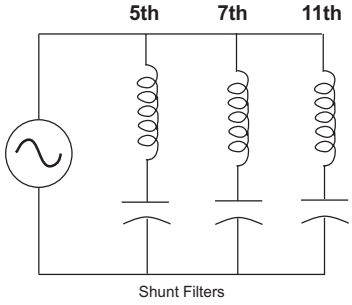


Fig. 11

(a) the most efficient and cost effective solution is selected;

(b) no adverse interaction between the system and the filter.

Load Alteration

Whenever load expansion is considered, the network is likely to change and existing filter equipment should be evaluated in conjunction with the new load condition. It is not recommended to have two or more filters tuned to the same frequency connected on the same distribution system. Slight tuning differences may cause one filter to take a much larger share of the harmonic distortion. Or, it may cause amplification of the harmonic order which the equipment has been designed to reduce. When there is a need to vary the power factor correction component of a harmonic filter, careful consideration of all load parameters is necessary.

Harmonic Analysis

The first step in solving harmonic related problems is to perform an analysis to determine the specific needs of your electrical distribution system. To determine capacitor and filter requirements, it is necessary to establish the impedance of the supply network and the value of each harmonic current. Capacitor, reactor and filter bank equipment are then specified under very detailed and stringent computer analysis to meet your needs.

Your ABB Solution to Harmonics

ABB is the world's largest manufacturer of dry type low voltage capacitors! ABB Control Inc. utilizes this experience in recommending three options to solve the problems associated with applying capacitors to systems having harmonic distortion:

1. Apply the correct amount of capacitance (kvar) to the network to avoid resonance with the source. This may be difficult, especially in automatic systems as the capacitance is always changing. This solution usually means connecting less capacitance to the system than is actually needed for optimum power factor correction.

2. Install reactors in series with capacitors to lower the resonance below critical order harmonics; i.e., 5th, 7th, 11th & 13th. This design tunes the resonant frequency of the system well below the critical harmonic and is called an anti-resonance bank. This solution allows the capacitors to operate in a harmonic environment.

Harmonic phenomena

3. Filters are recommended if a problem exists with harmonic distortion before the application of power factor correction, or if the harmonic distortion is above the limits recommended in IEEE 519, "Guide for Harmonic Control and Reactive Compensation of Static Power Converters". (The recommended limits for voltage distortion in IEEE 519 are presently 5% for general applications.) Tuned filters sized to reduce the harmonic distortion at critical frequencies have the benefits of correcting the power factor and improving the network power quality.

With our knowledge of harmonics, ABB provides a complete range of products from individual capacitors, fixed banks and automatic banks, to power filter systems. All these products utilize dry type low voltage ABB power factor correction capacitor elements which are self-healing for internal faults.

To maintain stringent quality control standards, most control components found in automatic and anti-resonance filter bank products are also ABB products. These products include contactors, circuit breakers, control relays, disconnect switches, power factor relays and pushbutton devices.

ABB Capacitor Features & Services

Every ABB Control low voltage capacitor product incorporates our unique dry type design. Therefore, environmental and personnel concerns associated with leakage or flammability of conventional oil-filled units are eliminated. Other features include:

- Patented Sequential Protection System includes dry, self-healing design; internally protected elements; and dry, non-flammable vermiculite filler
- Individual units, fixed and automatic capacitor bank designs, 208-600V
- Automatic and fixed tuned or anti-resonance capacitor banks
- Power factor and harmonic studies
- UL and CSA

Sizing capacitors at the motor load
Using formulas

Sizing Capacitors at the Motor Load

When the determination is made that power factor correction capacitors ARE a good investment for a particular electrical system, you need to know:

- How many capacitors are needed?
- What sizes are appropriate?

The capacitor provides a local source of reactive current. With respect to inductive motor load, this reactive power is the magnetizing or "no-load current" which the motor requires to operate.

A capacitor is properly sized when its full load current rating is 90% of the no-load current of the motor. This 90% rating avoids overcorrection and the accompanying problems such as overvoltages.

One Selection Method: Using Formulas

If no-load current is known . . .

The most accurate method of selecting a capacitor is to take the no-load current of the motor, and multiply by .90 (90%). Take this resulting figure, turn to the appropriate catalog page, and determine which kvar size is needed, catalog number, enclosure type, and price.

EXAMPLE: Size a capacitor for a 100hp, 460V 3-phase motor which has a full load current of 124 amps and a no-load current of 37 amps.

1. Multiply the no-load current figure of 37 amps by 90%.

37 no load amps X 90% = 33 no load amps

2. Turning to the catalog page for 480 volt, 3-phase capacitors, find the closest amp rating to, but NOT OVER 33 amps. See Table 1, sample catalog pricing chart. Per the sample chart the closest amperage is 32.5 amps. The proper capacitor unit, then is 27 kvar and the appropriate catalog number depends on the type enclosure desired.

NOTE

The formula method corrects power factor to approximately .95

If the no load current is not known . . .

If the no-load current is unknown, a reasonable estimate for 3-phase motors is to take the full load amps and multiply by 30%. Then take that figure and multiply times the 90% rating figure being used to avoid overcorrection and overvoltages.

EXAMPLE: Size a capacitor for a 75hp, 460V 3-phase motor which has a full load current of 92 amps and an unknown no-load current.

1. First, find the no-load current by multiplying the full load current times 30%.

92 (full load amps) X 30% = 28 estimated no-load amps

2. Multiply 28 no-load amps by 90%.

28 no-load amps X 90% = 25 no-load amps

3. Now examine the capacitor pricing and selection chart for 480 volt, 3-phase capacitors. Refer again to Table 1. Here it will be seen that the closest capacitor to 25 amps full load current without going over is a 20 kvar unit, rated at 24.1 amps.

4. The correct selection, then, is 20 kvar!

TABLE 1
480 VOLT, 60 Hz., 3-Phase

Enclosure Size	kvar Rating	Rated Current Per Phase	Approx. Shipping We ight (Lbs.)	Indoor – Nema 1 Catalog Number	Outdoor – Nema 3R Catalog Number	Indoor – Nema 12 Catalog Number
	1.5	1.8	8	C484G1.5	C484R1.5	C484D1.5
	2	2.4	8	C484G2	C484R2	C484D2
	2.5	3.0	8	C484G2.5	C484R2.5	C484D2.5
	3	3.6	8	C484G3	C484R2	C484D3
		4.8				
			13	C484G17.5		
	18	21.7	13	C484G18	C484R18	C484D18
	19	22.8	13	C484G19	C484R19	C484D19
	20	24.1	13	C484G20	C484R20	C484D20
	21	25.3	13	C484G21	C484R21	C484D21
	22	26.5	13	C484G22	C484R22	C484D22
	22.5	27.1	13	C484G22.5	C484R22.5	C484D22.5
	24	28.9	13	C484G24		
	25			G25		

20

Sizing capacitors at the motor load
Using charts

An Alternate Selection Method — Using Charts

TABLE 2: Suggested Maximum Capacitor Ratings for T-Frame NEMA Class B Motors

Induction motor rating (HP)	NOMINAL MOTOR SPEED											
	3600 R/Min		1800 R/Min		1200 R/Min		900 R/Min		720 R/Min		600 R/MIN	
	Capacitor rating (kvar)	Line current reduction (%)	Capacitor rating (kvar)	Line current reductions (%)	Capacitor rating (kvar)	Line current reduction (%)	Capacitor rating (kvar)	Line current reduction (%)	Capacitor rating (kvar)	Line current reduction (%)	Capacitor rating (kvar)	Line current reduction (%)
3	1.5	14	1.5	23	2.5	28	3	38	3	40	4	40
5	2	14	2.5	22	3	26	4	31	4	40	5	40
7.5	2.5	14	3	20	4	21	5	28	5	38	6	45
10	4	14	4	18	5	21	6	27	7.5	36	8	38
15	5	12	5	18	6	20	7.5	24	8	32	10	34
20	6	12	6	17	7.5	19	9	23	12	25	18	30
25	7.5	12	7.5	17	8	19	10	23	12	25	18	30
30	8	11	8	16	10	19	14	22	15	24	22.5	30
40	12	12	13	15	16	19	18	21	22.5	24	25	30
50	15	12	18	15	20	19	22.5	21	24	24	30	30
60	18	12	21	14	22.5	17	26	20	30	22	35	28
75	20	12	23	14	25	15	28	17	33	14	40	19
100	22.5	11	30	14	30	12	35	16	40	15	45	17
125	25	10	36	12	35	12	42	14	45	15	50	17
150	30	10	42	12	40	12	52.5	14	52.5	14	60	17
200	35	10	50	11	50	10	65	13	68	13	90	17
250	40	11	60	10	62.5	10	82	13	87.5	13	100	17
300	45	11	68	10	75	12	100	14	100	13	120	17
350	50	12	75	8	90	12	120	13	120	13	135	15
400	75	10	80	8	100	12	130	13	140	13	150	15
450	80	8	90	8	120	10	140	12	160	14	160	15
500	100	8	120	9	150	12	160	12	180	13	180	15

Applies to three-phase, 60Hz motors when switched with capacitors as a single unit.

Another method of selecting the proper capacitor employs the use of only a selection chart shown in Table 2 or 3. These tables take other variables such as motor RPM into consideration in making recommendations for capacitor applications. They are convenient because they only require that the user know the horsepower and RPM of the motor. Both tables estimate the percentage reduction in full load current drawn by the motor as a result of the capacitor's installation.

WARNING!

NEVER OVERSIZE CAPACITORS OR EXCEED 1.0 POWER FACTOR OR RESULTING PROBLEMS WITH THE MOTOR CAN OCCUR!!

If calculations or a kvar determination chart indicate a kvar rating not found in a pricing and selection chart, always refer to the next lower kvar rating!

EXAMPLE: A manufacturer needs to determine the proper capacitors required for a 1200 RPM, 75HP T-Frame NEMA class B motor.

1. First find 75 in the horsepower column of the chart.
2. Locate the 1200 RPM capacitor rating (kvar) column. Note the figure of 25 kvar.
3. Now refer to the appropriate pricing and selection chart Table 1, page 6.11. The appropriate kvar rating is 25 kvar. Depending on the desired enclosure, the price and catalog number can then be easily determined.

NOTE

Using the above charts for selecting capacitors will correct power to approximately .95.

TABLE 3: Suggested Maximum Capacitor Ratings for U-Frame NEMA Class B Motors

NEMA Motor Design A or B Normal Starting Torque Normal Running Current												
H.P. Rating	3600 RPM		1800 RPM		1200 RPM		900 RPM		720 RPM		600 RPM	
	kvar	%AR	kvar	%AR	kvar	%AR	kvar	%AR	kvar	%AR	kvar	%AR
3	1.5	14	1.5	15	1.5	20	2	27	2.5	35	3.5	41
5	2	12	2	13	2	17	3	25	4	32	4.5	37
7.5	2.5	11	2.5	13	2	15	4	22	5.5	30	6	34
10	3	10	3	11	3.5	14	5	21	6.5	27	7.5	31
15	4	9	4	10	5	13	6.5	18	8	23	9.5	27
20	5	9	5	10	5	11	7.5	18	10	20	10	25
25	5	6	5	8	7.5	11	7.5	13	10	20	10	21
30	5	5	5	8	7.5	11	10	15	15	22	15	25
40	7.5	8	10	8	10	10	15	16	15	18	15	20
50	10	7	10	8	10	9	15	12	20	15	25	22
60	10	6	10	8	15	10	15	11	20	15	25	20
75	15	7	15	8	15	9	20	11	30	15	40	20
100	20	8	20	8	25	9	30	11	40	14	45	18
125	20	6	25	7	30	9	30	10	45	14	50	17
150	30	6	30	7	35	9	40	10	50	17	60	17
200	40	6	40	7	45	8	55	11	60	12	75	17
250	45	5	45	6	60	9	70	10	75	12	100	17
300	50	5	50	6	75	9	75	9	80	12	105	17

Applies to three-phase, 60Hz motors when switched with capacitors as a single unit.

Sizing capacitors at the motor load
Using charts

Power factor correction chart

Original power factor in percent	DESIRED CORRECTED POWER FACTOR IN PER CENT																				
	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
50	0.982	1.008	1.034	1.060	1.086	1.112	1.139	1.165	1.192	1.220	1.248	1.276	1.306	1.337	1.369	1.403	1.442	1.481	1.529	1.590	1.732
51	.937	.962	.989	1.015	1.041	1.067	1.094	1.120	1.147	1.175	1.203	1.231	1.261	1.292	1.324	1.358	1.395	1.436	1.484	1.544	1.687
52	.893	.919	.945	.971	.997	1.023	1.050	1.076	1.103	1.131	1.159	1.187	1.217	1.248	1.280	1.314	1.351	1.392	1.440	1.500	1.643
53	.850	.876	.902	.928	.954	.980	1.007	1.033	1.060	1.088	1.116	1.144	1.174	1.205	1.237	1.271	1.308	1.349	1.397	1.457	1.600
54	.809	.835	.861	.887	.913	.939	.966	.992	1.019	1.047	1.075	1.103	1.133	1.164	1.196	1.230	1.267	1.308	1.356	1.416	1.669
55	.769	.795	.821	.847	.873	.899	.926	.952	.979	1.007	1.035	1.063	1.090	1.124	1.156	1.190	1.228	1.268	1.316	1.377	1.519
56	.730	.756	.782	.808	.834	.860	.887	.913	.940	.968	.996	1.024	1.051	1.085	1.117	1.151	1.189	1.229	1.277	1.338	1.480
57	.692	.718	.744	.770	.796	.822	.849	.875	.902	.930	.958	.986	1.013	1.047	1.079	1.113	1.151	1.191	1.239	1.300	1.442
58	.655	.681	.707	.733	.759	.785	.812	.838	.865	.893	.921	.949	.976	1.010	1.042	1.076	1.114	1.154	1.202	1.263	1.405
59	.618	.644	.670	.696	.722	.748	.775	.801	.828	.856	.884	.912	.939	.973	1.005	1.039	1.077	1.117	1.165	1.226	1.368
60	.584	.610	.636	.662	.688	.714	.741	.767	.794	.822	.850	.878	.907	.939	.971	1.005	1.043	1.083	1.131	1.192	1.334
61	.549	.575	.601	.627	.653	.679	.706	.732	.759	.787	.815	.843	.870	.907	.936	.970	1.008	1.048	1.096	1.157	1.299
62	.515	.541	.567	.593	.619	.645	.672	.698	.725	.753	.781	.809	.836	.870	.902	.936	.974	1.014	1.062	1.123	1.265
63	.483	.509	.535	.561	.587	.613	.640	.666	.693	.721	.749	.777	.804	.838	.870	.904	.942	.982	1.030	1.091	1.233
64	.450	.476	.502	.528	.554	.580	.607	.633	.660	.688	.716	.744	.771	.805	.837	.871	.909	.949	.997	1.058	1.200
65	.419	.445	.471	.497	.523	.549	.576	.602	.629	.657	.685	.713	.740	.774	.806	.840	.878	.918	.966	1.027	1.169
66	.368	.414	.440	.466	.492	.518	.545	.571	.598	.626	.654	.682	.709	.743	.775	.809	.847	.887	.935	.996	1.138
67	.358	.384	.410	.436	.462	.488	.515	.541	.568	.596	.624	.652	.679	.713	.745	.779	.817	.857	.905	.966	1.108
68	.329	.355	.381	.407	.433	.459	.486	.512	.539	.567	.595	.623	.650	.684	.716	.750	.788	.828	.876	.937	1.079
69	.299	.325	.351	.377	.403	.429	.456	.482	.509	.537	.565	.593	.620	.654	.686	.720	.758	.798	.840	.907	1.049
70	.270	.296	.322	.348	.374	.400	.427	.453	.480	.508	.536	.564	.591	.625	.657	.691	.729	.769	.811	.878	1.020
71	.242	.268	.294	.320	.346	.372	.399	.425	.452	.480	.508	.536	.563	.597	.629	.663	.701	.741	.783	.850	.992
72	.213	.239	.265	.291	.317	.343	.370	.396	.423	.451	.479	.507	.538	.568	.600	.634	.672	.712	.754	.821	.963
73	.186	.212	.238	.264	.290	.316	.343	.369	.396	.424	.452	.480	.507	.541	.573	.607	.645	.685	.727	.794	.936
74	.159	.185	.211	.237	.263	.289	.316	.342	.369	.397	.425	.453	.480	.514	.546	.580	.616	.658	.700	.767	.909
75	.132	.158	.184	.210	.236	.262	.289	.315	.342	.370	.398	.426	.453	.487	.519	.553	.591	.631	.673	.740	.882
76	.105	.131	.157	.183	.209	.235	.262	.288	.315	.343	.371	.399	.426	.460	.492	.526	.564	.604	.652	.713	.855
77	.079	.105	.131	.157	.183	.209	.236	.262	.289	.317	.345	.373	.400	.434	.466	.500	.538	.578	.620	.687	.829
78	.053	.079	.105	.131	.157	.183	.210	.236	.263	.291	.319	.347	.374	.408	.440	.474	.512	.552	.594	.661	.803
79	.026	.052	.078	.104	.130	.156	.183	.209	.236	.264	.292	.320	.347	.381	.413	.447	.485	.525	.567	.634	.776
80	.000	.026	.052	.078	.104	.130	.157	.183	.210	.238	.266	.294	.321	.355	.387	.421	.459	.499	.541	.608	.750
81	-	.000	.026	.052	.078	.104	.131	.157	.184	.212	.240	.268	.295	.329	.361	.395	.433	.473	.515	.582	.724
82	-	-	.000	.026	.052	.078	.105	.131	.158	.186	.214	.242	.269	.303	.335	.369	.407	.447	.489	.556	.698
83	-	-	-	.000	.026	.052	.079	.105	.132	.160	.188	.216	.243	.277	.309	.343	.381	.421	.463	.530	.672
84	-	-	-	-	.000	.026	.053	.079	.106	.134	.162	.190	.217	.251	.283	.317	.355	.395	.437	.504	.645
85	-	-	-	-	-	.000	.027	.053	.080	.108	.136	.164	.191	.225	.257	.291	.329	.369	.417	.478	.620
86	-	-	-	-	-	-	.000	.026	.053	.081	.109	.137	.167	.198	.230	.265	.301	.343	.390	.451	.593
87	-	-	-	-	-	-	-	.000	.027	.055	.082	.111	.141	.172	.204	.238	.275	.317	.364	.425	.567
88	-	-	-	-	-	-	-	-	.000	.028	.056	.084	.114	.145	.177	.211	.248	.290	.337	.398	.540
89	-	-	-	-	-	-	-	-	-	.000	.028	.056	.086	.117	.149	.183	.220	.262	.309	.370	.512
90	-	-	-	-	-	-	-	-	-	-	.000	.028	.058	.089	.121	.155	.192	.234	.281	.342	.484
91	-	-	-	-	-	-	-	-	-	-	-	.000	.030	.061	.093	.127	.164	.206	.253	.314	.456
92	-	-	-	-	-	-	-	-	-	-	-	-	.000	.031	.063	.097	.134	.176	.223	.284	.426
93	-	-	-	-	-	-	-	-	-	-	-	-	-	.000	.032	.066	.103	.145	.192	.253	.395
94	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.000	.034	.071	.113	.160	.221	.363
95	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.000	.037	.079	.126	.87	.328
96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.000	.042	.089	.150	.292
97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.000	.047	.108	.251
98	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.000	.061	.203
99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.000	.142

Sizing Capacitors for Improving System Power Factor

Sizing and selecting capacitors for system power factor correction is calculated using a Power Factor Correction Chart. Before this chart can be used, however, the total kW requirement needs to be known for the ENTIRE system in addition to the PRESENT and DESIRED power factors.

EXAMPLE: A plant has a present power factor level of .75; a load draws 806 amps at 480V; average power consumption of 500kW; and a desired power factor level of .90. Compute the necessary capacitance required and select the proper automatic and fixed bank unit.

1. First, look at the left hand column of the Power Factor Correction chart entitled “Original Power Factor”. Find your current power factor level of .75.

2. Second, follow the column of figures to the right of the .75 figure until you come to the column entitled “.90” (your desired power factor level).

3. The number in that row is .398. Now multiply this figure by the total plant kW of 500:

.398 X 500kW = 199 kvar

4. The resulting total of 199 represents the amount of capacitive power (kvar) required to bring the power factor to the desired level of .90.

5. Referring to the sample selection charts (See Table 4 or Table 5, next page), select the appropriate kvar rating.

NOTE: When selecting automatic bank units, select the closest kvar rating to the amount of kvar desired based on present and future applications. If the desired rating is not listed, the next higher kvar rating should be selected. When selecting fixed bank units, however, select the kvar rating WITHOUT GOING OVER (See Warning, page 6.12) the desired capacitance level.

In this example for the automatic capacitor bank, 200 kvar is the closest to the desired 199 kvar. For the fixed capacitor bank, 180 kvar should be selected without going over the desired kvar of 199.

Sizing capacitors at the motor load
Using charts

What if Present Power Factor Cannot Be Determined Because kVA is Unknown?

1. First, find the apparent power (kVA). kVA demand on a 3-phase system is equal to:

kVA = VOLTS x AMPS x$\sqrt{3}$ ÷ 1000

2. The voltage and amperage of the distribution system will be known. Again, using the above example, we know that the distribution system is 480 volts and draws 806 amps. Therefore:

480 VOLTS x 806 AMPS x$\sqrt{3}$ ÷ 1000 = 670kVA

3. Now power factor can be solved for:

500kW / 670kVA = .746 pf

4. With the power factor now known, the Power Factor Improvement chart can be used as before.

How is the Power Factor Correction Chart Used if Existing Power Factor Level is Unknown?

1. First, power factor has to be calculated. Power factor is equal to active power (kW) divided by apparent power (kVA). kW will be known because it is the total amount of power consumed over a given period of time and is the amount shown on a utility bill. Therefore:

pf = kW / kVA

2. Using the above example, 500kW divided by 670kVA equals a present power factor (pf) of .746.

500kW / 670kVA = .746 pf

3. When DETERMINING power factor, always round off to the next higher rating. Therefore, the .746 power factor figure is rounded off to .75.

NOTE: Don't confuse rounding UP a power factor figure that is manually calculated with the warning on page 46 that tells you to round DOWN when using a catalog selection chart!

4. Now that present power factor is known, the above problem can be solved as before.

FINAL EXAMPLE: A manufacturer has a 480 volt, 3-phase metered demand of 460kW. An ammeter on the system shows total current draw of 770 amps. Existing power factor and apparent power (kVA) are unknown. What is the existing system power factor and how much capacitance is required to correct to .92?

1. First, solve for kVA.

480 VOLTS x 770 AMPS x$\sqrt{3}$ ÷ 1000 = 640kVA

2. Next, solve for Power Factor.

460kW / 640kVA = .72 POWER FACTOR

3. To correct the power factor from .72 to .92 refer to the Power Factor Correction Chart on page 47. A factor of .534 will be determined.

4. The final step is to multiply the 460kW figure by the correction factor of .534.

460kW X .534 = 245 kvar

This system would require the installation of 245 kvar of capacitance to improve the power factor to .92. Refer to the appropriate automatic or fixed bank catalog pages, select the proper voltage and phase, then identify the proper catalog number.

TABLE 4 - Fixed Capacitor Banks

110	2/55	F246G110
120	2/60	F246G120
130	1/40, 2/45	F246G130
150	3/50	F246G150
160	2/80	F246G160
180	3/60	F246G180
200	4/50	F246G200
220	4/50	F24

TABLE 5 - Automatic Capacitor Banks

125	AA4 5B5	AA4D125B
150	AA4G150B6A	AA4D150B6A
175	AA4G175B7A	AA4D175B7A
200	AA4G200B8A	AA4D200B8A
225	AA4G225B9A	AA4D225B9A
250	AA4G250B10A	AA4D250B10A
300	AA4G300B12A	AA4D300B12A

Typical recommended ratings of cables & protected devices

Typical recommended ratings of cables and protected devices

3- Phase Capacitor kVar	Rated Current Per Phase (amps)	Minimum Copper Cable Size for 75oC Insulation	Recommended fuse amps Type Class RK5 (Time Delay)	Recommended Disconnect Switch Amps	Recommended MCCB Trip Amps
240 Volt					
2.5	6	#14	10	30	15
3.5	8.4	#14	15	30	15
5	12	#14	20	30	20
7.5	18	#12	30	30	30
10	24	#10	40	60	40
15	36	#6	60	60	60
20	48	#4	80	100	80
25	60	#4	100	100	90
30	72	#2	125	200	110
40	96	#1	175	200	150
50	120	1/0	200	200	200
60	144	2/0	250	400	225
75	180	250 kcmil	300	400	300
100	241	400 kcmil	400	400	400
125	301	(2) - 4/0	500	600	500
150	361	(2) - 250 kcmil	600	600	600
200	481	(2) - 400 kcmil	800	800	750
250	601	(3) - 300 kcmil	1000	1000	900
300	722	(3) - 400 kcmil	1200	1200	1100
480 Volt					
1.5	1.8	#14	3	30	15
2	1.8	#14	3	30	15
2.5	3	#14	6	30	15
3	3.6	#14	6	30	15
3.5	4.2	#14	10	30	15
4	4.8	#14	10	30	15
5	6	#14	10	30	15
6	7.2	#14	15	30	15
6.5	7.8	#14	15	30	15
7.5	9	#14	15	30	15
10	12	#14	20	30	20
15	18	#12	30	30	30
20	24	#10	40	60	40
25	30	#8	50	60	50
30	36	#6	60	60	60
35	42	#6	70	100	70
40	48	#4	80	100	80
45	54	#4	90	100	90
50	60	#4	100	100	90
60	72	#2	125	200	110
70	84	#1	150	200	150
75	90	#1	150	200	150
80	96	#1	175	200	150
90	108	1/0	200	200	175
100	120	2/0	200	200	200
150	180	250 kcmil	300	400	300
200	241	400 kcmil	400	400	400
250	301	(2) - 4/0	500	600	500
300	361	(2) - 250 kcmil	600	600	600
350	421	(2) - 300 kcmil	700	800	650
400	481	(2) - 400 kcmil	800	800	750
500	601	(3) - 300 kcmil	1000	1000	902

Typical recommended ratings of cables & protected devices

Typical recommended ratings of cables and protected devices

3-Phase Capacitor kvar	Rated Current Per Phase (amps)	Minimum Copper Cable Size for 75oC Insulation	Recommended fuse amps Type RK5 (Time Delay)	Recommended Disc Switch Amps	Recommended MCCB Trip Amps
600 Volt					
2	2	#14	3	30	15
3	3	#14	6	30	15
4	4	#14	6	30	15
5	5	#14	10	30	15
7.5	7	#14	15	30	15
10	10	#14	20	30	15
15	14	#14	25	30	25
20	19	#10	35	60	30
25	24	#10	40	60	40
30	29	#8	50	60	50
35	34	#8	60	60	60
40	38	#6	70	100	60
45	43	#6	80	100	70
50	48	#4	80	100	80
60	58	#4	100	100	90
70	67	#2	125	200	110
80	77	#2	150	200	125
90	87	#1	150	200	150
100	96	#0	175	200	150
150	144	3/0	250	400	225
200	192	300 kcmil	350	400	300
250	241	400 kcmil	400	400	400
300	289	(2) - 3/0	500	600	450
350	337	(2) - 4/0	600	600	550
400	385	(2) - 300 kcmil	650	800	600
500	481	(2) - 400 kcmil	800	800	750

NOTE: Cable sizes are derived from Article 310, Table 310-16 of 2002 ***NEC*** ®

The above table gives recommended ratings of cables, disconnect switches, and/or molded case circuit breakers for use with capacitor loads. For requirements not covered in the table, the following application guidelines may be used for capacitor switching duty:

- Power Cable Sizing 135% of Capacitor Current
- Disconnect Switch 165% of Capacitor Current
- Molded Case Circuit Breaker 135% of Capacitor Current

Note: For specific applications, refer to the *NEC*®.

Extract from *NEC*®
Separate overcurrent protection

Extract from 2002 *NEC*® Code Requirements

460-8. Conductors.

(A) Ampacity. The ampacity of capacitor circuit conductors shall not be less than 135 percent of the rated current of the capacitor. The ampacity of conductors that connect a capacitor to the terminals of a motor or to motor circuit conductors shall not be less than one third the ampacity of the motor circuit conductors and in no case less than 135 percent of the rated current of the capacitor.

(B) Overcurrent Protection. An overcurrent device shall be provided in each ungrounded conductor for each capacitor bank. The rating or setting of the overcurrent device shall be as low as practicable.

Exception: A separate overcurrent device shall not be required for a capacitor connected on the load side of a motor overload protective device.

(C) Disconnecting Means. A disconnecting means shall be provided in each ungrounded conductor for each capacitor bank and shall meet the following requirements.

(1) The disconnecting means shall open all ungrounded conductors simultaneously.

(2) The disconnecting means shall be permitted to disconnect the capacitor from the line as a regular operating procedure.

(3) The rating of the disconnecting means shall not be less than 135 percent of the rated current of the capacitor.

Exception: A separate disconnecting means shall not be required where a capacitor is connected on the load side of a motor controller.

460-9. Rating or Setting of Motor Overload Device. Where a motor installation includes a capacitor connected on the load side of the motor overload device, the rating or setting of the motor overload device shall be based on the improved power factor of the motor circuit.

The effect of the capacitor shall be disregarded in determining the motor circuit conductor rating in accordance with Section 430-22.

Separate overcurrent protection

A separate overcurrent device is not necessary when an ABB capacitor is electrically connected on the load side of the motor starter fused safety switch or breaker. Personnel and facility short circuit protection is provided within the capacitor by ABB's patented Sequential Protection System. Short circuit protection between the main feed and the capacitor is provided by the motor starter fused safety switch or breaker. A disconnect switch can be provided when the capacitor is connected as illustrated in Option C (See Fig. 12). When the capacitor is connected as shown in Option C, the capacitor remains energized when the motor is off. The optional disconnect switch provides a means to disconnect the capacitor when the motor is not in operation.

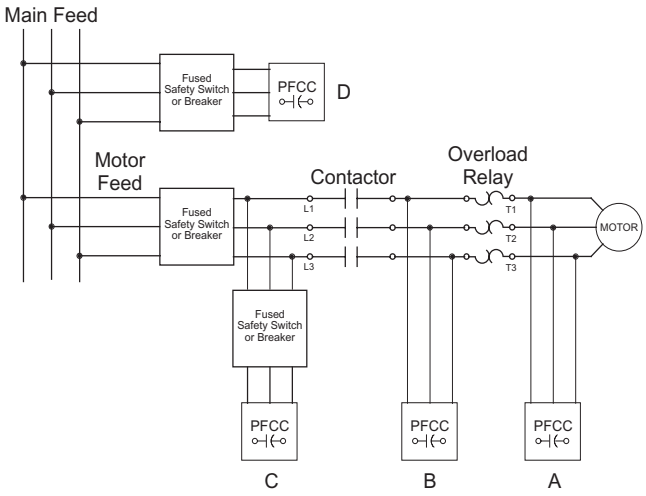


Fig. 12

20

Notes

Systems
Index

Notes

Panels • MCCs • Distribution

Systems

Systems
Panels
Motor control centers
Distribution systems

Description

The Modular New System (MNS) offers the user many alternative solutions and notable advantages in comparison with conventional-type installations:

- Compact, space saving design
- Back-to-back arrangement
- Economic energy distribution in the cubicles
- Easy project and detail engineering through standardized components
- Comprehensive range of standardized types
- Various design levels depending on operating and environmental conditions
- Easy combination of the different equipment systems, such as fixed and withdrawable modules in a single cubicle
- Arc-proof design possible (standard design with fixed module design)
- Earthquake, vibration and shock proof design is possible
- Easy assembly without special tools
- Easy conversion and retrofit
- Largely maintenance-free
- High operational reliability and availability
- Optimum personal protection

Applications

MNS systems are suitable for applications in all fields concerning distribution and use of electrical energy:

- Main and sub-distribution boards for energy
- Motor current supply of motor control centers
- Electronic cabinets for open and closed-loop control purposes
- For use in:
  - Utility companies
  - Power plants
  - Oil refineries
  - Off-shore drilling platforms
  - Ships
  - Production facilities
  - Sewage management
  - Buildings for other than dwelling purposes

Standards

Type tested switchgear assemblies (TTA)

IEC 439-1; EN 60-439; DIN VDE 0660, part 500; BS 5486, UTE 63-412

Test certificates

- Germanischer Lloyd, Hamburg (shipping)
- ASTA; Great-Britain (resist. to accidental arcs according to IEC 1641, VDE 0660 part 508)
- Federal Ministry for Regional Planning
- Building and Urban Development, Bonn (shelters)
- DRL German Research Institute for Aerospace e.V., Jülich, Earthquarke Test for Security Areas in Nuclear Power Stations

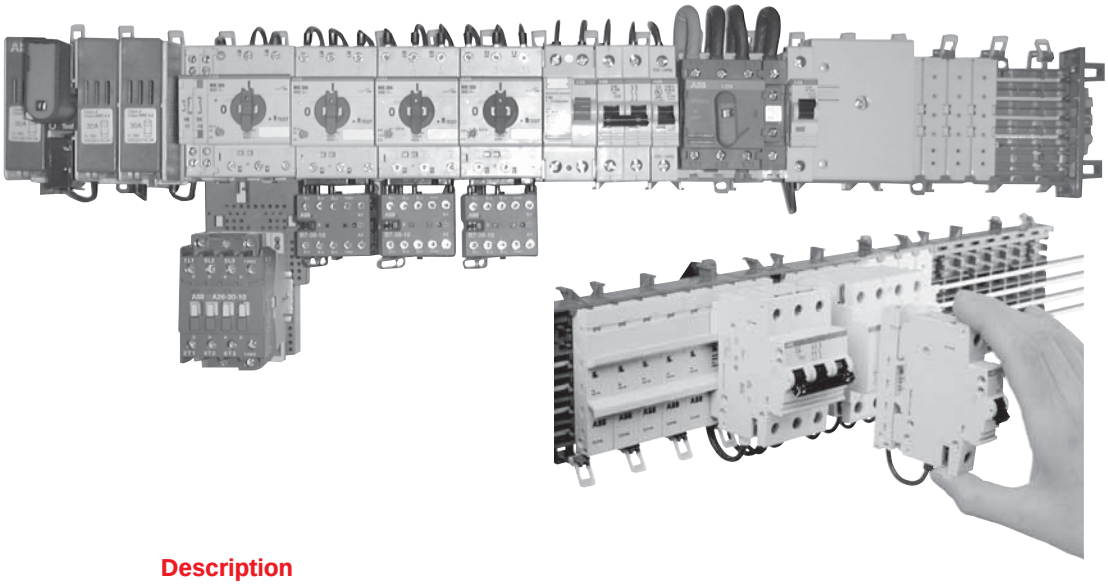
Contact factory for more information.

Notes

Modular power distribution bus system

smissline

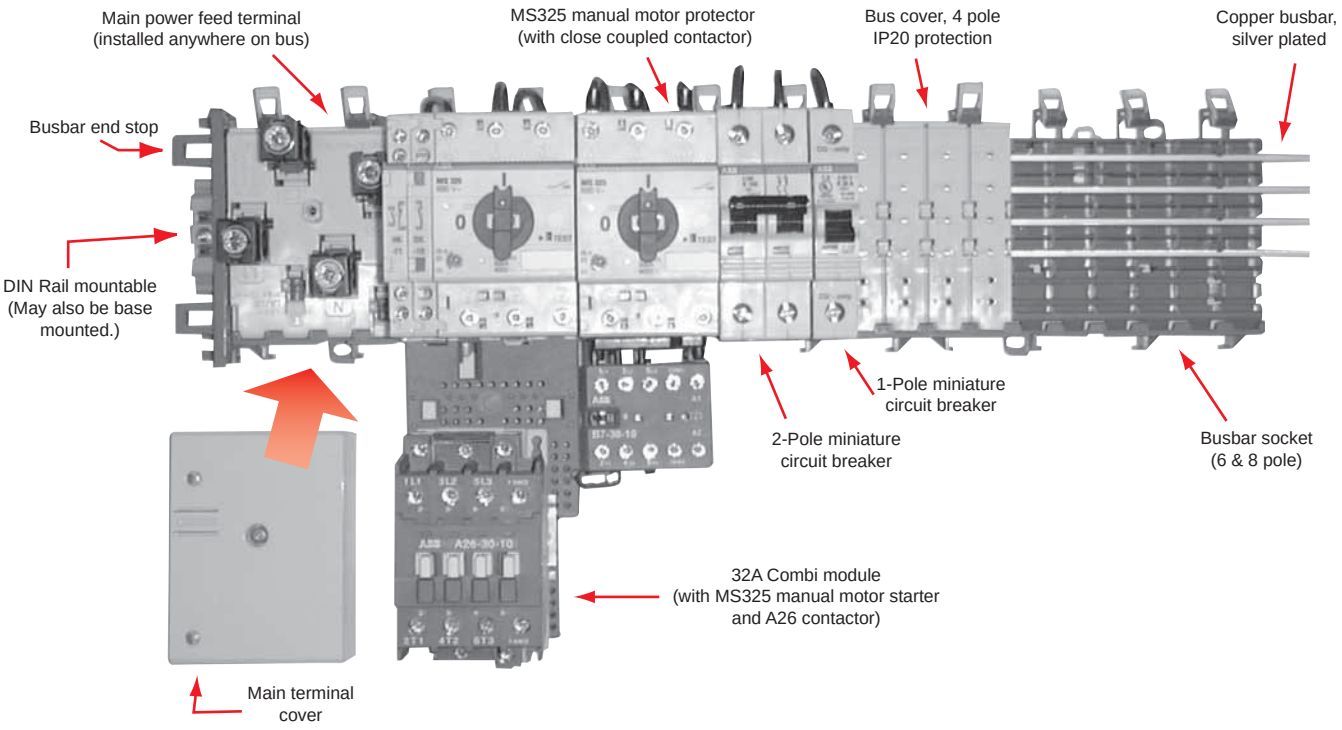
smissline
Modular power distribution bus system

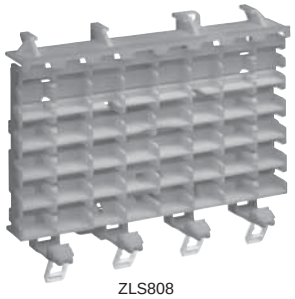


Description

- The smissline power distribution bus system provides a versatile and flexible means of distributing power to a wide variety of electrical devices. Ideal for group motor installations and ABB modular DIN rail products
- Hot swappable socket mounted components.
- Individual devices may be turned off and safely removed without turning off power to the whole bus.
- Bus system “Starter kits” available in various lengths, can also be easily cut down for custom installations.
- Busbar rated 100A when end fed and up to 200A when center fed. Main power feed terminals may be installed anywhere along the bus system.
- Individual bus stab adapters are available in L1, L2, L3 and N phase connections; they can be connected together to form multi-pole units. Unwired modules are available where bus connection is not required. 18mm width.
- Snap-on installation. No tools required to install or remove bus mounted components.
- System can be DIN rail or base mounted.
- Bus covers protect unused portions of the bus from accidental contact providing total bus isolation and IP20 finger safe protection.
- Reputable history of performance and reliability.
- UL508 Recognized, UL File No. E222110.

Components


Main power feed terminal
(installed anywhere on bus)
MS325 manual motor protector
(with close coupled contactor)
Bus cover, 4 pole
IP20 protection
Copper busbar,
silver plated
Busbar end stop
DIN Rail mountable
(May also be base
mounted.)
1-Pole miniature
circuit breaker
2-Pole miniature
circuit breaker
Busbar socket
(6 & 8 pole)
32A Combi module
(with MS325 manual motor starter
and A26 contactor)
Main terminal
cover



ZLS808

ZLS200

ZLS730

ZLS224

ZLS251

ZLS240

Sockets

Number of Modules	Length (inches)	Catalog number	List price
8	5.7	ZLS808	**$ 30**
6	4.3	ZLS806	**28**

Bus bar — 100A for L1, L2 L3, neutral and ground

	Length (inches)	Catalog number	List price
Cut to desired length	78.7	ZLS200	**$ 95**

End stops

		Catalog number	List price
Left and right included		ZLS730	**$ 30**

Main power feed terminals

Width in modules	End feed (A)	Center feed (A)	Phases	Wire range AWG	Catalog number	List price
4	100	150	3P 3P+N	10-1/0	ZLS225 ZLS224	**$ 110** **120**
2	100	200	N L1 L2 L3	8-4/0	ZLS250 ZLS251 ZLS252 ZLS253	**60**

Main power feed bus stab adaptor

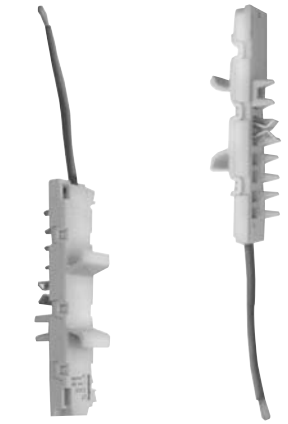
Width in modules	End feed (A)	Center feed (A)	Phases		Catalog number	List price
4 4	100 100	100 100	3P 3P+N		ZLS240 ZLS241	**$ 110** **120**

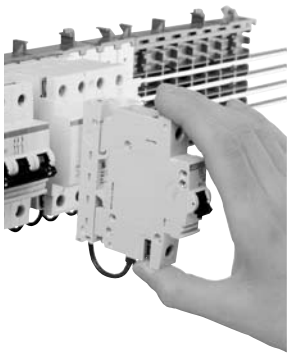
Combi module

Description	Width Mods	Qty		Catalog number	List price
Bottom clip Bottom fed	3	1		ZLS8403LWB-S	**$ 110**
Bottom clip Top fed	3	1		ZLS8403LWT-S	

For connecting MMP, contactor, and breaker combinations to busbar.

Components





Bus stab adapter being installed

Bus stab adapters and connectors

Bus stab adapters

	Current Rating (A)	Phase	Catalog number	List price
Top Clip Top Fed 	32	N	ZLS160	$ 20
		L1	ZLS161	20
		L2	ZLS162	20
		L3	ZLS163	20
		L1 300mm	ZLS161L300	23
		L2 300mm	ZLS162L300	23
		L3 300mm	ZLS163L300	23
		L1, L2, L3	ZLS183TT	60
	63	N	ZLS170	30
		L1	ZLS171	30
		L2	ZLS172	30
		L3	ZLS173	30
		L1 300mm	ZLS171L300	33
		L2 300mm	ZLS172L300	33
		L3 300mm	ZLS173L300	33
		L1, L2, L3	ZLS189TT	60
	*	*	ZLSS164	13
Top Clip Bottom Fed 	32	N	ZLS176	20
		L1	ZLS177	20
		L2	ZLS178	20
		L3	ZLS179	20
		L1 300mm	ZLS177L300	23
		L2 300mm	ZLS178L300	23
		L3 300mm	ZLS179L300	23
		L1, L2, L3	ZLS183TB	60
	63	N	ZLS166	30
		L1	ZLS167	30
		L2	ZLS168	30
		L3	ZLS169	30
		L1 300mm	ZLS167L300	33
		L2 300mm	ZLS168L300	33
		L3 300mm	ZLS169L300	33
		L1, L2, L3	ZLS189TB	60
	*	*	ZLS164	13
Bottom Clip Top Fed 	32	N	ZLS176	20
		L1	ZLS177	20
		L2	ZLS178	20
		L3	ZLS179	20
		L1 300mm	ZLS177L300	23
		L2 300mm	ZLS178L300	23
		L3 300mm	ZLS179L300	23
		L1, L2, L3	ZLS183BT	60
	63	N	ZLS166	30
		L1	ZLS167	30
		L2	ZLS168	30
		L3	ZLS169	30
		L1 300mm	ZLS167L300	23
		L2 300mm	ZLS168L300	23
		L3 300mm	ZLS169L300	23
		L1, L2, L3	ZLS189BT	60
	*	*	ZLS164	13
Bottom Clip, Bottom Fed 	32	N	ZLS160	30
		L1	ZLS161	30
		L2	ZLS162	30
		L3	ZLS163	30
		L1 300mm	ZLS161L300	23
		L2 300mm	ZLS162L300	23
		L3 300mm	ZLS163L300	23
		L1, L2, L3	ZLS183BB	60
	63	N	ZLS170	30
		L1	ZLS171	30
		L2	ZLS172	30
		L3	ZLS173	30
		L1 300mm	ZLS171L300	33
		L2 300mm	ZLS172L300	33
		L3 300mm	ZLS173L300	33
		L1, L2, L3	ZLS189BB	60
	*	*	ZLS164	13

Multi-pole bus stab adapter connectors

	Quantity	Catalog number	List price
	1 bag	ZLS174	$ 10

Connection pieces are used to join individual bus stab adapters into any multi-pole configuration desired (L1-L2, L1-N, L1-L2-L3, etc.). Each bag contains enough pieces to make 25 connections. For example, 25 2-pole bus stab adapters or 12 3-pole bus stab adapters.

ZLS100

ZLS101

ZLS722

ZLS239

Bus covers

	Quantity	Catalog number	List price
	5 pack	ZLS100	**$ 25**

Covers unused portions of the busbar to protect from physical contact. Supplied as a 4-module unit, separable into 1-module units by snapping it apart.

Bus cover DIN rail extensions

	Quantity	Catalog number	List price
	10 pack	ZLS101	**$ 20**

Snaps on to ZLS100 and provides 18mm wide mounting position for any DIN rail mounted device.

Bus covers — High profile

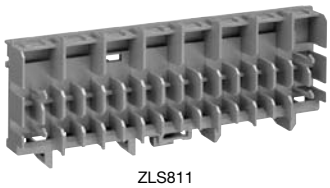
Width in modules	Quantity	Catalog number	List price
1/2 module	5 pack	ZLS721	**$ 23**
1 module	5 pack	ZLS722	**30**

Bus divider

Width in modules	Quantity	Catalog number	List price
1 module	1	ZLS239	**$ 10**

Allows a single smissline assembly to be divided into two isolated busbar systems.

Components
Neutral and ground

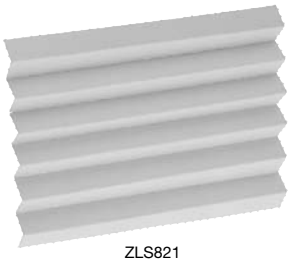

ZLS811


ZLS812


ZLS815


ZLS832


ZLS833


ZLS821


ZLS820

Neutral and ground sockets

Number of modules	Length (inches)	Catalog number	List price
8	5.7	ZLS811	**$ 17**
6	4.3	ZLS810	**15**

Use ZLS200, 100A busbar from page 20.5.

Neutral terminals

Width in modules	Wire range AWG	Wire range mm^2	Catalog number	List price
1/2	14 - 8	10	ZLS812	**$ 22**
1	10 - 1	50	ZLS813	**40**
2	8 - 3/0	95	ZLS254	**60**

Ground terminals

Width in modules	Wire range AWG	Wire range mm^2	Catalog number	List price
1/2	14 - 8	10	ZLS815	**$ 22**
1	10 - 1	50	ZLS816	**40**
2	8 - 3/0	95	ZLS255	**60**

Neutral and ground bus covers

Description	Width in modules	Quantity	Catalog number	List price
With DIN rail top	1	Package of 10	ZLS832	**$ 25**
Flat top	8	Package of 1	ZLS833	**5**

Labels

Description	Quantity	Catalog number	List price
Self-adhesive, 6 x 17mm	Sheet of 420	ZLS825	**$ 90**
Paper (protective cover required)	Sheet of 160	ZLS821	**12**
Cover	Bag of 100	ZLS820	**100**

MS325-1.0

For more information on manual motor protectors, see Section 5.

MS116

Manual motor protectors — Type MS325

Thermal setting range (Amps)	Single-phase horsepower ratings ① 120V	Single-phase horsepower ratings ① 240V	3-phase horsepower ratings 240V	3-phase horsepower ratings 480V	3-phase horsepower ratings 600V	Catalog number	List price
0.10 – 0.16	—	—	—	—	—	MS325-0.16	
0.16 – 0.25	—	—	—	—	—	MS325-0.25	**$ 144**
0.25 – 0.40	—	—	—	—	—	MS325-0.40	
0.40 – 0.63	—	—	—	—	—	MS325-0.63	
0.63 – 1.0	—	—	—	1/2	1/2	MS325-1.0	
1.0 – 1.6	—	1/10	—	3/4	3/4	MS325-1.6	
1.6 – 2.5	—	1/6	1/2	1	1.5	MS325-2.5	**165**
2.5 – 4.0	1/8	1/3	1	2	3	MS325-4.0	
4.0 – 6.3	1/4	1/2	1.5	3	5	MS325-6.3	
6.3 – 9.0	1/3	1	2.5	5	7.5	MS325-9.0	
9.0 – 12.5	1/2	2	3	7.5	10	MS325-12.5	**192**
12.5 – 16	1	2.5	5	10	10	MS325-16	
16 – 20	1.5	3	5	10	15	MS325-20	**211.50**
20 – 25	2	3	7.5	15	20	MS325-25	**223.50**

NOTE: Use Discount schedule MA

Manual motor protectors — Type MS116

Thermal setting range (Amps)	Single-phase horsepower ratings ① 120V	Single-phase horsepower ratings ① 240V	3-phase horsepower ratings 240V	3-phase horsepower ratings 480V	3-phase horsepower ratings 600V	Catalog number	List price
0.10 – 0.16	—	—	—	—	—	MS116-0.16	
0.16 – 0.25	—	—	—	—	—	MS116-0.25	**$ 129**
0.25 – 0.40	—	—	—	—	—	MS116-0.40	
0.40 – 0.63	—	—	—	—	—	MS116-0.63	
0.63 – 1.0	—	—	—	1/2	1/2	MS116-1.0	
1.0 – 1.6	—	1/10	—	3/4	3/4	MS116-1.6	
1.6 – 2.5	—	1/6	1/2	1	1.5	MS116-2.5	**148.50**
2.5 – 4.0	1/8	1/3	1	2	3	MS116-4.0	
4.0 – 6.3	1/4	1/2	1.5	3	5	MS116-6.3	
6.3 – 10	1/2	1.5	3	5	7.5	MS116-10	
8.0 – 12	1/2	2	3	7.5	10	MS116-12	**172.50**
10 – 16	1	2	5	10	10	MS116-16	

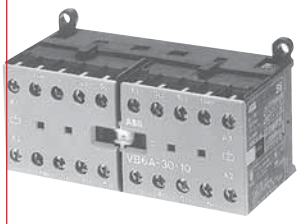
NOTE: Use Discount schedule MA

Manual motor protector/contactor close coupling adapters

Device	Catalog number	List price
MS116 + B6/B7 contactor	BEA7/116	**$ 9**
MS116 + A9, A12, A16 contactor	BEA16/116	
MS325 + B6/B7 contactor	BEA7/325	**12**
MS325 + A9, A12, A16 contactor	BEA16/325	**13.50**
MS325 + A26 contactor	BEA26/325	**15**

NOTE: Use Discount schedule MA

B6C-1



VB6M-1

For more information on miniature controls, see Section 4

Miniature contactors — Non-reversing with screw connections

General purpose AC1	Maximum motor FLA AC3	3 Phase motor horsepower 208V	230V	460V	600V	Single phase 120V	230V	Number of power poles	Auxiliary contacts	Catalog number	List price
AC operated											
12	6.8	1	2	3	1	1/2	1	3 3 4	1 N.O. 1 N.C. —	B6C-★ B6C-★01 B6C4P-★	**$ 51**
16	9.6	2	3	5	5	1	2	3 3 4	1 N.O. 1 N.C. —	B7C-★ B7C-★01 B7C4P-★	**72**
DC operated											
12	6.8	1	2	3	1	1/2	1	3 3	1 N.O. 1 N.C.	BC6C-★ BC6C-★01	**57**
16	9.6	2	3	5	5	1	2	3 3	1 N.O. 1 N.C.	BC7C-★ BC7C-★01	**78**

NOTE: Use Discount schedule AA

Miniature mechanically interlocked contactors with screw connections

General purpose AC1	Maximum motor FLA AC3	3 Phase motor horsepower 208V	230V	460V	600V	Single phase 120V	230V	Number of power poles	Auxiliary contacts	Catalog number	List price
AC operated											
12	6.8	1	2	3	1	1/2	1	3	1 N.O. 1 N.C.	VB6M-★ VB6M-★01	**$ 104**
16	9.6	2	3	5	5	1	2	3	1 N.O. 1 N.C.	VB7M-★ VB7M-★01	**143**
DC operated											
12	6.8	1	2	3	1	1/2	1	3	1 N.O. 1 N.C.	VBC6M-★ VBC6M-★01	**105**
16	9.6	2	3	5	5	1	2	3	1 N.O. 1 N.C.	VBC7M-★ VBC7M-★01	**156**

NOTE: Use Discount schedule AA

Coil voltage selection

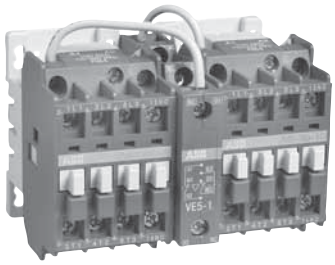
★ Coil voltage suffix. Refer to Coil Voltage Selection Chart and substitute the desired coil voltage suffix for the ★.

Coil voltage selection chart

	Volts 12	24	42	48	110/125	110/120	220	220/240	380/415
AC 40-450 Hz		F	L	G		1		2	M
DC	U	Y	V	W	P		R		

Applications with other ABB products
A-Line contactors
A9 - A26, AC operated


A26-30-10-84


A9M-30-10-84


A9R-30-10-84

General purpose current	UL motor switching current	Maximum motor horsepower ratings				Standard Aux. contacts		Non-reversing		Mechanically interlocked		Reversing	
		208V	240V	480V	575/600V	NO	NC	Catalog number	List price	Catalog number	List price	Catalog number	List price
AC1		UL rated											
21	9	2	2	5	7.5	1 0	0 1	A9-30-10-84 A9-30-01-84	**$ 78**	A9M-30-10-84 A9M-30-01-84	**$ 255**	A9R-30-10-84 A9R-30-01-84	**$ 315**
25	11	3	3	7.5	10	1 0	0 1	A12-30-10-84 A12-30-01-84	**84**	A12M-30-10-84 A12M-30-01-84	**315**	A12R-30-10-84 A12R-30-01-84	**375**
30	17	5	5	10	15	1 0	0 1	A16-30-10-84 A16-30-01-84	**102**	A16M-30-10-84 A16M-30-01-84	**345**	A16R-30-10-84 A16R-30-01-84	**413**
40	28	7.5	10	20	25	1 0	0 1	A26-30-10-84 A26-30-01-84	**183**	A26M-30-10-84 A26M-30-01-84	**405**	A26R-30-10-84 A26R-30-01-8	**480**

Coil voltage selection

All AC operated catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 contactor: A75-30-11-**80**

Auxiliary contact blocks

For additional auxiliary contact blocks, see catalog number explanation on page 1.2. Add $ 20 to list price for each additional auxiliary, and see page 1.18 for available combinations. Only side-mounted blocks are allowed to be factory installed. If auxiliary contacts are not required for A50 - A300, subtract $ 40 from list price and change catalog number to “00” instead of “11.”

Mechanical interlock

Mechanically interlocked contactors are designed for reversing, 2 speed, reduced voltage, etc. type starter applications. The complete assembly consists of two mechanically and electrically interlocked contactors mounted as follows with line and load terminals:

- A9 - A16 — mounted on 35mm DIN rail
- A26 - A300 — mounted on common baseplate

Power wiring is not included. The NC electrical interlock is provided with the mechanical interlock for A9 - A110 contactors.

Coil voltage selection chart

Hz	Cntr type	Volts															
		12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Reversing

Reversing contactors are designed for reversing type starter applications. The complete assembly consists of two mechanically and electrically interlocked contactors mounted as follows with line and load terminals:

- A9 - A16 — mounted on 35mm DIN rail
- A26 - A300 — mounted on common baseplate

The NC electrical interlock is provided with the mechanical interlock for A9 - A110 contactors.

For more information on across the line contactors see Section 1.

Applications with other ABB products
Miniature MCCBs
S200U, 240 VAC

K UL 489 CSA C22.2 - NO. 5
VDE 0660
Cable & equipment protection

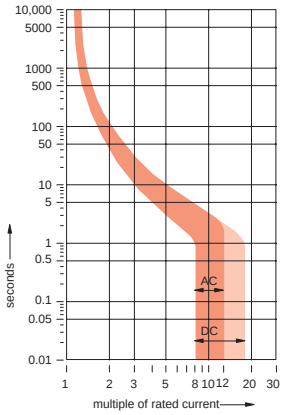

S201U-K, 1 pole


S202U-K, 2 pole


S203U-K, 3 pole


S204U-K, 4 pole

K



Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
1 pole					
0.2	S201U-K0.2	**$ 54**			
0.3	S201U-K0.3	**54**			
0.5	S201U-K0.5	**54**			
0.75	S201U-K0.75	**54**			
1	S201U-K1	**54**			
1.6	S201U-K1.6	**54**			
2	S201U-K2	**54**			
3	S201U-K3	**54**			
4	S201U-K4	**54**			
5	S201U-K5	**54**			
6	S201U-K6	**54**			
8	S201U-K8	**54**			
10	S201U-K10	**54**	A	10	4.6
13	S201U-K13	**54**			
15	S201U-K15	**54**			
16	S201U-K16	**54**			
20	S201U-K20	**54**			
25	S201U-K25	**56**			
30	S201U-K30	**58**			
32	S201U-K32	**58**			
40	S201U-K40	**64**			
50	S201U-K50	**70**			
60	S201U-K60	**80**			
63	S201U-K63	**80**			
2 pole					
0.2	S202U-K0.2	**128**			
0.3	S202U-K0.3	**128**			
0.5	S202U-K0.5	**128**			
0.75	S202U-K0.75	**128**			
1	S202U-K1	**128**			
1.6	S202U-K1.6	**128**			
2	S202U-K2	**128**			
3	S202U-K3	**128**			
4	S202U-K4	**128**			
5	S202U-K5	**128**			
6	S202U-K6	**128**			
8	S202U-K8	**128**	A	5	9.2
10	S202U-K10	**128**			
13	S202U-K13	**128**			
15	S202U-K15	**128**			
16	S202U-K16	**128**			
20	S202U-K20	**128**			
25	S202U-K25	**130**			
30	S202U-K30	**134**			
32	S202U-K32	**134**			
40	S202U-K40	**134**			
50	S202U-K50	**162**			
60	S202U-K60	**182**			
63	S202U-K63	**182**			

Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
3 pole					
0.2	S203U-K0.2	**$ 194**			
0.3	S203U-K0.3	**194**			
0.5	S203U-K0.5	**194**			
0.75	S203U-K0.75	**194**			
1	S203U-K1	**194**			
1.6	S203U-K1.6	**194**			
2	S203U-K2	**194**			
3	S203U-K3	**194**			
4	S203U-K4	**194**			
5	S203U-K5	**194**			
6	S203U-K6	**194**			
8	S203U-K8	**194**			
10	S203U-K10	**194**	A	1	13.9
13	S203U-K13	**194**			
15	S203U-K15	**194**			
16	S203U-K16	**194**			
20	S203U-K20	**194**			
25	S203U-K25	**196**			
30	S203U-K30	**200**			
32	S203U-K32	**200**			
40	S203U-K40	**214**			
50	S203U-K50	**246**			
60	S203U-K60	**280**			
63	S203U-K63	**280**			
4 pole					
0.2	S204U-K0.2	**265**			
0.3	S204U-K0.3	**265**			
0.5	S204U-K0.5	**265**			
0.75	S204U-K0.75	**265**			
1	S204U-K1	**265**			
1.6	S204U-K1.6	**265**			
2	S204U-K2	**265**			
3	S204U-K3	**265**			
4	S204U-K4	**265**			
5	S204U-K5	**265**			
6	S204U-K6	**265**			
8	S204U-K8	**265**			
10	S204U-K10	**265**	B	1	18.0
13	S204U-K13	**265**			
15	S204U-K15	**265**			
16	S204U-K16	**265**			
20	S204U-K20	**265**			
25	S204U-K25	**275**			
30	S204U-K30	**285**			
32	S204U-K32	**285**			
40	S204U-K40	**314**			
50	S204U-K50	**343**			
60	S204U-K60	**392**			
63	S204U-K63	**392**			

Delivery Class

A - Standard item, stock to 2 weeks lead time
B - Stock to 4 weeks lead time
C - 6 to 8 week lead time

UL489 listed as branch circuit protective device

Applications with other ABB products
Miniature MCCBs
S200UP, 480Y/277 VAC

K

UL 489 CSA C22.2 - NO. 5
VDE 0660
Cable & equipment protection

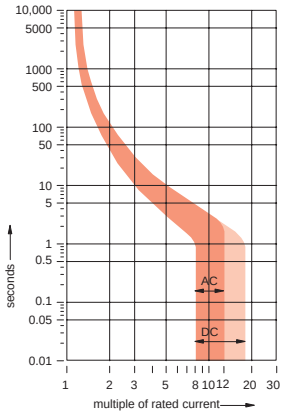

S201UP-K, 1 pole


S202UP-K, 2 pole


S203UP-K, 3 pole


S204UP-K, 4 pole

K



Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
1 pole					
0.2	S201UP-K0.2	**$ 90**			
0.3	S201UP-K0.3	**90**			
0.5	S201UP-K0.5	**90**			
0.75	S201UP-K0.75	**90**			
1	S201UP-K1	**90**			
1.6	S201UP-K1.6	**90**			
2	S201UP-K2	**90**			
3	S201UP-K3	**90**			
4	S201UP-K4	**90**			
5	S201UP-K5	**90**			
6	S201UP-K6	**90**			
8	S201UP-K8	**90**	A	10	4.6
10	S201UP-K10	**90**			
13	S201UP-K13	**90**			
15	S201UP-K15	**90**			
16	S201UP-K16	**90**			
20	S201UP-K20	**90**			
25	S201UP-K25	**90**			
2 pole					
0.2	S202UP-K0.2	**210**			
0.3	S202UP-K0.3	**210**			
0.5	S202UP-K0.5	**210**			
0.75	S202UP-K0.75	**210**			
1	S202UP-K1	**210**			
1.6	S202UP-K1.6	**210**			
2	S202UP-K2	**210**			
3	S202UP-K3	**210**			
4	S202UP-K4	**210**			
5	S202UP-K5	**210**			
6	S202UP-K6	**210**	A	5	9.2
8	S202UP-K8	**210**			
10	S202UP-K10	**210**			
13	S202UP-K13	**210**			
15	S202UP-K15	**210**			
16	S202UP-K16	**210**			
20	S202UP-K20	**210**			
25	S202UP-K25	**210**			

Rated current	Catalog number	List price	Delivery class	Sugg. order qty	Wgt. oz. (1 pc.)
3 pole					
0.2	S203UP-K0.2	**$ 320**			
0.3	S203UP-K0.3	**320**			
0.5	S203UP-K0.5	**320**			
0.75	S203UP-K0.75	**320**			
1	S203UP-K1	**320**			
1.6	S203UP-K1.6	**320**			
2	S203UP-K2	**320**			
3	S203UP-K3	**320**			
4	S203UP-K4	**320**			
5	S203UP-K5	**320**			
6	S203UP-K6	**320**	A	1	13.9
8	S203UP-K8	**320**			
10	S203UP-K10	**320**			
13	S203UP-K13	**320**			
15	S203UP-K15	**320**			
16	S203UP-K16	**320**			
20	S203UP-K20	**320**			
25	S203UP-K25	**320**			
4 pole					
0.2	S204UP-K0.2	**440**			
0.3	S204UP-K0.3	**440**			
0.5	S204UP-K0.5	**440**			
0.75	S204UP-K0.75	**440**			
1	S204UP-K1	**440**			
1.6	S204UP-K1.6	**440**			
2	S204UP-K2	**440**			
3	S204UP-K3	**440**			
4	S204UP-K4	**440**			
5	S204UP-K5	**440**			
6	S204UP-K6	**440**	B	1	18.0
8	S204UP-K8	**440**			
10	S204UP-K10	**440**			
13	S204UP-K13	**440**			
15	S204UP-K15	**440**			
16	S204UP-K16	**440**			
20	S204UP-K20	**440**			
25	S204UP-K25	**440**			

Delivery Class

A - Standard item, stock to 2 weeks lead time
B - Stock to 4 weeks lead time
C - 6 to 8 week lead time

UL489 listed as branch circuit protective device

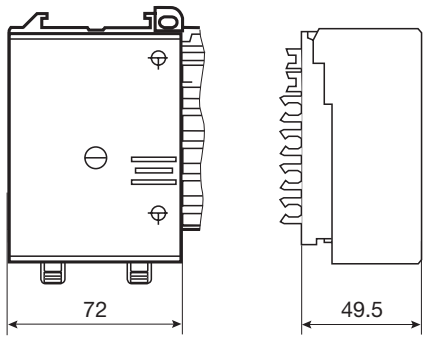
Technical data
Approximate dimensions

Technical data

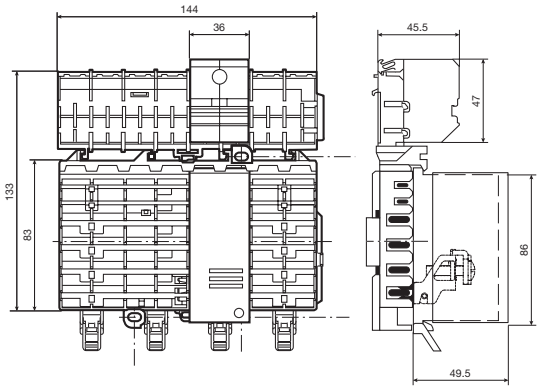
Item		Description
Rated voltage	VAC	600
Rated current	A	100 (end feed); up to 200A (center feed)
Short circuit rating	KAIC	50 when protected by 150A fuse
Approval		UL508 Recognized component
Power feed terminals wire range	AWG	10-1/0 & 8-3/0

Approximate dimensions

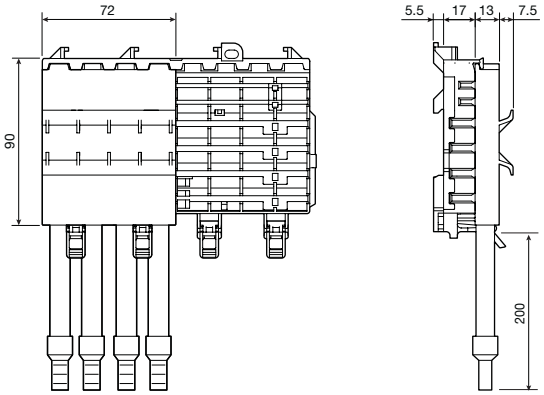
ZLS224 – Main power feed terminal



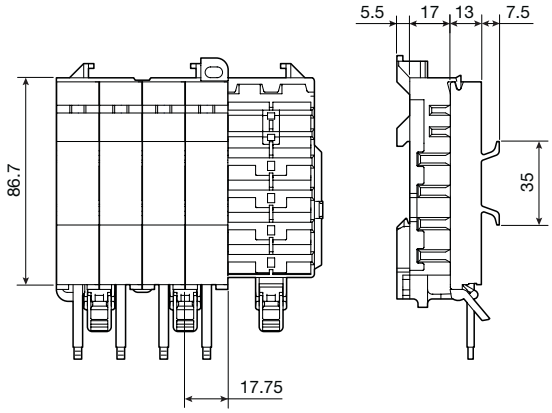
Incoming terminal components



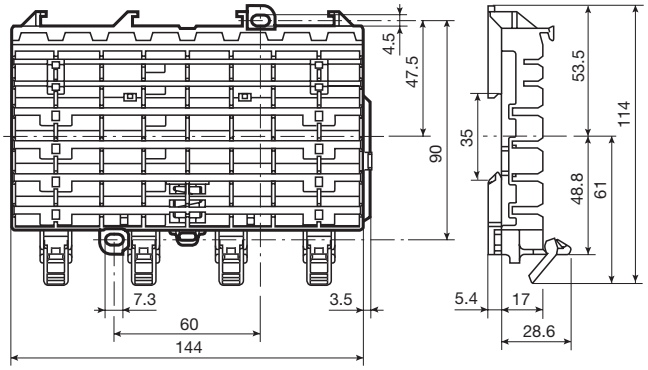
Adapter for non-smissline devices, 100A



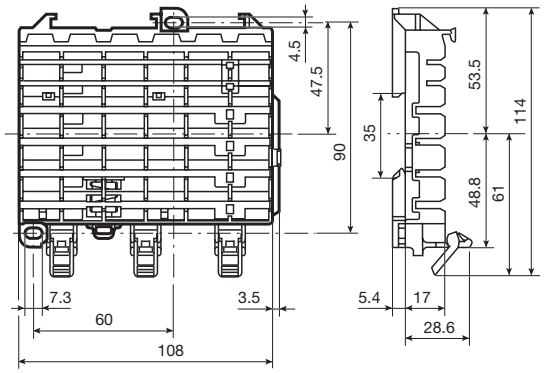
Adapter for foreign devices, 30A, 60A



ZLS808 – Socket base

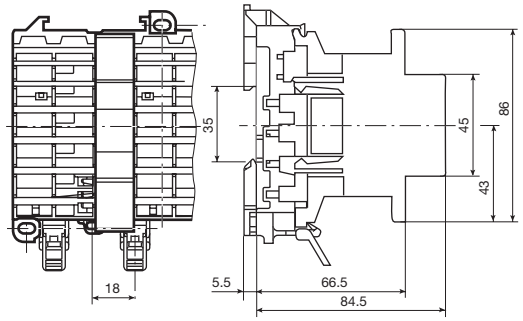


ZLS806 – Socket base

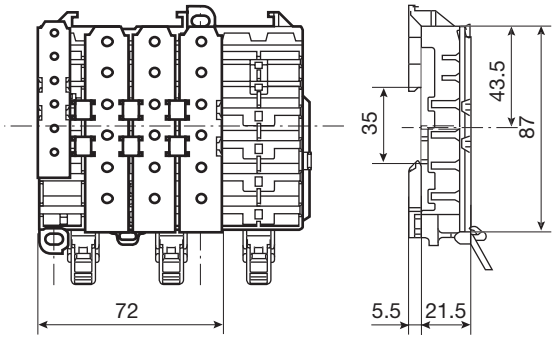


Approximate dimensions

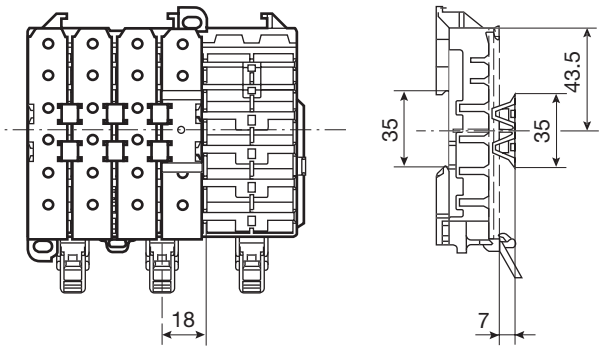
ZLS239 – Busbar isolator



ZLS100 – Bus bar cover



ZLS101 – Extension adapter



Notes

Low Voltage Products & Systems

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