



Main catalog

Motor protection and control

Contactors and overload relays

Power and productivity
for a better world™



Motor rated operational powers and currents

The currents given below concern standard three-phase four-pole cage motors (1800 r.p.m. at 60 Hz 1500 r.p.m. at 50 Hz). These values are given for guidance and may vary according to the motor manufacturer and depending on the number of poles.

UL / CSA	Motor nominal current: standardized values (according to IEC 60947-4-1 Annex G and UL 508 CSA C22.2 No.14)						
Motor power	120 V 1-ph	240 V 1-ph	208 V 3-ph	220-240 V 3-ph	380-415 V 3-ph	440-480 V 3-ph	550-600 V 3-ph
hp	A	A	A	A	A	A	A
1/10	3	1.5	–	–	–	–	–
1/8	3.8	1.9	–	–	–	–	–
1/6	4.4	2.2	–	–	–	–	–
1/4	5.8	2.9	–	–	–	–	–
1/3	7.2	3.6	–	–	–	–	–
1/2	9.8	4.9	2.4	2.2	1.3	1.1	0.9
3/4	13.8	6.9	3.5	3.2	1.8	1.6	1.3
1	16	8	4.6	4.2	2.3	2.1	1.7
1-1/2	20	10	6.6	6	3.3	3	2.4
2	24	12	7.5	6.8	4.3	3.4	2.7
3	34	17	10.6	9.6	6.1	4.8	3.9
5	56	28	16.7	15.2	9.7	7.6	6.1
7-1/2	80	40	24.2	22	14	11	9
10	100	50	30.8	28	18	14	11
15	135	68	46.2	42	27	21	17
20	–	88	59.4	54	34	27	22
25	–	110	74.8	68	44	34	27
30	–	136	88	80	51	40	32
40	–	176	114	104	66	52	41
50	–	216	143	130	83	65	52
60	–	–	169	154	103	77	62
75	–	–	211	192	128	96	77
100	–	–	273	248	165	124	99
125	–	–	343	312	208	156	125
150	–	–	396	360	240	180	144
200	–	–	528	480	320	240	192
250	–	–	–	604	403	302	242
300	–	–	–	722	482	361	289
350	–	–	–	828	560	414	336
400	–	–	–	954	636	477	382
450	–	–	–	1030	–	515	412
500	–	–	–	1180	786	590	472

IEC	Motor nominal current: standardized values in blue colour (according to IEC 60947-4-1 Annex G)									
Motor power	220 V	230 V	240 V	380 V	400 V	415 V	440 V	500 V	660 V	690 V
kW	A	A	A	A	A	A	A	A	A	A
0.06	0.37	0.35	0.34	0.21	0.2	0.19	0.18	0.16	0.13	0.12
0.09	0.54	0.52	0.50	0.32	0.3	0.29	0.26	0.24	0.18	0.17
0.12	0.73	0.7	0.67	0.46	0.44	0.42	0.39	0.32	0.24	0.23
0.18	1	1	1	0.63	0.6	0.58	0.53	0.48	0.37	0.35
0.25	1.6	1.5	1.4	0.9	0.85	0.82	0.74	0.68	0.51	0.49
0.37	2.0	1.9	1.8	1.2	1.1	1.1	1	0.88	0.67	0.64
0.55	2.7	2.6	2.5	1.6	1.5	1.4	1.3	1.2	0.91	0.87
0.75	3.5	3.3	3.2	2.0	1.9	1.8	1.7	1.5	1.15	1.1
1.1	4.9	4.7	4.5	2.8	2.7	2.6	2.4	2.2	1.7	1.6
1.5	6.6	6.3	6	3.8	3.6	3.5	3.2	2.9	2.2	2.1
2.2	8.9	8.5	8.1	5.2	4.9	4.7	4.3	3.9	2.9	2.8
3	11.8	11.3	10.8	6.8	6.5	6.3	5.7	5.2	4	3.8
4	15.7	15	14.4	8.9	8.5	8.2	7.4	6.8	5.1	4.9
5.5	20.9	20	19.2	12.1	11.5	11.1	10.1	9.2	7	6.7
7.5	28.2	27	25.9	16.3	15.5	14.9	13.6	12.4	9.3	8.9
11	39.7	38	36.4	23.2	22	21.2	19.3	17.6	13.4	12.8
15	53.3	51	48.9	30.5	29	28	25.4	23	17.8	17
18.5	63.8	61	58.5	36.8	35	33.7	30.7	28	22	21
22	75.3	72	69	43.2	41	39.5	35.9	33	25.1	24
30	100	96	92	57.9	55	53	48.2	44	33.5	32
37	120	115	110	69	66	64	58	53	40.8	39
45	146	140	134	84	80	77	70	64	49.1	47
55	177	169	162	102	97	93	85	78	59.6	57
75	240	230	220	139	132	127	116	106	81	77
90	291	278	266	168	160	154	140	128	97	93
110	355	340	326	205	195	188	171	156	118	113
132	418	400	383	242	230	222	202	184	140	134
160	509	487	467	295	280	270	245	224	169	162
200	637	609	584	368	350	337	307	280	212	203
250	782	748	717	453	430	414	377	344	261	250
315	983	940	901	568	540	520	473	432	327	313
355	1109	1061	1017	642	610	588	535	488	370	354
400	1255	1200	1150	726	690	665	605	552	418	400
500	1545	1478	1416	895	850	819	745	680	515	493
560	1727	1652	1583	1000	950	916	832	760	576	551
630	1928	1844	1767	1116	1060	1022	929	848	643	615
710	2164	2070	1984	1253	1190	1147	1043	952	721	690
800	2446	2340	2243	1417	1346	1297	1179	1076	815	780
900	2760	2640	2530	1598	1518	1463	1330	1214	920	880
1000	3042	2910	2789	1761	1673	1613	1466	1339	1014	970

Motor protection and control

Contactors and overload relays

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ABB sets a new standard in motor control and power switching

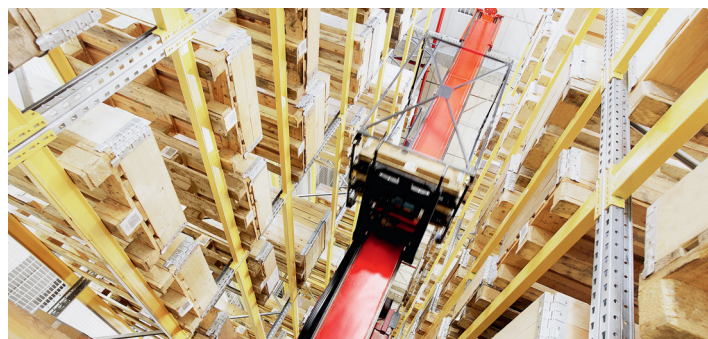
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Featuring AF technology as standard, the latest range of ABB's contactors establishes a new industry benchmark. The electronically controlled coil offers multiple benefits over conventional alternatives, and together with ABB's wide product offering – an optimal configuration, every time.



Access Global Support

The contactor and motor protection range from ABB is compatible with all major national and international standards and is available worldwide via a global distribution network. One contactor coil now handles 100 V – 250 V, AC/DC for use in North America or Europe as well as Asia.



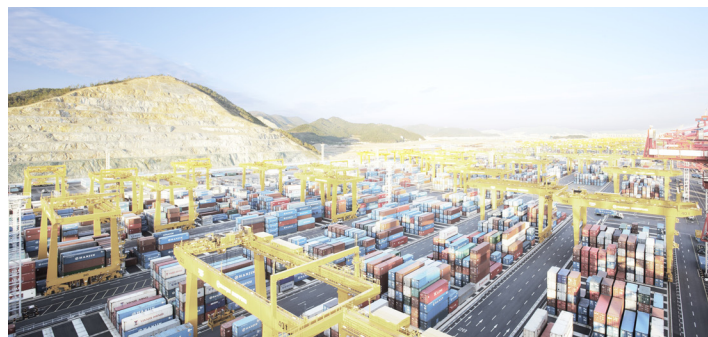
Optimize logistics

With its contactor and motor protection range, ABB has managed to reduce the number of contactor coils to just four. The total number of product variants has been reduced by up to 90%. This simplifies the customers' logistics and cuts administration costs.



Simplify design

By reducing contactor coil energy consumption by up to 80%, panels can be built smaller and transformers more compact. All the features of the AF technology, along with access to drawings and coordination tables online, simplifies your design and assembly process.



Secure uptime

Time to prevent stoppages caused by voltage fluctuations. The AF contactor ensures distinct operation in unstable networks and signifies a major advance in motor control and power switching. Voltage sags, dips and surges pose no threat. The AF contactor secures your uptime.



MacGregor. Keeping turnarounds brief.

Until the AF range was installed, voltage sags were affecting MacGregor's deck cranes. Conventional contactors welded shut, leading to several stoppages a week. No longer. Known for superior quality and an ability to operate in the most hostile environments, MacGregor deck cranes enjoy a global reputation for reliability. A small but vital component, the AF contactor helps maintain this reputation.

To keep things moving, you need Control. Connect to Control.

Explore all our case studies at www.abb.com/connecttocontrol

SSAB
Making certainty
standard

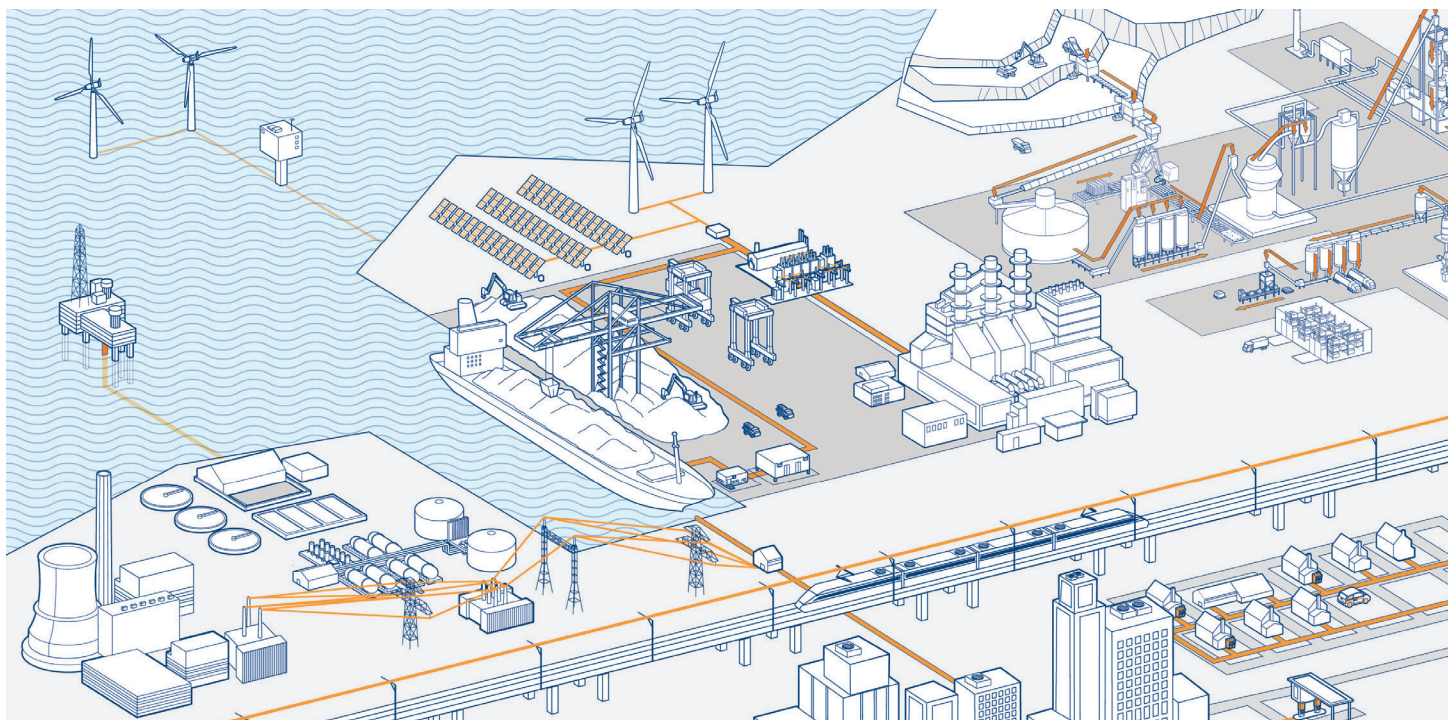
Gamesa
Taming the wind

LKAB
Providing fresh air

Contactors and motor protection

For a wide variety of segments

1



HVAC, General Machinery, Rail, Critical Power, Wind, Solar, Marine and Water & Wastewater

Contactors for any use

The AF contactor range covers small motor starting solutions from 7.5 hp up to big power switching solutions with our unique AF2650, the biggest single case block contactor in the world.

The contactor and motor protection range is part of one of the widest product offerings on the market meaning that ABB not only can provide the contactor but the full solution.

In addition to the standard product range ABB also offer products for special needs such as Bar contactors, GAF and contactors for capacitor switching.

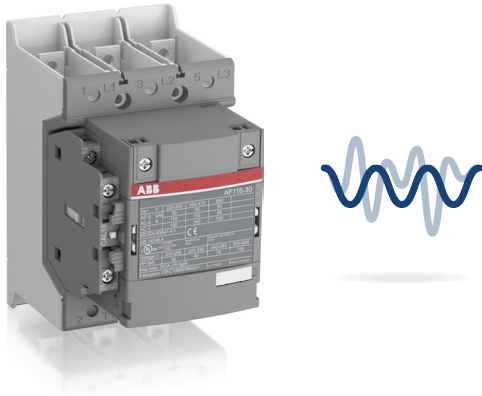
Cooperating with customers

ABB cooperates closely with its customers to ensure that products meet requirements from their specific segments and applications. With over 100 years' experience in motor control and power switching ABB knows how to create efficient solutions for its customers.

AF technology

Benefits

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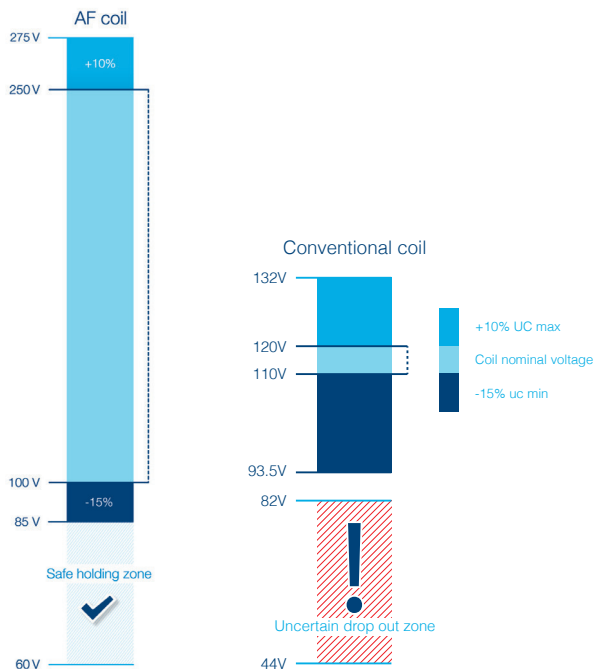


Reliable in all networks

The electronic system within the AF contactor rectifies the AC or DC control circuit voltage to a DC control voltage that is applied on the coil. The contactor is safely operated in an always optimized condition making it virtually noise free.

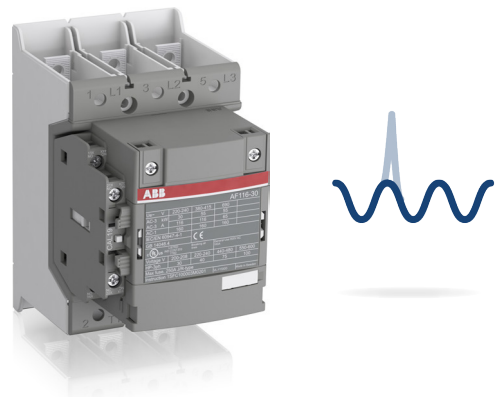
Four coils for the entire voltage range

The AF contactor features both AC and DC support. With the complete AF contactor range, functionality is improved. Still, the total number of product variants compared to a conventional range is reduced by 90%. Only four coils are required to cover 24 V AC, 20 V DC - 500 V AC/DC.



Wide control voltage range

With conventional contactor technology, different contactors were needed for different network voltages. Thanks to the wide operating range of the AF contactor it can operate just as well in Europe as in Asia or North America. The core coil of the AF contactor range covers 100-250 V AC/DC 50/60 Hz.



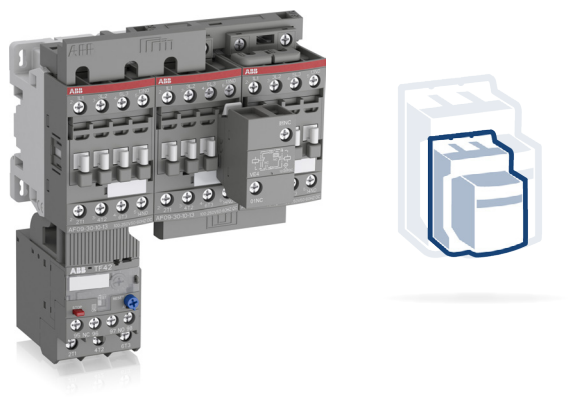
Built-in surge suppression

With conventional contactor technology it is recommended to use an external surge suppressor, an accessory that could cost as much as half the contactor itself. With the AF technology the surges are handled by the contactor itself and the surge never reaches the control circuit. Neither the surge suppressor nor the actual surge has to be considered anymore. One less product and one less complication to worry about.

Contactors and motor protection

Advanced but simple

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The AF contactor is compact

The AF contactor is compact in size and has had its width reduced by up to 30% thanks to an 80% reduction of the coil's energy consumption.



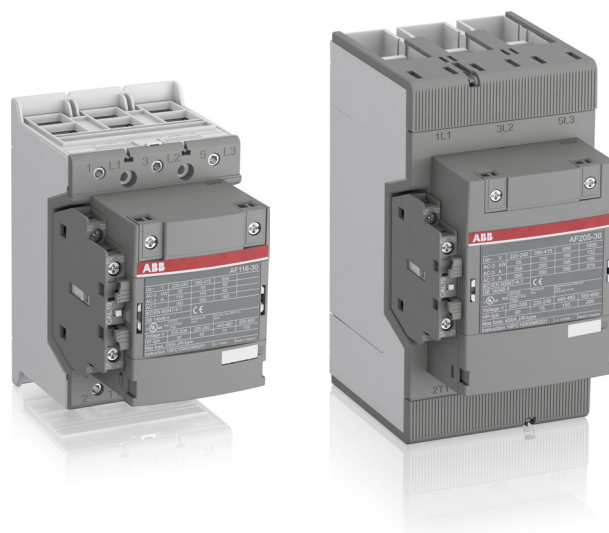
The AF contactor is flexible

AF09...AF370 is perfect for motor starting applications and for solutions where space is limited. Interlocked reversing pairs require no spacing between contactors meaning you can fit more functionality into cabinets or other small enclosures.



Coil terminal access in the front

The AF contactor has its coil terminals accessible from the front. The cables or bars do not have to be disconnected in order to perform voltage measurement or servicing work.



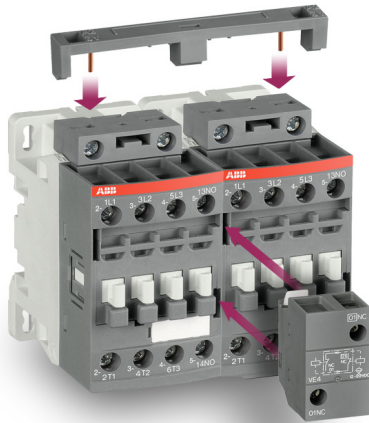
More functionality without adding width

The AF116 ... AF2650 can take up to 2 side mounted auxiliary contact blocks without adding to its width and are delivered with 1 N.O. + 1 N.C. as standard.

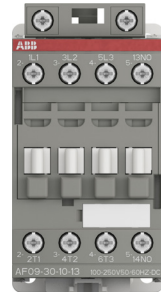
Contactors and motor protection

Mechanical features

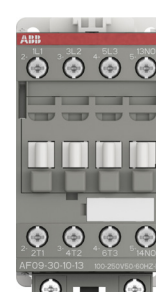
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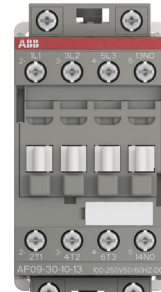
Front-mounted



Top-mounted



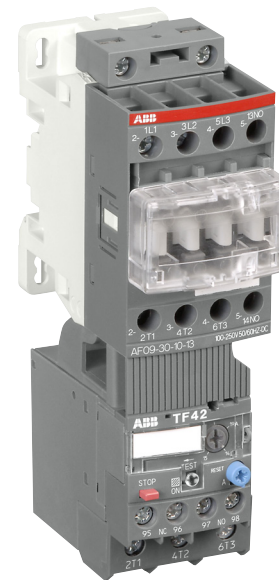
Bottom-mounted



Additional LDC4
coil terminal block

Easy-to-use accessories

Contactors up to 96 A offer free choice of coil terminal access and can take side and front mounted auxiliary contact blocks. All the accessories: Coil connection terminals, mechanical and electrical interlocks and electronic timers are easily connected through the snap-to-connect function.

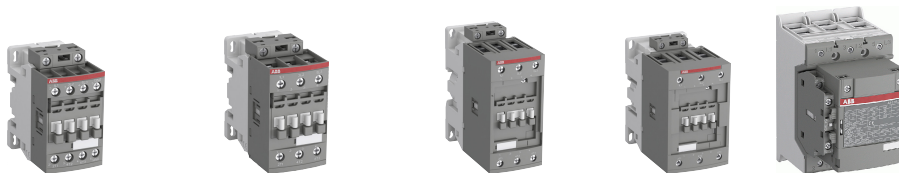


Safe control circuit with:

- Mirror contact according to IEC 60947-4-1
- Mechanically linked contacts according to IEC 60947-5-1
- Sealable and transparent protective covers on AF09...AF96 and overload relays TF/EF
- Third party certification

3-pole contactors, for motor control and power switching

1



UL/CSA	General use rating	600 V	A	25	28	30	45	50	50	60	80	90	105	115	160	200	
NEMA	NEMA Size			00	0	—	1	—	—	2	—	—	3	—	—	4	
AC / DC Control supply			Type	AF09	AF12	AF16	AF26	AF30	AF38	AF40	AF52	AF65	AF80	AF96	AF116	AF140	
Maximum motor HP rating	1 - phase, 120V	HP	0.75	1	1.5	2	2	2	3	3	5	7.5	7.5	—	—		
	240V		1.5	2	3	3	5	5	7.5	10	15	15	20	—	—		
	3 - phase, 208V	HP	2	3	5	7.5	10	10	10	15	20	25	30	30	40		
	240V		2	3	5	7.5	10	10	15	20	25	30	30	40	50		
	480V		5	7.5	10	15	20	25	30	40	50	60	60	75	100		
	600V		7.5	10	15	20	25	30	40	50	60	75	75	100	125		

Main accessories

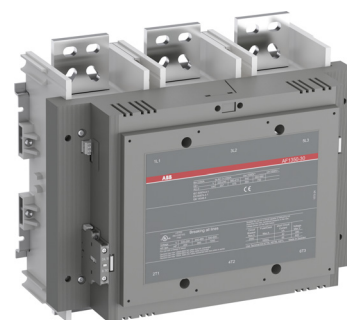
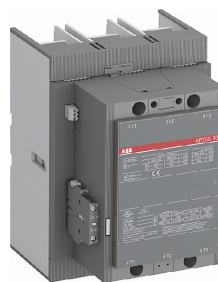
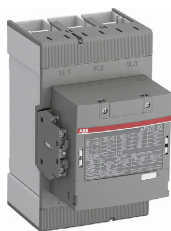
Auxiliary contact blocks	Front mounting	CA4-10 (1 x N.O.), CA4-01 (1 x N.C.)				
	Side mounting	CAL4-11 (1 x N.O. + 1 x N.C.)				CAL19-11 (1 x N.O. + 1 x N.C.)
Timers	Electronic	TEF4-ON, TEF4-OFF				
Interlocking units	Mechanical	VM4		VM96-4		VM19 (for same size contactors)
	Mechanical / Electrical	VEM4				
Connection sets	For reversing contactors	BER16-4	BER38-4	BER65-4	BER96-4	BER140-4
Surge suppressors		Built-in surge protection				

Overload relays

Thermal relays	Class 10 (Class 10A for TF140, TA200DU)	TF42 (0.10...38 A)		TF65 (22...67 A)	TF96 (40...96 A)	TF140 (66...142 A)
Electronic relays	Class 10E, 20E, 30E	EF19 (0.10...19 A)	EF19 (0.10...19 A) EF45 (9...45 A)	EF65 (20...70 A)	EF96 (36...100 A)	EF146 (54...150 A)

Manual motor starters

	Thermal / magnetic protection Class 10	MS116 (0.10...32 A) SCCR 18kA 480V, 5kA 600V	MS165 (10...65 A) SCCR 65kA 480V/277V, 30kA 600V/347V	MS5100 (45...100 A)
		MS132 (0.10...32 A) SCCR 30kA 480V, 18kA 600V		
	Magnetic only types	MO132 (0.16...32 A) SCCR 30kA 480V, 18kA 600V	MO165 (16...65 A) SCCR 65kA 480V/277V, 30kA 600V/347V	MO5100 (63...100 A)
Accessories	For contactor mounting	BEA16-4	BEA38-4	BEA65-4



	250	300	350	400	520	550	650	750	900	1210	1350	1650	2100	2700
	—	—	5	—	—	—	6	—	7	—	—	8	—	—
	AF190	AF205	AF265	AF305	AF370	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650
	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	50	60	75	100	125	125	150	200	250	—	—	—	—	—
	60	75	100	125	150	150	200	250	300	—	400	450	—	—
	125	150	200	250	300	350	400	500	600	—	800	900	—	—
	150	200	250	300	350	400	500	600	700	—	1000	1150	—	—

		CAL18-11 (1 x N.O. + 1 x N.C.)	
		VM750H, VM750V	VM1650H
BER205-4	BER370-4	BEM460-30	

TA200DU (66...200 A)				
EF205 (63...210 A)	EF370 (115...380 A)	EF460 (150...500 A)	EF750 (250...800 A)	E1250DU (375...1250 A)

Short-circuit protection devices

Tmax Circuit breaker and fusible switches
SCCR up to 100kA 600V



4-pole contactors

1

Contactors



UL/CSA	General use rating	600 V	A
AC / DC Control supply			Type

25	30
AF09	AF16

Contactor relays

Contactor relays



4-pole

UL/CSA	Pilot duty	600 V	
AC / DC Control supply			Type

A 600, Q 600		
NF22E	NF31E	NF40E

R contactors

DC Circuit switching



DC-1 Rated current up to 5000 A
DC-3/DC-5 Rated current up to 2000 A
1500 V with poles in series

IOR.. 63-.-CC to IOR.. 5100-.-CC

Specific contactors

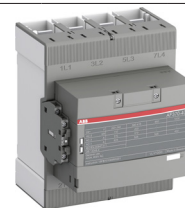
DC Circuit switching



35 A, 1000 VDC-1
75 A, 600 VDC-1
100 A, 440 VDC-1
GA75, GAF75 types



250 to 2050 A, 1000 VDC-1
GAF185 to GAF2050 types



45	55	60	80	105	160	200	230	250	300	350	420
AF26	AF38	AF40	AF52	AF80	AF116	AF140	AF190	AF205	AF265	AF305	AF370



8-pole



NF44E



NF53E



NF62E

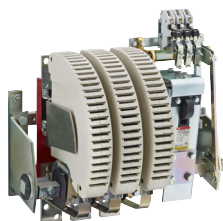


NF71E



NF80E

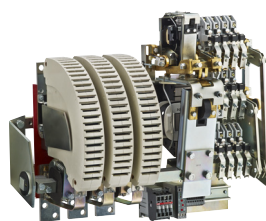
AC Circuit switching



AC-1 Rated current up to 5000 A
AC-3 Rated power up to 1500 kW
(1270 A - 690 V)

IOR.. 63-...-MT to IOR.. 5100-...-MT

Special versions



AC/DC Coupling: LOR.. contactors
Slip ring motor control: FOR .. contactors
Field discharge: AM(F)-CC-JORE contactors
AC/DC Switching (N.C./N.O. main poles):
NOR & JOR contactors
Latching contactors for energy saving
and safety requirements: AMA or AME contactors

Capacitor switching

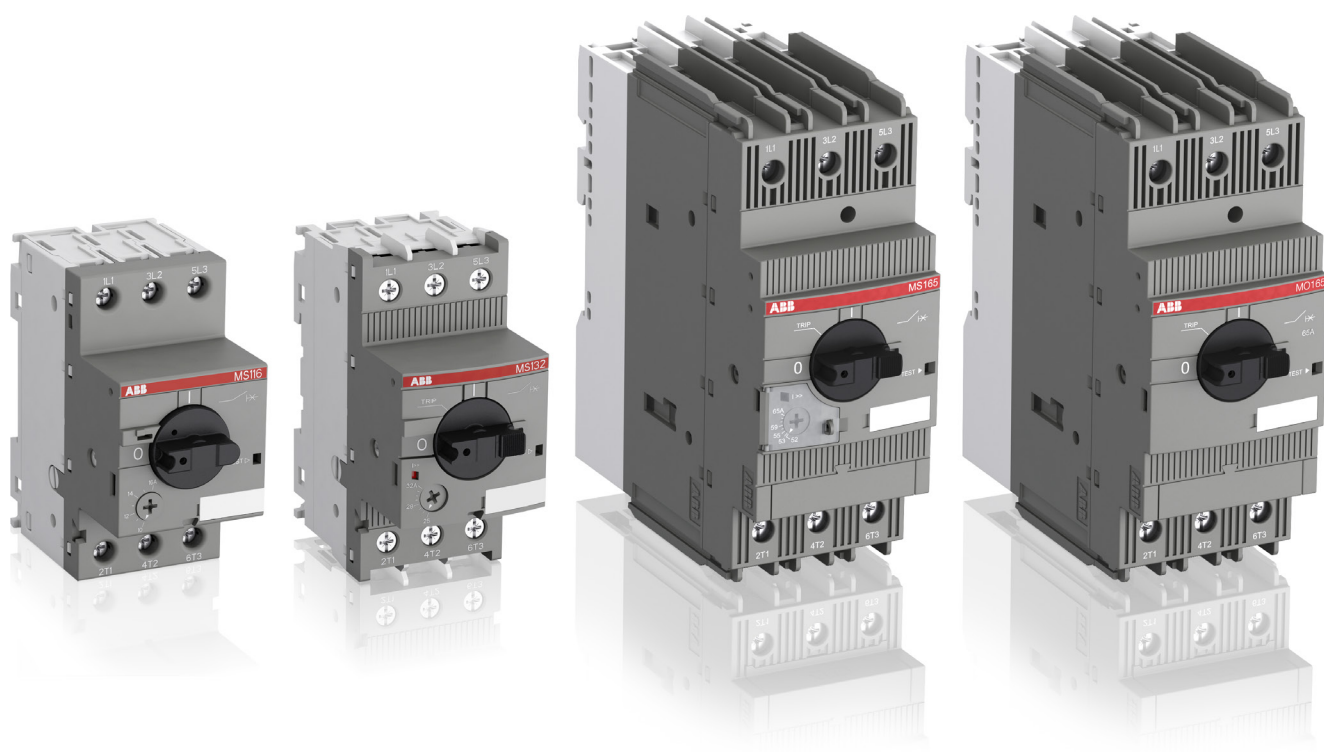


20 to 120 kvar
UA16..RA to UA110..RA types

Definite Purpose



25 to 90 A
1,2,3,4 pole
DP20 to DP90



Manual motor starters

Overview	
Benefits	2/2
Features	2/3
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Ordering details – 0.10 to 65 A – with thermal and electromagnetic protection	
MS116 manual motor starters	2/6
MS132 manual motor starters	2/7
MS165 manual motor starters	2/8
Ordering details – 0.16 to 65 A – with electromagnetic protection	
MO132 manual motor starters magnetic only	2/9
MO165 manual motor starters magnetic only	2/10
Ordering details – 0.10 to 25 A – with thermal and electromagnetic protection	
MS132-T circuit breakers for transformer protection	2/11
Main accessories – MS116, MS132, MS165	2/12
Ordering details – 40 to 100 A – with thermal and electromagnetic protection	
MS5100 manual motor starters	2/19
Ordering details – 70 to 100 A – with electromagnetic protection	
MO5100 manual motor starters magnetic only	2/20
Main accessories – MS5100	2/21
General accessories	2/22
Technical data	2/24

For direct product details information, use order code, ex :
www.abb.com/productdetails/MS132-4.0

Manual motor starters

Benefits

Manual motor starters (MMS) are protection devices for the main circuit. They combine motor control and protection in a single device. MMS are used mainly to switch motors manually ON/OFF and protect them and the installation fuse-less against short-circuit, overload and phase failures. Fuse-less protection with a manual motor starter saves costs, space and ensures a quick reaction under short-circuit condition, by switching off the motor within milliseconds.

Safe, compact, and cost-saving solution

Various motor protection functions in one device

- Overload
- Short-circuit
- Phase loss sensitivity

Efficient planning and installation perfectly matching the ABB contactor family, leads to high flexibility and increased exchangeability. Simple connecting links ensure the electrical and mechanical connection.

Products range for different applications available

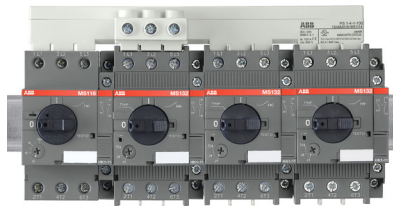
- Short-circuit breaking capacity up to 65 kA
- Magnetic-only devices (only short-circuit protection)
- Selected types are certified according to ATEX
- Special version for transformer protection

The manual motor starter range is compatible with all major national and international standards.

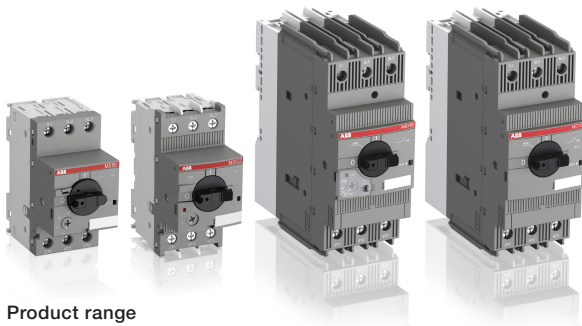
Comprehensive accessory range

Manual motor starters can be equipped with busbars, auxiliary contacts, signalling contacts, undervoltage releases and shunt trips. Moreover it is possible to order UL/CSA Type 12 door mounting kits, UL/CSA Type 12 enclosures and shafts for doors.

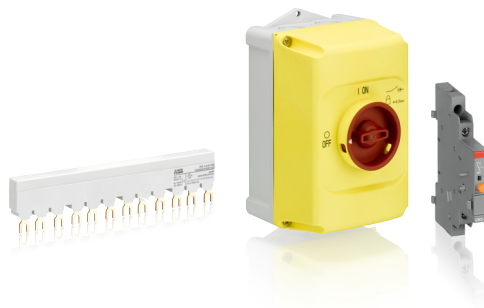
MS116, MS132, MS165, MO132, MO165 and MS132-T share almost the same accessory range. Customers can optimize administration costs and inventory costs through reduced number of order codes by benefiting from a compatible range of accessories.



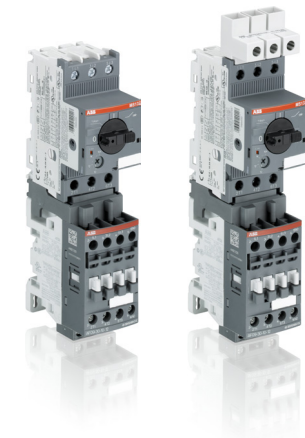
Manual motor starters with busbar connection



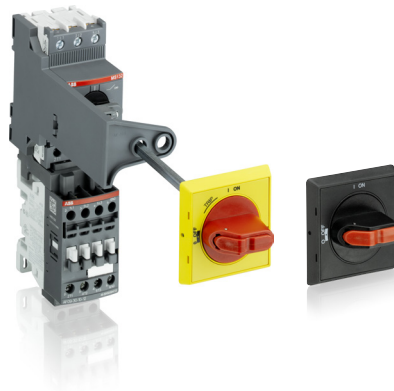
Product range



Accessory range



Direct-on-line starters



Door mounting kits

Manual motor starters

Features

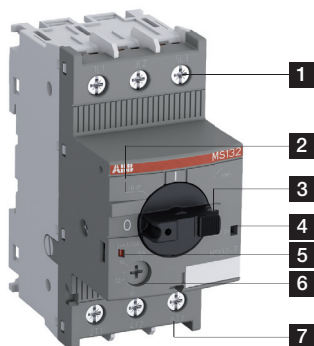
Features

- Manual control
- Disconnect function
- Handle can be locked in the off position
- Remote control via undervoltage release or shunt trip
- Trip indication
- Temperature compensation
- Adjustable current setting

- Magnetic trip indication for several types available (MS132, MS165, and MS132-T)
- One product family in 45 mm width (MS116, MS132, MO132, and MS132-T)
- Variants from 0.1 up to 100 A available
- Short-circuit breaking capacity up to 65 kA

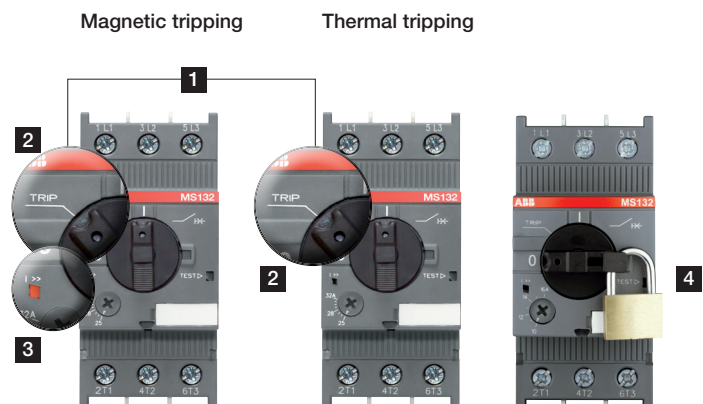
2

- 1 Terminals (1L1, 3L2, 5L3)
- 2 Switch position TRIP
- 3 Lockable handle
- 4 Test function
- 5 Status indication for short-circuit
- 6 Current setting range
- 7 Terminals 2T1, 4T2, 6T3



Features of type MS132

- 1 Clear trip indication
- 2 Handle in TRIP position
- 3 Optical indication for short-circuit
- 4 Easy locking



TRIP indication

Manual motor starters

Overview



2

Type	MS116	MS132	MS165	MS5100
Thermal and electromagnetic protection	Yes	Yes	Yes	Yes
Electromagnetic protection	-	-	-	-
Phase loss sensitivity	Yes	Yes	Yes	-
Switch position	ON/OFF	ON/OFF/TRIP	ON/OFF/TRIP	ON/OFF/TRIP
Magnetic trip indication	-	Yes	Yes	-
Lockable handle without accessories	-	Yes	Yes	Yes
Disconnecting feature	Yes	Yes	Yes	Yes
Width	45 mm	45 mm	55 mm	90 mm
Rated operational current I _e	0.16 ... 32 A	0.16 ... 32 A	16 ... 65 A	100 A
Setting range	0.1 ... 32 A	0.1 ... 32 A	10 ... 65 A	40 ... 100 A
Ambient air temperature	-25 ... +55 °C 1)	-25 ... +60 °C 1)	-20 ... +60 °C 1)	-25 ... +70 °C
1) Compensated				
Accessories				
Auxiliary contact	HKF1, HK1			AUX
Signalling contact	for tripped alarm	SK1		-
	for short-circuit alarm	-	CK1	-
Shunt trip	AA1			SOR-C
Undervoltage release	UA1			UVR-C

Table for short-circuit ratings for 600V

		Standard range MS116		Performance range MS132, MS165, MS5100			
Selection parameters							
Rated operational power HP @ 600V	Setting range for thermal release	Type	Short-circuit breaking capacity	Type	Short-circuit breaking capacity	Type	Short-circuit breaking capacity
–	0.1 ... 0.16 A	MS116-0.16	5 kA	MS132-0.16	47 kA		
–	0.16 ... 0.25 A	MS116-0.25	5 kA	MS132-0.25	47 kA		
–	0.25 ... 0.4 A	MS116-0.4	5 kA	MS132-0.4	47 kA		
–	0.4 ... 0.63 A	MS116-0.63	5 kA	MS132-0.63	47 kA		
1/2	0.63 ... 1.0 A	MS116-1.0	5 kA	MS132-1.0	47 kA		
3/4	1.0 ... 1.6 A	MS116-1.6	5 kA	MS132-1.6	47 kA		
1	1.6 ... 2.5 A	MS116-2.5	5 kA	MS132-2.5	47 kA		
2	2.5 ... 4.0 A	MS116-4.0	5 kA	MS132-4.0	47 kA		
5	4.0 ... 6.3 A	MS116-6.3	5 kA	MS132-6.3	18 kA		
7.5	6.3 ... 10 A	MS116-10	5 kA	MS132-10	18 kA		
7.5	8 ... 12 A	MS116-12	5 kA	MS132-12	18 kA		
10	10 ... 16 A	MS116-16	5 kA	MS132-16	18 kA	MS165-16	30 kA
15	14 ... 20 A					MS165-20	30 kA
15	16 ... 20 A	MS116-20	5 kA	MS132-20	18 kA		
20	18 ... 25 A					MS165-25	30 kA
20	20 ... 25 A	MS116-25	5 kA	MS132-25	18 kA		
25	25 ... 32 A	MS116-32	5 kA	MS132-32	18 kA		
25	23 ... 32 A					MS165-32	30 kA
30	30 ... 42 A					MS165-42	30 kA
40	40 ... 54 A					MS165-54	30 kA
50	40 ... 54 A					MS165-54	30 kA
60	52 ... 65 A					MS165-65	30 kA
75	40 ... 100 A					MS5100-100	
100	40 ... 100 A					MS5100-100	



MO132	MO165	MO5100	MS132-T
-	-	-	Yes
Yes	Yes	Yes	-
-	-	-	Yes
ON/OFF/TRIP	ON/OFF/TRIP	ON/OFF/TRIP	ON/OFF/TRIP
-	-	-	Yes
Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes
45 mm	55 mm	76.2 mm	45 mm
0.16 ... 32 A	16 ... 65 A	70 ... 100 A	0.16 ... 32 A
-	-	-	0.1 ... 25 A
-25 ... +60 °C	-25 ... +60 °C	-25 ... +70 °C	-25 ... +60 °C 1)

HKF1, HK1	AUX	HKF1
SK1	-	SK1
-	-	CK1
AA1	SOR-C	AA1
UA1	UVR-C	UA1

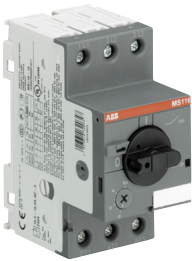
Standard range MO132	Performance range MO165, MO5100	Transformer protection MS132-T
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Type	Short-circuit breaking capacity	Type	Short-circuit breaking capacity	Type	Short-circuit breaking capacity
MO132-0.16	47 kA			MS132-0.16T	47 kA
MO132-0.25	47 kA			MS132-0.25T	47 kA
MO132-0.4	47 kA			MS132-0.4T	47 kA
MO132-0.63	47 kA			MS132-0.63T	47 kA
MO132-1.0	47 kA			MS132-1.0T	47 kA
MO132-1.6	47 kA			MS132-1.6T	47 kA
MO132-2.5	47 kA			MS132-2.5T	47 kA
MO132-4.0	47 kA			MS132-4.0T	47 kA
MO132-6.3	18 kA			MS132-6.3T	18 kA
MO132-10	18 kA			MS132-10T	18 kA
MO132-12	18 kA			MS132-12T	18 kA
MO132-16	18 kA	MO165-16	30 kA	MS132-16T	18 kA
		MO165-20	30 kA		
MO132-20	18 kA			MS132-20T	18 kA
MO132-25	18 kA	MO165-25	30 kA	MS132-25T	18 kA
MO132-32	18 kA			Transformer protection: The instantaneous short-circuit current setting is 20 times the rated operational current.	
		MO165-32	30 kA		
		MO165-42	30 kA		
		MO165-54	30 kA		
		MO5100-70			
		MO165-65	30 kA		
		MO5100-80			
		MO5100-100			

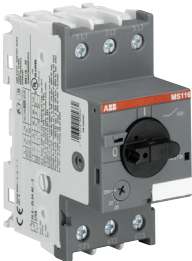
MS116 manual motor starters

0.10 to 32 A – with thermal and electromagnetic protection

2



MS116-16



MS116-25

Description

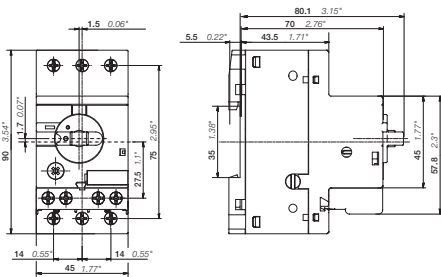
MS116 is a compact and economic range for motor protection up to 25 HP (600 V) / 32 A in width of 45 mm. Further features are the built-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication. The manual motor starter is suitable for three- and single-phase applications. Auxiliary contacts, signaling contacts, undervoltage releases, shunt trips, power in-feed blocks and locking devices for protection against unauthorized changes are available as accessory. These are suitable throughout the MS116/MS132/MS165-range.

Ordering details

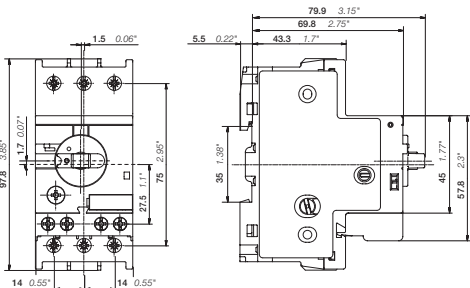
Rated operational power			Setting range		Short-circuit breaking capacity I_{cs} at 600 V AC	Rated instantaneous short-circuit current setting I_i	Order code	Weight (1 pc)
240 V	480 V	600 V	A	kA		A		kg
HP	HP	HP						
–	–	–	0.10 ... 0.16	5		2.00	MS116-0.16	0.23
–	–	–	0.16 ... 0.25	5		3.10	MS116-0.25	0.23
–	–	–	0.25 ... 0.40	5		5.00	MS116-0.4	0.23
–	–	–	0.40 ... 0.63	5		7.90	MS116-0.63	0.23
–	–	1/2	0.63 ... 1.00	5		12.5	MS116-1.0	0.23
–	3/4	3/4	1.00 ... 1.60	5		20.0	MS116-1.6	0.27
1/2	1	1.5	1.60 ... 2.50	5		31.3	MS116-2.5	0.27
1	2	3	2.50 ... 4.00	5		50.0	MS116-4.0	0.27
1.5	3	5	4.00 ... 6.30	5		78.8	MS116-6.3	0.27
3	5	7.5	6.30 ... 10.0	5		150	MS116-10	0.27
3	7.5	10	8.00 ... 12.0	5		180	MS116-12	0.27
5	10	10	10.0 ... 16.0	5		240	MS116-16	0.27
5	10	15	16.0 ... 20.0	5		300	MS116-20	0.31
7.5	15	20	20.0 ... 25.0	5		375	MS116-25	0.31
10	20	25	25.0 ... 32.0	5		480	MS116-32	0.31

Note: Manual motor starters should always be selected so that the actual motor current is within the setting range.

Main dimensions mm, inches



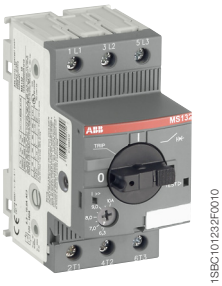
MS116 ≤ 16 A & MS116-HKF1-11 ≤ 16 A



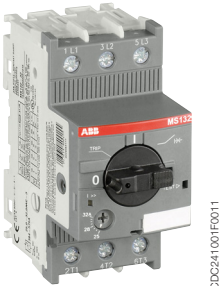
MS116 ≥ 20 A & MS116-HKF1-11 ≥ 20 A

MS132 manual motor starters

0.10 to 32 A – with thermal and electromagnetic protection



MS132-10



MS132-32

Description

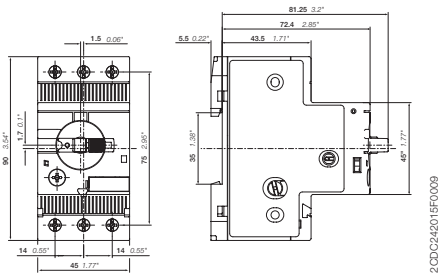
MS132 is a compact and powerful range for motor protection up to 25 HP (600 V) / 32 A in width of 45 mm. This type has also a clear and reliable indication of fault in a separate window in the event of short-circuit tripping. Further features are the build-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication. The manual motor starter is suitable for three- and single-phase applications. The handle is lockable to protect against unauthorized changes. Auxiliary contacts, signaling contacts, undervoltage releases, shunt trips, power in-feed blocks are available as accessory. These are suitable throughout the MS116/MS132/MS165-range.

Ordering details

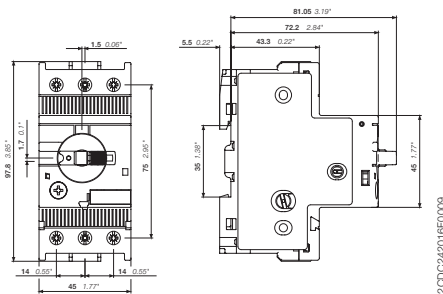
Rated operational power			Setting range	Short-circuit breaking capacity I_{cs} at 600 V AC	Rated instantaneous short-circuit current setting I_i	Order code	Weight (1 pc)
240 V	480 V	600 V					
HP	HP	HP	A	kA	A		kg
–	–	–	0.10 ... 0.16	47	2.00	MS132-0.16	0.22
–	–	–	0.16 ... 0.25	47	3.10	MS132-0.25	0.22
–	–	–	0.25 ... 0.40	47	5.00	MS132-0.4	0.22
–	–	–	0.40 ... 0.63	47	7.90	MS132-0.63	0.22
–	–	1/2	0.63 ... 1.00	47	12.5	MS132-1.0	0.22
–	3/4	3/4	1.00 ... 1.60	47	20.0	MS132-1.6	0.27
1/2	1	1.5	1.60 ... 2.50	47	31.3	MS132-2.5	0.27
1	2	3	2.50 ... 4.00	47	50.0	MS132-4.0	0.27
1.5	3	5	4.00 ... 6.30	18	78.8	MS132-6.3	0.27
3	5	7.5	6.30 ... 10.0	18	150	MS132-10	0.27
3	7.5	10	8.00 ... 12.0	18	180	MS132-12	0.31
5	10	10	10.0 ... 16.0	18	240	MS132-16	0.31
5	10	15	16.0 ... 20.0	18	300	MS132-20	0.31
7.5	15	20	20.0 ... 25.0	18	375	MS132-25	0.31
10	20	25	25.0 ... 32.0	18	480	MS132-32	0.31

Note: Manual motor starters should always be selected so that the actual motor current is within the setting range.

Main dimensions mm, inches



MS132 ≤ 10 A



MS132 ≥ 12 A

MS165 manual motor starters

10 to 65 A – with thermal and electromagnetic protection

2



MS165-65

2CDC24100AV0015

Description

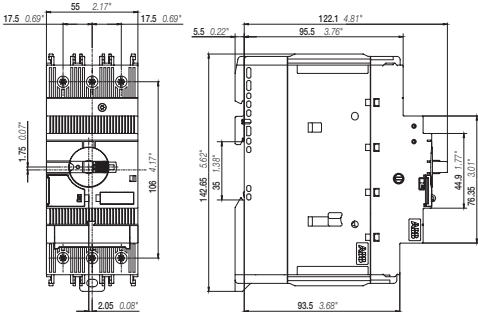
MS165 is a compact and powerful range for motor protection up to 60 HP (600 V) / 65 A in width of 55 mm. This type has also a clear and reliable indication of fault in a separate window in the event of short-circuit tripping. Further features are the build-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication. The manual motor starter is suitable for three- and single-phase applications. The handle is lockable to protect against unauthorized changes. Auxiliary contacts, signaling contacts, undervoltage releases, shunt trips, power in-feed blocks are available as accessory. These are suitable throughout the MS116/MS132/MS165-range.

Ordering details

Rated operational power			Setting range		Short-circuit breaking capacity I at 600 V AC	Rated instantaneous short-circuit current setting I	Order code	Weight (1 pc)
240 V	480 V	600 V	A	kA		A		kg
5	10	10	10 ... 16	30		240	MS165-16	0.95
5	10	15	14 ... 20	30		300	MS165-20	0.95
7.5	15	20	18 ... 25	30		375	MS165-25	0.96
10	20	30	23 ... 32	30		480	MS165-32	0.97
15	30	40	30 ... 42	30		630	MS165-42	0.97
20	40	50	40 ... 54	30		810	MS165-54	0.97
20	50	60	52 ... 65	30		975	MS165-65	0.98

Note: Manual motor starters should always be selected so that the actual motor current is within the setting rang

Main dimensions mm, inches

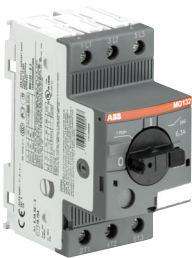


2CDC242001F0014

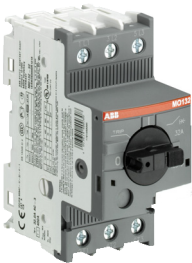
MS165

MO132 manual motor starters magnetic only

0.16 to 32 A – with electromagnetic protection



MO132-6.3



MO132-32

Description

Manual motor starters magnetic only are electromechanical protection devices for the main circuit. They are used mainly to switch motors manually ON/OFF and protect them fuse-less against short-circuit.

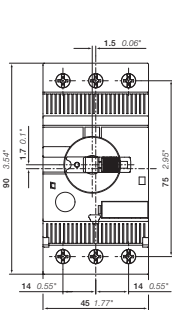
Fuse-less protection with a manual motor starter saves costs, space and ensures a quick reaction under short-circuit condition, by switching off the motor within milliseconds. Fuse-less starter combinations are setup together with contactors and overload relays.

Ordering details

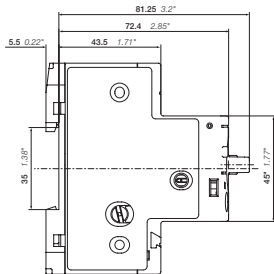
Rated operational power			Rated operational current	Short-circuit breaking capacity I _{at} 600 V AC	Rated instantaneous short-circuit current setting I _i	Order code	Weight (1 pc)
240 V	480 V	600 V					
HP	HP	HP	A	kA	A		kg
–	–	–	0.16	47	2.00	MO132-0.16	0.22
–	–	–	0.25	47	3.10	MO132-0.25	0.22
–	–	–	0.40	47	5.00	MO132-0.4	0.22
–	–	–	0.63	47	7.90	MO132-0.63	0.22
–	–	1/2	1.0	47	12.5	MO132-1.0	0.22
–	3/4	3/4	1.6	47	20.0	MO132-1.6	0.27
1/2	1	1.5	2.5	47	31.3	MO132-2.5	0.27
1	2	3	4.0	47	50.0	MO132-4.0	0.27
1.5	3	5	6.3	18	78.8	MO132-6.3	0.27
3	5	7.5	10	18	125	MO132-10	0.27
3	7.5	10	12	18	150	MO132-12	0.31
5	10	10	16	18	200	MO132-16	0.31
5	10	15	20	18	250	MO132-20	0.31
7.5	15	20	25	18	313	MO132-25	0.31
10	20	25	32	18	400	MO132-32	0.31

1) For overload protection of motors, an appropriate thermal or electronic overload relay must be used

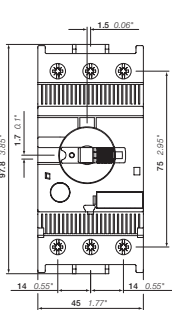
Main dimensions mm, inches



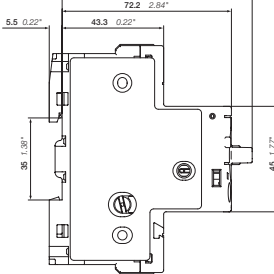
MO132 ≤ 10 A



2DC242009F0011



MO132 ≥ 12 A



2DC242009F0011

MO165 manual motor starters magnetic only

16 to 65 A – with electromagnetic protection

2



MO165-65

2CDC241003V0015

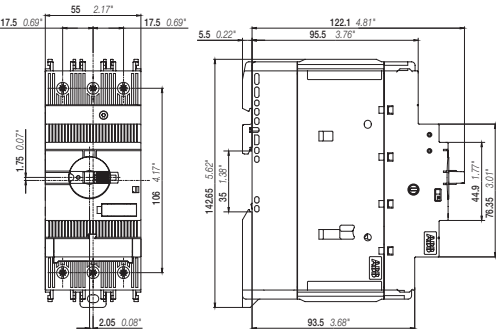
Description

Manual motor starters magnetic only are electromechanical protection devices for the main circuit. They are used mainly to switch motors manually ON/OFF and protect them fuse-less against short-circuit. Fuse-less protection with a manual motor starter saves costs, space and ensures a quick reaction under short-circuit condition, by switching off the motor within milliseconds. Fuse-less starter combinations are setup together with contactors and overload relays.

Ordering details

Rated operational power			Rated operational current	Short-circuit breaking capacity I at 600 V AC	Rated instantaneous short-circuit current setting I _i	Order code	Weight (1 pc)
240 V	480 V	600 V					
HP	HP	HP	A	kA	A		kg
5	10	10	16	30	240	MO165-16	0.95
5	10	15	20	30	300	MO165-20	0.95
7.5	15	20	25	30	375	MO165-25	0.96
10	20	30	32	30	480	MO165-32	0.97
15	30	40	42	30	630	MO165-42	0.97
20	40	50	54	30	810	MO165-54	0.97
20	50	60	65	30	975	MO165-65	0.98

Main dimensions mm, inches



M0165

2CDC24002F0014

MS132-T circuit breakers for transformer protection

0.10 to 25 A – with thermal and electromagnetic protection



MS132-10T



MS132-25T

Description

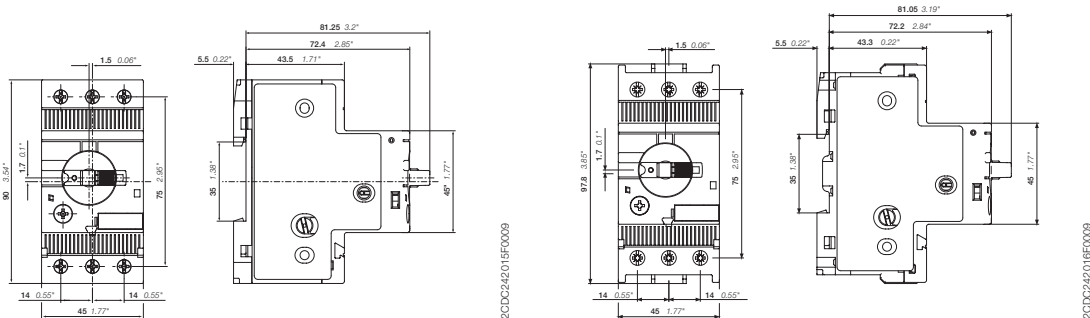
Circuit breakers for transformer protection are electro mechanical protection devices specially designed to protect control transformers on the primary side. They allow fuse-less protection against overload and short-circuit, saving space and cost and ensuring a quick reaction under short-circuit condition by switching off the transformer within milliseconds. The short-circuit current setting is fixed to 20 times the operating current to handle the high inrush current generated by transformers. The device allows manual connection and disconnection of the transformer from the mains.

MS132-T is a 45 mm (width) compact and powerful range for transformer protection up to 25 KW (600 V) / 25 A. This type has also a clear and reliable indication of fault in a separate window in the event of short-circuit tripping. Further features are the build-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication. The handle is lockable to protect against unauthorized changes. Auxiliary contacts, signaling contacts, undervoltage releases, shunt trips, power in-feed blocks are available as accessory. These are suitable throughout the MS116/MS132/MS165-range. Moreover ABB offers special accessories for fast single-phase setup.

Ordering details

Setting range	Short-circuit breaking capacity I at 600 V AC	Rated instantaneous short-circuit current setting I _i	Order code	Weight (1 pc)
A	kA	A		kg
0.10 ... 0.16	47	3.2	MS132-0.16T	0.22
0.16 ... 0.25	47	5	MS132-0.25T	0.22
0.25 ... 0.40	47	8	MS132-0.4T	0.22
0.40 ... 0.63	47	12.6	MS132-0.63T	0.22
0.63 ... 1.00	47	20	MS132-1.0T	0.22
1.00 ... 1.60	47	32	MS132-1.6T	0.27
1.60 ... 2.50	47	50	MS132-2.5T	0.27
2.50 ... 4.00	47	80	MS132-4.0T	0.27
4.00 ... 6.30	18	126	MS132-6.3T	0.27
6.30 ... 10.0	18	200	MS132-10T	0.27
8.00 ... 12.0	18	240	MS132-12T	0.31
10.0 ... 16.0	18	320	MS132-16T	0.31
16.0 ... 20.0	18	400	MS132-20T	0.31
20.0 ... 25.0	18	500	MS132-25T	0.31

Main dimensions mm, inches

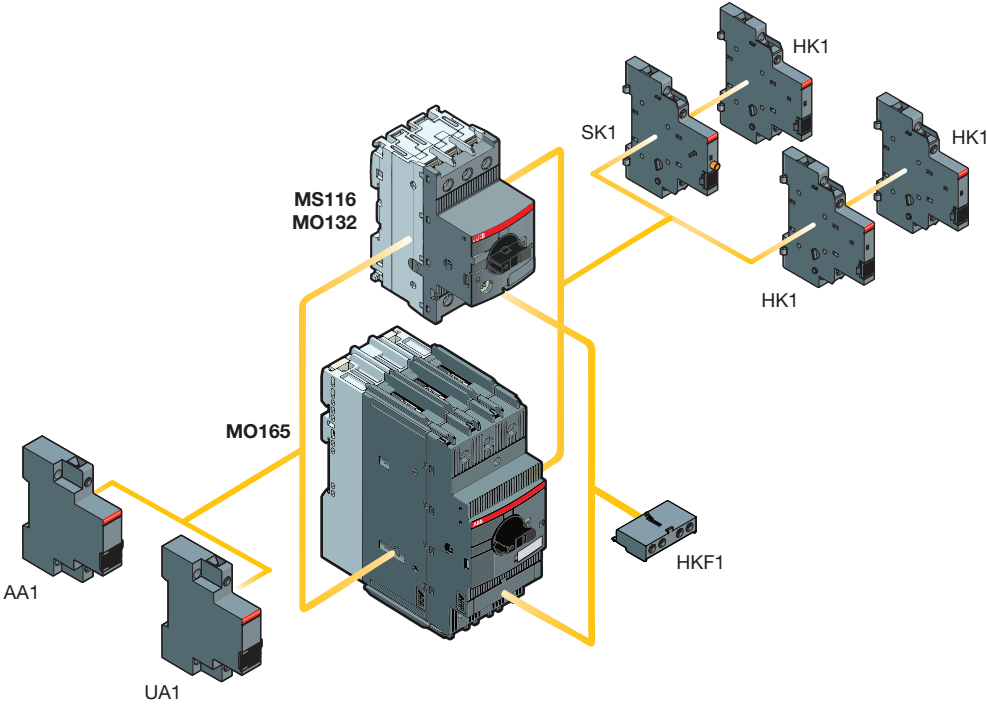


Main accessories

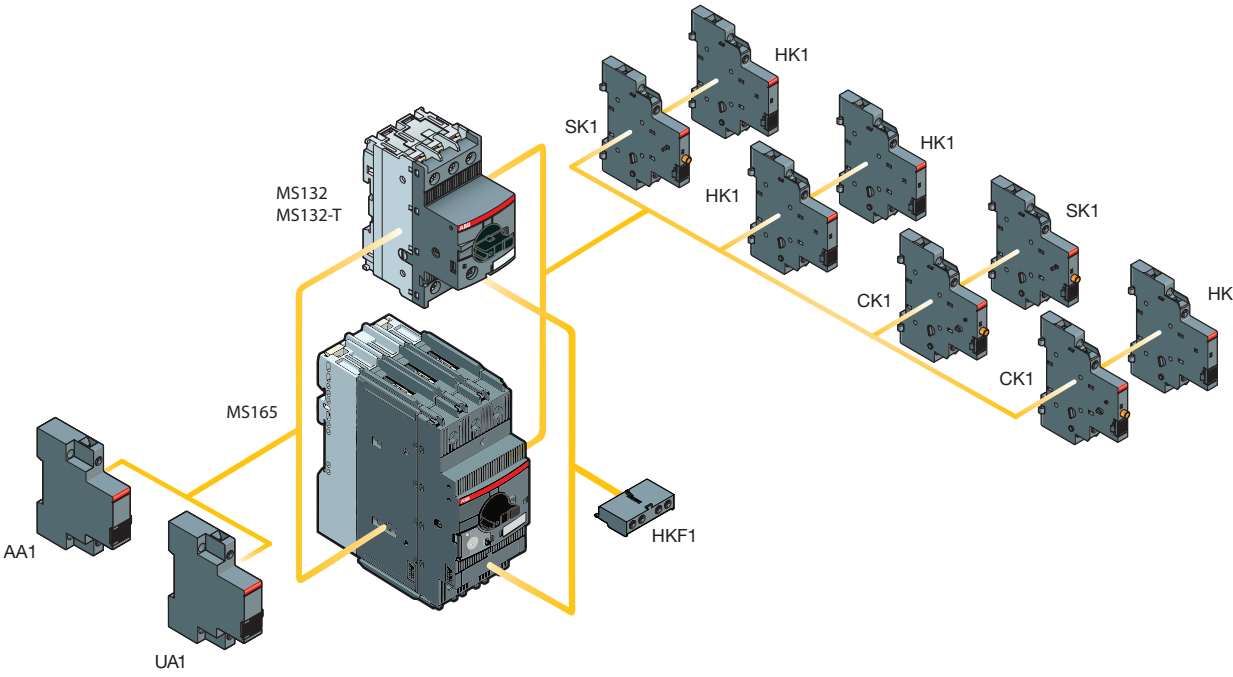
MS116, MS132, MS165, MO132, MO165, MS132-T

Manual motor starters with accessories (MS116, MO132, MO165)

2



Manual motor starters with accessories (MS132, MS165) and circuit breaker for transformer protection (MS132-T)



Main accessories

MS116, MS132, MS165, MO132, MO165, MS132-T



HKF1-11



HK1-11



SK1-11



CK1-11

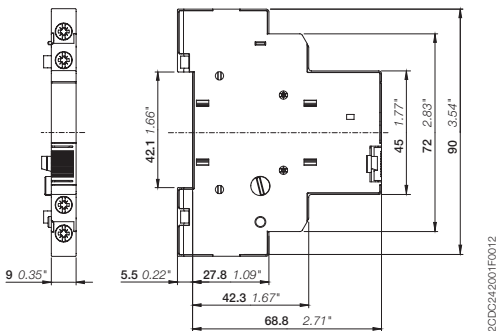
Description

MMS and MS132-T can be equipped with auxiliary contacts for lateral/front mounting, signaling contacts for lateral mounting, undervoltage releases and shunt trips. Two different signaling contacts are available. The accessories can be fitted wiring free and without tools. A variety of combinations is possible as required for the application. The auxiliary contacts change position with the main contacts. The signaling contact SK signals tripping regardless if it was caused by short-circuit or overload. The signaling contact CK signals tripping in case it was caused by short-circuit. Undervoltage releases are used for remote tripping of the manual motor starters especially for emergency stop circuits. Shunt trips release the MMS used for remote tripping. These main accessories are suitable throughout the MS116/MS132/MS165-range.

Ordering details

Suitable for	Auxiliary contacts N.O.	Auxiliary contacts N.C.	Description	Order code	Pkg qty	Weight (1 pc)
					pcs	kg
Auxiliary contacts – mountable on the front						
MS116, MS132, MS165 MO132, MO165 MS132-T	1	1		MS132-HKF1-11	10	0.02
	1	0		MS132-HKF1-10	10	0.01
	0	1		MS132-HKF1-01	10	0.02
	2	0		MS132-HKF1-20	10	0.02
Auxiliary contacts – mountable on the right						
MS116, MS132, MS165 MO132, MO165 MS132-T	1	1	max. 2 pieces	MS132-HK1-11	2	0.04
	2	0	max. 2 pieces	MS132-HK1-20	2	0.04
	0	2	max. 2 pieces	MS132-HK1-02	2	0.04
	2	0	with lead contacts	MS132-HK1-20L	2	0.04
Signaling contacts – mountable on the right						
MS116, MS132, MS165 MO132, MO165 MS132-T	1	1	for tripped alarm, max. 2 pieces	MS132-SK1-11	2	0.04
	2	0	for tripped alarm, max. 2 pieces	MS132-SK1-20	2	0.04
	0	2	for tripped alarm, max. 2 pieces	MS132-SK1-02	2	0.04
MS132, MS165, MS132-T	1	1	for short-circuit alarm, max. 2 pieces	MS132-CK1-11	2	0.04
	2	0	for short-circuit alarm, max. 2 pieces	MS132-CK1-20	2	0.04
	0	2	for short-circuit alarm, max. 2 pieces	MS132-CK1-02	2	0.04

Main dimensions mm, inches



HK1

Main accessories

MS116, MS132, MS165, MO132, MO165, MS132-T

2



AA1-24

1SBC101211F0014



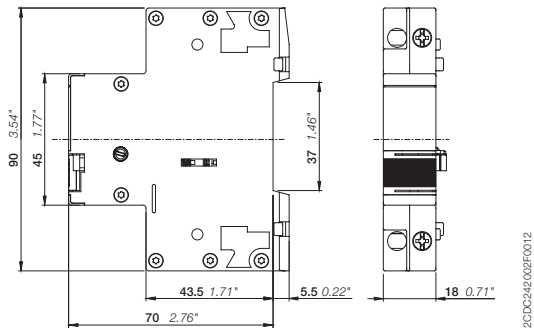
UA1-24

1SBC101212F0014

Ordering details

Suitable for	Rated control supply voltage		Order code		Pkg qty	Weight (1 pc)
	50 Hz V AC	60 Hz V AC				
					pcs	kg
Shunt trips – mountable on the left						
MS116, MS132, MS165, MO132, MO165, MS132-T	20 ... 24	20 ... 24	MS132-AA1-24		1	0.10
	110	110	MS132-AA1-110		1	0.10
	200 ... 240	200 ... 240	MS132-AA1-230		1	0.10
	350 ... 415	350 ... 415	MS132-AA1-400		1	0.10
Undervoltage releases – mountable on the left						
MS116, MS132, MS165, MO132, MO165, MS132-T	20	24	MS132-UA1-20		1	0.10
	24	-	MS132-UA1-24		1	0.10
	48	-	MS132-UA1-48		1	0.10
	60	-	MS132-UA1-60		1	0.10
	110	120	MS132-UA1-110		1	0.10
	-	208	MS132-UA1-208		1	0.10
	230	240	MS132-UA1-230		1	0.10
	400	-	MS132-UA1-400		1	0.10
	415	480	MS132-UA1-415		1	0.10
	-	575	MS132-UA1-575		1	0.10

Main dimensions mm, inches

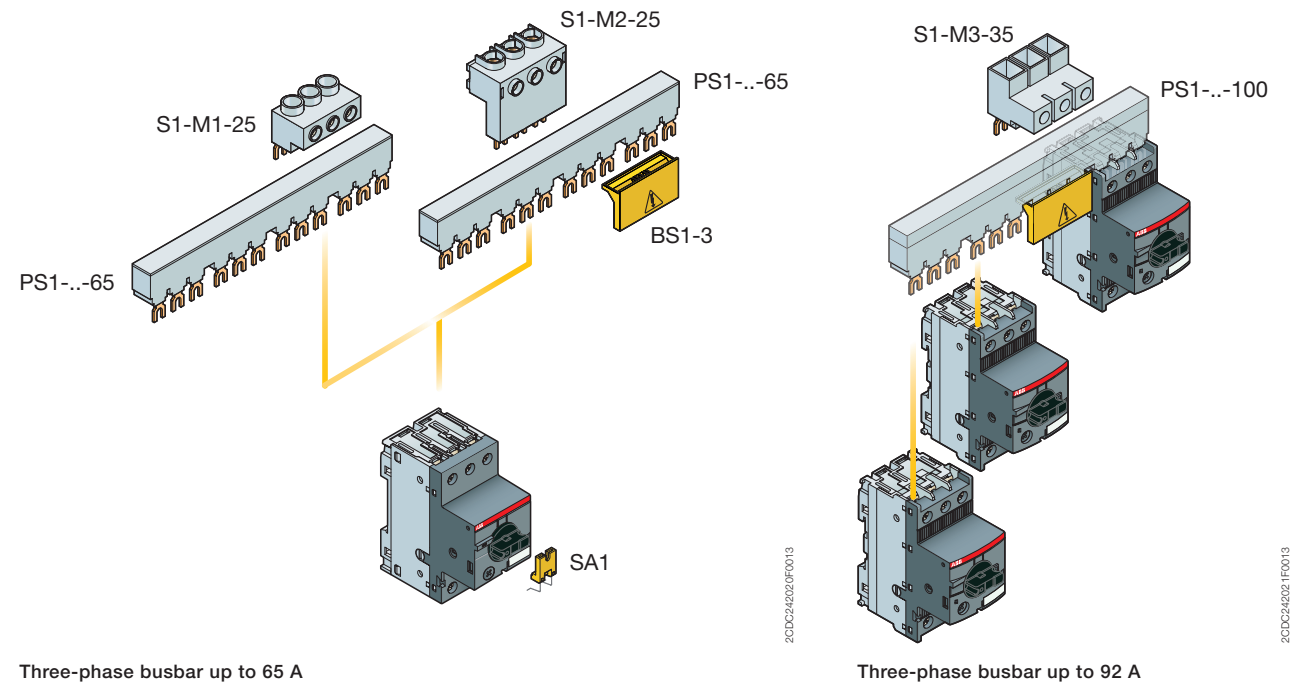


AA1, UA1

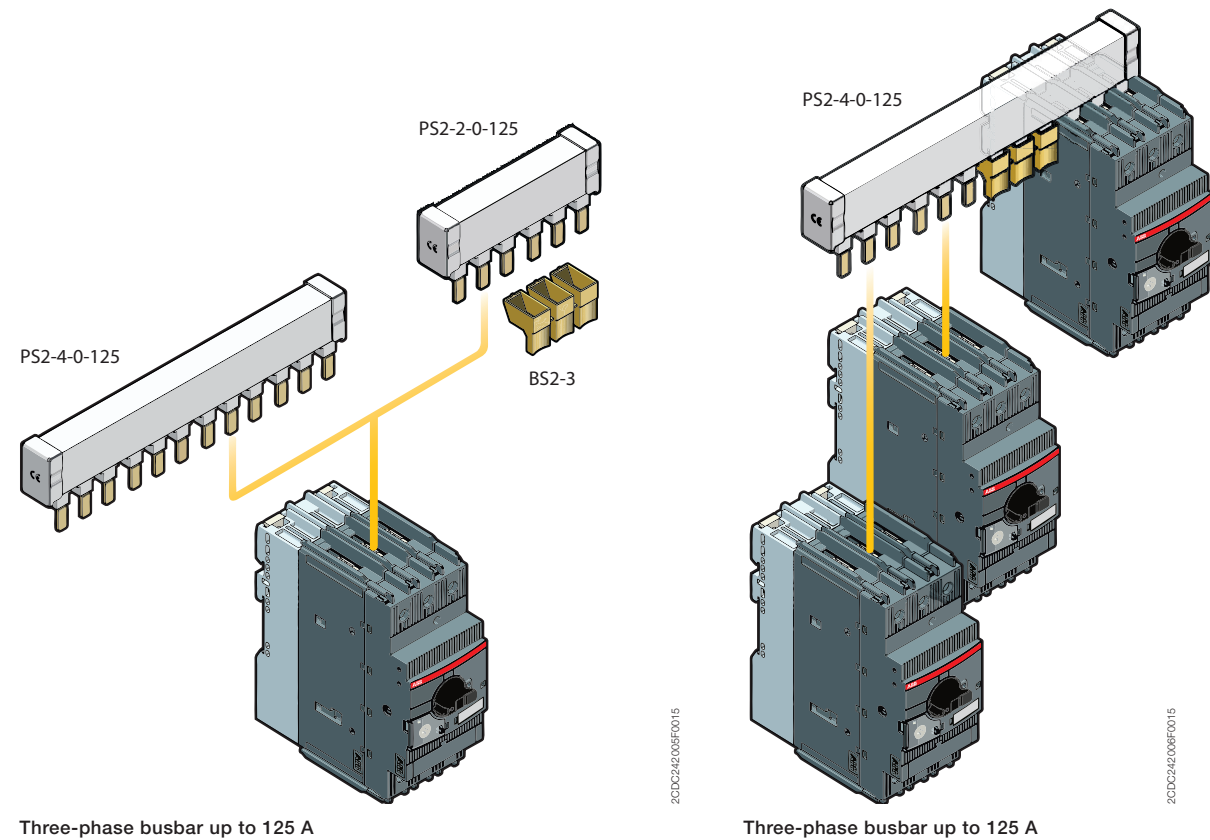
Main accessories

MS116, MS132, MS165, MO132, MO165

Manual motor starter with three-phase busbar systems (MS116, MS132, MO132)



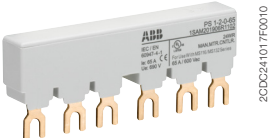
Manual motor starter with three-phase busbar systems (MS165, MO165)



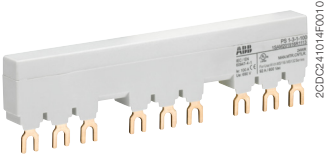
Main accessories

MS116, MS132, MO132, MS132-T

2



PS1-2-0-65



PS1-3-1-100



S1-M1-25



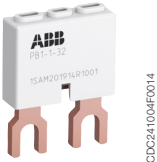
S1-M2-25



SA2



SA1



PB1-1-32



S1-PB1-25

Description

Three-phase busbars ensure a quick and safe connection and are therefore a cost effective solution. A variety of different three-phase busbars up to 92A are in the assortment. Between 2 and 5 manual motor starters with none, one or two lateral auxiliary contacts can be connected. Different three-phase feeder terminals are available according to the application.

Phase connecting links and phase power infeed blocks are also available for single-phase applications.

Ordering details

Suitable for	Rated operational current A	Number of MMS	Number of lateral aux.	Order code		Pkg qty pcs	Weight (1 pc) kg
Three-phase busbars							
MS116, MS132, MO132	65	2	0	MS132-PS1-2-0-65		10	0.03
	65	3	0	MS132-PS1-3-0-65		10	0.06
	65	4	0	MS132-PS1-4-0-65		10	0.08
	65	5	0	MS132-PS1-5-0-65		10	0.10
	65	2	1	MS132-PS1-2-1-65		10	0.04
	65	3	1	MS132-PS1-3-1-65		10	0.06
	65	4	1	MS132-PS1-4-1-65		10	0.09
	65	5	1	MS132-PS1-5-1-65		10	0.11
	65	2	2	MS132-PS1-2-2-65		10	0.04
	65	3	2	MS132-PS1-3-2-65		10	0.07
MS116, MS132, MO132	65	4	2	MS132-PS1-4-2-65		10	0.10
	65	5	2	MS132-PS1-5-2-65		10	0.12
	92	3	0	MS132-PS1-3-0-100		10	0.08
	92	4	0	MS132-PS1-4-0-100		10	0.12
	92	5	0	MS132-PS1-5-0-100		10	0.15
	92	3	1	MS132-PS1-3-1-100		10	0.09
	92	4	1	MS132-PS1-4-1-100		10	0.13
	92	5	1	MS132-PS1-5-1-100		10	0.17
	92	3	2	MS132-PS1-3-2-100		10	0.11

Suitable for	Rated operational current A	Rated cross section mm ²	Mounting form	Order code		Pkg qty pcs	Weight (1 pc) kg
Three-phase feeder terminals							
MS116, MS132, MO132	63	25	Flat	MS132-S1-M1-25		10	0.04
	63	25	High	MS132-S1-M2-25		10	0.05
	63	25	UL/CSA Type E/F	MS132-S1-M3-25		10	0.04
	92	35	UL/CSA Type E/F	MS132-S1-M3-35		10	0.06

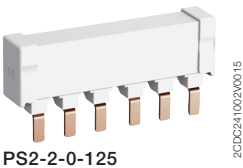
Suitable for	Description	Order code		Pkg qty pcs	Weight (1 pc) kg
MS116, MS132, MO132	Protection cover for busbars	MS132-BS1-3		50	0.01
MS116, MS132, MO132, MS132-T	Screw fixing kit	MS132-FS116		1	0.02
	Padlock + two keys	MS132-SA2		10	0.02
MS116	Lock handle	MS116-SA1		10	0.01
	Lock handle box SA1/SA2	MS116-SA3		10	0.05

Accessories for single-phase connection (IEC only)

MS116, MS132, MO132, MS132-T	Phase connecting link	PB1-1-32		1	0.01
	Phase power infeed block	S1-PB1-25		1	0.01

Main accessories

MS165, MO165



PS2-2-0-125



PS2-3-0-125



KA165



BS2-3



SA2

Description

Three-phase busbars ensure a quick and safe connection and are therefore a cost effective solution. A variety of different three-phase busbars up to 125A are in the assortment. Between 2 and 5 manual motor starters with none, one or two lateral auxiliary contacts can be connected.

Ordering details

Suitable for	Rated operational current A	Number of MMS	Number of lateral aux.	Order code		Pkg qty pcs	Weight (1 pc) kg
Three-phase busbars							
MS165, MO165	125	2	0	PS2-2-0-125		10	0.10
	125	3	0	PS2-3-0-125		10	0.16
	125	4	0	PS2-4-0-125		10	0.23
	125	2	2	PS2-2-2-125		10	0.12
	125	3	2	PS2-3-2-125		10	0.20
	125	4	2	PS2-4-2-125		10	0.28

Other busbar types on request.

Suitable for	Description	Order code		Pkg qty pcs	Weight (1 pc) kg
MS165, MO165	Terminal shroud	KA165		10	0.03
	Protection cover for busbars	BS2-3		50	0.01
	Padlock + two keys	MS132-SA2		10	0.02

Main accessories

MS116, MS132, MO132

2



IB132-Y

20DC241004F0010



IB132-G

20DC241003F0010



DMS132-Y

20DC241002F0010



DMS132-G

20DC241001F0010

Description

IB132 are UL/CSA Type 12 enclosures for single MMS installation. Additional mounting of auxiliary and signaling contacts, shunt trips and undervoltage release is possible. The handle is lockable in OFF position. For detailed specification see installation instruction.

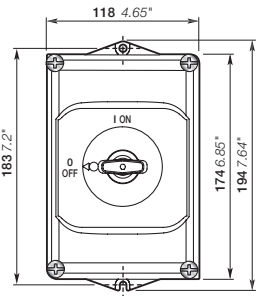
DMS132 are UL/CSA Type 12 door mounting kits for MMS installation in any enclosure. Additional mounting of auxiliary, signaling, shunt trips and undervoltage release is possible. The handle is lockable in OFF position. For detailed specification see installation instruction.

Ordering details

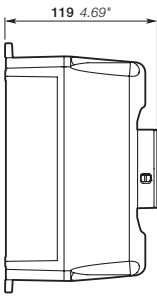
Suitable for	Description	Color	Order code		Pkg qty pcs	Weight (1 pc) kg
UL/CSA Type 12 enclosures						
MS116, MS132, MO132	Padlockable max. 3 padlocks with bail diameter 4 ... 6.5 mm	Yellow/red	IB132-Y		1	0.37
		Grey/black	IB132-G		1	0.37
UL/CSA Type 12 door mounting kits						
MS116, MS132, MO132	Padlockable max. 3 padlocks with bail diameter 4 ... 6.5 mm	Yellow/red	DMS132-Y		1	0.17
		Grey/black	DMS132-G		1	0.17

Indication I-O-T and ON-OFF-T

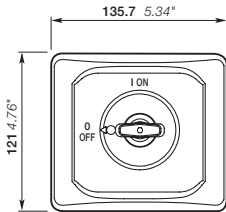
Main dimensions mm, inches



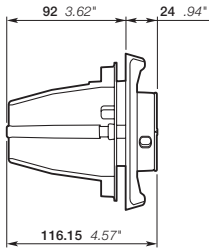
IB132



20DC242011F0011



DMS132



20DC242012F0011

2



Manual motor starters (MMS) are protection devices for the main circuit. They combine motor control and protection in a single device. MMS are used mainly to switch motors manually ON/OFF and protect them and the installation fuse-less against short-circuit, overload and phase failures. Fuse-less protection with a manual motor starter saves costs, space and ensures a quick reaction under short-circuit condition, by switching off the motor within milliseconds.

Rated operational power 600 V	Setting range	Short-circuit breaking capacity I _{at} 600 V AC	Rated instantaneous short-circuit current setting I _i	Order code	Weight (1 pc)
HP	A	kA	A		kg
MS5100 manual motor starters					
75	40 ... 100		600 ... 1300	MS5100-100	1.20

Technical drawing of a building facade showing a cross-section and elevation. The cross-section (left) shows a central window unit with dimensions: total width 120, window width 4.72, and various offsets. The elevation (right) shows a window with dimensions: total height 95.5, window height 3.76, and various offsets. Callouts 1, 2, 3, and 4 point to specific components.

SDC2 1034HF0001

MO5100 manual motor starters magnetic only

70 to 100 A – with electromagnetic protection

2



MO5100-100

MO5100-100 no mirror

Description

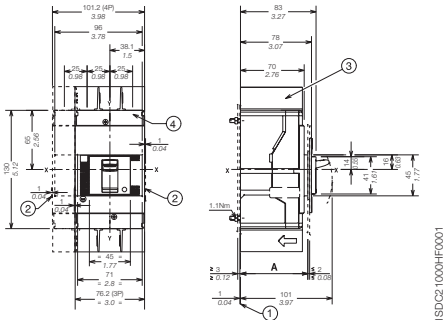
The manual motor starter magnetic only is used to manually switch on and off motors and to protect them reliably and without the need for a fuse from short-circuits.

Ordering details

Rated operational power 600 V	Rated operational current	Short-circuit breaking capacity I at 600 V AC	Rated instantaneous short-circuit current setting I _i	Order code		Weight (1 pc)
HP	A	kA	A			kg
MO5100 manual motor starter magnetic only						
50	70		210 ... 770	MO5100-70		1.10
60	80		240 ... 880	MO5100-80		1.10
75	100		300 ... 1100	MO5100-100		1.10

1) For overload protection of motors, an appropriate thermal or electronic overload relay must be used

Main dimensions mm, inches



MO5100

1SD02 1000HF0001

Main accessories

MS5100, MO5100 manual motor starters



Description

Manual motor starters can be equipped with auxiliary contacts, undervoltage release and shunt trips. Undervoltage release are used for remote tripping of the manual motor starter especially for emergency stop circuits. Shunt trips release the MMS used for remote tripping.

For this manual motor starter range we also offer key lock solutions for customer applications.

Ordering details

Suitable for	Auxiliary contacts N.O.	Auxiliary contacts N.C.	Description	Type	Order code	Pkg qty	Weight (1 pc)
						pcs	kg

Auxiliary contacts - mountable inside the breaker on the left slot (cabled version)

MS5100,			Changeover	AUX-C 1Q+1SY 250V AC	KXTAAXCQSYFP	2	0.06
MO5100			Changeover	AUX-C 2Q+1SY 250V AC	KXTAAXC2QSYFP	3	0.09
MS5100			Changeover	AUX-C 2Q+2SY+1SA 250V AC	KXTCAXC2Q2SYS51FP	5	0.15
			Changeover	AUX-C 3Q+1SY 250V AC	KXTDAXC3QSYFP	4	0.12
			Changeover	AUX-C 3Q+2SY 250V AC	KXTCAXC3Q2SYFP	5	0.15
MO5100			Changeover	AUX-C 1Q+1SY 24V DC	KXTAAXCDQSYFP	2	0.06

Suitable for	Rated control supply voltage V	Description	Type	Order code	Pkg qty	Weight (1 pc)
					pcs	kg

Shunt trips units - mountable inside the breaker on the left slot (cabled version)

MS5100,		Normally NON energized	SOR-C 12V DC	KXTASORCFPA	1	0.14
MO5100		Normally NON energized	SOR-C 24-30V AC/DC	KXTASORCFPB	1	0.14
		Normally NON energized	SOR-C 48-60V AC/DC	KXTASORCFPC	1	0.14
		Normally NON energized	SOR-C 110-127V AC / 110-125V DC	KXTASORCFPD	1	0.14
		Normally NON energized	SOR-C 220-240V AC / 220-250V DC	KXTASORCFPE	1	0.14
		Normally NON energized	SOR-C 380-440V AC	KXTASORCFPF	1	0.14
		Normally NON energized	SOR-C 480-525V AC	KXTASORCFPG	1	0.14

Undervoltages releases - mountable inside the breaker on the left slot (cabled version)

MS5100,		Normally energized	UVR-C 24-30V AC/DC	KXTAUVRCFP1	1	0.14
MO5100		Normally energized	UVR-C 48V AC/DC	KXTAUVRCFP2	1	0.14
		Normally energized	UVR-C 60V AC/DC	KXTAUVRCFP3	1	0.14
		Normally energized	UVR-C 110-127V AC / 110-125V DC	KXTAUVRCFP4	1	0.14
		Normally energized	UVR-C 220-240V AC / 220-250V DC	KXTAUVRCFP5	1	0.14
		Normally energized	UVR-C 380-440V AC	KXTAUVRCFP6	1	0.14
		Normally energized	UVR-C 480-525V AC	KXTAUVRCFP7	1	0.14

Suitable for	Description	Type	Order code	Pkg qty	Weight (1 pc)
				pcs	kg

Key locks

MS5100	Key lock on the circuit breaker, different keys, removable in open position	KLC Ronis	KXTCKLCCBDIF	1	NA
MO5100	Key lock on the circuit breaker, different keys, removable in open position	KLC Ronis	KXT1KLCCBDIF	1	NA

2

General accessories

MS116, MS132, MO132, MS165, MO165, MS5100, MO5100



MSHD-LB



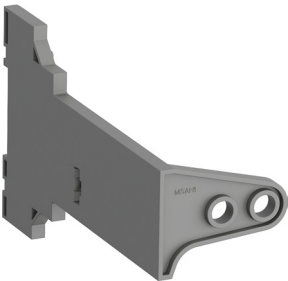
MSHD-LY



MSMN



MSH-AR



MSAH1



RHD Normal Direct Handle

Description

With this solution of door coupling rotary mechanism it is possible to operate a manual motor starter in the back of a switch cabinet from outside. The door coupling mechanism prevents opening of the door of a switch cabinet with the manual motor starter in ON position.

The complete mechanism includes handle, shaft, driver, shaft alignment ring and shaft supporter.

Most accessories fit for 6 mm shafts with a maximum length of 180 mm. The degree of protection for handles MSHD is UL/CSA Type 1, 3R, 12.

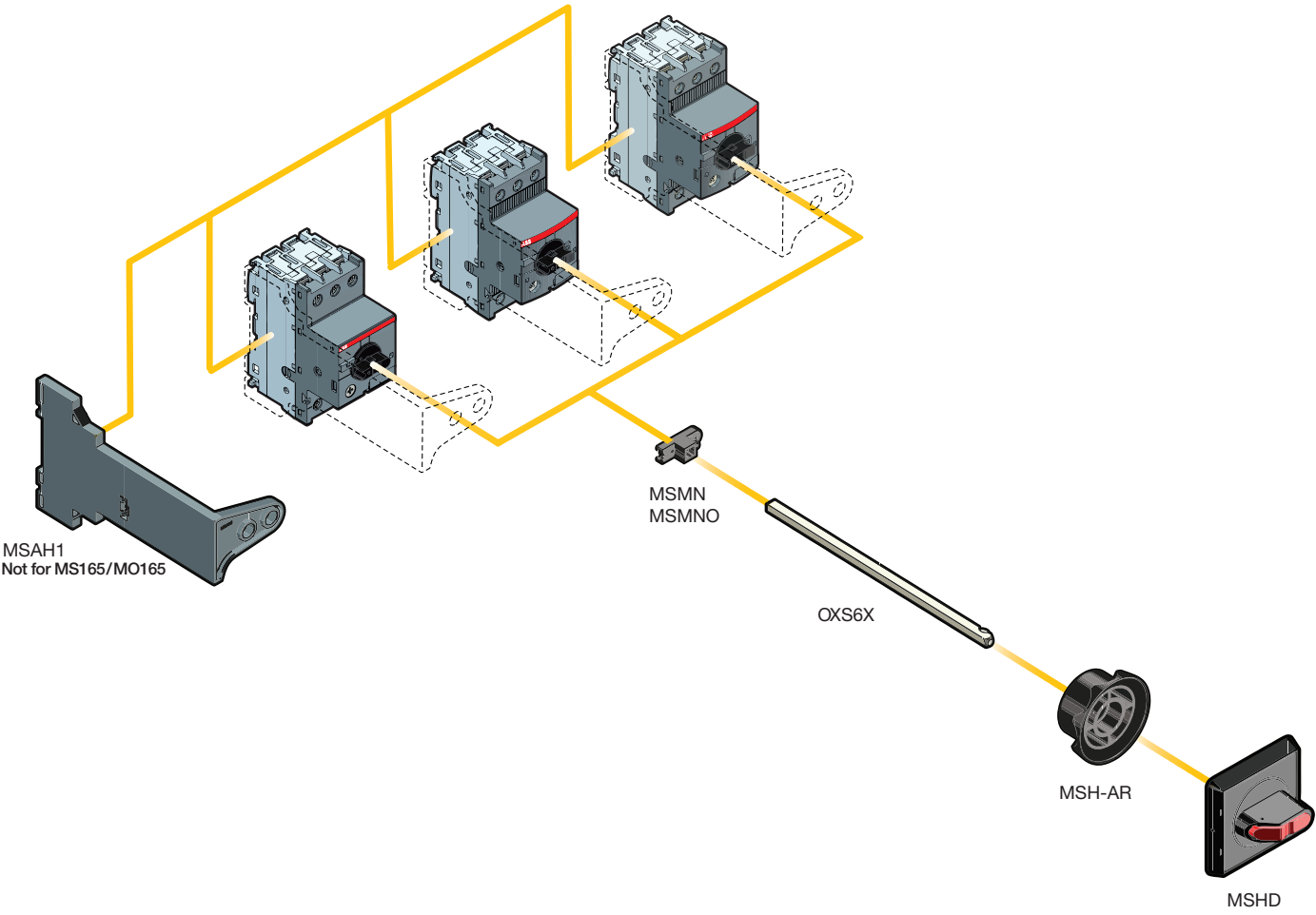
Ordering details

Suitable for	Description	Shaft length mm	Color	Order code	Pkg qty pcs	Weight (1 pc) kg
Shafts						
MS116, MS132, MO132, MS165, MO165	For MSHD handles. Shaft diameter 6 mm. Shaft extension for door coupling driver.	85		OXS6X85	1	0.02
		105		OXS6X105	1	0.02
		130		OXS6X130	1	0.03
		180		OXS6X180	1	0.04
UL/CSA Type 1, 3R, 12 handles						
MS116, MS132, MO132, MS165, MO165	Padlockable max. 3 padlocks with bail diameter 5 ... 8 mm, door interlock in ON position defeatable, for use with 6 mm OXS6...types up to 180 mm or driver shafts MSOX.		Black	MSHD-LB ¹⁾	1	0.07
			Yellow	MSHD-LY ¹⁾	1	0.07
			Black	MSHD-LTB ²⁾	1	0.07
			Yellow	MSHD-LTY ²⁾	1	0.07
Driver						
MS116, MS132, MO132, MS165, MO165	Coupling driver for use with 6 mm OXS6... types up to 180 mm.			MS132-MSMN ³⁾	1	0.01
					MS132-MSMNO ⁴⁾	1
Shaft alignment ring						
MS116, MS132, MO132, MS165, MO165	The MSH-AR supports the long shafts for alignment to the handle inlet. It makes closing panel doors more easy. Use for OXS6X > 105 mm.			OHZX11	1	0.01
Shaft supporter						
MS116, MS132, MO132	With the MSAH it is possible to support the shaft in the extension of handle (MSHD). It is mandatory for the usage of shafts >130 mm.			MSAH1	1	0.04
Rotary handle operating mechanism						
MS5100	Rotary handle operating mechanism			KXTCRHDSTFP	1	0.40
MO5100	Rotary handle operating mechanism			KXTBRHDSTFP	1	0.40

- 1) Indication I-O and ON-OFF (recommended for MS116)
2) Indication I-O and ON-OFF + Trip indication
3) Coded - Positioning of ON indication dependent from mounting orientation of the MMS
4) Uncoded - Positioning of ON indication independent from mounting orientation of the MMS

General accessories

MS116, MS132, MO132, MS165, MO165



20CD24202JF0013

Technical data

MS116, MS132, MS165, MO132, MO165, MS132-T

Main circuit – Utilization characteristics according to UL/CSA

2

Type	MS116	MS132	MS165	MO132	MO165	MS132-T
Standards	UL 60947-1, UL 60947-4-1 (UL 508), CSA C22.2 No.60947-4-1 (CSA C22.2 No.14)					-
Rated operational voltage U _e acc. to UL/CSA	600 V AC					-
Trip class	10A	10		-		-
Motor ratings ¹⁾	Horsepower	See table "Motor ratings, three-phase"				-
	Full Load Amps (FLA)	See table "Motor ratings, three-phase"				-
	Locked Rotor Amps (LRA)	See table "Motor ratings, three-phase"				-

1) See product data sheets for UL/CSA single-phase motor and general use (AC-1) ratings.

UL/CSA ratings overview

Type	MS116	MS132	MS165	MO132	MO165	MS132-T
Manual Motor Controller	x	x	x	x	x	-
Manual Motor Controller, Suitable as Motor Disconnect	x	x	x	x	x	-
Manual Motor Controller, Suitable for use in Group Installations	x	x	x	x	x	-
Manual Motor Controller, Suitable for Tap Conductor Protection in Group Installations	-	x	x	x	x	-
Manual self-protected Combination Motor Controller (Type E)	-	x	x	-	-	-
Combination Motor Controller (Type F)	-	with AF contactor	with AF contactor	with AF contactor and EOL	-	-

Main circuit – Utilization characteristics according to IEC/EN

Type	MS116	MS132	MS165	MO132	MO165	MS132-T
Standards	IEC/EN 60947-2, IEC/EN 60947-4-1, IEC/EN 60947-1					
Rated operational voltage U _e	690 V AC	690 V AC / 250 V DC	690 V AC	690 V AC	690 V AC	690 V AC
Rated frequency	50/60 Hz	DC, 50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Trip class	10A	10	10	-	-	10
Number of poles	3					
Duty time	100 %					
Mechanical durability	100000 cycles	100000 cycles	50000 cycles	100000 cycles	50000 cycles	100000 cycles
Electrical durability	up to 16 A	100000 cycles	25000 cycles	50000 cycles	25000 cycles	50000 cycles
	20 ... 65 A	50000 cycles	25000 cycles	50000 cycles	25000 cycles	50000 cycles
Rated impulse withstand voltage U _{imp}	6 kV	6 kV	8 kV	6 kV	8 kV	6 kV
Rated insulation voltage U _i	690 V	690 V	1000 V	690 V	1000 V	690 V
Rated operational current I _e	See ordering details					

Technical data

MS116, MS132, MS165, MO132, MO165, MS132-T

UL/CSA Motor ratings, three-phase – MS116

Type	200 V AC			208 V AC			220 ... 240 V AC			440 ... 480 V AC			550 ... 600 V AC		
	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA
MS116-0.16	-	0.16	0.96	-	0.16	0.96	-	0.16	0.96	-	0.16	0.96	-	0.16	0.96
MS116-0.25	-	0.25	1.5	-	0.25	1.5	-	0.25	1.5	-	0.25	1.5	-	0.25	1.5
MS116-0.40	-	0.4	2.4	-	0.4	2.4	-	0.4	2.4	-	0.4	2.4	-	0.4	2.4
MS116-0.63	-	0.63	3.78	-	0.63	3.78	-	0.63	3.78	-	0.63	3.78	-	0.63	3.78
MS116-1.0	-	1	6	-	1	6	-	1	6	-	1	6	1/2	1	6
MS116-1.6	-	1.6	9.6	-	1.6	9.6	-	1.6	9.6	3/4	1.6	9.6	3/4	1.6	9.6
MS116-2.5	1/2	2.5	15	1/2	2.5	15	1/2	2.5	15	1	2.5	15	1 1/2	2.5	15
MS116-4.0	3/4	4	24	3/4	4	24	1	4	24	2	4	24	3	3.9	25.6
MS116-6.3	1	6.3	37.8	1	6.3	37.8	1 1/2	6.3	37.8	3	4.8	32	5	6.1	36.8
MS116-10	2	7.8	57.5	2	7.5	55	3	9.6	64	5	7.6	46	7 1/2	9	50.8
MS116-12	3	11	73.6	3	10.6	71	3	9.6	64	7 1/2	11	63.5	10	11	64.8
MS116-16	3	11	73.6	3	10.6	71	5	15.2	92	10	14	81	10	11	64.8
MS116-20	5	17.5	105.8	5	16.7	102	5	15.2	92	10	14	81	15	17	93
MS116-25	5	17.5	105.8	7 1/2	24.2	140	7 1/2	22	127	15	21	116	20	22	116
MS116-32	7 1/2	25.3	146	10	30.8	179	10	28	162	20	27	145	25	27	146

UL/CSA Motor ratings, three-phase – MS132

Type	200 V AC			208 V AC			220 ... 240 V AC			440 ... 480 V AC			550 ... 600 V AC		
	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA
MS132-0.16	-	0.16	0.96	-	0.16	0.96	-	0.16	0.96	-	0.16	0.96	-	0.16	0.96
MS132-0.25	-	0.25	1.5	-	0.25	1.5	-	0.25	1.5	-	0.25	1.5	-	0.25	1.5
MS132-0.40	-	0.4	2.4	-	0.4	2.4	-	0.4	2.4	-	0.4	2.4	-	0.4	2.4
MS132-0.63	-	0.63	3.78	-	0.63	3.78	-	0.63	3.78	-	0.63	3.78	-	0.63	3.78
MS132-1.0	-	1	6	-	1	6	-	1	6	-	1	6	1/2	1	6
MS132-1.6	-	1.6	9.6	-	1.6	9.6	-	1.6	9.6	3/4	1.6	9.6	3/4	1.6	9.6
MS132-2.5	1/2	2.5	15	1/2	2.5	15	1/2	2.5	15	1	2.5	15	1-1/2	2.5	15
MS132-4.0	3/4	4	24	3/4	4	24	1	4	24	2	4	24	3	3.9	25.6
MS132-6.3	1	6.3	37.8	1	6.3	37.8	1 1/2	6.3	37.8	3	4.8	32	5	6.1	36.8
MS132-10	2	7.8	57.5	2	7.5	55	3	9.6	64	5	7.6	46	7 1/2	9	50.8
MS132-12	3	11	73.6	3	10.6	71	3	9.6	64	7 1/2	11	63.5	10	11	64.8
MS132-16	3	11	73.6	3	10.6	71	5	15.2	92	10	14	81	10	11	64.8
MS132-20	5	17.5	105.8	5	16.7	102	5	15.2	92	10	14	81	15	17	93
MS132-25	5	17.5	105.8	7 1/2	24.2	140	7 1/2	22	127	15	21	116	20	22	116
MS132-32	7 1/2	25.3	146	10	30.8	179	10	28	162	20	27	145	25	27	146

UL/CSA Motor ratings, three-phase – MS165

Type	200 V AC			208 V AC			220 ... 240 V AC			440 ... 480 V AC			550 ... 600 V AC		
	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA
MS165-16	3	11	73.6	3	10.6	71	5	15.2	92	10	14	81	10	11	64.8
MS165-20	5	17.5	105.8	5	16.7	102	5	15.2	92	10	14	81	15	17	93
MS165-25	5	17.5	105.8	7 1/2	24.2	140	7 1/2	22	127	15	21	116	20	22	116
MS165-32	7 1/2	25.3	146	10	30.8	179	10	28	162	20	27	145	30	32	174
MS165-42	10	32.2	186.3	10	30.8	179	15	42	232	30	40	218	40	41	232
MS165-54	15	48.3	267	15	46.2	257	20	54	290	40	52	290	50	52	290
MS165-65	20	62.1	334	20	59.4	321	20	54	290	50	65	363	60	62	348

hp Horsepower
FLA Full Load Amps
LRA Locked Rotor Amps

Note: Manual motor starters should always be selected so that the actual motor current is within the setting range; see ordering detail pages. Horsepower (hp) ratings are for reference only.

Technical data

MS116, MS132, MS165, MO132, MO165, MS132-T

UL/CSA Motor ratings, three-phase – MO132

Type	200 V AC			208 V AC			220 ... 240 V AC			440 ... 480 V AC			550 ... 600 V AC		
	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA
MO132-0.16	-	0.16	0.96	-	0.16	0.96	-	0.16	0.96	-	0.16	0.96	-	0.16	0.96
MO132-0.25	-	0.25	1.5	-	0.25	1.5	-	0.25	1.5	-	0.25	1.5	-	0.25	1.5
MO132-0.40	-	0.4	2.4	-	0.4	2.4	-	0.4	2.4	-	0.4	2.4	-	0.4	2.4
MO132-0.63	-	0.63	3.78	-	0.63	3.78	-	0.63	3.78	-	0.63	3.78	-	0.63	3.78
MO132-1.0	-	1	6	-	1	6	-	1	6	-	1	6	1/2	1	6
MO132-1.6	-	1.6	9.6	-	1.6	9.6	-	1.6	9.6	3/4	1.6	9.6	3/4	1.6	9.6
MO132-2.5	1/2	2.5	15	1/2	2.5	15	1/2	2.5	15	1	2.5	15	1 1/2	2.5	15
MO132-4.0	3/4	4	24	3/4	4	24	1	4	24	2	4	24	3	3.9	25.6
MO132-6.3	1	6.3	37.8	1	6.3	37.8	1 1/2	6.3	37.8	3	4.8	32	5	6.1	36.8
MO132-10	2	7.8	57.5	2	7.5	55	3	9.6	64	5	7.6	46	7 1/2	9	50.8
MO132-12	3	11	73.6	3	10.6	71	3	9.6	64	7 1/2	11	63.5	10	11	64.8
MO132-16	3	11	73.6	3	10.6	71	5	15.2	92	10	14	81	10	11	64.8
MO132-20	5	17.5	105.8	5	16.7	102	5	15.2	92	10	14	81	15	17	93
MO132-25	5	17.5	105.8	7 1/2	24.2	140	7 1/2	22	127	15	21	116	20	22	116
MO132-32	7 1/2	25.3	146	10	30.8	179	10	28	162	20	27	145	25	27	146

UL/CSA Motor ratings, three-phase – MO165

Type	200 V AC			208 V AC			220 ... 240 V AC			440 ... 480 V AC			550 ... 600 V AC		
	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA
MO165-16	3	11	73.6	3	10.6	71	5	15.2	92	10	14	81	10	11	64.8
MO165-20	5	17.5	105.8	5	16.7	102	5	15.2	92	10	14	81	15	17	93
MO165-25	5	17.5	105.8	7 1/2	24.2	140	7 1/2	22	127	15	21	116	20	22	116
MO165-32	7 1/2	25.3	146	10	30.8	179	10	28	162	20	27	145	30	32	174
MO165-42	10	32.2	186.3	10	30.8	179	15	42	232	30	40	218	40	41	232
MO165-54	15	48.3	267	15	46.2	257	20	54	290	40	52	290	50	52	290
MO165-65	20	62.1	334	20	59.4	321	20	54	290	50	65	363	60	62	348

hp Horsepower
FLA Full Load Amps
LRA Locked Rotor Amps

Technical data

MS116, MS132, MS165, MO132, MO165, MS132-T

UL/CSA Maximum short-circuit current ratings – MS116

Type	Manual Motor Controllers					
	Branch circuit protection, max. size per NEC/CEC ¹⁾		for motor disconnect ²⁾		for group installations	
	Fuses	Circuit breaker	480 V	600 V	480 V	600 V
	A	A	kA	kA	kA	kA
MS116-0.16	100	-	30	5	30	5
MS116-0.25	100	-	30	5	30	5
MS116-0.40	100	-	30	5	30	5
MS116-0.63	100	-	30	5	30	5
MS116-1.0	100	-	30	5	30	5
MS116-1.6	100	-	30	5	30	5
MS116-2.5	100	-	30	5	30	5
MS116-4.0	100	-	18	5	18	5
MS116-6.3	100	-	18	5	18	5
MS116-10	100	-	18	5	18	5
MS116-12	100	-	18	5	18	5
MS116-16	100	-	18	5	18	5
MS116-20	100	-	18	5	18	5
MS116-25	100	-	18	5	18	5
MS116-32	100	-	18	5	18	5

¹⁾ NEC: NFPA®70 National Electrical Code®; CEC: CSA C22.1 Canadian Electrical Code.

²⁾ Suitable as motor disconnect only when provide with padlock adaptor SA1 or SA3.

UL/CSA Maximum short-circuit current ratings – MS132

Type	Manual Motor Controllers		for motor disconnect		for group installations		for tap conductor protection in group installations		Manual self-protected Combination Motor Controllers (Type E)2)	
	Branch circuit protection, max. size per NEC/CEC ¹⁾									
	Fuses	Circuit breaker	480 V	600 V	480 V	600 V	480 V	600 V	480Y / 277 V	600Y / 347 V
	A	A	kA	kA	kA	kA	kA	kA	kA	kA
MS132-0.16	Any Listed fuses. Size per NEC/CEC	Any Listed UL489 / CSA C22.2 No.5 circuit breaker. Size per NEC/CEC	65	47	65	47	65	47	65	47
MS132-0.25			65	47	65	47	65	47	65	47
MS132-0.40			65	47	65	47	65	47	65	47
MS132-0.63			65	47	65	47	65	47	65	47
MS132-1.0			65	47	65	47	65	47	65	47
MS132-1.6			65	47	65	47	65	47	65	47
MS132-2.5			65	47	65	47	65	47	65	47
MS132-4.0			65	47	65	47	65	47	65	47
MS132-6.3			65	18	65	35	65	18	65	18
MS132-10			65	18	65	35	65	18	65	18
MS132-12			30	18	35	35	30	18	30	-
MS132-16			30	18	35	35	30	18	30	-
MS132-20			30	18	35	35	30	18	30	-
MS132-25			30	18	35	35	30	18	30	-
MS132-32			30	18	35	35	30	18	30	-

¹⁾ NEC: NFPA®70 National Electrical Code®; CEC: CSA C22.1 Canadian Electrical Code.

²⁾ Requires the use of S1-M3-xx line-side terminal feeder block.

Technical data

MS116, MS132, MS165, MO132, MO165, MS132-T

UL/CSA Maximum short-circuit current ratings – MS132/MO132 with AF contactors

Type	Combination Motor Controllers (Type F) ¹⁾			Type	Combination Motor Controllers (Type F) ¹⁾			
	Minimum contactor size	480Y / 277 V kA	600Y / 347 V kA		Minimum contactor Size	TOL	480Y / 277 V kA	600Y / 347 V kA
MS132-0.16	AF09	100	50	MO132-0.16	AF09	TF42	65	50
MS132-0.25	AF09	100	50	MO132-0.25	AF09	TF42	65	50
MS132-0.40	AF09	100	50	MO132-0.40	AF09	TF42	65	50
MS132-0.63	AF09	100	50	MO132-0.63	AF09	TF42	65	50
MS132-1.0	AF09	100	50	MO132-1.0	AF09	TF42	65	50
MS132-1.6	AF09	100	50	MO132-1.6	AF09	TF42	65	50
MS132-2.5	AF09	100	50	MO132-2.5	AF09	TF42	65	50
MS132-4.0	AF09	100	50	MO132-4.0	AF09	TF42	65	50
MS132-6.3	AF09	100	47	MO132-6.3	AF09	TF42	65	47
MS132-10	AF09	100	30	MO132-10	AF09	TF42	65	30
MS132-12	AF09	65	30	MO132-12	AF09	TF42	65	30
MS132-16	AF12	65	30	MO132-16	AF12	TF42	65	30
MS132-20	AF26	65	-	MO132-20	AF16	TF42	65	30
MS132-25	AF26	50	-	MO132-25	AF26	TF42	50	30
MS132-32	AF38	50	-	MO132-32	AF38	TF42	50	30

¹⁾ Requires the use of S1-M3-xx line-side terminal feeder block.

UL/CSA Maximum short-circuit current ratings – MS165

Type	Manual Motor Controllers								Manual self-protected Combination Motor Controllers (Type E)	
	Branch circuit protection, max. size per NEC/CEC ¹⁾		for motor disconnect		for group installations		for tap conductor protection in group installations		480Y / 277 V kA	600Y / 347 V kA
	Fuses A	Circuit breaker A	480 V kA	600 V kA	480 V kA	600 V kA	480 V kA	600 V kA		
MS165-16	Any Listed fuses. Size per NEC/CEC	Any Listed UL489 / CSA C22.2 No.5 circuit breaker. Size per NEC/CEC	65	30	65	30	65	30	65	30
MS165-20			65	30	65	30	65	30	65	30
MS165-25			65	30	65	30	65	30	65	30
MS165-32			65	30	65	30	65	30	65	30
MS165-42			65	30	65	30	65	30	65	-
MS165-54			65	30	65	30	65	30	65	-
MS165-65			65	30	65	30	65	30	65	-

¹⁾ NEC: NFPA®70 National Electrical Code®; CEC: CSA C22.1 Canadian Electrical Code.

UL/CSA Maximum short-circuit current ratings – MS165/MO165 with AF contactors

Type	Combination Motor Controllers (Type F)			Type	Combination Motor Controllers (Type F)			
	Minimum contactor size	480Y / 277 V	600Y / 347 V		Minimum contactor Size	TOL	480Y / 277 V	600Y / 347 V
		kA	kA				kA	kA
MS165-16	AF09	65	50	MO165-16	AF26	TF42	65	50
MS165-20	AF26	65	50	MO165-20	AF26	TF42	65	50
MS165-25	AF26	65	50	MO165-25	AF26	TF42	65	50
MS165-32	AF26	65	50	MO165-32	AF26	TF42	65	50
MS165-42	AF40	65	-	MO165-42	-	-	-	-
MS165-54	AF40	65	-	MO165-54	-	-	-	-
MS165-65	AF40	65	-	MO165-65	-	-	-	-

Technical data

MS116, MS132, MS165, MO132, MO165, MS132-T

UL/CSA Maximum short-circuit current ratings – MO132

Type	Manual Motor Controllers		for motor disconnect		for group installations		for tap conductor protection in group installations	
	Branch circuit protection, max. size per NEC/CEC1)							
	Fuses	Circuit breaker	480 V	600 V	480 V	600 V	480 V	600 V
	A	A	kA	kA	kA	kA	kA	kA
MO132-0.16	Any Listed fuses. Size per NEC/ CEC	Any Listed UL489 / CSA C22.2 No.5 circuit breaker. Size per NEC/ CEC	65	47	65	47	65	47
MO132-0.25			65	47	65	47	65	47
MO132-0.40			65	47	65	47	65	47
MO132-0.63			65	47	65	47	65	47
MO132-1.0			65	47	65	47	65	47
MO132-1.6			65	47	65	47	65	47
MO132-2.5			65	47	65	47	65	47
MO132-4.0			65	47	65	47	65	47
MO132-6.3			65	18	65	35	65	18
MO132-10			65	18	65	35	65	18
MO132-12			30	18	35	35	30	18
MO132-16			30	18	35	35	30	18
MO132-20			30	18	35	35	30	18
MO132-25			30	18	35	35	30	18
MO132-32			30	18	35	35	30	18

¹⁾ NEC: NFPA®70 National Electrical Code®; CEC: CSA C22.1 Canadian Electrical Code.

UL/CSA Maximum short-circuit current ratings – MO165

Type	Manual Motor Controllers		for motor disconnect		for group installations		for tap conductor protection in group installations	
	Branch circuit protection, max. size per NEC/CEC1)							
	Fuses	Circuit breaker	480 V	600 V	480 V	600 V	480 V	600 V
	A	A	kA	kA	kA	kA	kA	kA
MO165-16	Any Listed fuses. Size per NEC/ CEC	Any Listed UL489 / CSA C22.2 No.5 circuit breaker. Size per NEC/ CEC	65	30	65	30	65	30
MO165-20			65	30	65	30	65	30
MO165-25			65	30	65	30	65	30
MO165-32			65	30	65	30	65	30
MO165-42			65	30	65	30	65	30
MO165-54			65	30	65	30	65	30
MO165-65			65	30	65	30	65	30

¹⁾ NEC: NFPA®70 National Electrical Code®; CEC: CSA C22.1 Canadian Electrical Code.

Technical data

MS116, MS132, MS165, MO132, MO165, MS132-T

General technical data

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Type	MS116	MS132	MS165	MO132	MO165	MS132-T
Pollution degree	3	3	3	3	3	3
Phase loss sensitivity	Yes	Yes	Yes	No	No	Yes
Disconnect function acc. to IEC/EN 60947-2	Yes	Yes	Yes	Yes	Yes	Yes
Ambient air temperature						
Operation	Open - compensated	-25 ... +55 °C	-25 ... +60 °C	-25 ... +60 °C	-	-25 ... +60 °C
	Open	-25 ... +70 °C	-25 ... +70 °C	-25 ... +60 °C	-25 ... +60 °C	-25 ... +70 °C
	Enclosed (IB132)	0 ... +40 °C	0 ... +40 °C	-	-	0 ... +40 °C
Storage	-50 ... +80 °C	-50 ... +80 °C	-50 ... +80 °C	-50 ... +80 °C	-50 ... +80 °C	-50 ... +80 °C
Ambient air temperature compensation	Acc. to IEC/EN60947-4-1	Acc. to IEC/EN60947-4-1	Acc. to IEC/EN60947-4-1	-	-	Acc. to IEC/EN60947-4-1
Maximum operating altitude permissible	2000 m	2000 m	2000 m	2000 m	2000 m	2000 m
Resistance to shock acc. to IEC 60068-2-27	25g / 11 ms	25g / 11 ms	25g / 11 ms	25g / 11 ms	25g / 11 ms	25g / 11 ms
Resistance to vibrations acc. to IEC 60068-2-6	5g / 3 ... 150 Hz	5g / 3 ... 150 Hz	5g / 3 ... 150 Hz	5g / 3 ... 150 Hz	5g / 3 ... 150 Hz	5g / 3 ... 150 Hz
Mounting position						
Mounting	Position 1-6 (optional for single mounting)	Position 1-6 (optional for single mounting)	Position 1-6 (optional for single mounting)	Position 1-6 (optional for single mounting)	Position 1-6 (optional for single mounting)	Position 1-6 (optional for single mounting)
Group mounting	DIN-rail (EN 60715)	DIN-rail (EN 60715)	DIN-rail (EN 60715)	DIN-rail (EN 60715)	DIN-rail (EN 60715)	DIN-rail (EN 60715)
Minimum distance to other units same type	On request	On request	On request	On request	On request	-
Minimum distance to electrical conductive board	Horizontal	0 mm	0 mm	0 mm	0 mm	0 mm
	Vertical	150 mm	150 mm	150 mm	150 mm	150 mm
	Horizontal, up to 400 V	0 mm	0 mm	0 mm	0 mm	0 mm
	Horizontal, up to 690 V	> 1.5 mm	> 1.5 mm	> 1.5 mm	> 1.5 mm	> 1.5 mm
Degree of protection	Vertical	75 mm	75 mm	75 mm	75 mm	75 mm
	Housing	IP20	IP20	IP20	IP20	IP20
	Main circuit terminals	IP20	IP20	IP10	IP10	IP20

Connecting characteristics

Main circuit

Type	MS116 ≤ 16 A	MS116 ≥ 20 A
Connecting capacity		
 Rigid	1 or 2 x 1 ... 4 mm ²	2.5 ... 6 mm ²
 Flexible with ferrule	1 or 2 x 0.75 ... 2.5 mm ²	1 ... 6 mm ²
 Flexible with insulated ferrule	1 or 2 x 0.75 ... 2.5 mm ²	1 ... 6 mm ²
 Flexible	1 or 2 x 0.75 ... 2.5 mm ²	1 ... 6 mm ²
Stranded acc. to UL/CSA	1 or 2 x AWG 16-12	AWG 16-8
Stripping length	9 mm	10 mm
Tightening torque	0.8 ... 1.2 Nm / 10 ... 12 lb.in	2.0 Nm / 18 lb.in
Recommended screw driver	Pozidriv 2	Pozidriv 2

Main circuit

Type	MS132 ≤ 10 A	MS132 ≥ 12 A
Connecting capacity		
 Rigid	1 or 2 x 1 ... 4 mm ²	1 ... 2.5 mm ² 2.5 ... 6 mm ²
 Flexible with ferrule	1 or 2 x 0.75 ... 2.5 mm ²	0.75 ... 6 mm ²
 Flexible with insulated ferrule	1 or 2 x 0.75 ... 2.5 mm ²	0.75 ... 6 mm ²
 Flexible	1 or 2 x 0.75 ... 2.5 mm ²	1 ... 2.5 mm ² 2.5 ... 6 mm ²
Stranded acc. to UL/CSA	1 or 2 x AWG 16-12	AWG 16-8
Stripping length	9 mm	10 mm
Tightening torque	0.8 ... 1.2 Nm / 10 ... 12 lb.in	2.0 Nm / 18 lb.in
Recommended screw driver	Pozidriv 2	Pozidriv 2

Technical data

MS116, MS132, MS165, MO132, MO165, MS132-T

Connecting characteristics

Main circuit	
Type	MS165
Connecting capacity	
 Rigid	1 or 2 x 1 ... 50 mm ²
 Flexible with ferrule	1 or 2 x 1 ... 35 mm ²
 Flexible with insulated ferrule	1 or 2 x 1 ... 35 mm ²
 Flexible	1 or 2 x 1 ... 35 mm ²
Stranded acc. to UL/CSA	1 or 2 x AWG 16-3
Stripping length	16 mm
Tightening torque	4.0 Nm / 35 lb.in
Recommended screw driver	Pozidriv 2

Main circuit			
Type		MO132 ≤ 10 A	MO132 ≥ 12 A
Connecting capacity			
	Rigid	1 or 2 x	1 ... 4 mm²
			1 ... 2.5 mm² 2.5 ... 6 mm²
	Flexible with ferrule	1 or 2 x	0.75 ... 2.5 mm²
			0.75 ... 6 mm²
	Flexible with insulated ferrule	1 or 2 x	0.75 ... 2.5 mm²
			0.75 ... 6 mm²
	Flexible	1 or 2 x	0.75 ... 2.5 mm²
			1 ... 2.5 mm² 2.5 ... 6 mm²
	Stranded acc. to UL/CSA	1 or 2 x	AWG 16-12
			AWG 16-8
Stripping length		9 mm	10 mm
Tightening torque		0.8 ... 1.2 Nm / 10 ... 12 lb.in	2.0 Nm / 18 lb.in
Recommended screw driver		Pozidriv 2	Pozidriv 2

Main circuit	
Type	MO165
Connecting capacity	
 Rigid	1 or 2 x 1 ... 50 mm ²
 Flexible with ferrule	1 or 2 x 1 ... 35 mm ²
 Flexible with insulated ferrule	1 or 2 x 1 ... 35 mm ²
 Flexible	1 or 2 x 1 ... 35 mm ²
Stranded acc. to UL/CSA	1 or 2 x AWG 16-3
Stripping length	16 mm
Tightening torque	4.0 Nm / 35 lb.in
Recommended screw driver	Pozidriv 2

Main circuit				
Type		MS132-T ≤ 10 A	MS132-T ≥ 12 A	
Connecting capacity				
	Rigid	1 or 2 x	1 ... 4 mm²	1/2 x 1 ... 2.5 mm² 1/2 x 2.5 ... 6 mm²
	Flexible with ferrule	1 or 2 x	0.75 ... 2.5 mm²	1/2 x 0.75 ... 6 mm²
	Flexible with insulated ferrule	1 or 2 x	0.75 ... 2.5 mm²	1/2 x 0.75 ... 6 mm²
	Flexible	1 or 2 x	0.75 ... 2.5 mm²	1/2 x 1 ... 2.5 mm² 1/2 x 2.5 ... 6 mm²
Stranded acc. to UL/CSA		1 or 2 x	AWG 16-12	AWG 16-8
Stripping length		9 mm		10 mm
Tightening torque		0.8 ... 1.2 Nm / 10 ... 12 lb.in		2.0 Nm / 18 lb.in
Recommended screw driver		Pozidriv 2		Pozidriv 2

Main accessories

MS116, MS132, MS165, MO132, MO165, MS132-T

General technical data

2

Type	HK1, SK1, CK1		HKF1
Standards	IEC/EN 60947-2, IEC/EN 60947-4-1, IEC/EN 60947-1		
Rated operational voltage Ue	690 V AC / 600 DC		250 V AC / 250 V DC
Conventional free-air thermal current Ith	6 A		5 A
Rated frequency	50/60 Hz		
Rated impulse withstand voltage Uimp	6 kV		
Rated insulation voltage Ui	690 V AC		250 V AC
Pollution degree	3		
Ambient air temperature	Operation	-25 ... +70 °C	
	Storage	-50 ... +80 °C	
Resistance to shock acc. to IEC 60068-2-27	25g / 11 ms		
Resistance to vibrations acc. to IEC 60068-2-6	5g / 3 ... 150 Hz		
Ie / Rated operational current AC-15			
acc. to IEC/EN 60947-5-1 for utilization category			
	24 V, 120 V	6 A	3 A
	240 V	4 A	1.5 A
	400 V	3 A	-
	440 V, 690 V	1 A	-
Ie / Rated operational current DC-13			
acc. to IEC/EN 60947-5-1 for utilization category			
	24 V	2 A	1 A
	125 V	0.55 A	0.27 A
	250 V	0.27 A	0.11 A
	440 V, 600 V	0.15 A	-
Minimum switching capacity	17 V / 5 mA		
Short-circuit protective device	N.C., 95-96	10 A Type gG	
	N.O., 97-98	10 A Type gG	
Duty time	100 %		
Mounting	Right side of MMS / MS132-T		Front of MMS / MS132-T
Mounting positions	1-6		
Mechanical durability	50000 cycles		-
Electrical durability	50000 cycles		-

Contact utilization characteristics according to UL/CSA

Type	HK1, SK1, CK1		HKF1
Standards	UL 60947-1, UL 60947-4-1 (UL 508), CSA C22.2 No.60947-4-1 (CSA C22.2 No.14)		
Rated operational voltage Ue acc. to UL/CSA	600 V AC / 600 V DC		250 V AC / 250 V DC
Pilot duty	A600, Q600		B300, Q300
AC thermal rated current	10 A		5 A
AC maximum volt-ampere making	7200 VA		3600 VA
AC maximum volt-ampere breaking	720 VA		360 VA
DC thermal rated current	2.5 A		2.5 A
DC maximum volt-ampere making-breaking	69 VA		69 VA

Connecting characteristics

Auxiliary circuit

Type	HK1, SK1, CK1		HKF1
Connecting capacity			
 Rigid	1 or 2 x	1 ... 1.5 mm²	1 ... 2.5 mm²
 Flexible with ferrule	1 or 2 x	0.75 ... 1.5 mm²	
 Flexible with insulated ferrule	1 or 2 x	0.75 ... 1.5 mm²	
 Flexible	1 or 2 x	0.75 ... 1.5 mm²	
 Stranded acc. to UL/CSA	1 or 2 x	AWG 16-14	
Stripping length			
		8 mm	
Tightening torque			
		0.8 ... 1.2 Nm / 7 lb.in	
Recommended screw driver			
		Pozidriv 2	

Main accessories

MS116, MS132, MS165, MO132, MO165, MS132-T

General technical data

Type	UA1	AA1
Standards	IEC/EN 60947-1, IEC/EN 60947-4-1, UL 60947-1, UL 60947-4-1 (UL 508), CSA C22.2 No.60947-4-1 (CSA C22.2 No.14)	
Rated control supply voltage	see ordering details	AA1-24: 20-24 V 50/60 Hz; 20-70 V 50/60 Hz KB = 5 s, 20-70 V DC KB = 5 s AA1-100: 110 V 50/60 Hz; 110-200 V 50/60 Hz KB = 5 s, 110-200 V DC KB = 5 s AA1-230: 200-240 V 50/60 Hz, 200-350 V 50/60 Hz KB = 5 s, 200-350 V DC KB = 5 s AA1-400: 350-415 V 50/60 Hz, 350-500 V 50/60 Hz KB = 5 s, 350-500 V DC KB = 5 s
Rated frequency	see ordering details	50/60 Hz, DC
Operating voltage	Tripping 0.35 ... 0.7 x Us Coil operating voltage 0.85 ... 1.1 x Us	0.7 ... 1.1 x Us -
Power consumption	Pull-in	on request
	AC	on request
	DC	on request
	Holding	on request
Rated impulse withstand voltage Uimp	AC	on request
	DC	on request
Rated insulation voltage Ui	6 kV	6 kV
Pollution degree	690 V	690 V
Ambient air temperature	3	3
Operation	-25 ... +60 °C	-25 ... +60 °C
	Storage	-50 ... +80 °C
Resistance to shock acc. to IEC 60068-2-27	25g / 11 ms	25g / 11 ms
Resistance to vibrations acc. to IEC 60068-2-6	5g / 3 ... 150 Hz	5g / 3 ... 150 Hz
Mounting	left side of MMS / MS132-T	left side of MMS / MS132-T
Mounting positions	-	-

Connecting characteristics

Auxiliary circuit

Type	UA1	AA1
Connecting capacity		
 Rigid	1 or 2 x	1 ... 4 mm ²
 Flexible with ferrule	1 or 2 x	0.75 ... 2.5 mm ²
 Flexible with insulated ferrule	1 x	0.75 ... 2.5 mm ²
	2 x	0.75 ... 1.5 mm ²
 Flexible	1 or 2 x	0.75 ... 2.5 mm ²
Stranded acc. to UL/CSA	1 or 2 x	AWG 16-12
Stripping length	10 mm	
Tightening torque	0.8 ... 1.2 Nm / 7 lb.in	
Recommended screw driver	Pozidriv 2	

Main accessories

MS116, MS132, MS165, MO132, MO165

General technical data

2

Type		PS1-xxx-65	PS1-xxx-100	S1-Mx-25	S1-Mx-35
Standards		IEC/EN 60947-4-1, IEC/EN 60947-1, UL 60947-1, UL 60947-4-1 (UL 508), CSA C22.2 No.60947-4-1 (CSA C22.2 No.14)			
Rated operational voltage U_n		690 V			
Rated operational voltage U_n acc. to UL/CSA		600 V AC			
Rated operational current I_n		65 A	100 A	65 A	100 A
Rated operational current I_n acc. to UL/CSA		65 A	92 A	65 A	92 A
Rated frequency		50/60 Hz			
Rated impulse withstand voltage U_{imp}		6 kV			
Rated insulation voltage U_i		690 V AC			
Pollution degree		3			
Cross-section		10 mm²	16 mm²	25 mm²	35 mm²
Ambient air temperature	Operation	-25 ... +70 °C			
	Storage	-50 ... +80 °C			
Resistance to shock acc. to IEC 60068-2-27		25g / 11 ms			
Resistance to vibrations acc. to IEC 60068-2-6		5g / 3 ... 150 Hz			

Electrical connection

Main circuit

Type	S1-Mx-25	S1-Mx-35
Connecting capacity		
 Rigid	1 x 6 ... 25 mm ²	10 ... 35 mm ²
 Flexible with ferrule	1 x 6 ... 16 mm ²	10 ... 35 mm ²
 Flexible with insulated ferrule	1 x 6 ... 16 mm ²	10 ... 35 mm ²
 Flexible	1 x 6 ... 16 mm ²	10 ... 35 mm ²
Stranded acc. to UL/CSA	1 x AWG 10-4	AWG 8-2
Stripping length	10 mm	12 mm
Tightening torque	2.5 Nm / 22 lb.in	4.5 Nm / 40 lb.in
Recommended screw driver	Pozidriv 2	Hexagon SW4

Technical data for PS2-xxx on request.

Technical data

MS5100, MO5100 manual motor starters

Main circuit – Utilization characteristics according to IEC/EN

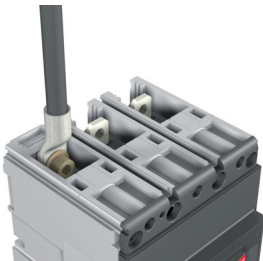
Type	MS5100	MO5100
Standards	IEC/EN 60947-2	IEC/EN 60947-2
Rated operational voltage Ue	690 V AC / 500 V DC	690 V AC / 450 V DC
Rated frequency	50/60 Hz	50/60 Hz
Trip class	3E, 5E, 10E, 20E	–
Number of poles	3	3
Duty time	–	–
Mechanical durability	25000 cycles	25 000 cycles
Electrical durability	8000 cycles	8 000 cycles
Rated impulse withstand voltage Uimp	8 kV	8 kV
Rated insulation voltage Ui	1000 V AC	800 V AC
Rated operational current Ie	See ordering details	
Rated instantaneous short-circuit current setting Ii	See ordering details	

Front terminals - F (UL Listed)

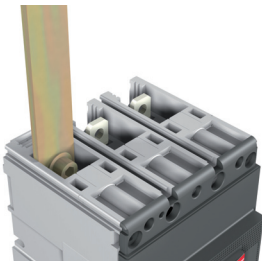
Type	MS5100	MO5100
Vers.	F	F
Busbar dimensions	W min	13 mm
	W max	20 mm
	H	7.5 mm
	Ø	6.5 mm
	D min	2.5 mm
	D max	5 mm
Cable terminals	W	20 mm
	Ø	6.5 mm
Tightening torque	6 Nm / 53.1 lb.in	
Recommended screw driver	M6	



Front terminal - F



F terminal with cable lug



F terminal with busbar

Technical data

MS5100, MO5100 manual motor starters

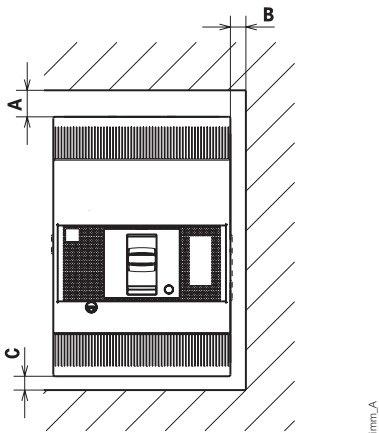
General technical data

2

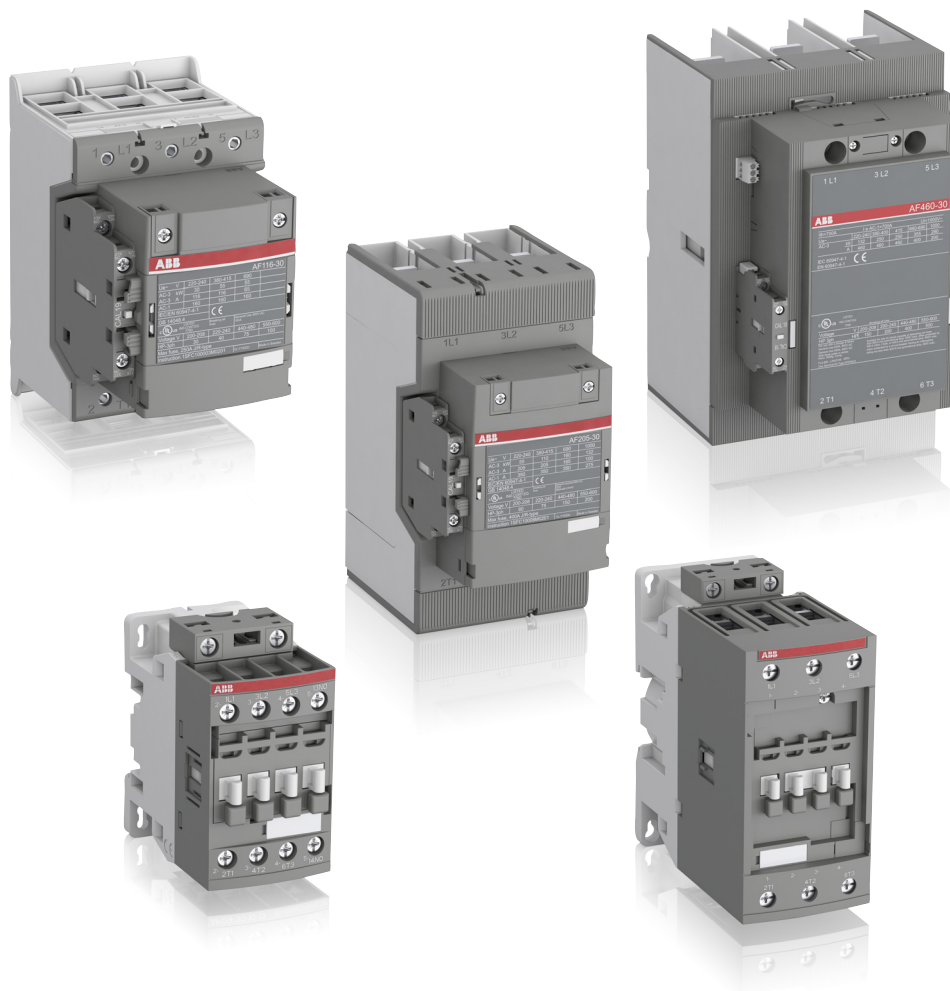
Type	MS5100	MO5100
Pollution degree	–	–
Phase loss sensitivity	–	–
Disconnect function acc. to IEC/EN 60947-2	Yes	Yes
Ambient air temperature		
Operation		
Open - compensated	–	–
Open	-25 ... +70 °C	-25 ... +70 °C
Enclosed	-25 ... +70 °C	-25 ... +70 °C
Storage	-40 ... +70 °C	-40 ... +70 °C
Ambient air temperature compensation	–	–
Maximum operating altitude permissible	2000 m	2000 m
Resistance to shock acc. to IEC 60068-2-27	–	–
Resistance to vibrations acc. to IEC 60068-2-6	–	–
Mounting position	Horizontal, vertical, or lying down position	Horizontal, vertical, or lying down position
Mounting	–	–
Minimum distance to other units same type		
Horizontal	N/A	N/A
Vertical - up to 240 V	N/A	N/A
Vertical - up to 440 V	N/A	N/A
Vertical - up to 500 V	N/A	N/A
Vertical - up to 690 V	N/A	N/A
Vertical	N/A	N/A
Minimum distance to electrical conductive board		
Horizontal	See "Insulation distances for installation in metallic cubicles"	See "Insulation distances for installation in metallic cubicles"
Horizontal - up to 500 V		
Horizontal - up to 690 V		
Vertical - up to 240 V		
Vertical - up to 440 V		
Vertical - up to 500 V		
Vertical - up to 690 V		
Vertical		
Degree of protection		
Housing	IP40 (on the lever)	IP40 (on the lever)
Main circuit terminals	–	–

Insulation distances for installation in metallic cubicles

Manual motor starter	A mm/in	B mm/in	C mm/in
MS5100	90/3.54	45/1.77	90/3.54
MO5100	120/4.72	70/2.76	120/4.72



MS5100, MO5100 insulation distances



AF contactors

AF 3-pole contactors

Contents	3/3
Ordering details 3-pole contactors	3/4
Technical data 3-pole contactors	3/26
Terminal marking and positioning	3/52
Main dimensions	3/55

AF 4-pole contactors

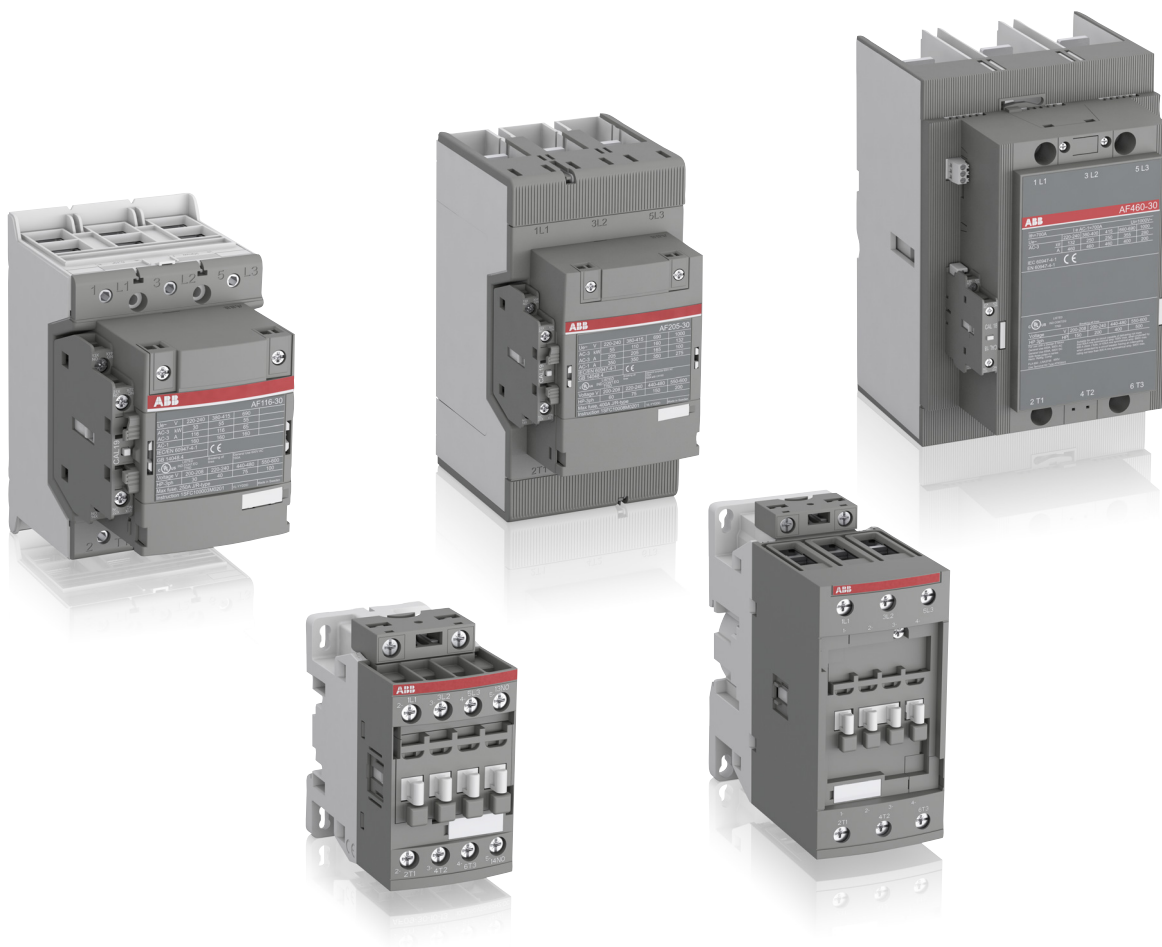
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Ordering details 4-pole contactors	3/90
Technical data 4-pole contactors	3/100
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Contactors for DC switching

Contents	3/129
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Ordering details GA75 ... GAF2050	3/132
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Contactors for lighting load and classic

Lighting, circuit switching	3/154
Welding, contactor	3/155
Drive contactor	3/156



AF 3-pole contactors

Ordering details

7.5 to 75 hp		
AF09 ... AF38	AC / DC operated	3/4
AF09R ... AF38R	AC / DC operated	3/5
AF09Z ... AF38Z	AC / DC operated - low consumption	3/6
AF09ZR ... AF38ZR	AC / DC operated	3/7
AF40 ... AF96	AC / DC operated	3/8
AF40R ... AF96R	AC / DC operated	3/9
Main accessories		3/10

100 to 350 hp		
AF116 ... AF140	AC / DC operated	3/12
AF190 ... AF370	AC / DC operated	3/14
AF116R ... AF140R	AC / DC operated	3/16
AF190R ... AF370R	AC / DC operated	3/17
Main accessories		3/18

400 to 1000 hp		
AF400 ... AF750	AC / DC operated	3/20
AF400R ... AF750R	AC / DC operated	3/21
AF1250 ... AF2650	AC / DC operated	3/22
Nema size AF09N00 ... AF1650N8		3/23
Main accessories		3/24

Technical data	3/26
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Terminal marking and positioning	3/52
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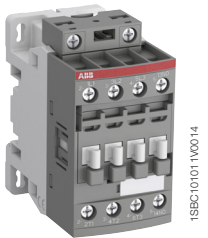
Main dimensions	3/55
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AF09 ... AF38 3-pole contactors

7.5 to 30 HP

AC / DC operated

3



AF09-30-10



AF26-30-00

Description

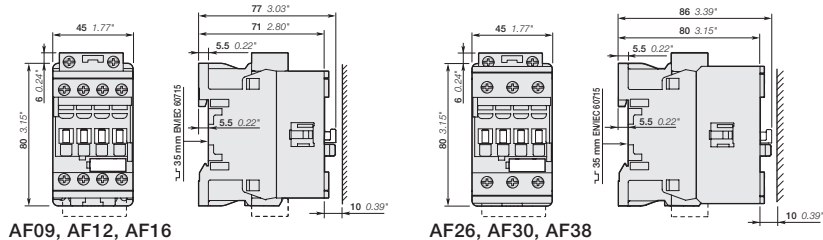
- AF09 ... AF38 contactors are mainly used for controlling 3-phase motors and power circuits up to 600 V AC and 250 V DC. These contactors are of the block type design with 3 main poles.
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening.
 - built-in surge suppression
 - add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

UL/CSA General Purpose rating	Motor rating HP					Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Order code	Weight
	1- phase		3 - phase			V 50/60 Hz	V DC				Pkg (1 pce) kg
A 25	120V	240V	2	5	7.5	24...60	20...60	(1)	1 0	AF09-30-10-11	0.27
									0 1	AF09-30-01-11	0.27
						48...130	48...130		1 0	AF09-30-10-12	0.27
									0 1	AF09-30-01-12	0.27
						100...250	100...250		1 0	AF09-30-10-13	0.27
									0 1	AF09-30-01-13	0.27
28	1	2	3	7.5	10	24...60	20...60	(1)	1 0	AF12-30-10-11	0.27
									0 1	AF12-30-01-11	0.27
						48...130	48...130		1 0	AF12-30-10-12	0.27
									0 1	AF12-30-01-12	0.27
						100...250	100...250		1 0	AF12-30-10-13	0.27
									0 1	AF12-30-01-13	0.27
30	1.5	3	5	10	15	24...60	20...60	(1)	1 0	AF16-30-10-11	0.27
									0 1	AF16-30-01-11	0.27
						48...130	48...130		1 0	AF16-30-10-12	0.27
									0 1	AF16-30-01-12	0.27
						100...250	100...250		1 0	AF16-30-10-13	0.27
									0 1	AF16-30-01-13	0.27
45	2	3	7.5	15	20	24...60	20...60	(1)	0 0	AF26-30-00-11	0.31
									0 0	AF26-30-00-12	0.31
						48...130	48...130		0 0	AF26-30-00-13	0.31
									0 0	AF26-30-00-14	0.35
						100...250	100...250		0 0	AF30-30-00-11	0.31
									0 0	AF30-30-00-12	0.31
50	2	5	10	20	25	24...60	20...60	(1)	0 0	AF30-30-00-11	0.31
									0 0	AF30-30-00-12	0.31
						48...130	48...130		0 0	AF30-30-00-13	0.31
									0 0	AF30-30-00-14	0.35
						100...250	100...250		0 0	AF38-30-00-11	0.31
									0 0	AF38-30-00-12	0.31
50	2	5	10	25	30	24...60	20...60	(1)	0 0	AF38-30-00-11	0.31
									0 0	AF38-30-00-12	0.31
						48...130	48...130		0 0	AF38-30-00-13	0.31
									0 0	AF38-30-00-14	0.35

(1) AF...30-...-11 not suitable for direct control by PLC-output.

Main dimensions mm, inches



AF09R ... AF38R 3-pole reversing contactors

7.5 to 30 HP

AC / DC operated

Description

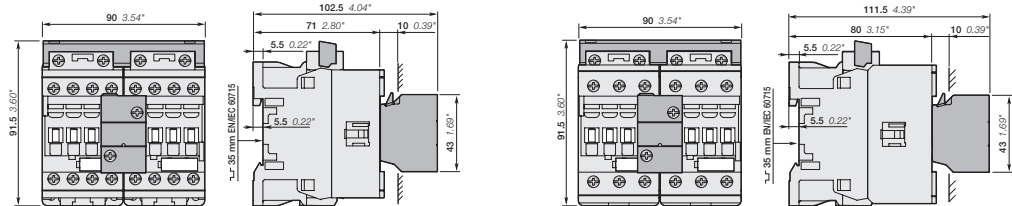
- AF09R ... AF38R reversing contactors are mainly used for controlling 3-phase motors and power circuits up to 600 V AC and 250 V DC. These contactors are of the block type design with 3 main poles.
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening.
 - built-in surge suppression
 - add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

UL/CSA						Rated control circuit voltage		Auxiliary contacts fitted per contactor	Order code	Weight
General Purpose rating	Motor rating HP					Uc min. ... Uc max.				
	1- phase		3 - phase			V 50/60 Hz	V DC			kg
A	120V	240V	220-240V	440-480V	550-600V					
25	0.75	1.5	2	5	7.5	24...60	20...60 (1)	1 0	AF09R-30-22-11	0.62
						48...130	48...130	1 0	AF09R-30-22-12	0.62
						100...250	100...250	1 0	AF09R-30-22-13	0.62
						250...500	250...500	1 0	AF09R-30-22-14	0.70
28	1	2	3	7.5	10	24...60	20...60 (1)	1 1	AF12R-30-22-11	0.62
						48...130	48...130	1 1	AF12R-30-22-12	0.62
						100...250	100...250	1 1	AF12R-30-22-13	0.62
						250...500	250...500	1 1	AF12R-30-22-14	0.70
30	1.5	3	5	10	15	24...60	20...60 (1)	1 1	AF16R-30-22-11	0.62
						48...130	48...130	1 1	AF16R-30-22-12	0.62
						100...250	100...250	1 1	AF16R-30-22-13	0.62
						250...500	250...500	1 1	AF16R-30-22-14	0.70
45	2	3	7.5	15	20	24...60	20...60 (1)	0 1	AF26R-30-02-11	0.76
						48...130	48...130	0 1	AF26R-30-02-12	0.76
						100...250	100...250	0 1	AF26R-30-02-13	0.76
						250...500	250...500	0 1	AF26R-30-02-14	0.84
50	2	5	10	20	25	24...60	20...60 (1)	0 1	AF30R-30-02-11	0.76
						48...130	48...130	0 1	AF30R-30-02-12	0.76
						100...250	100...250	0 1	AF30R-30-02-13	0.76
						250...500	250...500	0 1	AF30R-30-02-14	0.84
50	2	5	10	25	30	24...60	20...60 (1)	0 1	AF38R-30-02-11	0.76
						48...130	48...130	0 1	AF38R-30-02-12	0.76
						100...250	100...250	0 1	AF38R-30-02-13	0.76
						250...500	250...500	0 1	AF38R-30-02-14	0.84

(1) AF.-30-...-11 not suitable for direct control by PLC-output.

Main dimensions mm, inches



AF09R, AF12R, AF16R
+ VEM4 mechanical and electrical interlock set

AF26R, AF30R, AF38R
+ VEM4 mechanical and electrical interlock set

AF09 ... AF38Z 3-pole contactors

7.5 to 30 HP

AC / DC operated - low consumption

3



AF09Z-30-10



AF26Z-30-00

Description

AF09Z ... AF38Z contactors are mainly used for controlling 3-phase motors up to 600 V AC and 250 V DC. These contactors are of the block type design with 3 main poles.

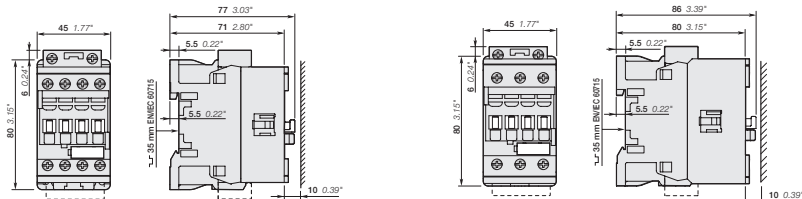
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
- can manage large control voltage variations
- allow direct control by PLC-output ≥ 24 V DC 500 mA
- reduced panel energy consumption
- very distinct closing and opening
- can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

UL/CSA		Motor rating HP					Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Order code	Weight
General Purpose rating	A	1 - phase		3 - phase			V 50/60 Hz	V DC	1	2		kg
		120V	240V	220-240V	440-480V	550-600V						
	25	0.75	1.5	2	5	7.5	-	12...20	1	0	AF09Z-30-10-20	0.31
							24...60	20...60	0	1	AF09Z-30-01-20	0.31
									1	0	AF09Z-30-10-21	0.31
									0	1	AF09Z-30-01-21	0.31
							48...130	48...130	1	0	AF09Z-30-10-22	0.31
									0	1	AF09Z-30-01-22	0.31
							100...250	100...250	1	0	AF09Z-30-10-23	0.31
									0	1	AF09Z-30-01-23	0.31
	28	1	2	3	7.5	10	-	12...20	1	0	AF12Z-30-10-20	0.31
							24...60	20...60	0	1	AF12Z-30-01-20	0.31
									1	0	AF12Z-30-10-21	0.31
									0	1	AF12Z-30-01-21	0.31
							48...130	48...130	1	0	AF12Z-30-10-22	0.31
									0	1	AF12Z-30-01-22	0.31
							100...250	100...250	1	0	AF12Z-30-10-23	0.31
									0	1	AF12Z-30-01-23	0.31
	30	1.5	3	5	10	15	-	12...20	1	0	AF16Z-30-10-20	0.31
							24...60	20...60	0	1	AF16Z-30-01-20	0.31
									1	0	AF16Z-30-10-21	0.31
									0	1	AF16Z-30-01-21	0.31
							48...130	48...130	1	0	AF16Z-30-10-22	0.31
									0	1	AF16Z-30-01-22	0.31
							100...250	100...250	1	0	AF16Z-30-10-23	0.31
									0	1	AF16Z-30-01-23	0.31
	45	2	3	7.5	15	20	-	12...20	0	0	AF26Z-30-00-20	0.35
							24...60	20...60	0	0	AF26Z-30-00-21	0.35
							48...130	48...130	0	0	AF26Z-30-00-22	0.35
							100...250	100...250	0	0	AF26Z-30-00-23	0.35
	50	2	5	10	20	25	-	12...20	0	0	AF30Z-30-00-20	0.35
							24...60	20...60	0	0	AF30Z-30-00-21	0.35
							48...130	48...130	0	0	AF30Z-30-00-22	0.35
							100...250	100...250	0	0	AF30Z-30-00-23	0.35
	50	2	5	10	25	30	-	12...20	0	0	AF38Z-30-00-20	0.35
							24...60	20...60	0	0	AF38Z-30-00-21	0.35
							48...130	48...130	0	0	AF38Z-30-00-22	0.35
							100...250	100...250	0	0	AF38Z-30-00-23	0.35

Note: Only AF..Z contactors with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.

Main dimensions mm, inches



AF09Z, AF12Z, AF16Z

AF26Z, AF30Z, AF38Z

AF09ZR ... AF38ZR 3-pole reversing contactors

7.5 to 30 HP

AC / DC operated - low consumption

Description

AF09ZR ... AF38ZR reversing contactors are mainly used for controlling 3-phase motors and power circuits up to 600 V AC and 250 V DC. These contactors are of the block type design with 3 main poles.

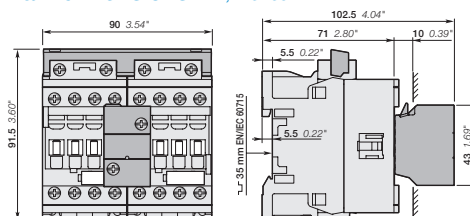
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
- can manage large control voltage variations
- allow direct control by PLC-output ≥ 24 V DC 500 mA
- reduced panel energy consumption
- very distinct closing and opening
- can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

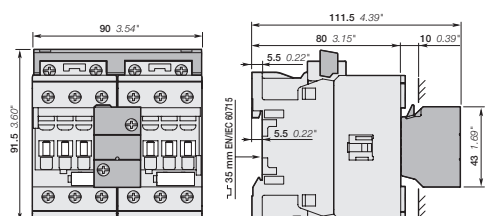
UL/CSA	Motor rating HP					Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted per contactor		Order code	Weight
General Purpose rating	1- phase		3- phase			V 50/60 Hz	V DC				Pkg (1 pce)
A	120V	240V	220-240V	440-480V	550-600V						kg
25	0.75	1.5	2	5	7.5	-	12...20	1	1	AF09ZR-30-22-20	0.70
						24...60	20...60	1	1	AF09ZR-30-22-21	0.70
						48...130	48...130	1	1	AF09ZR-30-22-22	0.70
						100...250	100...250	1	1	AF09ZR-30-22-23	0.70
28	1	2	3	7.5	10	-	12...20	1	1	AF12ZR-30-22-20	0.70
						24...60	20...60	1	1	AF12ZR-30-22-21	0.70
						48...130	48...130	1	1	AF12ZR-30-22-22	0.70
						100...250	100...250	1	1	AF12ZR-30-22-23	0.70
30	1.5	3	5	10	15	-	12...20	1	1	AF16ZR-30-22-20	0.70
						24...60	20...60	1	1	AF16ZR-30-22-21	0.70
						48...130	48...130	1	1	AF16ZR-30-22-22	0.70
						100...250	100...250	1	1	AF16ZR-30-22-23	0.70
45	2	3	7.5	15	20	-	12...20	0	1	AF26ZR-30-02-20	0.84
						24...60	20...60	0	1	AF26ZR-30-02-21	0.84
						48...130	48...130	0	1	AF26ZR-30-02-22	0.84
						100...250	100...250	0	1	AF26ZR-30-02-23	0.84
50	2	5	10	20	25	-	12...20	0	1	AF30ZR-30-02-20	0.84
						24...60	20...60	0	1	AF30ZR-30-02-21	0.84
						48...130	48...130	0	1	AF30ZR-30-02-22	0.84
						100...250	100...250	0	1	AF30ZR-30-02-23	0.84
50	2	5	10	25	30	-	12...20	0	1	AF38ZR-30-02-20	0.84
						24...60	20...60	0	1	AF38ZR-30-02-21	0.84
						48...130	48...130	0	1	AF38ZR-30-02-22	0.84
						100...250	100...250	0	1	AF38ZR-30-02-23	0.84

Note: Only AF.Z contactors with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.

Main dimensions mm, inches



AF09ZR, AF12ZR, AF16ZR
+ VEM4 mechanical and electrical interlock set



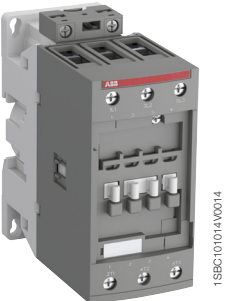
AF26ZR, AF30ZR, AF38ZR
+ VEM4 mechanical and electrical interlock set

AF40 ... AF96 3-pole contactors

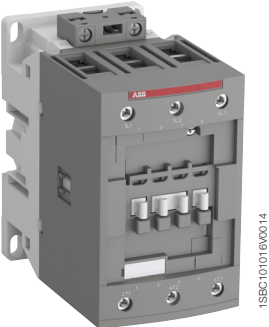
40 to 75 HP

AC / DC operated

3



AF40-30-00



AF80-30-00

Description

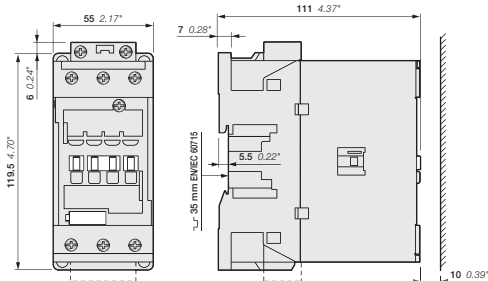
- AF40 ... AF96 contactors are mainly used for controlling 3-phase motors and power circuits up to 600 V AC and 250 V DC. These contactors are of the block type design with 3 main poles.
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening.
 - built-in surge suppression
 - add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

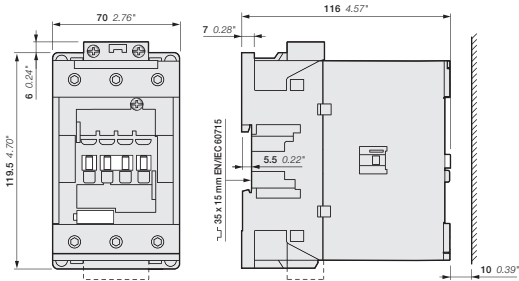
UL / CSA						Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted 	Order code	Weight Pkg (1 pce) kg
General Purpose rating	Motor rating. HP					V 50/60 Hz	V DC			
	1-Phase		3-Phase							
A	120V	240V	220-240V	440-480V	550-600V					
60	3	7.5	15	30	40	24...60	20...60 (1)	0 0	AF40-30-00-11	0.97
						48...130	48...130	0 0	AF40-30-00-12	0.97
						100...250	100...250	0 0	AF40-30-00-13	0.95
						250...500	250...500	0 0	AF40-30-00-14	0.95
80	3	10	20	40	50	24...60	20...60 (1)	0 0	AF52-30-00-11	0.97
						48...130	48...130	0 0	AF52-30-00-12	0.97
						100...250	100...250	0 0	AF52-30-00-13	0.95
						250...500	250...500	0 0	AF52-30-00-14	0.95
90	5	15	25	50	60	24...60	20...60 (1)	0 0	AF65-30-00-11	0.97
						48...130	48...130	0 0	AF65-30-00-12	0.97
						100...250	100...250	0 0	AF65-30-00-13	0.95
						250...500	250...500	0 0	AF65-30-00-14	0.95
105	7.5	15	30	60	75	24...60	20...60 (1)	0 0	AF80-30-00-11	1.22
						48...130	48...130	0 0	AF80-30-00-12	1.22
						100...250	100...250	0 0	AF80-30-00-13	1.17
						250...500	250...500	0 0	AF80-30-00-14	1.17
115	7.5	20	30	60	75	24...60	20...60 (1)	0 0	AF96-30-00-11	1.22
						48...130	48...130	0 0	AF96-30-00-12	1.22
						100...250	100...250	0 0	AF96-30-00-13	1.17
						250...500	250...500	0 0	AF96-30-00-14	1.17

(1) AF..-30...-11 not suitable for direct control by PLC-output.

Main dimensions mm, inches



AF40, AF52, AF65



AF80, AF96

AF40R ... AF96R 3-pole reversing contactors

40 to 75 HP

AC / DC operated

Description

AF40R ... AF96R reversing contactors are mainly used for controlling 3-phase motors to 600 V AC and 250 V DC. These contactors are of the block type design with 3 main poles.

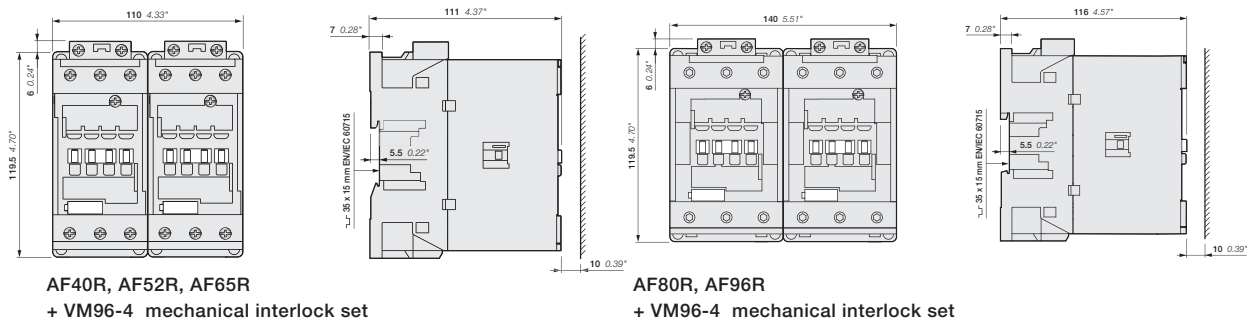
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
- can manage large control voltage variations
- reduced panel energy consumption
- very distinct closing and opening.
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

UL / CSA						Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted per contactor		Order code		Weight
General Purpose rating	Motor rating. HP											Pkg (1 pce)
	1-Phase		3-Phase			V 50/60 Hz	V DC					kg
A	120V	240V	220-240V	440-480V	550-600V							
60	3	7.5	15	30	40	24...60	20...60 (1)	1	1	AF40R-30-22-11	2.20	
						48...130	48...130	1	1	AF40R-30-22-12	2.20	
						100...250	100...250	1	1	AF40R-30-22-13	2.16	
						250...500	250...500	1	1	AF40R-30-22-14	2.16	
80	3	10	20	40	50	24...60	20...60 (1)	1	1	AF52R-30-22-11	2.20	
						48...130	48...130	1	1	AF52R-30-22-12	2.20	
						100...250	100...250	1	1	AF52R-30-22-13	2.16	
						250...500	250...500	1	1	AF52R-30-22-14	2.16	
90	5	15	25	50	60	24...60	20...60 (1)	1	1	AF65R-30-22-11	2.20	
						48...130	48...130	1	1	AF65R-30-22-12	2.20	
						100...250	100...250	1	1	AF65R-30-22-13	2.16	
						250...500	250...500	1	1	AF65R-30-22-14	2.16	
105	7.5	15	30	60	75	24...60	20...60 (1)	1	1	AF80R-30-22-11	2.78	
						48...130	48...130	1	1	AF80R-30-22-12	2.78	
						100...250	100...250	1	1	AF80R-30-22-13	2.68	
						250...500	250...500	1	1	AF80R-30-22-14	2.68	
115	7.5	20	30	60	75	24...60	20...60 (1)	1	1	AF96R-30-22-11	2.78	
						48...130	48...130	1	1	AF96R-30-22-12	2.78	
						100...250	100...250	1	1	AF96R-30-22-13	2.68	
						250...500	250...500	1	1	AF96R-30-22-14	2.68	

(1) AF.-30-...-11 not suitable for direct control by PLC-output.

Main dimensions mm, inches



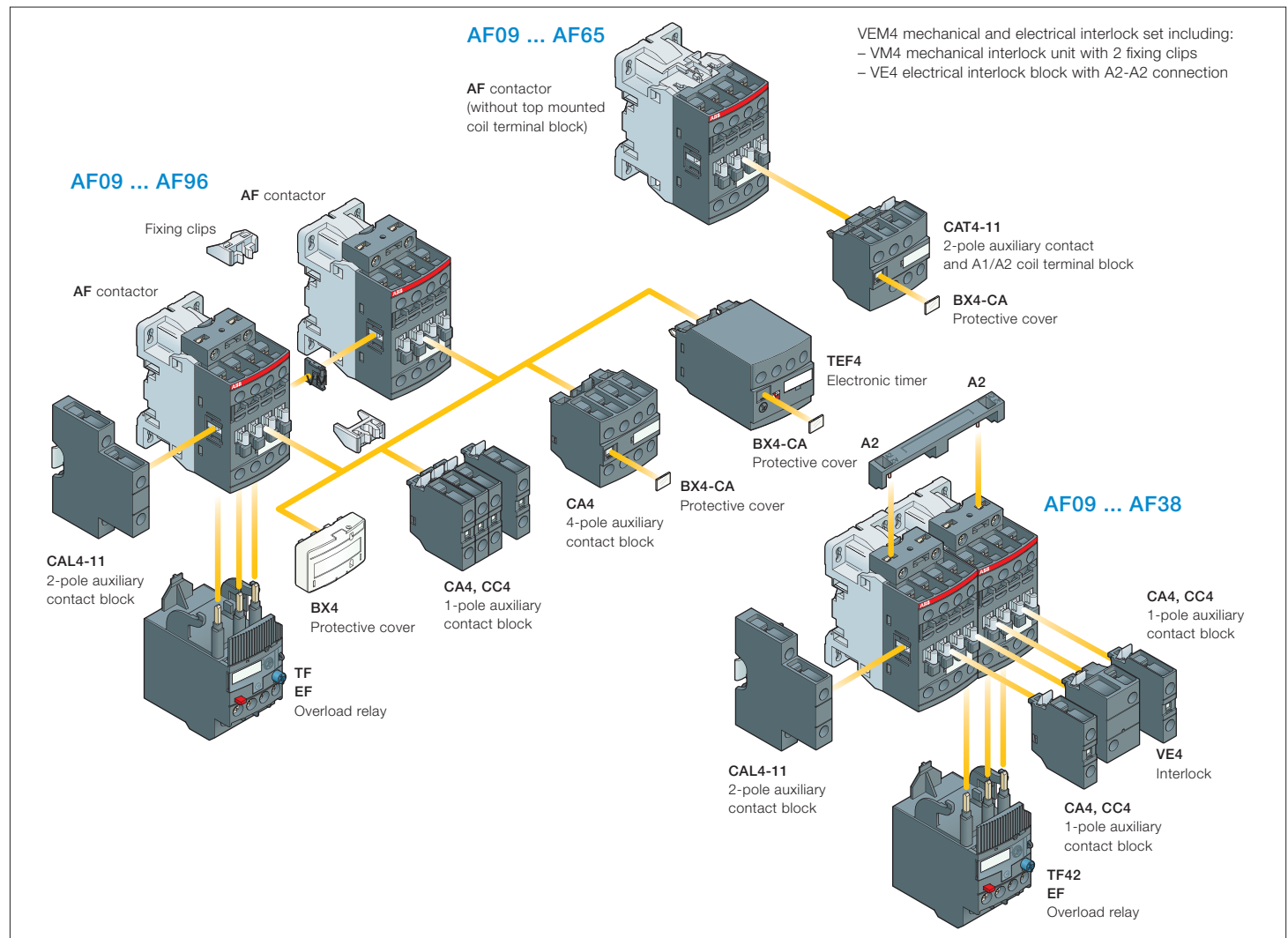
AF40R, AF52R, AF65R
+ VM96-4 mechanical interlock set

AF80R, AF96R
+ VM96-4 mechanical interlock set

AF09 ... AF96 3-pole contactors

Main accessories

Contactor and main accessories (other accessories available)



Main accessory fitting details

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

Contactor types	Main poles	Built-in auxiliary contacts	Front-mounted accessories				Side-mounted accessories		
			Auxiliary contact blocks				Auxiliary contact blocks		
			1-pole CA4				Left side	Right side	
			1-pole CC4				2-pole CAL4-11		
			Max. N.C. built-in and add-on N.C. auxiliary contacts: 4 N.C. max. on positions 1, 2, 3, 4 and 3 N.C. max. on positions 1 ±30°, 5						
AF09 ... AF16	3	0	0	1	4 max.	or 1	+	1	–
AF09 ... AF16	3	0	1	0	2 max.	or 1	+	1	+
AF26 ... AF38	3	0	0	0	3 max.	–	+	1	or 1
AF40 ... AF65	3	0	0	0	4 max.	or 1	+	1	+
AF80, AF96	3	0	0	0	4 max.	–	+	1	+

Overload relays fitting details (1)

Contactor types	Thermal overload relays		Electronic overload relays	
AF09 ... AF38	TF42 (0.10...38 A)		EF19 (0.10...19 A)	
AF26 ... AF38	TF42 (0.10...38 A)		EF45 (9...45 A)	
AF40 ... AF65	TF65 (22...67 A)		EF65 (20...70 A)	
AF80, AF96	TF96 (40...96 A)		EF96 (36...100 A)	

The addition of an overload relay on the contactor does not prevent fitting of many other accessories as shown above.

(1) Direct mounting - No kit required.

AF09 ... AF96 3-pole contactors

Main accessories



CA4-10



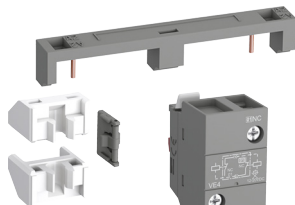
CAL4-11



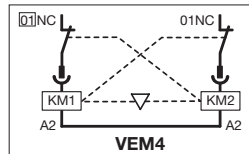
CA4-22E



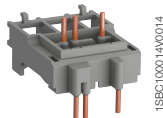
CAT4-11E



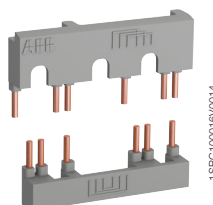
VEM4



TEF4-ON



BEA16-4



BER16-4

Ordering details (1)

For contactors	Auxiliary contacts	Order code	Pkg qty	Weight (1 pce)
				kg

Front-mounted instantaneous auxiliary contact blocks

AF09 ... AF96	1	0	-	-	CA4-10	1	0.014
	0	1	-	-	CA4-01	1	0.014
AF09 ... AF16...-30-10	2	2	-	-	CA4-22M	1	0.055
AF26 ... AF96...-30-00	2	2	-	-	CA4-22E	1	0.055
AF09 ... AF16...-30-01	2	2	-	-	CA4-22U	1	0.055

Front-mounted auxiliary contact blocks with N.O. leading contact and N.C. lagging contact

AF09 ... AF96	-	-	1	0	CC4-10	1	0.014
	-	-	0	1	CC4-01	1	0.014

Side-mounted instantaneous auxiliary contact blocks

AF09 ... AF96	1	1	-	-	CAL4-11	1	0.040
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Front-mounted instantaneous auxiliary contact and A1/A2 coil terminal blocks

AF09 ... AF16...-30-10	1	1	-	-	CAT4-11M	1	0.040
AF26 ... AF65...-30-00	1	1	-	-	CAT4-11E	1	0.040
AF09 ... AF16...-30-01	1	1	-	-	CAT4-11U	1	0.040

Note: CAT4 not suitable for AF..Z contactors with DC control voltage 12...20 V DC.

Mechanical interlock unit

AF09 ... AF38					VM4	10	0.005
AF40 ... AF96					VM96-4	10	0.006

Note: VM4 and VM96-4 include 2 fixing clips (BB4) to maintain together both contactors.

Mechanical and electrical interlock set

AF09 ... AF38	0	2	-	-	VEM4	1	0.035
---------------	---	---	---	---	------	---	-------

Note: - VEM4 includes a VM4 mechanical interlock unit with 2 fixing clips (BB4), a VE4 electrical interlock block. VE4 block must be used with A2-A2 connection to respect the electrical connection diagram.

- VEM4 not suitable for AF..Z contactors with DC control voltage 12...20 V DC.

For contactors	Time delay range selected by switch	Delay type	Auxiliary contacts	Order code	Pkg qty	Weight (1 pce)
						kg

Electronic timers

AF09 ... AF96	0.1...1 s	ON-delay	1	1	TEF4-ON	1	0.065
	1...10 s						
	10...100 s	OFF-delay	1	1	TEF4-OFF	1	0.065

Note: Rated control circuit voltage Uc 24...240 V 50/60 Hz or DC.

Connecting links with manual motor starters

AF09 ... AF16	with	MS116-0.16 ... MS116-25, MS132-0.16 ... MS132-25		BEA16-4	10	0.025
AF26 ... AF38	with	MS116-0.16 ... MS116-16, MS132-0.16 ... MS132-10		BEA26-4	10	0.025
	with	MS116-20 ... MS116-32, MS132-12 ... MS132-32		BEA38-4	10	0.030
AF40 ... AF65	with	MS165-16 ... MS165-65		BEA65-4	1	0.09

Connection sets for reversing contactors

AF09 ... AF16		BER16-4	1	0.045
AF26 ... AF38		BER38-4	1	0.100
AF40 ... AF65		BER65-4	1	0.175
AF80 ... AF96		BER96-4	1	0.250

Connection sets for star-delta starting

AF09 ... AF16	With or without VM4	BEY16-4	1	0.050
AF26 ... AF38	With or without VM4	BEY38-4	1	0.110
AF40 ... AF65	With or without VM96-4	BEY65-4	1	0.200
AF80 ... AF96	With or without VM96-4	BEY96-4	1	0.250

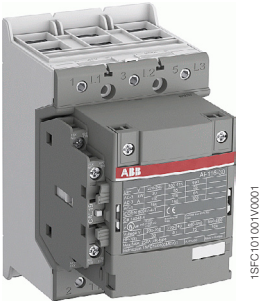
(1) For more information, refer to "Accessories" section.

AF116 ... AF140 3-pole contactors

100 to 125 HP

AC / DC operated

3



AF140-30-11

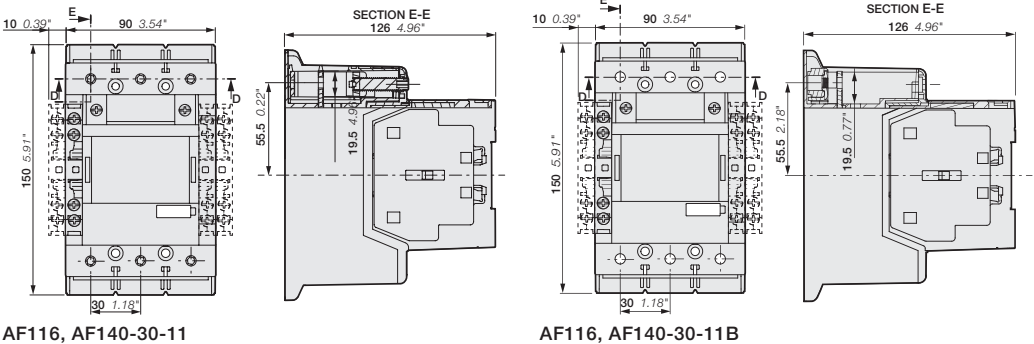
Description

- AF116 ... AF140 contactors are mainly used for controlling 3-phase motors and power circuits up to 600 V AC. These contactors are of the block type design with 3 main poles.
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
 - built-in surge suppression
 - add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

UL / CSA General Purpose rating	Motor Rating HP 3-phase				Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Order code	Weight Pkg (1 pce) kg
	200- 208V	220- 240V	440- 480V	550- 600V	V 50/60 Hz	V DC			
A									
For connection with built-in cable clamps									
160	30	40	75	100	24...60	20...60	1 1	AF116-30-11-11	1.75
					48...130	48...130	1 1	AF116-30-11-12	1.75
					100...250	100...250	1 1	AF116-30-11-13	1.75
					250...500	250...500	1 1	AF116-30-11-14	1.75
200	40	50	100	125	24...60	20...60	1 1	AF140-30-11-11	1.75
					48...130	48...130	1 1	AF140-30-11-12	1.75
					100...250	100...250	1 1	AF140-30-11-13	1.75
					250...500	250...500	1 1	AF140-30-11-14	1.75

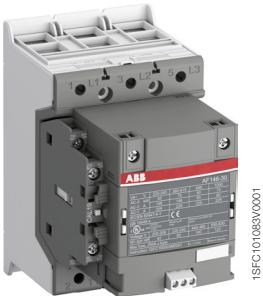
Main dimensions mm, inches



AF116 ... AF140 3-pole contactors with built-in PLC interface

100 to 125 HP

AC / DC operated



AF140-30-11

Description

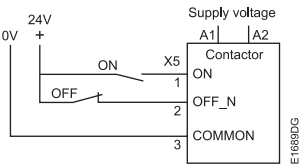
- AF116 ... AF140 contactors are mainly used for controlling 3-phase motors and power circuits up to 600 V AC. These contactors are of the block type design with 3 main poles.
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 2 coils to cover control voltages between 100...500 V 50/60 Hz and 100...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
 - built-in surge suppression
 - add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

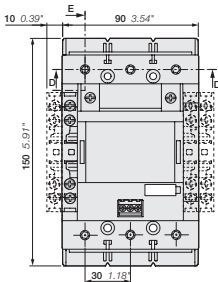
UL / CSA					Rated control circuit voltage Uc min. ... Uc max.	Auxiliary contacts fitted	Order code	Weight	
General Purpose rating	Motor Rating HP 3-phase								Pkg (1 pce)
A	200-208V	220-240V	440-480V	550-600V	V 50/60 Hz V DC			kg	
For connection with built-in cable clamps									
160	30	40	75	100	100...250	100...250	1 1	AF116-30-11-33	1.75
					250...500	250...500	1 1	AF116-30-11-34	1.75
200	40	50	100	125	100...250	100...250	1 1	AF140-30-11-33	1.75
					250...500	250...500	1 1	AF140-30-11-34	1.75

AF116 ... AF140 are equipped with low voltage inputs for control, for example by a PLC.

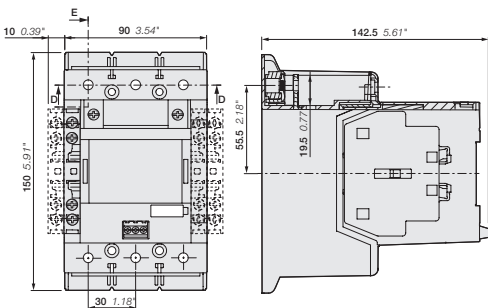
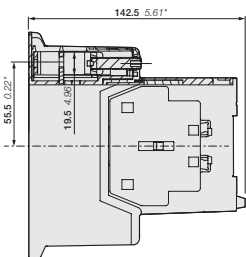
Control inputs



Main dimensions mm, inches



AF116, AF140-30-11



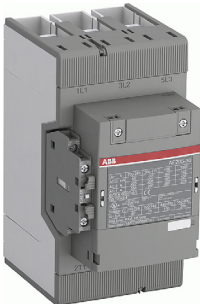
AF116, AF140-30-11B

AF190 ... AF370 3-pole contactors

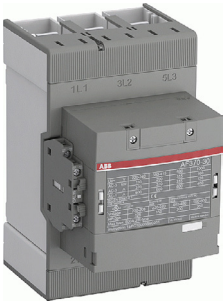
150 to 350 HP

AC / DC operated

3



AF205-30-11



AF370-30-11

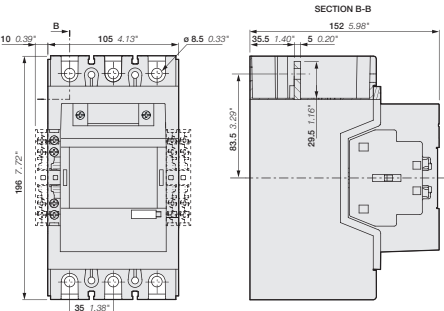
Description

- AF190 ... AF370 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC. These contactors are of the block type design with 3 main poles.
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
 - built-in surge suppression
 - add-on auxiliary contact blocks for side mounting and a wide range of accessories.

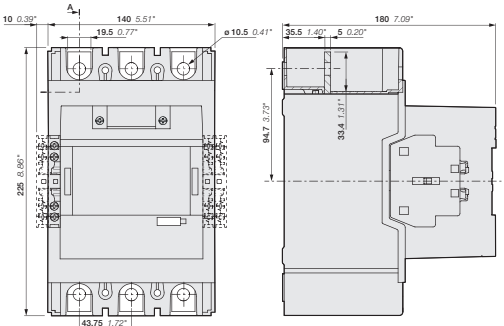
Ordering details

UL / CSA					Rated control circuit voltage		Auxiliary contacts fitted		Order code	Weight
General Purpose rating	Motor Rating HP 3-phase				Uc min. ... Uc max.					Pkg (1 pce)
A	200-208V	220-240V	440-480V	550-600V	V 50/60 Hz	V DC				
250	50	60	125	150	24...60	20...60	1	1	AF190-30-11-11	3.00
					48...130	48...130	1	1	AF190-30-11-12	3.00
					100...250	100...250	1	1	AF190-30-11-13	3.00
					250...500	250...500	1	1	AF190-30-11-14	3.00
300	60	75	150	200	24...60	20...60	1	1	AF205-30-11-11	3.00
					48...130	48...130	1	1	AF205-30-11-12	3.00
					100...250	100...250	1	1	AF205-30-11-13	3.00
					250...500	250...500	1	1	AF205-30-11-14	3.00
350	75	100	200	250	24...60	20...60	1	1	AF265-30-11-11	4.60
					48...130	48...130	1	1	AF265-30-11-12	4.60
					100...250	100...250	1	1	AF265-30-11-13	4.60
					250...500	250...500	1	1	AF265-30-11-14	4.60
400	100	125	250	300	24...60	20...60	1	1	AF305-30-11-11	4.60
					48...130	48...130	1	1	AF305-30-11-12	4.60
					100...250	100...250	1	1	AF305-30-11-13	4.60
					250...500	250...500	1	1	AF305-30-11-14	4.60
520	125	150	300	350	24...60	20...60	1	1	AF370-30-11-11	4.60
					48...130	48...130	1	1	AF370-30-11-12	4.60
					100...250	100...250	1	1	AF370-30-11-13	4.60
					250...500	250...500	1	1	AF370-30-11-14	4.60

Main dimensions mm, inches



AF190, AF205

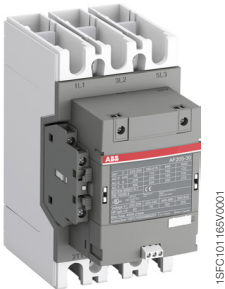


AF265, AF305, AF370

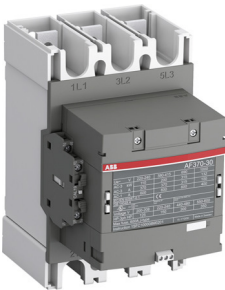
AF190 ... AF370 3-pole contactors with built-in PLC interface

150 to 350 HP

AC / DC operated



AF205-30-11



AF370-30-11

Description

- AF190 ... AF370 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC. These contactors are of the block type design with 3 main poles.
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 2 coils to cover control voltages between 100...500 V 50/60 Hz and 100...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
 - built-in surge suppression
 - add-on auxiliary contact blocks for side mounting and a wide range of accessories.

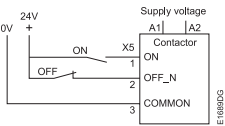
Ordering details

UL / CSA					Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Order code	Weight
General Purpose rating	Motor Rating HP 3-phase				V 50/60 Hz	V DC	1	2		Pkg (1 pce)
A	200-208V	220-240V	440-480V	550-600V	100...250	100...250	1	1	AF190-30-11-33	3.00
					250...500	250...500	1	1	AF190-30-11-34	3.00
	250	60	75	150	100...250	100...250	1	1	AF205-30-11-33	3.00
					250...500	250...500	1	1	AF205-30-11-34	3.00
	350	75	100	200	100...250	100...250	1	1	AF265-30-11-33	4.60
					250...500	250...500	1	1	AF265-30-11-34	4.60
400	100	125	250	300	100...250	100...250	1	1	AF305-30-11-33	4.60
					250...500	250...500	1	1	AF305-30-11-34	4.60
	520	125	150	300	100...250	100...250	1	1	AF370-30-11-33	4.60
					250...500	250...500	1	1	AF370-30-11-34	4.60

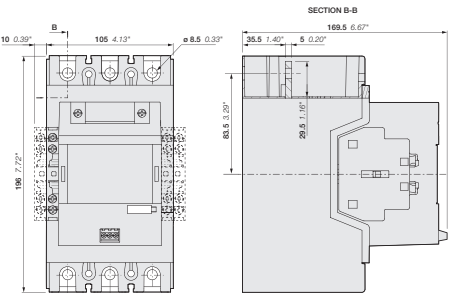
(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.

AF190 ... AF370 are equipped with low voltage inputs for control, for example by a PLC.

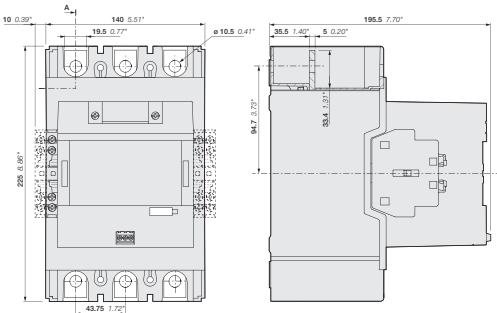
Control inputs



Main dimensions mm, inches



AF190, AF205



AF265, AF305, AF370

AF116R ... AF140R 3-pole reversing contactors

100 to 125 HP

AC / DC operated

3

Description

AF116R ... AF140 reversing contactors are mainly used for controlling 3-phase motors and power circuits up to 600 V AC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

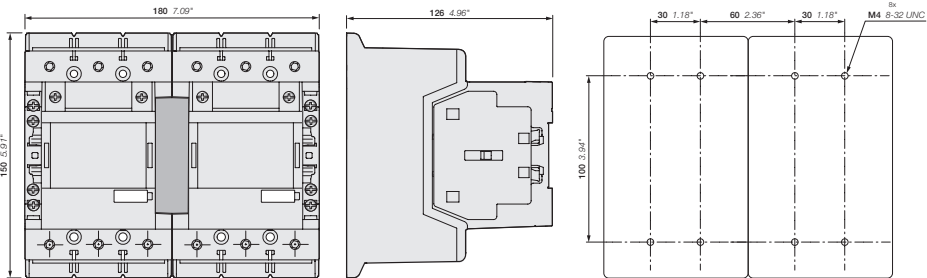
Ordering details

UL / CSA					Rated control circuit voltage Uc min. ... Uc max.	Auxiliary contacts fitted per contactors	Order code	Weight
General Purpose rating	Motor Rating HP 3-phase							
A	200-208V	220-240V	440-480V	550-600V	V 50/60 Hz; V DC			kg

For connection with built-in cable clamps

160	30	40	75	100	24...60	20...60	1	1	AF116R-30-22-11	5.66
					48...130	48...130	1	1	AF116R-30-22-12	5.66
					100...250	100...250	1	1	AF116R-30-22-13	5.66
					250...500	250...500	1	1	AF116R-30-22-14	5.66
200	40	50	100	125	24...60	20...60	1	1	AF140R-30-22-11	5.66
					48...130	48...130	1	1	AF140R-30-22-12	5.66
					100...250	100...250	1	1	AF140R-30-22-13	5.66
					250...500	250...500	1	1	AF140R-30-22-14	5.66

Main dimensions mm, inches



AF116, AF140
+ VM19 mechanical interlocking unit

AF116, AF140
+ VM19 mechanical interlocking unit

AF190R ... AF370R 3-pole reversing contactors

150 to 350 HP

AC / DC operated

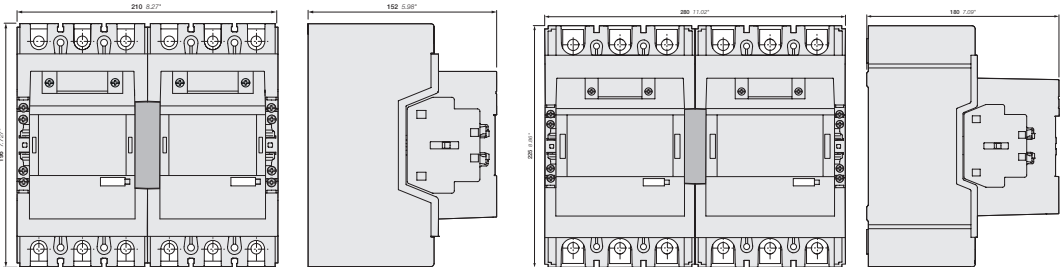
Description

- AF190R ... AF370R reversing contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC. These contactors are of the block type design with 3 main poles.
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
 - built-in surge suppression
 - add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

UL / CSA					Rated control circuit voltage		Auxiliary contacts fitted per contactor		Order code	Weight
General Purpose rating	Motor Rating HP 3-phase				Uc min. ... Uc max.					Pkg (1 pce)
A	200-208V	220-240V	440-480V	550-600V	V 50/60 Hz	V DC				
250	50	60	125	150	24...60	20...60	1	1	AF190R-30-22-11	9.24
					48...130	48...130	1	1	AF190R-30-22-12	9.24
					100...250	100...250	1	1	AF190R-30-22-13	9.24
					250...500	250...500	1	1	AF190R-30-22-14	9.24
300	60	75	150	200	24...60	20...60	1	1	AF205R-30-22-11	9.24
					48...130	48...130	1	1	AF205R-30-22-12	9.24
					100...250	100...250	1	1	AF205R-30-22-13	9.24
					250...500	250...500	1	1	AF205R-30-22-14	9.24
350	75	100	200	250	24...60	20...60	1	1	AF265R-30-22-11	13.42
					48...130	48...130	1	1	AF265R-30-22-12	13.42
					100...250	100...250	1	1	AF265R-30-22-13	13.42
					250...500	250...500	1	1	AF265R-30-22-14	13.42
400	100	125	250	300	24...60	20...60	1	1	AF305R-30-22-11	13.42
					48...130	48...130	1	1	AF305R-30-22-12	13.42
					100...250	100...250	1	1	AF305R-30-22-13	13.42
					250...500	250...500	1	1	AF305R-30-22-14	13.42
520	125	150	300	350	24...60	20...60	1	1	AF370R-30-22-11	13.42
					48...130	48...130	1	1	AF370R-30-22-12	13.42
					100...250	100...250	1	1	AF370R-30-22-13	13.42
					250...500	250...500	1	1	AF370R-30-22-14	13.42

Main dimensions mm, inches



AF190, AF205-30-11 + VM19 mechanical interlocking unit

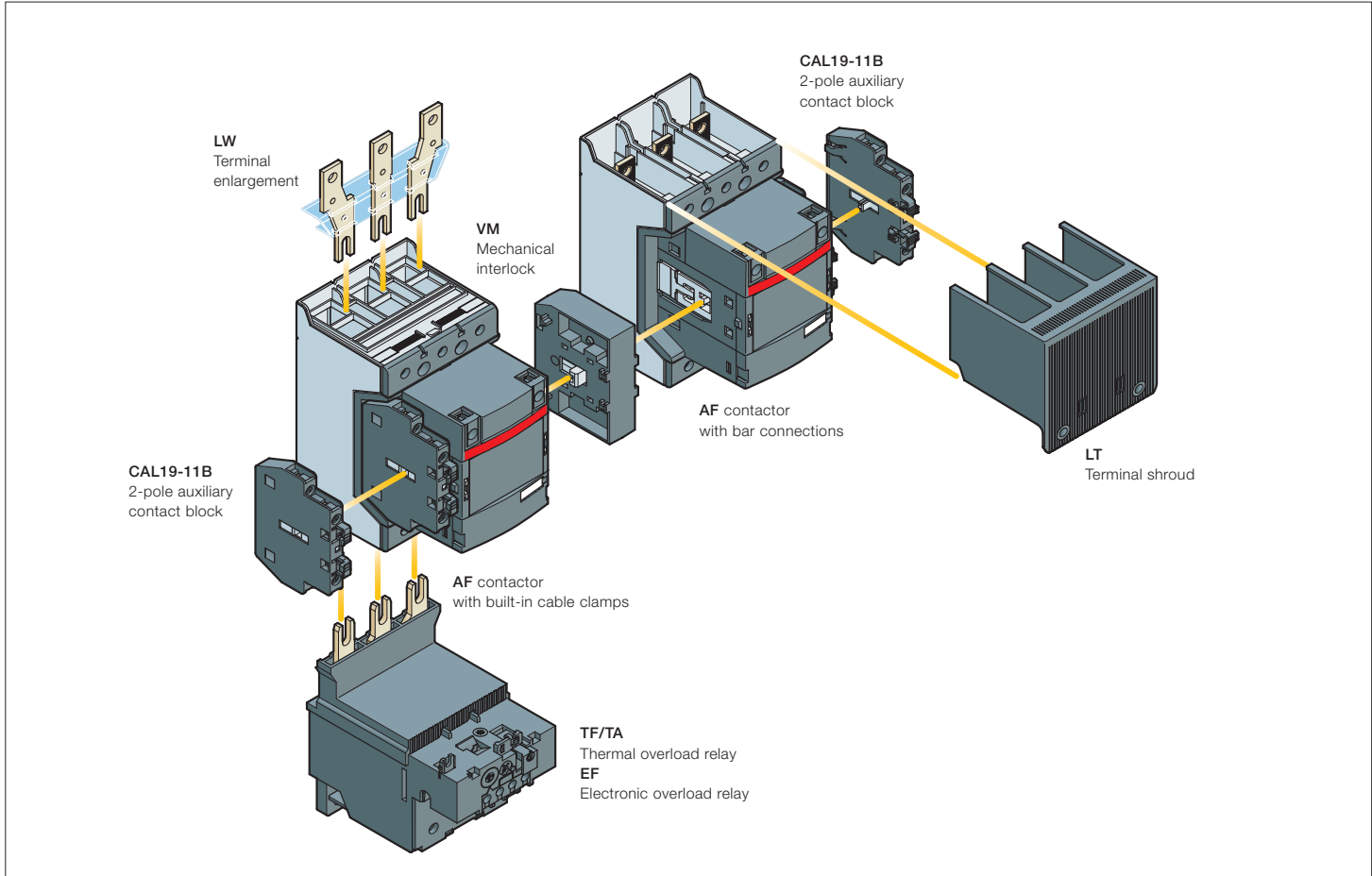
AF190, AF205

AF265R ... AF370R + VM19 mechanical interlocking unit

AF116 ... AF370 3-pole contactors

Main accessories

Main accessories (other accessories available)



Main accessory fitting details

Contactor types	Main poles		Available auxiliary contacts		Side-mounted accessories		
					Auxiliary contact blocks		Mechanical interlock units (between two contactors)
					CAL19-11	CAL19-11B	
AF116 ... AF370	3	0	1	1	1 x CAL19-11	+ 2 x CAL19-11B	–
AF116 ... AF370	3	0	1	1	–	+ 2 x CAL19-11B (1)	+ VM... (2)

(1) Total number of auxiliary contact blocks for the two contactors.

(2) Interlock type, according to the contactor ratings (see "Accessories").

Overload relays fitting details (1)

Contactor types	Thermal overload relays	Electronic overload relays
AF116 ... AF140	TF140DU (66...142 A)	EF146 (54...150 A)
AF190, AF205	TA200DU (66...200 A)	EF205 (63...210 A)
AF265 ... AF370	–	EF370 (115...380 A)

The addition of a thermal or electronic overload relay on the contactor does not prevent fitting of many other accessories as shown in "Main accessory fitting details" table.

(1) Direct mounting - No kit required.

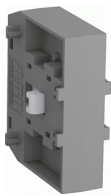
AF116 ... AF370 3-pole contactors

Main accessories



CAL19-11

1SFC101071V0001



VM19

1SFC101035V0001



LT370-30C

1SFC101041V0001



LX140

1SFC101049V0001

Ordering details (1)

For contactors	Auxiliary contacts	Order code	Pkg qty	Weight (1 pce)
	 			kg

Side-mounted instantaneous auxiliary contact blocks

AF116 ... AF370	1	1	CAL19-11	2	0.05
	1	1	CAL19-11B	2	0.05

Mechanical interlock unit

AF116 ... AF370	VM19	1	0.05
AF116 ... AF140 and AF190, AF205	VM140/190	1	0.09
AF190, AF205 and AF265 ... AF370	VM205/265	1	0.09

Connection sets for reversing contactors

AF116 ... AF140	BER140-4	1	0.62
AF190 ... AF205	BER205-4	1	1.24
AF265 ... AF370	BER370-4	1	2.14

Terminal shrouds

AF116 ... AF140, with compression lugs	LT140-30L	2	0.07
AF190, AF205, with cable clamps	LT205-30C	2	0.05
AF190, AF205, with compression lugs	LT205-30L	2	0.22
AF190, AF205, with shorting bar or between contactor and OL	LT205-30Y	1	0.05
AF265 ... AF370, with cable clamps	LT370-30C	2	0.04
AF265 ... AF370, with compression lugs	LT370-30L	2	0.28
AF265 ... AF370, with shorting bar or between contactor and OL	LT370-30Y	1	0.08
AF265 ... AF370, for use with terminal lugs, ATK 300/2	LT370-30D	1	0.15

For contactors	Dimensions	Order code	Pkg qty	Weight (1 pce)
	hole Ø mm	bar mm		kg

Terminal enlargements

AF116...AF140	6.5	13 x 3	LW140	1	0.12
AF190...AF205	10.5	17.5 x 5	LW205	1	0.26
AF265...AF370	10.5	20 x 5	LW370	1	0.34

Terminal extension

AF116...AF140	6.5	13 x 3	LX140	1	0.07
AF190...AF205	8.5	17.5 x 5	LX205	1	0.18
AF265...AF370	10.5	20 x 5	LX370	1	0.23

For contactors	Cable range	Order code	Pkg qty	Weight (1 pce)
				kg

Connector terminal lug kits

AF190...AF205	4-300 MCM	ATK185	3	0.16
AF265...AF370	4-400 MCM	ATK300	3	0.17
AF265...AF370	(2) 4-500 MCM	ATK300/2	3	0.25

(1) For more information, refer to "Accessories" section.

AF400 ... AF750 3-pole contactors 400 to 700 HP AC / DC operated

3



AF460-30-11



AF750-30-11

Description

- AF400 ... AF750 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC or 600 V DC (2). These contactors are of the block type design with 3 main poles.
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 48...500 V 50/60 Hz and 24...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltages sags (SEMI F47 conditions of use on request).
 - built-in surge suppression
 - add-on auxiliary contact blocks for side mounting and a wide range of accessories.

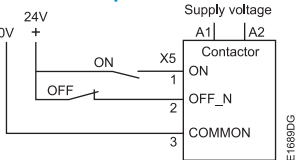
Ordering details

UL/CSA					Rated control circuit voltage		Auxiliary contacts fitted	Order code		Weight
General Purpose rating	Motor Rating HP 3-phase				Uc min. ... Uc max.					Pkg (1 pce)
A	200-208V	220-240V	440-480V	550-600V	V 50/60 Hz	V DC	 			kg
550	125	150	350	400	-	24...60	1 1	AF400-30-11-68 (1)		12.00
					48...130	48...130	1 1	AF400-30-11-69		12.00
					100...250	100...250	1 1	AF400-30-11-70		12.00
					250...500	250...500	1 1	AF400-30-11-71		12.00
650	150	200	400	500	-	24...60	1 1	AF460-30-11-68 (1)		12.00
					48...130	48...130	1 1	AF460-30-11-69		12.00
					100...250	100...250	1 1	AF460-30-11-70		12.00
					250...500	250...500	1 1	AF460-30-11-71		12.00
750	200	250	500	600	-	24...60	1 1	AF580-30-11-68 (1)		15.00
					48...130	48...130	1 1	AF580-30-11-69		15.00
					100...250	100...250	1 1	AF580-30-11-70		15.00
					250...500	250...500	1 1	AF580-30-11-71		15.00
900	400	500	600	700	-	24...60	1 1	AF750-30-11-68 (1)		15.00
					48...130	48...130	1 1	AF750-30-11-69		15.00
					100...250	100...250	1 1	AF750-30-11-70		15.00
					250...500	250...500	1 1	AF750-30-11-71		15.00

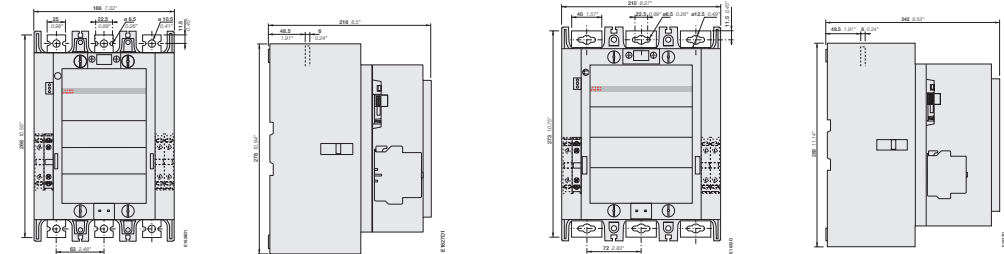
(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.
 (2) Up to 850 V DC for AF580, AF750.

AF400 ... AF750 are equipped with low voltage inputs for control, for example by a PLC.

Control inputs



Main dimensions mm, inches



AF400, AF460

AF580, AF750

AF400R ... AF750R 3-pole reversing contactors

400 to 700 HP

AC / DC operated

Description

- AF400R ... AF750R reversing contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC or 600 V DC (2). These contactors are of the block type design with 3 main poles.
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 48...500 V 50/60 Hz and 24...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltages sags (SEMI F47 conditions of use on request).
 - built-in surge suppression
 - add-on auxiliary contact blocks for side mounting and a wide range of accessories.

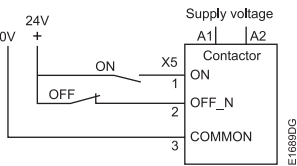
Ordering details

UL/CSA General Purpose rating	Motor Rating HP 3-phase				Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted per contractor		Order code	Weight Pkg (1 pce)
	200- 208V	220- 240V	440- 480V	550- 600V	V 50/60 Hz	V DC				kg
A	125	150	350	400	-	24...60	1	1	AF400R-30-22-68 (1)	32.10
					48...130	48...130	1	1	AF400R-30-22-69	32.10
					100...250	100...250	1	1	AF400R-30-22-70	32.10
					250...500	250...500	1	1	AF400R-30-22-71	32.10
					-	24...60	1	1	AF460R-30-22-68 (1)	32.10
650	150	200	400	500	48...130	48...130	1	1	AF460R-30-22-69	32.10
					100...250	100...250	1	1	AF460R-30-22-70	32.10
					250...500	250...500	1	1	AF460R-30-22-71	32.10
					-	24...60	1	1	AF580R-30-22-68 (1)	41.80
					48...130	48...130	1	1	AF580R-30-22-69	41.80
750	200	250	500	600	100...250	100...250	1	1	AF580R-30-22-70	41.80
					250...500	250...500	1	1	AF580R-30-22-71	41.80
					-	24...60	1	1	AF750R-30-22-68 (1)	41.80
					48...130	48...130	1	1	AF750R-30-22-69	41.80
					100...250	100...250	1	1	AF750R-30-22-70	41.80
900	400	500	600	700	250...500	250...500	1	1	AF750R-30-22-71	41.80
					-	24...60	1	1	AF750R-30-22-68 (1)	41.80
					48...130	48...130	1	1	AF750R-30-22-69	41.80
					100...250	100...250	1	1	AF750R-30-22-70	41.80
					250...500	250...500	1	1	AF750R-30-22-71	41.80

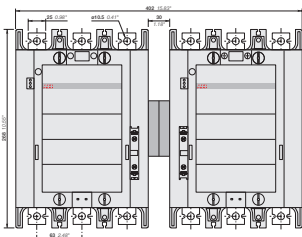
(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.
(2) Up to 850 V DC for AF580, AF750.

AF400R ... AF750R are equipped with low voltage inputs for control, for example by a PLC.

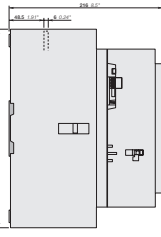
Control inputs



Main dimensions mm, inches



AF400R, AF460R



AF580R, AF750R

AF1250 ... AF2650 3-pole contactors

900 to 1000 HP and 1210 to 2700 A

AC / DC operated

3



AF1250-30-11

1SFC101027V0001



AF2650-30-11

1SFC101031V0001

Description

AF1250 ... AF2650 contactors are mainly used for controlling power circuits up to 600 V AC or 600 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
- only 4 coils for AF1250 to cover control voltages between 48...500 V 50/60 Hz and 24...500 V DC
- only 1 coil for AF1350 ... AF2650 to cover control voltages between 100...250 V 50/60 Hz and 100...250 V DC
- can manage large control voltage variations
- reduced panel energy consumption
- very distinct closing and opening
- can withstand short voltage dips and voltages sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

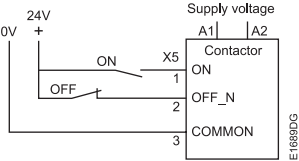
Ordering details

UL/CSA					Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Order code	Weight
General Purpose rating	Motor Rating HP 3-phase									Pkg (1 pce)
A	200-208V	220-240V	440-480V	550-600V	V 50/60 Hz	V DC				kg
1210	-	-	-	-	-	24...60	1	1	AF1250-30-11-68 (1)	16.00
					48...130	48...130	1	1	AF1250-30-11-69	16.00
					100...250	100...250	1	1	AF1250-30-11-70	16.00
					250...500	250...500	1	1	AF1250-30-11-71	16.00
1350	-	400	800	1000	100...250	100...250	1	1	AF1350-30-11-70	34.00
1650	-	450	900	1150	100...250	100...250	1	1	AF1650-30-11-70	35.00
2100	-	-	-	-	100...250	100...250	1	1	AF2050-30-11-70	35.00
2700	-	-	-	-	100...250	100...250	1	1	AF2650-30-11-70	45.00

(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.
(2) AF2650 : Maximum operational voltage = 1000 V according to UL / CSA.

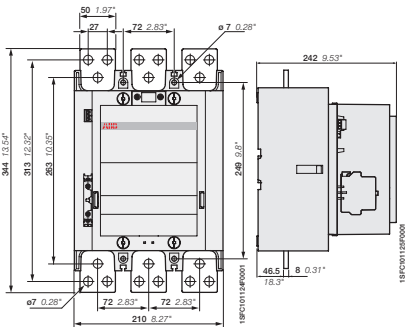
AF1250 ... AF2650 are equipped with low voltage inputs for control, for example by a PLC

Control inputs

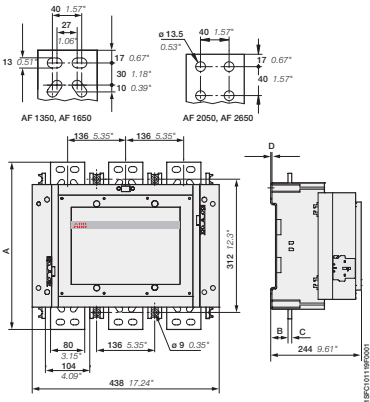


	AF1350, AF1650, AF2050	AF2650
A	392 mm / 15.43"	422 mm / 16.61"
B	47 mm / 1.85"	53.5 mm / 2.11"
C	10 mm / 0.39"	25 mm / 0.98"
D	3 mm / 0.12"	-

Main dimensions mm, inches



AF1250



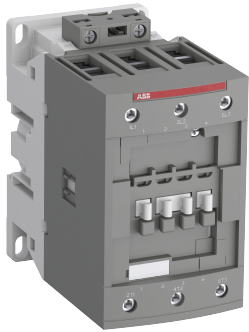
AF1350, AF1650, AF2050, AF2650

AF09N - AF1650N, AC/DC operated NEMA rated, 3 pole



AF40N2

1SBC101014V0014



AF80N3

1SBC101016V0014

Description

AF09N00 ... AF1650N8 NEMA contactors are mainly used for controlling 3-phase motors and power circuits up to 600 VAC. These contactors are of the block type design with 3 main poles.

Ordering Details: Non-Reversing

CSA/UL Ratings

NEMA Size	Continuous Currents	Maximum Motor Horsepower Ratings				Auxiliary Contacts		Order Code state coil voltage code ☐ ☐ (see table below)	Weight Kg
		208 V	240 V	480 V	600 V				
00	9	1.5	1.5	2	2	1	0	AF09N00-30-10- ☐ ☐	0.27
						0	1	AF09N00-30-01- ☐ ☐	0.27
0	18	3	3	5	5	1	0	AF12N0-30-10- ☐ ☐	0.31
						0	1	AF12N0-30-01- ☐ ☐	0.31
1	27	7.5	7.5	10	10	1	1	AF26N1-30-11- ☐ ☐	0.39
2	45	10	15	25	25	1	1	AF40N2-30-11- ☐ ☐	1.01
3	90	25	30	50	50	1	1	AF80N3-30-11- ☐ ☐	1.26
4	135	40	50	100	100	1	1	AF140N4-30-11- ☐ ☐	1.75
5	270	75	100	200	200	1	1	AF265N5-30-11- ☐ ☐	4.61
6	540	150	200	400	400	1	1	AF460N6-3011- ☐ ☐	12.00
7	810	—	300	600	600	1	1	AF750N7-3011- ☐ ☐	15.00
8	1215	—	450	900	900	1	1	AF1650N8-30-70	35.00

Ordering Details: Reversing with Mechanical and Electrical Interlock

CSA/UL Ratings

NEMA Size	Continuous Currents	Maximum Motor Horsepower Ratings				Auxiliary Contacts		Order Code state coil voltage code ☐ ☐ (see table below)	Weight Kg
		208 V	240 V	480 V	600 V				
00	9	1.5	1.5	2	2	2	2	AF09N00R-30- ☐ ☐	0.62
0	18	3	3	5	5	2	2	AF12N0R-30- ☐ ☐	0.70
1	27	7.5	7.5	10	10	2	2	AF26N1R-30- ☐ ☐	0.92
2	45	10	15	25	25	2	2	AF40N2R-30- ☐ ☐	2.23
3	90	25	30	50	50	2	2	AF80N3R-30- ☐ ☐	2.81
4	135	40	50	100	100	2	2	AF140N4R-30- ☐ ☐	5.66
5	270	75	100	200	200	2	2	AF265N5R-30- ☐ ☐	13.42
6	540	150	200	400	400	2	2	AF460N6R-30- ☐ ☐	32.10
7	810	—	300	600	600	2	2	AF750N7R-30- ☐ ☐	41.80
8	1215	—	450	900	900	2	2	AF1650N8R-30-70	76.00

Coil voltages and codes AF09N ... AF265N

Voltage V - 50Hz/60Hz	Voltage V - d.c.	Code ☐ ☐
24 ... 60	20 ... 60	1 1
48 ... 130	48 ... 130	1 2
100 ... 250	100 ... 250	1 3
250 ... 500	250 ... 500	1 4

Coil voltages and codes: AF460N ... AF1650N

Voltage 50/60Hz	Voltage V d.c.	Code ☐ ☐
—	20 ... 60	6 8 ⁽¹⁾
48 ... 130	48 ... 130	6 9
100 ... 250	100 ... 250	7 0 ⁽²⁾

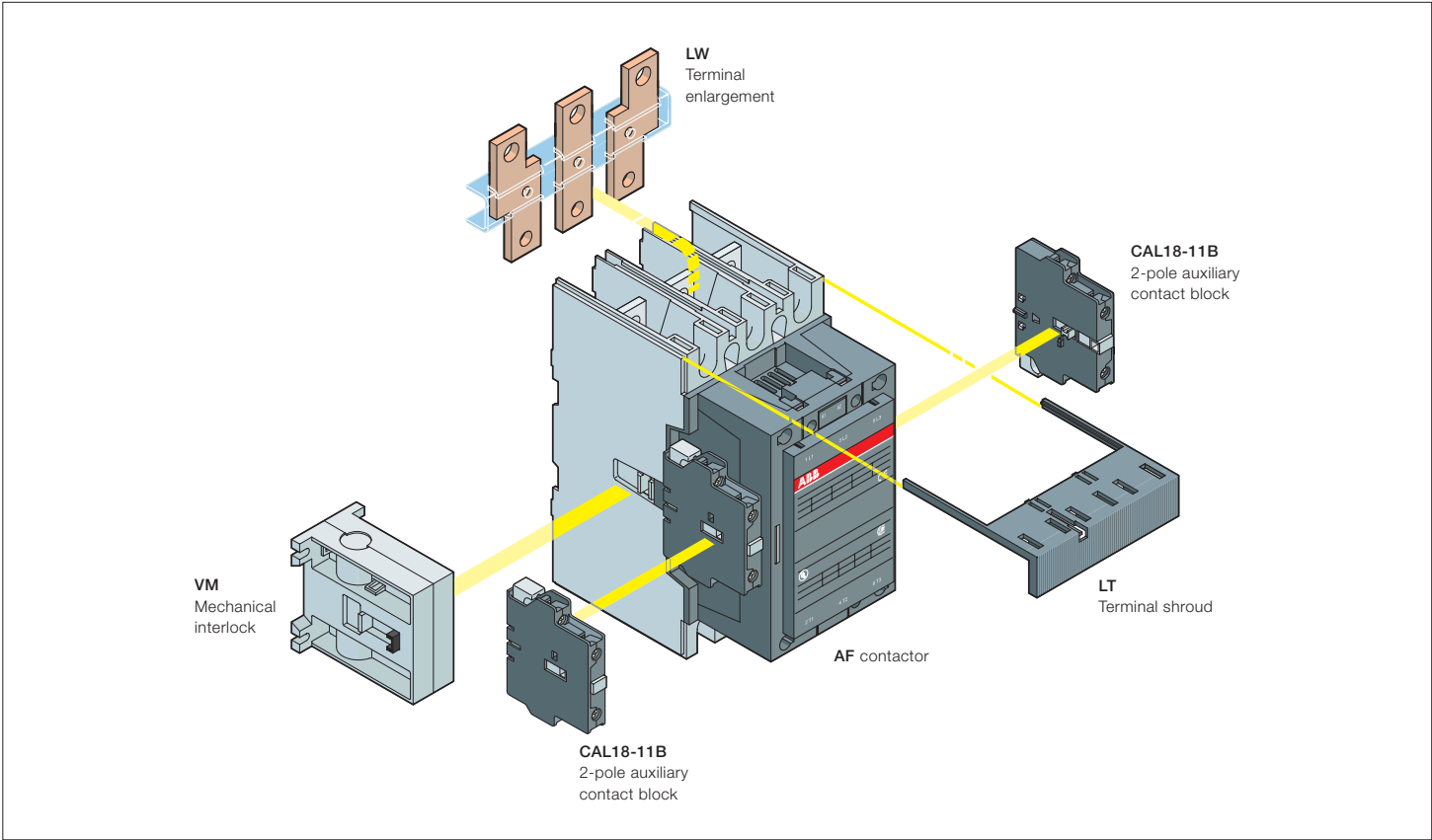
(1) The connection polarities indicated close to the coil terminals must be respected: **A1** for the **positive** pole and **A2** for the **negative** pole.

(2) Only coil available for AF1650N

AF400 ... AF2650 3-pole contactors

Main accessories

Main accessories (other accessories available)



Main accessory fitting details

Contactor types	Main poles	Available auxiliary contacts	Side-mounted accessories		
			Auxiliary contact blocks		Mechanical interlock units
			CAL18-11	CAL18-11B (3)	(between two contactors)

Contactor types + auxiliary contact blocks

AF400 ... AF2650	3	0	1	1	1 x CAL18-11	+	2 x CAL18-11B	-
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Contactor types with mechanical interlocking + auxiliary contact blocks

AF400 ... AF2650	3	0	1	1	2 x CAL18-11 (1)	+	4 x CAL18-11B (1)	+	VM...H (2)
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(1) Total number of auxiliary contact blocks for the two contactors. (2) Interlock type, according to the contactor ratings (see "Accessories").
(3) The CEL18-.. auxiliary contact blocks can replace the CAL18-11 and CAL18-11B. Though, no auxiliary contact block can be mounted outside the CEL18-..

Overload relays fitting details

Contactor types	Thermal overload relays	Electronic overload relays
AF400, AF460	-	EF460 (150...500 A) (4)
AF580, AF750	-	EF750 (250...800 A) (4)
AF1350, AF1650	-	E1250DU (375...1250 A) (4)

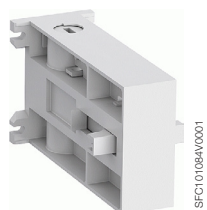
The addition of a thermal or electronic overload relay on the contactor does not prevent fitting of many other accessories as shown in "Main accessory fitting details" table.
(4) Mounting kit required (see "Motor protection").

AF400 ... AF2650 3-pole contactors

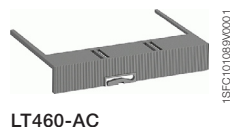
Main accessories



CAL18-11



VM750H



LT460-AC

Ordering details (1)

For contactors	Auxiliary contacts	Order code	Pkg qty	Weight (1 pce)
	 			kg

Side-mounted instantaneous auxiliary contact blocks

AF400 ... AF2650	1	1	CAL18-11	2	0.05
	1	1	CAL18-11B	2	0.05

Mechanical interlock unit

AF400 ... AF1250	VM750H	1	0.20
AF1350 ... AF2650	VM1650H	1	6.00

Terminal shrouds

AF400, AF460 with cable clamps	LT460-AC	2	0.10
AF400, AF460 with compression lugs	LT460-AL	2	0.80
AF580 ... AF750 with cable clamps	LT750-AC	2	0.12
AF580 ... AF750 with compression lugs	LT750-AL	2	0.83

For contactors	Dimensions	Order code	Pkg qty	Weight (1 pce)
	hole Ø mm	bar mm		kg

Terminal enlargements

AF400, AF460	10.5	25 x 5	LW460	1	0.73
AF580, AF750	13	40 x 6	LW750	1	1.23
AF1250	13	50 x 10	LW1250	1	2.00

Terminal extension

AF400, AF460	10.5	25 x 5	LX460	1	0.50
AF580, AF750	13	40 x 6	LX750	1	0.85

(1) For more information, refer to "Accessories" section.

For contactors	Cable range	Order code	Pkg qty	Weight (1 pce)
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Connector terminal lug kits

AF400 ... AF580	(2) 2/0 ... 500 MCM	ATK580/2	3	0.35
AF580 ... AF750	(3) 2/0 ... 500 MCM	ATK750/3	3	1.07
AF1350 ... AF1650	(4) 1/0 ... 750 MCM (1)	ATK1650/4	3	4.38
AF1350 ... AF1650	(6) 1/0 ... 750 MCM (1)	ATK1650/6	3	3.35

(1) Use of lug kits for AF1350 & AF1650 in general use application reduces the rating to 1050A and 13050A respectively. Recommend busbar connection for full ratings.

AF09 ... AF38 3-pole contactors

Technical data

Main pole - Utilization characteristics according to UL / NEMA / CSA

Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Standards		UL 508, CSA C22.2 N°60947-4-1					
Max. operational voltage		600 V					
NEMA size		00	0	–	1	–	–
NEMA continuous amp rating	Thermal current	9 A	18 A		27 A		
NEMA maximum horse power ratings 1-phase, 60 Hz	115 V AC	1/3 hp	1 hp		2 hp		
	230 V AC	1 hp	2 hp		3 hp		
NEMA maximum horse power ratings 3-phase, 60 Hz	200 V AC	1-1/2 hp	3 hp		7-1/2 hp		
	230 V AC	1-1/2 hp	3 hp		7-1/2 hp		
	460 V AC	2 hp	5 hp		10 hp		
	575 V AC	2 hp	5 hp		10 hp		
UL / CSA general use rating							
	600 V AC	25 A	28 A	30 A	45 A	50 A	50 A
With conductor cross-sectional area		AWG 10	AWG 10	AWG 10	AWG 8	AWG 8	AWG 8
1 pole	80 V DC	25 A	28 A	30 A	45 A	50 A	50 A
2 poles in serie	160 V DC	25 A	28 A	30 A	45 A	50 A	50 A
3 poles in serie	240 V DC	25 A	28 A	30 A	45 A	50 A	50 A
With conductor cross-sectional area		AWG 10	AWG 10	AWG 10	AWG 8	AWG 8	AWG 8
UL / CSA maximum 1-phase motor rating							
Full load current	120 V AC	13.8 A	16 A	20 A	24 A	24 A	24 A
	240 V AC	10 A	12 A	17 A	17 A	28 A	28 A
Horse power rating	120 V AC	3/4 hp	1 hp	1-1/2 hp	2 hp	2 hp	2 hp
	240 V AC	1-1/2 hp	2 hp	3 hp	3 hp	5 hp	5 hp
UL / CSA maximum 3-phase motor rating							
Full load current (1)	200-208 V AC	7.8 A	11 A	17.5 A	25.3 A	32.2 A	32.2 A
	220-240 V AC	6.8 A	9.6 A	15.2 A	22 A	28 A	28 A
	440-480 V AC	7.6 A	11 A	14 A	21 A	27 A	34 A
	550-600 V AC	9 A	11 A	17 A	22 A	27 A	32 A
Horse power rating (1)	200-208 V AC	2 hp	3 hp	5 hp	7-1/2 hp	10 hp	10 hp
	220-240 V AC	2 hp	3 hp	5 hp	7-1/2 hp	10 hp	10 hp
	440-480 V AC	5 hp	7-1/2 hp	10 hp	15 hp	20 hp	25 hp
	550-600 V AC	7-1/2 hp	10 hp	15 hp	20 hp	25 hp	30 hp
UL / CSA - DC motor starting - 3 poles in series							
Full Load Amps (FLA)	125 V DC	9.5 A	13.2 A	17 A	25 A	25 A	25 A
	250 V DC	8.5 A	12.2 A	12.2 A	20 A	29 A	29 A
Horse power rating	125 V DC	1 hp	1-1/2 hp	2 hp	3 hp	3 hp	3 hp
	250 V DC	2 hp	3 hp	3 hp	5 hp	7-1/2 hp	7-1/2 hp
Short-circuit protection device for contactors							
without thermal overload relay - Motor protection excluded							
High fault current		100 kA					
Fuse rating		30 A	30 A	60 A	60 A	100 A	100 A
Fuse type, 600 V		J					
Max. electrical switching frequency							
For general use		600 cycles/h					
For motor use		1200 cycles/h					

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

AF40 ... AF96 3-pole contactors

Technical data

Main pole - Utilization characteristics according to UL / NEMA / CSA

Contactor types	AC / DC operated	AF40	AF52	AF65	AF80	AF96
Standards		UL 60947-4-1, CSA C22.2 N°60947-4-1				
Maximum operational voltage		600 V				
NEMA size		2	-	-	3	-
NEMA continuous amp rating	Thermal current	45 A	-	-	90 A	-
NEMA maximum horse power ratings						
1-phase, 60 Hz	115 V AC	3 hp	-	-	-	-
	230 V AC	7.5 hp	-	-	-	-
NEMA maximum horse power ratings						
3-phase, 60 Hz	200 V AC	10 hp	-	-	25 hp	-
	230 V AC	15 hp	-	-	30 hp	-
	460 V AC	25 hp	-	-	50 hp	-
	575 V AC	25 hp	-	-	50 hp	-
UL / CSA general use rating						
	600 V AC	60 A	80 A	90 A	105 A	115 A
With conductor cross-sectional area		AWG 6	AWG 4	AWG 3	AWG 2	AWG 2
1 pole	80 V DC	60 A	80 A	90 A	105 A	115 A
2 poles in serie	160 V DC	60 A	80 A	90 A	105 A	115 A
3 poles in serie	240 V DC	60 A	80 A	90 A	105 A	115 A
With conductor cross-sectional area		AWG 6	AWG 4	AWG 3	AWG 2	AWG 2
UL / CSA maximum 1-phase motor rating						
Full load current	120 V AC	34 A	34 A	56 A	80 A	80 A
	240 V AC	40 A	50 A	68 A	68 A	88 A
Horse power rating	120 V AC	3 hp	3 hp	5 hp	7-1/2 hp	7-1/2 hp
	240 V AC	7-1/2 hp	10 hp	15 hp	15 hp	20 hp
UL / CSA maximum 3-phase motor rating						
Full load current (1)	200-208 V AC	32.2 A	48.3 A	62.1 A	78.2 A	92 A
	220-240 V AC	42 A	54 A	68 A	80 A	80 A
	440-480 V AC	40 A	52 A	65 A	77 A	77 A
	550-600 V AC	41 A	52 A	62 A	77 A	77 A
Horse power rating (1)	200-208 V AC	10 hp	15 hp	20 hp	25 hp	30 hp
	220-240 V AC	15 hp	20 hp	25 hp	30 hp	30 hp
	440-480 V AC	30 hp	40 hp	50 hp	60 hp	60 hp
	550-600 V AC	40 hp	50 hp	60 hp	75 hp	75 hp
UL / CSA - DC motor starting - 3 poles in series						
Full Load Amps (FLA)	125 V DC	40 A	58 A	76 A	76 A	110 A
	250 V DC	38 A	55 A	72 A	89 A	106 A
Horse power rating	125 V DC	5 hp	7-1/2 hp	10 hp	10 hp	15 hp
	250 V DC	10 hp	15 hp	20 hp	25 hp	30 hp
Short-circuit protection device for contactors						
without thermal overload relay - Motor protection excluded						
High fault current		100 kA				
Fuse rating		150 A	150 A	150 A	200 A	200 A
Fuse type, 600 V		J				
Maximum electrical switching frequency						
For general use		600 cycles/h				
For motor use		1200 cycles/h				

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

AF116 ... AF370 3-pole contactors

Technical data

Main pole - Utilization characteristics according to UL / NEMA / CSA

Contactor types	AC / DC operated	AF116	AF140	AF146	AF190	AF205	AF265	AF305	AF370
Standards		UL 60947-1 / 60947-4-1A and CSA 60947-1 / 60947-4-1A							
Maximum operational voltage		600V							
NEMA size		—	4	—	—	—	5	—	—
NEMA continuous amp rating	Thermal current	—	135 A	—	—	—	270 A	—	—
NEMA maximum horse power ratings 1-phase, 60 Hz	115 V AC	—	—	—	—	—	—	—	—
	230 V AC	—	—	—	—	—	—	—	—
NEMA maximum horse power ratings 3-phase, 60 Hz	200 V AC	—	40 hp	—	—	—	75 hp	—	—
	230 V AC	—	50hp	—	—	—	100 hp	—	—
	460 V AC	—	100 hp	—	—	—	200 hp	—	—
	575 V AC	—	100 hp	—	—	—	200 hp	—	—
UL / CSA general use rating									
600 V AC		160 A	200 A	200 A	250 A	300 A	350 A	400 A	520 A
With conductor cross-sectional area		AWG 2/0	AWG 3/0	AWG 3/0	MCM 250	MCM 350 (2)	MCM 500	2//AWG 3/0	2//MCM 300
1 pole	90 V DC	160 A	200 A	200 A	—	—	—	—	—
	100 V DC	—	—	—	250 A	350 A	—	—	—
	110 V DC	—	—	—	—	—	400 A	500 A	520 A
2 poles in serie	175 V DC	160 A	200 A	200 A	—	—	—	—	—
	200 V DC	—	—	—	250 A	350 A	—	—	—
	225 V DC	—	—	—	—	—	400 A	500 A	520 A
3 poles in serie	260 V DC	160 A	200 A	200 A	—	—	—	—	—
	300 V DC	—	—	—	250 A	350 A	—	—	—
	340 V DC	—	—	—	—	—	400 A	500 A	520 A
With conductor cross-sectional area		AWG 2/0	AWG 3/0	AWG 3/0	MCM 250	MCM 350 (2)	MCM 500	2//AWG 3/0	2//MCM 300
UL / CSA maximum 1-phase motor rating									
Full load current	120 V AC	—	—	—	—	—	—	—	—
	240 V AC	—	—	—	—	—	—	—	—
Horse power rating	120 V AC	—	—	—	—	—	—	—	—
	240 V AC	—	—	—	—	—	—	—	—
UL / CSA maximum 3-phase motor rating									
Full load current (1)	200-208 V AC	92 A	120 A	120 A	150 A	177 A	221 A	285 A	359 A
	220-240 V AC	104 A	130 A	130 A	154 A	192 A	248 A	312 A	360 A
	440-480 V AC	96 A	124 A	124 A	156 A	180 A	240 A	302 A	361 A
	550-600 V AC	99 A	125 A	125 A	144 A	192 A	242 A	289 A	336 A
Horse power rating (1)	200-208 V AC	30 hp	40 hp	40 hp	50 hp	60 hp	75 hp	100 hp	125 hp
	220-240 V AC	40 hp	50 hp	50 hp	60 hp	75 hp	100 hp	125 hp	150 hp
	440-480 V AC	75 hp	100 hp	100 hp	125 hp	150 hp	200 hp	250 hp	300 hp
	550-600 V AC	100 hp	125 hp	125 hp	150 hp	200 hp	250 hp	300 hp	350 hp
Short-circuit protection device for contactors									
without thermal overload relay - Motor protection excluded									
High fault current		100 kA							
Fuse rating		225 A	250 A	250 A	450 A	400 A	500 A	600 A	800 A
Fuse type, 600 V		J							
Maximum electrical switching frequency									
For general use		300 cycles/h							
For motor use		300 cycles/h							

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

(2) For conductor cross-sectional area above MCM 300 use terminal enlargements LW205.

AF400 ... AF2650 3-pole contactors

Technical data

Main pole - Utilization characteristics according to UL / NEMA / CSA

Contactor types	AC / DC operated	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650
Standards		UL 508, CSA C22.2 N°14								
Maximum operational voltage		600 V					1000 V			
NEMA size		–	6	–	7	–	–	8	–	–
NEMA maximum horse power ratings 1-phase, 60 Hz	115 V AC	–								
	230 V AC	–								
NEMA maximum horse power ratings 3-phase, 60 Hz	200 V AC	–	150 hp	–	–	–	–	–	–	–
	230 V AC	–	200 hp	–	300 hp	–	–	450 hp	–	–
	460 V AC	–	400 hp	–	600 hp	–	–	900 hp	–	–
	575 V AC	–	400 hp	–	600 hp	–	–	900 hp	–	–
UL / CSA general use rating										
1000 V AC		550 A	650 A	750 A	900 A	1210 A	1350 A	1650 A	2100 A	2700 A
UL / CSA maximum 1-phase motor rating										
Full load current	120 V AC	–	–	–	–	–	–	–	–	–
	240 V AC	–	–	–	–	–	–	–	–	–
Horse power rating	120 V AC	–	–	–	–	–	–	–	–	–
	240 V AC	–	–	–	–	–	–	–	–	–
UL / CSA maximum 3-phase motor rating										
Full load current (1)	200-208 V AC	358.8 A	414 A	552 A	692.3 A	–	954 A	1030 A	–	–
	220-240 V AC	360 A	480 A	604 A	722 A	–	954 A	1030 A	–	–
	440-480 V AC	414 A	477 A	590 A	722 A	–	954 A	1030 A	–	–
	550-600 V AC	382 A	472 A	578 A	672 A	–	944 A	1050 A	–	–
Horse power rating (1)	200-208 V AC	125 hp	150 hp	200 hp	250 hp	–	–	–	–	–
	220-240 V AC	150 hp	200 hp	250 hp	300 hp	–	400 A	450 hp	–	–
	440-480 V AC	350 hp	400 hp	500 hp	600 hp	–	800 A	900 hp	–	–
	550-600 V AC	400 hp	500 hp	600 hp	700 hp	–	1000 A	1150 hp	–	–
Short-circuit protection device for contactors										
without thermal overload relay - Motor protection excluded										
Fuse rating		1000 A		1200 A			Please consult us for coordination with circuit-breaker			
Fuse type, 600 V		L								
Maximum electrical switching frequency										
For general use		300 cycles/h					60 cycles/h			15 cycles/h
For motor use		300 cycles/h					60 cycles/h			–

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

AF09 ... AF96 3-pole contactors

Technical data

Main pole utilization characteristics - 3 N.O. non-reversing contactors

Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38	AF40	AF52	AF65	AF80	AF96
HVAC application - UL / CSA												
Definite purpose heating rating - 3-phase												
Full Load Amps (FLA)		20 A	25 A	30 A	45 A	50 A	50 A	60 A	80 A	90 A	105 A	115 A
Locked Rotor Amps (LRA)	200-208 V AC	120 A	150 A	180 A	270 A	300 A	300 A	360 A	480 A	540 A	630 A	690 A
	220-240 V AC	120 A	150 A	180 A	270 A	300 A	300 A	360 A	480 A	540 A	630 A	690 A
	440-480 V AC	120 A	150 A	180 A	270 A	300 A	300 A	360 A	480 A	540 A	630 A	690 A
	550-600 V AC	80 A	100 A	120 A	180 A	200 A	200 A	240 A	320 A	360 A	420 A	460 A
Definite purpose air conditioning rating - 3-phase												
Full Load Amps (FLA)		20 A	25 A	30 A	45 A	50 A	50 A	60 A	80 A	90 A	105 A	115 A
Locked Rotor Amps (LRA)	200-208 V AC	120 A	150 A	180 A	270 A	300 A	300 A	360 A	480 A	540 A	630 A	690 A
	220-240 V AC	120 A	150 A	180 A	270 A	300 A	300 A	360 A	480 A	540 A	630 A	690 A
	440-480 V AC	120 A	150 A	180 A	270 A	300 A	300 A	360 A	480 A	540 A	630 A	690 A
	550-600 V AC	80 A	100 A	120 A	180 A	200 A	200 A	240 A	320 A	360 A	420 A	460 A
AC Resistance air heating												
Full Load Amps (FLA)	600 V AC	20 A	25 A	30 A	45 A	50 A	50 A	65 A	80 A	90 A	105 A	115 A
Elevator control, load switching, 500 000 electrical operating cycles												
acc. to CSA B44.1 / ASME 17.5 paragraph 19.2.1												
1-phase												
Horse power rating	110-120 V AC	1/4 hp	1/3 hp	(1)	1-1/2 hp	2 hp	2 hp	3 hp	3 hp	3 hp	5 hp	5 hp
	220-240 V AC	1/2 hp	3/4 hp	(1)	3 hp	3 hp	5 hp	5 hp	7-1/2 hp	10 hp	10 hp	10 hp
3-phase												
Horse power rating	200-208 V AC	1 hp	2 hp	(1)	5 hp	7-1/2 hp	7-1/2 hp	10 hp	10 hp	15 hp	15 hp	15 hp
	220-240 V AC	1 hp	2 hp	(1)	5 hp	7-1/2 hp	10 hp	10 hp	15 hp	20 hp	20 hp	20 hp
	440-480 V AC	3 hp	5 hp	(1)	15 hp	20 hp	20 hp	25 hp	30 hp	40 hp	40 hp	40 hp
	550-600 V AC	3 hp	5 hp	(1)	15 hp	20 hp	20 hp	30 hp	40 hp	40 hp	50 hp	50 hp
Elevator control, 500 000 mechanical operating cycles, 5 electrical operating cycles												
acc. to CSA B44.1 / ASME 17.5 paragraph 19.2.2												
1-phase												
Horse power rating	110-120 V AC	3/4 hp	1 hp	1-1/2 hp	2 hp	2 hp	3 hp	3 hp	3 hp	5 hp	7-1/2 hp	7-1/2 hp
	220-240 V AC	1-1/2 hp	2 hp	3 hp	3 hp	5 hp	7.5 hp	7-1/2 hp	7-1/2 hp	10 hp	15 hp	20 hp
3-phase												
Horse power rating	200-208 V AC	2 hp	3 hp	5 hp	7-1/2 hp	10 hp	10 hp	10 hp	15 hp	20 hp	25 hp	30 hp
	220-240 V AC	2 hp	3 hp	5 hp	7-1/2 hp	10 hp	10 hp	15 hp	20 hp	25 hp	30 hp	30 hp
	440-480 V AC	5 hp	7-1/2 hp	10 hp	15 hp	20 hp	25 hp	30 hp	40 hp	50 hp	60 hp	60 hp
	550-600 V AC	7-1/2 hp	10 hp	15 hp	20 hp	25 hp	30 hp	40 hp	50 hp	60 hp	75 hp	75 hp
Lighting application - UL / CSA												
Tungsten lamps												
1-phase per pole	347 V AC	20 A	25 A	30 A	45 A	50 A	50 A	65 A	80 A	90 A	105 A	115 A
3-phase break all lines	600 V AC	20 A	25 A	30 A	45 A	50 A	50 A	65 A	80 A	90 A	105 A	115 A
Electrical discharge lamps (ballast)												
1-phase per pole	347 V AC	20 A	25 A	30 A	45 A	50 A	50 A	65 A	80 A	90 A	105 A	115 A
3-phase break all lines	600 V AC	20 A	25 A	30 A	45 A	50 A	50 A	65 A	80 A	90 A	105 A	115 A

(1) 3-pole AF16 cannot be used. Select 4-pole non-reversing contactor AF16..-40-..

AF116 ... AF370 3-pole contactors

Technical data

Main pole utilization characteristics - 3 N.O. non-reversing contactors

Contactor types	AC / DC operated	AF116	AF140	AF146	AF190	AF205	AF265	AF305	AF370
HVAC application - UL / CSA									
Definite purpose heating rating - 3-phase									
Full Load Amps (FLA)		116 A	125 A	160 A	200 A	250 A	300 A	350 A	520 A
Locked Rotor Amps (LRA)	200-208 V AC	800 A	875 A	1050 A	1400 A	1500 A	2100 A	2450 A	3120 A
	220-240 V AC	800 A	875 A	1050 A	1400 A	1500 A	2100 A	2450 A	3120 A
	440-480 V AC	800 A	875 A	1050 A	1400 A	1500 A	2100 A	2450 A	3120 A
	550-600 V AC	800 A	875 A	1050 A	1400 A	1500 A	2100 A	2450 A	3120 A
Definite purpose air conditioning rating - 3-phase									
Full Load Amps (FLA)		116 A	125 A	160 A	200 A	250 A	300 A	350 A	520 A
Locked Rotor Amps (LRA)	200-208 V AC	800 A	875 A	1050 A	1400 A	1500 A	2100 A	2450 A	3120 A
	220-240 V AC	800 A	875 A	1050 A	1400 A	1500 A	2100 A	2450 A	3120 A
	440-480 V AC	800 A	875 A	1050 A	1400 A	1500 A	2100 A	2450 A	3120 A
	550-600 V AC	800 A	875 A	1050 A	1400 A	1500 A	2100 A	2450 A	3120 A
AC Resistance air heating									
Full Load Amps (FLA)	600 V AC	160 A	200 A	200 A	250 A	300 A	400 A	450 A	520 A
Elevator control, load switching, 500 000 electrical operating cycles									
acc. to CSA B44.1 / ASME 17.5 paragraph 19.2.1									
3-phase									
Horse power rating	200-208 V AC	15 hp	15 hp	15 hp	–	–	–	–	–
	220-240 V AC	20 hp	20 hp	20 hp	–	–	–	–	–
	440-480 V AC	40 hp	40 hp	40 hp	–	–	–	–	–
	550-600 V AC	50 hp	50 hp	50 hp	–	–	–	–	–
Elevator control, 500 000 mechanical operating cycles, 5 electrical operating cycles									
acc. to CSA B44.1 / ASME 17.5 paragraph 19.2.2									
3-phase									
Horse power rating	200-208 V AC	30 hp	40 hp	40 hp	50 hp	60 hp	75 hp	100 hp	125 hp
	220-240 V AC	40 hp	50 hp	50 hp	60 hp	75 hp	100 hp	125 hp	150 hp
	440-480 V AC	75 hp	100 hp	100 hp	125 hp	150 hp	200 hp	250 hp	300 hp
	550-600 V AC	100 hp	125 hp	125 hp	150 hp	200 hp	250 hp	300 hp	350 hp
Lighting application - UL / CSA									
Tungsten lamps									
1-phase per pole	347 V AC	–	–	–	–	–	–	–	–
3-phase break all lines	600 V AC	–	–	–	–	–	–	–	–
Electrical discharge lamps (ballast)									
1-phase per pole	347 V AC	160 A	200 A	200 A	250 A	300 A	400 A	450 A	520 A
3-phase break all lines	600 V AC	160 A	200 A	200 A	250 A	300 A	400 A	450 A	520 A

AF09 ... AF38 3-pole contactors

Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1					
Rated operational voltage U_e max.		690 V					
Rated frequency (without derating)		50 / 60 Hz					
Conventional free-air thermal current I_{th}							
acc. to IEC 60947-4-1, open contactors, $\theta \leq 40^\circ\text{C}$		35 A	35 A	35 A	50 A	50 A	50 A
With conductor cross-sectional area		6 mm ²	6 mm ²	6 mm ²	10 mm ²	10 mm ²	10 mm ²
AC-1 Utilization category							
For air temperature close to contactor							
I_e / Rated operational current AC-1	$\theta \leq 40^\circ\text{C}$	25 A	28 A	30 A	45 A	50 A	50 A
U_e max. $\leq 690\text{ V}$, 50/60 Hz	$\theta \leq 60^\circ\text{C}$	25 A	28 A	30 A	40 A	42 A	42 A
	$\theta \leq 70^\circ\text{C}$	22 A	24 A	26 A	32 A	37 A	37 A
With conductor cross-sectional area		4 mm ²	6 mm ²	6 mm ²	10 mm ²	10 mm ²	10 mm ²
AC-3 Utilization category							
For air temperature close to contactor $\theta \leq 60^\circ\text{C}$							
I_e / Max. rated operational current AC-3 (1)							
	220-230-240 V	9 A	12 A	18 A	26 A	33 A	40 A
	380-400 V	9 A	12 A	18 A	26 A	32 A	38 A
	415 V	9 A	12 A	18 A	26 A	32 A	38 A
	440 V	9 A	12 A	18 A	26 A	32 A	38 A
	500 V	9.5 A	12.5 A	15 A	23 A	28 A	33 A
	690 V	7 A	9 A	10.5 A	17 A	21 A	24 A
Rated operational power AC-3 (1)							
	220-230-240 V	2.2 kW	3 kW	4 kW	6.5 kW	9 kW	11 kW
	380-400 V	4 kW	5.5 kW	7.5 kW	11 kW	15 kW	18.5 kW
	415 V	4 kW	5.5 kW	9 kW	11 kW	15 kW	18.5 kW
	440 V	4 kW	5.5 kW	9 kW	15 kW	18.5 kW	22 kW
	500 V	5.5 kW	7.5 kW	9 kW	15 kW	18.5 kW	22 kW
	690 V	5.5 kW	7.5 kW	9 kW	15 kW	18.5 kW	22 kW
Rated making capacity AC-3		10 x I_e AC-3 acc. to IEC 60947-4-1					
Rated breaking capacity AC-3		8 x I_e AC-3 acc. to IEC 60947-4-1					
AC-8a Utilization category							
(without thermal overload relay - U_e 400 V 50/60 Hz - $\theta \leq 40^\circ\text{C}$)							
I_e / Rated operational current AC-8a		12 A	16 A	22 A	30 A	40 A	50 A
Rated operational power AC-8a		5.5 kW	7.5 kW	11 kW	15 kW	20 kW	25 kW
Short-circuit protection device for contactors							
without thermal overload relay - Motor protection excluded (2)							
$U_e \leq 500\text{ V AC}$ - gG type fuse		25 A	32 A	32 A	50 A	63 A	63 A
Rated short-time withstand current I_{cw}							
at 40°C ambient temperature,	1 s	300 A	300 A	300 A	700 A	700 A	700 A
in free air from a cold state	10 s	150 A	150 A	150 A	350 A	350 A	350 A
	30 s	80 A	80 A	80 A	225 A	225 A	225 A
	1 min	60 A	60 A	60 A	150 A	150 A	150 A
	15 min	35 A	35 A	35 A	50 A	50 A	50 A
Maximum breaking capacity							
$\cos \varphi = 0.45$	at 440 V	250 A	250 A	250 A	500 A	500 A	500 A
	at 690 V	106 A	106 A	106 A	200 A	200 A	200 A
Power dissipation per pole							
	I_e / AC-1	0.8 W	1 W	1.2 W	1.8 W	2.4 W	2.4 W
	I_e / AC-3	0.1 W	0.2 W	0.35 W	0.6 W	0.9 W	1.3 W
Max. electrical switching frequency							
	AC-1	600 cycles/h					
	AC-3	1200 cycles/h					
	AC-2, AC-4	300 cycles/h				150 cycles/h	

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m. 50 Hz or 1800 r.p.m. 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

AF40 ... AF96 3-pole contactors

Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC / DC operated	AF40	AF52	AF65	AF80	AF96
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1				
Rated operational voltage U_e max.		690 V				1000 V
Rated frequency (without derating)		50 / 60 Hz				
Conventional free-air thermal current I_{th}						
acc. to IEC 60947-4-1, open contactors, $\theta \leq 40^\circ\text{C}$		105 A	105 A	105 A	130 A	130 A
With conductor cross-sectional area		35 mm ²	35 mm ²	35 mm ²	50 mm ²	50 mm ²
AC-1 Utilization category						
For air temperature close to contactor						
I_e / Rated operational current AC-1	$\theta \leq 40^\circ\text{C}$	70 A	100 A	105 A	125 A	130 A
U _e max. $\leq 690\text{ V}$, 50/60 Hz	$\theta \leq 60^\circ\text{C}$	60 A	80 A	90 A	100 A	105 A
	$\theta \leq 70^\circ\text{C}$	50 A	70 A	80 A	85 A	90 A
With conductor cross-sectional area		25 mm ²	35 mm ²	35 mm ²	50 mm ²	50 mm ²
AC-3 Utilization category						
For air temperature close to contactor $\theta \leq 60^\circ\text{C}$						
I_e / Max. rated operational current AC-3 (1)						
	220-230-240 V	40 A	53 A	65 A	80 A	96 A
	380-400 V	40 A	53 A	65 A	80 A	96 A
	415 V	40 A	53 A	65 A	80 A	96 A
	440 V	40 A	53 A	65 A	80 A	96 A
	500 V	35 A	45 A	55 A	65 A	80 A
	690 V	25 A	35 A	39 A	49 A	57 A
	1000 V	—	—	—	25 A	30 A
Rated operational power AC-3 (1)						
	220-230-240 V	11 kW	15 kW	18.5 kW	22 kW	25 kW
	380-400 V	18.5 kW	22 kW	30 kW	37 kW	45 kW
	415 V	22 kW	30 kW	37 kW	45 kW	55 kW
	440 V	22 kW	30 kW	37 kW	45 kW	55 kW
	500 V	22 kW	30 kW	37 kW	45 kW	55 kW
	690 V	22 kW	30 kW	37 kW	45 kW	55 kW
	1000 V	—	—	—	35 kW	40 kW
Rated making capacity AC-3		10 x I _e AC-3 acc. to IEC 60947-4-1				
Rated breaking capacity AC-3		8 x I _e AC-3 acc. to IEC 60947-4-1				
AC-8a Utilization category						
(without thermal overload relay - U _e 400 V 50/60 Hz - $\theta \leq 40^\circ\text{C}$)						
I_e / Rated operational current AC-8a		53 A	70 A	85 A	105 A	120 A
Rated operational power AC-8a		25 kW	37 kW	45 kW	55 kW	65 kW
Short-circuit protection device for contactors						
without thermal overload relay - Motor protection excluded (2)						
U _e $\leq 500\text{ V}$ AC - gG type fuse		100 A	125 A	160 A	160 A	200 A
Rated short-time withstand current I_{cw}	1 s	1000 A	1000 A	1000 A	1200 A	1200 A
at 40 °C ambient temperature,	10 s	600 A	600 A	600 A	780 A	780 A
in free air from a cold state	30 s	350 A	350 A	350 A	450 A	450 A
	1 min	250 A	250 A	250 A	300 A	300 A
	15 min	110 A	110 A	110 A	140 A	140 A
Maximum breaking capacity						
cos $\phi = 0.45$	at 440 V	950 A	950 A	950 A	1150 A	1150 A
	at 690 V	600 A	600 A	600 A	750 A	750 A
Power dissipation per pole	I _e / AC-1	3 W	6.3 W	7 W	7.6 W	8.2 W
	I _e / AC-3	1 W	1.7 W	2.7 W	3 W	4.5 W
Max. electrical switching frequency						
	AC-1	600 cycles/h				
	AC-3	1200 cycles/h				
	AC-2, AC-4	150 cycles/h				

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m. 50 Hz or 1800 r.p.m. 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

AF116 ... AF370 3-pole contactors

Technical data

Main pole - Utilization characteristics according to IEC

Contactors types	AC / DC operated	AF116	AF140	AF146	AF190	AF205	AF265	AF305	AF370
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1							
Rated operational voltage U_e max.		690 V	690 V	1000 V	1000 V	1000 V	1000 V	1000 V	1000 V
Rated frequency (without derating)		50 / 60 Hz							
Conventional free-air thermal current I_{th}									
acc. to IEC 60947-1, open contactors, $\theta \leq 40^\circ\text{C}$		160 A	200 A	225 A	275 A	350 A	400 A	500 A	600 A
With conductor cross-sectional area		70 mm ²	95 mm ²	95 mm ²	150 mm ²	240 mm ²	240 mm ² (3)	300 mm ²	2 x 185 mm ² (4)
AC-1 Utilization category									
For air temperature close to contactor									
I_e / Rated operational current AC-1	$\theta \leq 40^\circ\text{C}$	160 A	200 A	225 A	275 A	350 A	400 A	500 A	600 A
U _e max. $\leq 690\text{ V}$, 50/60 Hz	$\theta \leq 60^\circ\text{C}$	145 A	175 A	200 A	250 A	300 A	350 A	400 A	500 A
	$\theta \leq 70^\circ\text{C}$	130 A	160 A	175 A	200 A	240 A	290 A	325 A	400 A
I_e / Rated operational current AC-1	$\theta \leq 40^\circ\text{C}$	—	—	225 A	250 A	275 A	350 A	375 A	400 A
U _e max. $\leq 1000\text{ V}$, 50/60 Hz	$\theta \leq 60^\circ\text{C}$	—	—	200 A	225 A	250 A	300 A	325 A	350 A
	$\theta \leq 70^\circ\text{C}$	—	—	175 A	185 A	200 A	240 A	260 A	290 A
With conductor cross-sectional area		70 mm ²	95 mm ²	95 mm ²	150 mm ²	240 mm ²	240 mm ² (3)	300 mm ²	2 x 185 mm ² (4)
AC-3 Utilization category									
For air temperature close to contactor $\theta \leq 60^\circ\text{C}$									
I_e / Max. rated operational current AC-3 (1)									
	220-230-240 V	116 A	140 A	146 A	190 A	205 A	265 A	305 A	370 A
	380-400 V	116 A	140 A	146 A	190 A	205 A	265 A	305 A	370 A
	415 V	116 A	140 A	146 A	190 A	205 A	265 A	305 A	370 A
	440 V	116 A	140 A	146 A	190 A	205 A	265 A	305 A	370 A
	500 V	110 A	130 A	130 A	160 A	185 A	260 A	290 A	350 A
	690 V	65 A	80 A	93 A	135 A	165 A	250 A	290 A	315 A
	1000 V	—	—	60 A	85 A	100 A	100 A	100 A	100 A
Rated operational power AC-3 (1)									
	220-230-240 V	30 kW	37 kW	45 kW	55 kW	55 kW	75 kW	90 kW	110 kW
	380-400 V	55 kW	75 kW	75 kW	90 kW	110 kW	132 kW	160 kW	200 kW
	415 V	55 kW	75 kW	75 kW	90 kW	110 kW	132 kW	160 kW	200 kW
	440 V	75 kW	90 kW	90 kW	110 kW	132 kW	160 kW	160 kW	200 kW
	500 V	75 kW	90 kW	90 kW	110 kW	132 kW	160 kW	200 kW	250 kW
	690 V	55 kW	75 kW	90 kW	132 kW	160 kW	200 kW	250 kW	315 kW
	1000 V	—	—	75 kW	110 kW	132 kW	132 kW	132 kW	132 kW
Rated making capacity AC-3		10 x I _e AC-3 acc. to IEC 60947-4-1							
Rated breaking capacity AC-3		8 x I _e AC-3 acc. to IEC 60947-4-1							
Short-circuit protection device for contactors									
without thermal overload relay - Motor protection excluded (2)									
U _e $\leq 500\text{ V}$ AC - gG type fuse		250 A	315 A	315 A	355 A	400 A	500 A	500 A	630 A
Rated short-time withstand current I_{cw}									
at 40 °C ambient temperature,	1 s	1300 A	1460 A	1460 A	1900 A	2050 A	2650 A	3050 A	3700 A
in free air from a cold state	10 s	928 A	1168 A	1168 A	1520 A	1640 A	2120 A	2440 A	2960 A
	30 s	536 A	674 A	674 A	878 A	947 A	1224 A	1409 A	1709 A
	1 min	379 A	477 A	477 A	621 A	670 A	865 A	996 A	1208 A
	15 min	160 A	200 A	225 A	275 A	350 A	400 A	500 A	600 A
Maximum breaking capacity									
cos $\phi = 0.45$	at 440 V	2000 A	3000 A	3000 A	3300 A	3500 A	3800 A	4600 A	5000 A
(cos $\phi = 0.35$ for I _e > 100 A)	at 690 V	1000 A	1500 A	1500 A	2200 A	2500 A	3300 A	3800 A	4000 A
Power dissipation per pole	I _e / AC-1	12 W	18 W	23 W	15 W	25 W	32 W	50 W	72 W
	I _e / AC-3	6 W	9 W	10 W	7 W	8 W	14 W	19 W	27 W
Maximum electrical switching frequency	AC-1	300 cycles/h							
	AC-3	300 cycles/h							
	AC-2, AC-4	150 cycles/h							

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m., 50 Hz or 1800 r.p.m., 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

(3) For currents above 275A use terminal enlargements or terminal extensions.

(4) For currents above 450A use terminal enlargements or terminal extensions.

AF400 ... AF2650 3-pole contactors

Technical data

Main pole - Utilization characteristics according to IEC

Contactor types		AC / DC operated	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650	
Standards			IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1									
Rated operational voltage U_e max.			1000 V									
Rated frequency (without derating)			50/60 Hz									
Conventional free-air thermal current I_{th}												
acc. to IEC 60947-4-1, open contactors, $\theta \leq 40\text{ }^{\circ}\text{C}$			600 A	700 A	800 A	1050 A	1260 A	1350 A	1650 A	2050 A	2650 A	
With conductor cross-sectional area (3)			2x185 mm ²	2x240 mm ²	2x240 mm ²	800 mm ² (4)	1000 mm ² (4)	1000 mm ² (5)	1500 mm ² (5)	2000 mm ² (5)	3000 mm ² (5)	
AC-1 Utilization category												
For air temperature close to contactor												
	3-phase motors	I_e / Rated operational current AC-1	$\theta \leq 40\text{ }^{\circ}\text{C}$	600 A	700 A	800 A	1050 A	1260 A	1350 A	1650 A	2050 A	2650 A
		$\theta \leq 55\text{ }^{\circ}\text{C}$	500 A	600 A	700 A	875 A	1040 A	1150 A	1450 A	1750 A	2350 A	
		$\theta \leq 70\text{ }^{\circ}\text{C}$	400 A	480 A	580 A	720 A	875 A	1000 A	1270 A	1500 A	2120 A	
	1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors	I_e / Rated operational current AC-1	$\theta \leq 40\text{ }^{\circ}\text{C}$	600 A	700 A	800 A	1000 A	1260 A	1350 A	1650 A	2050 A	2650 A
		$\theta \leq 55\text{ }^{\circ}\text{C}$	500 A	600 A	700 A	875 A	1040 A	1150 A	1450 A	1750 A	2350 A	
		$\theta \leq 70\text{ }^{\circ}\text{C}$	400 A	480 A	580 A	720 A	875 A	1000 A	1270 A	1500 A	2120 A	
With conductor cross-sectional area			2x185 mm ²	2x240 mm ²	2x240 mm ²	800 mm ² (4)	1000 mm ² (4)	1000 mm ² (5)	1500 mm ² (5)	2000 mm ² (5)	3000 mm ² (5)	
AC-3 Utilization category												
For air temperature close to contactor $\theta \leq 55\text{ }^{\circ}\text{C}$												
I_e / Max. rated operational current AC-3 (1)												
	3-phase motors	220-230-240 V	400 A	460 A	580 A	750 A	–	860 A	1050 A	–	–	
		380-400 V	400 A	460 A	580 A	750 A	–	860 A	1050 A	–	–	
		415 V	400 A	460 A	580 A	750 A	–	860 A	1050 A	–	–	
		440 V	400 A	460 A	580 A	750 A	–	860 A	1050 A	–	–	
		500 V	400 A	460 A	580 A	750 A	–	800 A	950 A	–	–	
		690 V	350 A	400 A	500 A	650 A	–	800 A	950 A	–	–	
		1000 V	155 A	200 A	250 A	300 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	110 kW	132 kW	160 kW	220 kW	–	257 kW	315 kW	–	–	
		380-400 V	200 kW	250 kW	315 kW	400 kW	–	475 kW	560 kW	–	–	
		415 V	220 kW	250 kW	355 kW	425 kW	–	500 kW	600 kW	–	–	
		440 V	220 kW	250 kW	355 kW	450 kW	–	560 kW	670 kW	–	–	
		500 V	250 kW	315 kW	400 kW	520 kW	–	560 kW	700 kW	–	–	
		690 V	315 kW	355 kW	500 kW	600 kW	–	750 kW	900 kW	–	–	
		1000 V	220 kW	280 kW	355 kW	400 kW	–	–	–	–	–	
Rated making capacity AC-3			10 x I_e AC-3 acc. to IEC 60947-4-1									
Rated breaking capacity AC-3			8 x I_e AC-3 acc. to IEC 60947-4-1									
Short-circuit protection device for contactors												
without thermal overload relay												
Motor protection excluded (2)												
$U_e \leq 500$ V AC - gG type fuse			630 A	800 A	1000 A	1000 A	Please consult us for coordination with circuit-breaker					
Rated short-time withstand current I_{cw}			1 s	4600 A	4600 A	7000 A	7000 A	8000 A	10000 A	12000 A	12000 A	
at $40\text{ }^{\circ}\text{C}$ ambient temperature,			10 s	4400 A	4400 A	6400 A	6400 A	7200 A	8000 A	10000 A	10000 A	
in free air from a cold state			30 s	3100 A	3100 A	4500 A	4500 A	5200 A	6000 A	7500 A	7500 A	
			1 min	2500 A	2500 A	3500 A	3500 A	4000 A	4500 A	5500 A	5500 A	
			15 min	840 A	840 A	1300 A	1300 A	1500 A	1600 A	2200 A	2800 A	
Maximum breaking capacity												
$\cos \phi = 0.45$			at 440 V	4000 A	5000 A	6000 A	7500 A	10000 A	12000 A	8400 A	8400 A	
$(\cos \phi = 0.35 \text{ for } I_e > 100 \text{ A})$			at 690 V	3500 A	4500 A	5000 A	7000 A	–	–	–	–	
Power dissipation per pole			I_e / AC-1	30 W	42 W	32 W	50 W	80 W	80 W	80 W	125 W	200 W
			I_e / AC-3	16 W	21 W	17 W	28 W	–	50 W	50 W	–	–
Max. electrical switching frequency			AC-1	300 cycles/h		300 cycles/h		300 cycles/h		60 cycles/h		60 cycles/h
			AC-3	300 cycles/h		300 cycles/h		–		60 cycles/h		–
			AC-2, AC-4	60 cycles/h		60 cycles/h		–		60 cycles/h		–

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m. 50 Hz or 1800 r.p.m. 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

(3) Conductors with preparation.

(4) Max. connection bar width 50 mm.

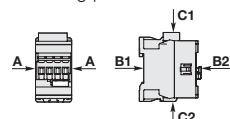
(5) Max. connection bar width 100 mm.

AF09 ... AF38 3-pole contactors

Technical data

General technical data

Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Rated insulation voltage Ui acc. to IEC 60947-4-1 acc. to UL / CSA		690 V 600 V					
Rated impulse withstand voltage Uimp.		6 kV					
Electromagnetic compatibility		Devices complying with IEC 60947-1 / EN 60947-1 - Environment A					
Ambient air temperature close to contactor							
Operation	Fitted with thermal overload relay	-25...+60 °C					
	Without thermal overload relay	-40...+70 °C					
Storage		-60...+80 °C					
Climatic withstand		Category B according to IEC 60947-1 Annex Q					
Maximum operating altitude (without derating)		3000 m					
Mechanical durability							
Number of operating cycles		10 millions operating cycles					
Max. switching frequency		3600 cycles/h					
Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27 Mounting position 1							
	Shock direction	1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position					
	A	30 g					
	B1	25 g closed position / 5 g open position					
	B2	15 g					
	C1	25 g					
	C2	25 g					
Vibration withstand acc. to IEC 60068-2-6		5...300 Hz 4 g closed position / 2 g open position					



Magnet system characteristics

Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Coil operating limits acc. to IEC 60947-4-1							
	AC supply	At $\theta \leq 60^\circ\text{C}$ $0.85 \times U_c \text{ min...} 1.1 \times U_c \text{ max.}$ At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min...} U_c \text{ max.}$					
	DC supply	At $\theta \leq 60^\circ\text{C}$ $0.85 \times U_c \text{ min...} 1.1 \times U_c \text{ max.}$ At $\theta \leq 70^\circ\text{C}$ (AF) $0.85 \times U_c \text{ min...} U_c \text{ max.}$ - (AF..Z) $0.85 \times U_c \text{ min...} 1.1 \times U_c \text{ max.}$					
AC control voltage 50/60 Hz							
Rated control circuit voltage U_c		24...500 V AC					
Coil consumption	Average pull-in value	(AF) 50 VA - (AF..Z) 16 VA					
	Average holding value	(AF) 2.2 VA / 2 W - (AF..Z) 1.7 VA / 1.5 W					
DC control voltage							
Rated control circuit voltage U_c		12...500 V DC					
Coil consumption	Average pull-in value	(AF) 50 W - (AF..Z) 12...16 W					
	Average holding value	(AF) 2 W - (AF..Z) 1.7 W					
PLC-output control		(AF..Z) $\geq 500 \text{ mA}$ 24 V DC					
Drop-out voltage		$\leq 60\%$ of $U_c \text{ min.}$					
Voltage sag immunity acc. to SEMI F47-0706		(AF..Z) conditions of use on request					
Dips withstand $-20^\circ\text{C} \leq \theta \leq +60^\circ\text{C}$		(AF..Z) 22 ms average for $U_c \geq 24 \text{ V}$ 50/60 Hz or $U_c \geq 20 \text{ V}$ DC					
Operating time							
Between coil energization and:	N.O. contact closing	40...95 ms					
	N.C. contact opening	38...90 ms					
Between coil de-energization and:	N.O. contact opening	11...95 ms					
	N.C. contact closing	13...98 ms					

Mounting characteristics and conditions for use

Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Mounting positions							
Mounting distances		Max. N.C. built-in and add-on N.C. auxiliary contacts: see accessory fitting details for a 3-pole contactor AF09 ... AF38 The contactors can be assembled side by side					
Fixing							
On rail according to IEC 60715, EN 60715		35 x 7.5 mm or 35 x 15 mm					
By screws (not supplied)		2 x M4 screws placed diagonally					

AF40 ... AF96 3-pole contactors

Technical data

General technical data

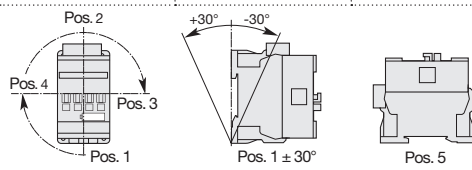
Contactor types	AC / DC operated	AF40	AF52	AF65	AF80	AF96
Rated insulation voltage U_i						
acc. to IEC 60947-4-1		690 V			1000 V	
acc. to UL / CSA		600 V				
Rated impulse withstand voltage U_{imp}		6 kV			8 kV	
Electromagnetic compatibility		Devices complying with IEC 60947-1 / EN 60947-1				
Ambient air temperature close to contactor						
Operation	Fitted with thermal overload relay	(1)				
	Without thermal overload relay	-40...+70 °C				
Storage		-60...+80 °C				
Climatic withstand		Category B according to IEC 60947-1 Annex Q				
Maximum operating altitude (without derating)		3000 m				
Mechanical durability						
Number of operating cycles		10 millions operating cycles				
Maximum switching frequency		3600 cycles/h				
Shock withstand						
acc. to IEC 60068-2-27 and EN 60068-2-27						
Mounting position 1						
	Shock direction	1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position				

(1) On request.

Magnet system characteristics

Contactor types	AC / DC operated	AF40	AF52	AF65	AF80	AF96
Coil operating limits	AC supply	At $\theta \leq 70$ °C $0.85 \times U_c \text{ min...} 1.1 \times U_c \text{ max.}$				
acc. to IEC 60947-4-1	DC supply	At $\theta \leq 70$ °C $0.85 \times U_c \text{ min...} 1.1 \times U_c \text{ max.}$				
AC control voltage 50/60 Hz						
Rated control circuit voltage U_c		24...500 V AC				
Coil consumption	Average pull-in value	25 VA			40 VA	
	Average holding value	4 VA / 2 W				
DC control voltage						
Rated control circuit voltage U_c		20...500 V DC				
Coil consumption	Average pull-in value	25 W			40 W	
	Average holding value	2 W				
PLC-output control		-				
Drop-out voltage		≤ 60 % of $U_c \text{ min.}$				
Voltage sag immunity						
acc. to SEMI F47-0706		conditions of use on request				
Dips withstand						
-20 °C $\leq \theta \leq$ +60 °C		24 ms average				
Operating time						
Between coil energization and:	N.O. contact closing	42...100 ms				
	N.C. contact opening	38...95 ms				
Between coil de-energization and:	N.O. contact opening	17...100 ms				
	N.C. contact closing	19...105 ms				

Mounting characteristics and conditions for use

Contactor types	AC / DC operated	AF40	AF52	AF65	AF80	AF96
Mounting positions						
		Max. N.C. built-in and add-on N.C. auxiliary contacts: see accessory fitting details for a 3-pole contactor AF40 ... AF96				
Mounting distances		The contactors can be assembled side by side				
Fixing						
On rail according to IEC 60715, EN 60715		35 x 7.5 mm or 35 x 15 mm			35 x 15 mm	
By screws (not supplied)		2 x M4 or 2 x M6 screws placed diagonally				

AF116 ... AF370 3-pole contactors

Technical data

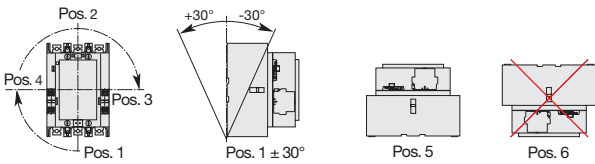
General technical data

Contactor types	AC / DC operated	AF116	AF140	AF190	AF205	AF265	AF305	AF370
Rated insulation voltage Ui								
acc. to IEC 60947-4-1		1000 V						
acc. to UL / CSA		600 V						
Rated impulse withstand voltage Uimp.		8 kV						
Electromagnetic compatibility		AF contactors comply with IEC 60947-1 / EN 60947-1 - Environment A						
Ambient air temperature close to contactor								
Operation	Fitted with thermal overload relay	-25 to +55 °C						
	Without thermal overload relay	-40 to +70 °C						
Storage		-40 to +70 °C						
Maximum operating altitude (without derating)		3000 m						
Mechanical durability								
Number of operating cycles		5 million operating cycles						
Maximum switching frequency		300 cycles/h						

Magnet system characteristics

Contactor types	AC / DC operated	AF116	AF140	AF190	AF205	AF265	AF305	AF370
Coil operating limits	AC supply	At $\theta \leq 70\text{ }^{\circ}\text{C}$ 0.85 x Uc min ... 1.1 x Uc max						
acc. to IEC 60947-4-1	DC supply	At $\theta \leq 70\text{ }^{\circ}\text{C}$ 0.80 x Uc min ... 1.1 x Uc max						
Rated control circuit voltage Uc								
Coil consumption								
AC control voltage 50/60 Hz								
24...60 V AC	Average pull-in value	225 VA		165 VA		475 VA		
	Average holding value	5.5 VA		6 VA		8.5 VA		
48...130 V AC	Average pull-in value	170 VA		175 VA		340 VA		
	Average holding value	4 VA		4 VA		17 VA		
100...250 V AC	Average pull-in value	130 VA		220 VA		385 VA		
	Average holding value	6 VA		7 VA		17.5 VA		
DC control voltage								
20...60 V DC	Average pull-in value	210 W		205 W		400 W		
	Average holding value	2.5 W		2.5 W		3 W		
48...130 V DC	Average pull-in value	130 W		130 W		360 W		
	Average holding value	2.5 W		2.5 W		2.5 W		
100...250 V DC	Average pull-in value	135 W		190 W		410 W		
	Average holding value	3 W		2.5 W		4.5 W		
Drop-out voltage		55 % of Uc min						
Operating time								
Coil supply between A1 - A2								
Between coil energization and:	N.O. contact closing	20...55 ms		25...60 ms		30...60 ms		
Between coil de-energization and:	N.O. contact opening	40...70 ms		45...80 ms		45...80 ms		

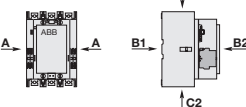
Mounting characteristics and conditions for use

Contactor types	AC / DC operated	AF116	AF140	AF190	AF205	AF265	AF305	AF370
Mounting positions								
		Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 3-pole contactor AF116 ... AF370						
Mounting distances		The contactors can be assembled side by side						
Fixing								
On rail acc. to IEC 60715, EN 60715		-						
By screws (not supplied)		4 x M5						

AF400 ... AF2650 3-pole contactors

Technical data

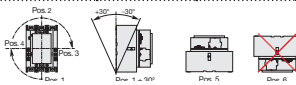
General technical data

Contactor types	AC / DC operated	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650
Rated insulation voltage Ui acc. to IEC 60947-4-1		1000 V								
acc. to UL		600 V								1000 V
Rated impulse withstand voltage Uimp.		8 kV								
Electromagnetic compatibility		AF contactors complying with IEC 60947-1 / EN 60947-1 - Environment A								
Ambient air temperature close to contactor										
Operation	Fitted with electronic overload relay	-25 to +70 °C								
	Without electronic overload relay	-40 to +70 °C								
Storage		-40 to +70 °C								
Maximum operating altitude (without derating)		3000 m								
Mechanical durability										
Number of operating cycles		3 millions operating cycles				0.5 million operating cycles				0.3 million operating cycles
Max. switching frequency		300 cycles/h				60 cycles/h				
Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27										
Mounting position 1	Shock direction	1/2 sinusoidal shock for 30 ms: no change in contact position, closed or open position								
	A	5 g								
	B1	5 g								
	B2	5 g								
	C1	5 g								
	C2	5 g								

Magnet system characteristics

Contactor types	AC / DC operated	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650
Coil operating limits	AC supply	At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$								
acc. to IEC 60947-4-1	DC supply	At $\theta \leq 70^\circ\text{C}$ $0.80 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$								
Rated control circuit voltage U_c										
Coil consumption										
AC control voltage 50/60 Hz										
24...60 V AC	Average pull-in value	900 VA		780 VA						
	Average holding value	12 VA		12 VA						
48...130 V AC	Average pull-in value	1215 VA		1100 VA						
	Average holding value	12 VA		12 VA						
100...250 V AC	Average pull-in value	955 VA		880 VA			2450 VA			
	Average holding value	12 VA		12 VA			48 VA			
250 ... 500 V AC	Average pull-in value	950 VA		985 VA						
	Average holding value	12 VA		12 VA						
DC control voltage										
20...60 V DC	Average pull-in value	900 VA		785 VA						
	Average holding value	5 VA		5.5 VA						
48...130 V DC	Average pull-in value	1150 VA		1020 VA						
	Average holding value	5 VA		5 VA						
100...250 V DC	Average pull-in value	895 VA		880 VA			2290 VA			
	Average holding value	5 VA		5 VA			20.5 VA			
250 ... 500 V AC	Average pull-in value	885 VA		910 VA						
	Average holding value	7.5 VA		7.5 VA						
Drop-out voltage		55 % of $U_c \text{ min.}$								
Voltage sag immunity acc. to SEMI F47		Conditions of use on request								
Dips withstand		$\geq 20 \text{ ms}$								
Operating time										
Coil supply between A1 - A2										
Between coil energization and:	Main contact closing	50...120 ms					50...80 ms			
Between coil de-energization and:	Main contact opening	33...70 ms					35...55 ms			
Control input for PLC's										
Between coil energization and:	Main contact closing	40...60 ms		40...90 ms			40...65 ms			
Between coil de-energization and:	Main contact opening	10...30 ms					10...30 ms			

Mounting characteristics and conditions for use

Contactor types	AC / DC operated	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650
Mounting positions										
		Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 3-pole contactor AF400 ... AF2650								
Mounting distances		The contactors can be assembled side by side								
Fixing										
On rail according to IEC 60715, EN 60715		-								
By screws (not supplied)		4 x M5		4 x M6			4 x M8			

AF09 ... AF38 3-pole contactors

Technical data

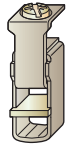
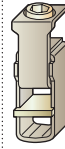
Connecting characteristics

Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Main terminals		 Screw terminals with cable clamp					
Connection capacity (min. ... max.)							
Main conductors (poles)							
 Rigid Solid ($\leq 4 \text{ mm}^2$)	}	1 x	1...6 mm ²		2.5...10 mm ²		
 Stranded ($\geq 6 \text{ mm}^2$)		2 x	1...6 mm ²		2.5...10 mm ²		
 Flexible with non insulated ferrule		1 x	0.75...6 mm ²		1.5...10 mm ²		
 Flexible with non insulated ferrule		2 x	0.75...6 mm ²		1.5...10 mm ²		
 Flexible with insulated ferrule		1 x	0.75...4 mm ²		1.5...10 mm ²		
 Flexible with insulated ferrule		2 x	0.75...2.5 mm ²		1.5...4 mm ²		
 Bars or lugs		L <	9.6 mm		12.5 mm		
Connection capacity acc. to UL/CSA	1 or 2 x	AWG 16...10			AWG 14...8		
Stripping length		10 mm			14 mm		
Tightening torque		1.5 Nm / 13 lb.in			2.5 Nm / 22 lb.in		
Auxiliary conductors							
(built-in auxiliary terminals + coil terminals)							
 Rigid solid		1 x	1...2.5 mm ²				
 Rigid solid		2 x	1...2.5 mm ²				
 Flexible with non insulated ferrule		1 x	0.75...2.5 mm ²				
 Flexible with non insulated ferrule		2 x	0.75...2.5 mm ²				
 Flexible with insulated ferrule		1 x	0.75...2.5 mm ²				
 Flexible with insulated ferrule		2 x	0.75...1.5 mm ²				
 Lugs		L <	8 mm				
Connection capacity acc. to UL/CSA	1 or 2 x	AWG 18...14					
Stripping length		10 mm					
Tightening torque							
Coil terminals		1.2 Nm / 11 lb.in					
Built-in auxiliary terminals		1.2 Nm / 11 lb.in					
Degree of protection							
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529							
Main terminals		IP20					
Coil terminals		IP20					
Built-in auxiliary terminals		IP20					
Screw terminals							
Main terminals		Delivered in open position, screws of unused terminals must be tightened					
		M3.5			M4		
	Screwdriver type	Flat Ø 5.5 / Pozidriv 2			Flat Ø 6.5 / Pozidriv 2		
Coil terminals		M3.5					
	Screwdriver type	Flat Ø 5.5 / Pozidriv 2					
Built-in auxiliary terminals		M3.5					
	Screwdriver type	Flat Ø 5.5 / Pozidriv 2					

AF40 ... AF96 3-pole contactors

Technical data

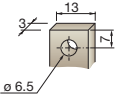
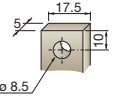
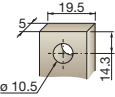
Connecting characteristics

Contractor types	AC / DC operated	AF40	AF52	AF65	AF80	AF96
Main terminals						
		Screw terminals with double connector 2 x (9.3 width x 7.9/10.3 depth)			Screw terminals with double connector 2 x (12.4 width x 9.3/11.1 depth)	
Connection capacity (min. ... max.)						
Main conductors (poles)						
 Rigid	Solid ($\leq 4 \text{ mm}^2$) Stranded ($\geq 6 \text{ mm}^2$)	1 x	6...35 mm ²			6...70 mm ²
		2 x	6...35 mm ²			6...50 mm ²
 Flexible with non insulated ferrule		1 x	4...35 mm ²			6...50 mm ²
		2 x	4...35 mm ²			6...50 mm ²
 Flexible with insulated ferrule		1 x	4...35 mm ²			6...50 mm ²
		2 x	4...35 mm ²			6...50 mm ²
 Bars or lugs		L <	9.2 mm			12.2 mm
Connection capacity acc. to UL/CSA	1 or 2 x	AWG 10...2			AWG 6...1	
Stripping length		16 mm			17 mm	
Tightening torque		4 Nm / 35 lb.in			6 Nm / 53 lb.in	
Auxiliary conductors						
(built-in auxiliary terminals + coil terminals)						
 Rigid solid		1 x	1...2.5 mm ²			
		2 x	1...2.5 mm ²			
 Flexible with non insulated ferrule		1 x	0.75...2.5 mm ²			
		2 x	0.75...2.5 mm ²			
 Flexible with insulated ferrule		1 x	0.75...2.5 mm ²			
		2 x	0.75...1.5 mm ²			
 Lugs		L <	8 mm			
Connection capacity acc. to UL/CSA	1 or 2 x	AWG 18...14				
Stripping length		10 mm				
Tightening torque						
Coil terminals		1.2 Nm / 11 lb.in				
Built-in auxiliary terminals		1.2 Nm / 11 lb.in				
Degree of protection						
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529						
Main terminals		IP10				
Coil terminals		IP20				
Built-in auxiliary terminals		IP20				
Screw terminals						
Main terminals		Delivered in open position, screws of unused terminals must be tightened				
		M6			M8	
	Screwdriver type	Flat Ø 6.5 / Pozidriv 2			Hexagon socket (s = 4 mm)	
Coil terminals		M3.5				
	Screwdriver type	Flat Ø 5.5 / Pozidriv 2				
Built-in auxiliary terminals		M3.5				
	Screwdriver type	Flat Ø 5.5 / Pozidriv 2				

AF116 ... AF370 3-pole contactors

Technical data

Connecting characteristics

Contactors types		AC / DC operated	AF116	AF140	AF190	AF205	AF265	AF305	AF370
Main terminals									
Flat type									
Connection capacity (min. ... max.)									
Main conductors (poles)									
	Cu cable - Stranded	1 x	10...95 mm ²		6...150 mm ²		16...300 mm ²		
	Clamp type		LD... included (1)		1SDA066917R1		1SDA055016R1		
	Tightening torque		8 Nm		14 Nm		25 Nm		
	Cu cable - Stranded	2 x	10...95 mm ²		50...120 mm ²		70...185 mm ²		
	Clamp type		LD... included (1)		1SFN074709R1000, LZ185-2C/120		1SCA022194R0890, OZXB4		
	Tightening torque		8 Nm		16 Nm		22 Nm		
	Al cable - Stranded	1 x	–		95...185 mm ²		185...240 mm ²		
	Clamp type		–		1SDA054988R1		1SDA055020R1		
	Tightening torque		–		31 Nm		43 Nm		
	Cu cable - Flexible	1 x	10...70 mm ²		6...120 mm ²		16...240 mm ²		
	Clamp type		LD... included (1)		1SDA066917R1		1SDA055016R1		
	Tightening torque		8 Nm		14 Nm		25 Nm		
	Cu cable - Flexible	2 x	10...70 mm ²		50...95 mm ²		70...185 mm ²		
	Clamp type		LD... included (1)		1SFN074709R1000, LZ185-2C/120		1SCA022194R0890, OZXB4		
	Tightening torque		8 Nm		16 Nm		22 Nm		
	Lugs	W ≤	22 mm (.866 in)		24 mm (.945 in)		32 mm (1.260 in)		
		Ø >	6 mm (.236 in)		8 mm (.315 in)		10 mm (.394 in)		
	Socket type		LL... included		LL... included		LL... included		
	Tightening torque		9 Nm / 80 lb.in		18 Nm / 160 lb.in		28 Nm / 248 lb.in		
Connection capacity acc. to UL / CSA		1 x	AWG 6...3/0		6...300 MCM		4...400 MCM		
	Clamp type		LD... included (1)		ATK185 (2)		ATK300 (2)		
	Tightening torque		8 Nm / 71 lb.in		34 Nm / 301 lb.in		42 Nm / 372 lb.in		
Connection capacity acc. to UL / CSA		2 x	AWG 6...3/0		–		4...500 MCM		
	Clamp type		LD... included (1)		–		ATK300/2 (2)		
	Tightening torque		8 Nm / 71 lb.in		–		42 Nm / 372 lb.in		
Auxiliary conductors (coil terminals)									
	Solid / stranded	1 x	1...4 mm ²						
		2 x	1...4 mm ²						
	Flexible	1 x	0.75...2.5 mm ²						
		2 x	0.75...2.5 mm ²						
	Flexible with non insulated ferrule	1 x	0.75...2.5 mm ²						
		2 x	0.75...2.5 mm ²						
	Flexible with insulated ferrule	1 x	0.75...2.5 mm ²						
		2 x	0.75...2.5 mm ²						
	Lugs	L <	8 mm						
		I >	3.5 mm						
Connection capacity acc. to UL / CSA		1 or 2 x	AWG 18...14						
Stripping length			9 mm						
Tightening torque			1.00 Nm / 9 lb.in						
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529									
Main terminals			IP00						
Coil terminals			IP20						
Screw terminals									
Main terminals			M6		M8		M10		
Screwdriver type			Screws and bolts						
Coil terminals (delivered in open position)			M3.5						
Screwdriver type			Flat Ø 5.5 mm / Pozidriv 2						

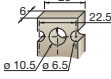
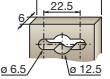
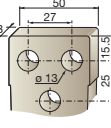
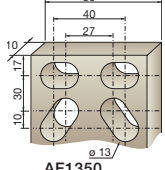
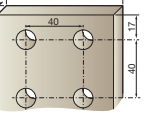
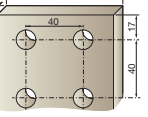
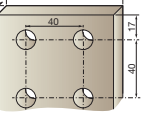
(1) LD... not included for AF116 ... AF140-30-..B.

(2) Available in North America only.

AF400 ... AF2650 3-pole contactors

Technical data

Connecting characteristics

Contactor types		AC / DC operated	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650
Main terminals											
Flat type											
											
Connection capacity (min. ... max.)											
Main conductors (poles)											
	Cu cable - Stranded	2 x	240 mm ²								
	Clamp type		1SDA013922R1								
	Tightening torque		35 Nm								
	Cu cable - Stranded	3 x	—		185 mm ²						
	Clamp type		—		1SDA013956R1						
	Tightening torque		35 Nm		45 Nm						
	Al cable - Stranded	2 x	240 mm ²								
	Clamp type		1SDA013922R1								
	Tightening torque		35 Nm								
		3 x	—		185 mm ²						
	Clamp type		—		1SDA013956R1						
	Tightening torque		35 Nm		45 Nm						
	Lugs	W ≤	47 mm		50 mm			100 mm			
		Ø >	10 mm		12 mm						
	Tightening torque		35 Nm / 310 lb.in		45 Nm / 398 lb.in						
Connection capacity acc. to UL / CSA		2 x	250-500 MCM alt. 2/0 AWG-400 MCM				2// 3 x 0.25 in	4/0 AWG - 500 MCM		4//4 x 0.25 in	
	Clamp type		K6TH alt. ATK580				bars, use LW1250	K7TK ATK1350/4	K7TK	bars	
	Tightening torque		275 lb.in					375 lb.in			
Connection capacity acc. to UL / CSA		3 x	2/0 AWG-400 MCM		2/0 AWG-500 MCM			1/0-750 MCM			
	Clamp type		K6TJ		ATK750/3			K8TL, K8TM, ATK1650/4	K8TL, K8TM, ATK1650/4, ATK1650/6		
	Tightening torque		275 lb.in		375 lb.in			500 lb.in			
Auxiliary conductors (coil terminals)											
	Solid / stranded	1 x	1...4 mm ²								
		2 x	1...4 mm ²								
	Flexible	1 x	0.75...2.5 mm ²								
		2 x	0.75...2.5 mm ²								
	Flexible with non insulated ferrule	1 x	0.75...2.5 mm ²								
		2 x	0.75...2.5 mm ²								
	Flexible with insulated ferrule	1 x	0.75...2.5 mm ²								
		2 x	0.75...2.5 mm ²								
	Lugs	L ≤	8 mm								
		I >	3.7 mm								
Connection capacity acc. to UL / CSA		1 or 2 x	AWG 18...14								
	Tightening torque	Recommended	1.00 Nm / 9 lb.in								
		Max.	1.20 Nm								
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529											
Main terminals			IP00								
Coil terminals			IP20								
Screw terminals											
Main terminals			M10		M12						
Coil terminals (delivered in open position)			Screws and bolts M3.5								
Screwdriver type			Flat Ø 5.5 mm / Pozidriv 2								

AF09 ... AF96 3-pole contactors

Technical data

Built-in auxiliary contacts according to IEC

Contact types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38	AF40	AF52	AF65	AF80	AF96
Rated operational voltage U_e max.		690 V										
Rated frequency (without derating)		50 / 60 Hz										
Conventional free air thermal current I_{th} - $\theta \leq 40^\circ\text{C}$		16 A										
Ie / Rated operational current AC-15												
acc. to IEC 60947-5-1	24-127 V 50/60 Hz	6 A										
	220-240 V 50/60 Hz	4 A										
	400-440 V 50/60 Hz	3 A										
	500 V 50/60 Hz	2 A										
	690 V 50/60 Hz	2 A										
Making capacity AC-15		10 x Ie AC-15 acc. to IEC 60947-5-1										
Breaking capacity AC-15		10 x Ie AC-15 acc. to IEC 60947-5-1										
Ie / Rated operational current DC-13												
acc. to IEC 60947-5-1	24 V DC	6 A / 144 W										
	48 V DC	2.8 A / 134 W										
	72 V DC	1 A / 72 W										
	110 V DC	0.55 A / 60 W										
	125 V DC	0.55 A / 69 W										
	220 V DC	0.27 A / 60 W										
	250 V DC	0.27 A / 68 W										
	400 V DC	0.15 A / 60 W										
	500 V DC	0.13 A / 65 W										
	600 V DC	0.1 A / 60 W										
Short-circuit protection device gG type fuse		10 A										
Rated short-time withstand current Icw	for 1.0 s	100 A										
	for 0.1 s	140 A										
Minimum switching capacity		12 V / 3 mA										
with failure rate acc. to IEC 60947-5-4		10 ⁻⁷										
Non-overlapping time between N.O. and N.C. contacts		≥ 2 ms										
Power dissipation per pole at 6 A		0.1 W										
Max. electrical switching frequency	AC-15	1200 cycles/h										
	DC-13	900 cycles/h										
Mechanically linked contacts												
acc. to annex L of IEC 60947-5-1		Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA4, CAL4, CAT4 aux. contact blocks) are mechanically linked contacts.										
Mirror contacts												
acc. to annex F of IEC 60947-4-1		Built-in N.C. auxiliary contacts or additional N.C. auxiliary contacts (CA4, CAL4, CAT4 aux. contact blocks) are mirror contacts.										

Built-in auxiliary contacts according to UL / CSA

Contact types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38	AF40	AF52	AF65	AF80	AF96
Max. operational voltage		600 V AC, 600 V DC										
Pilot duty		A600, Q600										
AC thermal rated current		10 A										
AC maximum volt-ampere making		7200 VA										
AC maximum volt-ampere breaking		720 VA										
DC thermal rated current		2.5 A										
DC maximum volt-ampere making-breaking		69 VA										

3-pole contactors

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 next pages, the curves corresponding to categories AC-1, 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.

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, see "Motor rated operational powers and currents").
 - 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, see "Motor rated operational powers and currents")
 - 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 operating cycles 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 Main pole utilization characteristic table (see "Technical data").
- For the selected contactor make a note of the following in relation to the voltage using diagram AC-3 in next pages:
 - 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

For uninterrupted duty, some verifications of preventing maintenance are necessary to check the functionality of the concerned product (consult us).

The combined 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.

3-pole contactors

Electrical durability

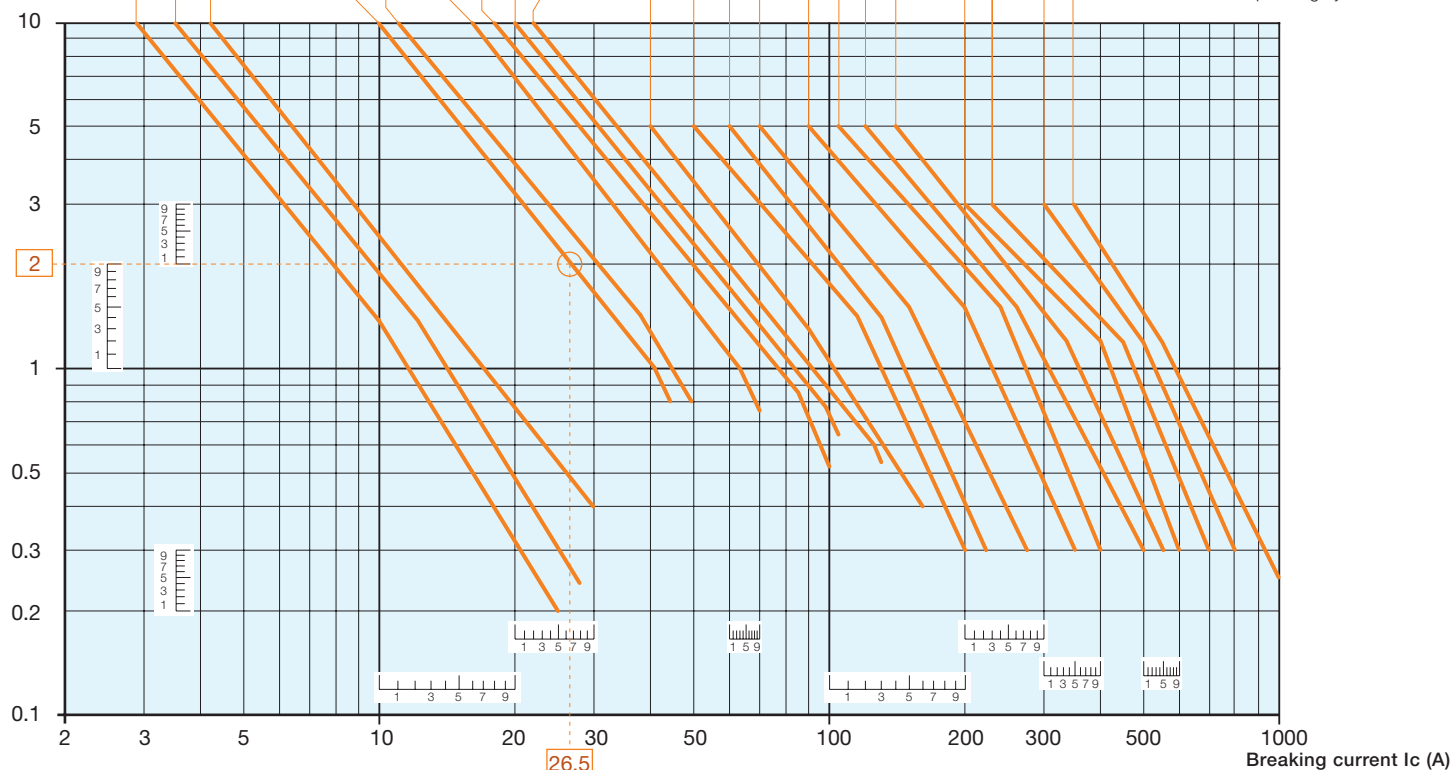
Electrical durability for AC-1 utilization category - $U_e \leq 690\text{ V}$

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.

Ambient temperature and maximum electrical switching frequency: see "Technical data".

3

Millions of
operating
cycles



Example:

$I_c / AC-1 = 26.5\text{ A}$ – Electrical durability required = 2 millions operating cycles.

Using the AC-1 curves above select the AF26 contactor at intersection "○" (26.5 A / 2 millions operating cycles).

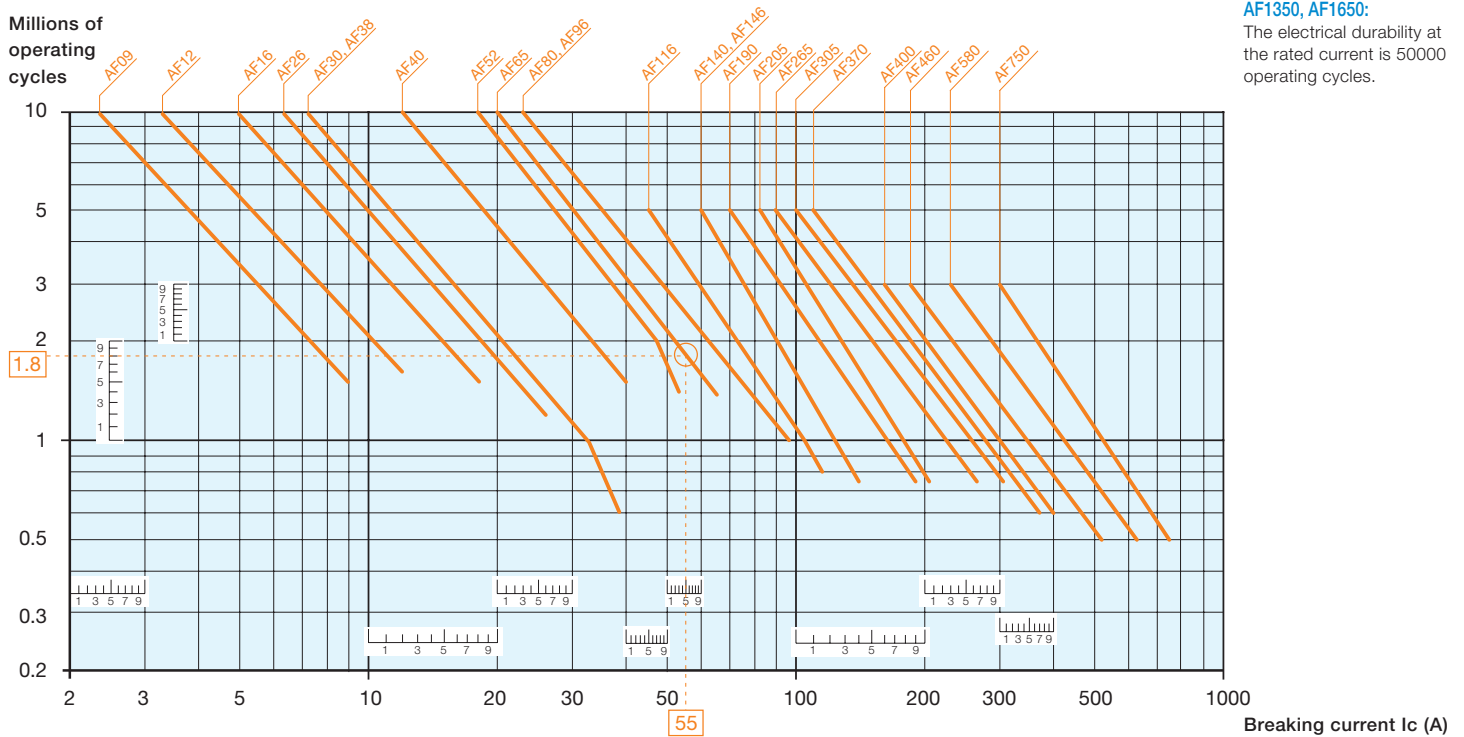
3-pole contactors

Electrical durability

Electrical durability for AC-3 utilization category - $U_e \leq 440$ V.

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).

Ambient temperature and maximum electrical switching frequency: see "Technical data".



AF1350, AF1650:
The electrical durability at the rated current is 50000 operating cycles.

Example:

Motor power 30 kW for AC-3 - $U_e = 400$ V and $I_e = 55$ A utilization – Electrical durability required = 1.8 million operating cycles. For AC-3: $I_c = I_e$. Select the AF65 contactor at intersection "○" (55 A / 1.8 million operating cycles) on the curves (AC-3 - $U_e \leq 440$ V).

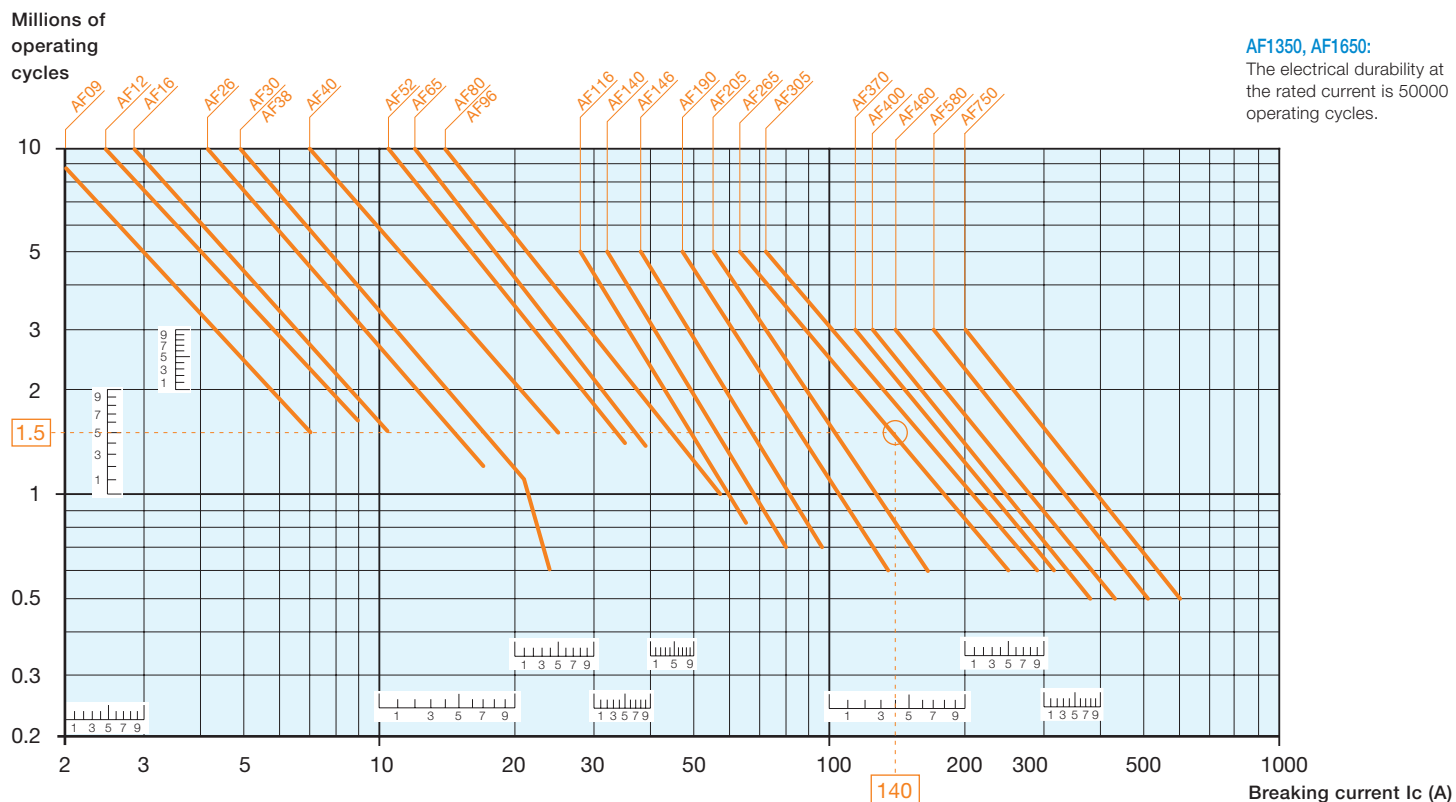
3-pole contactors

Electrical durability

Electrical durability for AC-3 utilization category - $440\text{ V} < U_e \leq 690\text{ V}$.

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).

Ambient temperature and maximum electrical switching frequency: see "Technical data".



Example:

Motor power 132 kW for AC-3 - $U_e = 660\text{ V}$ and $I_e = 140\text{ A}$ utilization – Electrical durability required = 1.5 million operating cycles. For AC-3: $I_c = I_e$. Select the AF265 contactor at intersection "○" (140 A / 1.5 million operating cycles) on the curves (AC-3 - $440\text{ V} < U_e \leq 690\text{ V}$).

3-pole contactors

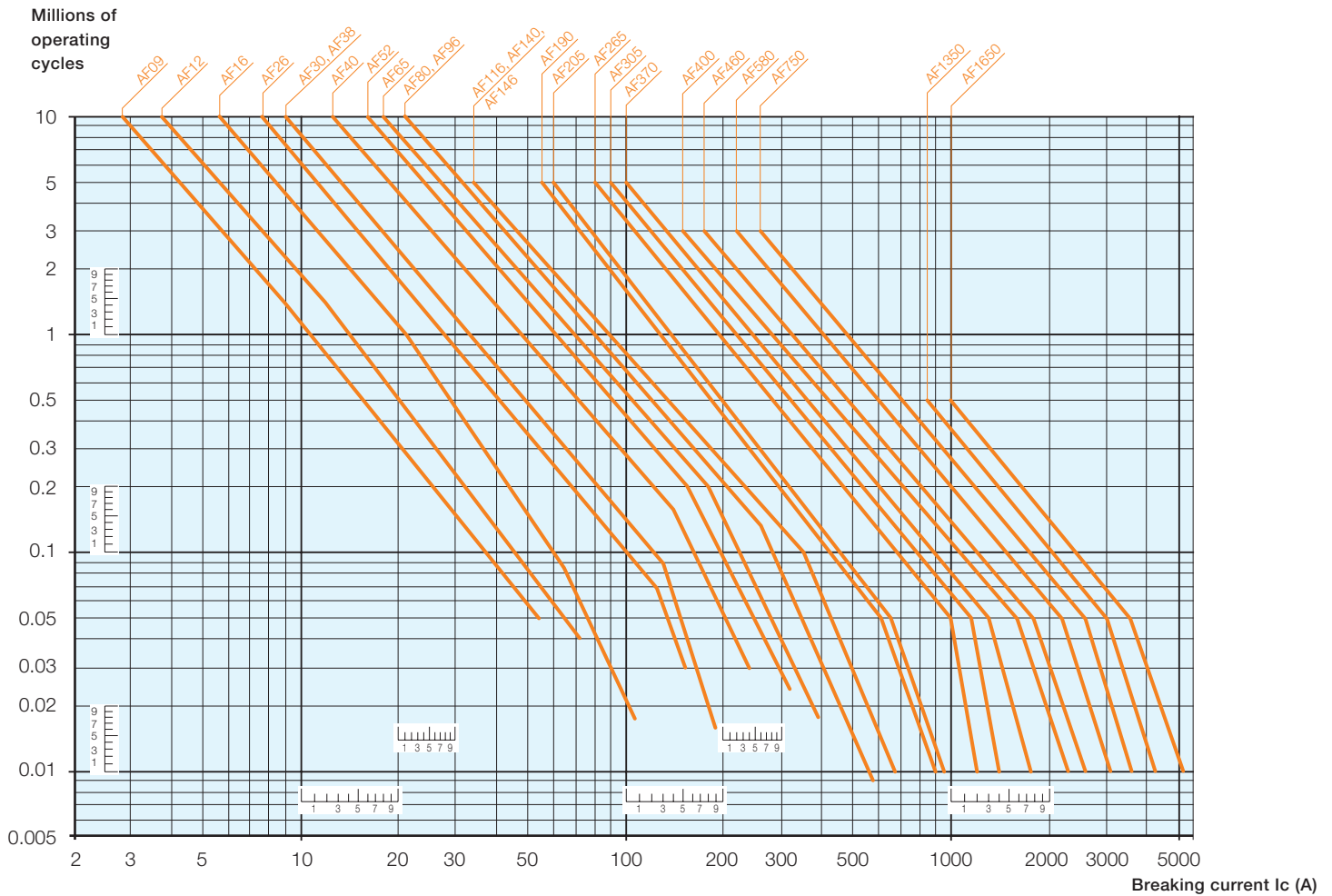
Electrical durability

Electrical durability for AC-2 or AC-4 utilization category - $U_e \leq 440 \text{ V}$

Ambient temperature $\leq 60 \text{ °C}$ for AF09 ... AF370, $\leq 55 \text{ °C}$ for AF400 ... AF1650

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

Maximum electrical switching frequency: see "Technical data".



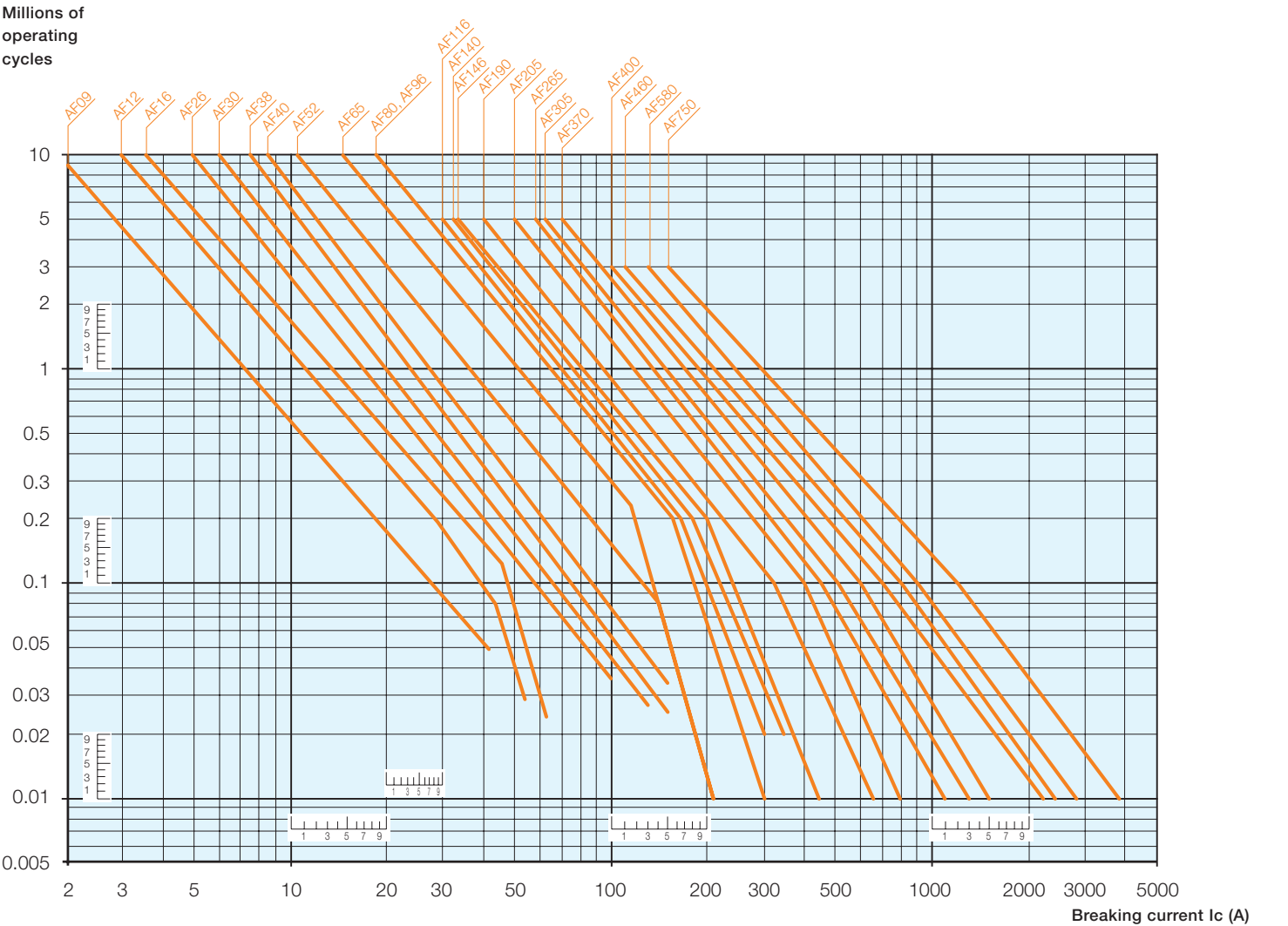
3-pole contactors

Electrical durability

Electrical durability for AC-2 or AC-4 utilization category - $440\text{ V} < U_e \leq 690\text{ V}$
Ambient temperature $\leq 60\text{ }^{\circ}\text{C}$ for AF09 ... AF370, $\leq 55\text{ }^{\circ}\text{C}$ for AF400 ... AF750

Switching cage motors: starting, reverse operation and step-by-step operation. The breaking current I_c is equal to $2.5 \times I_e$ for AC-2 and $6 \times I_e$ for AC-4, keeping in mind tha I_e is the motor rated operational current (I_e = motor full load current). Maximum electrical switching frequency: see "Technical data".

3



3-pole contactors

Electrical durability

Electrical durability for DC-1 utilization category

Switching Non inductive or slightly inductive loads, resistance furnaces.

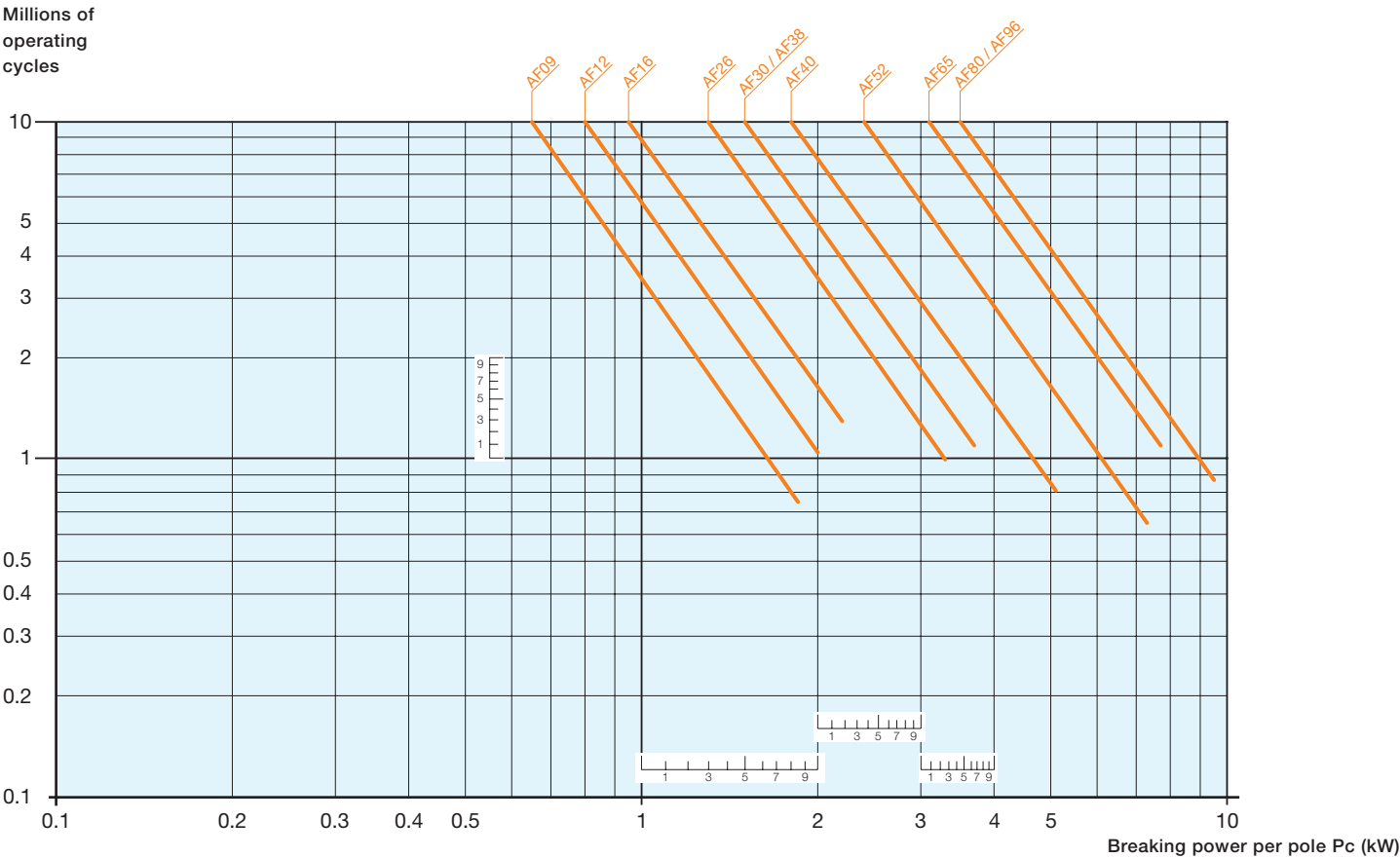
The breaking power per pole P_c is: $P_c = (U_c \times I_c) / n$

U_c : breaking voltage $U_c = U_e$

I_c : breaking current $I_c = I_e$

n : number of poles in series

Ambient temperature and maximum electrical switching frequency: see "Technical data".

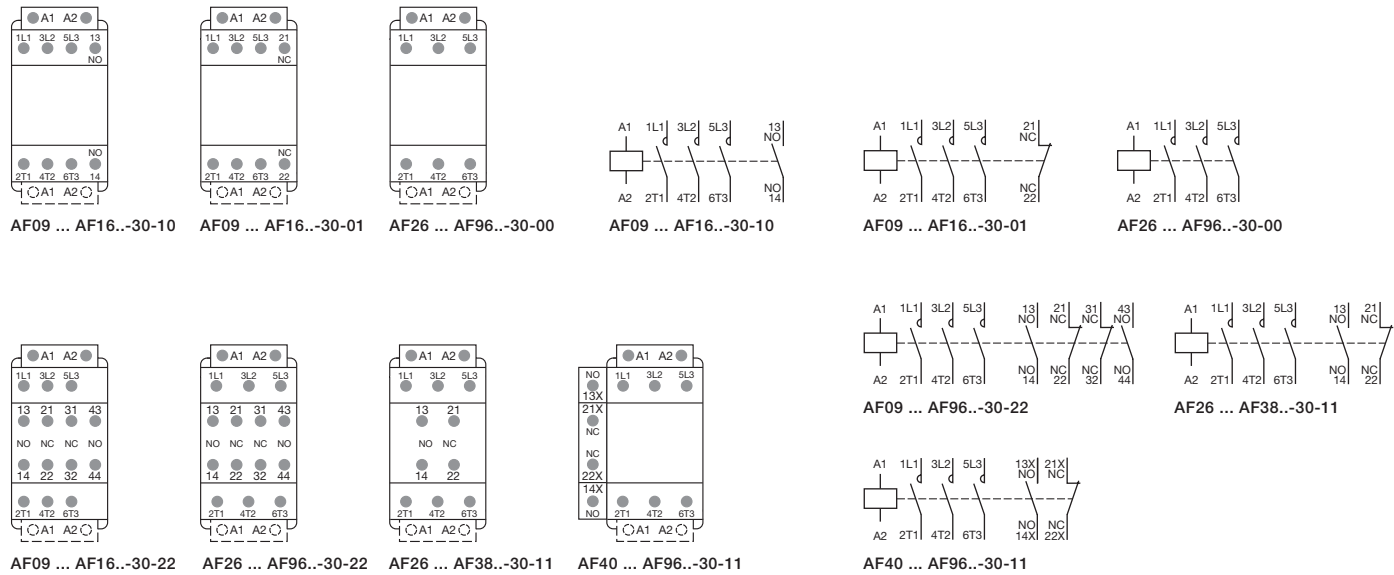


AF09 ... AF96 3-pole contactors

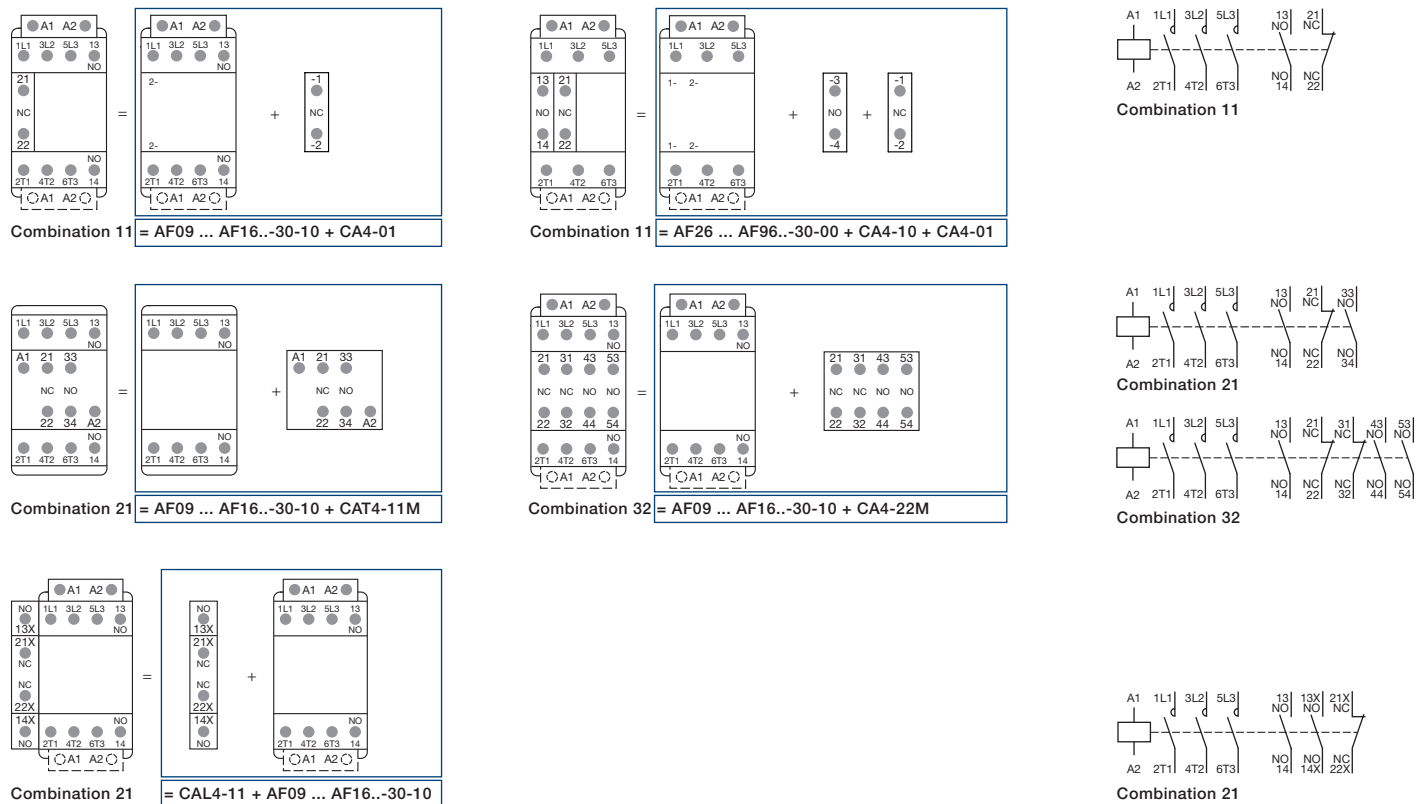
Terminal marking and positioning

AF09 ... AF96 contactors - AC / DC operated

Standard devices without addition of auxiliary contacts



Other possible contact combinations with auxiliary contacts added by the user



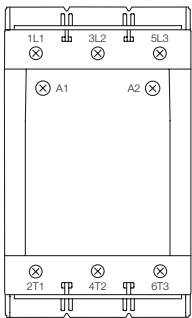
Note: Only AF.Z contactor with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole

AF116 ... AF370 3-pole contactors

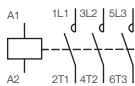
Terminal marking and positioning

AF116 ... AF370 contactors - AC / DC operated

Standard devices without addition of auxiliary contacts

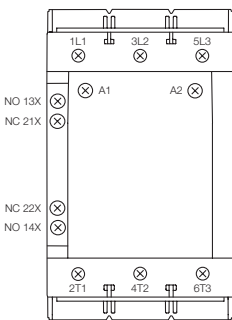


AF116 ... AF370-30-00

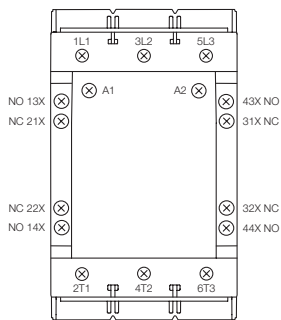


AF116 ... AF370-30-00

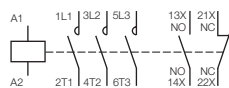
Standard devices with factory mounted auxiliary contacts



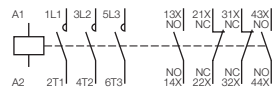
AF116 ... AF370-30-11



AF116 ... AF370-30-22



AF116 ... AF370-30-11



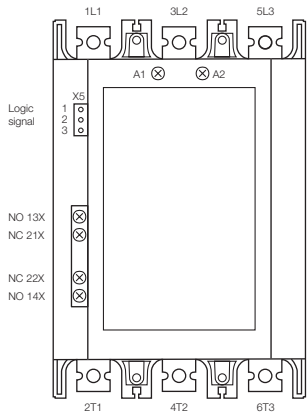
AF116 ... AF370-30-22

AF400 ... AF2650 3-pole contactors

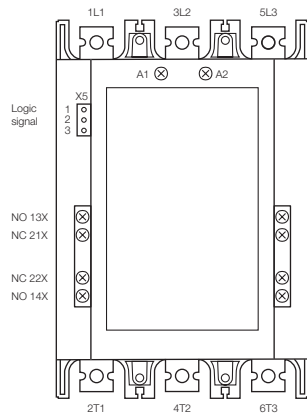
Terminal marking and positioning

AF400 ... AF1250 contactors - AC / DC operated

Standard devices with factory mounted auxiliary contacts

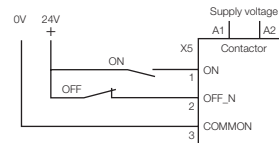


AF400 ... AF1250-30-11

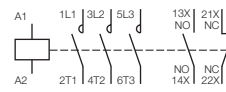


AF400 ... AF1250-30-22

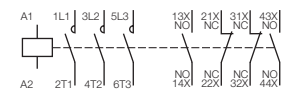
Control with logic signal



AF400 ... AF1250-30-11, AF400 ... AF1250-30-22



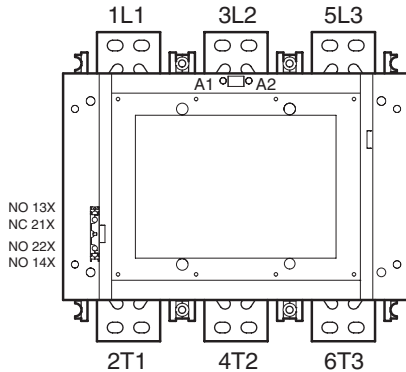
AF400 ... AF1250-30-11



AF400 ... AF1250-30-22

AF1350 ... AF2650 contactors - AC / DC operated

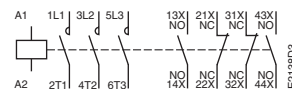
Standard devices with factory mounted auxiliary contacts



AF1350 ... AF2650-30-11



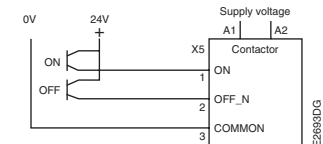
AF1350 ... AF2650-30-11



AF1350 ... AF2650-30-22

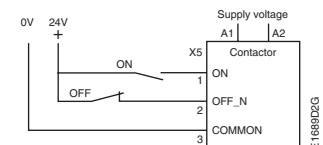
Wiring diagrams

when used with transistor output



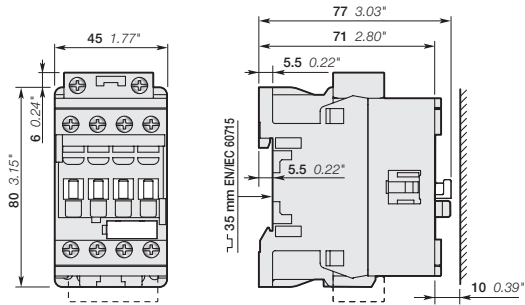
AF1350, AF1650

when used with transistor output

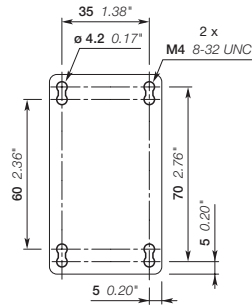


AF09, AF12, AF16 3-pole contactors

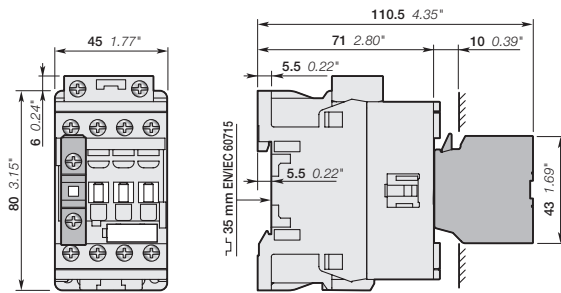
Main dimensions mm, inches



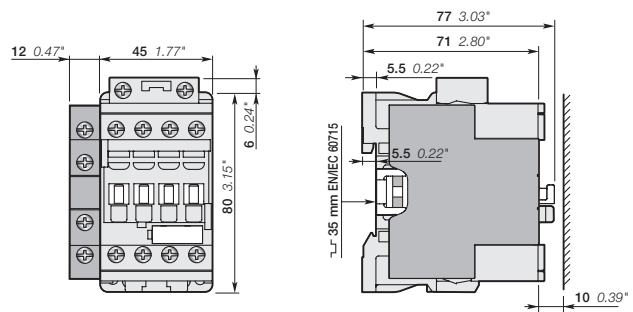
AF09, AF12, AF16



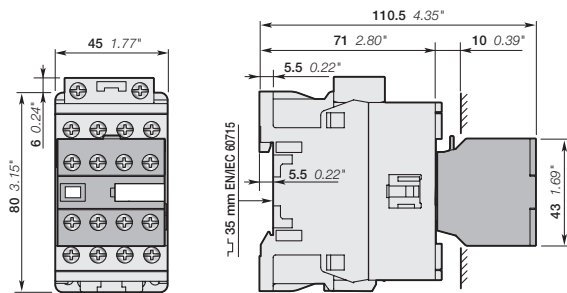
AF09, AF12, AF16



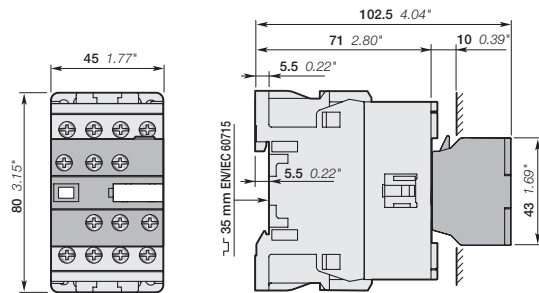
AF09, AF12, AF16
+ CA4, CC4 1-pole auxiliary contact block



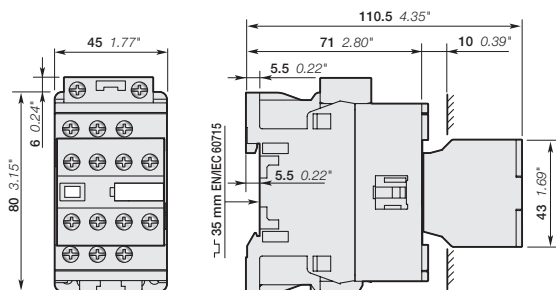
AF09, AF12, AF16
+ CAL4-11 2-pole auxiliary contact block



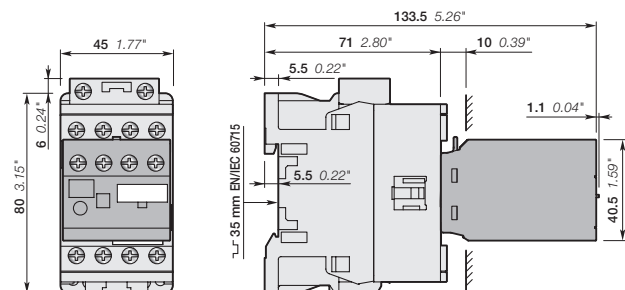
AF09, AF12, AF16
+ CA4 4-pole auxiliary contact block



AF09, AF12, AF16
+ CAT4 2-pole auxiliary contact and coil terminal block



AF09, AF12, AF16...-30-22

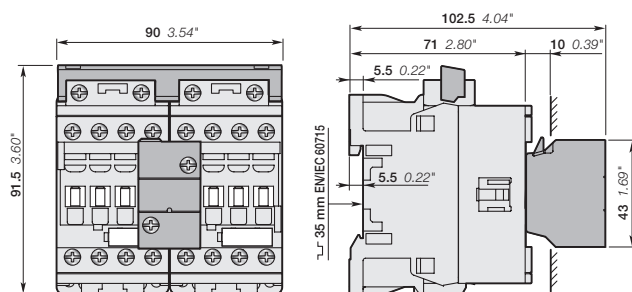


AF09, AF12, AF16
+ TEF4 electronic timer

Note: contactor lateral distance to grounded component 2 mm 0.08 inches min.

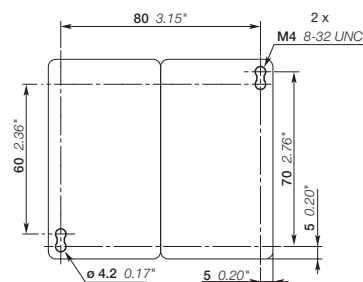
AF09, AF12, AF16 3-pole contactors

Main dimensions mm, inches



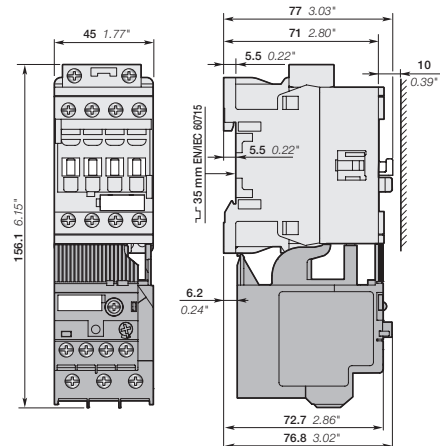
AF09, AF12, AF16

+ VEM4 mechanical and electrical interlock set



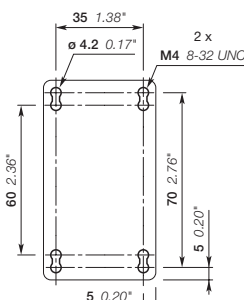
AF09, AF12, AF16

+ VEM4 mechanical and electrical interlock set



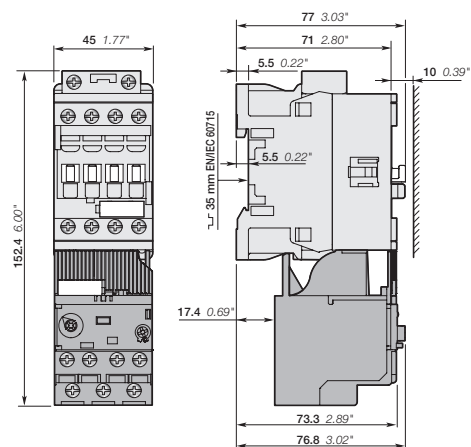
AF09, AF12, AF16

+ TF42 thermal overload relay



AF09, AF12, AF16

+ TF42, EF19



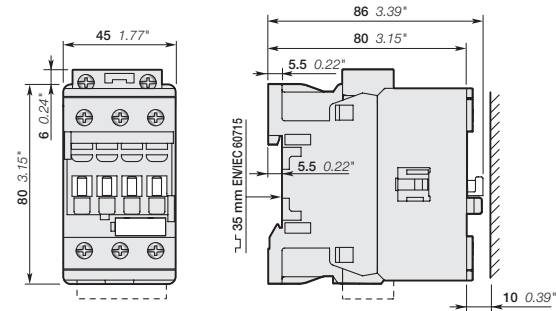
AF09, AF12, AF16 3-pole contactors

+ EF19 electronic overload relay

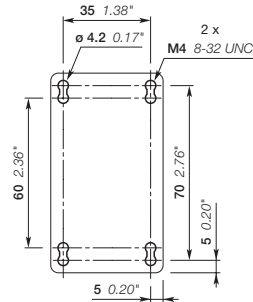
Note: contactor lateral distance to grounded component 2 mm (0.08 inches) min.

AF26, AF30, AF38 3-pole contactors

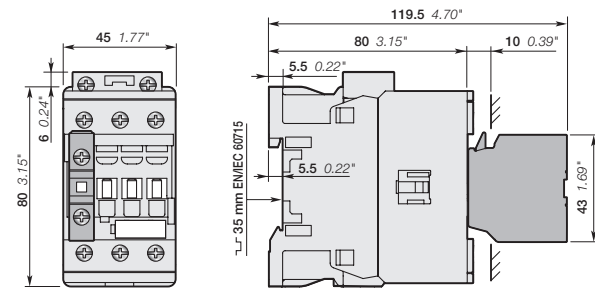
Main dimensions mm, inches



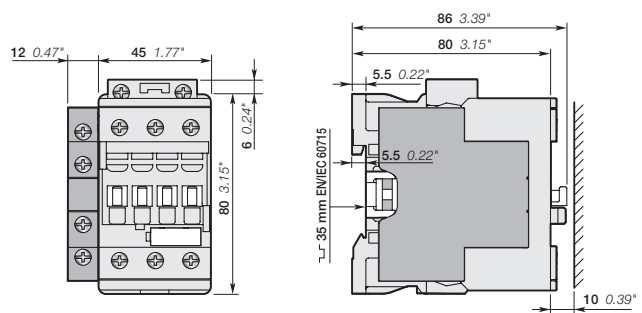
AF26, AF30, AF38



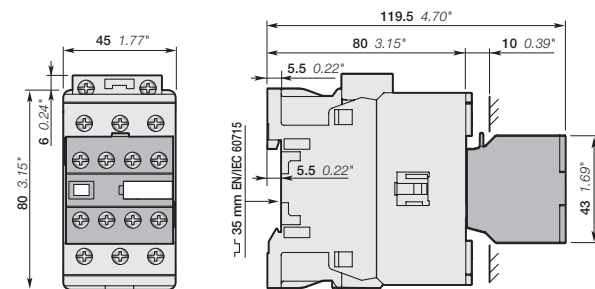
AF26, AF30, AF38



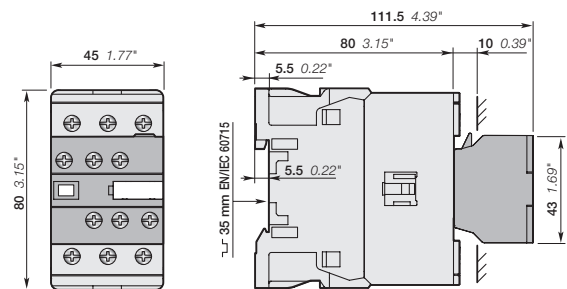
AF26, AF30, AF38
+ CA4, CC4 1-pole auxiliary contact block



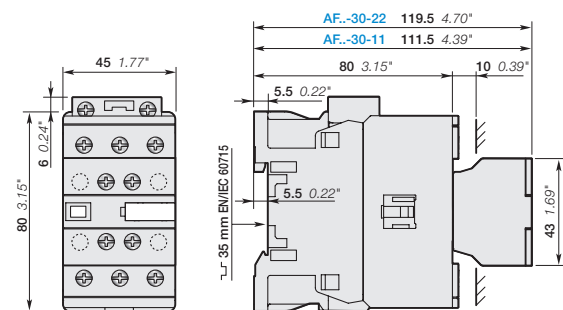
AF26, AF30, AF38
+ CAL4-11 2-pole auxiliary contact block



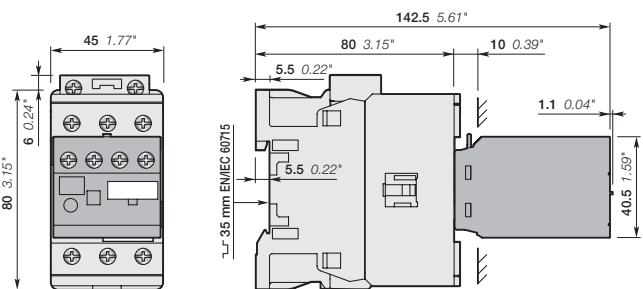
AF26, AF30, AF38
+ CA4 4-pole auxiliary contact block



AF26, AF30, AF38
+ CAT4 2-pole auxiliary contact and coil terminal block



AF26, AF30, AF38-30-11
AF26, AF30, AF38-30-22

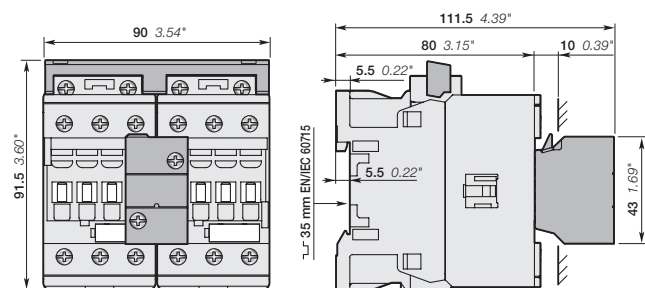


AF26, AF30, AF38
+ TEF4 electronic timer

Note: contactor lateral distance to grounded component 2 mm 0.08" min.

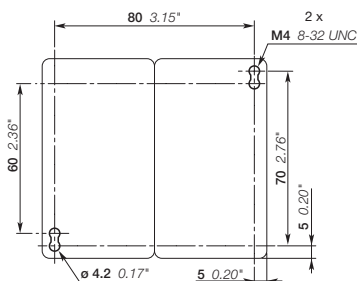
AF26, AF30, AF38 3-pole contactors

Main dimensions mm, inches



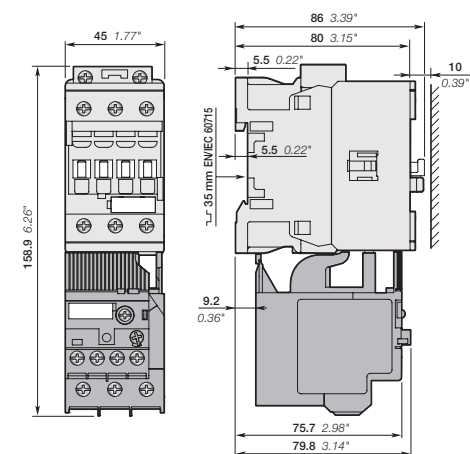
AF26, AF30, AF38

+ VEM4 mechanical and electrical interlock set



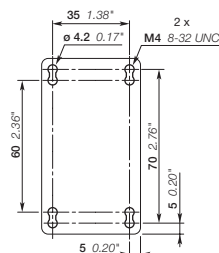
AF26, AF30, AF38

+ VEM4 mechanical and electrical interlock set



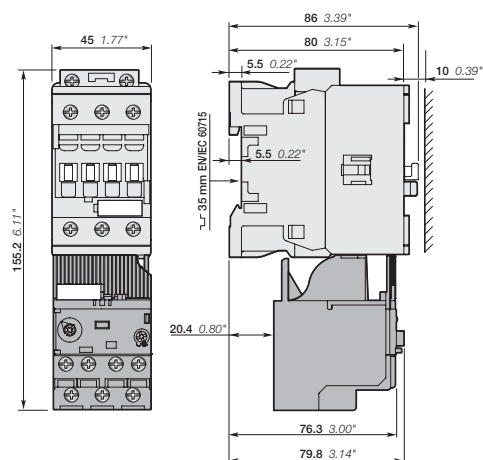
AF26, AF30, AF38

+ TF42 thermal overload relay



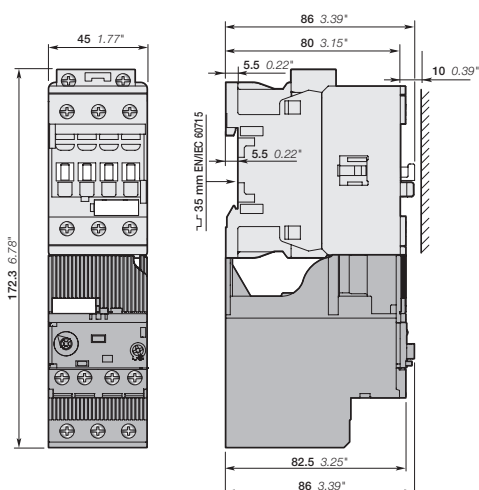
AF26, AF30, AF38

+ TF42, EF19, EF45



AF26 3-pole contactors

+ EF19 electronic overload relay



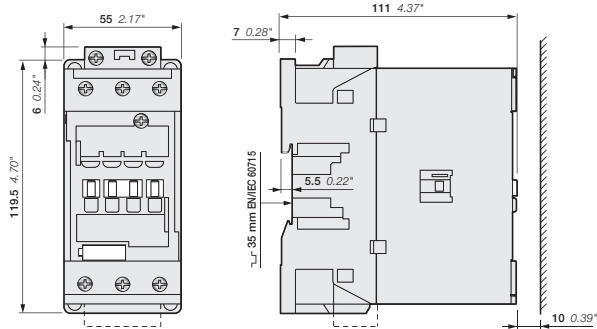
AF26, AF30, AF38, 3-pole contactors

+ EF45 electronic overload relay

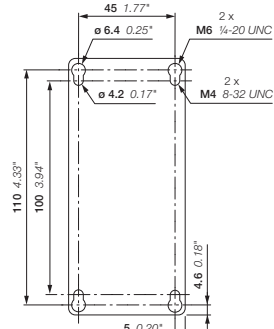
Note: contactor lateral distance to grounded component 2 mm (0.08") min.

AF40 ... AF65 3-pole contactors

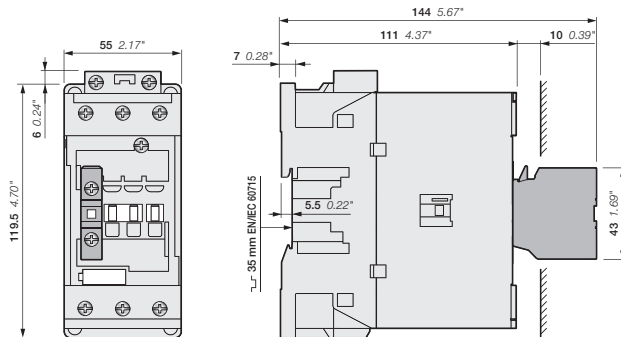
Main dimensions mm, inches



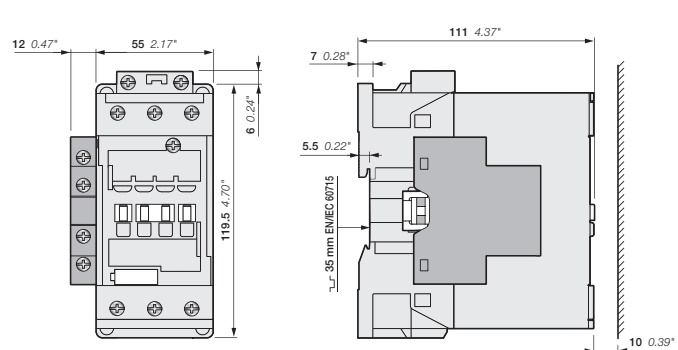
AF40, AF52, AF65



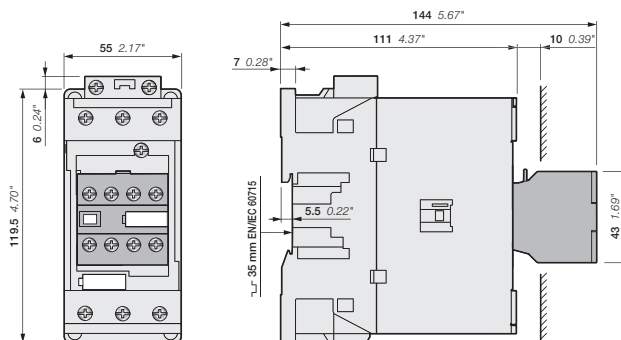
AF40, AF52, AF65



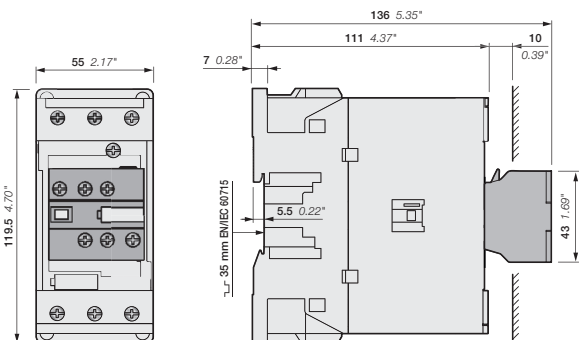
AF40, AF52, AF65
+ CA4, CC4 1-pole auxiliary contact block



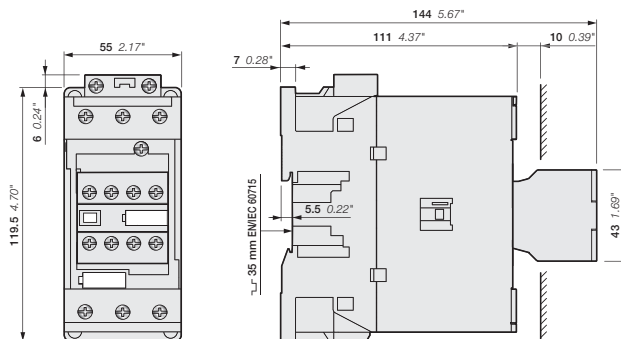
AF40, AF52, AF65-30-00 + CAL4-11 2-pole auxiliary contact block
AF40, AF52, AF65-30-11



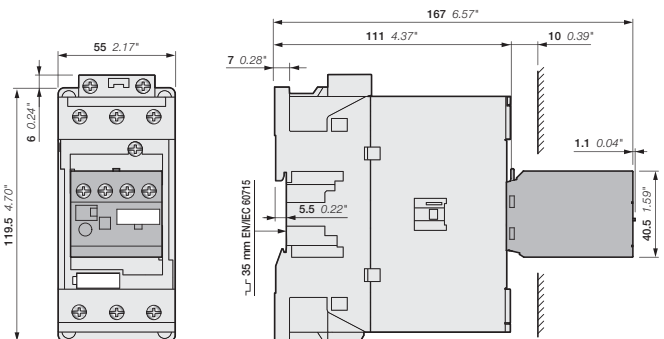
AF40, AF52, AF65
+ CA4 4-pole auxiliary contact block



AF40, AF52, AF65
+ CAT4 2-pole auxiliary contact and coil terminal block



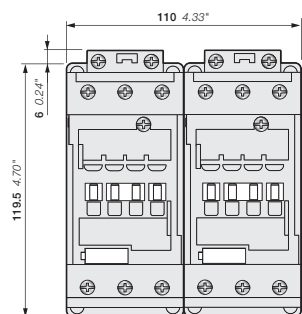
AF40, AF52, AF65-30-22



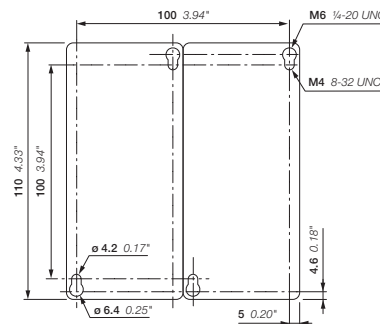
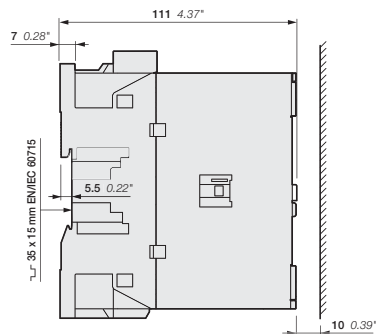
AF40, AF52, AF65
+ TEF4 electronic timer

AF40 ... AF65 3-pole contactors

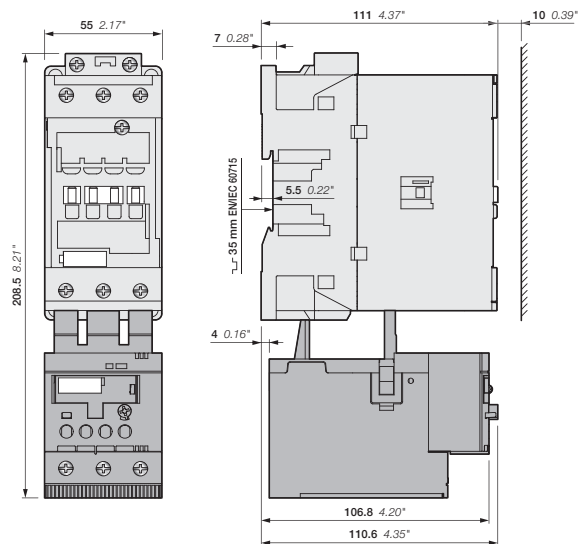
Main dimensions mm, inches



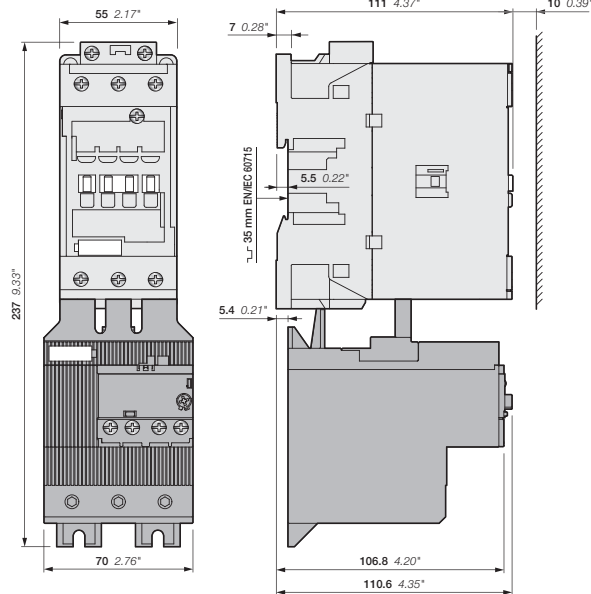
AF40, AF52, AF65
+ VM96-4 mechanical interlock set



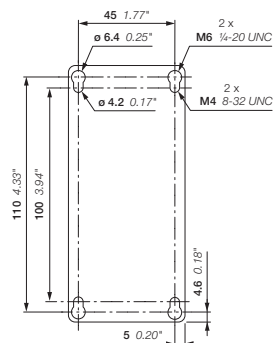
AF40, AF52, AF65
+ VM96-4 mechanical interlock set



AF40, AF52, AF65
+ TF65 thermal overload relay



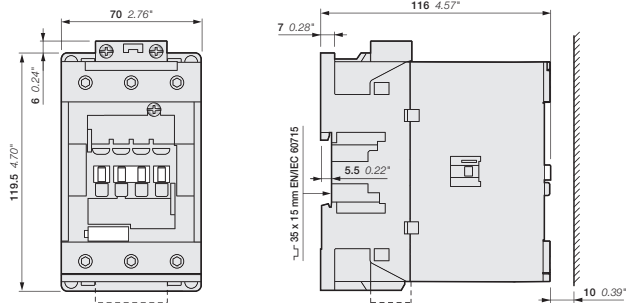
AF40, AF52, AF65
+ EF65 electronic overload relay



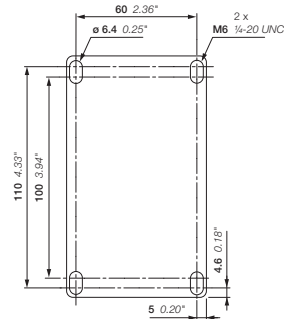
AF40, AF52, AF65
+ TF65, EF65

AF80 ... AF96 3-pole contactors

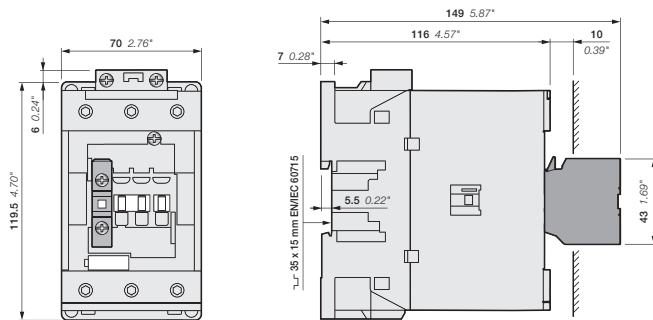
Main dimensions mm, inches



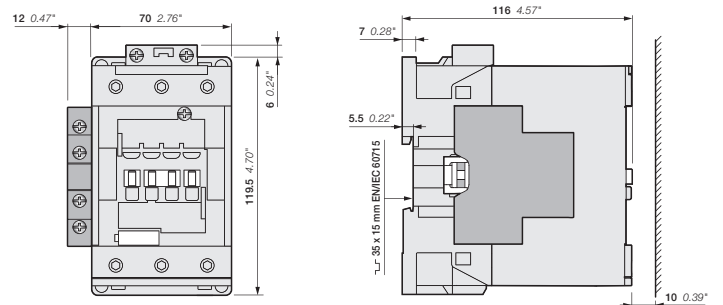
AF80, AF96



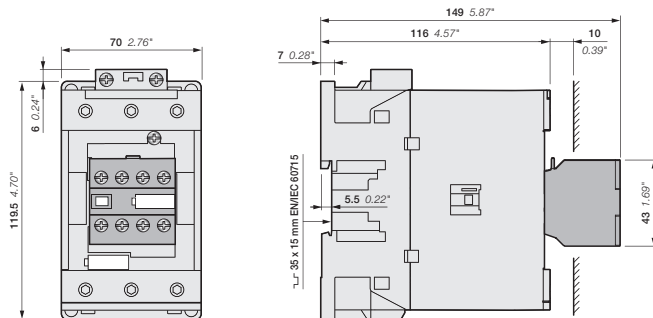
AF80, AF96



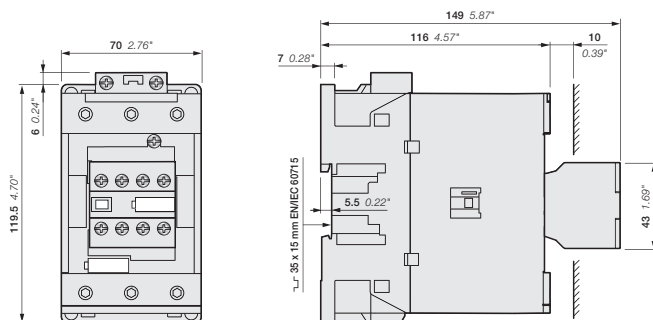
AF80, AF96
+ CA4, CC4 1-pole auxiliary contact block



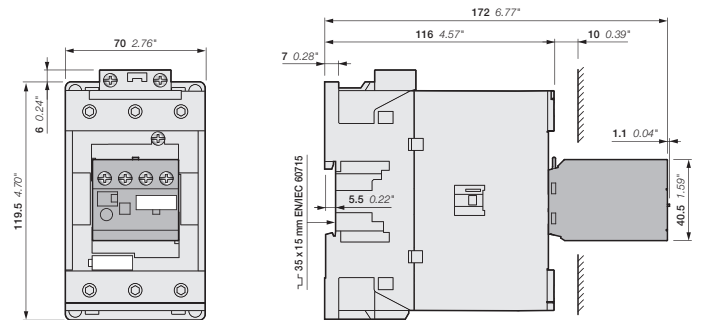
AF80, AF96-30-00 + CAL4-11 2-pole auxiliary contact block
AF80, AF96-30-11



AF80, AF96
+ CA4 4-pole auxiliary contact block



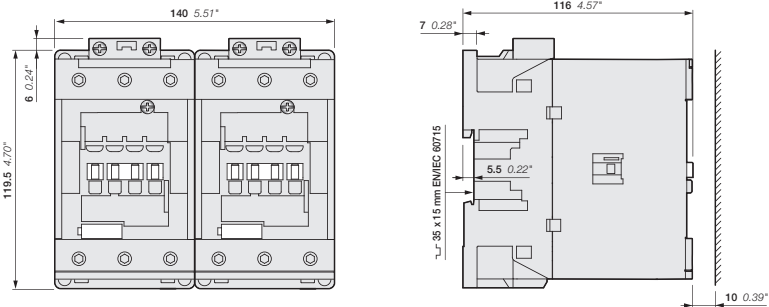
AF80, AF96-30-22



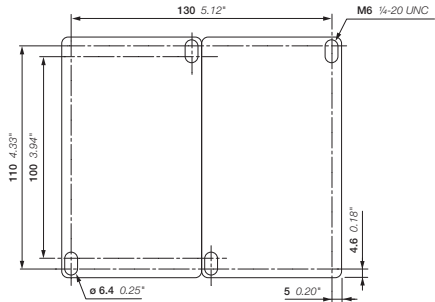
AF80, AF96
+ TEF4 electronic timer

AF80 ... AF96 3-pole contactors

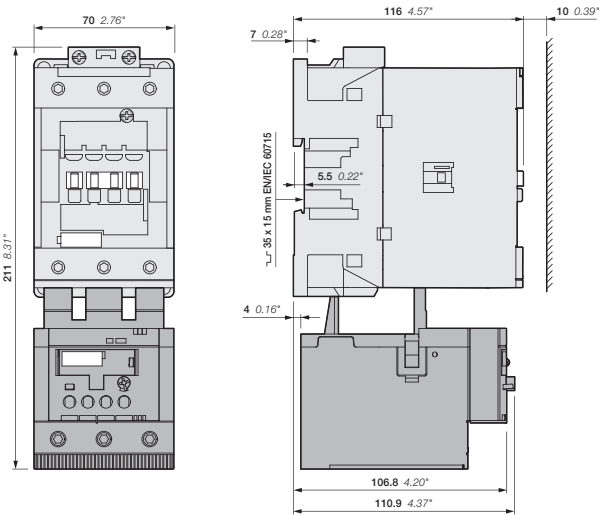
Main dimensions mm, inches



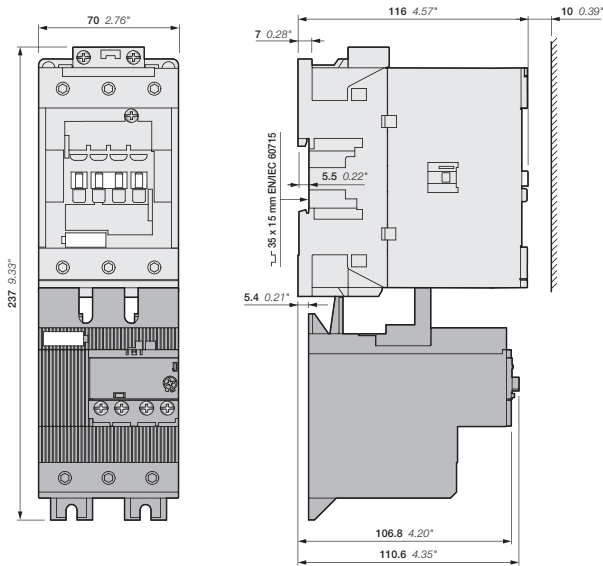
AF80, AF96
+ VM96-4 mechanical interlock set



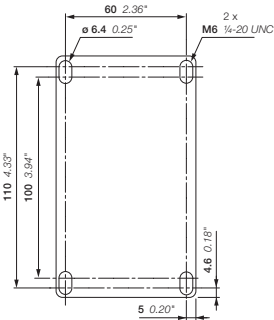
AF80, AF96
+ VM96-4 mechanical interlock set



AF80, AF96
+ TF96 thermal overload relay



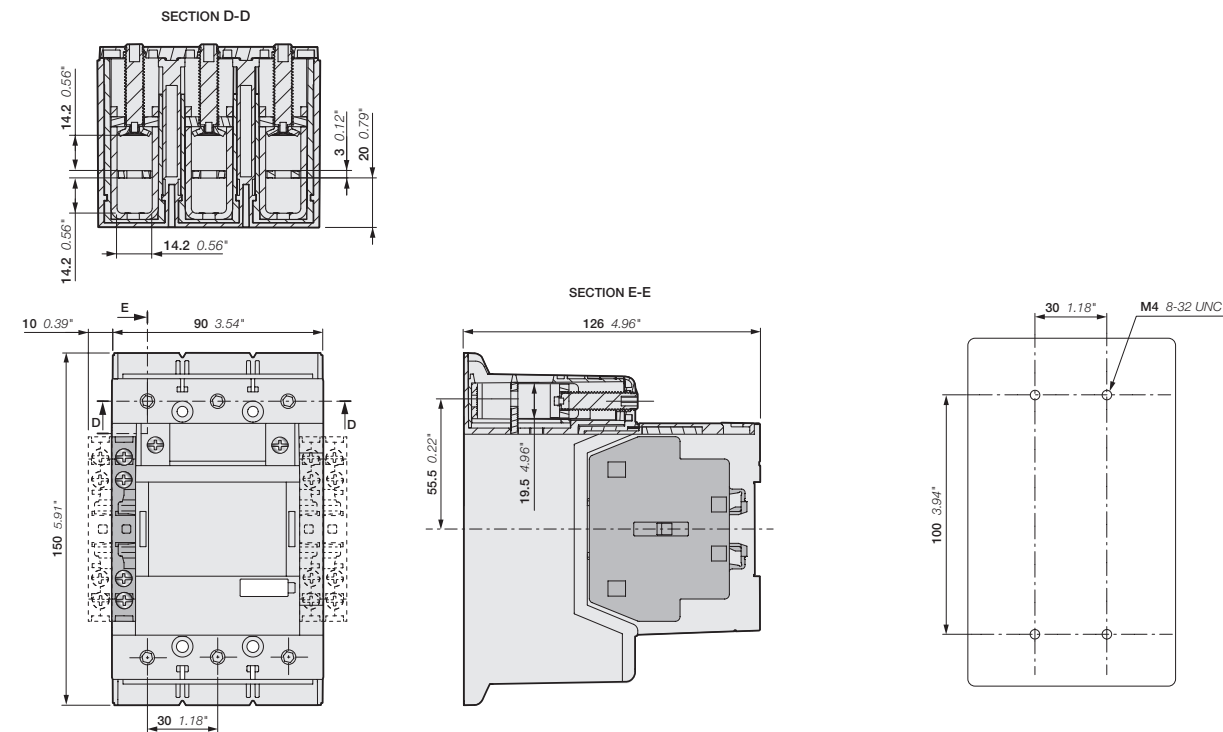
AF80, AF96
+ EF96 electronic overload relay



AF80, AF96
+ TF96, EF96

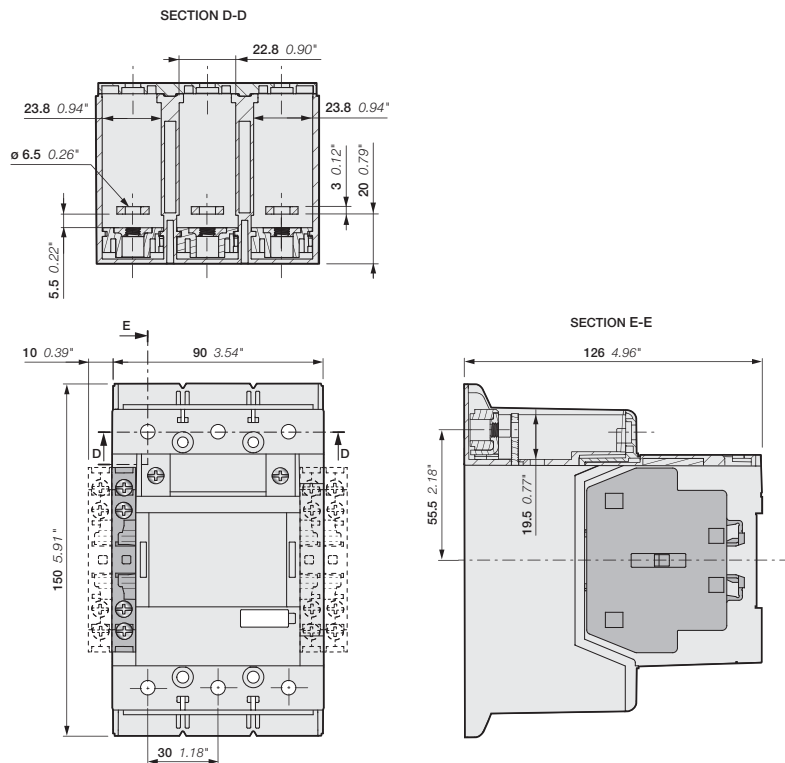
AF116, AF140, 3-pole contactors

Main dimensions mm, inches



AF116, AF140-30-00 + CAL19 2-pole auxiliary contact block
AF116, AF140-30-11

AF116, AF140

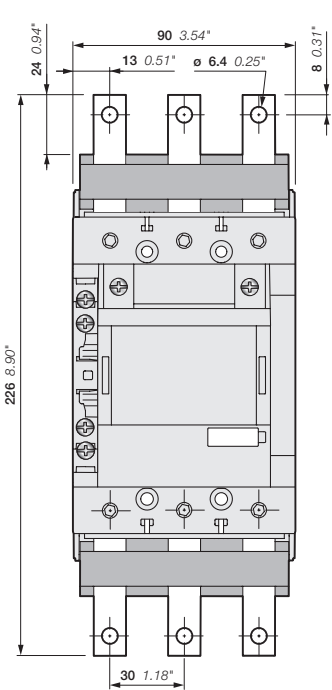


AF116, AF140-30-00B + CAL19 2-pole auxiliary contact block
AF116, AF140-30-11B

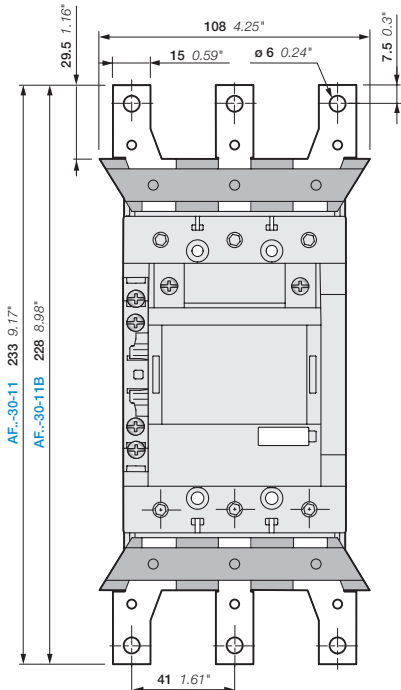
AF116, AF140, 3-pole contactors

Main dimensions mm, inches

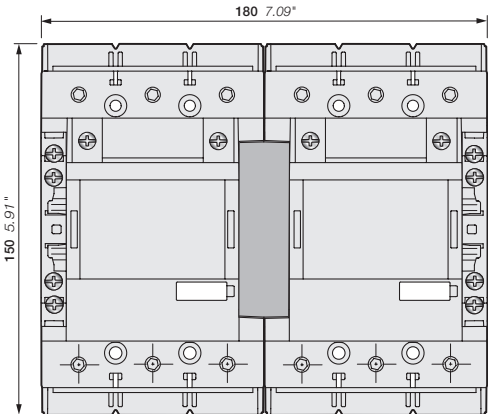
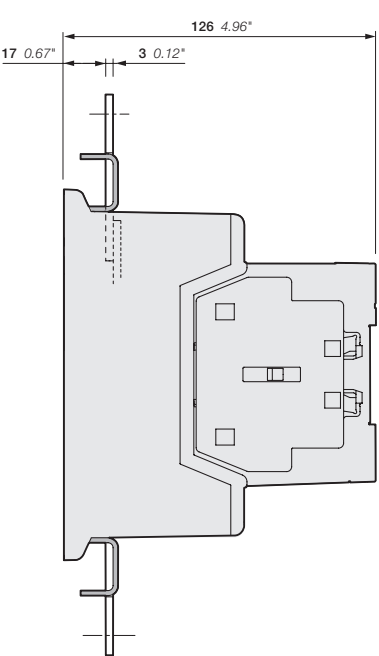
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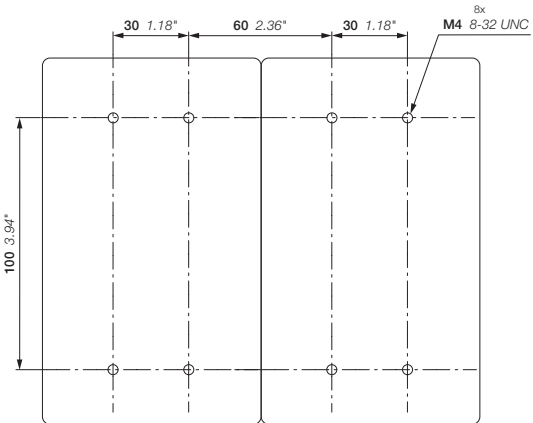
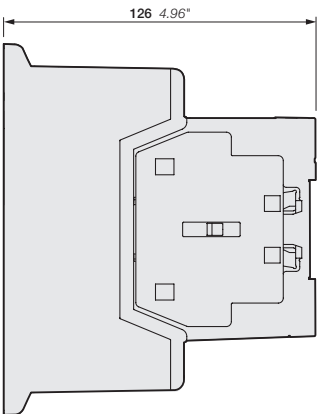
AF116, AF140-30-11
+ LX140 terminal extension



AF116, AF140-30-11(B)
+ LW140(B) terminal enlargement



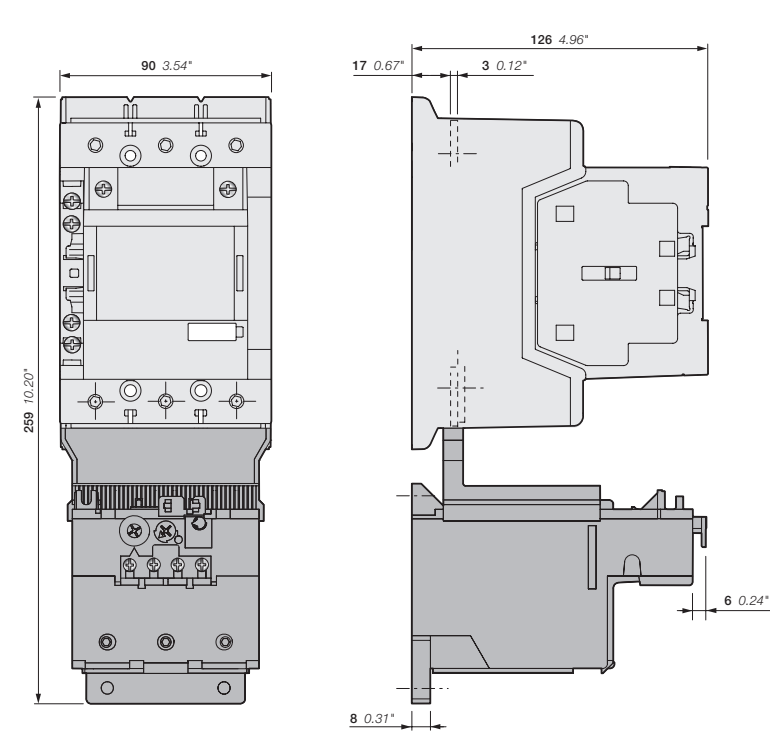
AF116, AF140-30-11
+ VM19 mechanical interlocking unit



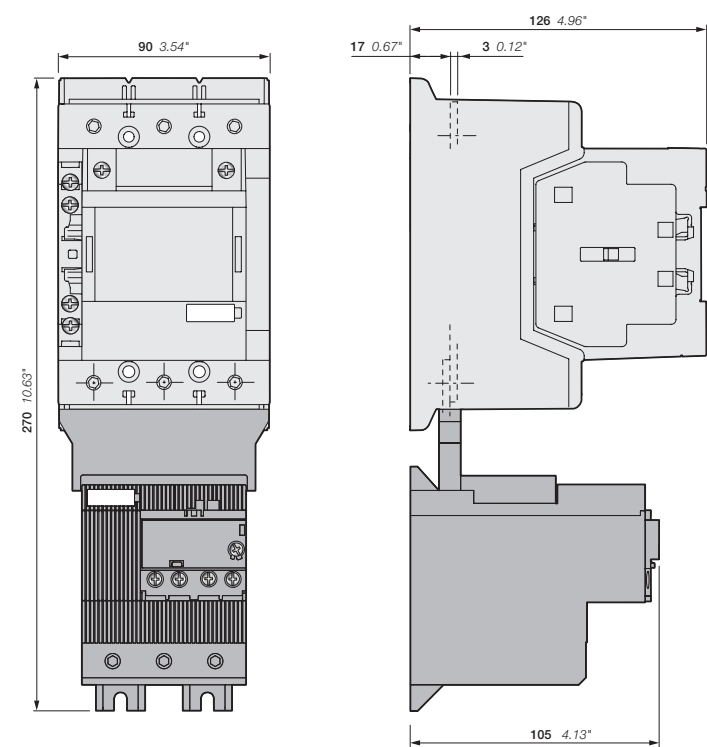
AF116, AF140-30-11
+ VM19 mechanical interlocking unit

AF116, AF140, 3-pole contactors

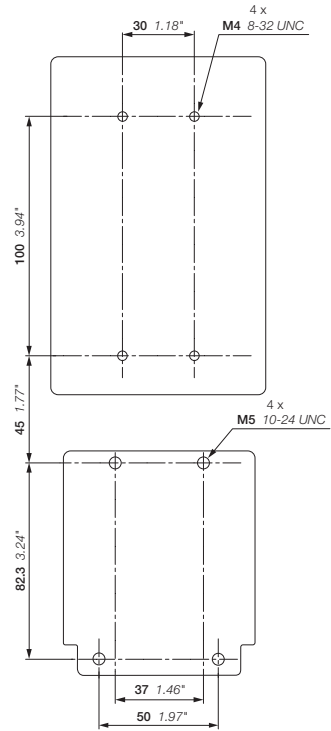
Main dimensions mm, inches



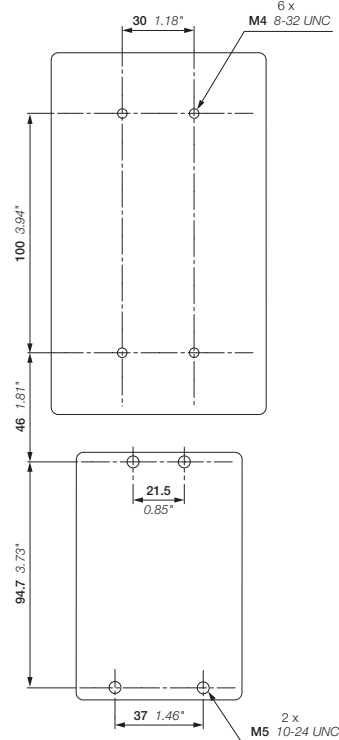
AF116, AF140-30-11
+ TF140 thermal overload relay



AF116, AF140-30-11
+ EF146 electronic overload relay



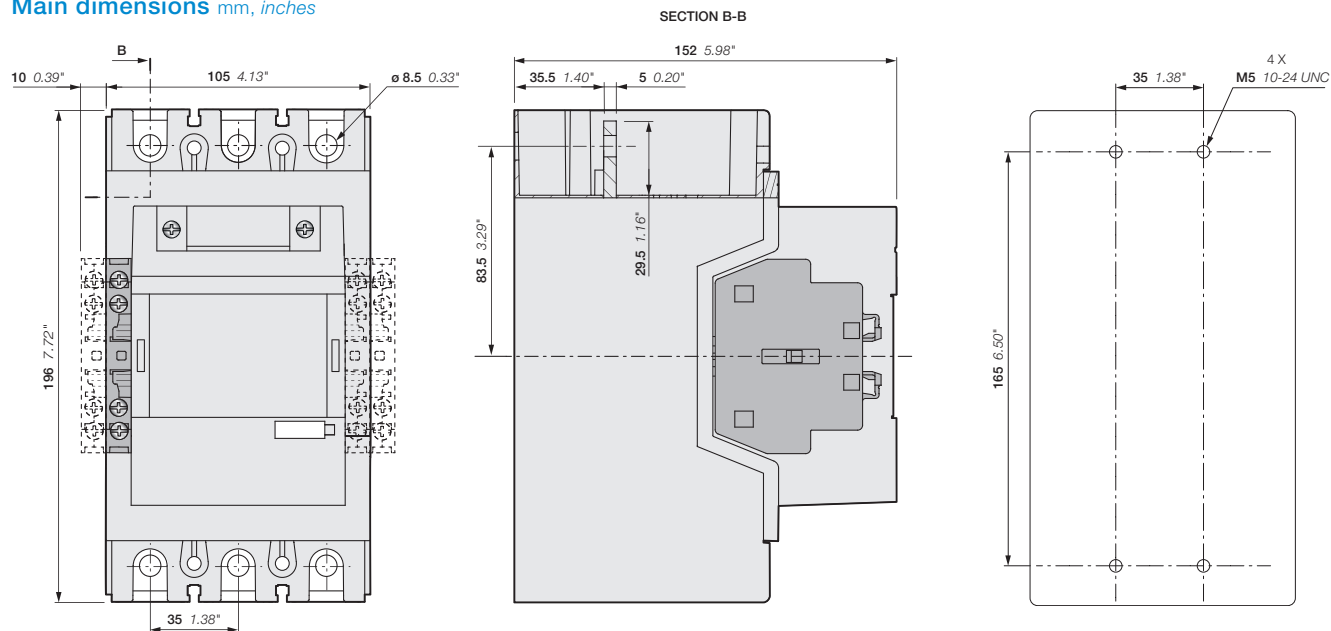
AF116, AF140-30-11
+ TF140 thermal overload relay



AF116, AF140-30-11
+ EF146 electronic overload relay

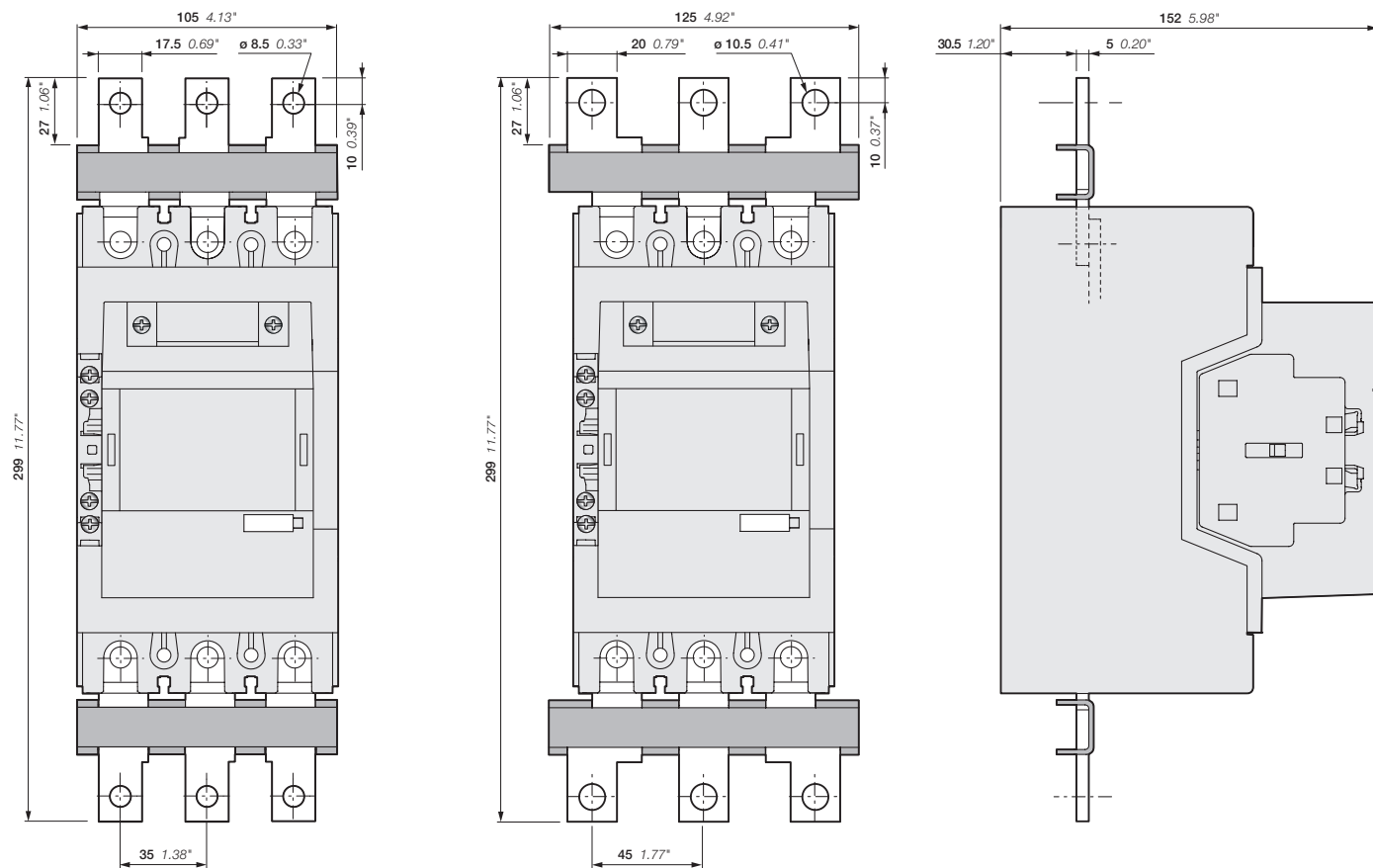
AF190, AF205 3-pole contactors

Main dimensions mm, inches



AF190, AF205-30-00 + CAL19 2-pole auxiliary contact block
AF190, AF205-30-11

AF190, AF205

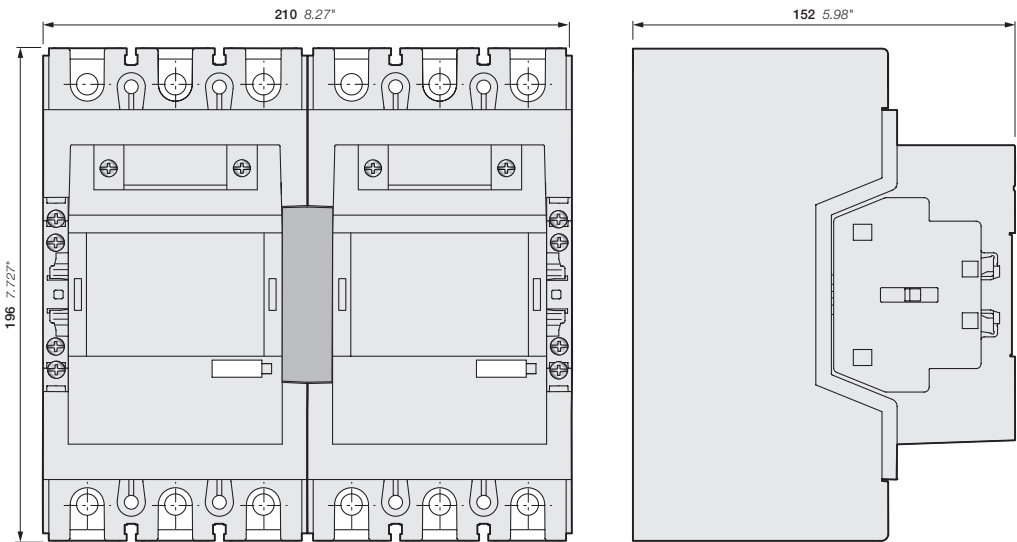


AF190, AF205-30-11
+ LX185 terminal extension

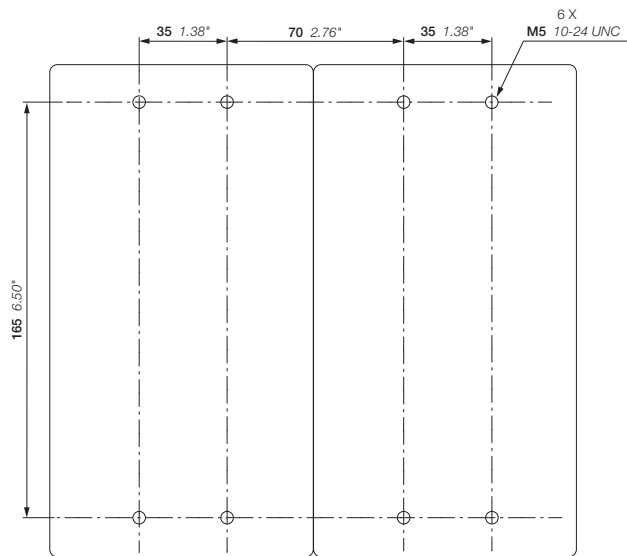
AF190, AF205-30-11
+ LW185 terminal enlargement

AF190, AF205 3-pole contactors

Main dimensions mm, inches



AF190, AF205-30-11
+ VM19 mechanical interlocking unit

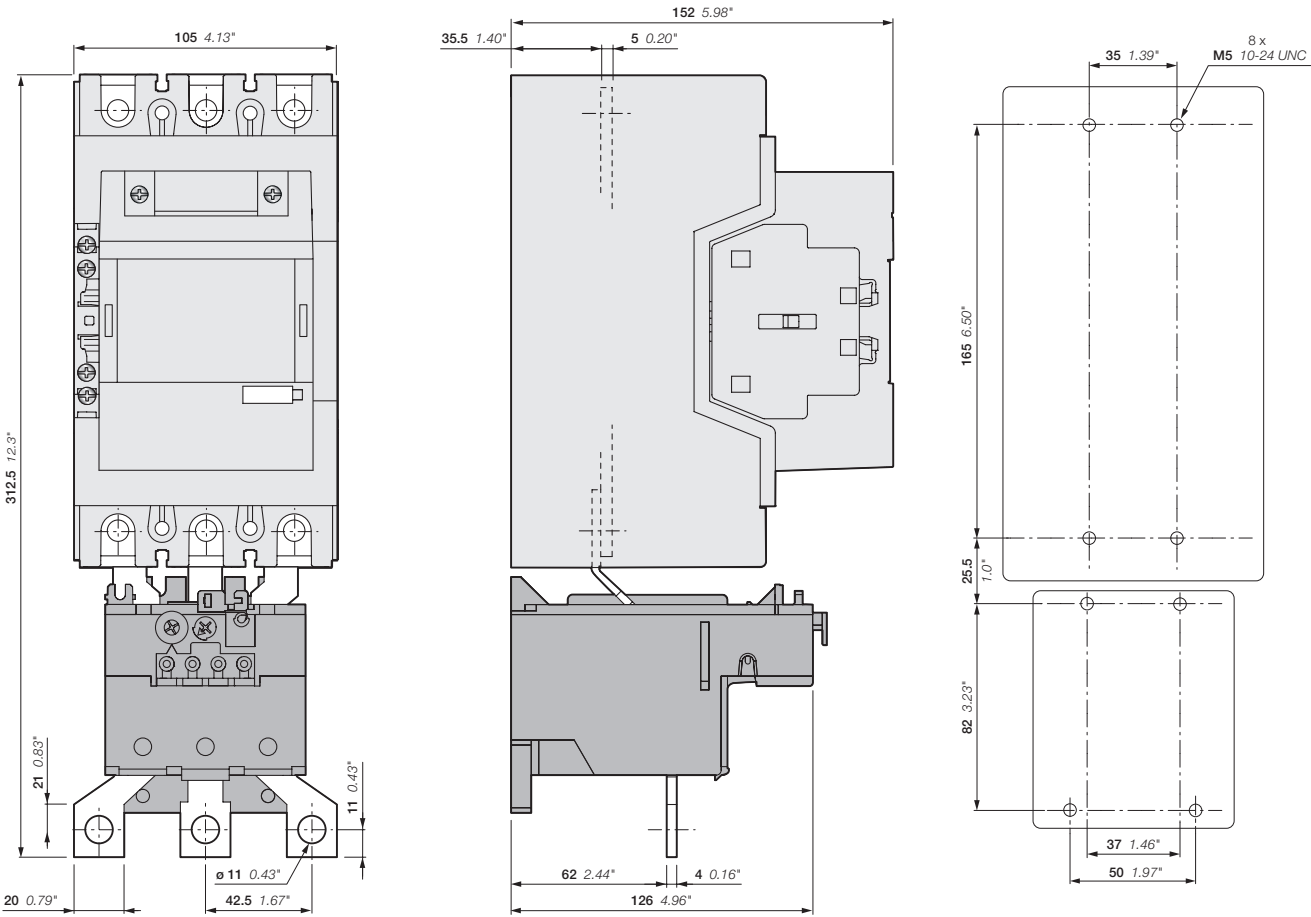


AF190, AF205
+ VM19 mechanical interlocking unit

AF190, AF205 3-pole contactors

Main dimensions mm, inches

3

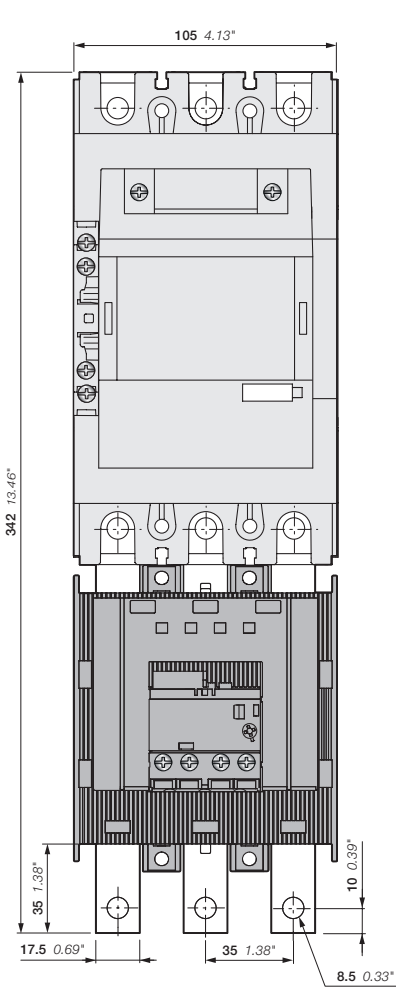


AF190, AF205-30-11
+ TA200DU thermal overload relay

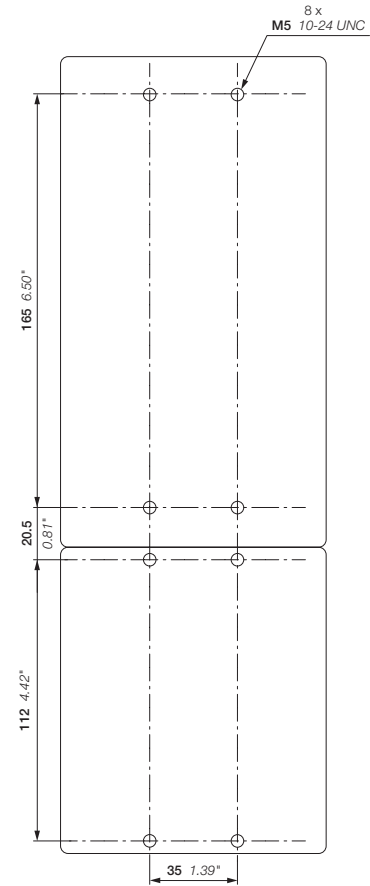
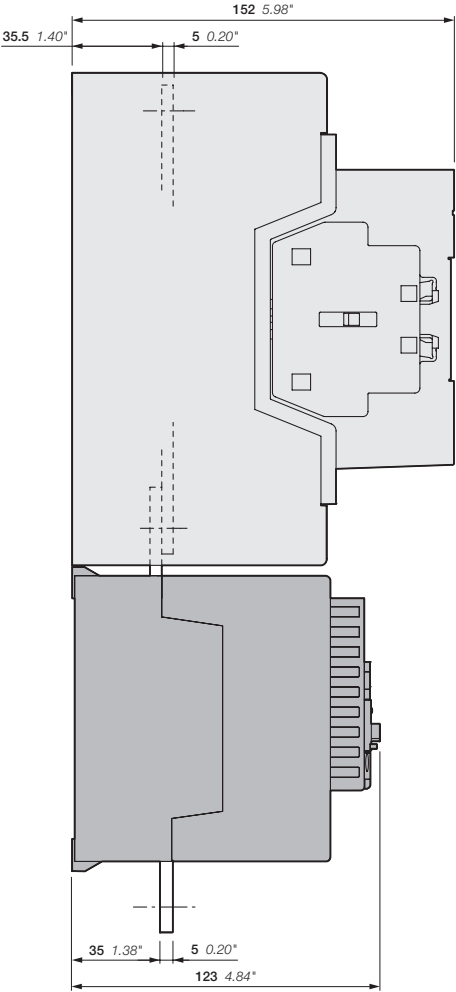
AF190, AF205
+ TA200DU thermal overload relay

AF190, AF205 3-pole contactors

Main dimensions mm, inches



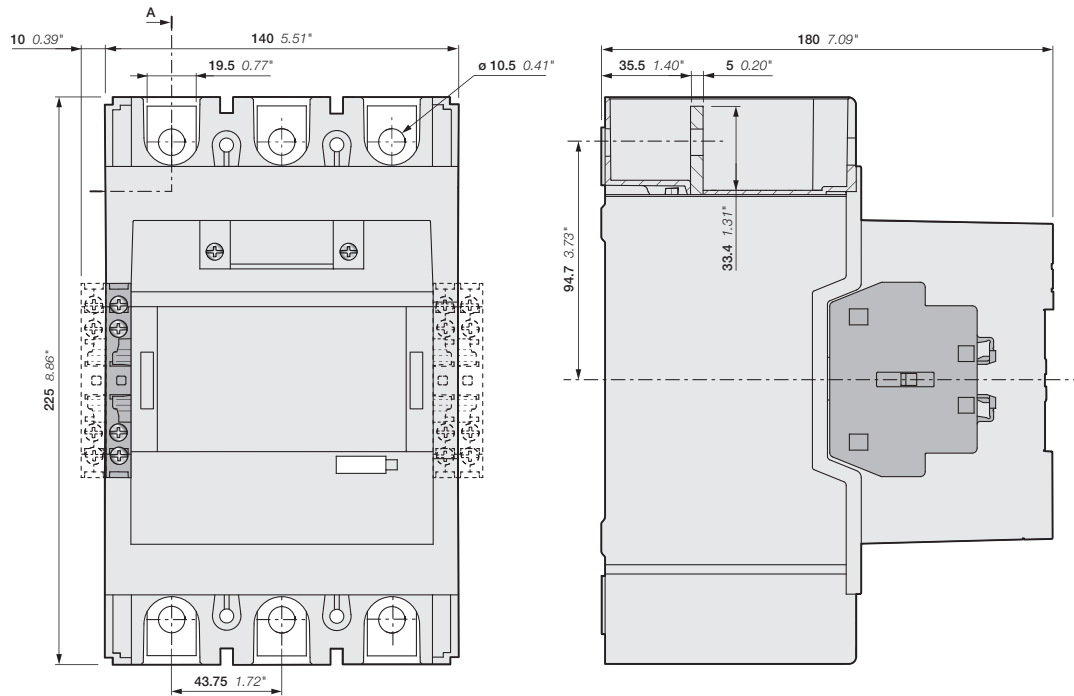
AF190, AF205-30-11
+ EF205 electronic overload relay



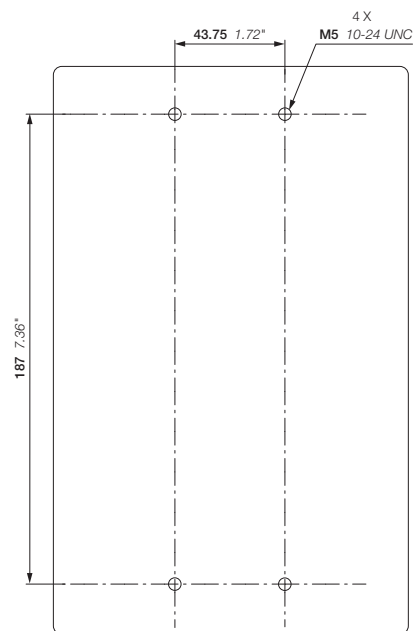
AF190, AF205
+ EF205 electronic overload relay

AF265, AF305, AF370 3-pole contactors

Main dimensions mm, inches



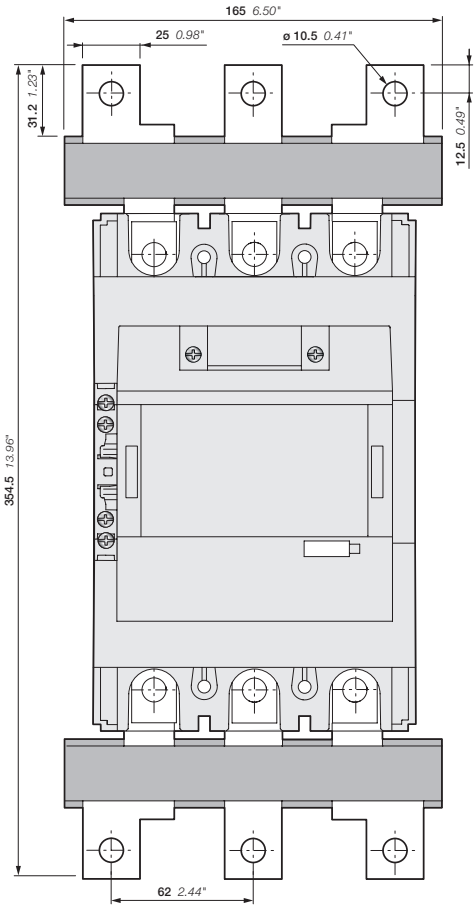
AF265, AF305, AF370-30-00 + CAL19 2-pole contact block
AF265, AF305, AF370-30-11



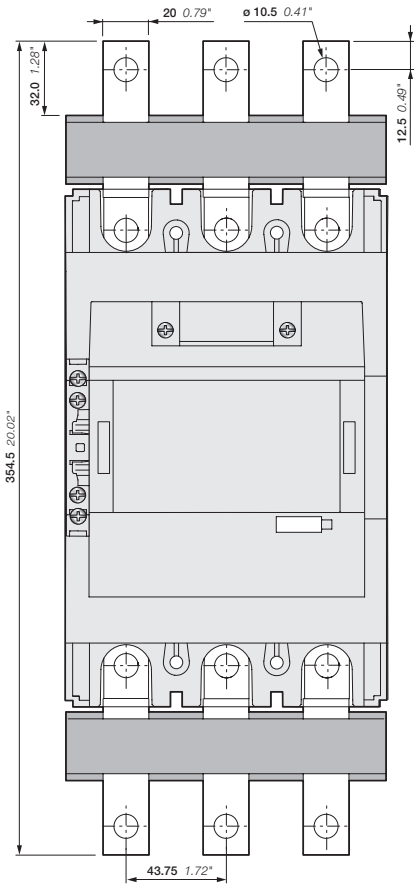
AF265, AF305, AF370

AF265, AF305, AF370 3-pole contactors

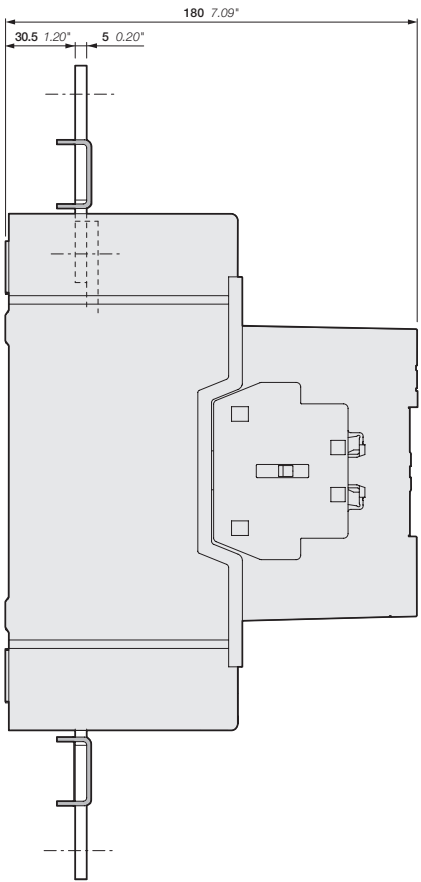
Main dimensions mm, inches



AF265, AF305, AF370-30-11
+ LX300 terminal extension



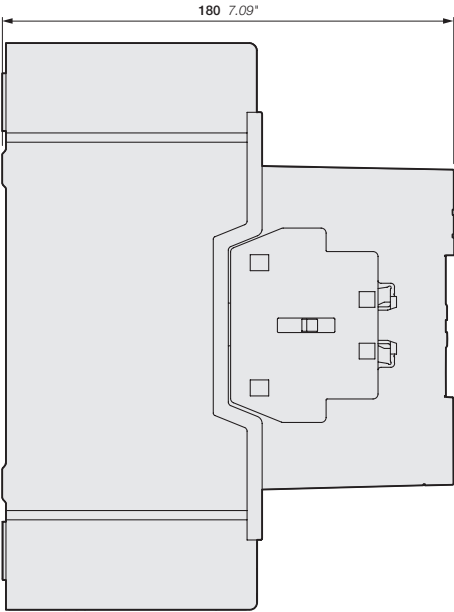
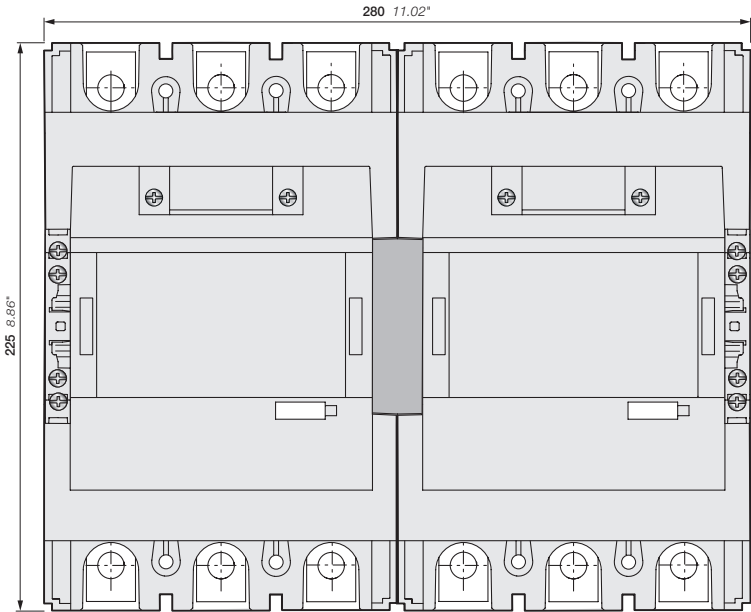
AF265, AF305, AF370-30-11
+ LW300 terminal enlargement



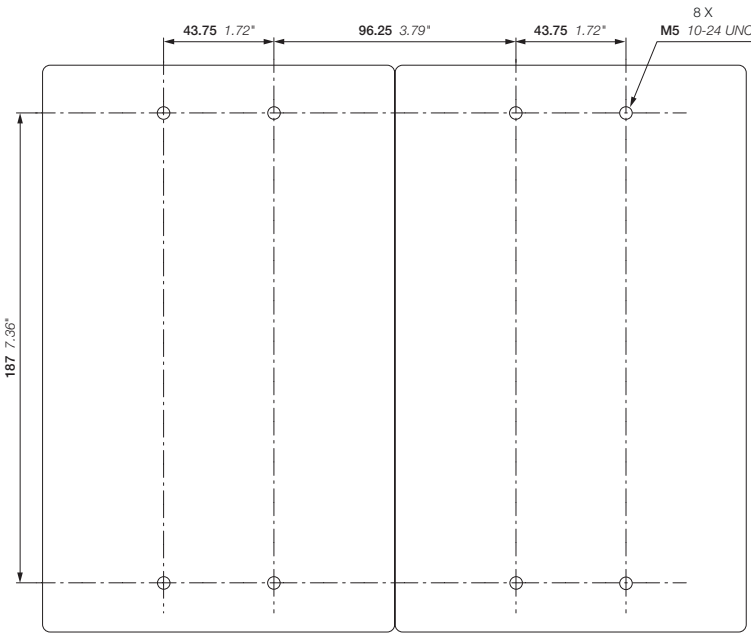
AF265, AF305, AF370 3-pole contactors

Main dimensions mm, inches

3



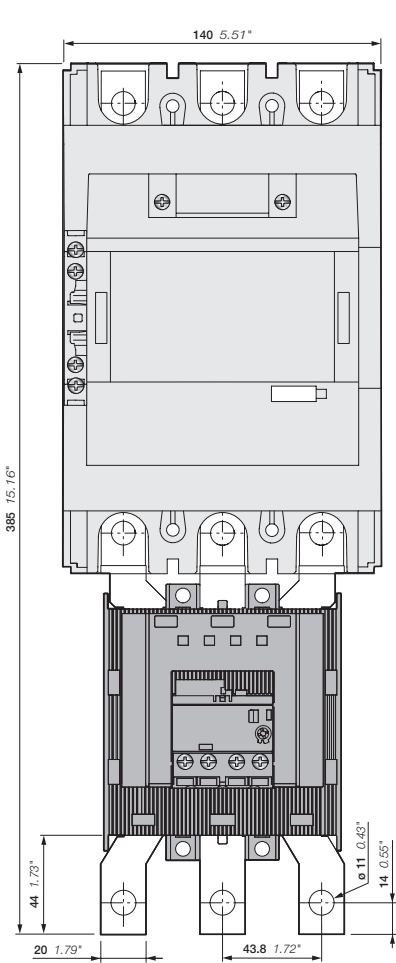
AF265, AF305, AF370-30-11
+ VM19 mechanical interlocking unit



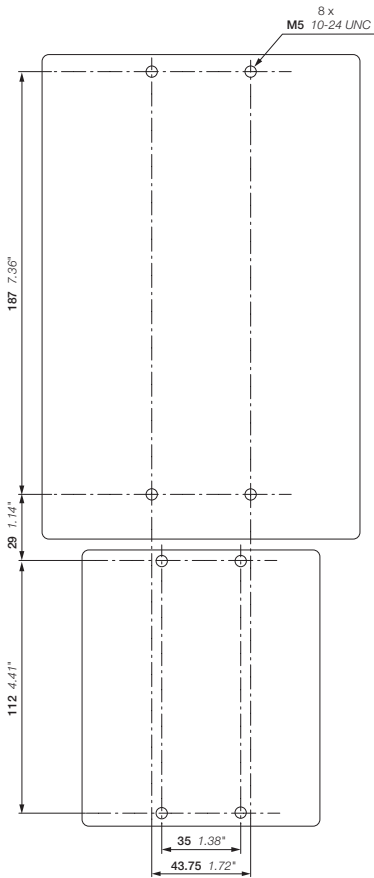
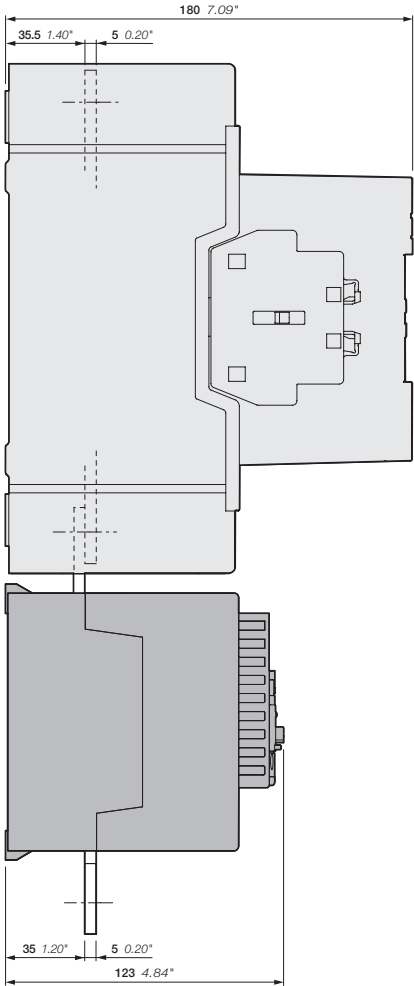
AF265, AF305, AF370
+ VM19 mechanical interlocking unit

AF265, AF305, AF370 3-pole contactors

Main dimensions mm, inches



AF265, AF305, AF370-30-11
+ EF370 electronic overload relay

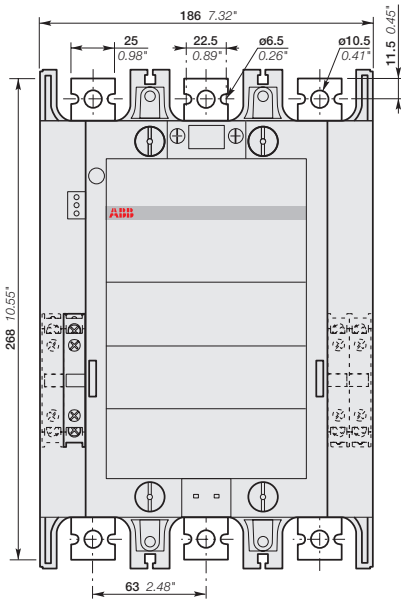


AF265, AF305, AF370
+ EF370 electronic overload relay

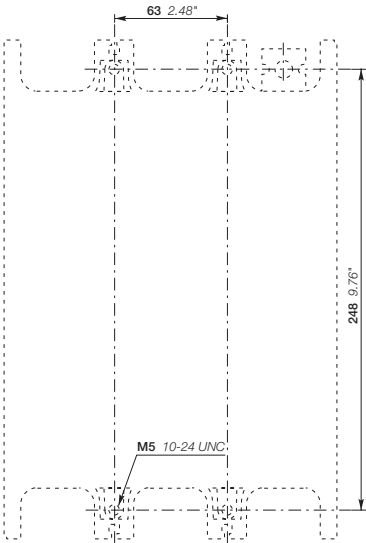
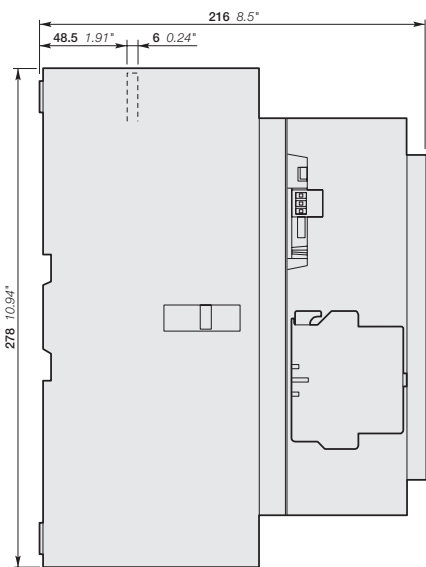
AF400 and AF460 3-pole contactors

Main dimensions mm, inches

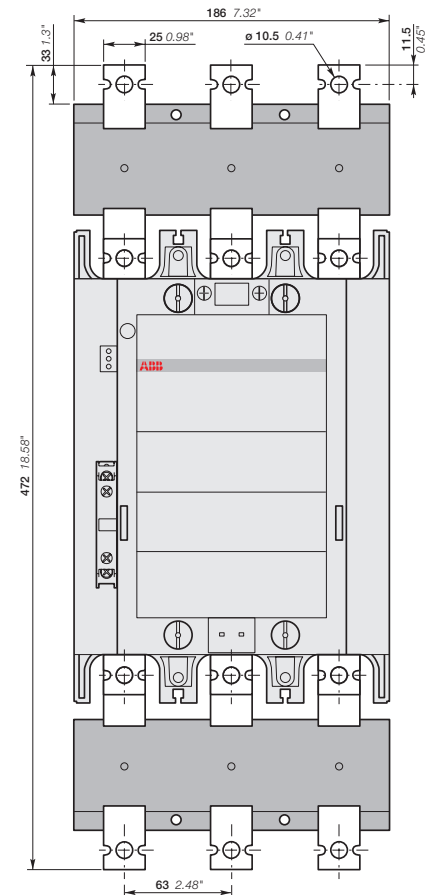
3



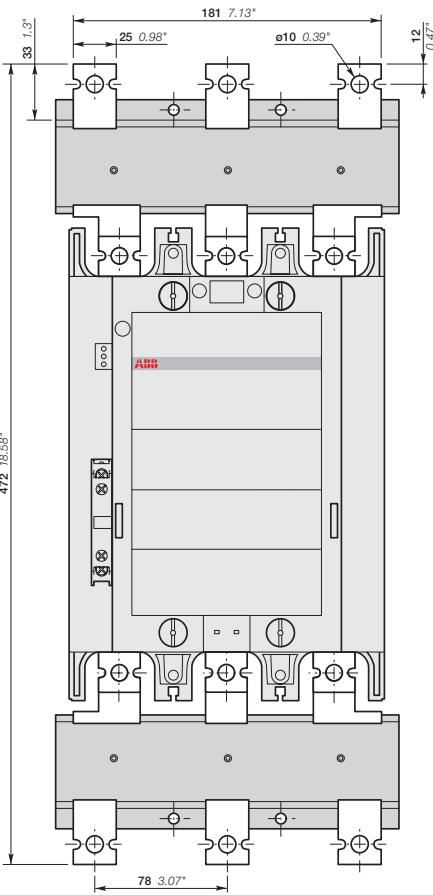
AF400, AF460-30-11



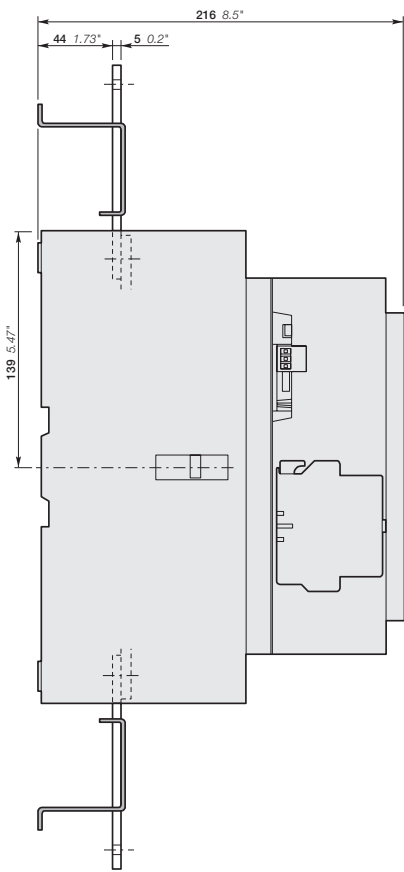
AF400, AF460



AF400, AF460-30-11
+ LX460 terminal extension

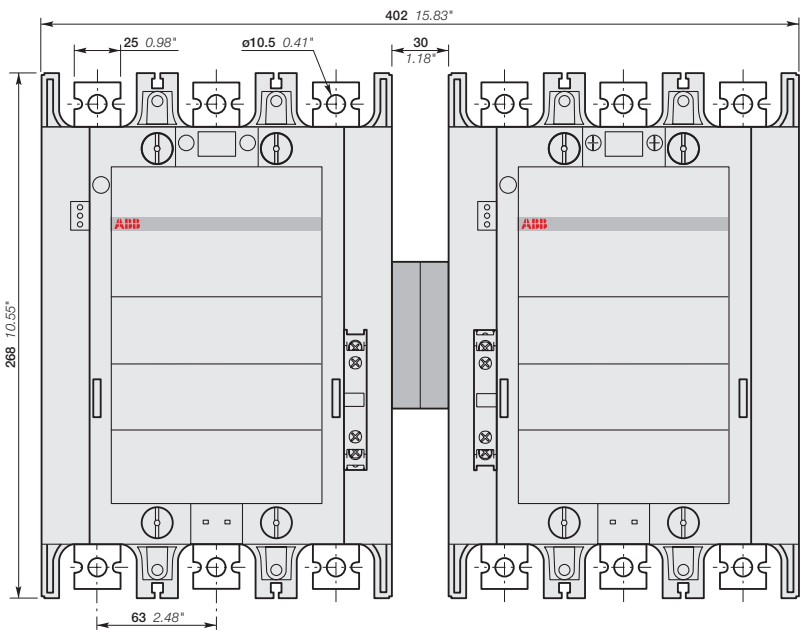


AF400, AF460-30-11
+ LW460 terminal enlargement

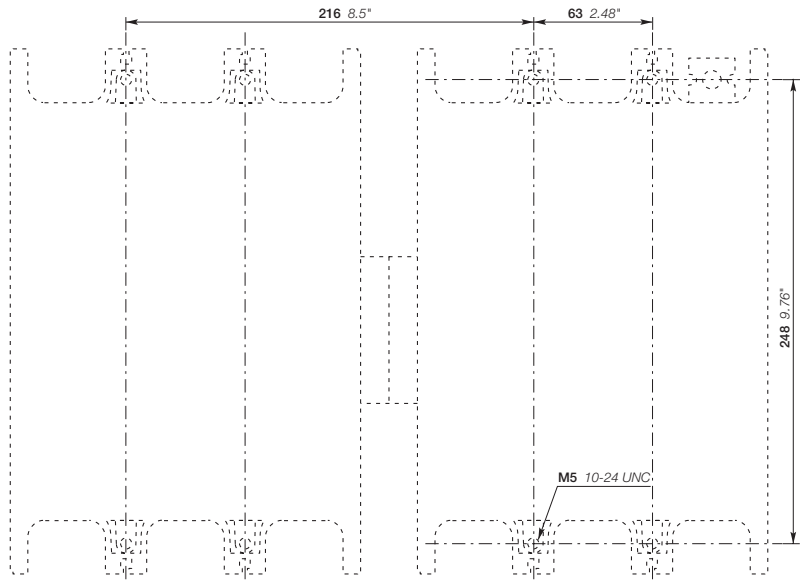
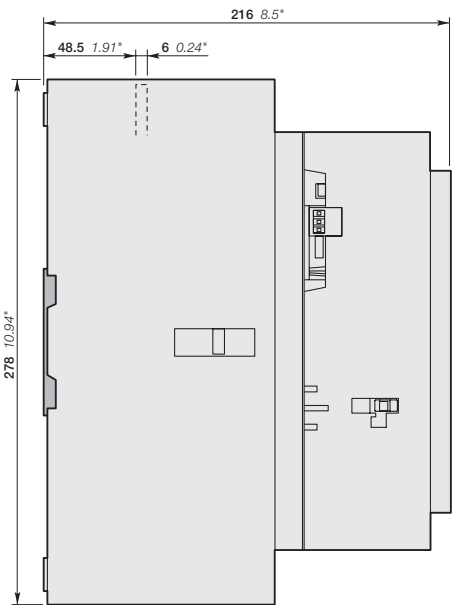


AF400 and AF460 3-pole contactors

Main dimensions mm, inches



AF400, AF460-30-11
+ VM750H mechanical interlock unit

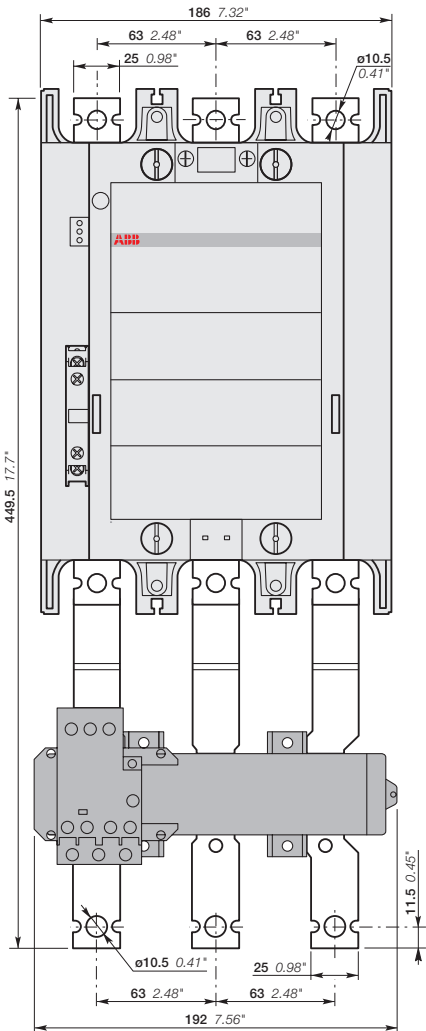


AF400, AF460
+ VM750H mechanical interlock unit

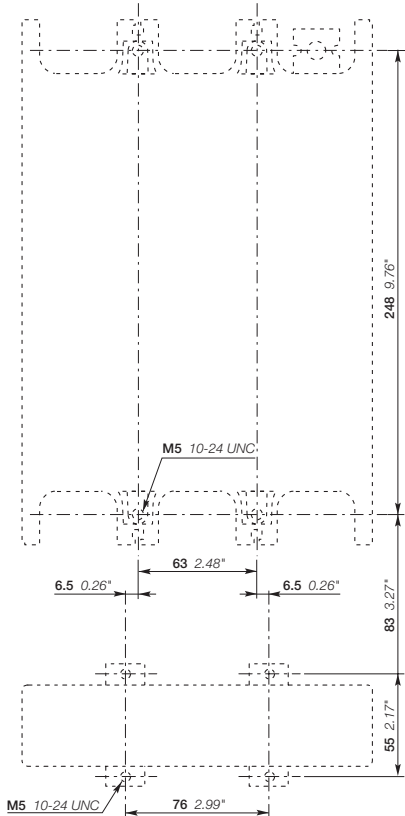
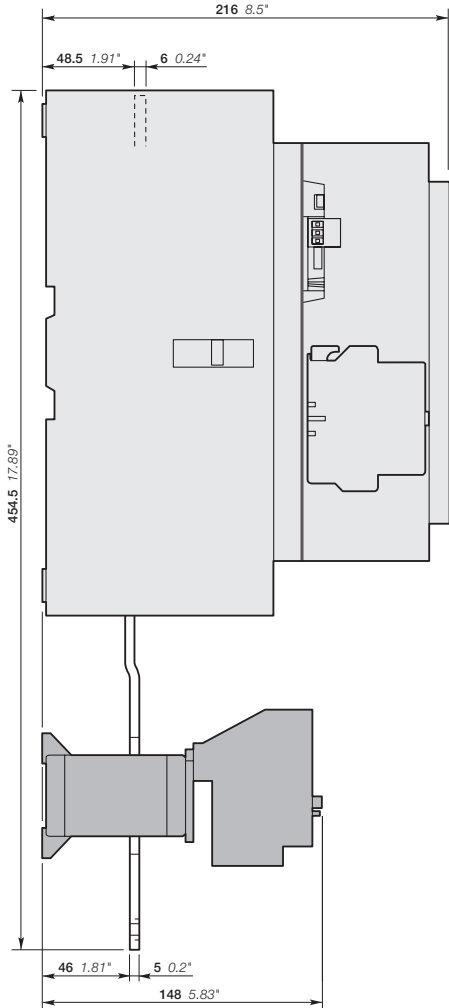
AF400 and AF460 3-pole contactors

Main dimensions mm, inches

3



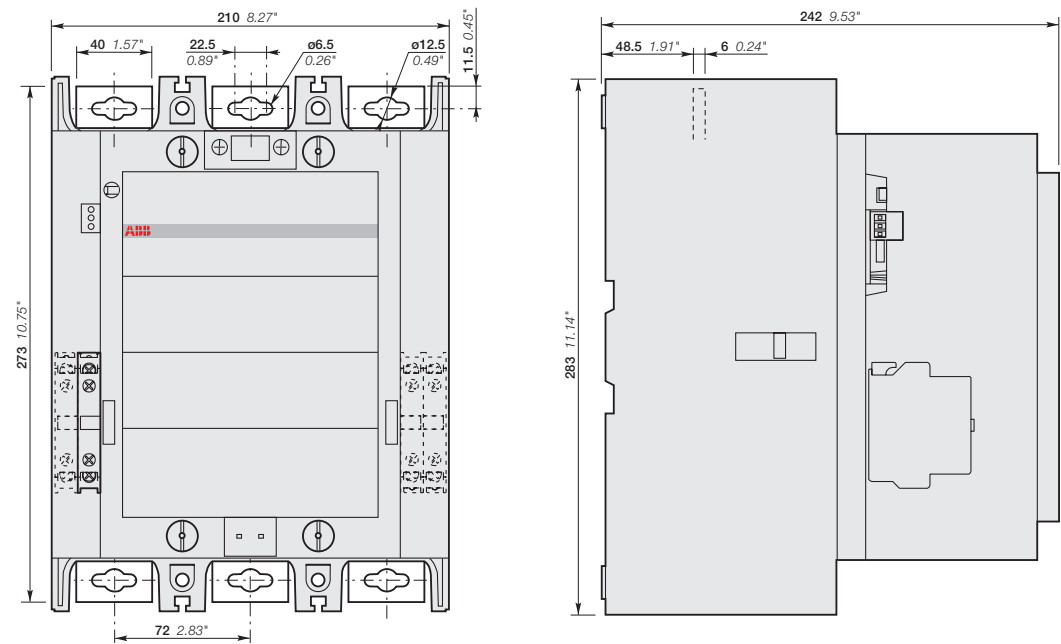
AF400, AF460-30-11
+ E500DU electronic O/L relay



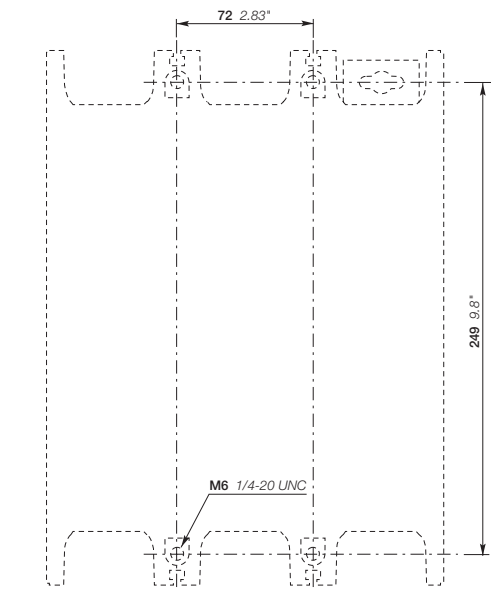
AF400, AF460
+ E500DU electronic O/L relay

AF580 and AF750 3-pole contactors

Main dimensions mm, inches



AF580 and AF750-30-11

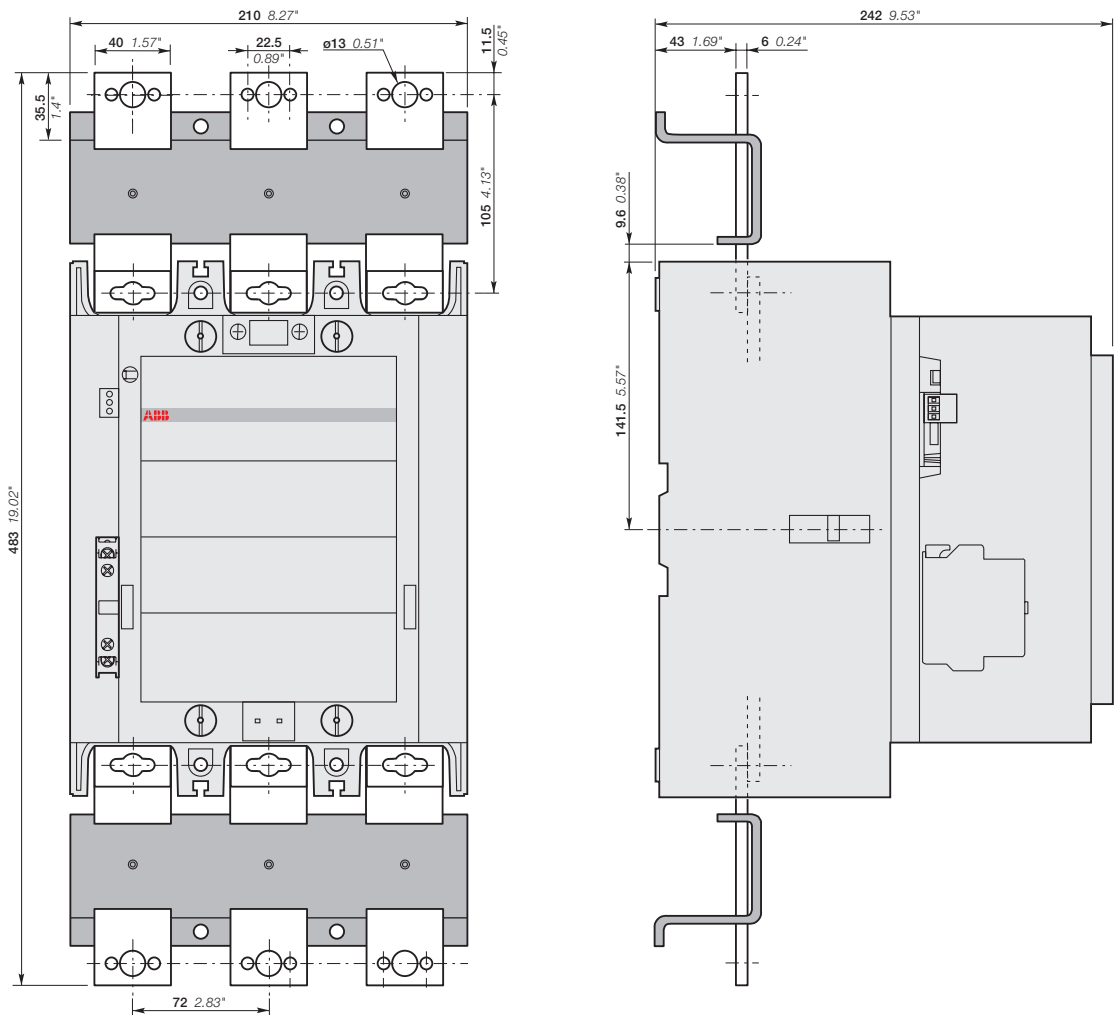


AF580 and AF750

AF580 and AF750 3-pole contactors

Main dimensions mm, inches

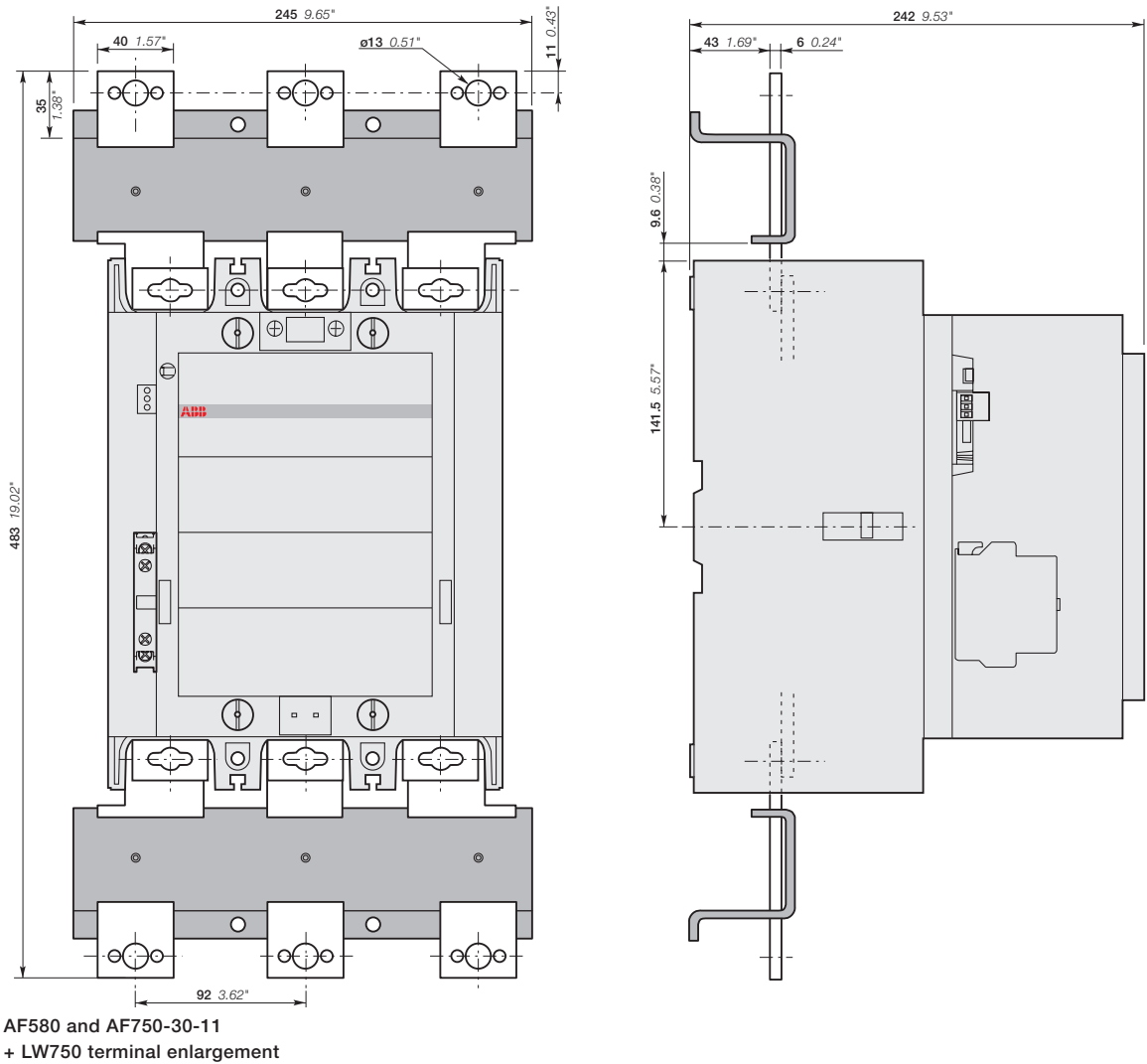
3



AF580 and AF750-30-11
+ LX750 terminal extension

AF580 and AF750 3-pole contactors

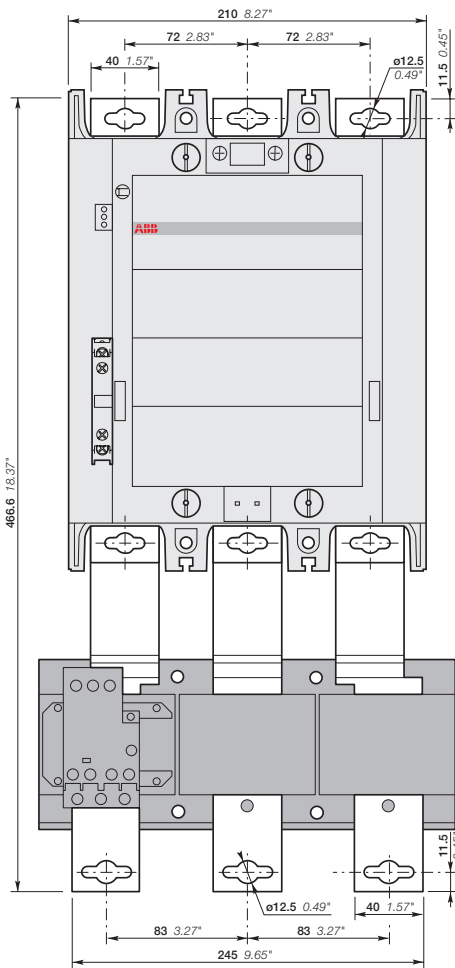
Main dimensions mm, inches



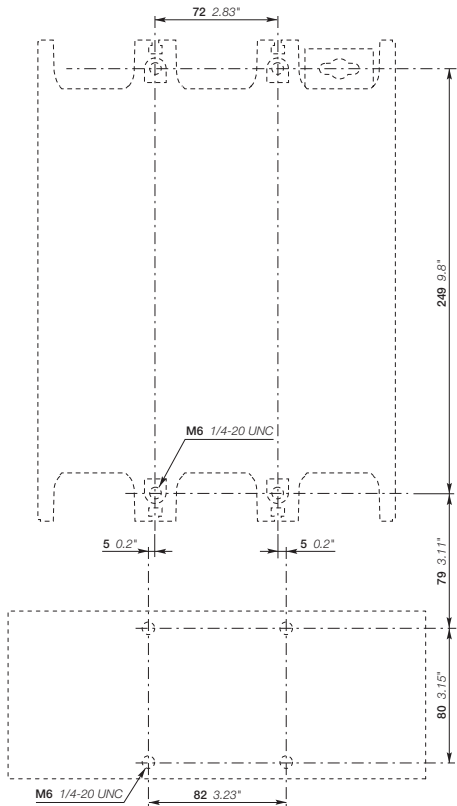
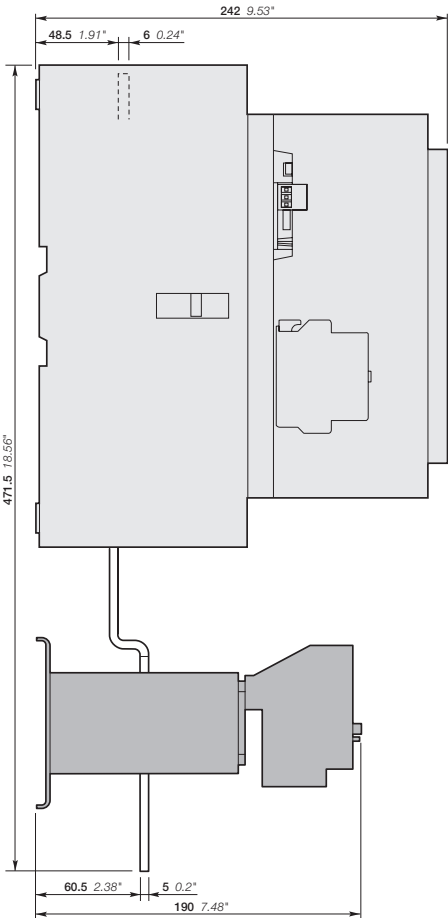
AF580 and AF750 3-pole contactors

Main dimensions mm, inches

3



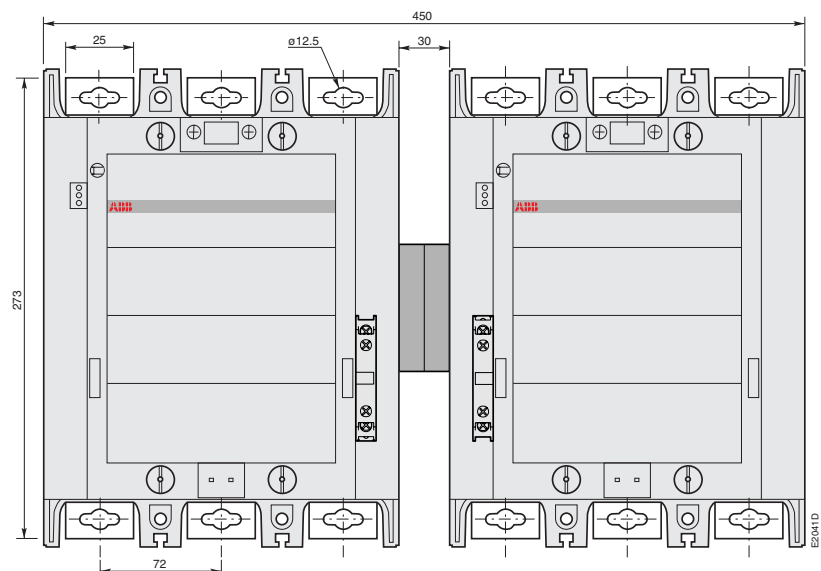
AF580 and AF750-30-11
+ E800DU electronic O/L relay



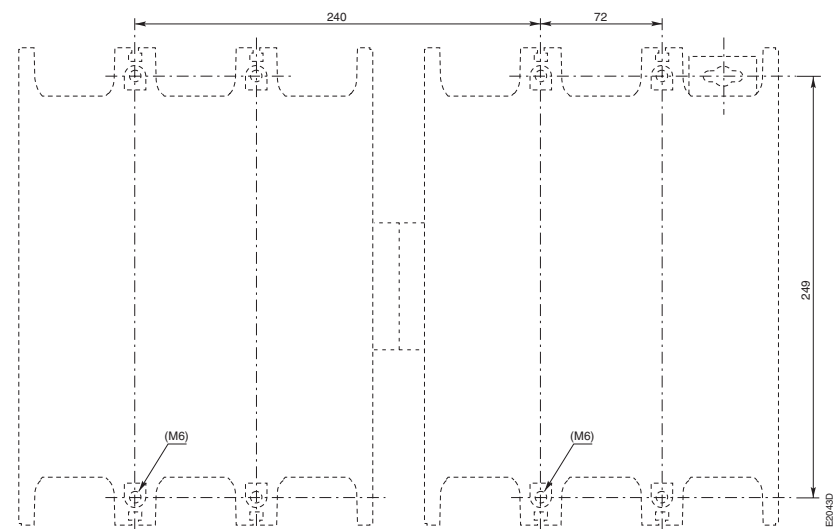
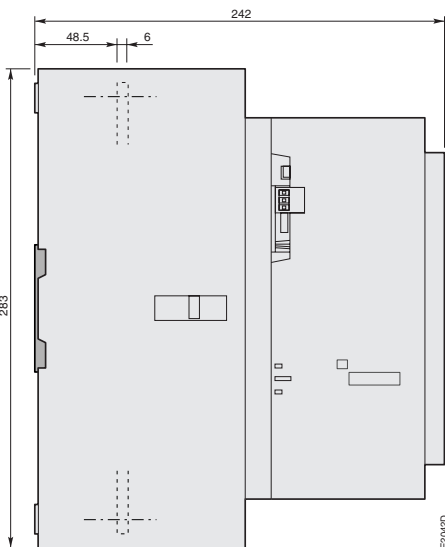
AF580 and AF750
+ E800DU electronic O/L relay

AF580 and AF750 3-pole contactors

Main dimensions mm, inches



AF580 and AF750-30-11
+ VM 750H mechanical interlock unit

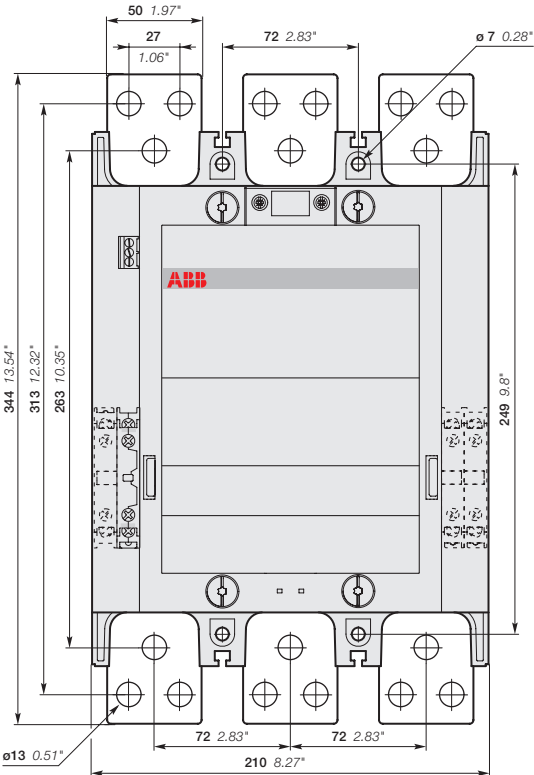


AF580 and AF750
+ VM 750H mechanical interlock unit

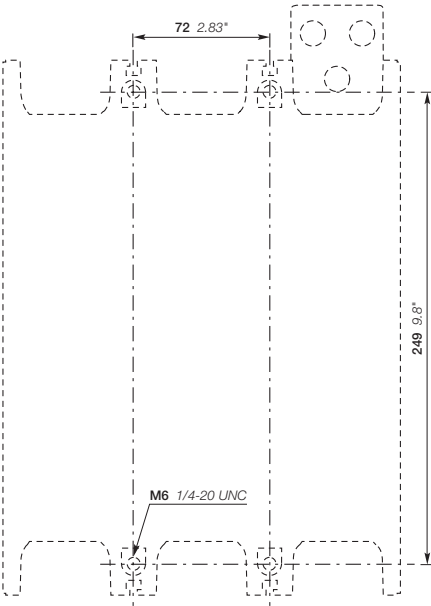
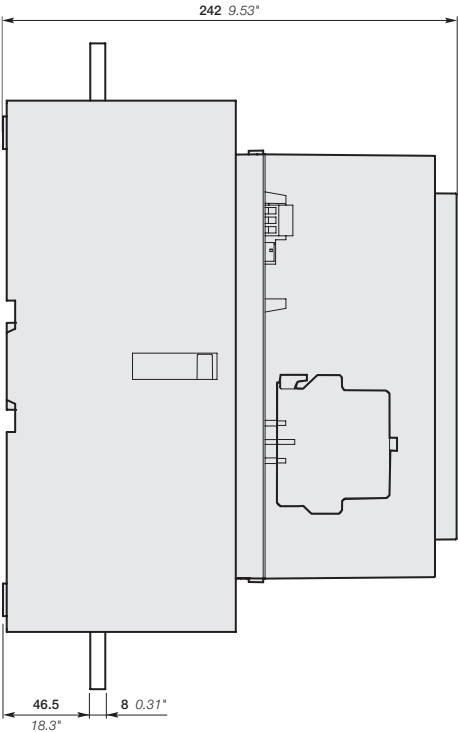
AF1250 3-pole contactors

Main dimensions mm, inches

3



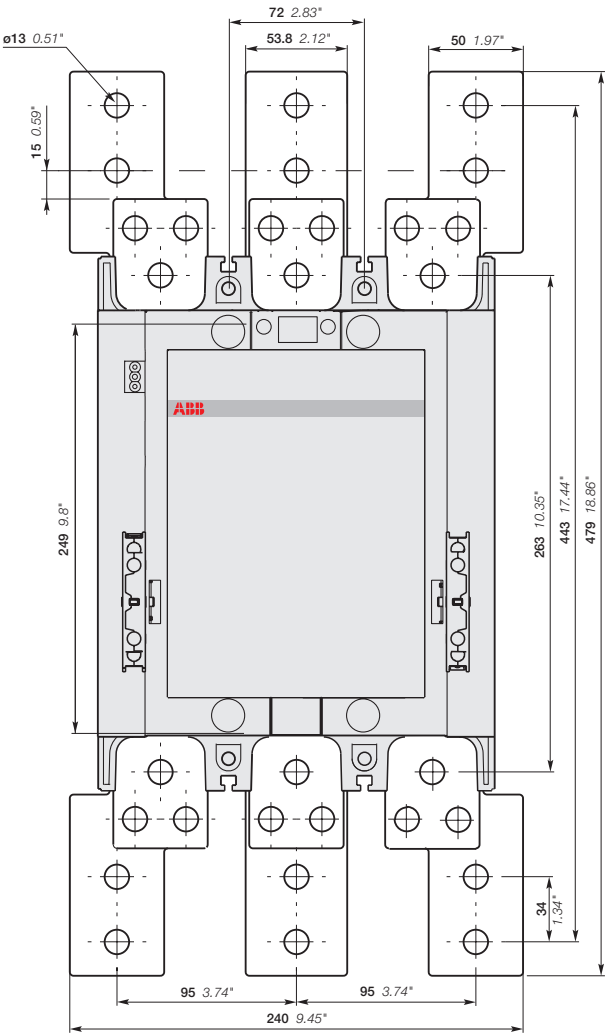
AF1250-30-11



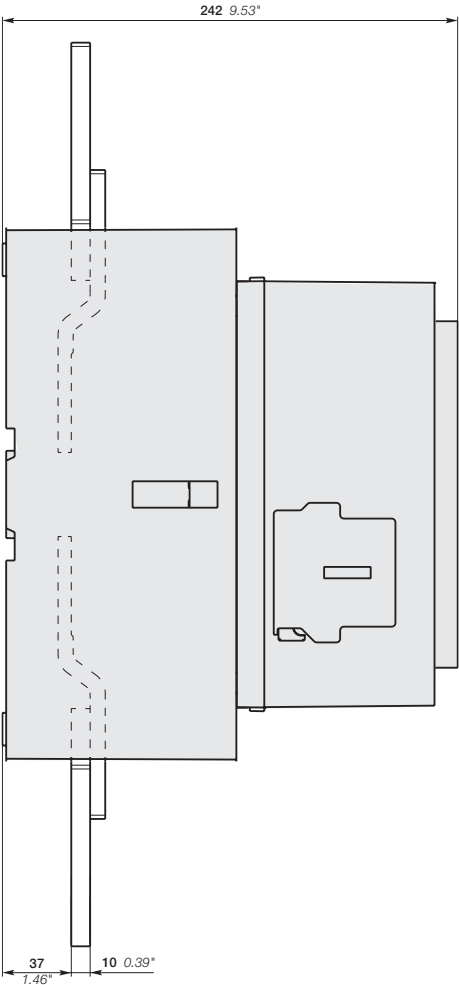
AF1250

AF1250 3-pole contactors

Main dimensions mm, inches



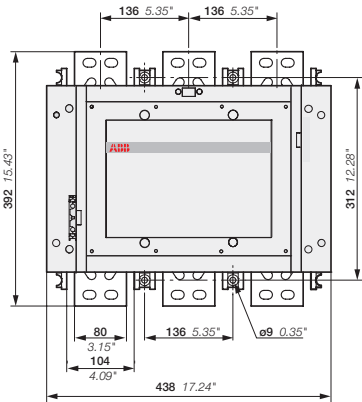
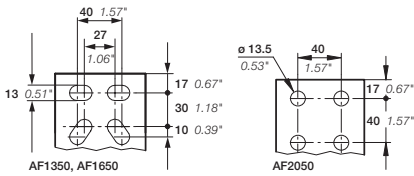
AF1250-30-11
+ LW1250 terminal enlargement



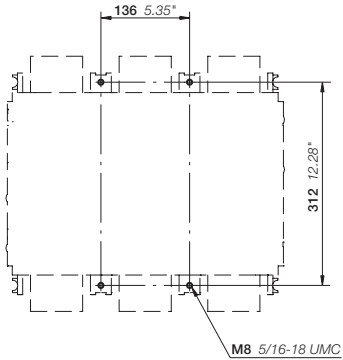
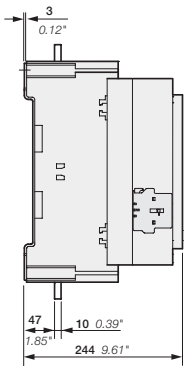
AF1350, AF1650, AF2050 and AF2650 3-pole contactors

Main dimensions mm, inches

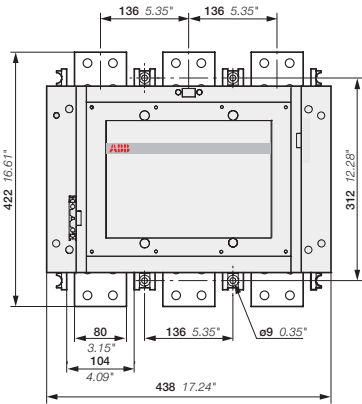
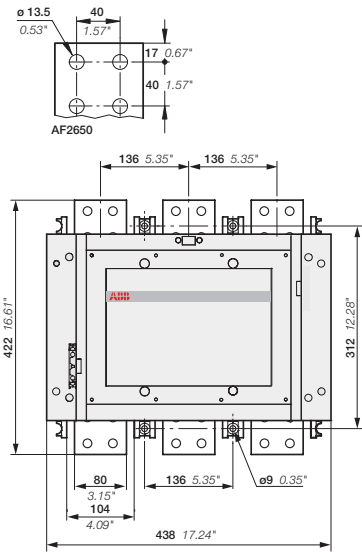
3



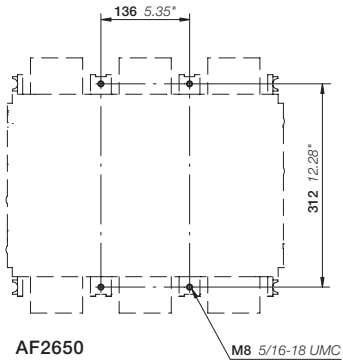
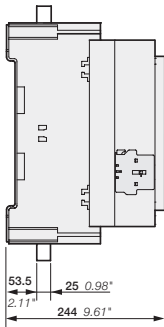
AF1350, AF1650, AF2050-30-11



AF1350, AF1650, AF2050



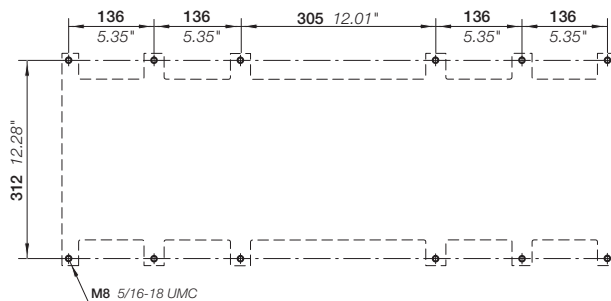
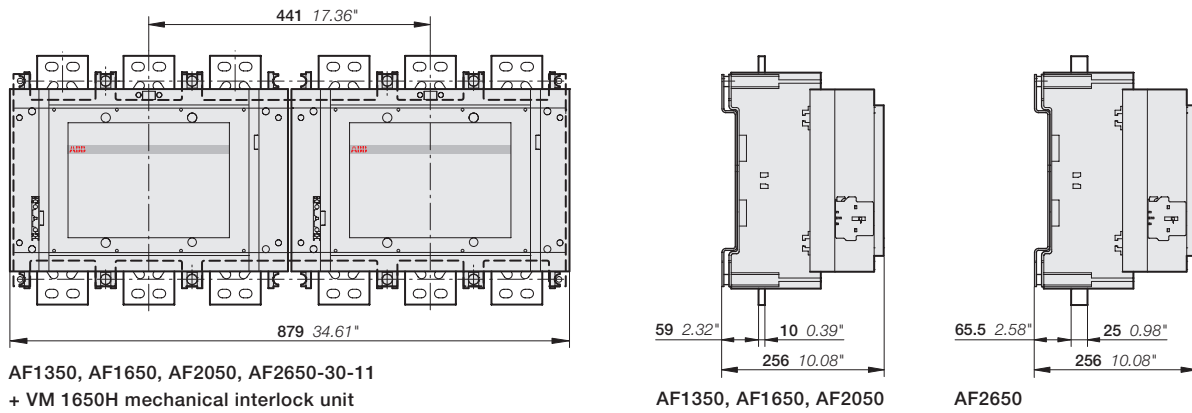
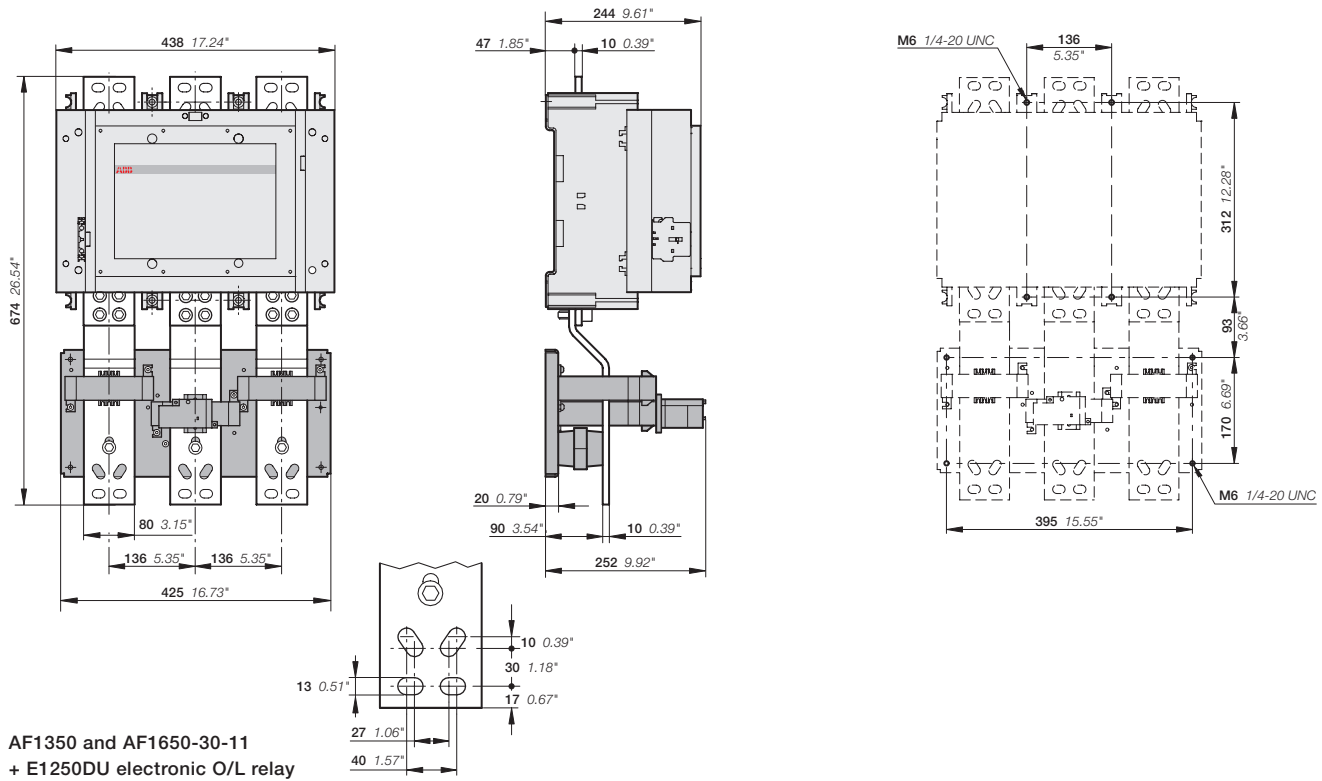
AF2650-30-11



AF2650

AF1350, AF1650, AF2050 and AF2650 3-pole contactors

Main dimensions mm, inches



Handwriting practice lines consisting of 30 horizontal dotted lines.

Handwriting practice lines consisting of 40 horizontal dotted lines.



AF 4-pole contactors

Ordering details

25 to 105 A		
AF09 ... AF38	AC / DC operated	3/90
AF09Z ... AF38Z	AC / DC operated - low consumption	3/91
AF40 ... AF80	AC / DC operated	3/92
Main accessories		3/94

160 to 420 A		
AF116 ... AF140	AC / DC operated	3/96
AF190 ... AF370	AC / DC operated	3/97
Main accessories		3/98

Technical data	3/100
Terminal marking and positioning	3/112
Main dimensions	3/114

AF09 ... AF38 4-pole contactors
25 to 55 A
AC / DC operated

3



AF09-40-00



AF26-40-00

Description

AF09 ... AF38 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 600 V AC and 250 V DC. These contactors are of the block type design with 4 main poles.

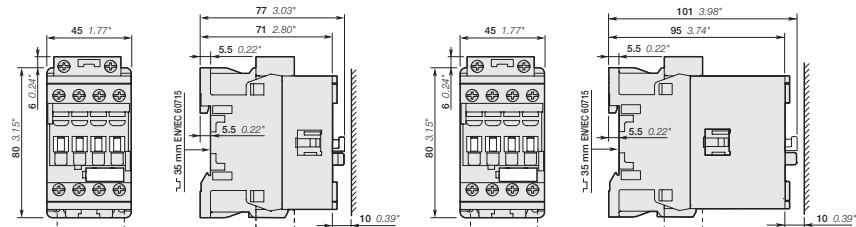
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
- can manage large control voltage variations
- reduced panel energy consumption
- very distinct closing and opening.
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

UL/CSA General use rating 600 V AC	Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Order code	Weight Pkg (1 pce)
A	V 50/60 Hz	V DC				kg
4 N.O. main poles						
25	24...60	20...60 (1)	0	0	AF09-40-00-11	0.27
	48...130	48...130	0	0	AF09-40-00-12	0.27
	100...250	100...250	0	0	AF09-40-00-13	0.27
	250...500	250...500	0	0	AF09-40-00-14	0.31
30	24...60	20...60 (1)	0	0	AF16-40-00-11	0.27
	48...130	48...130	0	0	AF16-40-00-12	0.27
	100...250	100...250	0	0	AF16-40-00-13	0.27
	250...500	250...500	0	0	AF16-40-00-14	0.31
45	24...60	20...60 (1)	0	0	AF26-40-00-11	0.36
	48...130	48...130	0	0	AF26-40-00-12	0.36
	100...250	100...250	0	0	AF26-40-00-13	0.36
	250...500	250...500	0	0	AF26-40-00-14	0.40
55	24...60	20...60 (1)	0	0	AF38-40-00-11	0.36
	48...130	48...130	0	0	AF38-40-00-12	0.36
	100...250	100...250	0	0	AF38-40-00-13	0.36
	250...500	250...500	0	0	AF38-40-00-14	0.40
2 N.O. + 2 N.C. main poles						
25	24...60	20...60 (1)	0	0	AF09-22-00-11	0.27
	48...130	48...130	0	0	AF09-22-00-12	0.27
	100...250	100...250	0	0	AF09-22-00-13	0.27
	250...500	250...500	0	0	AF09-22-00-14	0.31
30	24...60	20...60 (1)	0	0	AF16-22-00-11	0.27
	48...130	48...130	0	0	AF16-22-00-12	0.27
	100...250	100...250	0	0	AF16-22-00-13	0.27
	250...500	250...500	0	0	AF16-22-00-14	0.31
45	24...60	20...60 (1)	0	0	AF26-22-00-11	0.36
	48...130	48...130	0	0	AF26-22-00-12	0.36
	100...250	100...250	0	0	AF26-22-00-13	0.36
	250...500	250...500	0	0	AF26-22-00-14	0.40
55	24...60	20...60 (1)	0	0	AF38-22-00-11	0.36
	48...130	48...130	0	0	AF38-22-00-12	0.36
	100...250	100...250	0	0	AF38-22-00-13	0.36
	250...500	250...500	0	0	AF38-22-00-14	0.40

(1) AF...-...-11 not suitable for direct control by PLC-output.

Main dimensions mm, inches



AF09, AF16

AF26, AF38

AF09Z ... AF38Z 4-pole contactors

25 to 55 A

AC / DC operated - low consumption



AF09Z-40-00



AF26Z-40-00

Description

AF09Z ... AF38Z 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 600 V AC and 250 V DC. These contactors are of the block type design with 4 main poles.

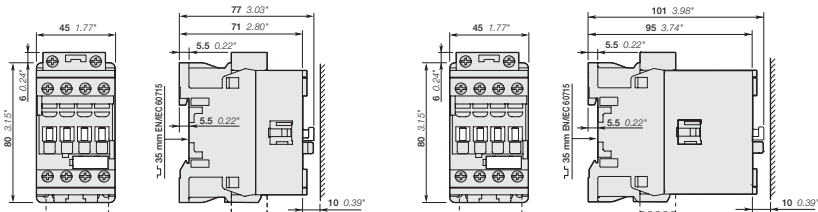
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
- can manage large control voltage variations
- allow direct control by PLC-output ≥ 24 V DC 500 mA
- reduced panel energy consumption
- very distinct closing and opening
- can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

UL/CSA General use rating 600 V AC	Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Order code	Weight Pkg (1 pce)
	V 50/60 Hz	V DC			
A			 		kg
4 N.O. main poles					
25	-	12...20	0 0	AF09Z-40-00-20	0.31
	24...60	20...60	0 0	AF09Z-40-00-21	0.31
	48...130	48...130	0 0	AF09Z-40-00-22	0.31
	100...250	100...250	0 0	AF09Z-40-00-23	0.31
30	-	12...20	0 0	AF16Z-40-00-20	0.31
	24...60	20...60	0 0	AF16Z-40-00-21	0.31
	48...130	48...130	0 0	AF16Z-40-00-22	0.31
	100...250	100...250	0 0	AF16Z-40-00-23	0.31
45	-	12...20	0 0	AF26Z-40-00-20	0.40
	24...60	20...60	0 0	AF26Z-40-00-21	0.40
	48...130	48...130	0 0	AF26Z-40-00-22	0.40
	100...250	100...250	0 0	AF26Z-40-00-23	0.40
55	-	12...20	0 0	AF38Z-40-00-20	0.40
	24...60	20...60	0 0	AF38Z-40-00-21	0.40
	48...130	48...130	0 0	AF38Z-40-00-22	0.40
	100...250	100...250	0 0	AF38Z-40-00-23	0.40
2 N.O. + 2 N.C. main poles					
25	-	12...20	0 0	AF09Z-22-00-20	0.31
	24...60	20...60	0 0	AF09Z-22-00-21	0.31
	48...130	48...130	0 0	AF09Z-22-00-22	0.31
	100...250	100...250	0 0	AF09Z-22-00-23	0.31
30	-	12...20	0 0	AF16Z-22-00-20	0.31
	24...60	20...60	0 0	AF16Z-22-00-21	0.31
	48...130	48...130	0 0	AF16Z-22-00-22	0.31
	100...250	100...250	0 0	AF16Z-22-00-23	0.31
45	-	12...20	0 0	AF26Z-22-00-20	0.40
	24...60	20...60	0 0	AF26Z-22-00-21	0.40
	48...130	48...130	0 0	AF26Z-22-00-22	0.40
	100...250	100...250	0 0	AF26Z-22-00-23	0.40
55	-	12...20	0 0	AF38Z-22-00-20	0.40
	24...60	20...60	0 0	AF38Z-22-00-21	0.40
	48...130	48...130	0 0	AF38Z-22-00-22	0.40
	100...250	100...250	0 0	AF38Z-22-00-23	0.40

Note: Only AF.Z contactors with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.

Main dimensions mm, inches



AF09Z, AF16Z

AF26Z, AF38Z

AF40 ... AF80 4-pole contactors

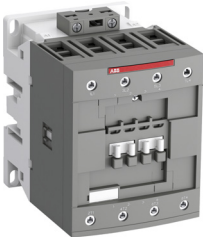
60 to 105 A

AC / DC operated

3



AF40-40-00



AF80-40-00

Description

AF40 ... AF80 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 600 V AC and 250 V DC. These contactors are of the block type design with 4 main poles.

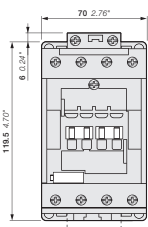
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
- can manage large control voltage variations
- reduced panel energy consumption
- very distinct closing and opening.
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

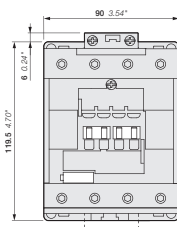
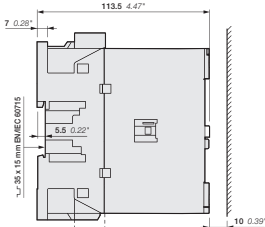
UL/CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Order code	Weight
General use rating 600 V AC						Pkg (1 pce)
A	V 50/60 Hz	V DC	kg			
4 N.O. Main Poles						
60	24...60	20...60 (1)	0 0	AF40-40-00-11		1.21
	48...130	48...130	0 0	AF40-40-00-12		1.21
	100...250	100...250	0 0	AF40-40-00-13		1.16
	250...500	250...500	0 0	AF40-40-00-14		1.16
80	24...60	20...60 (1)	0 0	AF52-40-00-11		1.21
	48...130	48...130	0 0	AF52-40-00-12		1.21
	100...250	100...250	0 0	AF52-40-00-13		1.16
	250...500	250...500	0 0	AF52-40-00-14		1.16
105	24...60	-	0 0	AF80-40-00-11		1.49
	24...60	20...60 (1)	0 0	AF80-40-00-11		1.49
	48...130	48...130	0 0	AF80-40-00-12		1.49
	100...250	100...250	0 0	AF80-40-00-13		1.44
	250...500	250...500	0 0	AF80-40-00-14		1.44
2 N.O. + 2 N.C. Main Poles						
60	24...60	20...60 (1)	0 0	AF40-22-00-11		1.21
	48...130	48...130	0 0	AF40-22-00-12		1.21
	100...250	100...250	0 0	AF40-22-00-13		1.16
	250...500	250...500	0 0	AF40-22-00-14		1.16
105	24...60	20...60 (1)	0 0	AF80-22-00-11		1.49
	48...130	48...130	0 0	AF80-22-00-12		1.49
	100...250	100...250	0 0	AF80-22-00-13		1.44
	250...500	250...500	0 0	AF80-22-00-14		1.44

(1) AF-...-11 not suitable for direct control by PLC-output.

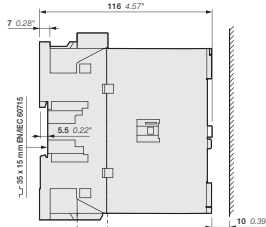
Main dimensions mm, inches

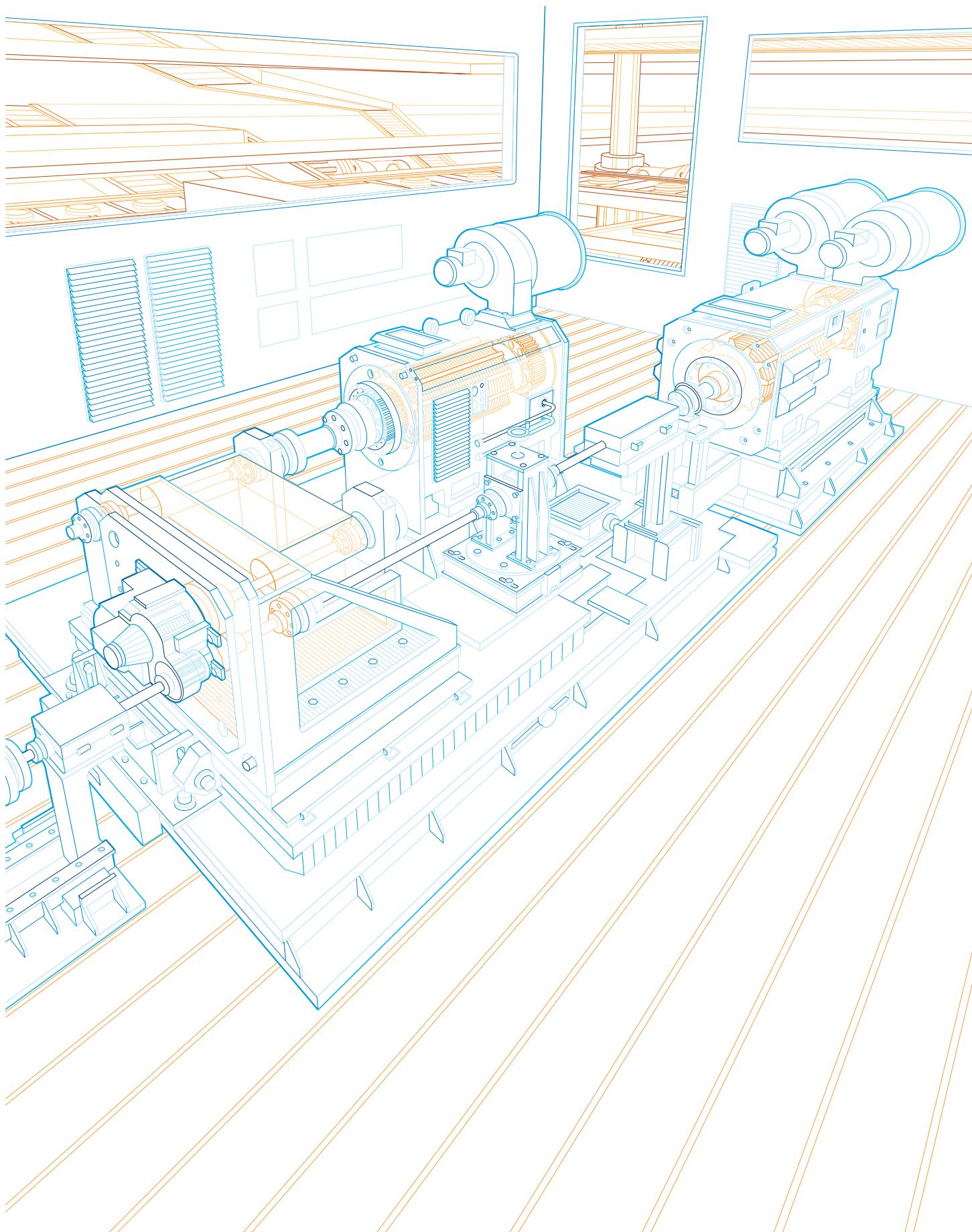


AF40, AF52



AF80

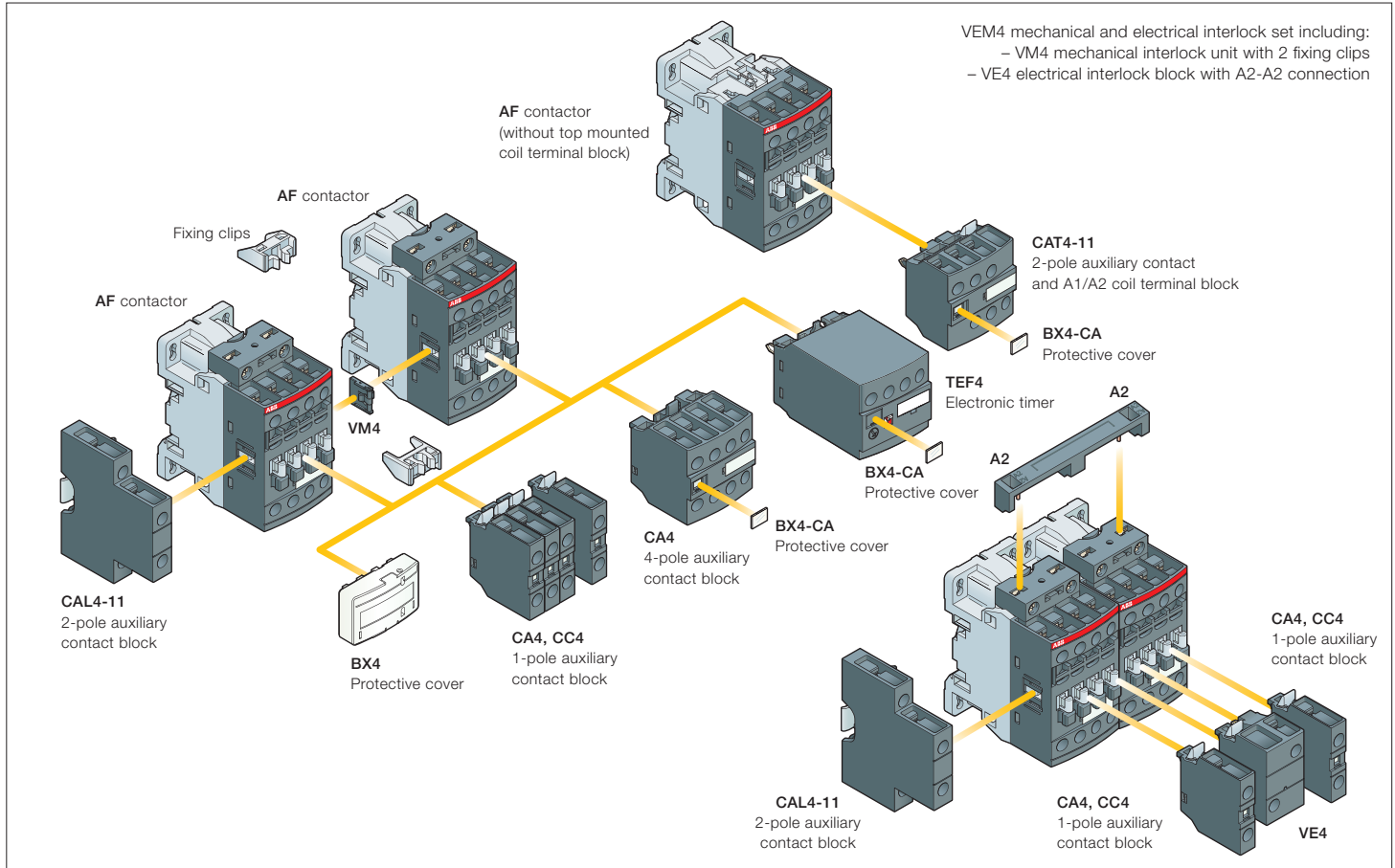




AF09 ... AF80 4-pole contactors

Main accessories

Contactor and main accessories (other accessories available)



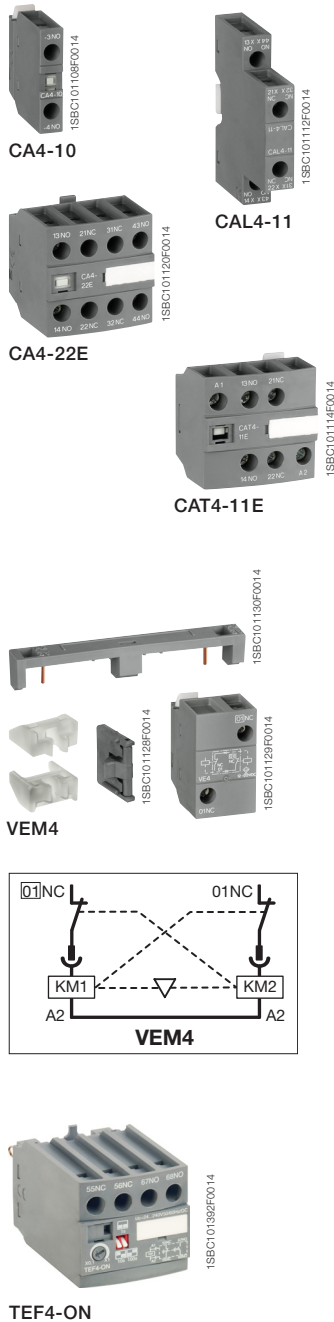
Main accessory fitting details

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

Contactor types	Main poles		Built-in auxiliary contacts		Front-mounted accessories				Side-mounted accessories						
					Auxiliary contact blocks		Electronic timer	Electrical and mechanical interlock set (between 2 contactors)	Auxiliary contact blocks						
					1-pole CA4	1-pole CC4	2-pole CAT4-11	4-pole CA4	TEF4	VEM4	Left side 2-pole CAL4-11	Right side			
Max. add-on N.C. auxiliary contacts: 4 N.C. max. on positions 1, 2, 3, 4 and 3 N.C. max. on positions 1 ±30°, 5															
AF09 ... AF16	4	0	0	0	4 max.	or	1	or	1	or	1	–			
					2 max.	or	1	–	or	1	–	+	1	+	1
					3 max.	–	–	–	–	+	1	+	1	or	1
Max. add-on N.C. auxiliary contacts: 3 N.C. max. on positions 1, 2, 3, 4 and 2 N.C. max. on positions 1 ±30°, 5															
AF26 ... AF38	4	0	0	0	4 max.	or	1	or	1	or	1	–			
					2 max.	or	1	–	or	1	–	+	1	+	1
					3 max.	–	–	–	–	+	1	+	1	or	1
Max. add-on N.C. auxiliary contacts: 6 N.C. max. on positions 1, 1 ±30°, 2, 3, 4, 5															
AF40 ... AF52	4	0	0	0	4 max.	or	1	or	1	or	1	–			
AF80	4	0	0	0	4 max.	–	or	1	or	1	–	+	1		
Max. add-on N.C. auxiliary contacts: 3 N.C. max. on positions 1, 2, 3, 4 and 2 N.C. max. on positions 1 ±30°, 5															
AF09 ... AF16	2	2	0	0	4 max.	or	1	or	1	or	1	–			
AF26 ... AF38	2	2	0	0	2 max.	or	1	–	or	1	–	+	1		
Max. add-on N.C. auxiliary contacts: 2 N.C. max. on positions 1, 1 ±30°, 2, 3, 4, 5															
AF40	2	2	0	0	4 max.	or	1	or	1	or	1	–			
		2	2	0	4 max.	–	or	1	or	1	–	+	1		
AF80	2	2	0	0	4 max.	–	or	1	or	1	–	+	1		

AF09 ... AF80 4-pole contactors

Main accessories



Ordering details (1)

For contactors	Auxiliary contacts	Order code	Pkg qty	Weight (1 pce)
				kg

Front-mounted instantaneous auxiliary contact blocks

AF09 ... AF80-40-00	1	0	-	-	CA4-10	1	0.02
AF09 ... AF80-22-00	0	1	-	-	CA4-01	1	0.02
	2	2	-	-	CA4-22E	1	0.06
	3	1	-	-	CA4-31E	1	0.06
	4	0	-	-	CA4-40E	1	0.06
AF09 ... AF16-40-00	0	4	-	-	CA4-04E	1	0.06
AF40 ... AF80-40-00	0	4	-	-	CA4-04E	1	0.06

Front-mounted auxiliary contact blocks with N.O. leading contact and N.C. lagging contact

AF09 ... AF80-40-00	-	-	1	0	CC4-10	1	0.02
AF09 ... AF80-22-00	-	-	0	1	CC4-01	1	0.02

Side-mounted instantaneous auxiliary contact blocks

AF09 ... AF80-40-00	1	1	-	-	CAL4-11	1	0.04
AF09 ... AF80-22-00							

Front-mounted instantaneous auxiliary contact and A1/A2 coil terminal blocks

AF09 ... AF52-40-00	1	1	-	-	CAT4-11E	1	0.04
AF09 ... AF40-22-00							

Note: CAT4 not suitable for AF..Z contactors with DC control voltage 12...20 V DC.

Mechanical interlock unit

AF09 ... AF38-40-00					VM4	10	0.01
AF40 ... AF80-40-00					VM96-4	10	0.01

Note: VM4 includes 2 fixing clips (BB4) to maintain together both contactors.

Mechanical and electrical interlock set

AF09, AF16-40-00	0	2	-	-	VEM4	1	0.04
AF26, AF38-40-00							

Note: – VEM4 includes a VM4 mechanical interlock unit with 2 fixing clips (BB4), a VE4 electrical interlock block. VE4 block must be used with A2-A2 connection to respect the electrical connection diagram.
– VEM4 not suitable for AF..Z contactors with DC control voltage 12...20 V DC.

For contactors	Time delay range selected by switch	Delay type	Auxiliary contacts	Order code	Pkg qty	Weight (1 pce)
						kg

Electronic timers

AF09 ... AF80	0.1...1 s	ON-delay	1	1	TEF4-ON	1	0.07
	1...10 s						
	10...100 s	OFF-delay	1	1	TEF4-OFF	1	0.07

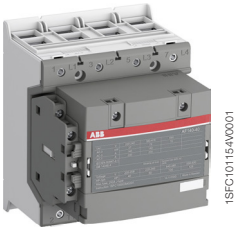
Note: Rated control circuit voltage U_c 24...240 V 50/60 Hz or DC.

(1) For more information, refer to "Accessories" section.

AF116 ... AF140 4-pole contactors

160 to 200 A

AC / DC operated



AF140-40-11

Description

- AF116 ... AF140 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 600 V AC. These contactors are of the block type design with 4 main poles.
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
 - built-in surge suppression
 - add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

UL / CSA General use rating 600 V AC	Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Order code	Weight Pkg (1 pce) kg
A	V 50/60 Hz	V DC				

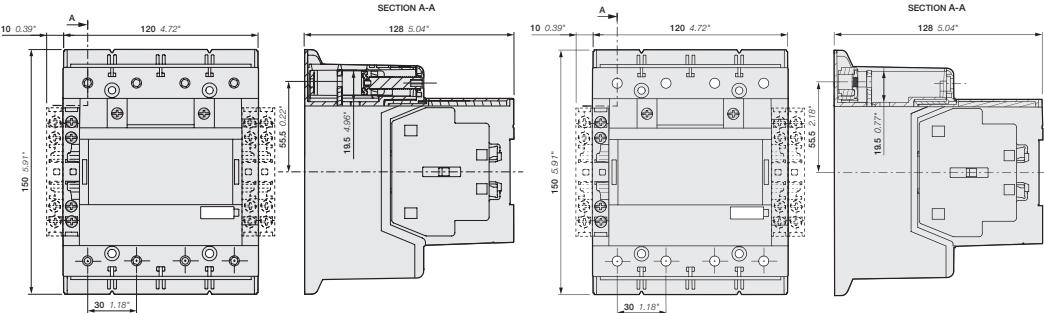
4 N.O. main poles

For connection with built-in cable clamps

160	24...60	20...60	1	1	AF116-40-11-11	2.27
	48...130	48...130	1	1	AF116-40-11-12	2.27
	100...250	100...250	1	1	AF116-40-11-13	2.27
	250...500	250...500	1	1	AF116-40-11-14	2.27
200	24...60	20...60	1	1	AF140-40-11-11	2.27
	48...130	48...130	1	1	AF140-40-11-12	2.27
	100...250	100...250	1	1	AF140-40-11-13	2.27
	250...500	250...500	1	1	AF140-40-11-14	2.27

(1) For other auxiliary contacts arrangements, please contact your ABB local organization.

Main dimensions mm, inches



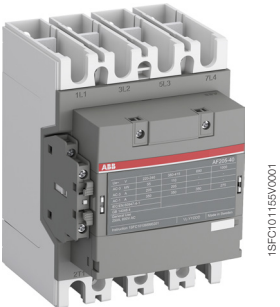
AF116, AF140-40-11

AF116, AF140-40-11B

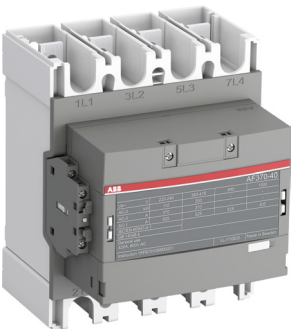
AF190 ... AF370 4-pole contactors

230 to 420 A

AC / DC operated



AF205-40-11



AF370-40-11

Description

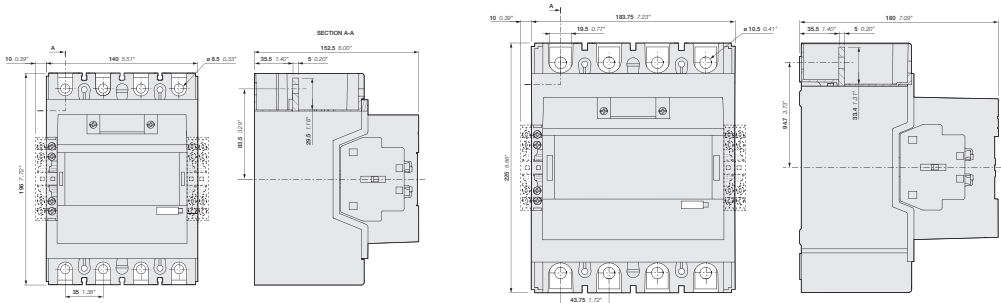
- AF190 ... AF370 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 600 V AC. These contactors are of the block type design with 4 main poles.
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
 - built-in surge suppression
 - add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

UL / CSA General use rating 600 V AC	Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Order code	Weight Pkg (1 pce) kg
A	V 50/60 Hz	V DC				
4 N.O. main poles						
230	24...60	20...60	1	1	AF190-40-11-11	3.92
	48...130	48...130	1	1	AF190-40-11-12	3.92
	100...250	100...250	1	1	AF190-40-11-13	3.92
	250...500	250...500	1	1	AF190-40-11-14	3.92
250	24...60	20...60	1	1	AF205-40-11-11	3.92
	48...130	48...130	1	1	AF205-40-11-12	3.92
	100...250	100...250	1	1	AF205-40-11-13	3.92
	250...500	250...500	1	1	AF205-40-11-14	3.92
300	24...60	20...60	1	1	AF265-40-11-11	6.38
	48...130	48...130	1	1	AF265-40-11-12	6.38
	100...250	100...250	1	1	AF265-40-11-13	6.38
	250...500	250...500	1	1	AF265-40-11-14	6.38
350	24...60	20...60	1	1	AF305-40-11-11	6.38
	48...130	48...130	1	1	AF305-40-11-12	6.38
	100...250	100...250	1	1	AF305-40-11-13	6.38
	250...500	250...500	1	1	AF305-40-11-14	6.38
420	24...60	20...60	1	1	AF370-40-11-11	6.38
	48...130	48...130	1	1	AF370-40-11-12	6.38
	100...250	100...250	1	1	AF370-40-11-13	6.38
	250...500	250...500	1	1	AF370-40-11-14	6.38

(1) For other auxiliary contacts arrangements, please contact your ABB local organization.

Main dimensions mm, inches



AF190, AF205

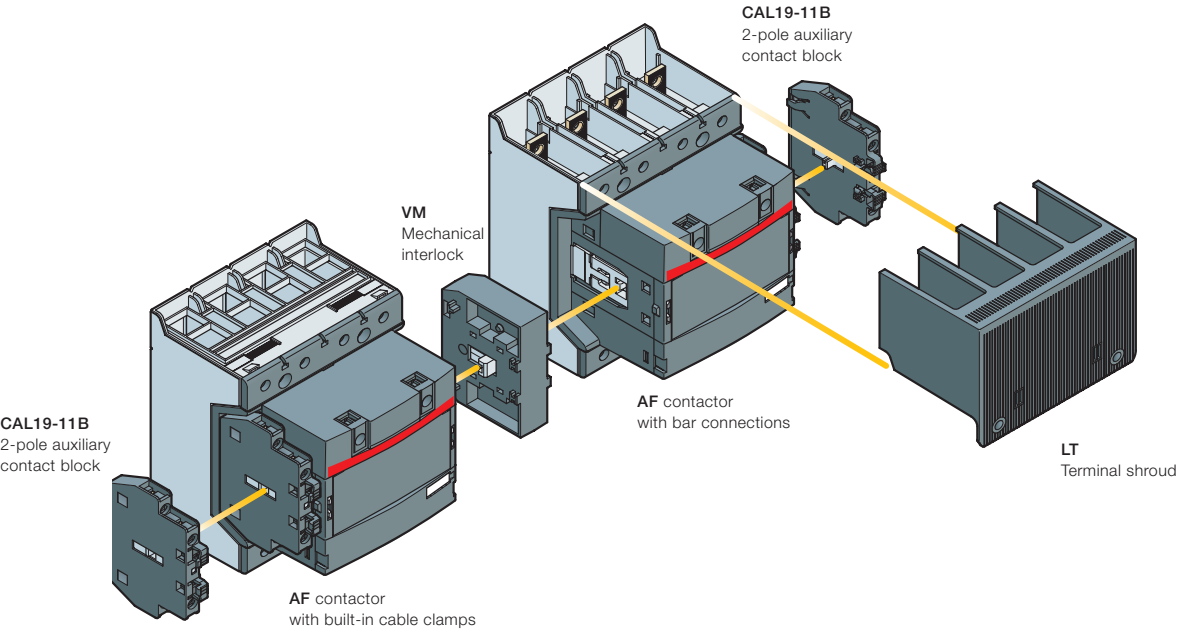
AF265, AF305, AF370

AF116 ... AF370 4-pole contactors

Main accessories

Main accessories (other accessories available)

3



Main accessory fitting details

Contactor types	Main poles	Available auxiliary contacts	Side-mounted accessories		
			Auxiliary contact blocks		Mechanical interlock units (between two contactors)
			CAL19-11	CAL19-11B	
AF116 ... AF370	4	0 1 1	1 x CAL19-11	+ 2 x CAL19-11B	–
AF116 ... AF370	4	0 1 1	–	+ 2 x CAL19-11B (1)	+ VM... (2)

(1) Total number of auxiliary contact blocks for the two contactors. (2) Interlock type, according to the contactor ratings (see "Accessories").

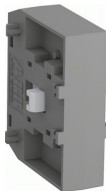
AF116 ... AF370 4-pole contactors

Main accessories



CAL19-11

1SFC101071V0001



VM19

1SFC101035V0001

Ordering details (1)

For contactors	Auxiliary contacts	Order code	Pkg qty	Weight (1 pce)
	 			kg

Side-mounted instantaneous auxiliary contact blocks

AF116 ... AF370	1	1	CAL19-11	2	0.05
	1	1	CAL19-11B	2	0.05

Mechanical interlock unit

AF116 ... AF370	VM19	1	0.06
AF116 ... AF146 and AF190, AF205	VM140/190	1	0.09
AF190, AF205 and AF265 ... AF370	VM205/265	1	0.09

Terminal shrouds

AF116 ... AF140, with compression lugs	LT140-40L	2	0.09
AF190 ... AF205, with cable clamps	LT205-40C	2	0.06
AF190 ... AF205, with compression lugs	LT205-40L	2	0.29
AF265 ... AF370, with cable clamps	LT370-40C	2	0.04
AF265 ... AF370, with compression lugs	LT370-40L	2	0.37

For contactors	Dimensions		Order code	Pkg qty	Weight (1 pce)
	hole Ø mm	bar mm			kg

Terminal enlargements

AF190 ... AF205	10.5	20 x 5	LW205-40	1	0.31
AF265 ... AF370	10.5	25 x 5	LW370-40	1	0.54

(1) For more information, refer to "Accessories" section.

AF09 ... AF80 4-pole contactors

Technical data

Main pole - Utilization characteristics according to IEC

Contactors types	AC / DC operated	AF09	AF16	AF26	AF38	AF40	AF52	AF80
Standards								
Rated operational voltage U _e max.		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1						
Rated frequency (without derating)		690 V						
Conventional free-air thermal current I _{th}		50 / 60 Hz						
acc. to IEC 60947-4-1, open contactors, $\theta \leq 40^\circ\text{C}$		35 A	35 A	55 A	55 A	105 A	105 A	125 A
With conductor cross-sectional area		6 mm ²	6 mm ²	16 mm ²	16 mm ²	35 mm ²	35 mm ²	50 mm ²
AC-1 Utilization category								
For air temperature close to contactor								
I _e / Rated operational current AC-1	$\theta \leq 40^\circ\text{C}$	25 A	30 A	45 A	55 A	70 A	100 A	125 A
U _e max. $\leq 690\text{ V}$, 50/60 Hz	$\theta \leq 60^\circ\text{C}$	25 A	30 A	40 A	45 A	60 A	80 A	105 A
	$\theta \leq 70^\circ\text{C}$	22 A	26 A	32 A	37 A	50 A	70 A	90 A
With conductor cross-sectional area		4 mm ²	6 mm ²	10 mm ²	16 mm ²	35 mm ²	35 mm ²	50 mm ²
AC-3 Utilization category								
For air temperature close to contactor $\theta \leq 60^\circ\text{C}$								
I _e / Max. rated operational current AC-3 (1)								
	220-230-240 V	9 A	18 A	23.2 A	23.2 A	40 A	53 A	80 A
	380-400 V	9 A	18 A	22 A	22 A	40 A	53 A	80 A
	415 V	9 A	18 A	21.2 A	21.2 A	40 A	53 A	80 A
	440 V	9 A	18 A	20 A	20 A	40 A	53 A	80 A
	500 V	9.5 A	15 A	17.6 A	17.6 A	35 A	45 A	65 A
	690 V	7 A	10.5 A	10.5 A	10.5 A	25 A	35 A	49 A
Rated operational power AC-3 (1)								
	220-230-240 V	2.2 kW	4 kW	5.5 kW	5.5 kW	11 kW	15 kW	22 kW
	380-400 V	4 kW	7.5 kW	11 kW (3)	11 kW (3)	18.5 kW	22 kW	37 kW
	415 V	4 kW	9 kW	11 kW	11 kW	22 kW	30 kW	45 kW
	440 V	4 kW	9 kW	11 kW	11 kW	22 kW	30 kW	45 kW
	500 V	5.5 kW	9 kW	11 kW	11 kW	22 kW	30 kW	45 kW
	690 V	5.5 kW	9 kW	9 kW	9 kW	22 kW	30 kW	45 kW
Rated making capacity AC-3								
10 x I _e AC-3 acc. to IEC 60947-4-1								
Rated breaking capacity AC-3								
8 x I _e AC-3 acc. to IEC 60947-4-1								
Short-circuit protection device for contactors								
Without thermal overload relay - Motor protection excluded								
U _e $\leq 500\text{ V}$ AC - gG type fuse		25 A	32 A	50 A	63 A	80 A	110 A	160 A
Rated short-time withstand current I_{cw}								
At 40 °C ambient temperature, in free air from a cold state								
	1 s	300 A	300 A	450 A	450 A	1000 A	1000 A	1200 A
	10 s	150 A	150 A	300 A	300 A	600 A	600 A	780 A
	30 s	80 A	80 A	225 A	225 A	350 A	350 A	450 A
	1 min	60 A	60 A	150 A	150 A	250 A	250 A	300 A
	15 min	35 A	35 A	55 A	55 A	110 A	110 A	140 A
Maximum breaking capacity								
N.O. main pole								
	at 440 V	250 A	250 A	-	-	950 A	950 A	1100 A
	at 690 V	106 A	106 A	-	-	600 A	600 A	750 A
N.C. Main pole								
	at 440 V	-	-	-	-	600 A	-	900 A
	at 690 V	-	-	-	-	300 A	-	750 A
Power dissipation per pole								
	I _e / AC-1	0.8 W	1.2 W	1.6 W	2.3 W	3 W	6.3 W	8 W
	I _e / AC-3	0.1 W	0.35 W	0.42 W	0.42 W	1 W	1.7 W	3.2 W
Max. electrical switching frequency								
	AC-1	600 cycles/h						

(1) For the corresponding kW/A values of 1500 r.p.m. 50 Hz or 1800 r.p.m. 60 Hz, 3-phase motors, see "Motor Rated Operational Powers and Currents"

(2) For the protection of motor starters against short circuits, see "Coordination with Short-circuit Protection Devices".

(3) 400 V 3-phase motors only.

AF116 ... AF370 4-pole contactors

Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC / DC operated	AF116	AF140	AF190	AF205	AF265	AF305	AF370
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1						
Rated operational voltage U_e max.		690 V						
Rated frequency (without derating)		50 / 60 Hz						
Conventional free-air thermal current I_{th}								
acc. to IEC 60947-4-1, open contactors, $\theta \leq 40^\circ\text{C}$		160 A	200 A	275 A	350 A	400 A	500 A	525 A
With conductor cross-sectional area		70 mm ²	95 mm ²	150 mm ²	240 mm ² (3)	240 mm ²	300 mm ² (4)	2x 185 mm ² (4)
AC-1 Utilization category								
For air temperature close to contactor								
I_e / Rated operational current AC-1								
$\theta \leq 40^\circ\text{C}$		160 A	200 A	275 A	350 A	400 A	500 A	525 A
$\theta \leq 60^\circ\text{C}$		145 A	175 A	250 A	300 A	350 A	400 A	425 A
$\theta \leq 70^\circ\text{C}$		130 A	160 A	200 A	240 A	290 A	325 A	350 A
U _e max. $\leq 1000\text{ V}$, 50/60 Hz								
$\theta \leq 40^\circ\text{C}$		-	-	250 A	275 A	350 A	375 A	400 A
$\theta \leq 60^\circ\text{C}$ (2)		-	-	225 A	250 A	300 A	325 A	350 A
$\theta \leq 70^\circ\text{C}$		-	-	185 A	200 A	240 A	260 A	290 A
With conductor cross-sectional area		70 mm ²	95 mm ²	150 mm ²	240 mm ² (3)	240 mm ²	300 mm ² (4)	2x 185 mm ² (4)
AC-3 Utilization category								
For air temperature close to contactor $\theta \leq 60^\circ\text{C}$ (2)								
I_e / Max. rated operational current AC-3 (1)								
220-230-240 V		116 A	140 A	190 A	205 A	265 A	305 A	370 A
380-400 V		116 A	140 A	190 A	205 A	265 A	305 A	370 A
415 V		116 A	140 A	190 A	205 A	265 A	305 A	370 A
440 V		116 A	140 A	190 A	205 A	265 A	305 A	370 A
500 V		-	-	-	-	-	-	-
690 V		-	-	-	-	-	-	-
1000 V		-	-	-	-	-	-	-
Rated operational power AC-3 (1)								
220-230-240 V		30 kW	37 kW	55 kW	55 kW	75 kW	90 kW	110 kW
380-400 V		55 kW	75 kW	90 kW	110 kW	132 kW	160 kW	200 kW
415 V		55 kW	75 kW	90 kW	110 kW	132 kW	160 kW	200 kW
440 V		75 kW	90 kW	110 kW	132 kW	160 kW	160 kW	200 kW
500 V		-	-	-	-	-	-	-
690 V		-	-	-	-	-	-	-
1000 V		-	-	-	-	-	-	-
Rated making capacity AC-3		10 x I _e AC-3 acc. to IEC 60947-4-1						
Rated breaking capacity AC-3		8 x I _e AC-3 acc. to IEC 60947-4-1						
Short-circuit protection device for contactors								
Without thermal overload relay - Motor protection excluded								
U _e $\leq 500\text{ V}$ AC - gG type fuse		200 A	250 A	355 A	400 A	630 A	630 A	630 A
Rated short-time withstand current I_{cw}								
1 s		1300 A	1460 A	1900 A	2050 A	2650 A	3050 A	3700 A
10 s		928 A	1168 A	1520 A	1640 A	2120 A	2440 A	2960 A
30 s		536 A	674 A	878 A	947 A	1224 A	1409 A	1709 A
1 min		379 A	477 A	621 A	670 A	865 A	996 A	1208 A
15 min		160 A	200 A	275 A	350 A	400 A	500 A	525 A
Maximum breaking capacity								
at 440 V		2000 A	3000 A	3300 A	3500 A	3800 A	4600 A	5000 A
at 690 V		-	-	-	-	-	-	-
Power dissipation per pole								
I_e / AC-1		12 W	18 W	15 W	25 W	32 W	50 W	72 W
I_e / AC-3		-	-	-	-	-	-	-
Max. electrical switching frequency								
AC-1		300 cycles/h						
AC-3		300 cycles/h						
AC-2, AC4		-						

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

(2) $\theta \leq 55^\circ\text{C}$ for EK550, EK1000

(3) For currents above 275 A use terminal enlargements or terminal extensions.

(4) For currents above 450 A use terminal enlargements or terminal extensions.

AF09 ... AF80 4-pole contactors

Technical data

Main pole - Utilization characteristics according to UL/NEMA/CSA

Contactors types	AC / DC operated	AF09	AF16	AF26	AF38	AF40	AF52	AF80
Standards		UL 508, CSA C22.2 N°14				UL 60947-4-1, CSA-C22.2 No. 60947-4-1		
Max. operational voltage		600 V						
UL / CSA general use rating								
	600 V AC	25 A	30 A	45 A	55 A	60 A	80 A	105 A
With conductor cross-sectional area		AWG 10	AWG 10	AWG 8	AWG 6	AWG 6	AWG 4	AWG 2
1 pole	80 V DC	25 A (1)	30 A (1)	45 A	55 A	60 A	80 A	105 A
2 poles in serie	160 V DC	25 A (1)	30 A (1)	45 A	55 A	60 A	80 A	105 A
3 poles in serie	240 V DC	25 A	30 A	45 A	55 A	60 A	80 A	105 A
4 poles in serie	320 V DC	25 A	30 A	45 A	55 A	60 A	80 A	105 A
With conductor cross-sectional area		AWG 10	AWG 10	AWG 8	AWG 8	AWG 6	AWG 4	AWG 2
Max. electrical switching frequency								
For general use		600 cycles/h						

Note: 4-pole contactors fitted with 2 N.O. + 2 N.C. main poles, see "General technical data".

(1) 20 A for AF09...-22-00 and AF16...-22-00.

Main pole utilization characteristics - 4 N.O. non-reversing contactors

Contactor types	AC / DC operated	AF09	AF16	AF26	AF38	AF40	AF52	AF80
Lighting application - UL / CSA - breaking all lines								
Electrical discharge lamps (ballast)								
1-phase per pole	347 V AC	20 A	30 A	45 A	50 A	-	-	-
3-phase break all lines	600 V AC	20 A	30 A	45 A	50 A	-	-	-
Elevator control, load switching, 500 000 electrical operating cycles acc. to CSA B44.1 / ASME 17.5 paragraph 19.2.1								
1-phase								
Horse power rating	110-120 V AC	-	1/2 hp	-	-	-	-	-
	220-240 V AC	-	1-1/2 hp	-	-	-	-	-
3-phase								
Horse power rating	200-208 V AC	-	3 hp	-	-	-	-	-
	220-240 V AC	-	3 hp	-	-	-	-	-
	440-480 V AC	-	7-1/2 hp	-	-	-	-	-
	550-600 V AC	-	10 hp	-	-	-	-	-

Note: 4-pole contactors fitted with 2 N.O. + 2 N.C. main poles, see "General technical data".

AF116 ... AF370 4-pole contactors

Technical data

Main pole - Utilization characteristics according to UL/NEMA/CSA

Contactor types	AC / DC operated	AF116	AF140	AF146	AF190	AF205	AF265	AF305	AF370
Standards		UL 60947-4-1							
Max. operational voltage		600 V							
UL / CSA general use rating									
600 V AC		160 A	200 A	-	230 A	250 A	300 A	350 A	420 A
With conductor cross-sectional area		AWG 2/0	AWG 3/0	-	MCM 250	MCM 250	MCM 400	MCM 500	2//MCM 300
1 pole	90 V DC	200 A	200 A	-	-	-	-	-	-
	100 V DC	-	-	250 A	350 A	-	-	-	-
	110 V DC	-	-	-	-	400 A	500 A	520 A	-
2 poles in serie	175 V DC	200 A	200 A	-	-	-	-	-	-
	200 V DC	-	-	250 A	350 A	-	-	-	-
	225 V DC	-	-	-	-	400 A	500 A	520 A	-
3 poles in serie	260 V DC	200 A	200 A	-	-	-	-	-	-
	300 V DC	-	-	250 A	350 A	-	-	-	-
	340 V DC	-	-	-	-	400 A	500 A	520 A	-
4 poles in series	350 V DC	200 A	200 A	-	-	-	-	-	-
	400 V DC	-	-	250 A	350 A	-	-	-	-
	450 V DC	-	-	-	-	400 A	500 A	520 A	-
With conductor cross-sectional area		AWG 2/0	AWG 3/0	-	MCM 250	MCM 250	MCM 400	MCM 500	2//MCM 300
Max. electrical switching frequency									
For general use		300 cycles/h							

Main pole utilization characteristics - 4 N.O. non-reversing contactors

Contactor types	AC / DC operated	AF116	AF140	AF146	AF190	AF205	AF265	AF305	AF370
Lighting application - UL/CSA - breaking all lines									
Electrical discharge lamps (ballast)									
1-phase per pole	347 V AC	160 A	200 A	200 A	250 A	300 A	400 A	450 A	520 A
3-phase break all lines	600 V AC	160 A	200 A	200 A	250 A	300 A	400 A	450 A	520 A

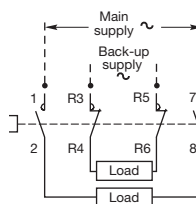
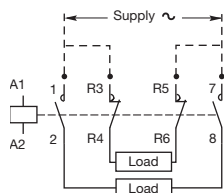
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Contractor types	AC / DC operated	AF09	AF16	AF26	AF38	AF40	AF52	AF80
Rated insulation voltage Ui								
acc. to IEC 60947-4-1		690 V						1000 V
acc. to UL / CSA		600 V						
Rated impulse withstand voltage Uimp.		6 kV						8 kV
Electromagnetic compatibility		Devices complying with IEC 60947-1 / EN 60947-1 - Environment A			Devices complying with IEC 60947-1 / EN 60947-1 - Environments A and B			
Ambient air temperature close to contactor								
Operation		-40...+70 °C						
Storage		-60...+80 °C						
Climatic withstand		Category B according to IEC 60947-1 Annex Q						
Maximum operating altitude (without derating)		3000 m						
Mechanical durability								
Number of operating cycles		10 millions operating cycles						
Max. switching frequency		3600 cycles/h						
Shock withstand								
acc. to IEC 60068-2-27 and EN 60068-2-27								
Mounting position 1								
	Shock direction	1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position						
	4 N.O.	A	30 g				(1)	
	Main poles	B1	25 g closed position / 5 g open position				(1)	
		B2	15 g				(1)	
		C1	25 g				(1)	
	2 N.O. + 2 N.C.	C2	25 g				(1)	
		A	30 g				(1)	
		B1	25 g closed position / 5 g open position				(1)	
	Main poles	B2	15 g				(1)	
		C1	25 g				(1)	
		C2	25 g				(1)	
	Vibration withstand							
	acc. to IEC 60068-2-6		5...300 Hz				(1)	
			4 g closed position / 2 g open position					



Block diagrams

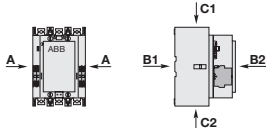
- 2 separate supplies and 2 separate loads



AF116 ... AF370 4-pole contactors

Technical data

General technical data

Contactor types	AC / DC operated	AF116	AF140	AF190	AF205	AF265	AF305	AF370
Rated insulation voltage Ui								
acc. to IEC 60947-4-1		1000 V						
acc. to UL / CSA		600 V						
Rated impulse withstand voltage Uimp.		8 kV						
Electromagnetic compatibility		AF contactors comply with IEC 60947-1 / EN 60947-1 - Environment A						
Ambient air temperature close to contactor								
Operation		-40 to +70 °C						
Storage		-40 to +70 °C						
Maximum operating altitude (without derating)		3000 m						
Mechanical durability								
Number of operating cycles		5 million operating cycles						
Maximum switching frequency		300 cycles/h						
Shock withstand								
acc. to IEC 60068-2-27 and EN 60068-2-27								
Mounting position 1		No change in contact position, closed or open position						
		Shock direction	1/2 sinusoidal shock for 11 ms			1/2 sinusoidal shock for 30 ms		
		A	20 g			20 g		
		B1	15 g closed position / 3 g open position			15 g closed position / 3 g open position		
		B2	15 g closed position / 3 g open position			15 g closed position / 3 g open position		
		C1	20 g			20 g		
		C2	20 g			20 g		
Vibration withstand								
acc to IEC 60068-2-6		0.7 g closed position / 0.7 g open position 13.2...100 Hz						

AF09 ... AF80 4-pole contactors

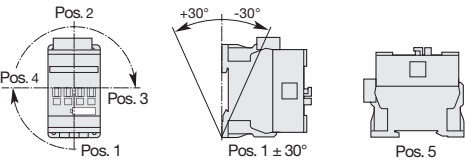
Technical data

Magnet system characteristics

Contactor types	AC / DC operated	AF09	AF16	AF26	AF38	AF40	AF52	AF80
Coil operating limits acc. to IEC 60947-4-1	AC supply	At $\theta \leq 60\text{ }^{\circ}\text{C}$ 0.85 x Uc min...1.1 x Uc max. At $\theta \leq 70\text{ }^{\circ}\text{C}$ 0.85 x Uc min...Uc max.				at $\theta \leq 70\text{ }^{\circ}\text{C}$ 0.85 x Uc min ... 1.1 x Uc max		
	DC supply	At $\theta \leq 60\text{ }^{\circ}\text{C}$ 0.85 x Uc min...1.1 x Uc max. At $\theta \leq 70\text{ }^{\circ}\text{C}$ (AF) 0.85 x Uc min...Uc max. - (AF..Z) 0.85 x Uc min...1.1 x Uc max.				at $\theta \leq 70\text{ }^{\circ}\text{C}$ 0.85 x Uc min ... 1.1 x Uc max		
AC control voltage 50/60 Hz								
Rated control circuit voltage Uc		24...500 V AC						
Coil consumption	Average pull-in value	(AF) 50 VA - (AF..Z) 16 VA				40 VA		
	Average holding value	(AF) 2.2 VA / 2 W - (AF..Z) 1.7 VA / 1.5 W				4 VA / 2 W		
DC control voltage								
Rated control circuit voltage Uc		12...500 V DC					20...500 V DC	
Coil consumption	Average pull-in value	(AF) 50 W - (AF..Z) 12...16 W				40 W		
	Average holding value	(AF) 2 W - (AF..Z) 1.7 W				2 W		
PLC-output control		(AF..Z) $\geq 500\text{ mA}$ 24 V DC				-		
Drop-out voltage		$\leq 60\text{ }\%$ of Uc min.				$\leq 60\text{ }\%$ of Uc min.		
Voltage sag immunity acc. to SEMI F47-0706		(AF..Z) conditions of use on request				conditions of use on request		
Dips withstand -20 °C $\leq \theta \leq$ +60 °C		(AF..Z) 22 ms average for Uc $\geq$ 24 V 50/60 Hz or Uc $\geq$ 20 V DC				24 ms average		
Operating time								
Between coil energization and:	N.O. contact closing	40...95 ms				(1)		
	N.C. contact opening	38...90 ms				(1)		
Between coil de-energization and:	N.O. contact opening	11...95 ms				(1)		
	N.C. contact closing	13...98 ms				(1)		

(1) On request.

Mounting characteristics and conditions for use

Contactor types	AF09	AF16	AF26	AF38	AF40	AF52	AF80
Mounting positions							
Mounting distances	Max. add-on N.C. auxiliary contacts: see accessory fitting details for a 4-pole contactor AF09 ... AF80						
Fixing	The contactors can be assembled side by side						
On rail according to IEC 60715, EN 60715	35 x 7.5 mm or 35 x 15 mm				35 x 15 mm		
By screws (not supplied)	2 x M4 screws placed diagonally				2 x M4 or 2 x M6 screws placed diagonally		

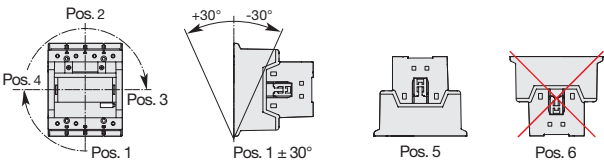
AF116 ... AF370 4-pole contactors

Technical data

Magnet system characteristics

Contactor types	AC / DC operated	AF116	AF140	AF190	AF205	AF265	AF305	AF370
Coil operating limits	AC supply	At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$						
acc. to IEC 60947-4-1	DC supply	At $\theta \leq 70^\circ\text{C}$ $0.80 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$						
Rated control circuit voltage U_c		24...500 V AC, 20...500 V DC						
Coil consumption								
AC control voltage 50/60 Hz								
24...60 V AC	Average pull-in value	225 VA		165 VA		475 VA		
	Average holding value	5.5 VA		6 VA		8.5 VA		
48...130 V AC	Average pull-in value	170 VA		175 VA		340 VA		
	Average holding value	4 VA		4 VA		17 VA		
100...250 V AC	Average pull-in value	130 VA		220 VA		385 VA		
	Average holding value	6 VA		7 VA		17.5 VA		
250...500 V AC	Average pull-in value	205 VA		185 VA		420 VA		
	Average holding value	16 VA		16 VA		21 VA		
DC control voltage								
20...60 V DC	Average pull-in value	210 W		205 W		400 W		
	Average holding value	2.5 W		2.5 W		3.5 W		
48...130 V DC	Average pull-in value	130 W		130 W		360 W		
	Average holding value	2.5 W		2.5 W		2.5 W		
100...250 V DC	Average pull-in value	135 W		190 W		410 W		
	Average holding value	3 W		2.5 W		4.5 W		
250...500 V DC	Average pull-in value	205 W		190 W		600 W		
	Average holding value	4 W		4 W		4.7 W		
Drop-out voltage		55 % of $U_c \text{ min}$						
Voltage sag immunity		Conditions of use on request						
acc. to SEMI F47								
Dips withstand		$\geq 20 \text{ ms}$						
Operating time								
Coil supply between A1 - A2								
Between coil energization and:	N.O. contact closing	20...55 ms		25...60 ms		30...60 ms		
Between coil de-energization and:	N.O. contact opening	40...70 ms		45...80 ms		45...80 ms		

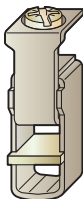
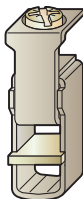
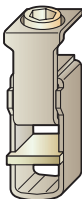
Mounting characteristics and conditions for use

Contactor types	AC / DC operated	AF116	AF140	AF190	AF205	AF265	AF305	AF370
Mounting positions		 Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 4-pole contactor AF116 ... AF370						
Mounting distances		The contactors can be assembled side by side						
Fixing								
On rail acc. to IEC 60715, EN 60715		-						
By screws (not supplied)		4 x M5						

AF09 ... AF80 4-pole contactors

Technical data

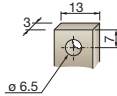
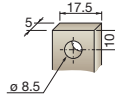
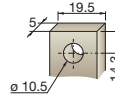
Connecting characteristics

Contactor types	AF09	AF16	AF26	AF38	AF40	AF52	AF80
Main terminals							
	Screw terminals with cable clamp	Screw terminals with double connector 2 x (5.5 width x 6.8 depth)		Screw terminals with double connector 2 x (9.3 width x 7.9/10.3 depth)		Screw terminals with double connector 2 x (12.4 width x 9.3/11.1 depth)	
Connection capacity (min. ... max.)							
Main conductors (poles)							
 Rigid Solid ($\leq 4 \text{ mm}^2$)	} 1 x	1...6 mm ²		1.5...16 mm ²		6...35 mm ²	
 Stranded ($\geq 6 \text{ mm}^2$)		2 x 1...6 mm ²		1.5...16 mm ²		6...35 mm ²	
 Flexible with non insulated ferrule	1 x	0.75...6 mm ²		1.5...16 mm ²		4...35 mm ²	
	2 x	0.75...6 mm ²		1.5...16 mm ²		4...35 mm ²	
 Flexible with insulated ferrule	1 x	0.75...4 mm ²		1.5...16 mm ²		4...35 mm ²	
	2 x	0.75...2.5 mm ²		1.5...16 mm ²		4...35 mm ²	
 Bars or lugs	L <	9.6 mm		-		9.2 mm	
Connection capacity acc. to UL/CSA	1 or 2 x	AWG 16...10		AWG 16...6		AWG 10...2	
Stripping length		10 mm		12 mm		16 mm	
Tightening torque		1.5 Nm / 13 lb.in		2.5 Nm / 22 lb.in		4 Nm / 35 lb.in	
Auxiliary conductors							
(coil terminals)							
 Rigid solid	1 x	1...2.5 mm ²					
	2 x	1...2.5 mm ²					
 Flexible with non insulated ferrule	1 x	0.75...2.5 mm ²					
	2 x	0.75...2.5 mm ²					
 Flexible with insulated ferrule	1 x	0.75...2.5 mm ²					
	2 x	0.75...1.5 mm ²					
 Lugs	L <	8 mm					
Connection capacity acc. to UL/CSA	1 or 2 x	AWG 18...14					
Stripping length		10 mm					
Tightening torque		1.2 Nm / 11 lb.in					
Degree of protection							
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529							
Main terminals	IP20				IP10		
Coil terminals	IP20						
Screw terminals							
Delivered in open position, screws of unused terminals must be tightened							
Main terminals		M3.5		M4.5		M6	M8
	Screwdriver type	Flat Ø 5.5 / Pozidriv 2				Flat Ø 6.5 / Pozidriv 2	hexagon socket (s = 4 mm)
Coil terminals		M3.5					
	Screwdriver type	Flat Ø 5.5 / Pozidriv 2					

AF116 ... AF370 4-pole contactors

Technical data

Connecting characteristics

Contactors types	AC / DC operated		AF116	AF140	AF190	AF205	AF265	AF305	AF370
Main terminals									
Flat type									
Connection capacity (min. ... max.)									
Main conductors (poles)									
	Cu cable - Stranded	1 x	10...95 mm ²		6...150 mm ²		16...300 mm ²		
	Clamp type		LD... included (1)		1SDA066917R1		1SDA055016R1		
	Tightening torque		8 Nm		14 Nm		25 Nm		
	Cu cable - Stranded	2 x	10...95 mm ²		50...120 mm ²		70...185 mm ²		
	Clamp type		LD... included (1)		1SFN074709R1000, LZ185-2C/120		1SCA022194R0890, OZXB4		
	Tightening torque		8 Nm		16 Nm		22 Nm		
	Al cable - Stranded	1 x	–		95...185 mm ²		185...240 mm ²		
	Clamp type		–		1SDA054988R1		1SDA055020R1		
	Tightening torque		–		31 Nm		43 Nm		
	Cu cable - Flexible	1 x	10...70 mm ²		6...120 mm ²		16...240 mm ²		
	Clamp type		LD... included (1)		1SDA066917R1		1SDA055016R1		
	Tightening torque		8 Nm		14 Nm		25 Nm		
	Cu cable - Flexible	2 x	10...70 mm ²		50...95 mm ²		70...185 mm ²		
	Clamp type		LD... included (1)		1SFN074709R1000, LZ185-2C/120		1SCA022194R0890, OZXB4		
	Tightening torque		8 Nm		16 Nm		22 Nm		
	Lugs	L ≤	22 mm (.866 in)		24 mm (.945 in)		32 mm (1.260 in)		
		Ø >	6 mm (.236 in)		8 mm (.315 in)		10 mm (.394 in)		
	Socket type		LL... included		LL... included		LL... included		
	Tightening torque		9 Nm / 80 lb.in		18 Nm / 160 lb.in		28 Nm / 248 lb.in		
Connection capacity acc. to UL / CSA		1 x	AWG 6...3/0		6...300 MCM		4...400 MCM		
	Clamp type		LD... included (1)		ATK185 (2)		ATK300 (2)		
	Tightening torque		8 Nm / 71 lb.in		34 Nm / 301 lb.in		42 Nm / 372 lb.in		
Connection capacity acc. to UL / CSA		2 x	AWG 6...3/0		–		4...500 MCM		
	Clamp type		LD... included (1)		–		ATK300/2 (2)		
	Tightening torque		8 Nm / 71 lb.in		–		42 Nm / 372 lb.in		
Auxiliary conductors									
(coil terminals)									
	Solid / stranded	1 x	1...4 mm ²						
		2 x	1...4 mm ²						
	Flexible	1 x	0.75...2.5 mm ²						
		2 x	0.75...2.5 mm ²						
	Flexible with non insulated ferrule	1 x	0.75...2.5 mm ²						
		2 x	0.75...2.5 mm ²						
	Flexible with insulated ferrule	1 x	0.75...2.5 mm ²						
		2 x	0.75...2.5 mm ²						
	Lugs	L <	8 mm						
		I >	3.5 mm						
Connection capacity acc. to UL / CSA		1 or 2 x	AWG 18...14						
Stripping length			9 mm						
Tightening torque			1.00 Nm / 9 lb.in						
Degree of protection									
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529									
Main terminals			IP00						
Coil terminals			IP20						
Screw terminals									
Main terminals			M6		M8		M10		
Screwdriver type			Screws and bolts						
Coil terminals (delivered in open position)			M3.5						
Screwdriver type			Flat Ø 5,5 mm / Pozidriv 2						

(1) LD... not included for AF116 ... AF146-30...B.

(2) Available in North America only.

4-pole contactors

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: $I_c = I_e$
- Category DC-1: $I_c = I_e$

Generally speaking $I_c = m \times I_e$ where m is a multiple of the load operational current.

On next pages, the curves corresponding to categories AC-1 and DC-1 represent the electrical durability variation of standard contactors in relation to the breaking current I_c .

Electrical durability curves:

- categories AC-1: the curves represent the electrical durability variation of standard contactors in relation to the breaking current I_c
- category DC-1: the curves represent the electrical durability variation of standard contactors in relation to the breaking power P_c per pole.

Electrical durability is expressed in millions of operating cycles.

Curve utilization mode

Electrical durability forecast and contactor selection for categories AC-1

- 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, see "Motor rated operational powers and currents").
 - Utilization category AC-1
 - Breaking current $I_c = I_e$ for AC-1
- 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 categories DC-1

- Note the characteristics of the load to be controlled:
 - Operational voltage U_e
 - Current normally drawn I_e
 - Utilization category DC-1
 - Breaking current and Breaking voltage $I_c = I_e$ and $U_c = U_e$ for DC-1
 - Number of poles in series n (1, 2, 3 or 4 poles in series)
- Define the breaking power per pole $P_c = (U_c \times I_c) / n$
- 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 (P_c ; N).

Case of uninterrupted duty

For uninterrupted duty, some verifications of preventing maintenance are necessary to check the functionality of the concerned product (consult us).

The combined 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.

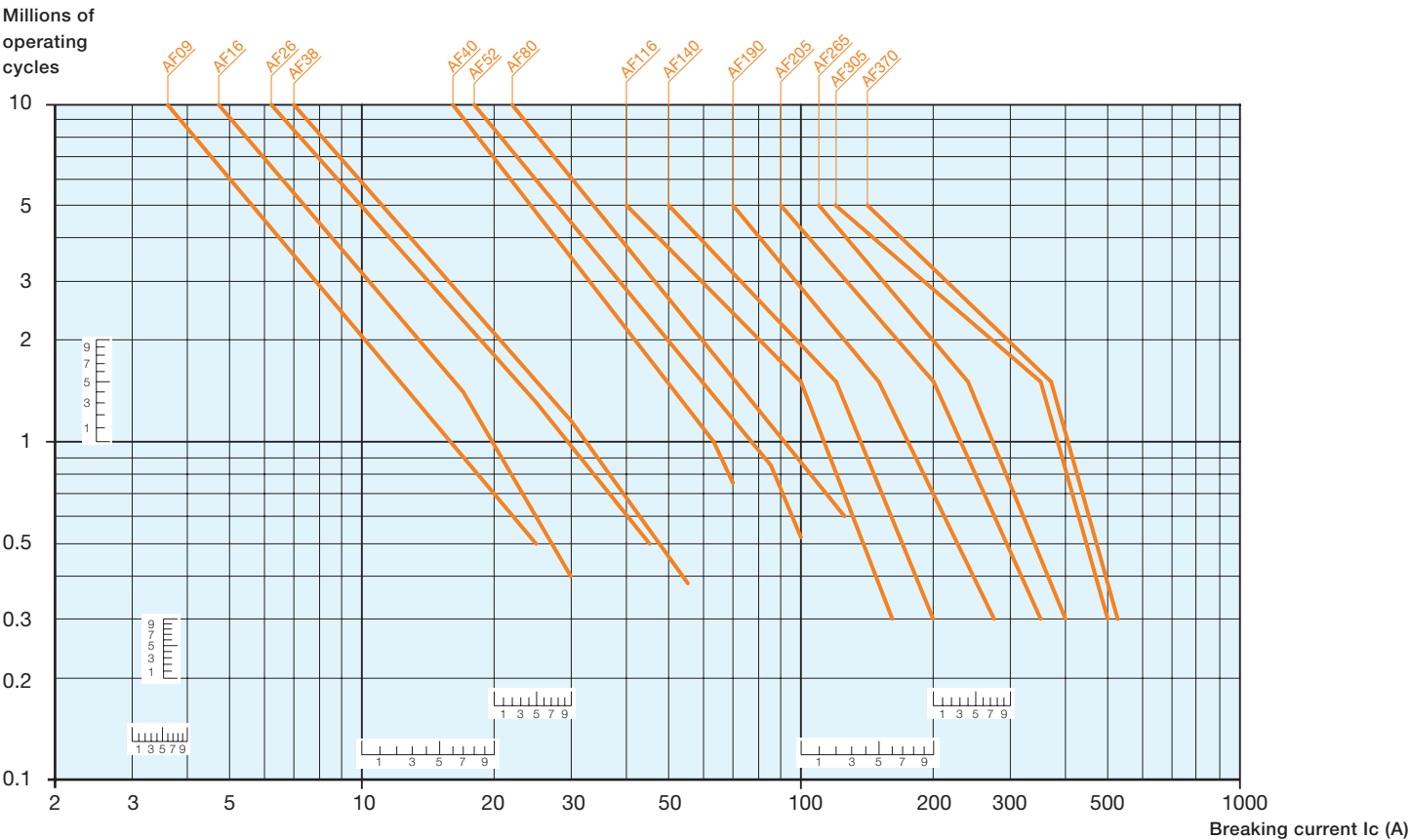
4-pole contactors

Electrical durability

Electrical durability for AC-1 utilization category - $U_e \leq 690\text{ V}$

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.

Ambient temperature and maximum electrical switching frequency: see "Technical data".



4-pole contactors

Electrical durability

Electrical durability for DC-1 utilization category

Switching Non inductive or slightly inductive loads, resistance furnaces.

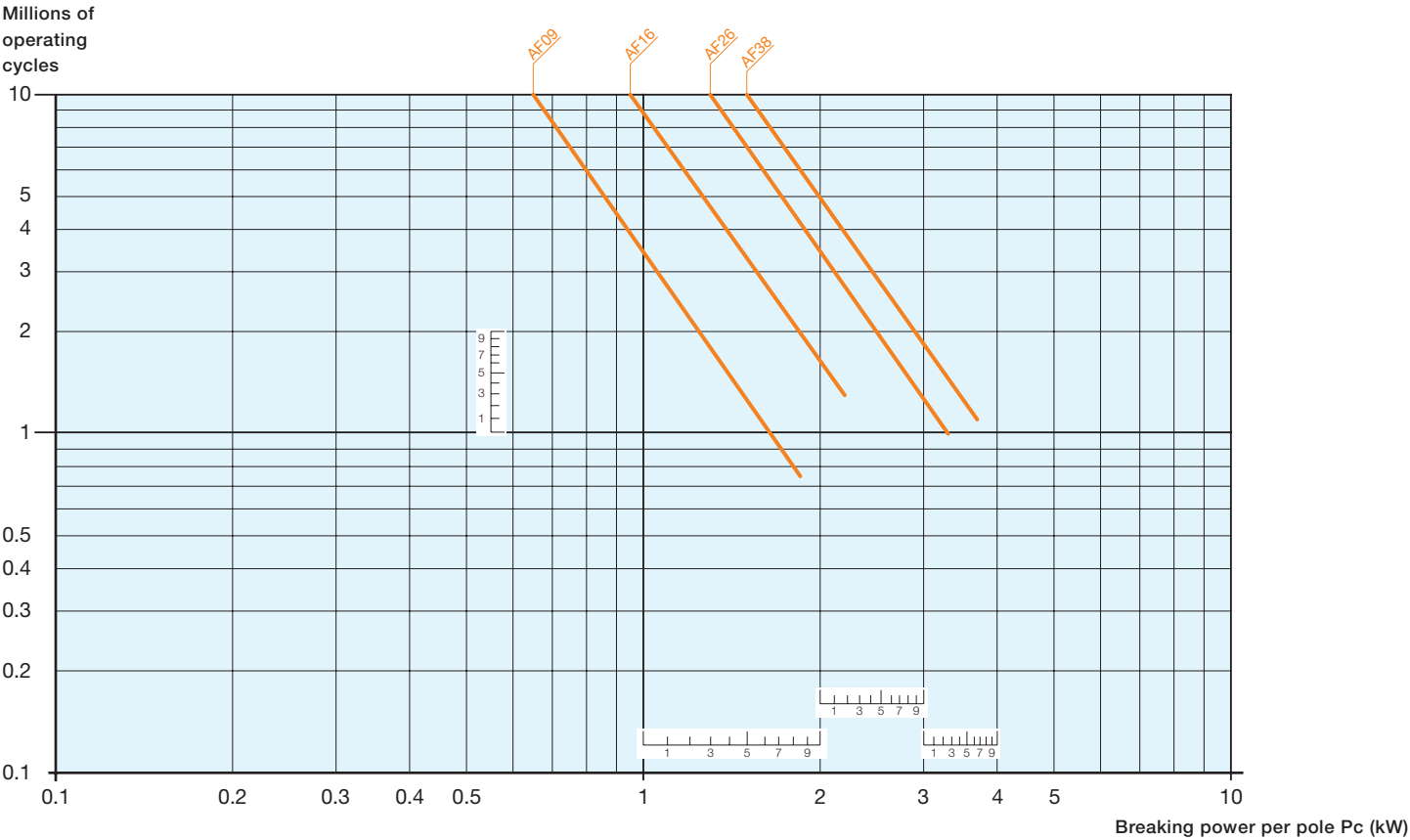
The breaking power per pole P_c is: $P_c = (U_c \times I_c) / n$

U_c : breaking voltage $U_c = U_e$

I_c : breaking current $I_c = I_e$

n : number of poles in series

Ambient temperature and maximum electrical switching frequency: see "Technical data".



Notes

3

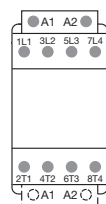
AF09 ... AF80 4-pole contactors

Terminal marking and positioning

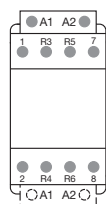
AF09 ... AF38 contactors - AC / DC operated

Standard devices without addition of auxiliary contacts

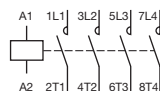
3



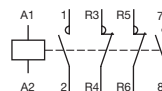
AF09 ... AF80..-40-00



AF09 ... AF40..-22-00
AF80-22-00

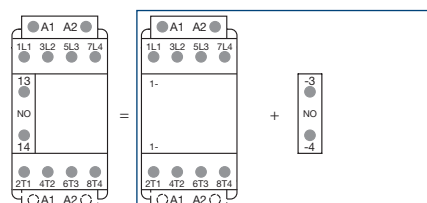


AF09 ... AF80..-40-00

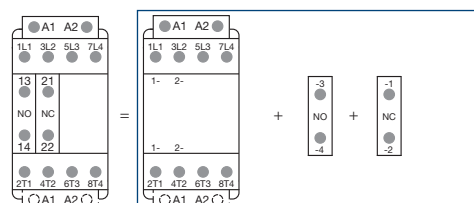


AF09 ... AF40..-22-00
AF80-22-00

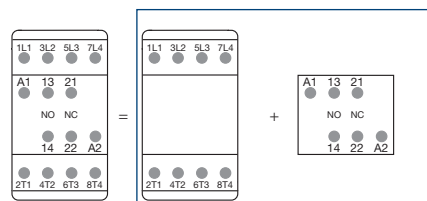
Other possible contact combinations with auxiliary contacts added by the user



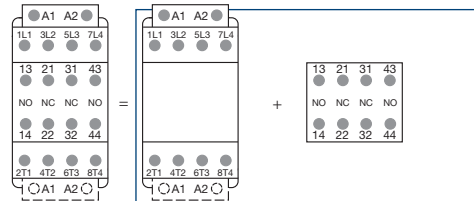
Combination 10 = AF09 ... AF80..-40-00 + CA4-10



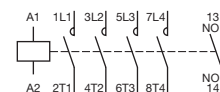
Combination 11 = AF09 ... AF80..-40-00 + CA4-10 + CA4-01



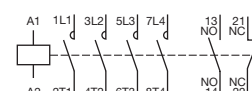
Combination 11 = AF09 ... AF80..-40-00 + CAT4-11E



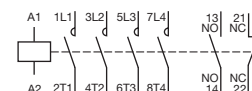
Combination 22 = AF09 ... AF80..-40-00 + CA4-22E



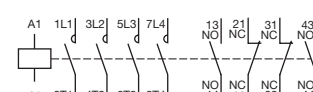
Combination 10



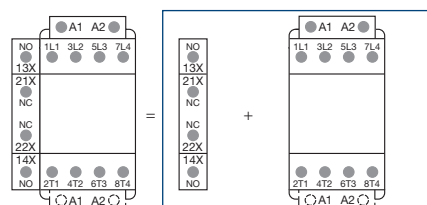
Combination 11



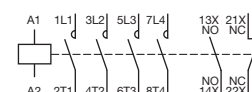
Combination 11



Combination 22



Combination 11 = CAL4-11 + AF09 ... AF80..-40-00



Combination 11

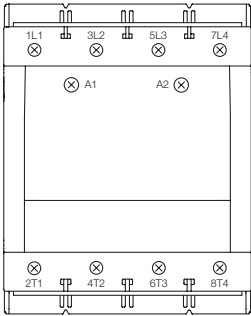
Note: Only AF09..Z ... AF38..Z contactor with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole

AF116 ... AF370 4-pole contactors

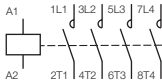
Terminal marking and positioning

AF116 ... AF370 contactors - AC / DC operated

Standard devices without addition of auxiliary contacts

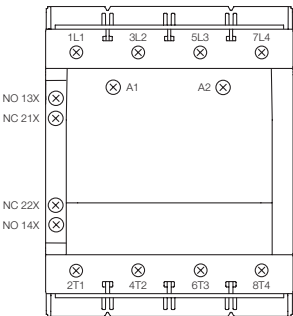


AF116 ... AF370-40-00

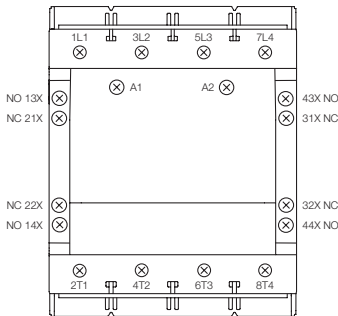


AF116 ... AF370-40-00

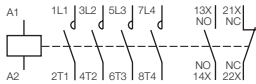
Standard devices with factory mounted auxiliary contacts



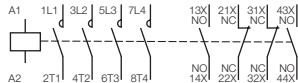
AF116 ... AF370-40-11



AF116 ... AF370-40-22



AF116 ... AF370-40-11

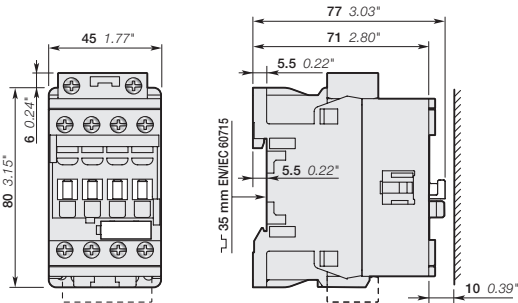


AF116 ... AF370-40-22

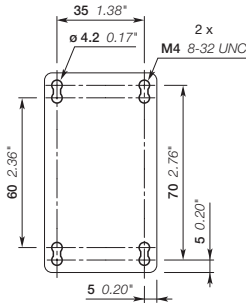
AF09, AF16 4-pole contactors

Main dimensions mm, inches

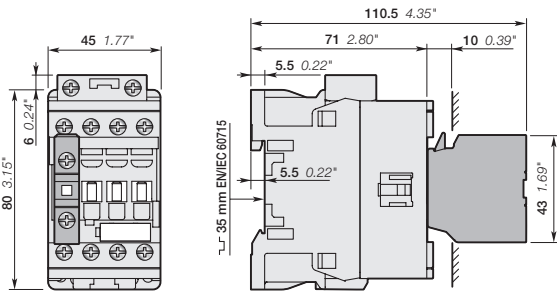
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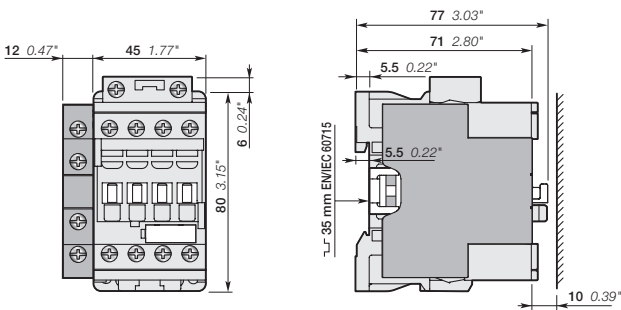
AF09, AF16



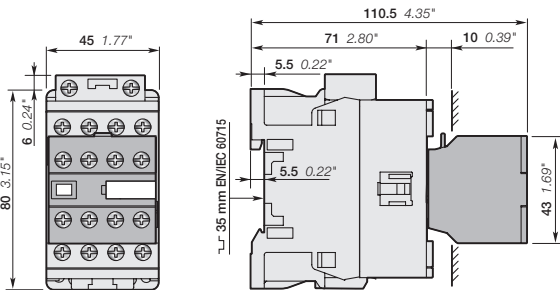
AF09, AF16



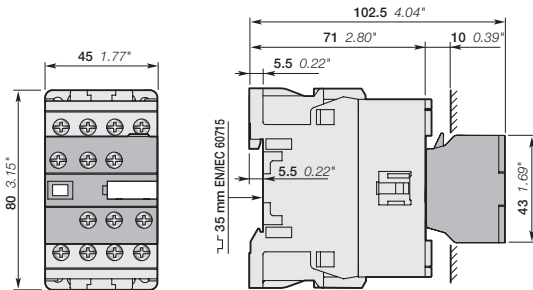
AF09, AF16
+ CA4, CC4 1-pole auxiliary contact block



AF09, AF16
+ CAL4-11 2-pole auxiliary contact block



AF09, AF16
+ CA4 4-pole auxiliary contact block

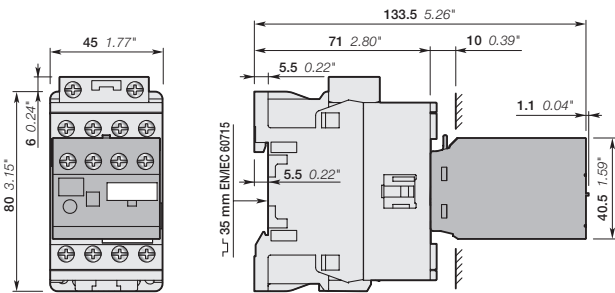


AF09, AF16
+ CAT4 2-pole auxiliary contact and coil terminal block

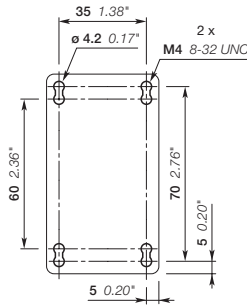
Note: contactor lateral distance to grounded component 2 mm 0.08 inches min.

AF09, AF16 4-pole contactors

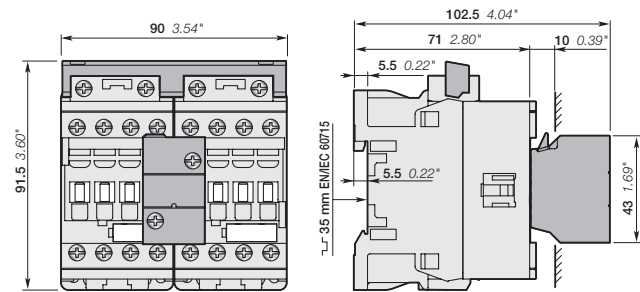
Main dimensions mm, inches



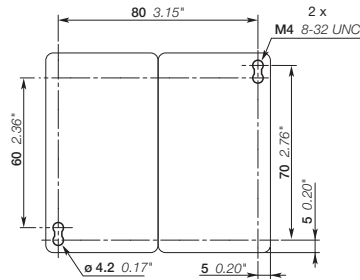
AF09, AF16
+ TEF4 electronic timer



AF09, AF16



AF09...-40-00, AF16...-40-00
+ VEM4 mechanical and electrical interlock set

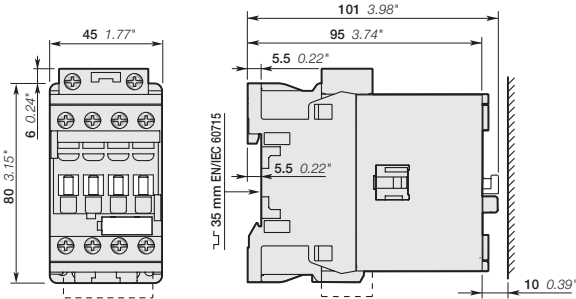


AF09...-40-00, AF16...-40-00
+ VEM4 mechanical and electrical interlock set

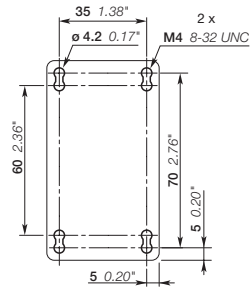
Note: contactor lateral distance to grounded component 2 mm 0.08 inches min.

AF26, AF38 4-pole contactors

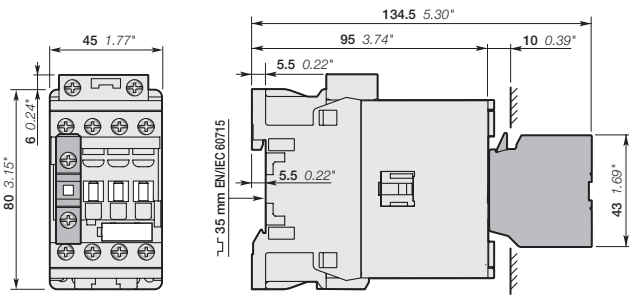
Main dimensions mm, inches



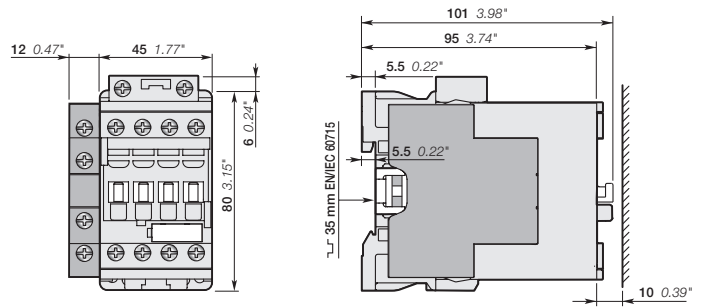
AF26, AF38



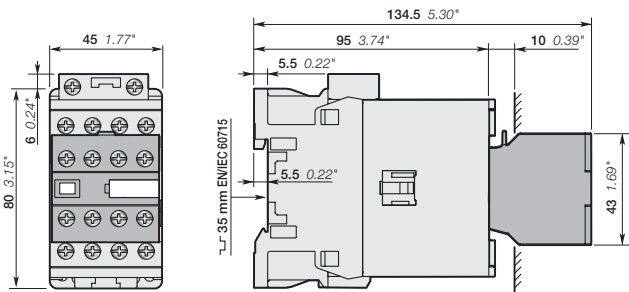
AF26, AF38



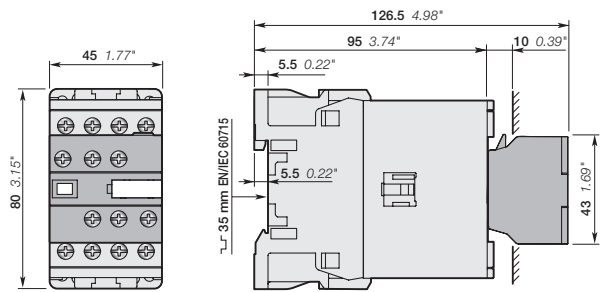
AF26, AF38
+ CA4, CC4 1-pole auxiliary contact block



AF26, AF38
+ CAL4-11 2-pole auxiliary contact block



AF26, AF38
+ CA4 4-pole auxiliary contact block

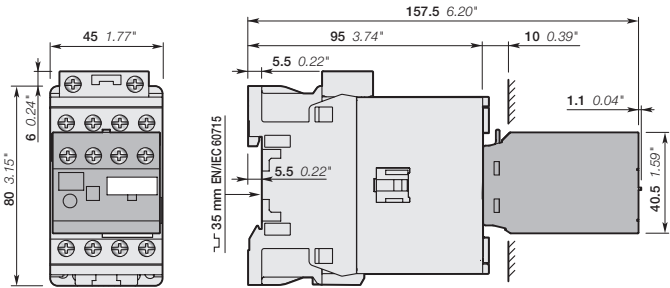


AF26, AF38
+ CAT4 2-pole auxiliary contact and coil terminal block

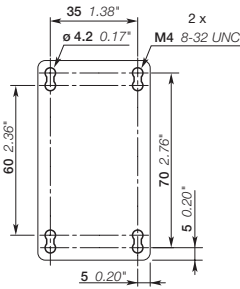
Note: contactor lateral distance to grounded component 2 mm 0.08" min.

AF26, AF38 4-pole contactors

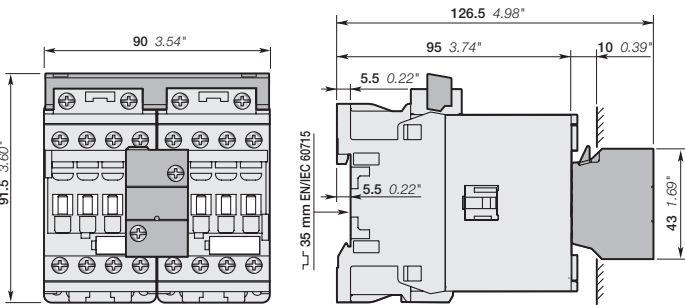
Main dimensions mm, inches



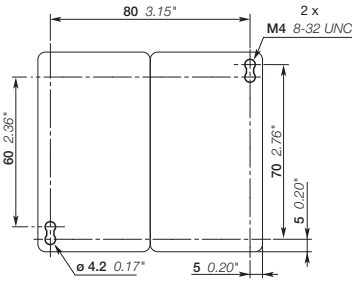
AF26, AF38
+ TEF4 electronic timer



AF26, AF38



AF26..-40-00, AF38..-40-00
+ VEM4 mechanical and electrical interlock set

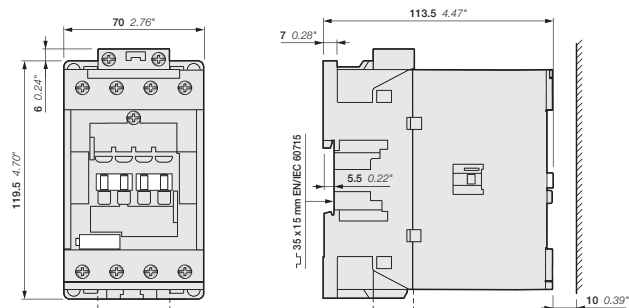


AF26..-40-00, AF38..-40-00
+ VEM4 mechanical and electrical interlock set

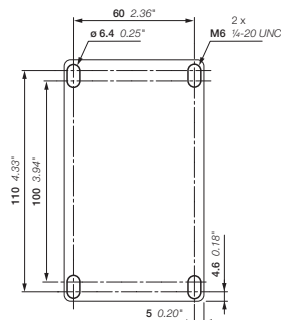
Note: contactor lateral distance to grounded component 2 mm 0.08" min.

AF40, AF52 4-pole contactors

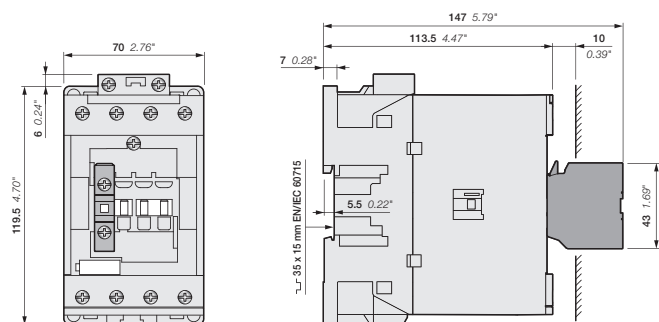
Main dimensions mm, inches



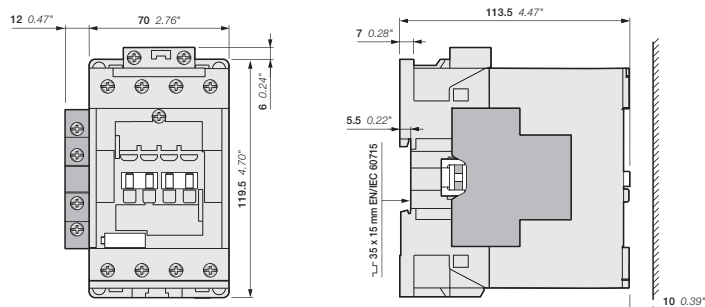
AF40, AF52



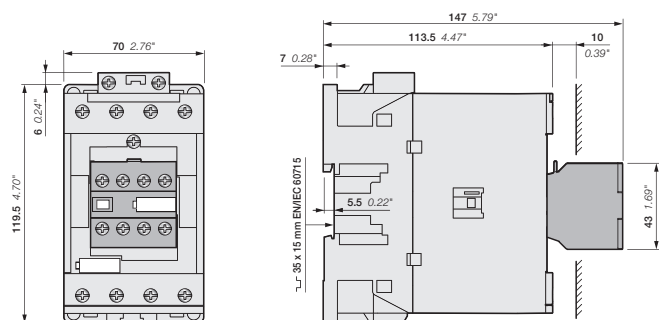
AF40, AF52



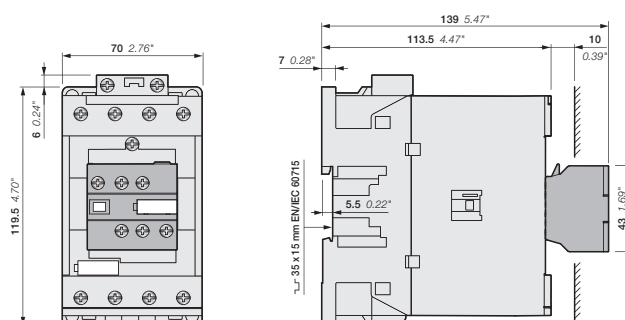
AF40, AF52
+ CA4, CC4 1-pole auxiliary contact block



AF40, AF52
+ CAL4-11 2-pole auxiliary contact block



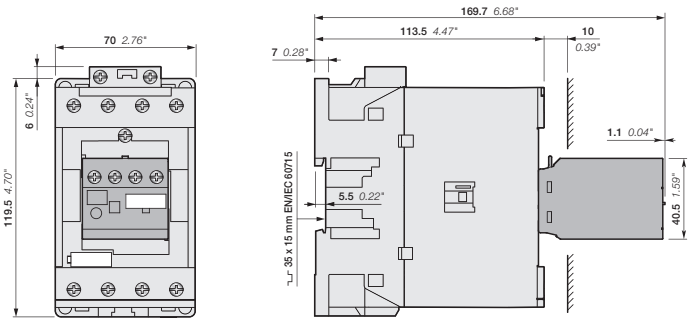
AF40, AF52
+ CA4 4-pole auxiliary contact block



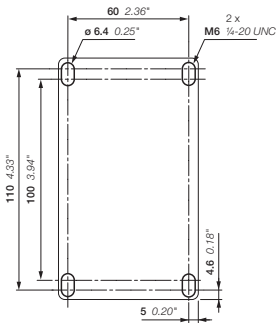
AF40, AF52
+ CAT4 2-pole auxiliary contact and coil terminal block

AF40, AF52 4-pole contactors

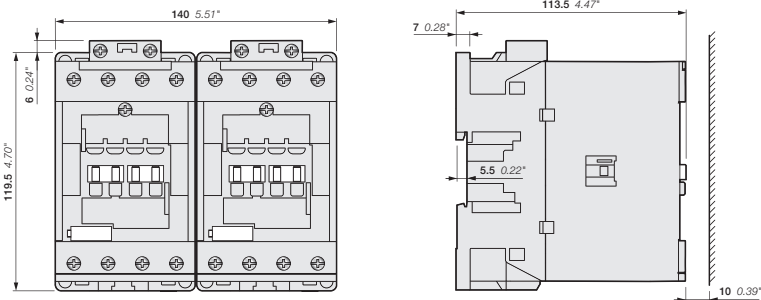
Main dimensions mm, inches



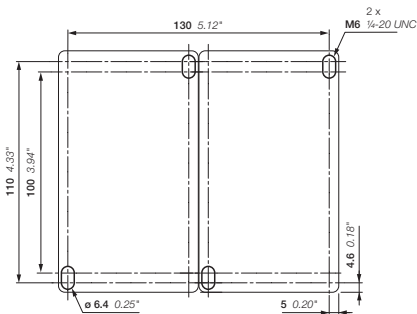
AF40, AF52
+ TEF4 electronic timer



AF40, AF52



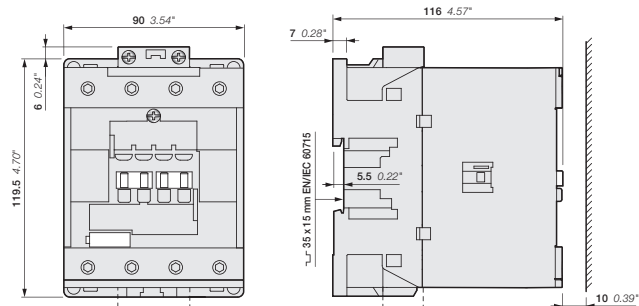
AF40, AF52
+ VM96-4 mechanical interlock unit



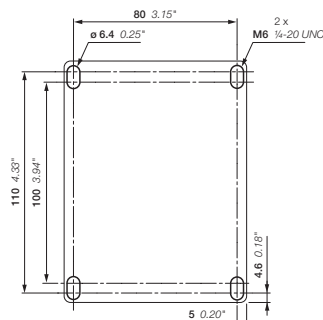
AF40, AF52
+ VM96-4 mechanical interlock unit

AF80 4-pole contactors

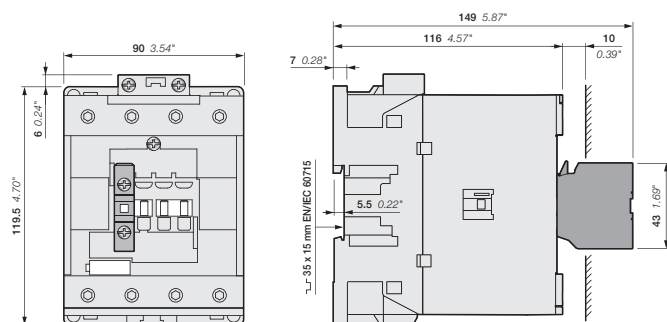
Main dimensions mm, inches



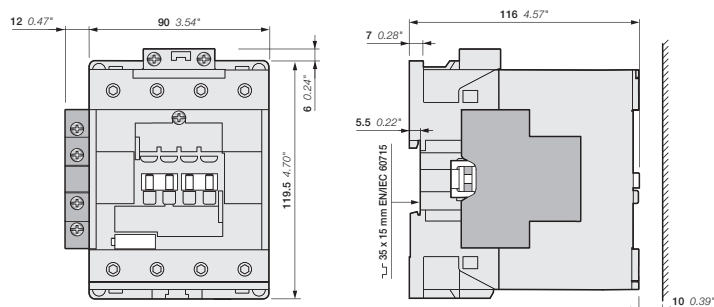
AF80



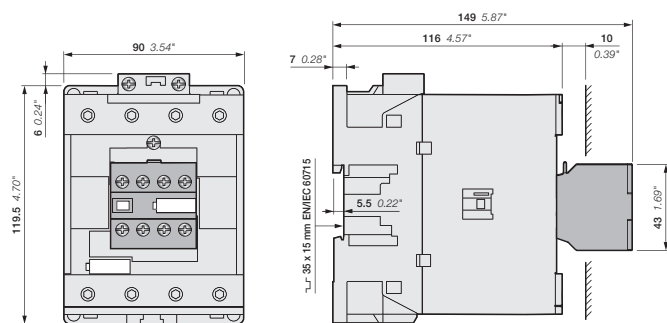
AF80



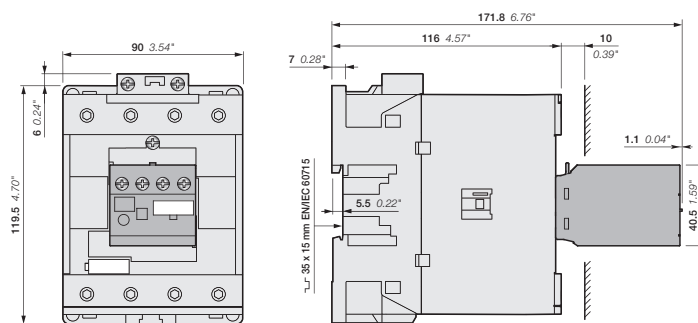
AF80
+ CA4, CC4 1-pole auxiliary contact block



AF80
+ CAL4-11 2-pole auxiliary contact block



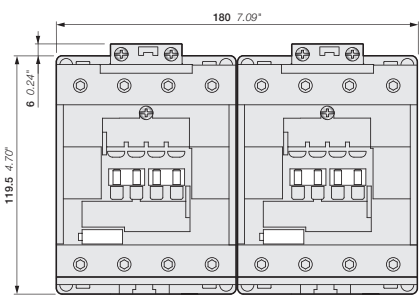
AF80
+ CA4 4-pole auxiliary contact block



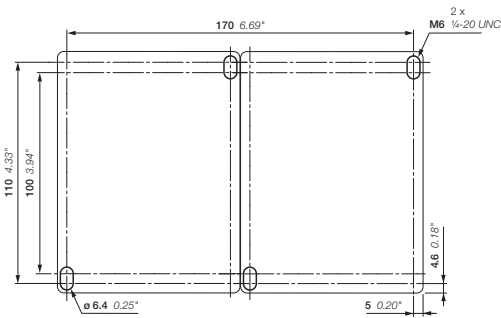
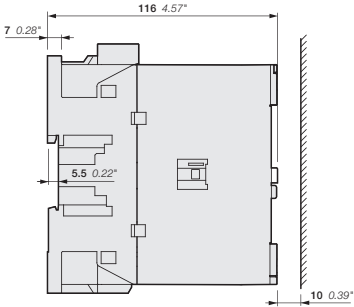
AF80
+ TEF4 Electronic timer

AF80 4-pole contactors

Main dimensions mm, inches



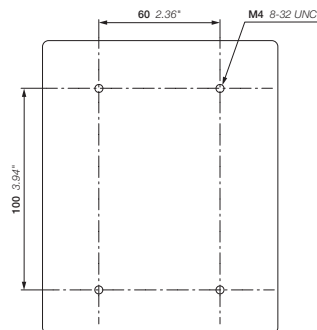
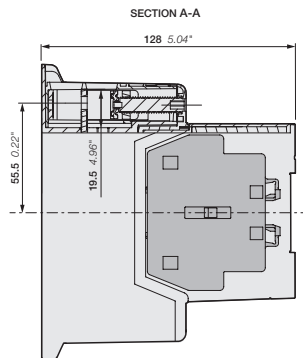
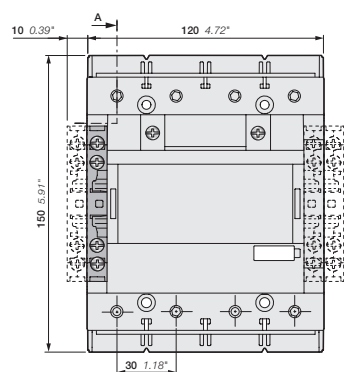
AF80
+ CA4, CC4 1-pole auxiliary contact block



AF80
+ VM96-4 mechanical interlock unit

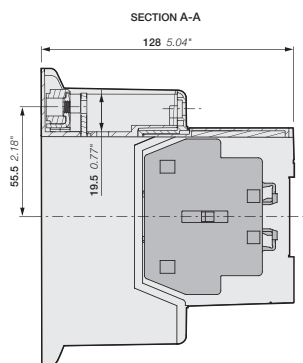
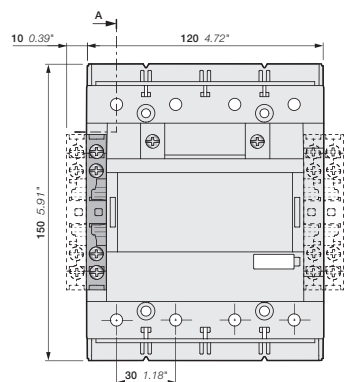
AF116, AF140 4-pole contactors

Main dimensions mm, inches

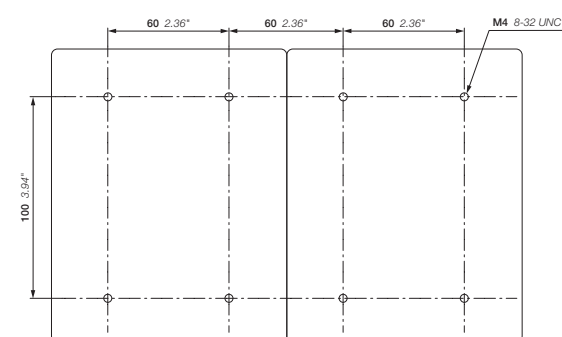
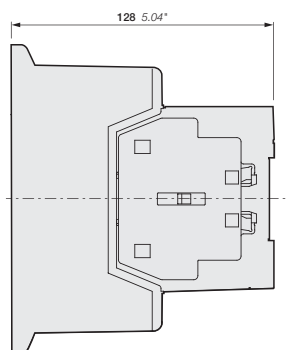
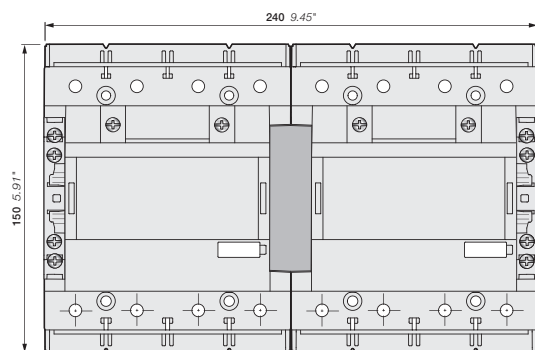


AF116, AF140-40-00 + CAL19 2-pole auxiliary contact block
AF116, AF140-40-11

AF116, AF140-40-...(B)



AF116, AF140-40-00B + CAL19 2-pole auxiliary contact block
AF116, AF140-40-11B

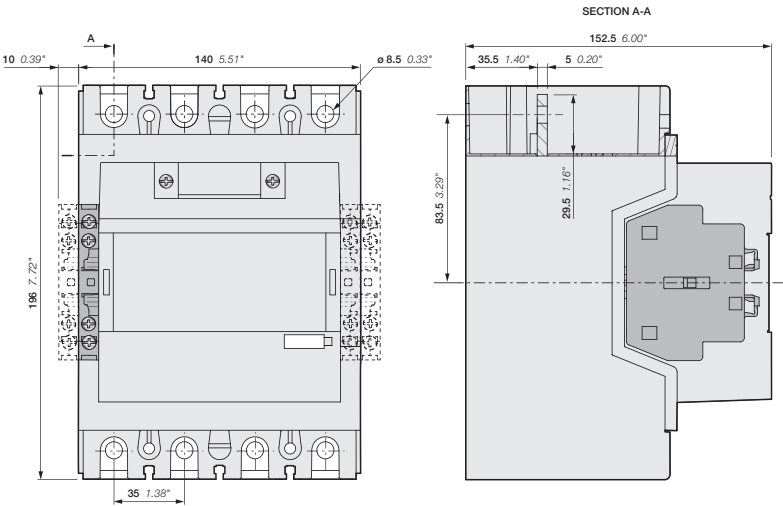


AF116, AF140-40-11
+ VM19 mechanical interlocking unit

AF116, AF140
+ VM19 mechanical interlocking unit

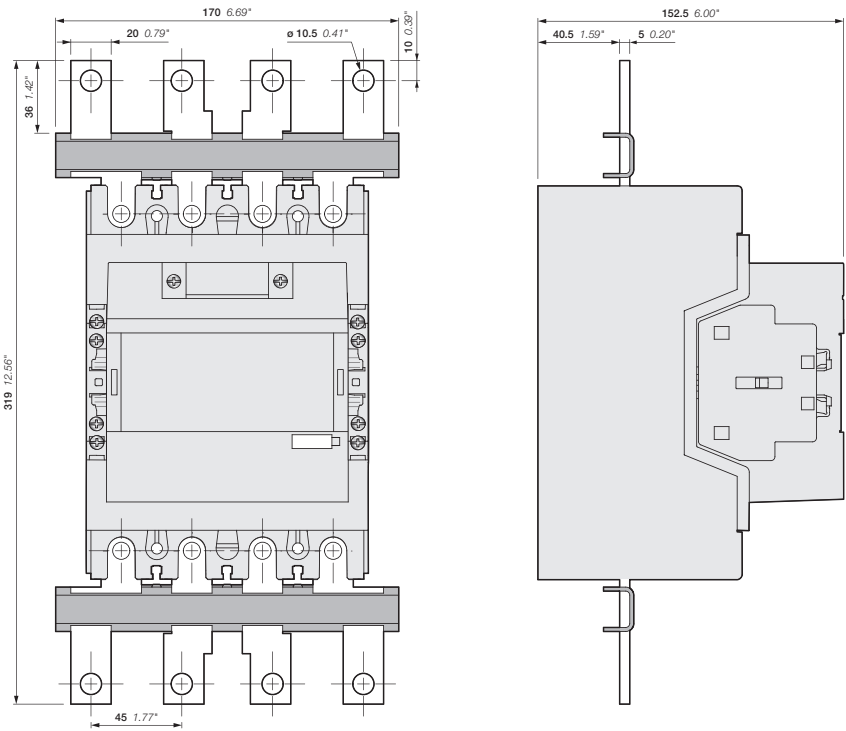
AF190, AF205 4-pole contactors

Main dimensions mm, inches



AF190, AF205-40-00 + CAL19 2-pole auxiliary contact block
AF190, AF205-40-11

AF190, AF205-40

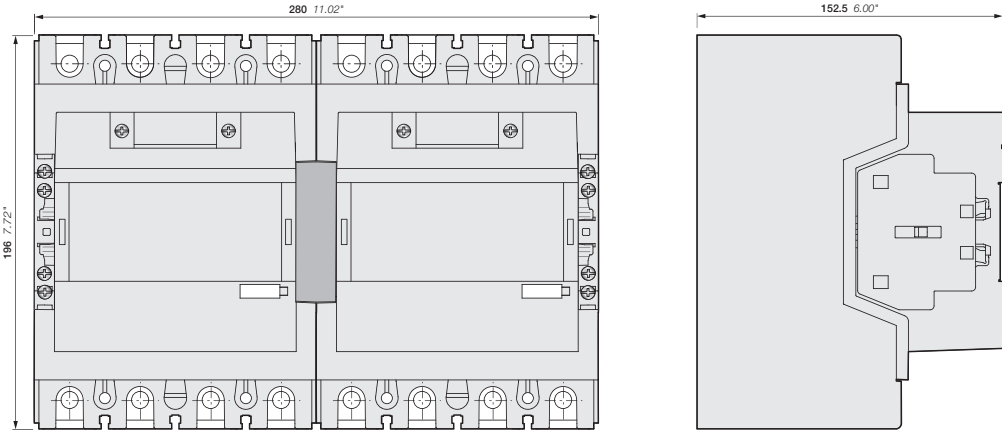


AF190, AF205-40-11
+ LW205-40 terminal enlargement

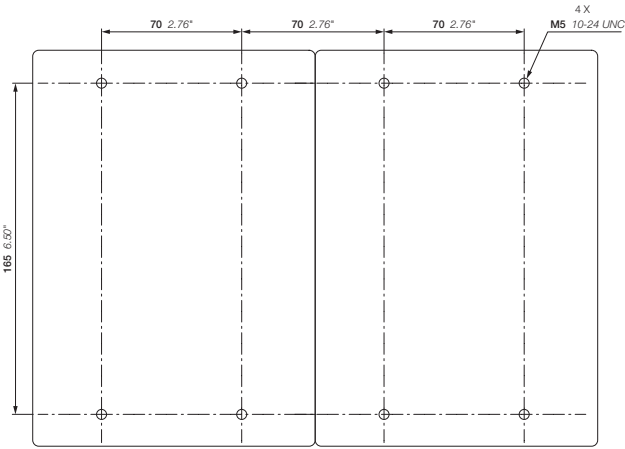
AF190, AF205 4-pole contactors

Main dimensions mm, inches

3



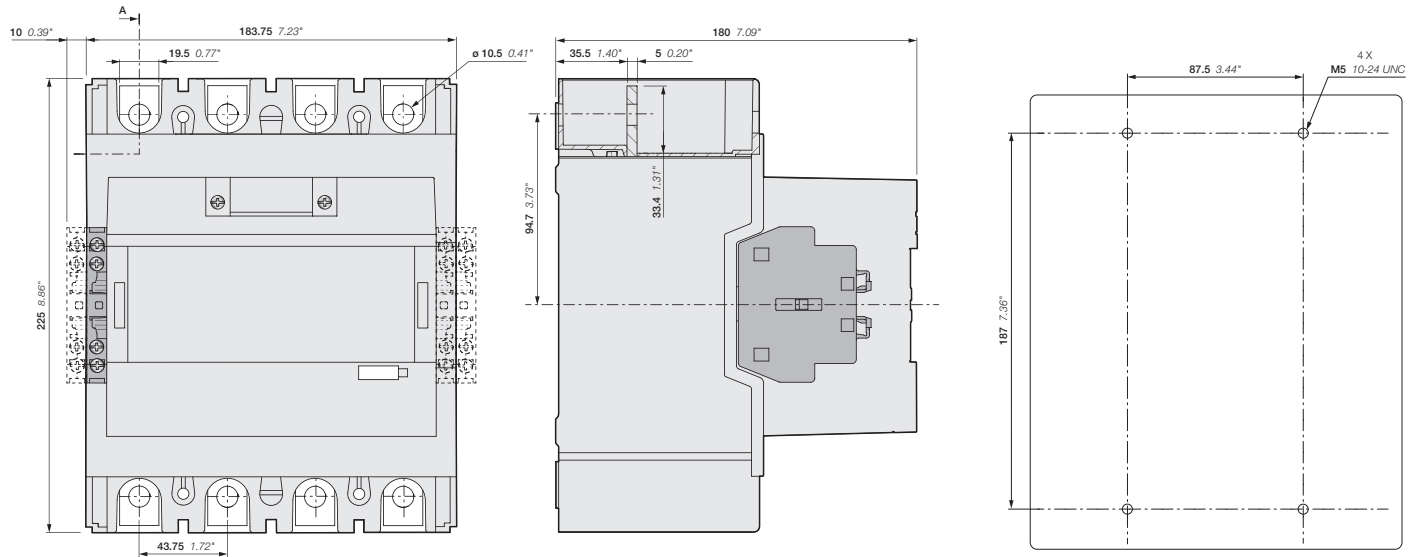
AF190, AF205-40-11
+ VM19 mechanical interlocking unit



AF190, AF205
+ VM19 mechanical interlocking unit

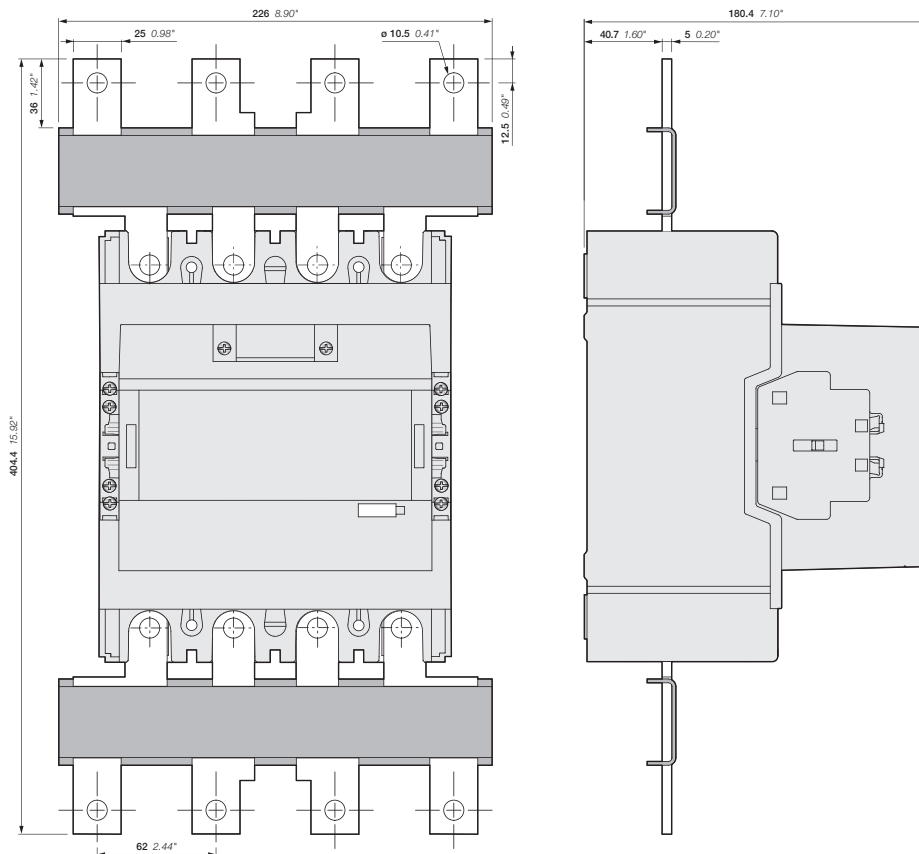
AF265, AF305, AF370 4-pole contactors

Main dimensions mm, inches



AF265, AF305, AF370-40-00 + CAL19 2-pole auxiliary contact block
AF265, AF305, AF370-40-11

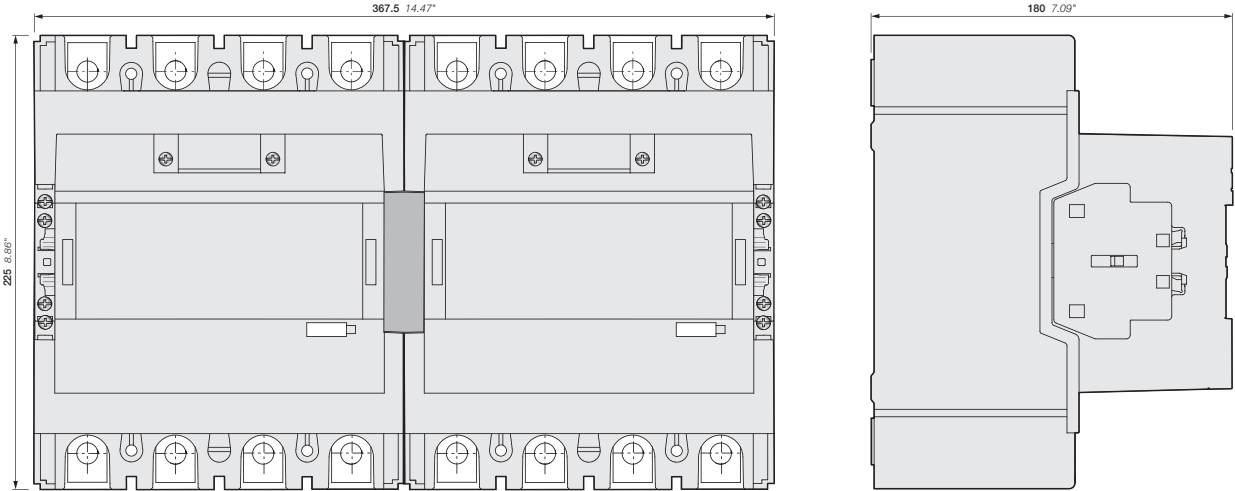
AF265, AF305, AF370



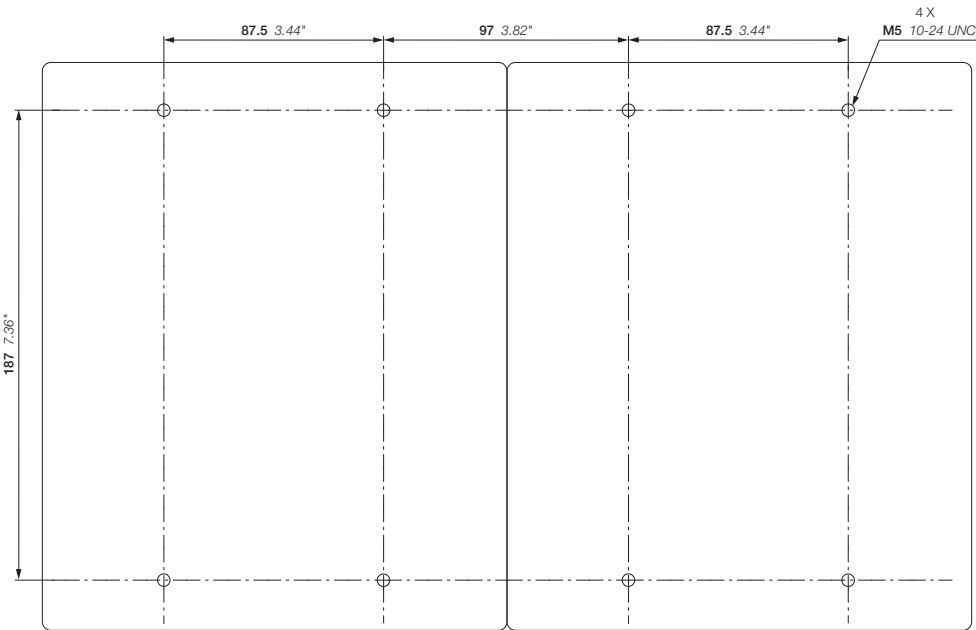
AF265, AF305, AF370-40-11
+ LW370-40 terminal enlargement

AF265, AF305, AF370 4-pole contactors

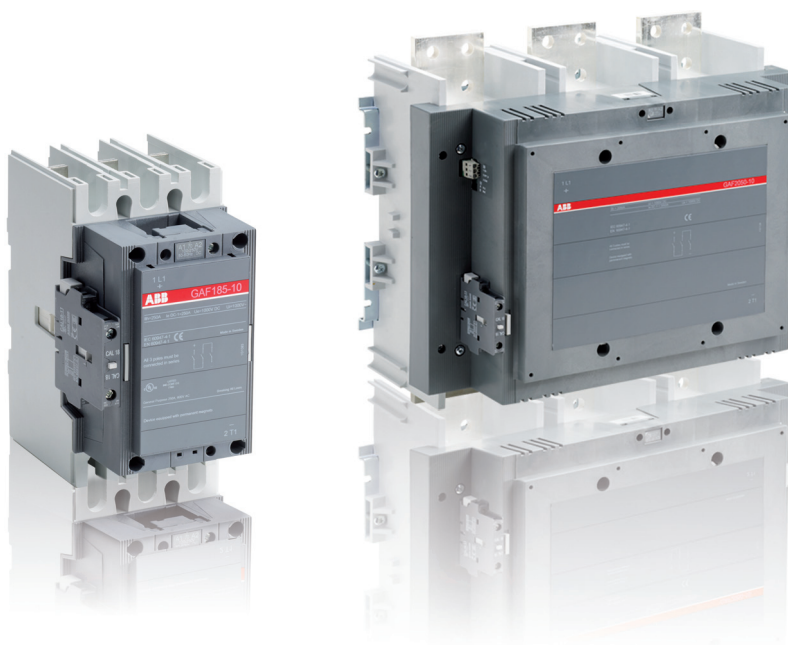
Main dimensions mm, inches



AF265, AF305, AF370-40-11
+ VM19 mechanical interlocking unit



AF265, AF305, AF370
+ VM19 mechanical interlocking unit



Contactors for DC switching, lighting, welding and drive

General description	3/132
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Selection table for DC switching

AF09 ... AF96 contactors	3/132
AF116 ... AF2050 contactors	3/133

Ordering details

100 A DC-1

GA75	AC operated	3/134
GAF75	AC / DC operated	3/135

250 to 400 A DC-1

GAF185 ... GAF300	AC / DC operated	3/136
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600 to 875 A DC-1

GAF460 ... GAF750	AC / DC operated	3/137
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1040 to 1750 A DC-1

GAF1250 ... GAF2050	AC / DC operated	3/138
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Main accessories	3/139
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Terminal marking and positioning	3/147
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Main dimensions	3/148
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Selection table for lighting load

AF09 ... AF265 contactors	3/154
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Selection table for welding isolation

A110W ... AF460W	3/155
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Selection table for drive contactors

DA75 ... EHDB960	3/156
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AF09 ... AF96 contactors

DC circuit switching

General

The arc switching on DC is more difficult than on AC.

- 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, the operating voltage U_e and the pole coupling details.
Ampere values quoted in these tables are valid for a -25...+70 °C temperature close to the contactors, as long as these values do not exceed the AC-1 Ampere values for the corresponding ambient temperature
- Max. switching frequency: 300 cycles/h.

Selection table

Contactor types		AF09	AF12	AF16	AF26		AF30	AF38		AF40	AF52	AF65	AF80	AF96
		3 or 4-pole			3-pole	4-pole	3-pole	3-pole	4-pole	3-pole	3-pole	3-pole	3-pole	3-pole
Utilization category DC-1, L/R ≤ 1 ms														
	≤ 72 V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A	70 A	100 A	105 A	125 A	130 A
	110 V	10 A	15 A	20 A	-	-	-	-	-	-	-	-	-	-
	220 V	-	-	-	-	-	-	-	-	-	-	-	-	-
	≤ 72 V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A	70 A	100 A	105 A	125 A	130 A
	110 V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A	70 A	100 A	105 A	125 A	130 A
	220 V	10 A	15 A	20 A	-	-	-	-	-	-	-	-	-	-
	≤ 72 V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A	70 A	100 A	105 A	125 A	130 A
	110 V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A	70 A	100 A	105 A	125 A	130 A
	220 V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A	70 A	100 A	105 A	125 A	130 A
	≤ 72 V	25 A	-	30 A	-	45 A	-	-	55 A	-	-	-	-	-
	110 V	25 A	-	30 A	-	45 A	-	-	55 A	-	-	-	-	-
	220 V	25 A	-	30 A	-	45 A	-	-	55 A	-	-	-	-	-
	440 V	10 A	-	20 A	-	-	-	-	-	-	-	-	-	-
Utilization category DC-3, L/R ≤ 2 ms														
	≤ 72 V	25 A	27 A	30 A	45 A	-	50 A	50 A	-	70 A	100 A	105 A	125 A	130 A
	110 V	6 A	7 A	8 A	-	-	-	-	-	-	-	-	-	-
	220 V	-	-	-	-	-	-	-	-	-	-	-	-	-
	≤ 72 V	25 A	27 A	30 A	45 A	-	50 A	50 A	-	70 A	100 A	105 A	125 A	130 A
	110 V	25 A	27 A	30 A	45 A	-	50 A	50 A	-	70 A	100 A	105 A	125 A	130 A
	220 V	6 A	7 A	8 A	-	-	-	-	-	-	-	-	-	-
	≤ 72 V	25 A	27 A	30 A	45 A	-	50 A	50 A	-	70 A	100 A	105 A	125 A	130 A
	110 V	25 A	27 A	30 A	45 A	-	50 A	50 A	-	70 A	100 A	105 A	125 A	130 A
	220 V	25 A	27 A	30 A	45 A	-	50 A	50 A	-	70 A	100 A	105 A	125 A	130 A
	≤ 72 V	25 A	-	30 A	-	-	-	-	-	-	-	-	-	-
	110 V	25 A	-	30 A	-	-	-	-	-	-	-	-	-	-
	220 V	25 A	-	30 A	-	-	-	-	-	-	-	-	-	-
	440 V	6 A	-	8 A	-	-	-	-	-	-	-	-	-	-
Utilization category DC-5, L/R ≤ 7.5 ms														
	≤ 72 V	9 A	12 A	16 A	20 A	-	25 A	25 A	-	70 A	100 A	105 A	125 A	130 A
	110 V	4 A	4 A	4 A	-	-	-	-	-	-	-	-	-	-
	220 V	-	-	-	-	-	-	-	-	-	-	-	-	-
	≤ 72 V	25 A	27 A	30 A	45 A	-	50 A	50 A	-	70 A	100 A	105 A	125 A	130 A
	110 V	10 A	15 A	20 A	45 A	-	50 A	50 A	-	70 A	100 A	105 A	125 A	130 A
	220 V	4 A	4 A	4 A	-	-	-	-	-	-	-	-	-	-
	≤ 72 V	25 A	27 A	30 A	45 A	-	50 A	50 A	-	70 A	100 A	105 A	125 A	130 A
	110 V	25 A	27 A	30 A	45 A	-	50 A	50 A	-	70 A	100 A	105 A	125 A	130 A
	220 V	9 A	12 A	16 A	20 A	-	25 A	25 A	-	70 A	100 A	105 A	125 A	130 A
	≤ 72 V	25 A	-	30 A	-	-	-	-	-	-	-	-	-	-
	110 V	25 A	-	30 A	-	-	-	-	-	-	-	-	-	-
	220 V	10 A	-	20 A	-	-	-	-	-	-	-	-	-	-
	440 V	4 A	-	4 A	-	-	-	-	-	-	-	-	-	-

For additional ratings ≥ 440 V, please consult us.

AF116 ... AF2050 contactors

DC circuit switching

Selection table

Contactor types	AF116	AF140	AF146	AF190	AF205	AF265	AF305	AF370	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050
	3 or 4-pole		3-pole	3 or 4-pole					3-pole							

Utilization category DC-1, L/R ≤ 1 ms

	≤ 72 V	160	200	200	250	350	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A
	90 V	160	200	200	250	350	400	500	520	-	-	-	-	-	-	-	-
	100 V	-	-	-	250	350	400	500	520	-	-	-	-	-	-	-	-
	110 V	-	-	-	-	-	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A
	≤ 72 V	160	200	200	250	350	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A
	110 V	160	200	200	250	350	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A
	175 V	160	200	200	250	350	400	500	520	600 A	700 A	800 A	1050 A	-	-	-	-
	200 V	-	-	-	250	350	400	500	520	600 A	700 A	800 A	1050 A	-	-	-	-
	220 V	-	-	-	-	-	400	500	520	600 A	700 A	800 A	1050 A	-	-	-	-
	≤ 72 V	160	200	200	250	350	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A
	110 V	160	200	200	250	350	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A
	220 V	160	200	200	250	350	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A
	260 V	160	200	200	250	350	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A
	300 V	-	-	-	250	350	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A
	340 V	-	-	-	-	-	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A
	440 V	-	-	-	-	-	-	-	-	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A
	600 V	-	-	-	-	-	-	-	-	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A
	850 V	-	-	-	-	-	-	-	-	-	-	800 A	1050 A	1250 A	1350 A	1650 A	2050 A
	850 V	-	-	-	-	-	-	-	-	-	-	800 A	1050 A	1250 A	1350 A	1650 A	2050 A
	≤ 350 V	200	200	-	250	350	400	500	520	-	-	-	-	-	-	-	-
	400 V	-	-	-	250	350	400	500	520	-	-	-	-	-	-	-	-
	440 V	-	-	-	-	-	400	500	520	-	-	-	-	-	-	-	-

Utilization category DC-3, L/R ≤ 2 ms

	≤ 72 V	-	-	-	-	-	-	-	-	600 A	700 A	800 A	1050 A	-	-	-	-
	110 V	-	-	-	-	-	-	-	-	600 A	700 A	800 A	1050 A	-	-	-	-
	≤ 72 V	145 A	160 A	-	250 A	275 A	350 A	400 A	450 A	600 A	700 A	800 A	1050 A	-	-	-	-
	110 V	145 A	160 A	-	250 A	275 A	350 A	400 A	450 A	600 A	700 A	800 A	1050 A	-	-	-	-
	220 V	-	-	-	-	-	-	-	-	600 A	700 A	800 A	1050 A	-	-	-	-
	≤ 72 V	145 A	160 A	-	250 A	275 A	350 A	400 A	450 A	600 A	700 A	800 A	1050 A	-	-	-	-
	110 V	145 A	160 A	-	250 A	275 A	350 A	400 A	450 A	600 A	700 A	800 A	1050 A	-	-	-	-
	220 V	145 A	160 A	-	250 A	275 A	350 A	400 A	450 A	600 A	700 A	800 A	1050 A	-	-	-	-
	440 V	-	-	-	-	-	-	-	-	600 A	700 A	800 A	1050 A	-	-	-	-
	600 V	-	-	-	-	-	-	-	-	600 A	700 A	800 A	1050 A	-	-	-	-

Utilization category DC-5, L/R ≤ 7.5 ms

	≤ 72 V	-	-	-	-	-	-	-	-	600 A	700 A	800 A	1050 A	-	-	-	-
	110 V	-	-	-	-	-	-	-	-	600 A	700 A	800 A	1050 A	-	-	-	-
	≤ 72 V	145 A	160 A	-	250 A	275 A	350 A	400 A	450 A	600 A	700 A	800 A	1050 A	-	-	-	-
	110 V	145 A	160 A	-	250 A	275 A	350 A	400 A	450 A	600 A	700 A	800 A	1050 A	-	-	-	-
	220 V	-	-	-	-	-	-	-	-	600 A	700 A	800 A	1050 A	-	-	-	-
	≤ 72 V	145 A	160 A	-	250 A	275 A	350 A	400 A	450 A	600 A	700 A	800 A	1050 A	-	-	-	-
	110 V	145 A	160 A	-	250 A	275 A	350 A	400 A	450 A	600 A	700 A	800 A	1050 A	-	-	-	-
	220 V	145 A	160 A	-	250 A	275 A	350 A	400 A	450 A	600 A	700 A	800 A	1050 A	-	-	-	-
	440 V	-	-	-	-	-	-	-	-	600 A	700 A	800 A	1050 A	-	-	-	-
	600 V	-	-	-	-	-	-	-	-	600 A	700 A	800 A	1050 A	-	-	-	-

For additional ratings ≥ 440 V, please consult us.

GA75, GAF75 1-pole contactors

100 A DC

AC operated



GA75-10-11

Description

GA75 contactors are designed for controlling shunt or series motors and resistive or slightly inductive loads up to 1000 V DC.

These contactors are of the block type design with 3 main poles connected in series.

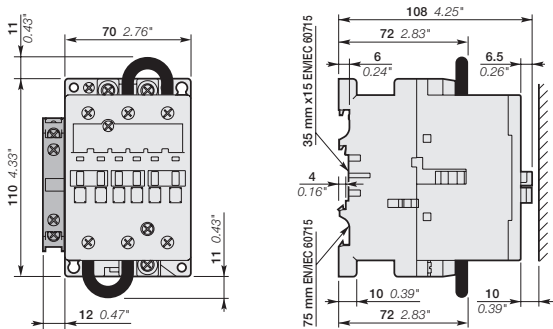
- main poles arc chutes fitted with permanent magnets specially designed for DC breaking. The connection polarities must be respected.
- control circuit: AC operated
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

UL / CSA General use rating		Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Order code	Weight Pkg (1 pce)
440 V DC A	1000 V DC A	V 50 Hz	V 60 Hz				kg
100	35	24	24	1	1	GA75-10-11-81	1.26
		110	110...120	1	1	GA75-10-11-84	1.26
		220...230	230...240	1	1	GA75-10-11-80	1.26

(1) Other control voltages see voltage codes table.

Main dimensions mm, inches



GA75-10-11

GAF75 1-pole contactors

100 A DC

AC/DC operated



GAF75-10-11

Description

GAF75 contactors are designed for controlling shunt or series motors and resistive or slightly inductive loads up to 1000 V DC.

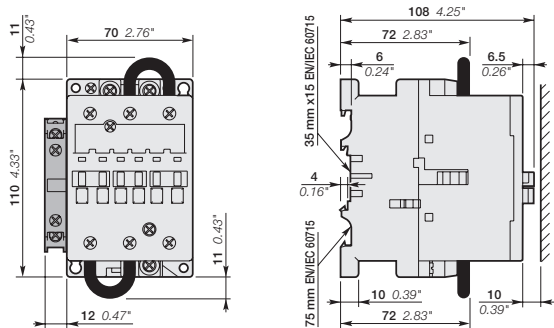
- These contactors are of the block type design with 3 main poles connected in series.
- main poles arc chutes fitted with permanent magnets specially designed for DC breaking. The connection polarities must be respected.
 - control circuit : AC/DC operated
 - add-on auxiliary contact blocks for side mounting and a wide range of accessories

Ordering details

UL / CSA General use rating		Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Order code	Weight Pkg (1 pce)
440 V DC A	1000 V DC A	50/60 Hz	DC				kg
100	35	–	20 ... 60	1	1	GAF75-10-11-72	1.30
		48 ... 130	48 ... 130	1	1	GAF75-10-11-69	1.30
		100 ... 250	100 ... 250	1	1	GAF75-10-11-70	1.30

(1) Other control voltages see voltage codes table.

Main dimensions mm, inches



GAF75-10-11

GAF185 ... GAF300 3-pole contactors

250 to 400 A DC

AC / DC operated with 1 N.O. + 1 N.C. auxiliary contact

3



GAF185-10-11



GAF300-10-11

Description

GAF185 ... GAF300 contactors are designed for controlling resistive or slightly inductive loads up to 1000 V DC.

These contactors are of the block type design with 3 main poles for connection in series by the user according to conductor cross-sectional area or by using LP connection bars to be ordered separately.

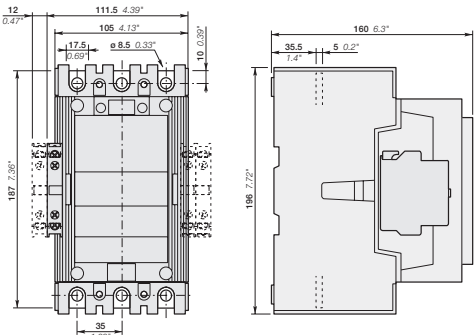
- main poles arc chutes fitted with permanent magnets specially designed for DC breaking. The connection polarities must be respected.
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 3 coils to cover control voltages between 48...250 V 50/60 Hz and 20...250 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

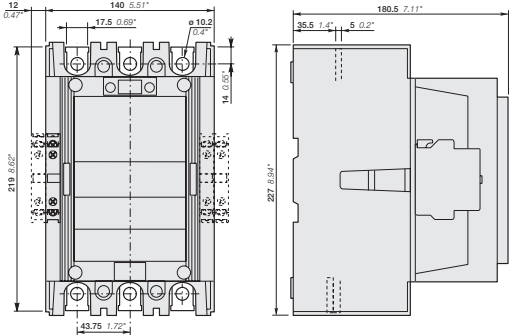
UL / CSA General use rating $\theta \leq 40\text{ }^{\circ}\text{C}$ 1000 V DC	Rated control circuit voltage Uc		Auxiliary contacts fitted		Order code	Weight Pkg (1 pce) kg
	V 50/60 Hz	V DC				
250 (2)	-	20...60	1	1	GAF185-10-11-72 (1)	3.60
	48...130	48...130	1	1	GAF185-10-11-69	3.60
	100...250	100...250	1	1	GAF185-10-11-70	3.60
400	-	20...60	1	1	GAF300-10-11-72 (1)	6.20
	48...130	48...130	1	1	GAF300-10-11-69	6.20
	100...250	100...250	1	1	GAF300-10-11-70	6.20

(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.
 (2) At 660 V DC.

Main dimensions mm, inches

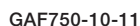


GAF185



GAF300

3



- can manage large control voltage variations
- reduced panel energy consumption
- very distinct closing and opening
- can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

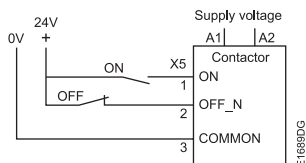
Ordering details

UL / CSA General use rating $\theta \leq 40^\circ\text{C}$ 1000 V DC	Rated control circuit voltage Uc		Auxiliary contacts fitted		Order code	Weight Pkg (1 pce)
A	V 50/60 Hz	V DC				kg
650	-	24...60	1	1	GAF460-10-11-68 (1)	12.00
	48...130	48...130	1	1	GAF460-10-11-69	12.00
	100...250	100...250	1	1	GAF460-10-11-70	12.00
	250...500	250...500	1	1	GAF460-10-11-71	12.00
900	-	24...60	1	1	GAF750-10-11-68 (1)	15.00
	48...130	48...130	1	1	GAF750-10-11-69	15.00
	100...250	100...250	1	1	GAF750-10-11-70	15.00
	250...500	250...500	1	1	GAF750-10-11-71	15.00

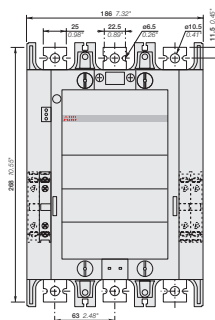
(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.

GAF460 ... GAF750 are equipped with low voltage inputs for control, for example by a PLC.

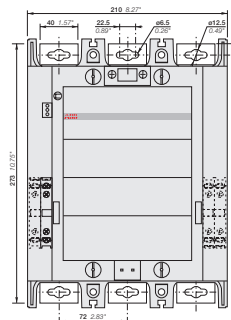
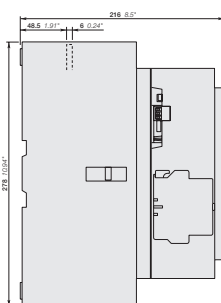
Control inputs



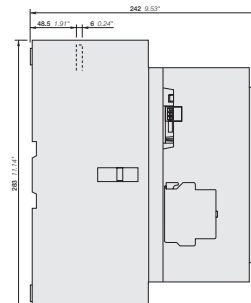
Main dimensions mm, inches



GAF460



GAF750

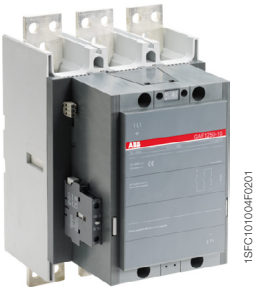


GAF1250 ... GAF2050 3-pole contactors

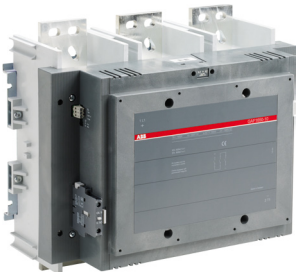
1210 to 2050 A DC

AC / DC operated with 1 N.O. + 1 N.C. auxiliary contact

3



GAF1250-10-11



GAF1650-10-11

Description

GAF1250 ... GAF2050 contactors are designed for controlling resistive or slightly inductive loads up to 1000 V DC.

These contactors are of the block type design with 3 main poles for connection in series by the user according to conductor cross-sectional area or by using LP connection bars to be ordered separately.

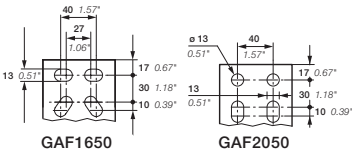
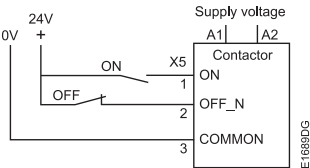
- main poles arc chutes fitted with permanent magnets specially designed for DC breaking. The connection polarities must be respected.
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 48...500 V 50/60 Hz and 24...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

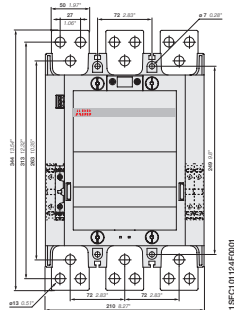
UL / CSA General use rating θ ≤ 40 °C 1000 V	Rated control circuit voltage Uc		Auxiliary contacts fitted		Order code	Weight Pkg (1 pce)
	V 50/60 Hz	V DC				
A						kg
1210	-	24...60	1	1	GAF1250-10-11-68	16.00
	48...130	48...130	1	1	GAF1250-10-11-69	16.00
	100...250	100...250	1	1	GAF1250-10-11-70	16.00
	250...500	250...500	1	1	GAF1250-10-11-71	16.00
1650	100...250	100...250	1	1	GAF1650-10-11-70	35.00
2050	100...250	100...250	1	1	GAF2050-10-11-70	35.00

GAF1250 ... AF2050 are equipped with low voltage inputs for control, for example by a PLC

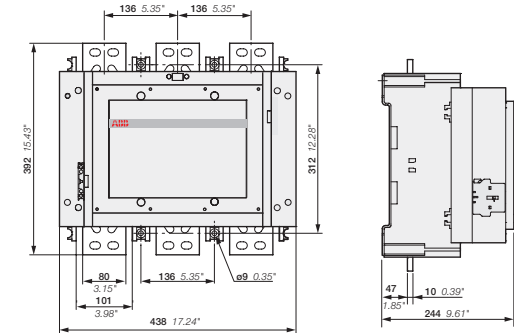
Control inputs



Main dimensions mm, inches



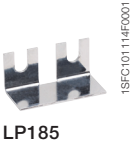
GAF1250



GAF1650, GAF2050

GAF185 ... GAF2050 3-pole contactors

Main accessories



Ordering details

For contactors	Auxiliary contacts	Order code	Pkg qty	Weight (1 pce)
				kg

Auxiliary contact blocks, low energy microswitch 0.1 A, N.O. or N.C.

GAF185 ... GAF2050	0	1	CEL18-01	0.05
	1	0	CEL18-10	0.05

Connection bar for contactor

GAF185	LP185	2	0.30
GAF300	LP300	2	0.40
GAF460	LP460	4	0.55
GAF750	LP750	4	0.95
GAF1250	LP1250	2	1.90
GAF1650, GAF2050	LP2050	4	2.90

GA75 ... GAF2050 contactors

Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC operated	GA75							
	AC / DC operated	GA75	GAF185	GAF300	GAF460	GAF750	GAF1250	GAF1650	GAF250
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1							
Rated operational voltage U _e max.		1000 V DC							
DC-1 Utilization category, L/R ≤ 1 ms									
For air temperature close to contactor									
I _e / Rated operational current DC-1									
θ ≤ 40 °C		220 V	120 A	-					
		440 V	100 A	-					
		600 V	75 A	-					
		1000 V	35 A	275 A	500 A	700 A	1050 A	1250 A	1650 A
θ ≤ 55 °C		220 V	100 A	-					
		440 V	100 A	-					
		600 V	75 A	-					
		1000 V	35 A	250 A	400 A	600 A	875 A	1040 A	1450 A
θ ≤ 70 °C		220 V	85 A	-					
		440 V	85 A	-					
		600 V	75 A	-					
		1000 V	35 A	180 A	325 A	480 A	720 A	875 A	1270 A
With conductor cross-sectional area			(1)	150 mm ²	300 mm ²	2x 240 mm ²	2x 50x8 mm ²	2x 100x5 mm ²	3x 100x5 mm ²
				(2)					4x 100x5 mm ²
DC-3 Utilization category, L/R ≤ 2 ms									
I _e / Rated operational current DC-3									
θ ≤ 55 °C		220 V	100 A	-					
		440 V	85 A	-					
DC-5 Utilization category, L/R ≤ 7.5 ms									
I _e / Rated operational current DC-5									
θ ≤ 55 °C		220 V	85 A	-					
		440 V	35 A	-					
Maximum electrical switching frequency		300 cycles/h							

(1) Refer to IEC 60947-1, table 9.

(2) For currents above 450 A, use 300 mm² and terminal extension/enlargement pieces (LX300/LW300).

Main pole - Utilization characteristics according to UL / CSA

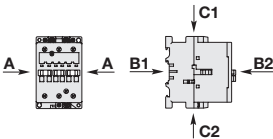
Contactor types	AC operated	GA75							
	AC / DC operated	GA75	GAF185	GAF300	GAF460	GAF750	GAF1250	GAF1650	GAF250
Standards		UL 508, CSA C22.2 N°14							
Maximum operational voltage		1000 V DC							
UL / CSA DC general use rating									
θ ≤ 40 °C		440 V	100 A	-					
		600 V	75 A	250 A	400 A				
		1000 V	35 A	(3)	400 A	650 A	900 A	1210 A	1650 A
									2050 A
Maximum electrical switching frequency		300 cycles/h							

(3) On request.

GA75 and GAF75 contactors

Technical data

General technical data

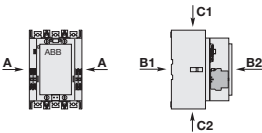
Contactor types	AC operated	GA75
	AC/DC operated	GAF75
Rated insulation voltage Ui		
acc. to IEC 60947-4-1		1000 V
acc. to UL		600 V
Rated impulse withstand voltage Uimp.		8 kV
Ambient air temperature close to contactor		
Operation		-40...+70 °C
Storage		-60...+80 °C
Climatic withstand		acc. to IEC 60068-2-30 and 60068-2-11 - UTE C 63-100 specification II
Maximum operating altitude (without derating)		3000 m
Mechanical durability		
Number of operating cycles		10 millions operating cycles (5 millions for GAE75)
Max. switching frequency		3600 cycles/h
Shock withstand		
acc. to IEC 60068-2-27 and EN 60068-2-27		
Mounting position 1		
		
	Shock direction	1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position
	A	20 g
	B1	10 g closed position / 5 g open position
	B2	15 g
	C1	20 g
	C2	20 g

GAF185 ... GAF2050 contactors

Technical data

General technical data

Contactor types	AC / DC operated	GAF185	GAF300	GAF460	GAF750	GAF1250	GAF1650	GAF2050
Rated insulation voltage Ui								
acc. to IEC 60947-4-1		1000 V						
acc. to UL		600 V						
Rated impulse withstand voltage Uimp.		8 kV						
Ambient air temperature close to contactor								
Operation		-40 to +70 °C						
Storage		-40 to +70 °C						
Climatic withstand		acc. to IEC 60068-2-30						
Maximum operating altitude (without derating)		3000 m						
Mechanical durability								
Number of operating cycles		5 millions operating cycles					0.5 millions operating cycles	
Max. switching frequency		300 cycles/h					60 cycles/h	
Shock withstand								
acc. to IEC 60068-2-27 and EN 60068-2-27								
Mounting position 1								
	Shock direction	1/2 sinusoidal shock for 30 ms: no change in contact position, closed or open position						
	A	5 g					-	
	B1	5 g					-	
	B2	5 g					-	
	C1	5 g					-	
	C2	5 g					-	



GA75 and GAF75 contactors

Technical data

Magnet system characteristics

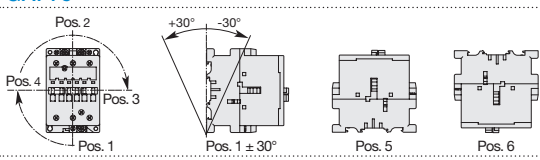
Contactor types	AC operated	GA75
Coil operating limits	AC supply	At $\theta \leq 55^\circ\text{C}$ $0.85 \dots 1.1 \times U_c$
acc. to IEC 60947-4-1		Please also refer to "Mounting characteristics and conditions for use"
AC control voltage		
Rated control circuit voltage U_c	at 50 Hz	24...690 V
	at 60 Hz	24...690 V
Coil consumption	Average pull-in value	50 Hz 180 VA
		60 Hz 210 VA
		50/60 Hz (1) 190 VA / 180 VA
	Average holding value	50 Hz 18 VA / 5.5 W
		60 Hz 18 VA / 5.5 W
		50/60 Hz (1) 18 VA / 5.5 W
Drop-out voltage		Approx. 40...65 % of U_c
Operating time		
Between coil energization and:	N.O. contact closing	8...27 ms
	N.C. contact opening	7...22 ms
Between coil de-energization and:	N.O. contact opening	4...11 ms
	N.C. contact closing	7...14 ms

(1) 50/60 Hz coils: see "Voltage code table".

Magnet system characteristics

Contactor types	AC/DC operated	GAF75
Coil operating limits	AC/DC supply	At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$
acc. to IEC 60947-4-1		Please also refer to "Mounting characteristics and conditions for use"
AC/DC control voltage		
Rated control circuit voltage U_c		20...250 V AC/DC
Coil consumption	Average pull-in value	210 VA/190 W
	Average holding value	7.5 VA/2.8 W
Drop-out voltage		55 % of $U_c \text{ min}$
Coil time constant		
Open	L/R	3 ms
Closed	L/R	15 ms
Operating time		
Between coil energization and:	N.O. contact closing	30...100 ms
	N.C. contact opening	27...95 ms
Between coil de-energization and:	N.O. contact opening	30...110 ms
	N.C. contact closing	35...115 ms

Mounting characteristics and conditions for use

Contactor types	AC operated	GA75
	AC/DC operated	GAF75
Mounting positions		
Control voltage / Ambient temperature		
Mounting positions	1, $1 \pm 30^\circ$, 2, 3, 4, 5	at $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ (max 55°C for GA75)
	6	Unauthorized
Mounting distances		The contactors can be assembled side by side
Fixing		
	On rail according to IEC 60715, EN 60715	35 x 15 mm or 75 x 25 mm
	By screws (not supplied)	2 x M6 screws placed diagonally

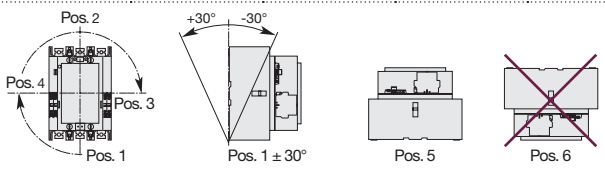
GAF185 ... GAF2050 contactors

Technical data

Magnet system characteristics

Contactor types	AC / DC operated	GAF185	GAF300	GAF460	GAF750	GAF1250	GAF1650	GAF2050
Coil operating limits	AC or DC supply	At $\theta \leq 70\text{ }^{\circ}\text{C}$ $0.85 \times U_c \text{ min...} 1.1 \times U_c \text{ max.}$ Please also refer to "Mounting characteristics and conditions for use"						
acc. to IEC 60947-4-1								
AC control voltage 50/60 Hz								
Rated control circuit voltage U_c		48...250 V AC		48...500 V AC		100...250 V AC		
Coil consumption	Average pull-in value	430 VA	470 VA	890 VA	850 VA	1900 VA		
	Average holding value	12 VA / 3.5 W	10 VA / 2.5 W	12 VA / 4 W	12 VA / 4.5 W	48 VA / 17 W		
DC control voltage								
Rated control circuit voltage U_c		20...250 V DC		24...500 V DC		100...250 V DC		
Coil consumption	Average pull-in value	500 W	520 W	990 W	950 W	1700 W		
	Average holding value	2 W		4 W	4.5 W	16 W		
Drop-out voltage		55 % of $U_c \text{ min.}$						
Dips withstand								
-20 °C $\leq \theta \leq$ +60 °C		$\geq 20 \text{ ms}$						
Operating time								
Coil supply between A1 - A2								
Between coil energization and:	N.O. contact closing	30...115 ms		50...120 ms		50...80 ms		
	N.C. contact opening	30...115 ms		50...120 ms		50...80 ms		
Between coil de-energization and:	N.O. contact opening	25...80 ms		33...70 ms		35...55 ms		
	N.C. contact closing	25...80 ms		33...70 ms		35...55 ms		
Control input for PLC's								
Between coil energization and:	N.O. contact closing	-		40...60 ms	40...90 ms	40...65 ms		
	N.C. contact opening	-		40...60 ms	40...90 ms	40...65 ms		
Between coil de-energization and:	N.O. contact opening	-		10...30 ms		10...30 ms		
	N.C. contact closing	-		10...30 ms		10...30 ms		

Mounting characteristics and conditions for use

Contactor types	AC / DC operated	GAF185	GAF300	GAF460	GAF750	GAF1250	GAF1650	GAF2050
Mounting positions								
Control voltage / Ambient temperature								
Mounting positions	1, 1±30°, 2, 3, 4, 5	at $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min.} \dots 1.1 \times U_c \text{ max.}$						
	6	Unauthorized						
Mounting distances		The contactors can be assembled side by side						
Fixing								
On rail according to IEC 60715, EN 60715		-						
By screws (not supplied)		4 x M5			4 x M6		4 x M8	

GA75 and GAF75 contactors

Technical data

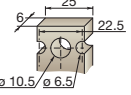
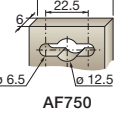
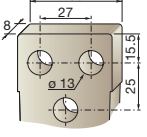
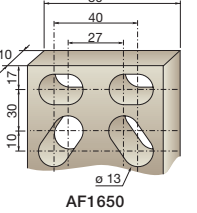
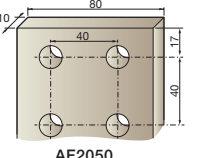
Connecting characteristics

Contactor types		AC operated	GA75
		AC/DC operated	GAF75
Main terminals			
		Screw terminals with single connector (13 x 10 mm)	
Connection capacity (min. ... max.)			
Main conductors (poles)			
	Rigid	Solid ($\leq 4 \text{ mm}^2$)	} 1 x 6...50 mm ² 2 x 6...25 mm ²
		Stranded ($\geq 6 \text{ mm}^2$)	
	Flexible with ferrule		1 x 6...35 mm ²
			2 x 6...16 mm ²
	Bars or lugs	L $\leq$	–
		L $>$	–
Connection capacity acc. to UL/CSA		1 or 2 x	AWG 8...1
Tightening torque	Recommended		4.00 Nm / 35 lb.in
	Max.		4.50 Nm
Auxiliary conductors			
(coil terminals)			
	Rigid solid	1 x	1...4 mm ²
		2 x	1...4 mm ²
	Flexible with ferrule	1 x	1...2.5 mm ²
		2 x	0.75...2.5 mm ²
	Lugs	L $\leq$	8 mm
		L $>$	3.7 mm
Connection capacity acc. to UL / CSA		1 or 2 x	AWG 18...14
Tightening torque	Coil terminals	Recommended	1.00 Nm / 9 lb.in
		Max.	1.20 Nm
Degree of protection			
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			
Main terminals			IP10
Coil terminals			IP20
Screw terminals			Delivered in open position, screws of unused terminals must be tightened
Main terminals			M6
		Screwdriver type	Flat Ø 6.5 / Pozidriv 2
Coil terminals			M3.5
		Screwdriver type	Flat Ø 5.5 / Pozidriv 2

GAF185 ... GAF2050 contactors

Technical data

Connecting characteristics

Contactor types	AC / DC operated	GAF185	GAF300	GAF460	GAF750	GAF1250	GAF1650	GAF2050
Main terminals								
Flat type								
								
Connection capacity (min. ... max.)								
Main conductors (poles)								
 Rigid with connector	Single for Cu cable	6...185 mm ²	16...240 mm ²	240 mm ²	300 mm ²	—	—	—
	Single for Al/Cu cable	25...150 mm ²	120...240 mm ²	240 mm ²	300 mm ²	—	—	—
	Double for Al/Cu cable	—	2 x 95...120 mm ²	2 x 240 mm ²	3 x 185 mm ²	—	—	—
 Bars or lugs	L ≤	24 mm	32 mm	47 mm	52 mm	100 mm	—	—
	Ø >	8 mm	10 mm	10 mm	12 mm	12 mm	—	—
Connection capacity acc. to UL/CSA		1 or 2 x	6 - 250 MCM	4 - 500 MCM (1)	2//250 - 500 MCM	3// 2/0 - 500 MCM	1/0 - 750 MCM	—
Tightening torque	Recommended	18 Nm / 160 lb.in	28 Nm / 247 lb.in	35 Nm / 310 lb.in	45 Nm / 398 lb.in	45 Nm / 398 lb.in	45 Nm / 398 lb.in	—
	Max.	20 Nm	30 Nm	40 Nm	49 Nm	49 Nm	49 Nm	—
Auxiliary conductors								
(coil terminals)								
 Rigid solid	1 x	1...4 mm ²	—	—	—	—	—	—
	2 x	1...4 mm ²	—	—	—	—	—	—
 Flexible with ferrule	1 x	0.75...2.5 mm ²	—	—	—	—	—	—
	2 x	0.75...2.5 mm ²	—	—	—	—	—	—
 Lugs	L ≤	8 mm	—	—	—	—	—	—
	L >	3.7 mm	—	—	—	—	—	—
Connection capacity acc. to UL/CSA		1 or 2 x	AWG 18...14	—	—	—	—	—
Tightening torque	Recommended	1.00 Nm / 9 lb.in	—	—	—	—	—	—
	Max.	1.20 Nm	—	—	—	—	—	—
Degree of protection								
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529								
Main terminals		IP00	—	—	—	—	—	—
Coil terminals		IP20	—	—	—	—	—	—
Screw terminals								
Main terminals		M8	M10	M10	M12	—	—	—
Screws and bolts		—	—	—	—	—	—	—
Coil terminals (delivered in open position)		M3.5	—	—	—	—	—	—
Screwdriver type		Flat Ø 5.5 mm / Pozidriv 2	—	—	—	—	—	—

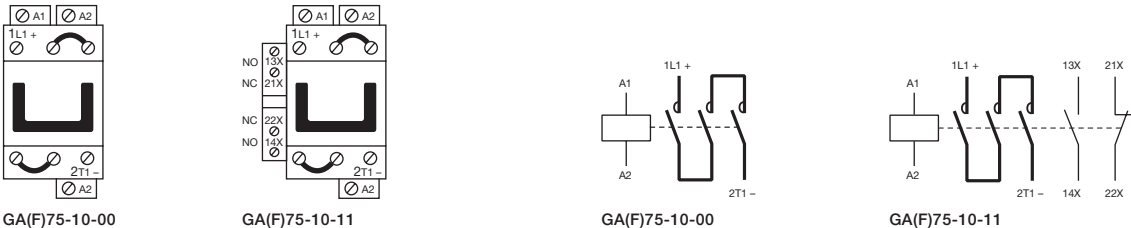
(1) With LW110 enlargement piece: see "Accessories".

GA75 ... GAF2050 contactors

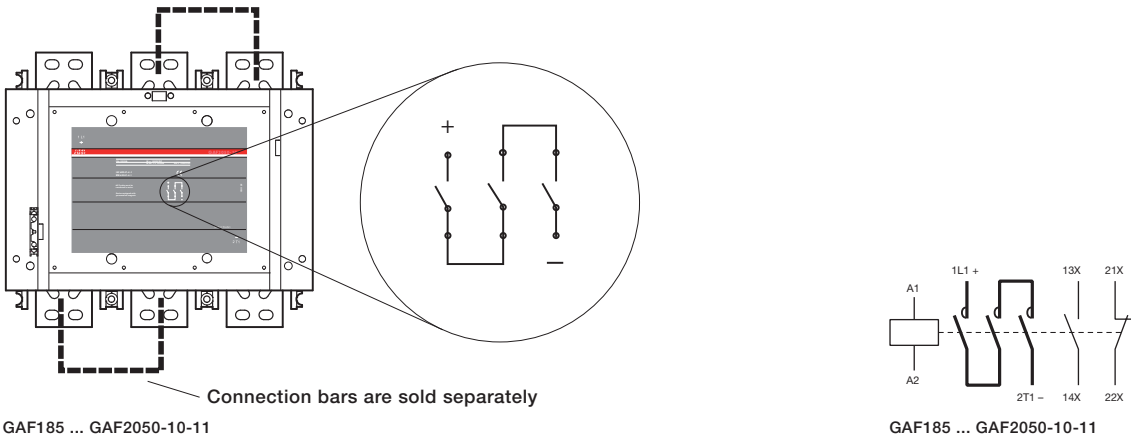
Terminal marking and positioning

GA(F)75 contactors - AC operated, AC/DC operated

Standard devices without addition of auxiliary contacts

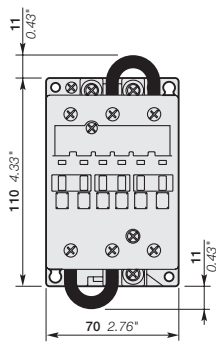


GAF185 ... GAF2050 contactors - AC / DC operated

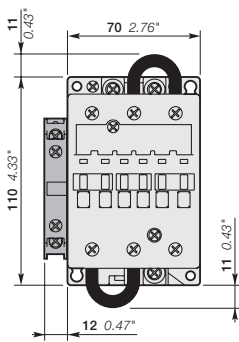


GA(F)75 1-pole contactor

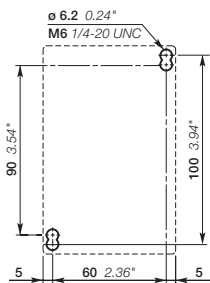
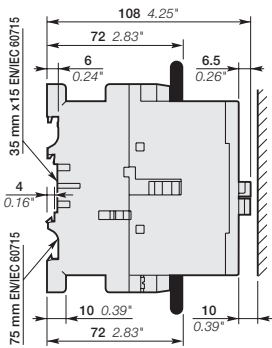
Main dimensions mm, inches



GA(F)75-10-00



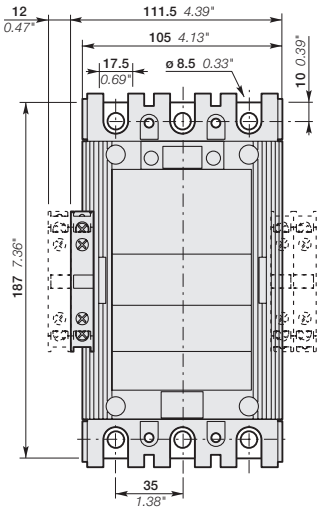
GA(F)75-10-11



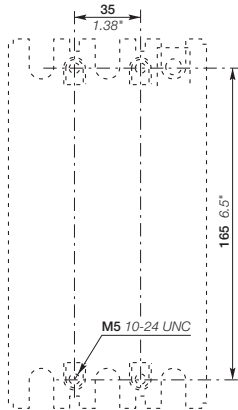
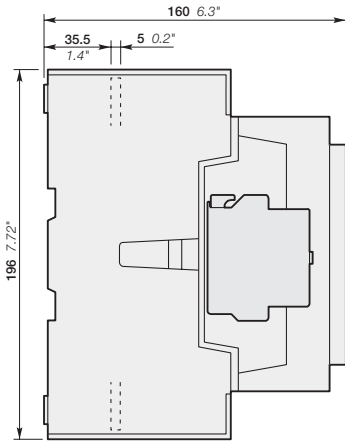
GA(F)75

GAF185, GAF300 3-pole contactor

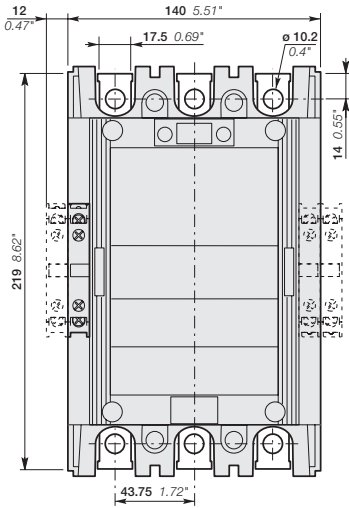
Main dimensions mm, inches



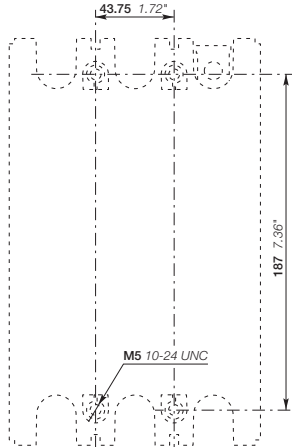
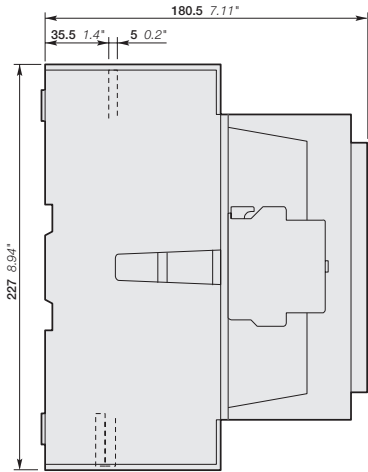
GAF185-30-11



GAF185-30-11



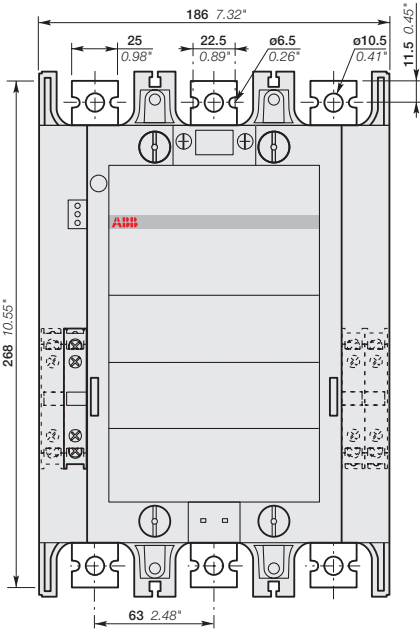
GAF300-30-11



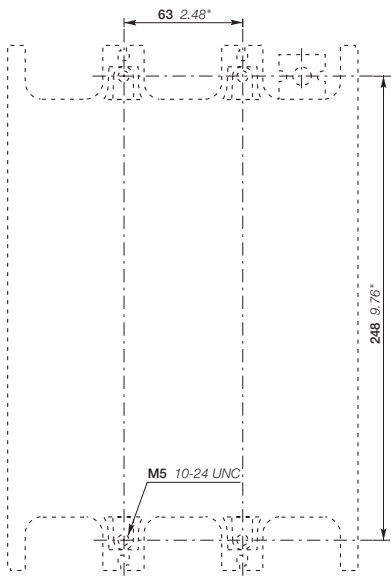
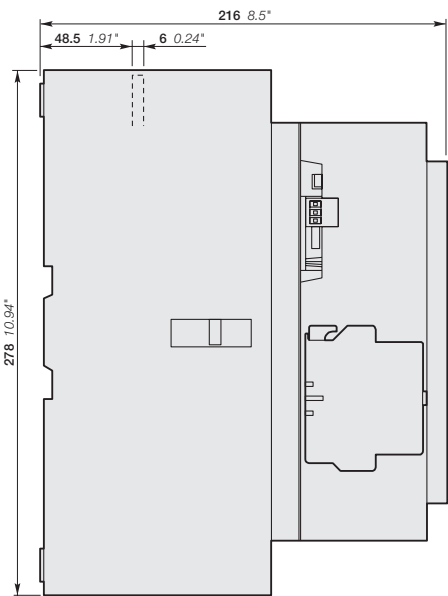
GAF300-30-11

GAF460 3-pole contactor

Main dimensions mm, inches

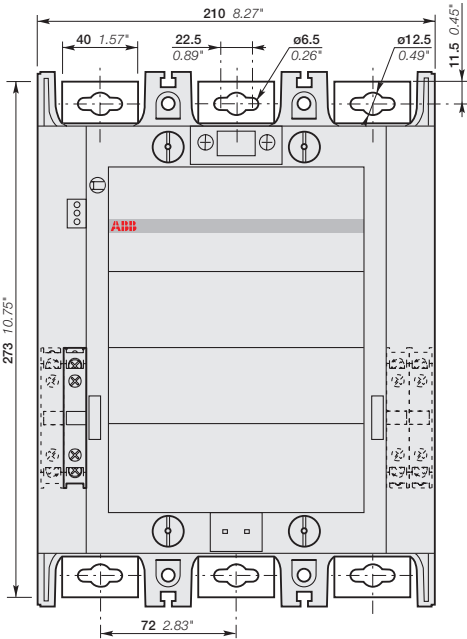


GAF460-30-11

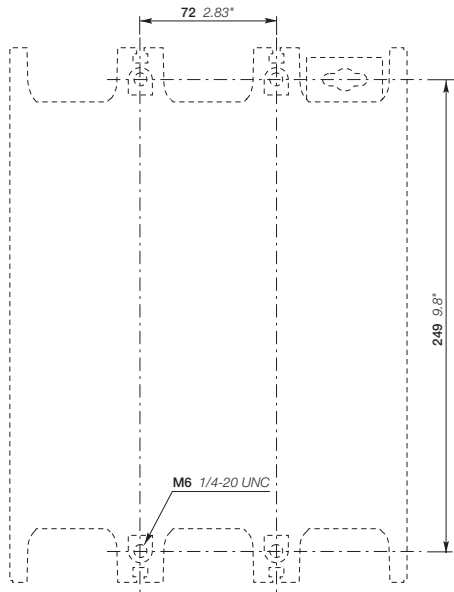
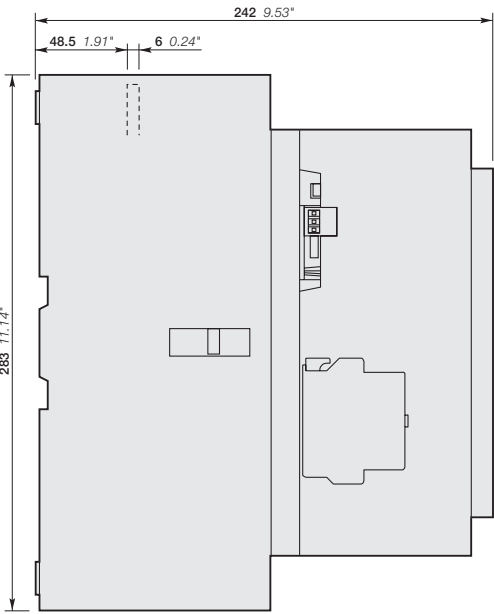


GAF750 3-pole contactor

Main dimensions mm, inches

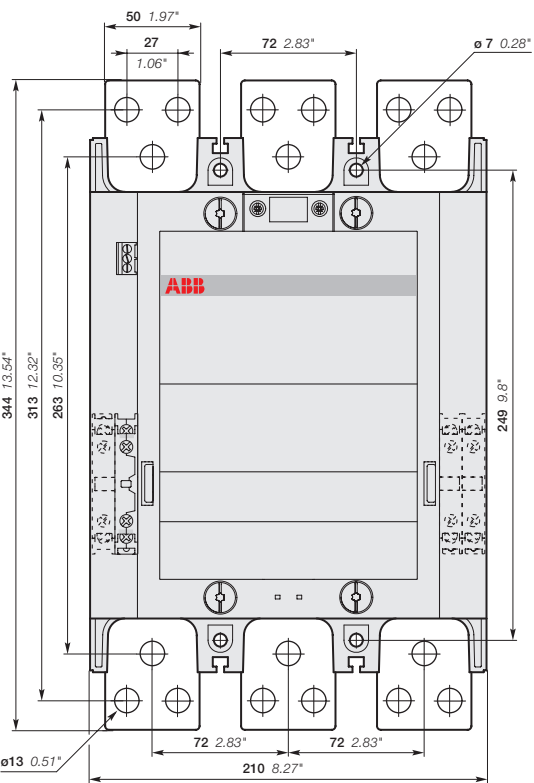


GAF750-30-11

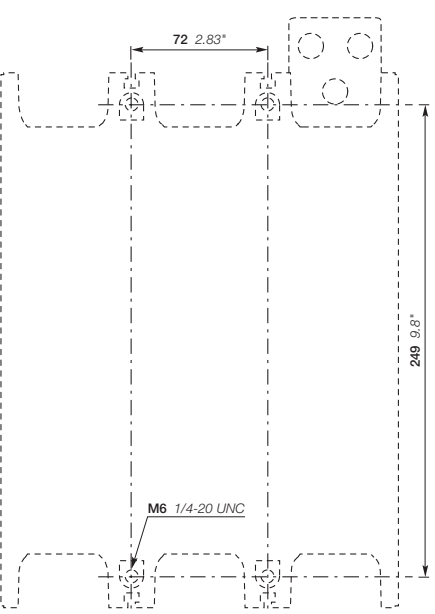
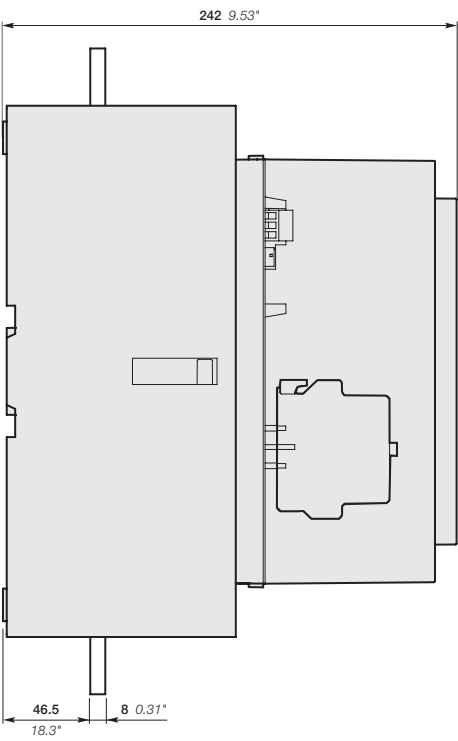


GAF1250 3-pole contactor

Main dimensions mm, inches

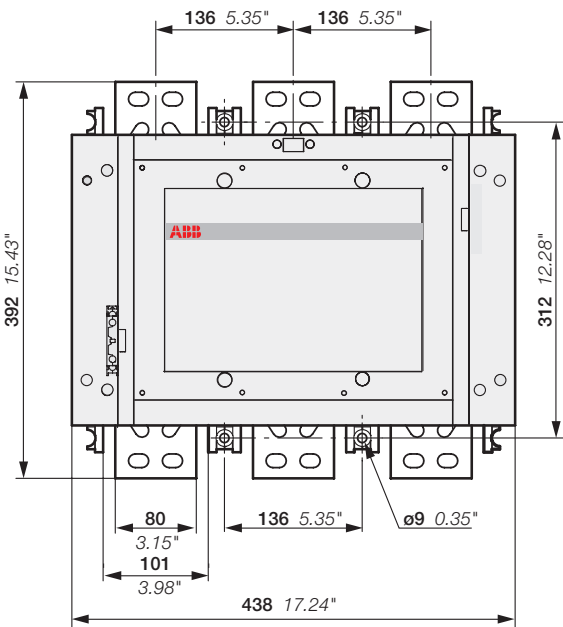
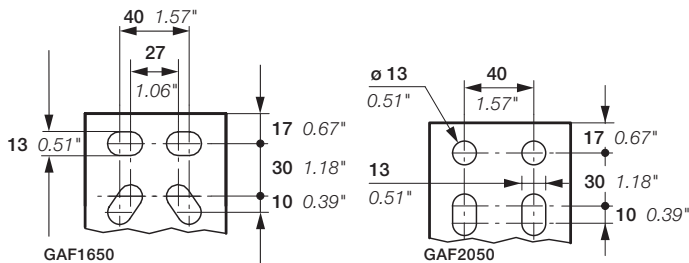


GAF1250-30-11

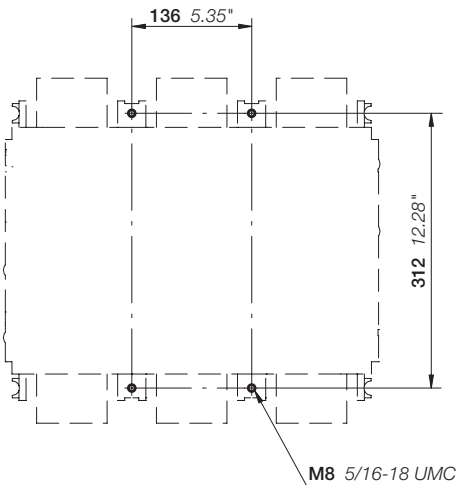
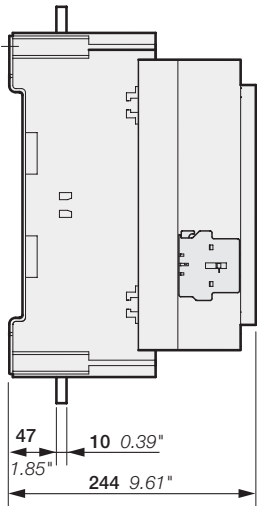


GAF1650, GAF2050 3-pole contactor

Main dimensions mm, inches



GAF1650, GAF2050-30-11



M8 5/16-18 UMC

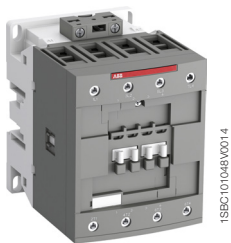
Lighting Circuit Switching

Contactors Selection

3



AF09-40-00



AF80-40-00

General

Contactors selection criteria for control of lighting circuits are as follows:

- type, power rating and number of lamps,
- connection mode,
- current values on closing and in steady state,
- power factor,
- presence or not of correction capacitors.

Lighting circuits

In a given circuit, the number and power rating of lamps are defined and cannot result in overload. Only short-circuit protection has to be provided. J fuses or modular circuit-breakers will be chosen for this purpose. The lamps have very specific technical data, according to their construction type.

- Incandescent lamps have a very high current on closing: more than 15 times nominal current. They do not introduce a large phase displacement between current and voltage.
- Fluorescent tubes are equipped with a ballast whose purpose is two-fold: contribute to ignition and limit current to nominal value once steady state is reached. This ballast is a reactor that considerably lowers the power factor. It may or may not be compensated.

Selection Tables - Lighting Contactors

Electrically held				
Amp Rating	Number of Poles	Order Code		Weight kg
20	4	AF09-40-00-□□L		0.27
20	8	AF09-80-00-□□L		0.54
20	12	AF09-120-00-□□L		0.81
30	4	AF16-40-00-□□L		0.27
30	8	AF16-80-00-□□L		0.54
30	12	AF16-120-00-□□L		0.81
45	4	AF26-40-00-□□L		0.40
45	8	AF26-80-00-□□L		0.80
45	12	AF26-120-00-□□L		1.20
50	4	AF38-40-00-□□L		0.40
65	3	AF40-30-00-□□L		0.97
80	3	AF52-30-00-□□L		0.97
90	3	AF65-30-00-□□L		0.97
105	3	AF80-30-00-□□L		1.22
115	3	AF96-30-00-□□L		1.22
160	3	AF116-30-11-□□L		1.75
200	3	AF140-30-11-□□L		1.75
250	3	AF190-30-11-□□L		3.00
300	3	AF205-30-11-□□L		3.00
400	3	AF265-30-11-□□L		4.64

Coil voltages and codes

Voltage (V) 50/60Hz	Voltage Code : □ □
24 ... 60	11
48 ... 130	12
100 ... 250	13
250 ... 500	14

Welding Isolation Contactors



A 110W



A 300W



AF 460W

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.

Ordering Details: 3 pole, A.C.

Size	Amp Rating	Auxiliary Contacts		Catalog Number	Weight
				state coil voltage code □□ (see table below)	kg
W3	140	1	1	A110W-30-11-□□	
—	200	1	1	A145W-30-11-□□	
W4	250	1	1	A185W-30-11-□□	
—	300	1	1	A210W-30-11-□□	
W5	350	1	1	A260W-30-11-□□	
—	400	1	1	A300W-30-11-□□	
W6	600	1	1	AF460W-30-11-□□	

Ordering Details: 2 pole, A.C.

Size	Amp Rating	Auxiliary Contacts		Catalog Number	Weight
				state coil voltage code □□ (see table below)	kg
—	200	1	1	A145W-20-11-□□	
W4	250	1	1	A185W-20-11-□□	
—	300	1	1	A210W-20-11-□□	
W5	350	1	1	A260W-20-11-□□	
—	400	1	1	A300W-20-11-□□	

Coil voltages and codes : A 110W ... A 300W

Voltage 50Hz	Voltage 60Hz	Code □ □	
24	24	8	1
48	48	8	3
110	110 ... 120	8	4
220 ... 230	230 ... 240	8	0
400 ... 415	480	5	1
500	600	5	5

Coil voltage and codes: AF 460W

Voltage 50/60Hz	Voltage V d.c.	Code □ □
—	24 ... 60	6 8 ⁽¹⁾
48 ... 130	48 ... 130	6 9
100 ... 250	100 ... 250	7 0

(1) The connection polarities indicated close to the coil terminals must be respected: **A1** for the **positive** pole and **A2** for the **negative** pole.

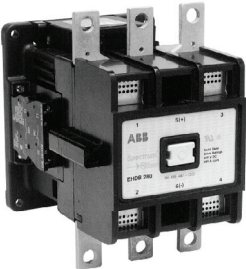
Drive Contactors

Type DA, EHDB

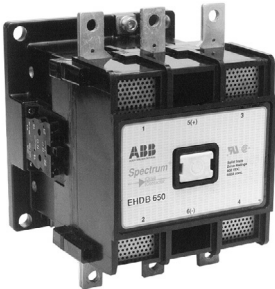
3



DA75



EHDB280



EHDB650

Description

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.

2 Pole - 60 to 960 A

2 pole (2 NO)

(600V N.O. rating)(1)									
Amp Rating	Maximum HP Rating				Aux. Contacts Fitted	Order Code		Weight	
500V DC	240V DC	500V DC	600V DC		 	Coil voltage code ☐ ☐ (see table below)		kg	
60	15	30	—		1	1	DA75-20-11- ☐ ☐		
220	60	125	150		1	1	EHDB220C2P- ☐ L		
280	75	150	200		1	1	EHDB280C2P- ☐ L		
360	100	200	250		1	1	EHDB360C2P- ☐ L		
520	150	300	300		1	1	EHDB520C2P- ☐ L		
650	150	400	400		1	1	EHDB650C2P- ☐ L		
800	—	500	600		1	1	EHDB800C2P- ☐ L		
960	—	600	700		1	1	EHDB960C2P- ☐ L		

3 Pole - 60 to 960 A

3 pole (2 NO & 1 NC)

(600V N.O. rating with 300V NC dynamic breaking rating)(1)											
Amp Rating	Maximum HP Rating			Maximum Amp Rating N.C. Contact		Aux. Contacts Fitted		Order Code			Weight
500V DC	240V DC	500V DC	600V DC	Make	Break			Coil voltage code □□ (see table below)			kg
60	15	30	—	90	56	1	1	DA75-21-11- □□			
220	60	125	150	330	165	1	1	EHDB220C- □ L			
280	75	150	200	420	210	1	1	EHDB280C- □ L			
360	100	200	250	525	263	1	1	EHDB360C- □ L			
520	150	300	300	780	390	1	1	EHDB520C- □ L			
650	150	400	400	975	488	1	1	EHDB650C- □ L			
800	—	500	600	1200	600	1	1	EHDB800C- □ L			
960	—	600	700	1440	720	1	1	EHDB960C- □ L			

Coil voltages and codes

Voltage (V)	DA/DAE	EHDB
60Hz	Voltage code: ☐ ☐	Voltage code: ☐
24	81	F
120	84	1
208	34	B
240	80	2
480	51	4
600	55	6
DC	24	Y
	125	Q
	250	S

(1) Contactors are supplied standard less lugs

DC Magnet coils (price adder per contactor)

Contactor Size	List Price
DAE75	
EHDB220 - EHDB280	
EHDB360	
EHDB520	
EHDB650 - EHDB960	

Technical Data for Drive Contactors

Type DA, EHDB

CONTACTOR MODEL NUMBER Similar A, EH Contactor Frame Size	DA75 A75	EHDB220 EH175	EHDB280 EH210	EHDB360 EH260	EHDB520 EH450	EHDB650 EH550	EHDB800 EH700	EHDB960 EH800
N.O. Poles, Amps @ 500VDC	60	220	280	360	520	650	800	960
240 VDC, HP	15	60	75	100	150	150	—	—
500 VDC, HP	30	125	150	200	300	400	500	600
600 VDC, HP	—	150	200	250	300	400	600	700
Max. Temperature of N.O. Pole Terminal	100°C	100°C	100°C	100°C	100°C	100°C	100°C	100°C
N.C. Pole, 600V MAKE, Max. Amps	90	330	420	525	780	975	1200	1440
N.C. Pole, 300V BREAK, Max. Amps	55	165	210	263	390	488	600	720
Max. Temperature of N.O. Pole Terminal	100°C	100°C	100°C	100°C	100°C	100°C	100°C	100°C
Connectable wire size								
Main Poles with Lugs	8 - 1	8 - 3/0	6 - 250 MCM	4 - 500 MCM	(2) 4 - 500 MCM	(2) 4 - 500 MCM	(3) 2 - 600 MCM	(3) 2 - 600MCM
Auxiliary Contacts, min./max.	18 - 10	16 - 10	16 - 10	16 - 10	16 - 10	16 - 10	16 - 10	16 - 10
DC Rating Information								
Peak Interrupting Current, N.O. Poles		850	850	850	3200	3200	3200	3200
Max. Thermal Current, N.O. Poles	60	220	280	360	520	650	800	960
Auxiliary Contacts								
NEMA Rating	A600	A600	A600	A600	A600	A600	A600	A600
A.C. rated voltage, V	600	600	600	600	600	600	600	600
A.C. thermal rated current, A	10	10	10	10	10	10	10	10
A.C. maximum making, VA	7200	7200	7200	7200	7200	7200	7200	7200
A.C. maximum breaking, VA	720	720	720	720	720	720	720	720
NEMA Rating	P600	P600	P600	P600	P600	P600	P600	P600
D.C. rated voltage, V	600	600	600	600	600	600	600	600
D.C. thermal rated current, A	5	5	5	5	5	5	5	5
D.C. maximum make-break, A	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Min. breakdown A.C. RMS voltage between live parts and ground	2200	2200	2200	2200	2200	2200	2200	2200
Minimum permissible load, 17V, A	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Min. expected mechanical life (mil.)	10	10	10	10	10	10	10	10
Min. expected electrical life (mil.)	2	2	2	2	2	2	2	2
Max. Wire Size on Terminals @ 2/Term.	10 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG
Max. Operations per hour	600	600	600	600	600	600	600	600
A.C. power consumption								
Inrush 60 Hz, VA	210	900	900	1200	2900	2900	4000	4000
Holding 60 Hz, VA	18	25	55	70	105	105	140	140
Holding 60 Hz, W	5.5	10	11	22	44	44	60	60
D.C. power consumption								
Inrush, W	—	450	450	630	800	800	1100	1100
Holding, W	—	22	18	20	20	20	20	20
A.C. operating time, ms (milliseconds)								
Closing ms	8 - 27	20 - 30	20 - 30	20 - 30	30 - 50	30 - 50	30 - 50	30 - 50
Opening ms	4 - 11	7 - 15	7 - 15	7 - 15	10 - 20	10 - 20	10 - 20	10 - 20
D.C. Operating time, ms (milliseconds)								
Closing ms	—	30 - 40	30 - 40	30 - 40	60 - 80	60 - 80	60 - 80	60 - 80
Opening ms	—	17 - 27	27 - 37	27 - 37	10 - 20	55 - 75	55 - 75	55 - 75
General Data								
Approximate Weight, lbs	2.4	9.2	9.2	13	27.3	27.3	37	38
Temperature Limits								
Maximum operating temperature	50°C	70°C	70°C	70°C	70°C	70°C	70°C	70°C
Minimum operating temperature	-25°C	-40°C	-40°C	-40°C	-40°C	-40°C	-40°C	-40°C
Minimum storage temperature	-40°C	-50°C	-50°C	-50°C	-50°C	-50°C	-50°C	-50°C
Minimum Breakdown AC RMS Voltage	2200	2200	2200	2200	2200	2200	2200	2200
Operating Altitude; Max Feet	10 000	10 000	10 000	10 000	10 000	10 000	10 000	10 000
Contactor Life								
Mechanical endurance (mil.), @ no load	5	5	5	5	5	5	5	5
Electrical endurance (mil.)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Frequency of operations (per hour)	600	600	600	600	600	600	600	600



NF 4-pole and 8-pole contactor relays

Ordering details 4-pole contactor relays

NF	AC / DC operated	4/2
NFZ	AC / DC operated - low consumption	4/3
Main accessories		4/4

Ordering details 8-pole contactor relays

NF	AC / DC operated	4/6
NFZ	AC / DC operated - low consumption	4/7
Main accessories		4/8

Technical data	4/10
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Terminal marking and positioning	4/14
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Main dimensions	4/16
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NF 4-pole contactor relays

AC / DC operated



NF22E

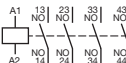
Description

NF contactor relays are used for switching auxiliary and control circuits.

These contactor relays are of the block type design with:

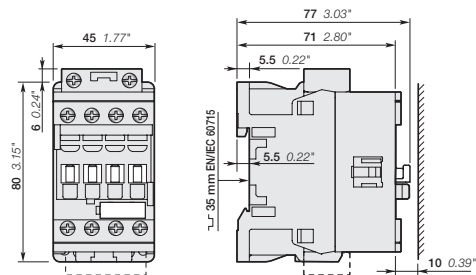
- 4 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
 - can manage large control voltage variations
 - only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
 - reduced panel energy consumption
 - very distinct closing and opening.
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

Number of contacts	Rated control circuit voltage Uc min. ... Uc max.		Order code	Weight Pkg (1 pce)
	V 50/60 Hz	V DC		kg
	24...60	20...60 (1)	NF22E-11	0.27
	48...130	48...130	NF22E-12	0.27
	100...250	100...250	NF22E-13	0.27
	250...500	250...500	NF22E-14	0.31
	24...60	20...60 (1)	NF31E-11	0.27
	48...130	48...130	NF31E-12	0.27
	100...250	100...250	NF31E-13	0.27
	250...500	250...500	NF31E-14	0.31
	24...60	20...60 (1)	NF40E-11	0.27
	48...130	48...130	NF40E-12	0.27
	100...250	100...250	NF40E-13	0.27
	250...500	250...500	NF40E-14	0.31

(1) NF..E-11 not suitable for direct control by PLC-output.

Main dimensions mm, inches



NF22E, NF31E, NF40E

NFZ 4-pole contactor relays

AC / DC operated - low consumption



NFZ22E

Description

NFZ contactor relays are used for switching auxiliary and control circuits.

These contactor relays are of the block type design with:

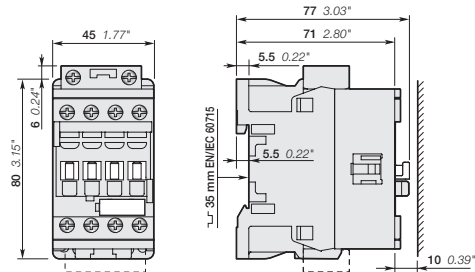
- 4 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
 - can manage large control voltage variations
 - only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
 - allow direct control by PLC-output ≥ 24 V DC 500 mA
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

Number of contacts	Rated control circuit voltage Uc min. ... Uc max.		Order code	Weight Pkg (1 pce) kg
	V 50/60 Hz	V DC		
	–	12...20	NFZ22E-20	0.31
	24...60	20...60	NFZ22E-21	0.31
	48...130	48...130	NFZ22E-22	0.31
	100...250	100...250	NFZ22E-23	0.31
	–	12...20	NFZ31E-20	0.31
	24...60	20...60	NFZ31E-21	0.31
	48...130	48...130	NFZ31E-22	0.31
	100...250	100...250	NFZ31E-23	0.31
	–	12...20	NFZ40E-20	0.31
	24...60	20...60	NFZ40E-21	0.31
	48...130	48...130	NFZ40E-22	0.31
	100...250	100...250	NFZ40E-23	0.31

Note: Only NFZ contactor relays with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.

Main dimensions mm, inches

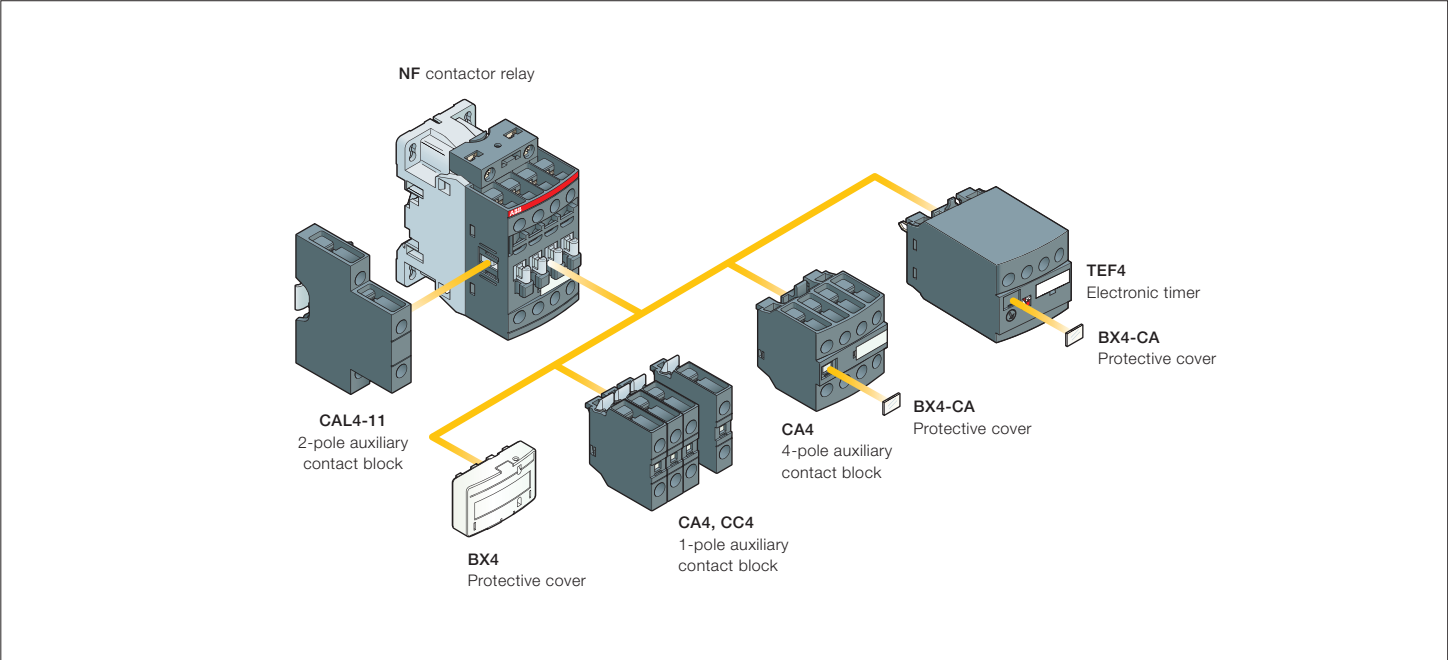


NFZ22E, NFZ31E, NFZ40E

NF 4-pole contactor relays

Main accessories

Contactor relays and main accessories (other accessories available)



Main accessory fitting details

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

Contactor relay types	Main poles	Front-mounted accessories			Side-mounted accessories		
		Auxiliary contact blocks		Electronic timer	Auxiliary contact blocks		
		1-pole CA4			Left side	Right side	
		1-pole CC4	4-pole CA4	TEF4	2-pole CAL4-11		
Max. add-on N.C. auxiliary contacts: 3 N.C. max. on positions 1, 2, 3, 4 and 2 N.C. max. on positions 1 ±30°, 5							
NF	2 2 E	4 max.	or 1	or 1	+	1	-
	3 1 E	2 max.	-	or 1	+	1	+ 1
Max. add-on N.C. auxiliary contacts: 4 N.C. max. on positions 1, 2, 3, 4 and 3 N.C. max. on positions 1 ±30°, 5							
NF	4 0 E	4 max.	or 1	or 1	+	1	-
		2 max.	-	or 1	+	1	+ 1

NF 4-pole contactor relays

Main accessories



CA4-10



CA4-22N



CAL4-11



TEF4-ON



LDC4



BX4



BX4-CA

Ordering details (1)

For contactor relays	Auxiliary contacts	Order code	Pkg qty	Weight (1 pce)
	 			kg

Front-mounted instantaneous auxiliary contact blocks

4-pole NF	1 0	- -	CA4-10	1	0.02
	0 1	- -	CA4-01	1	0.02
	4 0	- -	CA4-40N	1	0.06
	3 1	- -	CA4-31N	1	0.06
	2 2	- -	CA4-22N	1	0.06
	1 3	- -	CA4-13N	1	0.06
NF..40E	0 4	- -	CA4-04N	1	0.06

Front-mounted auxiliary contact blocks with N.O. leading contact and N.C. lagging contact

4-pole NF	- -	1 0	CC4-10	1	0.02
	- -	0 1	CC4-01	1	0.02

Side-mounted instantaneous auxiliary contact blocks

NF	1 1	- -	CAL4-11	1	0.04
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For contactors	Time delay range selected by switch	Delay type	Auxiliary contacts	Order code	Pkg qty	Weight (1 pce)
						kg

Electronic timers

NF	0.1...1 s	ON-delay	1 1	TEF4-ON	1	0.07
	1...10 s					
	10...100 s	OFF-delay	1 1	TEF4-OFF	1	0.07

Note: Rated control circuit voltage Uc 24...240 V 50/60 Hz or DC.

Additional coil terminal block

NF	LDC4	10	0.01
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Protective covers

All 1-stack contactor relays	BX4	10	0.01
4-pole CA4 auxiliary contact blocks and TEF4 electronic timer	BX4-CA	50	0.01

(1) For more information, refer to "Accessories" section.

NF 8-pole contactor relays

AC / DC operated



NF44E

Description

NF contactor relays are used for switching auxiliary and control circuits.

These contactor relays are of the block type design with:

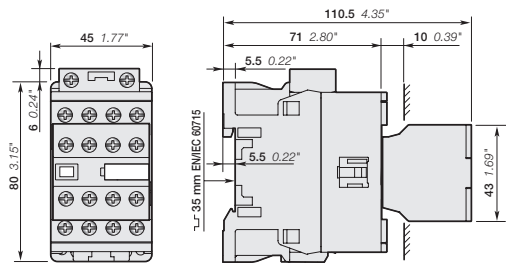
- 8 poles with a permanently fixed 4-pole auxiliary contact block. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
 - can manage large control voltage variations
 - only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
 - reduced panel energy consumption
 - very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

Number of contacts		Rated control circuit voltage		Order code	Weight
1st stack	2nd stack	Uc min. ... Uc max.			
		V 50/60 Hz	V DC		kg
		24...60	20...60	(1) NF44E-11	0.32
		48...130	48...130	NF44E-12	0.32
		100...250	100...250	NF44E-13	0.32
		250...500	250...500	NF44E-14	0.36
		24...60	20...60	(1) NF53E-11	0.32
		48...130	48...130	NF53E-12	0.32
		100...250	100...250	NF53E-13	0.32
		250...500	250...500	NF53E-14	0.36
		24...60	20...60	(1) NF62E-11	0.32
		48...130	48...130	NF62E-12	0.32
		100...250	100...250	NF62E-13	0.32
		250...500	250...500	NF62E-14	0.36
		24...60	20...60	(1) NF71E-11	0.32
		48...130	48...130	NF71E-12	0.32
		100...250	100...250	NF71E-13	0.32
		250...500	250...500	NF71E-14	0.36
		24...60	20...60	(1) NF80E-11	0.32
		48...130	48...130	NF80E-12	0.32
		100...250	100...250	NF80E-13	0.32
		250...500	250...500	NF80E-14	0.36

(1) NF..E-11 not suitable for direct control by PLC-output.

Main dimensions mm, inches



NF44E, NF53E, NF62E, NF71E, NF80E

NFZ 8-pole contactor relays

AC / DC operated – Low consumption



NFZ44E

Description

NFZ contactor relays are used for switching auxiliary and control circuits.

These contactor relays are of the block type design with:

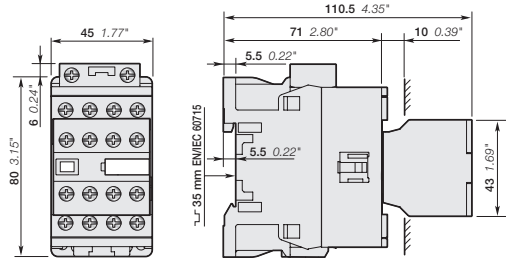
- 8 poles with a permanently fixed 4-pole auxiliary contact block. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
 - can manage large control voltage variations
 - only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
 - allow direct control by PLC-output ≥ 24 VDC 500 mA
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

Number of contacts		Rated control circuit voltage		Order code	Weight
1st stack	2nd stack	Uc min. ... Uc max.			Pkg (1 pce)
		V 50/60 Hz	V DC		kg
	–	12...20	NFZ44E-20	0.36	
	24...60	20...60	NFZ44E-21	0.36	
	48...130	48...130	NFZ44E-22	0.36	
	100...250	100...250	NFZ44E-23	0.36	
	–	12...20	NFZ53E-20	0.36	
	24...60	20...60	NFZ53E-21	0.36	
	48...130	48...130	NFZ53E-22	0.36	
	100...250	100...250	NFZ53E-23	0.36	
	–	12...20	NFZ62E-20	0.36	
	24...60	20...60	NFZ62E-21	0.36	
	48...130	48...130	NFZ62E-22	0.36	
	100...250	100...250	NFZ62E-23	0.36	
	–	12...20	NFZ71E-20	0.36	
	24...60	20...60	NFZ71E-21	0.36	
	48...130	48...130	NFZ71E-22	0.36	
	100...250	100...250	NFZ71E-23	0.36	
	–	12...20	NFZ80E-20	0.36	
	24...60	20...60	NFZ80E-21	0.36	
	48...130	48...130	NFZ80E-22	0.36	
	100...250	100...250	NFZ80E-23	0.36	

Note: Only NFZ contactor relays with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.

Main dimensions mm, inches

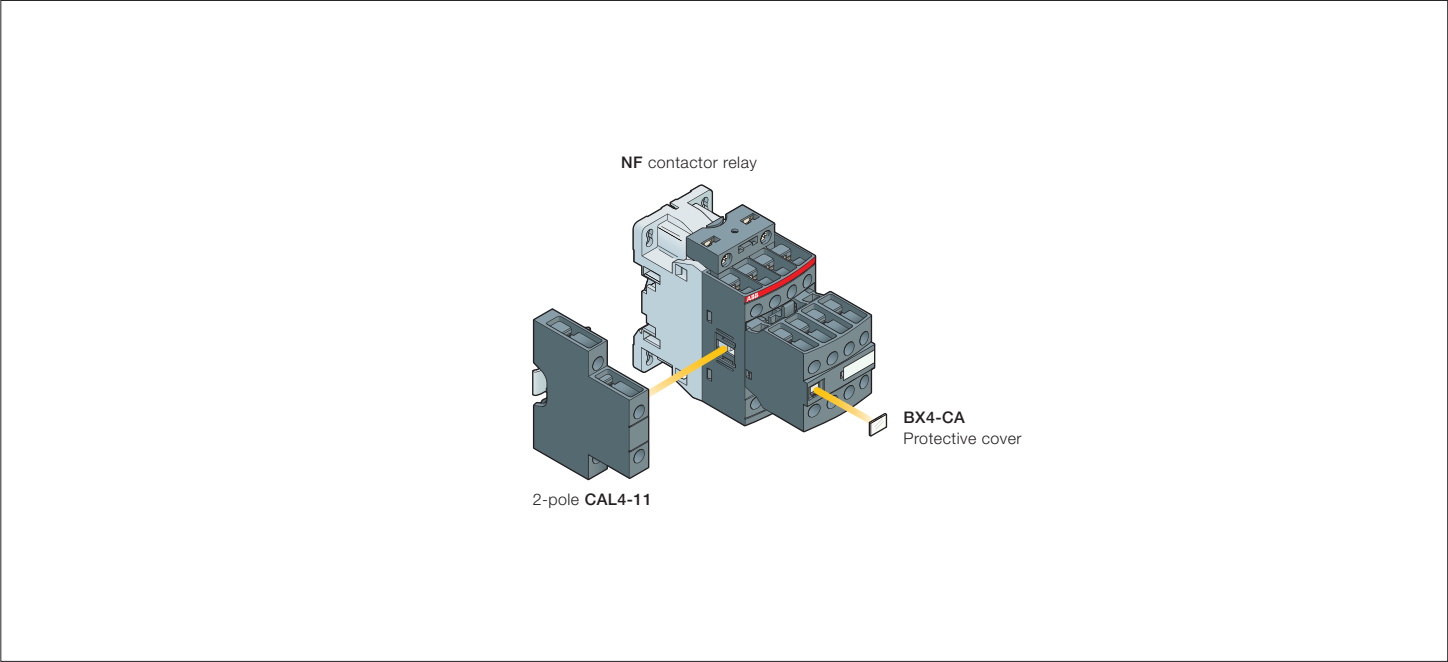


NFZ44E, NFZ53E, NFZ62E, NFZ71E, NFZ80E

NF 8-pole contactor relays

Main accessories

Contactor relays and main accessories (other accessories available)



Main accessory fitting details

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

Contactor relay types	Main poles			Front-mounted accessories			Side-mounted accessories		
				Auxiliary contact blocks			Auxiliary contact blocks		
				1-pole CA4			Left side		Right side
				1-pole CC4		4-pole CA4	2-pole CAL4-11		
NF	4	4	E	–		–	+	1	–
	5	3	E						
	6	2	E						
	7	1	E						
	8	0	E						

NF 8-pole contactor relays

Main accessories



CAL4-11



LDC4



BX4-CA

Ordering details (1)

For contactor relays	Auxiliary contacts	Order code	Pkg qty	Weight (1 pce)
	 			kg

Side-mounted instantaneous auxiliary contact blocks

NF	1 1	- -	CAL4-11	1	0.04
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Additional coil terminal block

NF			LDC4	10	0.01
----	--	--	------	----	------

Protective covers

NF			BX4-CA	50	0.01
----	--	--	--------	----	------

(1) For more information, refer to "Accessories" section.

NF contactor relays

Technical data

Contact utilization characteristics according to UL / CSA

Contactor relay types	AC / DC operated	NF
Standards		UL 508, CSA C22.2 N°14
Max. operational voltage		600 V AC, 600 V DC
Pilot duty		A600, Q600
AC thermal rated current		10 A
AC maximum volt-ampere making		7200 VA
AC maximum volt-ampere breaking		720 VA
DC thermal rated current		2.5 A
DC maximum volt-ampere making-breaking		69 VA

Contact utilization characteristics according to IEC

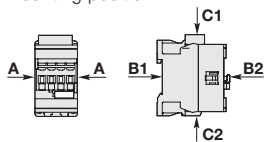
Contactor relay types	AC / DC operated	NF
Standards		IEC 60947-1 / 60947-5-1 and EN 60947-1 / 60947-5-1
Rated operational voltage U _e max.		690 V
Rated frequency (without derating)		50 / 60 Hz
Conventional free-air thermal current I _{th} θ ≤ 40 °C		16 A
I _e / Rated operational current AC-15		
acc. to IEC 60947-5-1	24-127 V 50/60 Hz	6 A
	220-240 V 50/60 Hz	4 A
	400-440 V 50/60 Hz	3 A
	500 V 50/60 Hz	2 A
	690 V 50/60 Hz	2 A
Rated making capacity AC-15		10 x I _e AC-15 acc. to IEC 60947-5-1
Rated breaking capacity AC-15		10 x I _e AC-15 acc. to IEC 60947-5-1
I _e / Rated operational current DC-13		
acc. to IEC 60947-5-1	24 V DC	6 A / 144 W
	48 V DC	2.8 A / 134 W
	72 V DC	1 A / 72 W
	110 V DC	0.55 A / 60 W
	125 V DC	0.55 A / 69 W
	220 V DC	0.27 A / 60 W
	250 V DC	0.27 A / 68 W
	400 V DC	0.15 A / 60 W
	500 V DC	0.13 A / 65 W
	600 V DC	0.1 A / 60 W
Short-circuit protection device gG type fuse		10 A
Rated short-time withstand current I _{cw}	for 1.0 s	100 A
	for 0.1 s	140 A
Minimum switching capacity		12 V / 3 mA
with failure rate acc. to IEC 60947-5-4		10 ⁻⁷
Non-overlapping time between N.O. and N.C. contacts		≥ 2 ms
Power dissipation per pole at 6 A		0.1 W
Max. electrical switching frequency	AC-15	1200 cycles/h
	DC-13	900 cycles/h
Mechanically linked contacts		Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA4, CAL4 aux. contact blocks) are mechanically linked contacts.
acc. to annex L of IEC 60947-5-1		

NF contactor relays

Technical data

General technical data

Contactor relay types	AC / DC operated	NF
Rated insulation voltage U_i		
acc. to IEC 60947-5-1		690 V
acc. to UL / CSA		600 V
Rated impulse withstand voltage U_{imp}		6 kV
Electromagnetic compatibility		Devices complying with IEC 60947-1 / EN 60947-1 - Environment A
Ambient air temperature close to contactor relay		
Operation in free air		-40...+70 °C
Storage		-60...+80 °C
Climatic withstand		Category B according to IEC 60947-1 Annex Q
Maximum operating altitude (without derating)		3000 m
Mechanical durability		
Number of operating cycles		20 millions operating cycles
Max. switching frequency		6000 cycles/h
Shock withstand		
acc. to IEC 60068-2-27 and EN 60068-2-27		
Mounting position 1		
	Shock direction	1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position
	A	30 g
	B1	25 g closed position / 5 g open position
	B2	15 g
	C1	25 g
	C2	25 g
Vibration withstand		
acc. to IEC 60068-2-6		5...300 Hz
		4 g closed position / 2 g open position



Magnet system characteristics

Contactor relay types	AC / DC operated	NF
Coil operating limits	AC supply	At $\theta \leq 60$ °C $0.85 \times U_c \text{ min...} 1.1 \times U_c \text{ max.}$
acc. to IEC 60947-5-1		At $\theta \leq 70$ °C $0.85 \times U_c \text{ min...} U_c \text{ max.}$
	DC supply	At $\theta \leq 60$ °C $0.85 \times U_c \text{ min...} 1.1 \times U_c \text{ max.}$
		At $\theta \leq 70$ °C (AF) $0.85 \times U_c \text{ min...} U_c \text{ max.}$ - (NFZ) $0.85 \times U_c \text{ min...} 1.1 \times U_c \text{ max.}$
AC control voltage 50/60 Hz		
Rated control circuit voltage U_c		24...500 V AC
Coil consumption	Average pull-in value	(NF) 50 VA - (NFZ) 16 VA
	Average holding value	(NF) 2.2 VA / 2 W - (NFZ) 1.7 VA / 1.5 W
DC control voltage		
Rated control circuit voltage U_c		12...500 V DC
Coil consumption	Average pull-in value	(NF) 50 W - (NFZ) 12...16 W
	Average holding value	(NF) 2 W - (NFZ) 1.7 W
PLC-output control		(NFZ) $\geq 500 \text{ mA}$ 24 V DC
Drop-out voltage		≤ 60 % of $U_c \text{ min.}$
Voltage sag immunity		
acc. to SEMI F47-0706		(NFZ) conditions of use on request
Dips withstand		
-20 °C $\leq \theta \leq +60$ °C		(NFZ) 22 ms average for $U_c \geq 24 \text{ V}$ 50/60 Hz or $U_c \geq 20 \text{ V}$ DC
Operating time		
Between coil energization and:	N.O. contact closing	40...95 ms
	N.C. contact opening	38...90 ms
Between coil de-energization and:	N.O. contact opening	11...95 ms
	N.C. contact closing	13...98 ms

Mounting characteristics

Contactor relay types	AC / DC operated	NF
Mounting positions		
		Max. add-on N.C. auxiliary contacts: see accessory fitting details for a NF contactor relay
Mounting distances		The contactor relays can be assembled side by side.
Fixing		
On rail according to IEC 60715, EN 60715		35 x 7.5 mm or 35 x 15 mm
By screws (not supplied)		2 x M4 screws placed diagonally

NF contactor relays

Technical data

Connecting characteristics

Contactor relay types	AC / DC operated	NF
Main terminals		 Screw terminals with cable clamp
Connection capacity (min. ... max.)		
Pole and coil terminals		
 Rigid	1 x	1...2.5 mm²
 Rigid	2 x	1...2.5 mm²
 Flexible with non insulated ferrule	1 x	0.75...2.5 mm²
 Flexible with non insulated ferrule	2 x	0.75...2.5 mm²
 Flexible with insulated ferrule	1 x	0.75...2.5 mm²
 Flexible with insulated ferrule	2 x	0.75...1.5 mm²
 Lugs	L <	8 mm
Connection capacity acc. to UL/CSA	1 or 2 x	AWG 18...14
Stripping length		10 mm
Tightening torque		
Pole terminals		1.2 Nm / 11 lb.in
Coil terminals		1.2 Nm / 11 lb.in
Degree of protection		
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		
All terminals		IP20
Screw terminals		Delivered in open position, screws of unused terminals must be tightened
All terminals		M3.5
	Screwdriver type	Flat Ø 5.5 / Pozidriv 2

Auxiliary contacts for safety circuits

Definitions from Standards

Mechanically linked contact elements , IEC 60947-5-1, Annex L 3.0 (known as "forced contacts", "positively activated contacts" or "linked contacts").

Combination of "n" Make contact element(s) and "m" Break contact element(s) designed in such a way that they cannot be in closed position simultaneously.

One control circuit device may have more than one group of mechanically linked contact elements.

Mirror contact. (Project of amendment of IEC 60947-4-1, Annex F 2.1)

Normally closed auxiliary contact (N.C.) which cannot be in closed position simultaneously with the normally open (N.O.) main contact.

Mechanically Linked Contacts Elements for Control Relays

The tables below are giving the recommended association between contactor relays offering mechanically linked auxiliary contacts according to IEC 60947-5-1, Annex L (2000).

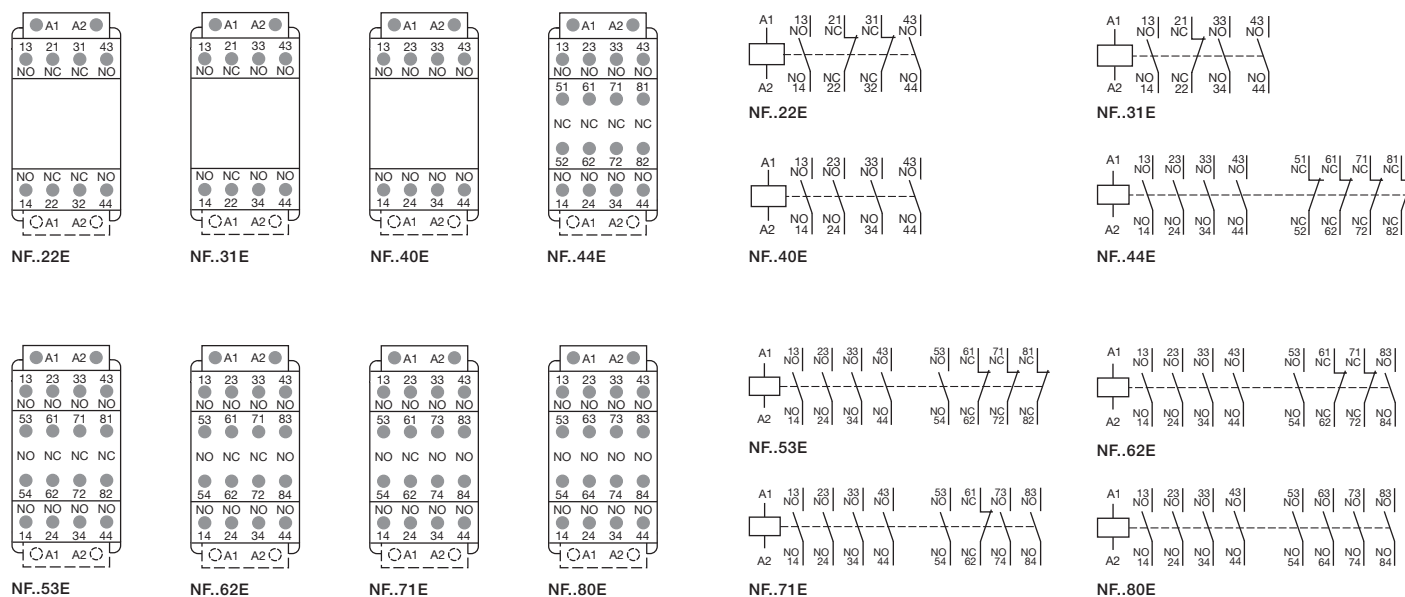
4-pole and 8-pole NF... control relays

Type	Built-in Auxiliary Contacts 	
	2	3
NF 22 E	2	2
NF 31 E	3	1
NF 44 E	4	4
NF 53 E	5	3
NF 62 E	6	2
NF 71 E	7	1

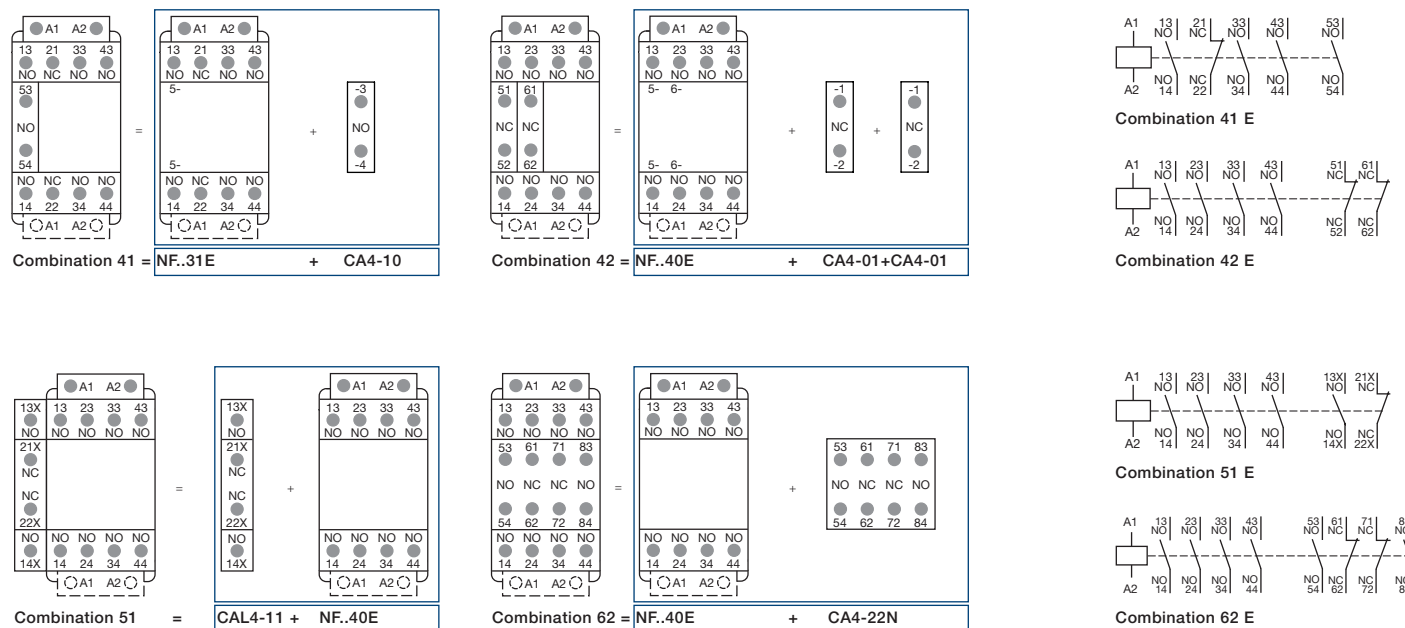
NF contactor relays

Terminal marking and positioning

Standard devices without addition of auxiliary contacts



Other possible contact combinations with auxiliary contacts added by the user

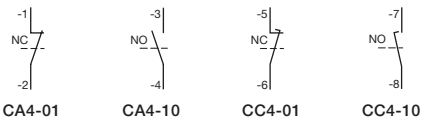


Note: Only NFZ contactor relays with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole

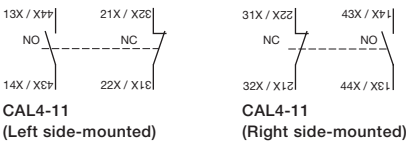
NF add-on auxiliary contacts

Terminal marking and positioning

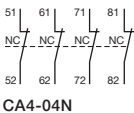
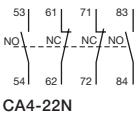
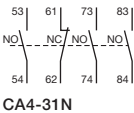
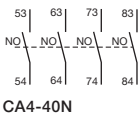
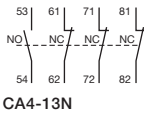
1-pole auxiliary contacts



2-pole auxiliary contacts



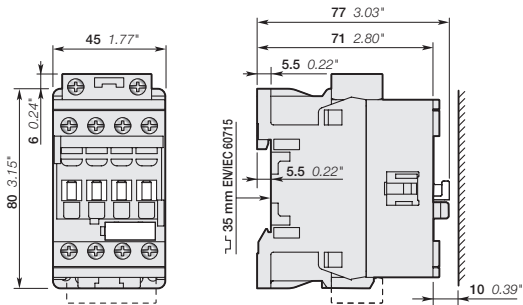
4-pole auxiliary contacts



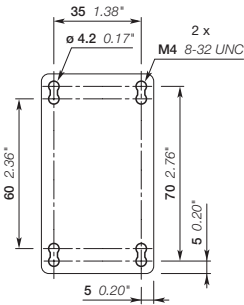
NF contactor relays

Main dimensions mm, inches

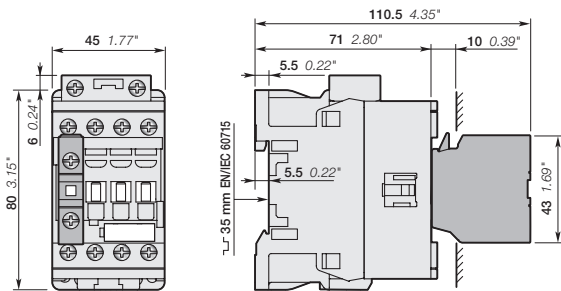
4



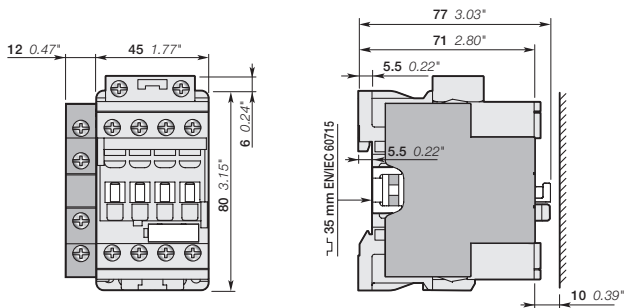
NF.22E, NF.31E, NF.40E



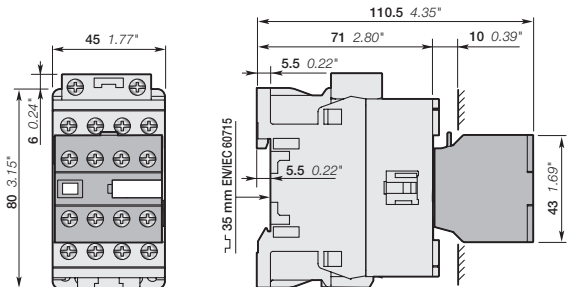
NF



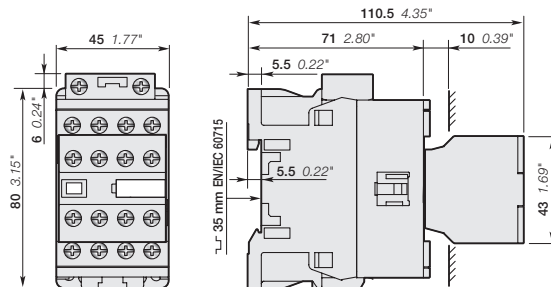
NF.22E, NF.31E, NF.40E
+ CA4, CC4 1-pole auxiliary contact block



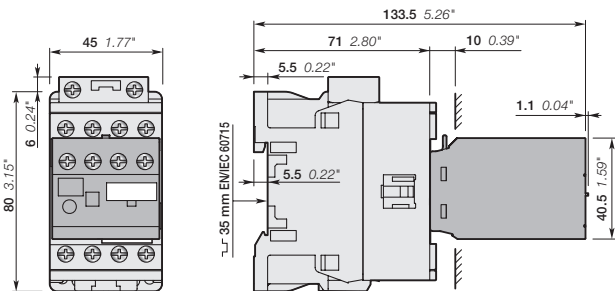
NF.22E, NF.31E, NF.40E
+ CAL4-11 2-pole auxiliary contact block



NF.22E, NF.31E, NF.40E
+ CA4 4-pole auxiliary contact block



NF.44E, NF.53E, NF.62E, NF.71E, NF.80E



NF.22E, NF.31E, NF.40E
+ TEF4 electronic timer

Note: Contactor relay lateral distance to grounded component 2 mm (0.08 inches) min.

Accessories for AF09 ... AF2650 3-pole contactors, AF09 ... AF370 4-pole contactors and NF contactor relays

Auxiliary contact blocks	5/2
Electronic timers	5/15
Interlocks	5/18
Impulse contact blocks	5/20
Mechanical latching units	5/22
Other accessories	5/24
Terminal shrouds	5/26
Connections	5/28
Terminal connecting strips and shorting bars	5/29
Connection accessories for starting solutions	5/30
Connection sets for star-delta starter	5/31
Connection bars	5/32
Mounting plates	5/33
Adapter plates	5/34
Contactor coils, main contact sets and arc chutes	5/35

Auxiliary contact blocks for AF09 ... AF96 contactors and NF contactor relays



CA4-10



CAL4-11



CA4-22E



CAT4-11E

Description

The auxiliary contact blocks are used for the operation of auxiliary circuits and control circuits for standard industrial environments.

Types of auxiliary contact blocks for front mounting:

- CA4 1 or 4-pole block, with instantaneous N.O., N.C. contacts
- CC4 1-pole block, with N.O. leading contact or N.C. lagging contact
- CAT4 2-pole block, with instantaneous N.O. + N.C. contacts and A1 / A2 coil terminal connection on front face.

Select the 4-pole auxiliary contact blocks CA4-..E, CA4-..M, CA4-..U or CA4-..N type, according to the contactor or contactor relay type for compliance with the standard requirements (see "Terminal marking and positioning").

Types of auxiliary contact blocks for side mounting:

- CAL4 2-pole block, with instantaneous N.O. + N.C. contacts.

For clipping onto the right- and/or left-hand side of the contactors.

The auxiliary contact blocks are equipped with screw type connecting terminals delivered open, protected against accidental direct contact and bear the corresponding function marking.

Ordering details (1)

For contactors	Auxiliary contacts	Order code	Pkg qty	Weight (1 pce)
	   			kg

Front-mounted instantaneous auxiliary contact blocks

AF09 ... AF96	1	0	-	-	CA4-10	1	0.02
4-pole NF	0	1	-	-	CA4-01	1	0.02
AF09 ... AF16...-30-10	2	2	-	-	CA4-22M	1	0.06
	3	1	-	-	CA4-31M	1	0.06
	1	3	-	-	CA4-13M	1	0.06
	0	4	-	-	CA4-04M	1	0.06
	2	2	-	-	CA4-22E	1	0.06
AF26 ... AF96...-30-00	3	1	-	-	CA4-31E	1	0.06
AF09 ... AF38...-40-00	4	0	-	-	CA4-40E	1	0.06
AF09 ... AF38...-22-00	0	4	-	-	CA4-04E	1	0.06
AF26 ... AF96...-30-00	2	2	-	-	CA4-22U	1	0.06
AF09 ... AF16...-40-00	3	1	-	-	CA4-31U	1	0.06
AF09 ... AF16...-30-01	4	0	-	-	CA4-40U	1	0.06
4-pole NF	2	2	-	-	CA4-22N	1	0.06
	3	1	-	-	CA4-31N	1	0.06
	4	0	-	-	CA4-40N	1	0.06
	1	3	-	-	CA4-13N	1	0.06
NF..40E	0	4	-	-	CA4-04N	1	0.06

Front-mounted auxiliary contact blocks with N.O. leading contact and N.C. lagging contact

AF09 ... AF96	-	-	1	0	CC4-10	1	0.02
4-pole NF	-	-	0	1	CC4-01	1	0.02

Side-mounted instantaneous auxiliary contact blocks

AF09 ... AF96, NF	1	1	-	-	CAL4-11	1	0.04
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Front-mounted instantaneous auxiliary contact and A1/A2 coil terminal blocks

AF09 ... AF16...-30-10	1	1	-	-	CAT4-11M	1	0.04
AF26 ... AF65...-30-00	1	1	-	-	CAT4-11E	1	0.04
AF09 ... AF38...-40-00							
AF09 ... AF38...-22-00							
AF09 ... AF16...-30-01	1	1	-	-	CAT4-11U	1	0.04

(1) For each contactor or contactor relay type, refer to "Accessory fitting details" table.
Note: CAT4 not suitable for AF..Z contactors with DC control voltage 12...20 V DC.

Auxiliary contact blocks for AF09 ... AF96 contactors and NF contactor relays

Technical data

Contact utilization characteristics according to UL / CSA

Types	1-pole CA4 , 1-pole CC4 , 4-pole CA4 , 2-pole CAT4 , 2-pole CAL4
Standards	UL 508, CSA C22.2 N°14
Max. operational voltage	600 V AC, 600 V DC
Pilot duty	A600, Q600
AC thermal rated current	10 A
AC maximum volt-ampere making	7200 VA
AC maximum volt-ampere breaking	720 VA
DC thermal rated current	2.5 A
DC maximum volt-ampere making-breaking	69 VA

Contact utilization characteristics according to IEC

Types	1-pole CA4 , 1-pole CC4 , 4-pole CA4 , 2-pole CAT4 , 2-pole CAL4																				
Standards	IEC 60947-5-1 and EN 60947-5-1																				
Rated insulation voltage U_i acc. to IEC 60947-5-1	690 V																				
Rated impulse withstand voltage U_{imp}	6 kV																				
Rated operational voltage U_e max.	24...690 V																				
Conventional thermal current I_{th} - $\theta \leq 40^\circ\text{C}$	16 A																				
Rated frequency (without derating)	50/60 Hz																				
I_e / Rated operational current AC-15 acc. to IEC 60947-5-1	<table> <tr><td>24-127 V 50/60 Hz</td><td>6 A</td></tr> <tr><td>220-240 V 50/60 Hz</td><td>4 A</td></tr> <tr><td>400-440 V 50/60 Hz</td><td>3 A</td></tr> <tr><td>500 V 50/60 Hz</td><td>2 A</td></tr> <tr><td>690 V 50/60 Hz</td><td>2 A</td></tr> </table>	24-127 V 50/60 Hz	6 A	220-240 V 50/60 Hz	4 A	400-440 V 50/60 Hz	3 A	500 V 50/60 Hz	2 A	690 V 50/60 Hz	2 A										
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690 V 50/60 Hz	2 A																				
Making capacity acc. to IEC 60947-5-1	10 x I_e AC-15																				
Breaking capacity acc. to IEC 60947-5-1	10 x I_e AC-15																				
I_e / Rated operational current DC-13 acc. to IEC 60947-5-1	<table> <tr><td>24 V DC</td><td>6 A / 144 W</td></tr> <tr><td>48 V DC</td><td>2.8 A / 134 W</td></tr> <tr><td>72 V DC</td><td>1 A / 72 W</td></tr> <tr><td>110 V DC</td><td>0.55 A / 60 W</td></tr> <tr><td>125 V DC</td><td>0.55 A / 69 W</td></tr> <tr><td>220 V DC</td><td>0.27 A / 60 W</td></tr> <tr><td>250 V DC</td><td>0.27 A / 68 W</td></tr> <tr><td>400 V DC</td><td>0.15 A / 60 W</td></tr> <tr><td>500 V DC</td><td>0.13 A / 65 W</td></tr> <tr><td>600 V DC</td><td>0.1 A / 60 W</td></tr> </table>	24 V DC	6 A / 144 W	48 V DC	2.8 A / 134 W	72 V DC	1 A / 72 W	110 V DC	0.55 A / 60 W	125 V DC	0.55 A / 69 W	220 V DC	0.27 A / 60 W	250 V DC	0.27 A / 68 W	400 V DC	0.15 A / 60 W	500 V DC	0.13 A / 65 W	600 V DC	0.1 A / 60 W
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500 V DC	0.13 A / 65 W																				
600 V DC	0.1 A / 60 W																				
Short-circuit protection device gG type fuse	10 A																				
Rated short-time withstand current I_{cw} $\theta = 40^\circ\text{C}$	<table> <tr><td>for 1.0 s</td><td>100 A</td></tr> <tr><td>for 0.1 s</td><td>140 A</td></tr> </table>	for 1.0 s	100 A	for 0.1 s	140 A																
for 1.0 s	100 A																				
for 0.1 s	140 A																				
Minimum switching capacity with failure rate acc. to IEC 60947-5-4	12 V / 3 mA 10^{-7}																				
Power dissipation per pole at 6 A	0.1 W																				
Mechanical durability	10 millions operating cycles																				
Max. switching frequency	3600 cycles/h																				
Max. electrical switching frequency	<table> <tr><td>AC-15</td><td>1200 cycles/h</td></tr> <tr><td>DC-13</td><td>900 cycles/h</td></tr> </table>	AC-15	1200 cycles/h	DC-13	900 cycles/h																
AC-15	1200 cycles/h																				
DC-13	900 cycles/h																				
Mechanically linked contacts acc. to annex L of IEC 60947-5-1	Additional N.O. or N.C. auxiliary contacts (CA4, CAL4, CAT4) are mechanically linked contacts																				
Mirror contacts acc. to annex F of IEC 60947-4-1	Additional N.C. auxiliary contacts (CA4, CAL4, CAT4) are mirror contacts																				

Connecting characteristics

Types	1-pole CA4 , 1-pole CC4 , 4-pole CA4 , 2-pole CAT4 , 2-pole CAL4				
Connection capacity (min. ... max.)					
 Rigid solid	<table> <tr><td>1 x</td><td>1...2.5 mm²</td></tr> <tr><td>2 x</td><td>1...2.5 mm²</td></tr> </table>	1 x	1...2.5 mm²	2 x	1...2.5 mm²
1 x	1...2.5 mm²				
2 x	1...2.5 mm²				
 Flexible with non insulated ferrule	<table> <tr><td>1 x</td><td>0.75...2.5 mm²</td></tr> <tr><td>2 x</td><td>0.75...2.5 mm²</td></tr> </table>	1 x	0.75...2.5 mm²	2 x	0.75...2.5 mm²
1 x	0.75...2.5 mm²				
2 x	0.75...2.5 mm²				
 Flexible with insulated ferrule	<table> <tr><td>1 x</td><td>0.75...2.5 mm²</td></tr> <tr><td>2 x</td><td>0.75...1.5 mm²</td></tr> </table>	1 x	0.75...2.5 mm²	2 x	0.75...1.5 mm²
1 x	0.75...2.5 mm²				
2 x	0.75...1.5 mm²				
 Lugs	L < 8 mm				
Connection capacity acc. to UL/CSA	1 or 2 x AWG 18...14				
Stripping length	10 mm				
Tightening torque	1.2 Nm / 11 lb.in				
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529	IP20				
Screw terminals	Delivered in open position, screws of unused terminals must be tightened				
All terminals	M3.5				
Screwdriver type	Flat Ø 5.5 / Pozidriv 2				

Auxiliary contact blocks for severe industrial environments for AF09 ... AF96 contactors and NF contactor relays



Description

The auxiliary contact blocks are used for the operation of auxiliary circuits and control circuits for severe industrial environments.

Types of auxiliary contact blocks for front mounting:

- CE5 1-pole block, instantaneous with N.O. contact or N.C. contact, available in 2 IP degrees
 - CE5 D with built-in microswitch IP40, degree of protection (IP20 on terminals)
 - CE5 W with built-in microswitch IP67, degree of protection (IP20 on terminals).

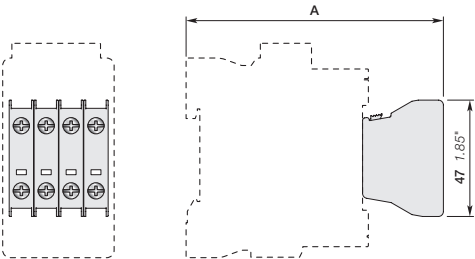
The auxiliary contact blocks are equipped with screw type connecting terminals delivered open, protected against accidental direct contact and bear the corresponding function marking.

Ordering details (1)

For contactors	Auxiliary contacts	Order code	Pkg qty	Weight (1 pce)
	 			kg
AF09 ... AF96	1 - - -	CE5-10D0.1	1	0.02
NF	- 1 - -	CE5-01D0.1	1	0.02
	1 - - -	CE5-10D2	1	0.02
	- 1 - -	CE5-01D2	1	0.02
	1 - - -	CE5-10W0.1	1	0.02
	- 1 - -	CE5-01W0.1	1	0.02
	1 - - -	CE5-10W2	1	0.02
	- 1 - -	CE5-01W2	1	0.02

(1) For each contactor type, refer to "Accessory fitting details" table.

Main dimensions mm, inches



1-pole CE5 on	A
AF09 ... AF16...-30-xx 1 stack	103.5 mm / 4.07"
AF09, AF16...-40/22-00	
NF..E 1-stack	
AF26 ... AF38...-30-00	112.5 mm / 4.43"
AF26, AF38...-40/22-00	127.5 mm / 5.02"
AF40 ... AF65-30-00	137 mm / 5.39"
AF40 ... AF65-40/22-00	140 mm / 5.51"
AF80 ... AF96-30-00	142 mm / 5.59"
AF80-40/22-00	142 mm / 5.59"

Auxiliary contact blocks for severe industrial environments

Technical data

Types	Front mounted 1-pole CE5-..0.1	1-pole CE5-..2
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Contact utilization characteristics according to IEC

Standards	IEC 60947-5-1 and EN 60947-5-1	
Rated insulation voltage U_i acc. to IEC 60947-5-1	250 V	
Rated operational voltage U_e max.	125 V	250 V
Conventional thermal current I_{th} - $\theta \leq 40^\circ\text{C}$	0.1 A	2 A
Rated frequency (without derating)	50 / 60 Hz	
I_e / Rated operational current acc. to IEC 60947-5-1	AC-14 0.1 A	AC-15 2 A
	24-127 V 50/60 Hz 220-240 V 50/60 Hz	2 A 2 A
Making capacity	6 x I_e AC-14 acc. to IEC 60947-5-1	10 x I_e AC-15 acc. to IEC 60947-5-1
Breaking capacity I_e / Rated operational current DC-12 acc. to IEC 60947-5-1	6 x I_e AC-14 acc. to IEC 60947-5-1	10 x I_e AC-15 acc. to IEC 60947-5-1
	24 V DC 0.1 A	2 A
	48 V DC 0.1 A	1 A
	72 V DC 0.1 A	0.3 A
	110 V DC 0.1 A	0.2 A
	125 V DC –	0.2 A
	220 V DC –	0.1 A
Short-circuit protection device FF type fuse (1)	0.1 A	10 A
Minimum switching capacity AF09 ... AF38 contactors with failure rate acc. to IEC 60947-5-4	3 V / 1 mA –	17 V / 1 mA $\leq 10^{-7}$
Mechanical durability Number of operating cycles	5 millions for CE5-..D0.1 2.5 millions for CE5-..W0.1	5 millions for CE5-..D2 2.5 millions for CE5-..W2
Max. switching frequency	3600 cycles/h	
Electrical durability Number of operating cycles	2.5 millions for CE5-..D0.1 0.7 millions for CE5-..W0.1	1 million for CE5-..D2 0.3 millions for CE5-..W2
Max. electrical switching frequency	AC-14 1200 cycles/h AC-15 1200 cycles/h DC-12 900 cycles/h	

Contact utilization characteristics according to UL / CSA

Standards	UL 508, CSA C22.2 N°14	
Max. operational voltage	125 V AC / 110 V DC	250 V AC / 220 V DC
Pilot duty AC thermal rated current	0.1 A	2 A

Connecting characteristics

Connection capacity (min. ... max.)		
 Rigid solid	1 x	1...4 mm ²
	2 x	1...4 mm ²
 Flexible with ferrule	1 x	0.75...2.5 mm ²
	2 x	0.75...2.5 mm ²
 Lugs	L ≤	7.7 mm
	L >	3.7 mm
Connecting capacity acc. to UL / CSA	1 or 2 x	AWG 18...14
Tightening torque		1 Nm
Degree of protection	Terminals	IP20
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529	Microswitches	IP40 for CE5-..D0.1 IP67 for CE5-..W0.1
		IP40 for CE5-..D2 IP67 for CE5-..W2
Screw terminals All terminals		Delivered in open position, screws of unused terminals must be tightened M3.5
Screwdriver type		Flat Ø 5.5 / Pozidriv 2

(1) HRC fuses for very fast action (6.3 x 32 mm size).

Auxiliary contact blocks for severe industrial environments

For AF contactors

Main accessory fitting details

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

Contactor types	Main poles	Built-in auxiliary contacts	Front-mounted accessories			Side-mounted accessories	
			Auxiliary contact blocks	Electrical and mechanical interlock set (Between 2 contactors)		Auxiliary contact blocks	
			1-pole CE5	1-pole CA4 1-pole CC4	VEM4	Left side 2-pole CAL4-11	Right side
3-pole contactors AF09 ... AF38							
			Max. N.C. built-in and add-on N.C. auxiliary contacts (CA4, CC4, CAL4, VEM4): 2 max. with 1 CE5, none with 2 CE5 on positions 1, 2, 3, 4				
AF09 ... AF16	3 0	0 1	1	+ 3 max.	–	+ 1	–
AF09 ... AF16	3 0	1 0	2	+ 2 max.	–	–	–
AF26 ... AF38	3 0	0 0	1	+ 3 max.	–	+ 1	–
			1	+ 1 max.	–	+ 1	+ 1
			1	+ 2 max.	+ 1	+ 1	–
			Max. N.C. built-in or add-on N.C. auxiliary contacts (CA4, CC4, CAL4, VEM4): 1 max. with 1 CE5 on positions 1 ±30°, 5				
AF09 ... AF16	3 0	0 1	1	+ 3 max.	–	–	–
AF09 ... AF16	3 0	1 0	1	+ 3 max.	–	+ 1	–
AF26 ... AF38	3 0	0 0	1	+ 2 max.	+ 1	–	–
			Max. add-on N.C. auxiliary contacts (CA4, CC4, CAL4): 4 max. with 1 CE5, 2 max. with 2 CE5 on positions 1, 1 ±30°, 2, 3, 4, 5				
AF40 ... AF96	3 0	0 0	2	+ 2 max.	–	+ 1	+ 1
			1	+ 3 max.	–	+ 1	+ 1
4-pole contactors AF09 ... AF80							
			Max. add-on N.C. auxiliary contacts (CA4, CC4, CAL4, VEM4): 2 max. with 1 CE5, none with 2 CE5 on positions 1, 2, 3, 4				
AF09, AF16	4 0	0 0	2	+ 2 max.	–	–	–
			1	+ 3 max.	–	+ 1	–
			1	+ 1 max.	–	+ 1	+ 1
			1	+ 2 max.	+ 1	+ 1	–
			Max. add-on N.C. auxiliary contacts (CA4, CC4, CAL4, VEM4): 1 max. with 1 CE5 on positions 1, 2, 3, 4				
AF26, AF38	4 0	0 0	1	+ 3 max.	–	+ 1	–
			1	+ 2 max.	+ 1	–	–
AF09, AF16	2 2	0 0	1	+ 3 max.	–	+ 1	–
AF26, AF38							
			Max. add-on N.C. auxiliary contacts (CA4, CC4, CAL4, VEM4): 1 max. with 1 CE5 on positions 1 ±30°, 5				
AF09, AF16	4 0	0 0	1	+ 3 max.	–	+ 1	–
			1	+ 2 max.	+ 1	–	–
			No add-on N.C. auxiliary contacts on positions 1 ±30°, 5				
AF26, AF38	4 0	0 0	1	+ 3 max.	–	–	–
AF09, AF16	2 2	0 0					
AF26, AF38	2 2	0 0					
			Max. add-on N.C. auxiliary contacts (CA4, CC4, CAL4): 4 max. with 1 CE5, 2 max. with 2 CE5 on positions 1, 1 ±30°, 2, 3, 4, 5				
AF40 ... AF80	4 0	0 0	2	+ 2 max.	–	+ 1	+ 1
			1	+ 3 max.	–	+ 1	+ 1
			No add-on N.C. auxiliary contacts on positions 1, 1 ±30°, 2, 3, 4, 5				
AF40, AF80	2 2	0 0	1	+ 3 max.	–	–	–

Auxiliary contact blocks for severe industrial environments

For NF contactor relays

Main accessory fitting details

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

Contactor relay types	Main poles		Front-mounted accessories				Side-mounted accessories			
			Auxiliary contact blocks				Auxiliary contact blocks			
			1-pole CE5		1-pole CA4 1-pole CC4		Left side 2-pole CAL4-11		Right side	
Max. add-on N.C. auxiliary contacts (CA4, CC4, CAL4): 1 max. with 1 CE5 on positions 1, 2, 3, 4										
NF	2 2 3 1	E E	1	+	3 max.	-	1	-		
Max. add-on N.C. auxiliary contacts (CA4, CC4, CAL4): 2 max. with 1 CE5, none with 2 CE5 on positions 1, 2, 3, 4										
NF	4 0	E	2	+	2 max.	-	-	-		
			1	+	3 max.	-	1	-		
			1	+	1 max.	-	1	+	1	
Max. add-on N.C. auxiliary contacts (CA4, CC4): none with 1 CE5 on positions 1 ±30°, 5										
NF	2 2 3 1	E E	1	+	3 max.	-	-	-		
Max. add-on N.C. auxiliary contacts (CA4, CC4, CAL4): 1 max. with 1 CE5 on positions 1 ±30°, 5										
NF	4 0	E	1	+	3 max.	-	1	-		

Auxiliary contact blocks for AF116 ... AF2650 contactors



CAL19-11

1SFC101071V0001

5



CAL18-11

1SFC101082V0001

Description

The auxiliary contact blocks are used for the operation of auxiliary circuits and control circuits for standard industrial environments.

Types of auxiliary contact blocks for side mounting:

- CAL 2-pole block, with instantaneous N.O. + N.C. contacts.

For clipping onto the right- and/or left-hand side of the contactors.

The CAL ...-11B is a second block for mounting in addition to a first CAL ...-11 block, right- and/or left-hand of the AF116 ... AF2650 contactors.

The auxiliary contact blocks are equipped with screw type connecting terminals delivered open, protected against accidental direct contact and bear the corresponding function marking.

Ordering details

For contactors	Auxiliary contacts	Order code		Pkg qty	Weight (1 pce)
	 				kg
Side-mounted instantaneous auxiliary contact blocks					
AF116 ... AF370	1 1	CAL19-11		2	0.04
	1 1	CAL19-11B		2	0.04
AF400 ... AF2650	1 1	CAL18-11		2	0.05
	1 1	CAL18-11B		2	0.05

(1) For each contactor type, refer to "Accessory fitting details" table.

Auxiliary contact blocks for AF116 ... AF2650 contactors

Technical data

Types	CAL18	CAL19
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Contact utilization characteristics according to UL / CSA

Standards	UL 508, CSA C22.2 N°14
Max. operational voltage	600 V AC, 250 V DC
Pilot duty	A600, Q300
AC thermal rated current	10 A
AC maximum volt-ampere making	7200 V A
AC maximum volt-ampere breaking	720 V A
DC thermal rated current	2.5 A
DC maximum volt-ampere making-breaking	69 V A

Contact utilization characteristics according to IEC

Standards	IEC 60947-5-1 and EN 60947-5-1	
Rated insulation voltage U_i acc. to IEC 60947-5-1	690 V	
Rated impulse withstand voltage U_{imp}	6 kV	
Rated operational voltage U_e max.	24...690 V AC	
Conventional thermal current I_{th} - $\theta \leq 40^\circ\text{C}$	16 A	
Rated frequency (without derating)	50/60 Hz	
I_e / Rated operational current AC-15		
acc. to IEC 60947-5-1	24-127 V 50/60 Hz	6 A
	220-240 V 50/60 Hz	4 A
	380-440 V 50/60 Hz	3 A
	500-690 V 50/60 Hz	2 A
Making capacity acc. to IEC 60947-5-1	10 x I_e AC-15	
Breaking capacity acc. to IEC 60947-5-1	10 x I_e AC-15	
I_e / Rated operational current DC-13		
acc. to IEC 60947-5-1	24 V DC	6 A / 144 W
	48 V DC	2.8 A / 134 W
	72 V DC	1 A / 72 W
	110 V DC	0.55 A / 60 W
	125 V DC	0.55 A / 69 W
	220 V DC	0.3 A / 66 W
	250 V DC	0.3 A / 75 W
Short-circuit protection device gG type fuse	10 A	
Rated short-time withstand current I_{cw}	for 1.0 s 100 A	
$\theta = 40^\circ\text{C}$	for 0.1 s 140 A	
Minimum switching capacity	24 V / 50 mA (0.5 million of operating cycles)	
with failure rate acc. to IEC 60947-5-4	$\leq 10^{-6}$	
Power dissipation per pole at 6 A	0.15 W	
Mechanical durability	Number of operating cycles	3 millions (A/AF400 ... AF750)
		0.5 million (AF1250 ... AF2050)
		5 millions operating cycles
	Max. switching frequency	3600 cycles/h
Max. electrical switching frequency	AC-15	1200 cycles/h
	DC-13	900 cycles/h
Mechanically linked contacts acc. to annex L of IEC 60947-5-1	N.O. or N.C. auxiliary contacts are mechanically linked contacts	
Mirror contacts acc. to annex F of IEC 60947-4-1	N.C. auxiliary contacts are mirror contacts	

Connecting characteristics

Connection capacity (min. ... max.)		
 Solid / stranded	1 x	1...4 mm ²
	2 x	1...4 mm ²
 Flexible with non insulated ferrule	1 x	0.75...2.5 mm ²
	2 x	0.75...2.5 mm ²
 Flexible with insulated ferrule	1 x	0.75...2.5 mm ²
	2 x	0.75...2.5 mm ²
 Lugs	L $\leq$	8 mm
	L $>$	3.7 mm
Connection capacity acc. to UL/CSA	1 or 2 x	AWG18...14
Stripping length	9 mm	
Tightening torque	1 Nm	
Degree of protection		
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529	IP20	
Screw terminals	Delivered in open position, screws of unused terminals must be tightened	
All terminals	M3.5	
Screwdriver type	Flat $\varnothing$ 5.5 / Pozidriv 2	

Auxiliary contact blocks for AF400 ... AF2650 contactors for severe industrial environments



CEL18

1SFC101083V0001

Description

The auxiliary contact blocks are used for the operation of auxiliary and control circuits for severe industrial environments.

Types of auxiliary contact blocks for side mounting:

- CEL18 1-pole block, with built-in microswitch IP67 degree of protection (IP20 on terminals). Instantaneous N.O. or N.C. contact.

For clipping onto the right- and/or left-hand side of the contactors.

The auxiliary contact blocks are equipped with screw type connecting terminals delivered open, protected against accidental direct contact and bear the corresponding function marking.

Ordering details (1)

For contactors	Auxiliary contacts	Order code	Pkg qty	Weight (1 pce)
	 			kg
Side-mounting instantaneous auxiliary contact blocks				
AF400 ... AF2650	1 0	CEL18-10	1	0.05
	0 1	CEL18-01	1	0.05

(1) For each contactor type, refer to "Accessory fitting details" table.

Auxiliary contact blocks for AF400 ... AF2650 contactors for severe industrial environments

Technical data

Types	CEL18
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Contact utilization characteristics according to UL / CSA

Standards	UL 508, CSA C22.2 N°14
Max. operational voltage	125 V
Pilot duty	
AC thermal rated current	0.1 A

Contact utilization characteristics according to IEC

Standards	IEC 60947-5-1 and EN 60947-5-1
Rated insulation voltage U_i acc. to IEC 60947-5-1	250 V
Rated operational voltage U_e max.	125 V
Conventional thermal current I_{th} - $\theta \leq 40^\circ\text{C}$	0.1 A
I_e / Rated operational current AC-14 acc. to IEC 60947-5-1	24-127 V 50/60 Hz 0.1 A
Making capacity acc. to IEC 60947-5-1	6 x I_e AC-14
Breaking capacity acc. to IEC 60947-5-1	6 x I_e AC-14
I_e / Rated operational current DC-12 acc. to IEC 60947-5-1	24 V DC 0.1 A
	48 V DC 0.1 A
	72 V DC 0.1 A
	110 V DC 0.1 A
	220 V DC -
Short-circuit protection device	0.1 A (FF type fuses) (1)
Minimum switching capacity	
with failure rate acc. to IEC 60947-5-4	3 V / 1 mA
Mechanical durability	
Number of operating cycles	1 million
Max. switching frequency	1200 cycles/h
Electrical durability	
Number of operating cycles	0.7 millions
Max. switching frequency	AC-14, AC15 1200 cycles/h
	DC-12 900 cycles/h

Connecting characteristics

Connection capacity (min. ... max.)	
 Rigid solid	1 x 1...4 mm ²
 Flexible with ferrule	2 x 1...4 mm ²
 Flexible with ferrule	1 x 0.75...2.5 mm ²
 Flexible with ferrule	2 x 0.75...2.5 mm ²
 Lugs	L ≤ 7.7 mm
	I > 3.7 mm
Connection capacity acc. to UL/CSA	1 or 2 x AWG 18...14
Tightening torque	1 Nm
Degree of protection	Terminals IP20
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529	Microswitches IP67
Screw terminals	
All terminals	Delivered in open position, screws of unused terminals must be tightened
	M3.5
Screwdriver type	Flat Ø 5.5 / Pozidriv 2

(1) or HRC fuses for very fast action (6.3 x 32 mm size).

Auxiliary contact blocks for AF09 ... AF96 contactors and NF contactor relays

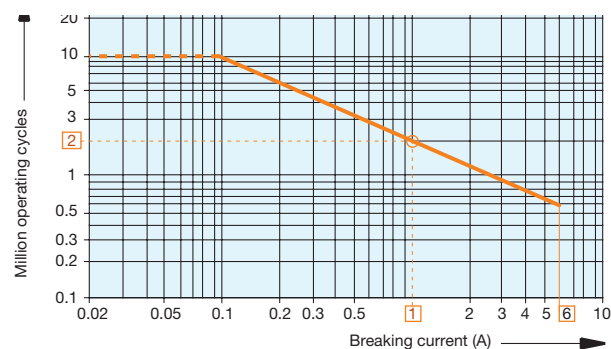
Electrical durability

Electrical durability for AC-15 utilization category

AC-15 utilization category according to IEC 60947-5-1 / EN 60947-5-1:

- making current: $10 \times I_e$ with $\cos \varphi = 0.7$ and U_e
- breaking current: I_e with $\cos \varphi = 0.4$ and U_e .

These curves represent the electrical durability of the built-in or add-on auxiliary contacts in relation to the breaking current. The curves have been drawn for resistive and inductive loads up to 690 V, 40...60 Hz.

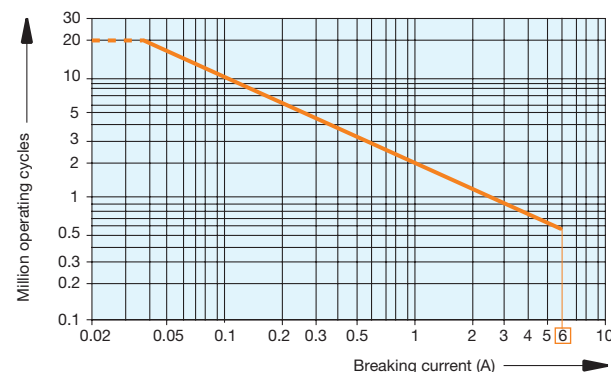


- AF09 ... AF96 contactor built-in auxiliary contacts
- 1-pole and 4-pole CA4, 2-pole CAT4, 1-pole CC4, 2-pole CAL4 add-on auxiliary contacts.

Example:

Breaking current = 1 A

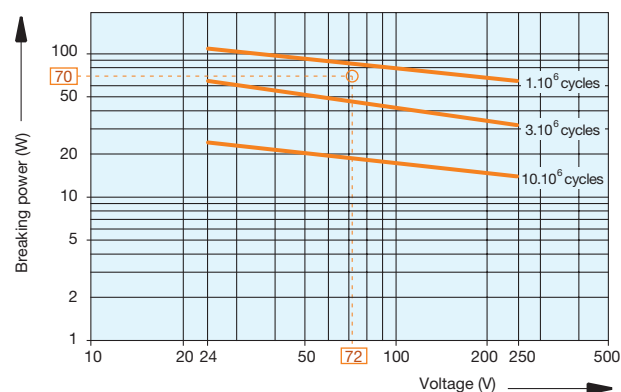
On the opposite curve at intersection "1" 1 A the corresponding value for the electrical durability is approximately 2 millions operating cycles.



NF contactor relays.
(For add on auxiliary contacts see curve above).

Electrical durability for DC-13 utilization category

DC-13 utilization category according to IEC 60947-5-1 / EN 60947-5-1: making and breaking current I_e and U_e .



- AF09 ... AF96 contactor built-in auxiliary contacts 1-pole and 4-pole CA4, 2-pole CAT4, 1-pole CC4,
- 2-pole CAL4 add-on auxiliary contacts,
- NF contactor relays.

Example:

Control of DC electro-magnet:

U_e voltage = 72 V DC and breaking power = 70 W.

On the opposite curve at intersection "72" 72 V / 70 W the corresponding value for the electrical durability is approximately 2 millions operating cycles.

Auxiliary contacts for AF116 ... AF2650 contactors

Electrical durability

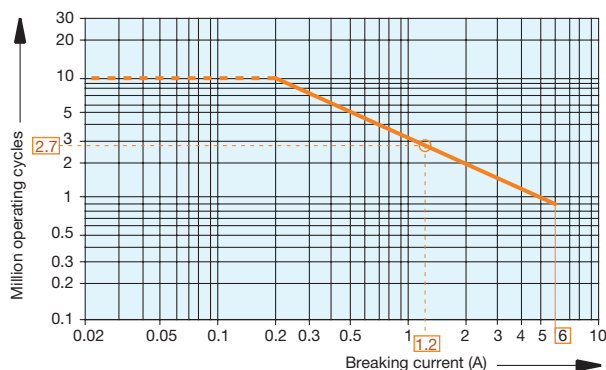
Electrical durability for AC-15 utilization category

AC-15 utilization category according to IEC 60947-5-1 / EN 60947-5-1:

- making current: $10 \times I_e$ with $\cos \varphi = 0.7$ and U_e
- breaking current: I_e with $\cos \varphi = 0.4$ and U_e .

These curves represent the electrical durability of the add-on auxiliary contacts, in relation to the breaking current.

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



- AF116 ... AF2650 contactors auxiliary contacts
- 2-pole CAL18 and CAL19 add-on auxiliary contacts

Example:

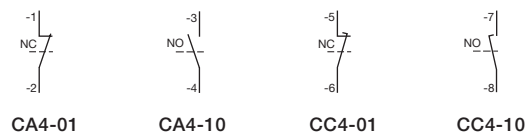
Breaking current = 1.2 A

On the opposite curve at intersection "O" 1.2 A the corresponding value for the electrical durability is approximately 2.7 millions operating cycles.

Add-on auxiliary contacts

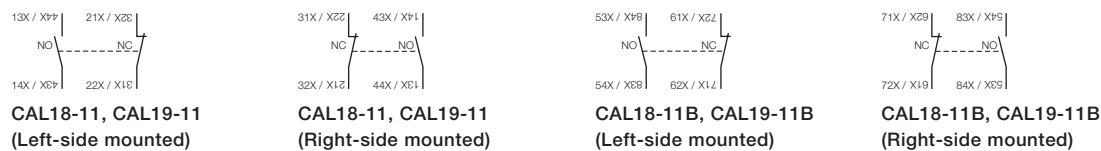
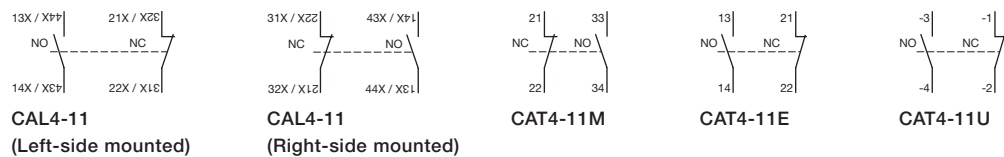
Terminal marking and positioning

1-pole auxiliary contacts

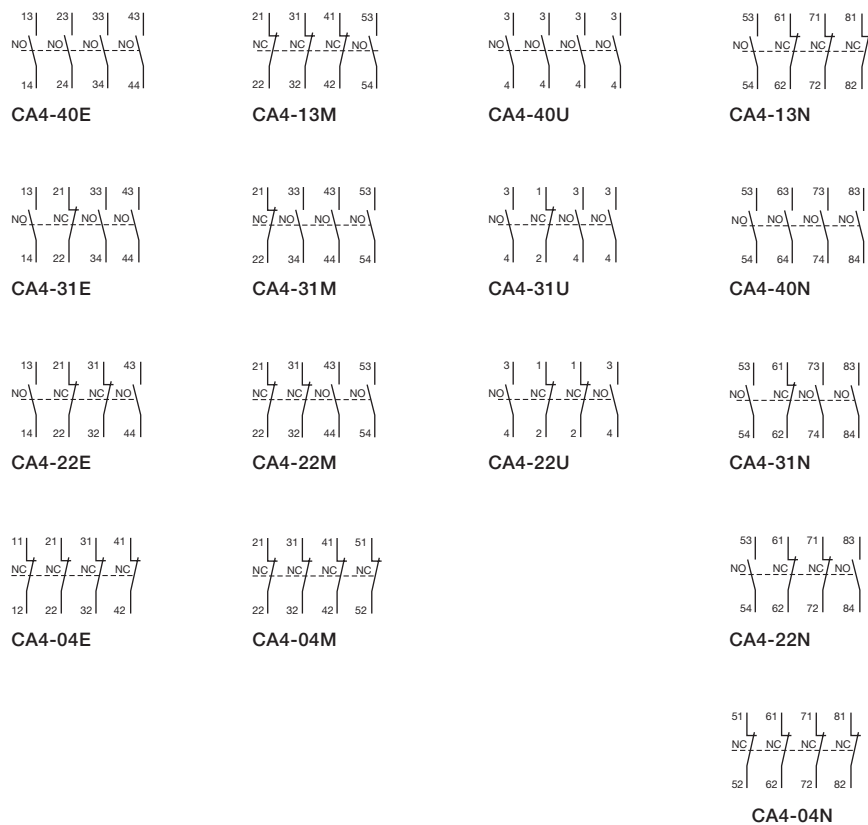


2-pole auxiliary contacts

5



4-pole auxiliary contacts



Electronic timers



TEF4-ON



TEF4-OFF

Description

TEF4 frontal electronic timers are used for realizing timing function and are available in ON-delay and OFF-delay versions.

Compact solution in cabinet compared to separate timers

TEF4 electronic timers are front-mounted and locked on AF contactors or NF contactor relays. A mechanical indicator allows to show the state of the contactor.

Safe and cost-reduced wiring

TEF4 electronic timers are supplied by a direct plug-in parallel connection to the coil terminals A1 - A2 of the contactor or contactor relay. A varistor is integrated on the timer to offer a built-in protection against surges in the contactor coil.

Available for a wide control voltage range 24...240 V AC/DC

TEF4-ON or TEF4-OFF allow time-delayed functions up to 100 s in 3 distinct time ranges, independently of the control system. The time delay ranges are selected by a switch and the time delay can be adjusted by means of a rotary switch. The timing function is activated by closing or opening the device on which the timer is mounted. The OFF-delay version operates without additional control supply.

Ordering details

For contactors, contactor relays	Time delay range selected by switch	Delay type	Rated control circuit voltage Uc	Auxiliary contacts	Order code	Weight
			V 50/60 Hz or DC	 		Pkg (1 pce) kg
AF09 ... AF96	0.1...1 s	ON-delay	24...240	1 1	TEF4-ON	0.065
NF	1...10 s					
	10...100 s	OFF-delay	24...240	1 1	TEF4-OFF	0.065

Electronic timers

Technical data

Contact utilization characteristics according to IEC

Types	TEF4-ON	TEF4-OFF
Standards	IEC 60947-5-1 and EN 60947-5-1	
Rated insulation voltage U_i acc. to IEC 60947-5-1	400 V	
Rated impulse withstand voltage U_{imp}	4 kV	
Rated operational voltage U_e max.	240 V	
Rated frequency (without derating)	50 / 60 Hz	
Conventional thermal current I_{th} - $\theta \leq 40^\circ\text{C}$	5 A	
le / Rated operational current AC-15		
acc. to IEC 60947-5-1	24-127 V 50/60 Hz	3 A
	220-240 V 50/60 Hz	1.5 A
Making capacity acc. to IEC 60947-5-1	10 x I_e AC-15	
Breaking capacity acc. to IEC 60947-5-1	10 x I_e AC-15	
le / Rated operational current DC-13		
acc. to IEC 60947-5-1	24 V DC	1 A / 24 W
Short-circuit protection device gG type fuse	6 A	
Rated short-time withstand current I_{cw}	for 1.0 s	8 A
$\theta = 40^\circ\text{C}$	for 0.1 s	8 A
Minimum switching capacity	12 V / 3 mA	
with failure rate acc. to IEC 60947-5-4	24 V DC	10^{-7}
Power dissipation per pole at 3 A	0.1 W	
Function diagram	ON-delay	OFF-delay
Bistable relay inside. Before use, once apply U_c then switch it off in order to initialize position of the contacts.		
Control circuit voltage		
AC control voltage	Rated control circuit voltage U_c	24...240 V AC
50/60 Hz	Average consumption	1.5 mA RMS
DC control voltage	Rated control circuit voltage U_c	24...240 V DC
	Average consumption	1.5 mA
Rated frequency limits	50 / 60 Hz	
Supply voltage range	0.85...1.1 x U_c (at $\theta \leq 70^\circ\text{C}$)	
Overvoltage protection	Varistor included	
Time delay range (t) selected by switch	0.1...1 s	
	1...10 s	
	10...100 s	
On-load reiteration accuracy under constant conditions	$\leq 1\%$	
Minimum ON period	0.1 s	1 s
Recovery time	0.15 s	0.1 s
Ambient air temperature	Operation	-25 $^\circ\text{C}$... +70 $^\circ\text{C}$
	Storage	-40 $^\circ\text{C}$... +80 $^\circ\text{C}$
Climatic withstand	Category B according to IEC 60947-1 Annex Q	
Maximum operating altitude	2000 m	
Mounting positions	Mounting positions 1, 1 +/- 30°, 2, 3, 4, 5	
Shock withstand	1/2 sinusoidal shock for 11 ms: no change in contact position	
acc. to IEC 60068-2-27 and EN 60068-2-27	Same as contactor or contactor relay	
(Mounting position 1)		
Vibration withstand	5...300 Hz	
acc. to IEC 60068-2-6	3 g closed position / 2 g open position	
Mechanical durability		
	Number of operating cycles	5 millions operating cycles
	Max. switching frequency	3600 cycles/h
Max. electrical switching frequency	AC-15	1200 cycles/h
	DC-13	900 cycles/h

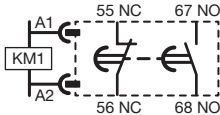
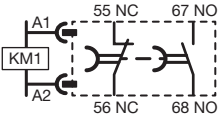
Electronic timers

Technical data

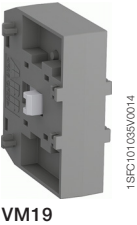
Contact utilization characteristics according to UL / CSA

Types	TEF4-ON	TEF4-OFF
Standards	UL 508, CSA C22.2 N°14	
Rated insulation voltage Ui acc. to UL / CSA	300 V	
Max. operational voltage	240 V	
Pilot duty	B300, R300	
AC thermal rated current	5 A	
AC maximum volt-ampere making	3600 VA	
AC maximum volt-ampere breaking	360 VA	
DC thermal rated current	1 A	
DC maximum volt-ampere making-breaking	28 VA	

Connecting characteristics

Connection capacity (min. ... max.)	1 x	1...2.5 mm²
 Rigid solid	2 x	1...2.5 mm²
 Flexible with non insulated ferrule	1 x	0.75...2.5 mm²
 Flexible with non insulated ferrule	2 x	0.75...2.5 mm²
 Flexible with insulated ferrule	1 x	0.75...2.5 mm²
 Flexible with insulated ferrule	2 x	0.75...1.5 mm²
 Lugs	L ≤	8 mm
	L >	3.7 mm
Connection capacity acc. to UL / CSA	1 or 2 x	AWG 18...14
Stripping length		10 mm
Tightening torque		1.2 N.m / 11 lb.in
Degree of protection		IP20
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		
Screw terminals		Delivered in open position, screws of unused terminals should be tightened
All terminals		M3.5
Screwdriver type		Flat Ø 5.5 / Pozidriv 2
Terminal Marking	 	

Interlocks



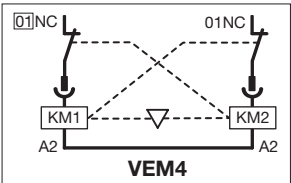
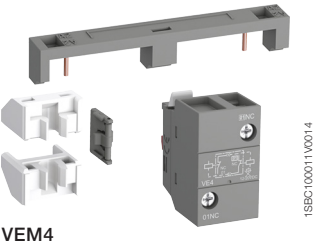
Mechanical interlock units

Description

The VM mechanical interlock units are designed for the interlocking of two AF contactors. When mounted between two contactors, the VM mechanical interlock unit prevents one of the contactors from closing as long as the other contactor is closed. The mechanical interlock units VM4 and VM96-4 include 2 fixing clips (BB4).

Ordering details

For contactors	Mounting	Order code		Pkg qty	Weight (1 pce) kg
Mechanical interlock units for two contactors mounted side by side					
AF09 ... AF30...-30-..		VM4		10	0.01
AF09 ... AF38...-40-00					
AF40 ... AF96		VM96-4		10	0.01
For same size contactors:		VM19		1	0.06
AF116 ... AF140					
AF190, AF205					
AF265 ... AF370					
AF116 ... AF140 and AF190, AF205		VM140/190		1	0.09
AF190, AF205 and AF265 ... AF370		VM205/265		1	0.09
AF400 ... AF1250	PN.. mounting plate to be ordered separately	VM750H		1	0.20
AF1350 ... AF2650	Plate included	VM1650H		1	6.00
Mechanical interlock units for two contactors mounted one above the other					
AF400 ... AF1250	Additional plate (not supplied)	VM750V		1	0.20



Mechanical and electrical interlock sets

Description

VEM4 mechanical and electrical interlock set for the interlocking of two AF contactors. VEM4 set includes a mechanical interlock unit VM4 with 2 fixing clips (BB4) and a VE4 electrical interlock block with A2-A2 connection. Fixing the electrical interlock block to the contactor front face connects the 2 built-in N.C. interlocking contacts with the two coils. VE4 block must be used with A2-A2 connection to respect the electrical connection diagram.

Ordering details

For contactors	Auxiliary contacts	Order code		Pkg qty	Weight (1 pce) kg
Mechanical and electrical interlock set					
For same size contactors:	0 2	VEM4		1	0.04
AF09 ... AF16...-30-..					
AF26 ... AF38...-30-00					
AF09, AF16...-40-00					
AF26, AF38...-40-00					
Fixing clips					
AF09 ... AF38		BB4		50	0.01

Note: VEM4 not suitable for AF..Z contactors with DC control voltage 12...20 V DC.

Interlocks

Technical data

Mechanical interlock unit

Types	VM4, VM96	VM19 ... VM750	VM1650H
Mechanical durability	Number of operating cycles	5 millions operating cycles	1 million operating cycles
	Max. mechanical switching frequency	1800 cycles/h	300 cycles/h

Mechanical and electrical interlock set

Contact utilization characteristics according to UL / CSA

Types	VEM4
Standards	UL 508, CSA C22.2 N°14
Max. operational voltage	500 V AC, 500 V DC

Contact utilization characteristics according to IEC

Contact utilization characteristics according to IEC		
Types		VEM4
Standards		IEC 60947-5-1 and EN 60947-5-1
Rated insulation voltage U_i acc. to IEC 60947-5-1		690 V
Rated impulse withstand voltage U_{imp} .		6 kV
Rated control circuit voltage U_c		
	AC 50/60 Hz control voltage	24...500 V AC
	DC control voltage	20...500 V DC
Conventional thermal current I_{th} - $\theta \leq 40^\circ\text{C}$		16 A
Mechanical durability	Number of operating cycles	5 millions operating cycles
	Max. mechanical switching frequency	1800 cycles/h
Electrical durability	Max. electrical switching frequency	1200 cycles/h

Connecting characteristics

Types	VEM4
Connection capacity (min. ... max.)	
 Rigid solid	1 x 1...2.5 mm ²
 Flexible with ferrule	2 x 1...2.5 mm ²
 Flexible with ferrule	1 x 0.75...2.5 mm ²
 Flexible with ferrule	2 x 0.75...2.5 mm ²
 Flexible with insulated ferrule	1 x 0.75...2.5 mm ²
 Flexible with insulated ferrule	2 x 0.75...1.5 mm ²
 Lugs	L < 8 mm
Connection capacity acc. to UL / CSA	1 or 2 x AWG 18...14
Stripping length	10 mm
Tightening torque	1.2 Nm / 11 lb.in
Degree of protection	IP20
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529	
Screw terminals	Delivered in open position, screws of unused terminals must be tightened
All terminals	M3.5
Screwdriver type	Flat Ø 5.5 / Pozidriv 2

Impulse contact blocks



CB5

Description

Impulse contact blocks are designed for use in enclosures, in association with an adjustable mechanical pushbutton. Two types are available:

- CB5-10: N.O. contact with a black actuator ("ON" function)
- CB5-01: N.C. contact with a light grey actuator ("OFF" function).

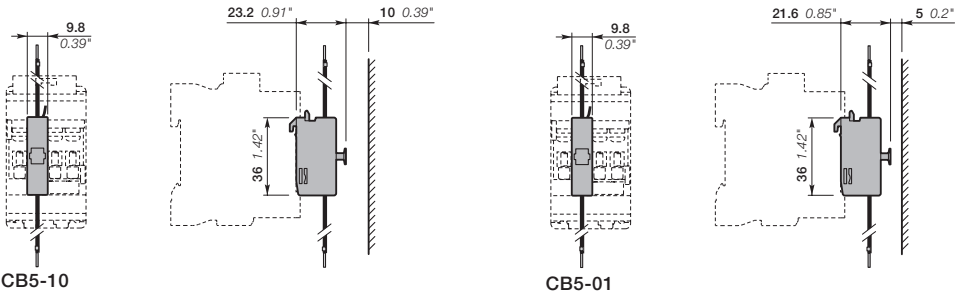
These blocks are equipped with 2 connecting leads 0.5 mm² with end, approximately 18 cm long.

Mounting: Clipped onto the front face of the contactors.

Ordering details

For contactors	Contacts	Order code		Pkg qty	Weight (1 pce) kg
	 				
AF09 ... AF96	1 –	CB5-10		1	0.012
	– 1	CB5-01		1	0.012

Main dimensions mm, inches



Notes

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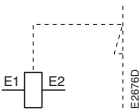
Mechanical latching units



WB75-A

1SBC1000000014

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Terminal marking

Description

For converting standard contactors into latched contactors.

The WB75-A 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, M3.5 (+,-) pozidriv 2 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 mechanism should the supply voltage fail at the contactor coil terminals.

Contactor opening can be controlled:

- electrically by an impulse (AC or DC) on the WB75-A block coil.
(the coil is not designed to be permanently energized)
- manually by pressing the pushbutton on the front face of the WB75-A block.

Mounting

The WB75-A block is clipped onto the front face of the 1-stack contactor where it takes up two slots (see dimension drawing). The two other slots do not accept CA4 single pole auxiliary contacts. Up to 2 CAL4-11 auxiliary contact blocks can be side-mounted on contactors (except NF22E and AF..-22-00, refer to main accessory fitting details table in main accessories section).

Ordering details

For contactors	Rated control circuit voltage Uc		Order code	Pkg qty	Weight (1 pce)
	V 50 Hz or DC	V 60 Hz			
AF09 ... AF65 NF	24	24...28	WB75-A01	1	0.12
	42	42...48	WB75-A02	1	0.12
	48	48...55	WB75-A03	1	0.12
	110	110...127	WB75-A04	1	0.12
	220...230	220...255	WB75-A06	1	0.12
	230...240	230...277	WB75-A05	1	0.12
	380...415	380...440	WB75-A07	1	0.12
	415...440	440...480	WB75-A08	1	0.12

Note: For WB75-A produced since week 06-2012.

Mechanical latching units

Technical data

Type	WB75-A	
Utilization characteristics according to IEC		
Rated insulation voltage Ui acc. to IEC 60947-1		690 V
Max. electrical impulse time		
On AC coil (with load factor 5 %)		20 s
On DC coil (with load factor 3 %)		8 s
Min. electrical impulse time		
For latching (energizing of the contactor coil)		AC 120 ms
		DC 120 ms
For pull-out (energizing of the WB block coil)		AC 30 ms
		DC 50 ms
Coil operating limits		AC or DC supply 0.85...1.1 x Uc
AC control voltage 50/60 Hz		
Rated control circuit voltage Uc		24...480 V AC
Coil consumption		Average pull-in value 90 VA
		Average holding value 60 VA
DC control voltage		
Rated control circuit voltage Uc		24...440 V DC
Coil consumption		Average pull-in value 110 W
		Average holding value 110 W
Operating time		
On contactor closing (latching)		
Between coil energization and:		
		N.O. contact closing No difference with the operation of a contactor without mechanical latching unit
		N.C. contact opening No difference with the operation of a contactor without mechanical latching unit
On contactor opening (unlatching)		
Between WB coil energization and:		
		N.O. contact opening 5...25 ms
		N.C. contact closing 7...28 ms
Mechanical durability		
Number of operating cycles		1 million operating cycles
Max. switching frequency		3600 cycles/h with on-load factor of 8 %
Connecting characteristics		
Connection capacity (min. ... max.)		
	Rigid solid	1 x 1...4 mm², 16...12 AWG
		2 x 1...4 mm², 16...12 AWG
	Flexible with ferrule	1 x 0.75...2.5 mm², 18...14 AWG
		2 x 0.75...2.5 mm², 18...14 AWG
	Lugs	L < 8 mm
		L > 3.5 mm
Tightening torque		
Recommended		1 Nm
Max.		1.2 Nm
Screw terminals		Delivered in open position, screws of unused terminals must be tightened
All terminals		M3.5
Screwdriver type		Flat Ø 5.5 / Pozidriv 2

Other accessories



LDC4



BX4



BX4-CA



BA4



BA5-50

Ordering details

For contactors	Order code	Pkg qty	Weight (1 pce) kg

Additional coil terminal blocks

Additional coil terminal blocks for a bottom access to the coil terminals of contactors or contactor relays.

AF09 ... AF96, NF	LDC4	10	0.01
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Protective covers

Sealable and transparent protective covers BX4 and non-removable BX4-CA to protect the devices against accidental contact.

AF09 ... AF96 1-stack contactors and NF contactor relays	BX4	10	0.01
4-pole CA4, 2-pole CAT4 auxiliary contact blocks and TEF4 electronic timer	BX4-CA	50	0.01

Note: BX4 produced since 13045 (day 045 - year 2013) are suitable for AF40 ... AF96.

Function markers AF09 ... AF370

Box of 16 blank cards (16 markers by card) printable on HTP500 thermal transfer printer and AMS 500 marking table to identify your contactors, overload relays or manual motor starters. Marker dimensions: 7 x 20 mm (.276" x .787").

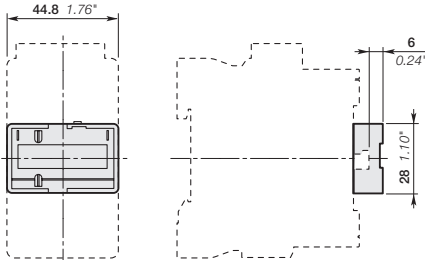
AF09 ... AF370 contactors, TF thermal overload relays, EF electronic overload relays and MS116, MS132 manual motor starters	BA4	16	0.01
AMS 500 support plate for 8 BA4	SPRC 1	1	0.22
HTP500 support plate	HTP500-BA4	1	0.29

Function markers AF400 ... AF2650

Set of 50 function markers designed to be clipped onto the front face of devices. Details can be added to these markers using a ball point pen, indelible felt-tip pen or pentel white. Self-adhesive labels (not supplied) can also be added to them. Marker dimensions: 7 x 19 mm (.276" x .748").

AF400 ... AF2650 and accessories	BA5-50	1	0.02
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Main dimensions mm, inches



BX4

Other accessories



BP38-4



BDT4
For AF09 ... AF65, NF



BDT4
For AF80 ... AF96

Ordering details

For contactors	Order code	Pkg qty	Weight (1 pce) kg
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Mounting pieces

Mounting piece for replacing installed contactors fixed by screws by AF contactors.

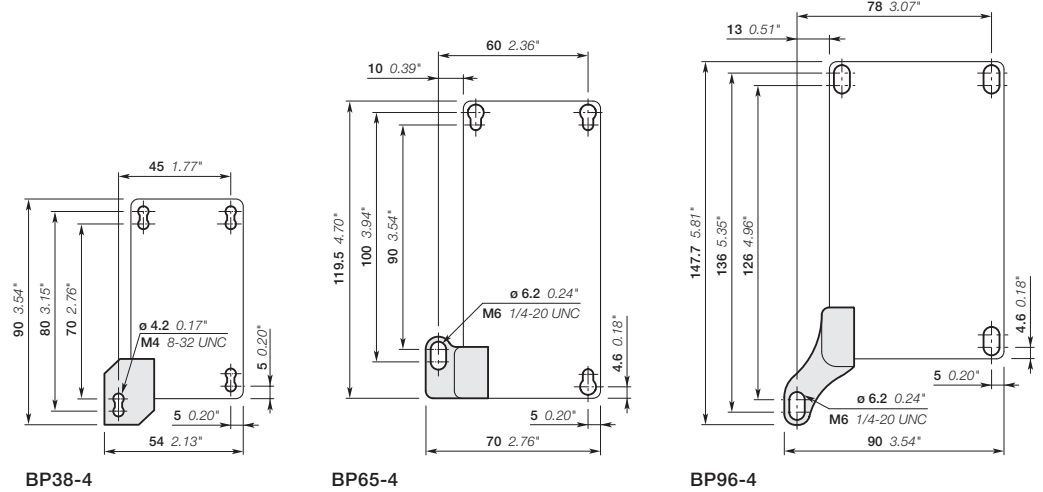
From contactor	To contactor			
A26 ... A40, AL26 ... AL40	AF09 ... AF38	BP38-4	10	0.01
A40 ... A75, AE50 ... AE75, AF50 ... AF75	AF40 ... AF65	BP65-4	10	0.01
A95, A110, AE95, AE110, AF95, AF110	AF80 ... AF96	BP96-4	10	0.01

Test block

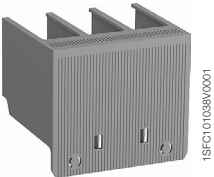
BDT4 test block is suitable for switching on contactor off-load.
Marking on the block indicates the contactor type to fit with.

AF09 ... AF96, NF	BDT4	10	0.02
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Main dimensions mm, inches



Terminal shrouds



LT140-30L



LT370-30C



LT460-AC

Description

Main terminal protection for AF116 ... AF1250 contactors.

The auxiliary contact blocks and coils are designed to provide an IP 20 degree of protection.

The main terminals, equipped with compression lugs or cable clamps, can be protected against accidental direct contact after wiring (EN 50274) by the addition of terminal shrouds (see table below).

Ordering details

For contactors	Order code		Pkg qty	Weight (1 pce) kg
3-pole contactors				
AF116 ... AF140, with compression lugs	LT140-30L		2	0.07
AF190, AF205, with cable clamps	LT205-30C		2	0.05
AF190, AF205, with compression lugs	LT205-30L		2	0.22
AF190, AF205, with shorting bar or between contactor OL relay	LT205-30Y		1	0.05
AF265 ... AF370, with cable clamps	LT370-30C		2	0.04
AF265 ... AF370, with compression lugs	LT370-30L		2	0.28
AF265 ... AF370, with shorting bar or between contactor and OL relay	LT370-30Y		1	0.08
AF265 ... AF370, for use with extending cable clamps, ATK300/2	LT370-30D		1	0.15
AF400, AF460 with cable clamps	LT460-AC		2	0.10
AF400, AF460 with compression lugs	LT460-AL		2	0.80
AF580, AF750 with cable clamps	LT750-AC		2	0.12
AF580, AF1250 with compression lugs	LT750-AL		2	0.83
4-pole contactors				
AF116 ... AF140, with compression lugs	LT140-40L		2	0.09
AF190 ... AF205, with cable clamps	LT205-40C		2	0.04
AF190 ... AF205, with compression lugs	LT205-40L		2	0.14
AF265 ... AF370, with cable clamps	LT370-40C		2	0.04
AF265 ... AF370, with compression lugs	LT370-40L		2	0.17

Additional terminal blocks



LD38-4

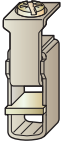
Description

The LD terminal block is designed to increase the connecting capacity of 3-pole AF26 ... AF38 contactors on which it is fitted and for preparation of the wiring before final connection to the contactor. LD38-4 blocks are 3-pole terminal blocks with tunnel terminals.

Ordering details

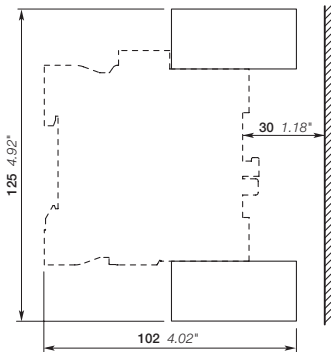
For contactors	Order code	Pkg qty	Weight (1 pce)
AF26 ... AF38	LD38-4	2	kg 0.07

Technical data

Types	LD38-4
Rated insulation voltage Ui	690 V
acc. to IEC 60947-4-1	600 V
acc. to UL / CSA	
Main terminals	 Screw terminals with double connector 2 x (7 width x 5.8/9.2 depth)
Connection capacity (min. ... max.)	
 Rigid Solid ($\leq 4 \text{ mm}^2$)	1x 2.5...25 mm ²
 Stranded ($\geq 6 \text{ mm}^2$)	1x 2.5...25 mm ² + 1x 2.5...16mm ²
 Flexible with non insulated ferrule	1x 2.5...16 mm ²
 Flexible with insulated ferrule	1x 2.5...16mm ² + 1x 2.5...10mm ²
	1x 2.5...16mm ²
	1x 2.5...16mm ² + 1x 2.5...10mm ²
Connection capacity acc. to UL / CSA	1x AWG 8-4
	2x AWG 8-6
Stripping length	14 mm
Tightening torque	2.5 Nm / 22 lb.in
Degree of protection	
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529	IP20
Screw terminals	Delivered in closed position, screws of unused terminals must be tightened
Main terminals	M5
Screwdriver type	Flat Ø 6.5 / Pozidriv 2

Note: The utilization of LD38-4 additional terminal blocks does not allow the use of BER and BEY connection sets.

Main dimensions mm, inches



Terminal enlargements

Description

Enlargement pieces designed to increase the width of the contactor terminal pads in order to allow larger connections to be mounted.

Ordering details

For contactors	Dimensions		Order code		Pkg qty	Weight (1 pce)
	hole Ø mm	bar mm				
						kg
3-pole contactors						
AF116 ... AF140	6.5	13 x 3	LW140		1	0.12
AF190, AF205	10.5	17.5 x 5	LW205		1	0.26
AF265 ... AF370	10.5	20 x 5	LW370		1	0.34
AF400, AF460	10.5	25 x 5	LW460		1	0.73
AF580, AF750	13	40 x 6	LW750		1	1.23
AF1250	13	50 x 10	LW1250		1	2.00
4-pole contactors						
AF190 ... AF205	10.5	20 x 5	LW205-40		1	0.31
AF265 ... AF370	10.5	25 x 5	LW370-40		1	0.54



5

Terminal extension

Description

Extension pieces designed to extend the main terminals of contactors for combined mounting of contactors and connection sets.

Ordering details

For contactors	Dimensions		Order code		Pkg qty	Weight (1 pce)
	hole Ø mm	bar mm				kg
AF116 ... AF140	6.5	13 x3	LX140		1	0.072
AF190, AF205	8.5	17.5 x 5	LX205		1	0.180
AF265 ... AF370	10.5	20 x 5	LX370		1	0.234
AF400, AF460	10.5	25 x 5	LX460		1	0.500
AF580, AF750	13	40 x 6	LX750		1	0.850



Connection sockets

Description

Connection socket can be used to replace built-in cable clamps in AF116 ... AF140.

Ordering details

For contactor	Order code		Pkg qty	Weight (1 pce) kg
3-pole contactors				
AF116 ... AF140	LL146-30		6	0.10
4-pole contactors				
AF116 ... AF140	LL146-40		8	0.13
AF190 ... AF205	LL205-40		2	0.22
AF265 ... AF370	LL370-40		2	0.23

Connection module

Description

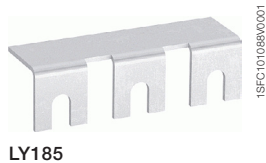
Connection module can be fixed on AF116 ... AF140 delivered with bar terminals.

Ordering details

For contactor	Order code		Pkg qty	Weight (1 pce) kg
3-pole contactors				
AF116 ... AF140	LD146-30		2	0.17
4-pole contactors				
AF116 ... AF140	LD146-40		2	0.23



Terminal connecting strips and shorting bars



Description

Parallel and series connection of 3-pole contactors:

- To obtain a star point (3 parallel-connected poles)
- To connect poles in parallel and thus increase the AC load passing through the flow path made up of the parallel-connected poles: LP, LY.
The relevant cable cross-sectional area may limit the maximum permissible current. Consult information in table below
- To connect poles in series and thus increase the DC load controlled by the poles: LP, LY (only LY16-4 and LY38-4 secable strips).

Types	for connection of "n" poles	with terminal	insulated
LP	n = 2	no	no (1)
LY	n = 2 (secable LY16-4, LY38-4 connecting strips)	no	yes
	n = 3	no	yes (1)

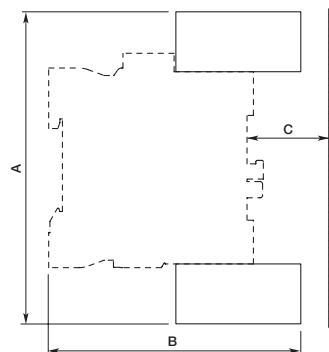
(1) LP460 ... LP750, LY185 ... LY750 not insulated. Use terminal shrouds.

Ordering details

For contactors	max. nominal continuous current with "n" poles				Cable cross-section- al area	Order code		Pkg qty	Weight (1 pce)
	in parallel		in series						
	2 poles	3 poles	4 poles	2 poles					mm² / AWG
AF09	30	33	–	25	6 / 10	LY16-4		10	0.01
AF12	32	36	–	27					
AF16	34	40	–	30					
AF26	50	60	–	45	10 / 8	LY38-4		10	0.01
AF116 ... AF140	–	240	–	–	–	LY140		1	0.06
AF190, AF205	–	400	–	–	–	LY185		1	0.20
AF265 ... AF370	–	670	–	–	–	LY300		1	0.30
AF400, AF460	–	1000	–	–	–	LY460		1	0.45
AF580, AF750	–	1650	–	–	–	LY750		1	0.80
AF190, AF205	300	–	–	–	–	LP185		2	0.30
AF265 ... AF370	475	–	–	–	–	LP300		2	0.40
AF400, AF460	725	–	–	–	–	LP460		2	0.55
AF580, AF750	1200	–	–	–	–	LP750		2	0.95
AF09	45	–	–	–	10 / 8	LH38-4		2	0.01
AF12	50	–	–	–	10 / 8				
AF16	54	–	–	–	16 / 6				
AF26	81	–	–	–	25 / 4				
AF30, AF38	91	–	–	–	25 / 4				
AF09	–	62	–	–	16 / 6	LF16-4		2	0.02
AF12	–	70	–	–	25 / 4				
AF16	–	75	–	–	25 / 4				
AF26	–	112	–	–	35 / 2		LF38-4		2
AF30, AF38	–	125	–	–	50 / 1				
AF09	–	–	70	–	25 / 4	LG16-4		2	0.03
AF12	–	–	78	–	25 / 4				
AF16	–	–	84	–	25 / 4				

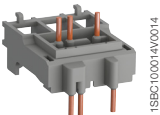


Main dimensions mm, inches

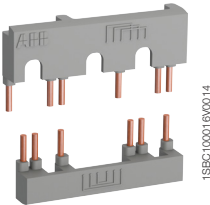


Type	For contactors	Dimensions					
		A		B		C	
		mm	inch	mm	inch	mm	inch
LH38-4	AF09 ... AF16	111.20	4.38"	83	3.27"	22	0.87"
	AF26 ... AF38	114	4.49"	86	3.39"	16	0.63"
LF16-4	AF09 ... AF16	121	4.76"	87	3.43"	23	0.91"
LF38-4	AF26 ... AF38	135.20	5.32"	103	4.06"	31	1.22"
LG16-4	AF09 ... AF16	124.20	4.89"	87	3.43"	23	0.91"

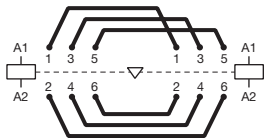
Connection accessories for starting solutions



BEA16-4



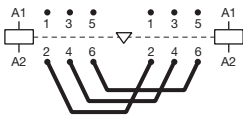
BER16-4



BER, BEM
Reversing connections



BEP140-30



BEP, BES
Phase to phase connections

Connecting links with manual motor starters

Description

The BEA insulated 3-pole connecting links are used to connect AF09 ... AF65 contactors with the MS116, MS132 or MS165 manual motor starters.

The BEA insulated 3-pole connecting links ensure the electrical and mechanical connection between the contactor and the associated manual motor starter.

Ordering details

For 3-pole contactors	Manual motor starter	Order code	Pkg qty	Weight (1 pce) kg
AF09 ... AF16	MS116-0.16 ... MS116-25, MS132-0.16 ... MS132-25	BEA16-4	10	0.03
AF26 ... AF38	MS116-0.16 ... MS116-16, MS132-0.16 ... MS132-10	BEA26-4	10	0.03
	MS116-20 ... MS116-32, MS132-12 ... MS132-32	BEA38-4	10	0.03
AF40 ... AF65	MS165-16 ... MS165-65	BEA65-4	1	0.09

Connection sets for reversing contactors

Description

The BER and BEM connection sets are used to connect the main poles of two 3-pole contactors mounted side by side.

The BER connection sets are made up of 1 upstream and 1 downstream connections.

The BEM connection sets are made up of 3 upstream and 3 downstream connections.

BER and BEM connection sets are insulated and made of solid copper bars.

Ordering details

For 3-pole contactors	Order code	Pkg qty	Weight (1 pce) kg
AF09 ... AF16	BER16-4	1	0.045
AF26 ... AF38	BER38-4	1	0.100
AF40 ... AF65	BER65-4	1	0.175
AF80, AF96	BER96-4	1	0.250
AF116 ... AF140	BER140-4	1	0.615
AF190, AF205	BER205-4	1	1.237
AF265 ... AF370	BER370-4	1	2.140
AF400, AF460	BEM460-30	1	4.400
AF580, AF750	BEM750-30	1	7.300

Phase to phase connections

Description

The BEP and BES connection sets are used to connect phase to phase the main poles of two 3 contactors mounted side by side.

The BEP connection sets are made up of 1 upstream or downstream connections.

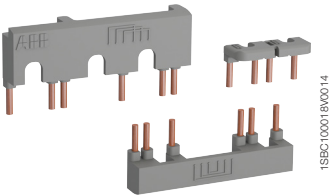
The BES connection sets are made up of 3 upstream or downstream connections.

BEP and BES connection sets are insulated and made of solid copper bars.

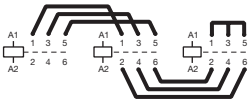
Ordering details

For 3-pole contactors	Order code	Pkg qty	Weight (1 pce) kg
3-pole contactors			
AF116 ... AF140	BEP140-30	1	0.32
AF190, AF205	BEP205-30	1	0.53
AF265 ... AF370	BEP370-30	1	0.93
AF400, AF460	BES460	1	2.20
AF580, AF750	BES750	1	3.70
4-pole contactors			
AF116 ... AF140	BEP140-30	1	0.42
AF190 ... AF205	BEP205-30	1	0.71
AF265 ... AF370	BEP370-30	1	1.23

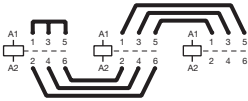
Connection sets for star-delta starter



BEY16-4



AF09 ... AF370
Line-delta-star connection



AF400 ... AF750
Star-delta-line connection

Description

The BEY and BED connection sets are used to connect the main poles of the Line, Delta and Star contactors of a star-delta starter.

The connection sets are made up of:

- Line contactor / delta contactor:
 - BEY: upstream phase-to-phase connection
 - BED: upstream connection in parallel
- Delta contactor / star contactor: downstream connection in parallel
- Star contactor: star point upstream
- Insulated, solid copper bar.

Ordering details

For 3-pole line, delta & star contactors	Interlock unit between delta & star contactors	Order code	Pkg qty	Weight (1 pce) kg
AF09 ... AF16	With or without VM4 or VEM4	BEY16-4	1	0.05
AF26 ... AF38	With or without VM4 or VEM4	BEY38-4	1	0.11
AF40 ... AF65	With or without VM96-4	BEY65-4	1	0.20
AF80, AF96	With or without VM96-4	BEY96-4	1	0.25
AF116 ... AF140	With or without VM19	BEY140-4	1	1.04
AF190 ... AF205 (line and delta) AF140 (star)	With or without VM140/190	BEY190-4	1	1.15
AF190, AF205	With or without VM19	BEY205-4	1	1.21
AF265 ... AF370 (line and delta) AF190 ... AF205 (star)	With or without VM205/265	BEY265-4	1	2.02
AF265 ... AF370	With or without VM19	BEY370-4	1	2.11
AF400 ... AF460	With or without VM750H	BED460	1	4.70
AF580 ... AF750 (line and delta) AF400 ... AF460 (star)	With or without VM750H	BED580	1	6.30
AF580 ... AF750	With or without VM750H	BED750	1	7.70

Connection bars

Connection bars between contactors and MCCB

Description

Connection between contactors/starters and moulded case circuit breakers. These connection sets are solid copper bars.

Ordering details

For contactors	MCCB	Order code	Pkg qty	Weight (1 pce)
				kg

Vertical assembly

AF116 ... AF140	XT2	BEA140/XT2	1	0.06
AF116 ... AF140	XT4	BEA140/XT4	1	0.07
AF190, AF205	XT4	BEA205/XT4	1	0.20
AF190, AF205	T4	BEA205/T4	1	0.19
AF265 ... AF370	T5	BEA370/T5	1	0.35
AF400 ... AF750	T6	BEA750/T6	1	0.41
AF400 ... AF750	T5	BEA750/T5	1	0.41

Vertical assembly with control wire terminals (also suitable when using busbar kits for starter combinations)

AF400 ... AF750	T5	BEA750D/T5	1	0.72
AF400 ... AF750	T6	BEA750D/T6	1	0.72

Horizontal assembly (also suitable when using busbar kits for starter combinations)

AF400, AF460	T4	BEA460H/T4	1	2.45
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Connection bars between contactors and switch fuse

Description

Connection between contactors/starters and moulded case circuit breakers. These connection sets are solid copper bars.

Ordering details

For contactors	Switch fuse	Order code	Pkg qty	Weight (1 pce)
				kg

Vertical assembly

AF400, AF460	OESA400	BEF460/OESA400	1	0.34
AF460 ... AF750	OESA630 to OESA800	BEF750/OESA800	1	0.74

Horizontal assembly

AF400, AF460	OESA400...LR	OESA460H/OESA400	1	1.25
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BEA140/XT2

1SFC101061M001



BEA205/T4

1SFC101064M001



BEA370/T5

1SFC101063M001

Mounting plates



PN460

1SFC10108700001

Description

Mounting plates with fixing holes for the specified contactors and overload relays.

Ordering details

For contactors		For overload relays	Order code		Pkg qty	Weight (1 pce)
						kg

Mounting plates for Direct on line starters

AF400, AF460		EF460	PN460-11		1	2.12
AF580, AF750		EF750	PN750-11		1	2.50

For two contactors side by side with space for mechanical interlock		For one or two overload relays	Order code		Pkg qty	Weight (1 pce)
						kg

Mounting plates for mechanical interlocked contactors, reversing starters and two speed starters for double windings

AF400, AF460		EF460	PN460-21		1	3.49
AF580, AF750		EF750	PN750-21		1	4.23

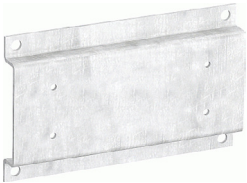
For main and delta contactors	For star contactor (1)	For overload relays	Order code		Pkg qty	Weight (1 pce)
						kg

Mounting plates for star-delta starters and two speed starters for single windings

AF400, AF460	AF400	EF460	PN460-41		1	5.31
AF580, AF750	AF400 ... AF580	EF750	PN750-41		1	6.32

(1) Space for mechanical interlock included.

Adapter plates



1SFC1010480001

PR146-1

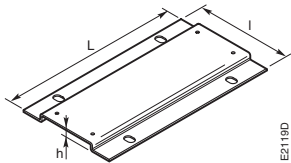
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Description

Adapter plates with fixing holes for replacing installed contactors.

Ordering details

From contactors	To contactor	Order code	Pkg qty	Weight (1 pce)
				kg
A95, AF95, A110, AF110	AF116, AF140	PR146-1	1	0.30
EH150, EH160, EH175, EH210, EG160	AF190, AF205	PR210-1	1	0.44
EH250, EH260, EH300	AF265, AF305, AF370	PR300-1	1	0.56
EH370, EH550, EG315	AF400, AF460, AF580	PR460-1	1	0.90
EH700, EH800	AF750	PR750-1	1	0.50
OKYM150, OKYM175	AF190	PR185-2	1	0.50
OKYM200, OKYM250	AF265, AF305, AF370	PR300-2	1	0.50
OKYM315	AF400, AF460	PR400-2	1	0.82
OKYM400	AF400, AF460	PR460-2	1	0.80
OKYM500	AF580	PR580-2	1	0.70
EH550, EG630, OKYM630	AF580, AF750	PR750-2	1	1.10



E2119D

Dimensions (mm)

Type of the plate	Dimensions			Fixing holes
	L	I	h	mm
PR146-1	150	90	15	4 x ø 6.5
PR210-1	200	132	11.5	4 x ø 7
PR300-1	200	172	11.5	4 x ø 7
PR460-1	278	198	11.5	4 x ø 7
PR750-1	283	244	11.5	4 x ø 7
PR185-2	202	152	11.2	4 x ø 11
PR300-2	202	152	11.2	4 x ø 11
PR400-2	278	151	11.5	4 x ø 11
PR460-2	278	176	11.5	4 x ø 11
PR580-2	283	176	11.5	4 x ø 11
PR750-2	283	255	11.5	4 x ø 14

Fixing holes according to the plate types

Contactor coils, main contact sets and arc chutes



ZAF1650

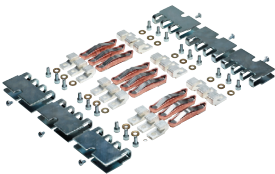
1SFC101007F0201

Contactor coils

Ordering details

For contactors	Rated control circuit voltage Uc min. ... Uc max.		Order code	Pkg qty	Weight (1 pce) kg
	V 50/60 Hz	V DC			
AF400, AF460	-	24...60	ZAF460-68	1	0.52
	48...130	48...130	ZAF460-69	1	0.52
	100...250	100...250	ZAF460-70	1	0.52
	250...500	250...500	ZAF460-71	1	0.52
AF580 ... AF1250	-	24...60	ZAF750-68	1	1.33
	48...130	48...130	ZAF750-69	1	1.33
	100...250	100...250	ZAF750-70	1	1.33
	250...500	250...500	ZAF750-71	1	1.33
AF1350 ... AF2050	100...250	100...250	ZAF1650-70 (1)	1 set	0.90
			ZP1650 (2)	1	0.30
AF2650	100...250	100...250	ZAF2650-70 (1)	1 set	0.90
			ZP2650 (2)	1	0.30

- (1) One set of two coil.
(2) Printed circuit board.



ZL1650

1SFC101009R0201

Main contact sets

Description

The contact sets for 3-pole contactors consists of six fixed contacts, three moving contacts, springs and the required screws.

Ordering details

For contactors	Order code	Pkg qty	Weight (1 pce) kg
AF400	ZL400	1	1.320
AF460	ZL460	1	1.320
AF580	ZL580	1	1.840
AF750	ZL750	1	1.840
AF1250	ZL1250	1	1.840
AF1350	ZL1350	1	2.500
AF1650	ZL1650	1	3.500
AF2050	ZL2050	1	3.500
AF2650	ZL2650 (1)	1	1.200

- (1) Does not include fixed contacts and screws

Arc chutes

Ordering details

For contactors	Order code	Pkg qty	Weight (1 pce) kg
AF400, AF460	ZW460	1	1.380
AF580, AF750, AF1250	ZW750	1	1.500
AF1350, AF1650, AF2050	ZW1650	1	4.000
AF2650	ZW2650	1	4.000



Overload relays

Overview

Thermal and electronic overload relays	6/2
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Thermal overload relays

TF42 (0.10 ... 38 A)	
Ordering details	6/4
Technical data	6/5
TF65 (22 ... 67 A)	
Ordering details	6/8
Technical data	6/9
TF96 (40 ... 96 A)	
Ordering details	6/12
Technical data	6/13
TF140DU (66 ... 142 A)	
Ordering details	6/16
Technical data	6/17
TA200DU (66 ... 200 A)	
Ordering details	6/20
Technical data	6/21

Electronic overload relays

EF19, EF45 (0.10 ... 45 A)	
Ordering details	6/24
Technical data	6/25
EF65, EF96, EF146 (25 ... 150 A)	
Ordering details	6/28
Technical data	6/29
EF205, EF370 (63 ... 380 A)	
Ordering details	6/32
Technical data	6/33
EF460, EF750, E1250DU (150 ... 1250 A)	
Ordering details	6/36
Technical data	6/37

Thermal and electronic overload relays

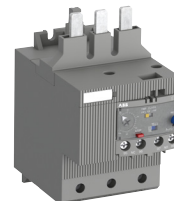
Thermal overload relays



UL/CSA: 3-phase hp-ratings	600 V	7.5 ... 25 hp	30 ... 60 hp	75 hp	
Fitting to contactors		AF09 ... AF30	AF40, AF52, AF65	AF80, AF96	
Type		TF42	TF65	TF96	
Current range		0.10 ... 38 A	22 ... 67 A	40 ... 96 A	
Trip class		10	10	10	
Separate mounting kit		DB42	DB65	DB96	

6 Electronic overload relays

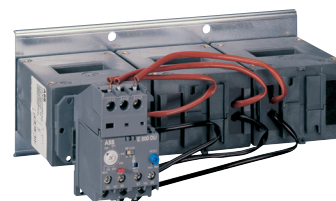
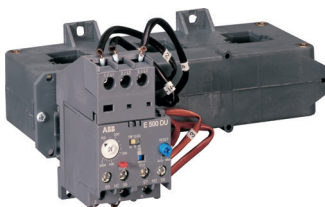
with integrated CT



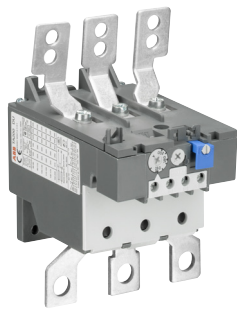
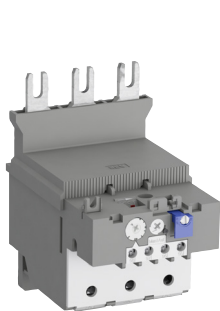
UL/CSA: 3-phase hp-ratings	600 V	7.5 ... 15 hp	20 ... 25 hp	30 ... 60 hp	
Fitting to contactors		AF09 ... AF16	AF26 ... AF30	AF40, AF52, AF65	
Type		EF19	EF45	EF65	
Current range		0.10 ... 19 A	9 ... 45 A	25 ... 70 A	
Trip class			10E, 20E, 30E selectable		
Separate mounting kit		DB19EF	DB45EF	-	

Electronic overload relays

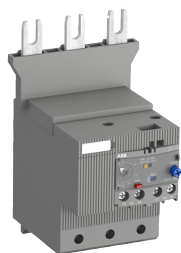
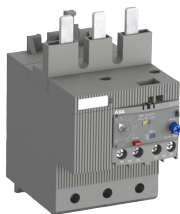
with external separate CT



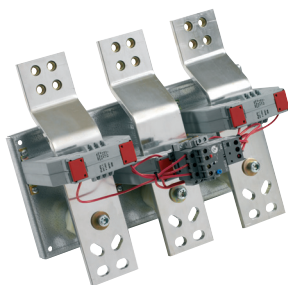
UL/CSA: 3-phase hp-ratings	600 V	400 ... 500 hp	600 ... 700 hp	
Fitting to contactors		AF400, AF460	AF580, AF750	
Type		EF460	EF750	
Current range		150 ... 500 A	250 ... 800 A	
Trip class			10E, 20E, 30E selectable	



100 ... 125 hp	150 ... 200 hp
AF116, AF140	AF190, AF205
TF140DU	TA200DU
66 ... 142 A	66 ... 200 A
10A	10A
-	DB200



75 hp	100 ... 125 hp	150 ... 200 hp	250 ... 350 hp
AF80, AF96	AF116, AF140	AF190, AF205	AF265, AF305, AF370
EF96	EF146	EF205	EF370
36 ... 100 A	54 ... 150 A	63 ... 210 A	115 ... 380 A
10E, 20E, 30E selectable			
DB96	-	-	-



900 ... 1000 hp
AF1350, AF1650
E1250DU
375 ... 1250 A
10E, 20E, 30E selectable

TF42 thermal overload relays for contactor AF09 ... AF38

0.10 ... 38.0 A



1SBC101326F0010

TF42



2CDC231001F0011

DB42



2CDC231026F0013

TF42 + DB42



1SFC161402F0001

KPR-101L

Description

The TF42 thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure. The devices have trip class 10.

The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications

Ordering details

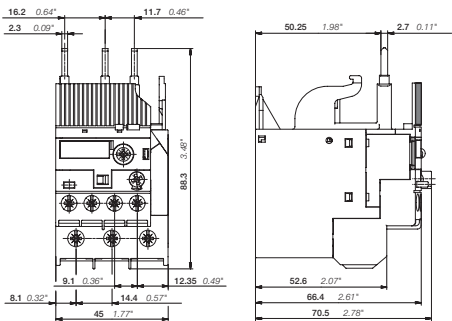
Setting range	Short-circuit protective device 100kA 600 VAC	Trip class	Fitting to contactors	Order code	Weight (1 pce) kg
A					
0.10 ... 0.13	1 A, Fuse class J	10	AF09 ... AF38	TF42-0.13	0.13
0.13 ... 0.17	1 A, Fuse class J	10	AF09 ... AF38	TF42-0.17	0.13
0.17 ... 0.23	1 A, Fuse class J	10	AF09 ... AF38	TF42-0.23	0.13
0.23 ... 0.31	3 A, Fuse class J	10	AF09 ... AF38	TF42-0.31	0.13
0.31 ... 0.41	3 A, Fuse class J	10	AF09 ... AF38	TF42-0.41	0.13
0.41 ... 0.55	3 A, Fuse class J	10	AF09 ... AF38	TF42-0.55	0.13
0.55 ... 0.74	3 A, Fuse class J	10	AF09 ... AF38	TF42-0.74	0.13
0.74 ... 1.00	6 A, Fuse class J	10	AF09 ... AF38	TF42-1.0	0.13
1.00 ... 1.30	6 A, Fuse class J	10	AF09 ... AF38	TF42-1.3	0.13
1.30 ... 1.70	6 A, Fuse class J	10	AF09 ... AF38	TF42-1.7	0.13
1.70 ... 2.30	10 A, Fuse class J	10	AF09 ... AF38	TF42-2.3	0.13
2.30 ... 3.10	10 A, Fuse class J	10	AF09 ... AF38	TF42-3.1	0.13
3.10 ... 4.20	15 A, Fuse class J	10	AF09 ... AF38	TF42-4.2	0.13
4.20 ... 5.70	20 A, Fuse class J	10	AF09 ... AF38	TF42-5.7	0.13
5.70 ... 7.60	25 A, Fuse class J	10	AF09 ... AF38	TF42-7.6	0.13
7.60 ... 10.0	35 A, Fuse class J	10	AF09 ... AF38	TF42-10	0.13
10.0 ... 13.0	40 A, Fuse class J	10	AF09 ... AF38	TF42-13	0.13
13.0 ... 16.0	60 A, Fuse class J	10	AF09 ... AF38	TF42-16	0.13
16.0 ... 20.0	80 A, Fuse class J	10	AF09 ... AF38	TF42-20	0.15
20.0 ... 24.0	80 A, Fuse class J	10	AF09 ... AF38	TF42-24	0.15
24.0 ... 29.0	100 A, Fuse class J	10	AF09 ... AF38	TF42-29	0.15
29.0 ... 35.0	150 A, Fuse class J	10	AF09 ... AF38	TF42-35	0.15
35.0 ... 38.0/40.0	150 A, Fuse class J	10	AF09 ... AF38	TF42-38	0.15

Ordering details accessories

For thermal overload relays	Description	Order code	Weight (1 pce) kg
A			
TF42	Single mounting kit	DB42	0.09
TF42	Reset push button*	KPR-101L	0.03

*Note: for more information see catalogue AC1400

Main dimensions mm, inches



TF42

2CDC232026F0009

TF42 thermal overload relays

Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	TF42
Standards	UL 508, CSA 22.2 No. 14
Maximum operational voltage	600 V AC
Trip rating	125 % of FLA
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"
Short-circuit protective device	See table "Full load amps and short-circuit protective device"

Auxiliary circuit according to UL/CSA

Type	TF42
Contact rating	N.C., 95-96 B600, Q300
	N.O., 97-98 D300, Q300
Conventional thermal current	N.C., 95-96 5 A
	N.O., 97-98 1 A

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device		480 / 600 V AC	
		Short circuit rating RMS symmetrical	Fuse type	Short circuit rating RMS symmetrical	Fuse type
TF42-0.13	0.13 A	18 kA	1 A, K5	100 kA	30 A, Class J
TF42-0.17	0.17 A	18 kA	1 A, K5	100 kA	30 A, Class J
TF42-0.23	0.23 A	18 kA	1 A, K5	100 kA	30 A, Class J
TF42-0.31	0.31 A	18 kA	3 A, K5	100 kA	30 A, Class J
TF42-0.41	0.41 A	18 kA	3 A, K5	100 kA	30 A, Class J
TF42-0.55	0.55 A	18 kA	3 A, K5	100 kA	30 A, Class J
TF42-0.74	0.74 A	18 kA	3 A, K5	100 kA	30 A, Class J
TF42-1.0	1.00 A	18 kA	6 A, K5	100 kA	30 A, Class J
TF42-1.3	1.30 A	18 kA	6 A, K5	100 kA	30 A, Class J
TF42-1.7	1.70 A	18 kA	6 A, K5	100 kA	30 A, Class J
TF42-2.3	2.30 A	18 kA	10 A, K5	100 kA	30 A, Class J
TF42-3.1	3.10 A	18 kA	10 A, K5	100 kA	30 A, Class J
TF42-4.2	4.20 A	18 kA	15 A, K5	100 kA	30 A, Class J
TF42-5.7	5.70 A	18 kA	20 A, K5	100 kA	30 A, Class J
TF42-7.6	7.60 A	18 kA	25 A, K5	100 kA	30 A, Class J
TF42-10	10.0 A	18 kA	35 A, K5	100 kA	45 A, Class J
TF42-13	13.0 A	18 kA	40 A, K5	100 kA	45 A, Class J
TF42-16	16.0 A	18 kA	60 A, K5	100 kA	45 A, Class J
TF42-20	20.0 A	18 kA	80 A, K5	100 kA	60 A, Class J
TF42-24	24.0 A	18 kA	80 A, K5	100 kA	60 A, Class J
TF42-29	29.0 A	18 kA	100 A, K5	100 kA	100 A, Class J
TF42-35	35.0 A	18 kA	150 A, K5	100 kA	175 A, Class J
TF42-38	38.0 A	18 kA	150 A, K5	100 kA	175 A, Class J

TF42 thermal overload relays

Technical data

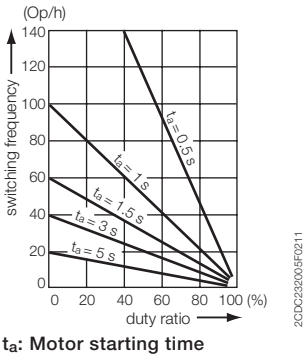
Main circuit – Utilization characteristics according to IEC/EN

Type	TF42
Standards	IEC/EN 60947-4-1, IEC/EN 60947-5-1, IEC/EN 60947-1
Rated operational voltage U_e	690 V AC
Rated frequency	50/60 Hz
Trip class	10
Number of poles	3
Duty time	100 %
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	690 V AC

Auxiliary circuit according to IEC/EN

Type	TF42
Rated operational voltage U_e	600 V
Conventional free air thermal current I_{th}	N.C., 95-96 6 A N.O., 97-98 4 A
Rated frequency	DC, 50/60 Hz
Number of poles	1 N.O. + 1 N.C.
I_e / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category	
110-120 V	N.C., 95-96 3.00 A N.O., 97-98 0.75 A
220-230-240 V	N.C., 95-96 3.00 A N.O., 97-98 0.75 A
440 V	N.C., 95-96 0.75 A N.O., 97-98 0.75 A
480-500 V	N.C., 95-96 0.75 A N.O., 97-98 0.75 A
I_e / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category	
24 V	N.C., 95-96 1.25 A N.O., 97-98 1.25 A
110-120-125 V	N.C., 95-96 0.55 A N.O., 97-98 0.55 A
250 V	N.C., 95-96 0.27 A N.O., 97-98 0.27 A
Minimum switching capacity	17 V / 3 mA
Short-circuit protective device	N.C., 95-96 6 A, Fuse type gG N.O., 97-98 4 A, Fuse type gG
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	690 V

Technical diagram – Intermittent periodic duty



TF42 thermal overload relays

Technical data

General technical data

Type	TF42	
Pollution degree	3	
Phase loss sensitive	Yes	
Ambient air temperature		
Operation	Open - compensated	-25 ... +60 °C
Storage	Open	-25 ... +60 °C
Storage		-50 ... +80 °C
Ambient air temperature compensation	Acc. to IEC/EN60947-4-1	
Maximum operating altitude permissible	2000 m	
Resistance to shock acc. to IEC 60068-2-27	25g / 11 ms	
Resistance to vibrations acc. to IEC 60068-2-6	3g / 3 ... 150 Hz	
Mounting position	Position 1-5	
Mounting	Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit on DIN rail (35 mm)	
Degree of protection	Housing	IP20
	Main circuit terminals	IP10

Electrical connection

Main circuit

Type	TF42 (TF42-0.13 ... TF42-16)		TF42 (TF42-20 ... TF42-38)
Connecting capacity			
 Rigid	1 x or 2 x	0.75 ... 4 mm ²	1.5 ... 2.5 mm ² or 2.5 ... 10 mm ² ¹⁾
 Flexible with insulated ferrule	1 x or 2 x	0.75 ... 4 mm ²	2.5 ... 4 mm ² or 4 ... 6 mm ²
Stranded acc. to UL/CSA	1 x or 2 x	AWG 18-10	AWG 14-6
Flexible acc. to UL/CSA	1 x or 2 x	AWG 18-10	AWG 14-6
Stripping length	12 mm		
Tightening torques	1.5 - 2.5 Nm / 13 ... 22 lb.in		2.5 - 2.7 Nm / 22 lb.in
Connection screw	M4 (Pozidriv 2)		

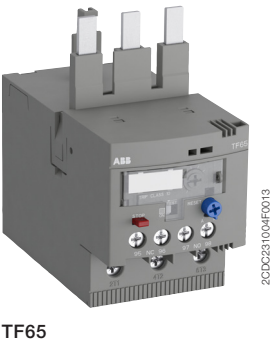
¹⁾ Only connect two different "conductor/wire" cross-sections, if they are within the indicated ranges

Auxiliary circuit

Type	TF42	
Connecting capacity		
 Rigid	1 x or 2 x	0.75 ... 4 mm ²
 Flexible with ferrule	1 x or 2 x	0.75 ... 2.5 mm ²
 Flexible with insulated ferrule	1 x	0.75 ... 2.5 mm ²
	2 x	0.75 ... 1.5 mm ²
 Flexible	1 x or 2 x	0.75 ... 1 mm ² or 1 ... 2.5 mm ²
Stranded acc. to UL/CSA	1 x or 2 x	AWG 18-12
Flexible acc. to UL/CSA	1 x or 2 x	AWG 18-12
Stripping length	9 mm	
Tightening torques	1.1 ... 1.5 Nm / 9 ... 13 lb.in	
Connection screw	M3 (Pozidriv 2)	

TF65 thermal overload relays for contactor AF40 ... AF65

22 ... 67A



Description

The TF65 thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure. The devices have trip class 10.

The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications

Ordering details

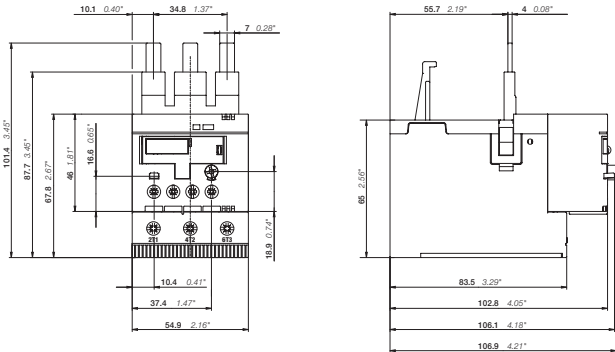
Setting range	Short-circuit protective device 100 kA 600 VAC	Trip class	Fitting to contactors	Order code	Weight (1 pce) kg
A					
22 ... 28	100 A, Fuse class J	10	AF40 ... AF65	TF65-28	0.46
25 ... 33	100 A, Fuse class J	10	AF40 ... AF65	TF65-33	0.46
30 ... 40	100 A, Fuse class J	10	AF40 ... AF65	TF65-40	0.46
36 ... 47	125 A, Fuse class J	10	AF40 ... AF65	TF65-47	0.46
44 ... 53	125 A, Fuse class J	10	AF40 ... AF65	TF65-53	0.46
50 ... 60	150 A, Fuse class J	10	AF40 ... AF65	TF65-60	0.47
57 ... 67	150 A, Fuse class J	10	AF40 ... AF65	TF65-67	0.47

Ordering details accessories

For thermal overload relays	Description	Order code	Weight (1 pce) kg
A			
TF65	Reset push button*	KPR-101L	0.03
TF65	Single mounting kit	DB65	0.13

*Note: for more information see catalogue AC1400

Main dimensions mm, inches



TF65

TF65 thermal overload relays

Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	TF65
Standards	UL 508, CSA 22.2 No. 14
Maximum operational voltage	600 V AC
Trip rating	125 % of FLA
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"
Short-circuit protective device	See table "Full load amps and short-circuit protective device"

Auxiliary circuit according to UL/CSA

Type	TF65
Contact rating	N.C., 95-96 B600, Q600
	N.O., 97-98 D300, Q600
Conventional thermal current	N.C., 95-96 5 A
	N.O., 97-98 1 A

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device		480 / 600 V AC	
		Short circuit rating RMS symmetrical	Fuse type	Short circuit rating RMS symmetrical	Fuse type
TF65-28	28 A	5 kA	100 A, K5 / RK5	100 kA	100 A, Class J
TF65-33	33 A	5 kA	100 A, K5 / RK5	100 kA	100 A, Class J
TF65-40	40 A	5 kA	100 A, K5 / RK5	100 kA	100 A, Class J
TF65-47	47 A	5 kA	125 A, K5 / RK5	100 kA	125 A, Class J
TF65-53	53 A	10 kA	125 A, K5 / RK5	100 kA	125 A, Class J
TF65-60	60 A	10 kA	150 A, K5 / RK5	100 kA	150 A, Class J
TF65-67	67 A	10 kA	150 A, K5 / RK5	100 kA	150 A, Class J

TF65 thermal overload relays

Technical data

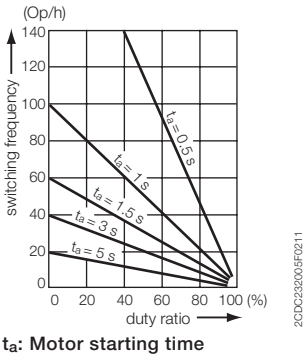
Main circuit – Utilization characteristics according to IEC/EN

Type	TF65
Standards	IEC/EN 60947-4-1, IEC/EN 60947-5-1, IEC/EN 60947-1
Rated operational voltage U_e	690 V AC
Rated frequency	50/60 Hz
Trip class	10
Number of poles	3
Duty time	100 %
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	690 V AC

Auxiliary circuit according to IEC/EN

Type	TF65
Rated operational voltage U_e	600 V
Conventional free air thermal current I_{th}	N.C., 95-96 6 A N.O., 97-98 4 A
Rated frequency	DC, 50/60 Hz
Number of poles	1 N.O. + 1 N.C.
I_e / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category	
110-120 V	N.C., 95-96 3.00 A N.O., 97-98 0.75 A
220-230-240 V	N.C., 95-96 3.00 A N.O., 97-98 0.75 A
440 V	N.C., 95-96 0.75 A N.O., 97-98 0.75 A
480-500 V	N.C., 95-96 0.75 A N.O., 97-98 0.75 A
I_e / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category	
24 V	N.C., 95-96 1.25 A N.O., 97-98 1.25 A
110-120-125 V	N.C., 95-96 0.55 A N.O., 97-98 0.55 A
250 V	N.C., 95-96 0.27 A N.O., 97-98 0.27 A
Minimum switching capacity	17 V / 3 mA
Short-circuit protective device	N.C., 95-96 6 A, Fuse type gG N.O., 97-98 4 A, Fuse type gG
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	690 V

Technical diagram – Intermittent periodic duty



TF65 thermal overload relays

Technical data

General technical data

Type	TF65	
Pollution degree	3	
Phase loss sensitive	Yes	
Ambient air temperature		
Operation	Open - compensated	-25 ... +60 °C
	Open	-25 ... +60 °C
Storage	-50 ... +80 °C	
Ambient air temperature compensation	Acc. to IEC/EN60947-4-1	
Maximum operating altitude permissible	2000 m	
Resistance to shock acc. to IEC 60068-2-27	25g / 11 ms	
Resistance to vibrations acc. to IEC 60068-2-6	5g / 3 ... 150 Hz	
Mounting position	Position 1	
Mounting	Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit on DIN rail (35 mm)	
Degree of protection	Housing	IP20
	Main circuit terminals	IP10

Electrical connection

Main circuit

Type	TF65	
Connecting capacity		
 Rigid	1 x or 2 x	2.5 ... 16 mm ² (1 x 2.5 ... 35 mm ²)
 Flexible with insulated ferrule	1 x or 2 x	2.5 ... 16 mm ² (1 x 2.5 ... 35 mm ²)
Stranded acc. to UL/CSA	1 x or 2 x	AWG 12-6 (1 x AWG 12 ... 2)
Flexible acc. to UL/CSA	1 x or 2 x	AWG 12-6 (1 x AWG 12 ... 2)
Stripping length	17 mm	
Tightening torques	4.0 - 4.5 Nm / 35 ... 40 lb.in	
Connection screw	M6 (Pozidriv 2)	

¹⁾ Only connect two different "conductor/wire" cross-sections, if they are within the indicated ranges

Auxiliary circuit

Type	TF65	
Connecting capacity		
 Rigid	1 x or 2 x	0.75 ... 4 mm ²
 Flexible with ferrule	1 x or 2 x	0.75 ... 2.5 mm ²
 Flexible with insulated ferrule	1 x	0.75 ... 2.5 mm ²
	2 x	0.75 ... 1.5 mm ²
 Flexible	1 x or 2 x	0.75 ... 1 mm ² or 1 ... 2.5 mm ²
Stranded acc. to UL/CSA	1 x or 2 x	AWG 18-12
Flexible acc. to UL/CSA	1 x or 2 x	AWG 18-12
Stripping length	9 mm	
Tightening torques	1.1 ... 1.5 Nm / 9 ... 13 lb.in	
Connection screw	M3 (Pozidriv 2)	

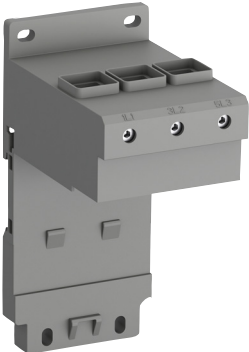
TF96 thermal overload relays for AF80 ... AF96

40 ... 96A



TF96

2CDD231009F0013



DB96

2CDD231001V0015



DB96 + TF96

2CDD231009V0015



KPR-101L

1SFC151402F0001

Description

The TF69 thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure. The devices have trip class 10.

The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications

Ordering details

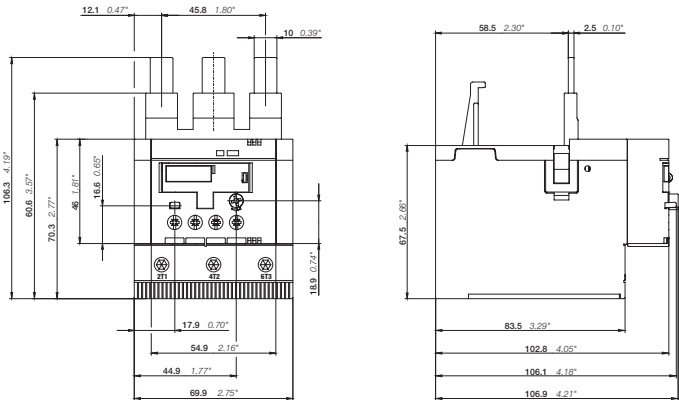
Setting range	Short-circuit protective device 100 kA 600 VAC	Trip class	Fitting to contactors	Order code	Weight (1 pce) kg
A					
40 ... 51	125 A, Fuse class J	10	AF80 ... AF96	TF96-51	0.62
48 ... 60	150 A, Fuse class J	10	AF80 ... AF96	TF96-60	0.62
57 ... 68	150 A, Fuse class J	10	AF80 ... AF96	TF96-68	0.62
65 ... 78	175 A, Fuse class J	10	AF80 ... AF96	TF96-78	0.62
75 ... 87	200 A, Fuse class J	10	AF80 ... AF96	TF96-87	0.62
84 ... 96	225 A, Fuse class J	10	AF80 ... AF96	TF96-96	0.63

Ordering details accessories

For thermal overload relays	Description	Order code	Weight (1 pce) kg
A			
TF96	Reset push button*	KPR-101L	0.03
TF96, EF96	Single mounting kit	DB96	0.19

*Note: for more information see catalogue AC1400

Main dimensions mm, inches



TF96

2CDD232005F0009

TF96 thermal overload relays

Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	TF96
Standards	UL 508, CSA 22.2 No. 14
Maximum operational voltage	600 V AC
Trip rating	125 % of FLA
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"
Short-circuit protective device	See table "Full load amps and short-circuit protective device"

Auxiliary circuit according to UL/CSA

Type	TF96
Contact rating	N.C., 95-96 B600, Q600
	N.O., 97-98 D300, Q600
Conventional thermal current	N.C., 95-96 5 A
	N.O., 97-98 1 A

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device		480 / 600 V AC	
		Short circuit rating RMS symmetrical	Fuse type	Short circuit rating RMS symmetrical	Fuse type
TF96-51	51 A	5 kA	150 A, K5 / RK5	100 kA	125 A, Class J
TF96-60	60 A	10 kA	150 A, K5 / RK5	100 kA	150 A, Class J
TF96-68	68 A	10 kA	150 A, K5 / RK5	100 kA	150 A, Class J
TF96-78	78 A	10 kA	175 A, K5 / RK5	100 kA	175 A, Class J
TF96-87	87 A	10 kA	200 A, K5 / RK5	100 kA	200 A, Class J
TF96-96	96 A	10 kA	250 A, K5 / RK5	100 kA	225 A, Class J

TF96 thermal overload relays

Technical data

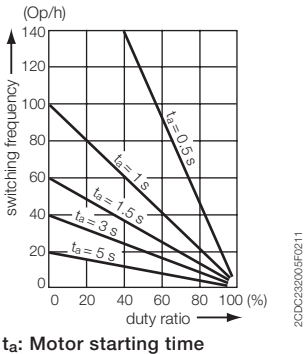
Main circuit – Utilization characteristics according to IEC/EN

Type	TF96
Standards	IEC/EN 60947-4-1, IEC/EN 60947-5-1, IEC/EN 60947-1
Rated operational voltage U_e	690 V AC
Rated frequency	50/60 Hz
Trip class	10
Number of poles	3
Duty time	100 %
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	690 V AC

Auxiliary circuit according to IEC/EN

Type	TF96
Rated operational voltage U_e	600 V
Conventional free air thermal current I_{th}	N.C., 95-96 6 A N.O., 97-98 4 A
Rated frequency	DC, 50/60 Hz
Number of poles	1 N.O. + 1 N.C.
I_e / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category	
110-120 V	N.C., 95-96 3.00 A N.O., 97-98 0.75 A
220-230-240 V	N.C., 95-96 3.00 A N.O., 97-98 0.75 A
440 V	N.C., 95-96 0.75 A N.O., 97-98 0.75 A
480-500 V	N.C., 95-96 0.75 A N.O., 97-98 0.75 A
I_e / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category	
24 V	N.C., 95-96 1.25 A N.O., 97-98 1.25 A
110-120-125 V	N.C., 95-96 0.55 A N.O., 97-98 0.55 A
250 V	N.C., 95-96 0.27 A N.O., 97-98 0.27 A
Minimum switching capacity	17 V / 3 mA
Short-circuit protective device	N.C., 95-96 6 A, Fuse type gG N.O., 97-98 4 A, Fuse type gG
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	690 V

Technical diagram – Intermittent periodic duty



TF96 thermal overload relays

Technical data

General technical data

Type	TF96	
Pollution degree	3	
Phase loss sensitive	Yes	
Ambient air temperature		
Operation	Open - compensated	-25 ... +60 °C
	Open	-25 ... +60 °C
Storage	-50 ... +80 °C	
Ambient air temperature compensation	Acc. to IEC/EN60947-4-1	
Maximum operating altitude permissible	2000 m	
Resistance to shock acc. to IEC 60068-2-27	25g / 11 ms	
Resistance to vibrations acc. to IEC 60068-2-6	3g / 3 ... 150 Hz	
Mounting position	Position 1-5	
Mounting	Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit on DIN rail (35 mm)	
Degree of protection	Housing	IP20
	Main circuit terminals	IP10

Electrical connection

Main circuit

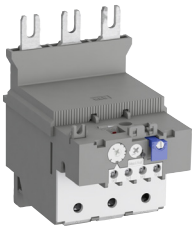
Type	TF96	
Connecting capacity		
 Rigid	1 x or 2 x	6 ... 35 mm ² (1 x 6 ... 50 mm ²)
 Flexible with insulated ferrule	1 x or 2 x	6 ... 16 mm ² (1 x 6 ... 50 mm ²)
Stranded acc. to UL/CSA	1 x or 2 x	AWG 8-3 (1 x AWG 8 ... 1)
Flexible acc. to UL/CSA	1 x or 2 x	AWG 8-3 (1 x AWG 8 ... 1)
Stripping length	22 mm	
Tightening torques	6.5 - 9 Nm / 57 ... 80 lb.in	
Connection screw	M8 (Hexagon 4)	

¹⁾ Only connect two different "conductor/wire" cross-sections, if they are within the indicated ranges

Auxiliary circuit

Type	TF96	
Connecting capacity		
 Rigid	1 x or 2 x	0.75 ... 4 mm ²
 Flexible with ferrule	1 x or 2 x	0.75 ... 2.5 mm ²
 Flexible with insulated ferrule	1 x	0.75 ... 2.5 mm ²
	2 x	0.75 ... 1.5 mm ²
 Flexible	1 x or 2 x	0.75 ... 1 mm ² or 1 ... 2.5 mm ²
Stranded acc. to UL/CSA	1 x or 2 x	AWG 18-12
Flexible acc. to UL/CSA	1 x or 2 x	AWG 18-12
Stripping length	9 mm	
Tightening torques	1.1 ... 1.5 Nm / 9 ... 13 lb.in	
Connection screw	M3 (Pozidriv 2)	

TF140DU thermal overload relays for contactor AF116 ... AF140 66 ... 142 A



TF140DU-110

2CDC23 1012V0012



KPR-101L

1SFC151402F0001

Description

The TF140DU thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure. The devices have trip class 10A.

The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications

Ordering details

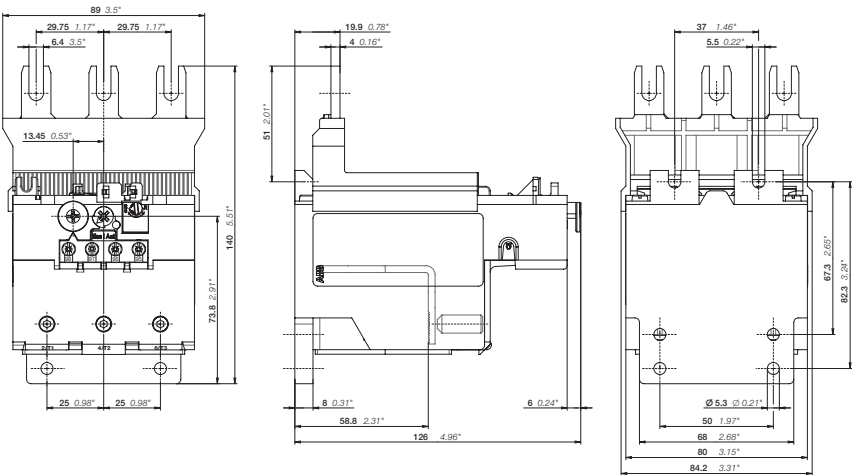
Setting range	Short-circuit protective device 100 kA 600 VAC	Trip class	Fitting to contactors	Order code	Weight (1 pce) kg
A					
66 ... 90	250 A, Fuse class J	10A	AF116 ... AF140	TF140DU-90	0.82
80 ... 110	250 A, Fuse class J	10A	AF116 ... AF140	TF140DU-110	0.82
100 ... 135	250 A, Fuse class J	10A	AF116 ... AF140	TF140DU-135	0.82
110 ... 142	250 A, Fuse class J	10A	AF116 ... AF140	TF140DU-142	0.82

Ordering details accessories

For thermal overload relays	Description	Order code	Weight (1 pce) kg
A			
TF140DU	Reset push button*	KPR-101L	0.03

*Note: for more information see catalogue AC1400

Main dimensions mm, inches



TF140DU

TF140DU thermal overload relays

Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	TF140DU
Standards	UL 508, CSA 22.2 No. 14, UL 60947-4-1A
Maximum operational voltage	600 V AC
Trip rating	125 % of FLA
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"
Short-circuit protective device	See table "Full load amps and short-circuit protective device"

Auxiliary circuit according to UL/CSA

Type	TF140DU
Contact rating	N.C., 95-96 B600
	N.O., 97-98 C300
Conventional thermal current	N.C./N.O. 5 A / 2.5 A

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device		480 / 600 V AC		480 / 600 V AC	
		480 / 600 V AC		480 / 600 V AC		480 / 600 V AC	Listed circuit breaker
		Short circuit rating RMS symmetrical	Fuse type	Short circuit rating RMS symmetrical	Fuse type	Short circuit rating RMS symmetrical	
TF140DU-90	90 A	10 kA	250 A, K5 / RK5	100 kA	250 A, Class J	100 kA	250 A
TF140DU-110	110 A	10 kA	250 A, K5 / RK5	100 kA	250 A, Class J	100 kA	250 A
TF140DU-135	135 A	10 kA	250 A, K5 / RK5	100 kA	250 A, Class J	100 kA	250 A
TF140DU-142	142 A	10 kA	250 A, K5 / RK5	100 kA	250 A, Class J	100 kA	250 A

TF140DU thermal overload relays

Technical data

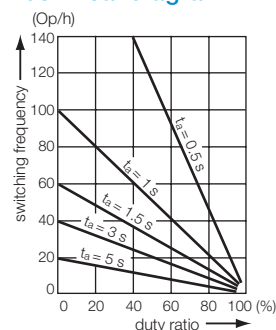
Main circuit – Utilization characteristics according to IEC/EN

Type	TF140DU
Standards	IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1
Rated operational voltage U_e	690 V AC
Rated frequency	DC, 50/60 Hz
Frequency range	0 ... 400 Hz
Trip class	10A
Number of poles	3
Duty time	100 %
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"
Rated impulse withstand voltage U_{imp}	8 kV
Rated insulation voltage U_i	690 V

Auxiliary circuit according to IEC/EN

Type	TF140DU
Rated operational voltage U_e	500 V AC, 440 V DC
Conventional free air thermal current I_{th}	N.C., 95-96 10 A N.O., 97-98 6 A
Rated frequency	DC, 50/60 Hz
Number of poles	1 N.O. + 1 N.C.
I_e / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category	
110-120 V	N.C., 95-96 3.00 A N.O., 97-98 1.50 A
220-230-240 V	N.C., 95-96 1.50 A N.O., 97-98 1.50 A
440 V	N.C., 95-96 1.00 A N.O., 97-98 1.00 A
480-500 V	N.C., 95-96 1.00 A N.O., 97-98 1.00 A
I_e / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category	
24 V	N.C., 95-96 1.25 A N.O., 97-98 1.25 A
60 V	N.C., 95-96 0.25 A N.O., 97-98 0.25 A
110-120-125 V	N.C., 95-96 0.25 A N.O., 97-98 0.25 A
250 V	N.C., 95-96 0.12 A N.O., 97-98 0.04 A
Minimum switching capacity	17 V / 3 mA
Short-circuit protective device	N.C., 95-96 10 A, Fuse type gG N.O., 97-98 6 A, Fuse type gG
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	690 V

Technical diagram – Intermittent periodic duty



t_a : Motor starting time

2CDC22006F0211

TF140DU thermal overload relays

Technical data

General technical data

Type	TF140DU	
Pollution degree	3	
Phase loss sensitive	Yes	
Ambient air temperature		
Operation	Open - compensated	-25 ... +55 °C
	Open	-25 ... +55 °C
Storage	-40 ... +70 °C	
Ambient air temperature compensation	Acc. to IEC/EN 60947-4-1	
Maximum operating altitude permissible	2000 m	
Resistance to shock acc. to IEC 60068-2-27	12g / 11 ms	
Mounting position	Position 1-5	
Mounting	Mount on the contactor and tighten the screws of the main circuit terminals	
Degree of protection	Housing	IP20
	Main circuit terminals	IP00

Electrical connection

Main circuit

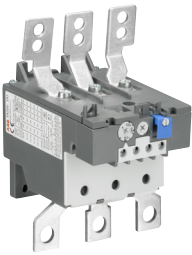
Type	TF140DU	
Connecting capacity		
 Rigid	1 x	16 ... 70 mm ²
	2 x	-
 Flexible	1 x	16 ... 70 mm ²
	2 x	-
	Stranded acc. to UL/CSA	1 x or 2 x AWG 6-2/0
	Flexible acc. to UL/CSA	1 x or 2 x AWG 6-2/0
Stripping length	25 mm	
Tightening torques	8 ... 10 Nm / 77 ... 88 lb.in	
Connection screw	M8 (Hexagon)	

Auxiliary circuit

Type	TF140DU	
Connecting capacity		
 Rigid	1 x or 2 x	0.75 ... 4 mm ²
 Flexible with ferrule	1 x or 2 x	0.75 ... 2.5 mm ²
 Flexible with insulated ferrule	1 x or 2 x	0.75 ... 2.5 mm ²
 Flexible	1 x or 2 x	0.75 ... 2.5 mm ²
	Stranded acc. to UL/CSA	1 x or 2 x AWG 18-14
	Flexible acc. to UL/CSA	1 x or 2 x AWG 18-14
Stripping length	9 mm	
Tightening torques	0.8 ... 1.3 Nm / 12 lb.in	
Connection screw	M3.5 (Pozi driv 2)	

TA200DU thermal overload relays for contactor AF190 ... AF205

66 ... 200 A



TA200DU-200

2DC2321010F0011



KPR-101L

18FC151402F0001

Description

The TA200DU thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure. The devices have trip class 10A.

The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications

Ordering details

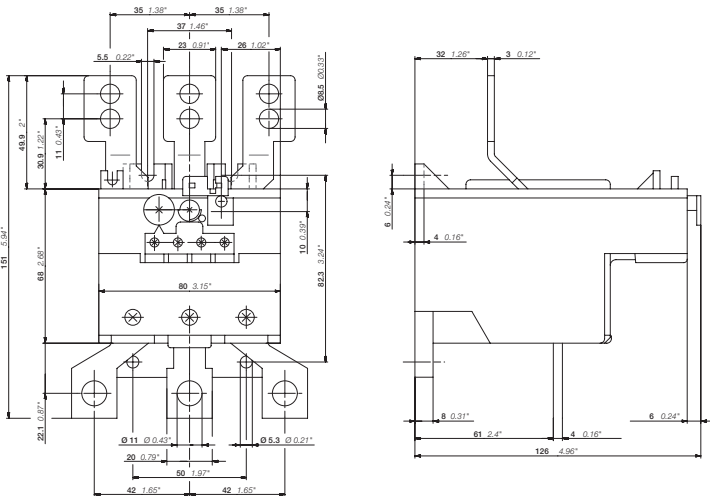
Setting range	Short-circuit protective device 100 kA 600 VAC	Trip class	Fitting to contactors	Order code	Weight (1 pce) kg
A					
66 ... 90	250 A, Fuse class J	10A	AF190 ... AF205	TA200DU90	0.76
80 ... 110	250 A, Fuse class J	10A	AF190 ... AF205	TA200DU110	0.76
100 ... 135	250 A, Fuse class J	10A	AF190 ... AF205	TA200DU135	0.76
110 ... 150	250 A, Fuse class J	10A	AF190 ... AF205	TA200DU150	0.76
130 ... 175	300 A, Fuse class J	10A	AF190 ... AF205	TA200DU175	0.77
150 ... 200	400 A, Fuse class J	10A	AF190 ... AF205	TA200DU200	0.79

Ordering details accessories

For thermal overload relays	Description	Order code	Weight (1 pce) kg
A			
TA200DU	Terminal shroud	LT200/A	0.09
TA200DU	Single mounting kit	DB200	0.23
TA200DU	Reset push button*	KPR-101L	0.03

*Note: for more information see catalogue AC1400

Main dimensions mm, inches



TA200DU

2DC232021F0011

TA200DU thermal overload relays

Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	TA200DU
Standards	UL 508, CSA 22.2 No. 14
Maximum operational voltage	600 V AC
Trip rating	125 % of FLA
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"
Short-circuit protective device	See table "Full load amps and short-circuit protective device"

Auxiliary circuit according to UL/CSA

Type	TA200DU
Contact rating	N.C., 95-96 C600
	N.O., 97-98 B600
Conventional thermal current	N.C. / N.O. 2.5 A / 5 A

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device						
		480 / 600 V AC						
		Short circuit rating RMS symmetrical	Fuse type	Listed circuit breaker	Short circuit rating RMS symmetrical	Fuse type	Short circuit rating RMS symmetrical	Listed circuit breaker
TA200DU-90	90 A	10 kA	250 A, K5 / RK5	225 A	100 kA	250 A, Class J	100 kA	250 A
TA200DU-110	110 A	10 kA	250 A, K5 / RK5	225 A	100 kA	250 A, Class J	100 kA	250 A
TA200DU-135	135 A	10 kA	300 A, K5 / RK5	225 A	100 kA	250 A, Class J	100 kA	250 A
TA200DU-150	150 A	10 kA	300 A, K5 / RK5	225 A	100 kA	250 A, Class J	100 kA	250 A
TA200DU-175	175 A	10 kA	300 A, K5 / RK5	225 A	100 kA	300 A, Class J	100 kA	300 A
TA200DU-200	200 A	10 kA	400 A, K5 / RK5	400 A	100 kA	400 A, Class J	100 kA	400 A

TA200DU thermal overload relays

Technical data

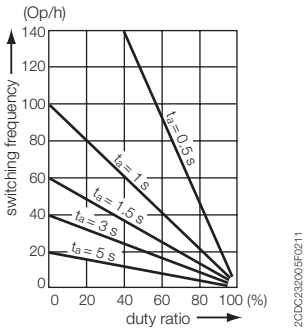
Main circuit – Utilization characteristics according to IEC/EN

Type	TA200DU
Standards	IEC/EN 60947-1, IEC/EN 60947-4-1
Rated operational voltage U_e	690 V AC
Rated frequency	DC, 50/60 Hz
Frequency range	0 ... 400 Hz
Trip class	10A
Number of poles	3
Duty time	100 %
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	690 V AC

Auxiliary circuit according to IEC/EN

Type	TA200DU
Rated operational voltage U_e	500 V AC, 440 V DC
Conventional free air thermal current I_{th}	N.C., 95-96 10 A N.O., 97-98 6 A
Rated frequency	DC, 50/60 Hz
Number of poles	1 N.O. + 1 N.C.
I_e / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category	
110-120 V	N.C., 95-96 3.00 A N.O., 97-98 1.50 A
220-230-240 V	N.C., 95-96 3.00 A N.O., 97-98 1.50 A
440 V	N.C., 95-96 1.00 A N.O., 97-98 1.00 A
480-500 V	N.C., 95-96 1.00 A N.O., 97-98 1.00 A
I_e / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category	
24 V	N.C., 95-96 1.25 A N.O., 97-98 1.25 A
60 V	N.C., 95-96 0.25 A N.O., 97-98 0.25 A
110-120-125 V	N.C., 95-96 0.25 A N.O., 97-98 0.25 A
250 V	N.C., 95-96 0.12 A N.O., 97-98 0.04 A
Minimum switching capacity	17 V / 3 mA
Short-circuit protective device	N.C., 95-96 10 A, Fuse type gG N.O., 97-98 6 A, Fuse type gG
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	690 V

Technical diagram – Intermittent periodic duty



t_a : Motor starting time

TA200DU thermal overload relays

Technical data

General technical data

Type	TA200DU	
Pollution degree	3	
Phase loss sensitive	Yes	
Ambient air temperature		
Operation	Open - compensated	-25 ... +55 °C
Storage	Open	-25 ... +55 °C
		-40 ... +70 °C
Ambient air temperature compensation	Acc. to IEC/EN60947-4-1	
Maximum operating altitude permissible	2000 m	
Resistance to shock acc. to IEC 60068-2-27	12g / 15 ms	
Mounting position	Position 1-6	
Mounting	Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit	
Degree of protection	Housing	IP20
	Main circuit terminals	IP00

Electrical connection

Main circuit

Type	TA200DU	
Connecting capacity		
 Rigid	1 x	25 ... 120 mm²
 Flexible	1 x	25 ... 120 mm²
Stranded acc. to UL/CSA	1 x	AWG 4 ... 0000
Flexible acc. to UL/CSA	1 x	AWG 4 ... 0000
Lugs	L > 10 mm	
Tightening torques	25 Nm / 220 lb.in	
Connection screw	Open bars	

Auxiliary circuit

Type	TA200DU	
Connecting capacity		
 Rigid	1 x or 2 x	0.75 ... 4 mm²
 Flexible with ferrule	1 x or 2 x	0.75 ... 2.5 mm²
 Flexible with insulated ferrule	1 x or 2 x	0.75 ... 2.5 mm²
 Flexible	1 x or 2 x	0.75 ... 2.5 mm²
Stranded acc. to UL/CSA	1 x or 2 x	AWG 18 ... 14
Flexible acc. to UL/CSA	1 x or 2 x	AWG 18 ... 14
Stripping length	9 mm	
Tightening torques	0.8 ... 1.3 Nm / 12 lb.in	
Connection screw	M3.5 (Pozidriv 2)	

EF19, EF45 electronic overload relays for contactor AF09 ... AF38

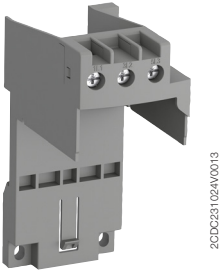
0.10 to 45.0 A



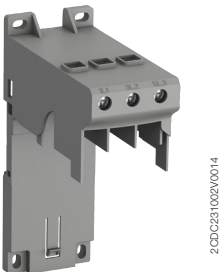
EF19-18.9



EF45-30



DB19EF



DB45EF



KPR-101L

Description

The EF19 and EF45 are self-supplied electronic overload relays, which means no extra external supply is needed. It offers reliable protection for motors in the event of overload or phase failure. Easy to use like a thermal overload relay and compatible with standard motor applications, the electronic overload relay is convincing, above all, due to its wide setting range, high accuracy, high operational temperature range and the possibility to select a trip class (10E, 20E, 30E). Further features are the temperature compensation, trip contact (N.C.), signal contact (N.O.), automatic or manual reset selectable, trip-free mechanism, STOP and TEST function and a trip indication. The overload relays are connected directly to the contactors.

Ordering details

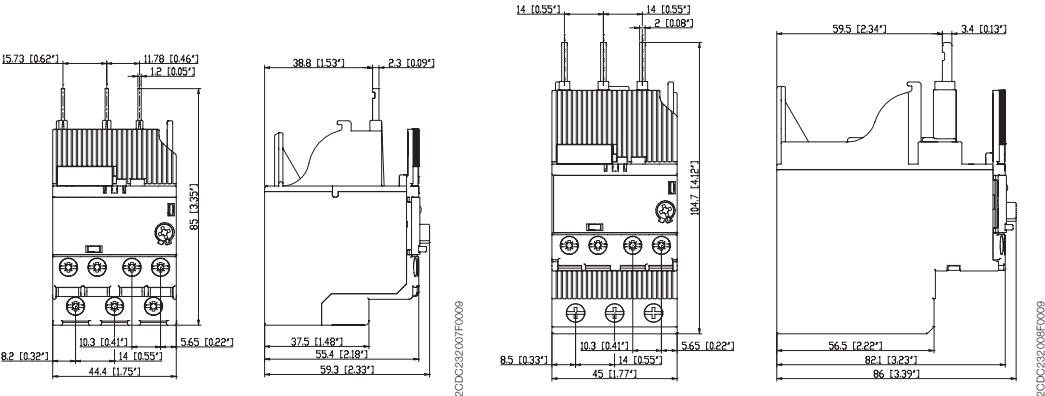
Setting range	Short-circuit protective device	Trip class	Fitting to connectors	Order code	Weight (1 pce) kg
A	100 kA 600 VAC				
EF19 electronic overload relays					
0.10 ... 0.32	2 A, Fuse class J	10E, 20E, 30E	AF09 ... AF38	EF19-0.32	0.16
0.30 ... 1.00	2 A, Fuse class J	10E, 20E, 30E	AF09 ... AF38	EF19-1.0	0.16
0.80 ... 2.70	4 A, Fuse class J	10E, 20E, 30E	AF09 ... AF38	EF19-2.7	0.16
1.90 ... 6.30	15 A, Fuse class J	10E, 20E, 30E	AF09 ... AF38	EF19-6.3	0.16
5.70 ... 18.9	30 A, Fuse class J	10E, 20E, 30E	AF09 ... AF38	EF19-18.9	0.16
EF45 electronic overload relays					
9.00 ... 30.0	150 A, Fuse class J	10E, 20E, 30E	AF26 ... AF38	EF45-30	0.36
15.0 ... 45.0	200 A, Fuse class J	10E, 20E, 30E	AF26 ... AF38	EF45-45	0.36

Ordering details accessories

Suitable for	Description	Order code	Weight (1 pce) kg
EF19, EF45	Reset push button*	KPR-101L	0.03
EF19	Single mounting kit	DB19EF	0.05
EF45	Single mounting kit	DB45EF	0.10

*Note: for more information see catalogue AC1400

Main dimensions mm, inches



EF19

EF45

EF19, EF45 electronic overload relays

Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	EF19	EF45
Standards	UL 508, CSA 22.2 No. 14	
Maximum operational voltage	600 V AC	
Trip rating	125 % of FLA	
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"	
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"	
Short-circuit protective device	See table "Full load amps and short-circuit protective device"	

Auxiliary circuit according to UL/CSA

Type	EF19	EF45
Contact rating	N.C., 95-96 B600, Q600	
	N.O., 97-98 B600, Q600	
Conventional thermal current	5 A	

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device					
		480 V AC		600 V AC			
		SCCR	Fuse type	SCCR	Fuse type	SCCR	Fuse type
EF19-0.32	0.32 A	50 kA	2 A, Class J	5 kA	2 A, K5 / RK5	100 kA	2 A, Class J
EF19-1.0	1.00 A	50 kA	2 A, K5 / RK5	5 kA	2 A, K5 / RK5	100 kA	2 A, Class J
EF19-2.7	2.70 A	50 kA	4 A, K5 / RK5	5 kA	4 A, K5 / RK5	100 kA	4 A, Class J
EF19-6.3	6.30 A	50 kA	15 A, K5 / RK5	5 kA	15 A, K5 / RK5	100 kA	15 A, Class J
EF19-18.9	18.90 A	50 kA	30 A, K5 / RK5	5 kA	30 A, K5 / RK5	100 kA	30 A, Class J

Type	Full load amps (FLA)	Short-circuit protective device					
		480 V AC		600 V AC			
		SCCR	Fuse type	SCCR	Fuse type	SCCR	Fuse type
EF45-30	30 A	18 kA	150 A, K5 / RK5	18 kA	150 A, K5 / RK5	100 kA	150 A, Class J
EF45-45	45 A	18 kA	200 A, K5 / RK5	18 kA	200 A, K5 / RK5	100 kA	200 A, Class J

EF19, EF45 electronic overload relays

Technical data

Main circuit – Utilization characteristics according to IEC/EN

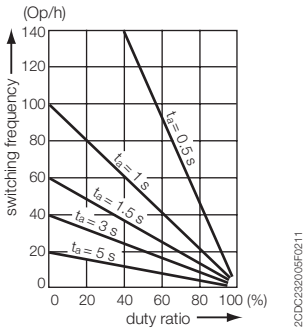
Type	EF19	EF45
Standards	IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1	
Rated operational voltage U_e	690 V AC	
Rated frequency	50/60 Hz – not suitable for DC applications	
Trip class	10E, 20E, 30E, selectable	
Number of poles	3	
Duty time	100 %	
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"	
Rated impulse withstand voltage U_{imp}	6 kV	
Rated insulation voltage U_i	690 V AC	

Auxiliary circuit according to IEC/EN

6

Type	EF19	EF45
Rated operational voltage U_e	600 V AC / DC	
Conventional free air thermal current I_{th}	6 A	
Rated frequency	DC, 50/60 Hz	
Number of poles	1 N.C. + 1 N.O.	
I_e / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category		
110-120 V	50/60 Hz	3.00 A
220-230-240 V	50/60 Hz	3.00 A
440 V	50/60 Hz	1.10 A
480-500 V	50/60 Hz	0.75 A
I_e / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category		
24 V		1.50 A
60 V		0.55 A
110-120-125 V		0.55 A
250 V		0.27 A
Minimum switching capacity	12 V / 3 mA	
Short-circuit protective device	6 A, Fuse type gG	
Rated impulse withstand voltage U_{imp}	6 kV	
Rated insulation voltage U_i	690 V	

Technical diagram – Intermittent periodic duty



t_a : Motor starting time

EF19, EF45 electronic overload relays

Technical data

General data

Type	EF19	EF45
Pollution degree	3	
Phase loss sensitive	Yes	
Ambient air temperature		
Operation	Open - compensated	
Storage		
Ambient air temperature compensation	Acc. to IEC/EN60947-4-1	
Maximum operating altitude permissible	2000 m	
Resistance to shock acc. to IEC 60068-2-27	15g / 11 ms	
Resistance to vibrations acc. to IEC 60068-2-6	1g / 3 ... 150 Hz	
Mounting position	Position 1-6	
Mounting	Mount on the contactor and tighten the screws of the main circuit terminals	
Degree of protection	Housing	IP20
	Main circuit terminals	IP20

Electrical connection

Main circuit

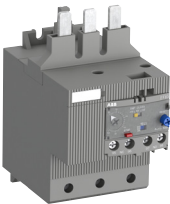
Type	EF19	EF45
Connecting capacity		
 Rigid	1 or 2 x 1 ... 4 mm ²	2.5 ... 16 mm ²
 Flexible with insulated ferrule	1 or 2 x 0.75 ... 2.5 mm ²	2.5 ... 10 mm ²
Stranded acc. to UL/CSA	1 or 2 x AWG 16-10	AWG 14-6
Flexible acc. to UL/CSA	1 or 2 x AWG 16-10	AWG 14-6
Stripping length	9 mm	13 mm
Tightening torques	0.8 ... 1.5 Nm / 7 ... 13 lb.in	2.3 ... 2.6 Nm / 20 ... 22 lb.in
Connection screw	M3.5 (Pozidriv 2)	

Auxiliary circuit

Type	EF19	EF45
Connecting capacity		
 Rigid	1 or 2 x 1 ... 4 mm ²	
 Flexible with ferrule	1 or 2 x 0.75 ... 2.5 mm ²	
 Flexible with insulated ferrule	1 or 2 x 0.75 ... 2.5 mm ²	
 Flexible	1 or 2 x 0.75 ... 2.5 mm ²	
Stranded acc. to UL/CSA	1 or 2 x AWG 18-10	
Flexible acc. to UL/CSA	1 or 2 x AWG 18-10	
Stripping length	9 mm	
Tightening torques	0.8 ... 1.2 Nm / 7 ... 11 lb.in	
Connection screw	M3 (Pozidriv 2)	

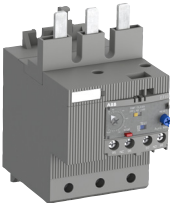
EF65, EF96, EF146 electronic overload relays

20 to 150 A



EF65-70

2DC231001F0013



EF96-100

2DC231016F0012



EF146-150

2DC231017F0012



DB96

2DC231001V0015



DB96 + EF96

2DC231002V0015



KPR-101L

1SPC15102F0001

Description

The EF65, EF96 and EF146 are self-supplied electronic overload relays, which means no extra external supply is needed. It offers reliable protection for motors in the event of overload or phase failure. Easy to use like a thermal overload relay and compatible with standard motor applications, the electronic overload relay is convincing, above all, due to its wide setting range, high accuracy, high operational temperature range and the possibility to select a trip class (10E, 20E, 30E). Further features are the temperature compensation, trip contact (N.C.), signal contact (N.O.), automatic or manual reset selectable, trip-free mechanism, STOP and TEST function and a trip indication. The overload relays are connected directly to the contactors.

Ordering details

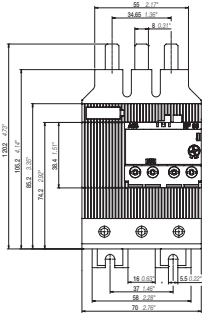
Setting range	Short-circuit protective device	Trip class	Fitting to contactors	Order code	Weight (1 pce) kg
A	100 kA 600 VAC				
20 ... 56	150 A, Fuse class J	10E, 20E, 30E	AF40 ... AF65	EF65-56	0.79
25 ... 70	150 A, Fuse class J	10E, 20E, 30E	AF40 ... AF65	EF65-70	0.79
36 ... 100	200 A, Fuse class J	10E, 20E, 30E	AF80 ... AF96	EF96-100	0.80
54 ... 150	250 A, Fuse class J	10E, 20E, 30E	AF116 ... AF140	EF146-150	0.89

Ordering details accessories

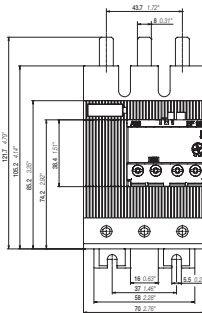
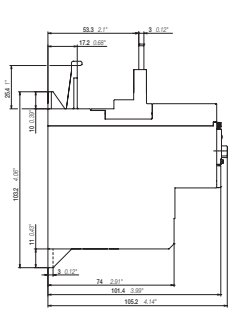
Suitable for	Description	Order code	Weight (1 pce) kg
EF96, TF96	Single mounting kit	DB96	0.19
EF65, EF96, EF146	Reset push button*	KPR-101L	0.03

*Note: for more information see catalogue AC1400

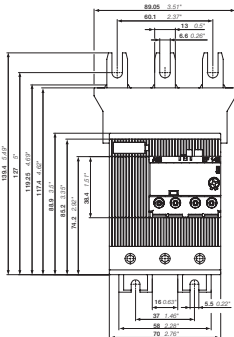
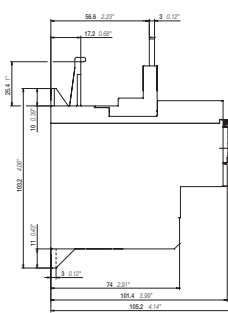
Main dimensions mm, inches



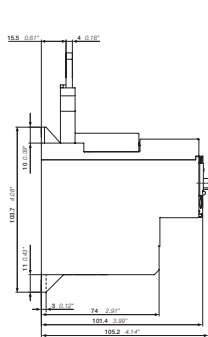
EF65-70



EF96-100



EF146-150



EF65, EF96, EF146 electronic overload relays

Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	EF65, EF96, EF146
Standards	UL 508, CSA 22.2 No. 14, UL 60947-4-1A
Maximum operational voltage	600 V AC
Trip rating	125 % of FLA
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"
Short-circuit protective device	See table "Full load amps and short-circuit protective device"

Auxiliary circuit according to UL/CSA

Type	EF65, EF96, EF146
Contact rating	N.C., 95-96 B600, Q600
	N.O., 97-98 B600, Q600
Conventional thermal current	5 A

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device					
		480 V AC	Fuse type	600 V AC	Fuse type	SCCR	Fuse type
		SCCR		SCCR			
EF65-56	56 A	10 kA	150 A, R5/RK5	10kA	150 A, R5/RK5	100 kA	150 A, J
EF65-70	70 A	10 kA	150 A, R5/RK5	10kA	150 A, R5/RK5	100 kA	150 A, J
EF96-100	100 A	10 kA	200 A, R5/RK5	10kA	200 A, R5/RK5	100 kA	200 A, J
EF146-150	150 A	10 kA	250 A, R5/RK5	10kA	250 A, R5/RK5	100 kA	250 A, J

EF65, EF96, EF146 electronic overload relays

Technical data

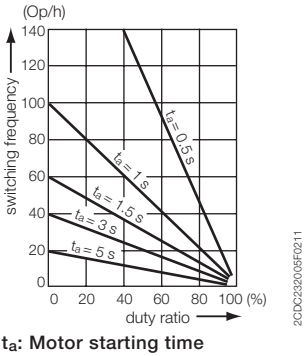
Main circuit – Utilization characteristics according to IEC/EN

Type	EF65, EF96, EF146
Standards	IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1
Rated operational voltage U_e	1000 V AC
Rated frequency	50/60 Hz – not suitable for DC applications
Trip class	10E, 20E, 30E, selectable
Number of poles	3
Duty time	100 %
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"
Rated impulse withstand voltage U_{imp}	8 kV
Rated insulation voltage U_i	1000 V

Auxiliary circuit according to IEC/EN

Type	EF65, EF96, EF146
Rated operational voltage U_e	600 V AC / DC
Conventional free air thermal current I_{th}	6 A
Rated frequency	DC, 50/60 Hz
Number of poles	1 N.C. + 1 N.O.
I_e / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category	
110-120 V	50/60 Hz 3.00 A
220-230-240 V	50/60 Hz 3.00 A
400 V	50/60 Hz 1.10 A
480-500 V	50/60 Hz 0.75 A
I_e / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category	
24 V	1.50 A
60 V	0.55 A
110-120-125 V	0.55 A
250 V	0.27 A
Minimum switching capacity	12 V / 3 mA
Short-circuit protective device	6 A, Fuse type gG
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	690 V

Technical diagram – Intermittent periodic duty



EF65, EF96, EF146 electronic overload relays

Technical data

General data

Type	EF65, EF96, EF146		
Pollution degree	3		
Phase loss sensitive	Yes		
Ambient air temperature			
Operation	Open - compensated	-25 ... +70 °C	
Storage		-50 ... +85 °C	
Ambient air temperature compensation	Acc. to IEC/EN 60947-4-1		
Maximum operating altitude permissible	2000 m		
Resistance to shock acc. to IEC 60068-2-27	15g / 11 ms		
Resistance to vibrations acc. to IEC 60068-2-6	5g / 3 ... 150 Hz		
Mounting position	Position 1-6		
Mounting	Mount on the contactor and tighten the screws of the main circuit terminals		
Degree of protection	Housing	IP20	
	Main circuit terminals	IP10	

Electrical connection

Main circuit				
Type	EF65		EF96	EF146
Connecting capacity				
 Rigid	1 x	4 ... 35 mm ²	6 ... 70 mm ²	10 ... 95 mm ²
	2 x	4 ... 35 mm ²	6 ... 35 mm ²	10 ... 35 mm ²
 Flexible	1 x	4 ... 35 mm ²	6 ... 50 mm ²	10 ... 70 mm ²
	2 x	4 ... 35 mm ²	6 ... 35 mm ²	10 ... 35 mm ²
Stranded acc. to UL/CSA	1 x	AWG 10-2	AWG 8-2	AWG 6-00
	2 x			AWG 6-2
Flexible acc. to UL/CSA	1 x	AWG 10-2	AWG 8-2	AWG 6-00
	2 x			AWG 6-2
Stripping length	20 mm		20 mm	20 mm
Tightening torques	4 Nm / 35 lb.in		6 Nm / 55 lb.in	8 Nm / 70 lb.in
Connection screw	M8 (Pozidriv 2)		M8 (Hexagon 4)	M8 (Hexagon 4)

Auxiliary circuit

Type	EF65, EF96, EF146		
Connecting capacity			
 Rigid	1 or 2 x	1 ... 4 mm²	
 Flexible with ferrule	1 or 2 x	0.75 ... 2.5 mm²	
 Flexible with insulated ferrule	1 or 2 x	0.75 ... 2.5 mm²	
 Flexible	1 or 2 x	0.75 ... 2.5 mm²	
Stranded acc. to UL/CSA	1 or 2 x	AWG 18-10	
Flexible acc. to UL/CSA	1 or 2 x	AWG 18-10	
Stripping length	9 mm		
Tightening torques	0.8 ... 1.2 Nm / 7 ... 11 lb.in		
Connection screw	M3.5 (Pozidriv 2)		

EF205, EF370 electronic overload relays

63 to 380 A



EF205-210



EF370-380



KPR-101L

Description

The EF205 and EF370 are self-supplied electronic overload relays, which means no extra external supply is needed. It offers reliable protection for motors in the event of overload or phase failure. Easy to use like a thermal overload relay and compatible with standard motor applications, the electronic overload relay is convincing, above all, due to its wide setting range, high accuracy, high operational temperature range and the possibility to select a trip class (10E, 20E, 30E). Further features are the temperature compensation, trip contact (N.C.), signal contact (N.O.), automatic or manual reset selectable, trip-free mechanism, STOP and TEST function and a trip indication. The overload relays are connected directly to the contactors.

Ordering details

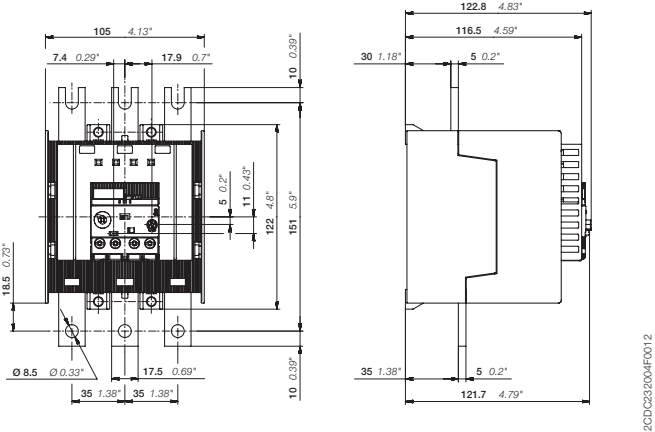
Setting range	Short-circuit protective device 100 kA 600 VAC	Trip class	Fitting to contactors	Order code	Weight (1 pce) kg
A					
63 ... 210	400 A, Fuse class J	10E, 20E, 30E	AF190 ... AF205	EF205-210	1.21
115 ... 380	600 A, Fuse class J	10E, 20E, 30E	AF265 ... AF370	EF370-380	1.43

Ordering details accessories

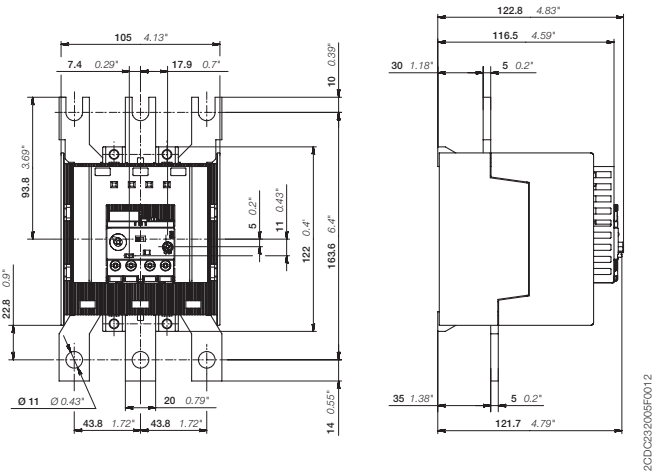
For thermal overload relays	Description	Order code	Weight (1 pce) kg
A			
EF205, EF370	Reset push button*	KPR-101L	0.03

*Note: for more information see catalogue AC1400

Main dimensions mm, inches



EF205-210



EF370-380

EF205, EF370 electronic overload relays

Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	EF205, EF370
Standards	UL 508, CSA 22.2 No. 14, UL 60947-4-1A
Maximum operational voltage	600 V AC
Trip rating	125 % of FLA
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"
Short-circuit protective device	See table "Full load amps and short-circuit protective device"

Auxiliary circuit according to UL/CSA

Type	EF205, EF370
Contact rating	N.C., 95-96 B600, Q600
	N.O., 97-98 B600, Q600
Conventional thermal current	5 A

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device					
		480 V AC	Fuse type	600 V AC	Fuse type	SCCR	Fuse type
		SCCR		SCCR			
EF205-210	210 A	10 kA	400 A, R5/RK5	10kA	400 A, R5/RK5	100 kA	400 A, J
EF370-380	380 A	18 kA	800 A, L/T	18kA	800 A, L/T	100 kA	600 A, J

EF205, EF370 electronic overload relays

Technical data

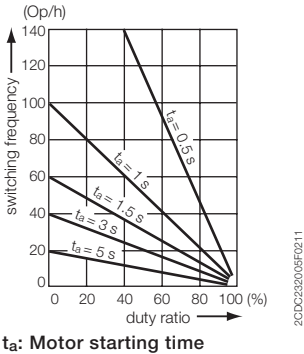
Main circuit – Utilization characteristics according to IEC/EN

Type	EF205, EF370
Standards	IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1
Rated operational voltage U_e	1000 V AC
Rated frequency	50/60 Hz – not suitable for DC applications
Trip class	10E, 20E, 30E, selectable
Number of poles	3
Duty time	100 %
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"
Rated impulse withstand voltage U_{imp}	8 kV
Rated insulation voltage U_i	1000 V

Auxiliary circuit according to IEC/EN

Type	EF205, EF370
Rated operational voltage U_e	600 V AC / DC
Conventional free air thermal current I_{th}	6 A
Rated frequency	DC, 50/60 Hz
Number of poles	1 N.C. + 1 N.O.
I_e / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category	
110-120 V	50/60 Hz 3.00 A
220-230-240 V	50/60 Hz 3.00 A
400 V	50/60 Hz 1.10 A
480-500 V	50/60 Hz 0.75 A
I_e / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category	
24 V	1.50 A
60 V	0.55 A
110-120-125 V	0.55 A
250 V	0.27 A
Minimum switching capacity	12 V / 3 mA
Short-circuit protective device	6 A, Fuse type gG
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	690 V

Technical diagram – Intermittent periodic duty



EF205, EF370 electronic overload relays

Technical data

General data

Type	EF205, EF370	
Pollution degree	3	
Phase loss sensitive	Yes	
Ambient air temperature		
Operation	Open - compensated	-25 ... +70 °C
Storage		-50 ... +85 °C
Ambient air temperature compensation	Acc. to IEC/EN 60947-4-1	
Maximum operating altitude permissible	2000 m	
Resistance to shock acc. to IEC 60068-2-27	25g / 11 ms	
Resistance to vibrations acc. to IEC 60068-2-6	5g / 3 ... 150 Hz	
Mounting position	Position 1-6	
Mounting	Mount on the contactor and tighten the screws of the main circuit terminals	
Degree of protection	Housing	IP20
	Main circuit terminals	IP20

Electrical connection

Main circuit

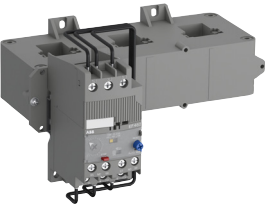
Type	EF205		EF370
Connecting capacity			
 Rigid	1 x	16 ... 185 mm ²	50 ... 240 mm ²
	2 x	16 ... 120 mm ²	50 ... 150 mm ²
 Flexible	1 x	16 ... 185 mm ²	50 ... 240 mm ²
	2 x	16 ... 120 mm ²	50 ... 150 mm ²
 Lugs	L ≤	24 mm	32 mm
 Bars	Ø >	8 mm	10 mm
Stranded acc. to UL/CSA	1 x	AWG 6-0000	AWG 1-500 kcmil
	2 x	AWG 6-0000	AWG 1-500 kcmil
Flexible acc. to UL/CSA	1 x	AWG 6-0000	AWG 1-500 kcmil
	2 x	AWG 6-0000	AWG 1-500 kcmil
Stripping length	-		-
Tightening torques	18 Nm / 160 lb.in		28 Nm / 247 lb.in
Connection screw	M8		M10

Auxiliary circuit

Type	EF205, EF370	
Connecting capacity		
 Rigid	1 or 2 x	1 ... 4 mm ²
 Flexible with ferrule	1 or 2 x	0.75 ... 2.5 mm ²
 Flexible with insulated ferrule	1 or 2 x	0.75 ... 2.5 mm ²
 Flexible	1 or 2 x	0.75 ... 2.5 mm ²
Stranded acc. to UL/CSA	1 or 2 x	AWG 18-10
Flexible acc. to UL/CSA	1 or 2 x	AWG 18-10
Stripping length	9 mm	
Tightening torques	0.8 ... 1.2 Nm / 7 ... 11 lb.in	
Connection screw	M3.5 (Pozidriv 2)	

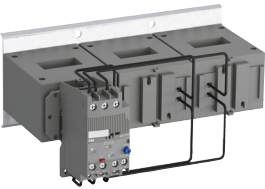
EF460, EF750, E1250DU electronic overload relays

150 to 1250 A



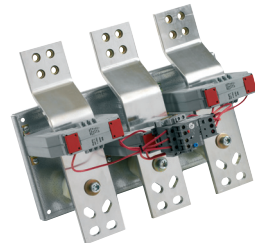
EF460-500

20DC232013F0013



EF750-800

20DC232014F0013



E1250DU

15FC101025F0001



KPR-101L

15FC151402F0001

Description

The EF460 up to E1250DU are self-supplied electronic overload relays, which means no extra external supply is needed. It offers reliable protection for motors in the event of overload or phase failure. Easy to use like a thermal overload relay and compatible with standard motor applications, the electronic overload relay is convincing, above all, due to its wide setting range, high accuracy, high operational temperature range and the possibility to select a trip class (10E, 20E, 30E). Further features are the temperature compensation, trip contact (N.C.), signal contact (N.O.), automatic or manual reset selectable, trip-free mechanism, STOP and TEST function and a trip indication. Busbar kits are available as accessory for contactor mounting.

Ordering details

Setting range	Short-circuit protective device	Trip class	Fitting to contactors	Order code	Weight (1 pce)
A	100 kA 600 VAC				kg

EF460 electronic overload relay

150 ... 500	800 A, Fuse class L	10E, 20E, 30E	AF400 ... AF460	EF460-500	1.17
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EF750 electronic overload relay

250 ... 800	1200 A, Fuse class L	10E, 20E, 30E	AF580 ... AF750	EF750-800	3.90
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E1250DU electronic overload relay

375 ... 1250	2000 A, Fuse class L (1)	10E, 20E, 30E	AF1350 ... AF1650	E1250DU	12.18
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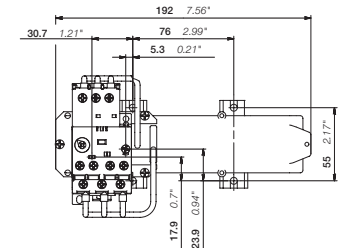
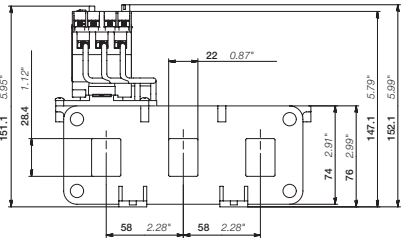
(1) Short-circuit rating 85 kA 600 VAC

Ordering details accessories

For electronic overload relays	Description	Order code	Weight (1 pce)
EF460	Terminal shroud for EF460	LT460EF	0.36
EF750	Terminal shroud for EF750	LT750EF	0.10
EF460, EF750	Reset push button*	KPR-101L	0.03

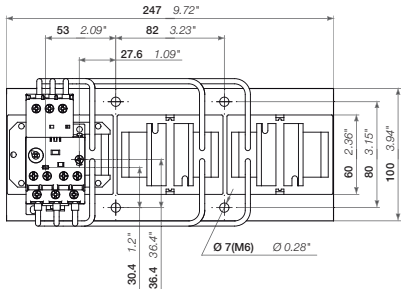
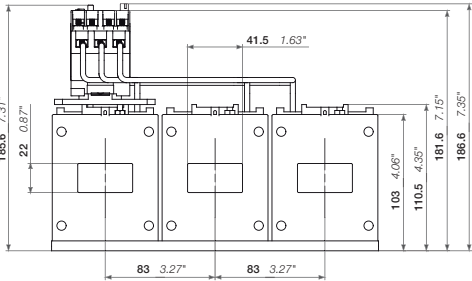
*Note: for more information see catalogue AC1400

Main dimensions mm, inches



EF460

20DC232013F0011



EF750

20DC232014F0011

EF460, EF750, E1250DU electronic overload relays

Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	EF460	EF750	E1250DU
Standards	UL 508, CSA 22.2 No. 14		
Maximum operational voltage	600 V AC		
Trip rating	125 % of FLA		

Auxiliary circuit according to UL/CSA

Type		EF460	EF750	E1250DU
Contact rating	N.C., 95-96	B600, Q300		
	N.O., 97-98	B600, Q300		
Conventional thermal current		5 A		

General data

Type	EF460	EF750	E1250DU
Pollution degree	3		
Phase loss sensitive	Yes		
Ambient air temperature			
Operation	Open - compensated		
Storage			
Ambient air temperature compensation	-25 ... +70 °C		
Maximum operating altitude permissible	-50 ... +85 °C		
Resistance to shock acc. to IEC 60068-2-27	Acc. to IEC/EN60947-4-1		
Resistance to vibrations acc. to IEC 60068-2-6	2000 m		
Degree of protection	15g / 11 ms		
Housing	5g / 3 ... 150 Hz		
Main circuit terminals	IP20		

Electrical connection

Auxiliary circuit

Type		EF460	EF750	E1250DU
Connecting capacity				
	Rigid	1 or 2 x	1 ... 4 mm²	
	Flexible with ferrule	1 or 2 x	0.75 ... 2.5 mm²	
	Flexible with insulated ferrule	1 or 2 x	0.75 ... 2.5 mm²	
	Flexible	1 or 2 x	0.75 ... 2.5 mm²	
	Stranded acc. to UL/CSA	1 or 2 x	AWG 16-10	
	Flexible acc. to UL/CSA	1 or 2 x	AWG 16-10	
Stripping length			9 mm	
Tightening torques			0.8 ... 1.2 Nm / 7 lb.in	
Connection screw			M3.5 (Pozidriv 2)	

EF460, EF750, E1250DU electronic overload relays

Technical data

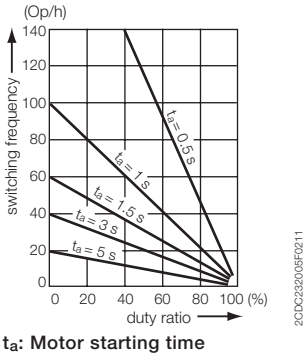
Main circuit – Utilization characteristics according to IEC/EN

Type	EF460	EF750	E1250DU
Standards	IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1		
Rated operational voltage U_e	1000 V AC		
Rated frequency	50/60 Hz – not suitable for DC applications		
Trip class	10E, 20E, 30E, selectable		
Number of poles	3		
Duty time	100 %		
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"		
Rated impulse withstand voltage U_{imp}	8 kV		
Rated insulation voltage U_i	1000 V AC		

Auxiliary circuit according to IEC/EN

Type	EF460		EF750	E1250DU
Rated operational voltage U _e	600 V AC / DC			
Conventional free air thermal current I _{th}	6 A			
Rated frequency	DC, 50/60 Hz			
Number of poles	1 N.C. + 1 N.O.			
I _e / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category				
110-120 V	50/60 Hz	3.00 A		
220-230-240 V	50/60 Hz	3.00 A		
440 V	50/60 Hz	1.10 A		
480-500 V	50/60 Hz	0.72 A		
I _e / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category				
24 V				1.50 A
60 V				0.55 A
110-120-125 V				0.55 A
250 V				0.27 A
Minimum switching capacity	12 V / 3 mA			
Short-circuit protective device	6 A, Fuse type gG			
Rated impulse withstand voltage U _{imp}	8 kV			
Rated insulation voltage U _i	690 V			

Technical diagram – Intermittent periodic duty



Thermal and electronic overload relays

General accessories



WRB-400



WRH-F

Description

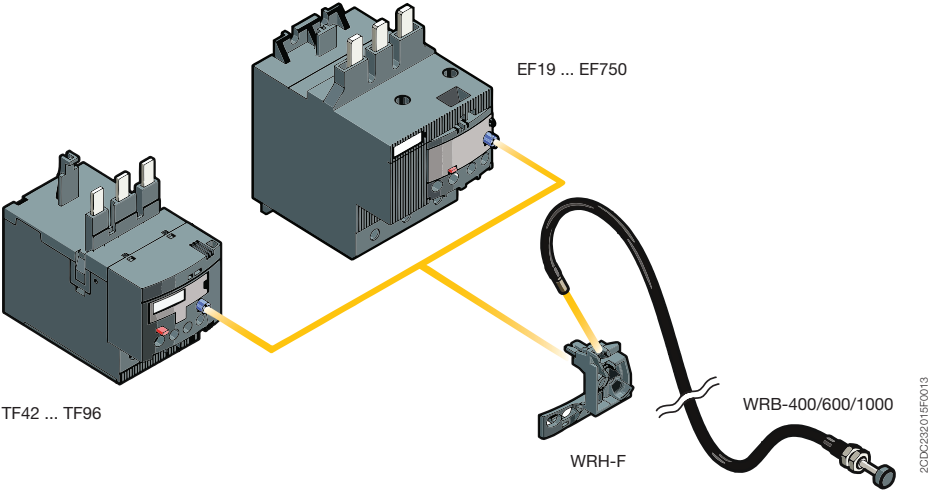
The wire reset is a general accessory for thermal and electronic overloads relays. In installations which are difficult to access, like a motor control centre or compact cubical, the accessory allows the user to remotely reset the overload relays.

The wire reset consists of two parts, the bowden wire with actuator and the holder. The actuator should be mounted into a door of a panel. The holder will be mounted on the overload relay. The actuator and holder are connected via the bowden wire.

Ordering details

Suitable for	Description	Length mm	Order code	Weight (1 pc) kg
Holder				
TF42, TF65, TF96, EF19, EF45, EF65, EF96, EF146, EF205, EF370, EF460, EF750	Holder for tool less direct mounting		WRH-F	0.01
Bowden wire with actuator				
WRH-F	Bowden wire with actuator, hole diameter: 7.3 mm, maximum panel thickness: 12 mm	400	WRB-400	0.03
		600	WRB-600	0.04
		1000	WRB-1000	0.06
IP54 gasket				
WRB-400 WRB-600 WRB-1000	IP54 Panel seal gasket		WRBG	0.04

Overload relays with accessory wire reset (WRH, WRB)



Certifications and approvals

General technical data

Certifications and approvals	7/2
General technical data	
Coordination with short-circuit protection devices	7/8
Standards, specifications and certifying organizations	7/10
Terms and technical definitions	7/12
Standards and utilization categories	7/14
Degrees of protection	7/16
Climatic withstand of devices	7/17

Certifications and approvals

Designed according to the appropriate specifications, the devices in this catalogue have been built and tested. They can be used in most countries without any further certifications.

Some countries, however, require certification according to their own national standards. In other cases, the Marine for example, approvals ratifying that particular specifications have been met are necessary.

The table below shows the approvals and certifications for different devices.

The following documents may be obtained on request:

- Certificates of conformity
- Certificates of certification or approval.

The use of certified devices does not exonerate the equipment supplier from complying with the legal specifications of the country concerned.

Explanation of symbols:

■ **Standard design approved**, the company labels bear the certification mark when this is required.

Mark	Certifications						Approvals: ship classification societies								
															
Abbreviation	CSA	UL	cULus	CCC	GOST or EAC		BV	GL	LR	DNV	RINa	ABS	RMRS	CCS	
Approved in	Canada	USA	North America	China	Russia		France	Germany	Gr.Britain	Norway	Italy	USA	Russia	China shipping	

3-pole contactors														
7.5 to 75HP														
AC / DC operated AF09, AF12, AF16, AF26, AF30, AF38								 (3)		 (3)		(1)		
AC / DC operated AF40, AF52, AF65, AF80, AF96								 (3)		 (3)		(1)		
100 to 350HP														
AC / DC operated (2) AF116, AF140, AF146													(1)	
AC / DC operated (2) AF190, AF205, AF265, AF305, AF370													(1)	
400 to 1150HP														
AC / DC operated AF400, AF460, AF580, AF750														
AC / DC operated AF1250														
AC / DC operated AF1350, AF1650														
AC / DC operated AF2050														
AC / DC operated AF2650														
4-pole contactors														
25 to 105A														
AC / DC operated AF09, AF16, AF26, AF38								 (3)		 (3)				
AC / DC operated AF40, AF52, AF80				(1)										
160 to 420A														
AC / DC operated AF116, AF140, AF190, AF205, AF265, AF305, AF370					(1)			(1)		(1)				

(1) in progress.
(2) Marine approvals for AF116 ... AF370 with built-in PLC interface: only DNV is available.
(3) DNV-GL certificate.

Certifications and approvals

	Certifications					
Mark						
Abbreviation	CSA	UL	cULus	CCC	GOST or EAC	
Approved in	Canada	USA	North America	China	Russia	

DC switching contactors

AC operated GA75			 E319322		
DC operated GAE75			 E319322		
AC / DC operated GAF185 ... GAF300			 E73397		
AC / DC operated GAF460, GAF750, GAF1250, GAF1650, GAF2050			 E73397		

Capacitor switching contactors

AC operated UA16			 E312527		
AC operated UA26 ... UA75			 E312527		
AC operated UA95, UA110			 E36588		
AC operated UA16..RA ... UA75..RA			 E312527		
AC operated UA95..RA, UA110..RA			 E36588		

Contactors relays

AC / DC operated 4-pole, 8-pole - NF..			 E252354		
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(1) in progress.

Approvals: ship classification societies

							
BV	GL	LR	DNV	RINa	ABS	RMRS	CCS
France	Germany	Gr.Britain	Norway	Italy	USA	Russia	China shipping

					(1)		

Certifications and approvals

	Certifications					
Mark						
Abbreviation	CSA	UL	cULus	CCC	GOST or EAC	
Approved in	Canada	USA	North America	China		Russia

Accessories for AF09 ... AF2650 and NF contactor relays

Auxiliary contacts

Cell	Cell	Cell	Cell	Cell
CA4, CC4		E252354		
CAT4		E252354		
CAL4		E252354		
CAL19		E76003		
CAL18		E76003		
CAL16		E76003		
CE5...D0.1		E319322		
CE5...D2		E319322		
CE5...W0.1		E319322		
CE5...W2		E319322		
CEL18		F76003		

Electronic timer

TEF4

Mechanical / electrical interlock unit

VEM4

Mechanical interlock units

VM4, VM96-4			E312527	
VM19			E36588	
VM140/190			E36588	
VM205/265			E36588	
VM 750			E36588	
VM1650H			E36588	

Latching unit

WB75-A

(1) in progress. ☐ Marine approvals not needed for this accessory.

Connecting links

BEA16-4, BEA26-4, BEA38-4, BEA65-4

Connection sets for reversing contactors

BER16-4, BER38-4	E312527	
BER65-4, BER96-4	E312527	
BER140-4, BER205-4, BER370-4	E36588	
BEM460-30, BEM750-30	E36588	

Connection sets for star-delta starters

BEY16-4, BEY38-4		E312527	
BEY65-4, BEY96-4		E312527	
BEY190-4, BEY205-4, BEY265-4, BEY370-4		E36588	
BED460, BED580, BED750		E36588	

Approvals: ship classification societies

							
BV	GL	LR	DNV	RINA	ABS	RMRS	CCS
France	Germany	Gr. Britain	Norway	Italy	USA	Russia	China

A 5x8 grid of blue squares. The squares are arranged in 5 rows and 8 columns. The following squares have labels above them: (CA4) above the top-left square, (CA4) above the top-second square, (1) (CA4) above the top-seventh square, and (CA4) above the top-eighth square. The grid is composed of 40 squares in total.

A 7x8 grid of blue squares on a white background. The grid is formed by 8 vertical dashed lines and 7 horizontal dashed lines, creating 7 rows and 8 columns. Each intersection of a vertical and horizontal dashed line contains a small blue square. There are 7 rows and 8 columns of these squares.

The image displays a 4x8 grid of blue squares. The grid is composed of four rows and eight columns. Solid horizontal lines separate the rows, and dotted vertical lines separate the columns. The squares are arranged in a regular pattern, with one square in each cell of the grid.

Certifications and approvals

	Certifications				
Mark					
Abbreviation	CSA	UL	cULus	CCC	GOST or EAC
Approved in	Canada	USA	North America	China	Russia
Phase to phase connections					
BEP140-30, BEP205-30, BEP370-30					
			E36588		
BEP140-40, BEP205-40, BEP370-40					
BES460, BES750					
			E36588		
Terminal connecting strips and shorting bars					
LY16-4, LY38-4					
			E312527		
LY110, LY185, LY300, LY460, LY750					
			E36588		
LP185, LP300, LP460, LP750					
			E36588		
LH38-4					
			E312527		
LF16-4, LF38-4					
			E312527		
LG16-4					
			E312527		
LK96-4					
			E312527		
Additional coil terminal blocks					
LD38-4					
			E312527		
Additional terminal blocks					
LDC4					
			E312527		
Protective covers					
BX4, BX4-CA					
			E252354		
Terminal shrouds					
LT, LT..-30					
			E36588		
LT..-40					
			E73397		
Terminal enlargement					
LW					
			E36588		
Terminal extension					
LX					
			E36588		
Connection socket					
LL					
			E36588		
Connection modules					
LD146-30, LD146-40					
			E36588		
Function marker					
BA4					
			E252354		
Fixing clip					
BB4					
			E312527		

 Marine approvals not needed for this accessory.

Approvals: ship classification societies							
							
BV	GL	LR	DNV	RINA	ABS	RMRS	CCS
France	Germany	Gr.Britain	Norway	Italy	USA	Russia	China shipping
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							

Certifications and approvals

Mark	Certifications						Approvals: ship classification societies							
Abbreviation														
Approved in	Canada	USA	North America	China	Russia			France	Germany	Gr.Britain	Norway	Italy	USA	Russia

Manual motor starters														
MS116			 E137861					 (1)						
MS132			 E137861 E345003											
MS165			 E137861 E345003											

Manual motor starters magnetic only														
MO132			 E137861 E345003											
MO165			 E137861 E345003											

Circuit breaker for transformer protection														
MS132-T			 E137861											

(1) MS116 up to 16 A only.

Thermal overload relays														
TF42			 E48139											
TF65			 E48139											 (3)
TF96			 E48139											 (3)
TF140DU			 E48139											
TA200DU			 E48139											

Electronic overload relays														
0.10...45 A														
EF19			 E48139											
EF45			 E48139											
20...150 A														
EF65			 E48139							 (2)				
EF96			 E48139											
EF146			 E48139											
63...380 A														
EF205			 E48139											
EF370			 E48139											
150...800 A														
EF460			 E48139											
EF750			 E48139											
150...1250 A														
E1250DU			 E76003											

(2) EF65-56 has no RINa approval and no ATEX certification.
(3) ATEX is valid for products produced from week 26, 2015.
All electronic overload relays are  (C-Tick) marked.

Coordination with short-circuit protection devices

In compliance with standards IEC 60947-4-1 and EN 60947-4-1, we define for the contactors and starters the type, rating and characteristics of the short-circuit protection devices SCPD which allow selective protection against overloads and ensure protection against short circuits.

Basic functions

Any starter is designed to:

- start motors,
- ensure continuous functioning of motors,
- disconnect motors from the supply line,
- guarantee protection of motors against overloads.

The starter is typically made up of a switching device (contactor) and an overload protection device (thermal overload relay or electronic overload relay).

These two devices MUST be coordinated with equipment capable of providing protection against short circuit (SCPD: short circuit protective device): typically a circuit breaker with magnetic release only or a switch fuse. These are not necessarily part of the starter.

Applicable standards

IEC 60947-4-1 (EN 60947-4-1) precisely defines the different points to be considered in order to carry out correct coordination. Complete coordination for a combination includes the following points:

- Selectivity test between the overload relay and the short-circuit protection device SCPD.
- Short-circuit condition tests:
 - at prospective " r " currents - These currents depend on the rated operational current of the starter (I_e AC-3) and are given by the standard (Table 13). For example:
 - $r = 1 \text{ kA}$ for $I_e \text{ AC-3} < 16 \text{ A}$
 - $r = 3 \text{ kA}$ for $16 \text{ A} < I_e \text{ AC-3} < 63 \text{ A}$
 - $r = 5 \text{ kA}$ for $63 \text{ A} < I_e \text{ AC-3} < 125 \text{ A}$ etc.
 - at the rated conditional short-circuit current " I_q " - This is the maximum prospective current that the combination can withstand, for example 50 kA.

Types of coordination

IEC 60947-4-1 (EN 60947-4-1) defines two types of coordination according to the expected level of service continuity. Acceptable extreme damage for the switchgear is divided into two types.

Type 1: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will not be able to then operate without being repaired or having parts replaced.

Type 2: 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 light welding is acceptable. In this case, the manufacturer must stipulate the measures to be taken with respect to maintenance of the equipment.

The complete ABB offer

ABB has acquired years of experience with respect to problems of coordination and is able to make a complete offer based on tests performed in its qualified laboratories. This offer includes 400 V, 500 V, 690 V networks.

A complete data base of coordination tables, according to IEC 60947-4-1 (EN 60947-4-1), is available on the ABB Website.

In the coordination tables the following short-circuit protection devices are recommended:

- Moulded case circuit-breakers (MCCBs)
- Miniature circuit-breakers (MCBs)
- Switch-disconnector-fuses (aM, gG and BS)
- Manual Motor Starters (MMS).

General remarks applicable to all tables

- Each table is defined for a maximum ambient temperature of 40 °C. For higher temperatures, apply a derating factor according to the following rules:
 - Fuses: factor of 0.8 applied to I_n for an ambient temperature of 70 °C
 - MCCBs and MCBs: factor of 0.8 applied to I_n for an ambient temperature of 60 °C
 - The starter derating factor depends on the operating conditions of thermal overload relays:
 - Factor of 0.9 applied to I_n for an ambient temperature of 70 °C.
- Each table is defined for motor currents: 3-phase motors, 4-pole
- **Normal starting** means a starting time $< 2 \text{ s}$. - **Difficult starting** means an accelerating time $10 \text{ s} < t_s < 30 \text{ s}$
 - Tripping classes** of thermal overload relays according to IEC 60947-4-1 (EN 60947-4-1): 10A and 10
 - Tripping classes** of electronic overload relays according to IEC 60947-4-1 (EN 60947-4-1): 10E, 20E, 30E selectable
- In the tables with MCCBs, these are fitted with the magnetic relay alone. Setting is always carried out at $> 12.3 I_e \text{ AC-3}$ so that the transient current peak occurring during starting does not lead to tripping.

Coordination with short-circuit protection devices

A complete data base of coordination tables, according to [IEC 60947-4-1](#) (EN 60947-4-1) or [UL 508 / UL 60947-4-1](#), is available on the ABB Website: see below.

Selection

Simple or multiple selections all from the same screen.

SOC - SELECTED OPTIMIZED COORDINATION

Motor protection | Selectivity | Back-up | Switch disconnection

Coordination tables for motor protection

Selection | Info on IE3 Motors

Clear selection

Motor efficiency class: ANY IE1/IE2 IE3

Protection Device	Rated Voltage	Short-Circuit Current	Starter Type	Coordination Type	Overload Relay	Motor Rated Power
	[V]	[kA]				[kW] [HP]
All	All	42	All	All	All	Overview
ACB	240Vac	45	DOL-NS	IEC Type 1	Embedded	0
Fuses	400Vac	47	DOL-HD	IEC Type 2	TOL	0.06
MCCB	415Vac	50	SD-NS	UL Type A	EOL	0.09
MMS	440Vac	55	SS-NS-IL	UL Type C	UMC	0.12
	460Vac	60	SS-NS-ID	UL Type D		0.18
	480Vac	65	UL	UL Type E		0.25
	500Vac	70		UL Type F		0.37
	525Vac	75		UL Component		0.5
	600V(347)Vac	80				0.65

search Export PDF

6 records, (0.22 seconds)

☒ Show newest ABB products only 20 Number of Records to show:

Short-circuit protection devices

- Air circuit breakers
- Fuses "gG" or "aM"
- Miniature circuit breaker
- Moulded case circuit breaker
- Manual motor starter

Starter type

- Direct-on-line normal start
- Direct-on-line heavy duty
- Star-delta normal start
- Soft starter normal start

Overload relay

- TOL : thermal overload relay
- EOL : electronic overload relay
- UMC : Universal motor controller

Coordination

- IEC type 1 or type 2
- UL type A to type F

Results

- Search results displayed at the bottom of the selection page.
- Only the most appropriate solutions to your application, will be displayed at the bottom of the page.
- "Enable Smart Current Search" function featured for the short-circuit current where "near to" selected values also are included in the result.
- Possible to print the page to a pdf file or from your printer.
- "Clear selection" function to deselect all selected.

Fuses, 400 Vac, 100 kA, DOL-NS, Coordination Type IEC Type 2, Overload Relay TOL, Motor efficiency class IE1 + IE2									
Motor		Fuses IEC			Contactor		Overload Relay		Max allowed load current [A]
Rated Power [kW]	Rated Current [A]	Switch-Fuse Type	Rating gG IaM [A]	Type and Size	Type	Type	Current range [A]		
0.25	0.85	OS32 GD	2	OFAF 000aM	AF09	TF42-1.0	0.74 - 1.00		1.00
0.12	0.44	OS32 GD	2	OFAF 000H	AF09	TF42-0.55	0.42 - 0.55		0.55

Fuses, 400 Vac, 100 kA, DOL-NS, Coordination Type IEC Type 2, Overload Relay EOL, Motor efficiency class IE3									
Motor		Fuses IEC			Contactor		Overload Relay		Max allowed load current [A]
Rated Power [kW]	Rated Current [A]	Switch-Fuse Type	Rating gG IaM [A]	Type and Size	Type	Type	Current range [A]		
0.18	0.60	OS32 GD	2	OFAF 000aM	AF09	EF19-1.0 10 *	0.30 - 1.00		>>
0.12	0.44	OS32 GD	2	OFAF 000H	AF09	EF19-1.0 10 *	0.30 - 1.00		>>
0.12	0.44	OS32 GD	2	OFAF 000H	AF09	EF19-1.0 10 *	0.30 - 1.00		0.54 >>
0.18	0.60	OS32 GD	2	OFAF 000aM	AF09	EF19-1.0 10 *	0.30 - 1.00		1.00 >>

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Access

To find the coordination tables for motor protection, please see:
<http://applications.it.abb.com/SOC/Page/Selection.aspx>

Standards, specifications and certifying organizations

Definitions

ABB low voltage devices are developed and manufactured in accordance with the applicable regulations as stated in the international IEC standards, the European EN standards and the national ones such as NF, DIN, GB and BS. For devices installed in ships, an approval issued by independent classification societies is demanded by the maritime insurance companies.

CB scheme

Certification Body certificates (CB certificates) are available to prove the complete conformity to standards

The IEC CB (Certification Body) scheme is multilateral agreement between the National Certification Bodies to allow international certification of electrical and electronic products so that a single certification allows worldwide market access.

The CB Scheme was established by the International Electrotechnical Committee for conformity testing to standards for electrical equipment (IECEE).

Certified products

In some cases, products are validated and tested according to a standard by a certification body and the manufacturer is regularly visited by this body in order to check the respect of the design and the materials used. This process creates a certified product. This is the case of UL (Underwriters Laboratories) and CSA (Canadian Standard Association) for instance (see below).

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 and National Specifications

The European committee for electrotechnical standardization (CENELEC), which groups together European countries, publishes EN standards.

These European standards may differ very little from IEC international standards and have similar numbering.

The same applies for national standards which use, without exception, the same numbering and reproduce the texts of these unified standards in their entirety. Contradicting national standards are withdrawn.

European Directives

The guarantee of the free movement of goods within the European Community means that any regulatory differences between member states have been eliminated. The European directives set up common rules that are included in the legislation of each state while contradictory regulations are cancelled.

Three directives are essential:

Low Voltage Directive 2006/95/EC concerns electrical equipment from 0 to 1000 V AC and from 0 to 1500 V DC.

This specifies that compliance with the requirements that it sets out is acquired if the equipment conforms to the standards harmonized on an European level. EN 60947-1 and EN 60947-4-1 for contactors.

Machinery Directive 2006/42/EC for safety specifications of machines and equipment on complete machines.

Electromagnetic Compatibility Directive 2004/108/EC which concerns all devices able to create electromagnetic disturbance.

CE Marking:

CE marking indicates that the marked equipment conforms to the relevant EU directive.

CE marking is part of an administrative procedure and guarantees free movement of the product within the European Community.

Standards in Canada and the USA

Canadian and American specifications are more or less equivalent but differ greatly from IEC standards.

UL Underwriters Laboratories USA

CSA Canadian Standard Association Canada

UL (USA) specifications make the following distinction between devices:



Listed Product

A product that has been produced under UL's listing and follow-up service program in accordance with the terms of UL's service agreement and that bears the UL listing mark as the manufacturer's declaration that the product complies with UL's requirements.



Recognized Component

A part or subassembly covered under UL's recognition service and intended for factory installation in listed (or other) products. Recognized components are incomplete in certain construction features or restricted in performance capabilities and not intended for separate installation in the field, rather they are intended for use as components of incomplete equipment submitted for investigation by UL. Final acceptance of the component in the complete equipment is dependent upon its installation and use in accordance with all applicable use conditions and ratings noted in the component report issued by UL, in the guide information and in the individual client's Recognized Component information page.

The combined UL signs for the USA and Canada are recognized by the authorities of both countries.

Compulsory China Certification (CCC): The CCC mark is a compulsory certification mark in the field of safety for products sold on the Chinese market.

GOST / EAC: Russia (please consult your local ABB sales office)

C-Tick: The C-Tick mark certifies compliance with the Australian EMC requirements. The mark is also recognized in New Zealand

ANCE: Mexico

Marine Approvals

The following specifications must be respected when these devices are used on ships:

BV	Bureau Veritas France
DNV	Det Norske Veritas Norway
GL	Germanischer Lloyd Germany
LRS	Lloyd's Register of Shipping Great Britain
ABS	America Bureau of Shipping
RMRS	Russian Maritime Register of Shipping RMRS
RRR	Russian River Register
MRS	Maritime Register of Shipping Russia
PRS	Polski Rejestr Statkow Poland
RINA	Registro Italiano Navale Italy

Standards, specifications and certifying organizations

Specifications (cont.)

International Standards

IEC 60947-1 Low-voltage switchgear and controlgear – Part 1: General rules
IEC 60947-4-1 Low-voltage switchgear and controlgear – Part 4: Contactors and motor starters – Section 1: Electromechanical contactors and motor starters
IEC 60947-5-1 Low-voltage switchgear and controlgear – Part 5: Control circuit devices and switching elements – Section 1: Electromechanical control circuit devices
IEC 60947-5-4 Low-voltage switchgear and controlgear – Part 5-4: Control circuit devices and switching elements. Method of assessing the performance of low-energy contacts. Special tests
IEC 60947-6-1 Low-voltage switchgear and controlgear – Part 6: Multiple function equipment – Section 1: Automatic transfer switching equipment
IEC 60204-1 Electrical equipment of industrial machines – Part 1: General requirements
IEC 60715 Dimensions of low-voltage switchgear and controlgear. Standardized mounting on rails for mechanical support of electrical devices in switchgear and controlgear installations

European Standards

EN 50 005 Low-voltage switchgear and controlgear for industrial use – Terminal marking and distinctive number: General rules (Annex L of IEC 60947-1).
EN 50 011 Low-voltage switchgear and controlgear for industrial use – Terminal marking, distinctive number and distinctive letter for particular contactor relays (Annex M of IEC 60947-5-1)
EN 60947-1 Low-voltage switchgear and controlgear – Part 1: General rules.
EN 60947-4-1 Low-voltage switchgear and controlgear – Part 4: Contactors and motor starters – Section 1: Electromechanical contactors and motor starters.
EN 60947-5-1 Low-voltage switchgear and controlgear – Part 5: Control circuit devices and switching elements – Section 1: Electromechanical control circuit devices.
EN 60947-5-4 Low-voltage switchgear and controlgear – Part 5-4: Control circuit devices and switching elements. Method of assessing the performance of low-energy contacts. Special tests.
EN 60947-6-1 Low-voltage switchgear and controlgear – Part 6: Multiple function equipment – Section 1: Automatic transfer switching equipment.
EN 60204-1 Electrical equipment of industrial machines – Part 1: General requirements.
EN 60 715 Dimensions of low-voltage switchgear and controlgear. Standardized mounting on rails for mechanical support of electrical devices in switchgear and controlgear installations.

National Standards

European countries national standards reproduce the corresponding EN... standards. Codification is built by addition of a prefix to EN numbering.

For instance:

- France **NF** EN...
- Germany **DIN** EN...
- Great Britain **BS** EN...
- Italy **CEI** EN...
- Sweden **SS** EN...

Terms and technical definitions

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.

Thermal overload relay tripping classes

IEC 60947-4-1 defines tripping classes 10 A, 10, 20 and 30. Types 10 A, 10, etc. correspond to the maximum tripping time for a making current at 7.2 times the setting current. Furthermore, for each class the standard specifies the tripping time for 1.5 times the setting current and sets the non tripping condition at 1.05 times the setting current. All these data are summarized in the table below.

Extract from IEC 60947-4-1:

Tripping class	10 A	10	20	30
Max. tripping time for 1.5 times the setting current (warm state)	s 120	240	480	720
Tripping time for 7.2 times the setting current (cold state)	s 2 - 10	4 - 10	6 - 20	9 - 30
For 1.05 times the setting current	No tripping			

Electromagnetic compatibility

AF... contactors comply with IEC 60947-1, 60947-4-1 and EN 60947-1, 60947-4-1 standards.

Definitions:

Environment A: "Mainly relates to low-voltage non public or industrial networks/locations/installations (EN 50082-2 article 4) including highly disturbing sources".

Environment B: "Mainly relates to low-voltage public networks (EN 50082-1 article 5) such as residential, commercial and light industrial locations/installations. Highly disturbing sources such as arc welders are not covered by this environment".

Notice for AF09 ... AF38, AF116 ... AF2650 contactors and NF contactor relays: these products have been designed for environment A. Use of this product in environment B may cause unwanted electromagnetic disturbances in which case the user may be required to take adequate mitigation measures.

AF40 ... AF96 have been designed for environment B.

Definitions according to SEMI F47-0706

SEMI F47-0706 defines the voltage sag immunity required for semiconductor processing, metrology and automated test equipment, and on subsystems and components which are used in the construction of semiconductor processing equipment including but not limited to:

- Power supplies
- Generators
- Robots and factory interface
- Chillers, pumps, blowers
- AC operated contactors and contactor relays
- ...

voltage sag: an rms reduction in the AC voltage, at the power frequency, for durations from a half cycle to a few seconds.

The IEC terminology for this phenomenon is voltage dip.

voltage sag immunity: the ability of equipment to withstand momentary electrical power interruptions or sags

Coordination of protections against short circuit

The goal here is to protect electromechanical starters and softstarters.

Any starter is designed to:

- start motors,
- ensure continuous functioning of motors,
- disconnect motors from the supply line,
- guarantee protection of motors against overloads.

The starter is typically made up of a switching device (contactor) and an overload protection device (thermal overload relay or electronic overload relay). These two devices MUST be coordinated with equipment capable of providing protection against short circuit (SCPD: short circuit protective device): typically a circuit breaker with magnetic release only or a switch fuse. These are not necessarily part of the starter.

The characteristics of the starter must comply with the international standard IEC 60947-4-1 which defines the above items as follows:

contactor: a mechanical switching device having only one position of rest, operated otherwise than by hand, capable of making, carrying and breaking currents under normal circuit conditions including overload conditions.

overload release: overload relay or release which operates in the case of overload and also in case of loss of phase.

circuit-breaker: defined by IEC 60947-2 as a mechanical switching device, capable of making, carrying and breaking currents under normal circuit conditions and also making, carrying for a specified time and breaking currents under specified abnormal circuit conditions.

IEC publication 60947-4-1 defines coordination types "1" and "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 then 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 light 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.

Operating cycle or cycle

Includes one making operation and one breaking operation.

Terms and technical definitions

Cycle time

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

Electrical durability

Number of on-load operating cycles that the contactor is able to carry out. It depends on the operational current, the operational voltage and the utilization category.

Mechanical durability

Number of no-current operating cycles that a contactor is able to carry out.

Assessed failure rate

Defined according to IEC 60947-5-4. This rate is given in standard industrial environments for the contactor relays and for the built-in auxiliary contact of contactors.

Load factor

Ratio of the on-load operating time to the total cycle time x 100.

Switching frequency

Number of switching cycles per hour.

Plugging

Stopping or fast reversal in rotation direction of a motor by two supply leads being interchanged while the motor is running.

Inching

Energization of a motor's circuit repeatedly or for short periods with the aim of obtaining small movements of the driven mechanism.

Coil operating limits

Expressed in multiples of the nominal control circuit voltage U_c for the upper and lower limits.

Mounting position

Comply with the manufacturer's instructions. Restrictions are to be taken into account for certain mounting positions.

Rated breaking or making capacity

Root mean square (r.m.s.) value of the current that the contactor is able to break or make at a given voltage according to the conditions specified by standards and for a given utilization category.

Intermittent duty

Duty during which the contactor is successively closed or open for periods which are too short to enable the contactor to achieve thermal balance.

Ambient temperature

Air temperature close to the contactor.

Time

- Time constant: Ratio of the inductance to the resistance ($L/R = \text{mH}/\Omega = \text{ms}$).
- Short-time withstand current: Current that the contactor is able to withstand in closed position for a short time interval and in specified conditions.
- Closing time: Time interval between the coil energization and the instant the contacts touch on all the poles.
- Opening time: Time interval between the coil de-energization and the instant the contacts separate on all the poles.

Rated control voltage U_c

Control voltage value for which the control circuit is sized.

Rated operational voltage U_e

Voltage to which the contactor's utilization characteristics refer. In three-phase it is the phase-to-phase voltage.

Rated insulation voltage U_i

Reference voltage for dielectric tests and creepage distances.

Rated impulse withstand voltage U_{imp}

Peak value of an impulse voltage, having a specified form and polarity, which does not cause breakdown in specific test conditions.

Shock withstand

Requirement for vehicles, crane drives, installations on board ships and plug-in equipment. For the acceptable "g" values, the contacts must not change position and the thermal overload relays must not trip.

Resistance to vibrations

Requirements for vehicles, boats and other means of transport. For the specified vibration amplitude and frequency values the device must remain able to operate.

Standards and utilization categories

Utilization categories:

A contactor's duty is characterised by the utilization category together with the rated operational voltage and current indicated.

Utilization categories for contactors according to IEC 60947-4-1:

Alternating current:	AC-1	Non-inductive or slightly inductive loads, resistance furnaces.
	AC-2	Slip-ring motors: starting, switching off.
	AC-3	Cage motors: starting, switching off running motors.
	AC-4	Cage motors: starting, plugging, inching.
	AC-5a	Discharge lamp switching.
	AC-5b	Incandescent lamp switching.
	AC-6a	Transformer switching.
	AC-6b	Capacitor bank switching.
Direct current:	AC-8a	Hermetic refrigeration compressor motor control with manual resetting of overload releases.
	AC-8b	Hermetic refrigeration compressor motor control with automatic resetting of overload releases.
	DC-1	Non inductive or slightly inductive loads, resistance furnaces.
	DC-3	Shunt motors: starting, plugging, inching, dynamic breaking of DC motors.
	DC-5	Series motors: starting, plugging, inching, dynamic breaking of DC motors.
	DC-6	Incandescent lamp switching.

Utilization categories for contactor relays according to IEC 60947-5-1:

Alternating current:	AC-12	Control of resistive loads and static loads with opto-coupler isolation.
	AC-13	Control of static loads with transformer isolation.
	AC-14	Control of weak electromagnetic loads (≤ 72 VA).
	AC-15	Control of electromagnetic loads (> 72 VA).
	DC-12	Control of resistive loads and static loads with opto-coupler isolation.
Direct current:	DC-13	Control of DC electromagnets.
	DC-14	Control of DC electromagnets having economy resistors.

In fact some applications, and the specific criteria characterizing the various loads controlled by contactors, may modify the utilization characteristics of the contactors. The main applications concerned are:

Capacitor bank switching

Account must be taken of high peaks when the current is made and of harmonic currents during continuous duty. For this application, IEC publication 60947-4-1 stipulates utilization category AC-6b. The operational currents or powers acceptable for the contactors are determined by our electrical tests; IEC publication 60947-4-1 gives the calculating formula for determining the operational current (Table 9).

Transformer switching

Account must be taken of the peaks due to magnetization phenomena when the current is made. For this application, IEC publication 60947-4-1 stipulates utilization category AC-6a. The operational currents or powers acceptable for the contactors are determined using the values obtained for AC-3 or AC-4 category tests and the calculating formula given in IEC 60947-4-1 (Table 9).

Lighting circuit switching

The current peaks occurring on energization of the circuit and the power factor depend on the type of lamps, the connection mode and whether or not there is compensation. For this application, IEC publication 60947-4-1 stipulates two standard utilization categories:

- AC-5a for discharge lamp switching.
- AC-5b for incandescent lamp switching.

Slip-ring motor switching

The contactors used for short-circuiting rotor resistors can be used for rotor voltages up to 2 times the rated operational voltage. The conditions of use of rotor contactors depend on the connection mode of the main poles. IEC 60947-4-1 stipulates AC-2 utilization category for starter contactor.

Standards and utilization categories

Utilization categories (cont.)

DC power circuit switching

Arc suppression is more difficult in direct current than in alternating current. Higher the time constant and voltage, heavier the breaking conditions: consequently several poles have to be connected in series.

AC high current circuit switching

Possibility of increasing performances by connecting poles in parallel.

Circuit switching during temporary and intermittent duty

In these cases higher operational currents are acceptable.

Influence of the length of the conductors used in the contactor control circuit

According to the operational voltages, the cross-sectional areas, the coil consumption and the control layout, difficulties due to line resistances and capacitances may appear during contactor closing and opening orders.

Making and breaking conditions for utilization categories

Utilization category	Durability test conditions						Occasional operation Making and breaking capacities - 50 operating cycles					
	Making conditions			Breaking conditions			Making conditions			Breaking conditions		
	I/le	U/Ue	Cos. φ or L/R (ms)	I/le	U/Ue	Cos. φ or L/R (ms)	Ic/le	Ur/Ue	Cos. φ or L/R (ms)	Ic/le	Ur/Ue	Cos. φ or L/R (ms)

Contactors for AC circuit switching

AC-1		1	1	0.95	1	1	0.95	1.5	1.05	0.8	1.5	1.05	0.8
AC-2		2.5	1	0.65	2.5	1	0.65	4	1.05	0.65	4	1.05	0.65
AC-3	le < 17 A	6	1	0.65	1	0.17	0.65	10	1.05	0.45	8	1.05	0.45
	17 < le < 100 A	6	1	0.35	1	0.17	0.35	10	1.05	0.45	8	1.05	0.45
	le > 100 A	6	1	0.35	1	0.17	0.35	10	1.05	0.35	8	1.05	0.35
AC-4	le < 17 A	6	1	0.65	6	1	0.65	12	1.05	0.45	10	1.05	0.45
	17 < le < 100 A	6	1	0.35	6	1	0.35	12	1.05	0.45	10	1.05	0.45
	le > 100 A	6	1	0.35	6	1	0.35	12	1.05	0.35	10	1.05	0.35

Contactors for DC circuit switching

DC-1		1	1	1	1	1	1	1.5	1.05	1	1.5	1.05	1
DC-3		2.5	1	2	2.5	1	2	4	1.05	2.5	4	1.05	2.5
DC-5		2.5	1	7.5	2.5	1	7.5	4	1.05	15	4	1.05	15

Contactor relays for AC circuit switching

AC-14	(≤ 72 VA)	—	—	—	—	—	—	6	1.1	0.7	6	1.1	0.7
AC-15	(> 72 VA)	10	1	0.7	1	1	0.4	10	1.1	0.3	10	1.1	0.3

Contactor relays for AC circuit switching

Utilization category	Standard operation						Occasional operation Making and breaking capacities - 50 operating cycles					
	Making conditions			Breaking conditions			Making conditions			Breaking conditions		
	I/le	U/Ue	T0.95	I/le	U/Ue	T0.95	Ic/le	Ur/Ue	T0.95	Ic/le	Ur/Ue	T0.95
DC-13	1	1	6 P(1)	1	1	6 P(1)	1.1	1.1	6 P(1)	1.1	1.1	6 P(1)
DC-14	—	—	—	—	—	—	10	1.1	15 ms	10	1.1	15 ms

(1) The value "6 x P" is the result of an empirical relation which is estimated to represent most DC magnetic loads up to the highest limit of P = 50 W (6 x P = 300 ms). It is accepted that loads having drawn energy above 50 W are made up of weaker loads in parallel. As a consequence, the 300 ms value must form the highest limit whatever the value of the power drawn.

Key:

U (I) = applied voltage (current)
Ur = recovery voltage
L/R = test circuit time constant
Ue (Ie) = rated operational voltage (current)

Ic = making and breaking current expressed in DC or in AC like the r.m.s. value of the symmetrical components
T0.95 = time required to reach 95 % of the current in steady-state conditions, expressed in milliseconds

Degrees of protection

General

In an installation, the degree of protection required for electrical equipment depends on the environmental characteristics. The degree of protection, ensured by the enclosure of equipment or by the cubicle containing the equipment is expressed by the IP code which gives the level of protection against access to hazardous parts, the ingress of foreign bodies and/or the ingress of water, in compliance with IEC 60529, IEC 60947-1. Besides the IP symbol, the complete code has two figures followed (optionally) by two additional letters. A short description of the elements used in IP coding is given below.

IP... code	Figures or letters	Specifications for installation protection	Protection of persons
First figure		Against ingress of foreign bodies	Against access to hazardous parts with:
	0	No protection	No protection
	1	Diameter > 50 mm	Back of hand
	2	Diameter > 12.5 mm	Finger
	3	Diameter > 2.5 mm	Tool
	4	Diameter > 1 mm	Wire
	5	Limited protection against dust	Wire
	6	Total protection against dust	Wire
Second figure		Against entrance of water having a harmful effect	
	0	No protection	
	1	Vertical dripping	
	2	Dripping at a vertical angle of < 15°	
	3	Rain at a vertical angle of < 60°	
	4	Splashing	
	5	Low pressure water jet	
	6	Powerful water jets	
	7	Temporary immersion	
	8	Permanent immersion	
Additional letter (optional) for use with:		Against ingress of foreign bodies	Against access to hazardous parts with:
First figure 0	A	Stopped by a barrier with a 50 mm Ø sphere	Back of hand
First figure 0 or 1	B	Entrance of test finger limited to 80 mm	Finger
First figure 1 or 2	C	Wire with 2.5 mm Ø and length of 100 mm	Tool
First figure 2 or 3	D	Wire with 1 mm Ø and length of 100 mm	Wire
Additional letter (optional)		Specific additional information	
	H	High voltage apparatus	–
	M	Moving parts which are moving during water test	
	S	Moving parts which are stationary during water test	
	W	Specified atmospheric conditions	

Note: The type of enclosure or cubicle in which the equipment must be installed prevails with respect to the degree of protection.

Climatic withstand of devices

The life time of devices are mainly influenced by series of climatic factors which cause their corrosion.

In practice, besides climatic conditions, there are other factors which may damage equipment such as fungi, insects (termites), dust, work site dirt and aggressive environment (salty or sulphurous atmosphere, etc.) which can often only be identified at the place of installation.

Climatic stress, definitions and test conditions are dealt with in national publications such as the DIN 50 series and UTE 63-100 publication which are attached to international publications such as IEC 60068.

The test conditions are:

Description	Symbolization	Time of one cycle	Cycle phase time	Temperature in test chamber	Relative humidity
Humidity and variable temperature	IEC 60068-2-30 Test Db	24 hours	12 hours including rise in temperature	40 °C	95 %
			12 hours including cooling (open device)	25 °C	95 %

ABB contactors have been used for many years in the most countries, with hot and humid climates for example: Brazil, Indonesia, India or on ships. Experience has shown that ABB devices can be used in most countries throughout the world.

The climate of the country in which the apparatus is installed is not the determining choice factor.

Account must be taken of:

- the immediate environment of the devices (sheltered, ventilated, temperature),
- the aggressivity of the immediate atmosphere at the place of installation,
- the length and frequency of non operating periods.

In the case of frequent condensation (i.e. the formation of condensation caused by rapid changes in temperature), heating resistors must be installed in cubicles (100 to 250 W per m³ of enclosure).

The table below gives the cases where heating is necessary.

Environment		Operating conditions	Climate	Internal heating of enclosure
Inside premises	No running water no condensation	Continuous or not	All climates	Without
	With running water	Continuous	All climates	Without
		Frequent or long stops	Temperate Tropical	Without With
Outside, sheltered	No running water no condensation	Continuous or not	Temperate Tropical	Without With
Outside or by the seaside	With running water	Continuous	All climates	Without
		Frequent or long stops	Temperate	Without
			Tropical	With

The entrance of dust, insects, dirt, etc. in devices may be prevented if the appropriate degree of protection according to IEC 60529 is chosen (See "Degree of protection" table).

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