Drive Contactors
Type BHD & EHDB

AC 1012

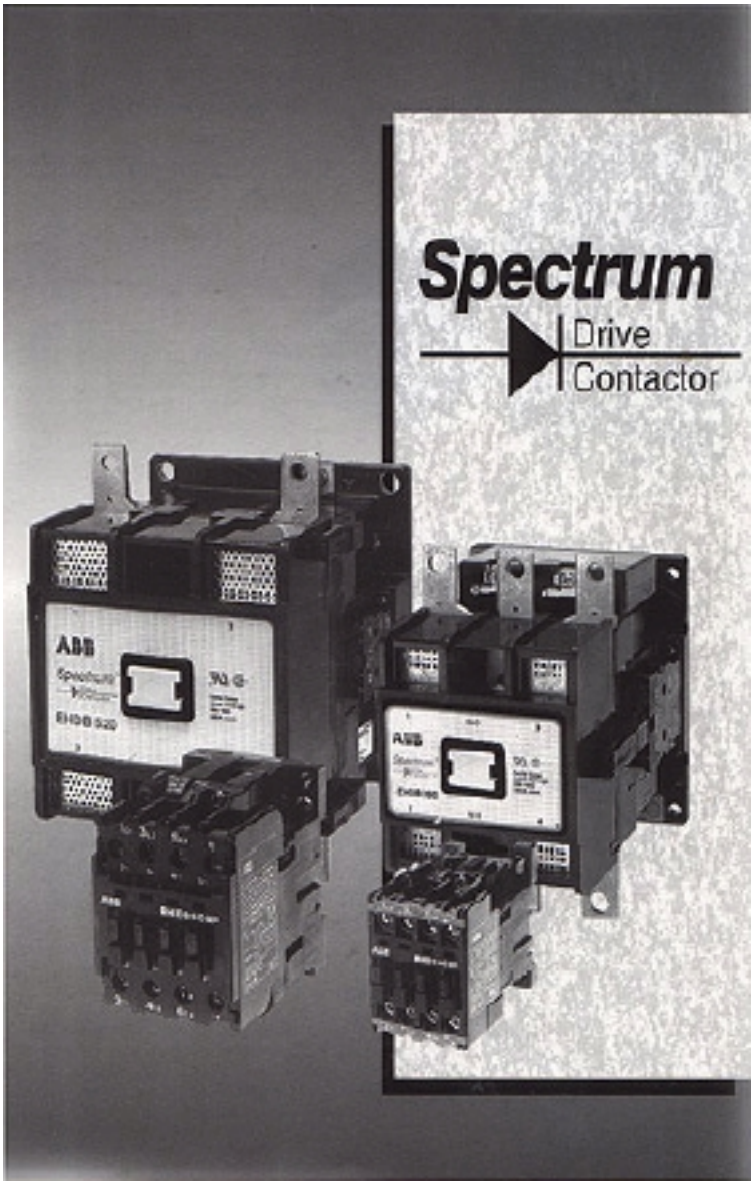
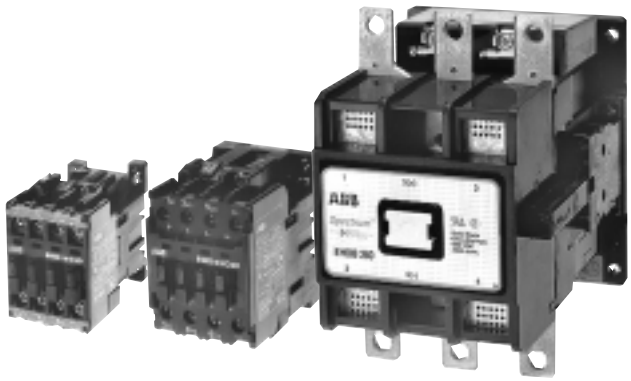


ABB Control Inc.

Drive contactors
Type BHD & EHDB

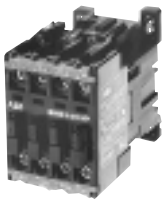


Description
BHD & EHDB are ABB Control's new offering of high quality, Spectrum Drive Contactors for variable speed DC drive applications. This line supersedes the highly-accepted and well-respected EFLG and EHD line. The new line offers a broader range featuring both smaller (15 amp) and larger (650, 800 and 960 amp) contactors as well as additional midrange sizes.

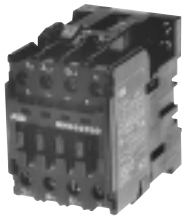
Type BHD
- 15, 30 & 60 amps in three sizes
- 500 volt DC ratings
- 160 and 300 volt DC normal closed ratings for dynamic braking
- Low energy auxiliary contacts available (17V, 5mA)
- Mechanically interlocked version available for reversing applications
- Small compact design
- 2 pole (2 N.O.) and 3 pole (2 N.O. & 1 N.C.) available
- Additional auxiliary contact blocks available
- Fast, snap-on DIN rail mounting
- Double break contact design
- Captive terminal screws
- Touch-safe design: all connection terminals are protected against accidental touch
- Terminals supplied open for ease of wiring
- Operates over an extended voltage range of 85% to 100% of rated control voltage
- N.C. dynamic braking pole is easily added to two pole contactors
- Screwdriver guide holes
- Snap-on front mounted accessories
- UL and CSA approved

Type EHDB
- 75 amps to 960 amps in ten sizes
- 2 pole (2 N.O.) and 3 pole (2 N.O. & 1 N.C.) power poles available
- 600 VDC making capacity: 300 VDC breaking capacity
- Auxiliary contacts suitable for low energy applications are standard (17V, 5mA)
- 1 N.O. & 1 N.C. auxiliary contacts are standard and up to six additional auxiliary contacts may be added to provide a total of 8 (4 N.O. & 4 N.C.)
- Early make & late break auxiliary contacts available
- Auxiliary contacts available to meet EN 81 standards
- EHDB 220, 280 & 360 contactors have withdrawable coils
- Mechanically interlocked contactors available for reversing applications
- Double break contact design with magnetic arc chamber extinguishes arc in shortest possible time
- High temperature encapsulated coil
- Easy removal of arc chute for quick inspection and change of contacts
- Operates over an extended voltage range of 85% to 110% of rated control voltage
- DC control operation available
- UL & CSA approved
  UL File # E36583
  CSA File # LR19700

Drive contactors
Type BHD
15 to 60 Amps



BHD15C3P-1



BHD30C3P-1

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

Thermal amp rating	Maximum amp rating N.C. contact		Auxiliary contacts included		2 pole (2 N.O.)		3 pole (2 N.O. & 1 N.C.)	
	Make 300 VDC	Break 160 VDC	N.O.	N.C.	Catalog number	List price	Catalog number	List price
15	24	14	— 1	— 1	— BHD15C2P-1	— **$ 86**	BHD15C3P-1 —	**$ 116** —
30	45	28	— 1	— 1	— BHD30C2P-1	— **128**	BHD30C3P-1 —	**168** —
60	90	55	2 1	1 1	— BHD60C2P-1	— **206**	BHD60C3P-1 —	**256** —

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

Thermal amp rating	Maximum amp rating N.C. contact		Auxiliary contacts included			3 pole (2 N.O. & 1 N.C.)	
	Make 500 VDC	Break 300 VDC	N.O.	N.C. low energy	N.C.	Catalog number	List price
15	24	14	1	1	1	BHD15C-1	**$ 124**
30	45	28	1	1	1	BHD30C-1	**184**
60	90	55	1	1	1	BHD60C-1	**286**

NOTE: BHD60 2 & 3 pole contactors are equipped with poloarity-dependent N.O. contacts.

Description

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

Coil voltage selection

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

Coil voltage selection chart

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

NOTE: DC coils are available for BHD60 contactors only.

Additional auxiliary contacts

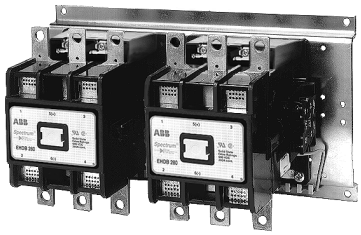
Contactor number	Number of auxiliary contacts that may be added to BHD contactors
BHD15C3P-1	(1 – 4) CA7 Aux
BHD30C3P-1	(1 – 4) CA7 Aux
BHD15C2P-1	(1) DB Adder deck or (1 – 4) CA7 Aux
BHD30C2P-1	(2) CA7 & (1) CAL7 Aux
BHD60C3P-1	(1 – 6) CA7 & (1) CAL7 Aux or (1 – 6) CA7 & (1) CAL7 Aux
BHD60C2P-1	(1) DB Adder deck & (2) CA7 & (1) CAL7 Aux

Auxiliary contact block adders

Top mounted for BHD15 – BHD60	Catalog number	List price
N.O.	CA7-10	**$ 10**
N.C.	CA7-01	**10**
N.O. Low energy	CA7-10G	**20**
Side mounted for BHD60 only		
1 N.O. & 1 N.C.	CAL7-11	**20**

Drive contactors
Type EHDB
75 to 960 Amps

EHDB280C-1L



EHDB280M-1L

EHDB520C2P-1L

2 & 3 pole — 600 volt N.O. ratings with 300 volt N.C. dynamic braking rating①

Thermal amp rating 600 volts	Maximum amp rating N.C. contact		Auxiliary contacts included		2 pole (2 N.O.)		3 pole (2 N.O. & 1 N.C.)	
	Make 300 VDC	Break 160 VDC	N.O.	N.C.	Catalog number	List price	Catalog number	List price
130	260	171	1	1	EHDB130C2P-1L	**$ 450**	EHDB130C-1L	**$ 575**
220	450	285	1	1	EHDB220C2P-1L	**465**	EHDB220C-1L	**665**
280	565	363	1	1	EHDB280C2P-1L	**630**	EHDB280C-1L	**860**
380	728	472	1	1	EHDB360C2P-1L	**1300**	EHDB360C-1L	**1880**
520	1040	680	1	1	EHDB520C2P-1L	**1500**	EHDB520C-1L	**2250**
650	1300	850	1	1	EHDB650C2P-1L	**2635**	EHDB650C-1L	**3100**
800	1600	1050	1	1	EHDB800C2P-1L	**3230**	EHDB800C-1L	**3800**
950	1920	1250	1	1	EHDB960C2P-1L	**4080**	EHDB960C-1L	**4800**

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

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

Coil voltage selection chart

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

NOTE: DC coils are available for BHD60 contactors only.

DC operated contactors
EHDB130 – EHDB960

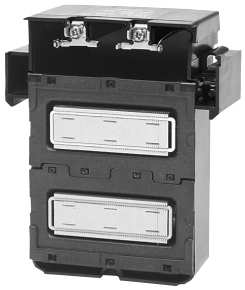
DC and AC operated contactors have the same magnet structure except the DC coil includes a resistor and a normally closed late break auxiliary interlock. To order, substitute the code from the coil voltage selection chart and refer to the DC magnet coils chart for the price adder.

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

DC magnet coils (per contactor)

Contactor size	List price
EHDB130	**$ 140**
EHDB220 – EHDB280	**170**
EHDB360	**190**
EHDB520	**240**
EHDB650 – EHDB960	**330**

Drive contactors
Replacement parts



EHDBRC280-1

Coils

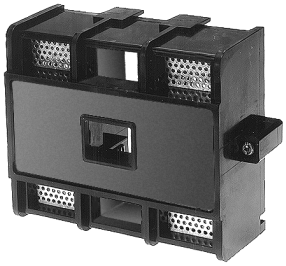
Contactor size		Catalog number	AC coils list price	DC coils list price
	BHD15	BHDRC15-★	$ 12	—
	BHD30	BHDRC30-★	20	—
	BHD60	BHDRC60-★	38	$ 76
	EHDB75, EHDB110	EHDBRC110-★	40	60
	EHDB130	EHDBRC130-★	80	100
	EHD220, EHD280	EHDRC280-★	100	130
	EHD350	EHDRC360-★	120	160
Withdrawable type	EHDB220, EHDB280	EHDBRC280-★	100	130
	EHDB360	EHDBRC360-★	120	160
	EHDB520, EHDB650	EHDBRC650-★	240	300
	EHDB800, EHDB960	EHDBRC960-★	290	350

EHDB coils can be used as replacement parts in EHD contactors.

Coil voltage selection chart

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

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



EHDBAS280

Arc shields

Contactor size		Catalog number	List price
3 Pole			
	EHDB75	EHDBAS075	$ 72
	EHDB110	EHDBAS110	88
	EHDB130	EHDBAS130	115
	EHDB220	EHDBAS220	133
	EHDB280	EHDBAS280	155
	EHDB360	EHDBAS360	169
	EHDB520	EHDBAS520	203
	EHDB650	EHDBAS650	233
	EHDB800	EHDBAS800	247
	EHDB960	EHDBAS960	264
2 Pole			
	EHDB75	EHDBAS075-2	67
	EHDB110	EHDBAS110-2	83
	EHDB130	EHDBAS130-2	110
	EHDB220	EHDBAS220-2	128
	EHDB280	EHDBAS280-2	147
	EHDB360	EHDBAS360-2	161
	EHDB520	EHDBAS520-2	195
	EHDB650	EHDBAS650-2	225
	EHDB800	EHDBAS800-2	238
	EHDB960	EHDBAS960-2	255

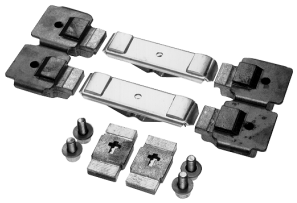
Auxiliary contact blocks — EHDB75 to EHDB960

Contactor sizes	Description	Terminal N.O.	Terminal N.C.	Catalog number	List price
EHDB75 to EHDB960	Standard 1 N.O. & 1 N.C.	13, 14	21, 22	CAL16-11A	$ 44
	Standard 1 N.O. & 1 N.C.	43, 44	31, 32	CAL16-11B	44
	Standard 1 N.O. & 1 N.C.	53, 54	61, 62	CAL16-11C	44
	Standard 1 N.O. & 1 N.C.	83, 84	71, 72	CAL16-11D	44
	Late break 1 N.O. & 1 N.C.	47, 48	35, 36	CAL16-11E	50
Type EN81 EHDB130	Standard 1 N.O. & 1 N.C. (left side)	13, 14	21, 22	CAL16-11L	80
	Standard 1 N.O. & 1 N.C. (right side)	43, 44	31, 32	CAL16-11M	
Type EN81 EHDB220 to EHDB280	Standard 1 N.O. & 1 N.C. (left side)	13, 14	21, 22	CAL16-11N	80
	Standard 1 N.O. & 1 N.C. (right side)	43, 44	31, 32	CAL16-11P	

EHDB75 to EHDB960 contactors are provided with a 1 N.O. & 1 N.C. auxiliary contact block mounted on each contactor. One additional 1 N.O. & 1 N.C. auxiliary contact block can be mounted on the left side of the contactor and two additional 1 N.O. & 1 N.C. contact blocks can be mounted on the right side.

Drive contactors
Replacement parts

EHDBCK280-NC



EHDBTK520
Kit includes lugs and mounting hardware

Contact kits

Contactor size	Catalog number	List price
2 Pole		
BHD60	BHDCK060-2	$ 95
EHDB75	EHDBCK075-2	100
EHDB110	EHDBCK110-2	140
EHDB130	EHDBCK130-2	155
EHDB220	EHDBCK220-2	200
EHDB280	EHDBCK280-2	240
EHDB360	EHDBCK360-2	465
EHDB520	EHDBCK520-2	684
EHDB650	EHDBCK650-2	912
EHDB800	EHDBCK800-2	1125
EHDB960	EHDBCK960-2	1410

N.C. DB Kit only

Contactor size	Contact rating	Auxiliary interlocks	Catalog number	List price
BHD15	300V	1 N.O.	CA7D-NC15	$ 30
BHD30	300V	1 N.O.	CA7D-NC30	40
BHD60	150V	1 N.O.	CA7D-NC60A	50
BHD60	300V	1 N.O.	CA7D-NC60B	50
EHDB75	300V	—	EHDBCK075-NC	75
EHDB110	300V	—	EHDBCK110-NC	75
EHDB130	300V	—	EHDBCK130-NC	95
EHDB220	300V	—	EHDBCK220-NC	110
EHDB280	300V	—	EHDBCK280-NC	110
EHDB360	300V	—	EHDBCK360-NC	210
EHDB520	300V	—	EHDBCK520-NC	342
EHDB650	300V	—	EHDBCK650-NC	342
EHDB800	300V	—	EHDBCK800-NC	460
EHDB960	300V	—	EHDBCK960-NC	460

Terminal kits

Contactor size	Wire size	Catalog number	List price
3 Pole			
EHDB75	10 – 2/0	EHDBTK075	$ 12
EHDB110	10 – 2/0	EHDBTK110	12
EHDB130	8 – 3/0	EHDBTK130	25
EHDB220	8 – 3/0	EHDBTK220	25
EHDB280	6 – 250 kcmils	EHDBTK280	30
EHDB360	4 – 500 kcmils	EHDBTK360	50
EHDB520	(2) 4 – 500 kcmils	EHDBTK520	60
EHDB650	(2) 4 – 500 kcmils	EHDBTK650	75
EHDB800	2 – 600 kcmils	EHDBTK800	100
EHDB960	2 – 600 kcmils	EHDBTK960	225
2 Pole			
EHDB75	10 – 2/0	EHDBTK075	8
EHDB110	10 – 2/0	EHDBTK110	8
EHDB130	8 – 3/0	EHDBTK130	17
EHDB220	8 – 3/0	EHDBTK220	17
EHDB280	6 – 250 kcmils	EHDBTK280	20
EHDB360	4 – 500 kcmils	EHDBTK360	35
EHDB520	(2) 4 – 500 kcmils	EHDBTK520	40
EHDB650	(2) 4 – 500 kcmils	EHDBTK650	50
EHDB800	2 – 600 kcmils	EHDBTK800	70
EHDB960	2 – 600 kcmils	EHDBTK960	150

Technical data for drive contactors
Type BHD

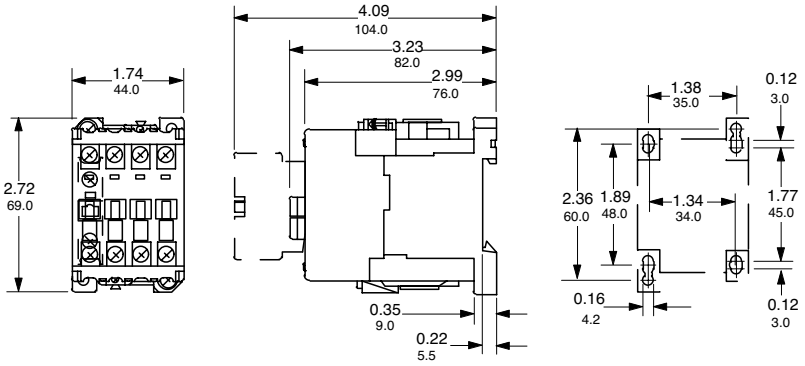
Contactor model number		BHD15C3P-1	BHD30C3P-1	BHD60C3P-1	BHD15C-1	BHD30C-1	BHD60C-1
Main poles							
N.O. Poles, Amps @ 500VDC	A	15	30	60	15	30	60
240 VDC	HP	3	7.5	15	3	7.5	15
500 VDC	HP	7.5	15	30	7.5	15	30
Center pole							
N.C. Pole, 160V Make	Max. Amps	24	45	90	—	—	—
N.C. Pole, 160V Break	Max. Amps	14	28	55	—	—	—
N.C. Pole, 300V Make	Max. Amps	—	—	—	24	45	90
N.C. Pole, 300V Break	Max. Amps	—	—	—	14	28	55
DC rating							
Maximum thermal current	A	15	30	60	15	30	60
Peak interrupting current	A	22.5	45	90	22.5	45	90
Connectable wire size							
Main poles with lugs		18 – 10	14 – 10	8 – 1	18 – 10	14 – 10	8 – 1
Auxiliary contacts, min/max		18 – 10	18 – 10	18 – 10	18 – 10	18 – 10	18 – 10
Main contacts (contactor life)							
Mechanical endurance @ no load	mil.	5	5	5	5	5	5
Electrical endurance, main poles	mil.	1.5	1.5	1.5	1.5	1.5	1.5
Frequency of operations	per hour	600	600	600	600	600	600
Auxiliary contacts							
NEMA rating		A600	A600	A600	A600	A600	A600
AC rated voltage	V	600	600	600	600	600	600
AC thermal rated current	A	10	10	10	10	10	10
AC maximum making	VA	7200	7200	7200	7200	7200	7200
AC maximum breaking	VA	720	720	720	720	720	720
NEMA rating		P600	P600	P600	P600	P600	P600
DC rated voltage	V	600	600	600	600	600	600
DC thermal rated current	A	5	5	5	5	5	5
DC maximum make-break	A	0.2	0.2	0.2	0.2	0.2	0.2
Min. breakdown AC RMS voltage between live parts and ground	V	2200	2200	2200	2200	2200	2200
Minimum permissable load, 17V	A	0.005	0.005	0.005	0.005	0.005	0.005
Max. wire size on terminals @ 2/term		10 AWG	10 AWG	10 AWG	10 AWG	10 AWG	10 AWG
Max. operations per hour		600	600	600	600	600	600
Min. expected mechanical life	mil.	10	10	10	10	10	10
Min. expected electrical life	mil.	2	2	2	2	2	2
Coil operating data							
AC power consumption							
Inrush 60 Hz	VA	80	100	200	80	100	200
Holding 60 Hz	VA	10	11	20	10	11	20
Holding 60 Hz	W	2.4	3.3	5.5	2.4	3.3	5.5
AC operating time (in milliseconds)							
Closing time	ms	9 – 17	10 – 20	20 – 25	9 – 17	10 – 20	20 – 15
Opening time	ms	5 – 13	5 – 15	10 – 15	5 – 13	5 – 15	10 – 15
General data							
Approximate weight	lbs	0.8	1.2	2.4	0.8	1.2	2.4
Temperature limits							
Maximum operating temperature	°C	50	50	50	50	50	50
Minimum operating temperature	°C	-25	-25	-25	-25	-25	-25
Minimum storage temperature	°C	-40	-40	-40	-40	-40	-40
Maximum storage temperature	°C	70	70	70	70	70	70
Min. breakdown AC RMS voltage	V	2200	2200	2200	2200	2200	2200
Operating altitude							
Maximum operating altitude	feet	10,000	10,000	10,000	10,000	10,000	10,000-

Technical data for drive contactors
Type EHDB

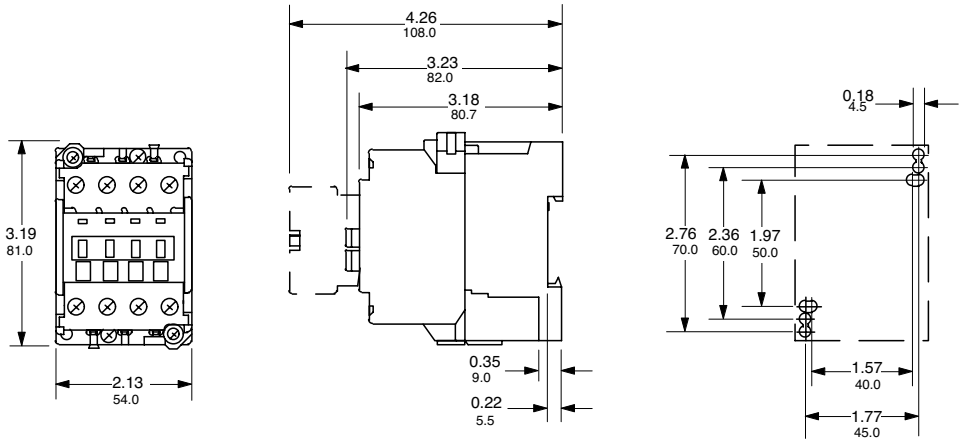
Contactor model number		EHDB130	EHDB220	EHDB280	EHDB360	EHDB520	EHDB650	EHDB800	EHDB960
N.O. poles, Amps	600 VDC	150	220	280	360	520	650	800	960
N.C. pole, 600V Make	Max. amps	260	456	565	728	1040	1300	1600	1920
N.C. pole, 300V Break	Max. amps	171	285	363	472	680	850	1050	1250
Connectable wire size									
Main poles with lugs		8 – 30	8 – 30	5 – 250 kcmils	4 – 500 kcmils	(2) 4 – 500 kcmils	(2) 4 – 500 kcmils	(3) 2 – 600 kcmils	(3) 2 – 600 kcmils
Auxiliary contacts	min./max.	16/10	16/10	16/10	16/10	16/10	16/10	16/10	16/10
DC rating information	**N.O. Poles**								
Peak interrupting current	A	195	330	420	540	780	975	1200	1440
Maximum thermal current	A	130	220	280	360	520	650	800	960
Main contacts (contactor life)									
Mechanical endurance @ no load	mil.	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	300	300	300	300	300	300	300	300
Auxiliary contacts									
NEMA rating		A600	A600	A600	A600	A600	A600	A600	A600
AC rated voltage	V	600	600	600	600	600	600	600	600
AC thermal rated current	A	10	10	10	10	10	10	10	10
AC maximum making	VA	7200	7200	7200	7200	7200	7200	7200	7200
AC maximum breaking	VA	720	720	720	720	720	720	720	720
NEMA rating									
DC rated voltage	V	600	600	600	600	600	600	600	600
DC thermal rated current	A	5	5	5	5	5	5	5	5
DC maximum make-break	A	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Min. breakdown AC RMS voltage between live parts and ground		2200	2200	2200	2200	2200	2200	2200	2200
Min. permissable load, 17V	A	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Expected mechanical life	mil.	10	10	10	10	10	10	10	10
Max. operations per hour		300	300	300	300	300	300	300	300
Coil operating data									
AC power consumption									
Inrush 60 Hz	VA	490	900	900	1200	2900	2900	400	4000
Holding 60 Hz	VA	35	52	52	65	105	105	140	140
Holding 60 Hz	W	11	18	18	22	44	44	60	60
DC power consumption									
Inrush	W	330	500	500	630	800	800	1100	1100
Holding	W	22	3.6	3.6	4	20	20	20	20
AC operating time									
Closing time	ms	20 – 30	20 – 30	20 – 30	20 – 30	30 – 50	30 – 50	30 – 50	30 – 50
Opening time	ms	7 – 15	7 – 15	7 – 15	7 – 15	10 – 20	10 – 20	10 – 20	10 – 20
DC operating time									
Closing time	ms	20 – 30	30 – 40	30 – 40	30 – 40	60 – 80	60 – 80	60 – 80	60 – 80
Opening time	ms	17 – 27	27 – 37	27 – 37	27 – 37	10 – 20	55 – 75	55 – 75	55 – 75
General data									
Approximate weight	lbs	5	9.2	9.2	13	27.3	27.3	37	38
Temperature limits									
Maximum operating temperature	°C	70	70	70	70	70	70	70	70
Minimum operating temperature	°C	-40	-40	-40	-40	-40	-40	-40	-40
Minimum storage temperature	°C	-50	-50	-50	-50	-50	-50	-50	-50
Maximum storage temperature	°C	70	70	70	70	70	70	70	70
Min. Breakdown AC	RMS Voltage	2200	2200	2200	2200	2200	2200	2200	2200
Operating altitude									
Maximum operating altitude	feet	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000

Approximate dimensions for drive contactors
Type BHD, 3 pole

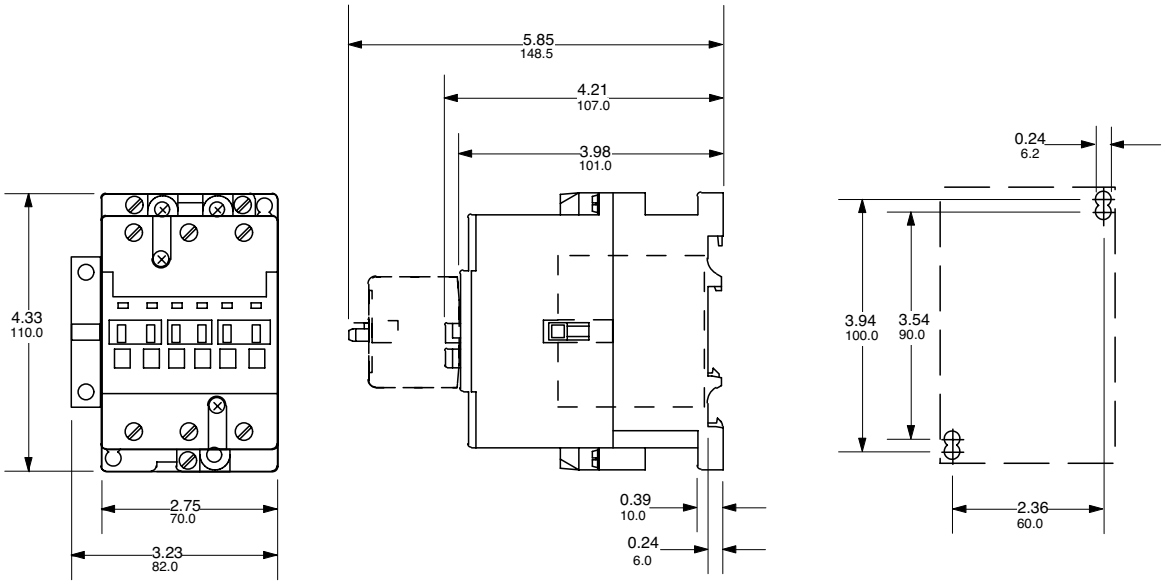
BHD15



BHD30

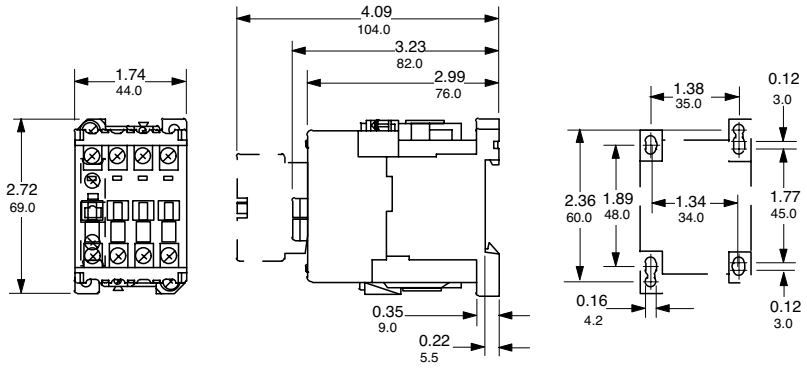


BHD60

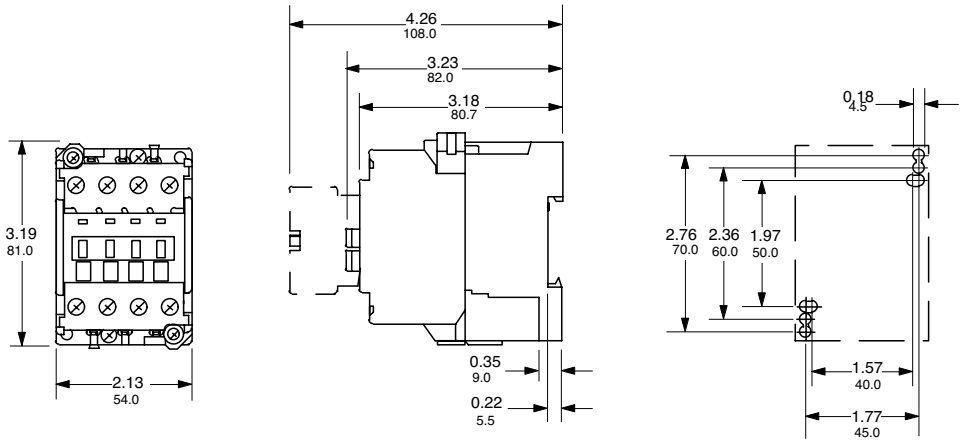


Approximate dimensions for drive contactors
Type BHD, 2 pole

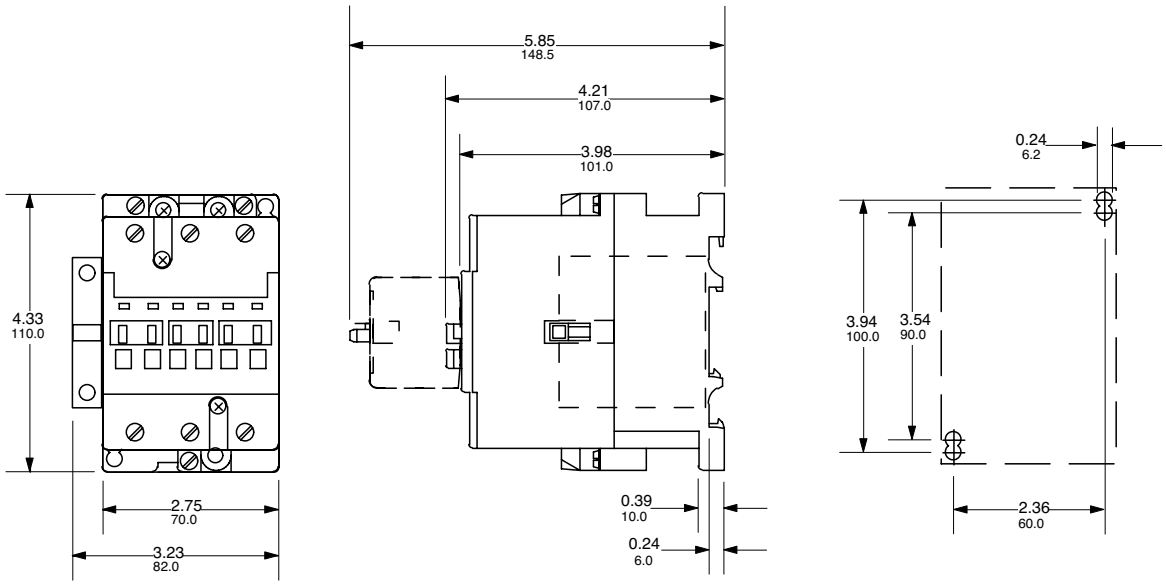
BHD15C2P



BHD30C2P

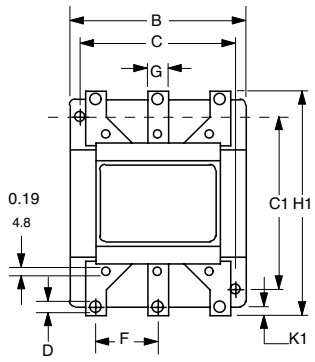


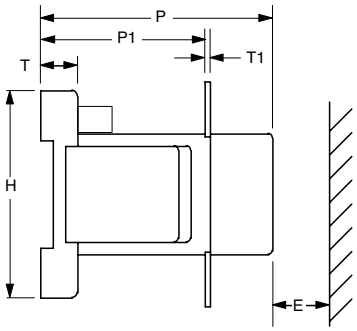
BHD60C2P

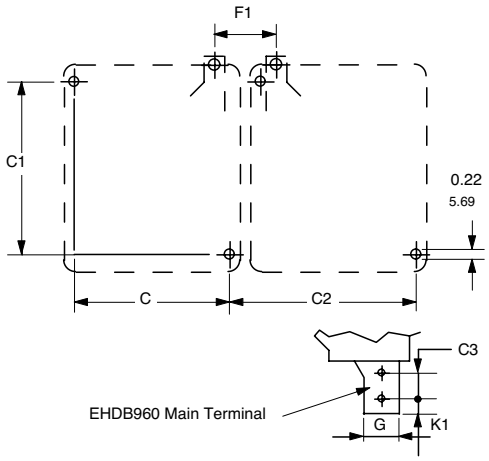


Approximate dimensions for drive contactors
Type EHDB 2 & 3 pole

EHDB130 – EHDB960





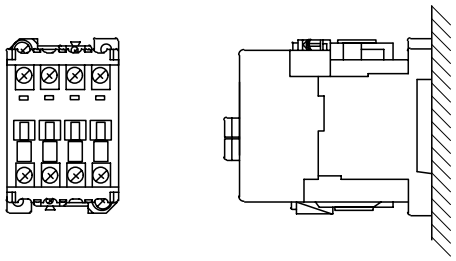


DIM.	B			B2	C	C1	C2				E	D	F	G	H	H1	K1	P	P1	T	T1	C3
	1, 2	3	4				①	≠	③	√												
	Aux. contact block																					
EHDB130in	4.88	5.31	5.75	5.94	4.33	4.72	5.00	5.00	5.35	5.79	1.57	0.43	1.61	0.79	5.51	6.73	0.39	5.63	3.58	0.75	0.16	—
mm	124	135	146	151	110	120	127	127	136	147	40	11	41	20	140	171	10	143	91	19	4	—
EHDB220in	5.35	5.83	6.30	6.46	4.72	5.51	5.39	5.39	5.87	6.34	0.59	0.24	1.77	0.79	6.14	7.79	0.39	6.65	4.06	0.41	0.20	—
mm	136	148	160	164	120	140	137	137	149	161	15	6	45	20	156	198	10	169	103	10.5	5	—
EHDB280in	5.35	5.83	6.30	6.46	4.72	5.51	5.39	5.39	5.87	6.34	0.59	0.24	1.77	0.79	6.14	7.79	0.39	6.65	4.06	0.41	0.20	—
mm	136	148	160	164	120	140	137	137	149	161	15	6	45	20	156	198	10	169	103	10.5	5	—
EHDB360in	6.92	7.44	7.72	8.11	6.30	5.51	7.20	7.32	7.48	7.76	1.18	0.24	2.44	0.98	6.14	8.14	0.49	6.88	4.21	0.7 ⑤	0.20	—
mm	176	189	196	206	160	140	183	186	190	197	30	6	62	25	156	207	12.5	175	107	19 ⑤	5	—
EHDB520in	7.80	8.23	8.62	8.90	6.69	7.87	7.91	7.91	8.19	8.54	1.57	0.24	2.64	0.98	8.78	10.71	0.49	8.90	5.51	0.9 ⑤	0.24	—
mm	198	209	219	226	170	200	201	201	208	217	40	6	67	25	223	272	12.5	226	140	23 ⑤	6	—
EHDB650in	7.80	8.23	8.62	8.90	6.69	7.87	7.91	7.91	8.19	8.54	1.57	0.24	2.64	0.98	8.78	10.71	0.49	8.90	5.51	0.9 ⑤	0.24	—
mm	198	209	219	226	170	200	201	201	208	217	40	6	67	25	223	272	12.5	226	140	23 ⑤	6	—
EHDB800in	9.61	9.96	10.31	10.63	8.66	7.87	9.69	9.690	10.00	10.35	1.57	0.24	3.23	1.57	8.78	11.57	0.79	8.90	5.51	0.9 ⑤	0.24	—
mm	244	253	262	270	220	200	246	246	254	263	40	6	82	40	223	294	20	226	140	23 ⑤	6	—
EHDB960in	9.61	9.96	10.31	10.63	8.66	7.87	9.69	9.690	10.00	10.35	1.57	0.24	3.23	1.57	8.78	11.57	0.79	8.90	5.51	0.9 ⑤	0.24	1.36
mm	244	253	262	270	220	200	246	246	254	263	40	6	82	40	223	294	20	226	140	23 ⑤	6	34.5

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

Drive contactors
Mounting positions, Type BHD & EHDB

Type BHD & EHDB



Terms & conditions

These terms and conditions govern all sales and shipments of control equipment products (including parts and accessories).

ABB Control Inc. hereby gives notice of its objection to any different or additional terms and conditions except for such as may be expressly accepted by it in writing.

Prices
Prices are subject to change without notice. Prices will be the prices in effect at the time of shipment by ABB Control Inc. and include freight, prepaid and allowed to first destination in the continental United States. In the event of a price change, the effective date of the change will be the date shown on the new price discount sheets. However, where a price change is made by letter or telegram, the effective date will be given as part of the announcement.

Taxes
The price does not include any Federal, state or local property, license, privilege, sales, use, excise, gross receipts or other like taxes which may now or hereafter be applicable. Payment by ABB Control Inc. of any such taxes shall be for the account of purchaser.

Standard Terms of Payment
Standard terms of payment are according to the appropriate discount schedule (AC 5000 - AC 5002).

Payment and Late Charges
ABB Control Inc. may require full or partial payment in advance if, in its sole judgement, the financial condition of the purchaser, at any time prior to delivery, does not merit the terms of payment specified.

If shipments are delayed by the purchaser or by reason of any of the causes referred to in the paragraph entitled "Excusable Delay", payments shall become due from the date when ABB Control Inc. is prepared to make shipment. Products held for the purchaser as a result of such delay shall be at the risk and expense of the purchaser.

If the purchaser fails to pay any invoice when due, ABB Control Inc. may defer deliveries under this or any other contract with purchaser, except upon prior receipt of satisfactory security for or cash in payment of any such invoice. Failure on the part of purchaser to pay invoices when due shall at the option of ABB Control Inc. constitute a default under this contract.

A service charge, the lesser of the highest rate allowed by law or 11/2% per month, or fraction thereof, for a maximum charge of 18% per annum will be charged on all overdue accounts.

Delivery
Delivery of products shall be FOB point of shipment regardless of transportation costs being "allowed", "prepaid" or collect". Where the scheduled delivery of products and parts is delayed by the purchaser or by reason of any of the causes referred to in the paragraph entitled Excusable Delay, ABB Control Inc. may deliver such products by moving them to storage for the account of and at the risk of the purchaser. Shipping dates are approximate and are based upon prompt receipt of all necessary information from purchaser. ABB Control Inc. reserves the right to make delivery in installments.

Purchaser Pick-up
No allowance will be made in lieu of transportation charges if the purchaser accepts shipment at the factory, warehouse or freight station. Transportation charges will not be deducted from the purchase price.

Origin, Method of Shipment and Routing
ABB Control Inc. shall determine the point of origin of shipment, the method of transportation and the routing of shipment. Costs for shipment by means requested by purchaser different from ABB Control Inc.'s standard means of shipment are invoiced to the purchaser as a separate charge.

Freight charges will be added to the price of any order under $100.

Excusable Delay
ABB Control Inc. shall not be liable for loss, damage, detention or delay, nor be deemed to be in default from causes beyond its reasonable control, including without limitation, fire, flood, strike or other labor difficulty, act or omission of any governmental authority or of the purchaser, insurrection or riot, embargo, delays or shortage in transportation or inability to obtain necessary labor, materials or manufacturing facilities from usual sources.

In the event of delay in performance due to any such cause, the date of delivery will be postponed by such length of time as may be reasonably necessary to compensate for the delay.

Warranty
ABB Control Inc. warrants that on date of shipment to purchaser, the goods will be the kind and quality described herein, merchantable and free of defects in workmanship and material.

If within one year from date of initial operation, but not more than eighteen months from date of shipment, should any failure to conform with this warranty appear within such time, ABB Control Inc. shall, if given prompt notice by purchaser, correct such nonconformity, at its option, either by repair or replacement F.O.B. repair facility or by refund of the purchase price of the nonconforming product or part. Return of products to ABB Control Inc. pursuant to this paragraph shall be at purchaser's risk and expense. The foregoing warranty is exclusive and in lieu of all other warranties of quality, expressed or implied, and all other warranties, including any warranty of merchantability or fitness for a particular purpose are hereby disclaimed.

Correction of nonconformities in the manner and for the period of time provided above shall be purchaser's exclusive remedy and shall constitute fulfillment of all liabilities of ABB Control Inc. whether in warranty, strict liability, contract, negligence, tort or otherwise with respect to any nonconformance or defect in the product.

The foregoing warranty shall not apply to any product which has been: a) improperly repaired or altered, b) subjected to misuse, misapplication, negligence or accident, c) used in a manner contrary to manufacturer's directions.

Limitation of Liability
ABB Control Inc.'s liability to purchaser on any claim in connection with the product shall not exceed the purchase price of the product which gives rise to the claim.

IN NO EVENT SHALL ABB CONTROL INC. BE LIABLE FOR SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES whether in warranty, contract, strict liability, tort, negligence or otherwise including but not limited to loss of profits or revenue, loss of use of the product or any associated product, cost of capital, cost of substitute products, facilities or services, downtime costs or claims of customers of the purchaser for such or other damages.

Except as prohibited by law, all causes of action against ABB Control Inc. shall expire unless brought within one year of the time of accrual thereof. ABB CONTROL INC. NEITHER ASSUMES NOR AUTHORIZES ANYONE TO ASSUME FOR IT ANY OTHER OR FURTHER LIABILITY THAN AS SET OUT ABOVE.

Patent Indemnity
ABB Control Inc. will at its own expense defend any suit which may be brought against the Purchaser based on a claim that any apparatus or part furnished under contract constitutes an infringement of any United States letter patent (provided ABB Control Inc. is notified promptly of such suit and copies of all papers therein are delivered to ABB Control Inc.), and ABB Control Inc. agrees to pay all judgements and costs recovered in any such suit and to reimburse the Purchaser for costs of expenses incurred in the defense of any such claim or suit. In case said apparatus or any part is held to constitute infringement and the use of the apparatus or part is enjoined, ABB Control Inc. shall at its own expense, either procure for the Purchaser the right to continue using the apparatus or part or replace it with non-infringing apparatus; or modify it so it becomes non-infringing, or remove the apparatus and refund the purchase price and the transportation and installation cost thereof. The foregoing states the entire liability of ABB Control Inc. for patent infringement by apparatus or any part thereof.

Shipping loss or damage
In the event of shipping loss or damage: 1) Notification must be given to ABB Control Inc. within 72 hours of delivery; 2) Written notice of apparent loss or damage must be made on the carrier's delivery receipt; and 3) Concealed damage must be immediately reported to the delivering carrier with a request for inspection. Purchaser shall comply with the foregoing procedure whether or not ABB Control Inc. has the risk of loss at the point of loss or damage to the shipment.

Title — risk of loss
The products sold hereunder shall remain the property of ABB Control Inc. and shall remain personal property until fully paid for in cash, and purchaser agrees, if requested by ABB Control Inc. to execute a further security agreement covering the products sold, and to perform all acts which may be necessary to perfect and assure retention of title to such products by ABB Control Inc. Not withstanding any agreement with respect to delivery terms, risk of loss or damage shall pass to the purchaser and delivery shall be deemed to be complete upon delivery to a private or common carrier or upon moving into storage, whichever occurs first, at the point of shipment.

Termination
Any order or contract may be terminated by the purchaser only on written notice and upon payment of reasonable and proper termination charges, including without limitation, all costs identified to the order of contract incurred by ABB Control Inc. up to the date of notice of termination and all charges incurred by ABB Control Inc. in respect of the termination.

Returns
In no event will ABB Control Inc. be responsible for unauthorized return of products. Returns will be accepted only at ABB Control Inc.'s option and subject to terms specified by ABB Control Inc. Authorization and shipping instructions for return of products must be obtained from ABB Control Inc. prior to return shipment. Product must be returned with proper identification. When a purchaser requests authorization to return for his own reasons, the return is subject to a minimum restocking charge of 20% for standard inventoried product and for any transportation paid by ABB Control Inc., both out and ingoing. Returns will be accepted up to 60 days after invoice date. Goods returned for purchaser's reason are subject to inspection and must be in good working condition, as new, and in original cartons.

Purchase orders
Except as provided below, all orders must be in writing and show quantities and prices, complete description (including catalog numbers) of products requested and mutually agreed delivery dates.

Verbal orders received via telephone or otherwise must be confirmed within 5 days either by mail, telex or the equivalent. Verbal orders with a purchase price over $5,000 will not be processed until such written confirmation is received.

Unless otherwise agreed in writing, an addition to a previously entered order will be accepted only at then applicable prices, discount schedules, conditions of sale, etc.

Special quotations
Special quotations will automatically expire 30 days from issuance unless renewed in writing by ABB Control Inc.

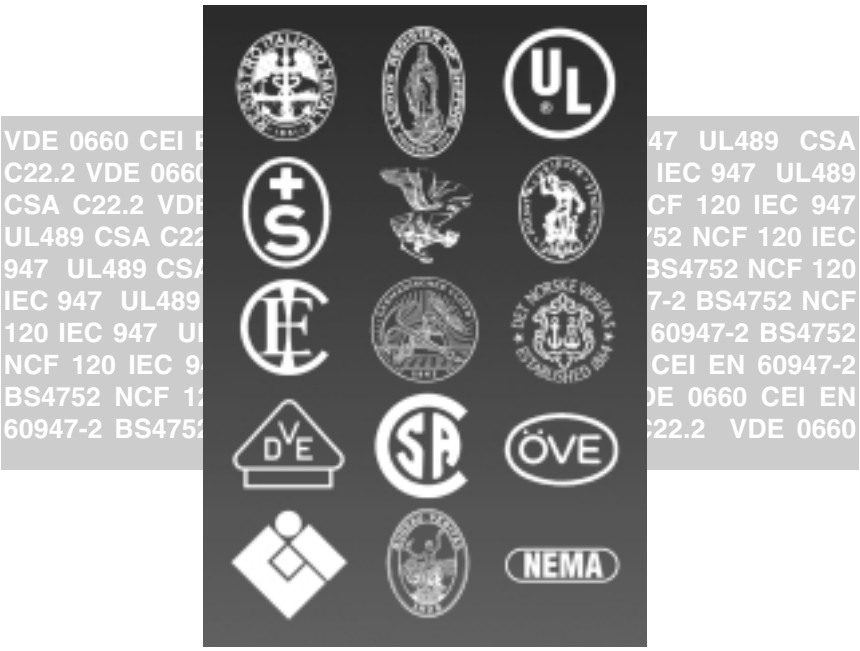
Assignment
Any assignment of this contract, or any rights hereunder, without prior written consent of ABB Control Inc. by a duly authorized representative thereof shall be void.

Partial invalidity
If any provisions herein or portions thereof conflict with any statute or rule of law of the jurisdiction of applicable law or wherein the contract may be sought to be enforced, then such provisions or portions thereof shall be deemed void to the extent that they may so conflict, but without invalidating the remaining portions of such provisions or other provisions hereof.

Remedies
The remedies expressly provided for in the Conditions of Sale shall be in addition to any other remedies which ABB Control Inc. may have under the Uniform Commercial Code or other applicable law.

Choice of law
The construction and performance of this contract and the rights and remedies of the parties hereto shall be governed by the laws of the State of Texas.

Worldwide approvals[1]



The CE Mark

Within the European Union, EU, conformity of products and the proper application of the CE marking to machines and control equipment is necessary for marketing electrical equipment. The intent is to ensure compliance with all relevant EU Directives.

ABB Low Voltage Apparatus

ABB is a global group serving customers in electric power generation, transmission and distribution, industrial building systems, and rail transportation. ABB Low Voltage Apparatus develops, produces and markets low voltage products such as disconnect switches, contactors, starters, pushbuttons, soft starters, arc guard systems, relays, mini-contactors, manual motor starters, Isomax MCCBs, and MCBs. With six manufacturing units within the European Union, we are ideally located to develop, manufacture and provide low voltage equipment to comply with the EU directive.

Background

The guarantee of free trade of goods within the Community is the most important objective. This will eliminate trade restrictions that result from different technical regulations in each individual member country. Harmonization of existing European standards and regulations, is being accomplished and already partially realized. Based on this goal, a new concept for creating directives was formed in 1985 by the European Community (EC) Commission to produce directives with a wide range of applications which contain only the most basic safety requirements.

The CE Mark

The CE mark is prescribed by law and assures the European free trade of goods. It is short for “Communauté Européen,” and is displayed on goods and/or packaging which acts as an external symbol for the inspection of products. It also illustrates the manufacturer’s responsibility to uphold the community’s directives.

ABB´s commitment to the directives

ABB Low Voltage Apparatus producing companies will attach the CE mark in accordance with the product directives. Our products will conform as follows:

- Declarations of conformity for ABB products will be available when required by the relevant EU directives.
- Those products required to do so will bear CE marking as specified by the relevant EU directives and CE marking regulations.
- Necessary technical documentation will be on file and made available to authorized organizations upon written request.

[1] Approvals listed may not apply to products listed in this publication.

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940-397-7000
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AC 1012
January, 2000

This information is provided by:

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