ABB Motor Starter Solutions

ABB provides the complete solution to all your motor starting needs in both AC and DC.
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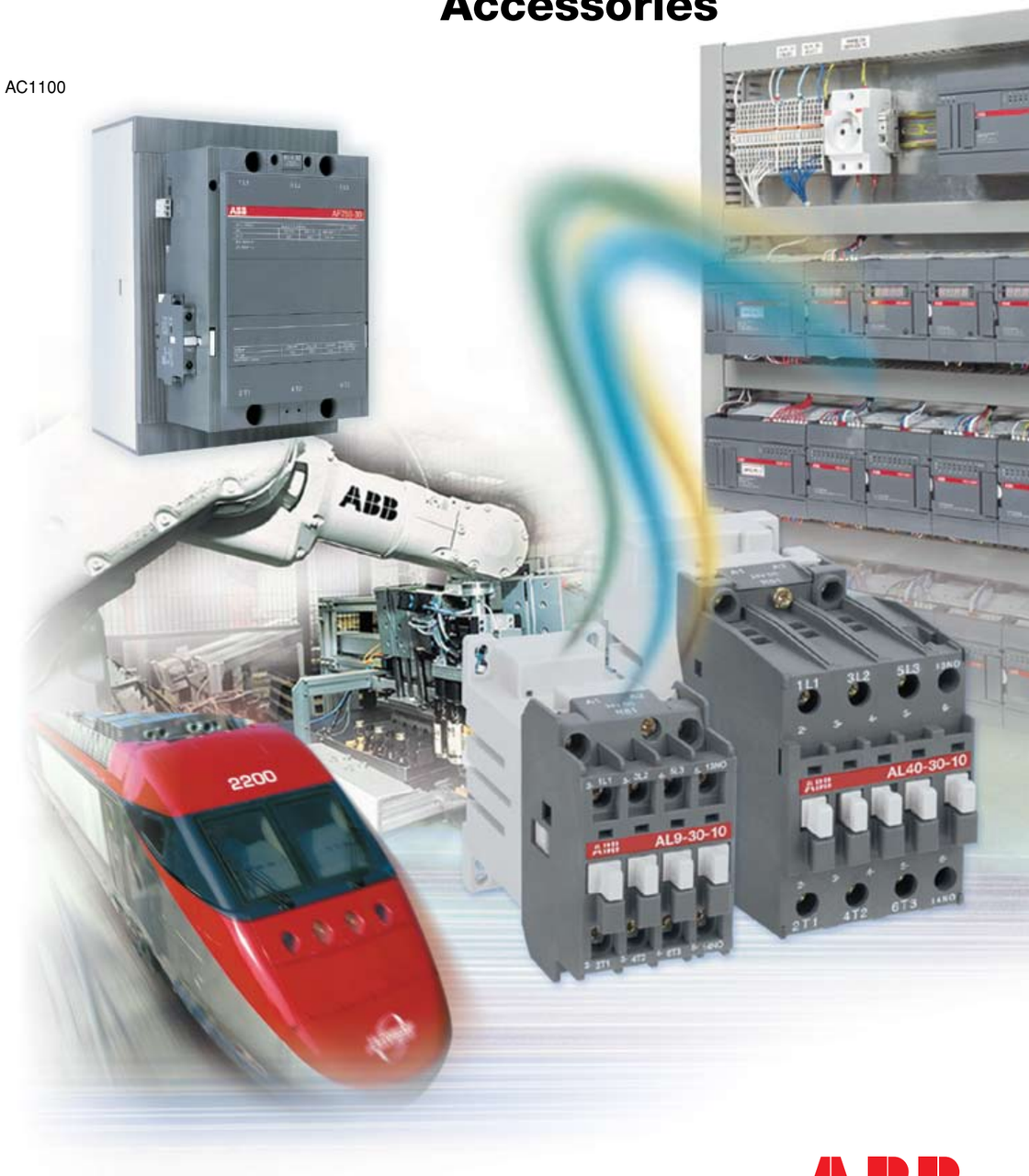
AC 1100 - April 2007

AC1100 **Contactors, Motor Protection, Accessories** Short Form 2007

Short Form 2007

Contactors
Motor Protection
Accessories

AC1100



Coil Voltage Code for Completing Order Codes

a.c. Coils

Contactors and control relays:
A..., UA..., UA...-R, GA... and N...

Voltage V - 50Hz	Voltage V - 60Hz	(1) Code
24	**24**	**8 1**
26	28	1 6
28	32	1 7
42	42	8 2
42	48	2 0
48	**48**	**8 3**
60	60	7 3
100	100 ... 110	7 4
105	110 ... 127	2 6
110	**110 ... 120**	**8 4**
110 ... 115	115 ... 127 (2)	8 9
120	140	2 9
125 ... 127	150	3 0
175	**208**	**3 4**
190	220	3 6
200	200 ... 220	7 5
210	240	4 0
220 ... 230	**230 ... 240**	**8 0**
230 ... 240	240 ... 260	8 8
230 ... 240	277	4 2
-	347	4 7 (3)
380	380 ... 415	7 7
380 ... 400	400 ... 415	8 5
400 ... 415	415 ... 440	8 6
400	440	5 0
400 ... 415	**480**	**5 1**
415 ... 440	440 ... 460	8 7
440	500	5 3
500	**600**	**5 5**
550	–	5 6
660 ... 690	–	5 8
–	690	5 9

(1) Codes **8 0** to **8 8** : dual frequency coils.
(2) A 145 ... A 300 contactors at 60 Hz 115 V only.
(3) A 9 ... A 75 only

a.c. / d.c. Coils with Electronic Coil Interface

Contactors:
AF 45 ... AF 300

Voltage V - 50/60Hz	Voltage V - d.c.	Code
–	20 ... 60	7 2
48 ... 130	48 ... 130	6 9
100 ... 250	100 ... 250	7 0

Contactors:
AF 400 ... AF 1650

Voltage V - 50/60Hz	Voltage V - d.c.	Code
–	24 ... 60	6 8
48 ... 130	48 ... 130	6 9
100 ... 250	100 ... 250	7 0 (1)
250 ... 500	250 ... 500	7 1

(1) only coil available for AF 1350 ... 1650

d.c. Coils

Standard Coils

Contactors and control relays:
AE..., AL..., NE..., NL...

Voltage V - d.c.	Code
12	8 0
24	8 1
42	8 2
48	8 3
50	2 1
60	8 4
75	8 5
110	8 6
125	8 7
220	8 8
240	8 9
250	3 8

Large Voltage Range Coils

Contactors and control relays:
TAE..., TAL... and TNL...

U_c min. ... U_c max. V - d.c.	Code
17 ... 32	5 1
25 ... 45	5 2
36 ... 65	5 4
42 ... 78	5 8
50 ... 90	5 5
77 ... 143	6 2
90 ... 150	6 6
152 ... 264	6 8

⚠ Voltage tolerances included in the U_c min. ... U_c max. voltage range.

Other voltages: please consult us.

Ampere ratings of 3 phase, AC induction motors

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

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

Contactors
Motor Protection
Accessories

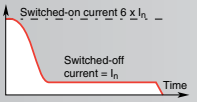
A.., AF.., 3-pole Contactors

a.c. Circuit Switching

Switching of 3-phase Cage Motors

AC-3 utilization category

When **making**, the motor current is about **6 x I_n**. **Breaking** while the motor is running at **I_n** motor F.L.C.

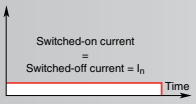


				A9	A12	A16	A26	A30	A40	A50	A63	A75
				AL 9	AL 12	AL 16	AL 26	AL 30	AL 40	AF50	AF63	AF75
AC-3	Rated operational current	600 V	A	9	11	17	28	34	42	54	65	80
AC-3	Power rating	240 V	HP	2	3	5	10	10	15	20	25	30
		480 V	HP	5	7.5	10	20	25	30	40	50	60
		600 V	HP	7.5	10	15	25	30	40	50	60	75

Switching of Resistive Circuits

AC-1 utilization category

When **making**, the switched-on current is equal to the **I_n load rated current with cos φ ≥ 0.95.**



			A9	A12	A16	A26	A30	A40	A50	A63	A75
AC-1	Rated operational current	A	21	25	30	40	50	60	80	90	105
●	Rated operational voltage	V	600								

3-pole Contactors

Selection & Ordering

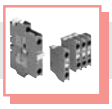
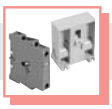
- Select contactor type.
- Select contactor coil voltage on cover page **0**/1, according to control circuit supply. (Please quote coil voltage in plain text).

			A9-A16	A26-A40	A50-A75
a.c.	Control circuit supply	*Types*	A 9-30-10 A 12-30-10 A 16-30-10	A26-30-10 A 40-30-10 A 40-30-10	A 50-30-00 A 63-30-00 A 75-30-00
d.c.	Control circuit supply	*Types*	AL 9-30-00 AL 12-30-00 AL 16-30-00	AL 26-30-00 AL 30-30-00 AL 40-30-00	AF 50-30-00 AF 63-30-00 AF 75-30-00

Contactor Main Accessories

Selection & Ordering

- Select accessory type and quote required data in plain text.

Auxiliary contacts		**CA 5-..**, 1-pole **CAL 5-..**, 2-pole	*Types*	CA 5-10 (1 x N.O.) · CA 5-01 (1 x N.C.) · CAL 5-11 (1 x N.O. + 1 x N.C.)
Timers		**TP..**, Pneumatic	*Types*	TP40DA, TP180DA, TP40IA, TP180IA
Interlocks		**VE 5-.**, Mechanical / Electrical **VM...**, Mechanical *mounting between 2 contactors*	*Types*	VE 5-1 VM 5-1 / VE 5-2 -
Surge suppressors		**RV..**, (Varistor) a.c./d.c. **RC..**, (Capacitor) a.c.	*Types*	RV 5 RC 5-1 / RV 5 RC 5-2

Protection of 3-phase motors

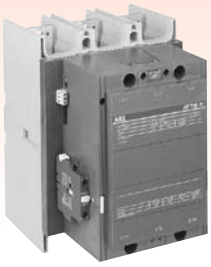
Selection & Ordering

- Select O/L relay type and setting range according to motor F.L.C.

O/L relays		**TA..DU..**, Thermal O/L relay **E..DU..**, Electronic O/L relay *Standard starting time 2 ... 10 s tripping class 10 A*	*Types & setting range in Amps*	TA 25 DU...: 0.10...0.16 · 0.16...0.25 · 0.25...0.40 · 0.40...0.63 · 0.63...1.0 · 1.0...1.4 · 1.3...1.8 · 1.7...2.4 · 2.2...3.1 · 2.8...4.0 · 3.5...5.0 · 4.5...6.5 · 6.0...8.5 · 7.5...11 · 10...14 TA 42 DU...: 13...19 · 18...25 · 24...32 · 22...32 · 29...42 TA 75 DU...: 29...42 · 36...52 · 45...63 · 60...80 E16 DU...-10: 0.1...0.32 · 0.3...1.0 · 0.9...2.7 · 2...6.3 · 5.7...18.9 E 45 DU...: 9...30 · 15...45 E 80 DU: 27...80

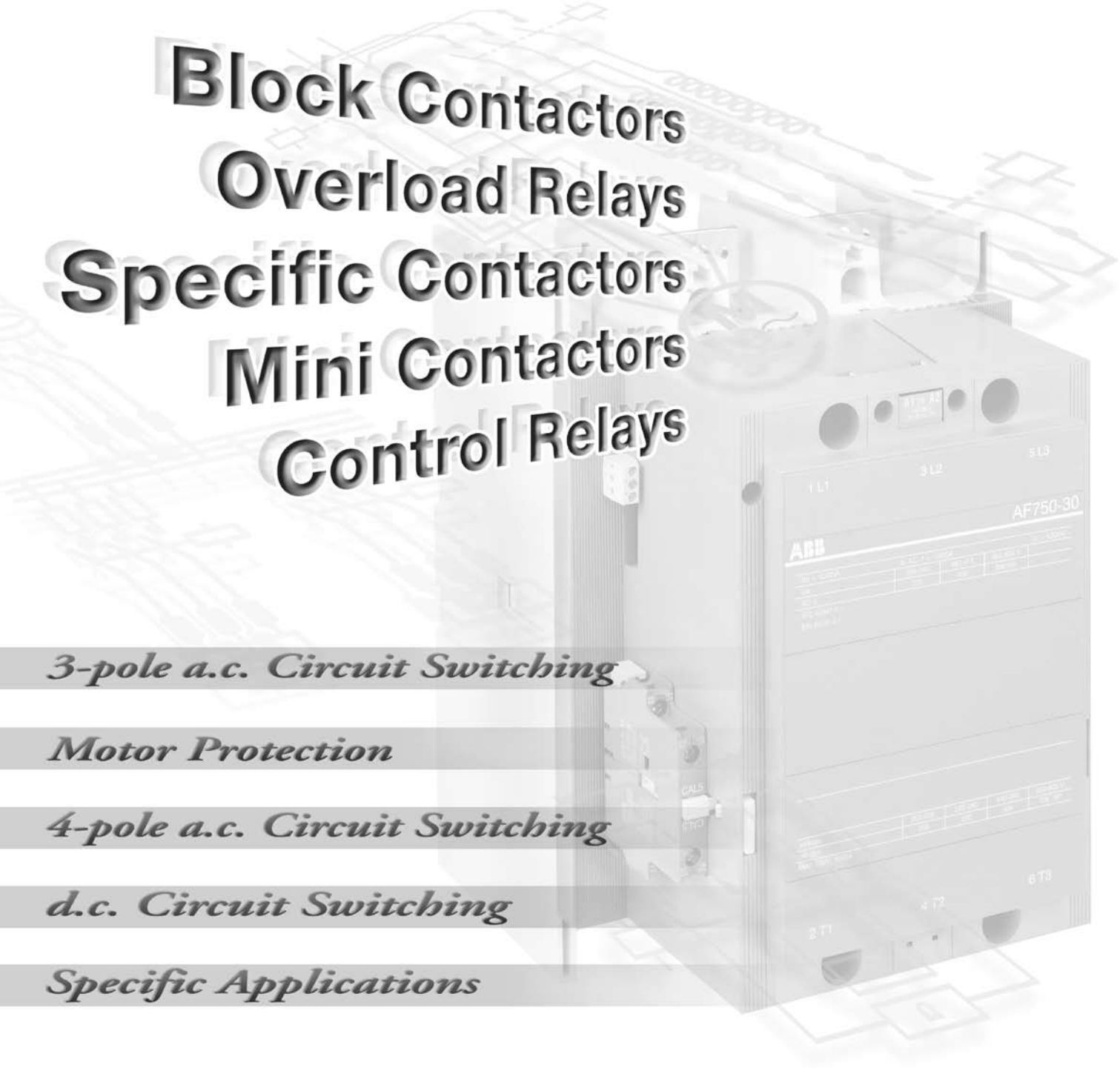







A 95 A 110 AF 95 AF 110	A 145 A 185 AF 145 AF 185	A 210 A 260 A 300 AF 210 AF 260 AF 300	AF 400 AF 460	AF 580 AF 750	AF1350 AF1650
95 110	**130 156**	**192 248 302**	**414 480**	**590 720**	**960 1100**
30 40 60 75 **75 100**	50 60 100 125 **125 150**	75 100 100 150 250 250 **200 250 300**	150 200 350 400 **400 500**	250 300 500 600 **600 700**	400 450 800 900 **1000 1150**
125 140	**230 250**	**300 350 400**	**550 650**	**750 900**	**1350 1650**
600					
A 95-30-00 **A 110-30-00**	**A 145-30-11** **A 185-30-11**	**A 210-30-11** **A 260-30-11** **A 300-30-11**			
AF 95-30-00 **AF 110-30-00**	**AF 145-30-11** **AF 185-30-11**	**AF 210-30-11** **AF 260-30-11** **AF 300-30-11**	**AF 400-30-11** **AF 460-30-11**	**AF 580-30-11** **AF 750-30-11**	**AF 1350-30-11** **AF 1650-30-11**
CA 5-10 (1 x N.O.) CA 5-01 (1 x N.C.) CAL 18-11 (1 x N.O. + 1 x N.C.)	**CAL 18-11** 2-pole, side mounting 1 x N.O. + 1 x N.C. (1st block)		**CAL 18-11 B** 1 x N.O. + 1 x N.C. (2nd block)		
–		–			
VE 5-2 –	–		–		–
	VM 300H		**VM 750H**		**VM 1650H**
RV 5 **RC 5-2**	–		The built-in coil interface eliminates the need of extra surge suppressors on these sizes		
	RC 5-2				
TA 80 DU... 60...**80** **TA 110 DU...** 65...**90** 80...**110**	**TA 200 DU...** 130...**175** 150...**200**	**TA 450 DU...** 165...**235** 220...**310**			
E 140 DU 50...**140**	**E 200 DU** 60...**200**	**E 320 DU** 100...**320**	**E 500 DU** 150...**500**	**E 800 DU** 250...**800**	**E 1250 DU** 375...**1250**

Block Contactors
Overload Relays
Specific Contactors
Mini Contactors
Control Relays



3-pole a.c. Circuit Switching

Motor Protection

4-pole a.c. Circuit Switching

d.c. Circuit Switching

Specific Applications

Block Contactors

Contents

A 9 ... A 110 3-pole Contactors

a.c. Operated

Application

A 9 ... A 110 contactors are mainly used for controlling 3-phase motors and generally for controlling power circuits up to 600 V a.c. or 220 V d.c. / 440 V d.c. The contactors can also be used for many other applications such as isolation, capacitor switching, lighting.

(☞ next pages in this section).

Description

The **A...** series 3-pole contactors are of the block type design.

- Main poles and auxiliary contact blocks

A 9 ... A 40 1-stack contactors:
– 3 main poles,
– 1 built-in auxiliary contact,
– front and side mounted add-on auxiliary contact blocks.
Auxiliary contacts for safety circuits: ☞ page **7**/6.

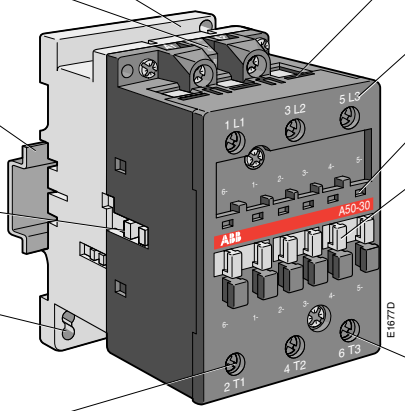
A 50 ... A 110 contactors:
– 3 main poles,
– front and side mounted add-on auxiliary contact blocks.

- Control circuit: a.c. operated with laminated magnet circuit.
- Accessories: a wide range of accessories are available (☞ next pages and section **4**).

A 9 ... A 40 2-stack contactors:
– 1st stack with 3 main poles and 1 built-in auxiliary contact,
– 2nd stack with 4 built-in auxiliary contacts,
– side mounted add-on auxiliary contact blocks.
The built-in auxiliary contact elements are mechanically linked.

Variants ☞ next pages in this section

- 4-pole: A 9 ... A 75 contactors (with 4 N.O. or 2 N.O. + 2 N.C. main poles).
- a.c./d.c. operated controlled supply: AF 50 ... AF 110 contactors.
- d.c. operated: AL 9 ... AL 40 contactors.
- d.c. operated with large coil voltage range: TAL 9 ...TAL40 contactors.
- contactors for capacitor switching (UA..-R types), contactors for d.c. switching (GA..., GAE... types).



Location of surge suppressors.

Clear marking of coil voltages and frequencies.

Quick fixing on mounting rail according to IEC 715, EN 50022 and EN 50023 standards:
– 35 x 7.5 mm for A 9 ... A 40 contactors,
– 35 x 15 mm for A 9 ... A 75 contactors,
– 75 x 25 mm for A 50 ... A 110 contactors.

Location of side-mounted accessories (on right or left hand side).

Holes for screw fixing (screws not supplied). Distance between holes according to EN 50003 (contactors for motors ≤ 11 kW).

Terminals delivered in open position with captive screws.
Screwdriver guidance for all terminals.
Degree of protection (IP...) of terminals according to IEC 60947-1:
– A 9 ... A 40 contactors:
IP 20 for main and auxiliary terminals.
– A 50 ... A 110 contactors:
IP 10 for main terminals,
IP 20 for auxiliary terminals.

Connecting point for control leads in top part of main terminals of A 50 ... A 110 contactors.

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

Location of function marker.

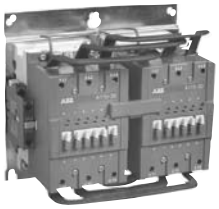
Stops for attaching front-mounted accessories.

Terminal screws:
– A 9 ... A 16 contactors:
M3.5 Pozidriv (+,-) No. 2 for all terminals,
– A 26 contactors:
M4 Pozidriv (+,-) No. 2 for main and auxiliary terminals,
M3.5 Pozidriv (+,-) No. 2 for coil terminals,
– A 30, A 40 contactors:
M5 Pozidriv (+,-) No. 2 for main terminals,
M3.5 Pozidriv (+,-) No. 2 for auxiliary and coil terminals,
– A 50 ... A 75 contactors:
M6 Pozidriv (+,-) No. 2 for main terminals,
M3.5 Pozidriv (+,-) No. 2 for coil terminals,
– A 95 ... A 110 contactors:
M8 Hexagon socket (s = 4 mm) for main terminals,
M3.5 Pozidriv (+,-) No. 2 for coil terminals.

A 9-30-10

A 26-30-10

A 50-30


A 110R-30-11-84

Coil voltages and codes

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

☞ Other voltages: page **0**/1.

Non-Reversing Ordering Details

CSA/UL Ratings

General Purpose Current AC-1	Motor Switching Current AC-3	Maximum motor horsepower ratings 1-phase 120V	1-phase 240V	1-phase 208V	3-phase 240V	3-phase 480V	3-phase 600V	Auxiliary contacts		Order code (state coil voltage code ☐☐ (see table below))	List Price
21	9	0.5	2	2	2	5	7.5	1	–	A9-30-10-☐☐	
		0.5	2	2	2	5	7.5	–	1	A9-30-01-☐☐	
25	11	0.75	2	3	3	7.5	10	1	–	A12-30-10-☐☐	
		0.75	2	3	3	7.5	10	–	1	A12-30-01-☐☐	
30	17	1	3	5	5	10	15	1	–	A16-30-10-☐☐	
		1	3	5	5	10	15	–	1	A16-30-01-☐☐	
40	28	2	5	7.5	10	20	25	1	–	A26-30-10-☐☐	
		2	5	7.5	10	20	25	–	1	A26-30-01-☐☐	
50	34	3	7.5	10	10	25	30	1	–	A30-30-10-☐☐	
		3	7.5	10	10	25	30	–	1	A30-30-01-☐☐	
60	42	3	7.5	10	15	30	40	1	–	A40-30-10-☐☐	
		3	7.5	10	15	30	40	–	1	A40-30-01-☐☐	
80	54	3	10	15	20	40	50	1	1	A50-30-11-☐☐	
90	65	5	10	20	25	50	60	1	1	A63-30-11-☐☐	
105	80	7.5	15	25	30	60	75	1	1	A75-30-11-☐☐	
125	95	7.5	20	30	30	60	75	1	1	A95-30-11-☐☐	
140	110	10	25	30	40	75	100	1	1	A110-30-11-☐☐	

Reversing, with Mechanical and Electrical Interlock

CSA/UL Ratings

General Purpose Current AC-1	Motor Switching Current AC-3	Maximum motor horsepower ratings 1-phase 120V	1-phase 240V	1-phase 208V	3-phase 240V	3-phase 480V	3-phase 600V	Auxiliary contacts		Order code (state coil voltage code ☐☐ (see table below))	List Price
21	9	0.5	2	2	2	5	7.5	1	–	A9R-30-10-☐☐	
		0.5	2	2	2	5	7.5	–	1	A9R-30-01-☐☐	
25	11	0.75	2	3	3	7.5	10	1	–	A12R-30-10-☐☐	
		0.75	2	3	3	7.5	10	–	1	A12R-30-01-☐☐	
30	17	1	3	5	5	10	15	1	–	A16R-30-10-☐☐	
		1	3	5	5	10	15	–	1	A16R-30-01-☐☐	
40	28	2	5	7.5	10	20	25	1	–	A26R-30-10-☐☐	
		2	5	7.5	10	20	25	–	1	A26R-30-01-☐☐	
50	34	3	7.5	10	10	25	30	1	–	A30R-30-10-☐☐	
		3	7.5	10	10	25	30	–	1	A30R-30-01-☐☐	
60	42	3	7.5	10	15	30	40	1	–	A40R-30-10-☐☐	
		3	7.5	10	15	30	40	–	1	A40R-30-01-☐☐	
80	54	3	10	15	20	40	50	1	1	A50R-30-11-☐☐	
90	65	5	10	20	25	50	60	1	1	A63R-30-11-☐☐	
105	80	7.5	15	25	30	60	75	1	1	A75R-30-11-☐☐	
125	95	7.5	20	30	30	60	75	1	1	A95R-30-11-☐☐	
140	110	10	25	30	40	75	100	1	1	A110R-30-11-☐☐	

A 145 ... AF 1650 3-pole Contactors

a.c. Operated - A 145 ... A 300 Contactors
a.c. / d.c. Operated - AF 400 ... AF 1650 Contactors

Application

A 145 ... AF 1650 contactors are mainly used for controlling 3-phase motors and generally for controlling power circuits up to 600 V a.c. or 220 V d.c. / 600 V d.c. The contactors can also be used for many other applications such as isolation, bypass, capacitor switching, lighting...
(☞ next pages in this section).

Description

The **A 145 ... AF 1650** 3-pole contactors are of the block type design.

- Main poles and auxiliary contact blocks
  - 3 main poles,
  - 1 N.O. and 1 N.C. auxiliary contact block (fitted on the left side).

  A maximum of 4 auxiliary contact blocks can be fitted on each contactor.
- Control circuit:

  A 145 ... A 300 contactors: a.c. operated with laminated magnet circuit,

  AF 400 ... AF 1650 contactors: a.c. operated, large voltage range, with electronic coil interface, with laminated magnet circuit.

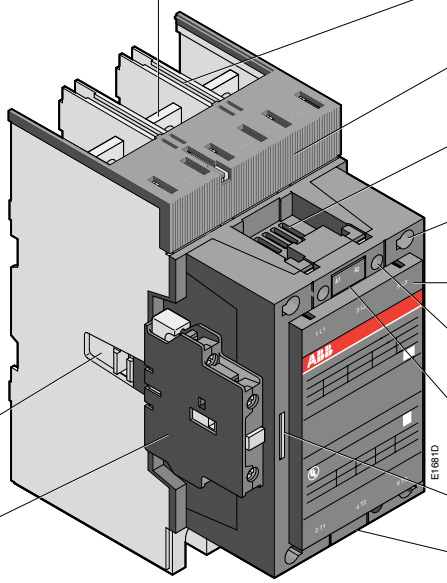
Contactors AF 400 ... AF 1650 are fitted as standard with an electronic coil interface which accepts a wide control voltage range for a.c. 50/60 Hz supply or d.c. supply (☞ Description page **2**/8).

- Accessories: a wide range of accessories are available (☞ next pages and section **4**).

Variants ☞ next pages in this section

- a.c./d.c. operated, large voltage range, with electronic coil interface: AF 145 ... AF 300 contactors.

A 145 ... A 300 contactors main terminals in line with Isomax circuit breakers.



Main terminals.
Screws and nut insert holders are included.

Screw fixing, top and bottom.
(Screws supplied).

Terminal shrouds for protection can easily be fitted from the front.

Location of surge suppressors on A 145 ... A 300 contactors.
(built-in on AF 400 ... AF 1650 contactors).

Quick release quarter turn screws for easy access to contact inspection.

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

Easy access to the coil terminals. Clear marking of coil voltages and frequencies.

Front access to the coil, no need to remove power cables when changing coil.

On-Off position indicator.

Location of function marker.

Location of side-mounted mechanical interlock (on right or left hand side).

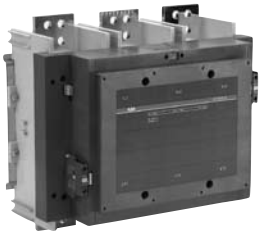
CAL 18-11 side mounted auxiliary contact block.
Easy access to the terminals.

A 145-30-11

A 300-30-11

AF 460-30-11

AF 750-30-11


AF 1650-30-11

Ordering Details, Non-Reversing

CSA/UL Ratings

General Purpose Current AC-1	Motor Switching Current AC-3	Maximum motor horsepower rating 208V	240V	480V	600V	Auxiliary contacts	Order code state coil voltage code ☐☐ (see table below)	List Price
230	130	40	50	100	125	1 1	A145-30-11-☐☐	
250	156	50	60	125	150	1 1	A185-30-11-☐☐	
300	192	60	75	150	200	1 1	A210-30-11-☐☐	
350	248	75	100	200	250	1 1	A260-30-11-☐☐	
400	302	100	100	250	300	1 1	A300-30-11-☐☐	
550	414	125	150	350	400	1 1	AF400-30-11-☐☐	
650	480	150	200	400	500	1 1	AF460-30-11-☐☐	
750	590	200	250	500	600	1 1	AF580-30-11-☐☐	
900	720	250	300	600	700	1 1	AF750-30-11-☐☐	
1210	–	–	–	–	–	1 1	AF1250-30-11-☐☐	
1350	960	–	400	800	1000	1 1	AF1350-30-11-70	
1650	1100	–	450	900	1150	1 1	AF1650-30-11-70	

Ordering Details, Reversing with Mechanical and Electrical Interlock

CSA/UL Ratings

General Purpose Current AC-1	Motor Switching Current AC-3	Maximum motor horsepower rating 208V	240V	480V	600V	Auxiliary contacts	Order code state coil voltage code ☐☐ (see table below)	List Price
230	130	40	50	100	125	1 1	A145R-30-11-☐☐	
250	156	50	60	125	150	1 1	A185R-30-11-☐☐	
300	192	60	75	150	200	1 1	A210R-30-11-☐☐	
350	248	75	100	200	250	1 1	A260R-30-11-☐☐	
400	302	100	100	250	300	1 1	A300R-30-11-☐☐	
550	414	125	150	350	400	1 1	AF400R-30-11-☐☐	
650	480	150	200	400	500	1 1	AF460R-30-11-☐☐	
750	590	200	250	500	600	1 1	AF580R-30-11-☐☐	
900	720	250	300	600	700	1 1	AF750R-30-11-☐☐	

Coil voltages and codes: A 145 ... A 300

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

☞ Other voltages: page **0**/1.

Coil voltages and codes: AF 400 ... AF 1650

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 (2)
250 ... 500	250 ... 500	7 1

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

AF... contactors with electronic coil interface: electromagnetic compatibility and **A** or **B environment** definitions ☞ page **2**/9.

(2) Only coil available for AF 1350 ...AF 1650

AL... 3-pole Contactors
d.c. Operated

Application

AL... contactors, as well as **TAL...** versions, are mainly used for controlling 3-phase motors and generally for controlling power circuits up to 600 V a.c. or 220 V d.c. / 440 V d.c.

The **TAL...** contactors are designed to operate in control circuits with large voltage variations. Example: battery supply.

Description

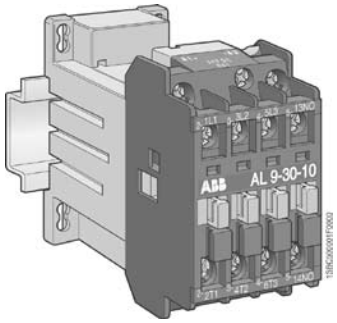
The **AL...** series 3-pole contactors are d.c. operated contactors.
The **AL Z...** series 3-pole contactors are d.c. operated contactors with very low consumption of 2.4W.
The **TAL...** series 3-pole contactors are d.c. operated contactors with **large coil voltage range**.

- Main poles and auxiliary contact blocks
  – 3 main poles,
  – front and side mounted add-on auxiliary contact blocks.
  Auxiliary contacts for safety circuits: ☞ page **7**/6.
- AL Control circuit: d.c. operated with solid magnetic circuit, and low consumption coil.
  coil must be energized from a d.c. supply and polarity (+ and -) must be respected.
- Accessories: a wide range of accessories are available (☞ section **4**).

Variants ☞ next pages in this section

- 4-pole AL9 ... AL26 contactors (with 4 N.O. main poles or 2 N.O. + 2 N.C. main poles).
- 4-pole TAL9 ... TAL26 contactors (with 4 N.O. main poles or 2 N.O. + 2 N.C. main poles).
- AL9 Z to AL16 Z contactors with a very low consumption of 2.4W.
- AL9 RT... AL26 RT and TAL9 RT ... TAL26 RT
- AL9 ST... AL16 ST with spring terminals.

AL... contactors specific design



- **AL 9 ... AL 40, TAL 9 ... TAL 40**
  The general design is identical to that of **A 9 ... A 40** contactors, only the depth is increased.

AL 16-30-10

Coil voltages and codes: AL...

Voltage - U_c V d.c.	Code □□
12	8 0
24	8 1
42	8 2
48	8 3
50	2 1
60	8 4
75	8 5
110	8 6
125	8 7
220	8 8
240	8 9
250	3 8

TAL 16-30-10

Coil voltages and codes: TAL ...

Voltage - U_c V d.c.	Code □□
17 ... 32	5 1
25 ... 45	5 2
36 ... 65	5 4
42 ... 78	5 8
50 ... 90	5 5
77 ... 143	6 2
90 ... 150	6 6
152 ... 264	6 8

Other voltages: please consult us.

Voltage tolerances (-15 % and +10 %) included in the **U_c** min. and **U_c**max. values for the **TAL...**

Ordering Details: AL ...

CSA/UL Ratings

General Purpose Current AC-1	Motor Switching Current AC-3	Maximum motor horsepower ratings 208V	240V	480V	600V	Auxiliary contacts	Order code (state coil voltage code □□ (see table below))	List Price
21	9	2 2	2 2	5 5	7.5 7.5	1 – – 1	AL9-30-10-□□ AL9-30-01-□□	
25	12	3 3	3 3	7.5 7.5	10 10	1 – – 1	AL12-30-10-□□ AL12-30-01-□□	
30	17	5 5	5 5	10 10	15 15	1 – – 1	AL16-30-10-□□ AL16-30-01-□□	
40	28	7.5 7.5	10 10	20 20	25 25	1 – – 1	AL26-30-10-□□ AL26-30-01-□□	
50	34	10 10	10 10	25 25	30 30	1 – – 1	AL30-30-10-□□ AL30-30-01-□□	
60	42	10 10	15 15	30 30	40 40	1 – – 1	AL40-30-10-□□ AL40-30-01-□□	

Ordering Details: TAL... (Contactors with large coil voltage range)

CSA/UL Ratings

General Purpose Current AC-1	Motor Switching Current AC-3	Maximum motor horsepower ratings 208V	240V	480V	600V	Auxiliary contacts	Order code (state coil voltage code □□ (see table below))	List Price
21	9	2 2	2 2	5 5	7.5 7.5	1 – – 1	TAL9-30-10-□□ TAL9-30-01-□□	
25	12	3 3	3 3	7.5 7.5	10 10	1 – – 1	TAL12-30-10-□□ TAL12-30-01-□□	
30	17	5 5	5 5	10 10	15 15	1 – – 1	TAL16-30-10-□□ TAL16-30-01-□□	
40	28	7.5 7.5	10 10	20 20	25 25	1 – – 1	TAL26-30-10-□□ TAL26-30-01-□□	
50	34	10 10	10 10	25 25	30 30	1 – – 1	TAL30-30-10-□□ TAL30-30-01-□□	
60	42	10 10	15 15	30 30	40 40	1 – – 1	TAL40-30-10-□□ TAL40-30-01-□□	

AF 50 ... AF 1650 3-pole Contactors

a.c. / d.c. Operated - Large Voltage Range
Electronic Coil Interface

Application

AF 50 ... AF 1650 contactors are mainly used for controlling 3-phase motors and generally for controlling power circuits up to 600 V a.c. or 220 V d.c. / 600 V d.c. The contactors can also be used for many other applications such as bypass, capacitor switching, lighting, d.c. power circuits...

The **AF...** contactors are fitted with an electronic coil interface which accepts a wide control voltage range, on a.c. 50/60 Hz or d.c. supplies. The same contactor can accept various supply voltages according to different countries where the final machine will be used or some fluctuation in the control voltage due to the local supply or network.

The **AF...** contactors are also fully suitable for operation in a.c. or d.c. control circuit liable to voltage interruptions or voltage dip risks.

Description

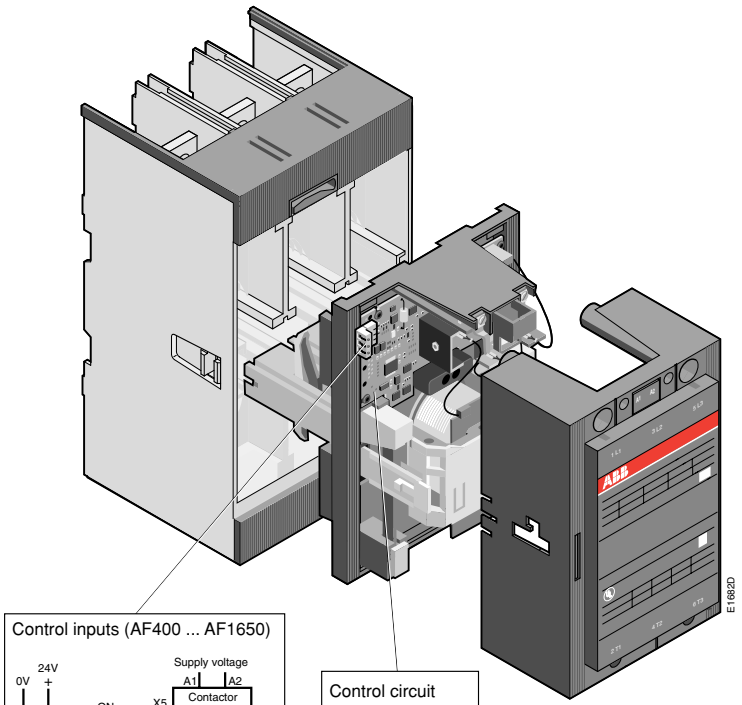
The **AF 50 ... AF 1650** 3-pole contactors are of the block type design.

- Main poles and auxiliary contact blocks
  - 3 main poles,
  - 1 N.O. and 1 N.C. auxiliary contact block (fitted on the left side).

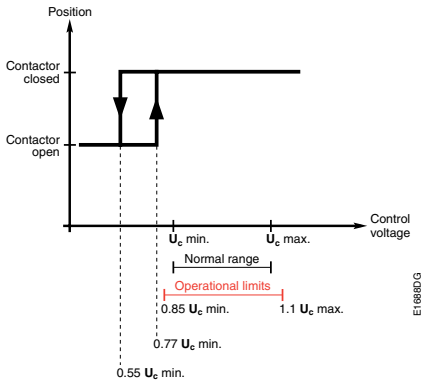
  A maximum of 4 auxiliary contact blocks can be fitted on each contactor.
- Electronic control:
  The contactors are fitted with an electronic interface that very precisely controls the voltage to the coil. The electronic control circuit always works using d.c. current through the coil and in a.c. operation the current is rectified before being applied to the coil. To achieve the levels of the currents required for making and holding respectively, the voltage is pulsed across the coil with the aid of a transistor. The pulsing also implies that the current in the coil can be optimally regulated all the time relatively independently of the voltage level. The function is controlled by a specific integrated circuit developed by **ABB**.

  Advantages
  - Wide voltage range, e.g. 100 ... 250 V a.c. and d.c.,
  - Can manage large voltage variations,
  - Reduced power consumption,
  - Very distinct closing and opening,
  - Noise free,
  - Can withstand voltage interruptions or voltage dips in the control supply (≤ 20 ms).
- Control inputs
  The large sizes **AF 400 ... AF 1650** are as standard equipped with low voltage inputs for control, for example by a PLC (☞ see drawing below).
- Accessories: a wide range of accessories are available (☞ section **4**).

AF... contactors specific design (☞ page **2**/12 for general design)



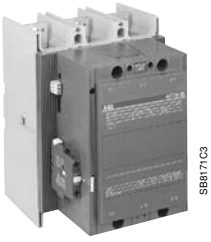
Operating diagram



AF 50-30

AF 95-30

AF 460-30-11



AF 750-30-11


AF 1650-30-11

Ordering Details

CSA/UL Ratings

General Purpose Current AC-1	Motor Switching Current AC-3	Maximum motor horsepower ratings 208V	240V	480V	600V	Auxiliary contacts		Order code state coil voltage code ☐☐ (see table below)	List Price
80	54	15	20	40	50	1	1	AF50-30-11-☐☐	
90	65	20	25	50	60	1	1	AF63-30-11-☐☐	
105	80	25	30	60	75	1	1	AF75-30-11-☐☐	
125	95	30	30	60	75	1	1	AF95-30-11-☐☐	
140	110	30	40	75	100	1	1	AF110-30-11-☐☐	
230	130	40	50	100	125	1	1	AF145-30-11-☐☐	
250	156	50	60	125	150	1	1	AF185-30-11-☐☐	
300	192	60	75	150	200	1	1	AF210-30-11-☐☐	
350	248	75	100	200	250	1	1	AF260-30-11-☐☐	
400	302	100	100	250	300	1	1	AF300-30-11-☐☐	
550	414	125	150	350	400	1	1	AF400-30-11-☐☐	
650	480	150	200	400	500	1	1	AF460-30-11-☐☐	
750	590	200	250	500	600	1	1	AF580-30-11-☐☐	
900	720	250	300	600	700	1	1	AF750-30-11-☐☐	
1350	960	–	400	800	1000	1	1	AF1350-30-11-70	
1650	1100	–	450	900	1150	1	1	AF1650-30-11-70	

Coil voltages and codes: AF 50 ... AF 300

Voltage 50/60Hz	Voltage V d.c.	Code ☐☐	
–	20 ... 60	7 2	(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.

Coil voltages and codes: AF 400 ... AF 1650

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	(2)
250 ... 500	250 ... 500	7 1	

(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 availlable for AF 1350 ... AF 1650

Electromagnetic compatibility

AF... contactors comply with international standards IEC 60947-1 (2000-10-Ed.3.1), 60947-4-1 (2000-11-Ed.2) and European standards EN 60947-1, 60947-4-1.

Notice: This product has 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.

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".

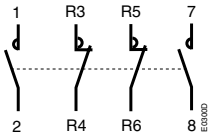
A 9 ... A 75 4-pole Contactors

a.c. Operated

A 9-40-00

A 45-40-00

A 9-22-00



Ordering Details

CSA/UL Ratings General Purpose Current **AC-1**	Auxiliary contacts	**Order code** state coil voltage code ☐☐ (see table below)	**List Price**
4 N.O. main poles			
21	– –	A9-40-00-☐☐	
30	– –	A16-40-00-☐☐	
40	– –	A26-40-00-☐☐	
65	– –	A45-40-00-☐☐	
80	– –	A50-40-00-☐☐	
105	– –	A75-40-00-☐☐	
2 N.O. + 2 N.C. main poles			
21	– –	A9-22-00-☐☐	
30	– –	A16-22-00-☐☐	
40	– –	A26-22-00-☐☐	
65	– –	A45-22-00-☐☐	
105	– –	A75-22-00-☐☐	
4 N.C. main poles			
30	– –	A16-04-00-☐☐	

Coil voltages and codes

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

☞ Other voltages: page **0**/1.

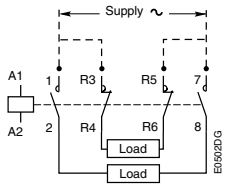
Note for A 9 ... A 75 4-pole contactors fitted with 2 N.O. + 2 N.C. main poles

These contactors are suitable for controlling 2 separate circuits, i.e. 2 loads with 2 separate supplies, or 1 circuit comprising 2 separate loads with a single supply (see diagrams below). When the contactor operates there is no mechanical overlapping between the N.O. poles and the N.C. poles: BREAK before MAKE.

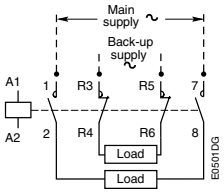
These contactors are not suitable for a reversing starter or star-delta starter or for controlling a single load from 2 separate supplies.

Block diagrams

● Single supply and 2 separate loads



● 2 separate supplies and 2 separate loads



AL... TAL... , AF 4-pole Contactors

d.c. Operated – Low Consumption
d.c. Operated – Electronical Interface

AL 16-40-00

Coil voltages and codes: AL...

Voltage - U_c V d.c.	Code ☐ ☐
12	8 0
24	8 1
125	8 7
250	3 8

Coil voltages and codes: AF...

Voltage 50/60Hz	Voltage V d.c.	Code ☐ ☐
–	20 ... 60	7 2 (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.

Coil voltages and codes: TAL...

Voltage - U_c V d.c.	Code ☐ ☐
17 ... 32	5 1
25 ... 45	5 2
36 ... 65	5 4
42 ... 78	5 8
50 ... 90	5 5
77 ... 143	6 2
90 ... 150	6 6
152 ... 264	6 8

Other voltages: please consult us.

Voltage tolerances (-15 % and +10 %) included in the U_c min. and U_c max. values for the **TAL...** contactors.

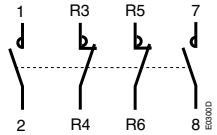
Ordering Details: AL...

Rated operational current AC-1 θ ≤ 40 °C A	Auxiliary contacts fitted	Order code state coil voltage code ☐☐ (see opposite table)	List Price
4 N.O. main poles			
21	– –	AL9-40-00-☐☐	
30	– –	AL16-40-00-☐☐	
40	– –	AL26-40-00-☐☐	
65	– –	AF45-40-00-☐☐	
80	– –	AF50-40-00-☐☐	
105	– –	AF75-40-00-☐☐	
2 N.O. + 2 N.C. main poles			
21	– –	AL9-22-00-☐☐	
30	– –	AL16-22-00-☐☐	
40	– –	AL26-22-00-☐☐	
65	– –	AF45-22-00-☐☐	
105	– –	AF75-22-00-☐☐	

Ordering Details: TAL... (Contactors with large coil voltage range)

Rated operational current AC-1 θ ≤ 40 °C A	Auxiliary contacts fitted	Order code state coil voltage code ☐☐ (see opposite table)	List Price
4 N.O. main poles			
21	– –	TAL9-40-00-☐☐	
30	– –	TAL16-40-00-☐☐	
40	– –	TAL26-40-00-☐☐	
2 N.O. + 2 N.C. main poles			
21	– –	TAL9-22-00-☐☐	
30	– –	TAL16-22-00-☐☐	
40	– –	TAL26-22-00-☐☐	

Note for AL... and TAL... 4-pole contactors fitted with 2 N.O. + 2 N.C. main poles

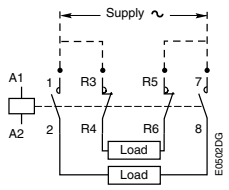


These contactors are suitable for controlling 2 separate circuits, i.e. 2 loads with 2 separate supplies, or 1 circuit comprising 2 separate loads with a single supply (☞ diagrams below). When the contactor operates there is no mechanical overlapping between the N.O. poles and the N.C. poles: BREAK before MAKE.

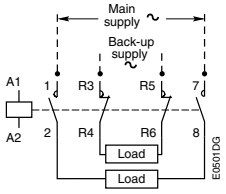
These contactors are not suitable for a reversing starter or star-delta starter or for controlling a single load from 2 separate supplies.

Block diagrams

● Single supply and 2 separate loads



● 2 separate supplies and 2 separate loads



A9N – AF1650N, AC operated
NEMA rated, 3 pole

A 26N1

A 145N4

AF 460N6


AF 1650N8

Ordering Details, non-reversing

CSA/UL Ratings

NEMA size	Continuous current	Maximum motor horsepower ratings 208V	240V	480V	600V	Auxiliary contacts		Order code (state coil voltage code ☐☐ (see table below))	List Price
00	9	1.5	1.5	2	2	1	–	A9N00-30-10-☐☐	
0	18	3	3	5	5	1	–	A16N0-30-10-☐☐	
1	27	7.5	7.5	10	10	1	–	A26N1-30-10-☐☐	
2	45	10	15	25	25	1	1	A50N2-30-11-☐☐	
3	90	25	30	50	50	1	1	A75N3-30-11-☐☐	
4	135	40	50	100	100	1	1	A145N4-30-11-☐☐	
5	270	75	100	200	200	1	1	A260N5-30-11-☐☐	
6	540	150	200	400	400	1	1	AF460N6-3011-☐☐	
7	810	–	300	600	600	1	1	AF750N7-3011-☐☐	
8	1215	–	450	900	900	1	1	AF1650N8-30-70	

Ordering Details, reversing with mechanical and electrical interlock

CSA/UL Ratings

NEMA size	Continuous current	Maximum motor horsepower ratings 208V	240V	480V	600V	Auxiliary contacts		Order code (state coil voltage code ☐☐ (see table below))	List Price
00	9	1.5	1.5	2	2	1	–	A9N00R-30-☐☐	
0	18	3	3	5	5	1	–	A16N0R-30-☐☐	
1	27	7.5	7.5	10	10	1	–	A26N1R-30-☐☐	
2	45	10	15	25	25	1	1	A50N2R-30-☐☐	
3	90	25	30	50	50	1	1	A75N3R-30-☐☐	
4	135	40	50	100	100	1	1	A145N4R-30-☐☐	
5	270	75	100	200	200	1	1	A260N5R-30-☐☐	
6	540	150	200	400	400	1	1	AF460N6R-30-☐☐	
7	810	–	300	600	600	1	1	AF750N7R-30-☐☐	

Coil voltages and codes : A9N ... A260N

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

☞ Other voltages: page 0/1.

Coil voltages and codes: AF 460N ... AF 1650N

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	(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.

AF... contactors with electronic coil interface: electromagnetic compatibility and **A** or **B environment** definitions ☞ page **2**/9.

(2) Only coil available for AF1650N

AL9 – AF1650, DC operated
NEMA rated, 3 pole

AL 26N1

AF 145N4

AF 460N6

AF 1650N8

Ordering Details

AL & AF Contactors

NEMA size	Continuous current	Maximum motor horsepower ratings 208V	240V	480V	600V	Auxiliary contacts		Order code state coil voltage code ☐☐ (see table below)	List Price
00	9	1.5	1.5	2	2	1	–	AL9N00-30-10-☐☐	
0	18	3	3	5	5	1	–	AL16N0-30-10-☐☐	
1	27	7.5	7.5	10	10	1	–	AL26N1-30-10-☐☐	
2	45	10	15	25	25	1	1	AF50N2-30-11-☐☐	
3	90	25	30	50	50	1	1	AF75N3-30-11-☐☐	
4	135	40	50	100	100	1	1	AF145N4-3011-☐☐	
5	270	75	100	200	200	1	1	AF260N5-3011-☐☐	
6	540	150	200	400	400	1	1	AF460N6-3011-☐☐	
7	810	–	300	600	600	1	1	AF750N7-3011-☐☐	
8	1215	–	450	900	900	1	1	AF1650N8-30-70	

Coil voltages and codes: AL...

Voltage - U_c V d.c.	Code ☐ ☐
12	8 0
24	8 1
42	8 2
48	8 3
50	2 1
60	8 4
75	8 5
110	8 6
125	8 7
220	8 8
240	8 9
250	3 8

Coil voltages and codes: AF 50 ... AF 1650

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	(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.

AF... contactors with electronic coil interface: electromagnetic compatibility and **A** or **B environment** definitions ☞ page **2**/9.

(2) Only coil available for AF1650N8

UA...-RA 3-pole Contactors for Capacitor Switching

Peak Current $\hat{I} \geq 100$ Times the rms Current

Application

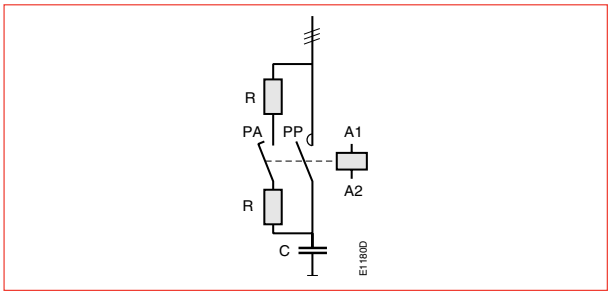
The **UA ...-RA** contactors can be used in installations in which peak current far exceeds 100 times nominal rms current. The contactors are delivered complete with their damping resistors and must be used without additional inductances (☞ table below).
The kvar ratings acc. to the table below are applicable to "star" connected capacitors (less current, cable savings).
The capacitors must be discharged (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making.
Their electrical durability is 250 000 operating cycles for $\mathbf{U_e}$ < 500 V and 100 000 operating cycles for $\mathbf{U_e} \geq$ 500 V.

Description

The **UA...-RA** contactors are fitted with a special front-mounted block ensuring the serial insertion in the circuit of damping resistors limiting current peak on energizing of the capacitor bank. Their connection also ensures capacitor precharging in order to limit the second current peak occurring on making of the main poles a few milliseconds later.

Operating principle
The front-mounted block mechanism of the **UA...-RA** contactors alternately ensures early making and breaking of the auxiliary "PA" poles with respect to the main "PP" poles of the contactor.

When the coil is energized, the early making auxiliary poles connect the capacitor to the network via the set of resistors, thus attenuating the current peak. A few milliseconds later, the contactor main poles short-circuit the resistors with a new reduced inrush current.



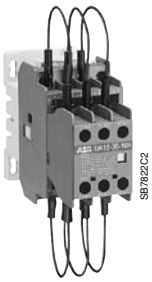
Selection Table

Type	Powers in kvar - 50/60 Hz (AC-6b)			Max. permissible peak current	J type fuses
	240 V	480 V	600 V	$\hat{I}$	max. (*)
UA 16-30-10-RA	**8**	**16**	**20**	**No limit**	80
UA 26-30-10-RA	**10**	**22**	**27**		125
UA 30-30-10-RA	**14**	**28**	**35**		200
UA 50-30-00-RA	**25**	**50**	**62**		200
UA 63-30-00-RA	**27.5**	**55**	**70**		200
UA 75-30-00-RA	**32**	**64**	**80**		200
UA 95-30-00-RA	**40**	**80**	**100**		250
UA 110-30-00-RA	**45**	**95**	**120**		250

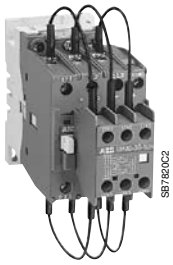
(*) The fuse ratings given in this column represent the maximum ratings ensuring type 1 co-ordination according to the definition of standard IEC 60947-4-1.

UA...-RA 3-pole Contactors for Capacitor Switching

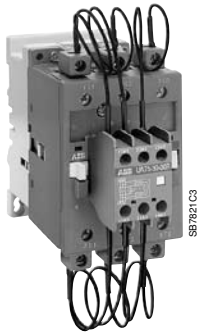
Peak Current $\hat{I} \geq 100$ Times the rms Current



UA 16-30-10-RA



UA 30-30-10-RA



UA 75-30-00-RA

Ordering Details

Power kvar 240 V	480 V	600 V	Auxiliary contacts fitted		Order code (state coil voltage code ☐☐ (see table below))	List Price
8	16	20	1	–	UA16-30-10-RA-☐☐	
10	22	27	1	–	UA26-30-10-RA-☐☐	
14	28	35	1	–	UA30-30-10-RA-☐☐	
25	50	62	–	–	UA50-30-00-RA-☐☐	
27.5	55	70	–	–	UA63-30-00-RA-☐☐	
32	64	80	–	–	UA75-30-00-RA-☐☐	
40	80	100	–	–	UA95-30-00-RA-☐☐	
45	95	120	–	–	UA110-30-00-RA-☐☐	

Coil voltages and codes

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

☞ Other voltages: page **0**/1.

Technical Data

Types	UA 16..-RA	UA 26..-RA	UA 30..-RA	UA 50..-RA UA 63..-RA UA 75..-RA	UA 95..-RA UA 110..-RA
Short-circuit protection J type fuses	sized 1.5 ... 1.8 I_n of the capacitor				
Max. electrical switching frequency cycles / h	240				
Electrical durability AC-6b					
– operating cycles at $U_e \leq 440$ V	250 000				
– operating cycles at $U_e \geq 500$ V	100 000				
Connecting capacity (min. ... max.)					
Main conductors (poles)					
Rigid solid (≤ 12 AWG)					
Rigid stranded (≥ 10 AWG)					
1 x AWG	16 ... 12	14 ... 10	12 ... 6	8 ... 1/0	8 ... 3/0
2 x AWG	–	–	12...6+12...10	8...6+10...6	10 ... 2
Flexible with cable end					
1 x AWG	18 ... 14	16 ... 12	12 ... 8	8 ... 2	8 ... 2/0
2 x AWG	–	–	12 ... 8 + 12	8...6 + 10...8	10 ... 3
Degree of protection acc. to IEC 60947-1, EN 60947-1 and IEC 60529, EN 60529					
– Main terminals	IP 20		IP 10		
– Coil terminals	IP 20				
– Auxiliary terminals	IP 20				

GA 75, GAE 75 and GTAE 75
Contactors for d.c. Switching

Application

GA 75, GAE 75 and **GTAE 75** contactors are designed for d.c. circuit switching.

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

For your information, here are some typical time constant values:

DC-1: non inductive loads such as resistance furnaces:.....L/R ≃ 1 ms,

DC-3: shunt motors:.....L/R ≃ 2 ms,

DC-5: series motors:.....L/R ≃ 7.5 ms.

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

Description

GA 75, **GAE 75** and **GTAE 75** contactors are of the block type design.

- Main poles
  GA 75, GAE 75 and GTAE 75 contactors are fitted with arc chutes with permanent magnets specially designed for d.c. breaking.
  The three contactor paths are arranged in series via two supplied and fitted insulated connections (4 AWG).
  The GA 75, GAE 75 and GTAE 75 are "single-pole" devices for which the connection polarities indicated next to the connection terminals must be respected. Furthermore, they are marked **1L1 for the positive terminal** and **2T1 for the negative terminal**.

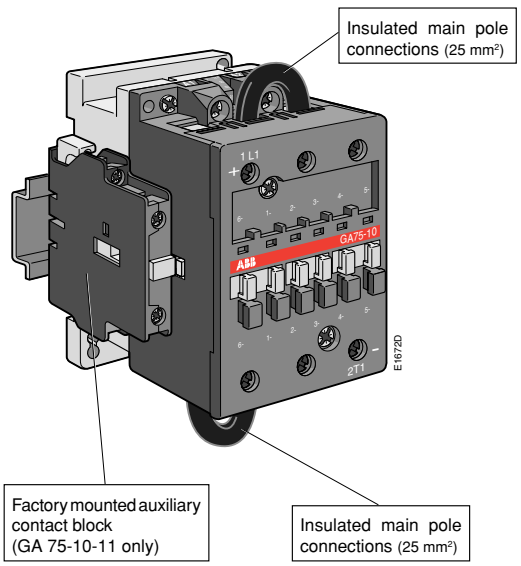
  Remark: Contacts cannot be changed.
- Auxiliary contact: 1 side mounted add-on auxiliary contact block (GA 75-10-11, GAE 75-10-11 and GTAE 75-10-11 only).
- Control circuit
  - **GA 75** a.c. operated,
  - **GAE 75** d.c. operated,
  - **GTAE 75** d.c. operated with large coil voltages range.
- Specific technical data
  - Rated insulation voltage $\mathbf{U}_i$ = 1000 V d.c. according to IEC 60947-4-1 and EN 60947-4-1,
  - Maximum switching frequencies: 300 operating cycles/h,
  - Maximum rated operational current $\mathbf{I}_e$

DC-1	θ ≤ 40 °C	Ue ≤ 400 V	100 A
	θ ≤ 40 °C	Ue ≤ 600 V	75 A
	θ ≤ 40 °C	Ue ≤ 1000 V	35 A
DC-3	–	Ue ≤ 440 V	85 A
DC-5	–	Ue ≤ 220 V	85 A
	–	Ue ≤ 440 V	35 A

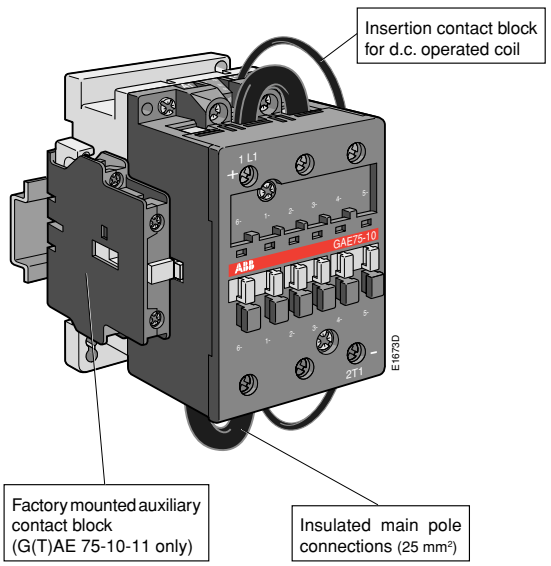
- Accessories: a wide range of accessories are available (☞ section **4**).

GA 75, GAE 75 and GTAE 75 contactors specific design (☞ page **2**/6 for general design)

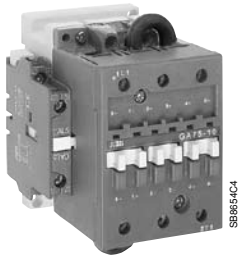
GA 75-10-11



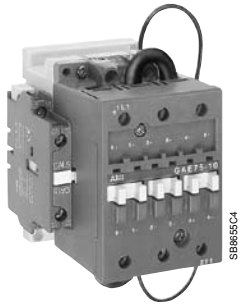
GAE 75-10-11
GTAE 75-10-11



GA 75, GAE 75 and GTAE 75
Contactors for d.c. Switching



GA 75-10-11



GAE 75-10-11

Ordering Details

Rated operational current general use CSA/UL			Available auxiliary contacts	Order code	List Price
440 V d.c. A	600 V d.c. A	1000 V d.c. A		state coil voltage code ☐☐ (see table below)	
100	75	35	– – / 1 1	GA75-10-00-☐☐ GA75-10-11-☐☐	
100	75	35	– – / 1 1	GAE75-10-00-☐☐ GAE75-10-11-☐☐	
100	75	35	– – / 1 1	GTAE75-10-00-☐☐ GTAE75-10-11-☐☐	

Coil voltages and codes: GA 75

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

☞ Other voltages: page **0**/1.

Coil voltages and codes: GAE 75

Voltage V d.c.	Code ☐☐
12	8 0
24	8 1
48	8 3
75	8 5
125	8 7
250	3 8

☞ Other voltages: page **0**/1.

Coil voltages and codes: GTAE 75

Voltage V d.c.	Code ☐☐
17...32	5 1
25...45	5 2
50...90	5 5
77...143	6 2
90...150	6 6

☞ Other voltages: page **0**/1.

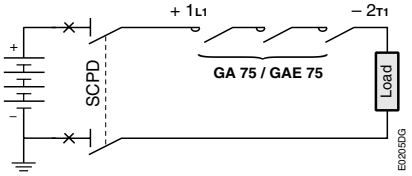
Connection Diagrams

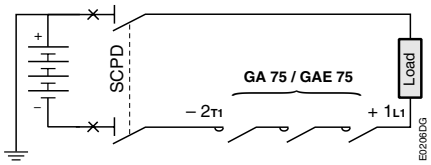
In d.c. circuits, the source to earth (or frame) connection mode is an important element.

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

Modes **A** and **B** do not impose any constraints with regard to the distribution of the contactor poles between the two source / load connecting branches. Mode **C** requirements are therefore suitable for modes **A** and **B**.

For mode **C, all the poles necessary for breaking must be installed in series between the load and the unearthed (also not connected to the frame) source polarity.**
We recommend this solution for all connection modes.
The above provisions relate to power circuit switching, the SCPD (Short-Circuit Protection Device) must comply with protection rules.





Lighting Circuit Switching
Contactor Selection

A9-40-00


A45-40-00

A145-30-11

Coil voltages and codes

Voltage (V) 60Hz	Voltage Code : ☐☐	
24	8 1	
110 ...120	8 4	
208	3 4	
230 ... 240	8 0	
347	4 7	(1)
480	5 1	
600	5 5	

(1) A 9 ... A 75 Only

General

Contactor 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	List Price
15	4	A9-40-00-☐☐L	
15	8	A9-80-00-☐☐L	
15	12	A9-120-00-☐☐L	
20	4	A16-40-00-☐☐L	
20	8	A16-80-00-☐☐L	
20	12	A16-120-00-☐☐L	
35	4	A26-40-00-☐☐L	
35	8	A26-80-00-☐☐L	
35	12	A26-120-00-☐☐L	
50	3	A30-30-10-☐☐L	
60	3	A40-30-10-☐☐L	
60	4	A45-40-00-☐☐L	
65	3	A50-30-00-☐☐L	
65	4	A50-40-00-☐☐L	
85	3	A63-30-00-☐☐L	
105	3	A75-30-00-☐☐L	
105	4	A75-40-00-☐☐L	
120	3	A95-30-00-☐☐L	
200	3	A145-30-11-☐☐L	
400	3	A300-30-11-☐☐L	

Selection tables - lighting contactors

Mechanically latched

Amp rating	Number of poles	Order Code	List Price
15	4	A9L-40-00-☐☐L	
15	8	A9L-80-00-☐☐L	
15	12	A9L-120-00-☐☐L	
20	4	A16L-40-00-☐☐L	
20	8	A16L-80-00-☐☐L	
20	12	A16L-120-00-☐☐L	
35	4	A26L-40-00-☐☐L	
35	8	A26L-80-00-☐☐L	
35	12	A26L-120-00-☐☐L	
50	3	A30L-30-10-☐☐L	
60	3	A40L-30-10-☐☐L	
60	4	A45L-40-00-☐☐L	
65	3	A50L-30-00-☐☐L	
65	4	A50L-40-00-☐☐L	
85	3	A63L-30-00-☐☐L	
105	3	A75L-30-00-☐☐L	
105	4	A75L-40-00-☐☐L	

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 state coil voltage code ☐☐ (see table below)	List Price
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 state coil voltage code ☐☐ (see table below)	List Price
–	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

☞ Other voltages: page **0**/1.

Coil voltages 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.

AF... contactors with electronic coil interface: electromagnetic compatibility and **A** or **B environment** definitions ☞ page **2**/9.

Drive Contactors
Type DA, EHDB

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

(600V N.O. rating)①

Amp rating 500V DC	Maximum HP rating 240V DC	500V DC	600V DC	Aux. contacts fitted		2 Pole (2 NO) Order Code Coil voltage code see table below: ☐ ☐	List Price
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

(600V N.O. rating with 300V NC dynamic breaking rating)①

Amp rating 500V DC	Maximum HP rating 240V DC	500V DC	600V DC	Maximum amp ratings N.C. Contact Make	Break	Aux. contacts fitted		3 Pole (2 NO & 1 NC) Order Code Coil voltage code see table below: ☐ ☐	List Price
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) 60 Hz :		DA/DAE Voltage code: ☐☐	EHDB Voltage code: ☐
	24	81	F
	120	84	1
	208	34	B
	240	80	2
	480	51	4
	600	55	6
DC	24	81	Y
	125	87	Q
	250	38	S

Other voltages : page 0/1

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	6-250MCM	4-500MCM	(2) 4-500MCM	(2) 4-500MCM	(3) 2-600MCM	(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 permissable 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

UL & CSA Technical data
A/AL – A/AF110
AC & DC operated

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

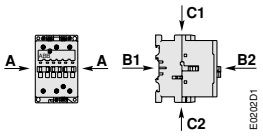
UL & CSA Technical data
A/AF145 – AF1650
AC & DC operated

ABB contactor frame size		A/AF 145	A/AF 185	A/AF 210	A/AF 260	A/AF 300	AF 400	AF 460	AF 580	AF 750	AF 1350	AF 1650
NEMA size		4	—	—	5	—	—	6	—	7	—	8
Number of poles		3	3	3	3	3	3	3	3	3	3	3
AC rating information												
NEMA cont. amp rating thermal current		135	—	—	270	—	—	540	—	810	—	1215
NEMA maximum H.P. ratings	1 phase											
115	VAC	—	—	—	—	—	—	—	—	—	—	—
230	VAC	—	—	—	—	—	—	—	—	—	—	—
NEMA maximum H.P. ratings	3 phase											
200	VAC	40	—	—	75	—	—	150	—	—	—	—
230	VAC	50	—	—	100	—	—	200	—	300	—	450
460/575	VAC	100	—	—	200	—	—	400	—	600	—	900
CSA/U.L. general purpose current	40°C	230	250	300	350	400	550	650	750	900	1350	1650
Max. 3 Ph switching motor loads	Amps	130	156	192	248	302	414	480	590	720	960	1100
CSA/U.L. maximum H.P. ratings	1 phase											
115	VAC	10	15	—	—	—	—	—	—	—	—	—
230	VAC	25	30	40	50	—	—	—	—	—	—	—
CSA/U.L. maximum H.P. ratings	3 phase											
200—208	VAC	40	50	60	75	100	125	150	200	250	—	—
220—240	VAC	50	60	75	100	100	150	200	250	300	400	450
440—480	VAC	100	125	150	200	250	350	400	500	600	800	900
550—600	VAC	125	150	200	250	300	400	500	600	700	1000	1150
Lighting - ballast and incandescent	600 VAC	200	—	—	—	—	—	—	—	—	—	—
Resisting heating application	600 VAC	200	—	—	—	—	—	—	—	—	—	—
CSA Elevator ratings												
220—240VAC	3 phase	—	30	—	—	—	—	—	—	—	—	—
440—480VAC	3 phase	—	60	—	—	—	—	—	—	—	—	—
550—600VAC	3 phase	—	75	—	—	—	—	—	—	—	—	—
Auxiliary contacts												
NEMA rating	AC	A600	A600	A600	A600	A600	A600	A600	A600	A600	A600	A600
AC rated voltage	VAC	600	600	600	600	600	600	600	600	600	600	600
AC thermal rated current	A	10	10	10	10	10	10	10	10	10	10	10
AC maximum volt—ampere making	VA	7200	7200	7200	7200	7200	7200	7200	7200	7200	7200	7200
AC maximum volt—ampere breaking	VA	720	720	720	720	720	720	720	720	720	720	720
NEMA rating	DC	P600	P600	P600	P600	P600	P600	P600	P600	P600	P600	P600
DC rated voltage	VDC	600	600	600	600	600	600	600	600	600	600	600
DC thermal rated current	A	5	5	5	5	5	5	5	5	5	5	5
DC Maximum make—break	A	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Approximate weight												
Contactor	lbs.	7.1	7.1	13	13	13	26	26	33	33	—	—
Starter	lbs.	9.11	9.11	17.67	17.67	17.67	35	35	45	45	—	—
Terminal wire range	AWG	6— 250MCM	6— 250MCM	4— 400MCM	4— 400MCM	4— 500MCM	250— 500MCM	250— 500MCM	2/0— 500MCM	2/0— 500MCM	2/0— 500MCM	2/0— 500MCM
Number of wires per phase		1	1	1	1	2	2	2	2	3	6	6
Maximum short circuit ratings												
MCCB,MCP,amps/kA	480VAC	400/85	400/85	800/85	800/85	800/85	800/80	800/80	1200/42	1200/42		
MCCB,MCP,amps/kA	600VAC	400/35	400/35	800/35	800/35	800/35	800/42	800/42	—	—	TBA	TBA
Fuse, amps—Type/kA	600VAC	400J/200	400J/200	600J/200	600J/200	600J/200	1000L/80	1000L/80	1200L/80	1200L/80		

General Technical Data

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

Shock withstand
acc. IEC 60068-2-27 and EN 60068-2-27
Mounting position 1 (☞ page **2**/30)



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

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

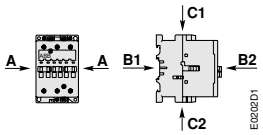
(1) (3 g for AF 45-22, AF 75-22
(2) (10 g for AF 45-22, AF 75-22

Not valid for DIN-rail mounting

General Technical Data for AL..., TAL... Contactors

Contactor types: AL... , TAL...	9	12	16	26	30	40
Rated insulation voltage U_i						
according to IEC 60947-4-1 V	1000					
according to UL/CSA V	600					
Rated impulse withstand voltage $U_{imp.}$ kV	8					
Standards	Devices complying with international standards IEC 60947-1 / 60947-4-1 and European standards EN 60947-1 / 60947-4-1					
Certifications - Approvals	UL, CSA					
Air temperature close to contactor	☞ "Conditions for use" page **2**/36, for control voltage limits and authorized mounting positions					
– fitted with thermal O/L relay °C	-25 to +55					
– without thermal O/L relay °C	-40 to +70					
– for storage °C	-60 to +80					
Climatic withstand	acc. to IEC 60068-2-30 and 60068-2-11 - UTE C 63-100 specification II					
Operating altitude m	≤ 3000					

Shock withstand
acc. IEC 60068-2-27 and EN 60068-2-27
Mounting position 1 (☞ page **2**/36)

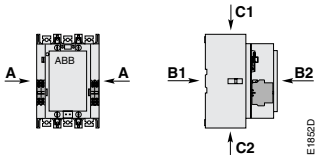


1/2 sinusoidal shock for 11 ms: no change in contact position

Shock direction	Making position	Breaking position
A	20 g	10 g
B1	15 g	5 g
B2	10 g	15 g
C1	20 g	8 g
C2	14 g	8 g

General Technical Data

Contactor types:	**A...**	**145**	**185**	**210**	**260**	**300**	**–**	**–**	**–**	**–**	**–**	**–**
	AF...	**145**	**185**	**210**	**260**	**300**	**400**	**460**	**580**	**750**	**1350**	**1650**
Rated insulation voltage U_i													
according to IEC 60947-4-1	**V**	1000											
according to UL/CSA	**V**	600											
Rated impulse withstand voltage $U_{imp.}$	**kV**	8											
Standards		Devices complying with international standards IEC 60947-1 / 60947-4-1 and European standards EN 60947-1 / 60947-4-1											
Certifications - Approvals		UL, CSA, CCC											
Air temperature close to contactor		☞ "Conditions for use" page **2**/31 , for control voltage limits and authorized mounting positions											
– fitted with thermal O/L relay	**°C**	-25 to +55											
– without thermal O/L relay	**°C**	-40 to +70											
– for storage	**°C**	-40 to +70											
Climatic withstand		acc. to IEC 60068-2-30											
Operating altitude	**m**	≤ 3000											
Shock withstand													
acc. IEC 60068-2-27 and EN 60068-2-27													
Mounting position 1 (☞ page **2**/31)		1/2 sinusoidal shock for 30 ms: no change in contact position											
		5 g in all directions (A, B1, B2, C1, C2)											



Main Pole - Utilization Characteristics

Contactor types:	**A...**	**9**	**12**	**16**	**26**	**30**	**40**	**45**	**50**	**63**	**75**	**95**	**110**
	AF...	**–**	**–**	**–**	**–**	**–**	**–**	**45**	**50**	**63**	**75**	**95**	**110**
Rated operational voltage U_e max.	**V**	690						1000 (690 for AF... contactors)					
Rated frequency limits	**Hz**	25 ... 400											
Conventional free-air thermal current I_{th} acc. to IEC 60947-4-1,													
open contactors θ ≤ 40 °C	**A**	26	28	30	45	65	65	100	100	125	125	145	160
with conductor cross-sectional area	**mm²**	4	4	4	6	16	16	35	35	50	50	50	70
Rated operational current I_e / AC-1 for air temperature close to contactor													
U_e max. 690 V θ ≤ **40 °C**	**A**	**25**	**27**	**30**	**45**	**55**	**60**	**70**	**100**	**115**	**125**	**145**	**160**
U_e max. 690 V θ ≤ 55 °C	**A**	22	25	27	40	55	60	60	85	95	105	135	145
U_e max. 690 V θ ≤ 70 °C	**A**	18	20	23	32	39	42	50	70	80	85	115	130
with conductor cross-sectional area	**mm²**	2.5	4	4	6	10	16	25	35	50	50	50	70
Utilization categorie AC-3 for air temperature close to contactor ≤ 55 °C													
Rated operational current I_e AC-3													
220-230-240 V	**A**	9	12	17	26	33	40	40	53	65	75	96	110
3-phase motors 380-400 V	**A**	9	12	17	26	32	37	37	50	65	75	96	110
415 V	**A**	9	12	17	26	32	37	37	50	65	72	96	110
440 V	**A**	9	12	16	26	32	37	37	45	65	70	93	100
500 V	**A**	9	12	15	22	28	33	33	45	55	65	80	100
690 V	**A**	7	9	12	13	18	21	25	35	43	46	65	82
1000 V	**A**	–	–	–	–	–	–	–	23	25	28	30	30
Rated operational power AC-3													
220-230-240 V	**kW**	2.2	3	4	6.5	9	11	11	15	18.5	22	25	30
1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 380-400 V	**kW**	4	5.5	7.5	11	15	18.5	18.5	22	30	37	45	55
3-phase motors 415 V	**kW**	4	5.5	9	11	15	18.5	18.5	25	37	40	55	59
440 V	**kW**	4	5.5	9	15	18.5	22	22	25	37	40	55	59
500 V	**kW**	5.5	7.5	9	15	18.5	22	22	30	37	45	55	59
690 V	**kW**	5.5	7.5	9	11	15	18.5	22	30	37	40	55	75
1000 V	**kW**	–	–	–	–	–	–	–	30	33	37	40	40
Rated making capacity AC-3 according to IEC 60947-4-1		10 x I_e AC-3											
Rated breaking capacity AC-3 according to IEC 60947-4-1		8 x I_e AC-3											
Short-circuit protection for contactors without thermal O/L relay - Motor protection excluded													
U_e ≤ 600 V a.c. - J type fuse	**A**	25	30	30	50	60		80	100	125	160	160	200
Rated short-time withstand current I_{cw} at 40 °C ambient temp., in free air,													
from a cold state 1 s	**A**	250	280	300	400	600		1000				1320	1320
10 s	**A**	100	120	140	210	400		650				800	800
30 s	**A**	60	70	80	110	225		370				500	500
1 min	**A**	50	55	60	90	150		250				350	350
15 min	**A**	26	28	30	45	65		110	110	135	135	160	175
Maximum breaking capacity cos φ = 0.45 (cos φ = 0.35 for I_e > 100 A)													
at 440 V	**A**	250			420	470		900	1300			1160	
at 690 V	**A**	100			106	175		490	630			800	
Heat dissipation per pole I_e / AC-1	**W**	0.8	1	1.2	1.8	2.5	3	2.5	5	6.5	7	6.5	7.5
I_e / AC-3	**W**	0.1	0.2	0.35	0.6	0.9	1.3	0.65	1.3	1.5	2	2.7	3.6
Max. electrical switching frequency													
– for AC-1	**cycles/h**	600						600				300	
– for AC-3	**cycles/h**	1200						600				300	
– for AC-2, AC-4	**cycles/h**	300						150				150	
Electrical durability		☞ pages **2**/39 ... **2**/41											
Mechanical durability													
– millions of operating cycles		10											
– max. mechanical switching frequency	**cycles/h**	3600 (300 for AF... contactors)											

Main Pole - Utilization Characteristics

Contactor types:	**A...**	**145**	**185**	**210**	**260**	**300**	**–**	**–**	**–**	**–**	**–**	**–**
	AF...	**145**	**185**	**210**	**260**	**300**	**400**	**460**	**580**	**750**	**1350**	**1650**
Rated operational voltage U_e max.	**V**	690									1000	
Rated frequency limits	**Hz**	25 ... 400										
Conventional free-air thermal current I_{th} acc. to IEC 60947-4-1,												
open contactors $\theta \le 40$ °C	**A**	250	275	350	400	500	600	700	800	1050	1350	1650
with conductor cross-sectional area	**mm²**	120	150	185	240	300	2 x 185	2 x 240	2 x 240	2 x 80 x 5	2 x 100 x 5	3 x 100 x 5
Rated operational current I_e / AC-1 for air temperature close to contactor												
U_e max. 690 V $\theta \le$ **40 °C**	**A**	**250**	**275**	**350**	**400**	**500**	**600**	**700**	**800**	**1050**	**1350**	**1650**
$\theta \le 55$ °C	**A**	230	250	300	350	400	500	600	700	800	1150	1450
$\theta \le 70$ °C	**A**	180	180	240	290	325	400	480	580	720	1000	1270
with conductor cross-sectional area	**mm²**	120	150	185	240	300	2 x 185	2 x 240	2 x 240	2 x 80 x 5	2 x 100 x 5	3 x 100 x 5
Utilization categorie AC-3 for air temperature close to contactor ≤ 55 °C												
Rated operational current I_e AC-3												
220-230-240 V	**A**	145	185	210	260	305	400	460	580	750	860	1050
3-phase motors 380-400 V	**A**	145	185	210	260	305	400	460	580	750	860	1050
415 V	**A**	145	185	210	260	300	400	460	580	750	860	1050
440 V	**A**	145	185	210	240	280	400	460	580	750	860	1050
500 V	**A**	145	170	210	240	280	400	460	580	750	800	950
690 V	**A**	120	170	210	220	280	350	400	500	650	800	950
1000 V	**A**	80	95	–	–	–	155	200	250	300	–	–
Rated operational power AC-3												
220-230-240 V	**kW**	45	55	59	80	90	110	132	160	220	257	315
1500 r.p.m. 50 Hz, 1800 r.p.m. 60 Hz, 3-phase motors 380-400 V	**kW**	75	90	110	140	160	200	250	315	400	475	560
415 V	**kW**	75	90	110	140	160	220	250	355	425	500	600
440 V	**kW**	75	90	110	140	160	220	250	355	450	560	670
500 V	**kW**	90	110	132	180	200	250	315	400	520	560	700
690 V	**kW**	110	132	160	200	250	315	355	500	600	750	900
1000 V	**kW**	110	132	–	–	–	220	280	355	400	–	–
Rated making capacity AC-3 according to IEC 60947-4-1		10 x I_e AC-3										
Rated breaking capacity AC-3 according to IEC 60947-4-1		8 x I_e AC-3										
Short-circuit protection for contactors without thermal O/L relay - Motor protection excluded												
$U_e \le 600$ V a.c. - J type fuse	**A**	300	350	400	500		600	800	1000		2000	
Rated short-time withstand current I_{cw} at 40 °C ambient temp., in free air,												
from a cold state 1 s	**A**	1800	2000	2500	3500		4600		7000		10000	12000
10 s	**A**	1200	1500	1700	2400		4400		6400		8000	10000
30 s	**A**	800	1000	1200	1500		3100		4500		6000	7500
1 min	**A**	600	800	1000	1100		2500		3500		4500	5500
15 min	**A**	280	320	400	500		840		1300		1600	2200
Maximum breaking capacity cos φ = 0.45 (cos φ = 0.35 for I_e > 100 A)												
at 440 V	**A**	1500	2000	2300	2600	3000	4000	5000	6000	7500	10000	12000
at 690 V	**A**	1200	1600	2000	2400	2500	3500	4500	5000	7000	–	–
Heat dissipation per pole I_e / AC-1	**W**	13	16	18	25	32	30	42	32	50	80	80
I_e / AC-3	**W**	5	8	9	14	18	16	21	17	28	50	50
Max. electrical switching frequency												
– for AC-1	**cycles/h**	300		300			300		300		60	
– for AC-3	**cycles/h**	300		300			300		300		60	
– for AC-2, AC-4	**cycles/h**	150		150			60		60		60	
Electrical durability		☞ pages **2**/39 ... **2**/41					–	–	–	–	TBA	
Mechanical durability												
– millions of operating cycles		5					3				0.5	
– max. mechanical switching frequency	**cycles/h**	3600 (300 for AF... contactors)					300				60	

Magnet System Characteristics for A... Contactors

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

(1) 50/60 Hz coils: voltage codes **8 0** to **8 8**. ☞ page **0**/1

Magnet System Characteristics for AF... Contactors

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

Magnet System Characteristics for A... Contactors

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

(1) 50/60 Hz coils: voltage codes **8 0** to **8 8**. ☞ page **0**/1

Magnet System Characteristics for AF... Contactors

Contactor types: AF...			145	185	210	260	300	400	460	580	750	1350	1650
Rated control circuit voltage U_c													
– at 50 Hz		**V**	48 ... 250									100 ... 250	
– at 60 Hz		**V**	48 ... 250									100 ... 250	
– d.c.		**V**	24 ... 250									100 ... 250	
Coil operating limits			θ ≤ 70 °C										
according to IEC 60947-4-1			0.85 ... 1.1 x U_c										
Drop-out voltage in % of U_c			55 %										
Coil consumption													
Average pull-in value	50 Hz	**VA**	430		470			890		850		1900	
	60 Hz	**VA**	430		470			890		850		1900	
	d.c.	**W**	500		520			990		950		1700	
Average holding value	50 Hz	**VA/W**	12/3.5		10/2.5			12/4		12/4.5		48/17	
	60 Hz	**VA/W**	12/3.5		10/2.5			12/4		12/4.5		48/17	
	d.c.	**W**	2		2			4		4.5		16	
Operating time													
between coil energization and:													
– N.O. contact closing		**ms**	30 ... 115					50 ... 120				50 ... 80	
– N.C. contact opening		**ms**	30 ... 115					50 ... 120				50 ... 80	
between coil de-energization and													
– N.O. contact opening		**ms**	25 ... 80					40 ... 70				35 ... 55	
– N.C. contact closing		**ms**	25 ... 80					40 ... 70				35 ... 55	

Mounting Characteristics

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

Conditions for Use

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

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

Notes for 4-pole contactors

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

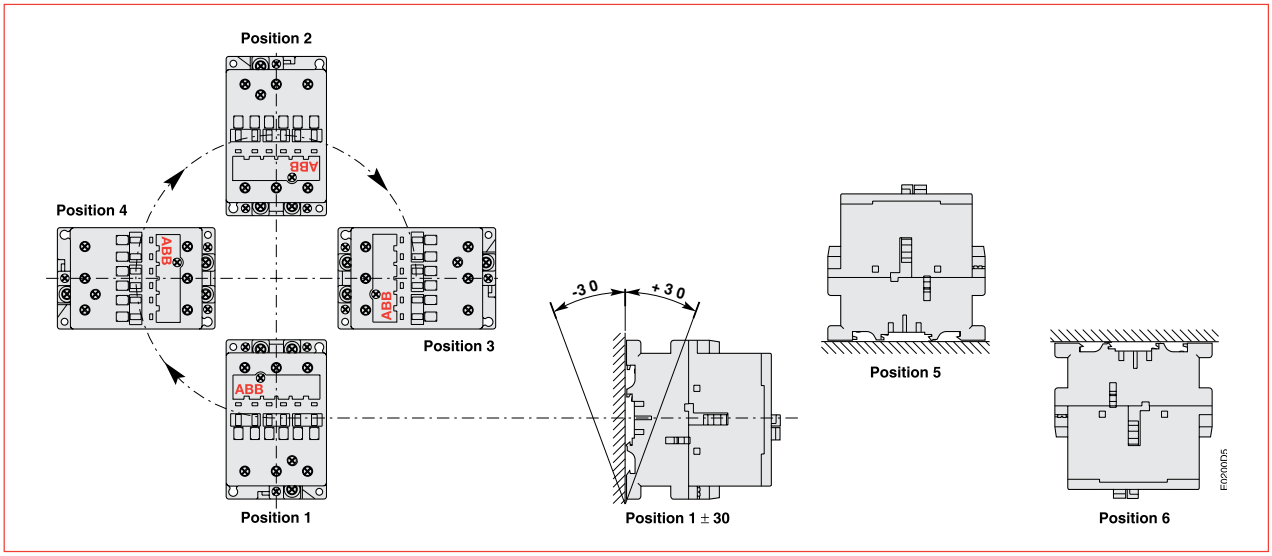
For 60 Hz coil voltage: (only for devices fitted with CA 5-.. and CAL 5-11 auxiliary contacts or TP timer)

– A 45-40-00, A 50-40-00 and A 75-40-00 contactors
Mounting positions 1 to 5 and ambient temperature ≤ 55 °C: tolerance reduced to 0.9 ... 1.1 $\mathbf{U_c}$ (instead of 0.85 ... 1.1 $\mathbf{U_c}$)

– A 45-22-00 and A 75-22-00 contactors
Mounting positions 1 to 4 (pos. 5 unauthorized) and ambient temperature ≤ 55 °C: tolerance reduced to 0.9 ... 1.1 $\mathbf{U_c}$ (instead of 0.85 ... 1.1 $\mathbf{U_c}$)

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

Mounting Positions (see the above table for authorized positions)



Mounting Characteristics

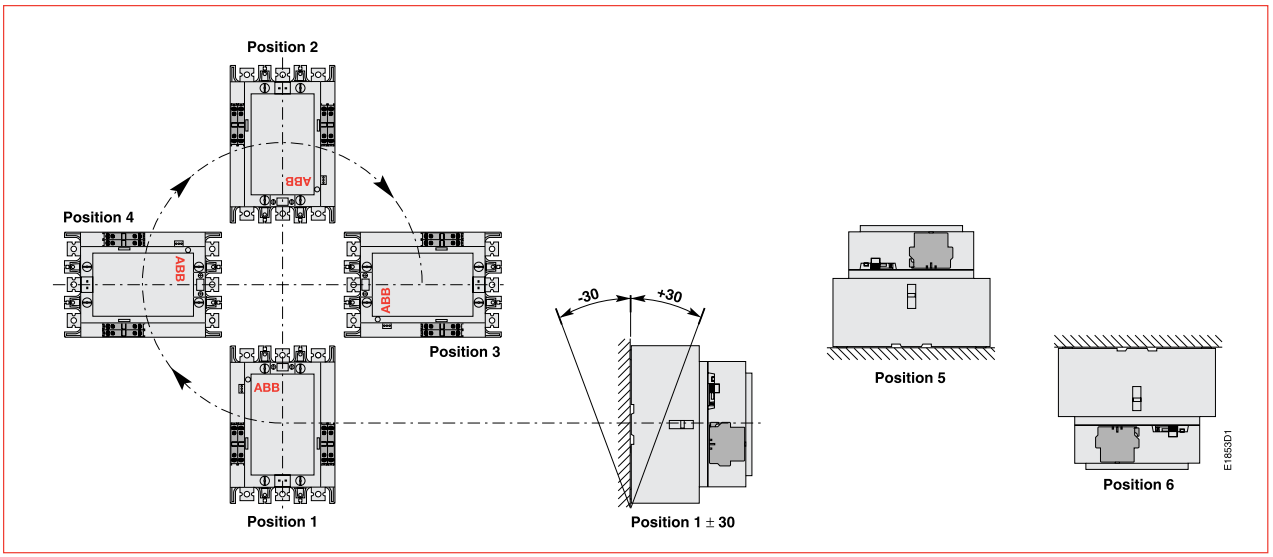
Contactor types:	**A...**	**145**	**185**	**210**	**260**	**300**	**–**	**–**	**–**	**–**	**–**	**–**
	AF...	**145**	**185**	**210**	**260**	**300**	**400**	**460**	**580**	**750**	**1350**	**1650**
Mounting positions		☞ "Condition for use"										
Mounting distances		The contactors can be assembled side by side										
Fixing on DIN rail according to IEC 715 and EN 50022 / EN 50023		–	–	–	–	–	–	–	–	–	–	–
by screws (not supplied)		4 x M5							4 x M6		4 x M8	

Conditions for Use

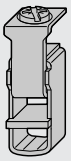
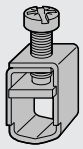
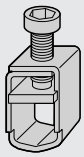
Sustainable utilization conditions for contactors involving at the same time the Mounting position, Ambient temperature and Control voltage operating limits are summarized in the table below.

Contactors	Mounting position	Ambient temperature	Control voltage
A 145 ... A 300	1, 1 ± 30°, 2, 3, 4, 5	≤ 70 °C	0.85 ... 1.1 x $\mathbf{U_c}$
	6 unauthorized	–	–
AF 145 ... AF 1650	1, 1 ± 30°, 2, 3, 4, 5	≤ 70 °C	0.85 x $\mathbf{U_c}$ min. ... 1.1 x $\mathbf{U_c}$ max.
	6 unauthorized	–	–

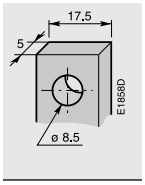
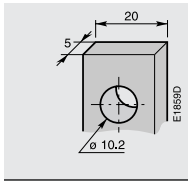
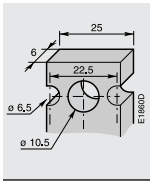
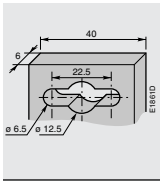
Mounting Positions (see the above table for authorized positions)



Connecting Characteristics

Contactor types:		**9**	**12**	**16**	**26**	**30**	**40**	**45**	**50**	**63**	**75**	**95**	**110**
	AF...	**–**	**–**	**–**	**–**	**–**	**–**	**45**	**50**	**63**	**75**	**95**	**110**
Main terminals		 with cable clamp				 with double connector 2 x (5.6 x 6.5 mm)		 with single connector (13 x 10 mm)				 with single connector (14 x 14 mm)	
Connecting capacity (min. ... max.) Main conductors (poles)													
Rigid: solid (≤ 4 mm²)	**AWG**	18 ... 10			12 ... 8	12 ... 6		10 ... 1				8 ... 3/0	
stranded (≥ 6 mm²)	**AWG**	18 ... 10			12 ... 8	12 ... 6		10 ... 6				10 ... 2	
Rigid with connector													
single for Cu cable	**AWG**	–	–	–	–	–	–	–	–	–	–	–	–
single for Al/Cu cable	**AWG**	–	–	–	–	–	–	–	–	–	–	–	–
double for Al/Cu cable	**AWG**	–	–	–	–	–	–	–	–	–	–	–	–
Flexible with cable end	**1 x AWG**	18 ... 14			12 ... 8	14 ... 8		10 ... 3				8 ... 2/0	
	2 x AWG	18 ... 14			12 ... 8	14 ... 8		10 ... 4				10 ... 3	
Bars or lugs	L **mm** ≤	8			10	–	–	–	–	–	–	30	
	I **mm** >	3.7			4.2	–	–	–	–	–	–	6	
Auxiliary conductors (built-in auxiliary terminals + coil terminals)													
Rigid solid	**1 x AWG**	18 ... 10											
	2 x AWG	18 ... 10											
Flexible with cable end	**1 x AWG**	18 ... 14											
	2 x AWG	18 ... 14											
Lugs	L **mm** ≤	8			(1)	8							
	I **mm** >	3.7			(1)	3.7							
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		Protection against direct contact acc. to VDE 0106 - Part. 100											
– Main terminals		IP 20						IP 10					
– Coil terminals		IP 20											
– Built-in auxiliary terminals		IP 20						–	–	–	–	–	–
Screw terminals		(delivered in open position, screws of unused terminals must be tightened)											
Main terminals		(+,-) pozidriv 2 screws										hexagon socket	
		M3.5			M4	M5		M6				M8 (s = 4 mm)	
Coil terminals		M3.5 (+,-) pozidriv 2 screws with cable clamp											
Built-in auxiliary terminals		(+,-) pozidriv 2 screws with cable clamp						–	–	–	–	–	–
		M3.5			M4	M5		–	–	–	–	–	–
Tightening torque													
Main pole terminals													
– recommended	**Nm / lb.in**	1.00 / 9			1.7 / 15	2.30 / 20		4.00 / 35				6.00 / 53	
– max.	**Nm**	1.20			2.20	2.60		4.50				6.50	
Coil terminals													
– recommended	**Nm / lb.in**	1.00 / 9											
– max.	**Nm**	1.20											
Built-in auxiliary terminals													
– recommended	**Nm / lb.in**	1.00 / 9			1.7 / 15	1.00 / 9		–	–	–	–	–	–
– max.	**Nm**	1.20			2.20	1.20		–	–	–	–	–	–
Terminal marking and positioning		contact ABB											

Connecting Characteristics

Contactor types:	**A...**	**145**	**185**	**210**	**260**	**300**	**–**	**–**	**–**	**–**	**–**	**–**
	AF...	**145**	**185**	**210**	**260**	**300**	**400**	**460**	**580**	**750**	**1350**	**1650**
Main terminals Flat type												
Connecting capacity (min. ... max.) Main conductors (poles)												
Rigid:	**1 x AWG**	–	–	–	–	–	–	–	–	–	–	–
	2 x AWG	–	–	–	–	–	–	–	–	–	–	–
Rigid with connector												
single for Cu cable	**AWG**	10 ... 350 MCM		6 ... 500 MCM			500 MCM		600 MCM			
single for Al/Cu cable	**AWG**	4 ... 300 MCM		250 ... 500 MCM			500 MCM		600 MCM			
double for Al/Cu cable	**AWG**	–		3/0 ... 250 MCM			2 x 500 MCM		3 x 350 MCM		(6) x 1/0 ... 750 MCM	
Flexible	**1 x AWG**	–	–	–	–	–	–	–	–	–	–	–
	2 x AWG	–	–	–	–	–	–	–	–	–	–	–
Bars or lugs	L **mm** ≤	24		32			47 / 45		52 / 50		100	
	Ø **mm** >	8		10			10		12		12	
Auxiliary conductors (coil terminals)												
Rigid solid	**1 x AWG**	18 ... 10										
	2 x AWG	18 ... 10										
Flexible with cable end	**1 x AWG**	18 ... 12										
	2 x AWG	18 ... 12										
Lugs	L **mm** ≤	8										
	l **mm** >	3.7										
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		Protection against direct contact acc. to VDE 0106 - part 100										
– Main terminals		IP 00										
– Coil terminals		IP 20										
– Built-in auxiliary terminals		–										
Screw terminals												
Main terminals		Screws and bolts										
		M8		M10			M10		M12		M12	
Coil terminals (delivered in open position)		M3.5 (+,-) pozidriv 2 screws with cable clamp										
Built-in auxiliary terminals		–	–	–	–	–	–	–	–	–	–	–
		–	–	–	–	–	–	–	–	–	–	–
Tightening torque												
Main pole terminals												
– recommended	**Nm / lb.in**	18 / 160		28 / 240			40 / 354		45 / 443		45 / 443	
– max.	**Nm**	20		30			44		49		49	
Coil terminals												
– recommended	**Nm / lb.in**	1.00 / 9										
– max.	**Nm**	1.20										
Built-in auxiliary terminals												
– recommended	**Nm / lb.in**	–	–	–	–	–	–	–	–	–	–	–
– max.	**Nm**	–	–	–	–	–	–	–	–	–	–	–
Terminal marking and positioning		contact ABB										

Magnet System Characteristics for AL... Contactors

Contactor types: AL...		9	12	16	26	30	40
Rated control circuit voltage U_c	**V d.c.**	12 ... 250					
Coil operating limits according to IEC 60947-4-1		see conditions for use p 2/36					
Drop-out voltage in % of U_c		roughly 10 ... 30 %					
Coil consumption - Average values							
– pull-in value	**W**	3.0			3.5		
– holding value	**W**	3.0			3.5		
Operating time							
between coil energization and:							
– N.O. contact closing	**ms**	50 ... 100			55 ... 110		
– N.C. contact opening	**ms**	20 ... 70			25 ... 75		
between coil de-energization and							
– N.O. contact opening	**ms**	10 ... 17			12 ... 18		
– N.C. contact closing	**ms**	16 ... 27			18 ... 28		

Magnet System Characteristics for TAL... Contactors

Contactor types: TAL...		9	12	16	26	30	40
Rated control circuit voltage U_c	**V d.c.**	9 ... 264					
Coil operating limits according to IEC 60947-4-1		see conditions for use p 2/36					
Drop-out voltage in % of U_c max.		roughly 20 ... 35 %					
Coil consumption							
– U_c max D.C.	**W**	8.5			9		
– U_c min D.C.	**W**	2.5			2.7		
– U_c D.C.	**W**	5			5.4		
Operating time							
between coil energization and:							
– N.O. contact closing	**ms**	50 ... 100			55 ...110		
– N.C. contact opening	**ms**	20 ... 70			25 ... 75		
between coil de-energization and							
– N.O. contact opening	**ms**	10 ... 17			12 ... 18		
– N.C. contact closing	**ms**	16 ... 27			18 ... 28		

Built-in Auxiliary Contacts - Utilization Characteristics

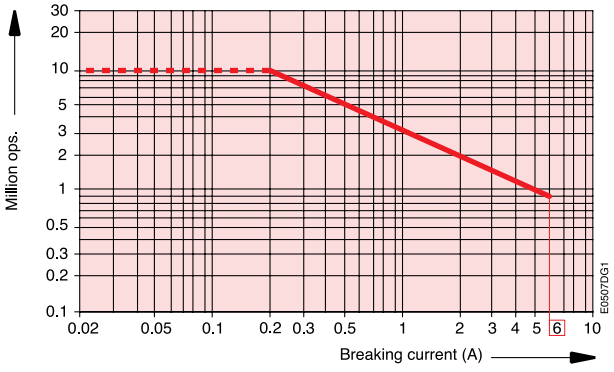
Contactor types: A, AL...		9	12	16	26	30	40
TAL...		9	12	16	26	30	40
Rated operational voltage U_e max.	**V**	690					
Conventional free air thermal current I_{th} - $\theta \leq 40$ °C	**A**	16					
Rated frequency limits	**Hz**	25 ... 400					
Rated operational current I_e / AC-15 acc. to IEC 60947-5-1							
24-127 V 50/60 Hz	**A**	6					
220-240 V 50/60 Hz	**A**	4					
380-440 V 50/60 Hz	**A**	3					
500 V 50/60 Hz	**A**	2					
690 V 50/60 Hz	**A**	2					
Rated operational current I_e / DC-13 acc. to IEC 60947-5-1							
24 V d.c.	**A / W**	6 / 144					
48 V d.c.	**A / W**	2.8 / 134					
72 V d.c.	**A / W**	2 / 144					
125 V d.c.	**A / W**	1.1 / 138					
250 V d.c.	**A / W**	0.55 / 138					
Rated making capacity according to IEC 60947-5-1		10 x I_e / AC-15					
Rated breaking capacity according to IEC 60947-5-1		10 x I_e / AC-15					
Short-circuit protection gG type fuse	**A**	10					
Rated short-time withstand current I_{cw}							
for 1.0 s	**A**	100					
for 0.1 s	**A**	140					
Minimum switching capacity	**V / mA**	17 / 5 (with failure rate of 10% according to IEC 60947-5-4)					
Non-overlapping time between N.O. and N.C. contacts	**ms**	≥ 2					
Heat dissipation per pole at 6 A	**W**	0.10					

Electrical Durability for AC-15 Utilization Category

AC-15 utilization category according to IEC 60947-5-1 / EN 60947-5-1:
– making current: 10 x I_e with cos φ = 0.7 and U_e
– breaking current: I_e with cos φ = 0.4 and U_e

This curve represents the electrical durability of the built-in or add-on auxiliary contacts in relation to the breaking current.

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



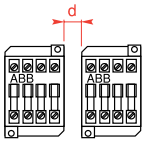
– A, AL.., AL..Z.. and TAL.. contactor built-in auxiliary contacts
– Auxiliary contact blocks CAL 5-.., CA 5-..

Mounting Characteristics

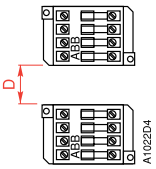
Contactor types:							
AL...	**9**	**12**	**16**	**26**	**30**	**40**
TAL...	**9**	**12**	**16**	**-**	**-**	**-**
Mounting positions	☞ "Condition for use"					
Mounting distances	The contactors can be assembled side by side, except TAL see table below					
Fixing						
on DIN rail according to IEC 715 and EN 50022	⌐¯¯¯¯¬ 35 x 7.5 mm ⌐¯¯¯¯¬ 35 x 15 mm					
by screws (not supplied)	2 x M4					

Mounting Distance (for TAL)

d mm	D mm	Ambient temperature °C
5	20	≥ 20



Pos. 1, 2, 5



Pos. 3, 4

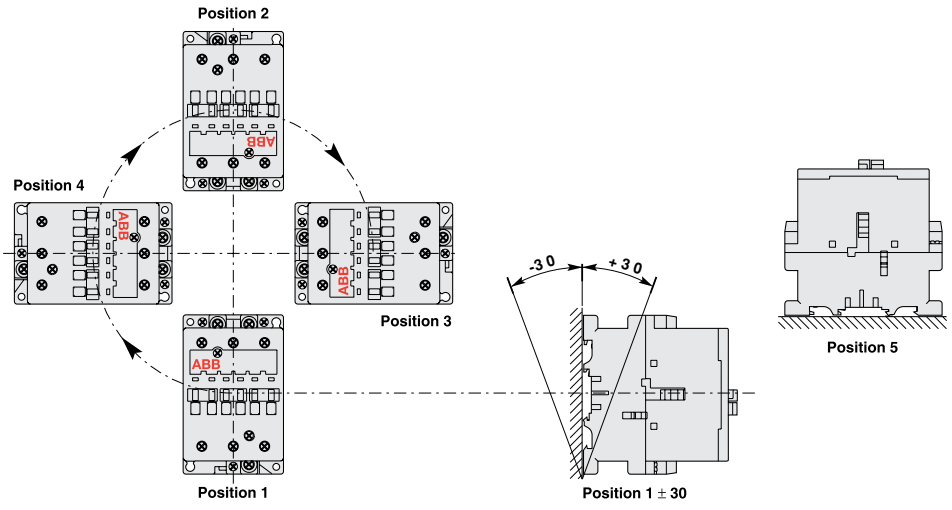
Conditions for Use

The contactor utilization conditions relating to the mounting position, ambient temperature and control voltage operating limits are summarized in the table below.

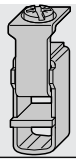
Contactors	Mounting position	Ambient temperature	Control voltage
AL9 ... AL40	1, 1 ± 30°, 2, 3, 4, 5 (1)	≤ 55 °C 55 ... 70 °C	0.85 ... 1.1 x U_c U_c
TAL9 ... TAL40	1, 1 ± 30°, 2, 3, 4, 5 (1)	≤ 55 °C	U_c min. - U_c max.

(1) (T)AL 9, (T)AL 16, (T)AL26-22-00 not allowed in pc on 5

Mounting Positions (see the above table for authorized positions)



Connecting Characteristics

Contactor types: AL...	9	12	16	26	30	40
TAL...	9	12	16	26	30	40
Main terminals	 with cable clamp				 with double connector 2 x (5.6 x 6.5 mm)	
Connecting capacity (min. ... max.) Main conductors (poles)						
Rigid:solid (≤ 4 mm²) **1 x AWG**	18 ... 10			12 ... 8	12 ... 6	
stranded (≥ 6 mm²) **2 x AWG**	18 ... 10			12 ... 8	12 ... 6	
Rigid with connector single for Cu cable **AWG**	–	–	–	–	–	–
single for Al/Cu cable **AWG**	–	–	–	–	–	–
double for Al/Cu cable **AWG**	–	–	–	–	–	–
Flexible with cable end **1 x AWG**	18 ... 14			12 ... 8	14 ... 8	
2 x AWG	18 ... 14			12 ... 8	14 ... 8	
Bars or lugs L **mm** ≤	7.7			10	–	
l **mm** >	3.7			4.2	–	
Auxiliary conductors (built-in auxiliary terminals + coil terminals)						
Rigid solid **1 x AWG**	18 ... 10					
2 x AWG	18 ... 10					
Flexible with cable end **1 x AWG**	18 ... 14					
2 x AWG	18 ... 14					
Lugs L **mm** ≤	7.7			(1)	8	
l **mm** >	3.7			(1)	3.7	
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529	Protection against direct contact acc. to VDE 0106 - Part. 100					
– Main terminals	IP 20					
– Coil terminals	IP 20					
– Built-in auxiliary terminals	IP 20					
Screw terminals	(delivered in open position, screws of unused terminals must be tightened)					
Main terminals	(+,-) pozidriv 2 screws					
	M3.5			M4	M5	
Coil terminals	M 3.5 (+,-) pozidriv 2 screws with cable clamp					
Built-in auxiliary terminals	(+,-) pozidriv 2 screws with cable clamp					
	M3.5			M4	M3.5	
Tightening torque						
Main pole terminals						
– recommended **Nm** / **lb.in**	1.00 / 9			1.7 / 15	2.30 / 20	
– max. **Nm**	1.20			2.2	2.60	
Coil terminals						
– recommended **Nm** / **lb.in**	1.00 / 9					
– max. **Nm**	1.20					
Built-in auxiliary terminals						
– recommended **Nm** / **lb.in**	1.00 / 9			1.70 / 15	1.00 / 9	
– max. **Nm**	1.20			2.20	1.20	
Terminal marking and positioning	contact ABB					

(1) L ≤ 8 and l ≥ 3.7 for coil terminal – L ≤ 10 and l > 4.2 for built-in auxiliary terminals.

Contactor Electrical Durability and Utilization Categories

General

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

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

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

Generally speaking $I_c = m \times I_e$ where **m** is a multiple of the load operational current.
On pages **2**/39 ... **2**/41, the curves corresponding to categories AC-1, AC-2, AC-3 and AC-4 represent the electrical durability variation of standard contactors in relation to the breaking current I_c.
Electrical durability is expressed in millions of operating cycles.
These curves have been plotted for 400 V - 50 Hz 3-phase currents but remain valid up to 690 V - 40 ... 60 Hz provided that a check is carried out to make sure that at the operational voltage U_e , the current I_e normally drawn by the load does not exceed the value of the contactor rated operational current: I_e / AC-1 for category AC-1 and I_e / AC-3 for categories AC-3 and AC-4. The values are given for each type of contactor in pages **2**/26, **2**/27 (Technical Data).

Curve Utilization Mode

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

- Note the characteristics of the load to be controlled:
  - Operational voltage ..... U_e
  - Current normally drawn ..... I_e (**U_e / I_e / H.P.** relation for motors, ☞ page **8**/42).
  - 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 / H.P.** relation for motors, ☞ **8**/42).
  - Breaking current for AC-3 ..... $I_c = I_e$
  - Breaking current for AC-4 while "motor accelerating" ..... $I_c = 6 \times I_e$
  - Percentage of AC-4 operations ..... **K** (on the basis of the total number of operating cycles)
- Define the total number of operating cycles **N** required.
- Note the smallest contactor rating compatible for AC-3 (U_e / I_e) on pages **2**/26, **2**/27.
- For the selected contactor make a note of the following in relation to the voltage using diagram AC-3 page **2**/40 and AC-4 page **2**/41:
  - The number of operating cycles **A** for $I_c = I_e$ (AC-3)
  - The number of operating cycles **B** for $I_c = 6 \times I_e$ (AC-4)
- Calculate the estimated number of cycles **N'** (**N'** is always below **A**)

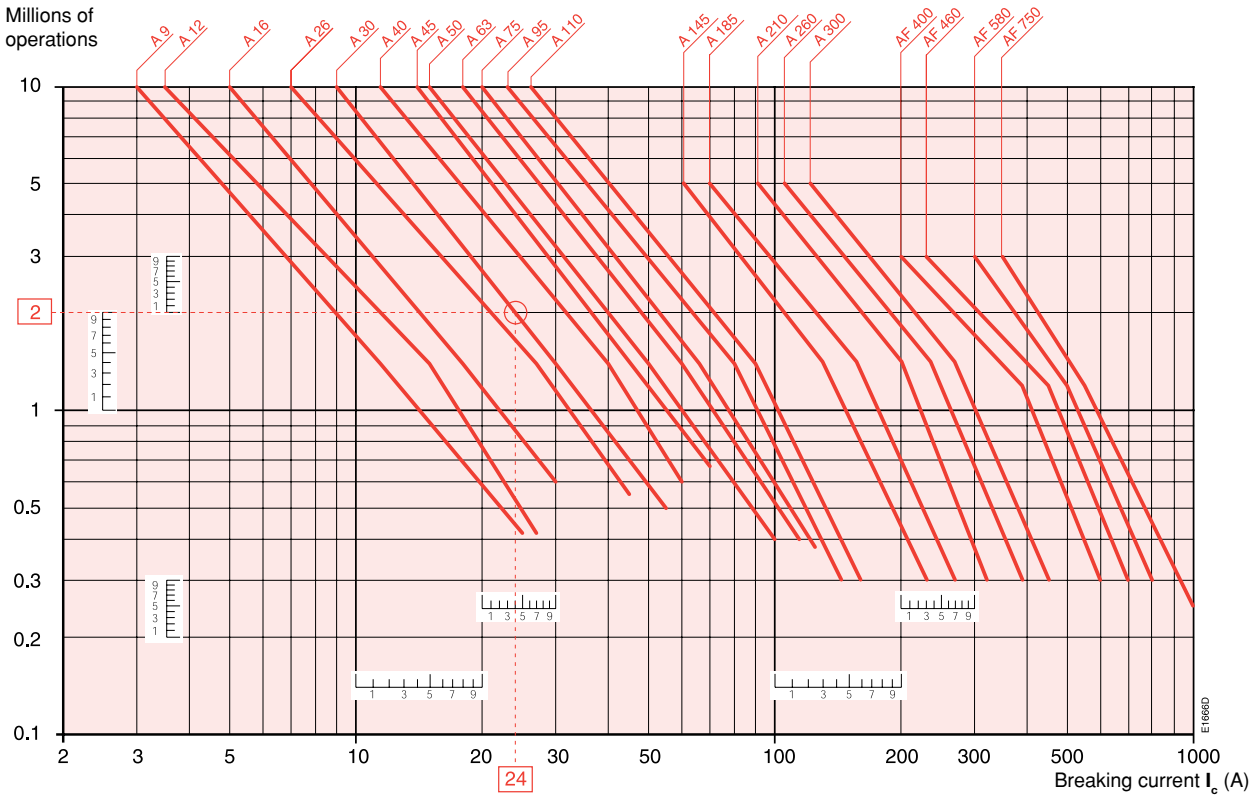
$$N' = \frac{A}{1 + 0.01\ K\ (A/B - 1)}$$

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

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

Electrical Durability for **AC-1** Utilization Category. $U_e \leq$ 690V Ambient Temperature ≤ 55 °C

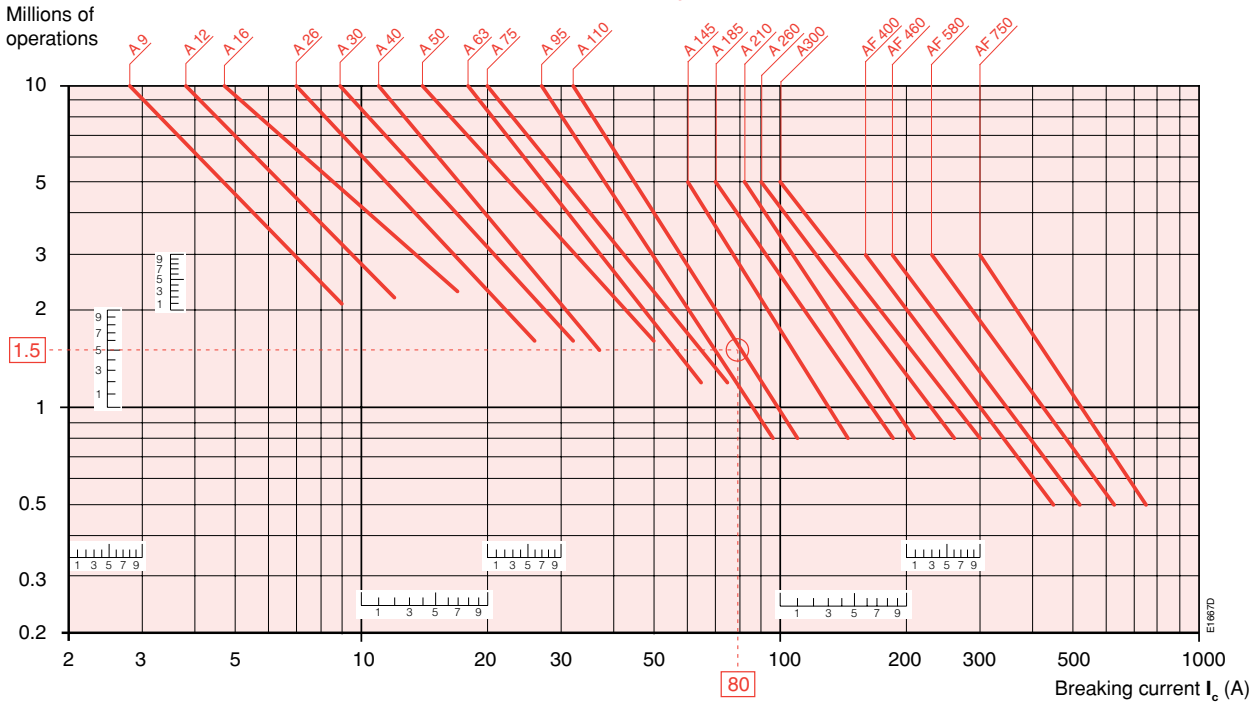
Switching non-inductive or slightly inductive loads. The breaking current I_c for AC-1 is equal to the rated operational current of the load.



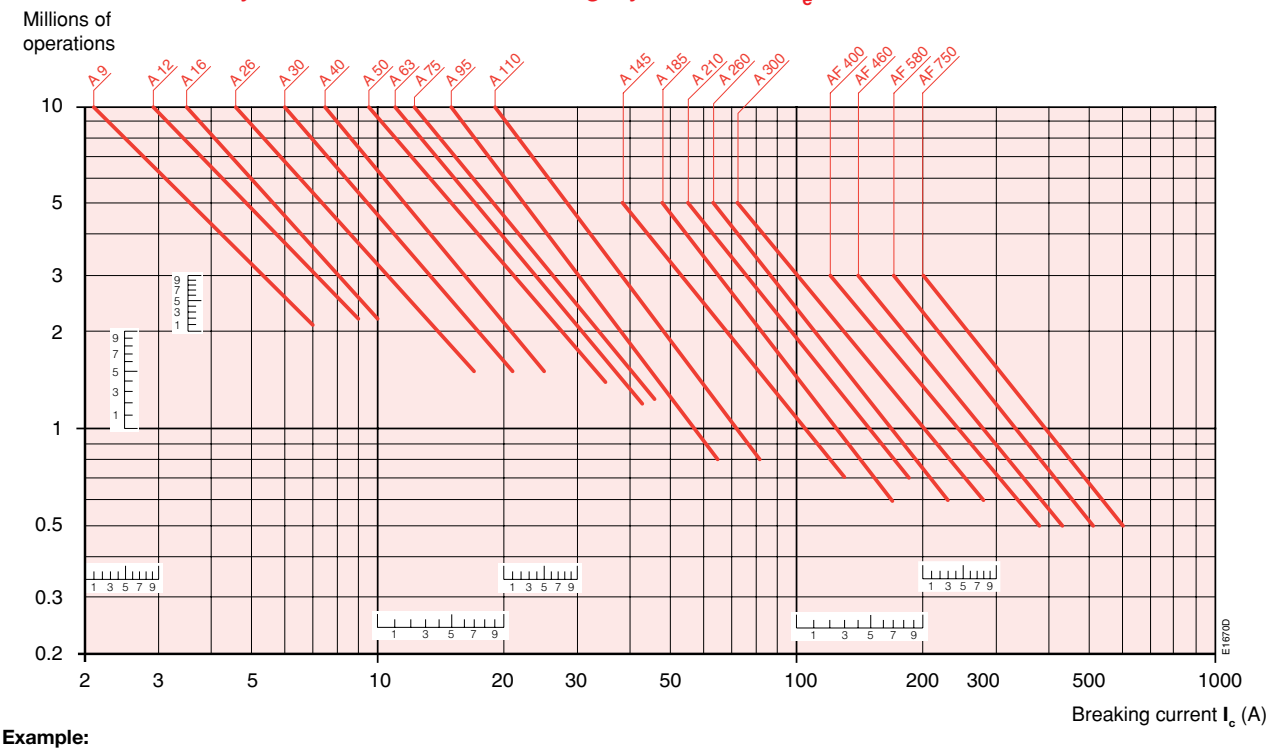
Example:
I_c / AC-1 = 24 A – Electrical durability required = 2 million operations.
Using the AC-1 curves above select the A 30 contactor at intersection "○" (24 A / 2 million operations).

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

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



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

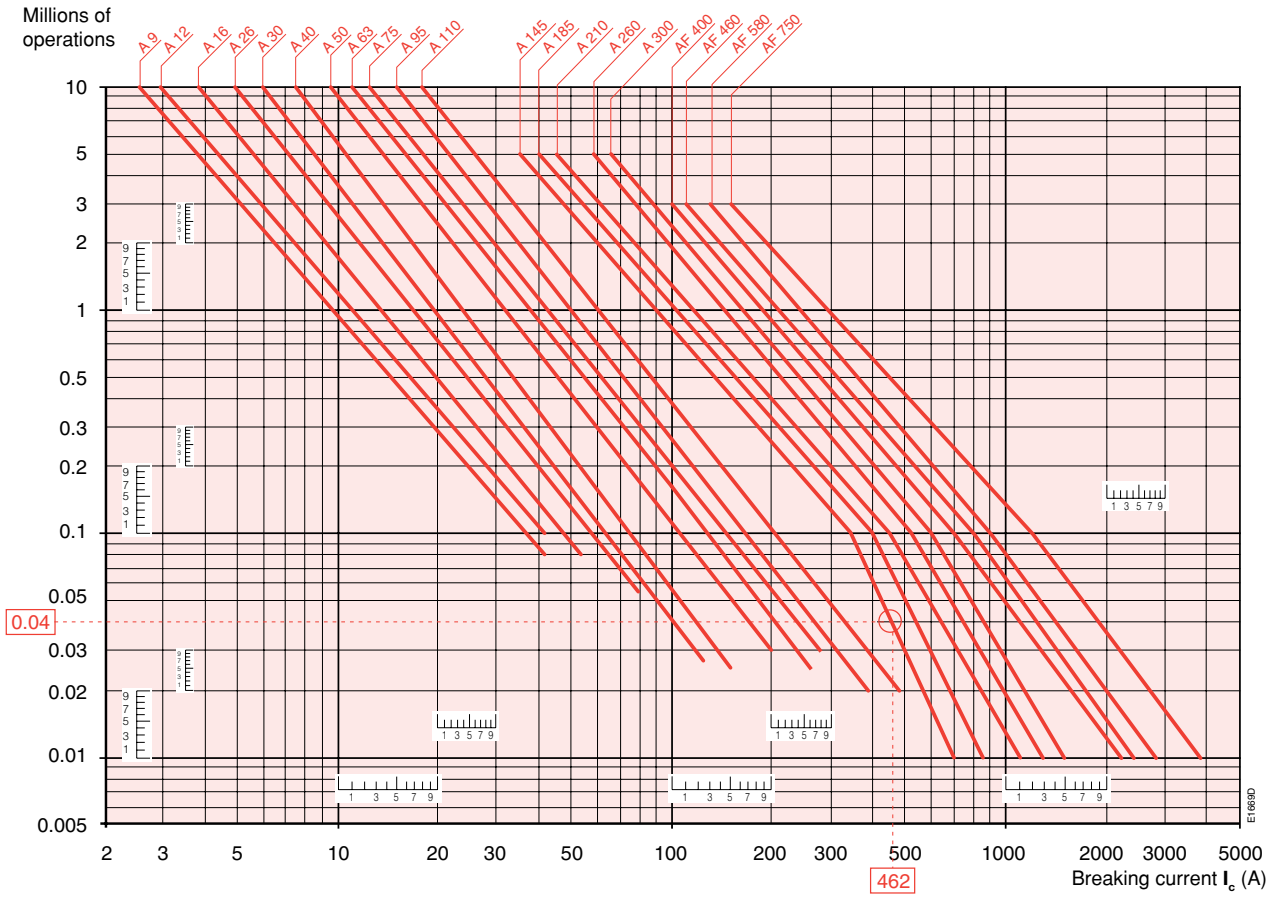


Example:
Motor power 30 Hp for AC-3 - U_e = 240 V utilization – Electrical durability required = 1.5 million operations.
As stated on the page **8**/42: 30 Hp, 240 V corresponds to I_e = 80 A. For AC-3: $I_c = I_e$. Select the A 110 contactor at intersection "○" (80 A / 1.5 million operations) on the curves (AC-3 - $U_e \leq 440$ V).

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

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

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



Example:
Motor power 75 Hp for AC-4 - U_e = 600 V utilization – Electrical durability required = 0.04 million operations.
As stated on page **8**/42: 75 Hp, 600 V corresponds to I_e = 77 A.
For AC-4: I_c = 6 x I_e = 462 A - Select the A 145 contactor at intersection "○" (462 A / 0.04 million operations) on the curves (AC-4 - 440 V < U_e ≤ 690 V).

Questionnaire for Product Specifications : Block Contactors

Customer :	**ABB correspondent :** .....
Contact person :	**Contact person :** .....
Tel : ..... e-mail :	Tel : ..... e-mail : .....
Project :	Date : .....

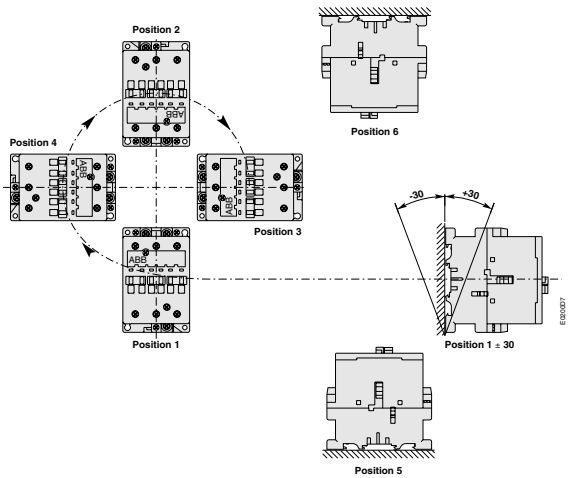
APPLICATION

Type of load : ..... No of phases .....
Utilisation category (AC / DC) : ..... %AC4 if any : .....
Voltage **Un** : ..... **V** **Cos** □ : ..... frequency : .....
L/R ..... **ms**
Nominal current **In** : ..... **A**
Making current : ..... **A** Breaking current ..... **A**
Duty : continuous - temporary - intermittent
Load factor (% of ON time) : ..... **%**

Number of cycles per hour ..... or per year : .....
Expected durability : ..... cycles
Number of main poles NO ..... NC .....
Other information : .....

INSTALLATION

Ambient temperature : ..... ℃
Ambient environment : .....
Humidity % : .....
Chemical pollution : .....
Other : .....
Mounting position (see drawing) : .....



Wiring : standard (clamping screws or cage connectors)
ring tongue / flat pins (faston)
Other : ..... Cross section : .....
Additional comments : .....
.....

CONTROL CIRCUIT

Coil voltage ..... **V** DC / AC **f** = ... Hz
Minimum / maximum : ..... **V** to ..... **V**
Surge suppressor : ..... type : .....
Accessories : .....
Number of auxiliary contacts : NO : ..... NC .....
Low level contacts : .....

PROTECTION

Short circuit protection : .....
Type : fuse - circuit breaker - MMS
Max short circuit current : ..... **A**
Motor protection : overload relay - MMS

LOGISTIC AND PACKAGING

Quantity by batch : .....
Delivery order : .....
.....

APPROVALS AND OTHER REQUIREMENTS

Reference standards : .....
Required approvals : .....
Customer specifications : .....
Shock and vibrations : .....
Interface with PLC : .....
Expected quantity : ..... per Year
Expected first delivery date : ..... and Qty : .....
Quantity on first 6 month : ..... on first year : .....
Specific quality assurance clauses : .....
.....
Other comments : .....
.....

This document is used to define the contactor specifications according to the complete information on the application

ABB **DQ01036 rev 0**

Please photocopy and forward.

Questionnaire also available in Word and .PDF formats on the ABB Website:
☞ www.abb.com/lowvoltage ☞ *left menu:* **"Low Voltage On-Line"** ☞ *select:* **"Support Tools".**

Control Relays

Contents

3

N... Control Relays
a.c. Operated

Application

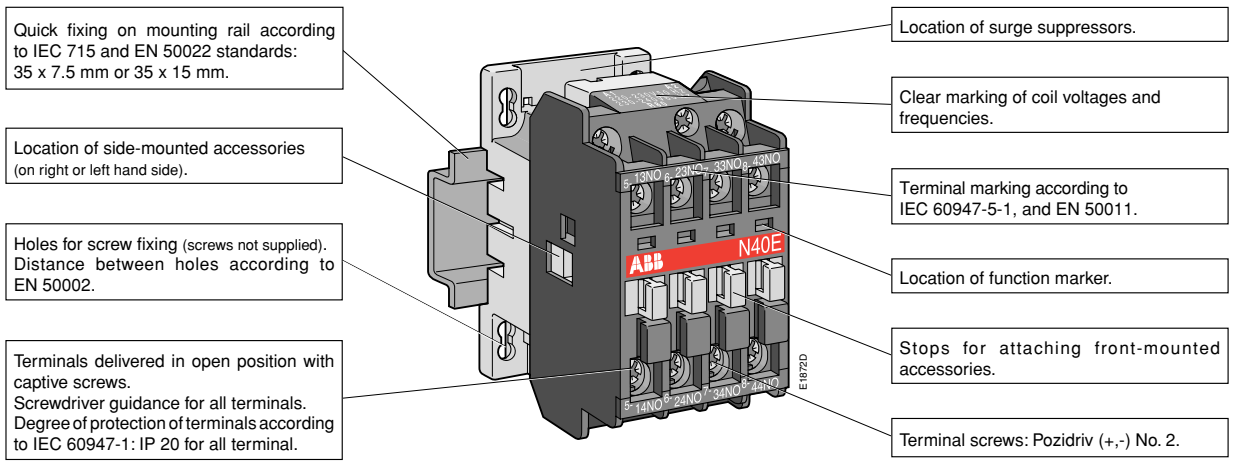
N... control relays are used for switching auxiliary circuits and control circuits.

Description

- Poles:
  - 1-stack control relays: 4-pole.
    Auxiliary contacts for safety circuits: ☞ page **7**/6.
  - 2-stack control relays: 8-pole, with mechanically linked contact elements.
    The width of 8-pole devices is identical to that of 4-pole devices; only the depth is increased.
- Control circuit: a.c. operated with laminated magnet circuit.
- Accessories: a wide range of accessories are available (☞ next pages and section **4**).

Variant ☞ next pages in this section

- d.c. operated: NL... control relays.
- d.c. operated: TNL... control relays with large coil voltage range.
- N... ST with spring terminals.
- N... RT with ring tongue terminals.



N 40 E

N 44 E

Ordering Details

Number of contacts 1st stack / 2nd stack						Order code state coil voltage code ☐☐ (see table below)	List Price
4-pole, 1-stack							
2	2	–	–	–	–	N22E-☐☐ (1)	
3	1	–	–	–	–	N31E-☐☐ (1)	
4	–	–	–	–	–	N40E-☐☐	
8-pole, 2-stack							
4	–	–	4	–	–	N44E-☐☐	
4	–	1	3	–	–	N53E-☐☐	
4	–	2	2	–	–	N62E-☐☐	
4	–	3	1	–	–	N71E-☐☐	
4	–	4	–	–	–	N80E-☐☐	
with overlapping of lagging / leading contacts							
3	1	–	2	1	1	N33/11-☐☐	
4	–	1	1	1	1	N51/11-☐☐	

(1) In mounting position 5, (☞ page **3**/11) max. 2 x N.C. front-mounted contacts only are acceptable. The **CAL 5-11** side-mounted blocks offer additional N.C. contacts.

Coil voltages and codes

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

☞ Other voltages: page **0**/1.

NL... and TNL... Control Relays

d.c. Operated - Low consumption

Application

NL... and **TNL...** control relays are used for switching auxiliary circuits and control circuits. Their low power consumption allows the direct control from transistor PLC output.

The **TNL...** control relays are designed to operate in control circuits with large voltage variations. Example: battery supply.

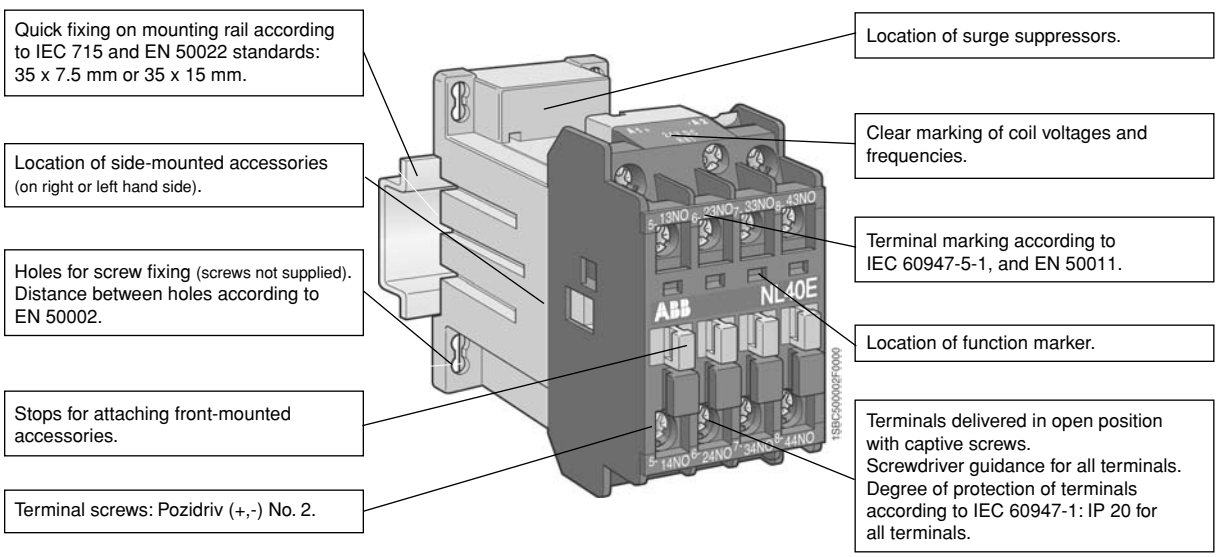
Description

NL... series: d.c. operated control relays.
TNL... series: d.c. operated control relays with **large coil voltage range**.

- Poles:
  - 1-stack control relays: 4-pole.
    Auxiliary contacts for safety circuits: ☞ page **7**/6.
  - 2-stack control relays: 8-pole, with mechanically linked contact elements.
    The width of 8-pole devices is identical to that of 4-pole devices, only the depth is increased.
- Control circuit: d.c. operated with solid magnetic circuit with low consumpyion coil. The coil must be energised from a d.c. supply and the polarity (+ and -) must be respected
- Accessories: a wide range of accessories are available (☞ section **4**).

Variant

- NL... RT with ring tongue terminals
- NL... ST with spring terminals



NL... and TNL... Control Relays

d.c. Operated with - Low Consumption

NL 22 E

Coil voltages and codes: NL...

Voltage - U_c V d.c	Code ☐☐
12	8 0
24	8 1
42	8 2
48	8 3
50	2 1
60	8 4
75	8 5
110	8 6
125	8 7
220	8 8
240	8 9
250	3 8

Coil voltages and codes: TNL...

Voltage - U_c V d.c	Code ☐☐
17 ... 32	5 1
25 ... 45	5 2
36 ... 65	5 4
42 ... 78	5 8
50 ... 90	5 5
77 ... 143	6 2
90 ... 150	6 6
152 ... 264	6 8

Other voltages: please consult us.

Voltage tolerances (-15 % and +10 %) included in the **U_c** min. and **U_c** max. values for the **TNL...** control relays.

Ordering Details: NL...

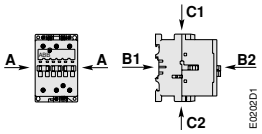
Auxiliary contacts 1st stack	2nd stack	Order code state coil voltage code ☐..☐ (see opposite table)	List Price
4-pole, 1-stack			
2 2	– –	NL22E-☐☐	
3 1	– –	NL31E-☐☐	
4 –	– –	NL40E-☐☐	
8-pole, 2-stack			
4 –	– 4	NL44E-☐☐	
4 –	1 3	NL53E-☐☐	
4 –	2 2	NL62E-☐☐	
4 –	3 1	NL71E-☐☐	
4 –	4 –	NL80E-☐☐	

Ordering Details: TNL... (control relays with large coil voltage range)

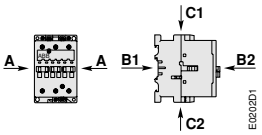
Number of contacts 1st stack	2nd stack	Order code state coil voltage code ☐..☐ (see opposite table)	List Price
4-pole, 1-stack			
2 2	– –	TNL22E-☐☐	
3 1	– –	TNL31E-☐☐	
4 –	– –	TNL40E-☐☐	
8-pole, 2-stack			
4 –	– 4	TNL44E-☐☐	
4 –	2 2	TNL62E-☐☐	
4 –	4 –	TNL80E-☐☐	

N..., NL... and TNL... Control Relays
Technical Data

General Technical Data for N... Control Relays

Control relay types		N...
Rated insulation voltage U_i		
according to IEC 60947-4-1	**V**	690
according to UL/CSA	**V**	600
Rated impulse withstand voltage $U_{imp.}$	**kV**	8
Standards		Devices complying with international standards IEC 60947-5-1 / 60947-4-1 and European standards EN 60947-5-1 / 60947-4-1
Certifications - Approvals		UL, CSA, CCC
Air temperature close to contactor		☞ "Conditions for use", page **3**/11, for control voltage limits, and authorized mounting positions
– for operation in free air	**°C**	-40 to +70
– for storage	**°C**	-60 to +80
Climatic withstand		acc. to IEC 60068-2-30 and 60068-2-11 - UTE C 63-100 specification II
Operating altitude	**m**	≤ 3000
Shock withstand		
acc. IEC 60068-2-27 and EN 60068-2-27		
Mounting position 1 (☞ page **3**/11)		1/2 sinusoidal shock for 11 ms: no change in contact position
		Shock direction A, C1, C2: 20 g B1: 5 g B2: 15 g

General Technical Data for NL... and TNL... Control Relays

Control relay types		NL..., TNL...
Rated insulation voltage U_i		
according to IEC 60947-4-1	**V**	690
according to UL/CSA	**V**	600
Rated impulse withstand voltage $U_{imp.}$	**kV**	8
Standards		Devices complying with international standards IEC 60947-5-1 / 60947-4-1 and European standards EN 60947-5-1 / 60947-4-1
Certifications - Approvals		UL, CSA, CCC
Air temperature close to contactor		☞ "Conditions for use", page **3**/11, for control voltage limits, and authorized mounting positions
– for operation in free air	**°C**	-40 to +70
– for storage	**°C**	-60 to +80
Climatic withstand		acc. to IEC 60068-2-30 and 60068-2-11 - UTE C 63-100 specification II
Operating altitude	**m**	≤ 3000
Shock withstand		
acc. IEC 60068-2-27 and EN 60068-2-27		
Mounting position 1 (☞ page **3**/11)		1/2 sinusoidal shock for 11 ms: no change in contact position
		Shock direction / Making position / Breaking A: 10 g / 20 g B1: 5 g / 15 g B2: 10 g / 15 g C1: 8 g / 20 g C2: 8 g / 14 g

Utilisation characteristics according to UL/CSA

Control relay types		N..., NL..., TNL...
Max rated voltage	**V**	600
Pilot duty		A600 (10A 600VAC) Q300 (2.5A 250VDC)

Contact Utilization Characteristics

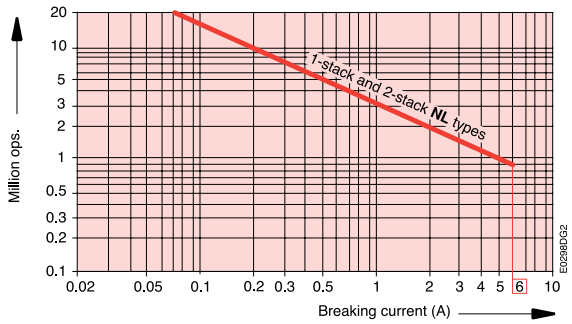
Control relay types			N..., NL..., TNL...
Rated operational voltage U_e max.		**V**	690
Rated frequency limits		**Hz**	25 ... 400
Conventional free-air thermal current I_{th} according to IEC 60947-5-1, open contactors $\theta \leq 40$ °C		**A**	16
Rated operational current I_e / AC-15 according to IEC 60947-5-1			
24-127 V	50/60 Hz	**A**	6
230-240 V	50/60 Hz	**A**	4
400-415 V	50/60 Hz	**A**	3
500 V	50/60 Hz	**A**	2
690 V	50/60 Hz	**A**	2
Rated operational current I_e / DC-13 according to IEC 60947-5-1			
24 V d.c.		**A / W**	6 / 144
48 V d.c.		**A / W**	2.8 / 134
72 V d.c.		**A / W**	1 / 72
125 V d.c.		**A / W**	0.55 / 69
250 V d.c.		**A / W**	0.3 / 75
Rated making capacity according to IEC 60947-5-1			10 x I_e / AC-15
Rated breaking capacity according to IEC 60947-5-1			10 x I_e / AC-15
Short-circuit protection fuse		**A**	10
Rated short-time withstand current I_{cw} at 40 °C ambient temp., in free air, from a cold state	1.0 s	**A**	100
	0.1 s	**A**	140
Minimum switching capacity with failure rate bellow 10^{-6}			17 V / 5 mA
Heat dissipation per pole at 6 A		**W**	0.10
Non-overlapping time between N.O. and N.C. contacts		**ms**	≥ 2
Mechanical durability			
– millions of operating cycles			> 20
– max. mechanical switching frequency		**cycles/h**	6000

Electrical Durability for AC-15 Utilization Category

AC-15 utilization category according to IEC 60947-5-1 / EN 60947-5-1:
– making current: 10 x I_e with cos φ = 0.7 and U_e
– breaking current: I_e with cos φ = 0.4 and U_e

This curve represents the electrical durability of the contactor relays, in relation to the breaking current.

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



– NL.. and TNL.. contactor relays.

Magnet System Characteristics for N... Control Relays

Control relay types			N...
Rated control circuit voltage U_c			
50/60 Hz		**V**	20 ... 690
Coil operating limits			$\theta \leq 55$ °C
acc. to IEC 60947-5-1:			0.85 ... 1.1 x **U_c**
Drop-out voltage in % of **U_c**			40 ... 65 %
Coil consumption			
Average pull-in value	50 Hz	**VA**	70
	60 Hz	**VA**	80
	50/60 Hz	**VA / VA**	74 / 70
Average holding value	50 Hz	**VA / W**	8 / 2
	60 Hz	**VA / W**	8 / 2
	50/60 Hz	**VA / W**	8 / 2
Operating time			
between coil energization and:			
– N.O. contact closing		**ms**	10 ... 26
– N.C. contact opening		**ms**	7 ... 21
between coil de-energization and:			
– N.O. contact opening		**ms**	4 ... 11
– N.C. contact closing		**ms**	9 ... 16

Magnet System Characteristics for NL... and TNL... Control Relays

Control relay types		NL...
Rated control circuit voltage U_c	**V d.c.**	12 ... 250
Coil operating limits		See conditions for use page 3/9
acc. to IEC 60947-5-1:		
Drop-out voltage in % of **U_c**		10 ... 30 %
Coil consumption		
– pull-in value	**W**	3.0
– holding value	**W**	3.0
Operating time		
between coil energization and:		
– N.O. contact closing	**ms**	50 ... 100
– N.C. contact opening	**ms**	20 ... 70
between coil de-energization and:		
– N.O. contact opening	**ms**	10 ... 17
– N.C. contact closing	**ms**	16 ... 27

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

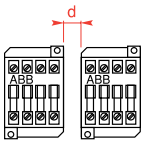
Control relay types		TNL
Rated control circuit voltage U_c	**V d.c.**	9 ... 264
Coil operating limits		See conditions for use page 3/9
acc. to IEC 60947-5-1:		
Drop-out voltage in % of **U_c**		roughly 20 ... 35 %
Coil consumption		
– **U_c** max d.c.	**W**	8.5
– **U_c** min d.c.	**W**	2.5
– **U_c** d.c.	**W**	5
Operating time		
between coil energization and:		
– N.O. contact closing	**ms**	50 ... 100
– N.C. contact opening	**ms**	20 ... 70
between coil de-energization and:		
– N.O. contact opening	**ms**	10 ... 17
– N.C. contact closing	**ms**	16 ... 27

Mounting Characteristics

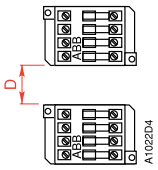
Control relay types	N...	NL...	TNL...
Mounting positions	☞ "Conditions for use"		
Mounting distances	–	☞ "Dimension drawings" (section **8**) for distances required between contactors	
Fixing			
on DIN rail according to IEC 715 and EN 50022	⊓ 35 x 7.5 mm		
	⊓ 35 x 15 mm		
by screws (not supplied)	2 x M4		

Mounting Distance (for TNL)

d mm	D mm	Ambient temperature °C
5	20	≥ 20



Pos. 1, 2, 5



Pos. 3, 4

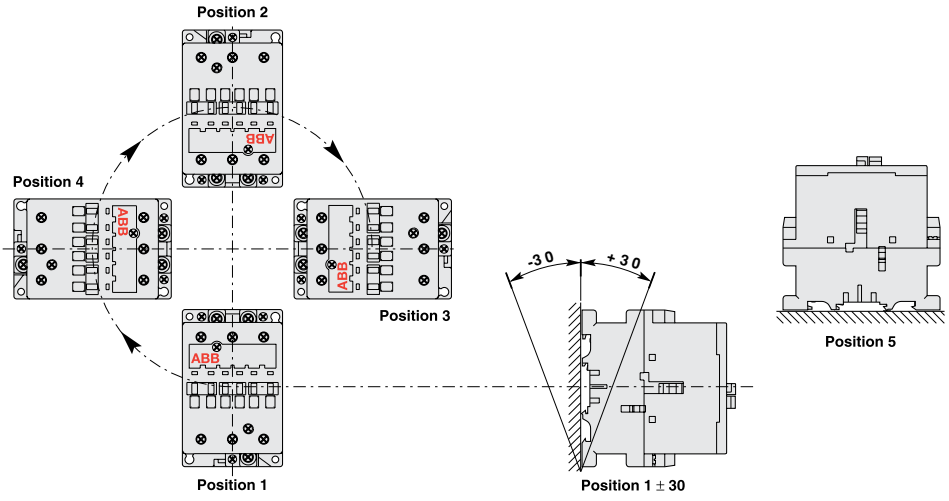
Conditions for Use

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

Control relays	Mounting position	Ambient temperature	Control voltage
N..., NL...	1, 1 ± 30°, 2, 3, 4, 5*	≤ 55 °C	0.85 ... 1.1 x **U_c**
		55 ... 70 °C	**U_c**
TNL...	1, 1 ± 30°, 2, 3, 4, 5*	≤ 55 °C	**U_c** min. ... **U_c** max.

*(T) NL22E not allowed in position 5

Mounting Positions (see the above table for authorized positions)



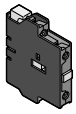
Connecting Characteristics

Control relay types			N...	NL...	TNL...
Terminals			 with cable clamp		
Connecting capacity (min. ... max.) (Poles and coil terminals)					
Rigid solid		**1 x AWG**	18 ... 10		
		**2 x AWG**	18 ... 10		
Flexible with cable end		**1 x AWG**	18 ... 12		
		**2 x AWG**	18 ... 12		
Lugs		L **mm** ≤	7.7		
		l **mm** >	3.7		
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			Protection against direct contact acc. to VDE 0106 - Part. 100		
– Pole terminals			IP 20		
– Coil terminals			IP 20		
Screw terminals					
– Pole terminals			M 3.5 (+, -) pozidriv 2 screws with cable clamp		
– Coil terminals			M 3.5 (+, -) pozidriv 2 screws with cable clamp		
Tightening torque					
Pole terminals					
– recommended		**Nm** / **lb.in**	1.00 / 9		
– max.		**Nm**	1.20		
Coil terminals					
– recommended		**Nm** / **lb.in**	1.00 / 9		
– max.		**Nm**	1.20		

N..., NL... and TNL... Control Relays

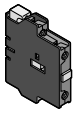
Assembling Details for Main Accessories

N... Control Relays

Basic unit			Front-mounted accessories		Side-mounted accessories
Types	Built-in contacts 1st stack	2nd stack	 Auxiliary contact 1-pole CA 5-..	 Auxiliary contact 4-pole CA 5-..	 Auxiliary contact 2-pole CAL 5-11
N 22 E (1)	2	2 – –			
N 31 E (1)	3	1 – –	1 to 4 x CA 5-..	or 1 x CA 5-.. (4-pole)	1 x CAL 5-11
N 40 E	4	– – –			
N 44 E	4	– – 4			
N 53 E	4	– 1 3	–	–	1 x CAL 5-11
N 62 E	4	– 2 2			
N 71 E	4	– 3 1			
N 80 E	4	– 4 –			

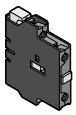
(1) In mounting position 5 (☞ page **3**/9), max. 2 x N.C. front-mounted auxiliary contacts only are acceptable. The **CAL 5-11** side-mounted blocks offer additional N.C. contacts.

NL... Control Relays

Basic unit			Front-mounted accessories		Side-mounted accessories
Types	Built-in contacts 1st stack	2nd stack	 Auxiliary contact 1-pole CA 5-..	 Auxiliary contact 4-pole CA 5-..	 Auxiliary contact 2-pole CAL 5-11
NL 22 E (1)	2	2 – –	1 to 4 x CA 5-..(2)	or 1 x CA 5-.. (4-pole)(2)	or 1 x CAL5 -11
NL 31 E	3	1 – –	1 to 4 x CA 5-..(3)	or 1 x CA 5-.. (4-pole)(3)	or 1 x CAL5 -11
NL 40 E	4	– – –			
NL 44 E	4	– – 4			
NL 62 E	4	– 2 2	–	–	–
NL 80 E	4	– 4 –			

(1) Mounting position 5 is not allowed.
(2) Max. 2 x N.C. auxiliary contacts only are acceptable.
(3) A maximum of 2 x N.C. contacts can be fitted in all position except 5.

TNL... Control Relays

Basic unit			Front-mounted accessories		Side-mounted accessories
Types	Built-in contacts 1st stack	2nd stack	 Auxiliary contact 1-pole CA 5-..	 Auxiliary contact 4-pole CA 5-..	 Auxiliary contact 2-pole CAL 5-11
TNL 22 E (1)	2	2 – –	1 to 4 x CA 5-..(3)	or 1 x CA 5-.. (4-pole)(3)	or –
TNL 31 E	3	1 – –	1 to 4 x CA 5-..(2)	or 1 x CA 5-.. (4-pole)(2)	or –
TNL 40 E (3)	4	– – –			
TNL 44 E	4	– – 4			
TNL 62 E	4	– 2 2	–	–	–
TNL 80 E	4	– 4 –			

(1) Mounting position 5 is not allowed.
(2) Max. 2 x N.C. auxiliary contacts only are acceptable, except in position 5.
(3) A maximum of 2 x N.C. contacts can be fitted.

Auxiliary Contact Blocks
Timers
Interlock Units
Surge Suppressors
Connection Pieces

Add-on Accessories

Accessories for Contactors and Control Relays

Contents

Auxiliary Contact Blocks
Front Mounting

CA 5-10

CA 5-40 E

CE 5-01 W

Description

Types of auxiliary contact blocks in standard version for general use:

- **CA...** 1 or 4-pole block, instantaneous with N.O., N.C. contacts.
- **CC...** 1-pole block, with N.O. leading contact or N.C. lagging contact.

Type of auxiliary contact block for low current and voltage levels (PLC's outputs) and for use in dusty or humid environments:

- **CE...**[2] 1-pole block, instantaneous with N.O. contact or N.C. contact, designed in 2 protection versions:
  - – **CE 5-.. D** with built-in microswitch IP 40, degree of protection (IP 20 on terminals)
  - – **CE 5-.. W** with built-in microswitch IP 67, degree of protection (IP 20 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

For contactors	Max. number of blocks	Contacts blocks				Order code	List Price
1-pole auxiliary contact blocks							
A 9 ... A 26[1]	4 blocks	1	–	–	–	CA5-10	
A 30, A 40[1]	5 blocks	–	1	–	–	CA5-01	
A 45 ... A 110	6 blocks	–	–	1	–	CC5-10	
AF 50 ... AF 110	6 blocks	–	–	–	1	CC5-01	
AL 9 ... AL 40	4 blocks	1	–	–	–	CE5-10D0.1	
TAL 9 ... TAL 40	4 blocks	–	1	–	–	CE5-01D0.1	
NL ..., TNL	4 blocks	1	–	–	–	CE5-10D2	
N ..[1],	4 blocks	–	1	–	–	CE5-01D2	
		1	–	–	–	CE5-10W0.1	
		–	1	–	–	CE5-01W0.1	
		1	–	–	–	CE5-10W2	
		–	1	–	–	CE5-01W2	
4-pole auxiliary contact blocks							
A 9 ... A 26-40-00	1 block	4	–	–	–	CA5-40E	
A 45 ... A 110	1 block	3	1	–	–	CA5-31E	
AF 45 ... AF 110	1 block	2	2	–	–	CA5-22E	
AL 9 ... AL26-40-00	1 block	0	4	–	–	CA5-04E	
		1	1	1	1	CA5-11/11E	
A 9 ... A 40-30-10	1 block	3	1	–	–	CA5-31M	
AL 9 ... AL 40-30-10	1 block	2	2	–	–	CA5-22M	
TAL 9 ... TAL 40-30-10	1 block	1	3	–	–	CA5-13M	
		0	4	–	–	CA5-04M	
		1	1	1	1	CA5-11/11M	
N and NL 4-pole	1 block	4	–	–	–	CA5-40N	
		3	1	–	–	CA5-31N	
		2	2	–	–	CA5-22N	
		0	4	–	–	CA5-04N	
		1	3	–	–	CA5-13N	

(1) In mounting position 5, there should be no more than 2 N.C. front-mounted auxiliary contacts on types **A 9** to **A 40-30-01**, **A 9** to **A 26-22-00, N 22 E, N 31 E.** The side-mounted blocks offer additional N.C. contacts.
Whatever the mounting position, there should be no more than 2 N.C. front-mounted auxiliary contacts on types **A 45** to **A 75-22-00**.
The side-mounted blocks offer additional N.C. contacts.

Note: The auxiliary contact blocks provided for the A... contactors can be used for the GA... and GAE types.

(2) Restrictions apply, consult ABB

Technical Data

Types		1-pole CA 5, 4-pole CA 5, 1-pole CC 5	1-pole CE 5-..0.1	1-pole CE 5-..2
Compliance with standards		IEC 60947-5-1 and EN 60947-5-1		
Certification and approvals		☞ section **7**		
Rated insulation voltage U_i				
according to IEC 60947-5-1	**V**	690	250	250
according to UL/CSA	**V**	600	250	250
Rated operational voltage U_e	**V a.c.**	24 to 690	125	250
Conventional thermal current I_{th}	**A**	16	0.1	2
Rated operational current I_e according to IEC 60947-5-1				
in a.c.		**AC-15**	**AC-14**	**AC-15**
24 to 127 V	**A**	6	0.1	2
220 to 240 V	**A**	4	–	2
380 to 440 V	**A**	3	–	–
500 to 690 V	**A**	2	–	–
in d.c.		**DC-13**	**DC-12**	**DC-12**
24 V	**A**	6	0.1	2
48 V	**A**	2.8	0.1	1
72 V	**A**	1	0.1	0.3
110 V	**A**	0.55	0.1	0.2
125 V	**A**	0.55	–	0.2
220 V	**A**	0.3	–	0.1
250 V	**A**	0.3	–	–
Short circuit protection	**A**	10 (fuses)	0.1 (fuses*)	10 (fuses*)
Rated making capacity		10 x I_e AC-15	6 x I_e AC-14	10 x I_e AC-15
Rated breaking capacity		10 x I_e AC-15	6 x I_e AC-14	10 x I_e AC-15
Rated short-time withstand current I_{cw} 1 s	**A**	100	–	–
θ = 40 °C 0.1 s	**A**	140	–	–
Power loss per pole at 6 A	**W**	0.15	–	–
Min. switching capacity	**V / mA**	17 / 5 (A 9 ... A 75) - 24 / 50 (A 95, A 110)	3 / 1	17 / 5
Reliability for min. switching capacity		–	10^{-8}	10^{-8}
Mechanical durability				
– millions of operating cycles		10 (A 9 ... A 75) 3 (A 95, A 110)	5 for **CE 5-.. D** 2.5 for **CE 5-.. W**	5 for **CE 5-.. D** 2.5 for **CE 5-.. W**
– max. mech. switching frequency	**cycles/h**	3600	3600	3600
Electrical durability				
– millions of operating cycles		3	2.5 for **CE 5-.. D 0.1** 0.7 for **CE 5-.. W 0.1**	1 for **CE 5-.. D 2** 0.3 for **CE 5-.. W 2**
– max. elec. switching frequency	**cycles/h**	1200	1200	1200
Connecting terminals (Delivered in open position. Screws of unused terminals should be tightened.)		M3.5 (+,-) pozidriv 2 screw with cable clamp		
Tightening torque				
– recommended	**Nm**	1.00		
– max.	**Nm**	1.20		
Connecting capacity (min. ... max.)				
– Rigid solid	**1 or 2 x AWG**	18 ... 10		
– Flexible with cable end	**1 or 2 x AWG**	18 ... 12		
– Lugs	L **mm** ≤	8		
	l **mm** >	3.7		
Degree of protection acc. to IEC 60529, IEC 60144, DIN 40050 and NFC 20-010		IP 20 for the terminals		

* HRC fuses for very fast action

Utilisation characteristics according to UL/CSA

Max rated voltage	**V**	600	125	250
Pilot duty		A600 (10A, 600VAC) Q300 (2.5A 250VDC)	0.1A	2.0A

Auxiliary Contact Blocks
Side Mounting

CAL 5-11

Application

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

Description

Types of auxiliary contacts blocks in standard version for general use:

- **CAL...** 2-pole block instantaneous N.O. + N.C. contacts.
- **CCL ...** 2-pole block N.O. leading + N.C. lagging contacts.

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	Max. number of blocks	Contacts blocks	Order code	List Price
2-pole auxiliary contacts N.O. + N.C.				
A 9 ... A 75	2 blocks	1 1 – –	CAL5-11	
AF 50 ... AF 75	2 blocks			
N	2 blocks			
A 95 ... A 300	2 blocks [1]	1 1 – –	CAL18-11 CAL18-11RT	
AF 95... AF1650	2 blocks [1]			
A 95 ... A 300	2 blocks [1]	1 1 – –	CAL18-11B	
AF 95 ... AF 1650	2 blocks [1]			
N.O. leading + N.C. lagging contacts				
A 9 ... A 16	2 blocks	– – 1 1	CCL5-11	
N	2 blocks			
1-pole microswitch auxiliary contact N.O. or N.C.				
A 95 ... A 300	2 blocks	1 – – –	CEL18-10	
AF 95 ... AF 1650	2 blocks			
A 95 ... A 300	2 blocks	– 1 – –	CEL18-01	
AF 95 ... AF 1650	2 blocks			

[1] 2 blocks CAL 18-11 + 2 blocks CAL 18-11 B

Notes: The auxiliary contact blocks provided for the **A...** contactors can be used for the **UA..-R** contactors.
Only one contact block can be mounted on **GA...** type.

Technical Data

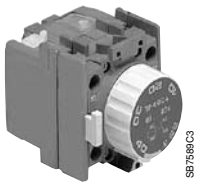
Types			CAL 5-11, CCL 5-11	CAL 18-11, -11B	CEL 18-10, -01
Compliance with standards			IEC 60947-5-1, EN 60947-5-1		
Certification and approvals			CE, UL, CSA, CCC		
Rated insulation voltage U_i					
according to IEC 60947-5-1		**V**	690		250
according to UL/CSA		**V**	600		250
Rated operational voltage U_e		**V a.c.**	24 to 690		125
Conventional free air thermal current I_{th}		**A**	16		0.1
Rated operational current I_e acc. to IEC 60947-5-1					
AC-15	24-127 V a.c.	**A**	6		0.1
	220-240 V a.c.	**A**	4		–
	380-440 V a.c.	**A**	3		–
	500-690 V a.c.	**A**	2		–
DC-13	24 V d.c.	**A**	6		0.1
	48 V d.c.	**A**	2.8		0.1
	72 V d.c.	**A**	1		0.1
	125 V d.c.	**A**	0.55		0.1
	250 V d.c.	**A**	0.3		–
Short-circuit protection - J type fuses		**A**	10		0.1
Rated making capacity			10 x I_e AC-15		6 x 1
Rated breaking capacity			10 x I_e AC-15		6 x 1
Rated short-time withstand current I_{cw}	1 s	**A**	100		–
θ = 40 °C	0.1 s	**A**	140		–
Power loss per pole at 6 A		**W**	0.10	0.15	–
Min. switching capacity		**V / mA**	17 / 1	24/50	3/1
Mechanical durability					
– millions of operating cycles			10	3	1
– max. mech. switching frequency		**cycles / h**	3600		1200
Electrical durability					
– millions of operating cycles			3		0.7
– max. elec. switching frequency		**cycles / h**	1200		1200
Connecting terminals (Delivered in open position. Screws of unused terminals should be tightened.)			M3.5 (+,-) pozidriv 2 screw with cable clamp		
Tightening torque					
– recommended		**Nm**	1.00		
– max.		**Nm**	1.20		
Connecting capacity (min. ... max.)					
Rigid solid		**1 or 2 x AWG**	18 ... 10		
Flexible with cable end		**1 or 2 x AWG**	18 ... 12		
Lugs		L **mm** ≤	8		
		l **mm** >	3.7		
Degree of protection according to IEC 60529, IEC 60144, DIN 40050 and NFC 20-010			IP 20		

(1) CCL 5-11 auxiliary contact, only for A 9 ... A 16 contactors and N... contactor relays.

Utilisation characteristics according to UL/CSA

Max rated voltage	**V**	600	125
Pilot duty		A600 (10A, 600VAC) Q300 (2.5A 250VDC)	0.1A

TP… Pneumatic Timer Blocks



TP 40 DA

BX-TP

Application

The timer blocks are equipped with adjustable time delay auxiliary contacts.

Types

– **TP 40 DA, TP 180 DA** (blue button) for time delay on energization.
– **TP 40 IA, TP 180 IA** (black button) for time delay on de-energization.

Description

- Pneumatic timer with 350° linear scale and setting via marked knurled knob.
- Block equipped with 2 time-delayed auxiliary contacts: 1N.O. and 1N.C. (electrically separate).
- Captive screw type connecting terminals with built-in cable clamps. M3.5 (+,-) pozidriv 2 screw with screw-driver guidance, supplied untightened and protected against accidental direct contact.

Mounting

Clipped onto the front panel of A 9 ... A 75 contactors and N control relays.

Accessory

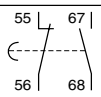
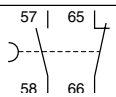
BX-TP plastic sealed cover protecting access to the time delay setting.

Ordering Details

Time delay setting	Type	Order code	List Price
0.1 ... 40 s	ON-DELAY	TP40DA	
10 ... 180 s	ON-DELAY	TP180DA	
0.1 ... 40 s	OFF-DELAY	TP40IA	
10 ... 180 s	OFF-DELAY	TP180IA	
–	PROTECTIVE COVER	BX-TP	

Note: The TP... timers provided for A contactors and N control relays can be used for the AF, GA, GAE and GTAE contactors.

Technical Data

Compliance with standards			IEC 60947-5-1, EN 60947-5-1	
Certification and approvals			☞ section **7**	
Rated insulation voltage U_i				
according to IEC 60947-5-1		**V a.c.**	690	
according to UL/CSA		**V a.c.**	600	
Rated operational voltage U_e				
according to IEC 60947-5-1		**V a.c.**	24 ... 690	
Conventional free air thermal current I_{th}		**A**	10	
Rated operational current I_e acc. to IEC 60947-5-1				
AC-15	24-127 V	**A**	6	
	220-240 V	**A**	4	
	380-400 V	**A**	3	
	500/690 V	**A**	1/0.5	
DC-13	24 V	**A**	6	
	48 V	**A**	2.8	
	72 V	**A**	1	
	125 V	**A**	0.55	
	250 V	**A**	0.3	
Rated making capacity			10 x I_e AC-15	
Rated breaking capacity			10 x I_e AC-15	
Short-circuit protection - fuses		**A**	10	
Rated short-time withstand current I_{cw} at θ = 40 °C				
	1 s	**A**	50	
	0.1 s	**A**	100	
Heat loss per pole at 6 A		**W**	0.15	
N.O. and N.C. contact non-overlapping time		**ms**	1 ... 2	
Resetting time		**ms**	approx. 40	
Accuracy (measured over 10 successive cycles)			±2 %	
Drift (variation in mean value during TP lifetime)			TP ... DA: -15 to +15 %	TP ... IA: -25 to +15 %
Drift according to ambient temperature				
– between -20 °C and +20 °C		**% per °C**	0.25	
– between +20 °C and +65 °C		**% per °C**	0.20	
Electrical durability			1 million	
max. switching frequency		**cycles/h**	1200	
Mechanical durability		**cycles**	5 million	
Connecting terminals (delivered in open position)			M3.5 (+,-) pozidriv 2 screw with cable clamp	
Connecting capacity				
– rigid solid		**1 or 2 x AWG**	18 ... 12	
– flexible with cable end		**1 or 2 x AWG**	18 ... 12	
Tightening torque				
– recommended		**Nm**	1.00	
– max.		**Nm**	1.20	
Terminal marking			TP 40 DA TP 180 DA 	TP 40 IA TP 180 IA 

Utilisation characteristics according to UL/CSA

Max rated voltage	**V**	600
Pilot duty		A600 (10A, 600VAC)

Mechanical Interlock Units
Mechanical and Electrical Interlock Units

Application

When mounted between two contactors, the mechanical interlock unit prevents one of the contactors from closing as long as the other contactor is closed.

Description

Mechanical interlocking of two horizontal mounted contactors, a.c. or d.c. coil

Interlock type	For contactors On left	On right	Fixing
VM 5-1	A 9 ... A 40, N	A9 ... A 40, N	Din-Rail or plate ☞ page **4**/19
VM 300H	A 95 ... A 300	A 145 ... A 300	Mounting plate ☞ page **4**/19
VM 300/460H	A 210 ... A 300	AF 400 ... AF 460	
VM 750H	AF 400 ... AF 750	AF 400 ... AF 750	
VM 1650H	AF 1350 ... AF 1650	AF 1350 ... AF 1650	Mounting plate included

Mechanical and electrical interlocking of two horizontal mounted contactors, a.c. or d.c. coil

Type	For contactors On left	On right	Fixing
VE 5-1	A 9 ... A 40, N	A 9 ... A 40, N	Din-rail or plate ☞ page **4**/19
VE 5-2 (1)	A 45 ... A 110	A 45 ... A 110	

(1) The combination of A 45 ... A 75 interlocked with A 95, A 110 cannot be mounted on symmetrical rail (75mm EN 50023).

Mechanical interlocking of two vertical mounted contactors, a.c. coil only

Type	For contactors Up	For contactors Down	Fixing
VM 300V	A 95 ... A 300	A 145 ... A 300	additional plate not supplied
VM 300/460V	A 210 ... A 300	AF 400 ... AF 460	
VM 750V	AF 400 ... AF 750	AF 400 ... AF 750	

Selection tables

Interlocking of two horizontal mounted contactors, a.c. or d.c. coil

Left \ Right	A 9 ... A 26, N	A 30, A 40	A 45 ... A 75	A 95, A 110	A 145 ... A 300	AF 400 ... 460	AF 400 ... 750	AF 1350 ... 1650
A 9 ... A 26, N	$V^M/_E$ 5-1	$V^M/_E$ 5-1	–	–	–	–	–	–
A 30, A 40	$V^M/_E$ 5-1	$V^M/_E$ 5-1	VE 5-2	–	–	–	–	–
A 45 ... A 75	–	VE 5-2	VE 5-2	VE 5-2	–	–	–	–
A 95, A 110	–	–	VE 5-2	VE 5-2	–	–	–	–
A 95 ... A 300	–	–	–	–	VM 300H	–	–	–
A 210 ... A 300	–	–	–	–	–	VM 300/460H	–	–
AF 400 ... AF 750	–	–	–	–	–	–	VM 750H	–
AF 1350 ... AF 1650	–	–	–	–	–	–	–	VM 1650H

Notes: The interlock units provided for A... and AL... contactors and the N... and NL... contactor relays, can be used for the AF, UA, UA..-R, GA and TAL contactors and the TNL contactors relays.

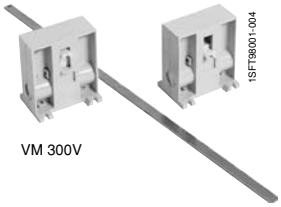
Interlocking of two vertical mounted contactors, a.c. coil only

Up \ Down	A 145 ... A 300	AF 400 ... AF 460	AF 400 ... AF 750	AF 1350 ... AF 1650
A 95 ... A 300	VM 300V	–	–	–
A 210 ... A 300	–	VM 300/460V	–	–
AF 400 ... AF 750	–	–	VM 750V	–

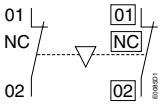
Mechanical Interlock Units
Mechanical and Electrical Interlock Units

VE 5-1

VM 300H



VM 300V



VE 5-1, VE 5-2
Terminal marking and positioning

Ordering Details

Mechanical interlocking of two horizontal mounted contactors

For contactors	Order code	List Price
☞ page **4**/8	VM5-1	
	VM300H	
	VM300/460H	
	VM750H	
	VM1650H	

Mechanical and electrical interlocking of two horizontal mounted contactors

For contactors	Order code	List Price
☞ page **4**/8	VE5-1	
	VE5-2	

Mechanical interlocking of two vertical mounted contactors

For contactors	Order code	List Price
☞ page **4**/8	VM300V	
	VM300/460V	
	VM750V	

Technical Data - VE 5-1 and VE 5-2 Mechanical and Electrical Interlock Units

Compliance with standards		IEC 60947-5-1, EN 60947-5-1
Rated insulation voltage U_i		
according to IEC 60947-5-1	**V**	690
according to UL / CSA	**V**	600
Rated operational voltage U_e		
acc. to IEC 60947-5-1	**V a.c.**	24 ... 690
Conventional thermal current I_{th}	**A**	16
Rated operational current I_e acc. to IEC 60947-5-1		
AC-15		
24-127 V	**A**	6
220-240 V	**A**	4
380-440 V	**A**	3
500-690 V	**A**	2
DC-13		
24 V	**A**	6
48 V	**A**	2.8
72 V	**A**	1
125 V	**A**	0.55
250 V	**A**	0.3
Rated making capacity		10 x I_e AC-15
Rated breaking capacity		10 x I_e AC-15

Rated short-time withstand current I_{cw} - θ = 40 °C		
1 s	**A**	100
0.1 s	**A**	140
Short-circuit protection gG type fuses	**A**	10
Heat loss per pole at 6 A	**W**	0.15
Mechanical durability	**cycles**	5 million
Max. switching frequency	**cycles/h**	600
Connecting capacity		
– rigid solid	**1 or 2 x AWG**	18 ... 10
– flexible with end	**1 or 2 x AWG**	18 ... 14
Connecting terminals delivered in open position (screws of unused terminals should be tightened)		M3.5 (+,-) pozidriv 2 screw with cable clamp
Tightening torque		
– recommended	**Nm**	1.00
– max.	**Nm**	1.20
Degree of protection acc. to IEC 60529, IEC 60144, DIN 40050, NFC 20010		IP 20

Technical note

When, during switching, the arc time is estimated to more than 40 ms, the closing signal of one of the two contactors must be delayed with respect to the opening signal of the other contactor in order to prevent a short-circuit.
Use a TP 40 pneumatic timer or a STAR-DELTA electronic timer with time lapse, as applicable.

4

WB 75-A Mechanical Latching Unit

WB 75-A

Application

For converting standard contactors into latched contactors.

Description

The **WB 75-A** block contains a mechanical latching device with electromagnetic impulse unlatching (a.c. or d.c.) or manual unlatching.
Captive screw type connecting terminals, built-in cable clamps, M3.5 (+,-) pozidriv 1 screw with screwdriver guidance; delivered untightened and protected against accidental direct contact.

Operation

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

Contactor opening can be controlled:

– electrically by an impulse* (a.c. or d.c.) on the WB 75-A block coil.

* the coil is not designed to be permanently energized.

– manually by pressing the pushbutton on the front face of the WB 75-A block.

Mounting

The **WB 75-A** block is clipped onto the front face of the contactor where it takes up two slots. The two other slots may accept **CA 5...** single pole auxiliary contacts (1 block on each side of the mechanical latch).

Ordering Details

For contactors or control relays	Order code state coil voltage code ☐ (see table below)	List Price
A 9 ... A 75, AF 50 ... AF 75, GA 75, GAE 75 AL 9 ... AL 40 N, NL	WB75-A ☐	

Coil voltages and codes

Voltage V - 50Hz/d.c.	Voltage V - 60Hz	Code ☐
24	24 ... 28	F
48	48 ... 55	G
110	110 ... 127	1
230 ... 240	230 ... 277	2
380 ... 415	380 ... 440	3
415 ... 440	440 ... 480	4

WB 75-A Mechanical Latching Unit

Technical Data

Rated insulation voltage U_i			
according to IEC 60947-1		**V a.c.**	690
according to UL/CSA		**V a.c.**	600
Rated control voltage U_c		**V a.c.**	24 ... 480
according to the coil voltage		**V d.c.**	24 ... 440
Coil operating range			0.85 ... 1.1 **U_c**
Max. electrical impulse time			
– on a.c. coil (with load factor 5 %)		**s**	20
– on d.c. coil (with load factor 3 %)		**s**	8
Min. electrical impulse time			
– for latching:	in a.c.	**ms**	50 (A... contactors, N... contactor relays)
(energizing of the contactor coil)	in d.c.	**ms**	50 (A... contactors, N... contactor relays)
– for pull-out:	in a.c.	**ms**	30
(energizing of the WB block coil)	in d.c.	**ms**	50
Coil consumption (mean values)			
– a.c. operated coil	inrush	**VA**	90
	holding	**VA**	60
– d.c. operated coil		**W**	110
Operating time			
– on contactor closing (latching) between coil energization and:			
N.O. contact closing			
N.C. contact opening			☞ page **2**/24: no difference with the operation of a contactor only
– on contactor closing (unlatching) between WB.. coil energization and:			
N.O. contact opening		**ms**	5 ... 25
N.C. contact closing		**ms**	7 ... 28
Mechanical durability	in millions of ops.		1
Max. switching frequency		**ops./h**	3600 with on-load factor of 8 %
Connecting terminals (delivered in open position)			M3.5 (+,-) pozidriv 1 screw with cable clamp
Connecting capacity			
– rigid solid		**AWG**	18 ... 10
– flexible with cable end		**AWG**	18 ... 12
Tightening torque			
– recommended		**Nm**	1.00
– max.		**Nm**	1.20
Degree of protection			IP 20

4

Surge Suppressors for Contactor Coils

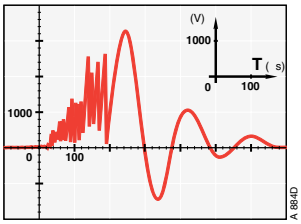
Application

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

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

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

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



Overvoltage Factor

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

$$k = \frac{\hat{U}_s \text{ max.}}{\hat{U}_c} \qquad \textbf{in d.c.:}\ k = \frac{\hat{U}_s \text{ max.}}{U_c} \qquad \text{or } \textbf{in a.c.:}\ k = \frac{\hat{U}_s \text{ max.}}{U_c\sqrt{2}}$$

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

Description

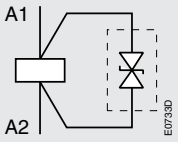
To guard against the harmful effects of these overvoltages, ABB has developed a range of surge suppressors designed to reduce the **k** factor defined above and to limit or even completely eliminate the high pre-damping voltage frequencies.

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

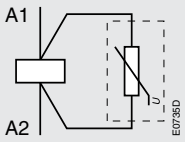
We have chosen the following solutions: transil diodes, varistors and RC blocks.

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

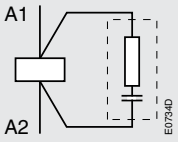
Wiring Diagrams



RT Zener diode

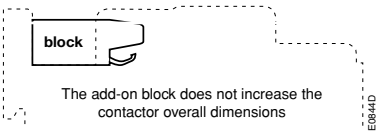


RV Varistor



RC type

Dimensions (in mm)



RT 5, RV 5, RC 5

Surge Suppressors for Contactor Coils

RV 5/50

RC 5-1/50

Ordering Details

For contactors	Control voltage			Order code	Price List
	V	d.c.	a.c.		
A 9 ... A 110, N, NL, TNL (T) AL9 (T) AL 40	24 ... 50	●	●	RV5/50	
	50 ... 133	●	●	RV5/133	
	110 ... 250	●	●	RV5/250	
	250 ... 440	●	●	RV5/440	
A 9 ... A 40 and N	24 ... 50	–	●	RC5-1/50	
	50 ... 133	–	●	RC5-1/133	
	110 ... 250	–	●	RC5-1/250	
	250 ... 440	–	●	RC5-1/440	
A 45 ... A 110	24 ... 50	–	●	RC5-2/50	
	50 ... 133	–	●	RC5-2/133	
	110 ... 250	–	●	RC5-2/250	
	250 ... 440	–	●	RC5-2/440	

Note: The surge suppressors provided for A... contactors can be used for the UA..-R and GA types.

4

Technical Data

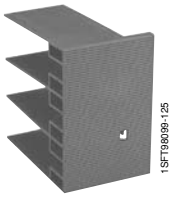
Varistor		RV 5/50	RV 5/133	RV 5/250	RV 5/440
Control voltage U_c	**V a.c./d.c.**	24 ... 50	50 ... 133	110 ... 250	250 ... 440
Residual overvoltage (clipping voltage)	**V a.c./d.c.**	132	270	480	825
Opening time growth factor		1.1 ... 1.5			
Operating temperature	**°C**	-20 ... +70			
Connection to the coil terminals (parallel mounting)		Clip-on for both fixing and connection.			
Fixing		Clipped onto the top part of the contactor base. This mounting method prevents any projections and change in contactor dimensions.			
Advantages		High energy absorption: good damping - Unpolarized system.			
Drawback		Clipping as from U_{vdr}*, thus voltage front up to this point.			

*U_{vdr} = Varistor operating voltage (voltage dependent resistor), tolerance ± 10 %.

RC type		RC 5-1/50 RC 5-2/50	RC 5-1/133 RC 5-2/133	RC 5-1/250 RC 5-2/250	RC 5-1/440 RC 5-2/440
Control voltage U_c	**V a.c.**	24 ... 50	50 ... 133	110 ... 250	250 ... 440
Residual overvoltage (clipping voltage)	**V a.c.**	2 to 3 x U_c max.			
Opening time growth factor		1.2 ... 1.3			
Operating temperature	**°C**	-20 ... +70			
Connection to the coil terminals (parallel mounting)		Clip-on for both fixing and connection.			
Fixing		Clipped onto the top part of the contactor base. This mounting method prevents any projections and change in contactor dimensions.			
Advantages		Very fast clipping - Attenuation of steep fronts and thus of high frequencies. No operating delays.			

Terminal Shrouds, Extension and Connectors

LT ...-AC



LT ...-AL

LT ...-AY

ATK185

Application

Main terminal protection for **A 145 ... AF 750** contactors.
The auxiliary contact blocks and coils are designed to provide an IP 20 degree of protection.
The main terminals, equipped with lugs or connectors, can be protected against accidental direct contact after wiring (VDE 0106 - Part. 100) by the addition of terminal shrouds (see table below).

Note: A 9 ... A 110 contactors do not require additional terminal shrouds as their terminals are all already protected against accidental direct contact according to VDE 0106 - Part. 100.

Description

Each terminal shroud protects all the terminals on one side of the contactor. Two terminal shrouds should be provided for each separate contactor.

Ordering Details

For contactors	Order code	List Price
A 145 ... A 185 with connectors	LT185-AC	
A 145 ... A 185 with lugs	LT185-AL	
A 145 ... A 185 with short. bar LY 185 or between A 145 and TA 200DU or between A 185 and TA 200DU	LT185-AY	
A 210 ... A 300 with connectors	LT300-AC	
A 210 ... A 300 with lugs ATK 300 only	LT300-AL	
A 210 ... A 300 with short. bar LY 300	LT300-AY	
AF 400 ... AF 460 with connectors	LT460-AC	
AF 400 ... AF 460 with lugs	LT460-AL	
AF 580 ... AF 750 with connectors	LT750-AC	
AF 580 ... AF 750 with lugs	LT750-AL	

Note: The shrouds provided for the A... contactors can be used for the AF... types.

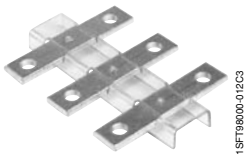
Connector Terminals Lug Kits

Application

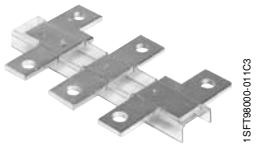
Connection of cables to the terminal pads of the poles of A and AF contactors, c/w 1 tapped hole for control conductor.

Ordering details

For contactors	Cable range	Order code (kit of 3 lugs)	List Price
A (F) 145 ... A (F) 185	6-250 MCM	ATK185	
A (F) 210 ... A (F) 300	4-400 MCM	ATK300	
A (F) 210 ... A (F) 300	(2) 4-500 MCM	ATK300/2	
A F 400 ... A F 580	(2) 2/0-500 MCM	ATK580/2	
A F 580 ... A F 750	(3) 2/0-500 MCM	ATK750/3	
A F 1350 ... A F 1650	(6) 1/0-750 MCM	ATK1650/6	



LX...



LW...

Terminal Extension Pieces

Application

LX... extension pieces are designed to extend the terminal pads of the **A...** contactors for simultaneous mounting of the connectors and the connection sets.

LW... enlargement pieces are designed to increase the width of the contactor terminal pads in order to allow larger connectors to be mounted.

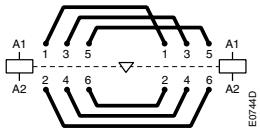
Ordering details

For contactors	Dimensions hole Ø mm	bar mm	Order code	List Price
A 145, A185	8.5	17.5 x 5	LX185	
A 210 ... A 300	10.5	20 x 5	LX300	
AF 400, AF 460	10.5	25 x 5	LX460	
AF 580, AF 750	13	40 x 6	LX750	
A 95, A 110	6.5	15 x 3	LW110	
A 145, A 185	10.5	17.5 x 5	LW185	
A 210 ... A 300	10.5	20 x 5	LW300	
AF 400, AF 460	10.5	25 x 5	LW460	
AF 580, AF 750	13	40 x 6	LW750	

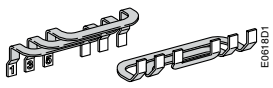
Note: The LX... pieces provided for the A... contactors can be used for the AF types.
Note: The LW... pieces provided for the A... contactors can be used for the AF, AE and TAE types.

4

Connections Sets

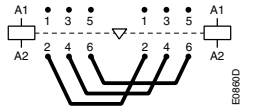


BEM, BER… connections

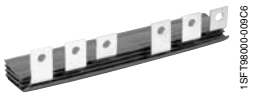


BEM 75-30

BEM 300-30



BES... for 3-pole connections



BES…

Connections for Reversing Contactors

Application

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

Description

The sets are made up of three upstream connections and three downstream connections.

BER 16V, BER 40V – Insulated, solid, rigid copper wires
BEM 75-30 ... BEM 750-30 – Insulated, solid copper bars

On the **A...** contactors, the power supply by bars or cables equipped with lugs is directly connected to the terminal pads of the main poles. For flange connectors (☞ page **4**/15), **LX…** terminal extension pieces should be used.

Ordering details

Mounting on 3-pole contactors	Order code	List Price
A 9 ... A 16	BER16V	
A 26 ... A 30	BER40V	
A 50 ... A 75	BEM75-30	
A 95, A 110	BEM110-30	
A145, A 185	BEM185-30	
A 210 ... A 300	BEM300-30	
AF 400, AF 460	BEM460-30	
AF 580, AF 750	BEM750-30	

Note: The connections provided for the A... contactors can be used for the AL, TAL, AF types.

3-pole Connections for Phase to Phase

Application

Connections between the main poles of **two 3-pole contactors** horizontal mounted.

Description

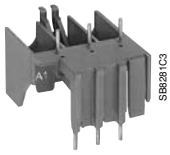
This set is made up of three downstream or upstream connections.

Ordering details

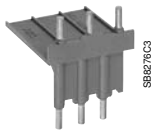
Mounting on 3-pole contactors	Order code	List Price
A 50 ... A 75	BES75-30	
A 95, A 110	BES110-30	
A 145, A 185	BES185-30	
A 210 ... A 300	BES300-30	
AF 400, AF 460	BES460-30	
AF 580, AF 750	BES750-30	

Note: The connections provided for the A... contactors can be used for the AF types.

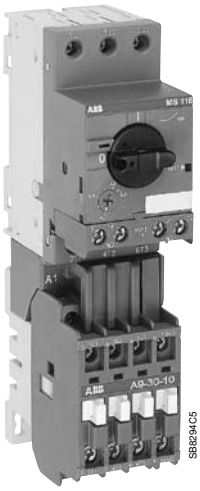
BEA 16 ... BEA 110 Connecting Links for Contactors and Manual Motor Starters



BEA 16/116



BEA 40/450



A 9-30-10 + BEA 16/116 + MS 116
DOL Starter Combination

Application

The **BEA...** connecting link is used for direct linking between a contactor and the associated manual motor starter which are used together as **DOL Starter Combination** in type 1 or type 2 co-ordination, complying with IEC 60947-4-1 and EN 60947-4-1.

☞ Database of co-ordination tables on the ABB Website:
www.abb.com/lowvoltage ☞ left menu: **"Low Voltage On-Line"** ☞ select: **"Support Tools".**

Description

The **BEA...** insulated 3-pole connecting link (touch safe) ensures the electrical linking between the contactor and the corresponding manual motor starter.
The **BEA...** connecting links can be used with the **A...** series contactors (including AL, TAL, AF... versions) and the **MS...** manual motor starter as indicated in the table below.
(For further information about contactors ☞ section **2** in this catalogue and ☞ separate technical catalogue for detailed information about the manual motor starter range).

Ordering Details

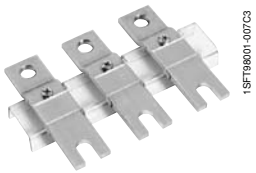
For contactors &	mounting Screws not supplied	**For** MMS &	mounting Screws / rail not supplied	I_e max. AC-3 600 V **A**	**Order code**	**List Price**
A 9	–	MS 116	15 x 35 mm	9	BEA16/116	
AL 9	–	MS 116		9	BEA16/116AL	
A 12	–	MS 116		11	BEA16/116	
AL 12	–	MS 116		11	BEA16/116AL	
A 16	–	MS 116		17	BEA16/116	
AL 16	–	MS 116		17	BEA16/116AL	
A 26	2 x M4	MS 116		28	BEA26/116	
A 9	–	MS 325	15 x 35 mm	9	BEA16/325	
AL 9	–	MS 325		9	BEA16/325AL	
A 12	–	MS 325		11	BEA16/325	
AL 12	–	MS 325		11	BEA16/325AL	
A 16	–	MS 325		17	BEA16/325	
AL 16	–	MS 325		17	BEA16/325AL	
A 26	2 x M4	MS 325		28	BEA26/325	
AL 26	–	MS 325		28	BEA26/325AL	
A 30	2 x M4	MS 450	2 x M5	34	BEA40/450	
A 40	2 x M4	MS 450	2 x M5	42	BEA40/450	
A 50	2 x M4	MS 450	2 x M5	54	BEA50/450	
A 50	2 x M6	MS 495	2 x M5	54	BEA75/495	
A 63	2 x M6	MS 495	2 x M5	65	BEA75/495	
A 75	2 x M6	MS 495	2 x M5	80	BEA75/495	
A 95	2 x M6	MS 495	2 x M5	95	BEA110/495	
A 110	2 x M6	MS 495	2 x M5	110	BEA110/495	

4

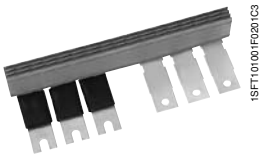
Connection Bars for Contactor and MCCB

A 300-30 contactor + MCCB on top

BEA 300/S5



BEA...D/S



BEA 300H/S5

Application

Connections between contactors/starters and moulded case circuit breakers or fusible switches.

Description

These connection sets are solid copper bars either isolated or protected by shrouds.

Ordering Details

Connection bars between contactor and MCCB

Vertical assembly

Contactors	MCCB	Order code	List Price
A 145, A 185	T 3, T 4	BEA185/T4	
A 145, A 185	S 3, S 4	BEA185/S3/S4	
A 210	T 4	BEA210/T4	
A 210 ... A 300	T 5	BEA300/T5	
AF 400, AF 460	S 5	BEA400/S5	
AF 400 ... AF 750	T 5	BEA750/T5	

Vertical assembly with control wire terminals (Also suitable when using busbar kits for starter combinations)

A 145, A 185	T 3	BEA185D/T3	
A 145 ... A 185	S 3, S 4	BEA185D/S3/S4	
A 210	S 4	BEA210D/S4	
A 210 ... A 300	S 5	BEA300D/S5	
AF 400, AF 460	S 5	BEA400D/S5	
AF 400 ... AF 750	S 6	BEA750D/S6	

Horizontal assembly (Also suitable when using busbar kits for starter combinations)

A 145, A 185	S 3, S 4	BEA185H/S4	
A 210	S 4	BEA210H/S4	
A 210, A 300	S 5	BEA300H/S5	
AF 400, AF 460	S 5	BEA400H/S5	
AF 400, AF 460	S 6	BEA460H/S6	
AF 580, AF 750	S 6	BEA750H/S6	

Note: The BEA... connection bars provided for the A 145 ... A 300 contactors can be used for the AF 145 ... AF 300 contactors.

Adapter Plates and Mounting Plates for A 95 ... AF 750 Contactors


1SFT98001-015C3

PR300-1


1SFT98001-014C3

PR400-2


1SFT98001-016C3

PN300A-11


1SFT98001-017C3

PN300-21


1SFT98001-018C3

PN300-41

Application

These are adapter plates and mounting plates with pre-drilled holes for the specified contactors and overload relays.

Ordering Details

Adapter plates

From old contactor	To new contactor	Order code	List Price
EH 65,75, 80, 90, EG 80	A 95, A 110	PR110-1	
EH 100, 145	A 110, A 145	PR145-1	
EH 150, 160, 175, 210, EG 160	A 185, A 210	PR210-1	
EH 250, 260, 300	A 210 ... A 300	PR300-1	
EH 370, 550, EG 315	AF 400 ... AF 580	PR460-1	
EH 700, 800	AF 750	PR750-1	
OKYM 150, 175, OKYM4	A 185	PR185-2	
OKYM 200, 250	A 210 ... A 300	PR300-2	
OKYM 315	AF 400, AF 460	PR400-2	
OKYM 400	AF 400, AF 460	PR460-2	
OKYM 500	AF 580	PR580-2	
EH 550, EG 630, OKYM 630	AF 580, AF 750	PR750-2	

Mounting plates for Direct on Line Starters

For contactor	For overload relay	Order code	List Price
A 145, A 185	TA 200 DU, E 200 DU	PN185-11	
A 210, A 260, A 300	E 320 DU	PN300-11	
AF 400, AF 460	E 500 DU	PN460-11	
AF 580, AF 750	E 800 DU	PN750-11	

Mounting plates for mechanical interlocked contactors, reversing starters and two speed starters for double windings

For two contactors side by side with space for mechanical interlock	For one or two overload relays	Order code	List Price
A 9 ...A 40	TA 25 DU, TA 42 DU	PN40-21	
A 50 ...A 75	TA 75 DU	PN75-21	
A 95, A 110	TA 80 DU, TA 110 DU	PN110-21	
A 145, A 185	TA 200 DU, E 200 DU	PN185-21	
A 210 ... A 300	E 320 DU	PN300-21	
AF 400, AF 460	E 500 DU	PN460-21	
AF 580, AF 750	E 800 DU	PN750-21	

Mounting plates for Star-Delta Starters and two speed starters for single windings

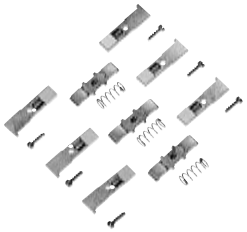
For Main and Delta contactors	For Star contactor (1)	For Overload relays	Order code	List Price
A 95, A 110	A 95	TA 110 DU	PN110-41	
A 145, A 185	A 145	E 200 DU	PN185-41	
A 210, 260, 300	A 185, A 210, A 260	E 320 DU	PN300-41	
AF 400, AF 460	A 300, AF 400	E 500 DU	PN460-41	
AF 580, AF 750	AF 400, AF 460,AF 580	E 800 DU	PN750-41	

(1) Space for mechanical interlock included.

Note: The adapter plates provided for the A... contactors can be used for the AF types.

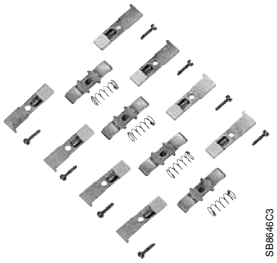
4

Main Contact Sets
Arc Chutes



ZL 50

ZL 185



ZLT 50

ZW...

Main Contact Sets for 3-pole Contactors

Description

The contact sets for 3-pole contactors consist of six fixed contacts, three moving contacts, springs and the necessary screws.

Ordering details

For contactors	Order code	List Price
A/AF 50-30	ZL50	
A/AF 63-30	ZL63	
A/AF 75-30	ZL75	
A/AF 95-30	ZL95	
A/AF 110-30	ZL110	
A/AF 145	ZL145	
A/AF 185	ZL185	
A/AF 210	ZL210	
A/AF 260	ZL260	
A/AF 300	ZL300	
AF 400	ZL400	
AF 460	ZL460	
AF 580	ZL580	
AF 750	ZL750	
AF1350	ZL1350	
AF 1650	ZL1650	
UA 50-R	ZLU50	
UA 63-R	ZLU63	
UA 75-R	ZLU75	

Note: GA, GAE 75 contacts cannot be changed.

Main Contact Sets for 4-pole Contactors

Description

The contact sets for 4-pole contactors consist of eight fixed contacts, four moving contacts, springs and the necessary screws.

Ordering details

For contactors	Order code	List Price
A/AF 45-40, -22	ZLT45	
A/AF 50-40	ZLT50	
A/AF 75-40, -22	ZLT75	

Arc Chutes

Ordering details

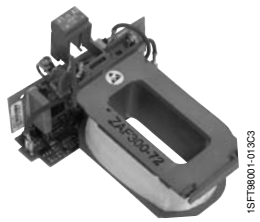
For contactors	Order code	List Price
A/AF 145, A/AF 185	ZW185	
A/AF 210 ... 300	ZW300	
AF 400, AF 460	ZW460	
AF 580, AF 750	ZW750	
AF 1350, AF 1650	ZW1650	

Contactor Coils

ZA 16

ZA 185

ZAF 110



ZAF 300

Ordering Details

a.c. Operated coils for A 9 ... A 300 contactors and N control relays

For contactors	Order code state coil voltage code ☐☐ ☞ page **0**/1	List Price
A 9 ... A 16 ; UA 16..-R ; N	ZA16-☐☐	
A 26 ... A 40 ; UA 26..-R, UA 30..-R	ZA40-☐☐	
A 45 ... A 75 ; UA 50..-R to UA 75..-R ; GA 75	ZA75-☐☐	
A 95 ... A 110 ; A 145 ... A 185 A 210 ... A 300	ZA110-☐☐ ZA185-☐☐ ZA300-☐☐	

a.c. / d.c. Operated coils c/w electronic interface for AF 45 ... AF 1650 contactors

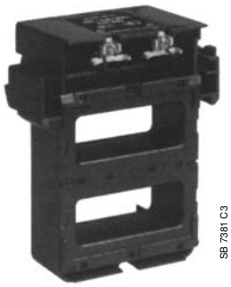
For contactors	Order code state coil voltage code ☐☐ ☞ page **0**/1	List Price
AF 45 ... AF 75	ZAF75-☐☐	
AF 95, AF 110	ZAF110-☐☐	
AF 145 ... AF 185	ZAF185-☐☐	
AF 210 ... AF 300	ZAF300-☐☐	
AF 400 ... AF 460	ZAF460-☐☐	
AF 580 ... AF 750	ZAF750-☐☐	
AF 1350 ... AF 1650	ZAF1650-70	

d.c. Operated coils for GAE 75 contactors and NE control relays

For contactors	Order code state coil voltage code ☐☐ ☞ page **0**/1	List Price
Coils only		
GAE 75	ZAE75-☐☐	

4

Spare Parts
EH, EHDB Contractors



KH 300

KZ 450

Spare Coils

For Contractor:		Order code state coil voltage code ☐ (see table below)	List Price
a.c. Operated			
	EH 145, EHDB 130	KH145-☐	
	EH 175, EH 210, EHDB 220, EHDB 280	KH210-☐	
3 -Pole	EH 260, EH 300, EHDB 360	KH300-☐	
	EH 450, EH 550, EHDB 520, EHDB 650	KH550-☐	
	EH 700, EH 800, EHDB 800, EHDB 960	KH800-☐	
d.c. Operated			
	EH 145, EHDB 130	KP145-☐	
	EH 175, EH 210, EHDB 220, EHDB 280	KP210-☐	
3 -Pole	EH 260, EH 300, EHDB 360	KP300-☐	
	EH 450, EH 550, EHDB 520, EHDB 650	KP550-☐	
	EH 700, EH 800, EHDB 800, EHDB 960	KP800-☐	

Coil voltages and codes KH

Voltage (V) 60 Hz :	Voltage code : ☐
24	**F**
120	**1**
208	**B**
230 ... 240	**2**
480	**4**
600	**6**

Coil voltages and codes KP

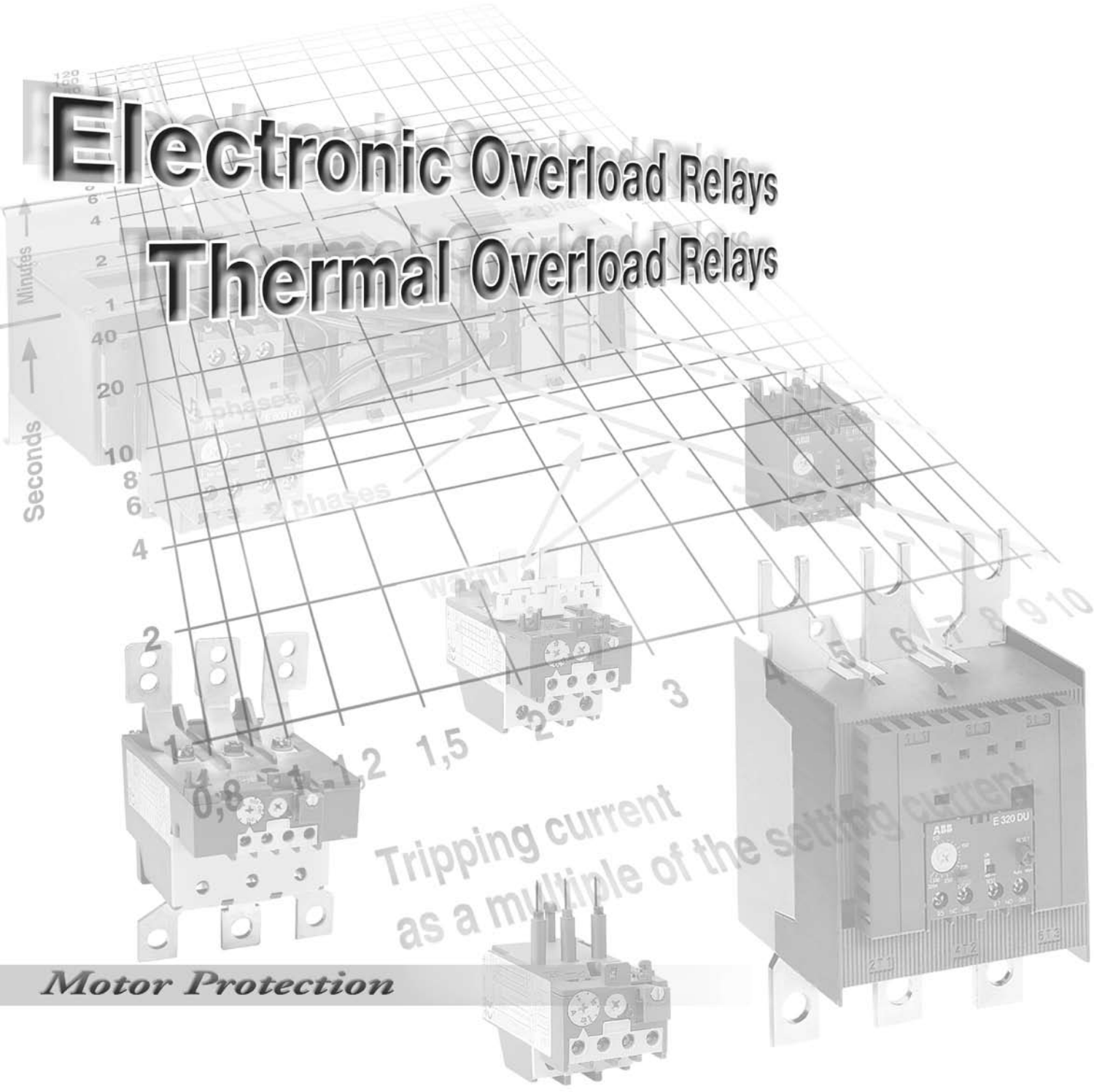
Voltage (V) DC :	Voltage code : ☐
24	**Y**
48	**W**
110	**P**
125	**Q**
220	**R**
250	**S**

Contact Sets

For Contractor:		Order code	List Price
	EH 145	KZ145	
	EH 175	KZ175	
	EH 210	KZ210	
3 -Pole	EH 260	KZ260	
	EH 300	KZ300	
	EH 450	KZ450	
	EH 550	KZ550	
	EH 700	KZ700	
	EH 800	KZ800	
	EH1200	KZ1200	
	EHDB 130	EHDBCK 130-2	
	EHDB 220	EHDBCK 220-2	
	EHDB 280	EHDBCK 280-2	
2 -Pole NO	EHDB 360	EHDBCK 360-2	
	EHDB 520	EHDBCK 520-2	
	EHDB 650	EHDBCK 650-2	
	EHDB 800	EHDBCK 800-2	
	EHDB 960	EHDBCK 960-2	
	EHDB 130	EHDBCK 130-NC	
	EHDB 220	EHDBCK 220-NC	
	EHDB 280	EHDBCK 280-NC	
1 -Pole NC	EHDB 360	EHDBCK 360-NC	
	EHDB 520	EHDBCK 520-NC	
	EHDB 650	EHDBCK 650-NC	
	EHDB 800	EHDBCK 800-NC	
	EHDB 960	EHDBCK 960-NC	

Notes

Electronic Overload Relays
Thermal Overload Relays



Motor Protection

Thermal Overload Relays
Electronic Overload Relays

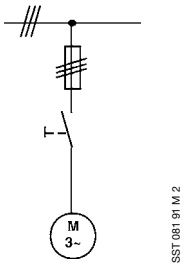
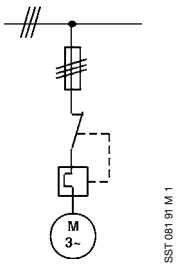
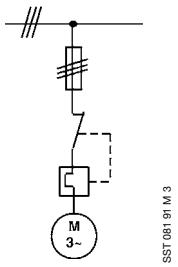
Contents

Motor protection - General aspects

Selection of an adequate motor protection is of great importance with regard to the operational reliability and service life of a motor.

The effectiveness of the available motor protection devices depends on the range of application.
The following shows a summary which facilitates the correct choice. Since no general rules exist, we will gladly give you further advice in special cases such as heavy starting.

Protection against:
- overload
- phase failure imbalance
- phase loss

Efficiency	Protection device current-dependent: Fuses	Overload relays with protection device in case of phase failure	Protection device, temperature-dependent: Thermistor machine protection CUSTORAPID
Reasons for unwanted overloading of the motor winding			
1 Current overloading	☐		
2 Rated duty types S1-S8 to IEC 34-I	☐	■	●
3 Operation when starting, braking, reversing	☐	■	●
4 Operation at starting rates Operating cycles 15 ops./h	☐	■	●
5 Locked motor	■	●	■ In the case of motors with thermally critical rotor
6 Overload at phase failure	☐	●	●
7 Over-/undervoltage in supply mains	☐	●	●
8 Variation of frequency in supply mains	☐	●	●
9 Increased ambient temperature	☐	●	●
10 External heating of the motor (e.g.: bearing heating)	☐	☐	●
11 Obstruction to motor cooling	☐	☐	●

Efficiency of protection device:
☐ not effective
■ partly effective
● fully effective

Note on fuses

Fuses do not protect a motor against overload. They serve only as short-circuit protection of switchgear and cables.
For direct starting, fuses of around 1.5 to 2.5 times the rated current should be used. A fuse must withstand 1.3 times its rated current for a sustained period. This would entail thermal overload of the motor. In order to protect motors against short-circuits, it is advisable to use fuses aM in conjunction with the thermal overload relay. The specifications in relation to short-circuit protection for contactors and overload relays must be noted when selecting the rating of fuses or circuit-breakers.

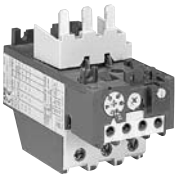
Thermal overload relays

T7DU, TA25DU, TA42DU, TA75DU, TA80DU, TA110DU, TA200DU, TA450DU

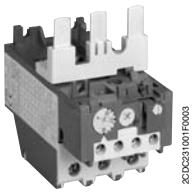
Class 10

T7DU

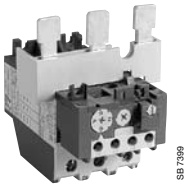
TA25DU



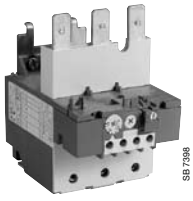
TA42DU



TA75DU



TA80DU



TA110DU

TA200DU

Normal starting time class 10:

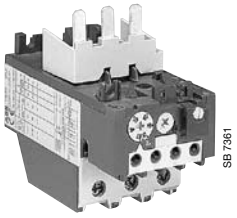
For contactors	Setting range A	Catalog number	List price
Mini contactors B7-BC7	0.1 ... 0.16	T7DU0.16	
	0.16 ... 0.24	T7DU0.24	
	0.24 ... 0.4	T7DU0.4	
	0.4 ... 0.6	T7DU0.6	
	0.6 ... 1	T7DU01.0	
	1 ... 1.6	T7DU1.6	
	1.6 ... 2.4	T7DU2.4	
	2.4 ... 4	T7DU4.0	
	4 ... 6	T7DU6.0	
	6 ... 9	T7DU9.0	
	9 ... 12	T7DU12.0	
A/AL/TAL9...40	0.1 ... 0.16	TA25DU0.16	
	0.16 ... 0.25	TA25DU0.25	
	0.25 ... 0.4	TA25DU0.4	
	0.4 ... 0.63	TA25DU0.63	
	0.63 ... 1	TA25DU1.0	
	1 ... 1.4	TA25DU1.4	
	1.3 ... 1.8	TA25DU1.8	
	1.7 ... 2.4	TA25DU2.4	
	2.2 ... 3.1	TA25DU3.1	
	2.8 ... 4	TA25DU4.0	
	3.5 ... 5	TA25DU5.0	
	4.5 ... 6.5	TA25DU6.5	
	6 ... 8.5	TA25DU8.5	
	7.5 ... 11	TA25DU11	
	10 ... 14	TA25DU14	
	13 ... 19	TA25DU19	
	18 ... 25	TA25DU25	
	24 ... 32(1)	TA25DU32	
A/AL/TAL30...40	18 ... 25	TA42DU25	
	22 ... 32	TA42DU32	
	29 ... 42	TA42DU42	
AF50...75	18 ... 25	TA75DU25	
	22 ... 32	TA75DU32	
	29 ... 42	TA75DU42	
	36 ... 52	TA75DU52	
	45 ... 63	TA75DU63	
	60 ... 80	TA75DU80	
A/AF95...110	29 ... 42	TA80DU42	
	36 ... 52	TA80DU52	
	45 ... 63	TA80DU63	
	60 ... 80	TA80DU80	
A/AF95...110	66 ... 90	TA110DU90	
	80 ... 110	TA110DU110	
A/AF145-A/AF185	66 ... 90	TA200DU90	
	80 ... 110	TA200DU110	
	100 ... 135	TA200DU135	
	110 ... 150	TA200DU150	
	130 ... 175	TA200DU175	
	150 ... 200	TA200DU200	
A/AF210-A/AF300	130 ... 185	TA450DU185	
	165 ... 235	TA450DU235	
	220 ... 310	TA450DU310	

(1) With terminal block DX25: 1 x 16 mm^2

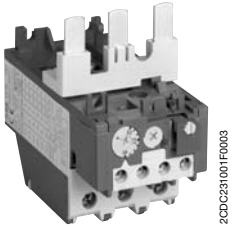
5

Thermal overload relays
TA25DU, TA42DU, TA75DU, TA80DU, TA450SU
Class 20, class 30

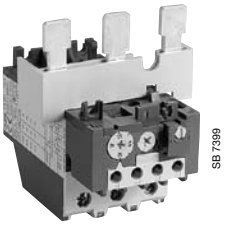
TA25DU



TA42DU



TA75DU



TA80DU

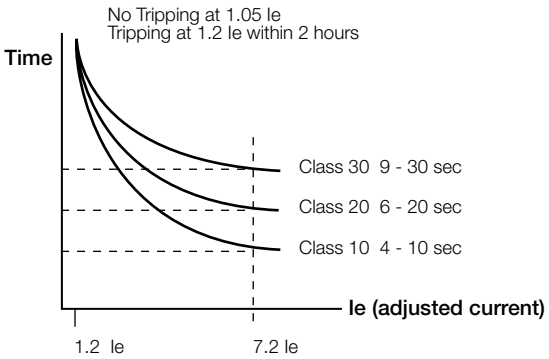
TA450DU

Thermal overload relays class 20:

For contactors	Setting range A	Catalog number	List price
A/AL/TAL9...40	1.3 ... 1.8	TA25DU1.8-20	
	1.7 ... 2.4	TA25DU2.4-20	
	2.2 ... 3.1	TA25DU3.1-20	
	2.8 ... 4	TA25DU4.0-20	
	3.5 ... 5	TA25DU5.0-20	
	4.5 ... 6.5	TA25DU6.5-20	
	6 ... 8.5	TA25DU8.5-20	
	7.5 ... 11	TA25DU11-20	
	10 ... 14	TA25DU14-20	
	13 ... 19	TA25DU19-20	
	18 ... 25	TA25DU25-20	
	24 ... 32	TA25DU32-20	
A/AL/TAL30...40	18 ... 25	TA42DU25-20	
	22 ... 32	TA42DU32-20	
	29 ... 42	TA42DU42-20	
A/AF50...75	18 ... 25	TA75DU25-20	
	22 ... 32	TA75DU32-20	
	29 ... 42	TA75DU42-20	
	36 ... 52	TA75DU52-20	
	45 ... 63	TA75DU63-20	
	60 ... 80	TA75DU80-20	
A/AF95...110	29 ... 42	TA80DU42-20	
	36 ... 52	TA80DU52-20	
	45 ... 63	TA80DU63-20	
	60 ... 80	TA80DU80-20	

Thermal overload relays for heavy start/long starting time class 30:

For contactors	Setting range A	Catalog number	List price
A145 ... 300	40 ... 60	TA450SU60	
	55 ... 80	TA450SU80	
	70 ... 105	TA450SU105	
	95 ... 140	TA450SU140	
	130 ... 185	TA450SU185	
	165 ... 235	TA450SU235	
	220 ... 310	TA450SU310	

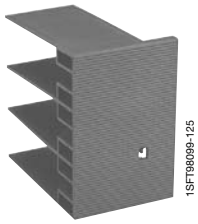


DX25

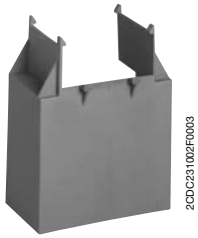
DB25

DB80

DB200



LTA185-AY



LT200/A

Terminal block -8 AWG

For overloads	Catalog number	List price
TA25DU25 and DB25/25A	DX25	

Mounting kits for single set-ups

For overloads	Mounting	Catalog number	List price
TA25DU≤25	snapping	DB25/25A	
TA25DU32	onto	DB25/32A	
TA42DU, TA75DU, TA80DU	35mm	DB80	
TA110DU, TA200DU	screw mounting	DB200*	

* No protective cover available for DB 200

Mounting kits for single set-ups

For contactors	Catalog number	List price
A145 ... 185	DT450/A185	
A210 ... 300	DT450/A300	

Terminal shround for TA200

For contactors	Mounting	Catalog number	List price
A145, A185	Between A145/185 and TA200DU	LTA185-AY	
	Load Side TA200D	LT200/A	

Terminal lug kits

For overloads	Wire range	Catalog number	List price
T200DU	6 — 250MCM	EHTK210	
TA450DU185	4 — 400MCM	ATK300HK	
TA450DU310	4 — 500MCM	ATK300/2HK	

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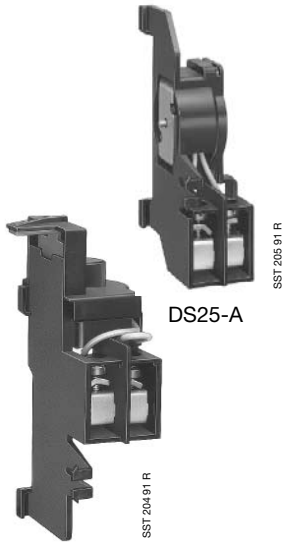


Remote tripping control

The coil serves to remotely trip the thermal overload relays TA25DU, TA450DU/SU.
The coil is not approved for continuous operation. Pulse duration 0.2 ... 0.35s.

For relay/description		Catalog number	List price
Operating-voltage Uc at 50/60 Hz	- 24V	DS25-A-24	
	- 48V	DS25-A-48	
	- 110V	DS25-A-110	
	- 220/380V	DS25-A-220/380	
	- 500V	DS25-A-500	

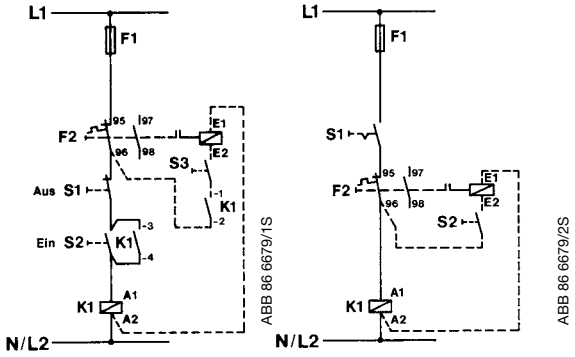
Remote reset coil

The coil serves to reset the thermal overload relays TA25DU, TA450DU/SU.
The overload relay must be set to “manual reset” for this purpose.
The coil is not approved for continuous operation. Pulse duration 0.2 ... 0.35s.

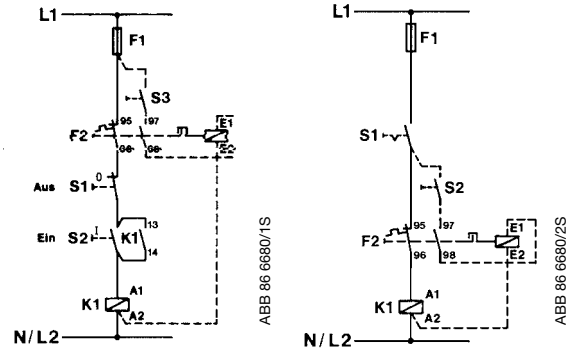
For relay/description		Catalog number	List price
Operating-voltage Uc at 50/60 Hz	- 24V	DR25-A-24	
	- 48V	DR25-A-48	
	- 110V	DR25-A-110	
	- 220/380V	DR25-A-220/380	
	- 500V	DR25-A-500	

Circuit diagrams

TA25DU with DS25-A



TA25DU with DR25-A



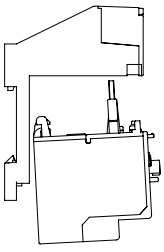
Electronic overload relays class 10, 20, 30
Ordering details

E16DU

E45DU

E80DU

E140DU



DB16E

For contactors	Setting range A	Catalog number	List price
Trip class 10			
A*9...A*16	0.1 ... 0.32A	E16DU0.32-10	
	0.3 ... 1.0A	E16DU1.0-10	
	0.9 ... 2.7A	E16DU2.7-10	
	2.0 ... 6.3A	E16DU6.3-10	
	5.7 ... 18.9A	E16DU18.9-10	
Trip class 20			
A*9...A*16	0.1 ... 0.32A	E16DU0.32-20	
	0.3 ... 1.0A	E16DU1.0-20	
	0.9 ... 2.7A	E16DU2.7-20	
	2.0 ... 6.3A	E16DU6.3-20	
	5.7 ... 18.9A	E16DU18.9-20	
Trip class 30			
A*9...A*16	0.1 ... 0.32A	E16DU0.32-30	
	0.3 ... 1.0A	E16DU1.0-30	
	0.9 ... 2.7A	E16DU2.7-30	
	2.0 ... 6.3A	E16DU6.3-30	
	5.7 ... 18.9A	E16DU18.9-30	
Trip class 10, 20, 30 selectable			
A*26 ... A*40	9 ... 30A	E45DU30	
A*26 ... A*40	15 ... 45A	E45DU45	
A*50 ... A*75	27 ... 80A	E80DU80	
A*95 ... A*110	50 ... 140A	E140DU140	

Accessories

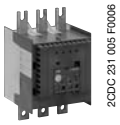
For electronic overload	Mounting	Catalog number	List price
E16DU	For separate mounting	DB16E	
E45DU		DB45E	
E80DU		DB80E	
E140DU		DB140E	

Lug kits

For electronic overload	Wire range	Catalog number	List price
E200DU200	6 - 250 MCM	ATK185	
E320DU320	4 - 400 MCM	ATK300	
E320DU320	4 - 500 MCM	ATK300/2	
E600DU600	2/0 - 500 MCM	ATK580/2HK	
E800DU800	2/0 - 500 MCM	ATK760/3HK	
E1250DU1250	1/0 - 750 MCM	ATK1350/4HK	

5

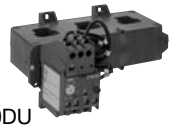
Electronic overload relays class 10, 20, 30
Ordering details


2CDC 231 005 F0006

E200DU


2CDC 231 006 F0006

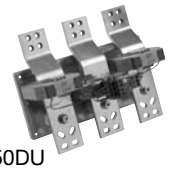
E320DU


2CDC 231 007 F0006

E500DU


2CDC 231 008 F0006

E800DU


1SFC 101 025 F0201

E1250DU


2CDC 235 011 F0006

Contactor A300 with E320


2CDC 341 081 F0006

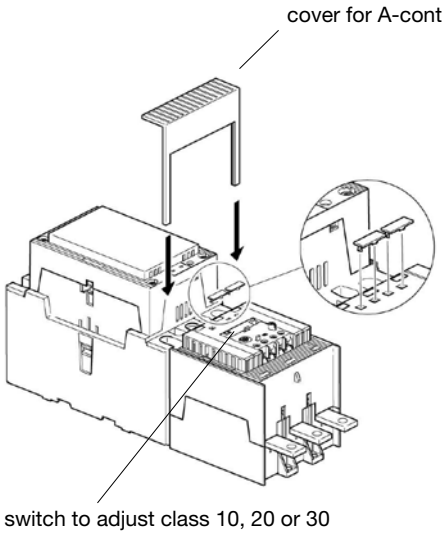
UMC22-FBP


2CDC 341 082 F0006

ACS100-PAN

For contactors	Setting range A	Catalog number	List price
Trip class 10, 20, 30 selectable			
A*145 ... A*185	60 ... 200A	E200DU	
A*210 ... A*300	100 ... 320A	E320DU	
AF400 ... AF460	150 ... 500A	E500DU	
AF580 ... AF750	250 ... 800A	E800DU	
AF1350 ... AF1630	375 ... 1250A	E1250DU	

Description	Catalog number	List price
Accessories		
Busbar Kit for AF 400, 460 YD, revers.	DT500/AF460L	
Busbar Kit for AF 400, 460 DOL	DT500/AF460S	
Busbar Kit for AF 580, 750 YD, revers.	DT800/AF750L	
Busbar Kit for AF 580, 750 DOL	DT800/AF750S	
Terminal Shrouds for E200DU	LT200E	
Terminal Shrouds for E320DU	LT320E	
Terminal Shrouds for E500DU	LT500E	
Terminal Shrouds for E800DU	LT800E	



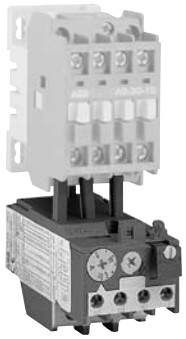
Type description	Setting range	Catalog number	List price
Universal Motor Controller UMC22-FBP, 0.2...63A			
UMC22-FBP	0.2 ... 63	1SAJ510000R0400	

Integrated motor control functions — direct, reverse-start, star-delta starting, servo-drive functions
6 digital inputs, 3 relay outputs
Diagnostic functions — overload, phase failure, trip — trip categories 10, 20, 30
Integrated storage of parameters and motor data

Operating Panel for diagnostic and parameterizing		
ACS100-PAN	1SAJ510001R0001	

Thermal overload relays T...

Description



Application

Thermal overload relays are economic electromechanical protection devices against current overload, phase failure and phase loss. They are used mainly for motors, also in combination with pumps. Starter combinations are formed with contactors.
For a better protection with higher accuracy and stable tripping curves as well as stable temperature behaviour ABB offers a complete range of “Electronic Overload Relays“

Product range

Standard relays

Types: T7DU, TA25DU, TA42DU, TA75DU, TA80DU, TA110DU, TA200DU, TA450DU/SU

- Relays **T7DU** to **TA200DU** are connected directly into the motor circuit and the motor current flows through them.
- Relay **TA450DU** is powered via converters with a linear characteristic.
- Relay **TA450SU** is powered via converters with saturation characteristic and therefore have longer tripping times.

Design and function

General

The relays and the accessories comply with the major international (IEC), European (EN) and national standards (DIN-VDE, NFC-UTE, BS, etc...) and meet the approval and licensing regulations necessary worldwide.

The thermal overload relays are three-pole relays
They have bimetallic releases (1 per phase) through which the motor current flows and are indirectly heated. The bimetallic releases bend subject to the influence of heating and this results in tripping of the relay. The auxiliary contacts change their switch position.

The relays feature a setting scale in Amperes. In compliance with international and national standards, the setting current is the rated motor current and not the tripping current (no tripping at 1.05 x I setting current, tripping at 1.2 x I setting current).

The relays are constructed so that they protect themselves in the event of overload until the series-connected short-circuit protection trips, as shown in the tables.

Technical data

All relays feature:

- **Trip-free mechanism:**
  Tripping in the event of a fault is not prevented even if the Reset button is pressed.

- **Temperature compensation:**
  TA-Relays are temperature compensated between -25 … +55 °C
  Electronic overload relays offer a compensation between -25 … +70 °C ambient temperature

- **Phase failure protection in accordance with IEC 947-4-1:**
  This device shortens the tripping times in the event of phase failure and thus improves the motor protection within the limits of the setting range.

- **Tripping category:**
  Class 10 - Standard TA-Relays T7, TA25… TA450, current range: 0.1 … 310 A
  - Electronic Overload Relays E16… E1250DU, current range: 0.1 … 1250 A

  Class 20 - Standard TA-Relays, TA25… TA80, current range: 0.1 … 80 A
  - Electronic Overload Relays E16… E1250DU, current range: 0.1 … 1250 A

  Class 30 - Standard TA-Relays, current range: 40 … 310 A
  - Electronic Overload Relays, current range: 0.1 … 1250 A

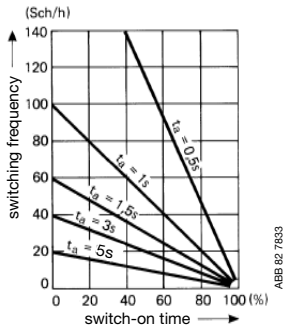
Auxiliary contacts

The relays feature two integrated auxiliary contacts

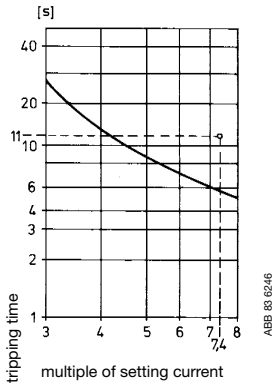
- one NC contact, marked by 95 - 96
- one NO contact, marked by 97 - 98

The two contacts are electrically isolated and are thus suitable for use in two different circuits (control circuit and signalling circuit).

Intermittent periodic duty



Switching frequency depending on duty ratio ED in %,
ta: Motor starting time



Tripping curve of overload relay T .. starting from cold state

- **Switching frequency**
  Thermal overload relays T cannot be operated at any arbitrary switching frequency in order to avid tripping. Applications involving up to 15 operations per hour are acceptable. Higher switching frequencies are permitted if the duty ratio and the motor starting time are allowed for and if the motor's making current does not appreciably exceed 6 times the rated operating current. Please refer to the adjacent diagram for guideline values for the permitted switching frequency.

  Example: Starting time of the motor: 1 second
  Duty ratio: 40 %
  means a permitted switching frequency of max. 60 operations per hour

  Use of the CUSTORAPID® motor protection is recommended for higher switching frequencies and alternating loading, e.g. for frequent starting and braking. Use of a combination of thermal overload relays and CUSTORAPID® is recommended in the case of locked rotors on motors with thermally critical rotors.

- **Protection with heavy starting**
  Relays **TA450SU** can be used for particularly severe starting conditions. The setting ranges specified on Pages 41 and 42 apply to non-recurrent looping through of the cables. The relay may also be used for lower motor rated currents. This is achieved by looping the cables through several times. The setting range specified on the rating plate is inversely proportional to the number of cables looped through. For instance: TA450DU/SU with a setting range of 130 ... 185 A is also suitable for currents of 65 ... 92.5 A if the cables are looped through twice; the figures are 43.3 ... 61.6 A for looping the cables through three times.

- **Special version for EEx e motors**
  Relays T7DU, TA25DU ... TA450DU/SU are suitable for protection of EEx e motors. They have been tested and approved by the **"German National Standards Laboratory" (PTB)** in Braunschweig, Germany.

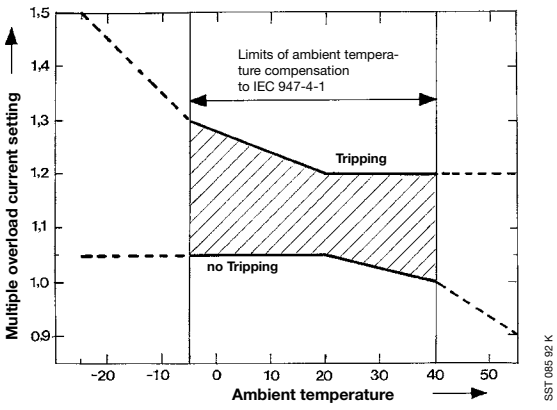
  When selecting the overload relay, check suitability on the basis of the tripping curves. The values for the ratio of pick-up current I_a to rated current I_n and the shortest t_E time are crucial, and these must be specified on the PTB Approval Certificate and on the motor's rating plate. The relay must trip within the t_E time, i.e. the tripping curve, starting from cold state, must run below the coordinate point I_a/I_n and the tE time.

- **Example for suitability of an overload relay T/TA:**
  The motor with increased safety has the following data:
  Output = 7.5 kW, Ia/In = 7.4 tE time = 11 seconds.
  In accordance with the adjacent tripping curve, the tripping time lies below the tE time of the motor.
  The special relay version for EEx e motors differs from the normal version as follows:

- **Special test of the tripping times at the works**

- **Special order code**
  Tripping curves for the individual setting ranges and the PTB Approvals Certificates may be ordered.

Limit values for tripping at ambient temperatures other than 20 °C



- **Ambient temperature compensation :**
  The overload relays are protected against influences of ambient temperature by a bimetallic compensation element which detects the ambient temperature.

  This design means that tripping occurs between -5 °C and +40 °C within the ranges defined by IEC 947-4-1. See the adjacent curve for the extended range of -25 °C resp. +55 °C.

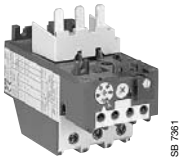
- **Example :**
  Tripping at -25 °C. Tripping occurs at ≤1.5 times the setting current.

- **Reset :**
  Types E16DU, T7DU, TA25DU ... TA450DU/SU feature a convertible Manual/ Automatic reset.

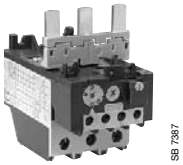
- **Condition as delivered :**
  Manual reset.

Thermal overload relays
T7DU, TA25DU ... T200DU, TA450DU
Tripping curves

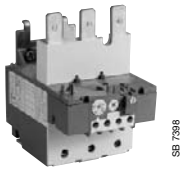
TA25DU



TA42DU



TA75DU



TA110DU

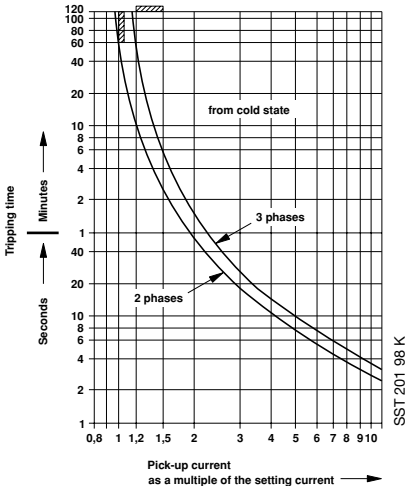
Thermal overload relays **T ... DU** are three-pole relays which can be converted from manual to automatic reset. The Reset button can also be used for disconnection.

The built-in auxiliary contacts are electrically isolated and are therefore suitable for two different circuits (control circuit and signalling circuit).

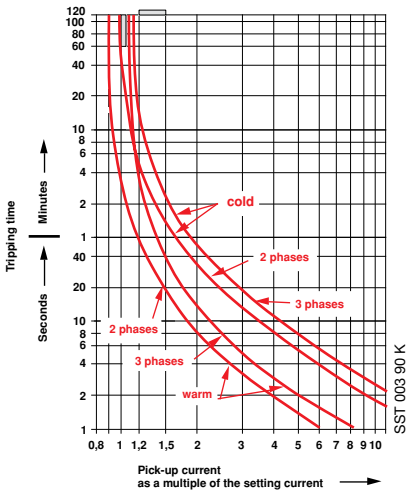
All relays feature a facility for temperature compensation and phase failure protection.
The overload relays up to size TA110DU are safe from finger-touch and safe from touch by the back of the hand.

Tripping curves of the thermal overload relays (group curves)

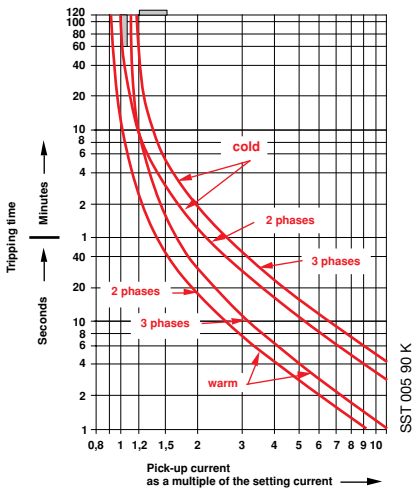
T7DU



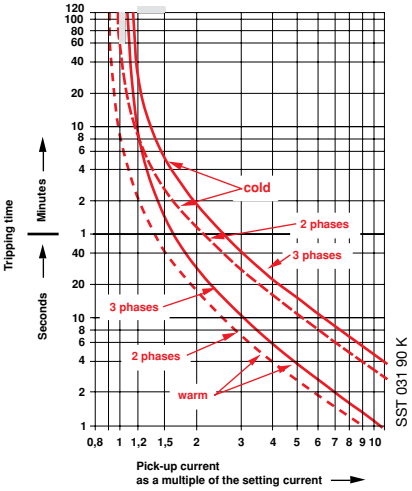
TA25DU



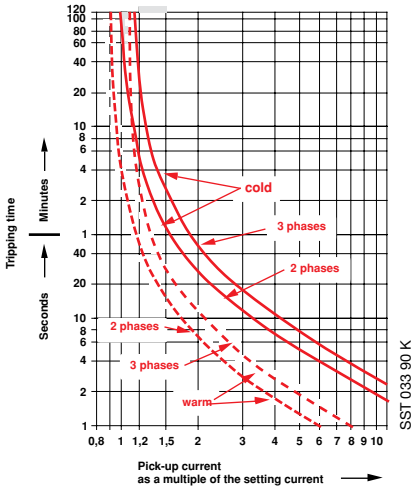
TA42DU / TA75DU / TA80DU



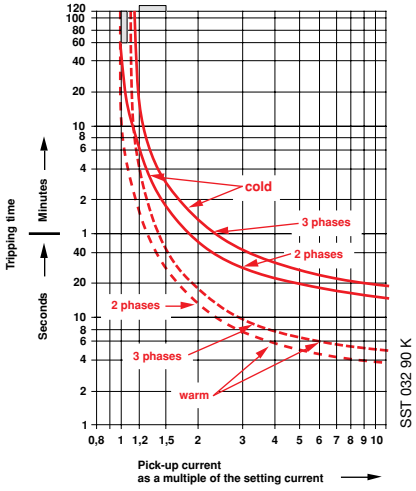
TA200DU



TA450DU

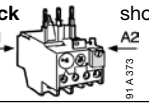


TA450SU



5

General technical data

Type		T7DU	TA25DU	TA42DU	TA75DU
Standards: (major international European and national standards)		IEC 947–4–1, VDE 0660, NFC 63 650, BS 4941, EN 60947–4–1 CSA22.2 No. 14, UL508			
Approvals, certificates		see page **5**/15			
Rated insulation voltage Ui to IEC 158–1, IEC 947–4–1	**V**	690	660/690		
Impulse withstand voltage Uimp to IEC 947–4–1	**kV**	6	6		
Permissible ambient temperature					
– Storage temperature	**°C**	– 40 to +70			
– for operation (compensated)	**°C**	– 25 to +55			
Climatic resistance to DIN 50017		Resistant to changeable climate KFW, 30 cycles			
Mounting position		any, but please avoid vertical mounting position wherever possible			
Resistance to shock at rated current I_e • critical shock direction A1, A2 	shock duration **ms**	10	15		
	multiple of g	10	12		
Resistance to vibration: (±1 mm, 50 Hz)	multiple of g	4	8		
Mounting – onto contactor – with AB.. mounting kit		hooking beneath the contactor, screwing on its main terminals by screws: 2 x M4 or ⊓ 35 mm EN 50022			
Connection terminals and attachment type			TA25DU setting ranges: 0.1…0.16 A24…32 A to 18…25 A		
Main conductors (motor side)					
• Screw terminals					
– Screw terminal		M3.5	M4	–	M6
– with terminal block		–	–	M5	–
– with busbars or cable lugs		–	–	–	–
• Connection cross-sections					
– single-core or stranded	**AWG**	2 x 18... 14	2 x 16... 10	2 x 16... 10	1 x 14 ... 4 or 2 x 14 ... 6
– flexible with wire end ferrule	**AWG**	2 x 18... 14	2 x 16... 10	2 x 16... 10	1 x 14 ... 4 or 2 x 14 ... 8
– busbars	**AWG**	–	–	–	–
Connections and auxiliary connectors					
• Screw terminal (screw size)					
– with self-disengaging clamping piece		M 3.5			
• Connection cross-section					
– single-core or stranded	**AWG**	2 x 18... 14	2 x 18... 14		
– flexible with wire end ferrule	**AWG**	2 x 18... 14	2 x 18... 14		
Enclosure to IEC 144, IEC 529		All terminals are safe from finger-touch and safe from touch by the back of the hand to VDE 0106, Part 100 (no extra terminal shrouds are required up to and including TA110DU)			

Technical data of the conducting paths

Type	T7DU	TA25DU	TA42DU	TA75DU	TA80DU	TA110DU	TA200DU	TA450DU	TA450SU
Number of paths	3								
Setting ranges	see ordering details								
Tripping class to IEC 947–4–1 / VDE 0660, Part 1021	10-20					10			30
Frequency range **Hz**	0 … 400							50/60	
Switching frequency without early tripping	up to 15 ops./h or 60 ops./h with 40 % if the breaking current does not exceed 6 x In and the starting time does not exceed 1 s								

General technical data (cont.)

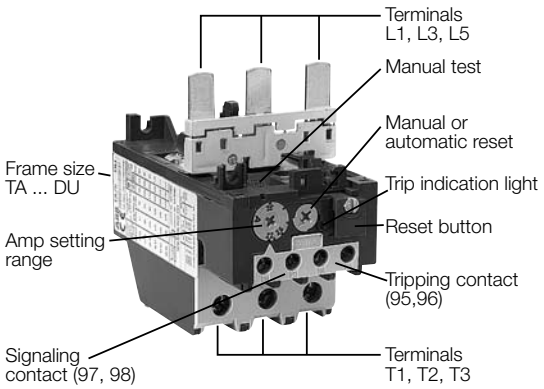
	TA80DU	TA110DU	TA200DU	TA450DU/SU
	IEC 947–4–1, VDE 0660, NFC 63 650, BS 4941, EN 60947-4-1 CSA22.2 No.14, UL508			
	see page **5**/15			
V	660/690			1000
kV	6			8
°C **°C**	- 40 to +70 - 25 to +55			
	Resistant to changeable climate KFW; 30 cycles			
	any, but please avoid vertical mounting position wherever possible			
ms	15			
x g	12			
x g	8			
	M6 –	4 screws M5		
	M6 – –	HC, M8 – –	– – M10	– – M10
AWG **AWG** **AWG**	1 x 14 ... 4 or 2 x 14 ... 6 1 x 14 ... 4 or 2 x 14 ... 8 –	6 … 2 6 … 2 –	4 … 250 MCM 4 … 310 20 x 4	2 x 500 MCM 2 x 500 MCM 25 x 5
	M 3.5			
AWG **AWG**	2 x 18 … 12 2 x 18 … 12			
	All terminals are safe from finger-touch and safe from touch by the back of the hand to VDE 0106, part 100.		All terminals are safe from finger-touch and safe from touch by the back of the hand to VDE 0106, part 100, only with additional terminal shrouds.	

TA25DU

Load rating of auxiliary contacts

Type		T7DU		TA25DU ...TA450DU/SU	
Auxiliary switch		NC 95 - 96	NO 97-98	NC 95 - 96	NO 97 - 98
Rated operating voltage U_e	V	500	500	500	
Rated thermal current I_{th}	A	6	6	10	6
Rated operating current Ie					
at AC 15 to 240 V	A	1.5	1.5	3	1.5
at AC 15 to 440 V	A	0.7	0.5	1.9	0.95
at AC 15 to 500 V	A	0.5	0.3	1	0.75
at DC 13 to 24 V	A	-	-	1.25	0.42
to 60 V	A	-	-	0.50	0.17
to 120 V	A	-	-	0.25	0.08
to 250 V	A	0.2	0.02	0.12	0.04
Maximum potential difference	AC V	500		500	
between the NO and NC contacts	DC V	440		440	
Short-circuit protection	gL/gG A	4	4	10	6
STOTZ circuit-breaker type:					
S271	A	K1	K1	K3	K1
S281	A	K1	K1	K3	K1

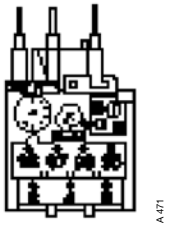
Function of the thermal overload relays



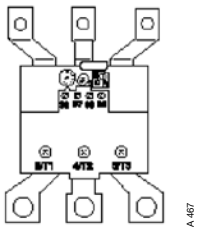
Press blue button	Contacts	Relay tripped		Relay not tripped	
		Manual	Automatic	Manual	Automatic
	NC 95-96	open	open	closed	closed
	NO 97-98	closed	closed	open	open
Button R		Reset	–	–	–
	NC 95-96	closes when Button's pressed	–	–	–
	NO 97-98	opens when Button's pressed	–	–	–
Button R/O		Reset	–	–	–
	NC 95-96	closes when Button's released	–	opens when Button's pressed closes when Button's released	opens when Button's pressed closes when Button's released
	NO 97-98	opens when Button's pressed	–	–	–

Position of the connection terminals

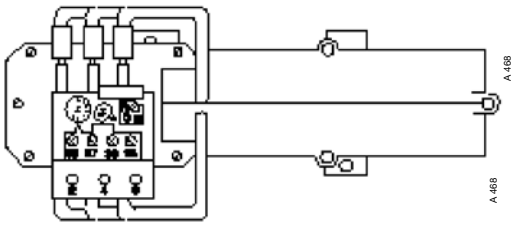
TA25DU, TA42DU, TA75DU, TA80DU



TA200DU



TA450DU/SU



Cross-sections of cables for test

in accordance with VDE 0660, Part 100 (IEC 947-1) German version EN 60 947-1

Table 1). Copper test conductor for test currents up to 400 A.

Test current range[1] (A)		Conductor cross-section[2), 3), 4)] (mm²)	AWG / MCM
0	8	1,0	18
8	12	1,5	16
12	15	2,5	14
15	20	2,5	12
20	25	4,0	10
25	32	6,0	10
32	50	10	8
50	65	16	6
65	85	25	4
85	100	35	3
100	115	35	2
115	130	50	1
130	150	50	0
150	175	70	00
175	200	95	000
200	225	95	0000
225	250	120	250
250	275	150	300
275	300	185	350
300	350	185	400
350	400	240	500

Table 2). Copper test conductor for test currents over 400 A to 800 A.

Test current range[1] (A)		Conductor cross-section[2), 3), 4)] metric Number	metric Cross-section (mm²)	MCM Number	MCM Cross-section (mm²)
400	500	2	150	2	250
500	630	2	185	2	350
630	800	2	240	3	300

Table 3). Copper test buses for test currents over 400 A to 3150 A.

Test current range[1] (A)		Copper buses[2), 3), 4), 5), 6)] Number	Cross-section (mm²)	Dimensions (inches)
400	500	2	30 x 5	1 x 0,250
500	630	2	40 x 5	1,25 x 0,250
630	800	2	50 x 5	1,5 x 0,250
800	1000	2	60 x 5	2 x 0,250
1000	1250	2	80 x 5	2,5 x 0,250
1250	1600	2	100 x 5	3 x 0,250
1600	2000	3	100 x 5	3 x 0,250
2000	2500	4	100 x 5	3 x 0,250
2500	3150	3	100 x 10	6 x 0,250

Footnotes to Tables 1, 2 and 3:

1) The test current must be higher than the first value in the first column and must be lower than or the same as the second value in this column.

2) To simplify the testing procedure and with the consent of the manufacturer, conductors with a smaller cross-section than the one determined for the test current may be used.

3) The table shows cross-sections of conductors alternatively in the metric system and in the AWG/MCM system and buses in mm and inches. A comparison of the AWG/MCM system and metric cross-sections is given in Table 1.

4) Optionally, either one of the two conductors given for the test current range may be used.

5) It is assumed that buses with the larger surface area are arranged vertically. Buses may be arranged horizontally if so directed by the manufacturer.

6) If 4 buses are used, they must be arranged in two pairs with a mean clearance of at most 100 mm.

5

General technical data

Approvals and certificates

Explanation of symbols:

■ Normal version approved:
Rating plates bear the test mark if mandatory.
● Special design approved

□ Submitted for approval, delivery time on request
○ No approval required except in special cases
△ Submission for approval intended
▲ Approved with restrictions

Unit type	Approvals				Ships' classification societies						
Test mark	CSA	UL	UL	Phys.-Technische Bundes-anstalt	BV	GL	LRS	DNV	PRS	RINa	MRS
Abbreviation valid for	Canada	USA	USA	PTB Germany	France	Germany	Great Britain	Norway	Poland	Italy	Russia
Thermal overload relays											
T7DU	■		■	■	■	□	□				
TA25DU	■		■	■	■	■	■	■	△	■	△
TA42DU	■		■	■	■	■	■	■	△	■	△
TA75DU	■		■	■	■	■	■	■	△	■	△
TA80DU	■		■	■	□	■	□	□	△	△	△
TA110DU	■		■	■	□	■	□	□	△	△	△
TA200DU	■		■	■	■	■	■	■	■	■	■
TA450DU/SU	■		■	■	■	■	■	■ (2)	■	■	■

(2) except Types SU.

Electronic overload relay E16/E45/E80/E140DU
Technical data

General technical data

Type		E16DU	E45DU30	E45DU45	E80DU80	E140DU140
Standards:		IEC/EN 60 947-4-1 / IEC/EN 60 947-5-1				
Approvals and certificates		UL, CSA CSA22.2 No.14 / UL508				
Rated insulation voltage U_i	**V**	690			1000	
Rated operating voltage U_e	**V**	690			1000	
Impulse withstand voltage U_{imp}	**kV**	6				
Permissible ambient temperature						
– Storage	**°C**	– 25 to + 70				
– Operation	**°C**	– 25 to + 70				
Climatic resistance according to		on request				
Mounting position						
Resistance to shock Shock duration ms multiple of g		on request [1]				
Resistance to vibrations to EN 61373		on requst				
Mounting – by screws:		Separate mounting with Kit for single set up by screws 4xM5				
– onto contactor:		or direct mounting onto condactor - no kit neccessary				
Connection terminals and attachment type						
Main contuctors (load side)						
• Screw terminal						
– with self-disengaging clamping piece		M5/2.3 ... 2.6 Nm			M8/6 ... 6,5 Nm	
• Connection cross-sections		1 x 14 ... 6			1 x 8 ... 3/0	
– single-core or stranded	**AWG**	2 x 14 ... 6			2 x 10 ... 2	
– flexible with wire end ferrule	**AWG**	1 x 14 ... 8 2 x 14 ... 8			1x8 ... 2/0 2x10 ... 2	
Connection to aux.-contacts terminals						
• Screw terminal		M3.5/0.8 ... 1.0 Nm				
– with self-disengaging clamping piece						
• Connection cross-sections		1 x 18 ... 14				
– single-core or stranded	**AWG**	2 x 18 ... 14				
– flexible with wire end ferrule	**AWG**	1 x 18 ... 10 2 x 18 ... 10				
Protection degree to IEC/EN 60 947-1		IP 20			IP 10	
		All terminals are safe from finger-touch and safe from touch by the back of the hand to EN 50274				

Technical data of the conducting paths

Type		E16DU	E45DU30	E45DU45	E80DU80	E140DU140
Number of conducting paths		3				
Setting ranges	**A ... A**	0.1 ... 18.9	9 ... 30	15 ... 45	27 ... 80	50 ... 140
Tripping classes to IEC/EN 60 947-4-1		10 or selectabe 10, 20, 30				
Frequency range	Hz	50 and 60 (only for a.c.operating 3 phase)				
Switching frequency without early tripping		80 ops./h with 40% if the making current does not exceed 6 x in and starting time does not exceed 1s.				

Load rating of auxiliary contacts

Contact		NC (95-96)	NO (97-98)
Rated operating voltage U_e	**V**	600	600
Rated thermal continuous current	**A**	6	6
Rated operating current I_e at AC-15 230 V	**A**	3	3
at AC-15 400 V	**A**	1.1	1.1
at AC-15 500 V	**A**	0.7	0.7
at DC-13 24 V	**A**	1.5	1.5
at DC-13 60 V	**A**	0.5	0.5
at DC-13 110 V	**A**	0.4	0.4
at DC-13 220 V	**A**	0.2	0.2
Short-circuit protection fuse gG	**A**	6	6

General technical data

Type			E200DU	E320DU	E500DU	E800DU	E1250DU
Standards:			IEC/EN 60 947-4-1 / IEC/EN 60 947-5-1				
Approvals and certificates			UL, CSA				
Rated insulation voltage U_i		**V**	690				
Rated operating voltage U_e		**V**	690				
Impulse withstand voltage U_{imp}		**kV**	6				
Permissible ambient temperature							
– Storage		**°C**	– 25 to + 70				
– Operation		**°C**	– 25 to + 70				
Climatic resistance according to			IEC 68-2-1, IEC 68-2-2 IEC 68-2-14, IEC 68-2-30		IEC 68-2-1, IEC 68-2-2, IEC 68-2-30		
Mounting position			any				
Resistance to shock	Shock duration ms		30				
	multiple of g		5				
Resistance to vibrations to EN 61373			category 1 class B				
Mounting	– by screws:		by screws 4 x M5	by screws 4 x M5	by screws 4 x M5 with DT ... mounting kit	by screws 4 x M6 with DT ... mounting kit	by screws 4 x M6 with DT ... mounting kit
	– onto contactor:		direct mounting				
Connection terminals and attachment type Main contuctors (load side)							
• Screw terminals			M8	M10	M10 (rail order separately)	M12 (rail order separately)	M12
– with busbar or cable lugs							
Connection terminals and attachment type Auxiliary contacts							
• Screw terminal							
– with self-disengaging clamping piece			M3.5				
– tigtening torque		**Nm**	1				
• Connection cross-sections							
– single-core or stranded		**AWG**					
– flexible with wire end ferrule		**AWG**	2 x 18 ... 10 2 x 18 ... 14				
Protection degree to IEC/EN 60 947-1			All terminals are safe from finger-touch and safe from touch by the back of the hand to EN 50274				IP 00

Technical data of the conducting paths

Type		E200DU	E320DU	E500DU	E800DU	E1250DU
Number of conducting paths		3				
Setting ranges	**A ... A**	60 ... 200	100 ... 320	150 ... 500	250 ... 800	375 ... 1250
Tripping classes to IEC/EN 60 947-4-1		10, 20, 30 selectable				
Frequency range	Hz	50 and 60 (only for a.c.operating 3 phase)				
Switching frequency without early tripping		80 ops./h with 40% if the making current does not exceed 6 x in and starting time does not exceed 1s.				

Load rating of auxiliary contacts

Type			E200DU, E320DU, E500DU, E800DU, E1250DU	
Contact			NC (95-96)	NO (97-98)
Rated operating voltage U_e		**V**	600	600
Rated thermal continuous current		**A**	6	6
Rated operating current I_e	at AC-15 230 V	**A**	3	3
	at AC-15 400 V	**A**	1.1	1.1
	at AC-15 500 V	**A**	0.7	0.7
	at DC-13 24 V	**A**	1.5	1.5
	at DC-13 60 V	**A**	0.5	0.5
	at DC-13 110 V	**A**	0.4	0.4
	at DC-13 220 V	**A**	0.2	0.2
Short-circuit protection fuse	gG	**A**	6	6

UMC22-FBP
Technical data

General technical data

Type		UMC22-FBP
Rated operating voltage Ue (three-phase system) **V AC/Hz**		max. 690/50
Rated operating current range **A**		0.24 ... 63
Trip classes		5, 10, 20, 30
Short-circuit-protection		separate fuses on power line side
Supply voltage **V DC**		19.2 ... 31.2, including ripple
Supply current **mA**		max. 130 (at 18 ... 30 V DC)
Total device power dissipation	W	max. 3.1 (at 24 V DC)
LEDs on front		LED 1, green: device ready for operation LED 2, yellow: motor current > 33 % of Is LED 3, red: fault (trip, device fault, etc.)
Mechanical relay contact lifetime		500 000 switching cycles
Electrical lifetime	250 VAC / 0.5 A	100 000 switching cycles
	250 VAC / 1.5 A	50 000 switching cycles
Terminal conductor cross section	mm^2	max. 2.5, max. 2 x 1.5
Current transformer bushing holes		11 mm Ø (25 mm“)
Internal clearance and creepage distances	mm	> 5.5 (safety insulation up to 250 V AC)
Mounting		on DIN rail (EN 50022-35) or wall mounting with 4 screws M4
Dimensions (W x H x D)	mm	70 x 105 x 110 (incl. FieldBusPlug and Control Panel)
Net weight	kg	0.39 (current transf. + control unit)
Degree of protection		IP 20
Storage temperature range	°C	-25...+70
Operating temperature range	°C	0...+55
FieldBusPlug connection		see FBP catalogue

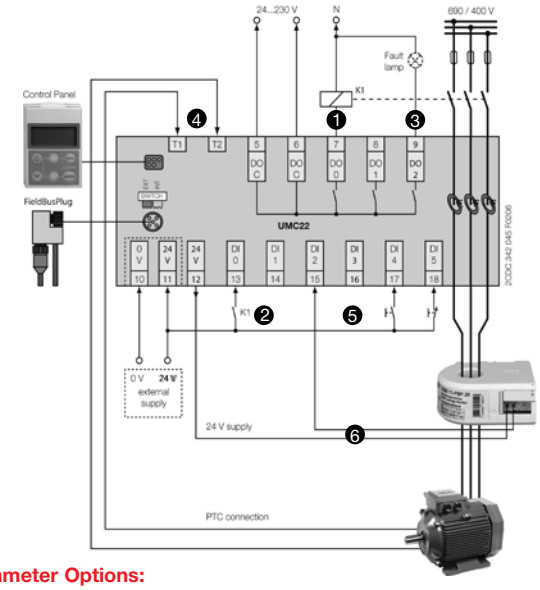
Digital inputs

Number of digital inputs	6 (DI0 ... DI5)
Power supply for digital inputs	18 … 30V, 70 mA
1-Signal (range including ripple)	+13 V ... +31.2 V
0-Signal (range including ripple)	-31.2 V ... +13 V
Input current per channel	(24 V DC) typ. 6.0 mA
Input resistor to 0 V	3.9 kOhm
Line length unshielded	max. 600 m
Line length shielded	max. 1000 m

Digital outputs

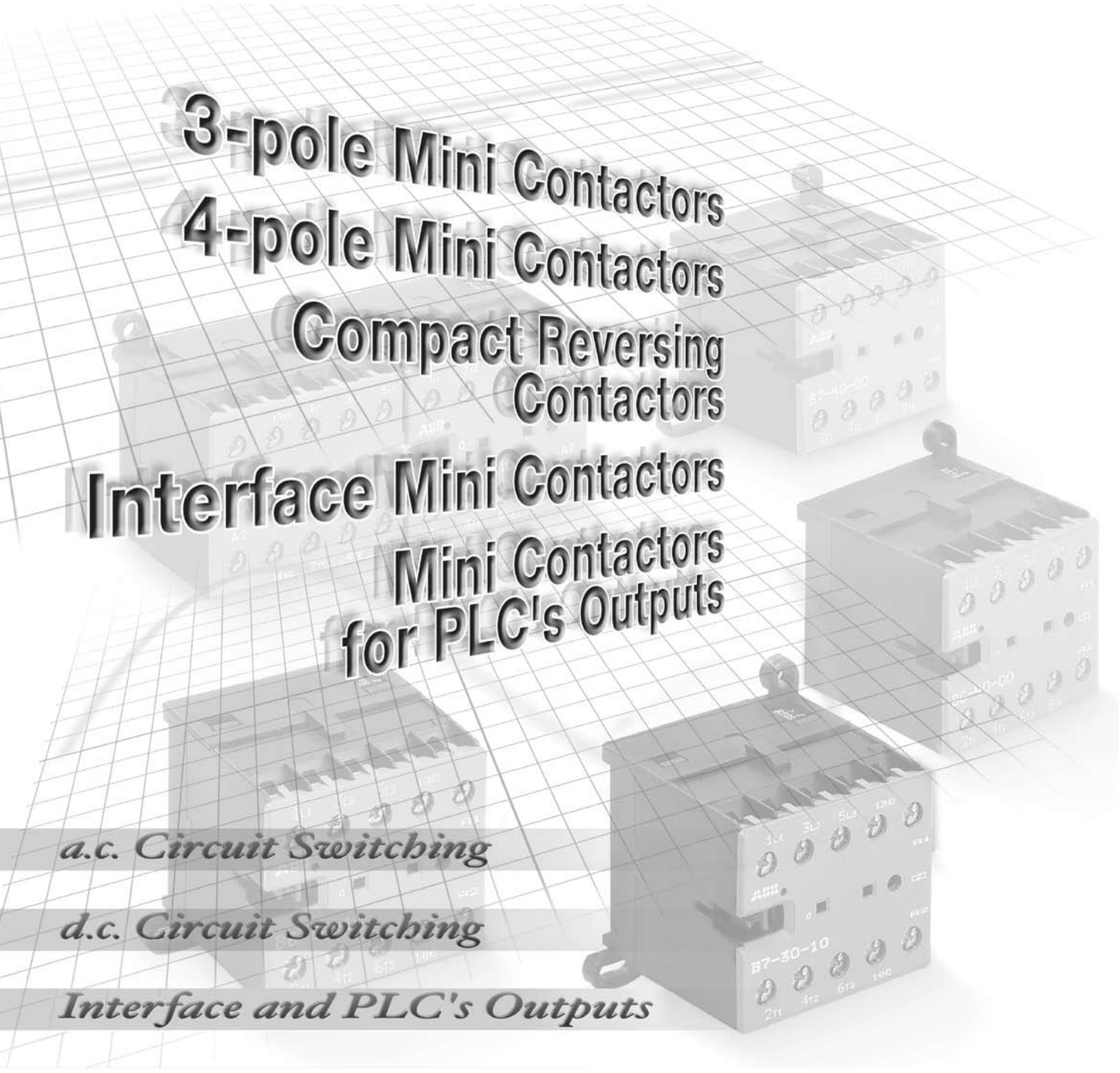
Number of digital relay outputs	3 (DO0...DO2)
Grouping of contacts	3 contacts with 1 common
Switching capacity per relay contact	
AC15:	120 VAC, max. 3 A 240 VAC, max. 1.5 A
DC13:	24 VDC, max. 0.1 A 125 VDC, max. 0.22 A 250 VDC, max. 0.11 A
max. load for all contacts	4 A (terminal 5 or 6)
min load for switching signals	12 V, 1 W or 1 VA
PTC Input - direct connection of PTC sensors from the motor	

Conductor holes through the current transformers max. 25 mm^2
(max. diameter incl. insulation 11 mm)



Parameter Options:
1 = Control function
2 = Check back via aux.-contact
3 = Fault output, e.g. to lamp
4 = PTC Input
5 = Digital inputs for control signals
6 = Connections for earth fault monitor

Notes


3-pole Mini Contactors
4-pole Mini Contactors
Compact Reversing Contactors
Interface Mini Contactors
Mini Contactors for PLC's Outputs
a.c. Circuit Switching
d.c. Circuit Switching
Interface and PLC's Outputs

Mini contactors B 7
Mini control relays K..
Compact reversing contactors VB..

Contents

6

Coil Voltages for Mini Contactors

B 7, VB 7(A), BC 7, VBC 7(A), K 6, KC 6.

AC		**DC**	
40-450 Hz V (1)	Code number ☐ ☐	DC V	Code number ☐ ☐
24	0 1	12	0 7
42	0 2	24	0 1
48	0 3	42	0 2
110 ... 127	8 4	48	1 6
220 ... 240	8 0	60	0 3
380 ... 415	8 5	110 ... 125	0 4
		220 ... 240	0 5

(1) Coil voltage range: 0.85 ... 1.1 x U_c

Mini contactors B 7, BC 7

Ordering details

B 7-30-10

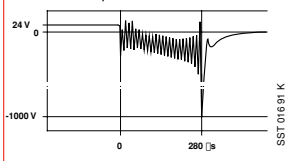
B 6-30-10-F

B 6-30-10-P

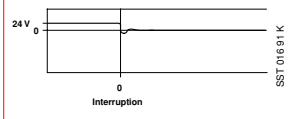
BC 7-30-10- 1.4

Oscillograms of control circuit interruption

Without protective circuit



With integrated protective circuit



- Controlled directly by PLC
- Integrated protective circuit with diodes and additional surge suppressor
- Non-confusible coil connection
- You save time and money for additional external wiring
- Thermal overload relay T7 DU available as accessory

CSA/UL Ratings									Order code	List Price
General Purpose Current	Maximum motor horsepower ratings						Auxiliary contacts			
	1 phase		3 phase							
AC-1	120V	240V	208V	240V	480V	600V			state coil voltage code ☐☐ (see page 6/1)	

Mini contactors B 7, BC 7

Mini contactors, with screw connection, for AC operation, 3.5 VA

12	0.75	1.5	2	3	5	5	1	-	B7-30-10-☐☐
							-	1	B7-30-01-☐☐
							-	-	B7-40-00-☐☐

Mini contactors, with flat pin connection, for AC operation, 3.5 VA

12	0.75	1.5	2	3	5	5	1	-	B7-30-10-F-☐☐
							-	1	B7-30-01-F-☐☐
							-	-	B7-40-00-F-☐☐

Mini contactors, with soldering pins, for AC operation, 3.5 VA, I_{th} < 8 A

12	0.75	1.5	2	3	5	5	1	-	B7-30-10-P-☐☐
							-	1	B7-30-01-P-☐☐

Mini contactors, with screw connection, for DC operation, 3.5 W

12	0.75	1.5	2	3	5	5	1	-	BC7-30-10-☐☐
							-	1	BC7-30-01-☐☐

Mini contactors, with flat pin connection, for DC operation, 3.5 W

12	0.75	1.5	2	3	5	5	1	-	BC7-30-10-F-☐☐
							-	1	BC7-30-01-F-☐☐

Mini contactors, with screw connection, for 24 V DC operation, with integr. surpressor diod, 3.5 W

12	0.75	1.5	2	3	5	5	1	-	B7D-30-10-01
							-	1	B7D-30-01-01
							-	-	B7D-40-00-01

Mini contactors, with soldering pins, for DC operation, 3.5 W, I_{th} < 8 A

12	0.75	1.5	2	3	5	5	1	-	BC7-30-10-P-☐☐
							-	1	BC7-30-01-P-☐☐

BC 7 Interface motor contactors

Auxiliary switch blocks cannot be fitted later on !

Motor contactors, with screw connection, for DC operation 24V / 1.4 W

12	0.75	1.5	2	3	5	5	1	-	BC7-30-10-1.4
							-	1	BC7-30-01-1.4

Motor contactors, with flat pin connection, for DC operation 24V / 1.4 W

12	0.75	1.5	2	3	5	5	1	-	BC7-30-10-F-1.4
							-	1	BC7-30-01-F-1.4

Motor contactors, with soldering pins, for DC operation 24V / 1.4 W, I_{th} < 8 A

12	0.75	1.5	2	3	5	5	1	-	BC7-30-10-P-1.4
							-	1	BC7-30-01-P-1.4

Motor contactors, with screw connection, for DC operation 17 ... 32 V / 2.4 W

12	0.75	1.5	2	3	5	5	1	-	BC7-30-10-2.4
							-	1	BC7-30-01-2.4

Motor contactors, with flat pin connection, for DC operation 17 ... 32 V / 2.4 W

12	0.75	1.5	2	3	5	5	1	-	BC7-30-10-F-2.4
							-	1	BC7-30-01-F-2.4

Motor contactors, with soldering pins, for DC operation 17 ... 32 V / 2.4 W, I_{th} < 8 A

12	0.75	1.5	2	3	5	5	1	-	BC7-30-10-P-2.4
							-	1	BC7-30-01-P-2.4

B 7 S Mini contactors for connection to PLCs ... with integrated protective circuit

Auxiliary switch blocks cannot be fitted later on !

Motor contactors with screw connection, for DC operation 24 V / 1.7 W

12	0.75	1.5	2	3	5	5	1	-	B7S-30-10-1.7

Motor contactors with screw connection, for DC operation 17...32 V / 2.8 W

12	0.75	1.5	2	3	5	5	1	0	B7S-30-10-2.8
12	0.75	1.5	2	3	5	5	0	1	B7S-30-01-2.8

Compact reversing contactors VB 7A

The mechanical interlock between the two contactors mechanically prevents switch-on of one contactor for as long as the other contactor is still on and vice versa. If reversing contactors are switched over too quickly, this involves the risk of a phase-to-phase short-circuit. This will be the case if the arc of the contactor switching off has not yet been quenched when the contacts of the contactor switching on are already closed.

In order to avoid these risks, both contactor coils must be de-energised **for at least 50 ms** and must also be mutually interlocked electrically.

The compact reversing contactors are offered with two different mechanical interlocks:

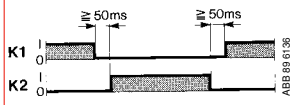
- VB 7A: interlock with mechanical safety blocking function

The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out.

Safety blocking means that the contactor to be switched on is locked mechanically in OFF condition owing to the switch-on signal issued too early, and this state is retained until the blocking function is cancelled again as follows:
disconnect the voltage from the two contactor coils and then reconnect the voltage to the coil of the contactor to be switched on.

The contactor coils are designed for continuous operation when the contactor is de-energised, i.e. the coil is not damaged if the mechanical interlock prevents switch-on of the contactor with the coil voltage applied.

VB 7-30-01



When the direction of rotation is changed, both contactor coils of VB 7A have to be de-energized for more than 50 ms.

CSA/UL Ratings

General Purpose Current	Maximum motor horsepower ratings 1 phase		3 phase				Auxiliary contacts		Order code	List Price
AC-1	120V	240V	208V	240V	480V	600V			state coil voltage code ☐☐ (see page 6/1)	

Compact reversing contactors VB 7A, VBC 7A, with mechanical interlock

Reversing contactors, with screw connection, for AC operation, 3.5 VA										
12	0.75	1.5	2	3	5	5	1	-	VB7A-30-10-☐☐	
							-	1	VB7A-30-01-☐☐	
Reversing contactors, with flat pin connection, for AC operation, 3.5 VA										
12	0.75	1.5	2	3	5	5	1	-	VB7A-30-10-F-☐☐	
							-	1	VB7A-30-01-F-☐☐	
Reversing contactors, with soldering pins, for AC operation, 3.5 VA, I_{th} < 8 A										
12	0.75	1.5	2	3	5	5	1	-	VB7A-30-10-P-☐☐	
							-	1	VB7A-30-01-P-☐☐	
Reversing contactors, with screw connection, for DC operation, 3.5 W										
12	0.75	1.5	2	3	5	5	1	-	VBC7A-30-10-☐☐	
							-	1	VBC7A-30-01-☐☐	
Reversing contactors, with flat pin connection, for DC operation, 3.5 W										
12	0.75	1.5	2	3	5	5	1	-	VBC7A-30-10F-☐☐	
							-	1	VBC7A-30-01F-☐☐	
Reversing contactors, with soldering pins, for DC operation, 3.5 W, I_{th} < 8 A										
12	0.75	1.5	2	3	5	5	1	-	VBC7A-30-10P-☐☐	
							-	1	VBC7A-30-01P-☐☐	

6

Mini control relays, interface control relays / mini control relays for connection to PLCs

Ordering details

KC 6-40 E-P

Contacts		Order Code state coil voltage code ☐☐ (see page 6/1)	List Price

Mini control relays

Control relays, with screw connection, for AC operation, 3.5 VA

4	0	K6-40E-☐☐
3	1	K6-31Z-☐☐
2	2	K6-22Z-☐☐

Control relays, with flat pin connection, for AC operation, 3.5 VA

4	0	K6-40E-F-☐☐
3	1	K6-31Z-F-☐☐
2	2	K6-22Z-F-☐☐

Control relays, with soldering pins, for AC operation, 3.5 VA

4	0	K6-40E-P-☐☐
3	1	K6-31Z-P-☐☐
2	2	K6-22Z-P-☐☐

Control relays, with screw connection, for DC operation, 3.5 W

4	0	KC6-40E-☐☐
3	1	KC6-31Z-☐☐
2	2	KC6-22Z-☐☐

Control relays, with flat pin connection, for DC operation, 3.5 W

4	0	KC6-40E-F-☐☐
3	1	KC6-31Z-F-☐☐
2	2	KC6-22Z-F-☐☐

Control relays, with soldering pins, for DC operation, 3.5 W

4	0	KC6-40E-P-☐☐
3	1	KC6-31Z-P-☐☐
2	2	KC6-22Z-P-☐☐

Interface control relays

Auxiliary switch blocks cannot be fitted later on !

Control relay, with screw connection, for DC operation, 24 V / 1.4 W

4	0	KC6-40E-1.4
3	1	KC6-31Z-1.4

Control relay, with flat pin connection, for DC operation, 24 V / 1.4 W

4	0	KC6-40E-F-1.4
3	1	KC6-31Z-F-1.4

Control relay, with soldering pins, for DC operation, 24 V / 1.4 W

4	0	KC6-40E-P-1.4
3	1	KC6-31Z-P-1.4

Control relay, with screw connection, for DC operation, 17 ... 32 V / 2.4 W

4	0	KC6-40E-2.4
3	1	KC6-31Z-2.4

Control relay, with flat pin connection, for DC operation, 17 ... 32 V / 2.4 W

4	0	KC6-40E-F-2.4
3	1	KC6-31Z-F-2.4

Control relay, with soldering pins, for DC operation, 17 ... 32 V / 2.4 W

4	0	KC6-40E-P-2.4
3	1	KC6-31Z-P-2.4

K 6 S Mini control relays for connection to PLCs ... with integrated protective circuit

Auxiliary switch blocks cannot be fitted later on !

Control relay, with screw connection, for DC operation, 24 V / 1.7 W

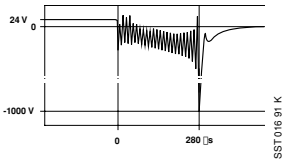
4	0	K6S-40E-1.7
3	1	K6S-31Z-1.7
2	2	K6S-22Z-1.7

Control relay, with screw connection, for DC operation, 17 ... 32 V / 2.8 W

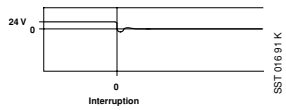
4	0	K6S-40E-2.8
3	1	K6S-31Z-2.8
2	2	K6S-22Z-2.8

Oscillograms

Without protective circuit



With integrated protective circuit



- Controlled directly by PLC
- Integrated protective circuit with diodes and additional surge suppressor
- Non-confusible coil connection
- You save time and money for additional external wiring

Mini motor contactors TBC 7
Mini control relays TKC 6

Railway app.: extended coil operating range, technical data

TBC 7-30-10

TKC 6-40E

CSA/UL Ratings

General Purpose Current	Maximum motor horsepower ratings						Auxiliary contacts		Order code	List Price
	1 phase		3 phase							
AC-1	120V	240V	208V	240V	480V	600V			state coil voltage code ☐☐ (see table below)	

Mini motor contactors TBC 7

Motor contactors, with screw connection, for DC operation

12	0.75	1.5	2	3	5	5	1 -	- 1	TBC7-30-10-☐☐ TBC7-30-01-☐☐

Mini control relays TKC 6

Control relays, with screw connection, for DC operation

2	2	TKC6-22Z-☐☐
3	1	TKC6-31Z-☐☐
4	-	TKC6-40E-☐☐

Control relays, with flat pin connection, for DC operation

2	2	TKC6-22Z-F-☐☐
3	1	TKC6-31Z-F-☐☐
4	-	TKC6-40E-F-☐☐

Coil code numbers

Coil voltage ranges

Example:

TBC 7-30-10-☐ ☐

17 ...	**24** ...	32 V DC =	**5**	**1**
50 ...	**70** ...	90 V DC =	**5**	**5**
77 ...	**110** ...	143 V DC =	**6**	**2**
140 ...	**200** ...	260 V DC =	**6**	**8**

Coil data

Power consumption of coils
at U_{max} (20 °C): operate/hold ≤ 5 W
Reliable drop-out: ≤ 0.2 x U_c (U_c = Rated operating voltage)
Reliable pick-up: ≥ $U_{c\,min}$

The voltages specified in the table are absolute limit values!
It is not permitted to attach auxiliary switch blocks CA 6 or CAF 6.

Technical data of TBC 7, TKC 6

Permissible ambient temperatures

including self-heating	°C	-30 ... +55
not including self-heating	°C	-30 ... +70
Storage temperature	°C	-40 ... +85

All other technical data and dimensions correspond to Types BC 7 and KC 6.

6

Accessories for mini contactors

Ordering details

CA 6 - 11 K
CA 6 - 11 E-F
CA 6 - 11 M-P

CAF6- 11M

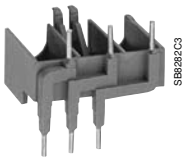
Varistor-type surge suppressor
RV-BC 6/...

Reversing connec-
ting link
BSM 6-30

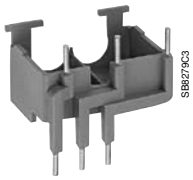
For mini contactors and control relays	Order code	List Price
Auxiliary switch blocks for mounting at one side (1)		
Screw connection		
K6... and KC6...	**CA6-11K**	
B7-40-00 and BC7-40-00	**CA6-11E**	
B7-30-10 and BC7-30-10	**CA6-11M**	
B7-30-01 and BC7-30-01	**CA6-11N**	
Flat pin connection		
K6...F and KC6...F	**CA6-11K-F**	
B7-40-00-F and BC7-40-00-F	**CA6-11E-F**	
B7-30-10-F and BC7-30-10-F	**CA6-11M-F**	
B7-30-01-F and BC7-30-01-F	**CA6-11N-F**	
Soldering connection		
K6...P and KC6...P	**CA6-11K-P**	
B7-40-00-P and BC7-40-00-P	**CA6-11E-P**	
B7-30-10-P and BC7-30-10-P	**CA6-11M-P**	
B7-30-01-P and BC7-30-01-P	**CA6-11N-P**	
Auxiliary switch blocks for mounting at front (1) **Screw connection**		
K 6 and KC 6	**CAF6-11K**	
K 6 and KC 6	**CAF6-20K**	
K 6 and KC 6	**CAF6-02K**	
B(C)7-40-00,	**CAF6-11E**	
B(C)7-40-00,	**CAF6-20E**	
B(C)7-40-00,	**CAF6-02E**	
B(C)7-30-10, VB(C)7, (A)-30-10	**CAF6-11M**	
B(C)7-30-10, VB(C)7, (A)-30-10	**CAF6-20M**	
B(C)7-30-10, VB(C)7, (A)-30-10	**CAF6-02M**	
B(C)7-30-01, VB(C)7, (A)-30-01	**CAF6-11N**	
B(C)7-30-01, VB(C)7, (A)-30-01	**CAF6-20N**	
B(C)7-30-01, VB(C)7, (A)-30-01	**CAF6-02N**	
Base with soldering pins, I_{th} < 8 A		
For mini contactors B, BC, K, KC	**LB6**	
For 2-pole auxiliary switch blocks	**LB6-CA**	
Plunger		
For manual operation	**BN 6**	
Function marker		
50 clip-on label carriers 50 transparent covers 60 non-adhesive labels* 75 self-adhesive labels* (* on sheet)	**BA50**	
Varistor-type surge suppressors for protective circuit of the DC contactors BC 7 and KC 6		
Note: Mini contactors for AC operation have an integrated protective circuit.		
24–60 V. with cable lug	**RV-BC6/60**	
24–60 V. flat pin, 2.8 mm	**RV-BC6-F/60**	
50–250 V. with cable lug	**RV-BC6/250**	
50–250 V. flat pin, 2.8 mm	**RV-BC6-F/250**	
380 V. with cable lug	**RV-BC6/380**	
380 V. flat pin, 2.8 mm	**RV-BC6-F/380**	
Reversing connecting link		
for compact reversing contactors VB7 and VBC7 with screw connection, cross-section 1.8 mm	**BSM6-30**	
Parallel connecting link		
for contactors B, BC, with screw connexion, 1 mm thick	**LP6**	

(1) Auxiliary switches CA 6 and CAF 6 may not be fitted simultaneously.

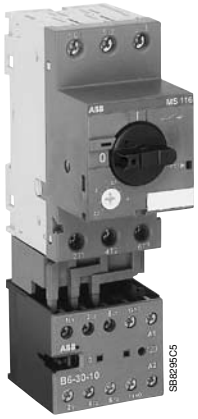
BEA 7... Connecting Link for Mini Contactors and Manual Motor Starters



BEA 7/116



BEA 7/325



B7-30-10 + BEA 7/116 + MS 116
DOL Starter Combination

Application

The **BEA 7...** connecting link is used for direct linking between a mini contactor (or a compact reversing contactor) and the associated manual motor starter which are used together as **DOL Starter Combination** (or Reversing / DOL Starter Combination) in type 1 or type 2 co-ordination, complying with IEC 60947-4-1 and EN 60947-4-1.

- Database of co-ordination tables on the ABB Website:
  www.abb.com/lowvoltage *-left menu:* "Low Voltage On-Line" *-select:* "Support Tools".

Description

The **BEA 7...** insulated 3-pole connecting link (touch safe) ensures the electrical linking between the mini contactor (or compact reversing contactor) and the corresponding manual motor starter.
The **BEA 7...** connecting link can be used with the **B7...** mini contactors and **VB7A...** compact reversing contactors (including BC7..., VBC7A... versions) and the **MS...** manual motor starters as indicated in the table below.
(For further information about mini contactor range + page 6/1 and - separate technical catalogue for detailed information about the manual motor starter range).

Ordering Details

For mini contactors and compact reversing contactors	For MMS	Fixing Rail not supplied	Order code	List Price
B 7, VB 7A	MS 116	15 x 35 mm	BEA7/116	
B 7, VB 7A	MS 325	15 x 35 mm	BEA7/325	

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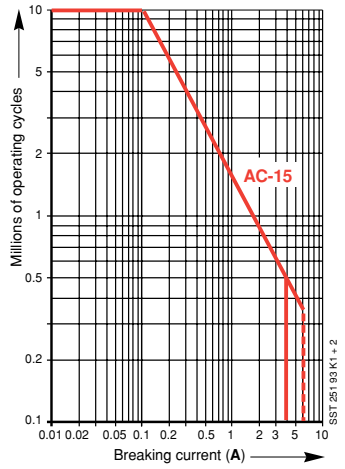
Mini control relays K 6, KC 6

Technical data to IEC 60947-4-1, IEC 60947-5-1

Utilisation category AC-15
Contact member service life curves
K 6, KC 6, CA 6, CAF 6



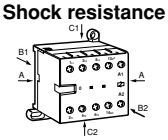
General data

Rated insulation voltage Ui			V690
Permissible ambient temperature			
Contactor without overload relay		°C	– 25 ... + 55
Contactor with overload relay		°C	– 25 ... + 50
Storage temperature		°C	– 40 ... + 80
Climatic resistance	to DIN 50 017 to UTE C 63-100		Resistant to changeable climates KFW, 30 cycles Version I
Mounting position			any

Main contacts

Mechanical service life			10 million operations			
Electrical service life			see curves			
Switching times						
Closing delay	NO	ms	14 to 26		14 to 26	
Opening delay		ms	16 to 40	4 to 10	16 to 40	4 to 10
Closing delay	NC	ms	18 to 42	6 to 12	18 to 42	6 to 12
Opening delay		ms	14 to 26		14 to 26	

Shock resistance with normal installation position



Semi-sinusoidal shock, 10 ms:
with no change in contact state

Shock resistance	A	B1	B2	C1	C2
Contactors switched off	20 g	20 g	20 g	20 g	20 g
Contactors switched on	10 g	20 g	20 g	20 g	20 g

Auxiliary contacts: integrated, CA 6, AF 6, K 6, KC 6, K 6S

Rated operating voltage Ue		V DC V AC	12 to 240 12 to 500
Conventional thermal continuous current Ith		A	6
Back-up fuse, Type gG		A	10
Rated operating current Ie / AC-15			
at Ue	24-240 V	A	4
	380/440 V	A	3
	500 V	A	2
Rated operating current Ie/DC -13			
at Ue	24 V	A	1.5
	60 V	A	0.5
	110 V	A	0.4
	220/240 V	A	0.04
Min. making/breaking capacity of the auxiliary contacts			≥ 17 V and ≥ 5 mA

A 394

Solenoid coils

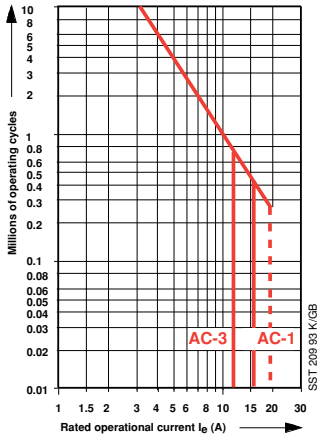
Rated power						
Basic contactors			closing / holding			
K 6	AC	VA	3.5			
KC 6	DC	W	3.5			
Interface contactors						
KC 6-1.4	DC 24 V	W	1.4			
KC 6-2.4	DC 17 ... 32 V	W	2.4			
Mini contactor for connection to PLCs, Mini control relay for connection to PLCs			cold **I** mA	 **P** W	warm **I** mA	 **P** W
K 6S-1.7	DC 24 V	W	77	1.75	60	1.35
K 6S-2.8	DC 17 ... 32 V	W	125	2.80	94	2.10
Coil voltage range			0.85 ...1.1x Uc			

Switching DC, see overleaf

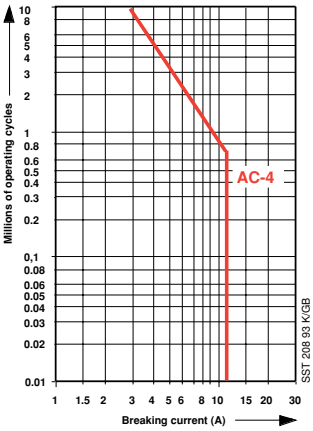
Mini contactors B 7, BC 7

Technical data to IEC 60947-4-1

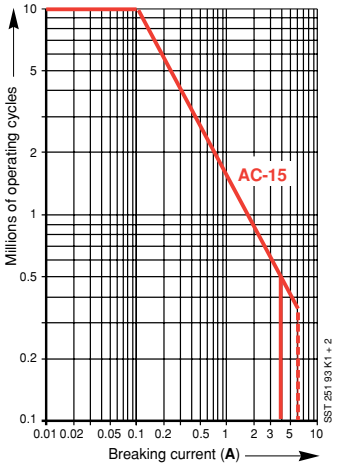
Utilisation category AC-1/AC-3
Contact member service life curves
B 7, BC 7, B 7S



Utilisation category AC-4
Switching a 3-phase squirrel-cage induction motor and switching off the starting current.
Switch-off current I_c at AC-4 corresponds to 6 times the motor's rated operating current



Utilisation category AC-15
Contact member service life curves
K 6, KC 6, CA 6, CAF 6



General data

Rated insulation voltage U_i	V	690
Permissible ambient temperature		
Contactor without overload relay	°C	– 25 ... + 55
Contactor with overload relay	°C	– 25 ... + 50
Storage temperature	°C	– 40 ... + 80
Climatic resistance to DIN 50 017 / to UTE C 63-100		Resistant to changeable climates KFW, 30 cycles Version 1
Mounting position		any

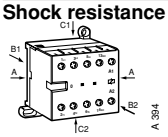
Main contacts

Mechanical service life		10 million operations
Electrical service life		see curves
Max. switching frequency AC-1	ops./h	300
DC-1, DC-3, DC-5, AC-2, AC-3, AC-15, DC-13	ops./h	600
Rated operating voltage U_e	V AC	12 to 690

Rated operating current I_e/AC-1, AC-3 and **motor output** / **AC-3**	**AC-1 / I_e A**		**AC-2, AC-3**	
	55 °C	40 °C	I_e A	**P** kW
at U_e 220/240 V	16	20	12	3
380/440 V	**16**	**20**	**12/11**	**5.5**
500 V	12	12	7	4
690 V	6	12	3.5	3

Switching times			**B 7**	**BC 7**
Closing delay	NO	ms	14 to 26	
Opening delay		ms	16 to 40	4 to 10
Closing delay	NC	ms	18 to 42	6 to 12
Opening delay		ms	14 to 26	

Shock resistance with normal installation position



Semi-sinusoidal shock, 10 ms, with no change in contact state

Shock direction	**A**	**B1**	**B2**	**C1**	**C2**
Contactors switched off	20 g	20 g	20 g	20 g	20 g
Contactors switched on	10 g	20 g	20 g	20 g	20 g

Power loss per pole:		2 W at 20 A
Back-up fuse assignment type	Type 1	25 A
	Type 2	20 A

Auxiliary contacts: integrated

Minimum making/breaking	≥ 17 V ≥ 5 mA

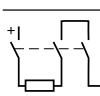
Solenoid coils

Rated power			Closing / holding
Basic contactors			
B 7 / VB 7	AC	VA	3.5
BC 7 / VBC 7	DC	W	3.5
Interface contactors			
BC 7-1.4	DC 24 V	W	1.4
BC 7-2.4	DC 17 ... 32 V	W	2.4

Mini contactor for connection to PLCs			cold		warm	
			I (mA)	**P** (W)	**I** (mA)	**P** (W)
B 7 NO-1.7	DC	24 V	77	1.70	60	1.35
B 7 NO-2.8	DC	17 ... 32 V	125	2.80	94	2.10

Coil voltage range	0.85...1.1x U_c

Utilisation categories for B 7

Utilisation category			**DC-1** L/R < 1 ms	**DC-3** L/R < 2 ms	**DC-5** L/R < 7.5 ms
	24 V	**A**	16.0	16.0	16.0
	48 V	**A**	16.0	8.0	2.0
	60 V	**A**	16.0	4.0	1.25
	110 V	**A**	7.0	1.5	0.4
	220 V	**A**	0.8	0.25	0.20
	24 V	**A**	16.0	16.0	16.0
	48 V	**A**	16.0	16.0	16.0
	60 V	**A**	16.0	15.0	12.0
	110 V	**A**	16.0	7.0	2.0
	220 V	**A**	5.0	1.5	0.5
	24 V	**A**	16.0	16.0	16.0
	48 V	**A**	16.0	16.0	16.0
	60 V	**A**	16.0	16.0	16.0
	110 V	**A**	16.0	15.0	8.0
	220 V	**A**	14.0	4.0	2.0

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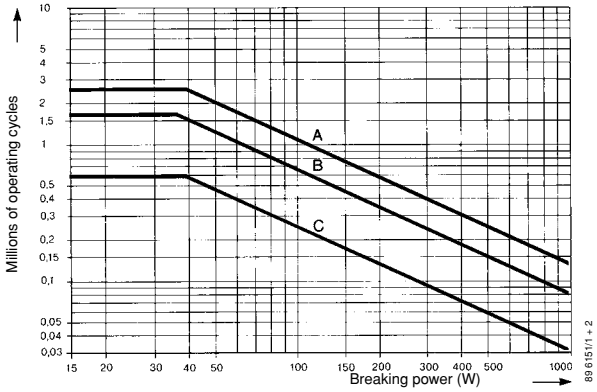
Contact member service life for utilisation categories DC-1, DC-3, DC-5

The following curves show the contact member service life for utilisation categories DC-1, DC-3 and DC-5 for 3 poles in series. If only one current path is used, the service life read off for the related breaking capacity must be multiplied by **0.33**, and, if there are 2 current paths, it must be multiplied by **0.66**.

The time constants L/R (ms) which differ for the individual utilisation categories have been allowed for on the curves.

A = 3 poles in series DC-1
B = 3 poles in series DC-3
C = 3 poles in series DC-5



Mini contactors, Mini control relays
Thermal overload relay,
Approvals

B6 30-10

KC6-31 Z

The following equipment has been approved or approval has been requested in those countries and classification societies where approval is mandatory. For some countries, special versions of equipment are available. When a supplier of a control unit incorporates approved equipment, this does not exempt him from his obligation to implement the overall installation in accordance with the legal local requirements of the country involved.

Approvals Test marks Abbreviation Validity	SEV Switzerland	DEMKO Denmark	NEMKO Norway	SEMKO Sweden	EL Inspect. Finland	CS Canada	USA		GL Germany
Mini motor contactors									
B7..	■	■	■	■	■	■		■	■
B7..-F	■	■	□	■	■	■	■	■	■
B7..-P	■	■	□	■	■	■	■	■	■
BC 7..	■	■	■	■	■	■		■	■
BC 7..-F	■	■	□	■	■	■	■	■	■
BC7..-P	■	■	□	■	■	■	■	■	■
BC7..-1.4	■	■	■	■	■	■		■	■
BC7..-F-1.4	■	■		■	■	■	■	■	■
BC7..-P-1.4	■	■		■	■	■	■		■
BC7..-2.4	■	■	■	■	■	■		■	■
BC7..-F-2.4	■	■		■	■	■	■	■	■
BC7..-P-2.4	■	■		■	■	■	■	■	■
B7 S						■		■	■
Compact reversing contactors									
VB7..	■	■	□	■	■	■	■	■	■
VBC7						■		■	■
Thermal overload relay									
T 7 DU						■		■	
Mini control relays									
K6..	■	■	■	■	■	■		■	
K6..-F	■	■		■	■	■	■		
K6..-P	■	■		■	■	■	■		
KC6..	■	■	■	■	■	■		■	
KC6..-F	■	■		■	■	■	■		
KC6..-P	■	■		■	■	■	■		
KC6..-1.4	■	■	■	■	■	■	■	■	
KC6..-F-1.4	■	■		■	■	■			
KC6..-P-1.4	■	■		■	■	■	■		
KC6..-2.4	■	■	■	■	■	■		■	
KC6..-F-2.4	■	■		■	■	■	■		
KC6..-P-2.4	■	■		■	■	■	■		
Accessories									
CA6-11..	■	■	■	■	■	■	■	■	
CAF6-..						■		■	
LB6		■			□		■		
LB6-CA									

■ Normal version approved; rating plates bear the test mark if mandatory.

□ Submitted for approval

Motor rating and rated operating currents in accordance with CSA and UL for contactors B(C) 7, in addition to control relays K(C)6.

In the case of CSA and UL, the contactors are approved both for "Motor rating 3-phase" and for "AMP rating". For this reason, the permissible ratings for contactors are approved either for "hp" or "Amp rating", with an assigned rated current respectively. The approved values for the individual contactors and contactor relays are given in the table below. The determining factor is the data indicated on the units as shown on the following table

Motor rating-3-phase for contactors B(C)7 :

Rated operating voltage	U_e ~ (V)	110/120 V	220/240 V	440/480 V	550/600 V
Motor output	P (hp)	1	3	5	5
3-phase	I_e (A)	7.2	9.6	7.6	6.1
Motor output	P (hp)	1	2	–	–
Single-phase	I_e (A)	16	12	–	–

Amp-rating: – 12 A-600 V, AC for the main contacts of contactors B(C)7

5 A-600 V, AC pilot duty A 600 for incorporated auxiliary contacts K(C)6 and B(C)7, in addition to attachable auxiliary switch blocks CA6. Values for 200 ... 208 V = (220 ... 240 V) x 1.15

Certification and Approvals
Co-ordination with
Short-circuit
Protection Devices
SCPD's
More Information...

General Technical Data

Contents

Certifications and Approvals

Designed according to the appropriate specifications, the devices in this catalogue have been built and tested by ourselves. They can be used in most countries without any further certifications being necessary.

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 state of 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.

○ **No approval required**, except in specific cases.

△ **Draft approval in progress.**

▲ **Approved with restrictions.**

Certifications and approvals		Approvals		Certifications of ship classification societies					
Mark									
Abbreviation Approved in		CSA Canada	UL USA	BV France	GL Germany	LRS Gr. Britain	DNV Norway	RINa Italy	MRS Russia
3-pole Contactors									
Control supply	**Contactor type**								
a.c.	**A 9 ... A 75**	■	■	■	■	■	■	■	△
	A 95 ... A 300	■	■	■	■	■	■	■	■
a.c. / d.c.	**AF 50 ... AF 75**	■	■	–	–	–	–	–	–
	AF 95 ... AF 750	■	■	△	△	△	△	△	△
d.c.	**AL 9 ... AL 40**	■	■	■	■	■	■	■	△
	TAL 9 ... TAL 40			–	–	–	–	–	–
a.c.	**UA 16-RA ... UA 75-RA**	■	■	■	–	–	–	–	–
a.c.	**GA 75**	■	■	–	–	–	–	–	–
d.c.	**GAE 75**	■	■	–	–	–	–	–	–
4-pole Contactors									
Control supply	**Contactor type**								
a.c.	**A 9, A 16**	■	■	■	■	■	■	■	○
	A 26	■	■	■	■	■	■	■	△
	A 45	■	■	○	○	■	○	○	○
	A 50, A 75	■	■	■	■	■	■	■	○
a.c. / d.c.	**AF 45 ... AF 75**	■	■	–	–	–	–	–	–
d.c.	**AL 9 ... AL 26**	■	■	–	–	–	–	–	–
	TAL 9 ... TAL 26	■	■	–	–	–	–	–	–

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Certifications and approvals		**Approvals**				**Certifications of ship classification societies**						
Mark					German National Standards Laboratory Ex"e" (1)							
Abbreviation		CSA	UL	UL	PTB	BV	GL	LRS	DNV	PRS	RINa	MRS
Approved in		Canada	USA	USA	Germany	France	Germany	Gr. Britain	Norway	Poland	Italy	Russia
Control relays												
Control supply	**Type**											
a.c.	**4-pole N...**	■	–	■	–	■	■	■	■	–	■	△
	8-pole N...	■	–	■	–	■	■	■	■	–	■	△
d.c.	**4-pole NL...**	■	–	■	–	■	■	■	■	■	○	△
	8-pole NL...	■	–	■	–	■	■	■	■	■	○	△
d.c.	**4-pole TNL...**	–	–	–	–	–	–	–	–	–	–	–
	8-pole TNL...	–	–	–	–	–	–	–	–	–	–	–
Thermal O/L Relays												
Amps	**Type**											
0.10 ... 32	**TA 25 DU**	■	–	■	■	■	■	■	■	–	■	△
18 ... 42	**TA 42 DU**	■	–	■	■	■	■	■	■	–	■	△
18 ... 80	**TA 75 DU**	■	–	■	■	■	■	■	■	–	■	△
29 ... 80	**TA 80 DU**	■	–	■	■	△	■	△	△	–	△	△
65 ... 110	**TA 110 DU**	■	–	■	■	△	■	△	△	–	△	△
66 ... 200	**TA 200 DU**	■	–	■	■	■	■	■	■	■	■	■
Electronic O/L Relays												
Amps	**Type**											
0.1 ... 18.9	**E 16 DU**	■	–	■	■	■	■	■	■	–	–	–
9 ... 45	**E 45 DU**	■	–	■	■	■	■	■	■	–	–	–
27 ... 80	**E 80 DU**	■	–	■	■	■	■	■	■	–	–	–
50 ... 140	**E 140 DU**	■	–	■	■	■	■	■	■	–	–	–
65 ... 200	**E 200 DU**	■	–	■	■	■	■	■	■	–	–	–
105 ... 320	**E 320 DU**	■	–	■	■	■	■	■	■	–	–	–
170 ... 500	**E 500 DU**	■	–	■	■	■	■	■	■	–	–	–
270 ... 800	**E 800 DU**	■	–	■	■	■	■	■	■	–	–	–
Accessories for contactors and control relays												
Designation	**Type**											
Auxiliary contacts	**CA 5-...**	■	–	■	–	■	■	■	■	–	■	△
	CAL 5-11	■	–	■	–	■	■	■	■	–	■	△
	CAL 16-11	■	–	■	–	–	–	–	–	–	–	–
	CAL 18-11	■	–	■	–	–	–	–	–	–	–	–
Mech. Interlock.	**VM 5**	○	–	○	–	○	○	○	○	○	○	○
Elec. Interlock.	**VE 5**	■	–	■	–	■	○	○	○	○	○	○
Mech. Interlock.	**VM 300, VM 750**	■	–	■	–	–	–	–	–	–	–	–
Latching unit	**WB 75**	■	–	■	–	–	–	–	–	–	–	–
Surge suppressors	**RV5**	■	–	■	–	■	■	■	■	–	■	△
	RC5	■	–	■	–	△	■	■	■	–	■	△
	RT5	■	–	■	–	△	■	■	■	○	■	○

(1) Protection of intrinsically safe motors (EN 50019) class EX "e" to DIN VDE 0165/02.91 (= Protection of intrinsically safe motors (EN 50019) of enclosure increased safety "e" in accordance with the provisions for "Installation of electrical systems in explosion-hazard areas" to DIN VDE 0165/02.91.)

7

CSA and UL Approvals

CSA and **UL** Approvals stipulate the following for contactors:
– the "3-phase motor-rating": motor horsepower (**HP**) and corresponding current (**A**).
– the "amp-rating": usual operational current (**A**) and nominal voltage (**V**).
Control relays are approved in amp-rating.

The technical characteristics figuring on devices must be respected and have been reproduced in the tables below.

3-phase motor-rating

Contactors	Size NEMA	Motor horsepower (HP) and nominal current I_e A							
		U_e 200V/208V		U_e 220V/240V		U_e 440V/480V		U_e 500V/600V	
Type		hp	A	hp	A	hp	A	hp	A
A 9, AL 9, TAL 9	00	2	7.8	2	6.8	5	7.6	7.5	9
A 12, AL 12, TAL 12	–	3	11	3	9.6	7.5	11	10	11
A 16, AL 16, TAL 16	0	5	17.5	5	15.2	10	14	15	17
A 26, AL 26, TAL 26	1	7.5	25.3	10	28	20	27	25	27
A 30, AL 30, TAL 30	1P	10	32.2	10	28	25	34	30	32
A 40, AL 40, TAL 40	–	10	32.2	15	42	30	40	40	41
A 45/50, AF45/50	2	15	48.3	20	54	40	52	50	52
A 63, AF 63	–	20	62.1	25	68	50	65	60	62
A 75, AF 75	3	25	78.2	30	80	60	77	75	77
A 95, AF 95	–	30	92	30	80	60	77	75	77
A 110, AF 110	–	30	92	40	104	75	96	100	99
A 145, AF 145	4	40	119.6	50	130	100	124	125	125
A 185, AF 185	–	50	149.5	60	145	125	156	150	144
A 210, AF 210	–	60	166.8	75	192	150	180	200	192
A 260, AF 260	5	75	220.8	100	248	200	240	250	242
A 300, AF 300	–	100	285.2	100	248	250	302	300	289
AF 400	–	125	358.8	150	360	350	414	400	382
AF 460	6	150	414	200	480	400	477	500	472
AF 580	–	200	552	250	602	500	590	600	590
AF 750	7	250	692.3	300	692	600	692	700	692
AF 1350	–	–	–	400	960	800	960	1000	960
AF 1650	8	–	–	450	1100	900	1100	1150	1100

Note: Other specific versions for the North-American market can be delivered on request.

CSA and UL Approvals

Amp-rating for A, AF and AL Contactors

The "amp-rating" value corresponds to the "General Use Rating" defined in specification CSA 22.2 No.14 and UL 508: the operational current, both during pull-in and steady-state conditions, must not exceed the "amp-rating" value of the device. In alternating current, the inductive cos φ of the load is between 0.75 and 0.8.

Contactors	**Main contacts (General Use Rating)**		**Auxiliary contacts:**		
Type	Nominal current **A**	Nominal voltage **V a.c.**	"pilot-duty"	Nominal current **A**	Nominal voltage **V a.c.**
A 9, AL 9,TAL 9	21	600	A 600, P 300	10	600
A 12, AL 12,TAL 12	25	600	A 600, P 300	10	600
A 16, AL 16,TAL 16	30	600	A 600, P 300	10	600
A 26, AL 26,TAL 26	40	600	A 600, P 300	10	600
A 30, AL 30,TAL 30	50	600	A 600, P 300	10	600
A 40, AL 40,TAL 40	60	600	A 600, P 300	10	600
A 45, A 50, AF 45, AF 50	80	600	A 600, Q 300	10	600
A 63, AF 63	90	600	A 600, Q 300	10	600
A 75, AF 75	105	600	A 600, Q 300	10	600
A 95, AF 95	125	600	A 600, Q 300	10	600
A 110, AF 110	140	600	A 600, Q 300	10	600
A 145, AF 145	230	600	A 600, Q 300	10	600
A 185, AF 185	250	600	A 600, Q 300	10	600
A 210, AF 210	300	600	A 600, Q 300	10	600
A 260, AF 260	350	600	A 600, Q 300	10	600
A 300, AF 300	400	600	A 600, Q 300	10	600
AF 400	550	600	A 600, Q 300	10	600
AF 460	650	600	A 600, Q 300	10	600
AF 580	750	600	A 600, Q 300	10	600
AF 750	780	600	A 600, Q 300	10	600
AF 1350	1350	600	A 600, Q 300	10	600
AF 1650	1650	600	A 600, Q 300	10	600

Amp-rating for N and KC Control Relays

Control Relays	"pilot-duty"	Nominal current **A**	Nominal voltage **V a.c.**
Type			
N, NL - (4 poles per stack)	A 600, Q 300	10	600

Amp-rating for Main Accessories

Accessories	"pilot-duty"	Nominal current **A**	Nominal voltage **V a.c.**
Type			
CA 5 auxiliary contacts	A 600, Q 300	10	600
CAL 5-11 auxiliary contacts	A 600, Q 300	10	600
CAL 16-11 auxiliary contacts	A 600, Q 300	10	600
CAL 18-11 auxiliary contacts	A 600, Q 300	10	600
TP - pneumatic timer	A 600	10	600

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 N... and NL... control relays

Control relays	Built-in auxiliary contacts 	
N 22 E, NL 22 E	2	2
N 31 E, NL 31 E	3	1
N 44 E, NL 44 E	4	4
N 53 E, NL 53 E	5	3
N 62 E, NL 62 E	6	2
N 71 E, NL 71 E	7	1

Mechanically Linked Contacts Elements for Contactors

The tables below are giving the recommended association between contactors (with or without built-in auxiliary contacts) **offering mechanically linked auxiliary contacts according to IEC 60947-5-1, Annex L (2000).**

3-pole A... AL contactors + one CA 5-.. 4-pole add-on auxiliary contact block

Contactors	Built-in auxiliary contacts		+	Add-on auxiliary contact blocks CA 5-22 E		or	CA 5-31 E		or	CA 5-40 E	
A/AL 9-30-10	1	–		2	2		3	1			
A/AL 9-30-01	–	1		2	2		3	1		4	–
A/AL 12-30-10	1	–		2	2		3	1			
A/AL 12-30-01	–	1		2	2		3	1		4	–
A/AL 16-30-10	1	–		2	2		3	1			
A/AL 16-30-01	–	1		2	2		3	1		4	–
A/AL 26-30-10	1	–		2	2		3	1			
A/AL 26-30-01	–	1		2	2		3	1		4	–
A/AL 30-30-10	1	–		2	2		3	1			
A/AL 30-30-01	–	1		2	2		3	1		4	–
A/AL 40-30-10	1	–		2	2		3	1			
A/AL 40-30-01	–	1		2	2		3	1		4	–

Mirror Contacts

N.C. built-in auxiliary contacts of **A 9 ... A 40**, **AL9 ... AL40** and **TAL 9 ... TAL 40** contactors are mirror contacts according to the above definition indicated in page **7**/4.

The **CA 5-22, CA 5-31, CA 5-04** and **CA 5-01** (respectively 4-pole and 1-pole auxiliary contact blocks) and the **CAL 5-11** (2-pole auxiliary contact block) when fitted on **A 9 ... A 75** contactors **have their own N.C. auxiliary mirror contacts**.

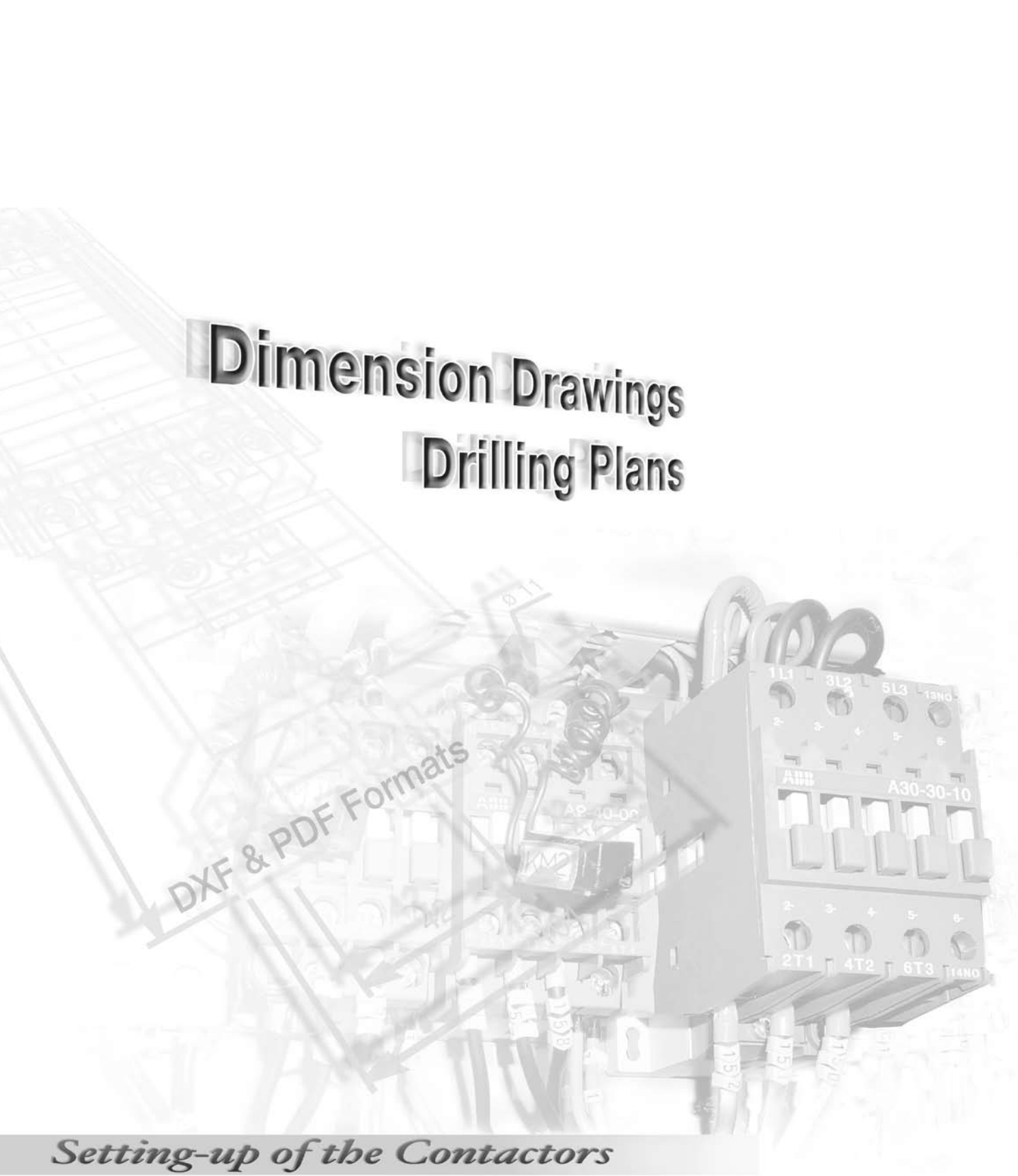
The **CAL 18-11** 2-pole auxiliary contact blocks when fitted on **A 95 ... AF 750** contactors **have their own N.C. auxiliary mirror contacts**.

Direct Opening Action of N.C. Built-in Auxiliary Contacts

Annex K2.1 of IEC 60947-5-1 defines a control switch with direct opening action: "the break contact element(s) is obtained when the actuator is moved through the direct opening travel by applying the force stated by the manufacturer".
The N.C. built-in auxiliary contacts of contactors **ARE NOT CONCERNED** by this annex.
Nevertheless, N.C. auxiliary contacts are designed to get "direct opening action" and are suitable for use such as lifts / elevators (acc. to EN 81-1).

7

Dimension Drawings
Drilling Plans



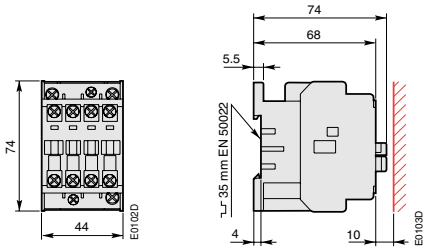
Setting-up of the Contactors

Dimensions

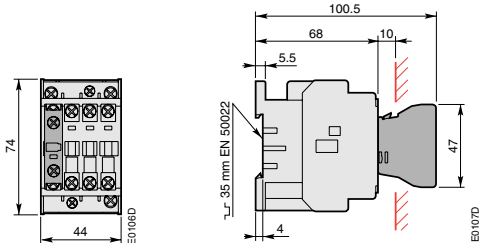
Contents

Only major dimensions are quoted on the drawings contained in this section.
Detailed dimension drawings available in DXF and PDF formats.

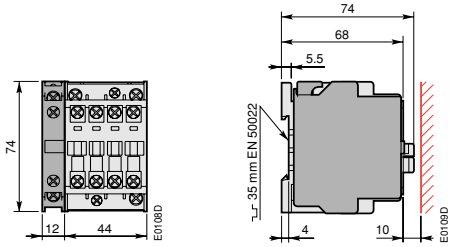
Dimensions (in mm)



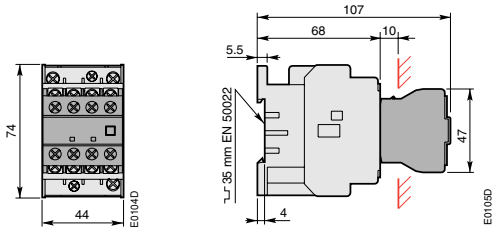
A 9, A 12, A 16, N



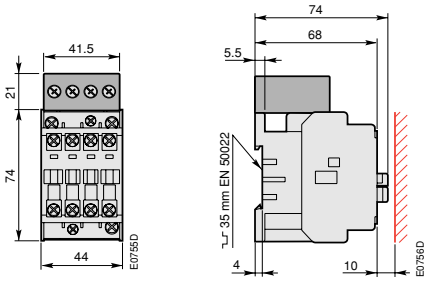
A 9, A 12, A 16, N
+ CA 5 front-mounted 1-pole auxiliary contact block



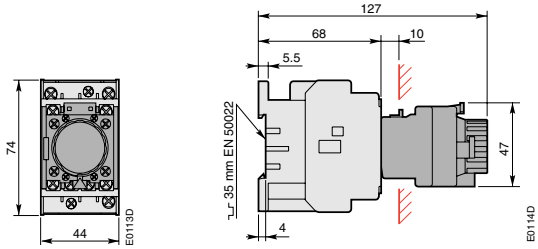
A 9, A 12, A 16, N
+ CAL 5 side-mounted 2-pole auxiliary contact block



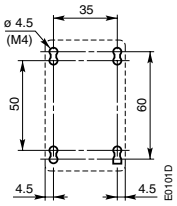
A 9, A 12, A 16, N
+ CA 5 front-mounted 4-pole auxiliary contact block



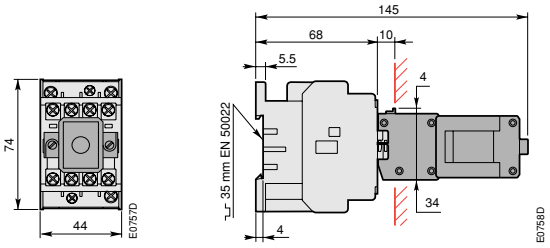
A 9, A 12, A 16, N
+ RA 5 interface relay



A 9, A 12, A 16, N
+ TP pneumatic timer



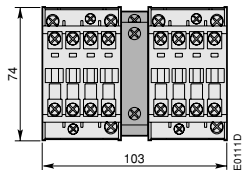
A 9, A 12, A 16, N drilling plan

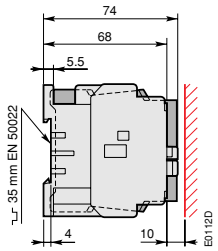


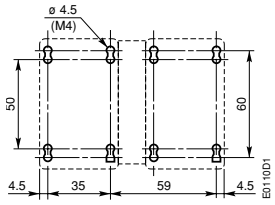
A 9, A 12, A 16, N
+ WB 75-A on-position latch

Detailed dimension drawings available in DXF and PDF formats.

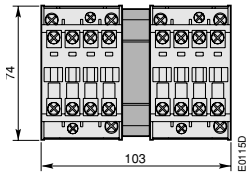
Dimensions (in mm)

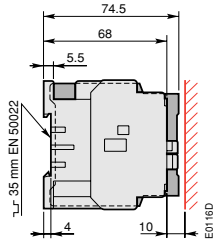


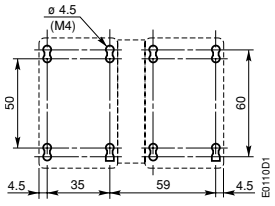




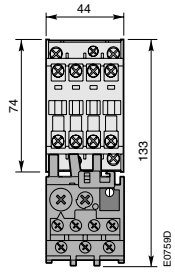
A 9, A 12, A 16
+ VE 5-1 electrical and mechanical interlock unit

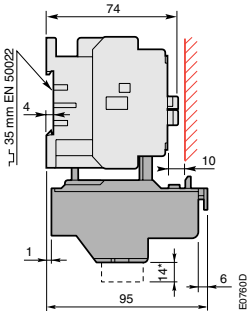


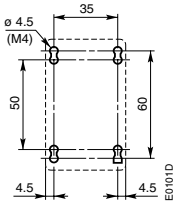




A 9, A 12, A 16
+ VM 5-1 mechanical interlock unit





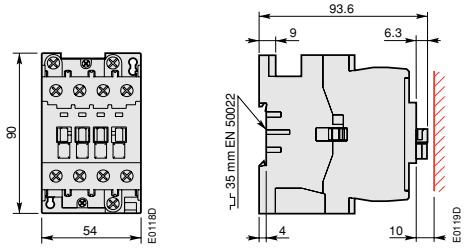


A 9, A 12, A 16
+ TA 25 DU thermal O/L relay

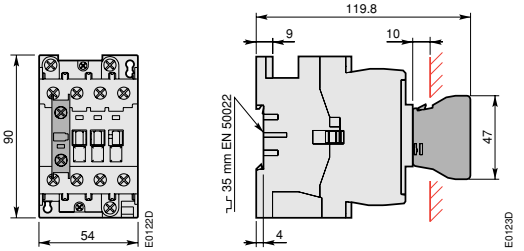
* For TA 25 DU 32 only

Detailed dimension drawings available in DXF and PDF formats.

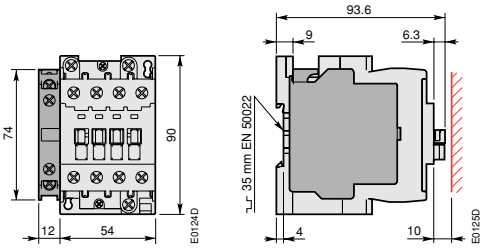
Dimensions (in mm)



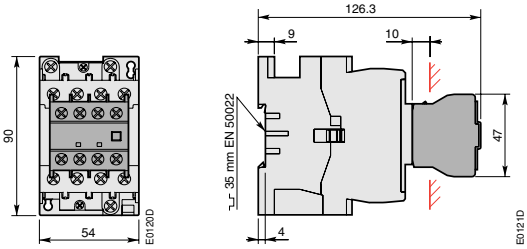
A 26



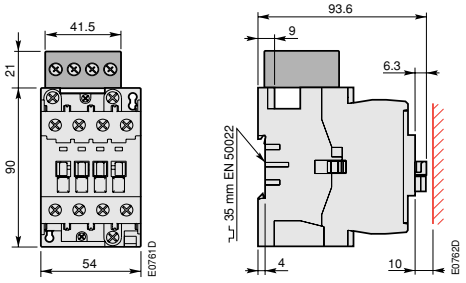
A 26
+ CA 5 front-mounted 1-pole auxiliary contact block



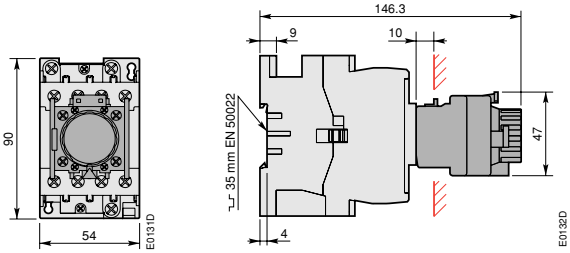
A 26
+ CAL 5 side-mounted 2-pole auxiliary contact block



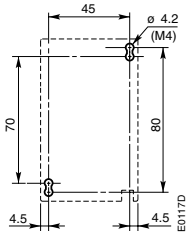
A 26
+ CA 5 front-mounted 4-pole auxiliary contact block



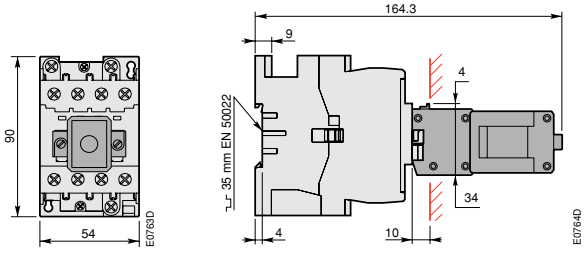
A 26
+ RA 5 interface relay



A 26
+ TP pneumatic timer



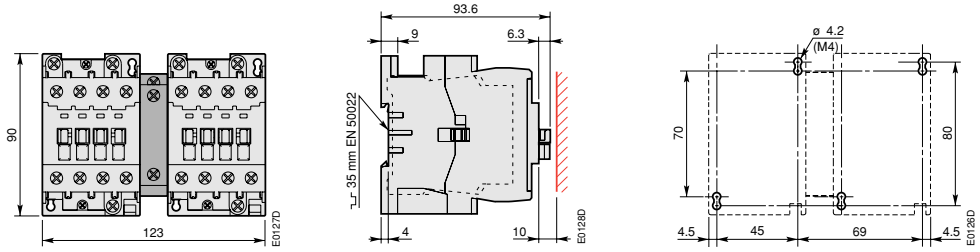
A 26 drilling plan



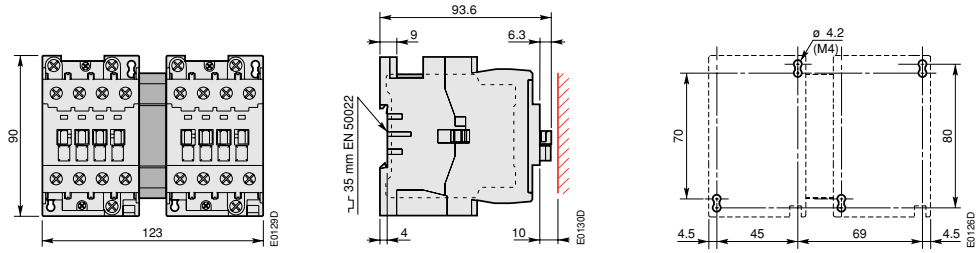
A 26
+ WB 75-A on-position latch

Detailed dimension drawings available in DXF and PDF formats.

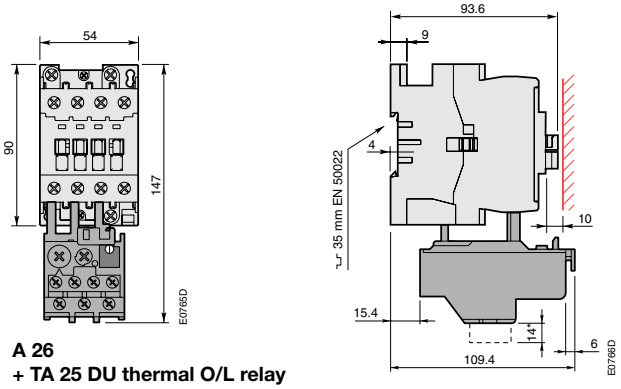
Dimensions (in mm)



A 26
+ VE 5-1 electrical and mechanical interlock unit



A 26
+ VM 5-1 mechanical interlock unit



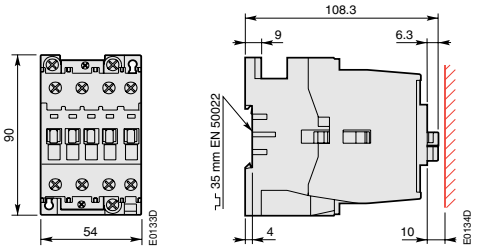
A 26
+ TA 25 DU thermal O/L relay

* For TA 25 DU 32 only

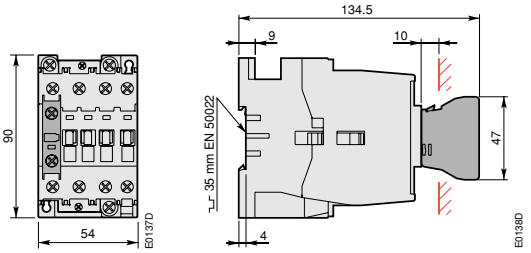
Detailed dimension drawings available in DXF and PDF formats.

8

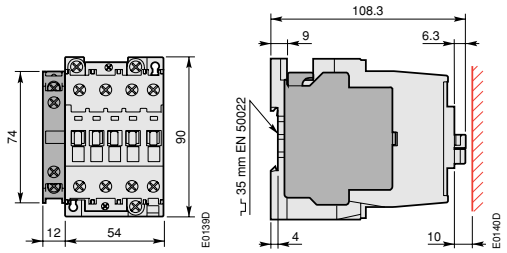
Dimensions (in mm)



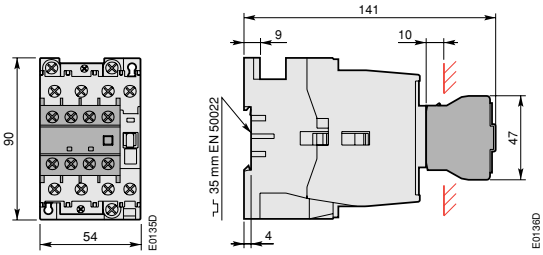
A 30, A 40



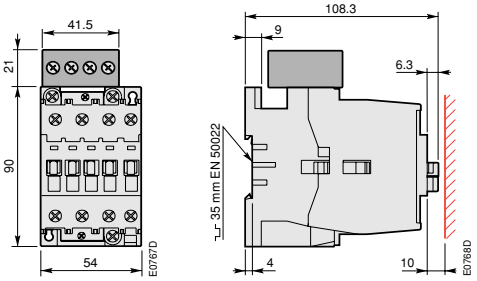
A 30, A 40
+ CA 5 front-mounted 1-pole auxiliary contact block



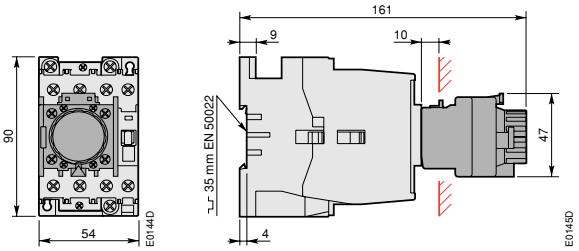
A 30, A 40
+ CAL 5 side-mounted 2-pole auxiliary contact block



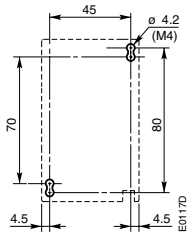
A 30, A 40
+ CA 5 front-mounted 4-pole auxiliary contact block



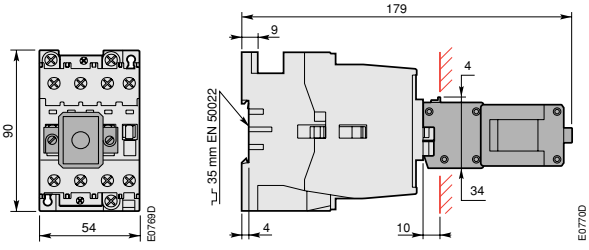
A 30, A 40
+ RA 5 interface relay



A 30, A 40
+ TP pneumatic timer



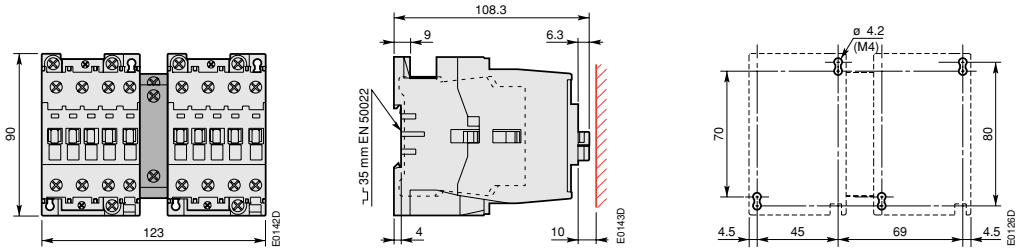
A 30, A 40 drilling plan



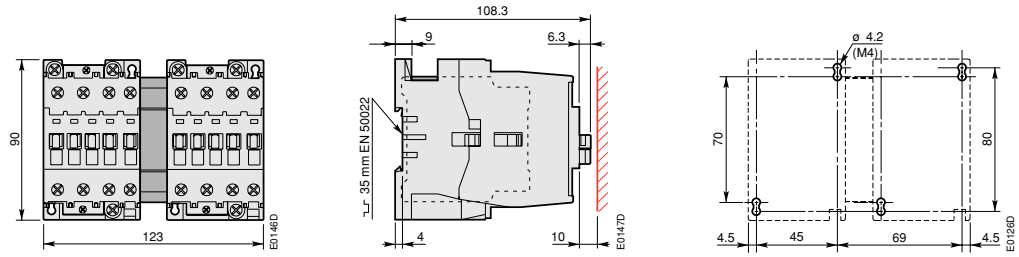
A 30, A 40
+ WB 75-A on-position latch

Detailed dimension drawings available in DXF and PDF formats.

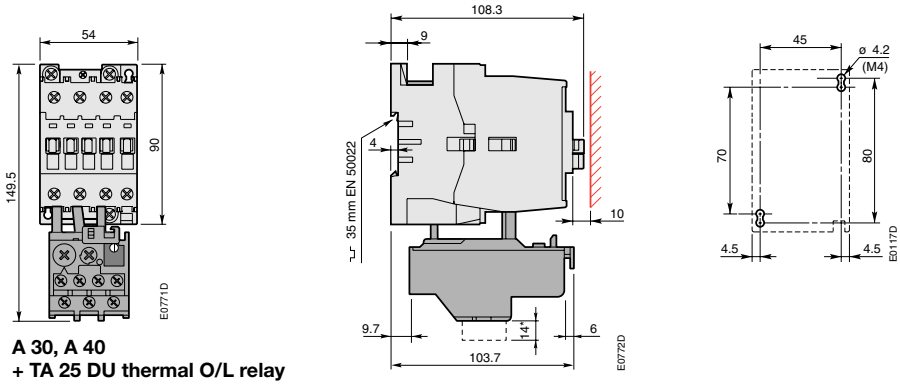
Dimensions (in mm)



A 30, A 40
+ VE 5-1 electrical and mechanical interlock unit

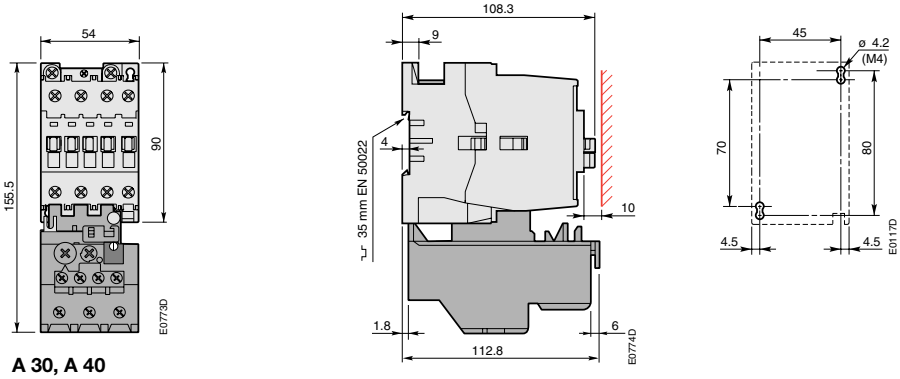


A 30, A 40
+ VM 5-1 mechanical interlock unit



A 30, A 40
+ TA 25 DU thermal O/L relay

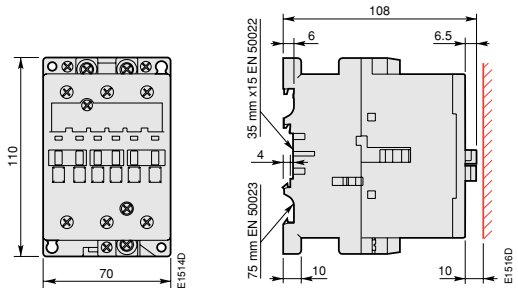
* For TA 25 DU 32 only



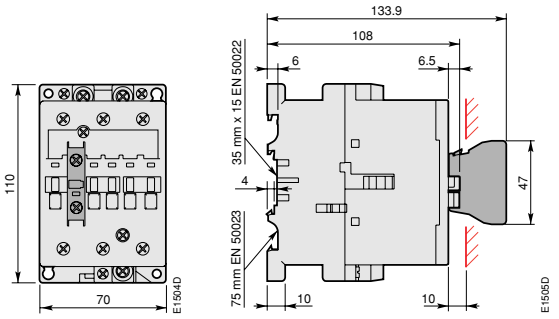
A 30, A 40
+ TA 42 DU thermal O/L relay

Detailed dimension drawings available in DXF and PDF formats.

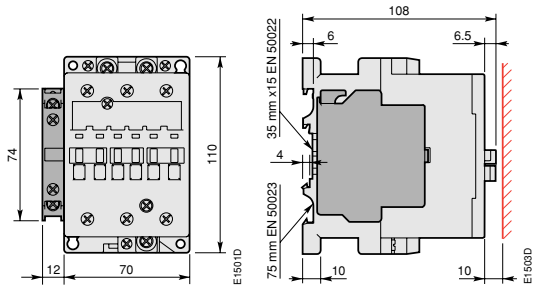
Dimensions (in mm)



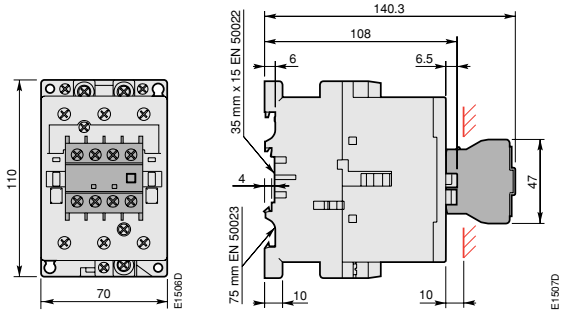
A 50, A 63, A 75, AF 50, AF 63, AF 75



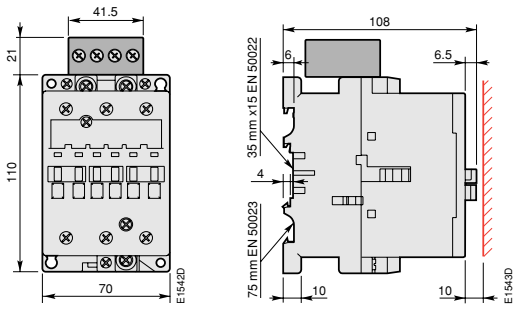
A 50, A 63, A 75, AF 50, AF 63, AF 75
+ CA 5 front-mounted 1-pole auxiliary contact block



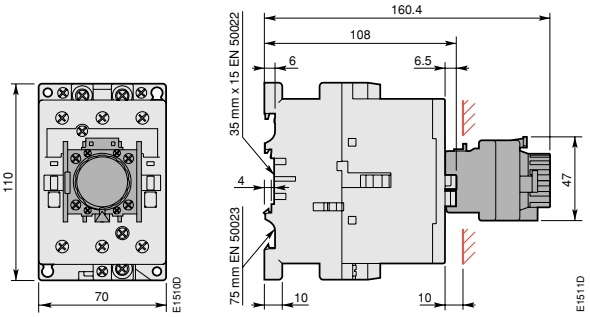
A 50, A 63, A 75, AF 50, AF 63, AF 75
+ CAL 5 side-mounted 2-pole auxiliary contact block



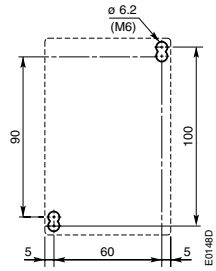
A 50, A 63, A 75, AF 50, AF 63, AF 75
+ CA 5 front-mounted 4-pole auxiliary contact block



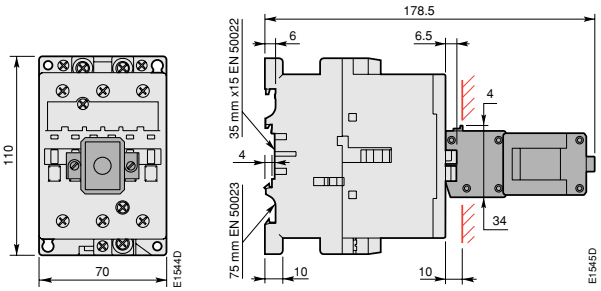
A 50, A 63, A 75, AF 50, AF 63, AF 75
+ RA 5 interface relay



A 50, A 63, A 75, AF 50, AF 63, AF 75
+ TP pneumatic timer



A 50, A 63, A 75, AF 50, AF 63, AF 75 drilling plan

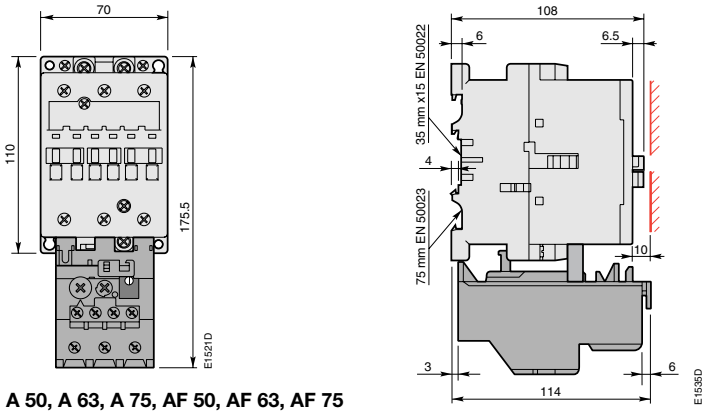


A 50, A 63, A 75, AF 50, AF 63, AF 75
+ WB 75-A on-position latch

Detailed dimension drawings available in DXF and PDF formats.

Dimensions (in mm)

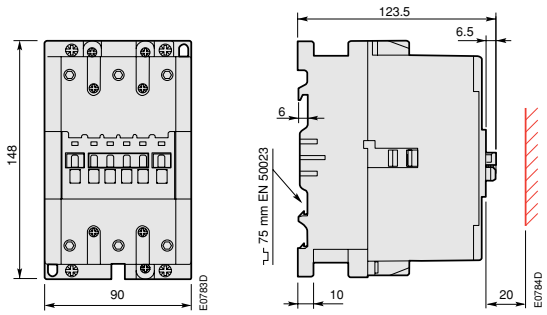
A 50, A 63, A 75, AF 50, AF 63, AF 75
+ VE 5-2 electrical and mechanical interlock unit



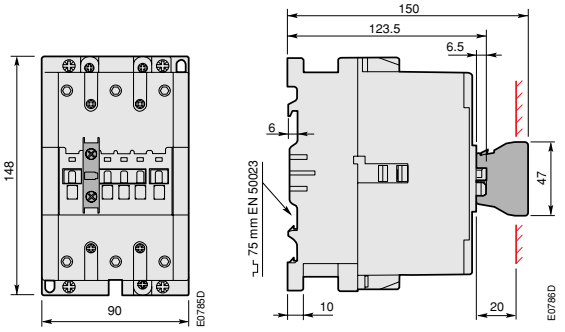
A 50, A 63, A 75, AF 50, AF 63, AF 75
+ TA 75 DU thermal O/L relay

Detailed dimension drawings available in DXF and PDF formats.

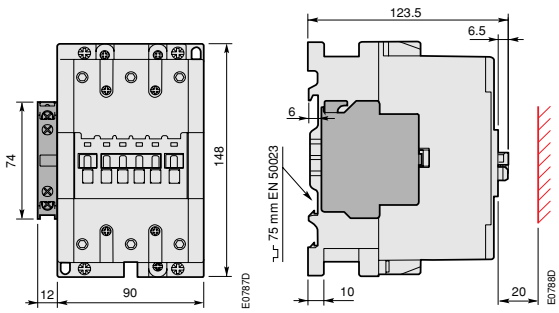
Dimensions (in mm)



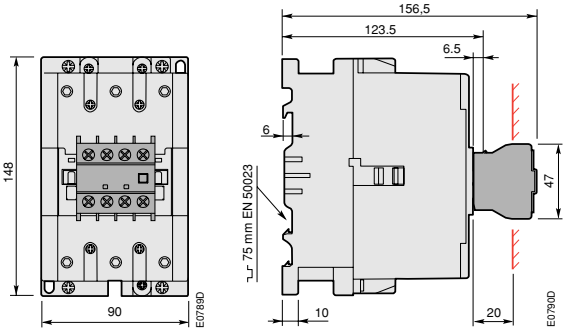
A 95, A 110, AF 95, AF 110



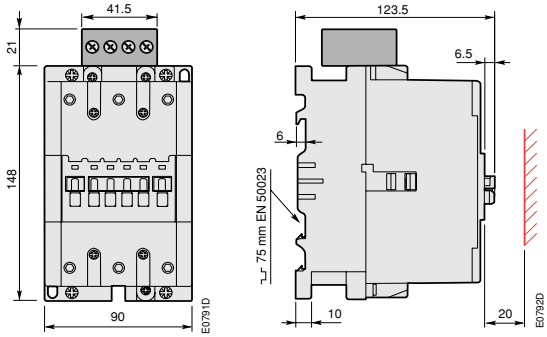
A 95, A 110, AF 95, AF 110
+ CA 5 front-mounted 1-pole auxiliary contact block



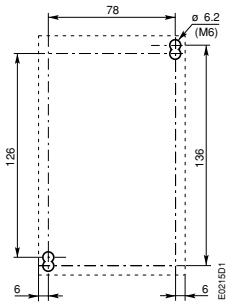
A 95, A 110, AF 95, AF 110
+ CAL 18 side-mounted 2-pole auxiliary contact block



A 95, A 110, AF 95, AF 110
+ CA 5 front-mounted 4-pole auxiliary contact block



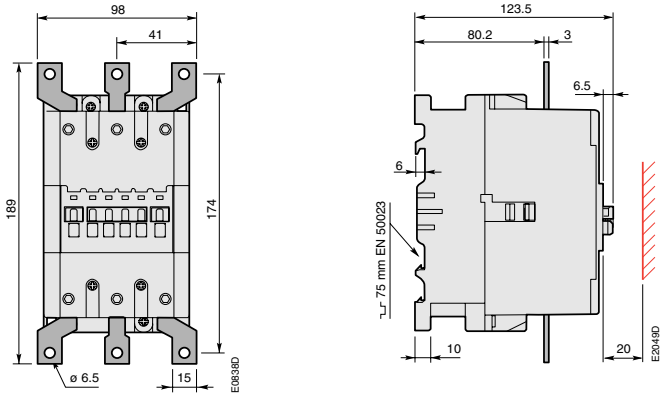
A 95, A 110, AF 95, AF 110
+ RA 5 interface relay



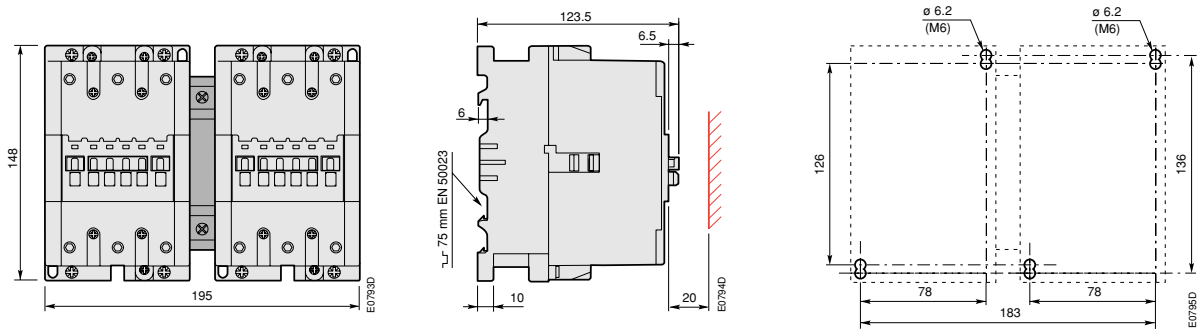
A 95, A 110, AF 95, AF 110 drilling plan

Detailed dimension drawings available in DXF and PDF formats.

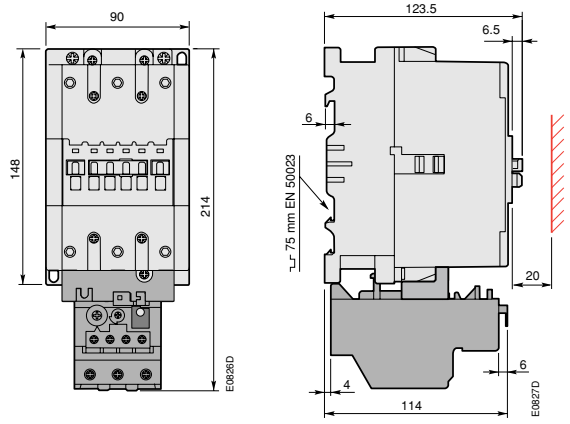
Dimensions (in mm)



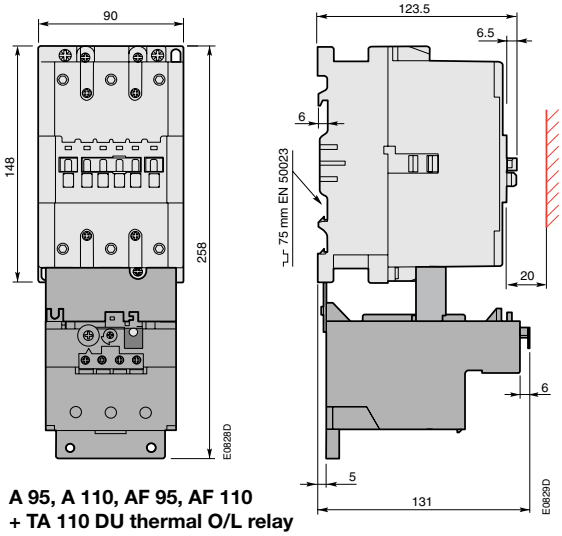
A 95, A 110, AF 95, AF 110
+ LW 110 terminal enlargement



A 95, A 110, AF 95, AF 110
+ VE 5-2 electrical and mechanical interlock unit



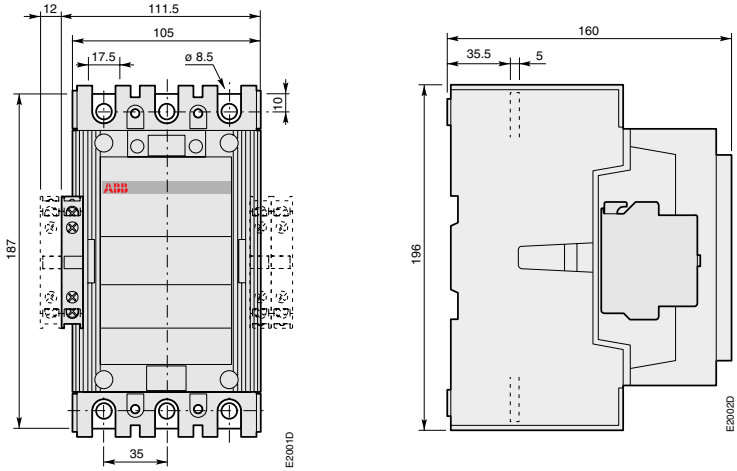
A 95, A 110, AF 95, AF 110
+ TA 80 DU thermal O/L relay



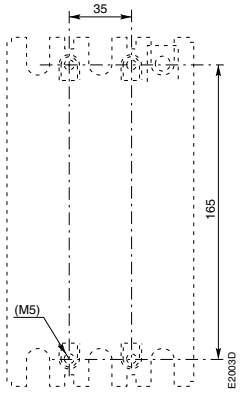
A 95, A 110, AF 95, AF 110
+ TA 110 DU thermal O/L relay

Detailed dimension drawings available in DXF and PDF formats.

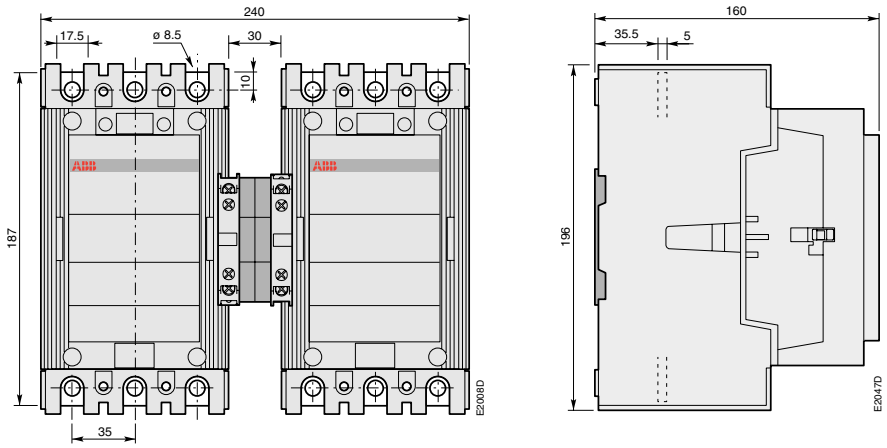
Dimensions (in mm)

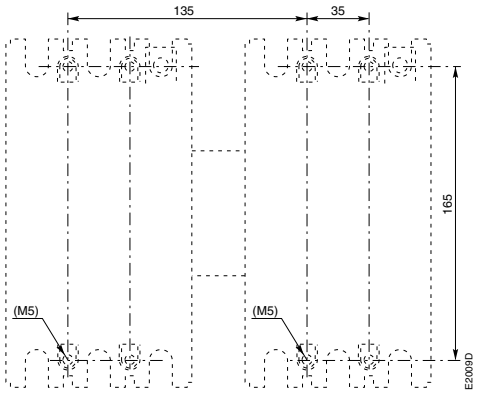


A 145, A 185, AF 145, AF 185 c/w 1 x **CAL18**



A 145, A 185, AF 145, AF 185
drilling plan

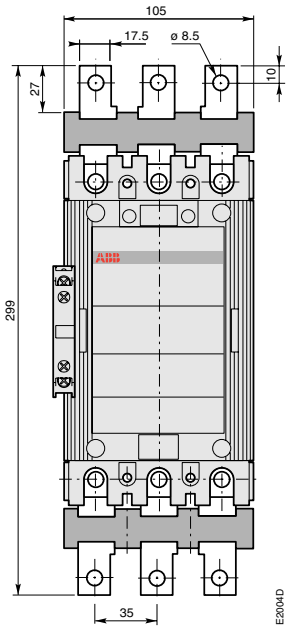




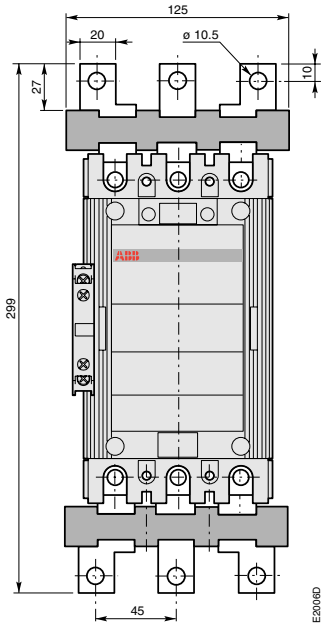
A 145, A 185, AF 145, AF 185 c/w 1 x **CAL18**
+ VM 300H mechanical interlock unit

Detailed dimension drawings available in DXF and PDF formats.

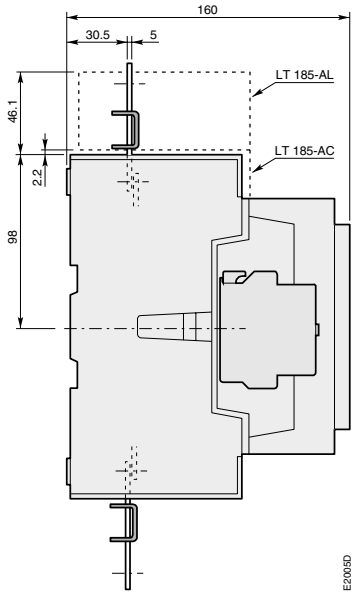
Dimensions (in mm)

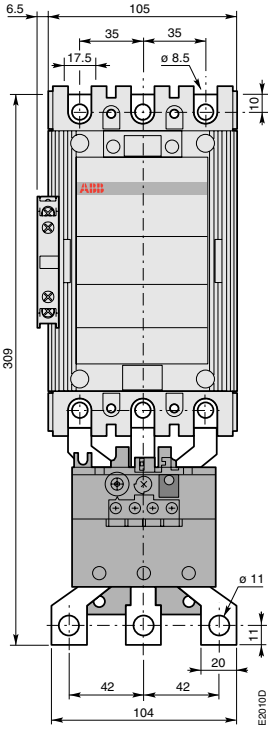


A 145, A 185, AF 145, AF 185 c/w 1 x **CAL18**
+ LX 185 terminal extension

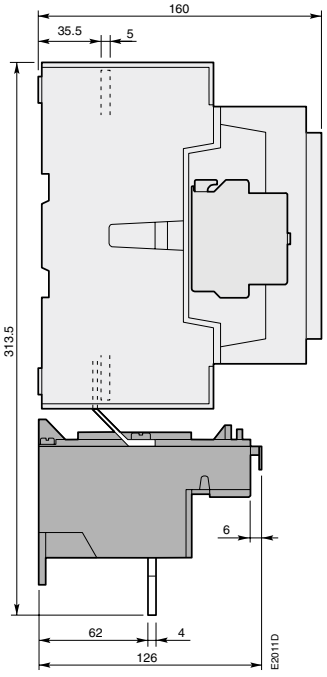


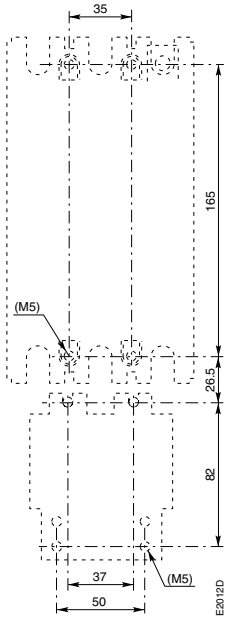
A 145, A 185, AF 145, AF 185 c/w 1 x **CAL18**
+ LW 185 terminal enlargement





A 145, A 185, AF 145, AF 185 c/w 1 x **CAL18**
+ TA 200 DU thermal O/L relay

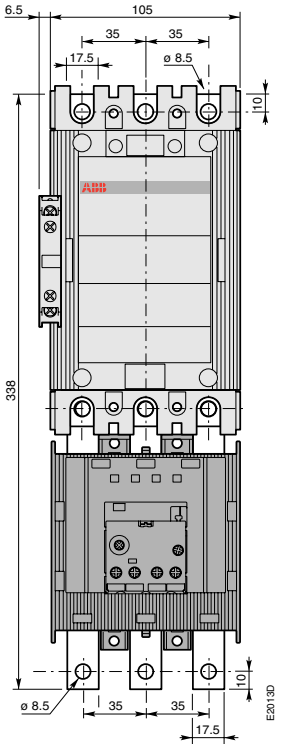


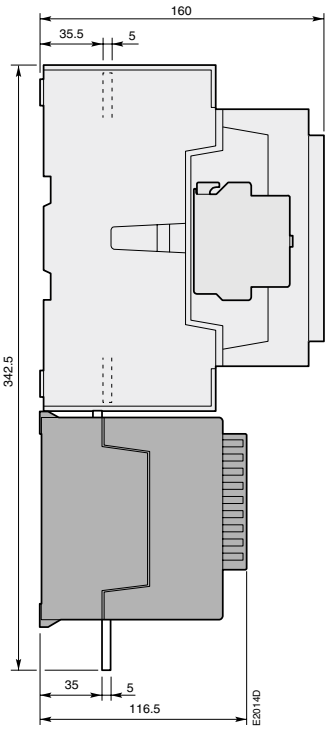


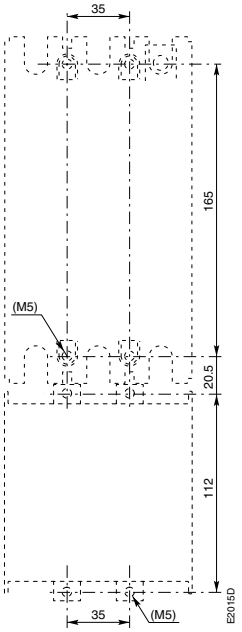
Detailed dimension drawings available in DXF and PDF formats.

8

A 145 and A 185 3-pole Contactors
AF 145 and AF 185 3-pole Contactors

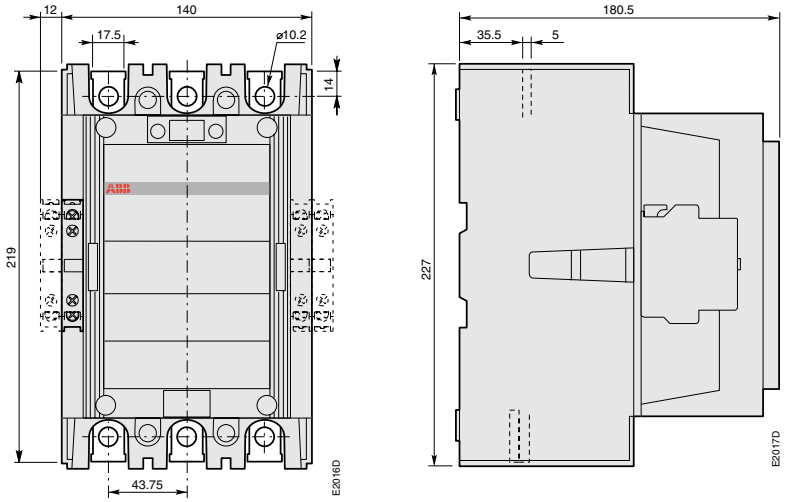




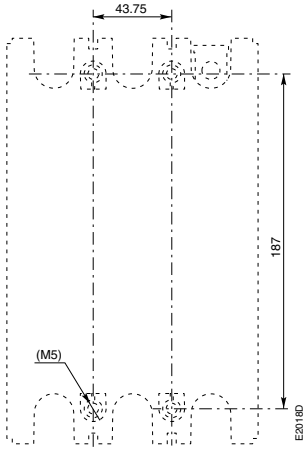


A 145, A 185, AF 145, AF 185 c/w 1 x **CAL18**
+ E 200 DU electronic O/L relay

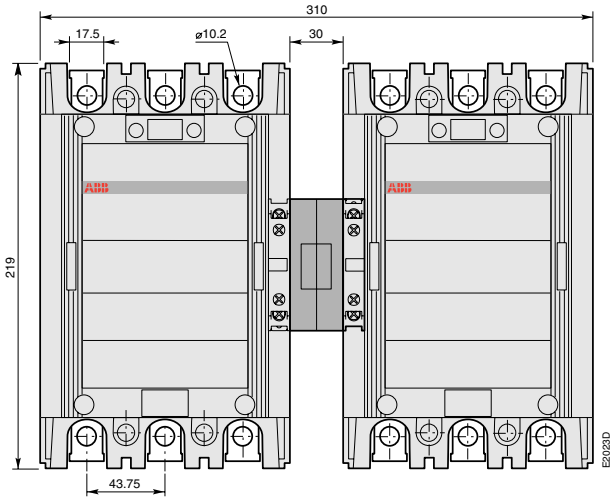
Dimensions (in mm)

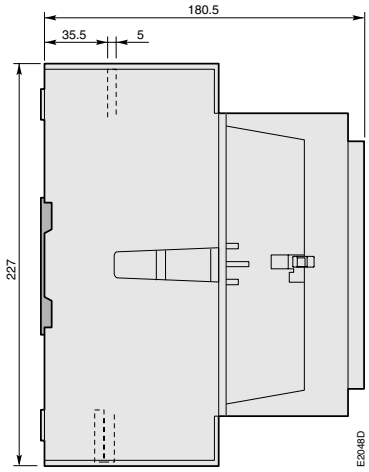


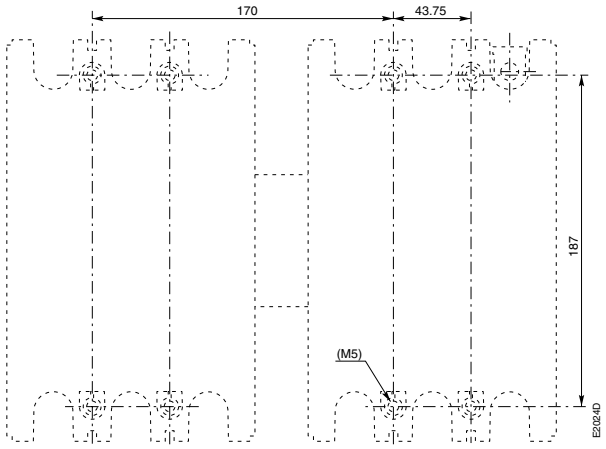
A 210, A 260, A 300, AF 210, AF 260, AF 300 c/w 1 x **CAL18**



A 210, A 260, A 300, AF 210, AF 260, AF 300 drilling plan





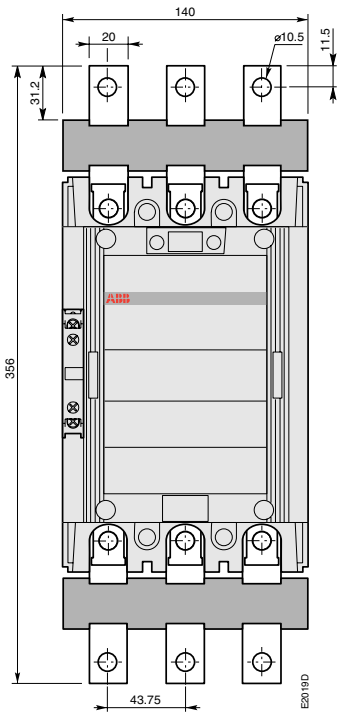


A 210, A 260, A 300, AF 210, AF 260, AF 300 c/w 1 x **CAL18**
+ VM 300H mechanical interlock unit

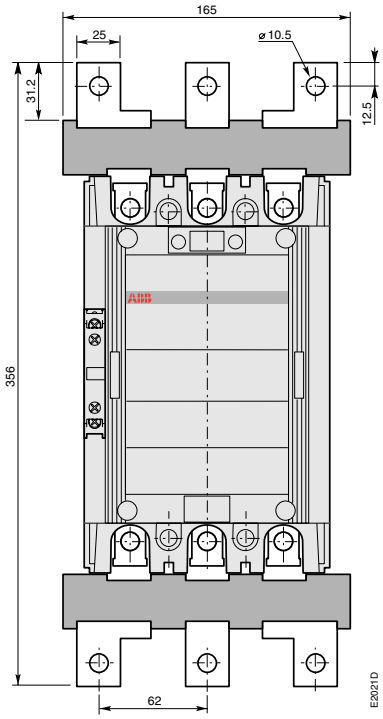
Detailed dimension drawings available in DXF and PDF formats.

8

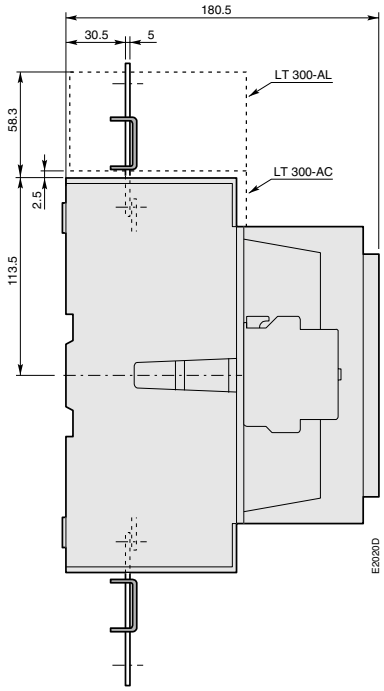
Dimensions (in mm)



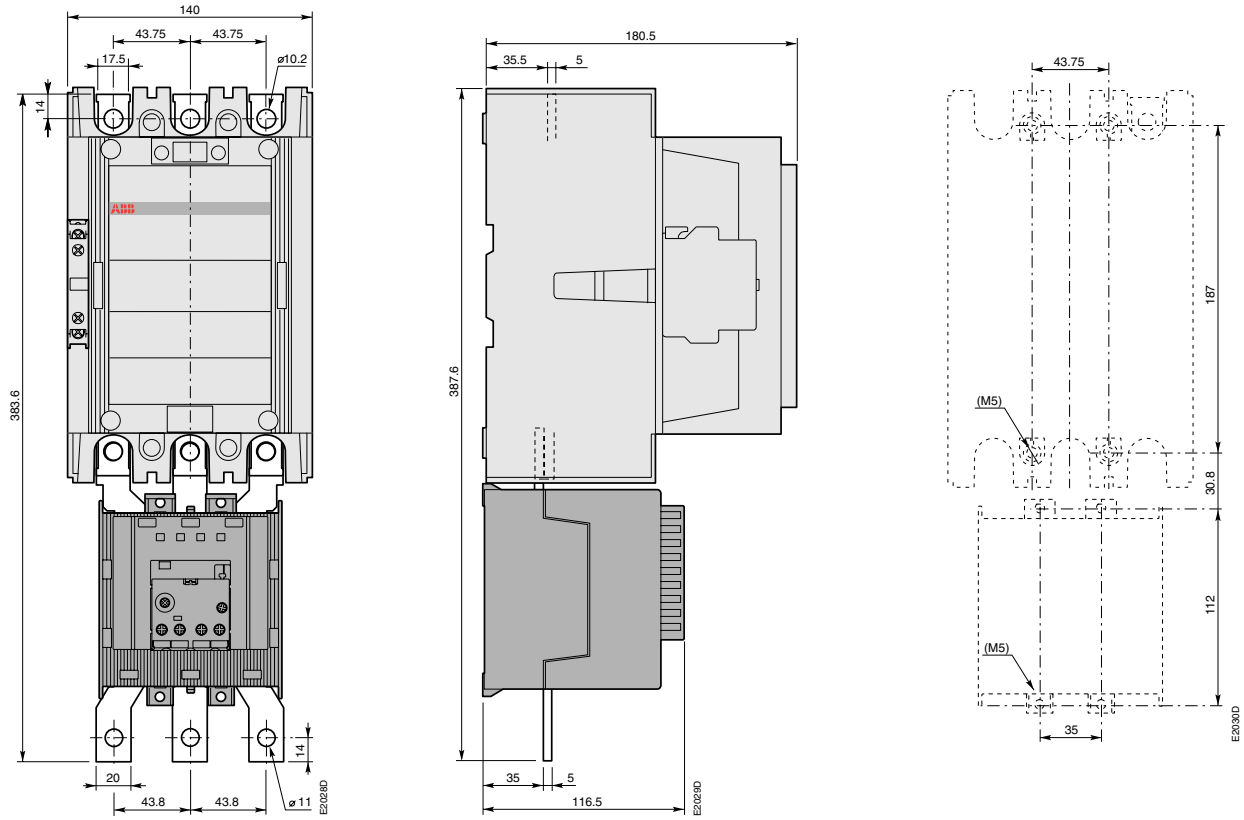
A 210, A 260, A 300, AF 210, AF 260, AF 300
c/w 1 x **CAL18 + LX 300 terminal extension**



A 210, A 260, A 300, AF 210, AF 260, AF 300
c/w 1 x **CA18 + LW 300 terminal enlargement**



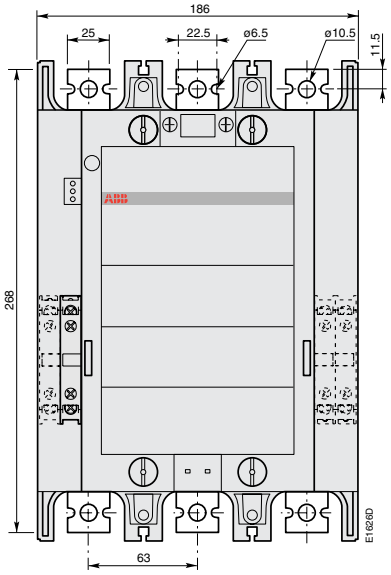
Dimensions (in mm)

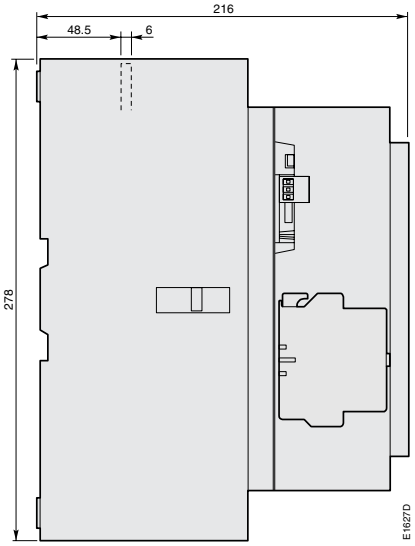


A 210, A 260, A300, AF 210, AF 260, AF 300 c/w 1 x **CAL18**
+ E 320 DU electronic O/L relay

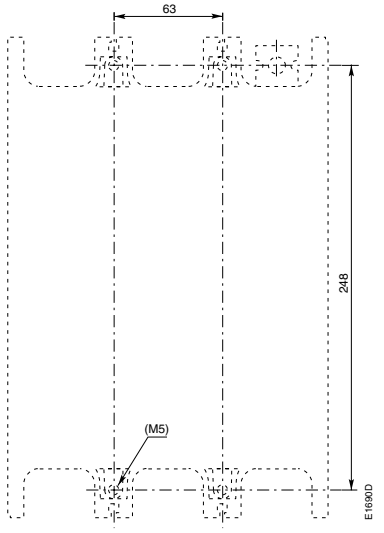
Detailed dimension drawings available in DXF and PDF formats.

Dimensions (in mm)

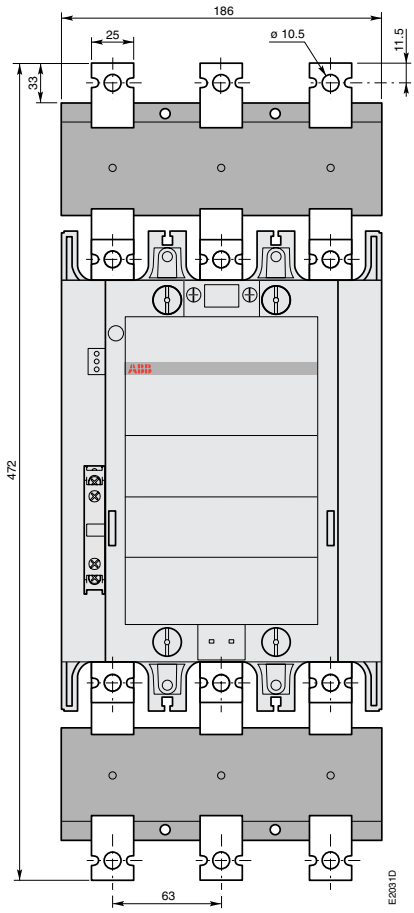




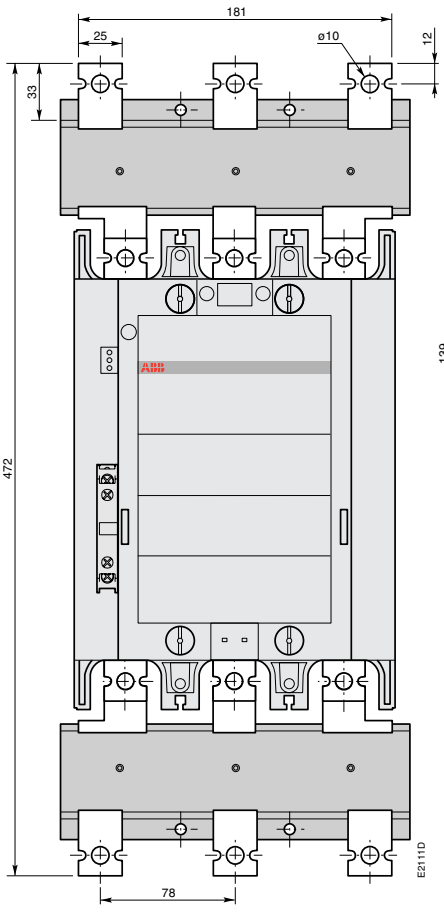
AF 400, AF 460 c/w 1 x **CAL18**



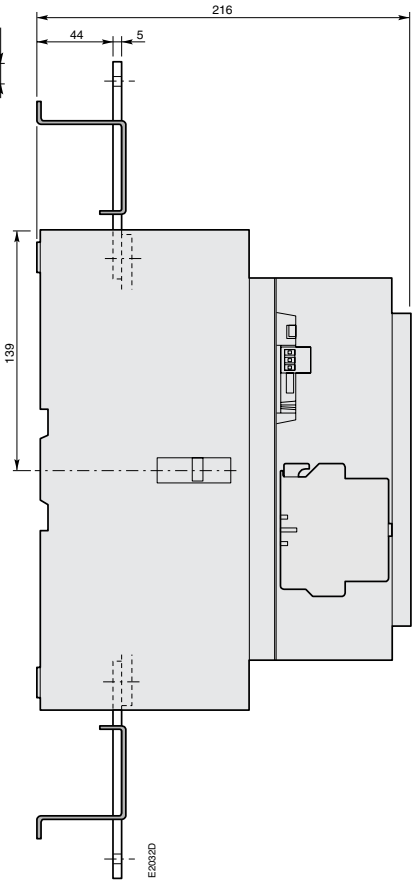
AF 400, AF 460 drilling plan



AF 400, AF 460 c/w 1 x **CAL18**
+ LX 460 terminal extension

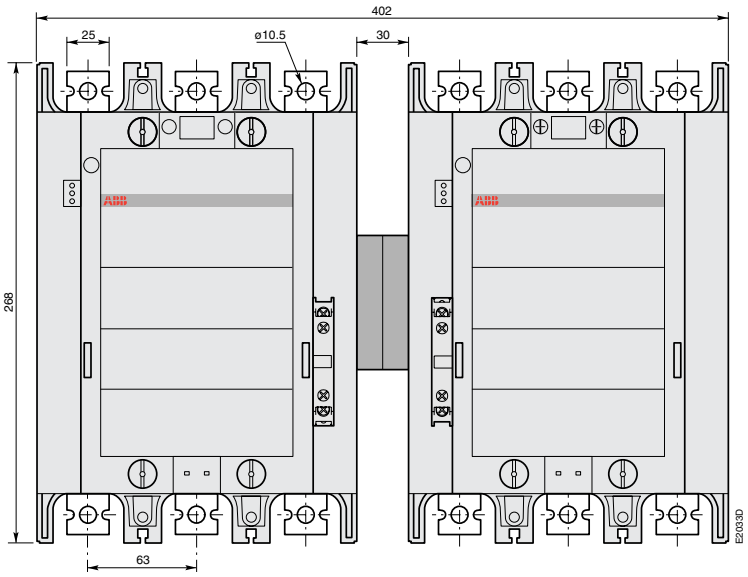


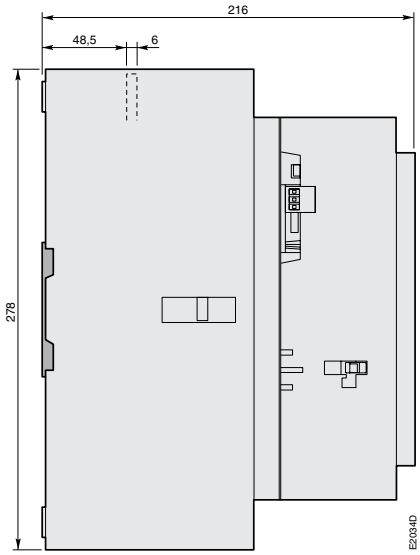
AF 400, AF 460 c/w 1 x **CAL18**
+ LW 460 terminal enlargement

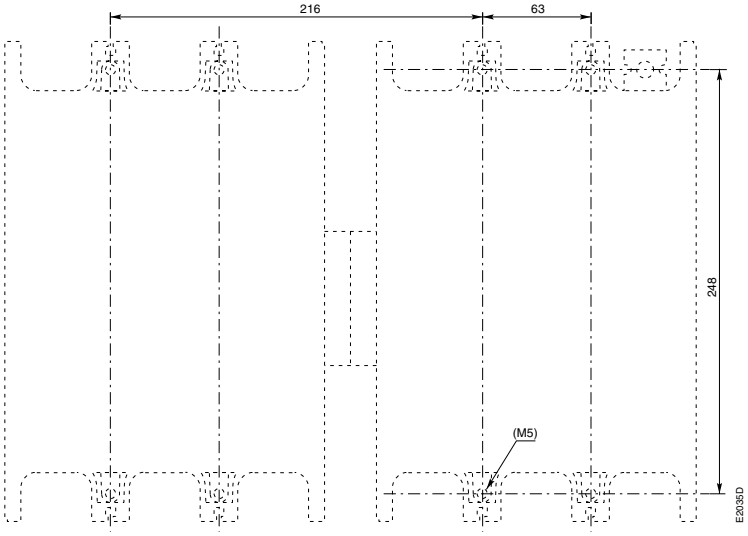


Detailed dimension drawings available in DXF and PDF formats.

Dimensions (in mm)



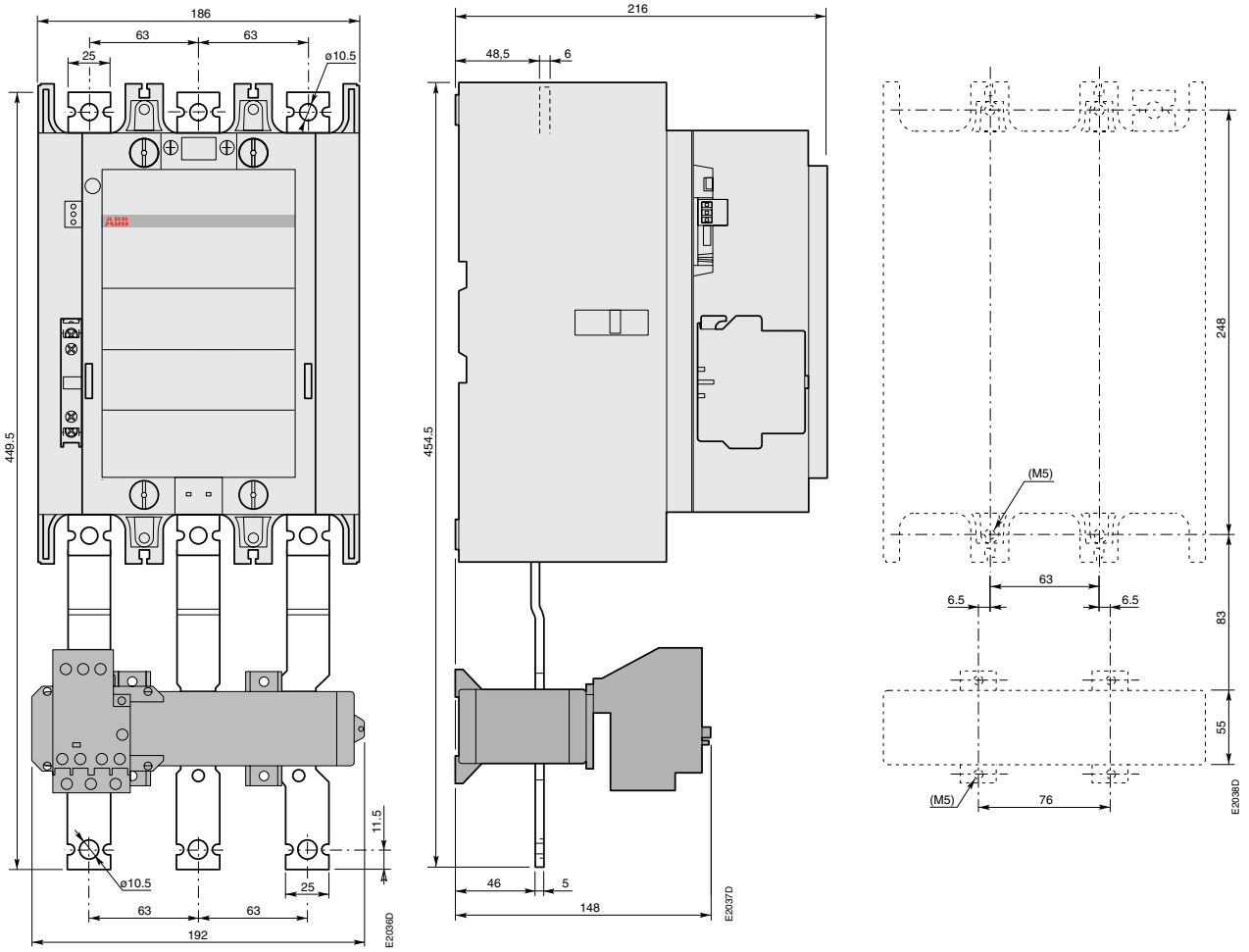




AF 400, AF 460 c/w 1 x **CAL18**
+ VM 750H mechanical interlock unit

Detailed dimension drawings available in DXF and PDF formats.

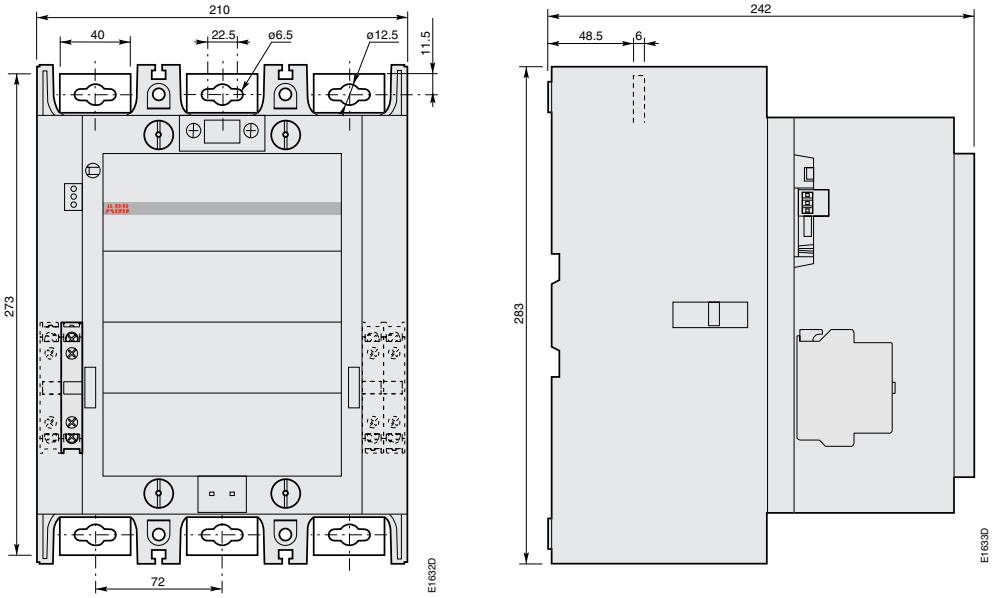
Dimensions (in mm)



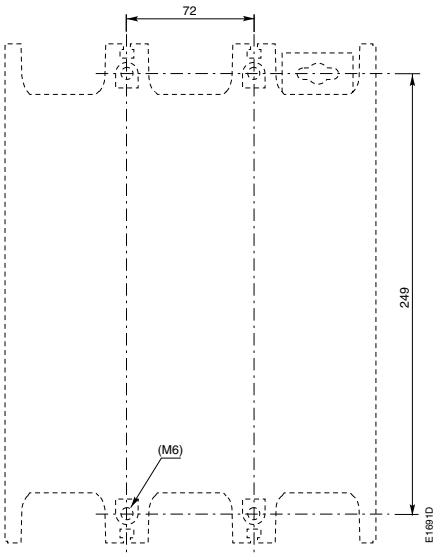
AF 400, AF 460 c/w 1 x **CAL18**
+ E 500 DU electronic O/L relay

Detailed dimension drawings available in DXF and PDF formats.

Dimensions (in mm)



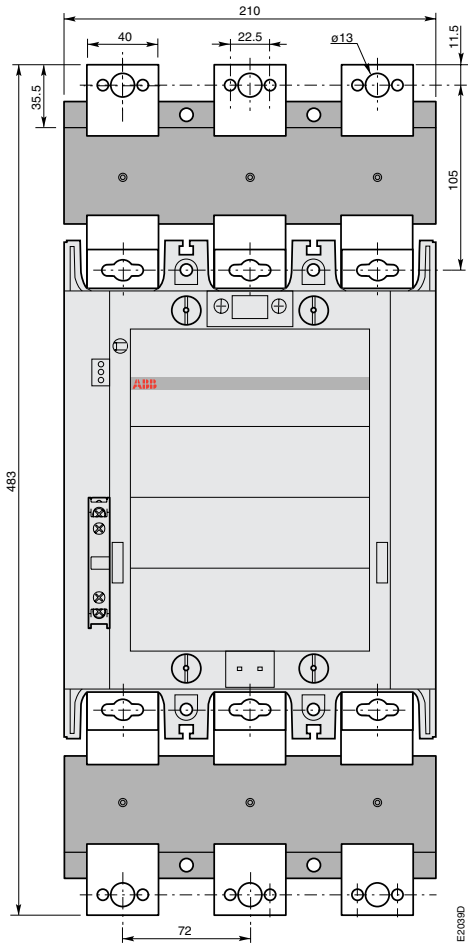
AF 580, AF 750 c/w 1 x **CAL18**

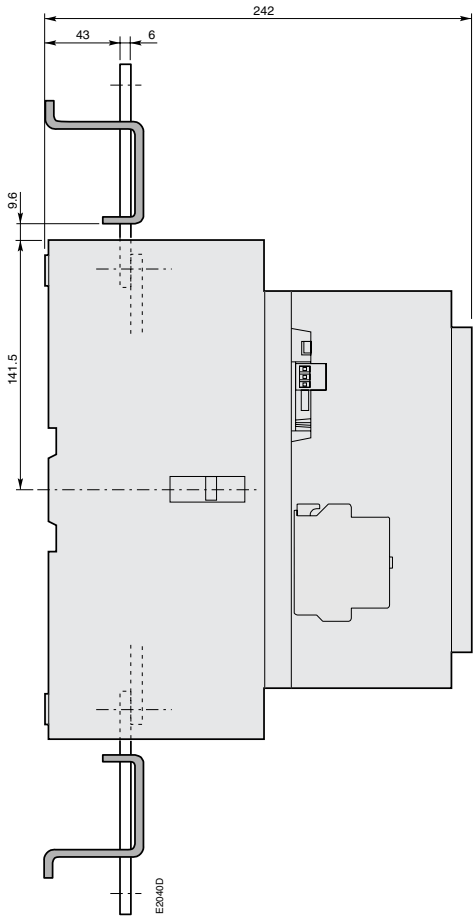


AF 580, AF 750 drilling plan

Detailed dimension drawings available in DXF and PDF formats.

Dimensions (in mm)

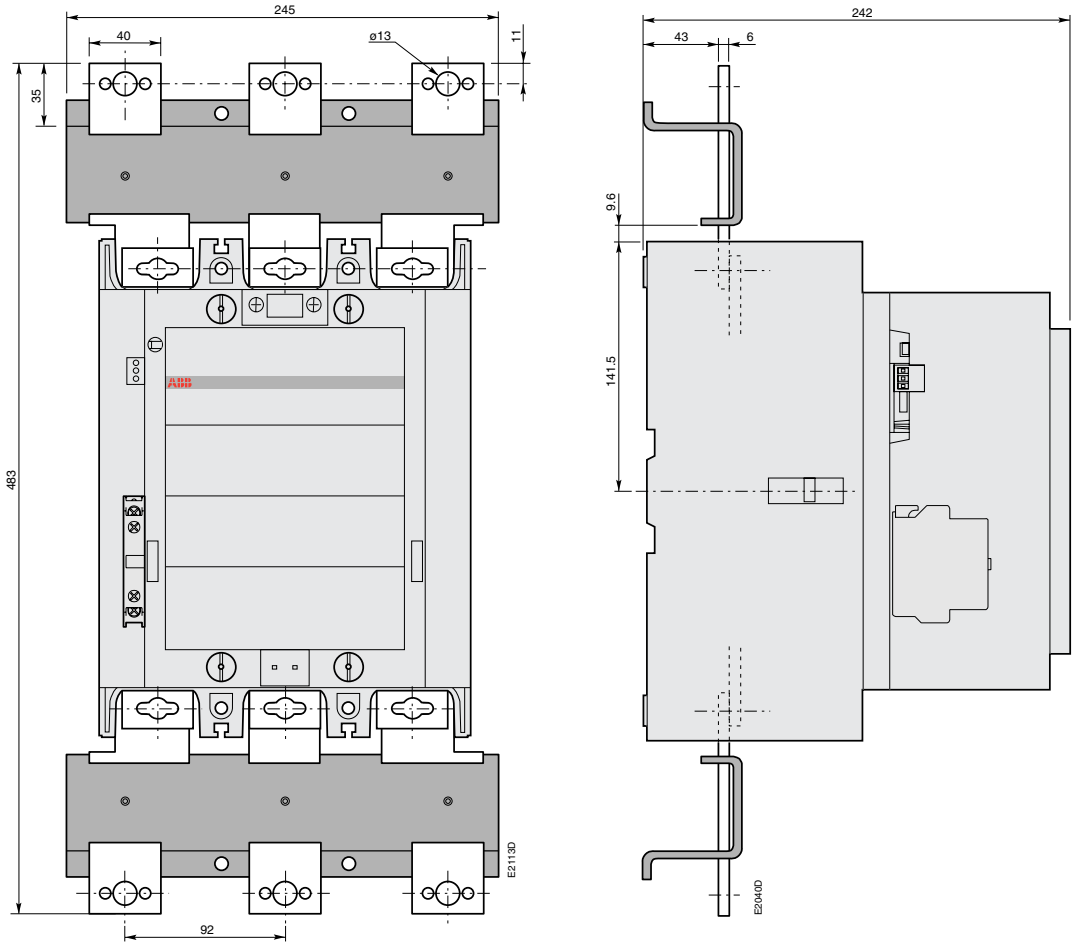




AF 580, AF 750 c/w 1 x **CAL18**
+ LX 750 terminal extension

Detailed dimension drawings available in DXF and PDF formats.

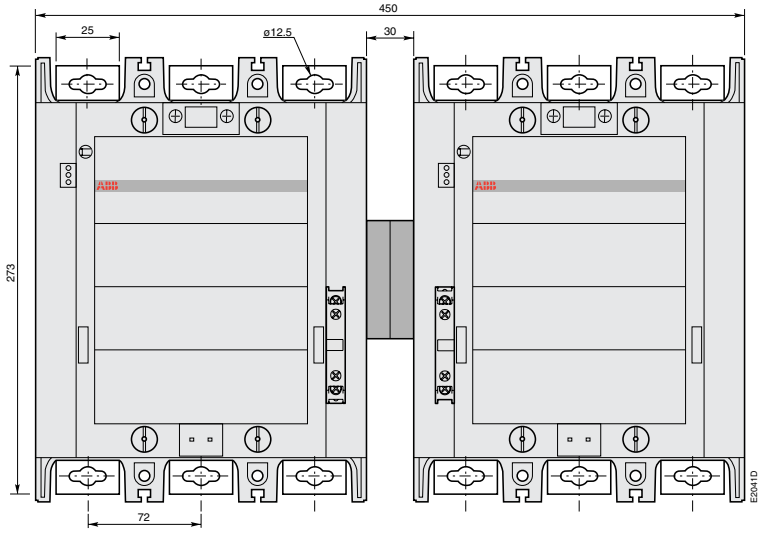
Dimensions (in mm)

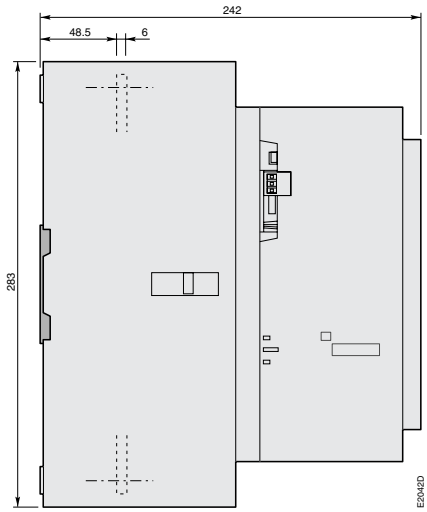


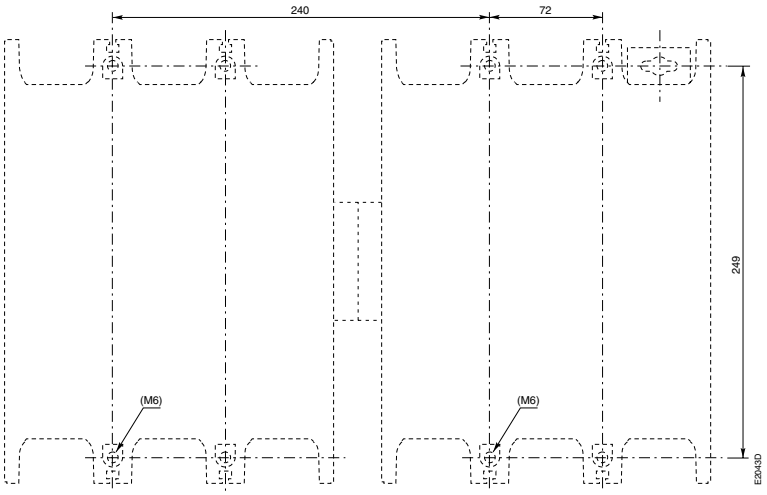
AF 580, AF 750 c/w 1 x **CAL18**
+ LW 750 terminal enlargement

Detailed dimension drawings available in DXF and PDF formats.

Dimensions (in mm)



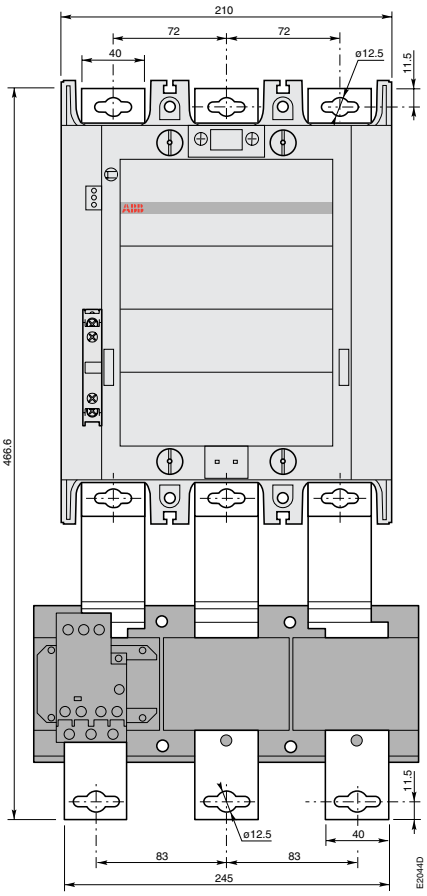


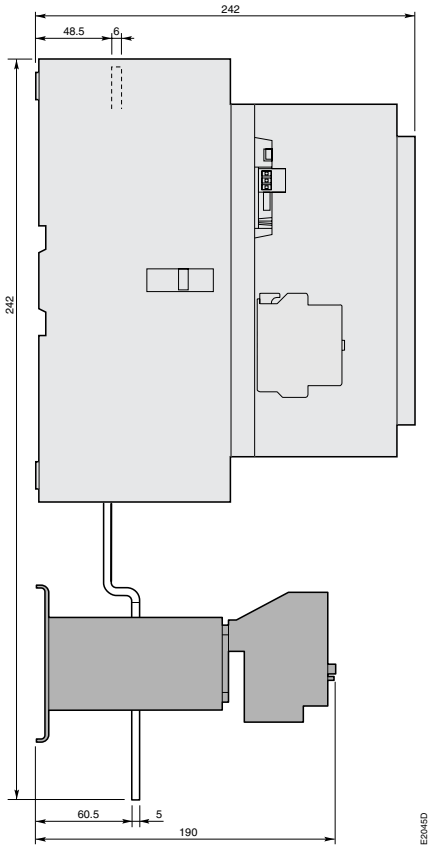


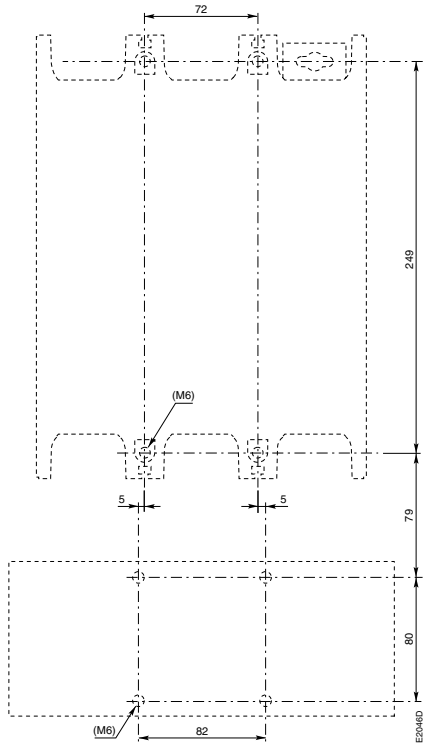
AF 580, AF 750 c/w 1 x **CAL18**
+ VM 750H mechanical interlock unit

Detailed dimension drawings available in DXF and PDF formats.

Dimensions (in mm)



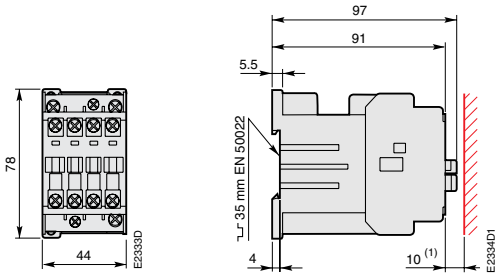




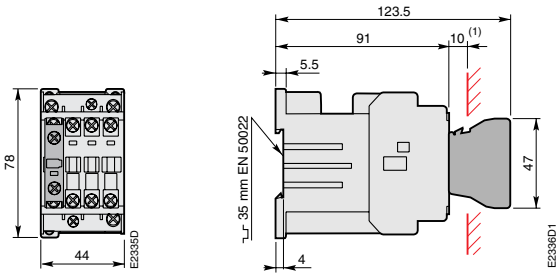
AF 580, AF 750 c/w 1 x **CAL18**
+ E 800 DU electronic O/L relay

8

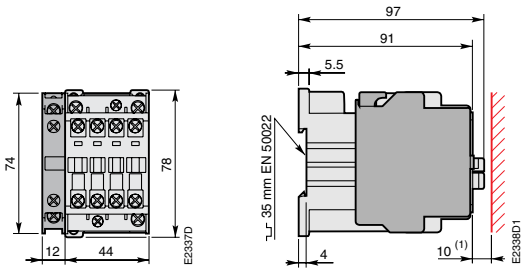
Dimensions (in mm)



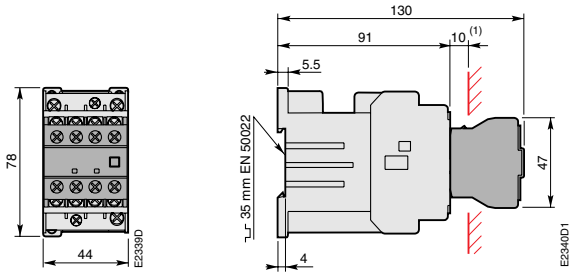
AL 9 ... AL 16, NL
TAL 9 ... TAL 16, TNL



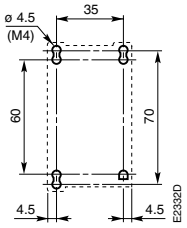
AL 9 ... AL 16, NL
TAL 9 ... TAL 16, TNL
+ CA 5 front-mounted 1-pole auxiliary contact block



AL 9 ... AL 16, NL
TAL 9 ... TAL 16, TNL
+ CAL 5 side-mounted 2-pole auxiliary contact block



AL 9 ... AL 16, NL
TAL 9 ... TAL 16, TNL
+ CA 5 front-mounted 4-pole auxiliary contact block

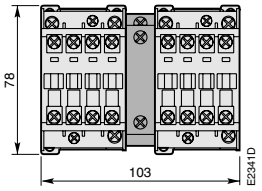


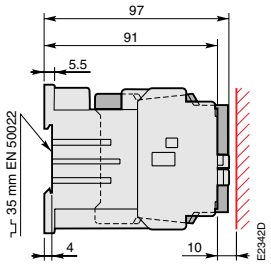
AL 9 ... AL 16, NL
TAL 9 ... TAL 16, TNL
drilling plan

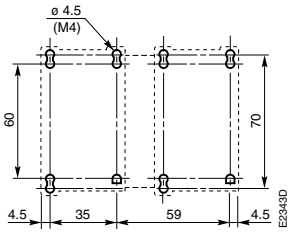
(1) Note: No recommended distance to earth is applicable to "NL.., TNL.." contactor relays.

Detailed dimension drawings available in DXF and PDF formats.

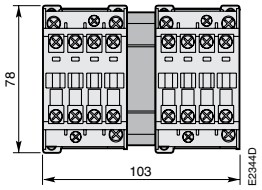
Dimensions (in mm)

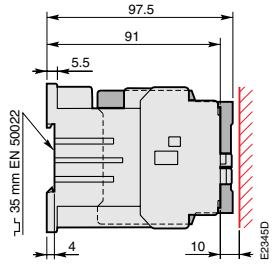


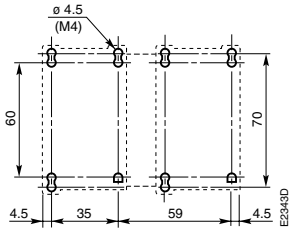




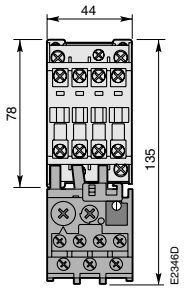
AL 9 ... AL 16
TAL 9 ... TAL 16
+ VE 5-1 electrical and mechanical interlock unit

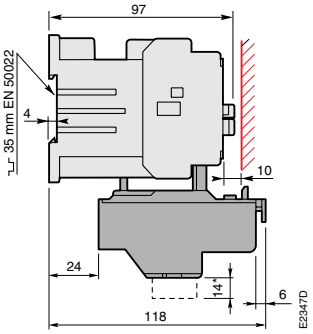


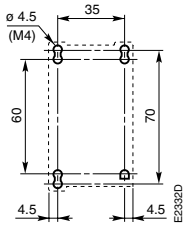




AL 9 ... AL 16
TAL 9 ... TAL 16
+ VM 5-1 mechanical interlock unit







AL 9, AL 12, AL 16 - 3-pole
AL 9 Z, AL 12 Z, AL 16 Z - 3-pole
TAL 9, TAL 12, TAL 16 - 3-pole
+ TA 25 DU thermal O/L relay

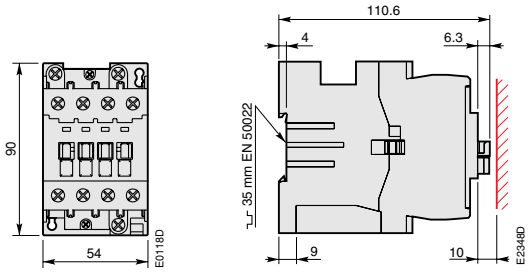
* For TA 25 DU 32 only

Detailed dimension drawings available in DXF and PDF formats.

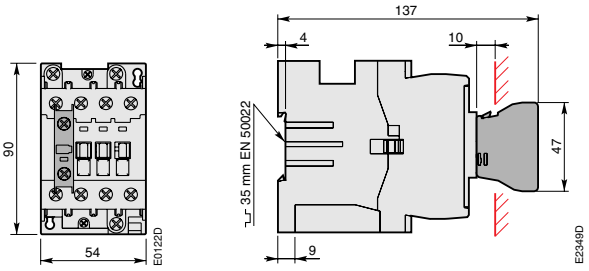
8

AL 26, 3-pole Contactor
TAL 26, 3-pole Contactor

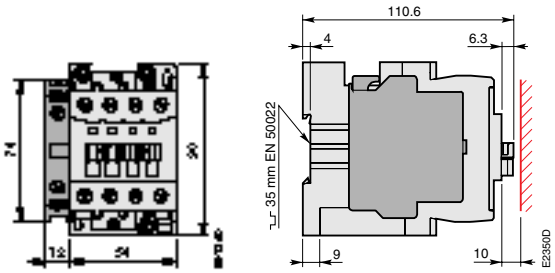
Dimensions (in mm)



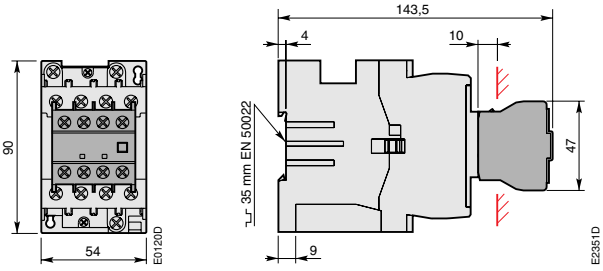
AL 26, TAL 26



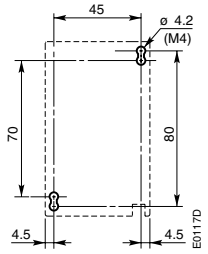
AL 26, TAL 26
+ CA 5 front-mounted 1-pole auxiliary contact block



AL 26, TAL 26
+ CAL 5 side-mounted 2-pole auxiliary contact block



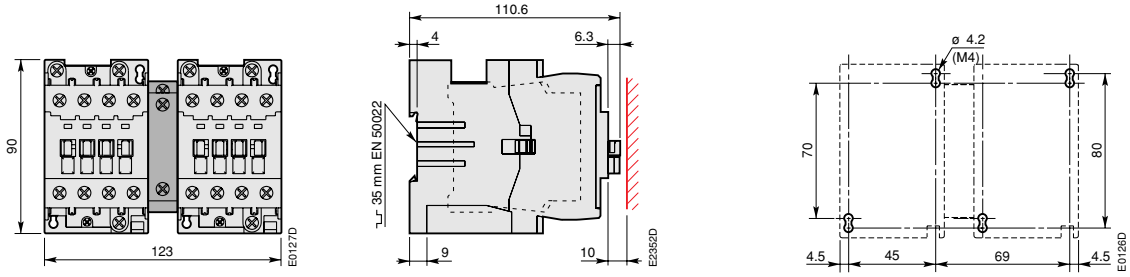
AL 26, TAL 26
+ CA 5 front-mounted 4-pole auxiliary contact block



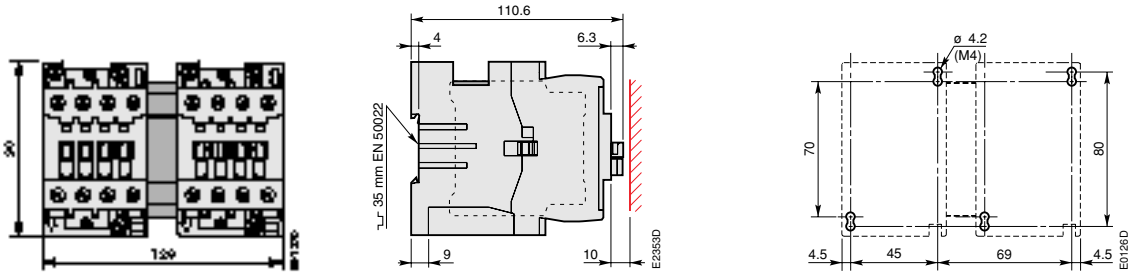
AL 26, TAL 26 - drilling plan

Detailed dimension drawings available in DXF and PDF formats.

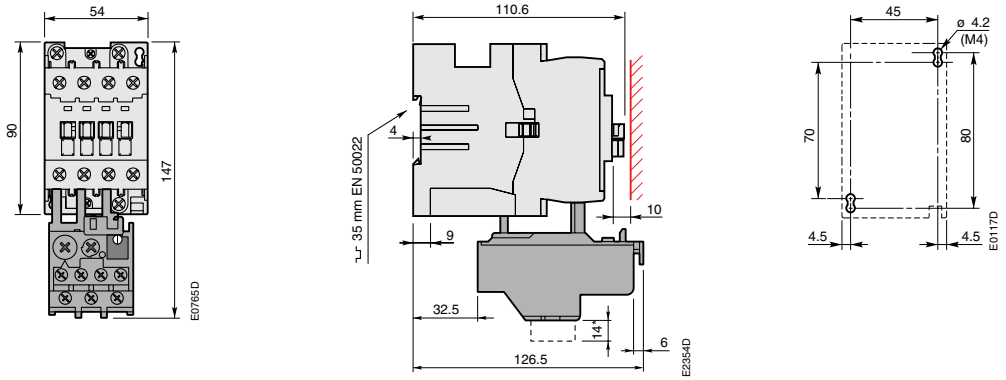
Dimensions (in mm)



AL 26, TAL 26
+ VE 5-1 electrical and mechanical interlock unit



AL 26, TAL 26
+ VM 5-1 mechanical interlock unit

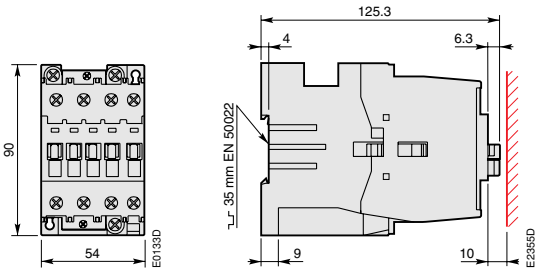


AL 26, TAL 26 - 3-pole
+ TA 25 DU thermal O/L relay

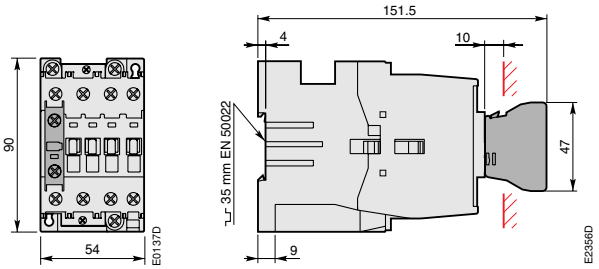
* For TA 25 DU 32 only

Detailed dimension drawings available in DXF and PDF formats.

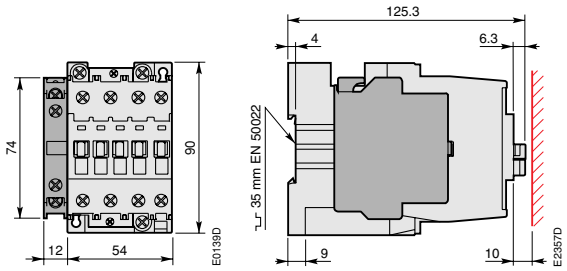
Dimensions (in mm)



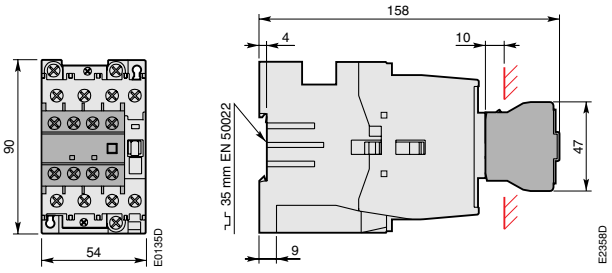
AL 30, AL 40, TAL 30, TAL 40



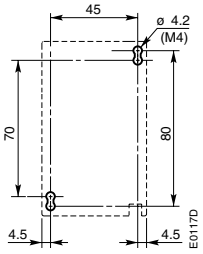
AL 30, AL 40, TAL 30, TAL 40
+ CA 5 front-mounted 1-pole auxiliary contact block



AL 30, AL 40, TAL 30, TAL 40
+ CAL 5 side-mounted 2-pole auxiliary contact block



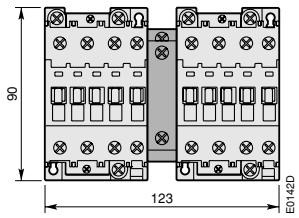
AL 30, AL 40, TAL 30, TAL 40
+ CA 5 front-mounted 4-pole auxiliary contact block

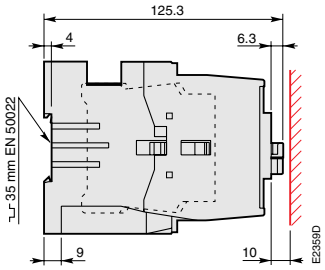


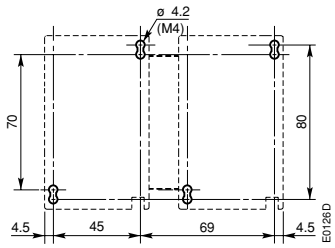
AL 30, AL 40, TAL 30, TAL 40 - drilling plan

Detailed dimension drawings available in DXF and PDF formats.

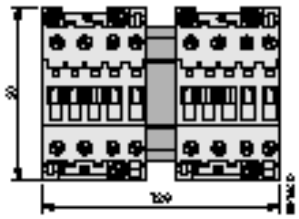
Dimensions (in mm)

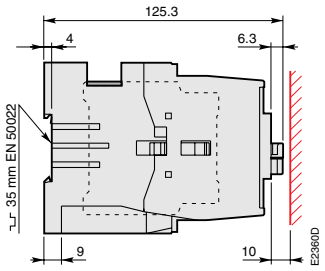


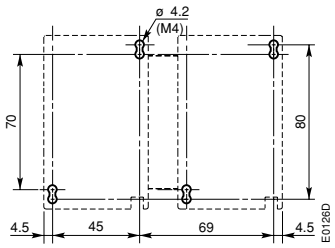




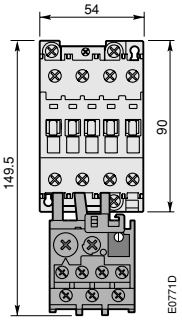
AL 30, AL 40, TAL 30, TAL 40
+ VE 5-1 electrical and mechanical interlock unit

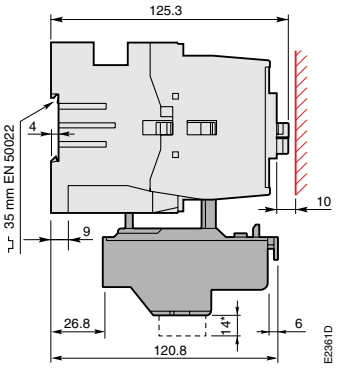


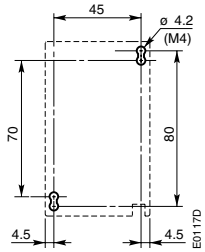




AL 30, AL 40, TAL 30, TAL 40
+ VM 5-1 mechanical interlock unit

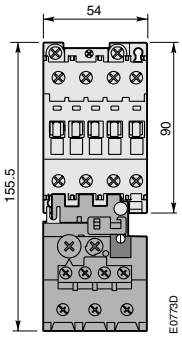


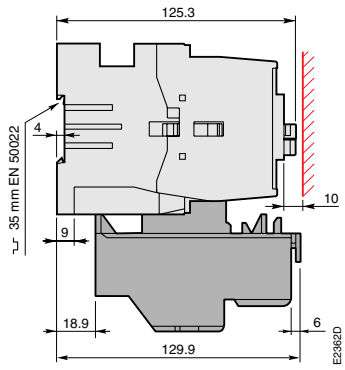


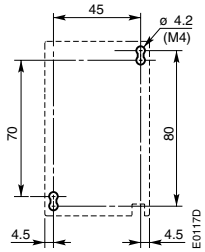


AL 30, AL 40, TAL 30, TAL 40
+ TA 25 DU thermal O/L relay

* For TA 25 DU 32 only





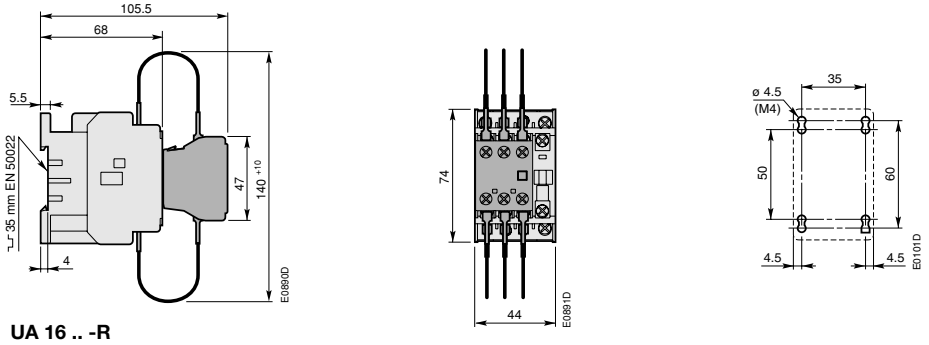


AL 30, AL 40, TAL 30, TAL 40
+ TA 42 DU thermal O/L relay

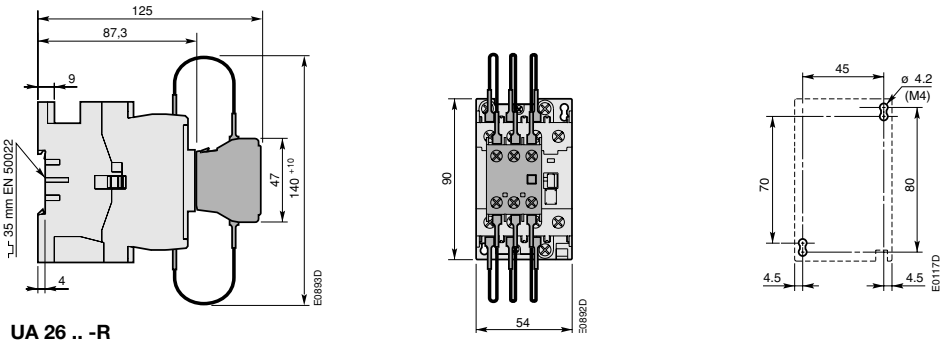
Detailed dimension drawings available in DXF and PDF formats.

8

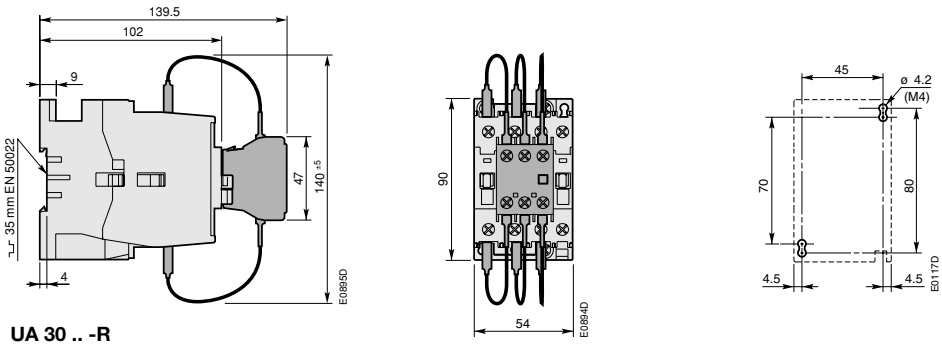
Dimensions (in mm)



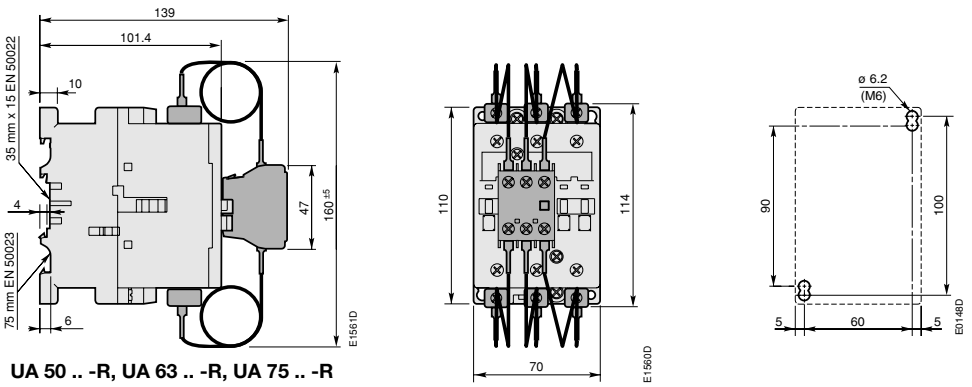
UA 16 .. -R



UA 26 .. -R



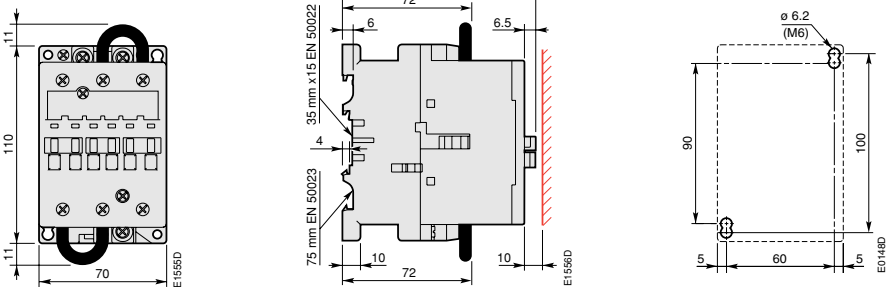
UA 30 .. -R



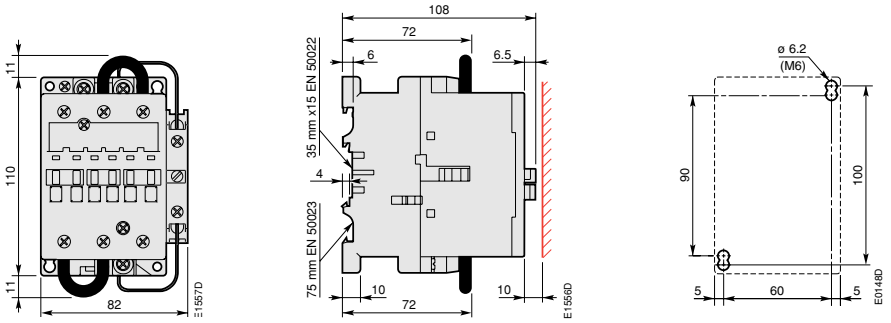
UA 50 .. -R, UA 63 .. -R, UA 75 .. -R

Detailed dimension drawings available in DXF and PDF formats.

Dimensions (in mm)



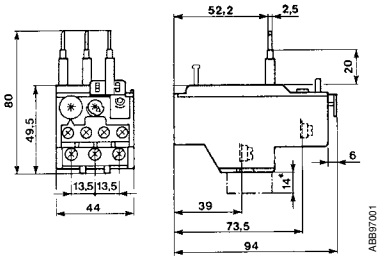
GA 75



GAE 75, GTAE 75

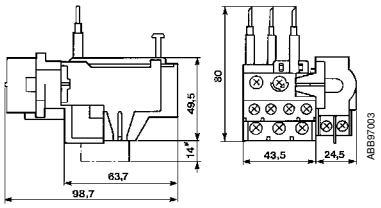
Detailed dimension drawings available in DXF and PDF formats.

Dimensions (in mm)



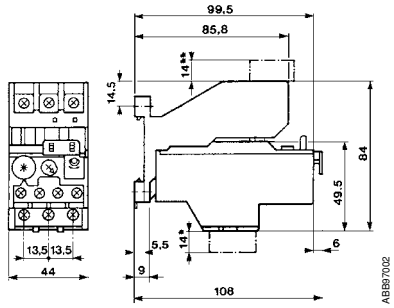
TA 25 DU

* For TA 25 DU 32



TA 25 DU + DS 25-A

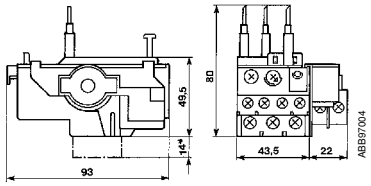
* For TA 25 DU 32



TA 25 DU + DB 25

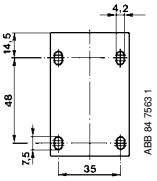
* For TA 25 DU 32

** For DB 25/32 A mounting kit

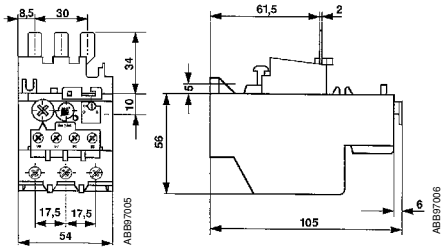


TA 25 DU + DR 25-A

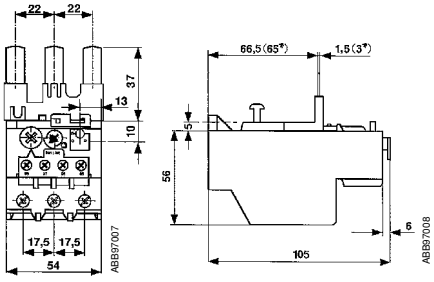
* For TA 25 DU 32



Drilling plan
(TA 25 DU + DB 25/25 A
or DB 25/32 A
for independent mounting)

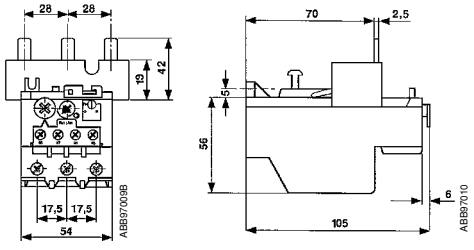


TA 42 DU

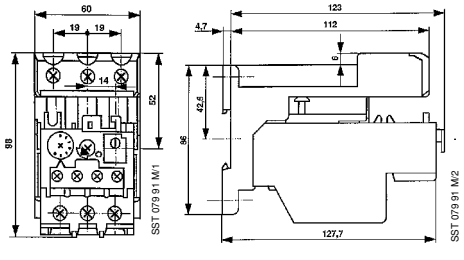


TA 75 DU

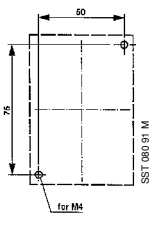
* For TA 75 DU 80



TA 80 DU



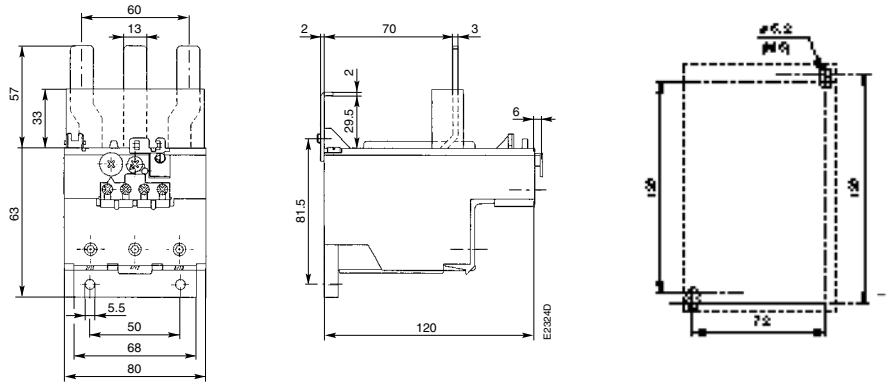
TA 42 DU, TA 75 DU, TA 80 DU + DB 80



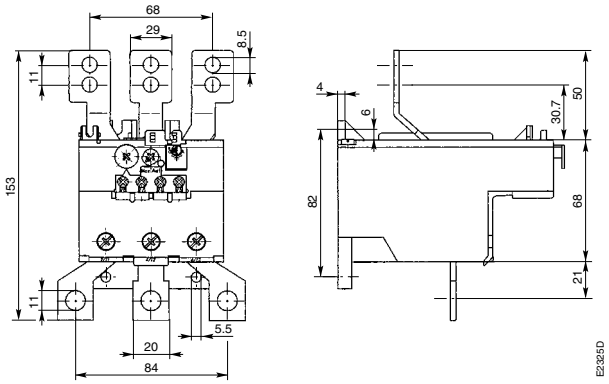
Drilling plan
(TA 42 DU, TA 75 DU
and TA 80 DU + DB 80
for independent mounting)

Detailed dimension drawings available in DXF and PDF formats.

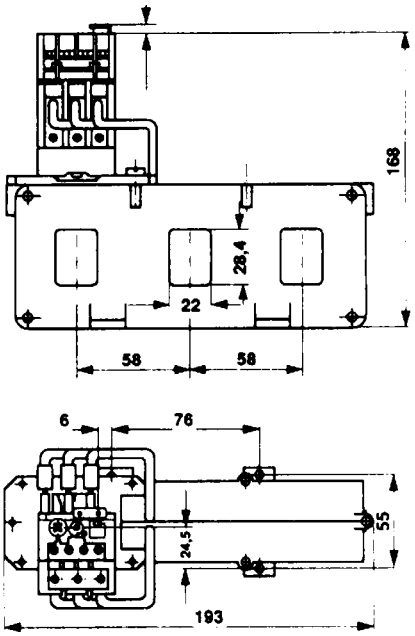
Dimensions (in mm)



TA 110 DU



TA 200 DU



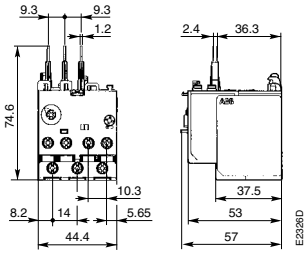
TA 450 DU/SU

Detailed dimension drawings available in DXF and PDF formats.

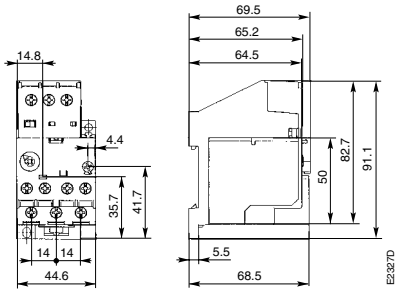
8

Electronic overload relays
Dimensions

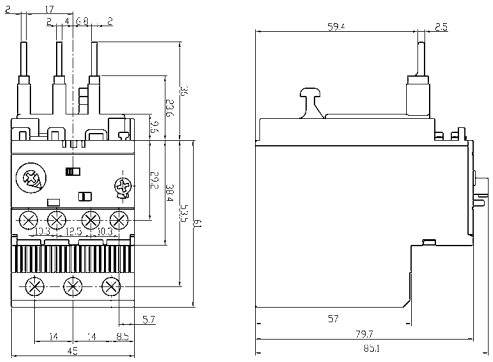
E16DU



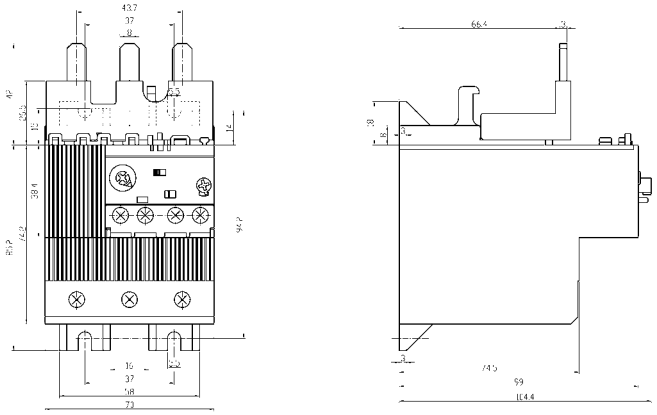
E16DU + DB16E



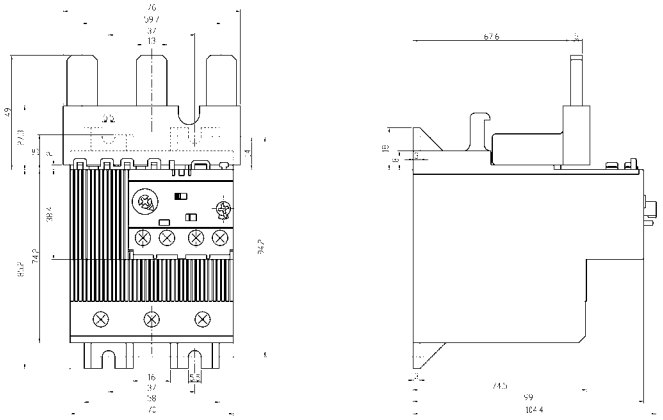
E45DU



E80DU

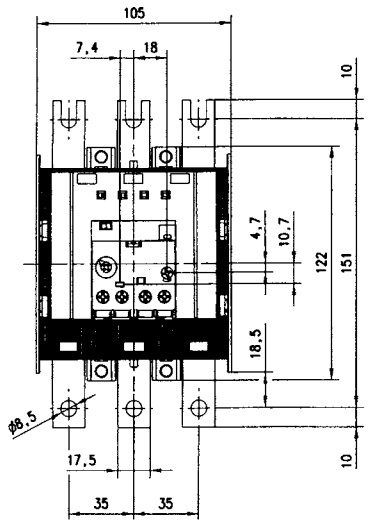


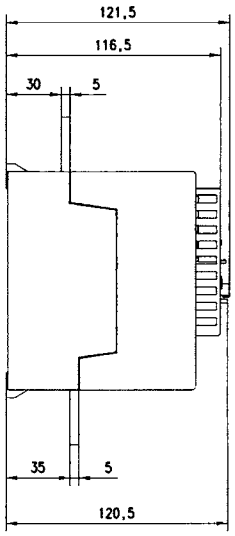
E140DU

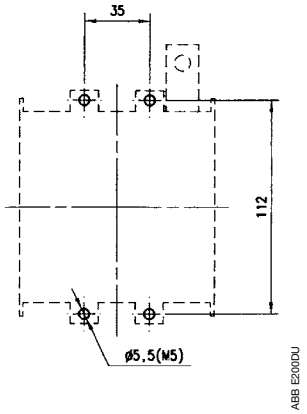


Detailed dimension drawings available in DXF and PDF formats.

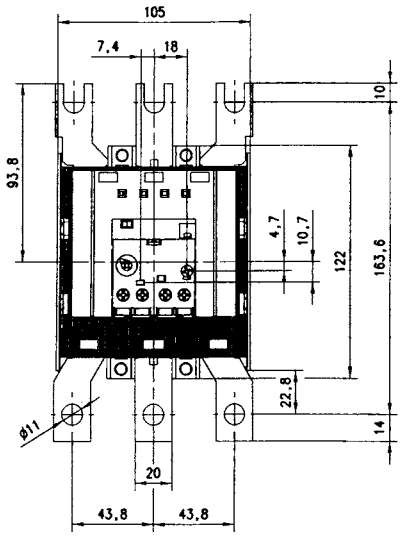
E200DU

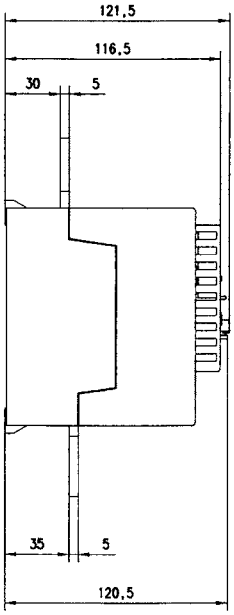


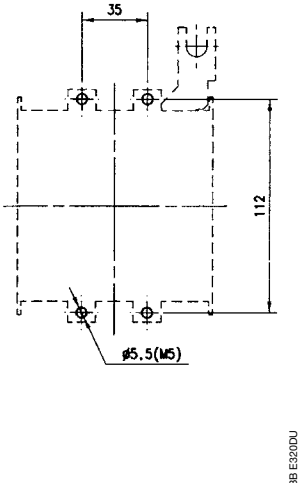




E320DU



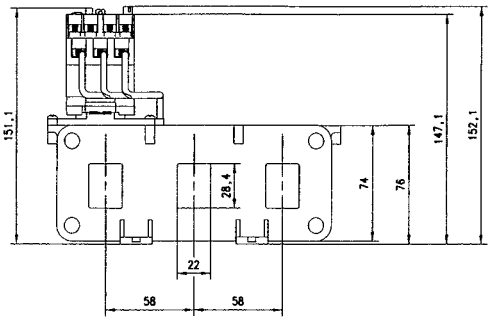


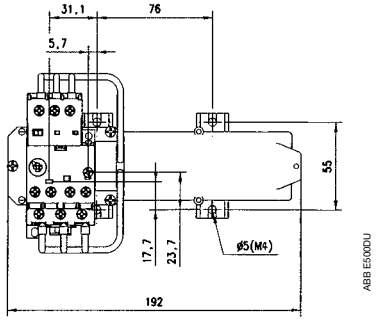


Detailed dimension drawings available in DXF and PDF formats.

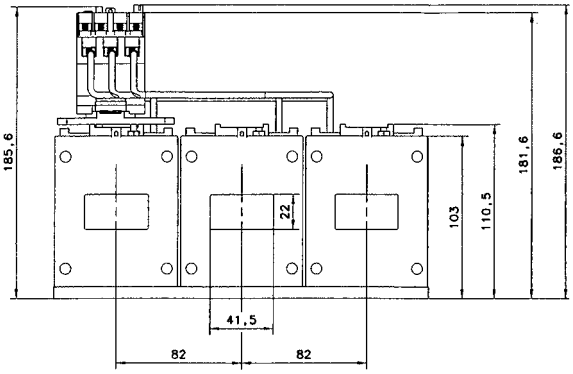
Electronic overload relays
Dimensions

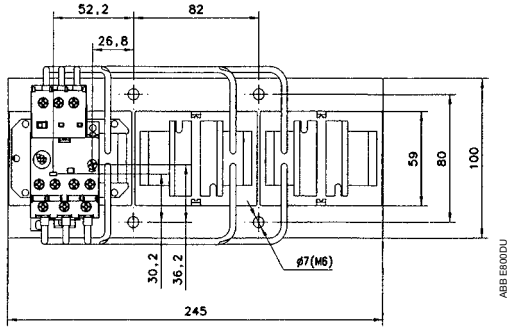
E500DU



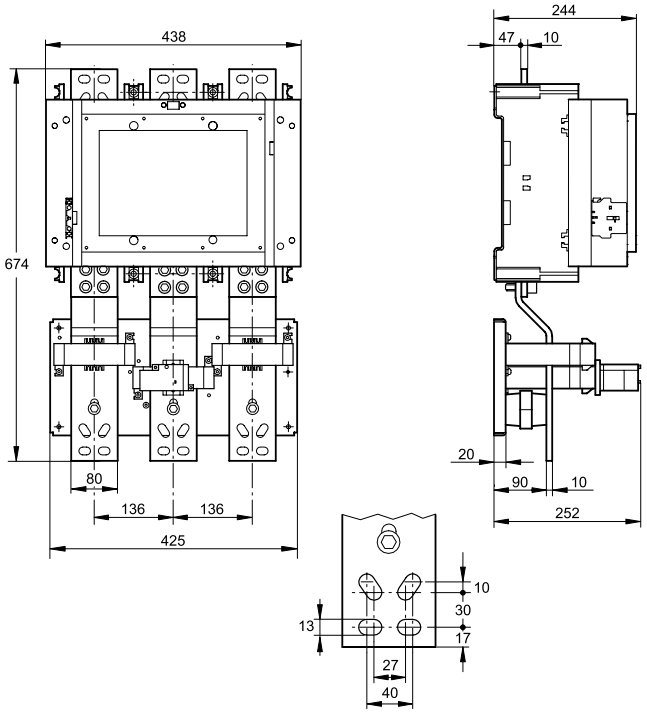


E800DU

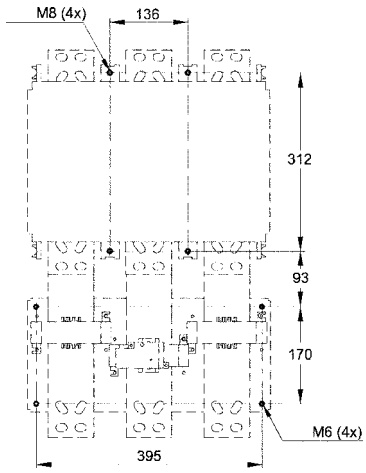




AF1350 / AF1650 + E1250DU

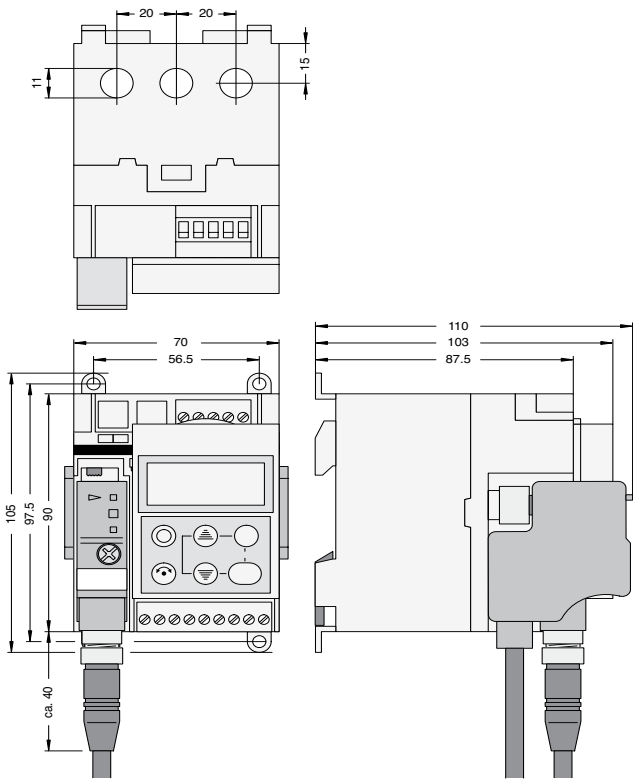


Drilling plan



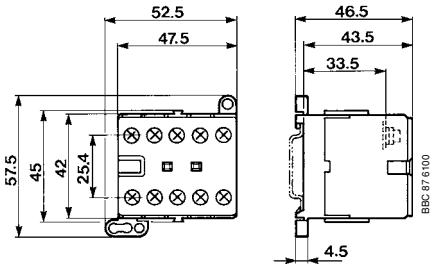
Detailed dimension drawings available in DXF and PDF formats.

UMC22-FBP

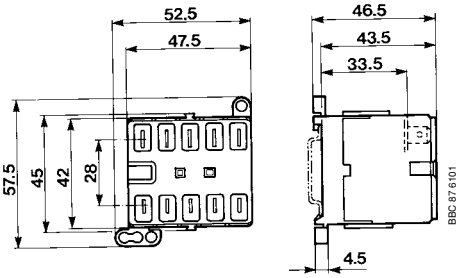


Detailed dimension drawings available in DXF and PDF formats.

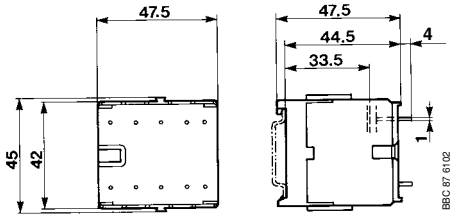
Dimensions (in mm)



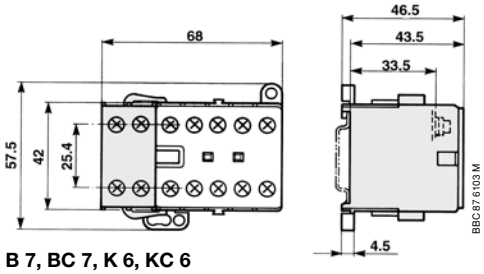
B 7, BC 7, K 6, KC 6
screw connection



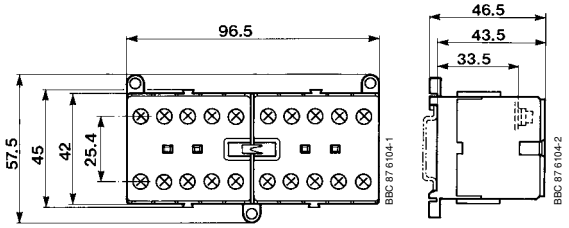
B 7, BC 7, K 6, KC 6
flat pin connection



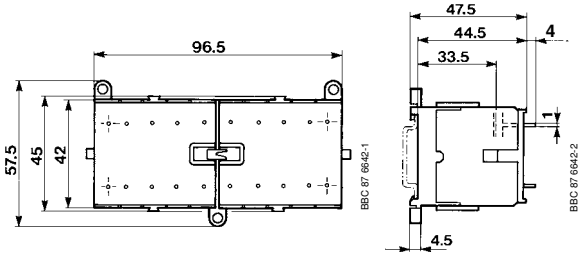
B 7, BC 7, K 6, KC 6
soldering pin connection



B 7, BC 7, K 6, KC 6
+ CA 6 auxiliary contact block

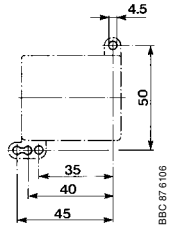


VB 7, VBC 7 compact reversing contactor
screw connection

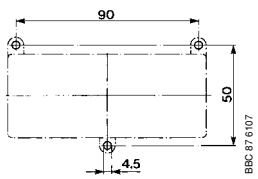


VB 7, VBC 7 compact reversing contactor
soldering pin connection

Drilling plans for M4 fixing screws

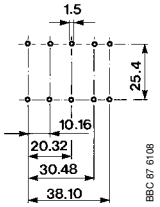


B 7, BC 7,
K 6, KC 6

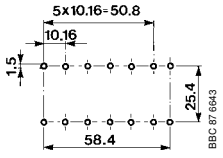


VB 7, VBC 7,
VB 7A, VBC 7A

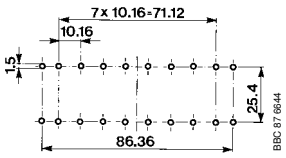
Drilling plans for printed circuit



Standard
4-pole device



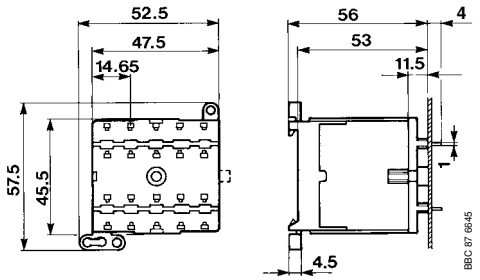
Standard device with
auxiliary contact block



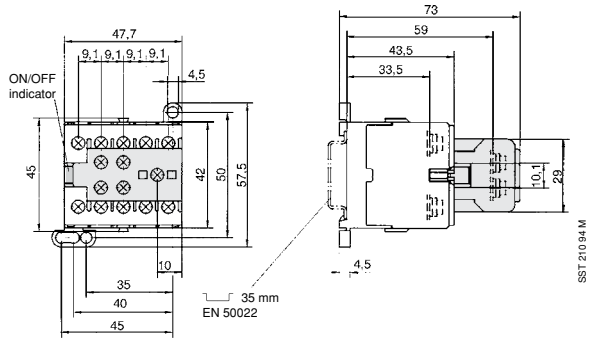
Compact reversing
contactor

Detailed dimension drawings available in DXF and PDF formats.

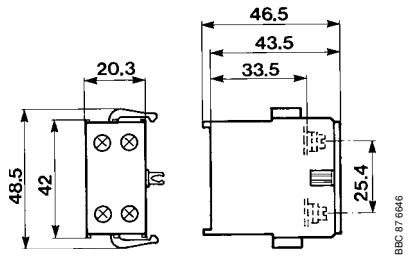
Dimensions (in mm)



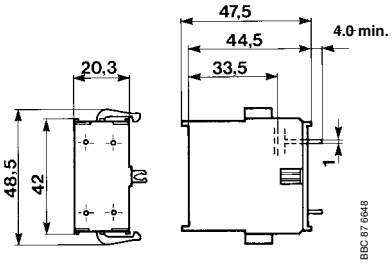
B 7- F + LB 6



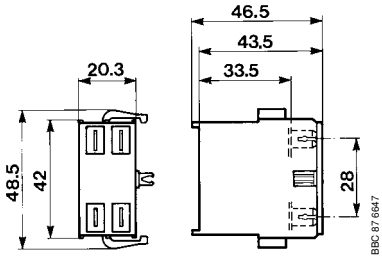
B 7, BC 7, K 6, KC 6
+ CAF 6 front-mounted auxiliary contact block



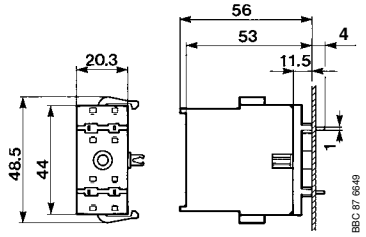
CA 6 auxiliary contact block
screw connection



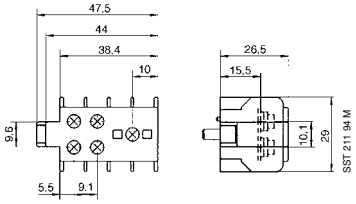
CA 6- P auxiliary contact block
soldering pin connection



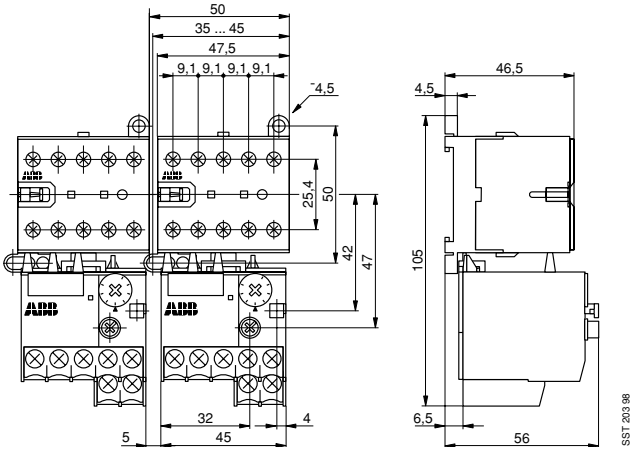
CA 6- F auxiliary contact block
flat pin connection



CA 6 auxiliary contact block
+ LB 6- CA



CAF 6 auxiliary contact block
screw connection



B 7
+ T 7 DU thermal O/L relay

Detailed dimension drawings available in DXF and PDF formats.

8