

Block Contactors

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AF 50 ... AF 2050 3-pole Contactors

a.c. / d.c. Operated - Large Voltage Range

Electronic Coil Interface



Application

AF 50 ... AF 2050 contactors are mainly used for controlling 3-phase motors and generally for controlling power circuits up to 600 V a.c. or 200 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 2050** 3-pole contactors are 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**.

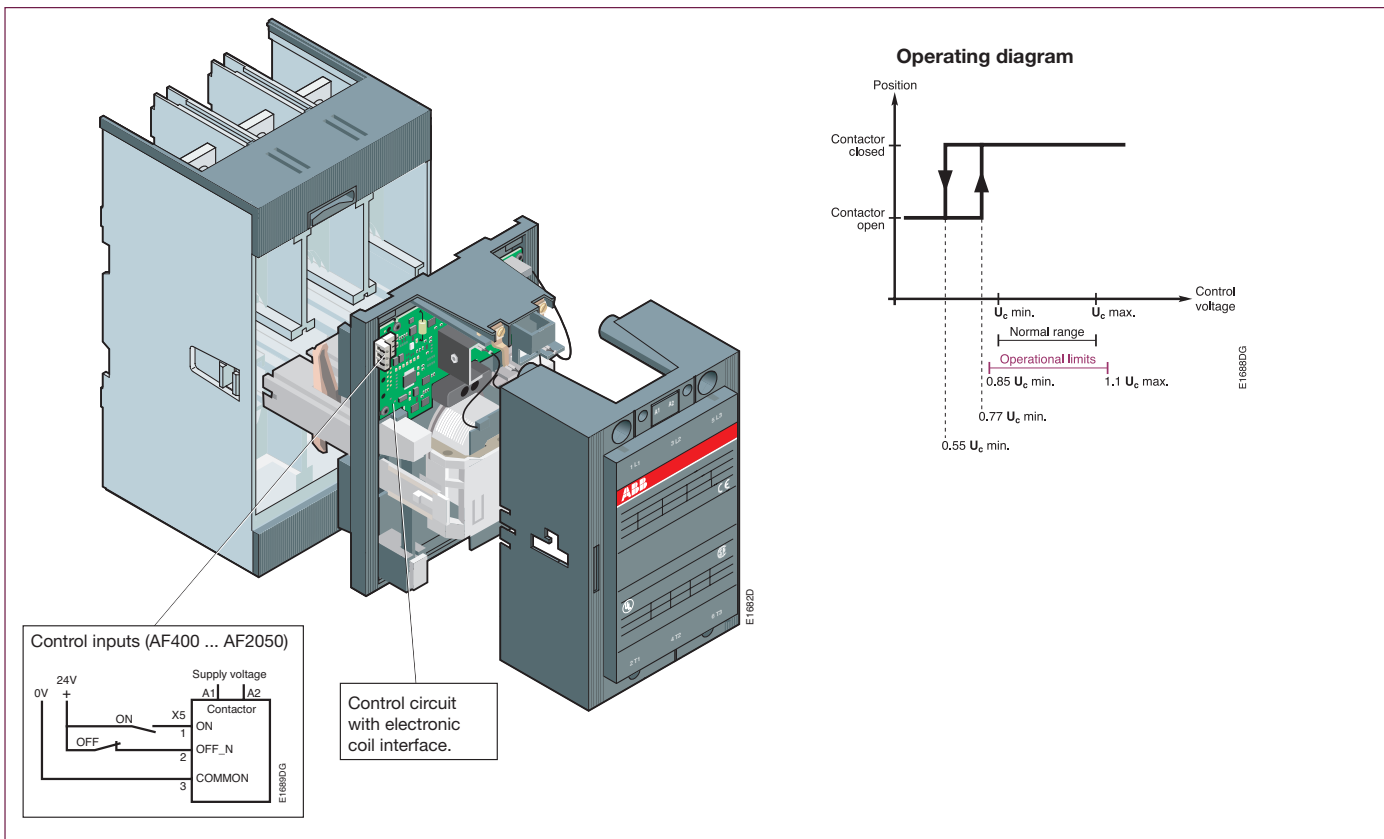
Advantages

- 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 2050** 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 (see section 4)



AF 50 ... AF 2050 3-pole Contactors

a.c. / d.c. Operated - Large Voltage Range

Electronic Coil Interface





cULus



CE



AF 50-30



AF 460-30-11



AF 750-30-11

Coil voltages and codes
AF 50 ... AF 300

Voltage V - 50Hz/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 2050

Voltage V - 50Hz/60Hz	Voltage V - d.c.	Code □ □
-	24 ... 60	7 2 ⁽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 available for AF 1350 ... AF 2050

Ordering Details : Non-Reversing

General Purpose Current	Motor Switching Current	Maximum Motor Horsepower Ratings				Auxiliary Contacts		Order Code state coil voltage code □ □ (see table below)	List Price
		208 V	240 V	480 V	600 V				
AC-1	AC-3								
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	
2100	—	—	—	—	—	1	1	AF2050-30-11-70	

Ordering Details : Reversing with Mechanical and Electrical Interlock

General Purpose Current	Motor Switching Current	Maximum Motor Horsepower Ratings				Auxiliary Contacts		Order Code state coil voltage code □ □ (see table below)	List Price
		208 V	240 V	480 V	600 V				
AC-1	AC-3								
80	54	15	20	40	50	1	1	AF50R-30-11-□□	
90	65	20	25	50	60	1	1	AF63R-30-11-□□	
105	80	25	30	60	75	1	1	AF75R-30-11-□□	
125	95	30	30	60	75	1	1	AF95R-30-11-□□	
140	110	30	40	75	100	1	1	AF110R-30-11-□□	
230	130	40	50	100	125	1	1	AF145R-30-11-□□	
250	156	50	60	125	150	1	1	AF185R-30-11-□□	
300	192	60	75	150	200	1	1	AF210R-30-11-□□	
350	248	75	100	200	250	1	1	AF260R-30-11-□□	
400	302	100	100	250	300	1	1	AF300R-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-□□	
1350	960	—	400	800	1000	1	1	AF1350R-30-11-70	
1650	1100	—	450	900	1150	1	1	AF1650R-30-11-70	
2100	—	—	—	—	—	1	1	AF2050R-30-11-70	

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.

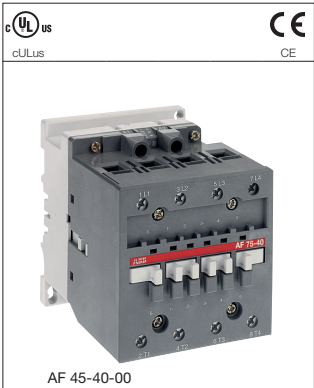
Definitions:

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".

AF 4-pole Contactors

a.c. / d.c. Operated - Electronic Interface



AF 45-40-00

Coil voltages and codes: AF...

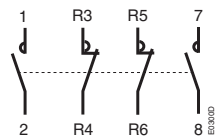
Voltage 50/60Hz	Voltage V d.c.	Code
—	20 ... 60	7 2 ⁽¹⁾
48 ... 130	48 ... 130	6 9
100 ... 250	100 ... 250	7 0

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

Ordering Details: AF...

CSA/UL Ratings			
Rated Operational Current	Auxiliary Contacts Fitted	Order Code	List Price
AC-1 θ < 40 °C A	 	state coil voltage code ☐ ☐ (see table below)	
4 N.O. main poles			
65	— —	AF45-40-00- ☐ ☐	
80	— —	AF50-40-00- ☐ ☐	
105	— —	AF75-40-00- ☐ ☐	
2 N.O. + 2 N.C. main poles			
65	— —	AF45-22-00- ☐ ☐	
105	— —	AF75-22-00- ☐ ☐	

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



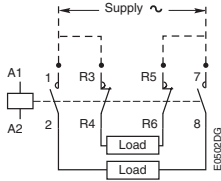
These contactors are suitable for controlling 2 separate circuits, i.e. 2 loads with 2 separate supplies, or 1 circuit comprising 2 separate loads with a single supply (see diagrams below). When the contactor operates there is no mechanical overlapping between the N.O. poles and the N.C. poles: BREAK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



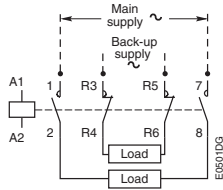
These contactors are not suitable for a reversing starter or star-delta starter or for controlling a single load from 2 separate supplies.

Block diagrams

● Single supply and 2 separate loads



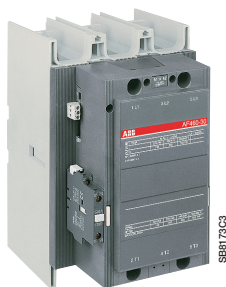
● 2 separate supplies and 2 separate loads



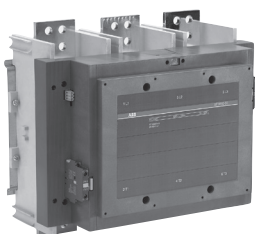
A50N - AF1650N, AC/DC operated NEMA rated, 3 pole



AF 145N4



AF 460N6



AF 1650N8

Ordering Details: Non-Reversing

CSA/UL Ratings

NEMA Size	Continuous Currents	Maximum Motor Horsepower Ratings				Auxiliary Contacts		Order Code state coil voltage code ☐ ☐ (see table below)	List Price
		208 V	240 V	480 V	600 V				
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	AF260N5-30-11- ☐ ☐	
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 Currents	Maximum Motor Horsepower Ratings				Auxiliary Contacts		Order Code state coil voltage code ☐ ☐ (see table below)	List Price
		208 V	240 V	480 V	600 V				
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	AF260N5R-30- ☐ ☐	
6	540	150	200	400	400	1	1	AF460N6R-30- ☐ ☐	
7	810	—	300	600	600	1	1	AF750N7R-30- ☐ ☐	
8	1215	—	450	900	900	1	1	AF1650N8R-30- ☐ ☐	

Coil voltages and codes A50N ... AF260N

Voltage V - 50Hz/60Hz	Voltage V - d.c.	Code ☐ ☐
—	24 ... 60	7 2 ⁽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 available for AF 1350 ... AF 2050

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

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

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

AF... Contactors with electronic coil interface: electromagnetic compatibility and A or B environment definitions page 2/3.

(2) Only coil available for AF1650N

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 (see 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 $U_e < 500$ V and 100 000 operating cycles for $U_e \geq 500$ V.

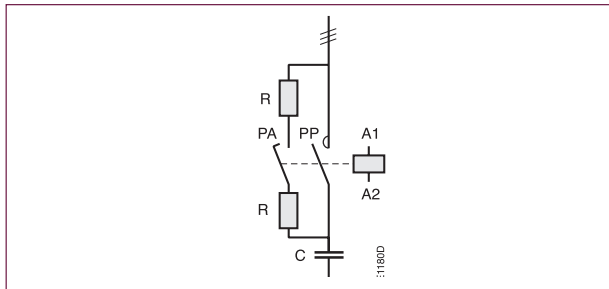
Description

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.

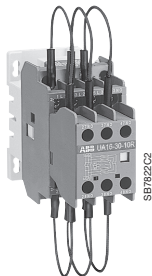


Selection Table

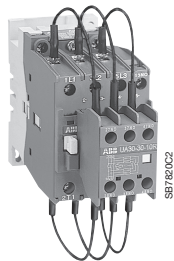
Type	Powers in kvar - 50/60 Hz (AC-6b)			Max. Permissible Peak Current $\hat{I}$	J Type Fuses Max. (*)
	240 V	480 V	600 V		
UA 16-30-10-RA	8	16	20	No limit	80
UA 26-30-10-RA	10	22	27		125
UA 30-30-10-RA	14	28	35		200
UA 50-30-00-RA	25	50	62		200
UA 63-30-00-RA	27.5	55	70		200
UA 75-30-00-RA	32	64	80		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.

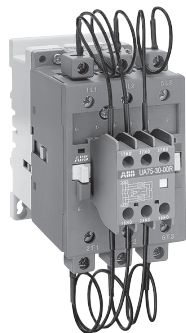
UA...-RA 3-pole Contactors for Capacitor Switching Peak Current $\hat{I} \geq 100$ Times the rms Current



UA 16-30-10-RA



UA 30-30-10-RA



UA 75-30-00-RA

Ordering Details

Power kvar			Auxiliary Contacts		Order Code	List Price
240 V	480 V	600 V			state coil voltage code □□ (see table below)	
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	1	1	UA50-30-00-RA□□	
27.5	55	70	1	1	UA63-30-00-RA□□	
32	64	80	1	1	UA75-30-00-RA-□□	
40	80	100	1	1	UA95-30-00-RA□□	
45	95	120	1	1	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 2/0

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	240	240	240	240
Electrical durability AC-6b - operating cycles at U _e ≤ 440 V - operating cycles at U _e ≥ 500 V	250 000 100 000	250 000 100 000	250 000 100 000	250 000 100 000	250 000 100 000
Connecting capacity (min. ... max.) Main conductors (poles) Rigid solid (≤ 12 AWG) Rigid stranded (≥ 10 AWG)	16 ... 12 —	14 ... 10 —	12 ... 6 12 ... 6 + 12 ... 10	8 ... 1/0 8 ... 6 + 10 ... 6	8 ... 3/0 10 ... 2
Flexible with cable end 1 X AWG 2 X AWG	18 ... 14 —	16 ... 12 —	12 ... 8 12 ... 8 + 12	8 ... 2 8 ... 6 + 10 ... 8	8 ... 2/0 10 ... 3
Degree of protection acc. to IEC 60947-1, EN 60947-1 and IEC 60529, EN 60529					
- Main terminals - Coil terminals - Auxiliary terminals	IP 20 IP 20 IP 20	IP 20 IP 20 IP 20	IP 10 IP 20 IP 20	IP 10 IP 20 IP 20	IP 10 IP 20 IP 20

DISCOUNT SCHEDULE DS-A1

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 $\approx$ 1 ms,
- DC-3: shunt motors:.....L/R $\approx$ 2 ms,
- DC-5: series motors:L/R $\approx$ 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**.

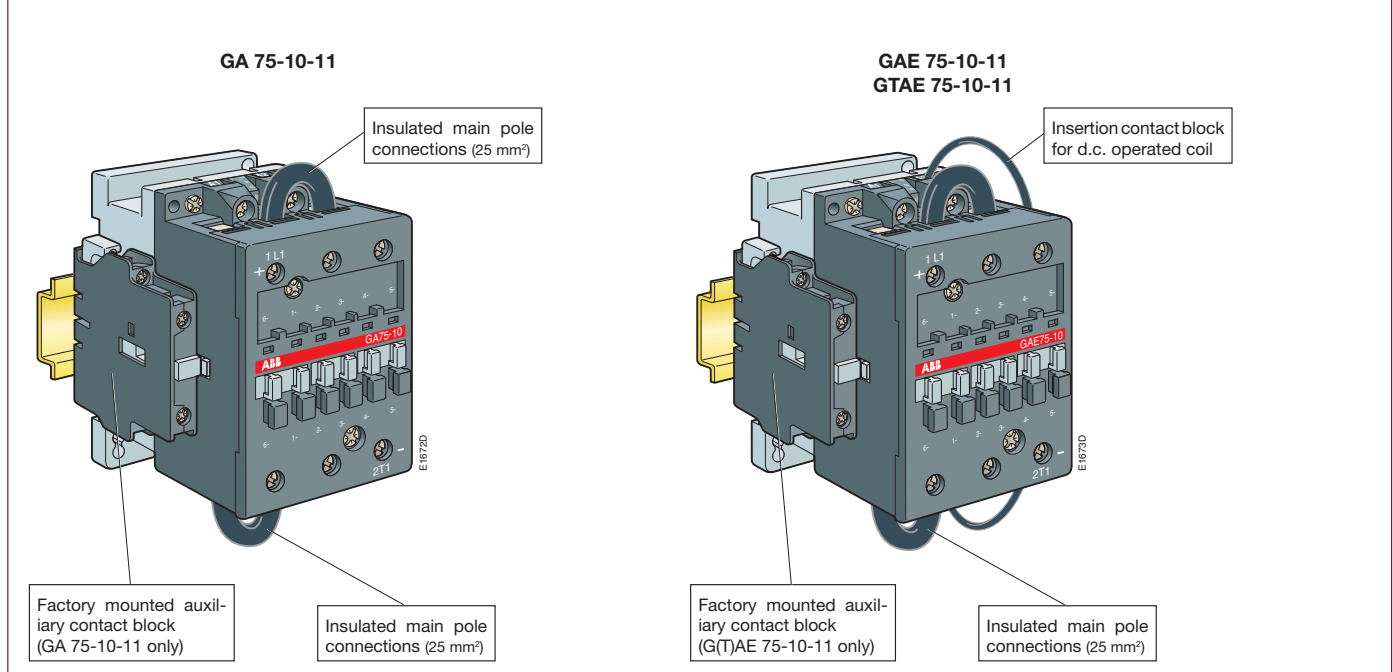
Remark: Contacts cannot be changed.

- 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 $U_i = 1000$ 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 I_e

DC-1	$\theta \leq 40\text{ }^{\circ}\text{C}$	$U_e \leq 400\text{ V}$	100 A
	$\theta \leq 40\text{ }^{\circ}\text{C}$	$U_e \leq 600\text{ V}$	75 A
	$\theta \leq 40\text{ }^{\circ}\text{C}$	$U_e \leq 1000\text{ V}$	35 A
DC-3	–	$U_e \leq 440\text{ V}$	85 A
DC-5	–	$U_e \leq 220\text{ V}$	85 A
	–	$U_e \leq 440\text{ V}$	35 A

- Accessories: a wide range of accessories are available (see section 4)

GA 75, GAE 75 and GTAE 75 contactors specific design



GA 75, GAE 75 and GTAE 75

Contactors for d.c. Switching



Ordering Details

Rated Operational Current General Use CSA/UL			Auxiliary Contacts	Order Code	List Price
440 V d.c. A	600 V d.c. A	1000 V d.c. A			
100	75	35		state coil voltage code ☐ ☐ (see table below)	
100	75	35	— —	GA75-10-00- ☐ ☐	
			1 1	GA75-10-11- ☐ ☐	
100	75	35	— —	GAE75-10-00- ☐ ☐	
			1 1	GAE75-10-11- ☐ ☐	
100	75	35	— —	GTAE75-10-00- ☐ ☐	
			1 1	GTAE75-10-11- ☐ ☐	

Coil voltages and codes : GA75

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 2/0

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 2/0

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 2/0

Connection Diagrams

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

Three modes are mainly used:

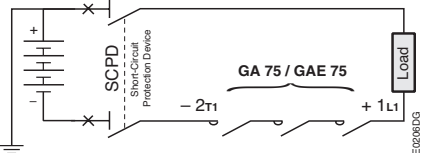
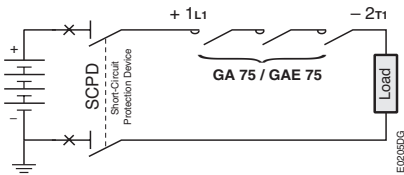
- A** – insulated source, i.e. unearthed (or not connected to the frame),
- B** – source earthed via its central point,
- C** – source earthed via one of its outer poles.

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.

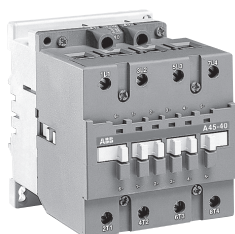


Lighting Circuit Switching

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
Coil voltage and codes same as
page 2/0

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	AF45-40-00-□□L	
65	3	AF50-30-00-□□L	
65	4	AF50-40-00-□□L	
85	3	AF63-30-00-□□L	
105	3	AF75-30-00-□□L	
105	4	AF75-40-00-□□L	
120	3	AF95-30-00-□□L	
200	3	AF145-30-11-□□L	
400	3	AF300-30-11-□□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	AF45L-40-00-□□L	
65	3	AF50L-30-00-□□L	
65	4	AF50L-40-00-□□L	
85	3	AF63L-30-00-□□L	
105	3	AF75L-30-00-□□L	
105	4	AF75L-40-00-□□L	

DISCOUNT SCHEDULE DS-A1

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	List Price
				state coil voltage code □□ (see table below)	
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	List Price
				state coil voltage code □□ (see table below)	
—	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 2/0

Coil voltage and codes: AF 460W

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

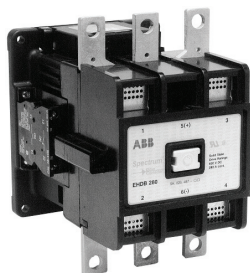
(1) The connection polarities indicated close to the coil terminals must be respected: **A1** for the **positive** pole and **A2** for the **negative** pole.

AF... Contactors with electronic coil interface: electromagnetic compatibility and **A** or **B** environment definitions page 2/3.

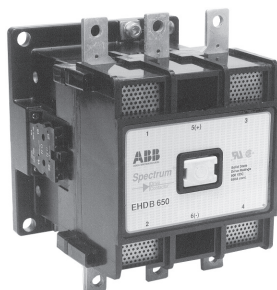
Drive Contactors Type DA, EHDB



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

2 pole (2 NO)

(600V N.O. rating)⁽¹⁾

Amp Rating	Maximum HP Rating			Aux. Contacts Fitted	Order Code	List Price
	240V DC	500V DC	600V DC			
60	15	30	—	1 1	DA75-20-11-□□	
220	60	125	150	1 1	EHDB220C2P-□L	
280	75	150	200	1 1	EHDB280C2P-□L	
360	100	200	250	1 1	EHDB360C2P-□L	
520	150	300	300	1 1	EHDB520C2P-□L	
650	150	400	400	1 1	EHDB650C2P-□L	
800	—	500	600	1 1	EHDB800C2P-□L	
960	—	600	700	1 1	EHDB960C2P-□L	

3 Pole - 60 to 960 A

3 pole (2 NO & 1 NC)

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

Amp Rating	Maximum HP Rating			Maximum Amp Rating N.C. Contact		Aux. Contacts Fitted	Order Code	List Price
	240V DC	500V DC	600V DC	Make	Break			
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) 60Hz	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 2/0

(1) Contactors are supplied standard less lugs

DC Magnet coils (price adder per contactor)

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

Technical Data for Drive Contactors

Type DA, EHDB

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

UL & CSA Technical Data

A/AL - A/AF110

AC & DC Operated

ABB Contactor Frame Size		A / AL	A / AL	A / AL	A / AL	A / AL	A / AL	A / AF	A / AF	A / AF	A / AF	A / AF	A / AF
		9	12	16	26	30	40	45	50	63	75	95	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
	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	—	—
CSA / U.L. maximum amp	240VDC	21	25	30	40	50	60	—	80	89	89	—	—
Lighting — ballast and incandescent	600VAC	15	15	20	35	50	60	65	65	85	105	120	—
Resistive heating applications	600VAC	15	15	20	35	50	60	65	65	85	105	—	—
CSA Elevator ratings													
220 - 240VAC	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	—	—
CSA Elevator ratings in accordance with clause 19.2.2 of CSA B44.1 / ASM A17.5													
200 - 208VAC	H.P. 3 phase	2	3	5	7.5	10	10	—	15	20	25	—	—
220 - 240VAC	H.P. 3 phase	2	3	5	10	10	15	—	20	25	30	—	—
440 - 480VAC	H.P. 3 phase	5	7.5	10	20	25	30	—	40	50	60	—	—
550 - 600VAC	H.P. 3 phase	7.5	10	10	25	30	40	—	50	60	75	—	—
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 - AF2050

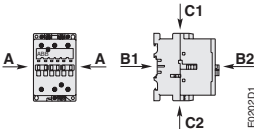
AC & DC Operated

ABB Contactor Frame Size		A / AF	A / AF	A / AF	A / AF	A / AF	AF	AF	AF	AF	AF	AF	AF
		145	185	210	260	300	400	460	580	750	1350	1650	2050
NEMA Size		4	—	—	5	—	—	6	—	7	—	8	—
Number of Poles		3	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	2100
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	—
CSA / U.L. maximum amp	240VDC	—	250	—	—	—	550	650	750	900	1350	1650	1900
	600VDC	—	—	—	—	—	550	650	750	900	1350	1650	1900
Lighting — ballast and incandescent	600VAC	200	—	—	—	400	—	—	—	—	—	—	—
Resisting heating application	600VAC	200	—	—	—	—	—	—	—	—	—	—	—
CSA Elevator ratings													
220 - 240VAC	H.P. 3 phase	—	25	—	—	60	—	—	—	—	—	—	—
440 - 480VAC	H.P. 3 phase	—	60	—	—	125	—	—	—	—	—	—	—
550 - 600VAC	H.P. 3 phase	—	75	—	—	150	—	—	—	—	—	—	—
CSA Elevator ratings in accordance with clause 19.2.2 of CSA B44.1 / ASM A17.5													
200 - 208VAC	H.P. 3 phase	40	50	60	75	100	125	150	—	—	—	—	—
220 - 240VAC	H.P. 3 phase	50	60	75	100	100	150	200	250	300	—	—	—
440 - 480VAC	H.P. 3 phase	100	125	150	200	250	350	400	500	600	—	—	—
550 - 600VAC	H.P. 3 phase	125	150	200	250	300	400	500	600	700	—	—	—
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													
Contactors	lbs.	7.1	7.1	13	13	13	26	26	33	33	—	—	—
Starters	lbs.	9.11	9.11	17.67	17.67	17.67	35	35	45	45	—	—	—
Terminal wire range	AWG	6—	6—	4—	4—	4—	250—	250—	2/0—	2/0—	2/0—	2/0—	2/0—
		250MCM	250MCM	400MCM	400MCM	500MCM	500MCM	500MCM	500MCM	500MCM	500MCM	500MCM	500MCM
Number of wires per phase		1	1	1	1	2	2	2	2	3	6	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	2000/42	2000/42	—
MCCB, MCP, Amps / kA	600VAC	400/35	400/35	800/35	800/35	800/35	800/42	800/42	800/42	800/42	2000/42	2000/42	TBA
Fuse, Amps — type / kA	600VAC	400J/200	400J/200	600J/200	600J/200	600J/200	1000L/80	1000L/80	1200L/80	1200L/80	1600L/80	2000L/80	—

A..., AF..., Contactors

Technical Data

General Technical Data

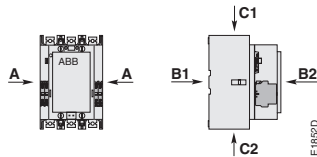
Contactor Types	A...,		9	12	16	26	30	40	45	50	63	75	95	110	
	AF...		—	—	—	—	—	—	45	50	63	75	95	110	
Rated insulation voltage U_i according to IEC 60947-4-1 according to UL/CSA		V V	1000 600	1000 600	1000 600	1000 600	1000 600	1000 600	1000 600	1000 600	1000 600	1000 600	1000 600	1000 600	
Rated impulse withstand voltage $U_{imp.}$		KV	8	8	8	8	8	8	8	8	8	8	8	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 - fitted with thermal O/L relay - without thermal O/L relay - for storage		°C °C °C	"Conditions for use" page 2/22, for control voltage limits and authorized mounting positions -25 to +55 -40 to +70 -60 to +80											-40 to +70	
Climatic withstand		acc. to IEC 60068-2-30 and 60068-2-11 - UTE C 63-100 specification II												acc. to IEC 68-2-30	
Operating altitude		m	≤ 3000												
Shock withstand acc. IEC 60068-2-27 and EN 60068-2-27 Mounting position 1 (see page 2/22)		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													

A... and AF... Contactors

Technical Data

General Technical Data

Contactor Types	A..., AF...												
	A...	145	185	210	260	300	—	—	—	—	—	—	—
Rated insulation voltage U_i according to IEC 60947-4-1 according to UL/CSA		145	185	210	260	300	400	460	580	750	1350	1650	2050
	V	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
	V	600	600	600	600	600	600	600	600	600	600	600	600
Rated impulse withstand voltage U_{imp}		8	8	8	8	8	8	8	8	8	8	8	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 - fitted with thermal O/L relay - without thermal O/L relay - for storage		"Conditions for use" page 2/23, for control voltage limits and authorized mounting positions °C -25 to +55 °C -40 to +70 °C -40 to +70											
Climatic withstand		acc. to IEC 60068-2-30											
Operating altitude		≤ 3000											
Shock withstand acc. IEC 60068-2-27 and EN 60068-2-27 Mounting position 1 (see page 2/23)		1/2 sinusoidal shock for 11 ms: no change in contact position 5 g in all directions (A, B1, B2, C1, C2)											



A..., AF..., Contactors

Technical Data

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_o max.		V	690	690	690	690	690	690	1000 (690 for AF... contactors)					
Rated frequency limits		Hz	25 ... 400	25 ... 400	25 ... 400	25 ... 400	25 ... 400	25 ... 400	25 ... 400	25 ... 400	25 ... 400	25 ... 400	25 ... 400	25 ... 400
Conventional free-air thermal current I_{th} acc. to IEC 60947-4-1 open contactors $\theta \leq 40^\circ\text{C}$ with conductor cross-sectional area		A mm ²	26 4	28 4	30 4	45 6	65 16	65 16	100 35	100 35	125 50	125 50	145 50	160 70
Rated operational current I_o / AC-1 for air temperature close to contactor														
U_o max. 690 V	$\theta \leq 40^\circ\text{C}$	A	25	27	30	45	55	60	70	100	115	125	145	160
	$\theta \leq 55^\circ\text{C}$	A	22	25	27	40	55	60	60	85	95	105	135	145
	$\theta \leq 70^\circ\text{C}$	A	18	20	23	32	39	42	50	70	80	85	115	130
	with conductor cross-sectional area	mm ²	2.5	4	4	6	10	16	25	35	50	50	50	70
Utilization categorie AC-3 for air temperature close to contactor $\leq 55^\circ\text{C}$														
Rated operational current I_e AC-3														
3-phase motors 	220-230-240 V	A	9	12	17	26	33	40	40	53	65	75	96	110
	380-400V	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	75	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														
1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors 	220-230-240 V	kW	2.2	3	4	6.5	9	11	11	15	18.5	22	25	30
	380-400 V	kW	4	5.5	7.5	11	15	18.5	18.5	22	30	37	45	55
	415 V	kW	4	5.5	9	11	15	18.5	18.5	25	37	40	55	59
	440 V	kW	4	5.5	9	15	18.5	22	22	25	37	40	55	59
	500 V	kW	5.5	7.5	9	15	18.5	22	22	30	37	45	55	59
	690 V	kW	5.5	7.5	9	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			$10 \times I_o$ AC-3	$10 \times I_o$ AC-3	$10 \times I_o$ AC-3	$10 \times I_o$ AC-3	$10 \times I_o$ AC-3	$10 \times I_o$ AC-3	$10 \times I_o$ AC-3	$10 \times I_o$ AC-3	$10 \times I_o$ AC-3	$10 \times I_o$ AC-3	$10 \times I_o$ AC-3	$10 \times I_o$ AC-3
Rated breaking capacity AC-3 according to IEC 60947-4-1			$8 \times I_o$ AC-3	$8 \times I_o$ AC-3	$8 \times I_o$ AC-3	$8 \times I_o$ AC-3	$8 \times I_o$ AC-3	$8 \times I_o$ AC-3	$8 \times I_o$ AC-3	$8 \times I_o$ AC-3	$8 \times I_o$ AC-3	$8 \times I_o$ AC-3	$8 \times I_o$ AC-3	$8 \times I_o$ AC-3
Short-circuit protection for contactors without thermal O/L relay - Motor protection excluded $U_o < 600$ V a.c. - J type fuse		A	25	30	30	50	60	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	600	1000	1000	1000	1000	1320	1320
	10 s	A	100	120	140	210	400	400	650	650	650	650	800	800
	30 s	A	60	70	80	110	225	225	370	370	370	370	500	500
	1 min	A	50	55	60	90	150	150	250	250	250	250	350	350
	15 min	A	26	28	30	45	65	65	110	110	135	135	160	175
Maximum breaking capacity $\cos \varphi = 0.45$ ($\cos \varphi = 0.35$ for $I_o > 100$ A)														
	at 440 V	A	250	250	250	420	470	470	900	1300	1300	1300	1160	1160
	at 690 V	A	100	100	100	106	175	175	490	630	630	630	800	800
Heat dissipation per pole														
	I_o / AC-1	W	0.8	1	1.2	1.8	2.5	3	2.5	5	6.5	7	6.5	7.5
	I_o / 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 - for AC-3 - for AC-2, AC-4	cycles/h		600	600	600	600	600	600	600	600	600	600	300	300
	cycles/h		1200	1200	1200	1200	1200	1200	600	600	600	600	300	300
	cycles/h		300	300	300	300	300	300	150	150	150	150	150	150
Electrical durability														
Mechanical durability														
- millions of operating cycles - max. mechanical switching frequency			10	10	10	10	10	10	10	10	10	10	10	10
	cycles/h		3600 (300 for AF... contactors)											

A... and AF... Contactors

Technical Data

Main Pole - Utilization Characteristics

Contactor Types		A..., AF...	145	185	210	260	300	—	—	—	—	—	—
Rated operational voltage U_e max.		V	690	690	690	690	690	690	690	690	690	1000	1000
Rated frequency limits		Hz	25 ... 400	25 ... 400	25 ... 400	25 ... 400	25 ... 400	25 ... 400	25 ... 400	25 ... 400	25 ... 400	25 ... 400	25 ... 400
Conventional free-air thermal current I_{th} acc. to IEC 60947-4-1 open contactors $\theta \leq 40^\circ\text{C}$ with conductor cross-sectional area		A mm ²	250 120	275 150	350 185	400 240	500 300	600 2 x 185	700 2 x 240	800 2 x 240	1050 2 x 80 x 5	1350 2 x 100 x 5	1650 3 x 100 x 5
Rated operational current I_e / AC-1 for air temperature close to contactor		A	250	275	350	400	500	600	700	800	1050	1350	1650
U_e max. 690 V		$\theta \leq 40^\circ\text{C}$	A	250	275	350	400	500	600	700	800	1050	1350
		$\theta \leq 55^\circ\text{C}$	A	230	250	300	350	400	500	600	700	800	1150
		$\theta \leq 70^\circ\text{C}$	A	180	180	240	290	325	400	480	580	720	1000
with conductor cross-sectional area		mm ²	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 $\leq 55^\circ\text{C}$													
Rated operational current I_e AC-3													
	220-230-240 V	A	145	185	210	260	305	400	460	580	750	860	1050
	380-400V	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
	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	10 x I_e AC-3	10 x I_e AC-3	10 x I_e AC-3	10 x I_e AC-3	10 x I_e AC-3	10 x I_e AC-3	10 x I_e AC-3	10 x I_e AC-3	10 x I_e AC-3	10 x I_e AC-3
Rated breaking capacity AC-3													
according to IEC 60947-4-1			8 x I_e AC-3	8 x I_e AC-3	8 x I_e AC-3	8 x I_e AC-3	8 x I_e AC-3	8 x I_e AC-3	8 x I_e AC-3	8 x I_e AC-3	8 x I_e AC-3	8 x I_e AC-3	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	300	350	400	500	500	600	800	1000	1000	2000	2000
Rated short-time withstand current I_{sw} at 40°C ambient temp., in free air, from a cold state													
1 s		A	1800	2000	2500	3500	3500	4600	4600	7000	7000	10000	12000
10 s		A	1200	1500	1700	2400	2400	4400	4400	6400	6400	8000	10000
30 s		A	800	1000	1200	1500	1500	3100	3100	4500	4500	6000	7500
1 min		A	600	800	1000	1100	1100	2500	2500	3500	3500	4500	5500
15 min		A	280	320	400	500	500	840	840	1300	1300	1600	2200
Maximum breaking capacity $\cos \varphi = 0.45$ ($\cos \varphi = 0.35$ 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	125
I_e / AC-3		W	5	8	9	14	18	16	21	17	28	50	—
Max. electrical switching frequency													
- for AC-1		cycles/h	300	300	300	300	300	300	300	300	300	60	60
- for AC-3		cycles/h	300	300	300	300	300	300	300	300	300	60	60
- for AC-2, AC-4		cycles/h	150	150	150	150	150	60	60	60	60	60	60
Electrical durability													
- millions of operating cycles			5	5	5	5	5	3	3	3	3	0.5	0.5
- max. mechanical switching frequency		cycles/h	3600 (300 for AF... contactors)					300	300	300	300	60	60

(1) Max. connection bar width 100 mm

A..., AF..., Contactors

Technical Data

Magnet System Characteristics for A... Contactors

Contactors Types	A...	9	12	16	26	30	40	45	50	63	75	95	110	
Rated control circuit voltage U_c - at 50 Hz - at 60 Hz		V V	20 ... 690 24 ... 600	20 ... 690 24 ... 600	20 ... 690 24 ... 600	20 ... 690 24 ... 600	20 ... 690 24 ... 600	20 ... 690 24 ... 600	20 ... 690 24 ... 600	20 ... 690 24 ... 600	20 ... 690 24 ... 600	20 ... 690 24 ... 600	20 ... 690 24 ... 600	
Coil operating limits according to IEC 60947-4-1		$\theta \leq 55^{\circ}\text{C}$ 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	70	70	120	120	120	180	180	180	180	350	350
	60 Hz	VA	80	80	80	140	140	140	210	210	210	210	450	450
	50/60 Hz ⁽¹⁾	VA/VA	74/70	74/70	74/70	125/120	125/120	125/120	190/180	190/180	190/180	190/180	410/365	410/365
Average holding value	50 Hz	VA/W	8/2	8/2	8/2	12/3	12/3	12/3	18/5.5	18/5.5	18/5.5	18/5.5	22/6.5	22/6.5
	60 Hz	VA/W	8/2	8/2	8/2	12/3	12/3	12/3	18/5.5	18/5.5	18/5.5	18/5.5	26/8	26/8
	50/60 Hz ⁽¹⁾	VA/W	8/2	8/2	8/2	12/3	12/3	12/3	18/5.5	18/5.5	18/5.5	18/5.5	27/7.5	27/7.5
Operating time between coil energization and:														
- N.O. contact closing	ms	10 ... 26	10 ... 26	10 ... 26	8 ... 21	8 ... 21	8 ... 21	8 ... 27	8 ... 27	8 ... 27	8 ... 27	10 ... 25	10 ... 25	
- N.C. contact opening	ms	7 ... 21	7 ... 21	7 ... 21	6 ... 18	6 ... 18	6 ... 18	7 ... 22	7 ... 22	7 ... 22	7 ... 22	7 ... 22	7 ... 22	
between coil de-energization and:														
- N.O. contact closing	ms	4 ... 11	4 ... 11	4 ... 11	4 ... 11	4 ... 11	4 ... 11	4 ... 11	4 ... 11	4 ... 11	4 ... 11	7 ... 15	7 ... 15	
- N.C. contact opening	ms	9 ... 16	9 ... 16	9 ... 16	7 ... 14	7 ... 14	7 ... 14	7 ... 14	7 ... 14	7 ... 14	7 ... 14	10 ... 18	10 ... 18	

(1) 50/60 Hz coils: voltage codes 8 0 to 8 8.  page 2/0

Magnet System Characteristics for AF... Contactors

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

(1) 50/60 Hz coils: voltage codes 8 0 to 8 8.  page 2/0

A... and AF... Contactors

Technical Data

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	24 ... 690	24 ... 690	24 ... 690	24 ... 690				
- at 60 Hz	V	24 ... 690	24 ... 690	24 ... 690	24 ... 690	24 ... 690				
Coil operating limits		$\theta \leq 70^\circ\text{C}$								
according to IEC 60947-4-1		$0.85 \dots 1.1 \times U_c$								
Drop-out voltage in % of U_c		roughly 25 ... 65 %								
Coil consumption										
Average pull-in value	50 Hz	VA	550	550	1350	1350	1350			
	60 Hz	VA	600	600	1550	1550	1550			
	50/60 Hz ⁽¹⁾	VA/VA	700/650	700/650	1700/1550	1700/1550	1700/1550			
Average holding value	50 Hz	VA/W	35/11	35/11	60/16	60/16	60/16			
	60 Hz	VA/W	40/12	40/12	65/19	65/19	65/19			
	50/60 Hz ⁽¹⁾	VA/W	44/13	44/13	80/21	80/21	80/21			
Operating time										
between coil energization and:										
- N.O. contact closing	ms	13 ... 27	13 ... 27	17 ... 35	17 ... 35	17 ... 35				
- N.C. contact opening	ms	8 ... 22	8 ... 22	12 ... 30	12 ... 30	12 ... 30				
between coil de-energization and:										
- N.O. contact closing	ms	5 ... 10	5 ... 10	7 ... 13	7 ... 13	7 ... 13				
- N.C. contact opening	ms	9 ... 13	9 ... 13	10 ... 16	10 ... 16	10 ... 16				

(1) 50/60 Hz coils: voltage codes **8 0** to **8 8**.  page 2/0

Magnet System Characteristics for AF... Contactors

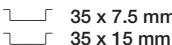
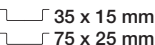
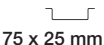
Contactor Types	AF...	145	185	210	260	300	400	460	580	750	1350	1650	2050
Rated control circuit voltage U_c													
- at 50 Hz	V	48 ... 250	48 ... 250	48 ... 250	48 ... 250	48 ... 250	48 ... 250	48 ... 250	48 ... 250	48 ... 250	100 ... 250	100 ... 250	100 ... 250
- at 60 Hz	V	48 ... 250	48 ... 250	48 ... 250	48 ... 250	48 ... 250	48 ... 250	48 ... 250	48 ... 250	48 ... 250	100 ... 250	100 ... 250	100 ... 250
- d.c.	V	24 ... 250	24 ... 250	24 ... 250	24 ... 250	24 ... 250	24 ... 250	24 ... 250	24 ... 250	24 ... 250	100 ... 250	100 ... 250	100 ... 250
Coil operating limits		$\theta \leq 70^\circ\text{C}$											
according to IEC 60947-4-1		$0.85 \dots 1.1 \times U_c$											
Drop-out voltage in % of U_c		55 %											
Coil consumption													
Average pull-in value	50 Hz	VA	430	430	470	470	470	890	890	850	850	1900	1900
	60 Hz	VA	430	430	470	470	470	890	890	850	850	1900	1900
	d.c.	W	500	500	520	520	520	990	990	950	950	1700	1700
Average holding value	50 Hz	VA/W	12/3.5	12/3.5	10/2.5	10/2.5	10/2.5	12/4	12/4	12/4.5	12/4.5	48/17	48/17
	60 Hz	VA/W	12/3.5	12/3.5	10/2.5	10/2.5	10/2.5	12/4	12/4	12/4.5	12/4.5	48/17	48/17
	d.c.	W	2	2	2	2	2	4	4	4.5	4.5	16	16
Operating time													
between coil energization and:													
- N.O. contact closing	ms	30 ... 115	30 ... 115	30 ... 115	30 ... 115	30 ... 115	50 ... 120	50 ... 120	50 ... 120	50 ... 120	50 ... 80	50 ... 80	50 ... 80
- N.C. contact opening	ms	30 ... 115	30 ... 115	30 ... 115	30 ... 115	30 ... 115	50 ... 120	50 ... 120	50 ... 120	50 ... 120	50 ... 80	50 ... 80	50 ... 80
between coil de-energization and:													
- N.O. contact closing	ms	25 ... 80	25 ... 80	25 ... 80	25 ... 80	25 ... 80	40 ... 70	40 ... 70	40 ... 70	40 ... 70	35 ... 55	35 ... 55	35 ... 55
- N.C. contact opening	ms	25 ... 80	25 ... 80	25 ... 80	25 ... 80	25 ... 80	40 ... 70	40 ... 70	40 ... 70	40 ... 70	35 ... 55	35 ... 55	35 ... 55

(1) 50/60 Hz coils: voltage codes **8 0** to **8 8**.  page 2/0

A..., AF... Contactors

Technical Data

Mounting Characteristics

Contactor Types	A...,	9	12	16	26	30	40	45	50	63	75	95	110
	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 according to IEC 715 and EN 50022 / EN 50023		 35 x 7.5 mm 35 x 15 mm						 35 x 15 mm 75 x 25 mm				 75 x 25 mm	
by screws (not supplied)		2 x M4	2 x M4	2 x M4	2 x M4	2 x M4	2 x M4	2 x M6	2 x M6	2 x M6	2 x M6	2 x M6	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 55 ... 70°C	0.85 ... 1.1 x U _c U _c
	6	≤ 55°C > 55°C unauthorized	0.95 ... 1.1 x U _c —
AF 45 ... AF 110	1, 1 ± 30°, 2, 3, 4, 5	≤ 70°C	0.85 U _c min. ... 1.1 x U _c max.
	6 unauthorized	—	—

Notes for 4-pole contactors

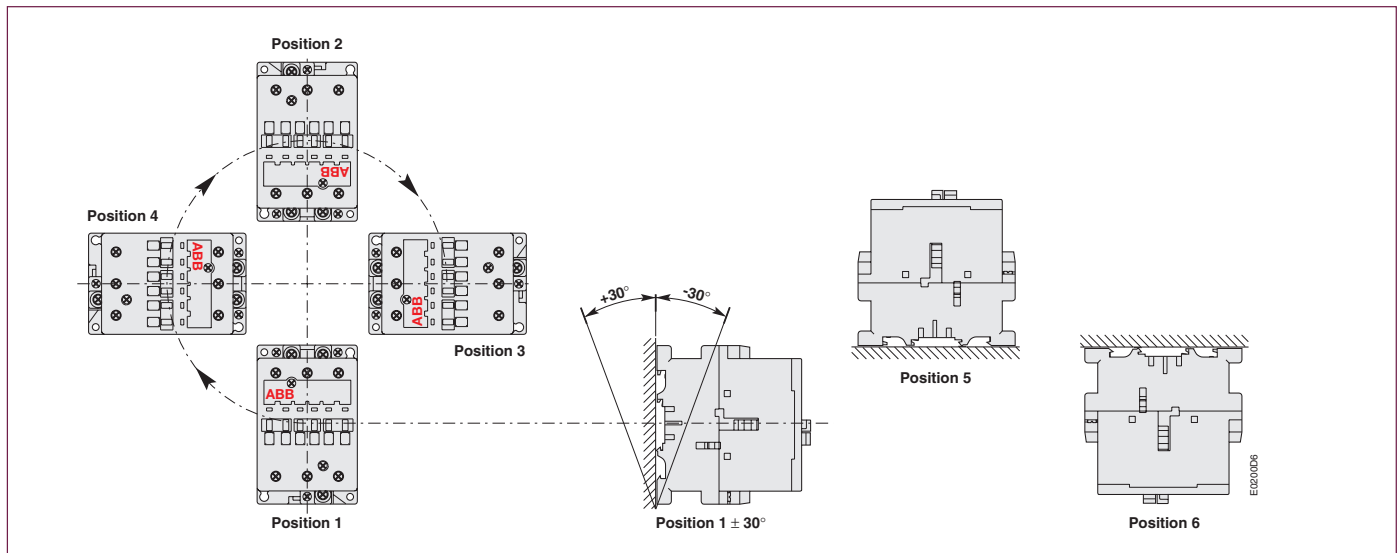
Whatever the coil voltage: Pos. 5 unauthorized for A 45-22-00, A 75-22-00 contactors.

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 U_c (instead of 0.85 ... 1.1 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 U_c (instead of 0.85 ... 1.1 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)



A... and AF... Contactors

Technical Data

Mounting Characteristics

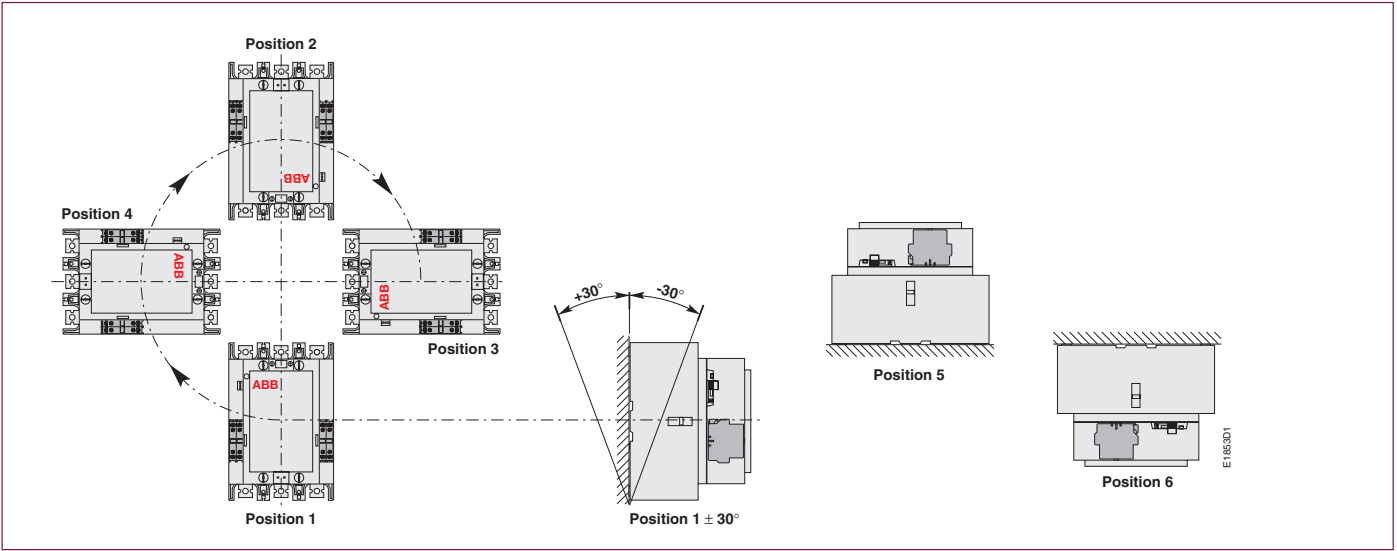
Contactor Types	A...	145	185	210	260	300	—	—	—	—	—	—	—
	AF...	145	185	210	260	300	400	460	580	750	1350	1650	2050
Mounting positions		☞ "Condition for use"											
Mounting distances		The contactors can be assembled side by side											
Fixing													
on DIN rail according to IEC 715 and EN 50022 / EN 50023		—	—	—	—	—	—	—	—	—	—	—	—
by screws (not supplied)		4 x M5	4 x M5	4 x M5	4 x M5	4 x M5	4 x M5	4 x M5	4 x M6	4 x M6	4 x M8	4 x M8	4 x M8

Conditions for Use

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

Contactors	Mounting Position	Ambient Temperature	Control Voltage
A 145 ... A 300	1, 1 ± 30°, 2, 3, 4, 5	≤ 70°C	0.85 ... 1.1 x U _c
	6 unauthorized	—	—
AF 145 ... AF 2050	1, 1 ± 30°, 2, 3, 4, 5	≤ 70°C	0.85 U _c min. ... 1.1 x U _c max.
	6 unauthorized	—	—

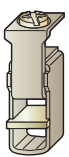
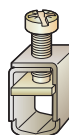
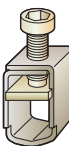
Mounting Positions (see the above table for authorized positions)



A..., AF... Contactors

Technical Data

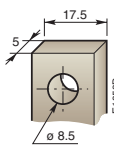
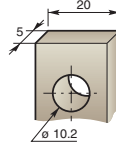
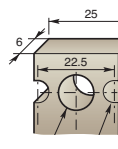
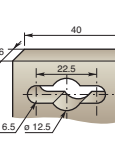
Connecting Characteristics

Connecting characteristics			A...	9	12	16	26	30	40	45	50	63	75	95	110
Contactor Types			AF...	—	—	—	—	—	—	45	50	63	75	95	110
Main terminals															
			with cable clamp				with double connector 2 x (5.6 x 6.5mm)		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	18 ... 10	18 ... 10	12 ... 8	12 ... 6	12 ... 6	10 ... 1	10 ... 1	10 ... 1	10 ... 1	8 ... 3/0	8 ... 3/0
			AWG	18 ... 10	18 ... 10	18 ... 10	12 ... 8	12 ... 6	12 ... 6	10 ... 6	10 ... 6	10 ... 6	10 ... 6	10 ... 2	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	18 ... 14	18 ... 14	12 ... 8	14 ... 8	14 ... 8	10 ... 3	10 ... 3	10 ... 3	10 ... 3	8 ... 2/0	8 ... 2/0
			2 x AWG	18 ... 14	18 ... 14	18 ... 14	12 ... 8	14 ... 8	14 ... 8	10 ... 4	10 ... 4	10 ... 4	10 ... 4	10 ... 3	10 ... 3
Bars or lugs		L mm ≤	8	8	8	10	—	—	—	—	—	—	—	30	30
		I mm >	3.7	3.7	3.7	4.2	—	—	—	—	—	—	—	6	6
Auxiliary conductors (built-in auxiliary terminals + coil terminals)															
Rigid solid		1 x AWG	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10
		2 x AWG	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10
Flexible with cable end			1 x AWG	18 ... 14	18 ... 14	18 ... 14	18 ... 14	18 ... 14	18 ... 14	18 ... 14	18 ... 14	18 ... 14	18 ... 14	18 ... 14	18 ... 14
			2 x AWG	18 ... 14	18 ... 14	18 ... 14	18 ... 14	18 ... 14	18 ... 14	18 ... 14	18 ... 14	18 ... 14	18 ... 14	18 ... 14	18 ... 14
Lugs		L mm ≤	8	8	8	(1)	8	8	8	8	8	8	8	8	8
		I mm >	3.7	3.7	3.7	(1)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	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												hexagonsocket
			M3.5	M3.5	M3.5	M4	M5	M5	M6	M6	M6	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	M3.5	M3.5	M4	M5	M5	—	—	—	—	—	—	
Tightening torque															
Main pole terminals															
- recommended			Nm / lb.in	1.00 / 9	1.00 / 9	1.00 / 9	1.7 / 15	2.30 / 20	2.30 / 20	4.00 / 35	4.00 / 35	4.00 / 35	4.00 / 35	6.00 / 53	6.00 / 53
- max.			Nm	1.20	1.20	1.20	2.20	2.60	2.60	4.50	4.50	4.50	4.50	6.50	6.50
Coil terminals															
- recommended			Nm / lb.in	1.00 / 9	1.00 / 9	1.00 / 9	1.00 / 9	1.00 / 9	1.00 / 9	1.00 / 9	1.00 / 9	1.00 / 9	1.00 / 9	1.00 / 9	1.00 / 9
- max.			Nm	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
Built-in in auxiliary terminals															
- recommended			Nm / lb.in	1.00 / 9	1.00 / 9	1.00 / 9	1.7 / 15	1.00 / 9	1.00 / 9	—	—	—	—	—	—
- max.			Nm	1.20	1.20	1.20	2.20	1.20	1.20	—	—	—	—	—	—
Terminal marking and positioning			Contact ABB												

A... and AF... Contactors

Technical Data

Connecting Characteristics

Main terminals		A...		145	185	210	260	300	—		—		—		
Flat type		AF...		145	185	210	260	300	400	460	580	750	1350	1650	2050
															
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	24	32	32	32	47/45	47/45	52/50	52/50	100	100	100	
		Ø mm >	8	8	10	10	10	10	10	10	12	12	12	12	12
Auxiliary conductors (coil terminals)															
Rigid solid		1 x AWG	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10
		2 x AWG	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10	18 ... 10
Flexible with cable end		1 x AWG	18 ... 12	18 ... 12	18 ... 12	18 ... 12	18 ... 12	18 ... 12	18 ... 12	18 ... 12	18 ... 12	18 ... 12	18 ... 12	18 ... 12	18 ... 12
		2 x AWG	18 ... 12	18 ... 12	18 ... 12	18 ... 12	18 ... 12	18 ... 12	18 ... 12	18 ... 12	18 ... 12	18 ... 12	18 ... 12	18 ... 12	18 ... 12
Lugs		L mm ≤	8	8	8	8	8	8	8	8	8	8	8	8	8
		l mm >	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	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	IP 20	IP 00	IP 00	IP 00	IP 00	IP 00	IP 00	IP 00	IP 00	IP 00	IP 00	IP 00
- Coil terminals			IP 20	IP 20	IP 20	IP 20	IP 20	IP 20	IP 20	IP 20	IP 20	IP 20	IP 20	IP 20	IP 20
- Built-in auxiliary terminals			—	—	—	—	—	—	—	—	—	—	—	—	—
Screw terminals															
Main terminals			Screws and bolts												
			M8	M8	M10	M10	M10	M10	M10	M10	M12	M12	M12	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	18 / 160	28 / 240	28 / 240	28 / 240	40 / 354	40 / 354	45 / 443	45 / 443	45 / 443	45 / 443	45 / 443
- max.			Nm	20	20	30	30	30	44	44	49	49	49	49	49
Coil terminals															
- recommended			Nm / lb.in	1.00 / 9	1.00 / 9	1.00 / 9	1.00 / 9	1.00 / 9	1.00 / 9	1.00 / 9	1.00 / 9	1.00 / 9	1.00 / 9	1.00 / 9	1.00 / 9
- max.			Nm	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
Built-in in auxiliary terminals															
- recommended			Nm / lb.in	—	—	—	—	—	—	—	—	—	—	—	—
- max.			Nm	—	—	—	—	—	—	—	—	—	—	—	—
Terminal marking and positioning			Contact ABB												

A... Contactors

Technical Data

Built-in Auxiliary Contacts - Utilization Characteristics

Contactors Types	A...	9	12	16	26	30	40
Rated operational voltage U_e max.	V	690	690	690	690	690	690
Conventional free-air thermal current I_{th} - $\theta \leq 40^\circ\text{C}$	A	16	16	16	16	16	16
Rated frequency limits	Hz	25 ... 400	25 ... 400	25 ... 400	25 ... 400	25 ... 400	25 ... 400
Rated operational current I_e / AC-15 acc. to IEC 60947-5-1							
24-127 V 50/60 Hz	A	6	6	6	6	6	6
220-240 V 50/60 Hz	A	4	4	4	4	4	4
380-440 V 50/60 Hz	A	3	3	3	3	3	3
500 V 50/60 Hz	A	2	2	2	2	2	2
690 V 50/60 Hz	A	2	2	2	2	2	2
Rated operational current I_e / DC-13 acc. to IEC 60947-5-1							
24 V d.c.	A / W	6 / 144	6 / 144	6 / 144	6 / 144	6 / 144	6 / 144
48 V d.c.	A / W	2.8 / 134	2.8 / 134	2.8 / 134	2.8 / 134	2.8 / 134	2.8 / 134
72 V d.c.	A / W	2 / 144	2 / 144	2 / 144	2 / 144	2 / 144	2 / 144
125 V d.c.	A / W	1.1 / 138	1.1 / 138	1.1 / 138	1.1 / 138	1.1 / 138	1.1 / 138
250 V d.c.	A / W	0.55 / 138	0.55 / 138	0.55 / 138	0.55 / 138	0.55 / 138	0.55 / 138
Rated making capacity according to IEC 60947-5-1		10 x I_e AC-15	10 x I_e AC-15	10 x I_e AC-15	10 x I_e AC-15	10 x I_e AC-15	10 x I_e AC-15
Rated breaking capacity according to IEC 60947-5-1		10 x I_e AC-15	10 x I_e AC-15	10 x I_e AC-15	10 x I_e AC-15	10 x I_e AC-15	10 x I_e AC-15
Short-circuit protection gG type fuse	A	10	10	10	10	10	10
Rated short-time withstand current I_{cw}							
for 1.0 s	A	100	100	100	100	100	100
for 0.1 s	A	140	140	140	140	140	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	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2
Heat dissipation per pole at 6 A	W	0.10	0.10	0.10	0.10	0.10	0.10

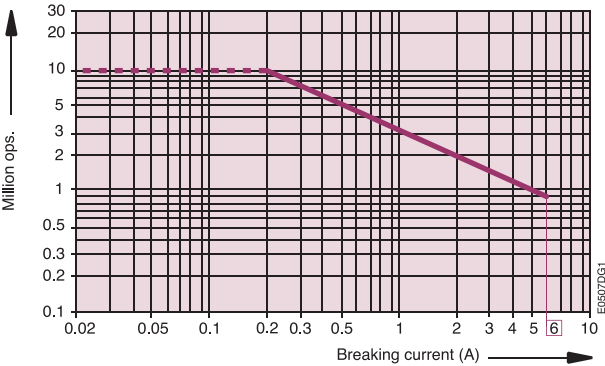
Electrical Durability for AC-15 Utilization Category

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

- making current: 10 x I_e with $\cos \varphi = 0.7$ and U_e
- breaking current: I_e with $\cos \varphi = 0.4$ 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... contactor built-in auxiliary contacts
- Auxiliary contact blocks CAL 5-., CA 5-..

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 2/28 ... 2/30, 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 2/18, 2/19 (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,  ?/?).
 - 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 2/18, 2/19.
- For the selected contactor make a note of the following in relation to the voltage using diagram AC-3 page 2/29 and AC-4 page 2/30:
 - 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.

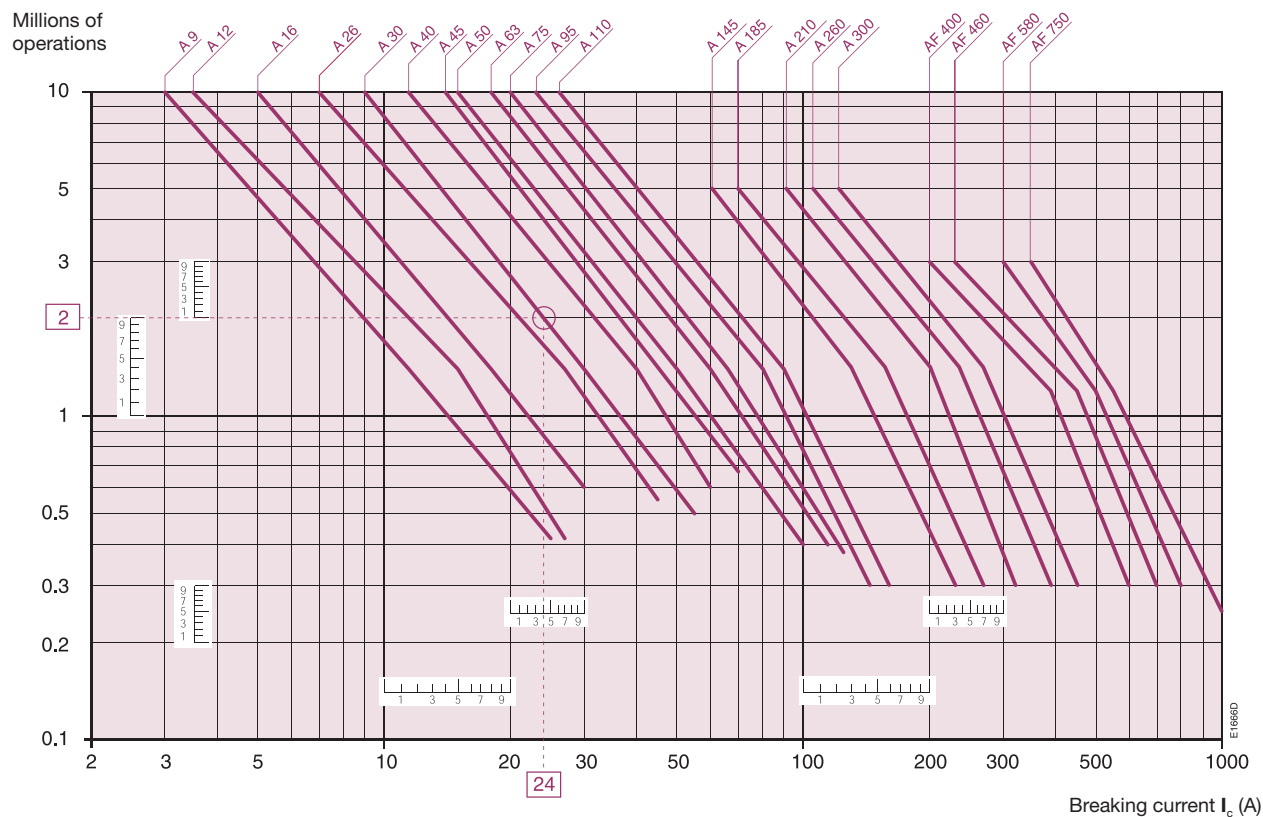
Among the different utilization categories, the uninterrupted duty implies the following remark. The combined effect of environmental conditions and the proper temperature of the product may require some disposals. As a matter of fact, for this duty, the use duration prevails over the number of operating cycles. 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.

A... Contactors

Electrical Durability

Electrical Durability for AC-1 Utilization Category. $U_e < 690V$ Ambient Temperature $< 55\text{ }^{\circ}C$

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:

$I_c / AC-1 = 24\text{ A}$ – Electrical durability required = 2 million operations.

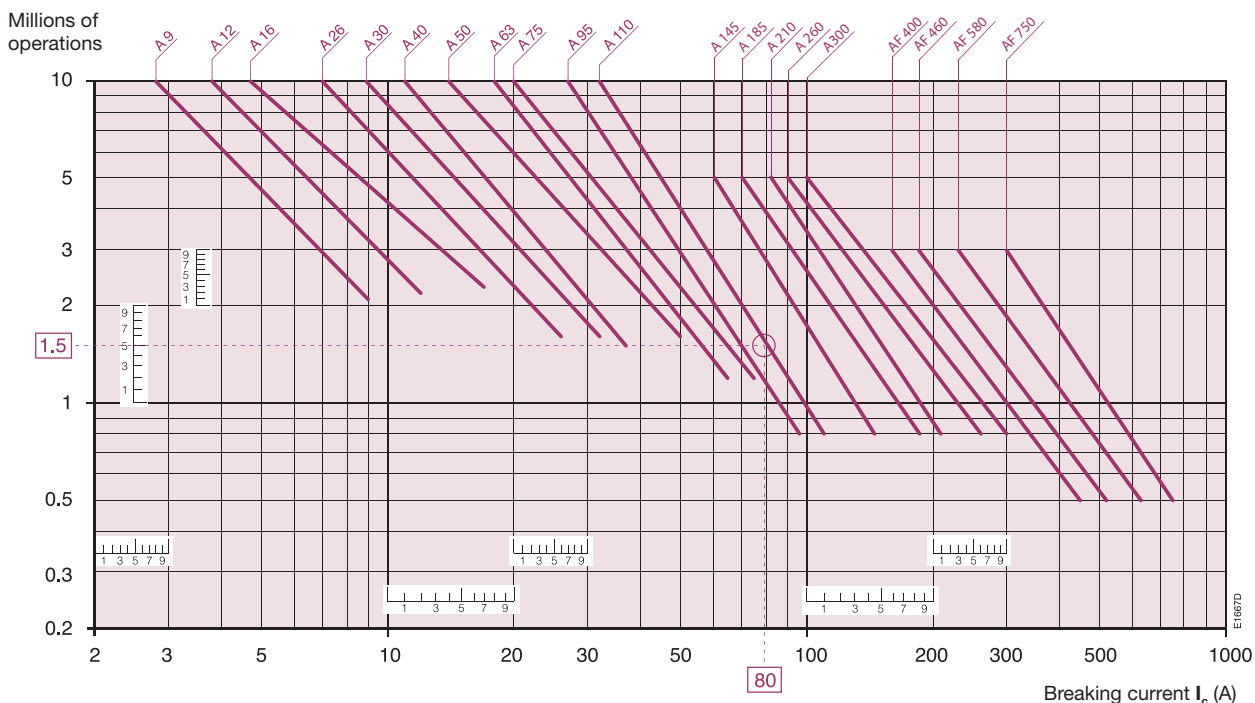
Using the AC-1 curves above select the A 30 contactor at intersection "○" (24 A / 2 million operations).

A... Contactors

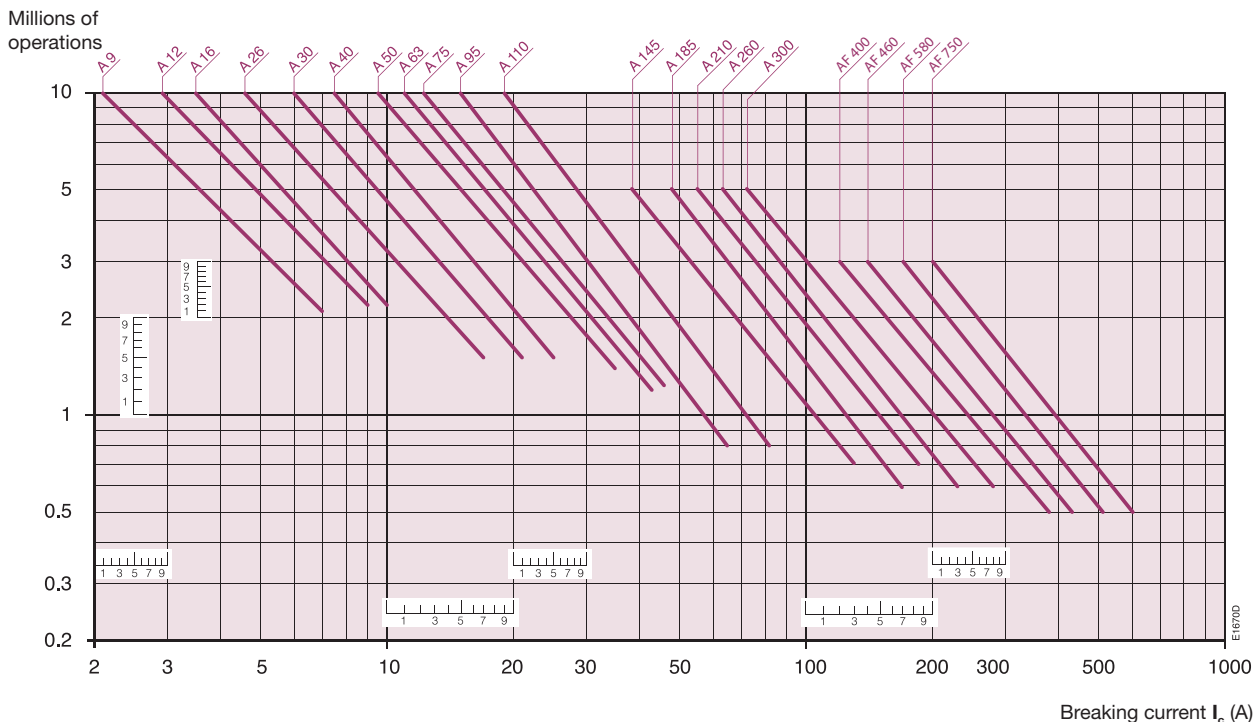
Electrical Durability

Switching cage motors: starting and switching off running motors. The breaking current I_e 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 - $U_e < 440$ V. Ambient Temperature < 55 °C



Electrical Durability for AC-3 Utilization Category - 440 V $< U_e < 690$ 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: $I_e = I_e$. Select the A 110 contactor at intersection "O" (80 A / 1.5 million operations) on the curves (AC-3 - $U_e \leq 440$ V).

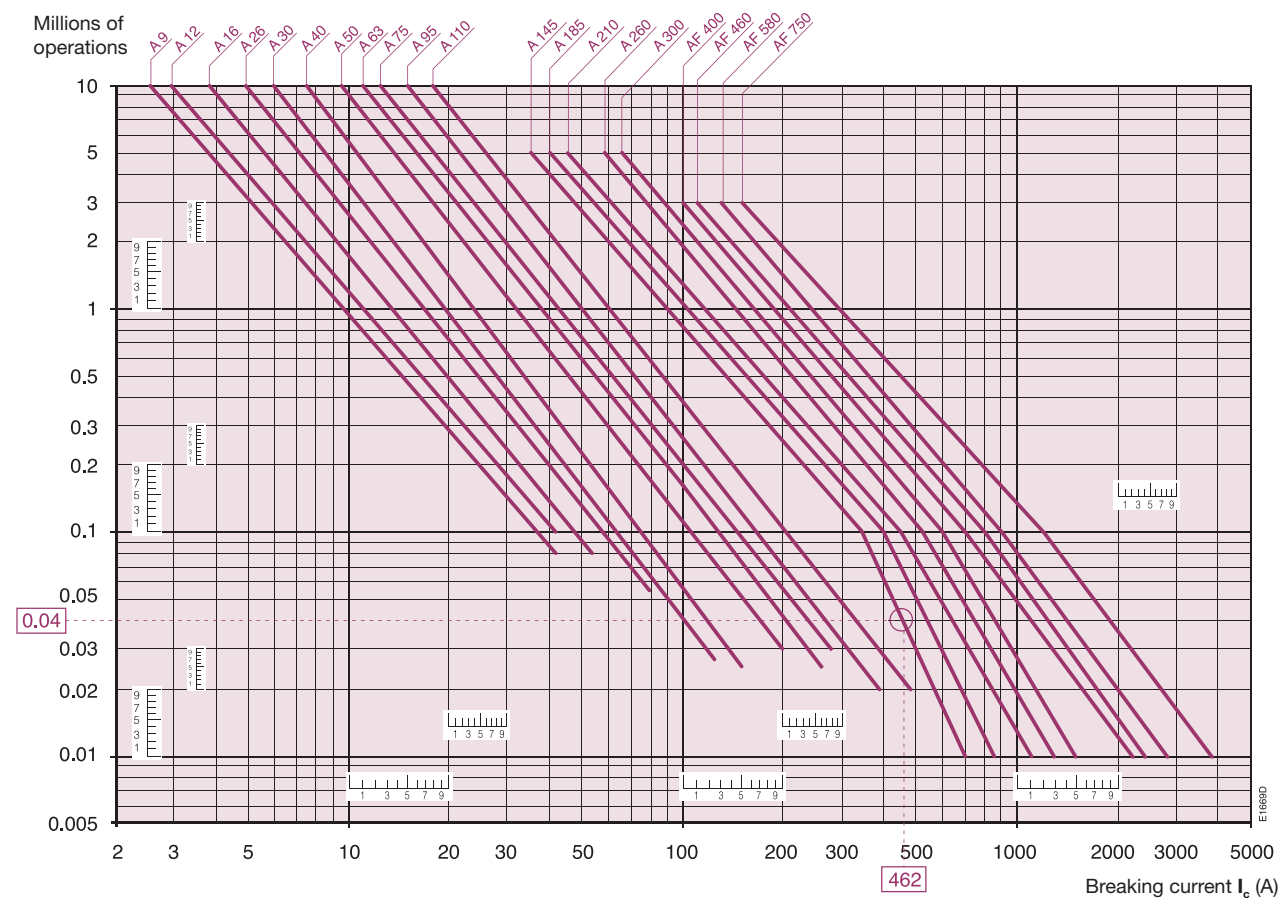
A... Contactors

Electrical Durability

Electrical Durability for AC-2 or AC-4 Utilization Category - $440\text{ V} < U_e < 690\text{ V}$. Ambient Temperature $< 55\text{ }^{\circ}\text{C}$

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 $2.5 \times I_n$ for AC-2 and $6 \times I_n$ for **AC-4**, keeping in mind that I_n is the motor rated operational current (I_n = motor full-load current).



Example:

Motor power 75 Hp for AC-4 - $U_e = 600\text{ V}$ utilization - Electrical durability required = 0.04 million operations.

As stated on page ?/? : 75 Hp, 600 V corresponds to $I_n = 77\text{ A}$.

For AC-4: $I_c = 6 \times I_n = 462\text{ A}$ - Select the A 145 contactor at intersection "○" (462 A / 0.04 million operations) on the curves (AC-4 - $440\text{ V} < U_e \leq 690\text{ V}$).



Questionnaire for Product Specification : Block Contactors

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

APPLICATION

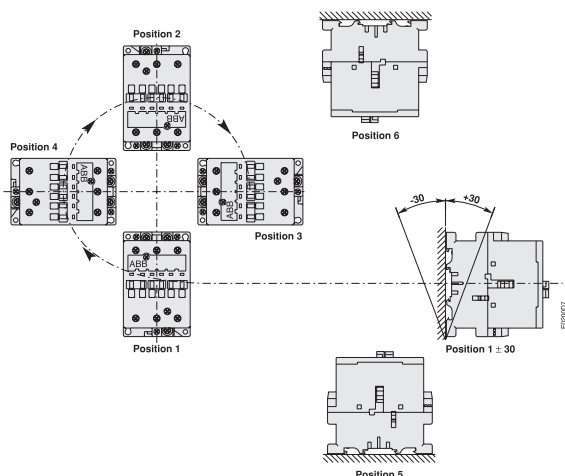
Type of load : No of phases
Utilisation category (AC / DC) : %AC4 if any :
Voltage **Un** : **V** **Cos φ** : frequency :
L/R ms

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 : °C
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 Control - France

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".

Accessories for Contactors and Control Relays

Contents

Accessories for A... Series Contactor and for Control Relays

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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 contacts blocks							
AF 50 ... AF 110	6 blocks	1	—	—	—	CA5-10	
		—	1	—	—	CA5-01	
		—	—	1	—	CC5-10	
		—	—	—	1	CC5-01	
		1	—	—	—	CE5-10D0.1	
		—	1	—	—	CE5-01D0.1	
		1	—	—	—	CE5-10D2	
		—	1	—	—	CE5-01D2	
		1	—	—	—	CE5-10W0.1	
		—	1	—	—	CE5-01W0.1	
		1	—	—	—	CE5-10W2	
		—	1	—	—	CE5-01W2	
4-pole auxiliary contacts blocks							
AF 45 ... AF 110	1 block	4	—	—	—	CA5-40E	
		3	1	—	—	CA5-31E	
		2	2	—	—	CA5-22E	
		0	4	—	—	CA5-04E	
		1	1	1	1	CA5-11/11E	

Whatever the mounting position, there should be no more than 2 N.C. front-mounted auxiliary contacts on types **AF 45** to **A 75-22-00**. The side-mounted blocks offer additional N.C. contacts.

(2) Restrictions apply, consult ABB

Auxiliary Contact Blocks

Front Mounting

Technical Data

Types		1-pole CA5, 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 2/67	Section 2/67	Section 2/67
Rated insulation voltage U_i according to IEC 60947-5-1 according to UL/CSA	V V	690 600	250 250	250 250
Rated operational voltage U_o max.	V a.c.	24 to 690	125	250
Conventional thermal current I_{th}	A	16	0.1	2
Rated operational current I_o acc. to IEC 60947-5-1 in a.c.		AC-15	AC-14	AC-15
24-127 V	A	6	0.1	2
220-240 V	A	4	—	2
380-440 V	A	3	—	—
500-690 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_o AC-15	6 x I_o AC-14	10 x I_o AC-15
Rated breaking capacity		10 x I_o AC-15	6 x I_o AC-14	10 x I_o AC-15
Rated short-time withstand current I_{cw} 1 s	A	100	—	—
$\theta = 40^\circ\text{C}$ 0.1 s	A	140	—	—
Power loss per pole at 6 A	W	0.15	—	—
Min. switching capacity	V / mA	17 / 5 (AF 50 ... AF 75) - 24 / 50 (AF 95, AF 110)	3 / 1	17 / 5
Reliability for min. switching capacity		—	10^{-8}	10^{-8}
Mechanical durability - millions of operating cycles		10 (AF 50 ... AF 75) 3 (AF 95, AF 110)	5 for CE 5-..D 2.5 for CE 5-..W 3600	5 for CE 5-..D 2.5 for CE 5-..W 3600
Electrical durability - millions of operating cycles		3	2.5 for CE 5-..D 0.1 0.7 for CE 5-..W 0.1 1200	1 for CE 5-..D 2 0.3 for CE 5-..W 2 1200
- max. mech. switching frequency	cycles/h	3600		
- max. elec. switching frequency	cycles/h	1200		
Connecting terminals (Delivered in open position. Screw of unused terminals should be tightened.)		M3.5 (+, -) pozidriv 2 screw with cable clamp		
Tightening torque - recommended	Nm	1.00	1.00	1.00
- max.	Nm	1.20	1.20	1.20
Connecting capacity (min. ... max.)				
- Rigid solid	1 or 2 x AWG	18 ... 10	18 ... 10	18 ... 10
- Flexible with cable end	1 or 2 x AWG	18 ... 12	18 ... 12	18 ... 12
- Lugs	L mm $\leq$ l mm $>$	8 3.7	8 3.7	8 3.7
Degree of protection acc. to IEC 60529, IEC 60144, DIN 40050 and NFC 20-010		IP 20 for the terminals	IP 20 for the terminals	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)	0.1 A	2.0 A

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.							
AF 50 ... AF 75	2 blocks	1	1	—	—	CAL5-11	
AF 95 ... AF 2050	2 blocks ⁽¹⁾	1	1	—	—	CAL18-11	
AF 95 ... AF 2050	2 blocks ⁽¹⁾	1	1	—	—	CAL18-11B	
1-pole microswitch auxiliary contacts N.O. or N.C.							
AF 95 ... AF 1650	2 blocks					CEL18-10	
AF 95 ... AF 1650	2 blocks					CEL18-01	

⁽¹⁾ 2 blocks CAL 18-11 + 2 blocks CAL 18-11 B

Auxiliary Contact Blocks

Side Mounting

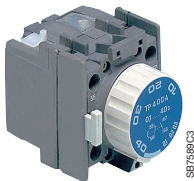
Technical Data

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

Utilisation Characteristics according to UL/CSA

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

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 screwdriver guidance, supplied untightened and protected against accidental direct contact.

Mounting

Clipped onto the front panel of AF 50 ... AF 75 contactors

Accessory

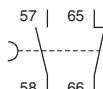
BX-TP plastic sealed cover protecting access to the time delay setting.

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	

TP ... Pneumatic Timer Blocks

Technical Data

Compliance with standards			IEC 60947-5-1 and EN 60947-5-1	
Certification and approvals			Section 4	
Rated insulation voltage U_i according to IEC 60947-5-1 according to UL/CSA		V a.c.	690	
		V a.c.	600	
Rated operational voltage U_o according to IEC 60947-5-1		V a.c.	24 ... 690	
Conventional free air thermal current I_{th}		A	10	
Rated operational current I_o 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	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	
Short circuit protection - fuses		A	10	
Rated making capacity			10 x I_o AC-15	
Rated breaking capacity			10 x I_o AC-15	
Rated short-time withstand current I_{cw}	1 s	A	50	
at $\theta = 40^\circ\text{C}$	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)			$\pm 2\%$	
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 $+20^\circ\text{C}$	% per $^\circ\text{C}$		0.25	
- between $+20^\circ\text{C}$ and $+65^\circ\text{C}$	% per $^\circ\text{C}$		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 DA TP 180 DA 	

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		Fixing
	On left	On right	
VM 300H	AF 95 ... AF 300	AF 145 ... AF 300	Mounting plate  page 2/50
VM 300/460H	AF 210 ... AF 300	AF 400 ... AF 460	Mounting plate  page 2/50
VM 750H	AF 400 ... AF 750	AF 400 ... AF 750	Mounting plate  page 2/50
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		Fixing
	On left	On right	
VM 5-2 ⁽¹⁾	AF 45 ... AF 110	AF 45 ... AF 110	DIN-Rail or plate  page 2/50

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

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

Type	For Contactors		Fixing
	On left	On right	
VM 300V	AF 95 ... AF 300	AF 145 ... AF 300	Additional plate not supplied
VM 300/460V	AF 210 ... AF 300	AF 400 ... AF 460	Additional plate not supplied
VM 750V	AF 400 ... AF 750	AF 400 ... AF 750	Additional plate not supplied

Selection Tables

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

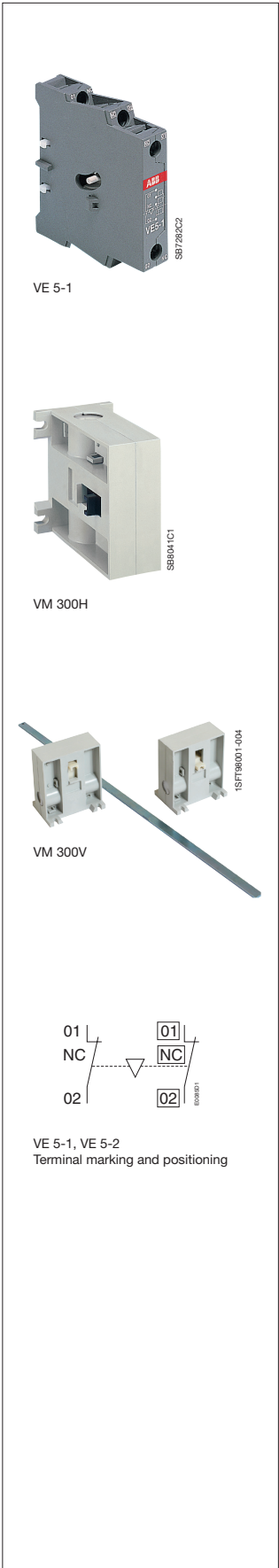
Right	AF 45 ... AF 75	AF 95, AF 110	AF 145 ... AF 300	AF 400 ... AF 460	AF 400 ... AF 750	AF 1350 ... AF 1650
Left						
AF 45 ... AF 75	VE 5-2	VE 5-2	—	—	—	—
AF 95, AF 110	VE 5-2	VE 5-2	—	—	—	—
AF 95 ... AF 300	—	—	VM 300H	—	—	—
AF 210 ... AF 300	—	—	—	VM 300/460H	—	—
AF 400 ... AF 750	—	—	—	—	VM 750H	—
AF 1350 ... AF 1650	—	—	—	—	—	VM 1650H

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

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

Mechanical Interlock Units

Mechanical and Electrical Interlock Units



Ordering Details

Mechanical interlocking of two horizontal mounted contactors		
For Contactors	Order Code	List Price
page 2/39	VM300H	
	VM300/460H	
	VM750H	
	VM1650H	

Mechanical and electrical interlocking of two horizontal mounted contactors		
For Contactors	Order Code	List Price
page 2/39	VE5-2	

Mechanical interlocking of two vertical mounted contactors		
For Contactors	Order Code	List Price
page 2/39	VM300V	
	VM300/460V	
	VM750V	

Technical Data

Compliance with standards		IEC 60947-5-1, EN 60947-5-1	
Rated insulation voltage U_i according to IEC 60947-5-1 according to UL/CSA		V	690
		V	600
Rated operational voltage U_o according to IEC 60947-5-1		V a.c.	24 ... 690
Conventional thermal current I_{th}		A	16
Rated operational current I_o 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_o AC-15	
Rated breaking capacity		10 x I_o AC-15	
		Rated short-time withstand current I_{cw} $\theta = 40\text{ }^{\circ}\text{C}$	
		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.

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
AF 50 ... AF 75,	WB75-A ☐	

Coil voltages and codes

Voltage V - 50Hz/d.c.	Voltage 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 according to UL/CSA		V a.c.	690
		V a.c.	600
Rated control voltage U_c according to the coil voltage		V a.c.	24 ... 480
		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: (energizing of the contactor coil)		In a.c. ms	50 (A... contactors)
		in d.c. ms	50 (A... contactors)
For pull-out: (energizing of the WB block coil)		In a.c. ms	30
		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 2/16: no difference with the operation of a contactor only
- on contactor closing (unlatching) between WB.. coil energization and:			
N.O. contact closing		ms	5 ... 25
N.C. contact opening		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

Surge Suppressors for Contactor Coils

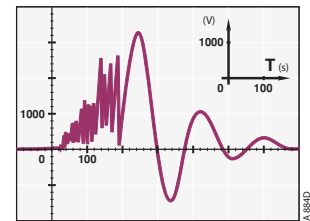
Application

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 :

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

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

Description

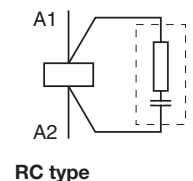
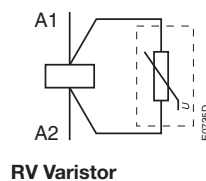
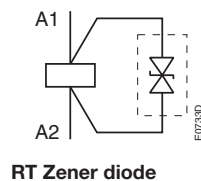
To guard against the harmful effects of these overvoltages, ABB has developed a range of surge suppressors designed to reduce the **k** factor defined above and to limit or even completely eliminate the high pre-damping voltage frequencies.

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

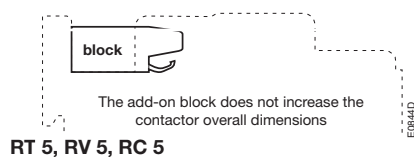
We have chosen the following solutions: transil diodes, varistors and RC blocks.

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

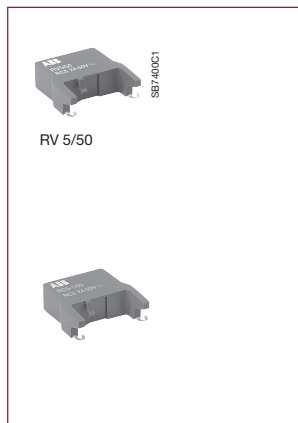
Wiring Diagrams



Dimensions (in mm)



Surge Suppressors for Contactor Coils



Ordering Details

For Contactors	Control Voltage	Order Code	List Price
	V	d.c. a.c.	
A 9 ... A 110, N, NL, TNL (T) AL9 (T) AL 40	24 ... 50 50 ... 133 110 ... 250 250 ... 440	• • • • • • • •	RV5/50 RV5/133 RV5/250 RV5/440
A 9 ... A 40 and N	24 ... 50 50 ... 133 110 ... 250 250 ... 440	— • — • — • — •	RC5-1/50 RC5-1/133 RC5-1/250 RC5-1/440
A 45 ... A 110	24 ... 50 50 ... 133 110 ... 250 250 ... 440	— • — • — • — •	RC5-2/50 RC5-2/133 RC5-2/250 RC5-2/440

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

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 ... 240
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	-20 ... +70	-20 ... +70	-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.			

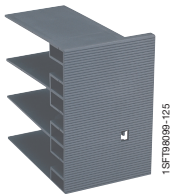
* U_{vdr} = Varistor operating voltage (voltage dependent resistor), tolerance $\pm 10\%$.

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 ... 240
Residual overvoltage (clipping voltage)	V a.c.	2 to 3 x U_c max.	2 to 3 x U_c max.	2 to 3 x U_c max.	2 to 3 x U_c max.
Opening time growth factor		1.2 ... 1.3	1.2 ... 1.3	1.2 ... 1.3	1.2 ... 1.3
Operating temperature	°C	-20 ... +70	-20 ... +70	-20 ... +70	-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.			

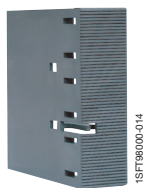
Terminal Shrouds, Extension and Connectors



LT ...-AC



LT ...-AL



LT ...-AY



ATK185

Application

Main terminal protection for **AF 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: AF 50 ... AF 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
AF 145 ... AF 185 with connectors	LT185-AC	
AF 145 ... AF 185 with lugs	LT185-AL	
AF 145 ... AF 185 with short. bar LY 185 or between AF 145 and TA 200DU or between AF 185 and TA 200DU	LT185-AY	
AF 210 ... AF 300 with connectors	LT300-AC	
AF 210 ... AF 300 with lugs ATK 300 only	LT300-AL	
AF 210 ... AF 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	

Connector Terminals Lug Kits

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

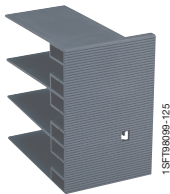
Ordering Details

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

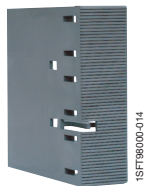
Terminal Shrouds, Extension and Connectors



LT ...-AC



LT ...-AL



LT ...-AY



ATK185

Terminal Extension Pieces

Application

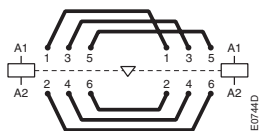
LX... extension pieces are designed to extend the terminal pads of the **AF...** contactors for simultaneous mounting of the connectors and the connection sets.

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

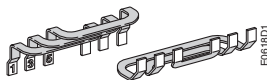
Ordering Details

For Contactors	Dimensions		Order Code	List Price
	hole Ø mm	bar mm		
A 145, A 185	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	

Connections Sets



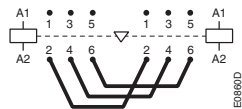
BEM, BER... connections



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.

- Insulated, solid, rigid copper wires
- Insulated, solid copper bars

BEM 75-30 ... BEM 750-30

On the **AF...** 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 (see page 2/46), **LX...** terminal extension pieces should be used.

Ordering Details

Mounting on 3-pole Contactors	Order Code	List Price
AF 50 ... AF 75	BEM75-30	
AF 95, AF 110	BEM110-30	
AF 145, AF 185	BEM185-30	
AF 210 ... AF 300	BEM300-30	
AF 400, AF 460	BEM460-30	
AF 580, AF 750	BEM750-30	

3-pole Connections for Phase to Phase

Application

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

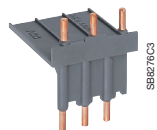
Description

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

Ordering Details

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

BEA 50 ... BEA 110 Connecting Links for Contactors and Manual Motor Starters



BEA 50/450

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 **AF...** series contactors (including AL, TAL, AF... versions) and the **MS...** manual motor starter as indicated in the table below.

(For further information about contactors see section 2 in this catalogue and separate technical catalogue for detailed information about the manual motor starter range).

Ordering Details

For Contactors & Mounting	For MMS & Mounting	I _n max. AC-3 600 V A	Order Code	List Price
Screw not supplied	Screw / rail not supplied			
AF 50 2 x M4	MS 450 2 x M5	54	BEA50/450	
AF 50 2 x M6	MS 495 2 x M5	54	BEA75/495	
AF 63 2 x M6	MS 495 2 x M5	65	BEA75/495	
AF 75 2 x M6	MS 495 2 x M5	80	BEA75/495	
AF 95 2 x M6	MS 495 2 x M5	95	BEA110/495	
AF 110 2 x M6	MS 495 2 x M5	110	BEA110/495	

Connection Bars for Contactor and MCCB



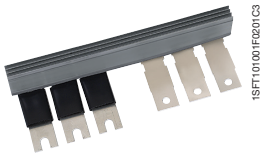
AF 300-30 contactor + MCCB on top



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
AF 145, AF 185	T 3, T 4	BEA185/T4	
AF 145, AF 185	S 3, S 4	BEA185/S3/S4	
AF 210	T 4	BEA210/T4	
AF 210 ... AF 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)

AF 145, AF 185	T 3	BEA185D/T3	
AF 145, AF 185	S 3, S 4	BEA185D/S3/S4	
AF 210	S 4	BEA210D/S4	
AF 210 ... AF 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)

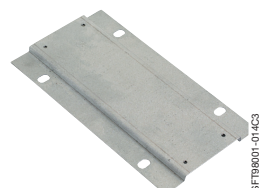
AF 145, AF 185	S 3, S 4	BEA185H/S4	
AF 210	S 4	BEA210H/S4	
AF 210, AF 300	S 5	BEA300H/S5	
AF 400, AF 460	S 5	BEA400H/S5	
AF 400, AF 460	S 6	BEA460H/S6	
AF 580, AF 750	S 6	BEA750H/S6	

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



PR300-1

1SFT98001-015C3



PR400-2

1SFT98001-014C3



PN300A-11

1SFT98001-016C3



PN300-21

1SFT98001-017C3



PN300-41

1SFT98001-018C3

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	AF 95, AF 110	PR110-1	
EH 100, 145	AF 110, AF 145	PR145-1	
EH 150, 160, 175, 210, EG 160	AF 185, AF 210	PR210-1	
EH 250, 260, 300	AF 210 ... AF 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	AF 185	PR185-2	
OKYM 200, 250	AF 210 ... AF 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
AF 145, AF 185	TA 200 DU, E 200 DU	PN185-11	
AF 210, AF 260, AF 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 Relay	Order Code	List Price
AF 9 ... AF 40	TA 25 DU, TA 42 DU	PN40-21	
AF 50 ... AF 75	TA 75 DU	PN75-21	
AF 95, AF 110	TA 80 DU, TA 110 DU	PN110-21	
AF 145, AF 185	TA 200 DU, E 200 DU	PN185-21	
AF 210 ... AF 300	E 320 DU	PN300-21	
AF 400, AF 460	E 500 DU	PN460-21	
AF 580, AF 750	E 800 DU	PN750-21	

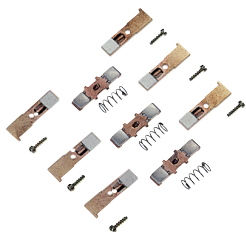
Mounting plates for Star-Delta Starters and two speed starters for single windings

For Main and Delta Contactors	For Star Contactor (1)	For Overload Relays	Order Code	List Price
AF 95, AF 110	AF 95	TA 110 DU	PN110-41	
AF 145, AF 185	AF 145	E 200 DU	PN185-41	
AF 210, 260, 300	AF 185, AF 210, AF 260	E 320 DU	PN300-41	
AF 400, AF 460	AF 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.

Main Contact Sets

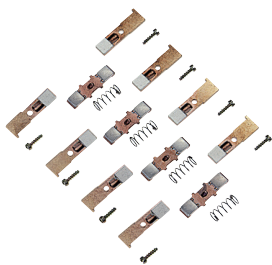
Arc Chutes



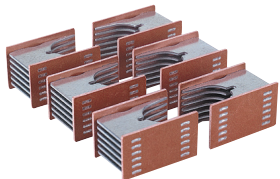
ZL 50



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, DA75	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	
AF 1350	ZL1350	
AF 1650	ZL1650	
AF 2050	ZL2050	
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

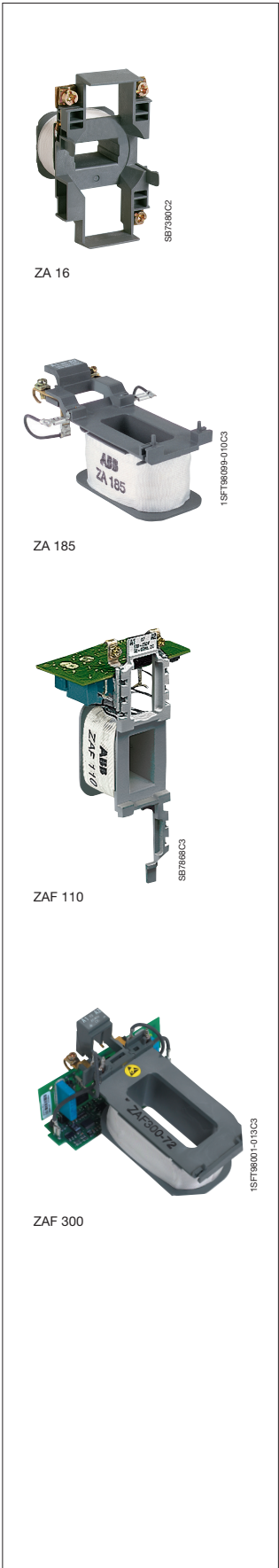
For Contactors	Order Code	List Price
A/AF 45-40, -22	ZLT75	
A/AF 50/40	ZLT50	
A/AF 75/40, -22	ZLT75	

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, AF 2050	ZW1650	

Contactor Coils



Ordering Details

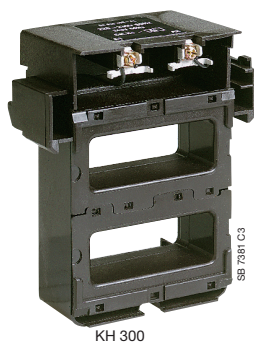
a.c. Operated coils for A 9 ... A 300 contactors and N control relays		
For Contactors	Order Code	List Price
	state coil voltage code ☐ ☐ ⚡ page 2/0	
A 9 ... A 16 ; UA 16...-R ; N	ZA16- ☐ ☐	
A 26 ... A 40 ; UA 26...-R, UA 30...-R	ZA40- ☐ ☐	
A 45 ... A 75 ; UA 50...-R to UA 75...-R ; GA 75	ZA75- ☐ ☐	
A 95 ... A 110 ;	ZA110- ☐ ☐	
A 145 ... A 185	ZA185- ☐ ☐	
A 210 ... A 300	ZA300- ☐ ☐	

a.c. / d.c. Operated coils c/w electronic interface for AF 45 ... AF 2050 contactors		
For Contactors	Order Code	List Price
	state coil voltage code ☐ ☐ ⚡ page 2/0	
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 2050	ZAF1650-70	

d.c. Operated coils for GAE 75 contactors and NE control relays		
For Contactors	Order Code	List Price
	state coil voltage code ☐ ☐ ⚡ page 2/0	
Coils only		
GAE 75	ZAE75- ☐ ☐	

Spare Parts

EH, EHDB Contactors



KH 300



KZ 450

Spare Coils

For Contactor	Order Code	List Price
	state coil voltage code ☐ (see table below)	
a.c. Operated		
	EH 145, EHDB 130	KH145- ☐
	EH 175, EH 210, EHDB 220, EHDB280	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 60 Hz	Voltage Code : ☐
24	F
120	1
208	B
230 ... 240	2
480	4
600	6

Coil voltages and codes KP

Voltage 60 Hz	Voltage Code : ☐
24	Y
48	W
110	P
125	Q
220	R
250	S

Contact Sets

For Contactor	Order Code	List Price
	EH 145	KZ145
	EH 175	KZ175
	EH 210	KZ210
	EH 260	KZ260
3-Pole	EH 300	KZ300
	EH 450	KZ450
	EH 550	KZ550
	EH 700	KZ700
	EH 800	KZ800
	EH 1200	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	EHDBCK220-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

DISCOUNT SCHEDULE DS-A3

Thermal Overload Relays

Electronic Overload Relays

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Motor Protection

Selection of the Protection Device

Motor protection - General aspects

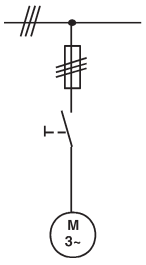
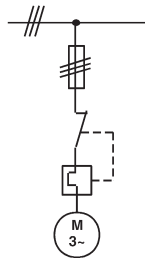
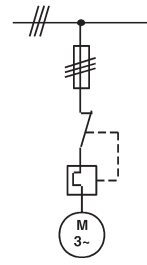
Selection of an adequate motor protection is of great importance with regard to the operational reliability and service life of a motor.

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 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

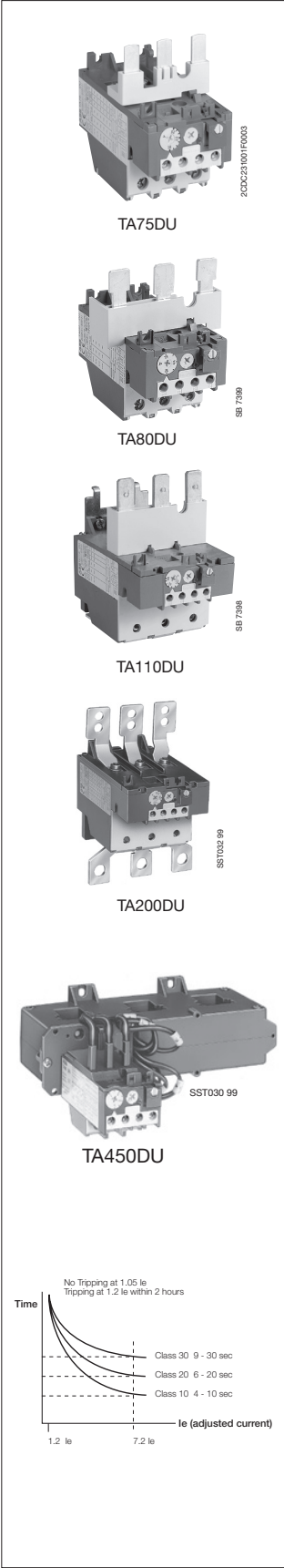
Note on fuses

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

T16, TA75DU, TA80DU, TA110DU, TA200DU, TA450DU



Normal starting time class 10

For Contactors	Setting Range A	Catalog Number	List Price
B(C) 7	0.10 ... 0.13	T16-0.13	
	0.13 ... 0.17	T16-0.17	
	0.17 ... 0.23	T16-0.23	
	0.23 ... 0.31	T16-0.31	
	0.31 ... 0.41	T16-0.41	
	0.41 ... 0.55	T16-0.55	
	0.55 ... 0.74	T16-0.74	
	0.74 ... 1.00	T16-1.0	
	1.00 ... 1.30	T16-1.3	
	1.30 ... 1.70	T16-1.7	
	1.70 ... 2.30	T16-2.3	
	2.30 ... 3.10	T16-3.10	
	3.10 ... 4.20	T16-4.20	
	4.20 ... 5.70	T16-5.70	
	5.70 ... 7.60	T16-7.60	
	7.60 ... 10.0	T16-10	
	10.0 ... 13.0	T16-13	
AF50...75	13.0 ... 16.0	T16-16	
	18 ... 25	TA75DU25	
	22 ... 32	TA75DU32	
	29 ... 42	TA75DU42	
	36 ... 52	TA75DU52	
	45 ... 63	TA75DU63	
AF95...110	60 ... 80	TA75DU80	
	29 ... 42	TA80DU42	
	36 ... 52	TA80DU52	
	45 ... 63	TA80DU63	
AF95...110	60 ... 80	TA80DU80	
	66 ... 90	TA110DU90	
	80 ... 110	TA110DU110	
AF145...AF185	66 ... 90	TA200DU90	
	80 ... 110	TA200DU110	
	100 ... 135	TA200DU135	
	110 ... 150	TA200DU150	
	130 ... 175	TA200DU175	
	150 ... 200	TA200DU200	
AF210...AF300	130 ... 185	TA450DU185	
	165 ... 235	TA450DU235	
	220 ... 310	TA450DU310	

Thermal overload relays class 20:

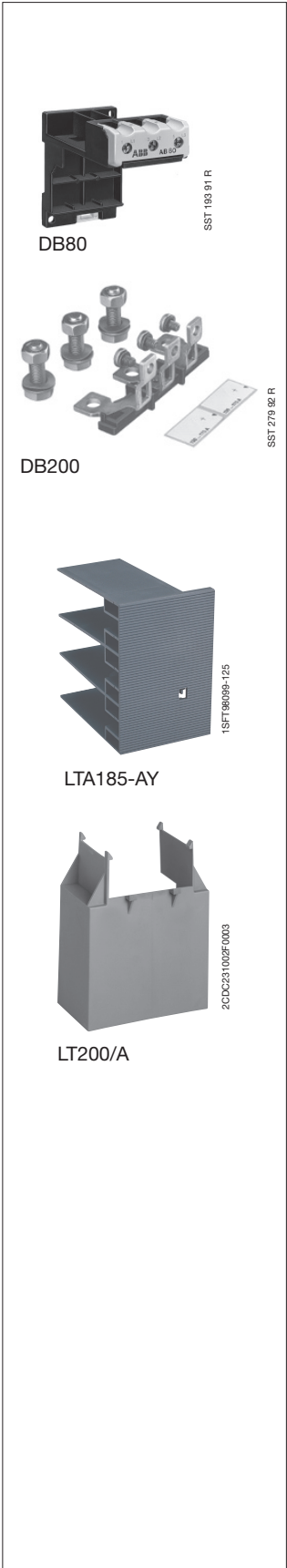
For Contactors	Setting Range A	Catalog Number	List Price
AF50...75	18 ... 25	TA75DU25-20	
	22 ... 32	TA75DU32-20	
	29 ... 42	TA75DU42-20	
	36 ... 52	TA75DU52-20	
	45 ... 63	TA75DU63-20	
	60 ... 80	TA75DU80-20	
A/AF95...110	29 ... 42	TA80DU42-20	
	36 ... 52	TA80DU52-20	
	45 ... 63	TA80DU63-20	
	60 ... 80	TA80DU80-20	

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

For Contactors	Setting Range A	Catalog Number	List Price
AF145 ... 300	40 ... 60	TA450SU60	
	55 ... 80	TA450SU80	
	70 ... 105	TA450SU105	
	95 ... 140	TA450SU140	
	130 ... 185	TA450SU185	
	165 ... 235	TA450SU235	
	220 ... 310	TA450SU310	

Thermal Overload Relays

Accessories



Mounting kits for single set-ups

For Overloads	Mounting	Catalog Number	List Price
TA75DU, TA80DU	snapping onto 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
AF 145 ... 185	DT450/A185	
AF 210 ... 300	DT450/A300	

Terminal shroud for TA200

For Contactors	Mounting	Catalog Number	List Price
AF 145, AF 185	Between A145/185 and TA200DU	LTA185-AY	
	Load Side TA200D	LT200/A	

Terminal lug kits

For Overloads	Wire Range	Kit of	Catalog Number	List Price
TA200DU	6 — 250MCM	3	EHTK210	
TA450DU185	4 — 400MCM	3	ATK300	
TA450DU310	4 — 500MCM	3	ATK300/2	

Electronic Overload Relays

Class 10, 20, 30



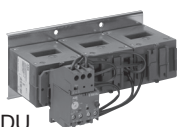
E80DU

2CDC 231 003 F0006



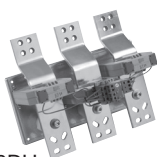
E140DU

2CDC 231 004 F0006



E800DU

2CDC 231 008 F0006



E1250DU

1SFC 101 025 F0201

For Contactors	Setting Range A	Catalog Number	List Price
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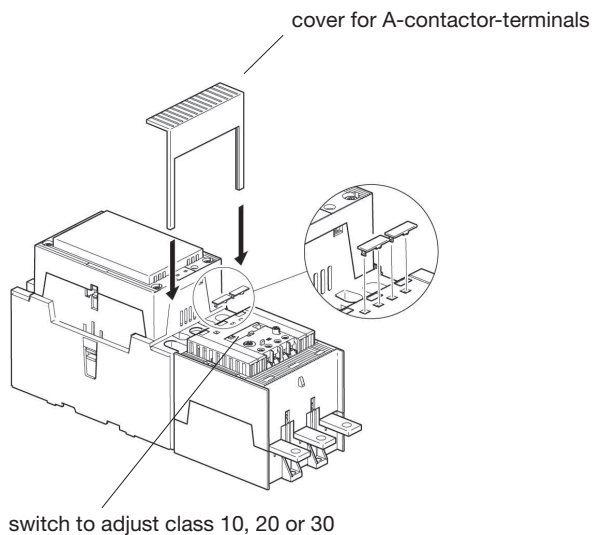
Trip class 10, 20, 30 selectable

AF50 ... AF75	27 ... 80A	E80DU80	
AF95 ... AF110	50 ... 140A	E140DU140	
AF145 ... AF185	60 ... 200A	E200DU	
AF210 ... AF300	100 ... 320A	E320DU	
AF400 ... AF460	150 ... 500A	E500DU	
AF580 ... AF750	250 ... 800A	E800DU	
AF1350 ... AF1650	375 ... 1250A	E1250DU	

For Electronic Overload	Mounting	Catalog Number	List Price
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Accessories

E80DU	DB80E	
E140DU	DB140E	
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	



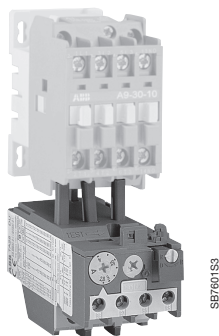
Lug kits

For Electronic Overload	Wire Range	Catalog Number	List Price
E200DU	6 - 250MCM	ATK185	
E320DU	4 - 400MCM	ATK300	
E320DU	4 - 500MCM	ATK300/2	
E600DU	2/0 - 500MCM	ATK580/2HK	
E800DU	2/0 - 500MCM	ATK760/3HK	
E1250DU	1/0 - 750MCM	ATK1350/4HK	

DISCOUNT SCHEDULE DS-A3

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: TA75DU, TA80DU, TA110DU, TA200DU, TA450DU/SU

- Relays **TA75DU** 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 $1.05 \times I$ setting current, tripping at $1.2 \times I$ 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 $-25 \dots +55 \text{ }^{\circ}\text{C}$
Electronic overload relays offer a compensation between $-25 \dots +70 \text{ }^{\circ}\text{C}$ 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, TA75... TA450, current range: 18 ... 310 A
- Electronic Overload Relays E80... E1250DU, current range: 27 ... 1250 A
 - Class 20 - Standard TA-Relays, TA75... TA80, current range: 18 ... 80 A
- Electronic Overload Relays E80... E1250DU, current range: 27 ... 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

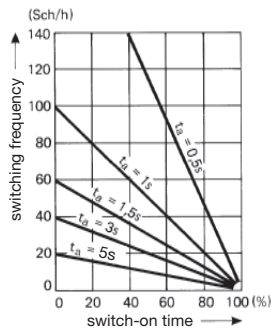
- one NC contact, marked by 95 - 96
- one NO contact, marked by 97 - 98

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

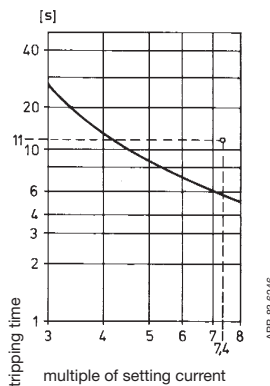
Thermal Overload Relays T...

Description

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 avoid 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 TA75DU ... 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 t_E time.

Example for suitability of an overload relay T/TA:

The motor with increased safety has the following data:

Output = 7.5 kW, $I_a/I_n = 7.4$ t_E time = 11 seconds.

In accordance with the adjacent tripping curve, the tripping time lies below the t_E time of the motor.

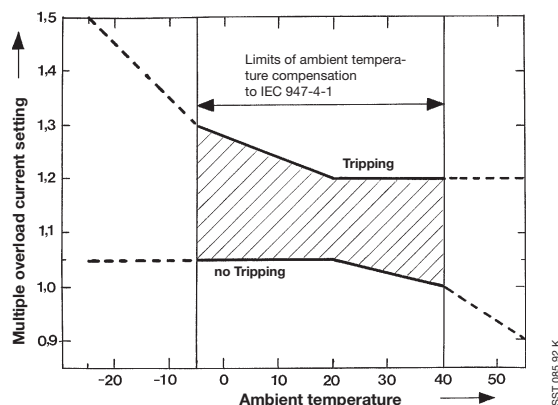
The special relay version for EEx e motors differs from the normal version as follows:

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 :

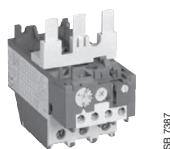
Types TA75DU ... TA450DU/SU feature a convertible Manual/ Automatic reset.

Condition as delivered :

Manual reset.

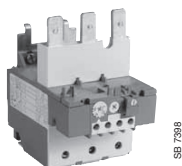
Thermal Overload Relays

TA75DU ... TA200DU, TA450DU Tripping Curves



TA75DU

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.



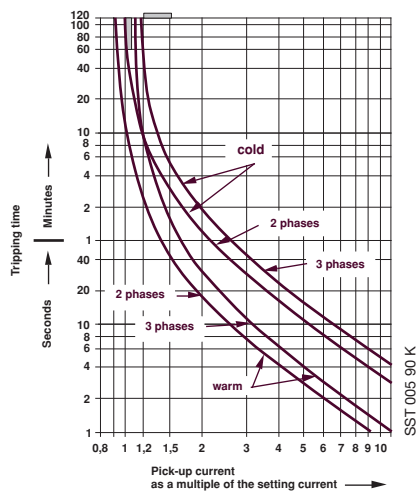
TA110DU

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

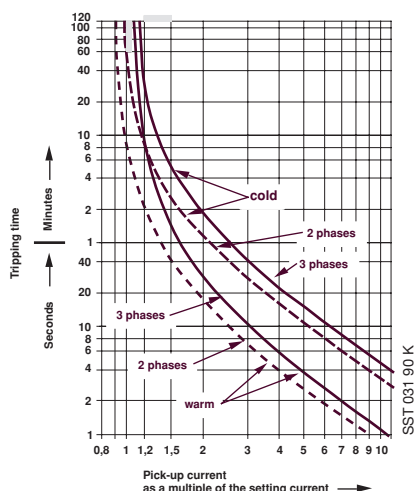
All relays feature a facility for temperature compensation and phase failure protection. The overload relays up to size TA110DU are safe from finger-touch and safe from touch by the back of the hand.

Tripping curves of the thermal overload relays (group curves)

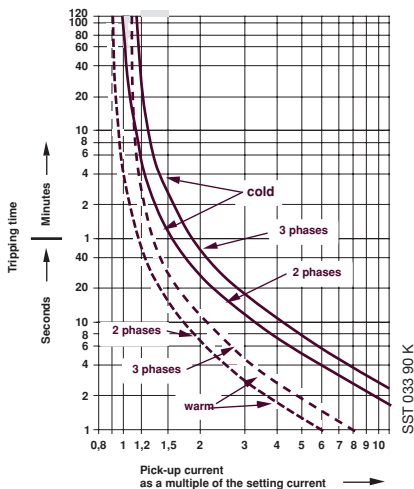
TA75DU / TA80DU



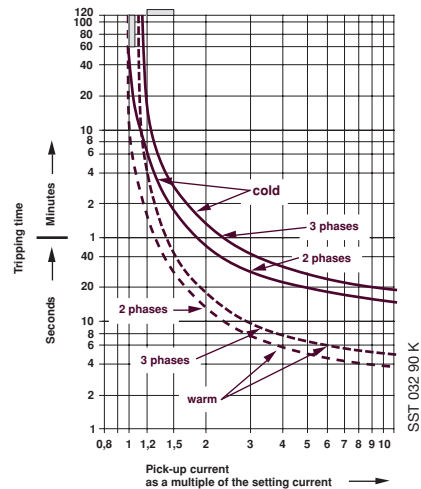
TA200DU



TA450DU



TA450SU



Thermal Overload Relays T...

Ordering Details

General Technical Data

Type		TA42DU	TA75DU
Standards: (major international European and national standards)		IEC 947-4-1, VDE 0660, NFC 63 650, BS 4941, EN 60947-4-1 CSA 22.2 No. 14, UL508	
Approvals, certificates		see page 2/74	
Rated insulation voltage U_i to IEC 158-1, IEC 947-4-1	V	660/690	660/690
Impulse withstand voltage U_{imp} to IEC 947-4-1	kV	6	6
Permissible ambient temperature			
- Storage temperature	°C	-40 to +70	-40 to +70
- for operation (compensated)	°C	-25 to +55	-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_n	Shock duration ms	15	15
• critical shock direction A1, A2	multiple of g	12	12
Resistance to vibration: (± 1mm, 50Hz)	multiple of g	8	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			
Main conductors (motor side)			
• Screw terminals			
- Screw terminal		M6	M6
- with terminal block		—	—
- with busbars or cable lugs		—	—
• Connection cross-sections			
- single-core or stranded	AWG	1 x 14 ... 4 or 2 x 14 ... 6	1 x 14 ... 4 or 2 x 14 ... 6
- flexible with wire end ferrule	AWG	1 x 14 ... 4 or 2 x 14 ... 8	1 x 14 ... 4 or 2 x 14 ... 8
- busbars	AWG	—	—
Torque	Nm	2 ... 2.4	3 ... 4
Connections and auxiliary connectors			
• Screw terminal (screw size)			
- with self-disengaging clamping piece		M3.5	M3.5
• 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	TA75DU	TA80DU	TA110DU	TA200DU	TA450DU	TA450SU
Number of paths	3	3	3	3	3	3
Settings range	see ordering details					
Tripping class to IEC 947-4-1 / VDE 0660, Part 1021	10-20	10-20	10	10	10	30
Frequency ranges	Hz	0 ... 400	0 ... 400	0 ... 400	50/60	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 I_n and the starting time does not exceed 1 s					

Thermal Overload Relays T ...

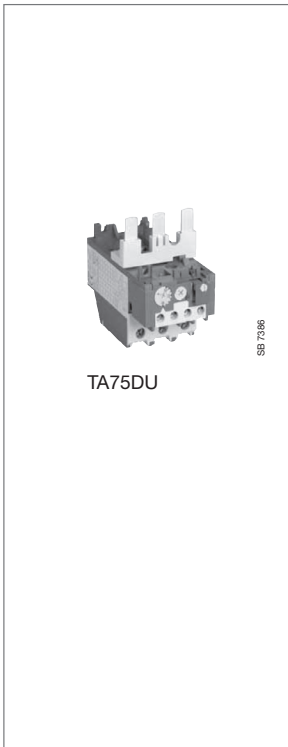
Description

General Technical Data (cont.)

Type		TA80DU	TA110DU	TA200DU	TA450DU/SU
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 2/74			
Rated insulation voltage U_i to IEC 158-1, IEC 947-4-1	V	660/690	660/690	660/690	1000
Impulse withstand voltage U_{imp} to IEC 947-4-1	kV	6	6	6	8
Permissible ambient temperature					
- Storage temperature	°C	-40 to +70	-40 to +70	-40 to +70	-40 to +70
- for operation (compensated)	°C	-25 to +55	-25 to +55	-25 to +55	-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_n	Shock duration ms	15	15	15	15
• critical shock direction A1, A2	multiple of g	12	12	12	12
Resistance to vibration: (± 1 mm, 50Hz)	multiple of g	8	8	8	8
Mounting	- onto contactor	M6			
	- with AB.. mounting kit	—	4 screws M5	4 screws M5	4 screws M5
Connection terminals and attachment type					
Main conductors (motor side)					
• Screw terminals					
- Screw terminal		M6	HC, M8	—	—
- with terminal block		—	—	—	—
- with busbars or cable lugs		—	—	M10	M10
• Connection cross-sections					
- single-core or stranded	AWG	1 x 14 ... 4 or 2 x 14 ... 6	6 ... 2	4 ... 250 MCM	2 x 500 MCM
- flexible with wire end ferrule	AWG	1 x 14 ... 4 or 2 x 14 ... 8	6 ... 2	4 ... 310	2 x 500 MCM
- busbars	AWG	—	—	20 x 4	25 x 5
Torque	Nm	3...4	7.2 ... 9.6	12 ... 16	12 ... 16
Connections and auxiliary connectors					
• Screw terminal (screw size)					
- with self-disengaging clamping piece		M3.5	M3.5	M3.5	M3.5
• Connection cross-section					
- single-core or stranded	AWG	2 X 18 ... 12	2 X 18 ... 12	2 X 18 ... 12	2 X 18 ... 12
- flexible with wire end ferrule	AWG	2 X 18 ... 12	2 X 18 ... 12	2 X 18 ... 12	2 X 18 ... 12
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.		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.	

Thermal Overload Relays T...

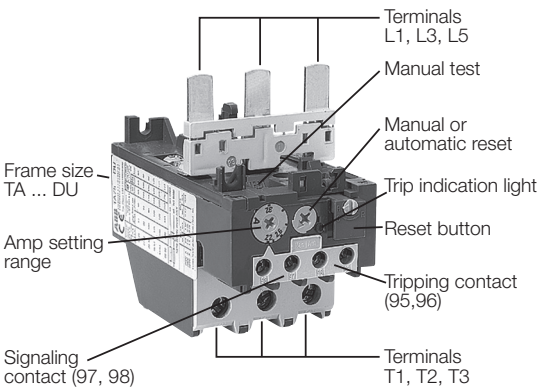
Technical Data



Load Rating of Auxiliary Contacts

Type		TA75DU ... TA450DU/SU	
Auxiliary switch		NC 95 - 96	NO 97 - 98
Rated operating voltage U_o	V	500	500
Rated thermal current I_{th}	A	10	6
Rated operating current I_o			
at AC 15 to 240 V	A	3	1.5
at AC 15 to 440 V	A	1.9	0.95
at AC 15 to 500 V	A	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	0.12	0.04
Maximum potential difference between the NO and NC contacts	AC V	500	500
	DC V	440	440
Short-circuit protection	J A	10	6
STOTZ circuit-breaker type			
S271	A	K3	K1
S281	A	K3	K1

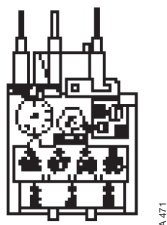
Function of the thermal overload relays



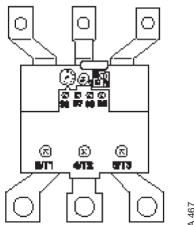
Press blue button	Contacts	Relay tripped		Relay not tripped	
		Manual	Automatic	Manual	Automatic
	NC 95-96 NO 97-98	open closed	open closed	closed open	closed open
Button R		Reset	—	—	—
	NC 95-96	closes when Button is pressed	—	—	—
	NO 97-98	opens when Button is pressed	—	—	—
Button R/O		Reset	—	—	—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

Position of the connection terminals

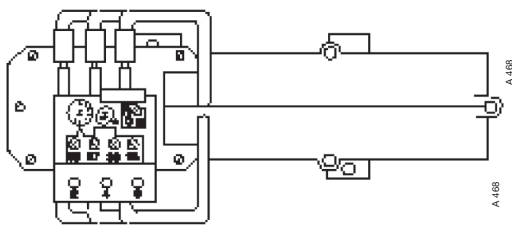
TA75DU, TA80DU



TA200DU



TA450DU/SU



Cross-sections of Cables for Test In Accordance with (IEC 947-1)

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

Test current range ¹⁾		Conductor cross-section ^{2), 3), 4)}	
(A)	(A)	(mm ²)	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

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.

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

Test current range ¹⁾		Conductor cross-section ^{2), 3), 4)}			
		Metric		MCM	
(A)	(A)	Number	Cross-section (mm ²)	Number	Cross-section (mm ²)
400	500	2	150	2	250
500	630	2	185	2	350
630	800	2	240	3	300

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

Test current range ¹⁾		Copper buses ^{2), 3), 4), 5), 6)}		
		Number	Cross-section (mm ²)	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

- 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.

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				Phys.- Technische Bundes- anstalt							
Abbreviation valid for	CSA Canada	UL USA	UL USA	PTB Germany	BV France	GL Germany	LRS Great Britain	DNV Norway	PRS Poland	RiNa Italy	MRS Russia

Thermal overload relays

TA75DU	■		■	■	■	■	■	■	△	■	△
TA80DU	■		■	■	□	■	□	□	△	△	△
TA110DU	■		■	■	□	■	□	□	△	△	△
TA200DU	■		■	■	■	■	■	■	■	■	■
TA450DU/SU	■		■	■	■	■	■	■ (2)	■	■	■

(2) except Types SU.

Electronic Overload Relay E80/E140DU

Technical Data

General Technical Data

Type		E80DU80	E140DU140
Standards:		IEC/EN 60 947-4-1 / IEC / EN 60 947-5-1	
Approvals and certificates		UL, CSA CSA 22.2 No. 14 / UL508	
Rated insulation voltage U_i	V	1000	1000
Rated operating voltage U_o	V	1000	1000
Impulse withstand voltage U_{imp}	kV	6	6
Permissible ambient temperature			
- Storage	°C	-25 to +70	-25 to +70
- Operation	°C	-25 to +70	-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 vibration to EN 61373		on request	
Mounting	- by screws: - onto contactor:	Separate mounting with Kit for single set up by screws 4 x M5 or direct mounting onto contactor - no kit necessary	
Connection terminals and attachment type			
Main conductors (load side)		M8 / 6 ... 6.5 Nm	
• Screw terminals - with self-disengaging clamping piece			
• Connection cross-sections		1 x 8 ... 3/0	1 x 8 ... 3/0
- single-core or stranded	AWG	2 x 10 ... 2	2 x 10 ... 2
- flexible with wire end ferrule	AWG	1 x 8 ... 2/0	1 x 8 ... 2/0
		2 x 10 ... 2	2 x 10 ... 2
Connections to aux.-contact terminals			
• Screw terminal - with self-disengaging clamping piece		M3.5/0.8 ... 1.0 Nm	M3.5/0.8 ... 1.0 Nm
• Connection cross-section		1 x 18 ... 14	1 x 18 ... 14
- single-core or stranded	AWG	2 x 18 ... 14	2 x 18 ... 14
- flexible with wire end ferrule	AWG	1 x 18 ... 10	1 x 18 ... 10
		2 x 18 ... 10	2 x 18 ... 10
Protection degree to IEC/EN 60 947-1		IP 10	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		E80DU80	E140DU140
Number of conducting paths		3	3
Setting ranges	A ... A	27 ... 80	50 ... 140
Tripping classes to IEC/EN 60 947-1			
Frequency range	Hz		
Switching frequency without early tripping			

Load Rating of Auxiliary Contacts

Contact		NC (95-96)	NO (97-98)
Rated operating voltage U_o	V	600	600
Rated thermal continuous current	A	6	6
Rated operating current I_o			
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

Electronic Overload Relay E200/ 320 / 500 / 800 / 1250DU

Technical Data

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	690	690	690	690
Rated operating voltage U_o	V	690	690	690	690	690
Impulse withstand voltage U_{imp}	kV	6	6	6	6	6
Permissible ambient temperature						
- Storage	°C	-25 to +70	-25 to +70	-25 to +70	-25 to +70	-25 to +70
- Operation	°C	-25 to +70	-25 to +70	-25 to +70	-25 to +70	-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 multiple of g	30 5	30 5	30 5	30 5	30 5
Resistance to vibration to EN 61373		category 1 class B				
Mounting	- by screw: - onto contactor:	by screws 4 x M5 direct mounting	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
Connection terminals and attachment type						
Main conductors (load side)						
• Screw terminals - with busbar or cable lugs		M8	M10	M10 (rail order separately)	M12 (rail order separately)	M12
Connection terminals and attachment type						
Auxiliary contacts						
• Screw terminal - with self-disengaging clamping piece - tightening torque	Nm	M3.5 1	M3.5 1	M3.5 1	M3.5 1	M3.5 1
• Connection cross-section - single-core or stranded - flexible with wire end ferrule	AWG AWG	 2 x 18 ... 10 2 x 18 ... 14	 2 x 18 ... 10 2 x 18 ... 14	 2 x 18 ... 10 2 x 18 ... 14	 2 x 18 ... 10 2 x 18 ... 14	 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	3	3	3	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 or 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

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

Mini Contactors B 7 Mini Control Relays K.. Compact Reversing Contactors VB..

Contents

Mini Contactors B 7, BC 7

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Compact Reversing Contactors

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Mini Control Relays, Interface Control Relays

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Mini Motor Contactors TBC 7, Mini Control Relays TKC 6

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Approvals 3/11

Coil Voltages for Mini Contactors

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

AC			DC		
40-450 Hz	Code Number		DC	Code Number	
V (1)	☐	☐	V	☐	☐
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

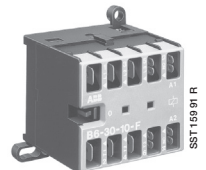
(1) Coil voltage range: 0.85 ... 1.1 x U_e

Mini Contactors B 7, BC 7

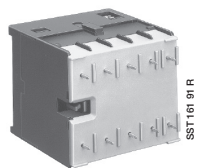
Ordering Details



B 7-30-10



B 7-30-10-F

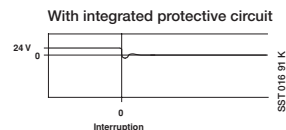
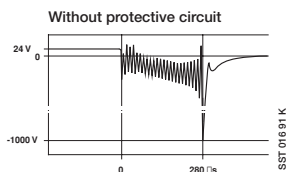


B 7-30-10-P



BC 7-30-10-1.4

Oscillograms of control circuit interruption



- Controlled directly by PLC
- Integrated protective circuit with diodes and additional surge suppressor
- Non-confusable coil connection
- You save time and money for additional external wiring
- Thermal overload relay T16DU available as accessory

CSA/UL Ratings		Maximum Motor Horsepower Ratings						Auxiliary Contacts	Order Code	List Price
General Purpose Current	1-phase	3-phase							state coil voltage code □□ (see page 3/1)	
AC-1	120 V 240 V	208 V	240 V	480 V	600 V					

Mini contactor 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. suppressor 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	

Mini contactors, with flat pin connection, for AC operation, 24 V / 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	—	B7S-30-10-2.8	
							—	1	B7S-30-01-2.8	

DISCOUNT SCHEDULE DS-A5

Compact Reversing Contactors

Ordering Details

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.

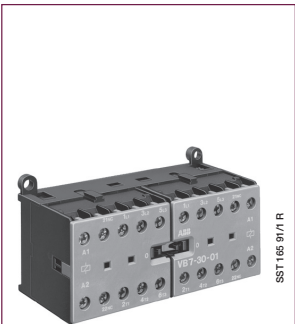
The compact reversing contactors are offered with two different mechanical interlocks:

- VB 7A: interlock with mechanical safety blocking function

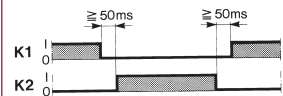
The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out.

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		Maximum Motor Horsepower Ratings						Auxiliary Contacts	Order Code	List Price
General Purpose Current	1-phase	3-phase							state coil voltage code ☐ ☐	
AC-1	120 V 240 V	208 V	240 V	480 V	600 V				(see page 3/1)	

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, $I_{th} < 8\text{ A}$

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

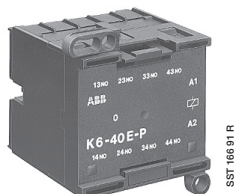
12	0.75	1.5	2	3	5	5	1	—	VBC7A-30-10-F- ☐ ☐	
							—	1	VBC7A-30-01-F- ☐ ☐	

Reversing contactors, with soldering pins, for DC operation, 3.5 W, $I_{th} < 8\text{ A}$

12	0.75	1.5	2	3	5	5	1	—	VBC7A-30-10-P- ☐ ☐	
							—	1	VBC7A-30-01-P- ☐ ☐	

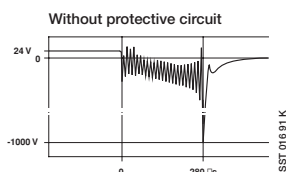
Mini Control Relays, Interface Control Relays / Mini Control Relays for Connection to PLCs

Ordering Details



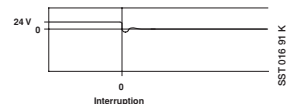
KC 6-40 E-P

Oscillograms of control circuit interruption



SST 016 91 K

With integrated protective circuit



SST 016 91 K

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

Contacts Order Code List Price

state coil voltage code □ □
(see page 3/1)

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

DISCOUNT SCHEDULE DS-A5

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		Maximum Motor Horsepower Ratings		Auxiliary Contacts	Order Code	List Price
General Purpose Current	1-phase	3-phase			state coil voltage code ☐ ☐	
AC-1	120 V	240 V	208 V			

Mini motor contactors TBC 7

Motor contactors, with screw connection, for DC operation

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

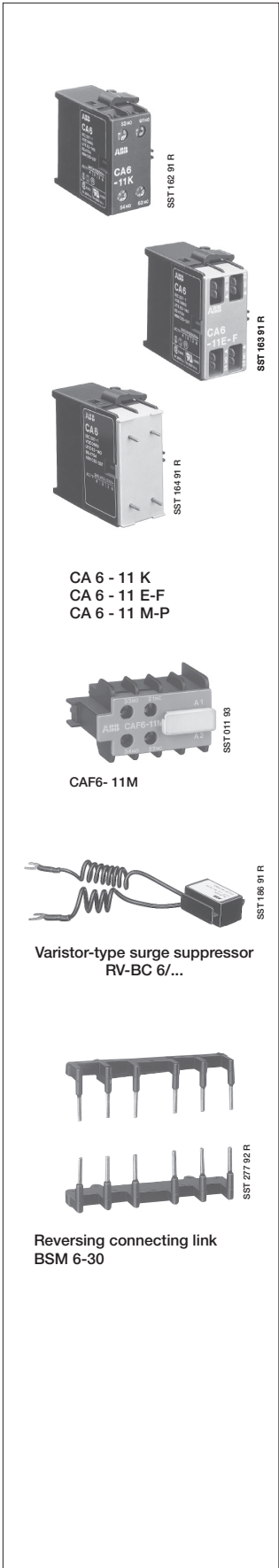
All other technical data and dimensions correspond to Types BC 7 and KC 6.

DISCOUNT SCHEDULE DS-A5

ABB | 3/5

Accessories for Mini Contactors

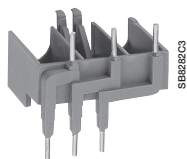
Ordering Details



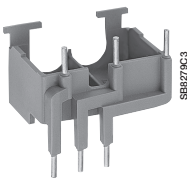
For mini contactors and control relays	Order Code	List Price
Auxiliary switch blocks for mounting at one side (1)		
Screw connection		
K6... and KC6...	CA6-11K	
B7-40-00 and BC7-40-00	CA6-11E	
B7-30-10 and BC7-30-10	CA6-11M	
B7-30-01 and BC7-30-01	CA6-11N	
Flat pin connection		
K6...F and KC6...F	CA6-11K-F	
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	BA50	
50 transparent covers		
60 non-adhesive labels*		
75 self-adhesive labels*		
(* on sheet)		
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,	LP6	
1 mm thick		
(1) Auxiliary switches CA 6 and CAF 6 may not be fitted simultaneously.		

BEA 7... Connecting Link

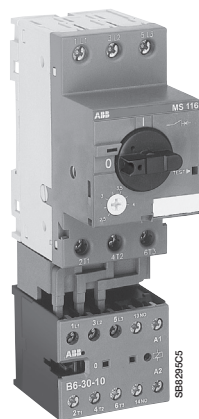
for Mini Contactors and Manual Motor Starters



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

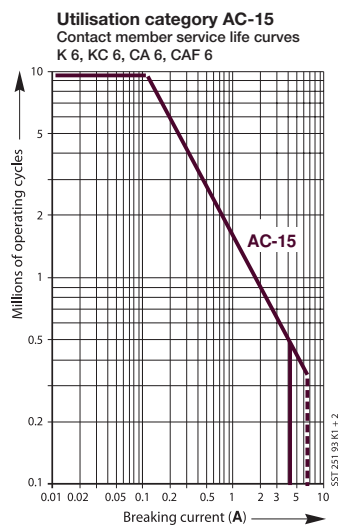
The BEA 7... insulated 3-pole connecting link (touch safe) ensures the electrical linking between the mini contactor (or compact reversing contactor) and the corresponding manual motor starter.
The BEA 7... connecting link can be used with the B7... mini contactors and VB7A... compact reversing contactors (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

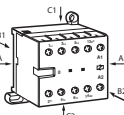
For Mini Contactors and Compact Reversing Contactors	For MMS	Fixing Rail not supplied	Order Code	List Price
B 7, VB 7 A	MS 116	 15 x 35 mm	BEA7/116	
B 7, VB 7 A	MS 325	 15 x 35 mm	BEA7/325	

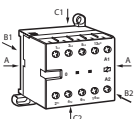
Mini Control Relays K 6, KC 6

Technical Data to IEC 60947-4-1, IEC 60945-5-1



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					
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

Max. rated voltage U _e		VAC	600 V
Pilot duty			A600 (5A at 600 VAC)
Conventional thermal continuous current I _{th}		A	6
Back-up fuses, Type J		A	10
Rated operating current I _e / AC-15			
at U _e	24-240 V	A	4
A 394	380/440 V	A	3
	500 V	A	2
Rated operating current I _e / DC-13			
at U _e	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

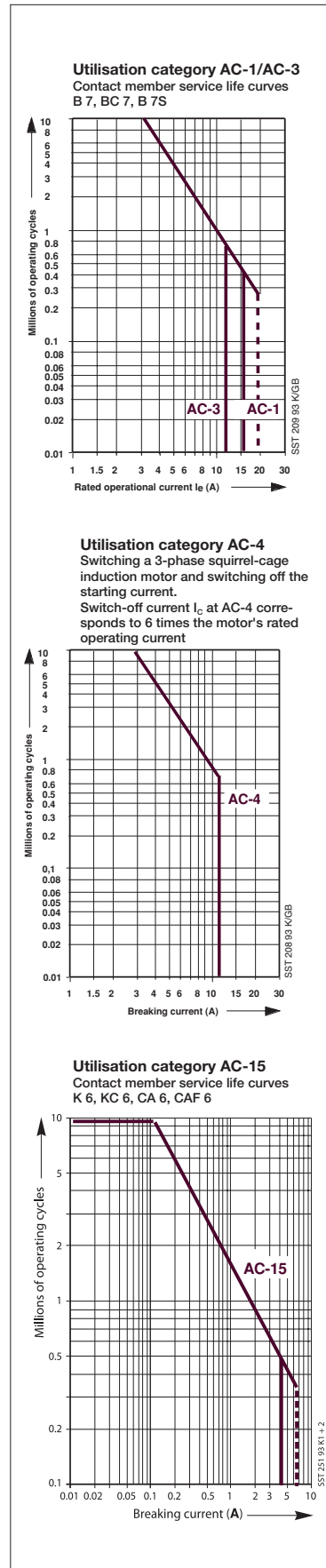
Solenoid Coils

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,			cold	warm
Mini control relay for connection to PLCs			I mA	P W
K 6S-1.7	DC 24 V	W	77	1.75
K 6S-2.8	DC 17 ... 32 V	W	125	2.80
Coil voltage range			0.85 ... 1.1x U_e	

Switching DC, see overleaf

Mini Contactors B 7, BC 7

Technical Data to IEC 60947-4-1



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		AC-1 / I _e A		AC-2, AC-3	
and motor output / 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

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

Shock resistance with normal installation position

		Semi-sinoidal shock, 10 ms, with no change in contact				
	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
	100 kA at 600 VAC
	when protected by 40 A J Fuse

Auxiliary Contacts: Integrated

Minimum making / breaking	≥ 17 V ≥ 5 mA
----------------------------------	-------------------------

Solenoid Coils

Rated power					
Basic contactors					Closing / holding
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 ... 1.1 x U_e

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

Mini Motor Contactors B 7, BC 7

Compact Reversing Contactors VB 7, VBC 7

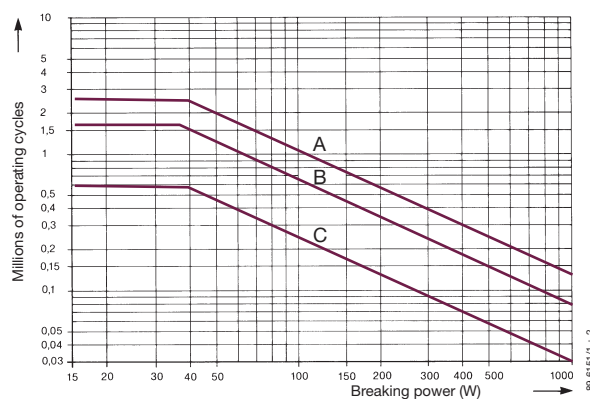
Contact Member Service Life, Utilisation Categories

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.

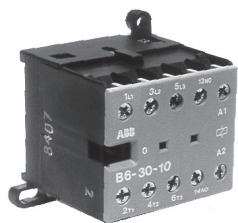
A = 3 poles in series DC-1
B = 3 poles in series DC-3
C = 3 poles in series DC-5



Mini Contactors, Mini Control Relays

Thermal Overload Relay,

Approvals



B7 30-10

91 A 043



KC6-31 Z

91 A 050

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 mark								
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	■	■	□	■	■	■	■	■
BC7..	■	■	■	■	■	■	■	■
BC7..-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								
T7 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_o	~	(V)	110/120 V	220/240 V	440/480 V	550/600 V
Motor output	P		(hp)	1	3	5	5
3-phase	I_o		(A)	7.2	9.6	7.6	6.1
Motor output	P		(hp)	3.4	1.5	—	—
Single-phase	I_o		(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

General Technical Data

Contents

CSA and UL Approvals.....	4/2
Auxiliary Contacts for Safety Circuits.....	4/4



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 _n A							
		U _e		U _e		U _e		U _e	
		200 V / 208 V		220 V / 240 V		440 V / 480 V		500 V / 600 V	
Type		hp	A	hp	A	hp	A	hp	A
AF09	00	2	7.8	2	6.8	5	7.6	7.5	9
AF12	0	3	11	3	9.6	7.5	11	10	11
AF16	—	5	17.5	5	15.2	10	14	15	17
AF26	1	7.5	25.3	7.5	22	15	21	20	22
AF30	—	10	32.2	10	28	20	27	25	27
AF 45/50	2	15	48.3	20	54	40	52	50	52
AF 63	—	20	62.1	25	68	50	65	60	62
AF 75	3	25	78.2	30	80	60	77	75	77
AF 95	—	30	92	30	80	60	77	75	77
AF 110	—	30	92	40	104	75	96	100	99
AF 145	4	40	119.6	50	130	100	124	125	125
AF 185	—	50	149.5	60	145	125	156	150	144
AF 210	—	60	166.8	75	192	150	180	200	192
AF 260	5	75	220.8	100	248	200	240	250	242
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.



Amp-rating for AF 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 $\cos \varphi$ of the load is between 0.75 and 0.8.

Contactors	Main Contacts (General Use Rating)		Auxiliary Contacts:		
	Nominal Current	Nominal voltage	"pilot-duty"	Nominal Current	Nominal voltage
Type	A	V a.c.		A	V a.c.
AF09	25	600	A 600, P 300	10	600
AF12	28	600	A 600, P 300	10	600
AF16	30	600	A 600, P 300	10	600
AF26	45	600	A 600, P 300	10	600
AF30	50	600	A 600, P 300	10	600
AF 45, AF 50	80	600	A 600, Q 300	10	600
AF 63	90	600	A 600, Q 300	10	600
AF 75	105	600	A 600, Q 300	10	600
AF 95	125	600	A 600, Q 300	10	600
AF 110	140	600	A 600, Q 300	10	600
AF 145	230	600	A 600, Q 300	10	600
AF 185	250	600	A 600, Q 300	10	600
AF 210	300	600	A 600, Q 300	10	600
AF 260	350	600	A 600, Q 300	10	600
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
AF 2050	2050	600	A 600, Q 300	10	600

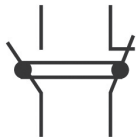
Amp-rating for NF Control Relays

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

Amp-rating for Main Accessories

Accessories	"pilot-duty"	Nominal Current	Nominal voltage
Type		A	V a.c.
CA4, CA 5 auxiliary contacts	A 600, Q 300	10	600
CAL4, 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 or "linked contacts"  , IEC 60947-5-1, Annex L 3.0 (known as "forced contacts", "positively activated contacts")

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

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

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

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

Mechanically Linked Contacts Elements for Control Relays

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

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

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

Auxiliary contacts for safety circuits

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 AF contactors + one CA 4-..

Contactors	Built-in Auxiliary Contacts		Add-on auxiliary contact blocks CA 4-22 E		CA 4-31 E		CA 4-40 E	
Type								
AF09-30-10	1	—	2	2	3	1	—	—
AF09-30-01	—	1	2	2	3	1	4	—
AF12-30-10	1	—	2	2	3	1	—	—
AF12-30-01	—	1	2	2	3	1	4	—
AF16-30-10	1	—	2	2	3	1	—	—
AF16-30-01	—	1	2	2	3	1	4	—
AF26-30-00	—	—	2	2	3	1	—	—
AF30-30-00	—	—	2	2	3	1	—	—

Mirror Contacts

N.C. built-in auxiliary contacts of AF09 ... AF 30 contactors are mirror contacts according to the above definition indicated in page 4/4.

The CA 4-22, CA 4-31, CA 4-04 and CA 4-01 (respectively 4-pole and 1-pole auxiliary contact blocks) and the CAL 4-11 (2-pole auxiliary contact block) when fitted on AF09 ... AF75 contactors have their own N.C. auxiliary mirror contacts.

The CAL 18-11 2-pole auxiliary contact blocks when fitted on AF95 ... 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).

Dimension Drawings

Drilling Plans

DXF & PDF Formats

Setting-up of the Contactors

Dimensions

Contents

Contactors with Thermal or Electronic O/L Relays and with Accessories

AF 50, AF 63 and AF 75	5/2
AF 95 and AF 110.....	5/4
AF 145 and AF 185.....	5/6
AF 210, AF 260 and AF 300	5/9
AF 400 and AF 460.....	5/12
AF 580 and AF 750.....	5/15

Specific Contactors

UA..-R.....	5/18
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Mini Contactors with Thermal O/L Relays and with Accessories

B 7, BC 7	5/25
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Thermal and Electronic O/L Relays

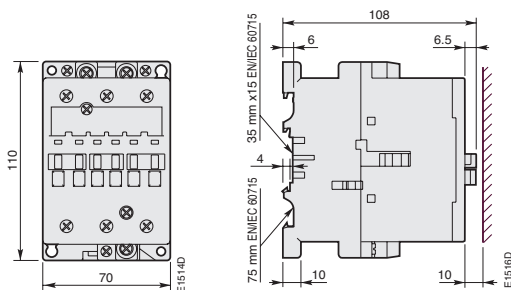
TA 75 DU, TA 80 DU, TA 110 DU, TA 200 DU.....	5/19
E 80 DU, E 140 DU, E 200 DU, E 320 DU, E 500 DU, E 800 DU.....	5/21

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

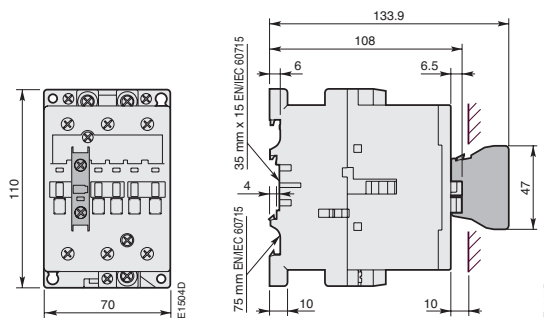
AF 50, AF 63 and AF 75 3-pole Contactors



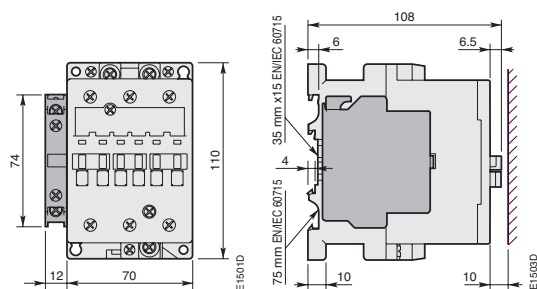
Dimensions (in mm)



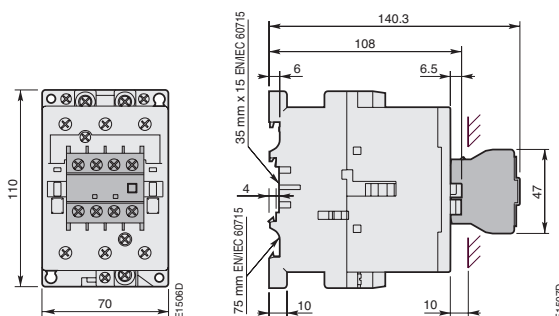
AF 50, AF 63, AF 75



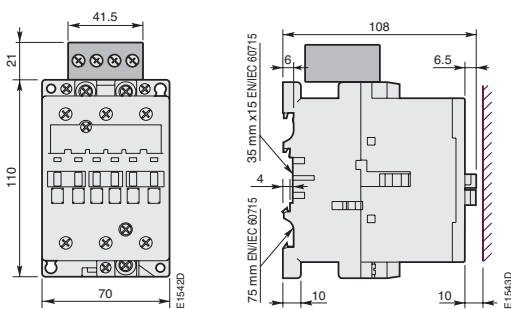
AF 50, AF 63, AF 75
+ CA 5 front-mounted 1-pole auxiliary contact block



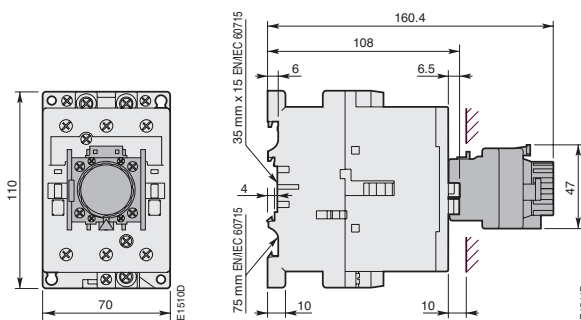
AF 50, AF 63, AF 75
+ CAL 5 side-mounted 2-pole auxiliary contact block



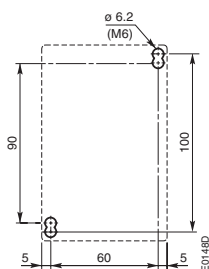
AF 50, AF 63, AF 75
+ CA 5 front-mounted 4-pole auxiliary contact block



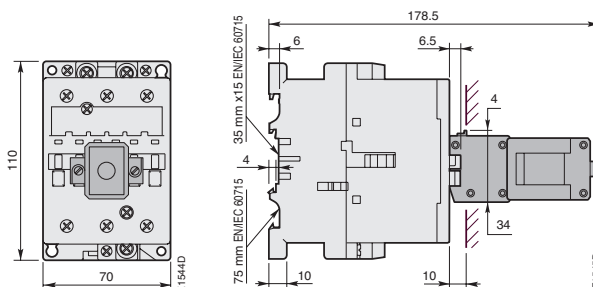
AF 50, AF 63, AF 75
+ RA 5 interface relay



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



AF 50, AF 63, AF 75 drilling plan



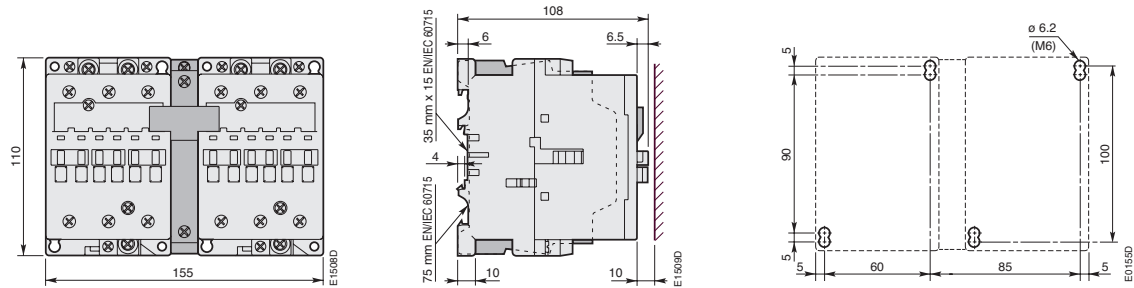
AF 50, AF 63, AF 75
+ WB 75-A on-position latch

Detailed dimension drawings available in DXF and PDF formats.

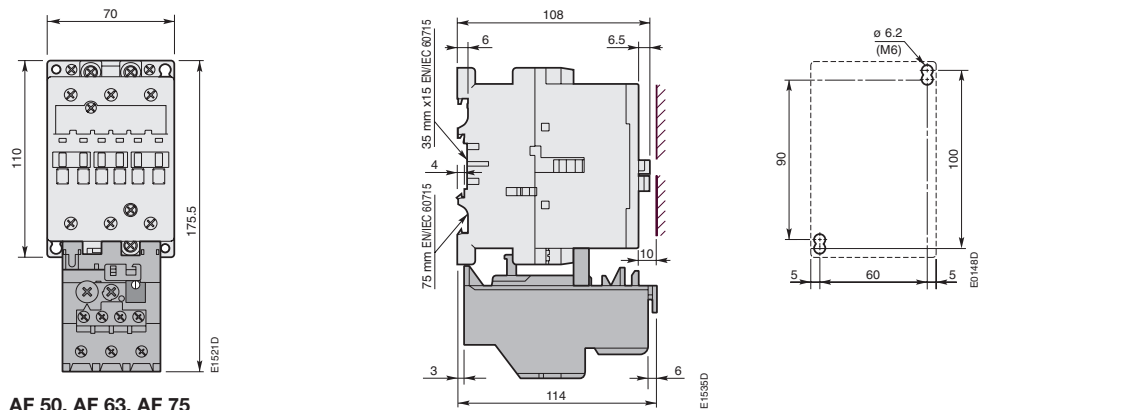
AF 50, AF 63 and AF 75 3-pole Contactors



Dimensions (in mm)



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

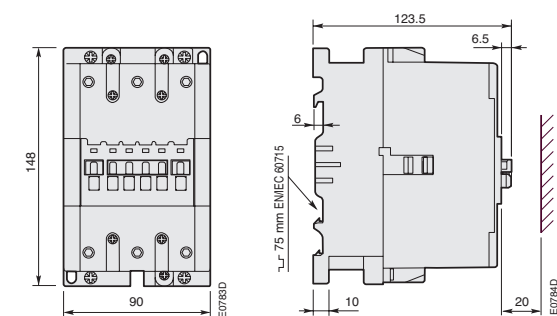


AF 50, AF 63, AF 75
+ TA 75 DU thermal O/L relay

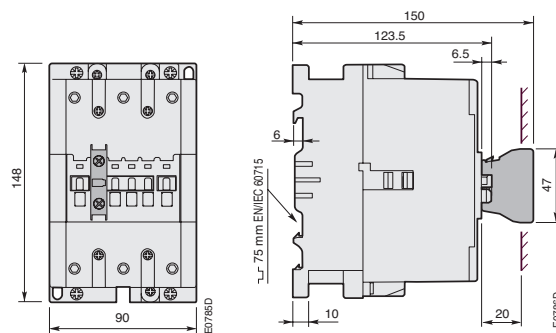
AF 95, and AF 110 3-pole Contactors



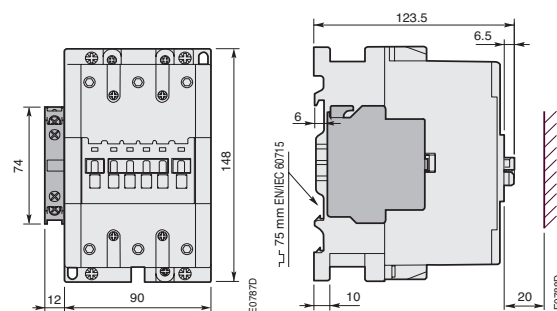
Dimensions (in mm)



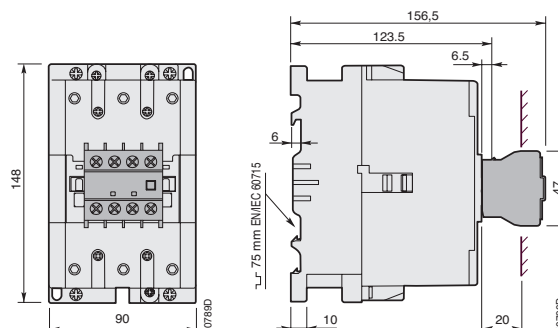
AF 95, AF 110



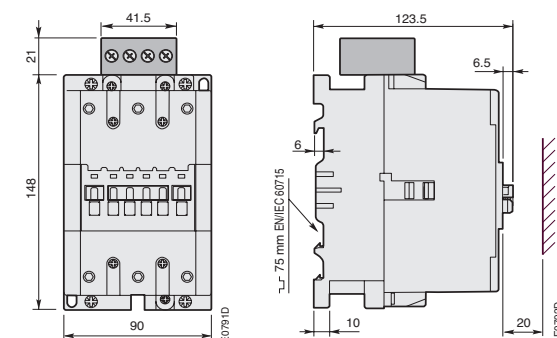
AF 95, AF 110
+ CA 5 front-mounted 1-pole auxiliary contact block



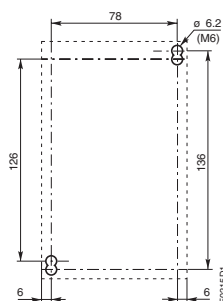
AF 95, AF 110
+ CAL 18 side-mounted 2-pole auxiliary contact block



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



AF 95, AF 110
+ RA 5 interface relay



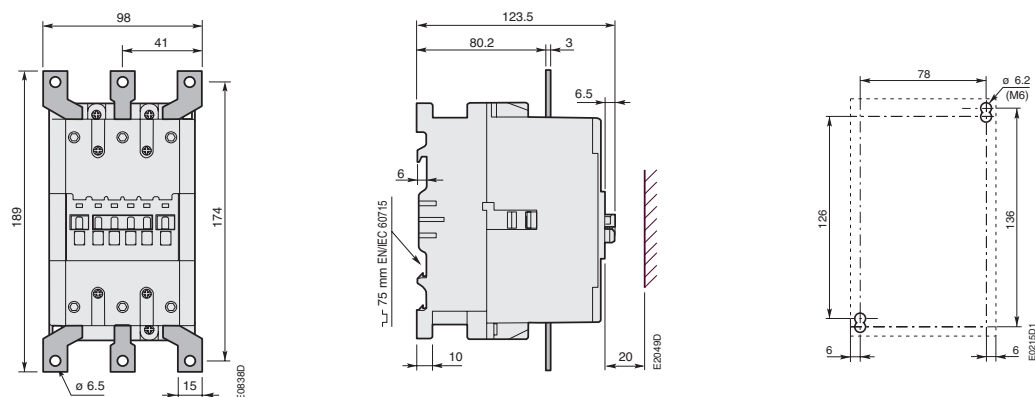
AF 95, AF 110 drilling plan

Detailed dimension drawings available in DXF and PDF formats.

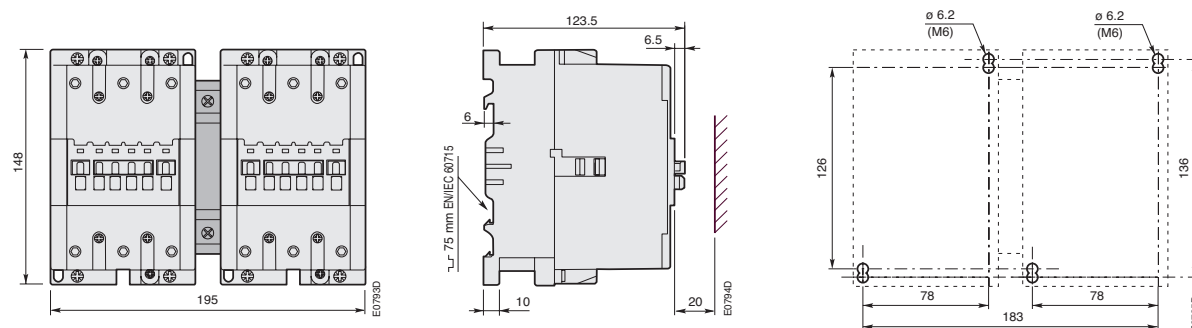
AF 95, and AF 110 3-pole Contactors



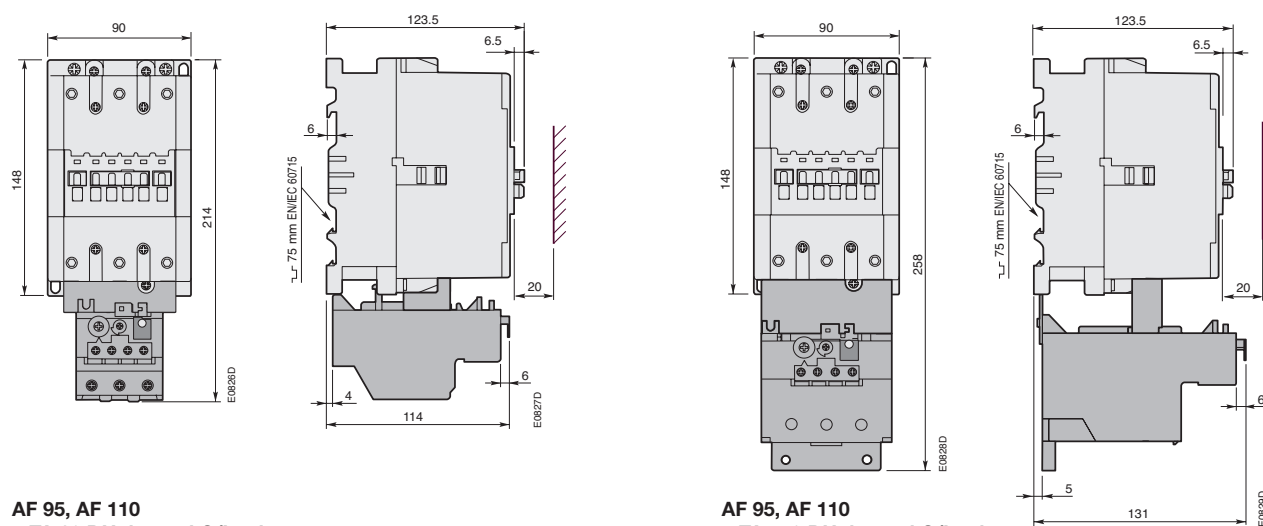
Dimensions (in mm)



AF 95, AF 110
+ LW 110 terminal enlargement



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



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

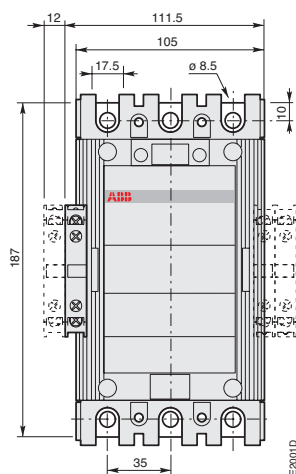
AF 95, AF 110
+ TA 110 DU thermal O/L relay

Detailed dimension drawings available in DXF and PDF formats.

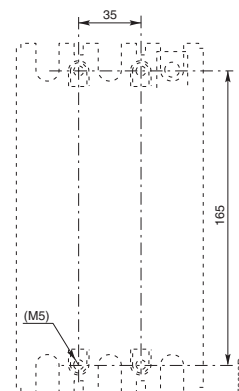
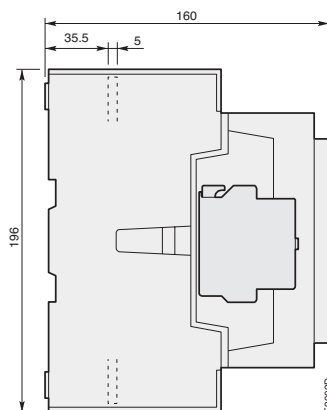
AF 145, and AF 185 3-pole Contactors



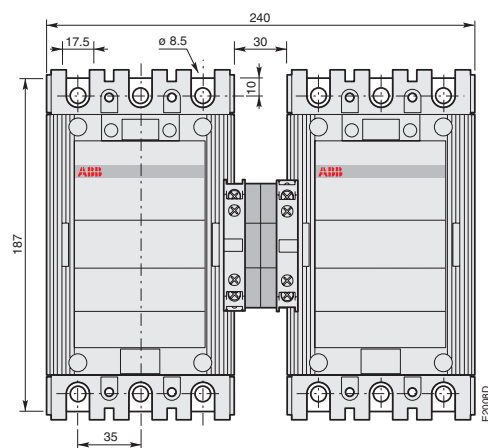
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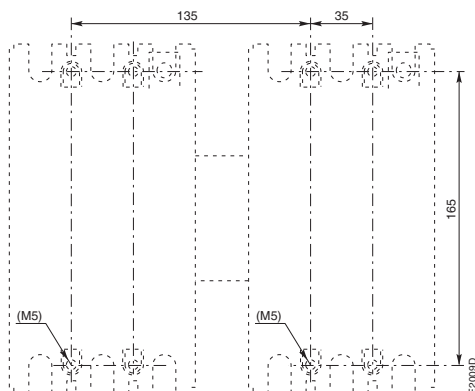
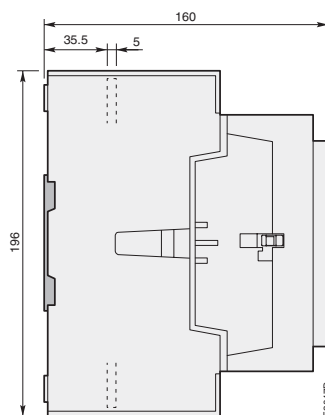
AF 185 c/w 1 x CAL18



**AF 145, AF 185
drilling plan**



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

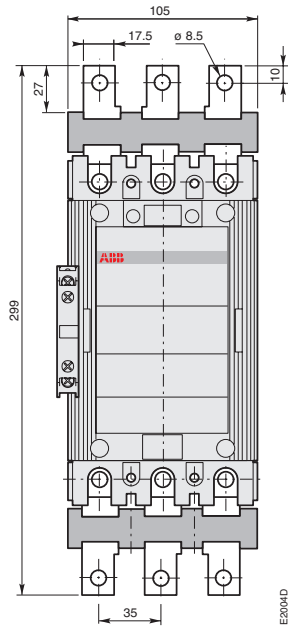


Detailed dimension drawings available in DXF and PDF formats.

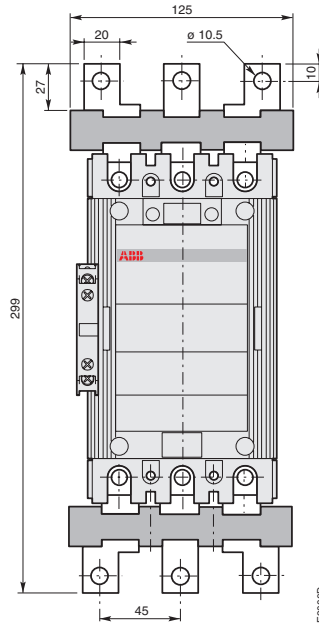
AF 145, and AF 185 3-pole Contactors



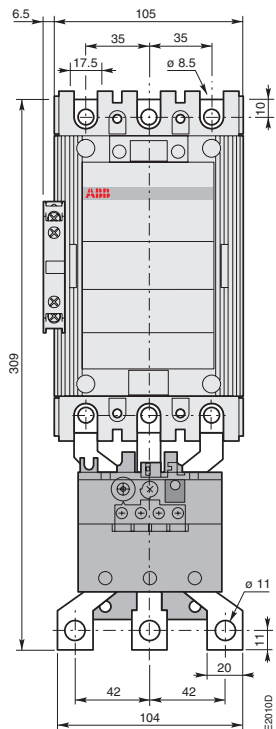
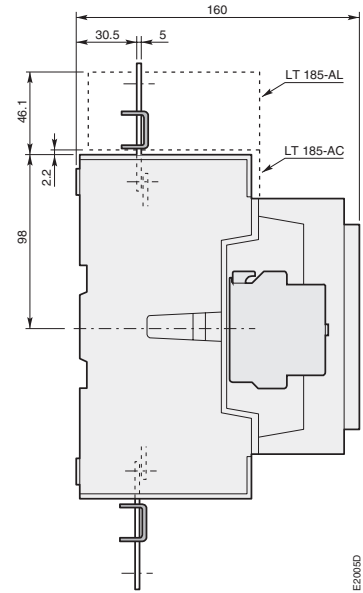
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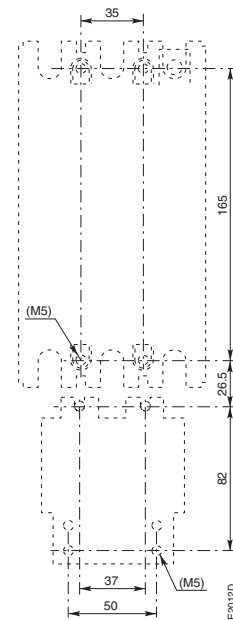
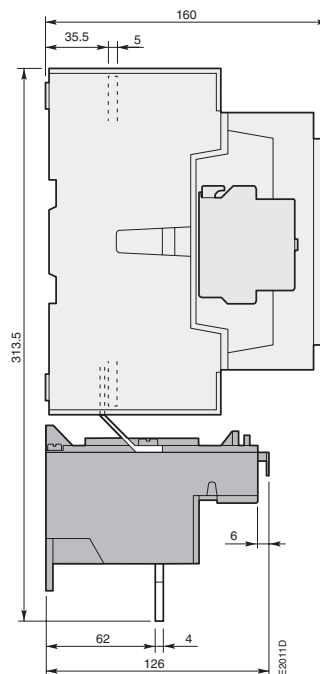
**AF 145, AF 185 c/w 1 x CAL18
+ LX 185 terminal extension**



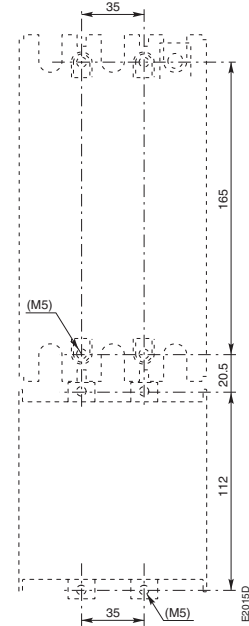
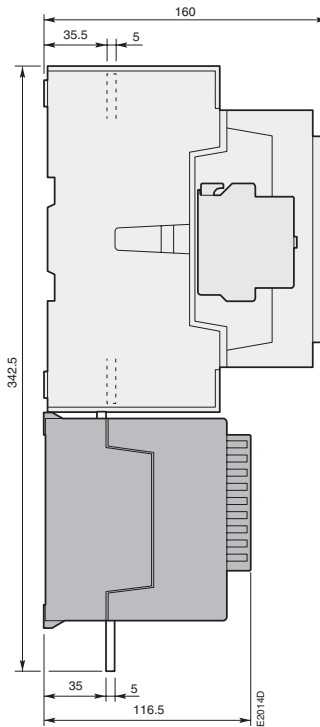
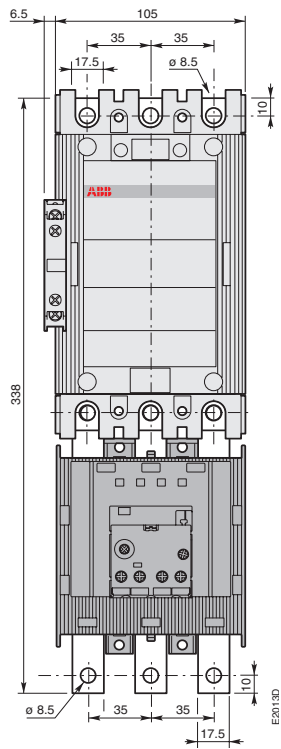
**AF 145, AF 185 c/w 1 x CAL18
+ LW 185 terminal enlargement**



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



AF 145, and AF 185 3-pole Contactors

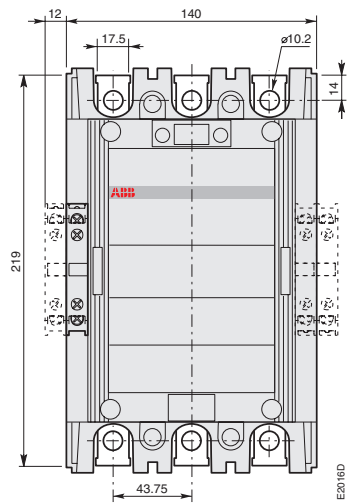


**AF 145, AF 185 c/w 1 x CAL18
+ E 200 DU electronic O/L relay**

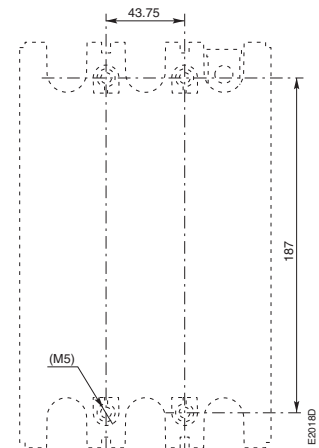
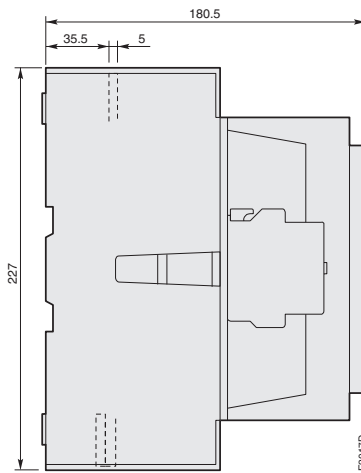
AF 210, AF 260 and AF 300 3-pole Contactors



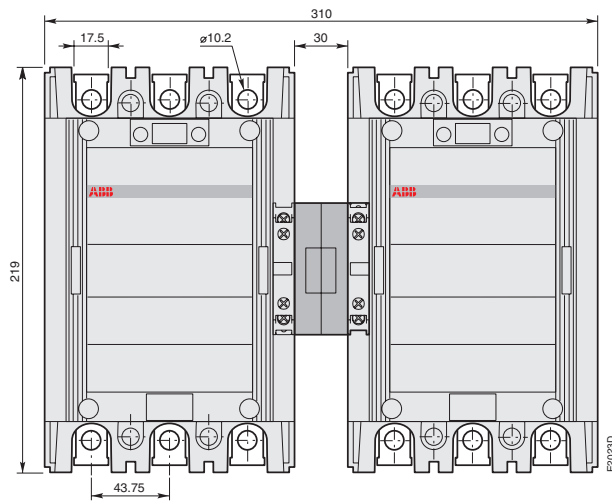
Dimensions (in mm)



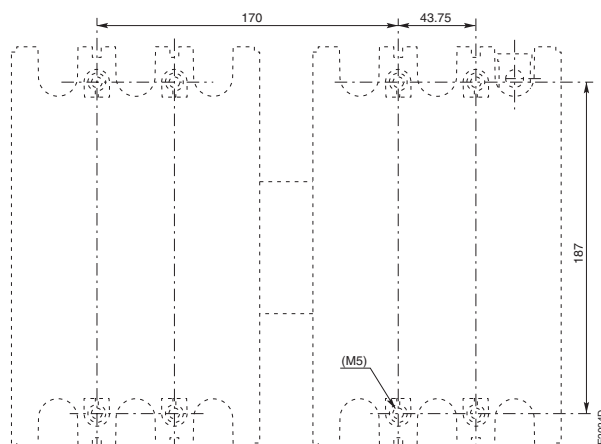
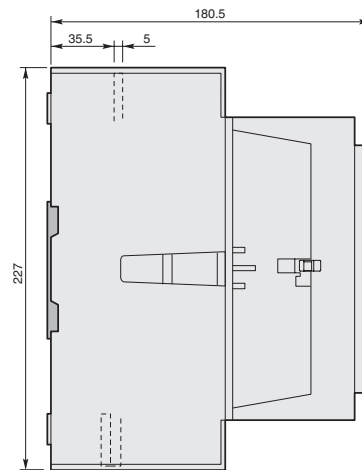
AF 210, AF 260, AF 300 c/w 1 x CAL18



AF 210, AF 260, AF 300 drilling plan



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

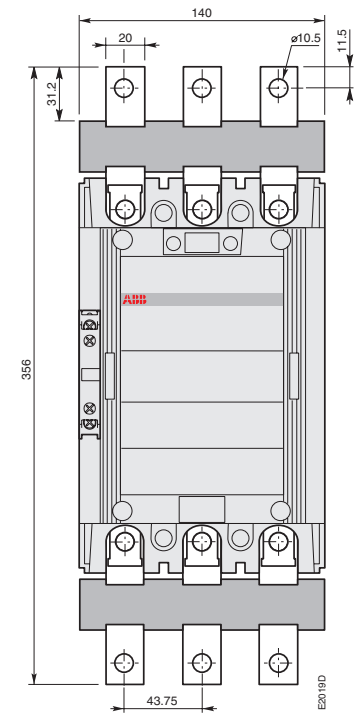


Detailed dimension drawings available in DXF and PDF formats.

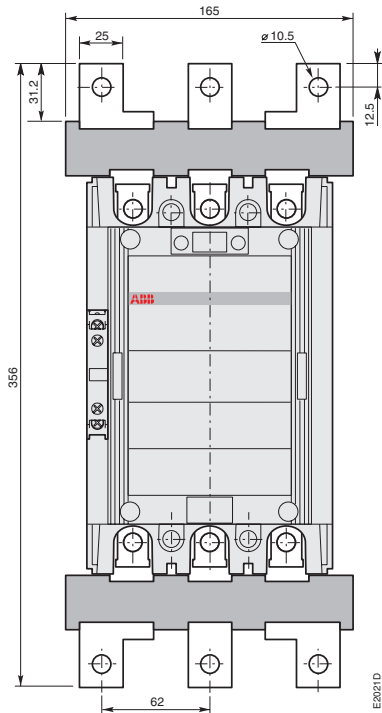
AF 210, AF 260 and AF 300 3-pole Contactors



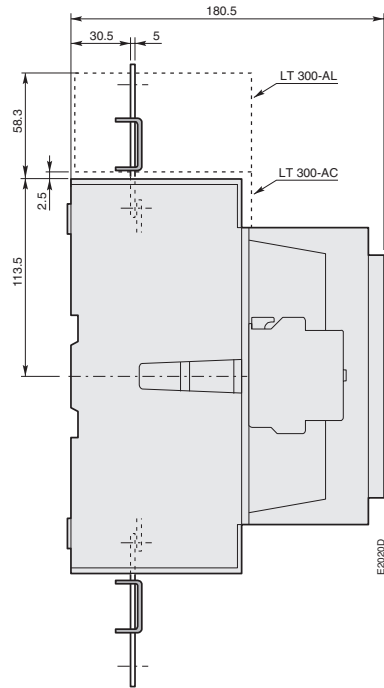
Dimensions (in mm)



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



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

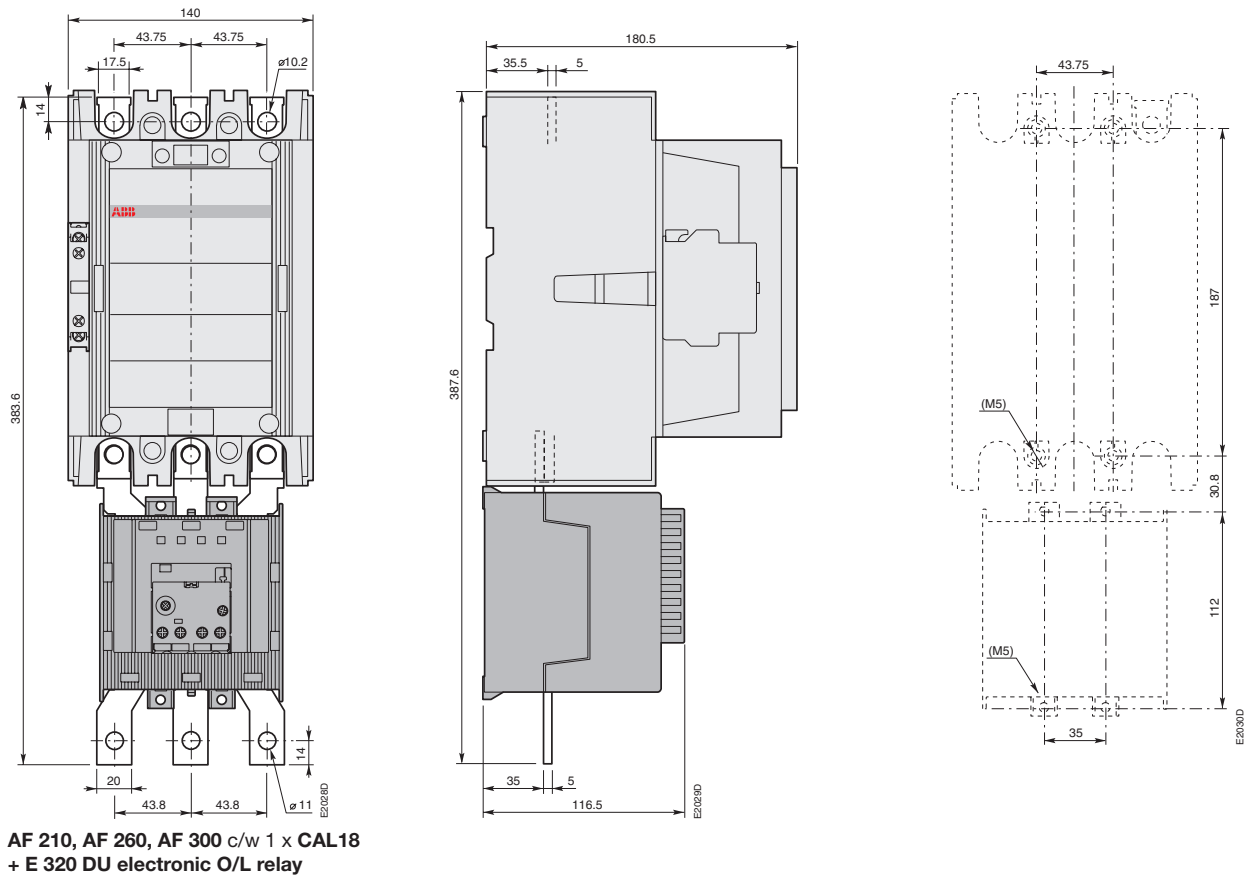


Detailed dimension drawings available in DXF and PDF formats.

AF 210, AF 260 and AF 300 3-pole Contactors



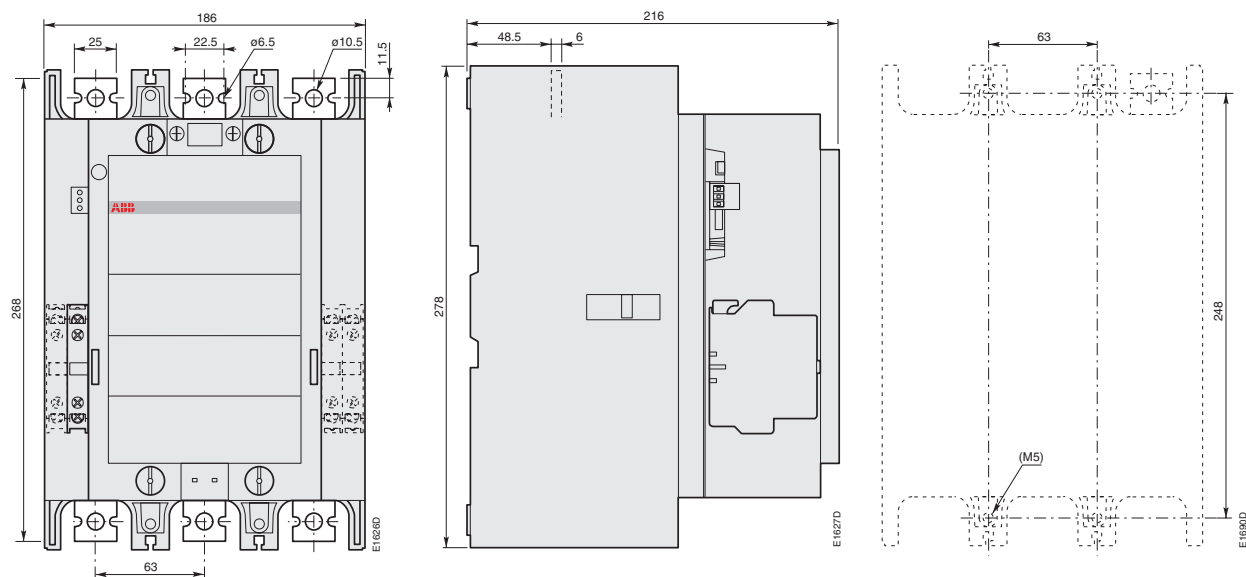
Dimensions (in mm)



AF 400 and AF 460 3-pole Contactors

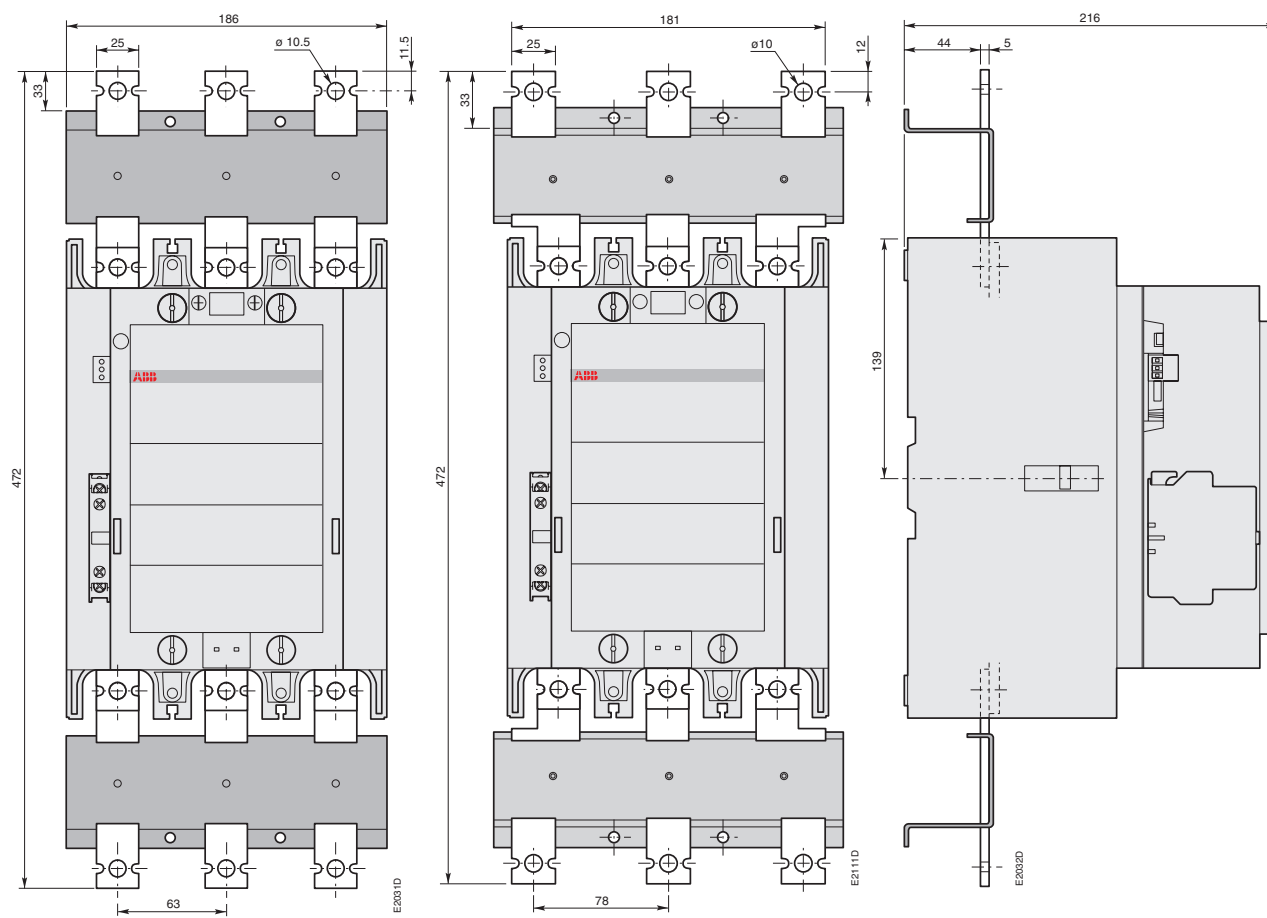


Dimensions (in mm)



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

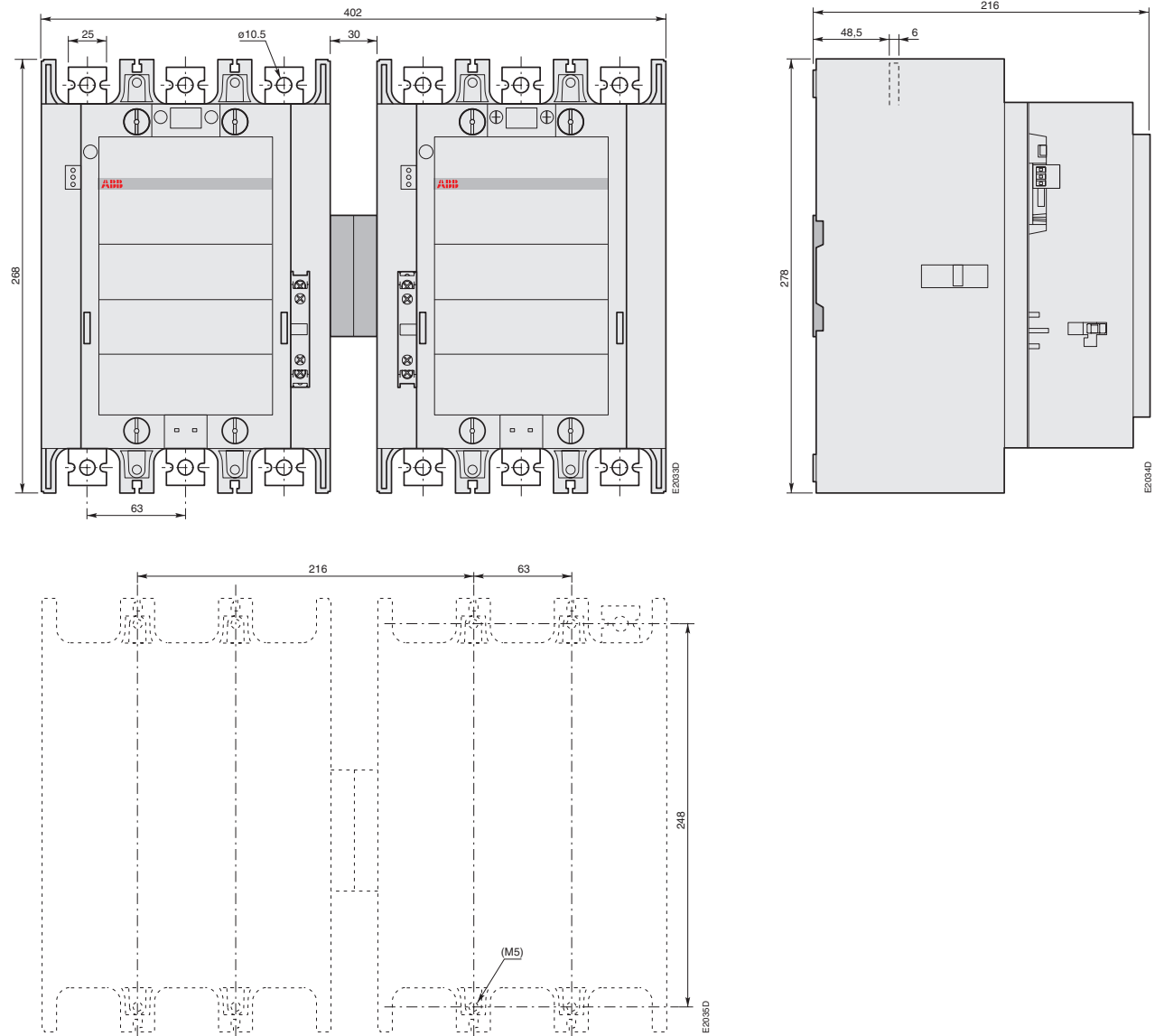
AF 400, AF 460 c/w 1 x CAL18
+ LW 460 terminal enlargement

Detailed dimension drawings available in DXF and PDF formats.

AF 400 and AF 460 3-pole Contactors



Dimensions (in mm)

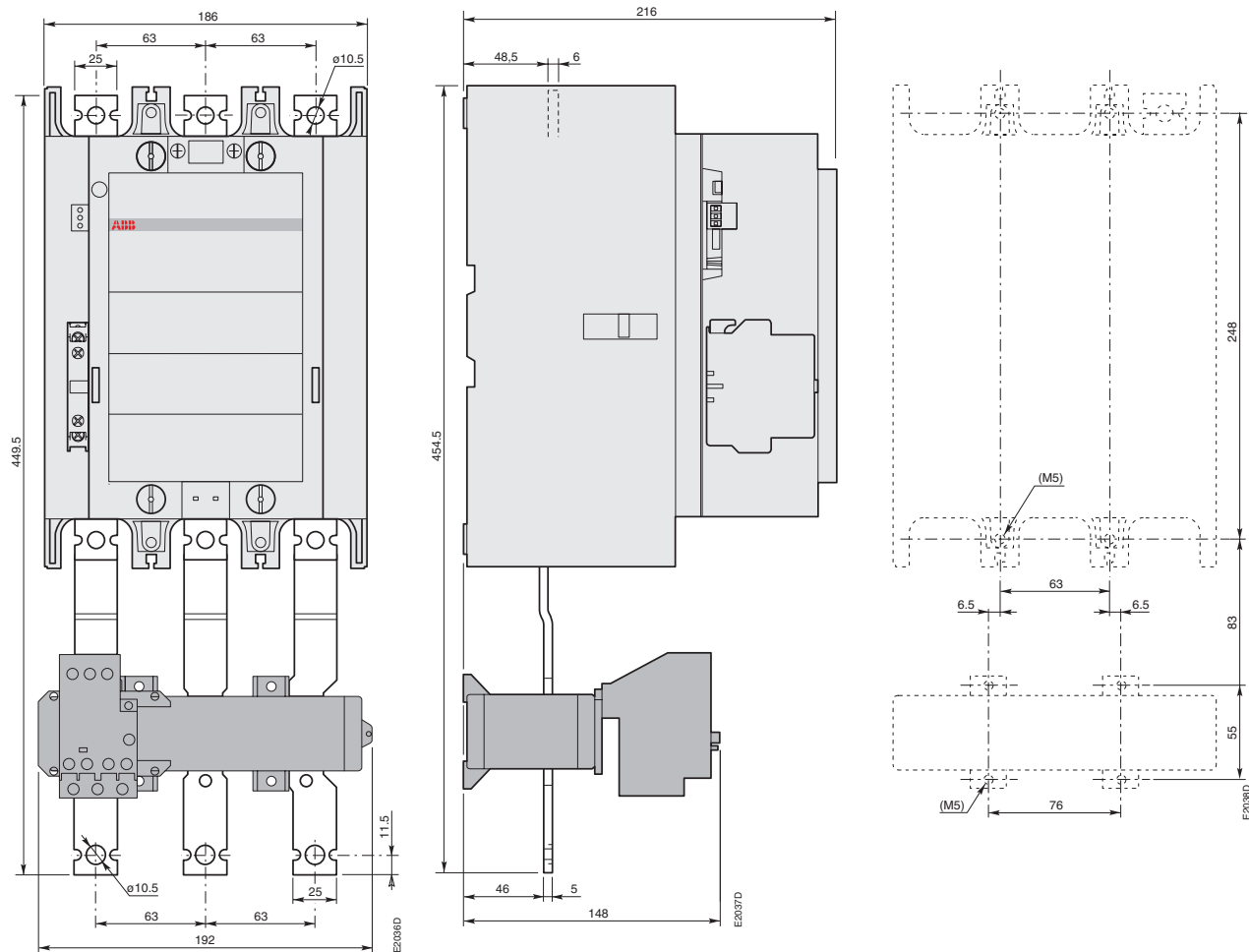


**AF 400, AF 460 c/w 1 x CAL18
+ VM 750H mechanical interlock unit**

AF 400 and AF 460 3-pole Contactors



Dimensions (in mm)

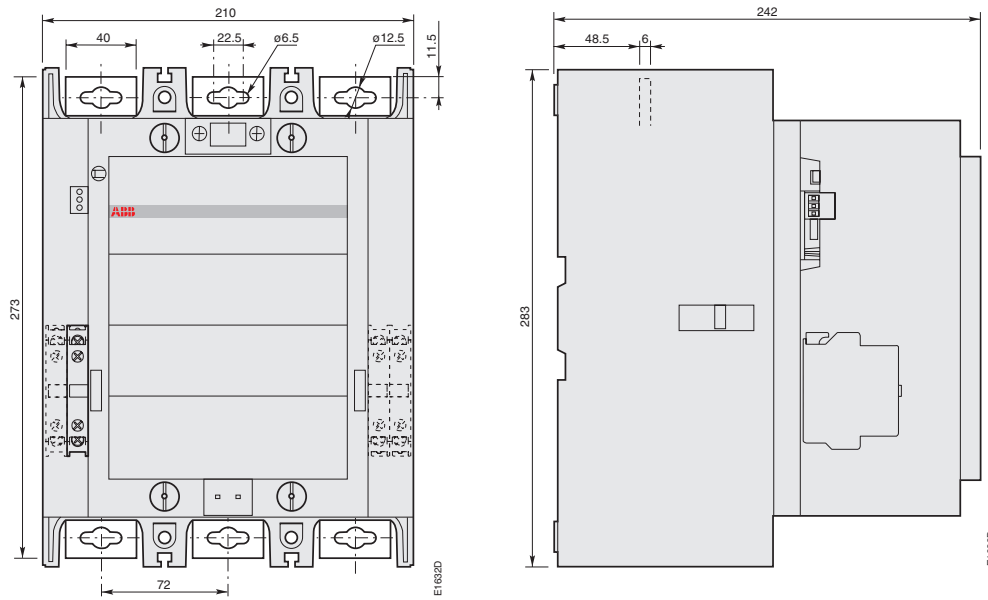


**AF 400, AF 460 c/w 1 x CAL18
+ E 500 DU electronic O/L relay**

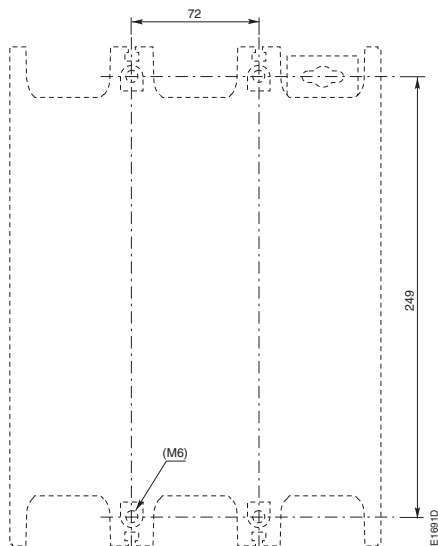
AF 400 and AF 460 3-pole Contactors



Dimensions (in mm)



AF 580, AF 750 c/w 1 x CAL18



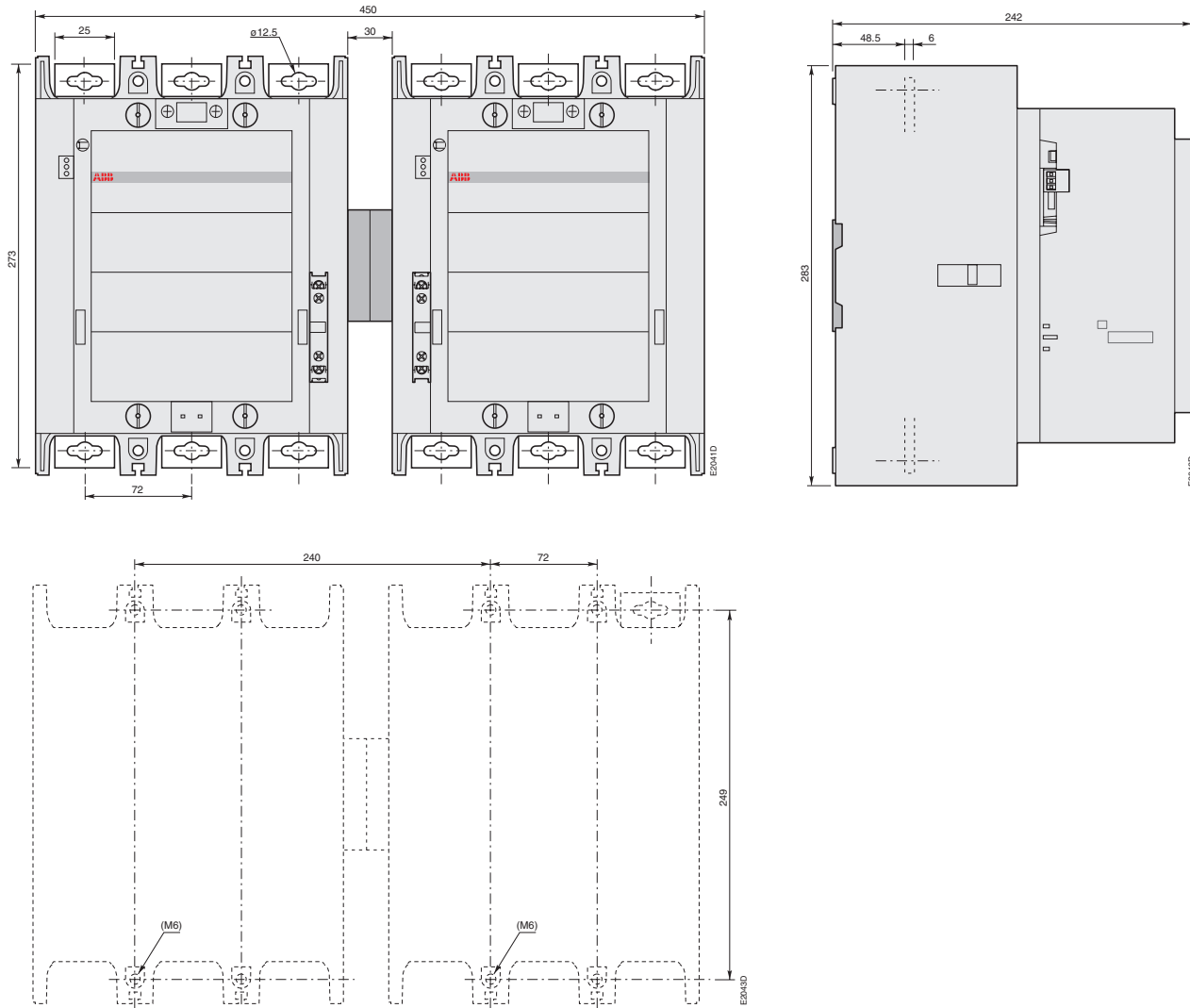
AF 580, AF 750 drilling plan

Detailed dimension drawings available in DXF and PDF formats.

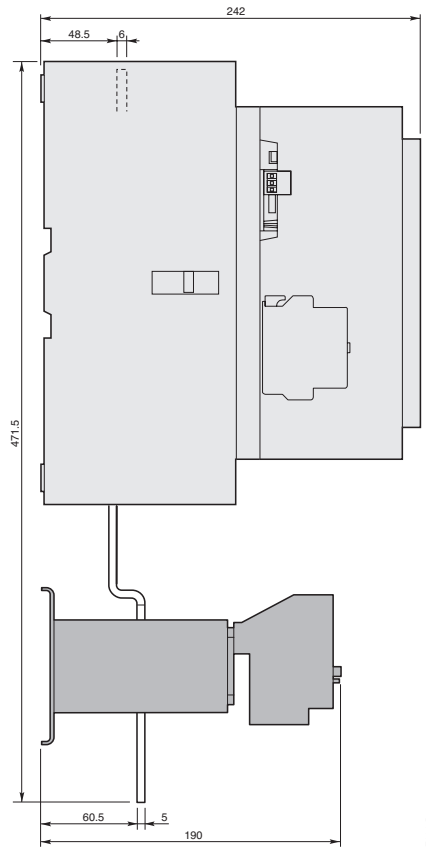
AF 580 and AF 750 3-pole Contactors



Dimensions (in mm)



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



FOOTNOTES

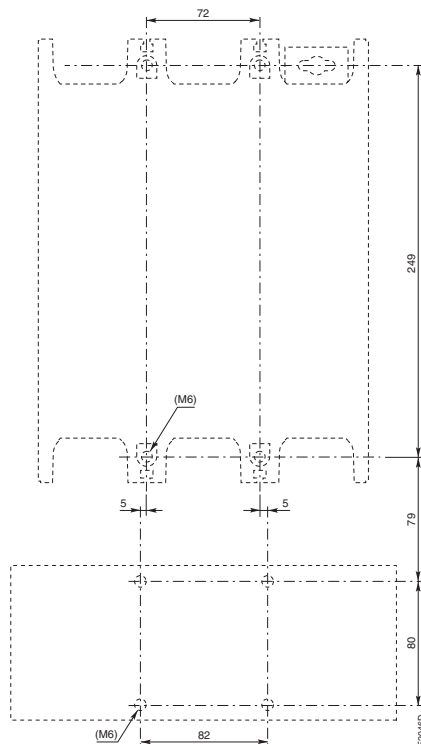
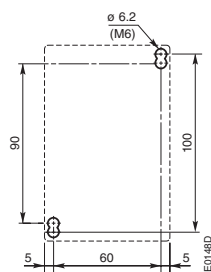
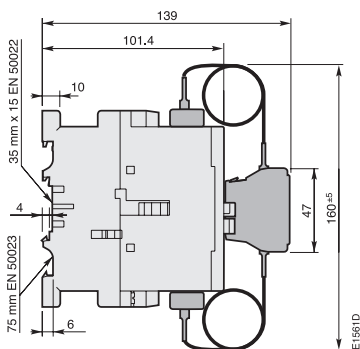
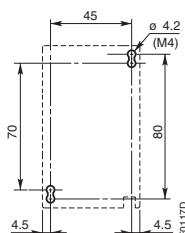
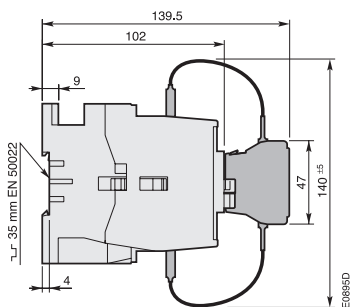
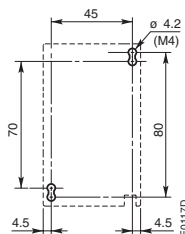
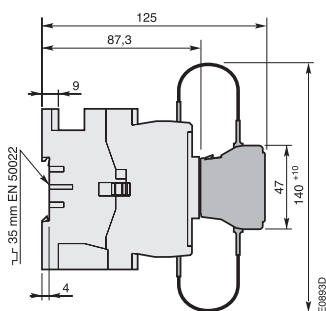
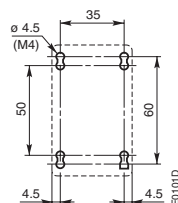


ABB | 5/17

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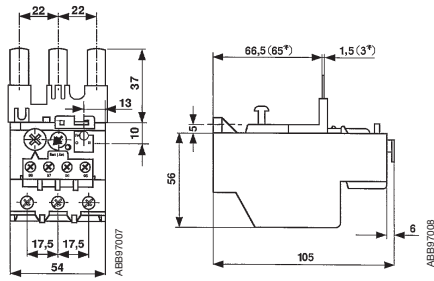
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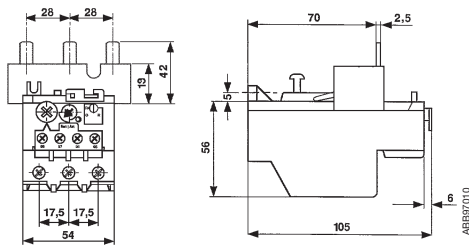
5/18 | ABB

TA 75 DU ... TA 110 DU Thermal O/L Relays

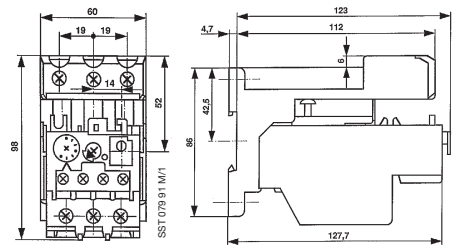
Dimensions (in mm)



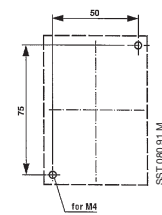
TA 75 DU



TA 80 DU



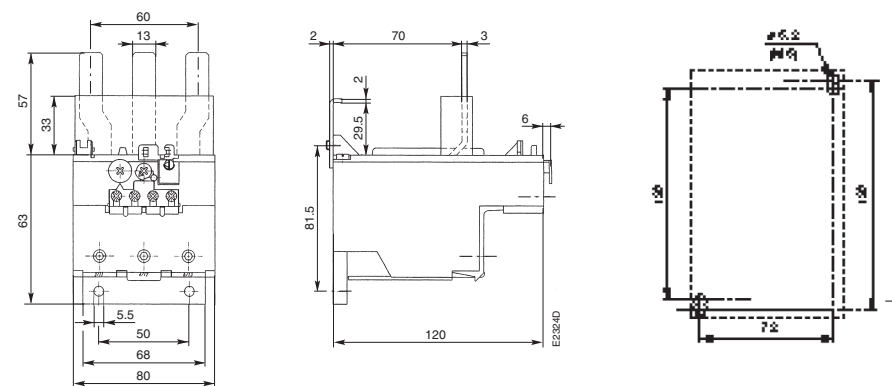
TA 42 DU, TA 75 DU, TA 80 DU + DB 80



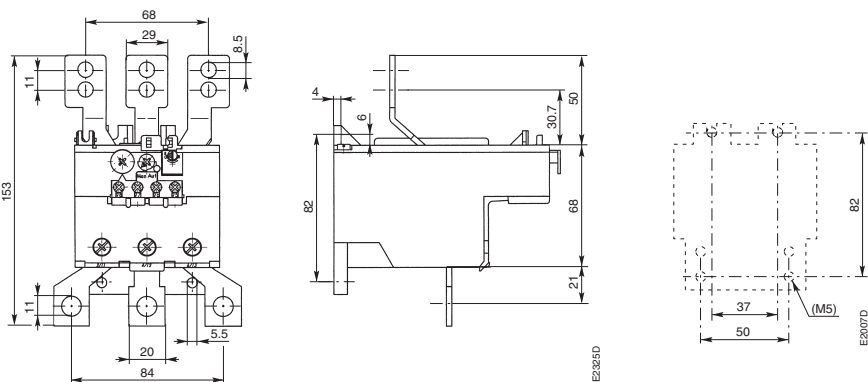
Drilling plan
(TA 42 DU, TA 75 DU
and TA 80 DU + DB 80
for independent mounting)

TA 110 DU ... TA 200 DU Thermal O/L Relays

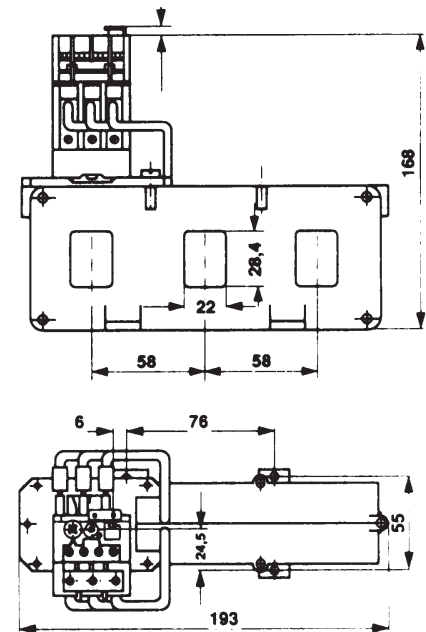
Dimensions (in mm)



TA 110 DU



TA 200 DU



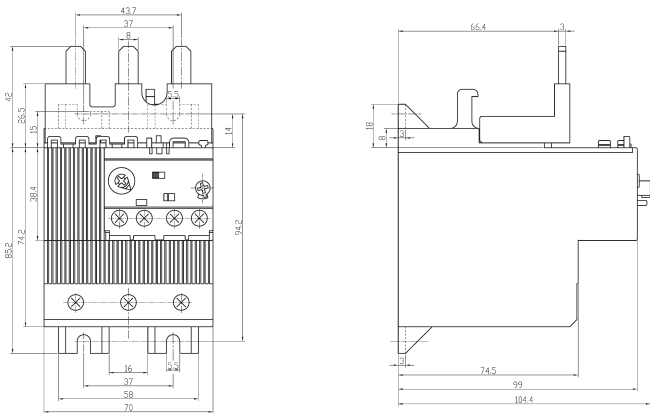
TA 450 DU/SU

Detailed dimension drawings available in DXF and PDF formats.

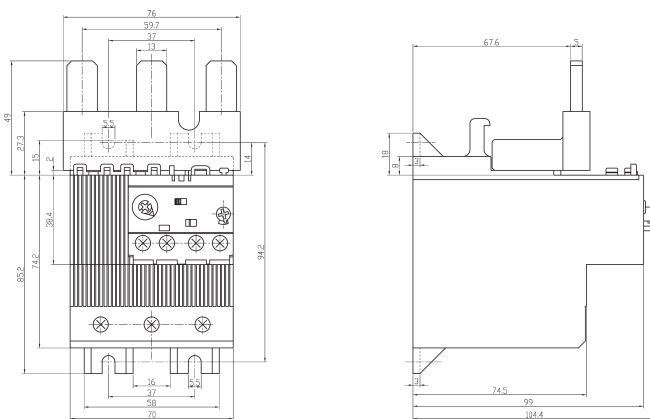
Electronic overload relays

Dimensions

E80DU

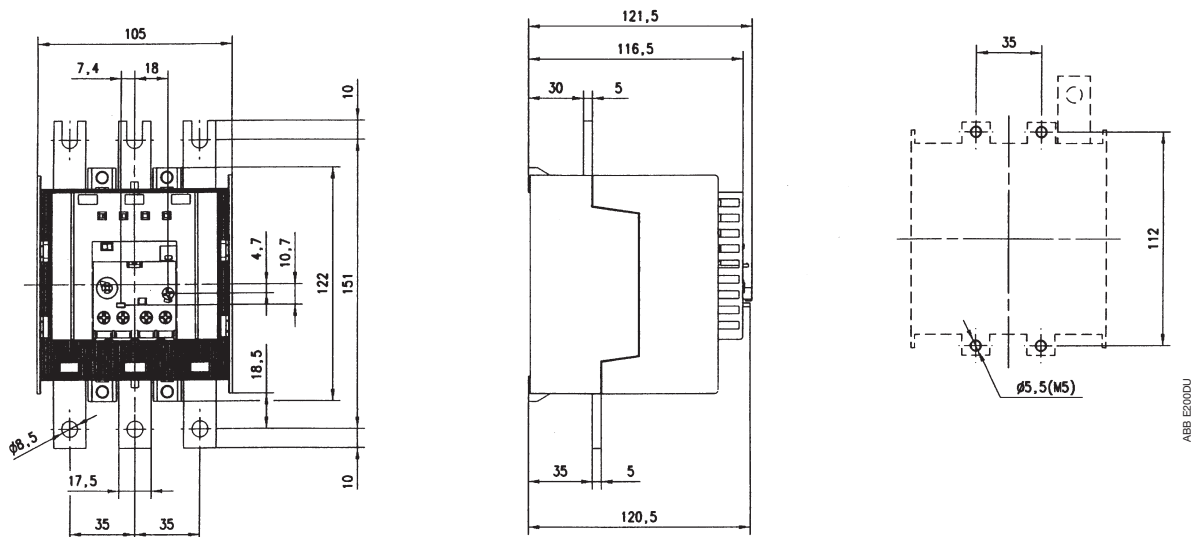


E140DU

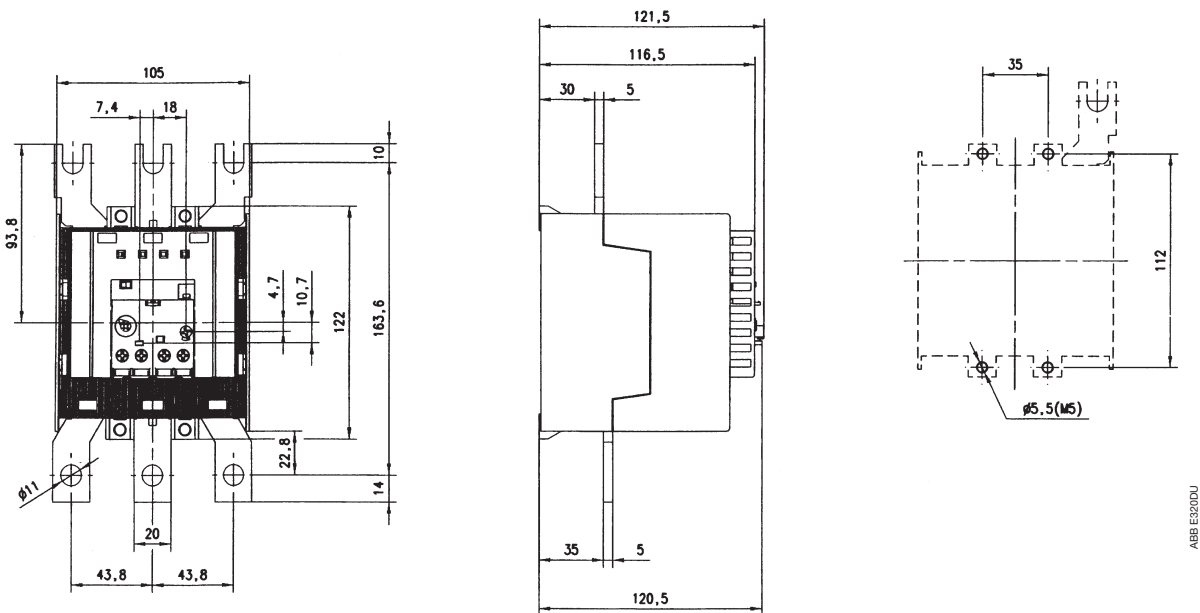


Electronic overload relays
Dimensions
Overload relays mounted onto contactors

E200DU



E320DU

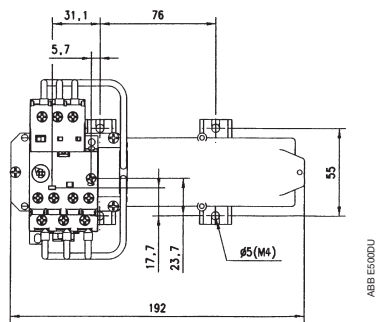
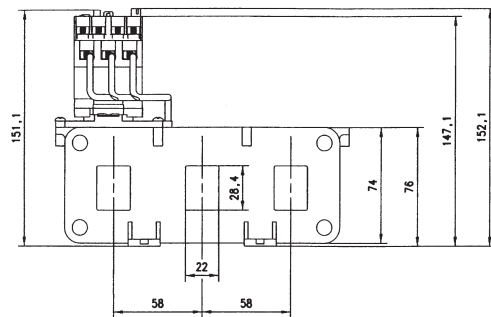


Detailed dimension drawings available in DXF and PDF formats.

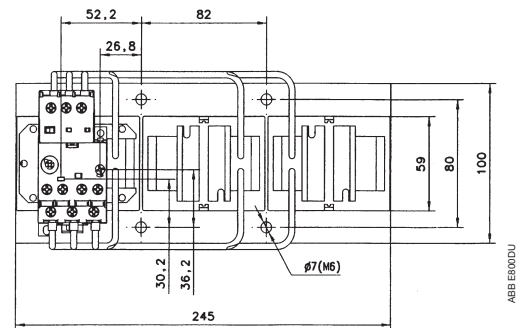
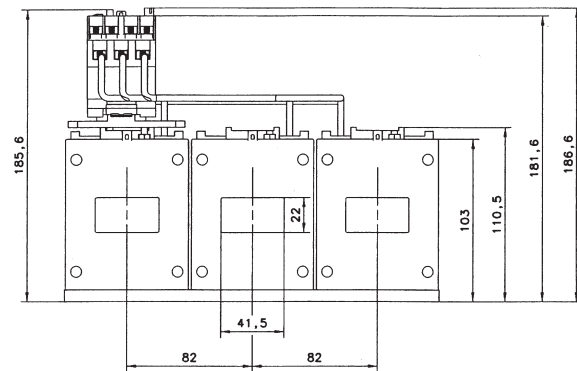
Electronic overload relays

Dimensions

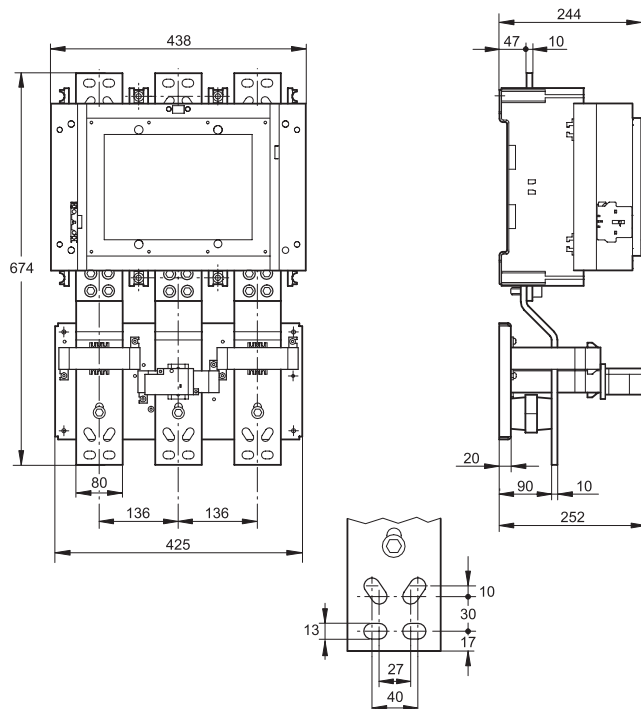
E500DU



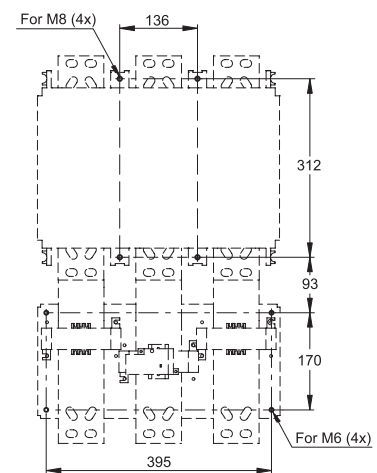
E800DU



AF1350 / AF1650 + E1250DU



Drilling plan

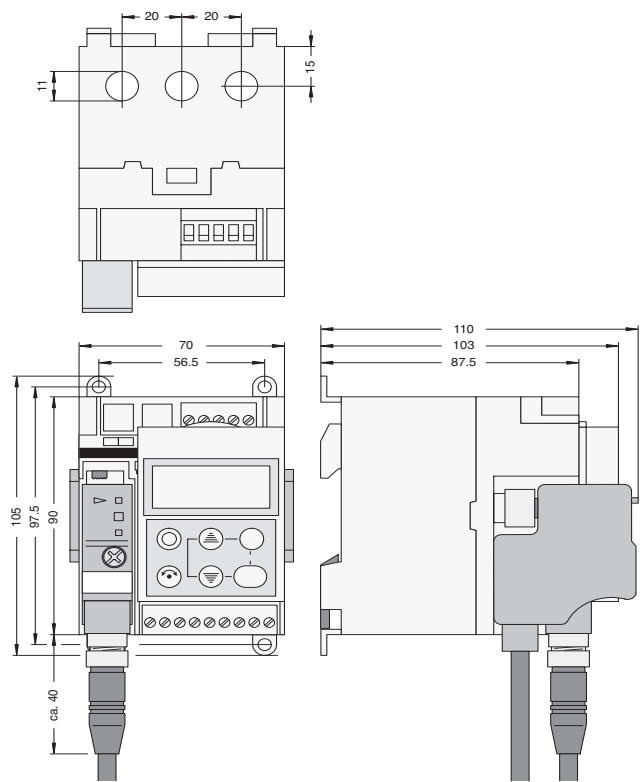


Detailed dimension drawings available in DXF and PDF formats.

Electronic overload relays

Dimensions

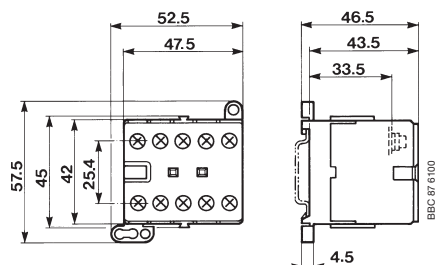
UMC22-FBP



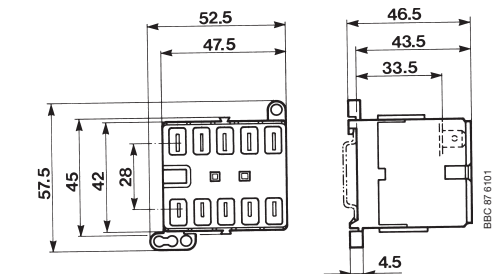
Detailed dimension drawings available in DXF and PDF formats.

Mini Contactors, Mini Control Relays and Accessories

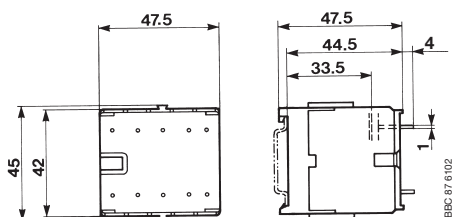
Dimensions (in mm)



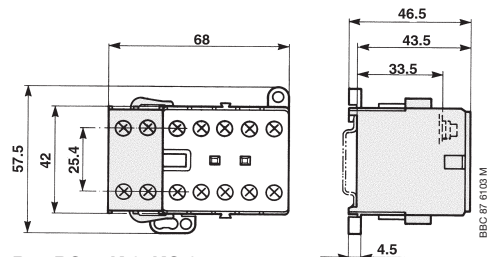
B 7, BC 7, K 6, KC 6
screw connection



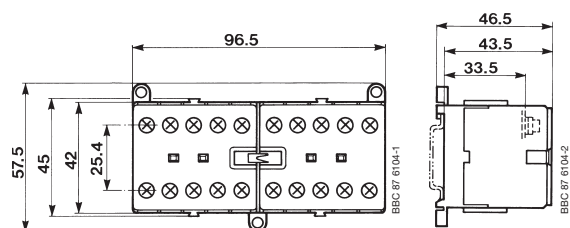
B 7, BC 7, K 6, KC 6
flat pin connection



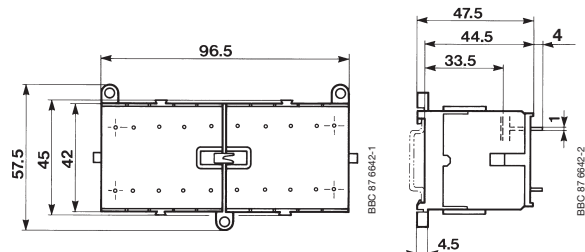
B 7, BC 7, K 6, KC 6
soldering pin connection



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

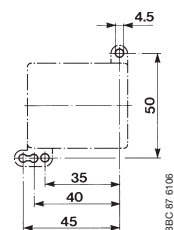


VB 7, VBC 7 compact reversing contactor
screw connection

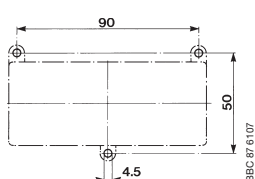


VB 7, VBC 7 compact reversing contactor
soldering pin connection

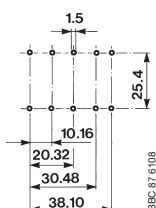
Drilling plans for M4 fixing screws



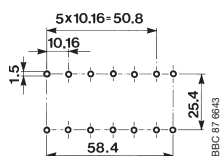
B 7, BC 7, K 6, KC 6



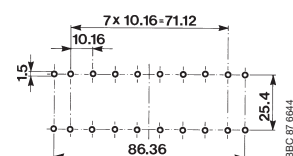
VB 7, VBC 7, VB 7A, VBC 7A



Standard 4-pole device



Standard device with auxiliary contact block

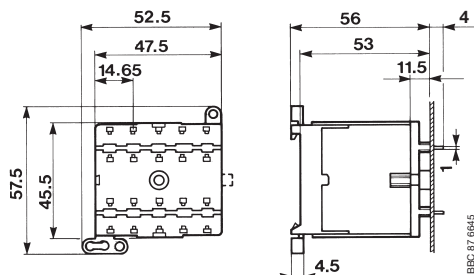


Compact reversing contactor

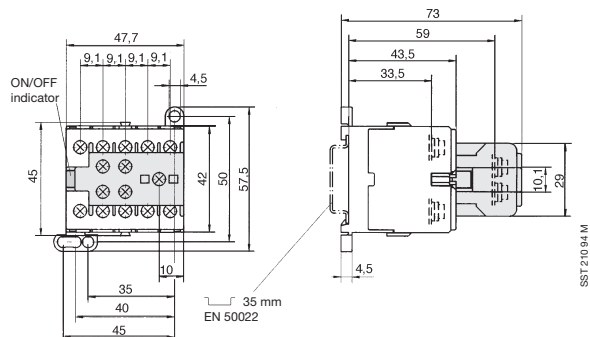
Detailed dimension drawings available in DXF and PDF formats.

Mini Contactors, Mini Control Relays and Accessories

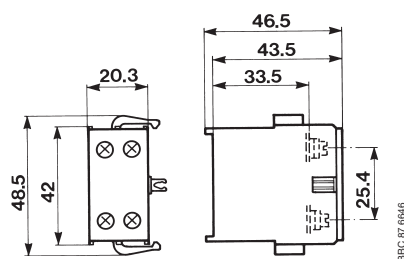
Dimensions (in mm)



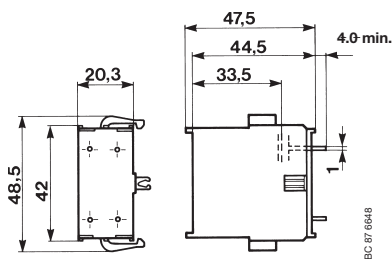
B 7-F + LB 6



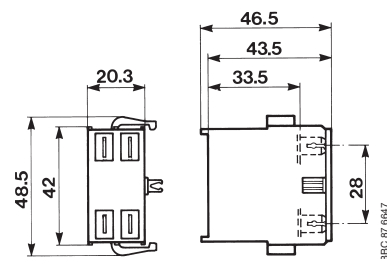
**B 7, BC 7, K 6, KC 6
+ CAF 6 front-mounted auxiliary contact block**



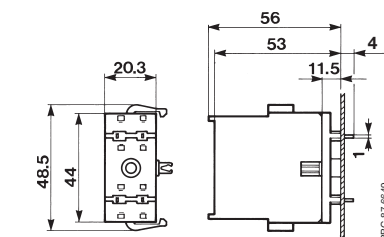
**CA 6 auxiliary contact block
screw connection**



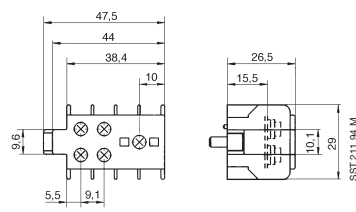
**CA 6-P auxiliary contact block
soldering pin connection**



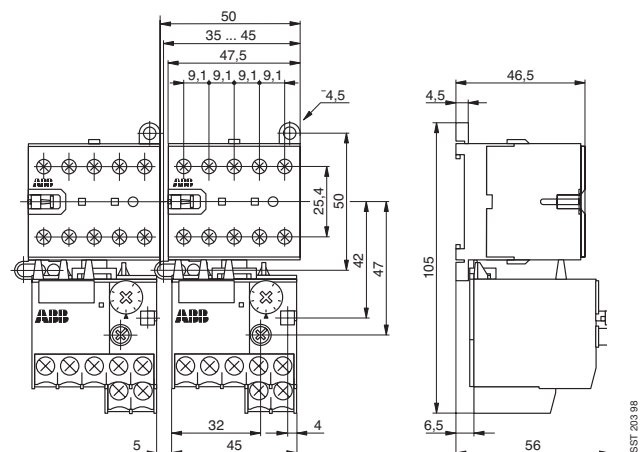
**CA 6-F auxiliary contact block
flat pin connection**



**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.

Notes

[illegible]