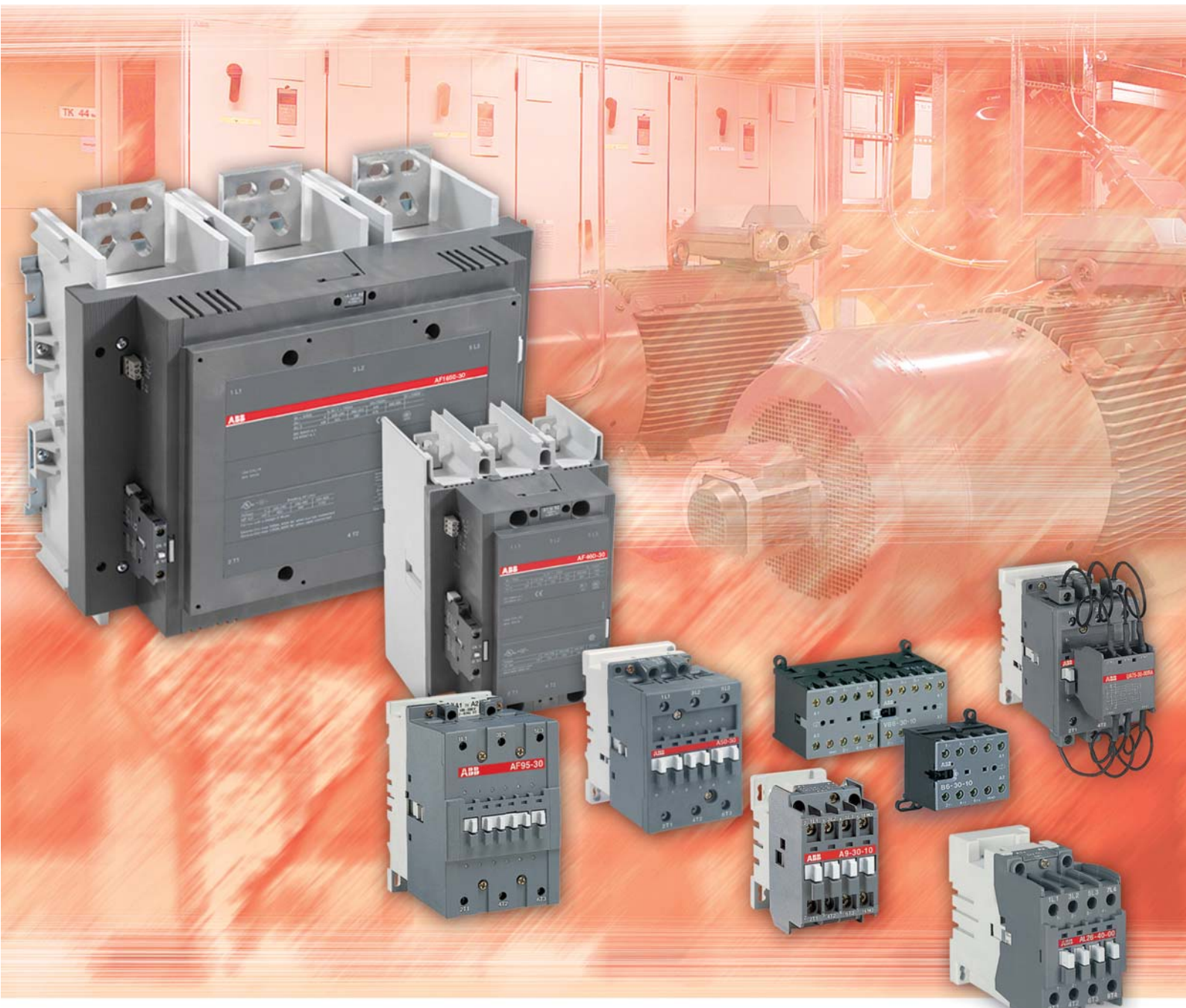


Contactors Motor Protection Accessories



Motor Rated Operational Powers and Currents

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

IEC Motor power kW	Motor nominal current: standardized values in red colour (according to IEC 60947-4-1 Annex G)									
	220 V A	230 V A	240 V A	380V A	400 V A	415 V A	440 V A	500 V A	660 V A	690 V A
0.06	0.37	0.35	0.34	0.21	0.2	0.19	0.18	0.16	0.13	0.12
0.09	0.54	0.52	0.50	0.32	0.3	0.29	0.26	0.24	0.18	0.17
0.12	0.73	0.7	0.67	0.46	0.44	0.42	0.39	0.32	0.24	0.23
0.18	1	1	1	0.63	0.6	0.58	0.53	0.48	0.37	0.35
0.25	1.6	1.5	1.4	0.9	0.85	0.82	0.74	0.68	0.51	0.49
0.37	2.0	1.9	1.8	1.2	1.1	1.1	1.0	0.88	0.67	0.64
0.55	2.7	2.6	2.5	1.6	1.5	1.4	1.3	1.2	0.91	0.87
0.75	3.5	3.3	3.2	2.0	1.9	1.8	1.7	1.5	1.15	1.1
1.1	4.9	4.7	4.5	2.8	2.7	2.6	2.4	2.2	1.7	1.6
1.5	6.6	6.3	6.0	3.8	3.6	3.5	3.2	2.9	2.2	2.1
2.2	8.9	8.5	8.1	5.2	4.9	4.7	4.3	3.9	2.9	2.8
3	11.8	11.3	10.8	6.8	6.5	6.3	5.7	5.2	4.0	3.8
4	15.7	15	14.4	8.9	8.5	8.2	7.4	6.8	5.1	4.9
5.5	20.9	20	19.2	12.1	11.5	11.1	10.1	9.2	7.0	6.7
7.5	28.2	27	25.9	16.3	15.5	14.9	13.6	12.4	9.3	8.9
11	39.7	38	36.4	23.2	22	21.2	19.3	17.6	13.4	12.8
15	53.3	51	48.9	30.5	29	28.0	25.4	23	17.8	17
18.5	63.8	61	58.5	36.8	35	33.7	30.7	28	22.0	21
22	75.3	72	69	43.2	41	39.5	35.9	33	25.1	24
30	100	96	92	57.9	55	53	48.2	44	33.5	32
37	120	115	110	69	66	64	58	53	40.8	39
45	146	140	134	84	80	77	70	64	49.1	47
55	177	169	162	102	97	93	85	78	59.6	57
75	240	230	220	139	132	127	116	106	81	77
90	291	278	266	168	160	154	140	128	97	93
110	355	340	326	205	195	188	171	156	118	113
132	418	400	383	242	230	222	202	184	140	134
160	509	487	467	295	280	270	245	224	169	162
200	637	609	584	368	350	337	307	280	212	203
250	782	748	717	453	430	414	377	344	261	250
315	983	940	901	568	540	520	473	432	327	313
355	1109	1061	1017	642	610	588	535	488	370	354
400	1255	1200	1150	726	690	665	605	552	418	400
500	1545	1478	1416	895	850	819	745	680	515	493
560	1727	1652	1583	1000	950	916	832	760	576	551
630	1928	1844	1767	1116	1060	1022	929	848	643	615
710	2164	2070	1984	1253	1190	1147	1043	952	721	690
800	2446	2340	2243	1417	1346	1297	1179	1076	815	780
900	2760	2640	2530	1598	1518	1463	1330	1214	920	880
1000	3042	2910	2789	1761	1673	1613	1466	1339	1014	970

UL / CSA Motor power hp	Motor nominal current: standardized values (according to IEC 60947-4-1 Annex G and UL 508)				
	208 V A	220-240 V A	380-415 V A	440-480 V A	550-600 V A
1/2	2.4	2.2	1.3	1.1	0.9
3/4	3.5	3.2	1.8	1.6	1.3
1	4.6	4.2	2.3	2.1	1.7
1-1/2	6.6	6	3.3	3	2.4
2	7.5	6.8	4.3	3.4	2.7
3	10.6	9.6	6.1	4.8	3.9
5	16.7	15.2	9.7	7.6	6.1
7-1/2	24.2	22	14	11	9
10	30.8	28	18	14	11
15	46.2	42	27	21	17
20	59.4	54	34	27	22
25	74.8	68	44	34	27
30	88	80	51	40	32
40	114	104	66	52	41
50	143	130	83	65	52
60	169	154	103	77	62
75	211	192	128	96	77
100	273	248	165	124	99
125	343	312	208	156	125
150	396	360	240	180	144
200	528	480	320	240	192
250	-	604	403	302	242
300	-	722	482	361	289
350	-	828	560	414	336
400	-	954	636	477	382
450	-	1030	-	515	412
500	-	1180	786	590	472

Coil Voltage Code for Completing Order Codes

a.c. Coils



Contactors and contactor relays:
A..., UA..., UA...RA, GA... and N...

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

(1) Codes in bold for dual frequency coils.
(2) A 145 ... A 300 contactors at 60 Hz 115 V only.
(3) Not for A 145 ... A 300 contactors.

Contactors:
EK 110 ... EK 210

Voltage	Voltage	Code
□ □ V - 50Hz	□ □ V - 60Hz	□ □
-	24	A A
24	-	A B
-	48	A C
48	-	A D
-	110	A E
110	120	A F
127	-	A G
-	208	A Z
190	220	A H
-	240	A K
220 ... 230	-	A L
230 ... 240	-	A M
-	380	A N
380 ... 400	440	A P
400 ... 415	-	A R
-	480	A S
440	-	A T
500	-	A U
-	600	A V

Contactors:
EK 370 ... EK 1000

Voltage	Voltage	Code
□ □ V - 50Hz	□ □ V - 60Hz	□ □
48	-	A D
-	110	A E
110	120	A F
127	-	A G
-	208	A Z
190	220	A H
-	240	A K
220 ... 230	240	A L
230 ... 240	-	A M
-	380	A N
380 ... 400	440	A P
400 ... 415	-	A R
-	480	A S
440	-	A T
500	-	A U
-	600	A V

Multi-frequency Coils

Contactors:
EK 110 ... EK 210

Voltage	Code
□ □ V - 40 ... 400Hz	□ □
110 ... 120	E F
115 ... 127	E G
220 ... 230	E L
230 ... 240	E M
380 ... 400	E P
400 ... 415	E R

Dual frequency coils

2 auxiliary contact blocks maximum per contactor, ambient temperature ≤ 55 °C and mounting positions 2 and 6 excluded.

Contactors:
EK 370 ... EK 1000

Voltage	Voltage	Code
□ □ V - 50Hz	□ □ V - 60Hz	□ □
110	110 ... 120	E F
110 ... 115	115 ... 127	E G
220	220 ... 240	E L
220 ... 230	230 ... 255	E M
380	380 ... 415	E P
380 ... 400	400 ... 440	E R

Dual Voltage Coils

Contactors and contactor relays:
A 9, A 12, A 16 and N...

Voltage	Voltage	Code
□ □ V - 50Hz	□ □ V - 60Hz	□ □
230/400	-	6 2
-	230/400	6 3

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



Contactors: **AF 45 ... AF 300**

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

Contactors: **AF 400 ... AF 750**

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

Contactors: **AF 1350, AF 1650**

Voltage	Voltage	Code
□ □ V - 50/60Hz	V - d.c.	□ □
100 ... 250	100 ... 250	7 0

d.c. Coils



Standard Coils

Contactors and contactor relays:
AL..., AE..., GAE..., AM..., NL...

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

Contactors and contactor relays:
AL...Z, NL Z...

Tension	Code
V - d.c.	□ □
24	1 5
48	2 0

Contactors:
EK 110 ... EK 1000

Voltage	Code
V - d.c.	□ □
12 *	D A
24	D B
36	D C
48	D D
60	D T
75	D G
110	D E
125	D U
220	D F

Large Voltage Range Coils

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

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

* Not for EK 370 ... EK 1000 contactors.

⚠ Voltage tolerances included in the U_c min. ... U_c max. voltage range. Other voltages: please consult us.

General Information for Ordering and Packaging

Ordering Details

When placing an order give either the **Order Code** or **Type**.

In most cases these are completed with other references, e.g. a contactor's coil voltage. This is why the order codes and types figuring in the "Ordering Details" tables have boxes and to be completed.

Packaging

● Individual standard packaging

Contactors, contactor relays, thermal overload relays and other basic products are supplied in **individual packaging**. Some small contactors (e.g. B6 and B7 - Section 6) or accessories are in **individual batches of "n" pieces** as indicated in the "Packaging" column of the "Ordering Details" table.

The weight and order code always correspond to a single part.

Other products are supplied as a "set" and are thus marked in the "Packaging" column of the "Ordering Details" table. In this case, the weight and order code correspond to a set.

● Collective packaging

To limit the amount of wasted packaging, simplify handling and checking of deliveries, we offer the **collective packaging** solution.

The weight and order code correspond to a single part.

Products chosen for this type of packaging are detailed below.

Type	Order code	Pack ^{ing} pieces	Weight kg	Product features
state coil voltage <input type="checkbox"/> (see table below)	state coil voltage code <input type="checkbox"/> <input type="checkbox"/> (see table below)		1 piece	page
3-pole - a.c. operated contactors				
A 9-30-10 <input type="checkbox"/>	1SBL 141 001 T <input type="checkbox"/> <input type="checkbox"/> 10	10	0.34	2/6
A 9-30-01 <input type="checkbox"/>	1SBL 141 001 T <input type="checkbox"/> <input type="checkbox"/> 01	10	0.34	2/6
A 9-30-22 <input type="checkbox"/>	1SBL 141 001 T <input type="checkbox"/> <input type="checkbox"/> 22	10	0.40	2/6
A 9-30-32 <input type="checkbox"/>	1SBL 141 001 T <input type="checkbox"/> <input type="checkbox"/> 32	10	0.40	2/6
A 12-30-10 <input type="checkbox"/>	1SBL 161 001 T <input type="checkbox"/> <input type="checkbox"/> 10	10	0.34	2/6
A 12-30-01 <input type="checkbox"/>	1SBL 161 001 T <input type="checkbox"/> <input type="checkbox"/> 01	10	0.34	2/6
A 12-30-22 <input type="checkbox"/>	1SBL 161 001 T <input type="checkbox"/> <input type="checkbox"/> 22	10	0.40	2/6
A 12-30-32 <input type="checkbox"/>	1SBL 161 001 T <input type="checkbox"/> <input type="checkbox"/> 32	10	0.40	2/6
A 16-30-10 <input type="checkbox"/>	1SBL 181 001 T <input type="checkbox"/> <input type="checkbox"/> 10	10	0.34	2/6
A 16-30-01 <input type="checkbox"/>	1SBL 181 001 T <input type="checkbox"/> <input type="checkbox"/> 01	10	0.34	2/6
A 16-30-22 <input type="checkbox"/>	1SBL 181 001 T <input type="checkbox"/> <input type="checkbox"/> 22	10	0.40	2/6
A 16-30-32 <input type="checkbox"/>	1SBL 181 001 T <input type="checkbox"/> <input type="checkbox"/> 32	10	0.40	2/6
A 26-30-10 <input type="checkbox"/>	1SBL 241 001 T <input type="checkbox"/> <input type="checkbox"/> 10	10	0.60	2/6
A 26-30-01 <input type="checkbox"/>	1SBL 241 001 T <input type="checkbox"/> <input type="checkbox"/> 01	10	0.60	2/6
4-pole - a.c. operated contactors				
A 9-40-00 <input type="checkbox"/>	1SBL 141 201 T <input type="checkbox"/> <input type="checkbox"/> 00	10	0.34	2/22
A 16-40-00 <input type="checkbox"/>	1SBL 181 201 T <input type="checkbox"/> <input type="checkbox"/> 00	10	0.34	2/22
A 26-40-00 <input type="checkbox"/>	1SBL 241 201 T <input type="checkbox"/> <input type="checkbox"/> 00	10	0.61	2/22
4-pole - a.c. operated, 1 stack contactor relays				
N 22 E <input type="checkbox"/>	1SBH 141 001 T <input type="checkbox"/> <input type="checkbox"/> 22	10	0.34	3/4
N 31 E <input type="checkbox"/>	1SBH 141 001 T <input type="checkbox"/> <input type="checkbox"/> 31	10	0.34	3/4
N 40 E <input type="checkbox"/>	1SBH 141 001 T <input type="checkbox"/> <input type="checkbox"/> 40	10	0.34	3/4
8-pole - a.c. operated, 2 stack contactor relays				
N 44 E <input type="checkbox"/>	1SBH 141 001 T <input type="checkbox"/> <input type="checkbox"/> 44	10	0.40	3/4
N 53 E <input type="checkbox"/>	1SBH 141 001 T <input type="checkbox"/> <input type="checkbox"/> 53	10	0.40	3/4
N 62 E <input type="checkbox"/>	1SBH 141 001 T <input type="checkbox"/> <input type="checkbox"/> 62	10	0.40	3/4
N 71 E <input type="checkbox"/>	1SBH 141 001 T <input type="checkbox"/> <input type="checkbox"/> 71	10	0.40	3/4
N 80 E <input type="checkbox"/>	1SBH 141 001 T <input type="checkbox"/> <input type="checkbox"/> 80	10	0.40	3/4
Replacement coils for A 9..., A 12..., A 16... and N... contactors				
ZA 16 <input type="checkbox"/>	1SBN 151 410 T <input type="checkbox"/> <input type="checkbox"/> 06	10	0.08	4/34

Type	Order code	Pack ^{ing} pieces	Weight kg	Product features
			1 piece	page
Auxiliary contact blocks				
CA 5-10	1SBN 010 010 W1010	60	0.014	4/2
CA 5-01	1SBN 010 010 W1001	60	0.014	4/2
CAL 5-11	1SBN 010 020 W1011	100	0.050	4/4
Interface blocks				
RA 5	1SBN 060 000 T1001	10	0.050	4/18
Electronic timers				
TE5S-24	1SBN 020 010 T1001	10	0.080	4/6
TE5S-120	1SBN 020 010 T1002	10	0.080	4/6
TE5S-240	1SBN 020 010 T1003	10	0.080	4/6
TE5S-440	1SBN 020 010 T1004	10	0.080	4/6

Additional code for a.c. coil voltages



Voltage <input type="checkbox"/> V - 50Hz	Voltage <input type="checkbox"/> V - 60Hz	Code <input type="checkbox"/> <input type="checkbox"/>
24	24	8 1
42	42	8 2
48	48	8 3
110	110 ... 120	8 4
110 ... 115	115 ... 127	8 9
220 ... 230	230 ... 240	8 0
230 ... 240	240 ... 260	8 8
380 ... 400	400 ... 415	8 5
400 ... 415	415 ... 440	8 6
415 ... 440	440 ... 460	8 7



Contactors Motor Protection Accessories

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Block Contactors

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As part of its on-going product improvement, ABB reserves the right to modify the characteristics of the products described in this catalogue. The information given is not contractual. For further details please contact the ABB company marketing these products in your country.



Block Contactors
Overload Relays
Specific Contactors
Mini Contactors
Contactor Relays

3-pole a.c. Circuit Switching

Motor Protection

4-pole a.c. Circuit Switching

d.c. Circuit Switching

Specific Applications



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Overview

Block Contactors and Motor Protection

3-pole a.c. Circuit Switching



3-pole Contactors

2

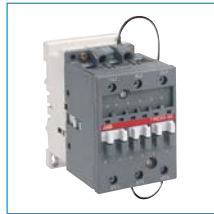
Control circuit	Ratings (AC-3, 400 V)	Types	Pages
a.c. operated	9 ... 110 A	A...	2/6
a.c. operated	145 ... 305 A	A...	2/10
a.c. / d.c. operated	400 ... 1050 A	AF...	2/10



3-pole Contactors

2

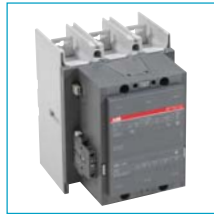
Control circuit	Ratings (AC-3, 400 V)	Types	Pages
d.c. operated, low consumption coil	9 ... 37 A	AL..., AL..Z	2/14
d.c. operated, large voltage range	9 ... 37 A	TAL...	2/16



3-pole Contactors

2

Control circuit	Ratings (AC-3, 400 V)	Types	Pages
d.c. operated, standard voltage range	50 ... 110 A	AE...	2/14
d.c. operated, large voltage range	50 ... 110 A	TAE...	2/16



3-pole Contactors

2

Control circuit	Ratings (AC-3, 400 V)	Types	Pages
a.c. / d.c. operated (electronic coil interface) and wide voltage range	50 ... 110 A	AF...	2/18
	145 ... 1050 A	AF...	2/20

Motor Protection



3-pole Manual Motor Starters

5

	Setting ranges	Types	Pages
Thermal and electromagnetic protection	0.16 ... 100 A	MS...	5/1



3-pole Overload Relays

5

	Setting ranges	Types	Pages
Thermal O/L Relays	0.1 ... 310 A	TA ... DU	5/1
Electronic O/L Relays	0.1 ... 18.9 A	E 16 DU	5/1
Electronic O/L Relays	60 ... 1250 A	E... DU	5/1

Block Contactors

4-pole
a.c. Circuit
Switching



4-pole Contactors

Control circuit	Ratings (AC-1, $\theta \leq 40^\circ\text{C}$)	Types	Pages
a.c. operated	25 ... 125 A	A...	2/22



4-pole Contactors

Control circuit	Ratings (AC-1, $\theta \leq 40^\circ\text{C}$)	Types	Pages
a.c. operated	200 ... 1000 A	EK...	2/24



4-pole Contactors

Control circuit	Ratings (AC-1, $\theta \leq 40^\circ\text{C}$)	Types	Pages
d.c. operated, low consumption coil	25 ... 45 A	AL...	2/26
d.c. operated, large voltage range	25 ... 45 A	TAL...	2/28



4-pole Contactors

Control circuit	Ratings (AC-1, $\theta \leq 40^\circ\text{C}$)	Types	Pages
d.c. operated, standard voltage range	70 ... 125 A	AE...	2/26
d.c. operated, large voltage range	70 ... 125 A	TAE...	2/28



4-pole Contactors

Control circuit	Ratings (AC-1, $\theta \leq 40^\circ\text{C}$)	Types	Pages
d.c. operated	200 ... 1000 A	EK...	2/30



4-pole Contactors

Control circuit	Ratings (AC-1, $\theta \leq 40^\circ\text{C}$)	Types	Pages
a.c. / d.c. operated (electronic coil interface) and wide voltage range	70 ... 125 A	AF...	2/31

Overview


Contactors for Specific Applications

3-phase Capacitor Switching



3-pole Contactors for Capacitor Switching



2

Control circuit		\hat{I} peak current	Types	Pages
a.c. operated		Unlimited	UA..RA	2/35
a.c. operated		$\leq 100 \times \hat{I}$ rms current	UA...	2/39

Standard 3-pole Contactors

2





Control circuit	 	\hat{I} peak current	Types	Pages
a.c. operated		$\leq 30 \times \hat{I}$	A...	2/43
a.c. / d.c. operated		rms current	AF...	2/43

d.c. Circuit Switching



Contactors for d.c. Switching




2

Control circuit	 	Main pole	Types	Pages
a.c. operated		1-pole	GA...	2/44
d.c. operated		1-pole	GAE...	2/44

Standard Contactors

2





Control circuit	  	Main poles	Types	Pages
a.c. operated		3 and 4-pole	A...	2/60
a.c. / d.c. operated (electronic coil interface)		3 and 4-pole	AF...	2/60
d.c. operated		3 and 4-pole	AL..., AE...	2/60

Standard Contactors

2




Control circuit	 	Main poles	Types	Pages
a.c. operated		4-pole	EK...	2/62
d.c. operated		4-pole	EK...	2/62

Switching with Magnetical Latching



Magnetically Latched Contactors

2

Control circuit		Main poles	Types	Pages
d.c. operated		3xNO	AM...	2/46
		2xNO + 2xNC	AM...	2/46

Contactors for Specific Applications

Non Inductive Loads



3-pole Contactors

Control circuit	Ratings (AC-1, $\theta \leq 40^\circ\text{C}$)	Types	Pages
a.c. operated	1200 A	EH 1200	2/48
d.c. operated	1200 A	EH 1200	2/48

Star-Delta Starting



Main, Star and Delta Contactors

Control circuit	Main poles	Types	Pages
a.c. operated	3-pole	A...	2/50
a.c. / d.c. operated (electronic coil interface)	3-pole	AF...	2/50

3-phase Slip-Ring Motor Control



Stator, Rotor Short-circuit and Acceleration Contactors

Control circuit	Main poles	Types	Pages
a.c. operated	3-pole	A...	2/52
a.c. / d.c. operated (electronic coil interface)	3-pole	AF...	2/53
d.c. operated	3-pole	AL..., AE...	2/53

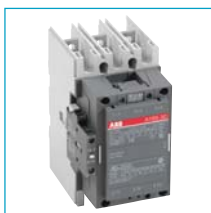
Autotransformer Starting



Line, Autotransformer and Star Contactors

Control circuit	Main poles	Types	Pages
a.c. operated	3-pole	A...	2/54
a.c. / d.c. operated (electronic coil interface)	3-pole	AF...	2/54
d.c. operated	3-pole	AL..., AE...	2/54

3-phase Transformer Switching



Line Contactors

Control circuit	Main poles	Types	Pages
a.c. operated	3-pole	A...	2/55
a.c. / d.c. operated (electronic coil interface)	3-pole	AF...	2/55
d.c. operated	3-pole	AL..., AE...	2/55

Lighting Circuit Switching



Line Contactors

Control circuit	Main poles	Types	Pages
a.c. operated	3 and 4-pole	A...	2/56
a.c. / d.c. operated (electronic coil interface)	3 and 4-pole	AF...	2/56
d.c. operated	3 and 4-pole	AL..., AE...	2/56

Overview

Mini Contactors and Motor Protection

3-pole
a.c. Circuit
Switching



3-pole Mini Contactors

Control circuit	Ratings (AC-3, 400 V)	Types	Pages
a.c. operated	9 A 12 A	B 6 B 7	6/2 6/2
d.c. operated	9 A 12 A	BC 6 BC 7	6/2 6/2

6



3-pole Mini Contactors

Control circuit	Ratings (AC-3, 400 V)	Types	Pages
d.c. operated with large voltage range	12 A	TBC 7	6/7

6



Compact Reversing Contactors with Interlocking

Control circuit	Ratings (AC-3, 400 V)	Types	Pages
a.c. operated	9 A 12 A	VB 6 VB 7	6/3 6/3
d.c. operated	9 A 12 A	VBC 6 VBC 7	6/3 6/3

6



Compact Reversing Contactors with Safety Interlocking

Control circuit	Ratings (AC-3, 400 V)	Types	Pages
a.c. operated	9 A 12 A	VB 6A VB 7A	6/4 6/4
d.c. operated	9 A 12 A	VBC 6A VBC 7A	6/4 6/4

6

Motor
Protection



3-pole Overload Relays

	Setting ranges	Types	Pages
Thermal O/L Relay	0.1 ... 12 A	T7 DU	5/5
Electronic O/L Relay	0.1 ... 18.9 A	E 16 DU	5/11

6

4-pole
a.c. Circuit
Switching



4-pole Mini Contactors

Control circuit	Ratings (AC-1, $\theta \leq 40^\circ\text{C}$)	Types	Pages
a.c. operated	16 A 20 A	B 6 B 7	6/2 6/2

6

Mini Contactors for Specific Applications

6

d.c.
Circuit
Switching



Mini Contactors

Control circuit	Main poles	Types	Pages
a.c. operated	3 and 4-pole	B 6	6/11
	3 and 4-pole	B 7	6/11
d.c. operated	3 and 4-pole	BC 6	6/11
	3 and 4-pole	BC 7	6/11

1

6



Compact Reversing Contactors

Control circuit	Main poles	Types	Pages
a.c. operated	3-pole	VB 6	6/11
	3-pole	VB 7	6/11
d.c. operated	3-pole	VBC 6	6/11
	3-pole	VBC 7	6/11

6

Lighting
Circuit
Switching



Mini Contactors

Control circuit	Main poles	Types	Pages
a.c. operated	3 and 4-pole	B 6	6/13
	3 and 4-pole	B 7	6/13
d.c. operated	3 and 4-pole	BC 6	6/13
	3 and 4-pole	BC 7	6/13

6



Compact Reversing Contactors

Control circuit	Main poles	Types	Pages
a.c. operated	3-pole	VB 6	6/13
	3-pole	VB 7	6/13
d.c. operated	3-pole	VBC 6	6/13
	3-pole	VBC 7	6/13

6

Interface



Interface Mini Contactors

Control circuit	Main poles	Types	Pages
d.c. operated	3-pole	BC 6	6/5
	3-pole	BC 7	6/5

6

PLC's Output



Mini Contactors for PLC's output

Control circuit	Main poles	Types	Pages
d.c. operated	3-pole	B6 S	6/5
	3-pole	B7 S	6/5

Overview


Contactor Relays and Mini Contactor Relays

Control
Circuit
Switching



Contactor Relays


3

Control circuit		Poles	Types	Pages
a.c. operated		4 and 8-pole	N...	3/4



Contactor Relays


3

Control circuit		Poles	Types	Pages
d.c. operated, low consumption coil		4 and 8-pole	NL..., NL Z	3/6



Contactor Relays

3


Control circuit		Poles	Types	Pages
d.c. operated, large voltage range		4 and 8-pole	TNL...	3/6

Control
Circuit
Switching



Mini Contactor Relays


6

Control circuit	 	Poles	Types	Pages
a.c. operated		4-pole	K 6...	6/6
d.c. operated		4-pole	KC 6...	6/6



Interface Mini Contactor Relays


6

Control circuit		Poles	Types	Pages
d.c. operated, standard voltage range		4-pole	KC 6...	6/6
d.c. operated, large voltage range		4-pole	TKC 6...	6/7



Mini Contactor Relays for PLC's Output

6

Control circuit		Poles	Types	Pages
d.c. operated		4-pole	K6 S...	6/6

Low Voltage Products

A complete range of products
to fit all your needs in many applications:

@ Industrial Control & Automation

Control Products

Connection Devices

Switches & Fusegear

Switchgear Systems

LOW VOLT/LV Drives

LV Motors

A complete range of products to fit all your needs in many applications.

- Industrial Control & Automation: Connecting, controlling, automating, protecting, and improving machines and equipment
- Installation and Commissioning: Safety and compliance: easy-to-use jobs by licensed electricians to connect appliances, lighting, and heating

@ Installation & Distribution

Modular DIN Rail Devices

Intelligent Installation Systems

Wiring Accessories

Industrial Plugs & Sockets

Enclosure & Cable Systems

Network Quality

Circuit Breakers




abb.com/lowvoltage

Selection of ABB contactor for AC-3 or AC-4 utilization categories


Please select the contactor and read the technical data or find a contactor according to the following data:
 - Voltage and current.
 - Expected electrical durability and current. In AC-4, the durability takes into account the breaking current ($I_c = 6 \times I_e$).
 The rated power is calculated for 4-pole squirrel-cage motor.

Contactor type: **A 9/AL 9**



AC-3 $T_a \leq 55^\circ\text{C}$	240 V	9	I_e [A]	25	TAXXXDU
	400 V	9		2,2	Pd [W]
	440 V	9		16	
	500 V	7		0,1	EXXXDU
	690 V	2,2		7	d [W]
Ue	240 V	4	e [kW]	9	I_n [A]
	400 V	4		9	
	440 V	5,5		30	
		5,5		44	$I_{e \leq 440\text{ V}}$


AC-3 n=3 x10⁶
 n=2 x10⁶
 n=1 x10⁶
 n=0,5x10⁶




Selection of ABB contactor for AC-1 utilization category

Please select the contactor and read the technical data or you can find a contactor according to the following data:
 - Maximum temperature and current.
 - Expected electrical durability and current.

Contactor type: **A9**



4	3-4	I_n [A]	25
	25	Ue max [V]	690
	4	S	25
3			m ²


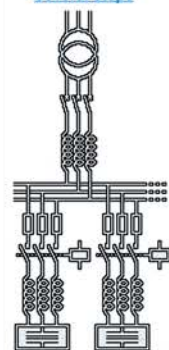


Selection of ABB contactor for capacitor switching

In Low Voltage industrial installations, capacitors are mainly used for reactive energy correction (raising the power factor). When these capacitors are energized, "inrush current peaks" occur through the installation devices.

This program allows the calculation of these peaks and gives the references of the ABB contactors according to the installation specifications.

This calculation is valid for 1 or several banks.

Consult CAPCAL OnLine (select single or several steps below)	or	DOWNLOAD it. Click HERE to save the application on your computer
<p>Single step</p> 	or	<p>Several steps</p> 
For several capacitor banks, the control can be:		
Step by Step	The closing of the contactors is always in the same order. Only the last contactor has to withstand the highest current peak.	
Circular	The succession of the contactor closing is done by the control system. Each contactor can withstand the highest peak.	

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ABB

Selection of ABB contactor according to lamp technology

Please select the power and the number of lamps per phase that the contactor can control and read the type of available contactors

Contactor type: **A 9/AL 9**

AC-5a

Pe	n
20 W	40
40 W	33
65 W	21
80 W	18
100 W	13
110 W	12

V = 220 / 240 V
Ta ≤ 55 °C

Selection of ABB contactor for AC-6a utilization category

The peak of current due to the magnetization phenomena is roughly 20 to 30 times the transformer nominal current. Please select the contactor and read technical data or find a contactor according to rated power of transformer. Then verify if the possible peak of current is in line with the current peak from the transformer. The selection is valid for a maximum switching frequency of 60 operating cycles per hour.

Contactor type: **A 9/AL 9**

AC-6a

Ue	Pe [kVA]
240 V	4
400 V	7
440 V	8
500 V	9,5
690 V	12,5
	330

Ip [A]

ABB Questionnaire for Product Specifications: Block Contactors

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

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 Breaking current: A
 Making 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:

CONTROL CIRCUIT

Coil voltage: V DC / AC f = Hz
 Minimum / maximum: V to V
 Surge suppressor: type:
 Interface with PLC:
 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:
 Customer approvals:
 Shock and vibrations:
 Expected quantity:
 Expected first delivery date: and City: per Year
 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 Entrellec - Control Division - France
 DQ01036 rev 1

Above tools are available on the ABB Website for selection of the contactors, for the usual utilization categories according to IEC 60947-4-1.

For other utilization categories, or specific applications, a questionnaire for product specifications is also available in this catalogue (see last page of section 2).

Conformity with Standards

The standards and specifications cited for different types of devices, e.g. IEC, BS, VDE, NFC, EN Publications, should be considered as statements of conformity in the sense of article 10 of the E.E.C. Low Voltage Directive of 19 February 1973.

There is no label on ABB Low Voltage Control Apparatus identifying a national certification organization. The ABB logo figuring on devices, labels and documents certifies the conformity of devices with respect to the applicable standards.

CE marking is proof of conformity with the European Directives concerning the product. It must not be confused with a mark of quality.

CE marking is part of an administrative procedure designed to guarantee the free movement of the product inside the European Community.

However, for some countries and some ship certification and classification organizations, certification is compulsory. In this case, the mark (or logo) of the given organization figures on the devices if so required.

Files pertaining to certifications and approvals obtained are available on request.

Liability

The devices in this catalogue do not endanger safety when they are installed, mounted and used according to their application and in compliance with the installation rules and standards which apply to them.

Quality

ABB has set up a quality assurance organisation in compliance with the requirements of ISO 9001 standard.

ABB factories are ISO 9001 approved.

ABB Low Voltage Control Apparatus meet with a high quality standard. It is developed, manufactured and tested under the sole responsibility of ABB. **Our test platforms benefit from a quality assurance organisation accredited as per standard ISO/IEC 17025.**

In compliance with the regulations set out by the ISO 9000 series standard, ABB sets up and manages the procedures and files relating to product quality and actions having an effect on quality.

Guarantee

The information contained in this catalogue reflects the current state of our knowledge and aims to present our products and their possible applications. Thus, the information does not guarantee certain specific characteristics of products or their aptitude for a specific utilization. All filed legal patents or industrial property rights must be respected.

Sustainable Development

In 1999, ABB extended its Environment Management Programme to all the principles of the Corporate Charter for Sustainable Development. **All concerned factories are ISO 14001 certified.**

Eco-design

Environmental information is accessible on ABB Website. www.abb.com/sustainability

Environmental product declarations can be issued upon customer's request.



Packing

Generally speaking, the diversification of reusable packing satisfies ecological requirements and the specific needs of our customers.

Packing is designed and produced with a continuous concern for respect of the environment.

For instance, polystyrene packing materials are replaced by recyclable wrapping materials with an efficient protection of our products during their transportation.

Industrial^{IT}

We have committed to the largest program of development and innovation in our corporate history to help our customers focus on productivity and profits.

We cordially invite you to share ABB's vision for a new era of power, automation, and information solutions dedicated to making our customers more productive and profitable in the age of eCommerce!

www.abb.com/lowvoltage - select: **Industrial^{IT}**.

Contact Directory

The ABB Contact Directory helps you find local contacts for ABB products in your country.

www.abb.com/contacts

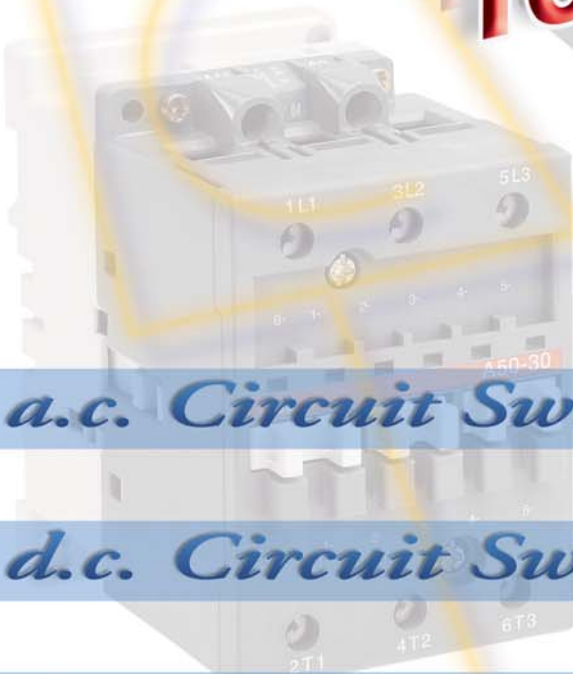


3-pole Contactors
4-pole Contactors

Specific Contactors

Applications

Technical Data

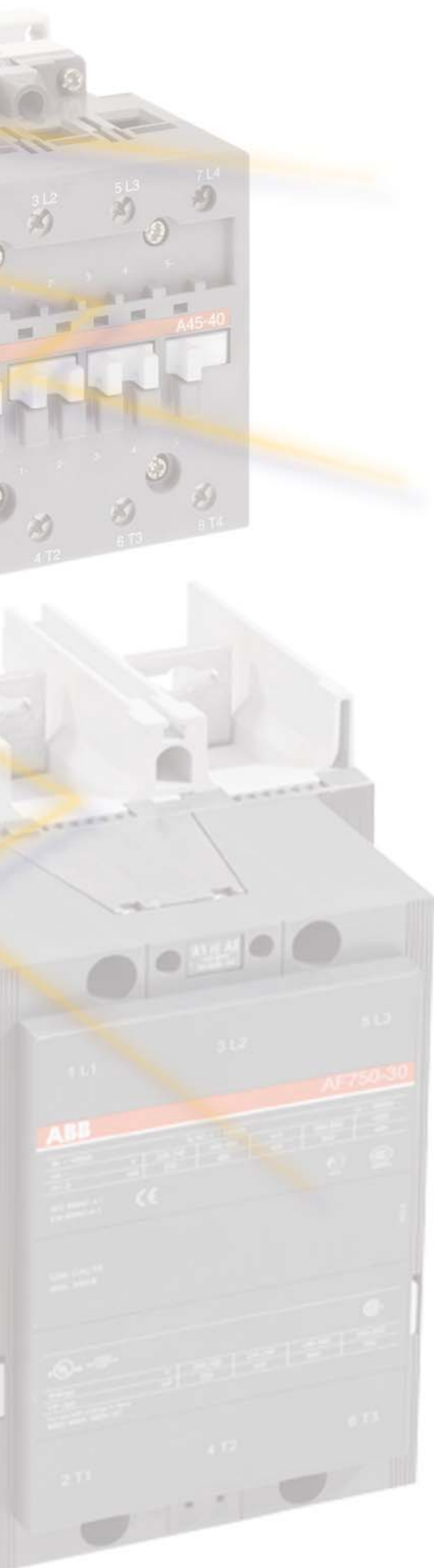


a.c. Circuit Switching

d.c. Circuit Switching

Capacitor Switching

Lighting Circuits



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TAL 9 ... TAE 110 Contactors (d.c. Operated)	2/16
AF 50 ... AF 110 Contactors (a.c. / d.c. Operated with Electronic Coil Interface)	2/18
AF 145 ... AF 1650 Contactors (a.c. / d.c. Operated with Electronic Coil Interface)	2/20

4-pole Contactors: Ordering Details

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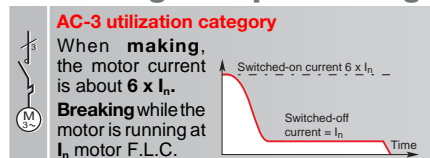
Technical Data

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A., AL., AE., AF.,

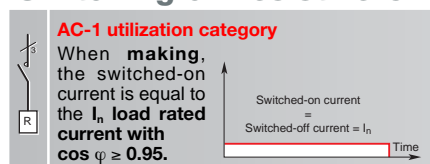
a.c. Circuit Switching

Switching of 3-phase Cage Motors



AC-3 Power rating	$\theta \leq 55^\circ\text{C}, 400\text{ V}$	kW	4	5.5	7.5	11	15	18.5
AC-3 Rated operational current	$\theta \leq 55^\circ\text{C}, 400\text{ V}$ $\theta \leq 55^\circ\text{C}, 415\text{ V}$ $\theta \leq 55^\circ\text{C}, 690\text{ V}$	A	9	12	17	26	32	37
		A	9	12	17	26	32	37
		A	7	9	10	17*	21*	25*

Switching of Resistive Circuits



AC-1 Rated operational current	$\theta \leq 40^\circ\text{C}, 690\text{ V}$ $\theta \leq 55^\circ\text{C}, 690\text{ V}$ $\theta \leq 70^\circ\text{C}, 690\text{ V}$	A	25	27	30	45	55	60
		A	22	25	27	40	55	60
		A	18	20	23	32	39	42
● With conductor cross-sectional area		mm²	2.5	4	4	6	10	16
● Rated operational voltage		V	690					

* For AL 26 ... AL 40 see "Technical Data"

3-phase Motor-rating General Use Rating

Motor-rating	480 V	hp	5	7.5	10	20	25	30
Amp-rating	600 V	A	21	25	30	40	50	60
Nema Size			00	0	-	1	1P	-

3-pole Contactors

Selection & Ordering

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

Note: The AF contactor range, with a.c./d.c. Electronic Coil Interface, is available from AF 50 up to AF 1650.



a.c. Control supply range Types
A..., AF... Contactors

A 9-30-10	A 26-30-10
A 12-30-10	A 30-30-10
A 16-30-10	A 40-30-10



d.c. Control supply range Types
AL..., AE..., AF... Contactors

AL 9-30-10	AL 26-30-10
AL 12-30-10	AL 30-30-10
AL 16-30-10	AL 40-30-10

Contactors Main Accessories

Selection & Ordering

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

Auxiliary contacts



CA 5-..., 1-pole,
CAL ..., 2-pole

CA 5-10 , 1-pole, front mounting 1 x N.O.	CA 5-01 , 1-pole, front mounting 1 x N.C.
--	--

Timers



TP..., Pneumatic (A..., AE..., AF... contactors only)
TE..., Electronic
Supply voltages: 24 V a.c./d.c., 110 ... 120; 220 ... 240; 380 ... 440 V a.c.

TP 40 DA, TP 180 DA Direct timing - Front mounting	TP 40 IA, TP 180 IA
TE5S Direct timing - Separate mounting	

Interlocks



VE 5-..., Mechanical / Electrical
VM..., Mechanical
mounting between 2 contactors

VE 5-1	VM 5-1
---------------	---------------

Surge suppressors



RV..., (Varistor) a.c./d.c.
RC..., (Capacitor) a.c.
RT..., (Transil diode) d.c.

RV 5	RC 5-1	RT 5
-------------	---------------	-------------

Protection of 3-phase motors

Selection & Ordering

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

O/L relays



TA..DU..., Thermal O/L relay
E..DU..., Electronic O/L relay
Standard starting time 2 ... 10 s
tripping class 10 A

TA 25 DU...	TA 42 DU...
0.10...0.16	1.0...1.4
0.16...0.25	1.3...1.8
0.25...0.40	1.7...2.4
0.40...0.63	2.2...3.1
0.63...1.0	2.8...4.0
3.5...5.0	13...19
4.5...6.5	18...25
6.0...8.5	24...32
7.5...11	
10...14	
E16 DU...-10	
0.1...0.32	0.9...2.7
0.3...1.0	2...6.3
5.7...18.9	

For further information:

- >> Description
- >> Ordering Details
- >> Technical Data

Types pages	A..	AF..	AL../TAL..	AE../TAE	UA../RA/UA..	GA../GAE..	AM..
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3-pole Contactors



	A 50	A 63	A 75	A 95	A 110	A 145	A 185	A 210	A 260	A 300	AF 400	AF 460	AF 580	AF 750	AF 1350	AF 1650	
	AE 50	AE 63	AE 75	AE 95	AE 110	AF 145	AF 185	AF 210	AF 260	AF 300							
	22	30	37	45	55	75	90	110	140	160	200	250	315	400	475	560	
	50	65	75	96	110	145	185	210	260	305	400	460	580	750	860	1050	
	50	65	75	96	110	145	185	210	260	300	400	460	580	750	860	1050	
	35	43	46	65	82	120	170	210	220	280	350	400	500	650	800	950	
	100	115	125	145	160	250	275	350	400	500	600	700	800	1050	1350	1650	
	85	95	105	135	145	230	250	300	350	400	500	600	700	875	1150	1450	
	70	80	85	115	130	180	180	240	290	325	400	480	580	720	1000	1270	
	35	50	50	50	70	120	150	185	240	300	2 x 185	2 x 240	2x240	bar / mm 2x50x8	bar / mm 2//100x5	bar / mm 3//100x5	
	1000					690					1000						
	40	60	60	60	75	100	125	150	200	250	350	400	500	600	800	900	
	80	90	105	125	140	230	250	300	350	400	550	650	750	900	1350	1650	
	2	-	3	-	-	4	-	-	5	-	-	6	-	7	-	8	

A 50-30-00 A 63-30-00 A 75 30-00	A 95-30-00 A 110-30-00	A 145-30-11 A 185-30-11	A 210-30-11 A 260-30-11 A 300-30-11	AF 400-30-11 AF 460-30-11	AF 580-30-11 AF 750-30-11	AF 1350-30-11 AF 1650-30-11
AE 50-30-00 AE 63-30-00 AE 75-30-00	AE 95-30-00 AE 110-30-00	AF 145-30-11 AF 185-30-11	AF 210-30-11 AF 260-30-11 AF 300-30-11	AF 400-30-11 AF 460-30-11	AF 580-30-11 AF 750-30-11	AF 1350-30-11 AF 1650-30-11

CAL 5-11 2-pole, side mounting 1 x N.O. + 1 x N.C.	CAL 18-11 2-pole, side mounting 1 x N.O. + 1 x N.C. (1st block)	CAL 18-11 B 2-pole, side mounting 1 x N.O. + 1 x N.C. (2nd block)
---	--	--

Inverse timing - Front mounting	TE5S Sep. mounting	TE5S Direct timing - Separate mounting
---------------------------------	--------------------	--

VE 5-2	VM 300H	VM 750H	VM 1650H
--------	---------	---------	----------

RV 5 RC 5-2 RT 5	The AF 50 ... AF 1650 contactors are equipped with a built-in electronic coil interface which eliminates the need of extra surge suppressors - For A 145 ... A 300 use RC-EH 300
------------------------	--

TA 75 DU... 29...42 36...52 45...63 60...80	TA 80 DU... 60...80 TA 110 DU... 65...90 80...110	TA 200 DU... 130...175 150...200	TA 450 DU... 165...235 220...310	E 200 DU 60...200	E 320 DU 100...320	E 500 DU 150...500	E 800 DU 250...800	E 1250 DU 375...1250
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Information about:

- >> Accessories section 4
- >> Motor Protection section 5
- >> Approvals section 7

- >> Terminal Marking section 8
- >> Dimensions section 9

A., AL., AE., EK.,

a.c. Circuit Switching



Switching of Resistive Circuits

IEC

AC-1 utilization category

When making, the switched-on current is equal to the I_n load rated current with $\cos \varphi \geq 0.95$.

Switched-on current = Switched-off current = I_n

AC-1	Rated operational current	$\theta \leq 40^\circ\text{C}$ $\theta \leq 55^\circ\text{C}$ $\theta \leq 70^\circ\text{C}$
	● With conductor cross-sectional area	
	● Rated operational voltage	

	A 9	A 16	A 26
	AL 9	AL 16	AL 26
A	25	30	45
A	22	27	40
A	18	23	32
mm²	2.5	4	6
V	690		

General Use Rating

UL/CSA

Amp-rating	600 V
Nema Size	

	A 9	A 16	A 26
A	21	30	40
	00	0	1

4-pole Contactors

Selection & Ordering

- ▶ Select 4 N.O. or 2 N.O. + 2 N.C. main poles.
- ▶ Select contactor type.
- ▶ Select contactor coil voltage on cover folding page 0/1, according to control circuit supply. (Please quote coil voltage in plain text).

Note: The 4 N.O. or 2 N.O. + 2 N.C. **AF** contactor range with a.c./d.c. **Electronic Coil Interface**, is available from **AF 45** up to **AF 75**.

4 N.O. main poles



a.c. Control supply range Types

A 9-40-00	A 16-40-00	A 26-40-00
-----------	------------	------------



d.c. Control supply range Types

AL 9-40-00	AL 16-40-00	AL 26-40-00
------------	-------------	-------------

2 N.O. + 2 N.C. main poles



a.c. Control supply range Types

A 9-22-00	A 16-22-00	A 26-22-00
-----------	------------	------------



d.c. Control supply range Types

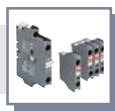
AL 9-22-00	AL 16-22-00	AL 26-22-00
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Contactor Main Accessories

Selection & Ordering

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

Auxiliary contacts



CA 5-.., 1-pole
CAL ..-.., 2-pole

CA 5-10 1-pole, front mounting 1 x N.O.	CA 5-01 1-pole, front mounting 1 x N.C.
---	---

Timers



TP.., Pneumatic for A..., AE... contactors only
TE.., Electronic
Supply voltages: 24 V a.c./d.c., 110 ... 120; 220 ... 240; 380 ... 440 V a.c.

TP 40 DA, TP 180 DA Direct timing - Front mounting	TE5S Direct timing - Separate
---	--------------------------------------

Interlocks



VE 5-.., Mechanical/ Electrical
VM... , VH... Mechanical
mounting between 2 contactors

VE 5-1 VM 5-1

Surge suppressors



RV.., (Varistor) a.c./d.c.
RC.., (Capacitor) a.c.
RT.., (Transil diode) d.c.

RV 5 RC 5-1 RT 5

For further information:

	Types	A..	EK..	AF..	AL../AE..	TAL../TAE..	AM..
>> Ordering Details pages	2/22	2/24, 2/30	2/31	2/26	2/28	2/47
>> Technical Data pages	2/64 ... 2/74	2/76 ... 2/80	2/64	2/74		2/46

4-pole Contactors



	A 45 AE 45	A 50 AE 50	A 75 AE 75	EK 110	EK 150	EK 175	EK 210	EK 370	EK 550	EK 1000
	70	100	125	200	250	300	350	550	800	1000
	60	85	105	180	230	270	310	470	650	800
	50	70	85	155	200	215	250	400	575	720
	25	35	50	95	150	185	240	2 x 185	2 x 240	2 x 300
		690					1000			
	80	80	105	170	200	250	300	420	540	-
	2	2	3	-	-	-	-	-	-	-

A 45-40-00	A 50-40-00	A 75-40-00	EK 110-40-11	EK 150-40-11	EK 175-40-11	EK 210-40-11	EK 370-40-11	EK 550-40-11	EK 1000-40-11
AE 45-40-00	AE 50-40-00	AE 75-40-00	EK 110-40-21	EK 150-40-21	EK 175-40-21	EK 210-40-21	EK 370-40-21	EK 550-40-21	EK 1000-40-21
A 45-22-00	A 75-22-00	-	-	-	-	-	-	-	-
AE 45-22-00	AE 75-22-00	-	-	-	-	-	-	-	-

CAL 5-11 2-pole, side mounting 1 x N.O. + 1 x N.C.	CAL 16-11 2-pole, side mounting 1 x N.O. + 1 x N.C.
---	--

TP 40 IA, TP 180 IA Inverse timing - Front mounting mounting	TE5S Direct timing - Separate mounting (interpose an N.. contactor relay for EK 370 ... EK 1000)
---	--

VE 5-2 -	VH 145 (Mechanical / Electrical)	VH 300 (Mechanical / Electrical)	- VH 800
RV 5 RC 5-2 RT 5	- RC-EH 300 -	-	RC-EH 800 (Varistor + RC) -

Information about:

>> Accessories section 4
>> Approvals section 7

>> Terminal Marking section 8
>> Dimensions section 9

A 9 ... A 110 3-pole Contactors

a.c. Operated



Application

A 9 ... A 110 contactors are mainly used for controlling 3-phase motors and generally for controlling power circuits up to 690 V a.c. / 1000 V a.c. or 220 V d.c. / 440 V d.c. The contactors can also be used for many other applications such as isolation, capacitor switching, lighting.

Description

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

● Main poles and auxiliary contact blocks

A 9 ... A 40 1-stack contactors:

- 3 main poles,
- 1 built-in auxiliary contact,
- front and side mounted add-on auxiliary contact blocks.

A 50 ... A 110 contactors:

- 3 main poles,
- front and side mounted add-on auxiliary contact blocks.

● Control circuit: a.c. operated with laminated magnet circuit.

● Accessories: a wide range of accessories is available

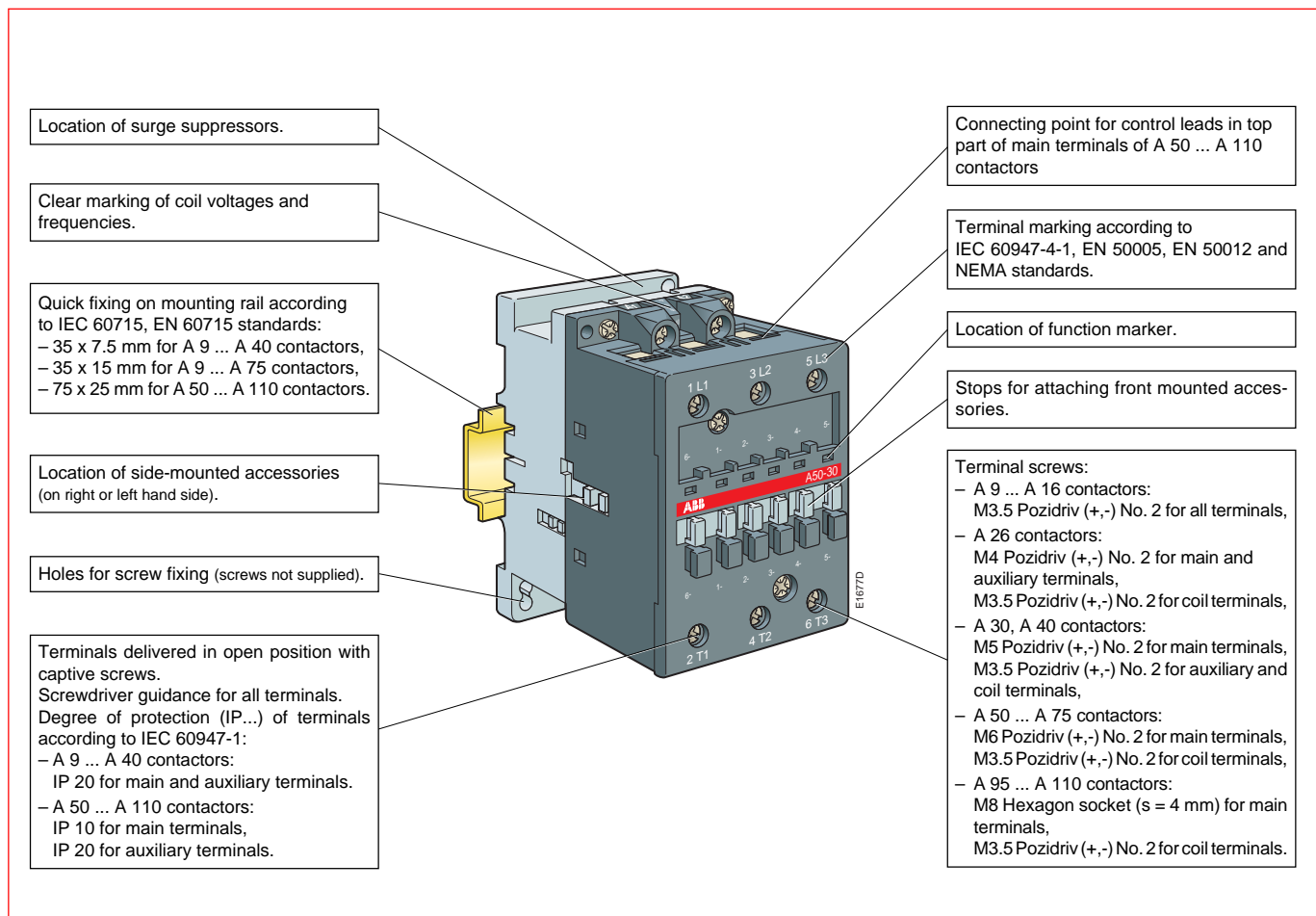
A 9 ... A 40 2-stack contactors:

- 1st stack with 3 main poles and 1 built-in auxiliary contact,
- 2nd stack with 4 built-in auxiliary contacts,
- side mounted add-on auxiliary contact blocks.

The built-in auxiliary contact elements are mechanically linked.

Variants

- 4-pole: A 9 ... A 75 contactors (with 4 N.O. or 2 N.O. + 2 N.C. main poles).
- d.c. operated: AL 9 ... AL 40, AL 9Z ... AL 16Z and AE 50 ... AE 110 contactors.
- d.c. operated with large coil voltage range: TAL 9 ... TAL 40 and TAE 50 ... TAE 110 contactors.
- electronic coil interface (a.c./d.c. operated): AF 50 ... AF 110 contactors.
- contactors for capacitor switching (UA..., UA..RA types).
- contactors for d.c. switching (GA..., GAE... types).
- magnetically latched contactors (AM... types).



A 9 ... A 110 3-pole Contactors

a.c. Operated



A 9-30-10



A 26-30-10



A 50-30-00



A 95-30-00

Ordering Details

IEC	UL/CSA		Auxiliary contacts fitted		Type	Order code	Weight kg
Rated power 400 V AC-3	Rated current $\theta \leq 40^\circ\text{C}$ AC-1	3-Phase motor rating 480 V hp	General use rating 600 V A	1 st stack 2 nd stack	state coil voltage <input type="text"/> (see table below)	state coil voltage code <input type="text"/> (see table below)	Pack ^{ing} 1 piece
kW	A	hp	A				
4	25	5	21	1 - --	A 9-30-10 <input type="text"/>	1SBL 141 001 R <input type="text"/> <input type="text"/> 10	0.340
				- 1 --	A 9-30-01 <input type="text"/>	1SBL 141 001 R <input type="text"/> <input type="text"/> 01	0.340
				-- 2 2	A 9-30-22 <input type="text"/>	1SBL 141 001 R <input type="text"/> <input type="text"/> 22	0.400
				1 - 2 2	A 9-30-32 <input type="text"/>	1SBL 141 001 R <input type="text"/> <input type="text"/> 32	0.400
5.5	27	7.5	25	1 - --	A 12-30-10 <input type="text"/>	1SBL 161 001 R <input type="text"/> <input type="text"/> 10	0.340
				- 1 --	A 12-30-01 <input type="text"/>	1SBL 161 001 R <input type="text"/> <input type="text"/> 01	0.340
				-- 2 2	A 12-30-22 <input type="text"/>	1SBL 161 001 R <input type="text"/> <input type="text"/> 22	0.400
				1 - 2 2	A 12-30-32 <input type="text"/>	1SBL 161 001 R <input type="text"/> <input type="text"/> 32	0.400
7.5	30	10	30	1 - --	A 16-30-10 <input type="text"/>	1SBL 181 001 R <input type="text"/> <input type="text"/> 10	0.340
				- 1 --	A 16-30-01 <input type="text"/>	1SBL 181 001 R <input type="text"/> <input type="text"/> 01	0.340
				-- 2 2	A 16-30-22 <input type="text"/>	1SBL 181 001 R <input type="text"/> <input type="text"/> 22	0.400
				1 - 2 2	A 16-30-32 <input type="text"/>	1SBL 181 001 R <input type="text"/> <input type="text"/> 32	0.400
11	45	20	40	1 - --	A 26-30-10 <input type="text"/>	1SBL 241 001 R <input type="text"/> <input type="text"/> 10	0.600
				- 1 --	A 26-30-01 <input type="text"/>	1SBL 241 001 R <input type="text"/> <input type="text"/> 01	0.600
				-- 2 2	A 26-30-22 <input type="text"/>	1SBL 241 001 R <input type="text"/> <input type="text"/> 22	0.660
				1 - 2 2	A 26-30-32 <input type="text"/>	1SBL 241 001 R <input type="text"/> <input type="text"/> 32	0.660
15	55	25	50	1 - --	A 30-30-10 <input type="text"/>	1SBL 281 001 R <input type="text"/> <input type="text"/> 10	0.710
				- 1 --	A 30-30-01 <input type="text"/>	1SBL 281 001 R <input type="text"/> <input type="text"/> 01	0.710
				-- 2 2	A 30-30-22 <input type="text"/>	1SBL 281 001 R <input type="text"/> <input type="text"/> 22	0.770
				1 - 2 2	A 30-30-32 <input type="text"/>	1SBL 281 001 R <input type="text"/> <input type="text"/> 32	0.770
18.5	60	30	60	-- --	A 40-30-10 <input type="text"/>	1SBL 321 001 R <input type="text"/> <input type="text"/> 10	0.710
				1 1 --	A 40-30-11 <input type="text"/>	1SBL 321 001 R <input type="text"/> <input type="text"/> 11	0.710
				-- 2 2	A 40-30-22 <input type="text"/>	1SBL 321 001 R <input type="text"/> <input type="text"/> 22	0.770
				-- --	A 50-30-00 <input type="text"/>	1SBL 351 001 R <input type="text"/> <input type="text"/> 00	1.160
22	100	40	80	1 1 --	A 50-30-11 <input type="text"/>	1SBL 351 001 R <input type="text"/> <input type="text"/> 11	1.200
				-- 2 2	A 50-30-22 <input type="text"/>	1SBL 351 001 R <input type="text"/> <input type="text"/> 22	1.230
				-- --	A 63-30-00 <input type="text"/>	1SBL 371 001 R <input type="text"/> <input type="text"/> 00	1.160
				1 1 --	A 63-30-11 <input type="text"/>	1SBL 371 001 R <input type="text"/> <input type="text"/> 11	1.200
30	115	60	90	-- --	A 63-30-22 <input type="text"/>	1SBL 371 001 R <input type="text"/> <input type="text"/> 22	1.230
				1 1 --	A 75-30-00 <input type="text"/>	1SBL 411 001 R <input type="text"/> <input type="text"/> 00	1.160
				-- --	A 75-30-11 <input type="text"/>	1SBL 411 001 R <input type="text"/> <input type="text"/> 11	1.200
				-- 2 2	A 75-30-22 <input type="text"/>	1SBL 411 001 R <input type="text"/> <input type="text"/> 22	1.230
37	125	60	105	1 1 --	A 95-30-00 <input type="text"/>	1SFL 431 001 R <input type="text"/> <input type="text"/> 00	2.000
				-- --	A 95-30-11 <input type="text"/>	1SFL 431 001 R <input type="text"/> <input type="text"/> 11	2.040
				-- 2 2	A 95-30-22 <input type="text"/>	1SFL 431 001 R <input type="text"/> <input type="text"/> 22	2.070
				-- --	A 110-30-00 <input type="text"/>	1SFL 451 001 R <input type="text"/> <input type="text"/> 00	2.000
45	145	60	125	1 1 --	A 110-30-11 <input type="text"/>	1SFL 451 001 R <input type="text"/> <input type="text"/> 11	2.040
				-- --	A 110-30-22 <input type="text"/>	1SFL 451 001 R <input type="text"/> <input type="text"/> 22	2.070
				-- --	A 110-30-00 <input type="text"/>	1SFL 451 001 R <input type="text"/> <input type="text"/> 00	2.000
				1 1 --	A 110-30-11 <input type="text"/>	1SFL 451 001 R <input type="text"/> <input type="text"/> 11	2.040
55	160	75	140	-- --	A 110-30-22 <input type="text"/>	1SFL 451 001 R <input type="text"/> <input type="text"/> 22	2.070
				1 1 --	A 110-30-00 <input type="text"/>	1SFL 451 001 R <input type="text"/> <input type="text"/> 00	2.000
				-- --	A 110-30-11 <input type="text"/>	1SFL 451 001 R <input type="text"/> <input type="text"/> 11	2.040
				-- 2 2	A 110-30-22 <input type="text"/>	1SFL 451 001 R <input type="text"/> <input type="text"/> 22	2.070

Coil voltages and codes

Voltage <input type="text"/> V - 50Hz	Voltage <input type="text"/> V - 60Hz	Code <input type="text"/> <input type="text"/>
24	24	8 1
48	48	8 3
110	110 ... 120	8 4
220 ... 230	230 ... 240	8 0
230 ... 240	240 ... 260	8 8
380 ... 400	400 ... 415	8 5
400 ... 415	415 ... 440	8 6

Other voltages: page 0/1.

- >> Accessory Fitting Details page 2/8
- >> Thermal O/L Relays page 2/9
- >> Auxiliary Contacts for Safety Circuits page 2/63
- >> Technical Data page 2/64
- >> General - Approvals section 7
- >> Terminal Marking and Positioning section 8
- >> Dimensions section 9

2

3-pole Contactors

A 9 ... A 110 3-pole Contactors

Main Accessories

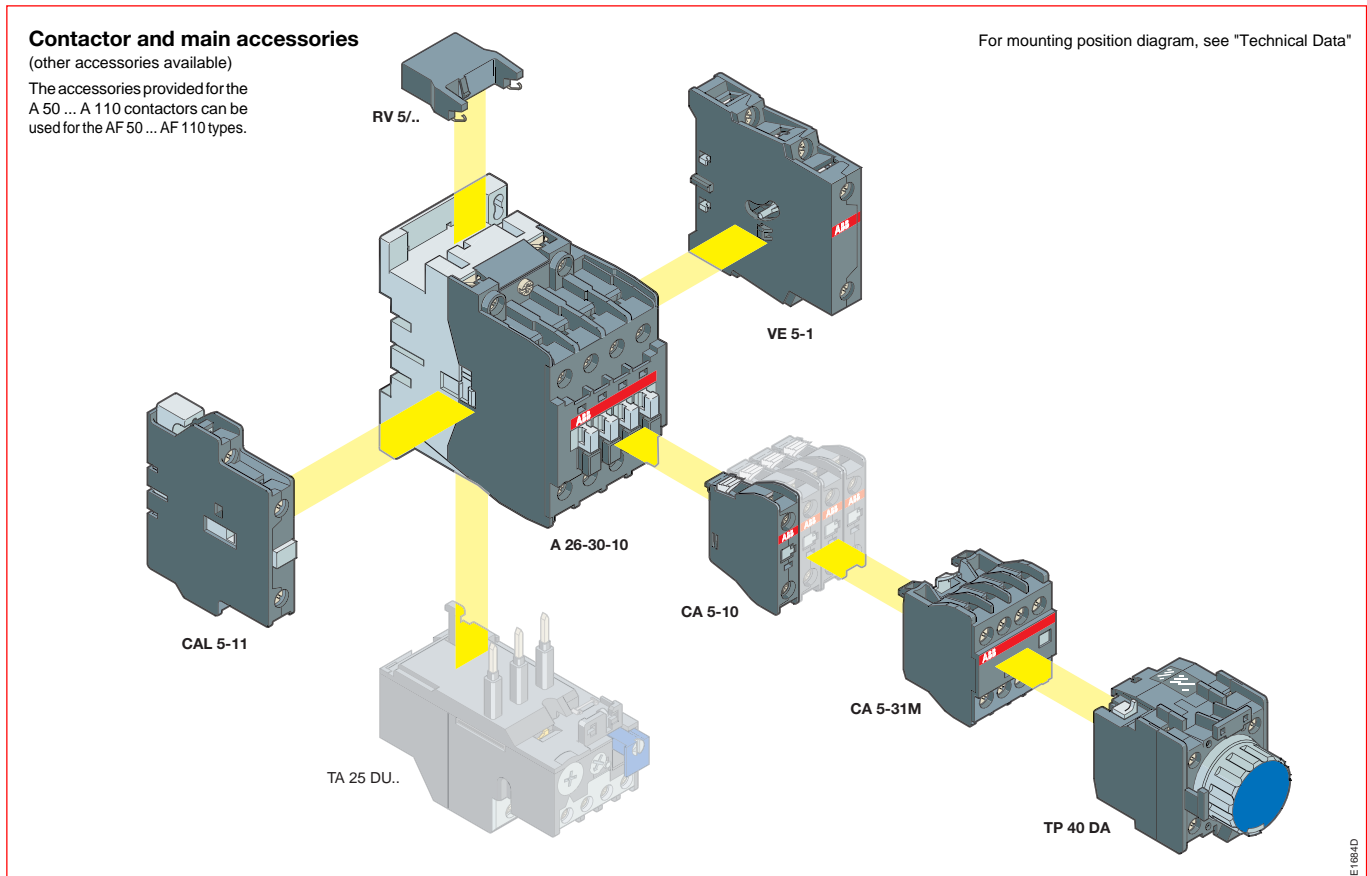
Fitting Details - For Ordering Details, see "Accessories"

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

Contactor types	Main poles	Available auxiliary contacts	Front mounted accessories			Side mounted accessories	
			Auxiliary contact 1-pole CA 5-.. (or 1-pole CE 5-..)	Auxiliary contact 4-pole CA 5-..	Pneumatic timer TP .. A	Auxiliary contact 2-pole CAL.. (or 1-pole CEL 18-..)	Interlock unit VM 5-.. or VE 5-..
A 9 ... A 26 A 9 ... A 26	3 0	1 0 0 1 (5)	1 to 4 x CA 5-.. (1 to 2 x CE 5-.. max.) (1)	or 1 x CA 5-.. (4-pole)	or 1 x TP .. A (6)	+	1 to 2 x CAL 5-11 or 1 x VM 5-1 or VE 5-1 + 1 x CAL 5-11
A 9 ... A 16 A 9 ... A 26	3 0	2 2 3 2	—	—	—	+	1 to 2 x CAL 5-11 or 1 x VM 5-1 or VE 5-1 + 1 x CAL 5-11
A 30, A 40 A 30, A 40	3 0	1 0 0 1 (5)	1 to 5 x CA 5-.. (1 to 3 x CE 5-.. max.) (2)	or 1 x CA 5-.. (4-pole) + 1 x 1-pole CA 5-.. or CE 5-.. (2)	or 1 x TP .. A + 1 x CA 5-.. (1-pole)	+	1 to 2 x CAL 5-11 or 1 x VM 5-1 or VE 5-1 + 1 x CAL 5-11
A 30, A 40	3 0	3 2 (5)	1 x CA 5-.. (or 1 x CE 5-..) (4)	—	—	+	1 to 2 x CAL 5-11 or 1 x VM 5-1 or VE 5-1 + 1 x CAL 5-11
A 50 ... A 75 A 50 ... A 75	3 0	0 0 1 1	1 to 6 x CA 5-.. (1 to 5 x CE 5-.. max.) (3)	or 1 x CA 5-.. (4-pole) + 2 x 1-pole CA 5-.. or CE 5-.. (3)	or 1 x TP .. A + 2 x CA 5-.. (1-pole)	+	1 to 2 x CAL 5-11 or 1 x VE 5-2 + 1 x CAL 5-11
A 50 ... A 75 A 50 ... A 75	3 0	2 2	1 to 2 x CA 5-.. (1 to 2 x CE 5-.. max.)	—	—	+	1 to 2 x CAL 5-11 or 1 x VE 5-2 + 1 x CAL 5-11
A 95, A 110 A 95, A 110	3 0	0 0 1 1	1 to 6 x CA 5-.. (1 to 5 x CE 5-.. max.) (3)	or 1 x CA 5-.. (4-pole) + 2 x 1-pole CA 5-.. or CE 5-.. (3)	—	+	1 to 2 x CAL 18-11 (or 1 to 2 x CEL 18-..) or 1 x VE 5-2 + 1 x CAL 18-11
A 95, A 110 A 95, A 110	3 0	2 2	1 to 2 x CA 5-.. (1 to 2 x CE 5-.. max.)	—	—	+	1 to 2 x CAL 18-11 (or 1 to 2 x CEL 18-..) or 1 x VE 5-2 + 1 x CAL 18-11

- (1) The total number of N.O. or N.C. CE 5-.. and other additional N.C. CA 5-.. auxiliary contacts is limited to 2.
 (2) The total number of N.O. or N.C. CE 5-.. and other additional N.C. CA 5-.. auxiliary contacts is limited to 3.
 (3) The total number of N.O. or N.C. CE 5-.. and other additional N.C. CA 5-.. auxiliary contacts is limited to 5.
 (4) CE 5-.. auxiliary contacts **not allowed in mounting position 5**.
 (5) 2 N.C. CA 5-.. auxiliary contacts maximum in mounting position 5.
 (6) A 9, A 12, A 16-30-01 in mounting position 5, TP..DA not allowed.

CE 5-.. auxiliary contacts **not allowed in mounting position 5**.
 CE 5-.. auxiliary contacts **not allowed in mounting position 5**.



A 9 ... A 110 3-pole Contactors

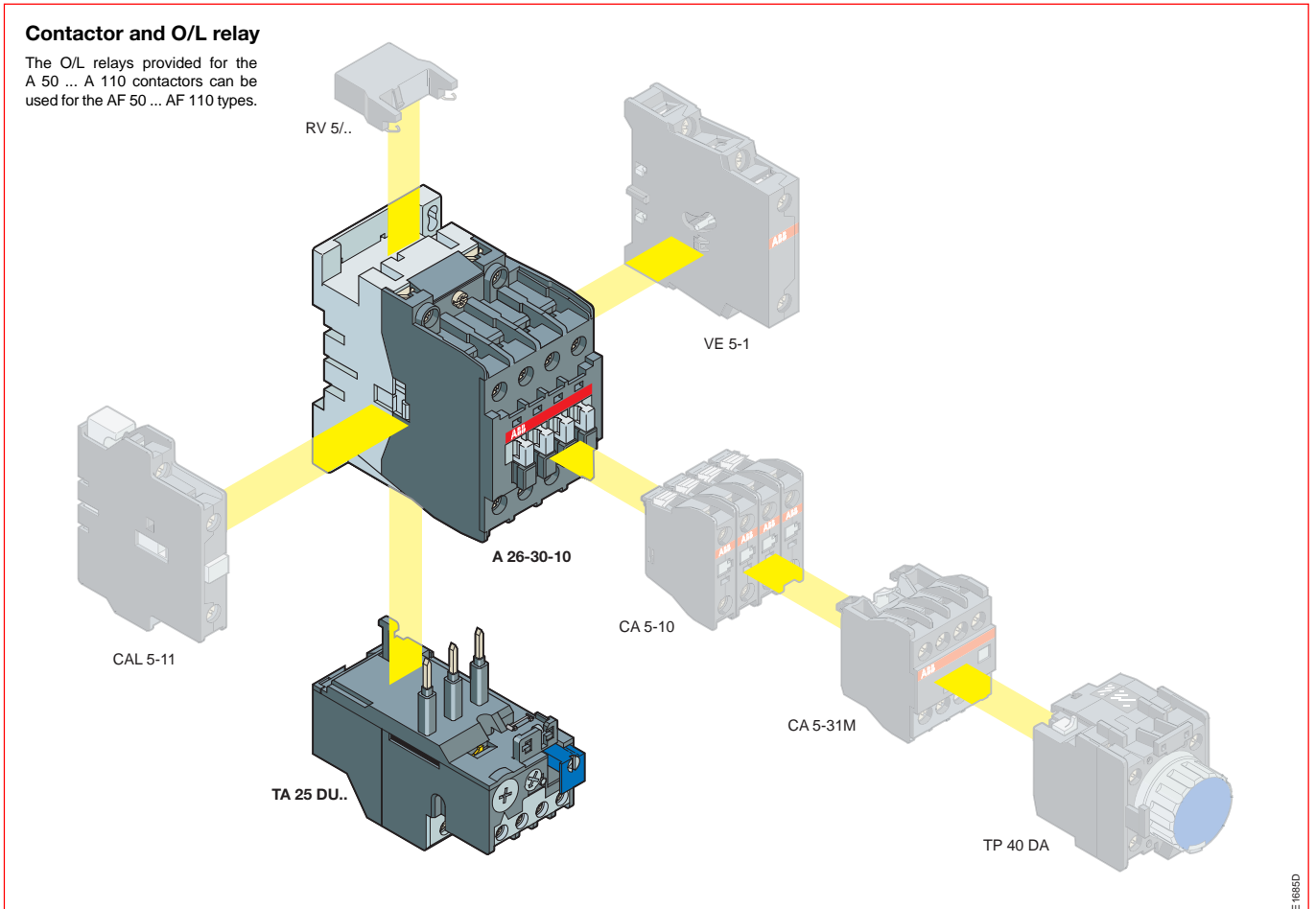
Thermal O/L Relays

Fitting Details - For Ordering Details, see "Motor Protection"

The addition of a thermal O/L relay on the contactor does not prevent fitting of many other accessories as shown below.

Contactor types	Thermal O/L relays - No mounting kit required, direct mounting				
	TA 25 DU.. 0.1 ... 0.16 to 24 ... 32 A	TA 42 DU 18 ... 25 to 29 ... 42 A	TA 75 DU 18 ... 25 to 60 ... 80 A	TA 80 DU 29 ... 42 to 60 ... 80 A	TA 110 DU 65 ... 90 to 80 ... 110 A
A 9 ... A 26	TA 25 DU..	–	–	–	–
A 30, A 40	TA 25 DU.. (1)	or TA 42 DU.. (1)	–	–	–
A 50 ... A 75	–	–	TA 75 DU..	–	–
A 95, A 110	–	–	–	TA 80 DU.. (1)	or TA 110 DU.. (1)

(1) According to the current value.



A 145 ... AF 1650 3-pole Contactors

a.c. Operated - A 145 ... A 300 Contactors

a.c. / d.c. Operated - AF 400 ... AF 1650 Contactors



Application

A 145 ... AF 1650 contactors are mainly used for controlling 3-phase motors and generally for controlling power circuits up to 690 V a.c. / 1000 V a.c. or 220 V d.c. / 600 V d.c. The contactors can also be used for many other applications such as isolation, bypass, capacitor switching, lighting...

Description

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

- Main poles and auxiliary contact blocks
 - 3 main poles,
 - 1 N.O. and 1 N.C. auxiliary contact block (fitted on the left side).A maximum of 4 auxiliary contact blocks can be fitted on each contactor.

● Control circuit:

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

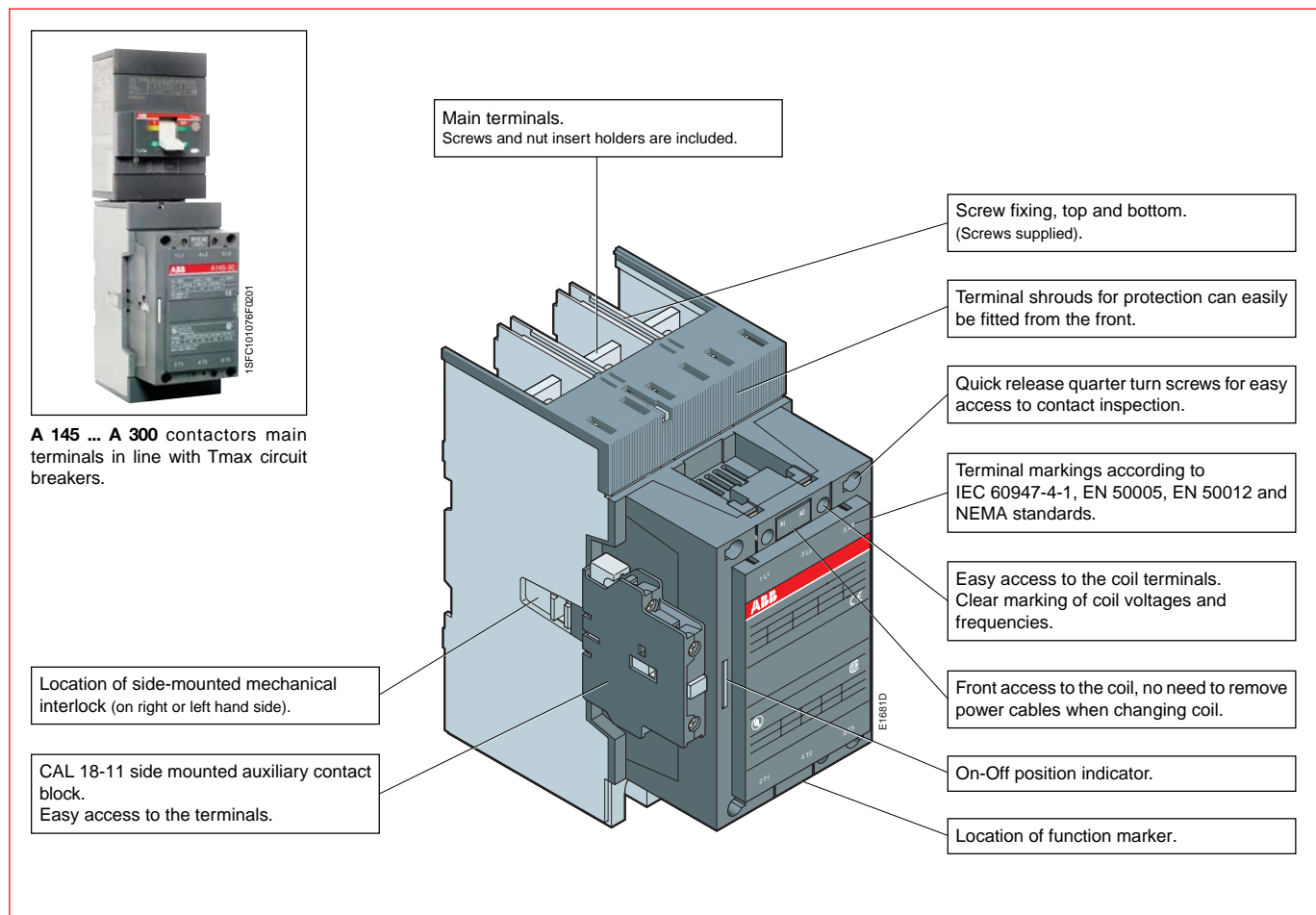
AF 400 ... AF 1650 contactors: a.c. operated, wide voltage range, with electronic coil interface, with laminated magnet circuit.

Contactors AF 400 ... AF 1650 are fitted as standard with an electronic coil interface which accepts a wide control voltage range for a.c. 50/60 Hz supply or d.c. supply.

- Accessories: a wide range of accessories is available.

Variants

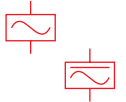
- electronic coil interface (a.c./d.c. operated) with wide voltage range: AF 145 ... AF 300 contactors.



A 145 ... AF 1650 3-pole Contactors

a.c. Operated - A 145 ... A 300 Contactors

a.c. / d.c. Operated - AF 400 ... AF 1650 Contactors



Ordering Details

IEC	UL/CSA		Auxiliary contacts fitted		Type	Order code	Weight kg
Rated power 400 V	Rated current $\theta \leq 40^\circ\text{C}$	3-Phase motor rating	General use rating				
AC-3	AC-1	480 V	600 V		state coil voltage <input type="text"/>	state coil voltage code <input type="text"/>	Pack ^{ing} 1 piece
kW	A	hp	A		(see table below)	(see table below)	
75	250	100	230	1 1 2 2	A 145-30-11 <input type="text"/> A 145-30-22 <input type="text"/>	1SFL 471 001 R <input type="text"/> <input type="text"/> 11 1SFL 471 001 R <input type="text"/> <input type="text"/> 22	3.500 3.500
90	275	125	250	1 1 2 2	A 185-30-11 <input type="text"/> A 185-30-22 <input type="text"/>	1SFL 491 001 R <input type="text"/> <input type="text"/> 11 1SFL 491 001 R <input type="text"/> <input type="text"/> 22	3.500 3.500
110	350	150	300	1 1 2 2	A 210-30-11 <input type="text"/> A 210-30-22 <input type="text"/>	1SFL 511 001 R <input type="text"/> <input type="text"/> 11 1SFL 511 001 R <input type="text"/> <input type="text"/> 22	6.100 6.100
140	400	200	350	1 1 2 2	A 260-30-11 <input type="text"/> A 260-30-22 <input type="text"/>	1SFL 531 001 R <input type="text"/> <input type="text"/> 11 1SFL 531 001 R <input type="text"/> <input type="text"/> 22	6.100 6.100
160	500	250	400	1 1 2 2	A 300-30-11 <input type="text"/> A 300-30-22 <input type="text"/>	1SFL 551 001 R <input type="text"/> <input type="text"/> 11 1SFL 551 001 R <input type="text"/> <input type="text"/> 22	6.100 6.100
200	600	350	550	1 1 2 2	AF 400-30-11 <input type="text"/> AF 400-30-22 <input type="text"/>	1SFL 577 001 R <input type="text"/> <input type="text"/> 11 1SFL 577 001 R <input type="text"/> <input type="text"/> 22	12.00 12.00
250	700	400	650	1 1 2 2	AF 460-30-11 <input type="text"/> AF 460-30-22 <input type="text"/>	1SFL 597 001 R <input type="text"/> <input type="text"/> 11 1SFL 597 001 R <input type="text"/> <input type="text"/> 22	12.00 12.00
315	800	500	750	1 1 2 2	AF 580-30-11 <input type="text"/> AF 580-30-22 <input type="text"/>	1SFL 617 001 R <input type="text"/> <input type="text"/> 11 1SFL 617 001 R <input type="text"/> <input type="text"/> 22	15.00 15.00
400	1050	600	900	1 1 2 2	AF 750-30-11 <input type="text"/> AF 750-30-22 <input type="text"/>	1SFL 637 001 R <input type="text"/> <input type="text"/> 11 1SFL 637 001 R <input type="text"/> <input type="text"/> 22	15.00 15.00
475	1350	800	1350	1 1 2 2	AF 1350-30-11 <input type="text"/> AF 1350-30-22 <input type="text"/>	1SFL 657 001 R <input type="text"/> <input type="text"/> 11 1SFL 657 001 R <input type="text"/> <input type="text"/> 22	34.00 34.00
560	1650	900	1650	1 1 2 2	AF 1650-30-11 <input type="text"/> AF 1650-30-22 <input type="text"/>	1SFL 677 001 R <input type="text"/> <input type="text"/> 11 1SFL 677 001 R <input type="text"/> <input type="text"/> 22	35.00 35.00

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

Voltage <input type="text"/> V - 50Hz	Voltage <input type="text"/> V - 60Hz	Code <input type="text"/> <input type="text"/>
24	24	8 1
48	48	8 3
110	110 ... 120	8 4
220 ... 230	230 ... 240	8 0
230 ... 240	240 ... 260	8 8
380 ... 400	400 ... 415	8 5
400 ... 415	415 ... 440	8 6

Other voltages: page 0/1.

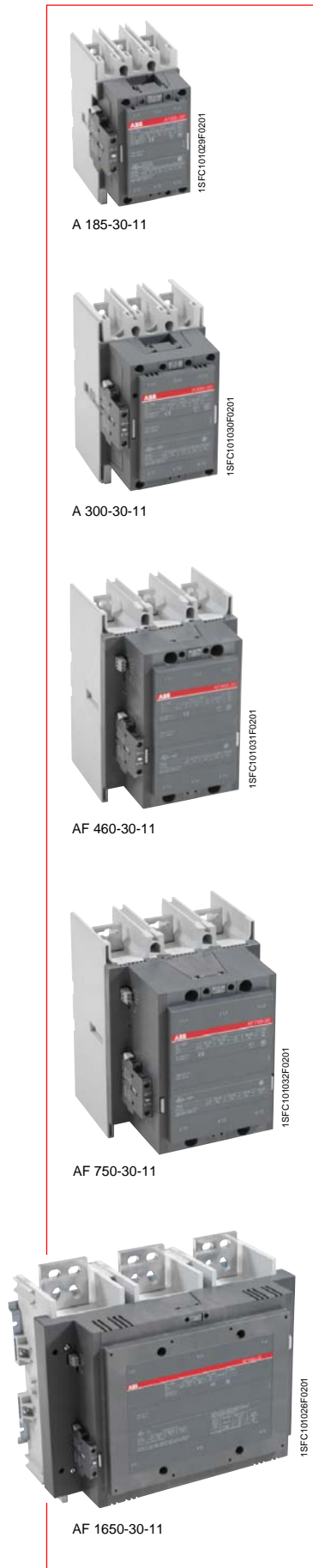
Coil voltages and codes: AF 400 ... AF 750

Voltage <input type="text"/> V - 50/60Hz	Voltage <input type="text"/> V d.c.	Code <input type="text"/> <input type="text"/>
-	24 ... 60	6 8 (1)
48 ... 130	48 ... 130	6 9
100 ... 250	100 ... 250	7 0
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.

Coil voltages and codes: AF 1350, AF 1650

Voltage <input type="text"/> V - 50/60Hz	Voltage <input type="text"/> V d.c.	Code <input type="text"/> <input type="text"/>
100 ... 250	100 ... 250	7 0



>> AF... contactors with electronic coil interface: electromagnetic compatibility	page 2/21	>> General - Approvals	section 7
>> Accessory Fitting Details	page 2/12	>> Terminal Marking and Positioning	section 8
>> Thermal & Electronic O/L Relays	page 2/13	>> Dimensions	section 9
>> Technical Data	page 2/65		

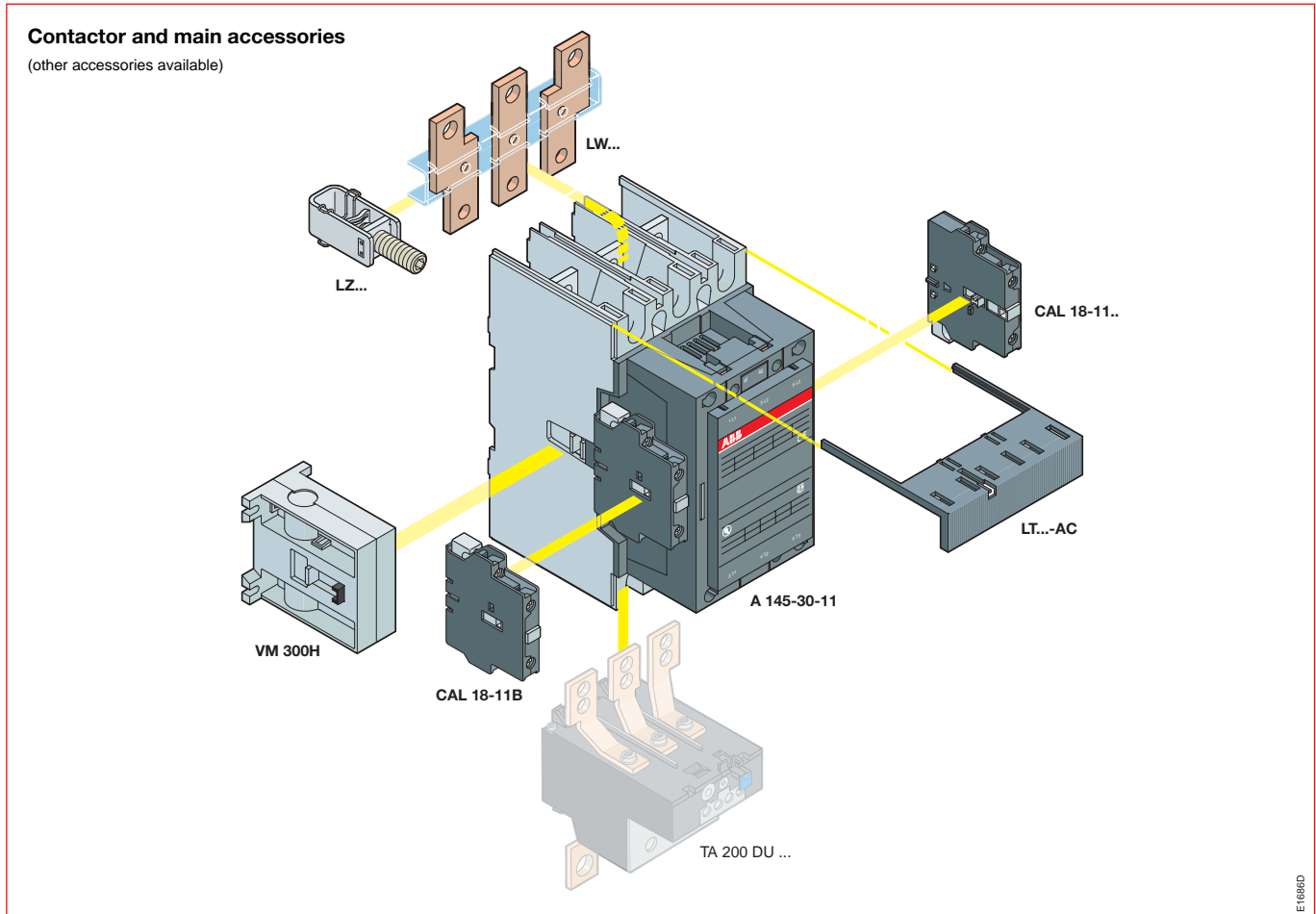
A 145 ... AF 1650 3-pole Contactors

Main Accessories

Fitting Details - For Ordering Details, see "Accessories"

Contactor types	Main poles	Available auxiliary contacts	Side mounted accessories	Mechanical interlock units	Mounting and positioning
			(Front mounted accessories are not available on large A..., AF... contactors) Add-on auxiliary contact blocks CAL 18-11, CAL 18-11B (3)	(for two horizontal mounted contactors)	
Contactor types					
Contactor types					
Contactor types					
Contactor types					
Contactor types					
Contactor types					

- (1) Total number of auxiliary contact blocks for the two contactors. (2) Interlock type, according to the contactor ratings (see "Accessories").
 (3) The CEL 18... auxiliary contact blocks can replace the CAL 18-11 and CAL 18-11B. Though, no auxiliary contact block can be mounted outside the CEL 18-...



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A 145 ... AF 1650 3-pole Contactors

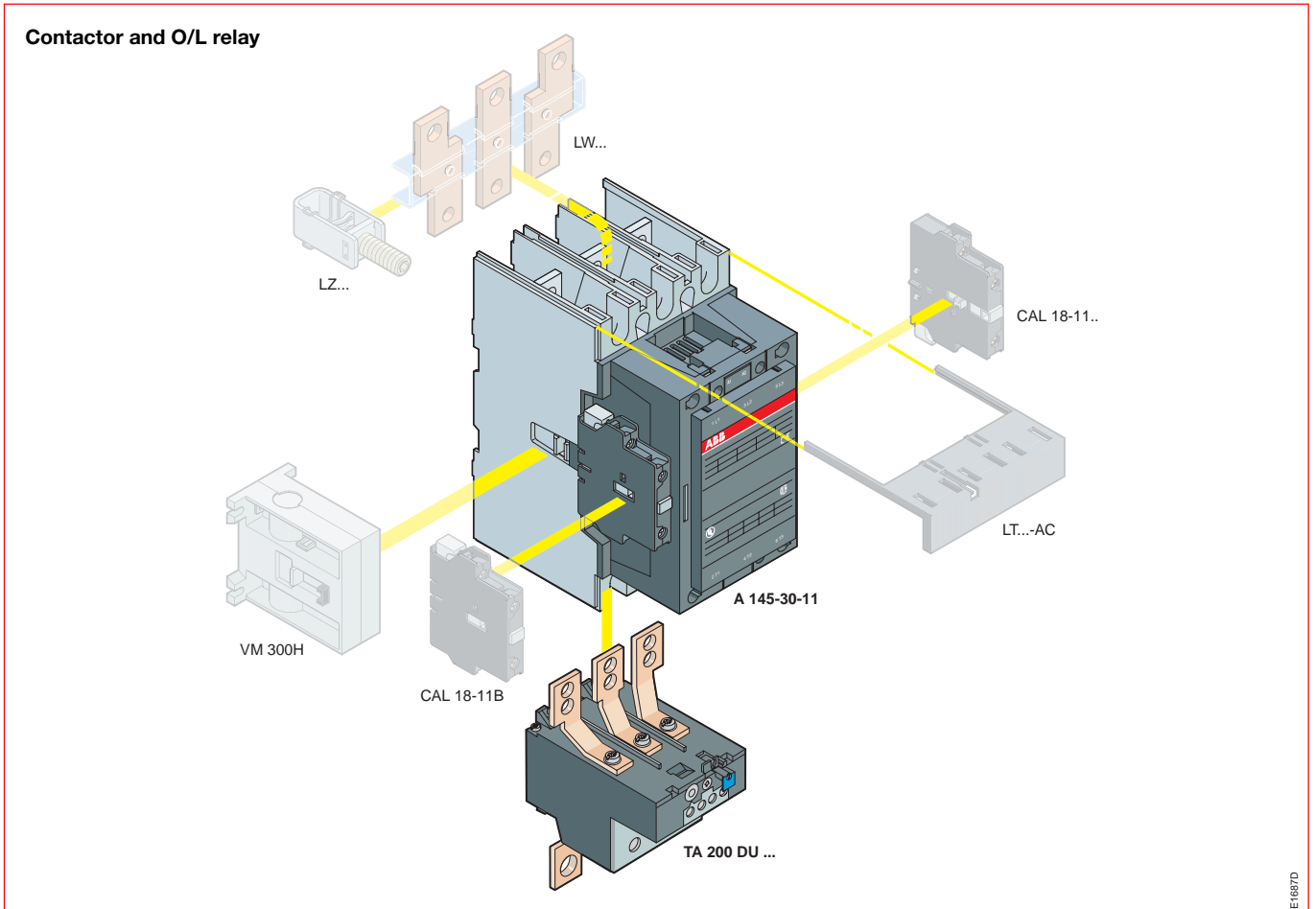
Thermal & Electronic O/L Relays

Fitting Details - For Ordering Details, see "Motor Protection"

The addition of a thermal or electronic O/L relay on the contactor does not prevent fitting of many other accessories as shown below.

Contactor types	Thermal O/L relays				
	TA 200 DU.. (1) 80 ... 110 to 150 ... 200 A	TA 450 DU (2) 130 ... 185 to 220 ... 310 A			
	Electronic O/L relays				
	E 200 DU.. (1) 60 ... 200 A	E 320 DU.. (1) 100 ... 320 A	E 500 DU.. (2) 150 ... 500 A	E 800 DU.. (2) 250 ... 800 A	E 1250 DU.. (1) 375 ... 1250 A
A 145, A 185	TA 200 DU.. or E 200 DU..	-	-	-	-
A 210 ... A 300	-	TA 450 DU.. or E 320 DU..	-	-	-
AF 400, AF 460	-	-	E 500 DU..	-	-
AF 580, AF 750	-	-	-	E 800 DU	-
AF 1350, AF 1650	-	-	-	-	E 1250 DU

(1) No mounting kit required, direct mounting
 (2) Mounting kit required (see "Motor Protection")



AL 9 ... AE 110, AL..Z... and TAL 9 ... TAE 110 3-pole Contactors



d.c. Operated

Application

AL... and AE... contactors, as well as TAL... and TAE... versions, are mainly used for controlling 3-phase motors and more generally for controlling power circuits up to 690 V a.c. (1000 V a.c. for AE... and TAE... contactors) or 220 / 440 V d.c.

Description

3-pole contactors of the block type design.

The AL... contactors are fitted with low consumption d.c. coils:

- AL 9 ... AL 16 contactors: **3 W** (pull-in and holding)
- AL 26 ... AL 40 contactors: **3.5 W** (pull-in and holding)
- AL 9Z ... AL 16Z contactors: with very low consumption d.c. coil **2.4 W** (pull-in and holding)

Contactors are thus suitable for a direct control by PLC transistor outputs, without the use of an interface relay.

The TAL... version offers a large coil voltage range.

The AE... contactors are fitted with standard double-winding d.c. coils.

The TAE... version offers a large coil voltage range.

- Main poles and auxiliary contact blocks

AL 9 ... AL 40 and TAL 9 ... TAL 40 1-stack contactors:

- 3 main poles,
- 1 built-in auxiliary contact,
- front or side mounted add-on auxiliary contact blocks (only front mounted for AL..Z... version).

AE 50 ... AE 110 and TAE 50 ... TAE 110 contactors:

- 3 main poles,
- front or side mounted add-on auxiliary contact blocks.

- Control circuit: d.c. operated.

The polarity on the coil terminals (A1+ and A2-) must be respected for AL..., AL..Z... and TAL... contactors.

- Accessories: a wide range of accessories is available.

AL 9 ... AL 40 2-stack contactors:

- 1st stack with 3 main poles
- 2nd stack with 4 built-in auxiliary contacts.

The built-in auxiliary contact elements are mechanically linked

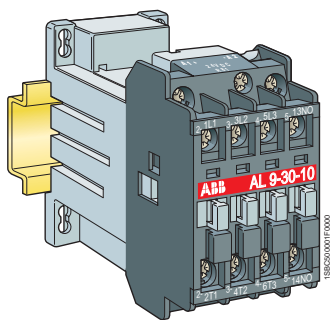
Larger d.c. operated contactors:

use AF 145 ... AF 1650 types.

Variants

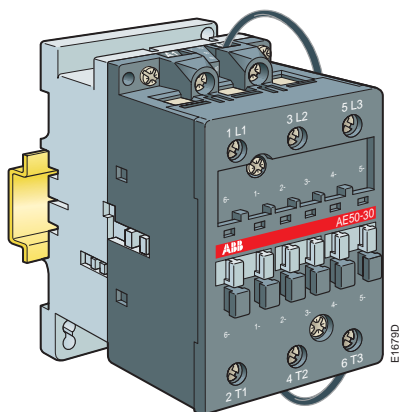
- electronic coil interface (a.c./d.c. operated): AF 50 ... AF 110 contactors.
- 4-pole: **AL 9 ... AL 26** contactors and **TAL 9 ... TAL 26** contactors (with 4 N.O. or 2 N.O. + 2 N.C. main poles)
AE 45 ... AE 75 contactors (with 4 N.O. or 2 N.O. + 2 N.C. main poles) and **TAE 45 ... TAE 75** contactors (with 4 N.O. main poles).

AL 9 ... AE 110 and TAL 9 ... TAE 110 contactors specific design (see A 9 ... A 110 contactors for general design)



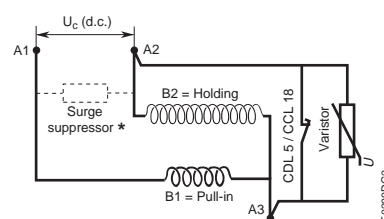
- **AL 9 ... AL 40, TAL 9 ... TAL 40**

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



- **AE 50 ... AE 110, TAE 50 ... TAE 110**

Add-on lagging contact (factory mounted) for insertion of the "holding" winding.



AE 50 ... AE 110, TAE 50 ... TAE 110

N.C. lagging auxiliary contact block with built-in varistor:

- CDL 5-01 type fitted on AE 50 ... AE 75 and TAE 50, TAE 75 contactors
- CCL 18-01 type fitted on AE 95, AE 110 and TAE 95, TAE 110 contactors

* Extra RV 5 (or RT 5) surge suppressor can be added on to the "Pull-in" winding, if required.

Please order separately (see "Accessories").

AL 9 ... AE 110 and AL..Z... 3-pole Contactors

d.c. Operated



AL 16-30-10



AL 40-30-10



AE 50-30-00



AE 95-30-00

Ordering Details

AL 9 ... AE 110 contactors

IEC	UL/CSA	Auxiliary contacts fitted		Type	Order code	Weight kg	
Rated power 400 V	Rated current $\theta \leq 40^\circ\text{C}$	3-Phase motor rating	General use rating	1 st stack 2 nd stack	state coil voltage (see table below)	state coil voltage code (see table below)	Pack ^{ing} 1 piece
AC-3 kW	AC-1 A	480 V hp	600 V A				
4	25	5	21	1 - -- - 1 -- -- 2 2	AL 9-30-10 AL 9-30-01 AL 9-30-22	1SBL 143 001 R□□10 1SBL 143 001 R□□01 1SBL 143 001 R□□22	0.520 0.520 0.580
5.5	27	7.5	25	1 - -- - 1 -- -- 2 2	AL 12-30-10 AL 12-30-01 AL 12-30-22	1SBL 163 001 R□□10 1SBL 163 001 R□□01 1SBL 163 001 R□□22	0.520 0.520 0.580
7.5	30	10	30	1 - -- - 1 -- -- 2 2	AL 16-30-10 AL 16-30-01 AL 16-30-22	1SBL 183 001 R□□10 1SBL 183 001 R□□01 1SBL 183 001 R□□22	0.520 0.520 0.580
11	45	20	40	1 - -- - 1 -- -- 2 2	AL 26-30-10 AL 26-30-01 AL 26-30-22	1SBL 243 001 R□□10 1SBL 243 001 R□□01 1SBL 243 001 R□□22	0.750 0.750 0.810
15	55	25	50	1 - -- - 1 -- -- 2 2	AL 30-30-10 AL 30-30-01 AL 30-30-22	1SBL 283 001 R□□10 1SBL 283 001 R□□01 1SBL 283 001 R□□22	0.850 0.850 0.910
18.5	60	30	60	1 - -- - 1 -- -- 2 2	AL 40-30-10 AL 40-30-01 AL 40-30-22	1SBL 323 001 R□□10 1SBL 323 001 R□□01 1SBL 323 001 R□□22	0.850 0.850 0.910
22	100	40	80	-- -- 1 1 --	AE 50-30-00 AE 50-30-11	1SBL 359 001 R□□00 1SBL 359 001 R□□11	1.200 1.240
30	115	60	90	-- -- 1 1 --	AE 63-30-00 AE 63-30-11	1SBL 379 001 R□□00 1SBL 379 001 R□□11	1.200 1.240
37	125	60	105	-- -- 1 1 --	AE 75-30-00 AE 75-30-11	1SBL 419 001 R□□00 1SBL 419 001 R□□11	1.200 1.240
45	145	60	125	-- -- 1 1 --	AE 95-30-00 AE 95-30-11	1SFL 439 001 R□□00 1SFL 439 001 R□□11	2.040 2.070
55	160	75	140	-- -- 1 1 --	AE 110-30-00 AE 110-30-11	1SFL 459 001 R□□00 1SFL 459 001 R□□11	2.040 2.070

AL 9Z ... AL 16Z contactors

4	25	5	21	1 - -- - 1 --	AL 9Z-30-10 AL 9Z-30-01	1SBL 144 001 R□□10 1SBL 144 001 R□□01	0.520 0.520
5.5	27	7.5	25	1 - -- - 1 --	AL 12Z-30-10 AL 12Z-30-01	1SBL 164 001 R□□10 1SBL 164 001 R□□01	0.520 0.520
7.5	30	10	30	1 - -- - 1 --	AL 16Z-30-10 AL 16Z-30-01	1SBL 184 001 R□□10 1SBL 184 001 R□□01	0.520 0.520

Coil voltages and codes:

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

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TAL 9 ... TAE 110 3-pole Contactors

d.c. Operated with Large Coil Voltage Range



TAL 16-30-10



TAL 40-30-10



TAE 50-30-00



TAE 95-30-00

Ordering Details

IEC		UL/CSA		Auxiliary contacts fitted		Type	Order code	Weight kg
Rated power 400 V	Rated current $\theta \leq 40^\circ\text{C}$	3-Phase motor rating	General use rating	1 st stack	2 nd stack			
AC-3 kW	AC-1 A	hp	A					
4	25	5	21	1 -	--	TAL 9-30-10	1SBL 143 061 R□□10	0.520
				- 1	--	TAL 9-30-01	1SBL 143 061 R□□01	0.520
5.5	27	7.5	25	1 -	--	TAL 12-30-10	1SBL 163 061 R□□10	0.520
				- 1	--	TAL 12-30-01	1SBL 163 061 R□□01	0.520
7.5	30	10	30	1 -	--	TAL 16-30-10	1SBL 183 061 R□□10	0.520
				- 1	--	TAL 16-30-01	1SBL 183 061 R□□01	0.520
11	45	20	40	1 -	--	TAL 26-30-10	1SBL 243 061 R□□10	0.750
				- 1	--	TAL 26-30-01	1SBL 243 061 R□□01	0.750
15	55	25	50	1 -	--	TAL 30-30-10	1SBL 283 061 R□□10	0.850
				- 1	--	TAL 30-30-01	1SBL 283 061 R□□01	0.850
18.5	60	30	60	1 -	--	TAL 40-30-10	1SBL 323 061 R□□10	0.850
				- 1	--	TAL 40-30-01	1SBL 323 061 R□□01	0.850
22	100	40	80	--	--	TAE 50-30-00	1SBL 359 061 R□□00	1.200
				1 1	--	TAE 50-30-11	1SBL 359 061 R□□11	1.240
37	125	60	105	--	--	TAE 75-30-00	1SBL 419 061 R□□00	1.200
				1 1	--	TAE 75-30-11	1SBL 419 061 R□□11	1.240
45	145	60	125	--	--	TAE 95-30-00	1SFL 439 061 R□□00	2.040
				1 1	--	TAE 95-30-11	1SFL 439 061 R□□11	2.070
55	160	75	140	--	--	TAE 110-30-00	1SFL 459 061 R□□00	2.040
				1 1	--	TAE 110-30-11	1SFL 459 061 R□□11	2.070

Coil voltages and codes: TAL... and TAE...

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

Other voltages: please consult us.



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

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AL 9 ... AE 110, AL..Z... and TAL 9 ... TAE 110 3-pole Contactors



Main Accessories

Accessory Fitting Details for AL 9 ... AL 40, AL..Z... and TAL 9 ... TAL 40 Contactors

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

Contactor configuration			Front mounted accessories			Side mounted accessories (7)		
Contactor types	Main poles	Available auxiliary contacts	Auxiliary contact 1-pole CA 5-..	Auxiliary contact 4-pole CA 5-..	Auxiliary contact 1-pole CE 5-..	Auxiliary contact 2-pole CAL 5-11	Interlock unit VM 5-.. or VE 5-..	
AL 9 ... AL 16	3 0	1 0	1 to 4 x CA 5-..(1)	or 1 x CA 5-.. (4-pole) (1)	or 1 to 2 x CE 5-.. (2)	or 1 x CAL 5-11	+ 1 x VM 5-1(3) or VE 5-1(3)(4)	
AL 9 ... AL 16	3 0	0 1	–	–	–	–	1 x VM 5-1 or VE 5-1	
AL 9 ... AL 16	3 0	2 2	–	–	–	–	1 x VM 5-1 or VE 5-1	
AL 26	3 0	1 0	1 to 4 x CA 5-..(5)	or 1 x CA 5-.. (4-pole) (5)	or 1 to 2 x CE 5-..	or 1 x CAL 5-11	+ 1 x VM 5-1 or VE 5-1	
AL 26	3 0	0 1	–	–	–	–	1 x VM 5-1 or VE 5-1	
AL 26	3 0	2 2	–	–	–	–	1 x VM 5-1 or VE 5-1	
AL 30, AL 40	3 0	1 0	1 to 5 x CA 5-..(5)	or 1 x CA 5-.. (4-pole) (5) + 1 x 1-pole CA 5-..	or 1 to 2 x CE 5-..	or 1 x CAL 5-11	+ 1 x VM 5-1 or VE 5-1(4)	
AL 30, AL 40	3 0	0 1	–	–	–	–	1 x VM 5-1 or VE 5-1	
AL 30, AL 40	3 0	2 2	–	–	–	–	1 x VM 5-1 or VE 5-1	
AL 9Z ... AL 16Z (7)	3 0	1 0	1 to 2 x CA 5-..(1)	–	or 1 to 2 x CE 5-.. (2)	–	–	
AL 9Z ... AL 16Z (7)	3 0	0 1	1 to 2 x CA 5-..(1)	–	or 1 to 2 x CE 5-.. (2)	–	or 1 x VM 5-1	
TAL 9 ... TAL 16	3 0	1 0	1 to 4 x CA 5-..(1)	or 1 x CA 5-.. (4-pole) (1)	or 1 to 2 x CE 5-.. (2)	or 1 x CAL 5-11	+ 1 x VM 5-1(6) or VE 5-1(6)(4)	
TAL 9 ... TAL 16	3 0	0 1	–	–	–	–	–	
TAL 26	3 0	1 0	1 to 4 x CA 5-..(5)	or 1 x CA 5-.. (4-pole) (5)	or 1 to 2 x CE 5-..	or 1 x CAL 5-11	+ 1 x VM 5-1 or VE 5-1	
TAL 26	3 0	0 1	–	–	–	–	–	
TAL 30, TAL 40	3 0	1 0	1 to 5 x CA 5-..(5)	or 1 x CA 5-.. (4-pole) (5) + 1 x 1-pole CA 5-..	or 1 to 2 x CE 5-..	or 1 x CAL 5-11	+ 1 x VM 5-1 or VE 5-1(4)	
TAL 30, TAL 40	3 0	0 1	–	–	–	–	–	

- (1) 2 N.C. auxiliary contacts maximum in all mounting positions except 5. In position 5 no N.C. auxiliary contact allowed.
- (2) CE 5-.. auxiliary contacts **not allowed in position 5**.
- (3) When **VM5-1** or **VE5-1** interlock unit is used with auxiliary contact CAL 5-11 the control voltage is limited to 0.9 U_c ... 1.1 U_c.
- (4) With **VE5-1** interlock unit, a maximum of 3 N.O. auxiliary contacts are permitted.
- (5) 2 N.C. auxiliary contacts maximum in mounting position 5.
- (6) When **VM5-1** or **VE5-1** interlock unit is used, CAL 5-11 auxiliary contact is not permitted in any position.
- (7) Not allowed in mounting position 1±30°.

Accessory Fitting Details for AE 50 ... AE 110 and TAE 50 ... TAE 110 Contactors

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

Contactor configuration			Front mounted accessories			Side mounted accessories		
Contactor types	Main poles	Available auxiliary contacts	Auxiliary contact 1-pole CA 5-.. (or 1-pole CE 5-..)	Auxiliary contact 4-pole CA 5-..	Pneumatic Timer TP .. A	Auxiliary contact 2-pole CAL.. (or 1-pole CEL 18-..)	Interlock unit VE 5-2	
AE 50 ... AE 75	3 0	0 0	1 to 6 x CA 5-.. (1 to 5 x CE 5-.. max.) (1)	or 1 x CA 5-.. (4-pole) + 2 x 1-pole CA 5-.. or CE 5-.. (1)	or 1 x TP .. A + 2 x CA 5-.. (1-pole)	+ 1 x CAL 5-11	or 1 x VE 5-2	
TAE 50, 75	3 0	0 0	–	–	–	–	–	
AE 50 ... AE 75	3 0	1 1	1 to 6 x CA 5-.. (1 to 5 x CE 5-.. max.) (1)	or 1 x CA 5-.. (4-pole) + 2 x 1-pole CA 5-.. or CE 5-.. (1)	or 1 x TP .. A + 2 x CA 5-.. (1-pole)	–	–	
TAE 50, 75	3 0	1 1	–	–	–	–	–	
AE 95, 110	3 0	0 0	1 to 6 x CA 5-.. (1 to 5 x CE 5-.. max.) (1)	or 1 x CA 5-.. (4-pole) + 2 x 1-pole CA 5-.. or CE 5-.. (1)	–	+ 1 x CAL 18-11 (or 1 x CEL 18-..)	or 1 x VE 5-2	
TAE 95, 110	3 0	0 0	–	–	–	–	–	
AE 95, 110	3 0	1 1	1 to 6 x CA 5-.. (1 to 5 x CE 5-.. max.) (1)	or 1 x CA 5-.. (4-pole) + 2 x 1-pole CA 5-.. or CE 5-.. (1)	–	–	–	
TAE 95, 110	3 0	1 1	–	–	–	–	–	

- (1) The total number of N.O. or N.C. CE 5-.. and other additional N.C. CA 5-.. auxiliary contacts is limited to 5.

AF 50 ... AF 110 3-pole Contactors



Electronic Coil Interface

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

Application

AF 50 ... AF 110 contactors are mainly used for controlling 3-phase motors and generally for controlling power circuits up to 690 V a.c. and 220 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 the different countries where the electrical equipment will be installed, 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 110** 3-pole contactors are of the block type design.

- Main poles and auxiliary contact blocks
 - 3 main poles,
 - front and side mounted add-on auxiliary contact blocks.

- Electronic control:

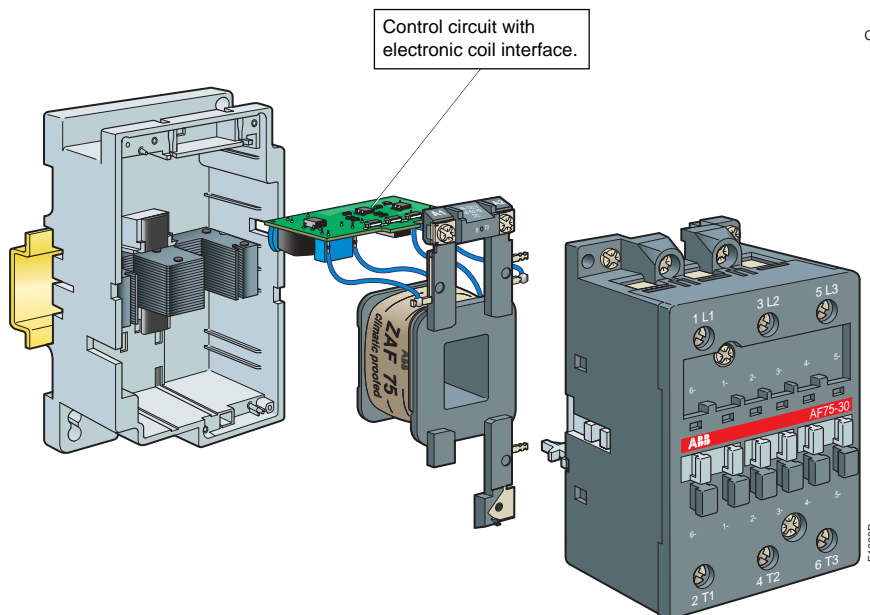
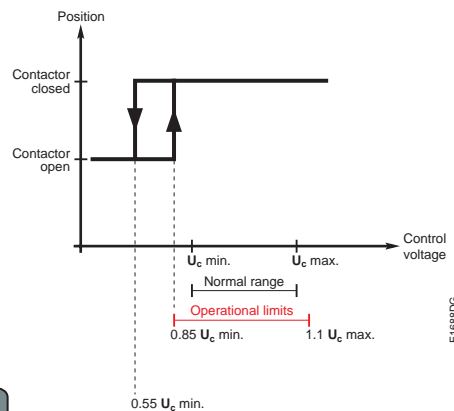
The contactors are fitted with an electronic interface that very precisely controls the voltage to the coil. The electronic control circuit always works using d.c. current through the coil and in a.c. operation the current is rectified before being applied to the coil. To achieve the levels of the currents 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).
- Accessories: a wide range of accessories is available.
The accessories provided for the A 50 ... A 110 contactors can be used for the AF 50 ... AF 110 types.

AF... contactors specific design (see A... contactors for general design).

Operating diagram



AF 50 ... AF 110 3-pole Contactors



Electronic Coil Interface

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



AF 50-30-00



AF 110-30-11

Ordering Details

IEC		UL/CSA		Auxiliary contacts fitted		Type	Order code	Weight kg
Rated power 400 V	Rated current $\theta \leq 40^\circ\text{C}$	3-Phase motor rating	General use rating	1 st stack	2 nd stack			
AC-3	AC-1	480 V	600 V			state coil voltage [][] (see table below)	state coil voltage code [][] (see table below)	Pack ^{ing} 1 piece
kW	A	hp	A					
22	100	40	80	-- -- 1 1	-- -- -- --	AF 50-30-00 [][] AF 50-30-11 [][]	1SBL 357 001 R [][] 00 1SBL 357 001 R [][] 11	1.180 1.220
30	115	60	90	-- -- 1 1	-- -- -- --	AF 63-30-00 [][] AF 63-30-11 [][]	1SBL 377 001 R [][] 00 1SBL 377 001 R [][] 11	1.180 1.220
37	125	60	105	-- -- 1 1	-- -- -- --	AF 75-30-00 [][] AF 75-30-11 [][]	1SBL 417 001 R [][] 00 1SBL 417 001 R [][] 11	1.180 1.220
45	145	60	125	-- -- 1 1	-- -- -- --	AF 95-30-00 [][] AF 95-30-11 [][]	1SFL 437 001 R [][] 00 1SFL 437 001 R [][] 11	2.030 2.070
55	160	75	140	-- -- 1 1	-- -- -- --	AF 110-30-00 [][] AF 110-30-11 [][]	1SFL 457 001 R [][] 00 1SFL 457 001 R [][] 11	2.030 2.070

Coil voltages and codes

Voltage [][] V - 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.

Electromagnetic compatibility

AF... contactors comply with IEC 60947-1, 60947-4-1 and 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 (see EN 50082-2 article 4) including highly disturbing sources".

Environment B: "Mainly relates to low-voltage public networks (see 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".

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2
3-pole Contactors

AF 145 ... AF 1650 3-pole Contactors



Electronic Coil Interface

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

Application

AF 145 ... AF 1650 contactors are mainly used for controlling 3-phase motors and generally for controlling power circuits up to 690 V a.c. / 1000 V a.c. or 220 V d.c. / 600 V d.c. The contactors can also be used for many other applications such as bypass, capacitor switching, lighting, d.c. power circuits... The **AF...** contactors are fitted with an electronic coil interface which accepts a wide control voltage range, on a.c. 50/60 Hz or d.c. supplies. The same contactor can accept various supply voltages according to the different countries where the electrical equipment will be installed, 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 145 ... AF 1650** 3-pole contactors are of the block type design.

● Main poles and auxiliary contact blocks

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

A maximum of 4 auxiliary contact blocks can be fitted on each contactor.

● Electronic control:

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

Advantages

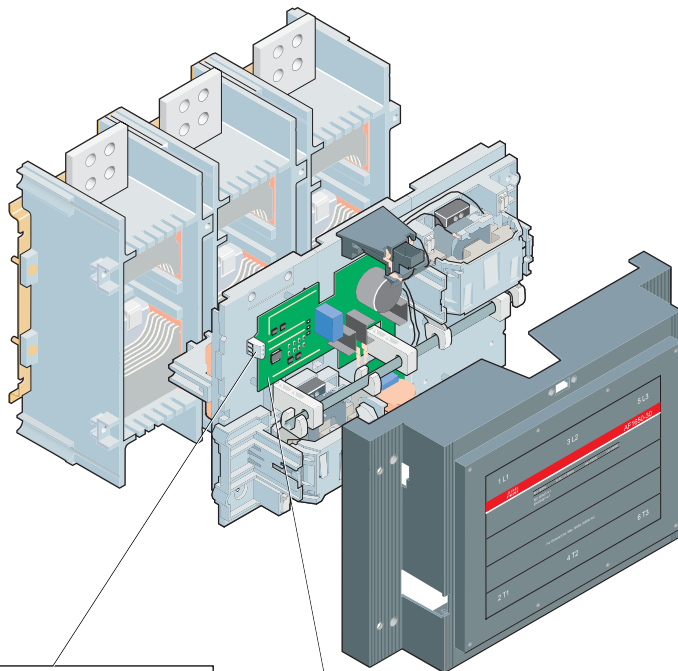
- Wide voltage range, e.g. 100 ... 250 V a.c. and d.c.,
- Can manage large voltage variations,
- Reduced power consumption,
- Very distinct closing and opening,
- Noise free,
- Can withstand voltage interruptions or voltage dips in the control supply (≤ 20 ms).

● Control inputs

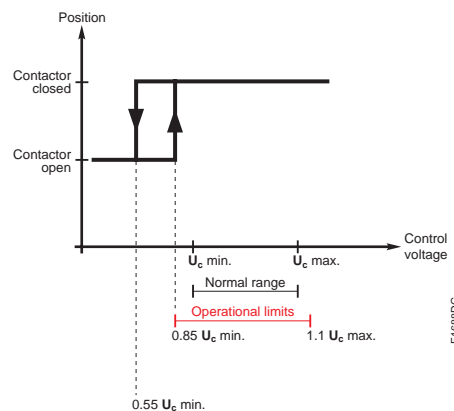
The large sizes **AF 400 ... AF 1650** are equipped with low voltage inputs for control, for example by a PLC.

● Accessories: a wide range of accessories is available.

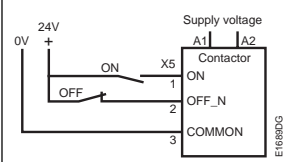
AF... contactors specific design (see A... contactors for general design)



Operating diagram



Control inputs (AF 400 ... AF 1650)



Control circuit with electronic coil interface.

AF 145 ... AF 1650 3-pole Contactors



Electronic Coil Interface

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

Ordering Details

IEC	UL/CSA		Auxiliary contacts fitted		Type	Order code	Weight kg
Rated power 400 V	Rated current $\theta \leq 40^\circ\text{C}$	3-Phase motor rating	General use rating				
AC-3	AC-1	480 V	600 V		state coil voltage <input type="text"/> <input type="text"/> <input type="text"/> (see table below)	state coil voltage code <input type="text"/> <input type="text"/> (see table below)	Pack ^{ing} 1 piece
kW	A	hp	A				
75	250	100	230	1 1 2 2	AF 145-30-11 <input type="text"/> <input type="text"/> <input type="text"/> AF 145-30-22 <input type="text"/> <input type="text"/> <input type="text"/>	1SFL 477 001 R <input type="text"/> <input type="text"/> <input type="text"/> 1SFL 477 001 R <input type="text"/> <input type="text"/> <input type="text"/>	3.600 3.600
90	275	125	250	1 1 2 2	AF 185-30-11 <input type="text"/> <input type="text"/> <input type="text"/> AF 185-30-22 <input type="text"/> <input type="text"/> <input type="text"/>	1SFL 497 001 R <input type="text"/> <input type="text"/> <input type="text"/> 1SFL 497 001 R <input type="text"/> <input type="text"/> <input type="text"/>	3.600 3.600
110	350	150	300	1 1 2 2	AF 210-30-11 <input type="text"/> <input type="text"/> <input type="text"/> AF 210-30-22 <input type="text"/> <input type="text"/> <input type="text"/>	1SFL 517 001 R <input type="text"/> <input type="text"/> <input type="text"/> 1SFL 517 001 R <input type="text"/> <input type="text"/> <input type="text"/>	6.200 6.200
140	400	200	350	1 1 2 2	AF 260-30-11 <input type="text"/> <input type="text"/> <input type="text"/> AF 260-30-22 <input type="text"/> <input type="text"/> <input type="text"/>	1SFL 537 001 R <input type="text"/> <input type="text"/> <input type="text"/> 1SFL 537 001 R <input type="text"/> <input type="text"/> <input type="text"/>	6.200 6.200
160	500	250	400	1 1 2 2	AF 300-30-11 <input type="text"/> <input type="text"/> <input type="text"/> AF 300-30-22 <input type="text"/> <input type="text"/> <input type="text"/>	1SFL 557 001 R <input type="text"/> <input type="text"/> <input type="text"/> 1SFL 557 001 R <input type="text"/> <input type="text"/> <input type="text"/>	6.200 6.200
200	600	350	550	1 1 2 2	AF 400-30-11 <input type="text"/> <input type="text"/> <input type="text"/> AF 400-30-22 <input type="text"/> <input type="text"/> <input type="text"/>	1SFL 577 001 R <input type="text"/> <input type="text"/> <input type="text"/> 1SFL 577 001 R <input type="text"/> <input type="text"/> <input type="text"/>	12.00 12.00
250	700	400	650	1 1 2 2	AF 460-30-11 <input type="text"/> <input type="text"/> <input type="text"/> AF 460-30-22 <input type="text"/> <input type="text"/> <input type="text"/>	1SFL 597 001 R <input type="text"/> <input type="text"/> <input type="text"/> 1SFL 597 001 R <input type="text"/> <input type="text"/> <input type="text"/>	12.00 12.00
315	800	500	750	1 1 2 2	AF 580-30-11 <input type="text"/> <input type="text"/> <input type="text"/> AF 580-30-22 <input type="text"/> <input type="text"/> <input type="text"/>	1SFL 617 001 R <input type="text"/> <input type="text"/> <input type="text"/> 1SFL 617 001 R <input type="text"/> <input type="text"/> <input type="text"/>	15.00 15.00
400	1050	600	900	1 1 2 2	AF 750-30-11 <input type="text"/> <input type="text"/> <input type="text"/> AF 750-30-22 <input type="text"/> <input type="text"/> <input type="text"/>	1SFL 637 001 R <input type="text"/> <input type="text"/> <input type="text"/> 1SFL 637 001 R <input type="text"/> <input type="text"/> <input type="text"/>	15.00 15.00
475	1350	800	1350	1 1 2 2	AF 1350-30-11 <input type="text"/> <input type="text"/> <input type="text"/> AF 1350-30-22 <input type="text"/> <input type="text"/> <input type="text"/>	1SFL 657 001 R <input type="text"/> <input type="text"/> <input type="text"/> 1SFL 657 001 R <input type="text"/> <input type="text"/> <input type="text"/>	34.00 34.00
560	1650	900	1650	1 1 2 2	AF 1650-30-11 <input type="text"/> <input type="text"/> <input type="text"/> AF 1650-30-22 <input type="text"/> <input type="text"/> <input type="text"/>	1SFL 677 001 R <input type="text"/> <input type="text"/> <input type="text"/> 1SFL 677 001 R <input type="text"/> <input type="text"/> <input type="text"/>	35.00 35.00

AF 300-30-11

AF 460-30-11

AF 750-30-11

AF 1650-30-11

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

Voltage <input type="text"/> <input type="text"/> <input type="text"/> V - 50/60Hz	Voltage <input type="text"/> <input type="text"/> <input type="text"/> V d.c.	Code <input type="text"/> <input type="text"/>
–	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 750

Voltage <input type="text"/> <input type="text"/> <input type="text"/> V - 50/60Hz	Voltage <input type="text"/> <input type="text"/> <input type="text"/> V d.c.	Code <input type="text"/> <input type="text"/>
–	24 ... 60	6 8 (1)
48 ... 130	48 ... 130	6 9
100 ... 250	100 ... 250	7 0
250 ... 500	250 ... 500	7 1

Coil voltages and codes: AF 1350, AF 1650

Voltage <input type="text"/> <input type="text"/> <input type="text"/> V - 50/60Hz	Voltage <input type="text"/> <input type="text"/> <input type="text"/> V d.c.	Code <input type="text"/> <input type="text"/>
100 ... 250	100 ... 250	7 0

Electromagnetic compatibility

AF... contactors comply with IEC 60947-1, 60947-4-1 and 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 (see EN 50082-2 article 4) including highly disturbing sources".

Environment B: "Mainly relates to low-voltage public networks (see 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".

>> Accessory Fitting Details page 2/12	>> General - Approvals section 7
>> Thermal & Electronic O/L Relays page 2/13	>> Terminal Marking and Positioning section 8
>> Technical Data page 2/65	>> Dimensions section 9

A 9 ... A 75 4-pole Contactors

a.c. Operated



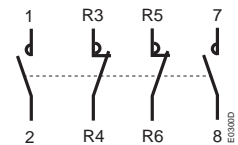
A 9-40-00



A 45-40-00



A 9-22-00



Ordering Details

IEC	UL/CSA	Auxiliary contacts fitted	Type	Order code	Weight kg	Pack ^{ing}
AC-1 Rated current $\theta \leq 40^\circ\text{C}$ A	General use rating 600 V A		state coil voltage <input type="text"/> (see table below)	state coil voltage code <input type="text"/> <input type="text"/> (see table below)		1 piece

4 N.O. main poles

25	21	-	-	A 9-40-00 <input type="text"/>	1SBL 141 201 R <input type="text"/> <input type="text"/>	0.340
30	30	-	-	A 16-40-00 <input type="text"/>	1SBL 181 201 R <input type="text"/> <input type="text"/>	0.340
45	40	-	-	A 26-40-00 <input type="text"/>	1SBL 241 201 R <input type="text"/> <input type="text"/>	0.610
70	80	-	-	A 45-40-00 <input type="text"/>	1SBL 331 201 R <input type="text"/> <input type="text"/>	1.390
100	80	-	-	A 50-40-00 <input type="text"/>	1SBL 351 201 R <input type="text"/> <input type="text"/>	1.390
125	105	-	-	A 75-40-00 <input type="text"/>	1SBL 411 201 R <input type="text"/> <input type="text"/>	1.390

2 N.O. + 2 N.C. main poles

25	21	-	-	A 9-22-00 <input type="text"/>	1SBL 141 501 R <input type="text"/> <input type="text"/>	0.340
30	30	-	-	A 16-22-00 <input type="text"/>	1SBL 181 501 R <input type="text"/> <input type="text"/>	0.340
45	40	-	-	A 26-22-00 <input type="text"/>	1SBL 241 501 R <input type="text"/> <input type="text"/>	0.610
70	80	-	-	A 45-22-00 <input type="text"/>	1SBL 331 501 R <input type="text"/> <input type="text"/>	1.400
125	105	-	-	A 75-22-00 <input type="text"/>	1SBL 411 501 R <input type="text"/> <input type="text"/>	1.400

Coil voltages and codes

Voltage <input type="text"/> V - 50Hz	Voltage <input type="text"/> V - 60Hz	Code <input type="text"/> <input type="text"/>
24	24	8 1
48	48	8 3
110	110 ... 120	8 4
220 ... 230	230 ... 240	8 0
230 ... 240	240 ... 260	8 8
380 ... 400	400 ... 415	8 5
400 ... 415	415 ... 440	8 6

Other voltages: page 0/1.

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

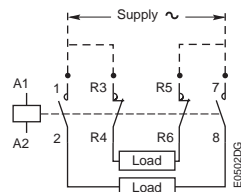
These contactors are suitable for controlling 2 separate circuits, i.e. 2 loads with 2 separate supplies, or 1 circuit comprising 2 separate loads with a single supply (see diagrams below). When the contactor operates there is no mechanical overlapping between the N.O. poles and the N.C. poles: BREAK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



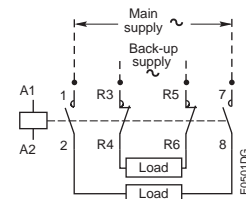
These contactors are not suitable for a reversing starter or star-delta starter or for controlling a single load from 2 separate supplies.

Block diagrams

● Single supply and 2 separate loads



● 2 separate supplies and 2 separate loads



>> Accessory Fitting Details page 2/23
 >> Accessory Ordering Details section 4
 >> Technical Data page 2/64

>> General - Approvals section 7
 >> Terminal Marking and Positioning section 8
 >> Dimensions section 9

A 9 ... A 75 4-pole Contactors

Main Accessories

Accessory Fitting Details

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

Contactor configuration	Front mounted accessories			Side mounted accessories				
	Contactor types	Main poles	Available auxiliary contacts	Auxiliary contact 1-pole CA 5-.. (or 1-pole CE 5-..)	Auxiliary contact 4-pole CA 5-..	Pneumatic Timer TP .. A	Auxiliary contact 2-pole CAL 5-11	Interlock unit VM 5-.. or VE 5-..
A 9, A 16	4 0	0 0		1 to 4 x CA 5-.. (1 to 2 x CE 5-.. max.) (1)	or 1 x CA 5-.. (4-pole)	or 1 x TP .. A	+ 1 to 2 x CAL 5-11	or 1 x VM 5-1 or VE 5-1 + 1 x CAL 5-11
A 9, A 16	2 2	0 0 (4)		1 to 4 x CA 5-.. (or 1 x CE 5-..) (7)	or 1 x CA 5-.. (4-pole)	or 1 x TP .. A (6)	+ 1 to 2 x CAL 5-11	—
A 26	4 0	0 0		1 to 4 x CA 5-.. (1 to 3 x CE 5-.. max.) (2)	or 1 x CA 5-.. (4-pole)	or 1 x TP .. A	+ 1 to 2 x CAL 5-11	or 1 x VM 5-1 or VE 5-1 + 1 x CAL 5-11
A 26	2 2	0 0 (4)		1 to 4 x CA 5-.. (or 1 x CE 5-..) (7)	or 1 x CA 5-.. (4-pole)	or 1 x TP .. A	+ 1 to 2 x CAL 5-11	—
A 45 ... A 75	4 0	0 0		1 to 6 x CA 5-.. (1 to 5 x CE 5-.. max.) (3)	or 1 x CA 5-.. (4-pole) + 2 x 1-pole CA 5-.. or CE 5-.. (3)	or 1 x TP .. A + 2 x 1-pole CA 5-..	+ 1 to 2 x CAL 5-11	or 1 x VE 5-2 + 1 x CAL 5-11
A 45 ... A 75	2 2	0 0 (5)		1 to 6 x CA 5-.. (no CE 5-..)	or 1 x CA 5-.. (4-pole) + 2 x 1-pole CA 5-..	or 1 x TP .. A + 2 x 1-pole CA 5-..	+ 1 to 2 x CAL 5-11	—

- (1) The total number of **N.O.** or **N.C. CE 5-..** and other **additional N.C. CA 5-..** auxiliary contacts is **limited to 2**. **CE 5-..** auxiliary contacts **not allowed in mounting position 5**.
- (2) The total number of **N.O.** or **N.C. CE 5-..** and other **additional N.C. CA 5-..** auxiliary contacts is **limited to 3**. **CE 5-..** auxiliary contacts **not allowed in mounting position 5**.
- (3) The total number of **N.O.** or **N.C. CE 5-..** and other **additional N.C. CA 5-..** auxiliary contacts is **limited to 5**.
- (4) **2 x N.C. CA 5-..** auxiliary contacts maximum in mounting position 5.
- (5) **2 x N.C. CA 5-..** auxiliary contacts maximum.
- (6) **A 9-22-00** and **A 16-22-00** in mounting position 5: **TP..DA not allowed**.
- (7) **CE 5-..** auxiliary contacts **not allowed in mounting position 5**.

The accessories provided for the A 45 ... A 75 contactors can be used for the AF 45 ... AF 75 types.

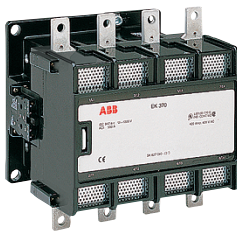
EK 110 ... EK 1000 4-pole Contactors

a.c. Operated



EK 175-40-11

1SBC57341-2FC0301



EK 370-40-11

1SBC57343-2FC0301



EK 1000-40-11

1SFT98039-06R02

Ordering Details

IEC	UL/CSA	Auxiliary contacts	Type	Order code	Weight kg
AC-1 Rated current $\theta \leq 40^\circ\text{C}$ A	General use rating 600 V A		state coil voltage <input type="text"/> (see table below)	state coil voltage code <input type="text"/> <input type="text"/> (see table below)	Pack ^{ing} 1 piece
200	170	1 1 2 2 2 1	EK 110-40-11 <input type="text"/> EK 110-40-22 <input type="text"/> EK 110-40-21 <input type="text"/>	SK 824 440- <input type="text"/> <input type="text"/> SK 824 450- <input type="text"/> <input type="text"/> SK 824 440-E <input type="text"/> <input type="text"/>	4.300 4.350 4.350
250	200	1 1 2 2 2 1	EK 150-40-11 <input type="text"/> EK 150-40-22 <input type="text"/> EK 150-40-21 <input type="text"/>	SK 824 441- <input type="text"/> <input type="text"/> SK 824 451- <input type="text"/> <input type="text"/> SK 824 441-E <input type="text"/> <input type="text"/>	4.350 4.400 4.400
300	250	1 1 2 2 2 1	EK 175-40-11 <input type="text"/> EK 175-40-22 <input type="text"/> EK 175-40-21 <input type="text"/>	SK 825 440- <input type="text"/> <input type="text"/> SK 825 448- <input type="text"/> <input type="text"/> SK 825 440-E <input type="text"/> <input type="text"/>	6.600 6.650 6.650
350	300	1 1 2 2 2 1	EK 210-40-11 <input type="text"/> EK 210-40-22 <input type="text"/> EK 210-40-21 <input type="text"/>	SK 825 441- <input type="text"/> <input type="text"/> SK 825 451- <input type="text"/> <input type="text"/> SK 825 441-E <input type="text"/> <input type="text"/>	6.600 6.650 6.650
550	420	1 1 2 2	EK 370-40-11 <input type="text"/> EK 370-40-22 <input type="text"/>	SK 827 040- <input type="text"/> <input type="text"/> SK 827 042- <input type="text"/> <input type="text"/>	17.20 17.20
800	540	1 1 2 2	EK 550-40-11 <input type="text"/> EK 550-40-22 <input type="text"/>	SK 827 041- <input type="text"/> <input type="text"/> SK 827 043- <input type="text"/> <input type="text"/>	17.20 17.20
1000	-	1 1 2 2	EK 1000-40-11 <input type="text"/> EK 1000-40-22 <input type="text"/>	SK 827 044- <input type="text"/> <input type="text"/> SK 827 045- <input type="text"/> <input type="text"/>	17.50 17.50

- E = 40 ... 400 Hz coil with built-in rectifier.

Coil voltages and codes: EK 110 ... EK 1000

Voltage <input type="text"/> <input type="text"/> V - 50Hz	Voltage <input type="text"/> <input type="text"/> V - 60Hz	Code <input type="text"/> <input type="text"/>
48	-	AD
-	110	AE
110	120	AF
220 ... 230	*	AL
230 ... 240	-	AM
-	380	AN
380 ... 400	440	AP
400 ... 415	-	AR

* Read 240V 60Hz for EK 370 ... EK 1000.

Other voltages: page 0/1.

Multi-frequency coils: EK 110 ... EK 210

Voltage <input type="text"/> <input type="text"/> V - 40 ... 400Hz	Code <input type="text"/> <input type="text"/>
110 ... 120	EF
115 ... 127	EG
220 ... 230	EL
230 ... 240	EM
380 ... 400	EP
400 ... 415	ER

Dual frequency coils (1): EK 370 ... EK 1000

Voltage <input type="text"/> <input type="text"/> V - 50Hz	Voltage <input type="text"/> <input type="text"/> V - 60Hz	Code <input type="text"/> <input type="text"/>
110	110 ... 120	EF
110 ... 115	115 ... 127	EG
220	220 ... 240	EL
220 ... 230	230 ... 255	EM
380	380 ... 415	EP
380 ... 400	400 ... 440	ER

(1) Two auxiliary contact blocks maximum per contactor, ambient temperature $\leq 55^\circ\text{C}$ and mounting positions 2 and 6 excluded.

>> Accessory Fitting Details page 2/25
>> Accessory Ordering Details section 4
>> Technical Data page 2/76

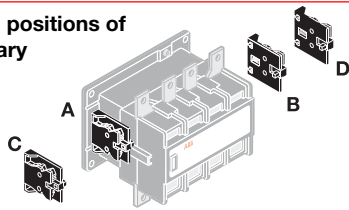
>> General - Approvals section 7
>> Terminal Marking and Positioning section 8
>> Dimensions section 9

EK 110 ... EK 1000 4-pole Contactors

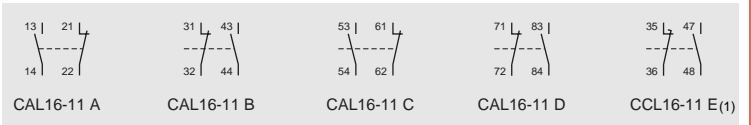
Main Accessories

Accessory Fitting Details

Mounting positions of the auxiliary contacts



Auxiliary contact types and connecting diagrams



(1) Contact 35-36 used for some types of EK... contactors

EK... 4-pole contactors

Contactor types	Main poles	Available auxiliary contacts	Add-on auxiliary contact blocks 2-pole CAL 16-11...	Mounting positions
				Factory mounted auxiliary contacts Add-on CAL 16-11 auxiliary contacts
a.c. operated, 50 Hz, 60 Hz or 50/60 Hz				
EK 110 ... EK 1000	4 0	1 1	+ 1 x CAL 16-11 B + 1 x CAL 16-11 C + 1 x CAL 16-11 D	
EK 110 ... EK 1000	4 0	2 2	+ 1 x CAL 16-11 C + 1 x CAL 16-11 D	
a.c. operated, 40 ... 400 Hz				
EK 110 ... EK 1000	4 0	2 1	1 x CAL 16-11 C	
d.c. operated				
EK 110 ... EK 1000	4 0	2 1	1 x CAL 16-11 C	

EK... 4-pole reversing contactors with VH 145 / VH 300 mechanical and electrical interlock units

"Lefthand" contactors	Interlocking	"Righthand" contactors	Add-on auxiliary contact blocks 2-pole CAL 16-11...	Mounting positions
				Factory mounted auxiliary contacts Add-on CAL 16-11 auxiliary contacts
a.c. operated, 50 Hz, 60 Hz or 50/60 Hz				
EK 110 ... 150 EK 175, 210	VH 145 VH 300	EK 110 ... 150 EK 175, 210	+ 1 x CAL 16-11 C + 1 x CAL 16-11 D	
a.c. operated, 40 ... 400 Hz				
EK 110 ... 150 EK 175, 210	VH 145 VH 300	EK 110 ... 150 EK 175, 210	—	
d.c. operated				
EK 110 ... 150 EK 175, 210	VH 145 VH 300	EK 110 ... 150 EK 175, 210	—	

AL 9 ... AE 75 4-pole Contactors

d.c. Operated



Ordering Details

IEC	UL/CSA	Aux. contacts fitted	Type	Order code	Weight kg
AC-1 Rated current $\theta \leq 40^\circ\text{C}$	General use rating 600V		state coil voltage <input type="text"/> (see table below)	state coil voltage code <input type="text"/> <input type="text"/> (see table below)	Pack ^{ing} 1 piece
A	A				

4 N.O. Main Poles

25	21	--	AL 9-40-00 <input type="text"/>	1SBL 143 201 R <input type="text"/> <input type="text"/>	0.520
30	30	--	AL 16-40-00 <input type="text"/>	1SBL 183 201 R <input type="text"/> <input type="text"/>	0.520
45	40	--	AL 26-40-00 <input type="text"/>	1SBL 243 201 R <input type="text"/> <input type="text"/>	0.750
70	80	--	AE 45-40-00 <input type="text"/>	1SBL 339 201 R <input type="text"/> <input type="text"/>	1.430
100	80	--	AE 50-40-00 <input type="text"/>	1SBL 359 201 R <input type="text"/> <input type="text"/>	1.430
125	105	--	AE 75-40-00 <input type="text"/>	1SBL 419 201 R <input type="text"/> <input type="text"/>	1.430

2 N.O. + 2 N.C. Main Poles

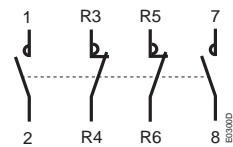
25	21	--	AL 9-22-00 <input type="text"/>	1SBL 143 501 R <input type="text"/> <input type="text"/>	0.520
30	30	--	AL 16-22-00 <input type="text"/>	1SBL 183 501 R <input type="text"/> <input type="text"/>	0.520
45	40	--	AL 26-22-00 <input type="text"/>	1SBL 243 501 R <input type="text"/> <input type="text"/>	0.750
70	80	--	AE 45-22-00 <input type="text"/>	1SBL 339 501 R <input type="text"/> <input type="text"/>	1.440
125	105	--	AE 75-22-00 <input type="text"/>	1SBL 419 501 R <input type="text"/> <input type="text"/>	1.440

Note: The polarity on the coil terminals (A1+ and A2-) must be respected for AL... contactors.

Coil voltages and codes: AL.. and AE...

Voltage - U _c V d.c.	Code
<input type="text"/>	<input type="text"/> <input type="text"/>
12	8 0
24	8 1
42	8 2
48	8 3
50	2 1
60	8 4
75	8 5
110	8 6
125	8 7
220	8 8
240	8 9
250	3 8

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



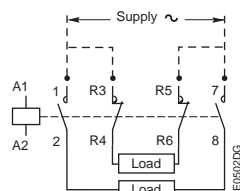
These contactors are suitable for controlling 2 separate circuits, i.e. 2 loads with 2 separate supplies, or 1 circuit comprising 2 separate loads with a single supply (see diagrams below). When the contactor operates there is no mechanical overlapping between the N.O. poles and the N.C. poles: BREAK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



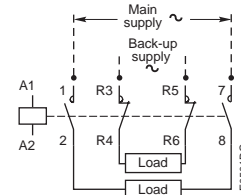
These contactors are not suitable for a reversing starter or star-delta starter or for controlling a single load from 2 separate supplies.

Block diagrams

● Single supply and 2 separate loads



● 2 separate supplies and 2 separate loads



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AL 9 ... AE 75 4-pole Contactors



Main Accessories

Accessory Fitting Details for AL 9 ... AL 26 Contactors

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

Contactor configuration	Front mounted accessories	Side mounted accessories ⁽⁸⁾
<p>Main poles Available auxiliary contacts</p> <p>Contactor types</p>	<p>Auxiliary contact 1-pole CA 5-..</p> <p>Auxiliary contact 4-pole CA 5-..</p> <p>Auxiliary contact 1-pole CE 5-..</p>	<p>Auxiliary contact 2-pole CAL 5-11</p> <p>Interlock unit VM 5-.. or VE 5-..</p>
AL 9, AL 16	4 0 0 0	1 to 4 x CA 5-..(1) or 1 x CA 5-.. (4-pole) (1) or 1 to 2 x CE 5-.. (2) or 1 x CAL 5-11 + 1 x VM 5-1(3) or VE 5-1(3)(4)
AL 9, AL 16	2 2 0 0	1 to 4 x CA 5-..(5) or 1 x CA 5-.. (4-pole) (5) or 1 x CAL 5-11
AL 26	4 0 0 0	1 to 4 x CA 5-..(6) or 1 x CA 5-.. (4-pole) (6) or 1 to 2 x CE 5-.. or 1 x CAL 5-11 + 1 x VM 5-1 or VE 5-1
AL 26	2 2 0 0	1 to 4 x CA 5-..(7) or 1 x CA 5-.. (4-pole) (7) or 1 x CAL 5-11

- (1) 2 N.C. auxiliary contacts maximum in all mounting positions except 5. In position 5 no N.C. auxiliary contact allowed.
- (2) CE 5-.. auxiliary contact **not allowed in position 5**.
- (3) When VMS-1 or VE5-1 interlock unit is used with auxiliary contact CAL 5-11 the control voltage is limited to 0.9 U_c ... 1.1 U_c.
- (4) With VE5-1 interlock unit, a maximum of 3 N.O. auxiliary contacts are permitted.
- (5) 2 N.C. auxiliary contacts maximum.
- (6) 2 N.C. auxiliary contacts maximum in mounting position 5.
- (7) N.C. auxiliary contacts are not allowed.
- (8) Mounting position 1±30° not allowed.

Accessory Fitting Details for AE 45 ... AE 75 Contactors

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

Contactor configuration	Front mounted accessories	Side mounted accessories
<p>Main poles Available auxiliary contacts</p> <p>Contactor types</p>	<p>Auxiliary contact 1-pole CA 5-.. (or 1-pole CE 5-..)</p> <p>Auxiliary contact 4-pole CA 5-..</p> <p>Pneumatic Timer TP .. A</p>	<p>Auxiliary contact 2-pole CAL 5-11</p> <p>Interlock unit VE 5-2</p>
AE 45 ... AE 75	4 0 0 0	1 to 6 x CA 5-.. (1 to 5 x CE 5-.. max.) (1) or 1 x CA 5-.. (4-pole) + 2 x 1-pole CA 5-.. or CE 5-.. (1) or 1 x TP .. A + 2 x 1-pole CA 5-.. + 1 x CAL 5-11 or 1 x VE 5-2
AE 45 ... AE 75	2 2 0 0 (2)	1 to 6 x CA 5-.. (no CE 5-..) or 1 x CA 5-.. (4-pole) + 2 x 1-pole CA 5-.. or 1 x TP .. A + 2 x 1-pole CA 5-.. + 1 x CAL 5-11

- (1) The total number of N.O. or N.C. CE 5-.. and other additional N.C. CA 5-.. auxiliary contacts is limited to 5.
- (2) 2 N.C. auxiliary contacts maximum.

TAL 9 ... TAE 75 4-pole Contactors

d.c. Operated with Large Coil Voltage Range



TAL 9-40-00



TAE 50-40-00

Ordering Details

IEC	UL/CSA	Aux. contacts fitted	Type	Order code	Weight kg
AC-1 Rated current $\theta \leq 40^\circ\text{C}$	General use rating 600V		state coil voltage <input type="text"/> (see table below)	state coil voltage code <input type="text"/> <input type="text"/> (see table below)	Pack ^{ing} 1 piece
A	A				

4 N.O. Main Poles

25	21	--	TAL 9-40-00 <input type="text"/>	1SBL 143 261 R <input type="text"/> <input type="text"/>	0.520
30	30	--	TAL 16-40-00 <input type="text"/>	1SBL 183 261 R <input type="text"/> <input type="text"/>	0.520
45	40	--	TAL 26-40-00 <input type="text"/>	1SBL 243 261 R <input type="text"/> <input type="text"/>	0.750
70	80	--	TAE 45-40-00 <input type="text"/>	1SBL 339 261 R <input type="text"/> <input type="text"/>	1.430
100	80	--	TAE 50-40-00 <input type="text"/>	1SBL 359 261 R <input type="text"/> <input type="text"/>	1.430
125	105	--	TAE 75-40-00 <input type="text"/>	1SBL 419 261 R <input type="text"/> <input type="text"/>	1.430

2 N.O. + 2 N.C. Main Poles

25	21	--	TAL 9-22-00 <input type="text"/>	1SBL 143 561 R <input type="text"/> <input type="text"/>	0.520
30	30	--	TAL 16-22-00 <input type="text"/>	1SBL 183 561 R <input type="text"/> <input type="text"/>	0.520
45	40	--	TAL 26-22-00 <input type="text"/>	1SBL 243 561 R <input type="text"/> <input type="text"/>	0.750

Note: The polarity on the coil terminals (A1+ and A2-) must be respected for TAL... contactors.

Coil voltages and codes: TAL... and TAE...

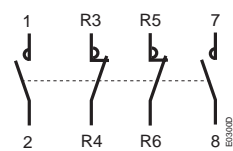
Voltage <input type="text"/> V - d.c.	Code <input type="text"/> <input type="text"/>
17 ... 32	5 1
25 ... 45	5 2
36 ... 65	5 4
42 ... 78	5 8
50 ... 90	5 5
77 ... 143	6 2
90 ... 150	6 6
152 ... 264	6 8

Other voltages: please consult us.



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

Remark for 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.

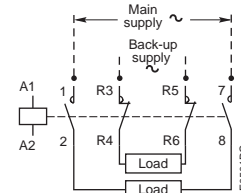
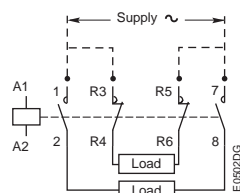


These contactors are not suitable for a reversing starter or star-delta starter or for controlling a single load from 2 separate supplies.

Block diagrams

● Single supply and 2 separate loads

● 2 separate supplies and 2 separate loads



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TAL 9 ... TAE 75 4-pole Contactors



Main Accessories

Accessory Fitting Details for TAL 9 ... TAL 26 Contactors

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

Contactor configuration	Front mounted accessories			Side mounted accessories ⁽⁸⁾				
	Contactor types	Main poles	Available auxiliary contacts	Auxiliary contact 1-pole CA 5-..	Auxiliary contact 4-pole CA 5-..	Auxiliary contact 1-pole CE 5-..	Auxiliary contact 2-pole CAL 5-11	Interlock unit VM 5-.. or VE 5-..
TAL 9, TAL 16	4	0	0	1 to 4 x CA 5-..(1) or 1 x CA 5-.. (4-pole) (1)	or 1 to 2 x CE 5-.. (2)	or 1 x CAL 5-11	+	1 x VM 5-1(3) or VE 5-1(3)(4)
TAL 9, TAL 16	2	2	0	1 to 4 x CA 5-..(5) or 1 x CA 5-.. (4-pole) (5)	–	or 1 x CAL 5-11	–	–
TAL 26	4	0	0	1 to 4 x CA 5-..(6) or 1 x CA 5-.. (4-pole) (6)	or 1 to 2 x CE 5-..	or 1 x CAL 5-11	+	1 x VM 5-1 or VE 5-1
TAL 26	2	2	0	1 to 4 x CA 5-..(7) or 1 x CA 5-.. (4-pole) (7)	–	or 1 x CAL 5-11	–	–

- (1) 2 N.C. auxiliary contacts maximum in all mounting positions except 5. In position 5 no N.C. auxiliary contact allowed.
- (2) CE 5-.. auxiliary contact **not allowed in position 5**.
- (3) When **VM5-1** or **VE5-1** interlock unit is used, CAL 5-11 auxiliary contact is not permitted in any position.
- (4) With **VE5-1** interlock unit, a maximum of 3 N.O. auxiliary contacts are permitted.
- (5) 2 N.C. auxiliary contacts maximum.
- (6) 2 N.C. auxiliary contacts maximum in mounting position 5.
- (7) N.C. auxiliary contacts are not allowed.
- (8) Mounting position 1±30° not allowed.

Accessory Fitting Details for TAE 45 ... TAE 75 Contactors

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

Contactor configuration	Front mounted accessories			Side mounted accessories				
	Contactor types	Main poles	Available auxiliary contacts	Auxiliary contact 1-pole CA 5-.. (or 1-pole CE 5-..)	Auxiliary contact 4-pole CA 5-..	Pneumatic Timer TP .. A	Auxiliary contact 2-pole CAL 5-11	Interlock unit VE 5-2
TAE 45 ... TAE 75	4	0	0	1 to 6 x CA 5-.. (1 to 5 x CE 5-.. max.) (1) or 1 x CA 5-.. (4-pole) + 2 x 1-pole CA 5-.. or CE 5-.. (1)	or 1 x TP .. A + 2 x 1-pole CA 5-..	+	1 x CAL 5-11	or 1 x VE 5-2

- (1) The total number of N.O. or N.C. CE 5-.. and other additional N.C. CA 5-.. auxiliary contacts is **limited to 5**.

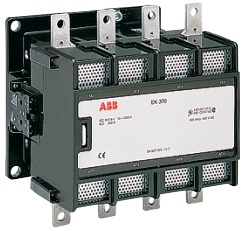
EK 110 ... EK 1000 4-pole Contactors

d.c. Operated



1SBC5 7341 2F0301

EK 175-40



1SBC5 7443 2F0301

EK 370-40



1SFT8009-069

EK 1000-40

Ordering Details

IEC	UL/CSA	Auxiliary contacts fitted	Type	Order code	Weight kg
AC-1 Rated current $\theta \leq 40^\circ\text{C}$ A	General use rating 600 V A		state coil voltage <input type="text"/> (see table below)	state coil voltage code <input type="text"/> <input type="text"/> (see table below)	Pack ^{ing} 1 piece
200	170	2 1	EK 110-40-21 <input type="text"/>	SK 824 440-D <input type="text"/>	4.350
250	200	2 1	EK 150-40-21 <input type="text"/>	SK 824 441-D <input type="text"/>	4.400
300	250	2 1	EK 175-40-21 <input type="text"/>	SK 825 440-D <input type="text"/>	6.650
350	300	2 1	EK 210-40-21 <input type="text"/>	SK 825 441-D <input type="text"/>	6.650
550	420	2 1	EK 370-40-21 <input type="text"/>	SK 827 040-D <input type="text"/>	17.20
800	540	2 1	EK 550-40-21 <input type="text"/>	SK 827 041-D <input type="text"/>	17.20
1000	—	2 1	EK 1000-40-21 <input type="text"/>	SK 827 044-D <input type="text"/>	17.50

Coil voltages and codes

Voltage <input type="text"/> <input type="text"/> V d.c.	Code <input type="text"/> <input type="text"/>
12 (1)	DA
24	DB
36	DC
48	DD
60	DT
75	DG
110	DE
125	DU
220	DF

(1) Not for EK 370 ... EK 1000 contactors.

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AF 45 ... AF 75 4-pole Contactors



Electronic Coil Interface

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



AF 75-40-00

1SBC5 8270 3RF0301

Ordering Details

IEC	UL/CSA	Auxiliary contacts fitted	Type	Order code	Weight kg
AC-1 Rated current $\theta \leq 40 \text{ }^\circ\text{C}$	General use rating 600 V		state coil voltage <input type="text"/> (see table below)	state coil voltage code <input type="text"/> <input type="text"/> (see table below)	Pack ^{ing} 1 piece
A	A				

4 N.O. main poles

70	80	--	AF 45-40-00 <input type="text"/>	1SBL 337 201 R <input type="text"/> <input type="text"/>	1.420
100	80	--	AF 50-40-00 <input type="text"/>	1SBL 357 201 R <input type="text"/> <input type="text"/>	1.420
125	105	--	AF 75-40-00 <input type="text"/>	1SBL 417 201 R <input type="text"/> <input type="text"/>	1.420

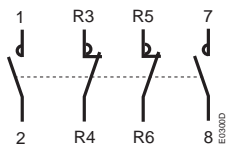
2 N.O. + 2 N.C. main poles

70	80	--	AF 45-22-00 <input type="text"/>	1SBL 337 501 R <input type="text"/> <input type="text"/>	1.420
125	105	--	AF 75-22-00 <input type="text"/>	1SBL 417 501 R <input type="text"/> <input type="text"/>	1.420

Coil voltages and codes

Voltage <input type="text"/> V - 50/60Hz	Voltage <input type="text"/> V d.c.	Code <input type="text"/> <input type="text"/>
–	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.



Remark for AF 45 ... AF 75 4-pole contactors built 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.

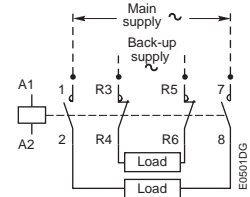
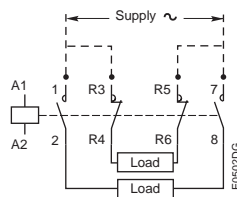


These contactors are not suitable for a reversing starter or star-delta starter or for controlling a single load from 2 separate supplies.

Block Diagrams

● Single supply and 2 separate loads

● 2 separate supplies and 2 separate loads



Electromagnetic compatibility

AF... contactors comply with IEC 60947-1, 60947-4-1 and 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 (see EN 50082-2 article 4) including highly disturbing sources".

Environment B: "Mainly relates to low-voltage public networks (see 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".

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Contactors for Capacitor Switching

AC-6b Utilization Category according to IEC 60947-4-1

Capacitor Transient Conditions

In Low Voltage industrial installations, capacitors are mainly used for reactive energy correction (raising the power factor). When these capacitors are energized, overcurrents of high amplitude and high frequencies (3 to 15 kHz) occur during the transient period (1 to 2 ms).

The amplitude of these current peaks, also known as "inrush current peaks", depends on the following factors:

- The network inductances.
- The transformer power and short-circuit voltage.
- The type of power factor correction.

There are 2 types of power factor correction: fixed or automatic.

Fixed power factor correction consists of inserting, in parallel on the network, a capacitor bank whose total power is provided by the assembly of capacitors of identical or different ratings.

The bank is energized by a contactor that simultaneously supplies all the capacitors (a single step).

The inrush current peak, in the case of fixed correction, can reach 30 times the nominal current of the capacitor bank.

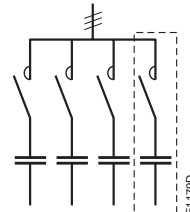


Single-step capacitor bank scheme
Use the A/AF... contactor ranges.

An automatic power factor correction system, on the other hand, consists of several capacitor banks of identical or different ratings (several steps), energized separately according to the value of the power factor to be corrected.

An electronic device automatically determines the power of the steps to be energized and activates the relevant contactors.

The inrush current peak, in the case of automatic correction, depends on the power of the steps already on duty, and can reach 100 times the nominal current of the step to be energized.



Multi-step capacitor bank scheme
Use the UA... or UA..RA contactor ranges.

Steady State Condition Data

The presence of harmonics and the network's voltage tolerance lead to a current, estimated to be 1.3 times the nominal current I_n of the capacitor, permanently circulating in the circuit.

Taking into account the manufacturing tolerances, the exact power of a capacitor can reach 1.15 times its nominal power.

Standard IEC 60831-1 Edition 2002 specifies that the capacitor must therefore have a maximum thermal current I_T of:

$$I_T = 1.3 \times 1.15 \times I_n = 1.5 \times I_n$$

Consequences for the Contactors

To avoid malfunctions (welding of main poles, abnormal temperature rise, etc.), contactors for capacitor bank switching must be sized to withstand:

- A permanent current that can reach 1.5 times the nominal current of the capacitor bank.
- The short but high peak current on pole closing (maximum permissible peak current \hat{I}).

Contactor Selection Tool for Capacitor Switching

In a given application, if the user does not know the value of the inrush current peak, this value can be approximately calculated using the formulas given on the **Application Guide "Contactors for Capacitor Switching"**.

Alternatively by the **CAPCAL Selection Tool**, available on the ABB Website:

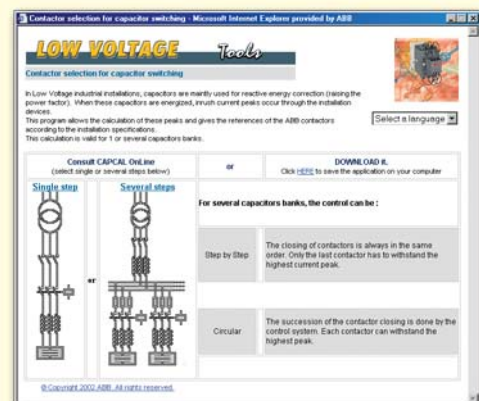
www.abb.com/lowvoltage

right menu: "Support"

search: "Online Product Selection Tools"

select: "Contactors: AC-6b Capacitor Switching"

This program allows the calculation of these peaks and gives the references of the ABB contactors according to the installation specifications. This calculation is valid for one or several capacitor banks.



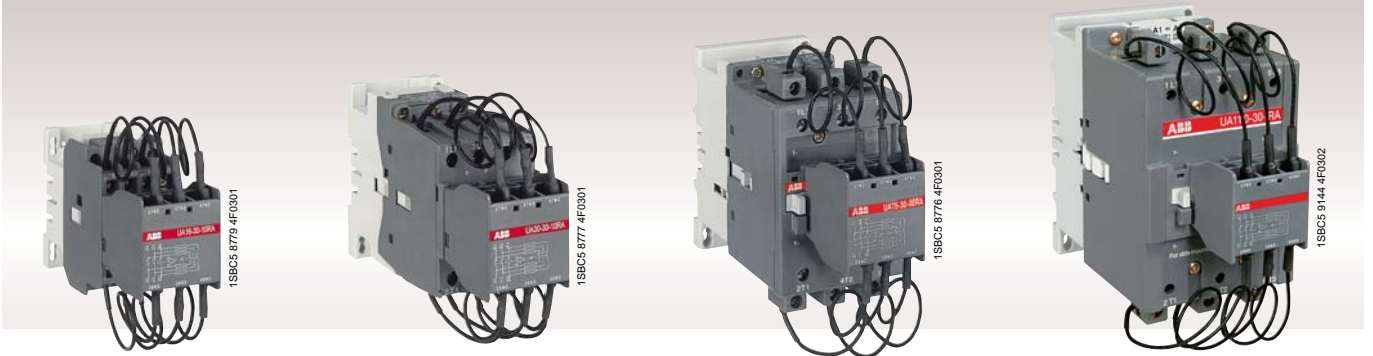
Contactors for Capacitor Switching

The ABB Solutions

ABB offers 3 contactor versions according to the value of the inrush current peak and the power of the capacitor bank.

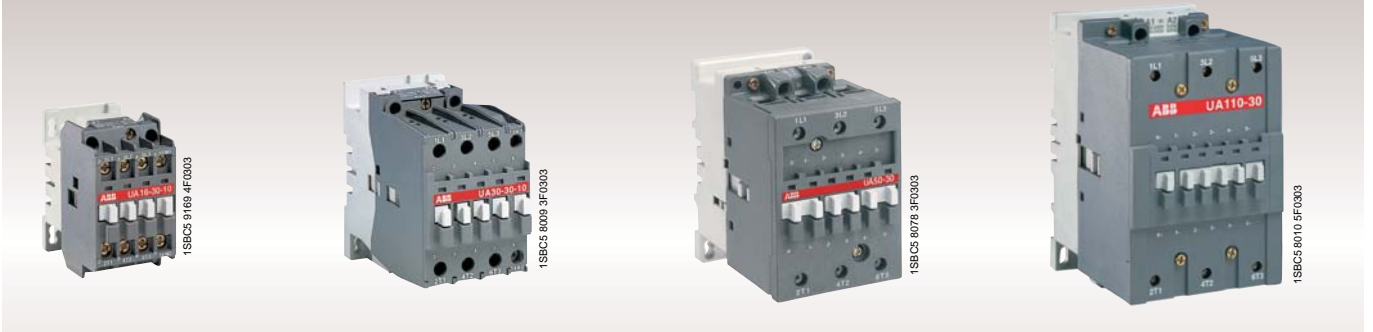
UA..RA Contactors for Capacitor Switching (UA 16..RA to UA 110..RA) with insertion of damping resistors.

The insertion of damping resistors protects the contactor and the capacitor from the highest inrush currents.



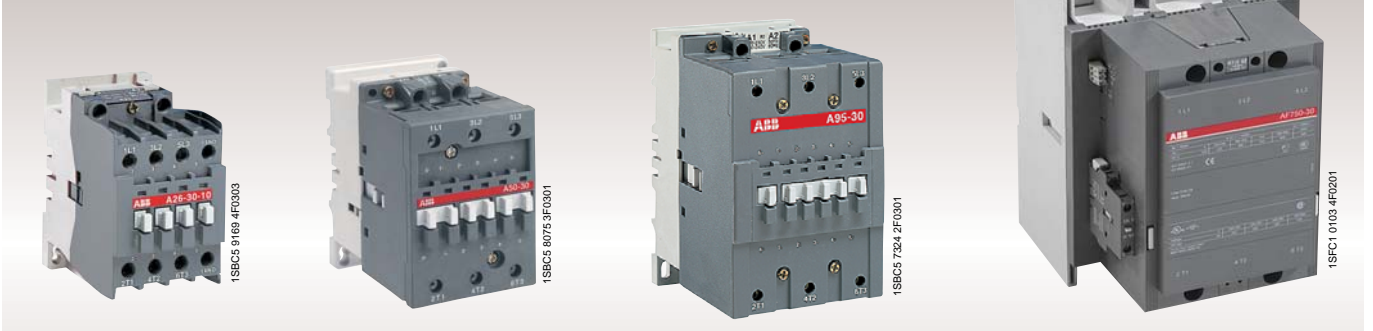
UA... Contactors for Capacitor Switching (UA 16 to UA 110)

Maximum permissible peak current $\hat{I} \leq 100$ times the nominal rms current of the switched capacitor.



A... and AF... Standard Contactors (A 12 to A 300 and AF 50 to AF 750)

Maximum permissible peak current $\hat{I} \leq 30$ times the nominal rms current of the switched capacitor.



UA..RA 3-pole Contactors for Capacitor Switching

Unlimited Peak Current \hat{I}



Application

The **UA..RA** contactors can be used in installations in which the 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 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 $500 \text{ V} \leq U_e \leq 690$ V.

Description

The **UA..RA** contactors are fitted with a special front mounted block, which ensures the serial insertion of 3 damping resistors into the circuit to limit the current peak on energization of the capacitor bank. Their connection also ensures capacitor precharging in order to limit the second current peak occurring upon making of the main poles.

Operating principle

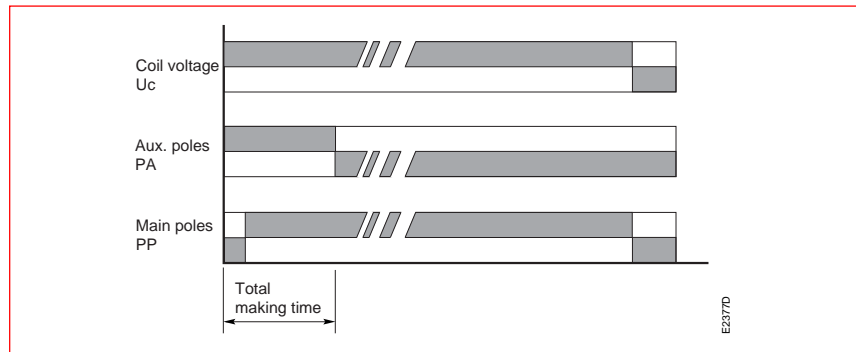
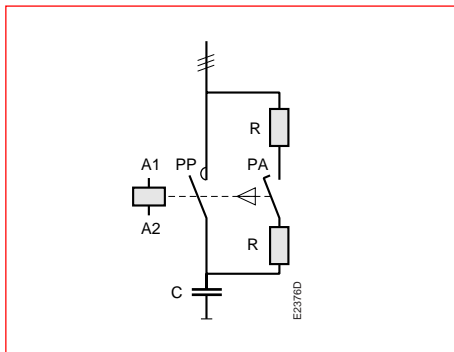
The front-mounted block mechanism of the **UA..RA** contactors ensures:

- early making of the auxiliary "PA" poles with respect to the main "PP" poles
- automatic return to the open position of the auxiliary "PA" poles after the main poles are closed.

When the coil is energized, the early making auxiliary poles connect the capacitor to the network via the set of 3 resistors. The damping resistors attenuate the first current peak and the second inrush current when the main contacts begin to make. Once the main poles are in the closed position, the auxiliary poles automatically break.

When the coil is de-energized, the main poles break ensuring the breaking of the capacitor bank.

The contactor can then begin a new cycle.



The insertion of resistors allows to damp the highest current peak of the capacitor when switching on, whatever its level.

Selection Table according to IEC

Type	Power in kvar – 50/60 Hz (AC-6b)															Max. permissible peak current \hat{I}	gG type fuses A max (*)
	230/240 V			400/415 V			440 V			500/550 V			690 V				
	40°C	55°C	70°C	40°C	55°C	70°C	40°C	55°C	70°C	40°C	55°C	70°C	40°C	55°C	70°C		
UA 16-30-10 RA	8	7.5	6	12.5	12.5	10	15	13	11	18	16	12.5	22	21	17	Unlimited	80
UA 26-30-10 RA	12.5	11.5	9	22	20	15.5	24	20	17	30	25	20	35	31	26		125
UA 30-30-10 RA	16	16	11	30	27.5	19.5	32	30	20.5	34	34	25	45	45	32		200
UA 50-30-00 RA	25	24	20	40	40	35	50	43	37	55	50	46	72	65	60		200
UA 63-30-00 RA	30	27	23	50	45	39	55	48	42.5	65	60	50	80	75	65		200
UA 75-30-00 RA	35	30	25	60	50	41	65	53	45	75	65	55	100	80	70		200
UA 95-30-00 RA	40	35	30	70	60	53	75	65	58	85	75	70	120	105	85	250	
UA 110-30-00 RA	45	40	35	80	70	60	85	75	70	95	82	78	130	110	100	250	

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

Selection Table according to UL/CSA

Type	Power in kvar – 60 Hz			Max permissible peak current \hat{I}
	240 V 40 °C	480 V 40 °C	600 V 40 °C	
UA 16-30-10 RA	8	16	20	Unlimited
UA 26-30-10 RA	11	22	27	
UA 30-30-10 RA	14	28	35	
UA 50-30-00 RA	25	50	62	
UA 63-30-00 RA	27.5	55	70	
UA 75-30-00 RA	32	64	80	

UA..RA 3-pole Contactors for Capacitor Switching

Unlimited Peak Current \hat{I}



Ordering Details

IEC Rated power 400 V 40 °C kvar	UL/CSA Rated power 480 V 40 °C kvar	Auxiliary contacts fitted	Type	Order code	Weight kg
			state coil voltage <input type="text"/> (see table below)	state coil voltage code <input type="text"/> <input type="text"/> (see table below)	Packing 1 piece
12.5	16	1 –	UA 16-30-10 RA <input type="text"/>	1SBL 181 024 R <input type="text"/> <input type="text"/> 10	0.460
22	22	1 –	UA 26-30-10 RA <input type="text"/>	1SBL 241 024 R <input type="text"/> <input type="text"/> 10	0.710
30	28	1 –	UA 30-30-10 RA <input type="text"/>	1SBL 281 024 R <input type="text"/> <input type="text"/> 10	0.810
40	50	– –	UA 50-30-00 RA <input type="text"/>	1SBL 351 024 R <input type="text"/> <input type="text"/> 00	1.350
50	55	– –	UA 63-30-00 RA <input type="text"/>	1SBL 371 024 R <input type="text"/> <input type="text"/> 00	1.350
60	64	– –	UA 75-30-00 RA <input type="text"/>	1SBL 411 024 R <input type="text"/> <input type="text"/> 00	1.350
70	–	– –	UA 95-30-00 RA <input type="text"/>	1SFL 431 024 R <input type="text"/> <input type="text"/> 00	2.000
80	–	– –	UA 110-30-00 RA <input type="text"/>	1SFL 451 024 R <input type="text"/> <input type="text"/> 00	2.000

Coil voltages and codes

Voltage <input type="text"/> V - 50Hz	Voltage <input type="text"/> V - 60Hz	Code <input type="text"/> <input type="text"/>
24	24	8 1
48	48	8 3
110	110 ... 120	8 4
220 ... 230	230 ... 240	8 0
230 ... 240	240 ... 260	8 8
380 ... 400	400 ... 415	8 5
400 ... 415	415 ... 440	8 6

Other voltages: page 0/1.



UA 16-30-10 RA

1SBCE 8779 4F0301



UA 30-30-10 RA

1SBCE 8777 4F0301



UA 75-30-00 RA

1SBCE 8776 4F0301



UA 110-30-00 RA

1SBCE 9144 4F0302

>> Accessory Fitting Details page 2/36
 >> Accessory Ordering Details section 4
 >> Technical Data page 2/37

>> General - Approvals section 7
 >> Terminal Marking and Positioning section 8
 >> Dimensions section 9

2


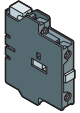
Specific Contactors

UA..RA 3-pole Contactors for Capacitor Switching

Unlimited Peak Current \hat{I}



Accessory Fitting Details

Contactor configuration			Front mounted accessories	Side mounted accessories
Contactor types	Main poles	Available auxiliary contacts	 Auxiliary contact 1-pole CA 5-...	 Auxiliary contact 2-pole CAL...
UA 16-30-10 RA	3 0	1 0	–	1 x CAL 5-11
UA 26-30-10 RA	3 0	1 0	–	1 to 2 x CAL 5-11
UA 30-30-10 RA	3 0	1 0	1 x CA5-...	+ 1 to 2 x CAL 5-11
UA 50-30-00 RA	3 0	0 0		
UA 63-30-00 RA	3 0	0 0	1 to 2 x CA5-...	+ 1 to 2 x CAL 5-11
UA 75-30-00 RA	3 0	0 0		
UA 95-30-00 RA	3 0	0 0		
UA 110-30-00 RA	3 0	0 0	1 to 2 x CA5-...	+ 1 to 2 x CAL 18-11

>> Accessory Ordering Details and Characteristics section 4

UA..RA 3-pole Contactors for Capacitor Switching

Unlimited Peak Current \hat{I}



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 gG type fuses	sized 1.5 ... 1.8 I_n of the capacitor				
Max. electrical switching frequency Operating cycles/h	240				
Electrical durability AC-6b – operating cycles at $U_e \leq 440$ V	250 000				
– operating cycles at 500 V $\leq U_e \leq 690$ V	100 000				
Connecting capacity (min. ... max.) Main conductors (poles)					
Rigid: solid (≤ 4 mm ²) } 1 x mm ²	1 ... 4	1.5 ... 6	2.5 ... 16	6 ... 50	10 ... 95
stranded (≥ 6 mm ²) } 2 x mm ²	–	–	2.5 ... 16 + 2.5 ... 6	6 ... 25 + 6 ... 16	6 ... 35
Flexible with cable end 1 x mm ²	0.75 ... 2.5	1.5 ... 4	2.5 ... 10	6 ... 35	10 ... 70
2 x mm ²	–	–	2.5 ... 10 + 2.5 ... 4	6 ... 16 + 6 ... 10	6 ... 35
Lugs L mm \leq	7.7	10	–	–	–
I mm $>$	3.7	4.2	–	–	–
Auxiliary conductors (built-in auxiliary terminals + coil terminals)					
Rigid solid 1 x mm ²	1 ... 4	–	–	–	0.75 ... 2.5
2 x mm ²	1 ... 4	–	–	–	0.75 ... 2.5
Flexible with cable end 1 x mm ²	0.75 ... 2.5	–	–	1 ... 2.5	0.75 ... 2.5
2 x mm ²	0.75 ... 2.5	–	–	–	–
Lugs					
Built-in aux. terminals L mm \leq	7.7	10	8	–	–
I mm $>$	3.7	4.2	3.7	–	–
Coil terminals L mm \leq	8				
I mm $>$	3.7				
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529	Protection against direct contact in acc. with EN 50274				
– Main terminals	IP 20		IP 10		
– Coil terminals	IP 20				
– Built-in auxiliary terminals	IP 20		–		

Other technical characteristics are the same as those of standard A... contactors.

UA... 3-pole Contactors for Capacitor Switching

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



Application

The **UA...** contactors can be used for the switching of capacitor banks whose inrush current peaks are less than or equal to 100 times nominal rms current. The table below gives the permissible powers according to operational voltage and temperature close to the contactor. It also specifies the maximum peak current **\hat{I} values** accepted by the contactor.

The capacitors must be discharged (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making.

In these conditions, electrical durability of contactors is equal to 100 000 operating cycles.

Description

See general design for **A...** standard contactors.

Selection Table according to IEC

Type	Power in kvar 50/60 Hz (AC-6b)															Max. permissible peak current \hat{I} (kA)	
	230/240 V			400/415 V			440 V			500/550 V			690 V			U_e	U_e
	40°C	55°C	70°C	40°C	55°C	70°C	40°C	55°C	70°C	40°C	55°C	70°C	40°C	55°C	70°C	≤ 500 V	> 500 V
UA 16	7.5	6.7	6	12.5	11.7	10	13.7	13	11	15.5	14.7	12.5	21.5	20	17	1.8	1.6
UA 26	12	11	8.5	20	18.5	14.5	22	20	16	22	22	19.5	30	30	25	3	2.7
UA 30	16	16	11	27.5	27.5	19	30	30	20	34	34	23.5	45	45	32	3.5	3.1
UA 50	20	20	19	33	33	32	36	36	35	40	40	40	55	55	52	5	4.5
UA 63	25	25	21	45	43	37	50	48	41	50	50	45	70	70	60	6.5	5.8
UA 75	30	30	22	50	50	39	55	53	43	62	62	47.5	75	75	65	7.5	6.75
UA 95	35	35	30	65	65	55	65	65	55	70	70	60	80	80	70	9.3	8
UA 110	40	40	35	75	70	65	75	75	70	80	80	75	90	90	85	10.5	9

For **220 V** and **380 V**, multiply by **0.9** the rated values at 230 V and 400 V respectively.

Example: 50 kvar/400 V corresponding to $0.9 \times 50 = 45$ kvar/**380 V**.

The capacitor bank will be protected by gG type fuses whose rating is equal to 1.5 ... 1.8 times nominal current.

Selection Table according to UL/CSA

Type	Power in kvar - 60 Hz		
	240 V 40 °C	480 V 40 °C	600 V 40 °C
UA 26	12.5	25	30
UA 30	16	32	40
UA 50	20	40	50
UA 75	27.5	55	70
UA 95	35	70	75
UA 110	40	80	85

If, in an application, the current peak is greater than the maximum peak current \hat{I} specified in the tables above, select a higher rating, refer to the **UA..RA** contactors, or add inductances. (see Application Guide "Contactors for Capacitor Switching").

UA... 3-pole Contactors for Capacitor Switching

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



UA 16-30-10



UA 30-30-10



UA 50-30-00



UA 110-30-00

Ordering Details

IEC Rated power 400 V 40 °C kvar	Max. peak current kA	UL/CSA Rated power 480 V 40 °C kvar	Auxiliary contacts fitted 	Type	Order code	Weight kg
12.5	1.8	—	1 —	UA 16-30-10	1SBL 181 022 R□□10	0.340
20	3	25	1 —	UA 26-30-10	1SBL 241 022 R□□10	0.600
27.5	3.5	32	1 —	UA 30-30-10	1SBL 281 022 R□□10	0.710
33	5	40	— — 1 1	UA 50-30-00 UA 50-30-11	1SBL 351 022 R□□00 1SBL 351 022 R□□11	1.160 1.200
45	6.5	—	— — 1 1	UA 63-30-00 UA 63-30-11	1SBL 371 022 R□□00 1SBL 371 022 R□□11	1.160 1.200
50	7.5	55	— — 1 1	UA 75-30-00 UA 75-30-11	1SBL 411 022 R□□00 1SBL 411 022 R□□11	1.160 1.200
65	9.3	70	— — 1 1	UA 95-30-00 UA 95-30-11	1SFL 431 022 R□□00 1SFL 431 022 R□□11	2.000 2.040
75	10.5	80	— — 1 1	UA 110-30-00 UA 110-30-11	1SFL 451 022 R□□00 1SFL 451 022 R□□11	2.000 2.040

Coil voltages and codes

Voltage □□ V - 50Hz	Voltage □□ V - 60Hz	Code □□
24	24	8 1
48	48	8 3
110	110 ... 120	8 4
220 ... 230	230 ... 240	8 0
230 ... 240	240 ... 260	8 8
380 ... 400	400 ... 415	8 5
400 ... 415	415 ... 440	8 6

Other voltages: page 0/1.

>> Accessory Fitting Details page 2/40	>> General - Approvals section 7
>> Accessory Ordering Details section 4	>> Terminal Marking and Positioning section 8
>> Technical Data page 2/41	>> Dimensions section 9

UA... 3-pole Contactors for Capacitor Switching

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



Accessory Fitting Details

Contactor configuration			Front mounted accessories			Side mounted accessories
Contactor types	Main poles	Available auxiliary contacts	Auxiliary contact 1-pole CA 5-..	Auxiliary contact 4-pole CA 5-..	Pneumatic Timer TP .. A	Auxiliary contact 2-pole CAL...
UA 16-30-10	3 0	1 0	1 to 4 x CA 5-..	or 1 x CA 5-.. (4-pole)	or 1 x TP .. A	+ 1 to 2 x CAL 5-11
UA 26-30-10	3 0	1 0	1 to 4 x CA 5-..	or 1 x CA 5-.. (4-pole)	or 1 x TP .. A	+ 1 to 2 x CAL 5-11
UA 30-30-10	3 0	1 0	1 to 5 x CA 5-..	or 1 x CA 5-.. (4-pole) + 1 x 1-pole CA 5-..	or 1 x TP .. A + 1 x CA 5-.. (1-pole)	+ 1 to 2 x CAL 5-11
UA 50-30-00	3 0	0 0				
UA 63-30-00	3 0	0 0	1 to 6 x CA 5-..	or 1 x CA 5-.. (4-pole) + 2 x 1-pole CA 5-..	or 1 x TP .. A + 2 x CA 5-.. (1-pole)	+ 1 to 2 x CAL 5-11
UA 75-30-00	3 0	0 0				
UA 95-30-00	3 0	0 0				
UA 110-30-00	3 0	0 0	1 to 6 x CA 5-..	or 1 x CA 5-.. (4-pole) + 2 x 1-pole CA 5-..	—	+ 1 to 2 x CAL 18-11

>> Accessory Ordering Details and Characteristics section 4

UA... 3-pole Contactors for Capacitor Switching

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



Technical Data

Types	UA 16	UA 26	UA 30	UA 50 UA 63 UA 75	UA 95 UA 110
Short-circuit protection gG type fuses	sized 1.5 ... 1.8 I_n of the capacitor				
Max. electrical switching frequency Operating cycles/h	240				
Electrical durability AC-6b operating cycles at $U_e \leq 690$ V	100 000				
Connecting capacity (min. ... max.) Main conductors (poles)					
Rigid: solid (≤ 4 mm ²) } 1 x mm ²	1 ... 4	1.5 ... 6	2.5 ... 16	6 ... 50	10 ... 95
stranded (≥ 6 mm ²) } 2 x mm ²	1 ... 4	1.5 ... 6	2.5 ... 16	6 ... 25	6 ... 35
Flexible with cable end 1 x mm ²	0.75 ... 2.5	0.75 ... 4	2.5 ... 10	6 ... 35	10 ... 70
2 x mm ²	0.75 ... 2.5	0.75 ... 4	2.5 ... 10	6 ... 16	6 ... 35
Lugs L mm \leq	7.7	10	–	–	–
I mm $>$	3.7	4.2	–	–	–
Auxiliary conductors (built-in auxiliary terminals + coil terminals)					
Rigid solid 1 x mm ²	1 ... 4				0.75 ... 2.5
2 x mm ²	1 ... 4				0.75 ... 2.5
Flexible with cable end 1 x mm ²	0.75 ... 2.5			1 ... 2.5	0.75 ... 2.5
2 x mm ²	0.75 ... 2.5				
Lugs					
Built-in aux. terminals L mm \leq	7.7	10	8	–	–
I mm $>$	3.7	4.2	3.7	–	–
Coil terminals L mm \leq	8				
I mm $>$	3.7				
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529	Protection against direct contact in acc. with EN 50274				
– Main terminals	IP 20			IP 10	
– Coil terminals	IP 20				
– Built-in auxiliary terminals	IP 20			–	

Other technical characteristics are the same as those of standard A... contactors.

2

Specific Contactors

A... and AF... Standard 3-pole Contactors for Capacitor Switching

Single Step - Peak Current $\hat{I} \leq 30$ Times the rms Current



Application

The **A...** and **AF...** contactors are suited for capacitor bank switching for the peak current and power values in the table below. The capacitors must be discharged (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making. In these conditions, electrical durability of contactors is equal to 100 000 operating cycles.

Description

See "General Design" for **A...** and **AF...** contactors

Selection Table according to IEC

Type	Power in kvar 50/60 Hz (AC-6b)															Max. peak current \hat{I} (kA)
	230/240 V			400/415 V			440 V			500/550V			690 V			
	40°C	55°C	70°C	40°C	55°C	70°C	40°C	55°C	70°C	40°C	55°C	70°C	40°C	55°C	70°C	
A 9	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
A 12	7	7	6	11	11	9.5	12	12	10.5	14	14	12	19	19	16.5	0.7
A 16	7.5	7.5	6	12.5	12.5	10	14	14	10.5	15.5	15.5	12	21.5	21.5	16.5	1
A 26	11.5	11.5	9	19	19	15	20	20	16.5	23	23	19	32	32	26	1.6
A 30	13	13	11	22	22	18.5	24	24	20.5	28	28	23	38	38	32	1.9
A 40	15	15	12	26	26	20	29	29	22	35	35	25	46	46	34.5	2.1
A/AF 50	22	22	20	38	38	34	42	42	37	48	48	42	65	65	58.5	2.3
A/AF 63	25	25	23	43	43	39	47	47	42.5	54	54	48.5	74	74	67	2.5
A/AF 75	28	28	24.5	48	48	41	52	52	45	60	60	51	82	82	70	2.6
A/AF 95	35	35	33	60	60	53	63	63	58	75	75	70	80	80	75	4
A/AF 110	40	40	35	70	70	60	75	75	65	83	83	78	90	90	85	4
A/AF 145	50	50	42	90	90	74	93	93	80	110	110	96	110	110	110	4
A/AF 185	60	60	45	110	110	83	115	115	85	135	135	102	135	135	135	5
A/AF 210	75	75	57	130	130	105	135	135	110	160	160	130	160	160	160	6.5
A/AF 260	85	85	70	145	145	135	155	155	140	180	180	165	200	200	200	8
A/AF 300	100	100	85	165	165	155	180	180	163	210	210	196	240	240	240	8
AF 400	120	120	105	210	210	195	220	220	200	260	260	241	300	300	300	10
AF 460	140	140	120	240	240	225	260	260	230	325	325	300	325	325	325	10
AF 580	170	170	160	285	285	275	300	300	290	350	350	340	440	440	440	12
AF 750	220	220	190	400	400	370	410	410	380	490	490	435	600	600	600	12

Note: For 3-pole A 16 ... A 110 contactors used with anti-resonance inductances (**Several mH**, built specially to suppress inrush current), see the Application Guide "Contactors for Capacitor Switching".

If, in an application, the current peak is greater than the maximum peak current \hat{I} specified in the table above, select a higher rating, refer to the **UA...** contactors, or add inductances, see the **Application Guide "Contactors for Capacitor Switching"**.

The capacitor bank will be protected by gG type fuses whose rating is equal to 1.5 ... 1.8 times nominal current.

A... and AF... Standard 3-pole Contactors for Capacitor Switching

Single Step - Peak Current $\hat{I} \leq 30$ Times the rms Current



A 26-30-10



A 50-30-00



A 95-30-00



AF 750-30-11

Ordering Details

IEC Power 400 V 40 °C kvar	Max. peak current \hat{I} kA	Auxiliary contacts fitted 	Type state coil voltage <input type="checkbox"/> <input type="checkbox"/> (see table below)	Order code state coil voltage code <input type="checkbox"/> <input type="checkbox"/> (see table below)	Weight kg Pack ^{ing} 1 piece
11	0.7	1 -	A 12-30-10 <input type="checkbox"/> <input type="checkbox"/>	1SBL 161 001 R <input type="checkbox"/> <input type="checkbox"/> 10	0.340
12.5	1	1 -	A 16-30-10 <input type="checkbox"/> <input type="checkbox"/>	1SBL 181 001 R <input type="checkbox"/> <input type="checkbox"/> 10	0.340
19	1.6	1 -	A 26-30-10 <input type="checkbox"/> <input type="checkbox"/>	1SBL 241 001 R <input type="checkbox"/> <input type="checkbox"/> 10	0.600
22	1.9	1 -	A 30-30-10 <input type="checkbox"/> <input type="checkbox"/>	1SBL 281 001 R <input type="checkbox"/> <input type="checkbox"/> 10	0.710
26	2.1	1 -	A 40-30-10 <input type="checkbox"/> <input type="checkbox"/>	1SBL 321 001 R <input type="checkbox"/> <input type="checkbox"/> 10	0.710
38	2.3	- -	A 50-30-00 <input type="checkbox"/> <input type="checkbox"/> AF 50-30-00 <input type="checkbox"/> <input type="checkbox"/>	1SBL 351 001 R <input type="checkbox"/> <input type="checkbox"/> 00 1SBL 357 001 R <input type="checkbox"/> <input type="checkbox"/> 00	1.160 1.180
43	2.5	- -	A 63-30-00 <input type="checkbox"/> <input type="checkbox"/> AF 63-30-00 <input type="checkbox"/> <input type="checkbox"/>	1SBL 371 001 R <input type="checkbox"/> <input type="checkbox"/> 00 1SBL 377 001 R <input type="checkbox"/> <input type="checkbox"/> 00	1.160 1.180
48	2.6	- -	A 75-30-00 <input type="checkbox"/> <input type="checkbox"/> AF 75-30-00 <input type="checkbox"/> <input type="checkbox"/>	1SBL 411 001 R <input type="checkbox"/> <input type="checkbox"/> 00 1SBL 417 001 R <input type="checkbox"/> <input type="checkbox"/> 00	1.160 1.180
60	4	- -	A 95-30-00 <input type="checkbox"/> <input type="checkbox"/> AF 95-30-00 <input type="checkbox"/> <input type="checkbox"/>	1SFL 431 001 R <input type="checkbox"/> <input type="checkbox"/> 00 1SFL 437 001 R <input type="checkbox"/> <input type="checkbox"/> 00	2.000 2.030
70	4	- -	A 110-30-00 <input type="checkbox"/> <input type="checkbox"/> AF 110-30-00 <input type="checkbox"/> <input type="checkbox"/>	1SFL 451 001 R <input type="checkbox"/> <input type="checkbox"/> 00 1SFL 457 001 R <input type="checkbox"/> <input type="checkbox"/> 00	2.000 2.030
90	4	1 1	A 145-30-11 <input type="checkbox"/> <input type="checkbox"/> AF 145-30-11 <input type="checkbox"/> <input type="checkbox"/>	1SFL 471 001 R <input type="checkbox"/> <input type="checkbox"/> 11 1SFL 477 001 R <input type="checkbox"/> <input type="checkbox"/> 11	3.500 3.600
110	5	1 1	A 185-30-11 <input type="checkbox"/> <input type="checkbox"/> AF 185-30-11 <input type="checkbox"/> <input type="checkbox"/>	1SFL 491 001 R <input type="checkbox"/> <input type="checkbox"/> 11 1SFL 497 001 R <input type="checkbox"/> <input type="checkbox"/> 11	3.500 3.600
130	6.5	1 1	A 210-30-11 <input type="checkbox"/> <input type="checkbox"/> AF 210-30-11 <input type="checkbox"/> <input type="checkbox"/>	1SFL 511 001 R <input type="checkbox"/> <input type="checkbox"/> 11 1SFL 517 001 R <input type="checkbox"/> <input type="checkbox"/> 11	6.100 6.200
145	8	1 1	A 260-30-11 <input type="checkbox"/> <input type="checkbox"/> AF 260-30-11 <input type="checkbox"/> <input type="checkbox"/>	1SFL 531 001 R <input type="checkbox"/> <input type="checkbox"/> 11 1SFL 537 001 R <input type="checkbox"/> <input type="checkbox"/> 11	6.100 6.200
165	8	1 1	A 300-30-11 <input type="checkbox"/> <input type="checkbox"/> AF 300-30-11 <input type="checkbox"/> <input type="checkbox"/>	1SFL 551 001 R <input type="checkbox"/> <input type="checkbox"/> 11 1SFL 557 001 R <input type="checkbox"/> <input type="checkbox"/> 11	6.100 6.200
210	10	1 1	AF 400-30-11 <input type="checkbox"/> <input type="checkbox"/>	1SFL 577 001 R <input type="checkbox"/> <input type="checkbox"/> 11	12.00
240	10	1 1	AF 460-30-11 <input type="checkbox"/> <input type="checkbox"/>	1SFL 597 001 R <input type="checkbox"/> <input type="checkbox"/> 11	12.00
285	12	1 1	AF 580-30-11 <input type="checkbox"/> <input type="checkbox"/>	1SFL 617 001 R <input type="checkbox"/> <input type="checkbox"/> 11	15.00
400	12	1 1	AF 750-30-11 <input type="checkbox"/> <input type="checkbox"/>	1SFL 637 001 R <input type="checkbox"/> <input type="checkbox"/> 11	15.00

Coil voltages and codes: A 12 ... A 300

Voltage <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> V - 50Hz	Voltage <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> V - 60Hz	Code <input type="checkbox"/> <input type="checkbox"/>
24	24	8 1
48	48	8 3
110	110 ... 120	8 4
220 ... 230	230 ... 240	8 0
230 ... 240	240 ... 260	8 8
380 ... 400	400 ... 415	8 5
400 ... 415	415 ... 440	8 6

Other voltages: page 0/1.

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

Voltage <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> V - 50/60Hz	Voltage <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> V d.c.	Code <input type="checkbox"/> <input type="checkbox"/>
-	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 750

Voltage <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> V - 50/60Hz	Voltage <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> V d.c.	Code <input type="checkbox"/> <input type="checkbox"/>
-	24 ... 60	6 8 (1)
48 ... 130	48 ... 130	6 9
100 ... 250	100 ... 250	7 0
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.

>> Accessory Fitting Details page 2/8, 2/12

>> Accessory Ordering Details section 4

>> AF... Contactors with Electronic Coil Interface: electromagnetic compatibility pages 2/19, 2/21

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

Application

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

● Main poles

GA 75 and **GAE 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 (25 mm²).

The **GA 75** and **GAE 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: Main contacts cannot be changed.

● Auxiliary contact: 1 CAL 5-11 side mounted add-on auxiliary contact block (**GA 75-10-11** and **GAE 75-10-11** types).

● Control circuit

– **GA 75** a.c. operated,

– **GAE 75** d.c. operated.

● Accessories: a wide range of accessories is available.

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 acc. to IEC

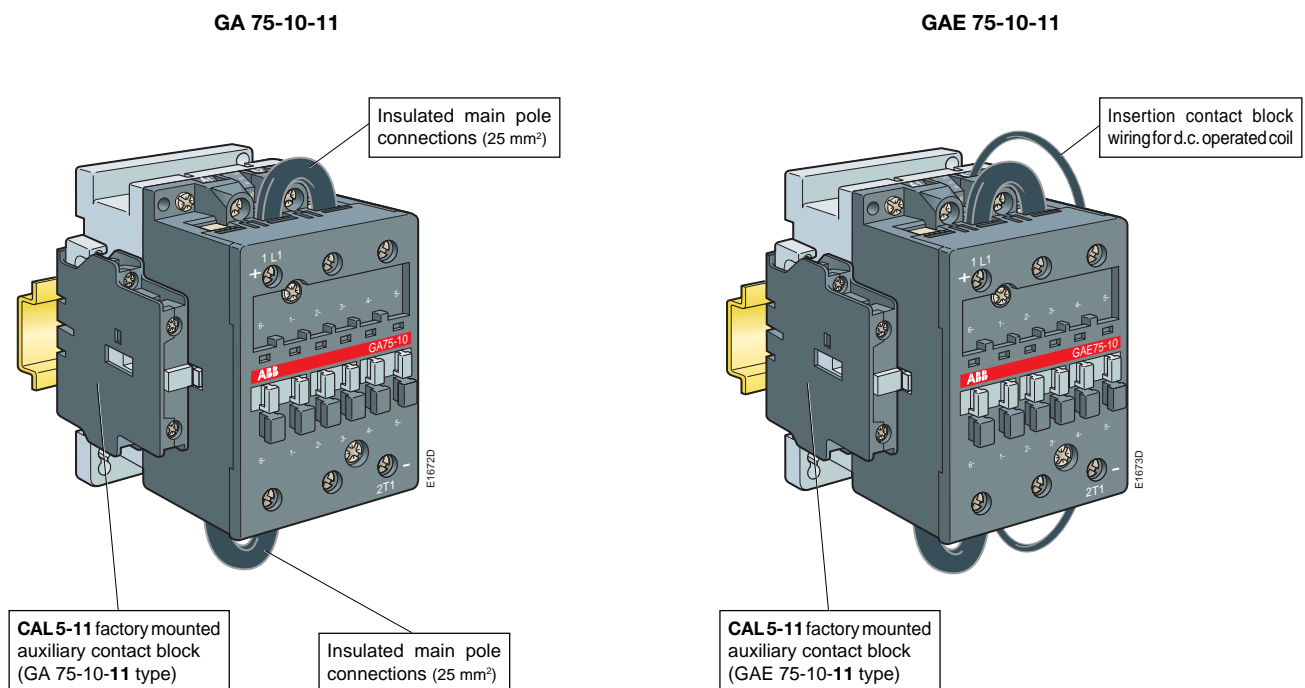
DC-1	$\theta \leq 55$ °C	220 V < $U_e \leq 440$ V	100 A
		440 V < $U_e \leq 600$ V	75 A
DC-3	–	220 V < $U_e \leq 440$ V	85 A
DC-5	–	110 V < $U_e \leq 220$ V	85 A
		220 V < $U_e \leq 440$ V	35 A

– Maximum rated operational current I_e acc. to UL/CSA

General use	$U_e \leq 440$ V	100 A
	$U_e \leq 600$ V	75 A
	$U_e \leq 1000$ V	35 A

Other technical data are the same as those of standard **A...** contactors.

GA 75 and GAE 75 contactors specific design (see A 9 ... A 110 contactors for general design)



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




GA 75-10-11



GAE 75-10-11

Ordering Details

IEC Rated operational current			Available auxiliary contacts		Type	Order code	Weight kg
DC-1 440 V $\theta \leq 55^\circ\text{C}$ A	DC-3 440 V A	DC-5 220 V A			state coil voltage <input type="checkbox"/> <input type="checkbox"/> (see table below)	state coil voltage code <input type="checkbox"/> <input type="checkbox"/> (see table below)	Packing 1 piece
100	85	85	-	-	GA 75-10-00 <input type="checkbox"/> <input type="checkbox"/>	1SBL 411 025 R <input type="checkbox"/> <input type="checkbox"/> 00	1.220
			1	1	GA 75-10-11 <input type="checkbox"/> <input type="checkbox"/>	1SBL 411 025 R <input type="checkbox"/> <input type="checkbox"/> 11	1.260
100	85	85	-	-	GAE 75-10-00 <input type="checkbox"/> <input type="checkbox"/>	1SBL 419 025 R <input type="checkbox"/> <input type="checkbox"/> 00	1.260
			1	1	GAE 75-10-11 <input type="checkbox"/> <input type="checkbox"/>	1SBL 419 025 R <input type="checkbox"/> <input type="checkbox"/> 11	1.300

Coil voltages and codes: GA 75

Voltage <input type="checkbox"/> <input type="checkbox"/> V - 50Hz	Voltage <input type="checkbox"/> <input type="checkbox"/> V - 60Hz	Code <input type="checkbox"/> <input type="checkbox"/>
24	24	8 1
48	48	8 3
110	110 ... 120	8 4
220 ... 230	230 ... 240	8 0
230 ... 240	240 ... 260	8 8
380 ... 400	400 ... 415	8 5
400 ... 415	415 ... 440	8 6

Other voltages: page 0/1.

Coil voltages and codes: GAE 75

Voltage <input type="checkbox"/> <input type="checkbox"/> V d.c.	Code <input type="checkbox"/> <input type="checkbox"/>
12	8 0
24	8 1
42	8 2
48	8 3
50	2 1
60	8 4
75	8 5
110	8 6
125	8 7
220	8 8
240	8 9
250	3 8

Connection Diagrams

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

Three modes are mainly used:

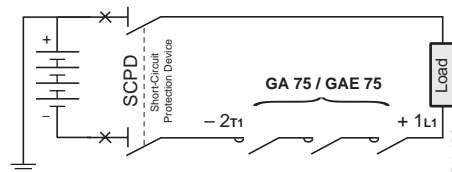
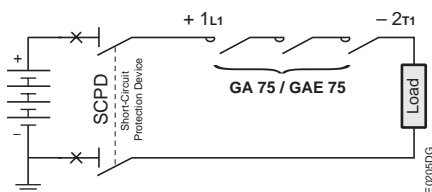
- A** – insulated source, i.e. unearthed (or not connected to the frame),
- B** – source earthed via its central point,
- C** – source earthed via one of its outer poles.

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.

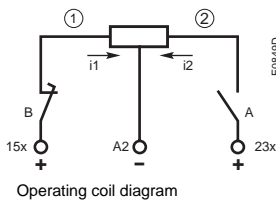
The above provisions relate to power circuit switching, the SCPD (Short-Circuit Protection Device) must comply with protection rules.



- >> Contactor Selection for d.c. Circuit Switching page 2/60
- >> Accessories section 4
- >> General - Approvals section 7
- >> Terminal Marking and Positioning section 8
- >> Dimensions section 9

AM... Magnetically Latched Contactors

d.c. Operated



Application

These contactors provide a safety function in those circuits where standard contactors would drop out in the event of a faulty control circuit supply voltage, i.e. excessive voltage drops, control circuit voltage failures.

They also provide an energy saving function in those circuits where contactors are used for an uninterrupted duty, i.e. distribution or current carrying duty.

This type of contactor is particularly suitable for industrial processes where voltage sags have heavy consequences and is totally immune to voltage dips.

Description

The **AM...** magnetically latched contactors are very similar in construction and dimensions to the **A...** standard contactors of equal rating. Only the electro-magnet and coil have a specific design in order to achieve the latching and de-latching operations.

The operating coil is built with 3 connecting terminals and 2 windings which, when energized, create two magnetic fields of opposite strength.

The coil windings must be energized from a d.c. supply, polarity (+ and -) must be observed.

Operation

– Contactor closing i.e. latching via "**B**" circuit. The contactor is held in closed position due to the circuit remanency.

– Contactor opening, i.e. de-latching via "**A**" circuit.

– On closing and opening the coil windings are automatically controlled and briefly energized through "**B**" (N.C.) and "**A**" (N.O.) auxiliary contacts.

The **AM...** contactors have two resting positions, **closed position** and **open position** and are delivered in closed position.

Changeover from one position to another is achieved by impulses on the coil with a minimum duration of 100 ms.

Coil operating limits: 0.85 ... 1.1 U_e

Technical Data

Same technical data as for the **AE 50**, **AE 75** contactors with the exception of:

– coil consumption: 210 W on latching, and 45 W on de-latching.

– mounting positions: position 5 is prohibited (see "Technical Data" for mounting position diagram).

>> A... Standard Contactor Description	page 2/6
>> Accessories	section 4
>> Technical Data	page 2/64

>> General - Approvals	section 7
>> Terminal Marking and Positioning	section 8
>> Dimensions	section 9

AM... Magnetically Latched Contactors

d.c. Operated



AM 75-30-22



AM 45-22-22

Ordering Details

Contactors with 3 N.O. main poles

IEC Rated power 400 V AC-3 kW	Rated current $\theta \leq 40^\circ\text{C}$ AC-1 A	Available auxiliary contacts	Type	Order code	Weight kg	Pack ^{ing} 1 piece
22	100	2 2	AM 50-30-22	state coil voltage <input type="text"/> (see table below) state coil voltage code <input type="text"/> <input type="text"/> (see table below)	1.230	1SBL 358 029 R <input type="text"/> <input type="text"/> 22
37	125	2 2	AM 75-30-22	state coil voltage <input type="text"/> (see table below) state coil voltage code <input type="text"/> <input type="text"/> (see table below)	1.230	1SBL 418 029 R <input type="text"/> <input type="text"/> 22

Contactors with 2 N.O. + 2 N.C. main poles

IEC AC-1 Rated current	$\theta \leq 40^\circ\text{C}$ A	$\theta \leq 55^\circ\text{C}$ A	Available auxiliary contacts	Type	Order code	Weight kg	Pack ^{ing} 1 piece
70	60	60	2 2	AM 45-22-22	state coil voltage <input type="text"/> (see table below) state coil voltage code <input type="text"/> <input type="text"/> (see table below)	1.440	1SBL 338 529 R <input type="text"/> <input type="text"/> 22
125	105	105	2 2	AM 75-22-22	state coil voltage <input type="text"/> (see table below) state coil voltage code <input type="text"/> <input type="text"/> (see table below)	1.440	1SBL 418 529 R <input type="text"/> <input type="text"/> 22

Coil voltages and codes

Voltage <input type="text"/> <input type="text"/> <input type="text"/> V d.c.	Code <input type="text"/> <input type="text"/>
12	8 0
24	8 1
42	8 2
48	8 3
50	2 1
60	8 4
75	8 5
110	8 6
125	8 7
220	8 8
240	8 9
250	3 8

Accessories

A wide range of accessories is available.

Note: Max. of 2 CA 5-.. 1-pole auxiliary contact blocks can be added on the AM... 3-pole contactors only.

>> A... Standard Contactor Description	page 2/6	>> General - Approvals	section 7
>> Accessories	section 4	>> Terminal Marking and Positioning	section 8
>> Technical Data	page 2/64	>> Dimensions	section 9

2

Specific Contactors

EH 1200 3-pole Contactor for non Inductive Loads



a.c. Operated or d.c. Operated

Application

The **EH 1200** contactor is designed for non inductive or slightly inductive loads (Utilization category AC-1 according to IEC 60947-4-1 standard, or General Use according to UL). Not suitable for motor applications.

Description

- Main poles and auxiliary contact blocks:
 - 3 main poles,
 - side mounted add-on auxiliary contact blocks.
- Control circuit:
 - The magnet system is d.c. operated with economizing resistor circuit, operated by an CCL 16-11 E auxiliary contact.
 - A rectifier system is used for the a.c. version, the control circuit connection is directly on the rectifier with push on terminals (6.3 mm).
- Accessories:
 - **CAL 16-11..** auxiliary contact blocks.
 - **RC-EH 800/10** surge suppressor for d.c. operated. (Not needed for a.c. operated.)

Accessory Fitting Details

Mounting positions of the auxiliary contacts

Auxiliary contact types and connecting diagrams

CAL16-11 A

CAL16-11 C

EH 1200... 3-pole contactors

Contactor types	Main poles	Available auxiliary contacts	Add-on auxiliary contact blocks 2-pole CAL 16-11...	Mounting positions
				<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> Factory mounted auxiliary contacts </div> <div style="width: 45%;"> Add-on CAL 16-11 auxiliary contacts </div> </div>

a.c. operated, 50/60 Hz / d.c. operated

EH 1200	3 0 1 1		<div style="background-color: #cccccc; padding: 5px; display: inline-block;">1 x CAL 16-11 C</div>	
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>> Accessory Ordering Details (see Accessories for EK Series Contactors) section 4

EH 1200 3-pole Contactor for non Inductive Loads



a.c. Operated or d.c. Operated



EH 1200-30-11

Ordering Details

IEC	UL	Available auxiliary contacts	Type	Order code	Weight kg
AC-1 Rated current $\theta \leq 40^\circ\text{C}$ A	General use rating 600 V A		state coil voltage <input type="text"/> (see table below)	state coil voltage code <input type="text"/> (see table below)	Pack ^{ing} 1 piece
1200	1200	1 1 2 2	EH 1200-30-11 <input type="text"/> EH 1200-30-22 <input type="text"/>	SK 828 006- <input type="text"/> SK 828 032- <input type="text"/>	18.00 18.00

Coil voltages and codes: EH 1200

Voltage <input type="text"/> V - 50/60 Hz	Voltage <input type="text"/> V - d.c.	Code <input type="text"/>
-	24	DB
-	110	DE
110 ... 120	-	EF
220 ... 240	-	EL
380 ... 400	-	EP

Technical Data

Main Pole - Utilization Characteristics

Rated insulation voltage U_i	V	1000
Rated operational current I_e / AC-1 for air temperature close to contactor		
U_e max. 1000 V	$\theta \leq 40^\circ\text{C}$	A 1200
	$\theta \leq 55^\circ\text{C}$	A 1000
	$\theta \leq 70^\circ\text{C}$	A 850
	with terminal bars	mm 2 x 80 x 5
UL rating		
General use	600 V	A 1200
Rated short-time withstand current I_{cw} at 40 °C ambient temp., in free air, from a cold state		
	1 s	A 8000
	10 s	A 7200
	30 s	A 5200
	1 min	A 4000
	15 min	A 1500
Electrical durability - AC-1, 1200 A		
- max. 440 V	operations	150 ... 200 000
- max. 690 V	operations	70 ... 100 000
- max. 1000 V	operations	10 ... 30 000
Mechanical durability	million of operations	0.5 ... 1

Magnet System Characteristics

Coil consumption		
- pull-in a.c.	VA	1000 ... 1400
- pull-in d.c.	W	1200
- holding a.c.	VA/W	20 ... 25
- holding d.c.	W	21
Operating time		
between coil energization and		
- N.O. contact closing	ms	60 ... 80
- N.C. contact opening	ms	55 ... 75
between coil de-energization and		
- N.O. contact opening	ms	13 ... 38
- N.C. contact closing	ms	10 ... 35

>> Connecting Characteristics: see "Dimensions" ... section 9
>> Accessories (See EK Contactors) section 4
>> Terminal Marking section 8
>> Dimensions section 9

2
Specific Contactors

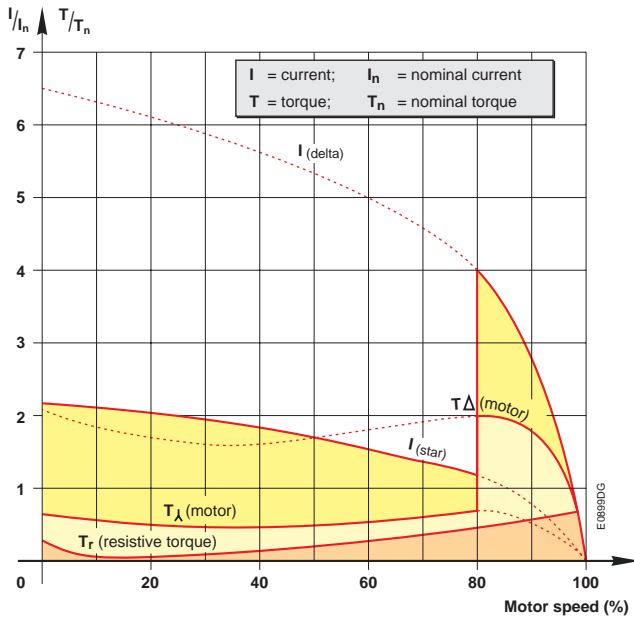
Star-Delta Starting of Three-Phase Asynchronous Motors

General

Star-delta starting is the most common method to reduce the starting current of a motor. This system can be used on all the squirrel cage motors, which are normally used in delta connection.

In this type of starting, it is recommended to choose motors having high starting torque i.e. much higher than the resistive torque in order to reach sufficient high speed when the motor is connected in star.

Star-delta starting



Technical Data

When starting:

- inrush current is reduced to a third of direct starting current,
- motor torque is reduced to a third or even less of direct starting torque.

Transient current is generated when switching from star to delta connection.

Utilization

During the initial starting phase ("star" connection), the resistive torque of the driven load must remain, irrespective of speed, less than the "star" motor torque until "star-delta" switching occurs.

This starting mode is therefore ideal for machines having low starting torque such as:

- pumps,
- centrifugal compressors,
- wood-working machines, etc.

In order to prevent a high current peak, at least 85 % of nominal speed must be reached before switching from star to delta.

Precautions

Motor nominal voltage in delta connection must be equal to that of the mains.

Example:

A motor for 400 V star-delta starting must be designed for 400 V in "delta" connection. Its usual designation is "400 V / 690 V motor". The motor must be constructed with 6 terminal windings.

Sequence

Starting is a three-stage process:

1st stage - "Star" connection

Press the "On" button on the control circuit to close the KM2 "star" contactor. The KM1 "line" contactor then closes and the motor starts. Countdown of programmed starting time (normally 6 to 10 s) then begins.

2nd stage - "Star" to "Delta" switching

When the programmed starting time is over, the KM2 "star" contactor opens.

3rd stage - "Delta" connection

A transition time (or dwelling time) of 50 ms is fixed between opening of the "star" contactor and closing of the "delta" contactor by the use of TE5S timer. This prevents short circuit between "star" and "delta".

Note: When AF... contactor types are used as **delta** and **star** contactors or an A... contactor as **star** contactor with an AF... contactor as **delta** contactor, the use of a timer including a dwelling time (or transition time) e.g. TE5S is not recommended. A timer set for the starting duration in star connection is enough. An electrical interlock between star and delta is mandatory such as VE 5 or through auxiliary contacts.

Furthermore, in open transition, the current interruption may reach up to 95 ms: it shall be checked that this duration is compatible with the application i.e. mainly if the decreasing in rotation speed is acceptable during the starting phase.

Star-Delta Starting of Three-Phase Asynchronous Motors

Controlgear Selection Guide - For more technical information, refer to ABB Starting Combinations catalogue

Motor power, kW Ambient temperature = 55 °C						Max. starting time from cold state (3) seconds	Contactors			O/L Relay (1)	Timer	Set of power connections
220-230 V	240 V	380-400 V	415 V	500 V	660-690 V		KM1 Main	KM3 Delta	KM2 Star			
4	4	7.5	7.5	5.5	5.5	15	A 9	A 9	A 9	TA 25 DU	TE5S	BED 16-1 (4)
5.5	5.5	11	11	7.5	7.5	15	A 12	A 12	A 9	TA 25 DU	TE5S	BED 16-1 (4)
9	11	15	15	15	11	15	A 16	A 16	A 12	TA 25 DU	TE5S	BED 16-1 (4)
12.5	12.5	22	22	22	15	15	A 26	A 26	A 16	TA 25 DU	TE5S	BED 26-1 (4)
15	15	25	25	25	18.5	15	A 30	A 30	A 26	TA 25 DU	TE5S	BED 40-1 (4)
18.5	22	37	37	37	37	30	A 40	A 40	A 26	TA 42 DU	TE5S	BED 40-1 (4)
25	25	45	45	45	45	30	A 50	A 50	A 30	TA 75 DU	TE5S	BED 50-1 (4)
30	33	55	55	63	59	30	A 63	A 63	A 40	TA 75 DU	TE5S	BED 50-1 (4)
37	40	63	70	75	63	30	A 75	A 75	A 50	TA 75 DU	TE5S	BED 75-1 (4)
45	45	75	75	90	90	20	A 95	A 95	A 75	TA 110 DU	TE5S	BED 95 (5)
55	59	90	100	110	132	20	A 110	A 110	A 95	TA 110 DU	TE5S	BED 110 (5)
75	75	132	132	160	160	20	A 145	A 145	A 110	TA 200 DU	TE5S	BED 145 (5)
90	90	160	160	200	250	20	A 185	A 185	A 145	TA 200 DU	TE5S	BED 185 (5)
110	110	200	200	250	315	20	A 210	A 210	A 185	TA 450 DU	TE5S	BED 210 (5)
140	140	220	250	295	355	20	A 260	A 260	A 210	TA 450 DU	TE5S	BED 300 (5)
160	160	250	250	355	450	20	A 300	A 300	A 260	TA 450 DU	TE5S	BED 300 (5)
180	200	355	355	450	560	20	AF 400	AF 400	A 260	E 500 DU	(2)	BED 400 (5)
250	250	450	475	560	670	20	AF 460	AF 460	A 300	E 500 DU	(2)	BED 400 (5)
315	315	560	600	700	750	20	AF 580	AF 580	AF 400	E 800 DU	(2)	BED 580 (5)
400	400	670	670	750	900	20	AF 750	AF 750	AF 460	E 800 DU	(2)	BED 580 (5)
450	475	830	900	960	1350	20	AF 1350	AF 1350	AF 580 (6)	E 1250 DU	(2)	—
560	600	1000	1050	1150	1600	20	AF 1650	AF 1650	AF 750 (6)	E 1250 DU	(2)	—

For motors above 670 kW/400 V, it is recommended to use Closed Transition Star-Delta starting. Contact your ABB Office for selection.

(1) The setting current value is: nominal motor current x 0.58.

(2) Contactor Relay type N + TP timer can be used as the AF contactors have a slight delay in closing.

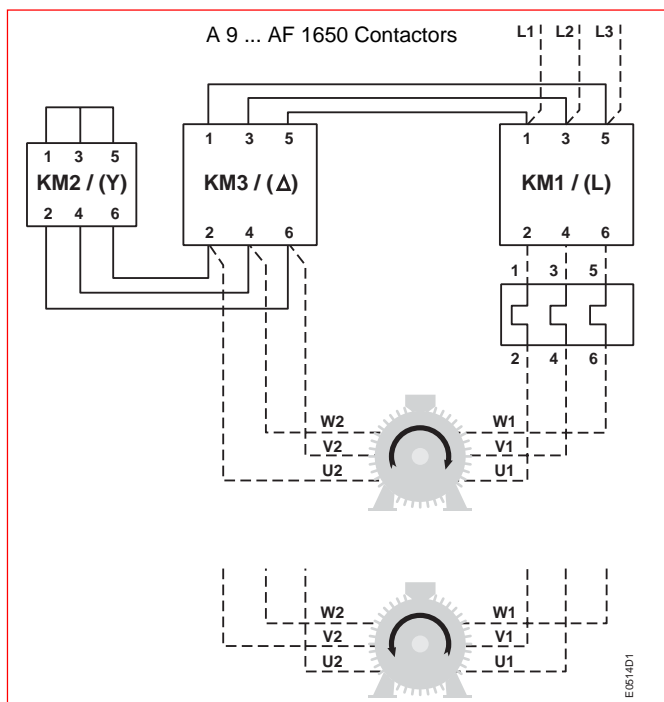
(3) Usual time value = 6 ... 10 s.

(4) Version without space for mechanical interlock.

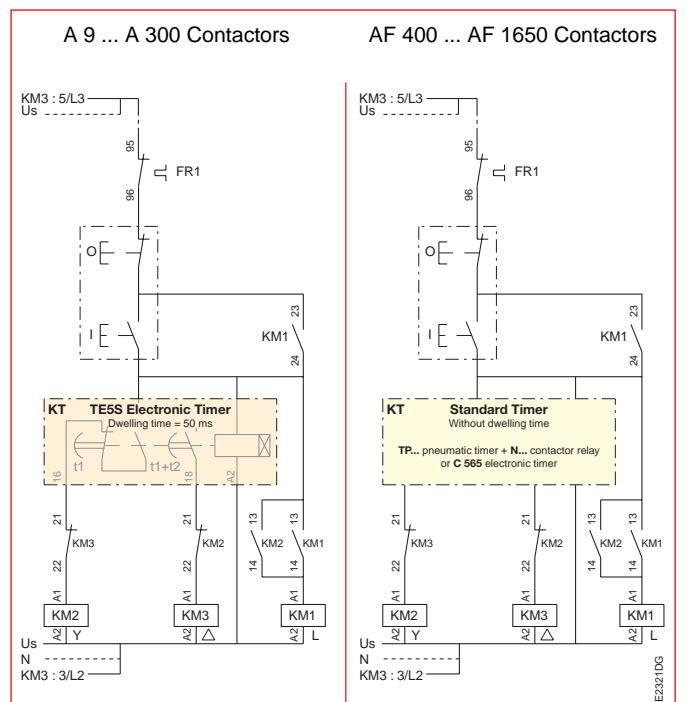
(5) Version with space for mechanical interlock.

(6) Use AF 1350 in case of mechanical interlock.

Power circuit diagram



Control circuit diagrams - Remote control



Control of Three-Phase Slip-Ring Motors

Contactor Selection

General

Three kinds of contactors are used to control three-phase slip-ring motors: the **stator contactor**, the **acceleration contactor(s)** and the **rotor short-circuit contactor**. Refer to the diagram opposite.

The selection tables below concern complete smooth starting, excluding specific cases, such as: intermittent operation, regenerative current, controlled slipping, etc. for which you need to consult our specialised departments.

The starting and breaking technical data for slip-ring motors are defined in standard IEC 60947-4-1 in the AC-2 utilization category.

The load factor is defined by the equation:
$$L. F. (\%) = \frac{\text{Operating cycle}}{\text{Cycle time (Operating cycle + Rest cycle)}} \times 100$$

Stator Contactor

Closing of the starting current, conditioned by the value of the rotor resistances: it may reach 1.5 to 4 times rated motor operational current.

Breaking of the rated operational current, or of the starting current, with possible regenerative current.

The following table gives the **permissible values of the I_e / AC-2 rated operational stator current**, as a function of load factor.

Temperature of 55 °C maximum near the contactor.

Maximum switching frequency and Electrical durability in AC-2 category: see "Technical Data".

Contactors			A 9	A 12	A 16	A 26	A 30	A 40	A 50	A 63	A 75	A 95	A 110	
Load factor	15%	I_e / AC-2 A	13.5	19	26	35	50	55	70	95	125	200	220	
	25%	I_e / AC-2 A	12	17	23	32	45	50	63	85	110	165	185	
	40%	I_e / AC-2 A	10.5	15	19.5	27	39	42	54	73	95	135	150	
	60%	I_e / AC-2 A	9.5	13	17.5	24	34	37	48	65	85	120	135	
S7 acc. to IEC 34-1: periodical continuous duty with electrical braking			A	9	12	17	26	32	35	45	60	75	96	110

Acceleration Contactors

The sizing of these contactors is based on the AC-1 rated operational current (see "Technical Data") that we recall below for the **maximum ambient temperature of 55 °C**. **Delta connection** of these contactors is considered (reduce currents by 35% if star connection is used).

The table opposite lists the **factors to be applied to the AC-1 current** of the contactors in order to obtain the permissible limit value of the motor rated operational rotor current. This table takes into account the number of cycles an hour (without inching) and the current flow time per cycle, in the contactor.

Number of cycles an hour	1	3	6	12	20	30	60	120
Current flow time per cycle	Factors applicable to I_e / AC-1							
5 s	5.2	4.9	4.7	4.3	4.0	3.7	3.4	2.8
10 s	3.8	3.6	3.4	3.1	3.0	2.8	2.6	2.2
20 s	2.8	2.7	2.6	2.5	2.4	2.2	2.0	1.6
30 s	2.4	2.3	2.2	2.1	2.1	1.9	1.7	–
40 s	2.2	2.1	2.0	1.9	1.9	1.7	1.5	–
60 s	1.9	1.8	1.8	1.7	1.7	1.5	–	–

Contactors			A 9	A 12	A 16	A 26	A 30	A 40	A 50	A 63	A 75	A 95	A 110	
Rated operational current I_e / AC-1 for air temperature near the contactor \leq 55 °C			A	22	25	27	40	55	60	85	95	105	135	145

Rotor Short-Circuit Contactor

The duty of this contactor is characterised by small closing stresses. The decisive factor is the thermal stress. **Delta connection** of the contactor is considered (reduce currents by 35% if star connection is used).

The following table gives the **permissible values of the rated operational rotor current**, as a function of load factor.

Temperature: 55 °C maximum near the contactor.

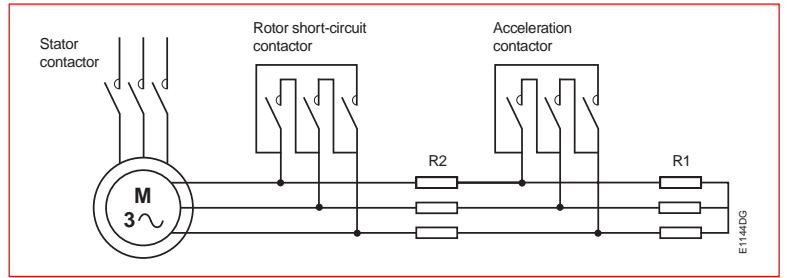
Contactors			A 9	A 12	A 16	A 26	A 30	A 40	A 50	A 63	A 75	A 95	A 110	
Load factor	15%	A	45	58	70	105	112	125	160	210	245	290	330	
	25%	A	40	51	63	93	102	115	140	180	215	260	300	
	40%	A	35	42	54	80	87	95	120	155	185	230	260	
	60%	A	30	39	47	70	76	86	110	140	163	200	230	
S7 acc. to IEC 34-1: periodical continuous duty with electrical braking			A	28	35	40	58	72	85	100	130	152	170	200
Rated operational rotor voltage:														
– Maximum values for starting and breaking			V	1100 (1320 if star connection)								2200 (2600)		
– Maximum values for starting and electrical braking			V	550 (600 if star connection)								690 (730)		

Control of Three-Phase Slip-Ring Motors

Contactor Selection

Example of a Three-Stroke Starter

- The first stroke corresponds to energisation of the motor by the **stator contactor**: all the resistances are operational in the rotor circuit.
- At the second stroke, the **acceleration contactor** short-circuits the first resistance stack.
- At the third stroke, the **rotor short-circuit contactor** is activated by eliminating the last resistance stack, thus completing the starting period.



The selection table for A 9 ... A 110 contactors can be used for the AL 9 ... AE 110 types.
 The selection table for A 50 ... A 300 contactors can be used for the AF 50 ... AF 300 types.

Contactors			A 145	A 185	A 210	A 260	A 300	AF 400	AF 460	AF 580	AF 750	AF 1350	AF 1650	
Load factor	15%	$I_e / AC-2$ A	335	360	425	530	625	850	950	1150	1500	1720	2100	
	25%	$I_e / AC-2$ A	270	300	350	440	515	680	780	975	1250	1430	1750	
	40%	$I_e / AC-2$ A	215	250	300	370	430	580	650	800	1050	1200	1470	
	60%	$I_e / AC-2$ A	180	220	255	315	370	480	550	700	900	1030	1250	
S7 acc. to IEC 34-1: periodical continuous duty with electrical braking			A	145	185	210	260	305	400	460	580	750	860	1050

Contactors			A 145	A 185	A 210	A 260	A 300	AF 400	AF 460	AF 580	AF 750	AF 1350	AF 1650	
Rated operational current $I_e / AC-1$ for air temperature near the contactor $\leq 55^\circ C$			A	230	250	300	350	400	500	600	700	800	1150	1450

Contactors			A 145	A 185	A 210	A 260	A 300	AF 400	AF 460	AF 580	AF 750	AF 1350	AF 1650	
Load factor	15%	A	540	580	750	830	950	1200	1400	1650	1900	2400	2800	
	25%	A	490	530	650	725	830	1050	1250	1450	1650	2100	2500	
	40%	A	425	460	575	630	720	950	1100	1300	1450	1850	2200	
	60%	A	375	400	500	575	650	810	975	1150	1300	1650	1950	
S7 acc. to IEC 34-1: periodical continuous duty with electrical braking			A	325	350	430	480	550	700	840	980	1150	1500	1800
Rated operational rotor voltage:														
- Maximum values for starting and breaking	V		2200		3000		(2600 if star connection) (3600 if star connection)							
- Maximum values for starting and electrical braking	V		690		(730 if star connection)									

Autotransformer Starters

Contactor Selection

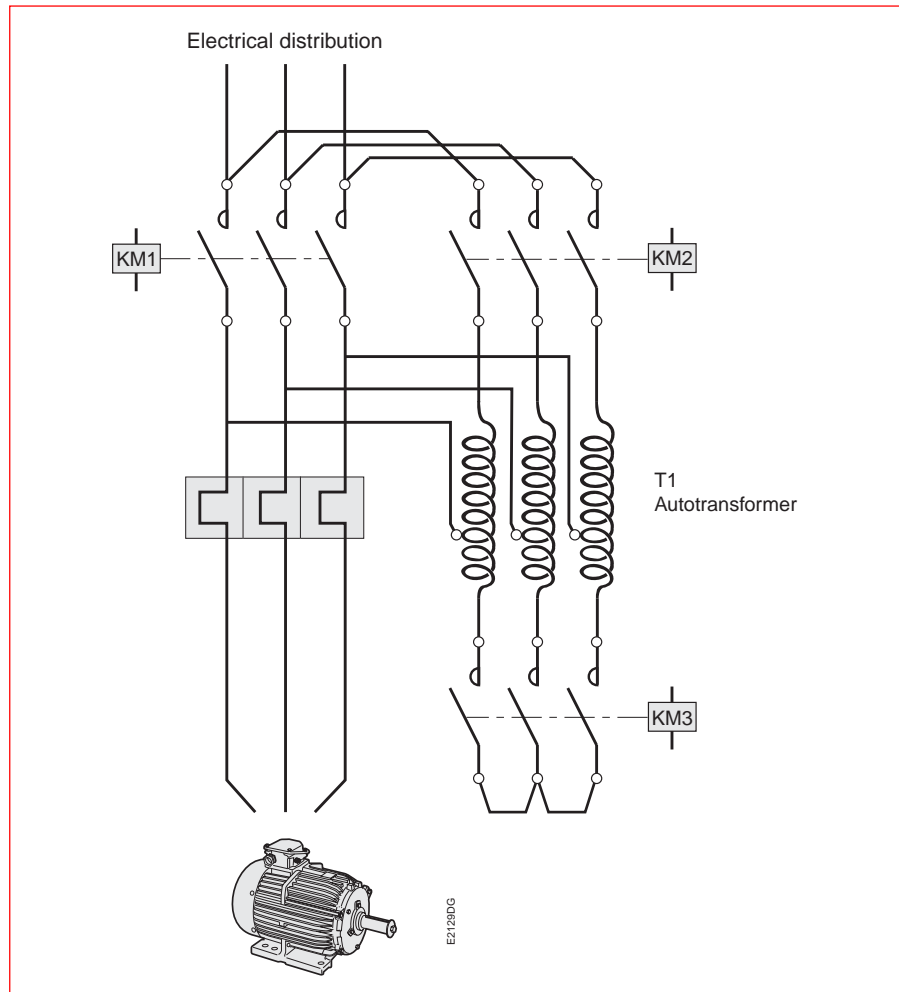
General

An autotransformer starter allows to start a squirrel cage motor with a reduced starting current due to the reduced voltage within the accelerating duration.

At the contrary of the Star-Delta wiring, this autotransformer starting method needs three wires and three terminals on the motor.

At the starting period, the motor is wired to the autotransformer taps: the Star Contactor "KM3" and the Autotransformer Contactor "KM2" are closed, the motor is under reduced voltage. Consequently, the torque is reduced as the square of the applied voltage. The autotransformers are generally equipped of three taps at each phase in order to adapt the starting parameters to the field requirements.

When the motor reaches 80 ... 95% of its nominal speed, the Star Contactor opens. Then, the Line Contactor "KM1" is making and the Autotransformer Contactor is opening. This starting process is done without any network interruption.



Selection Table (I_d starting current / I_n nominal current ≤ 8 - Acceleration time $\leq 20s$ - 30 cycles / h max.)

kW Motor ratings 50/60 Hz					Contactors					
220/240 V	380/400 V	415 V	440 V	690 V	Line	Autotransformer taps:				Star
						90%	80%	70%	60%	
4	7.5	7.5	7.5	9	A 16	A 16	A 12	A 9	A 9	A 9
6.5	11	11	11	15	A 26	A 26	A 16	A 16	A 12	A 16
11	18.5	18.5	18.5	22	A 40	A 30	A 26	A 26	A 16	A 26
15	22	22	22	30	A 50	A 40	A 30	A 30	A 26	A 30
18.5	30	30	30	37	A 63	A 50	A 40	A 40	A 26	A 40
22	37	37	37	40	A 75	A 63	A 50	A 40	A 30	A 40
25	45	45	45	55	A 95	A 95	A 63	A 50	A 40	A 50
30	55	55	55	75	A 110	A 110	A 95	A 63	A 50	A 63
45	75	75	75	110	A 145	A 145	A 110	A 95	A 75	A 95
55	90	90	90	132	A 185	A 145	A 145	A 110	A 95	A 95
59	110	110	110	160	A 210	A 185	A 145	A 145	A 95	A 110
80	140	140	140	200	A 260	A 260	A 185	A 145	A 110	A 145
90	160	160	160	250	A 300	A 260	A 210	A 185	A 145	A 185
110	200	220	220	315	AF 400	AF 400	A 260	A 210	A 185	A 185
132	250	250	250	355	AF 460	AF 400	A 300	A 260	A 185	A 210
160	315	355	355	500	AF 580	AF 580	AF 400	A 300	A 210	A 300
220	400	425	450	600	AF 750	AF 750	AF 580	AF 400	A 300	AF 400
257	475	500	560	-	AF 1350	AF 750	AF 580	AF 460	AF 400	AF 460
315	560	600	670	-	AF 1650	AF 1350	AF 750	AF 580	AF 460	AF 580

The selection table for A 9 ... A 110 contactors can be used for the AL 9 ... AE 110 types.
 The selection table for A 50 ... A 300 contactors can be used for the AF 50 ... AF 300 types.

LV/LV Three-phase Transformer Switching

Contactor Selection

AC-6a Utilization Category according to IEC 60947-4-1

General

Switching the primary of 3-phase transformers, on energization of the transformer, is characterized by high current peaks due to the magnetization phenomena. These current peaks are roughly 20 to 30 times the transformer nominal current.

Selection Table

The tables below show the operational ratings for a maximum switching frequency of 60 operating cycles per hour.

Table for 9 to 110 A ratings

a.c. operated contactors	A 9	A 12	A 16	A 26	A 30	A 40	A 50	A 63	A 75	A 95	A 110
a.c. / d.c. operated (electronic coil interface)	–	–	–	–	–	–	AF 50	AF 63	AF 75	AF 95	AF 110
d.c. operated contactors	AL 9	AL 12	AL 16	AL 26	AL 30	AL 40	AE 50	AE 63	AE 75	AE 95	AE 110

Operational power at U_g : 50/60 Hz - according to AC-6a

220/240 V	kVA	4	4	5	9.5	13	15	19	20	22	23	26
380/400 V	kVA	7	7	8	16.5	22	26	33	35	37.5	39	46
415/440 V	kVA	8	8	9	18	24	28.5	36	38	41	43	50
500 V	kVA	9.5	9.5	10.5	21.5	28	34.5	43	46	49	52	60
660/690 V	kVA	12.5	12.5	14	28.5	37	45.5	57	60.5	65	68	80
Max. permissible \hat{I}_{peak}	A	330	330	360	750	1000	1200	1500	1600	1700	1800	2100

Table for 145 to 1650 A ratings

a.c. operated contactors	A 145	A 185	A 210	A 260	A 300	–	–	–	–	–	–
a.c. / d.c. operated (electronic coil interface)	AF 145	AF 185	AF 210	AF 260	AF 300	AF 400	AF 460	AF 580	AF 750	AF 1350	AF 1650
d.c. operated contactors	–	–	–	–	–	–	–	–	–	–	–

Operational power at U_g : 50/60 Hz - according to AC-6a

220/240 V	kVA	35	45	50	55	60	95	100	110	130	160	190
380/400 V	kVA	60	75	90	95	100	165	170	190	240	275	350
415/440 V	kVA	65	80	100	110	115	180	190	210	270	325	390
500 V	kVA	80	100	120	130	140	220	230	250	320	–	–
660/690 V	kVA	105	130	150	170	180	290	300	310	410	–	–
Max. permissible \hat{I}_{peak}	kA	3.0	3.5	4.2	4.6	5.0	7.7	8.4	9.3	12.0	–	–

2

Applications

Lighting Circuit Switching

Contactor Selection

General

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

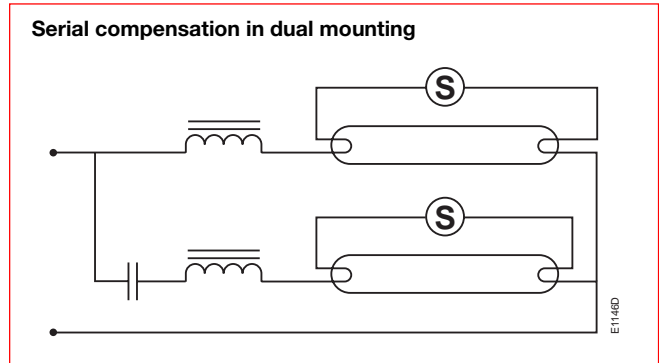
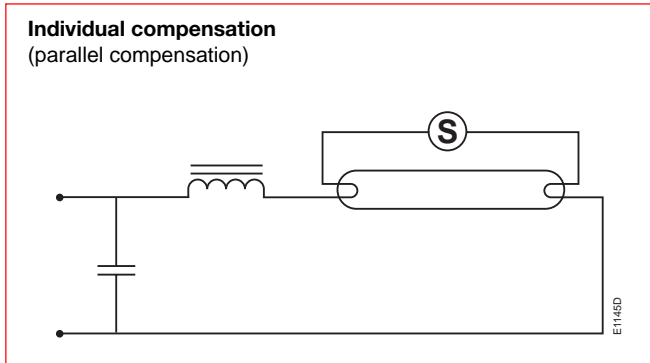
- type, power rating and number of lamps,
- connection mode,
- current values on closing and in steady state,
- power factor,
- presence or not of correction capacitors.

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. gG 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 of Contactors

The following tables indicate, for each contactor type, **the maximum permissible number of lamps per phase**. Air temperature, near the contactor, must be **limited to 55 °C**.

Numbers are given for a **230 V voltage distributed between phase and neutral**: single-phase (phase + neutral) or three-phase (3 phases + neutral) distribution, lamps are wired in star connection.

In the case of a three-phase supply without neutral, 230 V phase-to-phase, the permissible number of lamps per phase will be that given in the tables multiplied by 0.58.

Example: 120 x 100W / 230V incandescent lamps - 400 V three-phase network with distributed neutral.
 Calculate the number of lamps per phase: $120 : 3 = 40$. On the **100 W** line of the incandescent lamp table, contactor A12 is limited to 38 lamps per phase, you must thus **select contactor A 16 which accepts up to 42 lamps per phase**.

The selection table for A 50 ... A 110 contactors can be used for the AF 50 ... AF 110 types.
 The selection table for AL 9 ... AE 110 contactors can be used for the TAL 9 ... TAE 110 types.

Contactor Selection Tool for Lighting Circuit Switching

Tool for selection of the contactors according to the lamp technologies.

Available on the ABB Website:

www.abb.com/lowvoltage

right menu: "Support"

search: "Online Product Selection Tools"

select: "Contactors: Lighting Circuit Switching"



Lighting Circuit Switching

Contactor Selection

Selection Table

a.c. operated contactors			A 9	A 12	A 16	A 26	A 30	A 40	A 50	A 63	A 75	A 95	A 110
d.c. operated contactors			AL 9	AL 12	AL 16	AL 26	AL 30	AL 40	AE 50	AE 63	AE 75	AE 95	AE110
Lamp characteristics			Maximum permissible number of lamps per phase										
W	A	μF											

Incandescent and halogen lamps

according to AC-5b

Voltage: 220/240 V a.c.

60	0.27	–	57	65	70	103	142	155	220	246	272	355	390
100	0.45	–	34	38	42	62	85	93	132	147	163	210	240
200	0.91	–	17	19	20	30	42	46	65	73	80	105	120
300	1.37	–	11	12	13	20	28	30	43	48	53	70	80
500	2.28	–	6	7	8	12	16	18	26	29	32	42	48
1000	4.55	–	3	4	4	6	8	9	13	14	16	21	24

Fluorescent lamps without compensation - Fluorescent lamps with electronic starter

according to AC-5a

Voltage: 220/240 V a.c.

20	0.38	–	40	44	50	73	100	110	157	173	192	250	278
40	0.45	–	33	37	42	62	84	93	133	145	162	210	234
65	0.70	–	21	24	27	40	54	60	85	94	104	135	150
80	0.80	–	18	21	23	35	47	52	75	82	91	118	132
100	1.15	–	13	14	16	24	33	36	52	57	63	82	92
110	1.20	–	12	14	15	23	31	35	50	55	60	79	88

Fluorescent lamps with parallel compensation

according to AC-5a

Voltage: 220/240 V a.c.

20	0.18	5	83	94	105	155	215	233	335	360	400	530	580
40	0.26	5	58	65	75	107	150	160	230	255	280	365	400
65	0.42	7	35	40	45	66	92	100	142	158	173	225	250
80	0.52	7	28	32	36	53	74	80	115	126	140	180	200
100	0.65	16	23	26	29	43	59	64	92	101	112	145	160
110	0.70	18	21	24	27	40	55	59	85	94	104	135	150

Fluorescent lamps in dual mounting

according to AC-5a

Voltage: 220/240 V a.c.

2 x 20	2 x 0.14	–	2 x 54	2 x 62	2 x 67	2 x 99	2 x 137	2 x 148	2 x 214	2 x 236	2 x 260	2 x 336	2 x 375
2 x 40	2 x 0.25	–	2 x 30	2 x 35	2 x 38	2 x 56	2 x 77	2 x 84	2 x 120	2 x 133	2 x 147	2 x 190	2 x 208
2 x 65	2 x 0.40	–	2 x 19	2 x 21	2 x 23	2 x 35	2 x 48	2 x 52	2 x 75	2 x 83	2 x 90	2 x 120	2 x 130
2 x 80	2 x 0.48	–	2 x 16	2 x 18	2 x 19	2 x 29	2 x 40	2 x 43	2 x 62	2 x 68	2 x 76	2 x 100	2 x 110
2 x 100	2 x 0.60	–	2 x 12	2 x 14	2 x 15	2 x 22	2 x 32	2 x 34	2 x 49	2 x 55	2 x 60	2 x 80	2 x 88
2 x 110	2 x 0.65	–	2 x 11	2 x 13	2 x 14	2 x 21	2 x 29	2 x 32	2 x 46	2 x 51	2 x 56	2 x 73	2 x 82

Compact fluorescent lamps

according to AC-5a

Voltage: 220/240 V a.c.

5	0.045	–	342	388	422	622	855	930	1330	1470	1630	2100	2350
7	0.075	–	205	233	252	372	512	558	798	886	978	1250	1400
11	0.105	–	146	166	180	266	366	398	570	632	700	900	1000
15	0.135	–	114	128	140	205	285	310	440	490	540	700	780
20	0.160	–	96	109	118	175	240	262	375	415	458	590	650
23	0.180	–	85	96	105	155	212	230	330	368	408	525	580

Lighting Circuit Switching

Contactor Selection

Selection Table

a.c. operated contactors			A 9	A 12	A 16	A 26	A 30	A 40	A 50	A 63	A 75	A 95	A 110
d.c. operated contactors			AL 9	AL 12	AL 16	AL 26	AL 30	AL 40	AE 50	AE 63	AE 75	AE 95	AE110
Lamp characteristics			Maximum permissible number of lamps per phase										
W	A	μF											

Low pressure sodium vapour lamps without compensation

Voltage: 220/240 V a.c.

35	1.4	–	10	11	12	17	23	26	36	41	45	58	63
55	1.4	–	10	11	12	17	23	26	36	41	45	58	63
90	2.1	–	6	7	8	11	16	17	24	27	30	39	42
135	3.1	–	4	5	5	8	11	12	16	18	20	26	28
180	3.1	–	4	5	5	8	11	12	16	18	20	26	28

Low pressure sodium vapour lamps with parallel compensation

Voltage: 220/240 V a.c.

35	0.6	20	21	23	25	38	46	50	83	96	104	135	147
55	0.6	20	21	23	25	38	46	50	83	96	104	135	147
90	0.9	25	14	15	17	25	31	33	56	64	69	90	98
135	0.9	45	14	15	17	25	31	33	56	64	69	90	98
180	0.9	45	14	15	17	25	31	33	56	64	69	90	98

High pressure sodium vapour lamps without compensation

Voltage: 220/240 V a.c.

150	1.8	–	6	7	8	11	15	17	23	26	29	38	41
250	3	–	4	4	5	7	9	10	14	16	17	23	25
400	4.4	–	3	3	3	4	6	7	9	10	12	15	17
600	6.2	–	1	2	2	3	4	5	7	8	8	11	12
1000	10.3	–	–	1	1	2	3	3	4	5	5	6	7

High pressure sodium vapour lamps with parallel compensation

Voltage: 220/240 V a.c.

150	1	20	13	14	15	23	28	30	50	58	63	81	88
250	1.5	36	8	9	10	15	18	20	33	38	42	54	59
400	2.5	48	5	5	6	9	11	12	20	23	25	32	36
600	3.3	65	4	4	5	7	8	9	15	17	19	24	27
1000	6.2	100	–	–	–	4	4	5	8	9	10	13	14

High pressure mercury vapour lamps without compensation

Voltage: 220/240 V a.c.

50	0.60	–	18	20	22	33	46	50	70	79	100	125	135
80	0.80	–	14	16	17	25	34	37	53	59	75	95	100
125	1.15	–	10	11	12	17	24	26	37	41	52	65	70
250	2.15	–	5	6	6	9	13	14	20	22	28	35	35
400	3.25	–	3	4	4	6	8	9	13	15	19	23	25
700	5.40	–	2	2	2	4	5	5	8	9	11	14	15
1000	7.50	–	1	1	2	3	4	4	6	6	8	10	11

Voltage: 380/415 V a.c.

2000	8	–	1	1	1	2	3	4	5	6	7	9	10
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High pressure mercury vapour lamps with compensation

Voltage: 220/240 V a.c.

50	0.28	7	39	44	48	71	98	107	150	169	214	270	290
80	0.43	8	25	29	31	46	64	70	99	110	139	170	185
125	0.66	10	16	19	20	30	42	45	64	72	90	110	120
250	1.28	18	8	10	10	16	21	23	33	37	47	57	60
400	2.05	25	5	6	7	10	13	15	21	23	29	34	38
700	3.55	40	3	3	4	6	8	8	12	13	17	20	23
1000	4.83	60	2	2	3	4	6	6	9	10	12	14	16

Voltage: 380/415 V a.c.

2000	5.45	35	2	2	2	3	5	5	8	9	11	13	15
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Lighting Circuit Switching

Contactor Selection

Selection Table

a.c. operated contactors	A 9	A 12	A 16	A 26	A 30	A 40	A 50	A 63	A 75	A 95	A 110	
d.c. operated contactors	AL 9	AL 12	AL 16	AL 26	AL 30	AL 40	AE 50	AE 63	AE 75	AE 95	AE110	
Lamp characteristics	Maximum permissible number of lamps per phase											
W	A	μF										

Metal iodine vapour lamps without compensation

Voltage: 220/240 V a.c.

250	3	–	4	4	5	7	10	11	15	17	19	25	27
400	4	–	3	3	4	5	7	8	11	13	14	18	20
1000	9.5	–	1	1	1	2	3	3	5	5	6	8	8
2000	16.5	–	–	–	1	1	2	2	3	3	3	5	5

Voltage: 380/415 V a.c.

2000	10.5	–	1	1	1	2	3	3	4	5	6	7	8
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Metal iodine vapour lamps with compensation

Voltage: 220/240 V a.c.

250	1.32	33	9	10	11	16	23	25	35	39	44	56	60
400	2.22	45	5	6	7	10	13	15	21	23	26	33	36
1000	5.14	85	2	3	3	4	6	6	9	10	11	14	15
2000	11.5	148	1	1	1	2	2	3	4	4	5	6	7

Voltage: 380/415 V a.c.

2000	6.1	60	2	2	2	3	5	5	7	8	9	12	13
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d.c. Circuit Switching

Contactor Selection

General





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

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



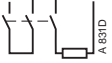

Selection Table - After selection from the ratings quoted in the tables below, please refer to "Ordering Details".

a.c. operated contactors	A 9	A 12	A 16	A 26	A 30	A 40	A 45	A 50	A 63	A 75	GA 75
a.c. / d.c. operated (electronic coil interface)	-	-	-	-	-	-	AF 45	AF 50	AF 63	AF 75	-
d.c. operated contactors	AL 9	AL 12	AL 16	AL 26	AL 30	AL 40	AE 45	AE 50	AE 63	AE 75	GAE 75




Utilization category DC-1, $L/R \leq 1$ ms

	≤ 72 V	A	25	27	30	45	55	60	70	100	110	120	120
	110 V	A	10	15	20	-	-	-	-	-	-	-	120
	220 V	A	-	-	-	-	-	-	-	-	-	-	120
	440 V	A	-	-	-	-	-	-	-	-	-	-	100
	600 V	A	-	-	-	-	-	-	-	-	-	-	75
	≤ 72 V	A	25	27	30	45	55	60	70	100	110	120	-
	110 V	A	25	27	30	45	55	60	70	100	110	120	-
	220 V	A	10	15	20	-	-	-	-	-	-	-	-
	≤ 72 V	A	25	27	30	45	55	60	70	100	110	120	-
	110 V	A	25	27	30	45	55	60	70	100	110	120	-
	≤ 72 V	A	25	27	30	45	-	-	70	100	-	120	-
	110 V	A	25	27	30	45	-	-	70	100	-	120	-
	220 V	A	25	27	30	45	-	-	70	100	-	120	-
	≤ 72 V	A	25	27	30	45	-	-	70	100	-	120	-
	110 V	A	25	27	30	45	-	-	70	100	-	120	-
	≤ 72 V	A	25	27	30	45	-	-	70	100	-	120	-
	110 V	A	25	27	30	45	-	-	70	100	-	120	-
	220 V	A	25	27	30	45	-	-	70	100	-	120	-
	440 V	A	10	15	20	-	-	-	-	-	-	-	-

Utilization category DC-3, $L/R \leq 2$ ms

	≤ 72 V	A	25	27	30	45	55	60	70	100	110	120	120
	110 V	A	6	7	8	-	-	-	-	-	-	-	120
	220 V	A	-	-	-	-	-	-	-	-	-	-	100
	440 V	A	-	-	-	-	-	-	-	-	-	-	85
	≤ 72 V	A	25	27	30	45	55	60	70	100	110	120	-
	110 V	A	25	27	30	45	55	60	70	100	110	120	-
	220 V	A	6	7	8	-	-	-	-	-	-	-	-
	≤ 72 V	A	25	27	30	45	55	60	70	100	110	120	-
	110 V	A	25	27	30	45	55	60	70	100	110	120	-
	220 V	A	25	27	30	45	55	60	70	100	110	120	-
	≤ 72 V	A	25	27	30	45	-	-	70	100	-	120	-
	110 V	A	25	27	30	45	-	-	70	100	-	120	-
	220 V	A	25	27	30	45	-	-	70	100	-	120	-
	≤ 72 V	A	25	27	30	45	-	-	70	100	-	120	-
	110 V	A	25	27	30	45	-	-	70	100	-	120	-
	220 V	A	25	27	30	45	-	-	70	100	-	120	-
	440 V	A	6	7	8	-	-	-	-	-	-	-	-

Utilization category DC-5, $L/R \leq 7.5$ ms

	≤ 72 V	A	9	12	16	25	30	40	50	50	63	75	85
	110 V	A	4	4	4	-	-	-	-	-	-	-	85
	220 V	A	-	-	-	-	-	-	-	-	-	-	85
	440 V	A	-	-	-	-	-	-	-	-	-	-	35
	≤ 72 V	A	25	27	30	45	55	60	70	100	110	120	-
	110 V	A	10	15	20	30	45	50	70	80	90	100	-
	220 V	A	4	4	4	-	-	-	-	-	-	-	-
	≤ 72 V	A	25	27	30	45	55	60	70	100	110	120	-
	110 V	A	25	27	30	45	55	60	70	100	110	120	-
	220 V	A	9	12	16	25	30	40	50	50	63	75	-
	≤ 72 V	A	25	27	30	45	-	-	70	100	-	120	-
	110 V	A	25	27	30	45	-	-	70	100	-	120	-
	220 V	A	10	15	20	30	-	-	70	70	-	100	-
	440 V	A	4	4	4	-	-	-	-	-	-	-	-




d.c. Circuit Switching

Contactor Selection




The selection table for AL 9 ... AE 110 contactors can be used for the TAL 9 ... TAE 110 types.

a.c. operated contactors	A 95	A 110	A 145	A 185	A 210	A 260	A 300	-	-	-	-
a.c. / d.c. operated (electronic coil interface)	AF 95	AF 110	AF 145	AF 185	AF 210	AF 260	AF 300	AF 400	AF 460	AF 580	AF 750
d.c. operated contactors	AE 95	AE 110	-	-	-	-	-	-	-	-	-




Utilization category DC-1, L/R ≤ 1 ms

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

Utilization category DC-3, L/R ≤ 2.5 ms

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

Utilization category DC-5, L/R ≤ 15 ms

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

Technical Data

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

>> AC-1 Ampere values pages 2/64, 2/65 >> Accessories section 4 >> Utilization Categories section 7

d.c. Circuit Switching

EK... Contactor Selection

General

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

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

Technical Data

● The tables indicate for the standard contactors the I_e max. operating currents depending on: the utilization category (i.e. L/R) DC-1, DC-3, DC-5 as defined in the IEC 60947-4-1 publication, the operating voltage U_e and the pole coupling details.






Ampere values quoted in the tables below are valid for a $-25 \dots +70$ °C temperature close to the contactors, as long as the **AC-1 Ampere values** for the corresponding ambient temperature **are not exceeded**.

- Max. switching frequency: 300 cycles/h.
- For switching higher d.c. ratings, we recommend the use of bar mounted contactors, R series (63 ... 2000 A).






Selection Table - After selection from the ratings quoted in the tables below, please refer to "Ordering Details".

a.c. / d.c. operated contactors	EK 110	EK 150	EK 175	EK 210	EK 370	EK 550	EK 1000
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


Utilization category DC-1, L/R ≤ 1 ms

 A 821D	≤ 72 V	A	120	145	210	210	370	550	—
	110 V	A	120	145	210	210	370	550	—
 A 830D	≤ 72 V	A	200	200	300	300	550	800	—
	110 V	A	200	200	300	300	550	800	—
	220 V	A	200	200	300	300	550	800	—
 A 831D	≤ 72 V	A	200	200	300	300	550	800	—
	110 V	A	200	200	300	300	550	800	—
	220 V	A	200	200	300	300	550	800	—
	440 V	A	—	—	210	210	450	650	—
 A 832D	≤ 72 V	A	200	200	300	300	550	800	—
	110 V	A	200	200	300	300	550	800	—
	220 V	A	200	200	300	300	550	800	—
	440 V	A	200	200	260	300	450	650	—
 A 833D	≤ 72 V	A	—	—	260	300	450	650	—
	600 V	A	—	—	260	300	450	650	—

Utilization category DC-3, L/R ≤ 2 ms

 A 821D	≤ 72 V	A	120	145	210	210	370	550	—
	110 V	A	135	145	210	210	450	650	—
 A 830D	≤ 72 V	A	135	135	210	210	450	650	—
	110 V	A	135	135	210	210	450	650	—
	220 V	A	135	135	210	210	450	650	—
 A 831D	≤ 72 V	A	135	145	210	210	450	650	—
	110 V	A	135	135	210	210	450	650	—
	220 V	A	135	135	210	210	450	650	—
	440 V	A	—	—	210	210	450	650	—
 A 832D	≤ 72 V	A	135	145	210	210	450	650	—
	110 V	A	135	135	210	210	450	650	—
	220 V	A	135	135	210	210	450	650	—
	440 V	A	135	135	210	210	450	650	—
 A 833D	≤ 72 V	A	—	—	170	210	450	650	—
	600 V	A	—	—	170	210	450	650	—

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

 A 830D	≤ 72 V	A	135	145	210	210	450	650	—
	110 V	A	135	135	210	210	450	650	—
	220 V	A	135	135	210	210	450	650	—
 A 831D	≤ 72 V	A	135	145	210	210	450	650	—
	110 V	A	135	135	210	210	450	650	—
	220 V	A	135	135	210	210	450	650	—
	440 V	A	—	—	210	210	450	650	—
 A 832D	≤ 72 V	A	135	145	210	210	450	650	—
	110 V	A	135	135	210	210	450	650	—
	220 V	A	135	135	210	210	450	650	—
	440 V	A	135	135	210	210	450	650	—
 A 833D	≤ 72 V	A	—	—	170	210	450	650	—
	600 V	A	—	—	170	210	450	650	—

Auxiliary Contacts for Safety Circuits

3-pole Contactors

Mechanically Linked Contact Elements for Contactors

(known as "forced contacts", "positively activated contacts" or "linked contacts").


Definitions from standards: mechanically linked contact elements  according to IEC 60947-5-1, Annex L 3.0.

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

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

The table below gives the contactors that offer mechanically linked auxiliary contacts according to IEC 60947-5-1, Annex L.

Mirror Contacts

Definitions from standards: mirror contact  according to IEC 60947-4-1, Annex F 2.1.

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

The table below indicates the contactors that offer a built-in auxiliary mirror contact.





The **CA 5-13, CA 5-22, CA 5-31, CA 5-04** and **CA 5-01** (respectively 4-pole and 1-pole auxiliary contact blocks) and the **CAL 5-11** (2-pole auxiliary contact block) when fitted on **A 9 ... A 75, AF 45 ... AF 75** or **AL 9 ... AL 40** contactors **have their own N.C. auxiliary mirror contacts**.

The **CAL 18-11** 2-pole auxiliary contact blocks when fitted on **A 95 ... A 300** and **AF 95 ... AF 750** contactors **have their own N.C. auxiliary mirror contacts**.

For **AF 1350, AF 1650** use 2 N.C. auxiliary contacts in series for mirror contact, one **CAL 18-11** on each side of the contactor.

3-pole A... and AL... contactors

+ one CA 5-... 4-pole add-on auxiliary contact block

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

The information provided for **AL** contactors can also be used for **AL..Z...** and **TAL...** contactors.

For each contactor type, see "Accessory Fitting Details".

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 full contact opening of 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 the annex K.

Nevertheless, N.C. auxiliary contacts are designed to have "direct opening action" and are suitable for uses such as lifts / elevators (acc. to EN 81-1).

A... and AF... Contactors AL..., TAL... and AE..., TAE... Contactors

Technical Data

Main Pole - Utilization Characteristics acc. to IEC

Contactor types: A...	9	12	16	26	30	40	45	50	63	75	95	110
AL..., TAL...	9	12	16	26	30	40	-	-	-	-	-	-
AE..., TAE..., AF...	-	-	-	-	-	-	45	50	63	75	95	110
Rated operational voltage U_e max. V	690						1000 (690 for AF... contactors)				1000	
Rated frequency limits Hz	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 mm^2	26	28	30	45	65	65	100	100	125	125	145	160
Rated operational current I_e / AC-1 for air temperature close to contactor $\theta \leq 40^\circ\text{C}$ U_e max. 690 V - 50/60 Hz	25	27	30	45	55	60	70	100	115	125	145	160
$\theta \leq 55^\circ\text{C}$	22	25	27	40	55	60	60	85	95	105	135	145
$\theta \leq 70^\circ\text{C}$ (3)	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 category AC-3 for air temperature close to contactor $\leq 55^\circ\text{C}$												
Max. rated operational current I_e AC-3 (1)												
220-230-240 V	9	12	17	26	33	40	40	53	65	75	96	110
3-phase motors 380-400 V	9	12	17	26	32	37	37	50	65	75	96	110
415 V	9	12	17	26	32	37	37	50	65	75	96	110
440 V	9	12	16	26	32	37	37	45	65	70	93	100
500 V	9	12	14	22	28	33	33	45	55	65	80	100
690 V	7	9	10	17 (4)	21 (4)	25 (4)	25	35	43	46	65	82
1000 V	-	-	-	-	-	-	-	23 (6)	25 (6)	28 (6)	30	30
Rated operational power AC-3 (1)												
220-230-240 V	2.2	3	4	6.5	9	11	11	15	18.5	22	25	30
380-400 V	4	5.5	7.5	11	15	18.5	18.5	22	30	37	45	55
415 V	4	5.5	9	11	15	18.5	18.5	25	37	40	55	59
440 V	4	5.5	9	15	18.5	22	22	25	37	40	55	59
500 V	5.5	7.5	9	15	18.5	22	22	30	37	45	55	59
690 V	5.5	7.5	9	15 (4)	18.5 (4)	22 (4)	22	30	37	40	55	75
1000 V	-	-	-	-	-	-	-	30 (6)	33 (6)	37 (6)	40	40
Rated operational current I_e / AC-8a without thermal O/L relay - U_e 400 V - $\theta \leq 40^\circ\text{C}$	12	16	22	30	40	50	-	63	85	95	120	140
Rated making capacity AC-3	10 x I_e AC-3 acc. to IEC 60947-4-1											
Rated breaking capacity AC-3	8 x I_e AC-3 acc. to IEC 60947-4-1											
Short-circuit protection for contactors without thermal O/L relay - Motor protection excluded (2) $U_e \leq 500$ V a.c. - gG type fuse	25	32	32	50	63		80	100	125	160	160	200
Rated short-time withstand current I_{cw} at 40°C ambient temp., 1 s in free air, from a cold state	250	280	300	400	600		1000				1320	1320
10 s	100	120	140	210	400		650				800	800
30 s	60	70	80	110	225		370				500	500
1 min	50	55	60	90	150		250				350	350
15 min	26	28	30	45	65		110	110	135	135	160	175
Maximum breaking capacity (5) $\cos \varphi = 0.45$ at 440 V $\cos \varphi = 0.35$ for $I_e > 100$ A at 690 V	250			420	820 (5)		900	1300			1160	
	90 (5)			170 (5)	340 (5)		490	630			800	
Heat dissipation per pole I_e / AC-1 I_e / AC-3	0.8	1	1.2	1.8	2.5	3	2.5	5	6.5	7	6.5	7.5
	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	600	1200	300					600 (300 for AF..., AE..., TAE...)	300 (300 for AF..., AE..., TAE...)			
	cycles/h	cycles/h	cycles/h					cycles/h	cycles/h			
Mechanical durability - millions of operating cycles - max. switching frequency	10 (5 for AE... and TAE... contactors)						3600 (300 for AF... contactors)					
	cycles/h						cycles/h					

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m., 50Hz or 1800 r.p.m., 60Hz, 3-phase motors, see "Motor Rated Operational Powers and Currents".
 (2) For the protection of motor starters against short circuits, see "Coordination with Short-circuit Protection Devices".
 (3) Unauthorised for TAL..., TAE... contactors.
 (4) AF... contactors excluded.

(4) AC-3, 690 V values for AL... and TAL... contactors

Types	AL 26	AL 30	AL 40
	TAL 26	TAL 30	TAL 40
Rated current I_e A	13	18	21
Rated power kW	11	15	18.5

(5) Max. breaking capacity for AL... and TAL... contactors

Types	AL 9 ... AL 16	AL 26	AL 30, AL 40
	TAL 9 ... TAL 16	TAL 26	TAL 30, TAL 40
440 V A	250	420	470
690 V A	100	106	175

A... and AF... Contactors

Technical Data

Main Pole - Utilization Characteristics acc. to IEC

Contactor types: A...	145	185	210	260	300	-	-	-	-	-	-	
AF...	145	185	210	260	300	400	460	580	750	1350	1650	
Rated operational voltage U_e max. V	1000		690			1000						
Rated frequency limits Hz	25 ... 400											
Conventional free-air thermal current I_{th} acc. to IEC 60947-4-1, open contactors, $\theta \leq 40^\circ\text{C}$	250	275	350	400	500	600	700	800	1050	1350	1650	
with conductor cross-sectional area (3) mm²	120	150	185	240	300 ⁽⁵⁾	2 x 185	2 x 240	2 x 240	2 x 50x8 ⁽⁴⁾	2 x 100x5 ⁽⁴⁾	3 x 100x5 ⁽⁴⁾	
Rated operational current I_e / AC-1 for air temperature close to contactor												
U_e max. 690 V - 50/60 Hz	$\theta \leq 40^\circ\text{C}$ A $\theta \leq 55^\circ\text{C}$ A $\theta \leq 70^\circ\text{C}$ A	250	275	350	400	500 ⁽⁵⁾	600	700	800	1050	1350	1650
		230	250	300	350	400	500	600	700	875	1150	1450
		180	180	240	290	325	400	480	580	720	1000	1270
U_e max. 1000 V - 50/60 Hz	$\theta \leq 40^\circ\text{C}$ A $\theta \leq 55^\circ\text{C}$ A $\theta \leq 70^\circ\text{C}$ A	180	200	-	-	-	600	700	800	1000	1350	1650
		180	200	-	-	-	500	600	700	875	1150	1450
		180	180	-	-	-	400	480	580	720	1000	1270
with conductor cross-sectional area mm²	120	150	185	240	240 ⁽⁵⁾	2 x 185	2 x 240	2 x 240	2 x 50x8 ⁽⁴⁾	2 x 100x5 ⁽⁴⁾	3 x 100x5 ⁽⁴⁾	
Utilization category AC-3 for air temperature close to contactor $\leq 55^\circ\text{C}$												
Max. rated operational current I_e AC-3⁽¹⁾												
220-230-240 V	A	145	185	210	260	305	400	460	580	750	860	1050
3-phase motors 380-400 V	A	145	185	210	260	305	400	460	580	750	860	1050
415 V	A	145	185	210	260	300	400	460	580	750	860	1050
440 V	A	145	185	210	240	280	400	460	580	750	860	1050
500 V	A	145	170	210	240	280	400	460	580	750	800	950
690 V	A	120	170	210	220	280	350	400	500	650	800	950
1000 V	A	80	95	-	-	-	155	200	250	300	-	-
Rated operational power AC-3⁽¹⁾												
220-230-240 V	kW	45	55	59	80	90	110	132	160	220	257	315
1500 r.p.m. 50 Hz 380-400 V	kW	75	90	110	140	160	200	250	315	400	475	560
1800 r.p.m. 60 Hz 3-phase motors												
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												
10 x I_e AC-3 acc. to IEC 60947-4-1												
Rated breaking capacity AC-3												
8 x I_e AC-3 acc. to IEC 60947-4-1												
Short-circuit protection for contactors without thermal O/L relay - Motor protection excluded (2)												
$U_e \leq 500$ V a.c. - gG type fuse	A	315	355	400	500	630	800	1000	Please consult us for coordination with circuit-breaker			
Rated short-time withstand current I_{cw}												
at 40 °C ambient temp.,	1 s	A	1800	2000	2500	3500	4600	7000	10000	12000		
in free air,	10 s	A	1200	1500	1700	2400	4400	6400	8000	10000		
from a cold state	30 s	A	800	1000	1200	1500	3100	4500	6000	7500		
	1 min	A	600	800	1000	1100	2500	3500	4500	5500		
	15 min	A	280	320	400	500	840	1300	1600	2200		
Maximum breaking capacity												
$\cos \varphi = 0.45$ at 440 V	A	1500	2000	2300	2600	3000	4000	5000	6000	7500	10000	12000
($\cos \varphi = 0.35$ for $I_e > 100$ A) 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	
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		60	
- for AC-3	cycles/h	300		300			300		300		60	
- for AC-2, AC-4	cycles/h	150		150			60		60		60	
Mechanical durability												
- millions of operating cycles		5					3					0.5
- max. switching frequency	cycles/h	3600 (300 for AF... contactors)					300					60

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

(4) Dimensions of the bars (in mm).
 (5) For currents above 450 A use 300 mm² and terminal extension / enlargement pieces (LX 300 / LW 300: see "Accessories").



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

(3) Conductors with preparation.

A... and AF... Contactors AL..., TAL... and AE..., TAE... Contactors

Technical Data

Main Pole - Utilization Characteristics acc. to UL/CSA

Contactor types: A...	9	12	16	26	30	40	45	50	63	75	95	110	
AL..., TAL...	9	12	16	26	30	40	-	-	-	-	-	-	
AE..., TAE..., AF...	-	-	-	-	-	-	45	50	63	75	95	110	
NEMA size	00	0	-	1	1P	-	2	2	-	3	-	-	
General use rating													
Amp-rating 600 V A	21	25	30	40	50	60	80	80	90	105	125	140	
3-phase motor rating													
Amp-rating (1)													
	200-208 V A	7.8	11	17.5	25.3	32.2	32.2	48.3	48.3	62.1	78.2	92	92
	220-240 V A	6.8	9.6	15.2	28	28	42	54	54	68	80	80	104
	440-480 V A	7.6	11	14	27	34	40	52	52	77	77	77	96
	550-600 V A	9	11	17	27	32	41	52	52	77	77	77	99
Motor power (1)													
	200-208 V hp	2	3	5	7.5	10	10	15	15	20	25	30	30
	220-240 V hp	2	3	5	10	10	15	20	20	25	30	30	40
	440-480 V hp	5	7.5	10	20	25	30	40	40	60	60	60	75
	550-600 V hp	7.5	10	15	25	30	40	50	50	75	75	75	100
Short-circuit protection for contactors without thermal O/L relay - Motor protection excluded													
Fuse rating A	35	35	60	90	150	150	175	175	200	200	200	200	
Fuse type, 600 V	FRS-R						J						
Max. electrical switching frequency													
- for general use cycles/h	600						600 (300 for AF..., AE...)				300		
- for motor use cycles/h	1200						600 (300 for AF..., AE...)				300		

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

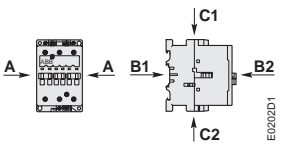
General Technical Data

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

Shock withstand

acc. IEC 60068-2-27 and EN 60068-2-27

Mounting position 1

		1/2 sinusoidal shock for 11 ms: no change in contact position					
		A 9 ... A 40 contactors		AL 9 ... AL 40 contactors TAL 9 ... TAL 40 contactors		A 45 ... A 110 and AF 45 ... AF 110 contactors AE 45 ... AE 110 and TAE 45 ... TAE 110 contactors	
		Closed position	Open position	Closed position	Open position	Closed position	Open position
	Shock direction A	20 g	20 g	20 g	10 g	20 g	20 g
	B1	10 g	5 g	15 g	5 g	10 g	5 g (2)
	B2	15 g	15 g	10 g	10 g	15 g (3)	15 g (3)
	C1	20 g	20 g	20 g	8 g	20 g	20 g
C2	20 g	20 g	14 g	8 g	20 g	20 g	

(1) 55 °C max. for TAL... and TAE... contactors

(2) 3 g for AF 45-22, AE 45-22, AF 75-22 and AE 75-22

(3) 10 g for AF 45-22, AE 45-22, AF 75-22 and AE 75-22

Note : for A 95, AE 95, TAE 95, AF 95 A 110, AE110, TAE110, AF 110 contactors, these values are not valid for rail mounting.

>> Motor Rated Powers and Currents page 0/0
>> Motor Protection section 5



>> Certification - Approvals section 7
>> Conditions for Use page 2/72

>> Mounting Positions page 2/72
>> Dimensions section 9

A... and AF... Contactors

Technical Data

Main Pole - Utilization Characteristics acc. to UL/CSA

Contactor types: A...	145	185	210	260	300	-	-	-	-	-	-	
AF...	145	185	210	260	300	400	460	580	750	1350	1650	
NEMA size	4	-	-	5	-	-	6	-	7	-	8	
General use rating												
Amp-rating 600 V A	230	250	300	350	400	550	650	750	900	1350	1650	
3-phase motor rating												
Amp-rating (1)												
 200-208 V A	119.6	149.5	166.8	220.8	285.2	358.8	414	552	692.3	954	1030	
220-240 V A	130	145	192	248	248	360	480	604	722	954	1030	
440-480 V A	124	156	180	240	302	414	477	590	722	954	1030	
550-600 V A	125	144	192	242	289	382	472	578	672	944	1050	
Motor power (1)												
 200-208 V hp	40	50	60	75	100	125	150	200	250	-	-	
220-240 V hp	50	60	75	100	100	150	200	250	300	400	450	
440-480 V hp	100	125	150	200	250	350	400	500	600	800	900	
550-600 V hp	125	150	200	250	300	400	500	600	700	1000	1150	
Short-circuit protection for contactors without thermal O/L relay - Motor protection excluded												
Fuse rating A	300	400	800					1000	1200	Please consult us for coordination with circuit-breaker		
Fuse type, 600 V	J/K5							L				
Max. electrical switching frequency												
- for general use cycles/h	300										60	
- for motor use cycles/h	300										60	

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

General Technical Data

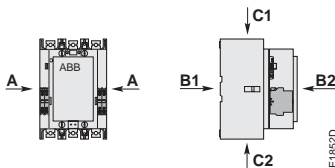
Contactor types: A...	145	185	210	260	300	-	-	-	-	-	-
AF...	145	185	210	260	300	400	460	580	750	1350	1650
Rated insulation voltage U_i											
according to IEC 60947-4-1 V	1000										
according to UL/CSA V	600										
Rated impulse withstand voltage U_{imp} kV	8										
Standards	Devices complying with IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1										
Air temperature close to contactor	see "Conditions for use", for control voltage limits and authorized mounting positions										
- fitted with thermal O/L relay °C	-25 to +55										
- fitted with electronic O/L relay °C	-25 to +70										
- without O/L relay °C	-40 to +70										
- for storage °C	-40 to +70										
Climatic withstand	acc. to IEC 60068-2-30										
Operating altitude m	≤ 3000										

Shock withstand

acc. IEC 60068-2-27 and EN 60068-2-27
Mounting position 1

1/2 sinusoidal shock for 30 ms: no change in contact position

5 g in all directions (A, B1, B2, C1, C2)



>> Motor Rated Powers and Currents page 0/0	>> Certification - Approvals section 7	>> Mounting Positions page 2/73
>> Motor Protection section 5	>> Conditions for Use page 2/73	>> Dimensions section 9

A... and AF... Contactors

Technical Data

Magnet System Characteristics for A... Contactors

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

(1) 50/60 Hz coils: see "Coil Voltage Code Table".

Magnet System Characteristics for AF... Contactors

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

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							
- at 60 Hz	V	24 ... 690							
Coil operating limits acc. to IEC 60947-4-1	0.85 ... 1.1 x U_c (at $\theta \leq 70$ °C) Please also refer to "Conditions for Use"								
Drop-out voltage in % of U_c	approx. 40 ... 65 %								
Coil consumption									
Average pull-in value	50 Hz	VA	550	1350					
	60 Hz	VA	600	1550					
	50/60 Hz (1)	VA/VA	700/650	1700/1550					
Average holding value	50 Hz	VA/W	35/11	60/16					
	60 Hz	VA/W	40/12	65/19					
	50/60 Hz (1)	VA/W	44/13	80/21					
Operating time									
between coil energization and:									
- N.O. contact closing	ms	13 ... 27		17 ... 35					
- N.C. contact opening	ms	8 ... 22		12 ... 30					
between coil de-energization and:									
- N.O. contact opening	ms	5 ... 10		7 ... 13					
- N.C. contact closing	ms	9 ... 13		10 ... 16					

(1) 50/60 Hz coils: see "Coil Voltage Code Table".

Magnet System Characteristics for AF... Contactors

Contactor types: AF...	145	185	210	260	300	400	460	580	750	1350	1650	
Rated control circuit voltage U_c												
- at 50 Hz	V	48 ... 250				48 ... 500				100 ... 250		
- at 60 Hz	V	48 ... 250				48 ... 500				100 ... 250		
- d.c.	V	20 ... 250				24 ... 500				100 ... 250		
Coil operating limits acc. to IEC 60947-4-1	0.85 ... 1.1 x U_c (at $\theta \leq 70$ °C) Please also refer to "Conditions for Use"											
Drop-out voltage in % of U_c min.	55 %											
Coil consumption												
Average pull-in value	50 Hz	VA	430	470	890	850	1900					
	60 Hz	VA	430	470	890	850	1900					
	d.c.	W	500	520	990	950	1700					
Average holding value	50 Hz	VA/W	12/3.5	10/2.5	12/4	12/4.5	48/17					
	60 Hz	VA/W	12/3.5	10/2.5	12/4	12/4.5	48/17					
	d.c.	W	2	2	4	4.5	16					
Operating time												
coil supply between A1-A2												
between coil energization and:												
- N.O. contact closing	ms	30 ... 115				50 ... 120				50 ... 80		
- N.C. contact opening	ms	30 ... 115				50 ... 120				50 ... 80		
between coil de-energization and:												
- N.O. contact opening	ms	25 ... 80				33 ... 70				35 ... 55		
- N.C. contact closing	ms	25 ... 80				33 ... 70				35 ... 55		
control input for PLC's												
between coil energization and:												
- N.O. contact closing	ms	-	-	-	-	40 ... 60	40 ... 90	40 ... 65				
- N.C. contact opening	ms	-	-	-	-	40 ... 60	40 ... 90	40 ... 65				
between coil de-energization and:												
- N.O. contact opening	ms	-	-	-	-	10 ... 30	10 ... 30					
- N.C. contact closing	ms	-	-	-	-	10 ... 30	10 ... 30					

AL..., AE... and TAL..., TAE... Contactors

Technical Data

Magnet System Characteristics for AL... and AE... Contactors

Contactor types: AL...	9	12	16	26	30	40	-	-	-	-	-	-		
AE...	-	-	-	-	-	-	45	50	63	75	95	110		
Rated control circuit voltage U_c V d.c.	12 ... 250 (24 and 48 for AL...Z version)						12 ... 250							
Coil operating limits acc. to IEC 60947-4-1	0.85 ... 1.1 x U_c (at $\theta \leq 55^\circ\text{C}$)										0.85 ... 1.1 x U_c (at $\theta \leq 70^\circ\text{C}$)			
Please also refer to "Conditions for Use"														
Drop-out voltage in % of U_c	approx. 10 ... 30 %						approx. 15 ... 40 %							
Coil consumption - Average values														
- pull-in value	W	3 (2.4 for AL...Z version)			3.5			200			400			
- holding value	W	3 (2.4 for AL...Z version)			3.5			4			2.4			
Coil time constant														
- open	L/R	ms	28			38			3			6		
- closed	L/R	ms	74			62			15			30 ... 40		
Operating time														
between coil energization and:														
- N.O. contact closing	ms	50 ... 100			55 ... 110			13 ... 30			15 ... 25			
- N.C. contact opening	ms	20 ... 70			25 ... 75			10 ... 27			12 ... 22			
between coil de-energization and:														
- N.O. contact opening	ms	10 ... 17 (1)			12 ... 18 (1)			5 ... 15 (1)			15 ... 20 (1)			
- N.C. contact closing	ms	16 ... 27 (1)			18 ... 28 (1)			8 ... 18 (1)			18 ... 23 (1)			

(1) The use of surge suppressors increases the opening time with a factor of 1.1 to 1.5 for a varistor suppressor and a factor of 1.5 to 3 for a diode suppressor.

Magnet System Characteristics for TAL... and TAE... Contactors

Contactor types: TAL...	9	12	16	26	30	40	-	-	-	-	-	-		
TAE...	-	-	-	-	-	-	45	50	-	75	95	110		
Rated control circuit voltage U_c V d.c.	17 ... 264													
Coil operating limits	U_c min. ... U_c max. (at $\theta \leq 55^\circ\text{C}$)										Please also refer to "Conditions for Use"			
Drop-out voltage in % of U_c max.	approx. 9 ... 25 %						approx. 10 ... 35 %							
Coil consumption values for U_c min. ... U_c max.														
- pull-in value	W	2.5 ... 8.5			2.7 ... 9			120 ... 250			250 ... 700			
- holding value	W	2.5 ... 8.5			2.7 ... 9			1.7 ... 6.5			2 ... 7			
Coil time constant														
- open	L/R	ms	28			38			3			6		
- closed	L/R	ms	74			62			15			40		
Operating time														
between coil energization and:														
- N.O. contact closing	ms	50 ... 100			55 ... 110			13 ... 30			15 ... 25			
- N.C. contact opening	ms	20 ... 70			25 ... 75			10 ... 27			12 ... 22			
between coil de-energization and:														
- N.O. contact opening	ms	10 ... 17 (1)			12 ... 18 (1)			5 ... 15 (1)			15 ... 20 (1)			
- N.C. contact closing	ms	16 ... 27 (1)			18 ... 28 (1)			8 ... 18 (1)			18 ... 23 (1)			

(1) The use of surge suppressors increases the opening time with a factor of 1.1 to 1.5 for a varistor suppressor and a factor of 1.5 to 3 for a diode suppressor.

A..., AL..., AL..Z... and TAL... Contactors

Technical Data

Built-in Auxiliary Contacts - Other auxiliary contacts see "Accessories"

Utilization characteristics acc. to IEC

Contactor types: A..., AL..., TAL...	9	12	16	26	30	40
AL..Z...	9	12	16	-	-	-
Rated operational voltage U_e max. V	690					
Conventional free air thermal current I_{th} - θ ≤ 40 °C A	16					
Rated frequency limits Hz	25 ... 400					
Rated operational current I_e / AC-15 according to IEC 60947-5-1						
24-127 V 50/60 Hz A	6					
220-240 V 50/60 Hz A	4					
380-440 V 50/60 Hz A	3					
500 V 50/60 Hz A	2					
690 V 50/60 Hz A	2					
Rated operational current I_e / DC-13 according to IEC 60947-5-1						
24 V d.c. A	6 (144 W)					
48 V d.c. A	2.8 (134 W)					
72 V d.c. A	2 (144 W)					
110 V d.c. A	1.1 (121 W)					
125 V d.c. A	1.1 (138 W)					
220 V d.c. A	0.55 (121 W)					
250 V d.c. A	0.55 (138 W)					
Making capacity acc. to IEC 60947-5-1	10 x I _e / AC-15					
Breaking capacity acc. to IEC 60947-5-1	10 x I _e / AC-15					
Short-circuit protection gG type fuse A	10					
Rated short-time withstand current I_{cw}						
for 1.0 s A	100					
for 0.1 s A	140					
Minimum switching capacity V / mA	17 / 5 (1)					
Non-overlapping time between N.O. and N.C. contacts ms	≥ 2					
Heat dissipation per pole at 6 A W	0.10					

(1) For AL..., AL..Z..., TAL... contactors, failure rate ≤ 10⁻⁷ according to IEC 60947-5-4.

Utilization characteristics acc. to UL/CSA

Contactor types: A..., AL..., TAL...	9	12	16	26	30	40
AL..Z...	9	12	16	-	-	-
Max. rated voltage V	600					
Pilot duty	A 600, P 300					

A... and AF... Contactors

AL..., AE... and TAL..., TAE... Contactors

Technical Data

Mounting Characteristics

Contactor types: A...	9	12	16	26	30	40	45	50	63	75	95	110
AL..., TAL...	9	12	16	26	30	40	-	-	-	-	-	-
AE..., TAE..., AF...	-	-	-	-	-	-	45	50	63	75	95	110
Mounting positions	see "Conditions for use"											
Mounting distances	The contactors can be assembled side by side - Except for TAL... contactors: see "Dimensions"											
Fixing												
on rail	35 x 7.5 mm				35 x 15 mm				75 x 25 mm			
according to IEC 60715, EN 60715	35 x 15 mm				75 x 25 mm				75 x 25 mm			
by screws (not supplied)	2 x M4						2 x M6					

Conditions for Use

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

Contactor types: A...	9	12	16	26	30	40	45	50	63	75	95	110	
AL...	9	12	16	26	30	40	-	-	-	-	-	-	
AE...	-	-	-	-	-	-	45	50	63	75	95	110	
Control voltage / Ambient temperature													
Mounting positions 1, 2, 3, 4, 5	≤ 55 °C		0.85 ... 1.1 x U _c										
	55 ... 70 °C		U _c						0.85 ... 1.1 x U _c				
Mounting pos. 1 ± 30° (unauthorized for AL...Z... types)	≤ 55 °C		0.85 ... 1.1 x U _c										
	55 ... 70 °C		U _c						0.85 ... 1.1 x U _c				
Mounting pos. 6 (Position 6 unauthorized for AL... and AL...Z... types)	≤ 55 °C		0.95 ... 1.1 x U _c										
	> 55 °C		unauthorized										
Contactor types: TAL...	9	12	16	26	30	40	-	-	-	-	-	-	
TAE...	-	-	-	-	-	-	45	50	-	75	95	110	
Control voltage / Ambient temperature													
Mounting positions 1, 1 ± 30°, 2, 3, 4, 5	≤ 55 °C		U _c min. ... U _c max.										
	> 55 °C		unauthorized										
Mounting pos. 6	-		unauthorized										
Contactor types: AF...	-	-	-	-	-	-	45	50	63	75	95	110	
Control voltage / Ambient temperature													
Mounting positions 1, 1 ± 30°, 2, 3, 4, 5	≤ 70 °C		-						0.85 x U _c min. ... 1.1 x U _c max.				
Mounting pos. 6	-		-						unauthorized				

Notes for 4-pole contactors

Whatever the coil voltage: Pos. 5 unauthorized for AL 9-22-00, AL 16-22-00, AL 26-22-00, TAL 9-22-00, TAL 16-22-00, TAL 26-22-00, A 45-22-00, AE 45-22-00, AF 45-22-00, A 75-22-00, AE 75-22-00, AF 75-22-00 contactors.

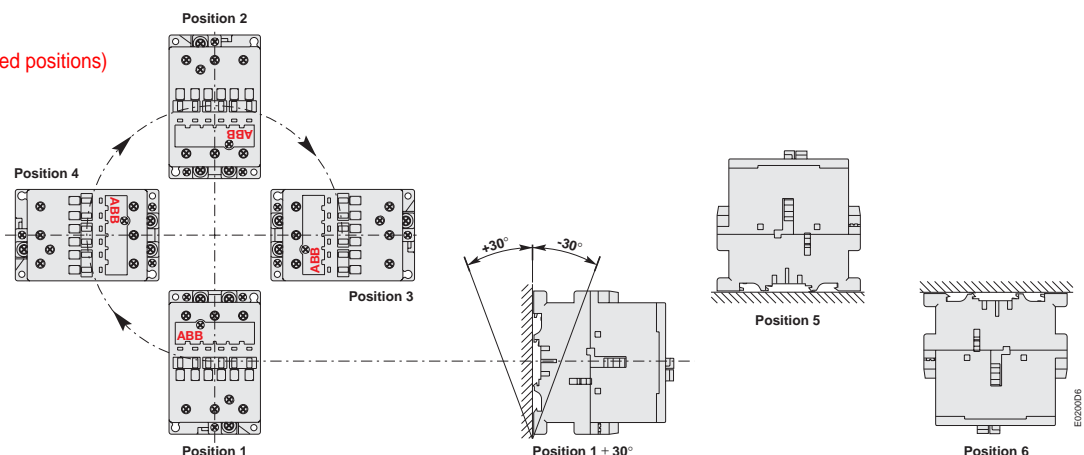
For 60 Hz coil voltage: (only for devices fitted with CA 5-... and CAL 5-11 auxiliary contacts or TP timer)

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

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

Mounting Positions

(see the above table for authorized positions)



A... and AF... Contactors

Technical Data

Mounting Characteristics

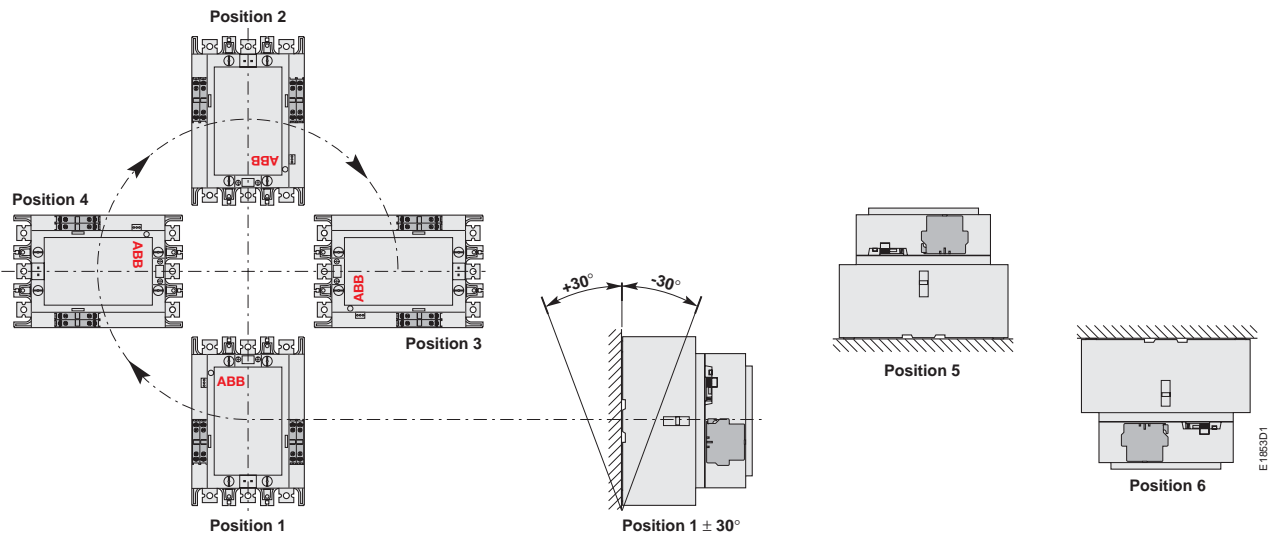
Contactor types: A...	145	185	210	260	300	-	-	-	-	-	-	
AF...	145	185	210	260	300	400	460	580	750	1350	1650	
Mounting positions	see "Conditions for use"											
Mounting distances	No mounting distance required between contactors											
Fixing												
on rail according to IEC 60715, EN 60715	-	-	-	-	-	-	-	-	-	-	-	
by screws (not supplied)	4 x M5				4 x M6				4 x M8			

Conditions for Use

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

Contactor types: A...	145	185	210	260	300	-	-	-	-	-	-
Control voltage / Ambient temperature											
Mounting positions 1, 1 ± 30°, 2, 3, 4, 5	≤ 70 °C					0.85 ... 1.1 x U _c		-		-	
Mounting position 6	-					unauthorized		-		-	
Contactor types: AF...	145	185	210	260	300	400	460	580	750	1350	1650
Control voltage / Ambient temperature											
Mounting positions 1, 1 ± 30°, 2, 3, 4, 5	≤ 70 °C					0.85 x U _c min. 1.1 x U _c max.					
Mounting position 6	-					unauthorized					

Mounting Positions (see the above table for authorized positions)

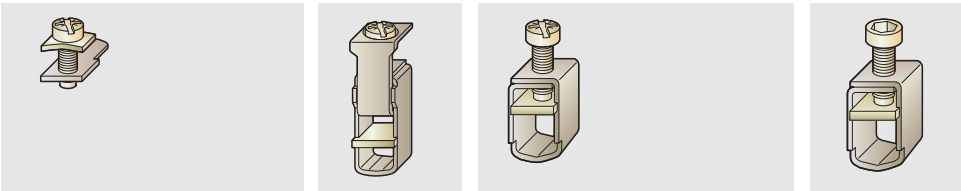


A... and AF... Contactors

AL..., AE... and TAL..., TAE... Contactors

Technical Data

Connecting Characteristics

Contactor types: A...	9	12	16	26	30	40	45	50	63	75	95	110						
AL..., TAL...	9	12	16	26	30	40	-	-	-	-	-	-						
AE..., TAE..., AF...	-	-	-	-	-	-	45	50	63	75	95	110						
Main terminals																		
	with cable clamp			with double connector 2 x (5.6 x 6.5 mm)			with single connector (13 x 10 mm)			with single connector (14 x 14 mm)								
Connecting capacity (min. ... max.)																		
Main conductors (poles)																		
Rigid: solid ($\leq 4 \text{ mm}^2$)	1 x mm ²			1.5...6			2.5...16			6...50			10...95					
stranded ($\geq 6 \text{ mm}^2$)	2 x mm ²			1.5...6			2.5...16			6...25			6...35					
Rigid with connector																		
single for Cu cable	mm ²			-			-			-			-					
single for Al/Cu cable	mm ²			-			-			-			-					
double for Al/Cu cable	mm ²			-			-			-			-					
Flexible with cable end	1 x mm ²			0.75...2.5			0.75...4			2.5...10			6...35			10...70		
	2 x mm ²			0.75...2.5			0.75...4			2.5...10			6...16			6...35		
Bars or lugs	L mm \leq			7.7			10			-			-			30 (2)		
	l mm $>$			3.7			4.2			-			-			6		
Capacity acc. to UL/CSA	AWG			10-18			8-12			4-8			1-8			6-2/0		
Auxiliary conductors (built-in auxiliary terminals + coil terminals)																		
Rigid solid	1 x mm ²			1...4									0.75...2.5					
	2 x mm ²			1...4									0.75...2.5					
Flexible with cable end	1 x mm ²			0.75...2.5						1...2.5			0.75...2.5					
	2 x mm ²			0.75...2.5														
Lugs	L mm \leq			7.7			(1) 8											
	l mm $>$			3.7			(1) 3.7											
Capacity acc. to UL/CSA	AWG			18-14														
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529	Protection against direct contact in acc. with EN 50274																	
- Main terminals	IP 20						IP 10											
- Coil terminals	IP 20																	
- Built-in auxiliary terminals	IP 20						-											
Screw terminals	(delivered in open position, screws of unused terminals must be tightened)																	
Main terminals	(+,-) pozidriv 2 screws																	
	M3.5			M4			M5			M6			hexagon socket M8 (s = 4 mm)					
Coil terminals	M3.5 (+,-) pozidriv 2 screws with cable clamp																	
Built-in auxiliary terminals	(+,-) pozidriv 2 screws with cable clamp																	
	M3.5			M4			M3.5			-			-					
Tightening torque																		
Main pole terminals																		
- recommended	Nm / lb.in			1.00 / 9			1.7 / 15			2.30 / 20			4.00 / 35			6.00 / 53		
- max.	Nm			1.20			2.20			2.60			4.50			6.50		
Coil terminals																		
- recommended	Nm / lb.in			1.00 / 9														
- max.	Nm			1.20														
Built-in auxiliary terminals																		
- recommended	Nm / lb.in			1.00 / 9			1.7 / 15			1.00 / 9			-					
- max.	Nm			1.20			2.20			1.20			-					

(1) L \leq 8 and l $>$ 3.7 for coil terminals - L \leq 10 and l $>$ 4.2 for built-in auxiliary terminals.
(2) With LW 110 enlargement piece: see "Accessories".

A... and AF... Contactors

Technical Data

Connecting Characteristics

Contactor types: A...	145	185	210	260	300	-	-	-	-		
AF...	145	185	210	260	300	400	460	580	750	1350	1650
Main terminals Flat type											
Connecting capacity (min. ... max.) Main conductors (poles)											
Rigid:											
1 x mm ²	-	-	-	-	-	-	-	-	-	-	-
2 x mm ²	-	-	-	-	-	-	-	-	-	-	-
Rigid with connector											
single for Cu cable	6 ... 185	16 ... 240	240	300	-	-	-	-	-	-	-
single for Al/Cu cable	25 ... 150	120 ... 240	240	300	-	-	-	-	-	-	-
double for Al/Cu cable	-	2 x 95 ... 120	2 x 240	3 x 185	-	-	-	-	-	-	-
Flexible											
1 x mm ²	-	-	-	-	-	-	-	-	-	-	-
2 x mm ²	-	-	-	-	-	-	-	-	-	-	-
Bars or lugs											
L mm ≤ 24	8	32	47	52	100						
Ø mm > 8	8	10	10	12	12						
Capacity acc. to UL/CSA	6-250 MCM	(2) 4-500 MCM	2//250-500 MCM	3// 2/0-500 MCM	1/0-750 MCM						
Capacity acc. to AWG											
Auxiliary conductors (coil terminals)											
Rigid solid											
1 x mm ²	1 ... 4										
2 x mm ²	1 ... 4										
Flexible with cable end											
1 x mm ²	0.75 ... 2.5										
2 x mm ²	0.75 ... 2.5										
Lugs											
L mm ≤ 8	3.7										
l mm > 8	3.7										
Capacity acc. to UL/CSA	18-14										
Capacity acc. to AWG											
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529	Protection against direct contact in acc. with EN 50274										
- Main terminals	IP 00										
- Coil terminals	IP 20										
- Built-in auxiliary terminals	-										
Screw terminals											
Main terminals	Screws and bolts										
	M8	M10	M10	M12	M12						
Coil terminals (delivered in open position)	M3.5 (+,-) pozidriv 2 screws with cable clamp										
Built-in auxiliary terminals	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-
Tightening torque											
Main pole terminals											
- recommended	Nm / lb.in	18 / 160	28 / 240	40 / 354	45 / 443	45 / 443					
- max.	Nm	20	30	44	49	49					
Coil terminals											
- recommended	Nm / lb.in	1.00 / 9									
- max.	Nm	1.20									
Built-in auxiliary terminals											
- recommended	Nm / lb.in	-	-	-	-	-	-	-	-	-	-
- max.	Nm	-	-	-	-	-	-	-	-	-	-

EK... Contactors

Technical Data

Main Pole - Utilization Characteristics acc. to IEC

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

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

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

EK... Contactors

Technical Data

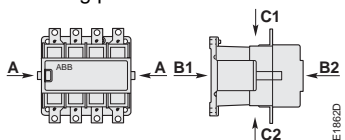
Main Pole - Utilization Characteristics acc. to UL/CSA

Contactor types: EK...			110	150	175	210	370	550	1000
NEMA Size			-	-	-	-	-	-	-
General use rating									
Amp-rating (1)	600 V	A	170	200	250	300	420	540	-
Short-circuit protection									
Fuse rating		A	400				1200		-
Fuse type, 600 V			J				L		-
Max. electrical switching frequency for general use			300						
			cycles/h						

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

General Technical Data

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



>> Motor Rated Powers and Currents page 0/0	>> Certification - Approvals section 7	>> Mounting Positions page 2/79
>> Motor Protection section 5	>> Conditions for Use page 2/79	>> Dimensions section 9

EK... Contactors

Technical Data

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

Contactor types: EK...	110	150	175	210	370	550	1000
Rated control circuit voltage U_c							
– at 50 Hz	V	24 ... 500				48 ... 500	
– at 60 Hz	V	24 ... 600				110 ... 600	
Coil operating limits	θ ≤ 70 °C						
according to IEC 60947-4-1	0.85 ... 1.1 x U _c						
Drop-out voltage in % of U _c	approx. 45 ... 65 % (20 ... 50 % for "E" coil voltage codes)				approx. 45 ... 65 %		
Coil consumption							
Average pull-in value	50 Hz ⁽¹⁾	VA	800	1100	3500		
	60 Hz ⁽¹⁾	VA	900	1200	4000		
	50/60 Hz ⁽²⁾	VA/VA	500/500	630/630	3800/3400		
Average holding value	50 Hz ⁽¹⁾	VA/W	44/15	52/18	125/50		
	60 Hz ⁽¹⁾	VA/W	52/18	65/22	140/60		
	50/60 Hz ⁽²⁾	VA/W	2.5/2.5	2.5/2.5	140/60		
Operating time							
between coil energization and:							
– N.O. contact closing	ms	20 ... 40 ⁽¹⁾ / 30 ... 50 ⁽²⁾				30 ... 60	
– N.C. contact opening	ms	15 ... 35 ⁽¹⁾ / 25 ... 45 ⁽²⁾				25 ... 55	
between coil de-energization and:							
– N.O. contact opening	ms	7.5 ... 15 ⁽¹⁾ / 95 ... 120 ⁽²⁾				10 ... 20	
– N.C. contact closing	ms	10 ... 18 ⁽¹⁾ / 100 ... 125 ⁽²⁾				13 ... 23	

(1) "A" coil voltage codes, see "Coil Voltage Code Table" (2) 50/60 Hz "E" coil voltage codes, see "Coil Voltage Code Table"

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

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

EK... Contactors

Technical Data

Mounting Characteristics

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

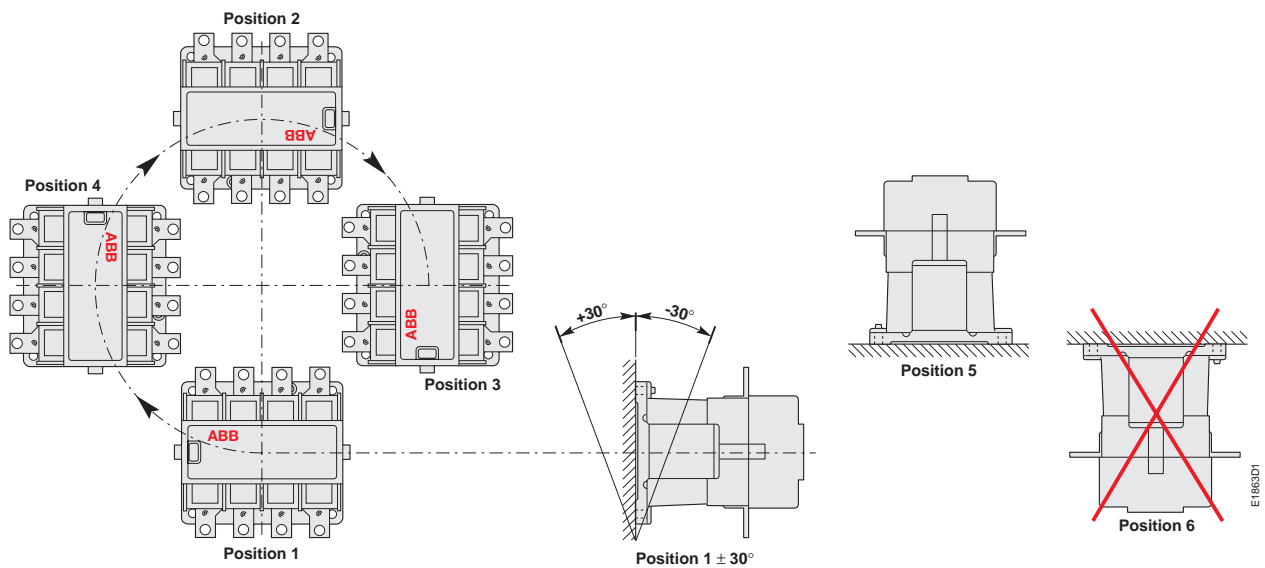
(1) Damping elements are supplied

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.

Contactor types: EK...	110	150	175	210	370	550	1000
Control voltage / Ambient temperature							
Mounting positions 1, 1 ± 30°, 3, 4, 5	0.85 ... 1.1 x U _c						
Mounting position 2	unauthorized				0.85 ... 1.1 x U _c		
Mounting position 6	unauthorized						

Mounting Positions (see the above table for authorized positions)



EK... Contactors

Technical Data

Connecting Characteristics

Contactor types: EK...	110	150	175	210	370	550	1000	
Main terminals Flat type								
Connecting capacity (min. ... max.)								
Main conductors (poles)								
Rigid:								
1 x mm ²	-	-	-	-	-	-	-	
2 x mm ²	-	-	-	-	-	-	-	
Rigid with connector								
single for Cu cable mm ²	25 ... 120	25 ... 185			70 ... 300		-	
single for Al/Cu cable mm ²	10 ... 70	35 ... 120			70 ... 300		95 ... 300	
double for Al/Cu cable mm ²	-	-			2 x 35 ... 185		2 x 95 ... 300	
Flexible								
1 x mm ²	-	-	-	-	-	-	-	
2 x mm ²	-	-	-	-	-	-	-	
Bars or lugs L mm ≤	30	30	33		55			
∅ mm >	6	10	10		10			
Capacity acc. to UL/CSA AWG	8-3/0		6-250 MCM		2,4-500 MCM	3,4-500 MCM	-	
Auxiliary conductors (coil terminals)								
Rigid solid								
1 x mm ²	0.5 ... 2.5							
2 x mm ²	0.5 ... 2.5							
Flexible with cable end								
1 x mm ²	0.5 ... 2.5							
2 x mm ²	0.5 ... 2.5							
Lugs L mm ≤	8							
l mm >	3.7							
Capacity acc. to UL/CSA AWG	18-14						-	
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529	Protection against direct contact in acc. with EN 50274							
- Main terminals	IP 00							
- Coil terminals	IP 20							
Screw terminals								
Main terminals	Screws and bolts							
	M6 M10							
Coil terminals (delivered in open position)	M3.5 (+,-) pozidriv 2 screws with cable clamp							
Tightening torque								
Main pole terminals								
- recommended	Nm / lb.in	5 / 44					18 / 160	
- max.	Nm	6					22	
Coil terminals								
- recommended	Nm / lb.in	1.00 / 9						
- max.	Nm	1.20						

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 next pages, 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.

For the AC-2 applications, the I_e values are given in the "stator contactor table" (see "Control of Three-Phase Slip-ring Motors").

Curve Utilization Mode

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

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

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

- Note the characteristics of the motor to be controlled:
 - Operational voltage U_e
 - Current normally drawn while "motor running" I_e ($U_e / I_e / kW$ relation for motors, see "Motor Rated Operational Powers and Currents").
 - Breaking current for AC-3 $I_c = I_e$
 - Breaking current for AC-4 while "motor accelerating" $I_c = 6 \times I_e$
 - Percentage of AC-4 operating cycles K (on the basis of the total number of operating cycles)
- Define the total number of operating cycles N required.
- Note the smallest contactor rating compatible for AC-3 (U_e / I_e) on Main Pole Utilization Characteristic table (see "Technical Data").
- For the selected contactor make a note of the following in relation to the voltage using diagram AC-3 in next pages:
 - The number of operating cycles A for $I_c = I_e$ (AC-3)
 - The number of operating cycles B for $I_c = 6 \times I_e$ (AC-4)
- Calculate the estimated number of cycles N' (N' is always below A)

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

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

Case of uninterrupted duty.

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.

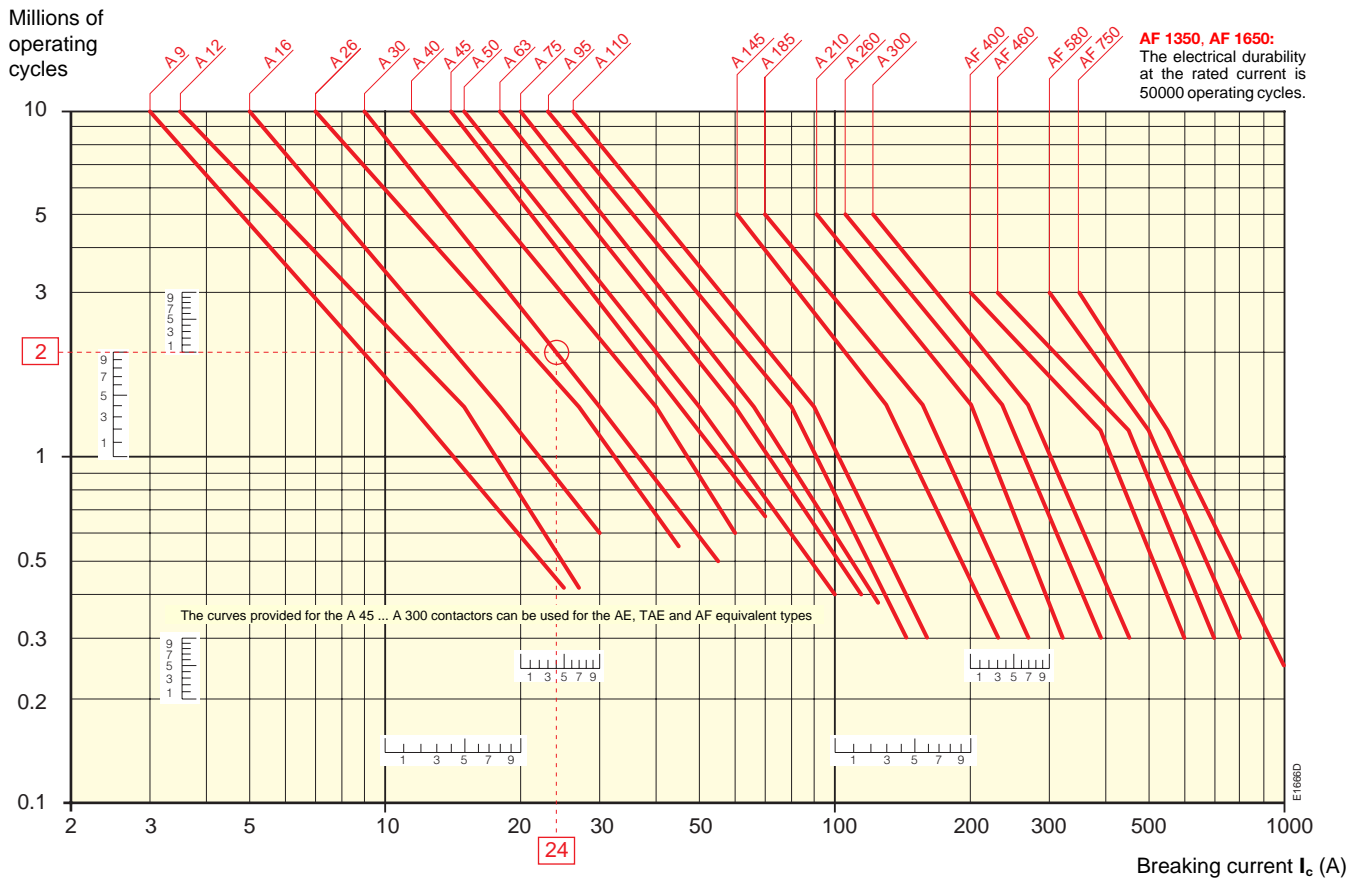
For long term service, some verifications of preventing maintenance are needed to check the functionality of the concerned product (consult us). Over a duration of five years, in these conditions the contactor might present high internal resistance. We recommend to change the contactor or change the contacts.

A... Contactors

Electrical Durability

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

Switching non-inductive or slightly inductive loads. The breaking current I_e for AC-1 is equal to the rated operational current of the load.
 Maximum electrical switching frequency: see "Technical Data".



Example:

$I_e / \text{AC-1} = 24\text{ A}$ – Electrical durability required = 2 million operating cycles.

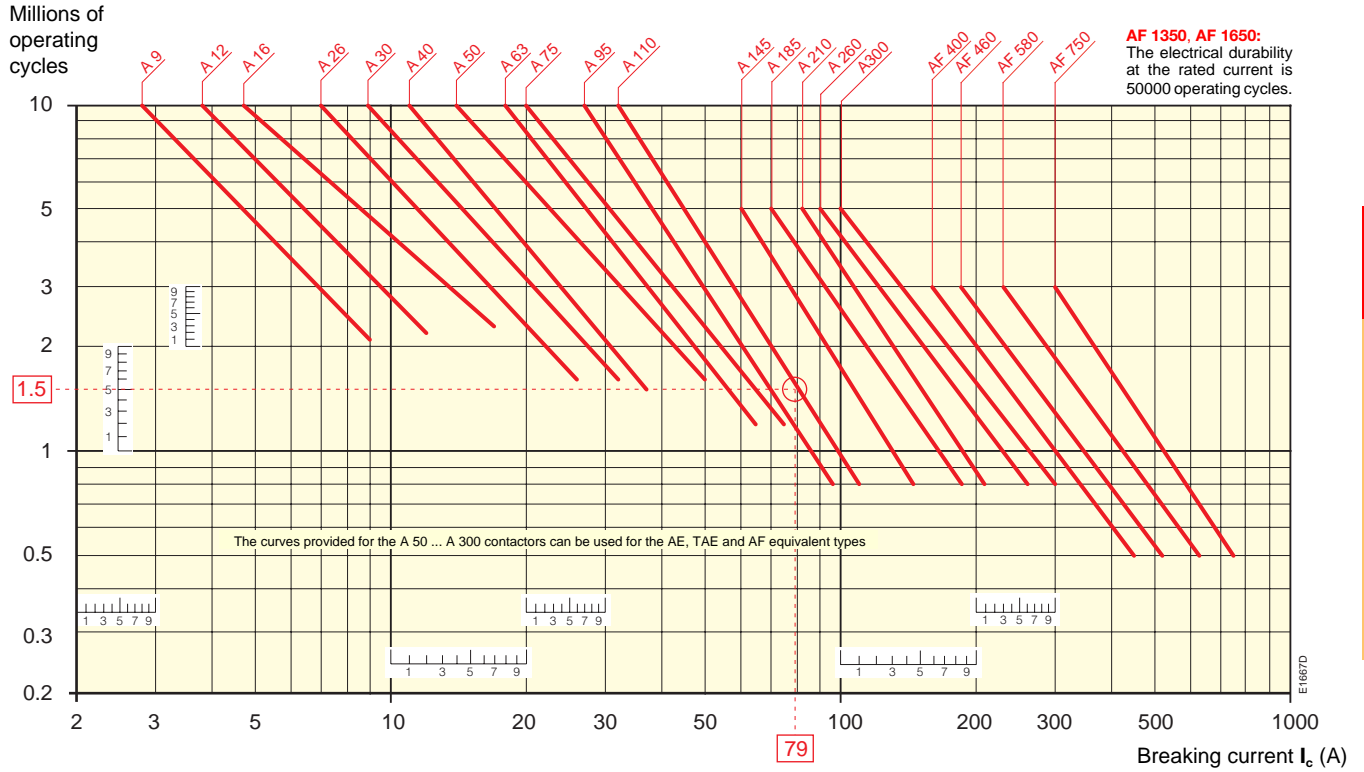
Using the AC-1 curves above select the A 30 contactor at intersection "O" (24 A / 2 million operating cycles).

A... Contactors

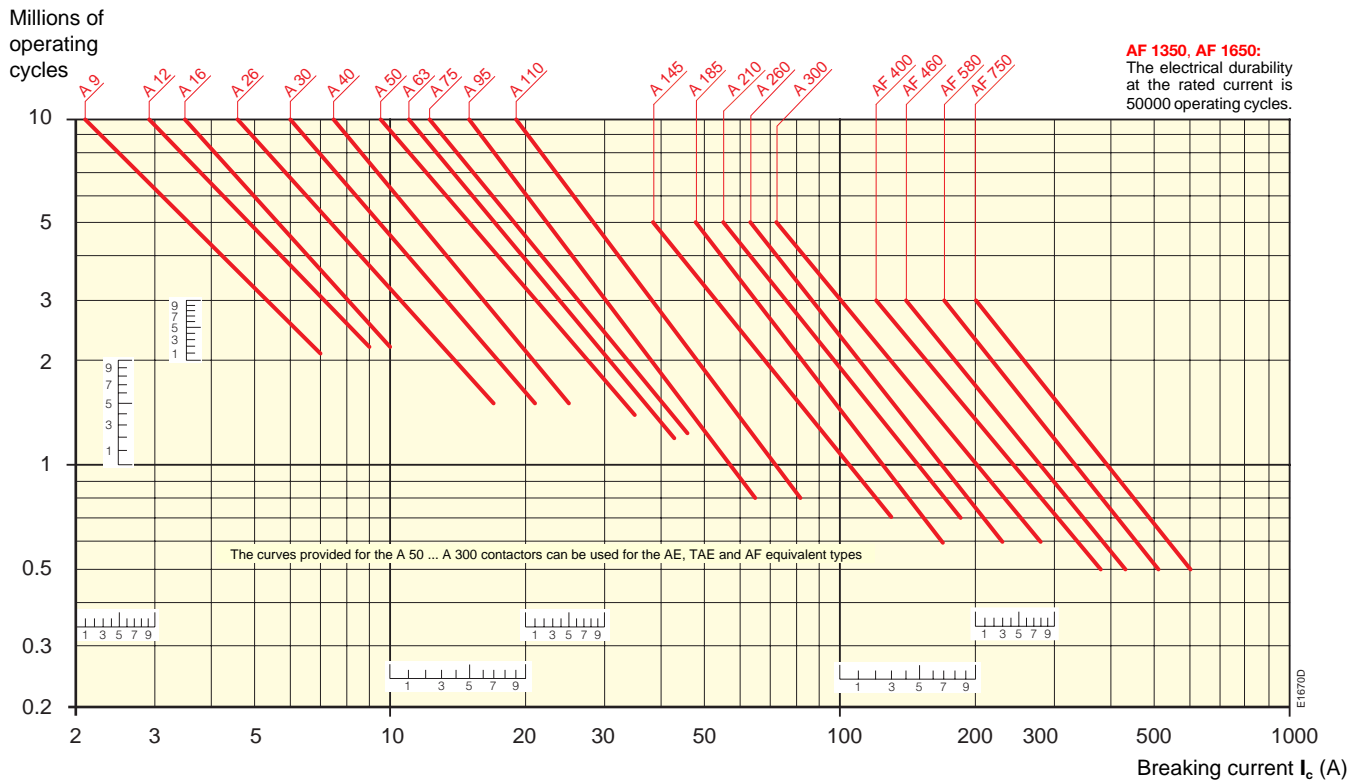
Electrical Durability

Switching cage motors: starting and switching off running motors. The breaking current I_b for AC-3 is equal to the rated operational current I_e ($I_b = \text{motor full load current}$). Maximum electrical switching frequency: see "Technical Data".

Electrical Durability for AC-3 Utilization Category - $U_e \leq 440 \text{ V}$. Ambient Temperature $\leq 55^\circ \text{C}$



Electrical Durability for AC-3 Utilization Category - $440 \text{ V} < U_e \leq 690 \text{ V}$. Ambient Temperature $\leq 55^\circ \text{C}$



Example:

Motor power 40 kW for AC-3 - $U_e = 400 \text{ V}$ and $I_e = 79 \text{ A}$ utilization – Electrical durability required = 1.5 million operating cycles.

For AC-3: $I_b = I_e$. Select the A 110 contactor at intersection "O" (79 A / 1.5 million operating cycles) on the curves (AC-3 - $U_e \leq 440 \text{ V}$).

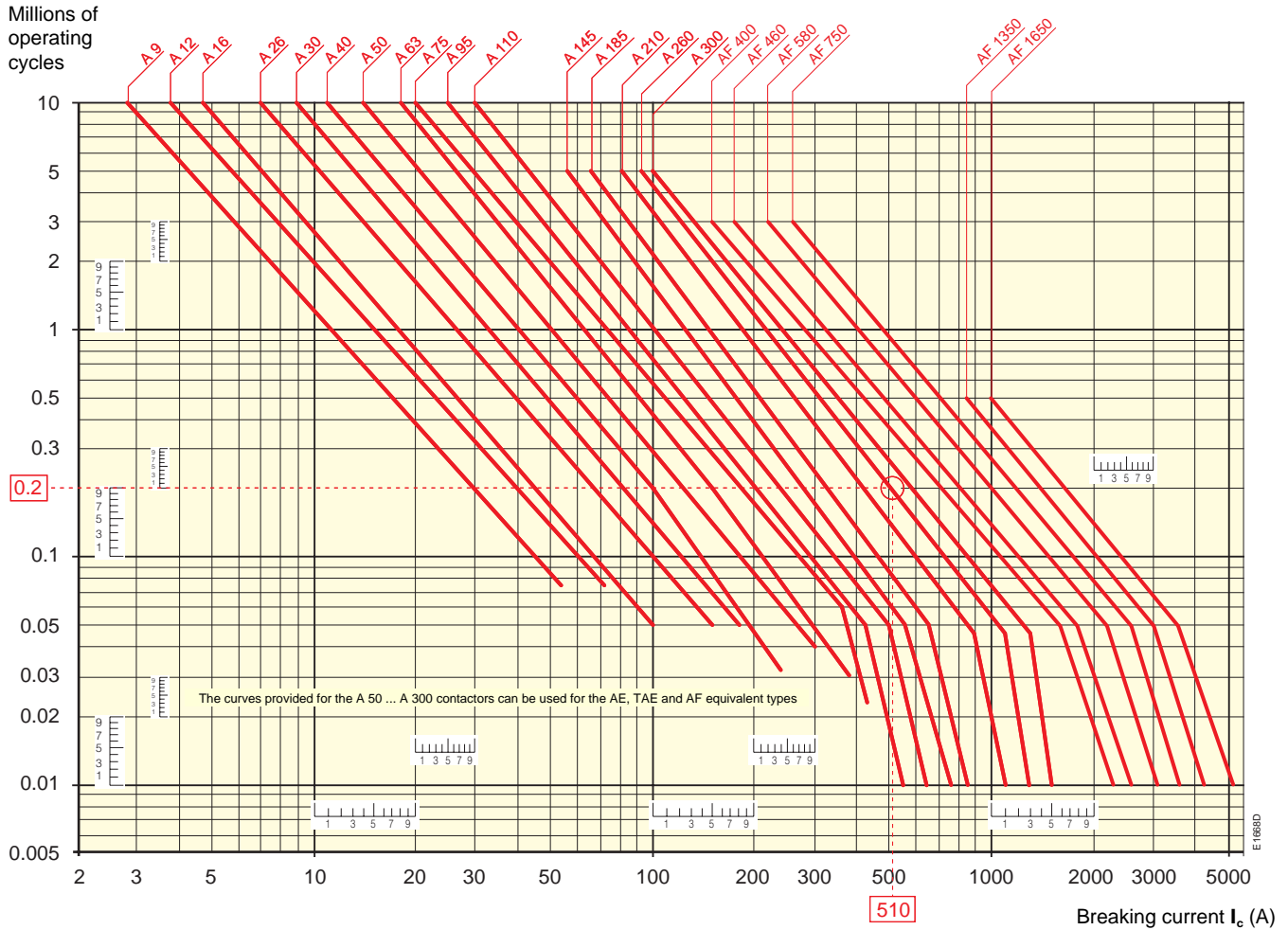
A... Contactors

Electrical Durability

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

Maximum electrical switching frequency: see "Technical Data".

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



Example:

Motor power 45 kW for AC-4 - $U_e = 400$ V and $I_e = 85$ A utilization – Electrical durability required = 0.2 million operating cycles.

For AC-4: $I_c = 6 \times I_e = 510$ A - Select the A 260 contactor at intersection "O" (510 A / 0.2 million operating cycles) on the curves (AC-4 - $U_e \leq 440$ V).

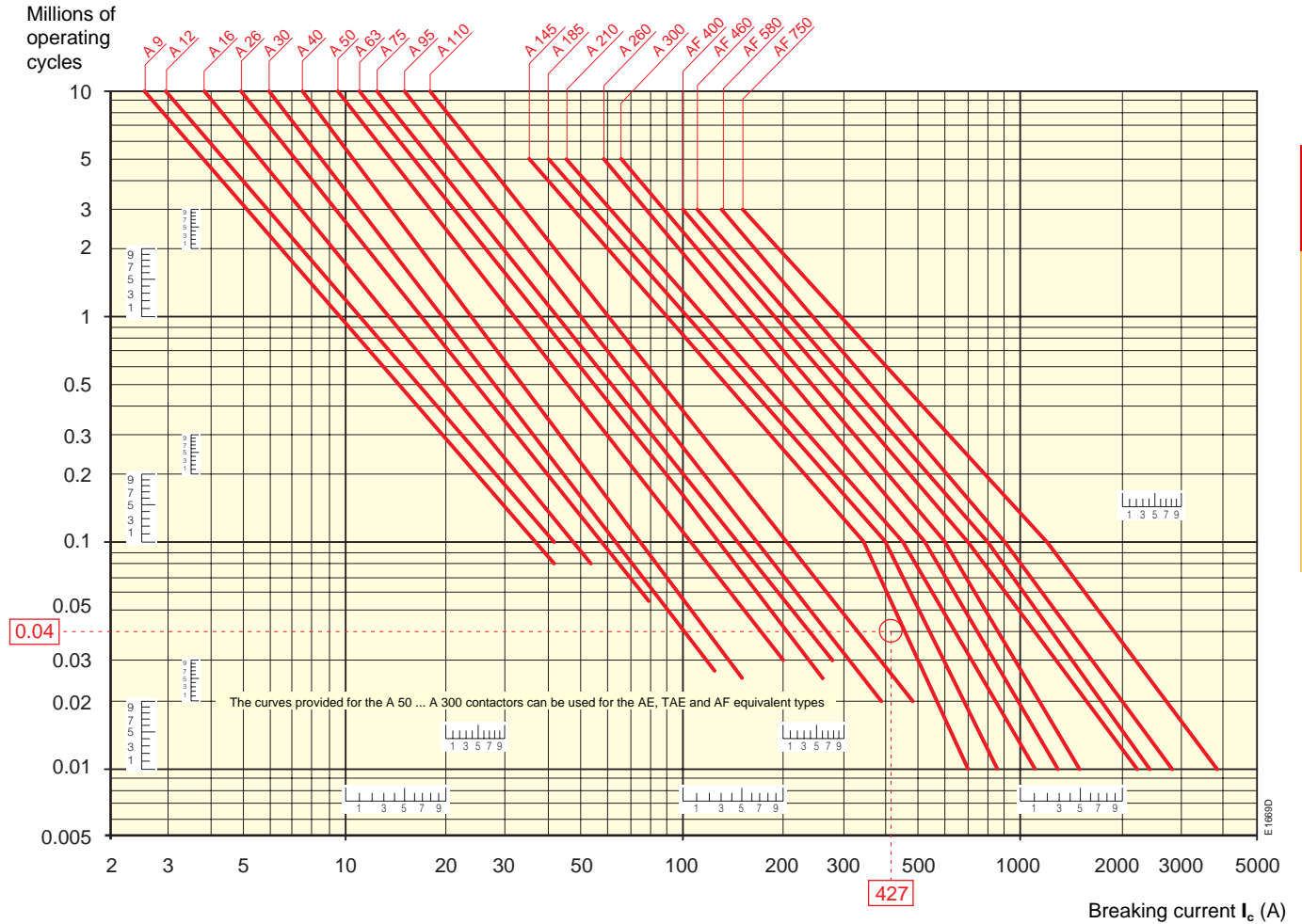
A... Contactors

Electrical Durability

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

Maximum electrical switching frequency: see "Technical Data".

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



Example:

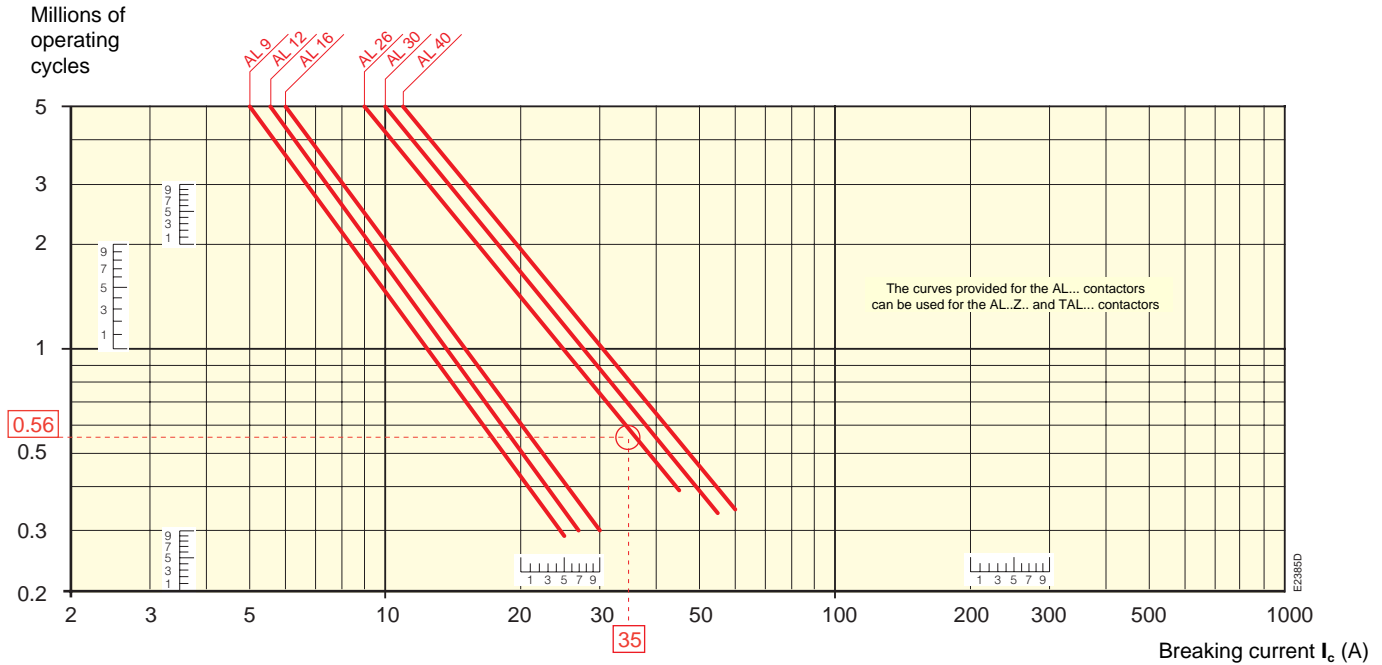
Motor power 59 kW for AC-4 - $U_e = 600\text{ V}$ and $I_e = 71.1\text{ A}$ utilization – Electrical durability required = 0.04 million operating cycles.
 For AC-4: $I_c = 6 \times I_e = 426.6\text{ A}$ - Select the A 145 contactor at intersection "O" (427 A / 0.04 million operating cycles) on the curves (AC-4 - $440\text{ V} < U_e \leq 690\text{ V}$).

AL.. Contactors

Electrical Durability

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

Switching non-inductive or slightly inductive loads. The breaking current I_b for AC-1 is equal to the rated operational current of the load. Maximum electrical switching frequency: see "Technical Data".



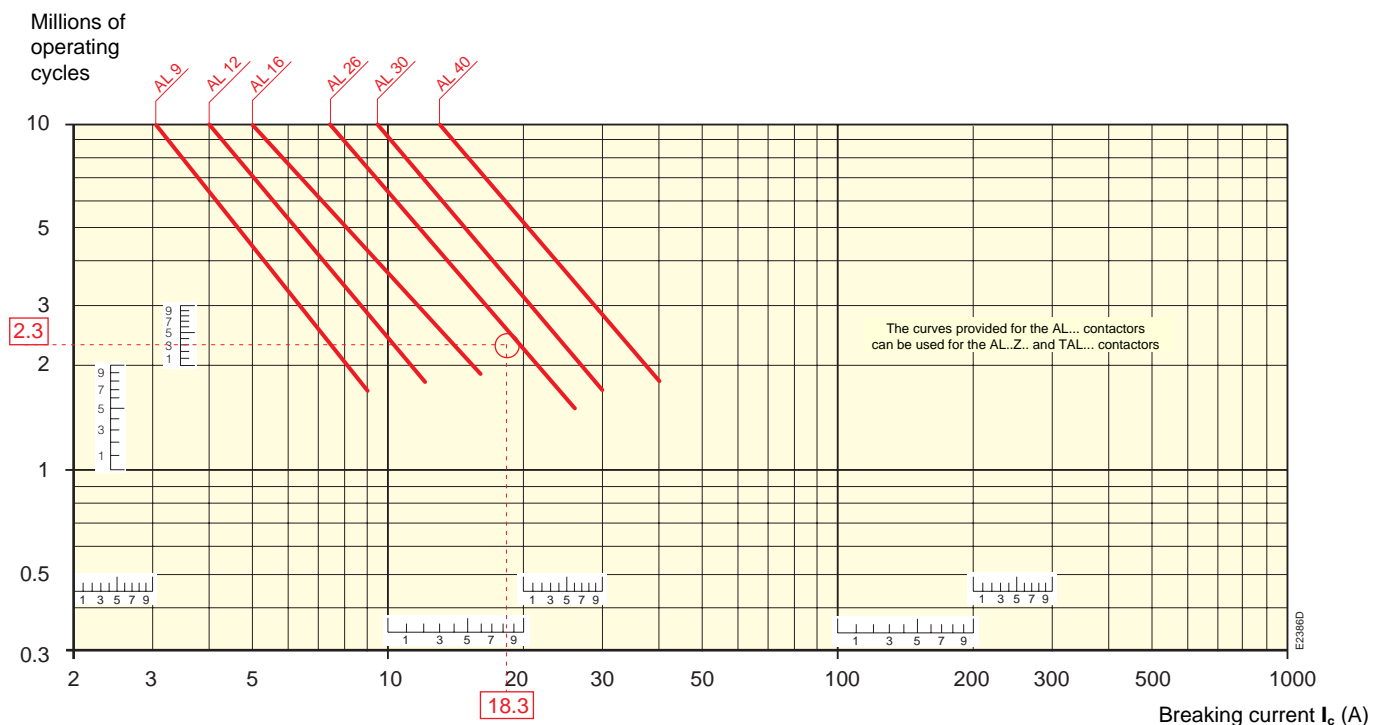
Example:

$I_b / AC-1 = 35 A$ – Electrical durability required = 560 000 operating cycles.

Using the AC-1 curves above select the AL 26 contactor at intersection "O" (35 A / 560 000 operating cycles).

Electrical Durability for AC-3 Utilization Category - $U_e \leq 500 V$. Ambient Temperature $\leq 55^\circ C$

Switching cage motors: starting and switching off running motors. The breaking current I_b for AC-3 is equal to the rated operational current I_e ($I_b = I_e = I_n$, motor full load current). Maximum electrical switching frequency: see "Technical Data".



Example:

Motor power 9 kW for AC-3 - $U_e = 400 V$ and $I_e = 18.3 A$ utilization – Electrical durability required = 2.3 million operating cycles.

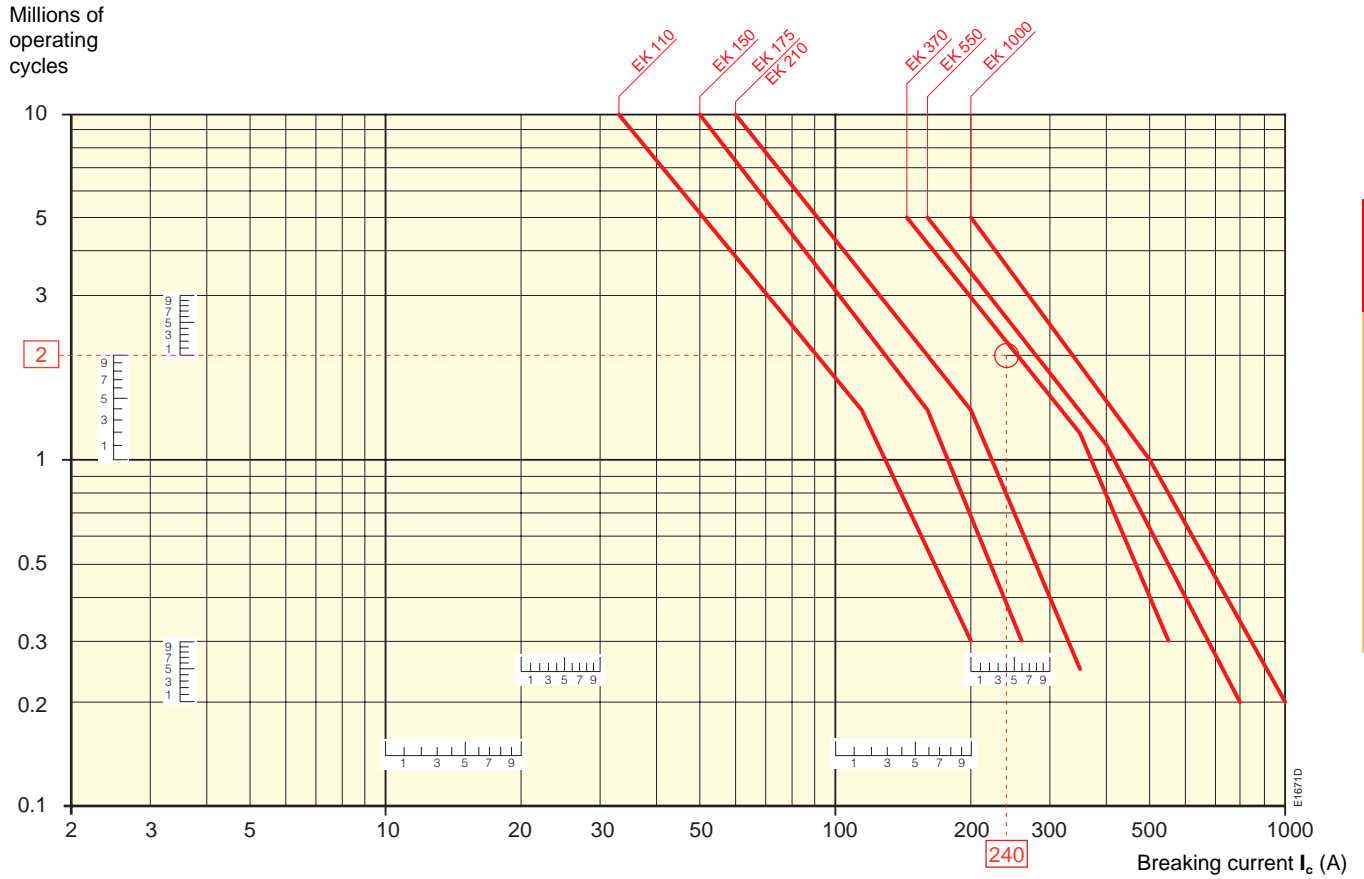
For AC-3: $I_b = I_e$. Select the AL 26 contactor at intersection "O" (18.3 A / 2.3 million operating cycles) on the curves (AC-3 - $U_e \leq 500 V$).

EK... Contactors

Electrical Durability

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

Switching non-inductive or slightly inductive loads. The breaking current I_b for AC-1 is equal to the rated operational current of the load. Maximum electrical switching frequency: see "Technical Data".



Example:

$I_b / \text{AC-1} = 240\text{ A}$ – Electrical durability required = 2 million operating cycles.

Using the AC-1 curves above select the EK 370 contactor at intersection "O" (240 A / 2 million operating cycles).

Influence of the Length of Conductors used in Contactor Control Circuit



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

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

Contactor Closing (contactor with a.c. or d.c. operated coil)

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

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

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

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

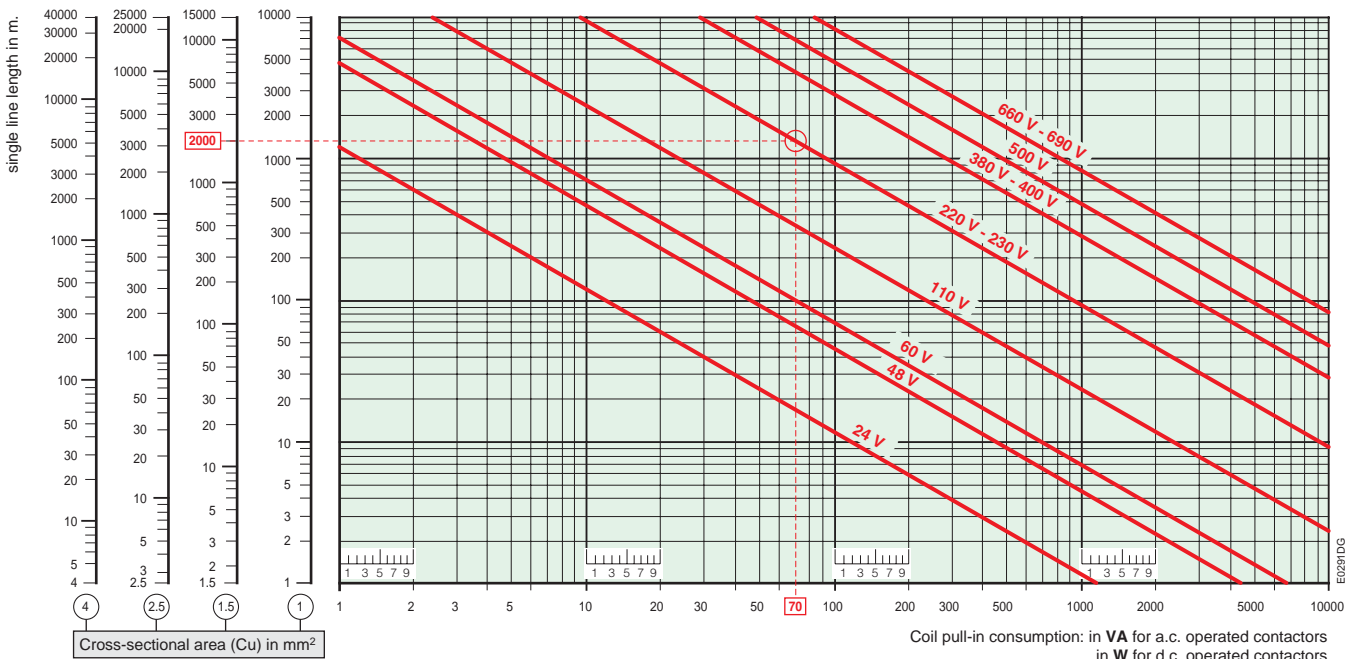
Coil pull-in consumption (average value)

Contactors	a.c. control circuit 50 Hz
A 9, 12, 16	70 VA
A 26, 30, 40	120 VA
A 45, 50, 63, 75	180 VA
A 95, 110	450 VA
A 145, 185	700 VA
A 210, 260, 300	1700 VA
AF 45, 50, 63, 75	210 VA
AF 95, 110	350 VA
AF 145, 185	430 VA
AF 210, 260, 300	470 VA
AF 400, 460	890 VA
AF 580, 750	850 VA
AF 1350, 1650	1900 VA

Contactors	d.c. control circuit
AL 9Z, 12Z, 16Z	2.4 W
AL 9, 12, 16	3 W
AL 26, 30, 40	3.5 W
AE 45, 50, 63, 75	200 W
AE 95, 110	400 W
AF 45, 50, 63, 75	190 W
AF 95, 110	400 W
AF 145, 185	500 W
AF 210, 260, 300	520 W
AF 400, 460	990 W
AF 580, 750	950 W
AF 1350, 1650	1700 W

Permissible single length for the control circuit conductors on contactor closing:

Depending on the coil pull-in power consumption on the supply voltage and on the control circuit conductor cross-sectional area.



Example:

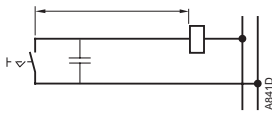
A 9 contactor

Coil voltage: 230 V 50 Hz, contactor coil pull-in power consumption: 70 VA, control circuit conductor cross-sectional area: Cu 1.5 mm².

Max. permissible length: 2000 m.

Influence of the Length of Conductors used in Contactor Control Circuit

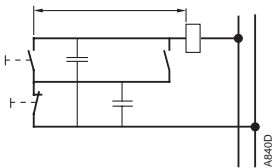
Single control line length



Wiring diagram A

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

Single control line length



Wiring diagram B

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

Contactor Opening (contactor with a.c. operated coil)

Under certain conditions, **an a.c. operated** contactor does not open when the control circuit is de-energized. This is due to a critical capacity of the excessively long control circuit line and the type of contactor coil control layout (see diagrams A and B opposite).

This may be caused by the following factors:

- high control voltage.
- low coil holding consumption.
- low contactor drop-out voltage (according to IEC 60947-4-1: 0.2 to 0.75 x U_c).

If lines longer than those indicated are required, the following measures must be taken:

- select a contactor with a higher rating.
- select a lower control voltage.
- connect "R_p" resistance in parallel with the contactor coil:

$$R_p = \frac{10^3}{C} \quad (\text{with } C \text{ in } \mu\text{F})$$

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

- the coil holding consumption VA.
- the supply voltage.
- the capacity in μF/km (depending on the control layout).

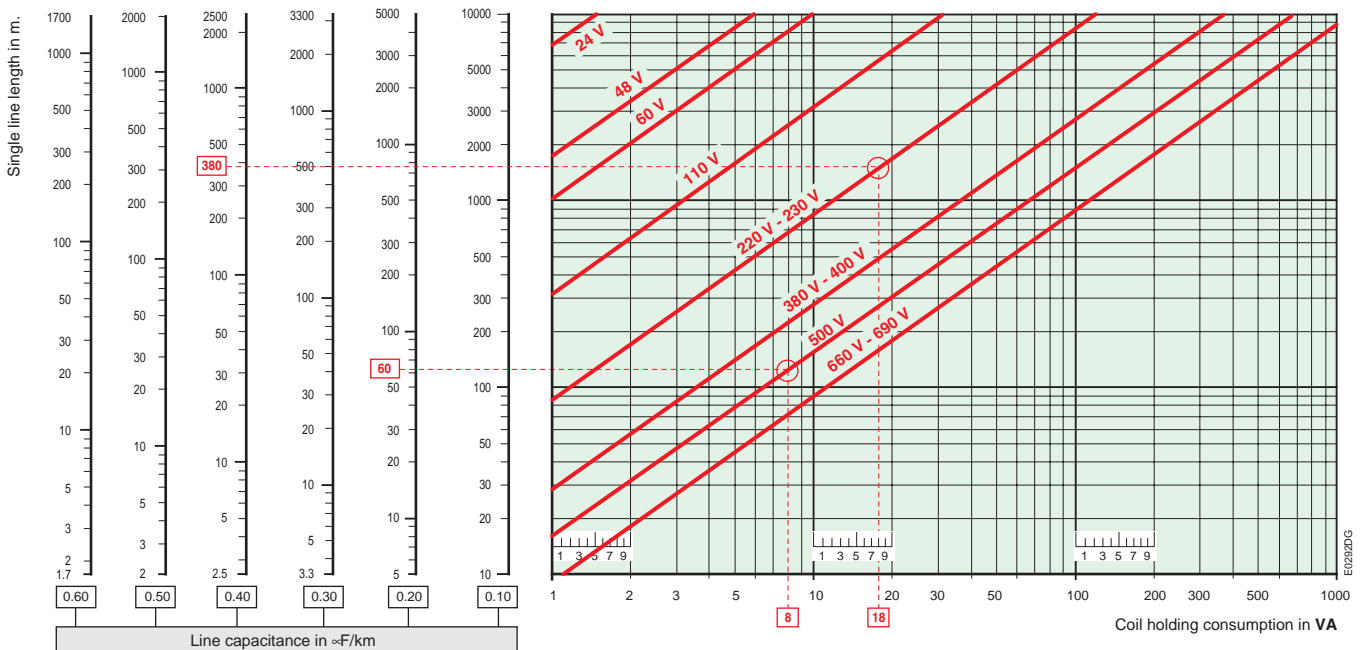
Wiring diagrams **A** and **B** opposite show two supply and coil control wiring examples.

Coil holding consumption (average value)

Contactors	a.c. control circuit 50 Hz	Contactors	a.c. control circuit 50 Hz
A 9, 12, 16	8 VA	AF 45, 50, 63, 75	7 VA
A 26, 30, 40	12 VA	AF 95, 110	7 VA
A 45, 50, 63, 75	18 VA	AF 145, 185	12 VA
A 95, 110	22 VA	AF 210, 260, 300	10 VA
A 145, 185	35 VA	AF 400, 460	12 VA
A 210, 260, 300	60 VA	AF 580, 750	12 VA
		AF 1350, 1650	48 VA

Permissible single length for the control circuit conductors on contactor opening:

Depending on the coil holding power consumption, on the supply voltage and on the control circuit conductor capacity.



Examples:

A 16 contactor

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

Max. permissible length: 60 m.

A 50 contactor

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

Max. permissible length: 380 m.

Parallel Connection of Main Poles

Parallel Connection of Main Poles

Purpose: Increasing the a.c. resistive load.

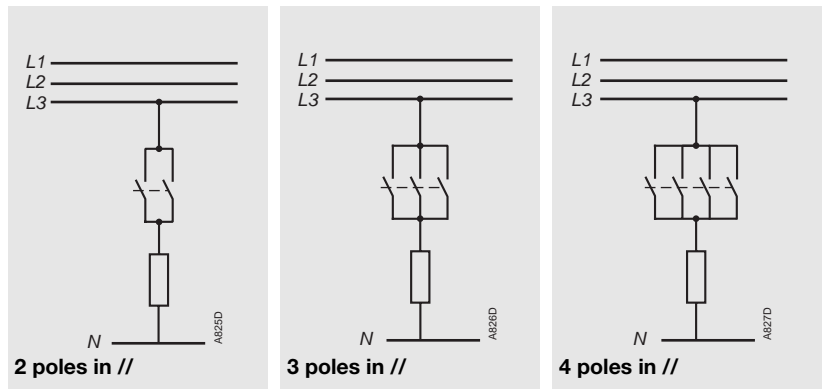
Remarks:

- Parallel connection of main poles to increase the d.c. resistive load is not acceptable.
- Parallel connection of main poles doesn't increase the breaking capacity.

Means: The poles can be connected in parallel via connecting strips: see "Accessories".

- LP and LH for parallel connection of 2 poles,
- LY and LF for parallel connection of 3 poles,
- LG for parallel connection of 4 poles.

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



Contactor	a.c. Operated	d.c. Operated	Cycles / h	Factor to be applied to the rated operational current $I_e / AC-1$ to obtain the permissible current $I_e / AC-1$ with "n" poles in parallel.		
3-pole contactors						
A 9 ... A 75	AL..., TAL...	600	1.6	2.2	–	
AF 50 ... AF 75	AE..., TAE... AF 50 ... AF 75	300	1.6	2.2	–	
A 95 ... A 300 AF 145 ... AF 750	AF 145 ... AF 750	300	1.6	2.2	–	
AF 1350, AF 1650	AF 1350, AF 1650	30	1.6	2.2	–	
4-pole contactors						
A 9 ... A 75	AL..., TAL...	600	1.6	2.2	2.6	
AF 45 ... AF 75	AE..., TAE... AF 45 ... AF 75	300	1.6	2.2	2.6	
EK...	EK...	300	1.6	2.2	2.8	

Temporary or Intermittent Duty

Utilization of Contactors for Temporary / Intermittent Duty

The table below shows the factor (known as "On-Load Factor") to be applied to the rated operational current $I_e / AC-1$ to obtain the permissible operational current $I_e / AC-1$ in relation to the switching frequency and the current flow time per cycle.

Operating cycles per hour	1	2	3	6	12	20	30	60	120
Preferred classes acc. to IEC 60947-4-1	1	-	3	-	12	-	30	-	120
Current flow time per cycle	Factors applicable to $I_e / AC-1$								
5 s	5.2	5	4.9	4.7	4.3	4.0	3.7	3.4	2.8
10 s	3.8	3.7	3.6	3.4	3.1	3.0	2.8	2.6	2.2
20 s	2.8	2.7	2.7	2.6	2.5	2.4	2.2	2.0	1.6
30 s	2.4	2.3	2.3	2.2	2.1	2.1	1.9	1.7	-
40 s	2.2	2.1	2.1	2.0	1.9	1.9	1.7	1.5	-
60 s	1.9	1.8	1.8	1.8	1.7	1.7	1.5	-	-

Example:

A 9 contactor (intermittent duty, resistive load)

Rated operational current $I_e / AC-1$ at 55 °C

(see "Technical Data: Main Pole Utilization Characteristics")

Switching frequency

Current flow time per cycle

Factor to be applied to the current $I_e / AC-1$

Permissible current: $2.7 \times 22 =$

22 A

2 operating cycles/h

20 s

2.7

59 A



Questionnaire for Product Specifications : Block Contactors

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

APPLICATION

Type of load : No of phases

Utilisation category (AC / DC) : %AC4 if any :

Voltage **Un** : **V** **Cos 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 :

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 :

Interface with PLC :

Accessories :

Number of auxiliary contacts : NO : NC

Low level contacts :

INSTALLATION

Ambient temperature : °C

Ambient environment :

Humidity % :

Chemical pollution :

Other :

Mounting position (see drawing) :

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 :

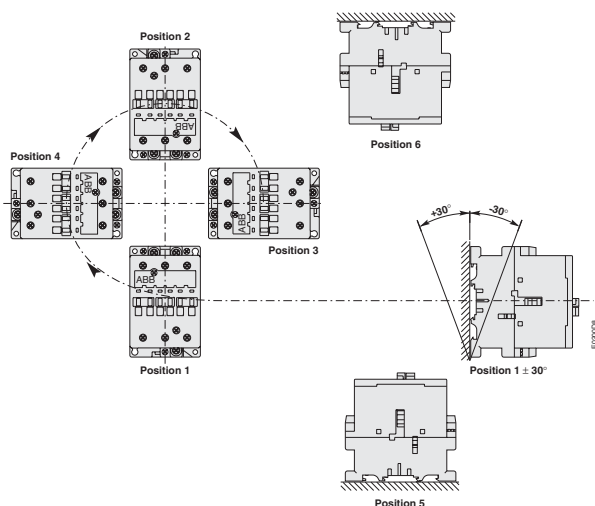
Expected quantity : per Year

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

Please photocopy and forward (see catalogue last back cover page).

Other comments :



Ruled area for writing comments, containing multiple horizontal lines.

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

ABB Entrelec - Control Division - France

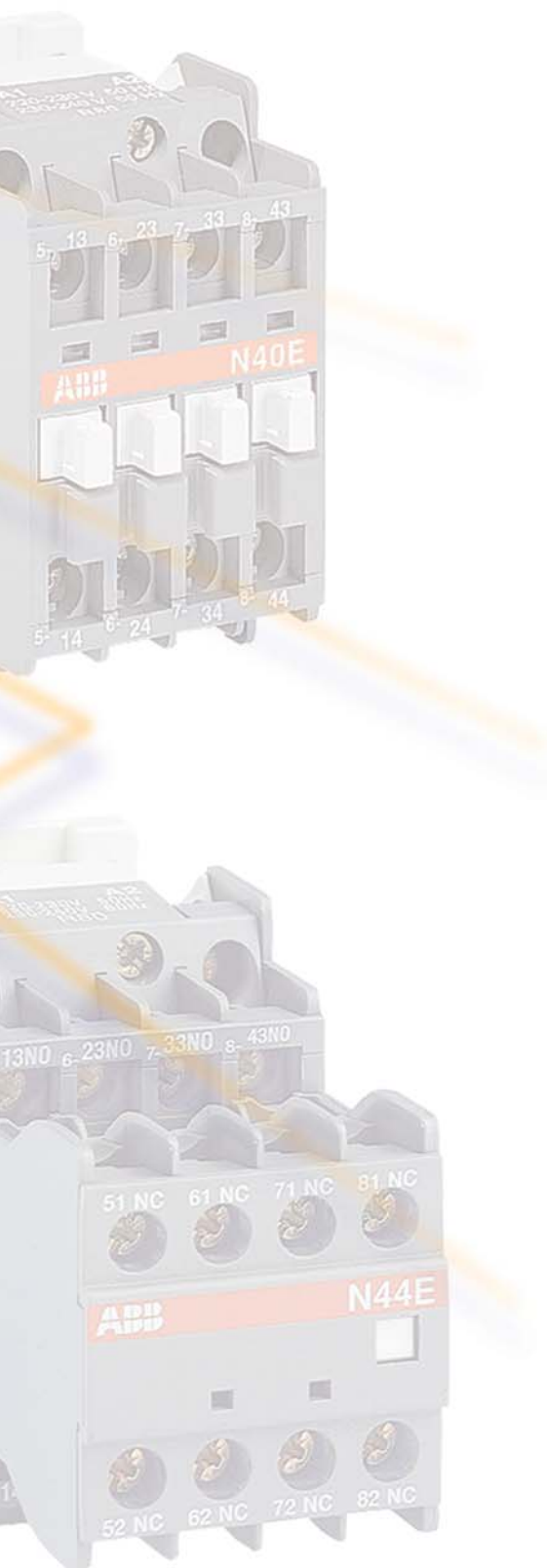
DQ01036 rev 1

Please photocopy and forward (see catalogue last back cover page).

4-pole Contactor Relays

8-pole Contactor Relays

Auxiliary Circuit Switching



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Terminal Marking and Positioning	Section 8
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N... Contactor Relays



a.c. operated



4-pole, 1-stack

N 22 E

N 31 E

N 40 E

Main contacts N.O. + N.C



IEC Rated operational current		
AC-15	240 V	A
	400 V	A
	690 V	A
DC-13	24 V	A / W
	250 V	A / W

4
3
2
6 / 144
0.3 / 75

UL/CSA Pilot duty

A 600, Q 300

Main accessories

Auxiliary contacts front mounting
side mounting

CA 5-10 1 N.O. / **CA 5-01** 1 N.C. / **CA 5-..** 4-pole

CAL 5-11 1 N.O. + 1 N.C.

Timer front mounting

TP 40 DA, TP 180 DA Direct timing / **TP 40 IA, TP 180 IA** Inverse timing

Surge suppressors

RV 5 (Varistor) / **RC 5-1** (RC type)

8-pole, 2-stack



N 44 E

N 53 E

N 62 E

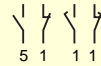
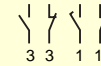
N 71 E

N 80 E

N 33/11

N 51/11

Main contacts N.O. + N.C



with overlapping of lagging / leading contacts

IEC Rated operational current		
AC-15	240 V	A
	400 V	A
	690 V	A
DC-13	24 V	A / W
	250 V	A / W

4
3
2
6 / 144
0.3 / 75

UL/CSA Pilot duty

A 600, Q 300

Main accessories

Auxiliary contacts side mounting

CAL 5-11 1 N.O. + 1 N.C.

Surge suppressors

RV 5 (Varistor) / **RC 5-1** (RC type)

NL... Contactor Relays



d.c. operated



4-pole, 1-stack

	NL 22 E	NL 31 E	NL 40 E
Main contacts N.O. + N.C.			
IEC Rated operational current			
AC-15 240 V A		4	
400 V A		3	
690 V A		2	
DC-13 24 V A / W		6 / 144	
250 V A / W		0.3 / 75	
UL/CSA Pilot duty		A 600, Q 300	
Main accessories	CA 5-10 1 N.O. / CA 5-01 1 N.C. / CA 5-.. 4-pole CAL 5-11 1 N.O. + 1 N.C.		
Auxiliary contacts front mounting side mounting			
Surge suppressors	RV 5 (Varistor) / RT 5 (Transil diode)		



8-pole, 2-stack

	NL 44 E	NL 53 E	NL 62 E	NL 71 E	NL 80 E	NL 33/11	NL 51/11
Main contacts N.O. + N.C.							
							with overlapping of lagging / leading contacts
IEC Rated operational current							
AC-15 240 V A					4		
400 V A					3		
690 V A					2		
DC-13 24 V A / W					6 / 144		
250 V A / W					0.3 / 75		
UL/CSA Pilot duty					A 600, Q 300		
Main accessories	RV 5 (Varistor) / RT 5 (Transil diode)						
Surge suppressors							

N... Contactor Relays

a.c. Operated



Application

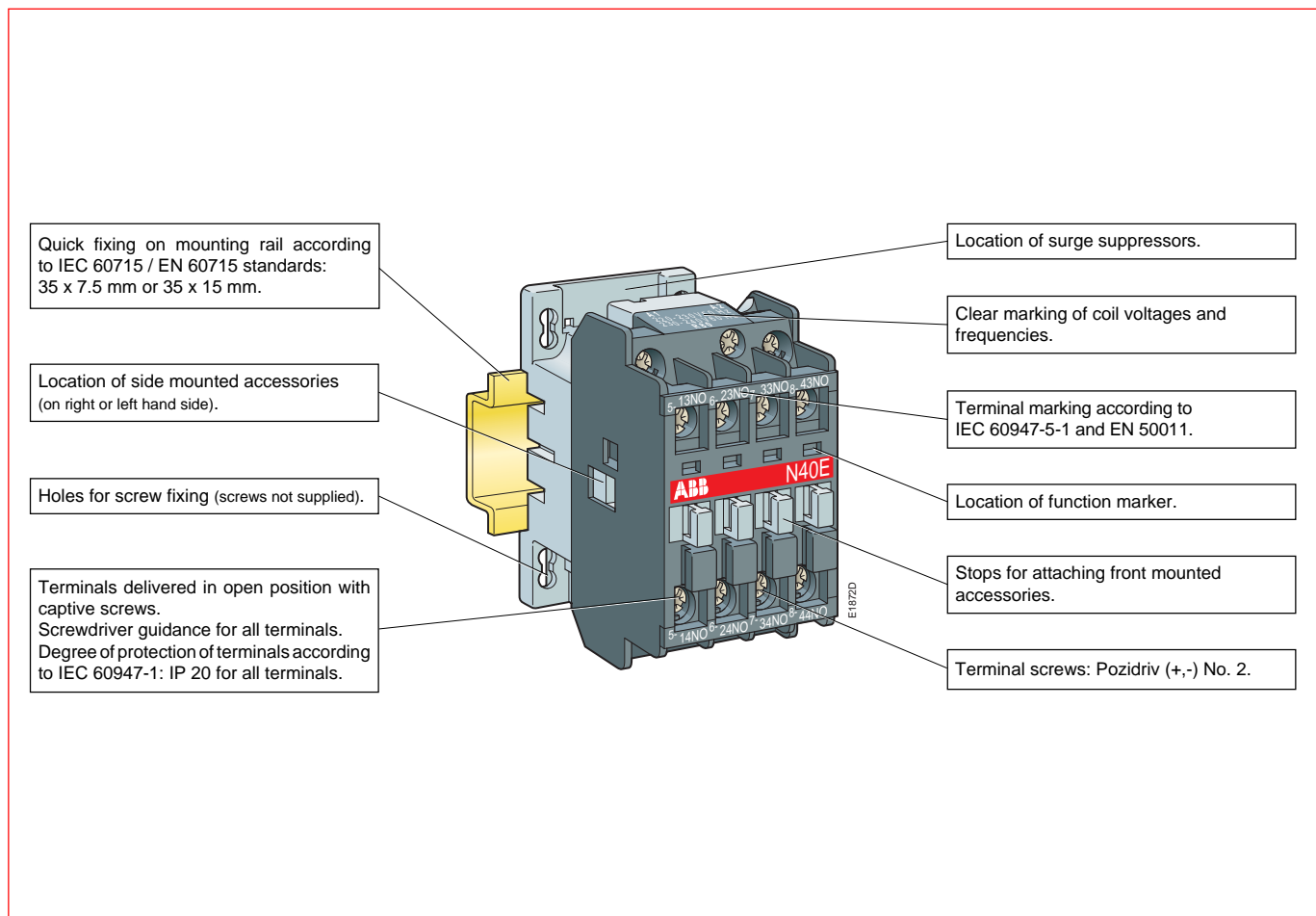
N... contactor relays are used for switching auxiliary circuits and control circuits.

Description

- Poles:
 - 1-stack contactor relays: 4-pole (mechanically linked contact elements available),
 - 2-stack contactor relays: 8-pole (mechanically linked contact elements available).
The width of 8-pole devices is identical to that of 4-pole devices; only the depth is increased.
- Control circuit: a.c. operated with laminated magnet circuit.
- Accessories: a wide range of accessories is available.

Variants

- d.c. operated: NL..., NL Z... contactor relays with low consumption coil.
- d.c. operated: TNL... contactor relays with low consumption and large coil voltage range.



N... Contactor Relays

a.c. Operated



N 40 E

1SB05 7362 2F0301



N 44 E

1SB05 7586 4F0301

Ordering Details

Number of contacts		Type	Order code	Weight
1 st stack	2 nd stack			kg
		state coil voltage <input type="text"/> (see table below)	state coil voltage code <input type="text"/> <input type="text"/> (see table below)	Pack ^{ing} 1 piece

4-pole, 1-stack

2	2	-	-	-	-	N 22 E <input type="text"/>	1SBH 141 001 R <input type="text"/> <input type="text"/> 22	0.340
3	1	-	-	-	-	N 31 E <input type="text"/>	1SBH 141 001 R <input type="text"/> <input type="text"/> 31	0.340
4	-	-	-	-	-	N 40 E <input type="text"/>	1SBH 141 001 R <input type="text"/> <input type="text"/> 40	0.340

8-pole, 2-stack

4	-	-	4	-	-	N 44 E <input type="text"/>	1SBH 141 001 R <input type="text"/> <input type="text"/> 44	0.400
4	-	1	3	-	-	N 53 E <input type="text"/>	1SBH 141 001 R <input type="text"/> <input type="text"/> 53	0.400
4	-	2	2	-	-	N 62 E <input type="text"/>	1SBH 141 001 R <input type="text"/> <input type="text"/> 62	0.400
4	-	3	1	-	-	N 71 E <input type="text"/>	1SBH 141 001 R <input type="text"/> <input type="text"/> 71	0.400
4	-	4	-	-	-	N 80 E <input type="text"/>	1SBH 141 001 R <input type="text"/> <input type="text"/> 80	0.400

With overlapping of lagging / leading contacts

3	1	-	2	1	1	N 33/11 <input type="text"/>	1SBH 141 001 R <input type="text"/> <input type="text"/> 39	0.400
4	-	1	1	1	1	N 51/11 <input type="text"/>	1SBH 141 001 R <input type="text"/> <input type="text"/> 59	0.400

Coil voltages and codes

Voltage	Voltage	Code
<input type="text"/> <input type="text"/> <input type="text"/> V - 50Hz	<input type="text"/> <input type="text"/> <input type="text"/> V - 60Hz	<input type="text"/> <input type="text"/>
24	24	8 1
48	48	8 3
110	110 ... 120	8 4
220 ... 230	230 ... 240	8 0
230 ... 240	240 ... 260	8 8
380 ... 400	400 ... 415	8 5
400 ... 415	415 ... 440	8 6

Other voltages: page 0/1.

>> Accessory Fitting Details page 3/8
 >> Technical Data page 3/10
 >> Auxiliary Contacts for Safety Circuits page 3/15

>> General - Approvals section 7
 >> Terminal Marking and Positioning section 8
 >> Dimensions section 9

3

NL..., NL Z... and TNL... Contactor Relays

d.c. Operated



Application

NL..., NL Z... and TNL... contactor relays are used for switching auxiliary circuits and control circuits. Their low power consumption allows the direct control from transistor PLC outputs.

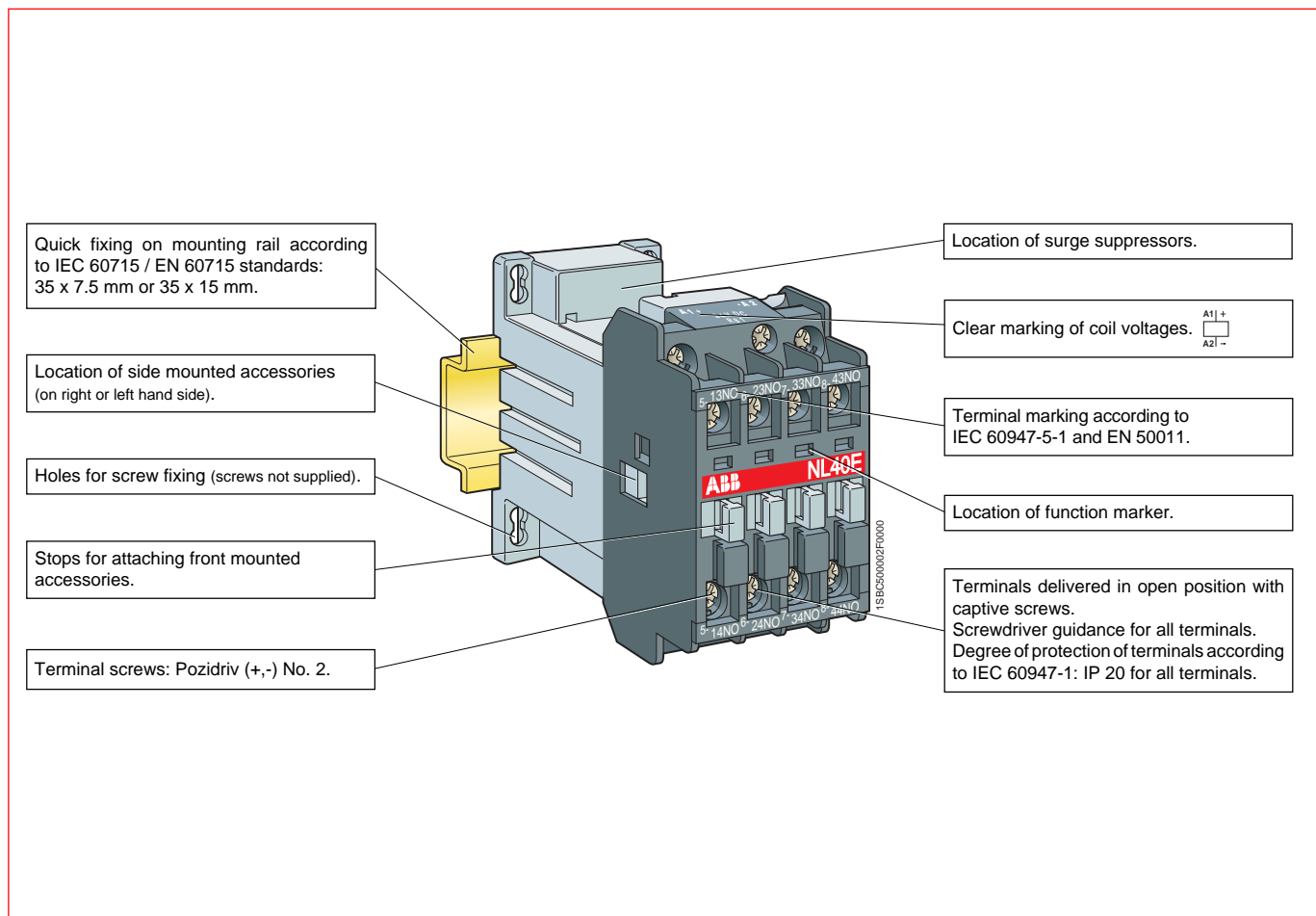
Description

The NL... contactor relays are fitted with low consumption d.c. coils:

- NL... contactor relays: **3 W** (pull-in and holding),
- NL Z... contactor relays with very low consumption: **2.4 W** (pull-in and holding).

The TNL... version offers a large coil voltage range.

- Poles:
 - 1-stack contactor relays: 4-pole (mechanically linked contact elements available),
 - 2-stack contactor relays: 8-pole (mechanically linked contact elements available).
The width of 8-pole devices is identical to that of 4-pole devices ; only the depth is increased.
- Control circuit: d.c. operated. The polarity on the coil terminals (A1+ and A2-) must be respected.
- Accessories: a wide range of accessories is available.



NL..., NL Z... and TNL... Contactor Relays

d.c. Operated



NL 22 E

1SBSC5 8791 4F0302



NL 80 E

1SBSC5 8794 4F0301



TNL 22 E

1SBSC5 90194 4F0304



TNL 80 E

1SBSC5 9020 3F0304

Ordering Details

Number of contacts		Type	Order code	Weight
1 st stack	2 nd stack			kg
		state coil voltage <input type="text"/> (see table below)	state coil voltage code <input type="text"/> <input type="text"/> (see table below)	Pack ^{ing} 1 piece

4-pole, 1-stack - 3 W consumption

2	2	-	-	-	-	NL 22 E <input type="text"/>	1SBH 143 001 R <input type="text"/> <input type="text"/> 22	0.520
3	1	-	-	-	-	NL 31 E <input type="text"/>	1SBH 143 001 R <input type="text"/> <input type="text"/> 31	0.520
4	-	-	-	-	-	NL 40 E <input type="text"/>	1SBH 143 001 R <input type="text"/> <input type="text"/> 40	0.520

8-pole, 2-stack - 3 W consumption

4	-	-	4	-	-	NL 44 E <input type="text"/>	1SBH 143 001 R <input type="text"/> <input type="text"/> 44	0.580
4	-	1	3	-	-	NL 53 E <input type="text"/>	1SBH 143 001 R <input type="text"/> <input type="text"/> 53	0.580
4	-	2	2	-	-	NL 62 E <input type="text"/>	1SBH 143 001 R <input type="text"/> <input type="text"/> 62	0.580
4	-	3	1	-	-	NL 71 E <input type="text"/>	1SBH 143 001 R <input type="text"/> <input type="text"/> 71	0.580
4	-	4	-	-	-	NL 80 E <input type="text"/>	1SBH 143 001 R <input type="text"/> <input type="text"/> 80	0.580

With overlapping of lagging / leading contacts

3	1	-	2	1	1	NL 33/11 <input type="text"/>	1SBH 143 001 R <input type="text"/> <input type="text"/> 39	0.580
4	-	1	1	1	1	NL 51/11 <input type="text"/>	1SBH 143 001 R <input type="text"/> <input type="text"/> 59	0.580

4-pole, 1-stack - 2.4 W consumption

2	2	-	-	-	-	NL Z 22 E <input type="text"/>	1SBH 144 001 R <input type="text"/> <input type="text"/> 22	0.520
3	1	-	-	-	-	NL Z 31 E <input type="text"/>	1SBH 144 001 R <input type="text"/> <input type="text"/> 31	0.520
4	-	-	-	-	-	NL Z 40 E <input type="text"/>	1SBH 144 001 R <input type="text"/> <input type="text"/> 40	0.520

4-pole, 1-stack - Large coil voltage range

2	2	-	-	-	-	TNL 22 E <input type="text"/>	1SBH 143 061 R <input type="text"/> <input type="text"/> 22	0.520
3	1	-	-	-	-	TNL 31 E <input type="text"/>	1SBH 143 061 R <input type="text"/> <input type="text"/> 31	0.520
4	-	-	-	-	-	TNL 40 E <input type="text"/>	1SBH 143 061 R <input type="text"/> <input type="text"/> 40	0.520

8-pole, 2-stack - Large coil voltage range

4	-	-	4	-	-	TNL 44 E <input type="text"/>	1SBH 143 061 R <input type="text"/> <input type="text"/> 44	0.580
4	-	2	2	-	-	TNL 62 E <input type="text"/>	1SBH 143 061 R <input type="text"/> <input type="text"/> 62	0.580
4	-	4	-	-	-	TNL 80 E <input type="text"/>	1SBH 143 061 R <input type="text"/> <input type="text"/> 80	0.580

Coil voltages and codes: NL...

Voltage - U _c <input type="text"/> V d.c.	Code <input type="text"/> <input type="text"/>
12	8 0
24	8 1
42	8 2
48	8 3
50	2 1
60	8 4
75	8 5
110	8 6
125	8 7
220	8 8
240	8 9
250	3 8

Coil voltages and codes: TNL...

Voltage - U _c <input type="text"/> V d.c.	Code <input type="text"/> <input type="text"/>
17 ... 32	5 1
25 ... 45	5 2
36 ... 65	5 4
42 ... 78	5 8
50 ... 90	5 5
77 ... 143	6 2
90 ... 150	6 6
152 ... 264	6 8

Other voltages: please consult us.



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

Coil voltages and codes: NL Z...

Voltage - U _c <input type="text"/> V d.c.	Code <input type="text"/> <input type="text"/>
24	1 5
48	2 0

>> Accessory Fitting Details page 3/9
 >> Technical Data page 3/10
 >> Auxiliary Contacts for Safety Circuits page 3/15

>> General - Approvals section 7
 >> Terminal Marking and Positioning section 8
 >> Dimensions section 9

N... Contactor Relays

Accessory Fitting Details - For Ordering Details, see "Accessories"

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

Contactor types	Built-in contacts		Front mounted accessories			Side mounted accessories
	1 st stack	2 nd stack	Auxiliary contact 1-pole CA 5-... (or 1-pole CE 5-...)	Auxiliary contact 4-pole CA 5-...	Pneumatic timer TP .. A	Auxiliary contact 2-pole CAL 5-11

N... Contactor Relays

N 22 E (1)	2 2	- - - -	1 to 4 x CA 5-... (or 1 x CE 5-...) (2)	or 1 x CA 5-... (4-pole)	or 1 x TP .. A	+ 1 to 2 x CAL 5-11
N 31 E (1)	3 1	- - - -	1 to 4 x CA 5-... (1 to 2 x CE 5-... max.) (3)	or 1 x CA 5-... (4-pole)	or 1 x TP .. A	+ 1 to 2 x CAL 5-11
N 40 E	4 0	- - - -				
N 44 E	4 0	0 4 - -				
N 53 E	4 0	1 3 - -				
N 62 E	4 0	2 2 - -				1 to 2 x CAL 5-11
N 71 E	4 0	3 1 - -				
N 80 E	4 0	4 0 - -				

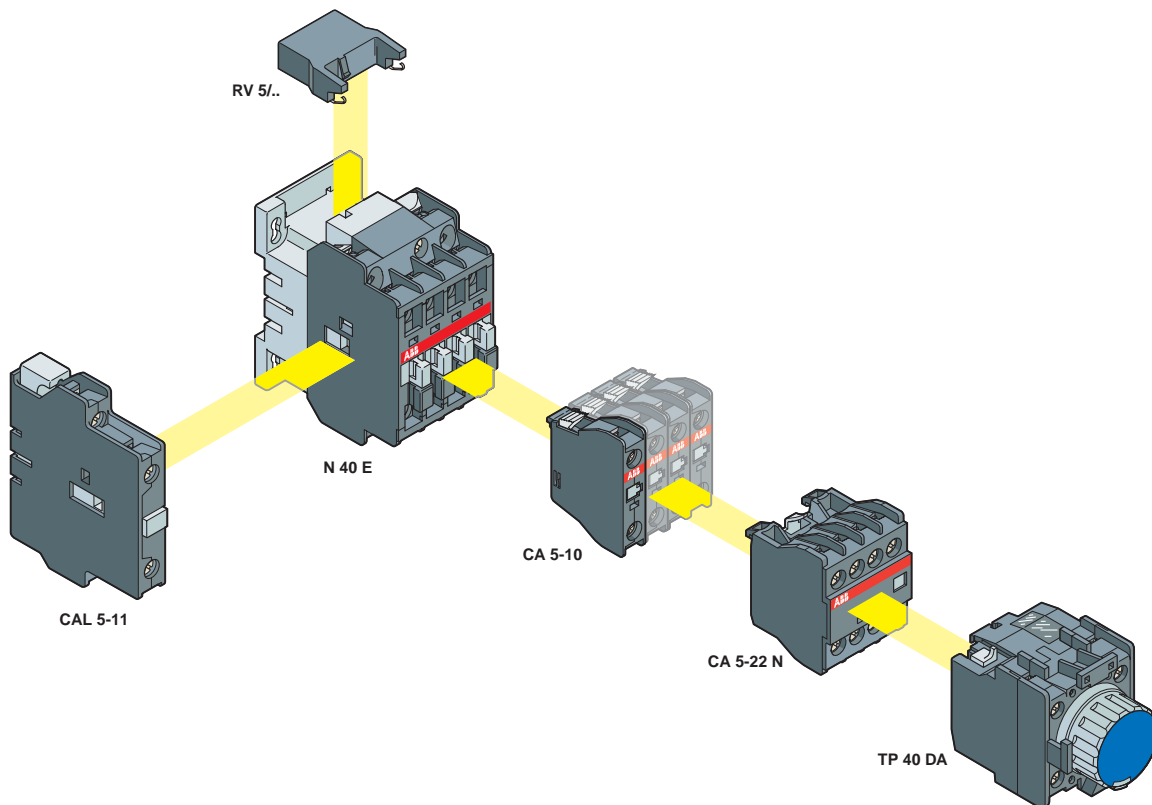
N... Contactor Relays with overlapping of lagging / leading contacts

N 33/11	3 1	0 2 1 1	-	-	-	1 to 2 x CAL 5-11
N 51/11	4 0	1 1 1 1				

- (1) 2 x N.C. front mounted auxiliary contacts maximum in mounting position 5.
N 22 E and N 31 E in mounting position 5, TP..DA not allowed.
- (2) CE5-.. auxiliary contacts **not allowed in mounting position 5**.
- (3) The total number of N.O. or N.C. CE 5-.. and other additional N.C. CA 5-.. auxiliary contacts is **limited to 2**.
CE 5-.. auxiliary contacts **not allowed in mounting position 5**.

N... contactor relays and main accessories

For mounting position diagram, see "Technical Data"



E1027303

NL..., NL Z... and TNL... Contactor Relays

Accessory Fitting Details - For Ordering Details, see "Accessories"

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

Contactor types	Built-in contacts		Front mounted accessories			Side mounted accessories (6)
	1 st stack	2 nd stack	Auxiliary contact 1-pole CA 5-...	Auxiliary contact 4-pole CA 5-...	Auxiliary contact 1-pole CE 5-...	Auxiliary contact 2-pole CAL 5-11

NL... Contactor Relays

NL 22 E (5)	2 2	- - - -	1 to 4 x CA 5-... (4)	or	1 x CA 5-... (4-pole) (4)	-	or	1 x CAL 5-11 (3)	
NL 31 E	3 1	- - - -	1 to 4 x CA 5-... (1)	or	1 x CA 5-... (4-pole) (1)	or	1 to 2 x CE 5-... (2)	or	1 x CAL 5-11 (3)
NL 40 E	4 0	- - - -							
NL 44 E	4 0	0 4 - -							
NL 53 E	4 0	1 3 - -							
NL 62 E	4 0	2 2 - -							
NL 71 E	4 0	3 1 - -							
NL 80 E	4 0	4 0 - -							

NL... Contactor Relays with overlapping of lagging / leading contacts

NL 33/11	3 1	0 2 1 1					
NL 51/11	4 0	1 1 1 1					

NL Z... and TNL... Contactor Relays

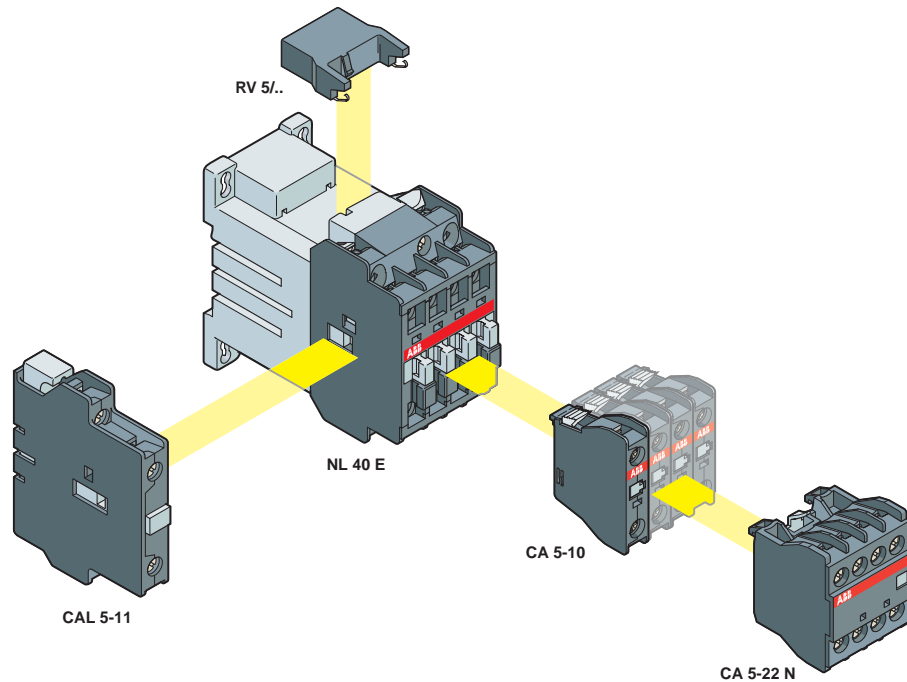
NL Z 22 E (5)(6)	2 2	- - - -	1 to 2 x CA 5-...	-	-		
NL Z 31 E (6)	3 1	- - - -	1 to 2 x CA 5-... (1)	-	or	1 to 2 x CE 5-... (2)	
NL Z 40 E (6)	4 0	- - - -					
TNL 22 E (5)	2 2	- - - -	1 to 4 x CA 5-... (4)	or	1 x CA 5-... (4-pole) (4)	-	
TNL 31 E	3 1	- - - -	1 to 4 x CA 5-... (1)	or	1 x CA 5-... (4-pole) (1)	or	1 to 2 x CE 5-... (2)
TNL 40 E	4 0	- - - -					
TNL 44 E	4 0	0 4 - -					
TNL 62 E	4 0	2 2 - -					
TNL 80 E	4 0	4 0 - -					

- (1) A maximum of 2 N.C. auxiliary contacts can be fitted in all mounting positions except 5. In position 5 no N.C. auxiliary contacts are permitted.
- (2) CE 5-... is not allowed in mounting position 5.
- (3) With CAL5-11 the control voltage is limited to $0.9 U_c \dots 1.1 U_c$ in all mounting positions.
- (4) A maximum of 2 N.C. auxiliary contacts can be fitted.
- (5) Mounting position 5 is not allowed.
- (6) Mounting position $1 \pm 30^\circ$ is not allowed.

3

NL..., NL Z... and TNL... contactor relays and main accessories

For mounting position diagram, see "Technical Data"



1SBC50020F0000

N..., NL..., NL Z... and TNL... Contactor Relays

Technical Data

Contact Utilization Characteristics

Utilization characteristics according to IEC

Contactor relay types	N...	NL...	NL Z...	TNL...
Rated operational voltage U_e max.	V 690			
Conventional free air thermal current I_{th} according to IEC 60947-5-1, open contactors $\theta \leq 40$ °C	A 16			
Rated frequency limits	Hz 25 ... 400			
Rated operational current I_e / AC-15 according to IEC 60947-5-1				
24-127 V 50/60 Hz	A	6		
230-240 V 50/60 Hz	A	4		
400-415 V 50/60 Hz	A	3		
500 V 50/60 Hz	A	2		
690 V 50/60 Hz	A	2		
Rated operational current I_e / DC-13 according to IEC 60947-5-1				
24 V d.c.	A / W	6 / 144		
48 V d.c.	A / W	2.8 / 134		
72 V d.c.	A / W	1 / 72		
110 V d.c.	A / W	0.55 / 60		
125 V d.c.	A / W	0.55 / 69		
220 V d.c.	A / W	0.30 / 66		
250 V d.c.	A / W	0.30 / 75		
Making capacity according to IEC 60947-5-1	10 x I_e / AC-15			
Breaking capacity according to IEC 60947-5-1	10 x I_e / AC-15			
Short-circuit protection $U_e \leq 500$ V a.c. - gG type fuse	A	10		
Rated short-time withstand current I_{cw} at 40 °C ambient temp., in free air, from a cold state				
1.0 s	A	100		
0.1 s	A	140		
Minimum switching capacity with failure rate acc. to IEC 60947-5-4	V / mA	17 / 5		
		$\leq 10^{-6}$	$\leq 10^{-7}$	
Non-overlapping time between N.O. and N.C. contacts	ms	≥ 2		
Heat dissipation per pole at 6 A	W	0.10		
Max. electric switching frequency	cycles/h	1200		
Mechanical durability – millions of operating cycles – max. mechanical switching frequency	cycles/h	> 20 6000		

Utilization characteristics according to UL/CSA

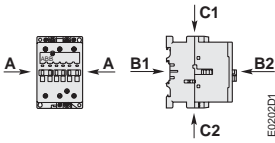
Contactor relay types	N...	NL...	NL Z...	TNL...
Max. rated voltage	V 600			
Pilot duty	A 600, Q 300			

N..., NL..., NL Z... and TNL... Contactor Relays

Technical Data

General Technical Data

Contactor relay types	N...	NL...	NL Z...	TNL...
Rated insulation voltage U_i according to IEC 60947-5-1	V	690		
according to UL/CSA	V	600		
Rated impulse withstand voltage $U_{imp.}$	kV	8		
Standards	Devices complying with IEC 60947-5-1 and EN 60947-5-1			
Air temperature close to contactor	see "Conditions for use", for control voltage limits and authorized mounting positions			
– for operation in free air	°C	-40 to +70		-40 to +55
– for storage	°C	-60 to +80		
Climatic withstand	acc. to IEC 60068-2-30 and 60068-2-11 - UTE C 63-100 specification II			
Operating altitude	m	≤ 3000		
Shock withstand acc. IEC 60068-2-27 and EN 60068-2-27 Mounting position 1	1/2 sinusoidal shock for 11 ms: no change in contact position			
	Shock direction	Closed or open position	Closed position	Open position
	A	20 g		10 g
	B1	5 g	15 g	5 g
	B2	15 g	10 g	10 g
	C1	20 g	20 g	8 g
	C2	20 g	14 g	8 g



3

>> Conditions for Use page 3/13	>> Certifications - Approvals section 7
>> Mounting Positions page 3/13	>> Dimensions section 9

N..., NL..., NL Z... and TNL... Contactor Relays

Technical Data

Magnet System Characteristics for N... Contactor Relays

Contactor relay types			N...
Rated control circuit voltage U_c	50/60 Hz	V	24 ... 690
Coil operating limits acc. to IEC 60947-5-1	0.85 ... 1.1 x U_c (at $\theta \leq 55^\circ\text{C}$) Please also refer to "Conditions for Use"		
Drop-out voltage in % of U_c	approx. 40 ... 65 %		
Coil consumption			
Average pull-in value	50 Hz	VA	70
	60 Hz	VA	80
Average holding value	50/60 Hz (1)	VA / VA	74 / 70
	50 Hz	VA / W	8 / 2
	60 Hz	VA / W	8 / 2
	50/60 Hz (1)	VA / W	8 / 2
Operating time			
between coil energization and:			
– N.O. contact closing		ms	10 ... 26
– N.C. contact opening		ms	7 ... 21
between coil de-energization and:			
– N.O. contact opening		ms	4 ... 11
– N.C. contact closing		ms	9 ... 16

(1) 50/60 Hz coils: see "Coil Voltage Code Table".

Magnet System Characteristics for NL... and NL Z... Contactor Relays

Contactor relay types			NL...	NL Z...
Rated control circuit voltage U_c		V d.c.	12 ... 250	24 and 48
Coil operating limits acc. to IEC 60947-5-1	0.85 ... 1.1 x U_c ($\theta \leq 55^\circ\text{C}$) Please also refer to "Conditions for Use"			
Drop-out voltage in % of U_c	approx. 10 ... 30 %			
Coil consumption - Average values				
– pull-in value		W	3.0	2.4
– holding value		W	3.0	2.4
Coil time constant				
– open	L/R	ms	28	
– closed	L/R	ms	74	
Operating time				
between coil energization and:				
– N.O. contact closing		ms	50 ... 100	
– N.C. contact opening		ms	20 ... 70	
between coil de-energization and:				
– N.O. contact opening		ms	10 ... 17 (1)	
– N.C. contact closing		ms	16 ... 27 (1)	

(1) The use of surge suppressors increases the opening time with a factor of 1.1 to 1.5 for a varistor suppressor and a factor of 1.5 to 3 for a transil diode suppressor.

Magnet System Characteristics for TNL... Contactor Relays

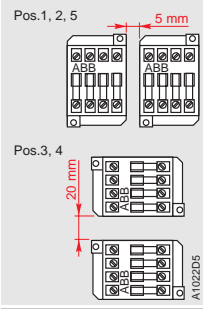
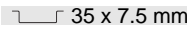
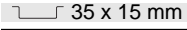
Contactor relay types			TNL...
Rated control circuit voltage U_c		V d.c.	17 ... 264
Coil operating limits	$U_{c \text{ min.}}$... $U_{c \text{ max.}}$ ($\theta \leq 55^\circ\text{C}$) Please also refer to "Conditions for Use"		
Drop-out voltage in % of $U_{c \text{ max.}}$	approx. 9 ... 25 %		
Coil consumption for $U_{c \text{ min.}}$... $U_{c \text{ max.}}$		W	2.5 ... 8.5 at pull-in and holding
Coil time constant			
– open	L/R	ms	28
– closed	L/R	ms	74
Operating time			
between coil energization and:			
– N.O. contact closing		ms	50 ... 100
– N.C. contact opening		ms	20 ... 70
between coil de-energization and:			
– N.O. contact opening		ms	10 ... 17 (1)
– N.C. contact closing		ms	16 ... 27 (1)

(1) The use of surge suppressors increases the opening time with a factor of 1.1 to 1.5 for a varistor suppressor and a factor of 1.5 to 3 for a transil diode suppressor.

N..., NL..., NL Z... and TNL... Contactor Relays

Technical Data

Mounting Characteristics

Contactor relay types	N...	NL...	NL Z...	TNL...
Mounting positions	see "Conditions for Use"			
Mounting distances	No mounting distance required between contactors			Distances for ambient temperature 20...55 °C 
Fixing				
on rail	 35 x 7.5 mm			
according to IEC 60715 and EN 60715	 35 x 15 mm			
by screws (not supplied)	2 x M4			

3

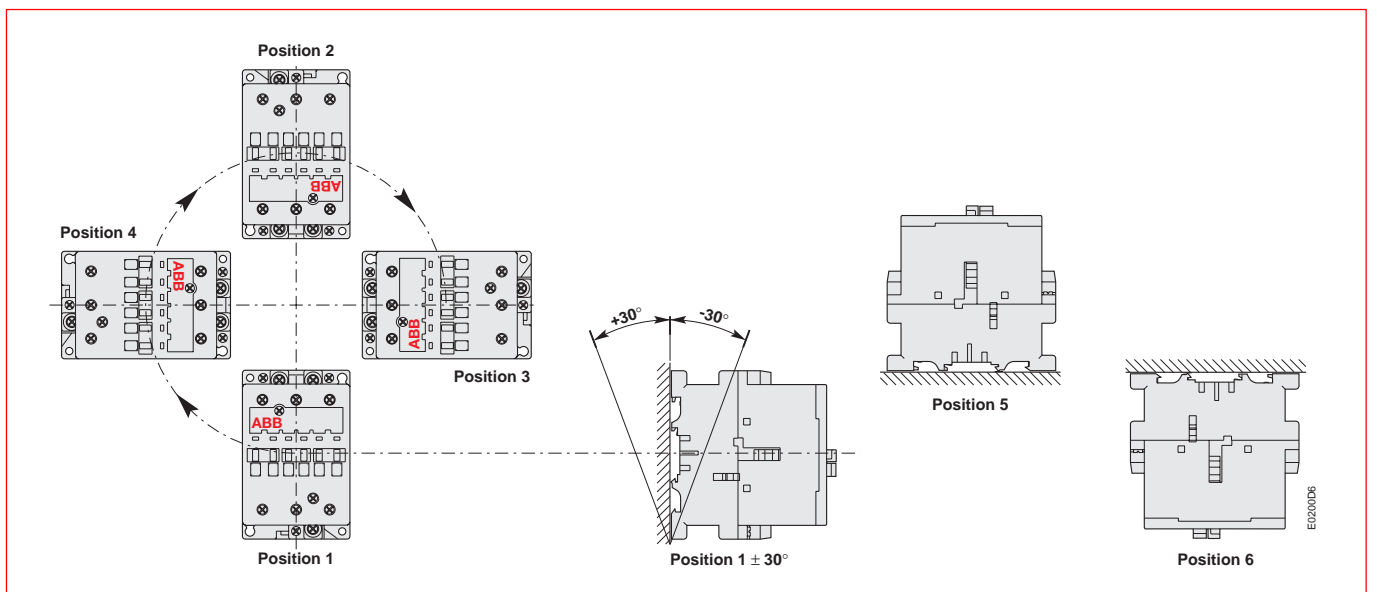
Conditions for Use

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

Contactor relay types	N...	NL...	NL Z...	TNL...
Control Voltage / Ambient temperature				
Mounting positions 1, 2, 3, 4, 5 (1)	$0.85 \dots 1.1 \times U_c$			$U_c \text{ min. } \dots U_c \text{ max.}$
Mounting position 1 ± 30°	$0.85 \dots 1.1 \times U_c$		unauthorized	$U_c \text{ min. } \dots U_c \text{ max.}$
Mounting position 6	$0.95 \dots 1.1 \times U_c$	unauthorized	unauthorized	

(1) NL 22 E, NL Z 22 E, and TNL 22 E not allowed in position 5.

Mounting Positions (see the above table for authorized positions)










>> Coil Voltage Code Table page 0/1 >> Influence of the Length of Conductors Used in Control Circuit page 2/88	>> Terminal Marking and Positioning section 8 >> Dimensions section 9
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N..., NL..., NL Z... and TNL... Contactor Relays

Technical Data

Connecting Characteristics

Contactor relay types	N...	NL...	NL Z...	TNL...
Terminals	 with cable clamp			
Connecting capacity (min. ... max.)				
Pole and coil terminals				
Rigid solid	 1 x mm²  2 x mm²	1 ... 4	1 ... 4	
Flexible with cable end	 1 x mm²  2 x mm²	0.75 ... 2.5	0.75 ... 2.5	
Lugs				
– Pole terminals		L mm ≤ 7.7 l mm > 3.7		
– Coil terminals		L mm ≤ 8 l mm > 3.7		
Capacity according to UL/CSA	AWG	18 - 14		
Degree of protection	Protection against direct contact in acc. with EN 50274			
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529				
All terminals	IP 20			
Screw terminals	(delivered in open position, screws of unused terminals must be tightened)			
All terminals	M 3.5 (+,-) pozidriv 2 screws with cable clamp			
Tightening torque				
– recommended	Nm / lb.in	1.00 / 9		
– max.	Nm	1.20		

>> Terminal Marking and Positioning section 8

Auxiliary Contacts for Safety Circuits

Contactor Relays

Mechanically Linked Contact Elements for Contactor Relays


(known as "forced contacts", "positively activated contacts" or "linked contacts").

Definitions from standards: mechanically linked contact elements  according to IEC 60947-5-1, Annex L 3.0.

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

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

The table below gives the contactor relays that offer mechanically linked auxiliary contacts according to IEC 60947-5-1, Annex L.

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


The information provided for **NL** and **TNL** contactor relays can also be used for **NL Z...** type. For each contactor type, see "Accessory Fitting Details".

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 full contact opening of 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 contactor relays ARE NOT CONCERNED by the annex K.

Nevertheless, N.C. auxiliary contacts are designed to have "direct opening action" and are suitable for uses such as lifts / elevators (according to EN 81-1).



Auxiliary Contact Blocks
Timers
Interlock Units
Surge Suppressors
Connection Pieces

Add-on Accessories

Contents

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

Auxiliary Contact Blocks - Front Mounting	4/2
Auxiliary Contact Blocks - Side Mounting	4/4
TE5S Electronic Timer for Star-Delta Starters	4/6
TP... Pneumatic Timer Blocks	4/8
Mechanical Interlock Units - Mechanical and Electrical Interlock Units	4/10
WB75-A Mechanical Latching Unit	4/12
Surge Suppressors for Contactor Coils	4/14
CB5... Impulse Contact Blocks	4/16
BL5-L Lamp Holder Block - BL5-F Fuse Holder Block	4/16
BA5-50 Function Markers	4/17
BP16 Mounting Piece	4/17
RA5 Interface Relays	4/18
LT... Terminal Shrouds	4/20
LK... Terminals for Control Lead Connections	4/21
LZ... Connector Terminals	4/22
LD... Additional Terminal Blocks	4/23
LX... Terminal Extension Pieces - LW... Terminal Enlargement Pieces	4/24
LP..., LY..., LH..., LF..., LG... Terminal Connecting Strips	4/25
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BEA... and BEF... Connection Bars	4/30
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Accessories for EK... Series Contactors

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Surge Suppressors for Contactor Coils	4/40
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Connection Sets	4/42
Mounting Plates	4/43
Main Contact Sets - Arc Chutes - Contactor Coils	4/44
Electrical Durability of Auxiliary Contacts	4/45

Auxiliary Contact Blocks

Front Mounting



CA 5-10



CA 5-40 E



CE 5-01 W

Application

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

Description

Types of auxiliary contact blocks for standard industrial environments:

- **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.

Select the 4-pole auxiliary contact blocks **CA 5-..E**, **CA 5-..M**, **CA 5-..U** or **CA 5-..N** type, according to the contactor or contactor relay type for compliance with the standard requirements. (see "Terminal Marking and Positioning").

Types of auxiliary contact blocks for severe industrial environments:

- **CE...** 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.

Fitting Details - For each contactor or contactor relay type, refer to "Accessory Fitting Details" table.

Ordering Details

For contactors	Number of blocks (1)	Contact blocks 	Type	Order code	Pack ^m g	Weight kg
						1 piece

1-pole auxiliary contact blocks

A 9 ... A 26	1-4	1 – – –	CA 5-10	1SBN 010 010 R1010	10	0.014
A 30, A 40	1-5	– 1 – –	CA 5-01	1SBN 010 010 R1001	10	0.014
A 45 ... A 110	1-6	– – 1 –	CC 5-10	1SBN 010 011 R1010	10	0.014
AL 9 ... AL 26	1-4	– – – 1	CC 5-01	1SBN 010 011 R1001	10	0.014
AL 9Z ... AL 16Z	1-2					
AL 30, AL 40	1-5	1 – – –	CE 5-10 D 0.1	1SBN 010 015 R1010	1	0.020
AE 45 ... AE 110	1-6	– 1 – –	CE 5-01 D 0.1	1SBN 010 015 R1001	1	0.020
TAL 9 ... TAL 26	1-4	1 – – –	CE 5-10 D 2	1SBN 010 017 R1010	1	0.020
TAL 30, TAL 40	1-5	– 1 – –	CE 5-01 D 2	1SBN 010 017 R1001	1	0.020
TAE 45 ... TAE 110	1-6	1 – – –	CE 5-10 W 0.1	1SBN 010 016 R1010	1	0.020
AF 45 ... AF 110	1-6	– 1 – –	CE 5-01 W 0.1	1SBN 010 016 R1001	1	0.020
N, NL and TNL (4-pole)	1-4	1 – – –	CE 5-10 W 2	1SBN 010 018 R1010	1	0.020
NL Z (4-pole)	1-2	– 1 – –	CE 5-01 W 2	1SBN 010 018 R1001	1	0.020

4-pole auxiliary contact blocks

A 9 ... A 26-40-00	1					
A 9 ... A 26-22-00	1					
A 45 ... A 110	1	4 – – –	CA 5-40 E	1SBN 010 040 R1040	2	0.060
AL 9 ... AL 26-40-00	1	3 1 – –	CA 5-31 E	1SBN 010 040 R1031	2	0.060
AL 9 ... AL 26-22-00	1	2 2 – –	CA 5-22 E	1SBN 010 040 R1022	2	0.060
AE 45 ... AE 110	1	0 4 – –	CA 5-04 E	1SBN 010 040 R1004	2	0.060
TAL 9 ... TAL 26-40-00	1	1 1 1 1	CA 5-11/11 E	1SBN 010 040 R1018	2	0.060
TAL 9 ... TAL 26-22-00	1					
TAE 45 ... TAE 110	1					
AF 45 ... AF 110	1					
A 9 ... A 40-30-10	1	3 1 – –	CA 5-31 M	1SBN 010 040 R1131	2	0.060
AL 9 ... AL 40-30-10	1	2 2 – –	CA 5-22 M	1SBN 010 040 R1122	2	0.060
TAL 9 ... TAL 40-30-10	1	1 3 – –	CA 5-13 M	1SBN 010 040 R1113	2	0.060
		0 4 – –	CA 5-04 M	1SBN 010 040 R1104	2	0.060
		1 1 1 1	CA 5-11/11 M	1SBN 010 040 R1118	2	0.060
A 9 ... A 40-30-01	1	4 – – –	CA 5-40 U	1SBN 010 040 R1340	2	0.060
AL 9 ... AL 40-30-01	1	3 1 – –	CA 5-31 U	1SBN 010 040 R1331	2	0.060
TAL 9 ... TAL 40-30-01	1	2 2 – –	CA 5-22 U	1SBN 010 040 R1322	2	0.060
		0 4 – –	CA 5-04 U	1SBN 010 040 R1304	2	0.060
N, NL and TNL (4-pole)	1	4 – – –	CA 5-40 N	1SBN 010 040 R1240	2	0.060
		3 1 – –	CA 5-31 N	1SBN 010 040 R1231	2	0.060
		2 2 – –	CA 5-22 N	1SBN 010 040 R1222	2	0.060
		1 3 – –	CA 5-13 N	1SBN 010 040 R1213	2	0.060
		0 4 – –	CA 5-04 N	1SBN 010 040 R1204	2	0.060

(1) For each contactor or contactor relay type, refer to "Accessory Fitting Details" table.

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




>> **Accessory Fitting Details (Contactors)** section 2 >> **Side Mounted Auxiliary Contact Blocks** page 4/4
 >> **Accessory Fitting Details (Contactors Relays)** section 3 >> **Auxiliary Contacts for Safety Circuits** ... pages 2/63, 3/15

Auxiliary Contact Blocks

Front Mounting

Technical Data

Utilization characteristics according to IEC

Types	1-pole CA 5..., 4-pole CA 5..., 1-pole CC 5...	1-pole CE 5-..0.1	1-pole CE 5-..2
Compliance with standards	IEC 60947-5-1 and EN 60947-5-1		
Rated insulation voltage U_i acc. to IEC 60947-5-1 V	690	250	250
Rated operational voltage U_e V a.c.	24 ... 690	125	250
Conventional thermal current I_{th} A	16	0.1	2
Rated operational current I_e acc. to IEC 60947-5-1	AC-15	AC-14	AC-15
24 ... 127 V a.c. A	6	0.1	2
220 ... 240 V a.c. A	4	–	2
380 ... 440 V a.c. A	3	–	–
500 ... 690 V a.c. A	2	–	–
Rated operational current I_e acc. to IEC 60947-5-1	DC-13	DC-12	DC-12
24 V d.c. A	6 (144 W)	0.1	2
48 V d.c. A	2.8 (134 W)	0.1	1
72 V d.c. A	1 (72 W)	0.1	0.3
110 V d.c. A	0.55 (60 W)	0.1	0.2
125 V d.c. A	0.55 (69 W)	–	0.2
220 V d.c. A	0.3 (66 W)	–	0.1
250 V d.c. A	0.3 (75 W)	–	–
Short circuit protection A	10 (gG fuses)	0.1 (FF fuses*)	10 (FF fuses*)
Making capacity	10 x I_e AC-15	6 x I_e AC-14	10 x I_e AC-15
Breaking capacity	10 x I_e AC-15	6 x I_e AC-14	10 x I_e AC-15
Rated short-time withstand current I_{cw} 1 s A	100	–	–
$\theta = 40^\circ\text{C}$ 0.1 s A	140	–	–
Power loss per pole at 6 A W	0.10	–	–
Min. switching capacity			
– A 9 ... A 75 contactors V / mA	17 / 1	3 / 1	17 / 1
with failure rate acc. to IEC 60947-5-4	$\leq 10^{-7}$	–	$\leq 10^{-7}$
– A 95, A 110 contactors V / mA	24 / 50	3 / 1	17 / 1
with failure rate acc. to IEC 60947-5-4	–	–	$\leq 10^{-7}$
Mechanical durability			
– millions of operating cycles	10 (A 9 ... A 75) 3 (A 95, A 110)	5 for CE 5-.. D 0.1 2.5 for CE 5-.. W 0.1	5 for CE 5-.. D 2 2.5 for CE 5-.. W 2
– max. mech. switching frequency cycles/h	3600	3600	3600
Electrical durability			
– millions of operating cycles	see "Electrical Durability" curves	2.5 for CE 5-.. D 0.1 0.7 for CE 5-.. W 0.1	1 for CE 5-.. D 2 0.3 for CE 5-.. W 2
– max. elec. switching frequency cycles/h	1200	1200	1200
Connecting terminals (Delivered in open position. Screws of unused terminals should be tightened.)	M3.5 (+,-) pozidriv 2 screws with cable clamp		
Tightening torque			
– recommended Nm	1.00		
– max. Nm	1.20		
Connecting capacity (min. ... max.)			
Rigid solid  1 or 2 x mm ²	1 ... 4		
Flexible with cable end  1 or 2 x mm ²	0.75 ... 2.5		
Lugs  L mm \leq	7.7		
I mm $>$	3.7		
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529	IP 20	IP 40 for CE 5-.. D 0.1 IP 67 for CE 5-.. W 0.1	IP 40 for CE 5-.. D 2 IP 67 for CE 5-.. W 2
Terminals	–		
Microswitches	–		

Utilization characteristics according to UL/CSA

Max. rated voltage V	600	125	250
Pilot duty	A600, Q300	0.1 A	2.0 A

>> Accessory Fitting Details sections 2, 3	>> Side Mounted Auxiliary Contact Blocks page 4/4
>> Auxiliary Contacts for Safety Circuits pages 2/63, 3/15	>> Electrical Durability Curves page 4/35
>> Certification and Approvals section 7	>> Terminal Marking and Positioning section 8
	>> Dimensions section 9

Auxiliary Contact Blocks

Side Mounting



CAL 5-11

1SBK5 7376 2F0301



CAL 18-11

1SFC1 0103 3F0201

Application

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

Description

Types of auxiliary contact blocks for standard industrial environments:

- **CAL...** 2-pole block instantaneous N.O. + N.C. contacts.
- **CCL 5-11** 2-pole block N.O. leading + N.C. lagging contacts.

Type of auxiliary contact block for severe industrial environments:

- **CEL 18-...** 1-pole block with built-in microswitch IP 67 degree of protection (IP 20 on terminals). Instantaneous N.O. or N.C. contact.

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

Fitting Details

Clipped onto the right and/or lefthand side of the contactors.

The **CAL 18-11B** is a second block for mounting in addition to a first **CAL 18-11** block, right and/or lefthand of the A 145 ... A 300 and AF 145 ... AF 1650 contactors.

For each contactor or contactor relay type, refer to "Accessory Fitting Details" table.

Ordering Details

For contactors	Number of blocks	Contact blocks	Type	Order code	Pack ^{ing} pieces	Weight kg
	(1)					1 piece

2-pole auxiliary contacts N.O. + N.C.

A 9 ... A 75	1-2		CAL 5-11	1SBN 010 020 R1011	2	0.050
AL 9 ... AL 40	1					
AE 45 ... AE 75	1					
TAL 9 ... TAL 40	1					
TAE 45 ... TAE 75	1					
AF 45 ... AF 75	1-2					
UA 16 ... UA 75	1-2		CAL 18-11	1SFN 010 720 R1011	2	0.050
N	1-2					
NL (4-pole)	1					
A 95 ... A 300	1-2					
AE 95, AE 110	1					
TAE 95, TAE 110	1					
AF 95 ... AF 1650	1-2		CAL 18-11B	1SFN 010 720 R3311	2	0.050
UA 95, UA 110	1-2					
A 145 ... A 300	1-2 ⁽²⁾		CAL 18-11B	1SFN 010 720 R3311	2	0.050
AF 145 ... AF 1650	1-2 ⁽²⁾					

2-pole auxiliary contacts N.O. leading + N.C. lagging

A 9 ... A 16	1-2		CCL 5-11	1SBN 011 421 R1008	2	0.050
N	1-2					

1-pole microswitch auxiliary contact N.O. or N.C.

A 95 ... A 300	1-2		CEL 18-10	1SFN 010 716 R1010	1	0.050
AF 95 ... AF 1650	1-2					
UA 95, UA 110	1-2					
A 95 ... A 300	1-2		CEL 18-01	1SFN 010 716 R1001	1	0.050
AF 95 ... AF 1650	1-2					
UA 95, UA 110	1-2					

(1) For each contactor or contactor relay type, refer to "Accessory Fitting Details" table

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

Note: The **CAL...** auxiliary contact blocks can be used for **UA..RA** contactors. See "Accessory Fitting Details" for this contactor type.

The **CAL...** auxiliary contact blocks can be used for **GA...** contactors:

- GA 75-10-00 : 2 x CAL 5-11 blocks
- GA 75-10-11 : 1 x CAL 5-11 block
- GAE 75-10-00 : 1 x CAL 5-11 block
- GAE 75-10-11 : no add-on block

>> Accessory Fitting Details for Contactors section 2
>> Accessory Fitting Details for Contactor Relays section 3




>> Front Mounted Aux. Contact Blocks page 4/2
>> Aux. Contacts for Safety Circuits pages 2/63, 3/15

Auxiliary Contact Blocks

Side Mounting

Technical Data

Utilization characteristics according to IEC

Types	CAL 5-11, CCL 5-11	CAL 18-11, CAL 18-11B	CEL 18-10, CEL 18-01
Compliance with standards	IEC 60947-5-1, EN 60947-5-1		
Rated insulation voltage U_i according to IEC 60947-5-1	V 690		250
Rated operational voltage U_e	V a.c. 24 ... 690		125
Conventional free air thermal current I_{th}	A 16		0.1
Rated operational current I_e acc. to IEC 60947-5-1	AC-15		AC-14
24-127 V a.c.	A 6		0.1
220-240 V a.c.	A 4		–
380-440 V a.c.	A 3		–
500-690 V a.c.	A 2		–
acc. to IEC 60947-5-1	DC-13		DC-12
24 V d.c.	A 6 (144 W)		0.1
48 V d.c.	A 2.8 (134 W)		0.1
72 V d.c.	A 1 (72 W)		0.1
110 V d.c.	A 0.55 (60 W)		0.1
125 V d.c.	A 0.55 (69 W)		–
220 V d.c.	A 0.3 (66 W)		–
250 V d.c.	A 0.3 (75 W)		–
Short-circuit protection	A 10 (gG type fuses)		0.1 (FF type fuses) (1)
Making capacity	10 x I_e AC-15		6 x I_e AC-14
Breaking capacity	10 x I_e AC-15		6 x I_e AC-14
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 0.10	0.15	–
Min. switching capacity	V / mA 17 / 1	24 / 50 (0.5 million of operating cycles)	3 / 1
with failure rate acc. to IEC 60947-5-4	$\leq 10^{-7}$	–	–
Mechanical durability – millions of operating cycles	10	5 (A/AF 95 ... A/AF 185) 3 (A/AF 210 ... AF 750) 0.5 (AF 1350, AF 1650)	1
– max. mech. switching frequency	cycles / h 3600		1200
Electrical durability – millions of operating cycles	see "Electrical Durability" curves		0.7
– max. elec. switching frequency	cycles / h 1200		1200
Connecting terminals (Delivered in open position. Screws of unused terminals should be tightened.)	M3.5 (+,-) pozidriv 2 screws with cable clamp		
Tightening torque – recommended	Nm 1.00		
– max.	Nm 1.20		
Connecting capacity (min. ... max.)			
Rigid solid  1 or 2 x mm ²	1 ... 4		
Flexible with cable end  1 or 2 x mm ²	0.75 ... 2.5		
Lugs  L mm ≤ l mm >	8 3.7		
Degree of protection according to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529	IP 20		

Utilization characteristics according to UL/CSA

Max. rated voltage	V 600	125
Pilot duty	A600, Q300	0.1 A

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

>> Electrical Durability Curves page 4/35	>> Terminal Marking and Positioning section 8
>> Certification and Approvals section 7	>> Dimensions section 9

TE5S Electronic Timer for Star-Delta Starters



TE5S...

Application

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

Description

According to the type of device chosen, the electronic circuit has a 24 V a.c./d.c., 110 to 120 V a.c., 220 to 240 V a.c. or 380 to 440 V a.c. supply. An output relay with reversing contact ensures high current switching. A two-position switch allows selection of one of the two time delay ranges: 0.8 to 8 s or 6 to 60 s. The 0.1 to 1.0 graduated button allows an initial setting without steps within the previously selected range which can then be adjusted using a chronometer.

Note: We recommend that you allow for temperature drift for the final adjustment of the time delay setting. Drift: -0.2 % per °C.

For example, a setting made at 20 °C will yield a time delay shorter by 7 % at 55 °C in a cubicle. (-0.2 % per °C i.e. $-0.2 \times 35 = -7\%$).

Regardless of these settings the **TE5S** provides a fixed "lapse" of 50 ms between the opening of contact 15-16 and the closing of contact 15-18. This time delay prevents from arc short-circuit during star to delta switching.

Operation

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

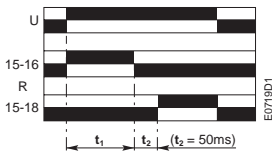
Count-down of the programmed time immediately commences.

When the time delay has elapsed, contact 15-16 opens and at the same time the 50 ms lapse, t_2 , begins after which contact 15-18 moves to the closed position. The yellow R indicator light comes on.

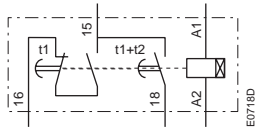
On de-energization, the U and R indicator lights go out and, after the 250 ms resetting time, the device is ready for a new cycle.

Mounting

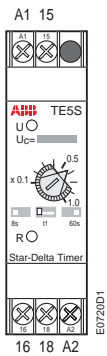
On 35 x 7.5 mm or 35 x 15 mm mounting rail according to IEC/EN 60715.



Chart



Equivalent diagram

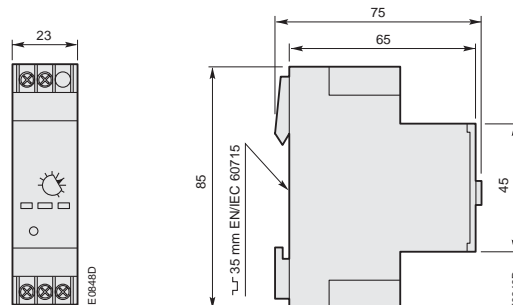


Front face

Ordering Details

For contactors	Rated control voltage U_c V	Type	Order code	Pack ^{ing} pieces	Weight kg
A 9 ... A 300	24 a.c./d.c.	TE5S-24	1SBN 020 010 R1001	1	0.080
	110 ... 120 a.c.	TE5S-120	1SBN 020 010 R1002	1	0.080
	220 ... 240 a.c.	TE5S-240	1SBN 020 010 R1003	1	0.080
	380 ... 440 a.c	TE5S-440	1SBN 020 010 R1004	1	0.080

Dimensions (in mm)



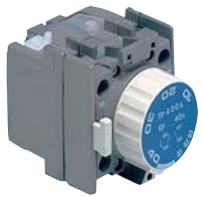
TE5S Electronic Timer for Star-Delta Starters

Technical Data

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

4

TP... Pneumatic Timer Blocks



TP 40 DA

1SBC5 7589 3 F0302



BX-TP

1SBC5 8652 2F0301

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: 1 N.O. and 1 N.C.
- 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.

Accessory

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

Fitting Details

Clipped onto the front panel of **A 9 ... A 75** 1-stack contactors and **N...** 1-stack contactor relays.

For each contactor or contactor relay type, refer to "Accessory Fitting Details" table.

Ordering Details

Time delay setting	Type	Order code	Pack ^{ing} pieces	Weight kg
0.1 ... 40 s	TP 40 DA	1SBN 020 300 R1000	1	0.070
10 ... 180 s	TP 180 DA	1SBN 020 300 R1001	1	0.070
0.1 ... 40 s	TP 40 IA	1SBN 020 301 R1000	1	0.070
10 ... 180 s	TP 180 IA	1SBN 020 301 R1001	1	0.070
–	BX-TP	FPTN 472 657 R0001	1	0.006



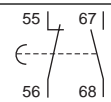
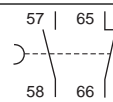
Note: The TP... timers provided for A contactors can be used for the AF, AE, TAE, UA, GA and GAE contactors.

>> Accessory Fitting Details sections 2, 3

TP... Pneumatic Timer Blocks

Technical Data

Utilization characteristics according to IEC

Compliance with standards	IEC 60947-5-1, EN 60947-5-1	
Rated insulation voltage U_i according to IEC 60947-5-1	V a.c.	690
Rated operational voltage U_e according to IEC 60947-5-1	V a.c.	24 ... 690
Conventional free air thermal current I_{th}	A	10
Rated operational current I_e acc. to IEC 60947-5-1		
AC-15		
24-127 V a.c.	A	6
220-240 V a.c.	A	4
380-440 V a.c.	A	3
500 V a.c.	A	1
690 V a.c.	A	0.5
DC-13		
24 V d.c.	A	6 (144 W)
48 V d.c.	A	2.8 (134 W)
72 V d.c.	A	1 (72 W)
110 V d.c.	A	0.55 (60 W)
125 V d.c.	A	0.55 (69 W)
220 V d.c.	A	0.3 (66 W)
250 V d.c.	A	0.3 (75 W)
Making capacity		10 x I_e AC-15
Breaking capacity		10 x I_e AC-15
Short-circuit protection - gG type fuses	A	10
Rated short-time withstand current I_{cw} at $\theta = 40\text{ °C}$		
1 s	A	50
0.1 s	A	100
Heat loss per pole at 6 A	W	0.15
N.O. and N.C. contact non-overlapping time	ms	1 ... 2
Resetting time	ms	approx. 40
Accuracy (measured over 10 successive cycles)		±2 %
Drift (variation in mean value during TP lifetime)		TP ... DA: -15 to +15 % TP ... IA: -25 to +15 %
Drift according to ambient temperature		
- between -20 °C and +20 °C	% per °C	0.25
- between +20 °C and +65 °C	% per °C	0.20
Electrical durability		see "Electrical Durability" curves
Max. switching frequency	cycles/h	1200
Mechanical durability	cycles	5 millions
Connecting terminals (delivered in open position)		M3.5 (+,-) pozidriv 2 screws with cable clamp
Connecting capacity		
- rigid solid	 1 or 2 x mm²	1 ... 2.5
- flexible with cable end	 1 or 2 x mm²	0.75 ... 2.5
Tightening torque		
- recommended	Nm	1.00
- max.	Nm	1.20
Terminal marking		
TP 40 DA		TP 40 IA
TP 180 DA		TP 180 IA
		

Utilization characteristics according to UL/CSA

Max. rated voltage	V	600
Pilot duty		A600

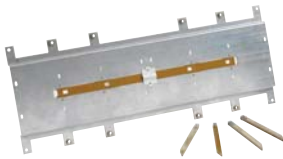
Mechanical Interlock Units

Mechanical and Electrical Interlock Units



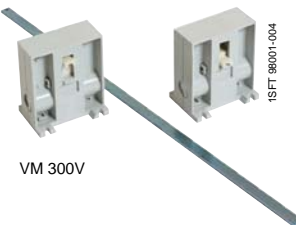
VM 300H

1SBC5 8041 1F0001



VM 1650H

1SFC1 0102 4F0201



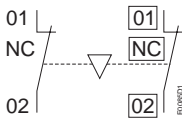
VM 300V

1SFT 98001-004



VE 5-1

1SBC5 7282 2F0301



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

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

- **VM...** interlock units for mechanical interlocking of two horizontal or vertical mounted a.c. or d.c. operated contactors.
- **VE...** interlock units for mechanical and electrical interlocking of two horizontal mounted a.c. or d.c. operated contactors.

See selection tables on the opposite page showing interlocking details between two contactors of a same or different rating.

Ordering Details

For contactors	Type	Order code	Pack ^{ing} pieces	Weight kg
Mechanical interlock units for two horizontal mounted contactors (1)				
see opposite "Selection Table"	VM 5-1	1SBN 030 100 R1000	1	0.066
	VM 300H	1SFN 034 700 R1000	1	0.150
	VM 300/460H	1SFN 035 100 R1000	1	0.150
	VM 750H	1SFN 035 700 R1000	1	0.200
	VM 1650H	1SFN 036 503 R1000	1	6.000

(1) Mechanical durability: VM 5-1 = 5 millions cycles, VM 300H ... VM 750H = 1 million cycles.

Mechanical interlock units for two vertical mounted contactors (1)

see opposite "Selection Table"	VM 300V	1SFN 034 701 R1000	1	0.150
	VM 300/460V	1SFN 035 101 R1000	1	0.150
	VM 750V	1SFN 035 701 R1000	1	0.200

(1) Mechanical durability: VM 300V ... VM 750V = 1 million cycles.

Mechanical and electrical interlock units for two horizontal mounted contactors

see opposite "Selection Table"	VE 5-1	1SBN 030 110 R1000	1	0.076
	VE 5-2	1SBN 030 210 R1000	1	0.146

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

Compliance with standards	IEC 60947-5-1, EN 60947-5-1		Rated short-time withstand current I_{cw} - $\theta = 40^\circ\text{C}$		
Rated insulation voltage U_i according to IEC 60947-5-1	V	690	1 s	A	100
according to UL / CSA	V	600	0.1 s	A	140
Rated operational voltage U_e acc. to IEC 60947-5-1	V a.c.	24 ... 690	Short-circuit protection gG type fuses		
Conventional thermal current I_{th}	A	16	A 10		
Rated operational current I_e acc. to IEC 60947-5-1			Heat loss per pole at 6 A		
AC-15			W 0.15		
24-127 V	A	6	Mechanical durability cycles		
220-240 V	A	4	5 millions		
380-440 V	A	3	Max. switching frequency cycles/h		
500-690 V	A	2	600		
DC-13			Connecting capacity		
24 V	A	6	- rigid solid 1 or 2 x mm² 1 ... 4		
48 V	A	2.8	- flexible with cable end 1 or 2 x mm² 0.75 ... 2.5		
72 V	A	1	Connecting terminals		
125 V	A	0.55	delivered in open position		
250 V	A	0.3	(screws of unused terminals should be tightened)		
Making capacity	10 x I_e AC-15		Tightening torque		
Breaking capacity	10 x I_e AC-15		- recommended Nm 1.00		
			- max. Nm 1.20		
			Degree of protection		
			acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		
			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 **TE5S** electronic timer with time lapse, as applicable.

>> Accessory Fitting Details sections 2, 3
>> Mounting Plates page 4/31

>> Dimensions section 9

Mechanical Interlock Units

Mechanical and Electrical Interlock Units

Selection Tables - VM... Interlock Units

Mechanical interlocking of two a.c. or d.c. operated contactors

Horizontal mounting

Contactor types		AL 9 ... AL 16	AL 26 ... AL 40	A 9 ... A 40	A 45 ... A 110	A 145 ... A 300	AF 400, AF 460	AF 580, AF 750	AF 1350, AF 1650
Right									
Left									
	AL 9 ... AL 16	VM 5-1	–	–	–	–	–	–	–
	AL 26 ... AL 40	–	VM 5-1	–	–	–	–	–	–
	A 9 ... A 40	–	–	VM 5-1	See table below (with VE 5-.. types)	–	–	–	–
	A 45 ... A 75	–	–	–		–	–	–	–
	A 95 ... A 185	–	–	–	–	VM 300H	–	–	–
	A 210 ... A 300	–	–	–	–	VM 300H	VM 300/460H	–	–
	AF 400 ... AF 750	–	–	–	–	–	VM 750H	VM 750H	–
	AF 1350, AF 1650	–	–	–	–	–	–	–	VM 1650H
	Fixing	Rail or PM 26-23 mounting plate (1) (to be supplied separately)				PN... mounting plate (to be supplied separately)			Mounting plate included

(1) **Rail mounting for:** 2 x A 9 ... A 40 or 2 x AL 9 ... AL 40 contactors only.

2 x A 30, A 40 or 2 x AL 30, AL 40 contactors + MMS.

PM 26-23 mounting plate for: 2 x A 9 ... A 26 contactors + MMS, or 2 x AL 9 ... AL 26 contactors + MMS.

The interlock units provided for A... contactors can be used for AF types.

The interlock units provided for AL... contactors can be used for AL..Z, and TAL types, according to the "Fitting Details" table.

Vertical mounting

Contactor types		A 145 ... A 300	AF 400, AF 460	AF 580, AF 750
Down				
Up				
	A 95 ... A 185	VM 300V	–	–
	A 210 ... A 300	VM 300V	VM 300/460V	–
	AF 400 ... AF 750	–	VM 750V	VM 750V
	Fixing	Additional plate (not supplied)		

Selection Table - VE... Interlock Units

Mechanical and electrical interlocking of two a.c. or d.c. operated contactors

Horizontal mounting

Contactor types		AL 9 ... AL 16	AL 26 ... AL 40	A 9 ... A 26	A 30, A 40	A 45 ... A 75	A 95, A 110	
Right								
Left								
	AL 9 ... AL 16	VE 5-1	–	–	–	–	–	
	AL 26 ... AL 40	–	VE 5-1	–	–	–	–	
	A 9 ... A 26	–	–	VE 5-1	VE 5-1	–	–	
	A 30, A 40	–	–	VE 5-1	VE 5-1	VE 5-2	–	
	A 45 ... A 75	–	–	–	VE 5-2	VE 5-2	VE 5-2 (3)	
	A 95, A 110	–	–	–	–	VE 5-2 (3)	VE 5-2	
	Fixing	Rail or PM 26-23 mounting plate (1) (to be supplied separately)				Rail (2)	PN... mounting plate (to be supplied separately)	

(1) **Rail mounting for:** 2 x A 9 ... A 40 or 2 x AL 9 ... AL 40 contactors only.

2 x A 30, A 40 or 2 x AL 30, AL 40 contactors + MMS.

PM 26-23 mounting plate for: 2 x A 9 ... A 26 contactors + MMS, or 2 x AL 9 ... AL 26 contactors + MMS.

(2) 2 contactors with or without MMS.

(3) The combination of A 45 ... 75 contactors interlocked with A 95, A 110 contactors cannot be mounted on symmetrical rail (75 mm, IEC/EN 60715).

The interlock units provided for A... contactors can be used for AE, TAE, AF, GA and GAE types.

The interlock units provided for AL... contactors can be used for TAL types, according to the "Fitting Details" table.

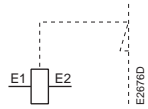
>> Accessories Fitting Details sections 2, 3	>> PM 26 Mounting Plate page 4/28
>> Dimensions section 9	>> PN... Mounting Plates page 4/31

WB 75-A Mechanical Latching Unit



WB 75-A

1SBC2 6548 3F0301



Terminal marking

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 2 screw with screwdriver guidance; delivered untightened and protected against accidental direct contact.

Operation

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

Contactor opening can be controlled:

– electrically by an impulse* (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 1-stack 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 contactor relays	Type	Order code	Weight kg Pack ^{ing} 1 piece
	state coil voltage <input type="text"/> (see table below)	state coil voltage code <input type="checkbox"/> <input type="checkbox"/> (see table below)	
A 9 ... A 75, AF 45 ... AF 75, AL 9 ... AL 40, AL 9Z ... AL 16Z, AE 45 ... AE 75, TAL 9 ... TAL 40, TAE 45 ... TAE 75, UA 16 ... UA 75, GA 75, GAE 75, N, NL, NL Z, TNL	WB 75-A <input type="text"/>	FPTN 372 726 R10 <input type="checkbox"/> <input type="checkbox"/>	0.120



Coil voltages and codes

Voltage <input type="text"/> V - 50Hz/d.c.	Voltage <input type="text"/> V - 60Hz	Code <input type="checkbox"/> <input type="checkbox"/>
24	24 ... 28	0 1
42	42 ... 48	0 2
48	48 ... 55	0 3
110	110 ... 127	0 4
220 ... 230	220 ... 255	0 6
230 ... 240	230 ... 277	0 5
380 ... 415	380 ... 440	0 7
415 ... 440	440 ... 480	0 8

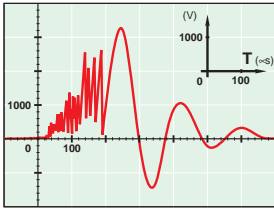
>> Dimensions section 9

WB 75-A Mechanical Latching Unit

Technical Data

Rated insulation voltage U_i according to IEC 60947-1	V a.c.	690
Rated control voltage U_c according to the coil voltage	V a.c. V d.c.	24 ... 480 24 ... 440
Coil operating range		0.85 ... 1.1 U_c
Max. electrical impulse time – on a.c. coil (with load factor 5 %) – on d.c. coil (with load factor 3 %)	s s	20 8
Min. electrical impulse time – for latching: (energizing of the contactor coil)	in a.c. in d.c.	ms ms
		50 (A..., UA..., GA... contactors, N... contactor relays) 120 (AL..., AL.Z..., TAL... contactors and NL... NL.Z... TNL... contactor relays)
		120 (AF... contactors) 120 (AF... contactors)
		50 (AE..., TAE... contactors and GAE... contactors)
– for pull-out: (energizing of the WB block coil)	in a.c. in d.c.	ms ms
		30 50
Coil consumption (mean values) – a.c. operated coil	inrush holding	VA VA
		90 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		
		no difference with the operation of a contactor without mechanical latching unit
– on contactor opening (unlatching) between WB.. coil energization and: N.O. contact opening N.C. contact closing	ms ms	5 ... 25 7 ... 28
Mechanical durability in millions of op. cycles		1
Max. switching frequency	cycles/h	3600 with on-load factor of 8 %
Connecting terminals (delivered in open position)		M3.5 (+,-) pozidriv 2 screw with cable clamp
Connecting capacity – rigid solid – flexible with cable end	 mm²  mm²	1 ... 4 0.75 ... 2.5
Tightening torque – recommended – max.	Nm Nm	1.00 1.20
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		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 reduce 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.

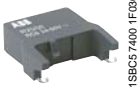
Note: A varistor is a resistor whose value decreases to a very large extent when a certain voltage is applied at its terminals.

Ordering Details

For contactors	Control voltage		Type	Order code	Pack ^{ing} Weight	
	V	d.c. a.c.			pieces	kg
					1 piece	
AL 9 ... AL 40, AL 9Z ... AL 16Z, AE 45 ... AE 110, TAL 9 ... TAL 40, TAE 45 ... TAE 110 NL, NL Z, TNL	12 ... 32	● –	RT 5/32	1SBN 050 020 R1000	2	0.015
	25 ... 65	● –	RT 5/65	1SBN 050 020 R1001	2	0.015
	50 ... 90	● –	RT 5/90	1SBN 050 020 R1002	2	0.015
	77 ... 150	● –	RT 5/150	1SBN 050 020 R1003	2	0.015
	150 ... 264	● –	RT 5/264	1SBN 050 020 R1004	2	0.015
A 9 ... A 110 AL 9 ... AL 40, AL 9Z ... AL 16Z, AE 45 ... AE 110, TAL 9 ... TAL 40 TAE 45 ... TAE 110 N, NL, NL Z, TNL	24 ... 50	● ●	RV 5/50	1SBN 050 010 R1000	2	0.015
	50 ... 133	● ●	RV 5/133	1SBN 050 010 R1001	2	0.015
	110 ... 250	● ●	RV 5/250	1SBN 050 010 R1002	2	0.015
	250 ... 440	● ●	RV 5/440	1SBN 050 010 R1003	2	0.015
A 9 ... A 40 and N	24 ... 50	– ●	RC 5-1/50	1SBN 050 100 R1000	2	0.012
	50 ... 133	– ●	RC 5-1/133	1SBN 050 100 R1001	2	0.012
	110 ... 250	– ●	RC 5-1/250	1SBN 050 100 R1002	2	0.012
	250 ... 440	– ●	RC 5-1/440	1SBN 050 100 R1003	2	0.012
A 45 ... A 110	24 ... 50	– ●	RC 5-2/50	1SBN 050 200 R1000	2	0.015
	50 ... 133	– ●	RC 5-2/133	1SBN 050 200 R1001	2	0.015
	110 ... 250	– ●	RC 5-2/250	1SBN 050 200 R1002	2	0.015
	250 ... 440	– ●	RC 5-2/440	1SBN 050 200 R1003	2	0.015

Note: The surge suppressors provided for A... contactors can be used for the UA, UA..RA and GA 75 types.
The surge suppressors provided for AE 45 ... AE 110 contactors can be used for the GAE 75 types.

>> Technical Data page 4/15



RV 5/50

1SBC57400 1F0301



RC 5-1/50

1SBC57389 1F0301

Surge Suppressors for Contactor Coils

Technical Data

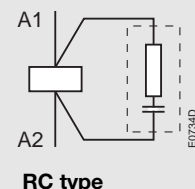
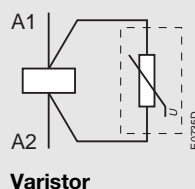
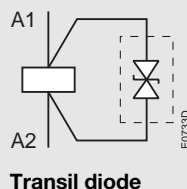
Transil diode		RT 5/32	RT 5/65	RT 5/90	RT 5/150	RT 5/264
Control voltage U_c	V d.c.	12 ... 32	25 ... 65	50 ... 90	77 ... 150	150 ... 264
Residual overvoltage (clipping voltage)	V d.c.	50	100	150	210	390
Opening time growth factor		1.5 ... 3				
Operating temperature	°C	-20 ... +70				
Connection to the coil terminals (parallel mounting)		Clip-on for both fixing and connection.				
Fixing		Clipped onto the top part of the contactor base without change in contactor overall dimensions.				
Advantages		Good energy absorption - Unpolarized system - Simple, reliable system.				
Drawback		A certain delay on drop out which does not however reduce contactor breaking capacity.				

Varistor		RV 5/50	RV 5/133	RV 5/250	RV 5/440
Control voltage U_c	V a.c./d.c.	24 ... 50	50 ... 133	110 ... 250	250 ... 440
Residual overvoltage (clipping voltage)	V a.c./d.c.	132	270	480	825
Opening time growth factor		1.1 ... 1.5			
Operating temperature	°C	-20 ... +70			
Connection to the coil terminals (parallel mounting)		Clip-on for both fixing and connection.			
Fixing		Clipped onto the top part of the contactor base without change in contactor overall dimensions.			
Advantages		High energy absorption: good damping - Unpolarized system.			
Drawback		Clipping as from U_{vdr}^* , thus voltage front up to this point.			

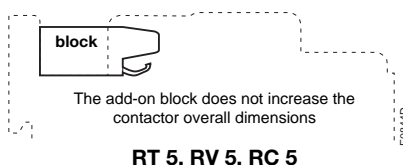
* U_{vdr} = Varistor operating voltage (voltage dependent resistor), tolerance $\pm 10\%$.

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			
Residual overvoltage (clipping voltage)	V a.c.	2 to 3 x U_c max.			
Opening time growth factor		1.2 ... 1.3			
Operating temperature	°C	-20 ... +70			
Connection to the coil terminals (parallel mounting)		Clip-on for both fixing and connection.			
Fixing		Clipped onto the top part of the contactor base without change in contactor overall dimensions.			
Advantages		Very fast clipping - Attenuation of steep fronts and thus of high frequencies. No operating delays.			

Wiring Diagrams



Dimensions



Impulse Contact blocks

Lamp Holder - Fuse Holder

CB 5... Impulse Contact Blocks

Application

Impulse contact blocks are available in two different types:
CB 5-10: N.O. contact with a black pushbutton ("ON" function),
CB 5-01: N.C. contact with a red pushbutton ("OFF" function).

Description

These blocks are equipped with 2 connecting leads 0.5 mm² with end, approximately 10 cm long.
 Mounting: Clipped onto the front face of the contactors.

Ordering details

For contactors	Contacts	Type	Order code	Pack ^{ing} pieces	Weight kg
A 9 ... A 110	1 –	CB 5-10	1SBN 010 013 R1010	1	0.012
	– 1	CB 5-01	1SBN 010 013 R1001	1	0.012

Note: The CB 5-10 and CB 5-01 blocks provided for the A... contactors can be used for the AF, AL, AL..Z, AE, TAL, TAE, UA, GA and GAE types.

BL 5-L Lamp Holder Block

Application: Lamp holder for indicator light.

Description

Block designed to hold a bulb, not supplied (BA 9 s type, max. P = 1.2 W, max. voltage = 400 V, max. length = 28 mm).
 Equipped with 2 connecting leads (1 mm² and approximately 10 cm long), with 3 lenses (green, red, colourless) for fixing on the front face of the d.o.l. starter enclosures (insulated enclosures).
 Mounting: Clipped onto the front face of the contactors.

Ordering details

For contactors	Type	Order code	Pack ^{ing} pieces	Weight kg
A 9 ... A 110, N	BL 5-L	1SBN 070 054 R1000	1	0.022

Note: The BL 5-L block provided for the A... contactors and N... contactor relays can be used for the AF, AL, AL..Z, AE, TAL, TAE, UA, GA, GAE, NL, NL Z, and TNL types.

BL 5-F Fuse Holder Block

Application: Fuse holder for the control circuit.

Description

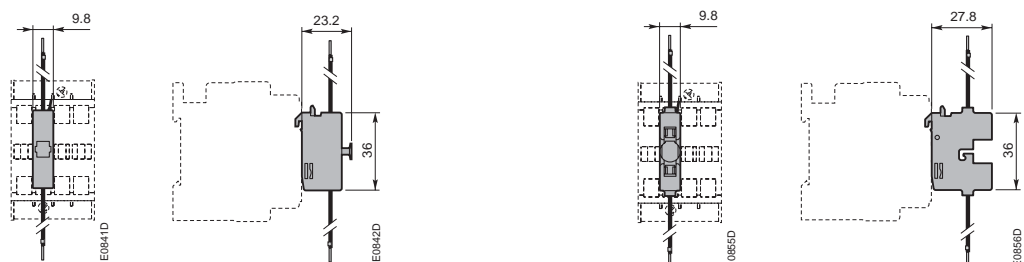
Block designed to hold a fuse cartridge (5 x 20, 4 A max.), not supplied.
 Equipped with 2 connecting leads 1 mm² and approximately 10 cm long.
 Mounting: Clipped onto the front face of the contactors.

Ordering details

For contactors	Type	Order code	Pack ^{ing} pieces	Weight kg
A 9 ... A 110, N	BL 5-F	1SBN 070 055 R1000	1	0.020

Note: The BL 5-F block provided for the A... contactors and N... contactor relays can be used for the AF, AL, AL..Z, AE, TAL, TAE, UA, GA, GAE, NL, NL Z, and TNL types.

Dimensions (in mm)



CB 5... Impulse contact blocks

BL 5-L Lamp holder blocks
 BL 5-F Fuse holder blocks



BA 5-50 Function Markers

BP 16 Mounting Piece



BA 5-50

1SBCS 7587 4F0301



BP 16

1SBCS 8672 4F0302

BA 5-50 Function Markers

Application

For marking contactors, thermal O/L relays, contactor relays and accessories.

Description

The **BA 5-50** is a set of 50 function markers designed to be clipped onto the front face of devices. Effective marking surface: 7 x 19 mm. Details can be added to these markers using a ball point pen, indelible felt-tip pen or pentel white. Self-adhesive labels (not supplied) can also be added to them.

Ordering details

For contactors	Type	Order code	Pack ^{ing} box	Weight kg
Contactors, thermal O/L relays, contactor relays and accessories	BA 5-50	1SBN 110 000 R1000	1	0.017

BP 16 Mounting Piece

Application

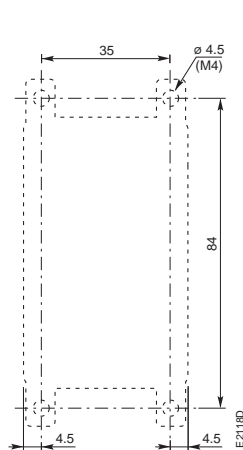
Mounting piece for screw fixing (M4, not supplied) of A... series contactors indicated in the table below. Easy handling of screwdrivers and screw driving.

Description

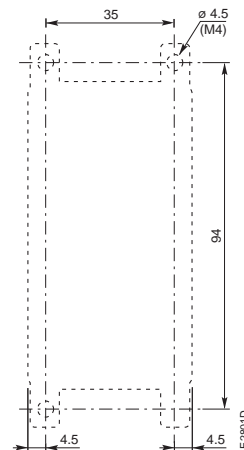
Add-on mounting piece on contactor's rear face, offering a wide fixing facility.

Ordering details

For contactors	Type	Order code	Pack ^{ing} pieces	Weight kg
A 9 ... A 16, AL 9 ... AL 16, AL 9Z ... AL 16Z, TAL 9 ... TAL 16, UA 16, UA 16..RA, N, NL, NL Z and TNL	BP 16	1SBN 111 403 R1000	100	0.141



Drilling plan for A 9 ... A 16, UA 16, UA16..RA, N contactors with BP 16



Drilling plan for AL 9 ... AL 16, AL 9Z ... AL 16Z, TAL 9 ... TAL 16, NL, NL Z and TNL contactors with BP 16

RA 5 Interface Relay



RA 5



A 50-30-00 + RA 5

Application

RA 5 interface relay is designed to receive 24 V d.c. signals delivered by PLC's or other sources **with a low output power** and to restore them with **sufficient power** to operate the coils of the relevant **A 9 ... A 75** contactors or the **N...** contactors relays.

Description

RA 5 interface relay is made up of a miniature electromechanical relay equipped with a N.O. contact and with a low consumption 24 V d.c. coil.

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

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

- on the 24 V d.c. relay coil via a diode,
- on the power contactor coil via a varistor.

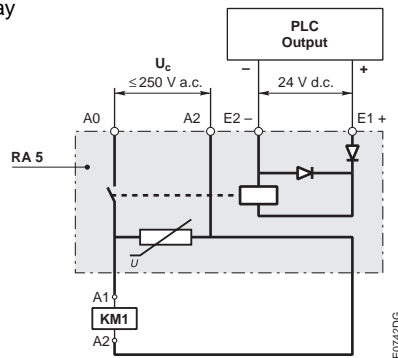
Furthermore, the RA 5 is protected against relay pole reversal by a diode inserted between the E1 and E2 input terminals.

Connection

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

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

RA 5 interface relay



Mounting

Terminal pads clamped inside the contactor coil terminals.

Ordering Details

For contactors	Coil voltages	Control voltage U_c	Type	Order code	Pack ^{ing} pieces	Weight kg
A 9 ... A 75, N	24 ... 250 V / 50-60 Hz	24 V d.c.	RA 5	1SBN 060 000 R1001	1	0.050

Notes: The interface relays provided for the A... contactors can be used for the UA, UA..RA and GA types.
For A95, A110 contactors use R1561 interface relay. Specific catalogue available on request.

>> Dimensions section 9

RA 5 Interface Relays

Technical Data

General technical data

Compliance with standards		IEC 60255-5
Rated insulation voltage U_i according to IEC 60947-4-1	V a.c.	250
Permissible ambient temperature: – for free air operation: – at $U_e = 24$ V d.c. (between E1 and E2)	°C	-25 ... +70
– from 0.85 to 1.1 U_e	°C	-25 ... +55
– for storage	°C	-40 ... +70
Climatic withstand		Complies with that of associated contactors
Operating altitude	m	≤ 3000
Mounting position		No limitation
Fixing		Using the contactor A1 and A2 terminal connecting parts
Connecting terminals (delivered in open position)		M3.5 (+,-) pozidriv 2 screws with cable clamp
Connecting capacity (min. ... max.) – rigid solid	2 x mm²	1 ... 4
– flexible with cable end	2 x mm²	0.75 ... 2.5
Tightening torque – recommended	Nm	1.00
– max.	Nm	1.20
Degree of protection acc. to IEC 60947-1/EN 60947-1 and IEC 60529/EN 60529		Protection against direct contact in acc. with EN 50274

Working data

Surge suppression: – for contactor coil – for interface relay coil		Varistor Diode
Protection against polarity reversal between terminals E1 and E2		Diode
Interface relay operating time	ms	Closing and drop-out ≤ 10
Total operating time, interface relay + contactor: – between energization and: N.O. contact closing	ms	19 ... 36
N.C. contact opening	ms	16 ... 32
– between de-energization and: N.O. contact opening	ms	15 ... 25
N.C. contact closing	ms	18 ... 28

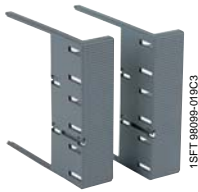
Electrical input data

Control voltage (E1 and E2 terminals) U_e – rated value	V d.c.	24
– max. range	V d.c.	17 ... 30
Max. consumption for $U_e = 24$ V d.c., $\theta = 20$ °C	W	0.3
"0" status (relay open) for U_e	V d.c.	≤ 2.4
or I_e	mA	< 1
"1" status (relay closed) for U_e	V d.c.	≥ 17
Max. short supply interruption immunity time	ms	4

Electrical output data

Switching voltage (A0 and A2 terminals)	V a.c.	≤ 250
Electrical durability million of operating cycles		2 (600 cycles/h) on A 9 ... A 40 contactors or N... contactor relay 1 (600 cycles/h) on A 45 ... A 75 contactors

LT... Terminal Shrouds



LT ...-AC

1SFN 98099-019C3



LT ...-AL

1SFN 98099-125



LT ...-AY

1SFN 98000-014

Application

Main terminal protection for **A 145 ... AF 750** contactors.
 The auxiliary contact blocks and coils are designed to provide an IP 20 degree of protection.
 The main terminals, equipped with lugs or connectors, can be protected against accidental direct contact after wiring (EN 50274) by the addition of terminal shrouds (see table below).

Note: A 9 ... A 110 contactors do not require additional terminal shrouds as their terminals are all already protected against accidental direct contact in acc. with EN 50274.

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	Type	Order code	Pack ^{ing} pieces	Weight kg 1 piece
A 145 ... A 185 with connectors	LT 185-AC	1SFN 124 701 R1000	2	0.050
A 145 ... A 185 with lugs	LT 185-AL	1SFN 124 703 R1000	2	0.220
A 145 ... A 185 with short. bar LY 185 or between A 145 and TA 200DU or between A 185 and TA 200DU	LT 185-AY	1SFN 124 704 R1000	1	0.050
A 210 ... A 300 with connectors	LT 300-AC	1SFN 125 101 R1000	2	0.070
A 210 ... A 300 with lugs	LT 300-AL	1SFN 125 103 R1000	2	0.280
A 210 ... A 300 with short. bar LY 300	LT 300-AY	1SFN 125 104 R1000	1	0.075
AF 400 ... AF 460 with connectors	LT 460-AC	1SFN 125 701 R1000	2	0.100
AF 400 ... AF 460 with lugs	LT 460-AL	1SFN 125 703 R1000	2	0.800
AF 580 ... AF 750 with connectors	LT 750-AC	1SFN 126 101 R1000	2	0.120
AF 580 ... AF 750 with lugs	LT 750-AL	1SFN 126 103 R1000	2	0.825

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

LK... Terminals for Control Lead Connections



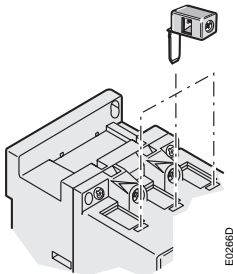
LK 75-L



LK 75-F



LK 110



LK ... positioning

Application

Terminals designed to connect the control conductors to the main poles of the **A 45 ... A 110** contactors and derivative versions.

Description

Accessories clipped into the slots placed above each power terminal connector.

The **LK 75...** are fitted with a pin designed to hold them in place until the connector has been fully clamped with its power cable.

The **LK 110** must be held in place until the connector has been clamped.

- Degree of protection IP 20
- Connecting terminal delivered in open position: cable clamp and M 3.5 (+,-) pozidriv 2 screw.
- Cable cross-sectional area:

– 1 or 2 rigid conductors	1 ... 4 mm ²
– 1 or 2 flexible conductors with cable end	0.75 ... 2.5 mm ²
- Tightening torque for the LK... screw:

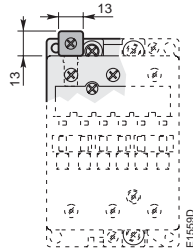
– recommended	1.00 Nm
– maxi.	1.20 Nm

Ordering Details

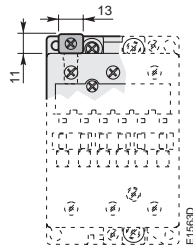
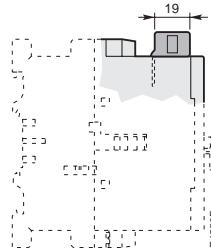
Connection	Type	Order code	Pack ^{ing} pieces	Weight kg 1 piece
Right and left on A 45 ... A 75	LK 75-L	1SBN 073 552 R1003	2	0.006
Opposite on A 45 ... A 75	LK 75-F	1SBN 073 552 R1002	2	0.006
Right and left on A 95 ... A 110	LK 110	1SFN 074 352 R1000	2	0.010

Note: The LK... terminals provided for the A... contactors can be used for the AF, AE, AM, TAE, UA, GA and GAE types.

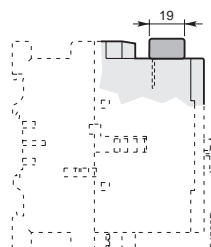
Dimensions (in mm)



LK 75-L, LK 110



LK 75-F



LZ... Connector Terminals

LZ... Connector Terminals for Al and Cu Cables

Application

Connection of copper and aluminium cables to the terminal pads of the poles of A and AF contactors.

Ordering details

Cables	For contactors	Cable cross section mm ²	Type	Order code	Pack ^{ing} set	Weight kg 1 piece
Single, Cu	A 145, A 185	6...185	–	1SDA 023 354 R0001	3	0.200
	A 210 ... AF 460	16...240	–	1SDA 023 368 R0001	3	0.400
Single Al & Cu	A 145, A 185	35...95	–	1SDA 023 356 R0001	3	0.100
	A 145, A 185	25...150	–	1SDA 023 357 R0001	3	0.100
	A 210 ... A 300	120...240	–	1SDA 023 370 R0001	3	0.200
Double, Cu	A 145, A 185	2x(50...120)	LZ 185-2C/120	1SFN 074 709 R1000	3	0.300
	A 210 ... A 300	2x(95...120)	–	1SDA 025 766 R0001	3	0.400
Al & Cu	AF 400 ... AF 750	2x(120...240)	–	1SDA 023 380 R0001	3	0.110
Triple Al & Cu	AF 400 ... AF 750	3x(70...185)	–	1SDA 023 384 R0001	3	0.265
Multi Al & Cu	AF 1350, AF 1650	4x(120...240)	–	1SDA 023 387 R0001	3	0.400

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



1SFT 98099-011C1

LZ...



1SFT 98099-095C2



1SBC5 8054 2F0302

LZ...

LD... Additional Terminal Blocks



A 9-30-10 with LD 16



LD 16



LD 26



LD 40



LD 75



LD 110

Application

The **LD...** terminal block is designed to increase the connecting capacity of the contactor on which it is fitted and for preparation of the wiring before final connection on the contactor.

Description

The **LD...** blocks are 3-pole terminal blocks with tunnel terminals. The available range can be used on A 9 to A 110 contactors.

The **LD75** and **LD110** terminal blocks are fixed in the 3 independent slots located above the built-in connectors.

Ordering Details

For contactors	Type	Order code	Pack ^{ing} pieces	Weight kg 1 piece
A 9 ... A 16	LD 16	1SBN 071 408 R1000	2	0.030
A 26	LD 26	1SBN 072 408 R1000	2	0.040
A 30, A 40	LD 40	1SBN 072 808 R1000	1	0.075
A 45, A 75	LD 75	1SBN 073 508 R1000	1	0.115
A 95, A 110	LD 110	1SFN 074 308 R1000	1	0.150

Note: The LD... terminal blocks provided for the A... contactors can be used for the AF, AL, AL...Z, AE, TAL, TAE and UA types.

Technical Data

Types	LD 16	LD 26	LD 40	LD 75	LD 110
Rated insulation voltage U_i according to IEC 60947-5-1	V 690				
according to UL / CSA	V 600				
Connecting terminals					
with single connector	mm 6x6	6x7	8x10	10x11	12x12
Connecting capacity (min. ... max.)					
Rigid solid ($\leq 4 \text{ mm}^2$) } \Rightarrow 1 x mm ²	1.5 ... 16	2.5 ... 16	4 ... 35	6 ... 50	10 ... 70
stranded ($\geq 6 \text{ mm}^2$) } \Rightarrow 2 x mm ²	1.5 ... 6	2.5 ... 6	4 ... 16	6 ... 25	10 ... 35
Flexible with cable end					
\Rightarrow 1 x mm ²	1.5 ... 16	2.5 ... 16	4 ... 25	6 ... 35	10 ... 50
\Rightarrow 2 x mm ²	1.5 ... 4	2.5 ... 4	4 ... 10	6 ... 16	10 ... 25
Bars	mm 6	6.5	8	10	12
Screw terminals (delivered in closed position)	(+,-) pozidriv 2 M4 M5 M6				Hexagon socket M8 (S = 4 mm)
Tightening torque (cable connection)	Nm 1.7	2.5	2.5	4	6
Degree of protection acc. to IEC 60947-4-1, EN 60947-4-1, IEC 60529 and EN 60529	IP 10				

Note: The utilization of **LD...** additional terminal blocks keeps the possibility to connect the following cables directly in the contactor main terminals but the **BED** and **BEM** connecting sets can no longer be used.

Possible cross section of rigid cable in the contactor terminals	LD 16	LD 26	LD 40	LD 75	LD 110
mm ²	4	6	10	50	95

>> Dimensions section 9

LX... Terminal Extension

LW... Terminal Enlargement



1SFT 98000-012C3

LX...

LX... Terminal Extension Pieces

Application

Extension pieces designed to extend the main terminals of contactors for combined mounting of connectors and connection sets.

Description

Sets containing 3 tin plated copper bars fixed by an isolating spacer.

Ordering details

For contactors	Dimensions hole Ø mm	bar mm	Type	Order code	Pack ^{ing} set	Weight kg 1 set
A 145, A185	8.5	17.5 x 5	LX 185	1SFN 074 710 R1000	1	0.250
A 210 ... A 300	10.5	20 x 5	LX 300	1SFN 075 110 R1000	1	0.350
AF 400, AF 460	10.5	25 x 5	LX 460	1SFN 075 710 R1000	1	0.500
AF 580, AF 750	13	40 x 6	LX 750	1SFN 076 110 R1000	1	0.850

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

LW... Enlargement Pieces

Application

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

Description

Sets containing 3 tin plated copper bars fixed by an isolating spacer.

Ordering details

For contactors	Dimensions hole Ø mm	bar mm	Type	Order code	Pack ^{ing} set	Weight kg 1 set
A 95, A 110	6.5	15 x 3	LW 110	1SFN 074 307 R1000	1	0.100
A 145, A 185	10.5	17.5 x 5	LW 185	1SFN 074 707 R1000	1	0.250
A 210 ... A 300	10.5	20 x 5	LW 300	1SFN 075 107 R1000	1	0.450
AF 400, AF 460	10.5	25 x 5	LW 460	1SFN 075 707 R1000	1	0.730
AF 580, AF 750	13	40 x 6	LW 750	1SFN 076 107 R1000	1	1.230

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



1SFT 98000-011C3

LW...

Terminal Connecting Strips and Shorting Bars



Application

Parallel and series connection of 3-pole and 4-pole contactor poles:

- To obtain a star point (3 parallel-connected poles): **LY**, **LF**, (LY allows 3 phases to be short-circuited).
- To connect poles in parallel and thus increase the a.c. load passing through the flow path made up of the parallel-connected poles: **LP** and **LH** (2 poles); **LY** and **LF** (3 poles); **LG** (4 poles).
For the maximum permissible current values with parallel-connected poles see "Parallel Connection of Main Poles".
The relevant cable cross-sectional area may limit the maximum permissible current. Consult the information in the table below.
- To connect poles in series and thus increase the d.c. load controlled by the poles: **LP** and **LH**.

Description

Types	for connection of "n" poles	with terminal	insulated
LP...	n = 2	no	yes (1)
LY...	n = 3	no	yes (1)
LH...	n = 2	yes	no
LF...	n = 3	yes	no
LG...	n = 4	yes	no

(1) LP 185 ... LP 750, LY 185 ... LY 750 not insulated. Use terminal shrouds.

Ordering Details

For contactors	max. nominal continuous current with "n" poles A	Cable cross-sectional area mm ²	Type	Order code	Pack ^{m9} pieces	Weight kg
						1 piece
A 9	30	6	LP 16	FPEP 407 000 R0001	10	0.002
A 12	32	6				
A 16	34	6				
N	–	6				
A 26	50	–	LP 25	FPEP 407 001 R0001	10	0.004
A 145, A 185	300	–	LP 185	1SFN 074 712 R1000	2	0.300
A 210 ... A 300	475	–	LP 300	1SFN 075 112 R1000	2	0.400
AF 400, AF 460	725	–	LP 460	1SFN 075 712 R1000	2	0.550
AF 580, AF 750	1200	–	LP 750	1SFN 076 112 R1000	2	0.950
A 9	33	6	LY 16	FPEP 407 002 R0001	10	0.005
A 12	36	6				
A 16	39	6				
A 95, A 110	240	–	LY 110	1SFN 074 303 R1000	1	0.055
A 145, A 185	400	–	LY 185	1SFN 074 703 R1000	1	0.200
A 210 ... A 300	670	–	LY 300	1SFN 075 103 R1000	1	0.300
AF 400, AF 460	1000	–	LY 460	1SFN 075 703 R1000	1	0.450
AF 580, AF 750	1650	–	LY 750	1SFN 076 103 R1000	1	0.800
A 9	35	10	LH 16	FPTN 477 017 R0001	2	0.010
A 12	38	10				
A 16	45	10				
A 26	72	16	LH 25	FPTN 472 669 R0001	2	0.014
A 45 ... A 75	200	95	LH 75	FPTN 472 734 R0001	2	0.085
A 9	50	16	LF 16	FPTN 477 017 R0002	2	0.010
A 12	54	16				
A 16	63	16				
A 26	100	35	LF 26	1SBN 072 405 R1000	2	0.022
A 30, A 40	140	50	LF 40	1SBN 073 205 R1000	2	0.037
A 45 ... A 75	275	150	LF 75	FPTN 472 735 R0001	2	0.095
A9	62	16	LG 16	FPTN 477 017 R0003	2	0.012
A 12	67	16				
A 16	72	16				

Note: – The strips and shorting bars provided for the A... contactors can be used for the AF, AL, AL.Z, AE, TAL and TAE types.
– The strips provided for the N... contactors relays can be used for the NL, NL Z and TNL types.

>> Parallel Connection of Main Poles page 2/90

>> Terminal Shrouds page 4/20

Connection Sets

Connections for Reversing Contactors

Application

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

Description

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

BEM 16-30

– Insulated, solid, rigid copper wires

BEM 26-30, BEM 40-30

– Insulated, stranded, rigid copper wires

BEM 75-30 ... BEM 750-30

– Insulated, solid copper bars

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

Ordering details

Mounting on 3-pole contactors	Type	Order code	Pack ^{ing} set	Weight kg 1 set
A 9 ... A 16	BEM 16-30	1SBN 081 401 R1000	1	0.025
A 26	BEM 26-30	1SBN 082 401 R1000	1	0.056
A 30, A 40	BEM 40-30	1SBN 082 801 R1000	1	0.096
A 50 ... A 75	BEM 75-30	1SBN 083 501 R1000	1	0.243
A 95, A 110	BEM 110-30	1SFN 084 301 R1000	1	0.450
A145, A 185	BEM 185-30	1SFN 084 701 R1000	1	0.900
A 210 ... A 300	BEM 300-30	1SFN 085 101 R1000	1	1.100
AF 400, AF 460	BEM 460-30	1SFN 085 701 R1000	1	4.400
AF 580, AF 750	BEM 750-30	1SFN 086 101 R1000	1	7.300

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

3-pole Connections 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	Type	Order code	Pack ^{ing} set	Weight kg 1 set
A 50 ... A 75	BES 75-30	1SBN 083 504 R1000	1	0.130
A 95, A 110	BES 110	1SFN 084 304 R1000	1	0.250
A 145, A 185	BES 185	1SFN 084 704 R1000	1	0.500
A 210 ... A 300	BES 300	1SFN 085 104 R1000	1	1.000
AF 400, AF 460	BES 460	1SFN 085 704 R1000	1	2.200
AF 580, AF 750	BES 750	1SFN 086 104 R1000	1	3.700

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

Connections for 4-pole Changeover Contactors

Application

Connection between the main poles of **two 4-pole contactors** mounted side by side so that they operate as source reversing contactors.

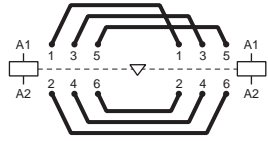
Description

These sets are made up of four downstream connections, with insulated, stranded, rigid copper cables.

Ordering details

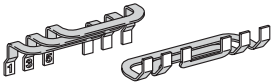
Mounting on 4-pole contactors	Type	Order code	Pack ^{ing} set	Weight kg 1 set
A 45, A 50, A 75	BES 75-40	1SBN 083 302 R1000	1	0.400

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



BEM... connections

EG744D



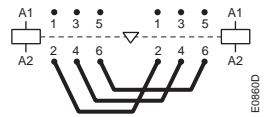
BEM 75-30

EG618D1



BEM 300-30

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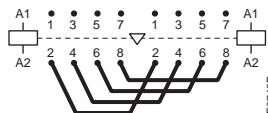
BES... for 3-pole connections

EG696D



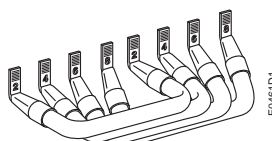
BES...

1SFT 98000-009C6



BES... for 4-pole connections

EG753D



BES 75-40

EG461D1

BED... Connection Sets

Connections for Star-Delta Starters

Application

Connections between the main poles of a star-delta starter.

Description

These sets are made up of:

- Three line contactor / delta contactor connections - Upstream side.
- Three connections for star and delta contactors - Downstream side.
- The necessary elements to create the star point upstream of the star contactor.

- BED 16 / BED 16-1, BED 26 / BED 26-1** - Insulated, solid copper wires.
- BED 40 / BED 40-1** - Insulated, stranded solid copper wires.
- BED 50 / BED 50-1, BED 75 / BED 75-1** - Solid copper bars and insulated stranded copper wires.
- BED 95 ... BED 750** - Insulated, solid copper bars.

BED 16-1 ... BED 75-1 connection sets are designed for star and delta contactors **without mechanical interlock unit** (contactors mounting joined side by side).

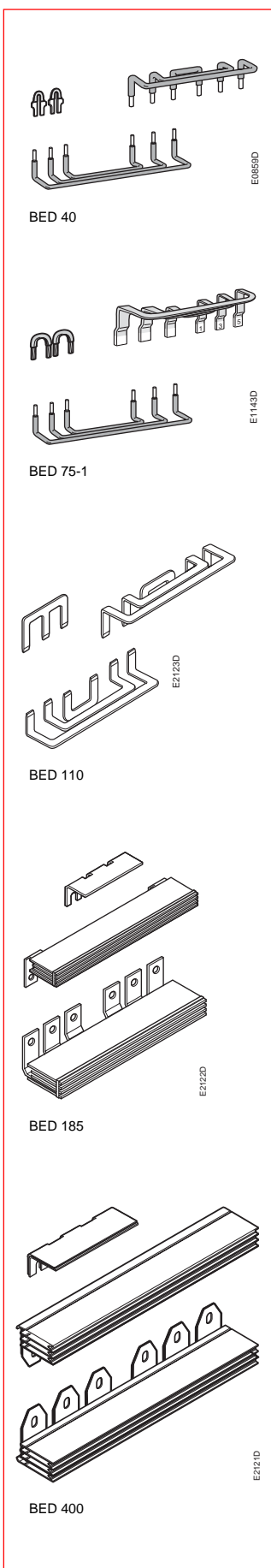
For **mechanically interlocked** star and delta contactors use **BED 16 ... BED 75** connection sets.

BED 95 ... BED 750 are designed for both star and delta contactors **with or without mechanical interlock unit**.

Ordering details

For contactors		Interlock unit between star and delta contactors	Type	Order code	Weight kg Pack ^{ing} 1 set	
Line and Delta	Star					
A 9	A 9	-	BED 16-1	1SBN 081 403 R1001	0.040	
A 12	A 9		BED 16	1SBN 081 403 R1000	0.040	
A 16	A 12		VM / VE 5-1			
A 26	A 16	-	BED 26-1	1SBN 082 403 R1001	0.045	
			VM / VE 5-1	BED 26	1SBN 082 403 R1000	0.050
A 30	A 26	-	BED 40-1	1SBN 082 803 R1001	0.070	
A 40	A 26		VM / VE 5-1	BED 40	1SBN 082 803 R1000	0.070
A 50	A 30		BED 50-1	1SBN 083 503 R1001	0.180	
A 63	A 40	VE 5-2	BED 50	1SBN 083 503 R1000	0.280	
			BED 75-1	1SBN 084 103 R1001	0.180	
A 75	A 50	VE 5-2	BED 75	1SBN 084 103 R1000	0.250	
A 95	A 75	VE 5-2	BED 95	1SFN 084 303 R1000	0.400	
A 110	A 95	VE 5-2	BED 110	1SFN 084 503 R1000	0.500	
A 145	A 110	VM 300H	BED 145 A	1SFN 084 703 R1000	1.300	
A 185	A 145	VM 300H	BED 185	1SFN 084 903 R1000	1.100	
A 210	A 185	VM 300H	BED 210	1SFN 085 103 R1000	1.500	
A 260	A 210	VM 300H	BED 300	1SFN 085 303 R1000	2.100	
A 300	A 260					
AF 400	A 260	VM 300/460H	BED 400	1SFN 085 503 R1000	3.500	
AF 460	A 300					
AF 460	AF 400	VM 750H	BED 460	1SFN 085 703 R1000	4.700	
AF 580	AF 400					
AF 580	AF 460	VM 750H	BED 580	1SFN 085 903 R1000	6.300	
AF 750	AF 580					
		VM 750H	BED 750	1SFN 086 103 R1000	7.700	

Note: The connections provided for A... contactors can be used for the AL, AL..Z, AE, TAL and TAE types.



BEA 16 ... BEA 110 Connecting Links and PM26... Mounting Plates for Contactors and Manual Motor Starters

Application

The **BEA...** connecting link is used to connect a contactor to an associated manual motor starter. These are then used together as **DOL** or **Reversing Starters** in type 1 or type 2 coordination, complying with IEC 60947-4-1 and EN 60947-4-1. See Database of coordination tables on the ABB Website: www.abb.com/lowvoltage Right menu, select: "Support" and select: "Online Product Selection Tools".

The **PM26...** mounting plates are used, with the **BEA...** connecting link, to create secure DOL and Reversing Starters.

Description

The **BEA...** insulated 3-pole connecting link (touch safe) ensures the electrical linking between the contactor and the corresponding manual motor starter.

Two **PM26...** mounting plates are available to suit the type of motor starting: **PM26-13** single mounting plate for DOL Starters or **PM26-23** double adjustable mounting plate for Reversing Starters.

The products are mounted onto the plate without the need for screws, they are simply clipped into position.

Selection Table

Direct-On-Line Starter

I _e max. AC-3, 400 V A	Contactor & fixing Screws not supplied	Connecting link	MMS & fixing Screws / Rail not supplied	Mounting plate
9	A 9 AL 9	BEA 16/116 BEA 16/116AL	MS116 15x35 mm	—
12	A 12 AL 12	BEA 16/116 BEA 16/116AL	MS116 15x35 mm	—
16	A 16 AL 16	BEA 16/116 BEA 16/116AL	MS116 15x35 mm	—
16	A 26	BEA 26/116	MS116	PM26-13
9	A 9 AL 9	BEA 16/325 BEA 16/325AL	MS325 15x35 mm	—
12	A 12 AL 12	BEA 16/325 BEA 16/325AL	MS325 15x35 mm	—
16	A 16 AL 16	BEA 16/325 BEA 16/325AL	MS325 15x35 mm	—
25	A 26 AL 26	BEA 26/325 BEA 26/325AL	MS325	PM26-13
32	A 30 2 x M4	BEA 40/450	MS 450 2 x M5	—
37	A 40 2 x M4	BEA 40/450	MS 450 2 x M5	—
50	A 50 2 x M4	BEA 50/450	MS 450 2 x M5	—
50	A 50 2 x M6	BEA 75/495	MS 495 2 x M5	—
63	A 63 2 x M6	BEA 75/495	MS 495 2 x M5	—
75	A 75 2 x M6	BEA 75/495	MS 495 2 x M5	—
90	A 95 2 x M6	BEA 110/495	MS 495 2 x M5	—
100	A 110 2 x M6	BEA 110/495	MS 495 2 x M5	—

Reversing Starter

I _e max. AC-3, 400 V A	Contactors & fixing Screws not supplied	Connecting link	MMS & fixing Screws not supplied	Connection set for the contactors	Interlock unit (see "Accessory Fitting Details")	Mounting plate
9	2 x A 9 2 x AL 9	BEA 16/116 BEA 16/116AL	MS116	BEM 16-30	VM 5-1 / VE 5-1	PM26-23
12	2 x A 12 2 x AL 12	BEA 16/116 BEA 16/116AL	MS116	BEM 16-30	VM 5-1 / VE 5-1	PM26-23
16	2 x A 16 2 x AL 16	BEA 16/116 BEA 16/116AL	MS116	BEM 16-30	VM 5-1 / VE 5-1	PM26-23
16	2 x A 26	BEA 26/116	MS116	BEM 26-30	VM 5-1 / VE 5-1	PM26-23
9	2 x A 9 2 x AL 9	BEA 16/325 BEA 16/325AL	MS325	BEM 16-30	VM 5-1 / VE 5-1	PM26-23
12	2 x A 12 2 x AL 12	BEA 16/325 BEA 16/325AL	MS325	BEM 16-30	VM 5-1 / VE 5-1	PM26-23
16	2 x A 16 2 x AL 16	BEA 16/325 BEA 16/325AL	MS325	BEM 16-30	VM 5-1 / VE 5-1	PM26-23
25	2 x A 26 2 x AL 26	BEA 26/325 BEA 26/325AL	MS325	BEM 26-30	VM 5-1 / VE 5-1	PM26-23
32	2 x A 30 4 x M4	BEA 40/450	MS 450 2 x M5	BEM 40-30	VM 5-1 / VE 5-1	—
37	2 x A 40 4 x M4	BEA 40/450	MS 450 2 x M5	BEM 40-30	VM 5-1 / VE 5-1	—
50	2 x A 50 4 x M4	BEA 50/450	MS 450 2 x M5	BEM 75-30	VE 5-2	—
50	2 x A 50 4 x M6	BEA 75/495	MS 495 2 x M5	BEM 75-30	VE 5-2	—
63	2 x A 63 4 x M6	BEA 75/495	MS 495 2 x M5	BEM 75-30	VE 5-2	—
75	2 x A 75 4 x M6	BEA 75/495	MS 495 2 x M5	BEM 75-30	VE 5-2	—
90	2 x A 95 4 x M6	BEA 110/495	MS 495 2 x M5	BEM 110-30	VE 5-2	—
100	2 x A 110 4 x M6	BEA 110/495	MS 495 2 x M5	BEM 110-30	VE 5-2	—

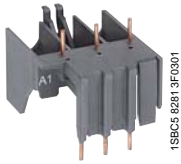


A 9-30-10 + BEA 16/116 + MS 116
DOL Starter



A 26-30-10 + BEA 26/325 + MS 325
+ PM26-13 DOL Starter

BEA 16 ... BEA 110 Connecting Links and PM26.. Mounting Plates for Contactors and Manual Motor Starters



BEA 16/116

1SBCE5 8281 3F0301



BEA 40/450

1SBCE5 8276 3F0301



PM26-13

1SBCE5 9080 3F0302



PM26-23

1SBCE5 9079 3F0302

Ordering Details

Connecting links

For contactors	For MMS	Type	Order code	Pack ^{ing} pieces	Weight kg 1 piece
A 9, A 12, A 16	MS 116	BEA 16/116	1SBN 081 406 R1000	10	0.020
AL 9, AL 12, AL 16	MS 116	BEA 16/116AL	1SBN 081 406 R1003	5	0.027
A 26	MS 116	BEA 26/116	1SBN 082 406 R1000	10	0.024
A 9, A 12, A 16	MS 325	BEA 16/325	1SBN 081 406 R1001	10	0.031
AL 9, AL 12, AL 16	MS 325	BEA 16/325AL	1SBN 081 406 R1002	5	0.032
A 26	MS 325	BEA 26/325	1SBN 082 406 R1001	10	0.031
AL 26	MS 325	BEA 26/325AL	1SBN 082 406 R1002	10	0.033
A 30, A 40	MS 450	BEA 40/450	1SBN 083 206 R1000	1	0.061
A 50	MS 450	BEA 50/450	1SBN 083 506 R1000	1	0.062
A 50, A 63, A 75	MS 495	BEA 75/495	1SBN 084 106 R1000	1	0.120
A 95, A 110	MS 495	BEA 110/495	1SBN 084 506 R1000	1	0.124

The **BEA...** connecting links provided for the **A...** contactors can be used for the **AF...**, **AE...**, and **TAE...** types.
The **BEA../...AL** connecting links provided for the **AL...** contactors can be used for the **AL..Z**, and **TAL...** types.

Mounting plates

For contactors	For MMS	Type	Order code	Pack ^{ing} pieces	Weight kg 1 piece
1 x A 26	MS 116 MS 325	PM26-13	1SBN 092 406 R1000	2	0.160
2 x A 9 ... A 26	MS 116 MS 325	PM26-23	1SBN 091 407 R1000	1	0.330

The **PM26-..** mounting plates provided for the **A...** contactors can be used for the **AL...**, **AL..Z** and **TAL...** types.

Mounting Characteristics

The contactors and MMS are mounted onto the **PM26-..** plate without the need for screws, they are simply clipped into position.

The **PM26-..** mounting plates can be fixed into place either by 2 x 35 mm rail positioned 125 mm apart or by screws (see "Dimensions" for drilling plan). The plates can only be mounted in position 1 and 5 (see "Contactor Technical Data" for mounting position diagram)

>> **Contactors** section 2
>> **MMS** section 5
>> **BEM... Connection Sets** page 4/26

>> **Interlock Units** page 4/10
>> **Accessory Fitting Details** pages 2/8, 2/17
>> **Dimensions** section 9

Connection Bars for Contactor and MCCB

Connection Bars for Contactor and Switch fuse



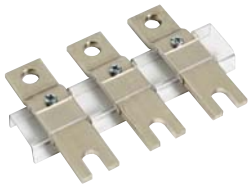
A 145-30 contactor + Tmax MCCB on top

1SFC 101076F0201



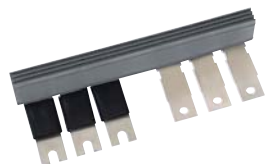
BEA 300/S5

1SFT 98001-006C3



BEA...D/S

1SFT 98001-007C3



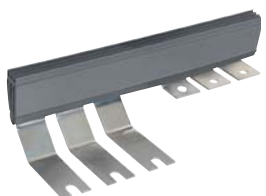
BEA 300H/S5

1SFT 101001F0201C3



BEF 300/OESA400

1SFT 98001-006C3



BEF 300H/OESA400

1SFT 98001-006C3

Application

Connections between contactors/starters and moulded case circuit breakers or switch fuses.

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	Type	Order code	Pack ^{ing} set	Weight kg 1 piece
A 145, A 185	T 3	BEA 185/T3	1SFN 084 706 R1003	1	0.150
A 145, A 185	S 3, S 4	BEA 185/S3/S4	1SFN 084 706 R1000	1	0.150
A 210	S 4	BEA 210/S4	1SFN 085 106 R1001	1	0.160
A 210 ... A 300	S 5	BEA 300/S5	1SFN 085 106 R1000	1	0.200
AF 400, AF 460	S 5	BEA 400/S5	1SFN 085 706 R1000	1	0.250
AF 400 ... AF 750	S 6	BEA 750/S6	1SFN 086 106 R1000	1	0.410

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

A 145, A 185	T 3	BEA 185 D/T3	1SFN 084 706 R1004	1	0.175
A 145 ... A 185	S 3, S 4	BEA 185D/S3/S4	1SFN 084 706 R1002	1	0.200
A 210	S 4	BEA 210D/S4	1SFN 085 106 R1002	1	0.270
A 210 ... A 300	S 5	BEA 300D/S5	1SFN 085 506 R1002	1	0.320
AF 400, AF 460	S 5	BEA 400D/S5	1SFN 085 706 R1002	1	0.480
AF 400 ... AF 750	S 6	BEA 750D/S6	1SFN 086 106 R1002	1	0.720

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

A 145, A 185	S 3, S 4	BEA 185H/S4	1SFN 084 707 R1000	1	0.520
A 210	S 4	BEA 210H/S4	1SFN 085 107 R1000	1	0.620
A 210, A 300	S 5	BEA 300H/S5	1SFN 085 307 R1000	1	1.280
AF 400, AF 460	S 5	BEA 400H/S5	1SFN 085 707 R1000	1	1.310
AF 400, AF 460	S 6	BEA 460H/S6	1SFN 085 907 R1000	1	2.450
AF 580, AF 750	S 6	BEA 750H/S6	1SFN 086 107 R1000	1	4.010

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

Connection bars between contactor and switch fuse

Vertical assembly

Contactors	Switch fuse	Type	Order code	Pack ^{ing} set	Weight kg 1 piece
A 185	OESA 250	BEF 185/OESA250	1SFN 084 908 R1000	1	0.260
A210 ... A 300	OESA 250 to OESA 400	BEF 300/OESA400	1SFN 085 108 R1000	1	0.330
AF 400 ... AF 460	OESA 400	BEF 460/OESA400	1SFN 085 708 R1000	1	0.340
AF 460 ... AF 750	OESA 630 to OESA 800	BEF 750/OESA800	1SFN 086 108 R1000	1	0.740

Horizontal assembly

A 145	OS 160..LR	OSZA 15	1SCA 022 509 R0120	1	0.170
A 145, A 185	OESA 250..LR	BEF 185H/OESA250	1SFN 084 709 R1000	1	0.550
A 210 ... A 300	OESA 250..LR to OESA 400..LR	BEF 300H/OESA400	1SFN 085 109 R1000	1	1.200
AF 400, AF 460	OESA 400..LR	BEF 460H/OESA400	1SFN 085 709 R1000	1	1.250

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

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

Application

Adapter plates and mounting plates with fixing holes for the specified contactors and overload relays.

Ordering Details

Adapter plates



PR300-1

1SFT 98001-015C3



PR400-2

1SFT 98001-014C3



PN300A-11

1SFT 98001-016C3



PN300-21

1SFT 98001-017C3



PN300-41

1SFT 98001-018C3

From old contactor	To new contactor	Type	Order code	Weight kg Pack ^{ing} 1 piece
EH 65,75, 80, 90, EG 80	A 95, A 110	PR 110-1	1SFN 094 500 R1000	0.270
EH 100, 145	A 110, A 145	PR 145-1	1SFN 094 700 R1000	0.360
EH 150, 160, 175, 210, EG 160	A 185, A 210	PR 210-1	1SFN 094 900 R1000	0.440
EH 250, 260, 300	A 210 ... A 300	PR 300-1	1SFN 095 300 R1000	0.560
EH 370, 550, EG 315	AF 400 ... AF 580	PR 460-1	1SFN 095 700 R1000	0.900
EH 700, 800	AF 750	PR 750-1	1SFN 096 100 R1000	0.500
OKYM 150, 175	A 185	PR 185-2	1SFN 095 100 R1001	0.500
OKYM 200, 250	A 210 ... A 300	PR 300-2	1SFN 095 300 R1001	0.500
OKYM 315	AF 400, AF 460	PR 400-2	1SFN 095 700 R1002	0.820
OKYM 400	AF 400, AF 460	PR 460-2	1SFN 095 700 R1001	0.800
OKYM 500	AF 580	PR 580-2	1SFN 096 100 R1002	0.700
EH 550, EG 630, OKYM 630	AF 580, AF 750	PR 750-2	1SFN 096 100 R1001	1.100

Mounting plates for Direct on Line Starters

For contactor	For overload relay	Type	Order code	Weight kg Pack ^{ing} 1 piece
A 145, A 185	TA 200 DU, E 200 DU	PN 185-11	1SFN 094 705 R1000	1.100
A 210, A 260, A 300	TA 450 DU, E 320 DU	PN 300A-11	1SFN 095 105 R1000	1.650
AF 400, AF 460	E 500 DU	PN 460-11	1SFN 095 705 R1000	2.120
AF 580, AF 750	E 800 DU	PN 750-11	1SFN 096 105 R1000	2.500

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 relays	Type	Order code	Weight kg Pack ^{ing} 1 piece
A 95, A 110	TA 80 DU, TA 110 DU	PN 110-21	1SFN 094 301 R1000	0.600
A 145, A 185	TA 200 DU, E 200 DU	PN 185-21	1SFN 094 701 R1000	1.800
A 210 ... A 300	TA 450 DU, E 320 DU	PN 300-21	1SFN 095 101 R1000	2.530
AF 400, AF 460	E 500 DU	PN 460-21	1SFN 095 701 R1000	3.490
AF 580, AF 750	E 800 DU	PN 750-21	1SFN 096 101 R1000	4.230

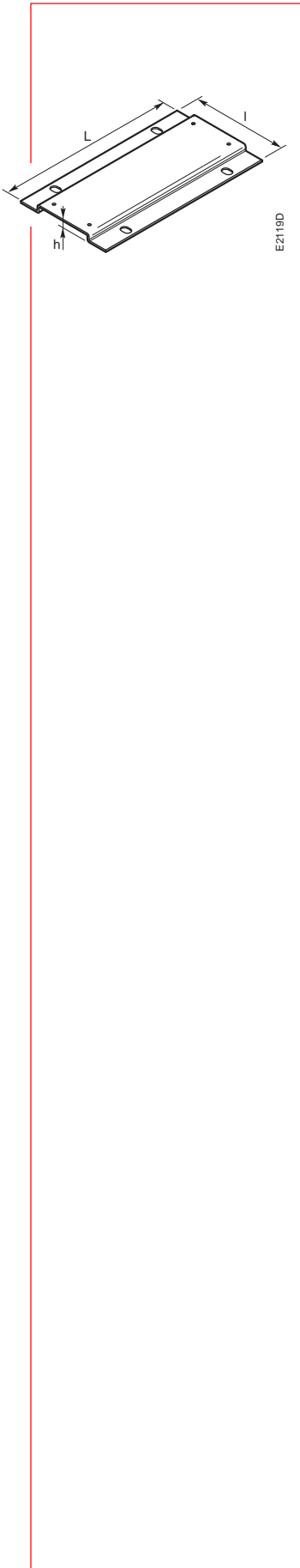
Mounting plates for Star-Delta Starters and two speed starters for single windings

For Main and Delta contactors	For Star contactor (1)	For Overload relays	Type	Order code	Weight kg Pack ^{ing} 1 piece
A 95, A 110	A 75, A 95	TA 80 DU or TA 110 DU	PN 110-41	1SFN 094 303 R1000	0.950
A 145, A 185	A 110, A 145	E 200 DU or TA 200 DU	PN 185-41	1SFN 094 903 R1000	2.440
A 210, 260, 300	A 185, A 210, A 260	E 320 DU or TA 450 DU	PN 300-41	1SFN 095 503 R1000	3.440
AF 400, AF 460	A 300, AF 400	E 500 DU	PN 460-41	1SFN 095 703 R1000	5.310
AF 580, AF 750	AF 400, AF 460, AF 580	E 800 DU	PN 750-41	1SFN 096 103 R1000	6.320

(1) Space for mechanical interlock included.

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

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



Dimensions (mm)

Type of the plate	Dimensions			Fixing holes mm
	L	l	h	
PR 110-1	151	106	11.2	2 x \varnothing 7
PR 145-1	180	122	11.5	4 x \varnothing 7
PR 210-1	200	132	11.5	4 x \varnothing 7
PR 300-1	200	172	11.5	4 x \varnothing 7
PR 460-1	278	198	11.5	4 x \varnothing 7
PR 750-1	283	244	11.5	4 x \varnothing 7
PR 185-2	202	152	11.2	4 x \varnothing 11
PR 300-2	202	152	11.2	4 x \varnothing 11
PR 400-2	278	151	11.5	4 x \varnothing 11
PR 460-2	278	176	11.5	4 x \varnothing 11
PR 580-2	283	176	11.5	4 x \varnothing 11
PR 750-2	283	255	11.5	4 x \varnothing 14

Note: Fixing holes according to the plate types.

>> Ordering Details page 4/31

Main Contact Sets Arc Chutes

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 required screws.

Ordering details

For contactors	Type	Order code	Pack ^{ing} set	Weight kg 1 piece
A/AF/AE/TAE 50-30	ZL 50	1SBN 163 503 R1000	1	0.115
A/AF/AE/TAE 63-30	ZL 63	1SBN 163 703 R1000	1	0.130
A/AF/AE/TAE 75-30	ZL 75	1SBN 164 103 R1000	1	0.145
A/AF/AE/TAE 95-30	ZL 95	1SFN 164 303 R1000	1	0.190
A/AF/AE/TAE 110-30	ZL 110	1SFN 164 503 R1000	1	0.190
A/AF 145	ZL 145	1SFN 164 703 R1000	1	0.380
A/AF 185	ZL 185	1SFN 164 903 R1000	1	0.380
A/AF 210	ZL 210	1SFN 165 103 R1000	1	0.670
A/AF 260	ZL 260	1SFN 165 303 R1000	1	0.670
A/AF 300	ZL 300	1SFN 165 503 R1000	1	0.670
AF 400	ZL 400	1SFN 165 703 R1000	1	1.320
AF 460	ZL 460	1SFN 165 903 R1000	1	1.320
AF 580	ZL 580	1SFN 166 103 R1000	1	1.840
AF 750	ZL 750	1SFN 166 303 R1000	1	1.840
AF 1350	ZL 1350	1SFN 166 503 R1000	1	2.500
AF 1650	ZL 1650	1SFN 166 703 R1000	1	3.500
UA 50	ZLU 50	1SBN 163 502 R1000	1	0.115
UA 63	ZLU 63	1SBN 163 702 R1000	1	0.145
UA 75	ZLU 75	1SBN 164 102 R1000	1	0.145
UA 95	ZLU 95	1SFN 164 302 R1000	1	0.190
UA 110	ZLU 110	1SFN 164 502 R1000	1	0.190

Note: GA, GAE 75, UA..RA 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.

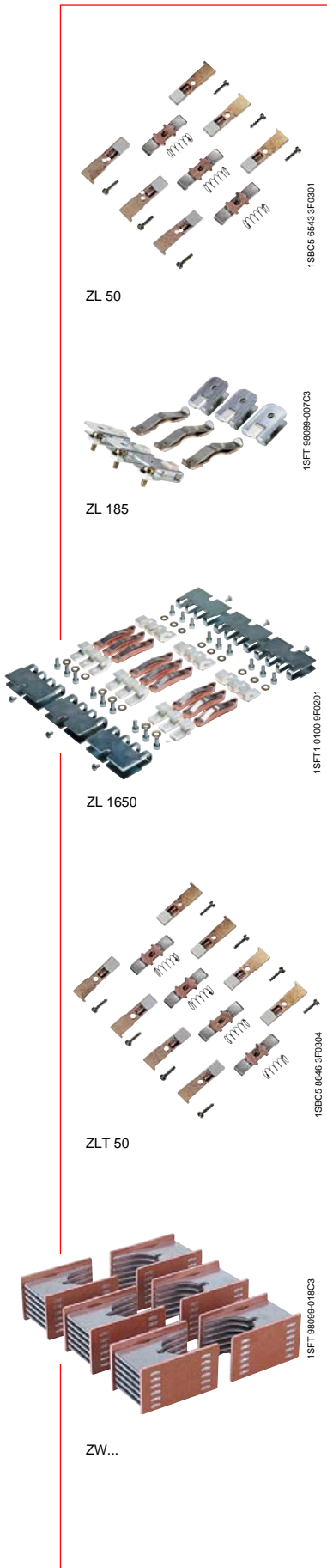
Ordering details

For contactors	Type	Order code	Pack ^{ing} set	Weight kg 1 piece
A/AE/AF 45-40	ZLT 45	1SBN 163 304 R1000	1	0.150
A/AE/AF 50-40	ZLT 50	1SBN 163 504 R1000	1	0.150
A/AE/AF 75-40	ZLT 75	1SBN 164 104 R1000	1	0.160

Arc Chutes

Ordering details

For contactors	Type	Order code	Pack ^{ing} set	Weight kg 1 piece
A/AF 145, A/AF 185	ZW 185	1SFN 164 710 R1000	1	0.360
A/AF 210 ... 300	ZW 300	1SFN 165 110 R1000	1	0.410
AF 400, AF 460	ZW 460	1SFN 165 710 R1000	1	1.380
AF 580, AF 750	ZW 750	1SFN 166 110 R1000	1	1.500
AF 1350, AF 1650	ZW 1650	1SFN 166 510 R1000	1	4.000



Contactors Coils

Ordering Details

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

For contactors	Type	Order code	Packing pieces	Weight kg
	state coil voltage <input type="text"/> see page 0/1	state coil voltage code <input type="text"/> <input type="text"/> see page 0/1		1 piece
A 9 ... A 16 ; UA16 ; UA 16..RA ; N	ZA 16 <input type="text"/>	1SBN 151 410 R <input type="text"/> <input type="text"/> 06	1	0.093
A 26 ... A 40 ; UA 26, UA 30, UA 26..RA, UA 30..RA	ZA 40 <input type="text"/>	1SBN 152 410 R <input type="text"/> <input type="text"/> 06	1	0.148
A 45 ... A 75 ; UA 50 ... UA 75 UA 50..RA to UA 75..RA ; GA 75	ZA 75 <input type="text"/>	1SBN 153 510 R <input type="text"/> <input type="text"/> 06	1	0.166
A 95, A 110 ; UA 95, UA 110 UA 95..RA, UA 110..RA	ZA 110 <input type="text"/> ZA 185 <input type="text"/>	1SFN 154 310 R <input type="text"/> <input type="text"/> 06 1SFN 154 710 R <input type="text"/> <input type="text"/> 06	1 1	0.170 0.180
A 145 ... A 185 A 210 ... A 300	ZA 300 <input type="text"/>	1SFN 155 110 R <input type="text"/> <input type="text"/> 06	1	0.400

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

For contactors	Type	Order code	Packing pieces	Weight kg
	state coil voltage <input type="text"/> see page 0/1	state coil voltage code <input type="text"/> <input type="text"/> see page 0/1		1 piece
AF 45 ... AF 75	ZAF 75 <input type="text"/>	1SBN 153 570 R <input type="text"/> <input type="text"/> 06	1	0.170
AF 95, AF 110	ZAF 110 <input type="text"/>	1SFN 154 370 R <input type="text"/> <input type="text"/> 06	1	0.200
AF 145, AF 185	ZAF 185 <input type="text"/>	1SFN 154 770 R <input type="text"/> <input type="text"/> 06	1	0.225
AF 210 ... AF 300	ZAF 300 <input type="text"/>	1SFN 155 170 R <input type="text"/> <input type="text"/> 06	1	0.450
AF 400, AF 460	ZAF 460 <input type="text"/>	1SFN 155 770 R <input type="text"/> <input type="text"/> 06	1	0.525
AF 580, AF 750	ZAF 750 <input type="text"/>	1SFN 156 170 R <input type="text"/> <input type="text"/> 06	1	1.335
AF 1350, AF 1650	ZAF 1650 <input type="text"/> (1) ZP 1650 <input type="text"/> (2)	1SFN 156 570 R7026 1SFN 166 521 R1070	1 set 1	0.900 0.300

(1) One set of 2 coils - (2) Printed circuit board.

d.c. Operated coils for AE 45 ... AE 110 contactors (coils for AL..., NL... and other variants are not provided)

For contactors	Type	Order code	Packing pieces	Weight kg
	state coil voltage <input type="text"/> see page 0/1	state coil voltage code <input type="text"/> <input type="text"/> see page 0/1		1 piece
Coils only				
AE 45 ... AE 75 ; GAE 75	ZAE 75 <input type="text"/>	1SBN 153 590 R <input type="text"/> <input type="text"/> 06	1	0.170
AE 95, AE 110	ZAE 110 <input type="text"/>	1SFN 154 390 R <input type="text"/> <input type="text"/> 06	1	0.195

Note: d.c. operated coils for TAE... contactors: please consult us (standard AE contactor coils are not suitable for TAE contactors).

Auxiliary device including an insertion contact and a varistor

AE 95, AE 110, TAE 95, TAE 110	CCL 18-01	1SFN 014 328 R1001	1	0.040
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Note: CDL 5-01 contact block (factory mounted on AE 45 ... AE 75 and TAE 45 ... TAE 75 contactors) is not available for separate delivery.

d.c. Operated coil and diode for AM 45 ... AM 75 contactors

For contactors	Type	Order code	Packing pieces	Weight kg
	state coil voltage <input type="text"/> see page 0/1	state coil voltage code <input type="text"/> <input type="text"/> see page 0/1		1 piece
Coil				
AM 45 ... AM 75	ZAM 75 <input type="text"/>	1SBN 153 580 R <input type="text"/> <input type="text"/> 06	1	0.170
Diode				
AM 45 ... AM 75	RT5-AM	1SBN 050 021 R1000	2	0.015



ZA 16

1SBSC5 7980 2F0302



ZA 185

1SFT 98099-010C3



ZAF 110

1SBSC5 7988 3F0302



ZAF 300

1SFT 98001-013C3



ZA 1650

1SFCT 0100 7F0201

Auxiliary Contacts

Electrical Durability

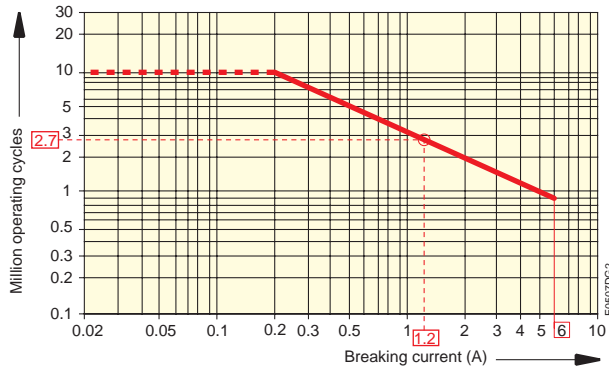
Electrical Durability for AC-15 Utilization Category

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

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

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

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

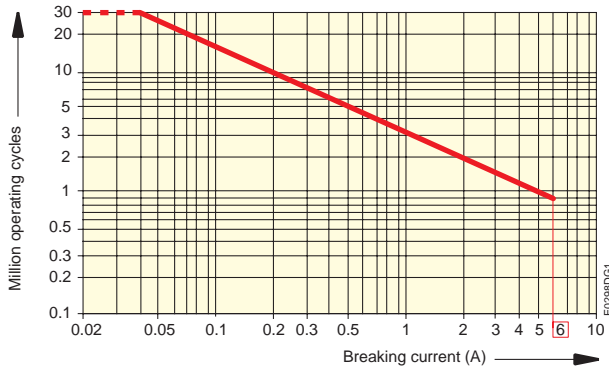


- A 9 ... A 40, AL 9 ... AL 40, AL 9Z ... AL 16Z, TAL 9 ... TAL 40 contactor built-in auxiliary contacts
- 1-pole and 4-pole CA 5-..., 1-pole CC 5-..., 2-pole CAL 5-..., CAL 18-.. and CCL 5-.. add-on auxiliary contacts.

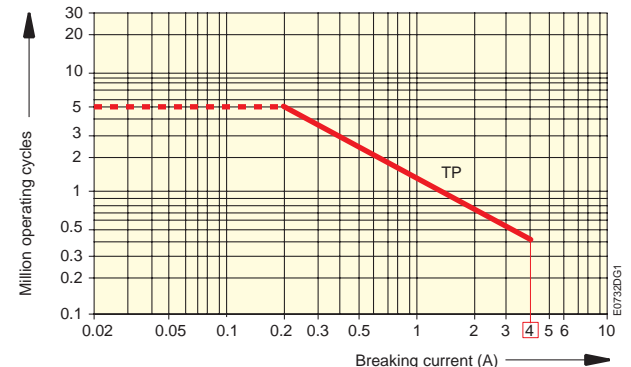
Example:

Breaking current = 1.2 A

On the opposite curve at intersection "O" 1.2 A the corresponding value for the electrical durability is approximately $2.7 \cdot 10^6$ operating cycles.



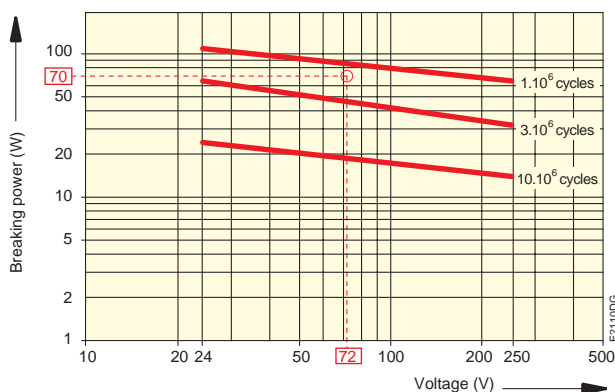
- N..., NL..., NL Z... and TNL... contactor relays. (For add-on auxiliary contacts see above curve).



- TP... pneumatic timer contacts.

Electrical Durability for DC-13 Utilization Category

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



- A 9 ... A 40, AL 9 ... AL 40, AL 9Z ... AL 16Z, TAL 9 ... TAL 40 contactor built-in auxiliary contacts
- 1-pole and 4-pole CA 5-..., 1-pole CC 5-..., 2-pole CAL 5-..., CAL 18-.. and CCL 5-.. add-on auxiliary contacts.
- N..., NL..., NL Z and TNL... contactor relays,
- TP... pneumatic timer contacts

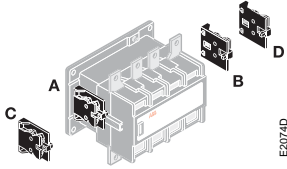
Example:

Control of d.c. electro-magnet: U_e voltage = 72 V d.c. and breaking power = 70 W.

On the opposite curve at intersection "O" 72 V / 70 W the corresponding value for the electrical durability is approximately 2.10^6 operating cycles.

Auxiliary Contact Blocks

Accessories for EK... Contactors



Mounting positions of the CAL 16-11

Application

Addition of auxiliary contacts on EK... contactors in side position for the self holding function or automation, alarms, etc.

Description

Auxiliary contact blocks are available in a 2-pole version with 1 N.O. and 1 N.C. contacts.



- **CAL...** : instantaneous, N.O. and N.C.
- **CCL...** : N.C. lagging + N.O. (overlapping contacts)

They are equipped with screw type connecting terminals delivered open and protected against accidental direct contact.

Mounting:

Screwed onto the right and / or lefthand side of the **EK 110** to **EK 1000** contactors.

Ordering Details

For contactors	Max. number of blocks	Contact blocks		Type	Order code	Weight kg
						
2-pole auxiliary contact blocks						
EK ...	1 block	1	1	CAL 16-11 A	SK 829 002-A	0.050
	1 block	1	1	CAL 16-11 B	SK 829 002-B	0.050
	1 block	1	1	CAL 16-11 C	SK 829 002-C	0.050
	1 block	1	1	CAL 16-11 D	SK 829 002-D	0.050
	1 block	1	-	CCL 16-11 E (1)	SK 829 002-E	0.050





(1) Mounting of a **CCL 16-11 E** block does not allow an additional second block to be added on top of it. All d.c. operated EK... contactors are equipped with one CCL 16-11 E on the right side.

Auxiliary Contact Blocks

Accessories for EK... Contactors

Technical Data

Utilization characteristics according to IEC

Types	2-pole CAL 16-11	2-pole CCL 16-11
Compliance with standards	IEC 60947-5-1 and EN 60947-5-1	
Rated insulation voltage U_i according to IEC 60947-5-1	V 690	
Rated operational voltage U_e	V a.c. 24 ... 690	
Conventional thermal current I_{th}	A 10	
Rated operational current I_e acc. to IEC 60947-5-1		
AC-15	24-127 V	A 6
	220-240 V	A 6
	380-440 V	A 4
	500-690 V	A 1
DC-13	24 V	A 6
	48 V	A 6
	72 V	A 4
	125 V	A 1.8
	250 V	A 0.6
Short circuit protection (gG fuses)	A 10	
Making capacity	10 x I_e AC-15	
Breaking capacity	10 x I_e AC-15	
Rated short-time withstand current I_{cw}	1 s	A 50
$\theta = 40^\circ\text{C}$	0.1 s	A 100
Power loss per pole at 6 A	W 0.2	
Min. switching capacity	0.25 VA / 12 V or 0.25 VA / 5 mA	
Mechanical durability		
– million of operating cycles	10	
– max. mech. switching frequency	cycles /h	3600
Electrical durability		
– million of operating cycles	see "Electrical Durability" curves	
– max. elec. switching frequency	cycles /h	1200
Connecting terminals (Delivered in open position. Screws of unused terminals should be tightened.)	M3.5 (+,-) pozidriv 2 screws with cable clamp	
Tightening torque		
– recommended	Nm	1.00
– max.	Nm	1.20
Connecting capacity (min. ... max.)		
Rigid solid 	1 or 2 x mm²	0.5 ... 2.5
Flexible with cable end 	1 or 2 x mm²	0.5 ... 2.5
Flexible with sleeve 	1 or 2 x mm²	0.5 ... 1.5
Lugs 	L mm ≤ l mm >	8 3.7
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529	IP 20	

Utilization characteristics according to UL/CSA

Max. rated voltage	V 600
Pilot duty	A600

>> Electrical Durability Curves page 4/45	>> Terminal Marking and Positioning section 8
>> Certification and Approvals section 7	>> Dimensions section 9

Mechanical Interlock Units

Mechanical and Electrical Interlock Units

Accessories for EK... Contactors



SK 829 070...



VH 145

Application

The mechanical interlock unit prevents one of the contactors from closing as long as while the other contactor is closed.

Description

- **VH 145, VH 300** interlock units for mechanical and electrical interlocking of two horizontal mounted a.c. or d.c. operated EK 110 ... EK 210 contactors.
- **VH 800** interlock unit for mechanical interlocking of two horizontal mounted a.c. or d.c. operated EK 370 ... EK 1000 contactors.

Ordering Details

For contactors	Type	Order code	Pack ^{ing} piece	Weight kg
Mechanical and electrical interlock units for two horizontal mounted contactors				
EK 110, EK 150	VH 145	SK 829 071-A	1	0.130
EK 175, EK 210	VH 300	SK 829 071-B	1	0.130
Mechanical interlock unit for two horizontal mounted contactors				
EK 370 ... EK 1000	VH 800	SK 829 070-F	1	6.000

Selection Table

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

Contactor types				
	Right	EK 110, EK 150	EK 175, EK 210	EK 370 ... EK 1000
Left				
EK 110, EK 150		VH 145	–	–
EK 175, EK 210		–	VH 300	–
EK 370 ... EK 1000		–	–	VH 800
Fixing		PN 210-22 mounting plate (to be supplied separately)	PN 300-22 mounting plate (to be supplied separately)	Mounting plate included

>> Accessory Fitting Details page 2/25
>> Dimensions section 9



>> Mounting plates page 4/43

Mechanical Interlock Units

Mechanical and Electrical Interlock Units

Accessories for EK... Contactors

Technical Data - VH 145 and VH 300 Mechanical and Electrical Interlock Units

Standards	IEC 60947-5-1, EN 60947-5-1		
Rated insulation voltage U_i according to IEC 60947-5-1	V		690
according to UL / CSA	V		600
Rated operational voltage U_e according to IEC 60947-5-1	V a.c.		24 ... 690
Conventional thermal current I_{th}	A		10
Rated operational current I_e according to IEC 60947-5-1			
AC-15			
24-127 V	A		6
220-240 V	A		6
380-440 V	A		4
500-690 V	A		1
DC-13			
24 V	A		6
48 V	A		6
72 V	A		4
125 V	A		1.8
250 V	A		0.6
Making capacity			10 x I_e AC-15
Breaking capacity			10 x I_e 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		operating cycles	1 million
Max. switching frequency		cycles /h	600
Connecting capacity			
- rigid solid		1 or 2 x mm²	1 ... 2.5
- flexible with end		1 or 2 x mm²	0.75 ... 2.5
Connecting terminals delivered in open position (screws of unused terminals should be tightened)			M3.5 (+,-) pozidriv 2 screws with cable clamp
Tightening torque			
- recommended		Nm	1.00
- max.		Nm	1.20
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			IP 20

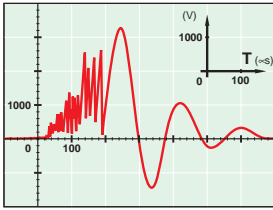
Technical note

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 TE5S electronic timer with time lapse, as applicable.

Surge Suppressors for Contactor Coils

Accessories for EK... Contactors



Application

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

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

The graph opposite reproduces the oscillogram showing voltage discharges at the terminals of a 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 reduce 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: 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.

Ordering Details

For contactors	Control voltage		Type	Order code	Pack ^{ing} Weight	
	V	d.c. a.c.			pieces	kg
EK 110 ... 210	24 ... 48	– ●	RC-EH 300/48	SK 829 007-A	1	0.015
	110 ... 415	– ●	RC-EH 300/415	SK 829 007-B	1	0.015
EK 370 ... 1000	48 ... 110	– ●	RC-EH 800/110	SK 829 007-C	1	0.015
EK 110 ... 1000	24 ... 125	● –		SK 829 007-D	1	0.015
EK 370 ... 1000	220 ... 600	– ●	RC-EH 800/600	SK 829 007-D	1	0.015



RC-EH 300/48

Surge Suppressors for Contactor Coils

Accessories for EK... Contactors

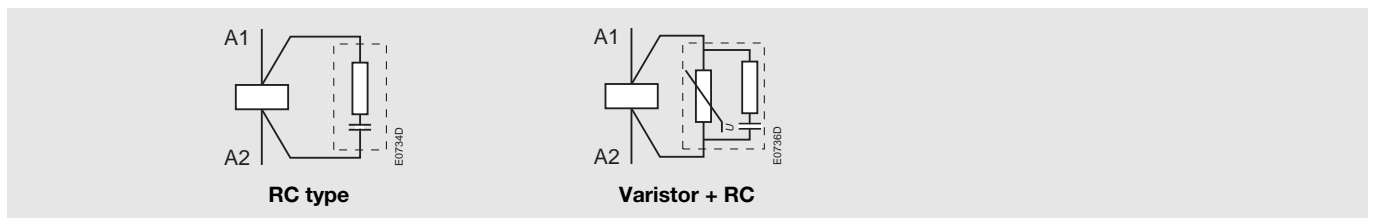
Technical Data

RC types	RC-EH 300/48	RC-EH 300/415
Control voltage U_c <small>(clipping voltage)</small>	V a.c. 24 ... 48	V a.c. 110 ... 415
Residual overvoltage <small>(clipping voltage)</small>	V a.c. 2 to 3 x U_c	
Opening time growth factor	1.2 ... 3	
Operating temperature	°C -20 ... +70	
Connection to the coil terminal <small>(parallel mounting)</small>	Flexible, accessible leads, equipped with forked lugs	
Fixing	Glued to the top part of the contactor base	
Advantages	<ul style="list-style-type: none"> ● Very fast clipping ● Attenuation of steep fronts and thus of high frequencies ● No operating delays 	

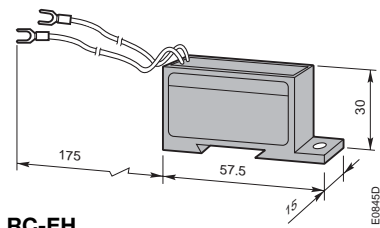
Varistor + RC	RC-EH 800/110	RC-EH 800/600
Control voltage U_c <small>(clipping voltage)</small>	V a.c. 48 ... 110 V d.c. 24 ... 125	V a.c. 220 ... 600 V d.c. -
Residual overvoltage	V a.c. 205 V d.c. 205	V a.c. 1100 V d.c. -
Opening time growth factor	1.1 ... 1.15	
Operating temperature	°C -20 ... +70	
Connection to the coil terminal <small>(parallel mounting)</small>	Flexible, accessible leads, equipped with forked lugs	
Fixing	Glued to the top part of the contactor base	
Advantages	<ul style="list-style-type: none"> ● High energy absorption: good damping ● Unpolarized system ● The RC system damps the voltage front under the U_{vdr}^* threshold. 	

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

Wiring Diagrams



Dimensions (in mm)



RC-EH

Terminal Shrouds - Connection Sets

Accessories for EK... Contactors

Terminal Shrouds

Application

The use of terminal shrouds on the main terminals of **EK...** contactors is required in electrical panels or cubicles to be built in compliance with the rules for protection against accidental direct contact with live parts in acc. with EN 50274.

Description

On **EK 110 ... EK 1000** 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 (EN 50274) by the addition of terminal shrouds (see table below).

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

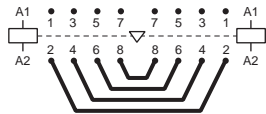
Ordering details

Mounting on contactor (with lugs or connectors)	Type	Order code	Pack ^{ing} pieces	Weight kg
EK 110, EK 150	LT 150-EK	SK 178 001-HB	1	0.139
EK 175, EK 210	LT 210-EK	SK 178 001-KB	1	0.152
EK 370, EK 550	LT 550-EK	SK 178 001-LB	1	0.190
EK 1000	LT 1000-EK	SK 178 001-MB	1	0.200



LT 210-EK

1SFC1 0100 2R0201C3



BSS 100 ... BSS 1000

E0747D

Connection Sets

Application

Connection between the main poles of **two 4-pole contactors** mounted side by side so that they operate as source reversing contactors.

Description

These sets are made up of four downstream connections.

- BSS 100 ... BSS 210** – Insulated, flexible copper bars.
- BSS 550, BSS 1000** – Bare, solid copper bars.

Ordering details

Mounting on 4-pole contactors	Type	Order code	Pack ^{ing} set	Weight kg
EK 110	BSS 100	SK 829 090-B	1	0.400
EK 150	BSS 145	SK 829 090-F	1	0.700
EK 175, 210	BSS 210	SK 829 090-G	1	1.000
EK 370, 550	BSS 550	SK 829 090-E	1	3.300
EK 1000	BSS 1000	SK 829 090-H	1	5.500

Mounting Plates

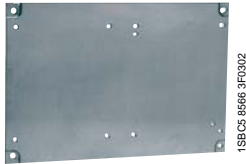
Accessories for EK... Contactors

Application

Plates for two horizontal mounted contactors with or without a mechanical interlock unit.

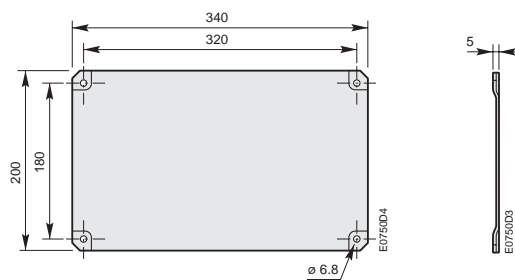
Ordering details

To use with:			Type	Order code	Weight kg Pack ^{ing} 1 piece
Lefthand contactor	Mechanical interlock	Righthand contactor			
EK 110, EK150	VH 145	EK 110, EK150	PN 210-22	SK 829 075-C	1.400
EK 175, EK 210	VH 300	EK 175, EK 210	PN 300-22	SK 829 075-E	2.070

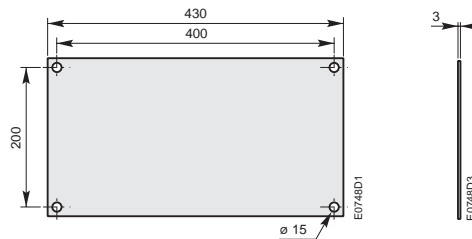


PN...

Dimensions (in mm)



PN 210-22



PN 300-22

Main Contact Sets - Arc Chutes - Contactor Coils

Accessories for EK... Contactors

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. In addition, the sets include four moving arcing contacts for **EK 370 ... EK 1000** contactors.

Ordering details

For contactors	Type	Order code	Pack ^{ing} set	Weight kg
EK 110	KZK 110	SK 824 204-A	1	0.450
EK 150	KZK 150	SK 824 204-B	1	0.450
EK 175	KZK 175	SK 825 204-A	1	0.700
EK 210	KZK 210	SK 825 204-B	1	0.700
EK 370	KZK 370	SK 827 204-A	1	2.400
EK 550	KZK 550	SK 827 204-B	1	2.400
EK 1000	KZK 1000	SK 827 204-F	1	3.000

Arc Chutes

Ordering details

For contactors	Type	Order code	Pack ^{ing} set	Weight kg
EK 110	KWK 110	5223 351-AH	1	0.660
EK 150	KWK 150	5223 351-AK	1	0.660
EK 175	KWK 175	5223 351-AL	1	1.260
EK 210	KWK 210	5223 351-AM	1	1.260
EK 370	KWK 370	5223 351-Y	1	3.170
EK 550	KWK 550	5223 351-Z	1	3.170
EK 1000	KWK 1000	5223 351-AN	1	3.170

Contactors Coils

Ordering details

For contactors	Type	Order code	Pack ^{ing} piece or set	Weight kg
	state coil voltage <input type="text"/> <input type="text"/> <input type="text"/> see page 0/1	state coil voltage code <input type="checkbox"/> <input type="checkbox"/> see page 0/1		

a.c. or d.c. coils only

EK 110, EK 150	KH 210 <input type="text"/> <input type="text"/> <input type="text"/>	SK 825 400 - <input type="checkbox"/> <input type="checkbox"/>	1	0.360
EK 175, EK 210	KH 300 <input type="text"/> <input type="text"/> <input type="text"/>	SK 826 400 - <input type="checkbox"/> <input type="checkbox"/>	1	0.440
EK 370, EK 550, EK 1000	KH 800 <input type="text"/> <input type="text"/> <input type="text"/>	SK 828 100 - <input type="checkbox"/> <input type="checkbox"/>	1	0.950

Sets including a d.c. coil, an economy resistor and an insertion contact

EK 110, 150	KP 210 <input type="text"/> <input type="text"/> <input type="text"/> (1)	SK 825 450 - <input type="checkbox"/> <input type="checkbox"/>	1 set	0.450
EK 175, 210	KP 300 <input type="text"/> <input type="text"/> <input type="text"/> (1)	SK 826 450 - <input type="checkbox"/> <input type="checkbox"/>	1 set	0.550
EK 370, EK 550, EK 1000	KP 800 <input type="text"/> <input type="text"/> <input type="text"/>	SK 828 150 - <input type="checkbox"/> <input type="checkbox"/>	1 set	1.060

(1) The KP 210 and KP 300 have a double coil winding instead of an economy resistor.

Sets including a multi-frequency coil and an insertion contact for contactor with built-in rectifier

EK 110, EK 150	KP 210 <input type="text"/> <input type="text"/> <input type="text"/>	SK 825 450 - E <input type="checkbox"/>	1 set	0.450
EK 175, EK 210	KP 300 <input type="text"/> <input type="text"/> <input type="text"/>	SK 826 450 - E <input type="checkbox"/>	1 set	0.550



KZK 370

1SBC5 8647 3F0304



KH 300

1SBC5 7361 3F0302

Auxiliary Contacts for EK... Contactors

Electrical Durability

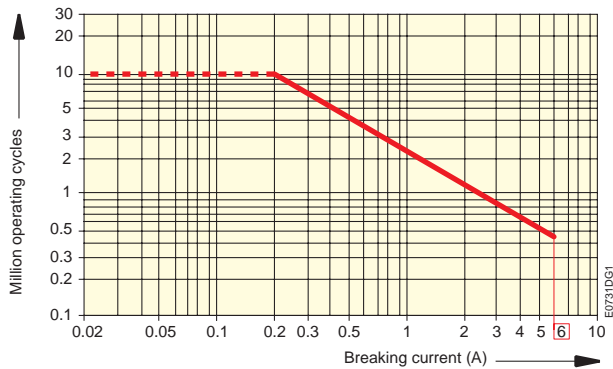
Electrical Durability for AC-15 Utilization Category

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

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

This curve represents the electrical durability of the 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.

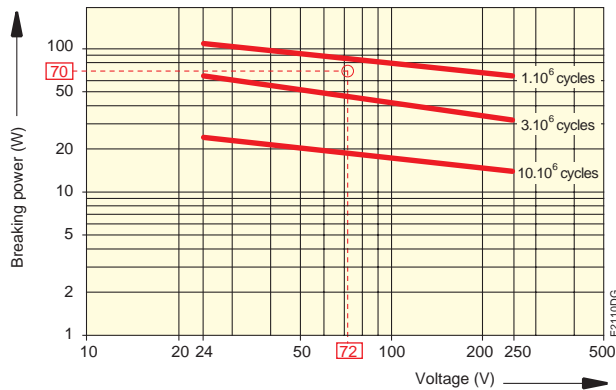


2-pole CAL 16... and CCL 16... auxiliary contact blocks

Electrical Durability for DC-13 Utilization Category

DC-13 utilization category according to IEC 60947-5-1 / EN 60947-5-1:

making and breaking current = I_e with U_e value.



2-pole CAL 16... and CCL 16... auxiliary contact blocks

Example:

Control of d.c. electro-magnet: U_e voltage = 72 V d.c. and breaking power = 70 W.

On the opposite curve at intersection "O" 72 V / 70 W the corresponding value for the electrical durability is approximately $2 \cdot 10^6$ cycles.

Manual Motor Starters

Electronic Overload Relays

Thermal Overload Relays



2 phases
warm



Tripping current
as a multiple of the s

Motor Protection





Motor Protection

Manual Motor Starters
Thermal Overload Relays
Electronic Overload Relays

Contents

Manual Motor Starters

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Thermal / Electronic Overload Relays

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Thermal Overload Relays

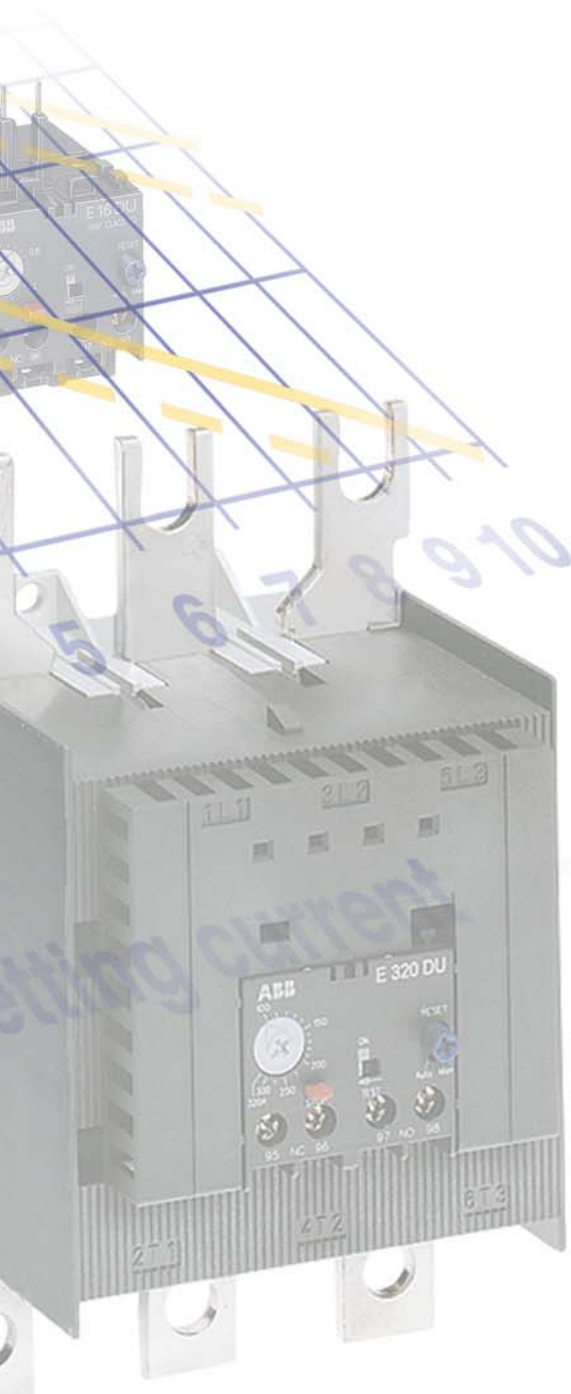
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Electronic Overload Relays

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Additional Information

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Terminal Marking and Positioning	Section 8
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Manual Motor Starters MS...

with Thermal and Magnetic Protection



Manual Motor Starters

		Types	MS 116	MS 325
Setting ranges	Number		11	13
	from		0.16 ... 0.25 A	0.16 ... 0.25 A
	to		10 ... 16 A	20 ... 25 A

Mounting possibilities onto 3-pole contactors

		Types	A 9	A 12	A 16	A 26	A 9	A 12	A 16	A 26
a.c. operated contactor range	Connecting link	Types	BEA 16/116		BEA 26/116		BEA 16/325		BEA 26/325	
		Types	AL 9		AL 12		AL 16		AL 26	
d.c. operated contactor range	Connecting link	Types	BEA 16/116AL		-		BEA 16/325AL		BEA 26/325AL	
		Types	AL 9		AL 12		AL 16		AL 26	

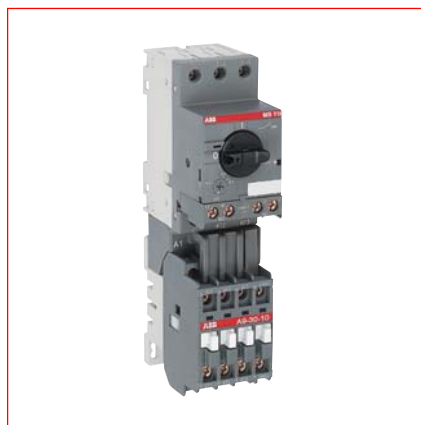
Mounting plates for starters

D.O.L starters	Types	Not required	PM 26-13	Not required	PM 26-13
Reversing starters	Types	PM 26-23		PM 26-23	

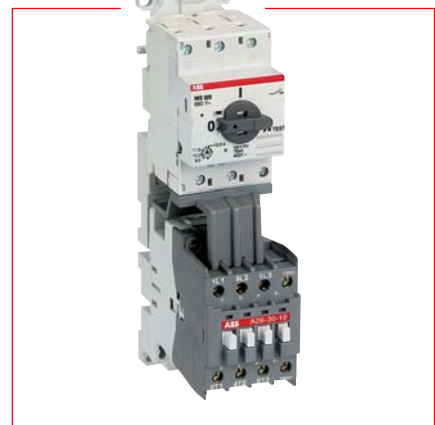
Accessories for Manual Motor Starters

Auxiliary switches - Front mounting	Types	HKF1-11 (1NO + 1NC)	HKF-11 (1NO + 1NC)
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Examples of Complete Assembly



Manual motor starter **MS 116..** + contactor **A 9..**
+ connecting link **BEA 16/116**



Manual motor starter **MS 325..** + contactor **A 26..**
+ connecting link **BEA 26/325** + mounting plate **PM26-13**

Manual Motor Starters MS..

with Thermal and Magnetic Protection



MS 450
7
11 ... 16 A 40 ... 50 A

MS 495
6
28 ... 40 A 80 ... 100 A

Larger ratings: **Tmax** circuit breakers
(Please consult us)

A 30	A 40	A 50
BEA 40/450	BEA 50/450	

A 50	A 63	A 75	A 95	A 110
BEA 75/495			BEA 110/495	

Larger ratings: **A 145 ... A 300** contactors
(Please consult us)

AL 30	AL 40	AE 50
-	BEA 50/450	

AE 50	AE 63	AE 75	AE 95	AE 110
BEA 75/495			BEA 110/495	

Larger ratings: **AF 145 ... AF 300** contactors
(Please consult us)

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-

-
-

-
-

HK4-11 (1NO + 1NC)

HK4-11 (1NO + 1NC)

-



Manual motor starter **MS 450** + contactor **A 40**..
+ connecting link **BEA 40/450**

Manual motor starter **MS 495** + contactor **A 110**..
+ connecting link **BEA 110/495**

Circuit breaker **Tmax** + contactor **A 145**..

Manual Motor Starter MS 116

Ordering details



MS 116

Type	Setting range	Order code	Packing Unit	Weight/ piece
	A...A		piece	kg
MS 116 with thermal and electromagnetic trips, short-circuit breaking capacity up to 50 kA				
MS 116 - 0.25	0.16 ... 0.25	1SAM 250 000 R1002	1	0.268
MS 116 - 0.4	0.25 ... 0.40	1SAM 250 000 R1003	1	0.268
MS 116 - 0.63	0.40 ... 0.63	1SAM 250 000 R1004	1	0.268
MS 116 - 1.0	0.63 ... 1.00	1SAM 250 000 R1005	1	0.268
MS 116 - 1.6	1.00 ... 1.60	1SAM 250 000 R1006	1	0.268
MS 116 - 2.5	1.60 ... 2.50	1SAM 250 000 R1007	1	0.268
MS 116 - 4	2.50 ... 4.00	1SAM 250 000 R1008	1	0.268
MS 116 - 6.3	4.00 ... 6.30	1SAM 250 000 R1009	1	0.268
MS 116 - 10.0	6.30 ... 10.00	1SAM 250 000 R1010	1	0.268
MS 116 - 12.0	8.00 ... 12.00	1SAM 250 000 R1012	1	0.268
MS 116 - 16.0	10.00 ... 16.00	1SAM 250 000 R1011	1	0.268

>> Manual Motor Starter Technical Catalogue available on request

Manual Motor Starter MS 116

Ordering details



HKF 1-11



Padlock + 2 keys + lock adapter

Add-on accessories

These parts can be provided in addition to the **MS 116**; they must be installed by the user.

Type	Features	Order code	Packing Unit	Weight/ piece
Auxiliary switches, for front mounting				
HKF1-11	1 NO + 1 NC	1SAM 201 901 R1001	10	0.011
Auxiliary switches with leading contacts, also to use with undervoltage release				
HK1-20L	2 NO leading contacts	1SAM 201 902 R1004	10	0.036
Auxiliary switches, lateral mounting, right side				
HK1-11	1 NO + 1 NC	1SAM 201 902 R1001	10	0.036
HK1-20	2 NO	1SAM 201 902 R1002	10	0.036
HK1-02	2 NC	1SAM 201 902 R1003	10	0.036
Shunt release, lateral mounting, left side				
AA1-24	24 V, 50/60 Hz	1SAM 201 910 R1001	10	0.100
AA1-110	110 V, 50/60 Hz	1SAM 201 910 R1002	10	0.100
AA1-230	200-240 V, 50/60 Hz	1SAM 201 910 R1003	10	0.100
AA1-400	350-415 V, 50/60 Hz	1SAM 201 910 R1004	10	0.100
Signal contact for general "tripped" signal, lateral mounting, right side				
SK1-11	1 NO + 1 NC	1SAM 201 903 R1001	10	0.036
SK1-20	2 NO	1SAM 201 903 R1002	10	0.036
SK1-02	2 NC	1SAM 201 903 R1003	10	0.036
Undervoltage release, lateral mounting, left side				
UA1-24	24 V, 50 Hz	1SAM 201 904 R1001	10	0.102
UA1-48	48 V, 50 Hz	1SAM 201 904 R1002	10	0.102
UA1-60	60 V, 50 Hz	1SAM 201 904 R1003	10	0.102
UA1-120	110 V 50 Hz/120 V 60 Hz	1SAM 201 904 R1004	10	0.102
UA1-208	208 V, 60 Hz	1SAM 201 404 R1008	10	0.102
UA1-230	230 V 50 Hz/240 V 60 Hz	1SAM 201 904 R1005	10	0.102
UA1-400	400 V, 50 Hz	1SAM 201 904 R1006	10	0.102
UA1-415	415 V 50 Hz/480 V 60 Hz	1SAM 201 904 R1007	10	0.102
Locking device				
SA1	lock adapter	GJF1 101 903 R0001	10	0.004
SA2	padlock + 2 keys	GJF1 101 903 R0002	10	0.004
SA3	lock adapter + padlock + 2 keys	GJF1 101 903 R0003	1	0.050

>> Connecting Link for Contactor Mounting page 4/28

Manual Motor Starter MS 325

Ordering details



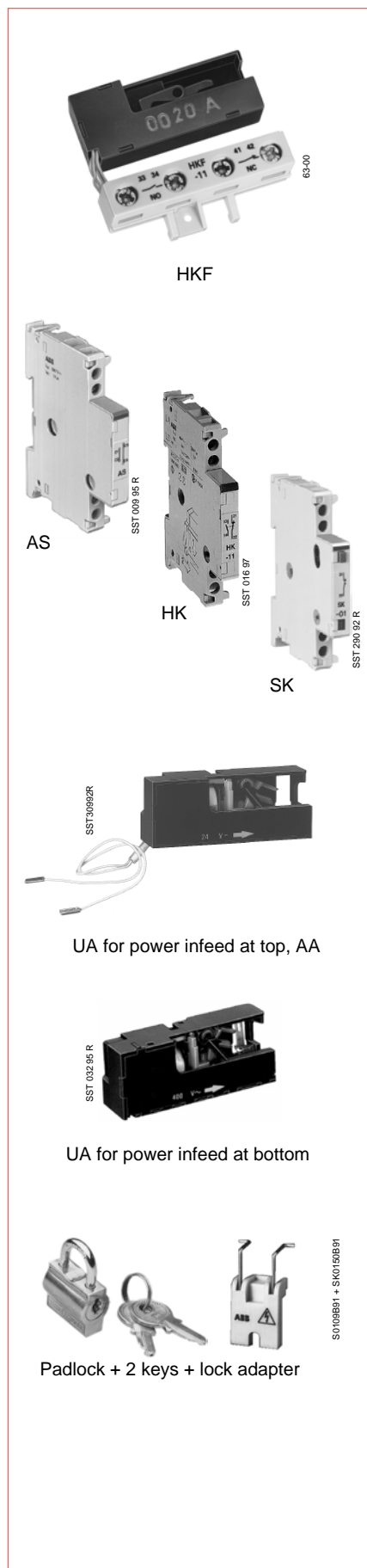
MS 325

Type	Setting range	Order code	Packing Unit piece	Weight/ piece kg
	A...A			
MS 325 with thermal and electromagnetic trips, short-circuit breaking capacity up to 100 kA, resp.50 kA				
MS 325 – 0.25	0.16 ... 0.25	1SAM 150 000 R1002	1	0.347
MS 325 – 0.4	0.25 ... 0.40	1SAM 150 000 R1003	1	0.347
MS 325 – 0.63	0.40 ... 0.63	1SAM 150 000 R1004	1	0.347
MS 325 – 1	0.63 ... 1.00	1SAM 150 000 R1005	1	0.347
MS 325 – 1.6	1.00 ... 1.60	1SAM 150 000 R1006	1	0.347
MS 325 – 2.5	1.60 ... 2.50	1SAM 150 000 R1007	1	0.347
MS 325 – 4	2.50 ... 4.00	1SAM 150 000 R1008	1	0.347
MS 325 – 6.3	4.00 ... 6.30	1SAM 150 000 R1009	1	0.347
MS 325 – 9	6.30 ... 9.00	1SAM 150 000 R1010	1	0.347
MS 325 – 12.5	9.00 ... 12.50	1SAM 150 000 R1011	1	0.347
MS 325 – 16	12.50 ... 16.00	1SAM 150 000 R1012	1	0.347
MS 325 – 20	16.00 ... 20.00	1SAM 150 000 R1013	1	0.347
MS 325 – 25	20.00 ... 25.00	1SAM 150 000 R1014	1	0.347

>> Manual Motor Starter Technical Catalogue available on request

Manual Motor Starter MS 325

Ordering details



Add-on accessories

These parts can be provided in addition to the MS 325; they must be installed by the user.

Type	Features	Order code	Packing Unit	Weight/ piece
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Auxiliary switches, for front mounting (1)

HKF-11	1 NO + 1 NC	1SAM 101 928 R0001	10	0.020
HKF-20	2 NO	1SAM 101 928 R0002	10	0.020

Auxiliary switches, lateral mounting, left side, max. 2 pieces (2) (3)

HK-11	1 NO + 1 NC	1SAM 101 901 R0001	10	0.031
HK-20	2 NO (4)	1SAM 101 901 R0002	10	0.031
HK-02	2 NC	1SAM 101 901 R0003	10	0.031

Signal contact for general "tripped" signal, lateral mounting, left side max. 1 piece

SK-11	1 NO + 1 NC	1SAM 101 904 R0003	10	0.031
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Undervoltage release, slide-in (5)

UA, power infeed at bottom, U_c 400 V~		1SAM 101 902 R0400	10	0.020
UAF, power infeed at top, resp. connection of external voltage	U_c 24 V~	1SAM 101 903 R0024	10	0.020
	48 V~	1SAM 101 903 R0048	10	0.020
	60 V~	1SAM 101 903 R0060	10	0.020
	110 V~	1SAM 101 903 R0110	10	0.020
	230 V~	1SAM 101 903 R0230	10	0.020
	400 V~	1SAM 101 903 R0400	10	0.020
	415 V~	1SAM 101 903 R0415	10	0.020
	500 V~	1SAM 101 903 R0500	10	0.020

Open circuit shunt release, slide-in (6)

AA	24 ... 60 V AC/DC	1SAM 101 909 R0001	10	0.020
AA	110... 240 V AC/DC	1SAM 101 909 R0002	10	0.020

Terminal support, lateral mounting, left side to MS 325, HK and SK

AS, for UA, AA or as N/LS terminal		1SAM 101 905 R0001	10	0.031
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Locking device for MS 325

SA1, lock adapter		GJF1 101 903 R0001	10	0.004
SA2, padlock + 2 keys		GJF1 101 903 R0002	10	0.004
SA3, lock adapter + padlock + 2 keys		GJF1 101 903 R0003	1	0.050

- (1) Not simultaneously with UA/UA and AA
- (2) Max. 1 piece in conjunction with SK. SK must be mounted on first position
- (3) Pre-mating normally open contacts
- (4) Can be used together with UAF (power infeed at top) for safety circuit with Emergency Stop button (further information available on request)
- (5) Other voltages, in particular DC, on request
- (6) Recommendation: Connection of external voltage via terminal support AS

Accessories required for UL 508 type E application

Auxiliary switch, for short-circuit tripping signal

CK-11	1 NO + 1 NC	1SAM 101 943 R0001	10	0.025
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Power infeed block with high insulation

S3-M3		1SAM 101 938 R0004	10	0.025
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>> Connecting Link for Contactor Mounting page 4/28

Manual Motor Starters MS 450 and MS 495

Ordering details



MS 450



MS 495

Type	Setting range	Order code	Packing unit piece	Weight/ piece kg
	A . . . A			

MS 450 with thermal and electromagnetic trips, tripping class 10, short-circuit breaking capacity up to 50 kA

MS 450 – 16	11 ... 16	1SAM 450 000 R1001	1	0.960
MS 450 – 20	14 ... 20	1SAM 450 000 R1002	1	0.960
MS 450 – 25	18 ... 25	1SAM 450 000 R1003	1	0.960
MS 450 – 32	22 ... 32	1SAM 450 000 R1004	1	0.960
MS 450 – 40	28 ... 40	1SAM 450 000 R1005	1	0.960
MS 450 – 45	36 ... 45	1SAM 450 000 R1006	1	0.960
MS 450 – 50	40 ... 50	1SAM 450 000 R1007	1	0.960

MS 495 with thermal and electromagnetic trips, tripping class 10, short-circuit breaking capacity up to 50 kA

MS 495 – 40	28 ... 40	1SAM 550 000 R1005	1	2.100
MS 495 – 50	36 ... 50	1SAM 550 000 R1006	1	2.100
MS 495 – 63	45 ... 63	1SAM 550 000 R1007	1	2.100
MS 495 – 75	57 ... 75	1SAM 550 000 R1008	1	2.100
MS 495 – 90	70 ... 90	1SAM 550 000 R1009	1	2.100
MS 495 – 100	80 ... 100 (1)	1SAM 550 000 R1010	1	2.100

(1) Max. motor current 95 A

>> Manual Motor Starter Technical Catalogue available on request

Manual Motor Starters MS 450 and MS 495

Ordering details



HK4-11



HKS4-02



SK4-11



release AA4



UA4-HK

Add-on accessories

These parts may be provided in addition to the MS 450 and MS 495. They must be mounted by the user.

Type	Order code	Packing unit	Weight/ piece
Auxiliary switches, for front mounting			
HK4-11, 1 NO + 1NC	1SAM 401 901 R1001	10	0.020
HK4-W, 1 Changeover	1SAM 401 901 R1002	10	0.020
Auxiliary switches, for lateral mounting, left side, max. 1 piece			
HKS4-11, 1 NO + 1 NC	1SAM 401 902 R1001	2	0.030
HKS4-20, 2 NO	1SAM 401 902 R1002	2	0.030
HKS4-02, 2 NC	1SAM 401 902 R1003	2	0.030
Pilot switch acc. to UL 508 type E application, for separate signalling of short-circuit and general tripping, lateral mounting, left side, max. 1 piece, also together with auxiliary switch (1)			
SK4-11 1 NO + 1 NC	1SAM 401 904 R1001	1	0.030
Terminal insulation barrier acc. to UL 508 type E application			
DX 495	1SAM 401 912 R1001	1	0.030
Undervoltage release, for lateral mounting, right side			
UA4, U _n 24 V 50 Hz	1SAM 401 905 R1004	1	0.120
UA4, 110 V 50 Hz	1SAM 401 905 R1001	1	0.120
UA4, 230 V 50 Hz / 240 V 60 H	1SAM 401 905 R1002	1	0.120
UA4, 400 V 50 Hz	1SAM 401 905 R1003	1	0.120
Undervoltage release with leading auxiliary switch 2 NO, for lateral mounting, right side			
UA4-HK, U _n 230 V 50 Hz / 240 V 60 Hz	1SAM 401 906 R1001	1	0.130
UA4-HK, 400 V 50 Hz	1SAM 401 906 R1002	1	0.130
Shunt release, lateral mounting, left side (2)			
AA4, 20-70 V, 50/60 Hz/DC	1SAM 401 907 R1001	1	0.110
AA4, 70-190 V, 50/60 Hz/DC	1SAM 401 907 R1002	1	0.110
AA4, 190-330 V, 50/60 Hz/DC	1SAM 401 907 R1003	1	0.110
AA4, 330-500 V, 50/60 Hz/DC	1SAM 401 907 R1004	1	0.110

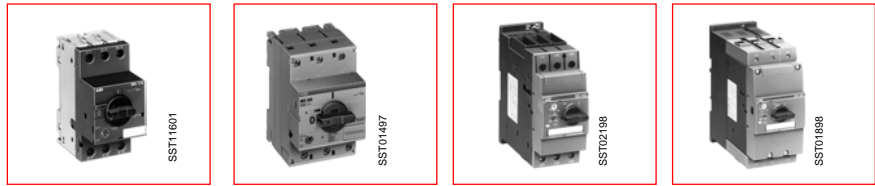
(1) Mounting sequence: motor protection switch, pilot switch, auxiliary switch.

(2) Max. ON time: 5 seconds, see also "Technical Data" page.

>> Connecting Link for Contactor Mounting page 4/28

Manual Motor Starters MS 116, MS 325, MS 450, MS 495

Technical data



Manual motor starter	Type	MS 116	MS 325	MS 450	MS 495
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General technical data

Standards:	IEC 60947-1 / IEC 60947-2 / IEC 60947-4-1 / IEC 60947-5-1 EN 60947-1 / EN 60947-2 / EN 60947-4-1 / EN 60947-5-1			
Disconnecter characteristics (to IEC/EN 60947-1)	yes	yes	yes	yes
Mechanical service life in operating cycles	100.000	100.000	50.000	
Permissible ambient temperature				
- open °C	- 20... + 55/70 (1)	- 25 ... + 55 (1)	- 20 ... + 60/70 (1)	
- encapsulated (in protective housing) °C	on request	- 25 ... + 40	- 20 ... + 35	
- Storage temperature °C	- 50 ... + 80	- 50 ... + 80	- 50 ... + 80	
Temperature compensation	with			
Mounting position	any			
Permissible altitude m	3000	3000	2000	
Permissible resistance to vibrations (2) (IEC 60068-2-6)	10-150 Hz Amplitude 5 g	10-150 Hz Amplitude 5 g	on request	on request
Permissible resistance to shocks sinusoidal shock (IEC 60068-2-27)	25 g (11 ms)	15 g (11 ms)	on request	on request
Mounting (mounting hardware not included in scope of delivery)				
Screw fixing	see accessories	see accessories	2 x M5	2 x M5
Quick fastening on top-hat rail acc. to IEC 60715 / EN 60715	35 mm	35 mm	35 mm (15 mm high)	35 mm, 75 mm
	-	-	-	
Electrical connection of the main conductors (main circuits)				
Type	Screw terminal	Box terminal	Box terminal + bus	Box terminal
Screw	Pozidrive size 2	Pozidrive size 2	Pozidrive size 2 4 mm	Internal hexagon
Single-core 1 x mm ²	1 ... 4	1 ... 10	0.75 ... 35	2.5 ... 70
2 x mm ²	1 ... 4	1 ... 4	0.75 ... 25	2.5 ... 50
Stranded 1 x mm ²	1 ... 4 ⁽³⁾	1 ... 10	0.75 ... 35	2.5 ... 70
2 x mm ²	1 ... 4	-	0.75 ... 25	2.5 ... 50
Flexible 1 x mm ²	0.75 ... 2.5	1 ... 6	0.75 ... 25	2.5 ... 50
2 x mm ²	0.75 ... 2.5	-	0.75 ... 16	2.5 ... 35
of the auxiliary conductors (auxiliary circuits)				
Type	Screw terminal	Screw terminal (4)	Screw terminal	
Screw	Pozidrive size 2	Pozidrive size 1	Pozidrive size 2	
Single-core 1 x mm ²	1 ... 2.5	0.5 ... 2.5	0.5 ... 2.5	
2 x mm ²	1 ... 2.5 ⁽⁵⁾	0.5 ... 2.5	0.5 ... 2.5	
Flexible 1 x mm ²	0.75 ... 2.5	0.5 ... 2.5	0.5 ... 1.5	
2 x mm ²	0.75 ... 2.5	0.5 ... 2.5	0.5 ... 1.5	

(1) Operating conditions up to 70° C on request

(2) G-values refer to the mounting position subject to the highest shock sensitivity

(3) Also applies to auxiliary switches HKF1 and undervoltage release UA1

(4) For auxiliary switch HKF.. Pozidrive 2

(5) Applies to auxiliary switches HK1 and SK1

>> Manual Motor Starter Technical Catalogue available on request

Manual Motor Starters MS 116, MS 325, MS 450, MS 495

Technical data

Manual motor starter	Type	MS 116	MS 325	MS 450	MS 495
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General electrical data

Rated insulation voltage U_j to EN 60947	V AC	690	690	690	690
to CSA / UL / NEMA	V AC	600	600	600	600
Rated operating voltage U_e up to	V	690 AC/440 DC	690 AC/440 DC	690 AC/440 DC	690 AC/440 DC
Rated impulse withstand voltage U_{imp}	kV	6	- / 6	6	6
Rated continuous thermal current I_{th}	A	16	25	50	100
Rated frequency (1)	Hz	50/60			
Rated current ranges I_e (number of ranges)	A	0.1 ... 16 (11)	0.1 ... 25 (14)	11 ... 50 (7)	28 ... 100 (6)

Rated service short-circuit breaking capacity I_{CS} and max. permissible back-up fuses see "Manual Motor Starters" Catalogue.

DC rated operating voltage in the case of series connection of 3 main circuits (see wiring diagram)					
DC 1, 440 V	A	on request	25	50	100
DC 3, 440 V	A	on request	25	50	100
DC 5, 440 V	A	on request	25	50	100
Short circuit capacity for DC-rating		on request			

Auxiliary circuits

Load rating of the auxiliary circuits				
Minimum load at:	24 V DC mA 12 V DC mA	5 mA at 17 VDC -	5 10	5 mA at 17 VDC -
Auxiliary contact for front mounting	AC15	24V, 3.0 A 230V, 1.5 A	24V, 4.0 A 120V, 3.0 A 230V, 2.0 A	24V, 4.0 A 230V, 3.0 A
	DC13	24V, 1.0 A 60V, 0.7 A 110 V, 0.3 A 220 V, 0.1 A	24V, 2.0 A 60V, 2.5 A 110 V, 0.6 A 220 V, 0.25 A	24V, 1.0 A 48V, 0.3 A 60 V, 0.15 A
Auxiliary and signal contact	AC15	24V, 6.0 A 230V, 4.0 A 400 V, 3.0 A	24V, 4.0 A 120V, 3.0 A 230V, 2.0 A	24V, 6.0 A 230V, 4.0 A 400 V, 3.0 A
	DC13	24V, 2.0 A 110 V, 0.5 A 220 V, 0.25 A	24V, 2.0 A 60V, 2.5 A 110 V, 0.6 A 220 V, 0.25 A	24V, 1.0 A 110 V, 0.5 A 220 V, 0.25 A

(1) Correction factors for other frequencies on request

Manual Motor Starters MS 116, MS 325, MS 450, MS 495

Technical data

Manual motor starter	Type	MS 116	MS 325	MS 450	MS 495
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Release

Device for phase failure protection			included		
Electromagnetic tripping range			9.6 ... 14.4 x I _n	7.5 ... 12 I _n (1) 9 ... 14 I _n (2) 10 ... 15 I _n (3) 12.5 ... 17.5 I _n (4)	10.4 I _n ... 15.6 I _n
Undervoltage release					
Pick-up value		% of U _c	≥ 85	≥ 85	≥ 85
Drop-out value		% of U _c	35 ... 75	35 ... 75	35 ... 70
Power consumption	Pick-up	VA	9.0	0.9	20.2
	Hold	VA	3.0	0.9	7.2
Open-circuit shunt release					
Pick-up value		% of U _c	≥ 70	≥ 85	≥ 70
On-load factor		%	100	–	100
Power consumption	Pick-up	VA	9.0	110-240V: 13-61 (5)	on request
	Hold	VA	3.0	–	on request

Internal resistance values

Setting ranges			Resistance per phase			
from	A	to	MS 116 Ω	MS 325 Ω	MS 450 mΩ	MS 495 mΩ
0.16	...	0.25	25.5	27.1	–	–
0.25	...	0.4	10.38	12.3	–	–
0.4	...	0.63	4.36	5.17	–	–
0.63	...	1.0	1.602	2.09	–	–
1.0	...	1.6	0.645	0.805	–	–
1.6	...	2.5	0.2795	0.34	–	–
2.5	...	4.0	0.1035	0.141	–	–
4.0	...	6.3	0.0433	0.051	–	–
6.3	...	9.0	–	0.0224	–	–
6.3	...	10.0	0.0217	–	–	–
8.0	...	12.0	0.0148	–	–	–
9.0	...	12.5	–	0.0122	–	–
10.0	...	16.0	0.0088	–	–	–
11.0	...	16.0	–	–	13.3	17.3
12.5	...	16.0	–	0.0081	–	–
14.0	...	20.0	–	–	8.74	11.3
16.0	...	20.0	–	0.0048	–	–
18.0	...	25.0	–	–	5.43	7.11
20.0	...	25.0	–	0.0035	–	–
22.0	...	32.0	–	–	3.60	4.75
28.0	...	40.0	–	–	2.56	3.28
36.0	...	45.0	–	–	1.80	–
36.5	...	50.0	–	–	–	2.24
40.0	...	50.0	–	–	1.46	–
45.0	...	63.0	–	–	–	1.40
57.0	...	75.0	–	–	–	0.95
70.0	...	90.0	–	–	–	0.60
80.0	...	100.0	–	–	–	0.54

(1) Current ranges 0.16 to 0.63 A

(2) Current ranges 1 to 2.5 A

(3) Current ranges 4 to 6.3 A

(4) Current ranges 9 to 25 A

(5) 24-60 V: 14.4-90 VA

Manual Motor Starter MS 116, MS 325

Technical data

Short-circuit protection MS 116, setting ranges, short-circuit strength and max. back-up fuses

		Maximum rated current of the short-circuit fuses if $I_{cc} > I_{cs}$ (1)																	
from	to	at 230 V AC			at 400 V AC			at 440 V AC			at 500 V AC			at 690 V AC					
		I_{cu} kA	I_{cs} kA	gL, gG A	I_{cu} kA	I_{cs} kA	gL, gG A	I_{cu} kA	I_{cs} kA	gL, gG A	I_{cu} kA	I_{cs} kA	gL, gG A	I_{cu} kA	I_{cs} kA	gL, gG A			
Setting ranges	0.1 ... 0.16	Short-circuit proof up to $I_{cc} = 50$ kA									Short-circuit proof up to $I_{cc} = 30$ kA								
	to																		
	1.0 ... 1.6																		
	1.6 ... 2.5										10	10	25	10	10	25	5	5	25
	2.5 ... 4.0										6	6	25	6	6	25	2	2	25
	4.0 ... 6.3										6	6	63	6	6	63	2	2	40
	6.3 ... 10.0										6	6	63	6	6	63	2	2	50
8.0 ... 12.0	25	25	80	25	25	80	6	6	63	6	6	63	2	2	50				
10.0 ... 16.0	16	16	80	16	16	80	4	4	63	4	4	63	2	2	63				

Short-circuit protection MS 325, setting ranges, short-circuit strength and max. back-up fuses

		Maximum rated current of the short-circuit fuses if $I_{cc} > I_{cs}$ (1)									
from	to	at 230 V AC		at 400 V AC		at 440 V AC		at 500 V AC		at 690 V AC	
		I_{cs} kA	gL, aM A	I_{cs} kA	gL, aM A	I_{cs} kA	gL, aM A	I_{cs} kA	gL, aM A	I_{cs} kA	gL, aM A
		Fuse types: Diazed, I.v.h.b.c., utilisation categories: gL, aM (VDE), gL/gG (IEC)									
Setting ranges	0.1 ... 0.16	Short-circuit proof									
	to	No back-up fuse required up to $I_{cc} = 100$ kA									
	1.0 ... 1.6										
	1.6 ... 2.5										
	2.5 ... 4.0										
	4.0 ... 6.3										
	6.3 ... 9.0										
9.0 ... 12.5											
12.5 ... 16.0											
16.0 ... 20.0											
20.0 ... 25.0											

Short-circuit protection MS 325, setting ranges, short-circuit strength and max. back-up fuses

		Maximum rated current of the short-circuit fuses if $I_{cc} > I_{cs}$ (1)									
from	to	at 230 V AC		at 400 V AC		at 440 V AC		at 500 V AC		at 690 V AC	
		I_{cs} kA	gL, aM A	I_{cs} kA	gL, aM A	I_{cs} kA	gL, aM A	I_{cs} kA	gL, aM A	I_{cs} kA	gL, aM A
		Fuse types: Diazed, I.v.h.b.c., utilisation categories: gL, aM (VDE), gL/gG (IEC)									
Setting ranges	0.1 ... 0.16	Short-circuit proof									
	to	No back-up fuse required up to $I_{cc} = 50$ kA									
	1.0 ... 1.6										
	1.6 ... 2.5										
	2.5 ... 4.0										
	4.0 ... 6.3										
	6.3 ... 9.0										
9.0 ... 12.5											
12.5 ... 16.0											
16.0 ... 20.0											
20.0 ... 25.0											

(1) I_{cs} = Rated service short-circuit breaking capacity, I_{cu} = Rated ultimate short-circuit capacity, I_{cc} = Prospective short-circuit current at installation location.
 $I_{cs} = I_{cu}$ in the case of MS 325 and MS 116.

>> Manual Motor Starter Technical Catalogue available on request

Manual Motor Starter MS 450, MS 495

Technical data

Short-circuit protection MS 450, setting ranges, short-circuit strength and max. back-up fuses

Setting ranges A	Maximum rated current of the short-circuit fuses if $I_{cu} > I_{cc}$ (1)														
	230 V AC			400 V AC			440 V AC			500 V AC			690 V AC		
	I_{cs} kA	I_{cu} kA	gL,gG A	I_{cs} kA	I_{cu} kA	gL,gG A	I_{cs} kA	I_{cu} kA	gL,gG A	I_{cs} kA	I_{cu} kA	gL,gG A	I_{cs} kA	I_{cu} kA	gL,gG A
11 ... 16	Short-circuit-proof No back-up fuse required up to $I_{cc} = 100kA$			25	50	100	25	50	100	6	12	63	3	5	63
14 ... 20				25	50	125	25	50	100	6	12	80	3	5	63
18 ... 25				25	50	125	15	30	100	6	12	80	3	5	63
22 ... 32				25	50	125	15	30	125	5	10	100	2	4	63
28 ... 40				25	50	160	15	30	125	5	10	100	2	4	63
36 ... 45				25	50	160	15	30	125	5	10	100	2	4	63
36 ... 50				25	50	160	15	30	125	5	10	100	2	4	80

Short-circuit protection MS 495, setting ranges, short-circuit strength and max. back-up fuses

Setting ranges A	Maximum rated current of the short-circuit fuses if $I_{cu} > I_{cc}$ (1)														
	230 V AC			400 V AC			440 V AC			500 V AC			690 V AC		
	I_{cs} kA	I_{cu} kA	gL,gG A	I_{cs} kA	I_{cu} kA	gL,gG A	I_{cs} kA	I_{cu} kA	gL,gG A	I_{cs} kA	I_{cu} kA	gL,gG A	I_{cs} kA	I_{cu} kA	gL,gG A
28 ... 40	Short-circuit-proof No back-up fuse required up to $I_{cc} = 100kA$			25	50	125	20	40	125	6	12	100	6	3	63
36 ... 50				25	50	125	20	40	125	6	12	100	6	3	80
45 ... 63				25	50	160	20	40	160	6	12	100	6	3	80
57 ... 75				25	50	160	20	40	160	4	8	125	5	3	100
70 ... 90				25	50	160	20	40	160	4	8	125	5	3	125
80 ... 100				25	50	160	20	40	160	4	8	125	5	3	125

(1) I_{cs} = Rated service short-circuit breaking capacity, I_{cu} = Rated ultimate short-circuit breaking capacity I_{cc} = Prospective short-circuit current at installation location.

Coordination with Short-circuit Protection Devices Manual Motor Starters and Contactors

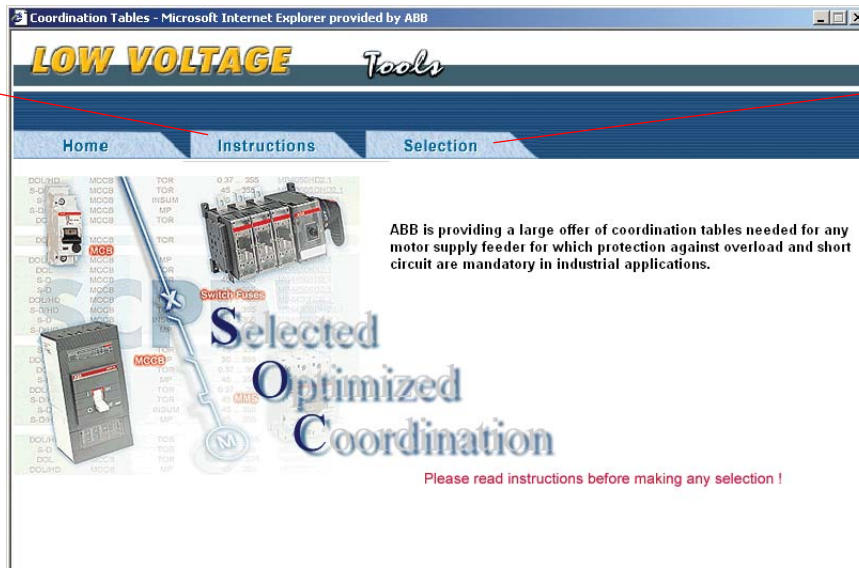
A motor starter is typically made up of a switching device (contactor) and an overload protection device.

These two devices MUST be coordinated with an equipment capable of providing protection against short-circuit (SCPD: Short-Circuit Protection Device).

A complete data base of coordination tables, according to IEC 60947-4-1 (EN 60947-4-1), is available on the ABB Website: see www.abb.com/lowvoltage then go to the right menu: "Support", select: "Online Product Selection Tools".

Online Selected Optimized Coordination Tables

- [Introduction](#)
- [Instructions](#)
- [F.A.Q.](#)
- [Troubleshooting](#)



Short-Circuit Protection Device (SCPD) selection

Selection

[Manual Motor Starters \(MMS\)](#)

Direct-on-line starter Normal Startwith Manual Motor Controller 400 V, 16 kA, 50/60Hz, AC-3, EN/IEC 60947-4-1, type 1						
Motor	Manual Motor Controller			Limitor	Contactors	Table
Rated Output [kW]	Rated Current [A]	Type	Instantaneous tripping current [A]	Instantaneous tripping current [A]	Type	Max. allowed setting current [A]
0.06	0.22	MS116-0,25	3	0,16 - 0,25	A9	0,25
0.06	0.22	MSD11-FBP-0,25	3	0,16 - 0,25	B7	0,25

Protection against short-circuits and overloads with Manual Motor Starter

Complete coordination tables are available for the **Short-Circuit Protection Device (SCPD)**, the **Contactors** and the **Overload Protection Device** according to the **Rated Operational Voltage U_e** , the **Rated Short-circuit Current I_q** , the **Coordination Type** (type 1 or 2) and the **Motor Power**.

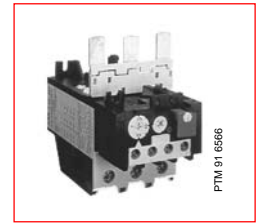
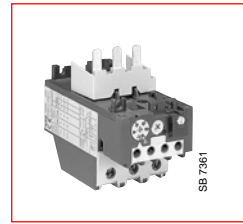
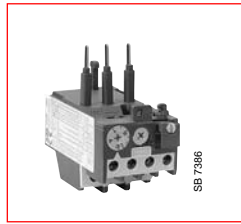
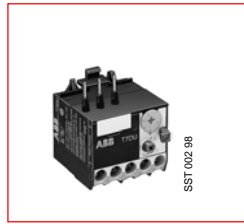
www.abb.com/lowvoltage **Online Selected Optimized Coordination Tables**

>> For Further Information see Section 7

Thermal overload relays TA... Electronic overload relays E...

Overview

Thermal overload relays



Type		T 7 DU	TA 25 DU	TA 42 DU	TA 75 DU
Setting ranges	Number	11	18	3	6
	from to	0.1 ... 0.16 A 9.0 ... 12.0 A	0.1 ... 0.16 A 24 ... 32 A	18 ... 25 A 29 ... 42 A	18 ... 25 A 60 ... 80 A

Mounting possibilities onto contactors

Mounting on	B 6, VB 6, VB 6A, BC 6, VBC 6, VBC 6A, B 7, VB 7, VB 7A, BC 7, VBC 7, VBC 7A	A 9 ... A 40 AL 9 ... AL 40 AL 9Z ... AL 16Z TAL 9 ... TAL 40	A 30, A 40 AL 30, AL 40 TAL 30, TAL 40	A 50 ... A 75 AF 50 ... AF 75 AE 50 ... AE 75 TAE 50 ... TAE 75
Mounting kit	No mounting kit required, direct mounting			

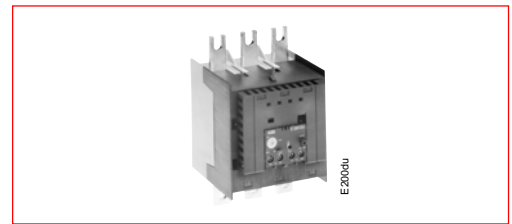
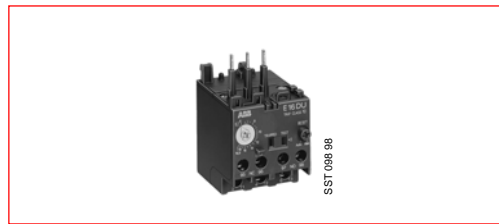
Accessories

Remote tripping coil	–	DS 25-A	–	–
Remote reset coil	–	DR 25-A	–	–
Main terminal shroud	Terminal shroud integrated			
Identification marker	BA 5-50			
Separate mounting kit	–	DB 25	DB 80	

Thermal overload relays for special application

For motors with heavy starting	–	–	–	–
For ATEX motor protection	–	TA 25 DU ... V 1000	TA 42 DU ... V 1000	TA 75 DU ... V 1000

Electronic overload relays



Type		E 16 DU	E 200 DU
Setting ranges	Number	5	1
	from to	0.1 ... 0.32 A 5.7 ... 18.9 A	60 A 200 A

Mounting possibilities onto contactors

Mounting on	B 6, VB 6, VB 6A, BC 6, VBC 6, VBC 6A, B 7, VB 7, VB 7A, BC 7, VBC 7, VBC 7A, A 9, A 12, A 16, AL 9, AL 12, AL 16, AL 9Z, AL 12Z, AL 16Z, TAL 9, TAL 12, TAL 16	A 145, A 185, AF 145, AF 185
Mounting kit	No mounting kit required, direct mounting	

Accessories

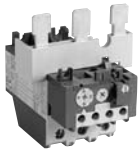
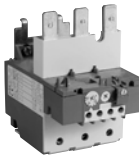
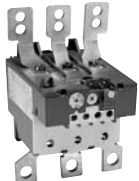

Main terminal shroud	Terminal shroud integrated	LT 200 E
Identification marker	BA 5-50	
Separate mounting kit	DB 16E	–

Electronic overload relays for special application


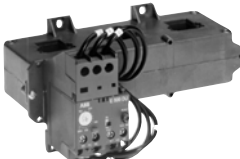
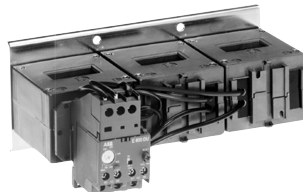
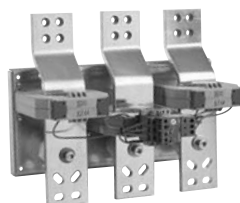
For motors with heavy starting	Class 10, 20, 30	Class 10, 20, 30 adjustable
For ATEX motor protection	PTB 02 ATEX 3041	PTB 02 ATEX 3044

Thermal overload relays TA... Electronic overload relays E...

Overview

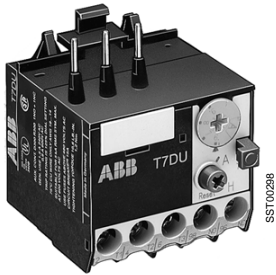
				
TA 80 DU	TA 110 DU	TA 200 DU	TA 450 DU/SU	
4	2	6	3	7
29 ... 42 A 60 ... 80 A	65 ... 90 A 80 ... 110 A	66 ... 90 A 150 ... 200 A	DU 130 ... 185 A 220 ... 310 A	SU 40 ... 60 A 220 ... 310 A
A 95, A 110, AF 95, AF 110, AE 95, AE 110, TAE 95, TAE 110		A 145, A 185, AF 145, AF 185	A 210 ... A 300, AF 210 ... AF 300	
No mounting kit required, direct mounting			DT 450/A	
–	–	–	DS 25-A	
–	–	–	DR 25-A	
Terminal shroud integrated		LT 200 A	–	
		BA 5-50		
DB 80	DB 200		–	
–	–	–	TA 450 SU	
TA 80 DU ... V 1000	TA 110 DU ... V 1000	TA 200 DU ... V 1000	TA 450 DU/SU ... V 1000	

5

				
E 320 DU	E 500 DU	E 800 DU	E 1250 DU	
1	1	1	1	
100 A 320 A	150 A 500 A	250 A 800 A	375 A 1 250 A	
A 210, A 260, A 300, AF 210, AF 260, AF 300	AF 400, AF 460	AF 580, AF 750	AF 1350, AF 1650	
No mounting kits required, direct mounting	DT 500 / AF 460	DT 800 / AF 750	–	
LT 320 E	LT 500 E	LT 800 E	–	
		BA 5-50		
–	–	–	–	
Class 10, 20, 30 adjustable				
PTB 02 ATEX 3044			–	

Thermal overload relay T 7 DU

Ordering details



Type	Order code	Setting range	Packing unit	Weight / piece
		A ... A	piece	kg

T7 DU Thermal overload relays for mini contactors B 6, BC 6, B 6S, BC 6, VB 6, VBC 6, B 7, BC 7, B 7S, BC 7, VB 7, VBC 7,

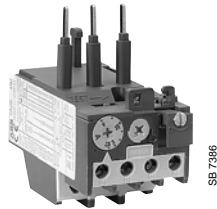
T 7 DU 0.16	1SAZ 111 301 R0001	0.1 ... 0.16	1	0.070
T 7 DU 0.24	1SAZ 111 301 R0002	0.16 ... 0.24	1	0.070
T 7 DU 0.4	1SAZ 111 301 R0003	0.24 ... 0.4	1	0.070
T 7 DU 0.6	1SAZ 111 301 R0004	0.4 ... 0.6	1	0.070
T 7 DU 1.0	1SAZ 111 301 R0005	0.6 ... 1.0	1	0.070
T 7 DU 1.6	1SAZ 111 301 R0006	1.0 ... 1.6	1	0.070
T 7 DU 2.4	1SAZ 111 301 R0007	1.6 ... 2.4	1	0.070
T 7 DU 4.0	1SAZ 111 301 R0008	2.4 ... 4.0	1	0.070
T 7 DU 6.0	1SAZ 111 301 R0009	4.0 ... 6.0	1	0.070
T 7 DU 9.0	1SAZ 111 301 R0010	6.0 ... 9.0	1	0.070
T 7 DU12.0	1SAZ 111 301 R0011	9.0 ... 12.0	1	0.070

>> Short-circuit Protection page 5/30

Thermal overload relays

TA25 DU, TA25 DU... V 1000, TA42 DU, TA42 DU... V 1000

Ordering details



TA 25 DU

SB 7386

Type	Order code	Setting range		Pack- ing unit piece	Weight per piece kg

TA 25 DU for contactors A 9 ... A 40, AL 9 ... AL 40, AL 9Z ... AL 16Z, TAL 9 ... TAL 40

TA 25 DU 0.16	1SAZ 211 201 R1005	0.1 ... 0.16		1	0.150
TA 25 DU 0.25	1SAZ 211 201 R1009	0.16 ... 0.25		1	0.150
TA 25 DU 0.4	1SAZ 211 201 R1013	0.25 ... 0.4		1	0.150
TA 25 DU 0.63	1SAZ 211 201 R1017	0.4 ... 0.63		1	0.150
TA 25 DU 1.0	1SAZ 211 201 R1021	0.63 ... 1.0		1	0.150
TA 25 DU 1.4	1SAZ 211 201 R1023	1.0 ... 1.4		1	0.150
TA 25 DU 1.8	1SAZ 211 201 R1025	1.3 ... 1.8		1	0.150
TA 25 DU 2.4	1SAZ 211 201 R1028	1.7 ... 2.4		1	0.150
TA 25 DU 3.1	1SAZ 211 201 R1031	2.2 ... 3.1		1	0.150
TA 25 DU 4.0	1SAZ 211 201 R1033	2.8 ... 4.0		1	0.150
TA 25 DU 5.0	1SAZ 211 201 R1035	3.5 ... 5.0		1	0.150
TA 25 DU 6.5	1SAZ 211 201 R1038	4.5 ... 6.5		1	0.150
TA 25 DU 8.5	1SAZ 211 201 R1040	6.0 ... 8.5		1	0.150
TA 25 DU 11	1SAZ 211 201 R1043	7.5 ... 11		1	0.150
TA 25 DU 14	1SAZ 211 201 R1045	10 ... 14		1	0.150
TA 25 DU 19	1SAZ 211 201 R1047	13 ... 19		1	0.150
TA 25 DU 25	1SAZ 211 201 R1051	18 ... 25		1	0.150
TA 25 DU 32	1SAZ 211 201 R1053	24 ... 32 (1)		1	0.170

(1) With terminal block DX 25: 1 x 16 mm²

TA 25 DU ... V 1000 (ATEX) for contactors A 9 ... A 40, AL 9 ... AL 40, AL 9Z ... AL 16Z, TAL 9 ... TAL 40

TA 25 DU 0.16 V1000	1SAZ 211 301 R1005	0.1 ... 0.16		1	0.150
TA 25 DU 0.25 V1000	1SAZ 211 301 R1009	0.16 ... 0.25		1	0.150
TA 25 DU 0.4 V1000	1SAZ 211 301 R1013	0.25 ... 0.4		1	0.150
TA 25 DU 0.63 V1000	1SAZ 211 301 R1017	0.4 ... 0.63		1	0.150
TA 25 DU 1.0 V1000	1SAZ 211 301 R1021	0.63 ... 1.0		1	0.150
TA 25 DU 1.4 V1000	1SAZ 211 301 R1023	1.0 ... 1.4		1	0.150
TA 25 DU 1.8 V1000	1SAZ 211 301 R1025	1.3 ... 1.8		1	0.150
TA 25 DU 2.4 V1000	1SAZ 211 301 R1028	1.7 ... 2.4		1	0.150
TA 25 DU 3.1 V1000	1SAZ 211 301 R1031	2.2 ... 3.1		1	0.150
TA 25 DU 4.0 V1000	1SAZ 211 301 R1033	2.8 ... 4.0		1	0.150
TA 25 DU 5.0 V1000	1SAZ 211 301 R1035	3.5 ... 5.0		1	0.150
TA 25 DU 6.5 V1000	1SAZ 211 301 R1038	4.5 ... 6.5		1	0.150
TA 25 DU 8.5 V1000	1SAZ 211 301 R1040	6.0 ... 8.5		1	0.150
TA 25 DU 11 V1000	1SAZ 211 301 R1043	7.5 ... 11.0		1	0.150
TA 25 DU 14 V1000	1SAZ 211 301 R1045	10 ... 14		1	0.150
TA 25 DU 19 V1000	1SAZ 211 301 R1047	13 ... 19		1	0.150
TA 25 DU 25 V1000	1SAZ 211 301 R1051	18 ... 25		1	0.150
TA 25 DU 32 V1000	1SAZ 211 301 R1053	24 ... 32 (1)		1	0.170

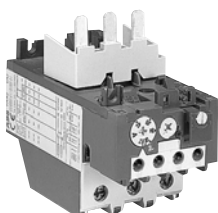
(1) With terminal block DX 25: 1 x 16 mm²

TA 42 DU for contactors A 30, A 40, AL 30, AL 40, TAL 30, TAL 40

TA 42 DU 25	1SAZ 311 201 R1001	18 ... 25		1	0.330
TA 42 DU 32	1SAZ 311 201 R1002	22 ... 32		1	0.330
TA 42 DU 42	1SAZ 311 201 R1003	29 ... 42		1	0.330

TA 42 DU ... V1000 (ATEX) for contactors A 30, A 40, AL 30, AL 40, TAL 30, TAL 40

TA 42 DU 25 V1000	1SAZ 311 301 R1001	18 ... 25		1	0.330
TA 42 DU 32 V1000	1SAZ 311 301 R1002	22 ... 32		1	0.330
TA 42 DU 42 V1000	1SAZ 311 301 R1003	29 ... 42		1	0.330



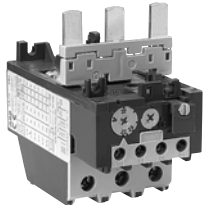
TA 42 DU

SB 7361

>> Short-circuit Protection page 5/30

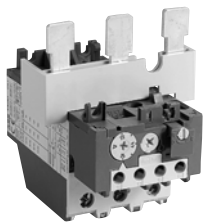
Thermal overload relays TA 75 DU, TA 80 DU, TA 110 DU

Ordering details



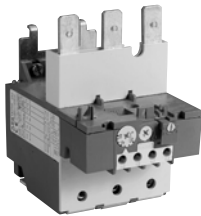
TA 75 DU

SB 7387



TA 80 DU

SB 7389



TA 110 DU

SB 7398

Type	Order code	Setting range		Pack- ing unit piece	Weight / piece kg
		A	... A		

TA 75 DU for contactors A 50 ... A 75, AE 50 ... AE 75, TAE 50 ... TAE 75, AF 50 ... AF 75

TA 75 DU 25	1SAZ 321 201 R1001	18	... 25	1	0.330
TA 75 DU 32	1SAZ 321 201 R1002	22	... 32	1	0.330
TA 75 DU 42	1SAZ 321 201 R1003	29	... 42	1	0.330
TA 75 DU 52	1SAZ 321 201 R1004	36	... 52	1	0.330
TA 75 DU 63	1SAZ 321 201 R1005	45	... 63	1	0.330
TA 75 DU 80	1SAZ 321 201 R1006	60	... 80	1	0.330

TA 75 DU ... V 1000 (ATEX) for contactors A 50 ... A 75, AE 50 ... AE 75, TAE 50 ... TAE 75, AF 50 ... AF 75

TA 75 DU 25 V 1000	1SAZ 321 301 R1001	18	... 25	1	0.330
TA 75 DU 32 V 1000	1SAZ 321 301 R1002	22	... 32	1	0.330
TA 75 DU 42 V 1000	1SAZ 321 301 R1003	29	... 42	1	0.330
TA 75 DU 52 V 1000	1SAZ 321 301 R1004	36	... 52	1	0.330
TA 75 DU 63 V 1000	1SAZ 321 301 R1005	45	... 63	1	0.330
TA 75 DU 80 V 1000	1SAZ 321 301 R1006	60	... 80	1	0.330

TA 80 DU for contactors A 95, A 110, AE 95, AE 110, TAE 95, TAE 110, AF 95, AF 110

TA 80 DU 42	1SAZ 331 201 R1003	29	... 42	1	0.360
TA 80 DU 52	1SAZ 331 201 R1004	36	... 52	1	0.360
TA 80 DU 63	1SAZ 331 201 R1005	45	... 63	1	0.360
TA 80 DU 80	1SAZ 331 201 R1006	60	... 80	1	0.360

TA 80 DU ... V 1000 (ATEX) for contactors A 95, A 110, AE 95, AE 110, TAE 95, TAE 110, AF 95, AF 110

TA 80 DU 42 V 1000	1SAZ 331 301 R1003	29	... 42	1	0.360
TA 80 DU 52 V 1000	1SAZ 331 301 R1004	36	... 52	1	0.360
TA 80 DU 63 V 1000	1SAZ 331 301 R1005	45	... 63	1	0.360
TA 80 DU 80 V 1000	1SAZ 331 301 R1006	60	... 80	1	0.360

TA 110 DU for contactors A 95, A 110, AE 95, AE 110, TAE 95, TAE 110, AF 95, AF 110

TA 110 DU 90	1SAZ 411 201 R1001	65	... 90	1	0.750
TA 110 DU 110	1SAZ 411 201 R1002	80	... 110	1	0.750

TA 110 DU ... V 1000 (ATEX) for contactors A 95, A 110, AE 95, AE 110, TAE 95, TAE 110, AF 95, AF 110

TA 110 DU 90 V1000	1SAZ 411 301 R1001	65	... 90	1	0.750
TA 110 DU 110 V1000	1SAZ 411 301 R1002	80	... 110	1	0.750

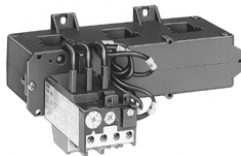
Thermal overload relays TA 200 DU, TA 450 DU/SU

Ordering details



SST1032.99

TA 200 DU



SST1030.99

TA 450 DU

Type	Order code	Setting range	For contactor	Packing unit piece	Weight / piece kg
		A ... A			

TA 200 DU ... for Normal starting time class 10 A

TA 200 DU 90	1SAZ 421 201 R1001	66 ... 90	A/AF 145, 185	1	0.750
TA 200 DU 110	1SAZ 421 201 R1002	80 ... 110	A/AF 145, 185	1	0.750
TA 200 DU 135	1SAZ 421 201 R1003	100 ... 135	A/AF 145, 185	1	0.750
TA 200 DU 150	1SAZ 421 201 R1004	110 ... 150	A/AF 145, 185	1	0.750
TA 200 DU 175	1SAZ 421 201 R1005	130 ... 175	A/AF 145, 185	1	0.750
TA 200 DU 200	1SAZ 421 201 R1006	150 ... 200	A/AF 145, 185	1	0.750

TA 200 DU ... V1000 (ATEX) for Normal starting time class 10

TA 200 DU 110 V1000	1SAZ 421 301 R1002	80 ... 110	A/AF 145, 185	1	0.750
TA 200 DU 130 V1000	1SAZ 421 301 R1003	100 ... 135	A/AF 145, 185	1	0.750
TA 200 DU 150 V1000	1SAZ 421 301 R1004	110 ... 150	A/AF 145, 185	1	0.750
TA 200 DU 175 V1000	1SAZ 421 301 R1005	130 ... 175	A/AF 145, 185	1	0.750
TA 200 DU 200 V1000	1SAZ 421 301 R1006	150 ... 200	A/AF 145, 185	1	0.750

Terminal shroud for TA 200 DU

LT 200/A	1SAZ 401 901 R1001			1	0.070
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Type	Order code	Setting range	For contactor	Packing unit piece	Weight / piece kg
		A ... A			

TA 450 DU ... for Normal starting time class 10 A

TA 450 DU 185	1SAZ 511 201 R1001	130 ... 185	A/AF 210, 260, 300	1	1.500
TA 450 DU 235	1SAZ 511 201 R1002	165 ... 235	A/AF 210, 260, 300	1	1.500
TA 450 DU 310	1SAZ 511 201 R1003	220 ... 310	A/AF 210, 260, 300	1	1.500

TA 450 DU ... V 1000 (ATEX) for Normal starting time class 10

TA 450 DU 185 V1000	1SAZ 511 301 R1001	130 ... 185	A/AF 210, 260, 300	1	1.500
TA 450 DU 235 V1000	1SAZ 511 301 R1002	165 ... 235	A/AF 210, 260, 300	1	1.500
TA 450 DU 310 V1000	1SAZ 511 301 R1003	220 ... 310	A/AF 210, 260, 300	1	1.500

TA 450 SU ... for Long starting time class 30

TA 450 SU 60	1SAZ 611 201 R1005	40 ... 60	A/AF 145 ... 300	1	1.500
TA 450 SU 80	1SAZ 611 201 R1006	55 ... 80	A/AF 145 ... 300	1	1.500
TA 450 SU 105	1SAZ 611 201 R1007	70 ... 105	A/AF 145 ... 300	1	1.500
TA 450 SU 140	1SAZ 611 201 R1008	95 ... 140	A/AF 145 ... 300	1	1.500
TA 450 SU 185	1SAZ 611 201 R1001	130 ... 185	A/AF 145 ... 300	1	1.500
TA 450 SU 235	1SAZ 611 201 R1002	165 ... 235	A/AF 145 ... 300	1	1.500
TA 450 SU 310	1SAZ 611 201 R1003	220 ... 310	A/AF 145 ... 300	1	1.500

TA 450 SU ... V 1000 (ATEX) for Long starting time class 30

TA 450 SU 60 V1000	1SAZ 611 301 R1005	40 ... 60	A/AF 145 ... 300	1	1.500
TA 450 SU 80 V1000	1SAZ 611 301 R1006	55 ... 80	A/AF 145 ... 300	1	1.500
TA 450 SU 105 V1000	1SAZ 611 301 R1007	70 ... 105	A/AF 145 ... 300	1	1.500
TA 450 SU 140 V1000	1SAZ 611 301 R1008	95 ... 140	A/AF 145 ... 300	1	1.500
TA 450 SU 185 V1000	1SAZ 611 301 R1001	130 ... 185	A/AF 145 ... 300	1	1.500
TA 450 SU 235 V1000	1SAZ 611 301 R1002	165 ... 235	A/AF 145 ... 300	1	1.500
TA 450 SU 310 V1000	1SAZ 611 301 R1003	220 ... 310	A/AF 145 ... 300	1	1.500

>> Short-circuit Protection page 5/31

Thermal overload relays Accessories

Ordering details

Mounting kits for thermal overload relay single set-up and mounting kits for mounting thermal overload relays onto contactors.

Relays TA 25 DU to TA 200 DU can be mounted onto contactors without mounting kits .



DB 25

SST 18291 R



DB 80

SST 193 91 R



DB 200

SST 279 92 R




DX 25

SST 014 94 R

Type	Order code	for thermal overload relay	Mounting		Packing unit piece	Weight / piece kg
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Mounting kits for single set-ups

DB 25/25 A	1SAZ 201 108 R0001	TA 25 DU 25 A	snapping onto 35 mm 		1	0.050
DB 25/32 A	1SAZ 201 108 R0002	TA 25 DU 32 A			1	0.075
DB 80	1SAZ 301 110 R0001	TA 42 DU TA 75 DU TA 80 DU			1	0.170
DB 200	1SAZ 401 110 R0001	TA 110 DU TA 200 DU	Screw mounting		1	0.230

Terminal block 10 mm²

DX 25	1SAZ 201 307 R0002	TA 25 DU ≤ 25 A and DB 25/25 A			1	0.030
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Identification markers for thermal overload relays TA 25 DU ... TA 450 DU/SU

BA 5-50	1SBN 110 000 R1000				Box	0.017
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Type	Order code	for contactor	overload relays		Pack. unit piece	Weight / piece kg
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Mounting kits for mounting thermal overload relays onto contactors

DT 450/A 185	1 SAZ 501 901 R1001	A/AF 145, A/AF 185	TA 450 DU/SU		1	0.500
DT 450/A 300	1 SAZ 501 902 R1001	A/AF 260, A/AF 300	TA 450 DU/SU		1	0.750

Thermal overload relays Accessories

Ordering details



LT 200/A

1SFT1980399-125



DS 25-A

SST 203 91 R



DR 25-A

SST 204 91 R

Type	Order code	Mounting onto contactors	Pack. unit piece	Weight / piece kg
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Terminal shroud for TA 200 DU

LT 185-AY between A 145/185 and TA 200 DU	1SFN 124 704 R1000	A/AF 145, A/AF 185	1	1.000
LT 200/A load side	1SAZ 401 901 R1001	A/AF 145, A/AF 185	1	0.070

Type	Order code	Description	Pack. unit piece	Weight / piece kg
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Remote tripping control

The coil serves to remotely trip the thermal overload relays TA 25 DU, TA 450 DU/SU.
The coil is not approved for continuous operation. Pulse duration 0.2 ... 0.35 s.

DS 25-A-24	1SAZ 201 501 R0001	24 V	Operating-voltage U_c at 50/60 Hz	1	0.100
DS 25-A-48	1SAZ 201 501 R0002	48 V		1	0.100
DS 25-A-110	1SAZ 201 501 R0003	110 V		1	0.100
DS 25-A-220/380	1SAZ 201 501 R0005	220/380 V		1	0.100
DS 25-A-500	1SAZ 201 501 R0006	500 V		1	0.100

Remote reset coil

The coil serves to reset the thermal overload relays TA 25 DU, TA 450 DU/SU.
The overload relay must be set to "manual reset" for this purpose.

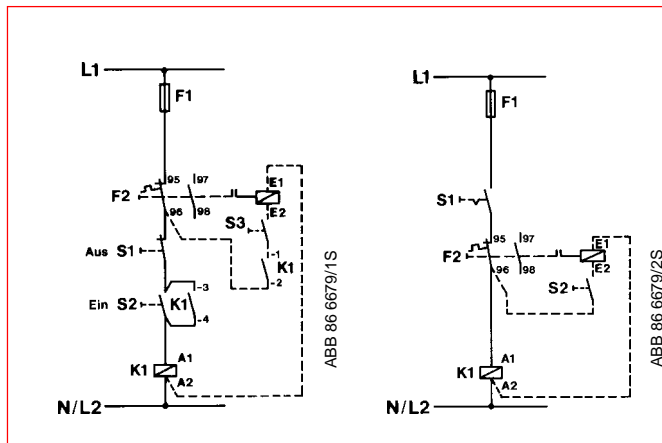
The coil is not approved for continuous operation. Pulse duration 0.2 ... 0.35 s.

DR 25-A-24	1SAZ 201 504 R0001	24 V	Operating-voltage U_c at 50/60 Hz	1	0.100
DR 25-A-48	1SAZ 201 504 R0002	48 V		1	0.100
DR 25-A-110	1SAZ 201 504 R0003	110 V		1	0.100
DR 25-A-220/380	1SAZ 201 504 R0005	220/380 V		1	0.100
DR 25-A-500	1SAZ 201 504 R0006	500 V		1	0.100

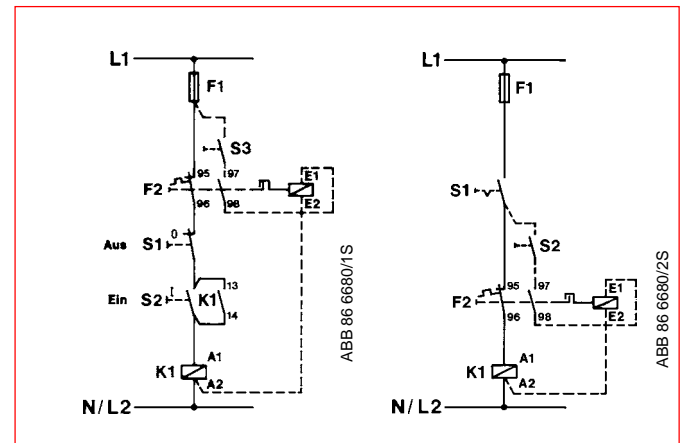
5

Circuit diagrams

TA 25 DU with DS 25-A



TA 25 DU with DR 25-A



Electronic overload relay E 16 DU for contactors and mini contactors

Ordering details



E 16 DU



E 16 DU with A 9-30-10

Type	Order code	Setting range A ... A	Pack. unit kg	Weight / piece
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E 16 DU tripping class 10 for contactors B 6, B 7, BC 6, BC 7, B 6S, B 7S, A 9, A 12, A 16, AL 9, AL 12, AL 16, AL 9Z, AL 12Z, AL 16Z, TAL 9, TAL 12, TAL 16

E16 DU 0.32 10 (1)	1SAX 111 201 R0001	0.1 ... 0.32	1	0.150
E16 DU 1.0 10 (1)	1SAX 111 201 R0002	0.3 ... 1.00	1	0.150
E16 DU 2.7 10 (1)	1SAX 111 201 R0003	0.9 ... 2.70	1	0.150
E16 DU 6.3 10 (1)	1SAX 111 201 R0004	2.0 ... 6.30	1	0.150
E16 DU 18.9 10 (1)	1SAX 111 201 R0005	5.7 ... 18.90	1	0.150

E 16 DU tripping class 20 for contactors B 6, B 7, BC 6, BC 7, B 6S, B 7S, A 9, A 12, A 16, AL 9, AL 12, AL 16, AL 9Z, AL 12Z, AL 16Z, TAL 9, TAL 12, TAL 16

E16 DU 0.32 20 (1)	1SAX 111 301 R0001	0.1 ... 0.32	1	0.150
E16 DU 1.0 20 (1)	1SAX 111 301 R0002	0.3 ... 1.00	1	0.150
E16 DU 2.7 20 (1)	1SAX 111 301 R0003	0.9 ... 2.70	1	0.150
E16 DU 6.3 20 (1)	1SAX 111 301 R0004	2.0 ... 6.30	1	0.150
E16 DU 18.9 20 (1)	1SAX 111 301 R0005	5.7 ... 18.90	1	0.150

E 16 DU tripping class 30 for contactors B 6, B 7, BC 6, BC 7, B 6S, B 7S, A 9, A 12, A 16, AL 9, AL 12, AL 16, AL 9Z, AL 12Z, AL 16Z, TAL 9, TAL 12, TAL 16

E16 DU 1.0 30 (1)	1SAX 111 401 R0002	0.3 ... 1.00	1	0.150
E16 DU 2.7 30 (1)	1SAX 111 401 R0003	0.9 ... 2.70	1	0.150
E16 DU 6.3 30 (1)	1SAX 111 401 R0004	2.0 ... 6.30	1	0.150
E16 DU 18.9 30 (1)	1SAX 111 401 R0005	5.7 ... 18.90	1	0.150

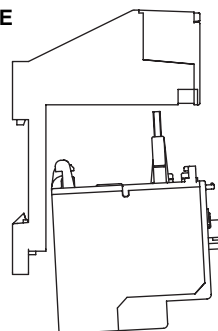
(1) Not suitable for single-phase motors and direct current (d.c.) motors!

Type	Order code	for overload relay	Pack. unit piece	Weight / piece kg
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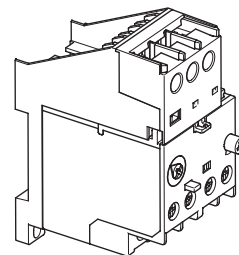
Mounting kit for single set-ups on rail or plate

DB 16 E	1SAX 101 110 R 0001	E 16 DU	1	0.020
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DB 16 E

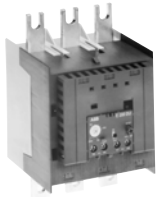


E 16 DU



Electronic overload relays E 200 DU ... E 1250 DU

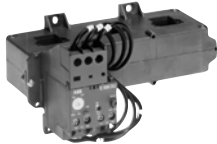
Ordering details



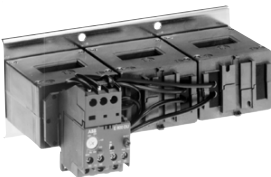
E 200 DU



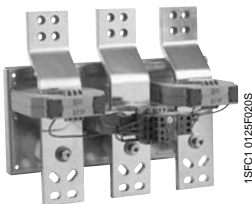
E 320 DU



E 500 DU



E 800 DU



E 1250 DU



A 300 contactor with E 320 DU O/L relay and LT 320 E terminal shroud

Type	Order code	Setting range A ... A	for contactor	Pack. unit	Weight / piece kg
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Electronic overload relays - class 10, 20, 30 selectable

E 200 DU	1SAX 511 001 R0001	60 ... 200	A/AF 145, A/AF 185	1	1.120
E 320 DU	1SAX 611 001 R0002	100 ... 320	A/AF 210 ... A/AF 300	1	1.260
E 500 DU	1SAX 711 001 R0001	150 ... 500	A/AF 400, A/AF 460	1	1.210
E 800 DU	1SAX 811 001 R0001	250 ... 800	A/AF 580, A/AF 750	1	4.240
E 1250 DU ⁽¹⁾	1SFA 739 001 R1000	375 ... 1250	AF 1350, AF 1650	1	10.00

(1) Mounting kit with busbars for contactor mounting included.

Type	Order code	Description	Pack. unit piece	Weight / piece kg
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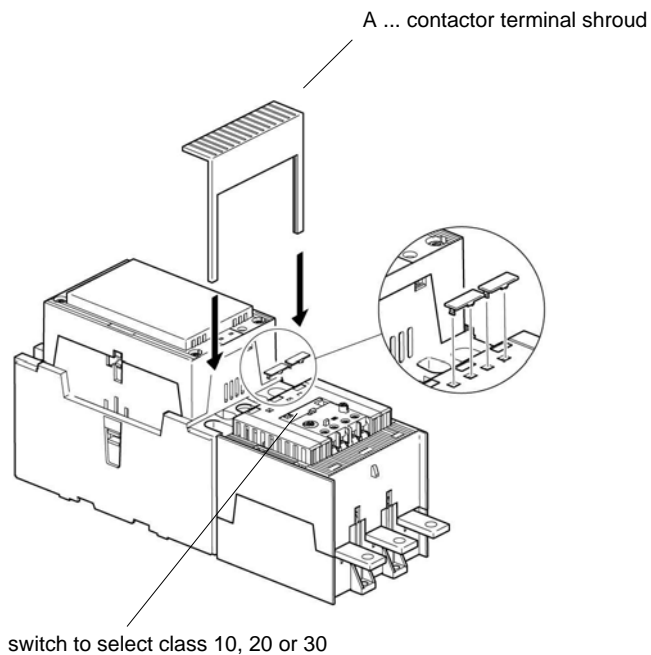
Mounting kits for AF... contactors

DT 500/AF 460S	1SAX 701 902 R1011	Mounting kit for AF 400/460	1	0.750
DT 500/AF 460L	1SAX 701 902 R1001	Mounting kit for AF 400/460 with reversing connector	1	0.720
DT 800/AF 750S	1SAX 801 902 R1011	Mounting kit for AF 580/750	1	1.500
DT 800/AF 750L	1SAX 801 902 R1001	Mounting kit for AF 580/750 with reversing connector	1	1.400

The mounting kits include busbars and accessories for contactor mounting

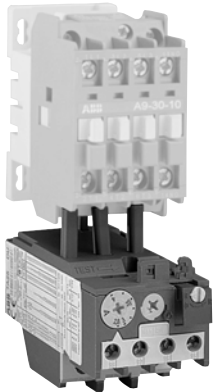
Terminal shrouds

LT 200 E	1SAX 501 904 R0001	Terminal shroud for E 200 DU	1	0.120
LT 320 E	1SAX 601 904 R0001	Terminal shroud for E 320 DU	1	0.120
LT 500 E	1SAX 701 904 R0001	Terminal shroud for E 500 DU	1	0.240
LT 800 E	1SAX 801 904 R0001	Terminal shroud for E 800 DU	1	0.240



Thermal overload relays T... and TA...

Description



Application

Thermal overload relays are used in connection with contactors A, AF, AL, AL..Z, TAL, AE and TAE to protect motors with a rated operating voltages up to 690 V a.c. and 800 V d.c.

Product range

Standard relays

Types: T 7 DU, TA 25 DU, TA 42 DU, TA 75 DU, TA 80 DU, TA 110 DU, TA 200 DU, TA 450 DU/SU

- Relays **T 7** to **TA 200** are connected directly into the motor circuit and the motor current flows through them.
- Relays **TA 450 DU** is powered via converters with a linear characteristic.
- Relays **TA 450 SU** is powered via converters with saturation characteristic and therefore have longer tripping times. See "Protection with heavy starting".

Special designs

Thermal overload relays with different approvals and certificates.
Relays to protect ATEX motors.

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 **tripping curves** (starting from cold and warm state, three and two-phase) are shown in the next "Technical Data" pages.

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:** - see next "Technical Data" pages
- **Phase failure protection in accordance with IEC 60947-4-1:** 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:** **10 A**, in the case of thermal overload relays TA ... DU
30, in the case of thermal overload relays TA ... SU.
- **Reset and test functions**, see "Technical Data" pages.

Auxiliary contacts

The relays feature two integrated auxiliary contacts

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

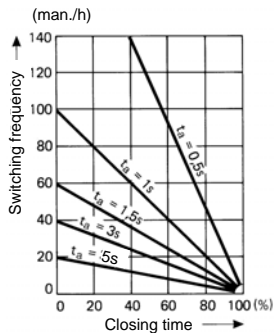
The two contacts are electrically isolated and are thus suitable for use in two different circuits (control circuit and signalling circuit).

>> Protection with Heavy Starting	page 5/27
>> Thermal O/L Relays for ATEX Motors	page 5/34
>> Certification and Approvals	section 7

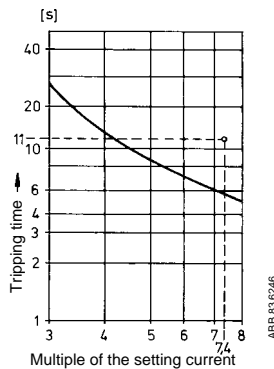
Thermal overload relays T 7 DU, TA 25 DU ... TA 450 DU

Technical data

Intermittent periodic duty



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



Tripping curve of overload relay TA .. 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 TA 450 SU can be used for particularly severe starting conditions. The setting ranges specified in the "Ordering Details" tables 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: TA 450DU/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 ATEX motors

Relays TA 25 DU ... TA 450 DU / SU are suitable for protection of ATEX 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 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 ATEX motors differs from the normal version as follows:

Special test of the tripping times at the works

Special order code

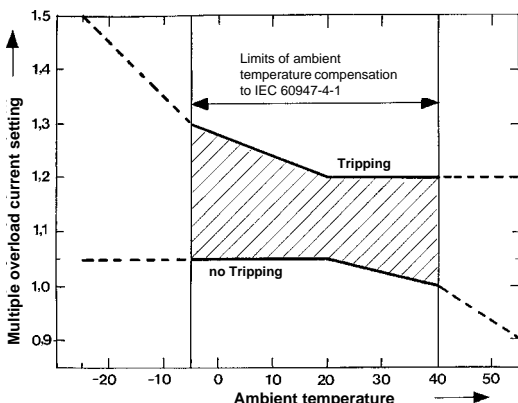
Tripping curves for the individual setting ranges and the PTB Approvals Certificates may be ordered.

Reference numbers of the PTB:

ATEX certificate acc. to European Directive 94/9/EC: PTB 02 ATEX 3045 valid for all V1000 thermal overload relays TA 25, TA 42, TA 75, TA 80, TA 110, TA 200, TA 450 types.

5

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 60947-4-1. 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 E 16 DU, T 7 DU, TA 25 DU ... TA 450 DU/SU feature a convertible Manual/ Automatic reset.


Condition as delivered :

Manual reset.

Thermal overload relays T... and TA...

Technical data

General technical data

Type		T 7 DU	TA 25 DU	TA 42 DU	TA 75 DU
Standards: (major international European and national standards)		IEC 60947-4-1, VDE 0660, NFC 63 650, BS 4941, EN 60947-4-1			
Rated insulation voltage U_i to IEC 158-1, IEC 60947-4-1	V	690		660/690	
Impulse withstand voltage U_{imp} to IEC 60947-4-1	kV	6		6	
Permissible ambient temperature – Storage temperature – for operation (compensated)	°C °C			– 40 to +70 – 25 to +55 (see curve for compensation limit values)	
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 • critical shock direction A1, A2	shock duration ms multiple of g	10		15	
Resistance to vibration: (±1 mm, 50 Hz)	multiple of g	4		8	
Mounting – onto contactor – with DB.. mounting kit		Clipped beneath the contactor, fixed by screws on its main terminals By screws: 2 x M4 or  35 mm acc. to IEC 60715/EN 60715			
Connection terminals and attachment type Main conductors (motor side)			TA25DU setting ranges: 0.1...0.16 A 24...32 A to 18...25 A		
• Screw terminals – Screw terminal – with terminal block – with busbars or cable lugs		M3.5 – –	M4 – –	– M5 –	M6 – –
• Tightening torque	Nm	1	1.2 ... 1.4	2 ... 2.4	3 ... 4
• Connection cross-sections – single-core or stranded – flexible with wire end ferrule – busbars	mm ² mm ² mm	2 x 0.75 ... 2.5 2 x 0.5 ... 1.5 –	2 x 1.5 ... 6 2 x 1.5 ... 4 –	1 x 10 2 x 0.75...6 –	1 x 2.5 ... 25 or 2 x 2.5 ... 16 1 x 2.5 ... 25 or 2 x 2.5 ... 10 –
Connections and auxiliary connectors • Screw terminal (screw size) – with self-disengaging clamping piece • Connection cross-section – single-core or stranded – flexible with wire end ferrule	mm ² mm ²	2 x 0.75 ... 2.5 2 x 0.5 ... 1.5	M 3.5		2 x 0.75 ... 4 2 x 0.75 ... 2.5
Enclosure to IEC 60947-1 / EN 60947-1, IEC 60529 / EN 60529		All terminals are protected against access to hazardous parts with back hand and finger in acc. with EN 50274 (no extra terminal shrouds are required up to and including TA 110 DU)			

Technical data of the conducting paths

Type	T7 DU	TA25 DU	TA42 DU	TA75 DU	TA80 DU	TA110 DU	TA200 DU	TA450 DU	TA450 SU
Number of paths	3								
Setting ranges	see "Ordering Details"								
Tripping class to IEC 60947-4-1 / VDE 0660, Part 1021	10 A							30	
Frequency range	0 ... 400							50/60	
Switching frequency without early tripping	up to 15 cycles/h or 60 cycles/h with 40 % if the breaking current does not exceed $6 \times I_n$ and the starting time does not exceed 1 s								
Resistance per phase in mΩ and heat dissipation per phase in W at maximum setting current	see next pages								
Required fuses for short-circuit protection	see next pages								

>> Temperature Compensation Limit Values page 5/27
>> Ordering Details pages 5/18 ... 5/21
>> Resistance per Phase pages 5/30, 5/31

>> Required Fuses pages 5/30, 5/31
>> Certifications and Approvals for T 7 O/L Relay section 6
>> Certifications and Approvals for TA 25 DU ... TA 75 DU O/L Relay section 7

Thermal overload relays TA...

Technical data

General technical data (cont.)

	TA 80 DU	TA 110 DU	TA 200 DU	TA 450 DU/SU
	IEC 60947-4-1, VDE 0660, NFC 63 650, BS 4941, EN 60947-4-1			
V	660/690			1000
kV	6			8
°C	- 40 to +70			
°C	- 25 to +55 (see curve for compensation limit values)			
	Resistant to changeable climate KFW; 30 cycles			
	any, but please avoid vertical mounting position wherever possible			
ms	15			
x g	12			
x g	8			
	M6 -	4 screws M5		
Nm	M6 - - 3 ... 4	HC, M8 - - 7.2 ... 9.6	- - M10 12 ... 16	- - M10 12 ... 16
mm ²	1 x 2.5 ... 25 or 2 x 2.5 ... 16	16 ... 35	25 ... 120	2 x 240
mm ²	1 x 2.5 ... 25 or 2 x 2.5 ... 10	16 ... 35	25 ... 95	2 x 240
mm	-	12 x 3	20 x 4 ... 5	25 x 5 ... 8
	M 3.5			
mm ²	2 x 0.75 ... 4			
mm ²	2 x 0.75 ... 2.5			
	All terminals are protected against access to hazardous parts with back hand and finger in acc. with EN 50274		All terminals are safe from finger-touch and protected against access to hazardous parts with back hand and finger in acc. with EN 50274 only with additional terminal shrouds.	

5

Thermal overload relays T... and TA...

Technical data

Resistances and power losses per phase
Short-circuit protection

Setting ranges from ... to A A	Short-circuit protection (fuses, circuit-breakers) Coordination type 2 (1)			Coordination type 1 (1)		Resistance per phase mΩ	Power loss per phase at upper current setting W
	gG A	aM A	S 223 K A	gG A	S 223 K		

Thermal overload relay T 7 DU

0.1 ... 0.16	0.5			20	K 6	62 300	1.6
0.16 ... 0.24	1			20		27 000	1.6
0.24 ... 0.40	2			20		11 700	1.9
0.4 ... 0.60	2			20		4 610	1.7
0.6 ... 1.00	4			20		1 660	1.7
1.0 ... 1.60	6			20		630	1.6
1.6 ... 2.40	6			20	K 10	270	1.6
2.4 ... 4.00	10			20		107	1.7
4.0 ... 6.00	10			20		49	1.8
6.0 ... 9.00	10			20	K 25	21	1.7
9.0 ... 12.00	20			20		10	1.4

Setting ranges from ... to A A	Short-circuit protection (fuses, circuit-breakers) Coordination type 2 (1)			Coordination type 1 (1)		Resistance per phase mΩ	Power loss per phase at upper current setting W
	gG A	aM A	S 223 K A	gG A	S 223 K		

Thermal overload relay TA 25 DU

0.1 ... 0.16	0.5	–	–	25	K6	85 850	2.2
0.16 ... 0.25	0.63	–	–	25		35 150	2.2
0.25 ... 0.40	1.25	–	0.5	25		13 750	2.2
0.4 ... 0.63	2	–	1.0	25		5 370	2.2
0.63 ... 1.00	4	2	1.0	25		2 190	2.2
1.0 ... 1.40	4	2	1.6	25		1 120	2.2
1.3 ... 1.80	6	4	2	25		670	2.2
1.7 ... 2.40	6	4	3	25	K10	383	2.2
2.2 ... 3.10	10	6	3	25		229	2.2
2.8 ... 4.00	10	6	4	25		137	2.2
3.5 ... 5.00	16	10	6	25		87.5	2.2
4.5 ... 6.50	20	16	8	25	K25	51.0	2.2
6.0 ... 8.50	25	20	10	25		30.4	2.2
7.5 ... 11.00	35	25	16	–		18.2	2.2
10 ... 14.00	35	25	16	–		11.2	2.2
13 ... 19.00	50	35	20	–	K40	6.3	2.3
18 ... 25.00	63	50	25	–		4.7	2.9
24 ... 32.00	80	63	32	–		3.2	3.3

Thermal overload relay TA 42 DU

18 ... 25	63	50	50	50	160	5.5	3.43
22 ... 32	80	63	50	50	160	2.89	2.91
29 ... 42	100	80	63	63	160	1.84	3.24

1) Coordination type 1 and 2, see "Terms and Technical Definitions".

Thermal overload relays TA...

Technical data

Resistances and power losses per phase
Short-circuit protection

Setting range from ... to A A	Short-circuit protection (fuses, circuit-breakers) Coordination type 2 (1)				Coordination type 1(1)		Resistance per phase mΩ	Power loss per phase at upper current setting W
	gG A	aM A	S 273 A	S 703 A	gG A			

Thermal overload relay TA 75 DU

18 ... 25	63	50	50	50	160		5.5	3.43
22 ... 32	80	63	50	50	160		2.89	2.91
29 ... 42	100	80	63	63	160		1.84	3.24
36 ... 52	125	100	63	80	160		1.3	3.51
45 ... 63	160	125	–	100	250		0.936	3.72
60 ... 80	200	160	–	100	250		0.615	3.94

Thermal overload relay TA 80 DU

29 ... 42	100	80	63	63	160		1.84	3.24
36 ... 52	125	100	63	80	160		1.3	3.51
45 ... 63	160	125	–	100	250		0.936	3.72
60 ... 80	200	160	–	100	250		0.615	3.94

Setting range from ... to A A	Short-circuit protection (fuses, circuit-breakers) Coordination type 2 (1)		Coordination type 1 (1)		Resistance per phase mΩ	Power loss per phase at upper current setting W
	gG A	aM A	gG A			

Thermal overload relay TA 110 DU

65 ... 90	200	160	250	0.540	4.37
80 ... 110	224	200	315	0.378	4.57

Thermal overload relay TA 200 DU

100 ... 135	224	200	315	0.318	5.79
110 ... 150	250	224	355	0.255	5.74
130 ... 175	315	250	400	0.214	6.55
150 ... 200	315	250	500	0.182	7.28

Thermal overload relay TA 450 SU

40 ... 60	125	100	not applicable to overload relays with current transformer	–	2.2
55 ... 80	160	125		–	2.2
70 ... 105	200	160		–	2.2
95 ... 140	315	250		–	2.2

Thermal overload relay TA 450 DU/SU

130 ... 185	355	250	not applicable to overload relays with current transformer	–	2.2
165 ... 235	400	315		–	2.2
220 ... 310	500	400		–	2.2

(1) Coordination type 1 and 2, see "Terms and Technical Definitions".

5

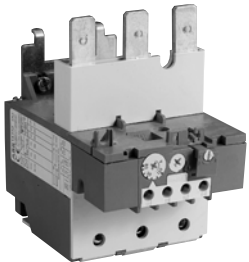
Thermal overload relays T... and TA...

Technical data



TA 25 DU

SB 7386



TA 110 DU

SB 7388

Load rating of auxiliary contacts

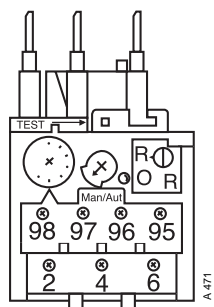
O/L relay type		T7 DU		TA25 DU ...TA450 DU/SU	
		NC 95 - 96	NO 97-98	NC 95 - 96	NO 97 - 98
Auxiliary contacts					
Rated operating voltage U_e	V	500	500	500	
Rated thermal current I_{th}	A	6	6	10	6
Rated operating current I_e					
at AC 15 to 240 V	A	1.5	1.5	3	1.5
at AC 15 to 440 V	A	0.7	0.5	1.9	0.95
at AC 15 to 500 V	A	0.5	0.3	1	0.75
at DC 13 to 24 V	A	-	-	1.25	0.42
to 60 V	A	-	-	0.50	0.17
to 120 V	A	-	-	0.25	0.08
to 250 V	A	0.2	0.02	0.12	0.04
Maximum potential difference between the NO and NC contacts	a.c. V	500		500	
	d.c. V	440		440	
Short-circuit protection fuse or:	gG A	4	4	10	6
STOTZ circuit-breaker type:					
S 271	A	K1	K1	K3	K1
S 281	A	K1	K1	K3	K1

Function of the thermal overload relays TA 25 DU ... TA 450 DU/SU

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's pressed	-	-	-
	NO 97-98	opens when Button's pressed	-	-	-
Button R/O		Reset	-	-	-
	NC 95-96	closes when Button's released	-	opens when Button's pressed closes when Button's released	opens when Button's pressed closes when Button's released
	NO 97-98	opens when Button's pressed	-	-	-

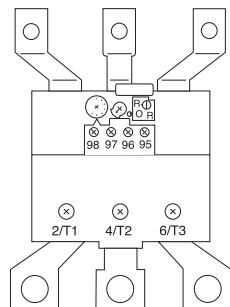
Position of the connection terminals

TA 25 DU, TA 42 DU,
TA 75 DU, TA 80 DU



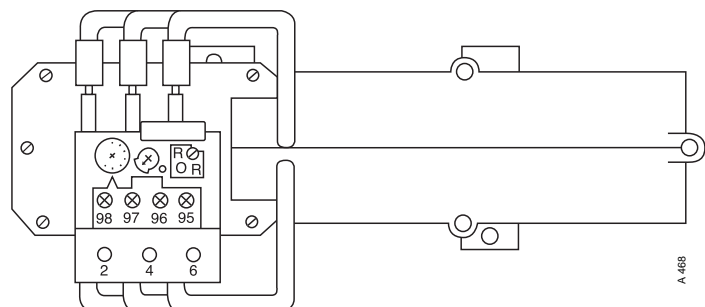
A 471

TA 200 DU



A 467

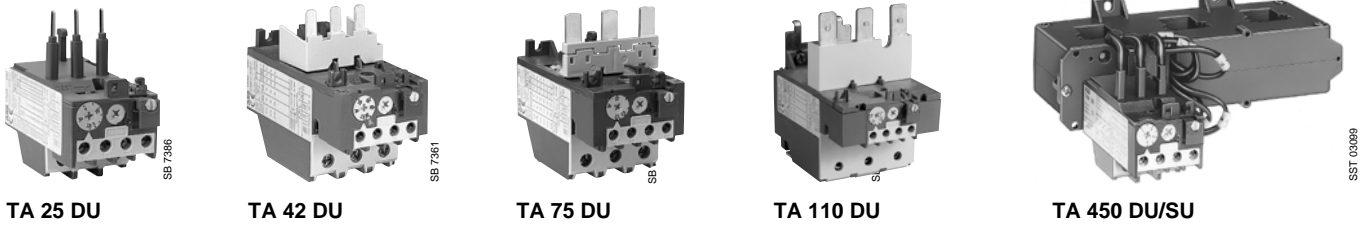
TA 450 DU/SU



A 468

Thermal overload relays T 7 DU, TA 25 DU ... TA 200 DU, TA 450 DU/SU

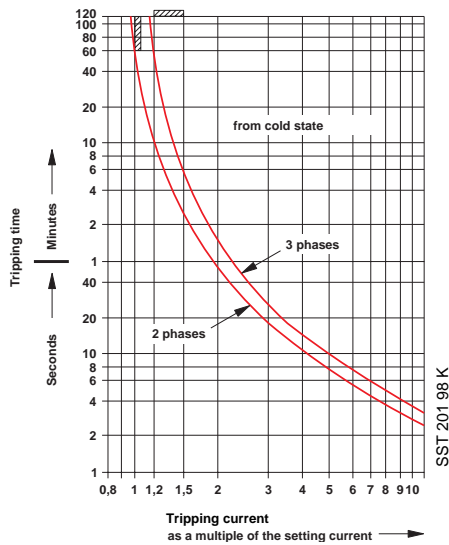
Tripping curves



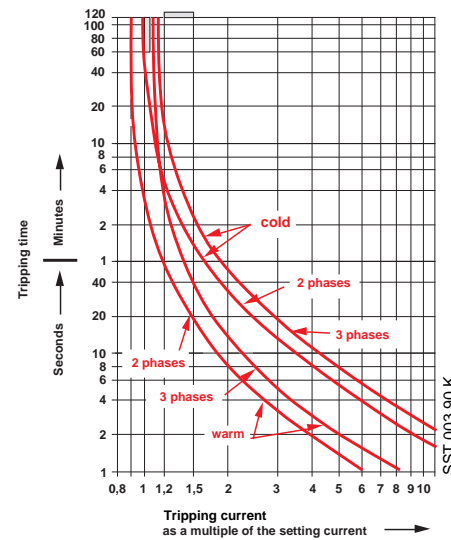
Thermal overload relays **T ... DU** are three-pole relays which can be converted from manual to automatic reset. The Reset button can also be used for disconnection. The built-in auxiliary contacts are electrically isolated and are therefore suitable for two different circuits (control circuit and signalling circuit). All relays feature a facility for temperature compensation and phase failure protection. The overload relays up to size TA 110 DU are safe from finger-touch and safe from touch by the back of the hand. Terminal shrouds are available for size TA 200 DU to TA 450 DU/SU. Connection terminals are delivered in open position, with Pozidriv cross-head screws (\pm) and screwdriver guide.

Tripping curves of the thermal overload relays (group curves)

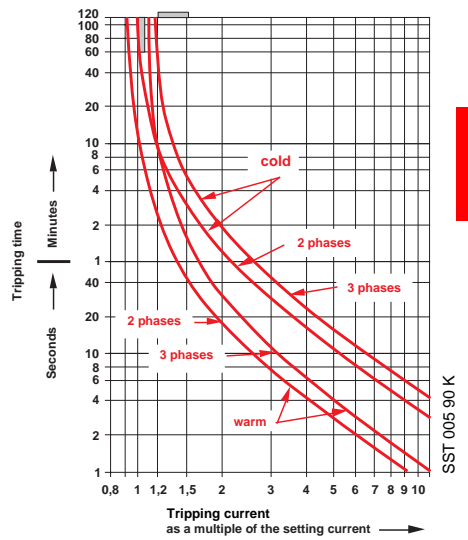
T 7 DU



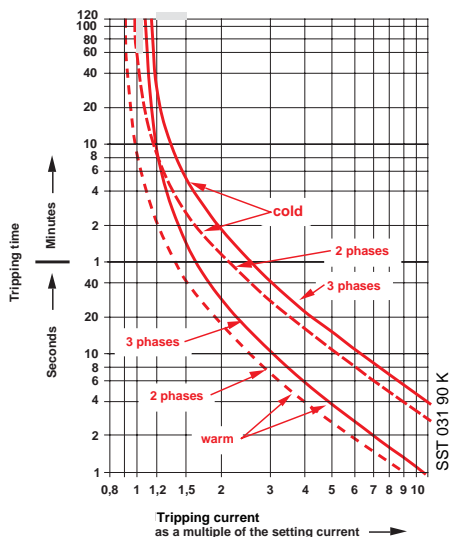
TA 25 DU



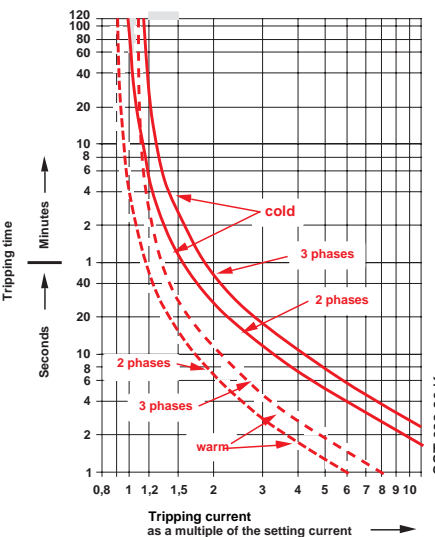
TA 42 DU / TA 75 DU / TA 80 DU



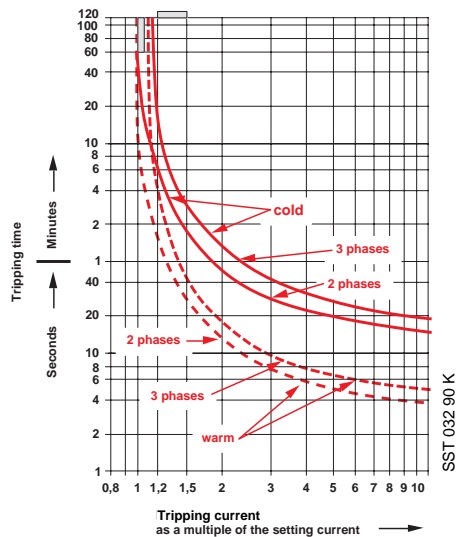
TA 200 DU



TA 450 DU



TA 450 SU



Thermal overload relays TA ..., V 1000 for ATEX motors

Selection table

Selection table for suitability of the overload relays for ATEX motors (PTB approvals).

Tripping times of the thermal overload relays as a function of a multiple of the setting current from cold state (tolerance $\pm 20\%$ of the tripping time).

Setting range of the thermal overload relays from ... to A A		Tripping times of the thermal overload relays at multiple of setting current:					
		3 s	4 s	5 s	6 s	7.2 s	8 s

Thermal overload relays TA 25 DU ... V 1000 (ATEX)

0.1 ... 0.16	17.3	10	7	5.6	4.5	4
0.16 ... 0.25	16.8	10	7.2	6	4.7	4.3
0.25 ... 0.4	16.3	10	7	5.6	4.4	3.9
0.4 ... 0.63	17.3	10.3	7.1	5.7	4.5	4
0.63 ... 1.0	20	12.6	8.4	6.7	5.3	4.5
1.0 ... 1.4	18.3	11.2	8	6.3	5	4.6
1.3 ... 1.8	18.8	11.1	7.5	6	4.7	4.2
1.7 ... 2.4	19.6	11.5	8	6	4.9	4.5
2.2 ... 3.1	18.3	10.5	7.6	6	4.7	4.2
2.8 ... 4.0	18.8	11.2	8	6.1	4.7	4.2
3.5 ... 5.0	17.8	10.9	7.7	6	4.5	4.1
4.5 ... 6.5	17.8	10.5	7.5	5.6	4.6	4
6.0 ... 8.5	17.8	10.9	7.7	6.1	5	4.5
7.5 ... 11	18.8	11.5	8.3	6.5	5.1	4.5
10 ... 14	17.8	10.9	7.7	6	4.7	4.2
13 ... 19	20.5	11.9	8.8	6	4.7	4
18 ... 25	22.4	13.3	8	6.8	5	4.5
24 ... 32	23.7	14	10	7.7	6	5.3

Thermal overload relays TA 42 DU, TA 75 DU, TA 80 DU ... V 1000 (ATEX)

18 ... 25	41	23.2	16	11.8	9	7.5
22 ... 32	37	21	13.8	10.6	8	6.8
29 ... 42	34	18.5	12.6	9.5	6.8	6
36 ... 52	43	23.9	16.1	11.8	9	7.3
45 ... 63	37.4	21.3	15.2	10.6	7.6	6.6
60 ... 80	46.7	23	15.7	11.5	7.9	6.7

Thermal overload relays TA ..., V 1000 for ATEX motors

Selection table

Thermal overload relays TA 110 DU ... V 1000 (ATEX)

66 ... 90	32	16.7	11.5	8.5	6.3	5.4
80 ... 110	34.5	18.2	12.2	8.8	6.7	5.1

Thermal overload relays TA 200 DU ... V 1000 (ATEX)

66 ... 90	27.7	15.8	10.6	7.9	5.6	4.9
80 ... 110	25.1	14.1	9.7	7.1	5.2	4.5
100 ... 135	24.4	13.3	8.9	6.3	4.6	4
110 ... 150	30	15.8	10.6	7.5	5.6	4.6
130 ... 175	30.1	15.8	11.0	7.5	5.6	5.0
150 ... 200	42.2	21.8	14.5	10.3	7.3	6

Thermal overload relays TA 450 DU ... V 1000 (ATEX)

130 ... 185	14.9	8.9	7.1	5.6	4.5	4.2
165 ... 235	18	10	7.1	5.5	4	3.8
220 ... 310	16.8	10	7.1	5.7	4.7	4

Electronic overload relay E 16 DU for contactors and mini contactors

Technical data

General technical data

Type		E 16 DU	
Standards: (major European and international standards)		IEC 60947-4-1 / IEC 60947-5-1 EN 60947-4-1 / EN 60947-5-1	
Rated insulation voltage U_i	V	690	
Rated operating voltage U_e	V	690	
Impulse withstand voltage U_{imp}	kV	6	
Permissible ambient temperature	- Storage	°C - 25 to +70	
	- Operation	°C - 25 to +70	
Climatic resistance according to		IEC 60068-2-1, IEC 60068-2-2, IEC 60068-2-14, IEC 60068-2-30	
Mounting position		any	
Resistance to shock	Shock duration	ms 11	
	multiple of g	15	
Resistance to vibrations (±1 mm, 10 ... 100 Hz)	multiple of g	-	
		5	
Mounting	- onto contactor	Clipped beneath the contactor, fixed by screws on its main terminals	
	- with DB.. mounting kit for single set-ups	By screws: 2 x M4 or	
Connection terminals and attachment type			
Main conductors (load side)/and auxiliary contacts.			
• Screw terminal (screw size)		M3.5	
- with self-disengaging clamping piece		-	
- with terminal block		-	
- with busbars or cable lugs		-	
• Tightening torque	Nm	1	
• Connection cross-sections			
- single-core or stranded		2 x 0.75...4	
- flexible with wire end ferrule		2 x 0.75...4	
Protection degree to IEC 60947-1/EN 60947-1		All terminals are protected against access to hazardous parts with back hand and finger in acc. with EN 50274	

Technical data of the conducting paths

Type		E 16 DU	
Number of conducting paths		3	
Setting ranges		see "Ordering Details"	
Tripping classes to IEC 60947-4-1/EN 60947-4-1		see "Ordering Details"	
Frequency range	Hz	50 and 60	
Switching frequency without early tripping		80 cycles./h with 40% if the making current does not exceed 6 x I_n and the starting time does not exceed 1s.	
Resistance per phase in Ω and power loss per phase in W at max. setting current		see next pages	
Required fuses for short-circuit protection		see next pages	

Load rating of auxiliary contacts

Type		E 16 DU		
Contact		NC (95-96)	NO (97-98)	
Rated operating voltage U_e	V	600	600	
Rated thermal continuous current	A	6	6	
Rated operating current I_e	at AC-15 230 V	A	3	3
	at AC-15 400 V	A	1.1	1.1
	at AC-15 500 V	A	0.7	0.7
	at DC-13 24 V	A	1.5	1.5
	at DC-13 60 V	A	0.5	0.5
	at DC-13 110 V	A	0.4	0.4
	at DC-13 220 V	A	0.2	0.2
Short-circuit protection fuse or	gG	A	6	6
STOTZ safety circuit-breaker: S271, S281			(1)	(1)


(1) on request

>> Ordering Details page 5/24 >> Resistance per Phase page 5/38	>> Required Fuses page 5/38 >> Certification and Approvals section 7
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Electronic overload relays E 200 DU ... E 1250 DU for contactors

Technical data

General technical data

Type	E 200 DU	E 320 DU	E 500 DU	E 800 DU	E 1250 DU
Standards: (major European and international standards)	IEC 60947-4-1 / IEC 60947-5-1 EN 60947-4-1 / EN 60947-5-1				
Rated insulation voltage U_i	V 690				
Rated operating voltage U_e	V 690				
Impulse withstand voltage U_{imp}	kV 6				
Permissible ambient temperature	- Storage °C -25 to +70 - Operation °C -25 to +70				
Climatic resistance according to	IEC 60068-2-1, IEC 60068-2-2, IEC 60068-2-14, IEC 60068-2-30		IEC 60068-2-1, IEC 60068-2-2, IEC 60068-2-30		
Mounting position	any				
Resistance to shock	Shock duration ms 30 multiple of g 5				—
Resistance to vibrations to IEC/EN 61373	category 1, class B				—
Mounting	- onto contactor Clipped beneath the contactor, fixed by screws on its main terminals - with DT.. mounting kit for single set-ups By screws: 2 x M4 or  - onto panel plate By screws: 4 x M5				—
Connection terminals and attachment type	By screws: 4 x M6				
Auxiliary contacts.	<ul style="list-style-type: none"> Screw terminal (screw size) - with self-disengaging clamping piece Tightening torque Nm M3.5 1 Connection cross-sections <ul style="list-style-type: none"> single-core or stranded mm² 2 x 0.75...4 flexible with wire end ferrule mm² 2 x 0.75...4 				
Connection terminals and attachment type	<ul style="list-style-type: none"> Screw terminal (screw size) 				
Main conductors.	M8	M10	(M10)	(M12) <small>(rail order separately)</small>	(M12)
Protection degree to IEC 60947-1/EN 60947-1	All terminals are protected against access to hazardous parts with back hand and finger in acc. with EN 50274				IP 00 (Main terminals) (auxiliary circuits are protected)

Technical data of the conducting paths

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

Load rating of auxiliary contacts

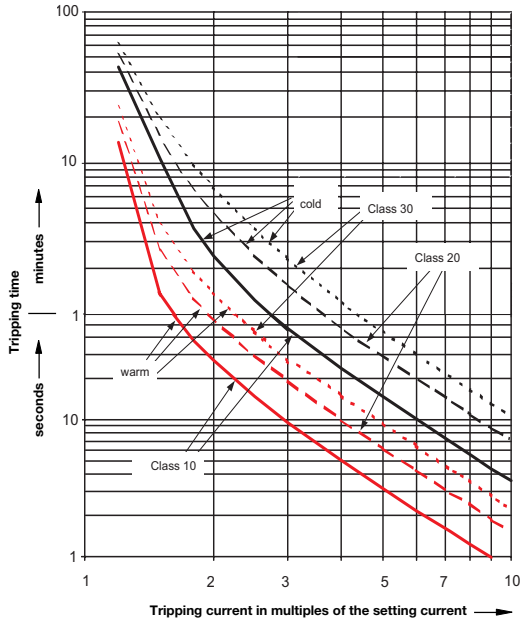
Type	E 200 DU, E320 DU, E 500 DU, E 800 DU, E 1250 DU			
Contact	NC (95-96)		NO (97-98)	
Rated operating voltage U_e	V 600		600	
Rated thermal continuous current	A 6		6	
Rated operating current I_e	A		A	
at AC-15 230 V	3		3	
at AC-15 400 V	1.1		1.1	
at AC-15 500 V	0.7		0.7	
at DC-13 24 V	1.5		1.5	
at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

(1) on request

Electronic overload relays E 16 DU ... E 1250 DU

Technical data

3-phase tripping curves for E ... DU electronic overload relay



Tripping times from warm state

Multiples of rated motor current at start-up	Tripping time class 10 approx. [s]	Tripping time class 20 approx. [s]	Tripping time class 30 approx. [s]
3	8.6	17.2	25.9
4	4.5	9.1	13.5
5	2.8	5.6	8.5
6	1.9	3.9	5.8
7.2	1.4	2.6	3.9
8	1.1	2.2	3.3

Tripping times from cold state

Multiples of rated motor current at start-up	Tripping time class 10 approx. [s]	Tripping time class 20 approx. [s]	Tripping time class 30 approx. [s]
3	46.2	92.6	138.4
4	23.9	47.9	71.7
5	14.8	29.5	44.4
6	10.1	20.2	30.2
7.2	6.9	13.9	20.8
8	5.6	11.1	16.7

Note: E 16 DU ... E 1250 DU O/L relays are not suitable for single-phase and direct current (d.c.) motors!

Resistances and power losses

Setting range	Short-circuit protection (fuses, miniature circuit-breakers)	Resistance per phase at upper setting current mΩ	Power loss per phase W
A ... A	gG A		

Electronic overload relay E 16 DU

0.1 ... 0.32	1	970	0.1
0.3 ... 1.00	4	113	0.11
0.9 ... 2.70	10	14	0.1
2.0 ... 6.30	20	2.4	0.1
5.7 ... 18.90	50	0.8	0.29

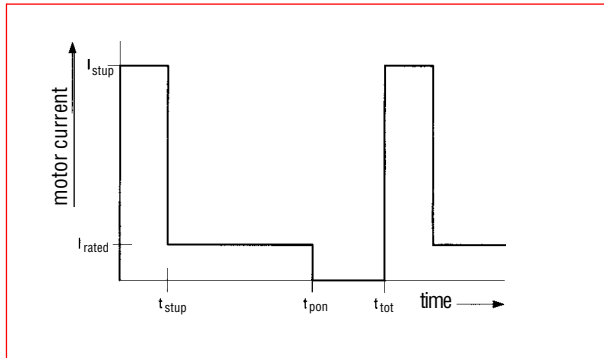
Electronic overload relays E 200 DU ... E 1250 DU: on request

Electronic overload relays E 16 DU ... E 1250 DU

Technical data

Applications with frequent starts

In order to avoid overloads, motors must not be operated with just any starting frequency. With frequent start of motors the rated current of the motor doesn't play the decisive part anymore but much rather the higher starting current (typical 6 x the rated motor current) as well as the starting frequency, the start-up time and the power-on time. A periodical operation of the motor is exemplified in the current-/time-curve below:

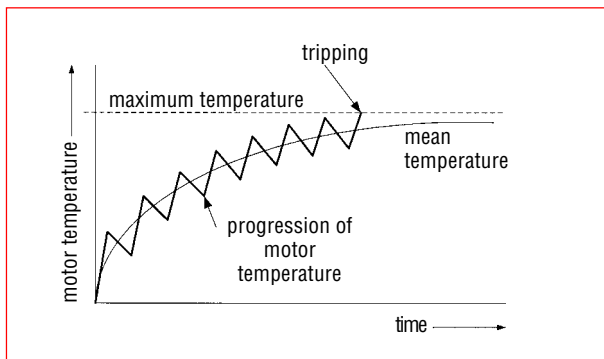


I_{stup} starting current of motor
 I_{rated} rated current of motor
 t_{stup} start-up time
 t_{pon} total power-on time
 t_{tot} cycle time

Sometimes calculations are done using the power-on time PT. The value of PT can be deducted as follows:

$$PT = \frac{t_{pon}}{t_{tot}}$$

The electronic overload relay simulates the thermal behaviour of a motor in a model. The tripping threshold of the overload relay is situated at $(1.125 \pm 0.075) \times$ rated current. The temperature of the motor can have the following characteristics, when it gets started frequently. As shown in this example the mean temperature of the motor stays beneath the permissible maximum temperature, however, on start-up the motor temperature can exceed this temperature barrier. In this case the overload relay trips.



With each start-up, the motor will heat up immensely though for a short time period only (increase in the temperature characteristic of the motor). The heat will distribute itself throughout the motor once the start-up process is finished as well as in breaks when the motor is not running (decrease in the temperature characteristic of the motor). This way the mean temperature of the motor rises. The light curve shows the increase of the mean temperature. To prevent damage to the motor it has to be stopped if the temperature of the motor exceeds the maximum permissible temperature. In this case the overload relay trips.

The tripping curve of the overload relays gives an orientation for the permissible duration of a motor start-up for cases, when due to long power-on times (PT) or due to frequent starts the mean effective value of the current reaches the rated current. The mean effective value I_{eff} is calculated as follows:

$$I_{eff} = \sqrt{\frac{I_{stup}^2 \cdot t_{stup} + I_{rated}^2 \cdot (t_{pon} - t_{stup})}{t_{tot}}}$$

For overload relays E... the maximum start-up times can be deducted from the curve "warm" for $I_{eff} \leq I_{rated}$ as an orientation. The start-up times should be 10% under the tripping times of the curve (see table)

Coordination with Short-circuit Protection Devices

Switch-disconnector-fuses, Contactors and Overload Relays

A motor starter is typically made up of a switching device (contactor) and an overload protection device.

These two devices MUST be coordinated with an equipment capable of providing protection against short-circuit (SCPD: Short-Circuit Protection Device).

A complete data base of coordination tables, according to IEC 60947-4-1 (EN 60947-4-1), is available on the ABB Website: see www.abb.com/lowvoltage then go to the right menu: "Support", select: "Online Product Selection Tools".

Online Selected Optimized Coordination Tables

- [Introduction](#)
- [Instructions](#)
- [F.A.Q.](#)
- [Troubleshooting](#)



Short-Circuit Protection Device (SCPD) selection

Selection

[Switch-disconnector-fuses \(aM and gG\)](#)

Rated Output [kW]	Rated Current [A]	Motor Type	Switch-Fuse Type	Fuse Rating gG / aM [A]	Fuse Type and Size	Contactor Type	Overload Protection Device Type	Current setting range [A] 16 setting max for starter [s]	Max. Allowed Setting Current [A]
0.37	1.1	DS 32D_	4	OFAA00H	A8	TA25DU 1.4	1.0 - 1.4	1.4	
0.55	1.5	DS 32D_	6	OFAA00H	A8	TA25DU 1.8	1.3 - 1.8	1.8	
0.75	1.9	DS 32D_	6	OFAA00H	A8	TA25DU 2.4	1.7 - 2.4	2	
1.1	2.7	DS 32D_	10	OFAA00H	A8	TA25DU 3.1	2.2 - 3.1	3.1	
1.5	3.8	DS 32D_	10	OFAA00H	A8	TA25DU 5.0	3.5 - 5.0	5	
1.5	3.8	DS 32D_	10	OFAA00H	A8	TA25DU 4.0	2.8 - 4.0	3.7	
2.2	4.9	DS 32D_	16	OFAA00H	A8	TA25DU 6.5	4.5 - 6.5	6.5	
3	6.5	DS 32D_	20	OFAA00H	A8	TA25DU 8.5	6.0 - 8.5	8	
4	8.5	DS 32D_	25	OFAA00H	A8	TA25DU 11	7.5 - 11	9	
5.5	11.5	DS 32D_	32	OFAA00H	A12	TA25DU 14	10 - 14	12	
7.5	15.2	DS 32D_	32	OFAA00H	A18	TA25DU 19	13 - 19	15.5	
7.5	15.2	DS 32D_	40	OFAA00H	A26	TA25DU 19	13 - 19	17	
11	22	DS 32D_	63	OFAA00H	A26	TA25DU 25	18 - 25	25	
15	29	DS 32D_	80	OFAA00H	A30	TA25DU 32	24 - 32	32	
18.5	35	DS 63D_	100	OFAA00H	A40	TA42DU 42	29 - 42	37	
18.5	35	DS 63D_	100	OFAA00H	A60	TA75DU 42	29 - 42	40	
22	41	DS 125D_	125	OFAA00H	A60	TA75DU 52	36 - 52	50	
30	55	DS 125D_	125	OFAA00H	A63	TA75DU 63	45 - 63	60	
30	55	DS 250D_	180	OFAA11H	A63	TA75DU 63	45 - 63	63	
37	66	DS 250D_	200	OFAA11H	A85	TA80DU 80	60 - 80	80	
45	80	DS 250D_	200	OFAA11H	A85	TA110DU 90	65 - 90	90	
45	80	DS 250D_	250	OFAA11H	A145	TA200DU 90	65 - 90	90	

Protection against short-circuits and isolation with switch-disconnector-fuse
 Protection against overloads with O/L relay

Complete coordination tables are available for the **Short-Circuit Protection Device (SCPD)**, the **Contactor** and the **Overload Protection Device** according to the **Rated Operational Voltage U_e** , the **Rated Short-circuit Current I_q** , the **Coordination Type** (type 1 or 2) and the **Motor Power**.

www.abb.com/lowvoltage Online Selected Optimized Coordination Tables

>> For Further Information see Section 7

Notes



3-pole Mini Contactors

4-pole Mini Contactors

**Compact Reversing
Contactors**

Interface Mini Contactors

**Mini Contactors
for PLC's Outputs**

a.c. Circuit Switching

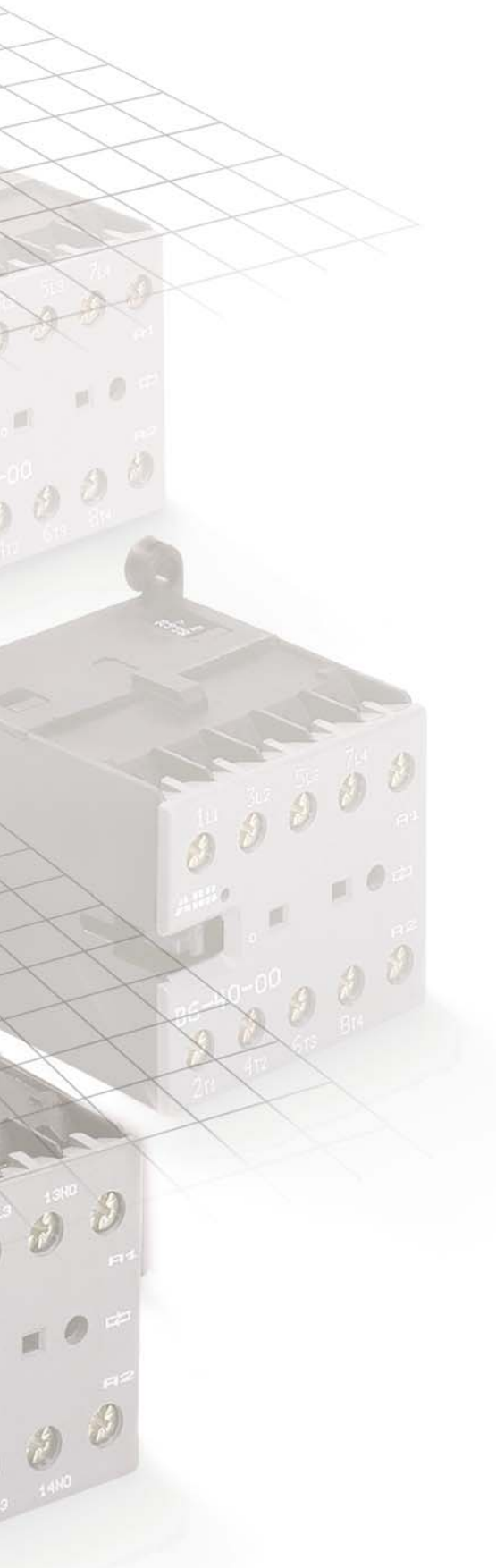
d.c. Circuit Switching

Lighting Circuits

Interface and PLC's Outputs



Mini contactors B 6 and B 7
Mini contactor relays K..
Compact reversing contactors VB..
Thermal overload relay T 7 DU



Contents

Mini Contactors B 6, BC 6, B 7, BC 7

Ordering Details 6/2

Compact Reversing Contactors

Ordering Details 6/3

Interface Motor Contactors

Ordering Details 6/5

Mini Contactors Relays, Interface Contactor Relays

Ordering Details 6/6

Mini Motor Contactors TBC 7, Mini Contactor Relays TKC 6

Ordering Details 6/7

Accessories for Mini Contactors 6/8

Technical Data 6/10

Thermal Overload Relay T 7 DU

Ordering Details 6/14

Technical Data 6/15

Approvals 6/16

Dimensions Section 9

Coil Voltages for Mini Contactors

B 6, B 7, VB 6(A), VB 7(A), BC 6, BC 7, VBC 6(A), 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_c

Mini contactors B 6, BC 6, B 7, BC 7

Ordering details



B6 30-10

SST 169 91 R



B 6-30-10-F

SST 169 91 R



B 6-30-10-P

SST 161 91 R



B 7-30-10

ST169 91 A



B 7-40-00

SST 010 93 R



B 7-40-00 with auxiliary switch CAF 6-11 screwed on afterwards

SST 009 93 R

Type	Order code See Page 6/1 for adding code suffixes <input type="checkbox"/> .. <input type="checkbox"/> to the order code	Auxiliary switches		Motor output	AC-2, AC-3	Packing unit piece	Weight per piece kg
		NO	NC	220 V 240 V kW	380 V 440 V kW		

Mini contactors B 6

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

B 6-30-10	GJL 121 1001 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	2.2	4	10	0.180
B 6-30-01	GJL 121 1001 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			10	0.180
B 6-40-00	GJL 121 1201 R <input type="checkbox"/> 00 <input type="checkbox"/>	0	0			10	0.180

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

B 6-30-10-F	GJL 121 1003 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	2.2	4	10	0.170
B 6-30-01-F	GJL 121 1003 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			10	0.170
B 6-40-00-F	GJL 121 1203 R <input type="checkbox"/> 00 <input type="checkbox"/>	0	0			10	0.170

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

B 6-30-10-P	GJL 121 1009 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	2.2	4	10	0.170
B 6-30-01-P	GJL 121 1009 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			10	0.170

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

BC 6-30-10	GJL 121 3001 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	2.2	4	100	0.180
BC 6-30-01	GJL 121 3001 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			10	0.180

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

BC 6-30-10-F	GJL 121 3003 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	2.2	4	10	0.170
BC 6-30-01-F	GJL 121 3003 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			10	0.170

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

BC 6-30-10-P	GJL 121 3009 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	2.2	4	10	0.170
BC 6-30-01-P	GJL 121 3009 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			10	0.170

Mini contactors B 7

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

B 7-30-10	GJL 131 1001 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	3.0	5.5	10	0.180
B 7-30-01	GJL 131 1001 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			10	0.180
B 7-40-00	GJL 131 1201 R <input type="checkbox"/> 00 <input type="checkbox"/>	0	0			10	0.180

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

B 7-30-10-F	GJL 131 1003 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	3.0	5.5	10	0.170
B 7-30-01-F	GJL 131 1003 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			10	0.170
B 7-40-00-F	GJL 131 1203 R <input type="checkbox"/> 00 <input type="checkbox"/>	0	0			10	0.170

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

B 7-30-10-P	GJL 131 1009 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	3.0	5.5	10	0.170
B 7-30-01-P	GJL 131 1009 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			10	0.170

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

BC 7-30-10	GJL 131 3001 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	3.0	5.5	10	0.180
BC 7-30-01	GJL 131 3001 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			10	0.180

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

BC 7-30-10-F	GJL 131 3003 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	3.0	5.5	10	0.170
BC 7-30-01-F	GJL 131 3003 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			10	0.170

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

B 7 D-30-10	GJL 131 7001 R 0101	1	0	3.0	5.5	10	0.170
B 7 D-30-01	GJL 131 7001 R 0011	0	1			10	0.170
B 7 D-40-00	GJL 131 7201 R 0001	0	0			10	0.170

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

BC 7-30-10-P	GJL 131 3009 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	3.0	5.5	10	0.170
BC 7-30-01-P	GJL 131 3009 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			10	0.170

Mini contactors, with screw connection, for 220 V DC operation, with integr. suppressor diod, 3.5 W

B 7 D-30-10	GJL 131 7001 R 0105	1	0	3.0	5.5	10	0.170
B 7 D-30-01	GJL 131 7001 R 0015	0	1			10	0.170
B 7 D-40-00	GJL 131 7201 R 0005	0	0			10	0.170

Compact reversing contactors

Ordering details

Compact reversing contactors VB 6, VB 7 and VB 6A, 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.

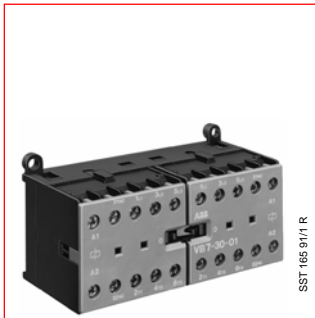
The compact reversing contactors are offered with two different mechanical interlocks:

- VB 6 resp. VB 7: normal interlock
- VB 6A resp. VB 7A: interlock with mechanical safety blocking function

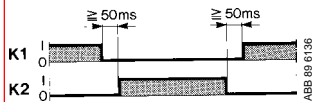
The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out.

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 6A, VB 7A have to be de-energized for more than 50 ms.

Type	Order code See Page 6/1 for adding code suffixes <input type="checkbox"/> .. <input type="checkbox"/> to the order code	Auxiliary switches		Motor output AC-2, AC-3		Pack- ing unit piece	Weight per piece kg
		NO	NC	max. 220 V 240 V kW	380 V 440 V kW		

Compact reversing contactors VB 6, VBC 6, with mechanical interlock

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

VB 6-30-10	GJL 121 1901 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	2.2	4	5	0.340
VB 6-30-01	GJL 121 1901 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			5	0.340

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

VB 6-30-10-F	GJL 121 1903 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	2.2	4	5	0.340
VB 6-30-01-F	GJL 121 1903 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			5	0.340

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

VB 6-30-10-P	GJL 121 1909 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	2.2	4	5	0.340
VB 6-30-01-P	GJL 121 1909 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			5	0.340

Reversing contactors, with screw connection, for DC operation, 3,5 W

VBC 6-30-10	GJL 121 3901 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	2.2	4	5	0.340
VBC 6-30-01	GJL 121 3901 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			5	0.340

Reversing contactors, with flat pin connection, for DC operation, 3,5 W

VBC 6-30-10-F	GJL 121 3903 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	2.2	4	5	0.340
VBC 6-30-01-F	GJL 121 3903 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			5	0.340

Reversing contactors, with soldering pins, for DC operation, 3,5 W, $I_{th} < 8 A$

VBC 6-30-10-P	GJL 121 3909 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	2.2	4	5	0.340
VBC 6-30-01-P	GJL 121 3909 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			5	0.340

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

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

VB 7-30-10	GJL 131 1901 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	3.0	5.5	5	0.340
VB 7-30-01	GJL 131 1901 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			5	0.340

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

VB 7-30-10-F	GJL 131 1903 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	3.0	5.5	5	0.340
VB 7-30-01-F	GJL 131 1903 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			5	0.340

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

VB 7-30-10-P	GJL 131 1909 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	3.0	5.5	5	0.340
VB 7-30-01-P	GJL 131 1909 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			5	0.340

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

VBC 7-30-10	GJL 131 3901 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	3.0	5.5	5	0.340
VBC 7-30-01	GJL 131 3901 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			5	0.340

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

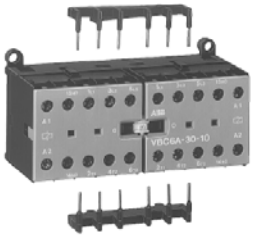
VBC 7-30-10-F	GJL 131 3903 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	3.0	5.5	5	0.340
VBC 7-30-01-F	GJL 131 3903 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			5	0.340

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

VBC 7-30-10-P	GJL 131 3909 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	3.0	5.5	5	0.340
VBC 7-30-01-P	GJL 131 3909 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			5	0.340

Compact reversing contactors

Ordering details



SST 276 92 R

Reversing contactor VBC 6A-3-10
Reversing connection BMS 6-30

Type	Order code See Page 6/1 for adding code suffixes <input type="checkbox"/> ... <input type="checkbox"/> to the order code	Auxiliary switches		Motor output AC-2, AC-3		Pack- ing unit piece	Weight per piece kg
		NO	NC	220 V 240 V kW	380 V 440 V kW		

Compact reversing contactors VB 6A, VBC 6A, with mechanical interlock

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

VB 6A-30-10	GJL 121 1911 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	2.2	4	5	0.340
VB 6A-30-01	GJL 121 1911 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			5	0.340

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

VB 6A-30-10-F	GJL 121 1913 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	2.2	4	5	0.340
VB 6A-30-01-F	GJL 121 1913 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			5	0.340

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

VB 6A-30-10-P	GJL 121 1919 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	2.2	4	5	0.340
VB 6A-30-01-P	GJL 121 1919 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			5	0.340

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

VBC 6A-30-10	GJL 121 3911 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	2.2	4	5	0.340
VBC 6A-30-01	GJL 121 3911 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			5	0.340

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

VBC 6A-30-10-F	GJL 121 3913 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	2.2	4	5	0.340
VBC 6A-30-01-F	GJL 121 3913 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			5	0.340

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

VBC 6A-30-10-P	GJL 121 3919 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	2.2	4	5	0.340
VBC 6A-30-01-P	GJL 121 3919 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			5	0.340

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

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

VB 7A-30-10	GJL 131 1911 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	3.0	5.5	5	0.340
VB 7A-30-01	GJL 131 1911 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			5	0.340

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

VB 7A-30-10-F	GJL 131 1913 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	3.0	5.5	5	0.340
VB 7A-30-01-F	GJL 131 1913 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			5	0.340

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

VB 7A-30-10-P	GJL 131 1919 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	3.0	5.5	5	0.340
VB 7A-30-01-P	GJL 131 1919 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			5	0.340

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

VBC 7A-30-10	GJL 131 3911 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	3.0	5.5	5	0.340
VBC 7A-30-01	GJL 131 3911 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			5	0.340

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

VBC 7A-30-10-F	GJL 131 3913 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	3.0	5.5	5	0.340
VBC 7A-30-01-F	GJL 131 3913 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			5	0.340

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

VBC 7A-30-10-P	GJL 131 3919 R <input type="checkbox"/> 10 <input type="checkbox"/>	1	0	3.0	5.5	5	0.340
VBC 7A-30-01-P	GJL 131 3919 R <input type="checkbox"/> 01 <input type="checkbox"/>	0	1			5	0.340

Interface motor contactors

Mini contactors for connection to PLCs

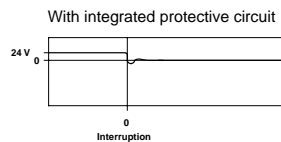
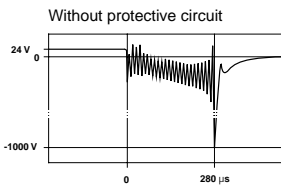
Ordering details



BC 7-30-10- 1.4

ABB 85 08441/R

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 T7 DU available as accessory.

BC 6 Interface motor contactors

Auxiliary switch blocks **cannot** be fitted later on !

Type	Order code	Auxiliary switches		Motor output AC-2, AC-3		Pack- ing unit piece	Weight per piece kg
		NO	NC	220 V 240 V kW	380 V 440 V kW		
Motor contactors, with screw connection, for DC operation 24V / 1.4 W							
BC 6-30-10-1.4	GJL 121 3001 R 8101	1	0	2.2	4	10	0.180
BC 6-30-01-1.4	GJL 121 3001 R 8011	0	1	2.2	4	10	0.180
Motor contactors, with flat pin connection, for DC operation 24V / 1.4 W							
BC 6-30-10-F-1.4	GJL 121 3003 R 8101	1	0	2.2	4	10	0.180
BC 6-30-01-F-1.4	GJL 121 3003 R 8011	0	1	2.2	4	10	0.180
Motor contactors, with soldering pins, for DC operation 24V / 1.4 W, I_{th} < 8 A							
BC 6-30-10-P-1.4	GJL 121 3009 R 8101	1	0	2.2	4	10	0.170
BC 6-30-01-P-1.4	GJL 121 3009 R 8011	0	1	2.2	4	10	0.170
Motor contactors, with screw connection, for DC operation 17 ... 32 V / 2.4 W							
BC 6-30-10-2.4	GJL 121 3001 R 5101	1	0	2.2	4	10	0.180
BC 6-30-01-2.4	GJL 121 3001 R 5011	0	1	2.2	4	10	0.180
Motor contactors, with flat pin connection, for DC operation 17 ... 32 V / 2.4 W							
BC 6-30-10-F-2.4	GJL 121 3003 R 5101	1	0	2.2	4	10	0.170
BC 6-30-01-F-2.4	GJL 121 3003 R 5011	0	1	2.2	4	10	0.170
Motor contactors, with soldering pins, for DC operation 17 ... 32 V / 2.4 W, I_{th} < 8 A							
BC 6-30-10-P-2.4	GJL 121 3009 R 5101	1	0	2.2	4	10	0.170
BC 6-30-01-P-2.4	GJL 121 3009 R 5011	0	1	2.2	4	10	0.170

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							
BC 7-30-10-1.4	GJL 131 3001 R 8101	1	0	3.0	5.5	10	0.170
BC 7-30-01-1.4	GJL 131 3001 R 8011	0	1	3.0	5.5	10	0.170
Motor contactors, with flat pin connection, for DC operation 24V / 1.4 W							
BC 7-30-10-F-1.4	GJL 131 3003 R 8101	1	0	3.0	5.5	10	0.170
BC 7-30-01-F-1.4	GJL 131 3003 R 8011	0	1	3.0	5.5	10	0.170
Motor contactors, with soldering pins, for DC operation 24V / 1.4 W, I_{th} < 8 A							
BC 7-30-10-P-1.4	GJL 131 3009 R 8101	1	0	3.0	5.5	10	0.170
BC 7-30-01-P-1.4	GJL 131 3009 R 8011	0	1	3.0	5.5	10	0.170
Motor contactors, with screw connection, for DC operation 17 ... 32 V / 2.4 W							
BC 7-30-10-2.4	GJL 131 3001 R 5101	1	0	3.0	5.5	10	0.170
BC 7-30-01-2.4	GJL 131 3001 R 5011	0	1	3.0	5.5	10	0.170
Motor contactors, with flat pin connection, for DC operation 17 ... 32 V / 2.4 W							
BC 7-30-10-F-2.4	GJL 131 3003 R 5101	1	0	3.0	5.5	10	0.170
BC 7-30-01-F-2.4	GJL 131 3003 R 5011	0	1	3.0	5.5	10	0.170
Motor contactors, with soldering pins, for DC operation 17 ... 32 V / 2.4 W, I_{th} < 8 A							
BC 7-30-10-P-2.4	GJL 131 3009 R 5101	1	0	3.0	5.5	10	0.170
BC 7-30-01-P-2.4	GJL 131 3009 R 5011	0	1	3.0	5.5	10	0.170

B 6 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							
B6 S-30-10-1.7	GJL 121 3001 R7101	1	0	2.2	4.0	10	0.180
B6 S-30-01-1.7	GJL 121 3001 R7011	0	1	2.2	4.0	10	0.180
Motor contactors with screw connection, for DC operation 17...32 V / 2.8 W							
B6 S-30-10-2.8	GJL 121 3001 R7102	1	0	2.2	4.0	10	0.180
B6 S-30-01-2.8	GJL 121 3001 R7012	0	1	2.2	4.0	10	0.180

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							
B7 S-30-10-1.7	GJL 131 3001 R7101	1	0	3.0	5.5	10	0.180
B7 S-30-01-1.7	GJL 131 3001 R7011	0	1	3.0	5.5	10	0.180
Motor contactors with screw connection, for DC operation 17...32 V / 2.8 W							
B7 S-30-10-2.8	GJL 131 3001 R7102	1	0	3.0	5.5	10	0.180
B7 S-30-01-2.8	GJL 131 3001 R7012	0	1	3.0	5.5	10	0.180

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

Ordering details



KC 6-40 E-P

SST 166 91 R

Type	Order code See Page 6/1 for adding code suffixes <input type="checkbox"/> .. <input type="checkbox"/> to the order code	Auxiliary switches		220 V 240 V A	AC-15 380 V 440 V A		500 V A	Packing unit piece	Weight per piece kg
		NO	NC						

Mini contactor relays

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

K 6-40 E	GJH 121 1001 R <input type="checkbox"/> 40 <input type="checkbox"/>	4	0	4	3	2	10	0.180
K 6-31 Z	GJH 121 1001 R <input type="checkbox"/> 31 <input type="checkbox"/>	3	1	4	3	2	10	0.180
K 6-22 Z	GJH 121 1001 R <input type="checkbox"/> 22 <input type="checkbox"/>	2	2	4	3	2	10	0.180

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

K 6-40 E- F	GJH 121 1003 R <input type="checkbox"/> 40 <input type="checkbox"/>	4	0	4	3	2	10	0.170
K 6-31 Z- F	GJH 121 1003 R <input type="checkbox"/> 31 <input type="checkbox"/>	3	1	4	3	2	10	0.170
K 6-22 Z- F	GJH 121 1003 R <input type="checkbox"/> 22 <input type="checkbox"/>	2	2	4	3	2	10	0.170

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

K 6-40 E- P	GJH 121 1009 R <input type="checkbox"/> 40 <input type="checkbox"/>	4	0	4	3	2	10	0.170
K 6-31 Z- P	GJH 121 1009 R <input type="checkbox"/> 31 <input type="checkbox"/>	3	1	4	3	2	10	0.170
K 6-22 Z- P	GJH 121 1009 R <input type="checkbox"/> 22 <input type="checkbox"/>	2	2	4	3	2	10	0.170

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

KC 6-40 E	GJH 121 3001 R <input type="checkbox"/> 40 <input type="checkbox"/>	4	0	4	3	2	10	0.180
KC 6-31 Z	GJH 121 3001 R <input type="checkbox"/> 31 <input type="checkbox"/>	3	1	4	3	2	10	0.180
KC 6-22 Z	GJH 121 3001 R <input type="checkbox"/> 22 <input type="checkbox"/>	2	2	4	3	2	10	0.180

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

KC 6-40 E- F	GJH 121 3003 R <input type="checkbox"/> 40 <input type="checkbox"/>	4	0	4	3	2	10	0.170
KC 6-31 Z- F	GJH 121 3003 R <input type="checkbox"/> 31 <input type="checkbox"/>	3	1	4	3	2	10	0.170
KC 6-22 Z- F	GJH 121 3003 R <input type="checkbox"/> 22 <input type="checkbox"/>	2	2	4	3	2	10	0.170

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

KC 6-40 E- P	GJH 121 3009 R <input type="checkbox"/> 40 <input type="checkbox"/>	4	0	4	3	2	10	0.170
KC 6-31 Z- P	GJH 121 3009 R <input type="checkbox"/> 31 <input type="checkbox"/>	3	1	4	3	2	10	0.170
KC 6-22 Z- P	GJH 121 3009 R <input type="checkbox"/> 22 <input type="checkbox"/>	2	2	4	3	2	10	0.170

Interface contactor relays

Auxiliary switch blocks **cannot** be fitted later on !

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

KC 6-40 E-1.4	GJH 121 3001 R 8401	4	0	4	3	2	10	0.180
KC 6-31 Z-1.4	GJH 121 3001 R 8311	3	1	4	3	2	10	0.180

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

KC 6-40 E-F-1.4	GJH 121 3003 R 8401	4	0	4	3	2	10	0.180
KC 6-31 Z-F-1.4	GJH 121 3003 R 8311	3	1	4	3	2	10	0.180

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

KC 6-40 E-P-1.4	GJH 121 3009 R 8401	4	0	4	3	2	10	0.170
KC 6-31 Z-P-1.4	GJH 121 3009 R 8311	3	1	4	3	2	10	0.170

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

KC 6-40 E-2.4	GJH 121 3001 R 5401	4	0	4	3	2	10	0.180
KC 6-31 Z-2.4	GJH 121 3001 R 5311	3	1	4	3	2	10	0.180

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

KC 6-40 E-F-2.4	GJH 121 3003 R 5401	4	0	4	3	2	10	0.170
KC 6-31 Z-F-2.4	GJH 121 3003 R 5311	3	1	4	3	2	10	0.170

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

KC 6-40 E-P-2.4	GJH 121 3009 R 5401	4	0	4	3	2	10	0.170
KC 6-31 Z-P-2.4	GJH 121 3009 R 5311	3	1	4	3	2	10	0.170

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

Auxiliary switch blocks **cannot** be fitted later on !

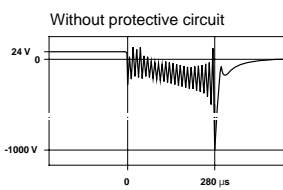
Contactor relay, with screw connection, for DC operation, 24 V / 1.7 W

K 6 S-40 E-1.7	GJH 121 3001 R 7401	4	0	4	3	2	10	0.180
K 6 S-31 Z-1.7	GJH 121 3001 R 7311	3	1	4	3	2	10	0.180
K 6 S-22 Z-1.7	GJH 121 3001 R 7221	2	2	4	3	2	10	0.180

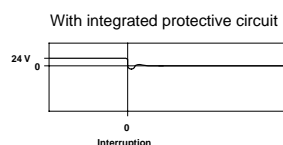
Contactor relay, with screw connection, for DC operation, 17 ... 32 V / 2.8 W

K 6 S-40 E-2.8	GJH 121 3001 R 7402	4	0	4	3	2	10	0.180
K 6 S-31 Z-2.8	GJH 121 3001 R 7312	3	1	4	3	2	10	0.180
K 6 S-22 Z-2.8	GJH 121 3001 R 7222	2	2	4	3	2	10	0.180

Oscillograms



SST 016 91 K



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

Mini motor contactors TBC 7 Mini contactor relays TKC 6

Railway app.: extended coil operating range, technical data



TBC 7-30-10



TKC 6-40E

Mini motor contactors TBC 7

Type	Order code See below for adding code suffixes □...□ to the order code	Auxiliary switch NO NC	AC-1 max. 220 V 240 V A	Motor output AC-2/AC-3 220 V 380 V 500 V 440 V kW kW kW	Pack- ing unit piece	Weight per piece kg
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Motor contactors, with screw connection, for DC operation

TBC 7-30-10	GJL 131 3061 R □ 10 □	1	0	20	3	5,5	4	10	0.180
TBC 7-30-01	GJL 131 3061 R □ 01 □	0	1	20	3	5,5	4	10	0.180

Mini contactor relays TKC 6

Contactor relays, with screw connection, for DC operation

TKC 6-22Z	GJH 121 3061 R □ 22 □	2	2	6				10	0.180
TKC 6-31Z	GJH 121 3061 R □ 31 □	2	2	6				10	0.180
TKC 6-40E	GJH 121 3061 R □ 40 □	4	0	6				10	0.180

Contactor relays, with flat pin connection, for DC operation

TKC 6-22Z-F	GJH 121 3063 R □ 22 □	2	2	6				10	0.180
TKC 6-31Z-F	GJH 121 3063 R □ 31 □	2	2	6				10	0.180
TKC 6-40E-F	GJH 121 3063 R □ 40 □	4	0	6				10	0.180

Coil code numbers

Coil voltage ranges

Example:

TBC 7-30-10	GJL 131 3061 R □ 10 □	1	0	20	3	5,5	4	10	0.180
-------------	-----------------------	---	---	----	---	-----	---	----	-------

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: $\leq 0.2 \times U_c$ (U_c = Rated operating voltage)

Reliable pick-up: $\geq U_{c min}$



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

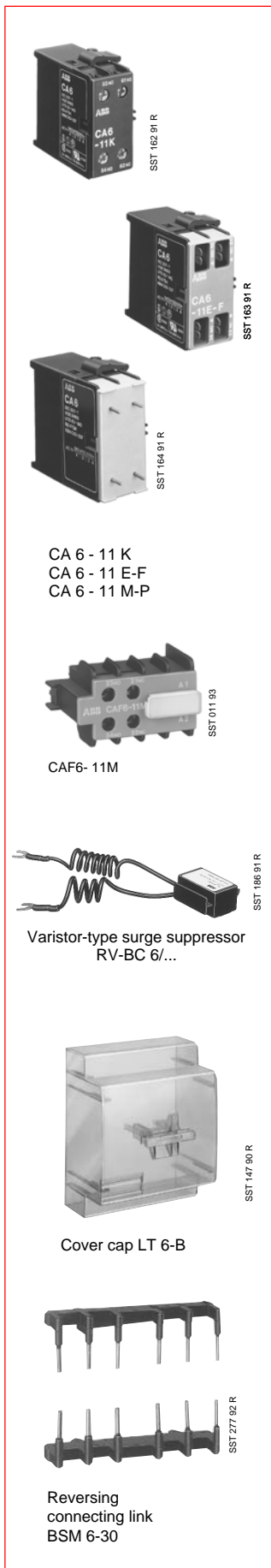
Permissible ambient temperatures

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.

Accessories for mini contactors

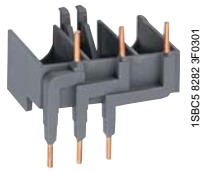
Ordering details



Type	Order code	For mini contactor	Packing unit	Weight per piece
		Type	piece	kg
Auxiliary switch blocks for mounting at one side (1)				
CA 6-11K	GJL 120 1317 R 0001	Screw connection K6... and KC6... B6(7)-40-00 and BC6(7)-40-00	10	0.030
CA 6-11E	GJL 120 1317 R 0002	B6(7)-30-10 and BC6(7)-30-10	10	0.030
CA 6-11M	GJL 120 1317 R 0003	B6(7)-30-01 and BC6(7)-30-01	10	0.030
CA 6-11N	GJL 120 1317 R 0004	Flat pin connection K6...F and KC6...F B6(7)-40-00-F and BC6(7)-40-00-F	10	0.030
CA 6-11K-F	GJL 120 1318 R 0001	B6(7)-30-10-F and BC6(7)-30-10-F	10	0.030
CA 6-11E-F	GJL 120 1318 R 0002	B6(7)-30-01-F and BC6(7)-30-01-F	10	0.030
CA 6-11M-F	GJL 120 1318 R 0003	Soldering connection K6...P and KC6...P B6(7)-40-00-P and BC6(7)-40-00-P	10	0.030
CA 6-11N-F	GJL 120 1318 R 0004	B6(7)-30-10-P and BC6(7)-30-10-P	10	0.030
CA 6-11K-P	GJL 120 1319 R 0001	B6(7)-30-01-P and BC6(7)-30-01-P	10	0.030
CA 6-11E-P	GJL 120 1319 R 0002			
CA 6-11M-P	GJL 120 1319 R 0003			
CA 6-11N-P	GJL 120 1319 R 0004			
Auxiliary switch blocks for mounting at front (1) Screw connection				
CAF 6- 11K	GJL 120 1330 R 0001	K 6 and KC 6	10	0.035
CAF 6- 20K	GJL 120 1330 R 0005	K 6 and KC 6	10	0.035
CAF 6- 02K	GJL 120 1330 R 0009	K 6 and KC 6	10	0.035
CAF 6- 11E	GJL 120 1330 R 0002	B(C)6-, B(C)7-40-00, VB(C)...(A)	10	0.035
CAF 6- 20E	GJL 120 1330 R 0006	B(C)6-, B(C)7-40-00, VB(C)...(A)	10	0.035
CAF 6- 02E	GJL 120 1330 R 0010	B(C)6-, B(C)7-40-00, VB(C)...(A)	10	0.035
CAF 6- 11M	GJL 120 1330 R 0003	B(C)6-, B(C)7-30-10, VB(C)...(A)	10	0.035
CAF 6- 20M	GJL 120 1330 R 0007	B(C)6-, B(C)7-30-10, VB(C)...(A)	10	0.035
CAF 6- 02M	GJL 120 1330 R 0011	B(C)6-, B(C)7-30-10, VB(C)...(A)	10	0.035
CAF 6- 11N	GJL 120 1330 R 0004	B(C)6-, B(C)7-30-01, VB(C)...(A)	10	0.035
CAF 6- 20N	GJL 120 1330 R 0008	B(C)6-, B(C)7-30-01, VB(C)...(A)	10	0.035
CAF 6- 02N	GJL 120 1330 R 0012	B(C)6-, B(C)7-30-01, VB(C)...(A)	10	0.035
Base with soldering pins, I_{th} < 8 A				
LB 6	GJL 120 1902 R 0001	For mini contactors B, BC, K, KC	10	0.014
LB 6-CA	GJL 120 1903 R 0001	For 2-pole auxiliary switch blocks	10	0.006
Plunger				
BN 6	GJL 120 1904 R 0001	For manual operation	50	0.060
Function marker				
BA 50	FPTN 472 625 R 0001	50 clip-on label carriers 50 transparent covers 60 non-adhesive labels* 75 self-adhesive labels* (* on sheet)	1 bag	0.100
Varistor-type surge suppressors for protective circuit of the DC contactors BC 6, BC 7 and KC 6				
<i>Note:</i> Mini contactors for AC operation have an integrated protective circuit.				
RV-BC6/60	GHV 250 1902 R 0002	24–60 V. with cable lug	10	0.004
RV-BC6-F/60	GHV 250 1902 R 0003	24–60 V. flat pin, 2.8 mm	10	0.004
RV-BC6/250	GHV 250 1903 R 0002	50–250 V. with cable lug	10	0.004
RV-BC6-F/250	GHV 250 1903 R 0003	50–250 V. flat pin, 2.8 mm	10	0.004
RV-BC6/380	GHV 250 1904 R 0002	380 V. with cable lug	10	0.004
RV-BC6-F/380	GHV 250 1904 R 0003	380 V. flat pin, 2.8 mm	10	0.004
Cover cap, transparent, sealable, enclosure IP 20				
LT 6- B	GJL 120 1906 R 0001	for contactors B, BC, K, KC 6 with screw connection	10	0.001
Reversing connecting link				
BSM 6-30	GJL 120 1908 R 0001	for compact reversing contactors, VB.., VBC.. with screw connection, cross-section 1.8 mm ²	10	0.010
Parallel connecting link				
LP 6	GJL 120 1907 R 0001	for contactors B, BC, with screw connexion, 1 mm thick	100	0.001

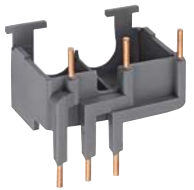
(1) Auxiliary switches CA 6 and CAF 6 may not be fitted simultaneously.

BEA 7... connecting link for mini contactors and manual motor starters



1SBC5 8282 3F0301

BEA 7/116



1SBC5 8279 3F0301

BEA 7/325



B6-30-10 + 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 coordination, complying with IEC 60947-4-1 and EN 60947-4-1.

See Database of coordination tables on the ABB Website:



www.abb.com/lowvoltage then go to the right menu select: "Support" select: "Online Product Selection 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 **B6/B7...** mini contactors and **VB6A/VB7A...** compact reversing contactors (including BC6/BC7..., VBC6A/VBC7A... versions) and the **MS...** manual motor starters as indicated in the table below.

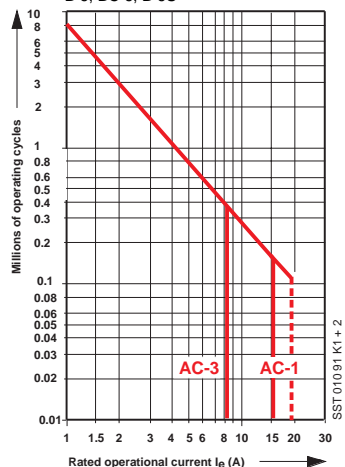
Ordering details

For mini contactors and compact reversing contactors	For MMS	fixing Rail not supplied	I _e max. AC-3 400 V A	Type	Order code	Pack ^{ing} pieces	Weight kg
B 6, VB 6A	MS 116		8	BEA 7/116	1SBN 08 0906 R1000	10	0.013
B 7, VB 7A	MS 116	15x35 mm	11	BEA 7/116	1SBN 08 0906 R1000	10	0.013
B 6, VB 6A	MS 325		8	BEA 7/325	1SBN 08 0906 R1001	10	0.021
B 7, VB 7A	MS 325	15x35 mm	11	BEA 7/325	1SBN 08 0906 R1001	10	0.021

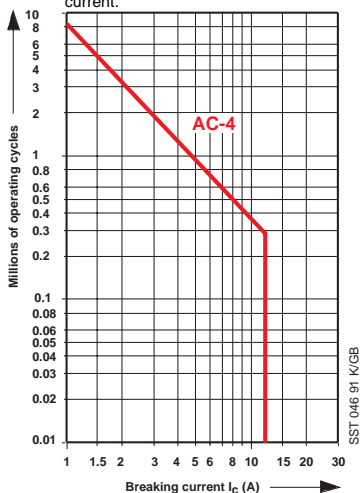
Mini contactors B 6, BC 6 Mini contactor relays K 6, KC 6

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

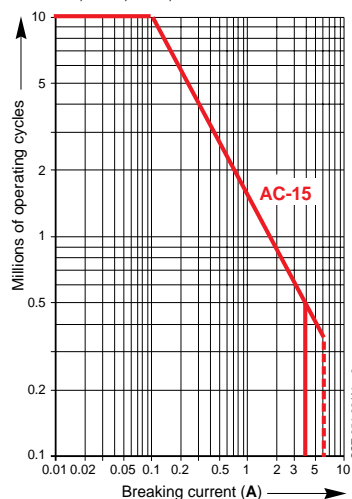
Utilisation category AC-1/AC-3
Contact member service life curves
B 6, BC 6, B 6S



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



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



General data

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

Main contacts

Mechanical service life	10 million operations				
Electrical service life	see curves				
Max. switching frequency AC-1	ops./h	300			
DC-1, DC-3, DC-5, AC-2, AC-3, AC-15, DC-13	ops./h	600			
Rated operating voltage U_e	V AC	12 to 690			
Rated operating current I_e/AC-1, AC-3 and max. motor output / AC-3 at U_e		AC-1 / I_e A		AC-2, AC-3	
		55 °C	40 °C	I_e A	P kW
	220/240 V	16	16	9	2.2
	380/440 V	16	16	9/8	4.0
	500 V	12	12	5.5	3.0
	690 V	6	12	3.5	3.0

Switching times		B 6	B C6	K 6	K C6
Closing delay	NO	14 to 26		14 to 26	
Opening delay		16 to 40	4 to 10	16 to 40	4 to 10
Closing delay	NC	18 to 42		18 to 42	
Opening delay		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

Power loss per pole:	2 W at 20 A
Back-up fuse, Type gL, Type 1, Type 2	20 A, 20 A

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

Rated operating voltage U_e	V DC	12 to 240
	V AC	12 to 500
Conventional thermal continuous current I_{th}	A	6
Back-up fuse, Type gG	A	10
Rated operating current I_e / AC-15		
at U_e	24-240 V	A
	380/440 V	A
	500 V	A
Rated operating current I_e/DC-13		
at U_e	24 V	A
	60 V	A
	110 V	A
	220/240 V	A
Min. making/breaking capacity of the auxiliary contacts		≥ 17 V and ≥ 5 mA

Solenoid coils

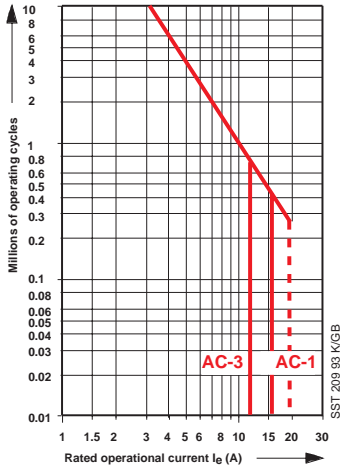
Rated power				
Basic contactors				closing / holding
B 6 / K 6, VB 6	AC	VA		3.5
BC 6 / KC 6, VBC 6	DC	W		3.5
Interface contactors				
BC 6 / KC 6-1.4	DC 24 V	W		1.4
BC 6 / KC 6-2.4	DC 17 ... 32 V	W		2.4
Mini contactor for connection to PLCs, mini contactor relay for connection to PLCs				
			cold	warm
			I mA	P W
B 6 NO-1.7, K 6S-1.7	DC 24 V	W	77	1.75
B 6 NO-2.8, K 6S-2.8	DC 17 ... 32 V	W	125	2.80
			60	1.35
			94	2.10
Coil voltage range			0.85 ... 1.1x U_e	

Switching DC, see overleaf

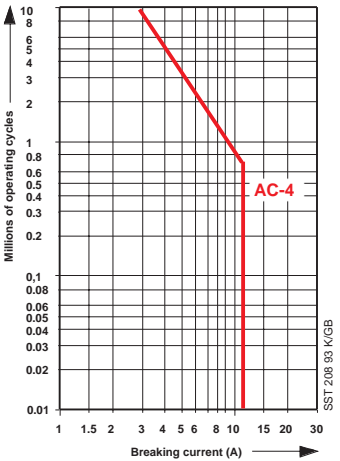
Mini contactors B 7, BC 7

Technical data to IEC 60947-4-1

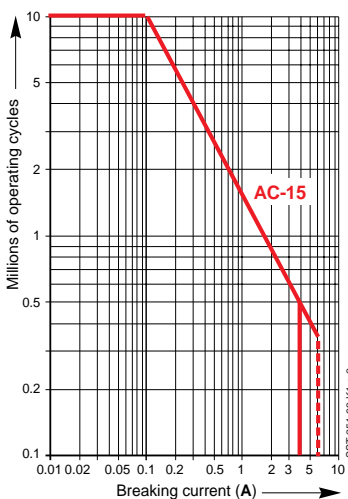
Utilisation category AC-1/AC-3
Contact member service life curves
B 7, BC 7, B 7S



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



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



General data

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

Main contacts

Mechanical service life	10 million operations			
Electrical service life	see curves			
Max. switching frequency AC-1	ops./h	300		
DC-1, DC-3, DC-5, AC-2, AC-3, AC-15, DC-13	ops./h	600		
Rated operating voltage U_e	V AC	12 to 690		
Rated operating current I_e / AC-1, AC-3 and motor output / AC-3		AC-1 / I_e A	AC-2, AC-3	
at U_e		55 °C	40 °C	I_e A P kW
220/240 V		16	20	12 3
380/440 V		16	20	12/11 5.5
500 V		12	12	7 4
690 V		6	12	3.5 3

Switching times

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

Shock resistance with normal installation position

	Semi-sinusoidal shock, 10 ms, with no change in contact state				
Shock direction	A	B1	B2	C1	C2
Contactors switched off	20 g	20 g	20 g	20 g	20 g
Contactors switched on	10 g	20 g	20 g	20 g	20 g

Power loss per pole:

	2 W at 20 A
Back-up fuse assignment type	Type 1
Type gG (gL)	Type 2
	25 A
	20 A

Auxiliary contacts: integrated

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

Solenoid coils

Rated power			Closing / holding			
Basic contactors						
B 7 / VB 7	AC	VA	3.5			
BC 7 / VBC 7	DC	W	3.5			
Interface contactors						
BC 7-1.4	DC 24 V	W	1.4			
BC 7-2.4	DC 17 ... 32 V	W	2.4			
Mini contactor for connection to PLCs			cold		warm	
			I (mA)	P (W)	I (mA)	P (W)
B 7 NO-1.7	DC	24 V	77	1.70	60	1.35
B 7 NO-2.8	DC	17 ... 32 V	125	2.80	94	2.10
Coil voltage range	0.85...1.1x U_c					

Utilisation categories for B 6 and B 7

Utilisation category			DC-1 L/R < 1 ms	DC-3 L/R < 2 ms	DC-5 L/R < 7.5 ms
 A 829	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
 A 830	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
 A 831	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

6

Mini motor contactors B 6, B 7 / BC 6, BC 7

Compact reversing contactors VB 6(7) / VBC 6(7)

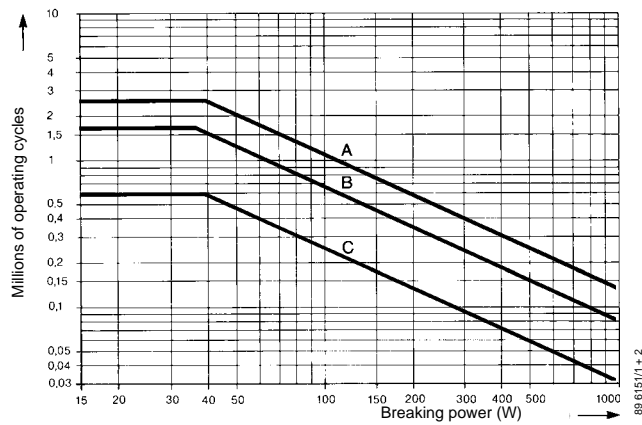
Contact member service life, utilisation categories

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 B 6, B 7 / BC 6, BC 7

Compact reversing contactors VB 6 (7) / VBC 6 (7)

Switching lamp loads

Switching lamp loads

The following table shows the number of lamps which can be connected per circuit at 230 V/50 Hz. Please note the following:

If the specified capacitor load is exceeded, this may result in admissibly high peak inrush currents. Other factors which influence the magnitude of peak inrush currents are as follows:

- Length and cross-section of installed supply cables
- Type of electronic ballast units
- Lamp make

The following lamp load table thus contains non-binding guideline values.

Lamp type	Lamp data		Permissible number of lamps per circuit (230 V, 50 Hz) in the case of contactor type B6, B7, BC6, BC7	Capacitor load in μF
	Watt	I_n A		
Incandescent lamps	60	0.26	20	
	100	0.43	12	
	200	0.87	6	
	300	1.30	4	
	500	2.17	2	
	1000	4.35	1	
Fluorescent lamps	p.f. uncorrected and series p.f. correction			
	15	0.33	25	
	20	0.37	23	
	40	0.43	20	
	58	0.67	16	
	65	0.67	12	
	115	1.5	5	
	140	1.5	5	
	Lead-lag circuit			
	2 x 20	2 x 0.13	2 x 26	Lamp pairs
	2 x 40	2 x 0.22	2 x 20	
	2 x 58	2 x 0.32	2 x 16	
	2 x 65	2 x 0.34	2 x 12	
	2 x 115	2 x 0.65	2 x 5	
2 x 140	2 x 0.75	2 x 5		
Parallel p.f. correction				
15	0.11	7	4.5	
20	0.13	6	4.5	
40	0.22	7	4.5	
58	0.32	5	7	
65	0.34	4	7	
115	0.65	1	18	
140	0.75	1	18	
High-pressure mercury-vapour lamps e.g. HQL, HPL	p.f. uncorrected			
	50	0.61	10	
	80	0.8	7	
	125	1.15	5	
	250	2.15	3	
	400	3.25	2	
	700	5.40	1	
	Parallel p.f. correction			
	50	0.28	4	7
	80	0.41	3	8
	125	0.65	2	10
	250	1.22	1	18
	400	1.95	1	25
	700	3.45	–	45
1000	4.8	–	60	
Lamps with electronic ballast units	1 x 18	–	17	
	2 x 18	–	8	
	1 x 36	–	11	
	2 x 36	–	6	
	1 x 56	–	11	
	2 x 58	–	6	

Lamp type	Lamp data		Permissible number of lamps per circuit (230 V, 50 Hz) in the case of contactor type B6, B7, BC6, BC7	Capacitor load in μF	
	Watt	I_n A			
Metal-halogen lamps e.g. HQL, HPI	p.f. uncorrected				
	35	0.53	10		
	70	1	5		
	150	1.8	3		
	250	3	2		
	400	3.5	1		
Parallel p.f. correction					
35	0.25	6	6		
70	0.45	3	12		
150	0.75	1	20		
250	1.5	1	33		
400	2.5	1	35		
Low-pressure sodium-vapour lamps	p.f. uncorrected				
	35	1.5	4		
	55	1.5	4		
	90	2.4	2		
	135	3.5	2		
	150	3.3	2		
	180	3.3	2		
	200	2.3	2		
	Parallel p.f. correction				
	35	0.31	–	20	
55	0.42	–	20		
90	0.63	–	30		
135	0.94	–	45		
150	1.0	–	40		
180	1.16	–	40		
200	1.32	–	25		
High-pressure sodium-vapour lamps	p.f. uncorrected				
	150	1.8	3		
	250	3.0	2		
	330	3.7	2		
	400	4.7	1		
	Parallel p.f. correction				
150	0.83	–	20		
250	1.5	–	33		
330	2.0	–	40		
400	2.4	–	48		
1000	6.3	–	106		
Transformers for halogen low-volt lamps	Transformers power		Permissible number of transformers per circuit (230 V, 50 Hz) in the case of contactor type B6, B7, BC6, BC7		
	Watt				
	20		40		
	50		20		
	75		13		
	100		10		
	150		7		
200		5			
300		3			

Thermal overload relay T 7 DU for mini contactors

Ordering details, technical data



SST 002 98

Thermal overload relay T 7 DU



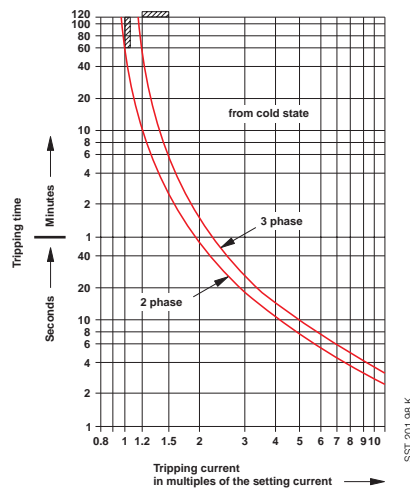
SST 001 98

Thermal overload relay T 7 DU mounted onto a mini contactor B 7-30-01

Type	Order code	Setting range	Max. fuse		Pack. unit	Weight
			aM A	gL A		
Thermal overload relay T 7 DU for mini contactors B 6, BC 6, B 6S, BC 6, VB 6, VBC 6, B 7, BC 7, B7S, BC 7, VB 7, VBC 7						
T 7 DU 0.16	1SAZ 111 301 R 0001	0.10 ... 0.16		0.5	1	0.070
T 7 DU 0.24	1SAZ 111 301 R 0002	0.16 ... 0.24		1,0	1	0.070
T 7 DU 0.4	1SAZ 111 301 R 0003	0.24 ... 0.40		2,0	1	0.070
T 7 DU 0.6	1SAZ 111 301 R 0004	0.40 ... 0.60		2,0	1	0.070
T 7 DU 1.0	1SAZ 111 301 R 0005	0.60 ... 1.00		4,0	1	0.070
T 7 DU 1.6	1SAZ 111 301 R 0006	1.00 ... 1.60		6,0	1	0.070
T 7 DU 2.4	1SAZ 111 301 R 0007	1.60 ... 2.40		6,0	1	0.070
T 7 DU 4.0	1SAZ 111 301 R 0008	2.40 ... 4.00		10,0	1	0.070
T 7 DU 6.0	1SAZ 111 301 R 0009	4.00 ... 6.00		10,0	1	0.070
T 7 DU 9.0	1SAZ 111 301 R 0010	6.00 ... 9.00		10,0	1	0.070
T 7 DU 12.0	1SAZ 111 301 R 0011	9.00 ... 12.00		20,0	1	0.070

Tripping curve

The tripping characteristic is the value at 20°C ambient temperature from cold state. The tripping time is dependent on the operating current. By operating in a warm state the tripping time of the overload relay approximately is reduced by 1/4 of the relevant value in cold state.



SST 201 98 K

Time-current curves (mean values), for thermal overload relay T 7 DU, 0.1 ... 12 A.

>> Full Description and Technical Data section 5
>> Approvals section 6

>> Terminal marking and positioning section 8
>> Dimensions section 9

Thermal overload relay T 7 DU for mini contactors

Technical data

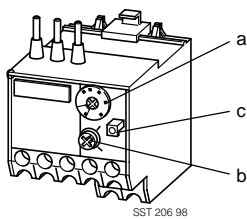
Technical data




Rated insulation voltage	U_i	690 V
Permissible ambient temperature	°C	-25 ... +50 open temperature-compensated
Storage temperature	°C	-40 ... +70
Mounting position		±30° referred to vertical mounting position not horizontal, not upside down, 5 mm lateral clearance for side-by-side mounting
Switching frequency with avoidance of premature tripping	max. ops./h	15
≤ 40 % relative duty	max. ops./h	60 (if 6 x I_n starting time ≤ 1s)

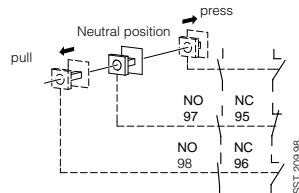
Load rating of auxiliary contacts

		NC 95-96	NO 97-98
Rated operating voltage U_e	V	500	500
Thermal continuous current	A	6	6
Rated operating voltage I_e at AC-15 220 to 240 V	A	1.5	1.5
at AC-15 380 to 415 V	A	0.7	0.5
at AC-15 to 500 V	A	0.5	0.3
In the case of DC-15 220 V	A	0.2	0.2
Short-circuit protection	gL A	4	4

Setting options

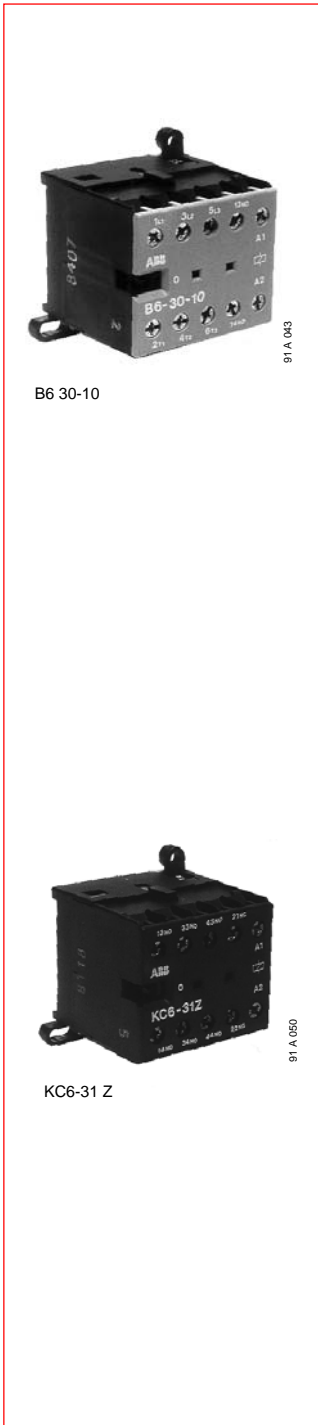


- a  **Setting knob** for motor rated current
- b  **Reset:** Manual "manual reset"
Position A: Auto "without manual reset"
Position H: Reset off
- c  **Test knob**



Mini motor contactors, mini contactor relays Thermal overload relay

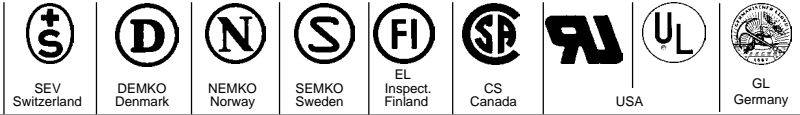
Approvals



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

Approvals

Test marks
Abbreviation
Validity



Mini motor contactors

B6./ B7..	■	■	■	■	■	■	■	■	■
B6/B7...-F	■	■	□	■	■	■	■	■	■
B6/B7...-P	■	■	□	■	■	■	■	■	■
BC6/BC 7..	■	■	■	■	■	■	■	■	■
BC6/BC 7...-F	■	■	□	■	■	■	■	■	■
BC6/BC7...-P	■	■	□	■	■	■	■	■	■
BC6/BC7...-1.4	■	■	■	■	■	■	■	■	■
BC6/BC7...-F-1.4	■	■	■	■	■	■	■	■	■
BC6/BC7...-P-1.4	■	■	■	■	■	■	■	■	■
BC6/BC7...-2.4	■	■	■	■	■	■	■	■	■
BC6/BC7...-F-2.4	■	■	■	■	■	■	■	■	■
BC6/BC7...-P-2.4	■	■	■	■	■	■	■	■	■
B 6 S/B7 S	■	■	■	■	■	■	■	■	■

Compact reversing contactors

VB6/VB7..	■	■	□	■	■	■	■	■	■
VBC 6/VBC7	■	■	■	■	■	■	■	■	■

Thermal overload relay

T 7 DU	■	■	■	■	■	■	■	■	■
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Mini contactor 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)6 and B(C) 7, in addition to contactor 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

Motor rating 3-phase for contactors B(C)6:

Rated operating voltage	U_e ~ (V)	110/120 V	220/240 V	440/480 V	540/600 V
Motor output 3-phase	P (hp)	1	2	1	1
	I_e (A)	7.2	6.8	1.8	1.4
Motor output Single-phase	P (hp)	1	2	—	—
	I_e (A)	16	12	—	—

Amp-rating: – 12 A-300 V, AC for the main contacts of contactors B(C)6

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

respectively. The approved values for the individual contactors and contactor relays are given in the table below. The determining factor is the data indicated on the units as shown on the following table

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

Rated operating voltage	U_e ~ (V)	110/120 V	220/240 V	440/480 V	540/600 V
Motor output 3-phase	P (hp)	1	3	5	5
	I_e (A)	7.2	9.6	7.6	6.1
Motor output Single-phase	P (hp)	0.5	1	2	2
	I_e (A)	9.8	16	6	4.8

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

Notes





Certification and Approvals

Coordination with Short-circuit Protection Devices



Direct-on-line starters

400 V - 50 kA - Normal start - up, type : 2

Note : MM40S0NS2.1

MS325/495

Rated Output	Rated Current	Type
0.37	1.5	S2X80 In1.6
0.55	1.9	S2X80 In2
0.75	2.8	S2X80 In2.5
1.1	3.5	S2X80 In3.2
1.5	5	S2X80 In5
2.2	6.6	S2X80 In6.5
3	8.6	S2X80 In8.5
4	11.5	S2X80 In11
5.5	15.2	S2X80 In16
7.5	22	S2X80 In20
11	28.5	S2X80 In25
15	36	S2X80 In32
18.5	42	S2X80 In40
22	56	S2X80 In50
30	68	S2X80 In63
37	83	S2X80 In80
45	100	S2X80 In100

Rated Output	Rated Current	Type
0.06	0.22	MS325-0
0.09	0.33	MS325-0
0.12	0.42	MS325-0
0.18	0.72	MS325-0
0.25	0.83	MS325-0
0.37	1.2	MS325-0
0.55	1.5	MS325-0
0.75	2	MS325-0
1.1	2.6	MS325-0
1.5	3.5	MS325-0
2.2	5	MS325-0
3	6.6	MS325-0
4	8.5	MS325-0
5.5	11.5	MS325-0
7.5	15.5	MS325-0

More Information...

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Standards, Specifications and Certifying Organizations

Definitions

ABB low voltage devices are developed and manufactured according to the rules set out in IEC international standards, in EN European standards and in national ones such as NF, DIN and BS.

● Compliance to standards

A declaration of conformity signed by the manufacturer is available on request. Certification Body Certificates (CB certificates) are also available to prove the complete conformity to standards.

● Certified products

In some cases, products are approved according to a given standard by a Certification Body and the manufacturer is regularly visited by this Body in order to check the respect of the design and the materials used.

This process creates a certified product. This is the case of UL (Underwriters Laboratories) and CSA (Canadian Standard Association) for instance (see below).

● Marine approved products

For devices installed on board ships, Marine assurance companies require devices approved by independent classification societies, see list below.

Specifications

● International Specifications

The International Electrotechnical Commission, IEC, which is part of the International Standards Organization, ISO, publishes IEC publications which act as a basis for the world market.

● European Specifications and National Specifications

The European Committee for Electrotechnical Standardization (CENELEC), which groups together 18 European countries, publishes EN standards. These European standards differ very little from IEC international standards and have similar numbering.

The same applies for national standards which use, without exception, the same numbering and reproduce the texts of these unified standards in their entirety. Contradicting national standards are withdrawn.

● European Directives

The guarantee of the free movement of goods within the European Community means that any regulatory differences between member states have been eliminated. The European directives set up common rules that are included in the legislation of each state while contradictory regulations are cancelled.

Three directives are essential:

– **Low Voltage Directive 73/23/EEC** concerns electrical equipment from 0 to 1000 V a.c. and from 0 to 1500 V d.c.

This specifies that compliance with the requirements that it sets out is **acquired** if the equipment conforms to the standards harmonized on a European level: EN 60947-1 and EN 60947-4-1 for contactors.

– **Machines Directive 89/392/EEC** for safety specifications of machines and equipment on **complete machines**. Machines bearing the CE mark comply with these specifications.

– **Electromagnetic Compatibility Directive 89/336/EEC** which concerns all devices able to create electromagnetic disturbance. Standard EN 60947-4-1 does not set out **any requirement** concerning the level of emission or immunity of contactors which do **not have any active electronic components**. Owing to this fact, compliance with standard EN 60947-4-1 meets the requirements for CE marking, with respect to this directive.

CE Marking:

CE marking indicates that the marked equipment conforms to the relevant EU directive.

CE marking is part of an administrative procedure and guarantees free movement of the product within the European Community.


● Standards in Canada and the USA

Canadian and American specifications are more or less equivalent but differ greatly from IEC, NF, DIN and BS standards.

UL Underwriters Laboratories USA Certificates of compliance on request

CSA Canadian Standard Association Canada Certificates of compliance on request

UL (USA) specifications make the following distinction between devices:

"Recognized" Authorized to be included in equipment, if the equipment in question has been entirely mounted and wired by qualified personnel. These devices bear the mark 

"Listed" Authorized to be included in equipment and for separate sale as components. These devices bear the mark 

● Certification in China: Compulsory China Certification

● Marine Approvals

The following specifications must be respected when these devices are used on ships:

BV	Bureau Veritas	France	MRS	Maritime Register of Shipping	Russia
DNV	Det Norske Veritas	Norway	PRS	Polski Rejestr Statkow	Poland
GL	Germanischer Lloyd	Germany	R.I.Na	Registro Italiano Navale	Italy
LRS	Lloyd's Register of Shipping	Great Britain			

● **Other approvals: ANCE:** Mexico, **GOST:** Russia (please consult your local ABB sales office).

Standards, Specifications and Certifying Organizations

Specifications (cont.)

● International Standards

IEC 60947-1	Low-voltage switchgear and controlgear – Part 1: General rules.
IEC 60947-4-1	Low-voltage switchgear and controlgear – Part 4: Contactors and motor starters – Section 1: Electromechanical contactors and motor starters.
IEC 60947-5-1	Low-voltage switchgear and controlgear – Part 5: Control circuit devices and switching elements – Section 1: Electromechanical control circuit devices.
IEC 60947-5-4	Low-voltage switchgear and controlgear – Part 5-4: Control circuit devices and switching elements. Method of assessing the performance of low-energy contacts. Special tests.
IEC 60947-6-1	Low-voltage switchgear and controlgear – Part 6: Multiple function equipment – Section 1: Automatic transfer switching equipment.
IEC 60204-1	Electrical equipment of industrial machines – Part 1: General requirements.
IEC 60715	Dimensions of low-voltage switchgear and controlgear. Standardized mounting on rails for mechanical support of electrical devices in switchgear and controlgear installations.

● European Standards

EN 50 005	Low-voltage switchgear and controlgear for industrial use – Terminal marking and distinctive number: General rules (Annex L of IEC 60947-1).
EN 50 011	Low-voltage switchgear and controlgear for industrial use – Terminal marking, distinctive number and distinctive letter for particular contactor relays (NFC 63-031).
EN 50 012	Low-voltage switchgear and controlgear for industrial use – Terminal marking and distinctive number for auxiliary contacts of particular contactors (NFC 63-032).
EN 60947-1	Low-voltage switchgear and controlgear – Part 1: General rules.
EN 60947-4-1	Low-voltage switchgear and controlgear – Part 4: Contactors and motor starters – Section 1: Electromechanical contactors and motor starters.
EN 60947-5-1	Low-voltage switchgear and controlgear – Part 5: Control circuit devices and switching elements – Section 1: Electromechanical control circuit devices.
EN 60947-5-4	Low-voltage switchgear and controlgear – Part 5-4: Control circuit devices and switching elements. Method of assessing the performance of low-energy contacts. Special tests.
EN 60947-6-1	Low-voltage switchgear and controlgear – Part 6: Multiple function equipment – Section 1: Automatic transfer switching equipment.
EN 60204-1	Electrical equipment of industrial machines – Part 1: General requirements.
EN 60 715	Dimensions of low-voltage switchgear and controlgear. Standardized mounting on rails for mechanical support of electrical devices in switchgear and controlgear installations.

● National Standards

European countries national standards reproduce the corresponding **EN...** standards. Codification is built by addition of a prefix to **EN** numbering. For instance:

– France	NF EN...
– Germany	DIN EN...
– Great Britain	BS EN...
– Italy	CEI EN...
– Sweden	SS EN...

Test Certifying Organizations

● LOVAG

ABB Control is a member of the **ASEFA** (Association of French Test Stations for Electrical Apparatus) whose platforms are accredited by **COFRAC** (national test network).

This independent organization is authorized to deliver certificates of testing and conformity with standards, especially IEC. **ASEFA** is one of the signatories of the **LOVAG** (Low Voltage Agreement Group) agreement which ensures reciprocal recognition between the main European certifying organizations for low voltage electrical tests by delivering certificates of LOVAG conformity.

Members of LOVAG :	ACAE Italy	SEMKO Sweden	ALPHA Germany	ASEFA France	CEBEC Belgium
Production centres LOVAG affiliated ABB	ABB Sace Italy	ABB Automation Technology Products Sweden	–	ABB Entelec France	–



Certifications and Approvals

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

Some countries, however, require certification according to their own national standards. In other cases, the Marine for example, approvals ratifying that particular specifications have been met are necessary.

The table below shows the approvals and certifications for different devices.

The following documents may be obtained on request: – certificates of conformity.

– certificates of certification or approval.

The use of certified devices does not exonerate the equipment supplier from complying with the legal specifications of the country concerned.




Explanation of symbols:

■ **Standard design approved**, the company labels bear the certification mark when this is required.







Certifications and approvals

Mark
Abbreviation
Approved in

Certifications

		
CSA Canada	UL USA	CCC China

Approvals: ship classification societies

					
BV France	GL Germany	LRS Gr. Britain	DNV Norway	RINa Italy	MRS Russia

3-pole Contactors

Control supply	Contacteur type	CSA	UL	CCC	BV	GL	LRS	DNV	RINa	MRS
a.c.	A 9 ... A 75	■	■	■	■	■	■	■	■	–
	A 95 ... A 300	■	■ (3)	■	■	■	■	■	■	■
a.c. / d.c.	AF 50 ... AF 75	■	■	–	–	–	–	–	–	–
	AF 95 ... AF 750	■ (1)	■ (3)	■	■ (2)	■	■	■ (2)	■ (2)	–
	AF 1350 ... AF 1650	–	■ (3)	■	■	■	■	–	–	–
d.c.	AL 9 ... AL 40	■	■	■	–	–	–	–	–	–
	AL 9Z ... AL 16Z	■	■	–	–	–	–	–	–	–
	AE 50, AE 75	■	■	■	–	–	–	–	–	–
	AE 95, AE 110	■	■ (3)	–	–	–	–	–	–	–
	TAL 9 ... TAL 40	■	■	■	–	–	–	–	–	–
	TAE 50 ... TAE 75	–	–	■	–	–	–	–	–	–
	TAE 95, TAE 110	–	–	–	–	–	–	–	–	–
a.c.	UA 16	–	–	■	–	–	–	–	–	–
	UA 26 ... UA 75	■	■	■	–	–	–	–	–	–
	UA 95, UA 110	■	■ (3)	■	–	–	–	–	–	–
	UA 16..RA ... UA 75..RA	■	■	■	–	–	–	–	–	–
	UA 95..RA, UA 110..RA	–	■ (3)	–	–	–	–	–	–	–
a.c.	GA 75	■	■	–	–	–	–	–	–	–
d.c.	GAE 75	■	■	–	–	–	–	–	–	–
a.c. or d.c.	EH 1200	■	■	■	–	–	–	–	–	–

4-pole Contactors













Control supply	Contacteur type	CSA	UL	CCC	BV	GL	LRS	DNV	RINa	MRS
a.c.	A 9, A 16	■	■	■	■	■	■	■	■	–
	A 26	■	■	■	■	■	■	■	■	–
	A 45	■	■	–	–	–	–	–	–	–
	A 50, A 75	■	■	■	■	■	■	■	■	–
a.c.	EK 110 ... EK 550	■	■	■	–	–	–	–	–	–
	EK 1000	–	–	■	–	–	–	–	–	–
a.c. / d.c.	AF 45 ... AF 75	■	■	–	–	–	–	–	–	–
d.c.	AL 9 ... AL 26	■	■	–	–	–	–	–	–	–
	AE 45	■	■	–	–	–	–	–	–	–
	AE 50, AE 75	■	■	–	–	–	–	–	–	–
	TAL 9 ... TAL 26	■	■	–	–	–	–	–	–	–
	TAE 45 ... TAE 75	–	–	–	–	–	–	–	–	–
d.c.	EK 110 ... EK 550	■	■	■	–	–	–	–	–	–
	EK 1000	–	–	■	–	–	–	–	–	–

(1) Only AF 145 ... AF 750

(2) Only AF 400 ... AF 750

(3) UL listed to U.S. and Canadian Safety Standards.

Certifications and Approvals

Certifications and approvals	Certifications					Approvals: ship classification societies						
Mark												
Abbreviation Approved in	CSA Canada	UL USA	UL USA	CCC China	German National Standards Laboratory ATEX PTB Germany	BV France	GL Germany	LRS Gr. Britain	DNV Norway	PRS Poland	RINa Italy	MRS Russia

Contactor relays

Control supply	Type	CSA	UL USA	UL USA	CCC	PTB	BV	GL	LRS	DNV	PRS	RINa	MRS
a.c.	4-pole N...	■	—	■	■	—	■	■	■	■	—	■	—
	8-pole N...	■	—	■	■	—	■	■	■	■	—	■	—
d.c.	4-pole NL...	■	—	■	—	—	—	—	—	—	—	—	—
	4-pole NL Z...	■	—	■	—	—	—	—	—	—	—	—	—
	8-pole NL...	■	—	■	—	—	—	—	—	—	—	—	—
	4-pole TNL...	■	—	■	—	—	—	—	—	—	—	—	—
	8-pole TNL...	■	—	■	—	—	—	—	—	—	—	—	—

Manual Motor Starters

Amps	Type	CSA	UL USA	UL USA	CCC	PTB	BV	GL	LRS	DNV	PRS	RINa	MRS
0.16 ... 16	MS 116	■	—	■	■	—	—	—	—	—	—	—	—
0.16 ... 25	MS 325	■	—	■	■	—	■	■	■	■	—	—	—
11 ... 50	MS 450	■	—	■	■	—	—	■	—	■	—	—	—
28 ... 100	MS 495	■	—	■	■	—	—	■	—	■	—	—	—

Thermal O/L Relays

Amps	Type	CSA	UL USA	UL USA	CCC	PTB	BV	GL	LRS	DNV	PRS	RINa	MRS
0.10 ... 32	TA 25 DU	■	—	■	■	■	■	■	■	■	—	■	—
18 ... 42	TA 42 DU	■	—	■	■	■	■	■	■	■	—	■	—
18 ... 80	TA 75 DU	■	—	■	■	■	■	■	■	■	—	■	—
29 ... 80	TA 80 DU	■	—	■	■	■	—	■	—	—	—	—	—
65 ... 110	TA 110 DU	■	—	■	■	■	—	■	—	—	—	—	—
66 ... 200	TA 200 DU	■	—	■	■	■	■	■	■	■	■	■	■
130 ... 310	TA 450 DU/SU	■	—	■	■	■	■	■	■	■ (1)	■	■	■

(1) Except for SU types.

Electronic O/L Relays

Amps	Type	CSA	UL USA	UL USA	CCC	PTB	BV	GL	LRS	DNV	PRS	RINa	MRS
0.1 ... 18.9	E 16 DU	■	—	■	—	■	■	■	■	■	■	—	—
65 ... 200	E 200 DU	■	—	■	—	■	■	■	■	■	■	—	—
105 ... 320	E 320 DU	■	—	■	—	■	■	■	■	■	■	—	—
170 ... 500	E 500 DU	■	—	■	—	■	■	■	■	■	■	—	—
270 ... 800	E 800 DU	■	—	■	—	■	■	■	■	■	■	—	—
375 ... 1250	E 1250 DU	—	—	■ (3)	—	—	—	—	—	—	—	—	—

Accessories for contactors and contactors relays

Designation	Type	CSA	UL USA	UL USA	CCC	PTB	BV	GL	LRS	DNV	PRS	RINa	MRS
Auxiliary contacts	CA 5-...	■	—	■	■	—	■	■	—	■	—	—	—
	CE 5-...	—	—	■	—	—	—	■	—	—	—	—	—
	CAL 5-11	■	—	■	■	—	■	■	—	■	—	—	—
	CAL 18-11	■	—	■ (3)	■	—	—	—	—	—	—	—	—
	CEL 18-...	—	—	■ (3)	—	—	—	—	—	—	—	—	—
	CAL 16-11	■	—	■	—	—	—	—	—	—	—	—	—
Elec. Timer	TE5S...	—	■	—	—	—	—	—	—	—	—	—	—
Pneum. Timer	TP...	■	—	■	—	—	■	■	—	■	—	—	—
Mech. Interlock.	VM 5	■	—	■	—	—	■	■	—	—	—	—	—
Elec. Interlock.	VE 5	■	—	■	—	—	■	■	—	—	—	—	—
Mech. Interlock.	VM 300, VM 750	■	—	■	—	—	—	—	—	—	—	—	—
Latching unit	WB 75-A	■	—	■	—	—	—	■	—	—	—	—	—
Surge suppressors	RV5	■	—	■	—	—	■	■	—	■	—	—	—
	RC5	■	—	■	—	—	—	■	—	■	—	—	—
	RT5	■	—	■	—	—	—	■	—	—	—	—	—
Connecting links	BEA 7 ... BEA 110	■	■	—	—	—	—	■	—	—	—	—	—
	BEA 185 ... BEA 750	■	—	■ (3)	—	—	—	■	—	—	—	—	—

(3) UL listed to U.S. and Canadian Safety Standards.

Terms and Technical Definitions

Circuits

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

Thermal Overload Relay Tripping Classes

IEC 60947-4-1 defines tripping classes 10 A, 10, 20 and 30. Types 10 A, 10, etc. correspond to the maximum tripping time for a making current at 7.2 times the setting current.

Furthermore, for each class the standard specifies the tripping time for 1.5 times the setting current and sets the non tripping condition at 1.05 times the setting current.

All these data are summarized in the table below.

Extract from IEC 60947-4-1:

Tripping class	10 A	10	20	30
Max. tripping time for 1.5 times the setting current (warm state) s	120	240	480	720
Tripping time for 7.2 times the setting current (cold state) s	2 - 10	4 - 10	6 - 20	9 - 30
For 1.05 times the setting current	No tripping			

Electromagnetic compatibility

AF... contactors comply with IEC 60947-1, 60947-4-1 and EN 60947-1, 60947-4-1 standards.

Definitions:

Environment A: "Mainly relates to low-voltage non public or industrial networks/locations/installations (EN 50082-2 article 4) including highly disturbing sources".

Environment B: "Mainly relates to low-voltage public networks (EN 50082-1 article 5) such as residential, commercial and light industrial locations/installations. Highly disturbing sources such as arc welders are not covered by this environment".

Notice for AF... contactors: 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.

Coordination of Protections against Short Circuit

The goal here is to protect electromechanical starters and softstarters.

Any starter is designed to:

- start motors,
- ensure continuous functioning of motors,
- disconnect motors from the supply line,
- guarantee protection of motors against overloads.

The starter is typically made up of a switching device (contactor) and an overload protection device (thermal overload relay TOR or electronic overload relay EOR). These two devices **MUST** be coordinated with equipment capable of providing protection against short circuit (SCPD: short circuit protective device): typically a circuit breaker with magnetic release only or a switch fuse. These are not necessarily part of the starter.

The characteristics of the starter must comply with the international standard IEC 60947-4-1 which defines the above items as follows:

contactor: a mechanical switching device having only one position of rest, operated otherwise than by hand, capable of making, carrying and breaking currents under normal circuit conditions including overload conditions.

overload release: overload relay or release which operates in the case of overload and also in case of loss of phase.

circuit-breaker: defined by IEC 60947-2 as a mechanical switching device, capable of making, carrying and breaking currents under normal circuit conditions and also making, carrying for a specified time and breaking currents under specified abnormal circuit conditions.

IEC publication 60947-4-1 defines coordination types "1" and "2":

- Type "1" coordination requires that, in the event of a short-circuit, the contactor or starter does not endanger persons or installations and will not then be able to operate without being repaired or parts being replaced.

- Type "2" coordination requires that, in short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts being light welded is acceptable. In this case, the manufacturer must stipulate the measures to be taken with respect to maintenance of the equipment.

Terms and Technical Definitions

Rated Operational Current I_e

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

Conventional Free Air Thermal Current I_{th}

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

Operating Cycle or Cycle

Includes one making operation and one breaking operation.

Cycle Time

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

Electrical Durability

Number of on-load operating cycles that the contactor is able to carry out. It depends on the utilization category.

Mechanical Durability

Number of no-current operating cycles that a contactor is able to carry out.

Assessed Failure Rate

Defined according to IEC 60947-5-4. This rate is given in standard industrial environments for the contactor relays and for the built-in auxiliary contact of contactors.

Load Factor

Ratio of the on-load operating time to the total cycle time x 100.

Switching Frequency

Number of switching cycles per hour.

Plugging

Stopping or fast reversal in rotation direction of a motor by two supply leads being interchanged while the motor is running.

Inching

Energization of a motor's circuit repeatedly or for short periods with the aim of obtaining small movements of the driven mechanism.

Coil Operating Limits

Expressed in multiples of the nominal control circuit voltage U_c for the upper and lower limits.

Mounting Position

Comply with the manufacturer's instructions. Restrictions are to be taken into account for certain mounting positions.

Rated Breaking or Making Capacity

Root mean square (r.m.s.) value of the current that the contactor is able to break or make at a given voltage according to the conditions specified by standards and for a given utilization category.

Intermittent Duty

Duty during which the contactor is successively closed or open for periods which are too short to enable the contactor to achieve thermal balance.

Ambient Temperature

Air temperature close to the contactor.

Time

- Time constant:
Ratio of the inductance to the resistance ($L/R = \text{mH}/\Omega = \text{ms}$).
- Short-time withstand current:
Current that the contactor is able to withstand in closed position for a short time interval and in specified conditions.
- Closing time:
Time interval between the beginning of the closing operation and the instant the contacts touch on all the poles.
- Opening time:
Time interval between the specified starting instant of the opening operation and the instant the contacts separate on all the poles.

Rated Control Voltage U_c

Control voltage value for which the control circuit is sized.

Rated Operational Voltage U_e

Voltage to which the contactor's utilization characteristics refer. In three-phase it is the phase-to-phase voltage.

Rated Insulation Voltage U_i

Reference voltage for dielectric tests and creepage distances.

Rated Impulse Withstand Voltage U_{imp}

Peak value of an impulse voltage, having a specified form and polarity, which does not cause breakdown in specific test conditions.

Shock Withstand

Requirement for vehicles, crane drives, installations on board ships and plug-in equipment. For the acceptable "g" values, the contacts must not change position and the thermal overload relays must not trip.

Resistance to Vibrations

Requirements for vehicles, boats and other means of transport. For the specified vibration amplitude and frequency values the device must remain able to operate.

Standards and Utilization Categories

Standards:

IEC publications 60941-1, 60947-4-1 and 60947-5-1 should be referred to on an international level with respect to contactors, contactor relays and thermal O/L relays.

Utilization Categories:

A contactor's duty is characterised by the utilization category together with the rated operational voltage and current indicated.

Utilization Categories for Contactors According to IEC 60947-4-1:

Alternating current:	AC-1	Non-inductive or slightly inductive loads, resistance furnaces.
	AC-2	Slip-ring motors: starting, switching off.
	AC-3	Cage motors: starting, switching off running motors.
	AC-4	Cage motors: starting, plugging, inching.
	AC-5a	Discharge lamp switching.
	AC-5b	Incandescent lamp switching.
	AC-6a	Transformer switching.
	AC-6b	Capacitor bank switching.
	AC-8a	Hermetic refrigeration compressor motor control with manual resetting of overload releases.
	AC-8b	Hermetic refrigeration compressor motor control with automatic resetting of overload releases.
Direct current:	DC-1	Non inductive or slightly inductive loads, resistance furnaces.
	DC-3	Shunt motors: starting, plugging, inching, dynamic breaking of d.c. motors.
	DC-5	Series motors: starting, plugging, inching, dynamic breaking of d.c. motors.
	DC-6	Incandescent lamp switching.

Utilization Categories for Contactor Relays According to IEC 60947-5-1:

Alternating current:	AC-12	Control of resistive loads and static loads with opto-coupler isolation.
	AC-13	Control of static loads with transformer isolation.
	AC-14	Control of weak electromagnetic loads (≤ 72 VA).
	AC-15	Control of electromagnetic loads (> 72 VA).
Direct current:	DC-12	Control of resistive loads and static loads with opto-coupler isolation.
	DC-13	Control of d.c. electromagnets.
	DC-14	Control of d.c. electromagnets having economy resistors.

In fact some applications, and the specific criteria characterizing the various loads controlled by contactors, may modify the utilization characteristics of the contactors. The main applications concerned are:

Capacitor Bank Switching

Account must be taken of high peaks when the current is made and of harmonic currents during continuous duty. For this application, IEC publication 60947-4-1 stipulates utilization category AC-6b. The operational currents or powers acceptable for the contactors are determined by our electrical tests; IEC publication 60947-4-1 gives the calculating formula for determining the operational current (Table 7 b).

Transformer Switching

Account must be taken of the peaks due to magnetization phenomena when the current is made.

For this application, IEC publication 60947-4-1 stipulates utilization category AC-6a. The operational currents or powers acceptable for the contactors are determined using the values obtained for AC-3 or AC-4 category tests and the calculating formula given in IEC 60947-4-1 (Table 7 b).

Lighting Circuit Switching

The current peaks occurring on energization of the circuit and the power factor VA depend on the type of lamps, the connection mode and whether or not there is compensation.

For this application, IEC publication 60947-4-1 stipulates two standard utilization categories:

- AC-5a for discharge lamp switching.
- AC-5b for incandescent lamp switching.

Slip-ring Motor Switching

The contactors used for short-circuiting rotor resistors can be used for rotor voltages above their natural nominal operational voltage.

The conditions of use of rotor contactors depend on the connection mode of the main poles. IEC 60947-4-1 stipulates AC-2 utilization category.

The current values on circuit closing and the current and voltage values on circuit opening (as well as a generally low load factor) are easily withstood by the contactors.

Standards and Utilization Categories

Utilization Categories (cont.)

d.c. Power Circuit Switching

Arc suppression is more difficult in direct current than in alternating current. Higher the time constant and voltage, heavier the breaking conditions: consequently several poles have to be connected in series.

a.c. High Current Circuit Switching

Possibility of increasing performances by connecting poles in parallel.

Circuit Switching during Temporary and Intermittent Duty

In these cases higher operational currents are acceptable, the appropriate uprating factors are given in this catalogue (section 2).

Influence of the Length of the Conductors used in the Contactor Control Circuit

According to the operational voltages, the cross-sectional areas, the coil consumption and the control layout, difficulties due to line resistances and capacitances may appear during contactor closing and opening orders. The corresponding information is given in this catalogue (section 2).

Making and Breaking Conditions for Utilization Categories

Utilization category	Durability test conditions						Occasional operation Making and Breaking Capacities - 50 operating cycles					
	Making conditions			Breaking conditions			Making conditions			Breaking conditions		
	I/I_e	U/U_e	Cos. φ or L/R (ms)	I/I_e	U/U_e	Cos. φ or L/R (ms)	I_c/I_e	U_r/U_e	Cos. φ or L/R (ms)	I_c/I_e	U_r/U_e	Cos. φ or L/R (ms)

Contactors for a.c. circuit switching

AC-1	1	1	0.95	1	1	0.95	1.5	1.05	0.8	1.5	1.05	0.8	
AC-2	2.5	1	0.65	2.5	1	0.65	4	1.05	0.65	4	1.05	0.65	
AC-3	$I_e < 17 \text{ A}$	6	1	0.65	1	0.17	0.65	10	1.05	0.45	8	1.05	0.45
	$17 < I_e < 100 \text{ A}$	6	1	0.35	1	0.17	0.35	10	1.05	0.45	8	1.05	0.45
	$I_e > 100 \text{ A}$	6	1	0.35	1	0.17	0.35	10	1.05	0.35	8	1.05	0.35
AC-4	$I_e < 17 \text{ A}$	6	1	0.65	6	1	0.65	12	1.05	0.45	10	1.05	0.45
	$17 < I_e < 100 \text{ A}$	6	1	0.35	6	1	0.35	12	1.05	0.45	10	1.05	0.45
	$I_e > 100 \text{ A}$	6	1	0.35	6	1	0.35	12	1.05	0.35	10	1.05	0.35

Contactors for d.c. circuit switching

DC-1	1	1	1	1	1	1	1.5	1.05	1	1.5	1.05	1
DC-3	2.5	1	2	2.5	1	2	4	1.05	2.5	4	1.05	2.5
DC-5	2.5	1	7.5	2.5	1	7.5	4	1.05	15	4	1.05	15

Contactors relays for a.c. circuit switching

AC-14	($\leq 72 \text{ VA}$)	–	–	–	–	–	–	–	–	–	–	–	
AC-15	(> 72 VA)	10	1	0.7	1	1	0.4	6	1.1	0.7	6	1.1	0.7
								10	1.1	0.3	10	1.1	0.3

Contactors relays for d.c. circuit switching

	Standard operation						Occasional operation Making and Breaking Capacities - 50 operating cycles					
	Making conditions			Breaking conditions			Making conditions			Breaking conditions		
	I/I_e	U/U_e	$T_{0.95}$	I/I_e	U/U_e	$T_{0.95}$	I/I_e	U/U_e	$T_{0.95}$	I/I_e	U/U_e	$T_{0.95}$
DC-13	1	1	6 P(1)	1	1	6 P(1)	1.1	1.1	6 P(1)	1.1	1.1	6 P(1)
DC-14	–	–	–	–	–	–	10	1.1	15 ms	10	1.1	15 ms

(1) The value "6 x P" is the result of an empirical relation which is estimated to represent most d.c. magnetic loads up to the highest limit of $P = 50 \text{ W}$ ($6 \times P = 300 \text{ ms}$). It is accepted that loads having drawn energy above 50 W are made up of weaker loads in parallel. As a consequence, the 300 ms value must form the highest limit whatever the value of the power drawn.

Key:

U (I) = applied voltage (current)

U_r = recovery voltage

L/R = test circuit time constant

U_e (I_e) = rated operational voltage (current)

I_c = making and breaking current expressed in d.c. or in a.c. like the r.m.s. value of the symmetrical components

$T_{0.95}$ = time required to reach 95% of the current in steady-state conditions, expressed in milliseconds

Degrees of Protection

General

In an installation, the degree of protection required for electrical equipment depends on the environmental characteristics. The degree of protection, ensured by the enclosure of equipment or by the cubicle containing the equipment is expressed by the IP code which gives the level of protection against access to hazardous parts, the ingress of foreign bodies and/or the ingress of water, in compliance with IEC 60529, IEC 60947-1.

Besides the IP symbol, the complete code has two figures followed (optionally) by two additional letters. A short description of the elements used in IP coding is given below.

IP... code	Figures or letters	Specifications for installation protection	Protection of persons
First figure		Against ingress of foreign bodies	Against access to hazardous parts with:
	0	No protection	No protection
	1	Diameter > 50 mm	Back of hand
	2	Diameter > 12.5 mm	Finger
	3	Diameter > 2.5 mm	Tool
	4	Diameter > 1 mm	Wire
	5	Limited protection against dust	Wire
	6	Total protection against dust	Wire
Second figure		Against entrance of water having a harmful effect	
	0	No protection	
	1	Vertical dripping	
	2	Dripping at a vertical angle of < 15°	
	3	Rain at a vertical angle of < 60°	
	4	Splashing	
	5	Low pressure water jet	
	6	Powerful water jets	
	7	Temporary immersion	
	8	Permanent immersion	
Additional letter (optional) for use with:		Against ingress of foreign bodies	Against access to hazardous parts with:
First figure 0	A	Stopped by a barrier with a 50 mm Ø sphere	Back of hand
First figure 0 or 1	B	Entrance of test finger limited to 80 mm	Finger
First figure 1 or 2	C	Wire with 2.5 mm Ø and length of 100 mm	Tool
First figure 2 or 3	D	Wire with 1 mm Ø and length of 100 mm	Wire
Additional letter (optional)		Specific additional information	
	H	High voltage apparatus	–
	M	Moving parts which are moving during water test	
	S	Moving parts which are stationary during water test	
	W	Specified atmospheric conditions	

Note: The type of enclosure or cubicle in which the equipment must be installed prevails with respect to the degree of protection.

Climatic Withstand of Devices

The life time of devices are mainly influenced by series of climatic factors which cause their corrosion.

In practice, besides climatic conditions, there are other factors which may damage equipment such as fungi, insects (termites), dust, work site dirt and aggressive environment (salty or sulphurous atmosphere, etc.) which can often only be identified at the place of installation.

Climatic stress, definitions and test conditions are dealt with in national publications such as the DIN 50 series and UTE 63-100 publication which are attached to international publications such as IEC 60068.

The test conditions are:

Description	Symbolization	Time of one cycle	Cycle phase time	Temperature in test chamber	Relative humidity
Humidity and variable temperature	IEC 60068-2-30 Test Db	24 hours	12 hours including rise in temperature	40 °C	95 %
			12 hours including cooling (open device)	25 °C	95 %

ABB contactors have been used for many years in the most countries, with hot and humid climates for example: Brazil, Indonesia, India or on ships. Experience has shown that ABB devices can be used in most countries throughout the world.

The climate of the country in which the apparatus is installed is not the determining choice factor.

Account must be taken of:

- the immediate environment of the devices (sheltered, ventilated, temperature),
- the aggressivity of the immediate atmosphere at the place of installation,
- the length and frequency of non operating periods.

In the case of frequent condensation (i.e. the formation of condensation caused by rapid changes in temperature), heating resistors must be installed in cubicles (100 to 250 W per m³ of enclosure).

The table below gives the cases where heating is necessary.

Environment		Operating conditions	Climate	Internal heating of enclosure
Inside premises	No running water No condensation	Continuous or not	All climates	Without
		Continuous	All climates	Without
	With running water	Frequent or long stops	Temperate Tropical	Without With
Outside, sheltered	No running water no condensation	Continuous or not	Temperate	Without
			Tropical	With
Outside or by the seaside	With running water	Continuous	All climates	Without
			Temperate	Without
			Tropical	With

The entrance of dust, insects, dirt, etc. in devices may be prevented if the appropriate degree of protection according to IEC 60529 is chosen (See "Degree of protection" table).



Coordination with Short-circuit Protection Devices

In compliance with standards IEC 60947-4-1 and EN 60947-4-1, we define for the contactors and starters the type, rating and characteristics of the short-circuit protection devices SCPD which allow selective protection against overloads and ensure protection against short circuits.

Basic Functions

Any starter is designed to:

- start motors,
- ensure continuous functioning of motors,
- disconnect motors from the supply line,
- guarantee protection of motors against overloads.

The starter is typically made up of a switching device (contactor) and an overload protection device (thermal overload relay TOR or electronic overload relay EOR).

These two devices MUST be coordinated with equipment capable of providing protection against short circuit (SCPD: short circuit protective device): typically a circuit breaker with magnetic release only or a switch fuse. These are not necessarily part of the starter..

Applicable Standards

IEC 60947-4-1 (EN 60947-4-1) precisely defines the different points to be considered in order to carry out correct coordination.

Complete coordination for a combination includes the following points:

- Selectivity test between the overload relay and the short-circuit protection device SCPD.
- Short-circuit condition tests:

- at prospective "r" currents - These currents depend on the rated operational current of the starter (I_e AC-3) and are given by the standard (Table 11). For example:

$r = 1\text{ kA}$ for I_e AC-3 < 16 A

$r = 3\text{ kA}$ for 16 A < I_e AC-3 < 63 A

$r = 5\text{ kA}$ for 63 A < I_e AC-3 < 125 A etc.

- at the rated prospective short-circuit current " I_q " - This is the maximum current that the combination can withstand, for example 50 kA.

Types of Coordination

IEC 60947-4-1 (EN 60947-4-1) defines two types of coordination according to the expected level of service continuity. Acceptable extreme damage for the switchgear is divided into two types.

Type 1: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will not be able to then operate without being repaired or having parts replaced.

Type 2: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts light welding is acceptable.

The Complete ABB Offer

ABB has acquired years of experience with respect to problems of coordination and is able to make a complete offer based on tests performed in its qualified laboratories. This offer includes 400 V, 500 V, 690 V networks.

A complete data base of coordination tables, according to IEC 60947-4-1 (EN 60947-4-1), is available on the ABB Website.

In the coordination tables the following short-circuit protection devices are recommended:

- Moulded case circuit-breakers (MCCBs)
- Miniature circuit-breakers (MCBs)
- Switch-disconnector-fuses (aM, gG and BS)
- Manual Motor Starters (M.M.S.)

General Remarks Applicable to all Tables

- Each table is defined for a maximum ambient temperature of 40 °C. For higher temperatures, apply a derating factor according to the following rules:
 - Fuses: factor of 0.8 applied to I_n for an ambient temperature of 70 °C.
 - MCCBs and MCBs: factor of 0.8 applied to I_n for an ambient temperature of 60 °C.
 - The starter derating factor depends on the operating conditions of thermal overload relays:
 - Factor of 0.9 applied to I_n for an ambient temperature of 70 °C.
- Each table is defined for motor currents: 3-phase motors, 4-pole.
- **Normal starting** means a starting time < 2 s. - **Difficult starting** means an accelerating time 10 s < t_s < 30 s.
 - Tripping classes** of thermal O/L relays according to IEC 60947-4-1 (EN 60947-4-1): 10 A and 10 for DU types and 30 for SU types.
- In the tables with MCCBs, these are fitted with the magnetic relay alone. Setting is always carried out at > 12.3 I_e AC-3 so that the transient current peak occurring during starting does not lead to tripping.

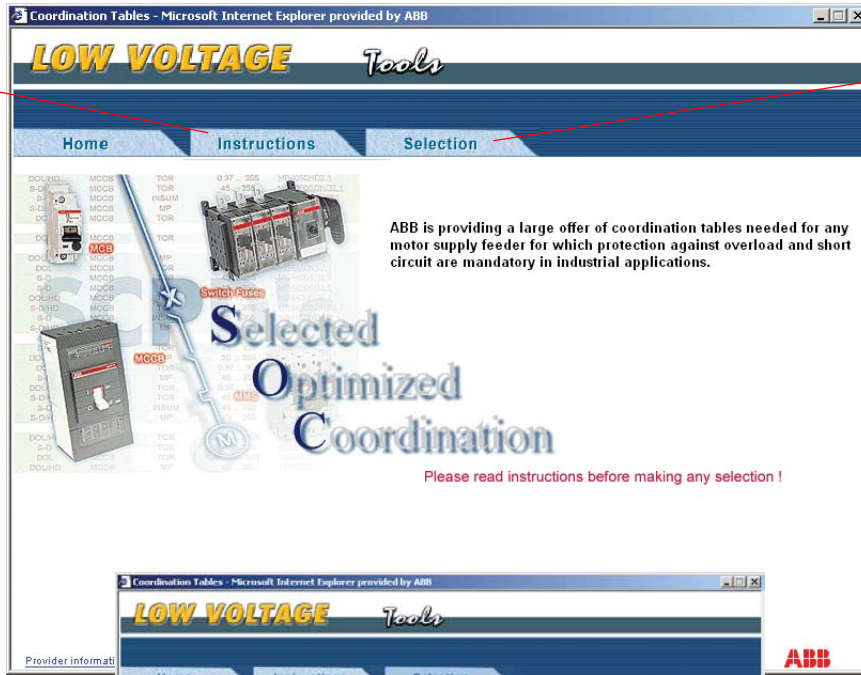
Coordination with Short-circuit Protection Devices

A motor starter is typically made up of a switching device (contactor) and an overload protection device (see opposite page "Basic Functions"). **These two devices MUST be coordinated with an equipment capable of providing protection against short circuit (SCPD: Short Circuit Protection Device).**

A complete data base of coordination tables, according to IEC 60947-4-1 (EN 60947-4-1), is available on the ABB Website: see www.abb.com/lowvoltage then go to the right menu: "Support", select: "Online Product Selection Tools".

Online Selected Optimized Coordination Tables

- [Introduction](#)
- [Instructions](#)
- [F.A.Q.](#)
- [Troubleshooting](#)



Short Circuit Protection Device (SCPD) selection

Selection

- [Switch-disconnector-fuses \(aM and gG\)](#)
- [Miniature Circuit-Breakers \(MCBs\)](#)
- [Moulded Case Circuit-Breakers \(MCCBs\)](#)
- [Manual Motor Starters \(MMS\)](#)

Rated Output [kW]	Rated Cu [A]
0.06	0.22
0.09	0.34
0.12	0.41
0.18	0.60
0.25	0.83
0.37	1.12
0.55	1.48
0.75	1.9
1.1	2.6
1.5	3.5
2.2	4.8
3	6.5
4	8.5
5.5	11.5
7.5	15
11	22

Rated Output [kW]	Rated Current [A]	Type	Fuse Rating gG Fuse [A]	Fuse Type and Size	Type	Type	Current setting range [A]	Max. Allowed Setting Current [A]	Table
0.37	1.1	OS 32S_4	4	OFAA 00H	AG	TA250U 1.4	1.0 - 1.4	1.4	FA3300S1002.2
0.37	1.1	OS 32S_3	3	OFAM 00aM	AG	TA250U 1.4	1.0 - 1.4	1.4	FA3300S1002.2
0.37	1.1	OS 32S_4	4	OFAA 00H	AG	ODPCB_	7	1.3	FA3300S1002.2
0.37	1.1	OS 32S_2	2	OFAM 00aM	AG	ODPCB_	7	1.4	FA3300S1002.2

Complete coordination tables are available for the **Short Circuit Protection Device (SCPD)**, the **Contactors** and the **Overload Protection Device** according to the **Rated Operational Voltage U_e** , the **Rated Short-circuit Current I_n** , the **Coordination Type** (type 1 or 2) and the **Motor Power**.

www.abb.com/lowvoltage Online Selected Optimized Coordination Tables

Coordination with Short-circuit Protection Devices according to IEC 60947-4-1

IEC Fuse Coordination Table

IEC Fuses for Short-circuit Protection - Thermal Overload Relay for Motor Protection

Updated table is available on the ABB Website:

see www.abb.com/lowvoltage then go to the right menu: "Support", select: "Online Product Selection Tools".

Coordinated protections of motor Starters.
Direct-on-line starter with Switch Fuse
400 V, 80 kA, IEC/EN 60947-4-1, AC-3, type 2
Normal start

Table number: FG4080NS2.2

Motor	Rated Output [kW]	Rated Current [A]	Switch-Fuse		Contactor	Overload Protection Device		Max. Allowed Setting Current [A]
			Type	Fuse Rating gG / gM [A]		Type	Current setting range [A] t6 setting max for starter [s]	
0.37	1.1	1.1	OS 32D_	4	A0	TA25DU 1.4	1.0 - 1.4	1.4
0.55	1.5	1.5	OS 32D_	6	A0	TA25DU 1.8	1.3 - 1.8	1.8
0.75	1.9	1.9	OS 32D_	6	A0	TA25DU 2.4	1.7 - 2.4	2
1.1	2.7	2.7	OS 32D_	10	A0	TA25DU 3.1	2.2 - 3.1	3.1
1.5	3.6	3.6	OS 32D_	10	A0	TA25DU 5.0	3.5 - 5.0	5
1.5	3.6	3.6	OS 32D_	10	A0	TA25DU 4.0	2.8 - 4.0	3.7
2.2	4.9	4.9	OS 32D_	16	A0	TA25DU 6.5	4.5 - 6.5	6.5
3	6.5	6.5	OS 32D_	20	A0	TA25DU 8.5	6.0 - 8.5	8
4	8.5	8.5	OS 32D_	25	A12	TA25DU 11	7.5 - 11	9
5.5	11.5	11.5	OS 32D_	32	A16	TA25DU 14	10 - 14	12
7.5	15.2	15.2	OS 32D_	32	A16	TA25DU 19	13 - 19	15.5
7.5	15.2	15.2	OS 32D_	40	A26	TA25DU 19	13 - 19	17
11	22	22	OS 32D_	63	A26	TA25DU 25	18 - 25	25
15	29	29	OS 32D_	80	A30	TA25DU 32	24 - 32	32
18.5	35	35	OS 63D_	100	A40	TA25DU 42	29 - 42	37
18.5	35	35	OS 63D_	100	A60	TA25DU 42	29 - 42	40
22	41	41	OS 125D_	125	A60	TA75DU 62	36 - 52	50
30	55	55	OS 125D_	125	A63	TA75DU 63	45 - 63	60
30	55	55	OS 250D_	160	A63	TA75DU 63	45 - 63	63
37	66	66	OS 250D_	200	A85	TA80DU 80	60 - 80	80
45	80	80	OS 250D_	200	A95	TA110DU 90	65 - 90	90
45	80	80	OS 250D_	250	A145	TA200DU 90	65 - 90	90

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Example for 400 V, I_n up to 80 kA, coordination type 2

Complete coordination tables are available for the **Short Circuit Protection Device (SCPD)**, the **Contactor** and the **Overload Protection Device** according to the **Rated Operational Voltage U_e**, the **Rated Short-circuit Current I_n**, the **Coordination Type** (type 1 or 2) and the **Motor Power**.

www.abb.com/lowvoltage Online Selected Optimized Coordination Tables

Coordination with Short-circuit Protection Devices according to IEC 60947-4-1

BS Fuse Coordination Table

BS Fuses for Short-circuit Protection - Thermal Overload Relay for Motor Protection

Updated table is available on the ABB Website:

see www.abb.com/lowvoltage then go to the right menu: "Support", select: "Online Product Selection Tools".

Coordinated protections of motor Starters.

Direct-on-line starter with Switch Fuse
415 V, 80 kA, IEC/EN 60947-4-1, AC-3, type 2
Normal start

Table number: FGB4180NS2.31ABB

Motor		Switch-Fuse		Contactor	Overload Protection Device		Max. Allowed Setting Current
Rated Output [kW]	Rated Current [A]	Type	Fuse Type and Rating gG / gM [A]	Fuse Size	Type	Type	Current setting range [A] t6 setting max for starter [s]
0.37	1.15	OS 20B_A1	ANIT4	A1	A0	TA25DU 1.4	1.0 - 1.4
0.55	1.4	OS 20B_A1	ANIT6	A1	A0	TA25DU 1.8	1.3 - 1.8
0.75	2	OS 20B_A1	ANIT6	A1	A0	TA25DU 2.4	1.7 - 2.4
1.1	2.5	OS 20B_A1	ANIT10	A1	A0	TA25DU 3.1	2.2 - 3.1
1.5	3.5	OS 20B_A1	ANIT16	A1	A0	TA25DU 4.0	2.8 - 4.0
2.2	5	OS 20B_A1	ANIT16	A1	A0	TA25DU 5.0	3.5 - 5.0
3	6.5	OS 20B_A1	ANIT20	A1	A0	TA25DU 6.5	4.5 - 6.5
4	8.4	OS 20B_A1	ANIT20	A1	A0	TA25DU 8.5	6.0 - 8.5
5.5	11	OS 20B_A1	ANIT32	A1	A12	TA25DU 11	7.5 - 11
5.5	11	OS 32B_A2	ATIA32M40	A2	A26	TA25DU 14	10 - 14
7.5	14	OS 32B_A2	ATIA32M50	A2	A26	TA25DU 19	13 - 19
11	21	OS 32B_A2	ATIA32M63	A2	A30	TA25DU 25	18 - 25
15	28	OS 32B_	ATIS63M80	A3	A40	TA42DU 32	24 - 32
18.5	35	OS 63B_	ATIS63M80	A3	A40	TA75DU 42	29 - 42
18.5	35	OS 100B_	ATIS63M100	A3	A60	TA75DU 42	36 - 52
22	40	OS 100B_	ATIS63M100	A3	A60	TA75DU 52	45 - 63
30	55	OS 125B_	ATCP100M125	A4	A63	TA75DU 63	45 - 63
30	55	OS 125B_	ATCP100M160	A4	A65	TA80DU 63	60 - 80
37	66	OS 125B_	ATCP100M160	A4	A65	TA80DU 80	65 - 90
45	80	OS 125B_	ATCP100M160	A4	A65	TA110DU 90	65 - 90

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Example for 415 V, I_q up to 80 kA, coordination type 2

Complete coordination tables are available for the **Short Circuit Protection Device (SCPD)**, the **Contactor** and the **Overload Protection Device** according to the **Rated Operational Voltage U_e**, the **Rated Short-circuit Current I_q**, the **Coordination Type** (type 1 or 2) and the **Motor Power**.

www.abb.com/lowvoltage Online Selected Optimized Coordination Tables

Coordination with Short-circuit Protection Devices according to IEC 60947-4-1

Miniature Circuit-Breaker (MCB) Coordination Table

Miniature Circuit-Breakers (MCBs) for Short-circuit Protection - Thermal Overload Relay for Motor Protection

Updated table is available on the ABB Website:

see www.abb.com/lowvoltage then go to the right menu: "Support", select: "Online Product Selection Tools".

Coordinated protections of motor Starters.

Direct-on-line starters with S 273/S283-K Circuit Breaker
400 V, 35 kA, 50/60Hz, AC-3, EN/IEC 60947-4-1, type 2

Table number: MC4035NS2.1

Motor	Rated Current [A]	Rated Output [kW]	Miniature Circuit-Breaker Type	Instantaneous tripping current [A]	Limiter Type	Instantaneous tripping current [A]	Contactor Type	Overload Relay Type	Current setting range [A]	Trip Class	Max allowed setting current [A]
0.06	0.22		S 273-K1	12			A9	TA25DU0.25	0.16 - 0.25		0.25
0.09	0.34		S 273-K1	12			A9	TA25DU0.4	0.25 - 0.4		0.4
0.12	0.44		S 273-K1	12			A9	TA25DU0.63	0.4 - 0.63		0.63
0.18	0.60		S 273-K1.6	19.2			A9	TA25DU0.63	0.4 - 0.63		0.63
0.25	0.83		S 273-K1.6	19.2			A9	TA25DU1	0.63 - 1		1
0.37	1.12		S 273-K2	24			A9	TA25DU1.4	1 - 1.4		1.35
0.55	1.45		S 273-K3	36			A9	TA25DU1.4	1 - 1.4		1.75
0.75	1.9		S 273-K3	36			A9	TA25DU1.8	1.3 - 1.8		2.35
1.1	2.6		S 273-K4	48			A16	TA25DU2.4	1.7 - 2.4		2.95
1.5	3.5		S 273-K6	72			A26	TA25DU3.1	2.3 - 3.1		3.75
							A26	TA25DU4	2.8 - 4		4.75
							A26	TA25DU5	3.5 - 5		6.25
							A26	TA25DU6.5	4.5 - 6.5		8
2.2	4.8		S 273-K8	96			A26	TA25DU8.5	6 - 8.5		10.5
3	6.5		S 283-K10	140			A30	TA25DU11	7.5 - 11		13.5
4	8.5		S 283-K13	182			A30	TA25DU14	10 - 14		18.5
5.5	11.5		S 283-K16	224			A30	TA25DU19	13 - 19		24
7.5	15		S 283-K20	280			A40	TA42DU25	18 - 25		
11	22		S 283-K32	448							

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Example for 400 V, I_n up to 35 kA, coordination type 2

Complete coordination tables are available for the **Short Circuit Protection Device (SCPD)**, the **Contactor** and the **Overload Protection Device** according to the **Rated Operational Voltage U_e**, the **Rated Short-circuit Current I_n**, the **Coordination Type** (type 1 or 2) and the **Motor Power**.

www.abb.com/lowvoltage Online Selected Optimized Coordination Tables

Coordination with Short-circuit Protection Devices according to IEC 60947-4-1

Moulded Case Circuit-Breaker (MCCB) Coordination Table

Moulded Case Circuit-Breakers (MCCBs) for Short-circuit Protection - Thermal Overload Relay for Motor Protection

Updated table is available on the ABB Website:

see www.abb.com/lowvoltage then go to the right menu: "Support", select: "Online Product Selection Tools".

Coordinated protections of motor Starters.
 Direct-On-Line starters with Moulded Case Circuit Breaker
 400/415 V, 80 kA, 50/60HZ, IEC/EN 60947-4-1, AC-3, type 2
 Normal start
 Table number: MB4080NS2.2

Motor		Moulded Case Circuit Breaker	Contactor	Overload Relay	KORC	Max allowed setting current [A]
Rated Power [kW]	Rated Current [A]	Type	Type	Type	Number of primary turns	
0.37	1.1	T2L160 MF 1.6	A0	TA25DU1.4;	1-1.4	1.4
0.55	1.5	T2L160 MF 1.6	A0	TA25DU1.8	1.3-1.8	1.6
0.75	1.9	T2L160 MF 2	A16	TA25DU2.4;	1.7-2.4	2
1.1	2.8	T2L160 MF 3.2	A26	TA25DU4	2.8-4	3.2
1.5	3.5	T2L160 MF 4	A26	TA25DU5;	3.5-5	4
2.2	5	T2L160 MF 5	A26	TA25DU6.5	4.5-6.5	5
3	6.6	T2L160 MF 8.5	A30	TA25DU8.5;	6-8.5	8.5
4	8.6	T2L160 MF 11	A60	TA25DU11	7.5-11	11
5.5	11.5	T2L160 MF 12.5	A60	TA25DU14;	10-14	12.5
7.5	15.2	T2L160 MA 20	A60	TA25DU19	13-19	19
11	22	T2L160 MA 32	A60	TA25DU25;	18-25	25
15	28.5	T2L160 MA 52	A60	TA75DU42	29-42	42
18.5	36	T2L160 MA 52	A60	TA75DU52;	36-52	50
22	42	T2L160 MA 80	A63	TA75DU52	36-52	65
30	56	T2L160 MA 80	A75	TA75DU80;	60-80	75
37	68	T2L160 MA 100	A95	TA75DU80	60-80	96
45	83	T4L250 PR221-1 In160	A110	TA110DU110;	80-110	110
55	98	T4L250 PR221-1 In250	A145	TA110DU110	80-110	145
75	135	T4L250 PR221-1 In250	A185	E200DU;	60-200	185
90	158	T4L320 PR221-1 In320	A210	E200DU	60-200	210
110	193	T4L320 PR221-1 In320	A260	E320DU;	100-320	260
132	232	T5L400 PR221-1 In400	A260	E320DU	100-320	260

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Example for 400/415 V, I_q up to 80 kA, coordination type 2

Complete coordination tables are available for the Short Circuit Protection Device (SCPD), the Contactor and the Overload Protection Device according to the Rated Operational Voltage U_e, the Rated Short-circuit Current I_q, the Coordination Type (type 1 or 2) and the Motor Power.

www.abb.com/lowvoltage Online Selected Optimized Coordination Tables

Coordination with Short-circuit Protection Devices according to IEC 60947-4-1

Manual Motor Starter (MMS) Coordination Table

MS 116 Manual Motor Starter (MMS) for Short-circuit and Motor Protection

Updated table is available on the ABB Website:

see www.abb.com/lowvoltage then go to the right menu: "Support", select: "Online Product Selection Tools".

Coordinated protections of motor Starters.

Table number: MM4016NS1.MS116.2

Motor	Rated Current [A]	Type	Instantaneous tripping current [A]	Current setting range [A]	Type	Limitor instantaneous tripping current [A]	Contactor Type	Max allowed setting current [A]
0.06	0.22	MS116-0,25	3	0,16 - 0,25			A0	0,25
0.09	0.34	MS116-0,40	4.8	0,25 - 0,40			A0	0,4
0.12	0.44	MS116-0,63	7.56	0,40 - 0,63			A0	0,63
0.18	0.72	MS116-1,00	12	0,63 - 1,00			A0	1
0.25	0.83	MS116-1,00	12	0,63 - 1,00			A0	1
0.37	1.12	MS116-1,60	19.2	1,00 - 1,60			A0	1,6
0.55	1.45	MS116-1,60	19.2	1,00 - 1,60			A0	1,6
0.75	1.9	MS116-2,50	30	1,60 - 2,50			A0	2,5
1.1	2.59	MS116-4,00	48	2,50 - 4,00			A0	4
1.5	3.45	MS116-4,00	48	2,50 - 4,00			A0	4
2	4	MS116-6,30	75.6	4,00 - 6,30			A0	6,3
2.2	4.8	MS116-6,30	75.6	4,00 - 6,30			A0	6,3
3	6.48	MS116-10,0	120	6,30 - 10,0			A12	10
4	8.6	MS116-10,0	120	6,30 - 10,0			A12	10
5.5	11.1	MS116-12,0	144	8,00 - 12,0			A12	12
7.5	14.8	MS116-16,0	192	10,0 - 16,0			A16	16

Comments :

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Example for 400 V, I_q up to 16 kA, coordination type 1

Complete coordination tables are available for the **Short Circuit Protection Device (SCPD)**, the **Contactor** and the **Overload Protection Device** according to the **Rated Operational Voltage U_e** , the **Rated Short-circuit Current I_q** , the **Coordination Type** (type 1 or 2) and the **Motor Power**.

www.abb.com/lowvoltage Online Selected Optimized Coordination Tables

Coordination with Short-circuit Protection Devices according to IEC 60947-4-1

Manual Motor Starter (MMS) Coordination Table

MS 325 Manual Motor Starter (MMS) for Short-circuit and Motor Protection

Updated table is available on the ABB Website:

see www.abb.com/lowvoltage then go to the right menu: "Support", select: "Online Product Selection Tools".

Coordinated protections of motor Starters.
400 V, 50 kA/50/60Hz, AC-3, EN/IEC 60947-4-1, type 2
Table number: MM4050NS2.2

Rated Output [kW]	Rated Current [A]	Motor	Manual Motor Controller	Instantaneous tripping current [A]	Current setting range [A]	Type	Contactor	Max allowed setting current [A]
0.06	0.22	MS325-0.25	2.44	0.16 - 0.25		A0	0.25	
0.09	0.34	MS325-0.40	3.9	0.25 - 0.40		A0	0.4	
0.12	0.44	MS325-0.63	6.14	0.40 - 0.63		A0	0.63	
0.18	0.72	MS325-1.00	11.5	0.63 - 1.00		A0	1	
0.25	0.83	MS325-1.00	11.5	0.63 - 1.00		A0	1.6	
0.37	1.12	MS325-1.60	18.4	1.00 - 1.60		A0	1.6	
0.55	1.46	MS325-1.60	18.4	1.00 - 1.60		A0	2.5	
0.75	1.9	MS325-2.50	28.75	1.60 - 2.50		A0	4	
1.1	2.59	MS325-4.00	50	2.50 - 4.00		A12	4	
1.5	3.46	MS325-4.00	50	2.50 - 4.00		A26	6.3	
2	4	MS325-6.30	78.75	4.00 - 6.30		A26	6.3	
2.2	4.8	MS325-6.30	78.75	4.00 - 6.30		A26	9	
3	6.48	MS325-9.00	135	6.30 - 9.00		A26	9	
4	8.6	MS325-9.00	135	6.30 - 9.00		A26	12.5	
5.5	11.1	MS325-12.5	187.5	9.00 - 12.5		A26	16	
7.5	14.8	MS325-16.0	240	12.5 - 16.0		A26	20	
9	18.3	MS325-20.0	300	16.0 - 20.0		A30	25	
11	21.5	MS325-25.0	375	20.0 - 25.0		A30	30	
15	30	MS450-32.0	416	22.0 - 32.0		A40	38	
18.5	37	MS450-40.0	520	28.0 - 40.0		A50	47.5	
22	45	MS450-50.0	650	36.0 - 50.0		^^	^^	

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Example for 400 V, I_q up to 50 kA, coordination type 2

Complete coordination tables are available for the **Short Circuit Protection Device (SCPD)**, the **Contactor** and the **Overload Protection Device** according to the **Rated Operational Voltage U_e**, the **Rated Short-circuit Current I_q**, the **Coordination Type** (type 1 or 2) and the **Motor Power**.

www.abb.com/lowvoltage Online Selected Optimized Coordination Tables

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Connecting of the Contactors

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Terminal Marking and Positioning

General

Standards

Terminal marking of contactors, contactor relays, auxiliary contacts and overload relays generally complies with international and European standards IEC 60445, IEC 60947-1 and EN 50005. In addition, the marking of these devices also meets the following specific standards:

- IEC 60947-4-1, EN 60947-4-1 and EN 50012 for contactors and their auxiliary contacts,
- IEC 60947-5-1 and EN 50011 for contactor relays,
- IEC 60947-4-1 and EN 60047-4-1 for overload relays.

Contactor Marking

Marking of contactor main pole terminals

Main pole terminals are marked by codes made up of a figure followed by an alphanumeric combination: e.g. 1L1-2T1, 3L2-4T2, etc.

Marking of contactor auxiliary contact terminals

Contactor auxiliary contacts are marked by two-figure numbers:

- The **figure of the units** marks the **function**:

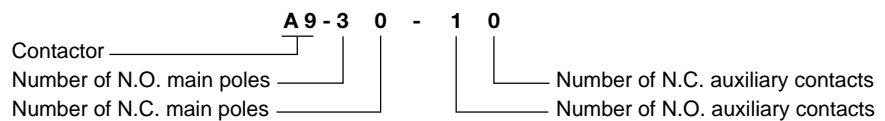
- | | | | |
|---------------------|----|---|----|
| - for N.C. contacts | -1 | - for N.C. contacts with a special function | -5 |
| | -2 | | -6 |
| - for N.O. contacts | -3 | - for N.O. contacts with a special function | -7 |
| | -4 | | -8 |

- The **figure of the tens** is a serial number allocated in continuous order starting from 1 (except for the contactors with one NC built-in auxiliary contact), regardless of the function of the contacts and running from left to right on the device starting with the 1st stack for 2-stack devices.

Furthermore, to meet the requirements of the American market these numbers are followed by the **NO** letters for **N**ormally **O**pen contacts and **NC** for **N**ormally **C**losed contacts.

Identification of contacts in contactor codes

Example :



Depending on device ratings, we deliver the following auxiliary contact arrangements (defined in standard EN 50012): 00, 10, 01, 11, 22, 32.

Other arrangements are possible by adding additional auxiliary contacts: 11, 12, 13, 21, 22, 23, 31, 32, 41.

Contactor Relay Marking

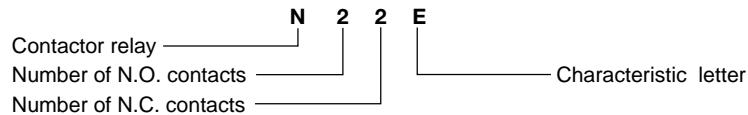
The marking of contactor relays complies with EN 50011 which outlines:

- The specific positioning of the contacts (the figures of the tens)
- The adequate function marking of the terminals of these contacts (the figures of the units, e.g. ⁻¹ ₋₂ ⁻³ ₋₄) as described above.

Furthermore, to meet the requirements of the American market these numbers are followed by the **NO** letters for **N**ormally **O**pen contacts and **NC** for **N**ormally **C**losed contacts.

According to EN 50011, contactor relays are designated by characteristic numbers and letters:

Example:



N, NL, NL Z and TNL contactor relays include these characteristic numbers and letters in their type code and are supplied in the following variants from the preferential **E** series:

- 22E-31E-40E for N, NL, NL Z and TNL contactor relays with 4 contacts
- 44E-53E-62E-71E-80E for N, NL contactor relays with 8 contacts
- 44E-62E-80E for TNL contactor relays with 8 contacts.

Other contact combinations are possible by adding auxiliary contact blocks.



A 9-30-10 contactor + CA5-10 aux. contact block one pole



N 22 E contactor relay

>> A... and AF... 3-pole Contactors pages 8/4 ... 8/6	>> A, AF, AL, AE, TAL, TAE 4-pole Contactors page 8/8
>> EH 1200 3-pole Contactors page 8/6	>> EK... 4-pole Contactors page 8/9
>> AL... TAL..., AE..., TAE... 3-pole Contactors page 8/7	>> UA..., UA..RA Contactors page 8/10

Terminal Marking and Positioning

General

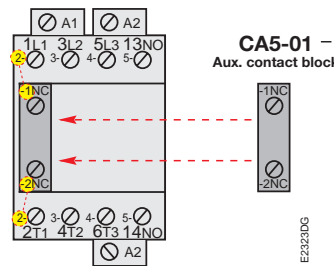
Add-on Auxiliary Contact Block Terminal Marking

Front mounting

- CA 5.., CC 5.. and CE 5.. one-pole auxiliary contact blocks only bear the **figure of the units** which refers to the **function** e.g. $\overset{-3}{-}$ followed by the two **NO** letters for **Normally Open** contacts and $\overset{-1}{-}$ followed by the two **NC** letters for **Normally Closed** contacts (see opposite pictures)

The figure of the units is then to be combined with the **figure of the tens** marked on the contactor itself which is a serial number allocated in continuous order, starting from 1 (except for the contactors with one NC built-in auxiliary contact), regardless of the function of the contacts and running from left to right on the contactor.

Example: **A9-30-10** Contactor - - - - - In this example the first auxiliary contact is the **N.O. built-in auxiliary contact** marked $\overset{13}{14}$ **NO**

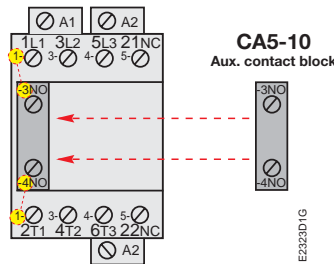


The second auxiliary contact is the **CA5-01 N.C. add-on auxiliary contact block** marked $\overset{-1}{-}$ **2**

The complete terminal marking reads $\overset{21}{22}$ **NC**

A third or fourth or fifth CA5-.. one-pole add-on auxiliary contact block might be added following the same rule.

Example: **A9-30-01** Contactor



In this example the first auxiliary contact is the **N.C. built-in auxiliary contact** marked $\overset{21}{22}$ **NC**

The second auxiliary contact is the **CA5-10 N.O. add-on auxiliary contact block** marked $\overset{-3}{-}$ **4**

The complete terminal marking reads $\overset{13}{14}$ **NO**

A third or fourth or fifth CA5-.. one-pole add-on auxiliary contact block might be added following the same rule.

CA 5.. 4-pole auxiliary contact blocks bear both the **figure of the units** which refers to the **function** and the **figure of the tens** (serial number allocated in continuous order), followed by the two **NO** letters for **Normally Open** contacts and the two **NC** letters for **Normally Closed** contacts (see opposite picture).

Note: For contactors with NC built-in auxiliary contacts use CA5-..U 4-pole auxiliary contact block with terminal marking according to standards.

The CA5-..U bears only the figure of the units which refers to the function, followed by two letters **NO** or **NC**. The figure of the units is then to be combined with the **figure of the tens** marked on the contactor itself.

Side mounting

- CAL 5.., CCL 5.. or CAL 18.. two-pole auxiliary contact blocks and CEL 18.. one-pole auxiliary contact blocks bear both the **figure of the units** which refers to the function and the **figure of the tens** (serial number allocated in continuous order), followed by the two **NO** letters for **Normally Open** contacts and the two **NC** letters for **Normally Closed** contacts (see opposite picture).

The additional **X** letter refers to the **side mounting** location on the contactors for the CAL 5.., CCL 5.. and CAL 18 blocks and so differentiate them from the CA 5.. auxiliary contact blocks used for front mounting.

- CAL 16.. and CCL 16.. two-pole auxiliary contact blocks bear both the **figure of the units** which refers to the **function** and the **figure of the tens** (serial number allocated in continuous order), followed by the two **NO** letters for **Normally Open** contacts and the two **NC** letters for **Normally Closed** contacts (see opposite picture)

Thermal and Electronic Overload Relay Terminal Marking

Marking of main terminals

The main terminals of the thermal and electronic overload relays are marked on the motor side by codes made up of a figure followed by an alphanumeric combination: 2T1, 4T2, 6T3.

Marking of auxiliary terminals

The auxiliary terminals are marked:

- 95-96 for N.C. contact,
- 97-98 for N.O. contact.

>> GA 75, GAE 75, AM.. Contactors page 8/11
 >> Contactor Relays page 8/12
 >> Add-on Auxiliary Contacts page 8/14

>> Thermal and Electronic Overload Relays page 8/15
 >> Manual Motor Starters page 8/16
 >> Mini Contactors and Mini Contactor Relays ... page 8/17

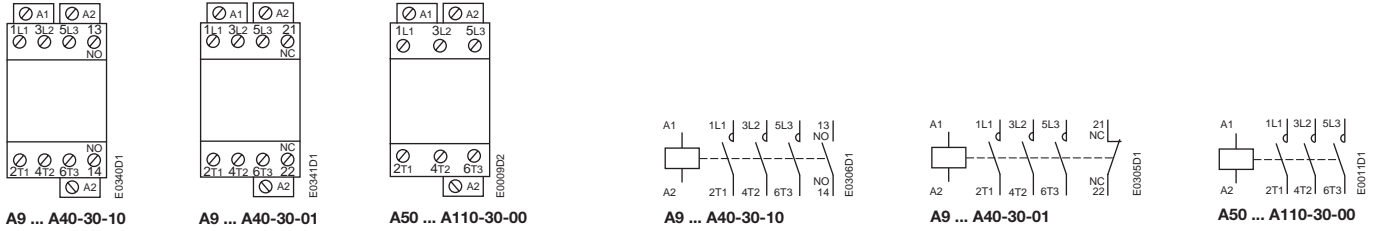


Terminal Marking and Positioning

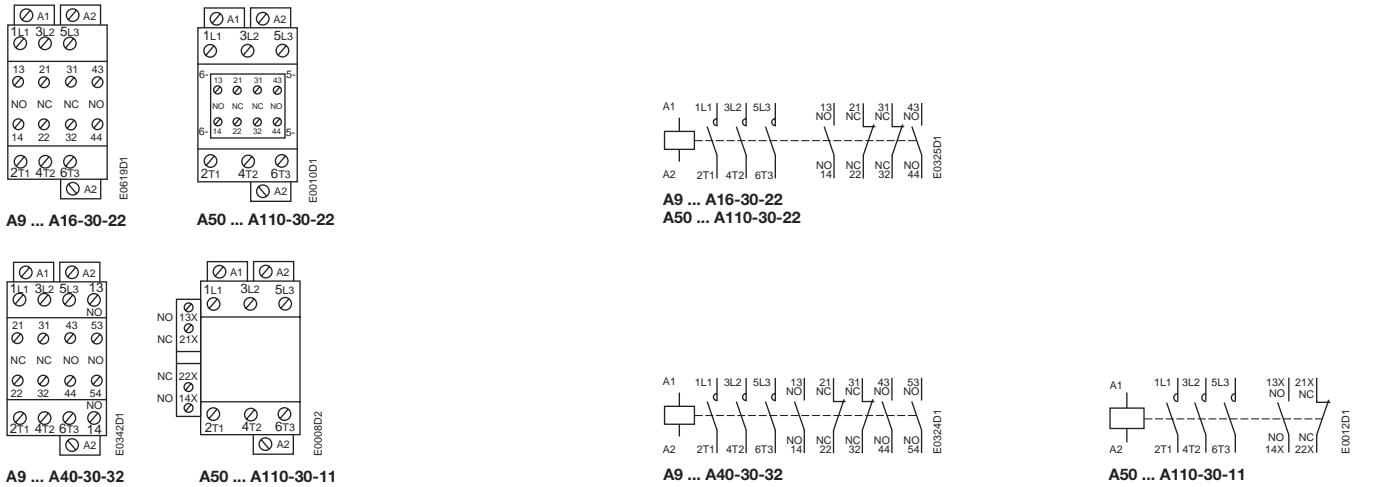
A 9 ... A 110 and AF 50 ... AF 110 3-pole Contactors

A 9 ... A 110 Contactors - a.c. operated

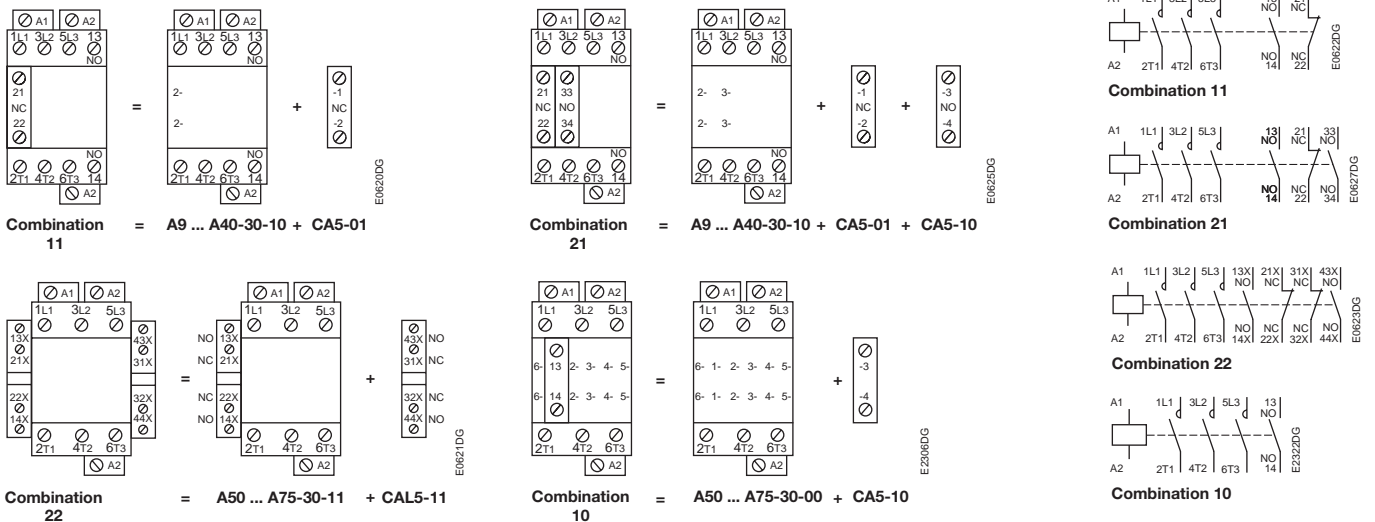
Standard devices without addition of auxiliary contacts



Standard devices with factory mounted auxiliary contacts

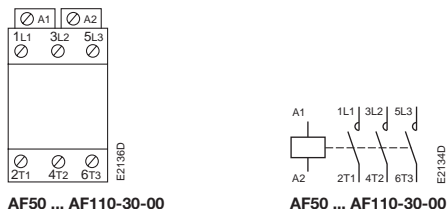


Other possible contact combinations with auxiliary contacts added by the user

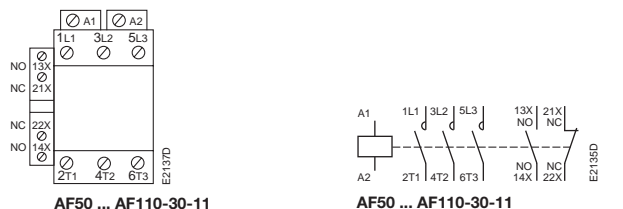


AF 50 ... AF 110 Contactors - a.c. / d.c. operated

Standard devices without addition of auxiliary contacts



Standard devices with factory mounted auxiliary contacts

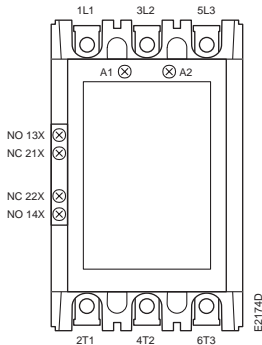


Terminal Marking and Positioning

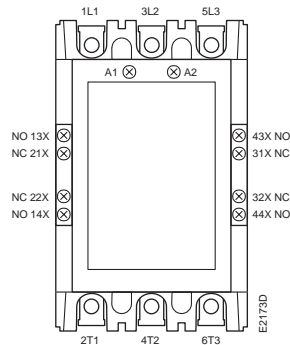
A 145 ... A 300 and AF 145 ... AF 750 3-pole Contactors

A 145 ... A 300 Contactors - a.c. operated

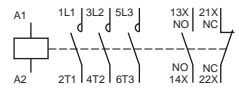
Standard devices with factory mounted auxiliary contacts



A145 ... A300-30-11



A145 ... A300-30-22



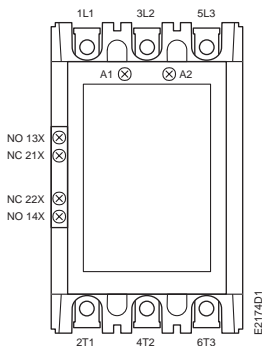
A145 ... A300-30-11



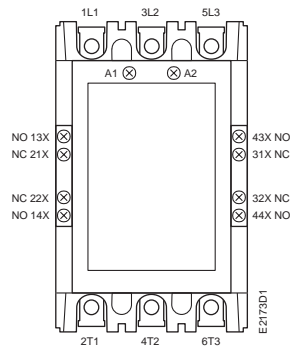
A145 ... A300-30-22

AF 145 ... AF 300 Contactors - a.c. / d.c. operated

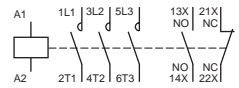
Standard devices with factory mounted auxiliary contacts



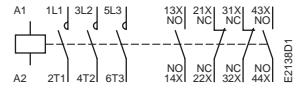
AF145 ... AF300-30-11



AF145 ... AF300-30-22



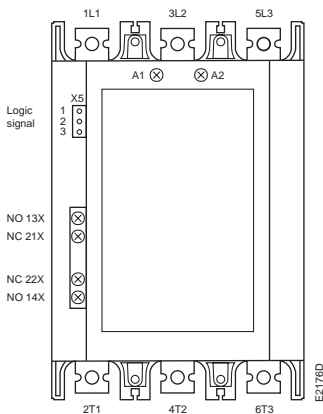
AF145 ... AF300-30-11



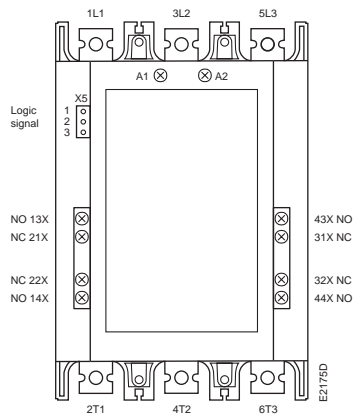
AF145 ... AF300-30-22

AF 400 ... AF 750 Contactors - a.c. / d.c. operated

Standard devices with factory mounted auxiliary contacts

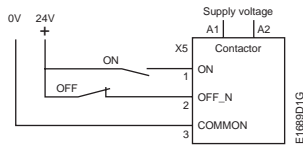


AF400 ... AF750-30-11

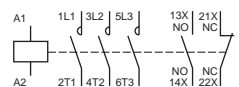


AF400 ... AF750-30-22

Control with logic signal



AF400 ... AF750-30-11, AF400 ... AF750-30-22



AF400 ... AF750-30-11



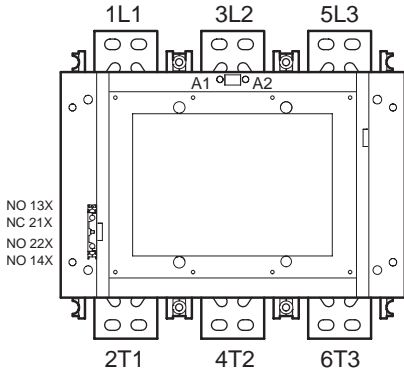
AF400 ... AF750-30-22

Terminal Marking and Positioning

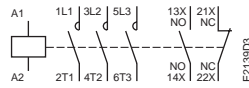
AF 1350, AF 1650 and EH 1200 3-pole Contactors

AF 1350 ... AF 1650 Contactors - a.c. / d.c. operated

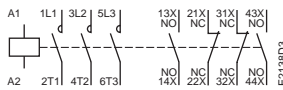
Standard devices with factory mounted auxiliary contacts



AF1350-30-11, AF1650-30-11

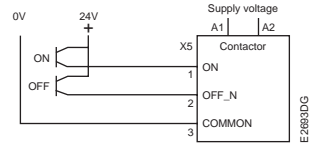


AF1350, AF1650-30-11



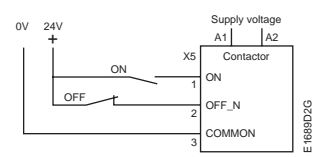
AF1350, AF1650-30-22

Wiring diagrams when used with transistor output



AF1350, AF1650

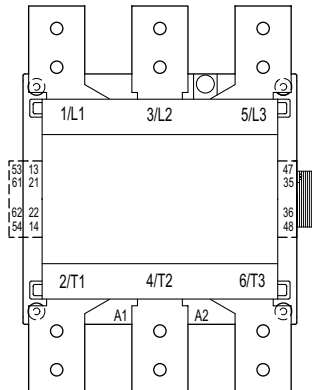
when used with switches



AF1350, AF1650

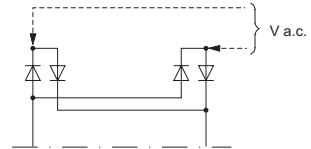
EH 1200 Contactors - a.c. or d.c. operated

Standard devices with factory mounted auxiliary contacts

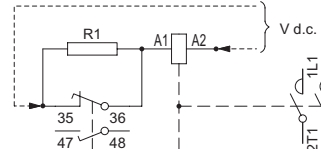


Coil Wiring

Coil codes EF, EL, EP

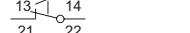


Coil codes DB, DE

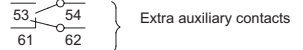


Right hand side

Left hand side



Left hand side



Extra auxiliary contacts

R1 Economic resistor

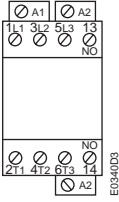
Terminal Marking and Positioning

AL 9 ... AL 40, TAL 9 ... TAL 40

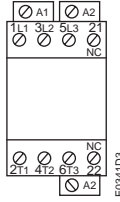
and AE 50 ... AE 110, TAE 50 ... TAE 110 3-pole Contactors

3-pole Contactors - d.c. operated (the polarity A1+, A2- must be respected)

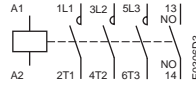
Standard devices without addition of auxiliary contacts



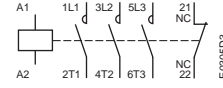
AL9 ... AL40-30-10
AL9 Z ... AL16 Z-30-10
TAL9 ... TAL40-30-10



AL9 ... AL40-30-01
AL9 Z ... AL16 Z-30-01
TAL9 ... TAL40-30-01

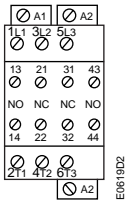


AL9 ... AL40-30-10
AL9 Z ... AL16 Z-30-10
TAL9 ... TAL40-30-10

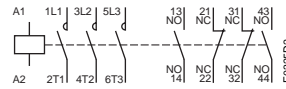


AL9 ... AL40-30-01
AL9 Z ... AL16 Z-30-01
TAL9 ... TAL40-30-01

Standard devices with factory mounted auxiliary contacts

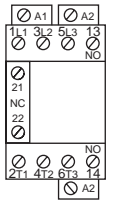


AL9 ... AL40-30-22

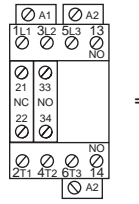
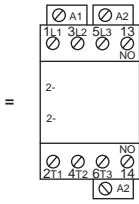


AL9 ... AL40-30-22

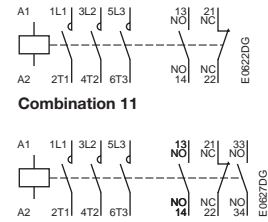
Other possible contact combinations with auxiliary contacts added by the user



Combination 11



Combination 21



Combination 11

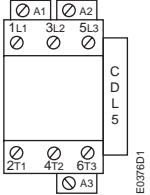
Combination 21

= AL9 ... AL40-30-10 + CA5-01
= AL9 Z ... AL16 Z-30-10 + CA5-01
= TAL9 ... TAL40-30-10 + CA5-01

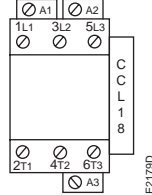
= AL9 ... AL40-30-10 + CA5-01 + CA5-10
= AL9 Z ... AL16 Z-30-10 + CA5-01 + CA5-10
= AL9 ... AL40-30-10 + CA5-01 + CA5-10

AE... and TAE... Contactors - d.c. operated

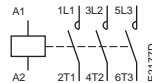
Standard devices without addition of auxiliary contacts



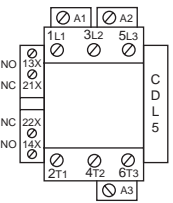
AE50 ... AE75-30-00
TAE50/75-30-00



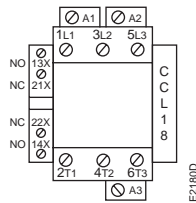
AE95/110-30-00
TAE95/110-30-00



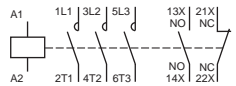
AE50 ... AE110-30-00
TAE50 ... TAE110-30-00



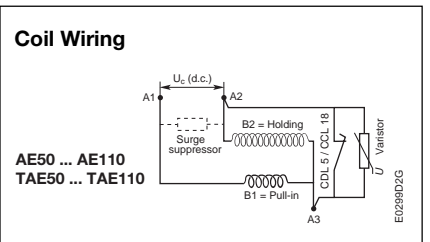
AE50 ... AE75-30-11
TAE50/75-30-11



AE95/110-30-11
TAE95/110-30-11



AE50 ... AE110-30-11
TAE50 ... TAE110-30-11

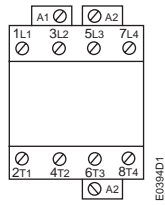


Terminal Marking and Positioning

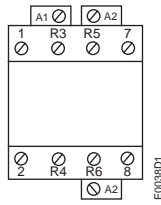
A..., AF..., AL..., AE..., TAE.. 4-pole Contactors

A 9 ... A 75 Contactors - a.c. operated

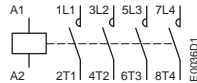
Standard devices without addition of auxiliary contacts



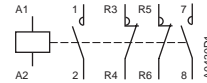
A9 ... A26-40-00
A45 ... A75-40-00



A9 ... A26-22-00
A45/75-22-00



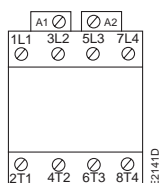
A9 ... A26-40-00
A45 ... A75-40-00



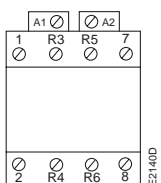
A9 ... A26-22-00
A45/75-22-00

AF 45 ... AF 75 Contactors - a.c. / d.c. operated

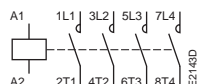
Standard devices without addition of auxiliary contacts



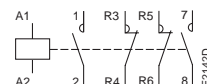
AF45 ... AF75-40-00



AF45/75-22-00



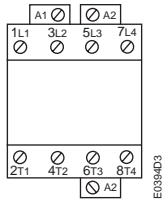
AF45 ... AF75-40-00



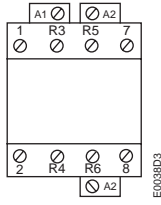
AF45/75-22-00

AL... Contactors - d.c. operated (the polarity A1+, A2- must be respected)

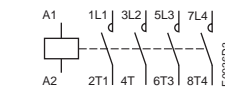
Standard devices without addition of auxiliary contacts



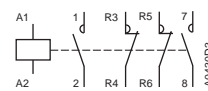
AL9 ... AL26-40-00
TAL9 ... TAL26-40-00



AL9 ... AL26-22-00
TAL9 ... TAL26-22-00



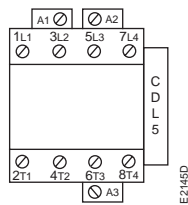
AL9 ... AL26-40-00
TAL9 ... TAL26-40-00



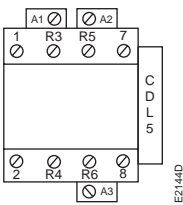
AL9 ... AL26-22-00
TAL9 ... TAL26-22-00

AE... and TAE... Contactors - d.c. operated

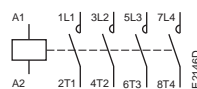
Standard devices without addition of auxiliary contacts



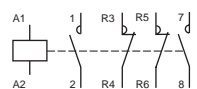
AE45 ... AE75-40-00
TAE45 ... TAE75-40-00



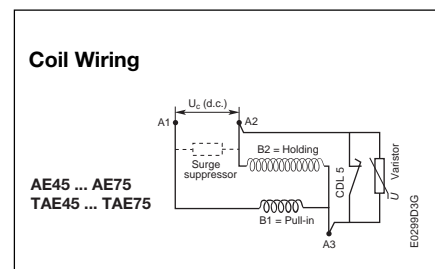
AE45/75-22-00



AE45 ... 75-40-00
TAE45 ... 75-40-00



AE45/75-22-00

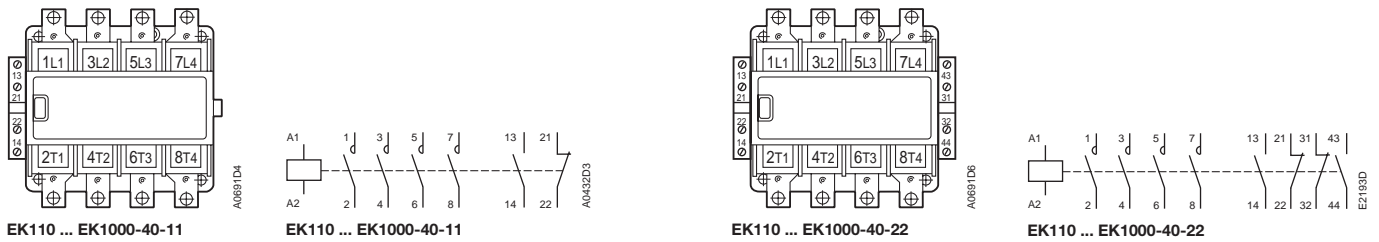


Terminal Marking and Positioning

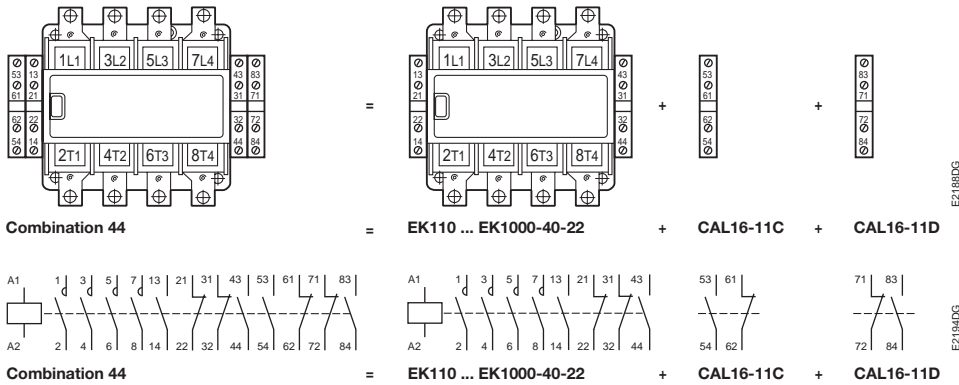
EK... 4-pole Contactors

EK 110 ... EK 1000 Contactors - a.c. operated

Standard devices

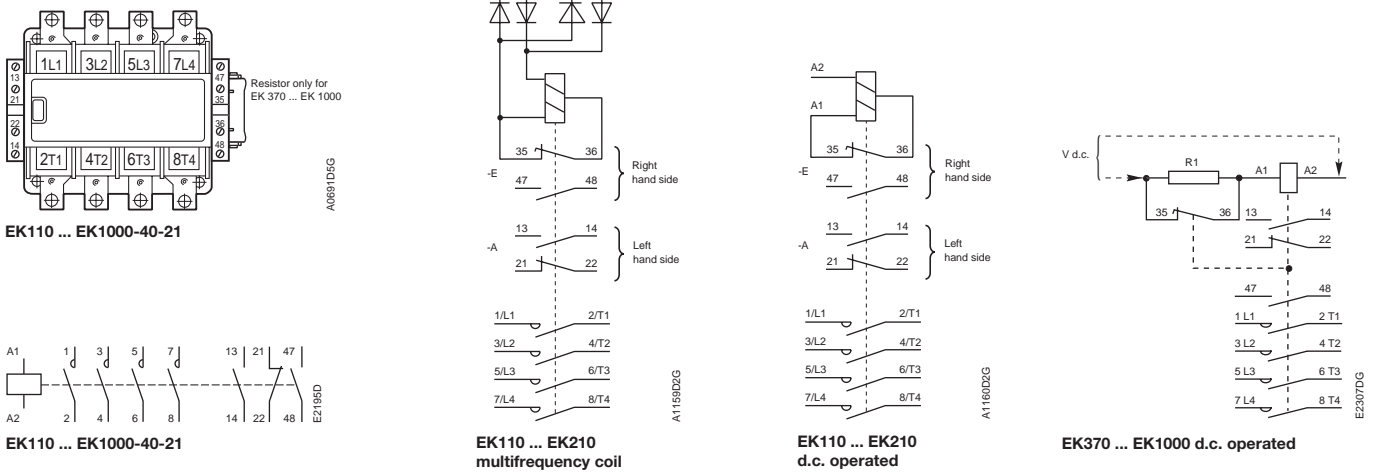


Other possible contact combinations with auxiliary contacts added by the user

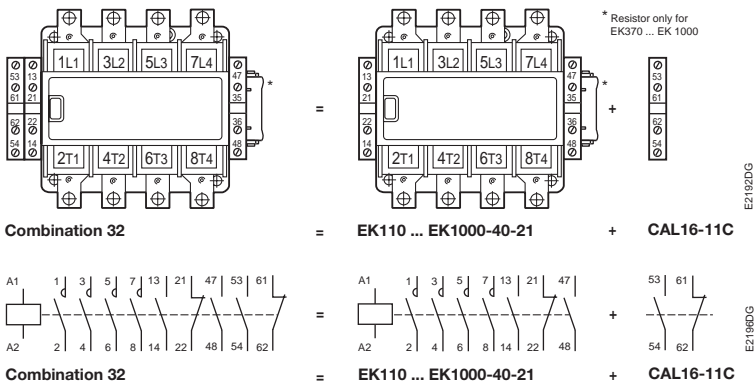


EK 110 ... EK 1000 Contactors - with multifrequency coil or d.c. operated

Standard devices



Other possible contact combinations with auxiliary contacts added by the user

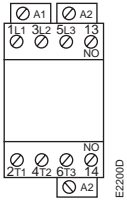


Terminal Marking and Positioning

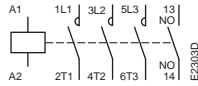
UA... and UA..RA Contactors

UA... Contactors - a.c. operated

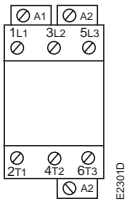
Standard devices without addition of auxiliary contacts



UA16 ... UA30-30-10



UA16 ... UA30-30-10

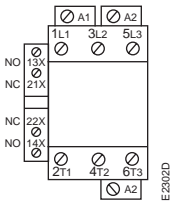


UA50 ... UA110-30-00

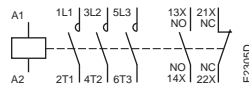


UA50... UA110-30-00

Standard devices with factory mounted auxiliary contacts



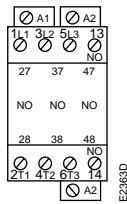
UA50 ... UA110-30-11



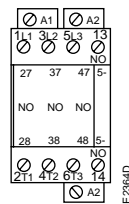
UA50... UA110-30-11

UA..RA Contactors - a.c. operated

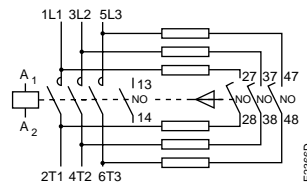
Standard devices without addition of auxiliary contacts



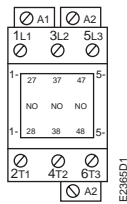
UA16-30-10 RA
UA26-30-10 RA



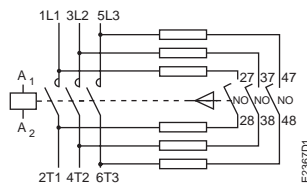
UA30-30-10 RA



UA16 ... 30-30-10 RA



UA50 ... 110-30-00 RA



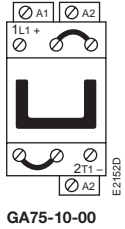
UA50 ... 110-30-00 RA

Terminal Marking and Positioning

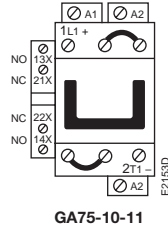
GA 75, GAE 75 and AM... Contactors

GA 75 Contactors - a.c. operated

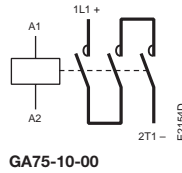
Standard devices without addition of auxiliary contacts



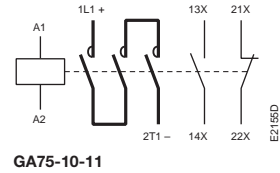
GA75-10-00



GA75-10-11



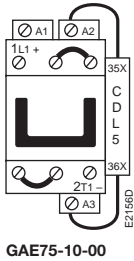
GA75-10-00



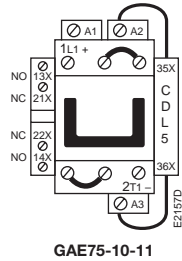
GA75-10-11

GAE 75 Contactors - d.c. operated

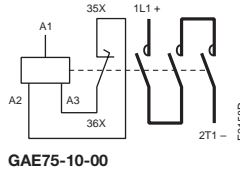
Standard devices without addition of auxiliary contacts



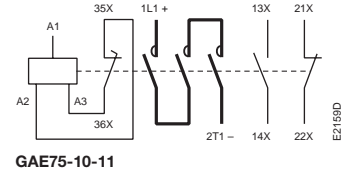
GAE75-10-00



GAE75-10-11



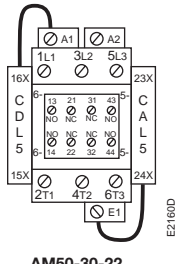
GAE75-10-00



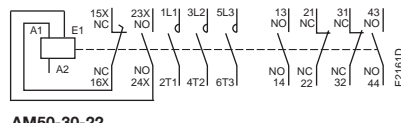
GAE75-10-11

AM... Contactors - d.c. operated

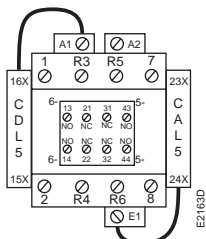
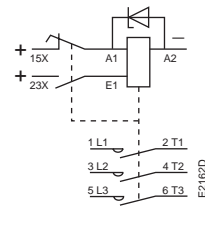
Standard devices without addition of auxiliary contacts



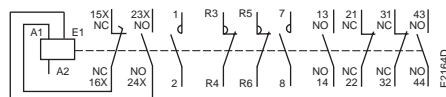
AM50-30-22
AM75-30-22



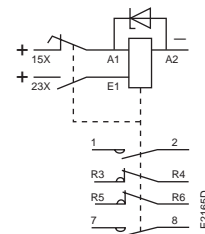
AM50-30-22
AM75-30-22



AM45-22-22
AM75-22-22



AM45-22-22
AM75-22-22

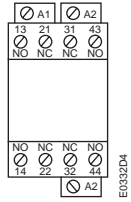


Terminal Marking and Positioning

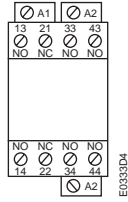
NL., TNL.. Contactor Relays

NL.. Contactor Relays - d.c. operated (the polarity A1+, A2- must be respected)

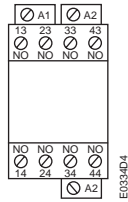
Standard devices without addition of auxiliary contacts



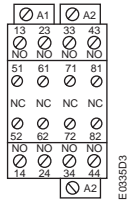
NL 22 E
NL Z 22 E
TNL 22 E



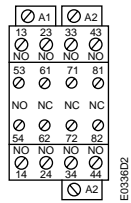
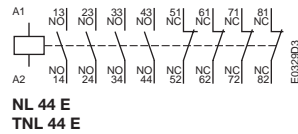
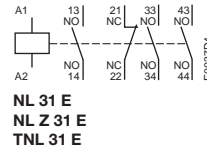
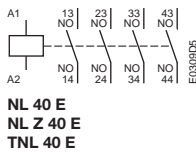
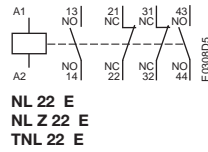
NL 31 E
NL Z 31 E
TNL 31 E



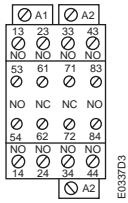
NL 40 E
NL Z 40 E
TNL 40 E



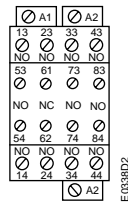
NL 44 E
TNL 44 E



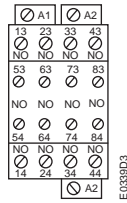
NL 53 E



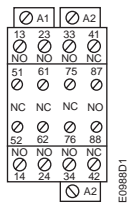
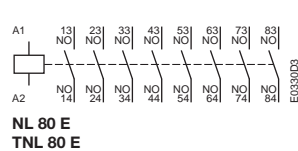
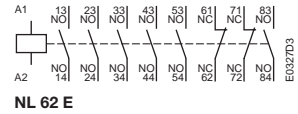
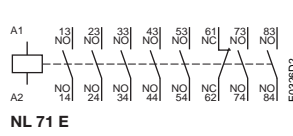
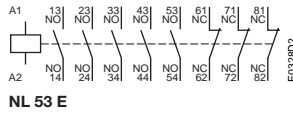
NL 62 E
TNL 62 E



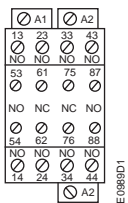
NL 71 E



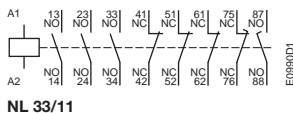
NL 80 E
TNL 80 E



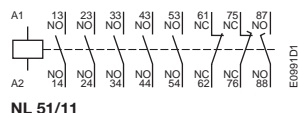
NL 33/11



NL 51/11

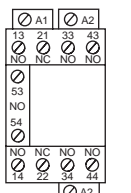


NL 33/11

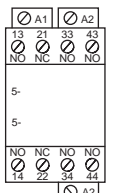


NL 51/11

Other possible contact combinations with auxiliary contacts added by the user



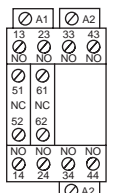
Combination 41 E



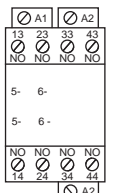
NL 31 E
NL Z 31 E
TNL 31 E



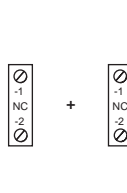
CA5-10



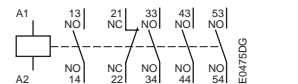
Combination 42 E



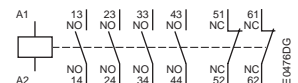
NL 40 E
NL Z 40 E
TNL 40 E



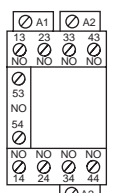
CA5-01



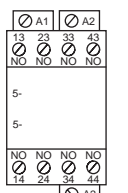
Combination 41 E



Combination 42 E



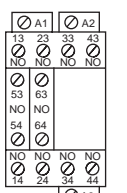
Combination 50 E



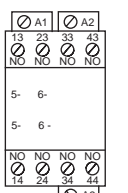
NL 40 E
NL Z 40 E
TNL 40 E



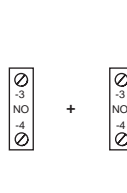
CA5-10



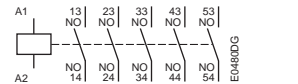
Combination 60 E



NL 40 E
NL Z 40 E
TNL 40 E



CA5-10



Combination 50 E



Combination 60 E

Terminal Marking and Positioning

Add-on Auxiliary Contacts

One-pole auxiliary contacts



CA5-01



CA5-10



CE5-01, CEL18-01



CE5-10, CEL18-10

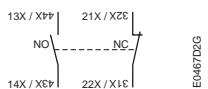


CC5-01

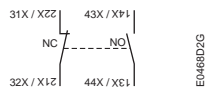


CC5-10

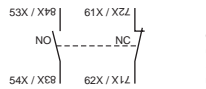
Two-pole auxiliary contacts



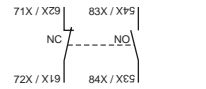
CAL5-11, CAL18-11
(L. h. s. mounted)



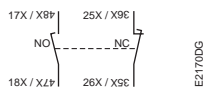
CAL5-11, CAL18-11
(R. h. s. mounted)



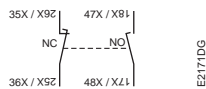
CAL18-11B
(L. h. s. mounted)



CAL18-11B
(R. h. s. mounted)



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



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



CAL16-11 A



CAL16-11 B



CAL16-11 C

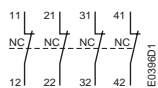


CAL16-11 D

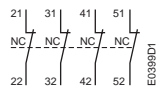


CCL16-11 E

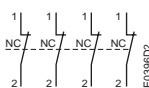
Four-pole auxiliary contacts



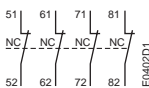
CA5-04 E



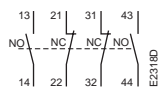
CA5-04 M



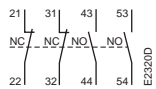
CA5-04 U



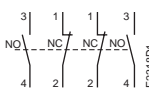
CA5-04 N



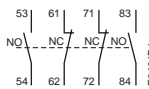
CA5-22 E



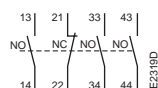
CA5-22 M



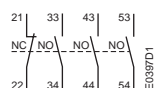
CA5-22 U



CA5-22 N



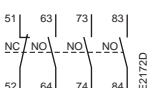
CA5-31 E



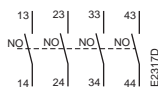
CA5-31 M



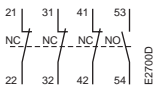
CA5-31 U



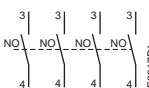
CA5-31 N



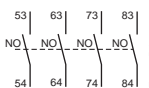
CA5-40 E



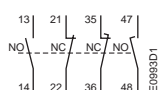
CA5-13 M



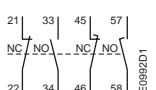
CA5-40 U



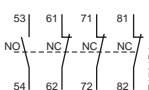
CA5-40 N



CA5-11/11 E



CA5-11/11 M



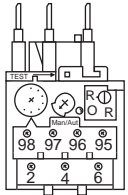
CA5-13 N

Terminal Marking and Positioning

Thermal Overload Relays

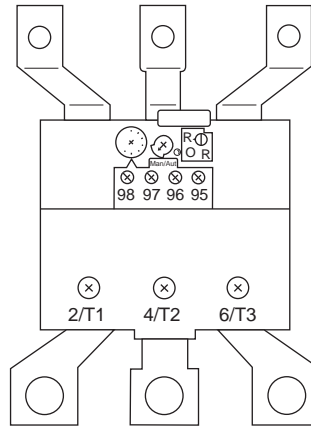
Electronic Overload Relays

TA... Thermal Overload Relays



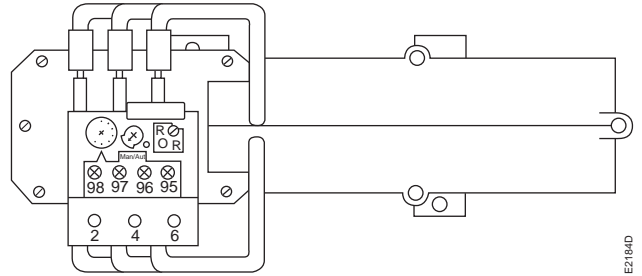
TA 25 DU, TA 42 DU,
TA 75 DU, TA 80 DU

AG471D1



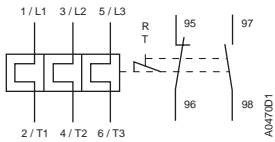
TA 110 DU, TA 200 DU

AG467D1



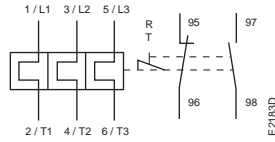
TA 450 DU/SU

E2184D



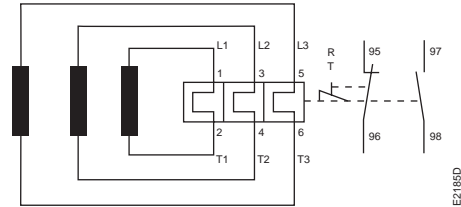
TA 25 DU, TA 42 DU,
TA 75 DU, TA 80 DU

AG470D1



TA 110 DU, TA 200 DU

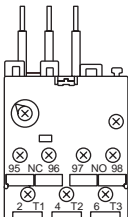
E2183D



TA 450 DU/SU

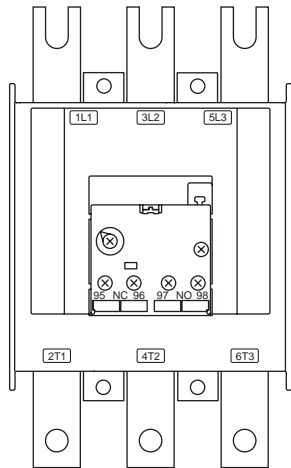
E2185D

E... Electronic Overload Relays



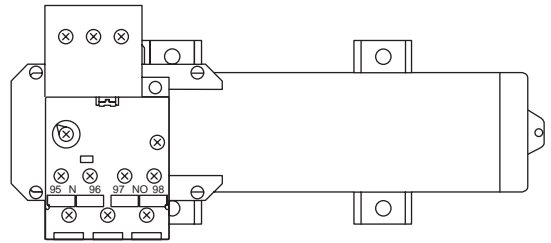
E 16 DU

E2187D



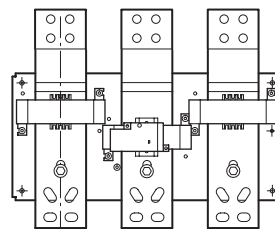
E 200 DU, E 320 DU

E2188D

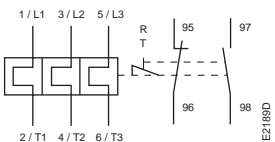


E 500 DU, E 800 DU

E2189D

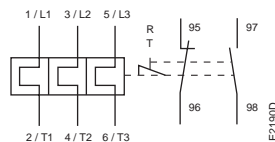


E 1250 DU



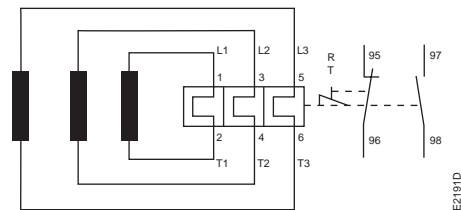
E 16 DU

E2186D



E 200 DU, E 320 DU

E2188D

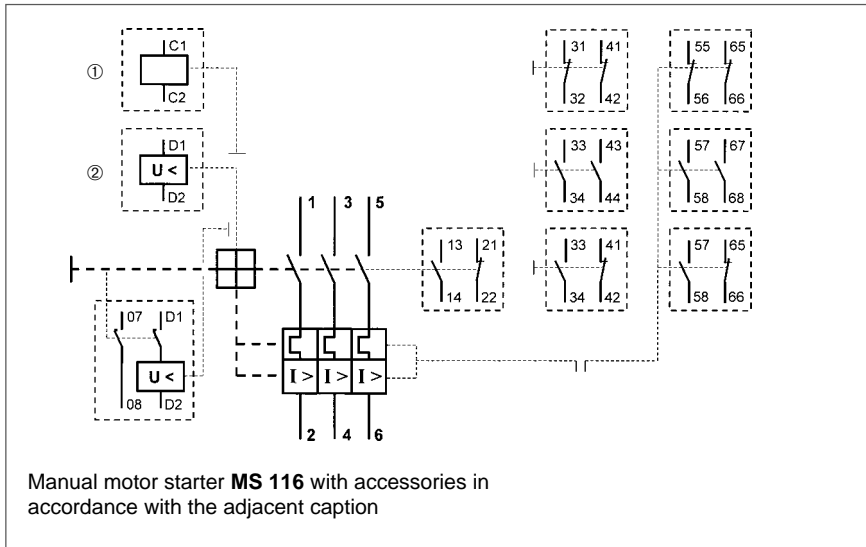


E 500 DU, E 800 DU, E 1250 DU

E2191D

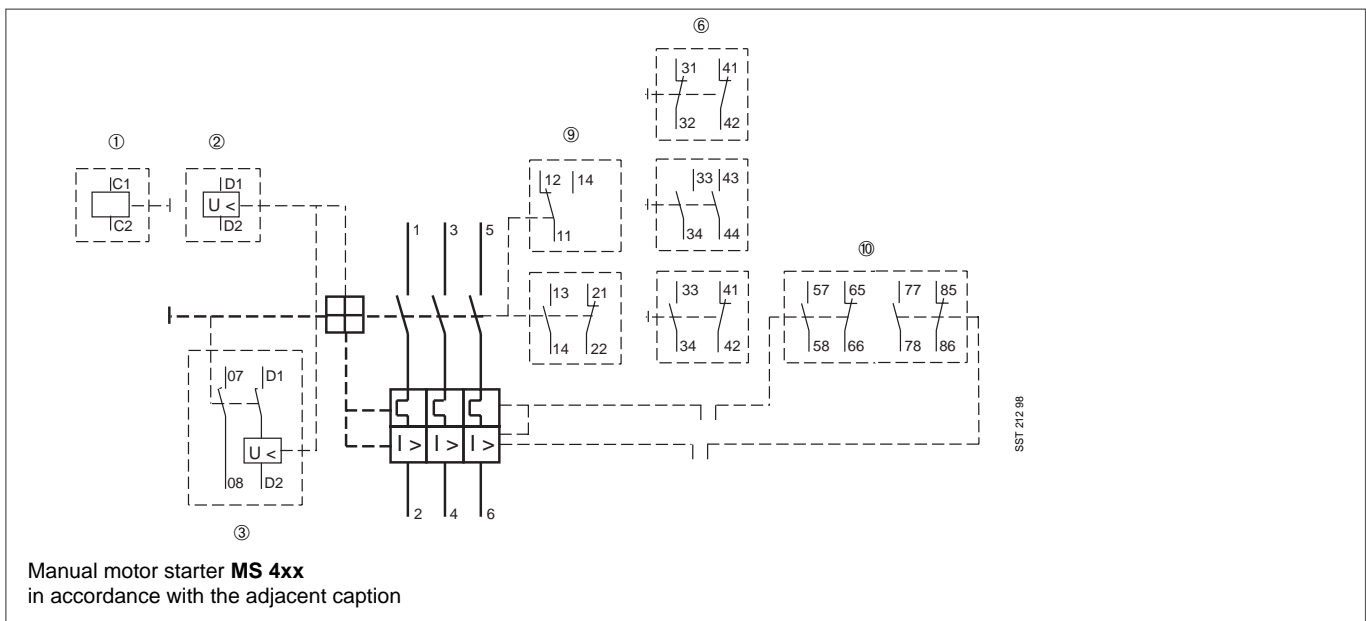
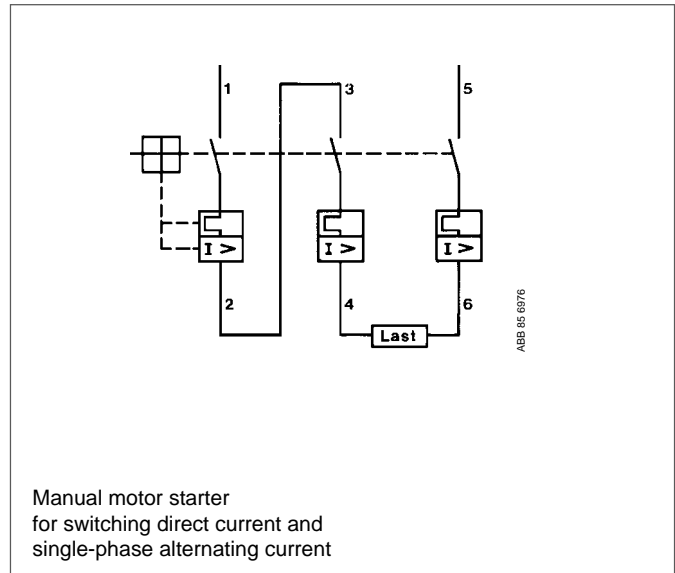
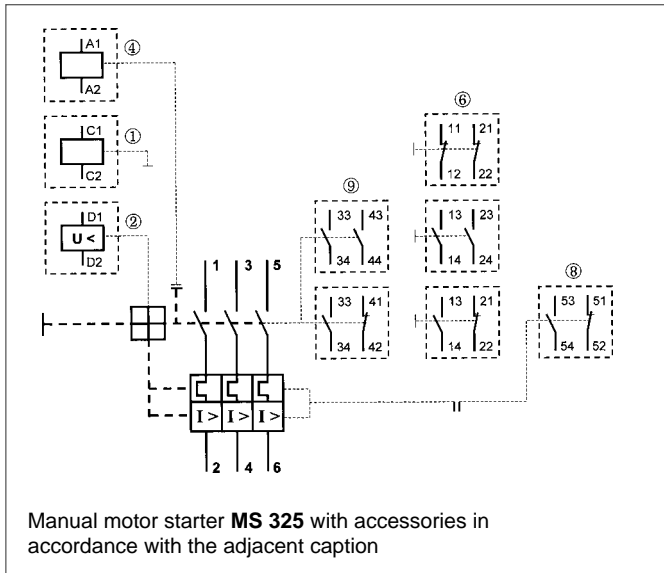
Terminal Marking and Positioning

Manual Motor Starters MS...



Caption

- ① Open-circuit shunt release
- ② Undervoltage release
- ③ Undervoltage release with leading auxiliary switch 2 SV
- ④ Indexing mechanism, only MS 325
- ⑥ Auxiliary switch blocks for lateral attachment
- ⑧ Tripped alarm switch block (signalling contact)
- ⑨ Auxiliary switches which can be plugged on at the front
- ⑩ Alarm switch for short-circuits and general tripping

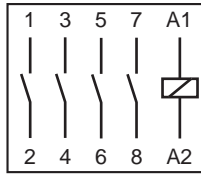


Terminal Marking and Positioning

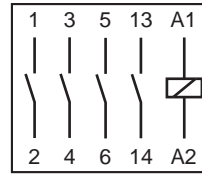
Mini Contactors and Mini Contactor Relays

Thermal Overload Relay for Mini Contactors

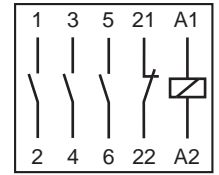
Mini Contactors



B 6-40-00, B 7-40-00

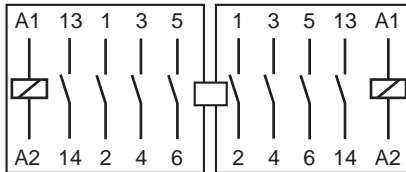


B 6-30-10, B 7-30-10
BC 6-30-10, BC 7-30-10
TBC 7-30-10, B 6 S-30-10

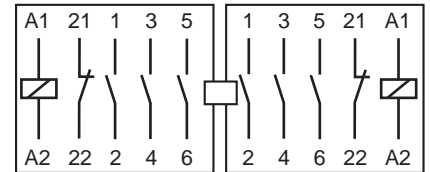


B 6-30-01, B 7-30-01
BC 6-30-01, BC 7-30-01
TBC 7-30-01, B 6 S-30-01

Compact Reversing Contactors

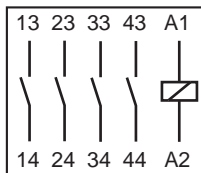


VB 6-30-10, VB 7-30-10
VBC 6-30-10, VBC 7-30-10
VB 6A-30-10, VB 7A-30-10
VBC 6A-30-10, VBC 7A-30-10

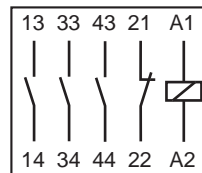


VB 6-30-01, VB 7-30-01
VBC 6-30-01, VBC 7-30-01
VB 6A-30-01, VB 7A-30-01
VBC 6A-30-01, VBC 7A-30-01

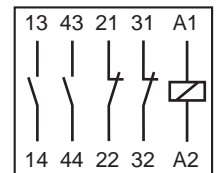
Mini Contactor Relays



K 6-40 E, KC 6-40 E
TKC 6-40 E



K 6-31 Z, KC 6-31 Z
TKC 6-31 Z



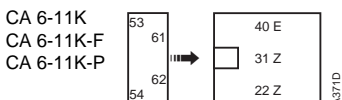
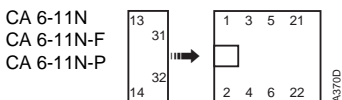
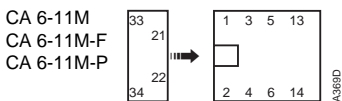
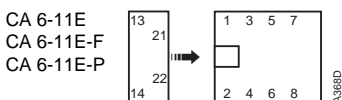
K 6-22 Z, KC 6-22 Z
TKC 6-22 Z

Add-on Auxiliary Contacts Blocks

CA 6 and **CAF 6** auxiliary contacts for B 6, B 7, BC 6, BC 7 mini contactors, and K 6, KC 6 mini contactor relays.
Except: contactors with coils < 3.5 W

CA 6 Side mounting auxiliary contact blocks
(Cannot be attached on compact reversing contactors)
Screw connection, Flat pin connection, Soldering connection

Auxiliary contacts



Contactors types

B(C) 6-40-00, B(C) 7-40-00
B(C) 6-40-00-F, B(C) 7-40-00-F
B(C) 6-40-00-P, B(C) 7-40-00-P

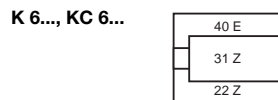
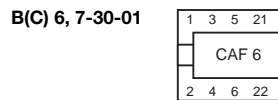
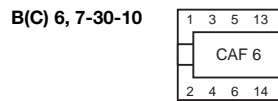
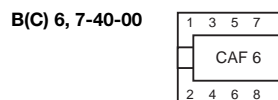
B(C) 6-30-10, B(C) 7-30-10
B(C) 6-30-10-F, B(C) 7-30-10-F
B(C) 6-30-10-P, B(C) 7-30-10-P

B(C) 6-30-01, B(C) 7-30-01
B(C) 6-30-01-F, B(C) 7-30-01-F
B(C) 6-30-01-P, B(C) 7-30-01-P

K 6..., KC 6...
K 6... F, KC 6... F
K 6... P, KC 6... P

CAF 6 Front mounting auxiliary contact blocks
(Also in the case of reversing contactors)
Screw connection

Contactors types



Auxiliary contacts

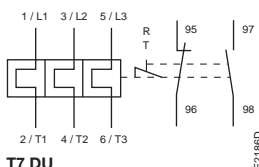
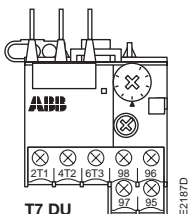
1 = CAF 6-11E
2 = CAF 6-20E
3 = CAF 6-02E

1 = CAF 6-11M
2 = CAF 6-20M
3 = CAF 6-02M

1 = CAF 6-11N
2 = CAF 6-20N
3 = CAF 6-02N

1 = CAF 6-11K
2 = CAF 6-20K
3 = CAF 6-02K

Thermal Overload Relay for Mini Contactors



Dimension Drawings

Drilling Plans

DXF & PDF Formats



Setting-up of the Contactors



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Specific Contactors

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AM 45, AM 50 and AM 75	9/67
EH 1200	9/68

Mini Contactors with Thermal O/L Relays and with Accessories

B 6, B 7, BC 6, BC 7	9/76
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Contactors Relays and Mini Contactor Relays with Accessories

N	9/47
NL, NL Z, TNL	9/55
K 6 and KC 6	9/76

Manual Motor Starters

MS 116, MS 325, MS 450, MS 495	9/69
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Thermal and Electronic O/L Relays

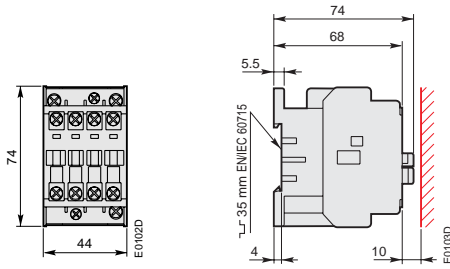
TA 25 DU, TA 42 DU, TA 75 DU, TA 80 DU, TA 110 DU, TA 200 DU, TA 450 DU/SU	9/72
E 16 DU, E 200 DU, E 320 DU, E 500 DU, E 800 DU, E 1250 DU	9/74
T 7 DU	9/77

Only major dimensions are quoted on the drawings contained in this section.
Detailed dimension drawings on request.

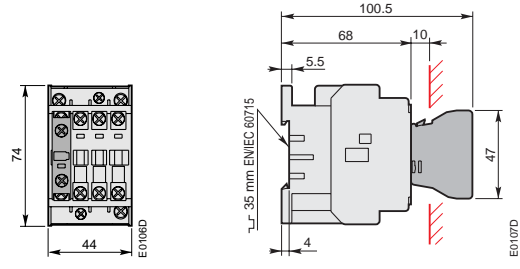
A 9, A 12 and A 16 3-pole Contactors



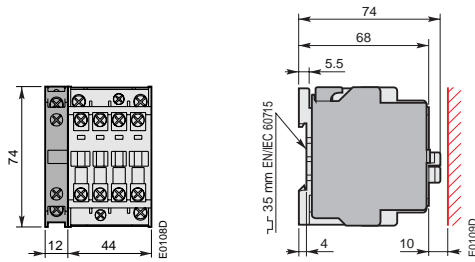
Dimensions (in mm)



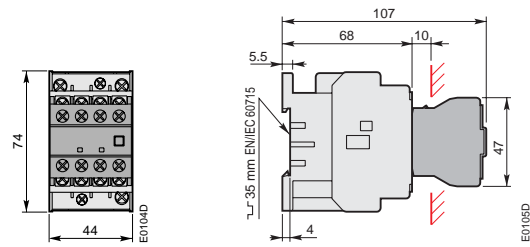
A 9, A 12, A 16



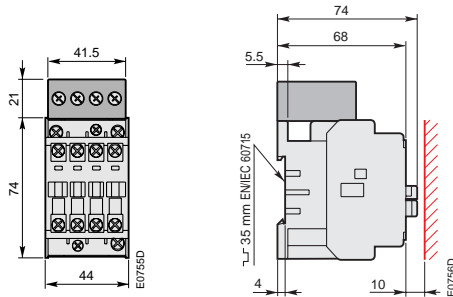
**A 9, A 12, A 16
+ CA 5 front-mounted 1-pole auxiliary contact block**



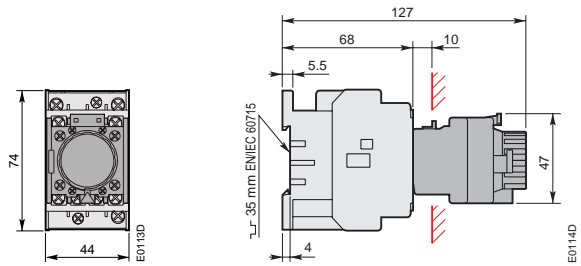
**A 9, A 12, A 16
+ CAL 5 side-mounted 2-pole auxiliary contact block**



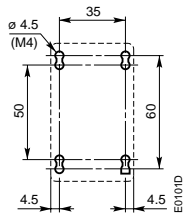
**A 9, A 12, A 16
+ CA 5 front-mounted 4-pole auxiliary contact block
and corresponding 2-stack versions**



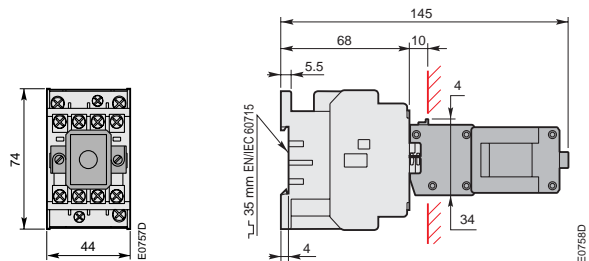
**A 9, A 12, A 16
+ RA 5 interface relay**



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



A 9, A 12, A 16 drilling plan

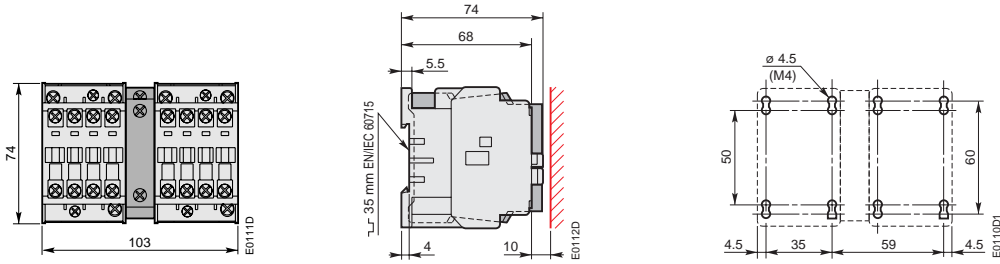


**A 9, A 12, A 16
+ WB 75-A on-position latch**

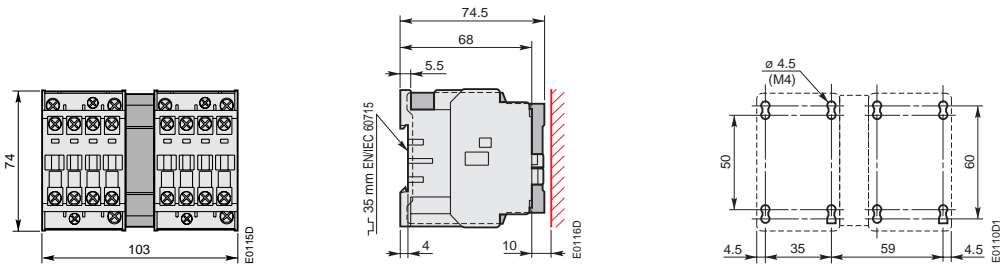
A 9, A 12 and A 16 3-pole Contactors



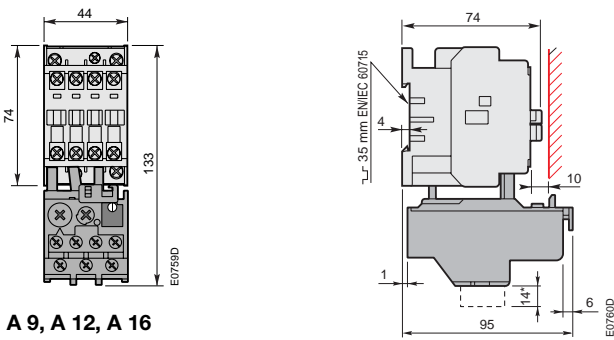
Dimensions (in mm)



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



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



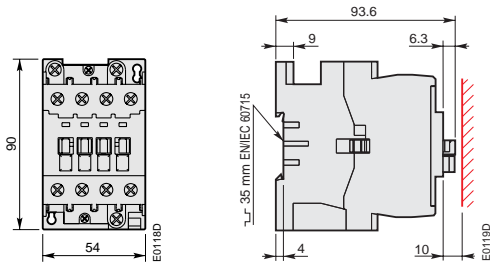
A 9, A 12, A 16
+ TA 25 DU thermal O/L relay

* For TA 25 DU 32 only

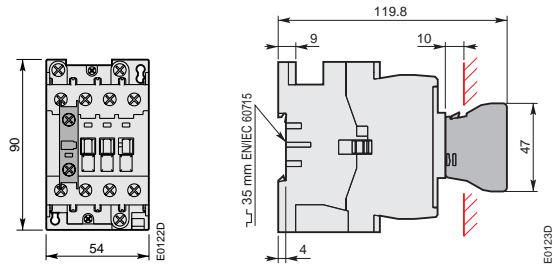
A 26 3-pole Contactor



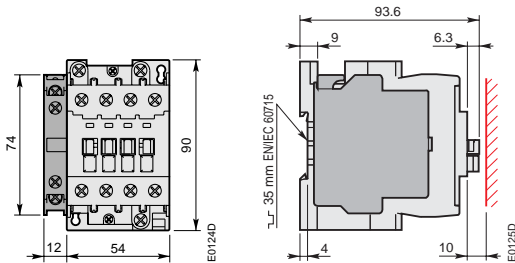
Dimensions (in mm)



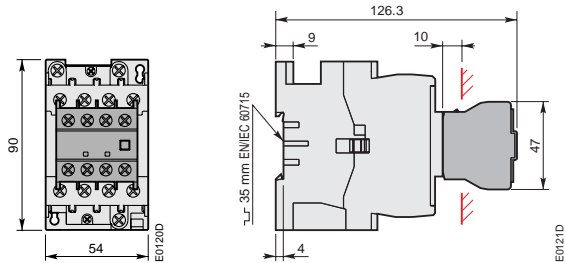
A 26



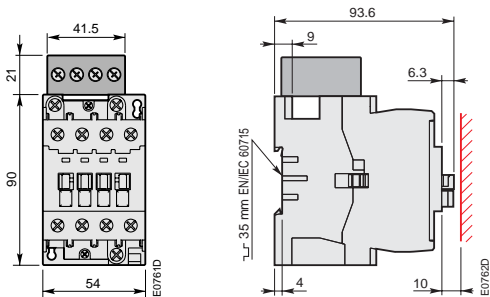
A 26 + CA 5 front-mounted 1-pole auxiliary contact block



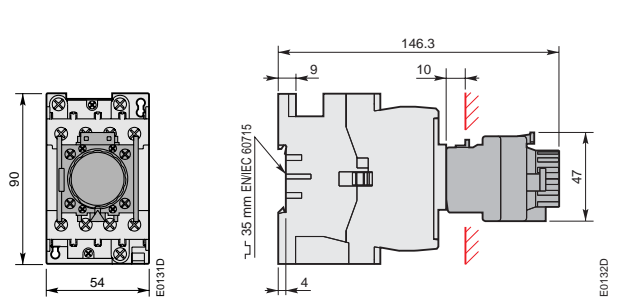
A 26 + CAL 5 side-mounted 2-pole auxiliary contact block



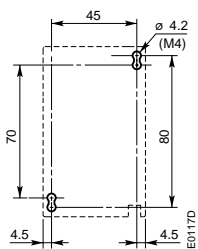
A 26 + CA 5 front-mounted 4-pole auxiliary contact block and corresponding 2-stack versions



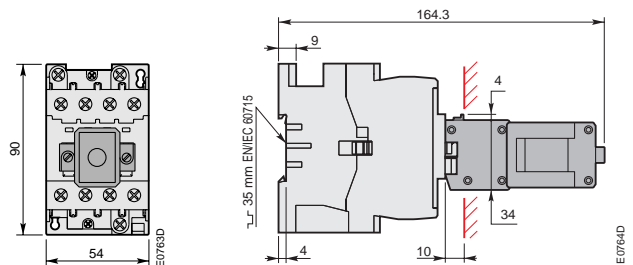
A 26 + RA 5 interface relay



A 26 + TP pneumatic timer



A 26 drilling plan

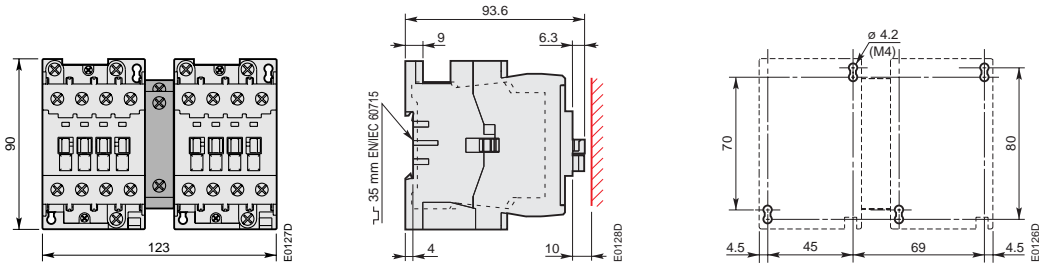


A 26 + WB 75-A on-position latch

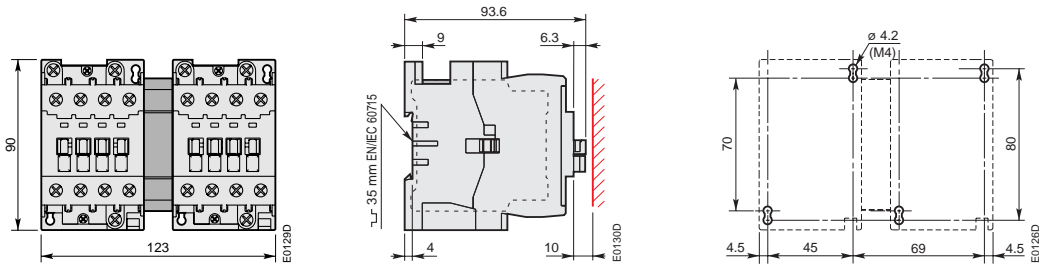
A 26 3-pole Contactor



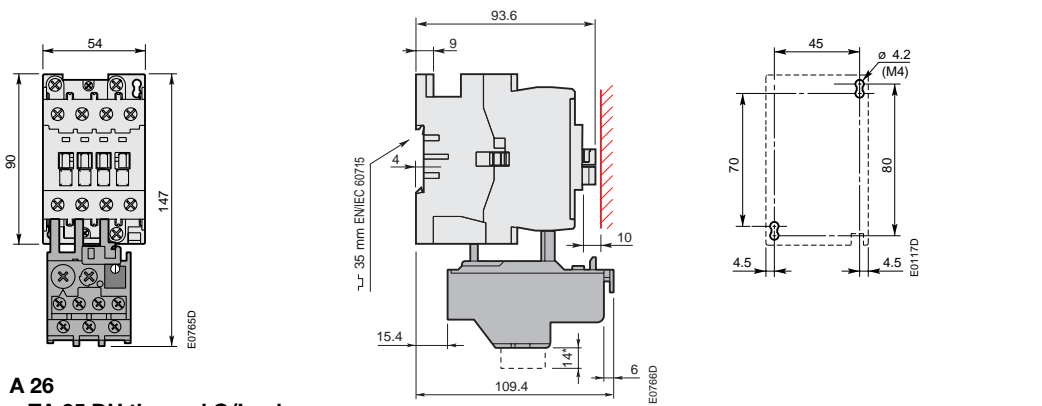
Dimensions (in mm)



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



A 26
+ VM 5-1 mechanical interlock unit



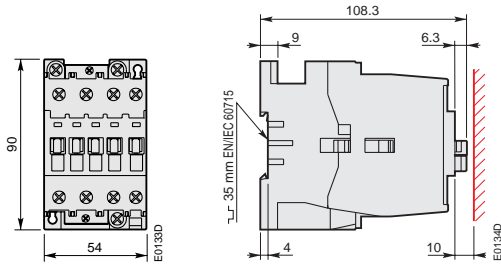
A 26
+ TA 25 DU thermal O/L relay

* For TA 25 DU 32 only

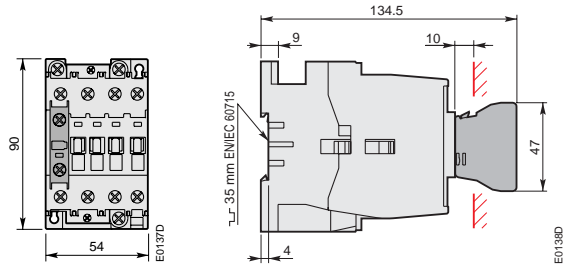
A 30 and A 40 3-pole Contactors



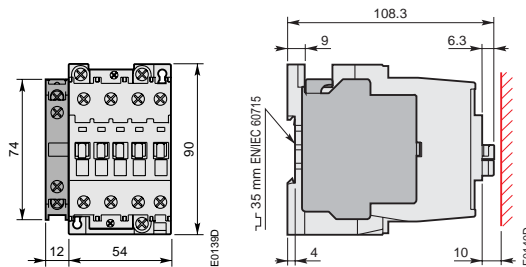
Dimensions (in mm)



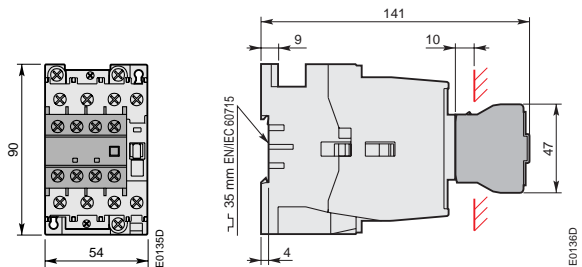
A 30, A 40



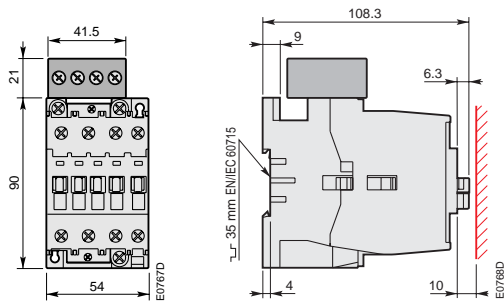
**A 30, A 40
+ CA 5 front-mounted 1-pole auxiliary contact block**



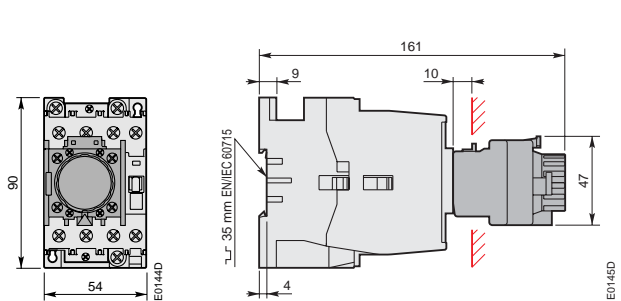
**A 30, A 40
+ CAL 5 side-mounted 2-pole auxiliary contact block**



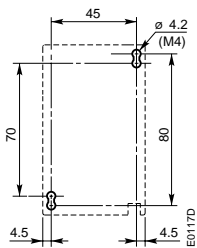
**A 30, A 40
+ CA 5 front-mounted 4-pole auxiliary contact block
and corresponding 2-stack versions**



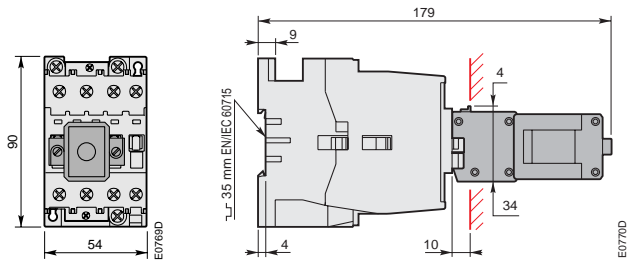
**A 30, A 40
+ RA 5 interface relay**



**A 30, A 40
+ TP pneumatic timer**



A 30, A 40 drilling plan

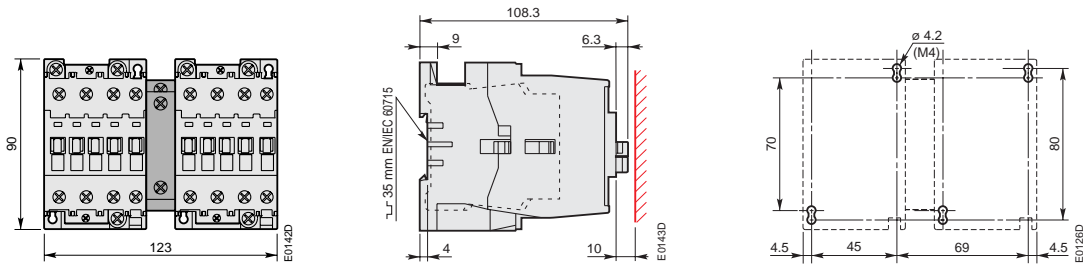


**A 30, A 40
+ WB 75-A on-position latch**

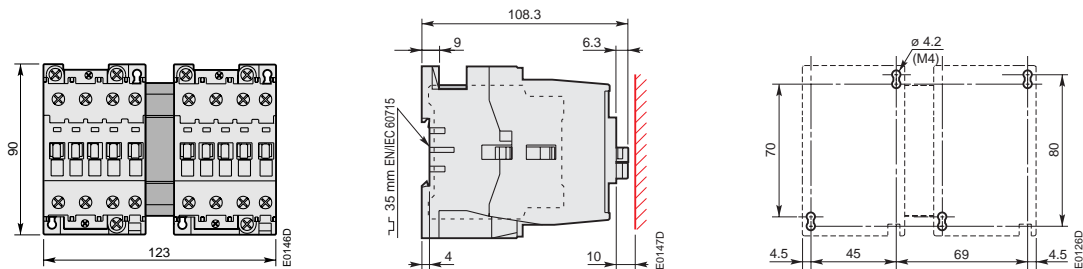
A 30 and A 40 3-pole Contactors



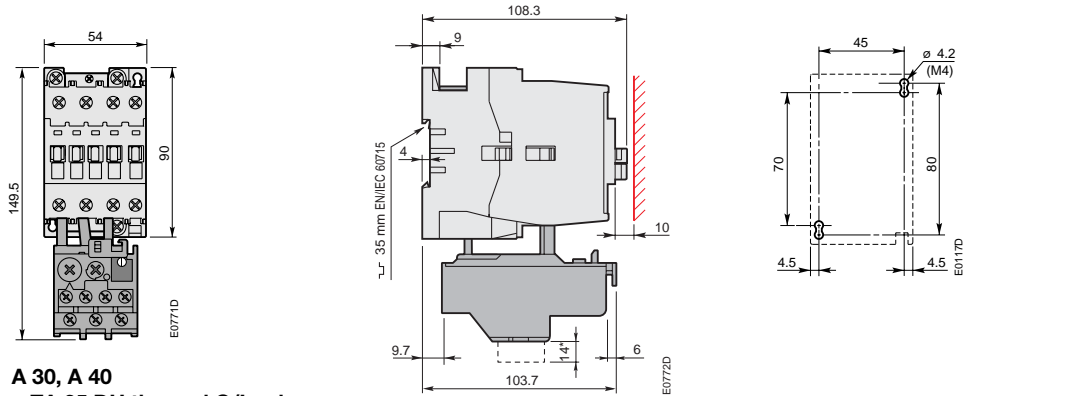
Dimensions (in mm)



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

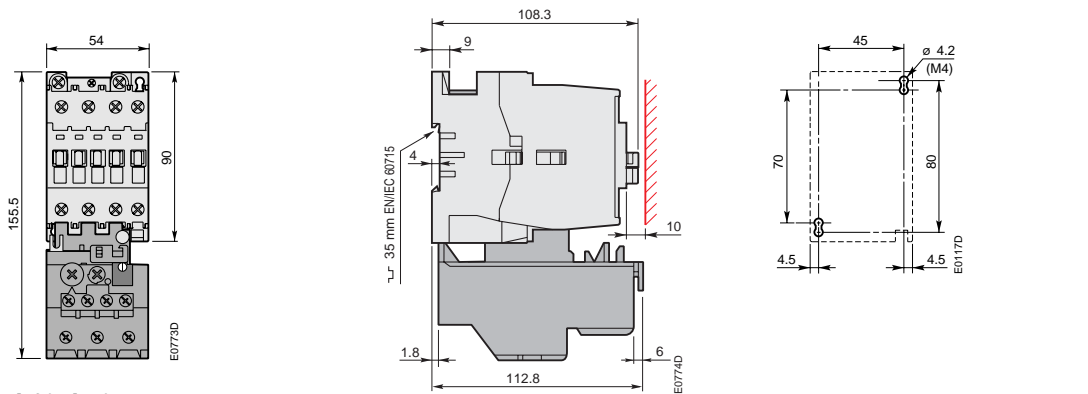


A 30, A 40
+ VM 5-1 mechanical interlock unit



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

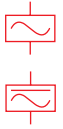
* For TA 25 DU 32 only



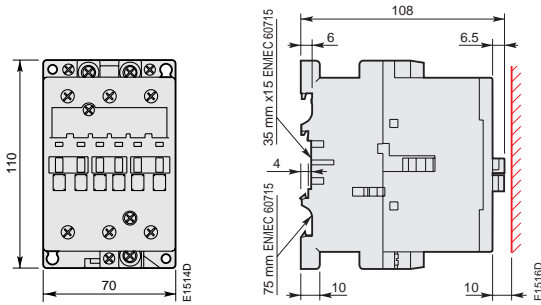
A 30, A 40
+ TA 42 DU thermal O/L relay

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

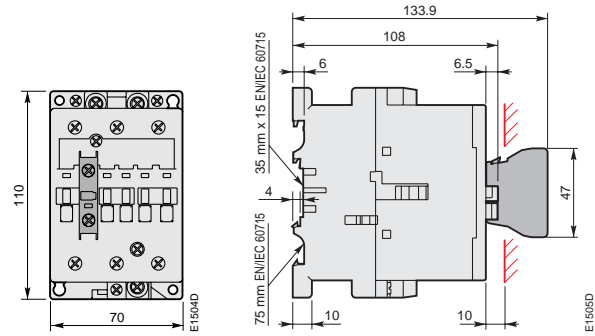
AF 50, AF 63 and AF 75 3-pole Contactors



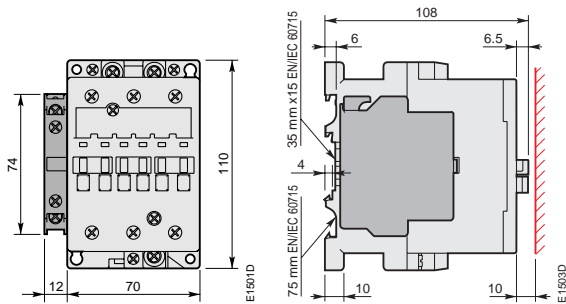
Dimensions (in mm)



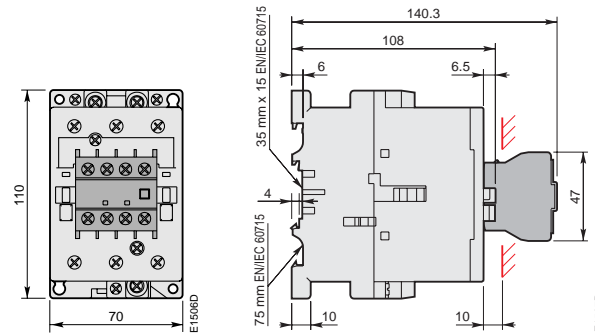
A 50, A 63, A 75, AF 50, AF 63, AF 75



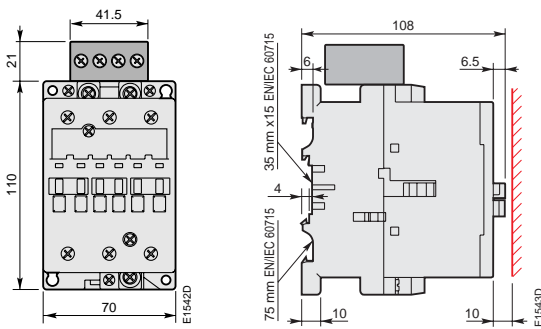
A 50, A 63, A 75, AF 50, AF 63, AF 75
+ CA 5 front-mounted 1-pole auxiliary contact block



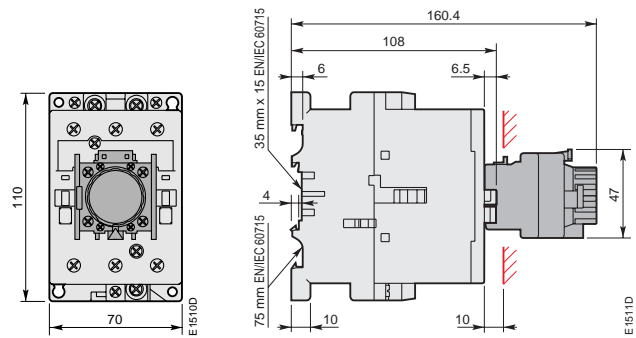
A 50, A 63, A 75, AF 50, AF 63, AF 75
+ CAL 5 side-mounted 2-pole auxiliary contact block



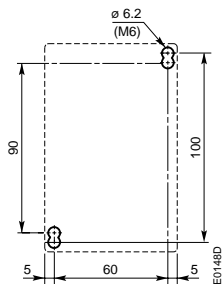
A 50, A 63, A 75, AF 50, AF 63, AF 75
+ CA 5 front-mounted 4-pole auxiliary contact block
and corresponding 2-stack versions



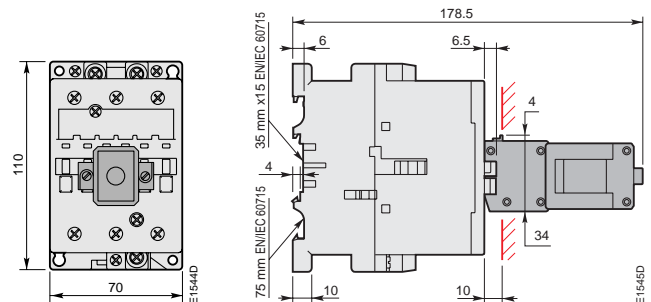
A 50, A 63, A 75, AF 50, AF 63, AF 75
+ RA 5 interface relay



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



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

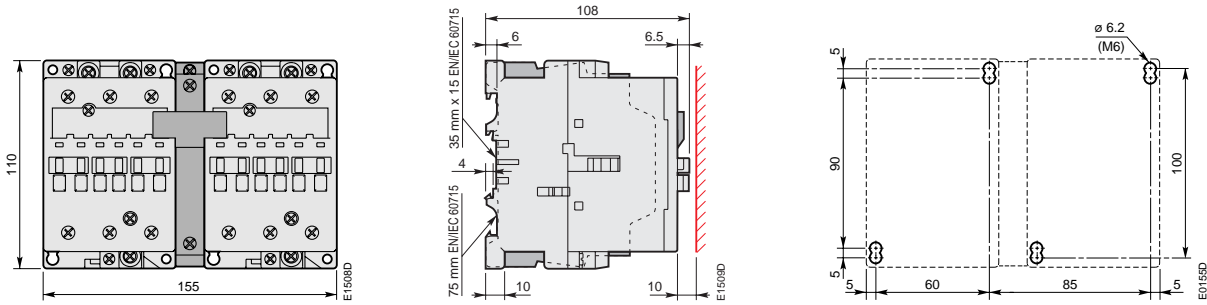


A 50, A 63, A 75, AF 50, AF 63, AF 75
+ WB 75-A on-position latch

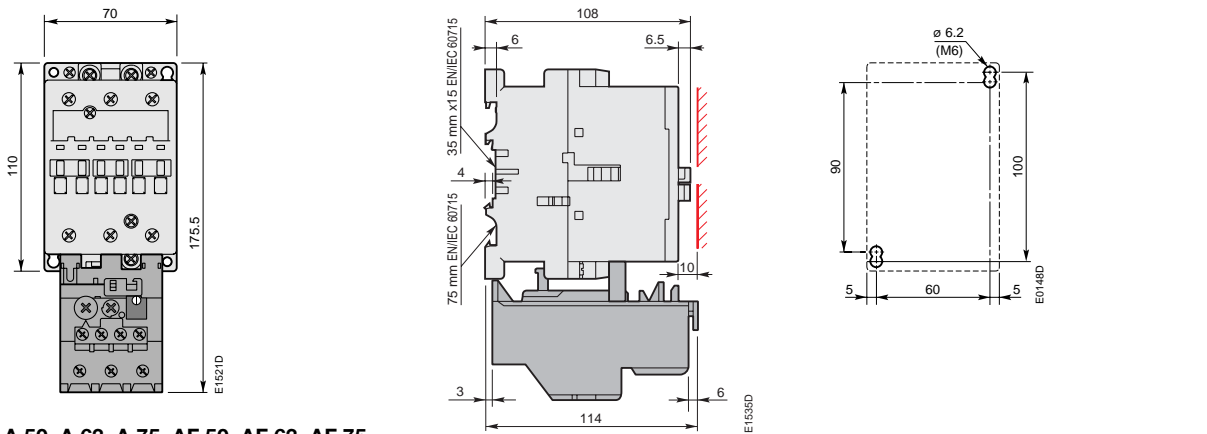
A 50, A 63 and A 75 3-pole Contactors AF 50, AF 63 and AF 75 3-pole Contactors



Dimensions (in mm)

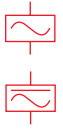


**A 50, A 63, A 75, AF 50, AF 63, AF 75
+ VE 5-2 electrical and mechanical interlock unit**

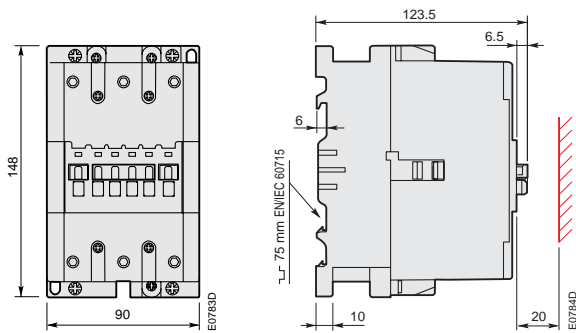


**A 50, A 63, A 75, AF 50, AF 63, AF 75
+ TA 75 DU thermal O/L relay**

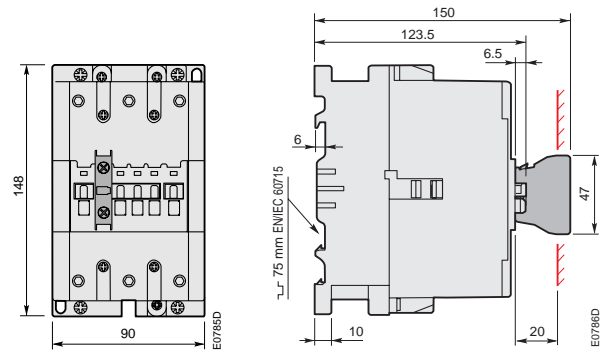
A 95 and A 110 3-pole Contactors AF 95 and AF 110 3-pole Contactors



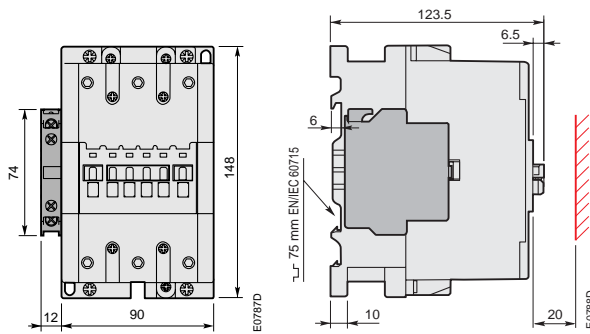
Dimensions (in mm)



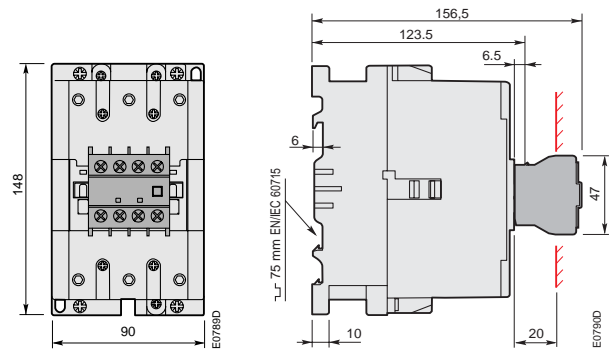
A 95, A 110, AF 95, AF 110



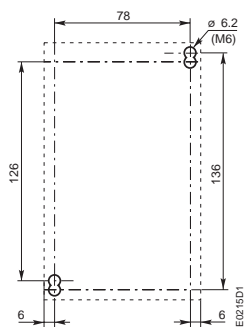
A 95, A 110, AF 95, AF 110
+ CA 5 front-mounted 1-pole auxiliary contact block



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



A 95, A 110, AF 95, AF 110
+ CA 5 front-mounted 4-pole auxiliary contact block
and corresponding 2-stack versions

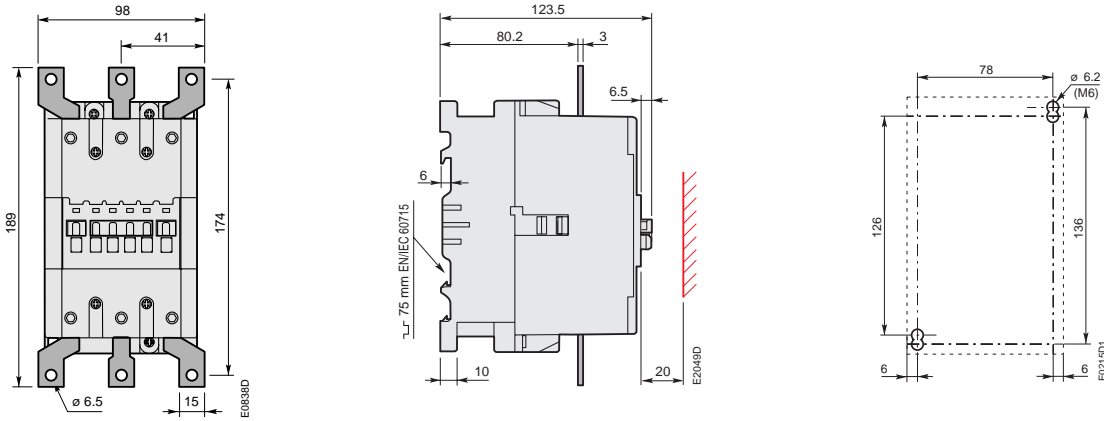


A 95, A 110, AF 95, AF 110 drilling plan

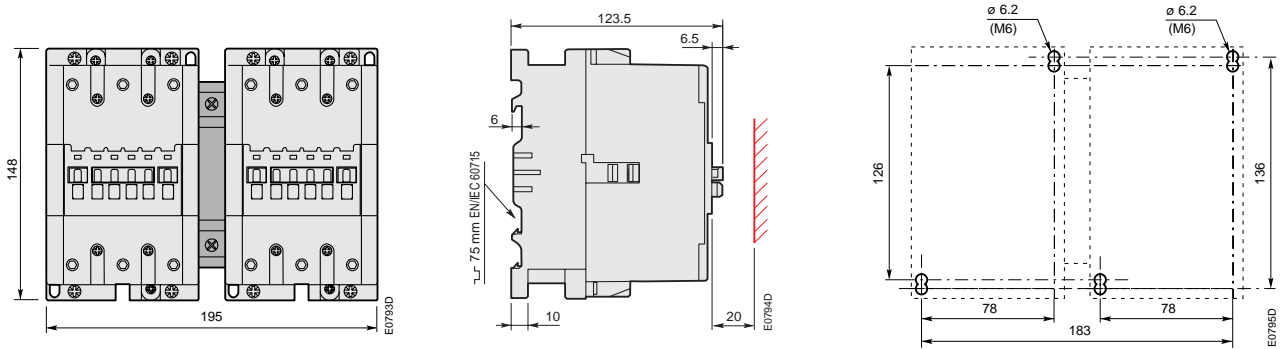
A 95 and A 110 3-pole Contactors AF 95 and AF 110 3-pole Contactors



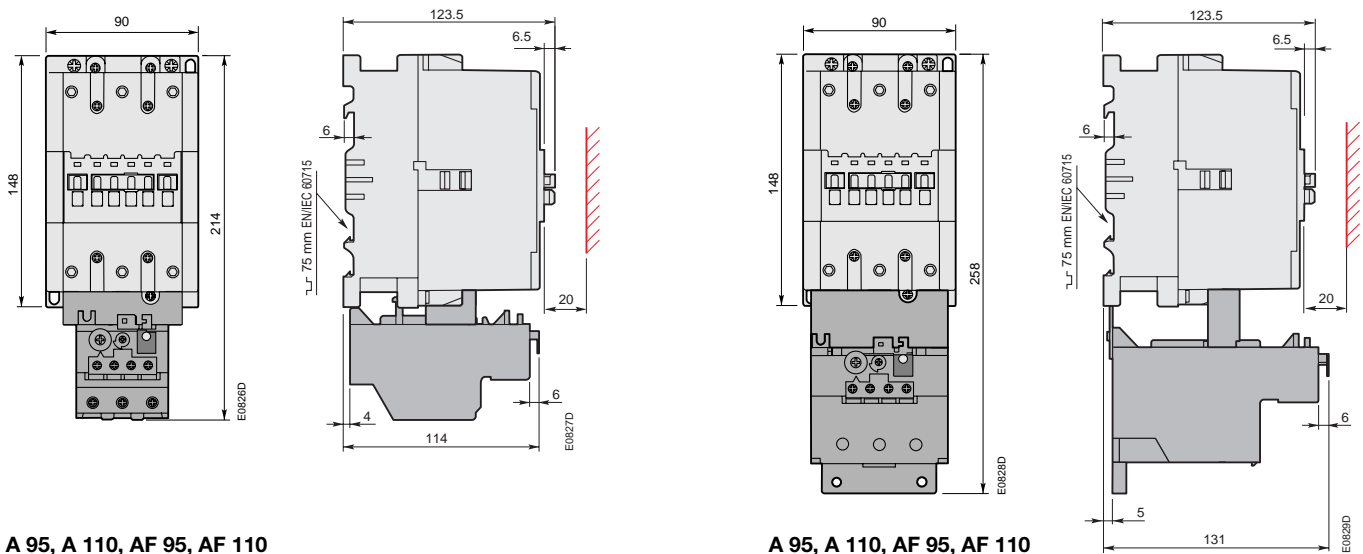
Dimensions (in mm)



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



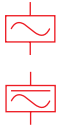
A 95, A 110, AF 95, AF 110
+ VE 5-2 electrical and mechanical interlock unit



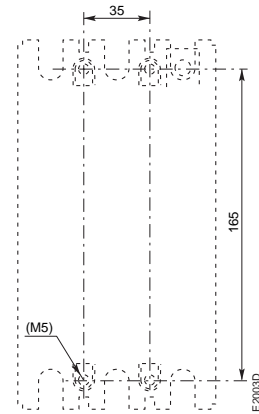
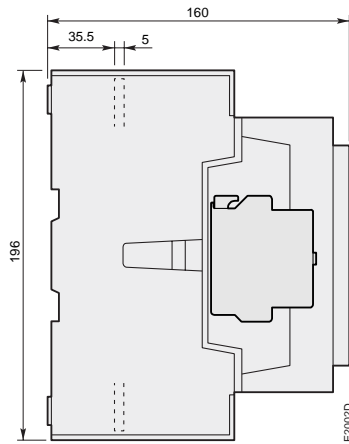
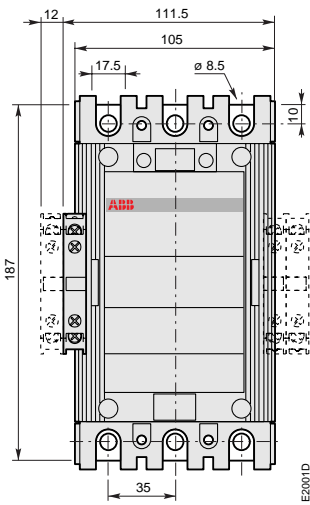
A 95, A 110, AF 95, AF 110
+ TA 80 DU thermal O/L relay

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

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

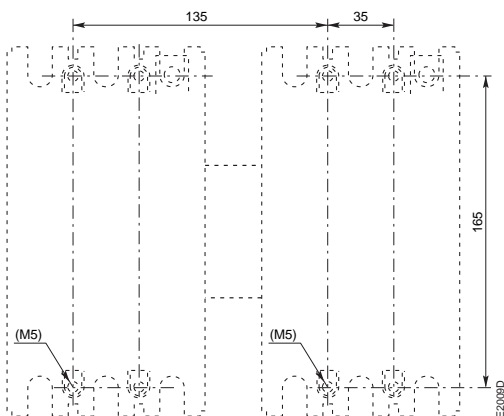
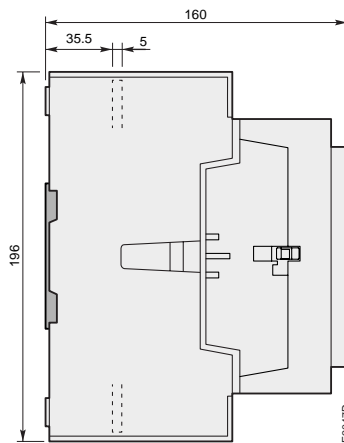
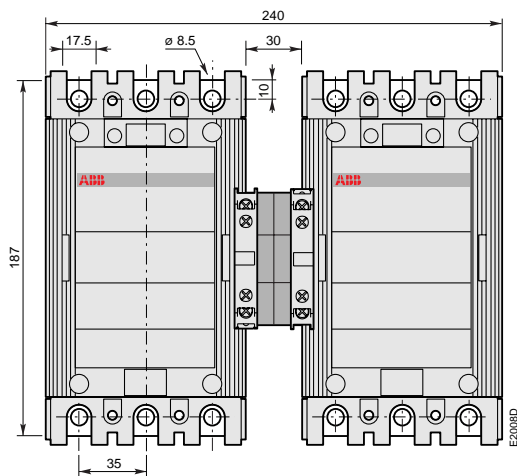


Dimensions (in mm)



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

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

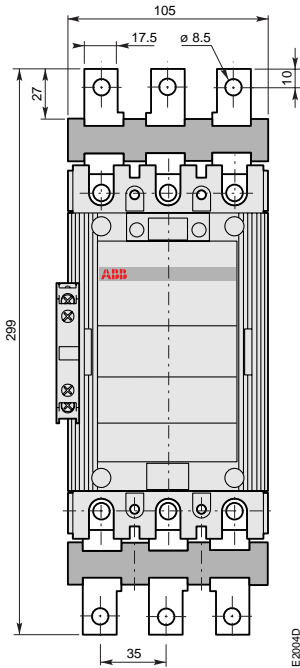


**A 145, A 185, AF 145, AF 185 c/w 1 x CAL18
+ VM 300H mechanical interlock unit**

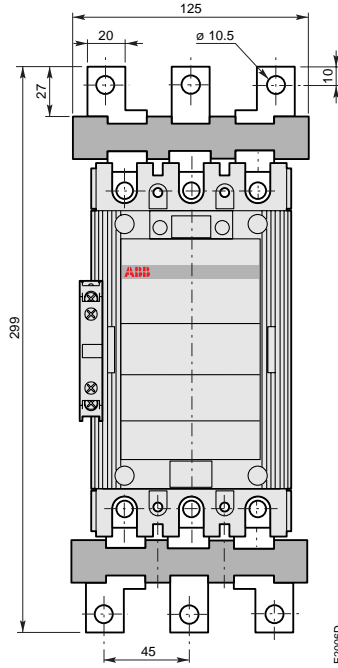
A 145 and A 185 3-pole Contactors AF 145 and AF 185 3-pole Contactors



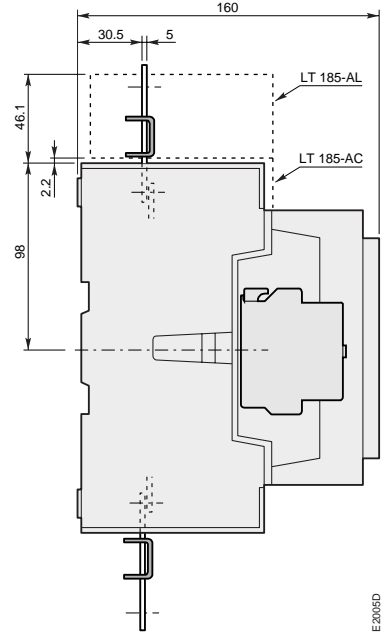
Dimensions (in mm)



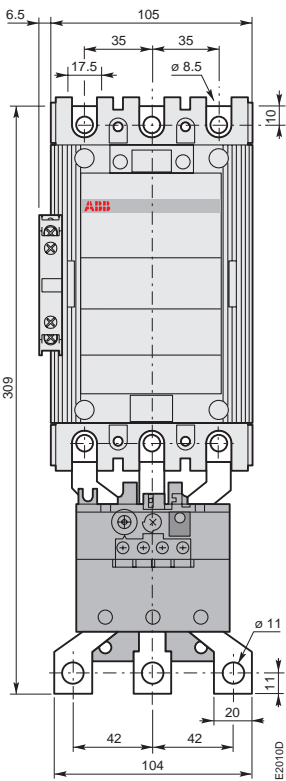
A 145, A 185, AF 145, AF 185 c/w 1 x CAL18 + LX 185 terminal extension



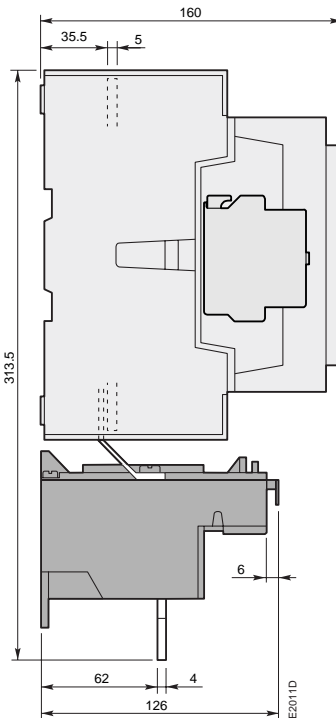
A 145, A 185, AF 145, AF 185 c/w 1 x CAL18 + LW 185 terminal enlargement



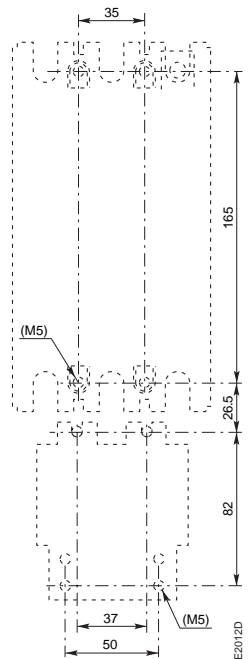
E2005D



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

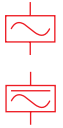


E2011D

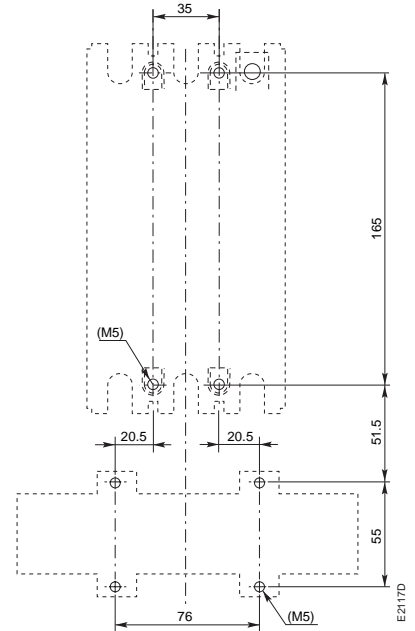
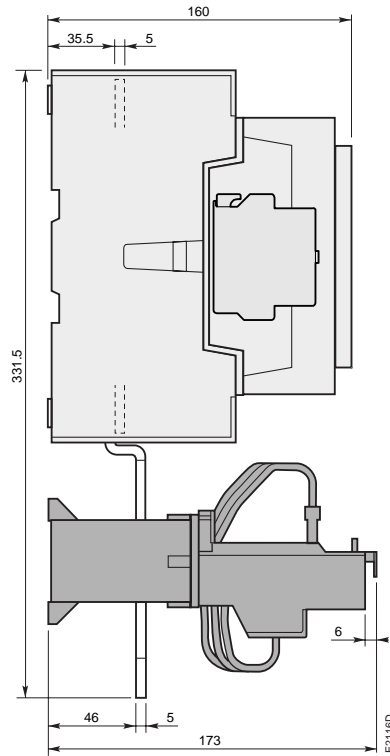
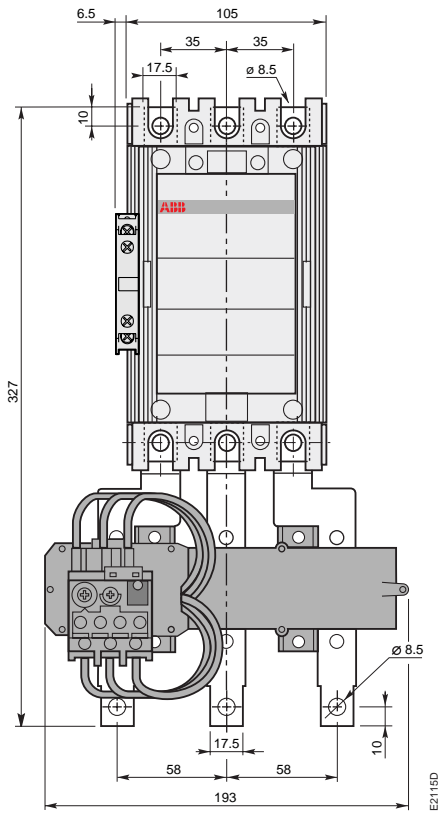


E2012D

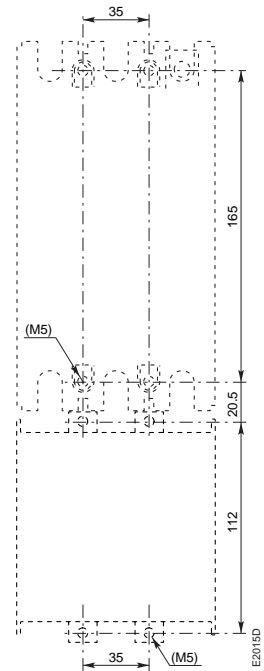
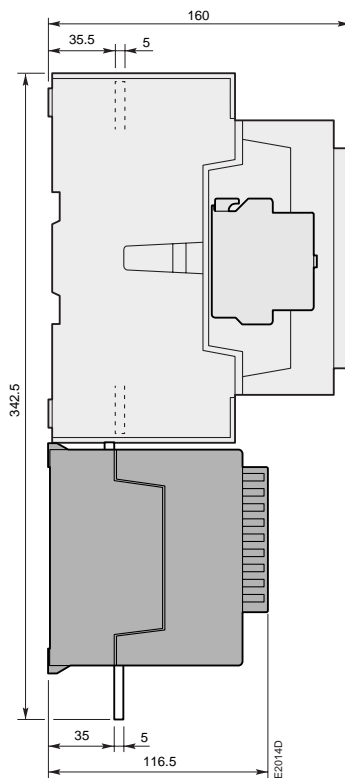
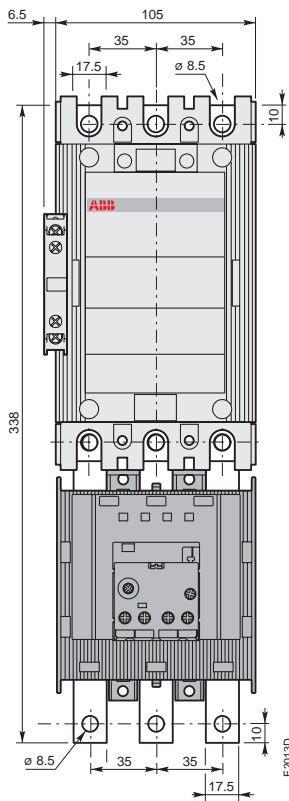
A 145 and A 185 3-pole Contactors AF 145 and AF 185 3-pole Contactors



Dimensions (in mm)



**A 145, A 185, AF 145, AF 185 c/w 1 x CAL18
+ TA 450 DU/SU thermal O/L relay**

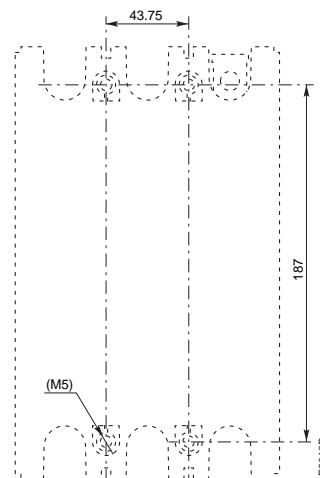
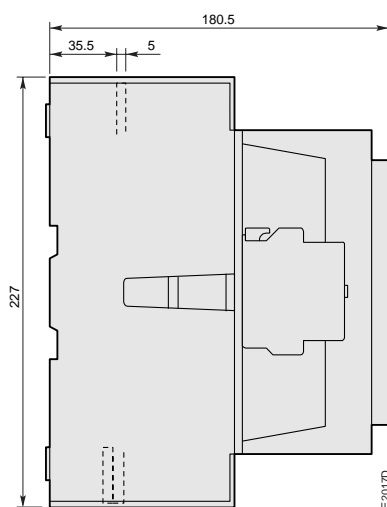
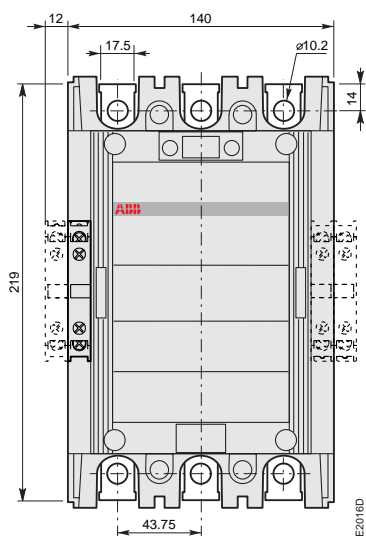


**A 145, A 185, AF 145, AF 185 c/w 1 x CAL18
+ E 200 DU electronic O/L relay**

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

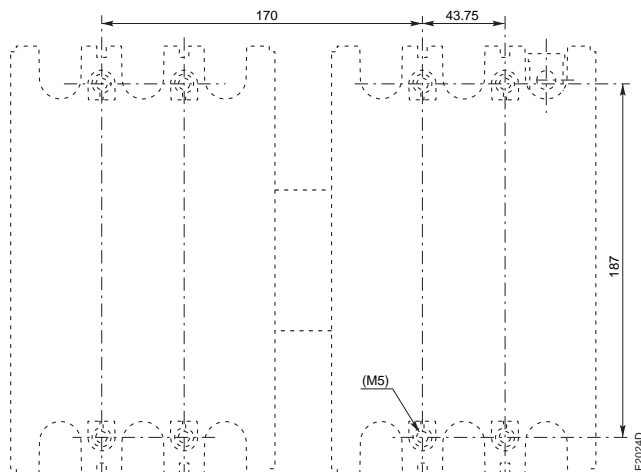
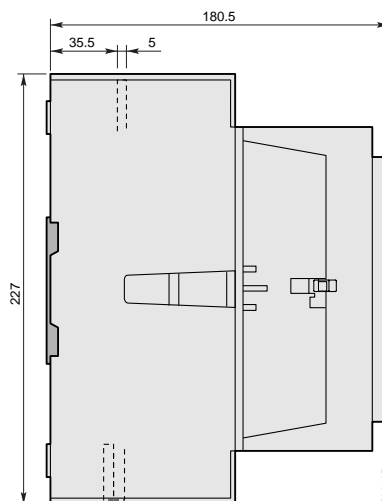
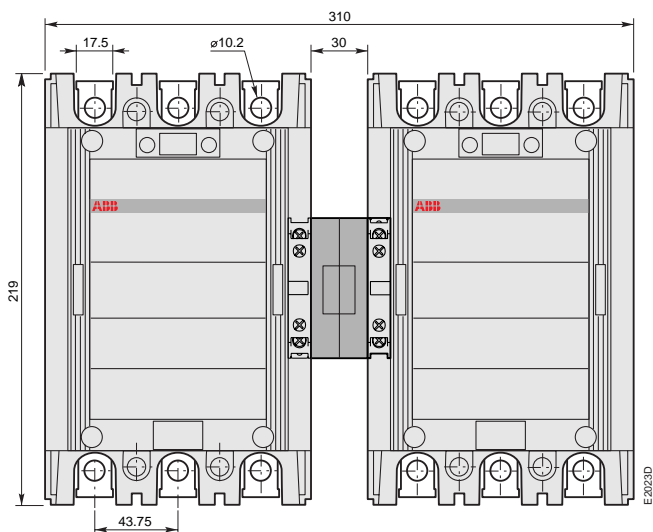


Dimensions (in mm)



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

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



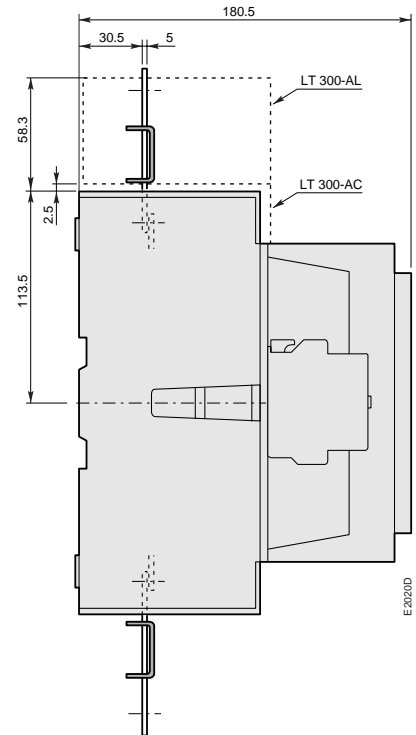
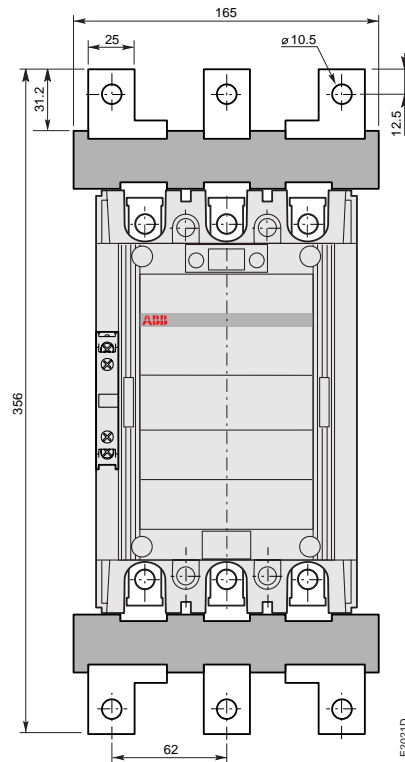
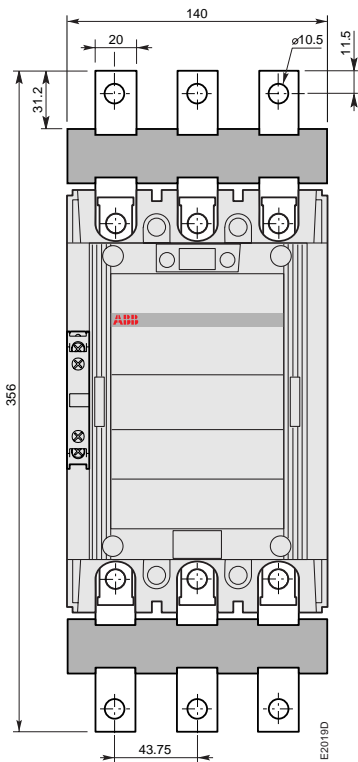
A 210, A 260, A 300, AF 210, AF 260, AF 300 c/w 1 x CAL18
+ VM 300H mechanical interlock unit

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

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

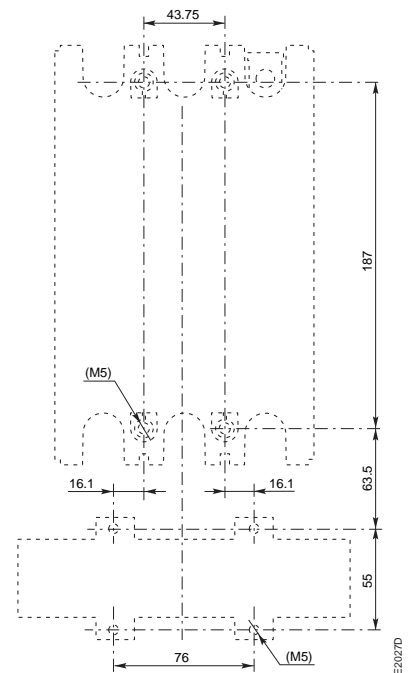
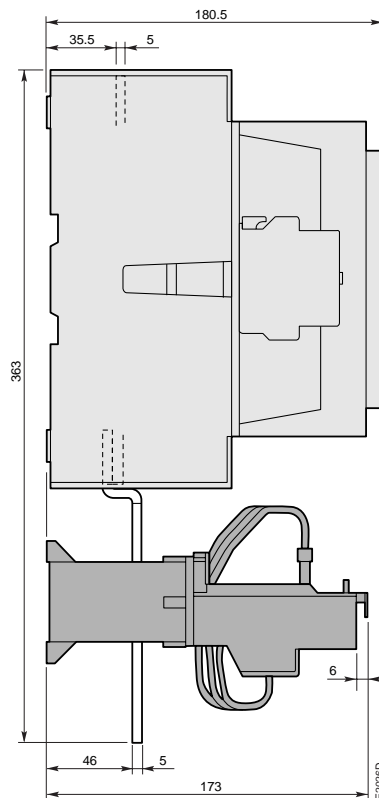
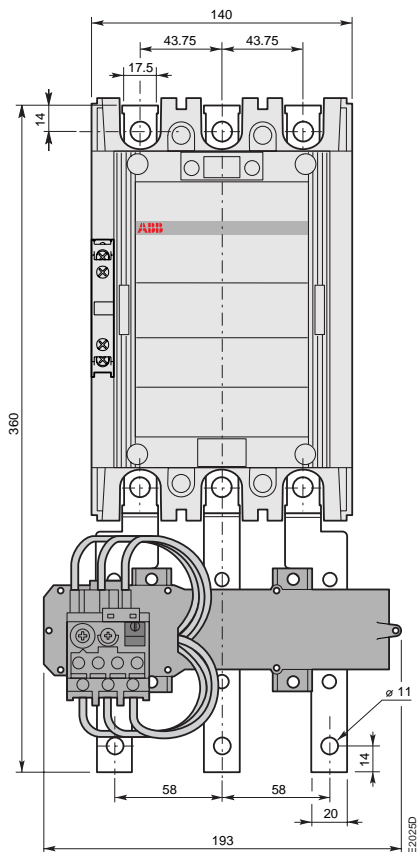


Dimensions (in mm)



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

A 210, A 260, A 300, AF 210, AF 260, AF 300
c/w 1 x CAL18 + LW 300 terminal enlargement

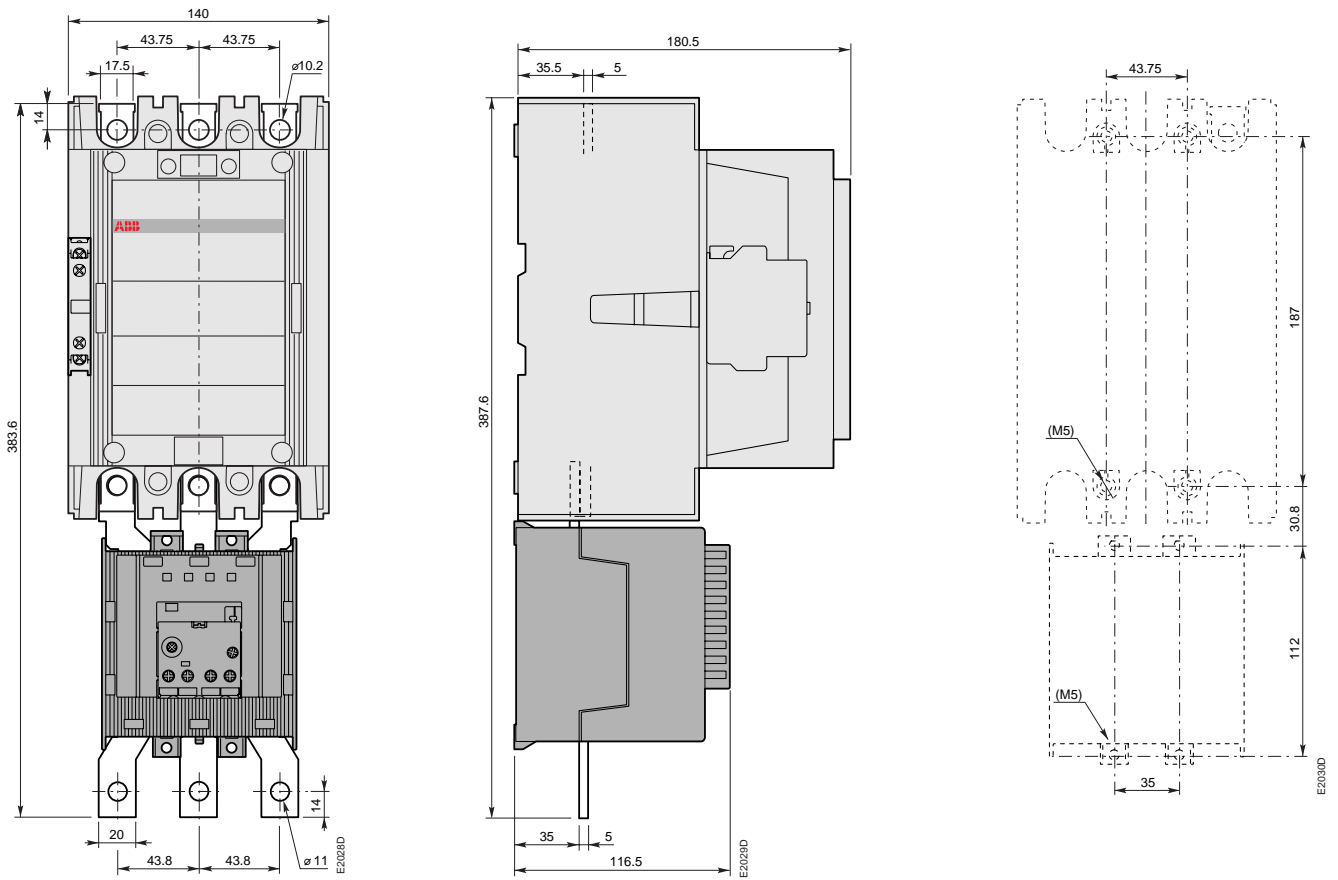


A 210, A 260, A300, AF 210, AF 260, AF 300 c/w 1 x CAL18
+ TA 450 DU/SU thermal O/L relay

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



Dimensions (in mm)

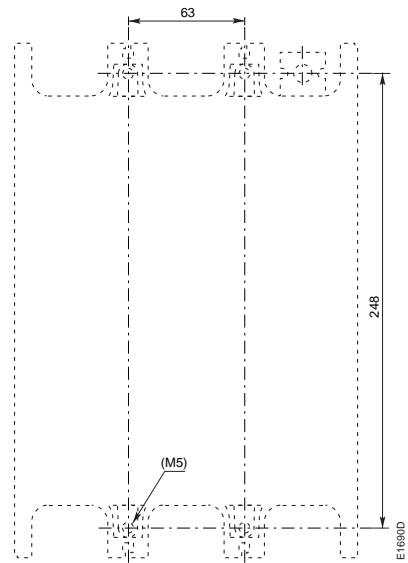
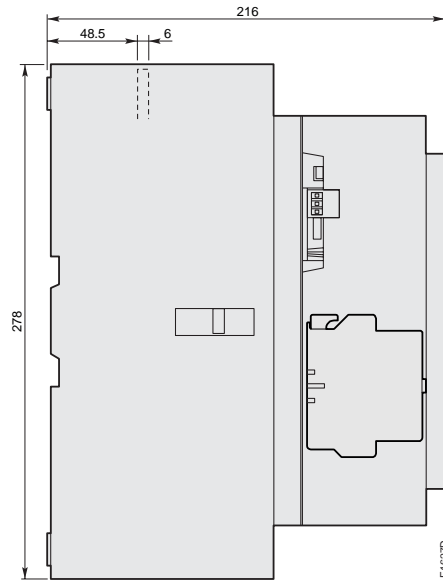
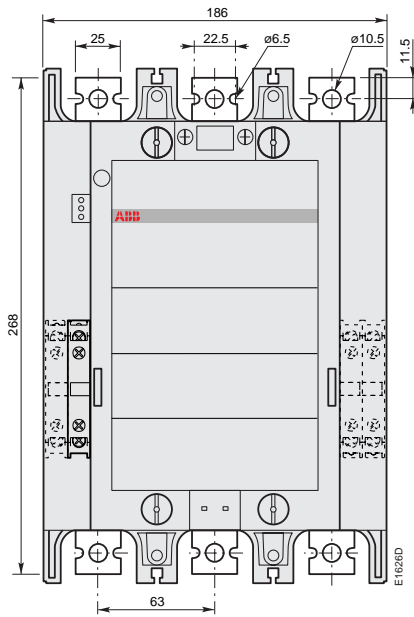


**A 210, A 260, A300, AF 210, AF 260, AF 300 c/w 1 x CAL18
+ E 320 DU electronic O/L relay**

AF 400 and AF 460 3-pole Contactors

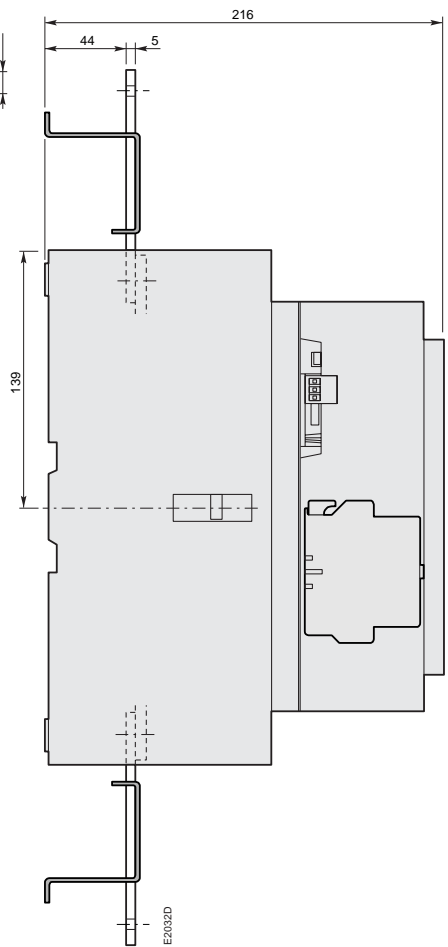
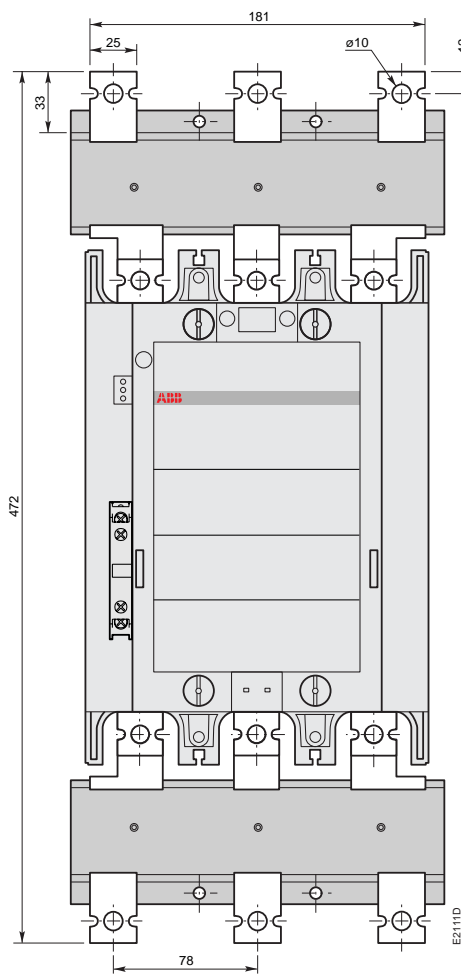
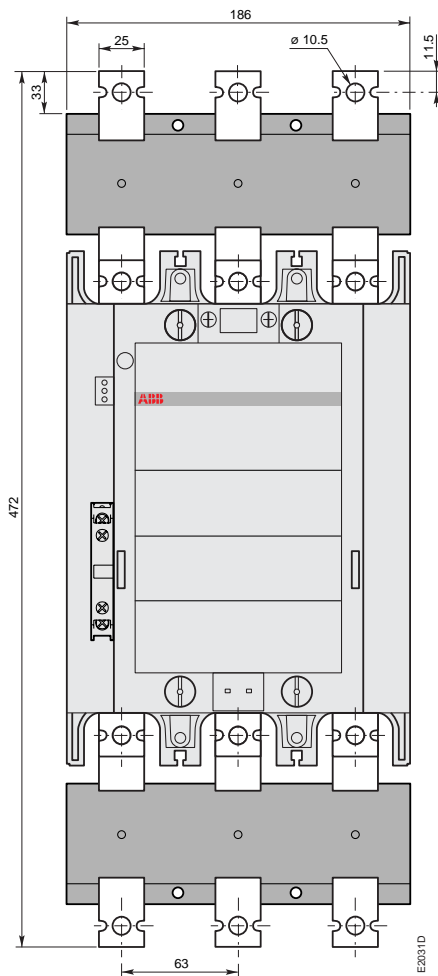


Dimensions (in mm)



AF 400, AF 460 c/w 1 x CAL18

AF 400, AF 460 drilling plan



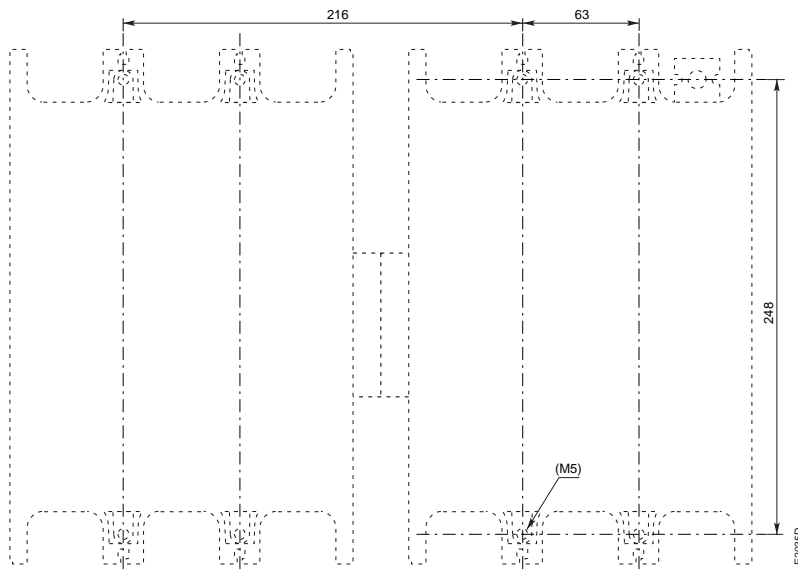
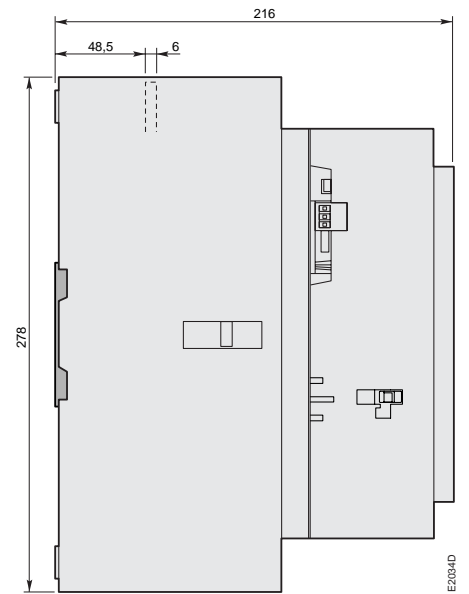
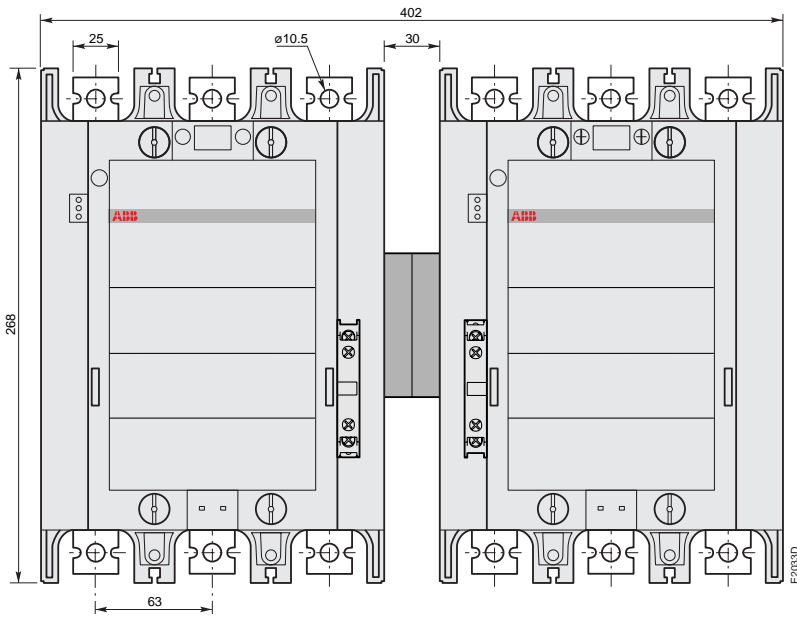
AF 400, AF 460 c/w 1 x CAL18
+ LX 460 terminal extension

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

AF 400 and AF 460 3-pole Contactors



Dimensions (in mm)

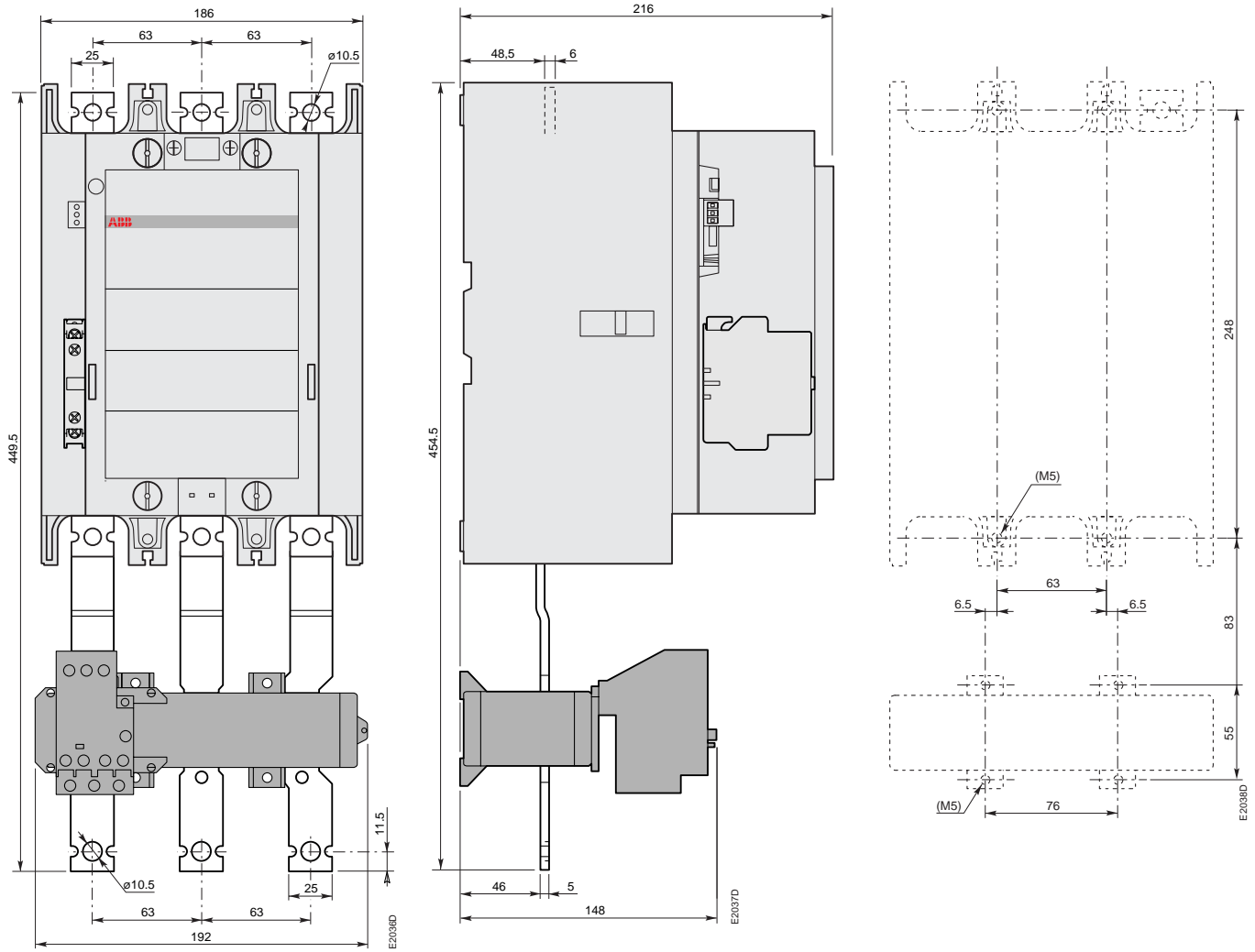


**AF 400, AF 460 c/w 1 x CAL18
+ VM 750H mechanical interlock unit**

AF 400 and AF 460 3-pole Contactors



Dimensions (in mm)

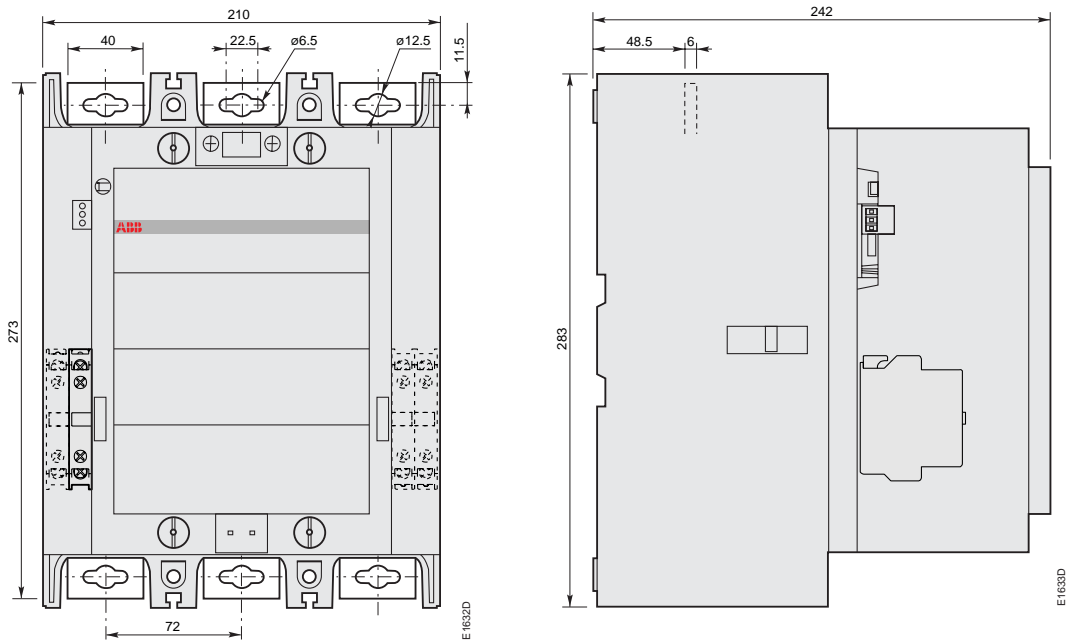


**AF 400, AF 460 c/w 1 x CAL18
+ E 500 DU electronic O/L relay**

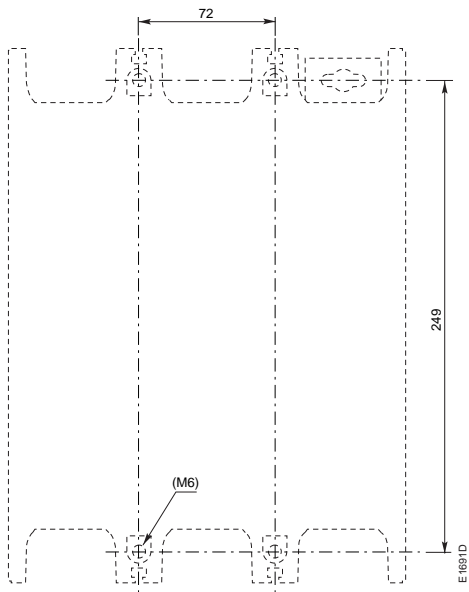
AF 580 and AF 750 3-pole Contactors



Dimensions (in mm)



AF 580, AF 750 c/w 1 x CAL18

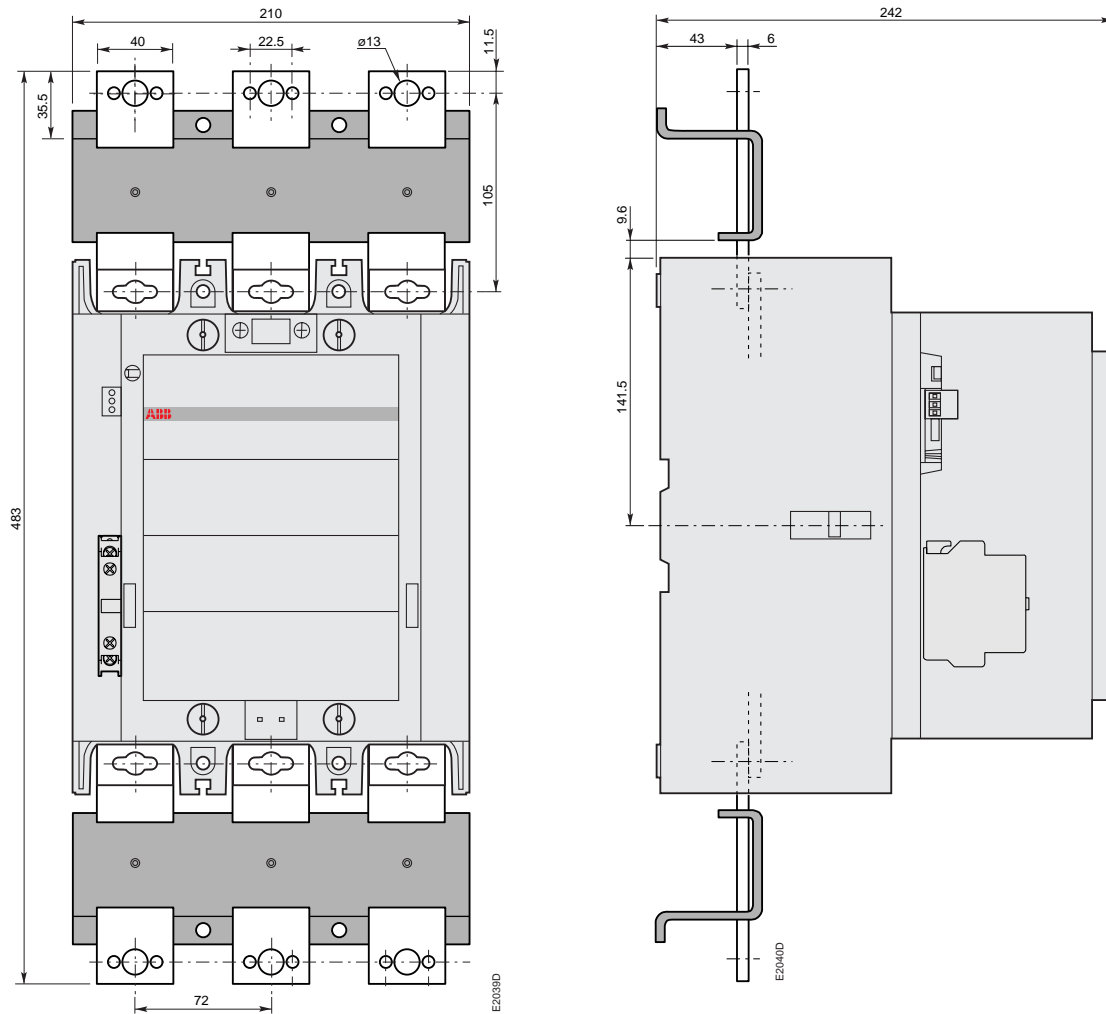


AF 580, AF 750 drilling plan

AF 580 and AF 750 3-pole Contactors



Dimensions (in mm)

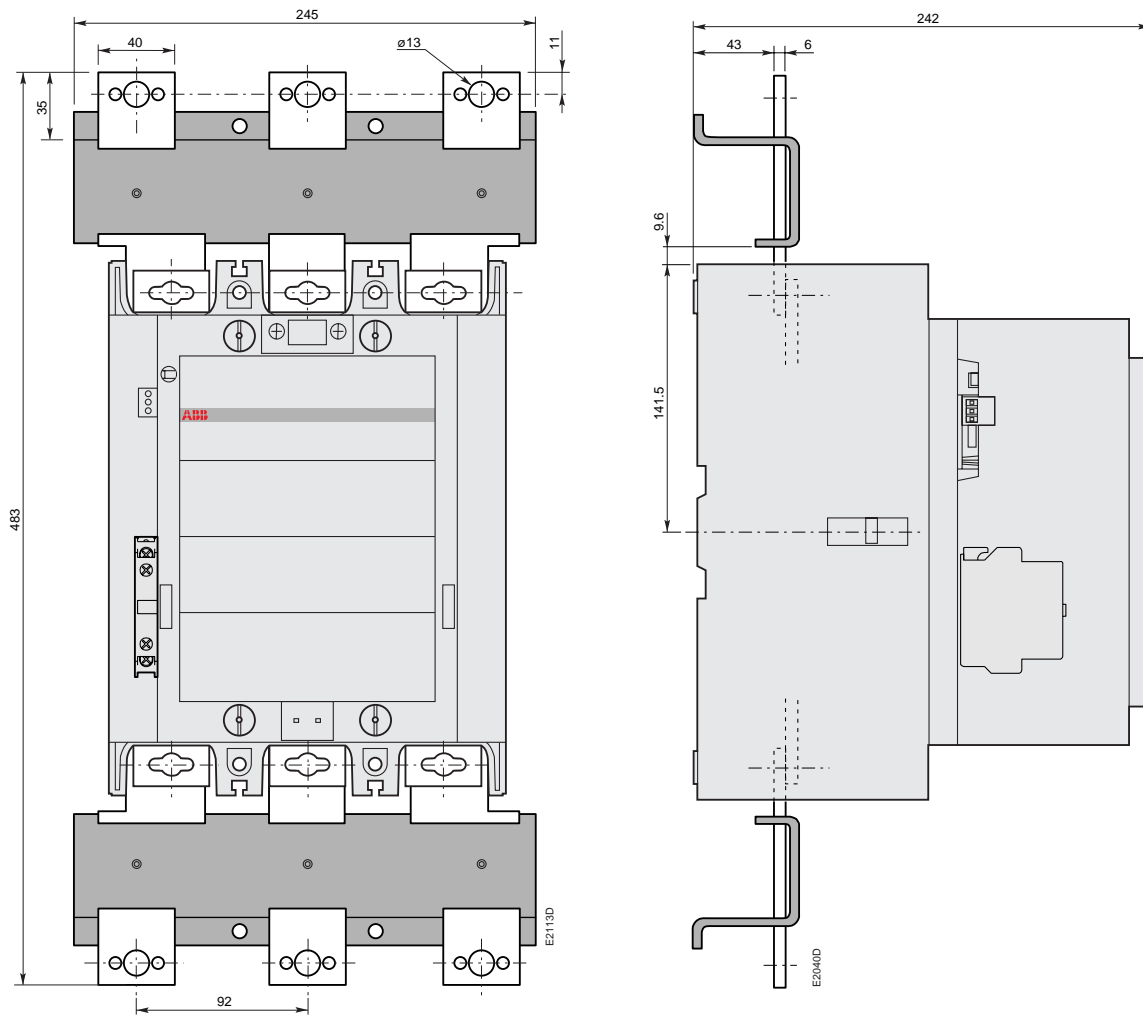


**AF 580, AF 750 c/w 1 x CAL18
+ LX 750 terminal extension**

AF 580 and AF 750 3-pole Contactors



Dimensions (in mm)

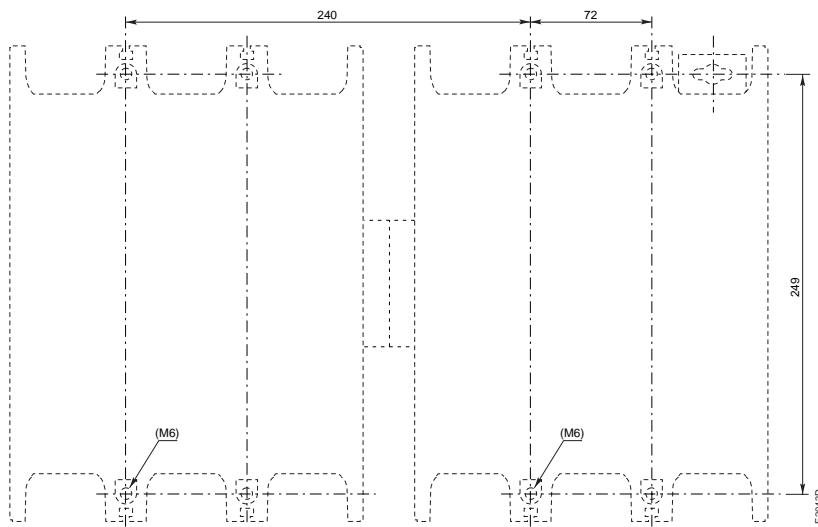
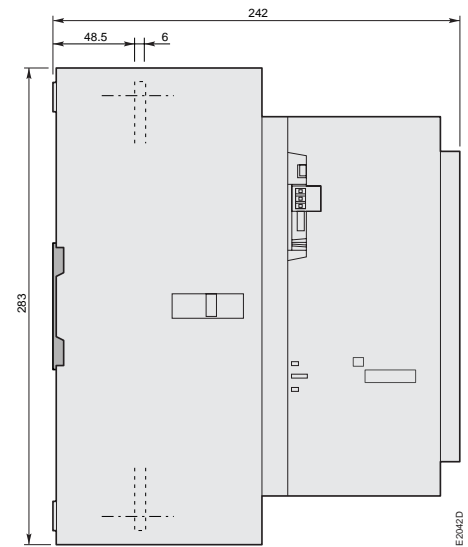
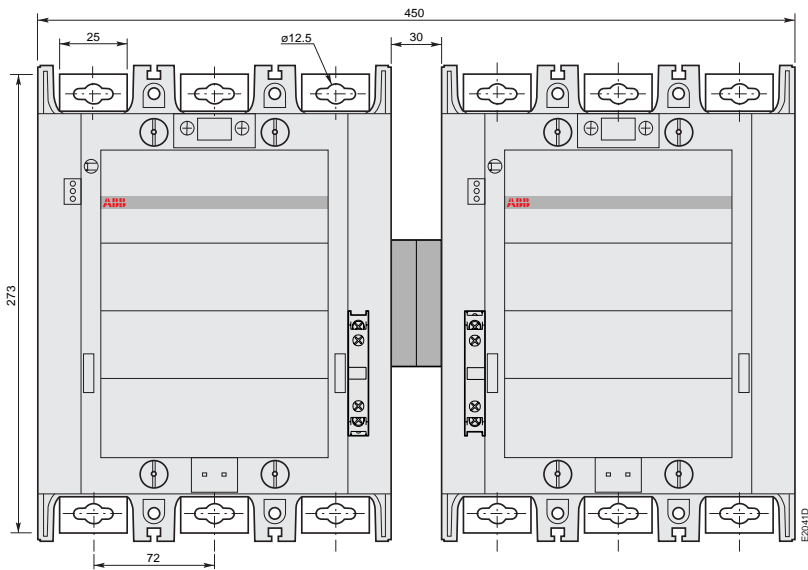


**AF 580, AF 750 c/w 1 x CAL18
+ LW 750 terminal enlargement**

AF 580 and AF 750 3-pole Contactors



Dimensions (in mm)

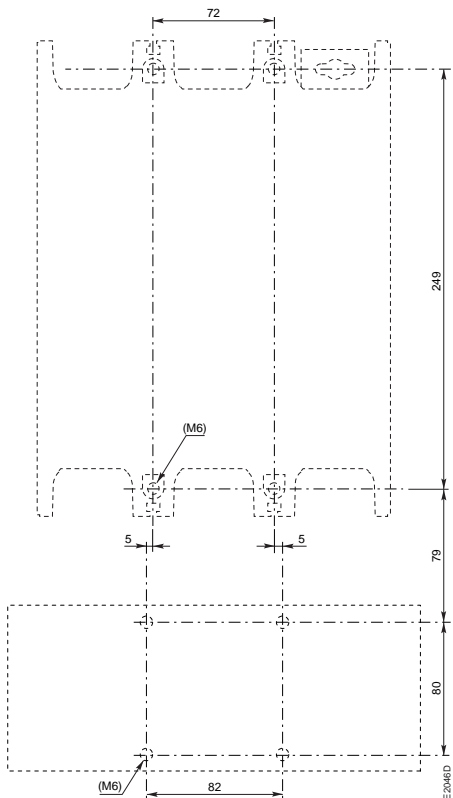
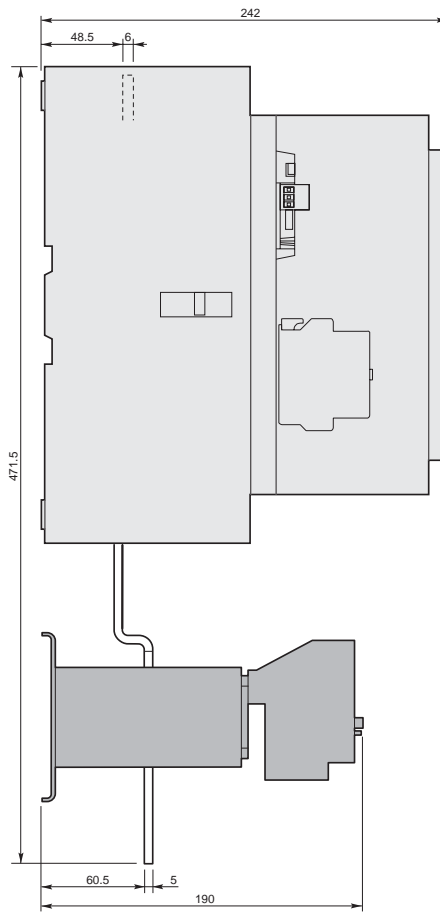
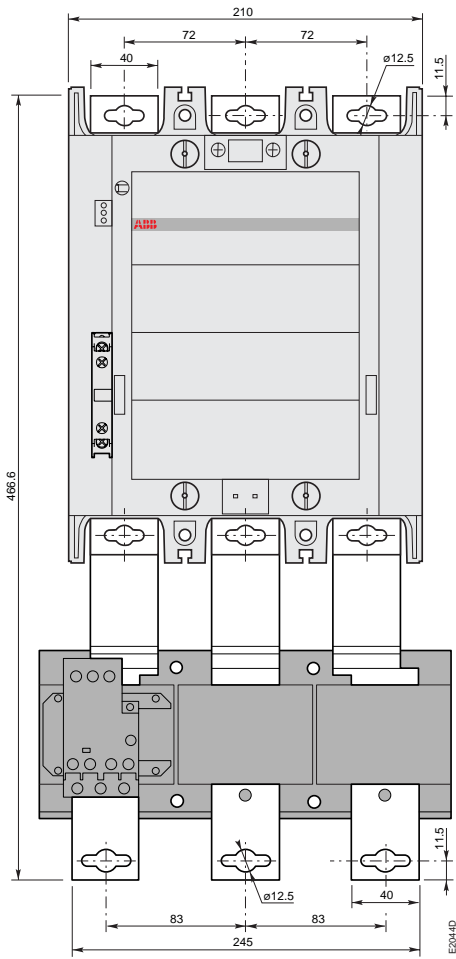


**AF 580, AF 750 c/w 1 x CAL18
+ VM 750H mechanical interlock unit**

AF 580 and AF 750 3-pole Contactors



Dimensions (in mm)

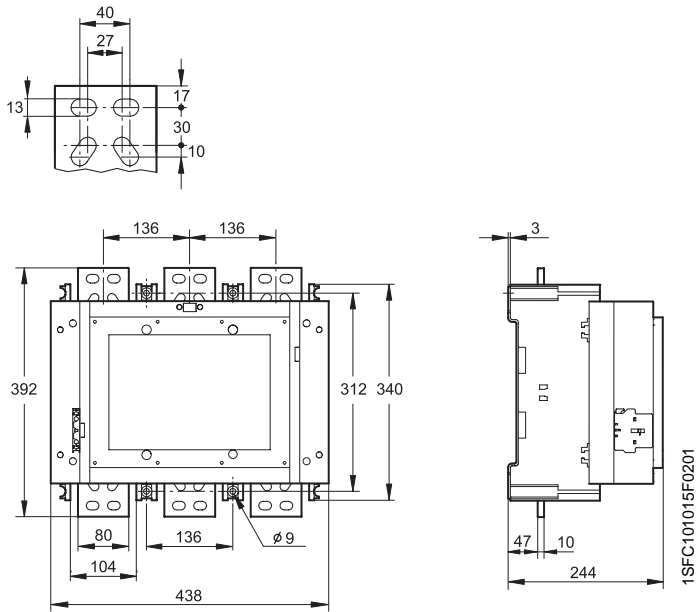


**AF 580, AF 750 c/w 1 x CAL18
+ E 800 DU electronic O/L relay**

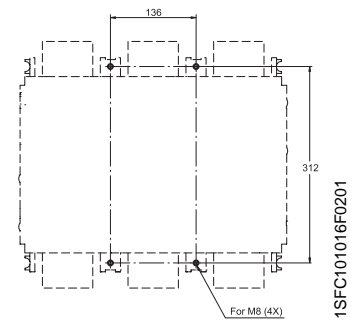
AF 1350 and AF 1650 3-pole Contactors



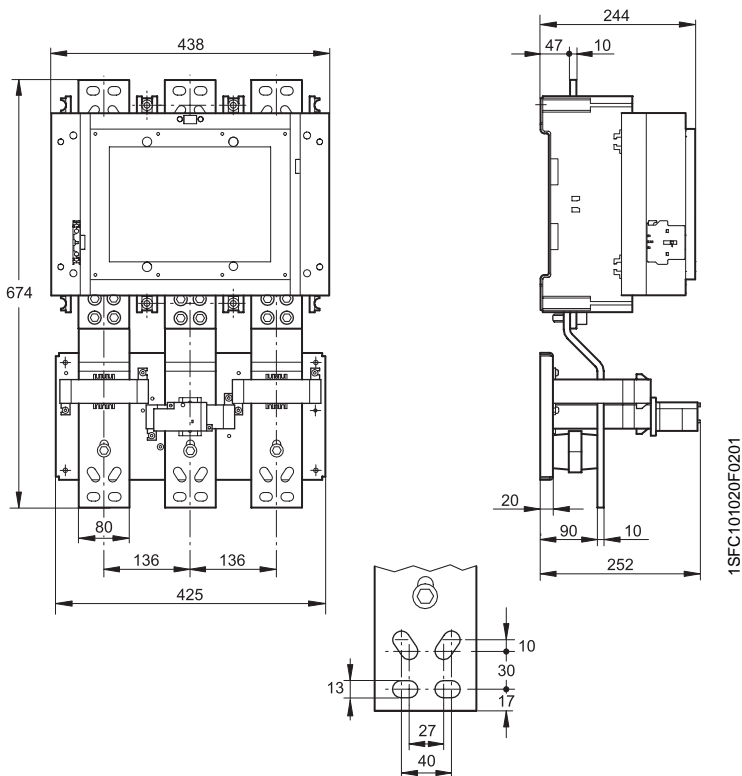
Dimensions (in mm)



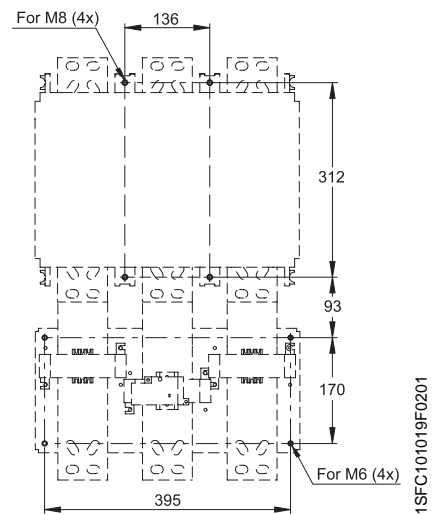
AF 1350, AF 1650



Drilling plan



AF 1350, AF 1650
+ E 1250 DU electronic O/L relay

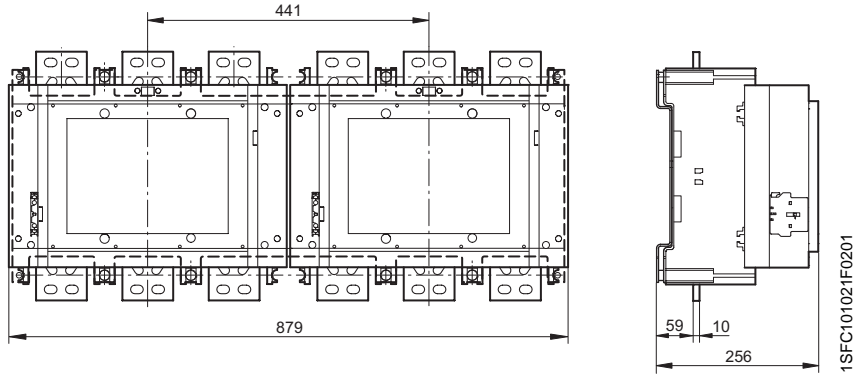


Drilling plan

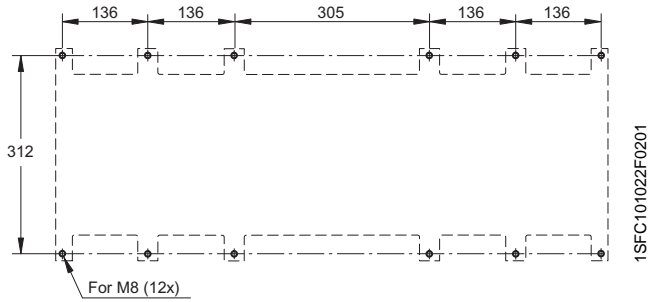
AF 1350 and AF 1650 3-pole Contactors



Dimensions (in mm)



AF 1350, AF 1650

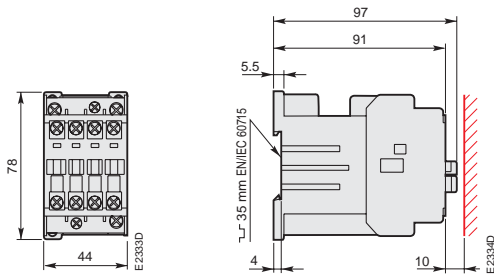


Drilling plan

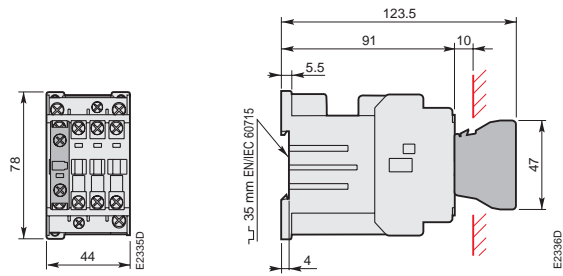
AL 9 ... 16, AL..Z., TAL 9 ... 16 3-pole Contactors



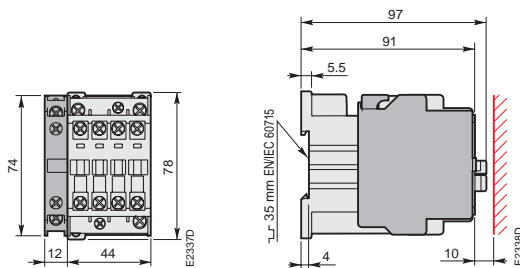
Dimensions (in mm)



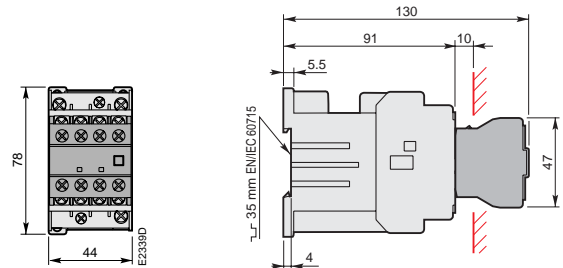
**AL 9 ... AL 16, AL..Z.,
TAL 9 ... TAL 16**



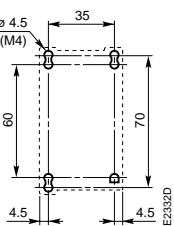
**AL 9 ... AL 16, AL..Z.,
TAL 9 ... TAL 16
+ CA 5 front-mounted 1-pole auxiliary contact block**



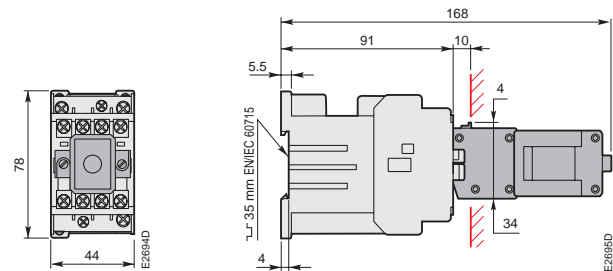
**AL 9 ... AL 16
TAL 9 ... TAL 16
+ CAL 5 side-mounted 2-pole auxiliary contact block**



**AL 9 ... AL 16
TAL 9 ... TAL 16
+ CA 5 front-mounted 4-pole auxiliary contact block
and corresponding 2-stack versions**



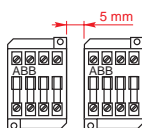
**AL 9 ... AL 16, AL..Z.,
TAL 9 ... TAL 16
drilling plan**



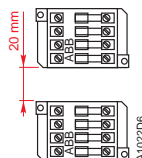
**AL 9 ... AL 16, AL..Z.,
TAL 9 ... TAL 16
+ WB 75-A on-position latch**

Mounting distance (for side by side mounting)

TAL 9 ... TAL 16
Position 1, 2, 5
 $20^{\circ}\text{C} \leq \theta \leq 55^{\circ}\text{C}$



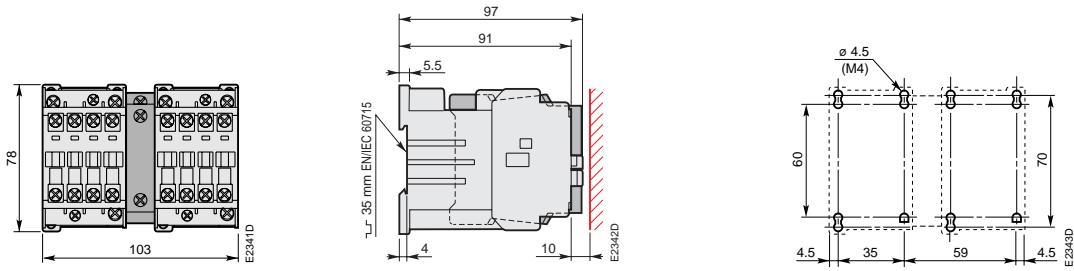
TAL 9 ... TAL 16
Position 3, 4
 $20^{\circ}\text{C} \leq \theta \leq 55^{\circ}\text{C}$



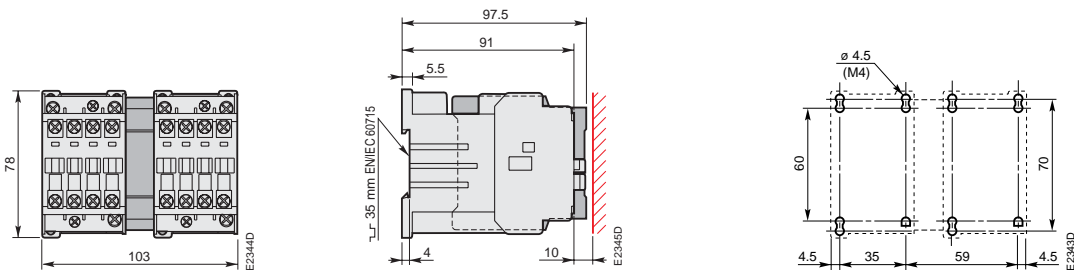
AL 9 ... 16, AL..Z., TAL 9 ... 16 3-pole Contactors



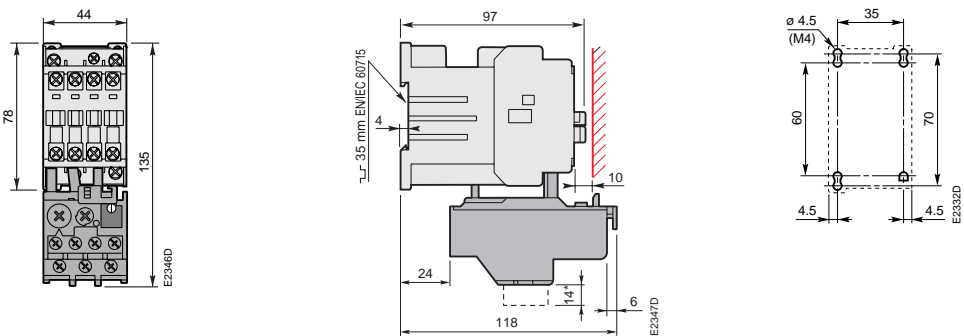
Dimensions (in mm)



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



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



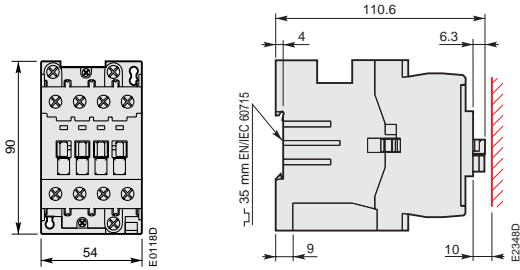
AL 9, AL 12, AL 16
AL 9 Z, AL 12 Z, AL 16 Z
TAL 9, TAL 12, TAL 16
 + TA 25 DU thermal O/L relay

* For TA 25 DU 32 only

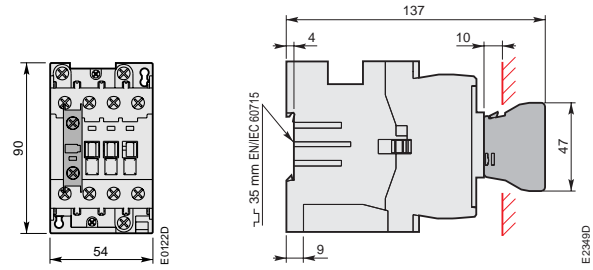
AL 26, TAL 26 3-pole Contactors



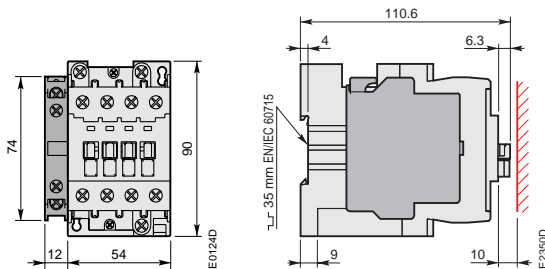
Dimensions (in mm)



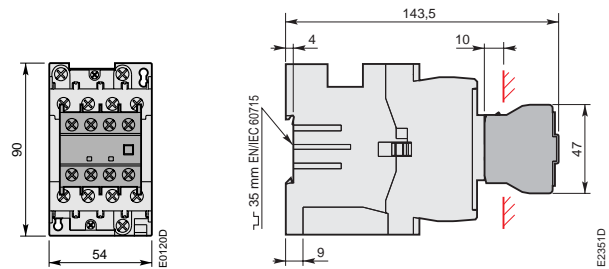
AL 26, TAL 26



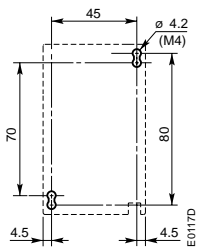
AL 26, TAL 26
+ CA 5 front-mounted 1-pole auxiliary contact block



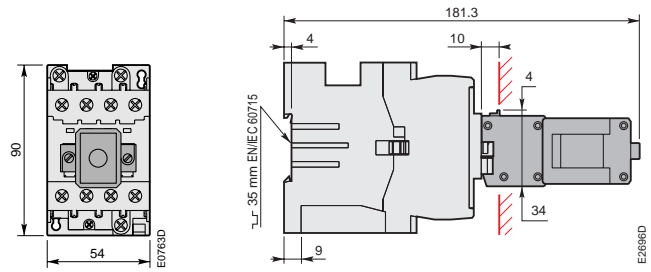
AL 26, TAL 26
+ CAL 5 side-mounted 2-pole auxiliary contact block



AL 26, TAL 26
+ CA 5 front-mounted 4-pole auxiliary contact block
and corresponding 2-stack versions



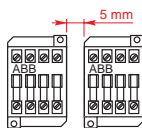
AL 26, TAL 26 - drilling plan



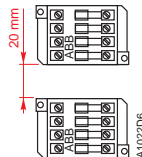
AL 26, TAL 26
+ WB 75-A on-position latch

Mounting distance (for side by side mounting)

TAL 26
Position 1, 2, 5
 $20^{\circ}\text{C} \leq \theta \leq 55^{\circ}\text{C}$



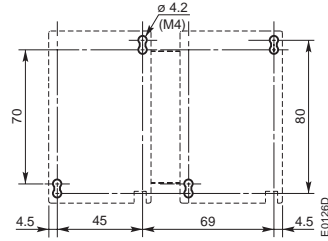
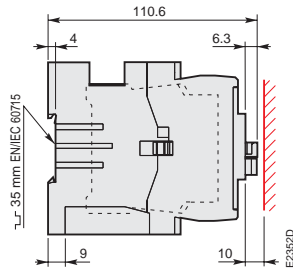
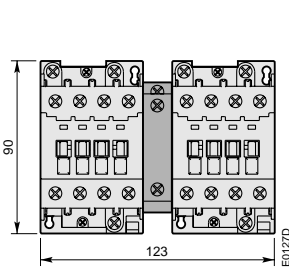
TAL 26
Position 3, 4
 $20^{\circ}\text{C} \leq \theta \leq 55^{\circ}\text{C}$



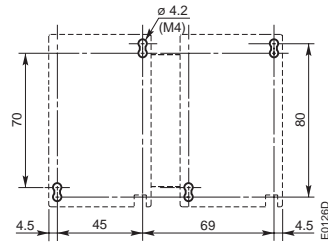
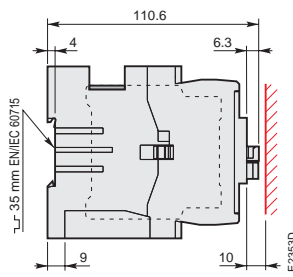
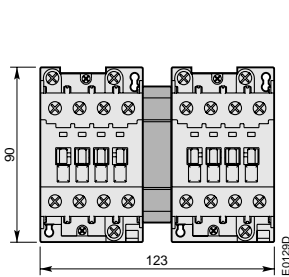
AL 26, TAL 26 3-pole Contactors



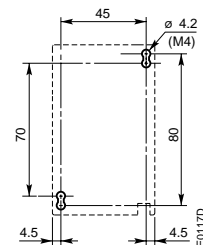
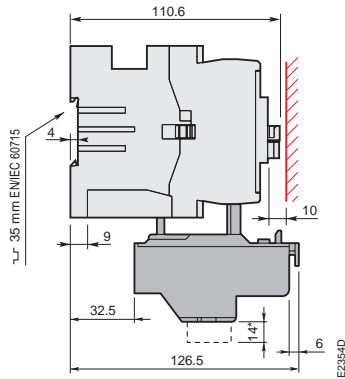
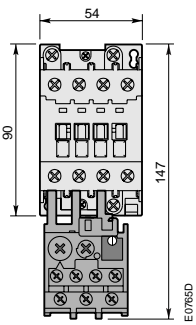
Dimensions (in mm)



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



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



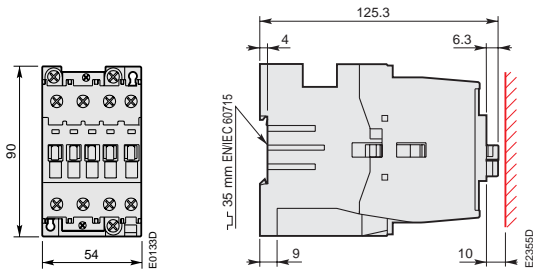
AL 26, TAL 26 + TA 25 DU thermal O/L relay

* For TA 25 DU 32 only

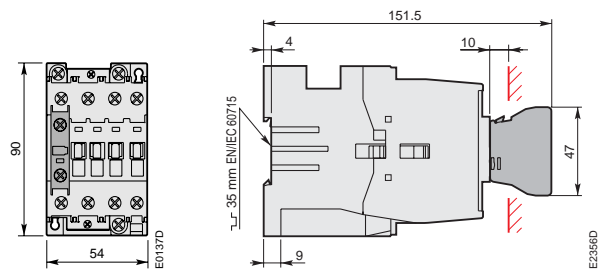
AL 30, AL 40, TAL 30, TAL 40 3-pole Contactors



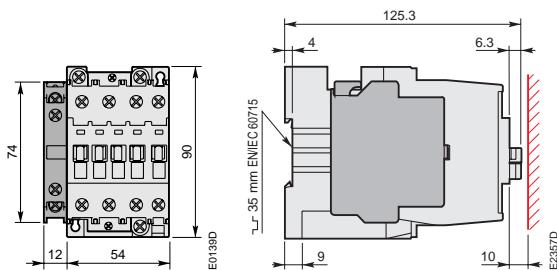
Dimensions (in mm)



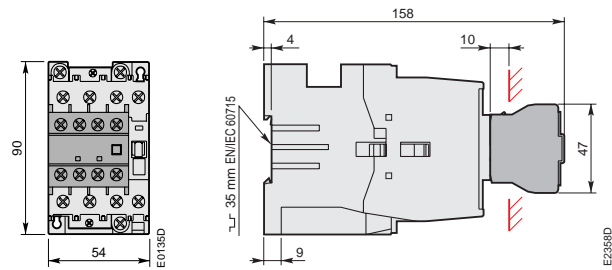
AL 30, AL 40, TAL 30, TAL 40



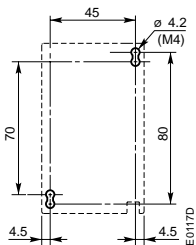
AL 30, AL 40, TAL 30, TAL 40
+ CA 5 front-mounted 1-pole auxiliary contact block



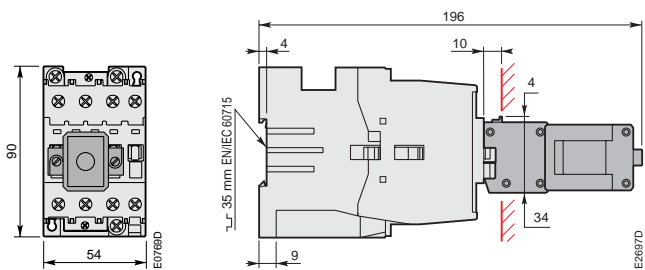
AL 30, AL 40, TAL 30, TAL 40
+ CAL 5 side-mounted 2-pole auxiliary contact block



AL 30, AL 40, TAL 30, TAL 40
+ CA 5 front-mounted 4-pole auxiliary contact block
and corresponding 2-stack versions



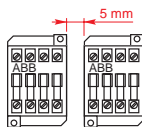
AL 30, AL 40, TAL 30, TAL 40 - drilling plan



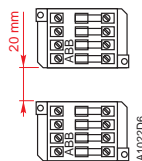
AL 30, AL 40, TAL 30, TAL 40
+ WB 75-A on-position latch

Mounting distance (for side by side mounting)

TAL 30, TAL 40
Position 1, 2, 5
 $20^{\circ}\text{C} \leq \theta \leq 55^{\circ}\text{C}$

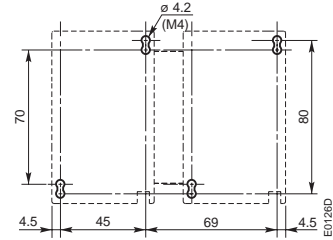
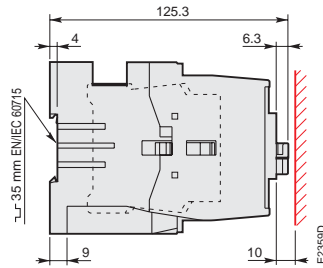
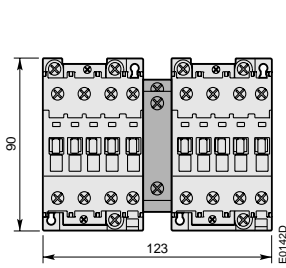


TAL 30, TAL 40
Position 3, 4
 $20^{\circ}\text{C} \leq \theta \leq 55^{\circ}\text{C}$

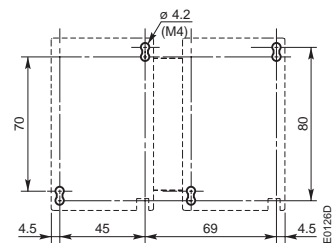
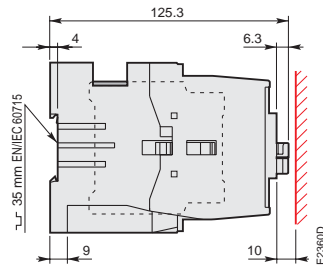
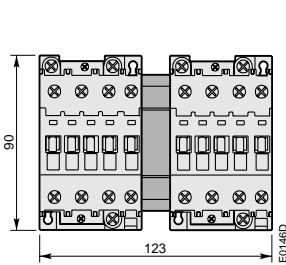




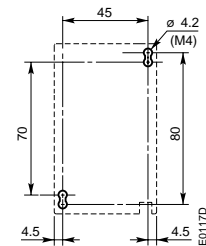
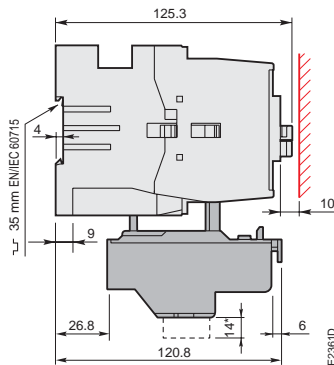
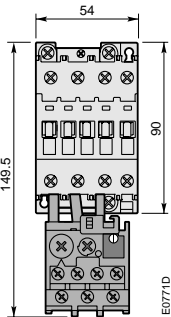
Dimensions (in mm)



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

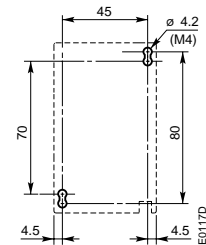
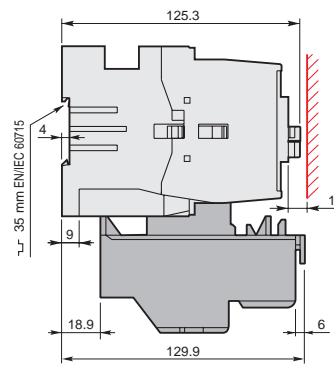
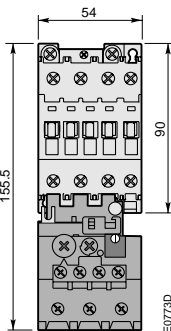


**AL 30, AL 40, TAL 30, TAL 40
+ VM 5-1 mechanical interlock unit**



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

* For TA 25 DU 32 only

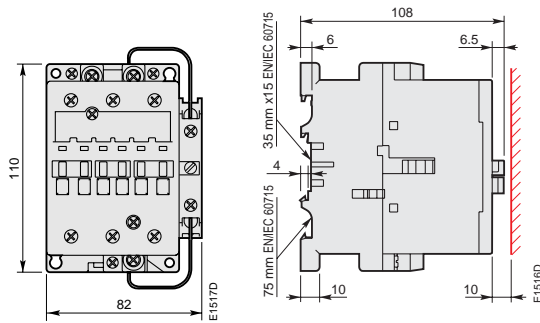


**AL 30, AL 40, TAL 30, TAL 40
+ TA 42 DU thermal O/L relay**

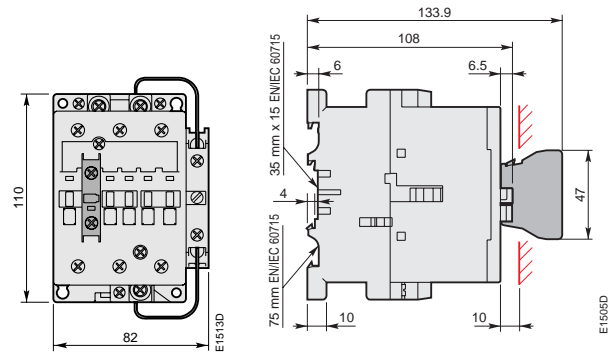
AE 50, AE 63 and AE 75 3-pole Contactors TAE 50 and TAE 75 3-pole Contactors



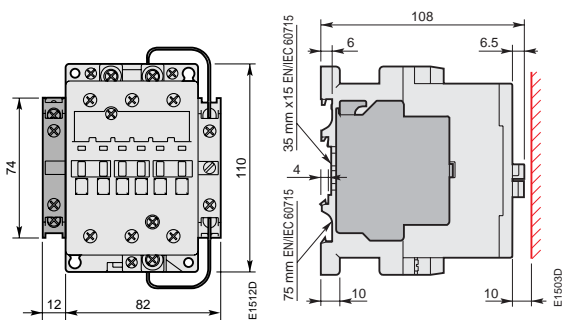
Dimensions (in mm)



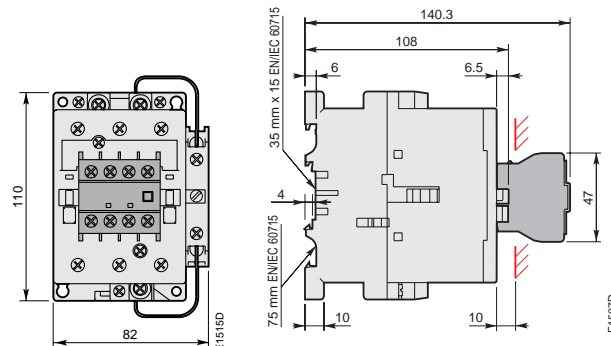
AE 50, AE 63, AE 75, TAE 50, TAE 75



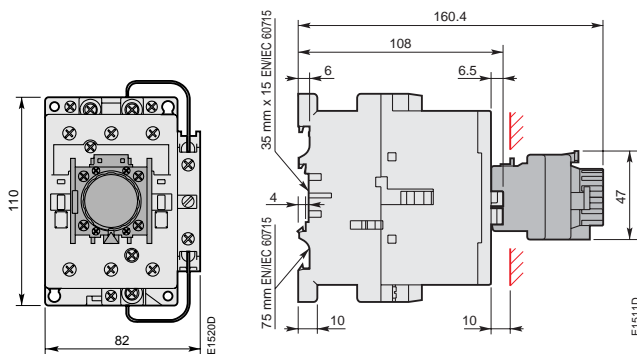
AE 50, AE 63, AE 75, TAE 50, TAE 75
+ CA 5 front-mounted 1-pole auxiliary contact block



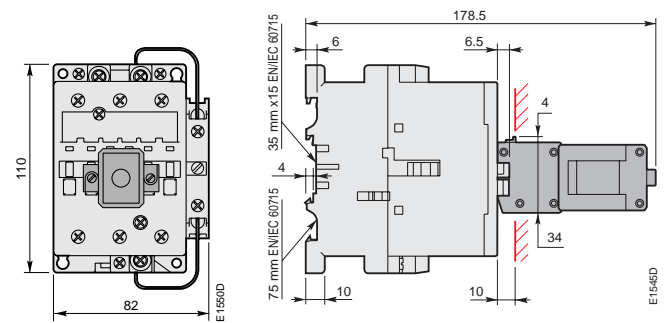
AE 50, AE 63, AE 75, TAE 50, TAE 75
+ CAL 5 side-mounted 2-pole auxiliary contact block



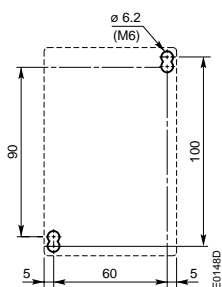
AE 50, AE 63, AE 75, TAE 50, TAE 75
+ CA 5 front-mounted 4-pole auxiliary contact block



AE 50, AE 63, AE 75, TAE 50, TAE 75
+ TP pneumatic timer



AE 50, AE 63, AE 75, TAE 50, TAE 75
+ WB 75-A on-position latch

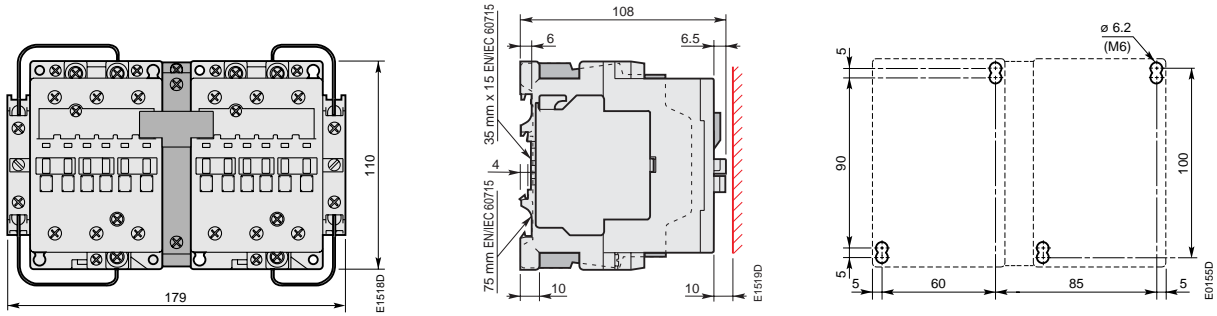


AE 50, AE 63, AE 75, TAE 50, TAE 75 drilling plan

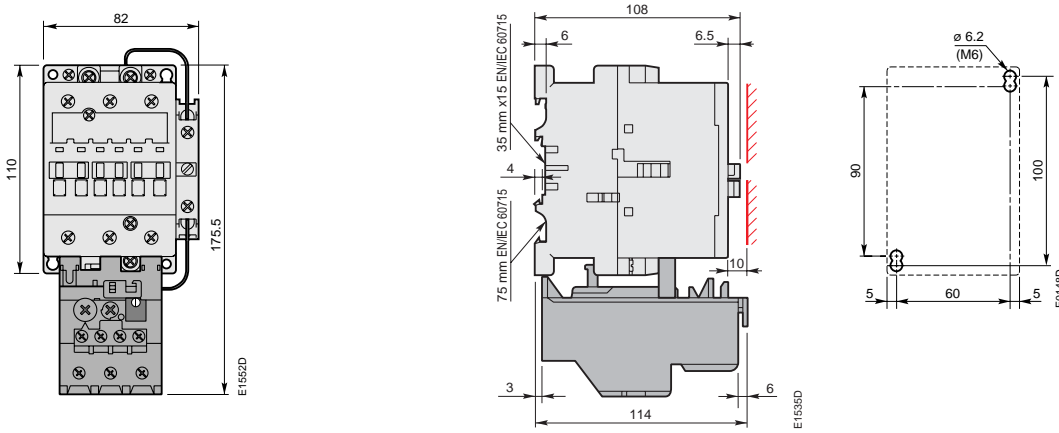
AE 50, AE 63 and AE 75 3-pole Contactors TAE 50 and TAE 75 3-pole Contactors



Dimensions (in mm)



**AE 50, AE 63, AE 75, TAE 50, TAE 75
+ VE 5-2 electrical and mechanical interlock unit**

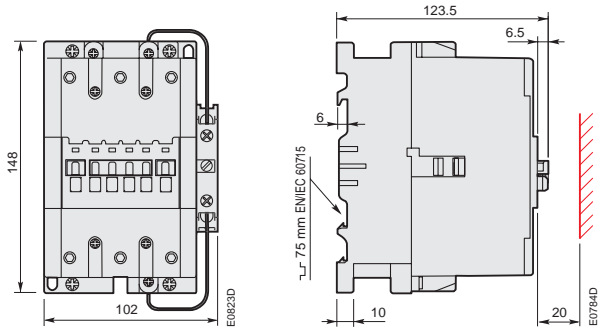


**AE 50, AE 63, AE 75, TAE 50, TAE 75
+ TA 75 DU thermal O/L relay**

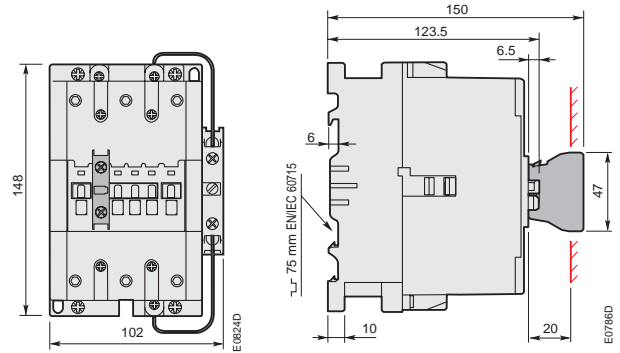
AE 95 and AE 110 3-pole Contactors TAE 95 and TAE 110 3-pole Contactors



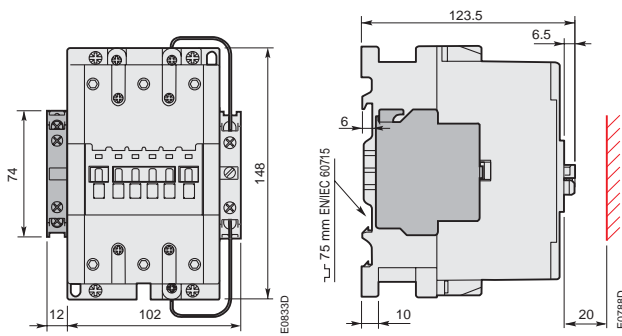
Dimensions (in mm)



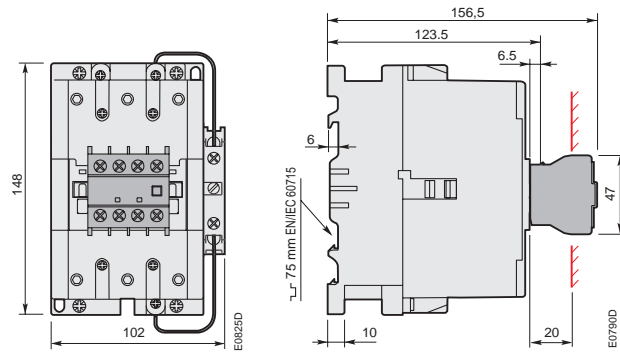
AE 95, AE 110, TAE 95, TAE 110



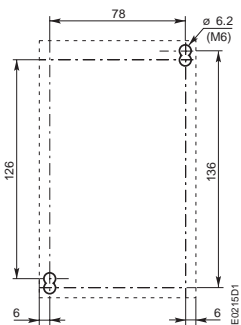
AE 95, AE 110, TAE 95, TAE 110
+ CA 5 front-mounted 1-pole auxiliary contact block



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



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

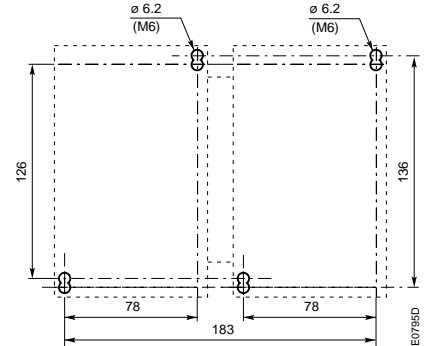
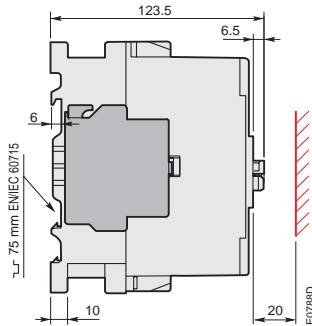
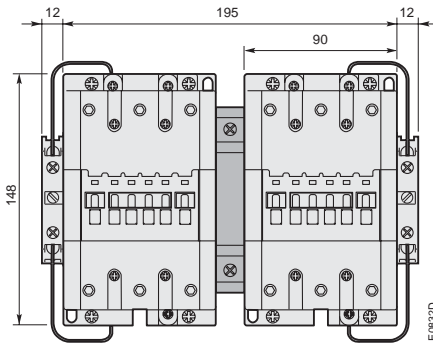


AE 95, AE 110, TAE 95, TAE 110 drilling plan

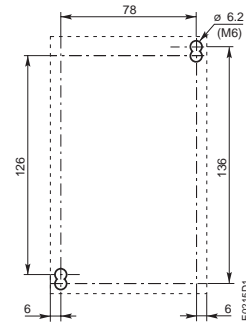
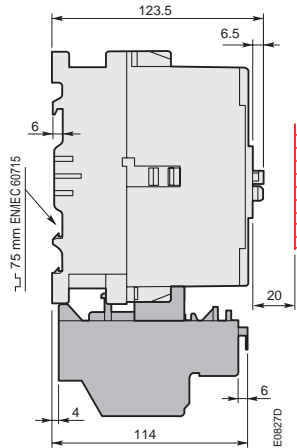
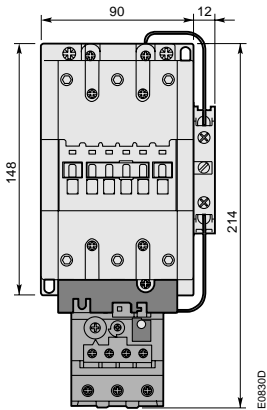
AE 95 and AE 110 3-pole Contactors TAE 95 and TAE 110 3-pole Contactors



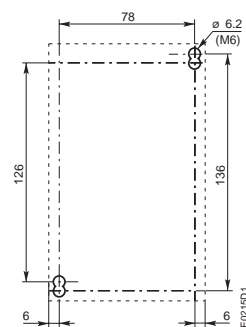
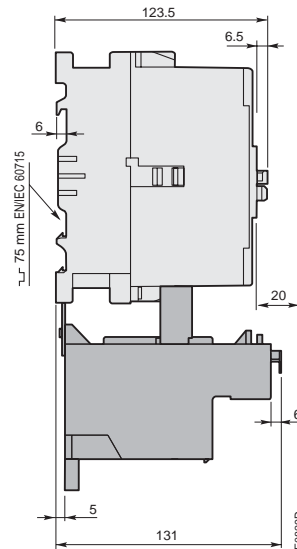
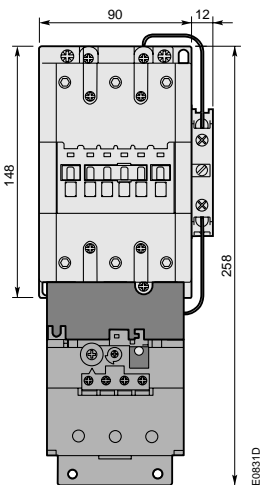
Dimensions (in mm)



**AE 95, AE 110, TAE 95, TAE 110
+ VE 5-2 electrical and mechanical interlock unit**



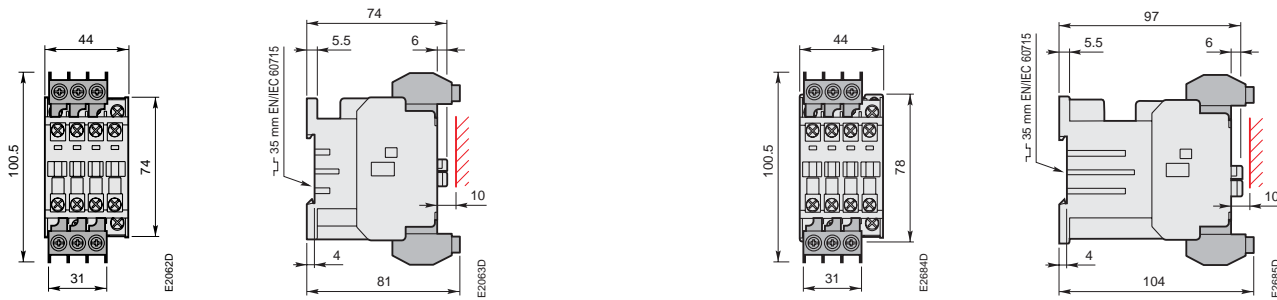
**AE 95, AE 110, TAE 95, TAE 110
+ TA 80 DU thermal O/L relay**



**AE 95, AE 110, TAE 95, TAE 110
+ TA 110 DU thermal O/L relay**

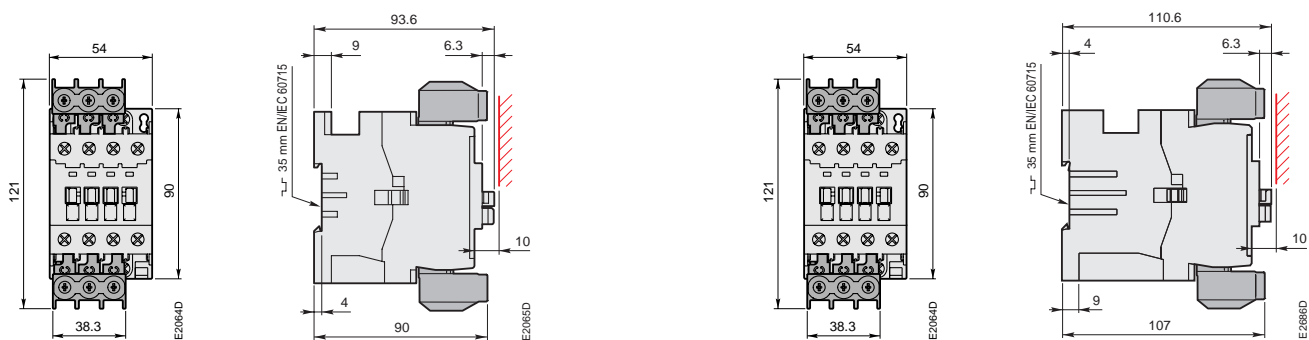
A... Series Contactors with LD.. Additional Terminal Blocks

Dimensions (in mm)



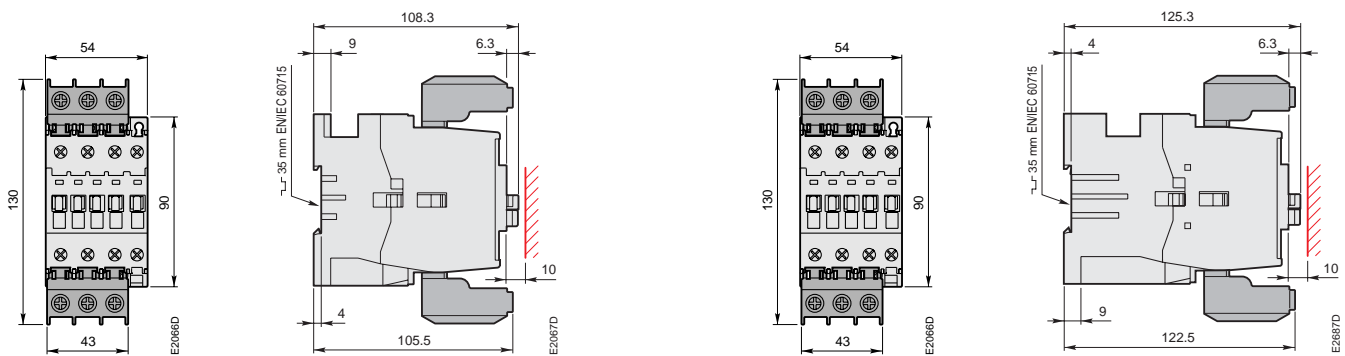
**A 9, A 12, A 16, UA 16 contactors
+ 2 x LD 16**

**AL 9, AL 12, AL 16, TAL 9, TAL 12, TAL 16 contactors
+ 2 x LD 16**



**A 26, UA 26 contactors
+ 2 x LD 26**

**AL 26, TAL 26 contactors
+ 2 x LD 26**

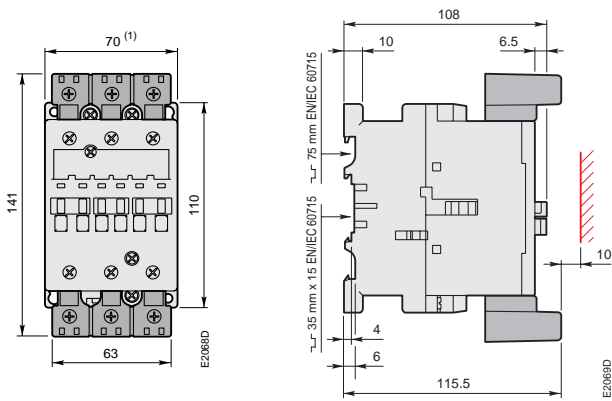


**A 30, A 40, UA 30 contactors
+ 2 x LD 40**

**AL 30, AL 40, TAL 30, TAL 40 contactors
+ 2 x LD 40**

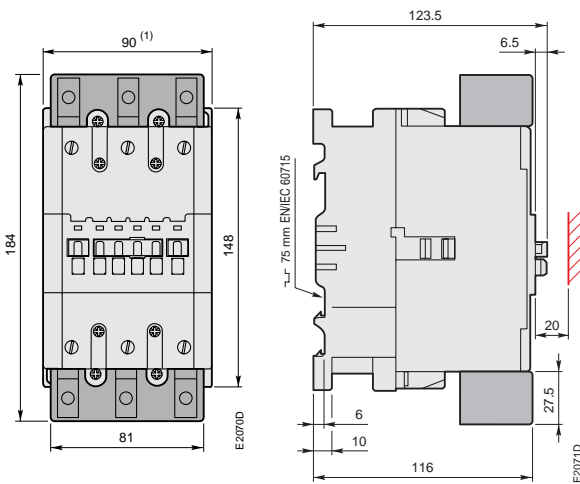
A... Series Contactors with LD.. Additional Terminal Blocks

Dimensions (in mm)



**A 50, A 63, A 75, AF 50, AF 63, AF 75, AE 50, AE 63, AE 75,
TAE 50, TAE 75, UA 50, UA 63, UA 75 contactors
+ 2 x LD 75**

(1) For AE... and TAE... contactors: 82 mm instead 70 mm (specific desing).

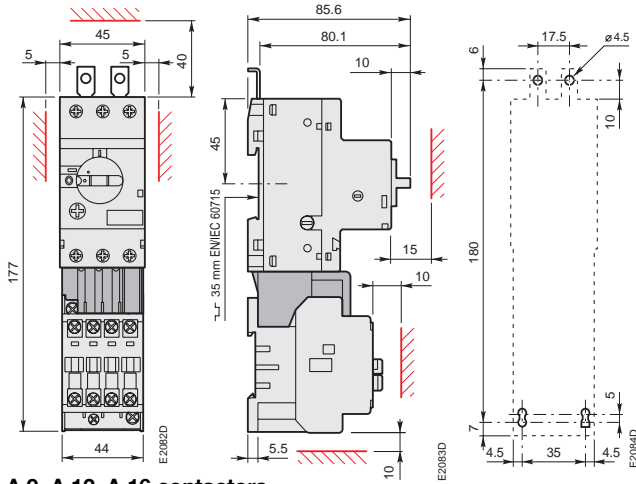


**A 95, A 110, AF 95, AF 110, AE 95, AE 110, TAE 95, TAE 110,
UA 95, UA 110 contactors
+ 2 x LD 110**

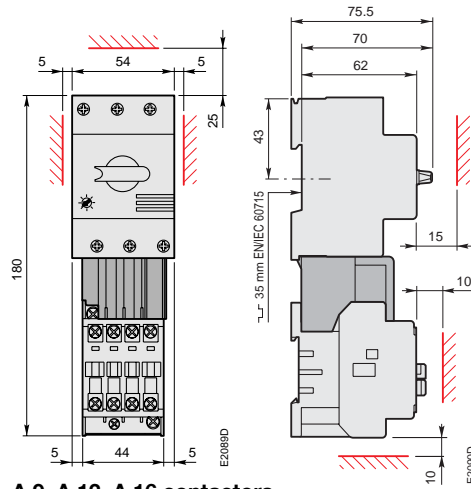
(1) For AE... and TAE... contactors: 102 mm instead 90 mm (specific desing).

A 9 ... A 26 3-pole Contactors with BEA.. Connecting Links and MMS Direct-On-Line Starter

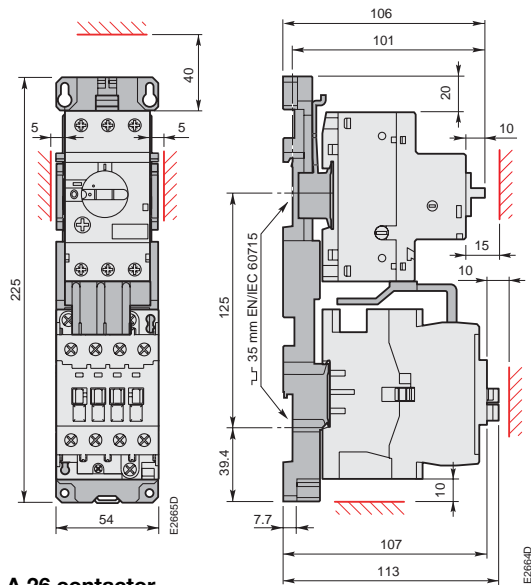
Dimensions (in mm)



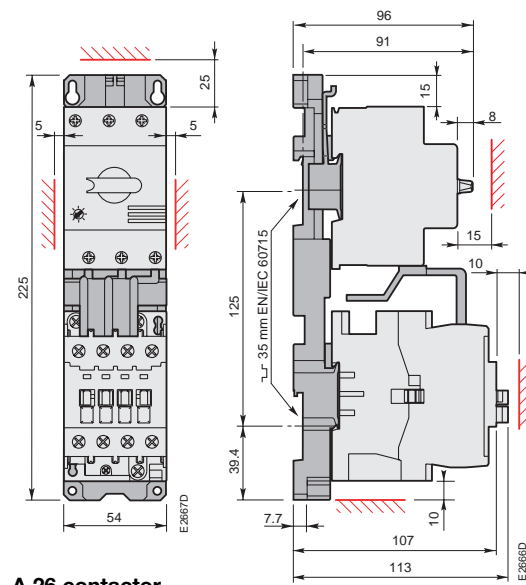
**A 9, A 12, A 16 contactors
+ BEA 16/116
+ MS 116**



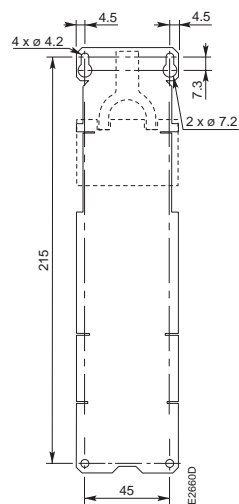
**A 9, A 12, A 16 contactors
+ BEA 16/325
+ MS 325**



**A 26 contactor
+ BEA 26/116
+ MS 116 + PM 26-13**



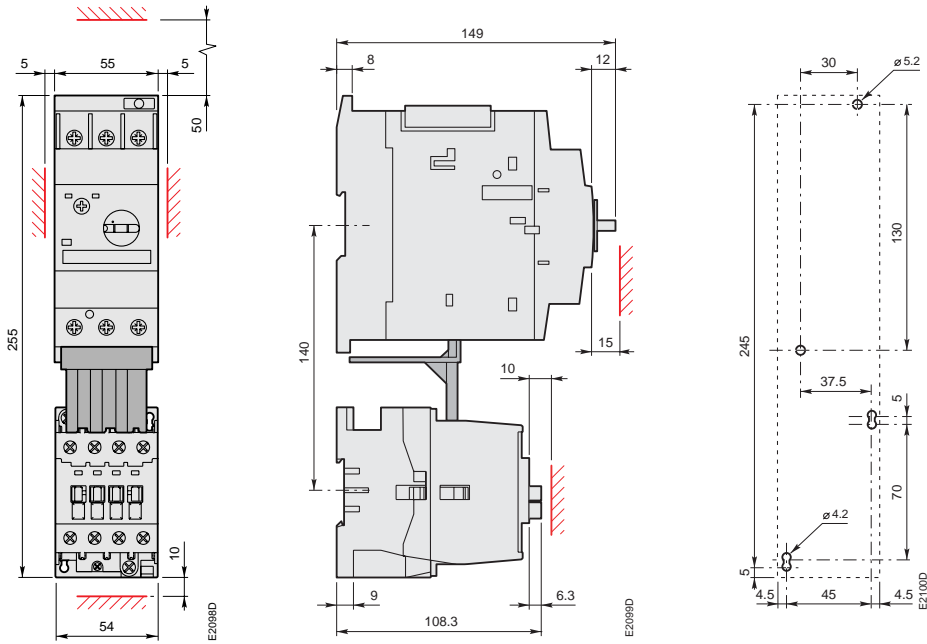
**A 26 contactor
+ BEA 26/325
+ MS 325 + PM 26-13**



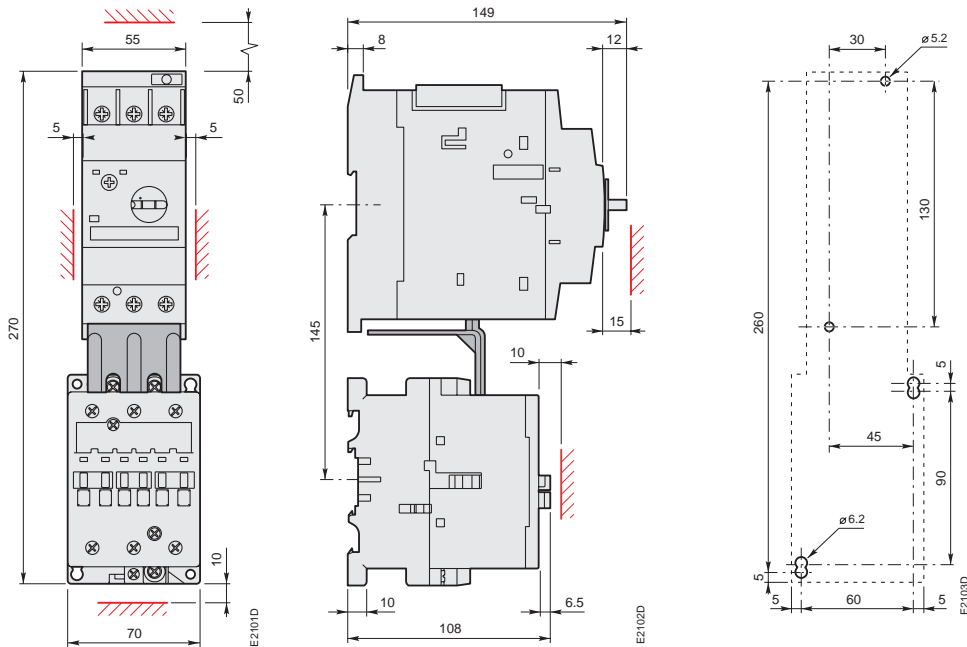
A 26 contactor + BEA.. + MS.. + PM 26-13 Drilling plan

A 30 ... A 50 3-pole Contactors with BEA.. Connecting Links and MMS Direct-On-Line Starter

Dimensions (in mm)



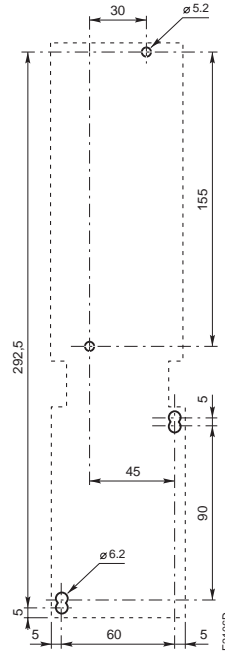
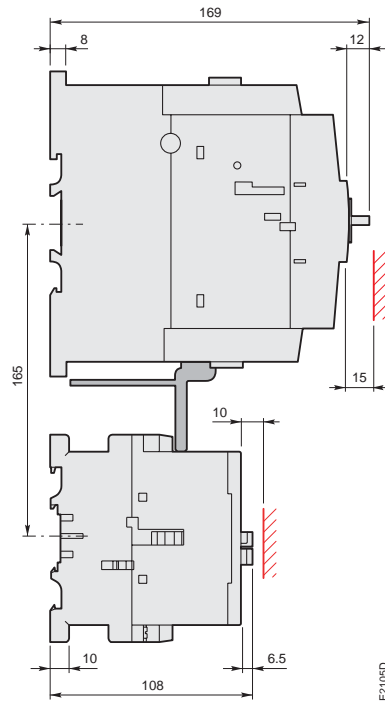
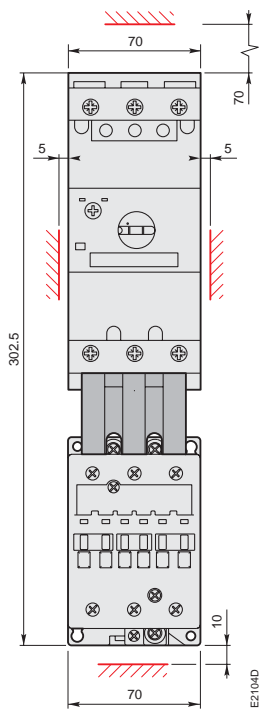
**A 30, A 40 contactors
+ BEA 40/450
+ MS 450**



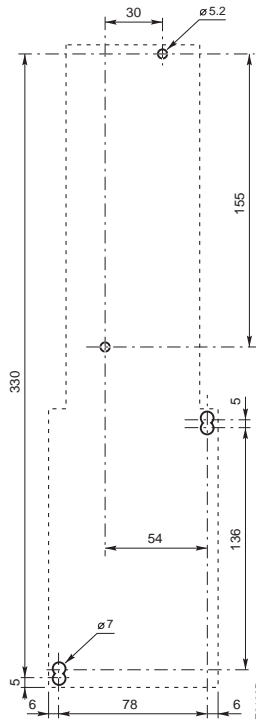
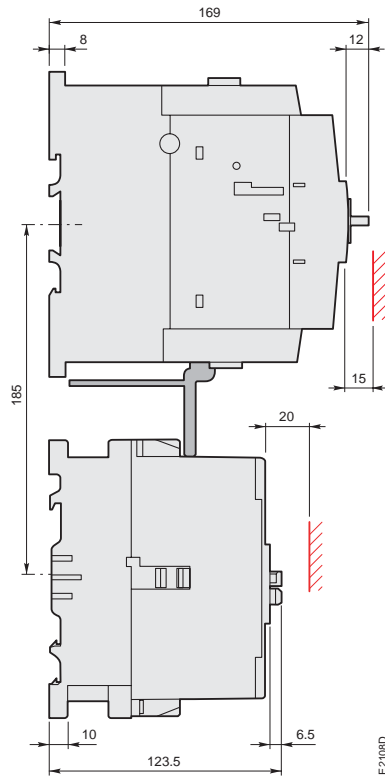
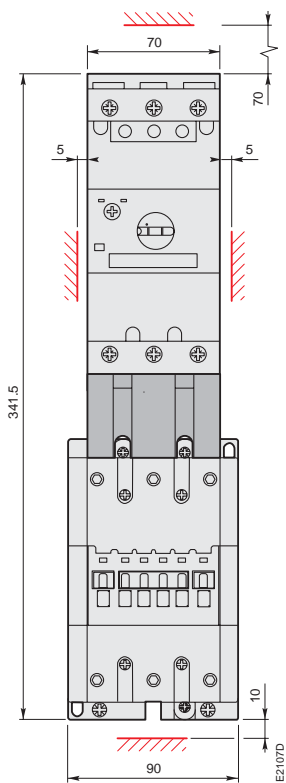
**A 50 contactor
+ BEA 50/450
+ MS 450**

A 75 ... A 110 3-pole Contactors with BEA.. Connecting Links and MMS Direct-On-Line Starter

Dimensions (in mm)



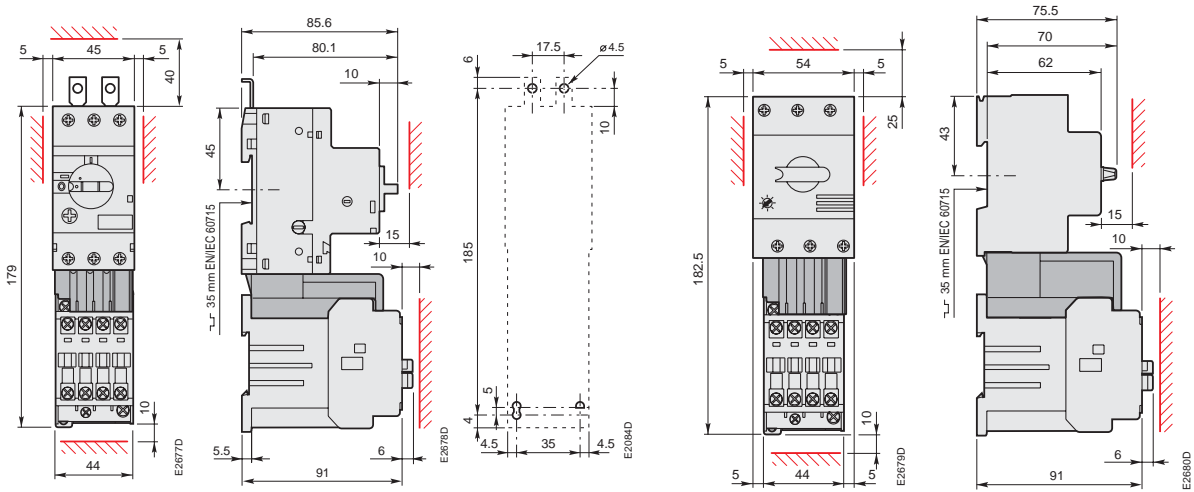
A 75 contactor
+ BEA 75/495
+ MS 495/496



A 95, A 110 contactors
+ BEA 110/495
+ MS 495/496

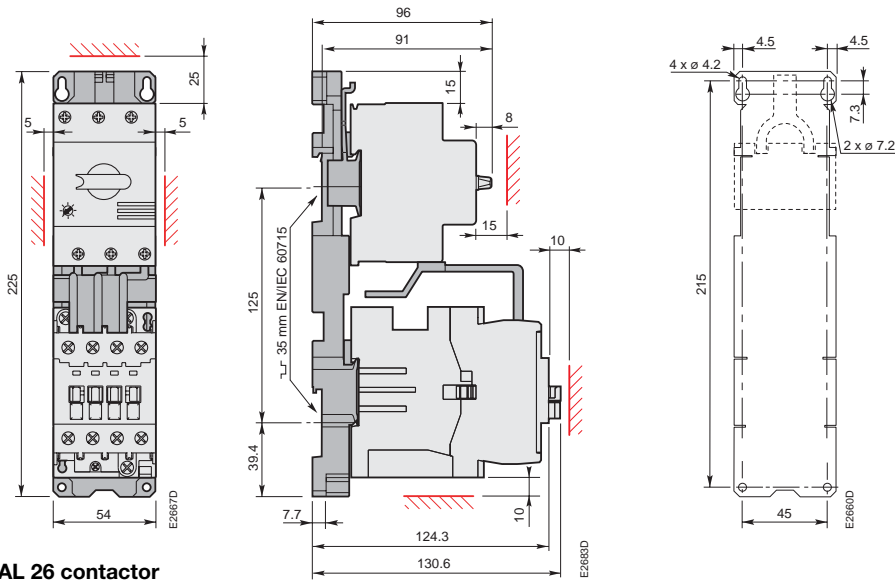
AL 9 ... AL 26 3-pole Contactors with BEA..AL Connecting Links and MMS Direct-On-Line Starter

Dimensions (in mm)



**AL 9, AL 12, AL 16 contactors
+ BEA 16/116AL
+ MS 116**

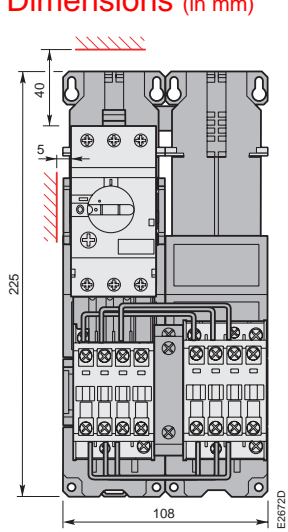
**AL 9, AL 12, AL 16 contactors
+ BEA 16/325AL
+ MS 325**



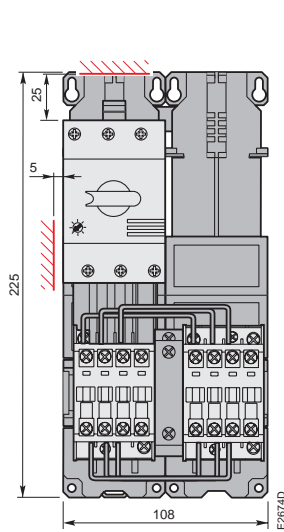
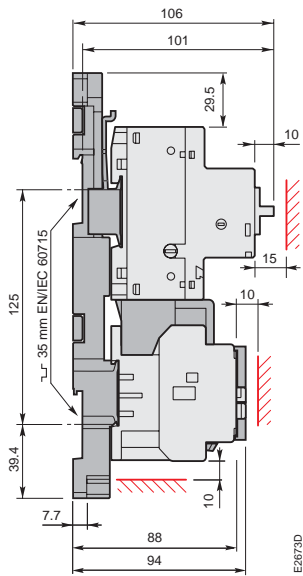
**AL 26 contactor
+ BEA 26/325AL
+ MS 325
+ PM 26-13**

A 9 ... A 26 3-pole Contactors with BEA.. Connecting Links and MMS Reversing Starter

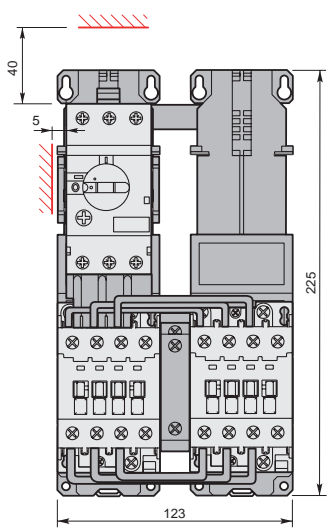
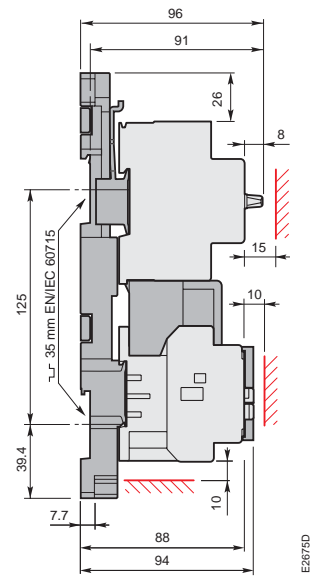
Dimensions (in mm)



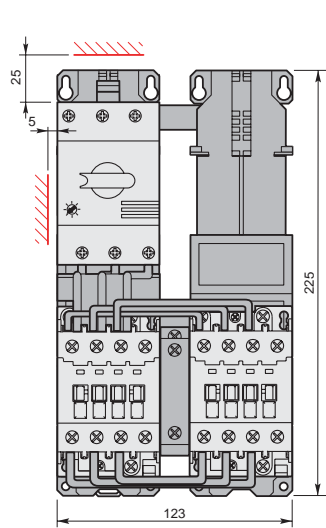
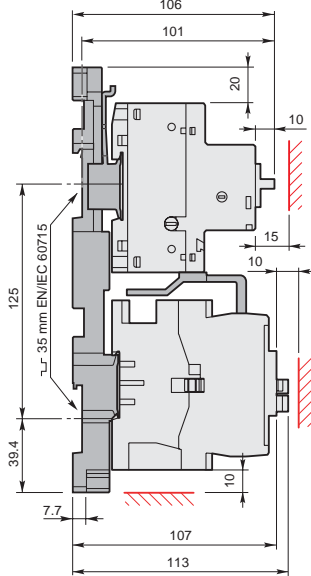
**A 9, A 12, A 16 contactors
+ BEA 16/116
+ MS 116 + PM 26-23**



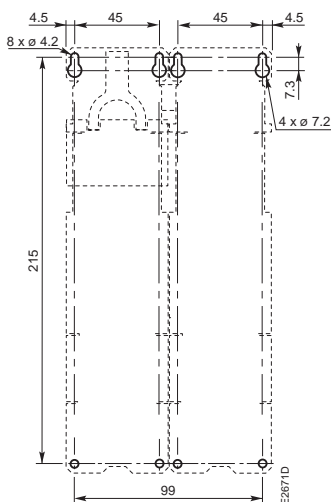
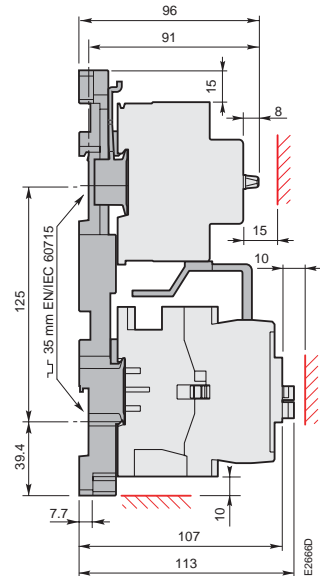
**A 9, A 12, A 16 contactors
+ BEA 16/325
+ MS 325 + PM 26-23**



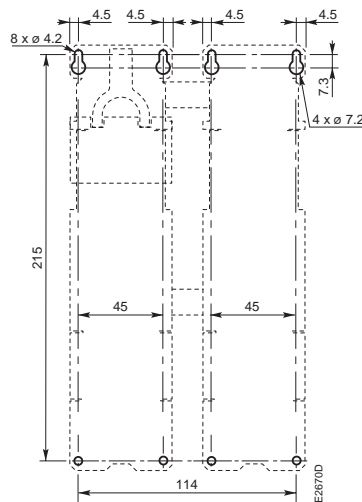
**A 26 contactors
+ BEA 26/116
+ MS 116 + PM 26-23**



**A 26 contactors
+ BEA 26/325
+ MS 325 + PM 26-23**



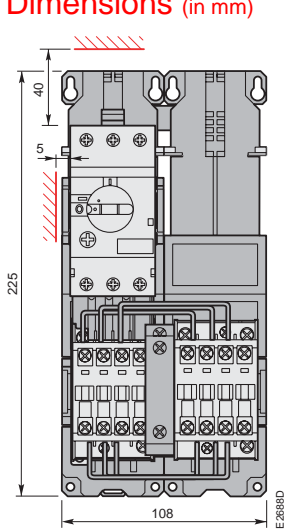
A 9, A 12, A 16 + BEA.. + MS... + PM 26-23 Drilling plan



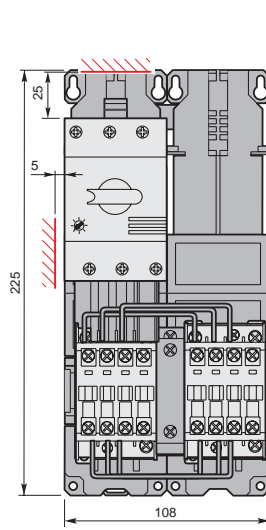
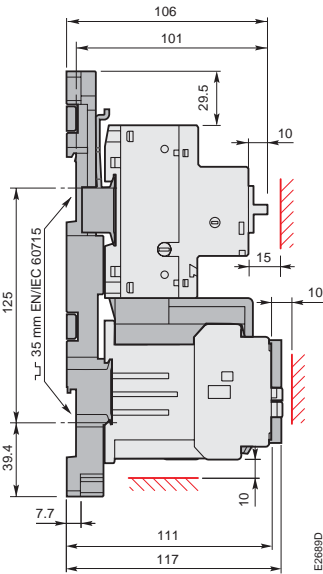
A 26 + BEA.. + MS... + PM 26-23 Drilling plan

AL 9 ... AL 26 3-pole Contactors with BEA..AL Connecting Links and MMS Reversing Starter

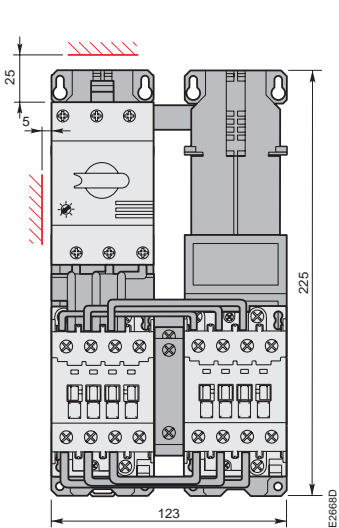
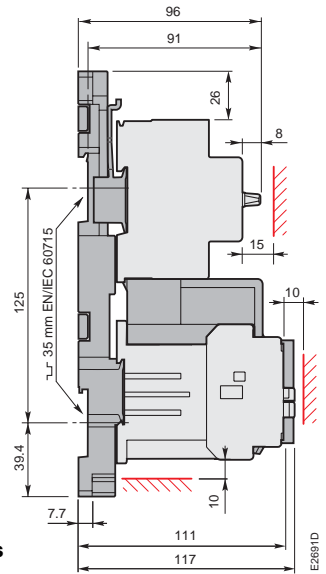
Dimensions (in mm)



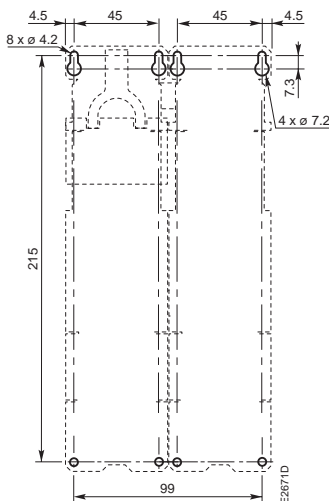
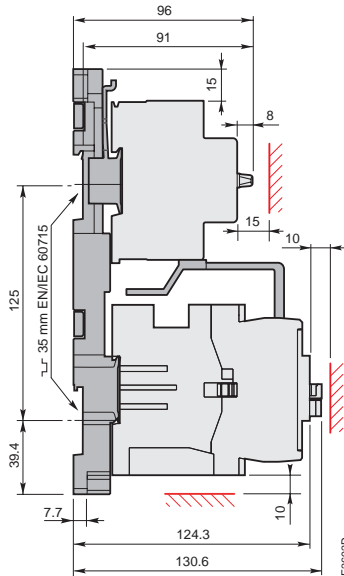
**AL 9, AL 12, AL 16 contactors
+ BEA 16/116AL
+ MS 116 + PM 26-23**



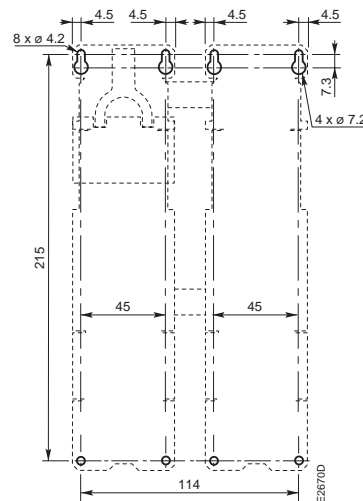
**AL 9, AL 12, AL 16 contactors
+ BEA 16/325AL
+ MS 325 + PM 26-23**



**AL 26 contactors
+ BEA 26/325AL
+ MS 325 + PM 26-23**



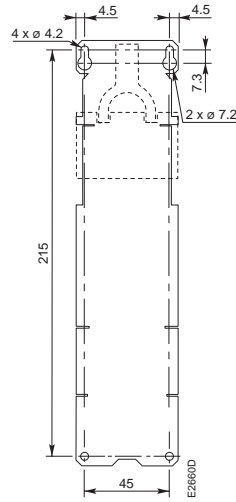
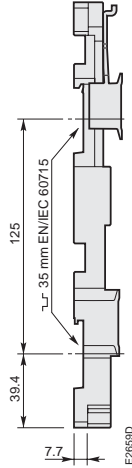
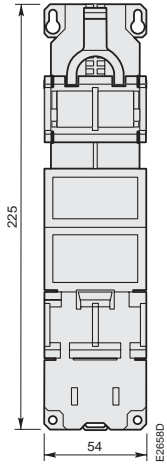
AL 9, AL 12, AL 16 + BEA..AL + MS... + PM 26-23 Drilling plan



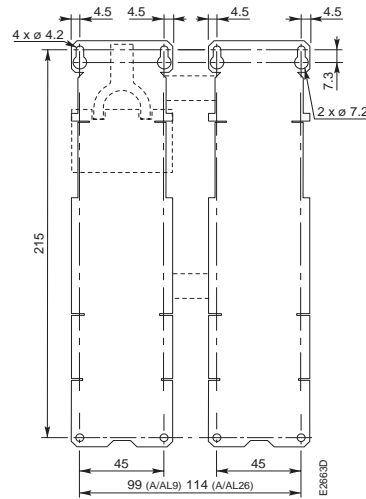
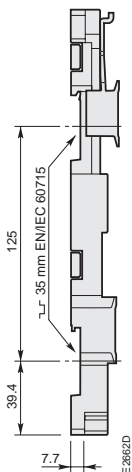
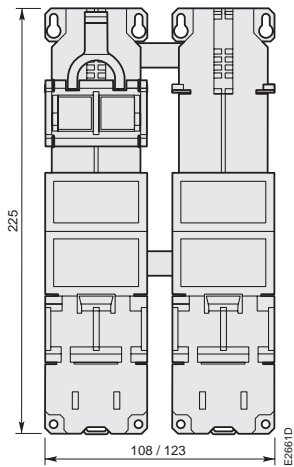
AL 26 + BEA 26/325AL + MS 325 + PM 26-23 Drilling plan

PM 26 Mounting Plates

Dimensions (in mm)



PM 26-13

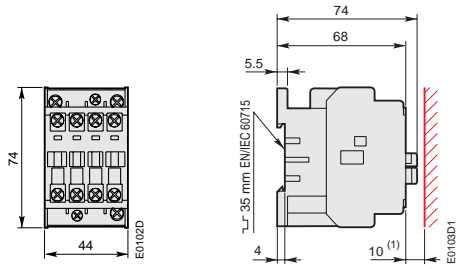


PM 26-23

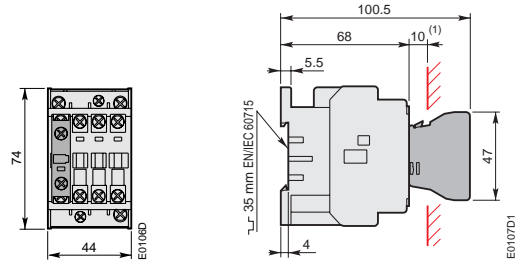
A 9 and A 16 4-pole Contactors N Contactor Relays



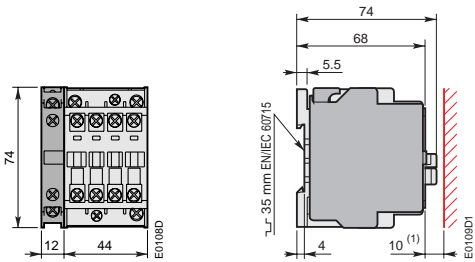
Dimensions (in mm)



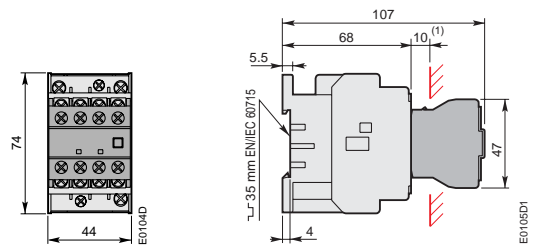
A 9, A 16, N



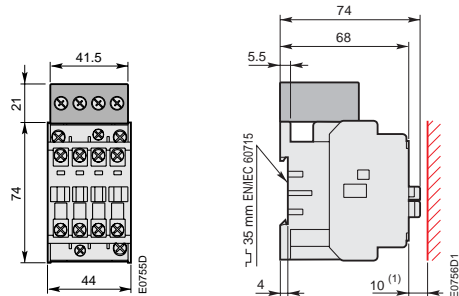
**A 9, A 16, N
+ CA 5 front-mounted 1-pole auxiliary contact block**



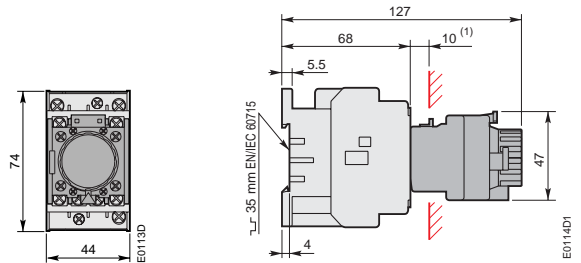
**A 9, A 16, N
+ CAL 5 side-mounted 2-pole auxiliary contact block**



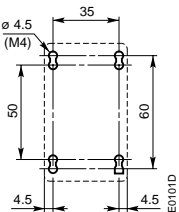
**A 9, A 16, N
+ CA 5 front-mounted 4-pole auxiliary contact block
and corresponding 2-stack versions**



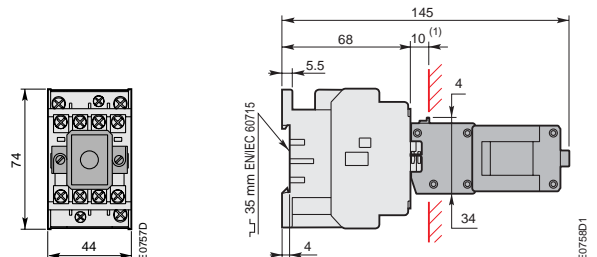
**A 9, A 16, N
+ RA 5 interface relay**



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



A 9, A 16, N drilling plan



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

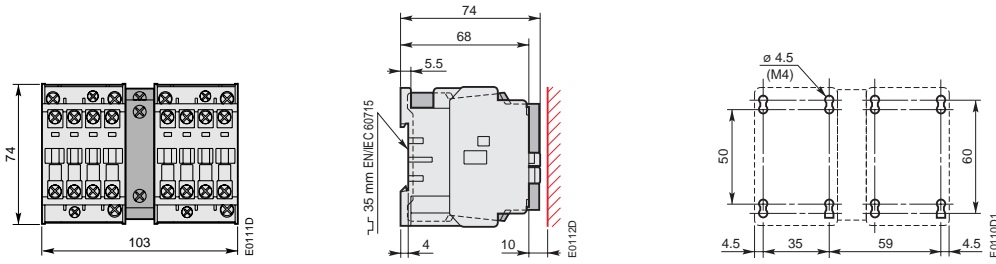
(1) Note : no recommended distance to earth applicable to "N" contactor relays.



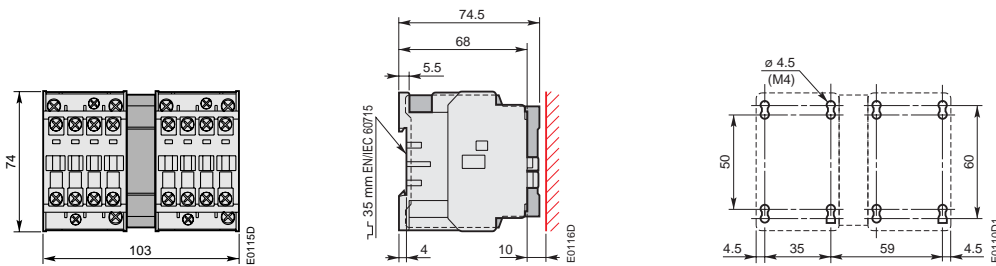
A 9 and A 16 4-pole Contactors



Dimensions (in mm)



A 9-40, A 16-40
+ VE 5-1 electrical and mechanical interlock unit

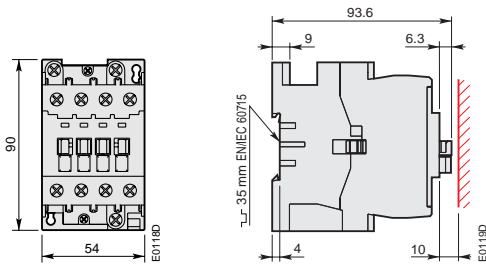


A 9-40, A 16-40
+ VM 5-1 mechanical interlock unit

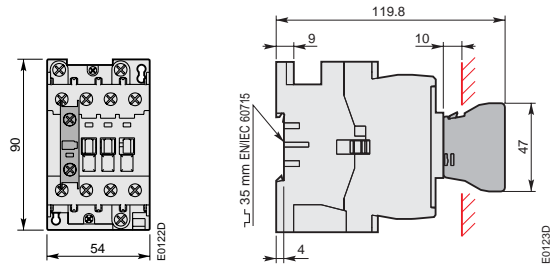
A 26 4-pole Contactor



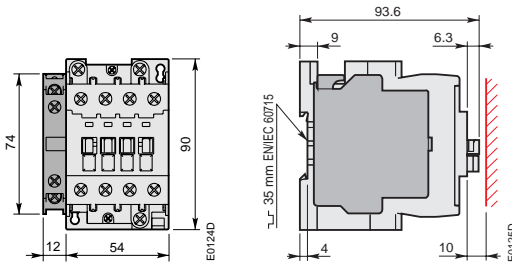
Dimensions (in mm)



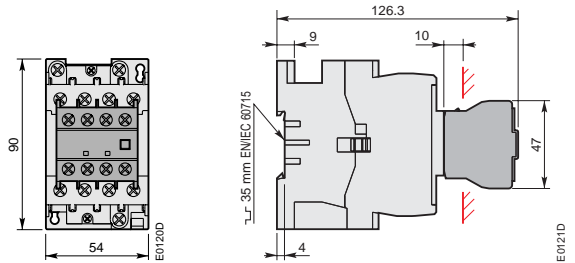
A 26



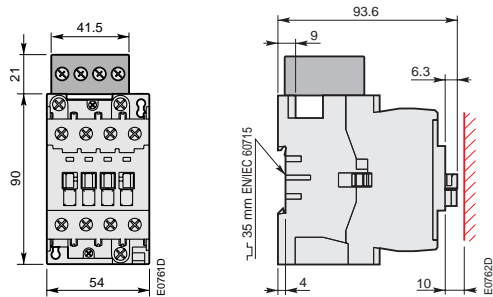
A 26
+ CA 5 front-mounted 1-pole auxiliary contact block



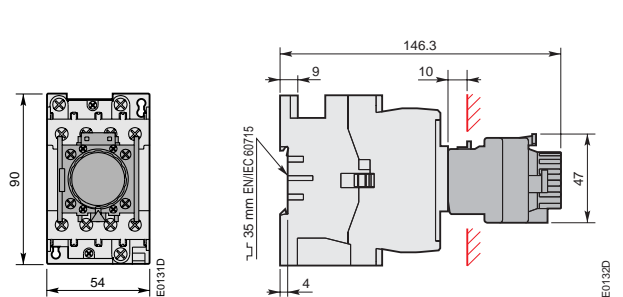
A 26
+ CAL 5 side-mounted 2-pole auxiliary contact block



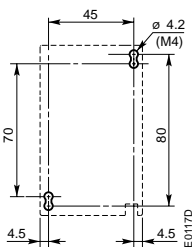
A 26
+ CA 5 front-mounted 4-pole auxiliary contact block



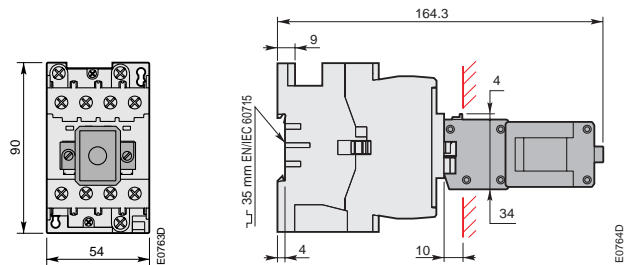
A 26
+ RA 5 interface relay



A 26
+ TP pneumatic timer



A 26 drilling plan

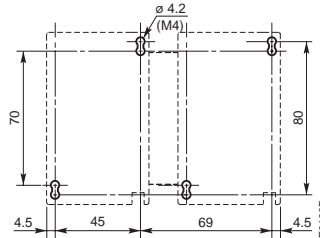
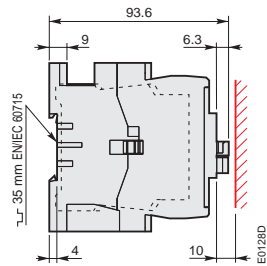
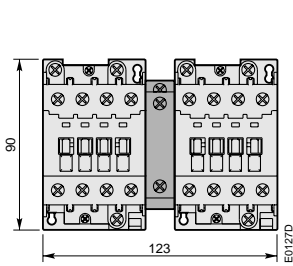


A 26
+ WB 75-A on-position latch

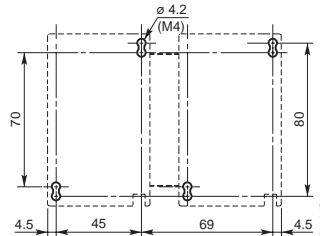
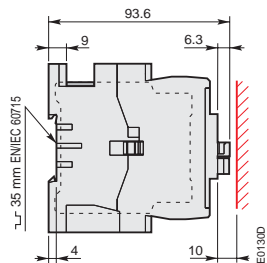
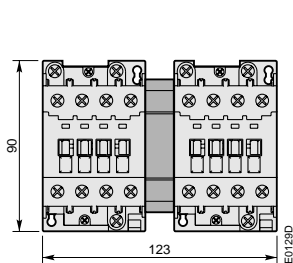
A 26 4-pole Contactor



Dimensions (in mm)



A 26-40 + VE 5-1 electrical and mechanical interlock unit

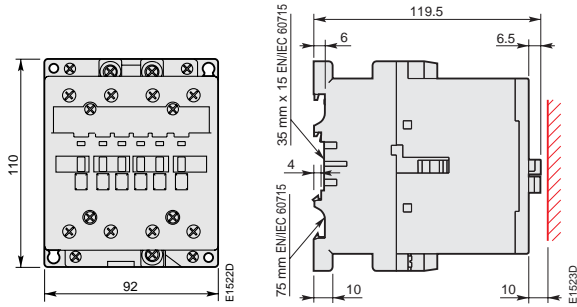


A 26-40 + VM 5-1 mechanical interlock unit

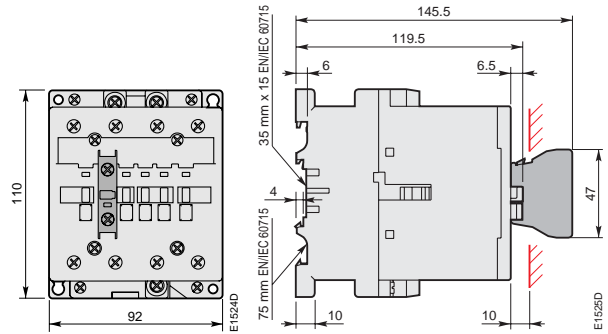
A 45, A 50 and A 75 4-pole Contactors AF 45, AF 50 and AF 75 4-pole Contactors



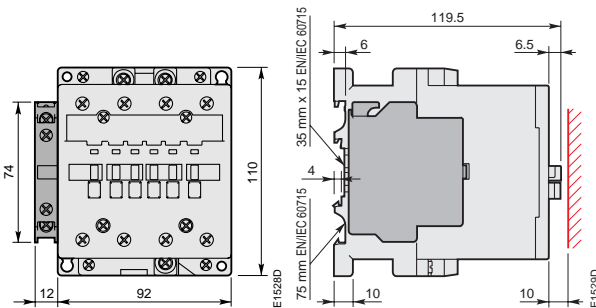
Dimensions (in mm)



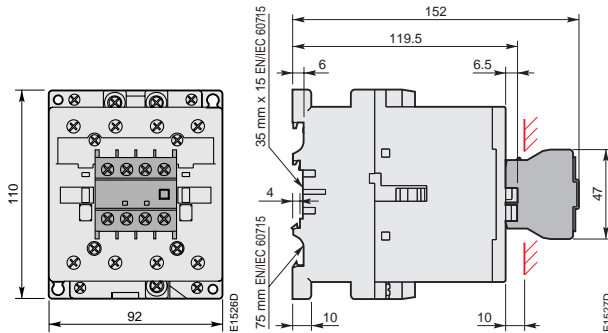
A 45, A 50, A 75, AF 45, AF 50, AF 75



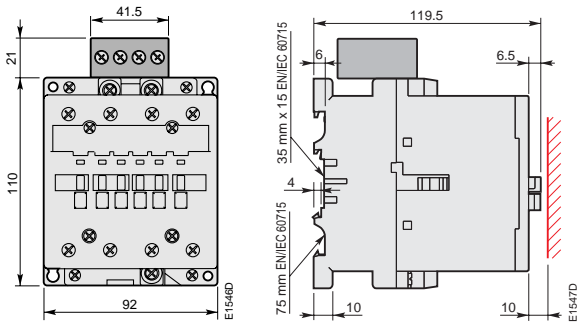
A 45, A 50, A 75, AF 45, AF 50, AF 75
+ CA 5 front-mounted 1-pole auxiliary contact block



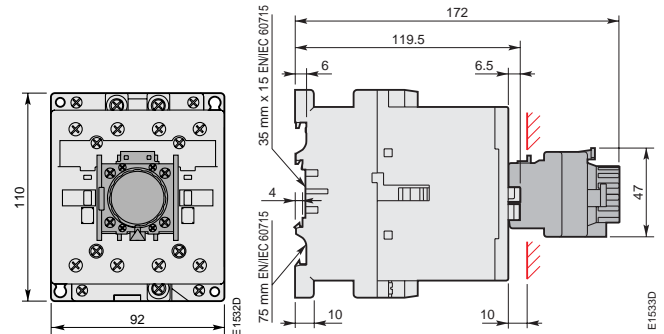
A 45, A 50, A 75, AF 45, AF 50, AF 75
+ CAL 5 side-mounted 2-pole auxiliary contact block



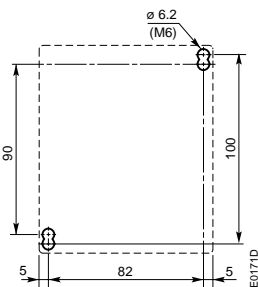
A 45, A 50, A 75, AF 45, AF 50, AF 75
+ CA 5 front-mounted 4-pole auxiliary contact block



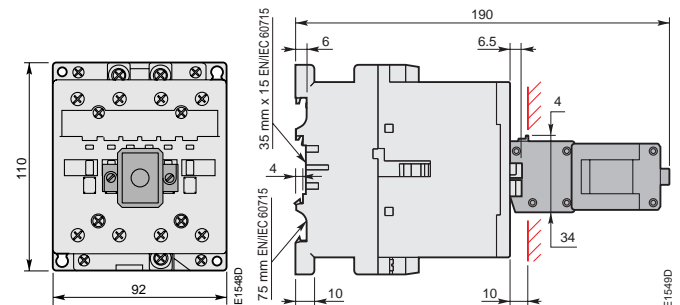
A 45, A 50, A 75, AF 45, AF 50, AF 75
+ RA 5 interface relay



A 45, A 50, A 75, AF 45, AF 50, AF 75
+ TP pneumatic timer



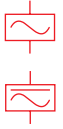
A 45, A 50, A 75, AF 45, AF 50, AF 75 drilling plan



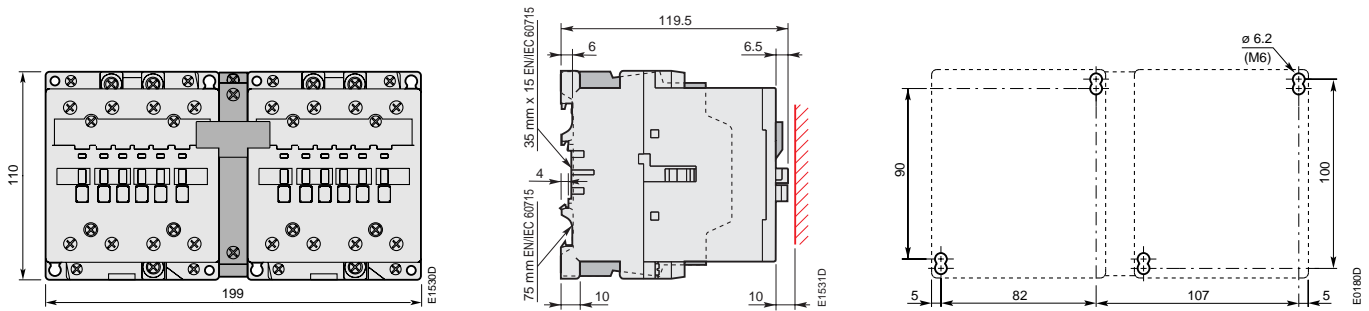
A 45, A 50, A 75, AF 45, AF 50, AF 75
+ WB 75-A on-position latch

A 45, A 50 and A 75 4-pole Contactors

AF 45, AF 50 and AF 75 4-pole Contactors



Dimensions (in mm)



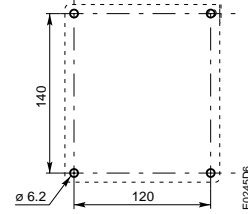
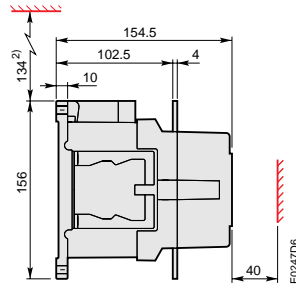
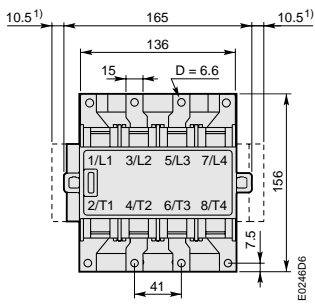
A 45-40, A 50-40, A 75-40,
AF 45-40, AF 50-40, AF 75-40
+ VE 5-2 electrical and mechanical interlock unit

EK 110 ... EK 210 4-pole Contactors

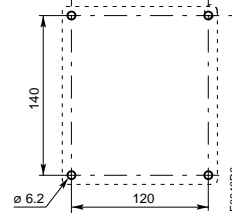
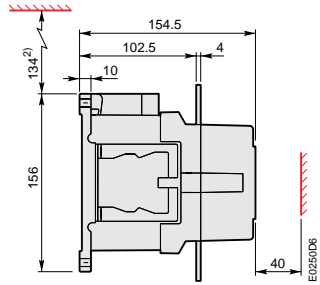
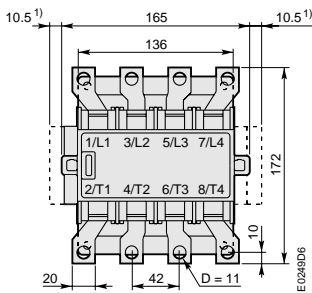
a.c. Operated



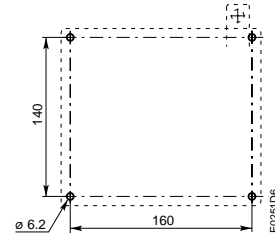
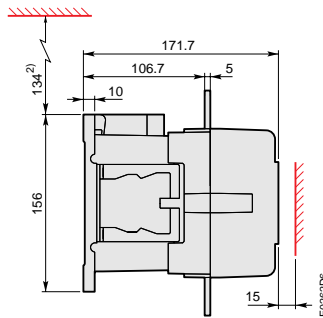
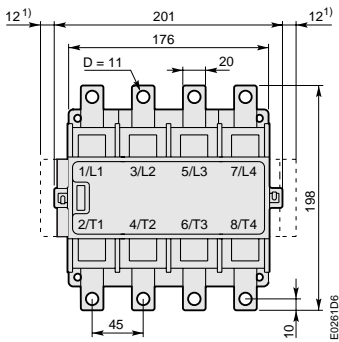
Dimensions (in mm)



EK 110



EK 150



EK 175, EK 210

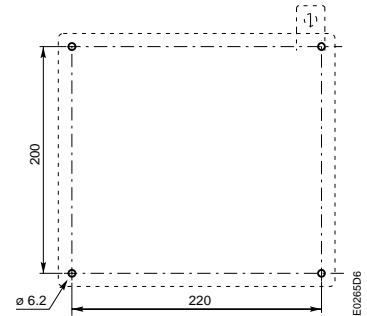
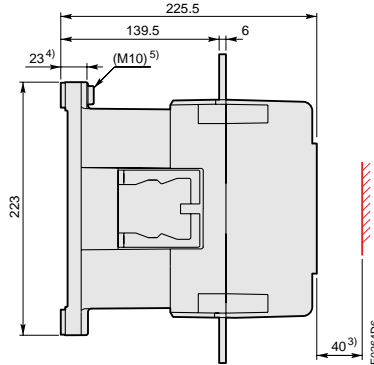
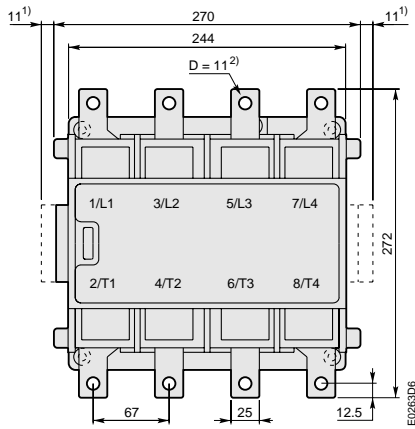
- 1) Dimension for extra auxiliary contact block
- 2) Min. distance to uninsulated wall

EK 370 ... EK 1000 4-pole Contactors

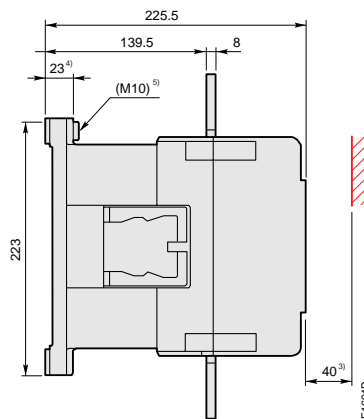
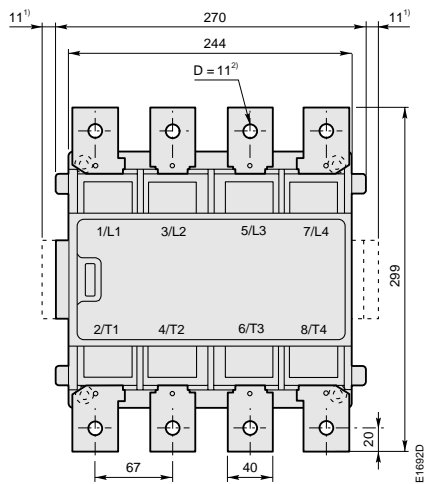
a.c. Operated



Dimensions (in mm)

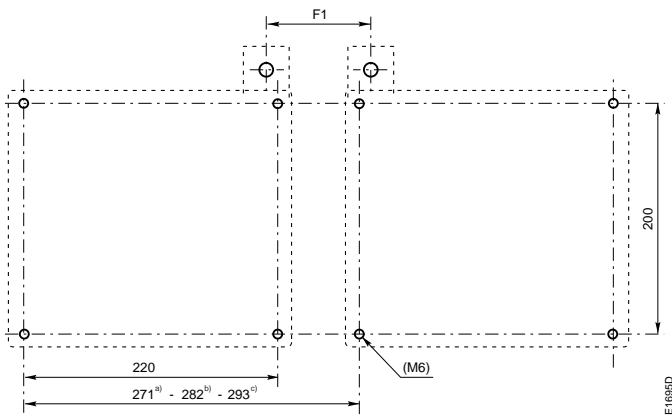


EK 370, EK 550



- 1) Dimension for extra auxiliary contact block
- 2) Screw, nut and washer by-packed
- 3) Min. distance to uninsulated wall
- 4) Damping elements are included
- 5) Earthing screw

EK 1000



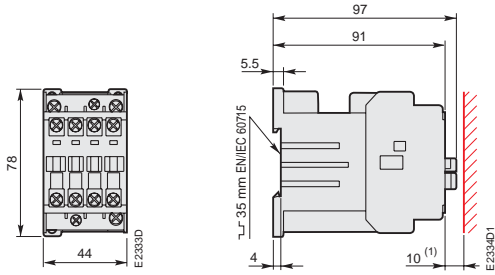
- a) Min. dim Makes distance $F1 = 70$
- b) Includes space for three auxiliary contact blocks between the contactors
- c) Includes space for four auxiliary contact blocks between the contactors

EK 1000 drilling plan

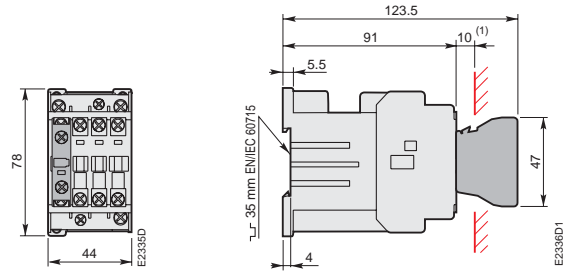
AL9 ... 16, TAL9 ... 16 4-pole Contactors NL..., NL Z..., TNL.. Contactor Relays



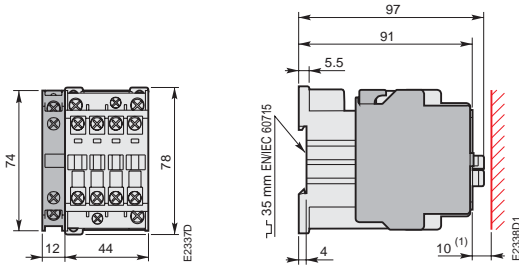
Dimensions (in mm)



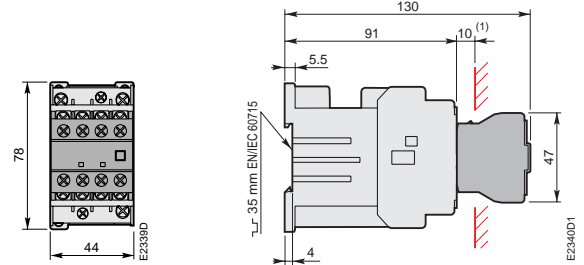
**AL 9 ... AL 16
TAL 9 ... TAL 16
NL..., NL Z..., TNL..**



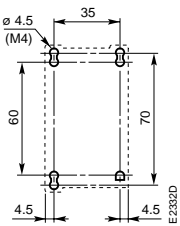
**AL 9 ... AL 16
TAL 9 ... TAL 16
NL..., NL Z..., TNL..
+ CA 5 front-mounted 1-pole auxiliary contact block**



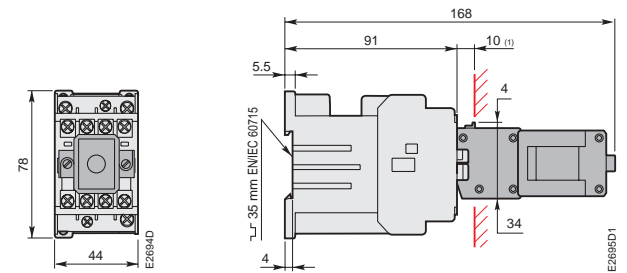
**AL 9 ... AL 16
TAL 9 ... TAL 16
NL..
+ CAL 5 side-mounted 2-pole auxiliary contact block**



**AL 9 ... AL 16
TAL 9 ... TAL 16
NL..., TNL..
+ CA 5 front-mounted 4-pole auxiliary contact block
and corresponding 2-stack versions**



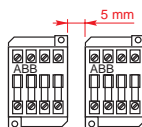
**AL 9 ... AL 16
TAL 9 ... TAL 16
NL..., NL Z..., TNL..
drilling plan**



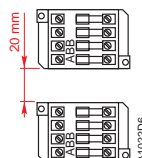
**AL 9 ... AL 16
TAL 9 ... TAL 16
NL..., NL Z..., TNL..
+ WB 75-A on-position latch**

Mounting distance (for side by side mounting)

TAL9 ... TAL16, TNL
Position 1, 2, 5
20°C ≤ θ ≤ 55 °C



TAL9 ... TAL16, TNL
Position 3, 4
20°C ≤ θ ≤ 55 °C

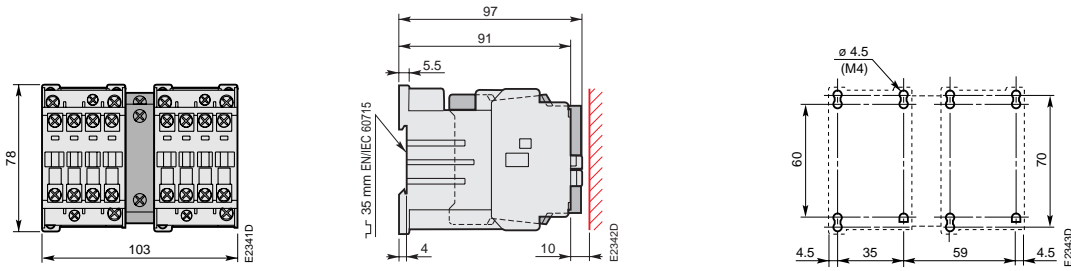


(1) Note: No recommended distance to earth is applicable to "NL...", NL Z..., TNL.." contactor relays.

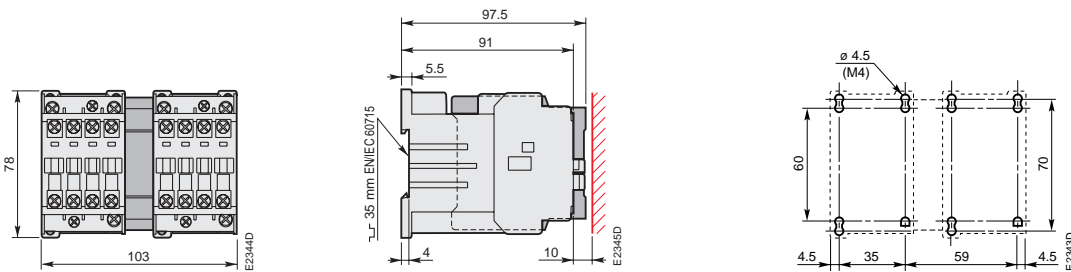
AL 9 ... 16, TAL 9 ... 16 4-pole Contactors



Dimensions (in mm)



AL 9-40 ... AL 16-40
TAL 9-40 ... TAL 16-40
+ VE 5-1 electrical and mechanical interlock unit

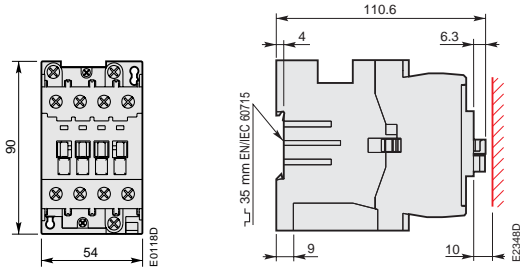


AL 9-40 ... AL 16-40
TAL 9-40 ... TAL 16-40
+ VM 5-1 mechanical interlock unit

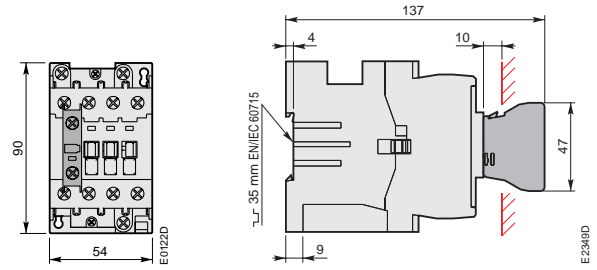
AL 26, TAL 26 4-pole Contactors



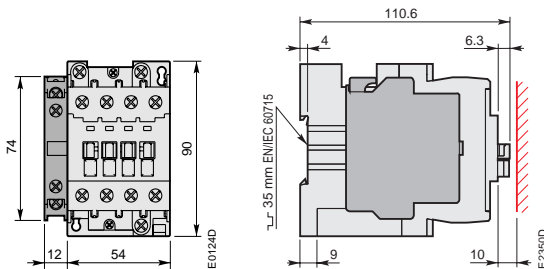
Dimensions (in mm)



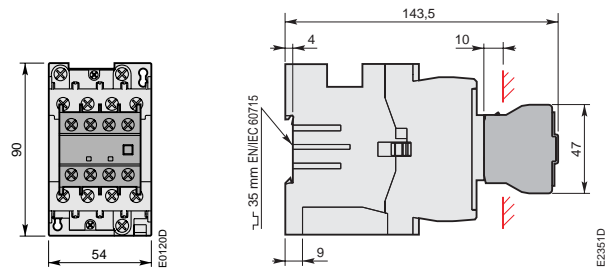
AL 26, TAL 26



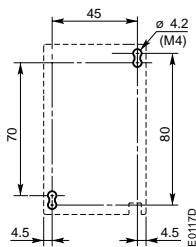
AL 26, TAL 26
+ CA 5 front-mounted 1-pole auxiliary contact block



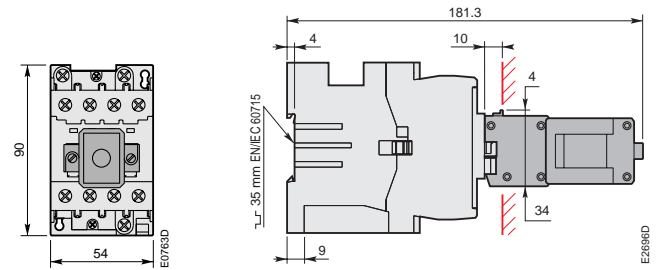
AL 26, TAL 26
+ CAL 5 side-mounted 2-pole auxiliary contact block



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



AL 26, TAL 26 - drilling plan

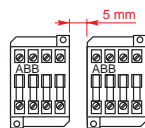


AL 26, TAL 26
+ WB 75-A on-position latch

Mounting distance (for side by side mounting)

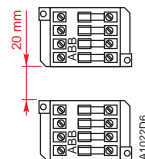
TAL 26

Position 1, 2, 5
20°C ≤ θ ≤ 55°C



TAL 26

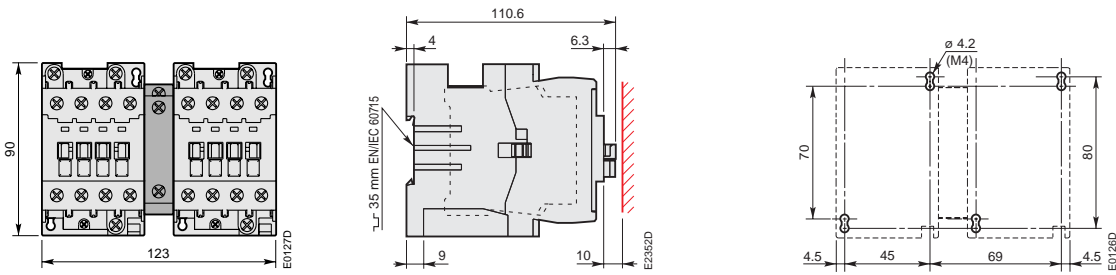
Position 3, 4
20°C ≤ θ ≤ 55°C



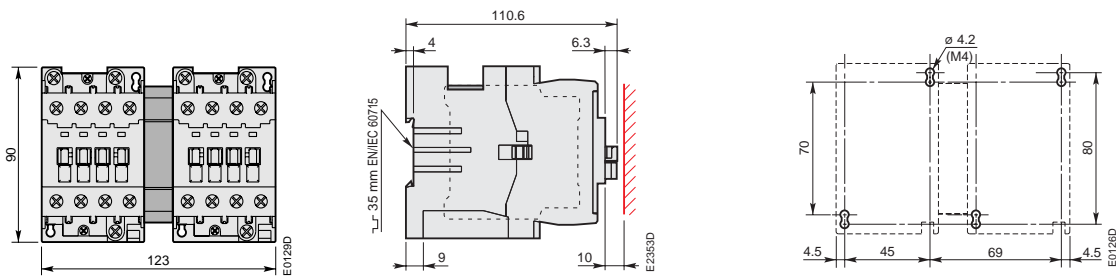
AL 26, TAL 26 4-pole Contactors



Dimensions (in mm)



**AL 26-40, TAL 26-40
+ VE 5-1 electrical and mechanical interlock unit**

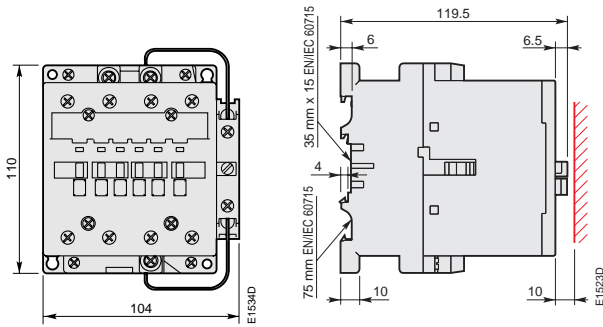


**AL 26-40, TAL 26-40
+ VM 5-1 mechanical interlock unit**

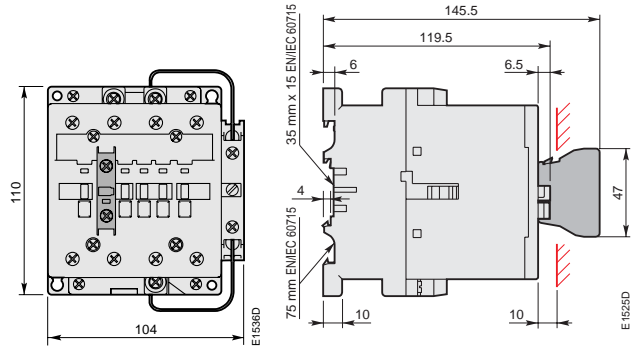
AE 45, AE 50 and AE 75 4-pole Contactors TAE 45, TAE 50 and TAE 75 4-pole Contactors



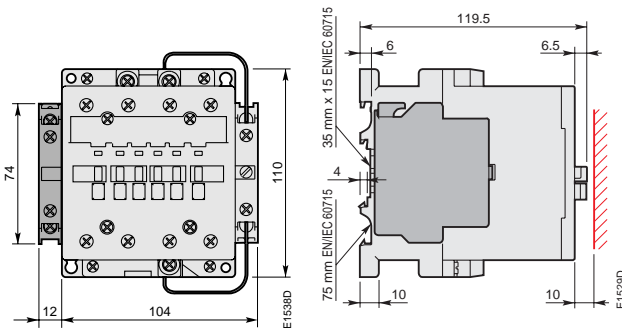
Dimensions (in mm)



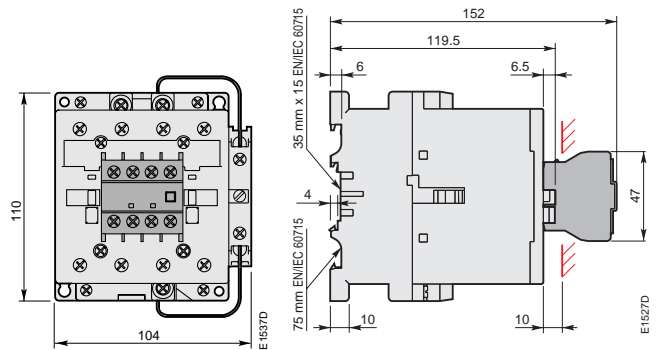
AE 45, AE 50, AE 75, TAE 45, TAE 50, TAE 75



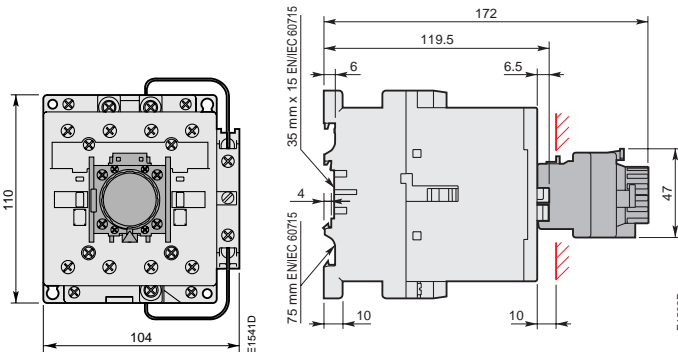
AE 45, AE 50, AE 75, TAE 45, TAE 50, TAE 75
+ CA 5 front-mounted 1-pole auxiliary contact block



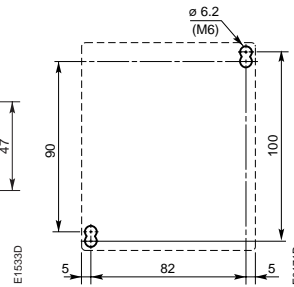
AE 45, AE 50, AE 75, TAE 45, TAE 50, TAE 75
+ CAL 5 side-mounted 2-pole auxiliary contact block



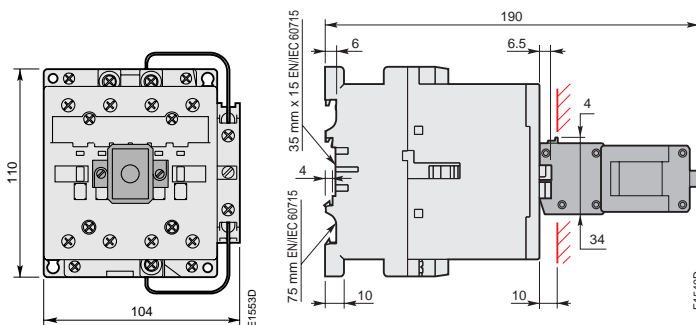
AE 45, AE 50, AE 75, TAE 45, TAE 50, TAE 75
+ CA 5 front-mounted 4-pole auxiliary contact block



AE 45, AE 50, AE 75, TAE 45, TAE 50, TAE 75
+ TP pneumatic timer



AE 45, AE 50, AE 75, TAE 45, TAE 50, TAE 75 drilling plan

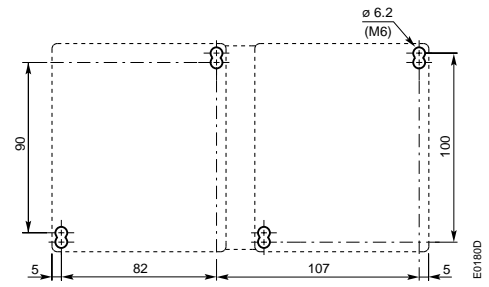
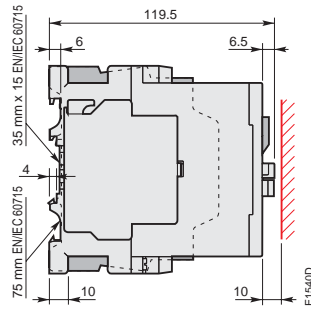
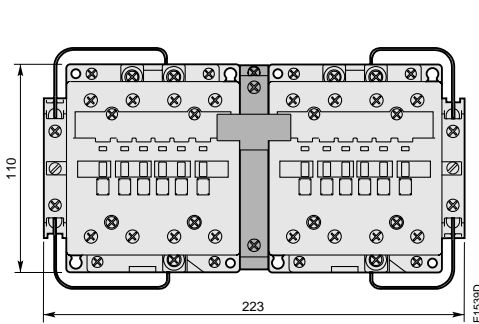


AE 45, AE 50, AE 75, TAE 45, TAE 50, TAE 75
+ WB 75-A on-position latch

AE 45, AE 50 and AE 75 4-pole Contactors TAE 45, TAE 50 and TAE 75 4-pole Contactors



Dimensions (in mm)



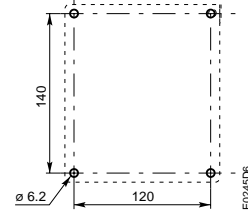
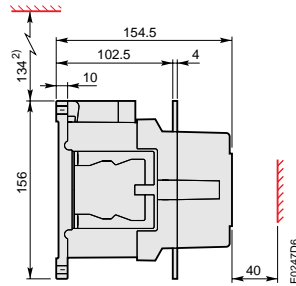
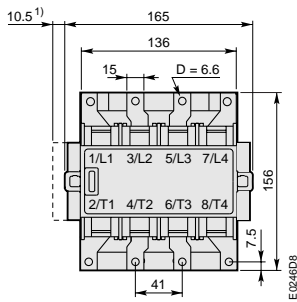
**AE 45-40, AE 50-40, AE 75-40,
TAE 45-40, TAE 50-40, TAE 75-40
+ VE 5-2 electrical and mechanical interlock unit**

EK 110 ... EK 210 4-pole Contactors

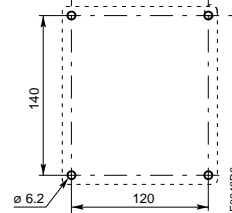
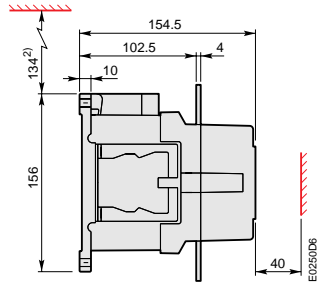
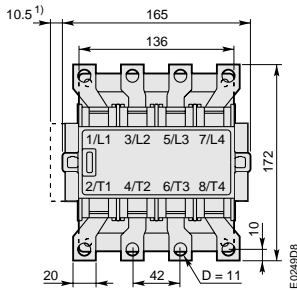
d.c. Operated



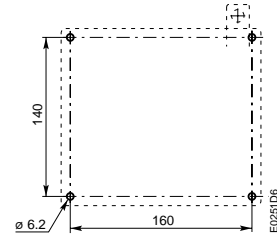
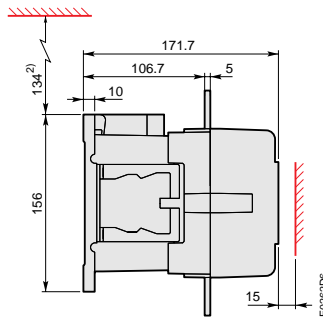
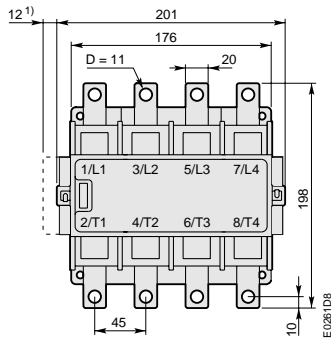
Dimensions (in mm)



EK 110



EK 150



EK 175, EK 210

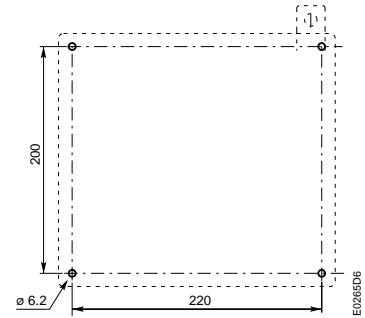
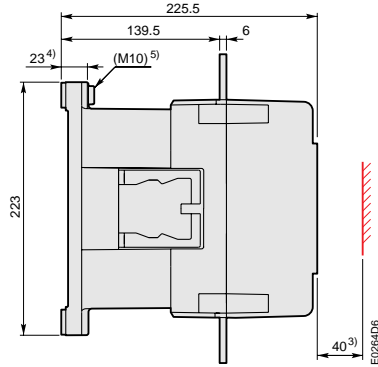
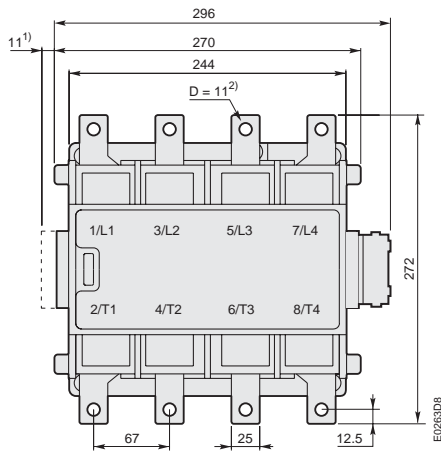
- 1) Dimension for extra auxiliary contact block
- 2) Min. distance to uninsulated wall

EK 370 ... EK 1000 4-pole Contactors

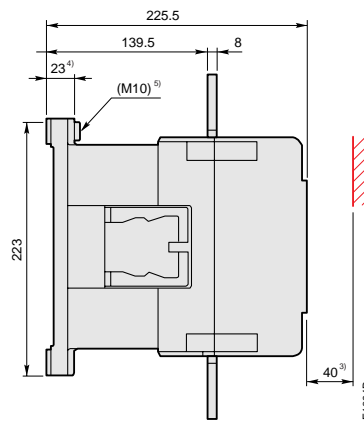
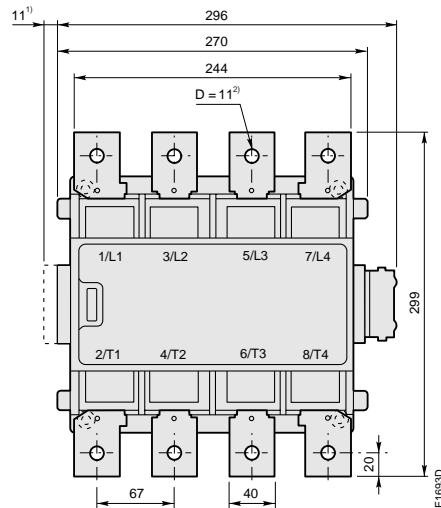
d.c. Operated



Dimensions (in mm)

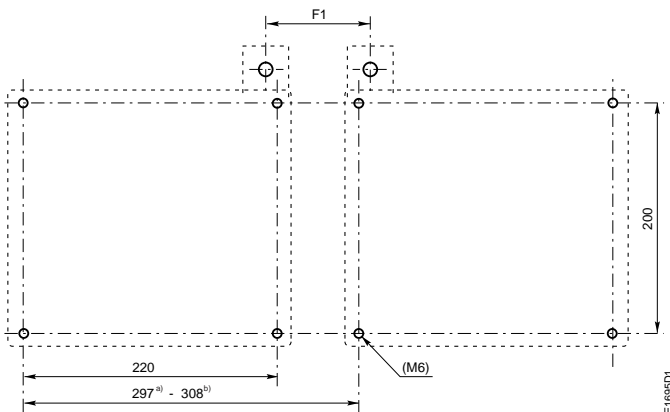


EK 370, EK 550



- 1) Dimension for extra auxiliary contact block
- 2) Screw, nut and washer by-packed
- 3) Min. distance to uninsulated wall
- 4) Damping elements are included
- 5) Earthing screw

EK 1000



- a) Min. dim.
- b) Includes space for two auxiliary contact blocks and the dc-unit between the contactors

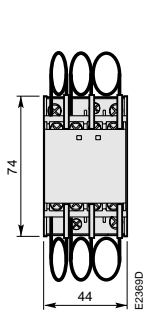
EK 1000 drilling plan

UA..RA 3-pole Contactors for Capacitor Switching

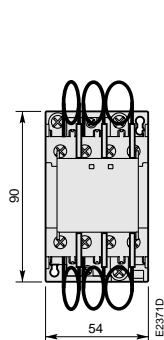
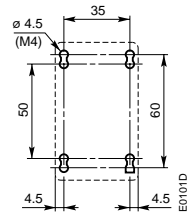
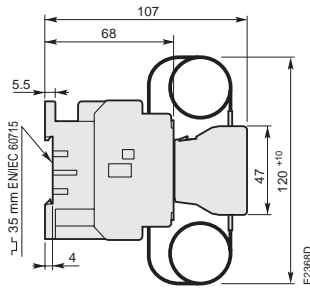
Unlimited Peak Current \hat{I}



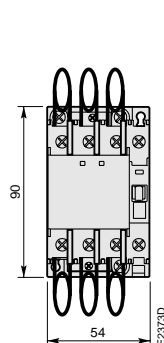
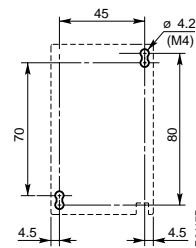
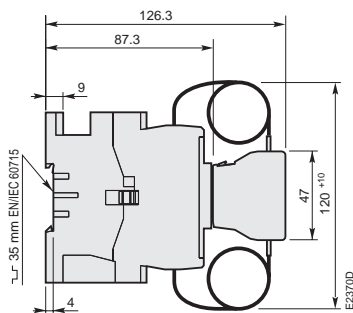
Dimensions (mm)



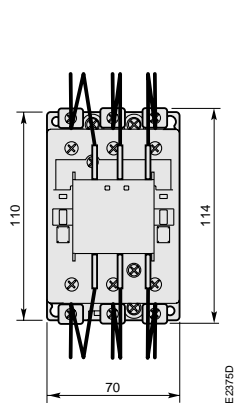
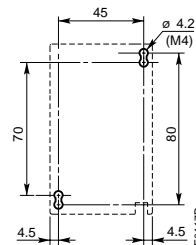
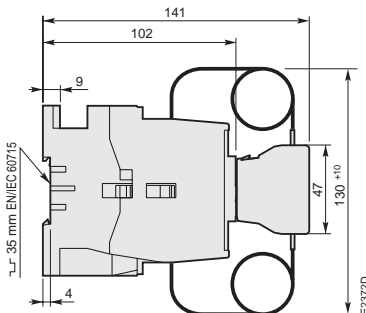
UA 16..RA



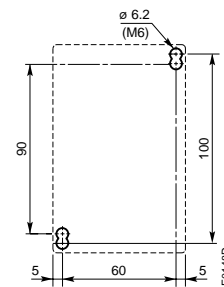
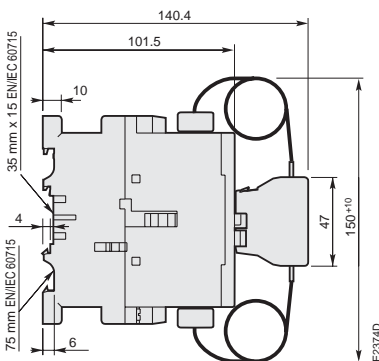
UA 26..RA



UA 30..RA



UA 50..RA, UA 63..RA, UA 75..RA

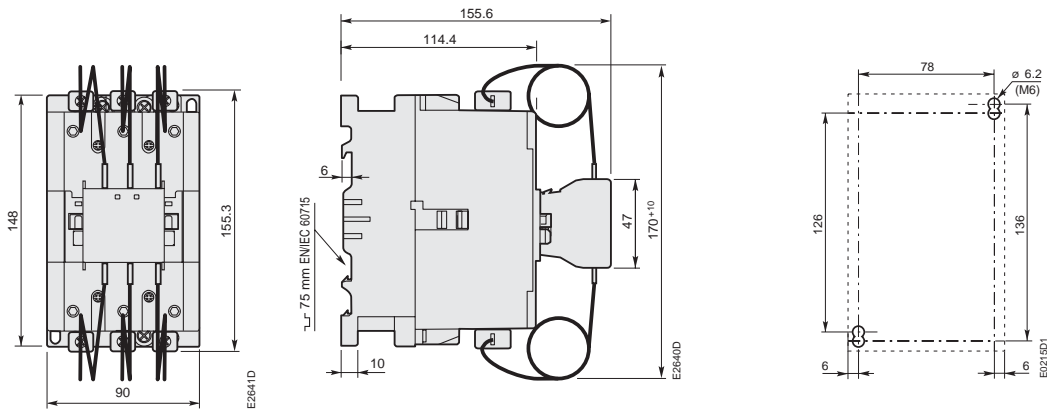


UA..RA 3-pole Contactors for Capacitor Switching

Unlimited Peak Current \hat{I}



Dimensions (mm)

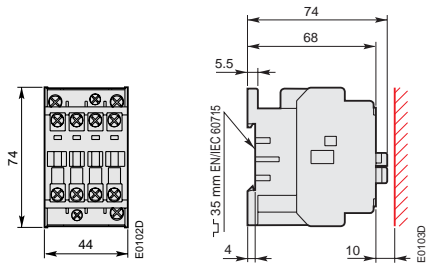


UA 95..RA, UA 110..RA

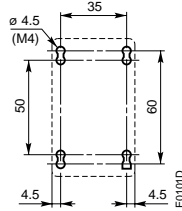
UA.. 3-pole Contactors for Capacitor Switching



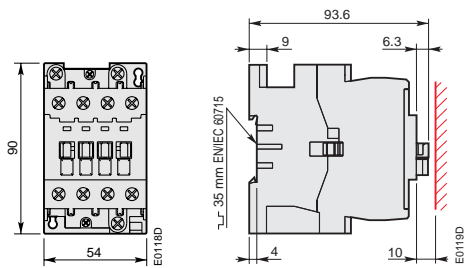
Dimensions (in mm)



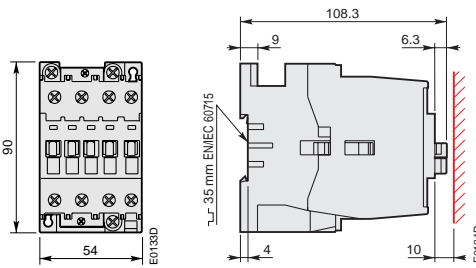
UA 16



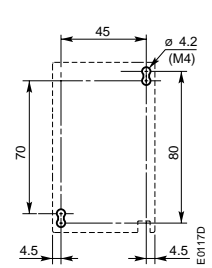
UA 16 drilling plan



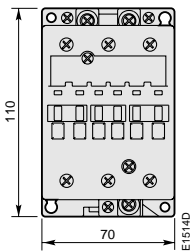
UA 26



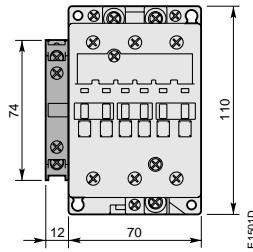
UA 30



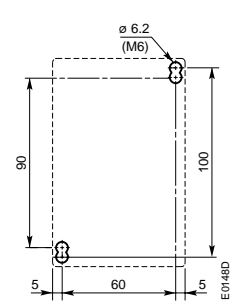
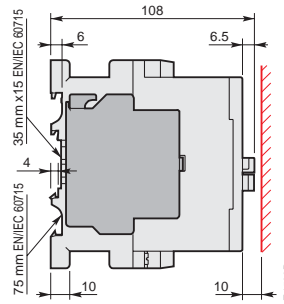
UA 26, UA 30 drilling plan



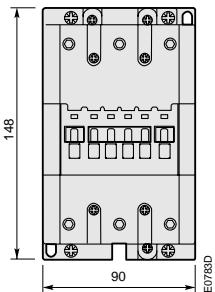
UA 50, UA 63, UA 75-30-00



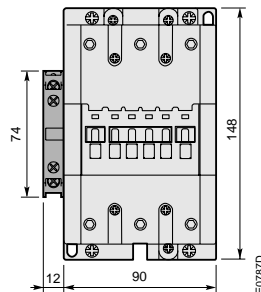
UA 50, UA 63, UA 75-30-11



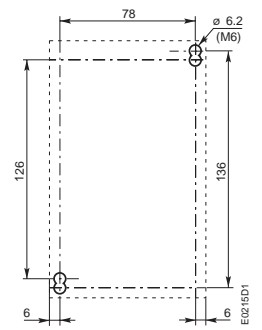
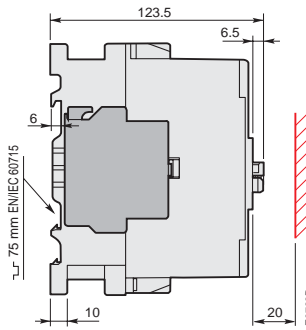
Drilling plan



UA 95, UA 110-30-00



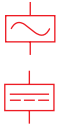
UA 95, UA 110-30-11



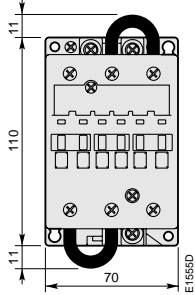
Drilling plan

GA 75 Contactor

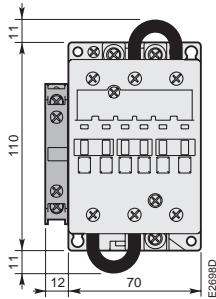
GAE 75 Contactor



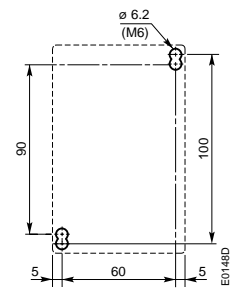
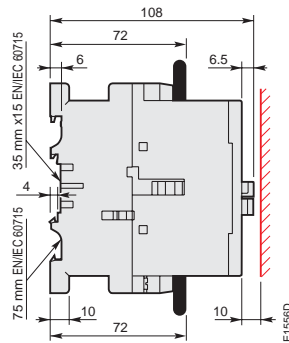
Dimensions (in mm)



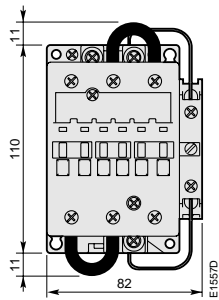
GA 75-10-00



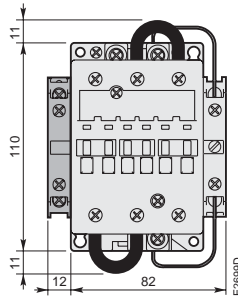
GA 75-10-11



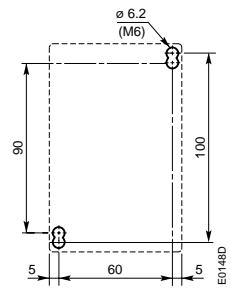
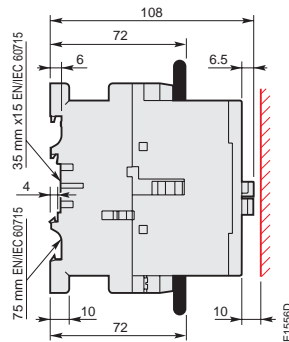
Drilling plan



GAE 75-10-00



GAE 75-10-11

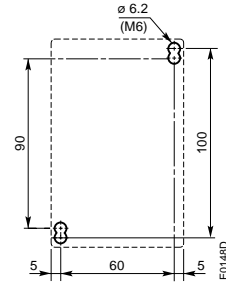
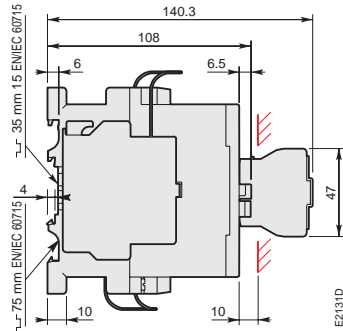
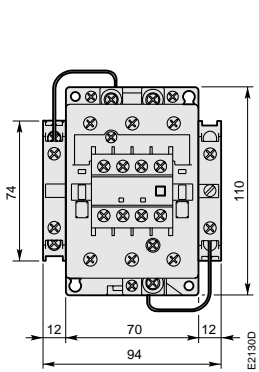


Drilling plan

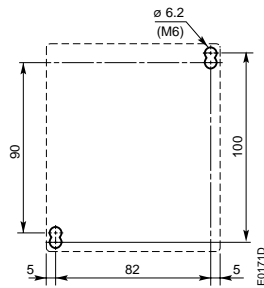
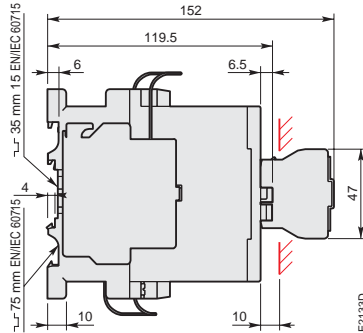
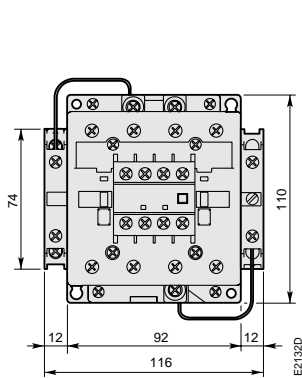
AM 50 and AM 75 3-pole Contactors AM 45 and AM 75 4-pole Contactors



Dimensions (in mm)



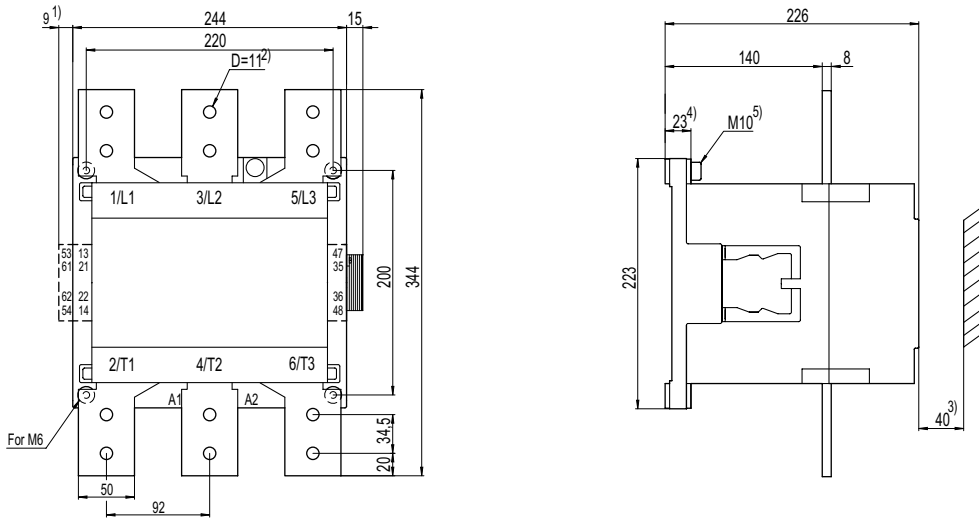
AM 50 and AM 75 3-pole contactors



AM 45 and AM 75 4-pole contactors

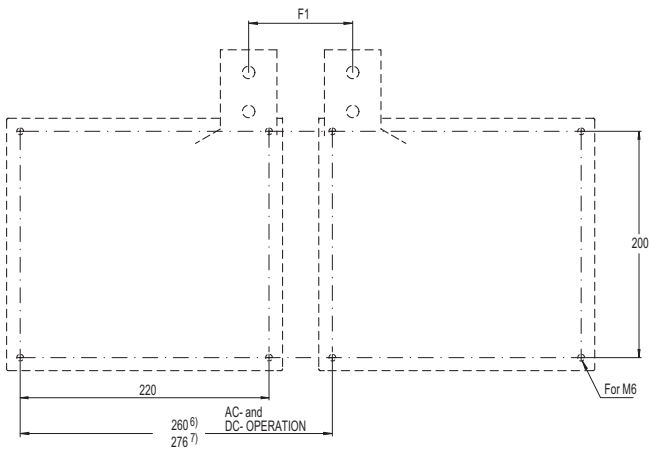
EH 1200 3-pole Contactor

Dimensions (in mm)



- 1) Dimension for extra auxiliary contact block
- 2) Screw, nut and washer by-packed
- 3) Min. distance to uninsulated wall
- 4) Damping elements are included
- 5) Earthing screw

EH 1200 3-pole contactors

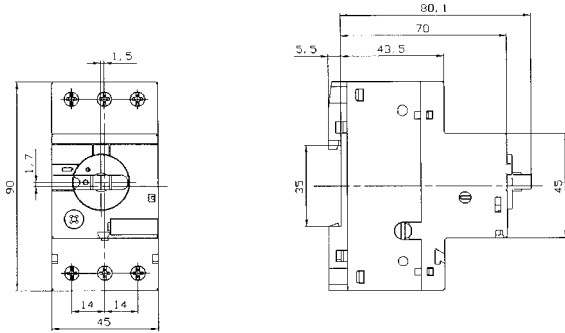


- 6) Min. dim.
- 7) Includes space for two auxiliary contact blocks and the dc-unit between the contactors

EH 1200 Drilling plan

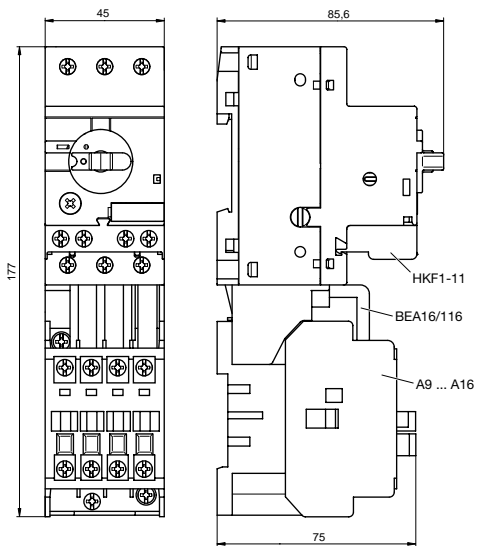
Manual Motor Starter MS 116

Dimensions (in mm)

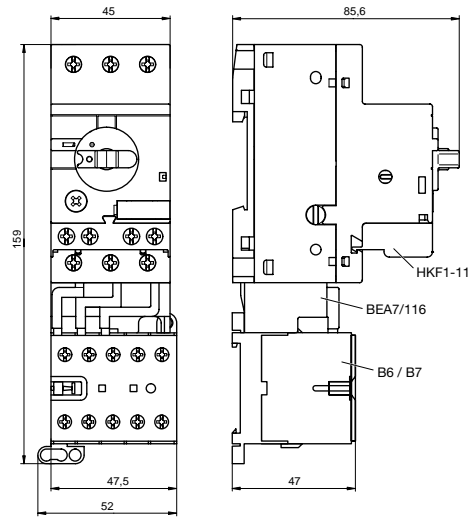


SST007-00

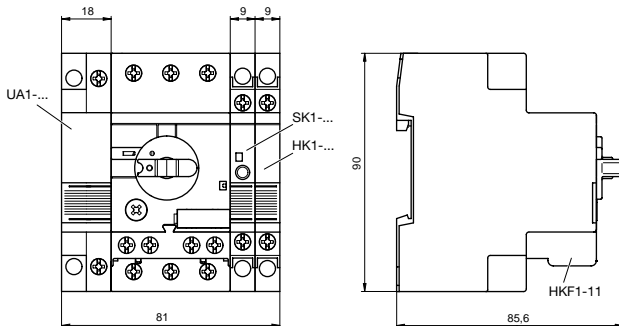
MS 116



MS 116 + A9...A16



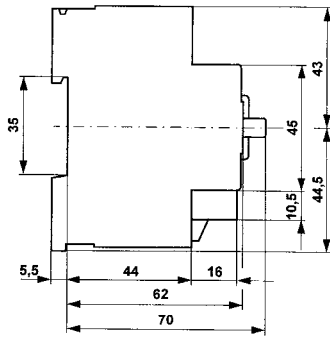
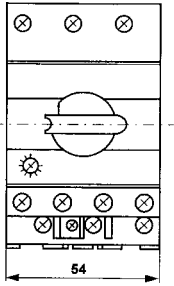
MS 116 + B6/7



MS 116 + UA1.../SK1.../HK1.../HKF1-11

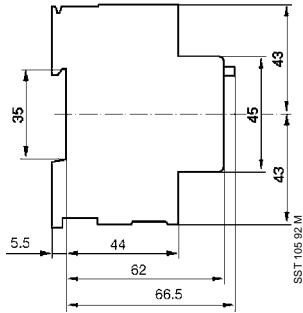
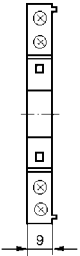
Manual Motor Starter MS 325

Dimensions (in mm)



SST 008-00

MS 325 + aux. contact HKF for front mounting

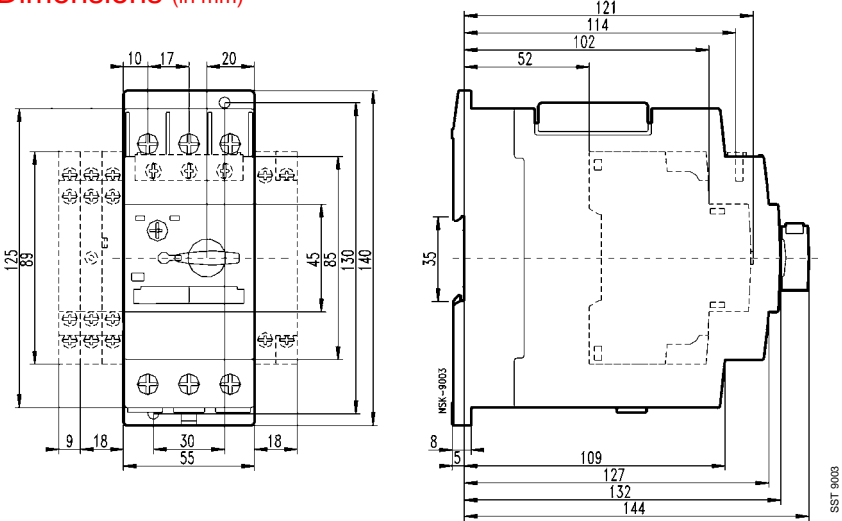


SST 106 92 M

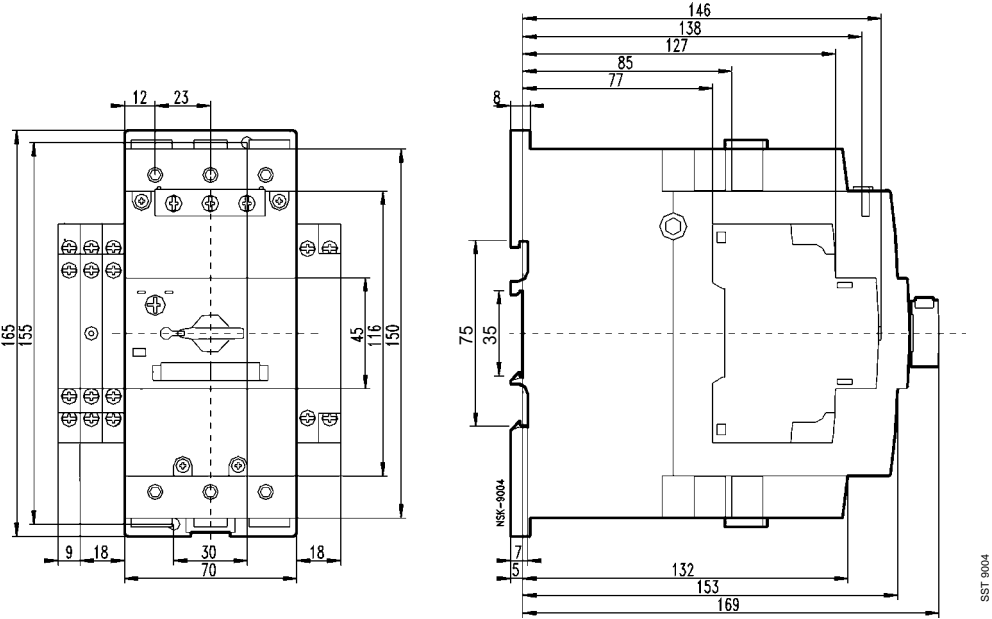
**Signal contact SK
Auxiliary switch HK**

Manual Motor Starter MS 45x, MS 49x

Dimensions (in mm)



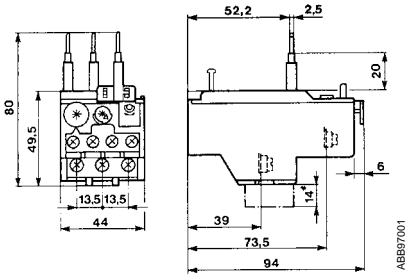
MS 45x



MS 49x

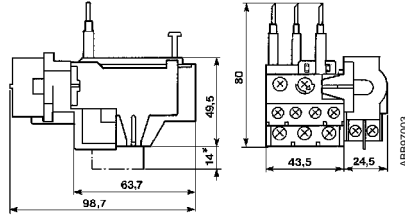
TA 25 DU ... TA 80 DU Thermal O/L Relays

Dimensions (in mm)



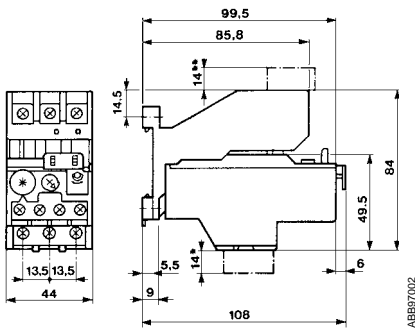
TA 25 DU

* For TA 25 DU 32



TA 25 DU + DS 25-A

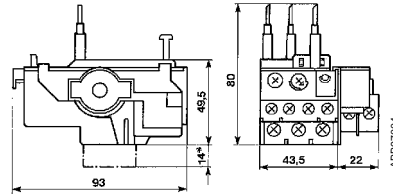
* For TA 25 DU 32



TA 25 DU + DB 25

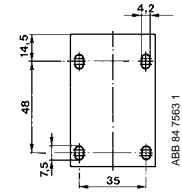
* For TA 25 DU 32

** For DB 25/32 A mounting kit



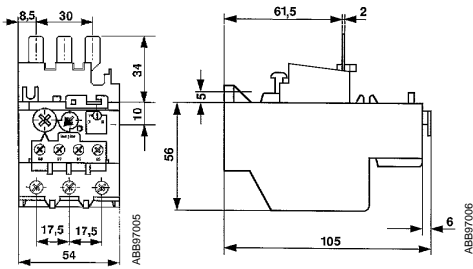
TA 25 DU + DR 25-A

* For TA 25 DU 32

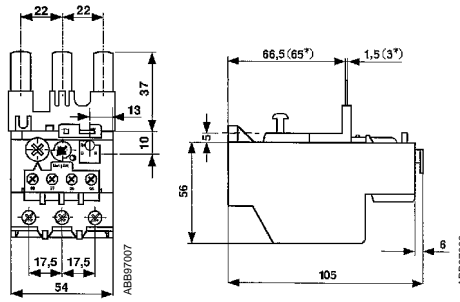


Drilling plan

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

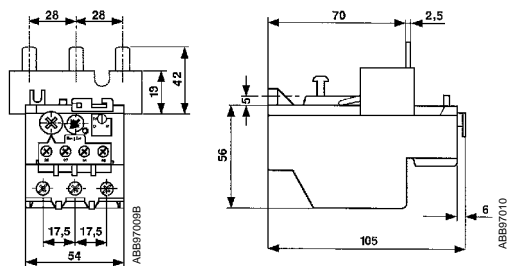


TA 42 DU

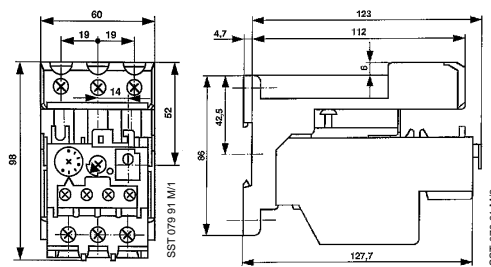


TA 75 DU

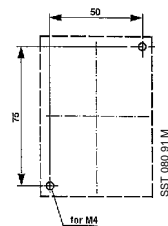
* For TA 75 DU 80



TA 80 DU



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

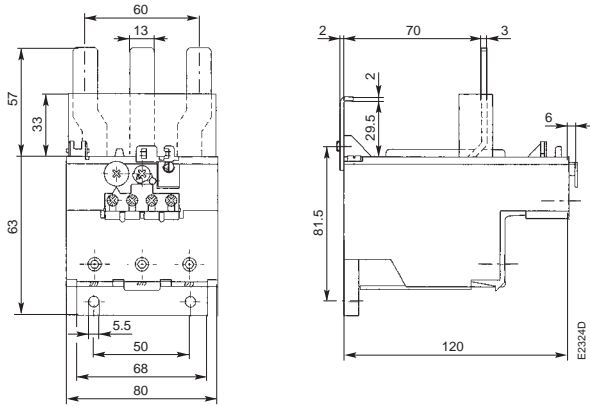


Drilling plan

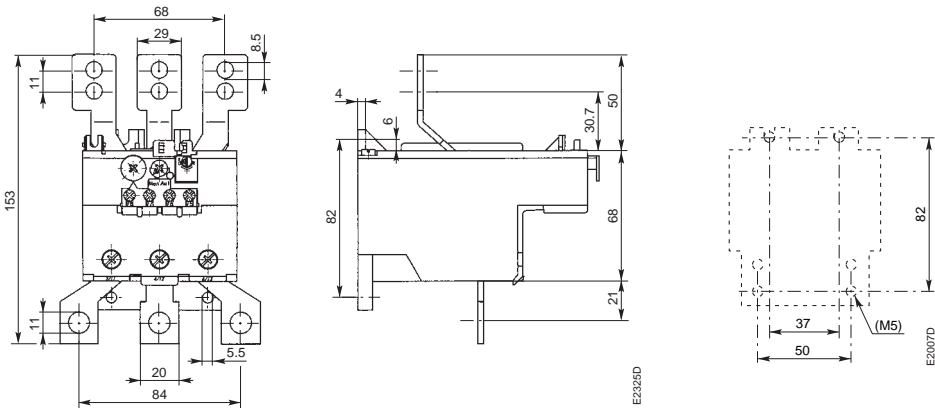
(TA 42 DU, TA 75 DU and TA 80 DU + DB 80 for independent mounting)

TA 110 DU ... TA 450 DU/SU Thermal O/L Relays

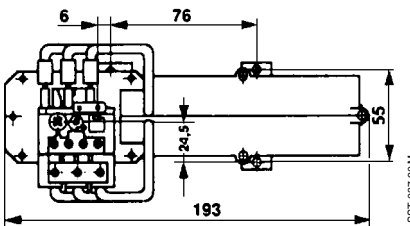
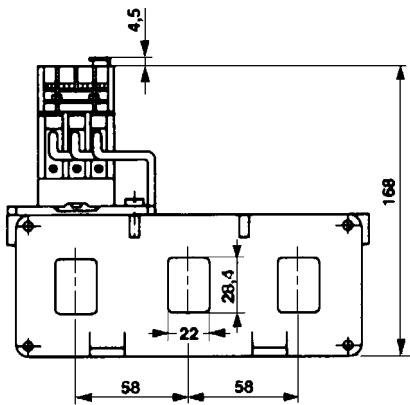
Dimensions (in mm)



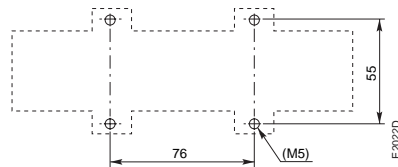
TA 110 DU



TA 200 DU

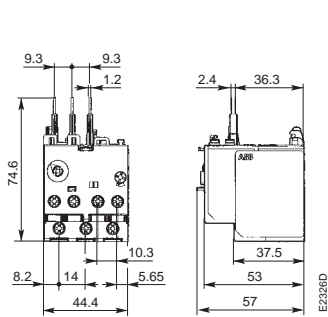


TA 450 DU/SU

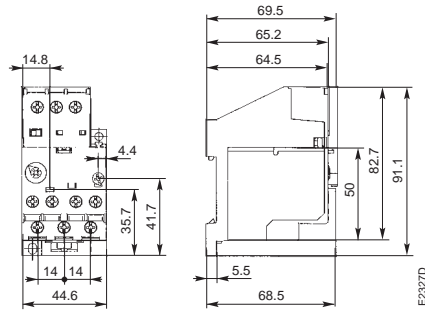


E 16 DU, E 200 DU and E 320 DU Electronic O/L Relays

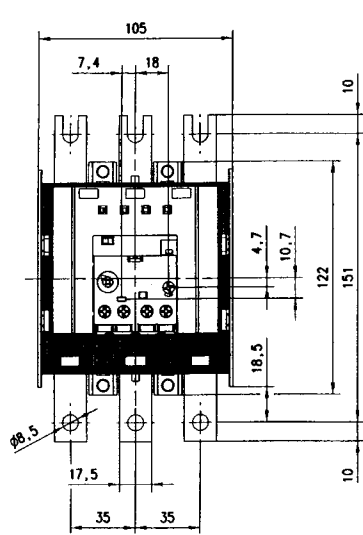
Dimensions (in mm)



E 16 DU



E 16 DU + DB 16 E



E 200 DU

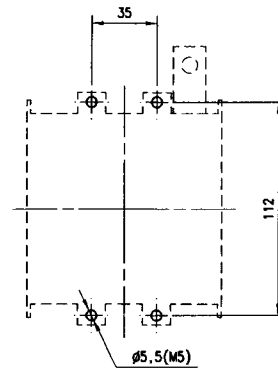
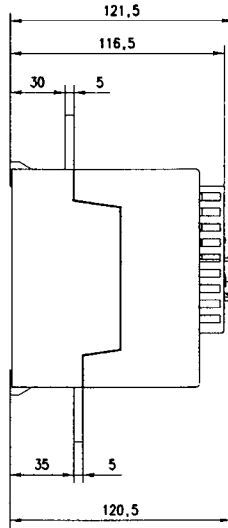
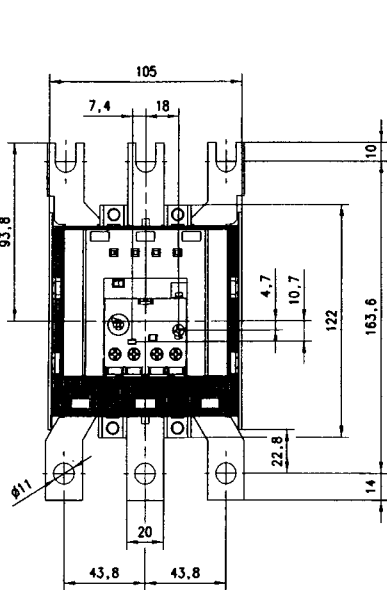


ABB E200DU



E 320 DU

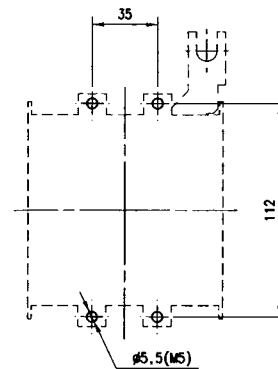
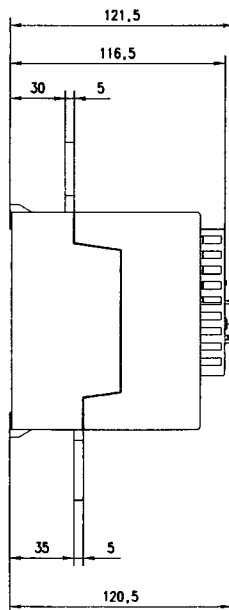


ABB E320DU

E 500 DU, E 800 DU and E1250 DU Electronic O/L Relays

Dimensions (in mm)

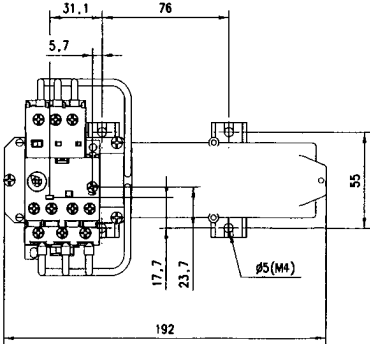
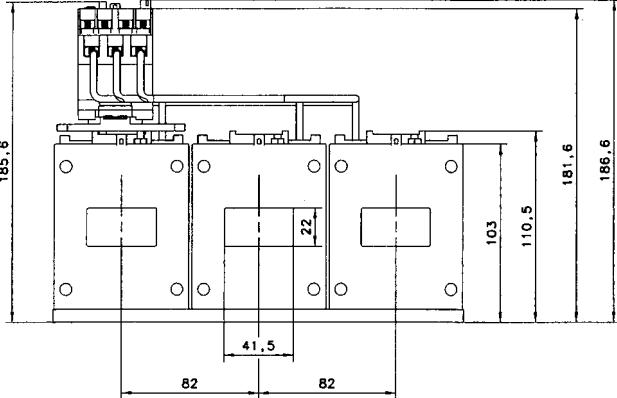
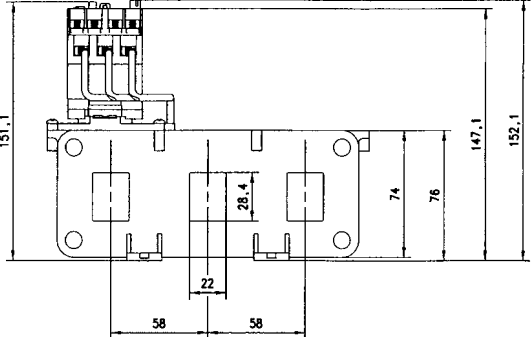


ABB E800DU

E 500 DU

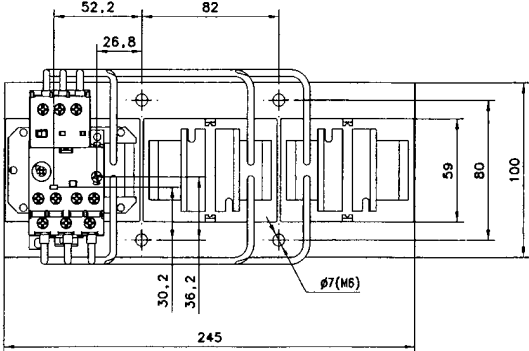


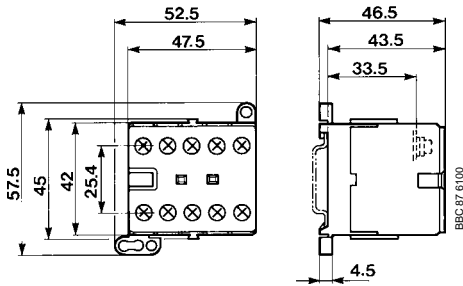
ABB E800DU

E 800 DU

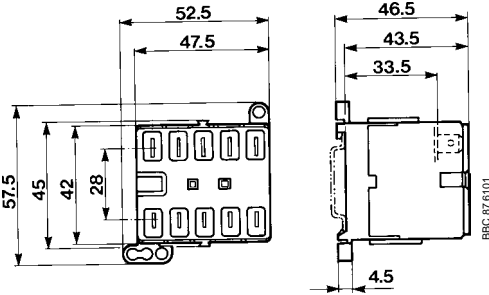
>> E 1250 DU Dimensions page 9/26

Mini Contactors, Mini Contactor Relays and Accessories

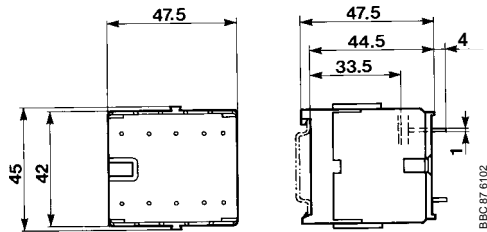
Dimensions (in mm)



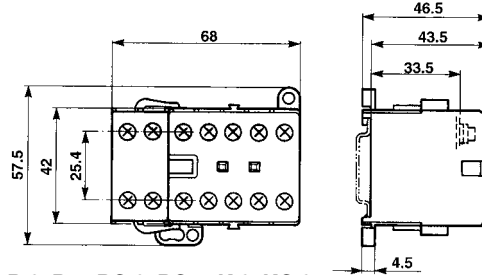
B 6, B 7, BC 6, BC 7, K 6, KC 6
screw connection



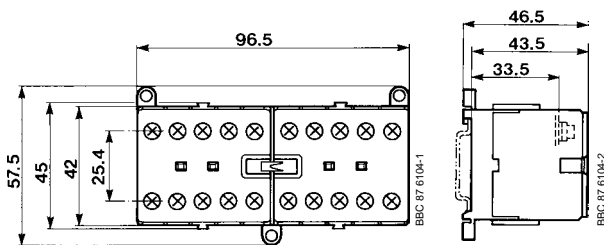
B 6, B 7, BC 6, BC 7, K 6, KC 6
flat pin connection



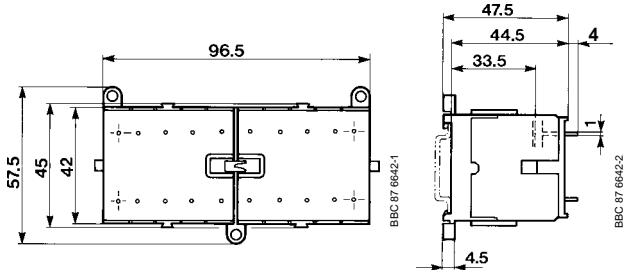
B 6, B 7, BC 6, BC 7, K 6, KC 6
soldering pin connection



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

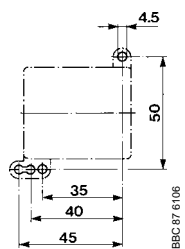


VB 6, VB 7, VBC 6, VBC 7 compact reversing contactor
screw connection

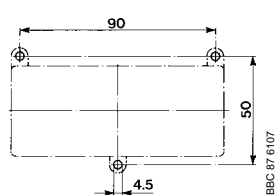


VB 6, VB 7, VBC 6, VBC 7 compact reversing contactor
soldering pin connection

Drilling plans for M4 fixing screws

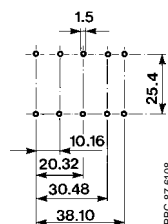


B 6, B 7, BC 6, BC 7, K 6, KC 6

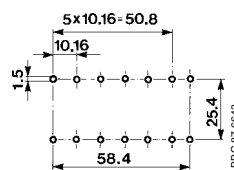


VB 6, VB 7, VBC 6, VBC 7, VB 6A, VB 7A, VBC 6A, VBC 7A

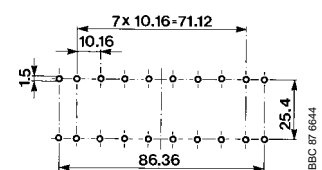
Drilling plans for printed circuit



Standard 4-pole device



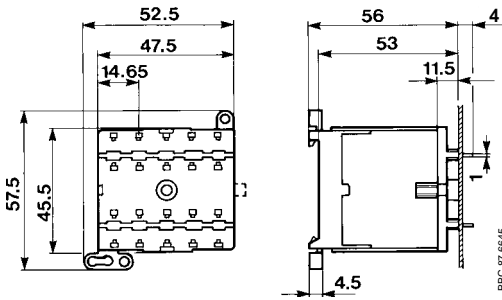
Standard device with auxiliary contact block



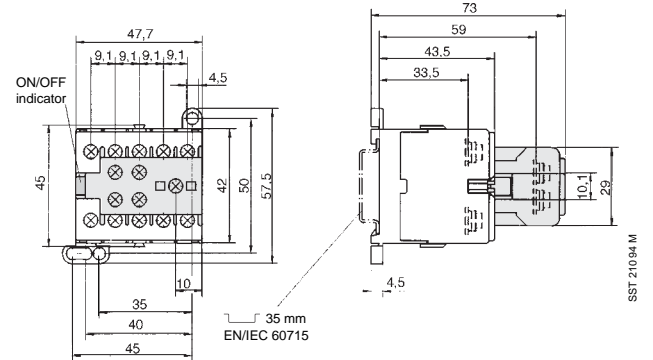
Compact reversing contactor

Mini Contactors, Mini Contactor Relays and Accessories

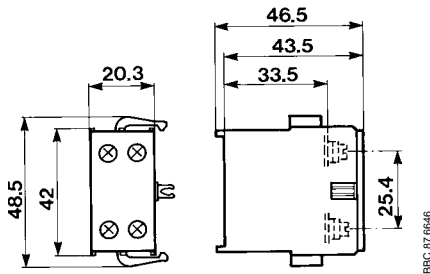
Dimensions (in mm)



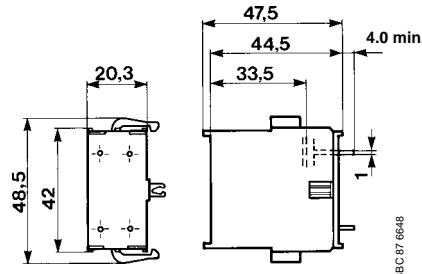
B 6- F, B 7- F + LB 6



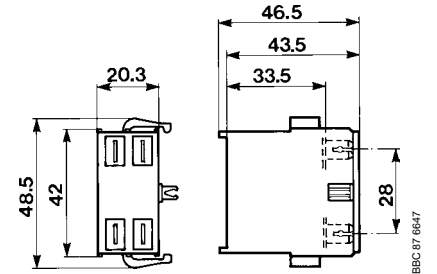
B 6, B 7, BC 6, BC 7, K 6, KC 6 + CAF 6 front-mounted auxiliary contact block



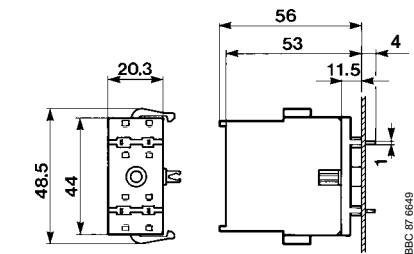
CA 6 auxiliary contact block screw connection



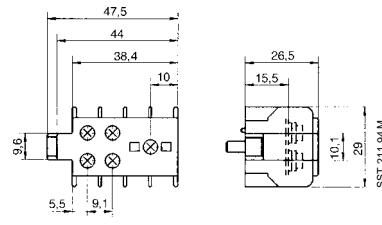
CA 6- P auxiliary contact block soldering pin connection



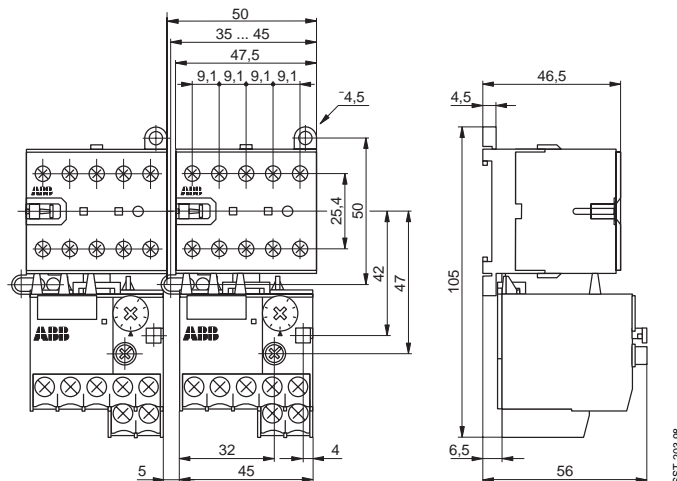
CA 6- F auxiliary contact block flat pin connection



CA 6 auxiliary contact block + LB 6- CA



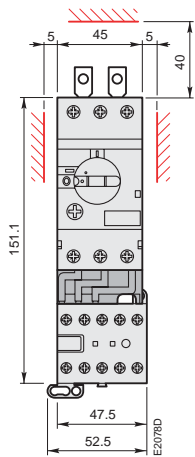
CAF 6 auxiliary contact block screw connection



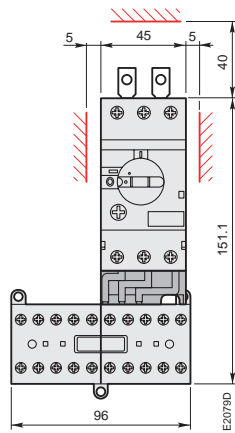
B 6, B 7 + T 7 DU thermal O/L relay

Mini Contactors with BEA.. Connecting Links and Manual Motor Starters

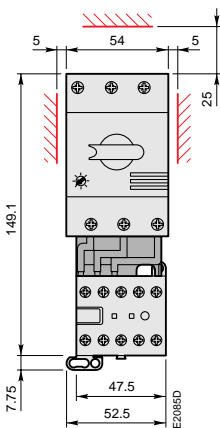
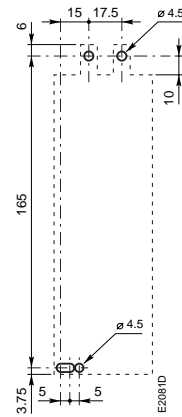
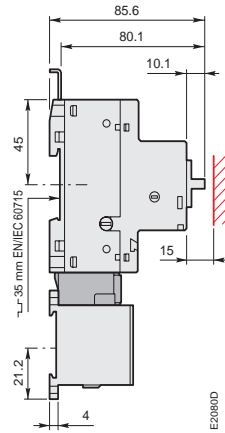
Dimensions (in mm)



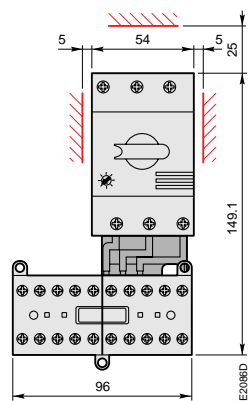
**B 6, B 7 mini contactors
+ BEA 7/116
+ MS 116 manual motor starter**



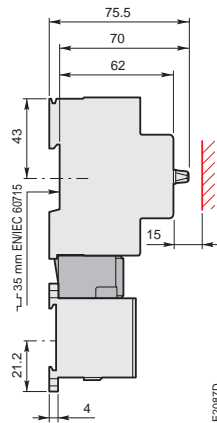
**VB 6, VB 7 mini contactors
+ BEA 7/116
+ MS 116 manual motor starter**



**B 6, B 7 mini contactors
+ BEA 7/325
+ MS 325 manual motor starter**



**VB 6, VB 7 mini contactors
+ BEA 7/325
+ MS 325 manual motor starter**



Notes



A series of horizontal lines for writing notes, starting from a red line below the pen icon and continuing down the page.

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in Middle East and Africa

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Listing of Products

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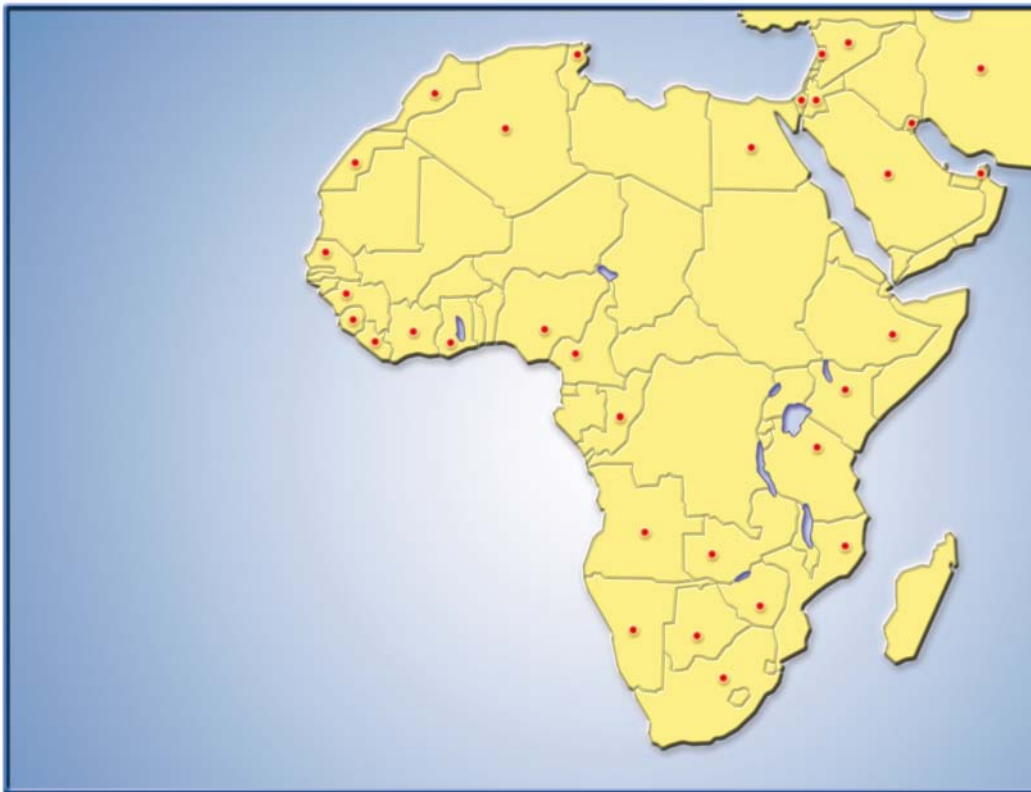
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