Main catalog – July 2017

Motor protection and control
Manual motor starters, contactors and overload relays

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

UL/CSA	Motor nominal current: single and three phase (according to UL 60947-4-1A)									
Motor power	120 V 1-ph	200 V 1-ph	200 V 3-ph	208 V 1-ph	208 V 3-ph	220-240 V 1-ph	220-240 V 3-ph	380-415 V 3-ph	440-480 V 3-ph	550-600 V 3-ph
hp	A	A	A	A	A	A	A	A	A	A
1/10	3	–	–	–	–	1.5	–	–	–	–
1/8	3.8	–	–	–	–	1.9	–	–	–	–
1/6	4.4	2.5	–	2.4	–	2.2	–	–	–	–
1/4	5.8	3.3	–	3.2	–	2.9	–	–	–	–
1/3	7.2	4.1	–	4	–	3.6	–	–	–	–
1/2	9.8	5.6	2.5	5.4	2.4	4.9	2.2	1.3	1.1	0.9
3/4	13.8	7.9	3.7	7.6	3.5	6.9	3.2	1.8	1.6	1.3
1	16	9.2	4.8	8.8	4.6	8	4.2	2.3	2.1	1.7
1-1/2	20	11.5	6.9	11	6.6	10	6	3.3	3	2.4
2	24	13.8	7.8	13.2	7.5	12	6.8	4.3	3.4	2.7
3	34	19.6	11	18.7	10.6	17	9.6	6.1	4.8	3.9
5	56	32.2	17.5	30.8	16.7	28	15.2	9.7	7.6	6.1
7-1/2	80	46	25.3	44	24.2	40	22	14	11	9
10	100	57.5	32.2	55	30.8	50	28	18	14	11
15	135	–	48.3	–	46.2	68	42	27	21	17
20	–	–	62.1	–	59.4	88	54	34	27	22
25	–	–	78.2	–	74.8	110	68	44	34	27
30	–	–	92	–	88	136	80	51	40	32
40	–	–	120	–	114	176	104	66	52	41
50	–	–	150	–	143	216	130	83	65	52
60	–	–	177	–	169	–	154	103	77	62
75	–	–	221	–	211	–	192	128	96	77
100	–	–	285	–	273	–	248	165	124	99
125	–	–	359	–	343	–	312	208	156	125
150	–	–	414	–	396	–	360	240	180	144
200	–	–	552	–	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

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Motor protection and control
Manual motor starters, contactors and overload relays

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3-pole contactors

Mini contactors

Contactors for motor control and

IEC (1)	**AC-3 Rated operational power**	θ ≤ 60 °C (2), 400 V	**kW**	**4**	**5.5**	**4**	**5.5**	**7.5**	**4**	**5.5**	**7.5**	**11**	**15**	**18.5**
UL/CSA	**3-phase motor rating**	480 V	**hp**	**3**	**5**	**5**	**7.5**	**10**	**5**	**7.5**	**10**	**15**	**20**	**25**
AC / DC Control supply			Type	—	—	—	—	—	AF09	AF12	AF16	AF26	AF30	AF38
AC Control supply			Type	B6	B7	AS09	AS12	AS16	AF09	AF12	AF16	AF26	AF30	AF38
DC Control supply			Type	BC6	BC7	ASL09	ASL12	ASL16	AF09	AF12	AF16	AF26	AF30	AF38
IEC	**AC-3 Rated operational current**	θ ≤ 60 °C (2), 400 V	**A**	**8.5**	**11.5**	**9**	**12**	**15.5**	**9**	**12**	**18**	**26**	**32**	**38**
	AC-1 Rated operational current	θ ≤ 40 °C, 690 V	**A**	**20** (400 V)	**20** (400 V)	**22**	**24**	**24**	**25**	**28**	**30**	**45**	**50**	**50**
UL/CSA	**General use rating**	600 V	**A**	**12** (300 V)	**16**	**20**	**20**	**20**	**25**	**28**	**30**	**45**	**50**	**50**
NEMA	**NEMA Size**			—	—	**00**	**00**	**0**	**00**	**0**	—	**1**	—	—

(1) 1000 V IEC ratings available for AF80, AF96 and AF146 ... AF2650 contactors.
(2) θ ≤ 55 °C for mini contactors and AF400 ... AF2650 contactors.

Main accessories

Auxiliary contact blocks	Front mounting	**CAF6**	**CA3-10** (1 x N.O.) **CA3-01** (1 x N.C.)	**CA4-10** (1 x N.O.) **CA4-01** (1 x N.C.)	
	Side mounting	**CA6**		**CAL4-11** (1 x N.O. + 1 x N.C.)	
Timers	Electronic		**TEF3-ON** **TEF3-OFF**	**TEF4-ON** **TEF4-OFF**	
Interlocking units (3)	Mechanical		**VM3**	**VM4**	
	Mechanical / Electrical			**VEM4**	
Connection sets	For reversing contactors	**BSM6-30**	**BER16C-3**	**BER16-4**	**BER38-4**
Surge suppressors	Varistor (AC/DC)	**RV-BC6**	**RV5** (24...440 V)	Built-in surge protection	
	RC type (AC)		**RC5-1** (24...440 V)		
	Transil diode (DC)	**RD7**	**RT5** (12...264 V)		

(3) See available reversing contactors VB6, VB7 and VAS09 ... VAS16.

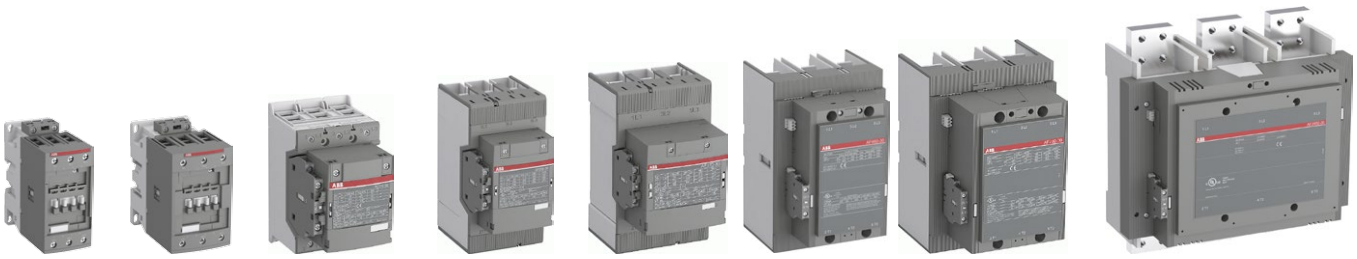
Overload relays

Thermal relays	Class 10 (Class 10A for TF140, TA200DU)	**T16** (0.10...16 A)	**T16** (0.10...16 A)	**TF42** (0.10...38 A)	
Electronic relays	Class 10E, 20E, 30E	**E16DU** (0.10...18.9 A)		**EF19** (0.10...18.9 A)	**EF19** (0.10...18.9 A) **EF45** (9...45 A)

Manual motor starters

Thermal / magnetic protection Class 10	**MS116** (0.10...32 A) Ics up to 50 kA for class 10A	**MS116** (0.10...32 A) Ics up to 50 kA for class 10A		**MS165** (10...65 A) Ics up to 100 kA
	MS132 (0.10...32 A) Ics up to 100 kA	**MS132** (0.10...32 A) Ics up to 100 kA		
				MS497 (22...100 A) Ics up to 100 kA
Magnetic only types	**MO132** (0.16...32A)	**MO132** (0.16...32 A) Ics up to 100 kA		**MO165** (16...65 A) Ics up to 100 kA
Accessories	For contactor mounting	**BEA7/132**	**BEA16-3**	**BEA16-4**	**BEA38-4**

(4) BEA65-4 suitable for MS165 and MO165 only.



	18.5	22	30	37	45	55	75	75	90	110	132	160	200	200	250	315	400	—	475	560	—	—
	30	40	50	60	60	75	100	100	125	150	200	250	300	350	400	500	600	—	800	900	—	—
	AF40	AF52	AF65	AF80	AF96	AF116	AF140	AF146	AF190	AF205	AF265	AF305	AF370	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650
	AF40	AF52	AF65	AF80	AF96	AF116	AF140	AF146	AF190	AF205	AF265	AF305	AF370	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650
	AF40	AF52	AF65	AF80	AF96	AF116	AF140	AF146	AF190	AF205	AF265	AF305	AF370	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650
	40	53	65	80	96	116	140	146	190	205	265	305	370	400	460	580	750	—	860	1060	—	—
	70	100	105	125	130	160	200	225	275	350	400	500	600	600	700	800	1050	1260	1350	1650	2050	2650
	60	80	90	105	115	160	200	200	250	300	350	400	520	550	650	750	900	1210	1350	1650	2100	2700
	2	—	—	3	—	—	4	—	—	—	5	—	—	—	6	—	7	—	—	8	—	—

						CAL19-11 (1 x N.O. + 1 x N.C.)								**CAL18-11** (1 x N.O. + 1 x N.C.)										
	VM96-4					**VM19** (for same size contactors)								**VM750H** **VM750V**					**VM1650H**					
	BER65-4			**BER96-4**		**BER140-4**			**BER205-4**		**BER370-4**			**BEM460-30**		**BEM750-30**								

	TF65 (22...67 A)			**TF96** (40...96 A)		**TF140DU** (66...142 A) $\theta \leq 55$ °C			**TA200DU** (66...200 A) $\theta \leq 55$ °C															
	EF65 (20...70 A)			**EF96** (20...100 A)		**EF146** (54...150 A)			**EF205** (63...210 A)		**EF370** (115...380 A)			**EF460** (150...500 A)		**EF750** (250...800 A)								

Short-circuit protection devices

MCCB and switch-fuses

																							MS5100 (40...100 A) Ics up to 50 kA	
																						MS495 (45...100 A) Ics up to 50 kA		
																							MO5100 (70...100 A) Ics up to 36 kA	
																						MO496 (32...100 A) Ics up to 100 kA		
																							MO495 (63...100 A) Ics up to 50 kA	
	BEA65-4 (4)																							

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4-pole contactors

Mini contactors

IEC	**AC-1 Rated operational current**	θ ≤ 40 °C, 690 V	**A**	**16**	**20**
UL/CSA	**General use rating**	600 V	**A**	**12** (300 V)	**16**
AC / DC Control supply			Type	–	–
AC Control supply			Type	**B6**	**B7**
DC Control supply			Type	**BC6**	**BC7**

Contactor relays

Mini contactor relays

IEC	**AC-15 Rated operational current**	400 V	**A**	**3**		
UL/CSA	**Pilot duty**			**A600**		
				2 2	3 1	4 0
AC Control supply			Type	**K6-22Z**	**K6-31Z**	**K6-40E**
DC Control supply			Type	**KC6-22Z**	**KC6-31Z**	**KC6-40E**
AC / DC Control supply			Type	–	–	–

R contactors

DC Circuit switching

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

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

Specific contactors

DC Circuit switching

100 A, 440 V, DC-1
GA75, **GAE75** types

275 to 2050 A, 1000 V, DC-1
GAF185 to **GAF2050** types

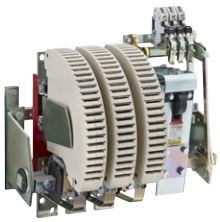
Contactors

25	30	45	55	70	100	125	160	200	275	350	400	500	525	800	1000
25	30	45	55	60	80	105	160	175	230	250	300	350	420	540	—
AF09	AF16	AF26	AF38	AF40	AF52	AF80	AF116	AF140	AF190	AF205	AF265	AF305	AF370	—	—
AF09	AF16	AF26	AF38	AF40	AF52	AF80	AF116	AF140	AF190	AF205	AF265	AF305	AF370	EK550	EK1000
AF09	AF16	AF26	AF38	AF40	AF52	AF80	AF116	AF140	AF190	AF205	AF265	AF305	AF370	EK550	EK1000

Contactor relays

3			3		
A600, Q300			A600, Q600		
2 2	3 1	4 0	2 2	3 1	4 0
NS22E	NS31E	NS40E	NF22E	NF31E	NF40E
NSL22E	NSL31E	NSL40E	NF22E	NF31E	NF40E
—	—	—	NF22E	NF31E	NF40E

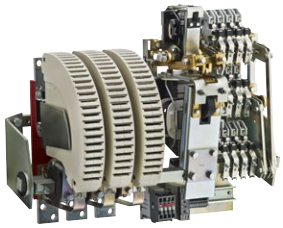
AC Circuit switching



AC-1 Rated current up to 5000 A
AC-3 Rated power up to 1500 kW
(1520 A - 440 V)

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

Special versions



AC/DC Coupling: LOR.. contactors

Slip ring motor control: FOR .. contactors

Field discharge: AM(F)-CC-JORE contactors

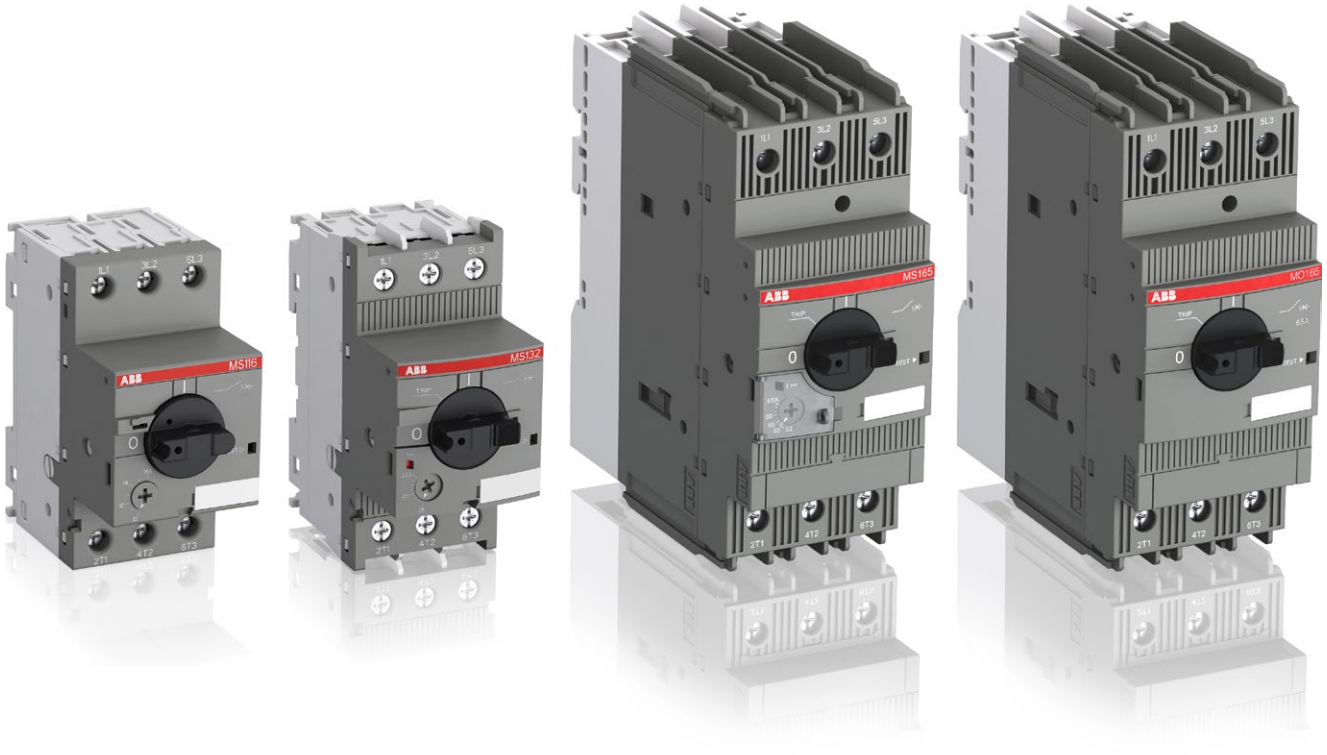
AC/DC Switching (N.C./N.O. main poles):
NOR & JOR contactors

Latching contactors for energy saving
and safety requirements: AMA or AME contactors

Capacitor switching

12.5 to 80 kvar

UA16..RA to **UA110..RA** types
UA16 to **UA110** types


MS116
MS132
MS165
MO165
ABB

Manual motor starters

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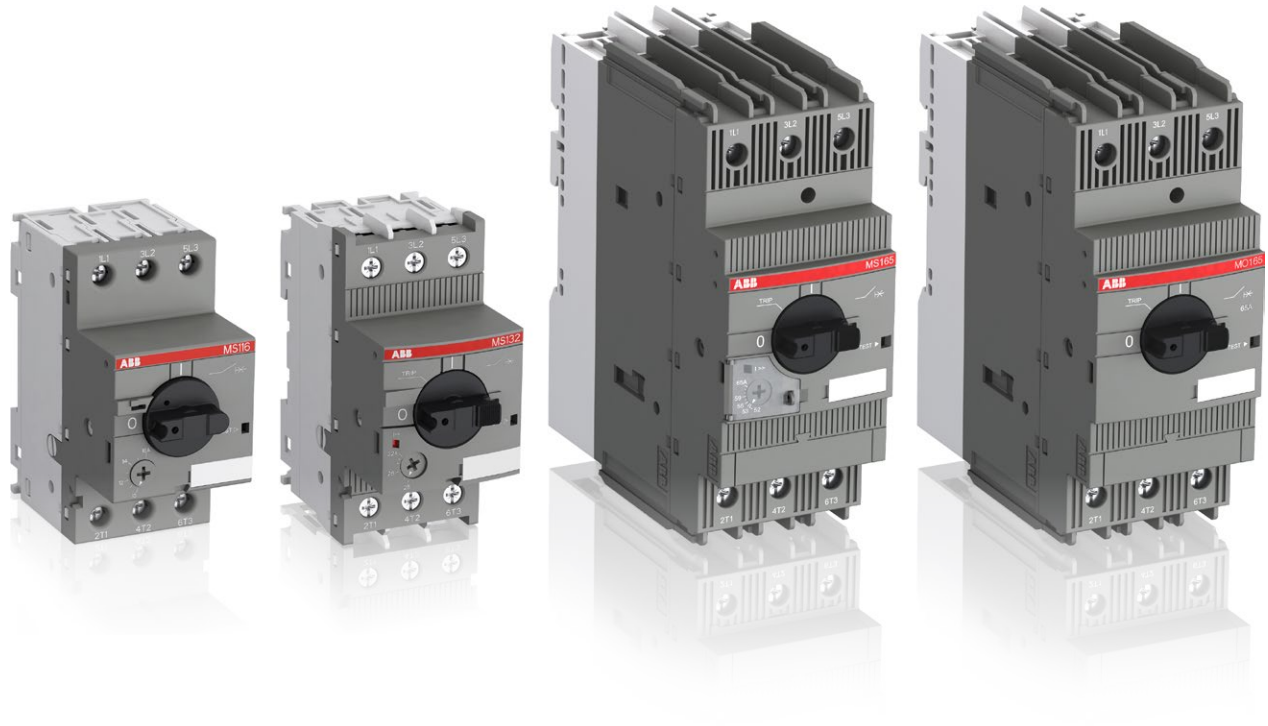
MS and MO manual motor starters
A complete motor protection concept

Fuseless protection saves costs, space and ensures a quick reaction under overload and short-circuit condition by switching off the motor within milliseconds. The full range of motor starters offers protection from 0.1 A to up to 100 A. The new family range has a harmonized range of accessories and offers the same features up to 65 A.



Safety and protection

Protect equipment and people

With its broad range of manual motor starters, ABB offers protection and safety in almost every situation including hazardous areas. Save people from electrical shocks and the installation from short-circuits, overloads and phase failures while also controlling the current flow through a simple and handy ON/OFF switch.

Continuous operation

Secure uptime

Fuseless motor protection reduces maintenance costs and downtimes by avoiding fuse replacement after faults. Furthermore, MS132 and MS165 feature a magnetic trip indicator making troubleshooting easier.

Speed up your projects

Simplified design

This range can be connected easily with ABB contactors or soft starters using the respective accessory. Additionally, the main range of accessories is shared across multiple starters, making planning simpler. At the same time, you can rely on ABB´s global technical support.

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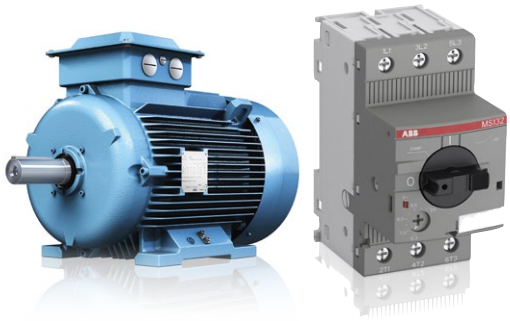
Protection and control
A full motor protection solution



MS116 MS132/ MO132 MS165/ MO165

An all-in-one solution
ABB offers protection against short-circuits, phase failures and overload together with disconnecting functionality – all in one single compact product.

High performance in compact size
The main range of motor starters can cover short-circuit breaking capacities up to 100 kA. Also, every motor starter is temperature compensated up to 60 °C, making them more reliable.

Troubleshooting made easy
MS132 and MS165 feature a magnetic trip indicator. This way, every tripping event will be distinguished, making troubleshooting a lot easier and faster.

Always an option
The MS116 and MS132 offer protection up to 32 A and a short-circuit breaking capacity of 50 kA and 100 kA, respectively – all in a 45 mm housing. They are designed for high performance in addition to their compact size.

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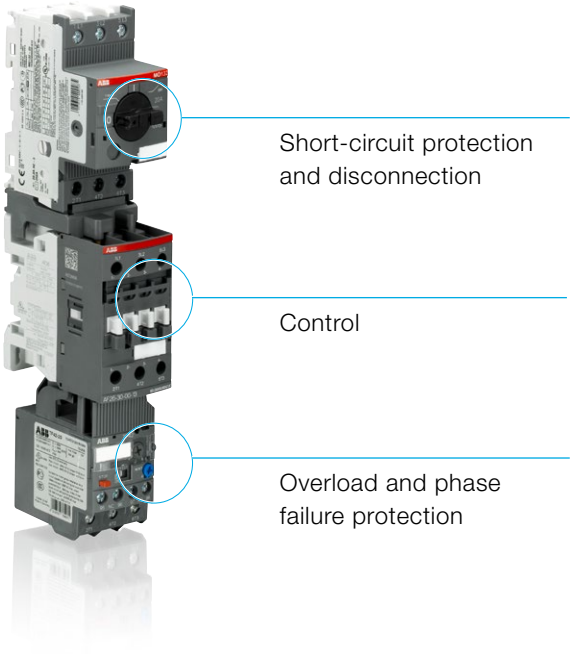
Control everywhere and anytime
Tuned for your application

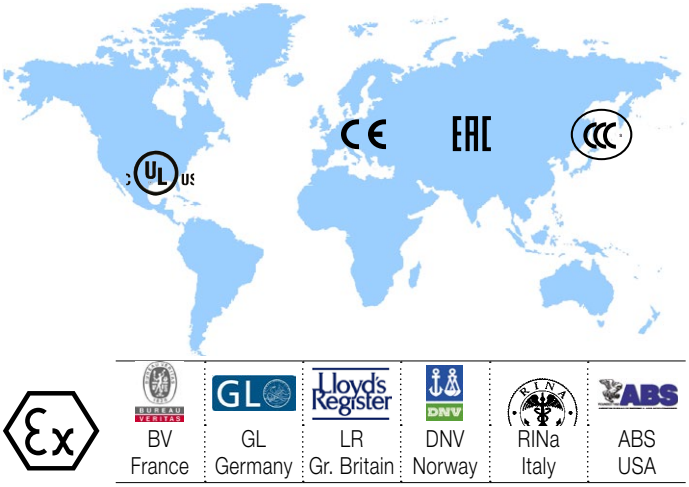


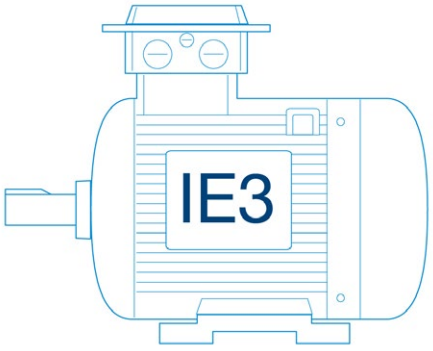
Dedicated for short-circuit protection

MO motor starters offer magnetic-only protection for the same range of operational currents as MS family and shared the same accessories range. These starters can be combined with a contactor and an overload relay in order to create a full motor protection solution.

Transformer protection

MS132-T is an inrush compensated circuit breaker for control transformer protection. With the right selection, it provides overcurrent protection on the primary side of the transformer. This avoids expensive protection on the secondary side.





Protection wherever you are

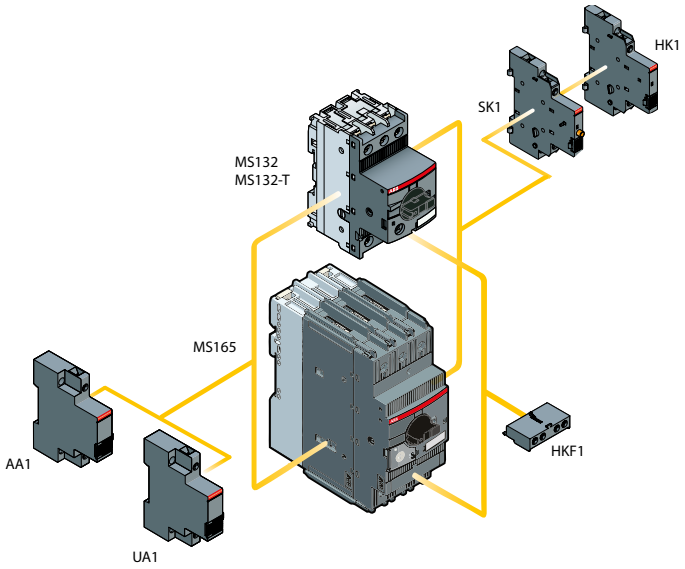
The manual motor starter range is worldwide applicable. With its wide range of certifications, it covers standards like IEC, cU-Lus, CCC, EAC and ship approvals. All manual motor starters also apply to ATEX standards and will protect your motors in hazardous areas.

Ready for IE3 motors

MS116/MS132/MO132 and MS/MO165 comply with the latest standards. They are "IE3 ready" and will protect the new generation of high efficiency motors.

2CDC131067C0202

Accessories
Easy add-ons, easier control



Busbar connectors and enclosures
With busbar connectors, up to 5 manual motor starters can be fitted next to each other with optional spacing for auxiliary contacts. For easier access, enclosures or door handle kits are also available.

Harmonized range of accessories
All types up to 65 A share the same main accessories like auxiliary contacts, signal contacts, shunt trips and under-voltage releases. This significantly slims the part list and makes selection of the right accessories easy.

Safety at work
With a lockable handle maintenance will be safe for every technician. For MS132 and MS165 a lock can seal the handle without the use of an additional accessory.

Easy to connect
Save time wiring and avoid mistakes by using a connecting link between ABB manual motor starters and soft starters or contactors. This creates harmonious and compact starter combination that is easy to mount.

2CDC131067C0202

Notes

Manual motor starters
Overview

Type	MS116	MS132	MS165	MS5100
Thermal and electromagnetic protection	Yes	Yes	Yes	Yes
Electromagnetic protection	-	-	-	-
Phase loss sensitivity	Yes	Yes	Yes	Yes
Switch position	ON/OFF	ON/OFF/TRIP	ON/OFF/TRIP	ON/OFF/TRIP
Magnetic trip indication	-	Yes	Yes	Yes
Lockable handle without accessories	-	Yes	Yes	Yes
Disconnecting feature	Yes	Yes	Yes	Yes
Width	45 mm	45 mm	55 mm	90 mm
Rated operational current I_e	0.16 ... 32 A	0.16 ... 32 A	16 ... 65 A	100 A
Setting range	0.1 ... 32 A	0.1 ... 32 A	10 ... 65 A	40 ... 100 A [2]
Ambient air temperature	-25 ... +55 °C [1]	-25 ... +60 °C [1]	-20 ... +60 °C [1]	-25 ... +70 °C

[1] Compensated
[2] For motor loads only up to 80 A

Accessories

Auxiliary contact		HKF1, HK1		AUX
Signalling contact	for tripped alarm	SK1		AUX SA
	for short-circuit alarm	-	CK1	-
Shunt trip		AA1		SOR-C
Undervoltage release		UA1		UVR-C

Table for short-circuit ratings for 400/415 V

	Standard range			Performance range		
	MS116			MS132, MS165, MS5100		
Selection parameters						
Rated operational power	**Setting range for thermal release**	**Type**	**Short-circuit breaking capacity**		**Type**	**Short-circuit breaking capacity**	
			I_{cu}	I_{cs}		I_{cu}	I_{cs}
0.03 kW[1]	0.1 ... 0.16 A	MS116-0.16	50 kA	50 kA	MS132-0.16	100 kA	100 kA
0.06 kW	0.16 ... 0.25 A	MS116-0.25	50 kA	50 kA	MS132-0.25	100 kA	100 kA
0.09 kW	0.25 ... 0.4 A	MS116-0.4	50 kA	50 kA	MS132-0.4	100 kA	100 kA
0.18 kW	0.4 ... 0.63 A	MS116-0.63	50 kA	50 kA	MS132-0.63	100 kA	100 kA
0.25 kW	0.63 ... 1.0 A	MS116-1.0	50 kA	50 kA	MS132-1.0	100 kA	100 kA
0.55 kW	1.0...1.6 A	MS116-1.6	50 kA	50 kA	MS132-1.6	100 kA	100 kA
0.75 kW	1.6...2.5 A	MS116-2.5	50 kA	50 kA	MS132-2.5	100 kA	100 kA
1.5 kW	2.5...4.0 A	MS116-4.0	50 kA	50 kA	MS132-4.0	100 kA	100 kA
2.2 kW	4.0...6.3 A	MS116-6.3	50 kA	50 kA	MS132-6.3	100 kA	100 kA
4.0 kW	6.3...10 A	MS116-10	50 kA	50 kA	MS132-10	100 kA	100 kA
5.5 kW	8...12 A	MS116-12	25 kA	25 kA	MS132-12	100 kA	100 kA
7.5 kW	10...16 A	MS116-16	16 kA	16 kA	MS132-16 / MS165-16	100 kA	100 kA
7.5 kW	14 ... 20 A				MS165-20	100 kA	100 kA
7.5 kW	16...20 A	MS116-20	15 kA	10 kA	MS132-20	100 kA	100 kA
11 kW	18 ... 25 A				MS165-25	100 kA	100 kA
11 kW	20...25 A	MS116-25	15 kA	10 kA	MS132-25	50 kA	50 kA
15 kW	25...32 A	MS116-32	10 kA	10 kA	MS132-32	50 kA	25 kA
15 kW	23 ... 32 A				MS165-32	100 kA	100 kA
22 kW	30 ... 42 A				MS165-42	50 kA	50 kA
22 kW	40 ... 54 A				MS165-54	50 kA	30 kA
25 kW	-						
30 kW	52 ... 65 A				MS165-65	50 kA	30 kA
37 kW	40 ... 100 A				MS5100-100	70 kA	70 kA
45 kW	40 ... 100 A				MS5100-100	70 kA	70 kA

[1] 690 V

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

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

	Standard range MO132	Performance range MO132, MO165, MO5100	Transformer protection MS132-T

	Type	Short-circuit breaking capacity		Type	Short-circuit breaking capacity		Type	Short-circuit breaking capacity
		I_{cu}	I_{cs}		I_{cu}	I_{cs}		I_{cu} / I_{cs}
	MO132-0.16	100 kA	100 kA	MO132-0.16	100 kA	100 kA	MS132-0.16T	100 kA
	MO132-0.25	100 kA	100 kA	MO132-0.25	100 kA	100 kA	MS132-0.25T	100 kA
	MO132-0.4	100 kA	100 kA	MO132-0.4	100 kA	100 kA	MS132-0.4T	100 kA
	MO132-0.63	100 kA	100 kA	MO132-0.63	100 kA	100 kA	MS132-0.63T	100 kA
	MO132-1.0	100 kA	100 kA	MO132-1.0	100 kA	100 kA	MS132-1.0T	100 kA
	MO132-1.6	100 kA	100 kA	MO132-1.6	100 kA	100 kA	MS132-1.6T	100 kA
	MO132-2.5	100 kA	100 kA	MO132-2.5	100 kA	100 kA	MS132-2.5T	100 kA
	MO132-4.0	100 kA	100 kA	MO132-4.0	100 kA	100 kA	MS132-4.0T	100 kA
	MO132-6.3	100 kA	100 kA	MO132-6.3	100 kA	100 kA	MS132-6.3T	100 kA
	MO132-10	100 kA	100 kA	MO132-10	100 kA	100 kA	MS132-10T	100 kA
	MO132-12	100 kA	100 kA	MO132-12	100 kA	100 kA	MS132-12T	100 kA
	MO132-16	100 kA	100 kA	MO132-16 / MO165-16	100 kA	100 kA	MS132-16T	100 kA
				MO165-20	100 kA	100 kA		
	MO132-20	100 kA	100 kA	MO132-20	100 kA	100 kA	MS132-20T	100 kA
	MO132-25	50 kA	50 kA	MO132-25 / MO165-25	50 kA / 100 kA	50 kA / 100 kA	MS132-25T	50 kA
	MO132-32	50 kA	25 kA	MO132-32	50 kA	25 kA	Transformer protection: The instantaneous short-circuit current setting is 20 times the rated operational current.	
				MO165-32	100 kA	100 kA		
				MO165-42	50 kA	50 kA		
				MO165-54	50 kA	30 kA		
				MO5100-70	36 kA	36 kA		
				MO165-65	50 kA	30 kA		
				MO5100-80	36 kA	36 kA		
				MO5100-100	36 kA	36 kA		

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MS116 manual motor starters
0.10 to 32 A – with thermal and electromagnetic protection

2CDC241010F0011

MS116-16

2CDC241001F0011

MS116-25

2CDC241013F0011

MS116-0.16-HKF1-11

2CDC241012F0011

MS116-32-HKF1-11

Description

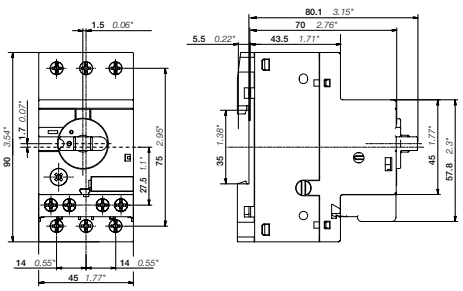
MS116 is a compact and economic range for motor protection up to 15 kW (400 V) / 32 A in width of 45 mm. Further features are the build-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication. The manual motor starter is suitable for three- and single phase applications. Auxiliary contacts, signaling contacts, undervoltage releases, shunt trips, power in-feed blocks and locking devices for protection against unauthorized changes are available as accessory. These are suitable throughout the MS116/MS132/MS165-range.

Ordering details

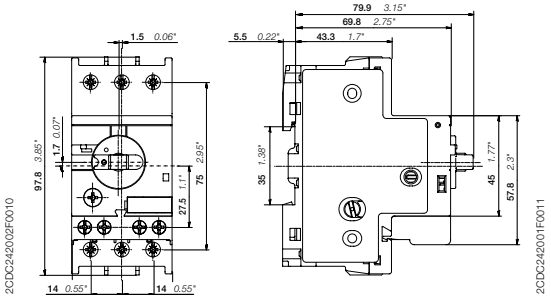
Rated operational power 400 V AC-3 kW	Setting range A	Short-circuit breaking capacity I_{cs} at 400 V AC kA	Rated instantaneous short-circuit current setting I_i A	Type	Order code		Weight (1 pce) kg
0.03 [2]	0.10 ... 0.16	50	2.00 [1]	MS116-0.16	1SAM250000R1001		0.225
0.06	0.16 ... 0.25	50	3.10 [1]	MS116-0.25	1SAM250000R1002		0.225
0.09	0.25 ... 0.40	50	5.00 [1]	MS116-0.4	1SAM250000R1003		0.225
0.18	0.40 ... 0.63	50	7.90 [1]	MS116-0.63	1SAM250000R1004		0.225
0.25	0.63 ... 1.00	50	12.5 [1]	MS116-1.0	1SAM250000R1005		0.225
0.55	1.00 ... 1.60	50	20.0 [1]	MS116-1.6	1SAM250000R1006		0.265
0.75	1.60 ... 2.50	50	31.3 [1]	MS116-2.5	1SAM250000R1007		0.265
1.50	2.50 ... 4.00	50	50.0	MS116-4.0	1SAM250000R1008		0.265
2.20	4.00 ... 6.30	50	78.8	MS116-6.3	1SAM250000R1009		0.265
4.00	6.30 ... 10.0	50	150	MS116-10	1SAM250000R1010		0.265
5.50	8.00 ... 12.0	25	180	MS116-12	1SAM250000R1012		0.265
7.50	10.0 ... 16.0	16	240	MS116-16	1SAM250000R1011		0.265
7.50	16.0 ... 20.0	10	300	MS116-20	1SAM250000R1013		0.310
11.0	20.0 ... 25.0	10	375	MS116-25	1SAM250000R1014		0.310
15.0	25.0 ... 32.0	10	480	MS116-32	1SAM250000R1015		0.310
0.03 [2]	0.10 ... 0.16	50	2.00 [1]	MS116-0.16-HKF1-11	1SAM250005R1001		0.240
0.06	0.16 ... 0.25	50	3.10 [1]	MS116-0.25-HKF1-11	1SAM250005R1002		0.240
0.09	0.25 ... 0.40	50	5.00 [1]	MS116-0.4-HKF1-11	1SAM250005R1003		0.240
0.18	0.40 ... 0.63	50	7.90 [1]	MS116-0.63-HKF1-11	1SAM250005R1004		0.240
0.25	0.63 ... 1.00	50	12.5 [1]	MS116-1.0-HKF1-11	1SAM250005R1005		0.240
0.55	1.00 ... 1.60	50	20.0 [1]	MS116-1.6-HKF1-11	1SAM250005R1006		0.280
0.75	1.60 ... 2.50	50	31.3 [1]	MS116-2.5-HKF1-11	1SAM250005R1007		0.280
1.50	2.50 ... 4.00	50	50.0	MS116-4.0-HKF1-11	1SAM250005R1008		0.280
2.20	4.00 ... 6.30	50	78.8	MS116-6.3-HKF1-11	1SAM250005R1009		0.280
4.00	6.30 ... 10.0	50	150	MS116-10.0-HKF1-11	1SAM250005R1010		0.280
5.50	8.00 ... 12.0	25	180	MS116-12.0-HKF1-11	1SAM250005R1012		0.280
7.50	10.0 ... 16.0	16	240	MS116-16.0-HKF1-11	1SAM250005R1011		0.280
7.50	16.0 ... 20.0	10	300	MS116-20-HKF1-11	1SAM250005R1013		0.326
11.0	20.0 ... 25.0	10	375	MS116-25-HKF1-11	1SAM250005R1014		0.326
15.0	25.0 ... 32.0	10	480	MS116-32-HKF1-11	1SAM250005R1015		0.326

Note: Manual motor starters should always be selected so that the actual motor current is within the setting range.
[1] The data is valid for products, produced after week 34, 2014.
[2] 690 V

Main dimensions mm, *inches*



MS116 ≤ 16 A & MS116-HKF1-11 ≤ 16 A



MS116 ≥ 20 A & MS116-HKF1-11 ≥ 20 A

2CDC131062C0201

MS132 manual motor starters
0.10 to 32 A – with thermal and electromagnetic protection

1SBC101232F0010

MS132-10

2CDC241001F0011

MS132-32

2CDC241014F0011

MS132-0.16-HKF1-11

2CDC241015F0011

MS132-32-HKF1-11

Description

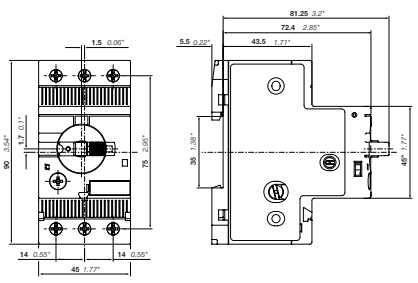
MS132 is a compact and powerful range for motor protection up to 15 kW (400 V) / 32 A in width of 45 mm. This type has also a clear and reliable indication of fault in a separate window in the event of short-circuit tripping. Further features are the build-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication. The manual motor starter is suitable for three- and single phase applications. The handle is lockable to protect against unauthorized changes. Auxiliary contacts, signaling contacts, undervoltage releases, shunt trips, power in-feed blocks are available as accessory. These are suitable throughout the MS116/MS132/MS165-range.

Ordering details

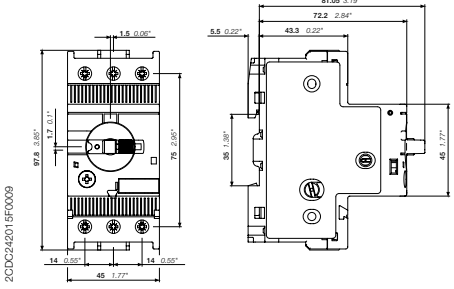
Rated operational power 400 V AC-3	Setting range	Short-circuit breaking capacity I_{cs} at 400 V AC	Rated instantaneous short-circuit current setting I_i	Type	Order code		Weight (1 pce)
kW	A	kA	A				kg
0.03 [2]	0.10 ... 0.16	100	2.00 [1]	MS132-0.16	1SAM350000R1001		0.215
0.06	0.16 ... 0.25	100	3.10 [1]	MS132-0.25	1SAM350000R1002		0.215
0.09	0.25 ... 0.40	100	5.00 [1]	MS132-0.4	1SAM350000R1003		0.215
0.18	0.40 ... 0.63	100	7.90 [1]	MS132-0.63	1SAM350000R1004		0.215
0.25	0.63 ... 1.00	100	12.5 [1]	MS132-1.0	1SAM350000R1005		0.215
0.55	1.00 ... 1.60	100	20.0 [1]	MS132-1.6	1SAM350000R1006		0.265
0.75	1.60 ... 2.50	100	31.3 [1]	MS132-2.5	1SAM350000R1007		0.265
1.50	2.50 ... 4.00	100	50.0	MS132-4.0	1SAM350000R1008		0.265
2.20	4.00 ... 6.30	100	78.8	MS132-6.3	1SAM350000R1009		0.265
4.00	6.30 ... 10.0	100	150	MS132-10	1SAM350000R1010		0.265
5.50	8.00 ... 12.0	100	180	MS132-12	1SAM350000R1012		0.310
7.50	10.0 ... 16.0	100	240	MS132-16	1SAM350000R1011		0.310
7.50	16.0 ... 20.0	100	300	MS132-20	1SAM350000R1013		0.310
11.0	20.0 ... 25.0	50	375	MS132-25	1SAM350000R1014		0.310
15.0	25.0 ... 32.0	25	480	MS132-32	1SAM350000R1015		0.310
0.03 [2]	0.10 ... 0.16	100	2.00 [1]	MS132-0.16-HKF1-11	1SAM350005R1001		0.231
0.06	0.16 ... 0.25	100	3.10 [1]	MS132-0.25-HKF1-11	1SAM350005R1002		0.231
0.09	0.25 ... 0.40	100	5.00 [1]	MS132-0.4-HKF1-11	1SAM350005R1003		0.231
0.18	0.40 ... 0.63	100	7.90 [1]	MS132-0.63-HKF1-11	1SAM350005R1004		0.231
0.25	0.63 ... 1.00	100	12.5 [1]	MS132-1.0-HKF1-11	1SAM350005R1005		0.231
0.55	1.00 ... 1.60	100	20.0 [1]	MS132-1.6-HKF1-11	1SAM350005R1006		0.281
0.75	1.60 ... 2.50	100	31.3 [1]	MS132-2.5-HKF1-11	1SAM350005R1007		0.281
1.50	2.50 ... 4.00	100	50.0	MS132-4.0-HKF1-11	1SAM350005R1008		0.281
2.20	4.00 ... 6.30	100	78.8	MS132-6.3-HKF1-11	1SAM350005R1009		0.281
4.00	6.30 ... 10.0	100	150	MS132-10.0-HKF1-11	1SAM350005R1010		0.281
5.50	8.00 ... 12.0	100	180	MS132-12.0-HKF1-11	1SAM350005R1012		0.326
7.50	10.0 ... 16.0	100	240	MS132-16.0-HKF1-11	1SAM350005R1011		0.326
7.50	16.0 ... 20.0	100	300	MS132-20-HKF1-11	1SAM350005R1013		0.326
11.0	20.0 ... 25.0	50	375	MS132-25-HKF1-11	1SAM350005R1014		0.326
15.0	25.0 ... 32.0	25	480	MS132-32-HKF1-11	1SAM350005R1015		0.326

Note: Manual motor starters should always be selected so that the actual motor current is within the setting range.
[1] The data is valid for products, produced after week 34, 2014.
[2] 690 V

Main dimensions mm, *inches*



MS132 ≤ 10 A



MS132 ≥ 12 A

2CDC242015F0009
2CDC242016F0009
2CDC131062C0201

MS165 manual motor starters
10 to 65 A – with thermal and electromagnetic protection

MS165-65

Description

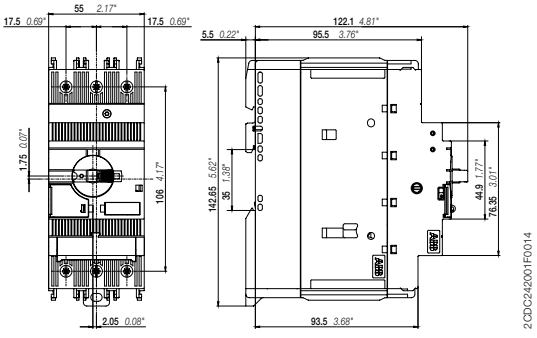
MS165 is a compact and powerful range for motor protection up to 30 kW (400 V) / 65 A in width of 55 mm. This type has also a clear and reliable indication of fault in a separate window in the event of short-circuit tripping. Further features are the build-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication. The manual motor starter is suitable for three- and single phase applications. The handle is lockable to protect against unauthorized changes. Auxiliary contacts, signaling contacts, undervoltage releases, shunt trips, power in-feed blocks are available as accessory. These are suitable throughout the MS116/MS132/MS165-range.

Ordering details

Rated operational power 400 V AC-3	Setting range	Short-circuit breaking capacity I_{cs} at 400 V AC	Rated instantaneous short-circuit current setting I_i	Type	Order code		Weight (1 pce)
kW	A	kA	A				kg
7.5	10 ... 16	100	240	MS165-16	1SAM451000R1011		0.950
7.5	14 ... 20	100	300	MS165-20	1SAM451000R1012		0.950
11	18 ... 25	100	375	MS165-25	1SAM451000R1013		0.960
15	23 ... 32	100	480	MS165-32	1SAM451000R1014		0.970
22	30 ... 42	50	630	MS165-42	1SAM451000R1015		0.970
22	40 ... 54	30	810	MS165-54	1SAM451000R1016		0.970
30	52 ... 65	30	975	MS165-65	1SAM451000R1017		0.980

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

Main dimensions mm, *inches*



MS165

2CDC131062C0201

MO132 manual motor starters magnetic only
0.16 to 32 A – with electromagnetic protection

MO132-6.3

MO132-32

Description

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

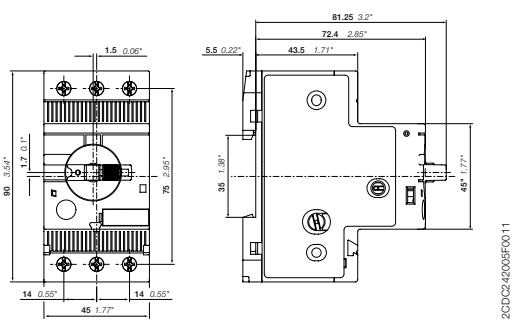
Fuse-less protection with a manual motor starter saves costs, space and ensures a quick reaction under short-circuit condition, by switching off the motor within milliseconds. Fuse-less starter combinations are setup together with contactors and overload relays.

Ordering details

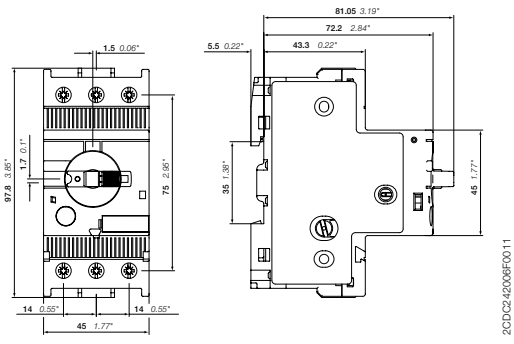
Rated operational power 400 V AC-3[1]	Rated operational current	Short-circuit breaking capacity I_{cs} at 400 V AC	Rated instantaneous short-circuit current setting I_i	Type	Order code		Weight (1 pce)
kW	A	kA	A				kg
0.03 [3]	0.16	100	2.00 [2]	MO132-0.16	1SAM360000R1001		0.215
0.06	0.25	100	3.10 [2]	MO132-0.25	1SAM360000R1002		0.215
0.09	0.40	100	5.00 [2]	MO132-0.4	1SAM360000R1003		0.215
0.12	0.63	100	7.90 [2]	MO132-0.63	1SAM360000R1004		0.215
0.25	1.0	100	12.5 [2]	MO132-1.0	1SAM360000R1005		0.215
0.55	1.6	100	20.0 [2]	MO132-1.6	1SAM360000R1006		0.265
0.75	2.5	100	31.3 [2]	MO132-2.5	1SAM360000R1007		0.265
1.5	4.0	100	50.0	MO132-4.0	1SAM360000R1008		0.265
2.2	6.3	100	78.8	MO132-6.3	1SAM360000R1009		0.265
4.0	10	100	125	MO132-10	1SAM360000R1010		0.265
5.5	12	100	150	MO132-12	1SAM360000R1012		0.310
7.5	16	100	200	MO132-16	1SAM360000R1011		0.310
7.5	20	100	250	MO132-20	1SAM360000R1013		0.310
11	25	50	313	MO132-25	1SAM360000R1014		0.310
15	32	25	400	MO132-32	1SAM360000R1015		0.310

[1] For overload protection of motors, an appropriate thermal or electronic overload relay must be used
[2] The data is valid for products, produced after week 34, 2014.
[3] 690 V

Main dimensions mm, *inches*



MO132 ≤ 10 A



MO132 ≥ 12 A

2CDC131062C0201

MO165 manual motor starters magnetic only
16 to 65 A – with electromagnetic protection

2CDC241005V0015

MO165-65

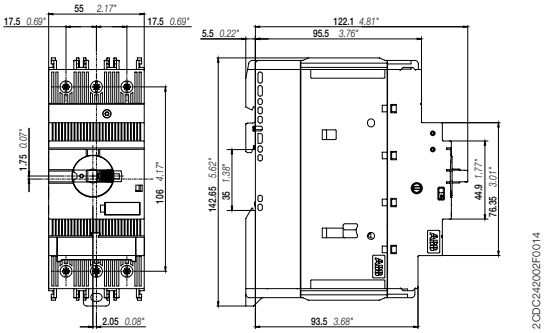
Description

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

Ordering details

Rated operational power 400 V AC-3	Rated operational current	Short-circuit breaking capacity I_{cs} at 400 V AC	Rated instantaneous short-circuit current setting I_i	Type	Order code		Weight (1 pce)
kW	A	kA	A				kg
7.5	16	100	240	MO165-16	1SAM461000R1011		0.950
7.5	20	100	300	MO165-20	1SAM461000R1012		0.950
11	25	100	375	MO165-25	1SAM461000R1013		0.960
15	32	100	480	MO165-32	1SAM461000R1014		0.970
22	42	50	630	MO165-42	1SAM461000R1015		0.970
22	54	30	810	MO165-54	1SAM461000R1016		0.970
30	65	30	975	MO165-65	1SAM461000R1017		0.980

Main dimensions mm, *inches*



2CDC242002F0014

MO165

2CDC131062C0201

MS132-T circuit breakers for transformer protection
0.10 to 25 A – with thermal and electromagnetic protection

MS132-10T

MS132-25T

Description

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

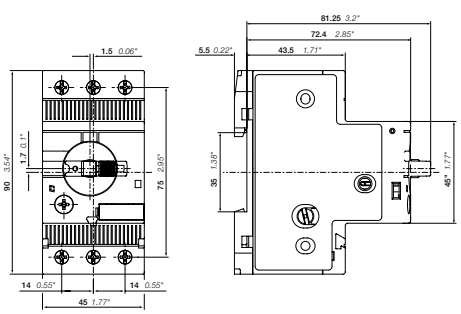
MS132-T is a 45 mm (width) compact and powerful range for transformer protection up to 12.5 kW (400 V) / 25 A. This type has also a clear and reliable indication of fault in a separate window in the event of short-circuit tripping. Further features are the build-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication. The handle is lockable to protect against unauthorized changes. Auxiliary contacts, signaling contacts, undervoltage releases, shunt trips, power in-feed blocks are available as accessory. These are suitable throughout the MS116/MS132/MS165-range. Moreover ABB offers special accessories for fast single phase setup.

Ordering details

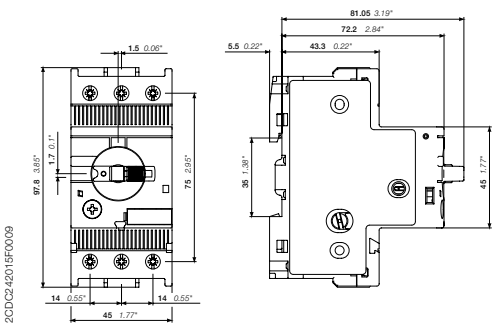
Setting range A	Short-circuit breaking capacity I_{cs} at 400 V AC kA	Rated instantaneous short-circuit current setting I_i A	Type	Order code		Weight (1 pcee) kg
0.10 ... 0.16	100	3.2	MS132-0.16T	1SAM340000R1001		0.215
0.16 ... 0.25	100	5	MS132-0.25T	1SAM340000R1002		0.215
0.25 ... 0.40	100	8	MS132-0.4T	1SAM340000R1003		0.215
0.40 ... 0.63	100	12.6	MS132-0.63T	1SAM340000R1004		0.215
0.63 ... 1.00	100	20	MS132-1.0T	1SAM340000R1005		0.215
1.00 ... 1.60	100	32	MS132-1.6T	1SAM340000R1006		0.265
1.60 ... 2.50	100	50	MS132-2.5T	1SAM340000R1007		0.265
2.50 ... 4.00	100	80	MS132-4.0T	1SAM340000R1008		0.265
4.00 ... 6.30	100	126	MS132-6.3T	1SAM340000R1009		0.265
6.30 ... 10.0	100	200	MS132-10T	1SAM340000R1010		0.265
8.00 ... 12.0	100	240	MS132-12T	1SAM340000R1012		0.310
10.0 ... 16.0	100	320	MS132-16T	1SAM340000R1011		0.310
16.0 ... 20.0	100	400	MS132-20T	1SAM340000R1013		0.310
20.0 ... 25.0	50	500	MS132-25T	1SAM340000R1014		0.310

Please check for single phase equipment chapter Main accessories.

Main dimensions mm, *inches*



MS132T ≤ 10 A



MS132T ≥ 12 A

2CDC131062C0201

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

Main circuit – Utilization characteristics according to IEC/EN

Type		MS116	MS132	MS165	MO132	MO165	MS132-T
Standards		IEC/EN 60947–2, IEC/EN 60947-4-1, IEC/EN 60947-1					
Rated operational voltage U_e		690 V AC	690 V AC / 250 V DC	690 V AC	690 V AC	690 V AC	690 V AC
Rated frequency		50/60 Hz	DC, 50/60 Hz	DC, 50/60 Hz	50/60 Hz	DC, 50/60 Hz	50/60 Hz
Operational frequency		50/60 Hz	0 ... 400 Hz	0 ... 400 Hz	0 ... 400 Hz	0 ... 400 Hz	0 ... 400 Hz
Trip class		10A	10	10	-	-	10
Number of poles		3					
Duty time		100 %					
Mechanical durability		100000 cycles	100000 cycles	50000 cycles	100000 cycles	50000 cycles	100000 cycles
Electrical durability	up to 16 A	100000 cycles	50000 cycles	25000 cycles	50000 cycles	25000 cycles	50000 cycles
	20 ... 65 A	50000 cycles	50000 cycles	25000 cycles	50000 cycles	25000 cycles	50000 cycles
Rated impulse withstand voltage U_{imp}		6 kV	6 kV	8 kV	6 kV	8 kV	6 kV
Rated insulation voltage U_i		690 V	690 V	1000 V	690 V	1000 V	690 V
Rated operational current I_e		See ordering details					
Rated operational current DC-5 I_e 3 conducting paths in series up to 250 V		-	See "Rated operational current I_e"	See "Rated operational current I_e"	-	See "Rated operational current I_e"	-
Rated instantaneous short-circuit current setting I_i		See ordering details					
Rated service short-circuit breaking capacity I_{cs}		See table "Short-circuit breaking capacity and back-up fuses"					
Rated ultimate short-circuit breaking capacity I_{cu}		See table "Short-circuit breaking capacity and back-up fuses"					
Rated service short-circuit breaking capacity DC I_{cs} 3 conducting paths in series up to 250 V		-	10 kA	100 kA	-	100 kA	-

Short-circuit breaking capacity and back-up fuses

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

Note: Maximum rated current of the back-up fuses if $I_{cc} > I_{cs}$

Type	230 V AC			400 V AC			440 V AC			500 V AC			690 V AC		
	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A
MS116-0.16	50	50	- [1]	50	50	- [1]	30	30	- [1]	30	30	- [1]	30	30	- [1]
MS116-0.25	50	50	- [1]	50	50	- [1]	30	30	- [1]	30	30	- [1]	30	30	- [1]
MS116-0.4	50	50	- [1]	50	50	- [1]	30	30	- [1]	30	30	- [1]	30	30	- [1]
MS116-0.63	50	50	- [1]	50	50	- [1]	30	30	- [1]	30	30	- [1]	30	30	- [1]
MS116-1.0	50	50	- [1]	50	50	- [1]	30	30	- [1]	30	30	- [1]	30	30	- [1]
MS116-1.6	50	50	- [1]	50	50	- [1]	30	30	- [1]	30	30	- [1]	30	30	- [1]
MS116-2.5	50	50	- [1]	50	50	- [1]	10	10	25 [2]	10	10	25 [2]	5	5	25 [2]
MS116-4.0	50	50	- [1]	50	50	- [1]	6	6	25 [2]	6	6	25 [2]	2	2	25 [2]
MS116-6.3	50	50	- [1]	50	50	- [1]	6	6	63 [2]	6	6	63 [2]	2	2	40 [2]
MS116-10	50	50	- [1]	50	50	- [1]	6	6	63 [2]	6	6	63 [2]	2	2	50 [2]
MS116-12	25	25	80 [2]	25	25	80 [2]	6	6	63 [2]	6	6	63 [2]	2	2	50 [2]
MS116-16	16	16	80 [2]	16	16	80 [2]	4	4	63 [2]	4	4	63 [2]	2	2	63 [2]
MS116-20	10	15	125 [2]	10	15	125 [2]	3	6	125 [2]	3	4	125 [2]	2	2	80 [2]
MS116-25	10	15	125 [2]	10	15	125 [2]	3	6	125 [2]	3	4	125 [2]	2	2	100 [2]
MS116-32	10	10	125 [2]	10	10	125 [2]	3	6	125 [2]	3	4	125 [2]	2	2	100 [2]

[1] No back-up fuse required, because short-circuit proof up to 50 kA
[2] Rated back-up fuse for short-circuit up to 50 kA

2CDC131062C0201

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

Short-circuit breaking capacity and back-up fuses

Type	230 V AC			400 V AC			440 V AC			500 V AC			690 V AC		
	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A
MS132-0.16	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]
MS132-0.25	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]
MS132-0.4	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]
MS132-0.63	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]
MS132-1.0	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]
MS132-1.6	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]
MS132-2.5	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]
MS132-4.0	100	100	- [1]	100	100	- [1]	20	20	35 [2]	20	20	35 [2]	3	3	32 [2]
MS132-6.3	100	100	- [1]	100	100	- [1]	20	20	63 [2]	20	20	63 [2]	3	3	50 [2]
MS132-10	100	100	- [1]	100	100	- [1]	20	20	100 [2]	20	20	100 [2]	3	3	50 [2]
MS132-12	100	100	- [1]	100	100	- [1]	20	20	100 [2]	20	20	100 [2]	3	3	63 [2]
MS132-16	100	100	- [1]	100	100	- [1]	20	20	125 [2]	20	20	125 [2]	3	3	63 [2]
MS132-20	100	100	- [1]	100	100	- [1]	20	20	125 [2]	20	20	125 [2]	3	3	80 [2]
MS132-25	50	50	125 [2]	50	50	125 [2]	20	20	125 [2]	10	10	125 [2]	3	3	100 [2]
MS132-32	25	50	125 [2]	25	50	125 [2]	20	20	125 [2]	10	10	125 [2]	3	3	100 [2]

[1] No back-up fuse required, because short-circuit proof up to 100 kA
[2] Rated back-up fuse for short-circuit up to 100 kA

Type	230 V AC			400 V AC			440 V AC			500 V AC			690 V AC			250 V DC [3]		
	I_{cs} kA	I_{cu} kA	gG A	I_{cs} kA	I_{cu} kA	gG A	I_{cs} kA	I_{cu} kA	gG A	I_{cs} kA	I_{cu} kA	gG A	I_{cs} kA	I_{cu} kA	gG A	I_{cs} kA	I_{cu} kA	gG A
MS165-16	100	100	- [1]	100	100	- [1]	75	75	125 [2]	20	20	125 [2]	8	8	63 [2]	100	100	- [1]
MS165-20	100	100	- [1]	100	100	- [1]	75	75	125 [2]	20	20	125 [2]	8	8	63 [2]	100	100	- [1]
MS165-25	100	100	- [1]	100	100	- [1]	50	50	125 [2]	20	20	125 [2]	8	8	80 [2]	100	100	- [1]
MS165-32	100	100	- [1]	100	100	- [1]	50	50	125 [2]	20	20	125 [2]	5	5	100 [2]	100	100	- [1]
MS165-42	50	50	125 [2]	50	50	125 [2]	50	50	125 [2]	20	20	125 [2]	5	5	100 [2]	100	100	- [1]
MS165-54	30	50	125 [2]	30	50	125 [2]	30	45	125 [2]	20	20	125 [2]	5	5	100 [2]	100	100	- [1]
MS165-65	30	50	125 [2]	30	50	125 [2]	30	45	125 [2]	20	20	125 [2]	5	5	100 [2]	100	100	- [1]

[1] No back-up fuse required, short-circuit proof up to 100 kA
[2] Rated back-up fuse for short-circuit up to 100 kA
[3] 3 poles in series

Type	230 V AC			400 V AC			440 V AC			500 V AC			690 V AC		
	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A
MO132-0.16	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]
MO132-0.25	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]
MO132-0.4	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]
MO132-0.63	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]
MO132-1.0	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]
MO132-1.6	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]
MO132-2.5	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]
MO132-4.0	100	100	- [1]	100	100	- [1]	20	20	35 [2]	20	20	35 [2]	3	3	32 [2]
MO132-6.3	100	100	- [1]	100	100	- [1]	20	20	63 [2]	20	20	63 [2]	3	3	50 [2]
MO132-10	100	100	- [1]	100	100	- [1]	20	20	100 [2]	20	20	100 [2]	3	3	50 [2]
MO132-12	100	100	- [1]	100	100	- [1]	20	20	100 [2]	20	20	100 [2]	3	3	63 [2]
MO132-16	100	100	- [1]	100	100	- [1]	20	20	125 [2]	20	20	125 [2]	3	3	63 [2]
MO132-20	100	100	- [1]	100	100	- [1]	20	20	125 [2]	20	20	125 [2]	3	3	80 [2]
MO132-25	50	50	125 [2]	50	50	125 [2]	10	10	125 [2]	10	10	125 [2]	3	3	100 [2]
MO132-32	25	50	125 [2]	25	50	125 [2]	10	10	125 [2]	10	10	125 [2]	3	3	100 [2]

[1] No back-up fuse required, because short-circuit proof up to 100 kA
[2] Rated back-up fuse for short-circuit up to 100 kA

2CDC131062C0201

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

Short-circuit breaking capacity and back-up fuses

Type	230 V AC			400 V AC			440 V AC			500 V AC			690 V AC			250 V DC [3]		
	I_{cs} kA	I_{cu} kA	gG A	I_{cs} kA	I_{cu} kA	gG A	I_{cs} kA	I_{cu} kA	gG A	I_{cs} kA	I_{cu} kA	gG A	I_{cs} kA	I_{cu} kA	gG A	I_{cs} kA	I_{cu} kA	gG A
MO165-16	100	100	- [1]	100	100	- [1]	75	75	125 [2]	20	20	125 [2]	8	8	63 [2]	100	100	- [1]
MO165-20	100	100	- [1]	100	100	- [1]	75	75	125 [2]	20	20	125 [2]	8	8	63 [2]	100	100	- [1]
MO165-25	100	100	- [1]	100	100	- [1]	50	50	125 [2]	20	20	125 [2]	8	8	80 [2]	100	100	- [1]
MO165-32	100	100	- [1]	100	100	- [1]	50	50	125 [2]	20	20	125 [2]	5	5	100 [2]	100	100	- [1]
MO165-42	50	50	125 [2]	50	50	125 [2]	50	50	125 [2]	20	20	125 [2]	5	5	100 [2]	100	100	- [1]
MO165-54	30	50	125 [2]	30	50	125 [2]	30	45	125 [2]	20	20	125 [2]	5	5	100 [2]	100	100	- [1]
MO165-65	30	50	125 [2]	30	50	125 [2]	30	45	125 [2]	20	20	125 [2]	5	5	100 [2]	100	100	- [1]

[1] No back-up fuse required, short-circuit proof up to 100 kA
[2] Rated back-up fuse for short-circuit up to 100 kA
[3] 3 poles in series

Type	230 V AC			400 V AC			440 V AC			500 V AC			690 V AC		
	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A
MS132-0.16T	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]
MS132-0.25T	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]
MS132-0.4T	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]
MS132-0.63T	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]
MS132-1.0T	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]
MS132-1.6T	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]
MS132-2.5T	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]	100	100	- [1]
MS132-4.0T	100	100	- [1]	100	100	- [1]	30	30	35 [2]	20	20	35 [2]	3	3	32 [2]
MS132-6.3T	100	100	- [1]	100	100	- [1]	30	30	63 [2]	20	20	63 [2]	3	3	50 [2]
MS132-10T	100	100	- [1]	100	100	- [1]	30	30	100 [2]	20	20	100 [2]	3	3	50 [2]
MS132-12T	100	100	- [1]	100	100	- [1]	30	30	100 [2]	20	20	100 [2]	3	3	63 [2]
MS132-16T	100	100	- [1]	100	100	- [1]	30	30	125 [2]	20	20	125 [2]	3	3	63 [2]
MS132-20T	100	100	- [1]	100	100	- [1]	30	30	125 [2]	20	20	125 [2]	3	3	80 [2]
MS132-25T	50	50	125 [2]	50	50	125 [2]	30	30	125 [2]	10	10	125 [2]	3	3	100 [2]

[1] No back-up fuse required, short-circuit proof up to 100 kA
[2] Rated back-up fuse for short-circuit up to 100 kA

Main circuit – Utilization characteristics according to UL/CSA

Type		MS116	MS132	MS165	MO132	MO165	MS132-T
Standards		UL 60947-1, UL 60947-4-1 (UL 508), CSA C22.2 No.60947-4-1 (CSA C22.2 No.14)					-
Rated operational voltage U_e acc. to UL/CSA		600 V AC	600 V AC	1000 V AC	600 V AC	1000 V AC	-
Trip class		10A	10		-		-
Motor ratings[1]	Horsepower	See table "Motor ratings, three phase"					-
	Full Load Amps (FLA)	See table "Motor ratings, three phase"					-
	Locked Rotor Amps (LRA)	See table "Motor ratings, three phase"					-

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

UL/CSA ratings overview

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

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

UL/CSA Motor ratings, three phase – MS116

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

UL/CSA Motor ratings, three phase – MS132

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

UL/CSA Motor ratings, three phase – MS165

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

hp Horsepower
FLA Full Load Amps
LRA Locked Rotor Amps

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

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

UL/CSA Motor ratings, three phase – MO132

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

UL/CSA Motor ratings, three phase – MO165

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

UL/CSA Motor ratings, single phase – MS132-T

Type	120 V AC			220 ... 240 V AC		
	hp	FLA	LRA	hp	FLA	LRA
MS132-0.16T	-	0.16	0.96	-	0.16	0.96
MS132-0.25T	-	0.25	1.5	-	0.25	1.5
MS132-0.4T	-	0.4	2.4	-	0.4	2.4
MS132-0.63T	-	0.63	3.78	-	0.63	3.78
MS132-1.0T	-	1	6	-	1	6
MS132-1.6T	-	1.6	9.6	1/10	1.6	9.6
MS132-2.5T	-	2.5	15	1/6	2.5	15
MS132-4.0T	1/8	4	24	1/3	4	24
MS132-6.3T	1/4	6.3	37.8	1/2	6.3	37.8
MS132-10T	1/2	9.8	58.8	1-1/2	10	60
MS132-12T	1/2	9.8	58.8	2	12	72
MS132-16T	1	16	96	2	12	72
MS132-20T	1-1/2	20	120	3	17	92
MS132-25T	2	24	144	3	17	127

hp Horsepower
FLA Full Load Amps
LRA Locked Rotor Amps

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

UL/CSA Maximum short-circuit current ratings – MS116

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

[1] NEC: NFPA®70 National Electrical Code®; CEC: CSA C22.1 Canadian Electrical Code.
[2] Suitable as motor disconnect only when provide with padlock adaptor SA1 or SA3.

UL/CSA Maximum short-circuit current ratings – MS132

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

[1] NEC: NFPA®70 National Electrical Code®; CEC: CSA C22.1 Canadian Electrical Code.
[2] Requires the use of S1-M3-xx line-side terminal feeder block.

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

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

Type	Combination Motor Controllers (Type F)[1]		
	Minimum contactor size	480Y / 277 V	600Y / 347 V
		kA	kA
MS132-0.16	AF26 ... AF38	65	47
MS132-0.25	AF26 ... AF38	65	47
MS132-0.40	AF26 ... AF38	65	47
MS132-0.63	AF26 ... AF38	65	47
MS132-1.0	AF26 ... AF38	65	47
MS132-1.6	AF26 ... AF38	65	47
MS132-2.5	AF26 ... AF38	65	47
MS132-4.0	AF26 ... AF38	65	47
MS132-6.3	AF26 ... AF38	65	47
MS132-10	AF26 ... AF38	65	47
MS132-12	AF26 ... AF38	30	-
MS132-16	AF26 ... AF38	30	-
MS132-20	AF26 ... AF38	30	-
MS132-25	AF26 ... AF38	30	-
MS132-32	AF26 ... AF38	30	-

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

UL/CSA Maximum short-circuit current ratings – MS165

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

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

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

Type	Manual self-protected Combination Motor Controllers (Type F) Coordination type 1				Manual self-protected Combination Motor Controllers (Type F) Coordination type 2			
	Minimum contactor size	480Y / 277 V	Minimum contactor size	600Y / 347 V	Minimum contactor size	480Y / 277 V	Minimum contactor size	600Y / 347 V
		kA		kA		kA		kA
MS165-16	AF09...AF38	65	AF09...AF38	50	AF26...AF38	65	AF09...AF38	30
MS165-20	AF26...AF38	65	AF26...AF38	50	AF26...AF38	65	AF09...AF38	30
MS165-25	AF26...AF38	65	AF26...AF38	50	AF26...AF38	65	AF40...AF65	30
MS165-32	AF26...AF38	65	AF26...AF38	50	AF26...AF38	65	AF40...AF65	30
MS165-42	AF40...AF65	65			AF40...AF65	65		
MS165-54	AF40...AF65	65			AF40...AF65	65		
MS165-65	AF40...AF65	65			AF40...AF65	65		

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

UL/CSA Maximum short-circuit current ratings – MO132

Type	Manual Motor Controllers							
	Branch circuit protection, max. size per NEC/CEC[1]		for motor disconnect		for group installations		for tap conductor protection in group installations	
	Fuses	Circuit breaker	480 V	600 V	480 V	600 V	480 V	600 V
	A	A	kA	kA	kA	kA	kA	kA
MO132-0.16	Any Listed fuses. Size per NEC/ CEC	Any Listed UL489 / CSA C22.2 No.5 circuit breaker. Size per NEC/ CEC	65	47	65	47	65	47
MO132-0.25			65	47	65	47	65	47
MO132-0.40			65	47	65	47	65	47
MO132-0.63			65	47	65	47	65	47
MO132-1.0			65	47	65	47	65	47
MO132-1.6			65	47	65	47	65	47
MO132-2.5			65	47	65	47	65	47
MO132-4.0			65	47	65	47	65	47
MO132-6.3			65	18	65	35	65	18
MO132-10			65	18	65	35	65	18
MO132-12			30	18	35	35	30	18
MO132-16			30	18	35	35	30	18
MO132-20			30	18	35	35	30	18
MO132-25			30	18	35	35	30	18
MO132-32			30	18	35	35	30	18

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

UL/CSA Maximum short-circuit current ratings – MO165

Type	Manual Motor Controllers							
	Branch circuit protection, max. size per NEC/CEC[1]		for motor disconnect		for group installations		for tap conductor protection in group installations	
	Fuses	Circuit breaker	480 V	600 V	480 V	600 V	480 V	600 V
	A	A	kA	kA	kA	kA	kA	kA
MO165-16	Any Listed fuses. Size per NEC/ CEC	Any Listed UL489 / CSA C22.2 No.5 circuit breaker. Size per NEC/ CEC	65	30	65	30	65	30
MO165-20			65	30	65	30	65	30
MO165-25			65	30	65	30	65	30
MO165-32			65	30	65	30	65	30
MO165-42			65	30	65	30	65	30
MO165-54			65	30	65	30	65	30
MO165-65			65	30	65	30	65	30

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

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

Type	Combination Motor Controllers (Type F) Coordination type 1					
	480Y / 277 V	OL Relay	Contactor	600Y / 347 V	OL Relay	Contactor
	kA			kA		
MO165-16	65	EF19-18.9	AF09…AF38	50	EF19-18.9	AF09…AF38
MO165-20	65	EF45-30	AF26…AF38	50	EF45-30	AF26…AF38
MO165-25	65	EF45-30	AF26…AF38	50	EF45-30	AF26…AF38
MO165-32	65	EF45-45	AF26…AF38	50	EF45-45	AF26…AF38
MO165-42	65	EF65	AF40…AF65			
MO165-54	65	EF65	AF40…AF65			
MO165-65	65	EF65	AF40…AF65			

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

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

Type	Combination Motor Controllers (Type F) Coordination type 2					
	480Y / 277 V kA	OL Relay	Contactor	600Y / 347 V kA	OL Relay	Contactor
MO165-16	65	TF42	AF09…AF38	30	TF42	AF09…AF38
MO165-20	65	TF42	AF26…AF38	30	TF42	AF09…AF38
MO165-25	65	TF42	AF26…AF38	50	TF42	AF26…AF38
MO165-32	65	TF42	AF26…AF38	50	TF42	AF26…AF38
MO165-42	65	TF65	AF40…AF65			
MO165-54	65	TF65	AF40…AF65			
MO165-65	65	TF65	AF40…AF65			

UL 508 — Manual controller for tap conductor protection and for control transformer

Type	Max. short-circuit current rating when used with upstream protection device	
	480 V kA	600 V kA
MS132-0.16T	65	47
MS132-0.25T	65	47
MS132-0.4T	65	47
MS132-0.63T	65	47
MS132-1.0T	65	47
MS132-1.6T	65	47
MS132-2.5T	65	47
MS132-4.0T	65	47
MS132-6.3T	65	18
MS132-10T	65	18
MS132-12T	30	18
MS132-16T	30	18
MS132-20T	30	18
MS132-25T	30	18

2CDC131062C0201

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

General technical data

Type		MS116	MS132	MS165	MO132	MO165	MS132-T
Pollution degree		3	3	3	3	3	3
Phase loss sensitivity		Yes	Yes	Yes	No	No	Yes
Disconnect function acc. to IEC/EN 60947-2		Yes	Yes	Yes	Yes	Yes	Yes
Ambient air temperature							
Operation	Open - compensated	-25 ... +55 °C	-25 ... +60 °C	-25 ... +60 °C	-	-	-25 ... +60 °C
	Open	-25 ... +70 °C	-25 ... +70 °C	-25 ... +60 °C	-25 ... +60 °C	-25 ... +60 °C	-25 ... +70 °C
	Enclosed (IB132[1])	0 ... +40 °C	0 ... +40 °C	-	-	-	0 ... +40 °C
Storage		-50 ... +80 °C	-50 ... +80 °C	-50 ... +80 °C	-50 ... +80 °C	-50 ... +80 °C	-50 ... +80 °C
Ambient air temperature compensation		Acc. to IEC/ EN60947-4-1	Acc. to IEC/ EN60947-4-1	Acc. to IEC/ EN60947-4-1	-	-	Acc. to IEC/ EN60947-4-1
Maximum operating altitude permissible		2000 m	2000 m	2000 m	2000 m	2000 m	2000 m
Resistance to shock acc. to IEC 60068-2-27		25g / 11 ms	25g / 11 ms	25g / 11 ms	25g / 11 ms	25g / 11 ms	25g / 11 ms
Resistance to vibrations acc. to IEC 60068-2-6		5g / 3 ... 150 Hz	5g / 3 ... 150 Hz	5g / 3 ... 150 Hz	5g / 3 ... 150 Hz	5g / 3 ... 150 Hz	5g / 3 ... 150 Hz
Mounting position		Position 1-6 (optional for single mounting)	Position 1-6 (optional for single mounting)	Position 1-6 (optional for single mounting)	Position 1-6 (optional for single mounting)	Position 1-6 (optional for single mounting)	Position 1-6 (optional for single mounting)
Mounting		DIN-rail (EN 60715)	DIN-rail (EN 60715)	DIN-rail (EN 60715)	DIN-rail (EN 60715)	DIN-rail (EN 60715)	DIN-rail (EN 60715)
Group mounting		On request	On request	On request	On request	On request	-
Recommended screw for mounting plate		-	-	M4	-	M4	-
Screw torque for mounting plate		-	-	2 Nm	-	2 Nm	-
Minimum distance to other units same type	Horizontal	0 mm	0 mm	0 mm	0 mm	0 mm	0 mm
	Vertical	150 mm	150 mm	150 mm	150 mm	150 mm	150 mm
Minimum distance to electrical conductive board	Horizontal, up to 400 V	0 mm	0 mm	0 mm	0 mm	0 mm	0 mm
	Horizontal, up to 690 V	> 1.5 mm	> 1.5 mm	> 1.5 mm	> 1.5 mm	> 1.5 mm	> 1.5 mm
	Vertical	75 mm	75 mm	75 mm	75 mm	75 mm	75 mm
Degree of protection	Housing	IP20	IP20	IP20	IP20	IP20	IP20
	Main circuit terminals	IP10	IP10	IP10	IP10	IP10	IP10

[1] not suitable for MS165 and MO165

Connecting characteristics

Main circuit

Type			MS116 ≤ 16 A	MS116 ≥ 20 A
Connecting capacity				
Rigid		**1 or 2 x**	1 ... 4 mm²	2.5 ... 6 mm²
Flexible with ferrule		**1 or 2 x**	0.75 ... 2.5 mm²	1 ... 6 mm²
Flexible with insulated ferrule		**1 or 2 x**	0.75 ... 2.5 mm²	1 ... 6 mm²
Flexible		**1 or 2 x**	0.75 ... 2.5 mm²	1 ... 6 mm²
Stranded acc. to UL/CSA		**1 or 2 x**	AWG 16-12	AWG 16-8
Stripping length			9 mm	10 mm
Tightening torque			0.8 ... 1.2 Nm / 10 ... 12 lb.in	2.0 Nm / 18 lb.in
Recommended screw driver			Pozidriv 2	Pozidriv 2

Main circuit

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

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

Connecting characteristics

Main circuit			
Type			MS165
Connecting capacity			
	Rigid	**1 or 2 x**	1 ... 50 mm²
	Flexible with ferrule	**1 or 2 x**	1 ... 35 mm²
	Flexible with insulated ferrule	**1 or 2 x**	1 ... 35 mm²
	Flexible	**1 or 2 x**	1 ... 35 mm²
	Stranded acc. to UL/CSA	**1 or 2 x**	AWG 16-0
Stripping length			16 mm
Tightening torque			4.0 Nm / 35 lb.in
Recommended screw driver			Pozidriv 2

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

Main circuit			
Type			MO165
Connecting capacity			
	Rigid	**1 or 2 x**	1 ... 50 mm²
	Flexible with ferrule	**1 or 2 x**	1 ... 35 mm²
	Flexible with insulated ferrule	**1 or 2 x**	1 ... 35 mm²
	Flexible	**1 or 2 x**	1 ... 35 mm²
	Stranded acc. to UL/CSA	**1 or 2 x**	AWG 16-0
Stripping length			16 mm
Tightening torque			4.0 Nm / 35 lb.in
Recommended screw driver			Pozidriv 2

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

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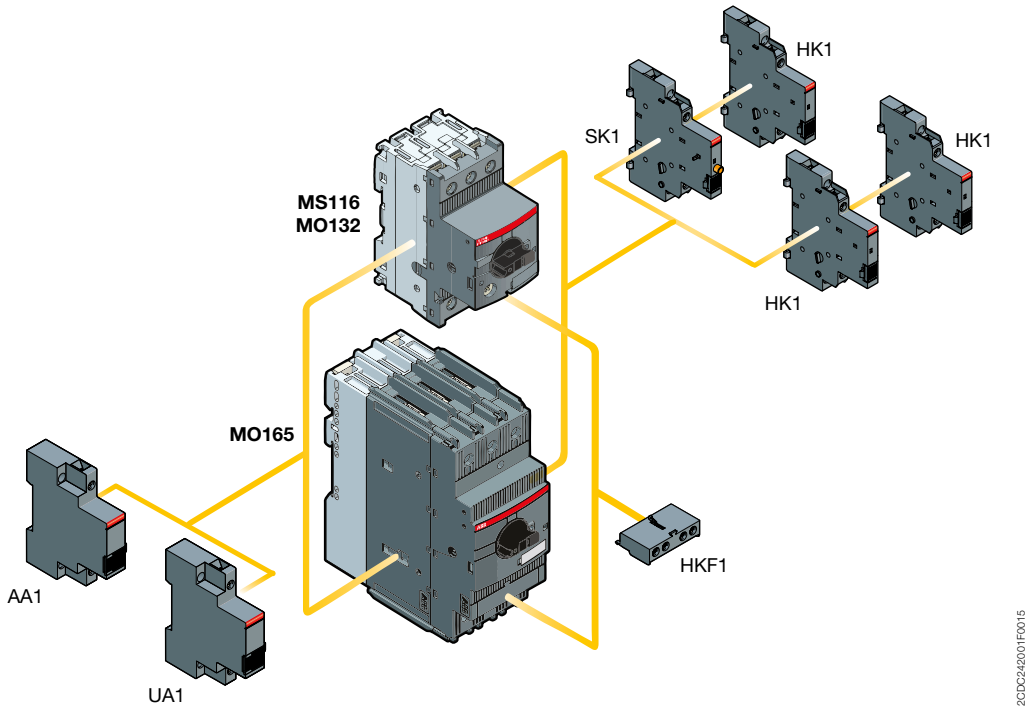
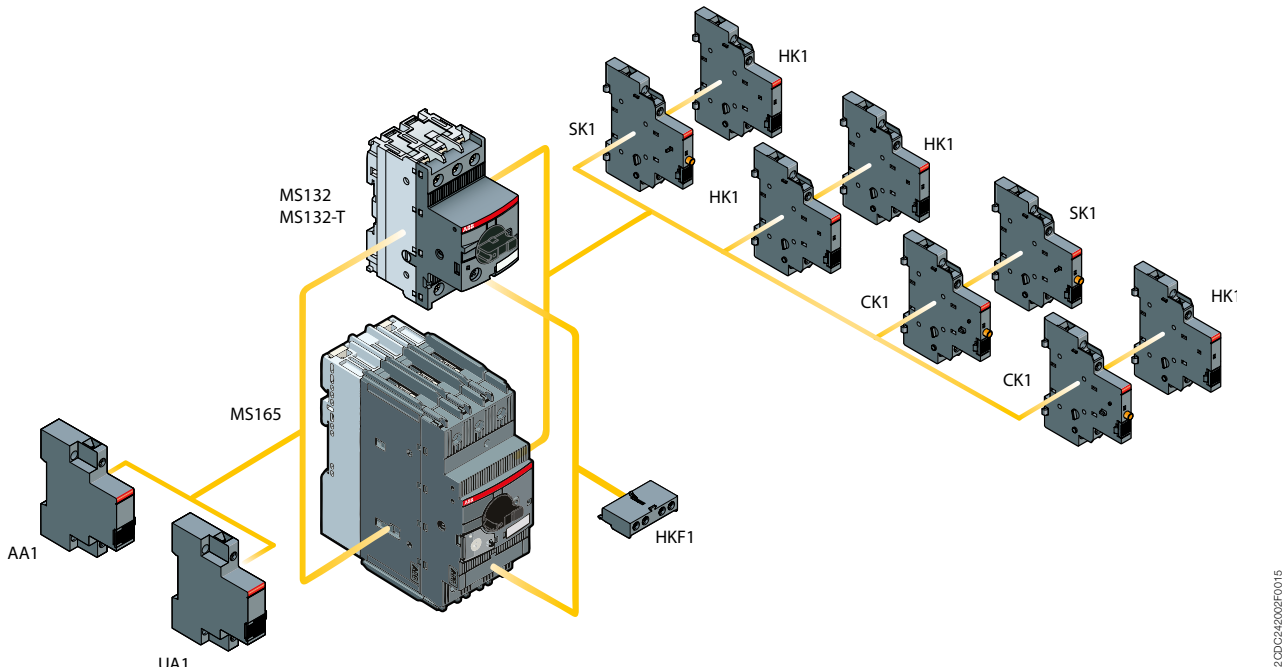
Main accessories
MS116, MS132, MS165, MO132, MO165, MS132-T

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



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



2CDC131050C0201

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

1SBC101208F0014

HKF1-11

1SBC101209F0014

HK1-11

1SBC101210F0014

SK1-11

1SBC101286F0014

CK1-11

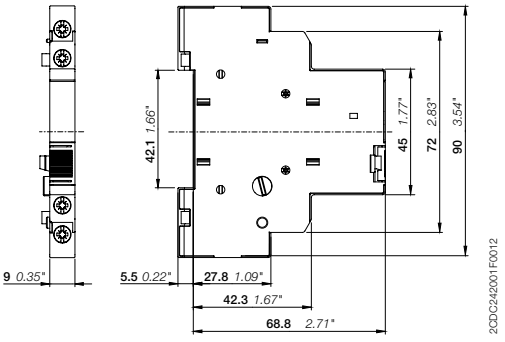
Description

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

Ordering details

Suitable for	Auxiliary contacts N.O.	Auxiliary contacts N.C.	Description	Type	Order code		Pkg qty	Weight (1 pce) kg
Auxiliary contacts – mountable on the front								
MS116, MS132, MS165 MO132, MO165 MS132-T	1	1		HKF1-11	1SAM201901R1001		10	0.015
	1	0		HKF1-10	1SAM201901R1003		10	0.013
	0	1		HKF1-01	1SAM201901R1004		10	0.013
	2	0		HKF1-20	1SAM201901R1002		10	0.015
Auxiliary contacts – mountable on the right								
MS116, MS132, MS165 MO132, MO165 MS132-T	1	1	max. 2 pieces	HK1-11	1SAM201902R1001		2	0.035
	2	0	max. 2 pieces	HK1-20	1SAM201902R1002		2	0.035
	0	2	max. 2 pieces	HK1-02	1SAM201902R1003		2	0.035
MS116, MS132, MO132, MS132-T	2	0	with lead contacts	HK1-20L	1SAM201902R1004		2	0.035
Signaling contacts – mountable on the right								
MS116, MS132, MS165 MO132, MO165 MS132-T	1	1	for tripped alarm, max. 2 pieces	SK1-11	1SAM201903R1001		2	0.035
	2	0	for tripped alarm, max. 2 pieces	SK1-20	1SAM201903R1002		2	0.035
	0	2	for tripped alarm, max. 2 pieces	SK1-02	1SAM201903R1003		2	0.035
MS132, MS165, MS132-T	1	1	for short-circuit alarm, max. 2 pieces	CK1-11	1SAM301901R1001		2	0.035
	2	0	for short-circuit alarm, max. 2 pieces	CK1-20	1SAM301901R1002		2	0.035
	0	2	for short-circuit alarm, max. 2 pieces	CK1-02	1SAM301901R1003		2	0.035

Main dimensions mm, *inches*



2CDC242001F0012

HK1

2CDC131050C0201

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

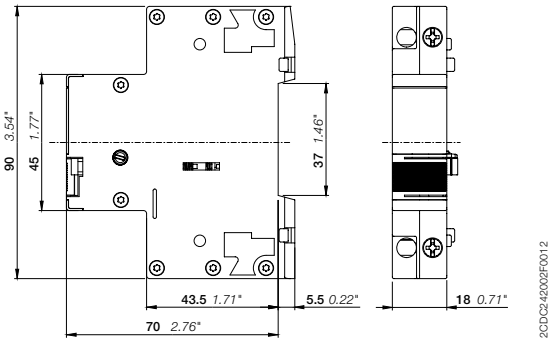
AA1-24

UA1-24

Ordering details

Suitable for	Rated control supply voltage 50 Hz V AC	Rated control supply voltage 60 Hz V AC	Type	Order code		Pkg qty	Weight (1 pce) kg
Shunt trips – mountable on the left							
MS116, MS132, MS165, MO132, MO165, MS132-T	20 ... 24	20 ... 24	AA1-24	1SAM201910R1001		1	0.100
	110	110	AA1-110	1SAM201910R1002		1	0.100
	200 ... 240	200 ... 240	AA1-230	1SAM201910R1003		1	0.100
	350 ... 415	350 ... 415	AA1-400	1SAM201910R1004		1	0.100
Undervoltage releases – mountable on the left							
MS116, MS132, MS165, MO132, MO165, MS132-T	20	24	UA1-20	1SAM201904R1010		1	0.100
	24	-	UA1-24	1SAM201904R1001		1	0.100
	48	-	UA1-48	1SAM201904R1002		1	0.100
	60	-	UA1-60	1SAM201904R1003		1	0.100
	110	120	UA1-110	1SAM201904R1004		1	0.100
	-	208	UA1-208	1SAM201904R1008		1	0.100
	230	240	UA1-230	1SAM201904R1005		1	0.100
	400	-	UA1-400	1SAM201904R1006		1	0.100
	415	480	UA1-415	1SAM201904R1007		1	0.100
	-	575	UA1-575	1SAM201904R1009		1	0.100

Main dimensions mm, *inches*



AA1, UA1

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

General technical data

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

Contact utilization characteristics according to UL/CSA

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

Connecting characteristics

Auxiliary circuit

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

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

General technical data

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

Connecting characteristics

Auxiliary circuit

			UA1	AA1
Type				
Connecting capacity				
	Rigid	**1 or 2 x**	1 ... 4 mm²	
	Flexible with ferrule	**1 or 2 x**	0.75 ... 2.5 mm²	
	Flexible with insulated ferrule	**1 x** **2 x**	0.75 ... 2.5 mm² 0.75 ... 1.5 mm²	
	Flexible	**1 or 2 x**	0.75 ... 2.5 mm²	
	Stranded acc. to UL/CSA	**1 or 2 x**	AWG 16-12	
Stripping length			10 mm	
Tightening torque			0.8 ... 1.2 Nm / 7 lb.in	
Recommended screw driver			Pozidriv 2	

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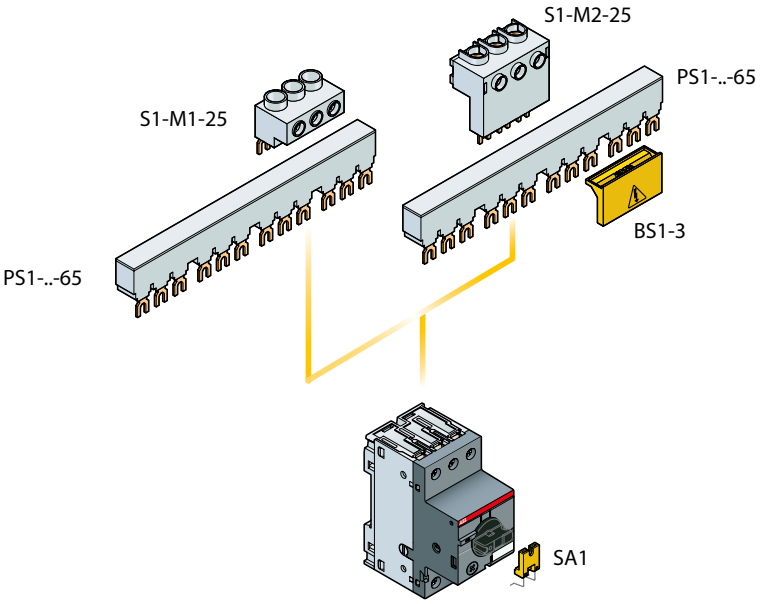
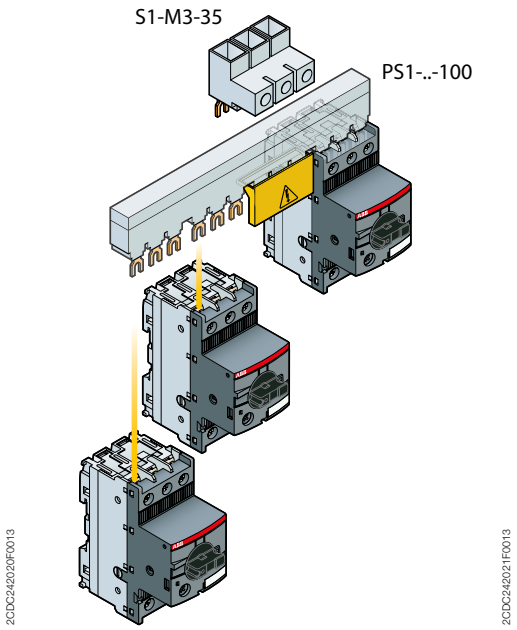
Main accessories
MS116, MS132, MS165, MO132, MO165

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

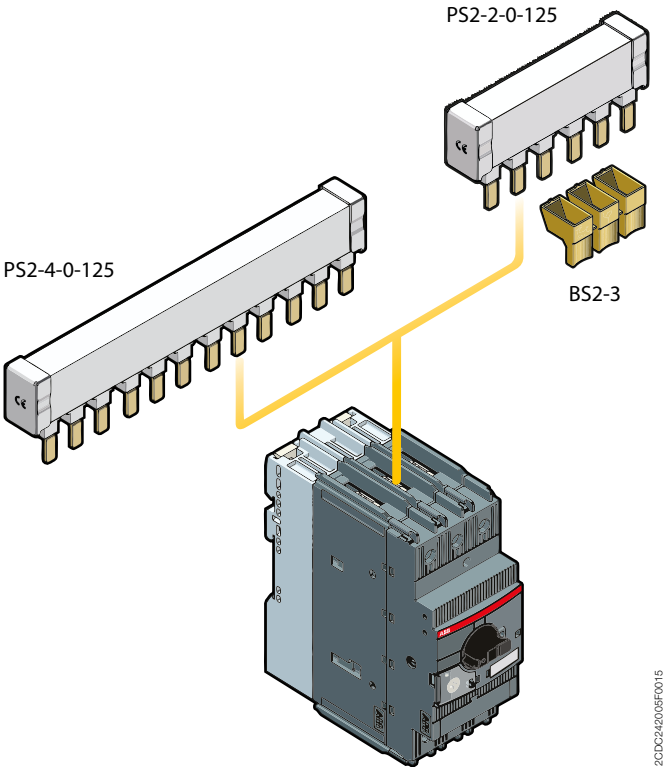


Three-phase busbar up to 65 A

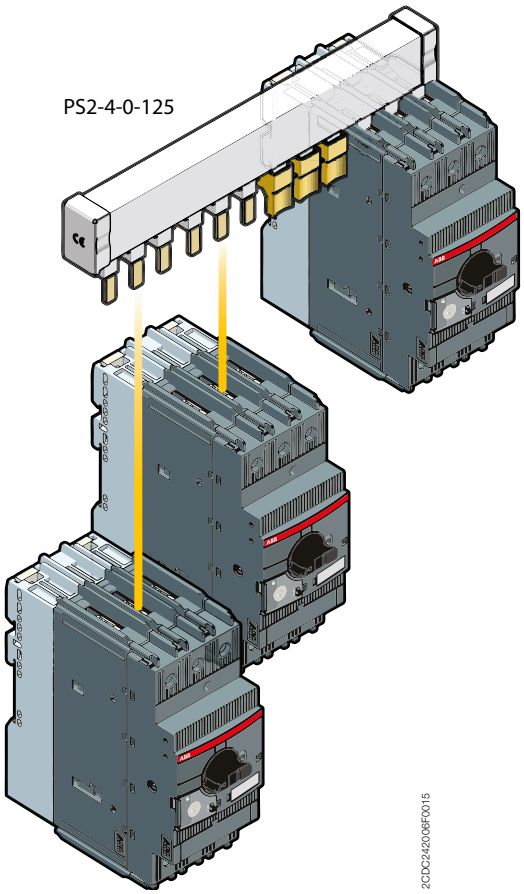


Three-phase busbar up to 100 A

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



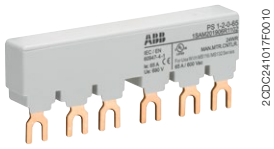
Three-phase busbar up to 125 A



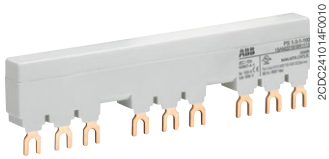
Three-phase busbar up to 125 A

2CDC131050C0201

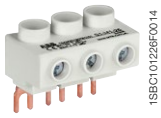
Main accessories
MS116, MS132, MO132, MS132-T



PS1-2-0-65



PS1-3-1-100



S1-M1-25

S1-M2-25

SA2

SA1

PB1-1-32

S1-PB1-25

Description

Three-phase busbars ensure a quick and safe connection and are therefore a cost effective solution. A variety of different three-phase busbars up to 100 A are in the assortment. Between 2 and 5 manual motor starters with none, one or two lateral auxiliary contacts can be connected. Different three-phase feeder terminals are available according to the application.

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

Ordering details

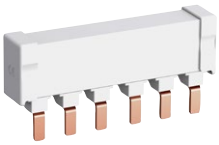
Suitable for	Rated operational current A	Number of MMS	Number of lateral aux.	Type	Order code		Pkg qty	Weight (1 pce) kg
Three-phase busbars								
MS116, MS132, MO132	65	2	0	PS1-2-0-65	1SAM201906R1102		10	0.034
	65	3	0	PS1-3-0-65	1SAM201906R1103		10	0.055
	65	4	0	PS1-4-0-65	1SAM201906R1104		10	0.077
	65	5	0	PS1-5-0-65	1SAM201906R1105		10	0.098
	65	2	1	PS1-2-1-65	1SAM201906R1112		10	0.036
	65	3	1	PS1-3-1-65	1SAM201906R1113		10	0.060
	65	4	1	PS1-4-1-65	1SAM201906R1114		10	0.087
	65	5	1	PS1-5-1-65	1SAM201906R1115		10	0.108
	65	2	2	PS1-2-2-65	1SAM201906R1122		10	0.040
	65	3	2	PS1-3-2-65	1SAM201906R1123		10	0.067
	65	4	2	PS1-4-2-65	1SAM201906R1124		10	0.095
	65	5	2	PS1-5-2-65	1SAM201906R1125		10	0.122
MS116, MS132, MO132	100	3	0	PS1-3-0-100	1SAM201916R1103		10	0.084
	100	4	0	PS1-4-0-100	1SAM201916R1104		10	0.117
	100	5	0	PS1-5-0-100	1SAM201916R1105		10	0.154
	100	3	1	PS1-3-1-100	1SAM201916R1113		10	0.094
	100	4	1	PS1-4-1-100	1SAM201916R1114		10	0.134
	100	5	1	PS1-5-1-100	1SAM201916R1115		10	0.172
	100	3	2	PS1-3-2-100	1SAM201916R1123		10	0.105

Suitable for	Rated operational current A	Rated cross section mm²	Mounting form	Type	Order code		Pkg qty	Weight (1 pce) kg
Three-phase feeder terminals								
MS116, MS132, MO132	65	25	Flat	S1-M1-25	1SAM201907R1101		10	0.038
	65	25	High	S1-M2-25	1SAM201907R1102		10	0.051
	65	25	UL/CSA Type E/F and IEC	S1-M3-25	1SAM201907R1103		10	0.042
	100	35	UL/CSA Type E/F and IEC	S1-M3-35	1SAM201913R1103		10	0.060

Suitable for	Description	Type	Order code		Pkg qty	Weight (1 pce) kg
MS116, MS132, MO132	Protection cover for busbars	BS1-3	1SAM201908R1001		50	0.003
MS116, MS132, MO132, MS132-T	Screw fixing kit	FS116	1SAM201909R1001		1	0.020
	Padlock + two keys	SA2	GJF1101903R0002		10	0.020
MS116	Lock handle	SA1	GJF1101903R0001		10	0.003
	Lock handle box SA1/SA2	SA3	GJF1101903R0003		10	0.050
Accessories for single-phase connection (IEC only)						
MS116, MS132, MO132, MS132-T	Phase connecting link	PB1-1-32	1SAM201914R1001		1	0.009
	Phase power infeed block	S1-PB1-25	1SAM201914R1002		1	0.013

2CDC131050C0201

Main accessories
MS165, MO165



PS2-2-0-125

PS2-3-0-125

KA165

BS2-3

SA2

Description

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

Ordering details

Suitable for	Rated operational current A	Number of MMS	Number of lateral aux.	Type	Order code		Pkg qty	Weight (1 pce) kg
Three-phase busbars								
MS165, MO165	125	2	0	PS2-2-0-125	1SAM401920R1002		10	0.100
	125	3	0	PS2-3-0-125	1SAM401920R1003		10	0.162
	125	4	0	PS2-4-0-125	1SAM401920R1004		10	0.226
	125	2	2	PS2-2-2-125	1SAM401920R1022		10	0.117
	125	3	2	PS2-3-2-125	1SAM401920R1023		10	0.197
	125	4	2	PS2-4-2-125	1SAM401920R1024		10	0.277

Other busbar types on request.

Suitable for	Description	Type	Order code		Pkg qty	Weight (1 pce) kg
MS165, MO165	Terminal shroud	KA165	1SAM401922R1001		10	0.025
	Protection cover for busbars	BS2-3	1SAM401921R1001		10	0.005
	Padlock + two keys	SA2	GJF1101903R0002		10	0.020

2CDC131050C0201

Main accessories
MS116, MS132, MS165, MO132, MO165

General technical data

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

Electrical connection

Main circuit

Type			S1-Mx-25	S1-Mx-35
Connecting capacity				
	Rigid	1 x	6 ... 25 mm²	10 ... 35 mm²
	Flexible with ferrule	1 x	6 ... 16 mm²	10 ... 35 mm²
	Flexible with insulated ferrule	1 x	6 ... 16 mm²	10 ... 35 mm²
	Flexible	1 x	6 ... 16 mm²	10 ... 35 mm²
	Stranded acc. to UL/CSA	1 x	AWG 10-4	AWG 8-2
Stripping length			10 mm	12 mm
Tightening torque			2.5 Nm / 22 lb.in	4.5 Nm / 40 lb.in
Recommended screw driver			Pozidriv 2	Hexagon SW4

Technical data for PS2-xxx on request.

2CDC131050C0201

Main accessories
MS116, MS132, MO132

2CDC241004F0010

IB132-Y

2CDC241003F0010

IB132-G

2CDC241022F0010

DMS132-Y

2CDC241001F0010

DMS132-G

Description

IB132 are IP65 (UL/CSA Type 12) enclosures for single MMS installation. Additional mounting of auxiliary and signaling contacts, shunt trips and undervoltage release is possible. The handle is lockable in OFF position. For detailed specification see installation instruction.

DMS132 are IP65 (UL/CSA Type 12) door mounting kits for MMS installation in any enclosure. Additional mounting of auxiliary, signaling, shunt trips and undervoltage release is possible. The handle is lockable in OFF position. For detailed specification see installation instruction.

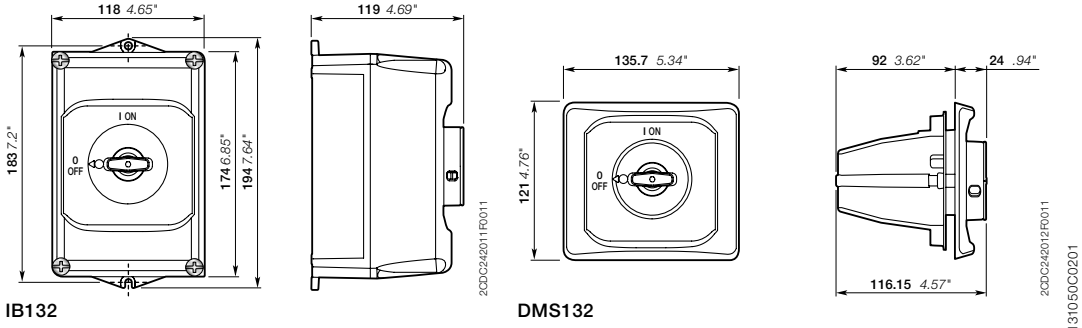
Ordering details

Suitable for	Description	Color	Type	Order code		Pkg qty	Weight (1 pce) kg
IP65 enclosures (UL/CSA Type 12)							
MS116, MS132, MO132	Padlockable max. 3 padlocks with bail diameter 4 ... 6.5 mm	Yellow/red	IB132-Y	1SAM201911R1011		1	0.370
		Grey/black	IB132-G	1SAM201911R1010		1	0.370
IP65 door mounting kits (UL/CSA Type 12)							
MS116, MS132, MO132	Padlockable max. 3 padlocks with bail diameter 4 ... 6.5 mm	Yellow/red	DMS132-Y	1SAM201912R1011		1	0.170
		Grey/black	DMS132-G	1SAM201912R1010		1	0.170

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

Please check for further equipment chapter General accessories.

Main dimensions mm, *inches*



IB132

DMS132

2CDC131050C0201

MS5100, MS495, MS497 manual motor starters
40 to 100 A – with thermal and electromagnetic protection

MS5100-100

MS495-75

MS497-100

Description

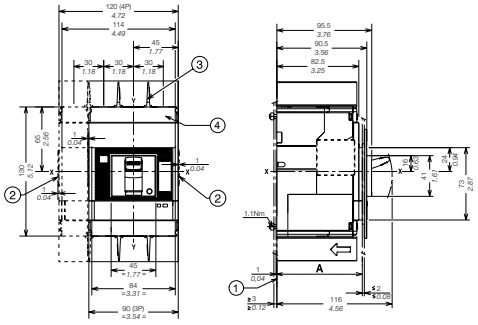
Manual motor starters (MMS) are protection devices for the main circuit. They combine motor control and protection in a single device. MMS are used mainly to switch motors manually ON/OFF and protect them and the installation fuse-less against short-circuit, overload and phase failures[1]. Fuse-less protection with a manual motor starter saves costs, space and ensures a quick reaction under short-circuit condition, by switching off the motor within milliseconds.

Ordering details

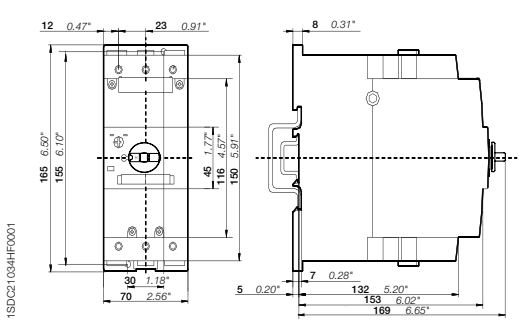
Rated operational power 400 V AC-3	Setting range	Short-circuit breaking capacity I_{cs} at 400 V AC	Rated instantaneous short-circuit current setting I_i	Type	Order code		Weight (1 pce)
kW	A	kA	A				kg
MS5100 manual motor starters							
45	40 ... 100 [2]	70	240 ... 1300	MS5100-100	1SDA082034R1		1.200
MS495 manual motor starters							
37	57 ... 75	25	975	MS495-75	1SAM550000R1008		2.253
45	70 ... 90	25	1170	MS495-90	1SAM550000R1009		2.280
55	80 ... 100	25	1235	MS495-100	1SAM550000R1010		2.295
MS497 manual motor starters							
37	57 ... 75	50	975	MS497-75	1SAM580000R1008		2.266
45	70 ... 90	50	1170	MS497-90	1SAM580000R1009		2.268
55	80 ... 100	50	1235	MS497-100	1SAM580000R1010		2.275

[1] The MS49x range offers phase loss sensitivity
[2] For motor loads only up to 80 A

Main dimensions mm, *inches*



MS5100



MS495, MS497

Technical data
MS5100, MS495, MS497 manual motor starters

Main circuit – Utilization characteristics according to IEC/EN

Type	MS5100	MS495, MS497
Standards	IEC/EN 60947-2	IEC/EN 60947–2, IEC/EN 60947-4-1, IEC/EN 60947-1
Rated operational voltage U_e	690 V AC	690 V AC / 450 V DC
Rated frequency	50/60 Hz	50/60 Hz
Trip class	3E, 5E, 10E, 20E	10
Number of poles	3	3
Duty time		100%
Mechanical durability	25000 cycles	50000 cycles
Electrical durability	8000 cycles	25000 cycles
Rated impulse withstand voltage U_{imp}	6 kV	6 kV
Rated insulation voltage U_i	690 V AC	690 V AC
Rated operational current I_e	See ordering details	
Rated instantaneous short-circuit current setting I_i	See ordering details	
Rated service short-circuit breaking capacity I_{cs}	See table "Short-circuit breaking capacity and back-up fuses"	
Rated ultimate short-circuit breaking capacity I_{cu}	See table "Short-circuit breaking capacity and back-up fuses"	

Short-circuit breaking capacity and back-up fuses

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

Note: Maximum rated current of the back-up fuses if $I_{CC} > I_{CS}$

Type	240 V AC			400 V AC			440 V AC			500 V AC			690 V AC		
	I_{CS} kA	I_{CU} kA	gG, aM A	I_{CS} kA	I_{CU} kA	gG, aM A	I_{CS} kA	I_{CU} kA	gG, aM A	I_{CS} kA	I_{CU} kA	gG, aM A	I_{CS} kA	I_{CU} kA	gG, aM A
Short-circuit protection MS5100															
MS5100-100	100	100	-	70	70	-	65	65	-	30	30	-	15	15	-
Short-circuit protection MS495															
MS495-75	No back-up fuse required up to I_{CC} = 100 kA			25	50	160	20	50	160	6	8	160	3	5	100
MS495-90				25	50	160	20	50	160	6	8	160	3	5	125
MS495-100				25	50	160	20	50	160	6	8	160	3	5	125

MS495-100: No need for back-up fuse in networks with a prospective current of up to 50 kA at 400 V.
With an approbiate 160 A type gG fuse the device can be used in a network with a prospective current of up to 100 kA.

Short-circuit protection MS497														
MS497-75	No back-up fuse required up to I_{CC} = 100 kA		50	100		50	70	200	5	10	160	3	6	125
MS497-90			50	100		50	70	200	5	10	160	3	6	160
MS497-100			50	100		50	70	200	5	10	160	3	6	160

MS497-90: No need for back-up fuse in networks with a prospective current of up to 70 kA at 440 V.
With an approbiate 200 A type gG fuse the device can be used in a network with a prospective current of up to 100 kA.

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Technical data
MS5100, MS495, MS497 manual motor starters

Main circuit – Utilization characteristics according to UL/CSA

Type		MS5100	MS495, MS497
Standards		UL489	UL 508, CSA 22.2 No. 14
Maximum operational voltage		600 V AC	600 V AC
Manual motor controller ratings		See table "UL 508 – Manual motor controller"	See table "UL 508 – Manual motor controller"
Trip rating		130% of magentic setting	125% FLA
Motor ratings	Horsepower	See table "Motor ratings, three-phase"	See table "Motor ratings, three-phase"
	Full Load Amps (FLA)	See table "Motor ratings, three-phase"	See table "Motor ratings, three-phase"

Motor ratings, three-phase

hp Horsepower

FLA Full Load Amps

Type	General purpose rating at max. 600 V AC	Full Load Amps	200 - 208 V AC	230 V AC	460 V AC	575 V AC
	A	FLA	hp	hp	hp	hp
MS5100-100	100*	100	30	30	75	100
MS495-75	75	75	25	25	60	75
MS495-90	90	90	30	30	75	100
MS495-100	100	100	40	40	75	100
MS497-75	75	75	25	25	60	75
MS497-90	90	90	30	30	75	100
MS497-100	100	100	30	40	75	100

*MS5100-100: For motor loads only up to 80 A

UL 508 – Manual motor controller

Type	Circuit breaker or class R fuse per UL/NEC	Max. circuit breaker or fuse per UL/NEC	Maximum short-circuit current for motor disconnect		for group installation		for tap conductor	for protection	UL 508	
									Type E [1]	Type E
	480/600 V	480/600 V	480 V	600 V	480 V	600 V	480Y/277V	600Y/347V	480Y/277V	600Y/347V
	A	A	kA	kA	kA	kA	kA	kA	kA	kA
MS5100-100	-	-	65	25	65	25	65	65	65	25
MS495-75	300	500	65	30	65	30	65	30	65	30
MS495-90	350	500	65	10	65	10	65	-	65	-
MS495-100	400	500	65	10	65	10	65	-	65	-
MS497-75	300	500	65	30	65	30	65	30	65	30
MS497-90	350	500	65	10	65	10	-	-	65	-
MS497-100	400	500	65	10	65	10	-	-	65	-

[1] only with use DX495

2CDC131113C0201

Technical data
MS5100, MS495, MS497 manual motor starters

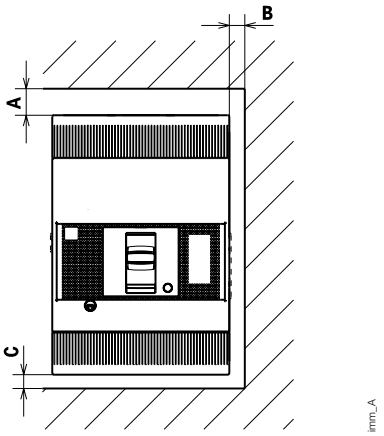
General technical data

Type		MS5100 [1]	MS495	MS497
Pollution degree		3	3	
Phase loss sensitivity			Yes	
Disconnect function acc. to IEC/EN 60947-2		Yes	Yes	
Ambient air temperature				
Operation	Open - compensated	-	-20 ... +60 °C	
	Open	-25 ... +70 °C	-20 ... +70 °C	
	Enclosed	-25 ... +70 °C	-20 ... +35 °C	
Storage		-40 ... +70 °C	-50 ... +80 °C	
Ambient air temperature compensation		Acc. to IEC/EN60947-4-1	Acc. to IEC/EN60947-4-1	
Maximum operating altitude permissible		2000 m	2000 m	
Resistance to shock acc. to IEC 60068-2-27		12g / 11 ms	-	
Resistance to vibrations acc. to IEC 60068-2-6		0.7g / 13 ... 100 Hz	2g / 5-150 Hz	
Mounting position		Horizontal, vertical, or lying down position	Position 1-6 (optional for single mounting)	
Mounting		-	DIN-rail 15 mm / 75 mm (EN 60715)	
Minimum distance to other units same type	Horizontal	0 mm	0 mm	
	Vertical - up to 240 V		50 mm	
	Vertical - up to 440 V		70 mm	
	Vertical - up to 500 V		110 mm	
	Vertical - up to 690 V		150 mm	
	Vertical		-	
Minimum distance to electrical conductive board	Horizontal	See "Insulation distances for installation in metallic cubicles"	-	
	Horizontal - up to 500 V		10 mm	
	Horizontal - up to 690 V		30 mm	
	Vertical - up to 240 V		50 mm	
	Vertical - up to 440 V		70 mm	
	Vertical - up to 500 V		110 mm	
	Vertical - up to 690 V		150 mm	
	Vertical		-	
Degree of protection	Housing	IP40 (on the lever)	IP20	
	Main circuit terminals	IP00	IP00	

[1] For U_e > 440 V power supply only from the upper terminal/lugs

Insulation distances for installation in metallic cubicles

Manual motor starter	A mm/in	B mm/in	C mm/in
MS5100			



MS5100, insulation distances

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Technical data
MS5100, MS495, MS497 manual motor starters

Connecting characteristics

Main circuit

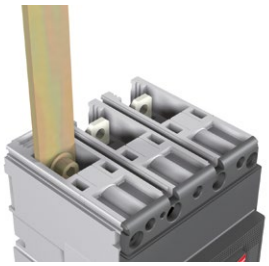
Type		MS495	MS497
Connecting capacity			
Rigid	1 or 2 x	2.5 ... 16 mm²	2.5 ... 16 mm²
Flexible with ferrule	1 x	10 ... 70 mm²	10 ... 70 mm²
	2 x	10 ... 50 mm²	10 ... 50 mm²
Flexible	1 x	10 ... 70 mm²	10 ... 70 mm²
	2 x	10 ... 50 mm²	10 ... 50 mm²
Stranded acc. to UL/CSA	1 x	AWG 10-2/0	AWG 10-2/0
	2 x	AWG 10-1/0	AWG 10-1/0
Flexible acc. to UL/CSA	1 x	AWG 10-2/0	AWG 10-2/0
	2 x	AWG 10-1/0	AWG 10-1/0
Stripping length		17 mm	17 mm
Tightening torque		4 - 6 Nm / 35 - 53 lb.in	4 - 6 Nm / 35 - 53 lb.in
Recommended screw driver		Hexagon 4	Hexagon 4

Front terminals - F (UL Listed)

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

Front terminal - F

F terminal with cable lug



F terminal with busbar

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MO5100, MO495, MO496 manual motor starters magnetic only
70 to 100 A – with electromagnetic protection

MO5100-100

MO495-75

MO496-100

Description

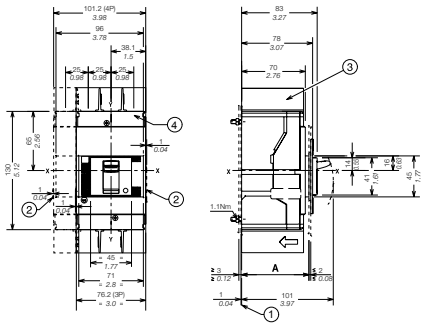
The manual motor starter magnetic only is used to manually switch on and off motors and to protect them reliably and without the need for a fuse from short-circuits.

Ordering details

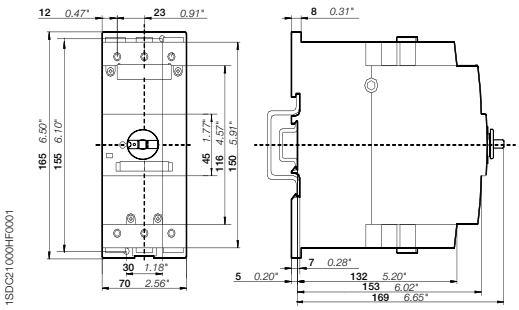
Rated operational power 400 V AC-3 [1]	Rated operational current	Short-circuit breaking capacity I_{cs} at 400 V AC	Rated instantaneous short-circuit current setting I_i	Type	Order code		Weight (1 pc)
kW	A	kA	A				kg
MO5100 manual motor starter magnetic only							
25	70	36 [2]	210 ... 770	MO5100-70	1SDA082031R1		1.100
30	80	36 [2]	240 ... 880	MO5100-80	1SDA082032R1		1.100
45	100	36 [2]	300 ... 1100	MO5100-100	1SDA082033R1		1.100
MO495 manual motor starter magnetic only							
37	75	25	975	MO495-75	1SAM560000R1008		2.247
45	90	25	1170	MO495-90	1SAM560000R1009		2.269
55	100	25	1235	MO495-100	1SAM560000R1010		2.292
MO496 manual motor starter magnetic only							
37	75	50	975	MO496-75	1SAM590000R1008		2.278
45	90	50	1170	MO496-90	1SAM590000R1009		2.266
55	100	50	1235	MO496-100	1SAM590000R1010		2.293

[1] For overload protection of motors, an appropriate thermal or electronic overload relay must be used
[2] I_{cs} at 415 V AC

Main dimensions mm, *inches*



MO5100



MO495, MO496

Technical data
MO5100, MO495, MO496 manual motor starters magnetic only

Main circuit – Utilization characteristics according to IEC/EN

Type	MO5100	MO495, MO496
Standards	IEC/EN 60947-2	IEC/EN 60947–2, IEC/EN 60947-4-1, IEC/EN 60947-1
Rated operational voltage U_e	690 V AC / 500 V DC	690 V AC / 450 V DC
Rated frequency	50/60 Hz	50/60 Hz
Number of poles	3	3
Duty time	-	100 %
Mechanical durability	25000 cycles	50000 cycles
Electrical durability	8000 cycles	25000 cycles
Rated impulse withstand voltage U_{imp}	6 kV	6 kV
Rated insulation voltage U_i	690 V AC	690 V AC
Rated operational current I_e	See ordering details	
Rated instantaneous short-circuit current setting I_i	See ordering details	
Rated service short-circuit breaking capacity I_{cs}	See table "Short-circuit breaking capacity and back-up fuses"	
Rated ultimate short-circuit breaking capacity I_{cu}	See table "Short-circuit breaking capacity and back-up fuses"	

Short-circuit breaking capacity and back-up fuses

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

Note: Maximum rated current of the back-up fuses if $I_{cc} > I_{cs}$

Type	240 V AC			400 V AC			440 V AC			500 V AC			690 V AC		
	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A
Short-circuit protection MO5100															
MO5100-70	48.75	65	-	36	36	-	18	36	-	11	22	-	4.5	6	-
MO5100-80	48.75	65	-	36	36	-	18	36	-	11	22	-	4.5	6	-
MO5100-100	48.75	65	-	36	36	-	18	36	-	11	22	-	4.5	6	-
Short-circuit protection MO495															
MO495-75	No back-up fuse required up to I_{cc} = 100 kA			25	50	160	20	50	160	6	8	160	3	5	100
MO495-90				25	50	160	20	50	160	6	8	160	3	5	125
MO495-100				25	50	160	20	50	160	6	8	160	3	5	125

MO495-100: No need for back-up fuse in networks with a prospective current of up to 50 kA at 400 V.
With an approbiate 160 A type gG fuse the device can be used in a network with a prospective current of up to 100 kA.

Short-circuit protection MO496														
MO496-75	No back-up fuse required up to I_{cc} = 100 kA	50	100	No back-up fuse required up to I_{cc} = 100 kA	50	70	200	5	10	160	3	6	125
MO496-90		50	100		50	70	200	5	10	160	3	6	160
MO496-100		50	100		50	70	200	5	10	160	3	6	160

MO496-90: No need for back-up fuse in networks with a prospective current of up to 70 kA at 440 V.
With an approbiate 200 A type gG fuse the device can be used in a network with a prospective current of up to 100 kA.

2CDC131114C0201

Technical data
MO5100, MO495, MO496 manual motor starters magnetic only

Main circuit – Utilization characteristics according to UL/CSA

Type		MO5100	MO495, MO496
Standards		UR (UL recognized)	UL 508, CSA 22.2 No. 14
Maximum operational voltage		480 V - 600 V Y / 347 V	600 V AC
Manual motor controller ratings		See table "UL 508 – Manual motor controller"	See table "UL 508 – Manual motor controller"
Trip rating		130% of magentic setting	125 % FLA
Motor ratings	Horsepower	See table "Motor ratings, three-phase"	See table "Motor ratings, three-phase"
	Full Load Amps (FLA)	See table "Motor ratings, three-phase"	See table "Motor ratings, three-phase"

Motor ratings, three-phase

hp Horsepower

FLA Full Load Amps

Type	General purpose rating at max. 600 V AC	Full Load Amps	200 - 208 V AC	230 V AC	460 V AC	575 V AC
	A	FLA	hp	hp	hp	hp
MO5100-70	70	70	20	25	50	-
MO5100-80	80	80	25	25	60	-
MO5100-100	100*	100	30	30	75	-
MO495-75	75	75	25	25	60	75
MO495-90	90	90	30	30	75	100
MO495-100	100	100	40	40	75	100
MO496-75	75	75	25	25	60	75
MO496-90	90	90	30	30	75	100
MO496-100	100	100	30	40	75	100

UL 508 – Manual motor controller

Type	Circuit breaker or class R fuse per UL/NEC	Max. circuit breaker or fuse per UL/NEC	Maximum short-circuit current			
			for motor disconnect		for group installation	
	480/600 V	480/600 V	480 V	600 V	480 V	600 V
	A	A	kA	kA	kA	kA
MO5100-70	-	-	65	25	-	-
MO5100-80	-	-	65	25	-	-
MO5100-100	-	-	65	25	-	-
MO495-75	250	500	65	30	65	30
MO495-90	300	500	65	30	65	30
MO495-100	350	500	65	10	65	10
MO496-75	300	500	65	30	65	30
MO496-90	350	500	65	10	65	10
MO496-100	400	500	65	10	65	10

2CDC131114C0201

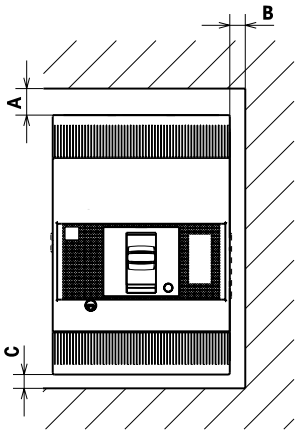
Technical data
MO5100, MO495, MO496 manual motor starters magnetic only

General technical data

Type		MO5100	MO495	MO496
Pollution degree		3	3	
Phase loss sensitivity			-	
Disconnect function acc. to IEC/EN 60947-2		Yes	Yes	
Ambient air temperature				
Operation	Open - compensated	-	-20 ... +60 °C	
	Open	-25 ... +70 °C	-20 ... +70 °C (above 60° C, current derating)	
	Enclosed	-25 ... +70 °C	-20 ... +35 °C	
Storage		-40 ... +70 °C	-50 ... +80 °C	
Ambient air temperature compensation		-	-	
Maximum operating altitude permissible		2000 m	2000 m	
Resistance to shock acc. to IEC 60068-2-27		12g / 11 ms	25g / 11 ms	
Resistance to vibrations acc. to IEC 60068-2-6		0.7g / 13 ... 100 Hz	-	
Mounting position		Horizontal, vertical, or lying down position	Position 1-6 (optional for single mounting)	
Mounting		-	DIN-rail 15 mm / 75 mm (EN 60715)	
Minimum distance to other units same type	Horizontal	0 mm	0 mm	
	Vertical - up to 240 V		50 mm	
	Vertical - up to 440 V		70 mm	
	Vertical - up to 500 V		110 mm	
	Vertical - up to 690 V		150 mm	
	Vertical		-	
Minimum distance to electrical conductive board	Horizontal	See "Insulation distances for installation in metallic cubicles"	-	
	Horizontal - up to 500 V		10 mm	
	Horizontal - up to 690 V		30 mm	
	Vertical - up to 240 V		50 mm	
	Vertical - up to 440 V		70 mm	
	Vertical - up to 500 V		110 mm	
	Vertical - up to 690 V		150 mm	
	Vertical		-	
Degree of protection	Housing	IP40 (on the lever)	IP20	
	Main circuit terminals	IP00	IP20	

Insulation distances for installation in metallic cubicles

Manual motor starter	A mm/in	B mm/in	C mm/in
MO5100			



imm_A

MO5100, insulation distances

2CDC131114C0201

Technical data
MO5100, MO495, MO496 manual motor starters magnetic only

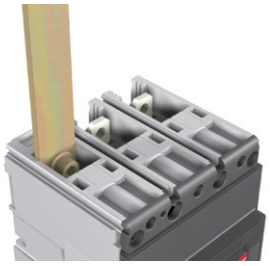
Connecting characteristics

Main circuit				
Type			MO495	MO496
Connecting capacity				
	Rigid	**1 or 2 x**	2.5 ... 16 mm²	2.5 ... 16 mm²
	Flexible with ferrule	**1 x**	10 ... 70 mm²	10 ... 70 mm²
		2 x	10 ... 50 mm²	10 ... 50 mm²
	Flexible	**1 x**	10 ... 70 mm²	10 ... 70 mm²
		2 x	10 ... 50 mm²	10 ... 50 mm²
	Stranded acc. to UL/CSA	**1 x**	AWG 10-2/0	AWG 10-2/0
		2 x	AWG 10-1/0	AWG 10-1/0
	Flexible acc. to UL/CSA	**1 x**	AWG 10-2/0	AWG 10-2/0
		2 x	AWG 10-1/0	AWG 10-1/0
Stripping length			17 mm	17 mm
Tightening torque			4 - 6 Nm / 35 - 53 lb.in	4 - 6 Nm / 35 - 53 lb.in
Recommended screw driver			Hexagon 4	Hexagon 4

Front terminals - F (UL Listed)		
Type		MS5100
Vers.		F
Busbar dimensions	**W min**	13 mm
	W max	16 mm
	H	7.5 mm
	Ø	6.5 mm
	D min	3.5 mm
	D max	5 mm
Cable terminals	**W**	16 mm
	Ø	6.5 mm
Tightening torque		6 Nm / 53.1 lb.in
Recommended screw driver		M6

Front terminal - F

F terminal with cable lug



F terminal with busbar

2CDC131114C0201

Main accessories
MS5100, MO5100 manual motor starters

XT AUX-Con cavi-01

AUX-C

XT SOR-Con cavi-01

SOR-C

1SDC210C86F0001

KLC Ronis

Description

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

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

Ordering details

Suitable for	Auxiliary contacts N.O.	Auxiliary contacts N.C.	Description	Type	Order code		Pkg qty pcs	Weight (1 pce) kg
Auxiliary contacts - mountable inside the breaker on the left slot (cabled version)								
MS5100, MO5100			Changeover	AUX-C 1Q+1SY 250 V AC	1SDA066431R1		2	0.06
			Changeover	AUX-C 2Q+1SY 250 V AC	1SDA066433R1		3	0.09
MS5100			Changeover	AUX-C 2Q+2SY+1SA 250 V AC	1SDA066438R1		5	0.15
			Changeover	AUX-C 3Q+1SY 250 V AC	1SDA066434R1		4	0.12
			Changeover	AUX-C 3Q+2SY 250 V AC	1SDA066436R1		5	0.15
MO5100			Changeover	AUX-C 1Q+1SY 24 V DC	1SDA066446R1		2	0.06

Suitable for	Rated control supply voltage V	Description	Type	Order code		Pkg qty pcs	Weight (1 pce) kg
Shunt trips units - mountable inside the breaker on the left slot (cabled version)							
MS5100, MO5100		Normally NON energized	SOR-C 12 V DC	1SDA066321R1		1	0.14
		Normally NON energized	SOR-C 24-30 V AC/DC	1SDA066322R1		1	0.14
		Normally NON energized	SOR-C 48-60 V AC/DC	1SDA066323R1		1	0.14
		Normally NON energized	SOR-C 110-127 V AC / 110-125 V DC	1SDA066324R1		1	0.14
		Normally NON energized	SOR-C 220-240 V AC / 220-250 V DC	1SDA066325R1		1	0.14
		Normally NON energized	SOR-C 380-440 V AC	1SDA066326R1		1	0.14
		Normally NON energized	SOR-C 480-525 V AC	1SDA066327R1		1	0.14
Undervoltages releases - mountable inside the breaker on the left slot (cabled version)							
MS5100, MO5100		Normally energized	UVR-C 24-30 V AC/DC	1SDA066396R1		1	0.14
		Normally energized	UVR-C 48 V AC/DC	1SDA060965R1		1	0.14
		Normally energized	UVR-C 60 V AC/DC	1SDA066397R1		1	0.14
		Normally energized	UVR-C 110-127 V AC / 110-125 V DC	1SDA066398R1		1	0.14
		Normally energized	UVR-C 220-240 V AC / 220-250 V DC	1SDA066399R1		1	0.14
		Normally energized	UVR-C 380-440 V AC	1SDA066400R1		1	0.14
		Normally energized	UVR-C 480-525 V AC	1SDA066401R1		1	0.14

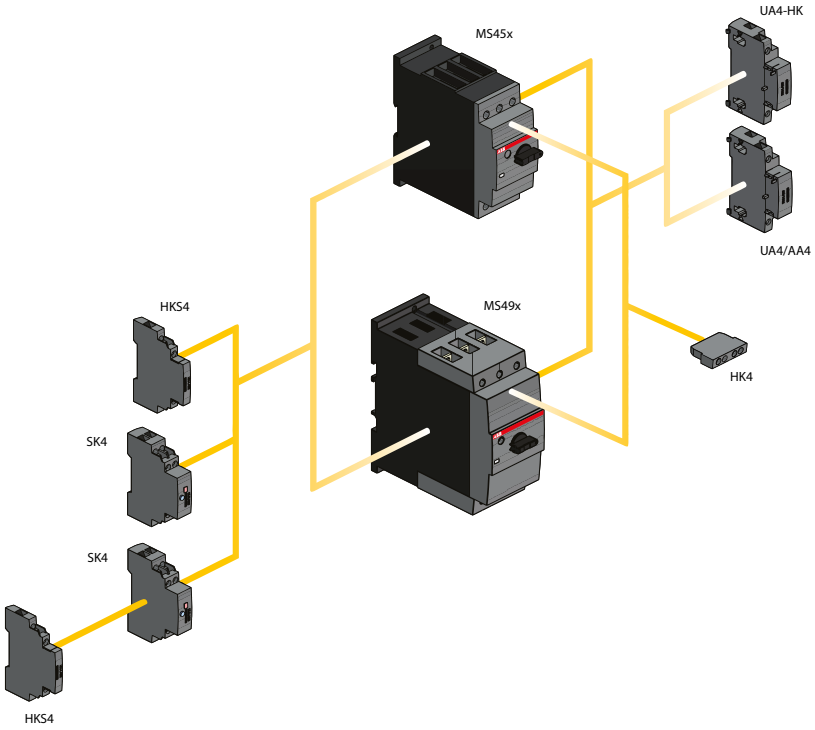
Suitable for	Description	Type	Order code		Pkg qty pcs	Weight (1 pce) kg
Key locks						
MS5100	Key lock on the circuit breaker, different keys, removable in open position	KLC Ronis [1]	1SDA066599R1		1	NA
MO5100	Key lock on the circuit breaker, different keys, removable in open position	KLC Ronis [1]	1SDA066593R1		1	NA

[1] UL Listed

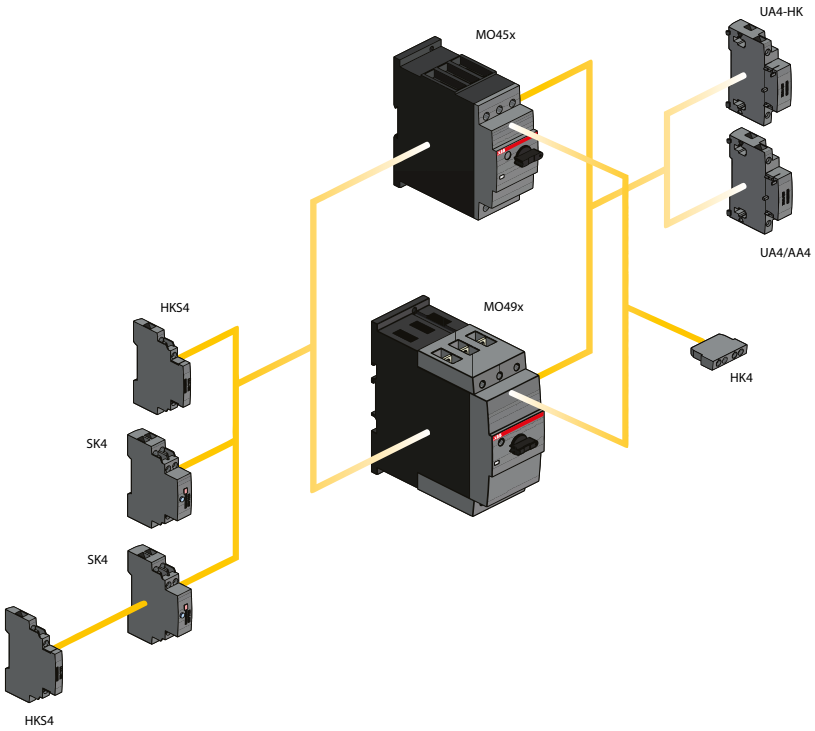
2CDC131115C0201

Main accessories
MS49x, MO49x manual motor starters

Manual motor starter MS49x with accessories



Manual motor starter MO49x with accessories



Main accessories
MS49x, MO49x manual motor starters

2CDC241026F0011

HK4-11

2CDC241022F0011

HKS4-20

2CDC241024F0011

SK4-11

2CDC241023F0011

AA4-24

2CDC241025F0011

UA4-110

2CDC241023F0013

SA2

Description

Manual motor starters can be equipped with auxiliary contacts for lateral/front mounting, signalling contact for lateral mounting, undervoltage release and shunt trips. The accessories can be fitted wiring free and without tools. A variety of combinations is possible as required for the application. The auxiliary contacts change position with the main contacts. Undervoltage release are used for remote tripping of the manual motor starter especially for emergency stop circuits. Shunt trips release the MMS used for remote tripping. For this manual motor starter range we offer terminal shrouds, terminal insulation barriers and different lock/key solutions for customer solutions.

Ordering details

Suitable for	Auxiliary contacts N.O.	Auxiliary contacts N.C.	Description	Type	Order code		Pkg qty pcs	Weight (1 pce) kg
Auxiliary contacts – mountable on the front								
MS49x, MO49x	1	1		HK4-11	1SAM401901R1001		10	0.017
			Changeover	HK4-W	1SAM401901R1002		10	0.015
Auxiliary contacts – mountable on the left								
MS49x, MO49x	1	1	Max. 1 piece	HKS4-11	1SAM401902R1001		2	0.045
	2	0	Max. 1 piece	HKS4-20	1SAM401902R1002		2	0.045
	0	2	Max. 1 piece	HKS4-02	1SAM401902R1003		2	0.045
Signalling contacts – mountable on the left								
MS49x, MO49x	2	2	Separate signalling acc. UL508E 1 N.O. + 1 N.C. for short circuit alarm and 1 N.O. + 1 N.C. for tripped alarm, max. 1x SK4-11 + 1 x HKS4-xx	SK4-11	1SAM401904R1001		1	0.093

Suitable for	Rated control supply voltage V	Frequency Hz	Type	Order code		Pkg qty pcs	Weight (1 pce) kg
Shunt trip units – mountable on the right							
MS49x, MO49x	20 ... 24	50/60	AA4-24	1SAM401907R1001		1	0.135
	90 ... 110	50/60	AA4-110	1SAM401907R1002		1	0.135
	200 ... 240	50/60	AA4-230	1SAM401907R1003		1	0.128
	350 ... 415	50/60	AA4-400	1SAM401907R1004		1	0.125
Undervoltage releases – mountable on the right							
MS49x, MO49x	24	50	UA4-24	1SAM401905R1004		1	0.134
	110/120	50/60	UA4-110	1SAM401905R1001		1	0.134
	230/240	50/60	UA4-230	1SAM401905R1002		1	0.131
	400/440	50/60	UA4-400	1SAM401905R1003		1	0.129
	230/240	50/60	UA4-HK-230	1SAM401906R1001		1	0.140
	400/440	50/60	UA4-HK-400	1SAM401906R1002		1	0.137

Suitable for	Description	Type	Order code		Pkg qty pcs	Weight (1 pce) kg
MS495, MS497, MO495, MO496	Terminal shroud	KA495	1SAM501901R1001		10	0.018
	Terminal shroud	KA495C [1]	1SAM501902R1001		10	0.038
	Terminal insulation barrier for UL508E	DX495	1SAM401912R1001		1	0.154
MS495, MS497, MO495, MO496	Padlock + two keys	SA2	GJF1101903R0002		10	0.020

[1] Is plugged onto the housing after removing the box terminals, if using cable lugs.

2CDC131115C0201

Main accessories
MS49x, MO49x manual motor starters

General technical data

Type		HK4-11	HK4-W	HKS4	SK4
Standards		IEC/EN 60947–1, IEC/EN 60947-5-1, UL 508, CSA22.2 No. 14			
Rated operational voltage U_e		230 V AC / 220 V DC	690 V AC / 220 V DC	690 V AC	690 V AC
Conventional free-air thermal current I_{th}		2.5 A	5 A	10 A	10 A
Rated frequency		DC, 50/60 Hz			
Rated impulse withstand voltage U_{imp}		6 kV			
Rated insulation voltage U_i		300 V	300 V	690 V	690 V
Pollution degree		3			
Ambient air temperature	Operation	-20 ... +70 °C			
	Storage	-50 ... +80 °C			
Resistance to shock acc. to IEC 60068-2-27		25g / 11 ms			
Resistance to vibrations acc. to IEC 60068-2-6		2g / 5 ... 150 Hz			
Number of poles		1 N.C. + 1 N.O.	Changeover	1 N.C. + 1 N.O. / 2 N.O. / 2 N.C.	2 N.C. + 2 N.O.
I_e / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category					
	24 V	2 A	4 A	6 A	6 A
	230 V	0.5 A	3 A	4 A	4 A
	400 V	-	1.5 A	3 A	3 A
	690 V	-	0.5 A	1 A	1 A
I_e / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category					
	24 V	1 A	1 A	2 A	2 A
	48 V	0.3 A	-	-	-
	60 V	0.15 A	-	-	-
	110 V	-	0.22 A	0.5 A	0.5 A
	230 V	-	0.1 A	0.25 A	0.25 A
Minimum switching capacity		17 V / 1 mA		-	-
Short-circuit protective device		10 A Type gG			
Duty time		100 %			
Mounting		Front of MMS	Front of MMS	Left side of MMS	Left side of MMS
Mounting positions		1-6			
Mechanical durability		100000 cycles			
Electrical durability		100000 cycles			

Type			UA4-xxx	AA4-xxx
Power consumption				
	Pull-in	**AC**	20.2/13 VA/W	20.2/13 VA/W
		DC	20 W	13 ... 80 W
	Holding	**AC**	7.2/2.4 VA/W	-
		DC	2.1 W	-
Operating voltage				
	Tripping		0.35 ... 0.7 V x U_s	0.7 ... 1.1 V x U_s
	Coil operating voltage		0.85 ... 1.1 V x U_s	-

2CDC131115C0201

Main accessories
MS49x, MO49x manual motor starters

Connecting characteristics

Auxiliary circuit

Type			HK4-11	HK4-W	HKS4	SK4
Connecting capacity						
	Rigid	**1 x** **2 x**	0.5... 2.5 mm² 0.5 ... 1.5 mm² or 0.75 ... 2.5 mm			
	Flexible with ferrule	**1 x** **2 x**	0.5 ... 2.5 mm² 0.5 ... 1.5 mm² or 0.75 ... 2.5 mm			
	Flexible	**1 x** **2 x**	0.5 ... 2.5 mm² 0.5 ... 1.5 mm² or 0.75 ... 2.5 mm			
	Stranded acc. to UL/CSA	**1 or 2 x**	AWG 18-14			
	Flexible acc. to UL/CSA	**1 or 2 x**	AWG 18-14			
Stripping length			10 mm			
Tightening torque			0.8 ... 1.2 Nm / 7 ... 10.3 lb.in			
Recommended screw driver			Pozidriv 2			

2CDC131115C0201

General accessories
MS1xx, MO1xx, MS5100, MO5100, MS49x, MO49x

2CDC241003F0011

MSHD-LB

2CDC241002S0011

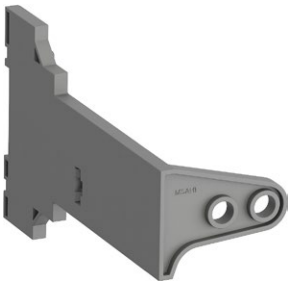
MSHD-LY

2CDC241004F0011

MSMN

2CDC241001F0012

MSH-AR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MSAH1

RHD-01

RHD Normal Direct Handle

Description

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

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

Most accessories fit for 6 mm shafts with a maximum length of 180 mm. The degree of protection for handles MSHD is IP64 (UL/CSA Type 1, 3R, 12).

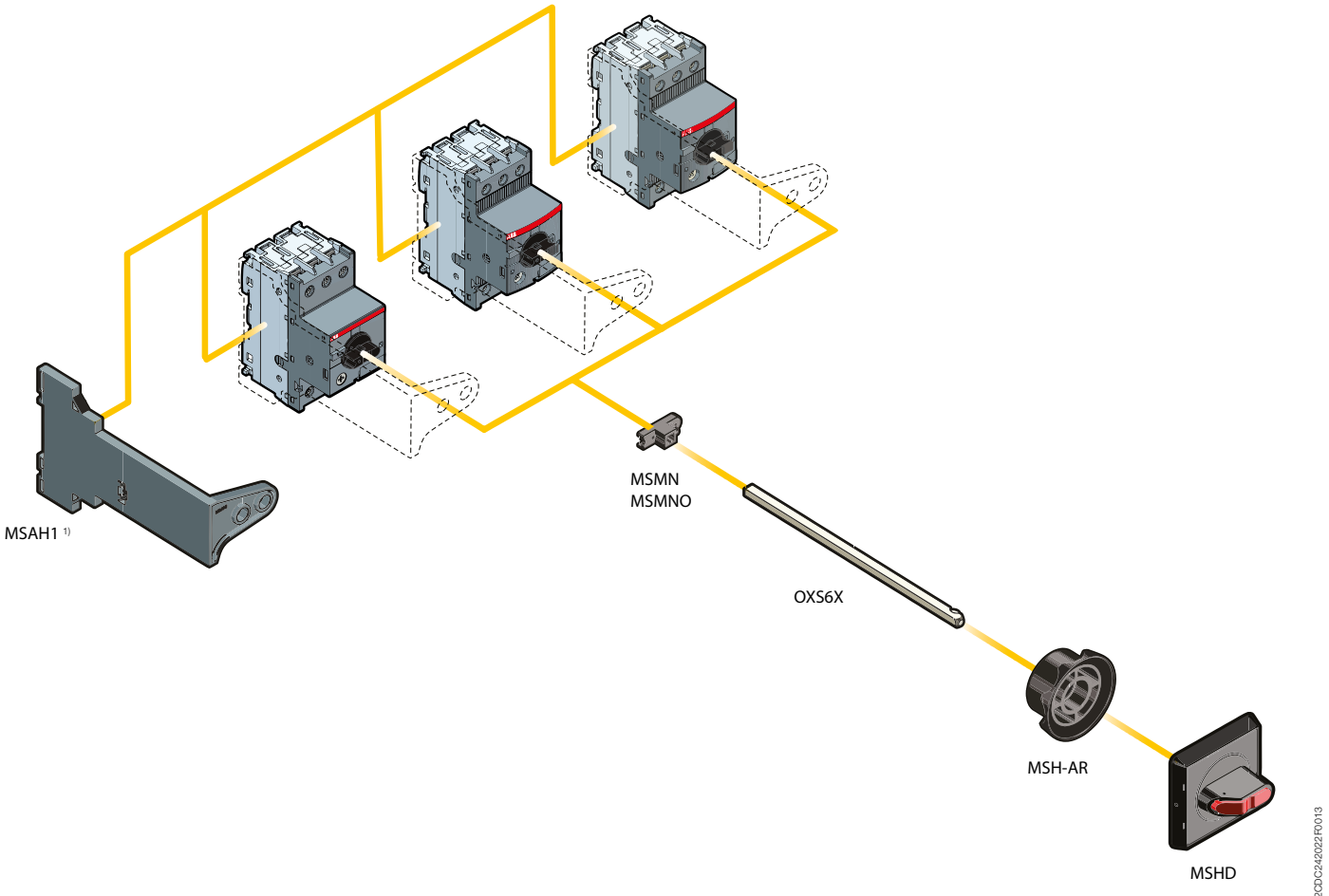
Ordering details

Suitable for	Description	Shaft length mm	Color	Type	Order code		Pkg qty pcs	Weight (1 pce) kg
Shafts								
MS116, MS132, MO132, MS165, MO165, MS4xx, MO4xx	For MSHD handles. Shaft diameter 6 mm. Shaft extension for door coupling driver.	85		OXS6X85	1SCA101647R1001		1	0.020
		105		OXS6X105	1SCA108043R1001		1	0.020
		130		OXS6X130	1SCA101655R1001		1	0.030
		180		OXS6X180	1SCA101659R1001		1	0.040
IP64 handles (UL/CSA Type 1, 3R, 12)								
MS116, MS132, MO132, MS165, MO165, MS4xx, MO4xx	Padlockable max. 3 padlocks with bail diameter 5 ... 8 mm, door interlock in ON position defeatable, for use with 6 mm OXS6...types up to 180 mm or driver shafts MSOX.		Black	MSHD-LB [1]	1SAM201920R1001		1	0.065
			Yellow	MSHD-LY [1]	1SAM201920R1002		1	0.065
			Black	MSHD-LTB [2]	1SAM201920R1011		1	0.065
			Yellow	MSHD-LTY [2]	1SAM201920R1012		1	0.065
Driver								
MS116, MS132, MO132, MS165, MO165, MS4xx, MO4xx	Coupling driver for use with 6 mm OXS6... types up to 180 mm.			MSMN [3]	1SAM101923R0002		1	0.002
				MSMNO [4]	1SAM101923R0012		1	0.002
Shaft alignment ring								
MS116, MS132, MO132, MS165, MO165, MS4xx, MO4xx	The MSH-AR supports the long shafts for alignment to the handle inlet. It makes closing panel doors more easy. Use for OXS6X > 105 mm.			MSH-AR	1SAM201920R1000		1	0.010
Shaft supporter								
MS116, MS132, MO132	With the MSAH it is possible to support the shaft in the extension of handle (MSHD). It is mandatory for the usage of shafts >130 mm.			MSAH1	1SAM201909R1021		1	0.035
Rotary handle operating mechanism								
MS5100	Rotary handle operating mechanism			RHD Normal Direct Handle [5]	1SDA069053R1		1	0.4
MO5100	Rotary handle operating mechanism			RHD Normal Direct Handle [5]	1SDA066475R1		1	0.4

[1] Indication I-O and ON-OFF (recommended for MS116, MS4xx, MO4xx)
[2] Indication I-O and ON-OFF + Trip indication
[3] Coded - Positioning of ON indication dependent from mounting orientation of the MMS
[4] Uncoded - Positioning of ON indication independent from mounting orientation of the MMS
[5] UL Listed

2CDC131116C0201

General accessories
MS1xx, MO1xx, MS49x, MO49x



1) MSAH1 fits to MS116,MS132 and MO132

1L1
3L2
5L3
13NO
A1
ABB
0
A2
B6-30-10
2T1
4T2
6T3
14NO

B mini contactors
K mini contactor relays

Presentation 3/3

Overview 3/6

With screw terminals

3-pole contactors

B6, B7 AC operated 3/8

BC6, BC7, B7D DC operated 3/9

3-pole reversing contactors

VB6, VB7 AC operated 3/10

VBC6, VBC7 DC operated 3/11

VB6A, VB7A AC operated 3/12

VBC6A, VBC7A DC operated 3/13

3-pole interface contactors

BC6, BC7, B6S, B7S DC operated 3/14

3-pole contactors - large coil voltage range

TBC7 DC operated 3/15

4-pole contactors

B6, B7 AC operated 3/16

BC6, B7D DC operated 3/17

4-pole contactors - large coil voltage range

TBC7 DC operated 3/18

Contactor relays

K6 AC operated 3/19

KC6 DC operated 3/20

Interface contactor relays

KC6, K6S DC operated 3/21

Contactor relays - large coil voltage range

TKC6 DC operated 3/22

With soldering pins

3-pole contactors

B6, B7 AC operated 3/23

BC6, BC7 DC operated 3/24

3-pole reversing contactors

VB6, VB7 AC operated 3/25

VBC6, VBC7 DC operated 3/26

VB6A, VB7A AC operated 3/27

VBC7A DC operated 3/28

Contactor relays

K6 AC operated 3/29

KC6 DC operated 3/30

3-pole interface contactors

BC6, BC7 DC operated 3/31

Interface contactor relays

KC6 DC operated 3/32

With flat pin connection

3-pole contactors

B6, B7 AC operated 3/33

BC6, BC7 DC operated 3/34

3-pole reversing contactors

VB7 AC operated 3/35

VBC7 DC operated 3/36

VB7A AC operated 3/37

VBC7A DC operated 3/38

3-pole interface contactors

BC6, BC7 DC operated 3/39

Contactor relays

K6 AC operated 3/40

KC6 DC operated 3/41

Interface contactor relays

KC6 DC operated 3/42

Accessories 3/43

Technical data 3/45

Location of the connection terminals and terminal designation 3/53

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B mini contactors
Flexibility in small spaces

Mini contactors are ideally suited for applications where reliability is a must and space is at a premium. The dimensions, technical features and the variety of the assortment provide customers a high flexibility in a wide-range of applications.

Space-saving

Designed to be mini

This type of contactor is a specialist for applications in small spaces. It comes with three different terminal types. Side or front auxiliary contact blocks can be mounted to match the requirements of width or depth limitations.

Optimum interface

Great flexibility

B mini offer many possibilities to adapt to any project. It offers screw terminals, soldering pins or flat pin connectors and different coil versions. This makes this contactor a perfect fit and simplifies the installation greatly.

Speed up your projects

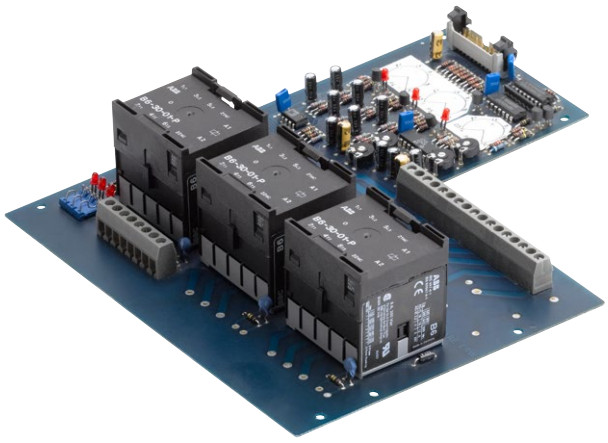
Simpler by design

You can easily combine a manual motor starter or overload relay with a mini contactor in order to create the solution of your choice. Reversing starters come pre-assembled from the factory, which saves time. With the right accessories, this range is simple to use

B mini contactor
Compact - a tiny specialist for specific needs

Small and silent
This range of mini contactors is the smallest on the market. The control circuit is hum-free by design. It covers AC or DC control voltages. They are available as 3- or 4-pole contactors or as contactor relay.

Screw terminals
This conventional terminal type enables a quick connection to an installation using just a one size screwdriver. All terminal screws, from power to control, are aligned and accessible from the front for easy tightening.



Flat pin connection
Some applications have specific requirements. Flat pin connections allow a safe and reliable connection even when things are shaking up.

Soldering pin terminals
This connection type allows an easy installation on PCB boards, where all components have to be soldered in place. The soldering pins sustain currents up to 12 A.

2CDC102073C0201

B mini contactor
Smart - Flexibility and diversity in a small size

Choose your specialist
Across this range are three different types of mini contactors. The interface relay types feature a low power consumption of only 1.4 W at 24 V. Special versions with integrated surge suppression or wide control voltage range acceptance are also available.

Mountable in just about any place
According to the available space, auxiliary contacts can be mounted on the front or at the side of the B mini. Also, additional surge protection can be fitted on any side of the contactor.

Save assembly time
This range offers reversing starters delivered as one piece from the factory. It avoids mounting mistakes and secures operation. It is also available with mechanical interlock for special demands.

Perfect fit
Mini contactors match manual motor starters or overload relays. This creates a space-saving and easy to install motor starting solution.

2CDC102073C0201

Mini contactors

				Screw terminals			
AC Control supply							
3-pole contactors	Coil consumption 3.5 W		Type	B6	B7	-	-
3-pole reversing contactors	Coil consumption 3.5 W		Type	-	-	VB6 VB6A[2]	VB7 VB7A[2]
4-pole contactors	Coil consumption 3.5 W		Type	B6	B7	-	-
DC Control supply							
3-pole contactors	Coil consumption 3.5 W		Type	BC6	BC7 B7D[1]	-	-
3-pole interface contactors	Coil consumption 1.4 ... 2.4 W		Type	BC6	BC7	-	-
3-pole reversing contactors	Coil consumption 3.5 W		Type	-	-	VBC6 VBC6A[2]	VBC7 VBC7A[2]
4-pole contactors	Coil consumption 3.5 W		Type	BC6	B7D		
Wide range types	Extended coil voltage and temperature		Type	-	TBC7		
PLC types	Coil consumption 1.7 W		Type	B6S[1]	B7S[1]		
IEC	**Rated operational power AC-3**	220-230-240 V	kW	2.2	3	2.2	3
		380-400 V	kW	4	5.5	4	5.5
	Rated operational current AC-1	400 V, $\theta \leq 40$ °C	A	20	20	20	20
UL/ CSA	**3-phase motor rating**	220-240 V AC	hp	2	3	2	3
		440-480 V AC	hp	3	5	3	5
	General use rating		A	12 (300 V)	16 (600 V)	12 (300 V)	16 (600 V)

[1] With integrated surge suppressor
[2] With safety blocking function

Main accessories

Auxiliary contact blocks	Front mounting		CAF6
	Side mounting		CA6
Connection sets	For reversing contactors		BSM6-30
Surge suppressors	Varistor (AC/DC)		RV-BC6

Overload relays

Thermal overload relays Thermal and phase failure protection, with single setup possible	Class 10	T16
Electronic overload relays With single setup possible	Class 10E, 20E, 30E	E16DU

Manual motor starters

Thermal / magnetic protection	Class 10	MS116, MS132
Magnetic only types		MO132
Connecting link to manual motor starters		BEA7/132

Mini contactor relays

				Screw terminals
AC Control supply				
4-pole contactor relays	Coil consumption 3.5 W		Type	K6
DC Control supply				
4-pole contactor relays	Coil consumption 3.5 W		Type	KC6
4-pole interface contactor relays	Coil consumption 1.4 ... 2.4 W		Type	KC6
Wide range types	Extended coil voltage and temperature		Type	TKC6
IEC	**Rated operational current AC-15**	220-230-240 V	A	4
		380-400 V	A	3
	Rated operational current DC-13	24 V	A	2.5

Main accessories

Auxiliary contact blocks	Front mounting		CAF6
	Side mounting		CA6-11K

	Soldering pins				Flat pins			
	B6...P	B7...P	-	-	B6...F	B7...F	-	-
	-	-	VB6...P VB6A...P[2]	VB7...P VB7A...P[2]	-	-	VB6...F VB6A...F[2]	VB7...F VB7A...F[2]
	-	-	-	-	-	-		
	BC6...P	BC7...P B7D...P[1]	-	-	BC6...F	BC7...F B7D...F[1]	-	-
	BC6...P	BC7...P	-	-	BC6...F	BC7...F	-	-
	-	-	VBC6...P VBC6A...P[2]	VBC7...P VBC7A...P[2]	-	-	VBC6...F VBC6A...F[2]	VBC7...F VBC7A...F[2]
	-	-			-	-		
	2.2	3	2.2	3	2.2	3	2.2	3
	4	5.5	4	5.5	4	5.5	4	5.5
	12	12	12	12	20	20	20	20
	2	3	2	3	2	3	2	3
	3	5	3	5	3	5	3	5
	12 (300 V)	16 (600 V)	12 (300 V)	16 (600 V)	12 (300 V)	16 (600 V)	12 (300 V)	16 (600 V)

	-	-
	CA6-11K-P	CA6-11K-F
	-	-
	-	-

	-	-
	-	-

	MS116, MS132	MS116, MS132
	MO132	MO132
	-	-

	Soldering pins	Flat pins
	K6...P	K6...F
	KC6...P	KC6...F
	KC6...P	KC6...F
	4	4
	3	3
	2.5	2.5

	-	-
	CA6-11K-P	CA6-11K-F

2CDC102050C0201

B6, B7 3-pole mini contactors – with screw terminals
4 to 5.5 kW
AC operated

B6-30-10

B7-30-10

Description

B6, B7 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with:

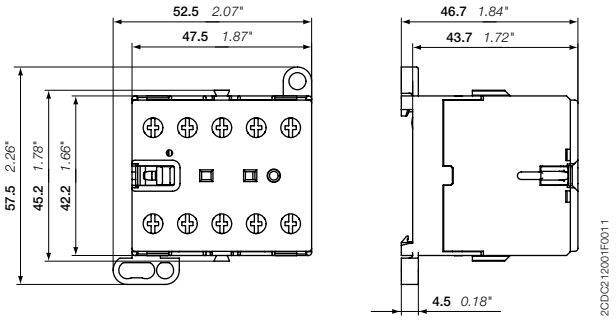
- 3 main poles and one built-in auxiliary contact
- control circuit: AC operated
  - low coil consumption (3.5 VA at pull-in and at holding)
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories
- hum-free coil
- designed for rail or wall mounting

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c		Auxiliary contacts fitted		Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3 kW	current θ ≤ 40 °C AC-1 A	3-phase motor rating 480 V hp	General use rating	50 Hz V AC	60 Hz V AC							kg
B6 mini contactors												
4	20	3	300 V / 12 A	24	24	1	0	B6-30-10-01	GJL1211001R0101		10	0.175
						0	1	B6-30-01-01	GJL1211001R0011		10	0.175
				42	42	1	0	B6-30-10-02	GJL1211001R0102		10	0.175
						0	1	B6-30-01-02	GJL1211001R0012		10	0.175
				48	48	1	0	B6-30-10-03	GJL1211001R0103		10	0.175
						0	1	B6-30-01-03	GJL1211001R0013		10	0.175
				110 ... 127	110 ... 127	1	0	B6-30-10-84	GJL1211001R8104		10	0.175
						0	1	B6-30-01-84	GJL1211001R8014		10	0.175
				220 ... 240	220 ... 240	1	0	B6-30-10-80	GJL1211001R8100		10	0.175
						0	1	B6-30-01-80	GJL1211001R8010		10	0.175
				380 ... 415	380 ... 415	1	0	B6-30-10-85	GJL1211001R8105		10	0.175
						0	1	B6-30-01-85	GJL1211001R8015		10	0.175
B7 mini contactors												
5.5	20	5	600 V / 16 A	24	24	1	0	B7-30-10-01	GJL1311001R0101		10	0.175
						0	1	B7-30-01-01	GJL1311001R0011		10	0.175
				42	42	1	0	B7-30-10-02	GJL1311001R0102		10	0.175
						0	1	B7-30-01-02	GJL1311001R0012		10	0.175
				48	48	1	0	B7-30-10-03	GJL1311001R0103		10	0.175
						0	1	B7-30-01-03	GJL1311001R0013		10	0.175
				110 ... 127	110 ... 127	1	0	B7-30-10-84	GJL1311001R8104		10	0.175
						0	1	B7-30-01-84	GJL1311001R8014		10	0.175
				220 ... 240	220 ... 240	1	0	B7-30-10-80	GJL1311001R8100		10	0.175
						0	1	B7-30-01-80	GJL1311001R8010		10	0.175
				380 ... 415	380 ... 415	1	0	B7-30-10-85	GJL1311001R8105		10	0.175
						0	1	B7-30-01-85	GJL1311001R8015		10	0.175

Other types on request

Main dimensions mm, *inches*



B6, B7

2CDC102008C0201

BC6, BC7, B7D 3-pole mini contactors – with screw terminals
4 to 5.5 kW
DC operated

2CDC211040F0011

BC6-30-10

2CDC211013F0011

BC7-30-10

Description

BC6, BC7, B7D 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with:

- 3 main poles and one built-in auxiliary contact
- control circuit: DC operated, low consumption (3.5 W at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories
- designed for rail or wall mounting

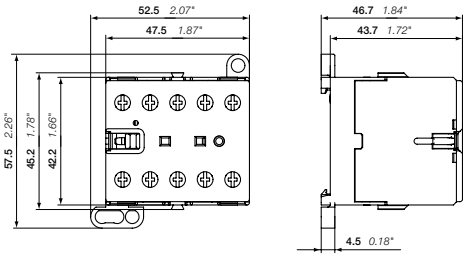
3

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3 kW	current $\theta \leq 40$ °C AC-1 A	3-phase motor rating 480 V hp	General use rating	V DC						kg
BC6 mini contactors										
4	20	3	300 V / 12 A	12	1 0	BC6-30-10-07	GJL1213001R0107		10	0.175
					0 1	BC6-30-01-07	GJL1213001R0017		10	0.175
				24	1 0	BC6-30-10-01	GJL1213001R0101		10	0.175
					0 1	BC6-30-01-01	GJL1213001R0011		10	0.175
				48	1 0	BC6-30-10-16	GJL1213001R1106		10	0.175
					0 1	BC6-30-01-16	GJL1213001R1016		10	0.175
				60	1 0	BC6-30-10-03	GJL1213001R0103		10	0.175
					0 1	BC6-30-01-03	GJL1213001R0013		10	0.175
				110 ... 125	1 0	BC6-30-10-04	GJL1213001R0104		10	0.175
					0 1	BC6-30-01-04	GJL1213001R0014		10	0.175
				220 ... 240	1 0	BC6-30-10-05	GJL1213001R0105		10	0.175
					0 1	BC6-30-01-05	GJL1213001R0015		10	0.175
BC7 mini contactors										
5.5	20	5	600 V / 16 A	12	1 0	BC7-30-10-07	GJL1313001R0107		10	0.175
					0 1	BC7-30-01-07	GJL1313001R0017		10	0.175
				24	1 0	BC7-30-10-01	GJL1313001R0101		10	0.175
					0 1	BC7-30-01-01	GJL1313001R0011		10	0.175
				48	1 0	BC7-30-10-16	GJL1313001R1106		10	0.175
					0 1	BC7-30-01-16	GJL1313001R1016		10	0.175
				60	1 0	BC7-30-10-03	GJL1313001R1103		10	0.175
					0 1	BC7-30-01-03	GJL1313001R0013		10	0.175
				110 ... 125	1 0	BC7-30-10-04	GJL1313001R0104		10	0.175
					0 1	BC7-30-01-04	GJL1313001R0014		10	0.175
				220 ... 240	1 0	BC7-30-10-05	GJL1313001R0105		10	0.175
					0 1	BC7-30-01-05	GJL1313001R0015		10	0.175
B7D mini contactors with integrated suppressor diode										
5.5	20	5	600 V / 16 A	24	1 0	B7D-30-10-01	GJL1317001R0101		10	0.175
					0 1	B7D-30-01-01	GJL1317001R0011		10	0.175
				220	1 0	B7D-30-10-05	GJL1317001R0105		10	0.175
					0 1	B7D-30-01-05	GJL1317001R0015		10	0.175

Other types on request

Main dimensions mm, *inches*



BC6, BC7, B7D

2CDC212001F0011

2CDC102015C0201

VB6, VB7 3-pole mini reversing contactors – with screw terminals
4 to 5.5 kW
AC operated

VB7-30-10

Description

VB6, VB7 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

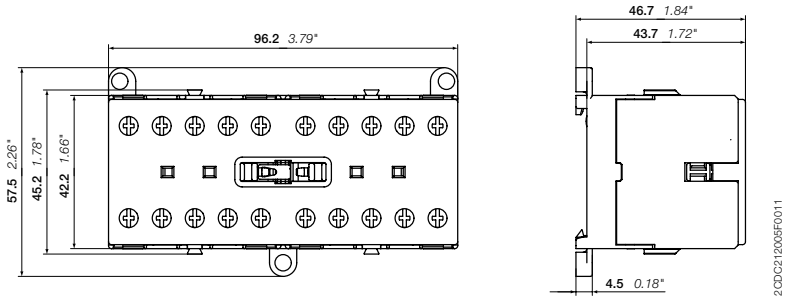
- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc.
- control circuit: AC operated
  - low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for front mounting
- designed for rail or wall mounting

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c		Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating	50 Hz	60 Hz						
kW	A	hp		V AC	V AC						kg
VB6 mini reversing contactors											
4	20	3	300 V / 12 A	24	24	1 0	VB6-30-10-01	GJL1211901R0101		5	0.355
						0 1	VB6-30-01-01	GJL1211901R0011		5	0.355
				42	42	1 0	VB6-30-10-02	GJL1211901R0102		5	0.355
						0 1	VB6-30-01-02	GJL1211901R0012		5	0.355
				48	48	1 0	VB6-30-10-03	GJL1211901R0103		5	0.355
						0 1	VB6-30-01-03	GJL1211901R0013		5	0.355
				110 ... 127	110 ... 127	1 0	VB6-30-10-84	GJL1211901R8104		5	0.355
						0 1	VB6-30-01-84	GJL1211901R8014		5	0.355
				220 ... 240	220 ... 240	1 0	VB6-30-10-80	GJL1211901R8100		5	0.355
						0 1	VB6-30-01-80	GJL1211901R8010		5	0.355
				380 ... 415	380 ... 415	1 0	VB6-30-10-85	GJL1211901R8105		5	0.355
						0 1	VB6-30-01-85	GJL1211901R8015		5	0.355
VB7 mini reversing contactors											
5.5	20	5	600 V / 16 A	24	24	1 0	VB7-30-10-01	GJL1311901R0101		5	0.355
						0 1	VB7-30-01-01	GJL1311901R0011		5	0.355
				42	42	1 0	VB7-30-10-02	GJL1311901R0102		5	0.355
						0 1	VB7-30-01-02	GJL1311901R0012		5	0.355
				48	48	1 0	VB7-30-10-03	GJL1311901R0103		5	0.355
						0 1	VB7-30-01-03	GJL1311901R0013		5	0.355
				110 ... 127	110 ... 127	1 0	VB7-30-10-84	GJL1311901R8104		5	0.355
						0 1	VB7-30-01-84	GJL1311901R8014		5	0.355
				220 ... 240	220 ... 240	1 0	VB7-30-10-80	GJL1311901R8100		5	0.355
						0 1	VB7-30-01-80	GJL1311901R8010		5	0.355
				380 ... 415	380 ... 415	1 0	VB7-30-10-85	GJL1311901R8105		5	0.355
						0 1	VB7-30-01-85	GJL1311901R8015		5	0.355

Other types on request

Main dimensions mm, *inches*



VB6, VB7

2CDC102016C0201

VBC6, VBC7 3-pole mini reversing contactors – with screw terminals
4 to 5.5 kW
DC operated

2CDC211042F0011

VBC6-30-10

2CDC211001F0011

VBC7-30-10

Description

VBC6, VBC7 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

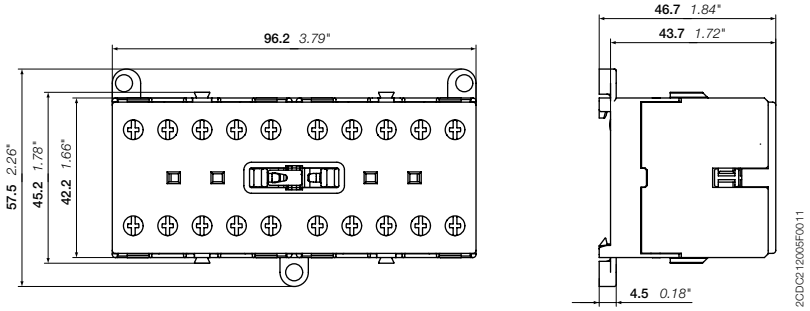
- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc.
- control circuit: DC operated
  - low coil consumption (3.5 W at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for front mounting
- designed for rail or wall mounting

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating							
kW	A	hp		V DC						kg
VBC6 mini reversing contactors										
4	20	3	300 V / 12 A	12	1 0	VBC6-30-10-07	GJL1213901R0107		5	0.355
					0 1	VBC6-30-01-07	GJL1213901R0017		5	0.355
				24	1 0	VBC6-30-10-01	GJL1213901R0101		5	0.355
					0 1	VBC6-30-01-01	GJL1213901R0011		5	0.355
				48	1 0	VBC6-30-10-16	GJL1213901R1106		5	0.355
					0 1	VBC6-30-01-16	GJL1213901R1016		5	0.355
				60	1 0	VBC6-30-10-03	GJL1213901R0103		5	0.355
					0 1	VBC6-30-01-03	GJL1213901R0013		5	0.355
				110 ... 125	1 0	VBC6-30-10-04	GJL1213901R0104		5	0.355
					0 1	VBC6-30-01-04	GJL1213901R0014		5	0.355
				220 ... 240	1 0	VBC6-30-10-05	GJL1213901R0105		5	0.355
					0 1	VBC6-30-01-05	GJL1213901R0015		5	0.355
VBC7 mini reversing contactors										
5.5	20	5	600 V / 16 A	12	1 0	VBC7-30-10-07	GJL1313901R0107		5	0.355
					0 1	VBC7-30-01-07	GJL1313901R0017		5	0.355
				24	1 0	VBC7-30-10-01	GJL1313901R0101		5	0.355
					0 1	VBC7-30-01-01	GJL1313901R0011		5	0.355
				48	1 0	VBC7-30-10-16	GJL1313901R1106		5	0.355
					0 1	VBC7-30-01-16	GJL1313901R1016		5	0.355
				60	1 0	VBC7-30-10-03	GJL1313901R0103		5	0.355
					0 1	VBC7-30-01-03	GJL1313901R0013		5	0.355
				110 ... 125	1 0	VBC7-30-10-04	GJL1313901R0104		5	0.355
					0 1	VBC7-30-01-04	GJL1313901R0014		5	0.355
				220 ... 240	1 0	VBC7-30-10-05	GJL1313901R0105		5	0.355
					0 1	VBC7-30-01-05	GJL1313901R0015		5	0.355

Other types on request

Main dimensions mm, *inches*



VBC6, VBC7

2CDC102017C0201

VB6A, VB7A 3-pole mini reversing contactors – with screw terminals
4 to 5.5 kW
AC operated – with safety blocking function

2CDC211037F0011

VB6A-30-10

2CDC211008F0011

VB7A-30-10

Description

VB6A, VB7A 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

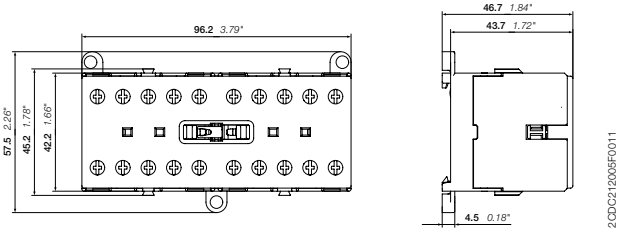
- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the 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.
- control circuit: AC operated
  - low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for front mounting
- designed for rail or wall mounting

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c		Auxiliary contacts fitted		Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power	current $\theta \leq 40$ °C	3-phase motor rating	General use rating	50 Hz	60 Hz							
400 V AC-3	AC-1	480 V										
kW	A	hp		V AC	V AC							kg
VB6A mini reversing contactors with safety blocking function												
4	20	3	300 V / 12 A	24	24	1	0	VB6A-30-10-01	GJL1211911R0101		5	0.355
						0	1	VB6A-30-01-01	GJL1211911R0011		5	0.355
				42	42	1	0	VB6A-30-10-02	GJL1211911R0102		5	0.355
						0	1	VB6A-30-01-02	GJL1211911R0012		5	0.355
				48	48	1	0	VB6A-30-10-03	GJL1211911R0103		5	0.355
						0	1	VB6A-30-01-03	GJL1211911R0013		5	0.355
				110 ... 127	110 ... 127	1	0	VB6A-30-10-84	GJL1211911R8104		5	0.355
						0	1	VB6A-30-01-84	GJL1211911R8014		5	0.355
				220 ... 240	220 ... 240	1	0	VB6A-30-10-80	GJL1211911R8100		5	0.355
						0	1	VB6A-30-01-80	GJL1211911R8010		5	0.355
				380 ... 415	380 ... 415	1	0	VB6A-30-10-85	GJL1211911R8105		5	0.355
						0	1	VB6A-30-01-85	GJL1211911R8015		5	0.355
VB7A mini reversing contactors with safety blocking function												
5.5	20	5	600 V / 16 A	24	24	1	0	VB7A-30-10-01	GJL1311911R0101		5	0.355
						0	1	VB7A-30-01-01	GJL1311911R0011		5	0.355
				42	42	1	0	VB7A-30-10-02	GJL1311911R0102		5	0.355
						0	1	VB7A-30-01-02	GJL1311911R0012		5	0.355
				48	48	1	0	VB7A-30-10-03	GJL1311911R0103		5	0.355
						0	1	VB7A-30-01-03	GJL1311911R0013		5	0.355
				110 ... 127	110 ... 127	1	0	VB7A-30-10-84	GJL1311911R8104		5	0.355
						0	1	VB7A-30-01-84	GJL1311911R8014		5	0.355
				220 ... 240	220 ... 240	1	0	VB7A-30-10-80	GJL1311911R8100		5	0.355
						0	1	VB7A-30-01-80	GJL1311911R8010		5	0.355
				380 ... 415	380 ... 415	1	0	VB7A-30-10-85	GJL1311911R8105		5	0.355
						0	1	VB7A-30-01-85	GJL1311911R8015		5	0.355

Other types on request

Main dimensions mm, *inches*



2CDC212005F0011

VB6A, VB7A

2CDC102018C0201

VBC6A, VBC7A 3-pole mini reversing contactors – with screw terminals
4 to 5.5 kW
DC operated – with safety blocking function

2CDC211044F0011

VBC6A-30-10

2CDC211007F0011

VBC7A-30-10

Description

VBC6A, VBC7A 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

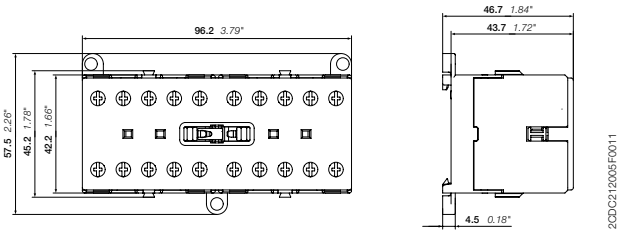
- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the 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.
- control circuit: DC operated
  - low coil consumption (3.5 W at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for front mounting
- designed for rail or wall mounting

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3 kW	current $\theta \leq 40$ °C AC-1 A	3-phase motor rating 480 V hp	General use rating	V DC						kg
VBC6A mini reversing contactors with safety blocking function										
4	20	3	300 V / 12 A	12	1 0	VBC6A-30-10-07	GJL1213911R0107		5	0.355
					0 1	VBC6A-30-01-07	GJL1213911R0017		5	0.355
				24	1 0	VBC6A-30-10-01	GJL1213911R0101		5	0.355
					0 1	VBC6A-30-01-01	GJL1213911R0011		5	0.355
				48	1 0	VBC6A-30-10-16	GJL1213911R1106		5	0.355
					0 1	VBC6A-30-01-16	GJL1213911R1016		5	0.355
				60	1 0	VBC6A-30-10-03	GJL1213911R0103		5	0.355
					0 1	VBC6A-30-01-03	GJL1213911R0013		5	0.355
				110 ... 125	1 0	VBC6A-30-10-04	GJL1213911R0104		5	0.355
					0 1	VBC6A-30-01-04	GJL1213911R0014		5	0.355
				220 ... 240	1 0	VBC6A-30-10-05	GJL1213911R0105		5	0.355
					0 1	VBC6A-30-01-05	GJL1213911R0015		5	0.355
VBC7A mini reversing contactors with safety blocking function										
5.5	20	5	600 V / 16 A	12	1 0	VBC7A-30-10-07	GJL1313911R0107		5	0.355
					0 1	VBC7A-30-01-07	GJL1313911R0017		5	0.355
				24	1 0	VBC7A-30-10-01	GJL1313911R0101		5	0.355
					0 1	VBC7A-30-01-01	GJL1313911R0011		5	0.355
				48	1 0	VBC7A-30-10-16	GJL1313911R1106		5	0.355
					0 1	VBC7A-30-01-16	GJL1313911R0016		5	0.355
				60	1 0	VBC7A-30-10-03	GJL1313911R0103		5	0.355
					0 1	VBC7A-30-01-03	GJL1313911R0013		5	0.355
				110 ... 125	1 0	VBC7A-30-10-04	GJL1313911R0104		5	0.355
					0 1	VBC7A-30-01-04	GJL1313911R0014		5	0.355
				220 ... 240	1 0	VBC7A-30-10-05	GJL1313911R0105		5	0.355
					0 1	VBC7A-30-01-05	GJL1313911R0015		5	0.355

Other types on request

Main dimensions mm, *inches*



2CDC212005F0011

VBC6A, VBC7A

2CDC102019C0201

BC6, BC7 3-pole interface mini contactors – with screw terminals
4 to 5.5 kW
DC operated

BC6-30-10

BC7-30-10

Description

BC6, BC7 3-pole interface mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with:

- 3 main poles and one built-in auxiliary contact
- control circuit: DC operated, very low coil consumption. Suitable for direct control by PLC outputs
- hum-free coil
- no auxiliary contact block permitted for mounting
- designed for rail or wall mounting

Ordering details

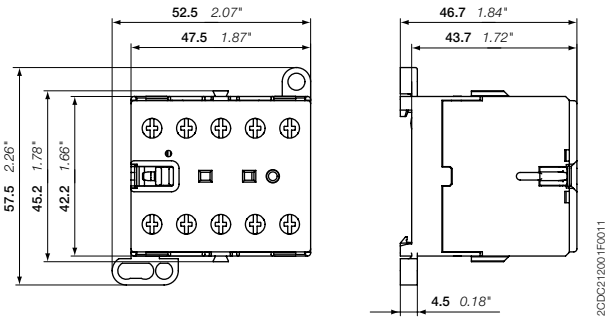
IEC		UL/CSA		Rated control circuit voltage U_c	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3 kW	current θ ≤ 40 °C AC-1 A	3-phase motor rating 480 V hp	General use rating	V DC						kg
DC operation 24 V / 1.4 W										
4	20	3	300 V / 12 A	24	1 0	BC6-30-10-1.4-81	GJL1213001R8101		10	0.175
					0 1	BC6-30-01-1.4-81	GJL1213001R8011		10	0.175
5.5	20	5	600 V / 16 A	24	1 0	BC7-30-10-1.4-81	GJL1313001R8101		10	0.175
					0 1	BC7-30-01-1.4-81	GJL1313001R8011		10	0.175
DC operation 17 ... 32 V / 2.4 W										
4	20	3	300 V / 12 A	17 ... 32	1 0	BC6-30-10-2.4-51	GJL1213001R5101		10	0.175
					0 1	BC6-30-01-2.4-51	GJL1213001R5011		10	0.175
5.5	20	5	600 V / 16 A	17 ... 32	1 0	BC7-30-10-2.4-51	GJL1313001R5101		10	0.175
					0 1	BC7-30-01-2.4-51	GJL1313001R5011		10	0.175

Connection to PLCs with integrated protective circuit

DC operation 24 V / 1.7 W										
4	20	3	300 V / 12 A	24	1 0	B6S-30-10-1.7-71	GJL1213001R7101		10	0.175
					0 1	B6S-30-01-1.7-71	GJL1213001R7011		10	0.175
5.5	20	5	600 V / 16 A	24	1 0	B7S-30-10-1.7-71	GJL1313001R7101		10	0.175
					0 1	B7S-30-01-1.7-71	GJL1313001R7011		10	0.175
DC operation 17 ... 32 V / 2.8 W										
4	20	3	300 V / 12 A	17 ... 32	1 0	B6S-30-10-2.8-72	GJL1213001R7102		10	0.175
					0 1	B6S-30-01-2.8-72	GJL1213001R7012		10	0.175
5.5	20	5	600 V / 16 A	17 ... 32	1 0	B7S-30-10-2.8-72	GJL1313001R7102		10	0.175
					0 1	B7S-30-01-2.8-72	GJL1313001R7012		10	0.175

Other types on request

Main dimensions mm, *inches*



BC6, BC7

2CDC102010C0201

TBC7 3-pole mini contactors – with screw terminals
4 to 5.5 kW
DC operated – large coil voltage range

2CDC211015F0011

TBC7-30-10

Description

TBC7 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with:

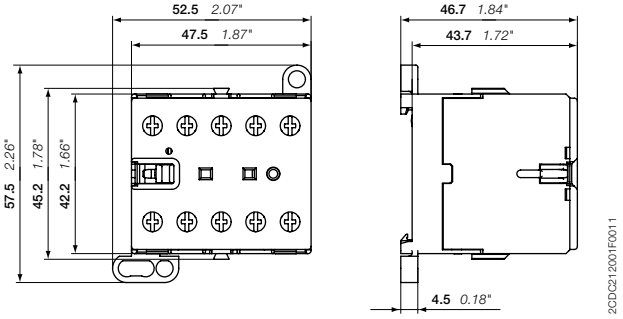
- 3 main poles and one built-in auxiliary contact
- control circuit: DC operated
  - low coil consumption (5 W at pull-in and at holding)
- hum-free coil
- expanded ambient temperature range -30 … +70 °C and wide range voltage supply
- no auxiliary contact block permitted for mounting
- designed for rail or wall mounting
- material is approved for railway applications

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_{Cmin} ... U_{Cmax}	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3 kW	current θ ≤ 40 °C AC-1 A	3-phase motor rating 480 V hp	General use rating	V DC						kg
TBC7 mini contactors										
5.5	20	5	600 V / 16 A	17 ... 32	1 0	TBC7-30-10-51	GJL1313061R5101		10	0.185
					0 1	TBC7-30-01-51	GJL1313061R5011		10	0.185
				50 ... 90	1 0	TBC7-30-10-55	GJL1313061R5105		10	0.185
					0 1	TBC7-30-01-55	GJL1313061R5015		10	0.185
				77 ... 143	1 0	TBC7-30-10-62	GJL1313061R6102		10	0.185
					0 1	TBC7-30-01-62	GJL1313061R6012		10	0.185
				140 ... 260	1 0	TBC7-30-10-68	GJL1313061R6108		10	0.185
					0 1	TBC7-30-01-68	GJL1313061R6018		10	0.185

Other types on request

Main dimensions mm, *inches*



2CDC212001F0011

TBC7

2CDC102020C0201

B6, B7 4-pole mini contactors – with screw terminals
4 to 5.5 kW
AC operated

B6-22-00

Description

B6, B7 4-pole mini contactors are compact control products mainly used for switching resistive loads up to 690 V AC.

These contactors are designed with:

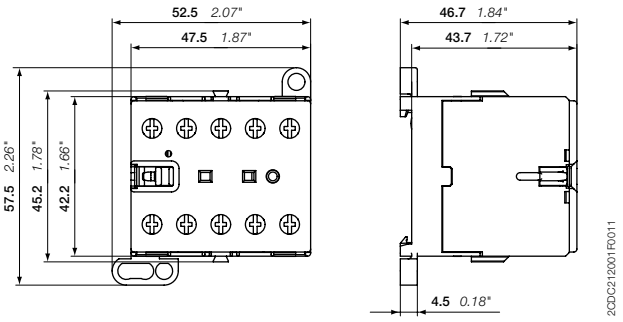
- 4 main poles
- control circuit: AC operated
  - low coil consumption (3.5 VA at pull-in and at holding)
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories
- hum-free coil
- designed for rail or wall mounting

Ordering details

IEC Rated operational current $\theta \leq 40$ °C AC-1 A	UL/CSA General use rating	Rated control circuit voltage U_c 50/60 Hz V AC	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce) kg
4 N.O. main poles								
20	300 V / 12 A	24	0 0	B6-40-00-01	GJL1211201R0001		10	0.175
		42	0 0	B6-40-00-02	GJL1211201R0002		10	0.175
		48	0 0	B6-40-00-03	GJL1211201R0003		10	0.175
		110 ... 127	0 0	B6-40-00-84	GJL1211201R8004		10	0.175
		220 ... 240	0 0	B6-40-00-80	GJL1211201R8000		10	0.175
20	600 V / 16 A	24	0 0	B7-40-00-01	GJL1311201R0001		10	0.175
		42	0 0	B7-40-00-02	GJL1311201R0002		10	0.175
		48	0 0	B7-40-00-03	GJL1311201R0003		10	0.175
		110 ... 127	0 0	B7-40-00-84	GJL1311201R8004		10	0.175
		220 ... 240	0 0	B7-40-00-80	GJL1311201R8000		10	0.175
2 N.O. + 2 N.C. main poles								
20	300 V / 12 A	24	0 0	B6-22-00-01	GJL1211501R0001		10	0.175
		42	0 0	B6-22-00-02	GJL1211501R0002		10	0.175
		48	0 0	B6-22-00-03	GJL1211501R0003		10	0.175
		110 ... 127	0 0	B6-22-00-84	GJL1211501R8004		10	0.175
		220 ... 240	0 0	B6-22-00-80	GJL1211501R8000		10	0.175
20	600 V / 16 A	24	0 0	B7-22-00-01	GJL1311501R0001		10	0.175
		42	0 0	B7-22-00-02	GJL1311501R0002		10	0.175
		48	0 0	B7-22-00-03	GJL1311501R0003		10	0.175
		110 ... 127	0 0	B7-22-00-84	GJL1311501R8004		10	0.175
		220 ... 240	0 0	B7-22-00-80	GJL1311501R8000		10	0.175

Other types on request

Main dimensions mm, *inches*



B6, B7

2CDC102009C0201

BC6, B7D 4-pole mini contactors – with screw terminals
4 to 5.5 kW
DC operated

BC6-22-00

Description

BC6, B7D 4-pole mini contactors are compact control products mainly used for switching resistive loads up to 690 V AC.

These contactors are designed with:

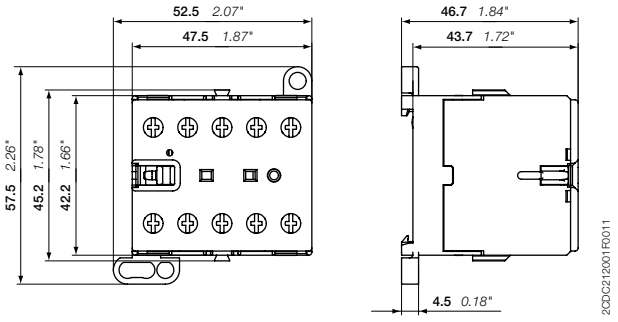
- 4 main poles
- control circuit: DC operated
  - low coil consumption (3.5 W at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for front or side mounting
- designed for rail or wall mounting

Ordering details

IEC Rated operational current $\theta \leq 40$ °C AC-1 A	UL/CSA General use rating	Rated control circuit voltage U_c V DC	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce) kg
4 N.O. main poles								
20	600 V / 16 A	24	0 0	B7D-40-00-01	GJL1317201R0001		10	0.175
		220	0 0	B7D-40-00-05	GJL1317201R0005		10	0.175
2 N.O. + 2 N.C. main poles								
20	300 V / 12 A	12	0 0	BC6-22-00-07	GJL1213501R0007		10	0.175
		24	0 0	BC6-22-00-01	GJL1213501R0001		10	0.175
		42	0 0	BC6-22-00-02	GJL1213501R0002		10	0.175
		48	0 0	BC6-22-00-16	GJL1213501R1006		10	0.175
		60	0 0	BC6-22-00-03	GJL1213501R0003		10	0.175
		110 ... 125	0 0	BC6-22-00-04	GJL1213501R0004		10	0.175
		220 ... 240	0 0	BC6-22-00-05	GJL1213501R0005		10	0.175

Other types on request

Main dimensions mm, *inches*



BC6, B7D

TBC7 4-pole mini contactors – with screw terminals
4 to 5.5 kW
DC operated – large coil voltage range

TBC7-31-00

Description

TBC7 4-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with:

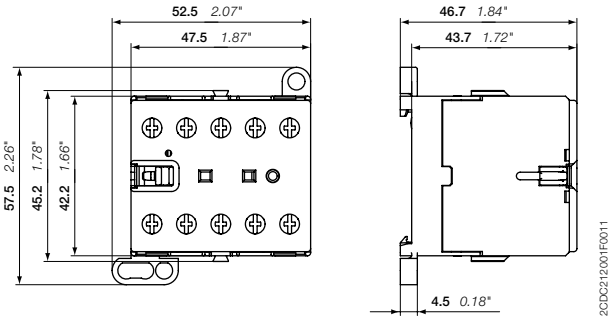
- 4 main poles
- control circuit: DC operated
  - low coil consumption (5 W at pull-in and at holding)
- hum-free coil
- expanded ambient temperature range -30 … +70 °C and wide range voltage supply
- no auxiliary contact block permitted for mounting
- designed for rail or wall mounting
- material is approved for railway applications

Ordering details

IEC Rated operational current $\theta \leq 40$ °C AC-1 A	UL/CSA General use rating	Rated control circuit voltage $U_{C\,min}$ ... $U_{C\,max}$ V DC	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce) kg
3 N.O. + 1 N.C. main poles								
20	600 V / 16 A	50 ... 90	0 0	TBC7-31-00-55	GJL1313461R5005		10	0.185
		77 ... 143	0 0	TBC7-31-00-62	GJL1313461R6002		10	0.185
		140 ... 260	0 0	TBC7-31-00-68	GJL1313461R6008		10	0.185
2 N.O. + 2 N.C. main poles								
20	600 V / 16 A	50 ... 90	0 0	TBC7-22-00-55	GJL1313561R5005		10	0.185
		77 ... 143	0 0	TBC7-22-00-62	GJL1313561R6002		10	0.185
		140 ... 260	0 0	TBC7-22-00-68	GJL1313561R6008		10	0.185

Other types on request

Main dimensions mm, *inches*



TBC7

2CDC102022C0201

K6 4-pole mini contactor relays – with screw terminals
AC operated

2CDC211012F0011

K6-22Z

2CDC211004F0010

K6-31Z

Description

K6 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to 4 A.

These contactors are designed with:

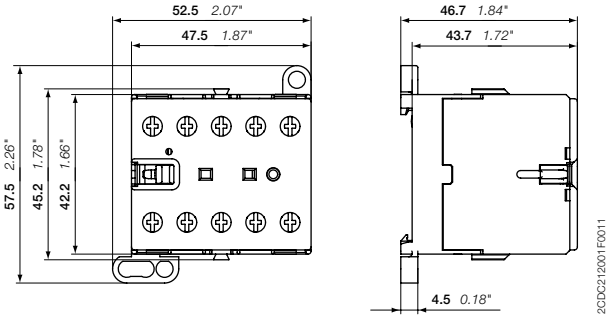
- 4-poles with various contact combinations
- control circuit: AC operated
  - low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for front or side mounting
- designed for rail or wall mounting

Ordering details

Rated control circuit voltage U_c		Type	Order code		Pkg qty	Weight (1 pce)
50 Hz	60 Hz					
V AC	V AC					kg
K6 4-pole mini contactor relays						
24	24	K6-22Z-01	GJH1211001R0221		10	0.175
42	42	K6-22Z-02	GJH1211001R0222		10	0.175
48	48	K6-22Z-03	GJH1211001R0223		10	0.175
110 ...127	110 ...127	K6-22Z-84	GJH1211001R8224		10	0.175
220 ... 240	220 ... 240	K6-22Z-80	GJH1211001R8220		10	0.175
380 ... 415	380 ... 415	K6-22Z-85	GJH1211001R8225		10	0.175
24	24	K6-31Z-01	GJH1211001R0311		10	0.175
42	42	K6-31Z-02	GJH1211001R0312		10	0.175
48	48	K6-31Z-03	GJH1211001R0313		10	0.175
110 ...127	110 ...127	K6-31Z-84	GJH1211001R8314		10	0.175
220 ... 240	220 ... 240	K6-31Z-80	GJH1211001R8310		10	0.175
380 ... 415	380 ... 415	K6-31Z-85	GJH1211001R8315		10	0.175
24	24	K6-40E-01	GJH1211001R0401		10	0.175
42	42	K6-40E-02	GJH1211001R0402		10	0.175
48	48	K6-40E-03	GJH1211001R0403		10	0.175
110 ...127	110 ...127	K6-40E-84	GJH1211001R8404		10	0.175
220 ... 240	220 ... 240	K6-40E-80	GJH1211001R8400		10	0.175
380 ... 415	380 ... 415	K6-40E-85	GJH1211001R8405		10	0.175

Other types on request

Main dimensions mm, *inches*



K6

KC6 4-pole mini contactor relays – with screw terminals
DC operated

KC6-22Z

Description

KC6 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to 4 A.

These contactors are designed with:

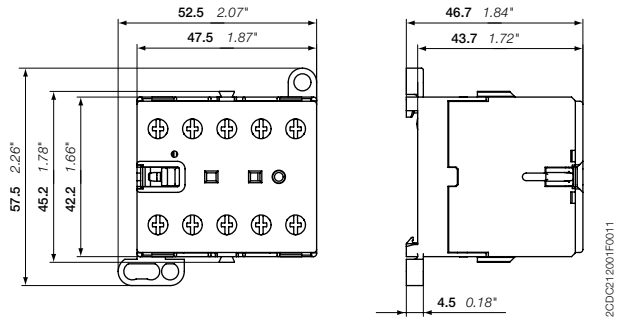
- 4-poles with various contact combinations
- control circuit: DC operated
  - low coil consumption (3.5 W at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for front or side mounting
- designed for rail or wall mounting

Ordering details

Rated control circuit voltage U_c V DC	Type	Order code		Pkg qty	Weight (1 pce) kg
KC6 4-pole mini contactor relays					
12	KC6-22Z-07	GJH1213001R0227		10	0.175
24	KC6-22Z-01	GJH1213001R0221		10	0.175
48	KC6-22Z-16	GJH1213001R1226		10	0.175
60	KC6-22Z-03	GJH1213001R0223		10	0.175
110 ... 125	KC6-22Z-04	GJH1213001R0224		10	0.175
220 ... 240	KC6-22Z-05	GJH1213001R0225		10	0.175
12	KC6-31Z-07	GJH1213001R0317		10	0.175
24	KC6-31Z-01	GJH1213001R0311		10	0.175
48	KC6-31Z-16	GJH1213001R1316		10	0.175
60	KC6-31Z-03	GJH1213001R0313		10	0.175
110 ... 125	KC6-31Z-04	GJH1213001R0314		10	0.175
220 ... 240	KC6-31Z-05	GJH1213001R0315		10	0.175
12	KC6-40E-07	GJH1213001R0407		10	0.175
24	KC6-40E-01	GJH1213001R0401		10	0.175
48	KC6-40E-16	GJH1213001R1406		10	0.175
60	KC6-40E-03	GJH1213001R0403		10	0.175
110 ... 125	KC6-40E-04	GJH1213001R0404		10	0.175
220 ... 240	KC6-40E-05	GJH1213001R0405		10	0.175

Other types on request

Main dimensions mm, *inches*



KC6

2CDC102012C0201

KC6 4-pole interface mini contactor relays – with screw terminals
DC operated

KC6-31Z

Description

KC6 4-pole interface mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to 4 A.

These contactors are designed with:

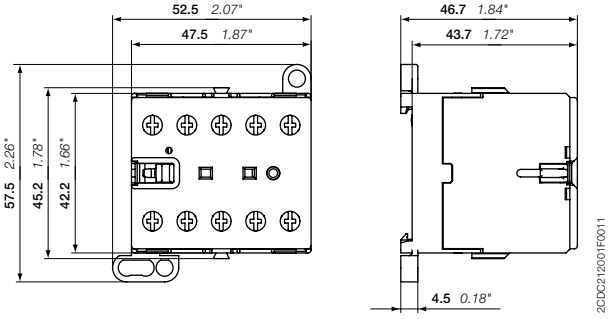
- 4-poles with various contact combinations
- control circuit: DC operated
  - low coil consumption (1.4 ... 2.8 W at pull-in and at holding)
- hum-free coil
- no auxiliary contact block permitted for mounting
- designed for rail or wall mounting

Ordering details

Rated control circuit voltage U_c V DC	Type	Order code		Pkg qty	Weight (1 pce) kg
DC operation 24 V / 1.4 W					
24	KC6-31Z-1.4-81	GJH1213001R8311		10	0.175
24	KC6-40E-1.4-81	GJH1213001R8401		10	0.175
DC operation 17 ... 32 V / 2.4 W					
17 ... 32	KC6-31Z-2.4-51	GJH1213001R5311		10	0.175
17 ... 32	KC6-40E-2.4-51	GJH1213001R5401		10	0.175
DC operation 24 V / 1.7 W					
24	K6S-22Z-1.7-71	GJH1213001R7221		10	0.175
24	K6S-31Z-1.7-71	GJH1213001R7311		10	0.175
24	K6S-40E-1.7-71	GJH1213001R7401		10	0.175
DC operation 17 ... 32 V / 2.8 W					
17 ... 32	K6S-22Z-2.8-72	GJH1213001R7222		10	0.175
17 ... 32	K6S-31Z-2.8-72	GJH1213001R7312		10	0.175
17 ... 32	K6S-40E-2.8-72	GJH1213001R7402		10	0.175

Other types on request

Main dimensions mm, *inches*



KC6

2CDC102013C0201

TKC6 4-pole mini contactor relays – with screw terminals
DC operated – large coil voltage range

TKC6-31Z

Description

TKC6 4-pole mini contactors are space optimized control products mainly used for control functions or for small loads up to 4 A.

These contactors are designed with:

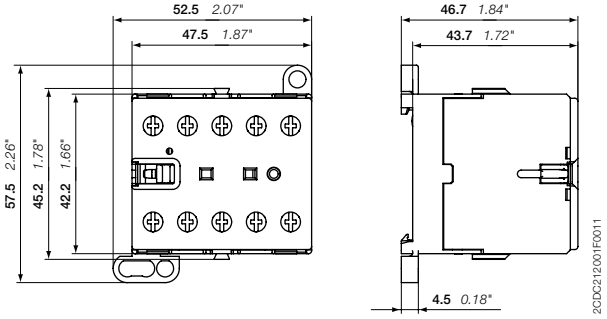
- 4-poles with various contact combinations
- control circuit: DC operated, hum free, low consumption (5 W at pull-in and at holding)
- expanded ambient temperature range -30 … +70 °C and wide range voltage supply
- material is suitable for railway applications
- humfree operating DC coil
- no auxiliary contact block permitted for mounting
- designed for rail or wall mounting

Ordering details

Rated control circuit voltage $U_{C\,min}$ ... $U_{C\,max}$ V DC	Type	Order code		Pkg qty	Weight (1 pce) kg
17 ... 32	TKC6-22Z-51	GJH1213061R5221		10	0.180
50 ... 90	TKC6-22Z-55	GJH1213061R5225		10	0.180
77 ... 143	TKC6-22Z-62	GJH1213061R6222		10	0.180
140 ... 260	TKC6-22Z-68	GJH1213061R6228		10	0.180
17 ... 32	TKC6-31Z-51	GJH1213061R5311		10	0.180
50 ... 90	TKC6-31Z-55	GJH1213061R5315		10	0.180
77 ... 143	TKC6-31Z-62	GJH1213061R6312		10	0.180
140 ... 260	TKC6-31Z-68	GJH1213061R6318		10	0.180
17 ... 32	TKC6-40E-51	GJH1213061R5401		10	0.180
50 ... 90	TKC6-40E-55	GJH1213061R5405		10	0.180
77 ... 143	TKC6-40E-62	GJH1213061R6402		10	0.180
140 ... 260	TKC6-40E-68	GJH1213061R6408		10	0.180

Other types on request

Main dimensions mm, *inches*



TKC6

2CDC102014C0201

B6, B7 3-pole mini contactors – with soldering pins
4 to 5.5 kW
AC operated

B6-30-10-P

B7-30-10-P

Description

B6..P and B7..P 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with:

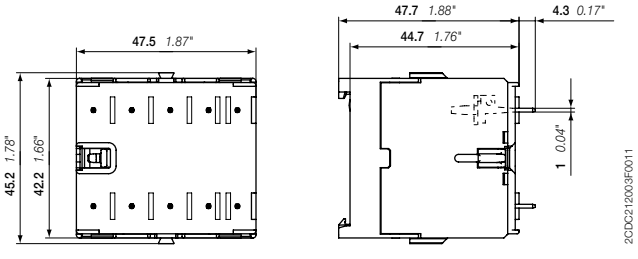
- 3 main poles and one built-in auxiliary contact
- control circuit: AC operated
  - low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for side mounting
- designed for soldering on PCB boards

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c		Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating	50 Hz	60 Hz						
kW	A	hp		V AC	V AC						kg
B6 mini contactors											
4	12	3	300 V / 12 A	24	24	1 0	B6-30-10-P-01	GJL1211009R0101		10	0.170
						0 1	B6-30-01-P-01	GJL1211009R0011		10	0.170
				42	42	1 0	B6-30-10-P-02	GJL1211009R0102		10	0.170
						0 1	B6-30-01-P-02	GJL1211009R0012		10	0.170
				48	48	1 0	B6-30-10-P-03	GJL1211009R0103		10	0.170
						0 1	B6-30-01-P-03	GJL1211009R0013		10	0.170
				110 ... 127	110 ... 127	1 0	B6-30-10-P-84	GJL1211009R8104		10	0.170
						0 1	B6-30-01-P-84	GJL1211009R8014		10	0.170
				220 ... 240	220 ... 240	1 0	B6-30-10-P-80	GJL1211009R8100		10	0.170
						0 1	B6-30-01-P-80	GJL1211009R8010		10	0.170
				380 ... 415	380 ... 415	1 0	B6-30-10-P-85	GJL1211009R8105		10	0.170
						0 1	B6-30-01-P-85	GJL1211009R8015		10	0.170
B7 mini contactors											
5.5	12	5	600 V / 16 A	24	24	1 0	B7-30-10-P-01	GJL1311009R0101		10	0.170
						0 1	B7-30-01-P-01	GJL1311009R0011		10	0.170
				42	42	1 0	B7-30-10-P-02	GJL1311009R0102		10	0.170
						0 1	B7-30-01-P-02	GJL1311009R0012		10	0.170
				48	48	1 0	B7-30-10-P-03	GJL1311009R0103		10	0.170
						0 1	B7-30-01-P-03	GJL1311009R0013		10	0.170
				110 ... 127	110 ... 127	1 0	B7-30-10-P-84	GJL1311009R8104		10	0.170
						0 1	B7-30-01-P-84	GJL1311009R8014		10	0.170
				220 ... 240	220 ... 240	1 0	B7-30-10-P-80	GJL1311009R8100		10	0.170
						0 1	B7-30-01-P-80	GJL1311009R8010		10	0.170
				380 ... 415	380 ... 415	1 0	B7-30-10-P-85	GJL1311009R8105		10	0.170
						0 1	B7-30-01-P-85	GJL1311009R8015		10	0.170

Other types on request

Main dimensions mm, *inches*



B6, B7

BC6, BC7 3-pole mini contactors – with soldering pins
4 to 5.5 kW
DC operated

BC7-30-10-P

3

Description

BC6, BC7 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with:

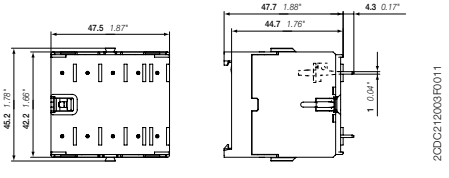
- 3 main poles and one built-in auxiliary contact
- control circuit: DC operated
  - low coil consumption (3.5 W at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for side mounting
- designed for soldering on PCB boards

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3 kW	current θ ≤ 40 °C AC-1 A	3-phase motor rating 480 V hp	General use rating	V DC						kg
BC6 mini contactors with 3 N.O. main poles										
4	12	3	300 V / 12 A	12	1 0	BC6-30-10-P-07	GJL1213009R0107		10	0.170
					0 1	BC6-30-01-P-07	GJL1213009R0017		10	0.170
				24	1 0	BC6-30-10-P-01	GJL1213009R0101		10	0.170
					0 1	BC6-30-01-P-01	GJL1213009R0011		10	0.170
				48	1 0	BC6-30-10-P-16	GJL1213009R1106		10	0.170
					0 1	BC6-30-01-P-16	GJL1213009R1016		10	0.170
				60	1 0	BC6-30-10-P-03	GJL1213009R0103		10	0.170
					0 1	BC6-30-01-P-03	GJL1213009R0013		10	0.170
				110 ... 125	1 0	BC6-30-10-P-04	GJL1213009R0104		10	0.170
					0 1	BC6-30-01-P-04	GJL1213009R0014		10	0.170
				220 ... 240	1 0	BC6-30-10-P-05	GJL1213009R0105		10	0.170
					0 1	BC6-30-01-P-05	GJL1213009R0015		10	0.170
BC7 mini contactors with 3 N.O. main poles										
5.5	12	5	600 V / 16 A	12	1 0	BC7-30-10-P-07	GJL1313009R0107		10	0.170
					0 1	BC7-30-01-P-07	GJL1313009R0017		10	0.170
				24	1 0	BC7-30-10-P-01	GJL1313009R0101		10	0.170
					0 1	BC7-30-01-P-01	GJL1313009R0011		10	0.170
				48	1 0	BC7-30-10-P-16	GJL1313009R1106		10	0.170
					0 1	BC7-30-01-P-16	GJL1313009R1016		10	0.170
				60	1 0	BC7-30-10-P-03	GJL1313009R0103		10	0.170
					0 1	BC7-30-01-P-03	GJL1313009R0013		10	0.170
				110 ... 125	1 0	BC7-30-10-P-04	GJL1313009R0104		10	0.170
					0 1	BC7-30-01-P-04	GJL1313009R0014		10	0.170
				220 ... 240	1 0	BC7-30-10-P-05	GJL1313009R0105		10	0.170
					0 1	BC7-30-01-P-05	GJL1313009R0015		10	0.170
BC6 mini contactors 2 N.O. + 1 N.C. main poles										
4	12	3	300 V / 12 A	24	1 0	BC6-21-10-P-01	GJL1213109R0101		10	0.170
				48	1 0	BC6-21-10-P-16	GJL1213109R1106		10	0.170
				60	1 0	BC6-21-10-P-03	GJL1213109R0103		10	0.170
				110 ... 125	1 0	BC6-21-10-P-04	GJL1213109R0104		10	0.170
				220 ... 240	1 0	BC6-21-10-P-05	GJL1213109R0105		10	0.170

Other types on request

Main dimensions mm, *inches*



B6, B7

2CDC102024C0201

VB6, VB7 3-pole mini reversing contactors – with soldering pins
4 to 5.5 kW
AC operated

VB7-30-10-P

Description

VB6, VB7 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

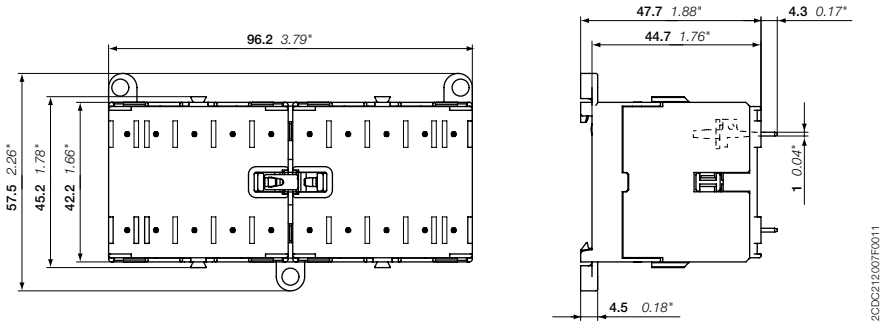
- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc
- control circuit: AC operated
  - low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- no auxiliary contact block permitted for mounting
- designed for soldering on PCB boards

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c		Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current $\theta \leq 40$ °C AC-1	3-phase motor rating 480 V	General use rating	50 Hz	60 Hz						
kW	A	hp		V AC	V AC						kg
VB6 mini reversing contactors											
4	12	3	300 V / 12 A	24	24	1 0	VB6-30-10-P-01	GJL1211909R0101		5	0.345
						0 1	VB6-30-01-P-01	GJL1211909R0011		5	0.345
				42	42	1 0	VB6-30-10-P-02	GJL1211909R0102		5	0.345
						0 1	VB6-30-01-P-02	GJL1211909R0012		5	0.345
				48	48	1 0	VB6-30-10-P-03	GJL1211909R0103		5	0.345
						0 1	VB6-30-01-P-03	GJL1211909R0013		5	0.345
				110 ... 127	110 ... 127	1 0	VB6-30-10-P-84	GJL1211909R8104		5	0.345
						0 1	VB6-30-01-P-84	GJL1211909R8014		5	0.345
				220 ... 240	220 ... 240	1 0	VB6-30-10-P-80	GJL1211909R8100		5	0.345
						0 1	VB6-30-01-P-80	GJL1211909R8010		5	0.345
				380 ... 415	380 ... 415	1 0	VB6-30-10-P-85	GJL1211909R8105		5	0.345
						0 1	VB6-30-01-P-85	GJL1211909R8015		5	0.345
VB7 mini reversing contactors											
5.5	12	5	600 V / 16 A	24	24	1 0	VB7-30-10-P-01	GJL1311909R0101		5	0.345
						0 1	VB7-30-01-P-01	GJL1311909R0011		5	0.345
				42	42	1 0	VB7-30-10-P-02	GJL1311909R0102		5	0.345
						0 1	VB7-30-01-P-02	GJL1311909R0012		5	0.345
				48	48	1 0	VB7-30-10-P-03	GJL1311909R0103		5	0.345
						0 1	VB7-30-01-P-03	GJL1311909R0013		5	0.345
				110 ... 127	110 ... 127	1 0	VB7-30-10-P-84	GJL1311909R8104		5	0.345
						0 1	VB7-30-01-P-84	GJL1311909R8014		5	0.345
				220 ... 240	220 ... 240	1 0	VB7-30-10-P-80	GJL1311909R8100		5	0.345
						0 1	VB7-30-01-P-80	GJL1311909R8010		5	0.345
				380 ... 415	380 ... 415	1 0	VB7-30-10-P-85	GJL1311909R8105		5	0.345
						0 1	VB7-30-01-P-85	GJL1311909R8015		5	0.345

Other types on request

Main dimensions mm, *inches*



VB6, VB7

VBC6, VBC7 3-pole mini reversing contactors – with soldering pins
4 to 5.5 kW
DC operated

VBC7-30-10-P

Description

VBC6, VBC7 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

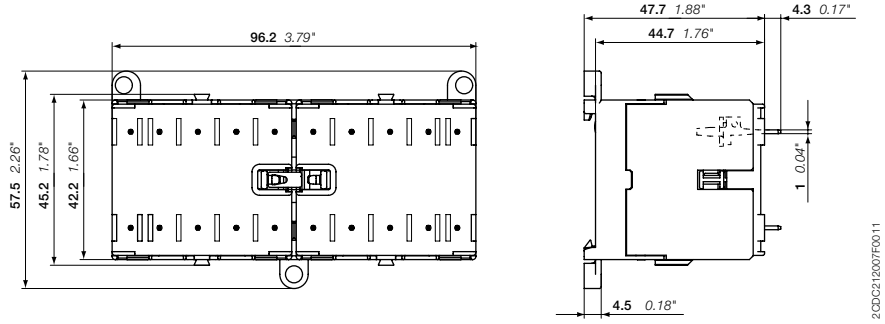
- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc
- control circuit: DC operated
  - low coil consumption (3.5 W at pull-in and at holding)
- hum-free coil
- no auxiliary contact block permitted for mounting
- designed for soldering on PCB boards

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3 kW	current θ ≤ 40 °C AC-1 A	3-phase motor rating 480 V hp	General use rating	V DC						kg
VBC6 mini reversing contactors										
4	12	3	300 V / 12 A	12	1 0	VBC6-30-10-P-07	GJL1213909R0107		5	0.345
					0 1	VBC6-30-01-P-07	GJL1213909R0017		5	0.345
				24	1 0	VBC6-30-10-P-01	GJL1213909R0101		5	0.345
					0 1	VBC6-30-01-P-01	GJL1213909R0011		5	0.345
				48	1 0	VBC6-30-10-P-06	GJL1213909R0106		5	0.345
					0 1	VBC6-30-06-P-06	GJL1213909R0016		5	0.345
				60	1 0	VBC6-30-10-P-03	GJL1213909R0103		5	0.345
					0 1	VBC6-30-01-P-03	GJL1213909R0013		5	0.345
				110 ... 125	1 0	VBC6-30-10-P-04	GJL1213909R0104		5	0.345
					0 1	VBC6-30-01-P-04	GJL1213909R0014		5	0.345
				220 ... 240	1 0	VBC6-30-10-P-05	GJL1213909R0105		5	0.345
					0 1	VBC6-30-01-P-05	GJL1213909R0015		5	0.345
VBC7 mini reversing contactors										
5.5	12	5	600 V / 16 A	12	1 0	VBC7-30-10-P-07	GJL1313909R0107		5	0.345
					0 1	VBC7-30-01-P-07	GJL1313909R0017		5	0.345
				24	1 0	VBC7-30-10-P-01	GJL1313909R0101		5	0.345
					0 1	VBC7-30-01-P-01	GJL1313909R0011		5	0.345
				48	1 0	VBC7-30-10-P-16	GJL1313909R1106		5	0.345
					0 1	VBC7-30-01-P-16	GJL1313909R1016		5	0.345
				60	1 0	VBC7-30-10-P-03	GJL1313909R0103		5	0.345
					0 1	VBC7-30-01-P-03	GJL1313909R0013		5	0.345
				110 ... 125	1 0	VBC7-30-10-P-04	GJL1313909R0104		5	0.345
					0 1	VBC7-30-01-P-04	GJL1313909R0014		5	0.345
				220 ... 240	1 0	VBC7-30-10-P-05	GJL1313909R0105		5	0.345
					0 1	VBC7-30-01-P-05	GJL1313909R0015		5	0.345

Other types on request

Main dimensions mm, *inches*



VBC6, VBC7

2CDC102026C0201

VB6A, VB7A 3-pole mini reversing contactors – with soldering pins
4 to 5.5 kW
AC operated – with safety blocking function

VB7-30-01-P

Description

VB6A, VB7A 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

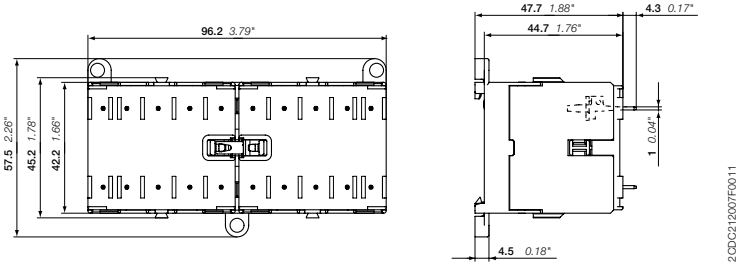
- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the 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.
- control circuit: AC operated
  - low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- no auxiliary contact block permitted for mounting
- designed for soldering on PCB boards

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c		Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3 kW	current θ ≤ 40 °C AC-1 A	3-phase motor rating 480 V hp	General use rating	50 Hz V AC	60 Hz V AC						kg
VB6A mini reversing contactors with safety blocking function											
4	12	3	300 V / 12 A	24	24	1 0	VB6A-30-10-P-01	GJL1211919R0101		5	0.345
						0 1	VB6A-30-01-P-01	GJL1211919R0011		5	0.345
				42	42	1 0	VB6A-30-10-P-02	GJL1211919R0102		5	0.345
						0 1	VB6A-30-01-P-02	GJL1211919R0012		5	0.345
				48	48	1 0	VB6A-30-10-P-03	GJL1211919R0103		5	0.345
						0 1	VB6A-30-01-P-03	GJL1211919R0013		5	0.345
				110 ... 127	110 ... 127	1 0	VB6A-30-10-P-84	GJL1211919R8104		5	0.345
						0 1	VB6A-30-01-P-84	GJL1211919R8014		5	0.345
				220 ... 240	220 ... 240	1 0	VB6A-30-10-P-80	GJL1211919R8100		5	0.345
						0 1	VB6A-30-01-P-80	GJL1211919R8010		5	0.345
				380 ... 415	380 ... 415	1 0	VB6A-30-10-P-85	GJL1211919R8105		5	0.345
						0 1	VB6A-30-01-P-85	GJL1211919R8015		5	0.345
VB7A mini reversing contactors with safety blocking function											
5.5	12	5	600 V / 16 A	24	24	1 0	VB7A-30-10-P-01	GJL1311919R0101		5	0.345
						0 1	VB7A-30-01-P-01	GJL1311919R0011		5	0.345
				42	42	1 0	VB7A-30-10-P-02	GJL1311919R0102		5	0.345
						0 1	VB7A-30-01-P-02	GJL1311919R0012		5	0.345
				48	48	1 0	VB7A-30-10-P-03	GJL1311919R0103		5	0.345
						0 1	VB7A-30-01-P-03	GJL1311919R0013		5	0.345
				110 ... 127	110 ... 127	1 0	VB7A-30-10-P-84	GJL1311919R8104		5	0.345
						0 1	VB7A-30-01-P-84	GJL1311919R8014		5	0.345
				220 ... 240	220 ... 240	1 0	VB7A-30-10-P-80	GJL1311919R8100		5	0.345
						0 1	VB7A-30-01-P-80	GJL1311919R8010		5	0.345
				380 ... 415	380 ... 415	1 0	VB7A-30-10-P-85	GJL1311919R8105		5	0.345
						0 1	VB7A-30-01-P-85	GJL1311919R8015		5	0.345

Other types on request

Main dimensions mm, *inches*



VB6A, VB7A

VBC7A 3-pole mini reversing contactors – with soldering pins
4 to 5.5 kW
DC operated – with safety blocking function

VBC7A-30-10-P

Description

VBC7A 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

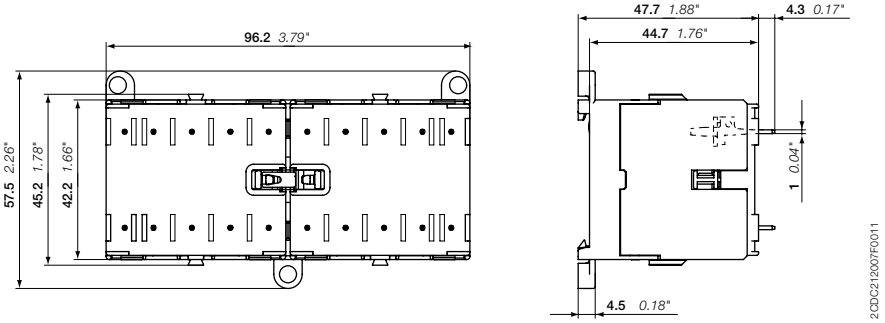
- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the 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.
- control circuit: AC operated
  - low coil consumption (3.5 W at pull-in and at holding)
- hum-free coil
- no auxiliary contact block permitted for mounting
- designed for soldering on PCB boards

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3 kW	current $\theta \leq 40$ °C AC-1 A	3-phase motor rating 480 V hp	General use rating	V DC						kg
VBC7A mini reversing contactors with safety blocking function										
5.5	12	5	600 V / 16 A	12	1 0	VBC7A-30-10-P-07	GJL1313919R0107		5	0.345
					0 1	VBC7A-30-01-P-07	GJL1313919R0017		5	0.345
				24	1 0	VBC7A-30-10-P-01	GJL1313919R0101		5	0.345
					0 1	VBC7A-30-01-P-01	GJL1313919R0011		5	0.345
				48	1 0	VBC7A-30-10-P-16	GJL1313919R1106		5	0.345
					0 1	VBC7A-30-01-P-16	GJL1313919R1016		5	0.345
				60	1 0	VBC7A-30-10-P-03	GJL1313919R0103		5	0.345
					0 1	VBC7A-30-01-P-03	GJL1313919R0013		5	0.345
				110 ... 125	1 0	VBC7A-30-10-P-04	GJL1313919R0104		5	0.345
					0 1	VBC7A-30-01-P-04	GJL1313919R0014		5	0.345
				220 ... 240	1 0	VBC7A-30-10-P-05	GJL1313919R0105		5	0.345
					0 1	VBC7A-30-01-P-05	GJL1313919R0015		5	0.345

Other types on request

Main dimensions mm, *inches*



VBC7A

2CDC102028C0201

K6 4-pole mini contactor relays – with soldering pins
AC operated

2CDC211022F0011

K6-22Z-P

Description

K6 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to 4 A.

These contactors are designed with:

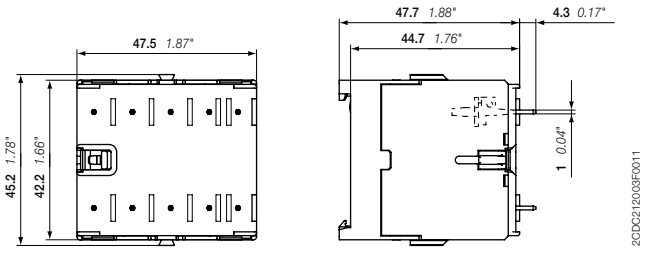
- 4-poles with various contact combinations
- control circuit: AC operated
  - low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact block for side mounting
- designed for soldering on PCB boards

Ordering details

Rated control circuit voltage U_c		Type	Order code		Pkg qty	Weight (1 pce)
50 Hz V AC	60 Hz V AC					kg
K6 4-pole mini contactor relays						
24	24	K6-22Z-P-01	GJH1211009R0221		10	0.170
42	42	K6-22Z-P-02	GJH1211009R0222		10	0.170
48	48	K6-22Z-P-03	GJH1211009R0223		10	0.170
110 ...127	110 ...127	K6-22Z-P-84	GJH1211009R8224		10	0.170
220 ... 240	220 ... 240	K6-22Z-P-80	GJH1211009R8220		10	0.170
380 ... 415	380 ... 415	K6-22Z-P-85	GJH1211009R8225		10	0.170
24	24	K6-31Z-P-01	GJH1211009R0311		10	0.170
42	42	K6-31Z-P-02	GJH1211009R0312		10	0.170
48	48	K6-31Z-P-03	GJH1211009R0313		10	0.170
110 ...127	110 ...127	K6-31Z-P-84	GJH1211009R8314		10	0.170
220 ... 240	220 ... 240	K6-31Z-P-80	GJH1211009R8310		10	0.170
380 ... 415	380 ... 415	K6-31Z-P-85	GJH1211009R8315		10	0.170
24	24	K6-40E-P-01	GJH1211009R0401		10	0.170
42	42	K6-40E-P-02	GJH1211009R0402		10	0.170
48	48	K6-40E-P-03	GJH1211009R0403		10	0.170
110 ...127	110 ...127	K6-40E-P-84	GJH1211009R8404		10	0.170
220 ... 240	220 ... 240	K6-40E-P-80	GJH1211009R8400		10	0.170
380 ... 415	380 ... 415	K6-40E-P-85	GJH1211009R8405		10	0.170

Other types on request

Main dimensions mm, *inches*



2CDC212003F0011

K6

2CDC102030C0201

KC6 4-pole mini contactor relays – with soldering pins
DC operated

KC6-22Z-P

KC6-31Z-P

Description

KC6 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to 4 A.

These contactors are designed with:

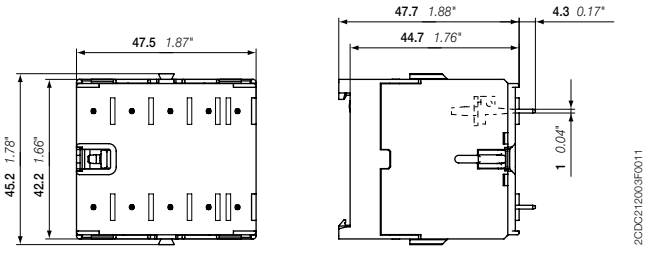
- 4-poles with various contact combinations
- control circuit: DC operated
  - low coil consumption (3.5 W at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact block for side mounting
- designed for soldering on PCB boards

Ordering details

Rated control circuit voltage U_c V DC	Type	Order code		Pkg qty	Weight (1 pce) kg
K6 4-pole mini contactor relays					
12	KC6-22Z-P-07	GJH1213009R0227		10	0.170
24	KC6-22Z-P-01	GJH1213009R0221		10	0.170
48	KC6-22Z-P-16	GJH1213009R1226		10	0.170
110 ... 125	KC6-22Z-P-04	GJH1213009R0224		10	0.170
220 ... 240	KC6-22Z-P-05	GJH1213009R0225		10	0.170
24	KC6-31Z-P-01	GJH1213009R0311		10	0.170
48	KC6-31Z-P-16	GJH1213009R1316		10	0.170
110 ... 125	KC6-31Z-P-04	GJH1213009R0314		10	0.170
220 ... 240	KC6-31Z-P-05	GJH1213009R0315		10	0.170
12	KC6-40E-P-07	GJH1213009R0407		10	0.170
24	KC6-40E-P-01	GJH1213009R0401		10	0.170
48	KC6-40E-P-16	GJH1213009R1406		10	0.170
110 ... 125	KC6-40E-P-04	GJH1213009R0404		10	0.170
220 ... 240	KC6-40E-P-05	GJH1213009R0405		10	0.170

Other types on request

Main dimensions mm, *inches*



KC6

2CDC102031C0201

BC6, BC7 3-pole interface mini contactors – with soldering pins
4 to 5.5 kW
DC operated

BC7-30-10-P

Description

BC6, BC7 3-pole interface mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with:

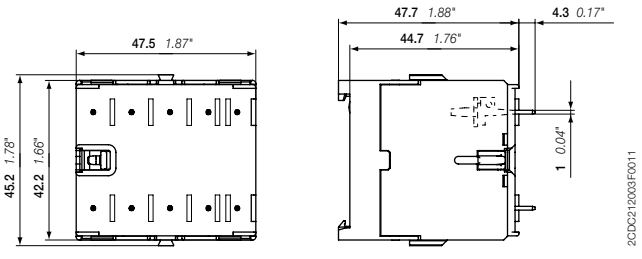
- 3 main poles and one built-in auxiliary contact
- control circuit: DC operated
  - low coil consumption (1.4 ... 2.4 W at pull-in and at holding)
- hum-free coil
- no auxiliary contact block permitted for mounting
- designed for soldering on PCB boards

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3 kW	current θ ≤ 40 °C AC-1 A	3-phase motor rating 480 V hp	General use rating	V DC						kg
DC operation 24 V / 1.4 W										
4	12	3	300 V / 12 A	24	1 0	BC6-30-10-P-1.4-81	GJL1213009R8101		10	0.170
					0 1	BC6-30-01-P-1.4-81	GJL1213009R8011		10	0.170
5.5	12	5	600 V / 16 A	24	1 0	BC7-30-10-P-1.4-81	GJL1313009R8101		10	0.170
					0 1	BC7-30-01-P-1.4-81	GJL1313009R8011		10	0.170
DC operation 17 ... 32 V / 2.4 W, I_{th} < 8 A										
4	12	3	300 V / 12 A	17 ... 32	1 0	BC6-30-10-P-2.4-51	GJL1213009R5101		10	0.170
					0 1	BC6-30-01-P-2.4-51	GJL1213009R5011		10	0.170
5.5	12	5	600 V / 16 A	17 ... 32	1 0	BC7-30-10-P-2.4-51	GJL1313009R5101		10	0.170
					0 1	BC7-30-01-P-2.4-51	GJL1313009R5011		10	0.170

Other types on request

Main dimensions mm, *inches*



BC6, BC7

KC6 4-pole interface mini contactor relays – with solderings pins
DC operated

KC6-31Z-P-1.4

3

Description

KC6 4-pole interface mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to 4 A.

These contactors are designed with:

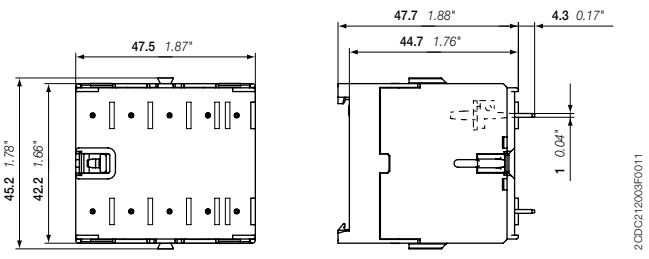
- 4-poles with various contact combinations
- control circuit: DC operated
  - low coil consumption (3.5 W at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact block for side mounting
- designed for soldering on PCB boards

Ordering details

Rated control circuit voltage U_c V DC	Type	Order code		Pkg qty	Weight (1 pce) kg
DC operation 24 V / 1.4 W					
24	KC6-31Z-P-1.4-81	GJH1213009R8311		10	0.170
24	KC6-40E-P-1.4-81	GJH1213009R8401		10	0.170
DC operation 17 ... 32 V / 2.4 W					
17 ... 32	KC6-31Z-P-2.4-51	GJH1213009R5311		10	0.170
17 ... 32	KC6-40E-P-2.4-51	GJH1213009R5401		10	0.170

Other types on request

Main dimensions mm, *inches*



KC6

2CDC102032C0201

B6, B7 3-pole mini contactors – with flat pin connection
4 to 5.5 kW
AC operated

B6-30-10-F

B7-30-10-F

Description

B6..F, B7..F 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with:

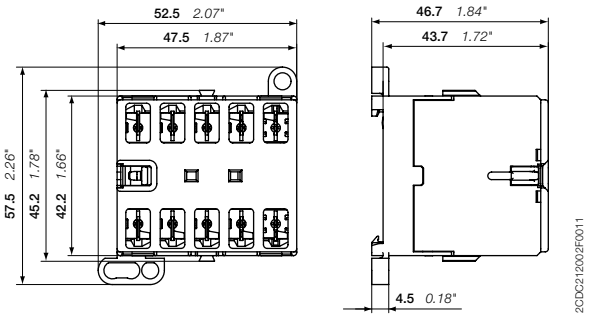
- flat pin connection for plug-in wiring and shake proven connection
- 3 main poles and one built-in auxiliary contact
- control circuit: AC operated
  - low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for side mounting
- designed for rail or wall mounting

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c		Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3 kW	current $\theta \leq 40$ °C AC-1 A	3-phase motor rating 480 V hp	General use rating	50 Hz V AC	60 Hz V AC						kg
B6 mini contactors											
4	20	3	300 V / 12 A	24	24	1 0	B6-30-10-F-01	GJL1211003R0101		10	0.170
						0 1	B6-30-01-F-01	GJL1211003R0011		10	0.170
				42	42	1 0	B6-30-10-F-02	GJL1211003R0102		10	0.170
						0 1	B6-30-01-F-02	GJL1211003R0012		10	0.170
				48	48	1 0	B6-30-10-F-03	GJL1211003R0103		10	0.170
						0 1	B6-30-01-F-03	GJL1211003R0013		10	0.170
				110 ... 127	110 ... 127	1 0	B6-30-10-F-84	GJL1211003R8104		10	0.170
						0 1	B6-30-01-F-84	GJL1211003R8014		10	0.170
				220 ... 240	220 ... 240	1 0	B6-30-10-F-80	GJL1211003R8100		10	0.170
						0 1	B6-30-01-F-80	GJL1211003R8010		10	0.170
				380 ... 415	380 ... 415	1 0	B6-30-10-F-85	GJL1211003R8105		10	0.170
						0 1	B6-30-01-F-85	GJL1211003R8015		10	0.170
B7 mini contactors											
5.5	20	5	600 V / 16 A	24	24	1 0	B7-30-10-F-01	GJL1311003R0101		10	0.170
						0 1	B7-30-01-F-01	GJL1311003R0011		10	0.170
				42	42	1 0	B7-30-10-F-02	GJL1311003R0102		10	0.170
						0 1	B7-30-01-F-02	GJL1311003R0012		10	0.170
				48	48	1 0	B7-30-10-F-03	GJL1311003R0103		10	0.170
						0 1	B7-30-01-F-03	GJL1311003R0013		10	0.170
				110 ... 127	110 ... 127	1 0	B7-30-10-F-84	GJL1311003R8104		10	0.170
						0 1	B7-30-01-F-84	GJL1311003R8014		10	0.170
				220 ... 240	220 ... 240	1 0	B7-30-10-F-80	GJL1311003R8100		10	0.170
						0 1	B7-30-01-F-80	GJL1311003R8010		10	0.170
				380 ... 415	380 ... 415	1 0	B7-30-10-F-85	GJL1311003R8105		10	0.170
						0 1	B7-30-01-F-85	GJL1311003R8015		10	0.170

Other types on request

Main dimensions mm, *inches*



B6, B7

BC6, BC7 3-pole mini contactors – with flat pin connection
4 to 5.5 kW
DC operated

BC6-30-10-F

BC7-30-10-F

Description

BC6, BC7 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with:

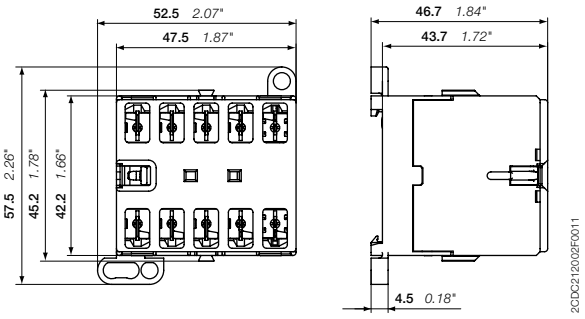
- flat pin connection for plug-in wiring and shake proven connection
- 3 main poles and one built-in auxiliary contact
- control circuit: DC operated
  - low coil consumption (3.5 W at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for side mounting
- designed for rail or wall mounting

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3 kW	current θ ≤ 40 °C AC-1 A	3-phase motor rating 480 V hp	General use rating	V DC						kg
BC6 mini contactors										
4	20	3	300 V / 12 A	12	1 0	BC6-30-10-F-07	GJL1213003R0107		10	0.170
					0 1	BC6-30-01-F-07	GJL1213003R0017		10	0.170
				24	1 0	BC6-30-10-F-01	GJL1213003R0101		10	0.170
					0 1	BC6-30-01-F-01	GJL1213003R0011		10	0.170
				48	1 0	BC6-30-10-F-16	GJL1213003R1106		10	0.170
					0 1	BC6-30-01-F-16	GJL1213003R1016		10	0.170
				60	1 0	BC6-30-10-F-03	GJL1213003R0103		10	0.170
					0 1	BC6-30-01-F-03	GJL1213003R0013		10	0.170
				110 ... 125	1 0	BC6-30-10-F-04	GJL1213003R0104		10	0.170
					0 1	BC6-30-01-F-04	GJL1213003R0014		10	0.170
				220 ... 240	1 0	BC6-30-10-F-05	GJL1213003R0105		10	0.170
					0 1	BC6-30-01-F-05	GJL1213003R0015		10	0.170
BC7 mini contactors										
5.5	20	5	600 V / 16 A	12	1 0	BC7-30-10-F-07	GJL1313003R0107		10	0.170
					0 1	BC7-30-01-F-07	GJL1313003R0017		10	0.170
				24	1 0	BC7-30-10-F-01	GJL1313003R0101		10	0.170
					0 1	BC7-30-01-F-01	GJL1313003R0011		10	0.170
				48	1 0	BC7-30-10-F-16	GJL1313003R1106		10	0.170
					0 1	BC7-30-01-F-16	GJL1313003R1016		10	0.170
				60	1 0	BC7-30-10-F-03	GJL1313003R0103		10	0.170
					0 1	BC7-30-01-F-03	GJL1313003R0013		10	0.170
				110 ... 125	1 0	BC7-30-10-F-04	GJL1313003R0104		10	0.170
					0 1	BC7-30-01-F-04	GJL1313003R0014		10	0.170
				220 ... 240	1 0	BC7-30-10-F-05	GJL1313003R0105		10	0.170
					0 1	BC7-30-01-F-05	GJL1313003R0015		10	0.170

Other types on request

Main dimensions mm, *inches*



BC6, BC7

2CDC102034C0201

VB7 3-pole mini reversing contactors – with flat pin connection
4 to 5.5 kW
AC operated

2CDC211005F0011

VB7-30-10-F

Description

VB7 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

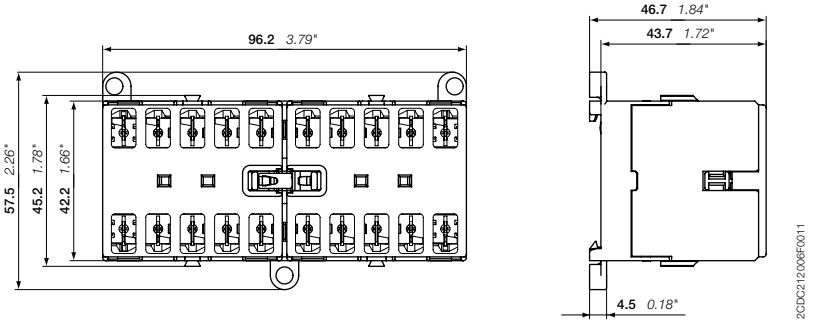
- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc.
- flat pin connection for plug-in wiring and shake proven connection
- control circuit: AC operated
  - low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- no auxiliary contact block permitted for mounting
- for rail and wall mounting

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c		Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3 kW	current θ ≤ 40 °C AC-1 A	3-phase motor rating 480 V hp	General use rating	50 Hz V AC	60 Hz V AC						kg
VB7 mini reversing contactors											
5.5	20	5	600 V / 16 A	24	24	1 0	VB7-30-10-F-01	GJL1311903R0101		5	0.345
						0 1	VB7-30-01-F-01	GJL1311903R0011		5	0.345
				42	42	1 0	VB7-30-10-F-02	GJL1311903R0102		5	0.345
						0 1	VB7-30-01-F-02	GJL1311903R0012		5	0.345
				48	48	1 0	VB7-30-10-F-03	GJL1311903R0103		5	0.345
						0 1	VB7-30-01-F-03	GJL1311903R0013		5	0.345
				110 ... 127	110 ... 127	1 0	VB7-30-10-F-84	GJL1311903R8104		5	0.345
						0 1	VB7-30-01-F-84	GJL1311903R8014		5	0.345
				220 ... 240	220 ... 240	1 0	VB7-30-10-F-80	GJL1311903R8100		5	0.345
						0 1	VB7-30-01-F-80	GJL1311903R8010		5	0.345
				380 ... 415	380 ... 415	1 0	VB7-30-10-F-85	GJL1311903R8105		5	0.345
						0 1	VB7-30-01-F-85	GJL1311903R8015		5	0.345

Other types on request

Main dimensions mm, *inches*



VB7

2CDC102035C0201

VBC7 3-pole mini reversing contactors – with flat pin connection
4 to 5.5 kW
DC operated

2CDC211004F0011

VBC7-30-10-F

Description

VBC7 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

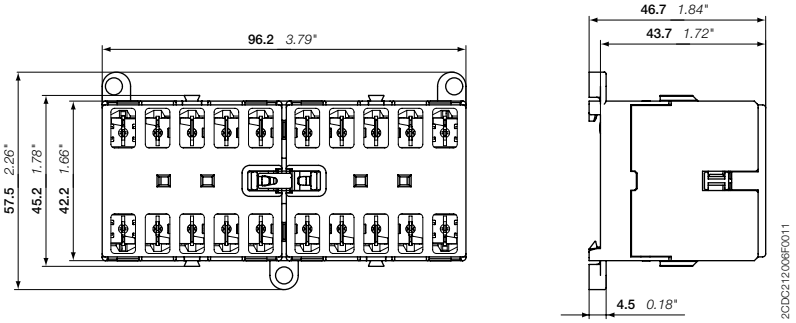
- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc
- flat pin connection for plug-in wiring and shake proven connection
- control circuit: DC operated
  - low coil consumption (3.5 W at pull-in and at holding)
- hum-free coil
- no auxiliary contact block permitted for mounting
- for rail and wall mounting

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3 kW	current θ ≤ 40 °C AC-1 A	3-phase motor rating 480 V hp	General use rating	V DC						kg
VBC7 mini reversing contactors										
5.5	20	5	600 V / 16 A	12	1 0	VBC7-30-10-F-07	GJL1313903R0107		5	0.345
					0 1	VBC7-30-01-F-07	GJL1313903R0017		5	0.345
				24	1 0	VBC7-30-10-F-01	GJL1313903R0101		5	0.345
					0 1	VBC7-30-01-F-01	GJL1313903R0011		5	0.345
				48	1 0	VBC7-30-10-F-16	GJL1313903R1106		5	0.345
					0 1	VBC7-30-01-F-16	GJL1313903R1016		5	0.345
				60	1 0	VBC7-30-10-F-03	GJL1313903R0103		5	0.345
					0 1	VBC7-30-01-F-03	GJL1313903R0013		5	0.345
				110 ... 125	1 0	VBC7-30-10-F-04	GJL1313903R0104		5	0.345
					0 1	VBC7-30-01-F-04	GJL1313903R0014		5	0.345
				220 ... 240	1 0	VBC7-30-10-F-05	GJL1313903R0105		5	0.345
					0 1	VBC7-30-01-F-05	GJL1313903R0015		5	0.345

Other types on request

Main dimensions mm, *inches*



VBC7

2CDC102036C0201

VB7A 3-pole mini reversing contactors – with flat pin connection
4 to 5.5 kW
AC operated – with safety blocking function

VB7A-30-10-F

Description

VB7A 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

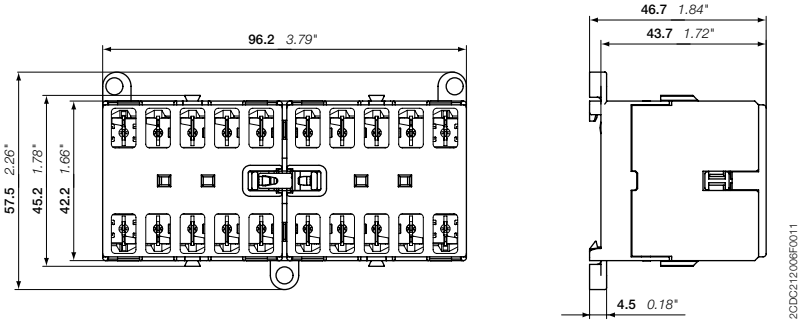
- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the 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.
- flat pin connection for plug-in wiring and shake proven connection
- control circuit: AC operated
  - low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- no auxiliary contact block permitted for mounting
- for rail and wall mounting

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c		Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating	50 Hz	60 Hz						
kW	A	hp		V AC	V AC					pce	kg
VB7A mini reversing contactors with safety blocking function											
5.5	20	5	600 V / 16 A	24	24	1 0	VB7A-30-10-F-01	GJL1311913R0101		5	0.345
						0 1	VB7A-30-01-F-01	GJL1311913R0011		5	0.345
				42	42	1 0	VB7A-30-10-F-02	GJL1311913R0102		5	0.345
						0 1	VB7A-30-01-F-02	GJL1311913R0012		5	0.345
				48	48	1 0	VB7A-30-10-F-03	GJL1311913R0103		5	0.345
						0 1	VB7A-30-01-F-03	GJL1311913R0013		5	0.345
				110 ... 127	110 ... 127	1 0	VB7A-30-10-F-84	GJL1311913R8104		5	0.345
						0 1	VB7A-30-01-F-84	GJL1311913R8014		5	0.345
				220 ... 240	220 ... 240	1 0	VB7A-30-10-F-80	GJL1311913R8100		5	0.345
						0 1	VB7A-30-01-F-80	GJL1311913R8010		5	0.345
				380 ... 415	380 ... 415	1 0	VB7A-30-10-F-85	GJL1311913R8105		5	0.345
						0 1	VB7A-30-01-F-85	GJL1311913R8015		5	0.345

Other types on request

Main dimensions mm, *inches*



VB7A

VBC7A 3-pole mini reversing contactors – with flat pin connection
4 to 5.5 kW
DC operated – with safety blocking function

VBC7A-30-10-F

3

Description

VBC7A 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

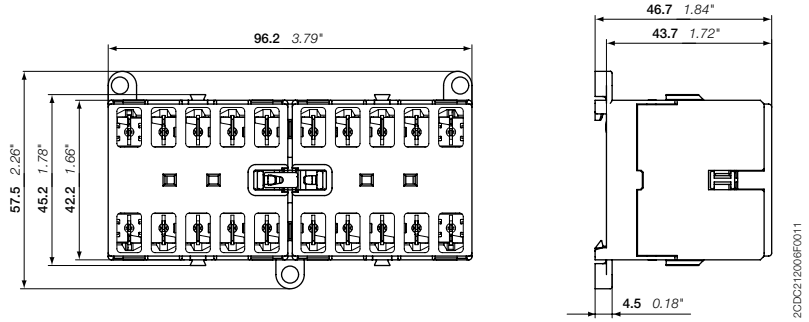
- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the 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.
- flat pin connection for plug-in wiring and shake proven connection
- control circuit: DC operated
  - low coil consumption (3.5 W at pull-in and at holding)
- hum-free coil
- no auxiliary contact block permitted for mounting
- for rail and wall mounting

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3 kW	current $\theta \leq 40$ °C AC-1 A	3-phase motor rating 480 V hp	General use rating	V DC						kg
VBC7A mini reversing contactors with safety blocking function										
5.5	20	5	600 V / 16 A	12	1 0	VBC7A-30-10-F-07	GJL1313913R0107		5	0.345
					0 1	VBC7A-30-01-F-07	GJL1313913R0017		5	0.345
				24	1 0	VBC7A-30-10-F-01	GJL1313913R0101		5	0.345
					0 1	VBC7A-30-01-F-01	GJL1313913R0011		5	0.345
				48	1 0	VBC7A-30-10-F-16	GJL1313913R1106		5	0.345
					0 1	VBC7A-30-01-F-16	GJL1313913R1016		5	0.345
				60	1 0	VBC7A-30-10-F-03	GJL1313913R0103		5	0.345
					0 1	VBC7A-30-01-F-03	GJL1313913R0013		5	0.345
				110 ... 125	1 0	VBC7A-30-10-F-04	GJL1313913R0104		5	0.345
					0 1	VBC7A-30-01-F-04	GJL1313913R0014		5	0.345
				220 ... 240	1 0	VBC7A-30-10-F-05	GJL1313913R0105		5	0.345
					0 1	VBC7A-30-01-F-05	GJL1313913R0015		5	0.345

Other types on request

Main dimensions mm, *inches*



VBC7A

2CDC102038C0201

BC6, BC7 3-pole interface mini contactors – with flat pin connection
4 to 5.5 kW
DC operated

2CDC211041F0011

BC6-30-10-F

2CDC211024F0011

BC7-30-10-F

Description

BC6, BC7 3-pole interface mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with:

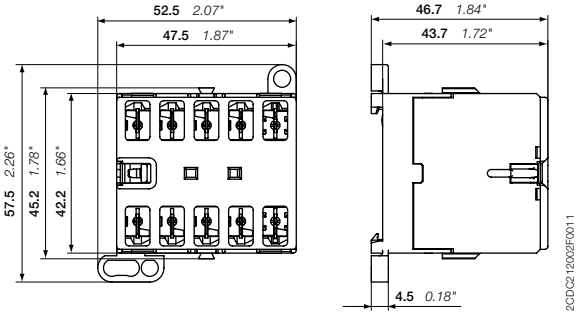
- flat pin connection for plug-in wiring and shake proven connection
- 3 main poles and one built-in auxiliary contact
- control circuit: DC operated
  - low coil consumption (1.4 ... 2.4 W at pull-in and at holding)
- hum-free coil
- no auxiliary contact block permitted for mounting
- designed for rail or wall mounting

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3 kW	current θ ≤ 40 °C AC-1 A	3-phase motor rating 480 V hp	General use rating	V DC						kg
DC operation 24 V / 1.4 W										
4	20	3	300 V / 12 A	24	1 0	BC6-30-10-F-1.4-81	GJL1213003R8101		10	0.170
					0 1	BC6-30-01-F-1.4-81	GJL1213003R8011		10	0.170
5.5	20	5	600 V / 16 A	24	1 0	BC7-30-10-F-1.4-81	GJL1313003R8101		10	0.170
					0 1	BC7-30-01-F-1.4-81	GJL1313003R8011		10	0.170
DC operation 17 ... 32 V / 2.4 W										
4	20	3	300 V / 12 A	17 ... 32	1 0	BC6-30-10-F-2.4-51	GJL1213003R5101		10	0.170
					0 1	BC6-30-01-F-2.4-51	GJL1213003R5011		10	0.170
5.5	20	5	600 V / 16 A	17 ... 32	1 0	BC7-30-10-F-2.4-51	GJL1313003R5101		10	0.170
					0 1	BC7-30-01-F-2.4-51	GJL1313003R5011		10	0.170

Other types on request

Main dimensions mm, *inches*



BC6, BC7

2CDC102039C0201

K6 4-pole mini contactor relays – with flat pin connection
AC operated

K6-22Z-F

Description

K6 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to 4 A.

These contactors are designed with:

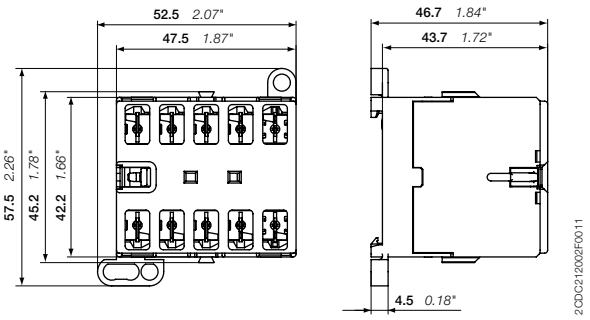
- flat pin connection for plug-in wiring and shake proven connection
- 4-poles with various contact combinations
- control circuit: AC operated
  - low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for side mounting
- for rail and wall mounting
- add-on auxiliary contact blocks for side mounting

Ordering details

Rated control circuit voltage U_c		Type	Order code		Pkg qty	Weight (1 pce)
50 Hz	60 Hz					
V AC	V AC					kg
K6 4-pole mini contactor relays						
24	24	K6-22Z-F-01	GJH1211003R0221		10	0.170
42	42	K6-22Z-F-02	GJH1211003R0222		10	0.170
48	48	K6-22Z-F-03	GJH1211003R0223		10	0.170
110 ...127	110 ...127	K6-22Z-F-84	GJH1211003R8224		10	0.170
220 ... 240	220 ... 240	K6-22Z-F-80	GJH1211003R8220		10	0.170
380 ... 415	380 ... 415	K6-22Z-F-85	GJH1211003R8225		10	0.170
24	24	K6-31Z-F-01	GJH1211003R0311		10	0.170
42	42	K6-31Z-F-02	GJH1211003R0312		10	0.170
48	48	K6-31Z-F-03	GJH1211003R0313		10	0.170
110 ...127	110 ...127	K6-31Z-F-84	GJH1211003R8314		10	0.170
220 ... 240	220 ... 240	K6-31Z-F-80	GJH1211003R8310		10	0.170
380 ... 415	380 ... 415	K6-31Z-F-85	GJH1211003R8315		10	0.170
24	24	K6-40E-F-01	GJH1211003R0401		10	0.170
42	42	K6-40E-F-02	GJH1211003R0402		10	0.170
48	48	K6-40E-F-03	GJH1211003R0403		10	0.170
110 ...127	110 ...127	K6-40E-F-84	GJH1211003R8404		10	0.170
220 ... 240	220 ... 240	K6-40E-F-80	GJH1211003R8400		10	0.170
380 ... 415	380 ... 415	K6-40E-F-85	GJH1211003R8405		10	0.170

Other types on request

Main dimensions mm, *inches*



K6

2CDC102040C0201

KC6 4-pole mini contactor relays – with flat pin connection
DC operated

2CDC211029F0011

KC6-22Z-F-01

Description

K6 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to 4 A.

These contactors are designed with:

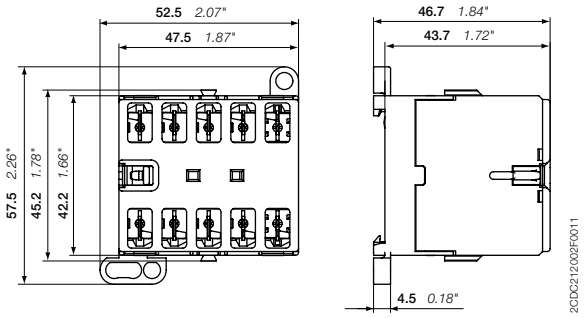
- flat pin connection for plug-in wiring and shake proven connection
- 4-poles with various contact combinations
- control circuit: AC operated
  - low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for side mounting
- for rail and wall mounting

Ordering details

Rated control circuit voltage U_c V DC	Type	Order code		Pkg qty	Weight (1 pce) kg
K6 4-pole mini contactor relays					
12	KC6-22Z-F-07	GJH1213003R0227		10	0.170
24	KC6-22Z-F-01	GJH1213003R0221		10	0.170
48	KC6-22Z-F-16	GJH1213003R1226		10	0.170
110 ... 125	KC6-22Z-F-04	GJH1213003R0224		10	0.170
220 ... 240	KC6-22Z-F-05	GJH1213003R0225		10	0.170
12	KC6-31Z-F-07	GJH1213003R0317		10	0.170
24	KC6-31Z-F-01	GJH1213003R0311		10	0.170
48	KC6-31Z-F-16	GJH1213003R1316		10	0.170
110 ... 125	KC6-31Z-F-04	GJH1213003R0314		10	0.170
220 ... 240	KC6-31Z-F-05	GJH1213003R0315		10	0.170
24	KC6-40E-F-01	GJH1213003R0401		10	0.170
48	KC6-40E-F-16	GJH1213003R1406		10	0.170
110 ... 125	KC6-40E-F-04	GJH1213003R0404		10	0.170
220 ... 240	KC6-40E-F-05	GJH1213003R0405		10	0.170

Other types on request

Main dimensions mm, *inches*



2CDC212002F0011

KC6

2CDC102041C0201

KC6 4-pole interface mini contactor relays – with flat pin connection
DC operated

KC6-31Z-F-05

3

Description

KC6 4-pole interface mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to 4 A.

These contactors are designed with:

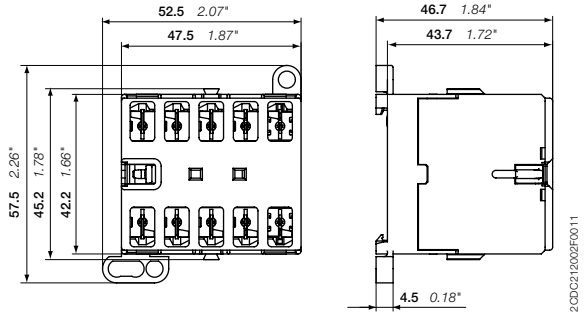
- flat pin connection for plug-in wiring and shake proven connection
- 4-poles with various contact combinations
- control circuit: AC operated
  - low coil consumption (1.4 ... 2.4 W at pull-in and at holding)
- hum-free coil
- no auxiliary contact block permitted for mounting
- for rail and wall mounting
- no add-on auxiliary contact blocks possible

Ordering details

Rated control circuit voltage U_c V DC	Type	Order code		Pkg qty	Weight (1 pce) kg
DC operation 24 V / 1.4 W					
24	KC6-31Z-F-1.4-81	GJH1213003R8311		10	0.170
24	KC6-40E-F-1.4-81	GJH1213003R8401		10	0.170
DC operation 17 ... 32 V / 2.4 W					
17 ... 32	KC6-31Z-F-51	GJH1213003R5311		10	0.170
17 ... 32	KC6-40E-F-51	GJH1213003R5401		10	0.170

Other types on request

Main dimensions mm, *inches*



KC6

2CDC102045C0201

B6, B7, BC6, BC7 3- and 4-pole mini contactors
VB6, VB7, VBC6, VBC7 3-pole mini reversing contactors
Accessories

2CDC211012F0010

CAF6-11N

2CDC211007F0010

RV-BC6/250

2CDC211008F0010

CA6-11E

2CDC211018F0011

CA6-11E-P

2CDC211020F0011

CA6-11E-F

SST27792R

BSM6-30

2CDC231012F0011

T16-16

Ordering details

Suitable for	Auxiliary contacts	Type	Order code		Pkg qty	Weight (1 pce) kg
Front mounted instantaneous auxiliary contact blocks (not allowed for mounting on TBC, B6S, B7S, interface contactors) [1]						
B6-, B7-40-00, BC6-, BC7-40-00 VB6, VB7, VBC6, VBC7, VB6A, VB7A VBC6A, VBC7A	1 1	CAF6-11E	GJL1201330R0002		10	0.020
	2 0	CAF6-20E	GJL1201330R0006		10	0.020
	0 2	CAF6-02E	GJL1201330R0010		10	0.020
B6-, B7-30-10, BC6-, BC7-30-10 VB6, VB7, VBC6, VBC7, VB6A, VB7A VBC6A, VBC7A	1 1	CAF6-11M	GJL1201330R0003		10	0.020
	2 0	CAF6-20M	GJL1201330R0007		10	0.020
	0 2	CAF6-02M	GJL1201330R0011		10	0.020
B6-, B7-30-01, BC6-, BC7-30-01 VB6, VB7, VBC6, VBC7, VB6A, VB7A VBC6A, VBC7A	1 1	CAF6-11N	GJL1201330R0004		10	0.020
	2 0	CAF6-20N	GJL1201330R0008		10	0.020
	0 2	CAF6-02N	GJL1201330R0012		10	0.020
Side mounted instantaneous auxiliary contact block [1]						
B6-, B7-40-00, BC6-, BC7-40-00	1 1	CA6-11E	GJL1201317R0002		10	0.030
B6-, B7-30-10, BC6-, BC7-30-10	1 1	CA6-11M	GJL1201317R0003		10	0.030
B6-, B7-30-01, BC6-, BC7-30-01	1 1	CA6-11N	GJL1201317R0004		10	0.030
Side mounted instantaneous auxiliary contact block with soldering pins [2]						
B6-, B7-40-00-P, BC6-,BC7-40-00-P	1 1	CA6-11E-P	GJL1201319R0002		10	0.025
B6-, B7-30-10-P, BC6-, BC7-30-10-P	1 1	CA6-11M-P	GJL1201319R0003		10	0.025
B6-, B7-30-01-P, BC6-, BC7-30-01-P	1 1	CA6-11N-P	GJL1201319R0004		10	0.025
Side mounted instantaneous auxiliary contact block with flat pin connection [2]						
B6-, B7-40-00-F, BC6-,BC7-40-00-F	1 1	CA6-11E-F	GJL1201318R0002		10	0.025
B6-, B7-30-10-F, BC6-, BC7-30-10-F	1 1	CA6-11M-F	GJL1201318R0003		10	0.025
B6-, B7-30-01-F, BC6-, BC7-30-01-F	1 1	CA6-11N-F	GJL1201318R0004		10	0.025
Soldering receptacle (I_{th} = 10 A, AC-3: 500 V / 8 A, 690 V / 3.5 A, UL: 300 V / 8 A)						
B6, B7, BC6, BC7		LB6	GJL1201902R0001		10	0.020
2-pole aux.contact blocks CA		LB6-CA	GJL1201903R0001		10	0.010

[1] CA6 and CAF6 must not be fitted simultaneously.

Suitable for	Rated control circuit voltage U_c V DC	Connection type	Type	Order code		Pkg qty	Weight (1 pce) kg
Surge suppressors for contactor coils							
BC6, BC7	24 ... 60	Cable lug	RV-BC6/60	GHV2501902R0002		10	0.005
	50 ... 250	Cable lug	RV-BC6/250	GHV2501903R0002		10	0.005

Note: Mini contactors for AC operation have an integrated protective circuit

Connecting links with manual motor starters					
To connect B..VB.. mini contactor to MS116, MS132	BEA7/132	1SBN080906R1002		10	0.013
To connect B..VB.. mini contactors to MS325	BEA7/325	1SBN080906R1001		10	0.021
Connection sets for reversing contactors					
VB6, VB7, VBC6, VBC7, VB6A, VB7A, VBC6A, VBC7A, cross-section 1.8 mm²	BSM6-30	GJL1201908R0001		10	0.010
Parallel connecting link					
B6, B7, BC6, BC7	LP6	GJL1201907R0001		100	0.009
Cover cap, transparent fitting to DIN rail design, sealable					
B6, B7, BC6, BC7	LT6-B	GJL1201906R0001		10	0.015
Plastic label for markings					
B6, B7, BC6, BC7	BA5-50	1SBN110000R1000		50	0.020
Thermal overload relays					
	T16 (see "Thermal overload relays" chapter)			1	0.100

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K6, KC6 4-pole mini contactor relays
Accessories

2CDC211019F0011

CAF6-11K

2CDC211009F0010

CA6-11K

2CDC211011F0010

CA6-11K-P

2CDC211010F0010

CA6-11K-F

2CDC211006F0010

LT6-B

2CDC211007F0010

RV-BC6/250

Ordering details

Suitable for	Auxiliary contacts	Type	Order code		Pkg qty	Weight (1 pce) kg
Front mounted instantaneous auxiliary contact blocks [1]						
K6, KC6	1 1	CAF6-11K	GJL1201330R0001		10	0.020
	2 0	CAF6-20K	GJL1201330R0005		10	0.020
	0 2	CAF6-02K	GJL1201330R0009		10	0.020
Side mounted instantaneous auxiliary contact block [1]						
K6, KC6	1 1	CA6-11K	GJL1201317R0001		10	0.030
Side mounted instantaneous auxiliary contact block with soldering pins [2]						
K6..P, KC6..P	1 1	CA6-11K-P	GJL1201319R0001		10	0.025
Side mounted instantaneous auxiliary contact block with flat pin connection [2]						
K6..F, KC6..F	1 1	CA6-11K-F	GJL1201318R0001		10	0.025
Soldering receptacle (I_e < 8 A)						
K6, KC6		LB6	GJL1201902R0001		10	0.020
2-pole auxiliary contact blocks CA		LB6-CA	GJL1201903R0001		10	0.010

[1] CA6 and CAF6 must not be fitted simultaneously.

Suitable for	Rated control circuit voltage U_c V DC	Connection type	Type	Order code		Pkg qty	Weight (1 pce) kg
Surge suppressors for contactor coils							
KC6	24 ... 60	Cable lug	RV-BC6/60	GHV2501902R0002		10	0.005
	50 ... 250	Cable lug	RV-BC6/250	GHV2501903R0002		10	0.005

Note: Mini contactors for AC operation have an integrated protective circuit

Cover cap, transparent fitting to DIN rail design, sealable							
K6, KC6			LT6-B	GJL1201906R0001		10	0.015

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B6, B7, BC6, BC7, TBC7 3- and 4-pole mini contactors
VB6, VB7, VBC6, VBC7 3- and 4-pole mini reversing contactors
Technical data

Main pole – Utilization characteristics according to IEC

Contactor types	AC operated	B6, VB6, VB6A	B7, VB7, VB7A
	DC operated	BC6, VBC6, VBC6A	BC7, TBC7, VBC7, VBC7A
Standards		IEC/EN 60947-1, IEC/EN 60947-4-1	
Rated operational voltage $U_{e\,max}$		690 V AC	
Rated frequency (without derating)		DC or 50 / 60 Hz	
Conventional free-air thermal current I_{th} acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C, with conductor cross-sectional area		Screw terminal types: 20 A Flat pin types: 20 A Soldering pin types: 12 A	
AC-1 Utilization category for air temperature close to contactor θ ≤ 40 °C			
I_e / Rated operational current AC-1 $U_{e\,max}$ ≤ 690 V, 50/60 Hz	220-230-240 V	Screw terminal types: 20 A Flat pin types: 20 A Soldering pin types: 12 A	
	380-400 V	Screw terminal types: 20 A Flat pin types: 20 A Soldering pin types: 12 A	
	440 V	Screw terminal types: 20 A Flat pin types: 20 A Soldering pin types: 12 A	
	500 V	12 A	
	690 V	6 A	
AC-1 Utilization category for air temperature close to contactor θ ≤ 55 °C			
I_e / Rated operational current AC-1 $U_{e\,max}$ ≤ 690 V, 50/60 Hz	220-230-240 V	Screw terminal types: 16 A Flat pin types: 16 A Soldering pin types: 12 A	
	380-400 V	Screw terminal types: 16 A Flat pin types: 16 A Soldering pin types: 12 A	
	440 V	Screw terminal types: 16 A Flat pin types: 16 A Soldering pin types: 12 A	
	500 V	12 A	
	690 V	6 A	
AC-3 Utilization category for air temperature close to contactor θ ≤ 55 °C			
I_e / Rated operational current AC-3	220 / 230 / 240 V	8.9 / 8.5 / 8.1 A	11.8 / 11.3 / 10.8 A
3-phase motors	380 / 400 V	8.9 / 8.5 A	12.1 / 11.5 A
	440 V	7.4 A	10.1 A
	500 V	6.8 A	9.2 A
	690 V	3.8 A	3.8 A
Rated operational power AC-3	220-230-240 V	2.2 kW	3 kW
1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors	380-400 V	4 kW	5.5 kW
	440 V	4 kW	5.5 kW
	500 V	4 kW	5.5 kW
	690 V	3 kW	3 kW
DC-1 Utilization category for air temperature close to contactor θ ≤ 55 °C			
I_e / Rated operational current DC-1	110 V	-	4 A
	220 V	-	0.6 A
DC-3 Utilization category for air temperature close to contactor θ ≤ 55 °C			
I_e / Rated operational current DC-3	110 V	-	1.5 A
	220 V	-	0.25 A
DC-5 Utilization category for air temperature close to contactor θ ≤ 55 °C			
I_e / Rated operational current DC-5	110 V	-	0.4 A
	220 V	-	0.2 A
Rated making capacity AC-3		10 x I_e AC-3 acc. to IEC 60947-4-1	
Rated breaking capacity AC-3		8 x I_e AC-3 acc. to IEC 60947-4-1	
Short-circuit protection device for contactors without thermal O/L relay - motor protection excluded U_e ≤ 500 V AC - fuse type gG		Type 1: 25 A / Type 2: 25 A	
Rated short-time withstand current I_{cw} at 40 °C ambient temperature, in free air from a cold state	10 s	64 A	96 A
Maximum breaking capacity cos φ = 0.45	at 400 V	64 A	96 A
Maximum electrical switching frequency	AC-1	300 cycles/h	
	AC-3	600 cycles/h	
	DC-1, DC-3, DC-5	600 cycles/h	

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B6, B7, BC6, BC7, TBC7 3- and 4-pole mini contactors
VB6, VB7, VBC6, VBC7 3- and 4-pole mini reversing contactors
Technical data

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

Contactor types		AC operated	B6, VB6, VB6A	B7, VB7, VB7A
		DC operated	BC6, VBC6, VBC6A	BC7, TBC7, VBC7, VBC7A
Standards			UL 508, CSA C22.2 N°14	
Maximum operational voltage			600 V	
UL/CSA general use rating			12 A / 300 V	16 A / 600 V
UL/CSA maximum 1-phase motor rating				
	Full load current	120 V AC	5.8 A	13.8 A
		240 V AC	4.9 A	10.0 A
	Horse power rating	120 V AC	0.25 hp	0.75 hp
		240 V AC	0.5 hp	1.5 hp
UL/CSA maximum 3-phase motor rating				
	Full load current [1]	200 / 208 V AC	4.8 / 4.6 A	7.8 / 10.6 A
		220-240 V AC	6.8 A	9.6 A
		440-480 V AC	4.8 A	7.6 A
		550-600 V AC	1.7 A	6.1 A
	Horse power rating [1]	200 / 208 V AC	1 hp	2 / 3 hp
		220-240 V AC	2 hp	3 hp
		440-480 V AC	3 hp	5 hp
		550-600 V AC	1 hp	5 hp
Resistive Heating		300 V per pole	8 A	8 A
Incandescent Lamps		300 V per pole	6 A	6 A
Fluorescent Lamps		300 V per pole	8.4 A	8.4 A
Short-circuit protection device for contactors				
without thermal overload relay - motor protection excluded				
	Fuse rating	600 V	40 A	
	Fuse type, 600 V	600 V	Class J	
Maximum electrical switching frequency				
	For resitive loads AC-1		300 cycles/h	
	For motor loads AC-3		600 cycles/h	

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

General technical data

Contactor types		AC operated	B6, VB6, VB6A	B7, VB7, VB7A
		DC operated	BC6, VBC6, VBC6A	BC7, TBC7, VBC7, VBC7A
Rated insulation voltage U_i				
	acc. to IEC 60947-4-1		690 V	
	acc. to UL/CSA		600 V	
Rated impulse withstand voltage U_{imp}			6 kV	
Ambient air temperature, close to contactor				
	Operation	Fitted with thermal overload relay	-25 ... +50 °C	
		Without thermal overload relay	-25 ... +55 °C	
	Storage		-40 ... +80 °C	
Climatic withstand			Acc. to IEC 60947-1 Annex Q	
Maximum operating altitude (without derating)			2000 m	
Mechanical durability			10^7 operating cycles	
Resistance to shock			Half-sine	
	acc. IEC 60068-2-27 and EN 60068-2-27		15 g / 11 ms	
	acc. to IEC/EN 60947-1 Annex. Q		Category E	
Resistance to vibrations			Sinusoidal	
	acc. IEC 60068-2-27 and EN 60068-2-27		5 g / 3 ... 150 Hz	
	acc. to IEC/EN 60947-1 Annex. Q		Category E	

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B6, B7, BC6, BC7, TBC7 3- and 4-pole mini contactors
VB6, VB7, VBC6, VBC7 3- and 4-pole mini reversing contactors
Technical data

Magnet system characteristics for B6, B7 contactors

Contactor types		**AC operated**	B6, VB6	B7, VB7
Coil operating limits acc. to IEC 60947-4-1		**AC supply**	0.85 ... 1.1 x U_c	
AC control voltage				
	Rated control circuit voltage U_c		See ordering tables	
	Coil consumption	Average pull-in value	3.5 VA / 3.5 W	
		Average holding value	3.5 VA / 3.5 W	
Drop-out voltage			0.20 ... 0.75 % of U_c	

Magnet system characteristics for BC6, BC7 contactors

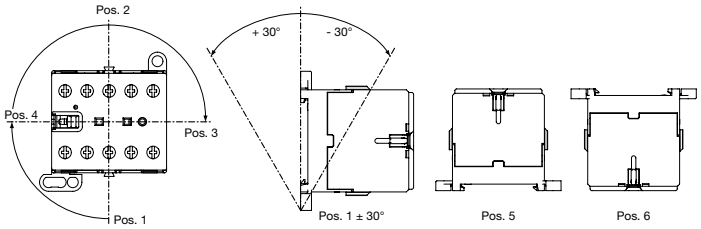
Contactor types		**DC operated**	BC6, VBC6	BC7, VBC7
Coil operating limits acc. to IEC 60947-4-1		**DC supply**	0.85 ... 1.1 x U_c	
AC control voltage				
	Rated control circuit voltage U_c		See ordering tables	
	Coil consumption [1]	Average pull-in value	3.5 VA / 3.5 W	
		Average holding value	3.5 VA / 3.5 W	
Drop-out voltage in % of $U_{c\,min}$			0.10 ... 0.75 x U_c	

[1] Interface mini-contactors: see coil consumption on ordering details pages

Magnet system characteristics for TBC7 contactors

Contactor types		**DC operated**	TBC7
Coil operating limits acc. to IEC 60947-4-1		**DC supply**	Wide range voltage supply see ordering tables, U_{Cmin} ... U_{Cmax}
AC control voltage			
	Rated control circuit voltage U_c		See ordering tables
	Coil consumption	Average pull-in value	5 VA / 5 W
		Average holding value	5 VA / 5 W
Drop-out voltage in % of $U_{c\,min}$			≤ 0.20 % of U_{Cmin}

Mounting characteristics and conditions for use

Contactor types		**AC operated**	B6, VB6, VB6A	B7, VB7, VB7A
		DC operated	BC6, VBC6, VBC6A	BC7, TBC7, VBC7, VBC7A
Mounting positions				
Mounting distances			The contactors can be assembled side by side	
Fixing				
	On rail acc. to IEC 60715, EN 60715		35 x 7.5 mm or 35 x 15 mm	
	By screws (not supplied)		2 x M4 screws placed diagonally	

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B6, B7, BC6, BC7, TBC7 3- and 4-pole mini contactors
VB6, VB7, VBC6, VBC7 3- and 4-pole mini reversing contactors
Technical data

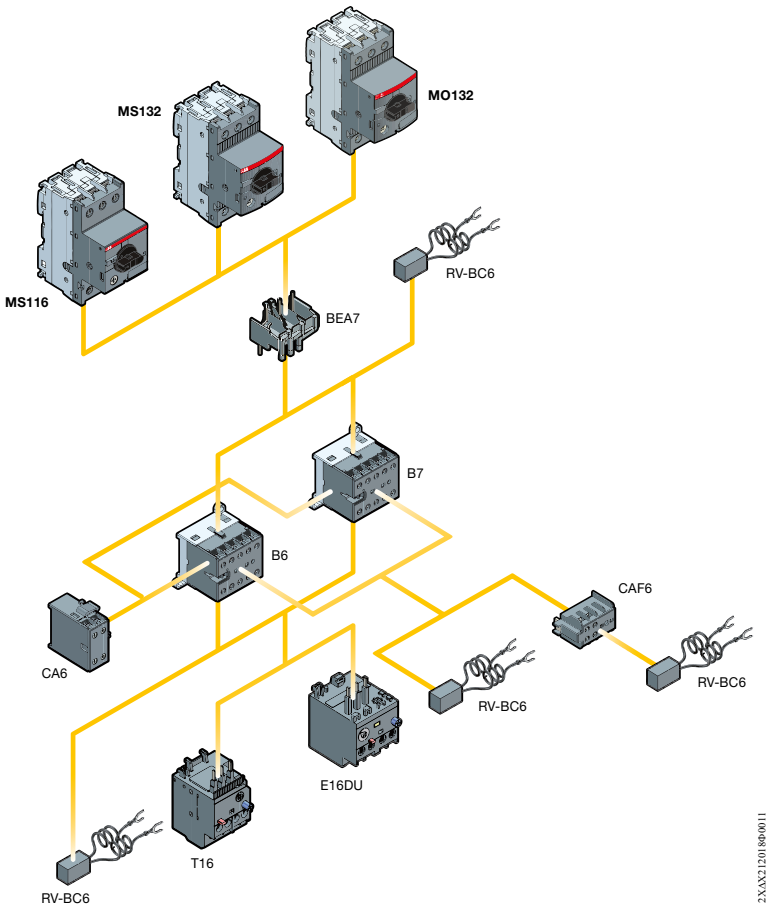
Auxiliary contacts for front mounting, side mounting and built-in according to IEC

Types		CA6, CAF6, built-in auxiliary contacts
Standards		IEC/EN 60947-1, IEC/EN 60947-4-1
Rated operational voltage Ue max		690 V
Rated frequency (without derating)		DC or 50 / 60 Hz
Conventional free-air thermal current I_{th} θ ≤ 40 °C		6 A
I_e / Rated operational current AC-15 acc. to IEC 60947-5-1	24 V 50/60 Hz	4 A
	110-120 V 50/60 Hz	4 A
	220-230-240 V 50/60 Hz	4 A
	380-400 V 50/60 Hz	3 A
	440 V 50/60 Hz	3 A
I_e / Rated operational current DC-13 acc. to IEC 60947-5-1	24 V DC	2.5 A
	110 V DC	0.7 A
	220 - 240 V DC	0.4 A
Short-circuit protection device		6 A, Type gG
Minimum switching capacity with failure rate acc. to IEC 60947-5-4		17 V / 5 mA
Maximum electrical switching frequency	AC-15	600 cycles/h
	DC-13	600 cycles/h

Auxiliary contacts for front mounting, side mounting and built-in according to UL/CSA

Types	CA6, CAF6, built-in auxiliary contacts
Max. operational voltage	600 V AC
Pilot duty	A600
AC thermal rated current	5 A

Accessories for mini contactors



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B6, B7, BC6, BC7, TBC7 3- and 4-pole mini contactors
VB6, VB7, VBC6, VBC7 3- and 4-pole mini reversing contactors
Technical data

Connection characteristics

Contactor types	**AC operated**	B6, VB6, VB6A	B7, VB7, VB7A
	DC operated	BC6, VBC6, VBC6A	BC7, TBC7, VBC7, VBC7A
Main terminals [1]		Screw terminals with cable clamp	
Connection capacity			
Main conductors (poles)			
Rigid: solid	**1 or 2 x**	1 ... 4 mm²	
Flexible without ferrule	**1 or 2 x**	1 ... 2.5 mm²	
Connection capacity acc. to UL/CSA	**1 or 2 x**	AWG 22 ... 10	
Stripping length		9 mm	
Tightening torques		0.8 ... 1.1 Nm / 7 lb.in	
Connection capacity – auxiliary conductors (built-in auxiliary terminals + coil terminals)			
Rigid: solid	**1 or 2 x**	1 ... 4 mm²	
Flexible without ferrule	**1 or 2 x**	1 ... 2.5 mm²	
Connection capacity acc. to UL/CSA	**1 or 2 x**	AWG 22 ... 10	
Stripping length		9 mm	
Tightening torques			
Coil terminals		0.8 ... 1.1 Nm / 7 lb.in	
Built-in auxiliary terminals		0.8 ... 1.1 Nm / 7 lb.in	
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			
Main terminals		IP20	
Coil terminals		IP20	
Built-in auxiliary terminals		IP20	
Screw terminals		(Delivered in open position, screws of unused terminals must be tightened)	
All terminals		M3	
Screwdriver type		Flat Ø 5.5 mm / Pozidriv 1	

[1] Soldering pin connection acc. to DIN 40801: 0.8 x 1 mm / 0.8 x 2.54 mm
Flat pin connection acc. to DIN 46248: 1 x 6.3 mm / 1 x 2.8 mm

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K6, KC6, TKC6 4-pole mini contactor relays
Technical data

Main pole – Utilization characteristics according to IEC

Contactor types	AC operated	K6
	DC operated	KC6, TKC6
Standards		IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1
Rated operational voltage U_{emax}		690 V
Rated frequency (without derating)		DC or 50 / 60 Hz
Conventional free-air thermal current I_{th} $\theta \leq 40$ °C		6 A
I_e / Rated operational current AC-15 acc. to IEC 60947-5-1	24 V 50/60 Hz	4 A
	110-120 V 50/60 Hz	4 A
	220-230-240 V 50/60 Hz	4 A
	380-400 V 50/60 Hz	3 A
	440 V 50/60 Hz	3 A
	480-500 V 50/60 Hz	2 A
I_e / Rated operational current DC-13 acc. to IEC 60947-5-1	24 V DC	2.5 A
	110 V DC	0.7 A
	220-240 V DC	0.4 A
Short-circuit protection device for contactors $U_e \leq 500$ V AC, fuse type gG		6 A
Minimum switching capacity		17 V / 5 mA
Maximum electrical switching frequency	AC-15	600 cycles/h
	DC-13	600 cycles/h

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

Contactor types	AC operated	K6
	DC operated	KC6, TKC6
Standards		UL 508, CSA C22.2 No14
Maximum operational voltage		600 V AC
Pilot duty		A600

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K6, KC6, TKC6 4-pole mini contactor relays
Technical data

General technical data

Contactor relay types		**AC operated**	K6
		DC operated	KC6, TKC6
Rated insulation voltage U_i			
acc. to IEC 60947-5-1			690 V
acc. to UL/CSA			600 V
Rated impulse withstand voltage U_{imp}			6 kV
Electromagnetic compatibility			
Ambient air temperature close to contactor relay		Operation in free air	-25 ... +55 °C
		Storage	-40 ... +80 °C
Climatic withstand			Acc. to IEC 60068-2-30
Maximum operating altitude (without derating)			2000 m
Mechanical durability			10^7 operating cycles
Resistance to shock			Half-sine
acc. IEC 60068-2-27 and EN 60068-2-27			15 g / 11ms
acc. to IEC/EN 60947-1 Annex. Q			Category E
Resistance to vibrations			Sinusoidal
acc. IEC 60068-2-27 and EN 60068-2-27			5 g / 3 ... 150 Hz
acc. to IEC/EN 60947-1 Annex. Q			Category E

Magnet system characteristics for K6 contactor relays

Contactor relay types		**AC operated**	K6
Coil operating limits acc. to IEC 60947-4-1		**AC supply**	0.85 ... 1.1 x U_C
AC control voltage			
Coil consumption	Average pull-in value		3.5 VA / 3.5 W
	Average holding value		3.5 VA / 3.5 W
Drop-out voltage in % of U_C min.			Approx. 20 ... 75%

Magnet system characteristics for KC6, TKC6 contactor relays

Contactor relay types		**DC operated**	KC6	TKC6
Coil operating limits acc. to IEC 60947-5-1		**DC supply**	0.85 ... 1.1 x U_C	See ordering details
DC control voltage				
Coil consumption	Average pull-in value		3.5 VA / 3.5 W	5 VA / 5 W
	Average holding value		3.5 VA / 3.5 W	5 VA / 5 W
Drop-out voltage in % of U_C min.			10 ... 75 %	10 ... 75 %

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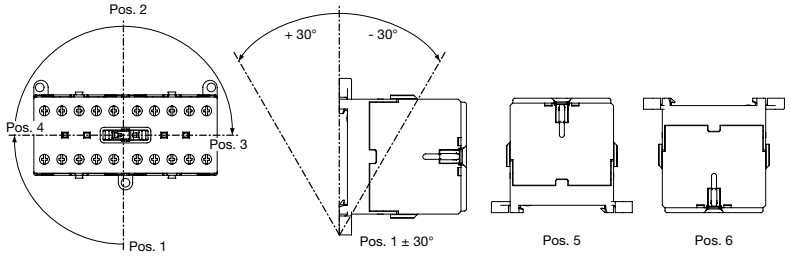
K6, KC6, TKC6 4-pole mini contactor relays
Technical data

Mounting characteristics and conditions for use

Contactor types	**AC operated**	K6
	DC operated	KC6, TKC6
Mounting positions		
Mounting distances		The contactors can be assembled side by side.
Fixing		
On rail acc. to IEC 60715, EN 60715		35 x 7.5 mm or 35 x 15 mm
By screws (not supplied)		2 x M4 screws placed diagonally

Connecting characteristics

Contactor relay types	**AC operated**	K6
	DC operated	KC6, TKC6
Main terminals [1]		Screw terminals with cable clamp
Connection capacity		
Main conductors (poles)		
Rigid: solid	**1 or 2 x**	1 ... 4 mm²
Flexible without ferrule	**1 or 2 x**	1 ... 2.5 mm²
Connection apacity acc. to UL/CSA	**1 or 2 x**	AWG 22 ... 10
Stripping length		9 mm
Tightening torques		0.8 ... 1.1 Nm / 7 lb.in
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		
All		IP20
Screw terminals		(Delivered in open position, screws of unused terminals must be tightened)
All terminals		M3
Screwdriver type		Flat Ø 5.5 / Pozidriv 1

[1] Soldering pin connection acc. to DIN 40801: 0.8 x 1 mm / 0.8 x 2.54 mm
Flat pin connection acc. to DIN 46248: 1 x 6.3 mm / 1 x 2.8 mm

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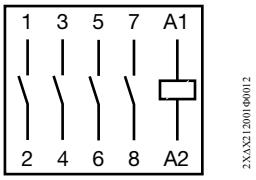
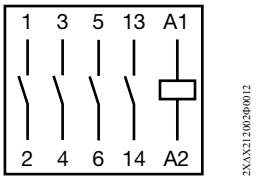
Mini contactors
Location of the connection terminals and terminal designation

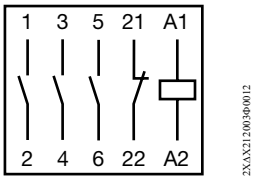
Mini contactors



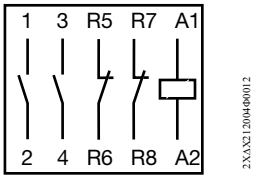
B6(7)-40-00 ...
BC6(7)-40-00 ...



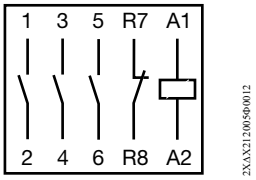
B6(7)-30-10 ...
BC6(7)-30-10 ...



B6(7)-30-01 ...
BC6(7)-30-01 ...

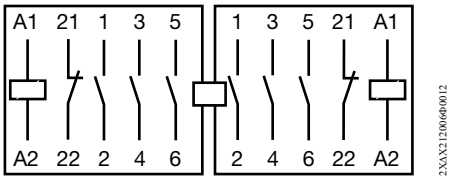


B6(7)-22-00 ...
BC6(7)-22-00 ...

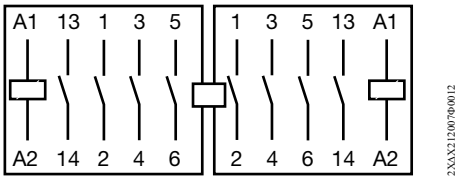


B6(7)-31-00 ...
BC6(7)-31-00 ...

Compact reversing contactors

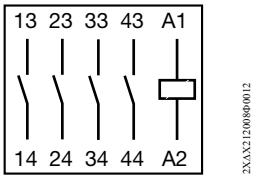


VB6(7)-30-01 ...
VBC6(7)-30-01 ...

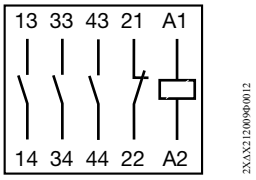


VB6(7)-30-10 ...
VBC6(7)-30-10 ...

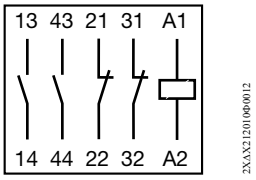
Mini contactor relays



K6-40E ...
KC6-40E ...



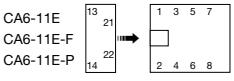
K6-31Z ...
KC6-31Z ...

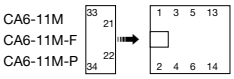


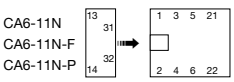
K6-22Z ...
KC6-22Z ...

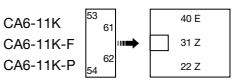
Auxiliary switches

CA6...

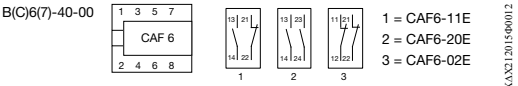


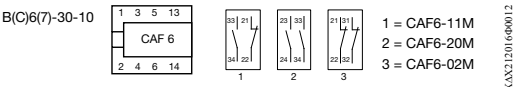


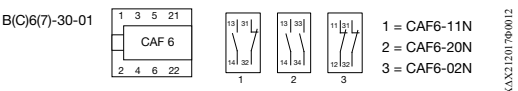


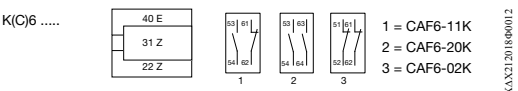


CAF...





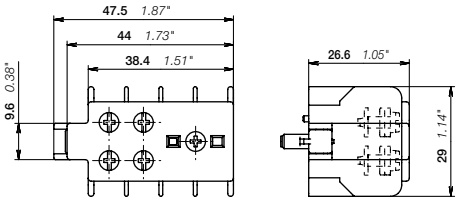




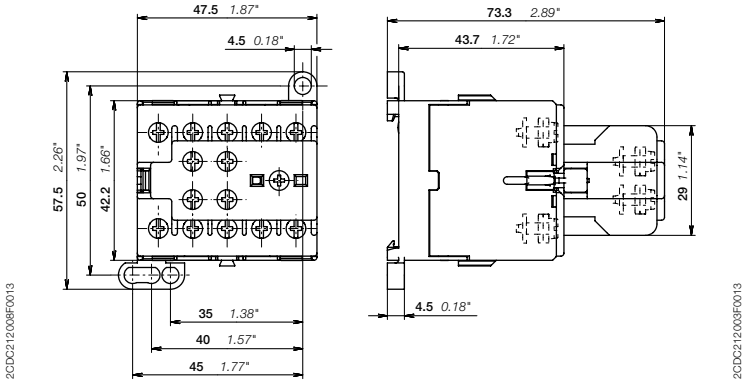
Mini contactors and contactor relays
Dimension drawings with accessories

Main dimensions mm, *inches*

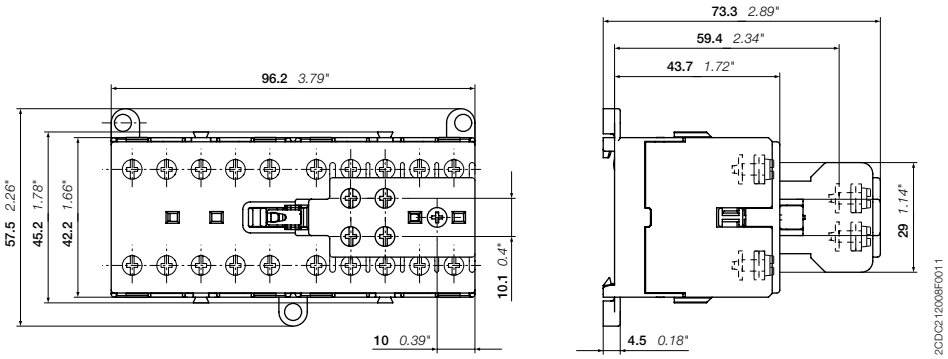
Front mounted auxiliary contact blocks, with screw terminals



CAF6

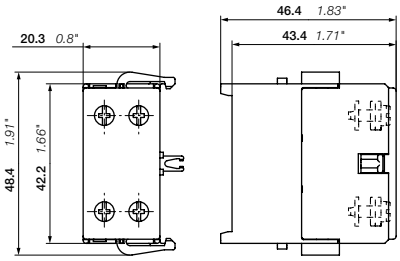


Mini contactors or contactor relays + CAF6

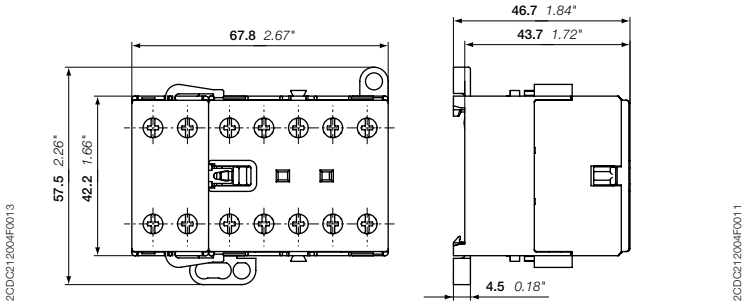


Mini reversing contactors + CAF6 (max. 2 contact blocks)

Side mounted auxiliary contact blocks, with screw terminals



CA6-11E, CA6-11M, CA6-11N



Mini contactors or contactor relays + CA6-11E, CA6-11M, CA6-11N

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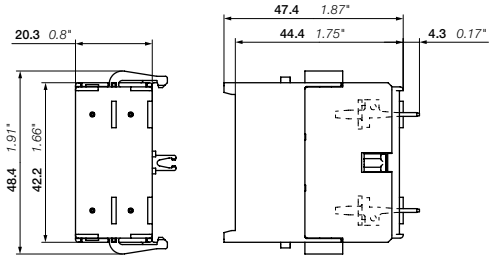
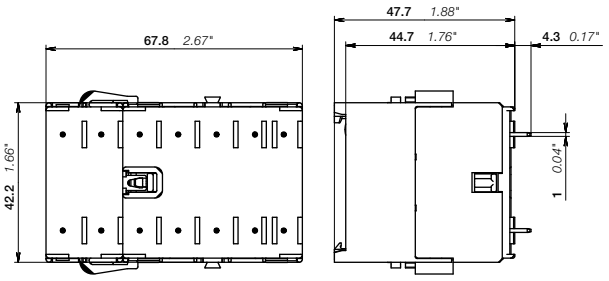
Mini contactors and contactor relays
Dimension drawings with accessories

Main dimensions mm, *inches*

Side mounted auxiliary contact blocks, with soldering pins



CA6-11E-P, CA6-11M-P, CA6-11N-P



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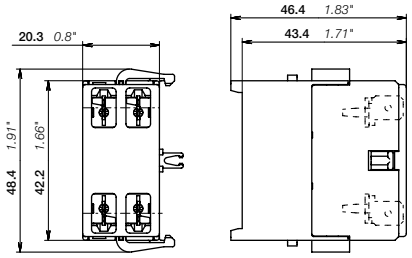
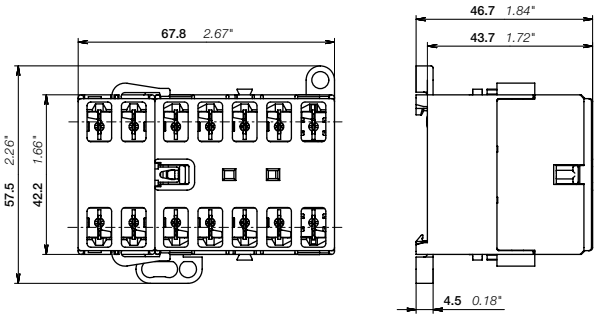
Mini contactors or contactor relays + CA6-11E-P, CA6-11M-P, CA6-11N-P

Side mounted auxiliary contact blocks, with flat pin connection



CA6-11E-F, CA6-11M-F, CA6-11N-F



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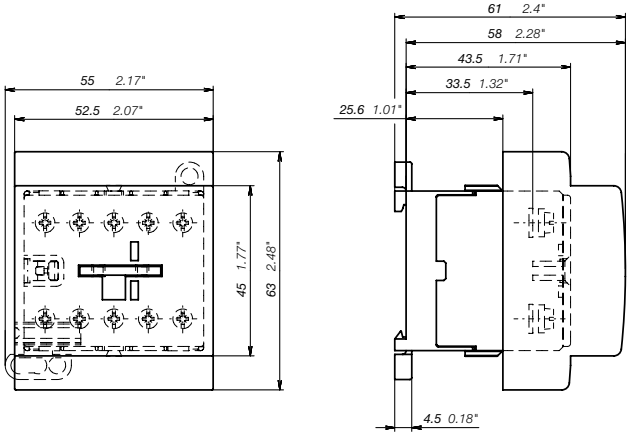
Mini contactors or contactor relays + CA6-11E-F, CA6-11M-F, CA6-11N-F

Front mounted cover cap for DIN rail panel installation



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2CDC212004F0011

Mini contactors or contactor relays + LT6-B cover cap

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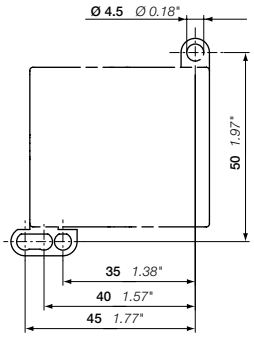
Mini contactors and contactor relays
Dimension drawings with accessories

Main dimensions mm, *inches*

Drilling plans for wall mounting



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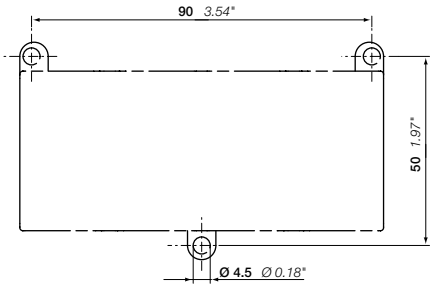
Mini contactors or contactor relays with screw terminals and flat pin connection



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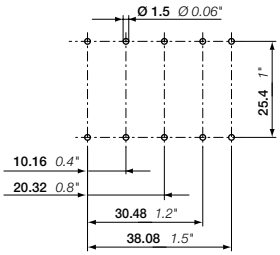
Mini reversing contactors with screw terminals and flat pin connection

Drilling plans for PCBA



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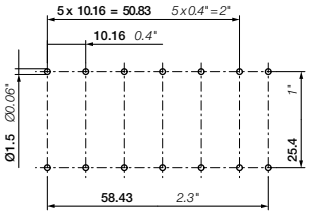
Mini contactors or contactor relays with soldering pins



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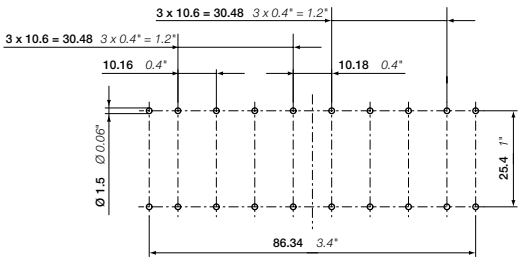
Mini contactors or contactor relays with soldering pins + CA6-11E-P, CA6-11M-P, CA6-11N-P



2CDC212012F0011

Mini reversing contactors with soldering pins

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Notes

1L1
3L2
5L3
13NO
A1
ABB
230 V 50/60 Hz
2T1
4T2
6T3
14NO
A2
1L1
3L2
5L3
21NC
A1
ABB
230 V 50/60 Hz
2T1
4T2
6T3
22NC
A2

AS contactors and
NS contactor relays with screw terminals

Overview 4/3

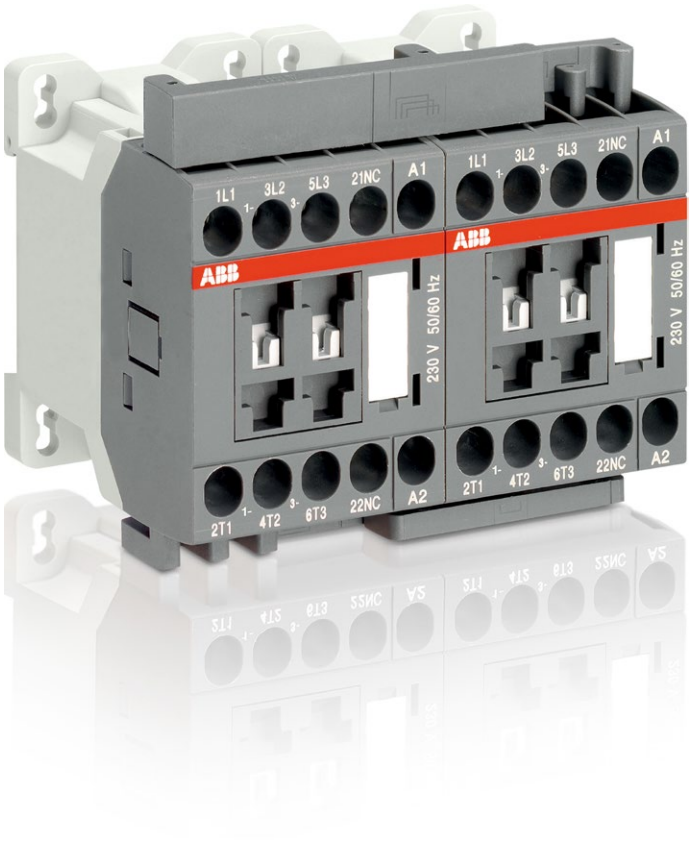
Motor starting solutions - open type version, in kit form with screw terminals 4/7

3-pole contactors and contactor relays with screw terminals 4/31

Voltage code table 4/78

AS contactors
Efficient and space saving

The compact AS contactor range allows you to optimize equipment design and is a reliable, time and cost saving solution.



Speed up your projects

Simpler by design

AS contactors come in one single size and are designed to make life easy for engineering, handling and wiring purposes. These products follow a simple marking pattern, which enables a quick identification of their individual features.

Easy to install

Easy to use

Make engineering a simple process with AS contactors. Every product is delivered with opened terminals, located directly on the front for easy access. Every terminal is screwdriver guided. Spring terminal versions are also available for a time-saving and reliable connection alternative.

Space saving

Space optimization

The addition of accessories keeps the panel smart and compact, while providing additional features. Interlocking kits and surge suppression are clipped into the housing without adding width to the small frame of the contactor.

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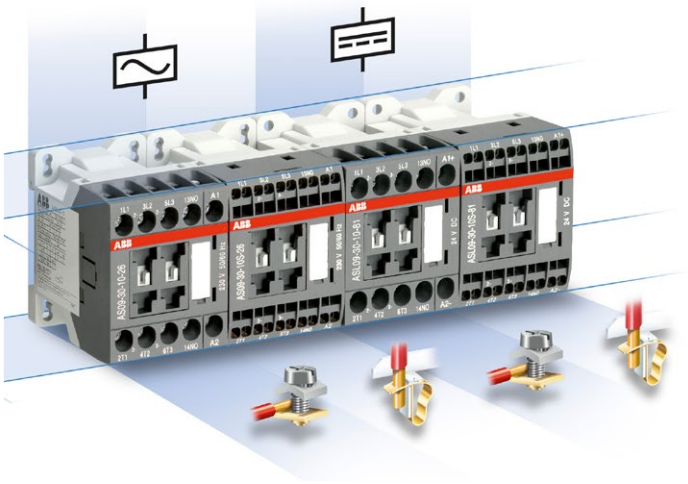
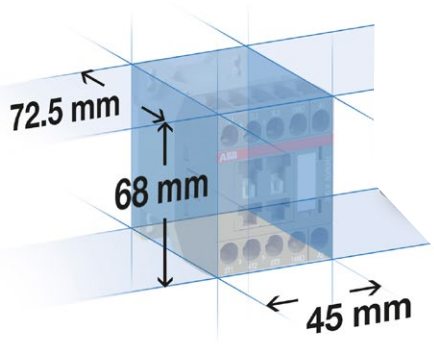
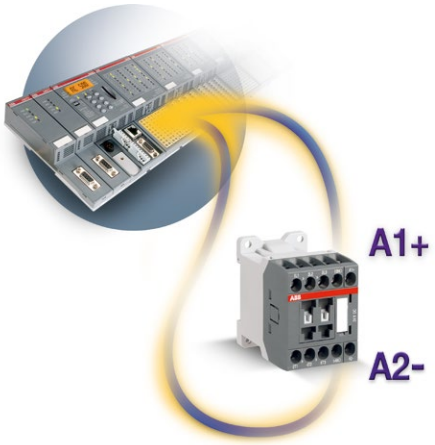
Compact and efficient
Optimize your equipment dimensions!

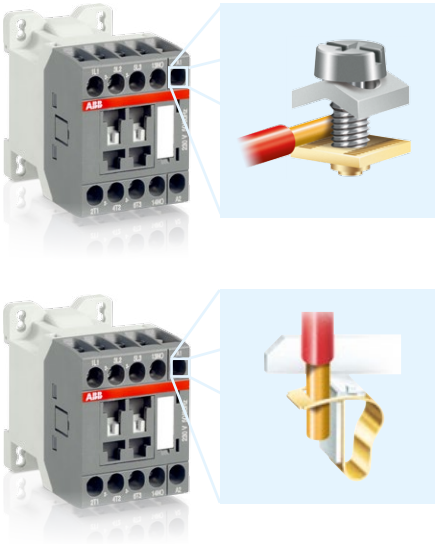




More choices, for more comfort
AS contactors feature products for AC and DC control circuits. On top of that, they are available with screw or spring terminals.

Easy to engineer with just one size
For motor starting solutions up to 7.5 kW at 400 V and 3 hp at 440 V, contactors are in one frame size for both AC and DC coils.





Direct control by PLC
With their low consumption coil of only 3 W, AS contactors can be controlled directly by most PLC's. For 24 V control circuits, this is only 125 mA.

Two types of terminals, for even more choices
As an alternative to the conventional screw terminals, spring terminals are often used in applications with vibrations. Both types are able to accommodate two cables. This way, AS offers the right type of terminal depending on the installation.

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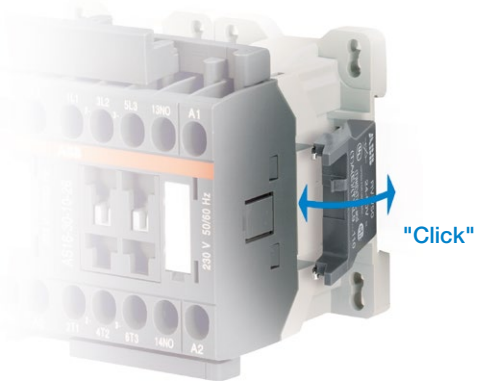
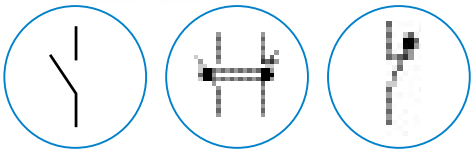
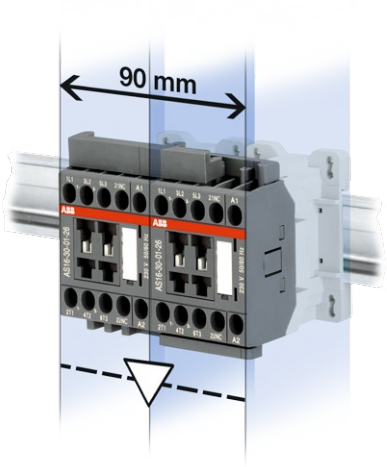
Easy to use
Space-saving and intuitive

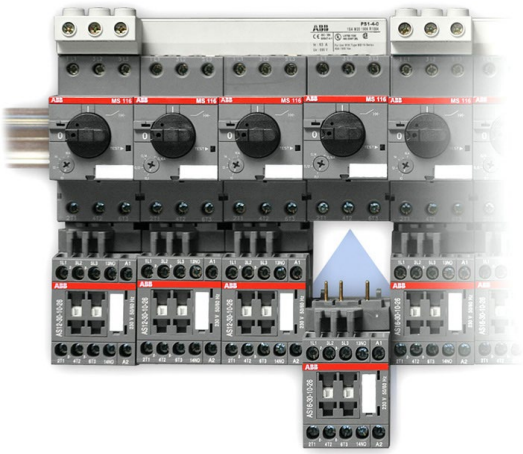




Make your control circuits reliable
Built-in and add-on auxiliary contacts offer high reliability for low signals and meet the requirements for mechanically linked and mirror contacts according to IEC standards.

Side clip-on surge suppressors
This add-on snaps and connects to the side of the housing and does not add width to the frame. The coil terminals remain accessible this way.





Compact reversing contactors
Using mechanical interlock units does not increase the width of the reversing contactor pair.

Choose reliable and time-saving solutions
AS contactors can easily be connected to manual motor starters or overload relays. The connecting accessories prevent mistakes and save time when assembling starter combinations.

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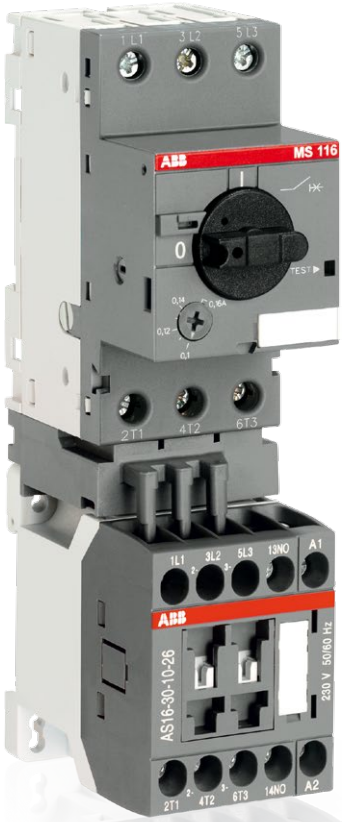
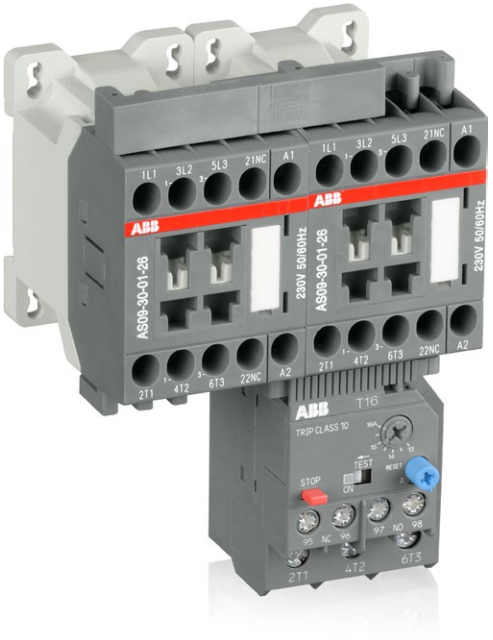


ABB
MS 116
1 L1
3 L2
5 L3
2T1
4T2
6T3
1L1
3L2
5L3
13NO
A1
AS16-30-10-26
230 V 50/60 Hz
14NO
A2


1L1
3L2
5L3
21NC
A1
ABB
AS09-30-01-26
230V 50/60Hz
2T1
4T2
6T3
22NC
A2
T16
TRIP CLASS 10
STOP
TEST
RESET
95
NC
96
97
NO
98

Motor starting solutions
Open type version, in kit form with screw terminals

Starters protected by manual motor starters

Overview **4**/8
Direct-on-line starters **4**/10
Reversing starters **4**/14
Dimensions **4**/18

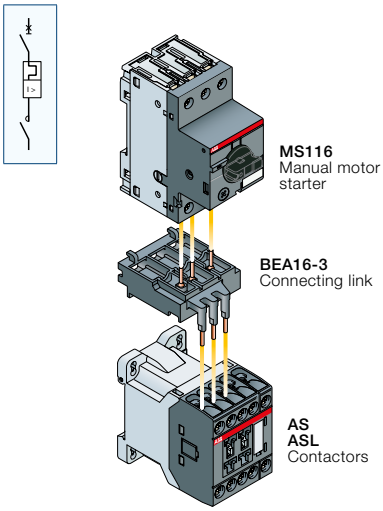
Starters protected by thermal overload relays

Direct-on-line and reversing starters **4**/20
Star-delta starters **4**/24
Dimensions **4**/28

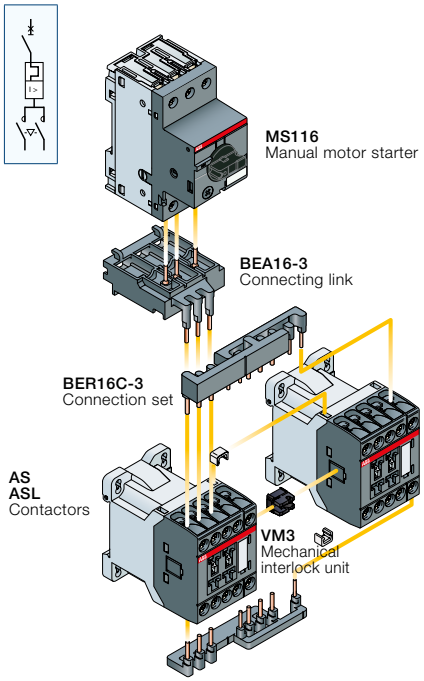
Motor starting solutions
Open type version, in kit form

Starters protected by manual motor starters

Direct-on-line starters

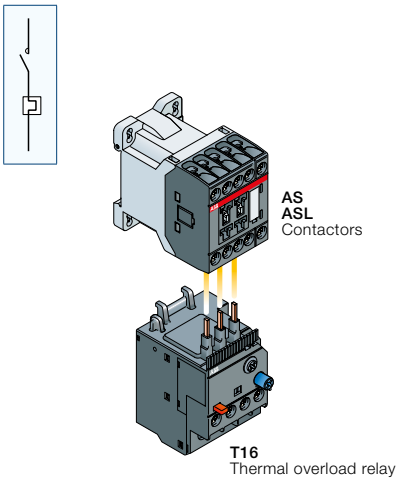


Reversing starters

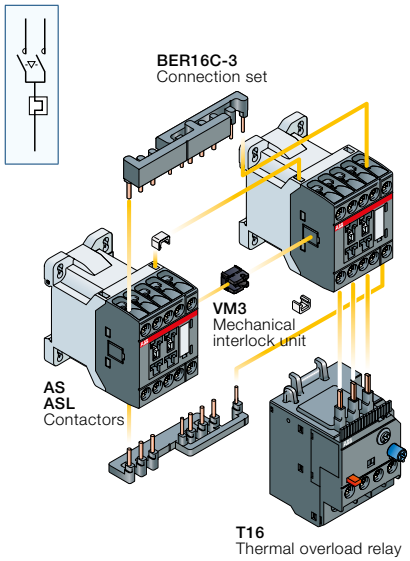


Starters protected by thermal overload relays

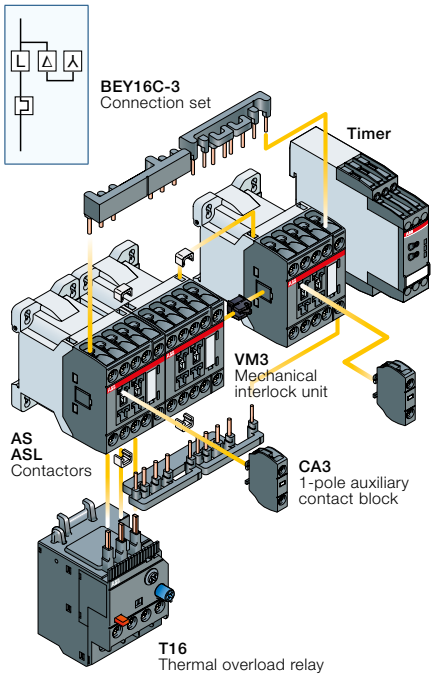
Direct-on-line starters



Reversing starters



Star-delta starters



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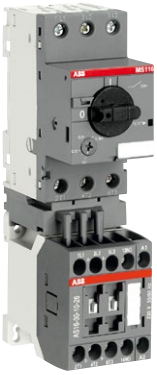
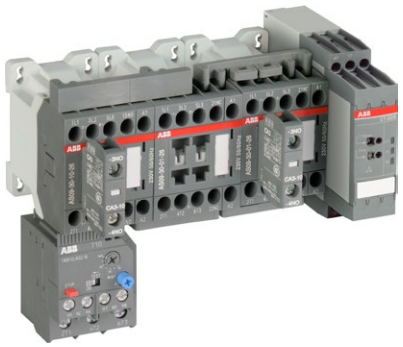
Starters protected by manual motor starters



Switching of 3-phase cage motors		Direct-on-line starters	Reversing starters
Rated power - AC-3, 400 V		**0.06...7.5 kW**	**0.06...7.5 kW**
Short-circuit current Iq		16 kA - 50 kA	16 kA - 50 kA
Coordination type		Type 1 & type 2	Type 1 & type 2
Manual motor starters		**MS116**	**MS116**
Contactors	AC operated	**AS09 ... AS16**	**AS09 ... AS16**
	DC operated	**ASL09 ... ASL16**	**ASL09 ... ASL16**

Starters protected by thermal overload relays

Switching of 3-phase cage motors		Direct-on-line starters	Reversing starters
Rated power - AC-3, 400 V		**4...7.5 kW**	**4...7.5 kW**
Contactors	AC operated	**AS09 ... AS16**	**AS09 ... AS16**
	DC operated	**ASL09 ... ASL16**	**ASL09 ... ASL16**
Thermal overload relays		**T16**	**T16**



Switching of 3-phase cage motors		Star-delta starters
Rated power - AC-3, 400 V		**7.5...11 kW**
Contactors	AC operated	**AS09 ... AS16**
	DC operated	**ASL09 ... ASL16**
Thermal overload relays		**T16**

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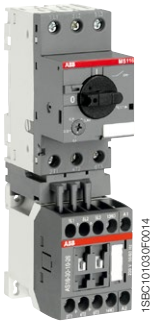
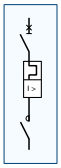
Direct-on-line starters protected by manual motor starters
With AS, ASL contactors - open type version in kit form

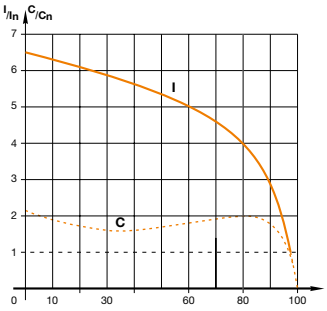




MS116 + BEA16-3 + AS16-30-10

Application

Full voltage direct-on-line starting for controlling three-phase asynchronous motors is a simple and economic solution characterised by a high starting torque (1.9 to 2.1 times full-speed torque) and a starting current 5.5 to 7 times nominal current.



I = current
C = torque
In = nominal current
Cn = nominal torque

Coordination types

The contactor and the manual motor starter control and protect motors against overload and short-circuits according to coordination types 1 and 2 (IEC 60947-4-1 / EN 60947-4-1) defining the anticipated level of service continuity as follow:

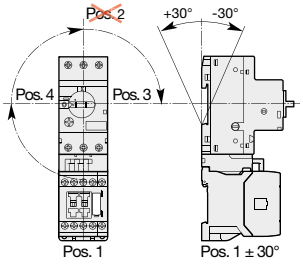
Type 1: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will not be able to then operate without being repaired or having parts replaced.

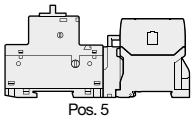
Type 2: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts light welding is acceptable.

Main technical data

Standards	IEC 60947-4-1 / EN 60947-4-1
Rated operational voltage Ue max.	690 V - 50/60 Hz
Rated insulation voltage Ui according to IEC 60947-4-1	690 V
Switching frequency	≤ 15 starts/hour - 80 % max. load factor - with max. 1.5 s starting time
	≤ 30 starts/hour - 50 % max. load factor - with max. 1.5 s starting time
Ambient air temperature close to the device	≤ 55 °C
Degree of protection	IP20

Mounting positions





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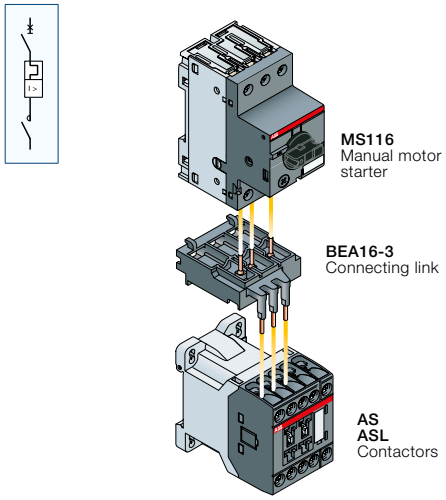
Direct-on-line starters protected by manual motor starters
With AS, ASL contactors - open type version in kit form



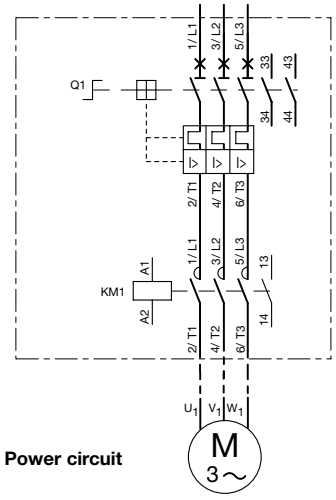
Description

You can easily assemble a direct-on-line starter by using the BEA16-3 connecting link 3-pole insulated. It is used to electrically and mechanically connect MS116 manual motor starter and AS or ASL contactors.

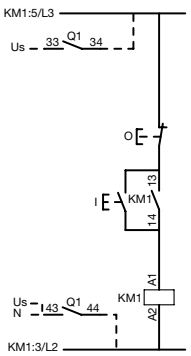
Select now easily and quickly your starter in the following pages for coordination type 1 or 2 at 400 V, 50 / 60 Hz, Iq = 16 kA or Iq = 50 kA up to 7.5 kW.

For complete coordination tables with MS116 or MS132, please contact your ABB local sales organization.

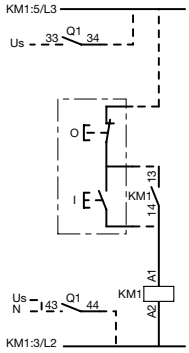
Wiring diagrams



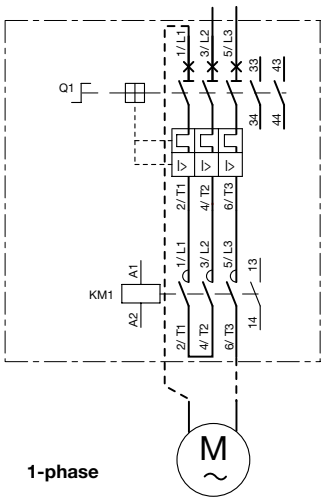
Power circuit



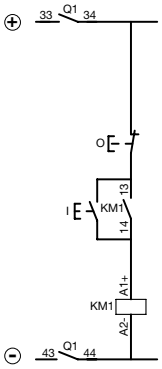
AC local control



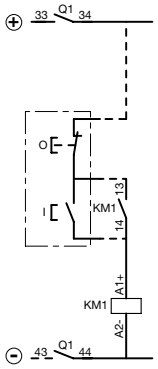
AC remote control



1-phase



DC local control

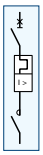


DC remote control

1SBC101272S0201

DOL starters protected by MS116 manual motor starters
With AS contactors - open type version in kit form

Coordination type 1 or type 2, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz



		Manual motor starters				Contactors				
IEC AC-3, 400 V Rated operational power	current	Type	Order code	Current setting range	Magnetic tripping current	Rated control circuit voltage Uc (1)		Type	Order code	Allowed setting current
kW	A			A	A	V 50 Hz	V 60 Hz			A
Coordination type 1										
Coordination type 2										
Iq = 16 kA										
Iq = 50 kA										
0.06	0.2	MS116-0.25	1SAM250000R1002	0.16...0.25	2.44	24	24	AS09-30-10-20	1SBL101001R2010	0.25
						230	230	AS09-30-10-26	1SBL101001R2610	
0.09	0.3	MS116-0.4	1SAM250000R1003	0.25...0.40	3.9	24	24	AS09-30-10-20	1SBL101001R2010	0.4
						230	230	AS09-30-10-26	1SBL101001R2610	
0.12	0.44	MS116-0.63	1SAM250000R1004	0.40...0.63	6.14	24	24	AS09-30-10-20	1SBL101001R2010	0.63
						230	230	AS09-30-10-26	1SBL101001R2610	
0.18	0.6	MS116-1.0	1SAM250000R1005	0.63...1.00	11.5	24	24	AS09-30-10-20	1SBL101001R2010	1
						230	230	AS09-30-10-26	1SBL101001R2610	
0.25	0.85	MS116-1.0	1SAM250000R1005	0.63...1.00	11.5	24	24	AS09-30-10-20	1SBL101001R2010	1
						230	230	AS09-30-10-26	1SBL101001R2610	
0.37	1.1	MS116-1.6	1SAM250000R1006	1.00...1.60	18.4	24	24	AS09-30-10-20	1SBL101001R2010	1.6
						230	230	AS09-30-10-26	1SBL101001R2610	
0.55	1.5	MS116-1.6	1SAM250000R1006	1.00...1.60	18.4	24	24	AS09-30-10-20	1SBL101001R2010	1.6
						230	230	AS09-30-10-26	1SBL101001R2610	
0.75	1.9	MS116-2.5	1SAM250000R1007	1.60...2.50	28.75	24	24	AS09-30-10-20	1SBL101001R2010	2.5
						230	230	AS09-30-10-26	1SBL101001R2610	
1.1	2.7	MS116-4.0	1SAM250000R1008	2.50...4.00	50	24	24	AS09-30-10-20	1SBL101001R2010	4
						230	230	AS09-30-10-26	1SBL101001R2610	
1.5	3.6	MS116-4.0	1SAM250000R1008	2.50...4.00	50	24	24	AS09-30-10-20	1SBL101001R2010	4
						230	230	AS09-30-10-26	1SBL101001R2610	
2.2	4.9	MS116-6.3	1SAM250000R1009	4.00...6.30	78.75	24	24	AS09-30-10-20	1SBL101001R2010	6.3
						230	230	AS09-30-10-26	1SBL101001R2610	
3	6.5	MS116-10	1SAM250000R1010	6.30...10.0	150	24	24	AS12-30-10-20	1SBL111001R2010	10
						230	230	AS12-30-10-26	1SBL111001R2610	
4	8.5	MS116-10	1SAM250000R1010	6.30...10.0	150	24	24	AS12-30-10-20	1SBL111001R2010	10
						230	230	AS12-30-10-26	1SBL111001R2610	
5.5	11.5	MS116-12	1SAM250000R1012	8.00...12.0	180	24	24	AS12-30-10-20	1SBL111001R2010	12
						230	230	AS12-30-10-26	1SBL111001R2610	
7.5	15.5	MS116-16	1SAM250000R1011	10.0...16.0	240	24	24	AS16-30-10-20	1SBL121001R2010	15.5
						230	230	AS16-30-10-26	1SBL121001R2610	

Note: for multiple packaging, please contact your ABB local sales organization.

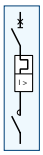
(1) Other control voltages see voltage code table.

Main accessories	Type	Order code
Connecting link for manual motor starter	BEA16-3	1SBN081006T1000

1SBC101383S0201 - Rev. A

DOL starters protected by MS116 manual motor starters
With ASL contactors - open type version in kit form

Coordination type 1 or type 2, AC-3, 16 or 50 kA, 400 V, 50/60 Hz



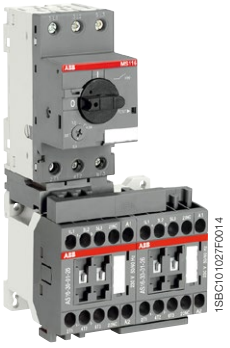
		Manual motor starters				Contactors				
IEC AC-3, 400 V Rated operational power	current	Type	Order code		Current setting range	Magnetic tripping current	Rated control circuit voltage Uc (1)	Type	Order code		Allowed setting current
kW	A				A	A	V DC				A
Coordination type 1											
Coordination type 2											
Iq = 16 kA											
Iq = 50 kA											
0.06	0.2	MS116-0.25	1SAM250000R1002		0.16...0.25	2.44	24	ASL09-30-10-81	1SBL103001R8110		0.25
0.09	0.3	MS116-0.4	1SAM250000R1003		0.25...0.40	3.9	24	ASL09-30-10-81	1SBL103001R8110		0.4
0.12	0.44	MS116-0.63	1SAM250000R1004		0.40...0.63	6.14	24	ASL09-30-10-81	1SBL103001R8110		0.63
0.18	0.6	MS116-1.0	1SAM250000R1005		0.63...1.00	11.5	24	ASL09-30-10-81	1SBL103001R8110		1
0.25	0.85	MS116-1.0	1SAM250000R1005		0.63...1.00	11.5	24	ASL09-30-10-81	1SBL103001R8110		1
0.37	1.1	MS116-1.6	1SAM250000R1006		1.00...1.60	18.4	24	ASL09-30-10-81	1SBL103001R8110		1.6
0.55	1.5	MS116-1.6	1SAM250000R1006		1.00...1.60	18.4	24	ASL09-30-10-81	1SBL103001R8110		1.6
0.75	1.9	MS116-2.5	1SAM250000R1007		1.60...2.50	28.75	24	ASL09-30-10-81	1SBL103001R8110		2.5
1.1	2.7	MS116-4.0	1SAM250000R1008		2.50...4.00	50	24	ASL09-30-10-81	1SBL103001R8110		4
1.5	3.6	MS116-4.0	1SAM250000R1008		2.50...4.00	50	24	ASL09-30-10-81	1SBL103001R8110		4
2.2	4.9	MS116-6.3	1SAM250000R1009		4.00...6.30	78.75	24	ASL09-30-10-81	1SBL103001R8110		6.3
3	6.5	MS116-10	1SAM250000R1010		6.30...10.0	150	24	ASL12-30-10-81	1SBL113001R8110		10
4	8.5	MS116-10	1SAM250000R1010		6.30...10.0	150	24	ASL12-30-10-81	1SBL113001R8110		10
5.5	11.5	MS116-12	1SAM250000R1012		8.00...12.0	180	24	ASL12-30-10-81	1SBL113001R8110		12
7.5	15.5	MS116-16	1SAM250000R1011		10.0...16.0	240	24	ASL16-30-10-81	1SBL123001R8110		15.5

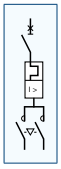
Note: for multiple packaging, please contact your ABB local sales organization.

(1) Other control voltages see voltage code table.

Main accessories	Type	Order code	
Connecting link for manual motor starter	BEA16-3	1SBN081006T1000	

Reversing starters protected by manual motor starters
With AS, ASL contactors - open type version in kit form

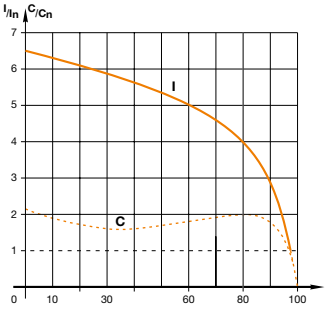




MS116 + BEA16-3 + VM3 + BER16C-3 + AS16-30-01

Application

Full voltage reversing starting for controlling three-phase asynchronous motors is a simple and economic solution characterised by a high starting torque (1.9 to 2.1 times full-speed torque) and a starting current 5.5 to 7 times nominal current.



I = current
C = torque
In = nominal current
Cn = nominal torque

Coordination types

The contactor and the manual motor starter control and protect motors against overload and short-circuits according to coordination types 1 and 2 (IEC 60947-4-1 / EN 60947-4-1) defining the anticipated level of service continuity as follow:

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.

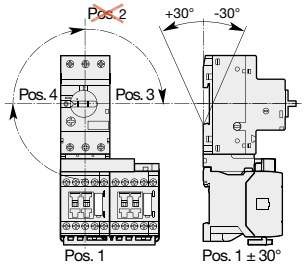
Type 2: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts light welding is acceptable.

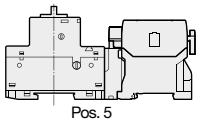
Main technical data

Standards	IEC 60947-4-1 / EN 60947-4-1
Rated operational voltage Ue max.	690 V - 50/60 Hz
Rated insulation voltage Ui according to IEC 60947-4-1	690 V
Switching frequency	≤ 15 starts/hour - 80 % max. load factor - with max. 1.5 s starting time
	≤ 30 starts/hour - 50 % max. load factor - with max. 1.5 s starting time
Ambient air temperature close to the device	≤ 55 °C
Degree of protection	IP20

Note: Minimum switchover delay of 50 ms must be introduced between respective opening and closing of AC operated reversing contactors

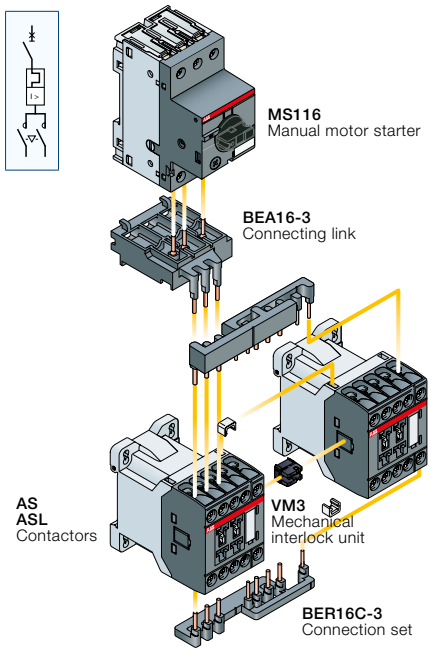
Mounting positions





1SBC101274S0201

Reversing starters protected by manual motor starters
With AS, ASL contactors - open type version in kit form



Description

You can easily assemble reversing starter thanks to our complete range of accessories:

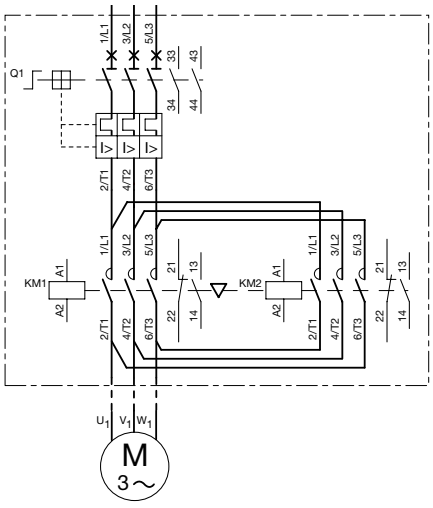
- BEA16-3 connecting link 3-pole insulated: it is used to electrically and mechanically connect MS116 manual motor starter and AS or ASL contactors.
- VM3 mechanical interlock unit: just clip it between the 2 contactors without increasing starter width.
- BER16C-3 connection set: it assures a safe and simple connection between both contactor main terminals and an electrical interlocking between coil and N.C. built-in auxiliary contact terminals of both contactors.

Select now easily and quickly your starter in the following pages for coordination type 1 or 2 at 400 V, 50 / 60 Hz, Iq = 16 kA or Iq = 50 kA up to 7.5 kW.

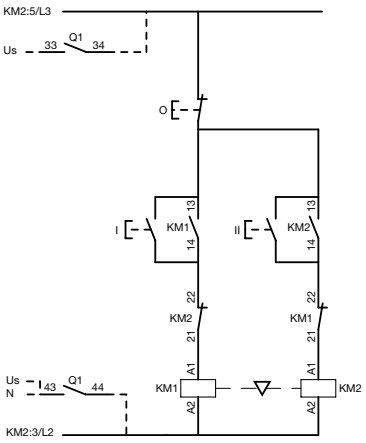
For complete coordination tables with MS116 or MS132, please contact your ABB local sales organization.

4

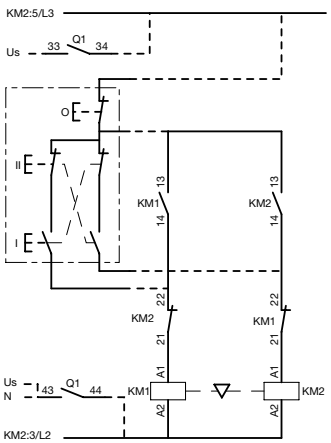
Wiring diagrams



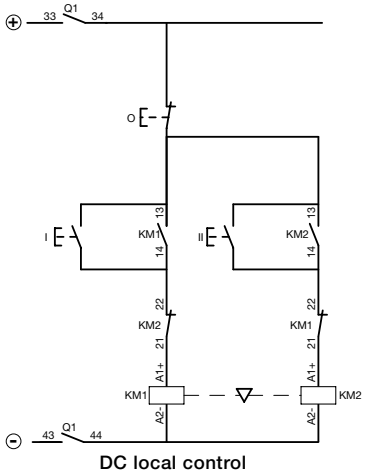
Power circuit



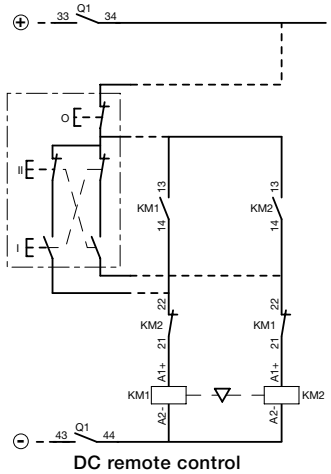
AC local control



AC remote control



DC local control



DC remote control

1SBC101274S0201

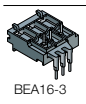
Reversing starters protected by MS116 manual motor starters
With AS contactors - open type version in kit form

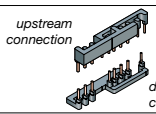
Coordination type 1 or type 2, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz

	IEC AC-3, 400 V Rated operational power kW	current A	Manual motor starters Type	Order code	Current setting range A	Magnetic tripping current A	Contactors Rated control circuit voltage Uc (1) V 50 Hz	V 60 Hz	Type	Order code	Allowed setting current A
Coordination type 1											
Coordination type 2											
Iq = 16 kA											
Iq = 50 kA											
	0.06	0.2	MS116-0.25	1SAM250000R1002	0.16...0.25	2.44	24	24	AS09-30-01-20	1SBL101001R2001	0.25
							230	230	AS09-30-01-26	1SBL101001R2601	
	0.09	0.3	MS116-0.4	1SAM250000R1003	0.25...0.40	3.9	24	24	AS09-30-01-20	1SBL101001R2001	0.4
							230	230	AS09-30-01-26	1SBL101001R2601	
	0.12	0.44	MS116-0.63	1SAM250000R1004	0.40...0.63	6.14	24	24	AS09-30-01-20	1SBL101001R2001	0.63
							230	230	AS09-30-01-26	1SBL101001R2601	
	0.18	0.6	MS116-1.0	1SAM250000R1005	0.63...1.00	11.5	24	24	AS09-30-01-20	1SBL101001R2001	1
							230	230	AS09-30-01-26	1SBL101001R2601	
	0.25	0.85	MS116-1.0	1SAM250000R1005	0.63...1.00	11.5	24	24	AS09-30-01-20	1SBL101001R2001	1
							230	230	AS09-30-01-26	1SBL101001R2601	
	0.37	1.1	MS116-1.6	1SAM250000R1006	1.00...1.60	18.4	24	24	AS09-30-01-20	1SBL101001R2001	1.6
							230	230	AS09-30-01-26	1SBL101001R2601	
	0.55	1.5	MS116-1.6	1SAM250000R1006	1.00...1.60	18.4	24	24	AS09-30-01-20	1SBL101001R2001	1.6
							230	230	AS09-30-01-26	1SBL101001R2601	
	0.75	1.9	MS116-2.5	1SAM250000R1007	1.60...2.50	28.75	24	24	AS09-30-01-20	1SBL101001R2001	2.5
							230	230	AS09-30-01-26	1SBL101001R2601	
	1.1	2.7	MS116-4.0	1SAM250000R1008	2.50...4.00	50	24	24	AS09-30-01-20	1SBL101001R2001	4
							230	230	AS09-30-01-26	1SBL101001R2601	
	1.5	3.6	MS116-4.0	1SAM250000R1008	2.50...4.00	50	24	24	AS09-30-01-20	1SBL101001R2001	4
							230	230	AS09-30-01-26	1SBL101001R2601	
	2.2	4.9	MS116-6.3	1SAM250000R1009	4.00...6.30	78.75	24	24	AS09-30-01-20	1SBL101001R2001	6.3
							230	230	AS09-30-01-26	1SBL101001R2601	
	3	6.5	MS116-10	1SAM250000R1010	6.30...10.0	150	24	24	AS12-30-01-20	1SBL111001R2001	10
							230	230	AS12-30-01-26	1SBL111001R2601	
	4	8.5	MS116-10	1SAM250000R1010	6.30...10.0	150	24	24	AS12-30-01-20	1SBL111001R2001	10
							230	230	AS12-30-01-26	1SBL111001R2601	
	5.5	11.5	MS116-12	1SAM250000R1012	8.00...12.0	180	24	24	AS12-30-01-20	1SBL111001R2001	12
							230	230	AS12-30-01-26	1SBL111001R2601	
	7.5	15.5	MS116-16	1SAM250000R1011	10.0...16.0	240	24	24	AS16-30-01-20	1SBL121001R2001	15.5
							230	230	AS16-30-01-26	1SBL121001R2601	

Note: for multiple packaging, please contact your ABB local sales organization.

(1) Other control voltages see voltage code table.


BEA16-3



VM3

Main accessories	Type	Order code
Connecting link for manual motor starter	BEA16-3	1SBN081006T1000
Connection set for reversing starter	BER16C-3	1SBN081012R1000
Mechanical interlock unit	VM3	1SBN031005T1000

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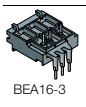
Reversing starters protected by MS116 manual motor starters
With ASL contactors - open type version in kit form

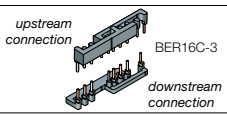
Coordination type 1 or type 2, AC-3, 16 or 50 kA, 400 V, 50/60 Hz

		Manual motor starters				Contactors				
IEC AC-3, 400 V Rated operational power	current	Type	Order code		Current setting range	Magnetic tripping current	Rated control circuit voltage Uc (1)	Type	Order code		Allowed setting current
kW	A				A	A	V DC				A
Coordination type 1											
Coordination type 2											
Iq = 16 kA											
Iq = 50 kA											
0.06	0.2	MS116-0.25	1SAM250000R1002		0.16...0.25	2.44	24	ASL09-30-01-81	1SBL103001R8101		0.25
0.09	0.3	MS116-0.4	1SAM250000R1003		0.25...0.40	3.9	24	ASL09-30-01-81	1SBL103001R8101		0.4
0.12	0.44	MS116-0.63	1SAM250000R1004		0.40...0.63	6.14	24	ASL09-30-01-81	1SBL103001R8101		0.63
0.18	0.6	MS116-1.0	1SAM250000R1005		0.63...1.00	11.5	24	ASL09-30-01-81	1SBL103001R8101		1
0.25	0.85	MS116-1.0	1SAM250000R1005		0.63...1.00	11.5	24	ASL09-30-01-81	1SBL103001R8101		1
0.37	1.1	MS116-1.6	1SAM250000R1006		1.00...1.60	18.4	24	ASL09-30-01-81	1SBL103001R8101		1.6
0.55	1.5	MS116-1.6	1SAM250000R1006		1.00...1.60	18.4	24	ASL09-30-01-81	1SBL103001R8101		1.6
0.75	1.9	MS116-2.5	1SAM250000R1007		1.60...2.50	28.75	24	ASL09-30-01-81	1SBL103001R8101		2.5
1.1	2.7	MS116-4.0	1SAM250000R1008		2.50...4.00	50	24	ASL09-30-01-81	1SBL103001R8101		4
1.5	3.6	MS116-4.0	1SAM250000R1008		2.50...4.00	50	24	ASL09-30-01-81	1SBL103001R8101		4
2.2	4.9	MS116-6.3	1SAM250000R1009		4.00...6.30	78.75	24	ASL09-30-01-81	1SBL103001R8101		6.3
3	6.5	MS116-10	1SAM250000R1010		6.30...10.0	150	24	ASL12-30-01-81	1SBL113001R8101		10
4	8.5	MS116-10	1SAM250000R1010		6.30...10.0	150	24	ASL12-30-01-81	1SBL113001R8101		10
5.5	11.5	MS116-12	1SAM250000R1012		8.00...12.0	180	24	ASL12-30-01-81	1SBL113001R8101		12
7.5	15.5	MS116-16	1SAM250000R1011		10.0...16.0	240	24	ASL16-30-01-81	1SBL123001R8101		15.5

Note: for multiple packaging, please contact your ABB local sales organization.

(1) Other control voltages see voltage code table.


BEA16-3



VM3

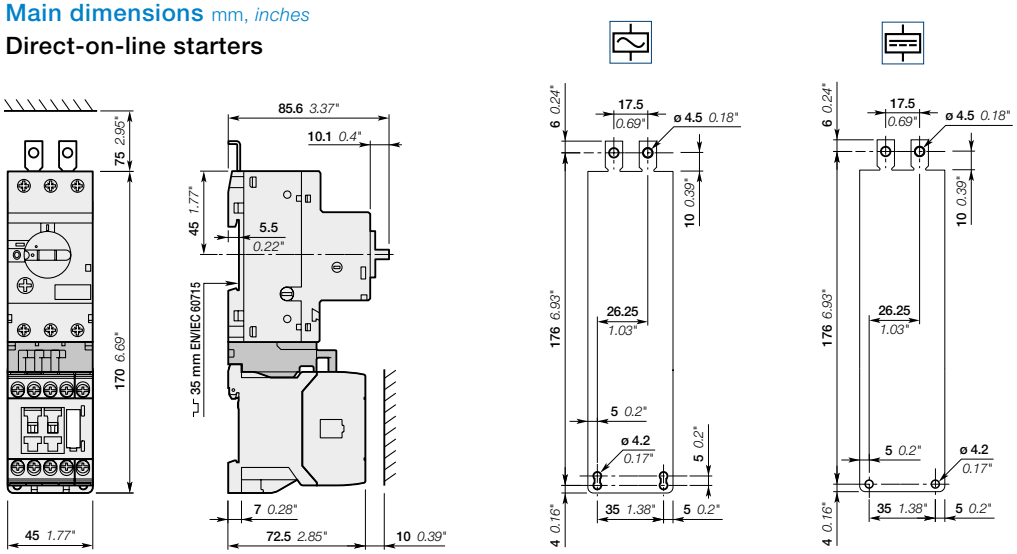
Main accessories	Type	Order code
Connecting link for manual motor starter	BEA16-3	1SBN081006T1000
Connection set for reversing starter	BER16C-3	1SBN081012R1000
Mechanical interlock unit	VM3	1SBN031005T1000

1SBC101273S0201 - Rev. A

DOL starters protected by MS116 manual motor starters
With AS, ASL contactors - open type version in kit form

Main dimensions mm, *inches*

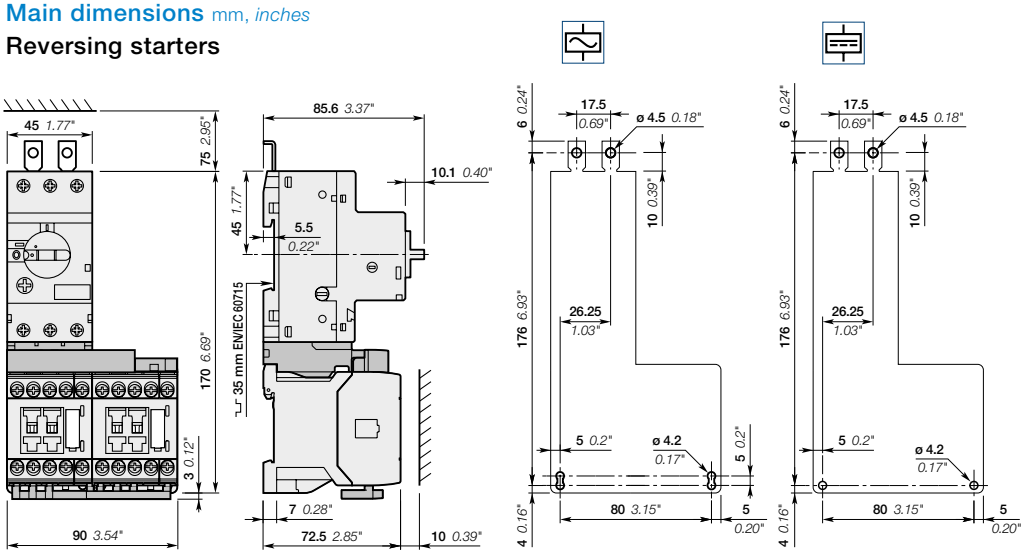
Direct-on-line starters



MS116
+ BEA16-3
+ AS09, ASL09, AS12, ASL12, AS16, ASL16

Reversing starters protected by MS116 manual motor starters
With AS, ASL contactors - open type version in kit form

Main dimensions mm, *inches*
Reversing starters

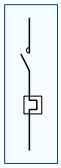


MS116
+ BEA16-3 + BER16C-3 + VM3
+ AS09, ASL09, AS12, ASL12, AS16, ASL16

1SBC101278S0201

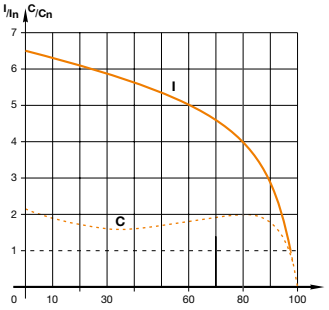
DOL & reversing starters protected by thermal overload relays
With AS, ASL contactors - open type version in kit form

AS09-30-10 + T16

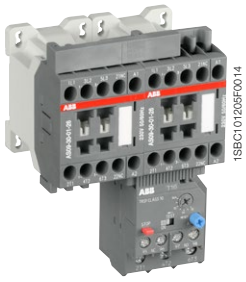


Application

Full voltage direct-on-line and reversing starting for controlling three-phase asynchronous motors is a simple and economic solution characterised by a high starting torque (1.9 to 2.1 times full-speed torque) and a starting current 5.5 to 7 times nominal current.



I = current
C = torque
In = nominal current
Cn = nominal torque



AS09-30-01 + BER16C + VM3 + T16

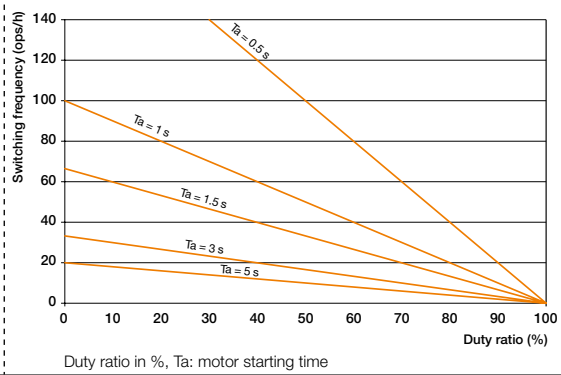
Coordination types

The contactor, the short-circuit protection device and the thermal overload relay control and protect motors against overload and short-circuits according to coordination types 1 and 2 (IEC 60947-4-1 / EN 60947-4-1) defining the anticipated level of service continuity as follow:

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.

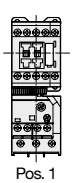
Main technical data

Standards	IEC 60947-4-1 / EN 60947-4-1
Rated operational voltage Ue max.	690 V - 50/60 Hz
Rated insulation voltage Ui according to IEC 60947-4-1	690 V
Air temperature close to the device	≤ 60 °C
Degree of protection	IP20
Switching frequency Thermal overload relays 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 operating cycles per hour.	 Duty ratio in %, Ta: motor starting time

Note: Minimum switchover delay of 50 ms must be introduced between respective opening and closing of AC operated reversing contactors

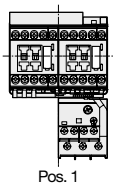
Mounting positions

Direct-on-line



Pos. 1

Reversing

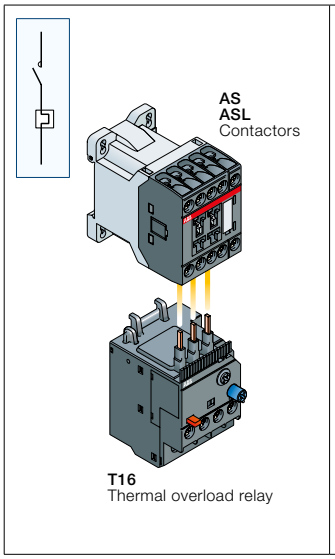


Pos. 1

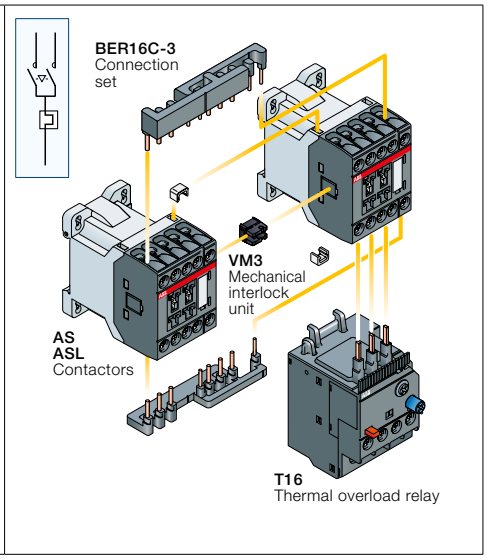
1SBC101275S0201

DOL & reversing starters protected by thermal overload relays
With AS, ASL contactors - open type version in kit form

Direct-on-line starters



Reversing starters



Description

You can easily assemble a direct-on-line starter by connecting AS or ASL contactors and T16 thermal overload relay.

You can easily assemble reversing starter thanks to our complete range of accessories:

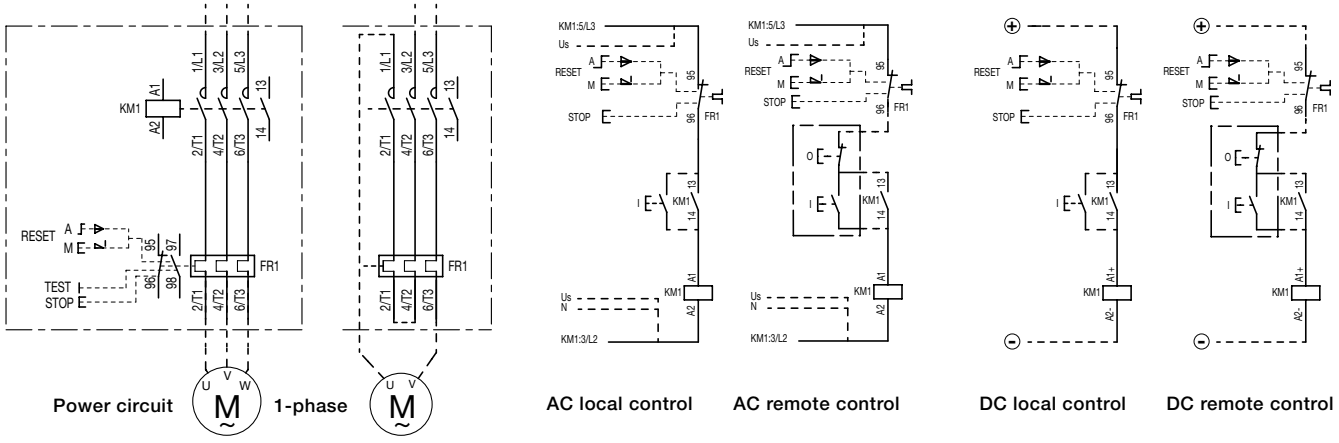
- VM3 mechanical interlock unit: just clip it between the 2 contactors without increasing starter length.
- BER16C-3 connection set: it assures a safe and simple reversing connection between both contactor main terminals and an electrical interlocking between coil and N.C. built-in auxiliary contact terminals of both contactors.

Select now easily and quickly your starter in the following pages at 400 V, up to 7.5 kW.

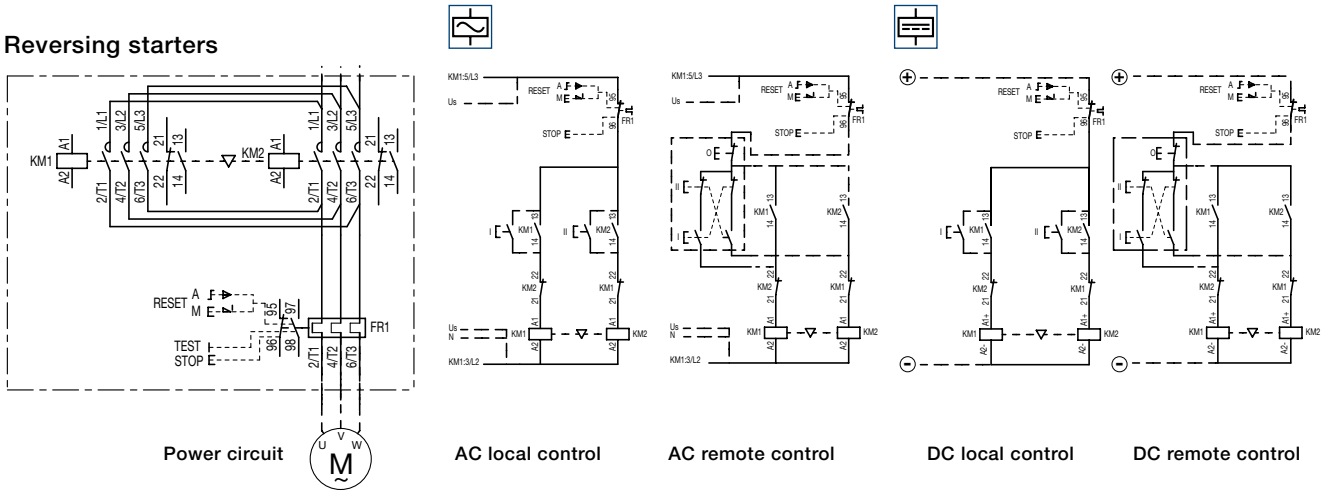
For complete coordination tables, please contact your ABB local sales organization.

Wiring diagrams

Direct-on-line starters



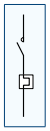
Reversing starters

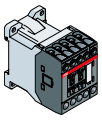
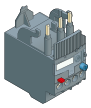


1SBC101275S0201

DOL starters protected by thermal overload relays
With AS, ASL contactors - open type version in kit form

Contactors - AC operated



Contactors						Thermal overload relays			Accessories
									
IEC AC-3, 400 V Rated operational power kW	current A	Rated control circuit voltage Uc (1) V 50 Hz	V 60 Hz	Type	Order code	Setting ranges A ... A	Type	Order code	
4	8.5	24	24	AS09-30-10-20	1SBL101001R2010	7.60...10.0	T16-10	1SAZ711201R1043	-
		230	230	AS09-30-10-26	1SBL101001R2610				
5.5	11.5	24	24	AS12-30-10-20	1SBL111001R2010	10.0...13.0	T16-13	1SAZ711201R1045	-
		230	230	AS12-30-10-26	1SBL111001R2610				
7.5	15.5	24	24	AS16-30-10-20	1SBL121001R2010	13.0...16.0	T16-16	1SAZ711201R1047	-
		230	230	AS16-30-10-26	1SBL121001R2610				

Contactors - DC operated

IEC AC-3, 400 V Rated operational power kW	current A	Rated control circuit voltage Uc (1) DC	Type	Order code	Setting ranges A ... A	Type	Order code	
4	8.5	24	ASL09-30-10-81	1SBL103001R8110	7.60...10.0	T16-10	1SAZ711201R1043	-
5.5	11.5	24	ASL12-30-10-81	1SBL113001R8110	10.0...13.0	T16-13	1SAZ711201R1045	-
7.5	15.5	24	ASL16-30-10-81	1SBL123001R8110	13.0...16.0	T16-16	1SAZ711201R1047	-

Note: for multiple packaging, please contact your ABB local sales organization.
(1) Other control voltages see voltage code table.

see table below for all setting ranges

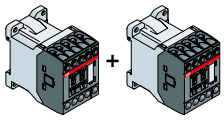
Setting ranges A ... A	Type	Order code
0.10...0.13	T16-0.13	1SAZ711201R1005
0.13...0.17	T16-0.17	1SAZ711201R1008
0.17...0.23	T16-0.23	1SAZ711201R1009
0.23...0.31	T16-0.31	1SAZ711201R1013
0.31...0.41	T16-0.41	1SAZ711201R1014
0.41...0.55	T16-0.55	1SAZ711201R1017
0.55...0.74	T16-0.74	1SAZ711201R1021
0.74...1.00	T16-1.0	1SAZ711201R1023
1.00...1.30	T16-1.3	1SAZ711201R1025
1.30...1.70	T16-1.7	1SAZ711201R1028
1.70...2.30	T16-2.3	1SAZ711201R1031
2.30...3.10	T16-3.1	1SAZ711201R1033
3.10...4.20	T16-4.2	1SAZ711201R1035
4.20...5.70	T16-5.7	1SAZ711201R1038
5.70...7.60	T16-7.6	1SAZ711201R1040
7.60...10.0	T16-10	1SAZ711201R1043
10.0...13.0	T16-13	1SAZ711201R1045
13.0...16.0	T16-16	1SAZ711201R1047

1SBC101280S0201 - Rev. A

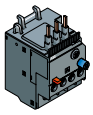
Reversing starters protected by thermal overload relays
With AS, ASL contactors - open type version in kit form

Contactors - AC operated

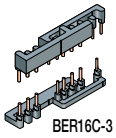
Contactors

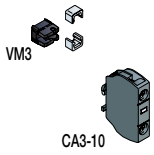


Thermal overload relays



Accessories





IEC AC-3, 400 V Rated operational power kW	current A	Rated control circuit voltage Uc (1) V 50 Hz	V 60 Hz	Type	Order code	Setting ranges A ... A	Type	Order code	Type	Order code
4	8.5	24	24	AS09-30-01-20	1SBL101001R2001	7.60...10.0	T16-10	1SAZ711201R1043	BER16C-3 + VM3 + 2x CA3-10	1SBN081012R1000 + 1SBN031005T1000 + 1SBN011010T1010
		230	230	AS09-30-01-26	1SBL101001R2601					
5.5	11.5	24	24	AS12-30-01-20	1SBL111001R2001	10.0...13.0	T16-13	1SAZ711201R1045	BER16C-3 + VM3 + 2x CA3-10	1SBN081012R1000 + 1SBN031005T1000 + 1SBN011010T1010
		230	230	AS12-30-01-26	1SBL111001R2601					
7.5	15.5	24	24	AS16-30-01-20	1SBL121001R2001	13.0...16.0	T16-16	1SAZ711201R1047	BER16C-3 + VM3 + 2x CA3-10	1SBN081012R1000 + 1SBN031005T1000 + 1SBN011010T1010
		230	230	AS16-30-01-26	1SBL121001R2601					

Contactors - DC operated

IEC AC-3, 400 V Rated operational power kW	current A	Rated control circuit voltage Uc (1) DC	Type	Order code	Setting ranges A ... A	Type	Order code	Type	Order code
4	8.5	24	ASL09-30-10-81	1SBL103001R8110	7.60...10.0	T16-10	1SAZ711201R1043	BER16C-3 + VM3 + 2x CA3-10	1SBN081012R1000 + 1SBN031005T1000 + 1SBN011010T1010
5.5	11.5	24	ASL12-30-10-81	1SBL113001R8110	10.0...13.0	T16-13	1SAZ711201R1045	BER16C-3 + VM3 + 2x CA3-10	1SBN081012R1000 + 1SBN031005T1000 + 1SBN011010T1010
7.5	15.5	24	ASL16-30-10-81	1SBL123001R8110	13.0...16.0	T16-16	1SAZ711201R1047	BER16C-3 + VM3 + 2x CA3-10	1SBN081012R1000 + 1SBN031005T1000 + 1SBN011010T1010

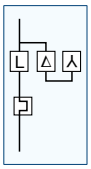
Note: for multiple packaging, please contact your ABB local sales organization.
(1) Other control voltages see voltage code table.

see table below for all setting ranges

Setting ranges A ... A	Type	Order code
0.10...0.13	T16-0.13	1SAZ711201R1005
0.13...0.17	T16-0.17	1SAZ711201R1008
0.17...0.23	T16-0.23	1SAZ711201R1009
0.23...0.31	T16-0.31	1SAZ711201R1013
0.31...0.41	T16-0.41	1SAZ711201R1014
0.41...0.55	T16-0.55	1SAZ711201R1017
0.55...0.74	T16-0.74	1SAZ711201R1021
0.74...1.00	T16-1.0	1SAZ711201R1023
1.00...1.30	T16-1.3	1SAZ711201R1025
1.30...1.70	T16-1.7	1SAZ711201R1028
1.70...2.30	T16-2.3	1SAZ711201R1031
2.30...3.10	T16-3.1	1SAZ711201R1033
3.10...4.20	T16-4.2	1SAZ711201R1035
4.20...5.70	T16-5.7	1SAZ711201R1038
5.70...7.60	T16-7.6	1SAZ711201R1040
7.60...10.0	T16-10	1SAZ711201R1043
10.0...13.0	T16-13	1SAZ711201R1045
13.0...16.0	T16-16	1SAZ711201R1047

1SBC101280S0201 - Rev. A

Star-delta starters protected by thermal overload relays
With AS, ASL contactors - open type version in kit form



AS09-30-10 + AS09-30-01 + AS09-30-01 + BEY16C-3 + VM3 + CT-SDS + CA3-10 + T16

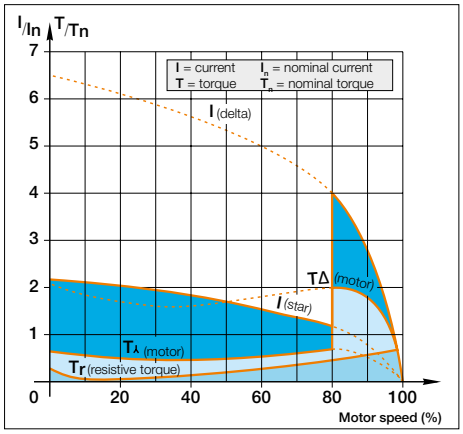
Application

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.

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.
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...



Precaution

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

Sequence

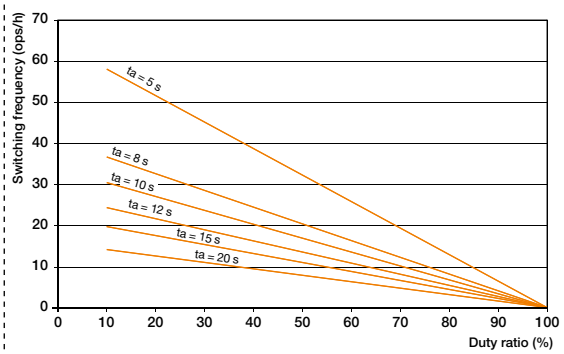
Starting is a three-stage process:

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 (6 to 10 s) then begins.

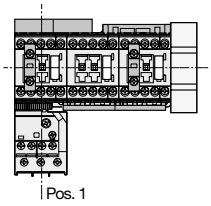
2nd stage: "Star" to "Delta" switching - when programmed starting time is over, the KM2 "Star" contactor opens.

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 CT-SDS timer. This prevent short-circuit between "star" and "delta".

Main technical data

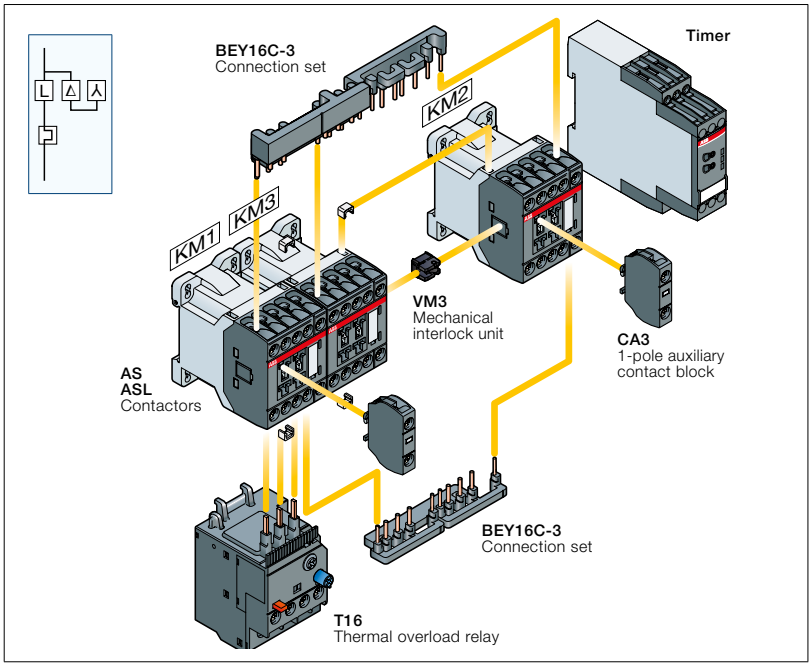
Standards	IEC 60947-4-1 / EN 60947-4-1
Rated operational voltage Ue max.	690 V - 50/60 Hz
Rated insulation voltage Ui according to IEC 60947-4-1	690 V
Air temperature close to the device	≤ 60 °C
Degree of protection	IP20
Switching frequency Switching frequency/hour, according to acceleration time and load factor. Respect of the following conditions enables utilization of the starter without excessive overheating of the connections or nuisance tripping of the thermal overload relay. Example: – Switching frequency = 15 starts/hr – Motor starting time "Ta" = 7 s (use 8 s curve) – Maximum load factor = 63 %. This corresponds to a 4-minute operating cycle (15 starts/hr) with 7 seconds acceleration, 2.5 minutes operation and 1.5 minutes rest.	 Duty ratio in %, Ta: acceleration time

Mounting positions



1SBC101288S0201

Star-delta starters protected by thermal overload relays
With AS, ASL contactors - open type version in kit form



Description

You can easily assemble a star-delta starter thanks to our complete range of accessories:

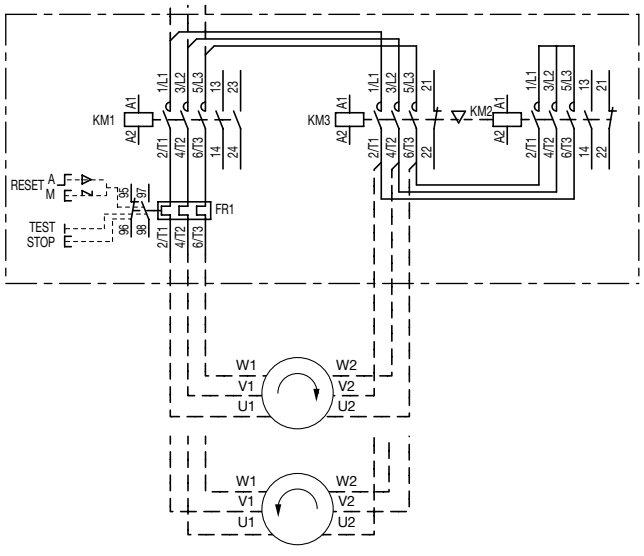
– VM3 mechanical interlock unit: just clip it between the 2 contactors without increasing starter length.
– BEY16C-3 connection set: it assures a safe and simple connection between contactors main terminals and an electrical interlocking between coil and N.C. built-in auxiliary contact terminals of star and delta contactors.

Select now easily and quickly your starter in the following pages at 400 V, up to 11 kW.

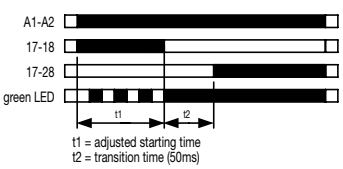
For complete coordination tables, please contact your ABB local sales organization.

4

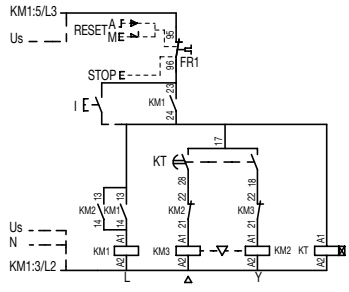
Wiring diagrams



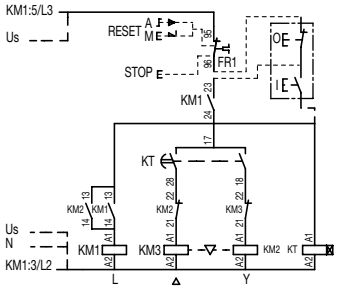
Function diagram Electronic Timer



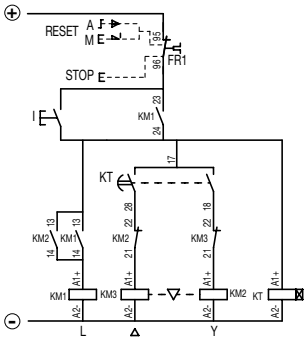
t1 = adjusted starting time
t2 = transition time (50ms)



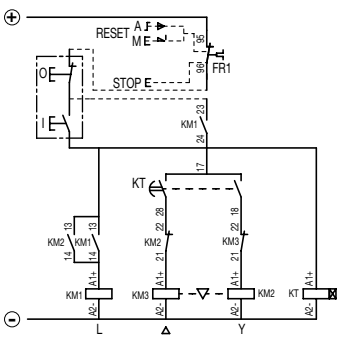
AC local control



AC remote control



DC local control

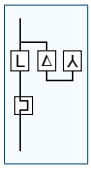


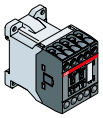
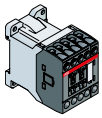
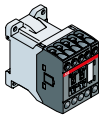
DC remote control

1SBC101288S0201

Star-delta starters protected by thermal overload relays
With AS, ASL contactors - open type version in kit form

Contactors - AC operated



				Line contactor KM1		Delta contactor KM3		Star contactor KM2	
									
IEC AC-3, 400 V Rated operational power	current	Rated control circuit voltage Uc (1)		Type	Order code	Type	Order code	Type	Order code
kW	A	V 50 Hz	V 60 Hz						
7.5	15.5	24	24	AS09-30-10-20	1SBL101001R2010	AS09-30-01-20	1SBL101001R2001	AS09-30-01-20	1SBL101001R2001
		230	230	AS09-30-10-26	1SBL101001R2610	AS09-30-01-26	1SBL101001R2601	AS09-30-01-26	1SBL101001R2601
11	22	24	24	AS12-30-10-20	1SBL111001R2010	AS12-30-01-20	1SBL111001R2001	AS09-30-01-20	1SBL101001R2001
		230	230	AS12-30-10-26	1SBL111001R2610	AS12-30-01-26	1SBL111001R2601	AS09-30-01-26	1SBL101001R2601

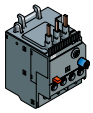
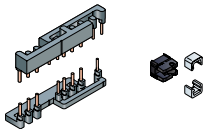
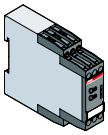
Contactors - DC operated

IEC AC-3, 400 V Rated operational power	current	Rated control circuit voltage Uc (1)	Type	Order code	Type	Order code	Type	Order code
kW	A	DC						
7.5	15.5	24	ASL09-30-10-81	1SBL103001R8110	ASL09-30-01-81	1SBL103001R8101	ASL09-30-01-81	1SBL103001R8101
11	22	24	ASL12-30-10-81	1SBL113001R8110	ASL12-30-01-81	1SBL113001R8101	ASL09-30-01-81	1SBL103001R8101

Note: for multiple packaging, please contact your ABB local sales organization.
(1) Other control voltages see voltage code table.

1SBC101281S0201 - Rev. A

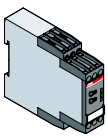
Star-delta starters protected by thermal overload relays
With AS, ASL contactors - open type version in kit form

	Thermal overload relays		Connection sets Mechanical interlock unit		Auxiliary contact block		Electronic timer	
	 The setting current value is: nominal motor current x 0.58							
Setting ranges A ... A	Type	Order code	Type	Order code	Type	Order code	Type	Order code
7.60...10.0	T16-10	1SAZ711201R1043	BEY16C-3 + VM3	1SBN081018R2000 + 1SBN031005T1000	**KM1:** 1 x CA3-10 **KM2:** 1 x CA3-10	1SBN011010T1010 1SBN011010T1010	CT-SDS...	see "Ordering Details"
10.0...13.0	T16-13	1SAZ711201R1045	BEY16C-3 + VM3	1SBN081018R2000 + 1SBN031005T1000	**KM1:** 1 x CA3-10 **KM2:** 1 x CA3-10	1SBN011010T1010 1SBN011010T1010	CT-SDS...	see "Ordering Details"

Setting ranges A ... A	Type	Order code	Type	Order code	Type	Order code	Type	Order code
7.60...10.0	T16-10	1SAZ711201R1043	BEY16C-3 + VM3	1SBN081018R2000 + 1SBN031005T1000	**KM1:** 1 x CA3-10 **KM2:** 1 x CA3-10	1SBN011010T1010 1SBN011010T1010	CT-SDS...	see "Ordering Details"
10.0...13.0	T16-13	1SAZ711201R1045	BEY16C-3 + VM3	1SBN081018R2000 + 1SBN031005T1000	**KM1:** 1 x CA3-10 **KM2:** 1 x CA3-10	1SBN011010T1010 1SBN011010T1010	CT-SDS...	see "Ordering Details"

see table below for all setting ranges

Setting ranges A ... A	Type	Order code
0.10...0.13	T16-0.13	1SAZ711201R1005
0.13...0.17	T16-0.17	1SAZ711201R1008
0.17...0.23	T16-0.23	1SAZ711201R1009
0.23...0.31	T16-0.31	1SAZ711201R1013
0.31...0.41	T16-0.41	1SAZ711201R1014
0.41...0.55	T16-0.55	1SAZ711201R1017
0.55...0.74	T16-0.74	1SAZ711201R1021
0.74...1.00	T16-1.0	1SAZ711201R1023
1.00...1.30	T16-1.3	1SAZ711201R1025
1.30...1.70	T16-1.7	1SAZ711201R1028
1.70...2.30	T16-2.3	1SAZ711201R1031
2.30...3.10	T16-3.1	1SAZ711201R1033
3.10...4.20	T16-4.2	1SAZ711201R1035
4.20...5.70	T16-5.7	1SAZ711201R1038
5.70...7.60	T16-7.6	1SAZ711201R1040
7.60...10.0	T16-10	1SAZ711201R1043
10.0...13.0	T16-13	1SAZ711201R1045
13.0...16.0	T16-16	1SAZ711201R1047


CT-SDS...

Ordering details - Main accessories

		Type	Order code		Pkg qty	Weight (1 pce) kg
Electronic timer*	28-48 V DC 24-240 V AC	CT-SDS.22S	1SVR730210R3300		1	0.114
	380-440 V AC	CT-SDS.23S	1SVR730211R2300		1	0.118

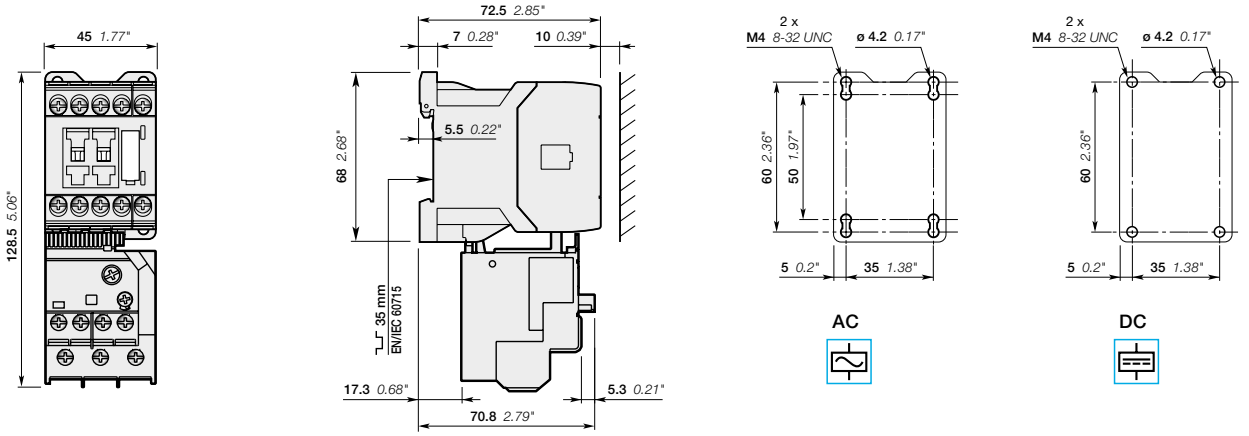
* 7 time ranges (0.05 s - 10 min), 50 ms transition time, 2 n/o contacts, 3 LEDs

1SBC101281S0201 - Rev. A

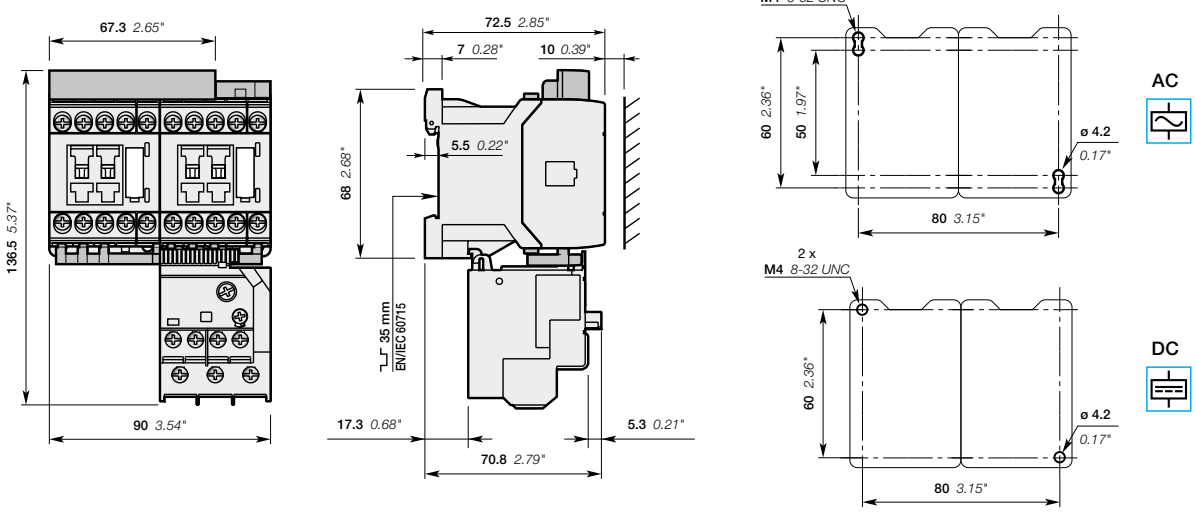
Protected by thermal overload relays
With AS, ASL contactors - open type version in kit form

Main dimensions mm, *inches*

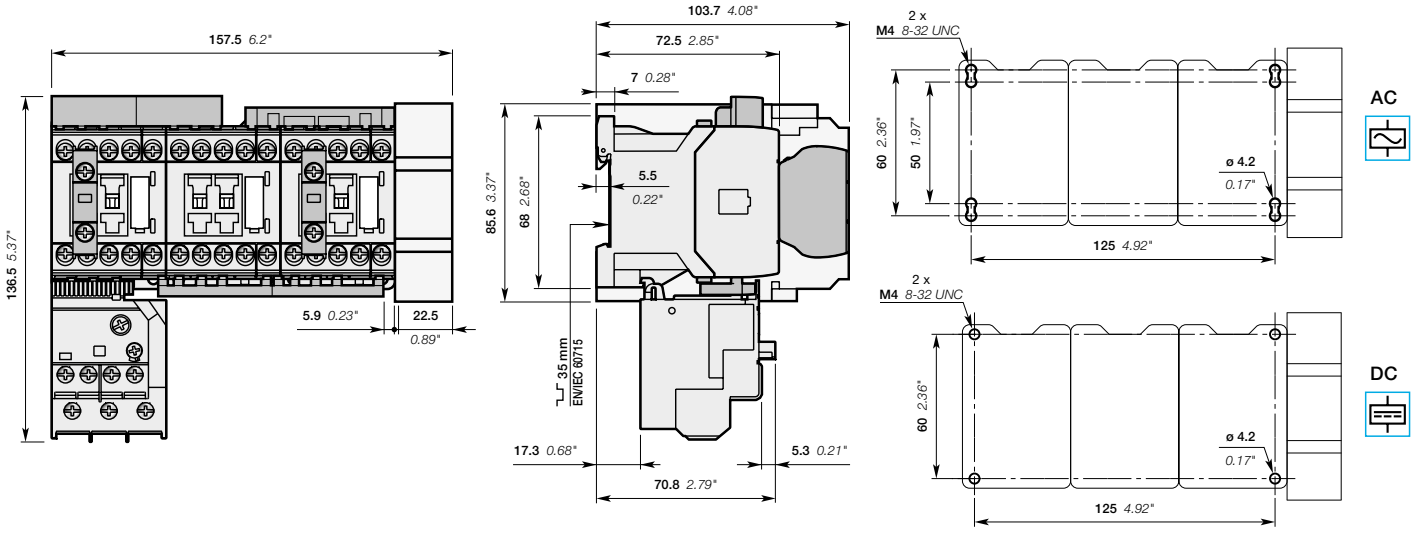
Direct-on-line starters



Reversing starters



Star-delta starters



1SBC101293S0201

Notes

1L1
3L2
5L3
13NO
A1
ABB
220 V 50/60 Hz
2T1
4T2
6T3
14NO
A2
1L1
3L2
5L3
21NC
A1
ABB
220 V 50/60 Hz
2T1
4T2
6T3
22NC
A2

3-pole contactors and contactor relays with screw terminals

3-pole contactors

Overview		**4**/32
AS09 ... AS16	AC operated	**4**/34
ASL09 ... ASL16	DC operated	**4**/35
AS09 ... AS16	AC operated - 2-stack	**4**/36
ASL09 ... ASL16	DC operated - 2-stack	**4**/37
Main accessories		**4**/38
Technical data		**4**/40
Electrical durability		**4**/46
Terminal marking and postioning		**4**/48
Dimensions		**4**/50

Contactor relays

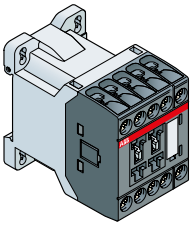
Overview		**4**/54
NS	AC operated	**4**/56
NSL	DC operated	**4**/57
Main accessories		**4**/58
Technical data		**4**/60
Terminal marking and positioning		**4**/64
Dimensions		**4**/66

Accessories

Auxiliary contact blocks		**4**/68
Technical data		**4**/69
Electrical durability		**4**/70
Electronic timers		**4**/71
Technical data		**4**/72
Surge suppressors		**4**/74
Technical data		**4**/75
Mechanical interlock unit and other accessories		**4**/76
Connection accessories for starting solutions		**4**/77

Voltage code table **4/78**

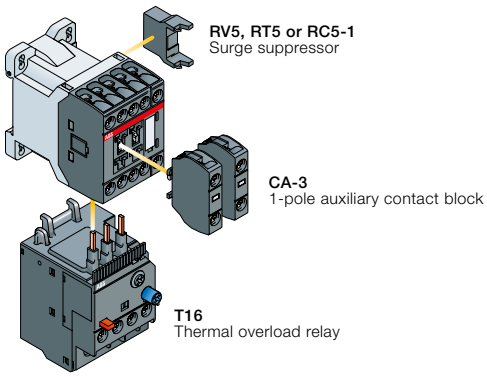
3-pole contactors
Main accessories



AS09 ... AS16
3-pole contactors

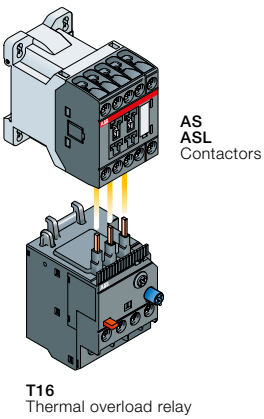
4

Main accessories for contactors

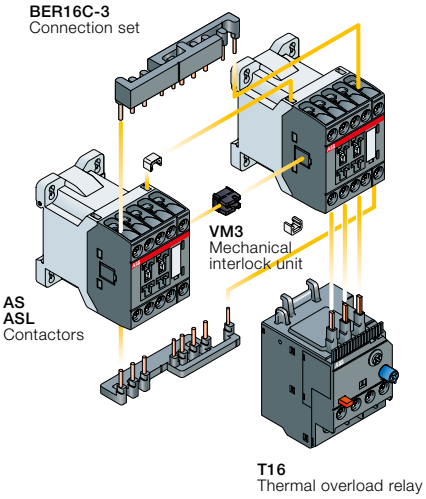


Main accessories for starting solutions

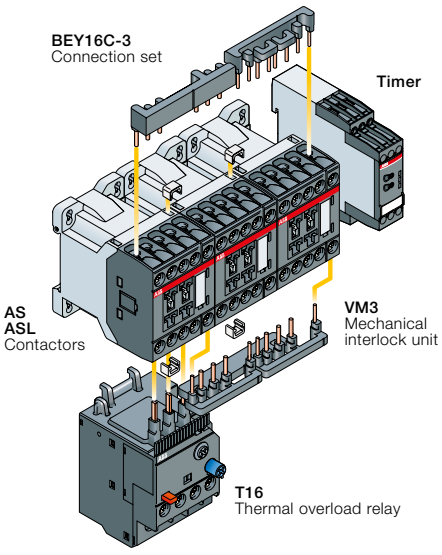
Direct-on-line starter



Reversing starter



Star-delta starter



1SBC101292S0201

3-pole contactors

Screw terminals

AC control voltage	AS09	AS12	AS16
DC control voltage	ASL09	ASL12	ASL16

Switching of 3-phase cage motors

IEC	AC-3	Rated operational power		400 V	4 kW	5.5 kW	7.5 kW
		Rated operational current	θ ≤ 60 °C	400 V	9 A	12 A	15.5 A
			θ ≤ 60 °C	415 V	9 A	12 A	15.5 A
			θ ≤ 60 °C	690 V	5 A	7 A	9 A
UL / CSA	3-phase motor rating			440-480 V	5 hp	7.5 hp	10 hp
NEMA size					00	00	0

Protection of 3-phase motors

Thermal overload relays

T16...					
0.10...**0.13**	0.23...**0.31**	0.55...**0.74**	1.30...**1.70**	3.10...**4.20**	7.60...**10.0**
0.13...**0.17**	0.31...**0.41**	0.74...**1.00**	1.70...**2.30**	4.20...**5.70**	10.0...**13.0**
0.17...**0.23**	0.41...**0.55**	1.00...**1.30**	2.30...**3.10**	5.70...**7.60**	13.0...**16.0**

Switching of resistive circuits

IEC	AC-1	Rated operational current	θ ≤ 40 °C	690 V	22 A	24 A	24 A
			θ ≤ 60 °C	690 V	18 A	20 A	20 A
			θ ≤ 70 °C	690 V	15 A	16 A	16 A
	With conductor cross-sectional area				2.5 mm²	2.5 mm²	2.5 mm²
UL / CSA	General use rating		600 V AC		20 A	20 A	20 A
	With conductor cross-sectional area				AWG 12	AWG 12	AWG 12

Main accessories

Auxiliary contact blocks	Front mounting		1-pole **CA3-10** or **CA3-01**
Interlocks	Mechanical		**VM3**
Surge suppressors	Side-mounted (without additional width)		**RV5** (Varistor) AC / DC **RC5-1** (Capacitor) AC **RT5** (Transil diode) DC
Connection sets	Reversing starters Star-delta starters		**BER16C-3** **BEY16C-3**
Connecting link	With manual motor starter		**BEA16-3**

1SBC101292S0201

AS09 ... AS16 3-pole contactors
4 to 7.5 kW
AC operated

AS09-30-10

Description

AS09 ... AS16 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

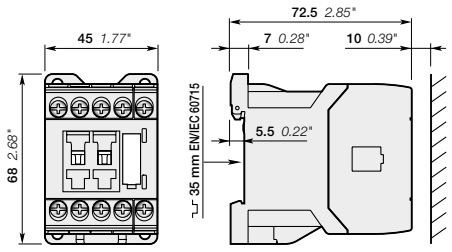
– 3 main poles and 1 built-in auxiliary contact
– control circuit: AC operated
– add-on auxiliary contact blocks for front mounting and a comprehensive range of accessories.

Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50 Hz	V 60 Hz						kg
4	22	5	20	24	24	1	0	AS09-30-10-20	1SBL101001R2010		0.220
						0	1	AS09-30-01-20	1SBL101001R2001		0.220
				230	230	1	0	AS09-30-10-26	1SBL101001R2610		0.220
						0	1	AS09-30-01-26	1SBL101001R2601		0.220
5.5	24	7.5	20	24	24	1	0	AS12-30-10-20	1SBL111001R2010		0.220
						0	1	AS12-30-01-20	1SBL111001R2001		0.220
				230	230	1	0	AS12-30-10-26	1SBL111001R2610		0.220
						0	1	AS12-30-01-26	1SBL111001R2601		0.220
7.5	24	10	20	24	24	1	0	AS16-30-10-20	1SBL121001R2010		0.220
						0	1	AS16-30-01-20	1SBL121001R2001		0.220
				230	230	1	0	AS16-30-10-26	1SBL121001R2610		0.220
						0	1	AS16-30-01-26	1SBL121001R2601		0.220

Note: for multiple packaging, please contact your ABB local sales organization.
(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



AS09, AS12, AS16

1SBC101301S0201 - Rev. A

ASL09 ... ASL16 3-pole contactors
4 to 7.5 kW
DC operated

ASL09-30-10

Description

ASL09 ... ASL16 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

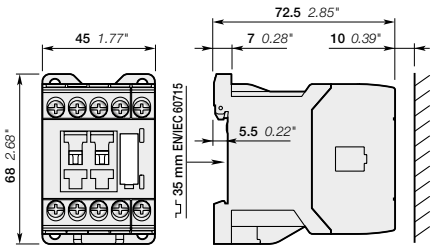
– 3 main poles and 1 built-in auxiliary contact
– control circuit: low consumption (3 W at pull-in and holding) DC operated with solid core magnet. Suitable for direct control by PLC outputs (the polarity on the coil terminals A1+ and A2- must be respected)
– add-on auxiliary contact blocks for front mounting and a comprehensive range of accessories.

Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc (1)	Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							Pkg (1 pce)
kW	A	hp	A	V DC						kg
4	22	5	20	24	1	0	ASL09-30-10-81	1SBL103001R8110		0.280
					0	1	ASL09-30-01-81	1SBL103001R8101		0.280
5.5	24	7.5	20	24	1	0	ASL12-30-10-81	1SBL113001R8110		0.280
					0	1	ASL12-30-01-81	1SBL113001R8101		0.280
7.5	24	10	20	24	1	0	ASL16-30-10-81	1SBL123001R8110		0.280
					0	1	ASL16-30-01-81	1SBL123001R8101		0.280

Note: for multiple packaging, please contact your ABB local sales organization.
(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



ASL09, ASL12, ASL16

AS09 ... AS16 2-stack 3-pole contactors
4 to 7.5 kW
AC operated

AS09-30-32

4

Description

AS09 ... AS16 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

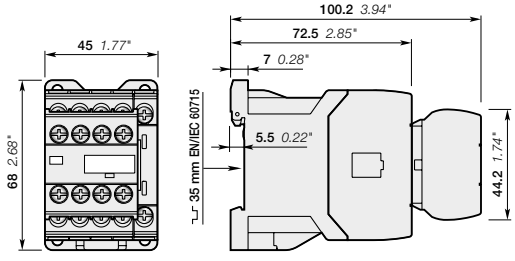
– 1st stack with 3 main poles and 1 N.O. built-in auxiliary contact
– 2nd stack with permanently fixed 2 N.O. + 2 N.C. auxiliary contact block. The auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
– control circuit: AC operated
– a comprehensive range of accessories.

Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50 Hz	V 60 Hz						kg
4	22	5	20	24	24	3	2	AS09-30-32-20	1SBL101001R2032		0.260
				230	230	3	2	AS09-30-32-26	1SBL101001R2632		0.260
5.5	24	7.5	20	24	24	3	2	AS12-30-32-20	1SBL111001R2032		0.260
				230	230	3	2	AS12-30-32-26	1SBL111001R2632		0.260
7.5	24	10	20	24	24	3	2	AS16-30-32-20	1SBL121001R2032		0.260
				230	230	3	2	AS16-30-32-26	1SBL121001R2632		0.260

Note: for multiple packaging, please contact your ABB local sales organization.
(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



AS09, AS12, AS16

1SBC101303S0201 - Rev. A

ASL09 ... ASL16 2-stack 3-pole contactors
4 to 7.5 kW
DC operated

ASL09-30-32

Description

ASL09 ... ASL16 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

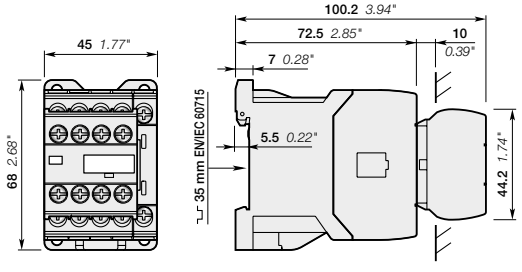
– 1st stack with 3 main poles and 1 N.O. built-in auxiliary contact
– 2nd stack with permanently fixed 2 N.O. + 2 N.C. auxiliary contact block. The auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
– control circuit: low consumption (3 W at pull-in and holding) DC operated with solid core magnet. Suitable for direct control by PLC outputs (the polarity on the coil terminals A1+ and A2- must be respected)
– a comprehensive range of accessories.

Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc (1)	Auxiliary contacts fitted		Type	Order code		Weight Pkg (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							
kW	A	hp	A	V DC						kg
4	22	5	20	24	3	2	ASL09-30-32-81	1SBL103001R8132		0.320
5.5	24	7.5	20	24	3	2	ASL12-30-32-81	1SBL113001R8132		0.320
7.5	24	10	20	24	3	2	ASL16-30-32-81	1SBL123001R8132		0.320

Note: for multiple packaging, please contact your ABB local sales organization.
(1) Other control voltages see voltage code table.

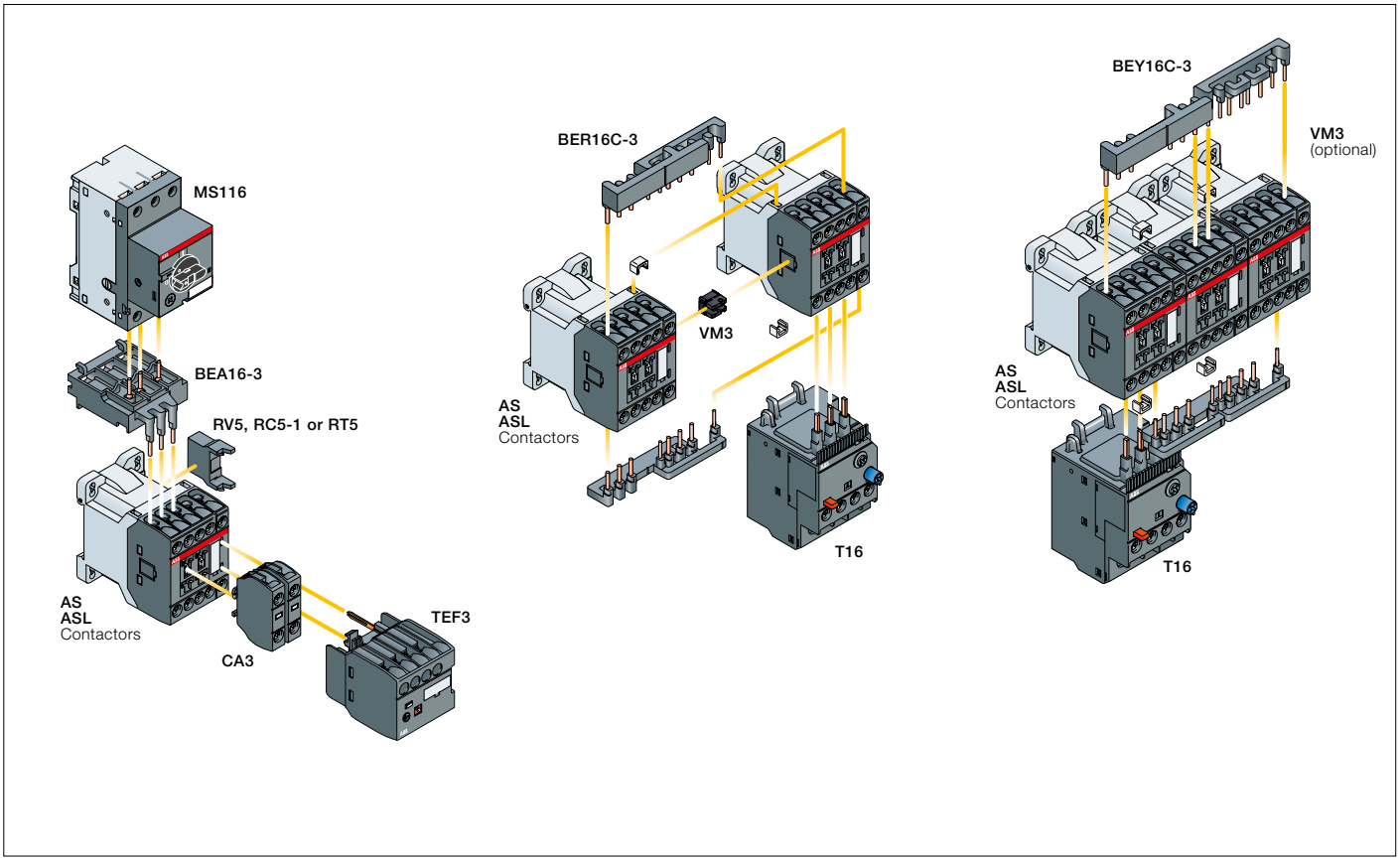
Main dimensions mm, *inches*



ASL09, ASL12, ASL16

AS09 ... AS16 and
ASL09 ... ASL16 3-pole contactors
Main accessories

Contactor and main accessories (other accessories available)



Main accessory fitting details

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

Contactor types	Main poles	Built-in auxiliary contacts	Front-mounted accessories						Side-mounted accessories		
			Auxiliary contact blocks		Electronic timer		Mechanical interlock unit (between 2 contactors)				
			1-pole CA3		TEF3		VM3		Surge suppressors		
AS09 ... AS16	3 0 3 0	1 0 0 1	2 max.	or	1	+	1	+	RV5	or	RC5-1
AS09 ... AS16	3 0	3 2	–		–		1	+	RV5	or	RC5-1
ASL09 ... ASL16	3 0 3 0	1 0 0 1	2 max.	or	1	+	1	+	RV5	or	RT5
ASL09 ... ASL16	3 0	3 2	–		–		1	+	RV5	or	RT5

Overload relays fitting details (1)

Contactor types	Thermal overload relays
AS09 ... AS16 ASL09 ... ASL16	T16 (0.10...16 A)

The addition of an overload relay on the contactor does not prevent fitting of many other accessories as shown above.
(1) Direct mounting - No kit required.

1SBC101297S0201

AS09 ... AS16 and ASL09 ... ASL16 3-pole contactors
Main accessories

CA3-10

Front-mounted instantaneous auxiliary contact blocks

For contactors	Auxiliary contacts		Type	Order code	Pkg qty	Weight (1 pce) kg
AS09 ... AS16	1	0	CA3-10	1SBN011010T1010	10	0.011
ASL09 ... ASL16	0	1	CA3-01	1SBN011010T1001	10	0.011

TEF3-ON

Front-mounted electronic timer

For contactors	Rated control circuit voltage - Uc V	Type	Order code	Pkg qty	Weight (1 pce) kg
ON-delay					
AS09 ... AS16, ASL09 ... ASL16	24...240 V AC/DC	TEF3-ON	1SBN021012R1000	1	0.065
OFF-delay					
AS09 ... AS16, ASL09 ... ASL16	24...240 V AC/DC	TEF3-OFF	1SBN021014R1000	1	0.065

VM3

Mechanical interlock unit

For contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
AS09 ... AS16, ASL09 ... ASL16	VM3	1SBN031005T1000	10	0.002

RV5

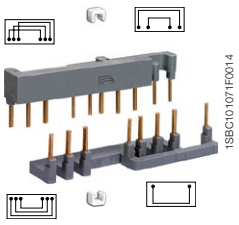
Surge suppressors

For contactors	Rated control circuit voltage - Uc V	AC	DC	Type	Order code	Pkg qty	Weight (1 pce) kg
AS09 ... AS16, ASL09 ... ASL16	24...50	●	●	RV5/50	1SBN050010R1000	2	0.015
	50...133	●	●	RV5/133	1SBN050010R1001	2	0.015
	110...250	●	●	RV5/250	1SBN050010R1002	2	0.015
	250...440	●	●	RV5/440	1SBN050010R1003	2	0.015
AS09 ... AS16	24...50	●	–	RC5-1/50	1SBN050100R1000	2	0.012
	50...133	●	–	RC5-1/133	1SBN050100R1001	2	0.012
	110...250	●	–	RC5-1/250	1SBN050100R1002	2	0.012
	250...440	●	–	RC5-1/440	1SBN050100R1003	2	0.012
ASL09 ... ASL16	12...32	–	●	RT5/32	1SBN050020R1000	2	0.015
	25...65	–	●	RT5/65	1SBN050020R1001	2	0.015
	50...90	–	●	RT5/90	1SBN050020R1002	2	0.015
	77...150	–	●	RT5/150	1SBN050020R1003	2	0.015
	150...264	–	●	RT5/264	1SBN050020R1004	2	0.015

BEA16-3

Connecting links with manual motor starters

For contactors	Manual motor starter	Type	Order code	Pkg qty	Weight (1 pce) kg
AS09 ... AS16 ASL09 ... ASL16	MS116-0.16 ... MS116-16 MS132-0.16 ... MS132-16	BEA16-3	1SBN081006T1000	10	0.019

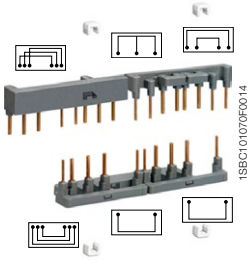


BER16C-3

Connection sets for reversing contactors

For contactors	Mechanical interlock unit	Type	Order code	Pkg qty	Weight (1 pce) kg
AS09 ... AS16, ASL09 ... ASL16	with or without VM3	BER16C-3	1SBN081012R1000	1	0.035

Note: BER16C-3 connection set includes two BB3 fixing clips, and an electrical interlocking when fitted on contactors with built-in N.C. auxiliary contacts. BER16C-3 can be used with or without VM3 mechanical interlock unit.



BEY16C-3

Connection sets for star-delta starting

For contactors	Mech. interlock unit between Star & Delta contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
AS09 ... AS12, ASL09 ... ASL12	with or without VM3	BEY16C-3	1SBN081018R2000	1	0.041

Note: BEY16C-3 connection set includes two BB3 fixing clips, and an electrical interlocking when fitted on Star and Delta contactors with built-in N.C. auxiliary contacts. BEY16C-3 can be used with or without VM3 mechanical interlock unit.

1SBC101297S0201

AS09 ... AS16 and ASL09 ... ASL16 3-pole contactors
Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC operated	AS09	AS12	AS16
	DC operated	ASL09	ASL12	ASL16
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1		
Rated operational voltage Ue max.		690 V		
Rated frequency (without derating)		50 / 60 Hz		
Conventional free-air thermal current Ith				
acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C		22 A	25 A	25 A
With conductor cross-sectional area		2.5 mm²	4 mm²	4 mm²
AC-1 Utilization category				
For air temperature close to contactor				
Ie / Rated operational current AC-1	**θ ≤ 40 °C**	22 A	24 A	24 A
Ue max. ≤ 690 V, 50/60 Hz	**θ ≤ 60 °C**	18 A	20 A	20 A
	θ ≤ 70 °C	15 A	16 A	16 A
With conductor cross-sectional area		2.5 mm²		
AC-3 Utilization category				
For air temperature close to contactor θ ≤ 60 °C				
Ie / Max. rated operational current AC-3 (1)				
	220-230-240 V	9 A	12 A	15.7 A
M 3~ 3-phase motors	**400 V**	9 A	12 A	15.5 A
	415 V	9 A	12 A	15.5 A
	440 V	8 A	11 A	13.6 A
	500 V	8 A	11 A	12.5 A
	690 V	5 A	7 A	9 A
Rated operational power AC-3 (1)				
	220-230-240 V	2.2 kW	3 kW	4 kW
M 3~ 1500 r.p.m. 50 Hz, 1800 r.p.m. 60 Hz, 3-phase motors	**400 V**	4 kW	5.5 kW	7.5 kW
	415 V	4 kW	5.5 kW	7.5 kW
	440 V	4 kW	5.5 kW	7.5 kW
	500 V	4 kW	5.5 kW	7.5 kW
	690 V	4 kW	5.5 kW	7.5 kW
Rated making capacity AC-3		10 x Ie AC-3 acc. to IEC 60947-4-1		
Rated breaking capacity AC-3		8 x Ie AC-3 acc. to IEC 60947-4-1		
AC-8a Utilization category				
(without thermal overload relay - Ue 400 V 50/60 Hz - θ ≤ 40 °C)				
Ie / Rated operational current AC-8a		12 A	16 A	22 A
Rated operational power AC-8a		5.5 kW	7.5 kW	11 kW
Short-circuit protection device for contactors				
without thermal overload relay - Motor protection excluded (2)				
Ue ≤ 500 V AC - gG type fuse		25 A		
Rated short-time withstand current Icw	**1 s**	230 A	250 A	250 A
at 40 °C ambient temperature,	**10 s**	100 A	124 A	124 A
in free air from a cold state	**30 s**	65 A	75 A	75 A
	1 min	50 A	55 A	55 A
	15 min	22 A	24 A	24 A
Maximum breaking capacity				
cos φ = 0.45	**at 440 V**	155 A		
	at 690 V	90 A		
Power dissipation per pole	**Ie / AC-1**	1 W	1.2 W	1.2 W
	Ie / AC-3	0.16 W	0.3 W	0.5 W
Max. electrical switching frequency	**AC-1**	600 cycles/h		
	AC-3	1200 cycles/h		
	AC-4	300 cycles/h		

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

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

1SBC101489S0201

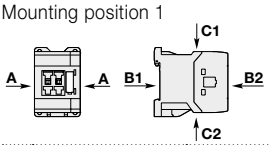
AS09 ... AS16 and ASL09 ... ASL16 3-pole contactors
Technical data

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

Contactor types	AC operated	AS09	AS12	AS16
	DC operated	ASL09	ASL12	ASL16
Standards		UL 508, CSA C22.2 N°14		
Max. operational voltage		690 V		
NEMA size		00	00	0
NEMA continuous amp rating	Thermal current	9 A	9 A	18 A
NEMA maximum horse power ratings 1-phase, 60 Hz	115 V AC	1/3 hp	1/3 hp	1 hp
	230 V AC	1 hp	1 hp	2 hp
NEMA maximum horse power ratings 3-phase, 60 Hz	200 V AC	1 1/2 hp	1 1/2 hp	3 hp
	230 V AC	1 1/2 hp	1 1/2 hp	3 hp
	460 V AC	2 hp	2 hp	5 hp
	575 V AC	2 hp	2 hp	5 hp
UL / CSA general use rating				
600 V AC		20 A	20 A	20 A
With conductor cross-sectional area		AWG 12	AWG 12	AWG 12
UL / CSA maximum 1-phase motor rating				
Full load current	120 V AC	7.2 A	9.8 A	13.8 A
	240 V AC	8 A	10 A	12 A
Horse power rating	120 V AC	1/3 hp	1/2 hp	3/4 hp
	240 V AC	1 hp	1-1/2 hp	2 hp
UL / CSA maximum 3-phase motor rating				
Full load current (1)	200-208 V AC	7.8 A	7.8 A	11 A
	220-240 V AC	6.8 A	9.6 A	15.2 A
	440-480 V AC	7.6 A	11 A	14 A
	550-600 V AC	9 A	11 A	11 A
Horse power rating (1)	200-208 V AC	2 hp	2 hp	3 hp
	220-240 V AC	2 hp	3 hp	5 hp
	440-480 V AC	5 hp	7-1/2 hp	10 hp
	550-600 V AC	7-1/2 hp	10 hp	10 hp
Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded				
Fuse rating		40 A	50 A	60 A
Fuse type, 600 V		J		
Max. electrical switching frequency				
For general use		600 cycles/h		
For motor use		1200 cycles/h		

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

General technical data

Contactor types		AC operated	AS09	AS12	AS16
		DC operated	ASL09	ASL12	ASL16
Rated insulation voltage Ui					
acc. to IEC 60947-4-1			690 V		
acc. to UL / CSA			600 V		
Rated impulse withstand voltage Uimp.			6 kV		
Ambient air temperature close to contactor					
Operation	Fitted with thermal overload relay		-25...+60 °C		
	Without thermal overload relay		-40...+70 °C		
Storage			-60...+80 °C		
Climatic withstand			Category B according to IEC 60947-1 Annex Q		
Maximum operating altitude (without derating)			3000 m		
Mechanical durability					
Number of operating cycles			10 millions operating cycles		
Max. switching frequency			3600 cycles/h		
Shock withstand			1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position		
acc. to IEC 60068-2-27 and EN 60068-2-27		Shock direction	AS contactors - AC operated		ASL contactors - DC operated
Mounting position 1		A	20 g		20 g closed position / 10 g open position
		B1	10 g closed position / 5 g open position		15 g closed position / 5 g open position
		B2	15 g		10 g
		C1	20 g closed position / 9 g open position		15 g closed position / 8 g open position
		C2	20 g closed position / 14 g open position		14 g closed position / 8 g open position
Vibration withstand acc. to IEC 60068-2-6			5...300 Hz / 3 g closed position / 2 g open position		

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AS09 ... AS16 and
ASL09 ... ASL16 3-pole contactors
Technical data

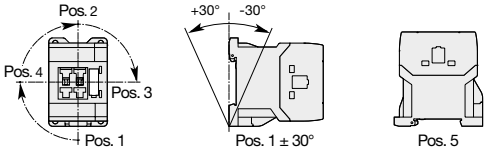
Magnet system characteristics for AS09 ... AS16 contactors

Contactor types		AC operated	AS09	AS12	AS16
Coil operating limits		AC supply			
acc. to IEC 60947-4-1			0.85...1.1 x Uc (at θ ≤ 60 °C); Uc (at θ ≤ 70 °C)		
AC control voltage	Rated control circuit voltage Uc	at 50 Hz	24...415 V		
		at 60 Hz	24...415 V		
	Coil consumption	Average pull-in value 50 Hz	33 VA		
		60 Hz	33 VA		
		50/60 Hz	33 VA		
		Average holding value 50 Hz	6.5 VA / 1.5 W		
		60 Hz	5 VA / 1.2 W		
		50/60 Hz	6.5 VA / 1.5 W		
Drop-out voltage			Approx. 30...50 % of Uc		
Operating time					
	Between coil energization and:	N.O. contact closing	9...24 ms		
		N.C. contact opening	6...18 ms		
	Between coil de-energization and:	N.O. contact opening (1)	5...19 ms		
		N.C. contact closing (1)	7...22 ms		
			(1) The use of RC5-1 surge suppressor increases opening time by a factor of 2 to 3		

Magnet system characteristics for ASL09 ... ASL16 contactors

Contactor types		DC operated	ASL09	ASL12	ASL16
Coil operating limits		DC supply			
acc. to IEC 60947-4-1			0.85...1.1 x Uc (at θ ≤ 60 °C); Uc (at θ ≤ 70 °C)		
DC control voltage	Rated control circuit voltage Uc		12...240 V DC		
	Coil consumption	Average pull-in value	3 W		
		Average holding value	3 W		
Drop-out voltage			Approx. 10...40 % of Uc		
Coil time constant	Open	L/R	12 ms		
	Closed	L/R	40 ms		
Operating time					
	Between coil energization and:	N.O. contact closing	36...59 ms		
		N.C. contact opening	31...53 ms		
	Between coil de-energization and:	N.O. contact opening (1)	13...17 ms		
		N.C. contact closing (1)	15...20 ms		
			(1) The use of RT5 surge suppressor increases opening time by a factor of 1.1 to 1.2		

Mounting characteristics and conditions for use

Contactor types		AC operated	AS09	AS12	AS16
		DC operated	ASL09	ASL12	ASL16
Mounting positions					
Mounting distances			The contactors can be assembled side by side.		
Fixing	On rail according to IEC 60715, EN 60715		35 x 7.5 mm or 35 x 15 mm		
	By screws (not supplied)		2 x M4 screws placed diagonally		

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AS09 ... AS16 and
ASL09 ... ASL16 3-pole contactors
Technical data

Connecting characteristics

Contactor types		AC operated	AS09	AS12	AS16
		DC operated	ASL09	ASL12	ASL16
Main terminals			Screw terminals with cable clamp		
Connection capacity (min. ... max.)					
Main conductors (poles)					
	Rigid solid	**1 x**	0.75...4 mm²		
		2 x	0.75...4 mm²		
	Flexible with non insulated ferrule	**1 x**	0.75...2.5 mm²		
		2 x	0.75...2.5 mm²		
	Flexible with insulated ferrule	**1 x**	0.75...2.5 mm²		
		2 x	0.75...1.5 mm²		
	Bars or lugs	**L ≤**	7.7 mm		
		l >	3.2 mm		
Connection capacity acc. to UL / CSA		**1 or 2 x**	AWG 18...12		
Stripping length			9 mm		
Tightening torque	Recommended		1.00 Nm / 9 lb.in		
	Max.		1.20 Nm		
Auxiliary conductors					
(built-in auxiliary terminals + coil terminals)					
	Rigid solid	**1 x**	0.75...2.5 mm²		
		2 x	0.75...2.5 mm²		
	Flexible with non insulated ferrule	**1 x**	0.75...2.5 mm²		
		2 x	0.75...2.5 mm²		
	Flexible with insulated ferrule	**1 x**	0.75...2.5 mm²		
		2 x	0.75...1.5 mm²		
	Lugs	**L ≤**	7.7 mm		
		l >	3.2 mm		
Connection capacity acc. to UL / CSA		**1 or 2 x**	AWG 18...14		
Stripping length					
Tightening torque					
Coil terminals	Recommended		1.00 Nm / 9 lb.in		
	Max.		1.20 Nm		
Built-in auxiliary terminals	Recommended		1.00 Nm / 9 lb.in		
	Max.		1.20 Nm		
Degree of protection					
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529					
All terminals			IP20		
Screw terminals			Delivered in open position, screws of unused terminals must be tightened		
All terminals			M3		
		Screwdriver type	Flat Ø 5.5 / Pozidriv 2		

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AS09 ... AS16 and
ASL09 ... ASL16 3-pole contactors
Technical data

Built-in auxiliary contacts according to IEC

Contactor types	AC operated	AS09	AS12	AS16
	DC operated	ASL09	ASL12	ASL16
Rated operational voltage Ue max.		690 V		
Rated frequency (without derating)		50 / 60 Hz		
Conventional free-air thermal current Ith - $\theta \leq 40$ °C		10 A		
Ie / Rated operational current AC-15				
acc. to IEC 60947-5-1	24-127 V 50/60 Hz	6 A		
	220-240 V 50/60 Hz	4 A		
	400-440 V 50/60 Hz	3 A		
	500 V 50/60 Hz	2 A		
	690 V 50/60 Hz	2 A		
Making capacity AC-15		10 x Ie AC-15 acc. to IEC 60947-5-1		
Breaking capacity AC-15		10 x Ie AC-15 acc. to IEC 60947-5-1		
Ie / Rated operational current DC-13				
acc. to IEC 60947-5-1	24 V DC	6 A / 144 W		
	48 V DC	2.8 A / 134 W		
	72 V DC	1 A / 72 W		
	110 V DC	0.55 A / 60 W		
	125 V DC	0.55 A / 69 W		
	220 V DC	0.27 A / 60 W		
	250 V DC	0.27 A / 68 W		
Short-circuit protection device gG type fuse		10 A		
Rated short-time withstand current Icw	for 1.0 s	100 A		
	for 0.1 s	140 A		
Minimum switching capacity		12 V / 3 mA		
with failure rate acc. to IEC 60947-5-4		10^{-7}		
Non-overlapping time between N.O. and N.C. contacts		1.5 ms		
Power dissipation per pole at 6 A		0.1 W		
Max. electrical switching frequency	AC-15	1200 cycles/h		
	DC-13	900 cycles/h		
Mechanically linked contacts acc. to annex L of IEC 60947-5-1		Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA3 aux. contact blocks) are mechanically linked contacts.		
Mirror contacts acc. to annex F of IEC 60947-4-1		Built-in N.C. auxiliary contacts or additional N.C. auxiliary contacts (CA3 aux. contact blocks) are mirror contacts.		

Built-in auxiliary contacts according to UL / CSA

Contactor types	AC operated	AS09	AS12	AS16
	DC operated	ASL09	ASL12	ASL16
Max. operational voltage		600 V AC, 250 V DC		
Pilot duty		A600, Q300		
AC thermal rated current		10 A		
AC maximum volt-ampere making		7200 VA		
AC maximum volt-ampere breaking		720 VA		
DC thermal rated current		2.5 A		
DC maximum volt-ampere making-breaking		69 VA		

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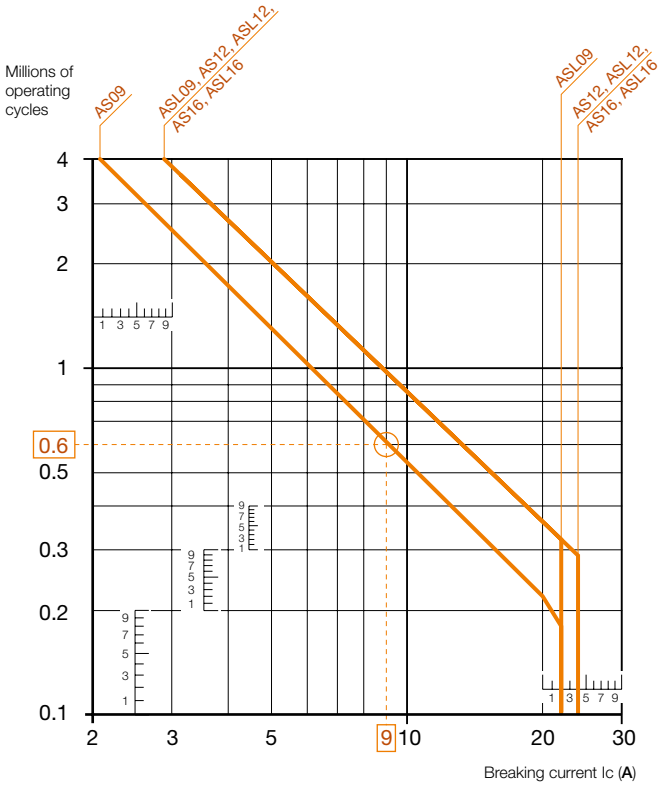
Notes

AS09 ... AS16 and ASL09 ... ASL16 3-pole contactors
Electrical durability

Electrical durability for AC-1 utilization category - Ue ≤ 690 V

Note: AC-1 maximum current is selected according to ambient temperature. Please see technical data.

Switching non-inductive or slightly inductive loads. The breaking current Ic for AC-1 is equal to the rated operational current of the load. Maximum electrical switching frequency: 600 cycles / hour.



Example:

Breaking current = 9 A.

On the opposite curve at intersection "○" 9 A the corresponding value for the electrical durability is approximately 0.6 millions operating cycles.

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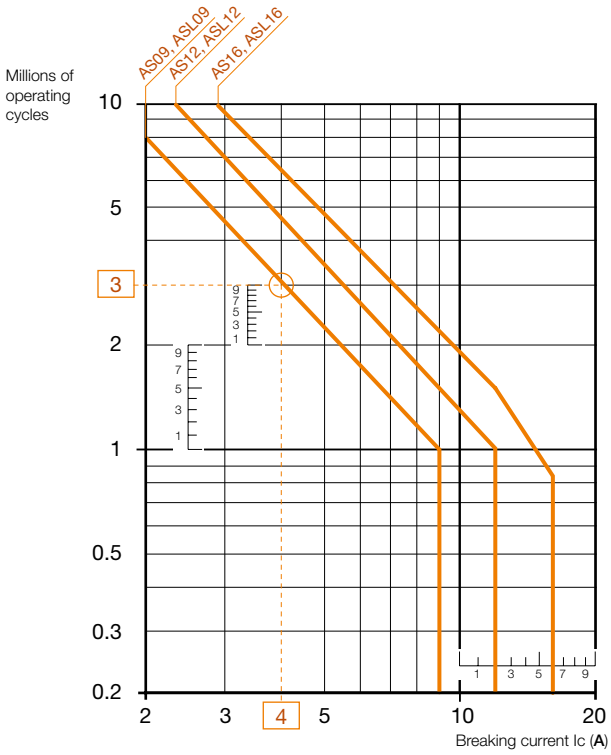
AS09 ... AS16 and ASL09 ... ASL16 3-pole contactors
Electrical durability

Electrical durability for AC-3 utilization category - Ue ≤ 440 V - Ambient temperature ≤ 60 °C

Switching cage motors: starting and switching off running motors. The breaking current Ic for AC-3 is equal to the rated operational current Ie (Ie = motor full load current). Maximum electrical switching frequency: 1200 cycles / hour.



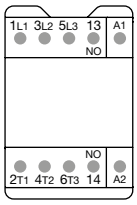
Example:

Breaking current = 4 A.

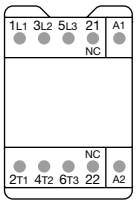
On the opposite curve at intersection "○" 4 A the corresponding value for the electrical durability is approximately 3 millions operating cycles.

AS09 ... AS16 3-pole contactors
Terminal marking and positioning

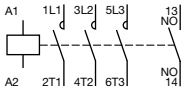
AS contactors - AC operated
Standard devices without addition of auxiliary contacts



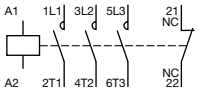
AS09 ... AS16-30-10



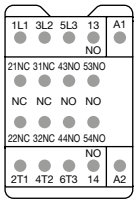
AS09 ... AS16-30-01



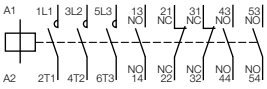
AS09 ... AS16-30-10



AS09 ... AS16-30-01

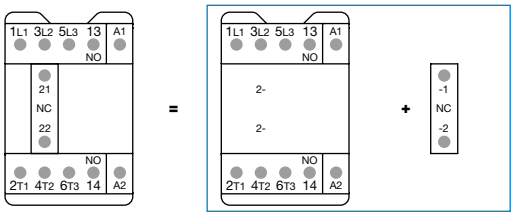


AS09 ... AS16-30-32

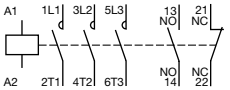


AS09 ... AS16-30-32

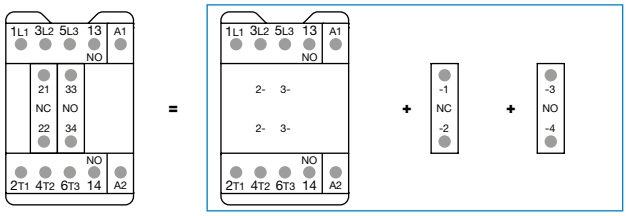
Other possible contact combinations with auxiliary contact blocks added by the user



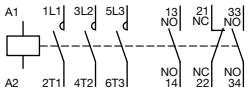
Combination 11 = AS09 ... AS16-30-10 + CA3-01



Combination 11

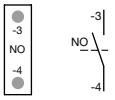


Combination 21 = AS09 ... AS16-30-10 + CA3-01 + CA3-10

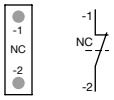


Combination 21

CA3 1-pole auxiliary contact blocks

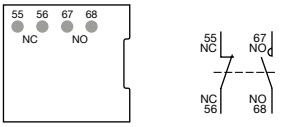


CA3-10



CA3-01

TEF3 front-mounted electronic timer



TEF3

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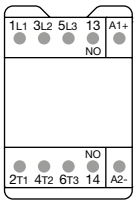
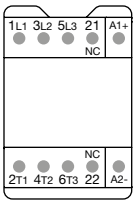
ASL09 ... ASL16 3-pole contactors
Terminal marking and positioning

ASL contactors - DC operated (the polarity A1+, A2- must be respected)

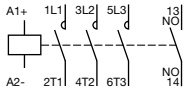
Standard devices without addition of auxiliary contacts



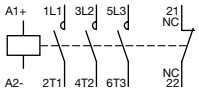
ASL09 ... ASL16-30-10



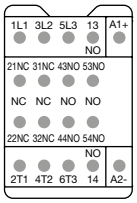
ASL09 ... ASL16-30-01



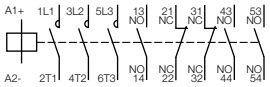
ASL09 ... ASL16-30-10



ASL09 ... ASL16-30-01

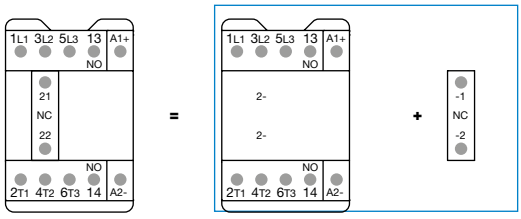


ASL09 ... ASL16-30-32

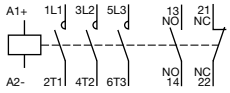


ASL09 ... ASL16-30-32

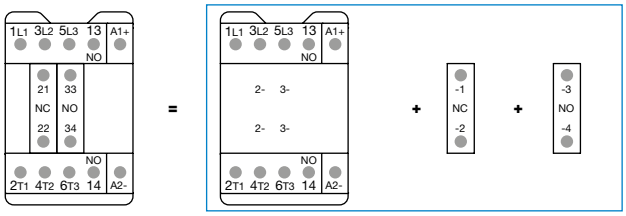
Other possible contact combinations with auxiliary contact blocks added by the user



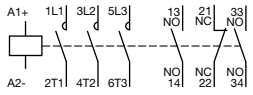
Combination 11 = ASL09 ... ASL16-30-10 + CA3-01



Combination 11

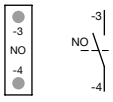


Combination 21 = ASL09 ... ASL16-30-10 + CA3-01 + CA3-10

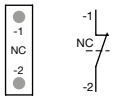


Combination 21

CA3 1-pole auxiliary contact blocks

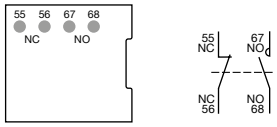


CA3-10



CA3-01

TEF3 front-mounted electronic timer



TEF3

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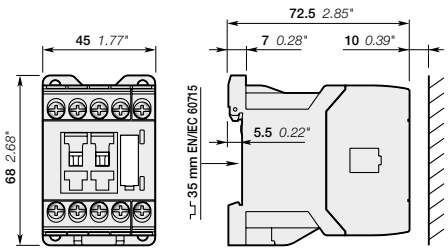
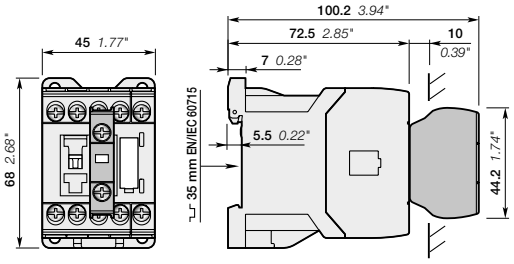
AS09 ... AS16 3-pole contactors

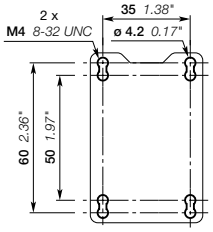
Main dimensions mm, *inches*

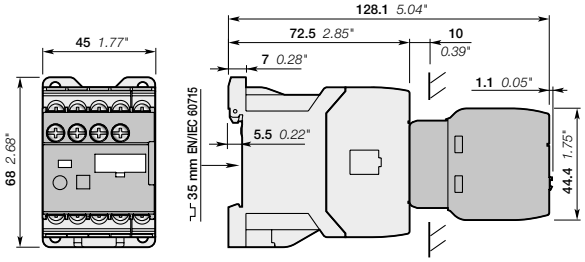


AS09, AS12, AS16

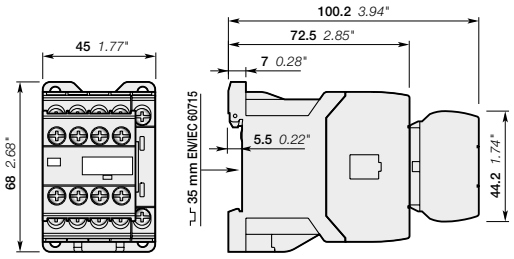


AS09, AS12, AS16
+ CA3 front-mounted 1-pole auxiliary contact block





AS09, AS12, AS16
+ TEF3 electronic timer

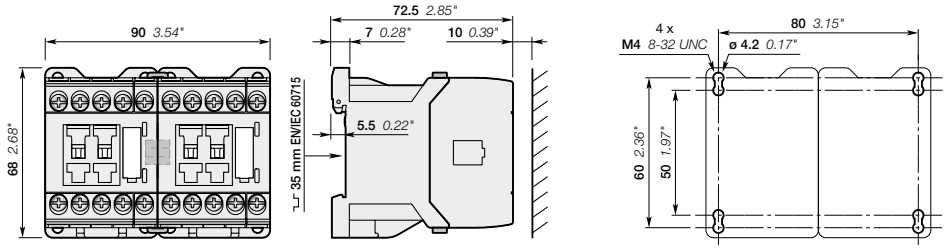


AS09 ... 16-30-32

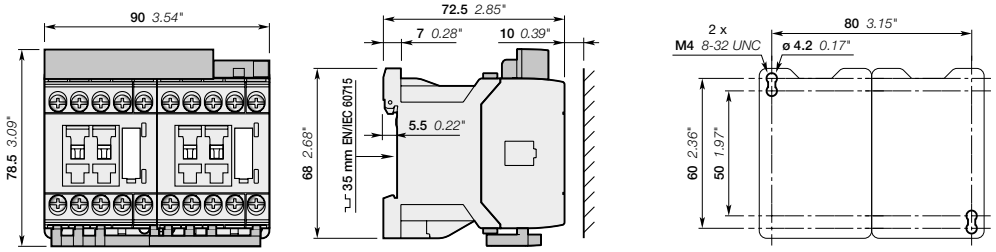
1SBC101405S0201

AS09 ... AS16 3-pole contactors

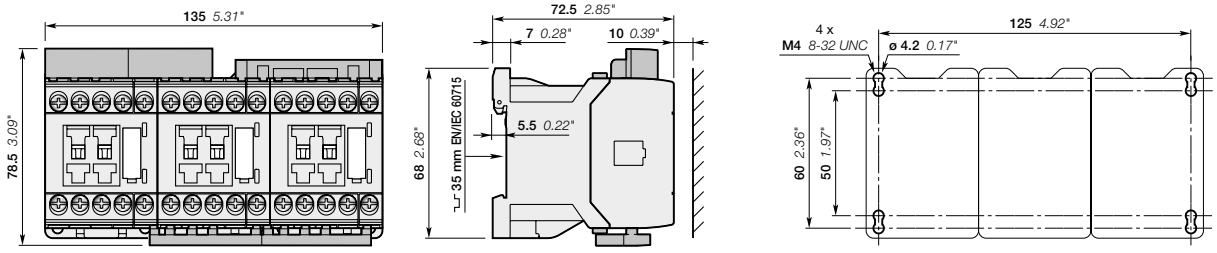
Main dimensions mm, *inches*



AS09, AS12, AS16
+ VM3 mechanical interlock unit including two BB3 fixing clips



AS09, AS12, AS16
+ BER16C-3 connection set for reversing starter including two BB3 fixing clips



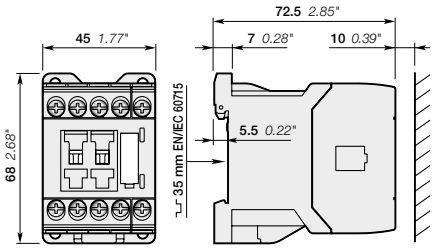
AS09, AS12, AS16
+ BEY16C-3 connection set for star-delta starter including four BB3 fixing clips

4

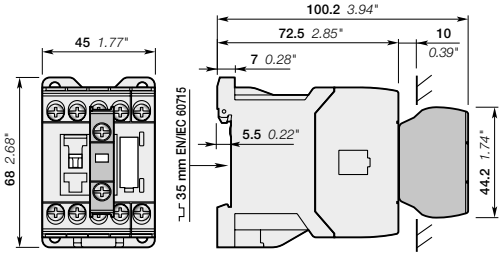
1SBC101405S0201

ASL09 ... ASL16 3-pole contactors

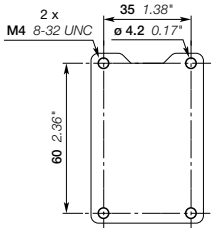
Main dimensions mm, *inches*

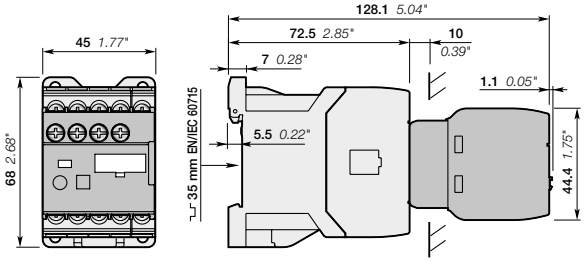


ASL09, ASL12, ASL16

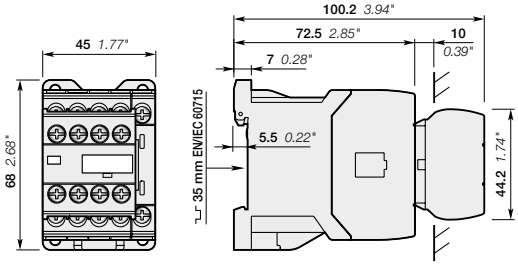


ASL09, ASL12, ASL16
+ CA3 front-mounted 1-pole auxiliary contact block





ASL09, ASL12, ASL16
+ TEF3 electronic timer

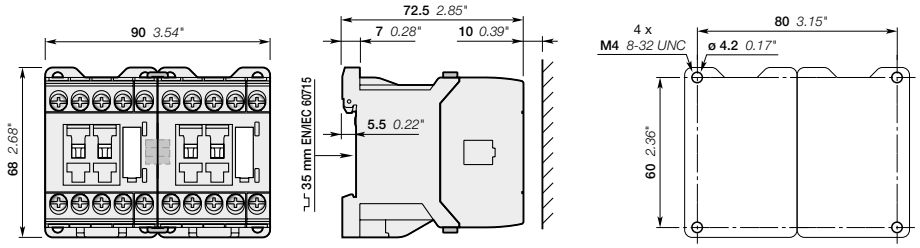


ASL09 ... 16-30-32

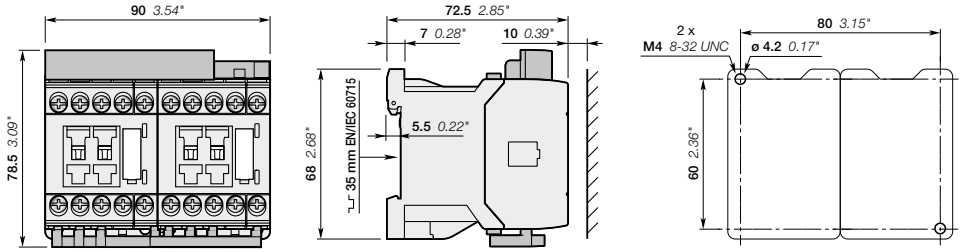
1SBC101406S0201

ASL09 ... ASL16 3-pole contactors

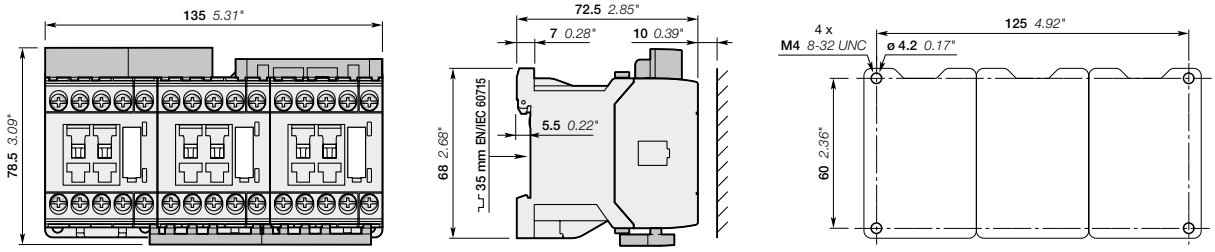
Main dimensions mm, *inches*



ASL09, ASL12, ASL16
+ VM3 mechanical interlock unit including two BB3 fixing clips



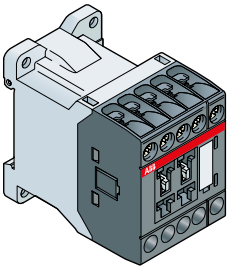
ASL09, ASL12, ASL16
+ BER16C-3 connection set for reversing starter including two BB3 fixing clips



ASL09, ASL12, ASL16
+ BEY16C-3 connection set for star-delta starter including four BB3 fixing clips

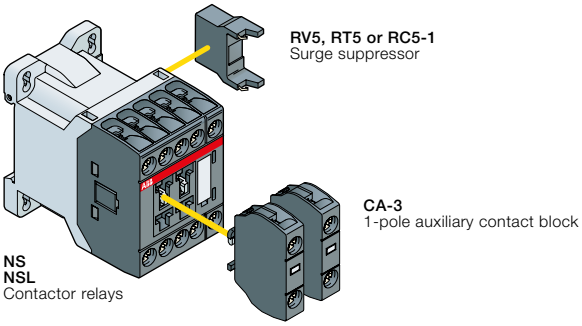
1SBC101406S0201

Contactor relays
Main accessories



NS, NSL
Contactor relays

4-pole contactor relays

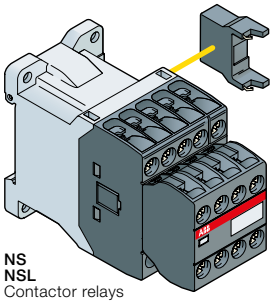


RV5, RT5 or RC5-1
Surge suppressor

CA-3
1-pole auxiliary contact block

NS
NSL
Contactor relays

8-pole contactor relays



RV5, RT5 or RC5-1
Surge suppressor

NS
NSL
Contactor relays

1SBC101409S0201

Contactor relays

Screw terminals

NS

NSL

AC control voltage	NS22E	NS31E	NS40E
DC control voltage	NSL22E	NSL31E	NSL40E
	2 N.O. + 2 N.C.	3 N.O. + 1 N.C.	4 N.O.

NS

NSL

AC control voltage	NS44E	NS53E	NS62E	NS71E	NS80E
DC control voltage	NSL44E	NSL53E	NSL62E	NSL71E	NSL80E
	4 N.O. + 4 N.C.	5 N.O. + 3 N.C.	6 N.O. + 2 N.C.	7 N.O. + 1 N.C.	8 N.O.

Control circuit switching

IEC	Rated operational current		
	AC-15	**240 V**	4 A
		400 V	3 A
		690 V	2 A
	DC-13	**24 V**	6 A / 144 W
		250 V	0.27 A / 68 W
UL / CSA	Pilot Duty		A600, Q300

Main accessories

Auxiliary contact blocks	Front mounting		1-pole **CA3-10** or **CA3-01**
Surge suppressors	Side-mounted (without additional width)		**RV5** (Varistor) AC / DC **RC5-1** (Capacitor) AC **RT5** (Transil diode) DC

1SBC101409S0201

NS contactor relays
AC operated

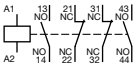
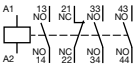
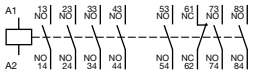
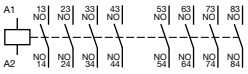
NS22E

4

Description

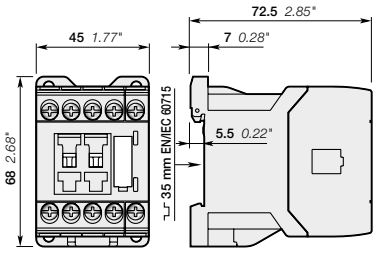
NS contactor relays are used for switching auxiliary and control circuits.
These contactor relays are designed with:
– 4 poles or 8 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
– control circuit: AC operated
– add-on auxiliary contact blocks for front mounting and a comprehensive range of accessories.

Ordering details

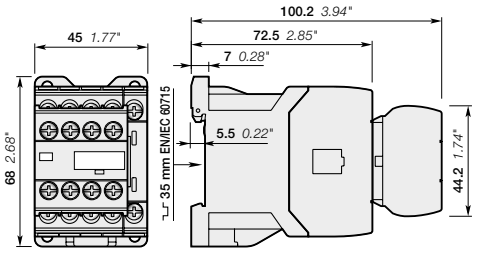
Number of contacts 1st stack	2nd stack	Rated control circuit voltage Uc (1) V 50 Hz	V 60 Hz	Type	Order code		Weight Pkg (1 pce) kg
		24	24	NS22E-20	1SBH101001R2022		0.220
		230	230	NS22E-26	1SBH101001R2622		0.220
		24	24	NS31E-20	1SBH101001R2031		0.220
		230	230	NS31E-26	1SBH101001R2631		0.220
		24	24	NS40E-20	1SBH101001R2040		0.220
		230	230	NS40E-26	1SBH101001R2640		0.220
		24	24	NS44E-20	1SBH101001R2044		0.260
		230	230	NS44E-26	1SBH101001R2644		0.260
		24	24	NS53E-20	1SBH101001R2053		0.260
		230	230	NS53E-26	1SBH101001R2653		0.260
		24	24	NS62E-20	1SBH101001R2062		0.260
		230	230	NS62E-26	1SBH101001R2662		0.260
		24	24	NS71E-20	1SBH101001R2071		0.260
		230	230	NS71E-26	1SBH101001R2671		0.260
		24	24	NS80E-20	1SBH101001R2080		0.260
		230	230	NS80E-26	1SBH101001R2680		0.260

Note: for multiple packaging, please contact your ABB local sales organization.
(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



NS22E, NS31E, NS40E



NS44E, NS53E, NS62E, NS71E, NS80E

1SBC101475S0201 - Rev. A

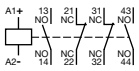
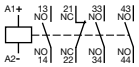
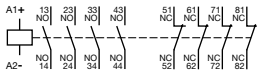
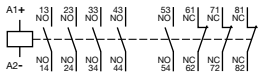
NSL contactor relays
DC operated

NSL22E

Description

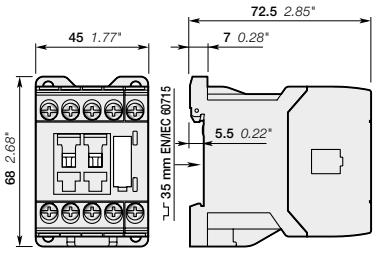
NSL contactor relays are used for switching auxiliary and control circuits.
These contactor relays are designed with:
– 4 poles or 8 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
– control circuit: low coil consumption (3 W at pull-in and holding) DC operated with solid core magnet. Suitable for direct control by PLC outputs (the polarity on the coil terminals A1+ and A2- must be respected)
– add-on auxiliary contact blocks for front mounting and a comprehensive range of accessories.

Ordering details

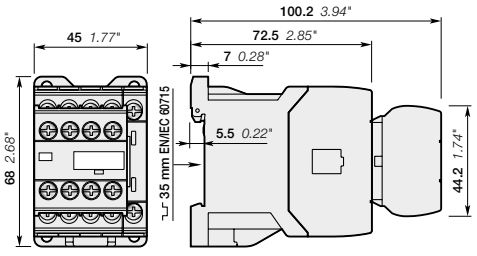
Number of contacts 1st stack	2nd stack	Rated control circuit voltage Uc (1) V DC	Type	Order code	Weight Pkg (1 pce) kg
		24	NSL22E-81	1SBH103001R8122	0.280
		24	NSL31E-81	1SBH103001R8131	0.280
		24	NSL40E-81	1SBH103001R8140	0.280
		24	NSL44E-81	1SBH103001R8144	0.320
		24	NSL53E-81	1SBH103001R8153	0.320
		24	NSL62E-81	1SBH103001R8162	0.320
		24	NSL71E-81	1SBH103001R8171	0.320
		24	NSL80E-81	1SBH103001R8180	0.320

Note: for multiple packaging, please contact your ABB local sales organization.
(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



NSL22E, NSL31E, NSL40E

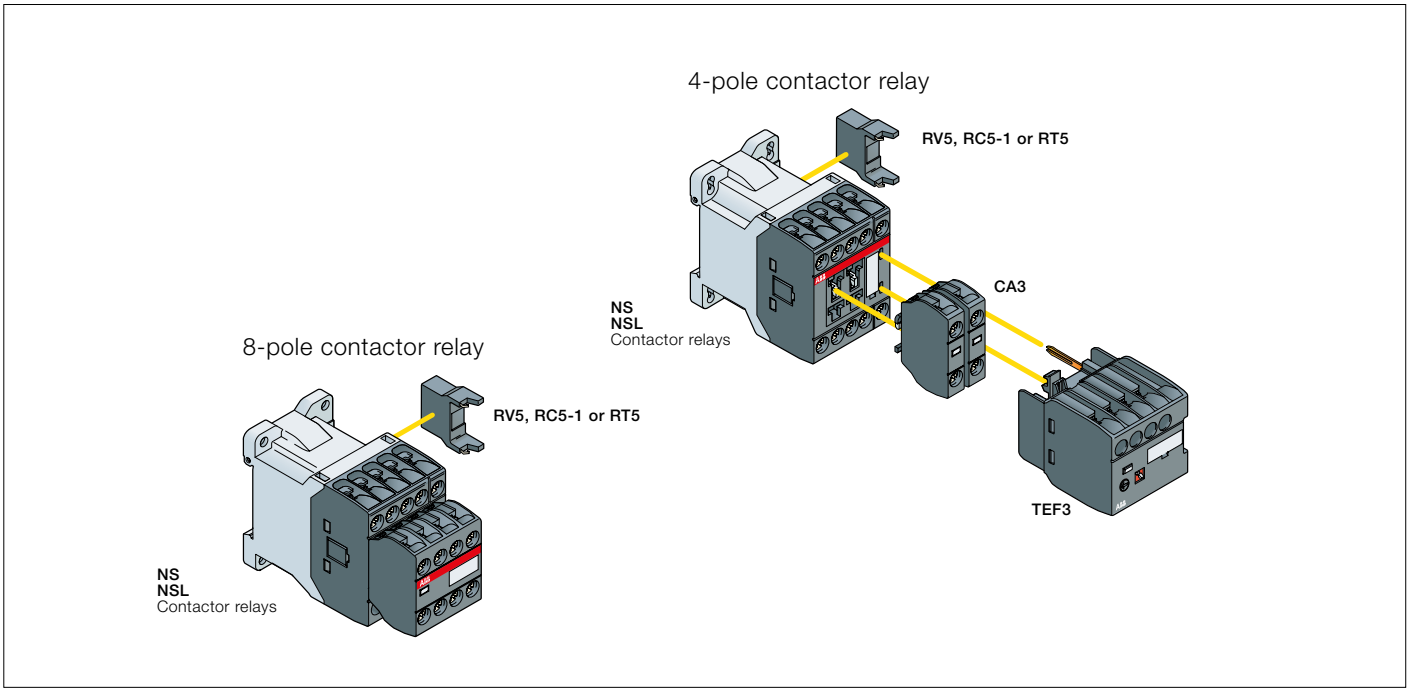


NSL44E, NSL53E, NSL62E, NSL71E, NSL80E

1SBC101479S0201 - Rev. A

NS and NSL contactor relays
Main accessories

Contactor relays and main accessories (other accessories available)



Main accessory fitting details

Contactor types	Main poles			Front-mounted accessories: Auxiliary contact blocks 1-pole CA3		Electronic timer TEF3		Side-mounted accessories: Surge suppressors		
NS..	2	2	E	2 max.	or	1	+	RV5	or	RC5-1
NS..	3	1	E							
NS..	4	0	E							
NS..	4	4	E	–		–		RV5	or	RC5-1
NS..	5	3	E							
NS..	6	2	E							
NS..	7	1	E							
NS..	8	0	E							
NSL..	2	2	E	2 max.	or	1	+	RV5	or	RT5
NSL..	3	1	E							
NSL..	4	0	E							
NSL..	4	4	E	–		–		RV5	or	RT5
NSL..	5	3	E							
NSL..	6	2	E							
NSL..	7	1	E							
NSL..	8	0	E							

1SBC101298S0201

NS and NSL contactor relays
Main accessories

CA3-10

Front-mounted instantaneous auxiliary contact blocks

For contactor relays	Auxiliary contacts		Type	Order code		Pkg qty	Weight (1 pce) kg
NS, NSL	1	0	CA3-10	1SBN011010T1010		10	0.011
	0	1	CA3-01	1SBN011010T1001		10	0.011

TEF3-ON

Front-mounted electronic timer

For contactors	Rated control circuit voltage - Uc V	Type	Order code		Pkg qty	Weight (1 pce) kg
ON-delay						
NS, NSL	24...240 V AC/DC	TEF3-ON	1SBN021012R1000		1	0.065
OFF-delay						
NS, NSL	24...240 V AC/DC	TEF3-OFF	1SBN021014R1000		1	0.065

RV5

Surge suppressors

For contactor relays	Rated control circuit voltage - Uc V	AC	DC	Type	Order code		Pkg qty	Weight (1 pce) kg
NS, NSL	24...50	●	●	RV5/50	1SBN050010R1000		2	0.015
	50...133	●	●	RV5/133	1SBN050010R1001		2	0.015
	110...250	●	●	RV5/250	1SBN050010R1002		2	0.015
	250...440	●	●	RV5/440	1SBN050010R1003		2	0.015
NS	24...50	●	–	RC5-1/50	1SBN050100R1000		2	0.012
	50...133	●	–	RC5-1/133	1SBN050100R1001		2	0.012
	110...250	●	–	RC5-1/250	1SBN050100R1002		2	0.012
	250...440	●	–	RC5-1/440	1SBN050100R1003		2	0.012
NSL	12...32	–	●	RT5/32	1SBN050020R1000		2	0.015
	25...65	–	●	RT5/65	1SBN050020R1001		2	0.015
	50...90	–	●	RT5/90	1SBN050020R1002		2	0.015
	77...150	–	●	RT5/150	1SBN050020R1003		2	0.015
	150...264	–	●	RT5/264	1SBN050020R1004		2	0.015

1SBC101298S0201

NS and NSL contactor relays
Technical data

Contact utilization characteristics according to IEC

Contactor relay types	**AC operated**	**NS**
	DC operated	**NSL**
Standards		IEC 60947-5-1 and EN 60947-5-1
Rated operational voltage Ue max.		690 V
Rated frequency (without derating)		50 / 60 Hz
Conventional free-air thermal current Ith - θ ≤ 40 °C		10 A
Ie / Rated operational current AC-15		
acc. to IEC 60947-5-1	**24-127 V 50/60 Hz**	6 A
	220-240 V 50/60 Hz	4 A
	400-440 V 50/60 Hz	3 A
	500 V 50/60 Hz	2 A
	690 V 50/60 Hz	2 A
Making capacity AC-15		10 x Ie AC-15 acc. to IEC 60947-5-1
Breaking capacity AC-15		10 x Ie AC-15 acc. to IEC 60947-5-1
Ie / Rated operational current DC-13		
acc. to IEC 60947-5-1	**24 V DC**	6 A / 144 W
	48 V DC	2.8 A / 134 W
	72 V DC	1 A / 72 W
	110 V DC	0.55 A / 60 W
	125 V DC	0.55 A / 69 W
	220 V DC	0.27 A / 60 W
	250 V DC	0.27 A / 68 W
Short-circuit protection device for contactors		
Ue ≤ 500 V AC - gG type fuse		10 A
Rated short-time withstand current Icw	**for 1.0 s**	100 A
	for 0.1 s	140 A
Minimum switching capacity		12 V / 3 mA
with failure rate acc. to IEC 60947-5-4		10^{-7}
Non-overlapping time between N.O. and N.C. contacts		1.5 ms
Power dissipation per pole at 6 A		0.1 W
Max. electrical switching frequency	**AC-15**	1200 cycles/h
	DC-13	900 cycles/h
Mechanically linked contacts acc. to annex L of IEC 60947-5-1		Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA3 aux. contact blocks) are mechanically linked contacts.

Contact utilization characteristics according to UL / CSA

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

4

1SBC101502S0201

NS and NSL contactor relays
Technical data

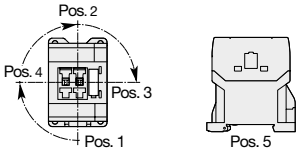
Magnet system characteristics for NS contactor relays

Contactor relay types		**AC operated**	NS
Coil operating limits		**AC supply**	
acc. to IEC 60947-5-1			0.85...1.1 x Uc (at θ ≤ 60 °C); Uc (at θ ≤ 70 °C)
AC control voltage	Rated control circuit voltage Uc	**at 50 Hz**	24...415 V
		at 60 Hz	24...415 V
	Coil consumption	**Average pull-in value 50 Hz**	33 VA
		60 Hz	33 VA
		50/60 Hz	33 VA
		Average holding value 50 Hz	6.5 VA / 1.5 W
		60 Hz	5 VA / 1.2 W
		50/60 Hz	6.5 VA / 1.5 W
Drop-out voltage			Approx. 30...50 % of Uc
Operating time			
	Between coil energization and:	**N.O. contact closing**	9...24 ms
		N.C. contact opening	6...18 ms
	Between coil de-energization and:	**N.O. contact opening (1)**	5...19 ms
		N.C. contact closing (1)	7...22 ms
			(1) The use of RC5-1 surge suppressor increases opening time by a factor of 2 to 3.

Magnet system characteristics for NSL contactor relays

Contactor relay types		**DC operated**	NSL
Coil operating limits		**DC supply**	
acc. to IEC 60947-5-1			0.85...1.1 x Uc (at θ ≤ 60 °C); Uc (at θ ≤ 70 °C)
DC control voltage	Rated control circuit voltage Uc		12...240 V DC
	Coil consumption	**Average pull-in value**	3 W
		Average holding value	3 W
Drop-out voltage			Approx. 10...40 % of Uc
Coil time constant	Open	**L/R**	12 ms
	Closed	**L/R**	40 ms
Operating time			
	Between coil energization and:	**N.O. contact closing**	36...59 ms
		N.C. contact opening	31...53 ms
	Between coil de-energization and:	**N.O. contact opening (1)**	13...17 ms
		N.C. contact closing (1)	15...20 ms
			(1) The use of RT5 surge suppressor increases opening time by a factor of 1.1 to 1.2.

Mounting characteristics and conditions for use

Contactor relay types		**AC operated**	NS
		DC operated	NSL
Mounting positions			
Mounting distances			The contactor relays can be assembled side by side.
Fixing	On rail according to IEC 60715, EN 60715		35 x 7.5 mm or 35 x 15 mm
	By screws (not supplied)		2 x M4 screws placed diagonally

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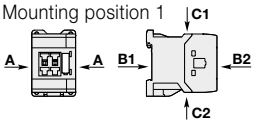
NS and NSL contactor relays
Technical data

General technical data

Contactor relay types		**AC operated**	NS
		DC operated	NSL
Rated insulation voltage Ui			
acc. to IEC 60947-5-1			690 V
acc. to UL / CSA			600 V
Rated impulse withstand voltage Uimp.			6 kV
Ambient air temperature close to contactor relay			
Operation in free air			-40...+70 °C
Storage			-60...+80 °C
Climatic withstand			Category B according to IEC 60947-1 Annex Q
Maximum operating altitude (without derating)			3000 m
Mechanical durability			
Number of operating cycles			20 millions operating cycles
Max. switching frequency			3600 cycles/h
Shock withstand			1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position
acc. to IEC 60068-2-27 and EN 60068-2-27		**Shock direction**	**NS contactor relays - AC operated** / **NSL contactor relays - DC operated**
Mounting position 1 		**A**	20 g / 20 g closed position / 10 g open position
		B1	5 g / 15 g closed position / 5 g open position
		B2	15 g / 10 g
		C1	19 g closed position / 8 g open position / 19 g closed position / 8 g open position
		C2	16 g closed position / 13 g open position / 14 g closed position / 8 g open position
Vibration withstand acc. to IEC 60068-2-6			5...300 Hz / 3 g closed position / 2 g open position

Connecting characteristics

Contactor relay types		**AC operated**	NS
		DC operated	NSL
Main terminals			Screw terminals with cable clamp
Connection capacity (min. ... max.)			
Pole and coil terminals			
Rigid solid		**1 x**	0.75...2.5 mm²
		2 x	0.75...2.5 mm²
Flexible with non insulated ferrule		**1 x**	0.75...2.5 mm²
		2 x	0.75...2.5 mm²
Flexible with insulated ferrule		**1 x**	0.75...2.5 mm²
		2 x	0.75...1.5 mm²
Lugs		**L ≤**	7.7 mm
		l >	3.2 mm
Connection capacity acc. to UL / CSA		**1 or 2 x**	AWG 18...14
Stripping length			9 mm
Tightening torque	Recommended		1.00 Nm / 9 lb.in
	Max.		1.20 Nm
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			
All terminals			IP20
Screw terminals			Delivered in open position, screws of unused terminals must be tightened
All terminals			M3
		Screwdriver type	Flat Ø 5.5 / Pozidriv 2

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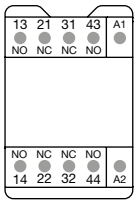
Notes

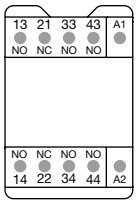
NS contactor relays
Terminal marking and positioning

NS contactor relays - AC operated

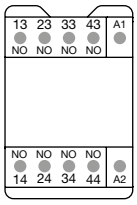
Standard devices without addition of auxiliary contact blocks



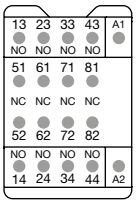
NS22E



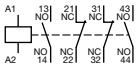
NS31E



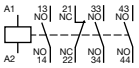
NS40E



NS44E

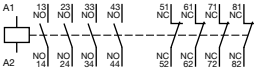


NS22E

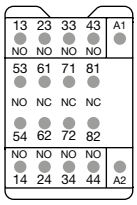


NS31E

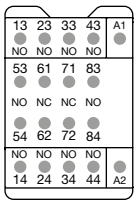
NS40E



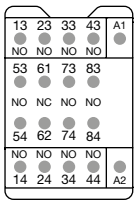
NS44E



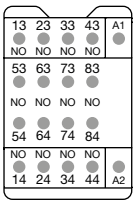
NS53E



NS62E



NS71E



NS80E

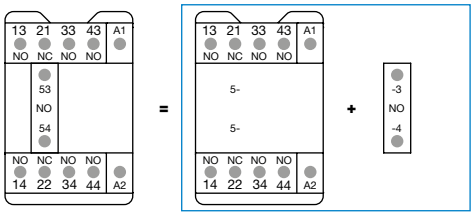
NS53E

NS62E

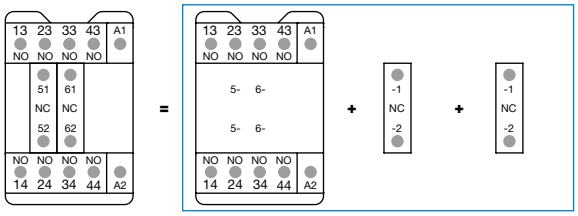
NS71E

NS80E

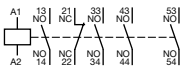
Other possible contact combinations with auxiliary contact blocks added by the user



Combination 41E = NS31E + CA3-10

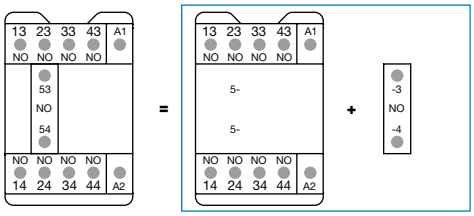


Combination 42E = NS40E + CA3-01 + CA3-01

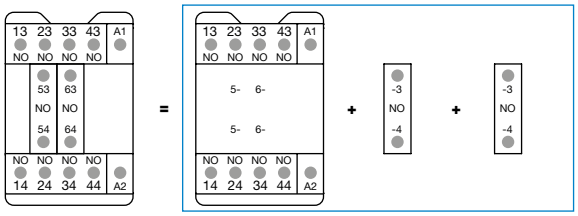


Combination 41E

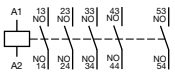
Combination 42E



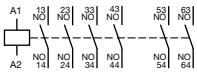
Combination 50E = NS40E + CA3-10



Combination 60E = NS40E + CA3-10 + CA3-10

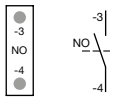


Combination 50E

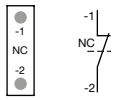


Combination 60E

CA3 1-pole auxiliary contact blocks

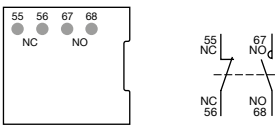


CA3-10



CA3-01

TEF3 front-mounted electronic timer



TEF3

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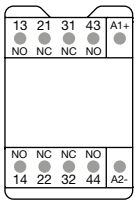
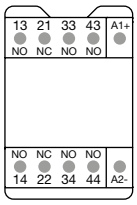
NSL contactor relays
Terminal marking and positioning

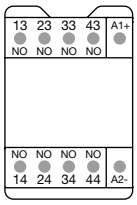
NSL contactor relays - DC operated (the polarity A1+, A2- must be respected)
Standard devices without addition of auxiliary contact blocks



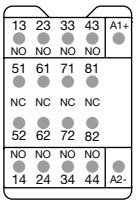
NSL22E



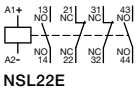
NSL31E



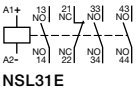
NSL40E



NSL44E

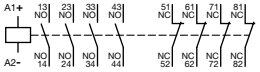


NSL22E

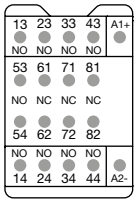


NSL31E

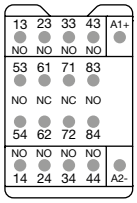
NSL40E



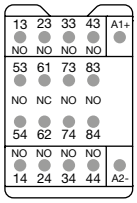
NSL44E



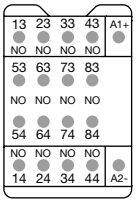
NSL53E



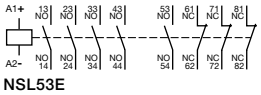
NSL62E



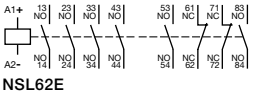
NSL71E



NSL80E



NSL53E

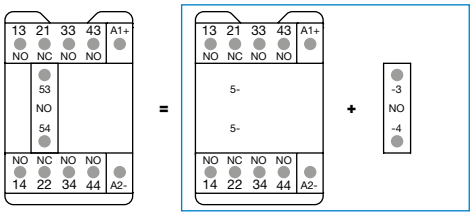


NSL62E

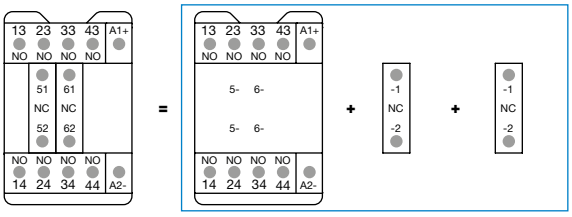
NSL71E

NSL80E

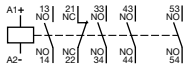
Other possible contact combinations with auxiliary contact blocks added by the user



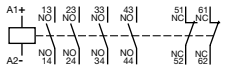
Combination 41E = NSL31E + CA3-10



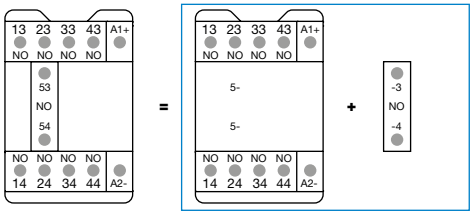
Combination 42E = NSL40E + CA3-01 + CA3-01



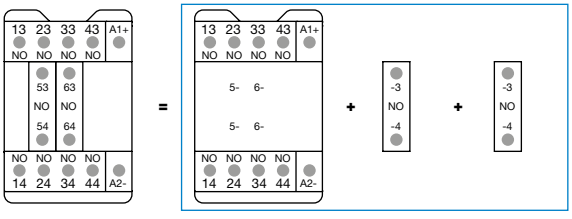
Combination 41E



Combination 42E

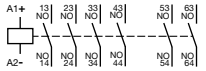


Combination 50E = NSL40E + CA3-10



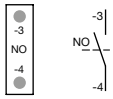
Combination 60E = NSL40E + CA3-10 + CA3-10

Combination 50E

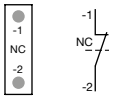


Combination 60E

CA3 1-pole auxiliary contact blocks

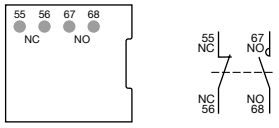


CA3-10



CA3-01

TEF3 front-mounted electronic timer



TEF3

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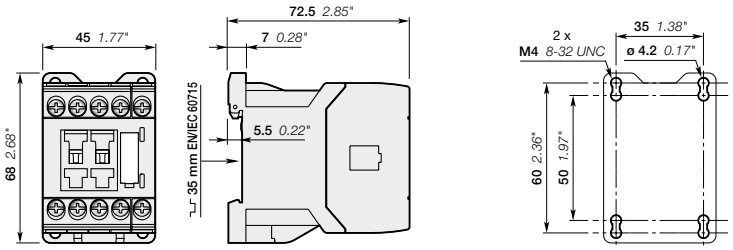
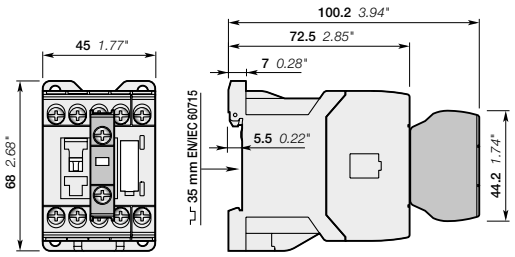
Main dimensions mm, *inches*

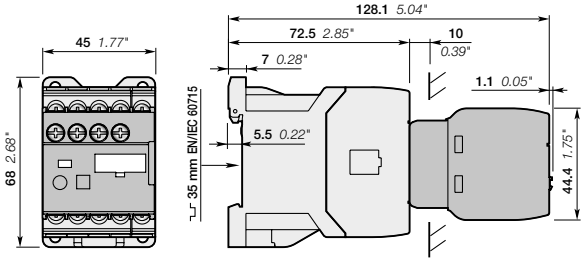
4-pole contactor relays



NS22E, NS31E, NS40E

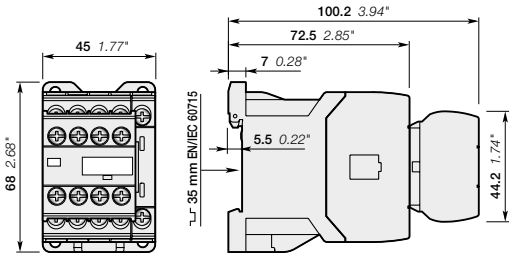


NS22E, NS31E, NS40E
+ CA3 front-mounted 1-pole auxiliary contact block



NS22E, NS31E, NS40E
+ TEF3 electronic timer

8-pole contactor relays



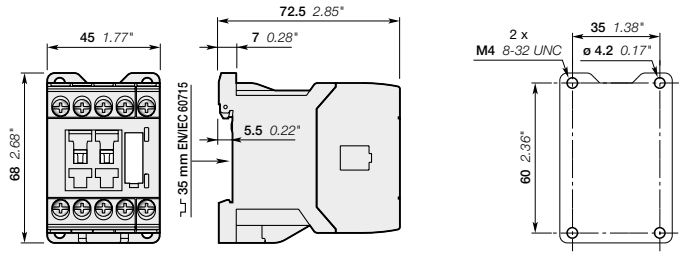
NS44E, NS53E, NS62E, NS71E, NS80E

1SBC101411S0201

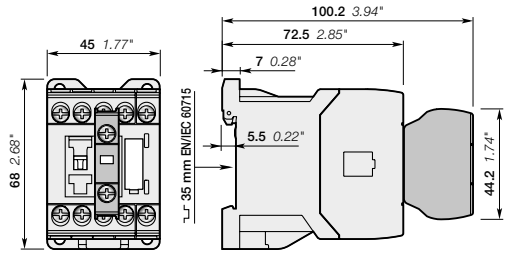
NSL contactor relays

Main dimensions mm, *inches*

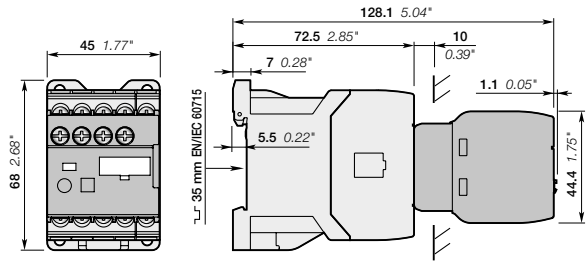
4-pole contactor relays



NSL22E, NSL31E, NSL40E

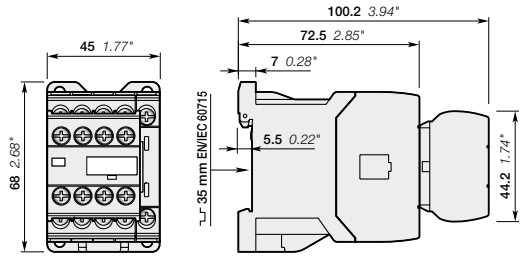


NSL22E, NSL31E, NSL40E
+ CA3 front-mounted 1-pole auxiliary contact block



NSL22E, NSL31E, NSL40E
+ TEF3 electronic timer

8-pole contactor relays



NSL44E, NSL53E, NSL62E, NSL71E, NSL80E

1SBC101411S0201

Auxiliary contact blocks
Accessories

CA3-10

Description

The auxiliary contact blocks are used for the operation of auxiliary circuits and control circuits.
CA3 1-pole auxiliary contact blocks, designed for standard industrial environments, are equipped with:
– N.O. or N.C. contacts.
– Screw-type connecting terminals with cage clamp delivered open.
All 1-pole auxiliary contact blocks are protected against accidental direct contact and bear the corresponding function marking.
A maximum of two 1-pole auxiliary contact blocks can be front-mounted on 1-stack contactors or 1-stack contactor relays.

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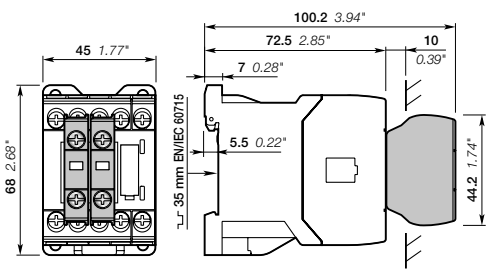
Ordering details

For contactors	For contactor relays	Contact blocks		Type	Order code		Pkg qty	Weight (1 pce) kg
1-pole auxiliary contact blocks with screw terminals								
AS09 ... AS16	NS, NSL	1	–	CA3-10	1SBN011010T1010		10	0.011
ASL09 ... ASL16		–	1	CA3-01	1SBN011010T1001		10	0.011

Main dimensions mm, *inches*



1SBC101492S0201

Auxiliary contact blocks
Technical data

Contact utilization characteristics according to IEC

Types		1-pole **CA3**
Standards		IEC 60947-5-1 and EN 60947-5-1
Rated insulation voltage Ui acc. to IEC 60947-5-1		690 V
Rated impulse withstand voltage Uimp		6 kV
Rated operational voltage Ue max.		690 V
Conventional thermal current Ith - θ ≤ 40 °C		10 A
Ie / Rated operational current AC-15		
acc. to IEC 60947-5-1	**24-127 V 50/60 Hz**	6 A
	220-240 V 50/60 Hz	4 A
	400-440 V 50/60 Hz	3 A
	500 V 50/60 Hz	2 A
	690 V 50/60 Hz	2 A
Making capacity		10 x Ie AC-15 acc. to IEC 60947-5-1
Breaking capacity		10 x Ie AC-15 acc. to IEC 60947-5-1
Ie / Rated operational current DC-13	**24 V DC**	6 A / 144 W
acc. to IEC 60947-5-1	**48 V DC**	2.8 A / 134 W
	72 V DC	1 A / 72 W
	110 V DC	0.55 A / 60 W
	125 V DC	0.55 A / 69 W
	220 V DC	0.27 A / 60 W
	250 V DC	0.27 A / 68 W
Short-circuit protection device gG type fuse		10 A
Rated short-time withstand current Icw	**for 1.0 s**	100 A
θ = 40 °C	**for 0.1 s**	140 A
Minimum switching capacity		12 V / 3 mA
with failure rate acc. to IEC 60947-5-4		10^{-7}
Power dissipation per pole at 6 A		0.1 W
Mechanical durability		
Number of operating cycles		10 millions operating cycles
Max. switching frequency		3600 cycles/h
Max. electrical switching frequency	**AC-15**	1200 cycles/h
	DC-13	900 cycles/h
Mechanically linked contacts acc. to annex L of IEC 60947-5-1		Additional N.O. or N.C. auxiliary contacts (CA3) are mechanically linked contacts
Mirror contacts acc. to annex F of IEC 60947-4-1		Additional N.C. auxiliary contacts (CA3) are mirror contacts

Contact utilization characteristics according to UL / CSA

Standards	UL 508, CSA C22.2 N°14
Max. operational voltage	690 V AC, 250 V DC
Pilot duty	A600, Q300
AC thermal rated current	10 A
AC maximum volt-ampere making	7200 VA
AC maximum volt-ampere breaking	720 VA
DC thermal rated current	2.5 A
DC maximum volt-ampere making-breaking	69 VA

Connecting characteristics

Connection capacity (min. ... max.)			
	Rigid solid	**1 x**	0.75...2.5 mm²
		2 x	0.75...2.5 mm²
	Flexible with non insulated ferrule	**1 x**	0.75...2.5 mm²
		2 x	0.75...2.5 mm²
	Flexible with insulated ferrule	**1 x**	0.75...2.5 mm²
		2 x	0.75...1.5 mm²
	Lugs	**L ≤**	7.7 mm
		l >	3.2 mm
Connection capacity acc. to UL / CSA		**1 or 2 x**	AWG 18...14
Stripping length			9 mm
Tightening torque	Recommended		1 Nm / 9 lb.in
	Max.		1.20 Nm
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			IP20
Screw terminals			Delivered in open position, screws of unused terminals must be tightened
All terminals			M3
Screwdriver type			Flat Ø 5.5 / Pozidriv 2

4

1SBC101493S0201

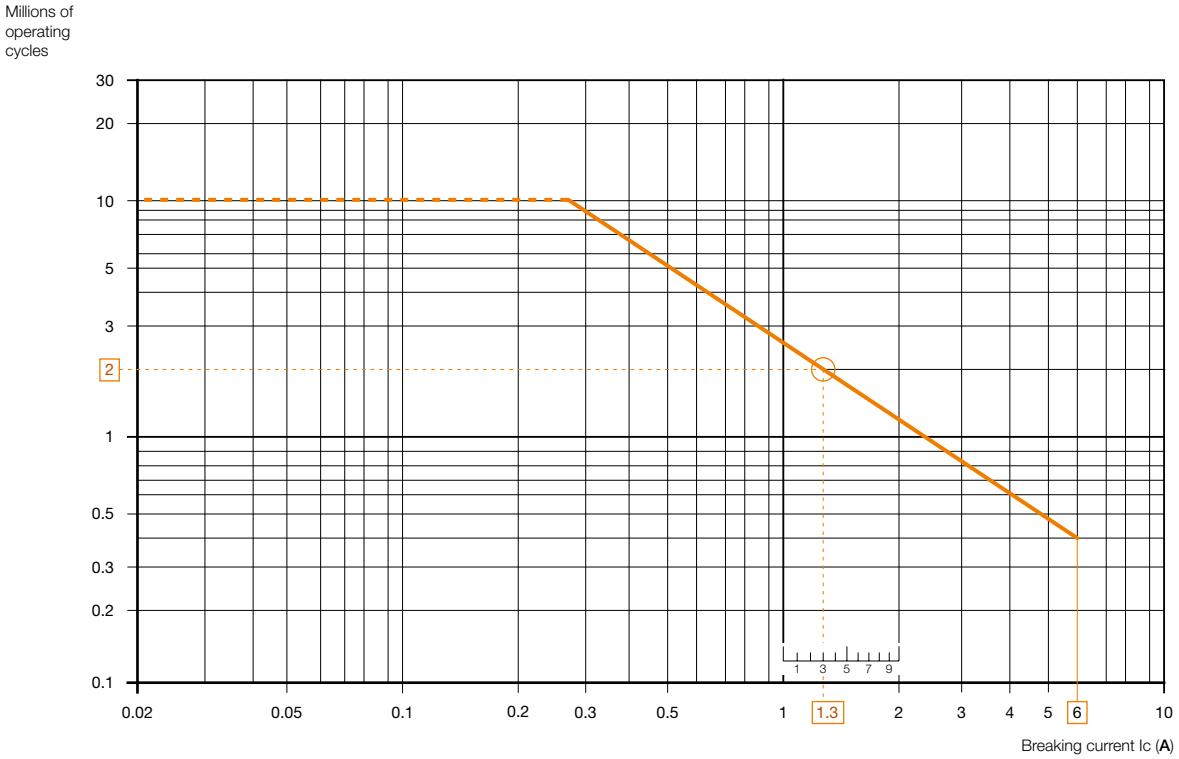
Auxiliary contact blocks for AS09 ... AS16, ASL09 ... ASL16 contactors and NS, NSL contactor relays
Electrical durability

Electrical durability for AC-15 utilization category - Ue ≤ 400 V

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

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

The curve has been drawn for resistive and inductive loads up to 400 V:
- AS09 ... AS16 and ASL09 ... ASL16 contactor built-in auxiliary contacts
- 1-pole CA3
- NS and NSL contactor relays.



Example:
Breaking current = 1.3 A
On the opposite curve at intersection "○" 1.3 A the corresponding value for the electrical durability is approximately 2 millions operating cycles.

1SBC101932S0201

Electronic timers

1SBC101337F0010

TEF3-ON

Description

TEF3 frontal electronic timers are used for realizing timing function and are available in ON-delay and OFF-delay versions.

Compact solution in cabinet compared to separate timers

TEF3 electronic timers are front-mounted and locked on AS/ASL contactors or NS/NSL contactor relays. A mechanical indicator allows to show the state of the contactor.

Safe and cost-reduced wiring

TEF3 electronic timers are supplied by a direct plug-in parallel connection to the coil terminals A1 - A2 of the contactor or contactor relay. A varistor is integrated on the timer to offer a built-in protection against surges in the contactor coil.

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

TEF3-ON or TEF3-OFF allow time-delayed functions up to 100 s in 3 distinct time ranges, independently of the control system. The time delay ranges are selected by a switch and the time delay can be adjusted by means of a rotary switch. The timing function is activated by closing or opening the device on which the timer is mounted. The OFF-delay version operates without additional control supply.

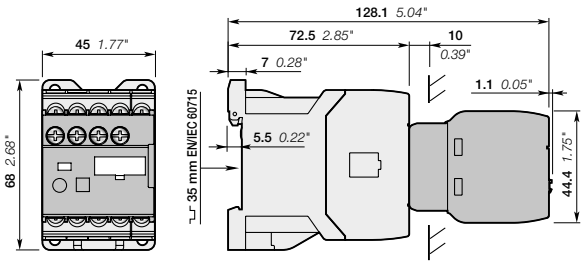
1SBC101336F0010

TEF3-OFF

Ordering details

For contactors, contactor relays	Time delay range selected by switch	Delay type	Rated control circuit voltage Uc V 50/60 Hz or DC	Auxiliary contacts		Type	Order code		Weight Pkg (1 pce) kg
AS09 ... AS16 ASL09 ... ASL16 NS, NSL	0.1...1 s 1...10 s 10...100 s	ON-delay	24...240	1	1	TEF3-ON	1SBN021012R1000		0.065
		OFF-delay	24...240	1	1	TEF3-OFF	1SBN021014R1000		0.065

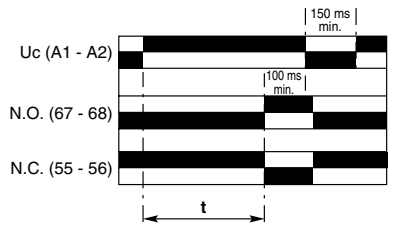
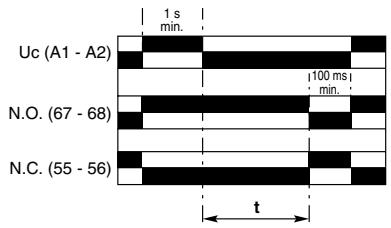
Main dimensions mm, *inches*



1SBC101504S0201

Electronic timers
Technical data

Contact utilization characteristics according to IEC

Types			TEF3-ON	TEF3-OFF
Standards			IEC 60947-5-1 and EN 60947-5-1	
Rated insulation voltage Ui acc. to IEC 60947-5-1			400 V	
Rated impulse withstand voltage Uimp			4 kV	
Rated operational voltage Ue max.			240 V	
Rated frequency (without derating)			50 / 60 Hz	
Conventional thermal current Ith - θ ≤ 40 °C			5 A	
Ie / Rated operational current AC-15				
acc. to IEC 60947-5-1		**24-127 V 50/60 Hz**	3 A	
		220-240 V 50/60 Hz	1.5 A	
Making capacity acc. to IEC 60947-5-1			10 x Ie AC-15	
Breaking capacity acc. to IEC 60947-5-1			10 x Ie AC-15	
Ie / Rated operational current DC-13				
acc. to IEC 60947-5-1		**24 V DC**	1 A / 24 W	
Short-circuit protection device gG type fuse			6 A	
Rated short-time withstand current Icw		**for 1.0 s**	8 A	
θ = 40 °C		**for 0.1 s**	8 A	
Minimum switching capacity			12 V / 3 mA	
with failure rate acc. to IEC 60947-5-4		**24 V DC**	10^{-7}	
Power dissipation per pole at 3 A			0.1 W	
Function diagram			ON-delay	OFF-delay
				
			Bistable relay inside. Before use, once apply Uc then switch it off in order to initialize position of the contacts.	
Control circuit voltage				
AC control voltage	Rated control circuit voltage Uc		24...240 V AC	
50/60 Hz	Average consumption		1.5 mA RMS	1 mA RMS
DC control voltage	Rated control circuit voltage Uc		24...240 V DC	
	Average consumption		1.5 mA	1 mA
Rated frequency limits			50 / 60 Hz	
Supply voltage range			0.85...1.1 x Uc (at θ ≤ 70 °C)	
Overvoltage protection			Varistor included	
Time delay range (t) selected by switch		**0.1...1 s**		
		1...10 s		
		10...100 s		
On-load reiteration accuracy under constant conditions			≤ 1 %	
Minimum ON period			0.1 s	1 s
Recovery time			0.15 s	0.1 s
Ambient air temperature	Operation		-25 °C ... +70 °C	
	Storage		-40 °C ... +80 °C	
Climatic withstand			Category B according to IEC 60947-1 Annex Q	
Maximum operating altitude			2000 m	
Mounting positions			Mounting positions 1, 1 +/- 30°, 2, 3, 4, 5	
Shock withstand			1/2 sinusoidal shock for 11 ms: no change in contact position	
acc. to IEC 60068-2-27 and EN 60068-2-27			Same as contactor or contactor relay	
(Mounting position 1)				
Vibration withstand			5...300 Hz	
acc. to IEC 60068-2-6			3 g closed position / 2 g open position	
Mechanical durability				
	Number of operating cycles		5 millions operating cycles	
	Max. switching frequency		3600 cycles/h	1800 cycles/h
Max. electrical switching frequency				
		AC-15	1200 cycles/h	
		DC-13	900 cycles/h	

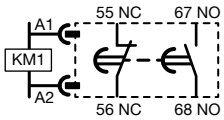
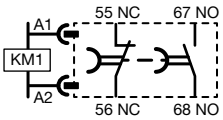
1SBC101505S0201 - Rev. B

Electronic timers
Technical data

Contact utilization characteristics according to UL / CSA

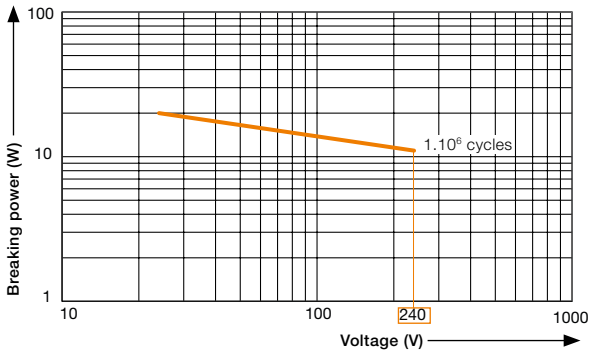
Types			TEF3-ON	TEF3-OFF
Standards			UL 508, CSA C22.2 N°14	
Rated insulation voltage Ui acc. to UL / CSA			300 V	
Max. operational voltage			240 V	
Pilot duty			B300, R300	
AC thermal rated current			5 A	
AC maximum volt-ampere making			3600 VA	
AC maximum volt-ampere breaking			360 VA	
DC thermal rated current			1 A	
DC maximum volt-ampere making-breaking			28 VA	

Connecting characteristics

Connection capacity (min. ... max.)			
	Rigid solid	**1 x**	0.75...2.5 mm²
		2 x	0.75...2.5 mm²
	Flexible with non insulated ferrule	**1 x**	0.75...2.5 mm²
		2 x	0.75...2.5 mm²
	Flexible with insulated ferrule	**1 x**	0.75...2.5 mm²
		2 x	0.75...1.5 mm²
	Lugs	**L ≤**	7.7 mm
		l >	3.2 mm
Connection capacity acc. to UL / CSA		**1 or 2 x**	AWG 18...14
Stripping length			9 mm
Tightening torque	Recommended		1 N.m / 9 lb.in
	Max.		1.20 N.m
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			IP20
Screw terminals			Delivered in open position, screws of unused terminals should be tightened
All terminals			M3
Screwdriver type			Flat Ø 5.5 / Pozidriv 2
Terminal Marking			 

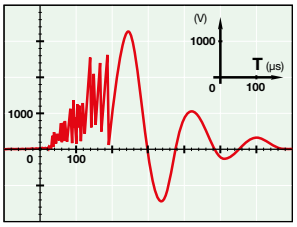
Electrical durability for DC-13 utilization category

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



1SBC101505S0201 - Rev. B

Surge suppressors for contactor coils



1SBC101042F0014

RV5

1SBC101042F0014

RC5-1

1SBC101042F0014

RT5

Description

The operation of inductive circuits causes overvoltages, in particular on opening 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 the breakdown of insulators and even the 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 Ûs to the peak value Ûc of the coil rated control voltage Uc:

$$k = \frac{\hat{U}s\ max.}{\hat{U}c} \qquad \text{in DC} \quad k = \frac{\hat{U}s\ max.}{Uc} \qquad \text{in AC} \quad k = \frac{\hat{U}s\ max.}{Uc\ \sqrt{2}}$$

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

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 generous sizing of parts have enabled us to reduce the number of variants.

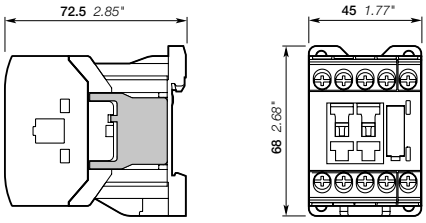
We have chosen the following solutions: transil diodes, varistors and RC blocks.

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	For contactor relays	Rated control circuit voltage - Uc			Type	Order code		Pkg qty	Weight (1 pce)
		V	AC	DC					kg
AS, ASL	NS, NSL	24...50	●	●	RV5/50	1SBN050010R1000		2	0.015
		50...133	●	●	RV5/133	1SBN050010R1001		2	0.015
		110...250	●	●	RV5/250	1SBN050010R1002		2	0.015
		250...440	●	●	RV5/440	1SBN050010R1003		2	0.015
AS	NS	24...50	●	–	RC5-1/50	1SBN050100R1000		2	0.012
		50...133	●	–	RC5-1/133	1SBN050100R1001		2	0.012
		110...250	●	–	RC5-1/250	1SBN050100R1002		2	0.012
		250...440	●	–	RC5-1/440	1SBN050100R1003		2	0.012
ASL	NSL	12...32	–	●	RT5/32	1SBN050020R1000		2	0.015
		25...65	–	●	RT5/65	1SBN050020R1001		2	0.015
		50...90	–	●	RT5/90	1SBN050020R1002		2	0.015
		77...150	–	●	RT5/150	1SBN050020R1003		2	0.015
		150...264	–	●	RT5/264	1SBN050020R1004		2	0.015

Main dimensions mm, *inches*



Easy connection to the coil terminals
(parallel mounting)
Clip-on for both fixing and connection.

No additional space
Clipped onto the right side part of the contactor base without changing contactor overall dimensions and keeping a free access to coil terminals.

1SBC101494S0201

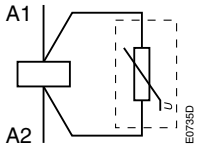
Surge suppressors for contactor coils
Technical data

Varistor	RV5/50	RV5/133	RV5/250	RV5/440
Rated control circuit voltage Uc	24...50 V AC	50...133 V AC	110...250 V AC	250...440 V AC
	24...50 V DC	50...133 V DC	110...250 V DC	250...440 V DC
Residual overvoltage (clipping voltage)	132 V AC	270 V AC	480 V AC	825 V AC
	132 V DC	270 V DC	480 V DC	825 V DC
Opening time growth factor	none			
Operating temperature	-20...+70 °C			
Advantages	High energy absorption: good damping - Unpolarized system			
Drawback	Clipping as from Uvdr*, thus voltage front up to this point *Uvdr = Varistor operating voltage (voltage dependent resistor), tolerance ± 10 %			

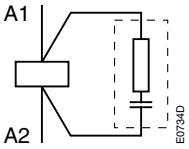
RC type	RC5-1/50	RC5-1/133	RC5-1/250	RC5-1/440
Rated control circuit voltage Uc	24...50 V AC	50...133 V AC	110...250 V AC	250...440 V AC
Residual overvoltage (clipping voltage)	2 to 3 x Uc max.			
Opening time growth factor	2...3			
Operating temperature	-20...+70 °C			
Advantages	Very fast clipping - Attenuation of steep fronts and thus of high frequencies			

Transil diode	RT5/32	RT5/65	RT5/90	RT5/150	RT5/264
Rated control circuit voltage Uc	12...32 V DC	25...65 V DC	50...90 V DC	77...150 V DC	150...264 V DC
Residual overvoltage (clipping voltage)	50 V DC	100 V DC	150 V DC	210 V DC	390 V DC
Opening time growth factor	1.1...1.2				
Operating temperature	-20...+70 °C				
Advantages	Good energy absorption - Unpolarized system - Simple, reliable system				
Drawback	Delay on drop out which does not however reduce contactor breaking capacity				

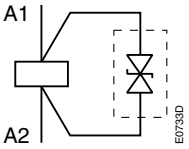
Wiring diagrams



Varistor



RC type



Transil diode

1SBC101602S0201

Mechanical interlock unit and other accessories

VM3

Mechanical interlock unit

When mounted between two contactors without additional width, the VM3 mechanical interlock unit prevents one of the contactors from closing as long as the other contactor is closed.
The mechanical interlock unit includes 2 fixing clips.

Ordering details

For contactors		Type	Order code		Pkg qty	Weight (1 pce)
Left	Right					kg
AS	AS	VM3	1SBN031005T1000		10	0.002
ASL	ASL					

Note : VM3 mechanical durability, 5 millions of operating cycles on both reversing contactors.

BB3

Fixing clips

BB3 is a set of 50 fixing clips.

Ordering details

For contactors	Type	Order code		Pkg qty	Weight (1 pce)
					kg
AS, ASL	BB3	1SBN111020R1000		1	0.009

BDT4

Test block

BDT4 test block is suitable for switching on contactor off-load.
Marking on the block indicates the contactor type to fit with.

Ordering details

For contactors	Type	Order code		Pkg qty	Weight (1 pce)
					kg
AS, ASL, NS, NSL	BDT4	1SBN110122T1000		10	0.007

BA4

Function markers

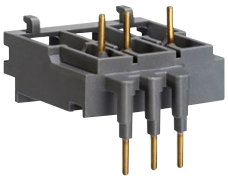
Box of 16 blank cards (16 markers by card) printable on HTP500 thermal transfer printer and AMS 500 marking table to identify your contactors, overload relays or manual motor starters.
Marker dimensions: 7 x 20 mm (*.276" x .787"*).

Ordering details

For contactors	Type	Order code		Pkg qty	Weight (1 pce)
					kg
AS, ASL, NS, NSL	BA4	1SNA235156R2700		16	0.011
AMS 500 support plate for 8 BA4	SPRC 1	1SNA360010R1500		1	0.220
HTP500 support plate	HTP500-BA4	1SNA235712R2400		1	0.290

1SBC101496S0201 - Rev. A

Connection accessories for starting solutions



BEA16-3

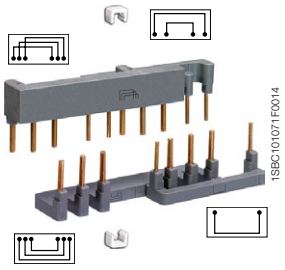
Connecting links

The BEA16-3 insulated 3-pole connecting links are used to connect an AC or DC operated contactors with manual motor starters.

The connecting links ensure the electrical and mechanical connection between the contactor and the manual motor starter.

Ordering details

For contactors	Manual motor starter	Type	Order code		Pkg qty	Weight (1 pce) kg
AS09 ... AS16 ASL09 ... ASL16	MS116-0.16 ... MS116-16 MS132-0.16 ... MS132-16	BEA16-3	1SBN081006T1000		10	0.019



BER16C-3

Connection sets for reversing contactors

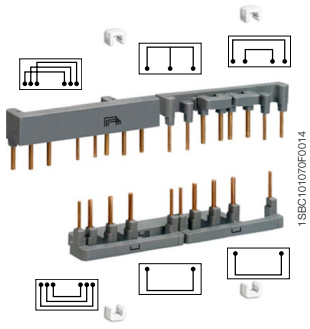
The BER16C-3 connection sets are used for the connections between the main poles of two 3-pole contactors mounted side by side as reversing contactors, including electrical interlocking between built-in N.C. auxiliary contact and coil terminals.

The connection sets are made up of:

– 1 upstream and 1 downstream connections: insulated, solid copper bars,
– 2 connections to realize electrical interlocking between contactors equipped with built-in N.C. auxiliary contacts,
– 2 fixing clips.

Ordering details

For contactors	Mechanical interlock unit	Type	Order code		Pkg qty	Weight (1 pce) kg
2 x AS09 ... AS16 2 x ASL09 ... ASL16	with or without VM3	BER16C-3	1SBN081012R1000		1	0.035



BEY16C-3

Connection sets for star-delta starting

BEY16C-3 connection sets are designed for star-delta starters whose contactors are assembled according to line delta star mounting.

The connection sets are made up of:

– Line contactor / delta contactor: upstream phase-to-phase connection,
– Delta contactor / star contactor: downstream connection in parallel,
– Star contactor: star point upstream,
– An electrical interlocking between delta and star contactors equipped with built-in N.C. auxiliary contacts,
– 4 fixing clips.

Ordering details

For contactors			Mech. interlock unit between star & delta contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
Line	Delta	Star						
AS09 AS12	AS09 AS12	AS09 AS09	with or without VM3	BEY16C-3	1SBN081018R2000		1	0.041

4

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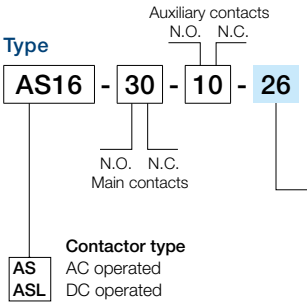
Voltage code table

The below tables indicate the available coil voltages and corresponding digits for order codes. When placing an order, please give either type or order code. Select a standard contactor from ordering detail pages. Change the **coil voltage code** in the type or in the order code according to the table below. Example: for contactor AS09-30-10 and coil 42 V 50/60 Hz, type is AS09-30-10-**21** and order code is 1SBL101001R**21**10.

3-pole contactors

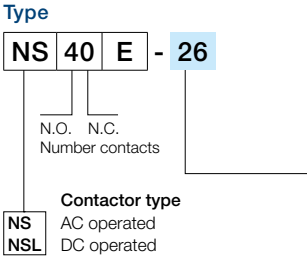


Order code

1SBL121001R **26** **10**

AC coil code	50 Hz	60 Hz	DC coil code	
20	24 V	24 V	80	12 V
21	42 V	42 V	81	24 V
22	48 V	48 V	83	48 V
23	110 V	110 V	84	60 V
24	115 V	115 V	86	110 V
16	–	120 V	87	125 V
25	220 V	220 V	88	220 V
26	**230 V**	**230 V**	89	240 V
27	240 V	240 V		
17	–	277 V		
13	380 V	–		
28	400 V	400 V		
29	415 V	415 V		

Contactor relays



Order code

1SBH101001R **26** **40**

AC coil code	50 Hz	60 Hz	DC coil code	
20	24 V	24 V	80	12 V
21	42 V	42 V	81	24 V
22	48 V	48 V	83	48 V
23	110 V	110 V	84	60 V
24	115 V	115 V	86	110 V
16	–	120 V	87	125 V
25	220 V	220 V	88	220 V
26	**230 V**	**230 V**	89	240 V
27	240 V	240 V		
17	–	277 V		
13	380 V	–		
28	400 V	400 V		
29	415 V	415 V		

1SBC101600S0201

Notes

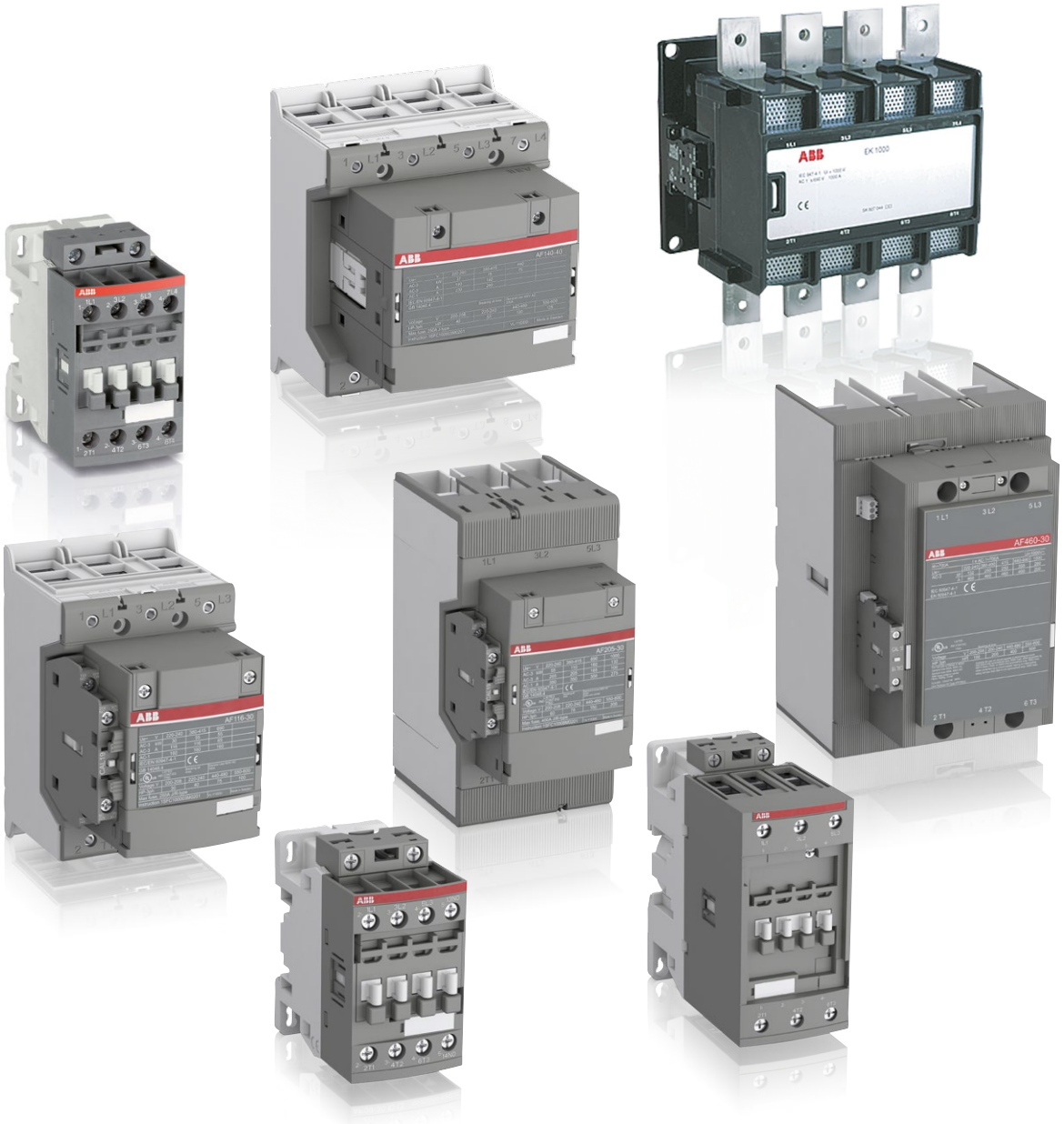


ABB
AF140-40
EK1000
AF116-30
AF205-30
AF460-30

AF, EK contactors and NF contactor relays

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AF contactors for motor starting and power switching up to 2650 A

The latest technology of electronically controlled coil is our standard. It offers multiple benefits over conventional alternatives, and together with ABB's wide product offering, it is an optimal configuration, every time.

Optimized logistics

Cut your costs

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

Continuous operation

Secure uptime

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

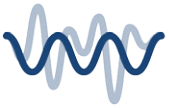
Speed up your projects

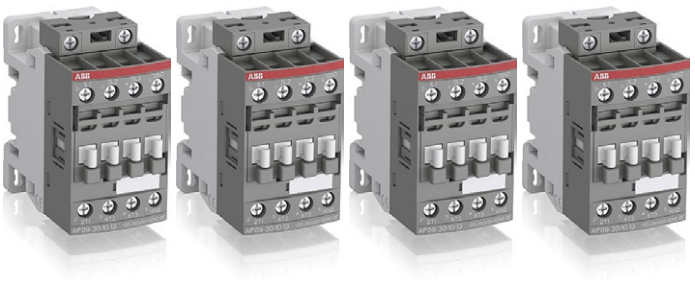
Simplify design

Use the same part number in Europe, Asia and North America as one contactor coil now handles 100 V – 250 V AC / DC, 50 / 60 Hz.
By reducing contactor coil energy consumption by up to 80%, panels can be built smaller and transformers more compact.

1SBC100200S0201

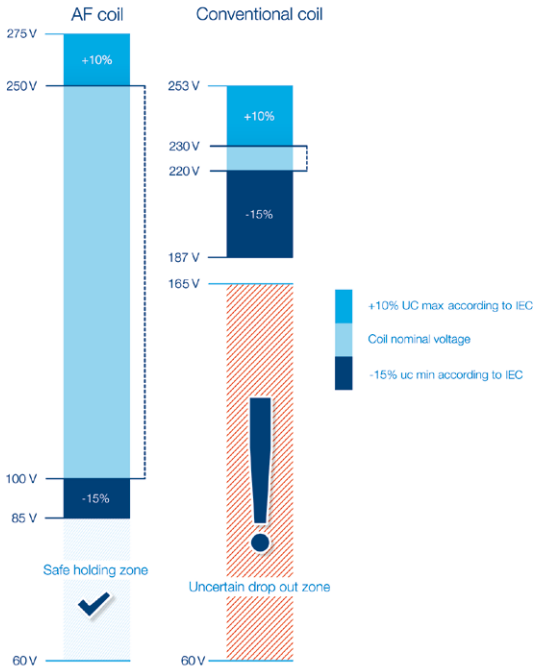
AF technology
Benefits

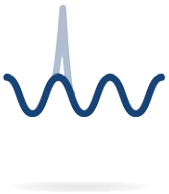




Reliable in all networks
The electronic system within the AF contactor continuously monitor the current and voltage apply to the coil. The contactor is safely operated in an always optimized condition and hum free.

Four coils for the entire voltage range
AF contactors feature both AC and DC control in the same product. Still, the total number of product variants compared to a conventional range is reduced by 90%. Only four coils are required to cover 24 V AC, 20 V DC - 500 V AC / DC.





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

Built-in surge suppression
With conventional contactor technology, it is recommended to use an external surge suppressor, an accessory that could cost as much as half of the contactor. With the AF technology, the surges are handled by the contactor and never reach the control circuit. One less product and one less complication to worry about.

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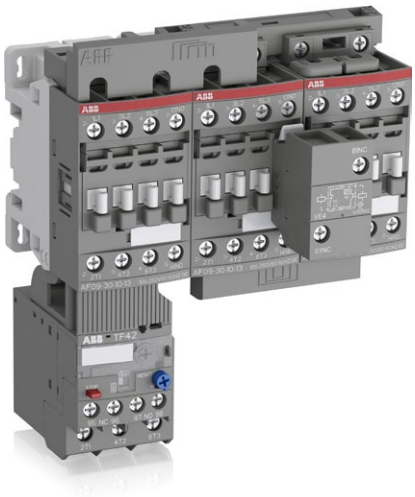
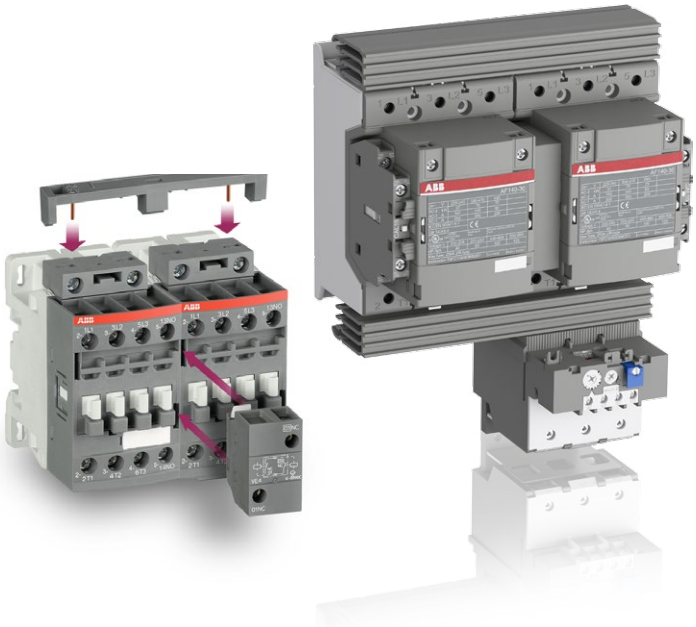
Contactors and motor protection
Advanced but simple



Easy, fast and secure starters assembly
The AF contactor range is perfect for motor starting applications and for solutions where space is limited. You can create any motor starting type and save assembly time with a complete range of accessories and connection sets.

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



Save space
Interlocking reversing pairs require no spacing between contactors, meaning you can fit more functionality into cabinets or other enclosures.

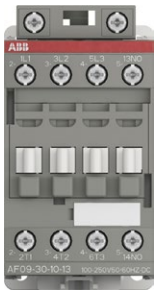
Protect from overload in all conditions
Select thermal overload relays (trip class 10) or electronic overload relays (trip class 10E, 20E, 30E in the same product) to protect your motors against overload and phase failure.

1SBC100202S0201

Contactors and motor protection
Flexible and safe

Easy to use accessories

1-pole, 2-pole and 4-pole auxiliary contact blocks, front or side mounted, are available for a great flexibility up to 96 A. Furthermore, 116 to 2650 A contactors can take up to 2 side mounted auxiliary contact blocks without adding to its width. Coil connection terminals, mechanical and electrical interlocks and electronic timers are easily connected through he snap-to-connect function.

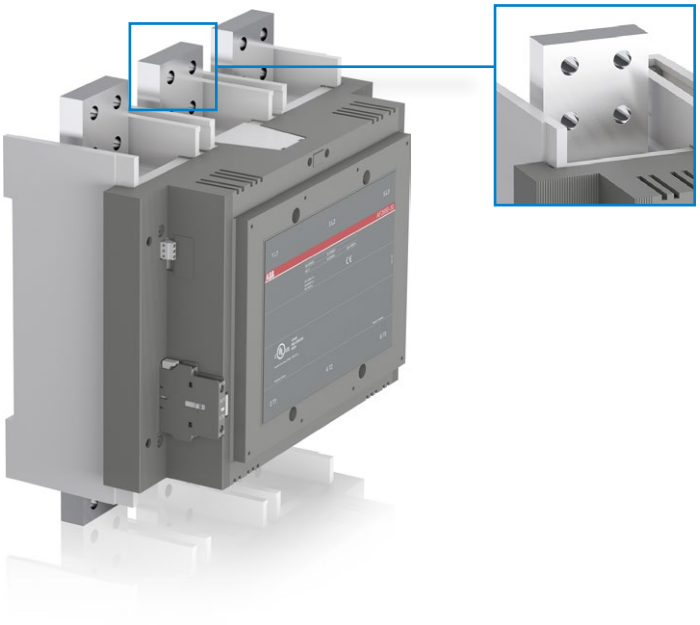


Top-mounted

Bottom-mounted

Additional coil terminal block

Front-mounted



Great flexibility for coil terminal access

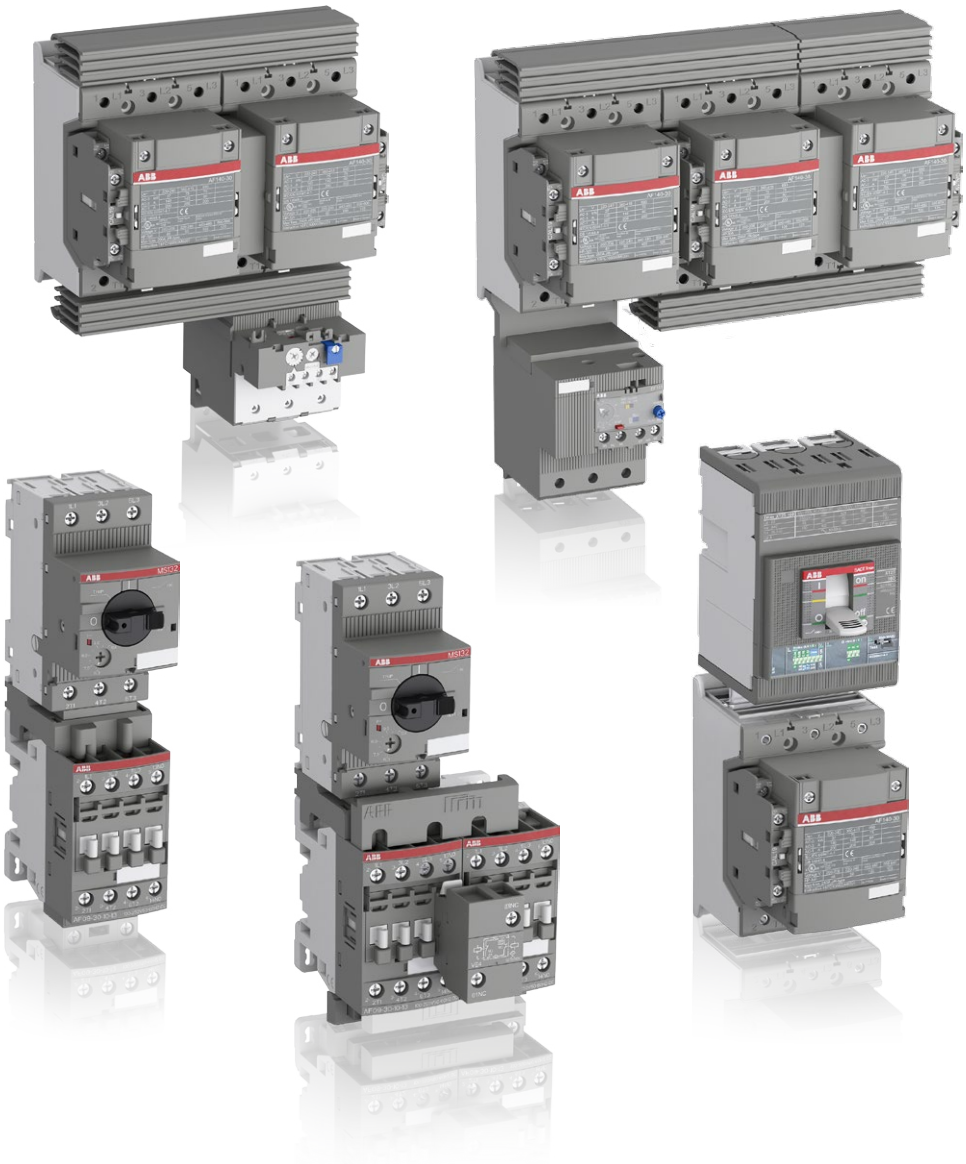
Contactors up to 96 A offer free choice of coil terminal access from top, bottom, both top and bottom or front.

Simple connection and maintenance

The main terminals of AF116 … AF2650 contactors are at the contactors's back to facilitate your bus bars connections. It also allows easy contact inspection and maintenance from AF400 and above.

1SBC100202S0201

Notes



Motor starting solution, in kit form

DOL and reversing starters protected by manual motor starters

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Star-delta starters protected by overload relays

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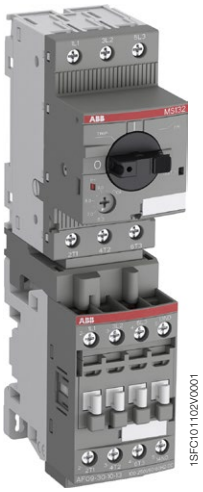
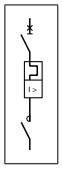
DOL and reversing starters protected by manual motor starters
With AF contactors - open type version in kit form

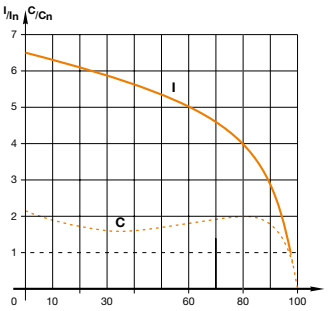




DOL starter
MS132-10 + BEA16-4 + AF09-30-10

Application

Full voltage direct-on-line (DOL) starting and reversing starting for controlling three-phase asynchronous motors is a simple and economic solution characterised by a high starting torque (1.9 to 2.1 times full-speed torque) and a starting current 5.5 to 7 times nominal current.



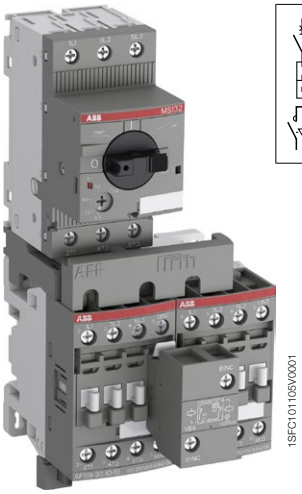
I = current
C = torque
In = nominal current
Cn = nominal torque

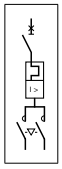
Coordination types

The contactor and the manual motor starter control and protect motors against overload and short-circuits according to coordination types 1 and 2 (IEC 60947-4-1 / EN 60947-4-1) defining the anticipated level of service continuity as follow:

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.



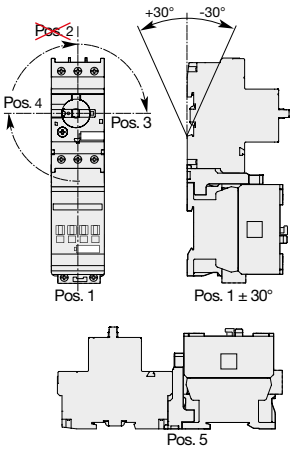


Reversing starter
MS132-10 + BEA16-4 + BER16-4 + VEM4 + AF09-30-10

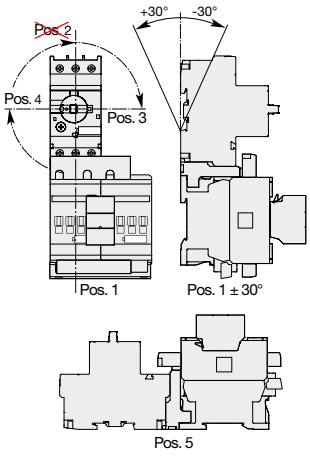
Main Technical Data

Standards		IEC 60947-4-1 / EN 60947-4-1
Rated operational voltage Ue max.		690 V - 50/60 Hz
Rated insulation voltage Ui		
acc. to IEC 60947-4-1		690 V
acc. to UL / CSA		600 V
Switching frequency		≤ 15 starts/hour - 80 % max. load factor - with max. 1.5 s starting time ≤ 30 starts/hour - 50 % max. load factor - with max. 1.5 s starting time
Ambient air temperature		
Close to the device	**use with MS116**	≤ 55 °C
	use with MS132, MS165, MS495	≤ 60 °C
Degree of protection		IP20

Mounting positions



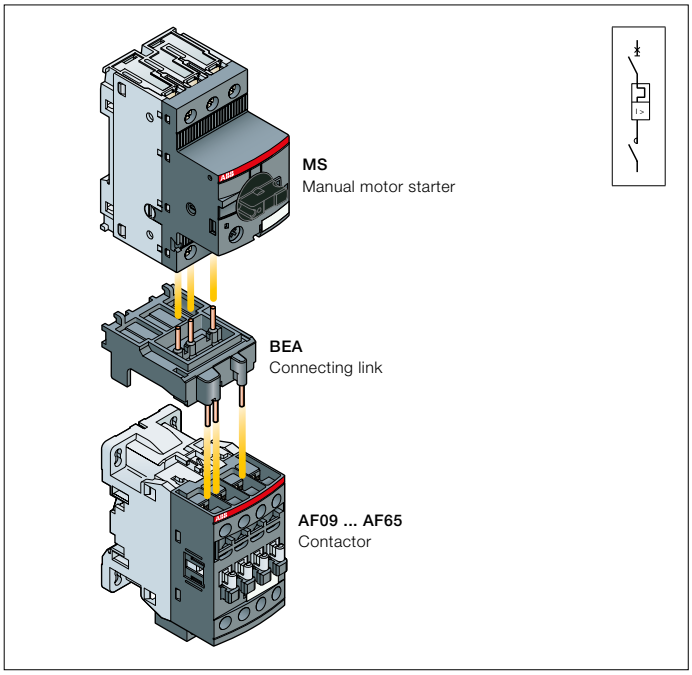
DOL starters



Reversing starters

1SBC101917S0201 - Rev. B

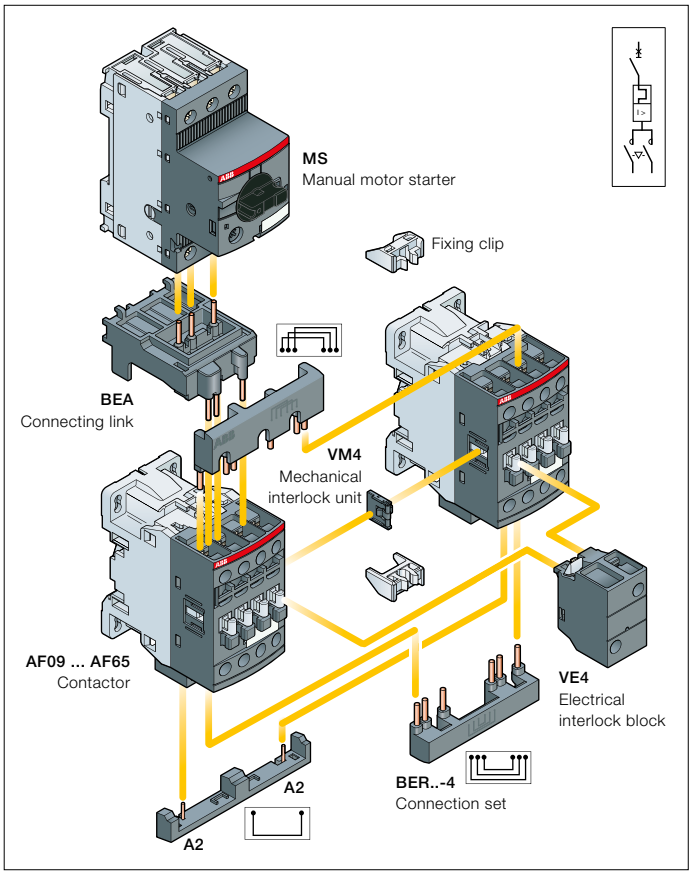
DOL and reversing starters protected by manual motor starters
With AF contactors - open type version in kit form



Direct-on-line starters

Description

You can easily assemble a direct-on-line starter by using the BEA..-4 connecting link 3-pole insulated. It is used to electrically and mechanically connect MS116, MS132 or MS165 manual motor starter and AF09 ... AF65 contactor, AC or DC operated.



Reversing starters

Description

You can easily assemble reversing starter thanks to our complete range of accessories:

- BEA..-4 connecting link 3-pole insulated: it is used to electrically and mechanically connect MS116, MS132 or MS165 manual motor starter and AF09 ... AF65 contactor, AC or DC operated
- For AF09 ... AF38, use VEM4 mechanical and electrical interlock set for reversing starter in 90 mm width. It includes:
  - VM4 mechanical interlock unit including 2 fixing clips
  - VE4 electrical interlock block with A2-A2 connection.
- For AF40 ... AF96, use VM96-4 mechanical interlock unit and additional auxiliary contact blocks for electrical interlocking
- BER..-4 connection set: it assures a safe and simple reversing connection between both contactor main terminals.

Note: for direct mounting on 2 rails 35 mm of MS165 manual motor starter with AF40 ... AF65 contactors, BEA65-4 connecting link must be associated with BPR65-4 35 mm rail hook fixed on each contactor base. Starter combination using BPR65-4 are applicable for MS165 manufactured after week 31, 2016 (date code > 16214).

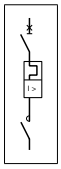
Select now easily and quickly your starter in the following pages for coordination type 1 or 2 at 400 V, 50/60 Hz, Iq = 16 kA up to 18.5 kW and Iq = 50 kA up to 45 kW.

For the full coordination tables:
www.abb.com/lowvoltage then go to the right menu: "Support", select: "Online Product Selection Tools" then select "Coordination Tables for motor protection"

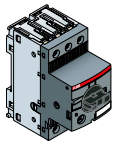
1SBC101917S0201 - Rev. B

DOL starters protected by MS manual motor starters
Coordination type 1

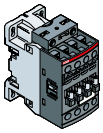
Coordination type 1, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz



Manual motor starters



Contactors



Accessories

BEA..-4

CA4-10

IEC AC-3, 400 V Rated operational power kW	current A	Type (1)	Order code	Current setting range A	Magnetic tripping current A	Rated control circuit voltage Uc min. ... Uc max. (2) V 50/60 Hz	V DC	Type (3)	Order code	Allowed setting current A	Type	Order code
0.06	0.2	MS132-0.25	1SAM350000R1002	0.16...0.25	2.44	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.25	BEA16-4	1SBN081306T1000
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.09	0.3	MS132-0.4	1SAM350000R1003	0.25...0.40	3.9	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.4		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.12	0.44	MS132-0.63	1SAM350000R1004	0.40...0.63	6.14	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.63		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.18	0.6	MS132-0.63	1SAM350000R1004	0.40...0.63	6.14	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.63		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.25	0.85	MS132-1.0	1SAM350000R1005	0.63...1.00	11.5	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	1		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.37	1.1	MS132-1.6	1SAM350000R1006	1.00...1.60	18.4	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	1.6		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.55	1.5	MS132-1.6	1SAM350000R1006	1.00...1.60	18.4	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	1.6		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.75	1.9	MS132-2.5	1SAM350000R1007	1.60...2.50	28.75	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	2.5		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
1.1	2.7	MS132-4.0	1SAM350000R1008	2.50...4.00	50	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	4		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
1.5	3.6	MS132-4.0	1SAM350000R1008	2.50...4.00	50	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	4		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
2.2	4.9	MS132-6.3	1SAM350000R1009	4.00...6.30	78.75	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	6.3		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
3	6.5	MS132-10	1SAM350000R1010	6.30...10.0	150	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	9		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
4	8.5	MS132-10	1SAM350000R1010	6.30...10.0	150	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	9		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
5.5	11.5	MS132-12	1SAM350000R1012	8.00...12.0	180	24...60	20...60	AF12Z-30-10-21	1SBL156001R2110	12		
						100...250	100...250	AF12-30-10-13	1SBL157001R1310			
7.5	15.5	MS132-16	1SAM350000R1011	10.0...16.0	240	24...60	20...60	AF16Z-30-10-21	1SBL176001R2110	16		
						100...250	100...250	AF16-30-10-13	1SBL177001R1310			
11	22	MS132-25	1SAM350000R1014	20.0...25.0	375	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	25	BEA38-4	1SBN082306T2000
						100...250	100...250	AF26-30-00-13	1SBL237001R1300		+ CA4-10	1SBN010110R1010
15	29	MS132-32	1SAM350000R1015	25.0...32.0	480	24...60	20...60	AF30Z-30-00-21	1SBL276001R2100	32		
						100...250	100...250	AF30-30-00-13	1SBL277001R1300			
18.5	35	MS165-42	1SAM451000R1015	30.0...42.0	630	24...60	20...60	AF40-30-00-11	1SBL347001R1100	40	BEA65-4	1SBN083406R1000
						100...250	100...250	AF40-30-00-13	1SBL347001R1300		BPR65-4 (4)	1SBN113405R1000
22	41	MS165-54	1SAM451000R1016	40.0...54.0	810	24...60	20...60	AF52-30-00-11	1SBL367001R1100	53	CA4-10	1SBN010110R1010
						100...250	100...250	AF52-30-00-13	1SBL367001R1300			
30	55	MS165-65	1SAM451000R1017	52.0...65.0	975	24...60	20...60	AF65-30-00-11	1SBL387001R1100	65		
						100...250	100...250	AF65-30-00-13	1SBL387001R1300			
37	66	MS495-75	1SAM550000R1008	57.0...75.0	975	24...60	20...60	AF80-30-00-11	1SBL397001R1100	75		
						100...250	100...250	AF80-30-00-13	1SBL397001R1300			
45	80	MS495-90	1SAM550000R1009	70.0...90.0	1170	24...60	20...60	AF96-30-00-11	1SBL407001R1100	90		
						100...250	100...250	AF96-30-00-13	1SBL407001R1300			

(1) MS116 manual motor starter can be selected according to the current setting range indicated on the coordination line, up to:
- 15 kW, 400 V - AC-3 at 16 kA
- 4 kW, 400 V - AC-3 at 50 kA.

(2) For other control voltages, see "Voltage code table".

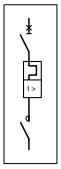
(3) AF38 3-pole contactor can be selected for coordination type 1, 16 kA and 50 kA, 18.5 kW, 400 V - AC-3 (BEA65-4 available for AF40 ... AF65 only).

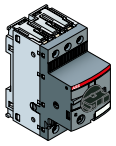
(4) For direct mounting on 2 rails 35 mm of MS165 with AF40 ... AF65: BEA65-4 must be associated with BPR65-4 fixed on contactor base. Applicable for MS165 manufactured after week 31, 2016 (date code > 16214).

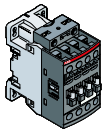
1SBC101913S0201 - Rev. D

DOL starters protected by MS manual motor starters
Coordination type 2

Coordination type 2, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz







BEA..-4

CA4-10

IEC AC-3, 400 V Rated operational power kW	current A	Manual motor starters Type (1)	Order code	Current setting range A	Magnetic tripping current A	Contactors Rated control circuit voltage Uc min. ... Uc max. (2) V 50/60 Hz	V DC	Type (3)	Order code	Allowed setting current A	Accessories Type (4)	Order code
0.06	0.2	MS132-0.25	1SAM350000R1002	0.16...0.25	2.44	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.25	BEA16-4	1SBN081306T1000
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.09	0.3	MS132-0.4	1SAM350000R1003	0.25...0.40	3.9	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.4		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.12	0.44	MS132-0.63	1SAM350000R1004	0.40...0.63	6.14	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.63		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.18	0.6	MS132-0.63	1SAM350000R1004	0.40...0.63	6.14	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.63		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.25	0.85	MS132-1.0	1SAM350000R1005	0.63...1.00	11.5	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	1		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.37	1.1	MS132-1.6	1SAM350000R1006	1.00...1.60	18.4	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	1.6		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.55	1.5	MS132-1.6	1SAM350000R1006	1.00...1.60	18.4	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	1.6		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.75	1.9	MS132-2.5	1SAM350000R1007	1.60...2.50	28.75	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	2.5		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
1.1	2.7	MS132-4.0	1SAM350000R1008	2.50...4.00	50	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	4	BEA26-4	1SBN082306T1000
						100...250	100...250	AF26-30-00-13	1SBL237001R1300		+ CA4-10	1SBN010110R1010
1.5	3.6	MS132-4.0	1SAM350000R1008	2.50...4.00	50	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	4		
						100...250	100...250	AF26-30-00-13	1SBL237001R1300			
2.2	4.9	MS132-6.3	1SAM350000R1009	4.00...6.30	78.75	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	6.3		
						100...250	100...250	AF26-30-00-13	1SBL237001R1300			
3	6.5	MS132-10	1SAM350000R1010	6.30...10.0	150	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	10		
						100...250	100...250	AF26-30-00-13	1SBL237001R1300			
4	8.5	MS132-10	1SAM350000R1010	6.30...10.0	150	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	10		
						100...250	100...250	AF26-30-00-13	1SBL237001R1300			
5.5	11.5	MS132-12	1SAM350000R1012	8.00...12.0	180	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	12	BEA38-4	1SBN082306T2000
						100...250	100...250	AF26-30-00-13	1SBL237001R1300		+ CA4-10	1SBN010110R1010
7.5	15.5	MS132-16	1SAM350000R1011	10.0...16.0	240	24...60	20...60	AF30Z-30-00-21	1SBL276001R2100	16		
						100...250	100...250	AF30-30-00-13	1SBL277001R1300			
11	22	MS132-25	1SAM350000R1014	20.0...25.0	375	24...60	20...60	AF30Z-30-00-21	1SBL276001R2100	25		
						100...250	100...250	AF30-30-00-13	1SBL277001R1300			
15	29	MS132-32	1SAM350000R1015	25.0...32.0	480	24...60	20...60	AF30Z-30-00-21	1SBL276001R2100	32		
						100...250	100...250	AF30-30-00-13	1SBL277001R1300			
18.5	35	MS165-42	1SAM451000R1015	30.0...42.0	630	24...60	20...60	AF40-30-00-11	1SBL347001R1100	40	BEA65-4	1SBN083406R1000
						100...250	100...250	AF40-30-00-13	1SBL347001R1300		BPR65-4 (5)	1SBN113405R1000
22	41	MS165-54	1SAM451000R1016	40.0...54.0	810	24...60	20...60	AF52-30-00-11	1SBL367001R1100	53	CA4-10	1SBN010110R1010
						100...250	100...250	AF52-30-00-13	1SBL367001R1300			
30	55	MS165-65	1SAM451000R1017	52.0...65.0	975	24...60	20...60	AF65-30-00-11	1SBL387001R1100	65		
						100...250	100...250	AF65-30-00-13	1SBL387001R1300			
37	66	MS495-75	1SAM550000R1008	57.0...75.0	975	24...60	20...60	AF80-30-00-11	1SBL397001R1100	75		
						100...250	100...250	AF80-30-00-13	1SBL397001R1300			
45	80	MS495-90	1SAM550000R1009	70.0...90.0	1170	24...60	20...60	AF96-30-00-11	1SBL407001R1100	90		
						100...250	100...250	AF96-30-00-13	1SBL407001R1300			

(1) MS116 manual motor starter can be selected according to the current setting range indicated on the coordination line, up to
- 15 kW 400V - AC-3 at 16 kA
- 4 kW, 400 V - AC-3 at 50 kA.

(2) For other control voltages, see "Voltage code table".

(3) AF26 3-pole contactor can be selected for coordination type 2, 16 kA, 7.5 kW, 400 V - AC-3.
AF38 3-pole contactor can be selected for coordination type 2, 16 kA and 50 kA, 18.5 kW, 400 V - AC-3 (BEA65-4 available for AF40 ... AF65 only).

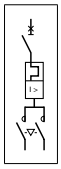
(4) BEA26-4 should be selected with MS116-12 … MS116-16 and AF26 … AF38.
BEA38-4 can only be selected with MS116-20 … MS116-32.

(5) For direct mounting on 2 rails 35 mm of MS165 with AF40 ... AF65: BEA65-4 must be associated with BPR65-4 fixed on contactor base. Applicable for MS165 manufactured after week 31, 2016 (date code > 16214).

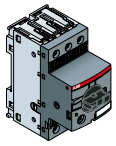
1SBC101914S0201 - Rev. D

Reversing starters protected by MS manual motor starters
Coordination type 1

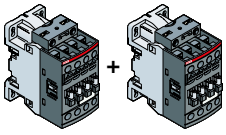
Coordination type 1, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz



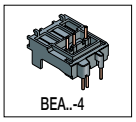
Manual motor starters

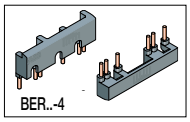


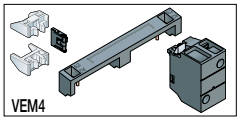
Contactors



Accessories







IEC AC-3, 400 V Rated operational power	current	Type (1)	Order code	Current setting range	Magnetic tripping current	Rated control circuit voltage Uc min. ... Uc max. (2)		Type (3)	Order code	Allowed setting current	Type	Order code
kW	A			A	A	V 50/60 Hz	V DC			A		
0.06	0.2	MS132-0.25	1SAM350000R1002	0.16...0.25	2.44	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.25	BEA16-4	1SBN081306T1000
						100...250	100...250	AF09-30-10-13	1SBL137001R1310		+ BER16-4	1SBN081311R1000
0.09	0.3	MS132-0.4	1SAM350000R1003	0.25...0.40	3.9	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.4	+ VEM4	1SBN030111R1000
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.12	0.44	MS132-0.63	1SAM350000R1004	0.40...0.63	6.14	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.63		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.18	0.6	MS132-0.63	1SAM350000R1004	0.40...0.63	6.14	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.63		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.25	0.85	MS132-1.0	1SAM350000R1005	0.63...1.00	11.5	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	1		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.37	1.1	MS132-1.6	1SAM350000R1006	1.00...1.60	18.4	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	1.6		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.55	1.5	MS132-1.6	1SAM350000R1006	1.00...1.60	18.4	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	1.6		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.75	1.9	MS132-2.5	1SAM350000R1007	1.60...2.50	28.75	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	2.5		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
1.1	2.7	MS132-4.0	1SAM350000R1008	2.50...4.00	50	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	4		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
1.5	3.6	MS132-4.0	1SAM350000R1008	2.50...4.00	50	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	4		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
2.2	4.9	MS132-6.3	1SAM350000R1009	4.00...6.30	78.75	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	6.3		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
3	6.5	MS132-10	1SAM350000R1010	6.30...10.0	150	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	9		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
4	8.5	MS132-10	1SAM350000R1010	6.30...10.0	150	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	9		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
5.5	11.5	MS132-12	1SAM350000R1012	8.00...12.0	180	24...60	20...60	AF12Z-30-10-21	1SBL156001R2110	12		
						100...250	100...250	AF12-30-10-13	1SBL157001R1310			
7.5	15.5	MS132-16	1SAM350000R1011	10.0...16.0	240	24...60	20...60	AF16Z-30-10-21	1SBL176001R2110	16		
						100...250	100...250	AF16-30-10-13	1SBL177001R1310			
11	22	MS132-25	1SAM350000R1014	20.0...25.0	375	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	25	BEA38-4	1SBN082306T2000
						100...250	100...250	AF26-30-00-13	1SBL237001R1300		+ BER38-4	1SBN082311R1000
15	29	MS132-32	1SAM350000R1015	25.0...32.0	480	24...60	20...60	AF30Z-30-00-21	1SBL276001R2100	32	+ VEM4	1SBN030111R1000
						100...250	100...250	AF30-30-00-13	1SBL277001R1300		+ 2x CA4-10	1SBN010110R1010
18.5	35	MS165-42	1SAM451000R1015	30.0...42.0	630	24...60	20...60	AF40-30-00-11	1SBL347001R1100	40	BEA65-4	1SBN083406R1000
						100...250	100...250	AF40-30-00-13	1SBL347001R1300		+ 2x BPR65-4 (4)	1SBN113405R1000
22	41	MS165-54	1SAM451000R1016	40.0...54.0	810	24...60	20...60	AF52-30-00-11	1SBL367001R1100	53	+ BER65-4	1SBN083411R1000
						100...250	100...250	AF52-30-00-13	1SBL367001R1300		+ VM96-4	1SBN033405T1000
30	55	MS165-65	1SAM451000R1017	52.0...65.0	975	24...60	20...60	AF65-30-00-11	1SBL387001R1100	65	+ 2x CA4-10	1SBN010110R1010
						100...250	100...250	AF65-30-00-13	1SBL387001R1300		+ 2x CA4-01	1SBN010110R1001
37	66	MS495-75	1SAM550000R1008	57.0...75.0	975	24...60	20...60	AF80-30-00-11	1SBL397001R1100	75	BER96-4	1SBN083911R1000
						100...250	100...250	AF80-30-00-13	1SBL397001R1300		+ VM96-4	1SBN033405T1000
45	80	MS495-90	1SAM550000R1009	70.0...90.0	1170	24...60	20...60	AF96-30-00-11	1SBL407001R1100	90	+ 2x CA4-10	1SBN010110R1010
						100...250	100...250	AF96-30-00-13	1SBL407001R1300		+ 2x CA4-01	1SBN010110R1001

(1) MS116 manual motor starter can be selected according to the current setting range indicated on the coordination line, up to:
- 15 kW, 400 V - AC-3 at 16 kA
- 4 kW, 400 V - AC-3 at 50 kA.

(2) For other control voltages, see "Voltage code table".

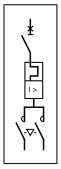
(3) AF38 3-pole contactor can be selected for coordination type 1, 16 kA and 50 kA, 18.5 kW, 400 V - AC-3 (BEA65-4 available for AF40 ... AF65 only).

(4) For direct mounting on 2 rails 35 mm of MS165 with AF40 ... AF65: BEA65-4 must be associated with BPR65-4 fixed on each contactor base. Applicable for MS165 manufactured after week 31, 2016 (date code > 16214).

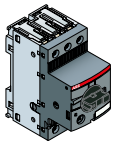
1SBC101915S0201 - Rev. C

Reversing starters protected by MS manual motor starters
Coordination type 2

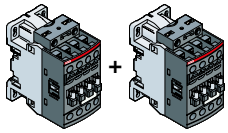
Coordination type 2, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz



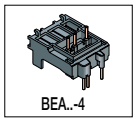
Manual motor starters

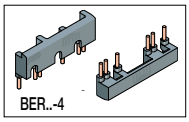


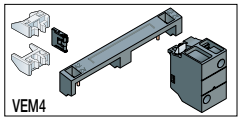
Contactors



Accessories







IEC AC-3, 400 V Rated operational power kW	current A	Manual motor starters Type (1)	Order code	Current setting range A	Magnetic tripping current A	Contactors Rated control circuit voltage Uc min. ... Uc max. (2) V 50/60 Hz	V DC	Type (3)	Order code	Allowed setting current A	Accessories Type (4)	Order code
0.06	0.2	MS132-0.25	1SAM350000R1002	0.16...0.25	2.44	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.25	BEA16-4	1SBN081306T1000
						100...250	100...250	AF09-30-10-13	1SBL137001R1310		+ BER16-4	1SBN081311R1000
0.09	0.3	MS132-0.4	1SAM350000R1003	0.25...0.40	3.9	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.4	+ VEM4	1SBN030111R1000
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.12	0.44	MS132-0.63	1SAM350000R1004	0.40...0.63	6.14	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.63		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.18	0.6	MS132-0.63	1SAM350000R1004	0.40...0.63	6.14	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.63		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.25	0.85	MS132-1.0	1SAM350000R1005	0.63...1.00	11.5	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	1		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.37	1.1	MS132-1.6	1SAM350000R1006	1.00...1.60	18.4	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	1.6		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.55	1.5	MS132-1.6	1SAM350000R1006	1.00...1.60	18.4	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	1.6		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.75	1.9	MS132-2.5	1SAM350000R1007	1.60...2.50	28.75	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	2.5		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
1.1	2.7	MS132-4.0	1SAM350000R1008	2.50...4.00	50	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	4	BEA26-4	1SBN082306T1000
						100...250	100...250	AF26-30-00-13	1SBL237001R1300		+ BER38-4	1SBN082311R1000
1.5	3.6	MS132-4.0	1SAM350000R1008	2.50...4.00	50	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	4	+ VEM4	1SBN030111R1000
						100...250	100...250	AF26-30-00-13	1SBL237001R1300		+ 2x CA4-10	1SBN010110R1010
2.2	4.9	MS132-6.3	1SAM350000R1009	4.00...6.30	78.75	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	6.3		
						100...250	100...250	AF26-30-00-13	1SBL237001R1300			
3	6.5	MS132-10	1SAM350000R1010	6.30...10.0	150	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	10		
						100...250	100...250	AF26-30-00-13	1SBL237001R1300			
4	8.5	MS132-10	1SAM350000R1010	6.30...10.0	150	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	10		
						100...250	100...250	AF26-30-00-13	1SBL237001R1300			
5.5	11.5	MS132-12	1SAM350000R1012	8.00...12.0	180	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	12	BEA38-4	1SBN082306T2000
						100...250	100...250	AF26-30-00-13	1SBL237001R1300		+ BER38-4	1SBN082311R1000
7.5	15.5	MS132-16	1SAM350000R1011	10.0...16.0	240	24...60	20...60	AF30Z-30-00-21	1SBL276001R2100	16	+ VEM4	1SBN030111R1000
						100...250	100...250	AF30-30-00-13	1SBL277001R1300		+ 2x CA4-10	1SBN010110R1010
11	22	MS132-25	1SAM350000R1014	20.0...25.0	375	24...60	20...60	AF30Z-30-00-21	1SBL276001R2100	25		
						100...250	100...250	AF30-30-00-13	1SBL277001R1300			
15	29	MS132-32	1SAM350000R1015	25.0...32.0	480	24...60	20...60	AF30Z-30-00-21	1SBL276001R2100	32		
						100...250	100...250	AF30-30-00-13	1SBL277001R1300			
18.5	35	MS165-42	1SAM451000R1015	30.0...42.0	630	24...60	20...60	AF40-30-00-11	1SBL347001R1100	40	BEA65-4	1SBN083406R1000
						100...250	100...250	AF40-30-00-13	1SBL347001R1300		+ 2x BPR65-4 (5)	1SBN113405R1000
22	41	MS165-54	1SAM451000R1016	40.0...54.0	810	24...60	20...60	AF52-30-00-11	1SBL367001R1100	53	+ BER65-4	1SBN083411R1000
						100...250	100...250	AF52-30-00-13	1SBL367001R1300		+ VM96-4	1SBN033405T1000
30	55	MS165-65	1SAM451000R1017	52.0...65.0	975	24...60	20...60	AF65-30-00-11	1SBL387001R1100	65	+ 2x CA4-10	1SBN010110R1010
						100...250	100...250	AF65-30-00-13	1SBL387001R1300		+ 2x CA4-01	1SBN010110R1001
37	66	MS495-75	1SAM550000R1008	57.0...75.0	975	24...60	20...60	AF80-30-00-11	1SBL397001R1100	75	BER96-4	1SBN083911R1000
						100...250	100...250	AF80-30-00-13	1SBL397001R1300		+ VM96-4	1SBN033405T1000
45	80	MS495-90	1SAM550000R1009	70.0...90.0	1170	24...60	20...60	AF96-30-00-11	1SBL407001R1100	90	+ 2x CA4-10	1SBN010110R1010
						100...250	100...250	AF96-30-00-13	1SBL407001R1300		+ 2x CA4-01	1SBN010110R1001

(1) MS116 manual motor starter can be selected according to the current setting range indicated on the coordination line, up to
- 15 kW 400V - AC-3 at 16 kA
- 4 kW, 400 V - AC-3 at 50 kA.

(2) For other control voltages, see "Voltage code table".

(3) AF26 3-pole contactor can be selected for coordination type 2, 16 kA, 7.5 kW, 400 V - AC-3.
AF38 3-pole contactor can be selected for coordination type 2, 16 kA and 50 kA, 18.5 kW, 400 V - AC-3 (BEA65-4 available for AF40 ... AF65 only).

(4) BEA26-4 should be selected with MS116-12 … MS116-16 and AF26 … AF38.
BEA38-4 can only be selected with MS116-20 … MS116-32.

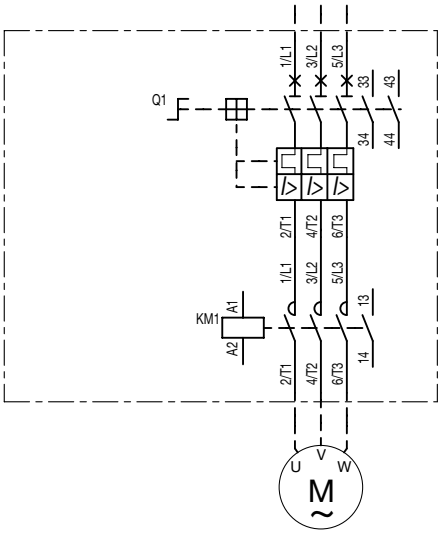
(5) For direct mounting on 2 rails 35 mm of MS165 with AF40 ... AF65: BEA65-4 must be associated with BPR65-4 fixed on each contactor base. Applicable for MS165 manufactured after week 31, 2016 (date code > 16214).

1SBC101916S0201 - Rev. D

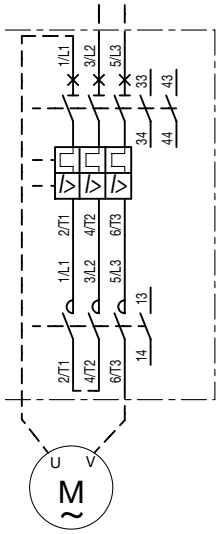
DOL and reversing starters protected by manual motor starters
With AF contactors - open type version in kit form
Wiring diagrams

Direct-on-line starters

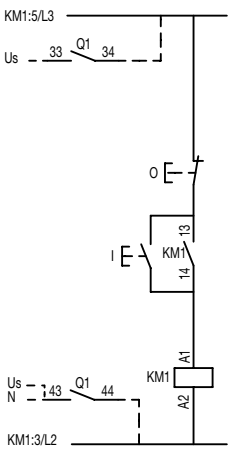
Power circuit



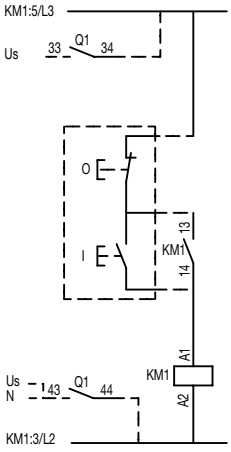
1-phase



AC or DC local control



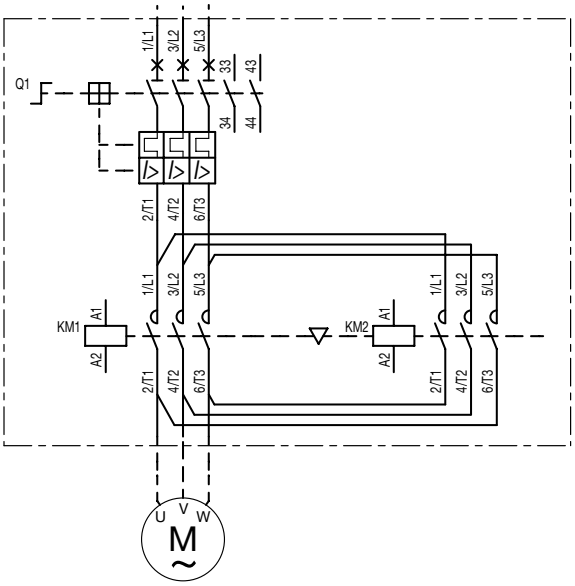
AC or DC remote control



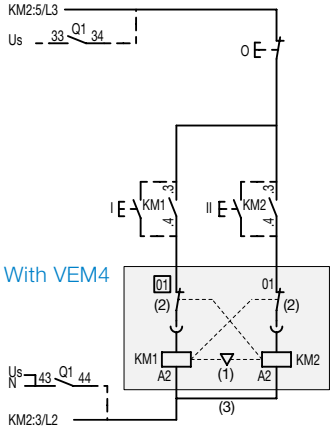
Note: coil Uc 12-20 V DC : A1+, A2-

Reversing starters

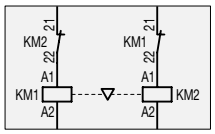
Power circuit



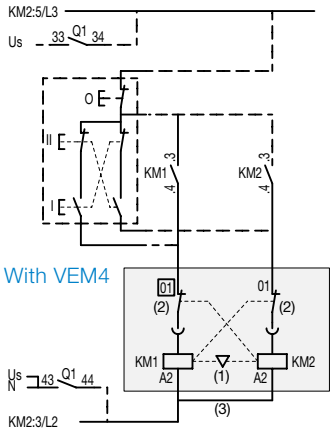
AC or DC local control



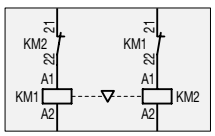
With VM



AC or DC remote control



With VM

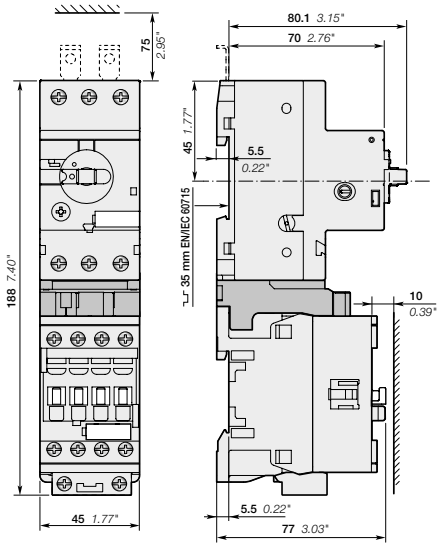


Note: - VEM4 = VM4 (1) + VE4 (2) with A2-A2 (3) connection
(Except for coil Uc 12-20 V DC : use VM4 with CA4).
- coil Uc 12-20 V DC : A1+, A2-

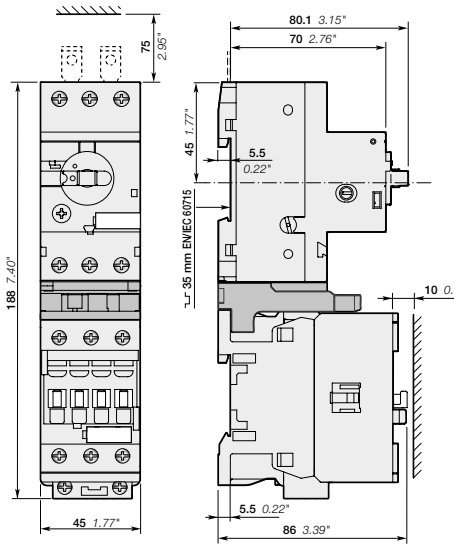
1SBC101918S0201

DOL starters protected by M116 manual motor starters
With AF contactors - open type version in kit form

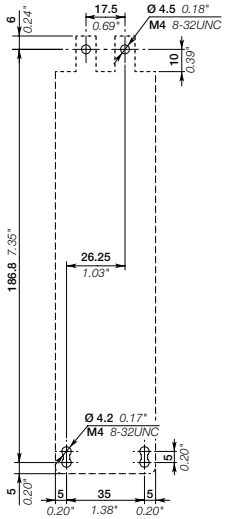
Main dimensions mm, *inches*



MS116-0.16 ... MS116-16
+ BEA16-4
+ AF09, AF12, AF16



MS116-0.16 ... MS116-16
+ BEA26-4
+ AF26, AF30, AF38



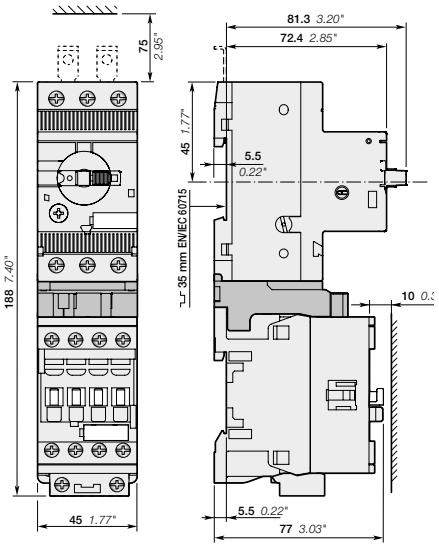
Note: contactor lateral distance to grounded component 2 mm *0.08*" min.

5

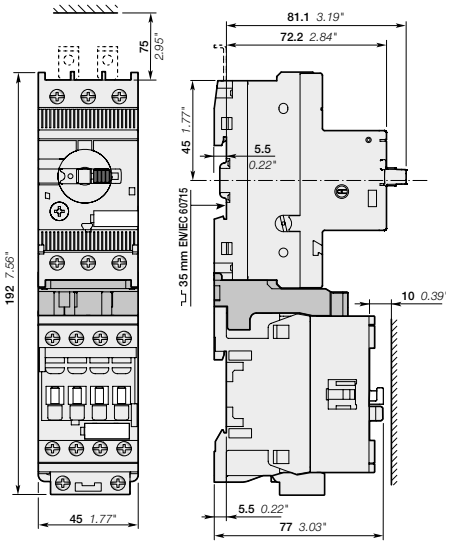
1SBC101919S0201

DOL starters protected by M132 manual motor starters
With AF contactors - open type version in kit form

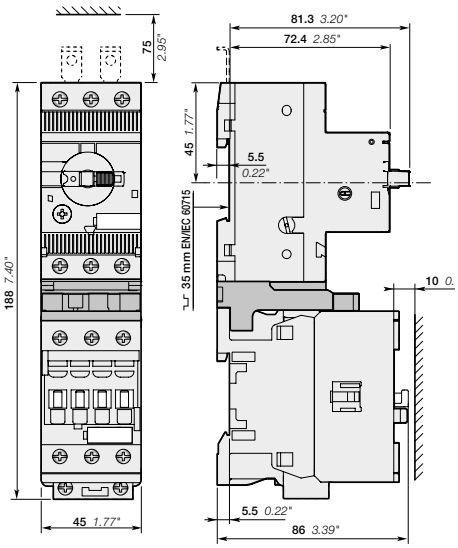
Main dimensions mm, *inches*



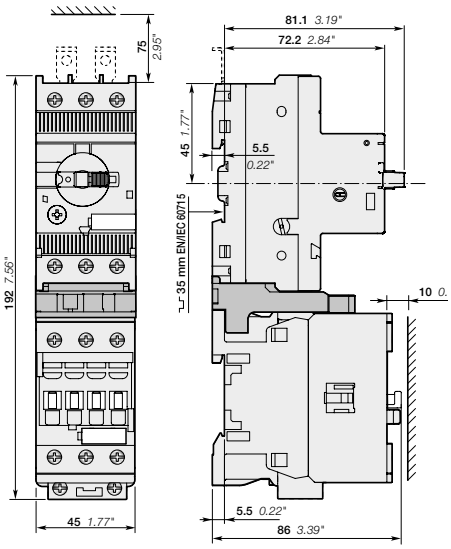
MS132-0.16 ... MS132-10
+ BEA16-4
+ AF09, AF12, AF16



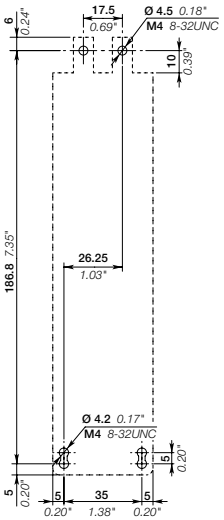
MS132-12 ... MS132-25
+ BEA16-4
+ AF09, AF12, AF16



MS132-0.16 ... MS132-10
+ BEA26-4
+ AF26, AF30, AF38



MS132-12 ... MS132-32
+ BEA38-4
+ AF26, AF30, AF38

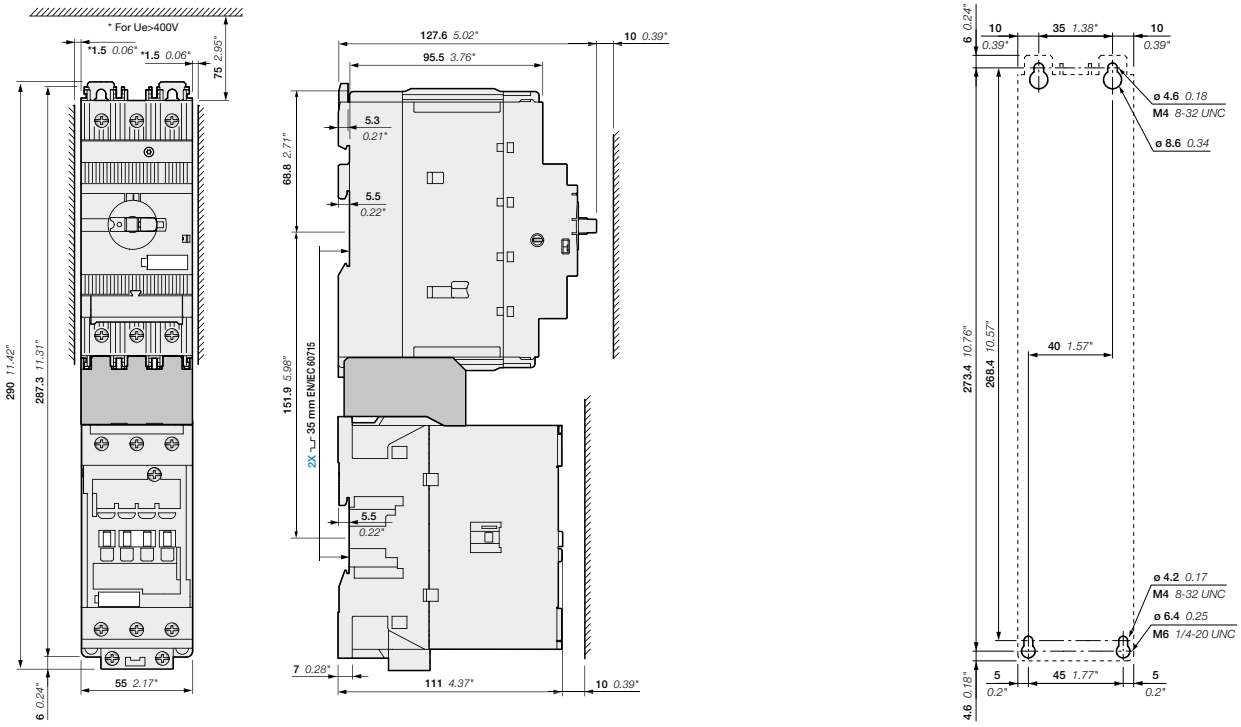


Note: contactor lateral distance to grounded component 2 mm *0.08"* min.

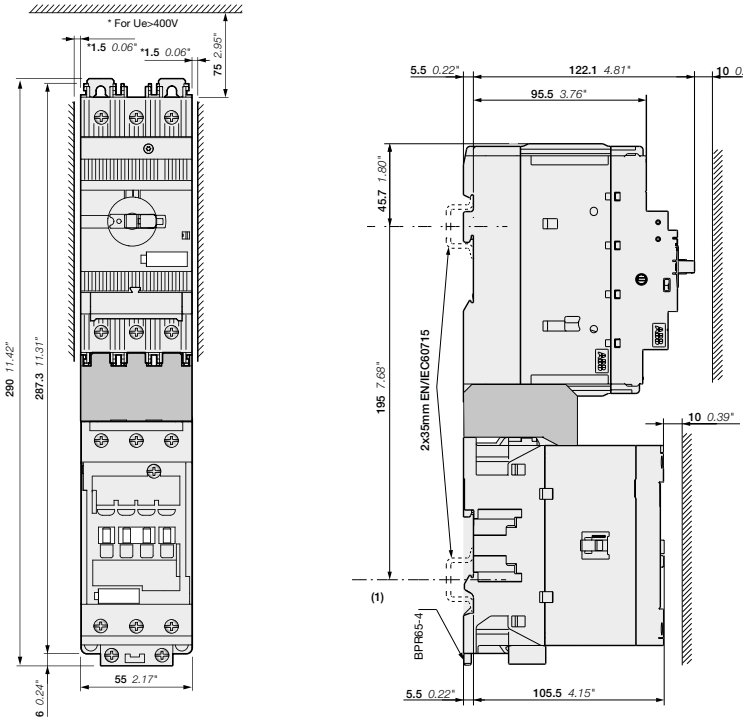
1SBC101923S0201 - Rev. A

DOL starters protected by MS165 manual motor starters
With AF contactors - open type version in kit form

Main dimensions mm, *inches*



MS165
+ BEA65-4
+ AF40, AF52, AF65



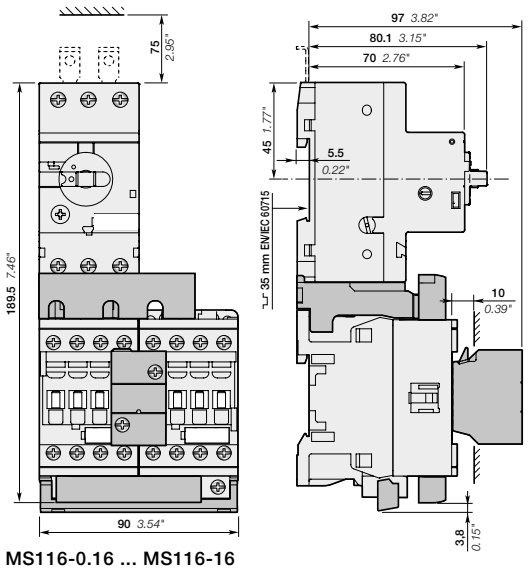
MS165
+ BEA65-4
+ AF40, AF52, AF65 + BPR65-4

Note: for Ue > 400 V, contactor lateral distance to grounded component 1.5 mm *0.06*" min.
(1) Assembly on fixed DIN Rails for DOL starter with BPR65-4 rail hook

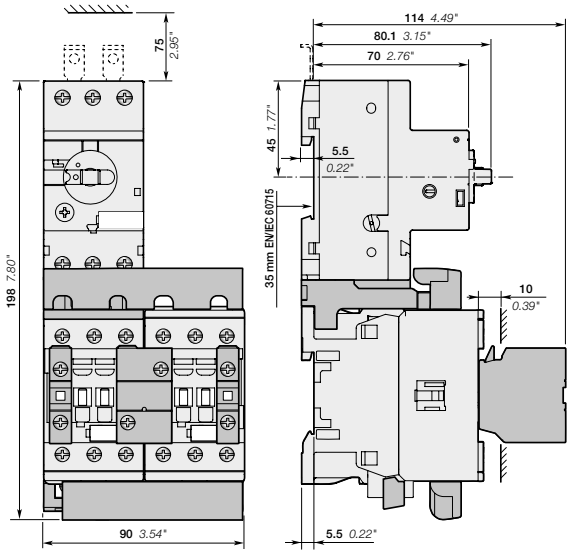
1SBC100088S0201 - Rev. B

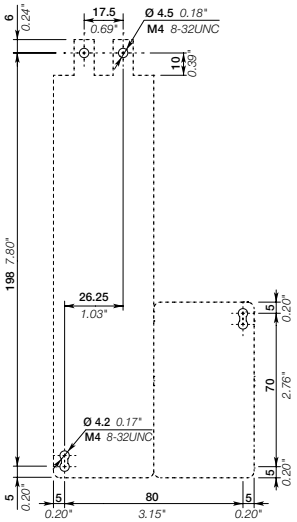
Reversing starters protected by M116 manual motor starters
With AF contactors - open type version in kit form

Main dimensions mm, *inches*



MS116-0.16 ... MS116-16
+ BEA16-4, BER16-4, VEM4
+ AF09, AF12, AF16





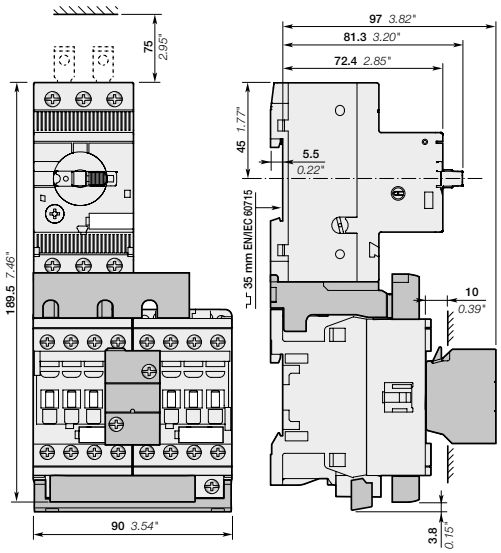
MS116-0.16 ... MS116-16
+ BEA26-4, BER38-4, VEM4, CA4-10
+ AF26, AF30, AF38

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

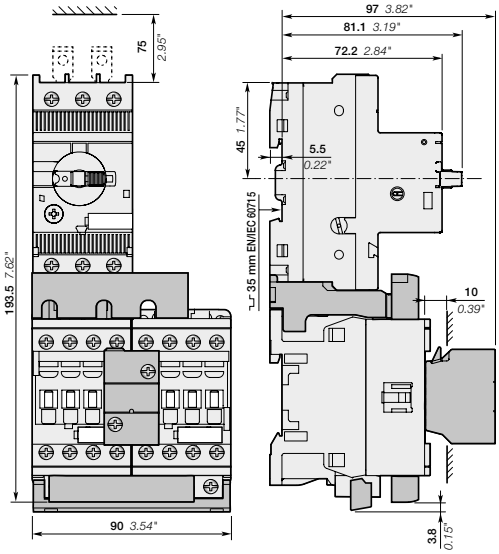
1SBC101924S0201

Reversing starters protected by M132 manual motor starters
With AF contactors - open type version in kit form

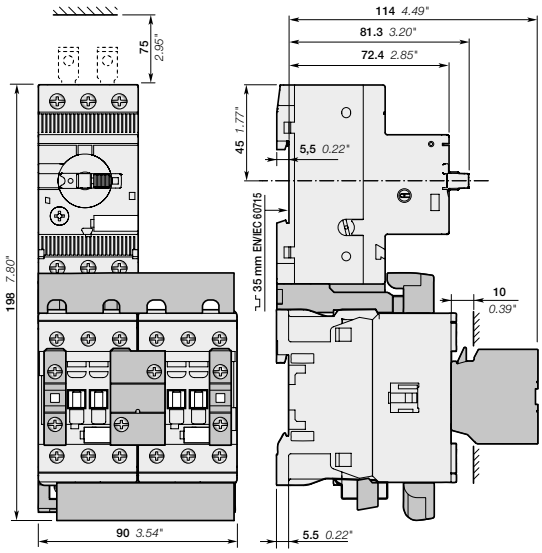
Main dimensions mm, *inches*



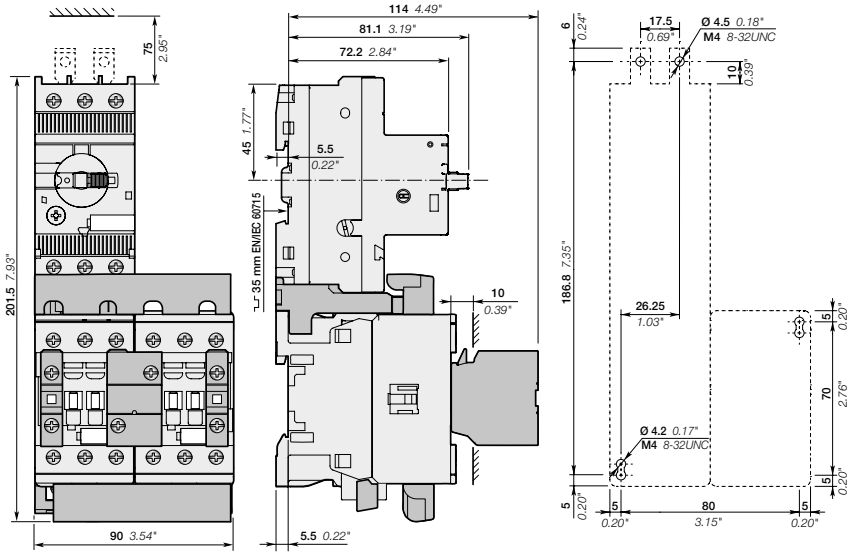
MS132-0.16 ... MS132-10
+ BEA16-4, BER16-4, VEM4
+ AF09, AF12, AF16



MS132-12 ... MS132-25
+ BEA16-4, BER16-4, VEM4
+ AF09, AF12, AF16



MS132-0.16 ... MS132-10
+ BEA26-4, BER38-4, VEM4, CA4-10
+ AF26, AF30, AF38



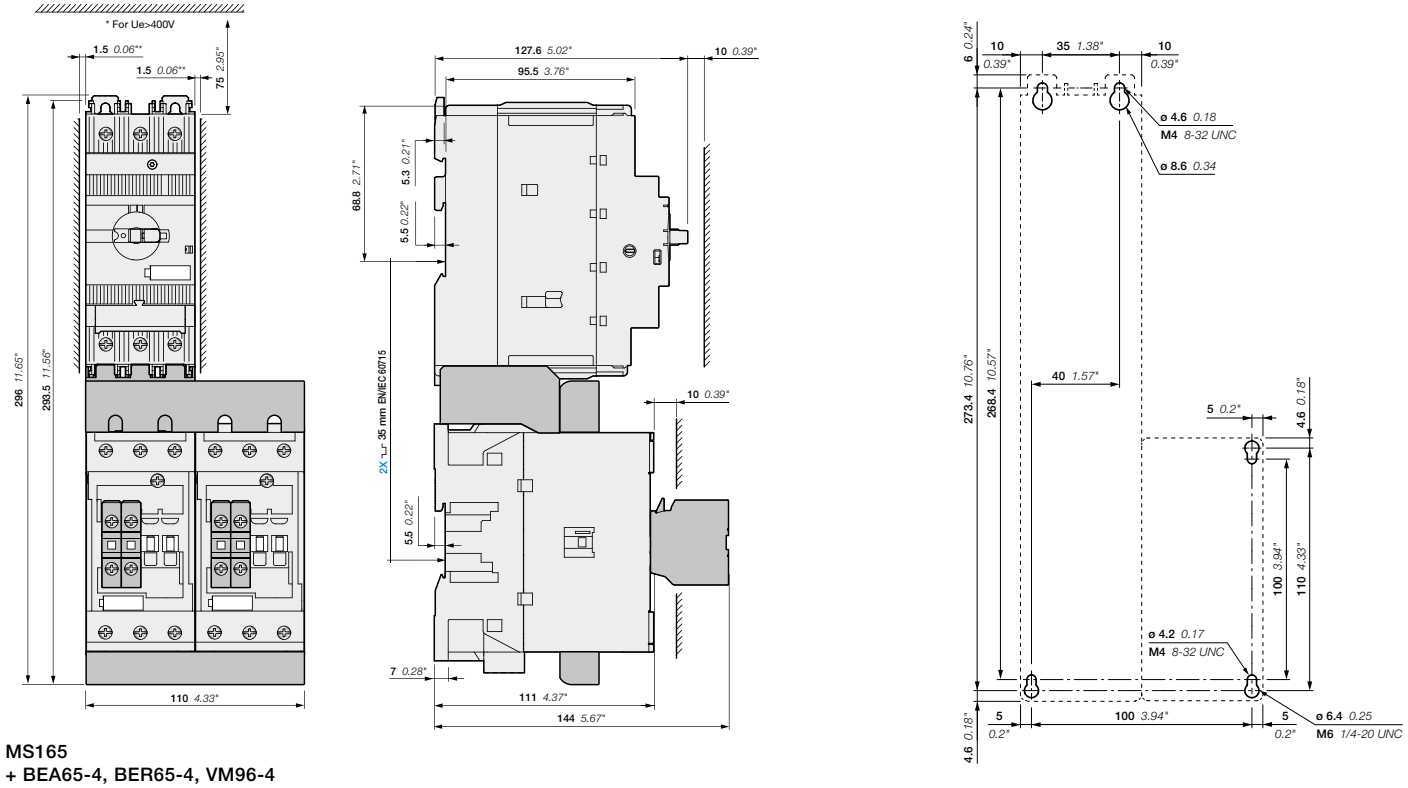
MS132-12 ... MS132-32
+ BEA38-4, BER38-4, VEM4, CA4-10
+ AF26, AF30, AF38

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

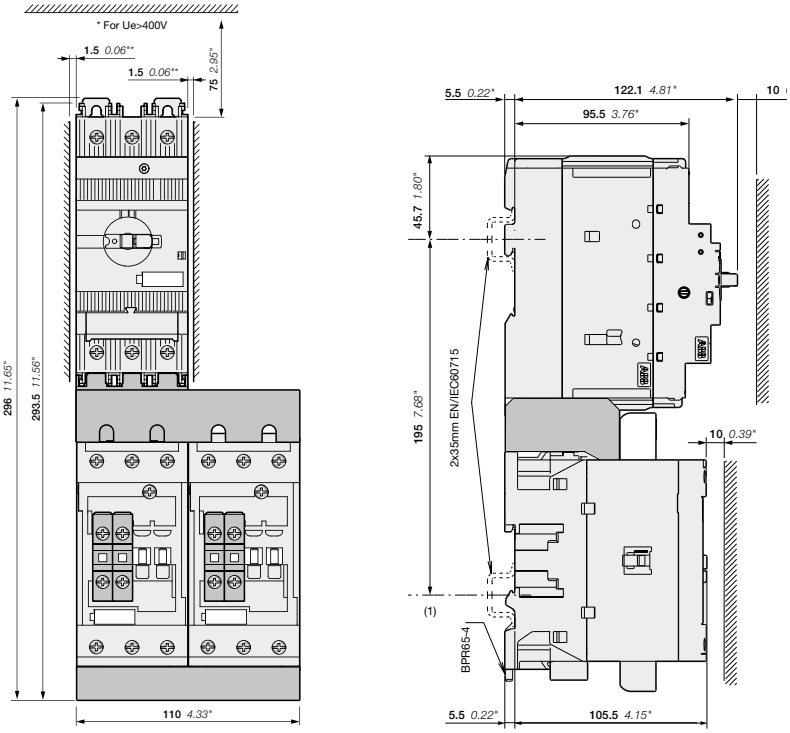
1SBC101925S0201

Reversing starters protected by MS165 manual motor starters
With AF contactors - open type version in kit form

Main dimensions mm, *inches*



MS165
+ BEA65-4, BER65-4, VM96-4
+ AF40, AF52, AF65



MS165
+ BEA65-4,
+ AF40, AF52, AF65 + 2x BPR65-4

Note: for Ue > 400 V, contactor lateral distance to grounded component 1.5 mm *0.06*" min.
(1): Assembly on fixed DIN Rails for reverser starter with BPR65-4 rail hook

1SBC100091S0201 - Rev. A

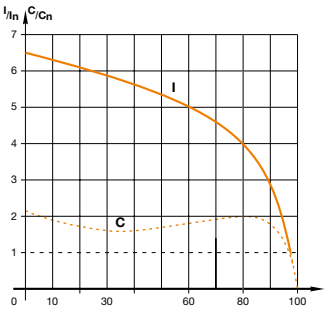
Notes

DOL starters protected by moulded-case circuit-breakers and overload relays
With AF contactors - Open type version in kit form

XT2S 160 + BEA140/XT2 + AF140-30-11

Application

Full voltage direct-on-line (DOL) starting for controlling three-phase asynchronous motors is a simple and economic solution characterised by a high starting torque (1.9 to 2.1 times full-speed torque) and a starting current 5.5 to 7 times nominal current.



I = current
C = torque
In = nominal current
Cn = nominal torque

Coordination types

The contactor and the moulded-case circuit-breaker control and protect motors against overload and short-circuits according to coordination types 1 and 2 (IEC 60947-4-1/EN 60947-4-1) defining the anticipated level of service continuity as follow:

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.

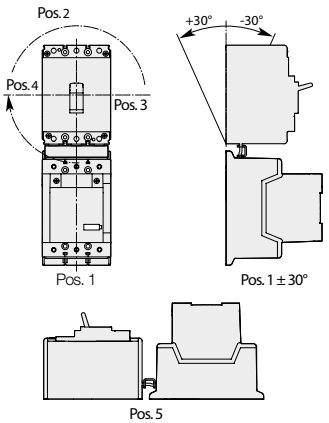
Type 2: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts light welding is acceptable.

XT2S 160 + BEA140/XT2 + AF140-30-11 + EF146

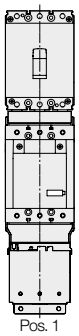
Main Technical Data

Standards	IEC 60947-4-1 / EN 60947-4-1
Rated operational voltage Ue max.	400 V - 50/60 Hz
Rated insulation voltage Ui	
acc. to IEC 60947-4-1	690 V
acc. to UL / CSA	600 V
Switching frequency	≤ 15 starts/hour - 80 % max. load factor - with max. 1.5 s starting time ≤ 30 starts/hour - 50 % max. load factor - with max. 1.5 s starting time
Ambient air temperature	
Close to the device	< 55 °C
Degree of protection	IP20

Mounting positions



Direct-on-line
MCCB + AF

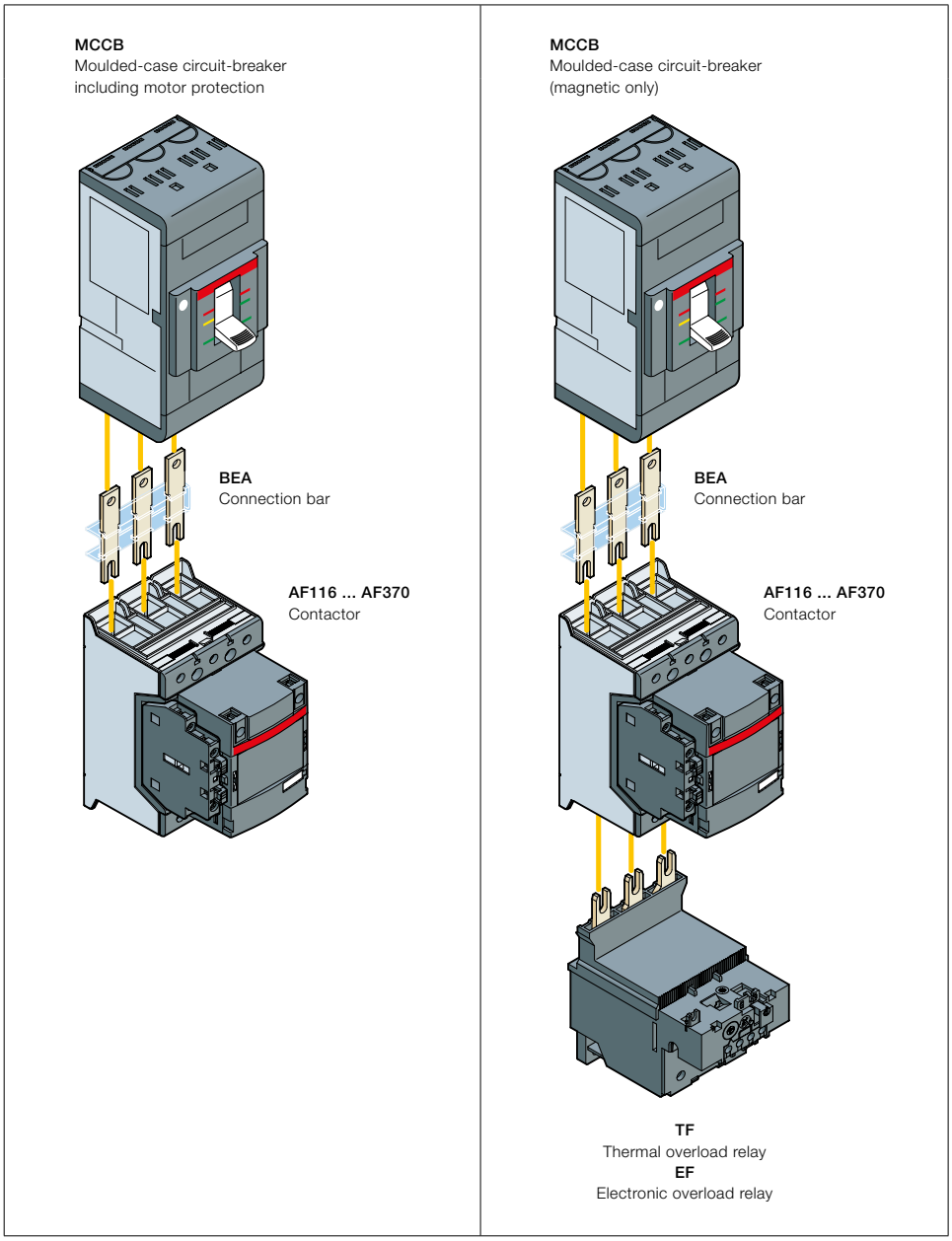


Direct-on-line
MCCB + AF + OL

1SBC101973S0201

DOL starters protected by moulded-case circuit-breakers and overload relays

With AF contactors - Open type version in kit form



Description

You can easily assemble a direct-on-line starter by using the BEA connection bars. It is used to electrically connect MCCB moulded-case circuit-breaker and AF116 ... AF370 contactor, AC or DC operated.

Select now easily and quickly your starter in the following pages for coordination type 1 or 2 at 400 V, 50/60 Hz, Iq = 50 kA up to 200 kW.

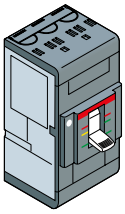
For the full coordination tables:
www.abb.com/lowvoltage then go to the right menu: "Support", select: "Online Product Selection Tools" then select "Coordination Tables for motor protection"

1SBC101973S0201

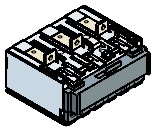
DOL starters protected by MCCB including motor protection
Coordination type 1 or 2

Coordination type 1 or 2, AC-3, 50 kA, 400 V, 50/60 Hz

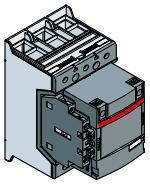
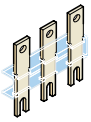
MCCB



+



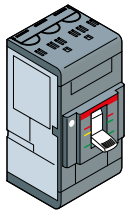
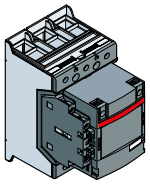
IEC		Magnetic triping current setting	Max. allowed thermal setting	Base			Trip unit		
AC-3, 400 V				Type	Order code		Type	Order code	
Rated power kW	Rated current A	A							
55	97	1440	116	XT2S 160	1SDA068164R1	+	Ekip M-LIU In160	1SDA067355R1	
75	132	1920	140	XT2S 160	1SDA068164R1	+	Ekip M-LIU In160	1SDA067355R1	
90	160	2400	190	T4S 250 PR222MP In200	1SDA054527R1		Included	-	
110	195	2880	205	T5S 400 PR222MP In320	1SDA054553R1		Included	-	
132	230	3600	265	T5S 400 PR222MP In400	1SDA054554R1		Included	-	
160	280	4400	305	T5S 400 PR222MP In400	1SDA054554R1		Included	-	

	Contactors					Connection bars		
								
	Control voltage Uc min. ... Uc max.		Type	Order code		Type	Order code	
	V 50/60 Hz	V DC						
	24...60	20...60	AF116-30-11-11	1SFL427001R1111		BEA140/XT2	1SFN084206R1000	
	100...250	100...250	AF116-30-11-13	1SFL427001R1311				
	24...60	20...60	AF140-30-11-11	1SFL447001R1111				
	100...250	100...250	AF140-30-11-13	1SFL447001R1311				
	24...60	20...60	AF190-30-11-11	1SFL487002R1111		BEA205/T4	1SFN084806R1001	
	100...250	100...250	AF190-30-11-13	1SFL487002R1311				
	24...60	20...60	AF205-30-11-11	1SFL527002R1111				
	100...250	100...250	AF205-30-11-13	1SFL527002R1311				
	24...60	20...60	AF265-30-11-11	1SFL547002R1111		BEA370/T5	1SFN085406R1000	
	100...250	100...250	AF265-30-11-13	1SFL547002R1311				
	24...60	20...60	AF305-30-11-11	1SFL587002R1111				
	100...250	100...250	AF305-30-11-13	1SFL587002R1311				

1SBC101975S0201

DOL starters protected by MCCB (magnetic only) and overload relays
Coordination type 1 or 2

Coordination type 1 or 2, AC-3, 50 kA, 400 V, 50/60 Hz

	MCCB	Contactors
		

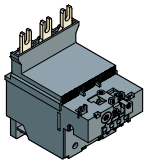
Thermal overload relays

IEC AC-3, 400 V Rated power kW	Rated current A	Magnetic triping current A	Type	Order code	Control voltage Uc min. ... Uc max. V 50/60 Hz	V DC	Type	Order code
55	97	1600	XT2S 160 MA 160	1SDA076530R1	24...60	20...60	AF116-30-11-11	1SFL427001R1111
					100...250	100...250	AF116-30-11-13	1SFL427001R1311
75	132	1920	XT2S 160 MA 160	1SDA076530R1	24...60	20...60	AF140-30-11-11	1SFL447001R1111
					100...250	100...250	AF140-30-11-13	1SFL447001R1311
90	160	2250	XT4S 250 Ekip I In250	1SDA068480R1	24...60	20...60	AF190-30-11-11	1SFL487002R1111
					100...250	100...250	AF190-30-11-13	1SFL487002R1311
110	195	2720	T4S 320 PR221-I In320	1SDA054126R1	24...60	20...60	AF205-30-11-11	1SFL527002R1111
					100...250	100...250	AF205-30-11-13	1SFL527002R1311

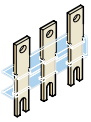
Electronic overload relays

55	97	1600	XT2S 160 MA 160	1SDA076530R1	24...60	20...60	AF116-30-11-11	1SFL427001R1111
					100...250	100...250	AF116-30-11-13	1SFL427001R1311
75	132	1920	XT2S 160 MA 160	1SDA076530R1	24...60	20...60	AF140-30-11-11	1SFL447001R1111
					100...250	100...250	AF140-30-11-13	1SFL447001R1311
90	160	2250	XT4S 250 Ekip I In250	1SDA068480R1	24...60	20...60	AF190-30-11-11	1SFL487002R1111
					100...250	100...250	AF190-30-11-13	1SFL487002R1311
110	195	2720	T4S 320 PR221-I In320	1SDA054126R1	24...60	20...60	AF205-30-11-11	1SFL527002R1111
					100...250	100...250	AF205-30-11-13	1SFL527002R1311
132	230	3200	T5S 400 PR221-I In400	1SDA054335R1	24...60	20...60	AF265-30-11-11	1SFL547002R1111
					100...250	100...250	AF265-30-11-13	1SFL547002R1311
160	280	4000	T5S 400 PR221-I In400	1SDA054335R1	24...60	20...60	AF305-30-11-11	1SFL587002R1111
					100...250	100...250	AF305-30-11-13	1SFL587002R1311
200	350	5040	T5S 630 PR221-I In630	1SDA054405R1	24...60	20...60	AF370-30-11-11	1SFL607002R1111
					100...250	100...250	AF370-30-11-13	1SFL607002R1311

Overload relays



Connection bars



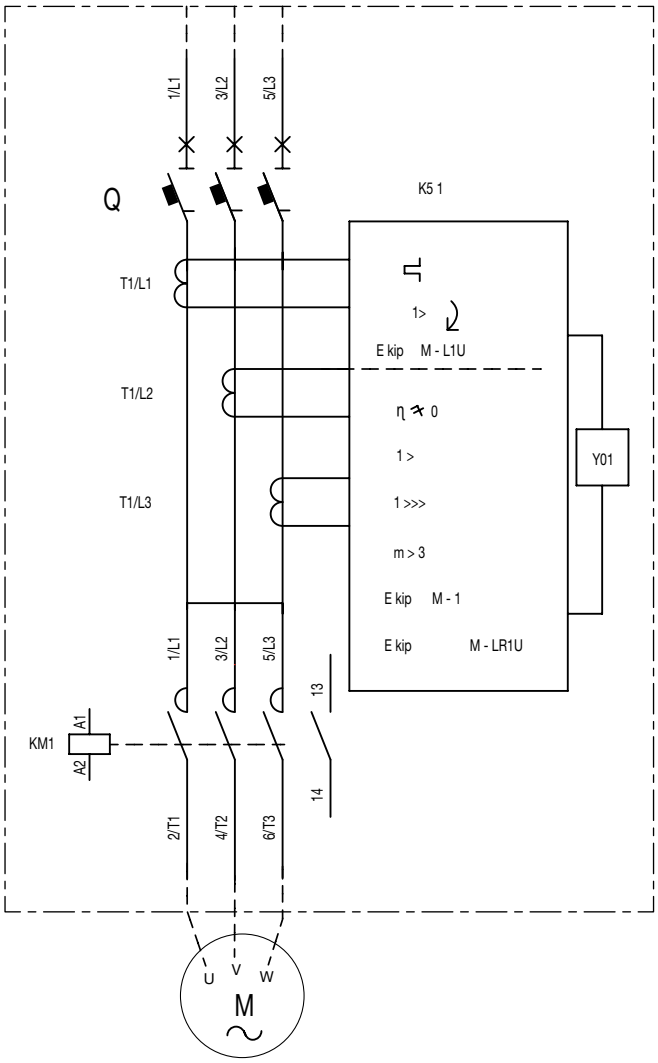
Setting ranges A	Max. allowed setting current A	Type	Order code	Type	Order code
80...110	110	TF140DU-110	1SAZ431201R1002	BEA140/XT2	1SFN084206R1000
110...142	140	TF140DU-142	1SAZ431201R1004		
130...175	175	TA200DU-175	1SAZ421201R1005	BEA205/XT4	1SFN084806R1000
155...200	200	TA200DU-200	1SAZ421201R1006	BEA205/T4	1SFN084806R1001
54...150	116	EF146-150	1SAX351001R1101	BEA140/XT2	1SFN084206R1000
54...150	140	EF146-150	1SAX351001R1101		
63...210	190	EF205-210	1SAX531001R1101	BEA205/XT4	1SFN084806R1000
63...210	205	EF205-210	1SAX531001R1101	BEA205/T4	1SFN084806R1001
115...380	265	EF370-380	1SAX611001R1101	BEA370/T5	1SFN085406R1000
115...380	305	EF370-380	1SAX611001R1101		
115...380	350	EF370-380	1SAX611001R1101		

1SBC101974S0201

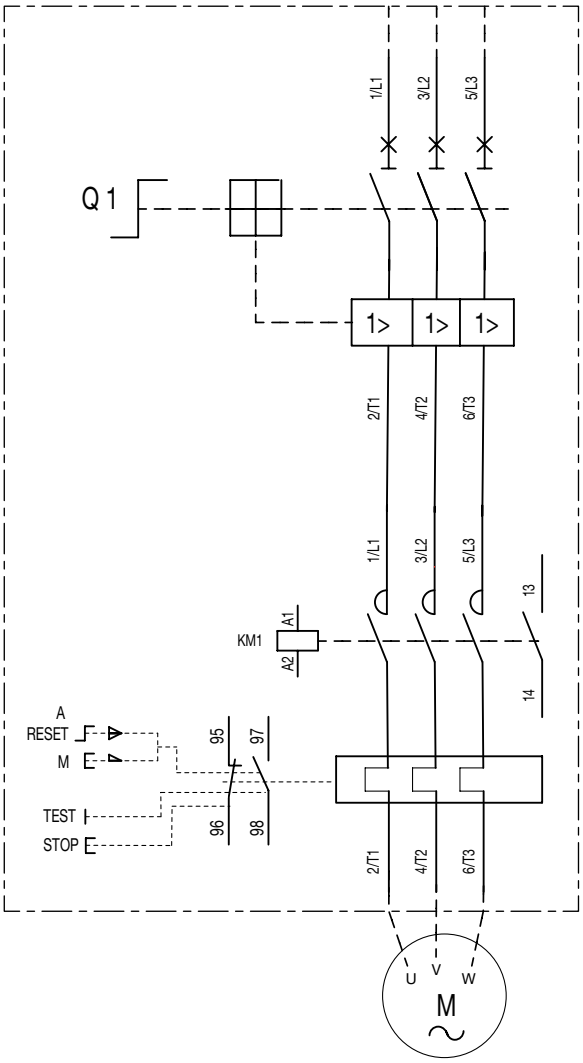
DOL starters protected by moulded-case circuit-breakers and overload relays
With AF contactors - Open type version in kit form

Direct-on-line starters

Protected by MCCB including motor protection



Protected by MCCB (magnetic only) and overload relays

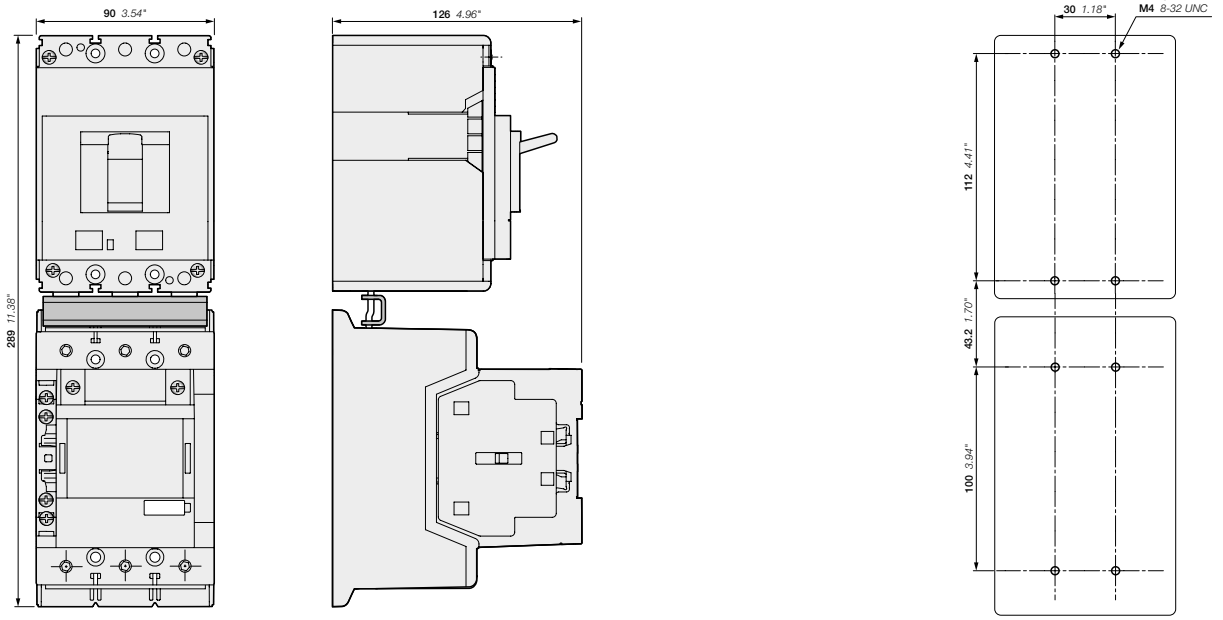


5

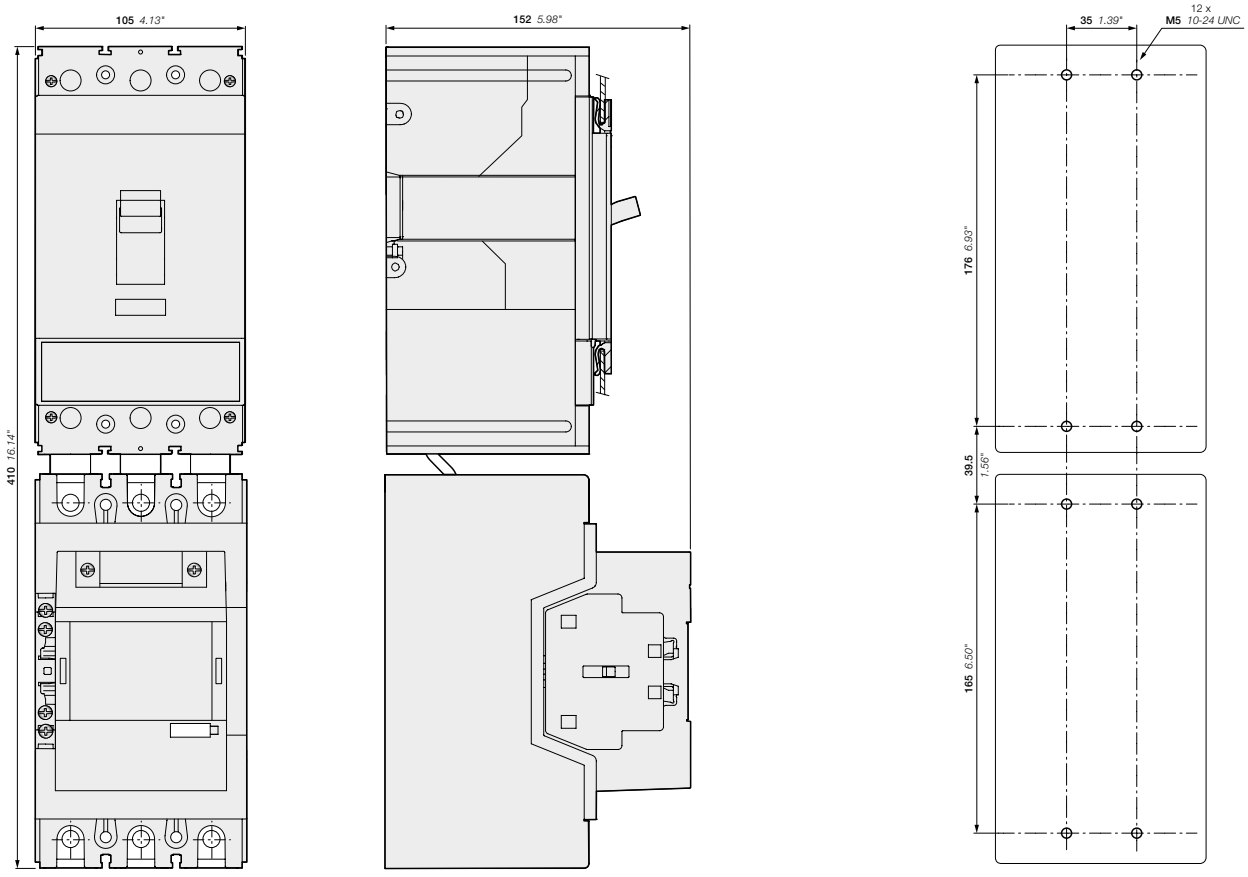
1SBC101976S0201

DOL starters protected by MCCB, including motor protection
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*



XT2S 160 + Ekip M-LIU In160
+ BEA140/XT2
+ AF116, AF140, AF146

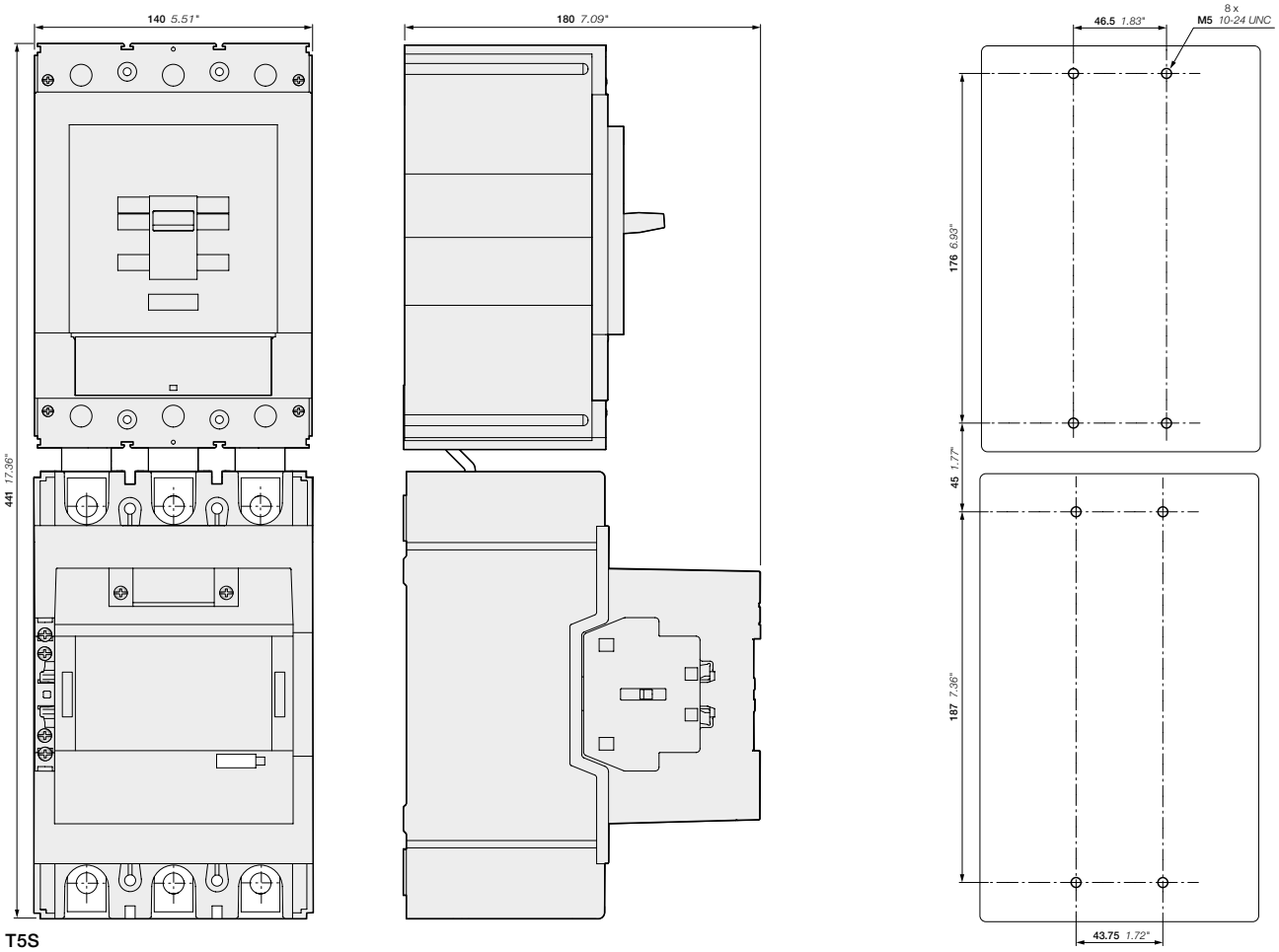


T4S
+ BEA205/T4
+ AF190, AF205

1SFC101187C0201

DOL starters protected by MCCB, including motor protection
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*

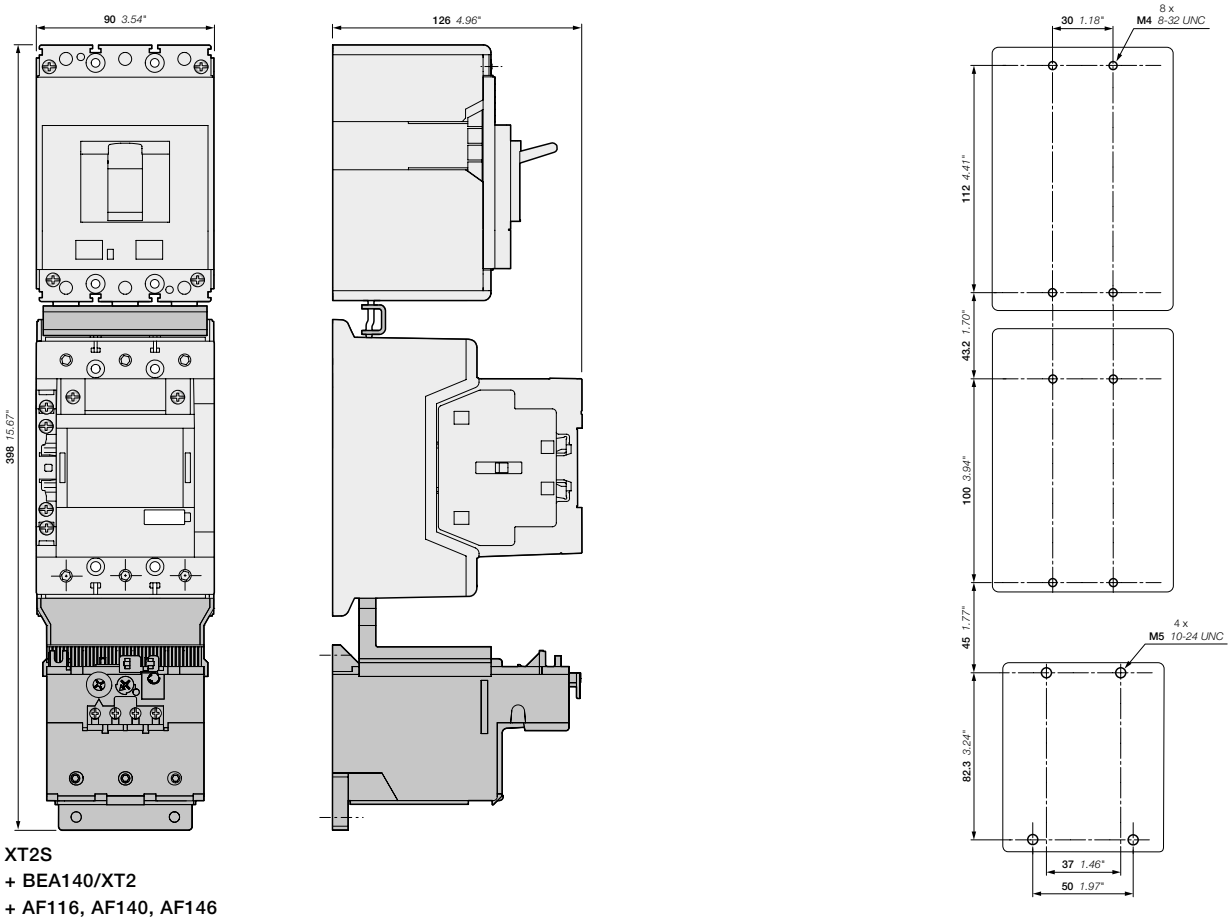


T5S
+ BEA370/T5
+ AF265, AF305, AF370

1SFC101188C0201

DOL starters protected by MCCB (magnetic only) and thermal overload relays
With AF contactors - Open type version in kit form

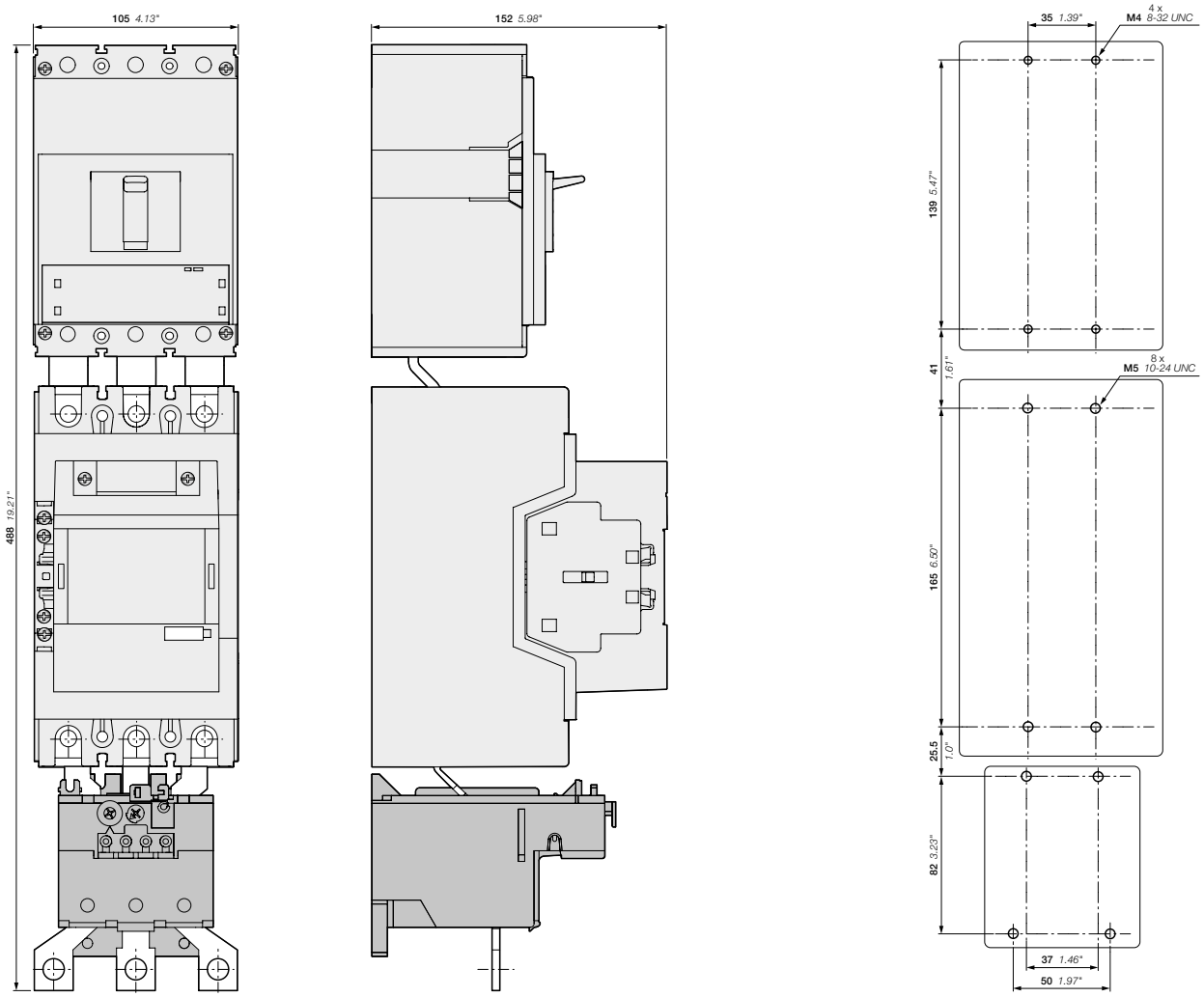
Main dimensions mm, *inches*



XT2S
+ BEA140/XT2
+ AF116, AF140, AF146
+ TF140 thermal overload relay

DOL starters protected by MCCB (magnetic only) and thermal overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*

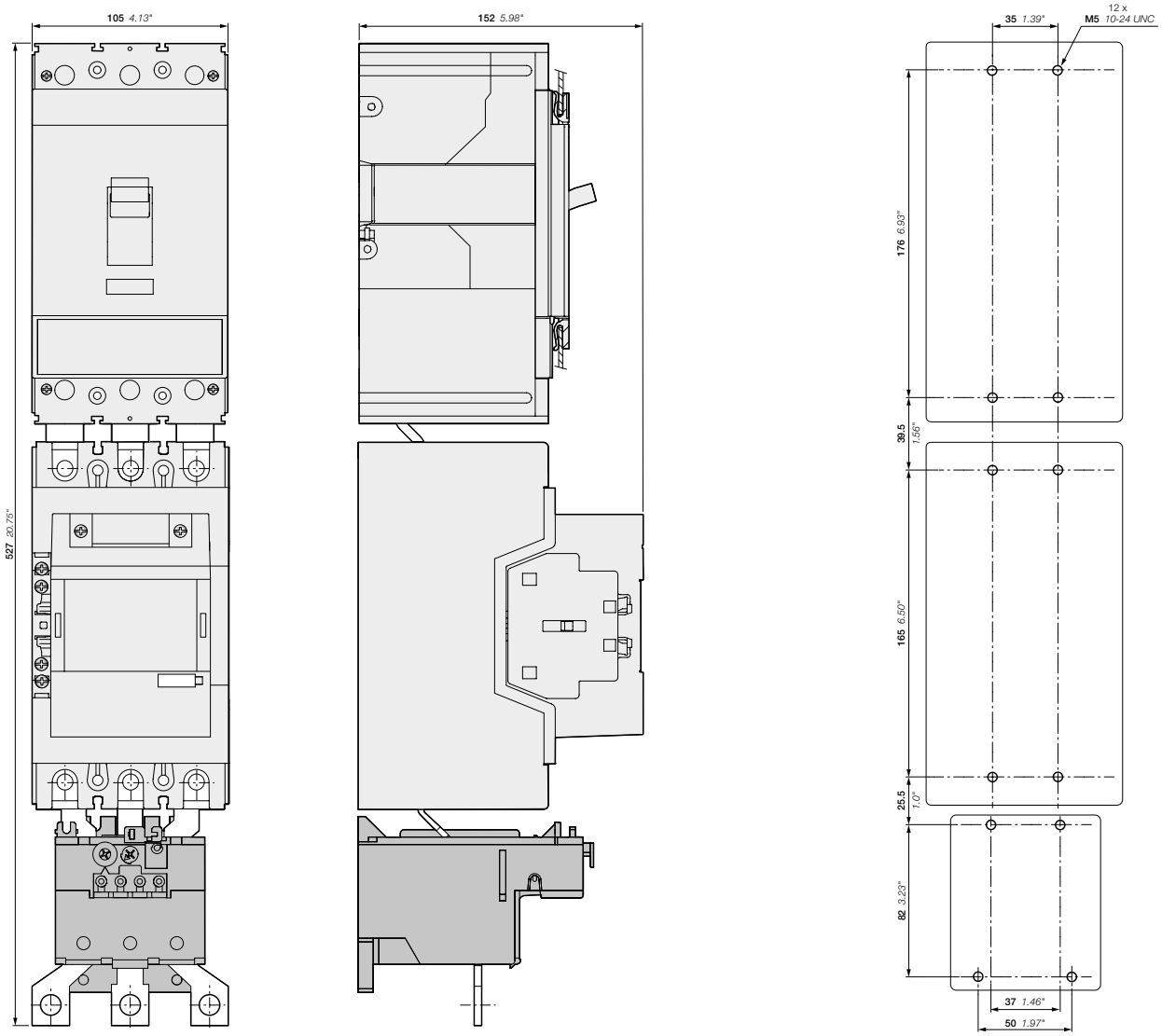


XT4S
+ BEA205/XT4
+ AF190, AF205
+ TA200DU thermal overload relay

1SFC101190C0201

DOL starters protected by MCCB (magnetic only) and thermal overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*



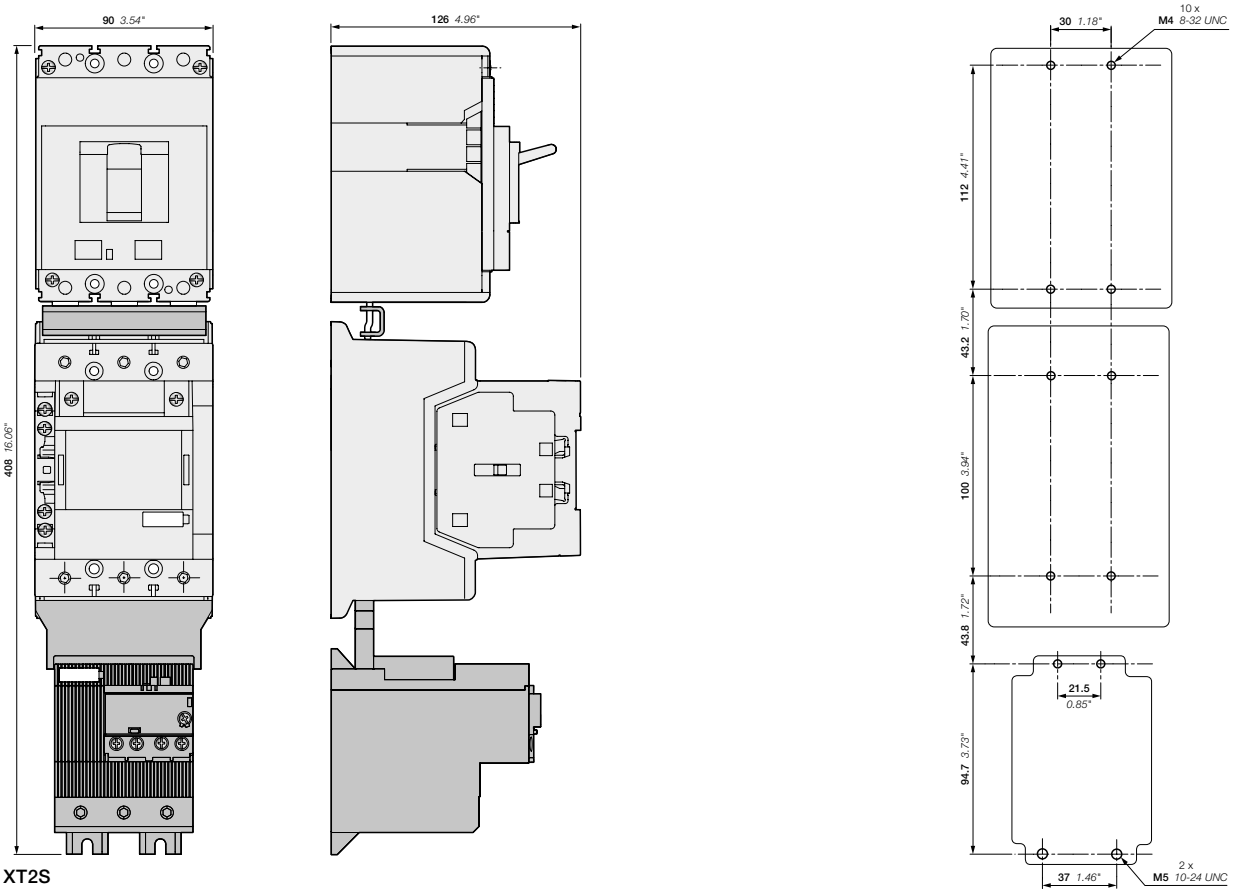
T4S
+ BEA205/T4
+ AF190, AF205
+ TA200DU thermal overload relay

5

1SFC101191C0201

DOL starters protected by MCCB (magnetic only) and electronic overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*



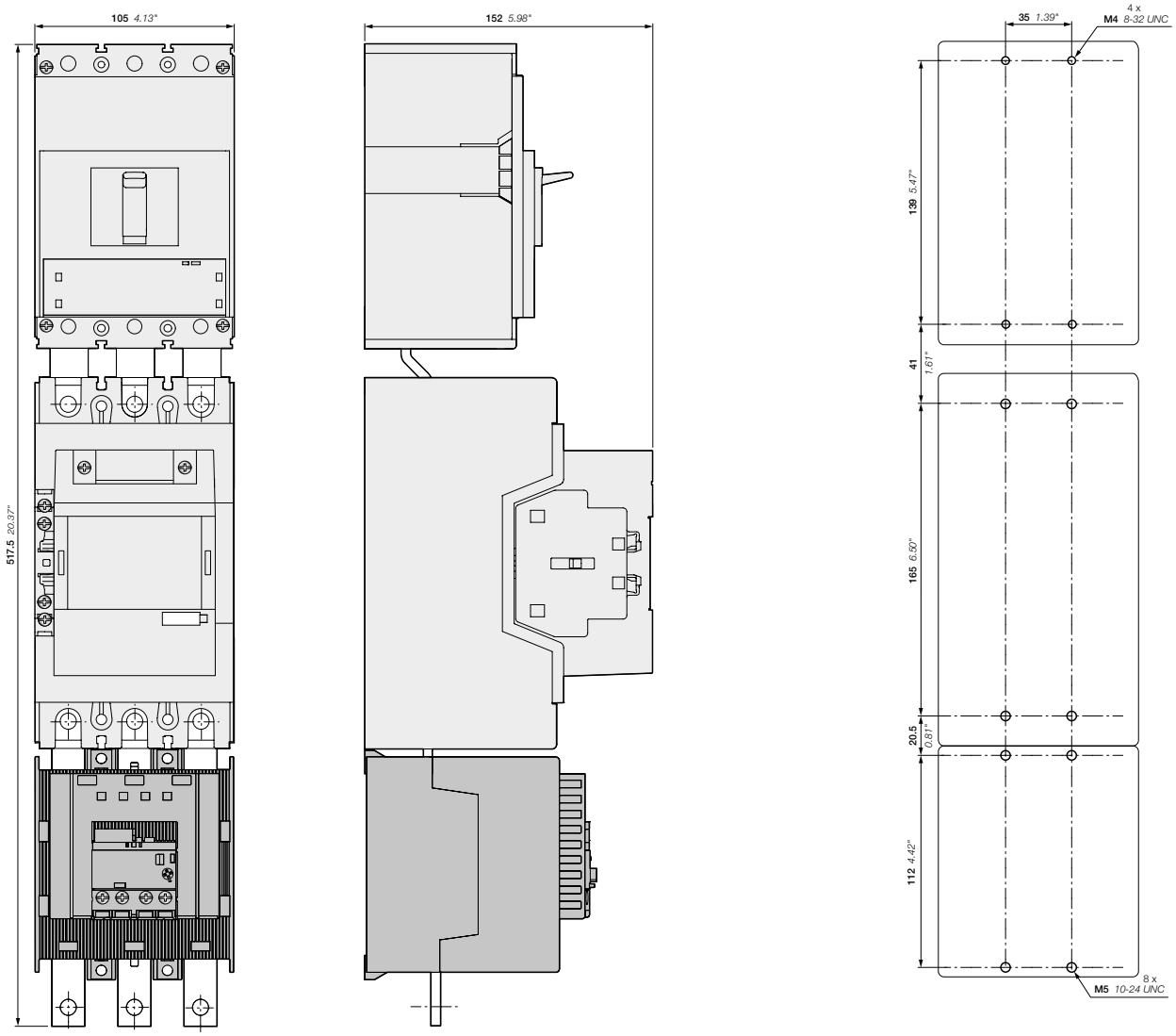
XT2S
+ BEA140/XT2
+ AF116, AF140, AF146
+ EF146 electronic overload relay

5

1SFC101192C0201

DOL starters protected by MCCB (magnetic only) and electronic overload relays
With AF contactors - Open type version in kit form

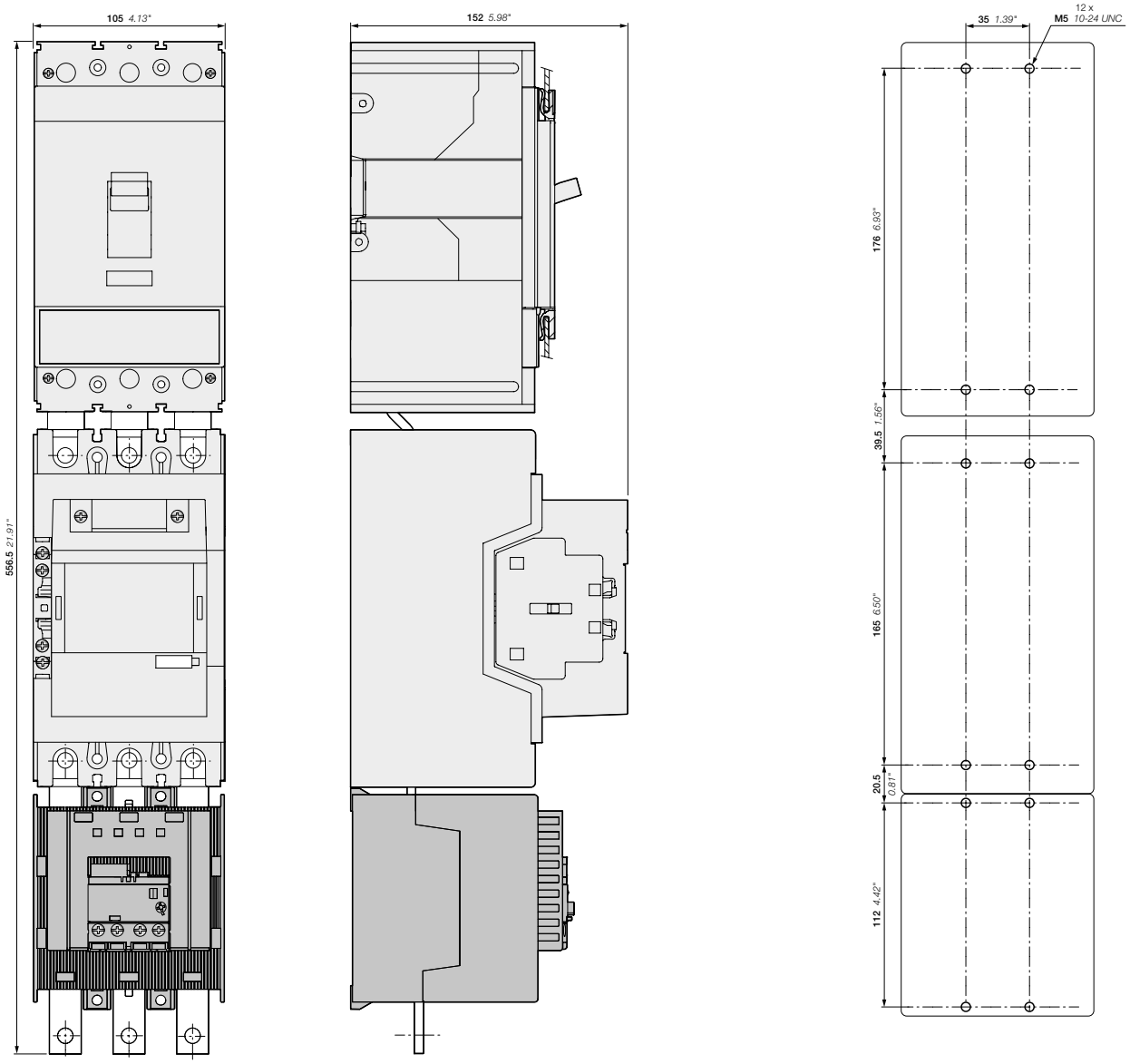
Main dimensions mm, *inches*



XT4S
+ BEA205/XT4
+ AF190, AF205
+ EF205 electronic overload relay

DOL starters protected by MCCB (magnetic only) and electronic overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*

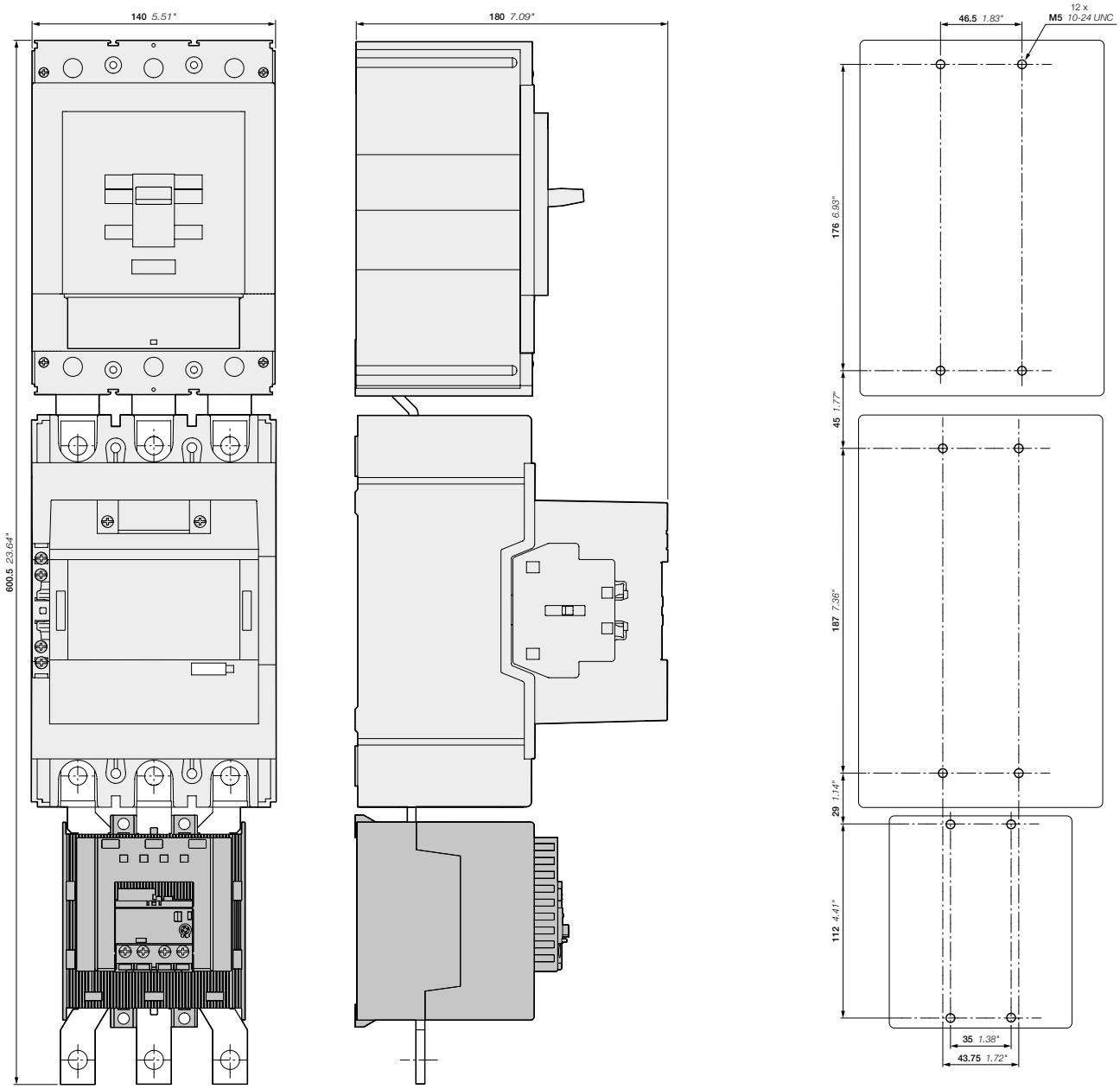


T4S
+ BEA205/T4
+ AF190, AF205
+ EF205 electronic overload relay

1SFC101194C0201

DOL starters protected by MCCB (magnetic only) and electronic overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*



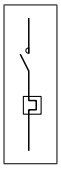
T5S
+ BEA370/T5
+ AF265, AF305, AF370
+ EF370 electronic overload relay

5

1SFC101195C0201

DOL and reversing starters protected by overload relays
With AF contactors - Open type version in kit form

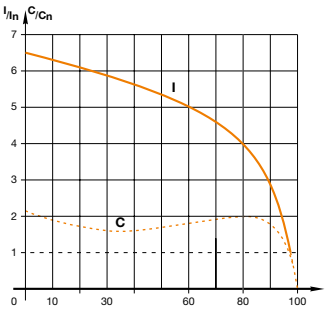
AF09-30-10 + TF42



AF140-30-11 + TF140DU

Application

Full voltage direct-on-line and reversing starting for controlling three-phase asynchronous motors is a simple and economic solution characterised by a high starting torque (1.9 to 2.1 times full-speed torque) and a starting current 5.5 to 7 times nominal current.



I = current
C = torque
In = nominal current
Cn = nominal torque

Coordination Types

The contactor, the short-circuit protection device and the thermal overload relay control and protect motors against overload and short-circuits according to coordination types 1 and 2 (IEC 60947-4-1 / EN 60947-4-1) defining the anticipated level of service continuity as follow:

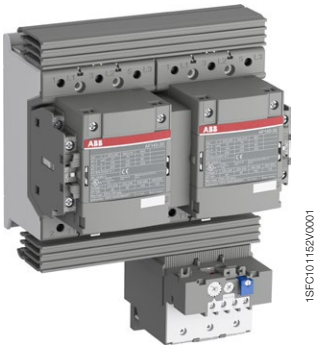
Type 1: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will not be able to then operate without being repaired or having parts replaced.

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.

AF09-30-10 + BER16-4 + VEM4 + TF42

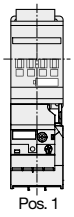
Main Technical Data

Standards	IEC 60947-4-1 / EN 60947-4-1
Rated operational voltage Ue max.	690 V - 50/60 Hz
Rated insulation voltage Ui	
acc. to IEC 60947-4-1	690 V
acc. to UL / CSA	600 V
Ambient air temperature	
Close to the device	≤ 60 °C (TF42: 38 A above ≤ 50 °C)
Degree of protection	IP20
Switching frequency	Refer to "Switching frequency diagrams" page

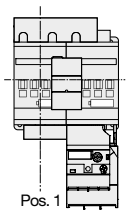


AF140-30-11 + BER140-4 + VM19 + TF140DU

Mounting positions



Direct-on-line

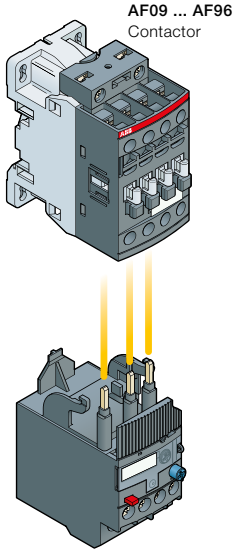


Reversing

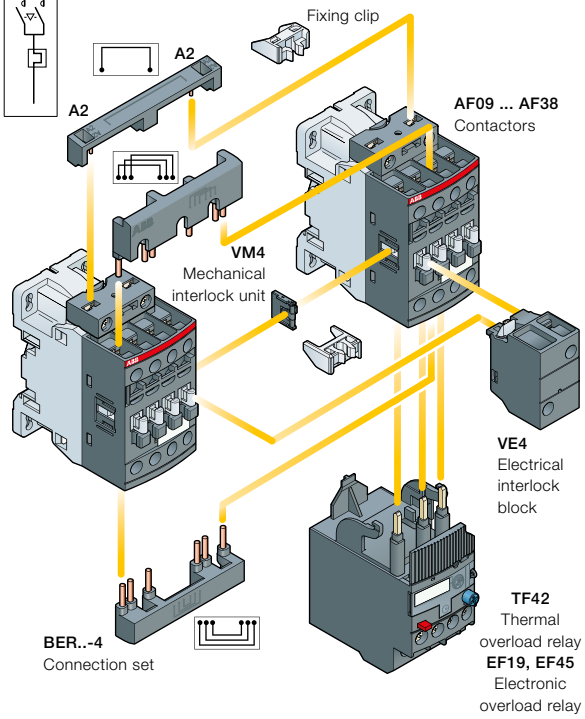
1SBC101920S0201

DOL and reversing starters protected by overload relays
With AF contactors - Open type version in kit form

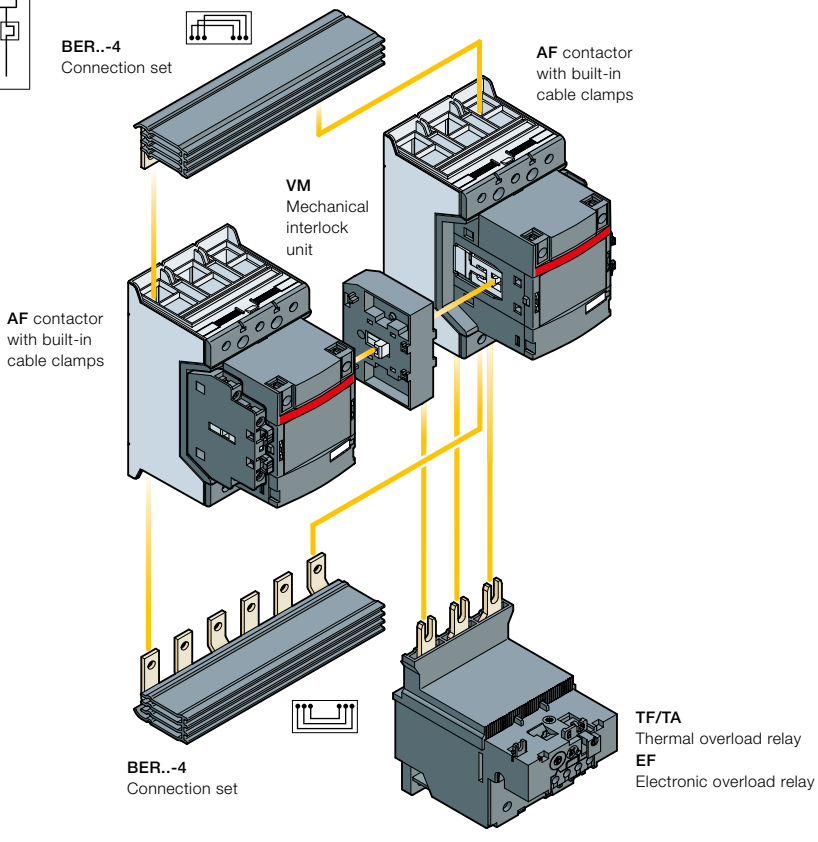
Direct-On-Line starters



Reversing starters for AF09 ... AF38



Reversing starters for AF116 ... AF370



Description

You can easily assemble a direct-on-line starter by connecting AF contactor and TF thermal overload relay or EF electronic overload relay.

You can also easily assemble reversing starter thanks to our complete range of accessories:

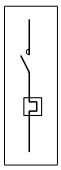
- For AF09 ... AF38, use VEM4 mechanical and electrical interlock set for reversing starter in 90 mm width.
  It includes:
  - VM4 mechanical interlock unit including 2 fixing clips
  - VE4 electrical interlock block with A2-A2 connection.
- For AF40 ... AF370, use VM mechanical interlock unit and additional auxiliary contact blocks for electrical interlocking.
- BER..-4 connection set: it assures a safe and simple reversing connection between both contactor main terminals.

Select now easily and quickly your starter in the following pages at 400 V, up to 200 kW.

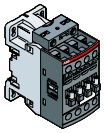
For the full coordination tables:
www.abb.com/lowvoltage then go to the right menu: "Support", select: "Online Product Selection Tools" then select "Coordination Tables for motor protection"

1SBC101920S0201

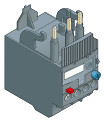
Direct-on-line starters protected by thermal overload relays
With AF contactors - Open type version in kit form



Contactors



Thermal overload relays



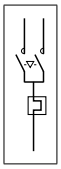
Accessories

IEC AC-3, 400 V Rated power	Rated current	Control voltage Uc min. ... Uc max. (1)		Type	Order code	Setting ranges	Type	Order code
kW	A	V 50/60 Hz	V DC			A		
4	8.5	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	7.60...10.0	TF42-10	1SAZ721201R1043
		100...250	100...250	AF09-30-10-13	1SBL137001R1310			
5.5	11.5	24...60	20...60	AF12Z-30-10-21	1SBL156001R2110	10.0...13.0	TF42-13	1SAZ721201R1045
		100...250	100...250	AF12-30-10-13	1SBL157001R1310			
7.5	15.5	24...60	20...60	AF16Z-30-10-21	1SBL176001R2110	13.0...16.0	TF42-16	1SAZ721201R1047
		100...250	100...250	AF16-30-10-13	1SBL177001R1310			
11	22	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	20.0...24.0	TF42-24	1SAZ721201R1051
		100...250	100...250	AF26-30-00-13	1SBL237001R1300			
15	29	24...60	20...60	AF30Z-30-00-21	1SBL276001R2100	29.0...35.0	TF42-35	1SAZ721201R1053
		100...250	100...250	AF30-30-00-13	1SBL277001R1300			
18.5	35	24...60	20...60	AF38Z-30-00-21	1SBL296001R2100	35.0...38.0/40.0	TF42-38	1SAZ721201R1055
		100...250	100...250	AF38-30-00-13	1SBL297001R1300			
18.5	35	24...60	20...60	AF40-30-00-11	1SBL347001R1100	30.0...40.0	TF65-40	1SAZ811201R1003
		100...250	100...250	AF40-30-00-13	1SBL347001R1300			
22	41	24...60	20...60	AF52-30-00-11	1SBL367001R1100	36.00...47.0	TF65-47	1SAZ811201R1004
		100-250	100-250	AF52-30-00-13	1SBL367001R1300			
30	55	24...60	20...60	AF65-30-00-11	1SBL387001R1100	50.0...60.0	TF65-60	1SAZ811201R1006
		100-250	100-250	AF65-30-00-13	1SBL387001R1300			
37	66	24...60	20...60	AF80-30-00-11	1SBL397001R1100	57.0...68.0	TF96-68	1SAZ911201R1003
		100-250	100-250	AF80-30-00-13	1SBL397001R1300			
45	80	24...60	20...60	AF96-30-00-11	1SBL407001R1100	75.0..87.0	TF96-87	1SAZ911201R1005
		100-250	100-250	AF96-30-00-13	1SBL407001R1300			
55	97	24...60	20...60	AF116-30-11-11	1SFL427001R1111	80...110	TF140DU-110	1SAZ431201R1002
		100-250	100-250	AF116-30-11-13	1SFL427001R1311			
75	132	24...60	20...60	AF140-30-11-11	1SFL447001R1111	100...135	TF140DU-135	1SAZ431201R1003
		100-250	100-250	AF140-30-11-13	1SFL447001R1311			
90	160	24...60	20...60	AF190-30-11-11	1SFL487002R1111	130...175	TA200DU-175	1SAZ421201R1005
		100-250	100-250	AF190-30-11-13	1SFL487002R1311			
110	195	24...60	20...60	AF205-30-11-11	1SFL527002R1111	150...200	TA200DU-200	1SAZ421201R1006
		100-250	100-250	AF205-30-11-13	1SFL527002R1311			

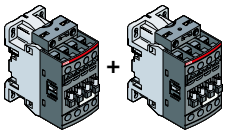
(1) For other control voltages, see "Voltage code table".
Note : for rated power above 110 kW, refer to "Starters protected by electronic overload relays".

1SBC101921S0201

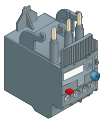
Reversing starters protected by thermal overload relays
With AF contactors - Open type version in kit form



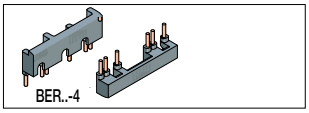
Contactors

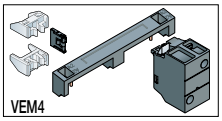


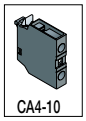
Thermal overload relays



Accessories







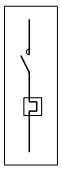
IEC AC-3, 400 V Rated power kW	Rated current A	Control voltage Uc min. ... Uc max. (1) V 50/60 Hz	V DC	Type	Order code	Setting ranges A	Type	Order code	Type	Order code
4	8.5	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	7.60...10.0	TF42-10	1SAZ721201R1043	BER16-4	1SBN081311R1000
		100...250	100...250	AF09-30-10-13	1SBL137001R1310				+ VEM4	1SBN030111R1000
5.5	11.5	24...60	20...60	AF12Z-30-10-21	1SBL156001R2110	10.0...13.0	TF42-13	1SAZ721201R1045		
		100...250	100...250	AF12-30-10-13	1SBL157001R1310					
7.5	15.5	24...60	20...60	AF16Z-30-10-21	1SBL176001R2110	13.0...16.0	TF42-16	1SAZ721201R1047		
		100...250	100...250	AF16-30-10-13	1SBL177001R1310					
11	22	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	20.0...24.0	TF42-24	1SAZ721201R1051	BER38-4	1SBN082311R1000
		100...250	100...250	AF26-30-00-13	1SBL237001R1300				+ VEM4	1SBN030111R1000
15	29	24...60	20...60	AF30Z-30-00-21	1SBL276001R2100	29.0...35.0	TF42-35	1SAZ721201R1053	+ 2x CA4-10	1SBN010110R1010
		100...250	100...250	AF30-30-00-13	1SBL277001R1300					
18.5	35	24...60	20...60	AF38Z-30-00-21	1SBL296001R2100	35.0...38.0/40.0	TF42-38	1SAZ721201R1055		
		100...250	100...250	AF38-30-00-13	1SBL297001R1300					
18.5	35	24...60	20...60	AF40-30-00-11	1SBL347001R1100	30.0...40.0	TF65-40	1SAZ811201R1003	BER65-4	1SBN083411R1000
		100...250	100...250	AF40-30-00-13	1SBL347001R1300				+ VM96-4	1SBN033405T1000
22	41	24...60	20...60	AF52-30-00-11	1SBL367001R1100	36.00...47.0	TF65-47	1SAZ811201R1004	+ 2x CA4-10	1SBN010110R1010
		100...250	100...250	AF52-30-00-13	1SBL367001R1300				+ 2x CA4-01	1SBN010110R1001
30	55	24...60	20...60	AF65-30-00-11	1SBL387001R1100	50.0...60.0	TF65-60	1SAZ811201R1006		
		100...250	100...250	AF65-30-00-13	1SBL387001R1300					
37	66	24...60	20...60	AF80-30-00-11	1SBL397001R1100	57.0...68.0	TF96-68	1SAZ911201R1003	BER96-4	1SBN083911R1000
		100...250	100...250	AF80-30-00-13	1SBL397001R1300				+ VM96-4	1SBN033405T1000
45	80	24...60	20...60	AF96-30-00-11	1SBL407001R1100	75.0..87.0	TF96-87	1SAZ911201R1005	+ 2x CA4-10	1SBN010110R1010
		100...250	100...250	AF96-30-00-13	1SBL407001R1300				+ 2x CA4-01	1SBN010110R1001
55	97	24...60	20...60	AF116-30-11-11	1SFL427001R1111	80...110	TF140DU-110	1SAZ431201R1002	BER140-4	1SFN084211R1000
		100...250	100...250	AF116-30-11-13	1SFL427001R1311				+ VM19	1SFN030300R1000
75	132	24...60	20...60	AF140-30-11-11	1SFL447001R1111	100...135	TF140DU-135	1SAZ431201R1003		
		100...250	100...250	AF140-30-11-13	1SFL447001R1311					
90	160	24...60	20...60	AF190-30-11-11	1SFL487002R1111	130...175	TA200DU-175	1SAZ421201R1005	BER205-4	1SFN084811R1000
		100...250	100...250	AF190-30-11-13	1SFL487002R1311				+ VM19	1SFN030300R1000
110	195	24...60	20...60	AF205-30-11-11	1SFL527002R1111	150...200	TA200DU-200	1SAZ421201R1006		
		100...250	100...250	AF205-30-11-13	1SFL527002R1311					

(1) For other control voltages, see "Voltage code table".

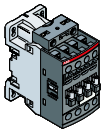
Note : for rated power above 110 kW, refer to "Starters protected by electronic overload relays".

1SBC101922S0201

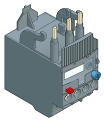
Direct-on-line starters protected by electronic overload relays
With AF contactors - Open type version in kit form



Contactors



Electronic overload relays



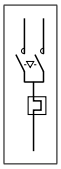
Accessories

IEC AC-3, 400 V Rated power	Rated current	Control voltage Uc min. ... Uc max. (1)		Type	Order code	Setting ranges	Type	Order code
kW	A	V 50/60 Hz	V DC			A		
4	8.5	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	5.70...18.9	EF19-18.9	1SAX121001R1105
		100...250	100...250	AF09-30-10-13	1SBL137001R1310			
5.5	11.5	24...60	20...60	AF12Z-30-10-21	1SBL156001R2110	5.70...18.9	EF19-18.9	1SAX121001R1105
		100...250	100...250	AF12-30-10-13	1SBL157001R1310			
7.5	15.5	24...60	20...60	AF16Z-30-10-21	1SBL176001R2110	5.70...18.9	EF19-18.9	1SAX121001R1105
		100...250	100...250	AF16-30-10-13	1SBL177001R1310			
11	22	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	9.00...30.0	EF45-30	1SAX221001R1101
		100...250	100...250	AF26-30-00-13	1SBL237001R1300			
15	29	24...60	20...60	AF30Z-30-00-21	1SBL276001R2100	9.00...30.0	EF45-30	1SAX221001R1101
		100...250	100...250	AF30-30-00-13	1SBL277001R1300			
18.5	35	24...60	20...60	AF38Z-30-00-21	1SBL296001R2100	15.0...45.0	EF45-45	1SAX221001R1102
		100...250	100...250	AF38-30-00-13	1SBL297001R1300			
18.5	35	24...60	20...60	AF40-30-00-11	1SBL347001R1100	25.0...70.0	EF65-70	1SAX331001R1101
		100...250	100...250	AF40-30-00-13	1SBL347001R1300			
22	41	24...60	20...60	AF52-30-00-11	1SBL367001R1100	25.0...70.0	EF65-70	1SAX331001R1101
		100-250	100-250	AF52-30-00-13	1SBL367001R1300			
30	55	24...60	20...60	AF65-30-00-11	1SBL387001R1100	25.0...70.0	EF65-70	1SAX331001R1101
		100-250	100-250	AF65-30-00-13	1SBL387001R1300			
37	66	24...60	20...60	AF80-30-00-11	1SBL397001R1100	36...100	EF96-100	1SAX341001R1101
		100-250	100-250	AF80-30-00-13	1SBL397001R1300			
45	80	24...60	20...60	AF96-30-00-11	1SBL407001R1100	36...100	EF96-100	1SAX341001R1101
		100-250	100-250	AF96-30-00-13	1SBL407001R1300			
55	97	24...60	20...60	AF116-30-11-11	1SFL427001R1111	54...150	EF146-150	1SAX351001R1101
		100-250	100-250	AF116-30-11-13	1SFL427001R1311			
75	132	24...60	20...60	AF140-30-11-11	1SFL447001R1111	54...150	EF146-150	1SAX351001R1101
		100-250	100-250	AF140-30-11-13	1SFL447001R1311			
90	160	24...60	20...60	AF190-30-11-11	1SFL487002R1111	63...210	EF205-210	1SAX531001R1101
		100-250	100-250	AF190-30-11-13	1SFL487002R1311			
110	195	24...60	20...60	AF205-30-11-11	1SFL527002R1111	63...210	EF205-210	1SAX531001R1101
		100-250	100-250	AF205-30-11-13	1SFL527002R1311			
132	230	24...60	20...60	AF265-30-11-11	1SFL547002R1111	115...380	EF370-380	1SAX611001R1101
		100-250	100-250	AF265-30-11-13	1SFL547002R1311			
160	280	24...60	20...60	AF305-30-11-11	1SFL587002R1111	115...380	EF370-380	1SAX611001R1101
		100-250	100-250	AF305-30-11-13	1SFL587002R1311			
200	350	24...60	20...60	AF370-30-11-11	1SFL607002R1111	115...380	EF370-380	1SAX611001R1101
		100-250	100-250	AF370-30-11-13	1SFL607002R1311			

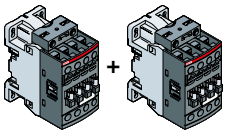
(1) For other control voltages, see "Voltage code table".

1SBC101948S0201

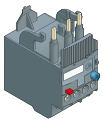
Reversing starters protected by electronic overload relays
With AF contactors - Open type version in kit form



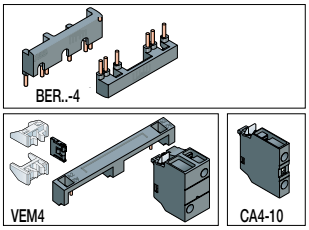
Contactors



Electronic overload relays



Accessories



IEC AC-3, 400 V Rated power kW	Rated current A	Control voltage Uc min. ... Uc max. (1) V 50/60 Hz	V DC	Type	Order code	Setting ranges A	Type	Order code	Type	Order code
4	8.5	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	5.70...18.9	EF19-18.9	1SAX121001R1105	BER16-4	1SBN081311R1000
		100...250	100...250	AF09-30-10-13	1SBL137001R1310				+ VEM4	1SBN030111R1000
5.5	11.5	24...60	20...60	AF12Z-30-10-21	1SBL156001R2110	5.70...18.9	EF19-18.9	1SAX121001R1105		
		100...250	100...250	AF12-30-10-13	1SBL157001R1310					
7.5	15.5	24...60	20...60	AF16Z-30-10-21	1SBL176001R2110	5.70...18.9	EF19-18.9	1SAX121001R1105		
		100...250	100...250	AF16-30-10-13	1SBL177001R1310					
11	22	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	9.00...30.0	EF45-30	1SAX221001R1101	BER38-4	1SBN082311R1000
		100...250	100...250	AF26-30-00-13	1SBL237001R1300				+ VEM4	1SBN030111R1000
15	29	24...60	20...60	AF30Z-30-00-21	1SBL276001R2100	9.00...30.0	EF45-30	1SAX221001R1101	+ 2x CA4-10	1SBN010110R1010
		100...250	100...250	AF30-30-00-13	1SBL277001R1300					
18.5	35	24...60	20...60	AF38Z-30-00-21	1SBL296001R2100	15.0...45.0	EF45-45	1SAX221001R1102		
		100...250	100...250	AF38-30-00-13	1SBL297001R1300					
18.5	35	24...60	20...60	AF40-30-00-11	1SBL347001R1100	25.0...70.0	EF65-70	1SAX331001R1101	BER65-4	1SBN083411R1000
		100...250	100...250	AF40-30-00-13	1SBL347001R1300				+ VM96-4	1SBN033405T1000
22	41	24...60	20...60	AF52-30-00-11	1SBL367001R1100	25.0...70.0	EF65-70	1SAX331001R1101	+ 2x CA4-10	1SBN010110R1010
		100...250	100...250	AF52-30-00-13	1SBL367001R1300				+ 2x CA4-01	1SBN010110R1001
30	55	24...60	20...60	AF65-30-00-11	1SBL387001R1100	25.0...70.0	EF65-70	1SAX331001R1101		
		100...250	100...250	AF65-30-00-13	1SBL387001R1300					
37	66	24...60	20...60	AF80-30-00-11	1SBL397001R1100	36...100	EF96-100	1SAX341001R1101	BER96-4	1SBN083911R1000
		100...250	100...250	AF80-30-00-13	1SBL397001R1300				+ VM96-4	1SBN033405T1000
45	80	24...60	20...60	AF96-30-00-11	1SBL407001R1100	36...100	EF96-100	1SAX341001R1101	+ 2x CA4-10	1SBN010110R1010
		100...250	100...250	AF96-30-00-13	1SBL407001R1300				+ 2x CA4-01	1SBN010110R1001
55	97	24...60	20...60	AF116-30-11-11	1SFL427001R1111	54...150	EF146-150	1SAX351001R1101	BER140-4	1SFN084211R1000
		100...250	100...250	AF116-30-11-13	1SFL427001R1311				+ VM19	1SFN030300R1000
75	132	24...60	20...60	AF140-30-11-11	1SFL447001R1111	54...150	EF146-150	1SAX351001R1101		
		100...250	100...250	AF140-30-11-13	1SFL447001R1311					
90	160	24...60	20...60	AF190-30-11-11	1SFL487002R1111	63...210	EF205-210	1SAX531001R1101	BER205-4	1SFN084811R1000
		100...250	100...250	AF190-30-11-13	1SFL487002R1311				+ VM19	1SFN030300R1000
110	195	24...60	20...60	AF205-30-11-11	1SFL527002R1111	63...210	EF205-210	1SAX531001R1101		
		100...250	100...250	AF205-30-11-13	1SFL527002R1311					
132	230	24...60	20...60	AF265-30-11-11	1SFL547002R1111	115...380	EF370-380	1SAX611001R1101	BER370-4	1SFN085411R1000
		100...250	100...250	AF265-30-11-13	1SFL547002R1311				+ VM19	1SFN030300R1000
160	280	24...60	20...60	AF305-30-11-11	1SFL587002R1111	115...380	EF370-380	1SAX611001R1101		
		100...250	100...250	AF305-30-11-13	1SFL587002R1311					
200	350	24...60	20...60	AF370-30-11-11	1SFL607002R1111	115...380	EF370-380	1SAX611001R1101		
		100...250	100...250	AF370-30-11-13	1SFL607002R1311					

(1) For other control voltages, see "Voltage code table".

1SBC101949S0201

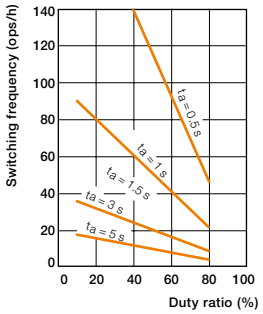
DOL and reversing starters protected by overload relays
With AF contactors - Open type version in kit form
Switching frequency diagrams

General

Overload relays 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.

Thermal overload relay

Intermittent periodic duty



ta: motor starting time

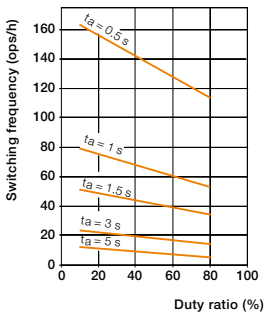
Example:

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

Electronic overload relay

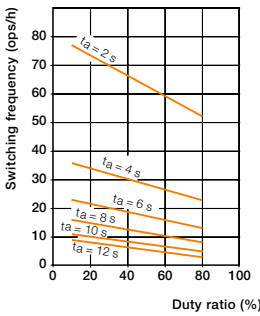
Intermittent periodic duty

Trip class 10E

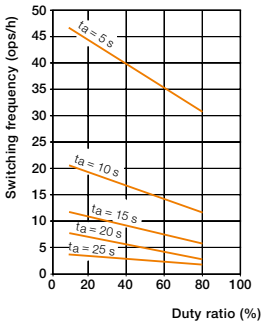


ta: motor starting time

Trip class 20E



Trip class 30E



Exemple for trip class 10E:

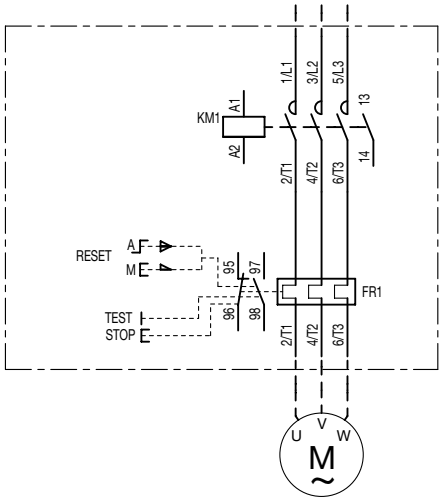
Starting time of the motor: 1 second. Duty ratio: 60 % means a permitted switching frequency of max. 60 operating cycles per hour, for a motor breaking current not exceeding 6 x In.

1SBC101954S0201

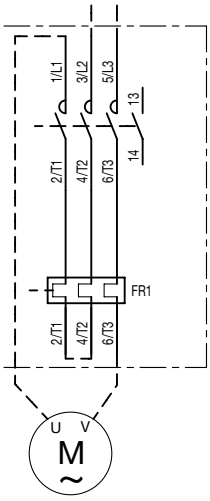
DOL and reversing starters protected by overload relays
With AF contactors - Open type version in kit form
Wiring diagrams

Direct-on-line starters

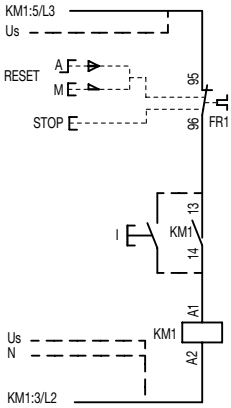
Power circuit



1-phase

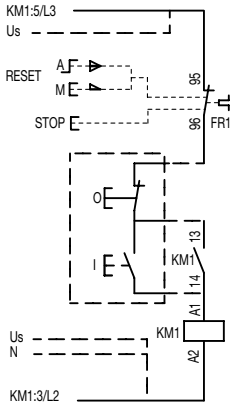


AC or DC local control



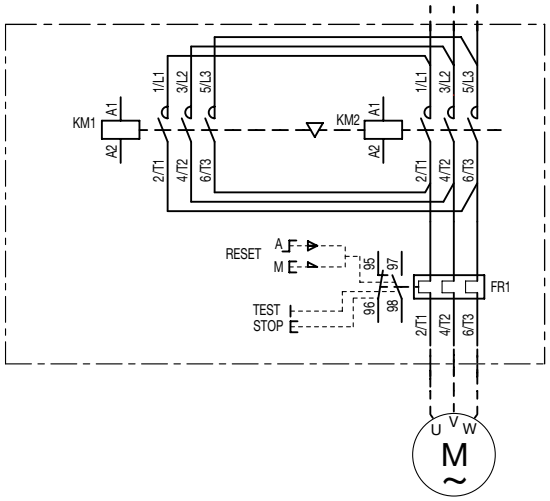
Note: coil Uc 12-20 V DC : A1+, A2-

AC or DC remote control

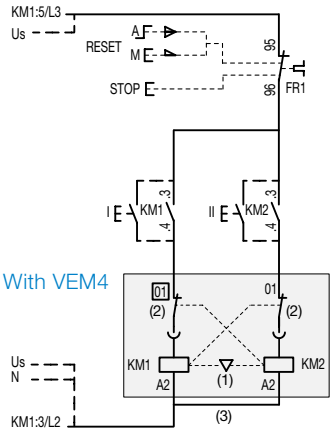


Reversing starters

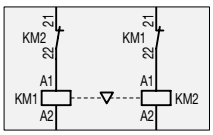
Power circuit



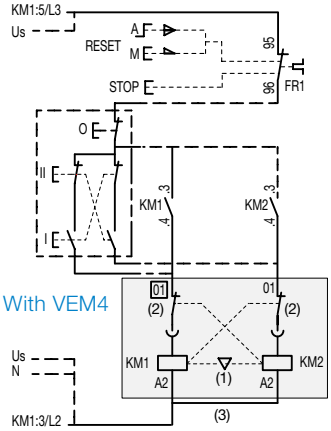
AC or DC local control



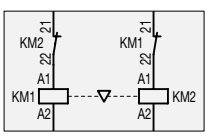
With VM



AC or DC remote control



With VM



Note: - VEM4 = VM4 (1) + VE4 (2) with A2-A2 (3) connection
(Except for coil Uc 12-20 V DC : use VM4 with CA4).
- coil Uc 12-20 V DC : A1+, A2-

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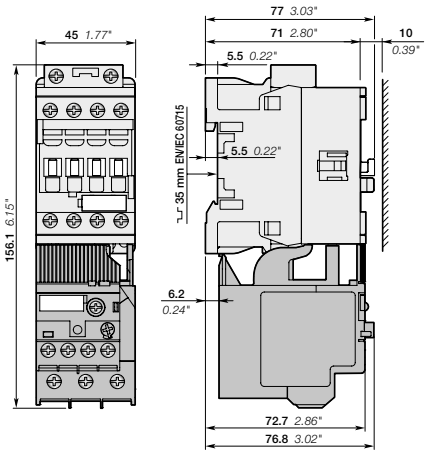
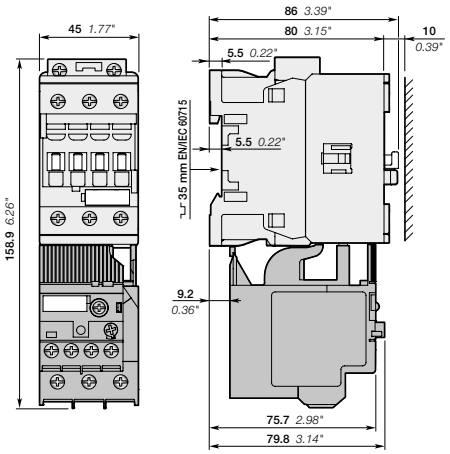
1SBC101926S0201

DOL starters protected by thermal overload relays
With AF contactors - open type version in kit form

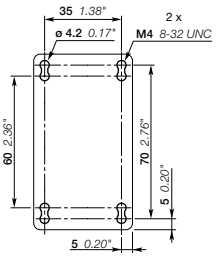
Main dimensions mm, *inches*



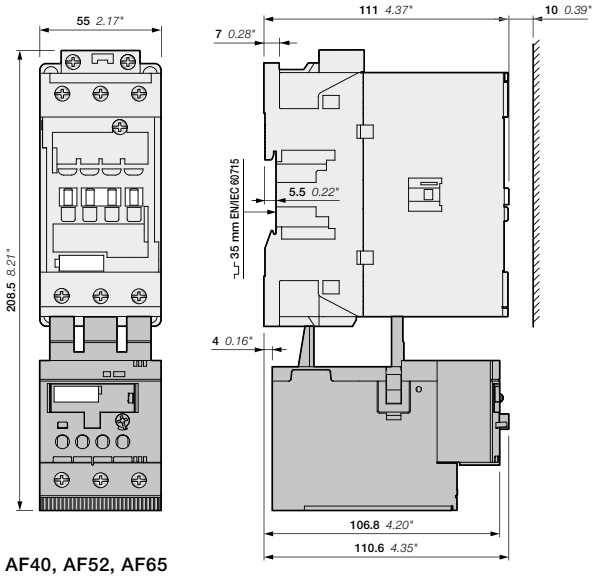
AF09, AF12, AF16
+ TF42 thermal overload relay



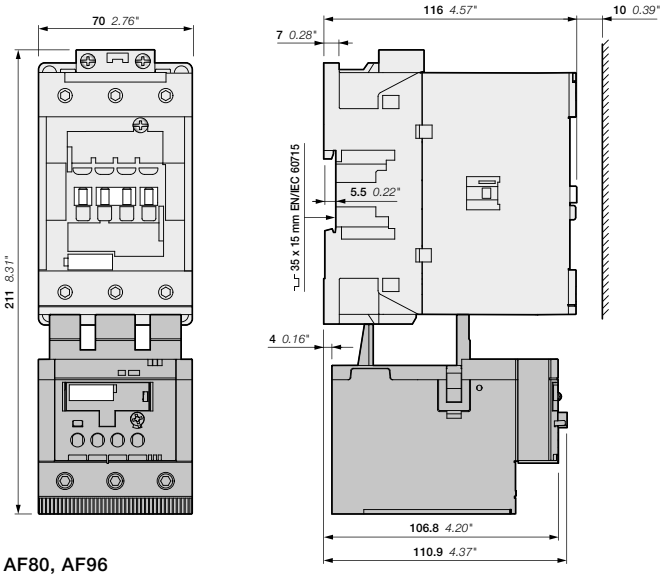
AF26, AF30, AF38
+ TF42 thermal overload relay



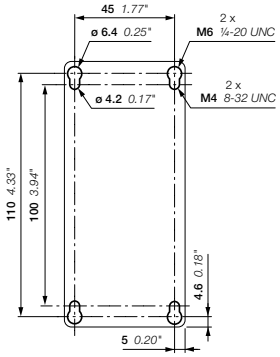
Note: contactor lateral distance to grounded component 2 mm *0.08*" min.



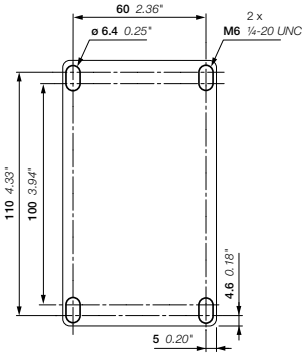
AF40, AF52, AF65
+ TF65 thermal overload relay



AF80, AF96
+ TF96 thermal overload relay



AF40, AF52, AF65
+ TF65 thermal overload relay

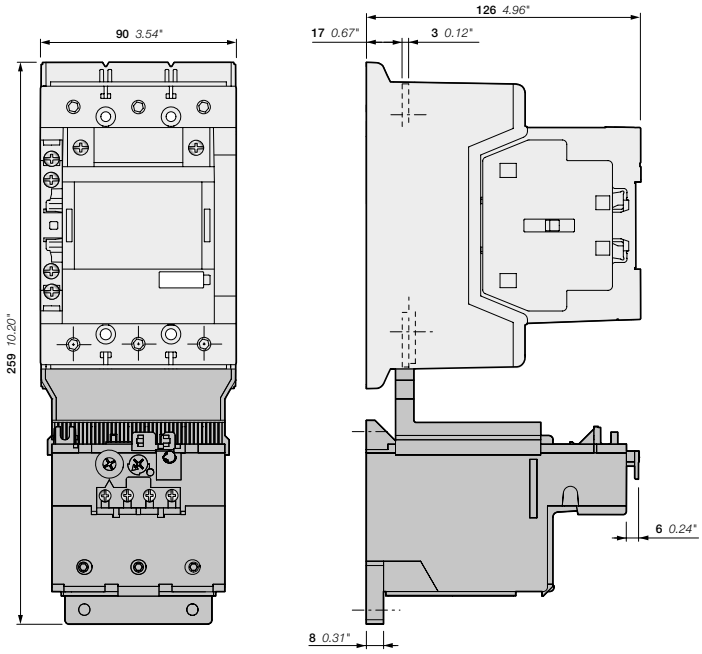


AF80, AF96
+ TF96 thermal overload relay

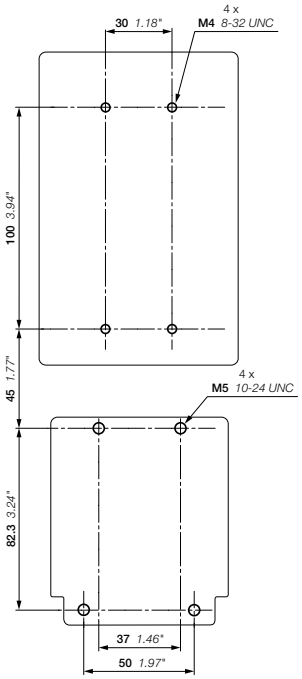
1SBC101927S0201

DOL starters protected by thermal overload relays
With AF contactors - open type version in kit form

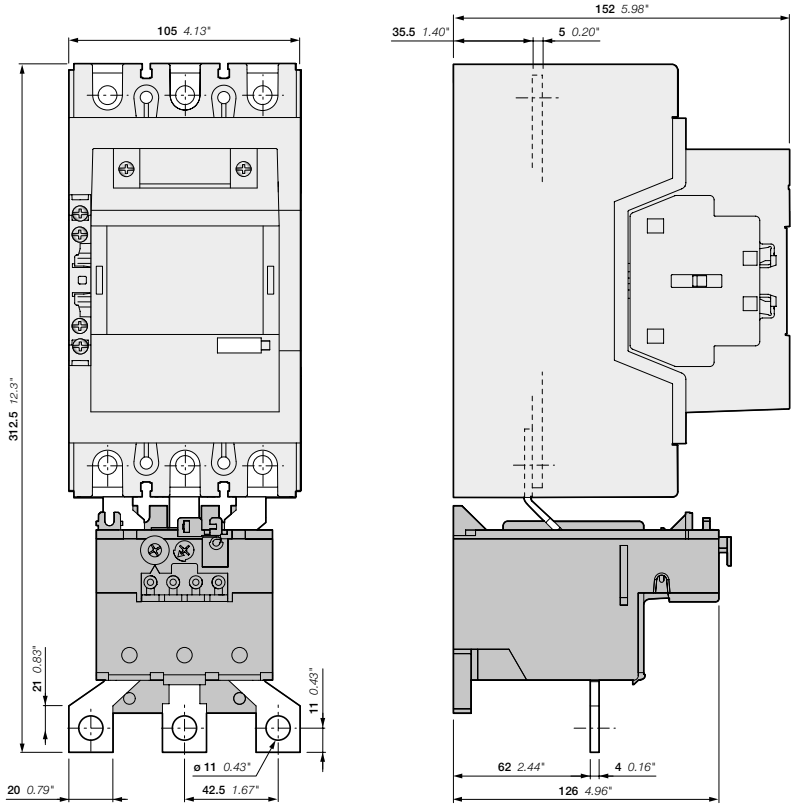
Main dimensions mm, *inches*



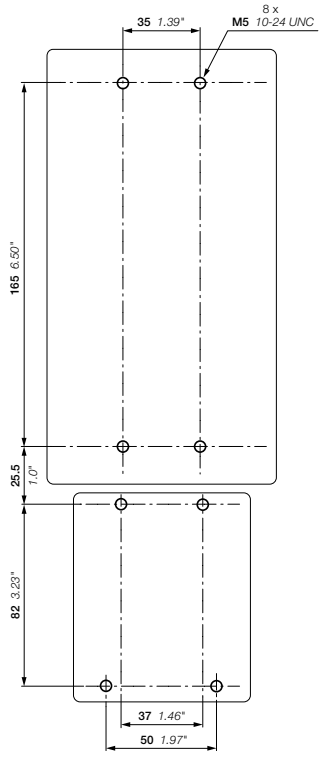
AF116, AF140-30-11(B)
+ TF140 thermal overload relay



AF116, AF140-30-11(B)
+ TF140 thermal overload relay



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



AF190, AF205
+ TA200DU thermal overload relay

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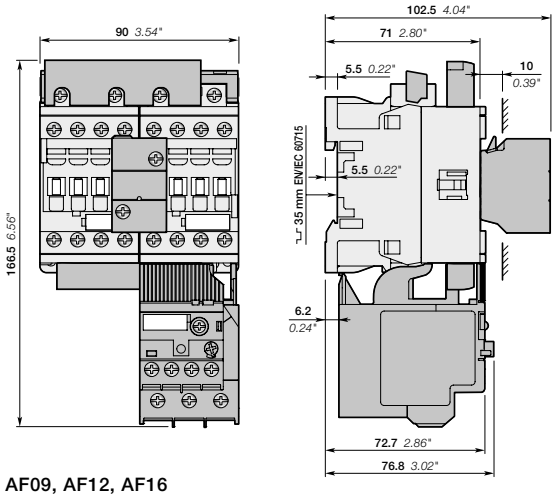
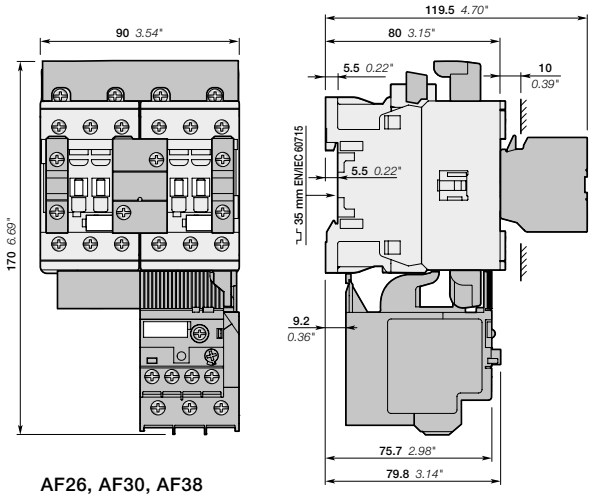
1SFC101156C0201

Reversing starters protected by thermal overload relays
With AF contactors - open type version in kit form

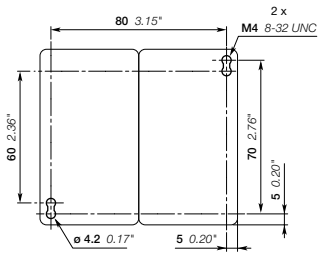
Main dimensions mm, *inches*



AF09, AF12, AF16
+ BER16-4, VEM4
+ TF42 thermal overload relay



AF26, AF30, AF38
+ BER38-4, VEM4, CA4-10
+ TF42 thermal overload relay



AF09, AF12, AF16, AF26, AF30, AF38

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

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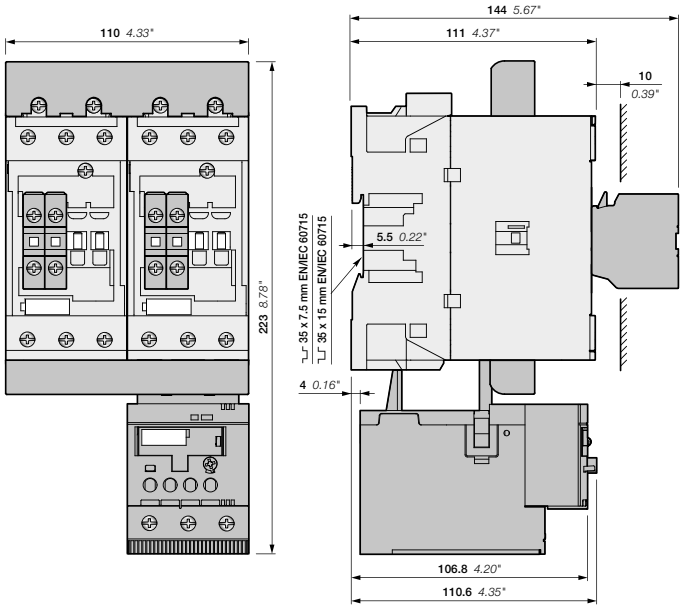
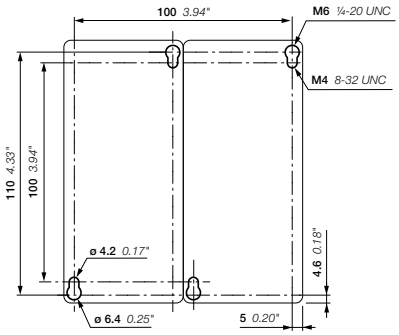
Reversing starters protected by thermal overload relays
With AF contactors - open type version in kit form

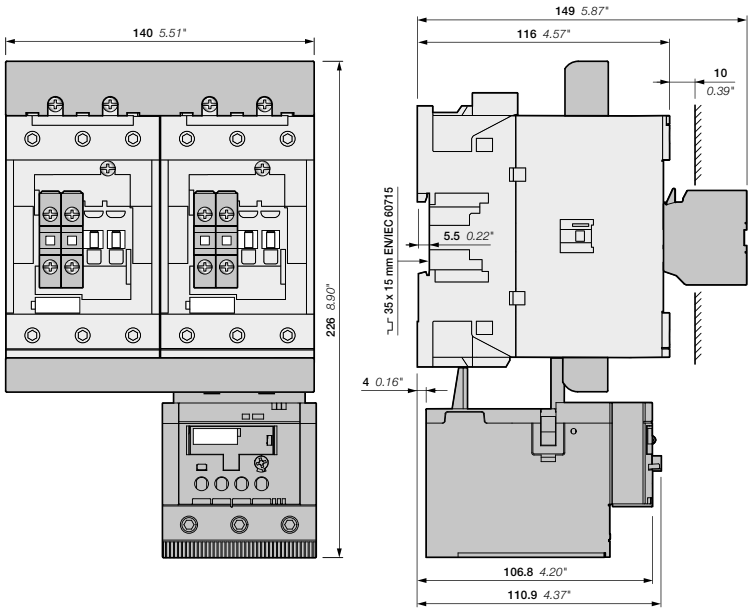
Main dimensions mm, *inches*



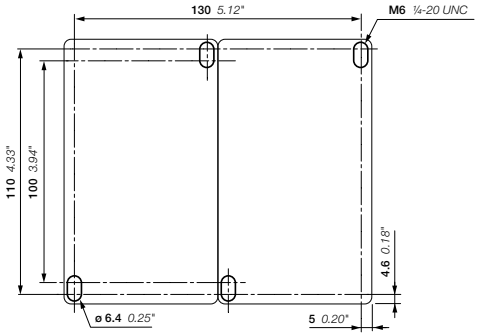
AF40, AF52, AF65
+ BER65-4, VM96-4
+ TF65 thermal overload relay



AF40, AF52, AF65
+ BER65-4, VM96-4
+ TF65 thermal overload relay



AF80, AF96
+ BER96-4, VM96-4
+ TF96 thermal overload relay

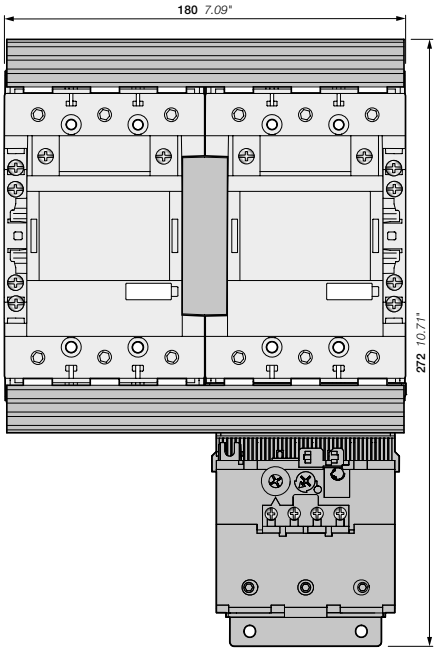


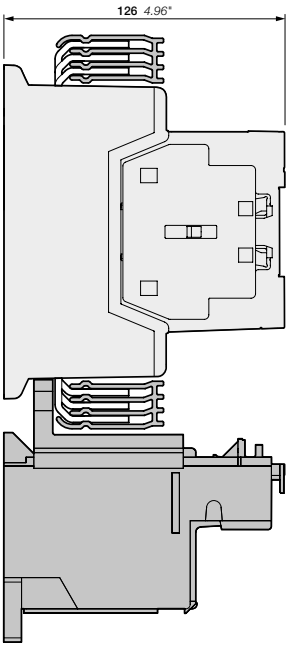
AF80, AF96
+ BER96-4, VM96-4
+ TF96 thermal overload relay

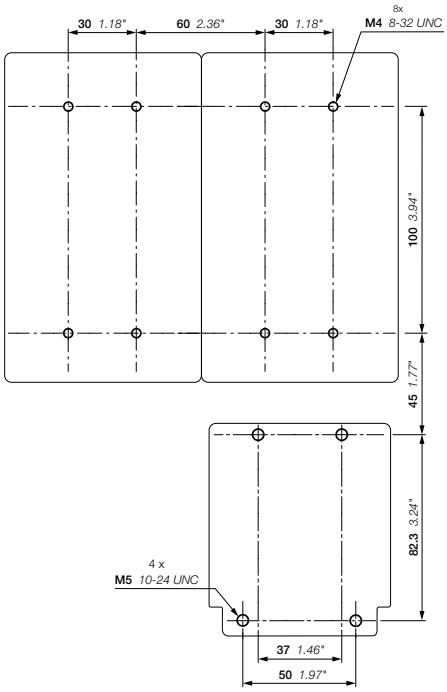
5

Reversing starters protected by thermal overload relays
With AF contactors - open type version in kit form

Main dimensions mm, *inches*





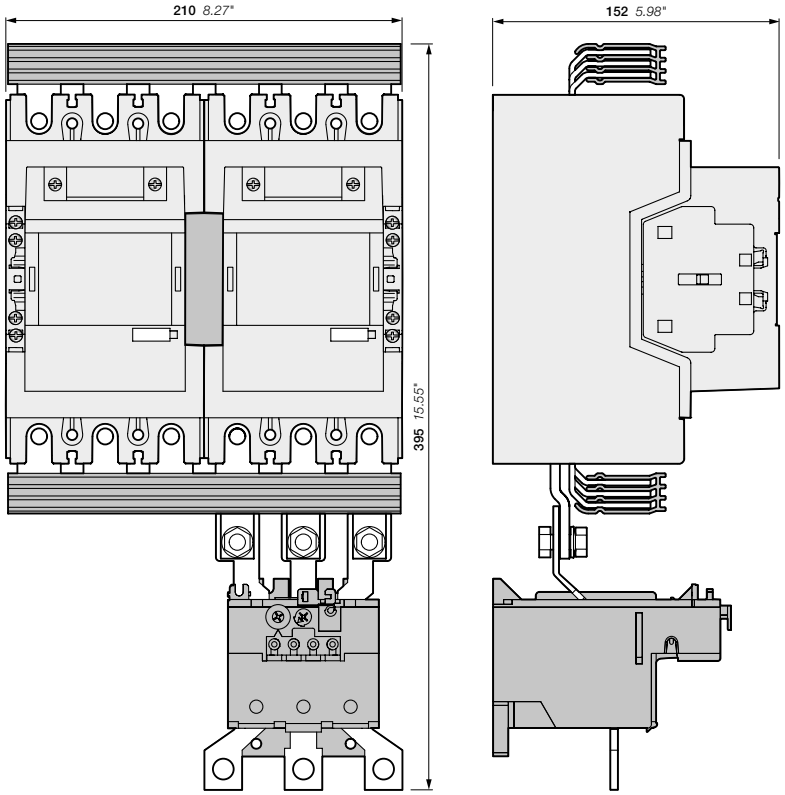


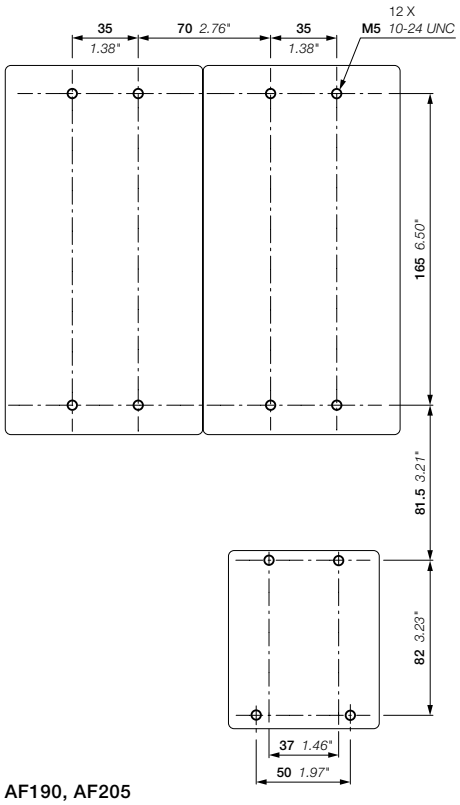
AF116, AF140, AF146
+ BER140-4, VM19
+ TF140 thermal overload relay

1SFC101158C0201

Reversing starters protected by thermal overload relays
With AF contactors - open type version in kit form

Main dimensions mm, *inches*





AF190, AF205
+ BER205-4, VM19
+ TA200DU thermal overload relay

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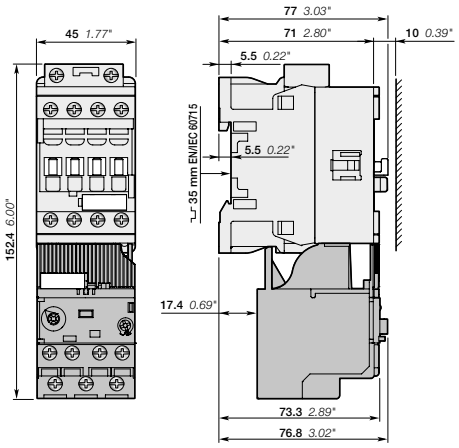
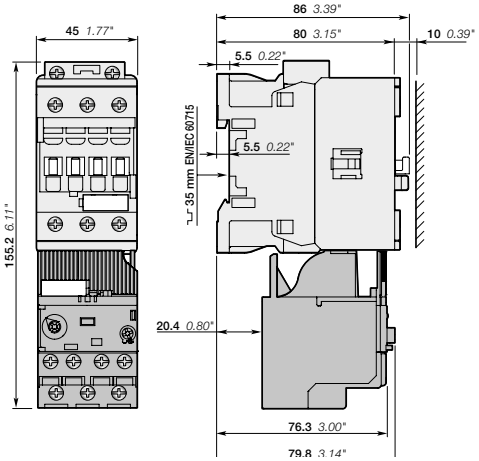
1SFC101159C0201

DOL starters protected by electronic overload relays
With AF contactors - open type version in kit form

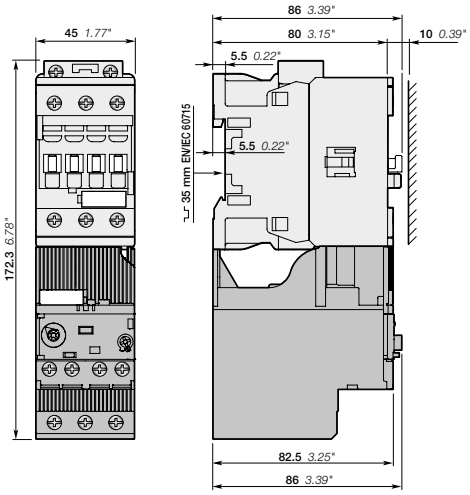
Main dimensions mm, *inches*



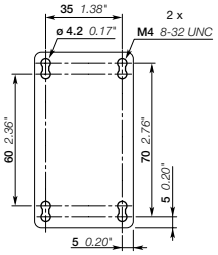
AF09, AF12, AF16
+ EF19 electronic overload relay



AF26, AF30, AF38
+ EF19 electronic overload relay



AF26, AF30, AF38
+ EF45 electronic overload relay



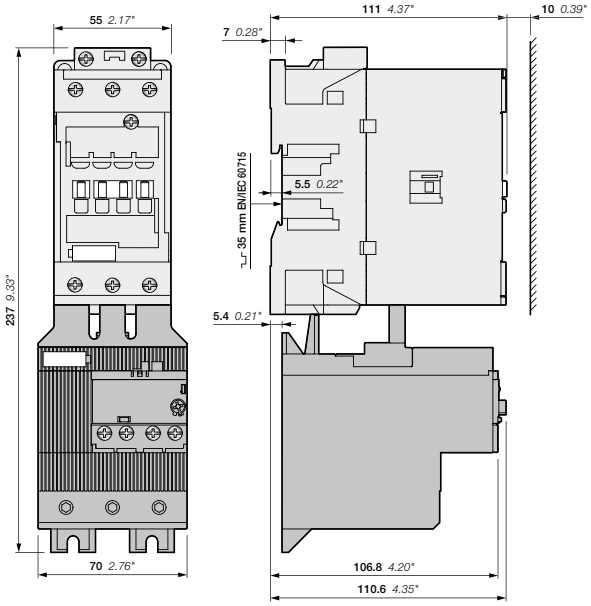
AF09, AF12, AF16, AF26, AF30, AF38
+ EF electronic overload relay

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

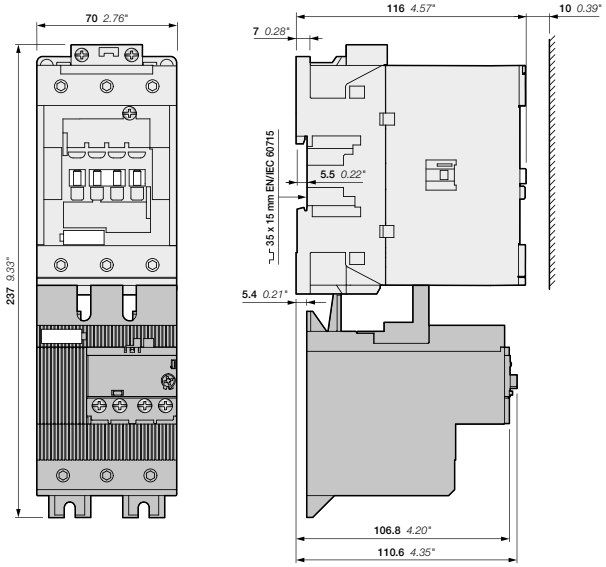
1SBC101950S0201

DOL starters protected by electronic overload relays
With AF contactors - open type version in kit form

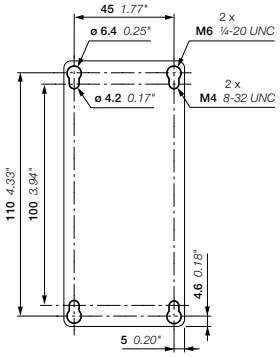
Main dimensions mm, *inches*



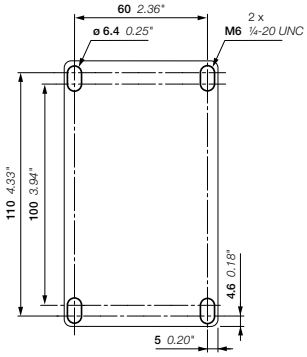
AF40, AF52, AF65
+ EF65 electronic overload relay



AF80, AF96
+ EF96 electronic overload relay



AF40, AF52, AF65
+ EF65 electronic overload relay



AF80, AF96
+ EF96 electronic overload relay

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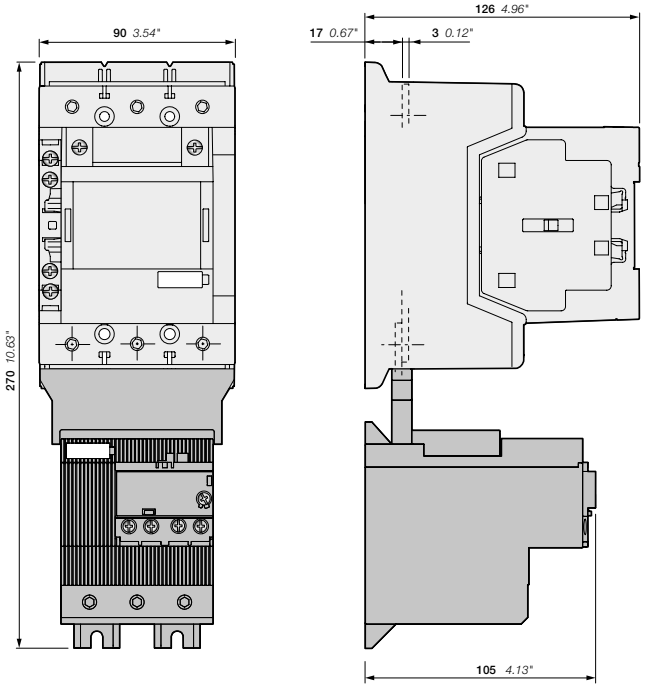
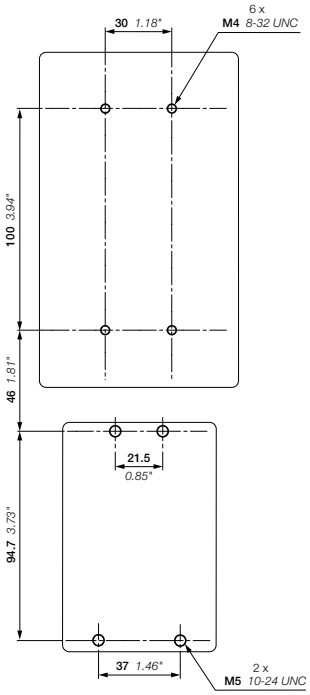
1SBC101951S0201

DOL starters protected by electronic overload relays
With AF contactors - open type version in kit form

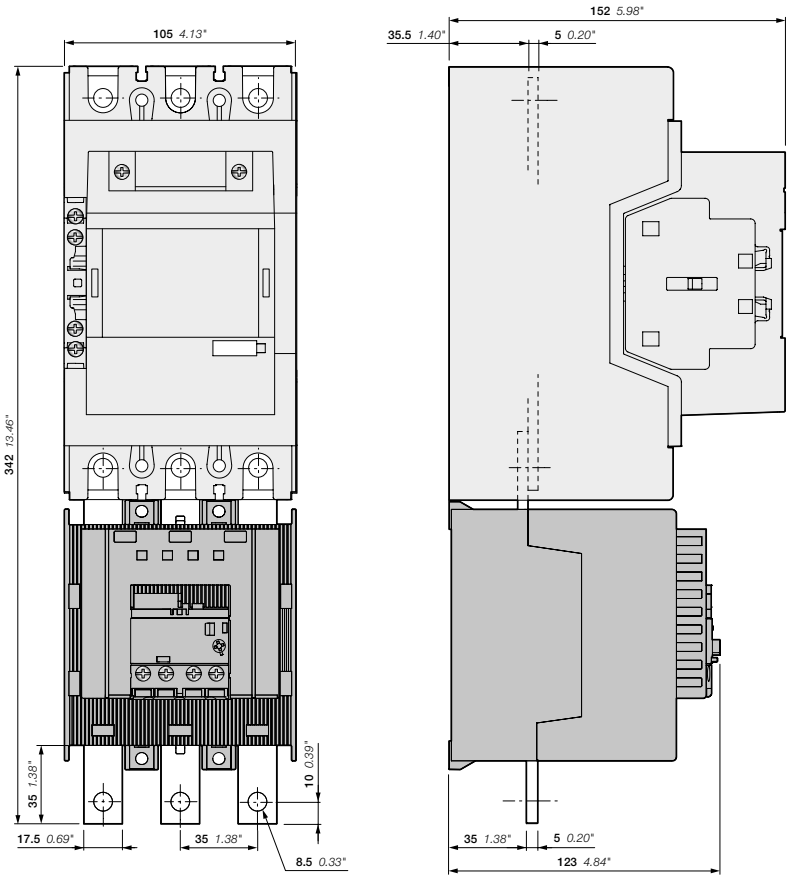
Main dimensions mm, *inches*



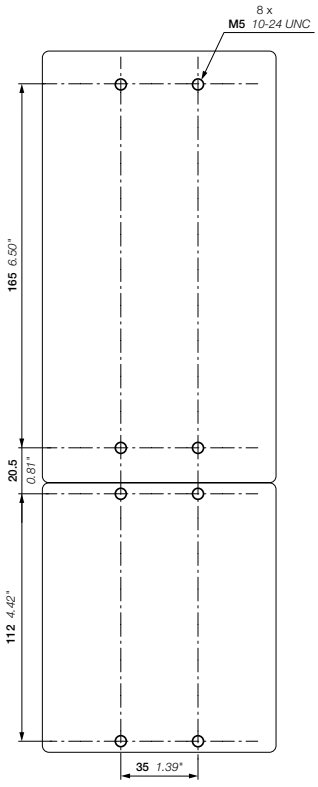
AF116, AF140, AF146-30-11(B)
+ EF146 electronic overload relay



AF116, AF140, AF146-30-11(B)
+ EF146 electronic overload relay



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



AF190, AF205
+ EF205 electronic overload relay

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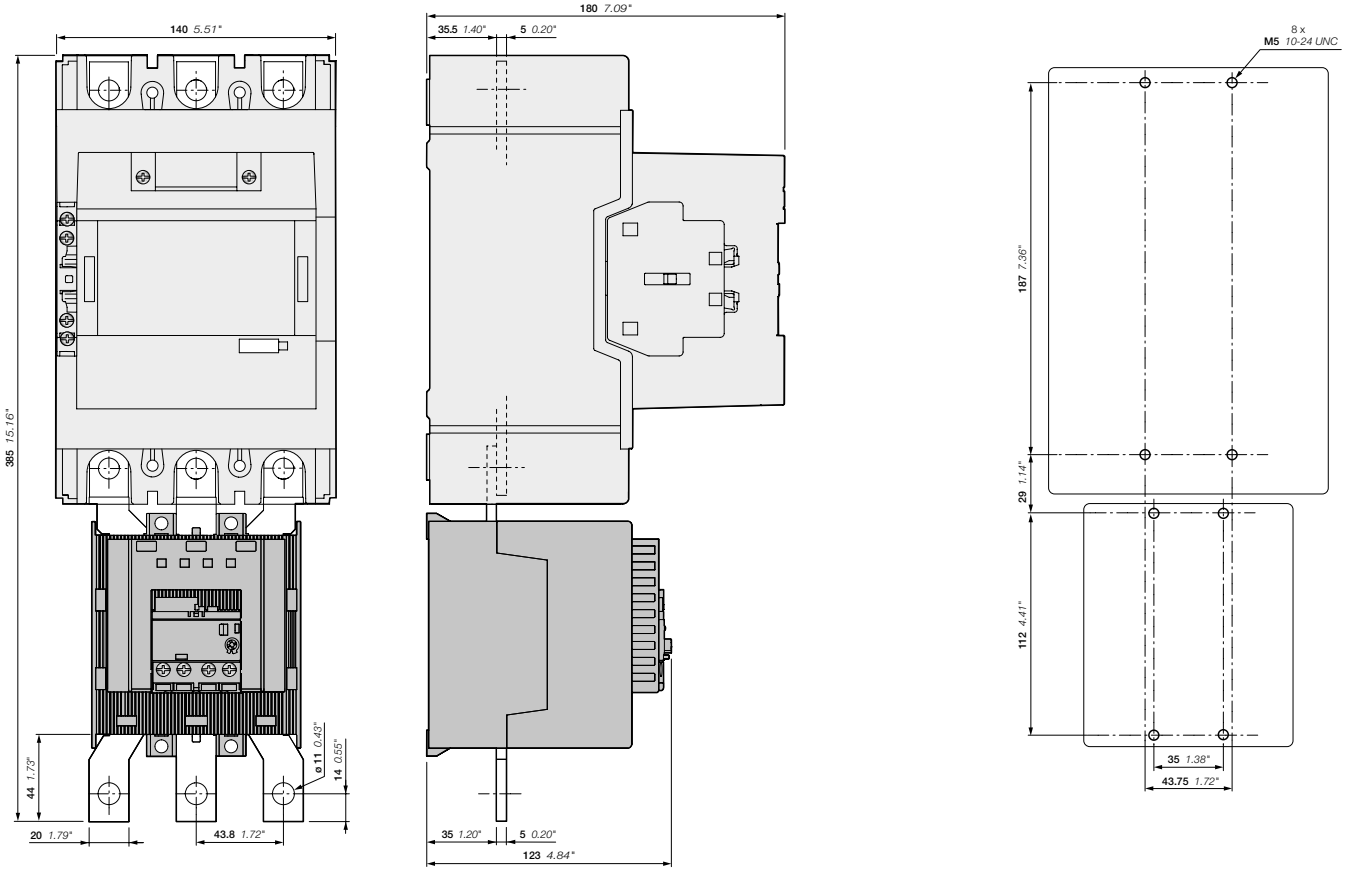
DOL starters protected by electronic overload relays
With AF contactors - open type version in kit form

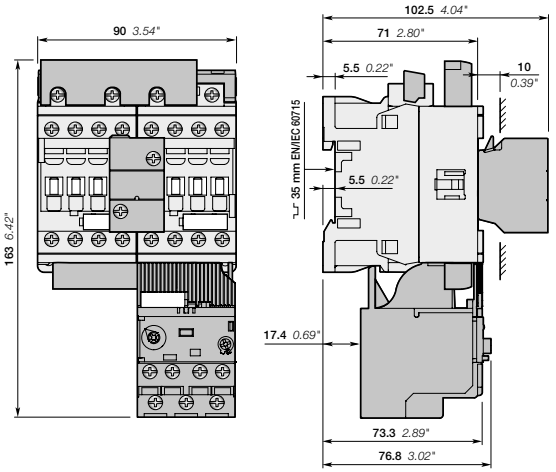
Main dimensions mm, *inches*



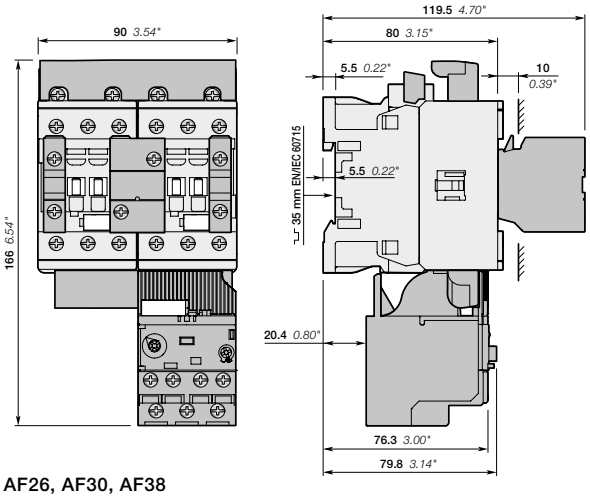
AF265, AF305, AF370-30-11
+ EF370 electronic overload relay

Reversing starters protected by electronic overload relays
With AF contactors - open type version in kit form

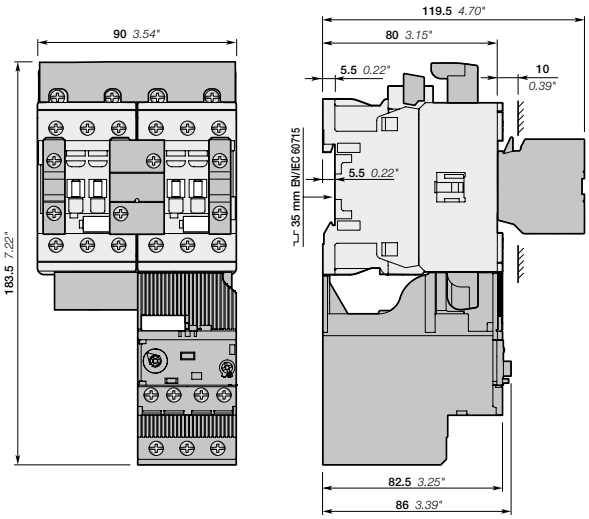
Main dimensions mm, *inches*



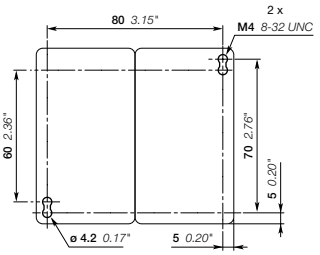
AF09, AF12, AF16
+ BER16-4, VEM4
+ EF19 electronic overload relay



AF26, AF30, AF38
+ BER38-4, VEM4, CA4-10
+ EF19 electronic overload relay



AF26, AF30, AF38
+ BER38-4, VEM4, CA4-10
+ EF45 electronic overload relay



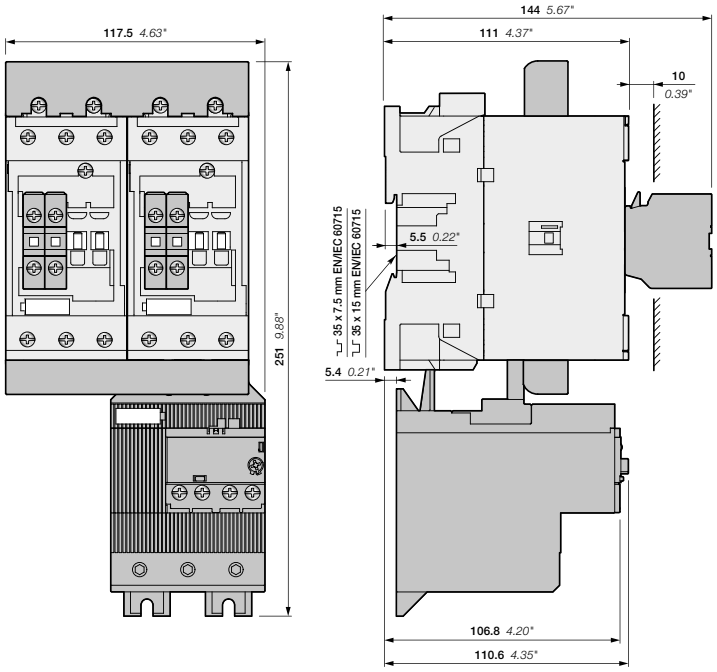
AF09, AF12, AF16, AF26, AF30, AF38

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

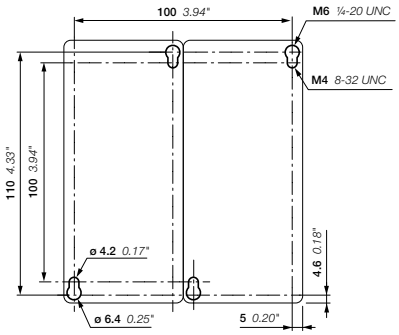
1SBC101952S0201

Reversing starters protected by electronic overload relays
With AF contactors - open type version in kit form

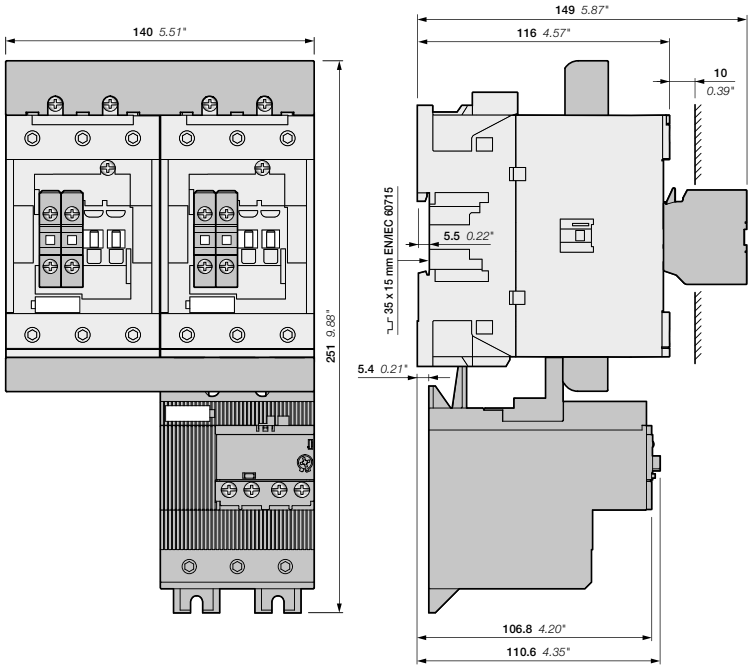
Main dimensions mm, *inches*



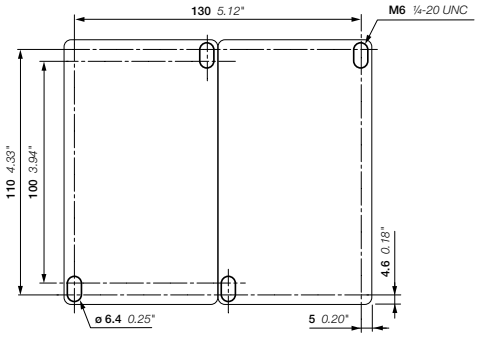
AF40, AF52, AF65
+ BER65-4, VM96-4
+ EF65 electronic overload relay



AF40, AF52, AF65
+ BER65-4, VM96-4
+ EF65 electronic overload relay



AF80, AF96
+ BER96-4, VM96-4
+ EF96 electronic overload relay



AF80, AF96
+ BER96-4, VM96-4
+ EF96 electronic overload relay

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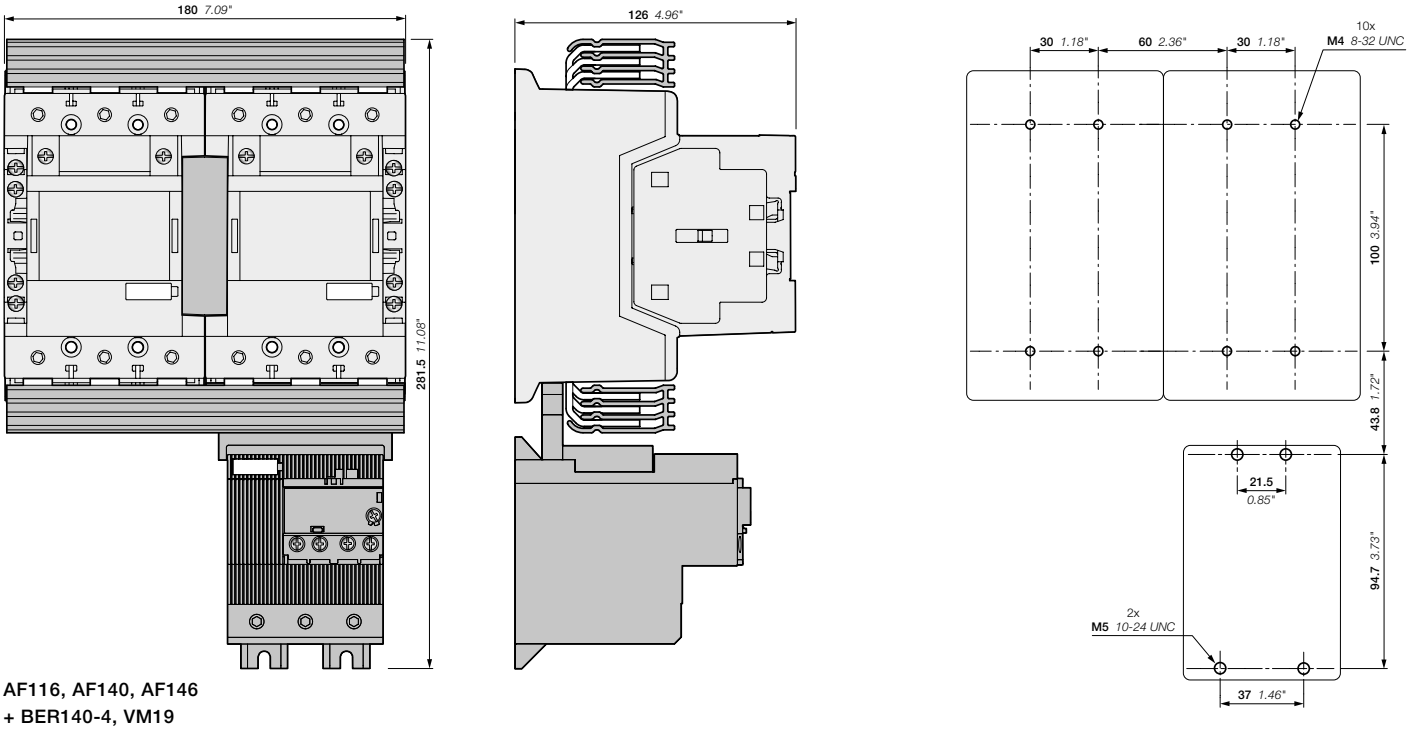
Reversing starters protected by electronic overload relays
With AF contactors - open type version in kit form

Main dimensions mm, *inches*



AF116, AF140, AF146
+ BER140-4, VM19
+ EF146 electronic overload relay

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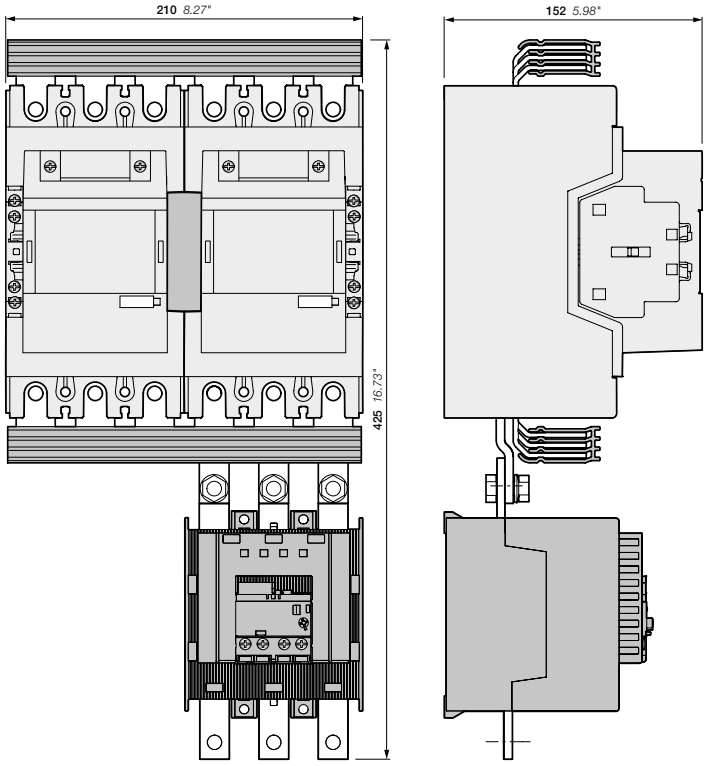
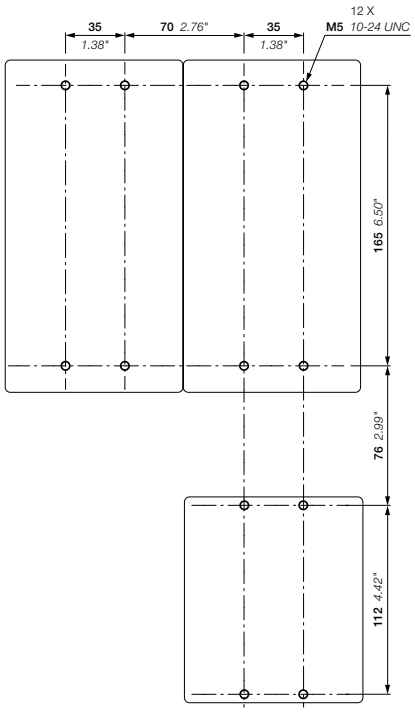
Reversing starters protected by electronic overload relays
With AF contactors - open type version in kit form

Main dimensions mm, *inches*





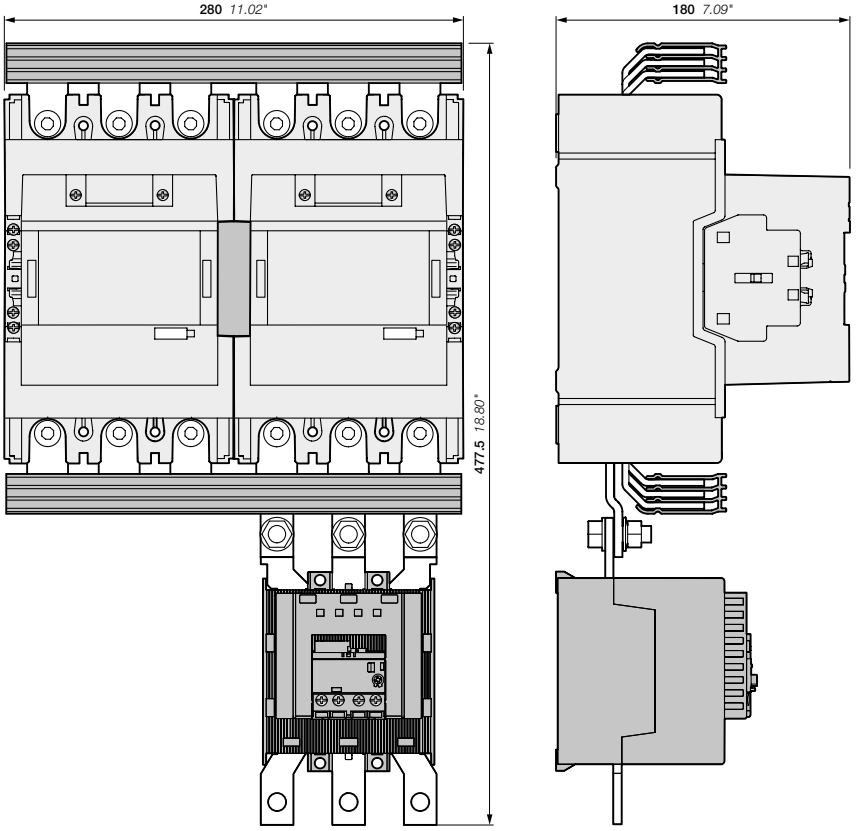
AF190, AF205
+ BER205-4, VM19
+ EF205 electronic overload relay

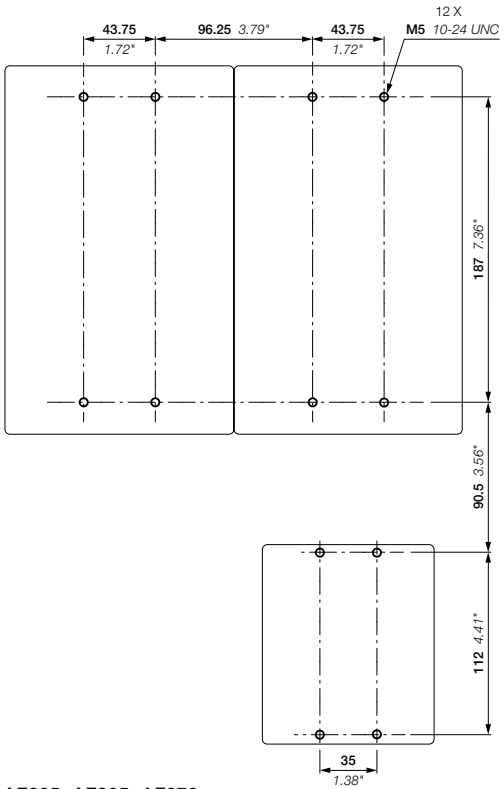
5

1SFC101163C0201

Reversing starters protected by electronic overload relays
With AF contactors - open type version in kit form

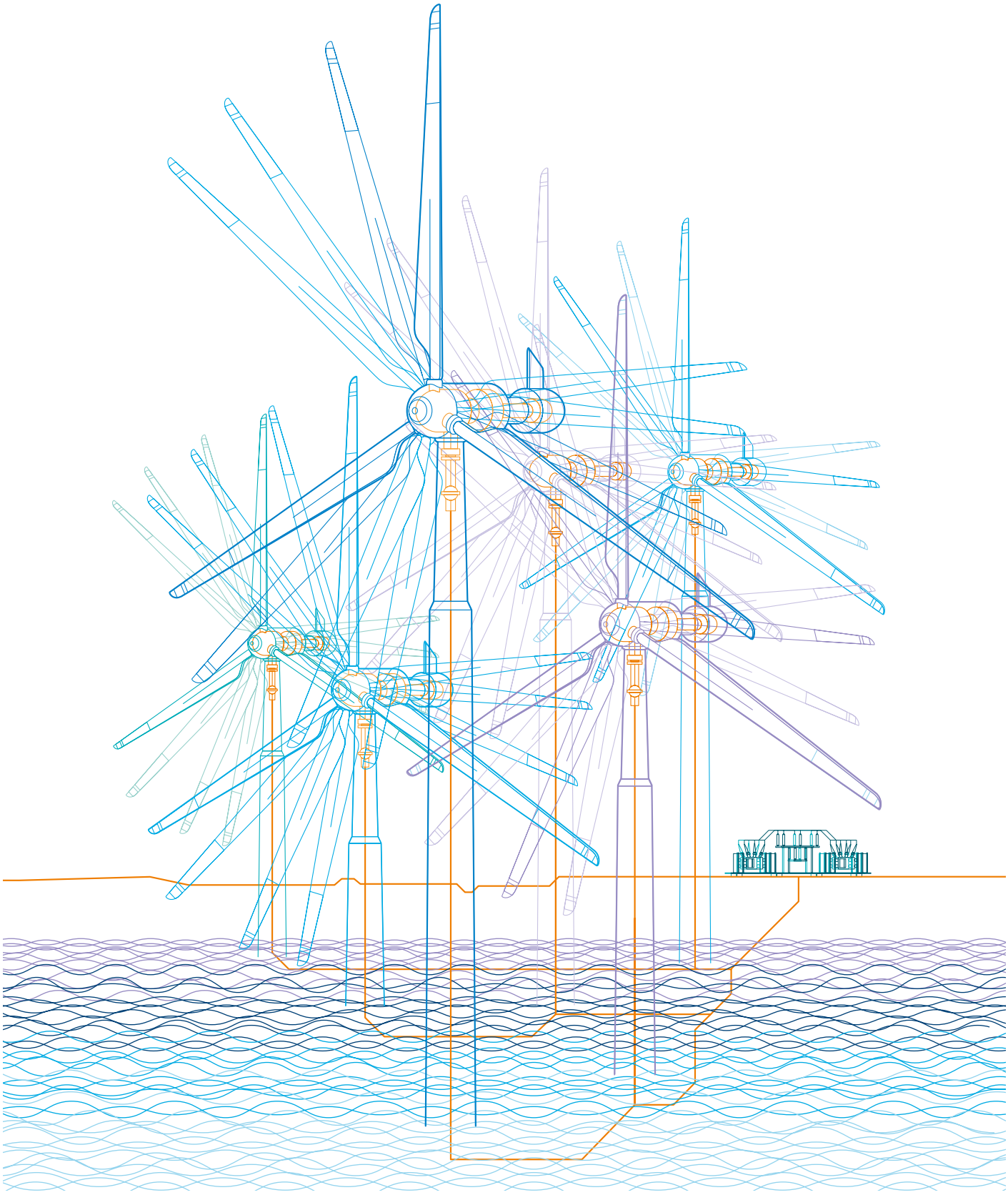
Main dimensions mm, *inches*



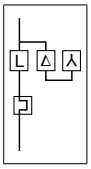


AF265, AF305, AF370
+ BER370-4, VM19
+ EF370 electronic overload relay

1SFC101160C0201



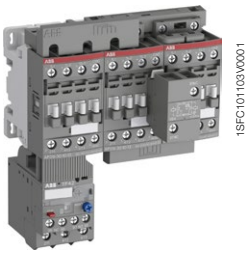
Star-delta starters protected by overload relays
With AF contactors - Open type version in kit form



Application

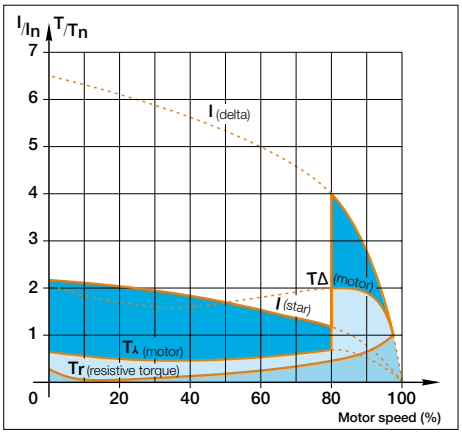
Star-delta starting is the most common method to reduce the starting current of a motor.

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.



1SFC101103V0001

AF16-30-10 + AF16-30-10 + AF09-30-10 + BEY16-4 + VEM4 + TF42



I = current
T = torque

In = nominal current
Tn = nominal torque

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.

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...

1SFC101104V0001

AF140-30-11 + AF140-30-11 + AF140-30-11 + BEY140-4 + VM19 + EF146

Precaution

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

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 (6 to 10 s) then begins.

2nd stage: "Star" to "Delta" switching - when programmed starting time is over, the KM2 "Star" contactor opens.

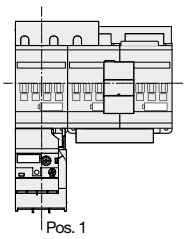
3rd stage: "Delta" connection - Thanks to AF contactors, a transition time (or dwelling time) of 50 ms is already integrated between the opening of the "star" contactor and closing of the "delta" contactor.

Conclusion: An on-delay timer without dwelling time (e.g.: CT-ERS.21S or TEF4-ON) is enough to count-down the programmed starting time (6 to 10 s) during "Star connection". The use of a star-delta timer including a dwelling time is not permitted.

Main Technical Data

Standards	IEC 60947-4-1 / EN 60947-4-1
Rated operational voltage Ue max.	690 V - 50/60 Hz
Rated insulation voltage Ui	
acc. to IEC 60947-4-1	690 V
acc. to UL / CSA	600 V
Ambient air temperature	
Close to the device	≤ 60 °C (TF42: 38 A above ≤ 50 °C)
Degree of protection	IP20
Switching frequency	Refer to "Switching frequency diagrams" page

Mounting positions



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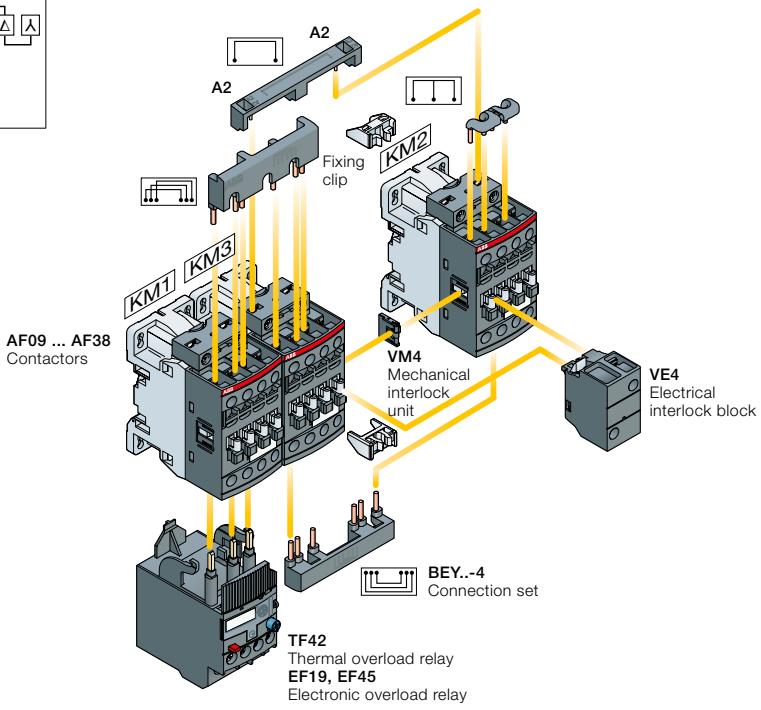
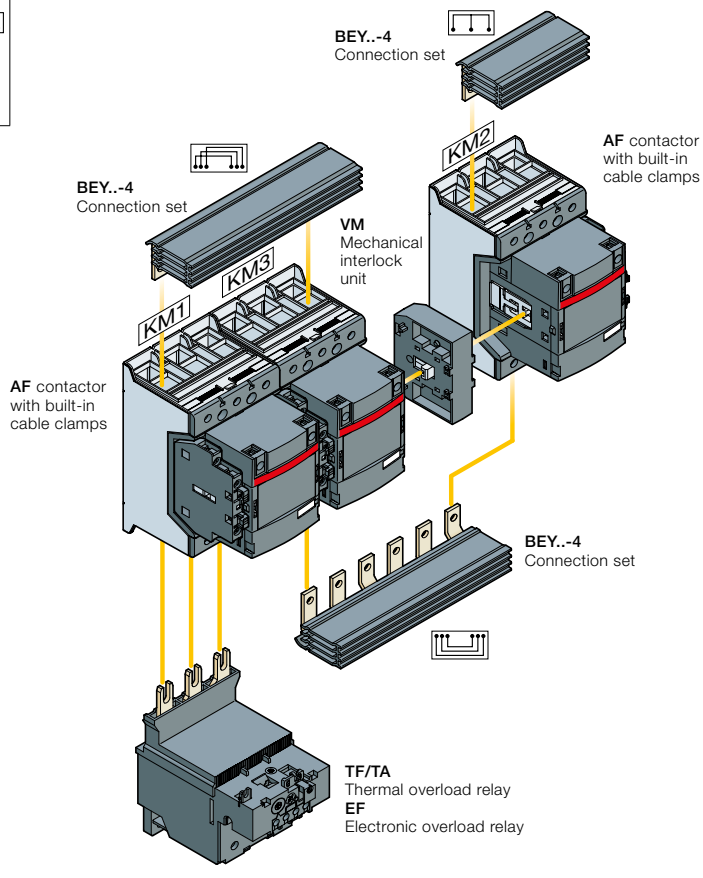
Star-delta starters protected by overload relays
With AF contactors - Open type version in kit form

Star-delta starters for AF09 ... AF38



Star-delta starters for AF116 ... AF370



Description

You can easily assemble star-delta starter thanks to our complete range of accessories:

- For AF09 ... AF38, use VEM4 mechanical and electrical interlock set without increasing starter width. It includes:
  - VM4 mechanical interlock unit and 2 fixing clips
  - VE4 electrical interlock block with A2-A2 connection.
- For AF40 ... AF370, use VM mechanical interlock unit and additional auxiliary contact blocks for electrical interlocking.
- BEY..-4 connection set: it assures a safe and simple connection between both contactor main terminals.

Select now easily and quickly your starter in the following pages at 400 V, up to 200 kW.

For the full coordination tables:
www.abb.com/lowvoltage then go to the right menu: "**Support**", select: "**Online Product Selection Tools**" then select "**Coordination Tables for motor protection**"

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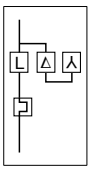
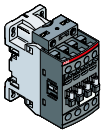
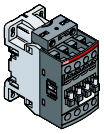
Star-delta starters protected by thermal overload relays
With AF contactors - Open type version in kit form



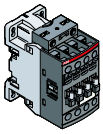
Line contactor KM1



Delta contactor KM3



Star contactor KM2



IEC AC-3 Rated power								Rated current	Control voltage Uc min. ... Uc max. (1)		Line contactor KM1		Delta contactor KM3		Star contactor KM2	
220 V kW	230/240 V kW	380 V kW	400 V kW	415 V kW	440 V kW	500 V kW	690 V kW	400 V A	V 50/60 Hz	V DC	Type	Order code	Type	Order code	Type	Order code
4	4	7.5	7.5	7.5	7.5	9	9	15.5	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	AF09Z-30-10-21	1SBL136001R2110	AF09Z-30-10-21	1SBL136001R2110
									100...250	100...250	AF09-30-10-13	1SBL137001R1310	AF09-30-10-13	1SBL137001R1310	AF09-30-10-13	1SBL137001R1310
5.5	5.5	9	11	11	11	11	11	22	24...60	20...60	AF12Z-30-10-21	1SBL156001R2110	AF12Z-30-10-21	1SBL156001R2110	AF09Z-30-10-21	1SBL136001R2110
									100...250	100...250	AF12-30-10-13	1SBL157001R1310	AF12-30-10-13	1SBL157001R1310	AF09-30-10-13	1SBL137001R1310
7.5	9	15	15	15	15	15	15	29	24...60	20...60	AF16Z-30-10-21	1SBL176001R2110	AF16Z-30-10-21	1SBL176001R2110	AF09Z-30-10-21	1SBL136001R2110
									100...250	100...250	AF16-30-10-13	1SBL177001R1310	AF16-30-10-13	1SBL177001R1310	AF09-30-10-13	1SBL137001R1310
11	11	18.5	18.5	25	25	25	25	35	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	AF26Z-30-00-21	1SBL236001R2100	AF26Z-30-00-21	1SBL236001R2100
									100...250	100...250	AF26-30-00-13	1SBL237001R1300	AF26-30-00-13	1SBL237001R1300	AF26-30-00-13	1SBL237001R1300
11	11	22	22	25	25	25	25	41	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	AF26Z-30-00-21	1SBL236001R2100	AF26Z-30-00-21	1SBL236001R2100
									100...250	100...250	AF26-30-00-13	1SBL237001R1300	AF26-30-00-13	1SBL237001R1300	AF26-30-00-13	1SBL237001R1300
11	15	25	25	25	25	30	30	47	24...60	20...60	AF30Z-30-00-21	1SBL276001R2100	AF30Z-30-00-21	1SBL276001R2100	AF26Z-30-00-21	1SBL236001R2100
									100...250	100...250	AF30-30-00-13	1SBL277001R1300	AF30-30-00-13	1SBL277001R1300	AF26-30-00-13	1SBL237001R1300
18.5	18.5	37	37	37	37	37	37	66	24...60	20...60	AF40-30-00-11	1SBL347001R1100	AF40-30-00-11	1SBL347001R1100	AF40-30-00-11	1SBL347001R1100
									100...250	100...250	AF40-30-00-13	1SBL347001R1300	AF40-30-00-13	1SBL347001R1300	AF40-30-00-13	1SBL347001R1300
25	25	45	45	45	45	45	45	80	24...60	20...60	AF52-30-00-11	1SBL367001R1100	AF52-30-00-11	1SBL367001R1100	AF40-30-00-11	1SBL347001R1100
									100...250	100...250	AF52-30-00-13	1SBL367001R1300	AF52-30-00-13	1SBL367001R1300	AF40-30-00-13	1SBL347001R1300
30	30	55	55	55	55	55	55	97	24...60	20...60	AF65-30-00-11	1SBL387001R1100	AF65-30-00-11	1SBL387001R1100	AF40-30-00-11	1SBL347001R1100
									100...250	100...250	AF65-30-00-13	1SBL387001R1300	AF65-30-00-13	1SBL387001R1300	AF40-30-00-13	1SBL347001R1300
37	37	75	75	75	75	75	75	132	24...60	20...60	AF80-30-00-11	1SBL397001R1100	AF80-30-00-11	1SBL397001R1100	AF52-30-00-11	1SBL367001R1100
									100...250	100...250	AF80-30-00-13	1SBL397001R1300	AF80-30-00-13	1SBL397001R1300	AF52-30-00-13	1SBL367001R1300
45	45	90	90	90	90	90	90	160	24...60	20...60	AF96-30-00-11	1SBL407001R1100	AF96-30-00-11	1SBL407001R1100	AF65-30-00-11	1SBL387001R1100
									100...250	100...250	AF96-30-00-13	1SBL407001R1300	AF96-30-00-13	1SBL407001R1300	AF65-30-00-13	1SBL387001R1300
55	55	90	110	110	132	132	110	195	24...60	20...60	AF116-30-11-11	1SFL427001R1111	AF116-30-11-11	1SFL427001R1111	AF116-30-11-11 (4)	1SFL427001R1111
									100...250	100...250	AF116-30-11-13	1SFL427001R1311	AF116-30-11-13	1SFL427001R1311	AF116-30-11-13	1SFL427001R1311
75	75	132	132	132	132	160	132	230	24...60	20...60	AF140-30-11-11	1SFL447001R1111	AF140-30-11-11	1SFL447001R1111	AF116-30-11-11	1SFL427001R1111
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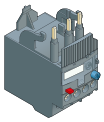
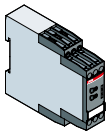
90	90	160	160	160	160	200	200	280	24...60	20...60	AF190-30-11-11	1SFL487002R1111	AF190-30-11-11	1SFL487002R1111	AF140-30-11-11	1SFL447001R1111
									100...250	100...250	AF190-30-11-13	1SFL487002R1311	AF190-30-11-13	1SFL487002R1311	AF140-30-11-13	1SFL447001R1311

(1) AF09 ... AF190: ambient temperature ≤ 60 °C.
(2) The setting current value is: nominal motor current x 0.58. Overload relay type given for 400 V - AC-3.
For other voltage, select overload relay type according to required nominal motor current x 0.58.
(3) On-delay timer without dwelling-time (e.g.: side-mounted CT-ERS.21S or front-mounted TEF4-ON) is enough to countdown the programmed starting time during "Star connection".
In case of use of front-mounted TEF4-ON on-delay timer, mount on KM1 contactor AF26 ... AF96 a side-mounted CAL4-11 auxiliary contact block instead of CA4-10 auxiliary contact block.
(4) AF80 can also be used, but no connection set and mechanical interlock is available for this combination.

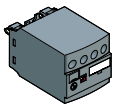
Thermal overload relays (2)



Electronic timers (3)



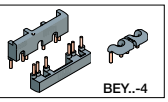
CT-ERS



TEF4-ON
Uc = 24...240 V
50/60 Hz or DC

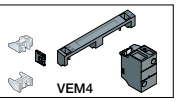
Accessories

Connection sets



BEY..-4

Mechanical and electrical interlock sets



VEM4

Auxiliary contact blocks

CA4

Setting ranges A	Type	Order code	Type	Order code	Type	Order code	Type	Order code
7.60...10.0	TF42-10	1SAZ721201R1043	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY16-4 + VEM4	1SBN081313R2000 1SBN030111R1000	-	-
10.0...13.0	TF42-13	1SAZ721201R1045	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY16-4 + VEM4	1SBN081313R2000 1SBN030111R1000	-	-
16.0...20.0	TF42-20	1SAZ721201R1049	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY16-4 + VEM4	1SBN081313R2000 1SBN030111R1000	-	-
20.0...24.0	TF42-24	1SAZ721201R1051	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY38-4 + VEM4	1SBN082713R2000 1SBN030111R1000	KM1 : 1 x CA4-10 KM2 : 1 x CA4-10	1SBN010110R1010 1SBN010110R1010
20.0...24.0	TF42-24	1SAZ721201R1051	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY38-4 + VEM4	1SBN082713R2000 1SBN030111R1000	KM1 : 1 x CA4-10 KM2 : 1 x CA4-10	1SBN010110R1010 1SBN010110R1010
24.0...29.0	TF42-29	1SAZ721201R1052	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY38-4 + VEM4	1SBN082713R2000 1SBN030111R1000	KM1 : 1 x CA4-10 KM2 : 1 x CA4-10	1SBN010110R1010 1SBN010110R1010
30.0...40.0	TF65-40	1SAZ811201R1003	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY65-4 + VM96-4	1SBN083413R2000 1SBN033405T1000	KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01	1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001
36.0...47.0	TF65-47	1SAZ811201R1004	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY65-4 + VM96-4	1SBN083413R2000 1SBN033405T1000	KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01	1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001
50.0...60.0	TF65-60	1SAZ811201R1006	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY65-4 + VM96-4	1SBN083413R2000 1SBN033405T1000	KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01	1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001
65.0...78.0	TF96-78	1SAZ911201R1004	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY96-4 + VM96-4	1SBN083913R2000 1SBN033405T1000	KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01	1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001
84.0...96.0	TF96-96	1SAZ911201R1006	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY96-4 + VM96-4	1SBN083913R2000 1SBN033405T1000	KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01	1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001
100...135	TF140DU-135	1SAZ431201R1003	CT-ERS.21S	1SVR730100R0300	BEY140-4 + VM19	1SFN084413R1000 1SFN030300R1000	-	-
100...135	TF140DU-135	1SAZ431201R1003	CT-ERS.21S	1SVR730100R0300	BEY140-4 + VM19	1SFN084413R1000 1SFN030300R1000	-	-
130...175	TA200DU-175	1SAZ421201R1005	CT-ERS.21S	1SVR730100R0300	BEY190-4 + VM140/190	1SFN084813R1000 1SFN034403R1000	-	-

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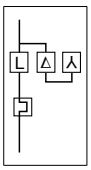
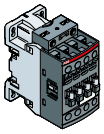
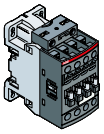
Star-delta starters protected by electronic overload relays
With AF contactors - Open type version in kit form



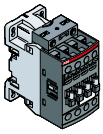
Line contactor KM1



Delta contactor KM3



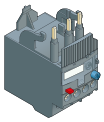
Star contactor KM2



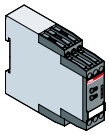
IEC AC-3 Rated power								Rated current	Control voltage Uc min. ... Uc max. (1)		Line contactor KM1		Delta contactor KM3		Star contactor KM2	
220 V kW	230/240 V kW	380 V kW	400 V kW	415 V kW	440 V kW	500 V kW	690 V kW	400 V A	V 50/60 Hz	V DC	Type	Order code	Type	Order code	Type	Order code
4	4	7.5	7.5	7.5	7.5	9	9	15.5	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	AF09Z-30-10-21	1SBL136001R2110	AF09Z-30-10-21	1SBL136001R2110
									100...250	100...250	AF09-30-10-13	1SBL137001R1310	AF09-30-10-13	1SBL137001R1310	AF09-30-10-13	1SBL137001R1310
5.5	5.5	9	11	11	11	11	11	22	24...60	20...60	AF12Z-30-10-21	1SBL156001R2110	AF12Z-30-10-21	1SBL156001R2110	AF09Z-30-10-21	1SBL136001R2110
									100...250	100...250	AF12-30-10-13	1SBL157001R1310	AF12-30-10-13	1SBL157001R1310	AF09-30-10-13	1SBL137001R1310
7.5	9	15	15	15	15	15	15	29	24...60	20...60	AF16Z-30-10-21	1SBL176001R2110	AF16Z-30-10-21	1SBL176001R2110	AF09Z-30-10-21	1SBL136001R2110
									100...250	100...250	AF16-30-10-13	1SBL177001R1310	AF16-30-10-13	1SBL177001R1310	AF09-30-10-13	1SBL137001R1310
11	11	18.5	18.5	25	25	25	25	35	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	AF26Z-30-00-21	1SBL236001R2100	AF26Z-30-00-21	1SBL236001R2100
									100...250	100...250	AF26-30-00-13	1SBL237001R1300	AF26-30-00-13	1SBL237001R1300	AF26-30-00-13	1SBL237001R1300
11	11	22	22	25	25	25	25	41	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	AF26Z-30-00-21	1SBL236001R2100	AF26Z-30-00-21	1SBL236001R2100
									100...250	100...250	AF26-30-00-13	1SBL237001R1300	AF26-30-00-13	1SBL237001R1300	AF26-30-00-13	1SBL237001R1300
11	15	25	25	25	25	30	30	47	24...60	20...60	AF30Z-30-00-21	1SBL276001R2100	AF30Z-30-00-21	1SBL276001R2100	AF26Z-30-00-21	1SBL236001R2100
									100...250	100...250	AF30-30-00-13	1SBL277001R1300	AF30-30-00-13	1SBL277001R1300	AF26-30-00-13	1SBL237001R1300
18.5	18.5	37	37	37	37	37	37	66	24...60	20...60	AF40-30-00-11	1SBL347001R1100	AF40-30-00-11	1SBL347001R1100	AF40-30-00-11	1SBL347001R1100
									100...250	100...250	AF40-30-00-13	1SBL347001R1300	AF40-30-00-13	1SBL347001R1300	AF40-30-00-13	1SBL347001R1300
25	25	45	45	45	45	45	45	80	24...60	20...60	AF52-30-00-11	1SBL367001R1100	AF52-30-00-11	1SBL367001R1100	AF40-30-00-11	1SBL347001R1100
									100...250	100...250	AF52-30-00-13	1SBL367001R1300	AF52-30-00-13	1SBL367001R1300	AF40-30-00-13	1SBL347001R1300
30	30	55	55	55	55	55	55	97	24...60	20...60	AF65-30-00-11	1SBL387001R1100	AF65-30-00-11	1SBL387001R1100	AF40-30-00-11	1SBL347001R1100
									100...250	100...250	AF65-30-00-13	1SBL387001R1300	AF65-30-00-13	1SBL387001R1300	AF40-30-00-13	1SBL347001R1300
37	37	75	75	75	75	75	75	132	24...60	20...60	AF80-30-00-11	1SBL397001R1100	AF80-30-00-11	1SBL397001R1100	AF52-30-00-11	1SBL367001R1100
									100...250	100...250	AF80-30-00-13	1SBL397001R1300	AF80-30-00-13	1SBL397001R1300	AF52-30-00-13	1SBL367001R1300
45	45	90	90	90	90	90	90	160	24...60	20...60	AF96-30-00-11	1SBL407001R1100	AF96-30-00-11	1SBL407001R1100	AF65-30-00-11	1SBL387001R1100
									100...250	100...250	AF96-30-00-13	1SBL407001R1300	AF96-30-00-13	1SBL407001R1300	AF65-30-00-13	1SBL387001R1300
55	55	90	110	110	132	132	110	195	24...60	20...60	AF116-30-11-11	1SFL427001R1111	AF116-30-11-11	1SFL427001R1111	AF116-30-11-11 (4)	1SFL427001R1111
									100...250	100...250	AF116-30-11-13	1SFL427001R1311	AF116-30-11-13	1SFL427001R1311	AF116-30-11-13	1SFL427001R1311
75	75	132	132	132	132	160	132	230	24...60	20...60	AF140-30-11-11	1SFL447001R1111	AF140-30-11-11	1SFL447001R1111	AF116-30-11-11	1SFL427001R1111
									100...250	100...250	AF140-30-11-13	1SFL447001R1311	AF140-30-11-13	1SFL447001R1311	AF116-30-11-13	1SFL427001R1311
90	90	160	160	160	160	200	200	280	24...60	20...60	AF190-30-11-11	1SFL487002R1111	AF190-30-11-11	1SFL487002R1111	AF140-30-11-11	1SFL447001R1111
									100...250	100...250	AF190-30-11-13	1SFL487002R1311	AF190-30-11-13	1SFL487002R1311	AF140-30-11-13	1SFL447001R1311
110	110	160	200	200	200	250	250	350	24...60	20...60	AF205-30-11-11	1SFL527002R1111	AF205-30-11-11	1SFL527002R1111	AF190-30-11-11	1SFL487002R1111
									100...250	100...250	AF205-30-11-13	1SFL527002R1311	AF205-30-11-13	1SFL527002R1311	AF190-30-11-13	1SFL487002R1311
132	132	250	250	250	250	315	355	430	24...60	20...60	AF265-30-11-11	1SFL547002R1111	AF265-30-11-11	1SFL547002R1111	AF205-30-11-11	1SFL527002R1111
									100...250	100...250	AF265-30-11-13	1SFL547002R1311	AF265-30-11-13	1SFL547002R1311	AF205-30-11-13	1SFL527002R1311
160	160	315	315	315	355	400	400	540	24...60	20...60	AF370-30-11-11	1SFL607002R1111	AF370-30-11-11	1SFL607002R1111	AF265-30-11-11	1SFL547002R1111
									100...250	100...250	AF370-30-11-13	1SFL607002R1311	AF370-30-11-13	1SFL607002R1311	AF265-30-11-13	1SFL547002R1311
200	200	315	355	355	400	400	500	610	24...60	20...60	AF370-30-11-11	1SFL607002R1111	AF370-30-11-11	1SFL607002R1111	AF305-30-11-11	1SFL587002R1111
									100...250	100...250	AF370-30-11-13	1SFL607002R1311	AF370-30-11-13	1SFL607002R1311	AF305-30-11-13	1SFL587002R1311

(1) AF09 ... AF370: ambient temperature ≤ 60 °C.
(2) The setting current value is: nominal motor current x 0.58. Overload relay type given for 400 V - AC-3.
For other voltage, select overload relay type according to required nominal motor current x 0.58.
(3) On-delay timer without dwelling-time (e.g.: side-mounted CT-ERS.21S or front-mounted TEF4-ON) is enough to countdown the programmed starting time during "Star connection".
In case of use of front-mounted TEF4-ON on-delay timer, mount on KM1 contactor AF26 ... AF96 a side-mounted CAL4-11 auxiliary contact block instead of CA4-10 auxiliary contact block.
(4) AF80 can also be used, but no connection set and mechanical interlock is available for this combination.

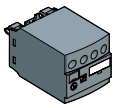
Electronic overload relays (2)



Electronic timers (3)



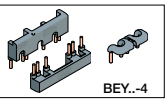
CT-ERS



TEF4-ON
Uc = 24...240 V
50/60 Hz or DC

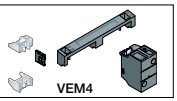
Accessories

Connection sets



BEY..-4

Mechanical and electrical interlock sets



VEM4

Auxiliary contact blocks

CA4

Setting ranges A	Type	Order code		Type	Order code		Type	Order code		Type	Order code
5.70...18.9	EF19-18.9	1SAX121001R1105		CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000		BEY16-4 + VEM4	1SBN081313R2000 1SBN030111R1000		-	-
5.70...18.9	EF19-18.9	1SAX121001R1105		CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000		BEY16-4 + VEM4	1SBN081313R2000 1SBN030111R1000		-	-
5.70...18.9	EF19-18.9	1SAX121001R1105		CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000		BEY16-4 + VEM4	1SBN081313R2000 1SBN030111R1000		-	-
9.00...30.0	EF45-30	1SAX221001R1101		CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000		BEY38-4 + VEM4	1SBN082713R2000 1SBN030111R1000		KM1 : 1 x CA4-10 KM2 : 1 x CA4-10	1SBN010110R1010 1SBN010110R1010
9.00...30.0	EF45-30	1SAX221001R1101		CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000		BEY38-4 + VEM4	1SBN082713R2000 1SBN030111R1000		KM1 : 1 x CA4-10 KM2 : 1 x CA4-10	1SBN010110R1010 1SBN010110R1010
9.00...30.0	EF45-30	1SAX221001R1101		CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000		BEY38-4 + VEM4	1SBN082713R2000 1SBN030111R1000		KM1 : 1 x CA4-10 KM2 : 1 x CA4-10	1SBN010110R1010 1SBN010110R1010
25...70	EF65-70	1SAX331001R1101		CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000		BEY65-4 + VM96-4	1SBN083413R2000 1SBN033405T1000		KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01	1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001
25...70	EF65-70	1SAX331001R1101		CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000		BEY65-4 + VM96-4	1SBN083413R2000 1SBN033405T1000		KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01	1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001
25...70	EF65-70	1SAX331001R1101		CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000		BEY65-4 + VM96-4	1SBN083413R2000 1SBN033405T1000		KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01	1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001
36...100	EF96-100	1SAX341001R1101		CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000		BEY96-4 + VM96-4	1SBN083913R2000 1SBN033405T1000		KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01	1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001
36...100	EF96-100	1SAX341001R1101		CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000		BEY96-4 + VM96-4	1SBN083913R2000 1SBN033405T1000		KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01	1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001
54...150	EF146-150	1SAX351001R1101		CT-ERS.21S	1SVR730100R0300		BEY140-4 + VM19	1SFN084413R1000 1SFN030300R1000		-	-
54...150	EF146-150	1SAX351001R1101		CT-ERS.21S	1SVR730100R0300		BEY140-4 + VM19	1SFN084413R1000 1SFN030300R1000		-	-
63...210	EF205-210	1SAX531001R1101		CT-ERS.21S	1SVR730100R0300		BEY190-4 + VM140/190	1SFN084813R1000 1SFN034403R1000		-	-
63...210	EF205-210	1SAX531001R1101		CT-ERS.21S	1SVR730100R0300		BEY205-4 + VM19	1SFN085213R1000 1SFN030300R1000		-	-
115...380	EF370-380	1SAX611001R1101		CT-ERS.21S	1SVR730100R0300		BEY265-4 + VM205/265	1SFN085413R1000 1SFN035203R1000		-	-
115...380	EF370-380	1SAX611001R1101		CT-ERS.21S	1SVR730100R0300		BEY370-4 + VM19	1SFN085813R1000 1SFN030300R1000		-	-
115...380	EF370-380	1SAX611001R1101		CT-ERS.21S	1SVR730100R0300		BEY370-4 + VM19	1SFN085813R1000 1SFN030300R1000		-	-

1SBC101960S0201

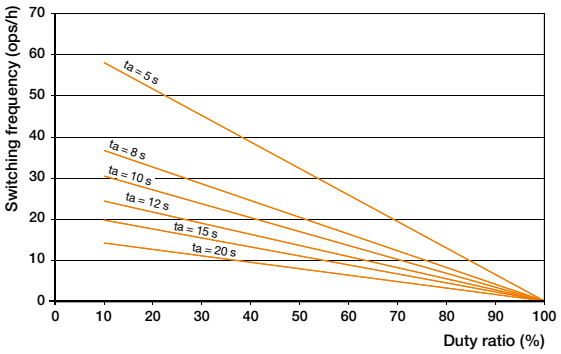
Star-delta starters protected by overload relays
With AF contactors - Open type version in kit form
Switching frequency diagrams

General

Switching frequency/hour, according to acceleration time and load factor. Respect of the following conditions enables utilization of the starter without excessive overheating of the connections or nuisance tripping of the thermal overload relay.

Thermal overload relay

Intermittent periodic duty



ta: motor starting time

Example:

Starting time of the motor: 7 second (use 8s curve) - Duty ratio: 63 % means a permitted switching frequency of max. 15 operating cycles per hour.

This corresponds to a 4 minute operating cycle (15 starts/hr) with 7 seconds acceleration, 2.5 minutes operation and 1.5 minutes rest.

Electronic overload relay : please consult us

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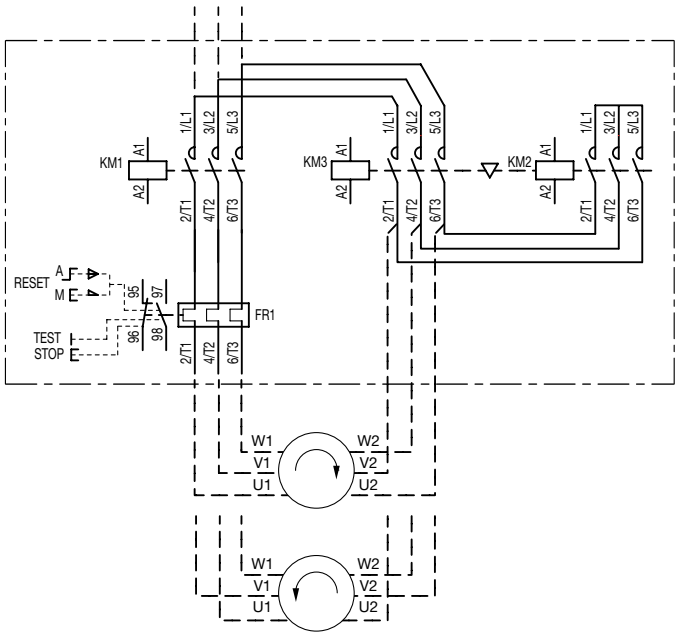
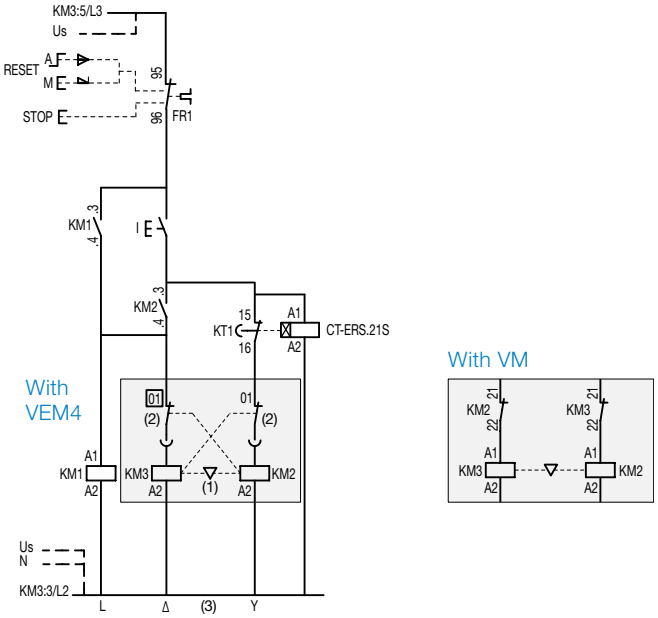
Star-delta starters protected by overload relays
With AF contactors - Open type version in kit form
Wiring diagrams with CT-ERS.21S timer

Star-delta starters

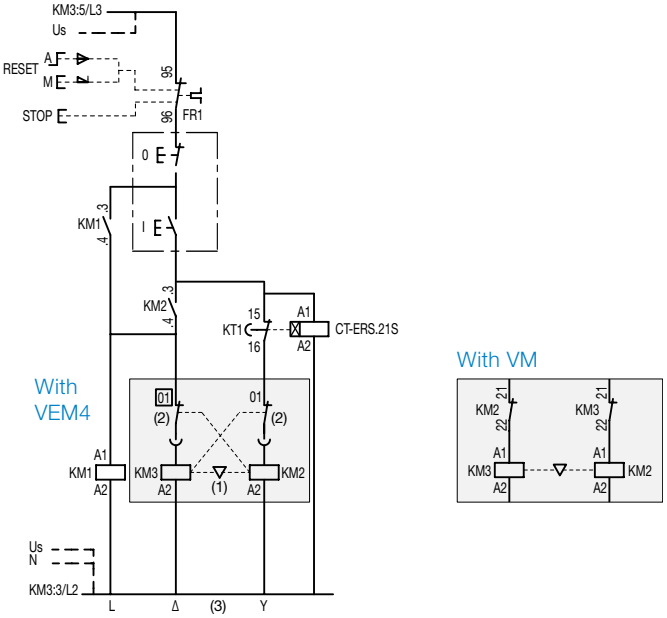
Power circuit



AC or DC local control with CT-ERS.21S timer



AC or DC remote control with CT-ERS.21S timer



Note: - VEM4 = VM4 (1) + VE4 (2) with A2-A2 (3) connection
(Except for coil Uc 12-20 V DC : use VM4 with CA4).
- coil Uc 12-20 V DC : A1+, A2-

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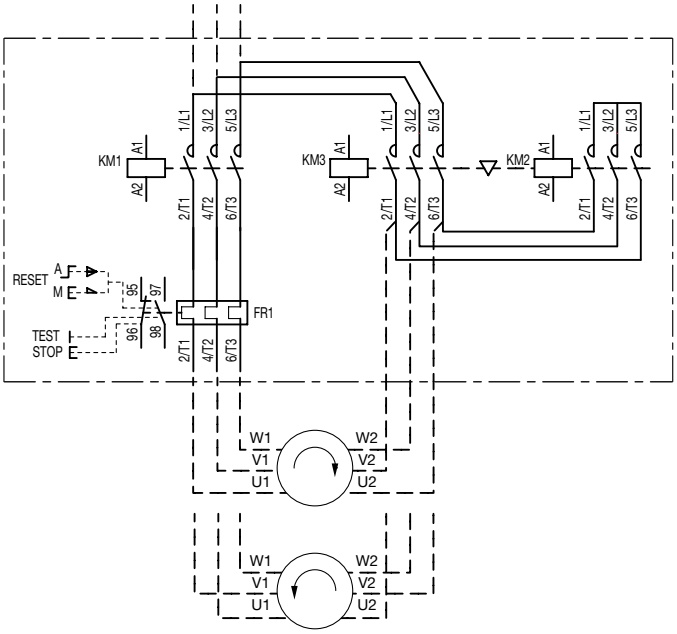
Star-delta starters protected by overload relays
With AF contactors - Open type version in kit form
Wiring diagrams with TEF4-ON timer

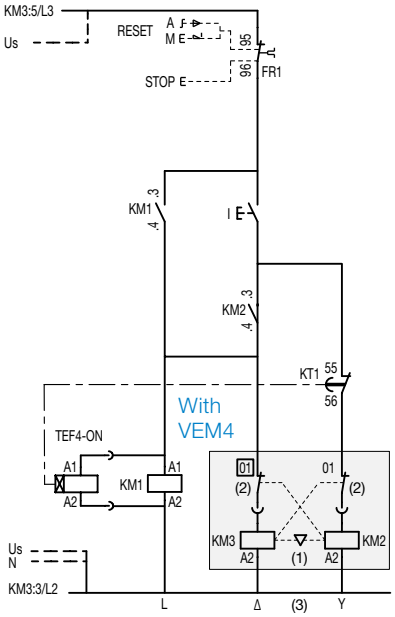
Star-delta starters

Power circuit

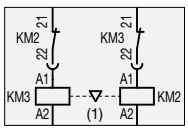


AC or DC local control with TEF4-ON timer

Uc = 24...240 V 50/60 Hz or DC

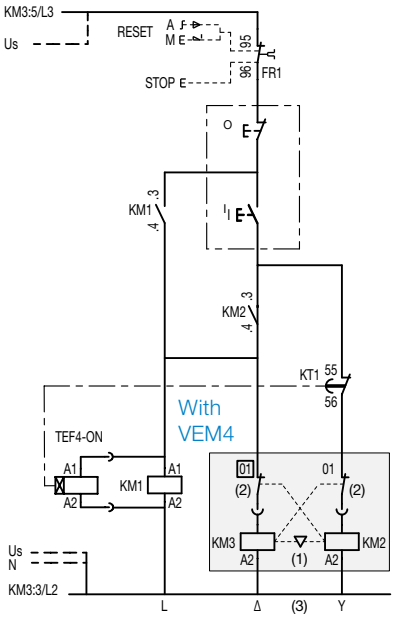


With VM

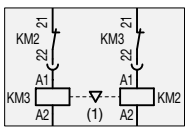


AC or DC remote control with TEF4-ON timer

Uc = 24...240 V 50/60 Hz or DC



With VM

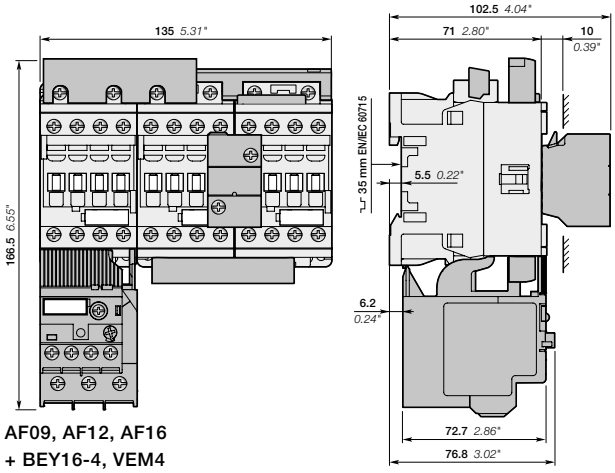


Note: VEM4 = VM4 (1) + VE4 (2) with A2-A2 (3) connection

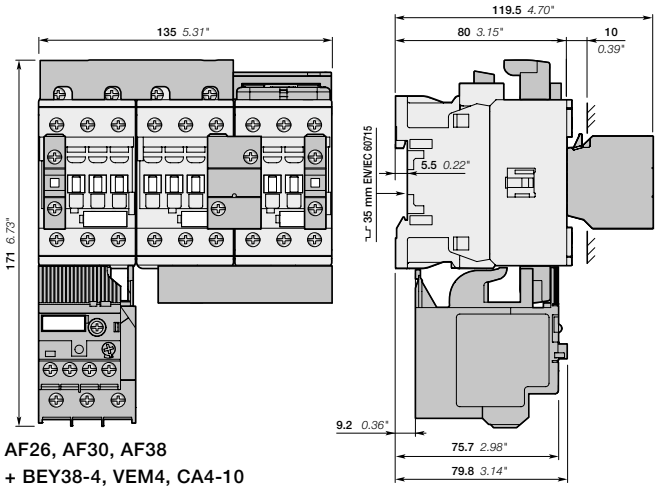
1SBC101962S0201

Star-delta starters protected by thermal overload relays
With AF contactors - Open type version in kit form

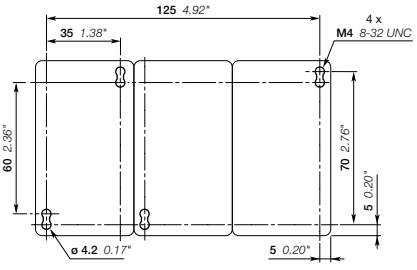
Main dimensions mm, *inches*



AF09, AF12, AF16
+ BEY16-4, VEM4
+ TF42 thermal overload relay



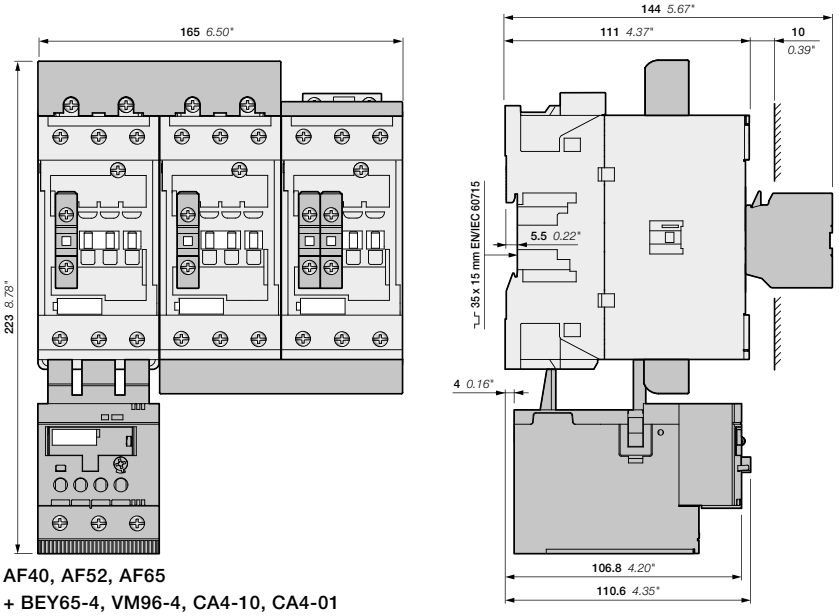
AF26, AF30, AF38
+ BEY38-4, VEM4, CA4-10
+ TF42 thermal overload relay



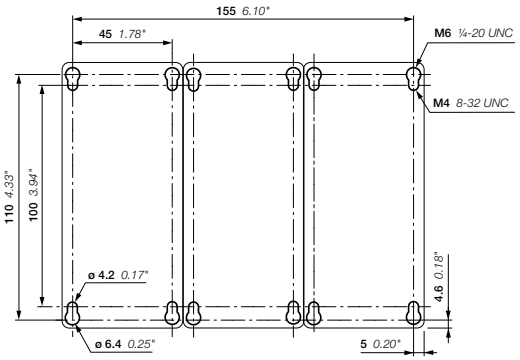
Note: contactor lateral distance to grounded component 2 mm *0.08*" min.

Star-delta starters protected by thermal overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*



AF40, AF52, AF65
+ BEY65-4, VM96-4, CA4-10, CA4-01
+ TF65 thermal overload relay

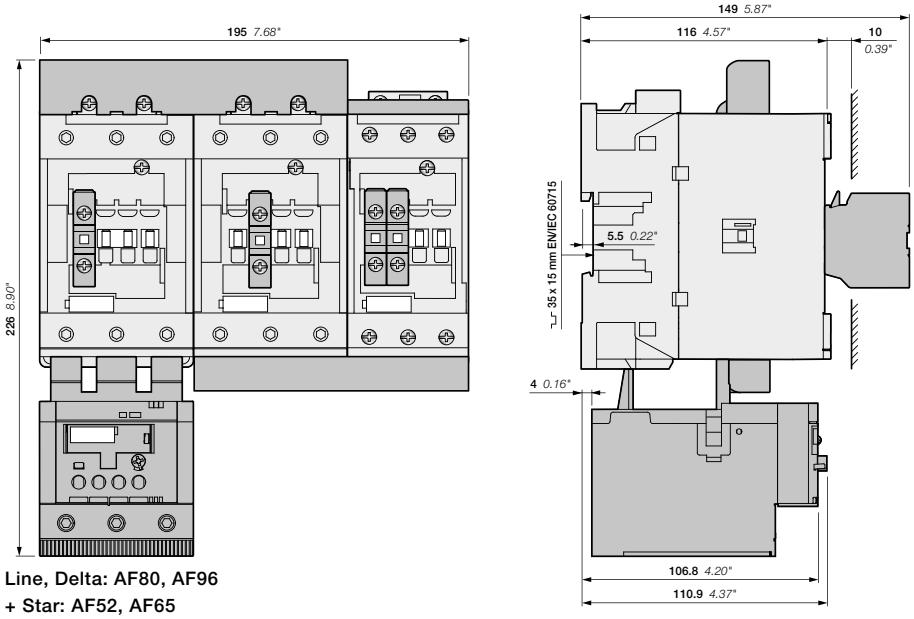


5

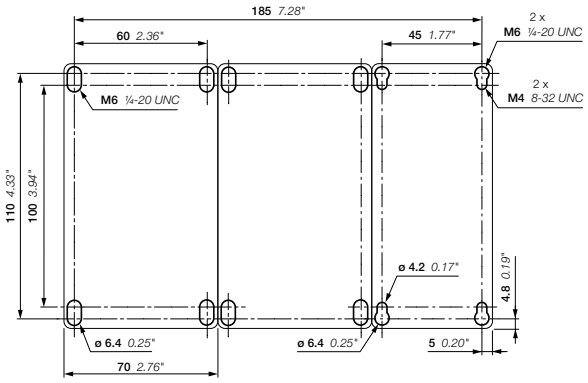
1SBC101964S0201 - Rev. A

Star-delta starters protected by thermal overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*



Line, Delta: AF80, AF96
+ Star: AF52, AF65
+ BEY96-4, VM96-4, CA4-10, CA4-01
+ TF96 thermal overload relay



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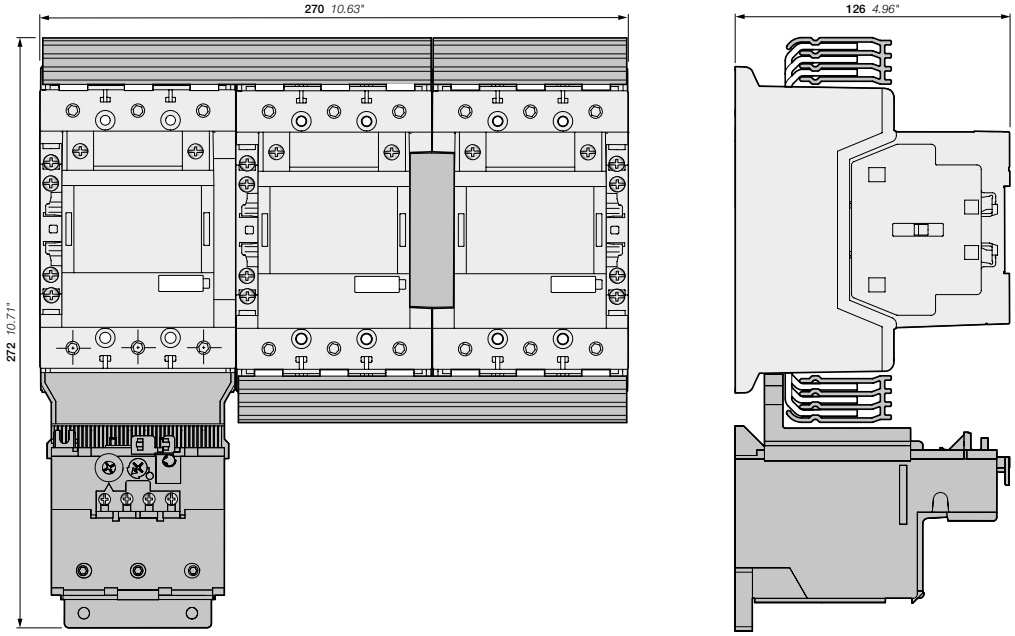
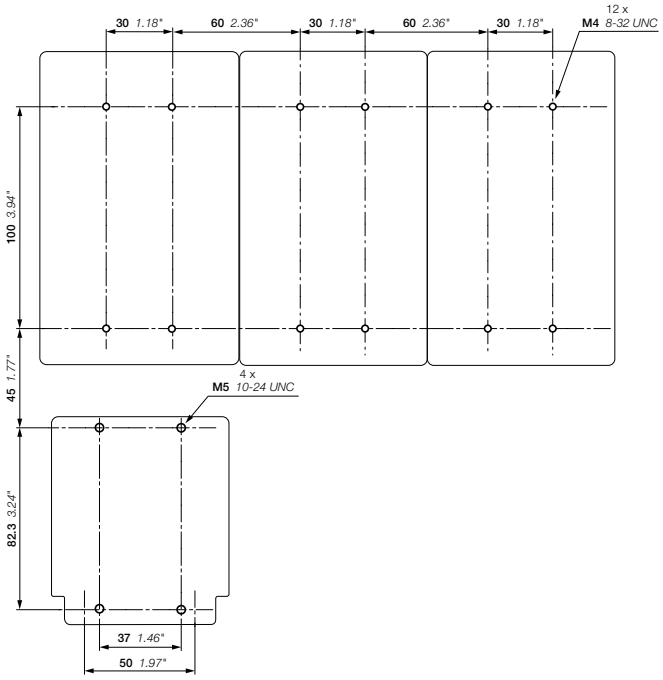
1SBC101965S0201

Star-delta starters protected by thermal overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*



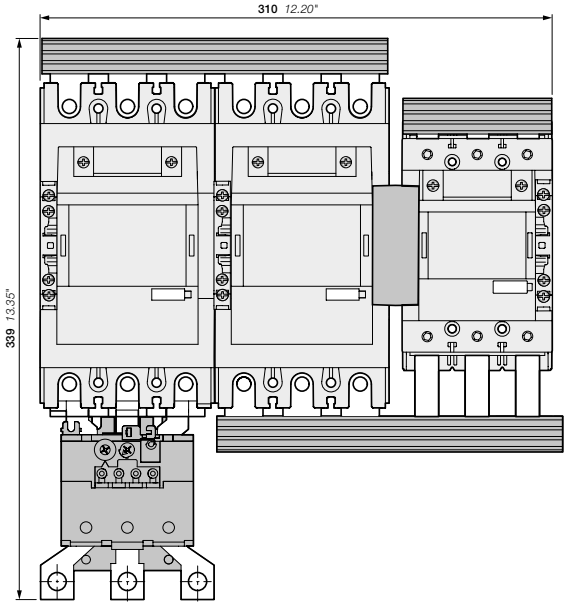
AF116, AF140, AF146
+ BEY140-4, VM19
+ TF140 thermal overload relay

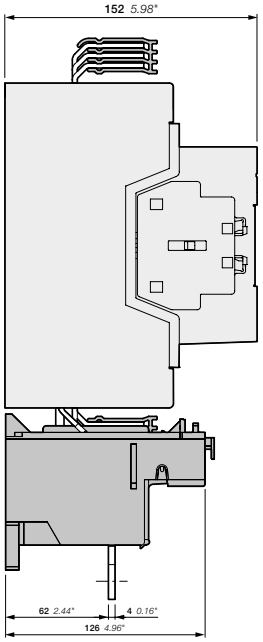


1SFC101170C0201

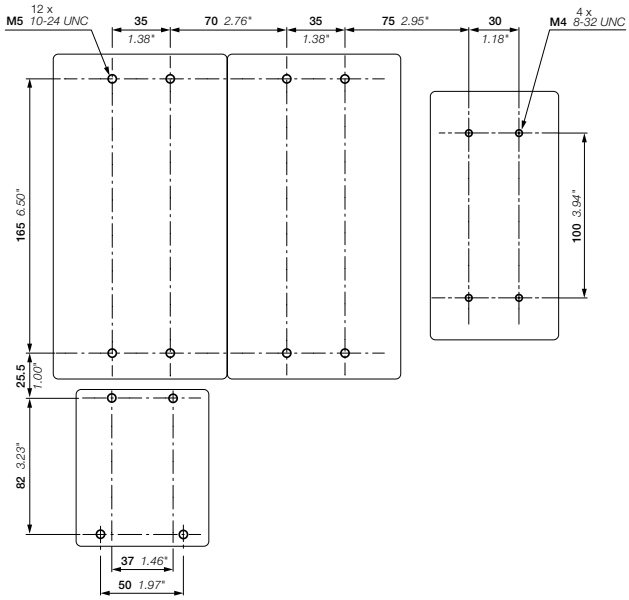
Star-delta starters protected by thermal overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*





Line, Delta: AF190, AF205
+ Star: AF116, AF140, AF146
+ BEY190-4, VM140/190
+ TA200 thermal overload relay

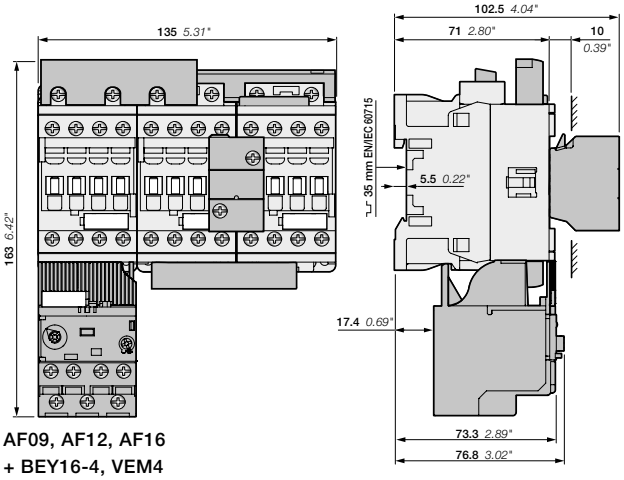


5

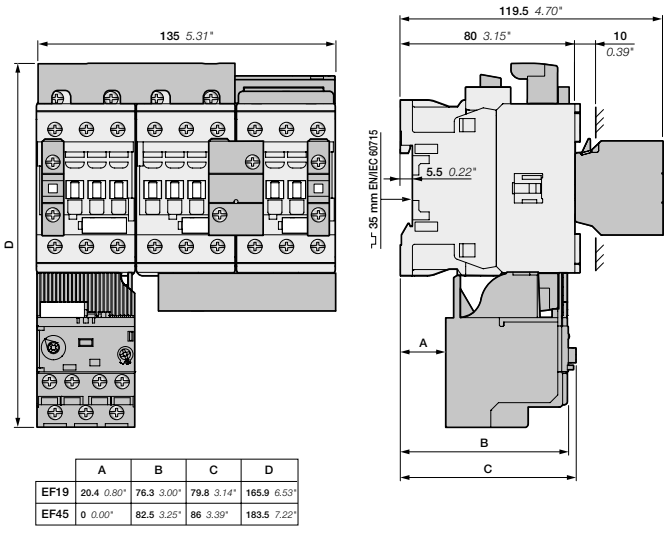
1SFC101171C0201

Star-delta starters protected by electronic overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*

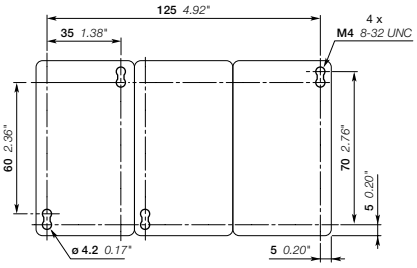


AF09, AF12, AF16
+ BEY16-4, VEM4
+ EF19 electronic overload relay



	A	B	C	D
EF19	20.4 *0.80"*	76.3 *3.00"*	79.8 *3.14"*	165.9 *6.53"*
EF45	0 *0.00"*	82.5 *3.25"*	86 *3.39"*	183.5 *7.22"*

AF26, AF30, AF38
+ BEY38-4, VEM4, CA4-10
+ EF19/EF45 electronic overload relay

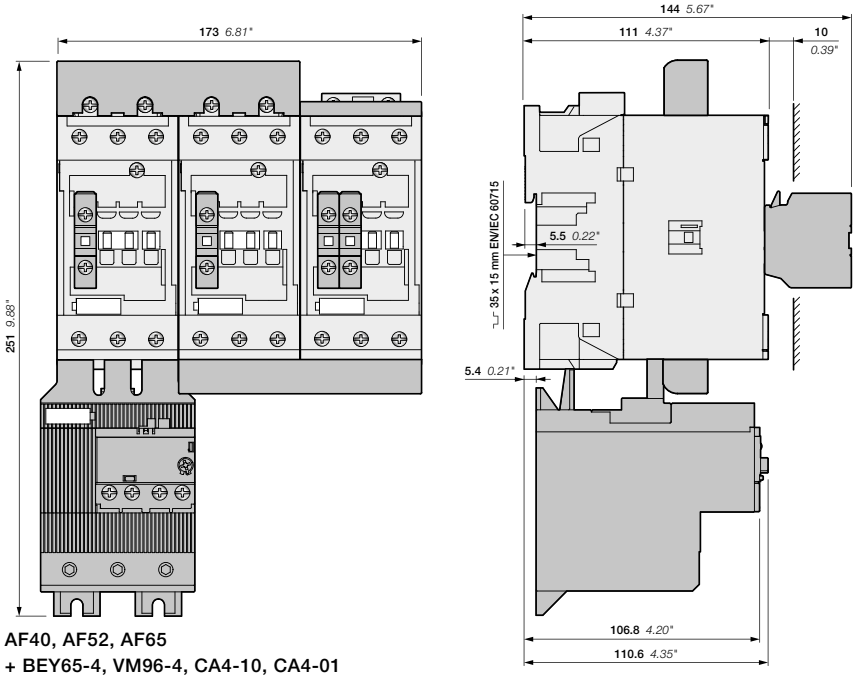


Note: contactor lateral distance to grounded component 2 mm *0.08"* min.

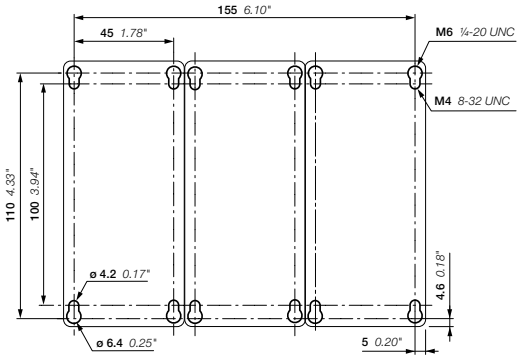
1SBC101966S0201

Star-delta starters protected by electronic overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*



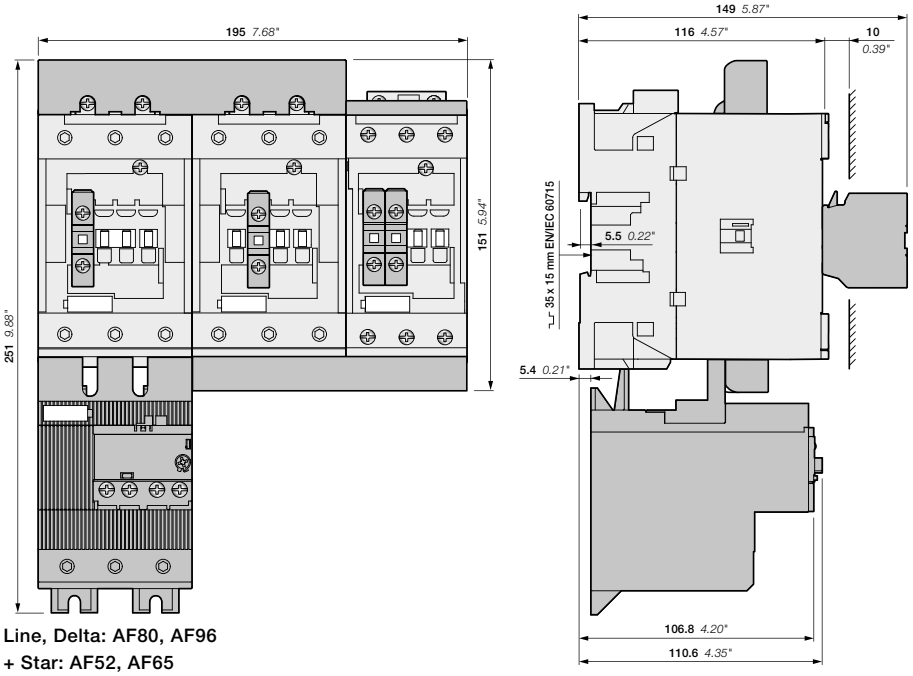
AF40, AF52, AF65
+ BEY65-4, VM96-4, CA4-10, CA4-01
+ EF65 electronic overload relay



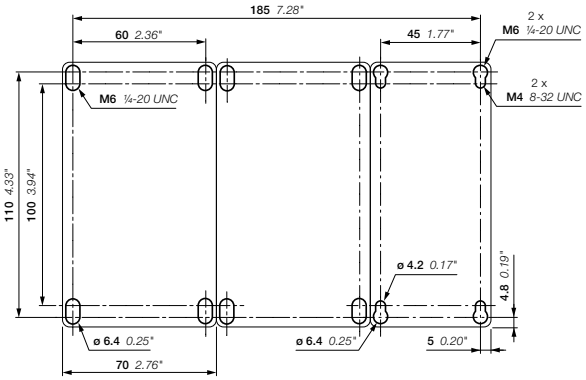
5

Star-delta starters protected by electronic overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*



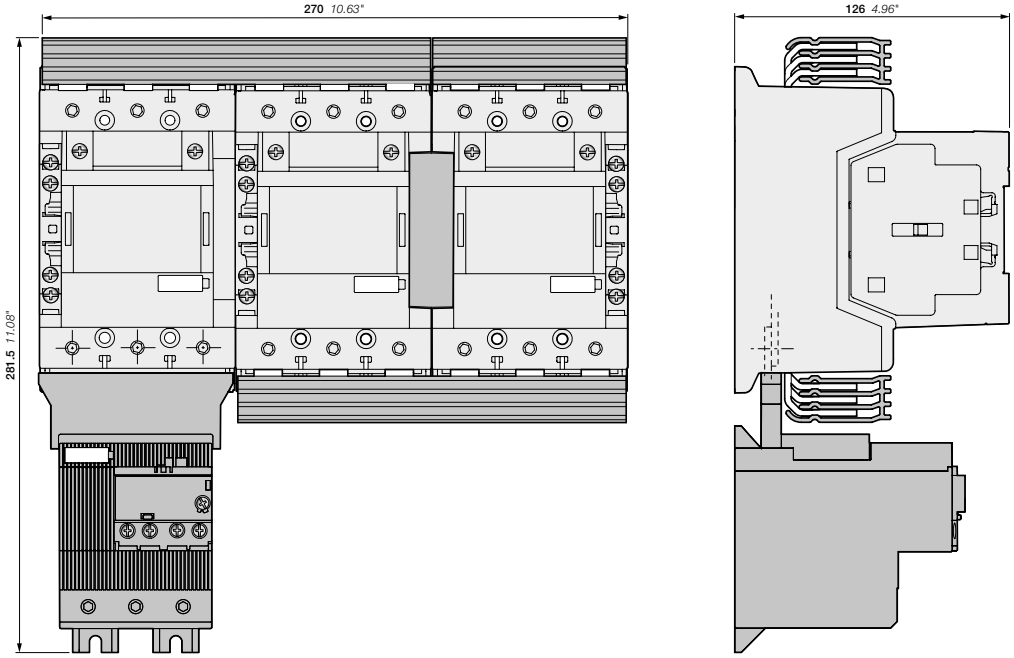
Line, Delta: AF80, AF96
+ Star: AF52, AF65
+ BEY96-4, VM96-4, CA4-10, CA4-01
+ EF96 electronic overload relay



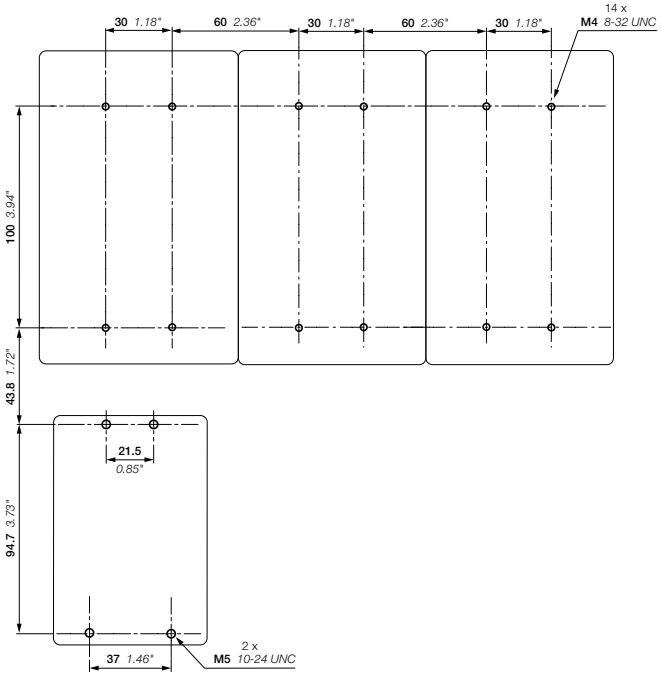
1SBC101968S0201

Star-delta starters protected by electronic overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*



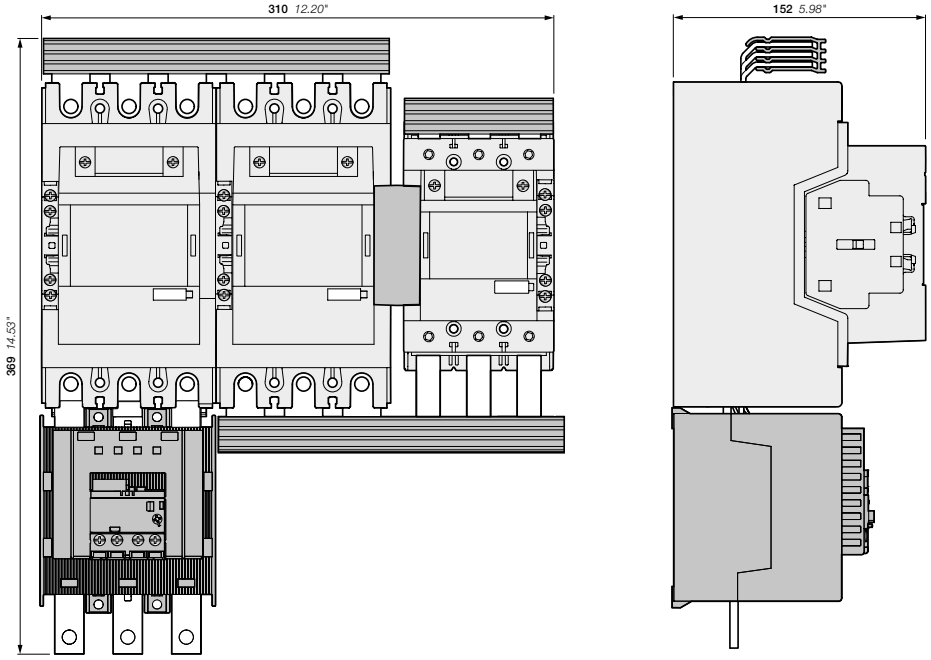
AF116, AF140, AF146
+ BEY140-4, VM19
+ EF146 electronic overload relay



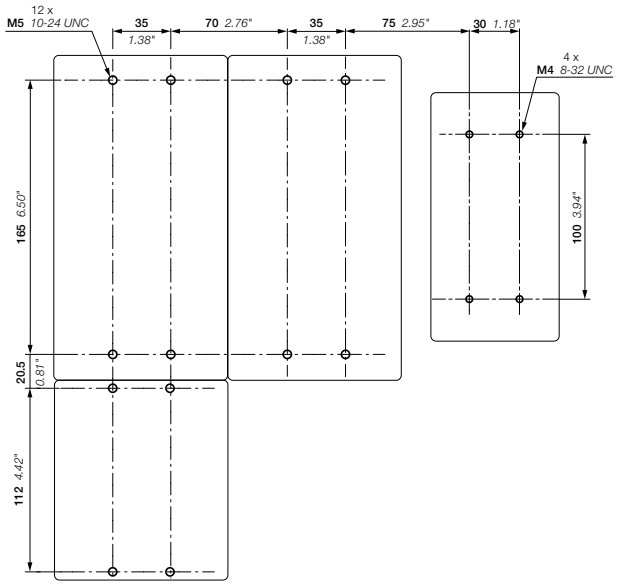
1SFC101172C0201

Star-delta starters protected by electronic overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*



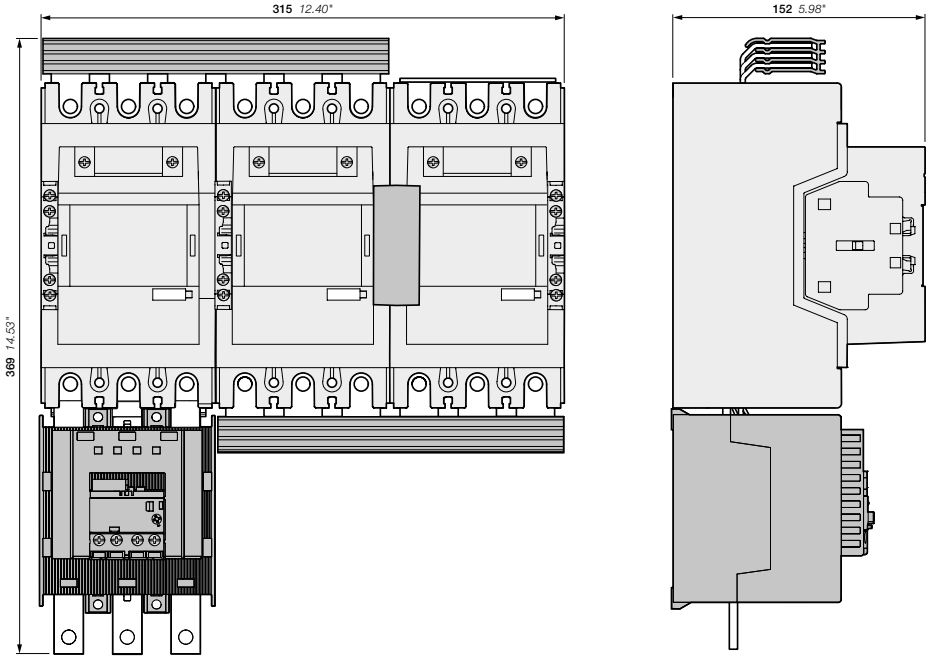
Line, Delta: AF190, AF205
+ Star: AF116, AF140, AF146
+ BEY190-4, VM140/190
+ EF205 electronic overload relay



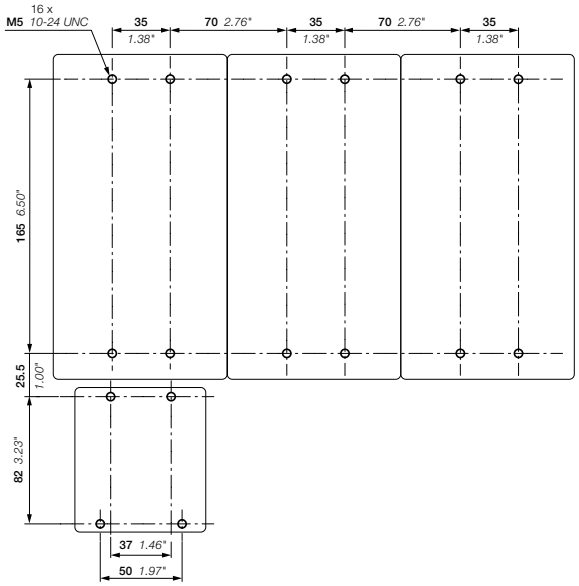
1SFC101173C0201

Star-delta starters protected by electronic overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*



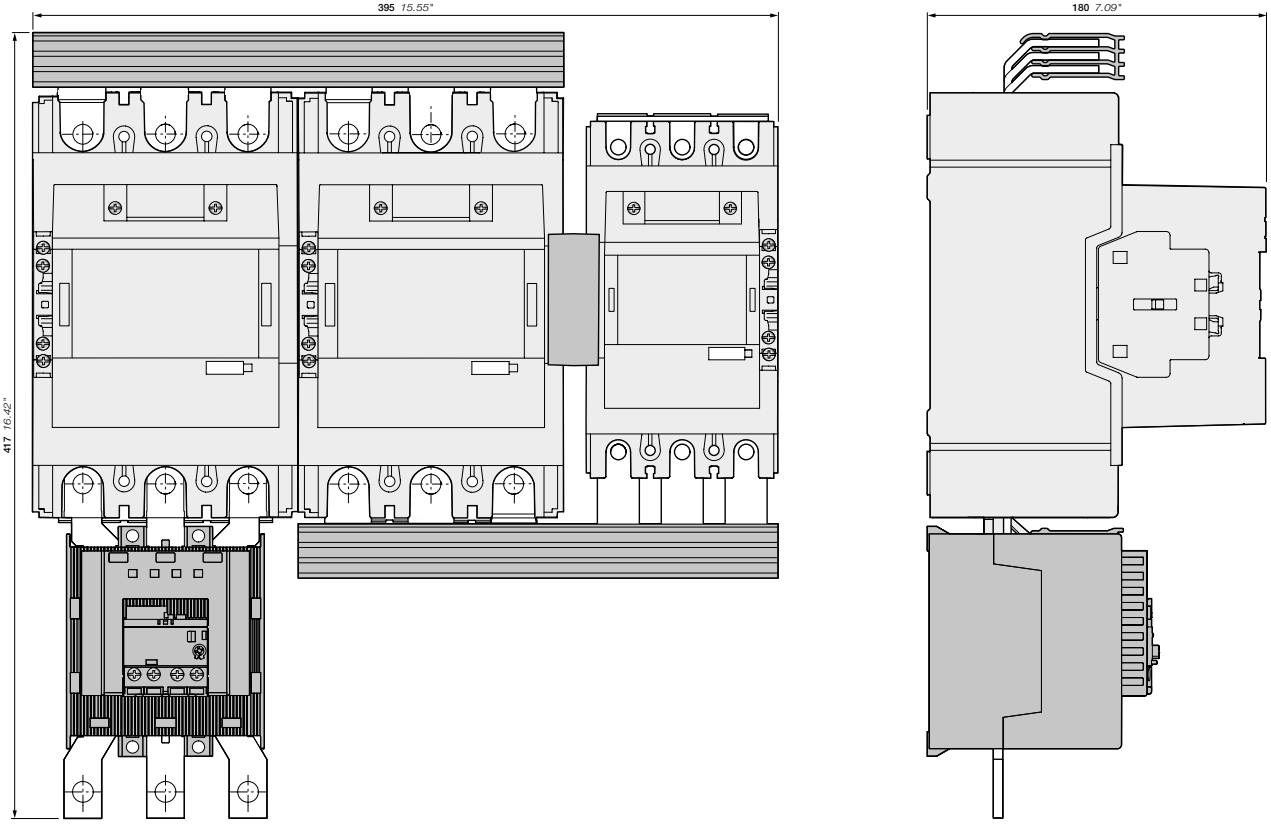
AF190, AF205
+ BEY205-4, VM19
+ EF205 electronic overload relay



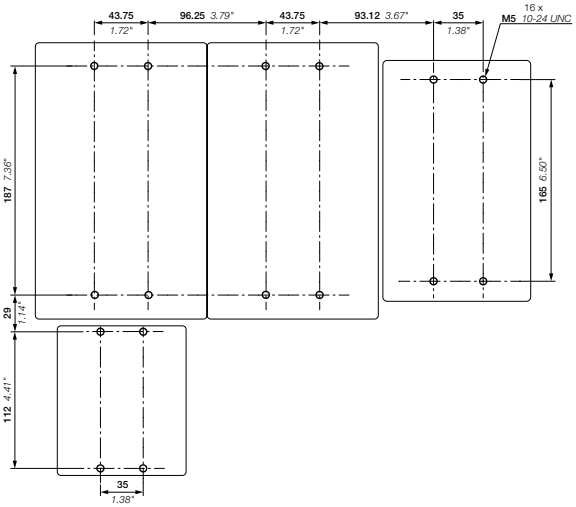
1SFC101174C0201

Star-delta starters protected by electronic overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*



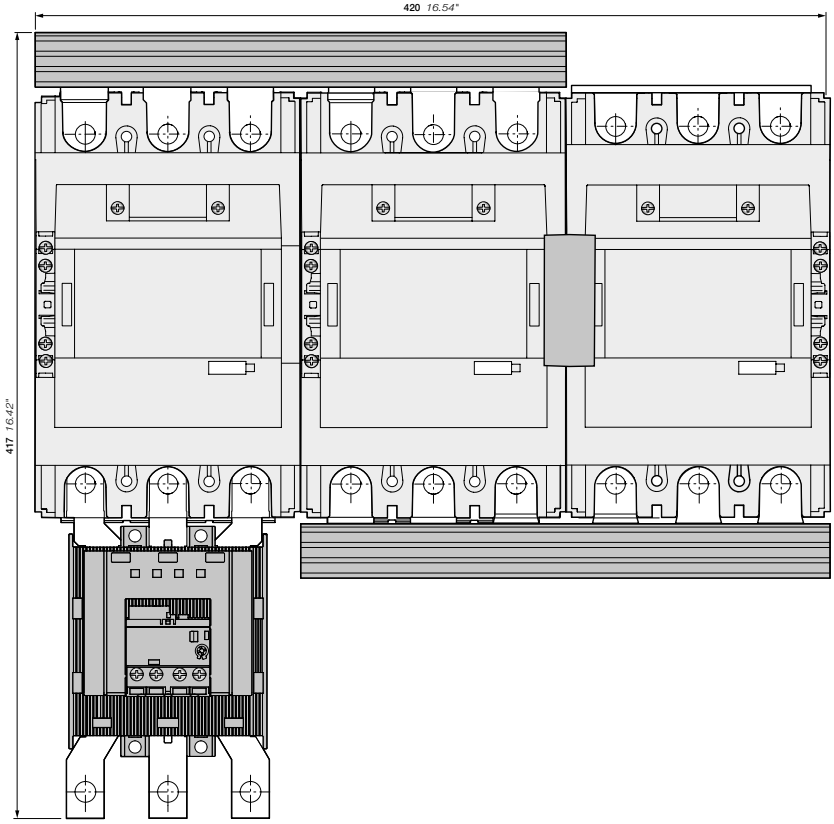
Line, Delta: AF265, AF305, AF370
+ Star: AF190, AF205
+ BEY265-4, VM205/265
+ EF370 electronic overload relay

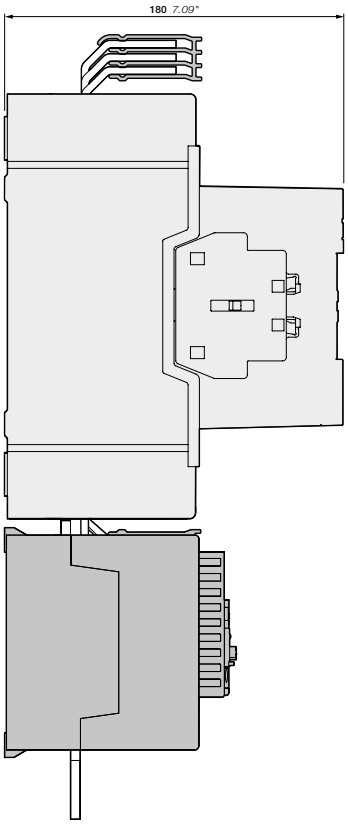


1SFC101175C0201

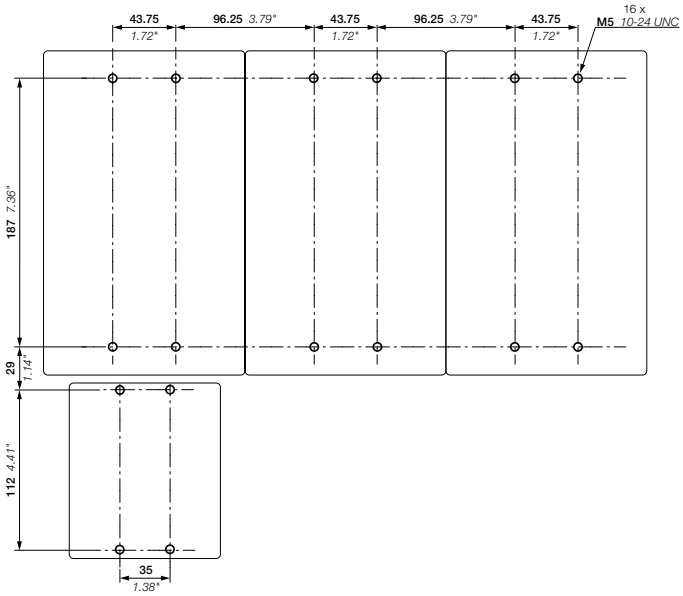
Star-delta starters protected by electronic overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*

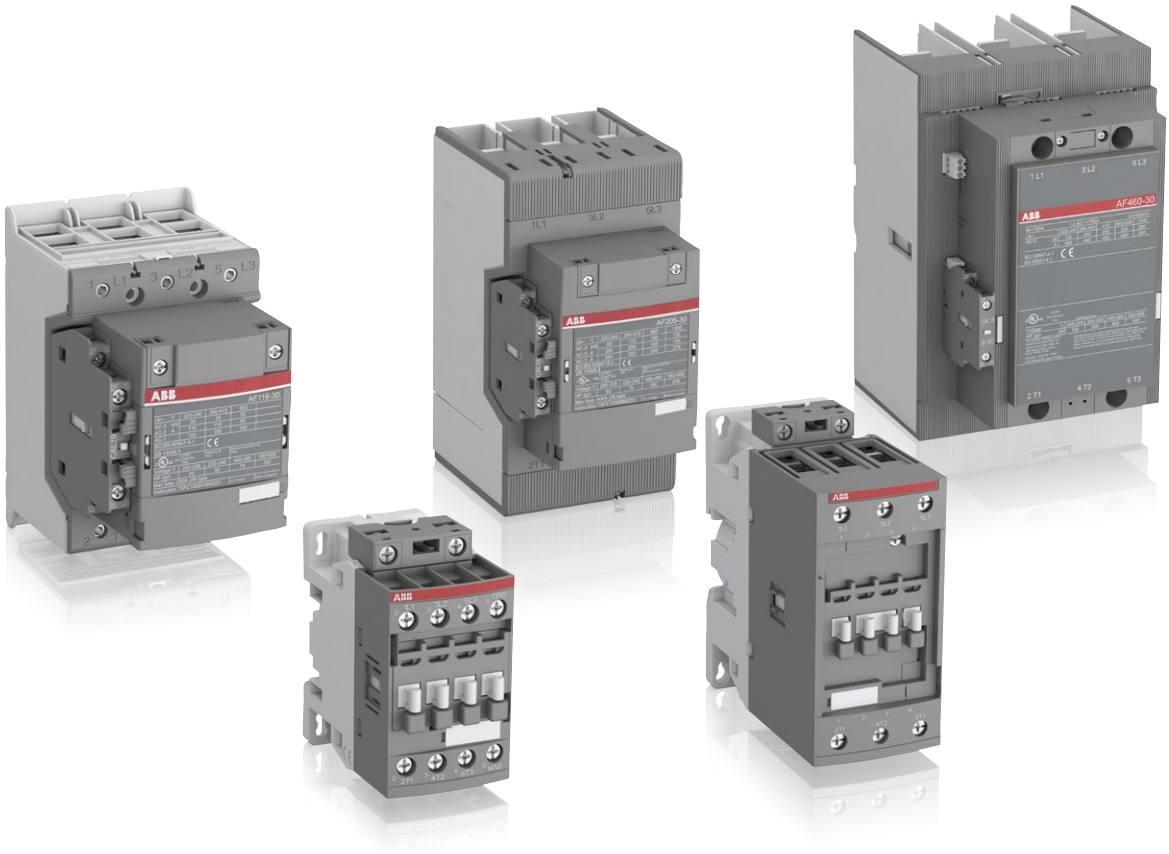




AF265, AF305, AF370
+ BEY370-4, VM19
+ EF370 electronic overload relay



1SFC101176C0201


AF460-30

AF 3-pole contactors

Overview 5/88

Ordering details

4 to 45 kW / 5 to 60 hp

AF09 ... AF38 AC / DC operated **5**/90
AF09Z ... AF38Z AC / DC operated - low consumption **5**/91
AF40 ... AF96 AC / DC operated **5**/92
Main accessories **5**/94

55 to 200 kW / 75 to 300 hp

AF116 ... AF146 AC / DC operated **5**/96
AF190 ... AF370 AC / DC operated **5**/98
Main accessories **5**/100
AF116 ... AF146 AC / DC operated with 1 N.O. + 1 N.C. **5**/102
AF190 ... AF370 AC / DC operated with 1 N.O. + 1 N.C. **5**/104
Main accessories **5**/106

200 to 560 kW / 350 to 900 hp

AF400 ... AF750 AC / DC operated with 1 N.O. + 1 N.C. **5**/108
AF1250 ... AF2650 AC / DC operated with 1 N.O. + 1 N.C. **5**/109
AF1350T ... AF2650T with LVRT AC operated with 1 N.O. + 1 N.C. **5**/111
Main accessories **5**/112

4 to 45 kW / 5 to 60 hp - 2-stack

AF09 ... AF38 AC / DC operated **5**/114
AF09Z ... AF38Z AC / DC operated - low consumption **5**/115
AF40 ... AF65 AC / DC operated **5**/116
AF80 ... AF96 AC / DC operated **5**/117
Main accessories **5**/118

55 to 560 kW / 75 to 900 hp

AF116 ... AF146 AC / DC operated with 2 N.O. + 2 N.C. **5**/120
AF190 ... AF370 AC / DC operated with 2 N.O. + 2 N.C. **5**/122
Main accessories **5**/124
AF400 ... AF750 AC / DC operated with 2 N.O. + 2 N.C. **5**/126
AF1250 ... AF2650 AC / DC operated with 2 N.O. + 2 N.C. **5**/127
Main accessories **5**/128

Technical data 5/130

Electrical durability 5/149

Terminal marking and positioning 5/155

Main dimensions 5/158

Voltage code table 5/417

3-pole contactors, for motor control and power switching

AC / DC Control supply				Type	AF09	AF12	AF16	AF26	AF30	AF38	AF40	AF52	AF65	AF80	AF96
IEC	**AC-3**	Rated operational power θ ≤ 60 °C for AF09 ... AF370 θ ≤ 55 °C for AF400 ... AF2650	220 - 230 - 240 V	kW	2.2	3	4	6.5	9	11	11	15	18.5	22	25
			380 - 400 V	**kW**	**4**	**5.5**	**7.5**	**11**	**15**	**18.5**	**18.5**	**22**	**30**	**37**	**45**
			415 V	kW	4	5.5	9	11	15	18.5	22	30	37	45	55
			440 V	kW	4	5.5	9	15	18.5	22	22	30	37	45	55
			500 V	kW	5.5	7.5	9	15	18.5	22	22	30	37	45	55
			690 V	kW	5.5	7.5	9	15	18.5	22	22	30	37	45	55
			1000 V	kW	—	—	—	—	—	—	—	—	—	35	40
		Rated operational current	**380 - 400 V**	**A**	**9**	**12**	**18**	**26**	**32**	**38**	**40**	**53**	**65**	**80**	**96**
	AC-1	Rated operational current	**θ ≤ 40 °C, 690 V**	**A**	**25**	**28**	**30**	**45**	**50**	**50**	**70**	**100**	**105**	**125**	**130**

UL / CSA	**1-phase motor rating**	120 V	hp	0.75	1	1.5	2	2	2	3	3	5	7.5	7.5
		240 V	hp	1.5	2	3	3	5	5	7.5	10	15	15	20
	3-phase motor rating	200 - 208 V	hp	2	3	5	7.5	10	10	10	15	20	25	30
		220 - 240 V	hp	2	3	5	7.5	10	10	15	20	25	30	30
		440 - 480 V	**hp**	**5**	**7.5**	**10**	**15**	**20**	**25**	**30**	**40**	**50**	**60**	**60**
		550 - 600 V	hp	7.5	10	15	20	25	30	40	50	60	75	75
	General use rating	**600 V**	**A**	**25**	**28**	**30**	**45**	**50**	**50**	**60**	**80**	**90**	**105**	**115**
NEMA	**NEMA Size**			**00**	**0**	—	**1**	—	—	**2**	—	—	**3**	—

Main accessories

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

Overload relays

Thermal relays	Class 10 (Class 10A for TF140, TA200DU)	**TF42** (0.10...38 A)		**TF65** (22...67 A)	**TF96** (40...96 A)
Electronic relays	Class 10E, 20E, 30E	**EF19** (0.10...18.9 A)	**EF19** (0.10...18.9 A) **EF45** (9...45 A)	**EF65** (20...70 A)	**EF96** (36...100 A)

Manual motor starters

	Thermal / magnetic protection Class 10	**MS116** (0.10...32 A) Ics up to 50 kA for class 10 A		**MS165** (10...65 A) Ics up to 100 kA (1)	**MS5100** (40...100 A) Ics up to 50 kA
		MS132 (0.10...32 A) Ics up to 100 kA			**MS495** (45...100 A) Ics up to 50 kA
				MS497 (22...100 A) Ics up to 100 kA	
	Magnetic only types	**MO132** (0.16...32 A) Ics up to 100 kA		**MO165** (16...65 A) Ics up to 100 kA (1)	**MO5100** (70...100 A) Ics up to 36 kA
				MO496 (32...100 A) Ics up to 100 kA	
					MO495 (63...100 A) Ics up to 50 kA
Accessories	For contactor mounting	**BEA16-4**	**BEA38-4**	**BEA65-4** (2)	

(1) MS165/MO165 are suitable for use with AF09 ... AF30 for North american applications.
(2) BEA65-4 suitable for MS165 and MO165 only.

	AF116	AF140	AF146	AF190	AF205	AF265	AF305	AF370	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650
	30	37	45	55	55	75	90	110	110	132	160	220	—	257	315	—	—
	55	**75**	**75**	**90**	**110**	**132**	**160**	**200**	**200**	**250**	**315**	**400**	—	**475**	**560**	—	—
	55	75	75	90	110	132	160	200	220	250	355	425	—	500	630	—	—
	75	90	90	110	132	160	160	200	220	250	355	450	—	560	710	—	—
	75	90	90	110	132	160	200	250	250	315	400	520	—	560	710	—	—
	55	75	90	132	160	200	250	315	315	355	500	600	—	800	1000	—	—
	—	—	75	110	132	132	132	132	220	280	355	400	—	—	—	—	—
	116	**140**	**146**	**190**	**205**	**265**	**305**	**370**	**400**	**460**	**580**	**750**	—	**860**	**1060**	—	—
	160	**200**	**225**	**275**	**350**	**400**	**500**	**600**	**600**	**700**	**800**	**1050**	**1260**	**1350**	**1650**	**2050**	**2650**
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	30	40	40	50	60	75	100	125	125	150	200	250	—	—	—	—	—
	40	50	50	60	75	100	125	150	150	200	250	300	—	400	450	—	—
	75	**100**	**100**	**125**	**150**	**200**	**250**	**300**	**350**	**400**	**500**	**600**	—	**800**	**900**	—	—
	100	125	125	150	200	250	300	350	400	500	600	700	—	1000	1150	—	—
	160	**200**	**200**	**250**	**300**	**350**	**400**	**520**	**550**	**650**	**750**	**900**	**1210**	**1350**	**1650**	**2100**	**2700**
	—	**4**	—	—	—	**5**	—	—	—	**6**	—	**7**	—	—	**8**	—	—

	CAL19-11 (1 x N.O. + 1 x N.C.)			**CAL18-11** (1 x N.O. + 1 x N.C.)		
	VM19 (for same size contactors)			**VM750H** **VM750V**		**VM1650H**
	BER140-4	**BER205-4**	**BER370-4**	**BEM460-30**	**BEM750-30**	

	TF140DU (66...142 A) $\theta \leq 55$ °C		**TA200DU** (66...200 A) $\theta \leq 55$ °C			
	EF146 (54...150 A)		**EF205** (63...210 A)	**EF370** (115...380 A)	**EF460** (150...500 A)	**EF750** (250...800 A)

Short-circuit protection devices

MCCB and switch-fuses

1SBC101908S0201 - Rev. C

AF09 ... AF38 3-pole contactors
4 to 18.5 kW
AC / DC operated

AF09-30-10

AF26-30-00

5

Description

AF09 ... AF38 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles.

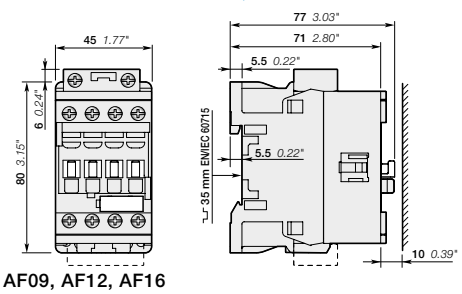
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  -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

Ordering details

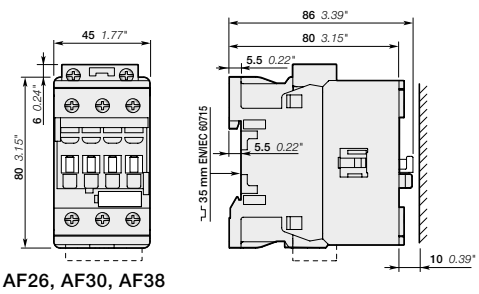
IEC		UL/CSA		Rated control circuit voltage Uc min. ... Uc max.			Auxiliary contacts fitted		Type (1)	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC									Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC							kg
4	25	5	25	24...60	-	(2)	1	0	AF09-30-10-41	1SBL137001R4110		0.270
							0	1	AF09-30-01-41	1SBL137001R4101		0.270
				48...130	48...130		1	0	AF09-30-10-12	1SBL137001R1210		0.270
							0	1	AF09-30-01-12	1SBL137001R1201		0.270
				100...250	100...250		1	0	AF09-30-10-13	1SBL137001R1310		0.270
							0	1	AF09-30-01-13	1SBL137001R1301		0.270
				250...500	250...500		1	0	AF09-30-10-14	1SBL137001R1410		0.310
							0	1	AF09-30-01-14	1SBL137001R1401		0.310
5.5	28	7.5	28	24...60	-	(2)	1	0	AF12-30-10-41	1SBL157001R4110		0.270
							0	1	AF12-30-01-41	1SBL157001R4101		0.270
				48...130	48...130		1	0	AF12-30-10-12	1SBL157001R1210		0.270
							0	1	AF12-30-01-12	1SBL157001R1201		0.270
				100...250	100...250		1	0	AF12-30-10-13	1SBL157001R1310		0.270
							0	1	AF12-30-01-13	1SBL157001R1301		0.270
				250...500	250...500		1	0	AF12-30-10-14	1SBL157001R1410		0.310
							0	1	AF12-30-01-14	1SBL157001R1401		0.310
7.5	30	10	30	24...60	-	(2)	1	0	AF16-30-10-41	1SBL177001R4110		0.270
							0	1	AF16-30-01-41	1SBL177001R4101		0.270
				48...130	48...130		1	0	AF16-30-10-12	1SBL177001R1210		0.270
							0	1	AF16-30-01-12	1SBL177001R1201		0.270
				100...250	100...250		1	0	AF16-30-10-13	1SBL177001R1310		0.270
							0	1	AF16-30-01-13	1SBL177001R1301		0.270
				250...500	250...500		1	0	AF16-30-10-14	1SBL177001R1410		0.310
							0	1	AF16-30-01-14	1SBL177001R1401		0.310
11	45	15	45	24...60	-	(2)	0	0	AF26-30-00-41	1SBL237001R4100		0.310
				48...130	48...130		0	0	AF26-30-00-12	1SBL237001R1200		0.310
				100...250	100...250		0	0	AF26-30-00-13	1SBL237001R1300		0.310
				250...500	250...500		0	0	AF26-30-00-14	1SBL237001R1400		0.350
15	50	20	50	24...60	-	(2)	0	0	AF30-30-00-41	1SBL277001R4100		0.310
				48...130	48...130		0	0	AF30-30-00-12	1SBL277001R1200		0.310
				100...250	100...250		0	0	AF30-30-00-13	1SBL277001R1300		0.310
				250...500	250...500		0	0	AF30-30-00-14	1SBL277001R1400		0.350
18.5	50	25	50	24...60	-	(2)	0	0	AF38-30-00-41	1SBL297001R4100		0.310
				48...130	48...130		0	0	AF38-30-00-12	1SBL297001R1200		0.310
				100...250	100...250		0	0	AF38-30-00-13	1SBL297001R1300		0.310
				250...500	250...500		0	0	AF38-30-00-14	1SBL297001R1400		0.350

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.
(2) For 24...60 V 50/60 Hz - 20...60 V DC, use AF..Z-30-..-21.

Main dimensions mm, *inches*



AF09, AF12, AF16



AF26, AF30, AF38

1SBC101371S0201 - Rev. C

AF09Z ... AF38Z 3-pole contactors
4 to 18.5 kW
AC / DC operated - low consumption

AF09Z-30-10

AF26Z-30-00

Description

AF09Z ... AF38Z contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles.

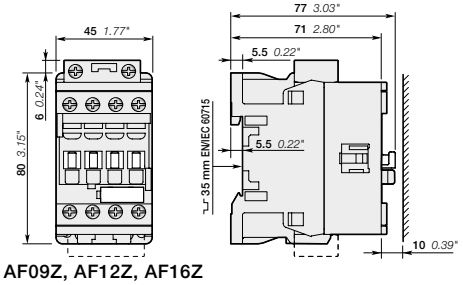
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
  - can manage large control voltage variations
  - allow direct control by PLC-output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

Ordering details

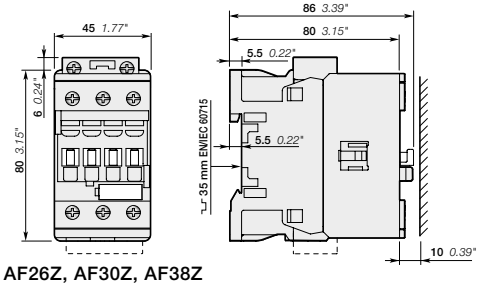
IEC		UL/CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Type (1)	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC						kg
4	25	5	25	-	12...20	1	0	AF09Z-30-10-20	1SBL136001R2010		0.310
						0	1	AF09Z-30-01-20	1SBL136001R2001		0.310
				24...60	20...60	1	0	AF09Z-30-10-21	1SBL136001R2110		0.310
						0	1	AF09Z-30-01-21	1SBL136001R2101		0.310
				48...130	48...130	1	0	AF09Z-30-10-22	1SBL136001R2210		0.310
						0	1	AF09Z-30-01-22	1SBL136001R2201		0.310
				100...250	100...250	1	0	AF09Z-30-10-23	1SBL136001R2310		0.310
						0	1	AF09Z-30-01-23	1SBL136001R2301		0.310
5.5	28	7.5	28	-	12...20	1	0	AF12Z-30-10-20	1SBL156001R2010		0.310
						0	1	AF12Z-30-01-20	1SBL156001R2001		0.310
				24...60	20...60	1	0	AF12Z-30-10-21	1SBL156001R2110		0.310
						0	1	AF12Z-30-01-21	1SBL156001R2101		0.310
				48...130	48...130	1	0	AF12Z-30-10-22	1SBL156001R2210		0.310
						0	1	AF12Z-30-01-22	1SBL156001R2201		0.310
				100...250	100...250	1	0	AF12Z-30-10-23	1SBL156001R2310		0.310
						0	1	AF12Z-30-01-23	1SBL156001R2301		0.310
7.5	30	10	30	-	12...20	1	0	AF16Z-30-10-20	1SBL176001R2010		0.310
						0	1	AF16Z-30-01-20	1SBL176001R2001		0.310
				24...60	20...60	1	0	AF16Z-30-10-21	1SBL176001R2110		0.310
						0	1	AF16Z-30-01-21	1SBL176001R2101		0.310
				48...130	48...130	1	0	AF16Z-30-10-22	1SBL176001R2210		0.310
						0	1	AF16Z-30-01-22	1SBL176001R2201		0.310
				100...250	100...250	1	0	AF16Z-30-10-23	1SBL176001R2310		0.310
						0	1	AF16Z-30-01-23	1SBL176001R2301		0.310
11	45	15	45	-	12...20	0	0	AF26Z-30-00-20	1SBL236001R2000		0.350
				24...60	20...60	0	0	AF26Z-30-00-21	1SBL236001R2100		0.350
				48...130	48...130	0	0	AF26Z-30-00-22	1SBL236001R2200		0.350
				100...250	100...250	0	0	AF26Z-30-00-23	1SBL236001R2300		0.350
15	50	20	50	-	12...20	0	0	AF30Z-30-00-20	1SBL276001R2000		0.350
				24...60	20...60	0	0	AF30Z-30-00-21	1SBL276001R2100		0.350
				48...130	48...130	0	0	AF30Z-30-00-22	1SBL276001R2200		0.350
				100...250	100...250	0	0	AF30Z-30-00-23	1SBL276001R2300		0.350
18.5	50	25	50	-	12...20	0	0	AF38Z-30-00-20	1SBL296001R2000		0.350
				24...60	20...60	0	0	AF38Z-30-00-21	1SBL296001R2100		0.350
				48...130	48...130	0	0	AF38Z-30-00-22	1SBL296001R2200		0.350
				100...250	100...250	0	0	AF38Z-30-00-23	1SBL296001R2300		0.350

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.
Note: Only AF..Z contactors with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.

Main dimensions mm, *inches*



AF09Z, AF12Z, AF16Z



AF26Z, AF30Z, AF38Z

1SBC101372S0201 - Rev. B

AF40 ... AF96 3-pole contactors
18.5 to 45 kW
AC / DC operated

AF40-30-00

AF80-30-00

5

Description

AF40 ... AF96 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles.

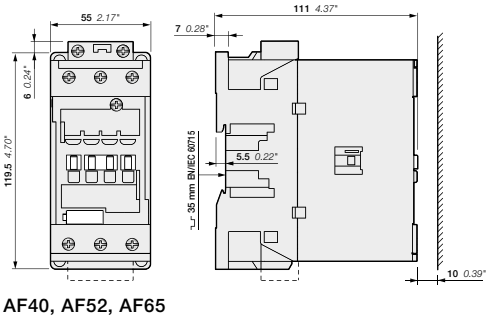
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
 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

Ordering details

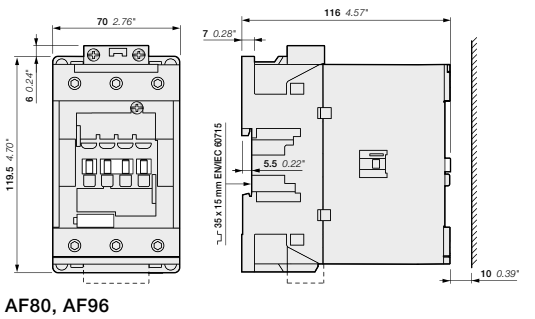
IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC					kg
18.5	70	30	60	24...60	-	0 0	AF40-30-00-41	1SBL347001R4100		0.970
				24...60	20...60 (2)	0 0	AF40-30-00-11	1SBL347001R1100		0.970
				48...130	48...130	0 0	AF40-30-00-12	1SBL347001R1200		0.970
				100...250	100...250	0 0	AF40-30-00-13	1SBL347001R1300		0.950
				250...500	250...500	0 0	AF40-30-00-14	1SBL347001R1400		0.950
22	100	40	80	24...60	-	0 0	AF52-30-00-41	1SBL367001R4100		0.970
				24...60	20...60 (2)	0 0	AF52-30-00-11	1SBL367001R1100		0.970
				48...130	48...130	0 0	AF52-30-00-12	1SBL367001R1200		0.970
				100...250	100...250	0 0	AF52-30-00-13	1SBL367001R1300		0.950
				250...500	250...500	0 0	AF52-30-00-14	1SBL367001R1400		0.950
30	105	50	90	24...60	-	0 0	AF65-30-00-41	1SBL387001R4100		0.970
				24...60	20...60 (2)	0 0	AF65-30-00-11	1SBL387001R1100		0.970
				48...130	48...130	0 0	AF65-30-00-12	1SBL387001R1200		0.970
				100...250	100...250	0 0	AF65-30-00-13	1SBL387001R1300		0.950
				250...500	250...500	0 0	AF65-30-00-14	1SBL387001R1400		0.950
37	125	60	105	24...60	-	0 0	AF80-30-00-41	1SBL397001R4100		1.220
				24...60	20...60 (2)	0 0	AF80-30-00-11	1SBL397001R1100		1.220
				48...130	48...130	0 0	AF80-30-00-12	1SBL397001R1200		1.220
				100...250	100...250	0 0	AF80-30-00-13	1SBL397001R1300		1.170
				250...500	250...500	0 0	AF80-30-00-14	1SBL397001R1400		1.170
45	130	60	115	24...60	-	0 0	AF96-30-00-41	1SBL407001R4100		1.220
				24...60	20...60 (2)	0 0	AF96-30-00-11	1SBL407001R1100		1.220
				48...130	48...130	0 0	AF96-30-00-12	1SBL407001R1200		1.220
				100...250	100...250	0 0	AF96-30-00-13	1SBL407001R1300		1.170
				250...500	250...500	0 0	AF96-30-00-14	1SBL407001R1400		1.170

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.
(2) AF..-30-..-11 not suitable for direct control by PLC-output.

Main dimensions mm, *inches*



AF40, AF52, AF65



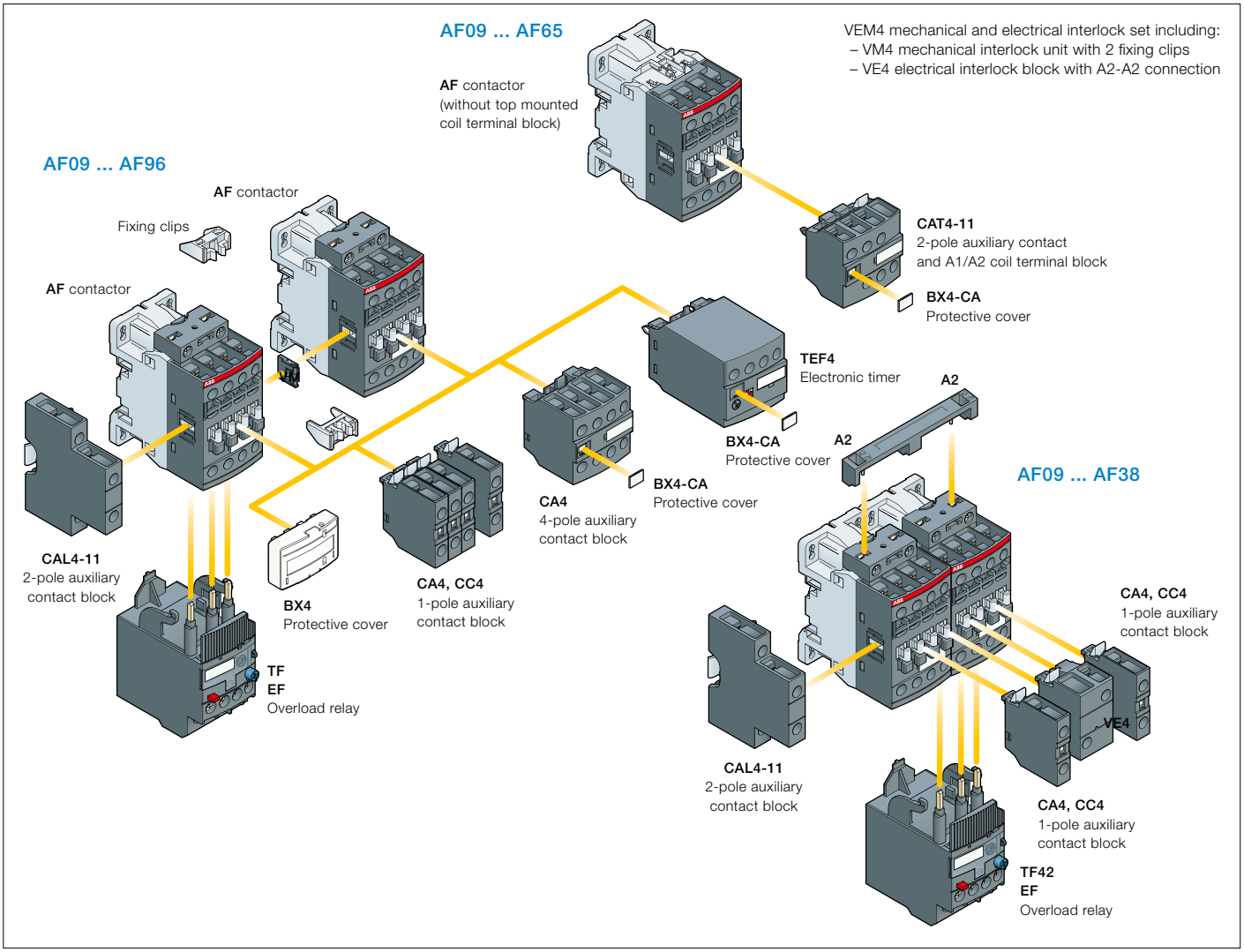
AF80, AF96

1SBC101740S0201 - Rev. A

Notes

AF09 ... AF96 3-pole contactors
Main accessories

Contactor and main accessories (other accessories available)



Main accessory fitting details

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

Contactor types	Main poles		Built-in auxiliary contacts		Front-mounted accessories: Auxiliary contact blocks 1-pole CA4 / 1-pole CC4		2-pole CAT4-11		4-pole CA4		Electronic timer TEF4		Electrical and mechanical interlock set (between 2 contactors) VEM4		Side-mounted accessories: Auxiliary contact blocks Left side / 2-pole CAL4-11		Right side
					Max. N.C. built-in and add-on N.C. auxiliary contacts: 4 N.C. max. on positions 1, 2, 3, 4 and 3 N.C. max. on positions 1 ±30°, 5												
AF09 ... AF16	3	0	0	1	4 max.	or	1	or	1	or	1		–	+	1		–
AF09 ... AF16	3	0	1	0	2 max.	or	1		–	or	1		–	+	1	+	1
AF26 ... AF38	3	0	0	0	3 max.		–		–		–	+	1	+	1	or	1
					Max. add-on N.C. auxiliary contacts: 6 N.C. max. on positions 1, 1 ±30°, 2, 3, 4, 5												
AF40 ... AF65	3	0	0	0	4 max.	or	1	or	1	or	1		–	+	1	+	1
AF80, AF96	3	0	0	0	4 max.		–	or	1	or	1		–	+	1	+	1

Overload relays fitting details (1)

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

The addition of an overload relay on the contactor does not prevent fitting of many other accessories as shown above.
(1) Direct mounting - No kit required.

1SBC101748S0201 - Rev. A

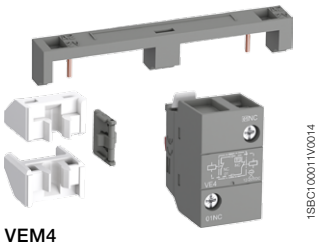
AF09 ... AF96 3-pole contactors
Main accessories

CA4-10

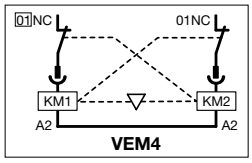
CAL4-11

CA4-22E

CAT4-11E

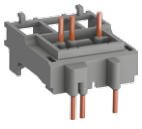


VEM4

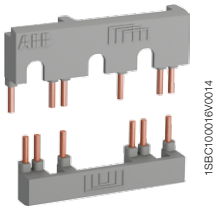


VEM4

TEF4-ON



BEA16-4



BER16-4

Ordering details (1)

For contactors	Auxiliary contacts				Type	Order code		Pkg qty	Weight (1 pce) kg
Front-mounted instantaneous auxiliary contact blocks									
AF09 ... AF96	1	0	–	–	CA4-10	1SBN010110R1010		1	0.014
	1	0	–	–	CA4-10-T	1SBN010110T1010		10	0.014
	0	1	–	–	CA4-01	1SBN010110R1001		1	0.014
	0	1	–	–	CA4-01-T	1SBN010110T1001		10	0.014
AF09 ... AF16..-30-10	2	2	–	–	CA4-22M	1SBN010140R1122		1	0.055
AF26 ... AF96..-30-00	2	2	–	–	CA4-22E	1SBN010140R1022		1	0.055
AF09 ... AF16..-30-01	2	2	–	–	CA4-22U	1SBN010140R1322		1	0.055
Front-mounted auxiliary contact blocks with N.O. leading contact and N.C. lagging contact									
AF09 ... AF96	–	–	1	0	CC4-10	1SBN010111R1010		1	0.014
	–	–	0	1	CC4-01	1SBN010111R1001		1	0.014
Side-mounted instantaneous auxiliary contact blocks									
AF09 ... AF96	1	1	–	–	CAL4-11	1SBN010120R1011		1	0.040
	1	1	–	–	CAL4-11-T	1SBN010120T1011		10	0.040
Front-mounted instantaneous auxiliary contact and A1/A2 coil terminal blocks									
AF09 ... AF16..-30-10	1	1	–	–	CAT4-11M	1SBN010151R1111		1	0.040
AF26 ... AF65..-30-00	1	1	–	–	CAT4-11E	1SBN010151R1011		1	0.040
AF09 ... AF16..-30-01	1	1	–	–	CAT4-11U	1SBN010151R1311		1	0.040

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

Mechanical interlock unit									
AF09 ... AF38					VM4	1SBN030105T1000		10	0.005
AF40 ... AF96					VM96-4	1SBN033405T1000		10	0.006

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

Mechanical and electrical interlock set									
AF09 ... AF16 AF26 ... AF38	0	2	–	–	VEM4	1SBN030111R1000		1	0.035

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

For contactors	Time delay range selected by switch	Delay type	Auxiliary contacts	Type	Order code		Pkg qty	Weight (1 pce) kg
Electronic timers								
AF09 ... AF96	0.1...1 s 1...10 s 10...100 s	ON-delay	1 1	TEF4-ON	1SBN020112R1000		1	0.065
		OFF-delay	1 1	TEF4-OFF	1SBN020114R1000		1	0.065

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

Connecting links with manual motor starters							
AF09 ... AF16	with	MS116-0.16 ... MS116-25, MS132-0.16 ... MS132-25	BEA16-4	1SBN081306T1000		10	0.025
AF26 ... AF38	with	MS116-0.16 ... MS116-16, MS132-0.16 ... MS132-10	BEA26-4	1SBN082306T1000		10	0.025
	with	MS116-20 ... MS116-32, MS132-12 ... MS132-32	BEA38-4	1SBN082306T2000		10	0.030
AF40 ... AF65	with	MS165-16 ... MS165-65	BEA65-4	1SBN083406R1000		1	0.090
Connection sets for reversing contactors							
AF09 ... AF16			BER16-4	1SBN081311R1000		1	0.045
AF26 ... AF38			BER38-4	1SBN082311R1000		1	0.100
AF40 ... AF65			BER65-4	1SBN083411R1000		1	0.175
AF80 ... AF96			BER96-4	1SBN083911R1000		1	0.250
Connection sets for star-delta starting							
AF09 ... AF16	With or without VM4		BEY16-4	1SBN081313R2000		1	0.050
AF26 ... AF38	With or without VM4		BEY38-4	1SBN082713R2000		1	0.110
AF40 ... AF65	With or without VM96-4		BEY65-4	1SBN083413R2000		1	0.200
AF80 ... AF96	With or without VM96-4		BEY96-4	1SBN083913R2000		1	0.250

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

1SBC101749S0201 - Rev. A

AF116 ... AF146 3-pole contactors
55 to 75 kW
AC / DC operated

AF146-30-00

AF146-30-00B

Description

AF116 ... AF140 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC and AF116 ... AF146 up to 260 V DC. These contactors are of the block type design with 3 main poles.

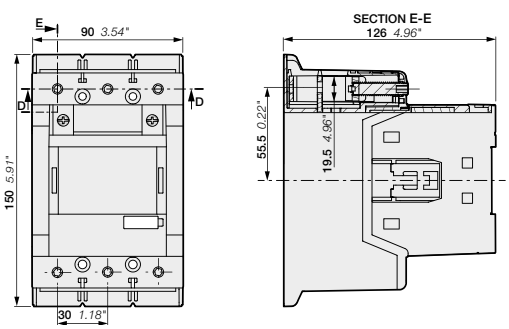
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption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

Ordering details

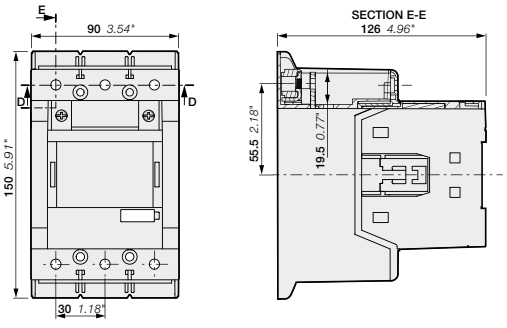
IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Type (1)	Order code		Weight Pkg (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC								
kW	A	hp	A	V 50/60 Hz	V DC						kg
For connection with built-in cable clamps											
55	160	75	160	24...60	20...60	0	0	AF116-30-00-11	1SFL427001R1100		1.750
				48...130	48...130	0	0	AF116-30-00-12	1SFL427001R1200		1.750
				100...250	100...250	0	0	AF116-30-00-13	1SFL427001R1300		1.750
				250...500	250...500	0	0	AF116-30-00-14	1SFL427001R1400		1.750
75	200	100	200	24...60	20...60	0	0	AF140-30-00-11	1SFL447001R1100		1.750
				48...130	48...130	0	0	AF140-30-00-12	1SFL447001R1200		1.750
				100...250	100...250	0	0	AF140-30-00-13	1SFL447001R1300		1.750
				250...500	250...500	0	0	AF140-30-00-14	1SFL447001R1400		1.750
75	225	100	200	24...60	20...60	0	0	AF146-30-00-11	1SFL467001R1100		1.750
				48...130	48...130	0	0	AF146-30-00-12	1SFL467001R1200		1.750
				100...250	100...250	0	0	AF146-30-00-13	1SFL467001R1300		1.750
				250...500	250...500	0	0	AF146-30-00-14	1SFL467001R1400		1.750
With bar connections											
55	160	75	160	24...60	20...60	0	0	AF116-30-00B-11	1SFL427002R1100		1.500
				48...130	48...130	0	0	AF116-30-00B-12	1SFL427002R1200		1.500
				100...250	100...250	0	0	AF116-30-00B-13	1SFL427002R1300		1.500
				250...500	250...500	0	0	AF116-30-00B-14	1SFL427002R1400		1.500
75	200	100	200	24...60	20...60	0	0	AF140-30-00B-11	1SFL447002R1100		1.500
				48...130	48...130	0	0	AF140-30-00B-12	1SFL447002R1200		1.500
				100...250	100...250	0	0	AF140-30-00B-13	1SFL447002R1300		1.500
				250...500	250...500	0	0	AF140-30-00B-14	1SFL447002R1400		1.500
75	225	100	200	24...60	20...60	0	0	AF146-30-00B-11	1SFL467002R1100		1.500
				48...130	48...130	0	0	AF146-30-00B-12	1SFL467002R1200		1.500
				100...250	100...250	0	0	AF146-30-00B-13	1SFL467002R1300		1.500
				250...500	250...500	0	0	AF146-30-00B-14	1SFL467002R1400		1.500

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

Main dimensions mm, *inches*



AF116, AF140, AF146-30-00



AF116, AF140, AF146-30-00B

1SFC101088C0201 - Rev. D

AF116 ... AF146 3-pole contactors with built-in PLC interface
55 to 75 kW
AC / DC operated

AF146-30-00

AF146-30-00B

Description

AF116 ... AF146 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC and AF116 ... AF146 up to 260 V DC. These contactors are of the block type design with 3 main poles.

– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...500 V AC and DC), only 2 coils to cover control voltages between 100...500 V 50/60 Hz and 100...250 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
– built-in surge suppression
– add-on auxiliary contact blocks for side mounting and a wide range of accessories.

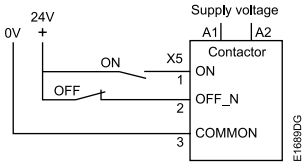
Ordering details

IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code		Weight Pkg (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							
kW	A	hp	A	V 50/60 Hz	V DC					kg
For connection with built-in cable clamps										
55	160	75	160	100...250	100...250	0 0	AF116-30-00-33	1SFL427001R3300		1.750
				250...500	250...500	0 0	AF116-30-00-34	1SFL427001R3400		1.750
75	200	100	200	100...250	100...250	0 0	AF140-30-00-33	1SFL447001R3300		1.750
				250...500	250...500	0 0	AF140-30-00-34	1SFL447001R3400		1.750
75	225	100	200	100...250	100...250	0 0	AF146-30-00-33	1SFL467001R3300		1.750
				250...500	250...500	0 0	AF146-30-00-34	1SFL467001R3400		1.750
With bar connections										
55	160	75	160	100...250	100...250	0 0	AF116-30-00B-33	1SFL427002R3300		1.500
				250...500	250...500	0 0	AF116-30-00B-34	1SFL427002R3400		1.500
75	200	100	200	100...250	100...250	0 0	AF140-30-00B-33	1SFL447002R3300		1.500
				250...500	250...500	0 0	AF140-30-00B-34	1SFL447002R3400		1.500
75	225	100	200	100...250	100...250	0 0	AF146-30-00B-33	1SFL467002R3300		1.500
				250...500	250...500	0 0	AF146-30-00B-34	1SFL467002R3400		1.500

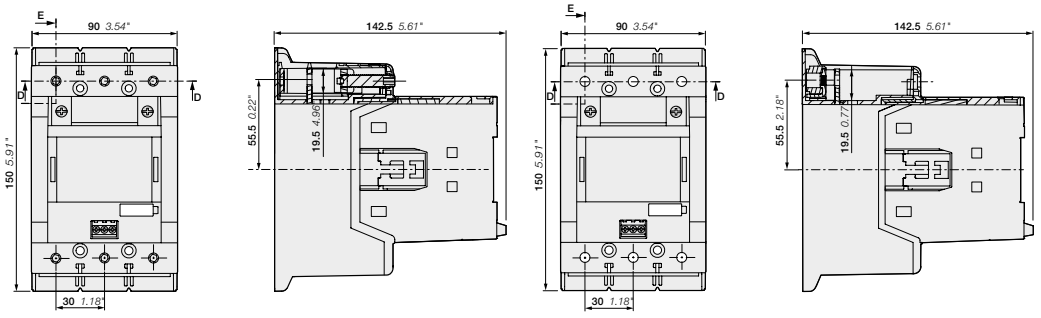
(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.

AF116 ... AF146 are equipped with low voltage inputs for control, for example by a PLC.

Control inputs



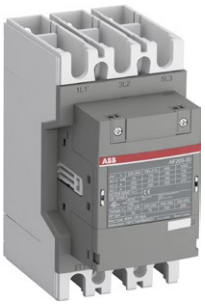
Main dimensions mm, *inches*



AF116, AF140, AF146-30-00

AF116, AF140, AF146-30-00B

AF190 ... AF370 3-pole contactors
90 to 200 kW
AC / DC operated



AF205-30-00

AF370-30-00

5

Description

AF190 ... AF370 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and 340 V DC. These contactors are of the block type design with 3 main poles.

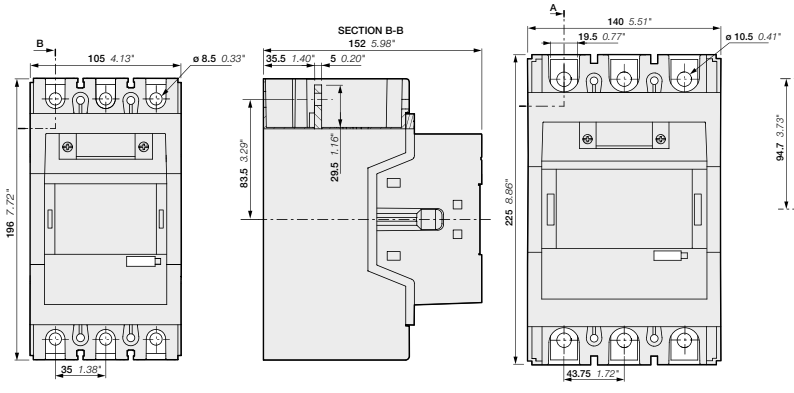
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption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

Ordering details

IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC					kg
90	275	125	250	24...60	20...60	0 0	AF190-30-00-11	1SFL487002R1100		3.000
				48...130	48...130	0 0	AF190-30-00-12	1SFL487002R1200		3.000
				100...250	100...250	0 0	AF190-30-00-13	1SFL487002R1300		3.000
				250...500	250...500	0 0	AF190-30-00-14	1SFL487002R1400		3.000
110	350	150	300	24...60	20...60	0 0	AF205-30-00-11	1SFL527002R1100		3.000
				48...130	48...130	0 0	AF205-30-00-12	1SFL527002R1200		3.000
				100...250	100...250	0 0	AF205-30-00-13	1SFL527002R1300		3.000
				250...500	250...500	0 0	AF205-30-00-14	1SFL527002R1400		3.000
132	400	200	350	24...60	20...60	0 0	AF265-30-00-11	1SFL547002R1100		4.605
				48...130	48...130	0 0	AF265-30-00-12	1SFL547002R1200		4.605
				100...250	100...250	0 0	AF265-30-00-13	1SFL547002R1300		4.605
				250...500	250...500	0 0	AF265-30-00-14	1SFL547002R1400		4.605
160	500	250	400	24...60	20...60	0 0	AF305-30-00-11	1SFL587002R1100		4.605
				48...130	48...130	0 0	AF305-30-00-12	1SFL587002R1200		4.605
				100...250	100...250	0 0	AF305-30-00-13	1SFL587002R1300		4.605
				250...500	250...500	0 0	AF305-30-00-14	1SFL587002R1400		4.605
200	600	300	520	24...60	20...60	0 0	AF370-30-00-11	1SFL607002R1100		4.605
				48...130	48...130	0 0	AF370-30-00-12	1SFL607002R1200		4.605
				100...250	100...250	0 0	AF370-30-00-13	1SFL607002R1300		4.605
				250...500	250...500	0 0	AF370-30-00-14	1SFL607002R1400		4.605

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

Main dimensions mm, *inches*

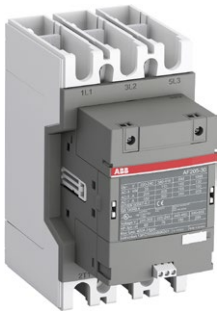


AF190, AF205

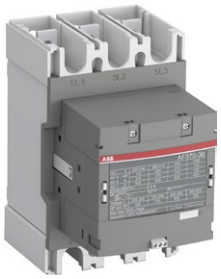
AF265, AF305, AF370

1SFC101089C0201 - Rev. E

AF190 ... AF370 3-pole contactors with built-in PLC interface
90 to 200 kW
AC / DC operated



AF205-30-00



AF370-30-00

Description

AF190 ... AF370 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and 340 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 2 coils to cover control voltages between 100...500 V 50/60 Hz and 100...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

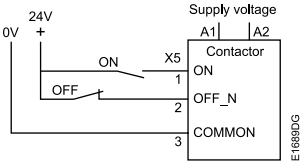
Ordering details

IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Type (1)	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC						kg
90	275	125	250	100...250	100...250	0	0	AF190-30-00-33	1SFL487002R3300		3.000
				250...500	250...500	0	0	AF190-30-00-34	1SFL487002R3400		3.000
110	350	150	300	100...250	100...250	0	0	AF205-30-00-33	1SFL527002R3300		3.000
				250...500	250...500	0	0	AF205-30-00-34	1SFL527002R3400		3.000
132	400	200	350	100...250	100...250	0	0	AF265-30-00-33	1SFL547002R3300		4.605
				250...500	250...500	0	0	AF265-30-00-34	1SFL547002R3400		4.605
160	500	250	400	100...250	100...250	0	0	AF305-30-00-33	1SFL587002R3300		4.605
				250...500	250...500	0	0	AF305-30-00-34	1SFL587002R3400		4.605
200	600	300	520	100...250	100...250	0	0	AF370-30-00-33	1SFL607002R3300		4.605
				250...500	250...500	0	0	AF370-30-00-34	1SFL607002R3400		4.605

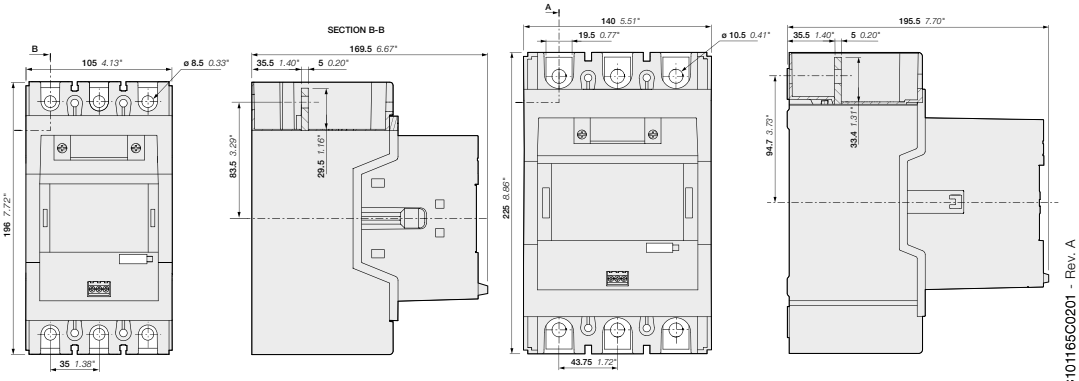
(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.

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

Control inputs



Main dimensions mm, *inches*

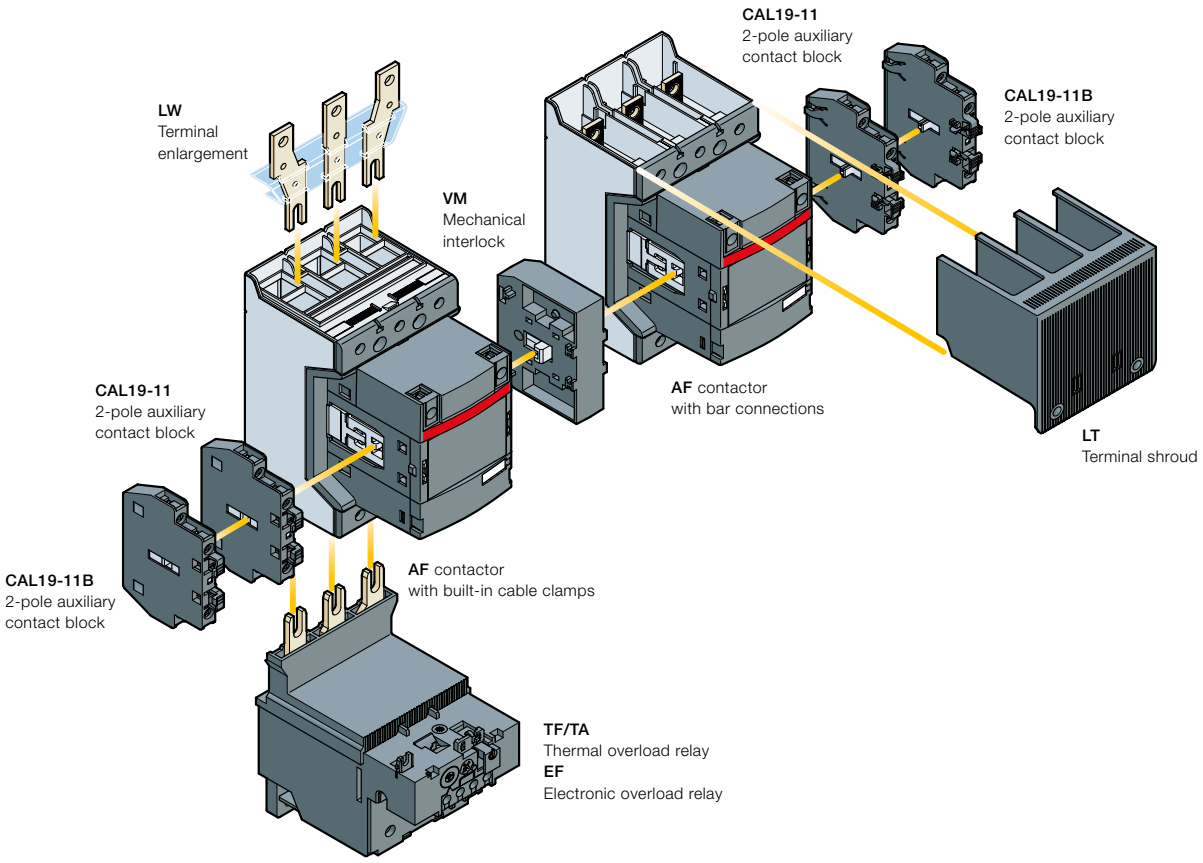


AF190, AF205 **AF265, AF305, AF370**

1SFC101165C0201 - Rev. A

AF116 ... AF370 3-pole contactors
Main accessories

Main accessories (other accessories available)



Main accessory fitting details

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

(1) Total number of auxiliary contact blocks for the two contactors. (2) Interlock type, according to the contactor ratings (see "Accessories").
(3) The CEL19 auxiliary contact blocks can replace the CAL19-11 and CAL19-11B. Though, no auxiliary contact block can be mounted outside the CEL19.

Overload relays fitting details (1)

Contactor types	Thermal overload relays	Electronic overload relays
AF116 ... AF140	TF140DU (66...142 A)	EF146 (54...150 A)
AF146	–	EF146 (54...150 A)
AF190, AF205	TA200DU (66...200 A)	EF205 (63...210 A)
AF265 ... AF370	–	EF370 (115...380 A)

The addition of a thermal or electronic overload relay on the contactor does not prevent fitting of many other accessories as shown in "Main accessory fitting details" table.
(1) Direct mounting - No kit required.

1SFC101135C0201 - Rev. A

AF116 ... AF370 3-pole contactors
Main accessories

1SFC101071V0001

CAL19-11

1SFC101035V0001

VM19

1SFC101041V0001

LT370-30C

1SFC101049V0001

LX140

Ordering details (1)

For contactors	Auxiliary contacts	Type	Order code		Pkg qty	Weight (1 pce) kg
Side-mounted instantaneous auxiliary contact blocks						
AF116 ... AF370	1 1	CAL19-11	1SFN010820R1011		2	0.050
	1 1	CAL19-11B	1SFN010820R3311		2	0.050
Mechanical interlock unit						
AF116 ... AF370		VM19	1SFN030300R1000		1	0.054
AF116 ... AF146 and AF190, AF205		VM140/190	1SFN034403R1000		1	0.088
AF190, AF205 and AF265 ... AF370		VM205/265	1SFN035203R1000		1	0.090
Terminal shrouds						
AF116 ... AF146, with compression lugs		LT140-30L	1SFN124203R1000		2	0.070
AF190, AF205, with cable clamps		LT205-30C	1SFN124801R1000		2	0.050
AF190, AF205, with compression lugs		LT205-30L	1SFN124803R1000		2	0.220
AF190, AF205, with shorting bar or between contactor and TOL/EOL in DOL-starters		LT205-30Y	1SFN124804R1000		1	0.050
AF265 ... AF370, with cable clamps		LT370-30C	1SFN125401R1000		2	0.035
AF265 ... AF370, with compression lugs		LT370-30L	1SFN125403R1000		2	0.280
AF265 ... AF370, with shorting bar or between contactor and TOL/EOL in DOL-starters		LT370-30Y	1SFN125404R1000		1	0.075
AF265 ... AF370, for use with extending cable clamps, ATK300/2 and OZXB4		LT370-30D	1SFN125406R1000		1	0.150

For contactors	Dimensions hole Ø mm	bar mm	Type	Order code		Pkg qty	Weight (1 pce) kg
Terminal enlargements							
AF116 ... AF146	6.5	13 x 3	LW140	1SFN074207R1000		1	0.115
AF190 ... AF205	10.5	17.5 x 5	LW205	1SFN074807R1000		1	0.260
AF265 ... AF370	10.5	20 x 5	LW370	1SFN075407R1000		1	0.340
Terminal extension							
AF116 ... AF146	6.5	13 x 3	LX140	1SFN074210R1000		1	0.072
AF190 ... AF205	8.5	17.5 x 5	LX205	1SFN074810R1000		1	0.180
AF265 ... AF370	10.5	20 x 5	LX370	1SFN075410R1000		1	0.234

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

AF116 ... AF146 3-pole contactors
55 to 75 kW
AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts

AF146-30-11

AF146-30-11B

Description

AF116 ... AF140 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC and AF116 ... AF146 up to 260 V DC. These contactors are of the block type design with 3 main poles.

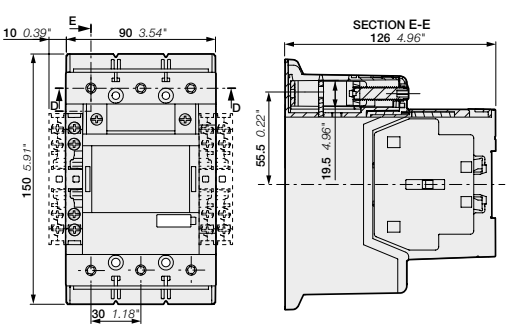
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption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

Ordering details

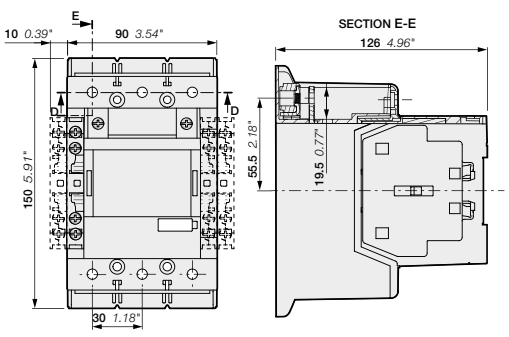
IEC		UL / CSA		Rated control ircuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code		Weight Pkg (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							
kW	A	hp	A	V 50/60 Hz	V DC					kg
For connection with built-in cable clamps										
55	160	75	160	24...60	20...60	1 1	AF116-30-11-11	1SFL427001R1111		1.750
				48...130	48...130	1 1	AF116-30-11-12	1SFL427001R1211		1.750
				100...250	100...250	1 1	AF116-30-11-13	1SFL427001R1311		1.750
				250...500	250...500	1 1	AF116-30-11-14	1SFL427001R1411		1.750
75	200	100	200	24...60	20...60	1 1	AF140-30-11-11	1SFL447001R1111		1.750
				48...130	48...130	1 1	AF140-30-11-12	1SFL447001R1211		1.750
				100...250	100...250	1 1	AF140-30-11-13	1SFL447001R1311		1.750
				250...500	250...500	1 1	AF140-30-11-14	1SFL447001R1411		1.750
75	225	100	200	24...60	20...60	1 1	AF146-30-11-11	1SFL467001R1111		1.750
				48...130	48...130	1 1	AF146-30-11-12	1SFL467001R1211		1.750
				100...250	100...250	1 1	AF146-30-11-13	1SFL467001R1311		1.750
				250...500	250...500	1 1	AF146-30-11-14	1SFL467001R1411		1.750
With bar connections										
55	160	75	160	24...60	20...60	1 1	AF116-30-11B-11	1SFL427002R1111		1.500
				48...130	48...130	1 1	AF116-30-11B-12	1SFL427002R1211		1.500
				100...250	100...250	1 1	AF116-30-11B-13	1SFL427002R1311		1.500
				250...500	250...500	1 1	AF116-30-11B-14	1SFL427002R1411		1.500
75	200	100	200	24...60	20...60	1 1	AF140-30-11B-11	1SFL447002R1111		1.500
				48...130	48...130	1 1	AF140-30-11B-12	1SFL447002R1211		1.500
				100...250	100...250	1 1	AF140-30-11B-13	1SFL447002R1311		1.500
				250...500	250...500	1 1	AF140-30-11B-14	1SFL447002R1411		1.500
75	225	100	200	24...60	20...60	1 1	AF146-30-11B-11	1SFL467002R1111		1.500
				48...130	48...130	1 1	AF146-30-11B-12	1SFL467002R1211		1.500
				100...250	100...250	1 1	AF146-30-11B-13	1SFL467002R1311		1.500
				250...500	250...500	1 1	AF146-30-11B-14	1SFL467002R1411		1.500

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

Main dimensions mm, *inches*



AF116, AF140, AF146-30-11



AF116, AF140, AF146-30-11B

1SFC101090C0201 - Rev. D

AF116 ... AF146 3-pole contactors with built-in PLC interface
55 to 75 kW
AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts

AF146-30-11

AF146-30-11B

Description

AF116 ... AF140 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC and AF116 ... AF146 up to 260 V DC. These contactors are of the block type design with 3 main poles.

– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 2 coils to cover control voltages between 100...500 V 50/60 Hz and 100...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
– built-in surge suppression
– add-on auxiliary contact blocks for side mounting and a wide range of accessories.

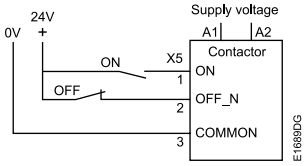
Ordering details

IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code		Weight Pkg (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							
kW	A	hp	A	V 50/60 Hz	V DC					kg
For connection with built-in cable clamps										
55	160	75	160	100...250	100...250	1 1	AF116-30-11-33	1SFL427001R3311		1.750
				250...500	250...500	1 1	AF116-30-11-34	1SFL427001R3411		1.750
75	200	100	200	100...250	100...250	1 1	AF140-30-11-33	1SFL447001R3311		1.750
				250...500	250...500	1 1	AF140-30-11-34	1SFL447001R3411		1.750
75	225	100	200	100...250	100...250	1 1	AF146-30-11-33	1SFL467001R3311		1.750
				250...500	250...500	1 1	AF146-30-11-34	1SFL467001R3411		1.750
With bar connections										
55	160	75	160	100...250	100...250	1 1	AF116-30-11B-33	1SFL427002R3311		1.500
				250...500	250...500	1 1	AF116-30-11B-34	1SFL427002R3411		1.500
75	200	100	200	100...250	100...250	1 1	AF140-30-11B-33	1SFL447002R3311		1.500
				250...500	250...500	1 1	AF140-30-11B-34	1SFL447002R3411		1.500
75	225	100	200	100...250	100...250	1 1	AF146-30-11B-33	1SFL467002R3311		1.500
				250...500	250...500	1 1	AF146-30-11B-34	1SFL467002R3411		1.500

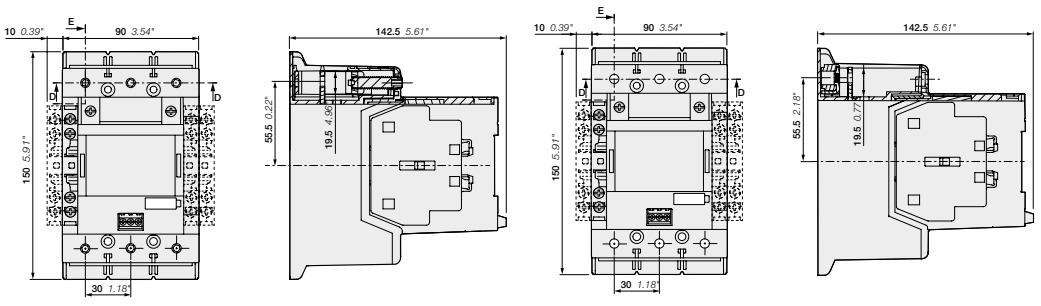
(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.

AF116 ... AF146 are equipped with low voltage inputs for control, for example by a PLC.

Control inputs



Main dimensions mm, *inches*

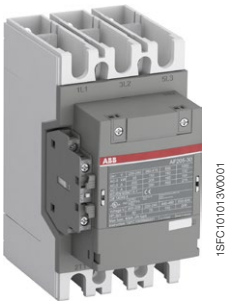


AF116, AF140, AF146-30-11

AF116, AF140, AF146-30-11B

1SFC101166C0201 - Rev. A

AF190 ... AF370 3-pole contactors
90 to 200 kW
AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts



AF205-30-11

AF370-30-11

5

Description

AF190 ... AF370 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and up to 340 V DC. These contactors are of the block type design with 3 main poles.

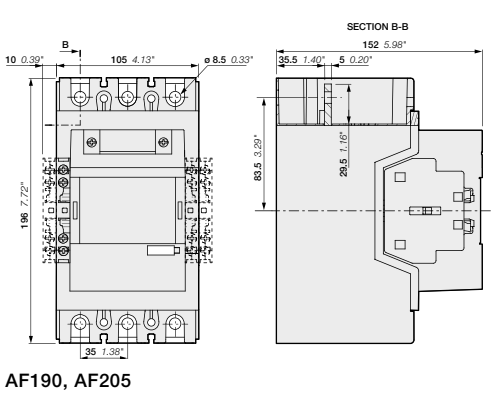
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption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

Ordering details

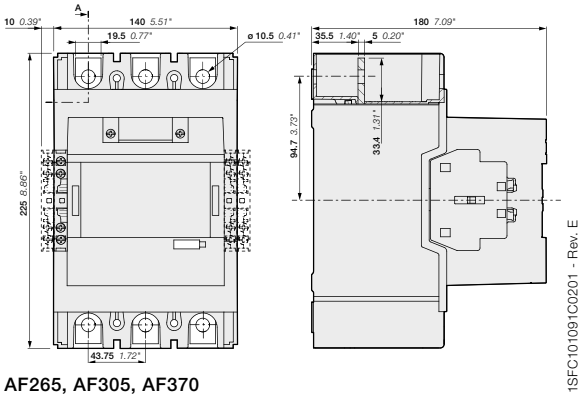
IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC					kg
90	275	125	250	24...60	20...60	1 1	AF190-30-11-11	1SFL487002R1111		3.000
				48...130	48...130	1 1	AF190-30-11-12	1SFL487002R1211		3.000
				100...250	100...250	1 1	AF190-30-11-13	1SFL487002R1311		3.000
				250...500	250...500	1 1	AF190-30-11-14	1SFL487002R1411		3.000
110	350	150	300	24...60	20...60	1 1	AF205-30-11-11	1SFL527002R1111		3.000
				48...130	48...130	1 1	AF205-30-11-12	1SFL527002R1211		3.000
				100...250	100...250	1 1	AF205-30-11-13	1SFL527002R1311		3.000
				250...500	250...500	1 1	AF205-30-11-14	1SFL527002R1411		3.000
132	400	200	350	24...60	20...60	1 1	AF265-30-11-11	1SFL547002R1111		4.640
				48...130	48...130	1 1	AF265-30-11-12	1SFL547002R1211		4.640
				100...250	100...250	1 1	AF265-30-11-13	1SFL547002R1311		4.640
				250...500	250...500	1 1	AF265-30-11-14	1SFL547002R1411		4.640
160	500	250	400	24...60	20...60	1 1	AF305-30-11-11	1SFL587002R1111		4.640
				48...130	48...130	1 1	AF305-30-11-12	1SFL587002R1211		4.640
				100...250	100...250	1 1	AF305-30-11-13	1SFL587002R1311		4.640
				250...500	250...500	1 1	AF305-30-11-14	1SFL587002R1411		4.640
200	600	300	520	24...60	20...60	1 1	AF370-30-11-11	1SFL607002R1111		4.640
				48...130	48...130	1 1	AF370-30-11-12	1SFL607002R1211		4.640
				100...250	100...250	1 1	AF370-30-11-13	1SFL607002R1311		4.640
				250...500	250...500	1 1	AF370-30-11-14	1SFL607002R1411		4.640

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

Main dimensions mm, *inches*



AF190, AF205

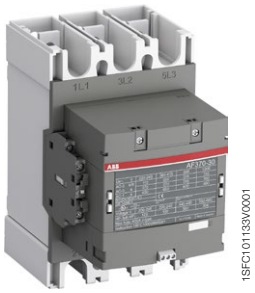


AF265, AF305, AF370

1SFC101091C0201 - Rev. E

AF190 ... AF370 3-pole contactors with built-in PLC interface
90 to 200 kW
AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts

AF205-30-11



AF370-30-11

Description

AF190 ... AF370 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and up to 340 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 2 coils to cover control voltages between 100...500 V 50/60 Hz and 100...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

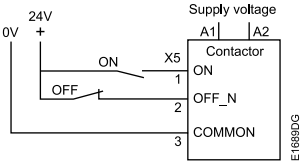
Ordering details

IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC					kg
90	275	125	250	100...250	100...250	1 1	AF190-30-11-33	1SFL487002R3311		3.000
				250...500	250...500	1 1	AF190-30-11-34	1SFL487002R3411		3.000
110	350	150	300	100...250	100...250	1 1	AF205-30-11-33	1SFL527002R3311		3.000
				250...500	250...500	1 1	AF205-30-11-34	1SFL527002R3411		3.000
132	400	200	350	100...250	100...250	1 1	AF265-30-11-33	1SFL547002R3311		4.640
				250...500	250...500	1 1	AF265-30-11-34	1SFL547002R3411		4.640
160	500	250	400	100...250	100...250	1 1	AF305-30-11-33	1SFL587002R3311		4.640
				250...500	250...500	1 1	AF305-30-11-34	1SFL587002R3411		4.640
200	600	300	520	100...250	100...250	1 1	AF370-30-11-33	1SFL607002R3311		4.640
				250...500	250...500	1 1	AF370-30-11-34	1SFL607002R3411		4.640

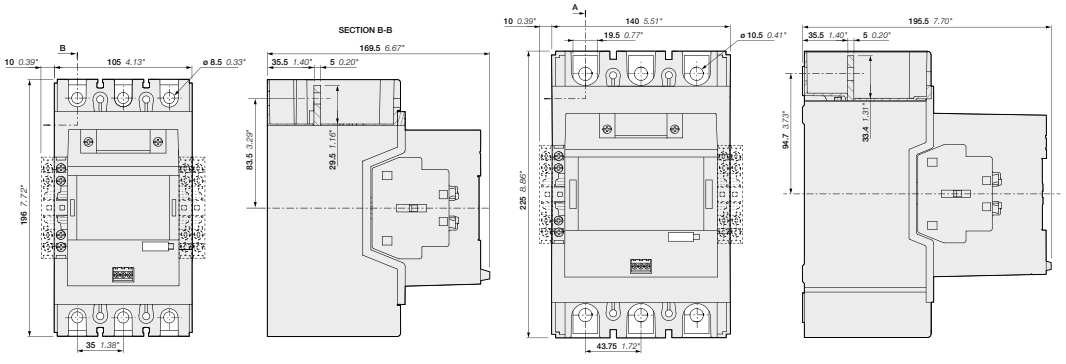
(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.

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

Control inputs



Main dimensions mm, *inches*



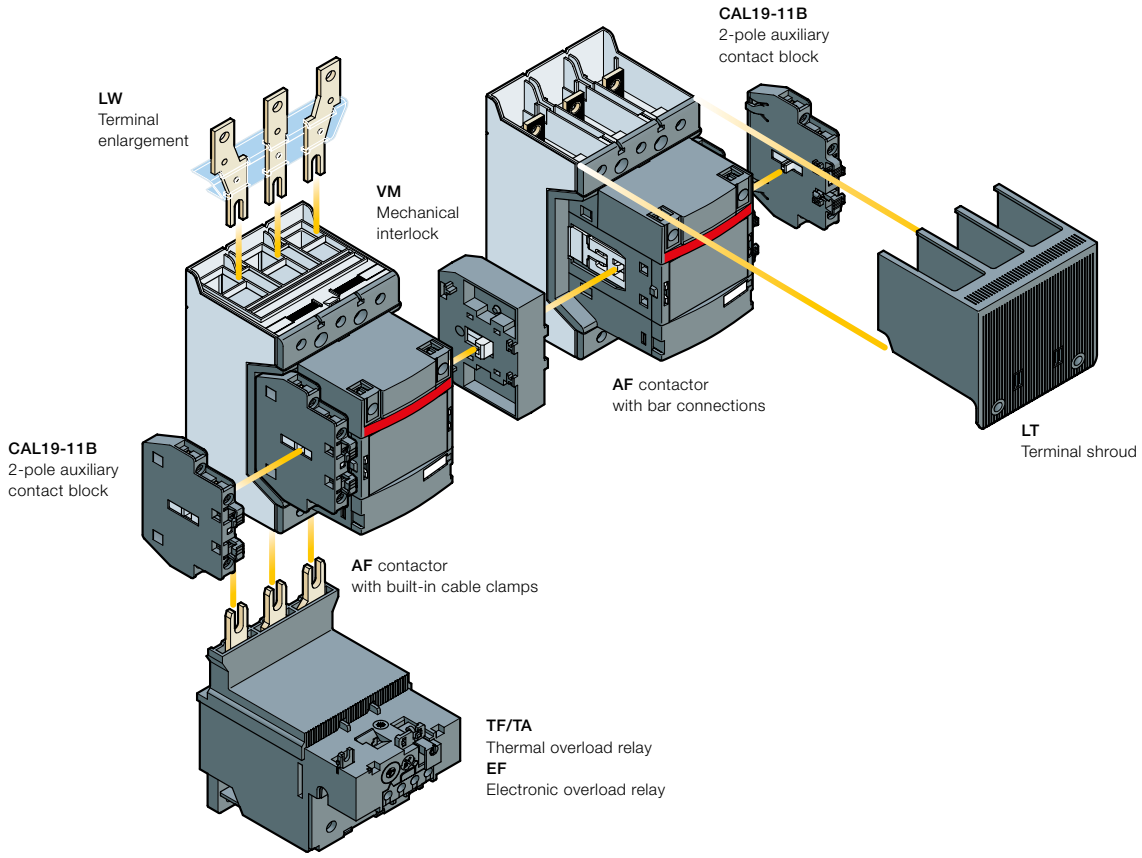
AF190, AF205

AF265, AF305, AF370

1SFC101167C0201 - Rev. A

AF116 ... AF370 3-pole contactors
with 1 N.O. + 1 N.C. auxiliary contacts
Main accessories

Main accessories (other accessories available)



Main accessory fitting details

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

(1) Total number of auxiliary contact blocks for the two contactors. (2) Interlock type, according to the contactor ratings (see "Accessories").
(3) The CEL19 auxiliary contact blocks can replace the CAL19-11 and CAL19-11B. Though, no auxiliary contact block can be mounted outside the CEL19.

Overload relays fitting details (1)

Contactor types	Thermal overload relays	Electronic overload relays
AF116 ... AF140	TF140DU (66...142 A)	EF146 (54...150 A)
AF146	–	EF146 (54...150 A)
AF190, AF205	TA200DU (66...200 A)	EF205 (63...210 A)
AF265 ... AF370	–	EF370 (115...380 A)

The addition of a thermal or electronic overload relay on the contactor does not prevent fitting of many other accessories as shown in "Main accessory fitting details" table.
(1) Direct mounting - No kit required.

1SFC101132C0201 - Rev. A

AF116 ... AF370 3-pole contactors
with 1 N.O. + 1 N.C. auxiliary contacts
Main accessories

1SFC101071V0001

CAL19-11

1SFC101035V0001

VM19

1SFC101041V0001

LT370-30C

1SFC101049V0001

LX140

Ordering details (1)

For contactors	Auxiliary contacts	Type	Order code		Pkg qty	Weight (1 pce) kg
Side-mounted instantaneous auxiliary contact blocks						
AF116 ... AF370	1 1	CAL19-11	1SFN010820R1011		2	0.050
	1 1	CAL19-11B	1SFN010820R3311		2	0.050
Mechanical interlock unit						
AF116 ... AF370		VM19	1SFN030300R1000		1	0.054
AF116 ... AF146 and AF190, AF205		VM140/190	1SFN034403R1000		1	0.088
AF190, AF205 and AF265 ... AF370		VM205/265	1SFN035203R1000		1	0.090
Terminal shrouds						
AF116 ... AF146, with compression lugs		LT140-30L	1SFN124203R1000		2	0.070
AF190, AF205, with cable clamps		LT205-30C	1SFN124801R1000		2	0.050
AF190, AF205, with compression lugs		LT205-30L	1SFN124803R1000		2	0.220
AF190, AF205, with shorting bar or between contactor and TOL/EOL in DOL-starters		LT205-30Y	1SFN124804R1000		1	0.050
AF265 ... AF370, with cable clamps		LT370-30C	1SFN125401R1000		2	0.035
AF265 ... AF370, with compression lugs		LT370-30L	1SFN125403R1000		2	0.280
AF265 ... AF370, with shorting bar or between contactor and TOL/EOL in DOL-starters		LT370-30Y	1SFN125404R1000		1	0.075
AF265 ... AF370, for use with extending cable clamps, ATK300/2 and OZXB4		LT370-30D	1SFN125406R1000		1	0.150

For contactors	Dimensions hole Ø mm	bar mm	Type	Order code		Pkg qty	Weight (1 pce) kg
Terminal enlargements							
AF116...AF146	6.5	13 x 3	LW140	1SFN074207R1000		1	0.115
AF190...AF205	10.5	17.5 x 5	LW205	1SFN074807R1000		1	0.260
AF265...AF370	10.5	20 x 5	LW370	1SFN075407R1000		1	0.340
Terminal extension							
AF116...AF146	6.5	13 x 3	LX140	1SFN074210R1000		1	0.072
AF190...AF250	8.5	17.5 x 5	LX205	1SFN074810R1000		1	0.180
AF265...AF370	10.5	20 x 5	LX370	1SFN075410R1000		1	0.234

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

AF400 ... AF750 3-pole contactors
200 to 400 kW
AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts

AF460-30-11

AF750-30-11

Description

AF400 ... AF750 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC or 600 V DC (2). These contactors are of the block type design with 3 main poles.

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

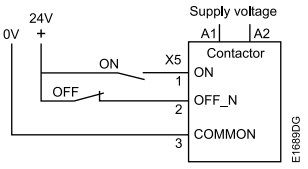
Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C 690 V AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC						kg
200	600	350	550	-	24...60	1	1	AF400-30-11	1SFL577001R6811 (1)		12.000
				48...130	48...130	1	1	AF400-30-11	1SFL577001R6911		12.000
				100...250	100...250	1	1	AF400-30-11	1SFL577001R7011		12.000
				250...500	250...500	1	1	AF400-30-11	1SFL577001R7111		12.000
250	700	400	650	-	24...60	1	1	AF460-30-11	1SFL597001R6811 (1)		12.000
				48...130	48...130	1	1	AF460-30-11	1SFL597001R6911		12.000
				100...250	100...250	1	1	AF460-30-11	1SFL597001R7011		12.000
				250...500	250...500	1	1	AF460-30-11	1SFL597001R7111		12.000
315	800	500	750	-	24...60	1	1	AF580-30-11	1SFL617001R6811 (1)		15.000
				48...130	48...130	1	1	AF580-30-11	1SFL617001R6911		15.000
				100...250	100...250	1	1	AF580-30-11	1SFL617001R7011		15.000
				250...500	250...500	1	1	AF580-30-11	1SFL617001R7111		15.000
400	1050	600	900	-	24...60	1	1	AF750-30-11	1SFL637001R6811 (1)		15.000
				48...130	48...130	1	1	AF750-30-11	1SFL637001R6911		15.000
				100...250	100...250	1	1	AF750-30-11	1SFL637001R7011		15.000
				250...500	250...500	1	1	AF750-30-11	1SFL637001R7111		15.000

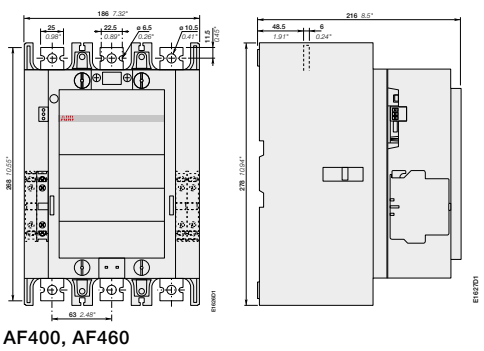
(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.
(2) Up to 850 V DC for AF580, AF750.

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

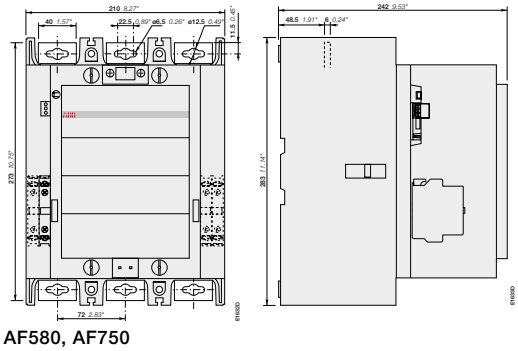
Control inputs



Main dimensions mm, *inches*



AF400, AF460



AF580, AF750

1SFC101013C0201 - Rev. A

AF1250 ... AF2650 3-pole contactors
475 to 560 kW and 1260 to 2650 A AC-1
AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts

AF1250-30-11

AF2650-30-11

Description

AF1250 ... AF2050 contactors are mainly used for controlling power circuits up to 1000 V AC or 850 V DC, AF2650 for controlling power up to 1000 V AC. These contactors are of the block type design with 3 main poles.

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

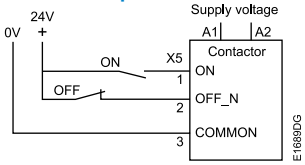
Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C 690 V AC-1	3-phase motor rating 480 V	General use rating 600 V AC (2)								Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC						kg
-	1260	-	1210	-	24...60	1	1	AF1250-30-11	1SFL647001R6811 (1)		16.000
				48...130	48...130	1	1	AF1250-30-11	1SFL647001R6911		16.000
				100...250	100...250	1	1	AF1250-30-11	1SFL647001R7011		16.000
				250...500	250...500	1	1	AF1250-30-11	1SFL647001R7111		16.000
475	1350	800	1350	100...250	100...250	1	1	AF1350-30-11	1SFL657001R7011		34.000
560	1650	900	1650	100...250	100...250	1	1	AF1650-30-11	1SFL677001R7011		35.000
-	2050	-	2100	100...250	100...250	1	1	AF2050-30-11	1SFL707001R7011		35.000
-	2650	-	2700	100...250	100...250	1	1	AF2650-30-11	1SFL667001R7011		45.000

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

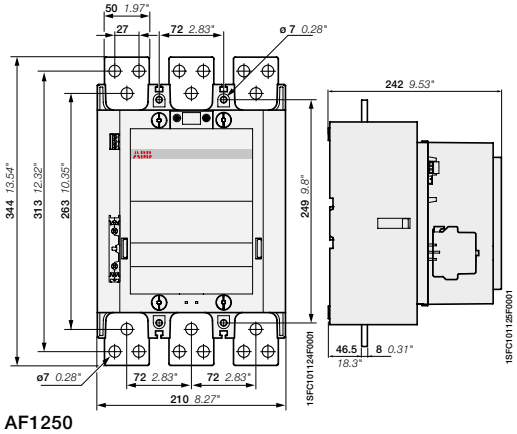
AF1250 ... AF2650 are equipped with low voltage inputs for control, for example by a PLC

Control inputs

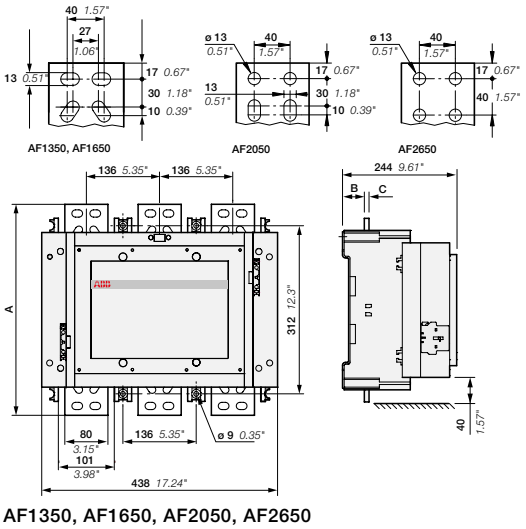


	AF1350, AF1650, AF2050	AF2650
A	392 mm / *15.43"*	422 mm / *16.61"*
B	47 mm / *1.85"*	53 mm / *2.09"*
C	10 mm / *0.39"*	25 mm / *0.98"*

Main dimensions mm, *inches*



AF1250



AF1350, AF1650, AF2050, AF2650

1SFC101094C0201 - Rev. A

Notes

AF1350T ... AF2650T 3-pole contactors with built-in LVRT
475 to 560 kW and 1350 to 2650 A AC-1
AC operated with 1 N.O. + 1 N.C. auxiliary contacts

AF2650-30T-11

Description

AF1350T .. AF2050T contactors are designed to meet the Low Voltage Ride Through requirements for grid connections withstand voltage drop-outs up to 1 sec without opening. These contactors are often used in grid connected applications where the demand of non interrupted power is required. When controlled through built-in PLC connection the contactor is operated directly without delay function.

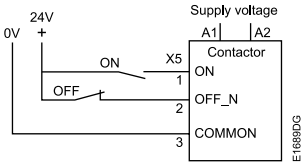
– Control circuit: AC or DC operated with electronic coil interface
  - can withstand voltage drop-outs according to Low Voltage Ride Through requirements
  - equipped with low voltage inputs for direct control by a PLC
  - distinct closing and opening
  - add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

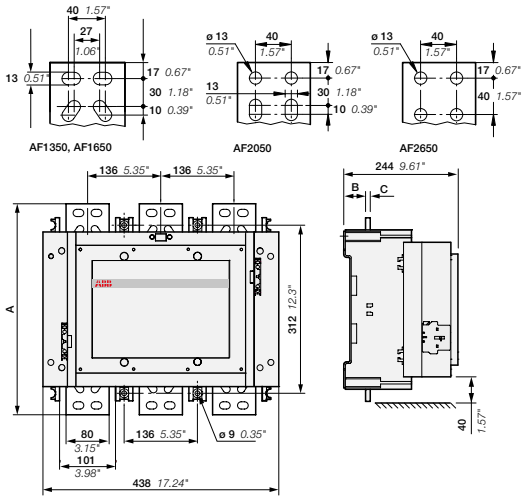
IEC		UL/CSA		Rated control circuit voltage Uc	Auxiliary contacts fitted		Type	Order code		Weight Pkg (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 40 °C 690 V AC-1	3-phase motor rating 480 V	General use rating 600 V AC							
kW	A	hp	A	V 50/60 Hz						kg
475	1350	800	1350	220 ... 240	1	1	AF1350T-30-11 (1)	1SFL657001R9101		34.000
560	1650	900	1650	220 ... 240	1	1	AF1650T-30-11 (1)	1SFL677001R9101		35.000
-	2050	-	2100	220 ... 240	1	1	AF2050T-30-11 (1)	1SFL707001R9101		35.000
-	2650	-	2700	220 ... 240	1	1	AF2650T-30-11 (1)	1SFL667001R9101		45.000

(1) Types -00 and -22 on request.

Control inputs



Main dimensions *mm, inches*



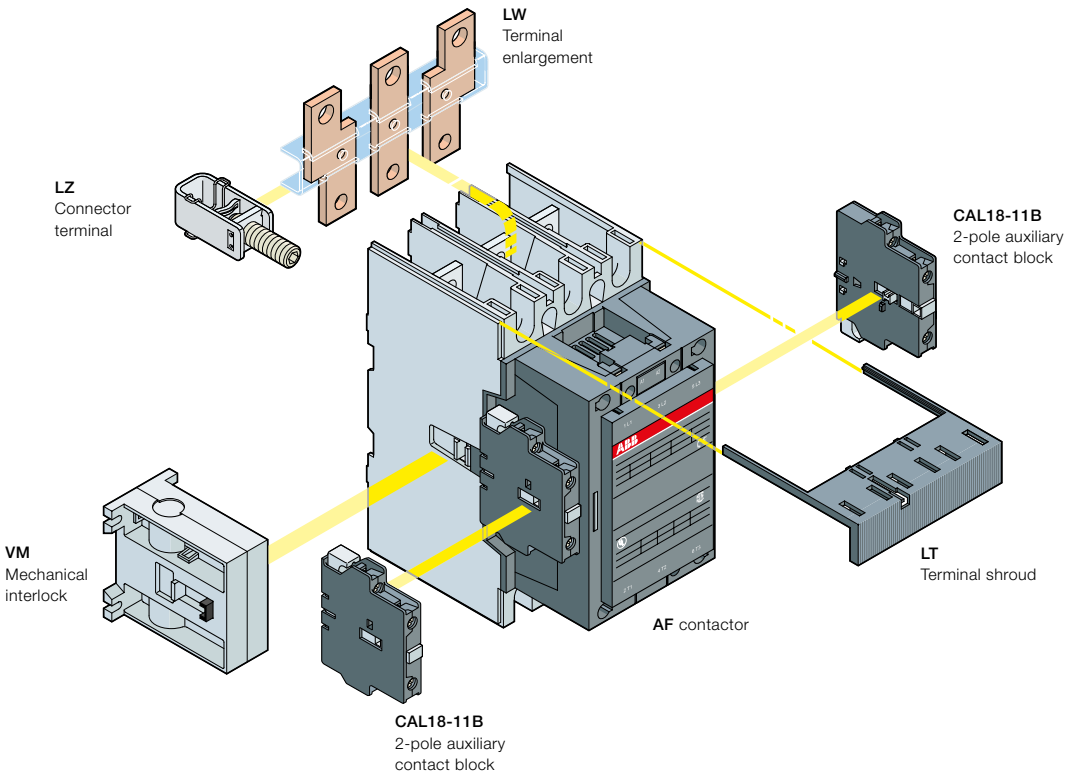
AF1350T-30-11, AF1650T-30-11, AF2050T-30-11, AF2650T-30-11

	AF1350, AF1650, AF2050	AF2650
A	392 mm / *15.43*"	422 mm / *16.61*"
B	47 mm / *1.85*"	53 mm / *2.09*"
C	10 mm / *0.39*"	25 mm / *0.98*"

1SFC101076D0201

AF400 ... AF2650 3-pole contactors
with 1 N.O. + 1 N.C. auxiliary contacts
Main accessories

Main accessories (other accessories available)



Main accessory fitting details

Contactor types	Main poles	Available auxiliary contacts	Side-mounted accessories Auxiliary contact blocks CAL18-11		CAL18-11B (3)		Mechanical interlock units (between two contactors)
Contactors + auxiliary contact blocks							
AF400 ... AF2650	3 0	1 1	1 x CAL18-11	+	2 x CAL18-11B		–
Contactors with mechanical interlocking + auxiliary contact blocks							
AF400 ... AF2650	3 0	1 1	2 x CAL18-11 (1)	+	4 x CAL18-11B (1)	+	VM...H (2)

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

Overload relays fitting details

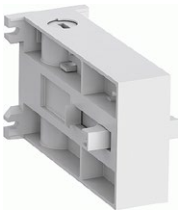
Contactor types	Thermal overload relays	Electronic overload relays
AF400, AF460	–	EF460 (150...500 A) (1)
AF580, AF750	–	EF750 (250...800 A) (1)
AF1350, AF1650	–	E1250DU (375...1250 A) (1)

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

1SFC101126C0201 - Rev. A

AF400 ... AF2650 3-pole contactors
with 1 N.O. + 1 N.C. auxiliary contacts
Main accessories

CAL18-11



VM750H

LT460-AC

Ordering details (1)

For contactors	Auxiliary contacts		Type	Order code		Pkg qty	Weight (1 pce) kg
Side-mounted instantaneous auxiliary contact blocks							
AF400 ... AF2650	1	1	CAL18-11	1SFN010720R1011		2	0.050
	1	1	CAL18-11B	1SFN010720R3311		2	0.050
Mechanical interlock unit							
AF400 ... AF1250			VM750H	1SFN035700R1000		1	0.200
AF1350 ... AF2650			VM1650H	1SFN036503R1001		1	6.000
Terminal shrouds							
AF400, AF460 with connectors			LT460-AC	1SFN125701R1000		2	0.100
AF400, AF460 with lugs			LT460-AL	1SFN125703R1000		2	0.800
AF580 ... AF750 with connectors			LT750-AC	1SFN126101R1000		2	0.120
AF580 ... AF750 with lugs			LT750-AL	1SFN126103R1000		2	0.825

For contactors	Dimensions hole Ø mm	bar mm	Type	Order code		Pkg qty	Weight (1 pce) kg
Terminal enlargements							
AF400, AF460	10.5	25 x 5	LW460	1SFN075707R1000		1	0.730
AF580, AF750	13	40 x 6	LW750	1SFN076107R1000		1	1.230
AF1250	13	50 x 10	LW1250	1SFN076407R1000		1	2.000
Terminal extension							
AF400, AF460	10.5	25 x 5	LX460	1SFN075710R1000		1	0.500
AF580, AF750	13	40 x 6	LX750	1SFN076110R1000		1	0.850

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

AF09 ... AF38 2-stack 3-pole contactors
4 to 18.5 kW
AC / DC operated

AF09-30-22

AF26-30-11

AF26-30-22

5

Description

AF09 ... AF38 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles (1st stack):

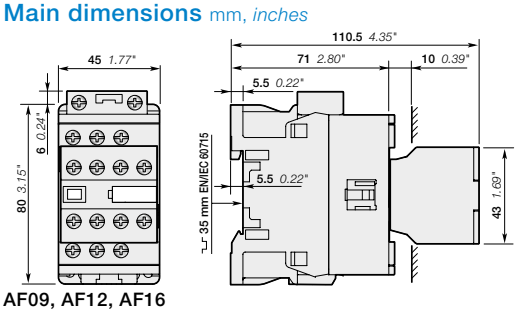
- 2nd stack with permanently fixed auxiliary contact block. The built-in auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening.
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

IEC Rated operational power 400 V AC-3 kW	current θ ≤ 40 °C AC-1 A	UL/CSA 3-phase motor rating 480 V hp	General use rating 600 V AC A	Rated control circuit voltage Uc min. ... Uc max. V 50/60 Hz	V DC	Auxiliary contacts fitted		Type (1)	Order code		Weight Pkg (1 pce) kg
4	25	5	25	24...60	- (2)	2	2	AF09-30-22-41	1SBL137001R4122		0.320
				48...130	48...130	2	2	AF09-30-22-12	1SBL137001R1222		0.320
				100...250	100...250	2	2	AF09-30-22-13	1SBL137001R1322		0.320
				250...500	250...500	2	2	AF09-30-22-14	1SBL137001R1422		0.360
5.5	28	7.5	28	24...60	- (2)	2	2	AF12-30-22-41	1SBL157001R4122		0.320
				48...130	48...130	2	2	AF12-30-22-12	1SBL157001R1222		0.320
				100...250	100...250	2	2	AF12-30-22-13	1SBL157001R1322		0.320
				250...500	250...500	2	2	AF12-30-22-14	1SBL157001R1422		0.360
7.5	30	10	30	24...60	- (2)	2	2	AF16-30-22-41	1SBL177001R4122		0.320
				48...130	48...130	2	2	AF16-30-22-12	1SBL177001R1222		0.320
				100...250	100...250	2	2	AF16-30-22-13	1SBL177001R1322		0.320
				250...500	250...500	2	2	AF16-30-22-14	1SBL177001R1422		0.360
11	45	15	45	24...60	- (2)	1	1	AF26-30-11-41	1SBL237001R4111		0.350
						2	2	AF26-30-22-41	1SBL237001R4122		0.360
				48...130	48...130	1	1	AF26-30-11-12	1SBL237001R1211		0.350
						2	2	AF26-30-22-12	1SBL237001R1222		0.360
				100...250	100...250	1	1	AF26-30-11-13	1SBL237001R1311		0.350
						2	2	AF26-30-22-13	1SBL237001R1322		0.360
				250...500	250...500	1	1	AF26-30-11-14	1SBL237001R1411		0.390
						2	2	AF26-30-22-14	1SBL237001R1422		0.400
15	50	20	50	24...60	- (2)	1	1	AF30-30-11-41	1SBL277001R4111		0.350
						2	2	AF30-30-22-41	1SBL277001R4122		0.360
				48...130	48...130	1	1	AF30-30-11-12	1SBL277001R1211		0.350
						2	2	AF30-30-22-12	1SBL277001R1222		0.360
				100...250	100...250	1	1	AF30-30-11-13	1SBL277001R1311		0.350
						2	2	AF30-30-22-13	1SBL277001R1322		0.360
				250...500	250...500	1	1	AF30-30-11-14	1SBL277001R1411		0.390
						2	2	AF30-30-22-14	1SBL277001R1422		0.400
18.5	50	25	50	24...60	- (2)	1	1	AF38-30-11-41	1SBL297001R4111		0.350
						2	2	AF38-30-22-41	1SBL297001R4122		0.360
				48...130	48...130	1	1	AF38-30-11-12	1SBL297001R1211		0.350
						2	2	AF38-30-22-12	1SBL297001R1222		0.360
				100...250	100...250	1	1	AF38-30-11-13	1SBL297001R1311		0.350
						2	2	AF38-30-22-13	1SBL297001R1322		0.360
				250...500	250...500	1	1	AF38-30-11-14	1SBL297001R1411		0.390
						2	2	AF38-30-22-14	1SBL297001R1422		0.400

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.
(2) For 24...60 V 50/60 Hz - 20...60 V DC, use AF..Z-30-..-21.
AF..-30-..-11 not suitable for direct control by PLC-output.

Main dimensions mm, *inches*



1SBC101373S0201 - Rev. C

AF09Z ... AF38Z 2-stack 3-pole contactors
4 to 18.5 kW
AC / DC operated - Low consumption

AF09Z-30-22

AF26Z-30-11

AF26Z-30-22

Description

AF09Z ... AF38Z contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles (1st stack):

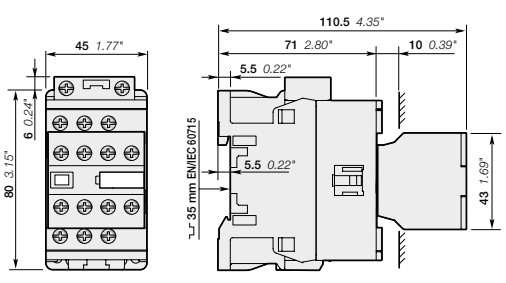
- 2nd stack with permanently fixed auxiliary contact block. The built-in auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
  - can manage large control voltage variations, allow direct control by PLC-output ≥ 24 V DC 500 mA, reduced panel energy consumption, very distinct closing and opening,
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

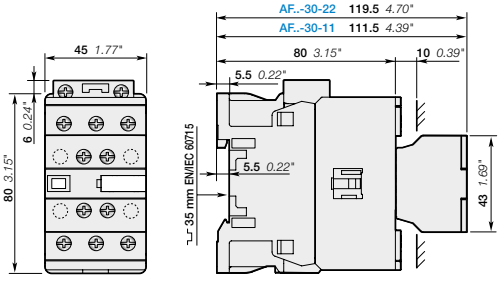
IEC		UL/CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Type (1)	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC						kg
4	25	5	25	-	12...20	2	2	AF09Z-30-22-20	1SBL136001R2022		0.360
				24...60	20...60	2	2	AF09Z-30-22-21	1SBL136001R2122		0.360
				48...130	48...130	2	2	AF09Z-30-22-22	1SBL136001R2222		0.360
				100...250	100...250	2	2	AF09Z-30-22-23	1SBL136001R2322		0.360
5.5	28	7.5	28	-	12...20	2	2	AF12Z-30-22-20	1SBL156001R2022		0.360
				24...60	20...60	2	2	AF12Z-30-22-21	1SBL156001R2122		0.360
				48...130	48...130	2	2	AF12Z-30-22-22	1SBL156001R2222		0.360
				100...250	100...250	2	2	AF12Z-30-22-23	1SBL156001R2322		0.360
7.5	30	10	30	-	12...20	2	2	AF16Z-30-22-20	1SBL176001R2022		0.360
				24...60	20...60	2	2	AF16Z-30-22-21	1SBL176001R2122		0.360
				48...130	48...130	2	2	AF16Z-30-22-22	1SBL176001R2222		0.360
				100...250	100...250	2	2	AF16Z-30-22-23	1SBL176001R2322		0.360
11	45	15	45	-	12...20	1	1	AF26Z-30-11-20	1SBL236001R2011		0.390
						2	2	AF26Z-30-22-20	1SBL236001R2022		0.400
				24...60	20...60	1	1	AF26Z-30-11-21	1SBL236001R2111		0.390
						2	2	AF26Z-30-22-21	1SBL236001R2122		0.400
				48...130	48...130	1	1	AF26Z-30-11-22	1SBL236001R2211		0.390
						2	2	AF26Z-30-22-22	1SBL236001R2222		0.400
				100...250	100...250	1	1	AF26Z-30-11-23	1SBL236001R2311		0.390
						2	2	AF26Z-30-22-23	1SBL236001R2322		0.400
15	50	20	50	-	12...20	1	1	AF30Z-30-11-20	1SBL276001R2011		0.390
						2	2	AF30Z-30-22-20	1SBL276001R2022		0.400
				24...60	20...60	1	1	AF30Z-30-11-21	1SBL276001R2111		0.390
						2	2	AF30Z-30-22-21	1SBL276001R2122		0.400
				48...130	48...130	1	1	AF30Z-30-11-22	1SBL276001R2211		0.390
						2	2	AF30Z-30-22-22	1SBL276001R2222		0.400
				100...250	100...250	1	1	AF30Z-30-11-23	1SBL276001R2311		0.390
						2	2	AF30Z-30-22-23	1SBL276001R2322		0.400
18.5	50	25	50	-	12...20	1	1	AF38Z-30-11-20	1SBL296001R2011		0.390
						2	2	AF38Z-30-22-20	1SBL296001R2022		0.400
				24...60	20...60	1	1	AF38Z-30-11-21	1SBL296001R2111		0.390
						2	2	AF38Z-30-22-21	1SBL296001R2122		0.400
				48...130	48...130	1	1	AF38Z-30-11-22	1SBL296001R2211		0.390
						2	2	AF38Z-30-22-22	1SBL296001R2222		0.400
				100...250	100...250	1	1	AF38Z-30-11-23	1SBL296001R2311		0.390
						2	2	AF38Z-30-22-23	1SBL296001R2322		0.400

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.
Note: Only AF..Z contactors with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole

Main dimensions mm, *inches*



AF09Z, AF12Z, AF16Z

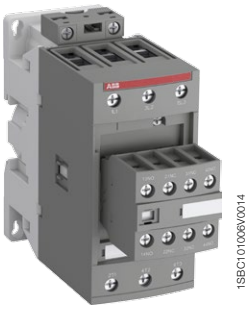


AF26Z, AF30Z, AF38Z

1SBC101374S0201 - Rev. B

AF40 ... AF65 2-stack 3-pole contactors
18.5 to 30 kW
AC / DC operated

AF40-30-11



AF40-30-22

Description

AF40 ... AF65 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles (1st stack):

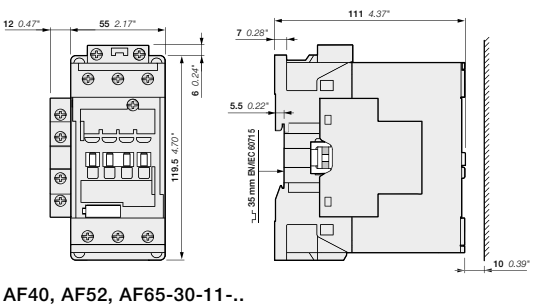
- 2nd stack with permanently fixed auxiliary contact block. The built-in auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening.
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

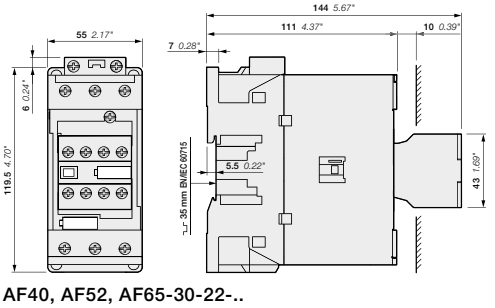
IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC					kg
18.5	70	30	60	24...60	-	1 1	AF40-30-11-41	1SBL347001R4111		1.010
						2 2	AF40-30-22-41	1SBL347001R4122		1.020
				24...60	20...60 (2)	1 1	AF40-30-11-11	1SBL347001R1111		1.010
						2 2	AF40-30-22-11	1SBL347001R1122		1.020
				48...130	48...130	1 1	AF40-30-11-12	1SBL347001R1211		1.010
						2 2	AF40-30-22-12	1SBL347001R1222		1.020
				100...250	100...250	1 1	AF40-30-11-13	1SBL347001R1311		0.990
						2 2	AF40-30-22-13	1SBL347001R1322		1.000
				250...500	250...500	1 1	AF40-30-11-14	1SBL347001R1411		0.990
						2 2	AF40-30-22-14	1SBL347001R1422		1.000
22	100	40	80	24...60	-	1 1	AF52-30-11-41	1SBL367001R4111		1.010
						2 2	AF52-30-22-41	1SBL367001R4122		1.020
				24...60	20...60 (2)	1 1	AF52-30-11-11	1SBL367001R1111		1.010
						2 2	AF52-30-22-11	1SBL367001R1122		1.020
				48...130	48...130	1 1	AF52-30-11-12	1SBL367001R1211		1.010
						2 2	AF52-30-22-12	1SBL367001R1222		1.020
				100...250	100...250	1 1	AF52-30-11-13	1SBL367001R1311		0.990
						2 2	AF52-30-22-13	1SBL367001R1322		1.000
				250...500	250...500	1 1	AF52-30-11-14	1SBL367001R1411		0.990
						2 2	AF52-30-22-14	1SBL367001R1422		1.000
30	105	50	90	24...60	-	1 1	AF65-30-11-41	1SBL387001R4111		1.010
						2 2	AF65-30-22-41	1SBL387001R4122		1.020
				24...60	20...60 (2)	1 1	AF65-30-11-11	1SBL387001R1111		1.010
						2 2	AF65-30-22-11	1SBL387001R1122		1.020
				48...130	48...130	1 1	AF65-30-11-12	1SBL387001R1211		1.010
						2 2	AF65-30-22-12	1SBL387001R1222		1.020
				100...250	100...250	1 1	AF65-30-11-13	1SBL387001R1311		0.990
						2 2	AF65-30-22-13	1SBL387001R1322		1.000
				250...500	250...500	1 1	AF65-30-11-14	1SBL387001R1411		0.990
						2 2	AF65-30-22-14	1SBL387001R1422		1.000

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.
(2) AF..-30-..-11 not suitable for direct control by PLC-output.

Main dimensions mm, *inches*



AF40, AF52, AF65-30-11-..



AF40, AF52, AF65-30-22-..

1SBC101741S0201 - Rev. A

AF80 ... AF96 2-stack 3-pole contactors
37 to 45 kW
AC / DC operated

AF80-30-11

AF80-30-22

Description

AF80 ... AF96 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles (1st stack):

– 2nd stack with permanently fixed auxiliary contact block. The built-in auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening.
– built-in surge suppression
– add-on auxiliary contact blocks for side mounting and a wide range of accessories.

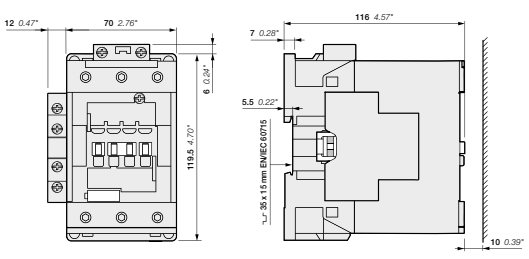
5

Ordering details

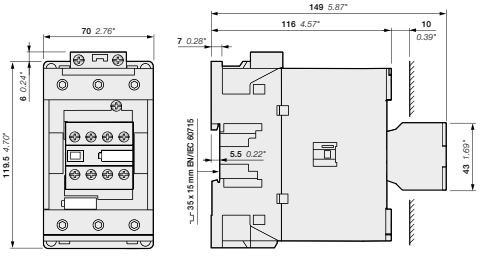
IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Type (1)	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC						kg
37	125	60	105	24...60	-	1	1	AF80-30-11-41	1SBL397001R4111		1.260
						2	2	AF80-30-22-41	1SBL397001R4122		1.270
				24...60	20...60 (2)	1	1	AF80-30-11-11	1SBL397001R1111		1.260
						2	2	AF80-30-22-11	1SBL397001R1122		1.270
				48...130	48...130	1	1	AF80-30-11-12	1SBL397001R1211		1.260
						2	2	AF80-30-22-12	1SBL397001R1222		1.270
				100...250	100...250	1	1	AF80-30-11-13	1SBL397001R1311		1.210
						2	2	AF80-30-22-13	1SBL397001R1322		1.220
				250...500	250...500	1	1	AF80-30-11-14	1SBL397001R1411		1.210
						2	2	AF80-30-22-14	1SBL397001R1422		1.220
45	130	60	115	24...60	-	1	1	AF96-30-11-41	1SBL407001R4111		1.260
						2	2	AF96-30-22-41	1SBL407001R4122		1.270
				24...60	20...60 (2)	1	1	AF96-30-11-11	1SBL407001R1111		1.260
						2	2	AF96-30-22-11	1SBL407001R1122		1.270
				48...130	48...130	1	1	AF96-30-11-12	1SBL407001R1211		1.260
						2	2	AF96-30-22-12	1SBL407001R1222		1.270
				100...250	100...250	1	1	AF96-30-11-13	1SBL407001R1311		1.210
						2	2	AF96-30-22-13	1SBL407001R1322		1.220
				250...500	250...500	1	1	AF96-30-11-14	1SBL407001R1411		1.210
						2	2	AF96-30-22-14	1SBL407001R1422		1.220

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.
(2) AF..-30-..-11 not suitable for direct control by PLC-output.

Main dimensions mm, *inches*



AF80, AF96-30-11-..

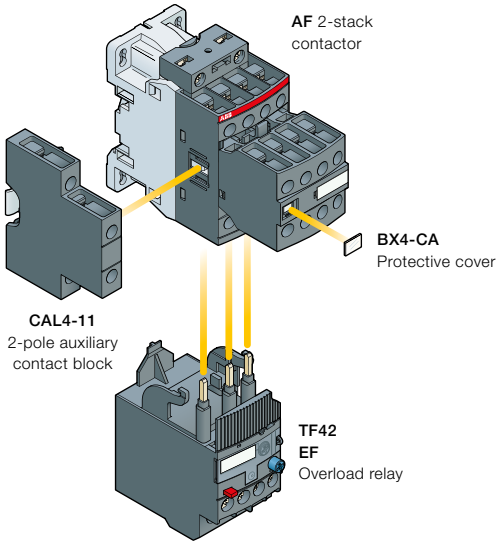


AF80, AF96-30-22-..

AF09 ... AF96 2-stack 3-pole contactors
Main accessories

Contactor and main accessories (other accessories available)

AF09 ... AF96-30-22
AF26 ... AF38-30-11



Main accessory fitting details

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

Contactor types	Main poles		Built-in auxiliary contacts		Front-mounted accessories: Auxiliary contact blocks 1-pole CC4		1-pole CA4 2-pole CAT4-11		4-pole CA4		Electronic timer TEF4	Electrical and mechanical interlock set (between 2 contactors) VEM4		Side-mounted accessories: Auxiliary contact blocks Left side 2-pole CAL4-11		Right side
AF26 ... AF38	3	0	1	1	–		–		–		–	–	+	1	+	1
AF40 ... AF65	3	0	1	1	4 max.	or	1	or	1	or	1	–		–	+	1
AF80 ... AF96	3	0	1	1	4 max.		–	or	1	or	1	–		–	+	1
AF09 ... AF96	3	0	2	2	–		–		–		–	–	+	1		–
AF40 ... AF96	3	0	2	2	–		–		–		–	–	+	1	+	1

Overload relays fitting details (1)

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

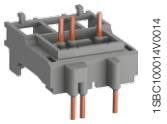
The addition of an overload relay on the contactor does not prevent fitting of many other accessories as shown above.
(1) Direct mounting - No kit required.

1SBC101750S0201 - Rev. A

AF09 ... AF96 2-stack 3-pole contactors
Main accessories

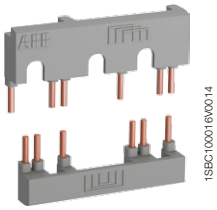
CAL4-11

VM4

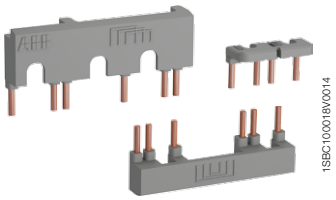


BEA16-4

TEF4-ON



BER16-4



BEY16-4

Ordering Details (1)

For contactors	Auxiliary contacts		Type	Order code		Pkg qty	Weight (1 pce) kg
Side-mounted instantaneous auxiliary contact blocks							
AF09 ... AF96	1 1	– –	CAL4-11	1SBN010120R1011		1	0.040
	1 1	– –	CAL4-11-T	1SBN010120T1011		10	0.040
Mechanical interlock unit							
AF09 ... AF38			VM4	1SBN030105T1000		10	0.005
AF40 ... AF96			VM96-4	1SBN033405T1000		10	0.006

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

For contactors	Time delay range selected by switch	Delay type	Auxiliary contacts	Type	Order code		Pkg qty	Weight (1 pce) kg
Electronic timers								
AF40 ... AF96-30-11	0.1...1 s 1...10 s 10...100 s	ON-delay	1 1	TEF4-ON	1SBN020112R1000		1	0.065
		OFF-delay	1 1	TEF4-OFF	1SBN020114R1000		1	0.065

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

Connecting links with manual motor starters						
AF09 ... AF16	with	MS116-0.16 ... MS116-25, MS132-0.16 ... MS132-25	BEA16-4	1SBN081306T1000	10	0.025
AF26 ... AF38	with	MS116-0.16 ... MS116-16, MS132-0.16 ... MS132-10	BEA26-4	1SBN082306T1000	10	0.025
	with	MS116-20 ... MS116-32, MS132-12 ... MS132-32	BEA38-4	1SBN082306T2000	10	0.030
AF40 ... AF65	with	MS165-16 ... MS165-65	BEA65-4	1SBN083406R1000	1	0.090
Connection sets for reversing contactors						
AF09 ... AF16			BER16-4	1SBN081311R1000	1	0.045
AF26 ... AF38			BER38-4	1SBN082311R1000	1	0.100
AF40 ... AF65			BER65-4	1SBN083411R1000	1	0.175
AF80 ... AF96			BER96-4	1SBN083911R1000	1	0.250
Connection sets for star-delta starting						
AF09 ... AF16	with or without VM4		BEY16-4	1SBN081313R2000	1	0.050
AF26 ... AF38	with or without VM4		BEY38-4	1SBN082713R2000	1	0.110
AF40 ... AF65	with or without VM96-4		BEY65-4	1SBN083413R2000	1	0.200
AF80 ... AF96	with or without VM96-4		BEY96-4	1SBN083913R2000	1	0.250

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

1SBC101751S0201 - Rev. A

AF116 ... AF146 3-pole contactors
55 to 75 kW
AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts

AF146-30-22

AF146-30-22B

Description

AF116 ... AF140 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC and AF116 ... AF146 up to 260 V DC. These contactors are of the block type design with 3 main poles.

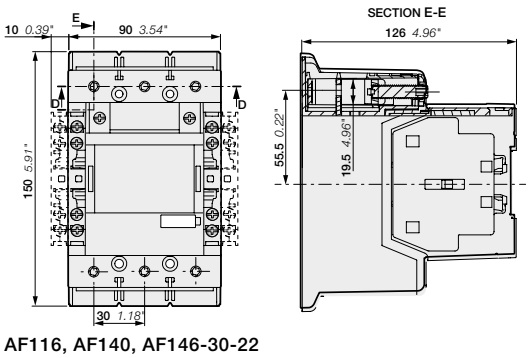
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption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

Ordering details

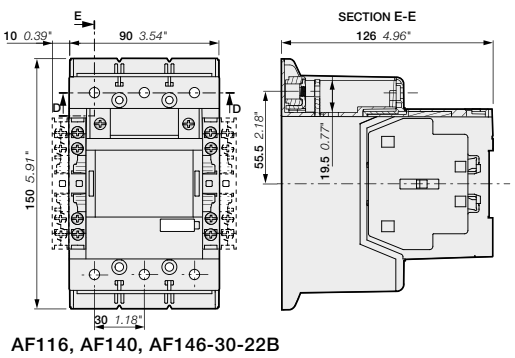
IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code		Weight Pkg (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							
kW	A	hp	A	V 50/60 Hz	V DC					kg
For connection with built-in cable clamps										
55	160	75	160	24...60	20...60	2 2	AF116-30-22-11	1SFL427001R1122		1.750
				48...130	48...130	2 2	AF116-30-22-12	1SFL427001R1222		1.750
				100...250	100...250	2 2	AF116-30-22-13	1SFL427001R1322		1.750
				250...500	250...500	2 2	AF116-30-22-14	1SFL427001R1422		1.750
75	200	100	200	24...60	20...60	2 2	AF140-30-22-11	1SFL447001R1122		1.750
				48...130	48...130	2 2	AF140-30-22-12	1SFL447001R1222		1.750
				100...250	100...250	2 2	AF140-30-22-13	1SFL447001R1322		1.750
				250...500	250...500	2 2	AF140-30-22-13	1SFL447001R1422		1.750
75	225	100	200	24...60	20...60	2 2	AF146-30-22-11	1SFL467001R1122		1.750
				48...130	48...130	2 2	AF146-30-22-12	1SFL467001R1222		1.750
				100...250	100...250	2 2	AF146-30-22-13	1SFL467001R1322		1.750
				250...500	250...500	2 2	AF146-30-22-14	1SFL467001R1422		1.750
With bar connections										
55	160	75	160	24...60	20...60	2 2	AF116-30-22B-11	1SFL427002R1122		1.500
				48...130	48...130	2 2	AF116-30-22B-12	1SFL427002R1222		1.500
				100...250	100...250	2 2	AF116-30-22B-13	1SFL427002R1322		1.500
				250...500	250...500	2 2	AF116-30-22B-14	1SFL427002R1422		1.500
75	200	100	200	24...60	20...60	2 2	AF140-30-22B-11	1SFL447002R1122		1.500
				48...130	48...130	2 2	AF140-30-22B-12	1SFL447002R1222		1.500
				100...250	100...250	2 2	AF140-30-22B-13	1SFL447002R1322		1.500
				250...500	250...500	2 2	AF140-30-22B-14	1SFL447002R1422		1.500
75	225	100	200	24...60	20...60	2 2	AF146-30-22B-11	1SFL467002R1122		1.500
				48...130	48...130	2 2	AF146-30-22B-12	1SFL467002R1222		1.500
				100...250	100...250	2 2	AF146-30-22B-13	1SFL467002R1322		1.500
				250...500	250...500	2 2	AF146-30-22B-14	1SFL467002R1422		1.500

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

Main dimensions mm, *inches*



AF116, AF140, AF146-30-22



AF116, AF140, AF146-30-22B

1SFC101092C0201 - Rev. D

AF116 ... AF146 3-pole contactors with built-in PLC interface
55 to 75 kW
AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts

AF146-30-22

AF146-30-22B

Description

AF116 ... AF146 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC and AF116 ... AF146 up to 260 V DC. These contactors are of the block type design with 3 main poles.

– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 2 coils to cover control voltages between 100...500 V 50/60 Hz and 100...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
– built-in surge suppression
– add-on auxiliary contact blocks for side mounting and a wide range of accessories.

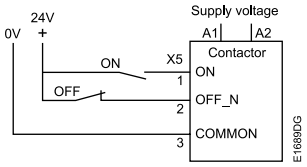
Ordering details

IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code		Weight Pkg (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							
kW	A	hp	A	V 50/60 Hz	V DC					kg
For connection with built-in cable clamps										
55	160	75	160	100...250	100...250	2 2	AF116-30-22-33	1SFL427001R3322		1.750
				250...500	250...500	2 2	AF116-30-22-34	1SFL427001R3422		1.750
75	200	100	200	100...250	100...250	2 2	AF140-30-22-33	1SFL447001R3322		1.750
				250...500	250...500	2 2	AF140-30-22-34	1SFL447001R3422		1.750
75	225	100	200	100...250	100...250	2 2	AF146-30-22-33	1SFL467001R3322		1.750
				250...500	250...500	2 2	AF146-30-22-34	1SFL467001R3422		1.750
With bar connections										
55	160	75	160	100...250	100...250	2 2	AF116-30-22B-33	1SFL427002R3322		1.500
				250...500	250...500	2 2	AF116-30-22B-34	1SFL427002R3422		1.500
75	200	100	200	100...250	100...250	2 2	AF140-30-22B-33	1SFL447002R3322		1.500
				250...500	250...500	2 2	AF140-30-22B-34	1SFL447002R3422		1.500
75	225	100	200	100...250	100...250	2 2	AF146-30-22B-33	1SFL467002R3322		1.500
				250...500	250...500	2 2	AF146-30-22B-34	1SFL467002R3422		1.500

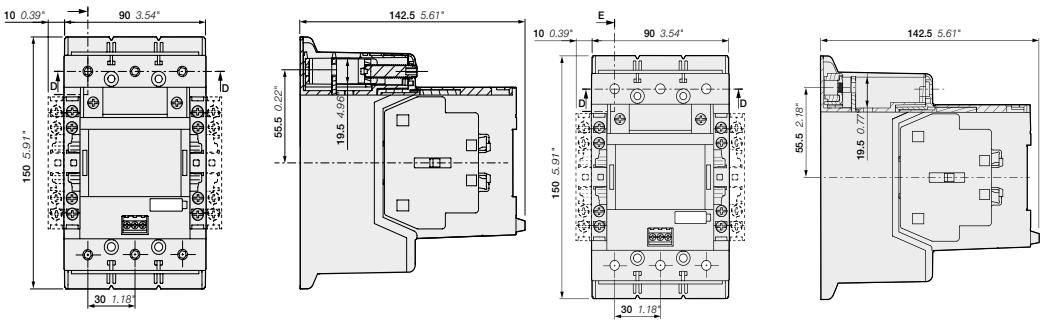
(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.

AF116 ... AF146 are equipped with low voltage inputs for control, for example by a PLC.

Control inputs



Main dimensions mm, *inches*



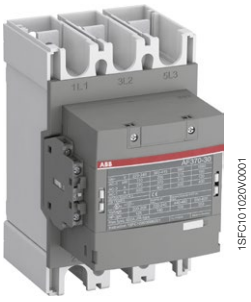
AF116, AF140, AF146-30-22

AF116, AF140, AF146-30-22B

1SFC101168C0201 - Rev. A

AF190 ... AF370 3-pole contactors
90 to 200 kW
AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts

AF205-30-22



AF370-30-22

5

Description

AF190 ... AF370 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and up to 340 V DC. These contactors are of the block type design with 3 main poles.

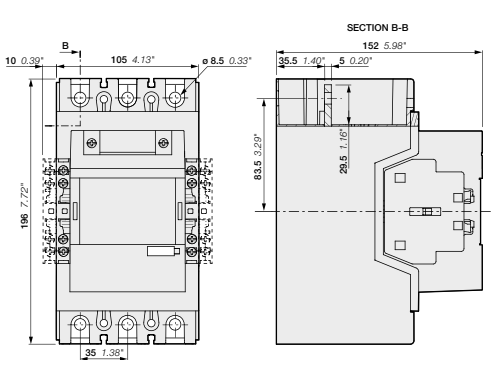
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption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

Ordering details

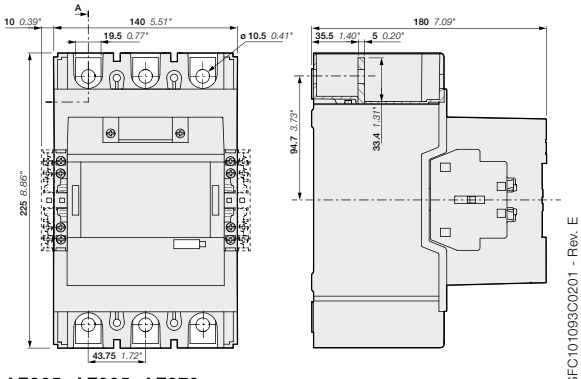
IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC					kg
90	275	125	250	24...60	20...60	2 2	AF190-30-22-11	1SFL487002R1122		3.000
				48...130	48...130	2 2	AF190-30-22-12	1SFL487002R1222		3.000
				100...250	100...250	2 2	AF190-30-22-13	1SFL487002R1322		3.000
				250...500	250...500	2 2	AF190-30-22-14	1SFL487002R1422		3.000
110	350	150	300	24...60	20...60	2 2	AF205-30-22-11	1SFL527002R1122		3.000
				48...130	48...130	2 2	AF205-30-22-12	1SFL527002R1222		3.000
				100...250	100...250	2 2	AF205-30-22-13	1SFL527002R1322		3.000
				250...500	250...500	2 2	AF205-30-22-14	1SFL527002R1422		3.000
132	400	200	350	24...60	20...60	2 2	AF265-30-22-11	1SFL547002R1122		4.675
				48...130	48...130	2 2	AF265-30-22-12	1SFL547002R1222		4.675
				100...250	100...250	2 2	AF265-30-22-13	1SFL547002R1322		4.675
				250...500	250...500	2 2	AF265-30-22-14	1SFL547002R1422		4.675
160	500	250	400	24...60	20...60	2 2	AF305-30-22-11	1SFL587002R1122		4.675
				48...130	48...130	2 2	AF305-30-22-12	1SFL587002R1222		4.675
				100...250	100...250	2 2	AF305-30-22-13	1SFL587002R1322		4.675
				250...500	250...500	2 2	AF305-30-22-14	1SFL587002R1422		4.675
200	600	300	520	24...60	20...60	2 2	AF370-30-22-11	1SFL607002R1122		4.675
				48...130	48...130	2 2	AF370-30-22-12	1SFL607002R1222		4.675
				100...250	100...250	2 2	AF370-30-22-13	1SFL607002R1322		4.675
				250...500	250...500	2 2	AF370-30-22-14	1SFL607002R1422		4.675

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

Main dimensions mm, *inches*



AF190, AF205

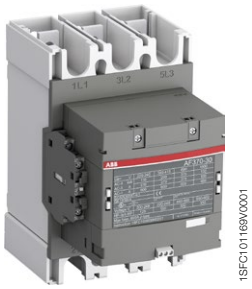


AF265, AF305, AF370

1SFC101093C0201 - Rev. E

AF190 ... AF370 3-pole contactors with built-in PLC interface
90 to 200 kW
AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts

AF205-30-22



AF370-30-22

Description

AF190 ... AF370 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and up to 340 V DC. These contactors are of the block type design with 3 main poles.

– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 2 coils to cover control voltages between 100...500 V 50/60 Hz and 100...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
– built-in surge suppression
– add-on auxiliary contact blocks for side mounting and a wide range of accessories.

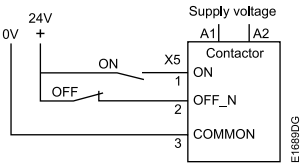
Ordering details

IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC					kg
90	275	125	250	100...250	100...250	2 2	AF190-30-22-33	1SFL487002R3322		3.000
				250...500	250...500	2 2	AF190-30-22-34	1SFL487002R3422		3.000
110	350	150	300	100...250	100...250	2 2	AF205-30-22-33	1SFL527002R3322		3.000
				250...500	250...500	2 2	AF205-30-22-34	1SFL527002R3422		3.000
132	400	200	350	100...250	100...250	2 2	AF265-30-22-33	1SFL547002R3322		4.675
				250...500	250...500	2 2	AF265-30-22-34	1SFL547002R3422		4.675
160	500	250	400	100...250	100...250	2 2	AF305-30-22-33	1SFL587002R3322		4.675
				250...500	250...500	2 2	AF305-30-22-34	1SFL587002R3422		4.675
200	600	300	520	100...250	100...250	2 2	AF370-30-22-33	1SFL607002R3322		4.675
				250...500	250...500	2 2	AF370-30-22-34	1SFL607002R3422		4.675

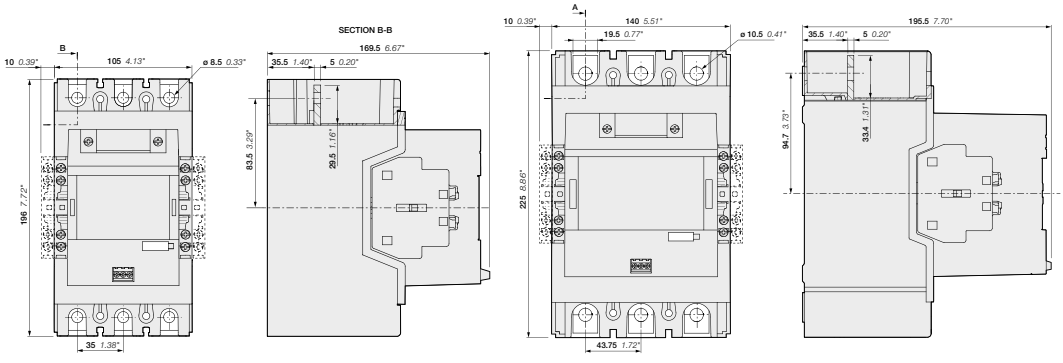
(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.

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

Control inputs



Main dimensions mm, *inches*



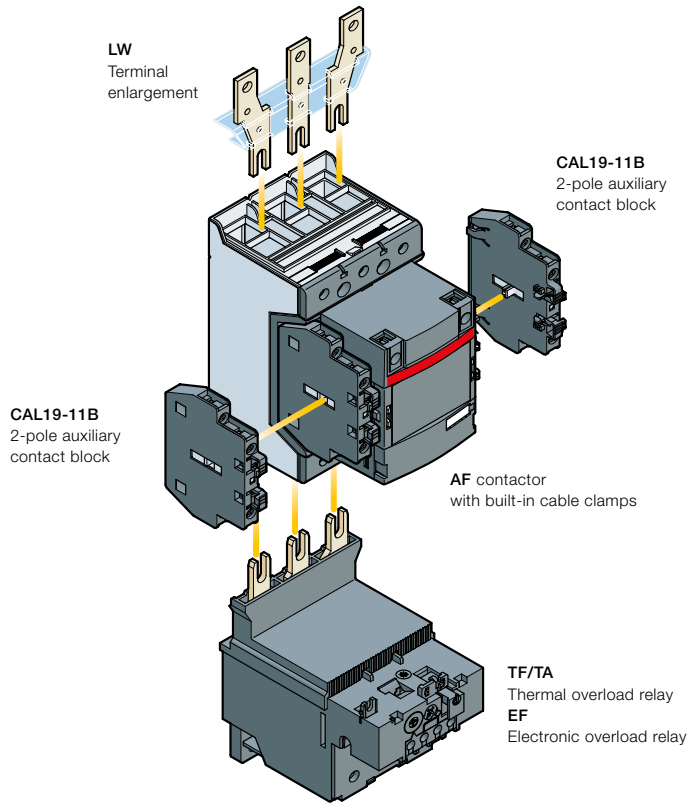
AF190, AF205

AF265, AF305, AF370

1SFC101169C0201 - Rev. A

AF116 ... AF370 3-pole contactors
with 2 N.O. + 2 N.C. auxiliary contacts
Main accessories

Main accessories (other accessories available)



Main accessory fitting details

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

(2) The CEL19 auxiliary contact blocks can replace the CAL19-11 and CAL19-11B. Though, no auxiliary contact block can be mounted outside the CEL19.

Overload relays fitting details (1)

Contactor types	Thermal overload relays	Electronic overload relays
AF116 ... AF140	TF140DU (66...142 A)	EF146 (54...150 A)
AF146	–	EF146 (54...150 A)
AF190, AF205	TA200DU (66...200 A)	EF205 (63...210 A)
AF265 ... AF370	–	EF370 (115...380 A)

The addition of a thermal or electronic overload relay on the contactor does not prevent fitting of many other accessories as shown in "Main accessory fitting details" table.
(1) Direct mounting - No kit required.

1SFC101133C0201 - Rev. B

AF116 ... AF370 3-pole contactors
with 2 N.O. + 2 N.C. auxiliary contacts
Main accessories

1SFC101071V0001

CAL19-11

1SFC101041V0001

LT370-30C

1SFC101049V0001

LX140

Ordering details (1)

For contactors	Auxiliary contacts	Type	Order code		Pkg qty	Weight (1 pce) kg
Side-mounted instantaneous auxiliary contact blocks						
AF116 ... AF370	1 1	CAL19-11B	1SFN010820R3311		2	0.050
Terminal shrouds						
AF116 ... AF146, with compression lugs		LT140-30L	1SFN124203R1000		2	0.070
AF190, AF205, with cable clamps		LT205-30C	1SFN124801R1000		2	0.050
AF190, AF205, with compression lugs		LT205-30L	1SFN124803R1000		2	0.220
AF190, AF205, with shorting bar or between contactor and TOL/EOL in DOL-starters		LT205-30Y	1SFN124804R1000		1	0.050
AF265 ... AF370, with cable clamps		LT370-30C	1SFN125401R1000		2	0.035
AF265 ... AF370, with compression lugs		LT370-30L	1SFN125403R1000		2	0.280
AF265 ... AF370, with shorting bar or between contactor and TOL/EOL in DOL-starters		LT370-30Y	1SFN125404R1000		1	0.075
AF265 ... AF370, for use with extending cable clamps, ATK300/2 and OZXB4		LT370-30D	1SFN125406R1000		1	0.150

For contactors	Dimensions hole Ø mm	bar mm	Type	Order code		Pkg qty	Weight (1 pce) kg
Terminal enlargements							
AF116...AF146	6.5	13 x 3	LW140	1SFN074207R1000		1	0.115
AF190...AF205	10.5	17.5 x 5	LW205	1SFN074807R1000		1	0.260
AF265...AF370	10.5	20 x 5	LW370	1SFN075407R1000		1	0.340
Terminal extension							
AF116...AF146	6.5	13 x 3	LX140	1SFN074210R1000		1	0.072
AF190...AF250	8.5	17.5 x 5	LX205	1SFN074810R1000		1	0.180
AF265...AF370	10.5	20 x 5	LX370	1SFN075410R1000		1	0.234

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

AF400 ... AF750 3-pole contactors
200 to 400 kW
AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts

AF460-30-22

AF750-30-22

5

Description

AF400 ... AF750 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC or 600 V DC (2). These contactors are of the block type design with 3 main poles.
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 48...500 V 50/60 Hz and 24...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltages sags (SEMI F47 conditions of use on request).
– built-in surge suppression
– add-on auxiliary contact blocks for side mounting and a wide range of accessories.

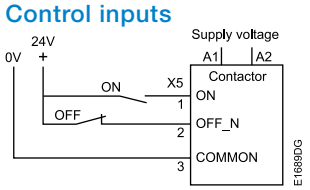
Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C 690 V AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC						kg
200	600	350	550	-	24...60	2	2	AF400-30-22	1SFL577001R6822 (1)		12.000
				48...130	48...130	2	2	AF400-30-22	1SFL577001R6922		12.000
				100...250	100...250	2	2	AF400-30-22	1SFL577001R7022		12.000
				250...500	250...500	2	2	AF400-30-22	1SFL577001R7122		12.000
250	700	400	650	-	24...60	2	2	AF460-30-22	1SFL597001R6822 (1)		12.000
				48...130	48...130	2	2	AF460-30-22	1SFL597001R6922		12.000
				100...250	100...250	2	2	AF460-30-22	1SFL597001R7022		12.000
				250...500	250...500	2	2	AF460-30-22	1SFL597001R7122		12.000
315	800	500	750	-	24...60	2	2	AF580-30-22	1SFL617001R6822 (1)		15.000
				48...130	48...130	2	2	AF580-30-22	1SFL617001R6922		15.000
				100...250	100...250	2	2	AF580-30-22	1SFL617001R7022		15.000
				250...500	250...500	2	2	AF580-30-22	1SFL617001R7122		15.000
400	1050	600	900	-	24...60	2	2	AF750-30-22	1SFL637001R6822 (1)		15.000
				48...130	48...130	2	2	AF750-30-22	1SFL637001R6922		15.000
				100...250	100...250	2	2	AF750-30-22	1SFL637001R7022		15.000
				250...500	250...500	2	2	AF750-30-22	1SFL637001R7122		15.000

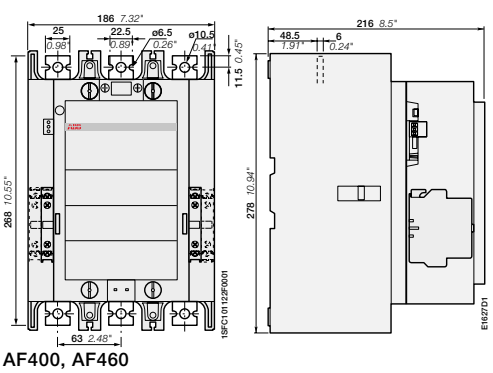
(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.
(2) Up to 850 V DC for AF580, AF750.

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

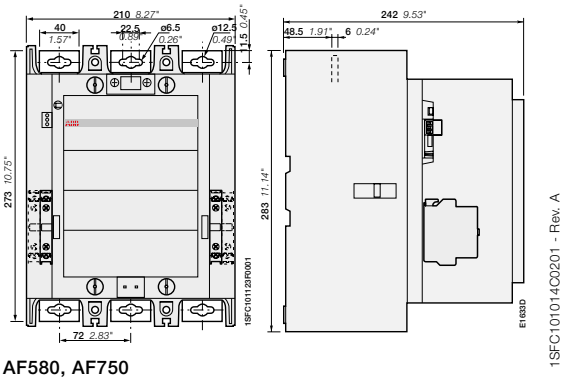
Control inputs



Main dimensions mm, *inches*



AF400, AF460



AF580, AF750

1SFC101014C0201 - Rev. A

AF1250 ... AF2650 3-pole contactors
475 to 560 kW and 1260 to 2650 A AC-1
AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts

AF1250-30-22

AF2650-30-22

Description

AF1250 ... AF2050 contactors are mainly used for controlling power circuits up to 1000 V AC or 850 V DC, AF2650 for controlling power up to 1000 V AC. These contactors are of the block type design with 3 main poles.

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

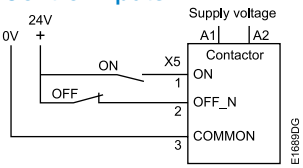
Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C 690 V AC-1	3-phase motor rating 480 V	General use rating 600 V AC (2)								Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC						kg
-	1260	-	1210	-	24...60	2	2	AF1250-30-22	1SFL647001R6822 (1)		16.000
				48...130	48...130	2	2	AF1250-30-22	1SFL647001R6922		16.000
				100...250	100...250	2	2	AF1250-30-22	1SFL647001R7022		16.000
				250...500	250...500	2	2	AF1250-30-22	1SFL647001R7122		16.000
475	1350	800	1350	100...250	100...250	2	2	AF1350-30-22	1SFL657001R7022		34.000
560	1650	900	1650	100...250	100...250	2	2	AF1650-30-22	1SFL677001R7022		35.000
-	2050	-	2100	100...250	100...250	2	2	AF2050-30-22	1SFL707001R7022		35.000
-	2650	-	2700	100...250	100...250	2	2	AF2650-30-22	1SFL667001R7022		45.000

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

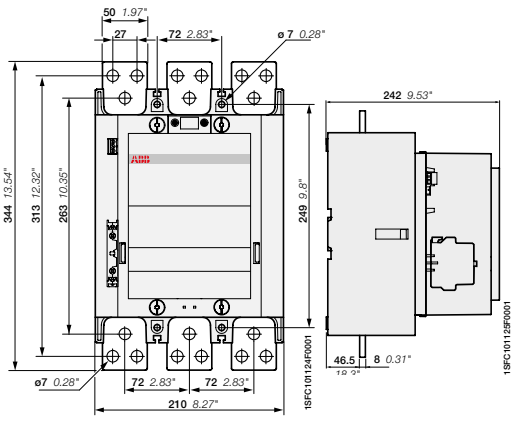
AF1250 ... AF2650 are equipped with low voltage inputs for control, for example by a PLC.

Control inputs

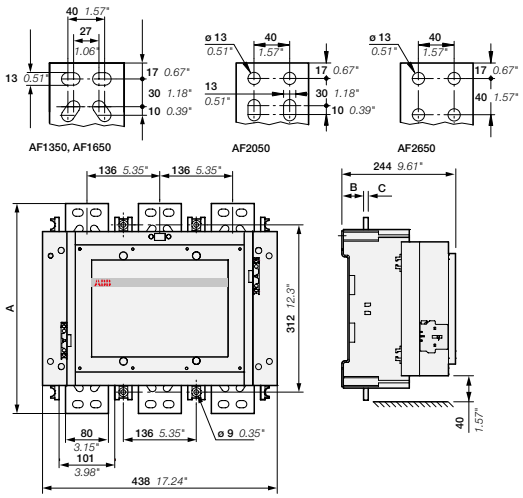


	AF1350, AF1650, AF2050	AF2650
A	392 mm / *15.43*"	422 mm / *16.61*"
B	47 mm / *1.85*"	53 mm / *2.11*"
C	10 mm / *0.39*"	25 mm / *0.98*"

Main dimensions mm, *inches*



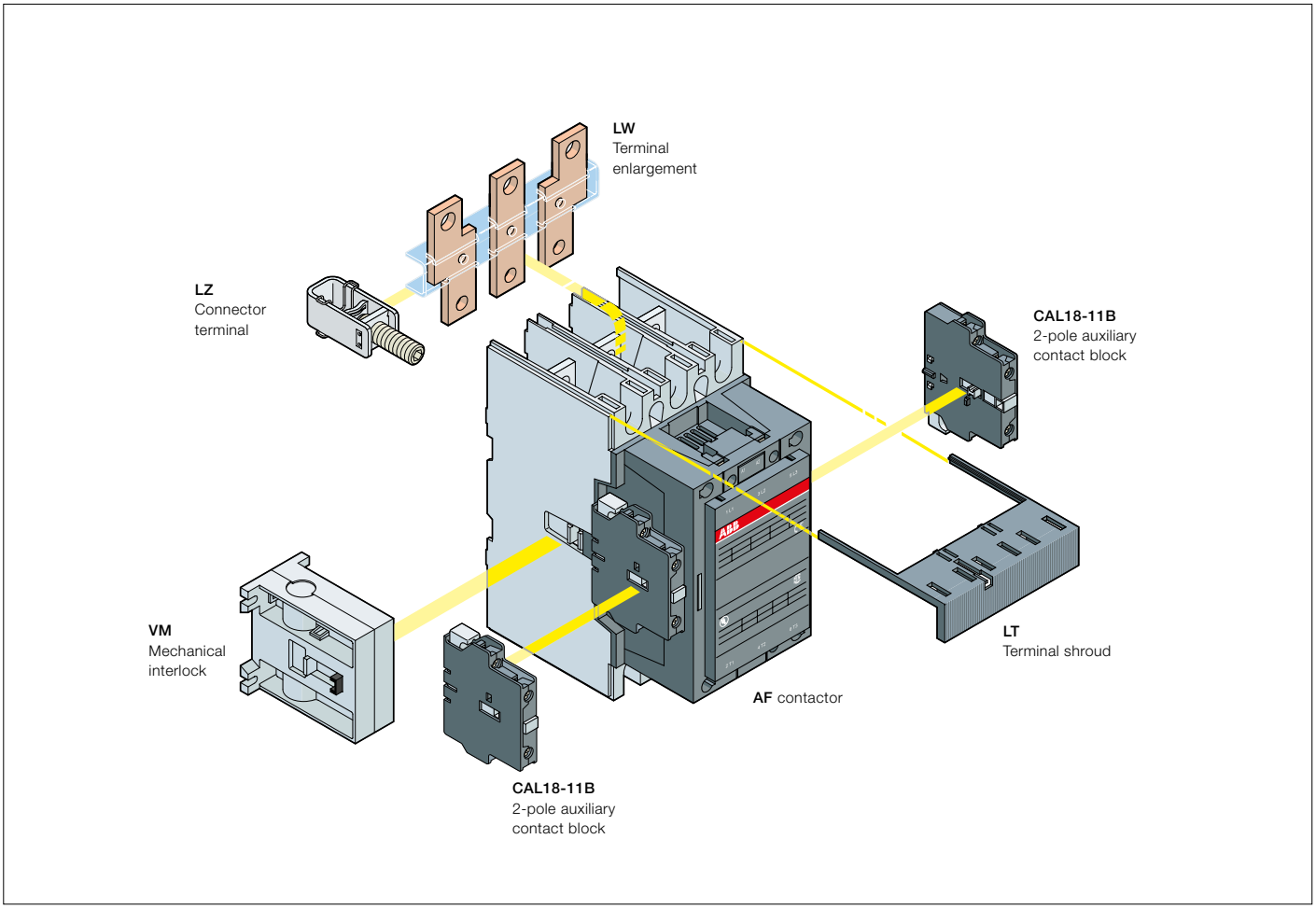
AF1250



AF1350, AF1650, AF2050, AF2650

AF400... AF2650 3-pole contactors
with 2 N.O. + 2 N.C. auxiliary contacts
Main accessories

Main accessories (other accessories available)



Main accessory fitting details

Contactor types	Main poles	Available auxiliary contacts	Side-mounted accessories Auxiliary contact blocks CAL18-11	CAL18-11B (2)		Mechanical interlock units (between two contactors)
Contactors + auxiliary contact blocks						
AF145 ... AF2650	3 0	2 2	2 x CAL18-11 included	2 x CAL18-11B		–
Contactors with mechanical interlocking + auxiliary contact blocks						
AF400 ... AF2650	3 0	2 2	2 x CAL18-11 included	4 x CAL18-11B	+	VM...H (1)

(1) Interlock type, according to the contactor ratings (see "Accessories").
(2) The CEL18-.. auxiliary contact blocks can replace the CAL18-11 and CAL18-11B. Though, no auxiliary contact block can be mounted outside the CEL18-..

Overload relays fitting details

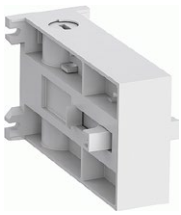
Contactor types	Thermal overload relays	Electronic overload relays
AF400, AF460	–	EF460 (150...500 A) (3)
AF580, AF750	–	EF750 (250...800 A) (3)
AF1350, AF1650	–	E1250DU (375...1250 A) (3)

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

1SFC101127C0201 - Rev. A

AF400 ... AF2650 3-pole contactors
with 2 N.O. + 2 N.C. auxiliary contacts
Main accessories

CAL18-11



VM750H

LT460-AC

Ordering details (1)

For contactors	Auxiliary contacts	Type	Order code		Pkg qty	Weight (1 pce) kg
Side-mounted instantaneous auxiliary contact blocks						
AF400 ... AF2650	1 1	CAL18-11B	1SFN010720R3311		2	0.050
Mechanical interlock unit						
AF400 ... AF1250		VM750H	1SFN035700R1000		1	0.200
AF1350 ... AF2650		VM1650H	1SFN036503R1001		1	6.000
Terminal shrouds						
AF400, AF460 with connectors		LT460-AC	1SFN125701R1000		2	0.100
AF400, AF460 with lugs		LT460-AL	1SFN125703R1000		2	0.800
AF580 ... AF750 with connectors		LT750-AC	1SFN126101R1000		2	0.120
AF580 ... AF750 with lugs		LT750-AL	1SFN126103R1000		2	0.825

For contactors	Dimensions hole Ø mm	bar mm	Type	Order code		Pkg qty	Weight (1 pce) kg
Terminal enlargements							
AF400, AF460	10.5	25 x 5	LW460	1SFN075707R1000		1	0.730
AF580, AF750	13	40 x 6	LW750	1SFN076107R1000		1	1.230
AF1250	13	50 x 10	LW1250	1SFN076407R1000		1	2.000
Terminal extension							
AF400, AF460	10.5	25 x 5	LX460	1SFN075710R1000		1	0.500
AF580, AF750	13	40 x 6	LX750	1SFN076110R1000		1	0.850

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

AF09 ... AF38 3-pole contactors
Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1					
Rated operational voltage Ue max.		690 V					
Rated frequency (without derating)		50 / 60 Hz					
Conventional free-air thermal current Ith							
acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C		35 A	35 A	35 A	50 A	50 A	50 A
With conductor cross-sectional area		6 mm²	6 mm²	6 mm²	10 mm²	10 mm²	10 mm²
AC-1 Utilization category							
For air temperature close to contactor							
Ie / Rated operational current AC-1	**θ ≤ 40 °C**	25 A	28 A	30 A	45 A	50 A	50 A
Ue max. ≤ 690 V, 50/60 Hz	**θ ≤ 60 °C**	25 A	28 A	30 A	40 A	42 A	42 A
	θ ≤ 70 °C	22 A	24 A	26 A	32 A	37 A	37 A
With conductor cross-sectional area		4 mm²	6 mm²	6 mm²	10 mm²	10 mm²	10 mm²
AC-3 Utilization category							
For air temperature close to contactor θ ≤ 60 °C							
Ie / Max. rated operational current AC-3 (1)							
	220-230-240 V	9 A	12 A	18 A	26 A	33 A	40 A
	380-400 V	9 A	12 A	18 A	26 A	32 A	38 A
3-phase motors	**415 V**	9 A	12 A	18 A	26 A	32 A	38 A
	440 V	9 A	12 A	18 A	26 A	32 A	38 A
	500 V	9.5 A	12.5 A	15 A	23 A	28 A	33 A
	690 V	7 A	9 A	10.5 A	17 A	21 A	24 A
Rated operational power AC-3 (1)							
	220-230-240 V	2.2 kW	3 kW	4 kW	6.5 kW	9 kW	11 kW
	380-400 V	4 kW	5.5 kW	7.5 kW	11 kW	15 kW	18.5 kW
1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors	**415 V**	4 kW	5.5 kW	9 kW	11 kW	15 kW	18.5 kW
	440 V	4 kW	5.5 kW	9 kW	15 kW	18.5 kW	22 kW
	500 V	5.5 kW	7.5 kW	9 kW	15 kW	18.5 kW	22 kW
	690 V	5.5 kW	7.5 kW	9 kW	15 kW	18.5 kW	22 kW
Rated making capacity AC-3		10 x Ie AC-3 acc. to IEC 60947-4-1					
Rated breaking capacity AC-3		8 x Ie AC-3 acc. to IEC 60947-4-1					
AC-8a Utilization category							
(without thermal overload relay - Ue 400 V 50/60 Hz - θ ≤ 40 °C)							
Ie / Rated operational current AC-8a		12 A	16 A	22 A	30 A	40 A	50 A
Rated operational power AC-8a		5.5 kW	7.5 kW	11 kW	15 kW	20 kW	25 kW
Short-circuit protection device for contactors							
without thermal overload relay - Motor protection excluded (2)							
Ue ≤ 500 V AC - gG type fuse		25 A	32 A	32 A	50 A	63 A	63 A
Rated short-time withstand current Icw	**1 s**	300 A	300 A	300 A	700 A	700 A	700 A
at 40 °C ambient temperature,	**10 s**	150 A	150 A	150 A	350 A	350 A	350 A
in free air from a cold state	**30 s**	80 A	80 A	80 A	225 A	225 A	225 A
	1 min	60 A	60 A	60 A	150 A	150 A	150 A
	15 min	35 A	35 A	35 A	50 A	50 A	50 A
Maximum breaking capacity							
cos φ = 0.45	**at 440 V**	250 A	250 A	250 A	500 A	500 A	500 A
	at 690 V	106 A	106 A	106 A	200 A	200 A	200 A
Power dissipation per pole	**Ie / AC-1**	0.8 W	1 W	1.2 W	1.8 W	2.4 W	2.4 W
	Ie / AC-3	0.1 W	0.2 W	0.35 W	0.6 W	0.9 W	1.3 W
Max. electrical switching frequency	**AC-1**	600 cycles/h					
	AC-3	1200 cycles/h					
	AC-2, AC-4	300 cycles/h			150 cycles/h		

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

1SBC101425S0201 - Rev. A

AF40 ... AF96 3-pole contactors
Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC / DC operated	AF40	AF52	AF65	AF80	AF96
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1				
Rated operational voltage Ue max.		690 V			1000 V	
Rated frequency (without derating)		50 / 60 Hz				
Conventional free-air thermal current Ith						
acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C		105 A	105 A	105 A	130 A	130 A
With conductor cross-sectional area		35 mm²	35 mm²	35 mm²	50 mm²	50 mm²
AC-1 Utilization category						
For air temperature close to contactor						
Ie / Rated operational current AC-1	**θ ≤ 40 °C**	70 A	100 A	105 A	125 A	130 A
Ue max. ≤ 690 V, 50/60 Hz	**θ ≤ 60 °C**	60 A	80 A	90 A	100 A	105 A
	θ ≤ 70 °C	50 A	70 A	80 A	85 A	90 A
With conductor cross-sectional area		25 mm²	35 mm²	35 mm²	50 mm²	50 mm²
AC-3 Utilization category						
For air temperature close to contactor θ ≤ 60 °C						
Ie / Max. rated operational current AC-3 (1)						
	220-230-240 V	40 A	53 A	65 A	80 A	96 A
	380-400 V	40 A	53 A	65 A	80 A	96 A
3-phase motors	**415 V**	40 A	53 A	65 A	80 A	96 A
	440 V	40 A	53 A	65 A	80 A	96 A
	500 V	35 A	45 A	55 A	65 A	80 A
	690 V	25 A	35 A	39 A	49 A	57 A
	1000 V	-	-	-	25 A	30A
Rated operational power AC-3 (1)						
	220-230-240 V	11 kW	15 kW	18.5 kW	22 kW	25 kW
	380-400 V	18.5 kW	22 kW	30 kW	37 kW	45 kW
1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors	**415 V**	22 kW	30 kW	37 kW	45 kW	55 kW
	440 V	22 kW	30 kW	37 kW	45 kW	55 kW
	500 V	22 kW	30 kW	37 kW	45 kW	55 kW
	690 V	22 kW	30 kW	37 kW	45 kW	55 kW
	1000 V	-	-	-	35 kW	40 kW
Rated making capacity AC-3		10 x Ie AC-3 acc. to IEC 60947-4-1				
Rated breaking capacity AC-3		8 x Ie AC-3 acc. to IEC 60947-4-1				
AC-8a Utilization category						
(without thermal overload relay - Ue 400 V 50/60 Hz - θ ≤ 40 °C)						
Ie / Rated operational current AC-8a		53 A	70 A	85 A	105 A	120 A
Rated operational power AC-8a		25 kW	37 kW	45 kW	55 kW	65 kW
Short-circuit protection device for contactors						
without thermal overload relay - Motor protection excluded (2)						
Ue ≤ 500 V AC - gG type fuse		100 A	125 A	160 A	160 A	200 A
Rated short-time withstand current Icw	**1 s**	1000 A	1000 A	1000 A	1200 A	1200 A
at 40 °C ambient temperature,	**10 s**	600 A	600 A	600 A	780 A	780 A
in free air from a cold state	**30 s**	350 A	350 A	350 A	450 A	450 A
	1 min	250 A	250 A	250 A	300 A	300 A
	15 min	110 A	110 A	110 A	140 A	140 A
Maximum breaking capacity						
cos φ = 0.45	**at 440 V**	950 A	950 A	950 A	1150 A	1150 A
	at 690 V	600 A	600 A	600 A	750 A	750 A
Power dissipation per pole	**Ie / AC-1**	3 W	6.3 W	7 W	7.6 W	8.2 W
	Ie / AC-3	1 W	1.7 W	2.7 W	3 W	4.5 W
Max. electrical switching frequency	**AC-1**	600 cycles/h				
	AC-3	1200 cycles/h				
	AC-2, AC-4	150 cycles/h				

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

1SBC101743S0201 - Rev. B

AF116 ... AF370 3-pole contactors
Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC / DC operated	AF116	AF140	AF146	AF190	AF205	AF265	AF305	AF370
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1							
Rated operational voltage Ue max.		690 V	690 V	1000 V	1000 V	1000 V	1000 V	1000 V	1000 V
Rated frequency (without derating)		50 / 60 Hz							
Conventional free-air thermal current Ith									
acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C		160 A	200 A	225 A	275 A	350 A	400 A	500 A	600 A
With conductor cross-sectional area		70 mm²	95 mm²	95 mm²	150 mm²	240 mm² (3)	240 mm²	300 mm² (4)	2 x 185 mm² (4)
AC-1 Utilization category									
For air temperature close to contactor									
Ie / Rated operational current AC-1	**θ ≤ 40 °C**	160 A	200 A	225 A	275 A	350 A	400 A	500 A	600 A
Ue max. ≤ 690 V, 50/60 Hz	**θ ≤ 60 °C**	145 A	175 A	200 A	250 A	300 A	350 A	400 A	500 A
	θ ≤ 70 °C	130 A	160 A	175 A	200 A	240 A	290 A	325 A	400 A
Ie / Rated operational current AC-1	**θ ≤ 40 °C**	–	–	225 A	250 A	275 A	350 A	375 A	400 A
Ue max. ≤ 1000 V, 50/60 Hz	**θ ≤ 60 °C**	–	–	200 A	225 A	250 A	300 A	325 A	350 A
	θ ≤ 70 °C	–	–	175 A	185 A	200 A	240 A	260 A	290 A
With conductor cross-sectional area		70 mm²	95 mm²	95 mm²	150 mm²	240 mm² (3)	240 mm²	300 mm² (4)	2 x 185 mm² (4)
AC-3 Utilization category									
For air temperature close to contactor θ ≤ 60 °C									
Ie / Max. rated operational current AC-3 (1)									
	220-230-240 V	116 A	140 A	146 A	190 A	205 A	265 A	305 A	370 A
	380-400 V	116 A	140 A	146 A	190 A	205 A	265 A	305 A	370 A
M 3~ 3-phase motors	**415 V**	116 A	140 A	146 A	190 A	205 A	265 A	305 A	370 A
	440 V	116 A	140 A	146 A	190 A	205 A	265 A	305 A	370 A
	500 V	110 A	130 A	130 A	135 A	165 A	250 A	290 A	315 A
	690 V	65 A	80 A	93 A	135 A	165 A	250 A	290 A	315 A
	1000 V	–	–	60 A	85 A	100 A	100 A	100 A	100 A
Rated operational power AC-3 (1)									
	220-230-240 V	30 kW	37 kW	45 kW	55 kW	55 kW	75 kW	90 kW	110 kW
	380-400 V	55 kW	75 kW	75 kW	90 kW	110 kW	132 kW	160 kW	200 kW
M 3~ 1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors	**415 V**	55 kW	75 kW	75 kW	90 kW	110 kW	132 kW	160 kW	200 kW
	440 V	75 kW	90 kW	90 kW	110 kW	132 kW	160 kW	160 kW	200 kW
	500 V	75 kW	90 kW	90 kW	90 kW	110 kW	200 kW	200 kW	250 kW
	690 V	55 kW	75 kW	90 kW	132 kW	160 kW	200 kW	250 kW	315 kW
	1000 V	–	–	75 kW	110 kW	132 kW	132 kW	132 kW	132 kW
Rated making capacity AC-3		10 x Ie AC-3 acc. to IEC 60947-4-1							
Rated breaking capacity AC-3		8 x Ie AC-3 acc. to IEC 60947-4-1							
Short-circuit protection device for contactors									
without thermal overload relay - Motor protection excluded (2)									
Ue ≤ 500 V AC - gG type fuse		250 A	315 A	315 A	355 A	400 A	500 A	500 A	630 A
Rated short-time withstand current Icw	**1 s**	1300 A	1460 A	1460 A	1900 A	2050 A	2650 A	3050 A	3700 A
at 40 °C ambient temperature,	**10 s**	928 A	1168 A	1168 A	1520 A	1640 A	2120 A	2440 A	2960 A
in free air from a cold state	**30 s**	536 A	674 A	674 A	878 A	947 A	1224 A	1409 A	1709 A
	1 min	379 A	477 A	477 A	621 A	670 A	865 A	996 A	1208 A
	15 min	160 A	200 A	225 A	275 A	350 A	400 A	500 A	600 A
Maximum breaking capacity									
cos φ = 0.45	**at 440 V**	2000 A	3000 A	3000 A	3300 A	3500 A	3800 A	4600 A	5000 A
(cos φ = 0.35 for Ie > 100 A)	**at 690 V**	1000 A	1500 A	1500 A	2200 A	2500 A	3300 A	3800 A	4000 A
Power dissipation per pole	**Ie / AC-1**	12 W	18 W	23 W	15 W	25 W	32 W	50 W	72 W
	Ie / AC-3	6 W	9 W	10 W	7 W	8 W	14 W	19 W	27 W
Maximum electrical switching frequency	**AC-1**	300 cycles/h							
	AC-3	300 cycles/h							
	AC-2, AC-4	150 cycles/h							

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".
(3) For currents above 275A use terminal enlargements or terminal extensions.
(4) For currents above 450A use terminal enlargements or terminal extensions.

1SFC101108C0201 - Rev. A

AF400 … AF2650 3-pole contactors
Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC / DC operated	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1								
Rated operational voltage Ue max.		1000 V								
Rated frequency (without derating)		50/60 Hz								
Conventional free-air thermal current Ith										
acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C		600 A	700 A	800 A	1050 A	1260 A	1350 A	1650 A	2050 A	2650 A
With conductor cross-sectional area (3)		2x185 mm²	2x240 mm²	2x240 mm²	800 mm² (4)	1000 mm² (4)	1000 mm² (5)	1500 mm² (5)	2000 mm² (5)	3000 mm² (5)
AC-1 Utilization category										
For air temperature close to contactor										
Ie / Rated operational current AC-1	**θ ≤ 40 °C**	600 A	700 A	800 A	1050 A	1260 A	1350 A	1650 A	2050 A	2650 A
Ue max. ≤ 690 V, 50/60 Hz	**θ ≤ 55 °C**	500 A	600 A	700 A	875 A	1040 A	1150 A	1450 A	1750 A	2350 A
	θ ≤ 70 °C	400 A	480 A	580 A	720 A	875 A	1000 A	1270 A	1500 A	2120 A
Ie / Rated operational current AC-1	**θ ≤ 40 °C**	600 A	700 A	800 A	1000 A	1260 A	1350 A	1650 A	2050 A	2650 A
Ue max. ≤ 1000 V, 50/60 Hz	**θ ≤ 55 °C**	500 A	600 A	700 A	875 A	1040 A	1150 A	1450 A	1750 A	2350 A
	θ ≤ 70 °C	400 A	480 A	580 A	720 A	875 A	1000 A	1270 A	1500 A	2120 A
With conductor cross-sectional area		2x185 mm²	2x240 mm²	2x240 mm²	800 mm² (4)	1000 mm² (4)	1000 mm² (5)	1500 mm² (5)	2000 mm² (5)	3000 mm² (5)
AC-3 Utilization category										
For air temperature close to contactor θ ≤ 55 °C										
Ie / Max. rated operational current AC-3 (1)										
	220-230-240 V	400 A	460 A	580 A	750 A	–	860 A	1060 A	1060 A	–
	380-400 V	400 A	460 A	580 A	750 A	–	860 A	1060 A	1060 A	–
M 3~ 3-phase motors	**415 V**	400 A	460 A	580 A	750 A	–	860 A	1060 A	1060 A	–
	440 V	400 A	460 A	580 A	750 A	–	860 A	1060 A	1060 A	–
	500 V	400 A	460 A	580 A	750 A	–	800 A	970 A	970 A	–
	690 V	350 A	400 A	500 A	650 A	–	800 A	970 A	970 A	–
	1000 V	155 A	200 A	250 A	300 A	–	375 A	400 A	425 A	–
Rated operational power AC-3 (1)										
	220-230-240 V	110 kW	132 kW	160 kW	220 kW	–	257 kW	315 kW	–	–
	380-400 V	200 kW	250 kW	315 kW	400 kW	–	475 kW	560 kW	–	–
M 3~ 1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors	**415 V**	220 kW	250 kW	355 kW	425 kW	–	500 kW	630 kW	630 kW	–
	440 V	220 kW	250 kW	355 kW	450 kW	–	560 kW	710 kW	710 kW	–
	500 V	250 kW	315 kW	400 kW	520 kW	–	560 kW	710 kW	–	–
	690 V	315 kW	355 kW	500 kW	600 kW	–	800 kW	1000 kW	1000 kW	–
	1000 V	220 kW	280 kW	355 kW	400 kW	–	560 kW	600 kW	630 kW	–
Rated making capacity AC-3		10 x Ie AC-3 acc. to IEC 60947-4-1								
Rated breaking capacity AC-3		8 x Ie AC-3 acc. to IEC 60947-4-1								
Short-circuit protection device for contactors										
without thermal overload relay										
Motor protection excluded (2)										
Ue ≤ 500 V AC - gG type fuse		630 A	800 A	1000 A	1000 A	Please consult us for coordination with circuit-breaker				
Rated short-time withstand current Icw	**1 s**	4600 A	4600 A	7000 A	7000 A	8000 A	10000 A	12000 A	12000 A	12000 A
at 40 °C ambient temperature,	**10 s**	4400 A	4400 A	6400 A	6400 A	7200 A	8000 A	10000 A	10000 A	10000 A
in free air from a cold state	**30 s**	3100 A	3100 A	4500 A	4500 A	5200 A	6000 A	7500 A	7500 A	7500 A
	1 min	2500 A	2500 A	3500 A	3500 A	4000 A	4500 A	5500 A	5500 A	5500 A
	15 min	840 A	840 A	1300 A	1300 A	1500 A	1600 A	2200 A	2200 A	2800 A
Maximum breaking capacity										
cos φ = 0.45	**at 440 V**	4000 A	5000 A	6000 A	7500 A		10000 A	12000 A	8400 A	8400 A
(cos φ = 0.35 for Ie > 100 A)	**at 690 V**	3500 A	4500 A	5000 A	7000 A		–	–	–	–
Power dissipation per pole	**Ie / AC-1**	30 W	42 W	32 W	50 W	80 W	80 W	80 W	125 W	200 W
	Ie / AC-3	16 W	21 W	17 W	28 W	–	50 W	50 W	–	–
Max. electrical switching frequency	**AC-1**	300 cycles/h		300 cycles/h		300 cycles/h	60 cycles/h		60 cycles/h	15 cycles/h
	AC-3	300 cycles/h		300 cycles/h		–	60 cycles/h		–	–
	AC-2, AC-4	60 cycles/h		60 cycles/h		–	60 cycles/h		–	–

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".
(3) Conductors with preparation.
(4) Max. connection bar width 50 mm.
(5) Max. connection bar width 100 mm.

1SFC101110C0201 - Rev. D

AF09 ... AF38 3-pole contactors
Technical data

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

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

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see “Motor rated operational powers and currents”.
(2) For contactors produced since week 49-2011.
(3) For contactors produced since week 36-2014.

1SBC101426S0201 - Rev. C

AF40 ... AF96 3-pole contactors
Technical data

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

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

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

1SBC101744S0201 - Rev. B

AF116 ... AF370 3-pole contactors
Technical data

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

Contactor types	AC / DC operated	AF116	AF140	AF146	AF190	AF205	AF265	AF305	AF370
Standards		UL 60947-1 / 60947-4-1 and CSA C 22.2 N°60947-1 / 60947-4-1							
Maximum operational voltage		600 V		1000 V					
NEMA size		–	4	–	–	–	5	–	–
NEMA continuous amp rating	Thermal current	–	135 A	–	–	–	270 A	–	–
NEMA maximum horse power ratings									
1-phase, 60 Hz	**115 V AC**	–	–	–	–	–	–	–	–
	230 V AC	–	–	–	–	–	–	–	–
NEMA maximum horse power ratings									
3-phase, 60 Hz	**200 V AC**	–	40 hp	–	–	–	75 hp	–	–
	230 V AC	–	50hp	–	–	–	100 hp	–	–
	460 V AC	–	100 hp	–	–	–	200 hp	–	–
	575 V AC	–	100 hp	–	–	–	200 hp	–	–
UL / CSA general use rating									
600 V AC		160 A	200 A	200 A	250 A	300 A	350 A	400 A	520 A
With conductor cross-sectional area		AWG 2/0	AWG 3/0	AWG 3/0	MCM 250	MCM 350 (2)	MCM 500	2//AWG 3/0	2//MCM 300
1 000 V AC		–	–	200 A	250 A	275 A	300 A	350 A	400 A
With conductor cross-sectional area		AWG 2/0	AWG 3/0	AWG 3/0	MCM 250	MCM 350 (2)	MCM 500	2//AWG 3/0	2//MCM 300
1 pole	**90 V DC**	160 A	200 A	200 A	–	–	–	–	–
	100 V DC	–	–	–	250 A	350 A	–	–	–
	110 V DC	–	–	–	–	–	400 A	500 A	520 A
2 poles in serie	**175 V DC**	160 A	200 A	200 A	–	–	–	–	–
	200 V DC	–	–	–	250 A	350 A	–	–	–
	225 V DC	–	–	–	–	–	400 A	500 A	520 A
3 poles in serie	**260 V DC**	160 A	200 A	200 A	–	–	–	–	–
	300 V DC	–	–	–	250 A	350 A	–	–	–
	340 V DC	–	–	–	–	–	400 A	500 A	520 A
With conductor cross-sectional area		AWG 2/0	AWG 3/0	AWG 3/0	MCM 250	MCM 350 (2)	MCM 500	2//AWG 3/0	2//MCM 300
UL / CSA maximum 1-phase motor rating									
Full load current	**120 V AC**	–	–	–	–	–	–	–	–
	240 V AC	–	–	–	–	–	–	–	–
Horse power rating	**120 V AC**	–	–	–	–	–	–	–	–
	240 V AC	–	–	–	–	–	–	–	–
UL / CSA maximum 3-phase motor rating									
Full load current (1)	**200-208 V AC**	92 A	120 A	120 A	150 A	177 A	221 A	285 A	359 A
	220-240 V AC	104 A	130 A	130 A	154 A	192 A	248 A	312 A	360 A
	440-480 V AC	96 A	124 A	124 A	156 A	180 A	240 A	302 A	361 A
	550-600 V AC	99 A	125 A	125 A	144 A	192 A	242 A	289 A	336 A
Horse power rating (1)	**200-208 V AC**	30 hp	40 hp	40 hp	50 hp	60 hp	75 hp	100 hp	125 hp
	220-240 V AC	40 hp	50 hp	50 hp	60 hp	75 hp	100 hp	125 hp	150 hp
	440-480 V AC	75 hp	100 hp	100 hp	125 hp	150 hp	200 hp	250 hp	300 hp
	550-600 V AC	100 hp	125 hp	125 hp	150 hp	200 hp	250 hp	300 hp	350 hp
Short-circuit protection device for contactors									
without thermal overload relay - Motor protection excluded									
High fault current		100 kA							
Fuse rating		225 A	250 A	250 A	350 A	400 A	500 A	600 A	600 A
Fuse type, 600 V		J							
Maximum electrical switching frequency									
For general use		300 cycles/h							
For motor use		300 cycles/h							

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
(2) For conductor cross-sectional area above MCM 300 use terminal enlargements LW205.

1SBC100068S0201 - Rev. A

AF400 ... AF2650 3-pole contactors
Technical data

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

Contactor types	AC / DC operated	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650
Standards		UL 60947-1 / 60947-4-1 and CSA C 22.2 N°60947-1 / 60947-4-1								
Maximum operational voltage		1 000 V								
NEMA size		–	6	–	7	–	–	8	–	–
NEMA maximum horse power ratings										
1-phase, 60 Hz	**115 V AC**	–								
	230 V AC	–								
NEMA maximum horse power ratings										
3-phase, 60 Hz	**200 V AC**	–	150 hp	–	–		–	–	–	–
	230 V AC	–	200 hp	–	300 hp		–	450 hp	–	–
	460 V AC	–	400 hp	–	600 hp		–	900 hp	–	–
	575 V AC	–	400 hp	–	600 hp		–	900 hp	–	–
UL / CSA general use rating										
1000 V AC		550 A	650 A	750 A	900 A	1210 A	1350 A	1650 A	2100 A	2700 A
3 poles in serie	**600 V DC**	550 A	650 A	750 A	900 A	1210 A	–	–	–	–
UL / CSA maximum 1-phase motor rating										
Full load current	**120 V AC**	–	–	–	–	–	–	–	–	–
	240 V AC	–	–	–	–	–	–	–	–	–
Horse power rating	**120 V AC**	–	–	–	–	–	–	–	–	–
	240 V AC	–	–	–	–	–	–	–	–	–
UL / CSA maximum 3-phase motor rating										
Full load current (1)	**200-208 V AC**	358.8 A	414 A	552 A	692.3 A	–	954 A	1030 A	–	–
	220-240 V AC	360 A	480 A	604 A	722 A	–	954 A	1030 A	–	–
	440-480 V AC	414 A	477 A	590 A	722 A	–	954 A	1030 A	–	–
	550-600 V AC	382 A	472 A	578 A	672 A	–	944 A	1050 A	–	–
Horse power rating (1)	**200-208 V AC**	125 hp	150 hp	200 hp	250 hp	–	–	–	–	–
	220-240 V AC	150 hp	200 hp	250 hp	300 hp	–	400 hp	450 hp	–	–
	440-480 V AC	350 hp	400 hp	500 hp	600 hp	–	800 hp	900 hp	–	–
	550-600 V AC	400 hp	500 hp	600 hp	700 hp	–	1000 hp	1150 hp	–	–
Short-circuit protection device for contactors										
without thermal overload relay - Motor protection excluded										
Fuse rating		1000 A		1200 A			Please consult us for coordination with			
Fuse type, 600 V		L					circuit-breaker			
Maximum electrical switching frequency										
For general use		300 cycles/h					60 cycles/h			15 cycles/h
For motor use		300 cycles/h					60 cycles/h			–

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

1SFC101111C0201 - Rev. F

AF09 ... AF96 3-pole contactors
Technical data

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

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

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

1SBC100065S0201

AF116 ... AF370 3-pole contactors
Technical data

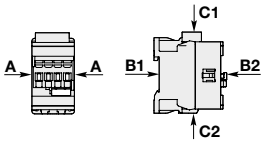
Main pole utilization characteristics - 3 N.O. non-reversing contactors

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

1SBC100069S0201

AF09 ... AF38 3-pole contactors
Technical data

General technical data

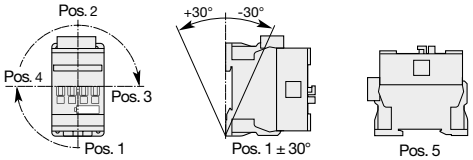
Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Rated insulation voltage Ui							
acc. to IEC 60947-4-1		690 V					
acc. to UL / CSA		600 V					
Rated impulse withstand voltage Uimp.		6 kV					
Electromagnetic compatibility		Devices complying with IEC 60947-1 / EN 60947-1 - Environment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

(1) Environment B: all AF09 ... AF38 contactors produced since week 08-2013. AF09 ... AF38-..-..-12 (48...130 V 50/60 Hz-DC) compliant to environment A only.
For environment B: select AF09 ... AF38-..-..-22.

Magnet system characteristics

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

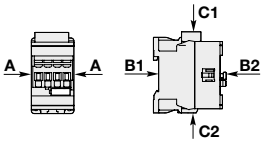
Mounting characteristics and conditions for use

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

1SBC101427S0201 - Rev. B

AF40 ... AF96 3-pole contactors
Technical data

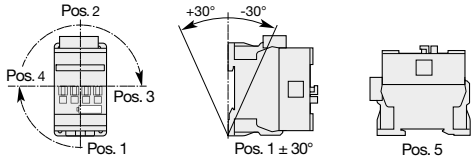
General technical data

Contactor types	AC / DC operated	AF40	AF52	AF65	AF80	AF96
Rated insulation voltage Ui						
acc. to IEC 60947-4-1		690 V			1000 V	
acc. to UL / CSA		600 V				
Rated impulse withstand voltage Uimp.		6 kV			8 kV	
Electromagnetic compatibility		Devices complying with IEC 60947-1 / EN 60947-1 - Environment A and B				
Ambient air temperature close to contactor						
Operation Fitted with thermal overload relay		-25...+60 °C				
Without thermal overload relay		-40...+70 °C				
Storage		-60...+80 °C				
Climatic withstand		Category B according to IEC 60947-1 Annex Q				
Maximum operating altitude (without derating)		3000 m				
Mechanical durability						
Number of operating cycles		10 millions operating cycles				
Maximum switching frequency		3600 cycles/h				
Shock withstand						
acc. to IEC 60068-2-27 and EN 60068-2-27						
Mounting position 1						
	**Shock direction**	1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position				
	A	25 g				
	B1	25 g closed position / 5 g open position				
	B2	15 g				
	C1	25 g				
	C2	25 g				
Vibration withstand		5...300 Hz				
acc. to IEC 60068-2-6		3 g closed position / 3 g open position				

Magnet system characteristics

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

Mounting characteristics and conditions for use

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

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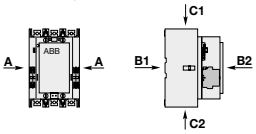
1SBC101745S0201 - Rev. A

AF116 ... AF370 3-pole contactors
Technical data

General technical data

Contactor types	AC / DC operated	AF116	AF140	AF146	AF190	AF205	AF265	AF305	AF370
Rated insulation voltage Ui									
acc. to IEC 60947-4-1		1000 V							
acc. to UL / CSA		600 V							
Rated impulse withstand voltage Uimp.		8 kV							
Electromagnetic compatibility		AF contactors comply with IEC 60947-1 / EN 60947-1 - Environment A							
Ambient air temperature close to contactor									
Operation Fitted with thermal overload relay		-25 to +55 °C							
Without thermal overload relay		-40 to +70 °C							
Storage		-40 to +70 °C							
Climatic withstand		Category B according to IEC 60947-1 Annex Q							
Maximum operating altitude (without derating)		3000 m							
Mechanical durability									
Number of operating cycles		5 million operating cycles							
Maximum switching frequency		300 cycles/h							
Shock withstand									
acc. to IEC 60068-2-27 and EN 60068-2-27									
Mounting position 1		No change in contact position, closed or open position							
	Shock direction	1/2 sinusoidal shock for 11 ms				1/2 sinusoidal shock for 30 ms			
	A	20 g				20 g			
	B1	15 g closed position / 3 g open position				15 g closed position / 3 g open position			
	B2	15 g closed position / 3 g open position				15 g closed position / 3 g open position			
	C1	20 g				20 g			
	C2	20 g				20 g			
Vibration withstand									
acc to IEC 60068-2-6		0.7 g closed position / 0.7 g open position 13.2...100 Hz							

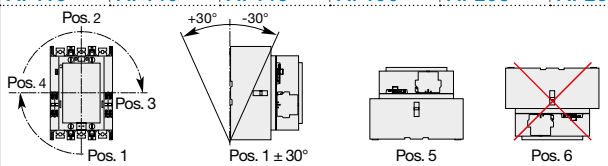


Magnet system characteristics

Contactor types	AC / DC operated	AF116	AF140	AF146	AF190	AF205	AF265	AF305	AF370
Coil operating limits	**AC supply**	At θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max							
acc. to IEC 60947-4-1	**DC supply**	At θ ≤ 70 °C 0.80 x Uc min ... 1.1 x Uc max							
Rated control circuit voltage Uc		24...500 V AC, 20...500 V DC							
Coil consumption									
AC control voltage 50/60 Hz									
24...60 V AC	**Average pull-in value**	225 VA			165 VA		475 VA		
	Average holding value	5.5 VA			6 VA		8.5 VA		
48...130 V AC	**Average pull-in value**	170 VA			175 VA		340 VA		
	Average holding value	4 VA			4 VA		17 VA		
100...250 V AC	**Average pull-in value**	130 VA			220 VA		385 VA		
	Average holding value	6 VA			7 VA		17.5 VA		
250...500 V AC	**Average pull-in value**	205 VA			185 VA		420 VA		
	Average holding value	16 VA			16 VA		21 VA		
DC control voltage									
20...60 V DC	**Average pull-in value**	210 W			205 W		400 W		
	Average holding value	2.5 W			2.5 W		3.5 W		
48...130 V DC	**Average pull-in value**	130 W			130 W		360 W		
	Average holding value	2.5 W			2.5 W		2.5 W		
100...250 V DC	**Average pull-in value**	135 W			190 W		410 W		
	Average holding value	3 W			2.5 W		4.5 W		
250...500 V DC	**Average pull-in value**	205 W			190 W		600 W		
	Average holding value	4 W			4 W		4.7 W		
Drop-out voltage		55 % of Uc min							
Voltage sag immunity		Conditions of use on request							
acc. to SEMI F47									
Dips withstand		≥ 20 ms							
Operating time									
Coil supply between A1 - A2									
Between coil energization and:	**N.O. contact closing**	20...55 ms			25...60 ms		30...60 ms		
Between coil de-energization and:	**N.O. contact opening**	40..70 ms			45...80 ms		45...80 ms		

Mounting characteristics and conditions for use

Contactor types	AC / DC operated	AF116	AF140	AF146	AF190	AF205	AF265	AF305	AF370
Mounting positions									
Mounting distances		The contactors can be assembled side by side							
Fixing									
On rail acc. to IEC 60715, EN 60715		–							
By screws (not supplied)		4 x M4			4 x M5				

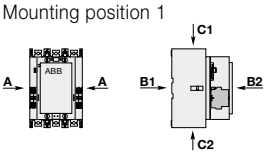


Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 3-pole contactor AF116 ... AF370

1SFC101112C0201 - Rev. B

AF400 ... AF2650 3-pole contactors
Technical data

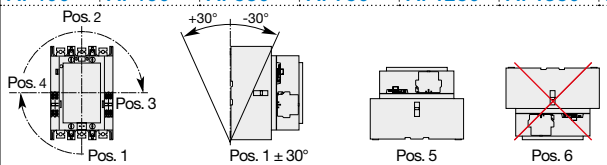
General technical data

Contactor types	AC / DC operated	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650
Rated insulation voltage Ui										
acc. to IEC 60947-4-1		1000 V								
acc. to UL / CSA		600 V					1000 V			
Rated impulse withstand voltage Uimp.		8 kV								
Electromagnetic compatibility		AF contactors complying with IEC 60947-1 / EN 60947-1 - Environment A								
Ambient air temperature close to contactor										
Operation	Fitted with electronic overload relay	-25 to +70 °C								
	Without electronic overload relay	-40 to +70 °C								
Storage		-40 to +70 °C								
Climatic withstand		Category B according to IEC 60947-1 Annex Q								
Maximum operating altitude (without derating)		3000 m								
Mechanical durability										
Number of operating cycles		3 millions operating cycles				0.5 million operating cycles				0.3 million op. cycles
Max. switching frequency		300 cycles/h					60 cycles/h			
Shock withstand										
acc. to IEC 60068-2-27 and EN 60068-2-27										
Mounting position 1										
	**Shock direction**	1/2 sinusoidal shock for 30 ms: no change in contact position, closed or open position								
	A	5 g					–			
	B1	5 g					–			
	B2	5 g					–			
	C1	5 g					–			
	C2	5 g					–			
Vibration withstand										
acc to IEC 60068-2-6		0.7 g closed position / 0.7 g open position 13.2…100 Hz								

Magnet system characteristics

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

Mounting characteristics and conditions for use

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

AF09 ... AF38 3-pole contactors
Technical data

Connecting characteristics

Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Main terminals		Screw terminals with cable clamp					
Connection capacity (min. ... max.)							
Main conductors (poles)							
Rigid Solid (≤ 4 mm²)	**1 x**	1...6 mm²			2.5...10 mm²		
Stranded (≥ 6 mm²)	**2 x**	1...6 mm²			2.5...10 mm²		
Flexible with non insulated ferrule	**1 x**	0.75...6 mm²			1.5...10 mm²		
	2 x	0.75...6 mm²			1.5...10 mm²		
Flexible with insulated ferrule	**1 x**	0.75...4 mm²			1.5...10 mm²		
	2 x	0.75...2.5 mm²			1.5...4 mm²		
Bars or lugs	**L <**	9.6 mm			12.5 mm		
Connection capacity acc. to UL/CSA	**1 or 2 x**	AWG 16...10			AWG 14...8		
Stripping length		10 mm			14 mm		
Tightening torque		1.5 Nm / 13 lb.in			2.5 Nm / 22 lb.in		
Auxiliary conductors (built-in auxiliary terminals + coil terminals)							
Rigid solid	**1 x**	1...2.5 mm²					
	2 x	1...2.5 mm²					
Flexible with non insulated ferrule	**1 x**	0.75...2.5 mm²					
	2 x	0.75...2.5 mm²					
Flexible with insulated ferrule	**1 x**	0.75...2.5 mm²					
	2 x	0.75...1.5 mm²					
Lugs	**L <**	8 mm					
Connection capacity acc. to UL/CSA	**1 or 2 x**	AWG 18...14					
Stripping length		10 mm					
Tightening torque							
Coil terminals		1.2 Nm / 11 lb.in					
Built-in auxiliary terminals		1.2 Nm / 11 lb.in					
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529							
Main terminals		IP20					
Coil terminals		IP20					
Built-in auxiliary terminals		IP20					
Screw terminals		Delivered in open position, screws of unused terminals must be tightened					
Main terminals		M3.5			M4		
	Screwdriver type	Flat Ø 5.5 / Pozidriv 2			Flat Ø 6.5 / Pozidriv 2		
Coil terminals		M3.5					
	Screwdriver type	Flat Ø 5.5 / Pozidriv 2					
Built-in auxiliary terminals		M3.5					
	Screwdriver type	Flat Ø 5.5 / Pozidriv 2					

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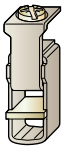
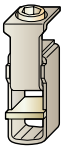
AF40 ... AF96 3-pole contactors
Technical data

Connecting characteristics

Contactor types	AC / DC operated	AF40	AF52	AF65	AF80	AF96
Main terminals		 Screw terminals with double connector 2 x (9.3 width x 7.9/10.3 depth)			 Screw terminals with double connector 2 x (12.4 width x 9.3/11.1 depth)	
Connection capacity (min. ... max.)						
Main conductors (poles)						
Rigid Solid (≤ 4 mm²)	**1 x**	6...35 mm²			6...70 mm²	
Stranded (≥ 6 mm²)	**2 x**	6...35 mm²			6...50 mm²	
Flexible with non insulated ferrule	**1 x**	4...35 mm²			6...50 mm²	
	2 x	4...35 mm²			6...50 mm²	
Flexible with insulated ferrule	**1 x**	4...35 mm²			6...50 mm²	
	2 x	4...35 mm²			6...50 mm²	
Bars or lugs	**L <**	9.2 mm			12.2 mm	
Connection capacity acc. to UL/CSA	**1 or 2 x**	AWG 10...2			AWG 6...1	
Stripping length		16 mm			17 mm	
Tightening torque		4 Nm / 35 lb.in			6 Nm / 53 lb.in	
Auxiliary conductors (built-in auxiliary terminals + coil terminals)						
Rigid solid	**1 x**	1...2.5 mm²				
	2 x	1...2.5 mm²				
Flexible with non insulated ferrule	**1 x**	0.75...2.5 mm²				
	2 x	0.75...2.5 mm²				
Flexible with insulated ferrule	**1 x**	0.75...2.5 mm²				
	2 x	0.75...1.5 mm²				
Lugs	**L <**	8 mm				
Connection capacity acc. to UL/CSA	**1 or 2 x**	AWG 18...14				
Stripping length		10 mm				
Tightening torque						
Coil terminals		1.2 Nm / 11 lb.in				
Built-in auxiliary terminals		1.2 Nm / 11 lb.in				
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529						
Main terminals		IP10				
Coil terminals		IP20				
Built-in auxiliary terminals		IP20				
Screw terminals		Delivered in open position, screws of unused terminals must be tightened				
Main terminals		M6			M8	
	Screwdriver type	Flat Ø 6.5 / Pozidriv 2			Hexagon socket (s = 4 mm)	
Coil terminals		M3.5				
	Screwdriver type	Flat Ø 5.5 / Pozidriv 2				
Built-in auxiliary terminals		M3.5				
	Screwdriver type	Flat Ø 5.5 / Pozidriv 2				

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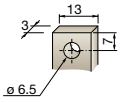
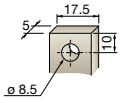
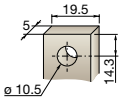
AF116 ... AF370 3-pole contactors
Technical data

Connecting characteristics

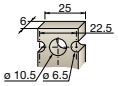
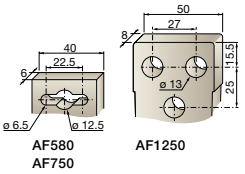
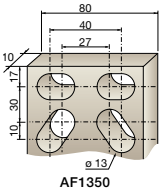
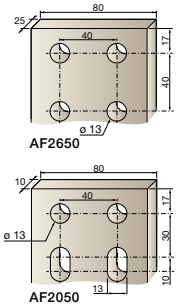
Contactor types	AC / DC operated	AF116	AF140	AF146	AF190	AF205	AF265	AF305	AF370
Main terminals Flat type									
Connection capacity (min. ... max.)									
Main conductors (poles)									
Cu cable - Stranded	**1 x**	10...95 mm²			6...150 mm²		16...300 mm²		
Clamp type		LD... included (1)			1SDA066917R1		1SDA055016R1		
Tightening torque		8 Nm			14 Nm		25 Nm		
Cu cable - Stranded	**2 x**	10...95 mm²			50...120 mm²		70...185 mm²		
Clamp type		LD... included (1)			1SFN074709R1000, LZ185-2C/120		1SCA022194R0890, OZXB4		
Tightening torque		8 Nm			16 Nm		22 Nm		
Al cable - Stranded	**1 x**	–			95...185 mm²		185...240 mm²		
Clamp type		–			1SDA054988R1		1SDA055020R1		
Tightening torque		–			31 Nm		43 Nm		
Cu cable - Flexible	**1 x**	10...70 mm²			6...120 mm²		16...240 mm²		
Clamp type		LD... included (1)			1SDA066917R1		1SDA055016R1		
Tightening torque		8 Nm			14 Nm		25 Nm		
Cu cable - Flexible	**2 x**	10...70 mm²			50...95 mm²		70...185 mm²		
Clamp type		LD... included (1)			1SFN074709R1000, LZ185-2C/120		1SCA022194R0890, OZXB4		
Tightening torque		8 Nm			16 Nm		22 Nm		
Lugs	**L ≤**	22 mm (.866 in)			24 mm (.945 in)		32 mm (1.260 in)		
	Ø >	6 mm (.236 in)			8 mm (.315 in)		10 mm (.394 in)		
Socket type		LL... included			LL... included		LL... included		
Tightening torque		9 Nm / 80 lb.in			18 Nm / 160 lb.in		28 Nm / 248 lb.in		
Connection capacity acc. to UL / CSA	**1 x**	AWG 6...3/0			6...300 MCM		4...400 MCM		
Clamp type		LD... included (1)			ATK185 (2)		ATK300 (2)		
Tightening torque		8 Nm / 71 lb.in			34 Nm / 301 lb.in		42 Nm / 372 lb.in		
Connection capacity acc. to UL / CSA	**2 x**	AWG 6...3/0			–		4...500 MCM		
Clamp type		LD... included (1)			–		ATK300/2 (2)		
Tightening torque		8 Nm / 71 lb.in			–		42 Nm / 372 lb.in		
Auxiliary conductors (coil terminals)									
Solid / stranded	**1 x**	1...4 mm²							
	2 x	1...4 mm²							
Flexible	**1 x**	0.75...2.5 mm²							
	2 x	0.75...2.5 mm²							
Flexible with non insulated ferrule	**1 x**	0.75...2.5 mm²							
	2 x	0.75...2.5 mm²							
Flexible with insulated ferrule	**1 x**	0.75...2.5 mm²							
	2 x	0.75...2.5 mm²							
Lugs	**L <**	8 mm							
	I >	3.5 mm							
Connection capacity acc. to UL / CSA	**1 or 2 x**	AWG 18...14							
Stripping length		9 mm							
Tightening torque		1.00 Nm / 9 lb.in							
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529									
Main terminals		IP00							
Coil terminals		IP20							
Screw terminals									
Main terminals		M6			M8		M10		
Screwdriver type		Screws and bolts							
Coil terminals (delivered in open position)		M3.5							
Screwdriver type		Flat Ø 5.5 mm / Pozidriv 2							

(1) LD... not included for AF116 ... AF146-30-..B.
(2) Available in North America only.

1SFC101114C0201 - Rev. A

AF400 ... AF2650 3-pole contactors
Technical data

Connecting characteristics

Contactor types	AC / DC operated	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650
Main terminals Flat type				 AF580 AF750 AF1250			 AF1350 AF1650		 AF2650 AF2050	
Connection capacity (min. ... max.)										
Main conductors (poles)										
Cu cable - Stranded	**2 x**	240 mm²			–					
Clamp type		1SDA013922R1			–					
Tightening torque		35 Nm			–					
Cu cable - Stranded	**3 x**	–		185 mm²		–				
Clamp type		–		1SDA013956R1		–				
Tightening torque		35 Nm		45 Nm		–				
Al cable - Stranded	**2 x**	240 mm²			–					
Clamp type		1SDA013922R1			–					
Tightening torque		35 Nm			–					
	3 x	–		185 mm²		–				
Clamp type		–		1SDA013956R1		–				
Tightening torque		35 Nm		45 Nm		–				
Lugs	**L ≤**	47 mm		50 mm			100 mm			
	Ø >	10 mm		12 mm						
Tightening torque		35 Nm / 310 lb.in		45 Nm / 398 lb.in						
Connection capacity acc. to UL / CSA	**2 x**	250-500 MCM alt. 2/0 AWG-500 MCM		–		2// 3 x 0.25 in	4/0 AWG - 500 MCM		4//4 x 0.25 in	
Clamp type		K6TH alt. ATK580		–		bars, use LW1250	K7TK ATK1350/4	K7TK	bars	
Tightening torque		275 lb.in		–			375 lb.in		–	
Connection capacity acc. to UL / CSA	**3 x**	2/0 AWG-400 MCM		2/0 AWG-500 MCM			1/0-750 MCM		–	
Clamp type		K6TJ		ATK750/3			K8TL, K8TM, ATK1650/4	K8TL, K8TM, ATK1650/4, ATK1650/6	–	
Tightening torque		275 lb.in		375 lb.in			500 lb.in		–	
Auxiliary conductors (coil terminals)										
Solid / stranded	**1 x**	1...4 mm²								
	2 x	1...4 mm²								
Flexible	**1 x**	0.75...2.5 mm²								
	2 x	0.75...2.5 mm²								
Flexible with non insulated ferrule	**1 x**	0.75...2.5 mm²								
	2 x	0.75...2.5 mm²								
Flexible with insulated ferrule	**1 x**	0.75...2.5 mm²								
	2 x	0.75...2.5 mm²								
Lugs	**L ≤**	8 mm								
	l >	3.7 mm								
Connection capacity acc. to UL / CSA	**1 or 2 x**	AWG 18...14								
Tightening torque	Recommended	1.00 Nm / 9 lb.in								
	Max.	1.20 Nm								
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529										
Main terminals		IP00								
Coil terminals		IP20								
Screw terminals										
Main terminals		M10		M12						
		Screws and bolts								
Coil terminals (delivered in open position)		M3.5								
	Screwdriver type	Flat Ø 5.5 mm / Pozidriv 2								

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AF09 ... AF96 3-pole contactors
Technical data

Built-in auxiliary contacts according to IEC

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

Built-in auxiliary contacts according to UL / CSA

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

1SBC101445S0201 - Rev. A

3-pole contactors
Electrical durability and utilization categories

General

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

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

– Categories AC-1 and AC-3: Ic = Ie
– Category AC-2: Ic = 2.5 x Ie
– Category AC-4: Ic = 6 x Ie

Generally speaking Ic = m x Ie where m is a multiple of the load operational current.

On next pages, the curves corresponding to categories AC-1, AC-3 and AC-4 represent the electrical durability variation of standard contactors in relation to the breaking current Ic.

Electrical durability is expressed in millions of operating cycles.

Curve utilization mode

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

- Note the characteristics of the load to be controlled:
– Operational voltage ..... Ue
– Current normally drawn ..... Ie (Ue / Ie / kW relation for motors, see "Motor rated operational powers and currents").
– Utilization category ..... AC-1, AC-2, AC-3 or AC-4
– Breaking current ..... Ic = Ie for AC-1 and for AC-3 ; Ic = 2.5 x Ie for AC-2 ; Ic = 6 x Ie 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 (Ic ; N).

Electrical durability forecast and contactor selection for mixed duty motor control: AC-3 (Ic = Ie) type switching off while "motor running" and, occasionally, AC-4 (Ic = 6 x Ie) type switching off while "motor accelerating"

- Note the characteristics of the motor to be controlled:
– Operational voltage ..... Ue
– Current normally drawn while "motor running" ..... Ie (Ue / Ie / kW relation for motors, see "Motor rated operational powers and currents")
– Breaking current for AC-3 ..... Ic = Ie
– Breaking current for AC-4 while "motor accelerating" ..... Ic = 6 x Ie
– 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 (Ue / Ie) 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 Ic = Ie (AC-3)
– The number of operating cycles B for Ic = 6 x Ie (AC-4)
- Calculate the estimated number of cycles N’ (N’ is always below A)

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

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

Case of uninterrupted duty

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

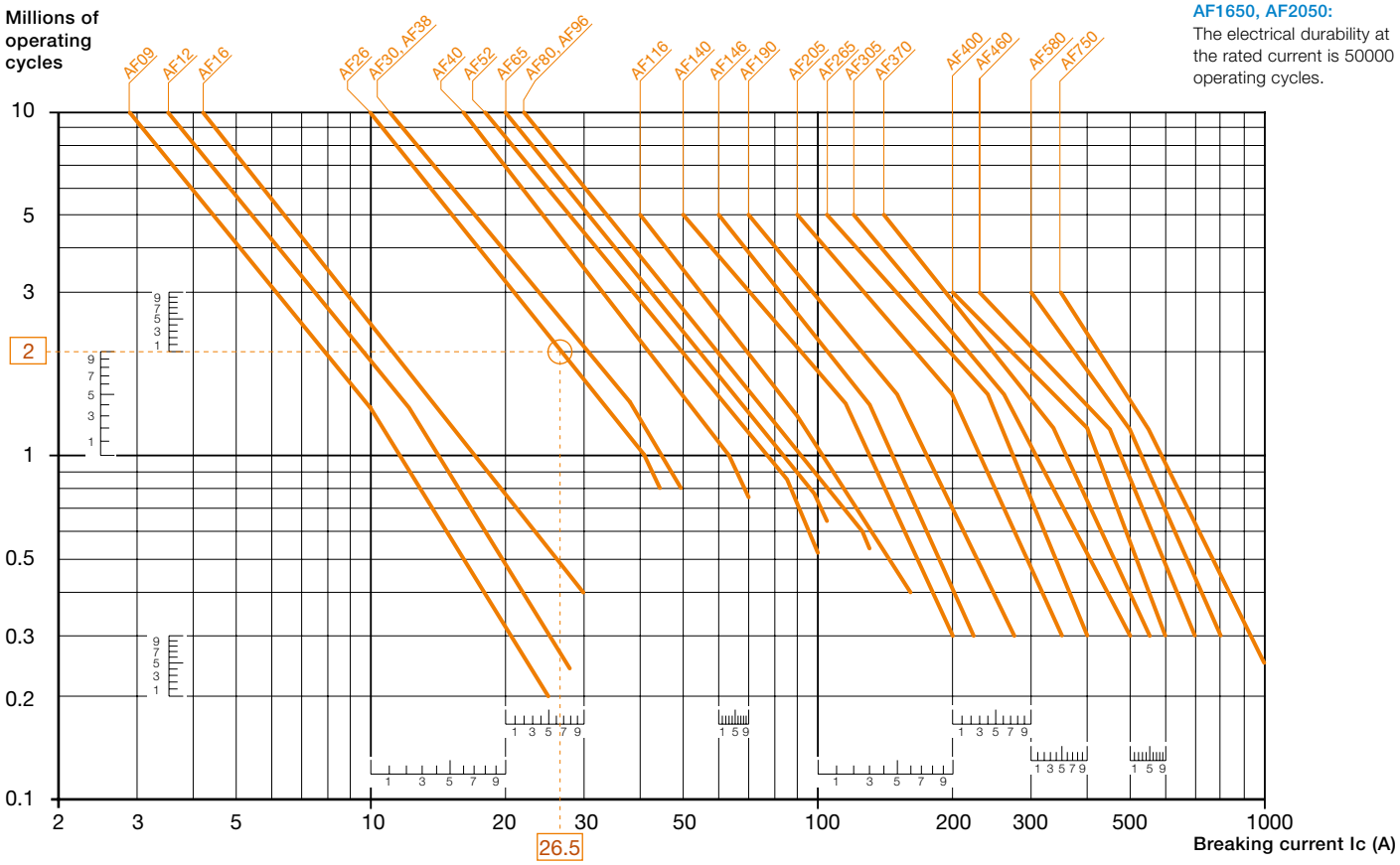
The combined effect of environmental conditions and the proper temperature of the product may require some disposals. As a matter of fact, for this duty, the use duration prevails over the number of operating cycles.

1SBC101314S0201

3-pole contactors
Electrical durability

Electrical durability for AC-1 utilization category - Ue ≤ 690 V

Switching non-inductive or slightly inductive loads. The breaking current Ic for AC-1 is equal to the rated operational current of the load.
Ambient temperature and maximum electrical switching frequency: see "Technical data".



AF1250, AF1350, AF1650, AF2050:
The electrical durability at the rated current is 50000 operating cycles.

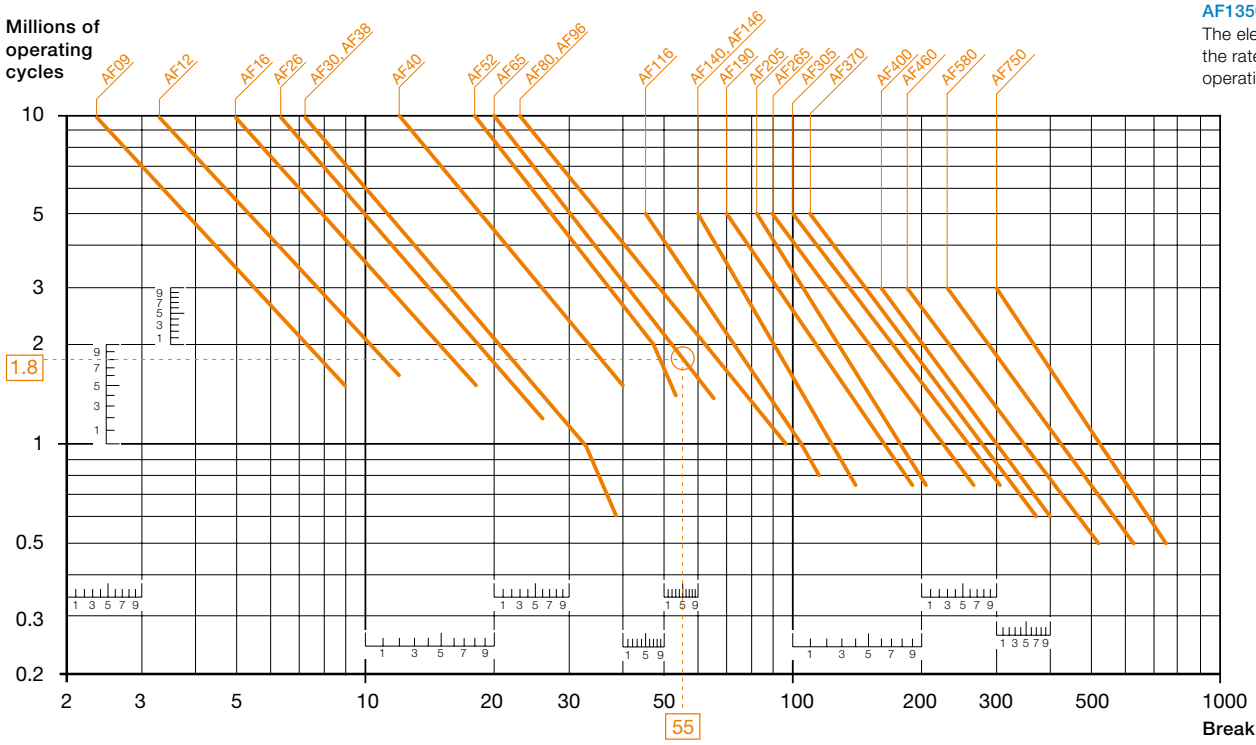
Example:
Ic / AC-1 = 26.5 A – Electrical durability required = 2 millions operating cycles.
Using the AC-1 curves above select the AF26 contactor at intersection "○" (26.5 A / 2 millions operating cycles).

1SBC101940S0201

3-pole contactors
Electrical durability

Electrical durability for AC-3 utilization category - Ue ≤ 440 V.

Switching cage motors: starting and switching off running motors. The breaking current Ic for AC-3 is equal to the rated operational current Ie (Ie = motor full load current).
Ambient temperature and maximum electrical switching frequency: see "Technical data".



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

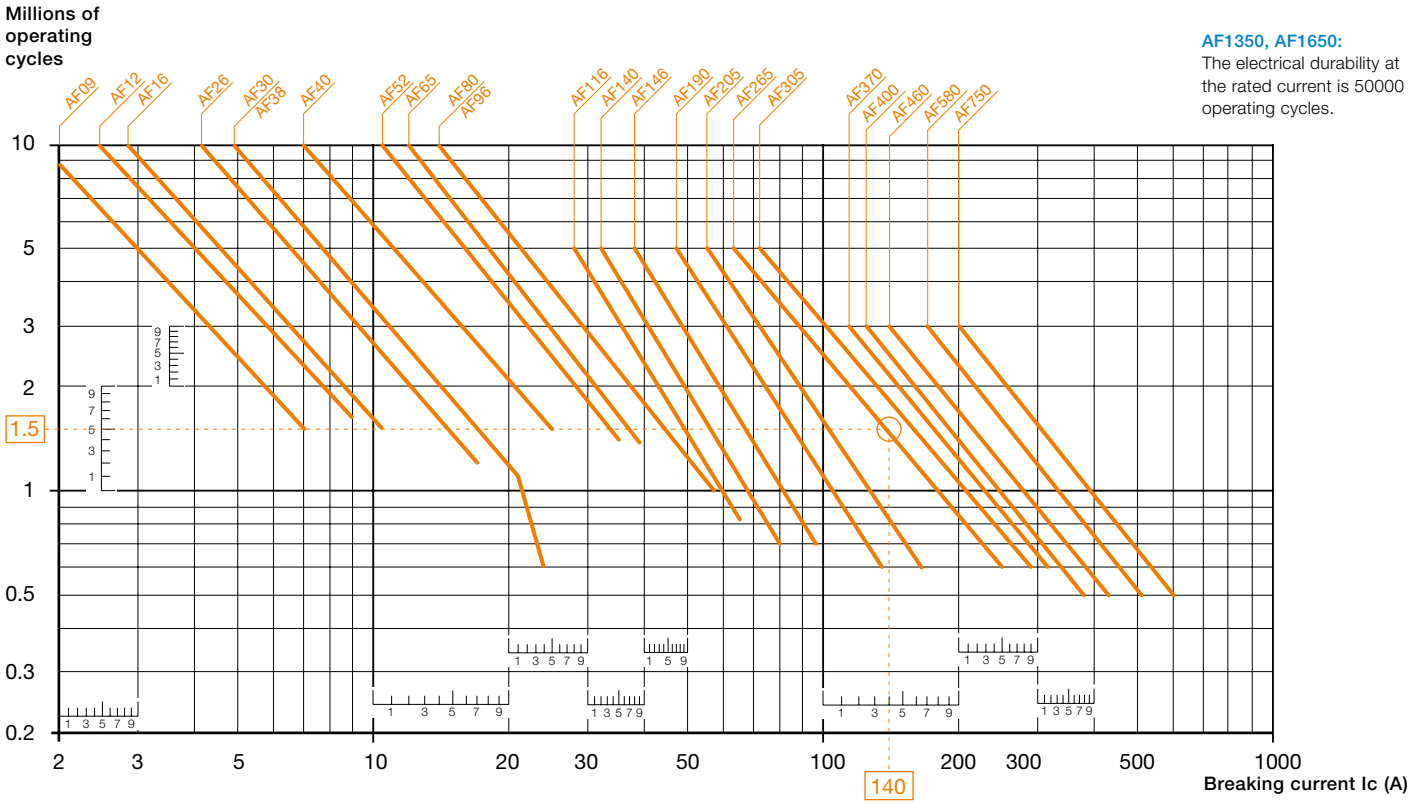
Example:
Motor power 30 kW for AC-3 - Ue = 400 V and Ie = 55 A utilization – Electrical durability required = 1.8 million operating cycles.
For AC-3: Ic = Ie. Select the AF65 contactor at intersection "○" (55 A / 1.8 million operating cycles) on the curves (AC-3 - Ue ≤ 440 V).

1SBC101941S0201

3-pole contactors
Electrical durability

Electrical durability for AC-3 utilization category - 440 V < Ue ≤ 690 V.

Switching cage motors: starting and switching off running motors. The breaking current Ic for AC-3 is equal to the rated operational current Ie (Ie = motor full load current).
Ambient temperature and maximum electrical switching frequency: see "Technical data".



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

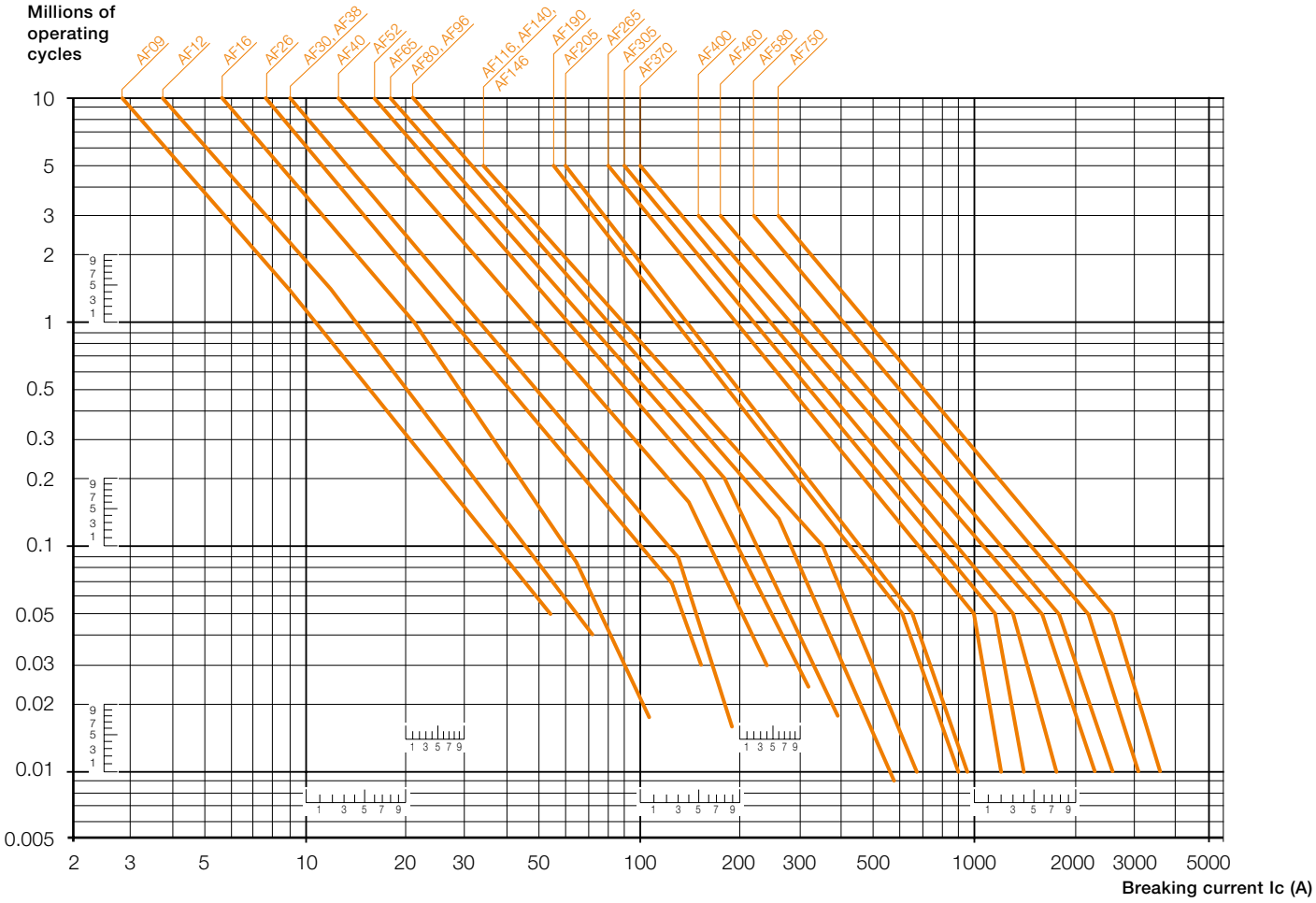
Example:
Motor power 132 kW for AC-3 - Ue = 660 V and Ie = 140 A utilization – Electrical durability required = 1.5 million operating cycles.
For AC-3: Ic = Ie. Select the AF265 contactor at intersection "○" (140 A / 1.5 million operating cycles) on the curves (AC-3 - 440 V < Ue ≤ 690 V).

1SBC101955S0201

3-pole contactors
Electrical durability

Electrical durability for AC-2 or AC-4 utilization category - Ue ≤ 440 V
Ambient temperature ≤ 60 °C for AF09 ... AF370, ≤ 55 °C for AF400 ... AF1650

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



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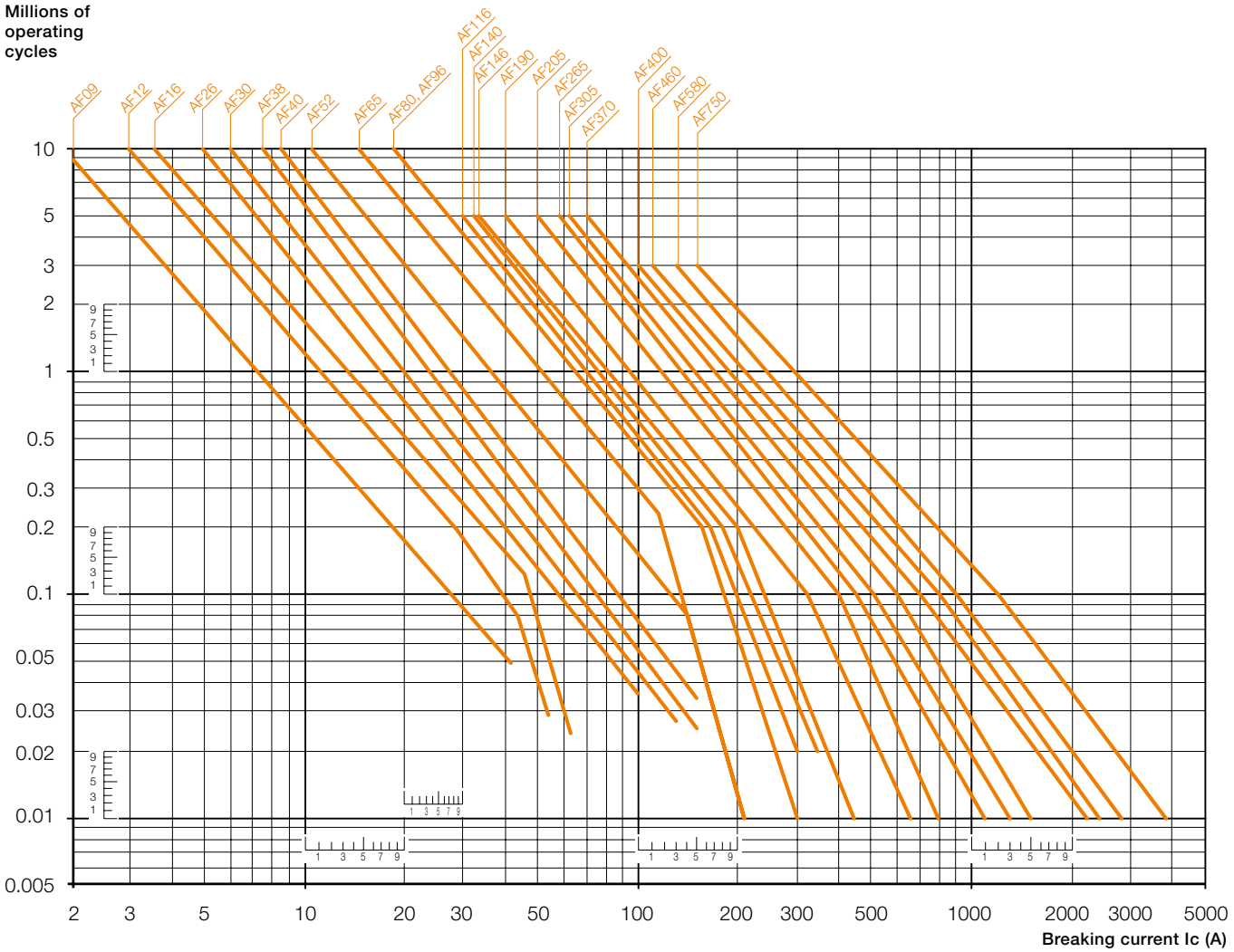
3-pole contactors
Electrical durability

Electrical durability for AC-2 or AC-4 utilization category - 440 V < Ue ≤ 690 V
Ambient temperature ≤ 60 °C for AF09 ... AF370, ≤ 55 °C for AF400 ... AF750

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



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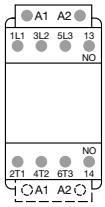
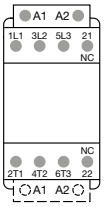
AF09 ... AF96 3-pole contactors
Terminal marking and positioning

AF09 ... AF96 contactors - AC / DC operated

Standard devices without addition of auxiliary contacts

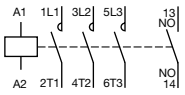


AF09 ... AF16..-30-10

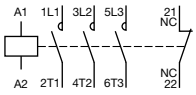


AF09 ... AF16..-30-01

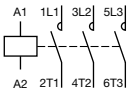
AF26 ... AF96..-30-00



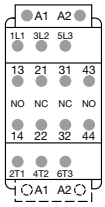
AF09 ... AF16..-30-10



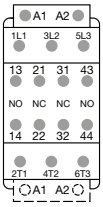
AF09 ... AF16..-30-01



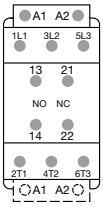
AF26 ... AF96..-30-00



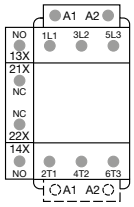
AF09 ... AF16..-30-22



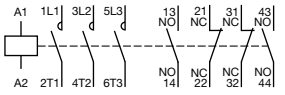
AF26 ... AF96..-30-22



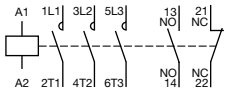
AF26 ... AF38..-30-11



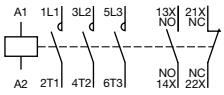
AF40 ... AF96..-30-11



AF09 ... AF96..-30-22

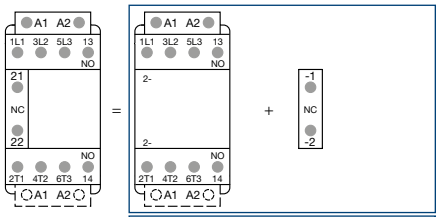


AF26 ... AF38..-30-11

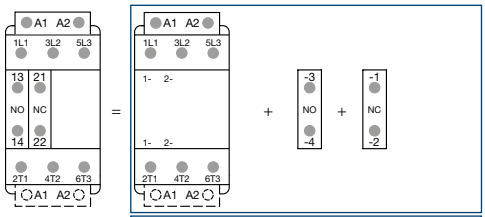


AF40 ... AF96..-30-11

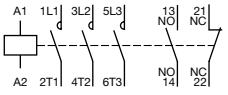
Other possible contact combinations with auxiliary contacts added by the user



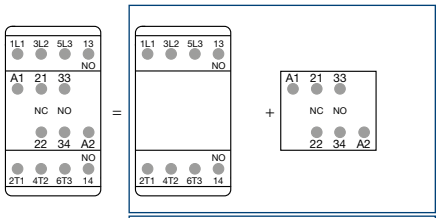
Combination 11 = AF09 ... AF16..-30-10 + CA4-01



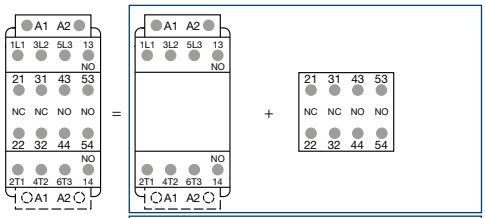
Combination 11 = AF26 ... AF96..-30-00 + CA4-10 + CA4-01



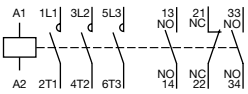
Combination 11



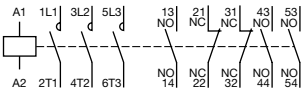
Combination 21 = AF09 ... AF16..-30-10 + CAT4-11M



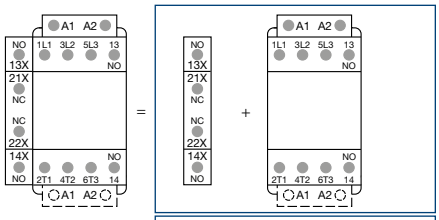
Combination 32 = AF09 ... AF16..-30-10 + CA4-22M



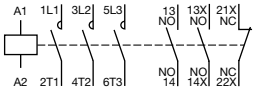
Combination 21



Combination 32



Combination 21 = CAL4-11 + AF09 ... AF16..-30-10



Combination 21

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

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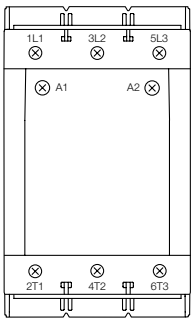
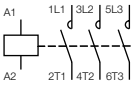
AF116 ... AF370 3-pole contactors
Terminal marking and positioning

AF116 ... AF370 contactors - AC / DC operated

Standard devices without addition of auxiliary contacts

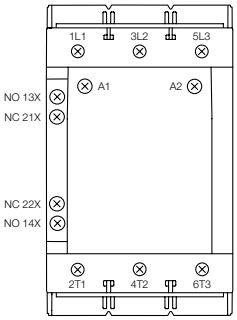


AF116 ... AF370-30-00

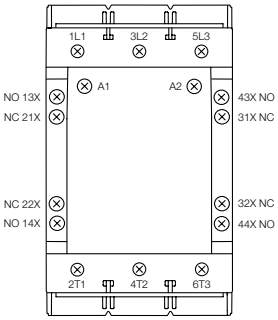


AF116 ... AF370-30-00

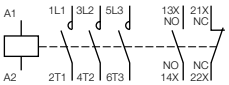
Standard devices with factory mounted auxiliary contacts



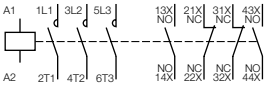
AF116 ... AF370-30-11



AF116 ... AF370-30-22



AF116 ... AF370-30-11



AF116 ... AF370-30-22

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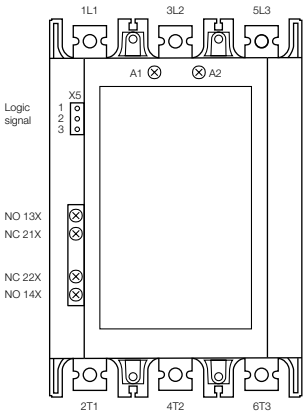
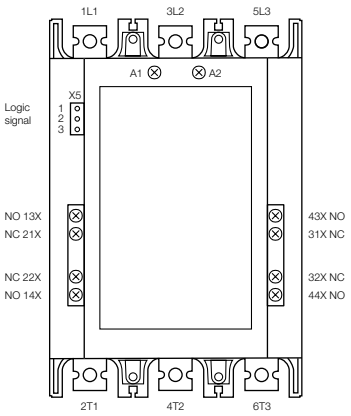
AF400 ... AF2650 3-pole contactors
Terminal marking and positioning

AF400 ... AF1250 contactors - AC / DC operated
Standard devices with factory mounted auxiliary contacts

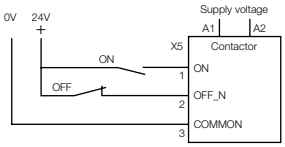


AF400 ... AF1250-30-11

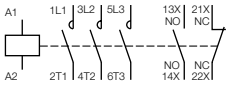


AF400 ... AF1250-30-22

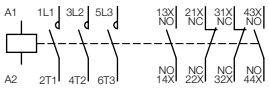
Control with logic signal



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

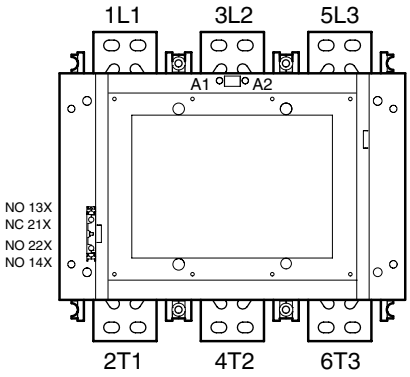


AF400 ... AF1250-30-11

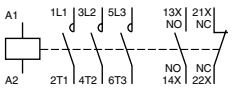


AF400 ... AF1250-30-22

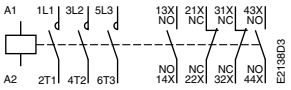
AF1350 ... AF2650 contactors - AC / DC operated
Standard devices with factory mounted auxiliary contacts



AF1350 ... AF2650-30-11

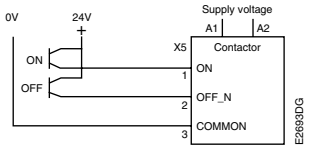


AF1350 ... AF2650-30-11



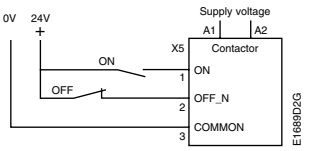
AF1350 ... AF2650-30-22

Wiring diagrams
when used with transistor output



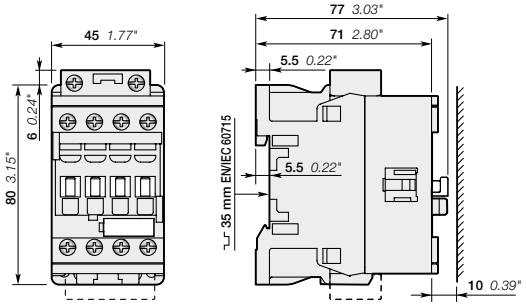
AF1350, AF1650

when used with transistor output

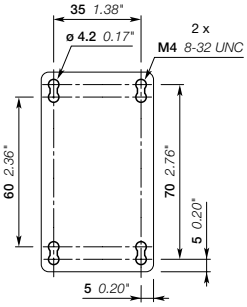


AF09, AF12, AF16 3-pole contactors

Main dimensions mm, *inches*



AF09, AF12, AF16



AF09, AF12, AF16

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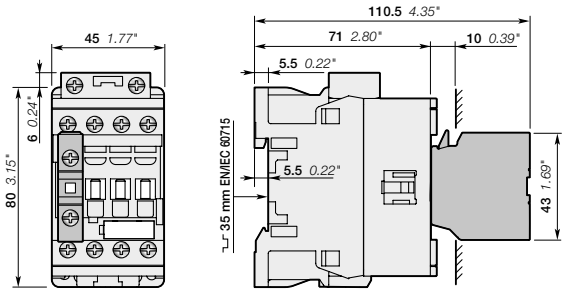
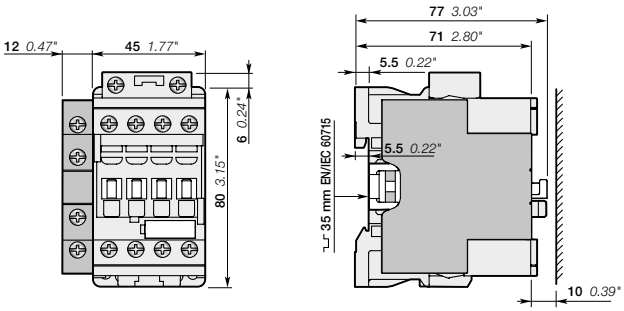
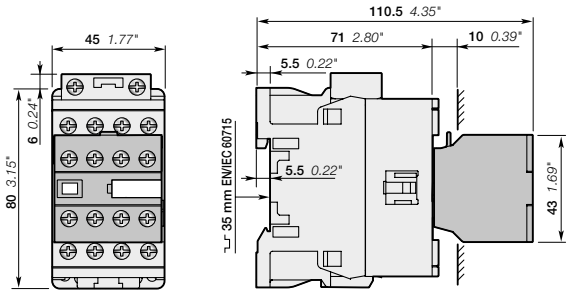


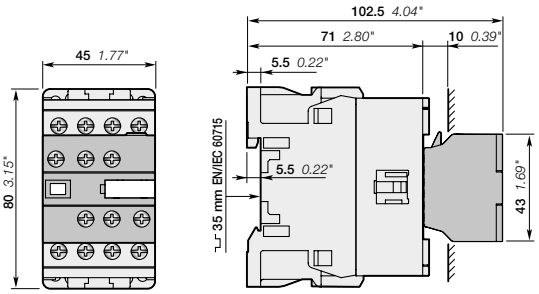
AF09, AF12, AF16
+ CA4, CC4 1-pole auxiliary contact block



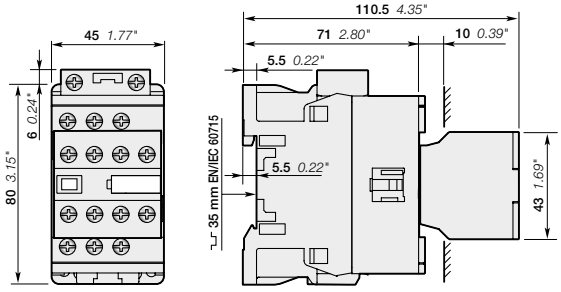
AF09, AF12, AF16
+ CAL4-11 2-pole auxiliary contact block



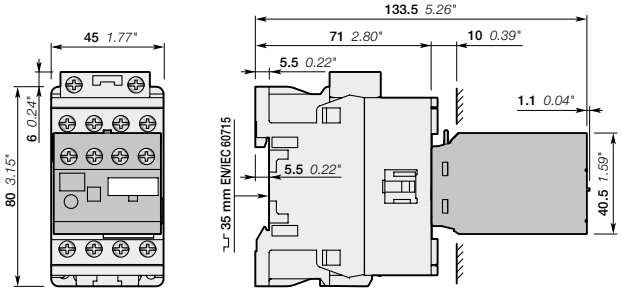
AF09, AF12, AF16
+ CA4 4-pole auxiliary contact block



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



AF09, AF12, AF16..-30-22



AF09, AF12, AF16
+ TEF4 electronic timer

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

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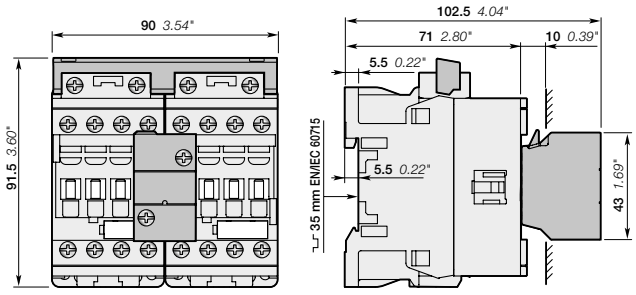
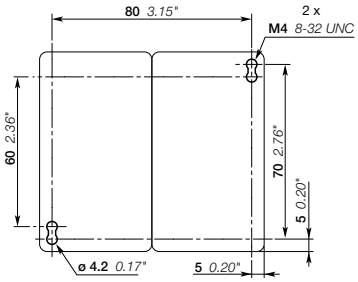
AF09, AF12, AF16 3-pole contactors

Main dimensions mm, *inches*

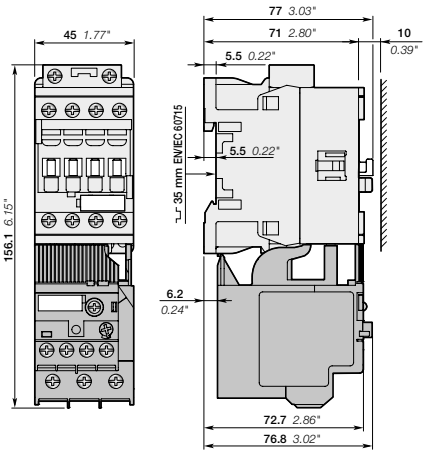


AF09, AF12, AF16
+ VEM4 mechanical and electrical interlock set

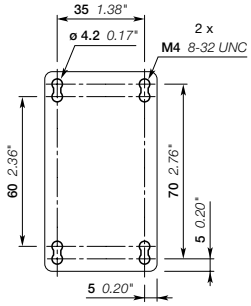


AF09, AF12, AF16
+ VEM4 mechanical and electrical interlock set

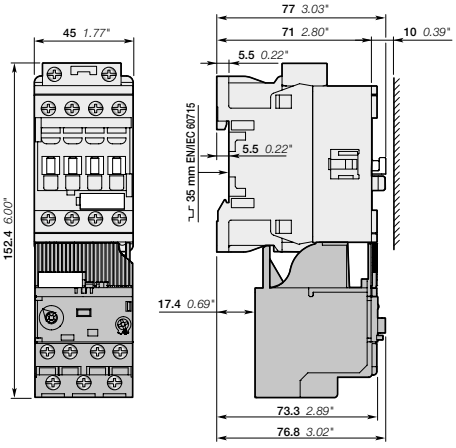
5



AF09, AF12, AF16
+ TF42 thermal overloard relay



AF09, AF12, AF16
+ TF42, EF19



AF09, AF12, AF16 3-pole contactors
+ EF19 electronic overload relay

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

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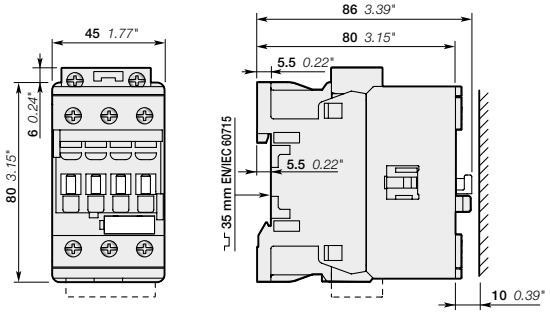
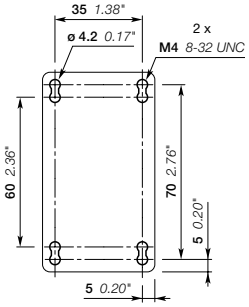
AF26, AF30, AF38 3-pole contactors

Main dimensions mm, *inches*



AF26, AF30, AF38



AF26, AF30, AF38

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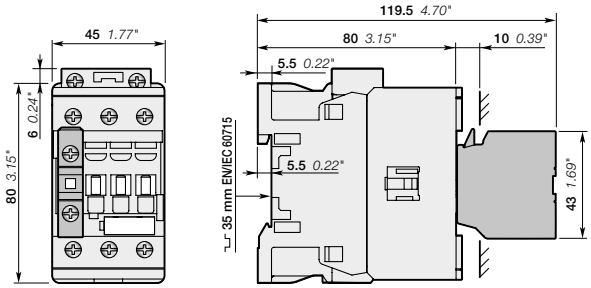
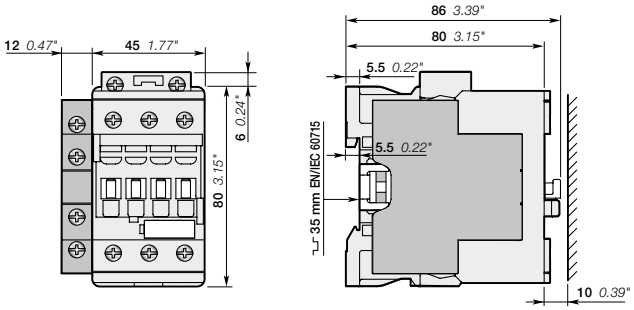
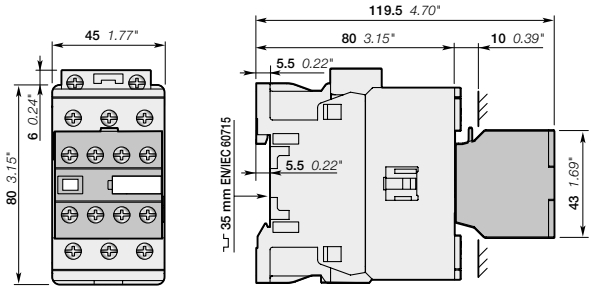


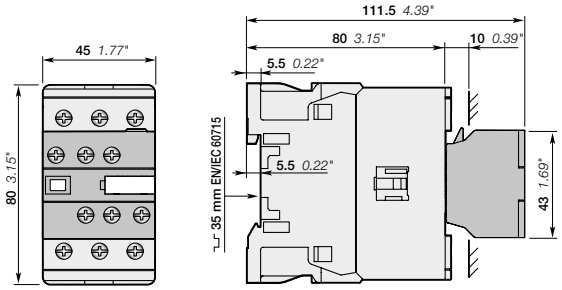
AF26, AF30, AF38
+ CA4, CC4 1-pole auxiliary contact block



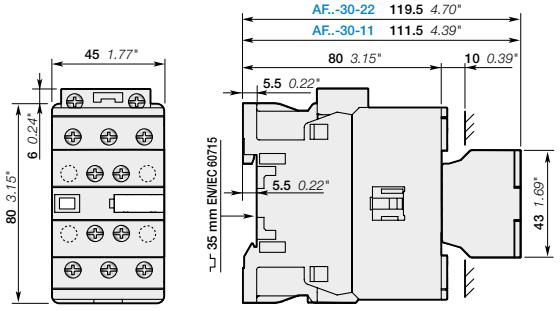
AF26, AF30, AF38
+ CAL4-11 2-pole auxiliary contact block



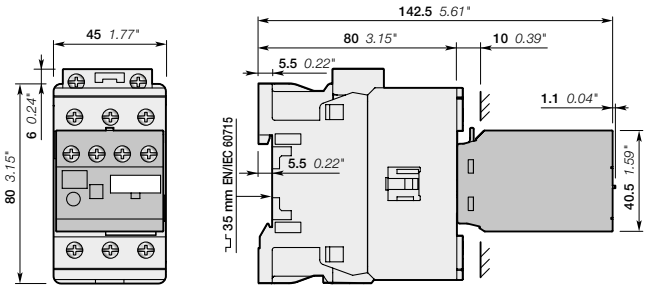
AF26, AF30, AF38
+ CA4 4-pole auxiliary contact block



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



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



AF26, AF30, AF38
+ TEF4 electronic timer

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

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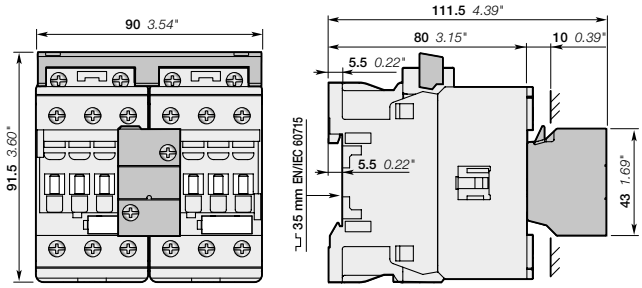
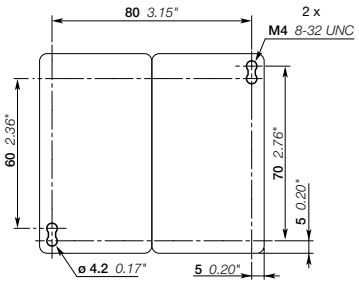
AF26, AF30, AF38 3-pole contactors

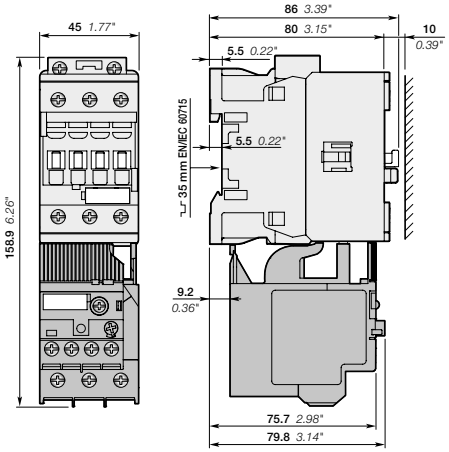
Main dimensions mm, *inches*



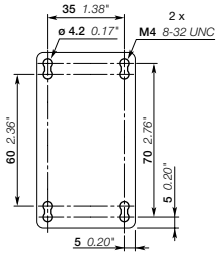
AF26, AF30, AF38
+ VEM4 mechanical and electrical interlock set



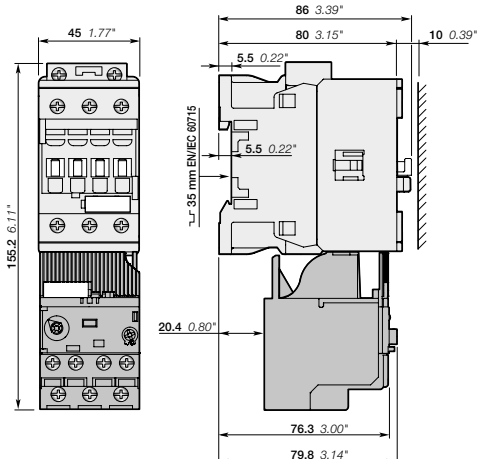
AF26, AF30, AF38
+ VEM4 mechanical and electrical interlock set



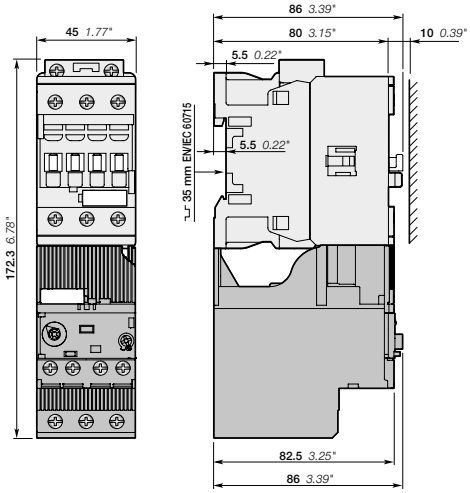
AF26, AF30, AF38
+ TF42 thermal overload relay



AF26, AF30, AF38
+ TF42, EF19, EF45



AF26 3-pole contactors
+ EF19 electronic overload relay



AF26, AF30, AF38 3-pole contactors
+ EF45 electronic overload relay

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

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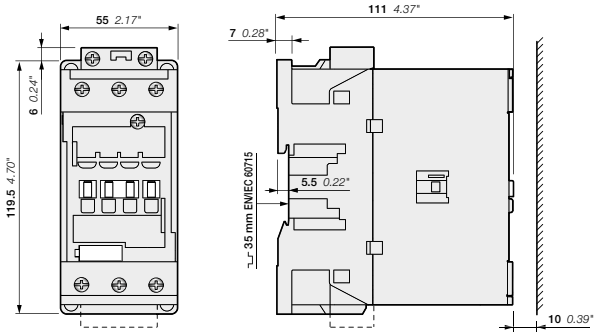
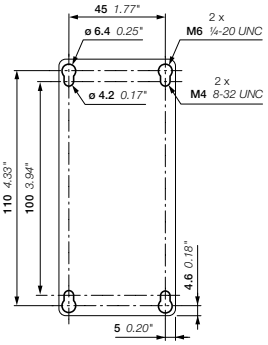
AF40 ... AF65 3-pole contactors

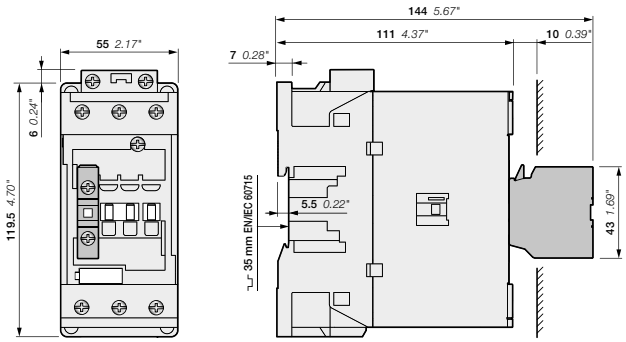
Main dimensions mm, *inches*



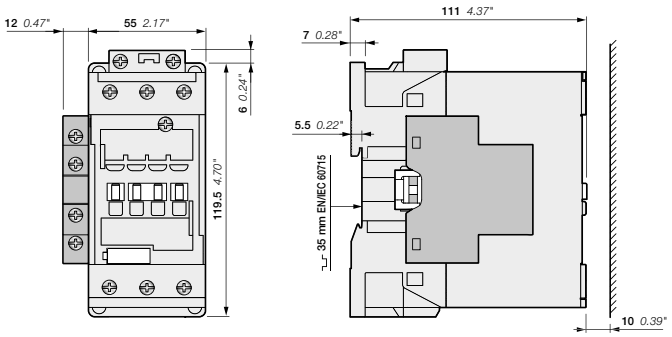
AF40, AF52, AF65



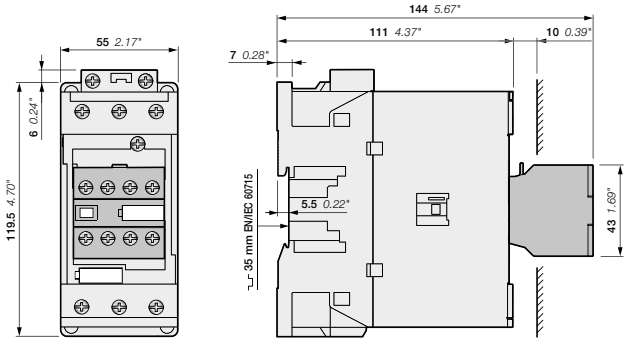
AF40, AF52, AF65



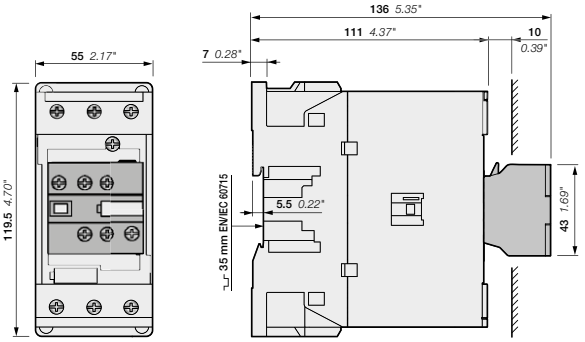
AF40, AF52, AF65
+ CA4, CC4 1-pole auxiliary contact block



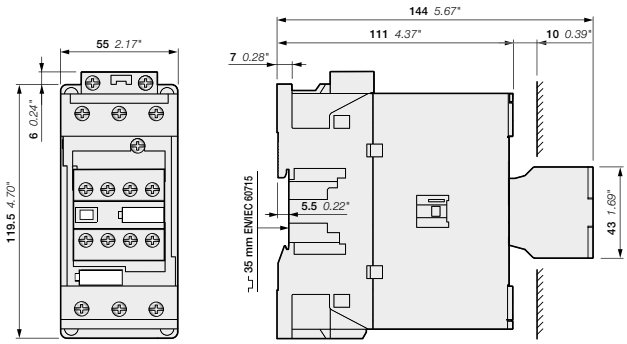
AF40, AF52, AF65-30-00 + CAL4-11 2-pole auxiliary contact block
AF40, AF52, AF65-30-11



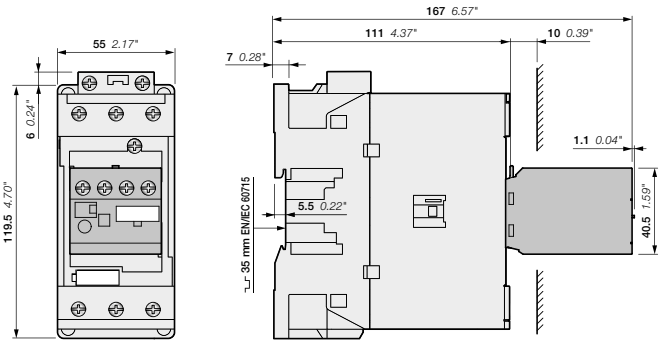
AF40, AF52, AF65
+ CA4 4-pole auxiliary contact block



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



AF40, AF52, AF65..-30-22



AF40, AF52, AF65
+ TEF4 electronic timer

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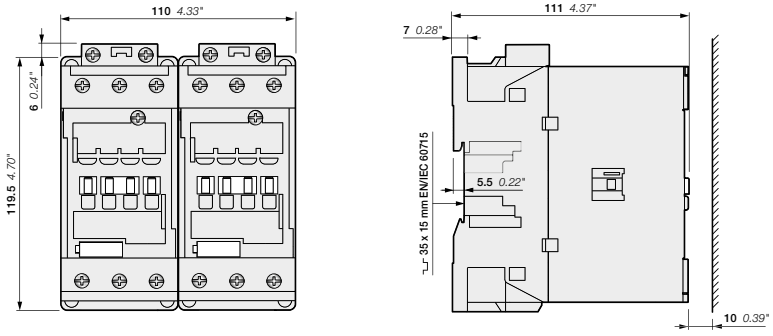
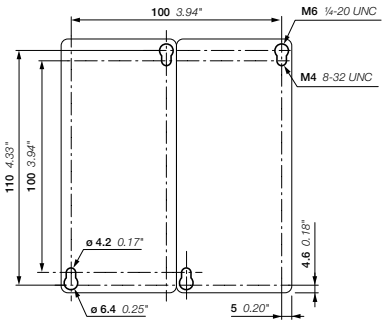
AF40 ... AF65 3-pole contactors

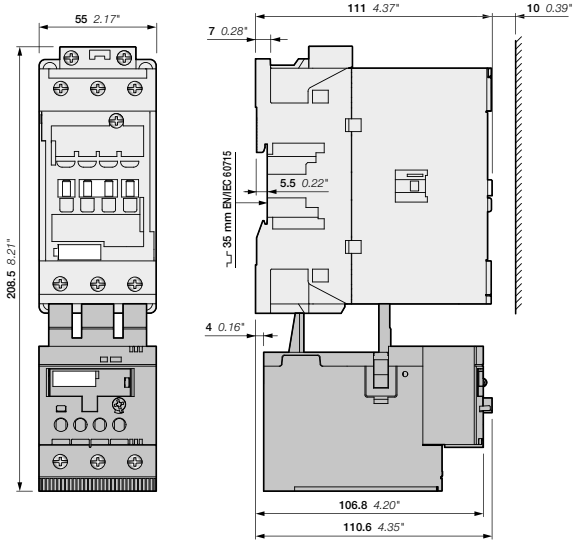
Main dimensions mm, *inches*



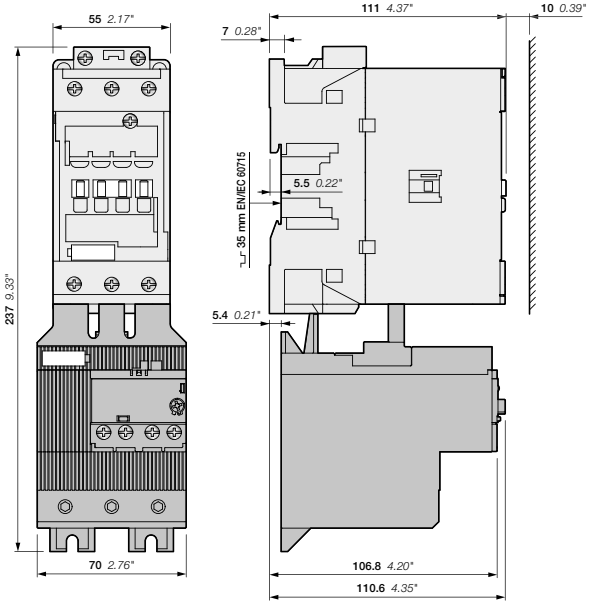
AF40, AF52, AF65
+ VM96-4 mechanical interlock unit



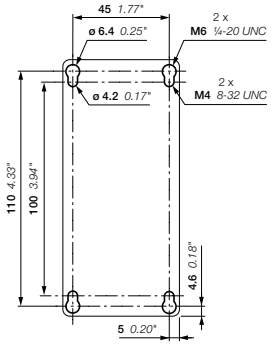
AF40, AF52, AF65
+ VM96-4 mechanical interlock set



AF40, AF52, AF65
+ TF65 thermal overload relay



AF40, AF52, AF65
+ EF65 electronic overload relay



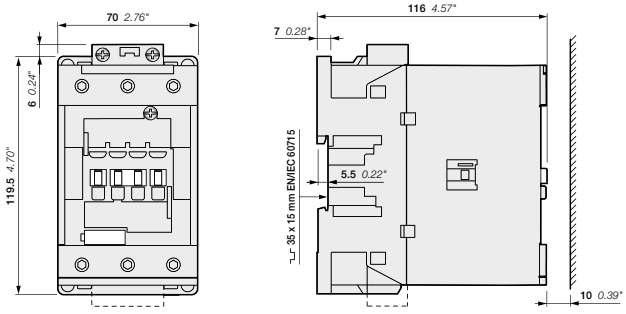
AF40, AF52, AF65
+ TF65, EF65

5

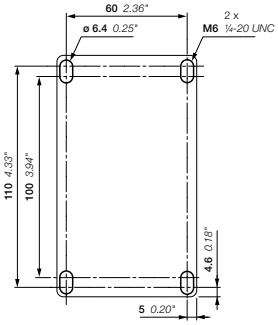
1SBC101731S0201

AF80 ... AF96 3-pole contactors

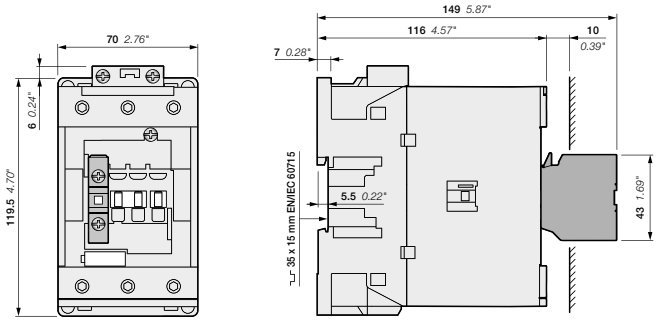
Main dimensions mm, *inches*



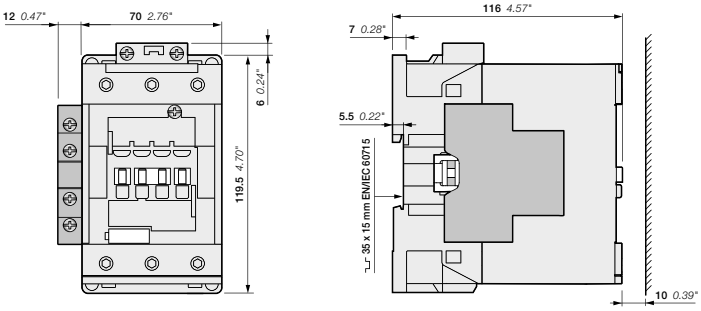
AF80, AF96



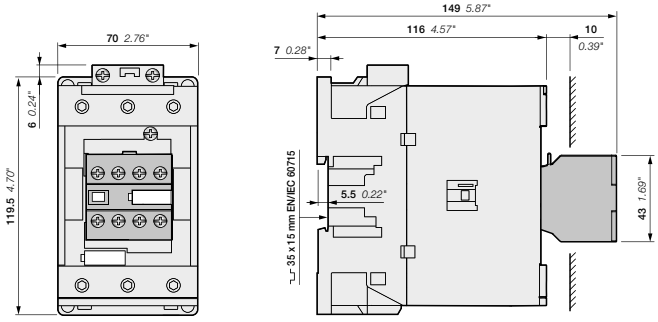
AF80, AF96



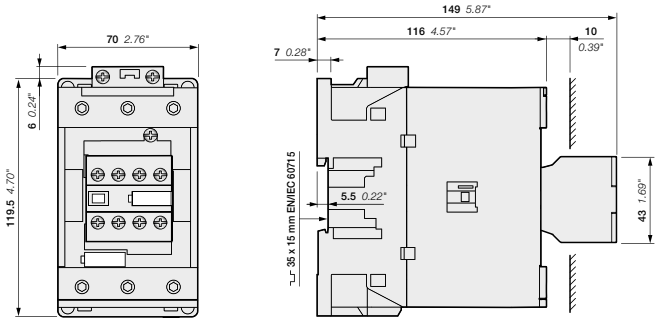
AF80, AF96
+ CA4, CC4 1-pole auxiliary contact block



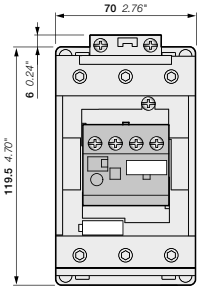
AF80, AF96-30-00 + CAL4-11 2-pole auxiliary contact block
AF80, AF96-30-11



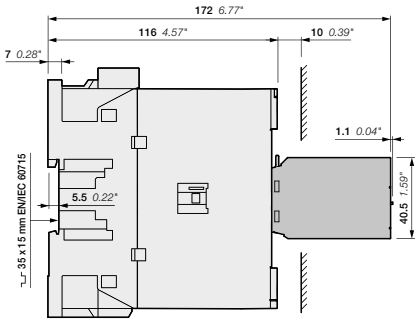
AF80, AF96
+ CA4 4-pole auxiliary contact block



AF80, AF96..-30-22



AF80, AF96
+ TEF4 electronic timer



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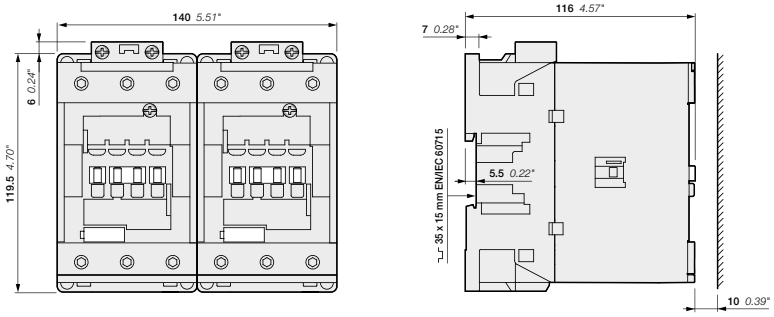
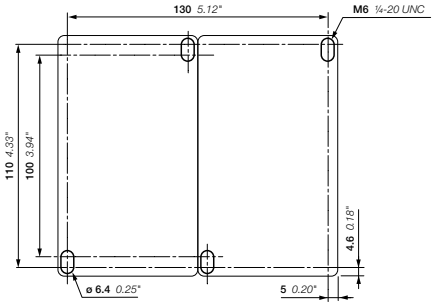
AF80 ... AF96 3-pole contactors

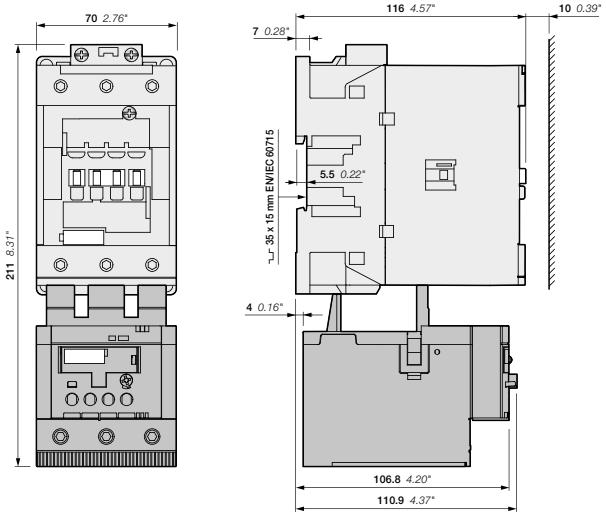
Main dimensions mm, *inches*



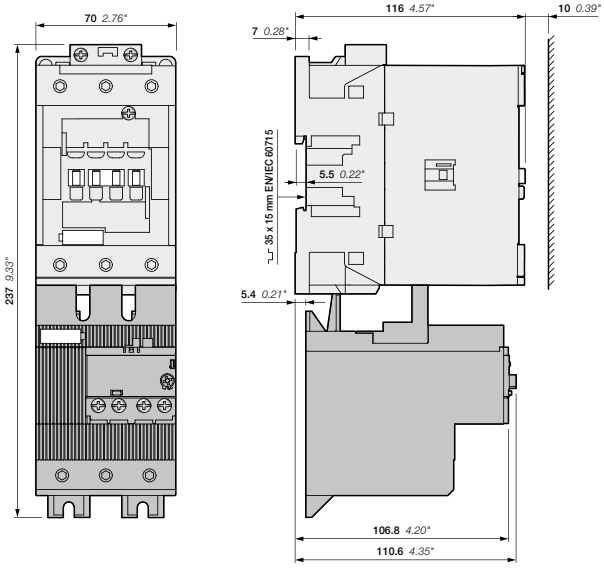
AF80, AF96
+ VM96-4 mechanical interlock unit



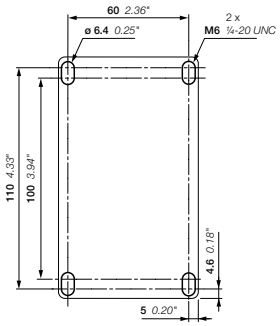
AF80, AF96
+ VM96-4 mechanical interlock set



AF80, AF96
+ TF96 thermal overload relay



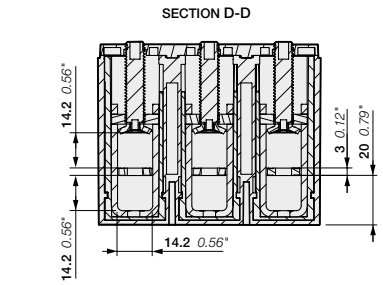
AF80, AF96
+ EF96 electronic overload relay

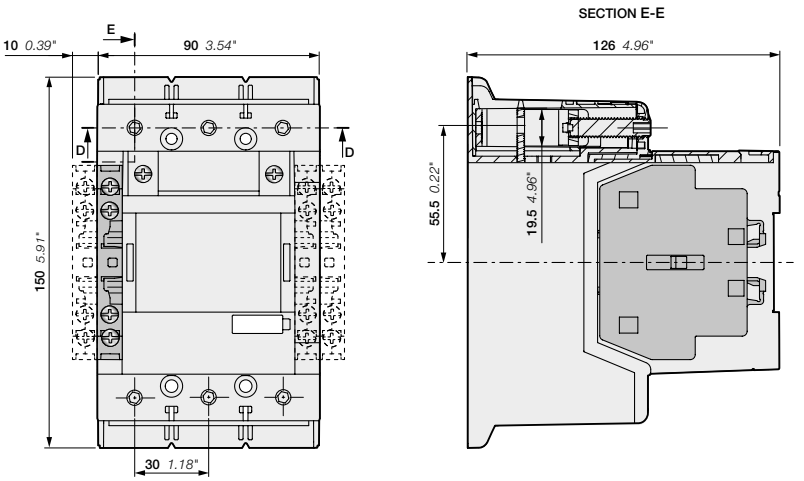


AF80, AF96
+ TF96, EF96

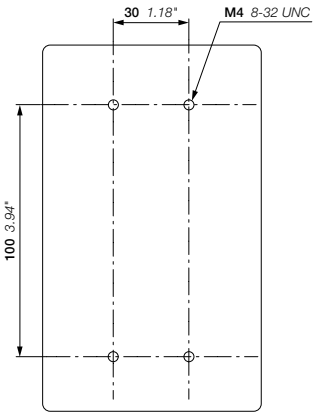
AF116, AF140, AF146 3-pole contactors

Main dimensions mm, *inches*

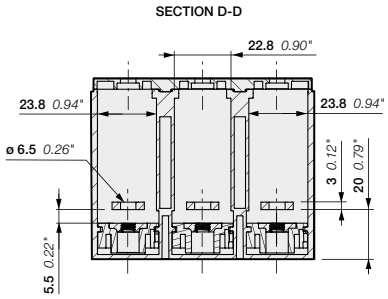


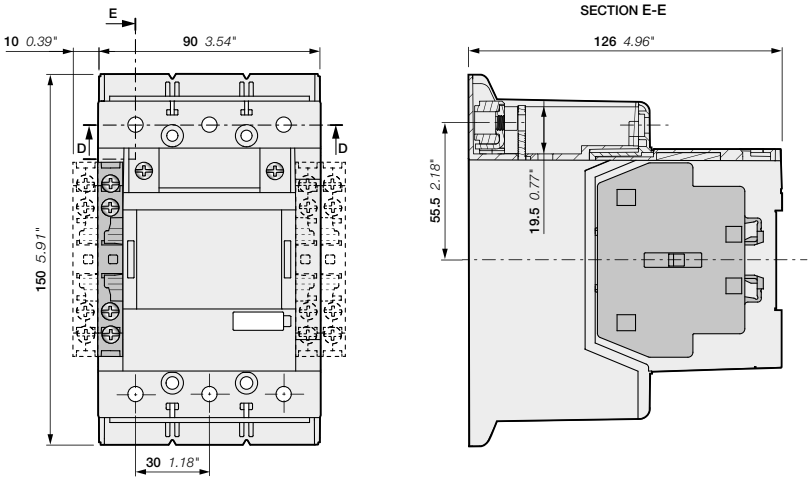


AF116, AF140, AF146-30-00 + CAL19 2-pole auxiliary contact block
AF116, AF140, AF146-30-11



AF116, AF140, AF146-30-..(B)





AF116, AF140, AF146-30-00B + CAL19 2-pole auxiliary contact block
AF116, AF140, AF146-30-11B

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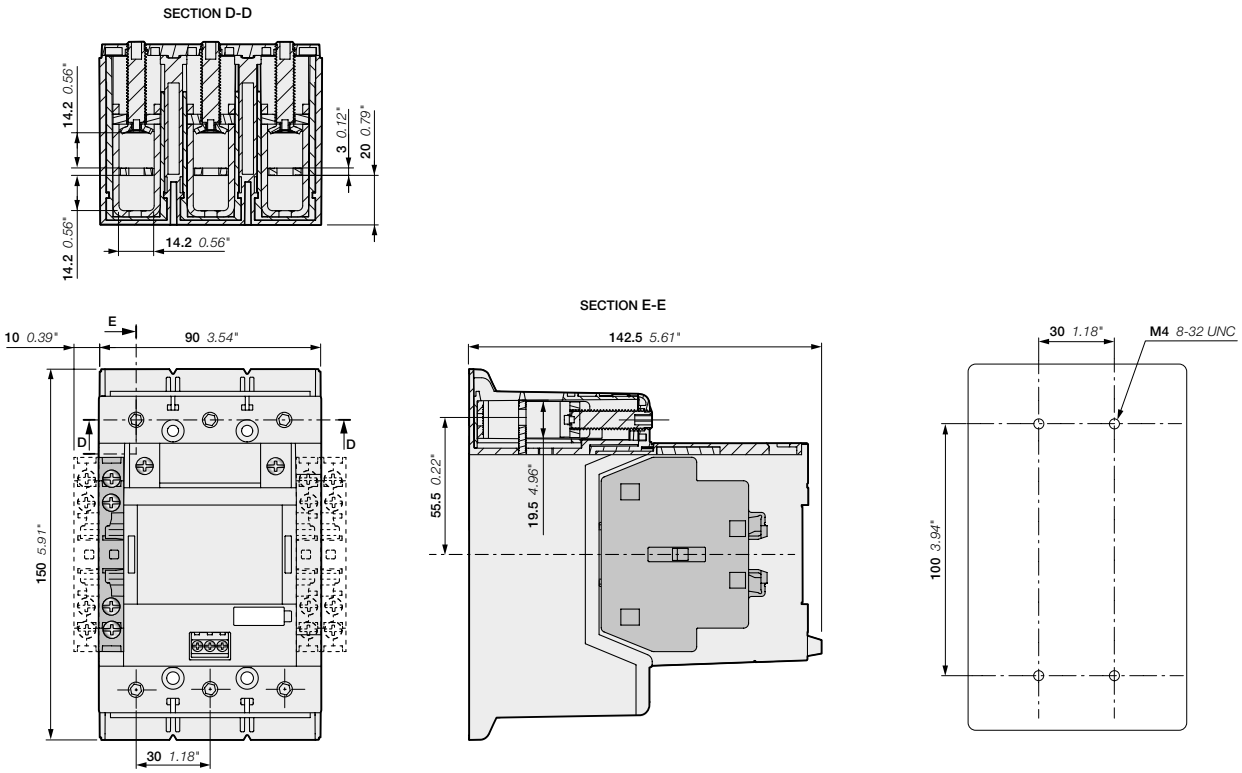
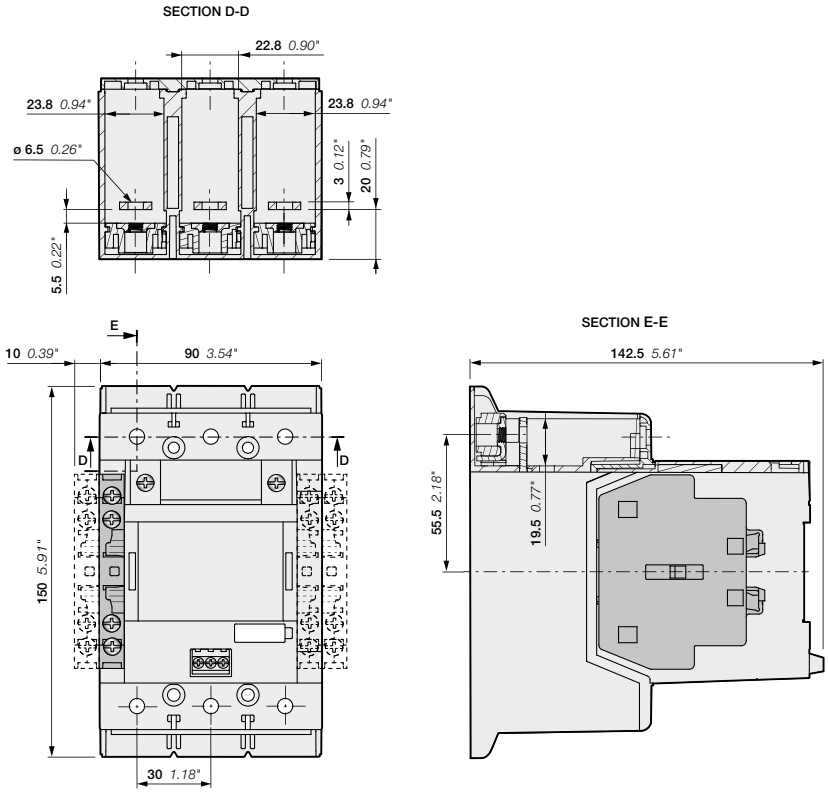
AF116, AF140, AF146 3-pole contactors
With built-in PLC interface (coil code 33, 34)

Main dimensions mm, *inches*



AF116, AF140, AF146-30-00 + CAL19 2-pole auxiliary contact block
AF116, AF140, AF146-30-11

AF116, AF140, AF146-30-..(B)

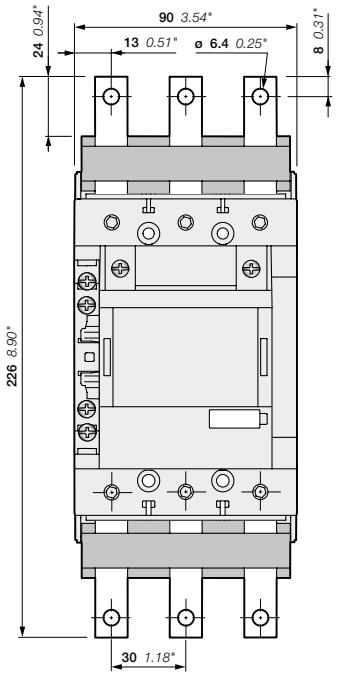


AF116, AF140, AF146-30-00B + CAL19 2-pole auxiliary contact block
AF116, AF140, AF146-30-11B

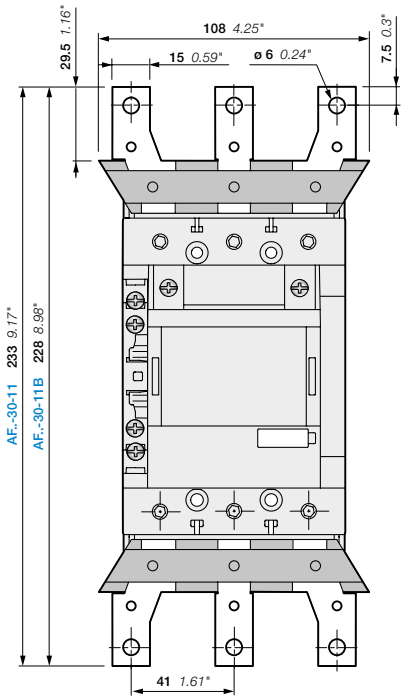
1SFC101118C0201

AF116, AF140, AF146 3-pole contactors

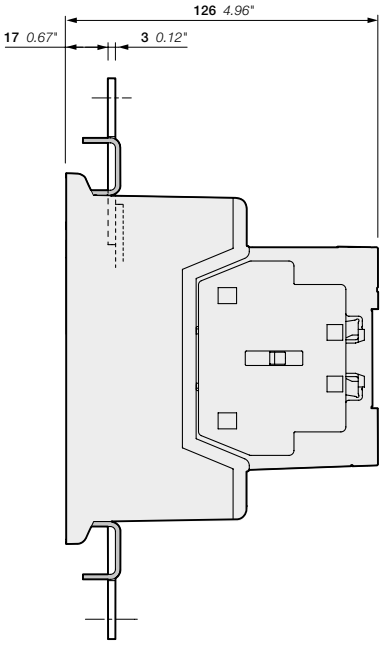
Main dimensions mm, *inches*

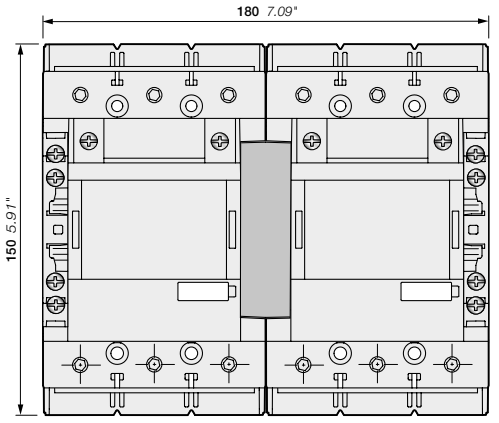


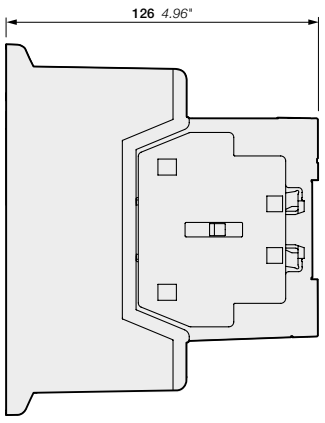
AF116, AF140, AF146-30-11
+ LX140 terminal extension



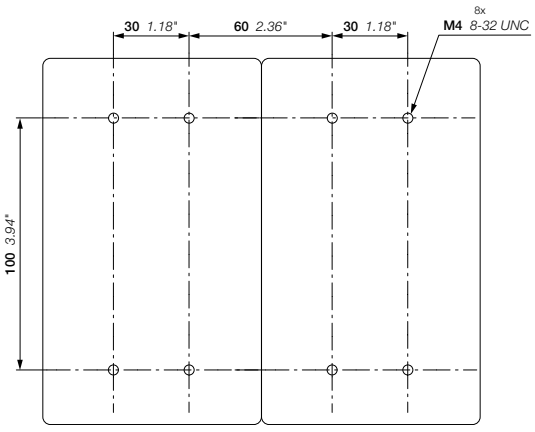
AF116, AF140, AF146-30-11(B)
+ LW140(B) terminal enlargement







AF116, AF140, AF146-30-11(B)
+ VM19 mechanical interlocking unit



AF116, AF140, AF146-30-11(B)
+ VM19 mechanical interlocking unit

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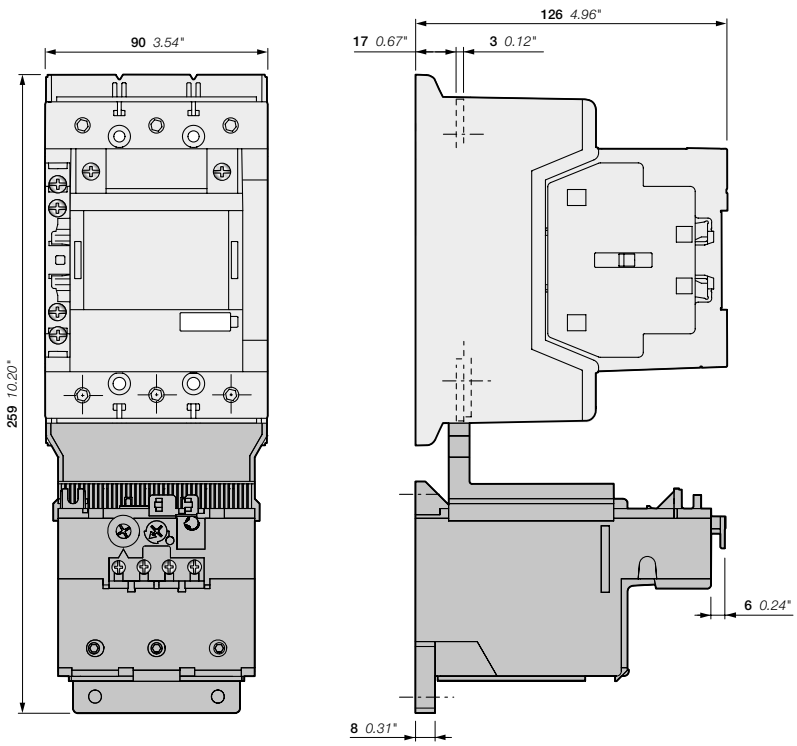
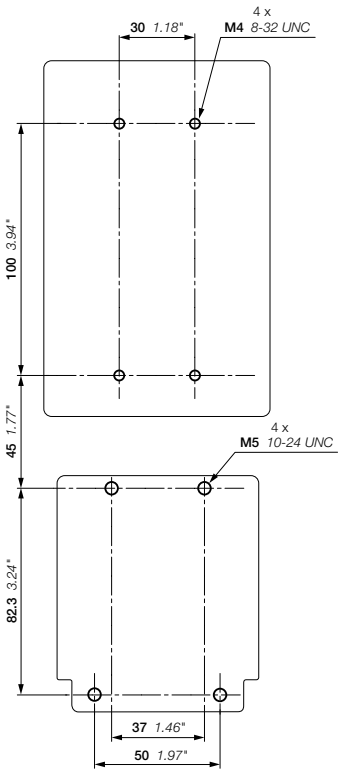
AF116, AF140, AF146 3-pole contactors

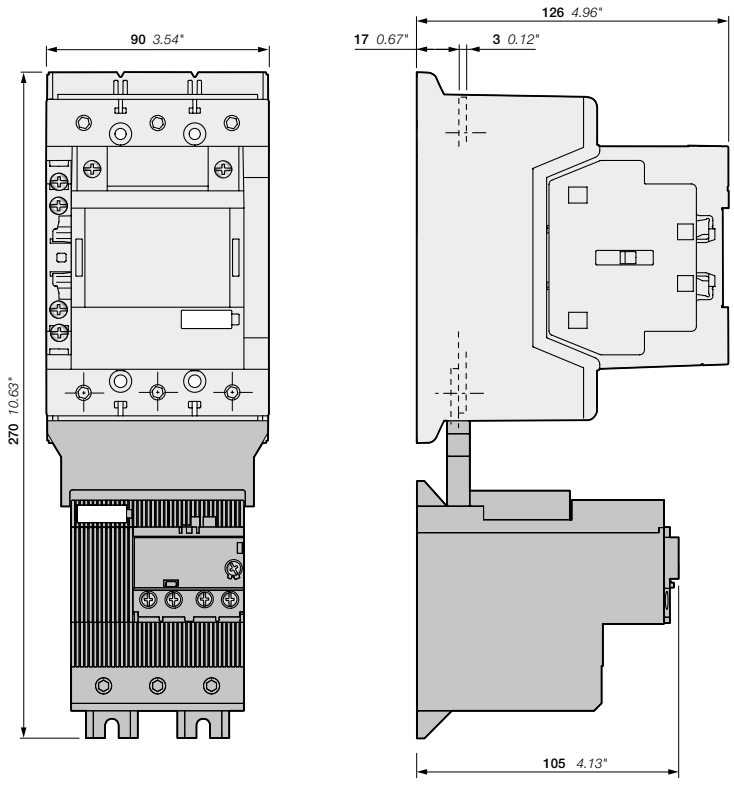
Main dimensions mm, *inches*



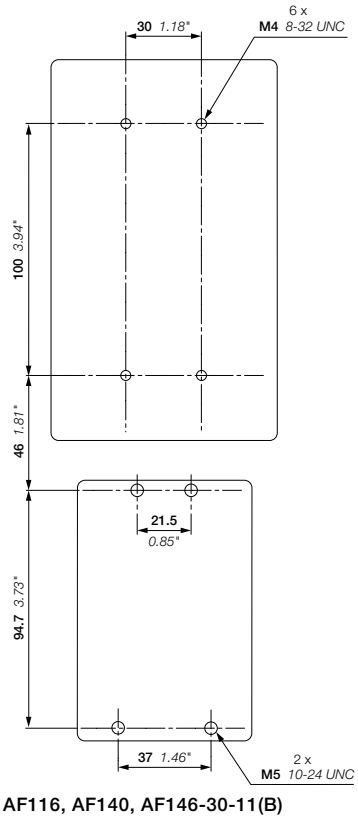
AF116, AF140-30-11(B)
+ TF140 thermal overload relay



AF116, AF140-30-11(B)
+ TF140 thermal overload relay



AF116, AF140, AF146-30-11(B)
+ EF146 electronic overload relay



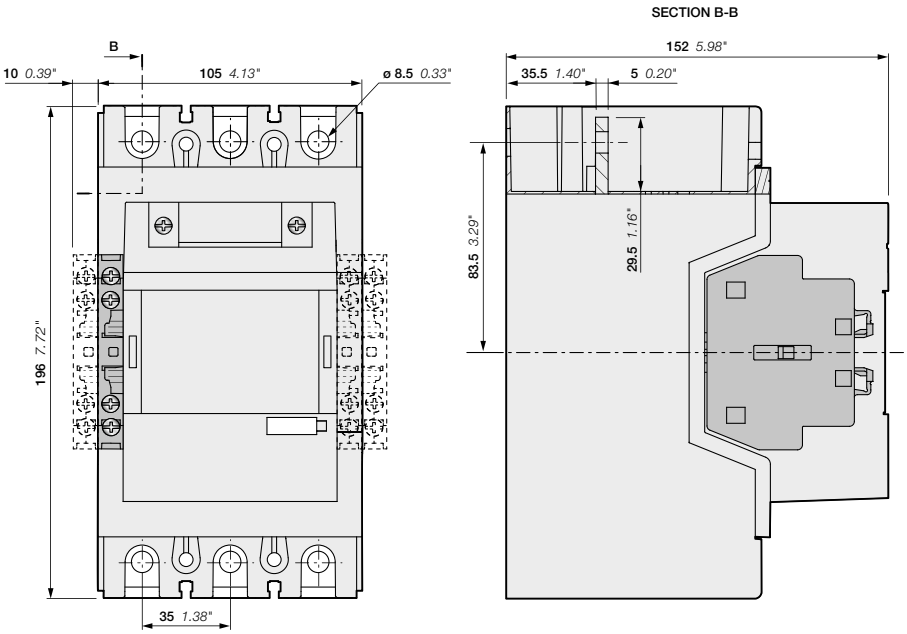
AF116, AF140, AF146-30-11(B)
+ EF146 electronic overload relay

5

1SFC101118C0201

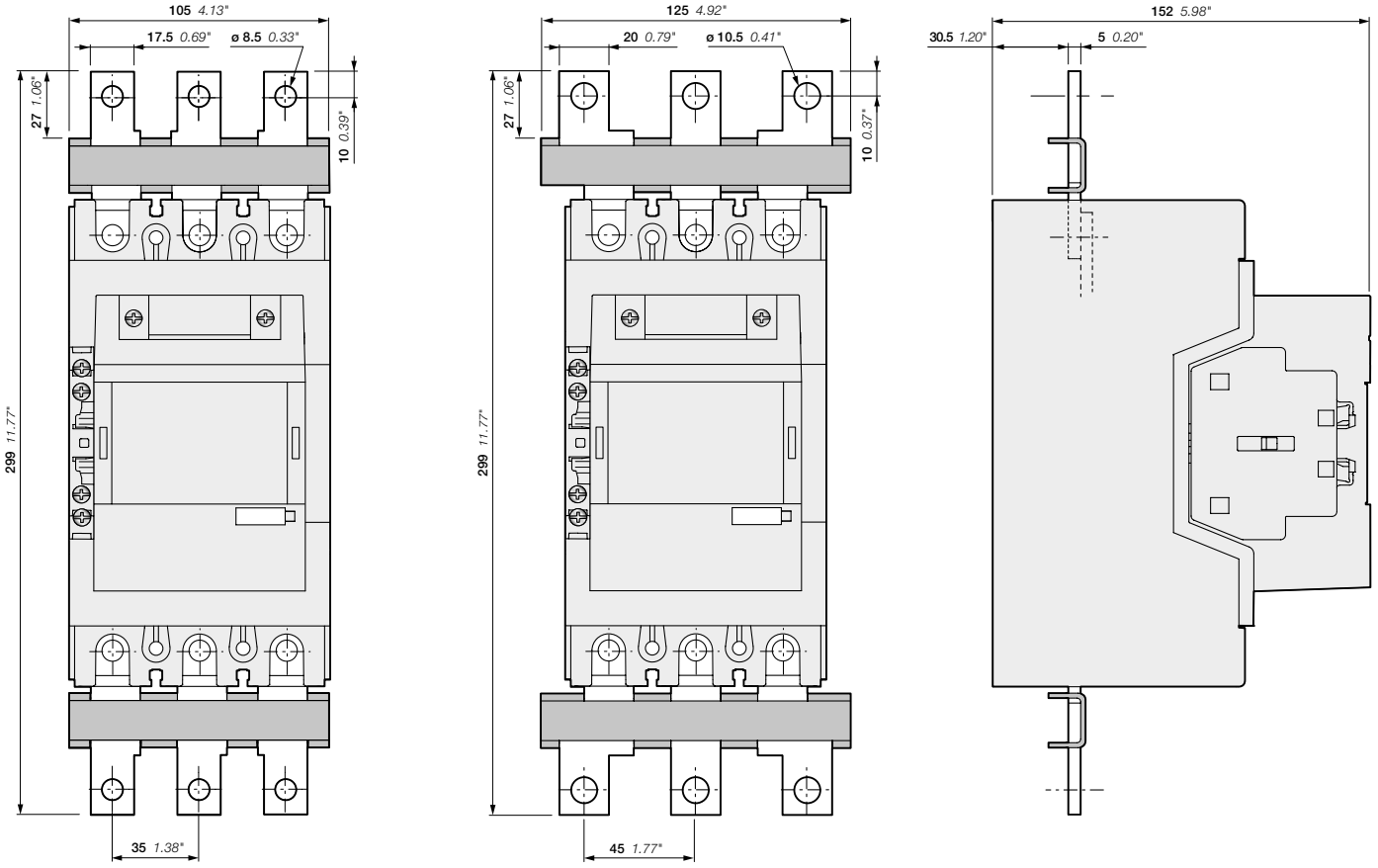
AF190, AF205 3-pole contactors

Main dimensions mm, *inches*



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

AF190, AF205



AF190, AF205-30-11
+ LX205 terminal extension

AF190, AF205-30-11
+ LW205 terminal enlargement

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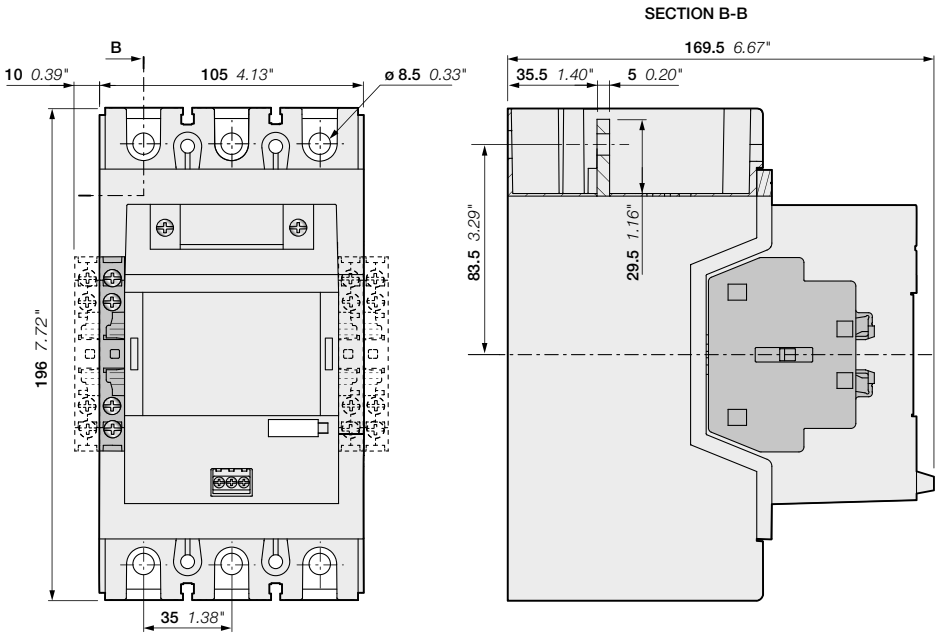
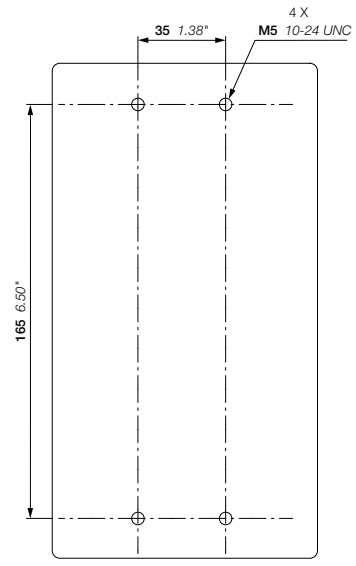
AF190, AF205 3-pole contactors
With built-in PLC interface (coil code 33, 34)

Main dimensions mm, *inches*



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



AF190, AF205

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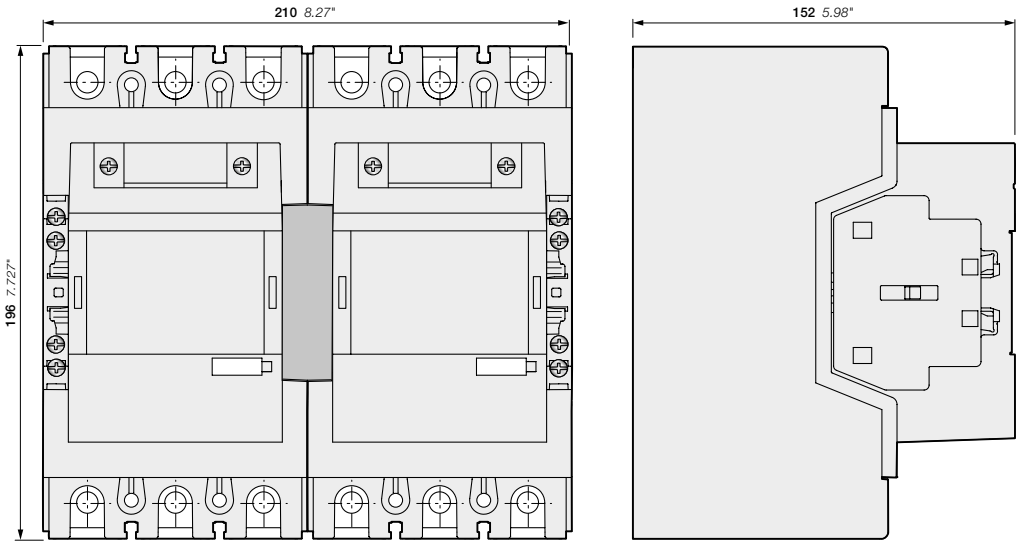
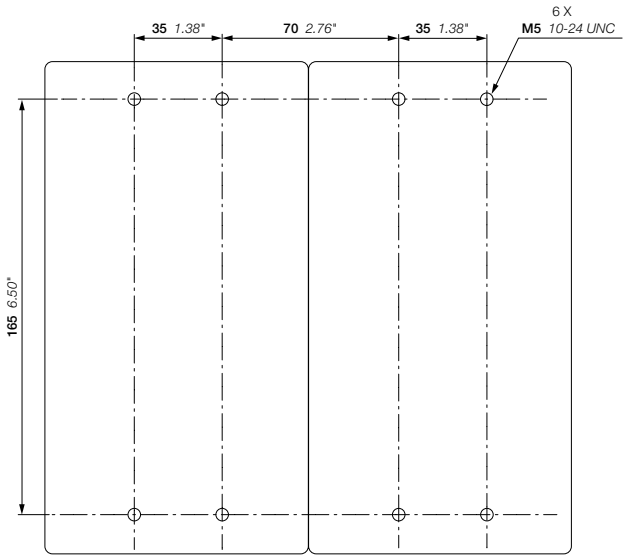
AF190, AF205 3-pole contactors

Main dimensions mm, *inches*



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

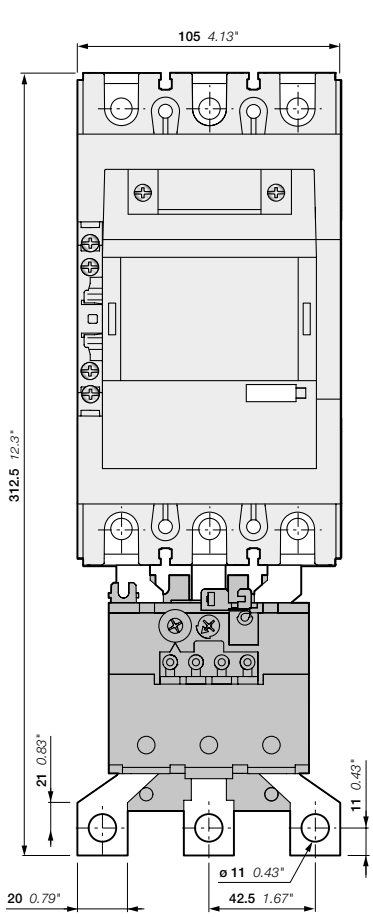


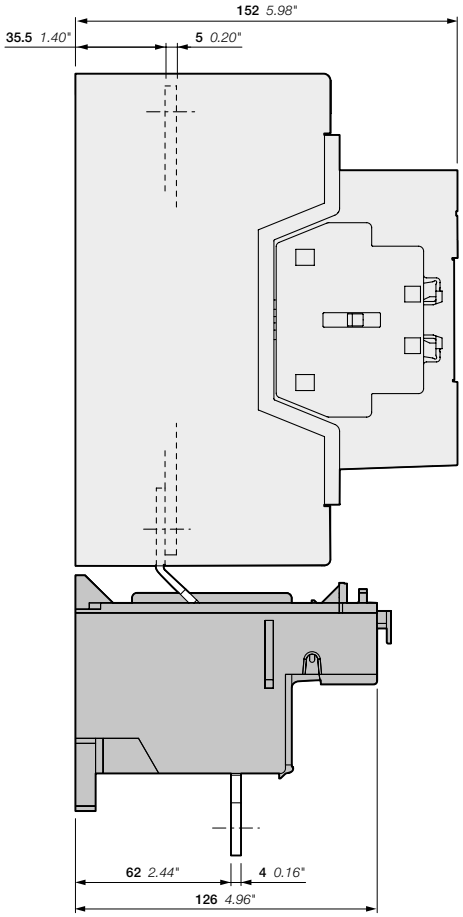
AF190, AF205
+ VM19 mechanical interlocking unit

1SFC101119C0201

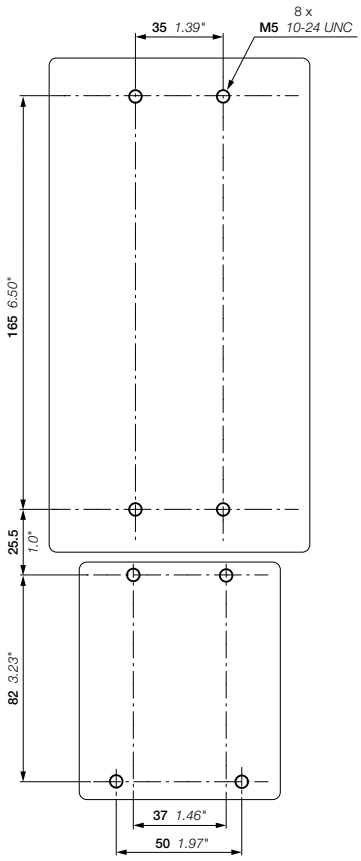
AF190, AF205 3-pole contactors

Main dimensions mm, *inches*





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

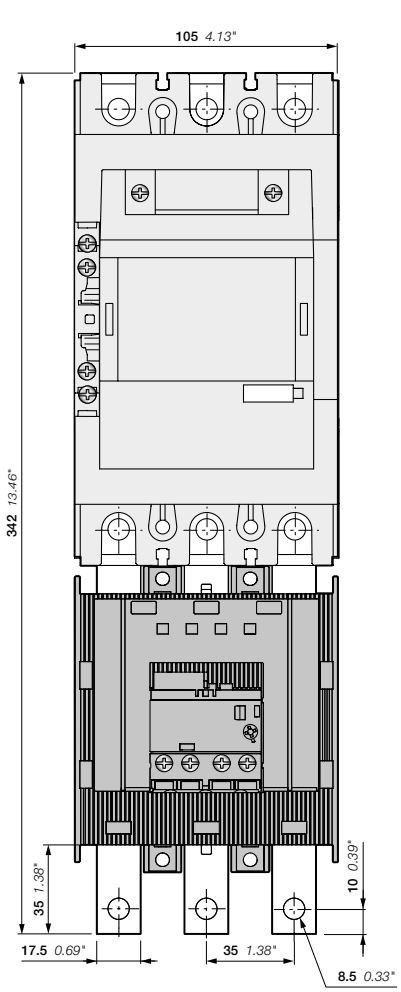


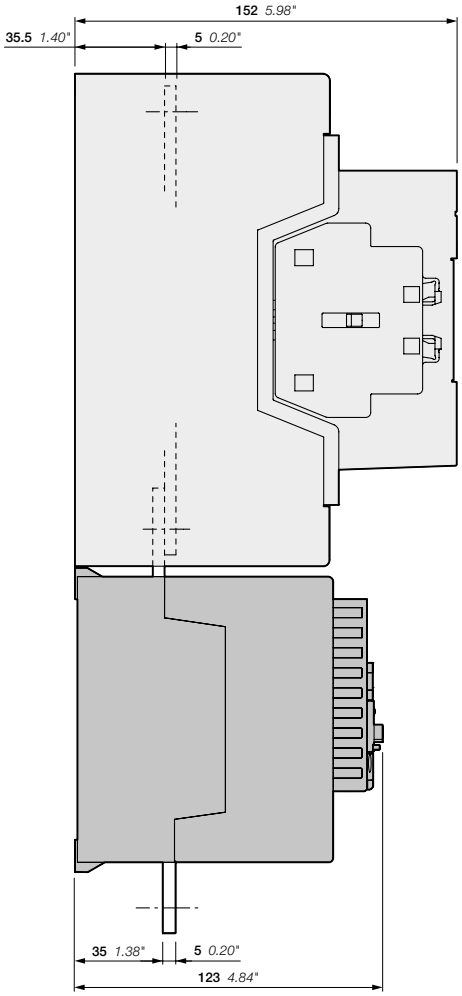
AF190, AF205
+ TA200DU thermal overload relay

1SFC101119C0201

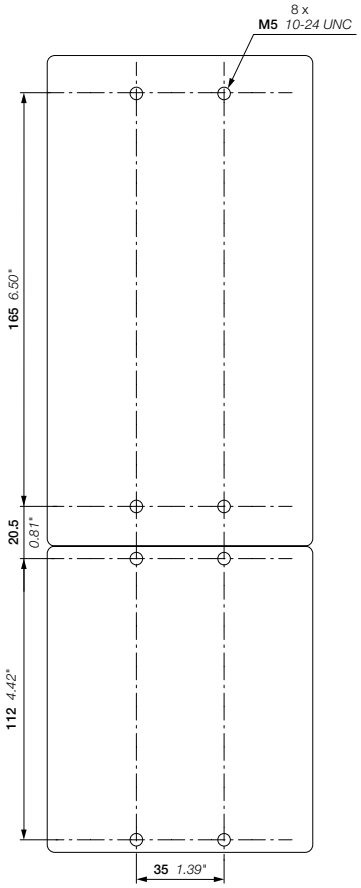
AF190, AF205 3-pole contactors

Main dimensions mm, *inches*





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

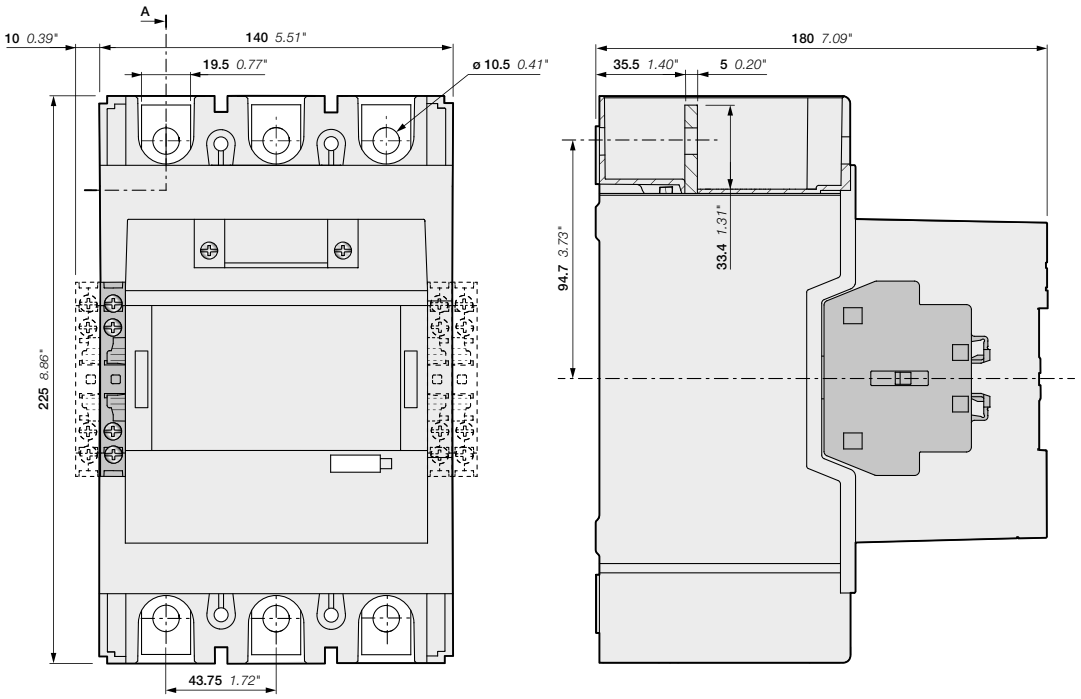


AF190, AF205
+ EF205 electronic overload relay

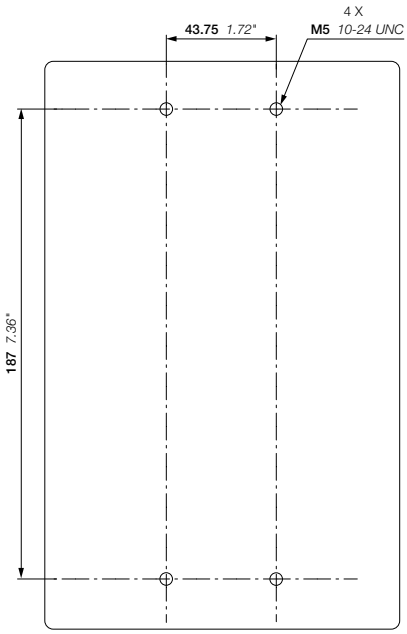
1SFC101119C0201

AF265, AF305, AF370 3-pole contactors

Main dimensions mm, *inches*



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



AF265, AF305, AF370

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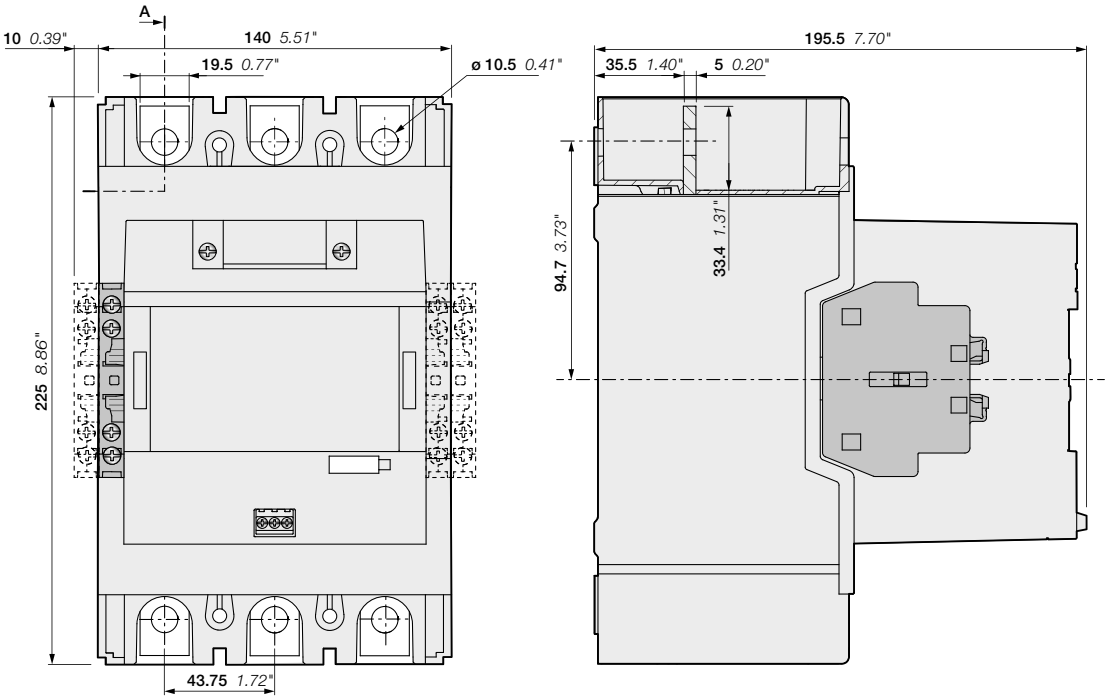
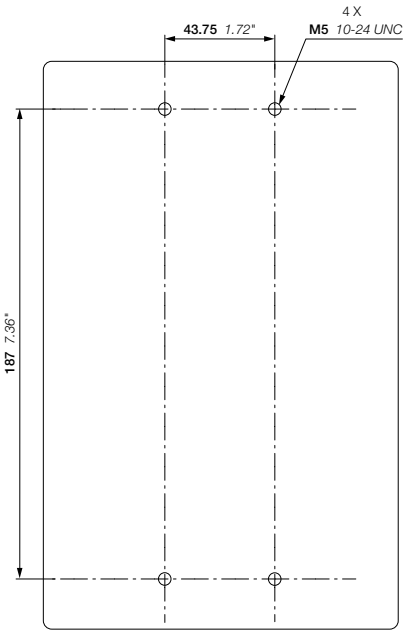
AF265, AF305, AF370 3-pole contactors
With built-in PLC interface (coil code 33, 34)

Main dimensions mm, *inches*



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

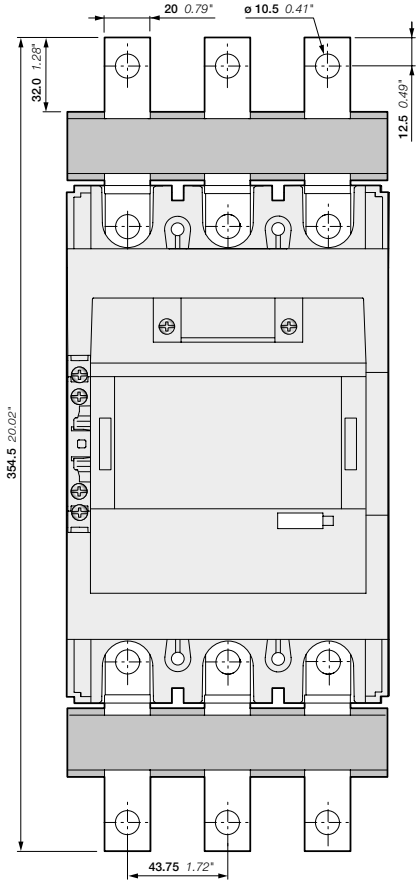


AF265, AF305, AF370

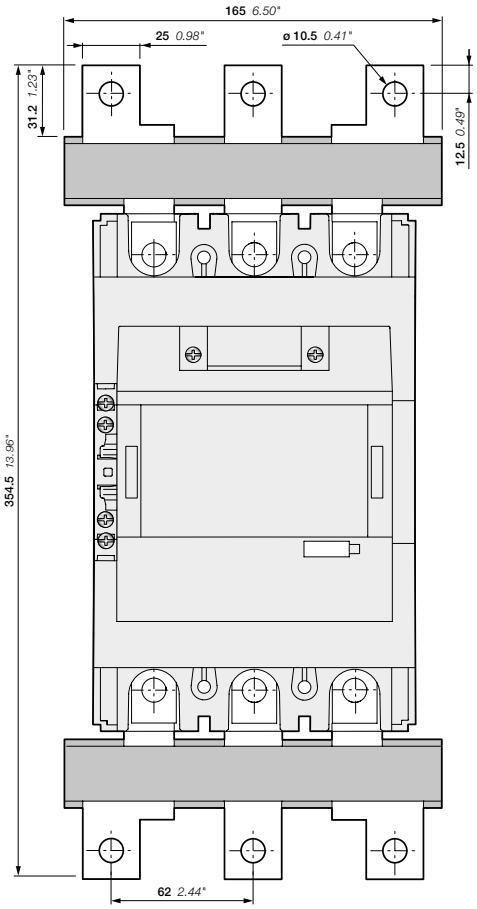
1SFC101120C0201 - Rev. B

AF265, AF305, AF370 3-pole contactors

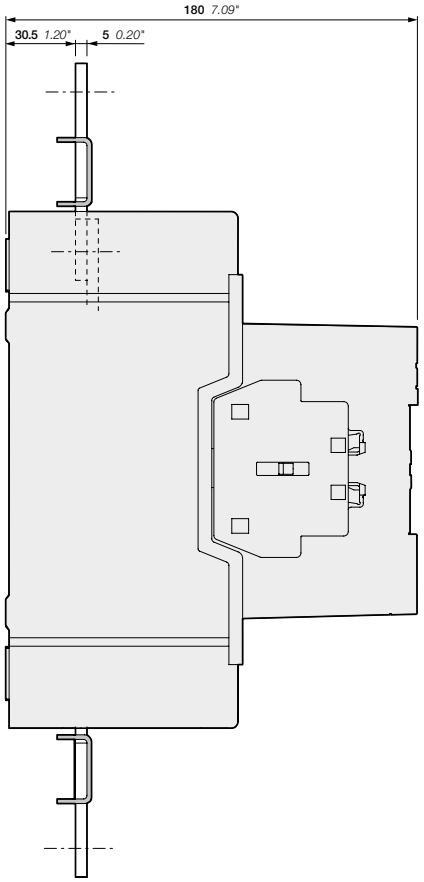
Main dimensions mm, *inches*



AF265, AF305, AF370-30-11
+ LX370 terminal extension



AF265, AF305, AF370-30-11
+ LW370 terminal enlargement



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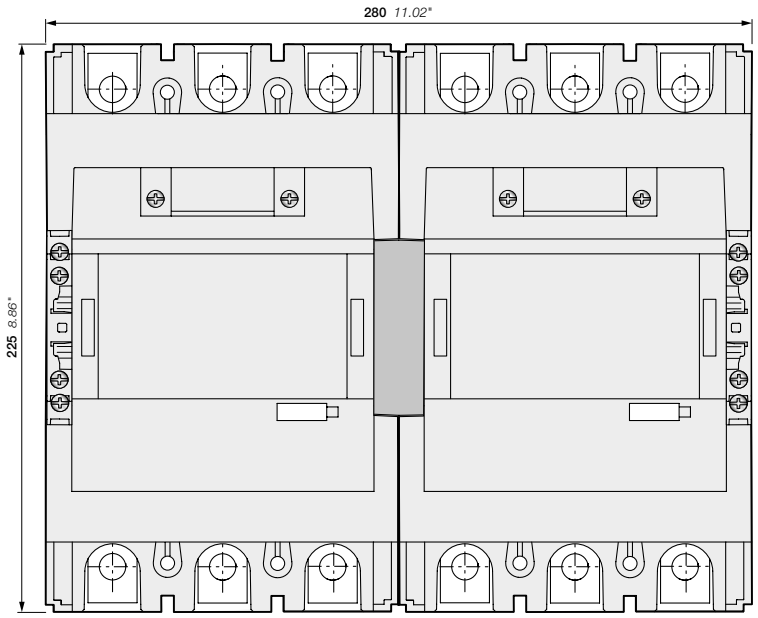
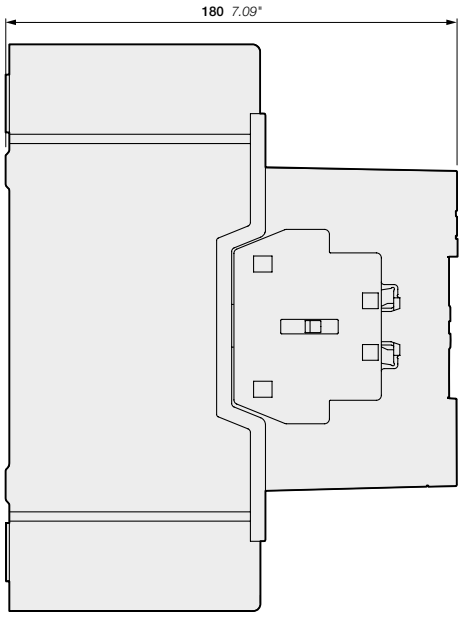
1SFC101120C0201 - Rev. B

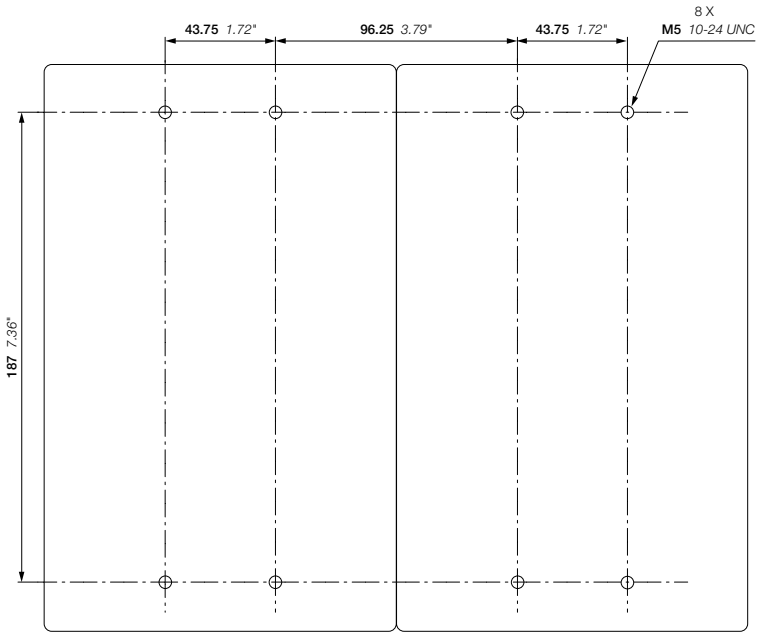
AF265, AF305, AF370 3-pole contactors

Main dimensions mm, *inches*





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

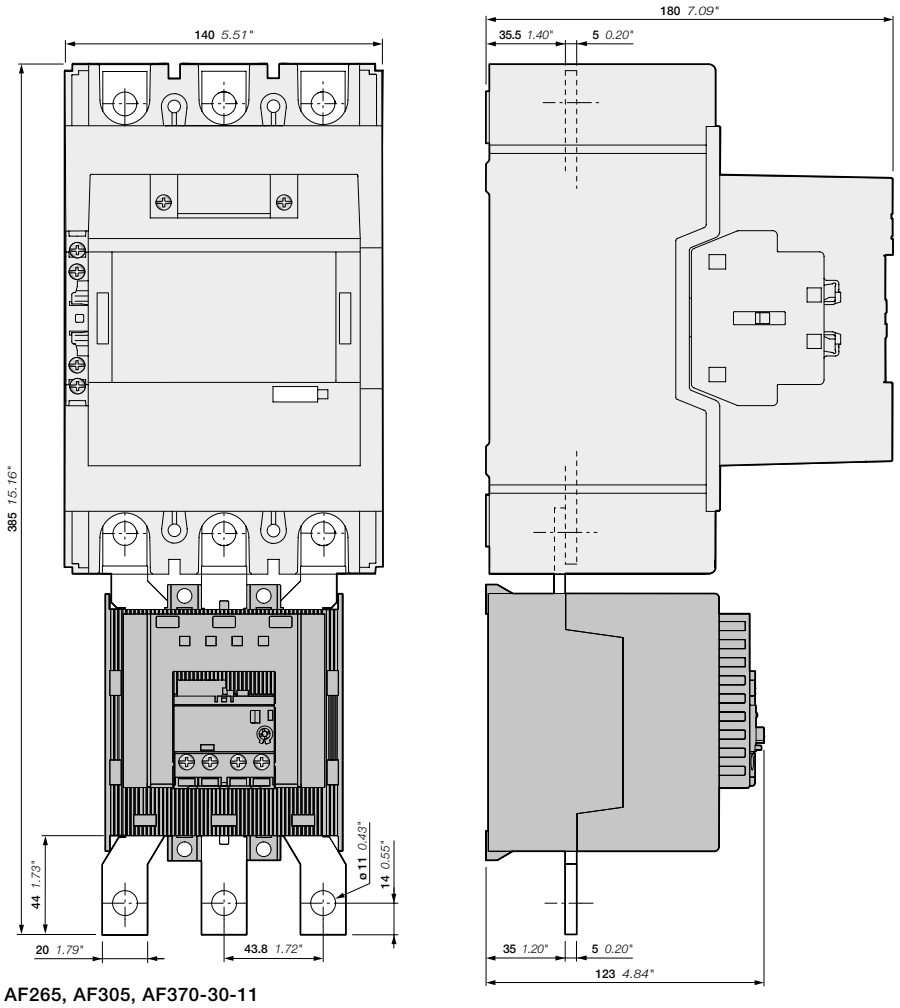


AF265, AF305, AF370
+ VM19 mechanical interlocking unit

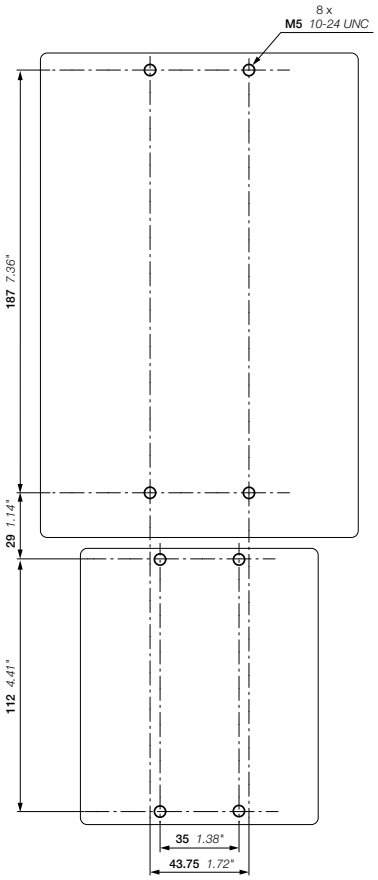
1SFC101120C0201 - Rev. B

AF265, AF305, AF370 3-pole contactors

Main dimensions mm, *inches*



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



AF265, AF305, AF370
+ EF370 electronic overload relay

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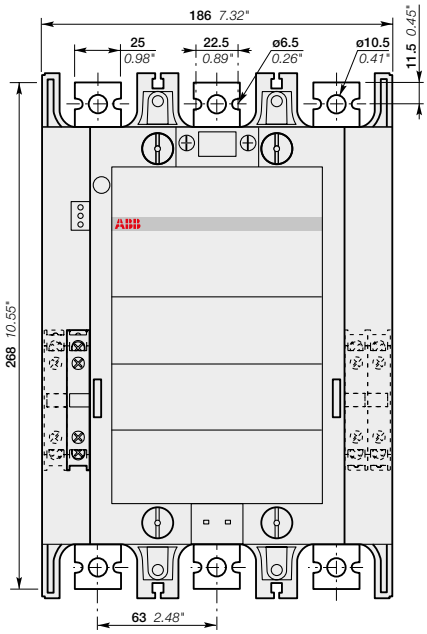
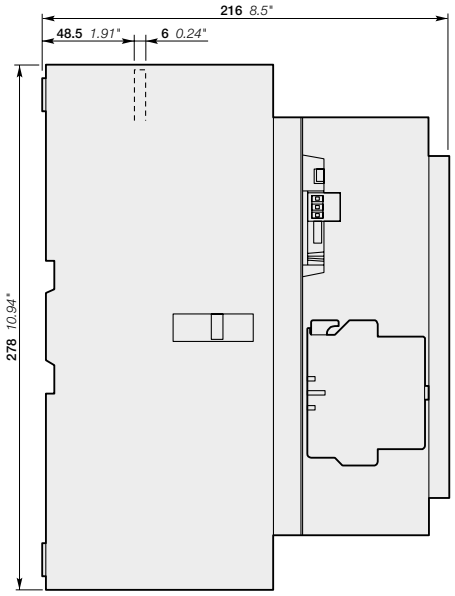
1SFC101120C0201 - Rev. B

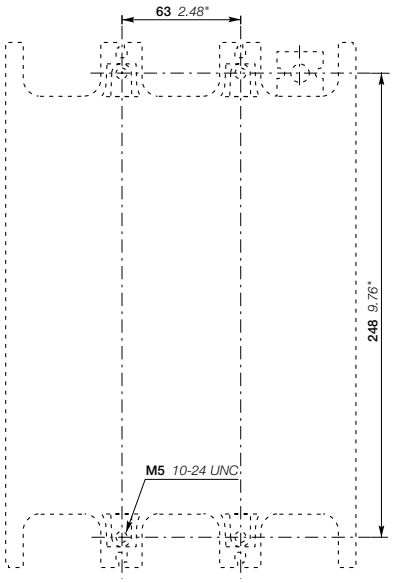
AF400 and AF460 3-pole contactors

Main dimensions mm, *inches*

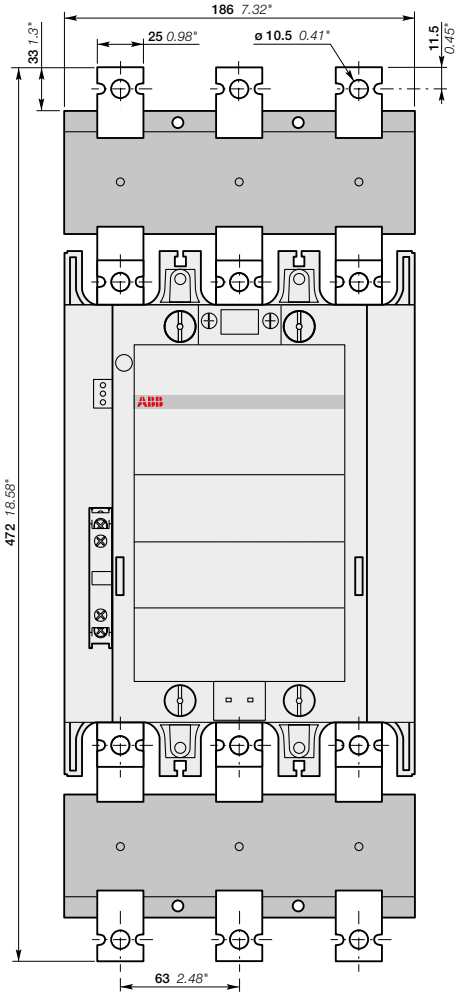


AF400, AF460-30-11

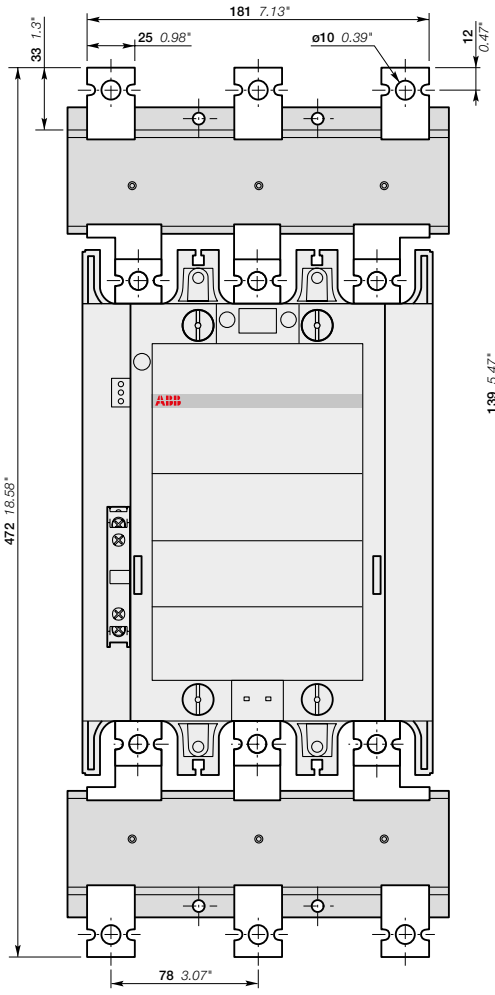




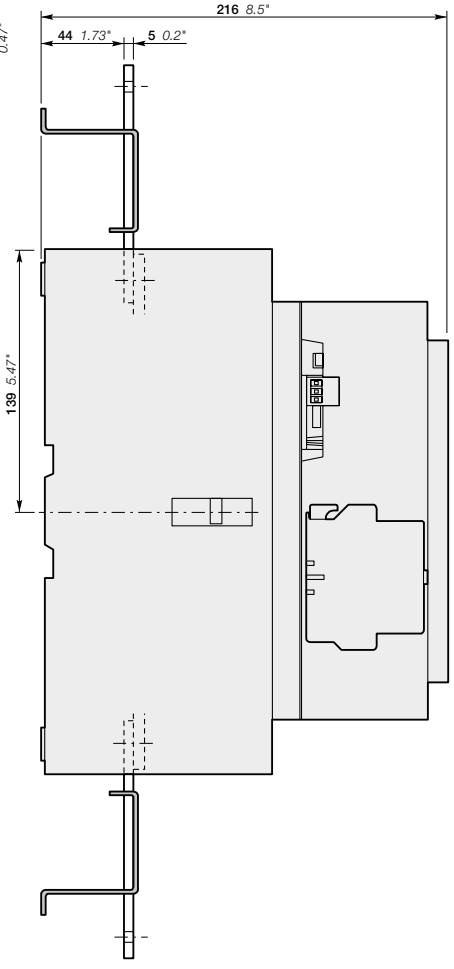
AF400, AF460



AF400, AF460-30-11
+ LX460 terminal extension



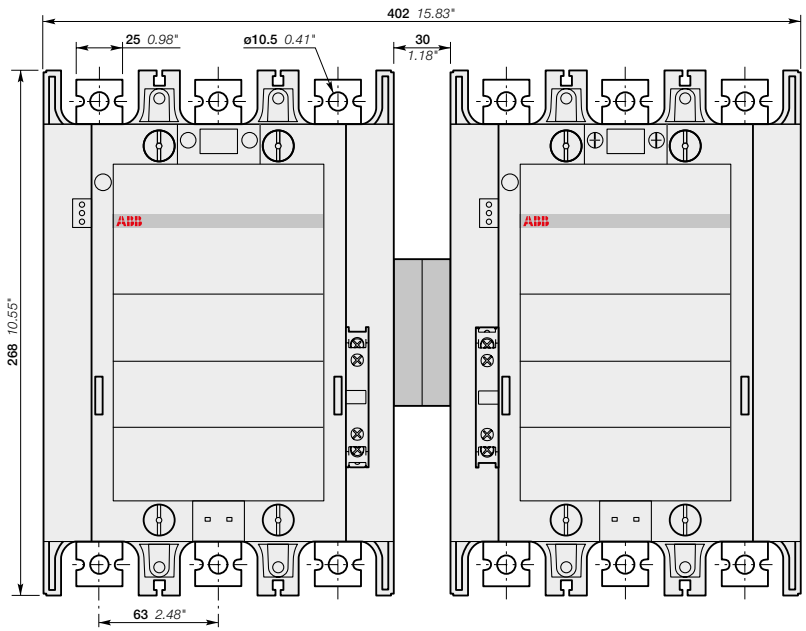
AF400, AF460-30-11
+ LW460 terminal enlargement

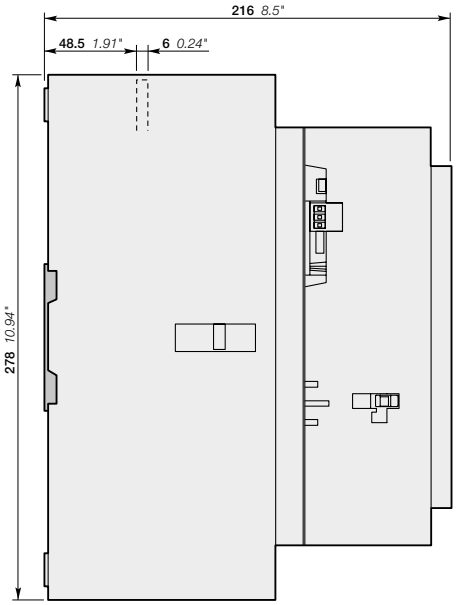


1SFC101121C0201

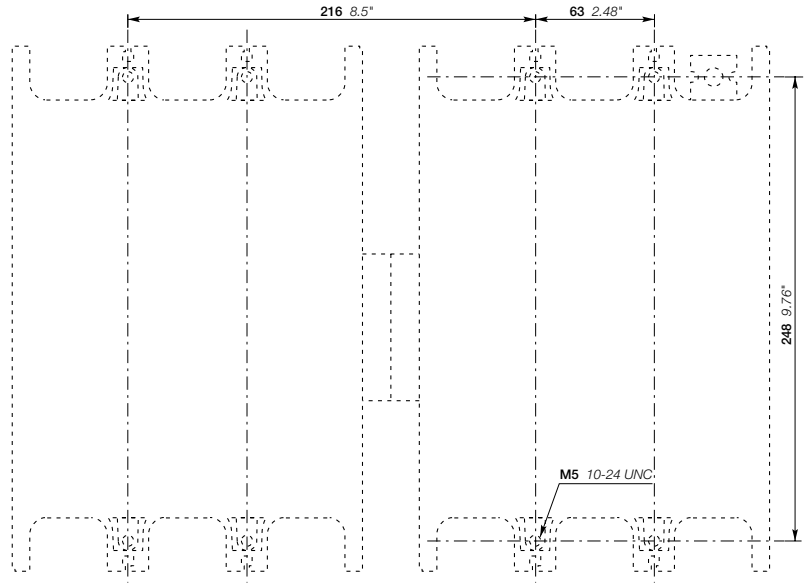
AF400 and AF460 3-pole contactors

Main dimensions mm, *inches*





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



AF400, AF460
+ VM750H mechanical interlock unit

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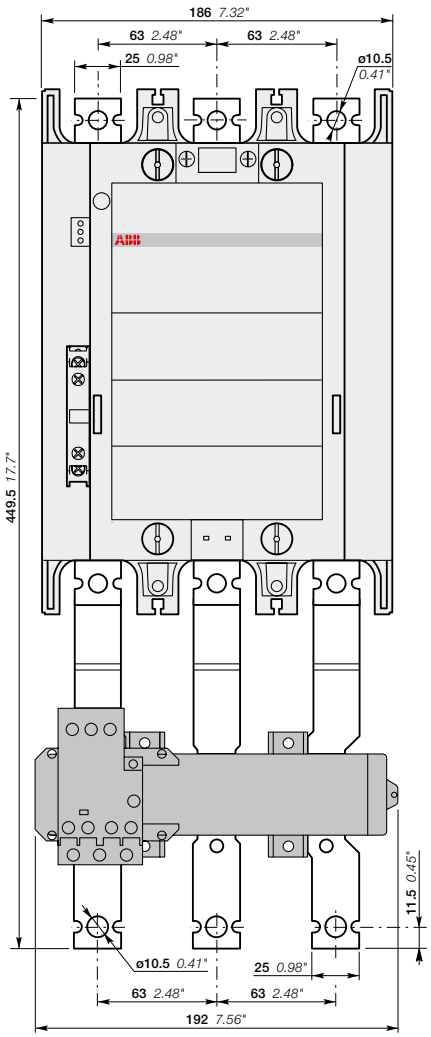
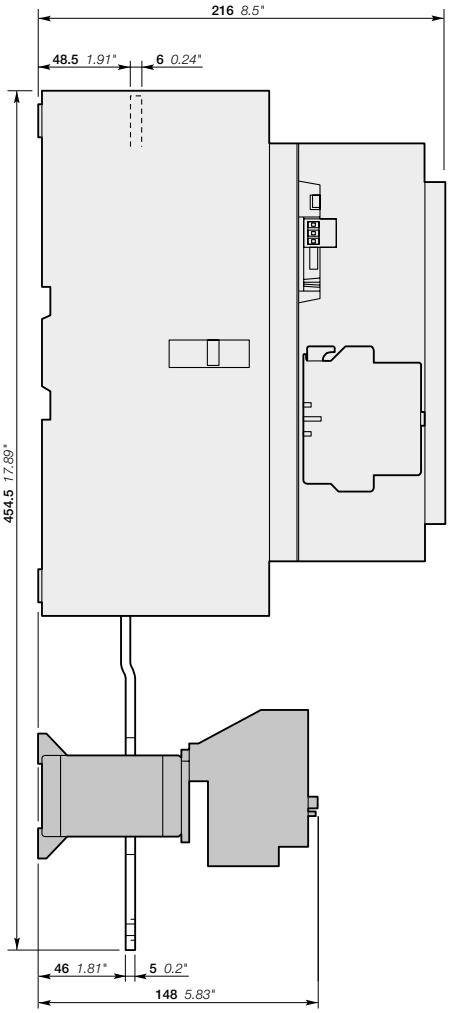
1SFC101121C0201

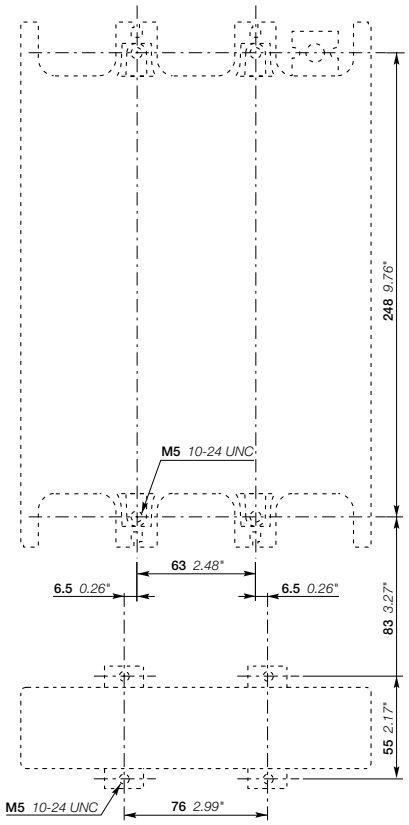
AF400 and AF460 3-pole contactors

Main dimensions mm, *inches*





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

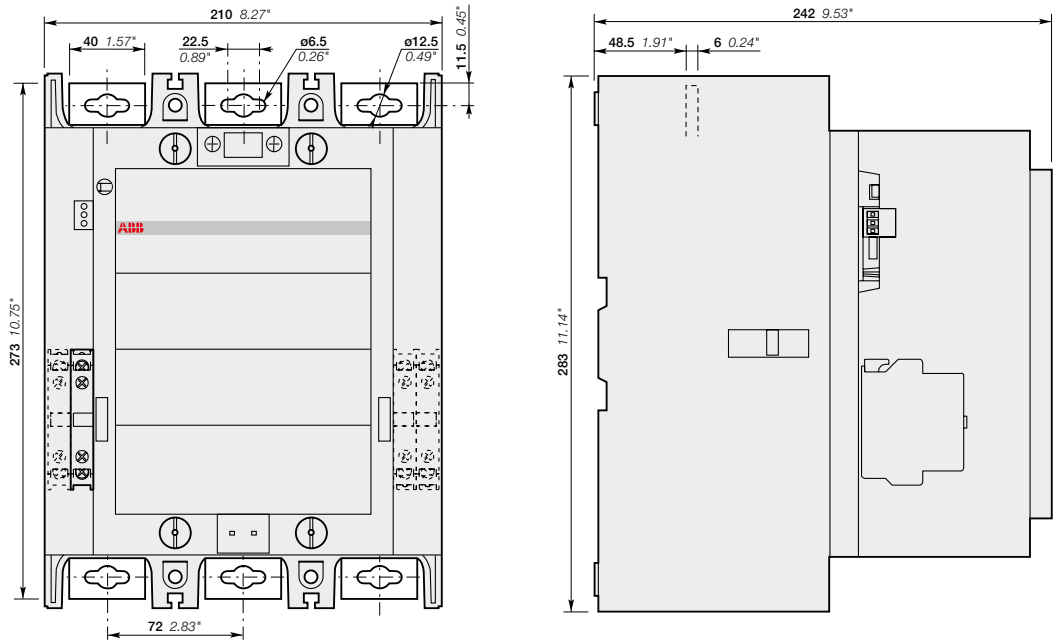


AF400, AF460
+ E500DU electronic O/L relay

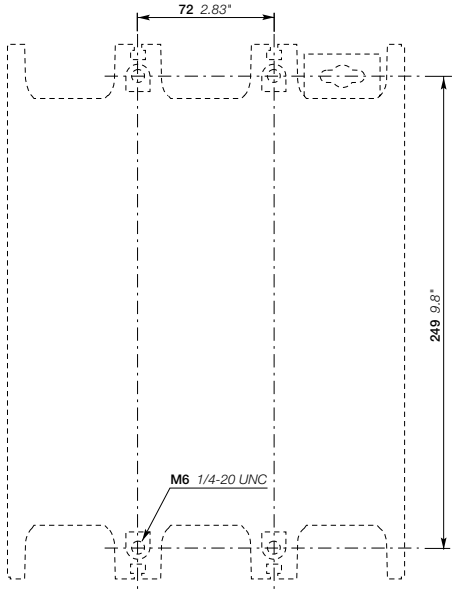
1SFC101121C0201

AF580 and AF750 3-pole contactors

Main dimensions mm, *inches*



AF580 and AF750-30-11



AF580 and AF750

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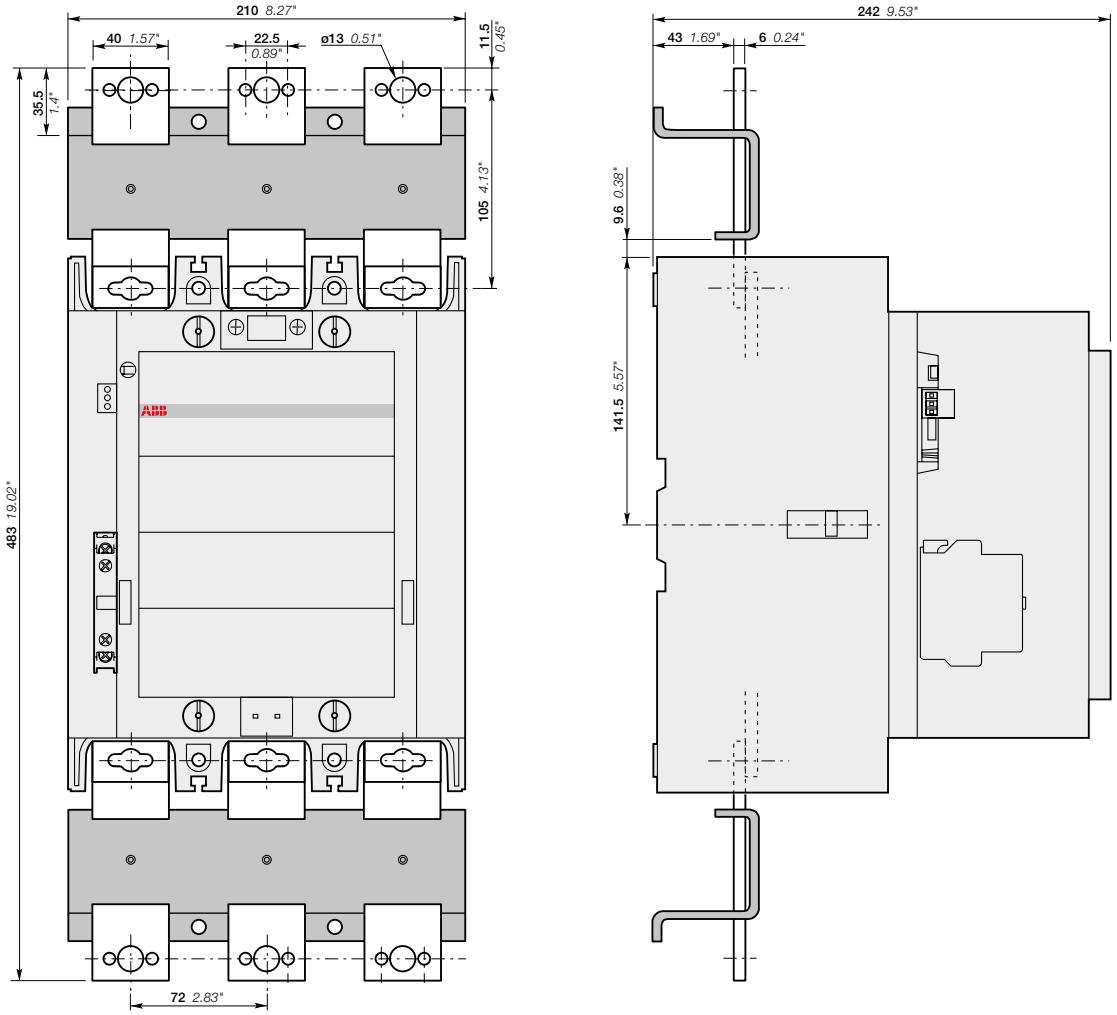
1SFC101122C0201

AF580 and AF750 3-pole contactors

Main dimensions mm, *inches*



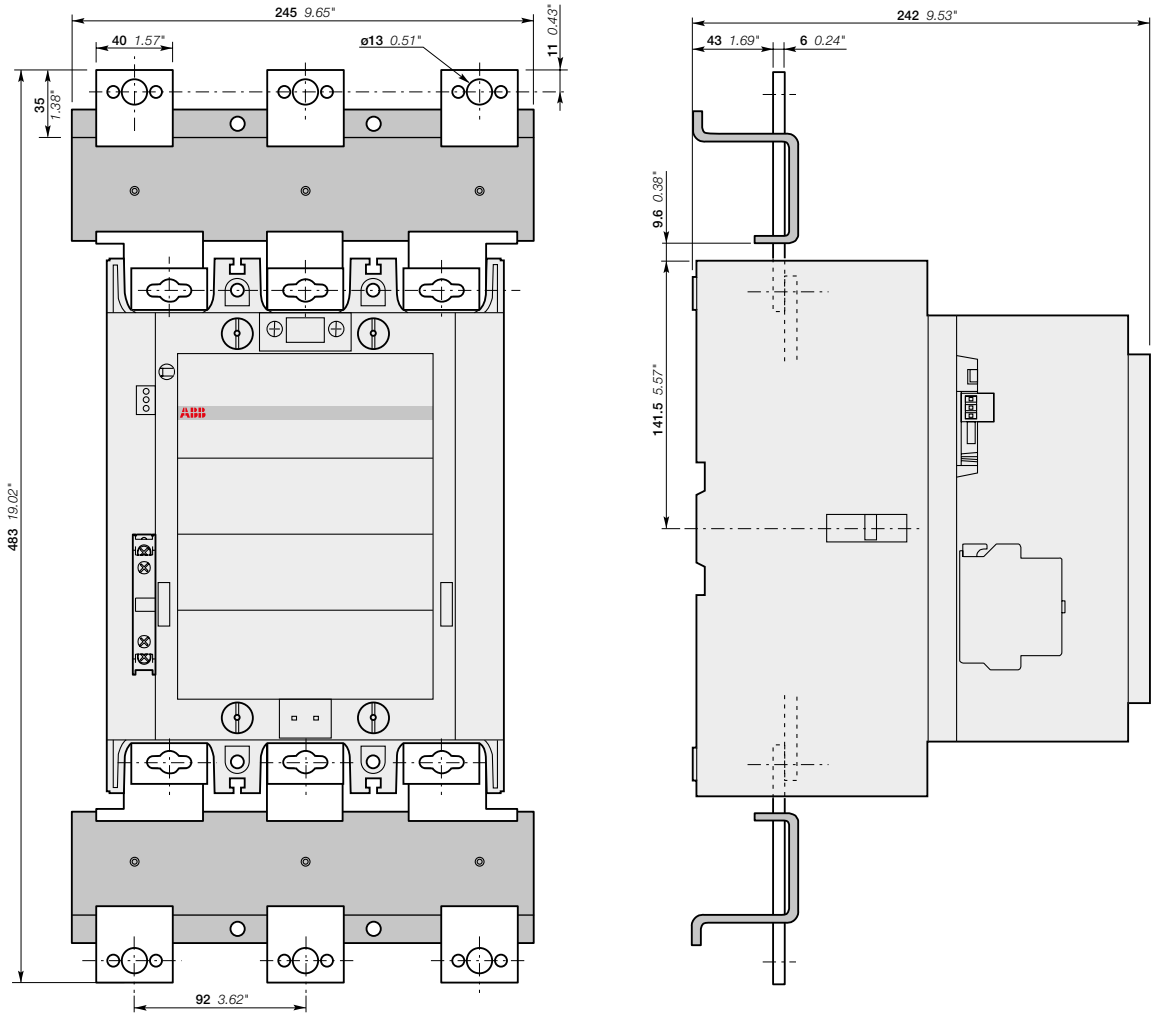
AF580 and AF750-30-11
+ LX750 terminal extension

5

1SFC101122C0201

AF580 and AF750 3-pole contactors

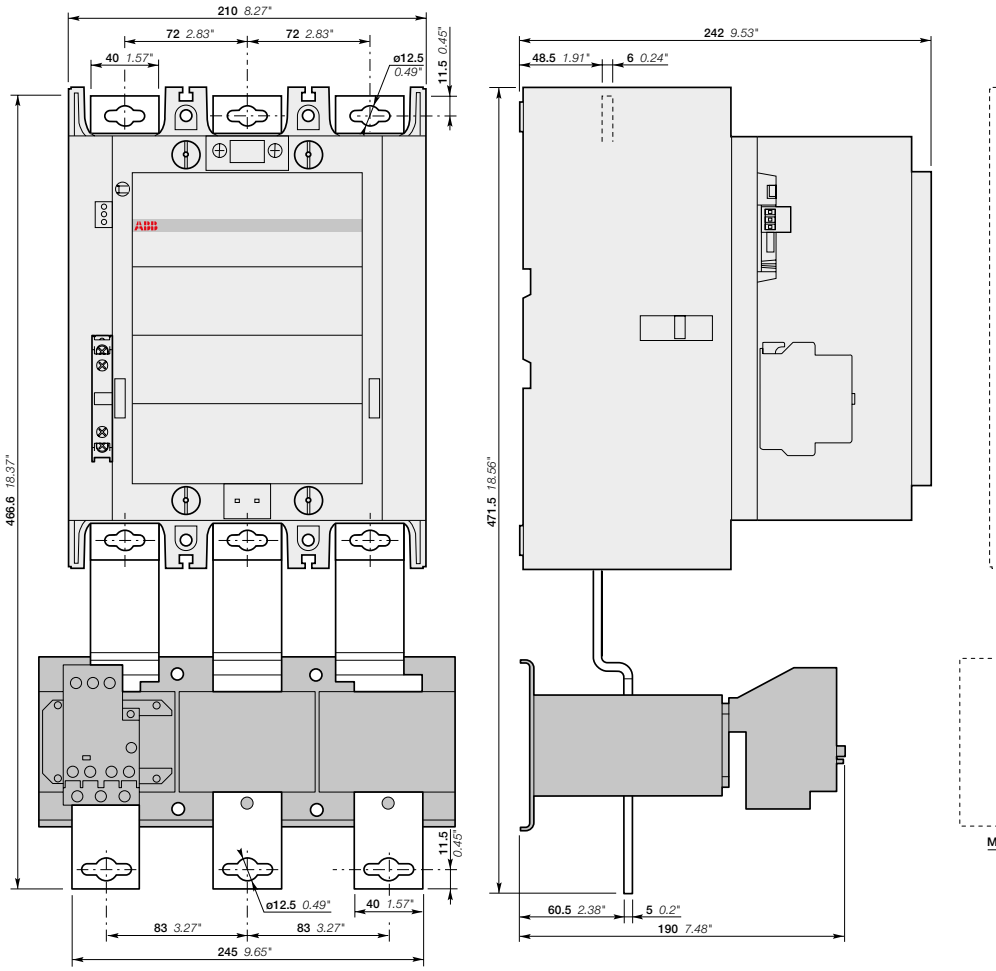
Main dimensions mm, *inches*



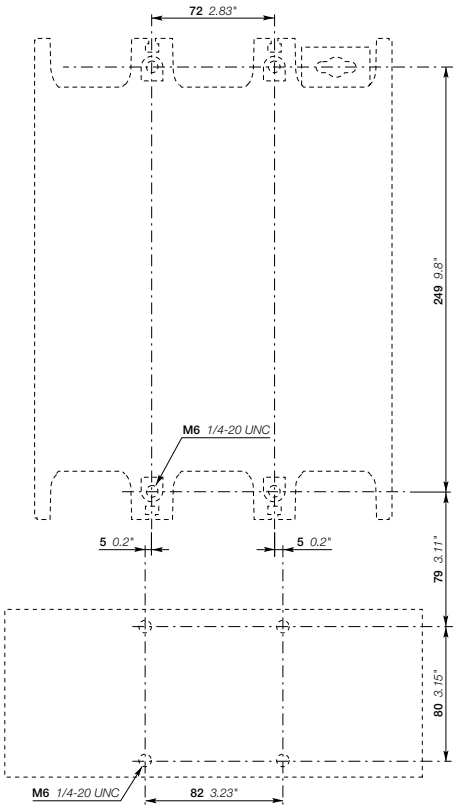
AF580 and AF750-30-11
+ LW750 terminal enlargement

AF580 and AF750 3-pole contactors

Main dimensions mm, *inches*



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

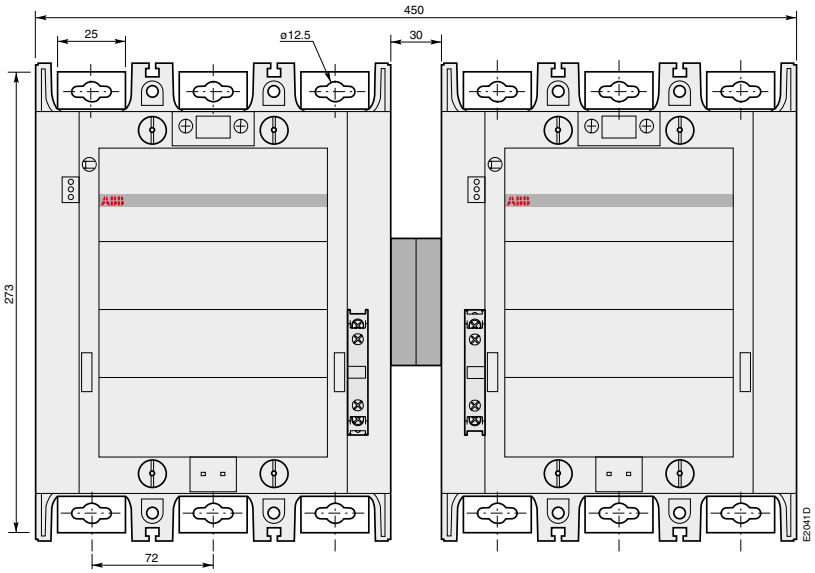


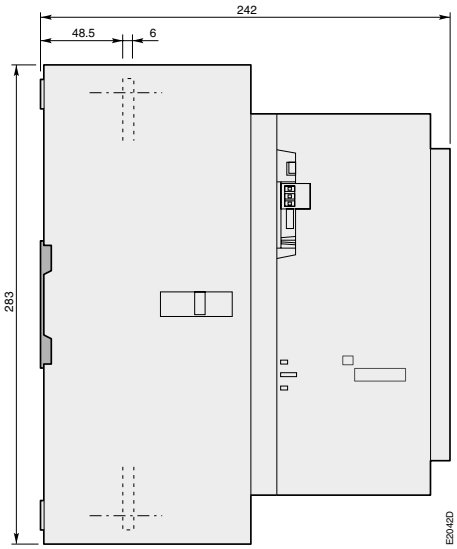
AF580 and AF750
+ E800DU electronic O/L relay

1SFC101122C0201

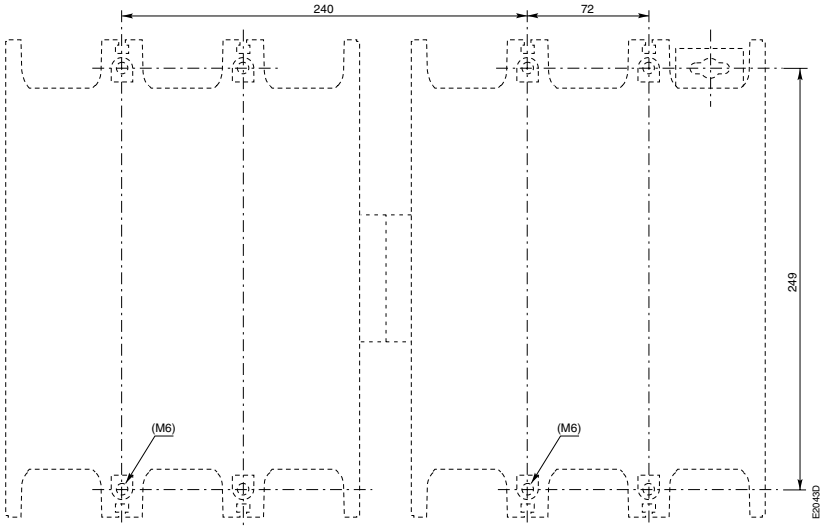
AF580 and AF750 3-pole contactors

Main dimensions mm, *inches*





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

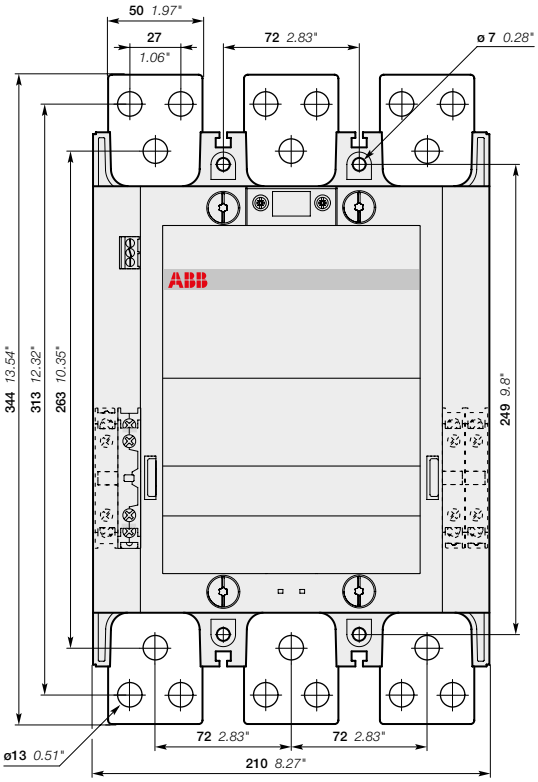


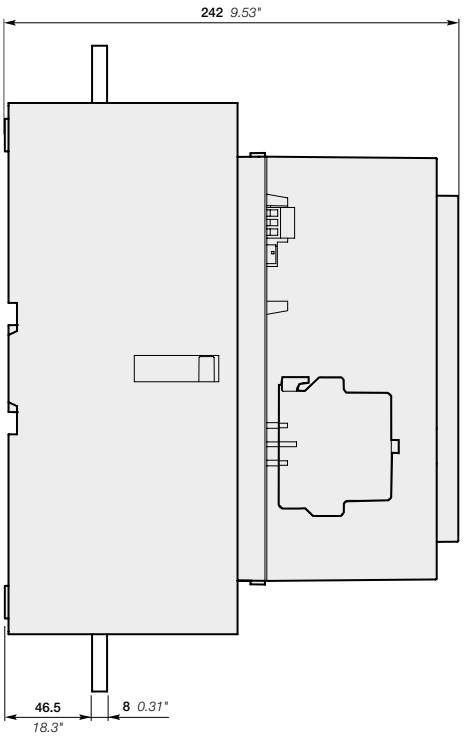
AF580 and AF750
+ VM 750H mechanical interlock unit

1SFC101122C0201

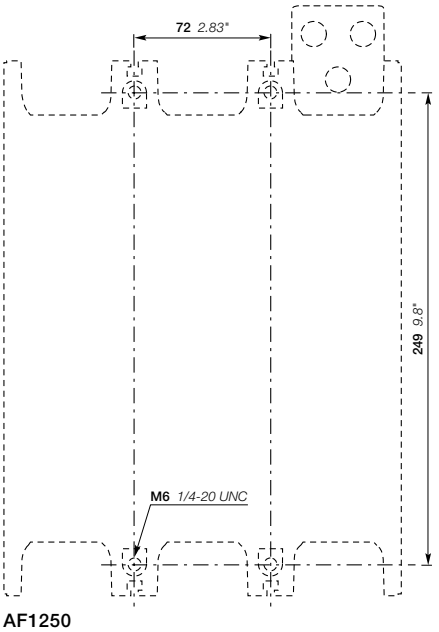
AF1250 3-pole contactors

Main dimensions mm, *inches*





AF1250-30-11

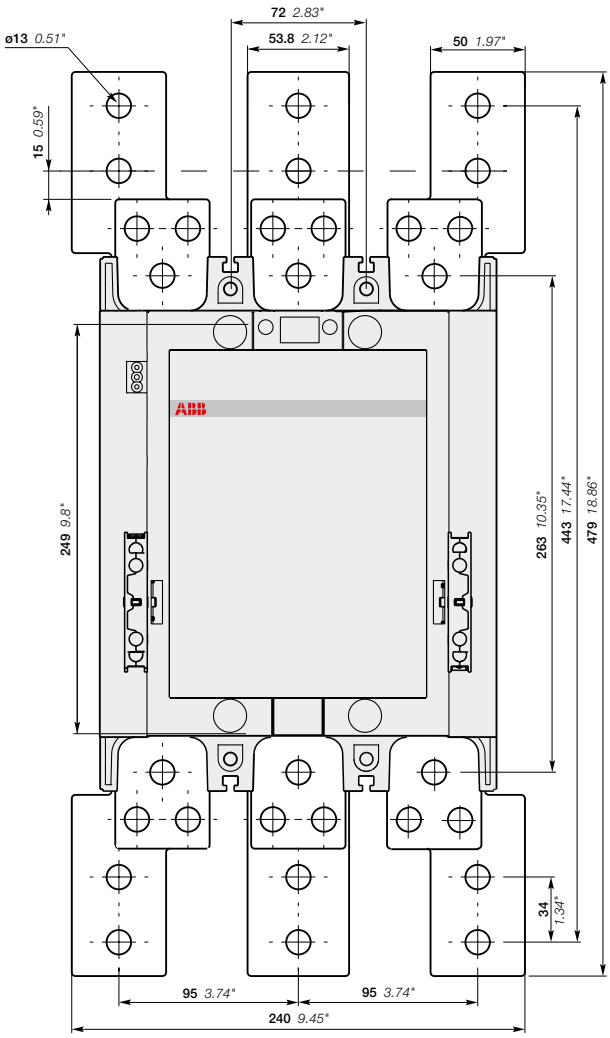


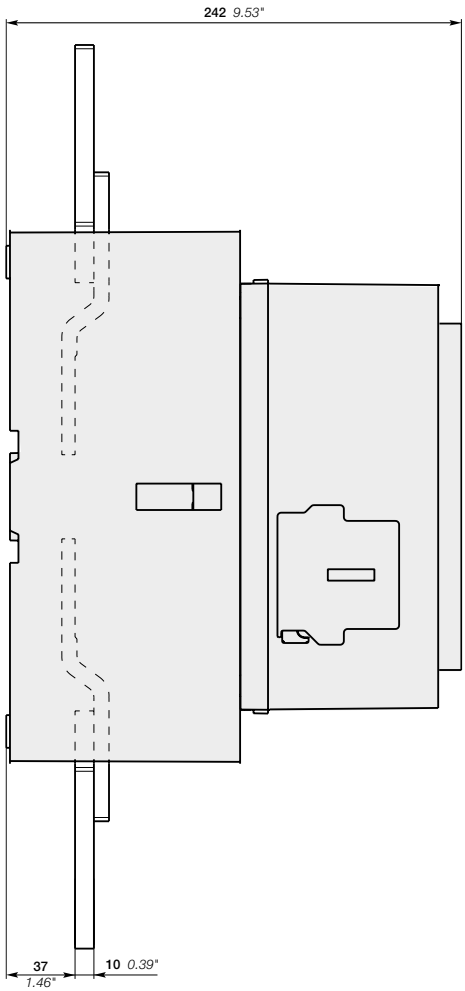
AF1250

1SFC101136C0201

AF1250 3-pole contactors

Main dimensions mm, *inches*





AF1250-30-11
+ LW1250 terminal enlargement

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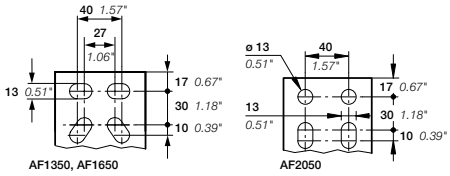
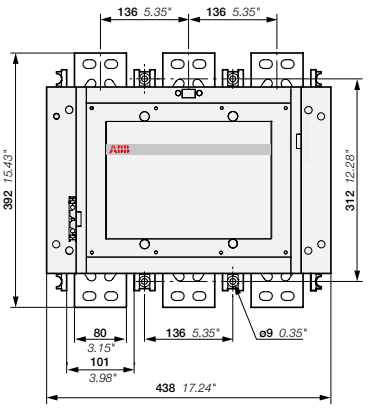
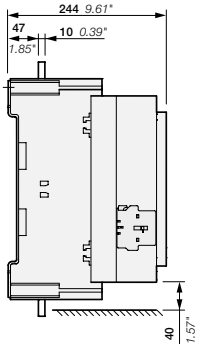
AF1350, AF1650, AF2050 and AF2650 3-pole contactors

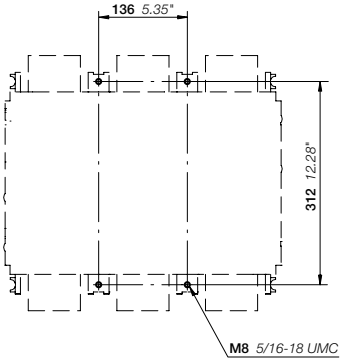
Main dimensions mm, *inches*



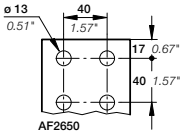


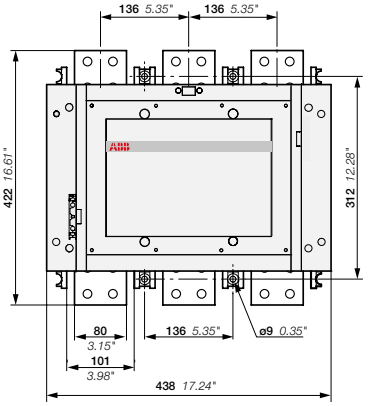
AF1350, AF1650, AF2050-30-11



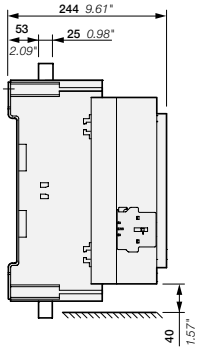


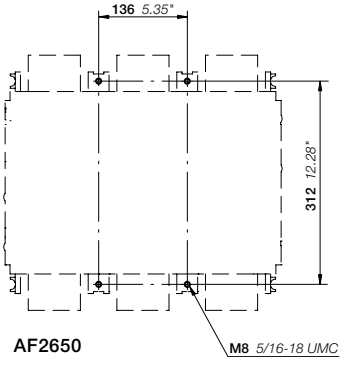
AF1350, AF1650, AF2050





AF2650-30-11



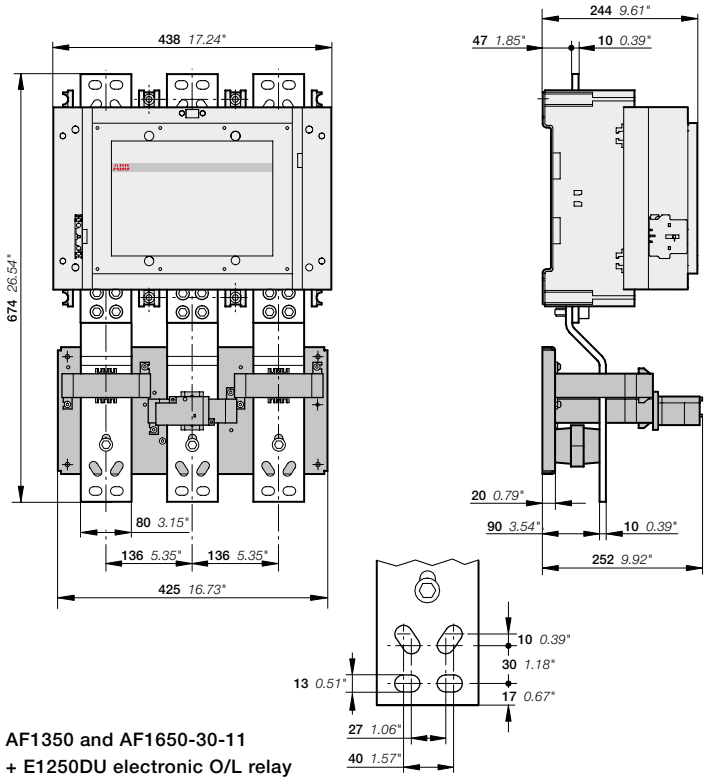


AF2650

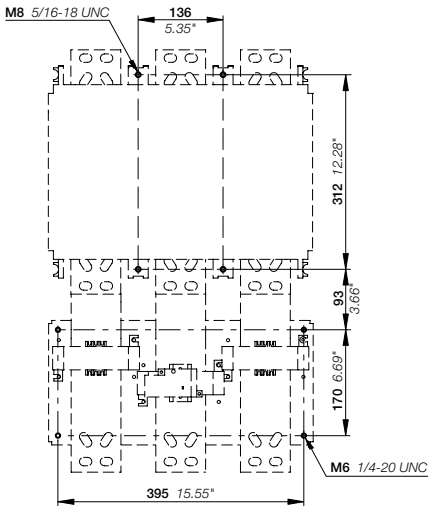
1SFC101123C0201 - Rev. B

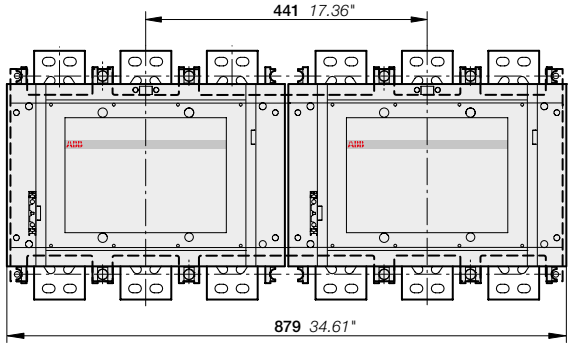
AF1350, AF1650, AF2050 and AF2650 3-pole contactors

Main dimensions mm, *inches*

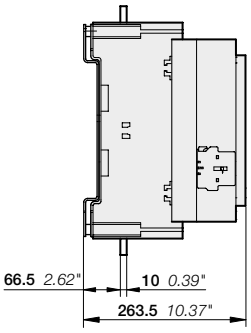


AF1350 and AF1650-30-11
+ E1250DU electronic O/L relay

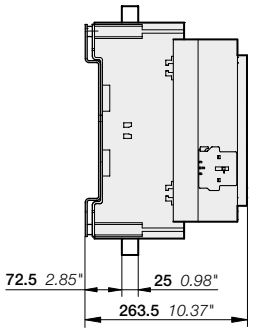




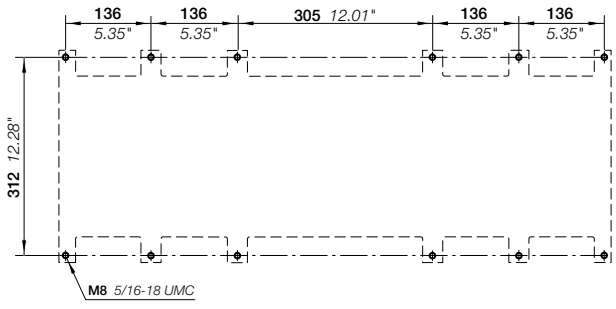
AF1350, AF1650, AF2050, AF2650-30-11
+ VM 1650H mechanical interlock unit



AF1350, AF1650, AF2050



AF2650



AF1350, AF1650, AF2050, AF2650
+ VM 1650H mechanical interlock unit

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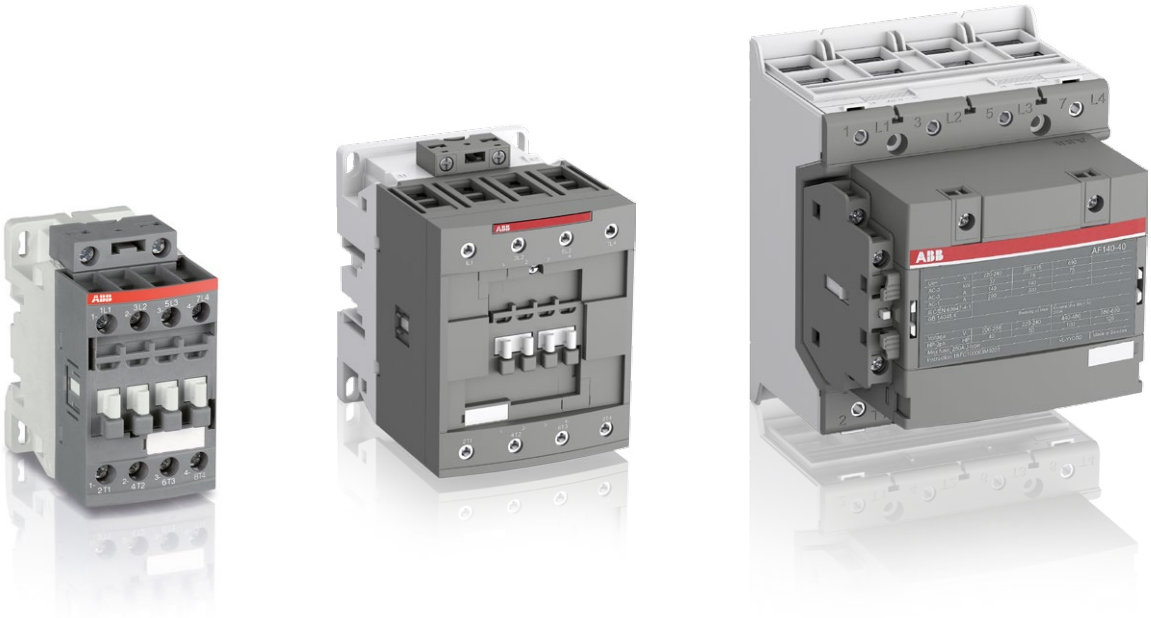


AF and EK 4-pole contactors

Overview 5/194

Ordering details

25 to 125 A AC-1

AF09 ... AF38	AC / DC operated	**5**/196
AF09Z ... AF38Z	AC / DC operated - low consumption	**5**/197
AF40 ... AF80	AC / DC operated	**5**/198
Main accessories		**5**/200

160 to 525 A AC-1

AF116 ... AF140	AC / DC operated	**5**/202
AF190 ... AF370	AC / DC operated	**5**/203
Main accessories		**5**/204
AF116 ... AF140	AC / DC operated - with 1 N.O. + 1 N.C.	**5**/206
AF190 ... AF370	AC / DC operated - with 1 N.O. + 1 N.C.	**5**/207
Main accessories		**5**/208
AF116 ... AF140	AC / DC operated - with 2 N.O. + 2 N.C.	**5**/210
AF190 ... AF370	AC / DC operated - with 2 N.O. + 2 N.C.	**5**/211
Main accessories		**5**/212

800 to 1000 A AC-1

EK550, EK1000	AC operated - with 1 N.O. + 1 N.C.	**5**/214
EK550, EK1000	DC operated - with 2 N.O. + 1 N.C.	**5**/215
EK550, EK1000	AC operated - with 2 N.O. + 2 N.C.	**5**/216
Main accessories		**5**/218

Technical data 5/220

Electrical durability 5/232

Terminal marking and positionning 5/234

Main dimensions 5/237

Voltage code table 5/417

4-pole contactors

IEC	**AC-1 Rated operational current**	θ ≤ 40 °C, 690 V	**A**	**25**	**30**	**45**	**55**	**70**	**100**	**125**
UL/CSA	**General use rating**	600 V	**A**	**25**	**30**	**45**	**55**	**60**	**80**	**105**
AC / DC Control supply			Type	**AF09**	**AF16**	**AF26**	**AF38**	**AF40**	**AF52**	**AF80**
AC Control supply			Type	**AF09**	**AF16**	**AF26**	**AF38**	**AF40**	**AF52**	**AF80**
DC Control supply			Type	**AF09**	**AF16**	**AF26**	**AF38**	**AF40**	**AF52**	**AF80**
IEC	**AC-1 Rated operational current** 690 V	θ ≤ 40 °C	**A**	**25**	**30**	**45**	**55**	**70**	**100**	**125**
		θ ≤ 60 °C (1)	**A**	**25**	**30**	**40**	**45**	**60**	**80**	**105**
		θ ≤ 70 °C	**A**	**22**	**26**	**32**	**37**	**50**	**70**	**90**
	With conductor cross sectional area		**mm²**	**4**	**6**	**10**	**16**	**35**	**35**	**50**
	Rated operational voltage Ue max.		**V**	**690**	**690**	**690**	**690**	**690**	**690**	**690**

(1) θ ≤ 55 °C for EK550, EK1000 contactors

Main accessories

Auxiliary contact blocks	Front mounting	**CA4-10** (1 x N.O.), **CA4-01** (1 x N.C.)	
	Side mounting	**CAL4-11** (1 x N.O. + 1 x N.C.)	
Timers	Electronic	**TEF4-ON** **TEF4-OFF**	
Interlocking units	Mechanical	**VM4**	**VM96-4**
	Mechanical / Electrical	**VEM4**	
Surge suppressors	Varistor + RC (AC / DC)	Built-in surge protection	

	160	200	275	350	400	500	525	800	1000
	160	175	230	250	300	350	420	540	—
	AF116	AF140	AF190	AF205	AF265	AF305	AF370	—	—
	AF116	AF140	AF190	AF205	AF265	AF305	AF370	EK550	EK1000
	AF116	AF140	AF190	AF205	AF265	AF305	AF370	EK550	EK1000
	160	200	275	350	400	500	525	800	1000
	145	175	250	300	350	400	425	650	800
	130	160	200	240	290	325	350	575	720
	70	95	150	240	240	300	2 x 185	2 x 240	2 x 300
	690	690	1000	1000	1000	1000	1000	1000	1000

	CAL19-11 (1 x N.O. + 1 x N.C.)	**CAL16-11** (1 x N.O. + 1 x N.C.)
	VM19 (for same size contactors)	**VH800**
		RC-EH800

1SBC101569S0201 - Rev. E

AF09 ... AF38 4-pole contactors
25 to 55 A AC-1
AC / DC operated

AF09-40-00

AF26-40-00

5

Description

AF09 ... AF38 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

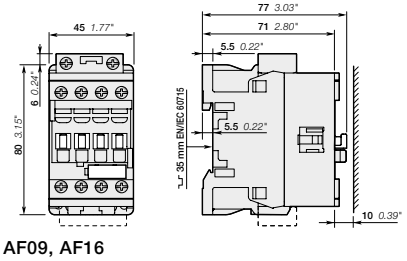
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
 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

Ordering details

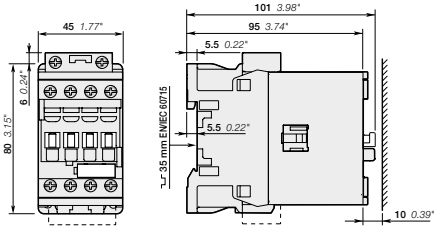
IEC Rated operational current $\theta \leq 40$ °C AC-1 A	UL/CSA General use rating 600 V AC A	Rated control circuit voltage Uc min. ... Uc max. V 50/60 Hz	 V DC	Auxiliary contacts fitted NO	 NC	Type	Order code		Weight Pkg (1 pce) kg
4 N.O. main poles									
25	25	24...60	- (1)	0	0	AF09-40-00-41	1SBL137201R4100		0.270
		48...130	48...130	0	0	AF09-40-00-12	1SBL137201R1200		0.270
		100...250	100...250	0	0	AF09-40-00-13	1SBL137201R1300		0.270
		250...500	250...500	0	0	AF09-40-00-14	1SBL137201R1400		0.310
30	30	24...60	- (1)	0	0	AF16-40-00-41	1SBL177201R4100		0.270
		48...130	48...130	0	0	AF16-40-00-12	1SBL177201R1200		0.270
		100...250	100...250	0	0	AF16-40-00-13	1SBL177201R1300		0.270
		250...500	250...500	0	0	AF16-40-00-14	1SBL177201R1400		0.310
45	45	24...60	- (1)	0	0	AF26-40-00-41	1SBL237201R4100		0.360
		48...130	48...130	0	0	AF26-40-00-12	1SBL237201R1200		0.360
		100...250	100...250	0	0	AF26-40-00-13	1SBL237201R1300		0.360
		250...500	250...500	0	0	AF26-40-00-14	1SBL237201R1400		0.400
55	55	24...60	- (1)	0	0	AF38-40-00-41	1SBL297201R4100		0.360
		48...130	48...130	0	0	AF38-40-00-12	1SBL297201R1200		0.360
		100...250	100...250	0	0	AF38-40-00-13	1SBL297201R1300		0.360
		250...500	250...500	0	0	AF38-40-00-14	1SBL297201R1400		0.400
2 N.O. + 2 N.C. main poles									
25	25	24...60	- (1)	0	0	AF09-22-00-41	1SBL137501R4100		0.270
		48...130	48...130	0	0	AF09-22-00-12	1SBL137501R1200		0.270
		100...250	100...250	0	0	AF09-22-00-13	1SBL137501R1300		0.270
		250...500	250...500	0	0	AF09-22-00-14	1SBL137501R1400		0.310
30	30	24...60	- (1)	0	0	AF16-22-00-41	1SBL177501R4100		0.270
		48...130	48...130	0	0	AF16-22-00-12	1SBL177501R1200		0.270
		100...250	100...250	0	0	AF16-22-00-13	1SBL177501R1300		0.270
		250...500	250...500	0	0	AF16-22-00-14	1SBL177501R1400		0.310
45	45	24...60	- (1)	0	0	AF26-22-00-41	1SBL237501R4100		0.360
		48...130	48...130	0	0	AF26-22-00-12	1SBL237501R1200		0.360
		100...250	100...250	0	0	AF26-22-00-13	1SBL237501R1300		0.360
		250...500	250...500	0	0	AF26-22-00-14	1SBL237501R1400		0.400
55	55	24...60	- (1)	0	0	AF38-22-00-41	1SBL297501R4100		0.360
		48...130	48...130	0	0	AF38-22-00-12	1SBL297501R1200		0.360
		100...250	100...250	0	0	AF38-22-00-13	1SBL297501R1300		0.360
		250...500	250...500	0	0	AF38-22-00-14	1SBL297501R1400		0.400

(1) For 24...60 V 50/60 Hz - 20...60 V DC, use AF..Z-..-00-21.

Main dimensions mm, *inches*



AF09, AF16



AF26, AF38

1SBC101375S0201 - Rev. B

AF09Z ... AF38Z 4-pole contactors
25 to 55 A AC-1
AC / DC operated - low consumption

AF09Z-40-00

AF26Z-40-00

Description

AF09Z ... AF38Z 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

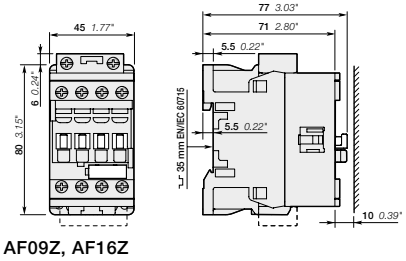
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
  - can manage large control voltage variations
  - allow direct control by PLC-output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

Ordering details

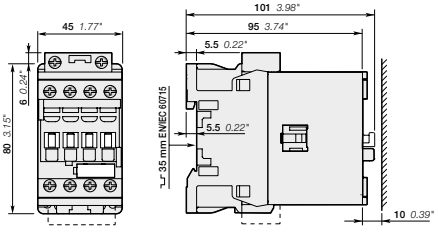
IEC Rated operational current θ ≤ 40 °C AC-1 A	UL/CSA General use rating 600 V AC A	Rated control circuit voltage Uc min. ... Uc max. V 50/60 Hz	 V DC	Auxiliary contacts fitted		Type	Order code		Weight Pkg (1 pce) kg
4 N.O. main poles									
25	25	-	12...20	0	0	AF09Z-40-00-20	1SBL136201R2000		0.310
		24...60	20...60	0	0	AF09Z-40-00-21	1SBL136201R2100		0.310
		48...130	48...130	0	0	AF09Z-40-00-22	1SBL136201R2200		0.310
		100...250	100...250	0	0	AF09Z-40-00-23	1SBL136201R2300		0.310
30	30	-	12...20	0	0	AF16Z-40-00-20	1SBL176201R2000		0.310
		24...60	20...60	0	0	AF16Z-40-00-21	1SBL176201R2100		0.310
		48...130	48...130	0	0	AF16Z-40-00-22	1SBL176201R2200		0.310
		100...250	100...250	0	0	AF16Z-40-00-23	1SBL176201R2300		0.310
45	45	-	12...20	0	0	AF26Z-40-00-20	1SBL236201R2000		0.400
		24...60	20...60	0	0	AF26Z-40-00-21	1SBL236201R2100		0.400
		48...130	48...130	0	0	AF26Z-40-00-22	1SBL236201R2200		0.400
		100...250	100...250	0	0	AF26Z-40-00-23	1SBL236201R2300		0.400
55	55	-	12...20	0	0	AF38Z-40-00-20	1SBL296201R2000		0.400
		24...60	20...60	0	0	AF38Z-40-00-21	1SBL296201R2100		0.400
		48...130	48...130	0	0	AF38Z-40-00-22	1SBL296201R2200		0.400
		100...250	100...250	0	0	AF38Z-40-00-23	1SBL296201R2300		0.400
2 N.O. + 2 N.C. main poles									
25	25	-	12...20	0	0	AF09Z-22-00-20	1SBL136501R2000		0.310
		24...60	20...60	0	0	AF09Z-22-00-21	1SBL136501R2100		0.310
		48...130	48...130	0	0	AF09Z-22-00-22	1SBL136501R2200		0.310
		100...250	100...250	0	0	AF09Z-22-00-23	1SBL136501R2300		0.310
30	30	-	12...20	0	0	AF16Z-22-00-20	1SBL176501R2000		0.310
		24...60	20...60	0	0	AF16Z-22-00-21	1SBL176501R2100		0.310
		48...130	48...130	0	0	AF16Z-22-00-22	1SBL176501R2200		0.310
		100...250	100...250	0	0	AF16Z-22-00-23	1SBL176501R2300		0.310
45	45	-	12...20	0	0	AF26Z-22-00-20	1SBL236501R2000		0.400
		24...60	20...60	0	0	AF26Z-22-00-21	1SBL236501R2100		0.400
		48...130	48...130	0	0	AF26Z-22-00-22	1SBL236501R2200		0.400
		100...250	100...250	0	0	AF26Z-22-00-23	1SBL236501R2300		0.400
55	55	-	12...20	0	0	AF38Z-22-00-20	1SBL296501R2000		0.400
		24...60	20...60	0	0	AF38Z-22-00-21	1SBL296501R2100		0.400
		48...130	48...130	0	0	AF38Z-22-00-22	1SBL296501R2200		0.400
		100...250	100...250	0	0	AF38Z-22-00-23	1SBL296501R2300		0.400

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

Main dimensions mm, *inches*



AF09Z, AF16Z

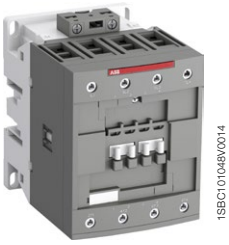


AF26Z, AF38Z

1SBC101376S0201 - Rev. A

AF40 ... AF80 4-pole contactors
70 to 125 A AC-1
AC / DC operated

AF40-40-00



AF80-40-00

5

Description

AF40 ... AF80 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

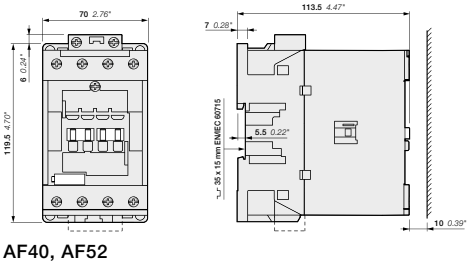
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltages ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
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

Ordering details

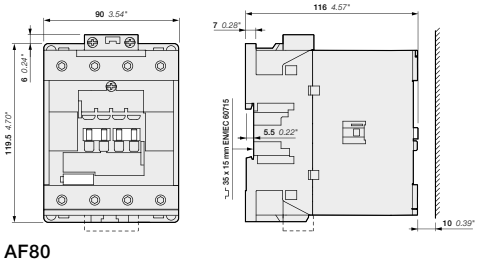
IEC	UL/CSA	Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code		Weight
Rated operational current θ ≤ 40 °C AC-1	General use rating 600 V AC							Pkg (1 pce)
A	A	V 50/60 Hz	V DC					kg
4 N.O. Main Poles								
70	60	24...60	-	0 0	AF40-40-00-41	1SBL347201R4100		1.210
		24...60	20...60 (1)	0 0	AF40-40-00-11	1SBL347201R1100		1.210
		48...130	48...130	0 0	AF40-40-00-12	1SBL347201R1200		1.210
		100...250	100...250	0 0	AF40-40-00-13	1SBL347201R1300		1.160
		250...500	250...500	0 0	AF40-40-00-14	1SBL347201R1400		1.160
100	80	24...60	-	0 0	AF52-40-00-41	1SBL367201R4100		1.210
		24...60	20...60 (1)	0 0	AF52-40-00-11	1SBL367201R1100		1.210
		48...130	48...130	0 0	AF52-40-00-12	1SBL367201R1200		1.210
		100...250	100...250	0 0	AF52-40-00-13	1SBL367201R1300		1.160
		250...500	250...500	0 0	AF52-40-00-14	1SBL367201R1400		1.160
125	105	24...60	-	0 0	AF80-40-00-41	1SBL397201R4100		1.490
		24...60	20...60 (1)	0 0	AF80-40-00-11	1SBL397201R1100		1.490
		48...130	48...130	0 0	AF80-40-00-12	1SBL397201R1200		1.490
		100...250	100...250	0 0	AF80-40-00-13	1SBL397201R1300		1.440
		250...500	250...500	0 0	AF80-40-00-14	1SBL397201R1400		1.440
2 N.O. + 2 N.C. Main Poles								
70	60	24...60	-	0 0	AF40-22-00-41	1SBL347501R4100		1.210
		24...60	20...60 (1)	0 0	AF40-22-00-11	1SBL347501R1100		1.210
		48...130	48...130	0 0	AF40-22-00-12	1SBL347501R1200		1.210
		100...250	100...250	0 0	AF40-22-00-13	1SBL347501R1300		1.160
		250...500	250...500	0 0	AF40-22-00-14	1SBL347501R1400		1.160
125	105	24...60	-	0 0	AF80-22-00-41	1SBL397501R4100		1.490
		24...60	20...60 (1)	0 0	AF80-22-00-11	1SBL397501R1100		1.490
		48...130	48...130	0 0	AF80-22-00-12	1SBL397501R1200		1.490
		100...250	100...250	0 0	AF80-22-00-13	1SBL397501R1300		1.440
		250...500	250...500	0 0	AF80-22-00-14	1SBL397501R1400		1.440

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

Main dimensions mm, *inches*



AF40, AF52



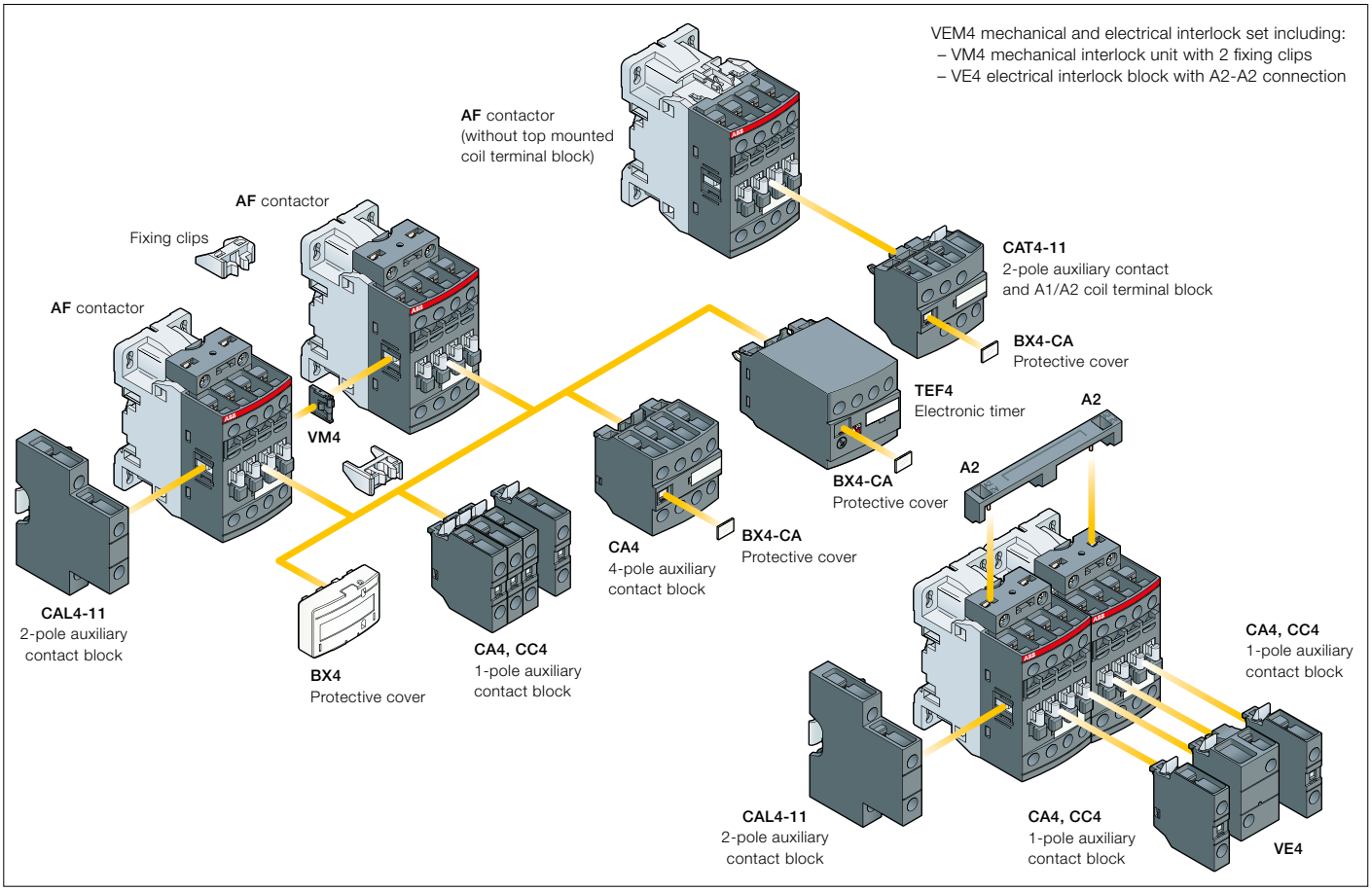
AF80

1SBC101987S0201 - Rev. B

Notes

AF09 ... AF80 4-pole contactors
Main accessories

Contactor and main accessories (other accessories available)



Main accessory fitting details

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

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

1SBC101392S0201 - Rev. B

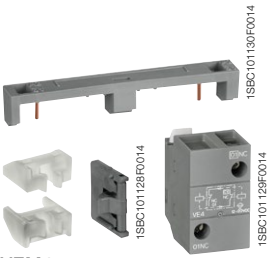
AF09 ... AF80 4-pole contactors
Main accessories

CA4-10

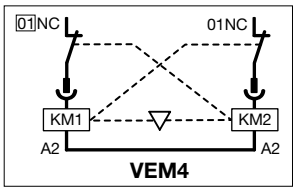
CAL4-11

CA4-22E

CAT4-11E



VEM4



TEF4-ON

Ordering details (1)

For contactors	Auxiliary contacts		Type	Order code		Pkg qty	Weight (1 pce) kg
Front-mounted instantaneous auxiliary contact blocks							
AF09 ... AF80-40-00 AF09 ... AF80-22-00	1 0	– –	CA4-10	1SBN010110R1010		1	0.014
	1 0	– –	CA4-10-T	1SBN010110T1010		10	0.014
	0 1	– –	CA4-01	1SBN010110R1001		1	0.014
	0 1	– –	CA4-01-T	1SBN010110T1001		10	0.014
	2 2	– –	CA4-22E	1SBN010140R1022		1	0.055
	3 1	– –	CA4-31E	1SBN010140R1031		1	0.055
	4 0	– –	CA4-40E	1SBN010140R1040		1	0.055
AF09 ... AF16..-40-00 AF40 ... AF80-40-00	0 4	– –	CA4-04E	1SBN010140R1004		1	0.055
Front-mounted auxiliary contact blocks with N.O. leading contact and N.C. lagging contact							
AF09 ... AF80-40-00	– –	1 0	CC4-10	1SBN010111R1010		1	0.014
AF09 ... AF80-22-00	– –	0 1	CC4-01	1SBN010111R1001		1	0.014
Side-mounted instantaneous auxiliary contact blocks							
AF09 ... AF80-40-00	1 1	– –	CAL4-11	1SBN010120R1011		1	0.040
AF09 ... AF80-22-00	1 1	– –	CAL4-11-T	1SBN010120T1011		10	0.040
Front-mounted instantaneous auxiliary contact and A1/A2 coil terminal blocks							
AF09 ... AF52..-40-00 AF09 ... AF40..-22-00	1 1	– –	CAT4-11E	1SBN010151R1011		1	0.040

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

Mechanical interlock unit							
AF09 ... AF38..-40-00			VM4	1SBN030105T1000		10	0.005
AF40 ... AF80..-40-00			VM96-4	1SBN033405T1000		10	0.006

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

Mechanical and electrical interlock set							
AF09, AF16..-40-00 AF26, AF38..-40-00	0 2	– –	VEM4	1SBN030111R1000		1	0.035

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

For contactors	Time delay range selected by switch	Delay type	Auxiliary contacts	Type	Order code		Pkg qty	Weight (1 pce) kg
Electronic timers								
AF09 ... AF80	0.1...1 s 1...10 s 10...100 s	ON-delay	1 1	TEF4-ON	1SBN020112R1000		1	0.065
		OFF-delay	1 1	TEF4-OFF	1SBN020114R1000		1	0.065

Note: Rated control circuit voltage Uc 24...240 V 50/60 Hz or DC.
(1) For more information, refer to main catalog "Accessories" section.

1SBC101393S0201 - Rev. B

AF116 ... AF140 4-pole contactors
160 to 200 A AC-1
AC / DC operated

AF140-40-00

AF140-40-00B

5

Description

AF116 ... AF140 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 350 V DC. These contactors are of the block type design with 4 main poles.

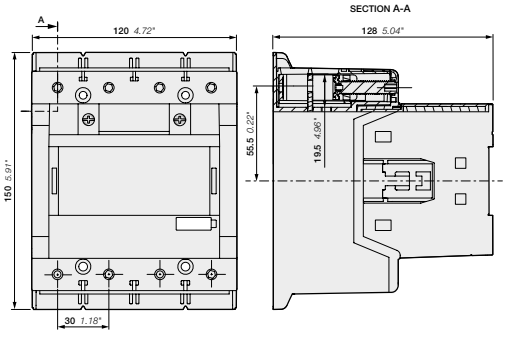
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption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

Ordering details

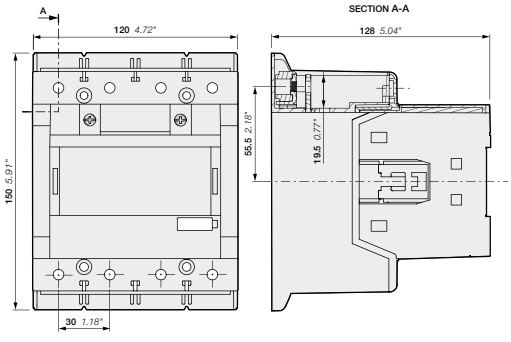
IEC Rated operational current $\theta \leq 40$ °C AC-1 A	UL / CSA General use rating 600 V AC A	Rated control circuit voltage Uc min. ... Uc max. V 50/60 Hz	 V DC	Auxiliary contacts fitted	Type (1)	Order code		Weight Pkg (1 pce) kg
4 N.O. main poles								
For connection with built-in cable clamps								
160	160	24...60	20...60	0	0	AF116-40-00-11	1SFL427101R1100	2.250
		48...130	48...130	0	0	AF116-40-00-12	1SFL427101R1200	2.250
		100...250	100...250	0	0	AF116-40-00-13	1SFL427101R1300	2.250
		250...500	250...500	0	0	AF116-40-00-14	1SFL427101R1400	2.250
200	175	24...60	20...60	0	0	AF140-40-00-11	1SFL447101R1100	2.250
		48...130	48...130	0	0	AF140-40-00-12	1SFL447101R1200	2.250
		100...250	100...250	0	0	AF140-40-00-13	1SFL447101R1300	2.250
		250...500	250...500	0	0	AF140-40-00-14	1SFL447101R1400	2.250
With bar connections								
160	160	24...60	20...60	0	0	AF116-40-00B-11	1SFL427102R1100	2.150
		48...130	48...130	0	0	AF116-40-00B-12	1SFL427102R1200	2.150
		100...250	100...250	0	0	AF116-40-00B-13	1SFL427102R1300	2.150
		250...500	250...500	0	0	AF116-40-00B-14	1SFL427102R1400	2.150
200	175	24...60	20...60	0	0	AF140-40-00B-11	1SFL447102R1100	2.150
		48...130	48...130	0	0	AF140-40-00B-12	1SFL447102R1200	2.150
		100...250	100...250	0	0	AF140-40-00B-13	1SFL447102R1300	2.150
		250...500	250...500	0	0	AF140-40-00B-14	1SFL447102R1400	2.150

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

Main dimensions mm, *inches*



AF116, AF140-40-00

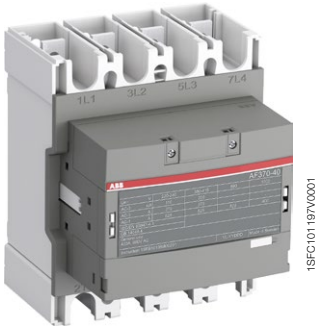


AF116, AF140-40-00B

1SFC101197C0201 - Rev. B

AF190 ... AF370 4-pole contactors
275 to 525 A AC-1
AC / DC operated

AF205-40-00



AF370-40-00

Description

AF190 ... AF370 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 1000 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

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

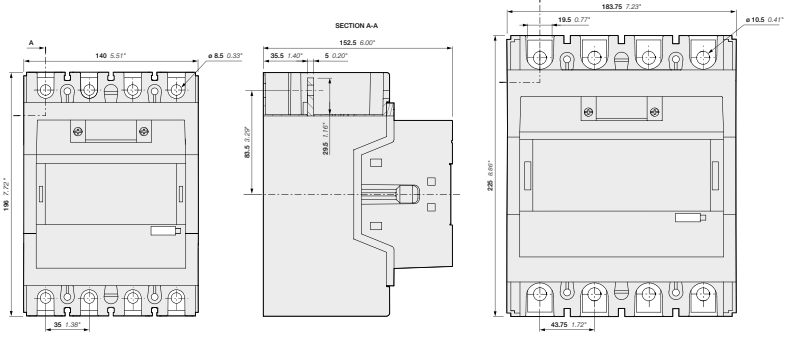
5

Ordering details

IEC Rated operational current θ ≤ 40 °C AC-1 A	UL / CSA General use rating 600 V AC A	Rated control circuit voltage Uc min. ... Uc max. V 50/60 Hz	 V DC	Auxiliary contacts fitted		Type (1)	Order code		Weight Pkg (1 pce) kg
4 N.O. main poles									
275	230	24...60	20...60	0	0	AF190-40-00-11	1SFL487102R1100		3.900
		48...130	48...130	0	0	AF190-40-00-12	1SFL487102R1200		3.900
		100...250	100...250	0	0	AF190-40-00-13	1SFL487102R1300		3.900
		250...500	250...500	0	0	AF190-40-00-14	1SFL487102R1400		3.900
350	250	24...60	20...60	0	0	AF205-40-00-11	1SFL527102R1100		3.900
		48...130	48...130	0	0	AF205-40-00-12	1SFL527102R1200		3.900
		100...250	100...250	0	0	AF205-40-00-13	1SFL527102R1300		3.900
		250...500	250...500	0	0	AF205-40-00-14	1SFL527102R1400		3.900
400	300	24...60	20...60	0	0	AF265-40-00-11	1SFL547102R1100		6.360
		48...130	48...130	0	0	AF265-40-00-12	1SFL547102R1200		6.360
		100...250	100...250	0	0	AF265-40-00-13	1SFL547102R1300		6.360
		250...500	250...500	0	0	AF265-40-00-14	1SFL547102R1400		6.360
500	350	24...60	20...60	0	0	AF305-40-00-11	1SFL587102R1100		6.360
		48...130	48...130	0	0	AF305-40-00-12	1SFL587102R1200		6.360
		100...250	100...250	0	0	AF305-40-00-13	1SFL587102R1300		6.360
		250...500	250...500	0	0	AF305-40-00-14	1SFL587102R1400		6.360
525	420	24...60	20...60	0	0	AF370-40-00-11	1SFL607102R1100		6.360
		48...130	48...130	0	0	AF370-40-00-12	1SFL607102R1200		6.360
		100...250	100...250	0	0	AF370-40-00-13	1SFL607102R1300		6.360
		250...500	250...500	0	0	AF370-40-00-14	1SFL607102R1400		6.360

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

Main dimensions mm, *inches*



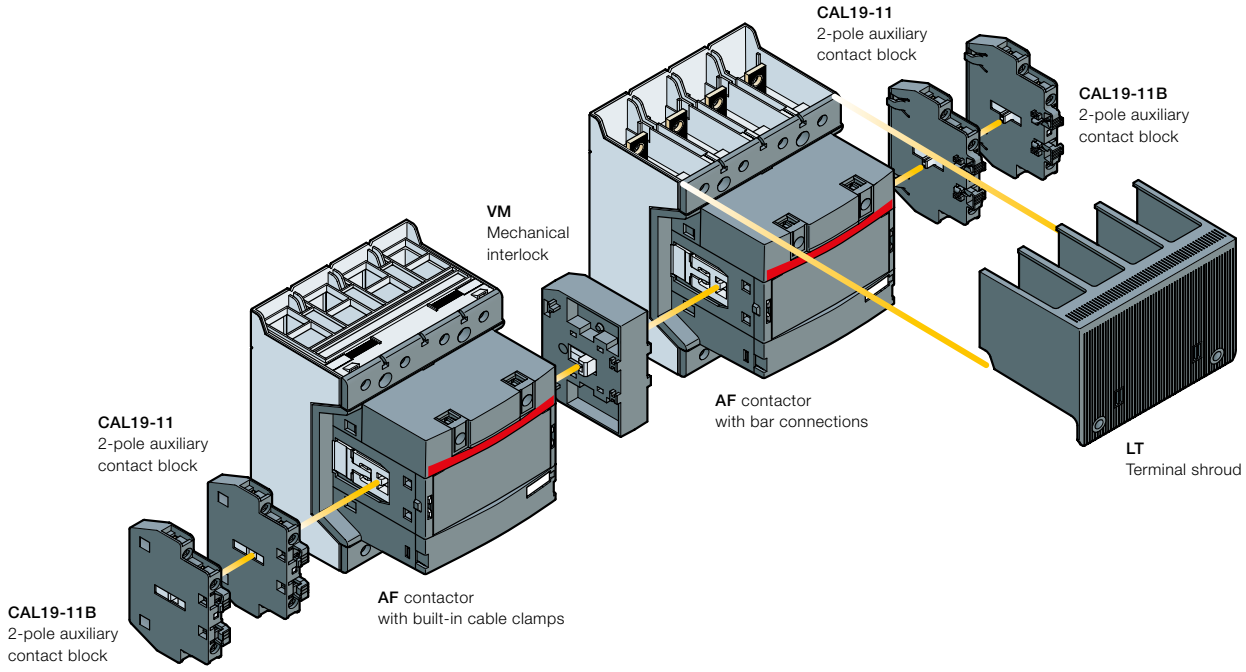
AF190, AF205

AF265, AF305, AF370

1SFC101198C0201 - Rev. B

AF116 ... AF370 4-pole contactors
Main accessories

Main accessories (other accessories available)



Main accessory fitting details

Contactor types	Main poles	Available auxiliary contacts	Side-mounted accessories Auxiliary contact blocks CAL19-11 (3)		CAL19-11B (3)		Mechanical interlock units (between two contactors)
AF116 ... AF370	4 0	0 0	2 x CAL19-11	+	2 x CAL19-11B		–
AF116 ... AF370	4 0	0 0	2 x CAL19-11 (1)	+	2 x CAL19-11B (1)	+	VM... (2)

(1) Total number of auxiliary contact blocks for the two contactors. (2) Interlock type, according to the contactor ratings (see "Accessories").
(3) The CEL19 auxiliary contact blocks can replace the CAL19-11 and CAL19-11B. Though, no auxiliary contact block can be mounted outside the CEL19.

1SFC101203C0201 - Rev. A

AF116 ... AF370 4-pole contactors
Main accessories

CAL19-11

VM19

Ordering details (1)

For contactors	Auxiliary contacts		Type	Order code		Pkg qty	Weight (1 pce) kg
Side-mounted instantaneous auxiliary contact blocks							
AF116 ... AF370	1	1	CAL19-11	1SFN010820R1011		2	0.050
	1	1	CAL19-11B	1SFN010820R3311		2	0.050
Mechanical interlock unit							
AF116 ... AF370			VM19	1SFN030300R1000		1	0.054
AF116 ... AF146 and AF190, AF205			VM140/190	1SFN034403R1000		1	0.088
AF190, AF205 and AF265 ... AF370			VM205/265	1SFN035203R1000		1	0.090
Terminal shrouds							
AF116 ... AF140, with compression lugs			LT140-40L	1SFN124203R2000		2	0.090
AF190 ... AF205, with cable clamps			LT205-40C	1SFN124801R2000		2	0.060
AF190 ... AF205, with compression lugs			LT205-40L	1SFN124803R2000		2	0.290
AF265 ... AF370, with cable clamps			LT370-40C	1SFN125401R2000		2	0.040
AF265 ... AF370, with compression lugs			LT370-40L	1SFN125403R2000		2	0.370

For contactors	Dimensions		Type	Order code		Pkg qty	Weight (1 pce) kg
	hole Ø mm	bar mm					
Terminal enlargements							
AF190 ... AF205	10.5	20 x 5	LW205-40	1SFN074807R2000		1	0.306
AF265 ... AF370	10.5	25 x 5	LW370-40	1SFN075407R2000		1	0.540

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

AF116 ... AF140 4-pole contactors
160 to 200 A AC-1
AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts

AF140-40-11

AF140-40-11B

5

Description

AF116 ... AF140 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 350 V DC. These contactors are of the block type design with 4 main poles.

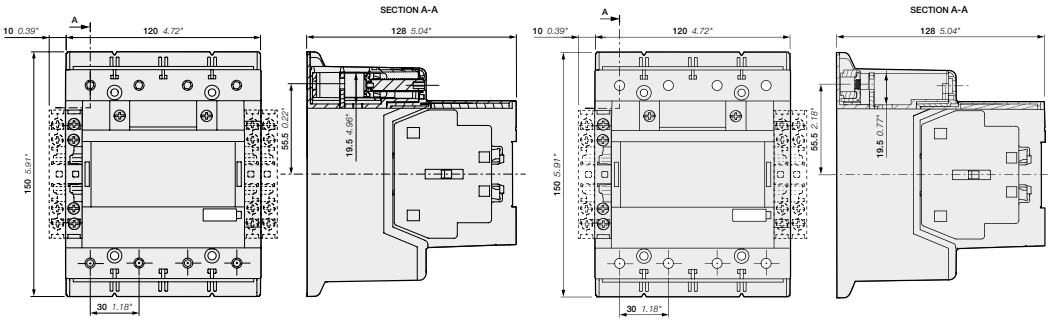
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption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

Ordering details

IEC Rated operational current $\theta \leq 40$ °C AC-1 A	UL / CSA General use rating 600 V AC A	Rated control circuit voltage Uc min. ... Uc max. V 50/60 Hz	 V DC	Auxiliary contacts fitted	Type (1)	Order code		Weight Pkg (1 pce) kg
4 N.O. main poles								
For connection with built-in cable clamps								
160	160	24...60	20...60	1 1	AF116-40-11-11	1SFL427101R1111		2.270
		48...130	48...130	1 1	AF116-40-11-12	1SFL427101R1211		2.270
		100...250	100...250	1 1	AF116-40-11-13	1SFL427101R1311		2.270
		250...500	250...500	1 1	AF116-40-11-14	1SFL427101R1411		2.270
200	175	24...60	20...60	1 1	AF140-40-11-11	1SFL447101R1111		2.270
		48...130	48...130	1 1	AF140-40-11-12	1SFL447101R1211		2.270
		100...250	100...250	1 1	AF140-40-11-13	1SFL447101R1311		2.270
		250...500	250...500	1 1	AF140-40-11-14	1SFL447101R1411		2.270
With bar connections								
160	160	24...60	20...60	1 1	AF116-40-11B-11	1SFL427102R1111		2.170
		48...130	48...130	1 1	AF116-40-11B-12	1SFL427102R1211		2.170
		100...250	100...250	1 1	AF116-40-11B-13	1SFL427102R1311		2.170
		250...500	250...500	1 1	AF116-40-11B-14	1SFL427102R1411		2.170
200	175	24...60	20...60	1 1	AF140-40-11B-11	1SFL447102R1111		2.170
		48...130	48...130	1 1	AF140-40-11B-12	1SFL447102R1211		2.170
		100...250	100...250	1 1	AF140-40-11B-13	1SFL447102R1311		2.170
		250...500	250...500	1 1	AF140-40-11B-14	1SFL447102R1411		2.170

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

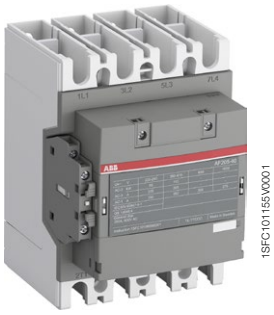
Main dimensions mm, *inches*



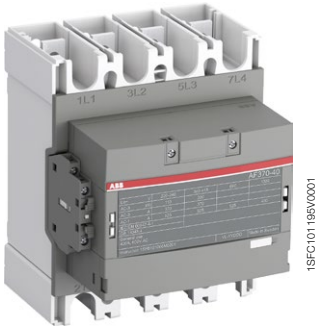
AF116, AF140-40-11 **AF116, AF140-40-11B**

1SFC101199C0201 - Rev. B

AF190 ... AF370 4-pole contactors
275 to 525 A AC-1
AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts



AF205-40-11



AF370-40-11

Description

AF190 ... AF370 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 1000 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

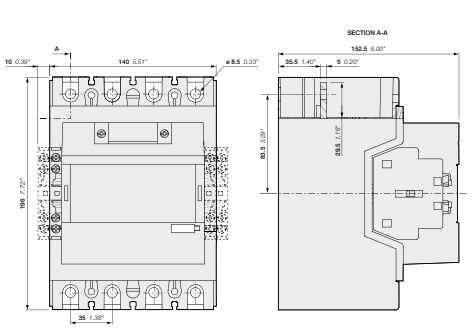
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption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

Ordering details

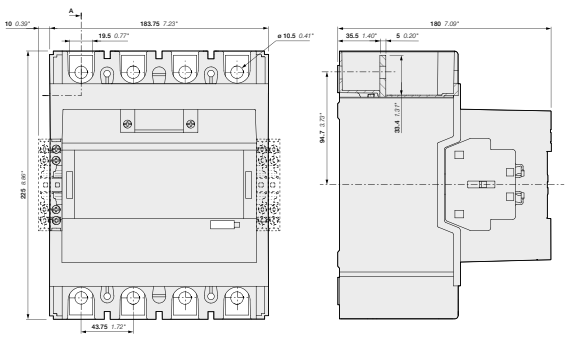
IEC Rated operational current θ ≤ 40 °C AC-1 A	UL / CSA General use rating 600 V AC A	Rated control circuit voltage Uc min. ... Uc max. V 50/60 Hz	 V DC	Auxiliary contacts fitted	Type (1)	Order code		Weight Pkg (1 pce) kg
4 N.O. main poles								
275	230	24...60	20...60	1 1	AF190-40-11-11	1SFL487102R1111		3.920
		48...130	48...130	1 1	AF190-40-11-12	1SFL487102R1211		3.920
		100...250	100...250	1 1	AF190-40-11-13	1SFL487102R1311		3.920
		250...500	250...500	1 1	AF190-40-11-14	1SFL487102R1411		3.920
350	250	24...60	20...60	1 1	AF205-40-11-11	1SFL527102R1111		3.920
		48...130	48...130	1 1	AF205-40-11-12	1SFL527102R1211		3.920
		100...250	100...250	1 1	AF205-40-11-13	1SFL527102R1311		3.920
		250...500	250...500	1 1	AF205-40-11-14	1SFL527102R1411		3.920
400	300	24...60	20...60	1 1	AF265-40-11-11	1SFL547102R1111		6.380
		48...130	48...130	1 1	AF265-40-11-12	1SFL547102R1211		6.380
		100...250	100...250	1 1	AF265-40-11-13	1SFL547102R1311		6.380
		250...500	250...500	1 1	AF265-40-11-14	1SFL547102R1411		6.380
500	350	24...60	20...60	1 1	AF305-40-11-11	1SFL587102R1111		6.380
		48...130	48...130	1 1	AF305-40-11-12	1SFL587102R1211		6.380
		100...250	100...250	1 1	AF305-40-11-13	1SFL587102R1311		6.380
		250...500	250...500	1 1	AF305-40-11-14	1SFL587102R1411		6.380
525	420	24...60	20...60	1 1	AF370-40-11-11	1SFL607102R1111		6.380
		48...130	48...130	1 1	AF370-40-11-12	1SFL607102R1211		6.380
		100...250	100...250	1 1	AF370-40-11-13	1SFL607102R1311		6.380
		250...500	250...500	1 1	AF370-40-11-14	1SFL607102R1411		6.380

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

Main dimensions mm, *inches*



AF190, AF205

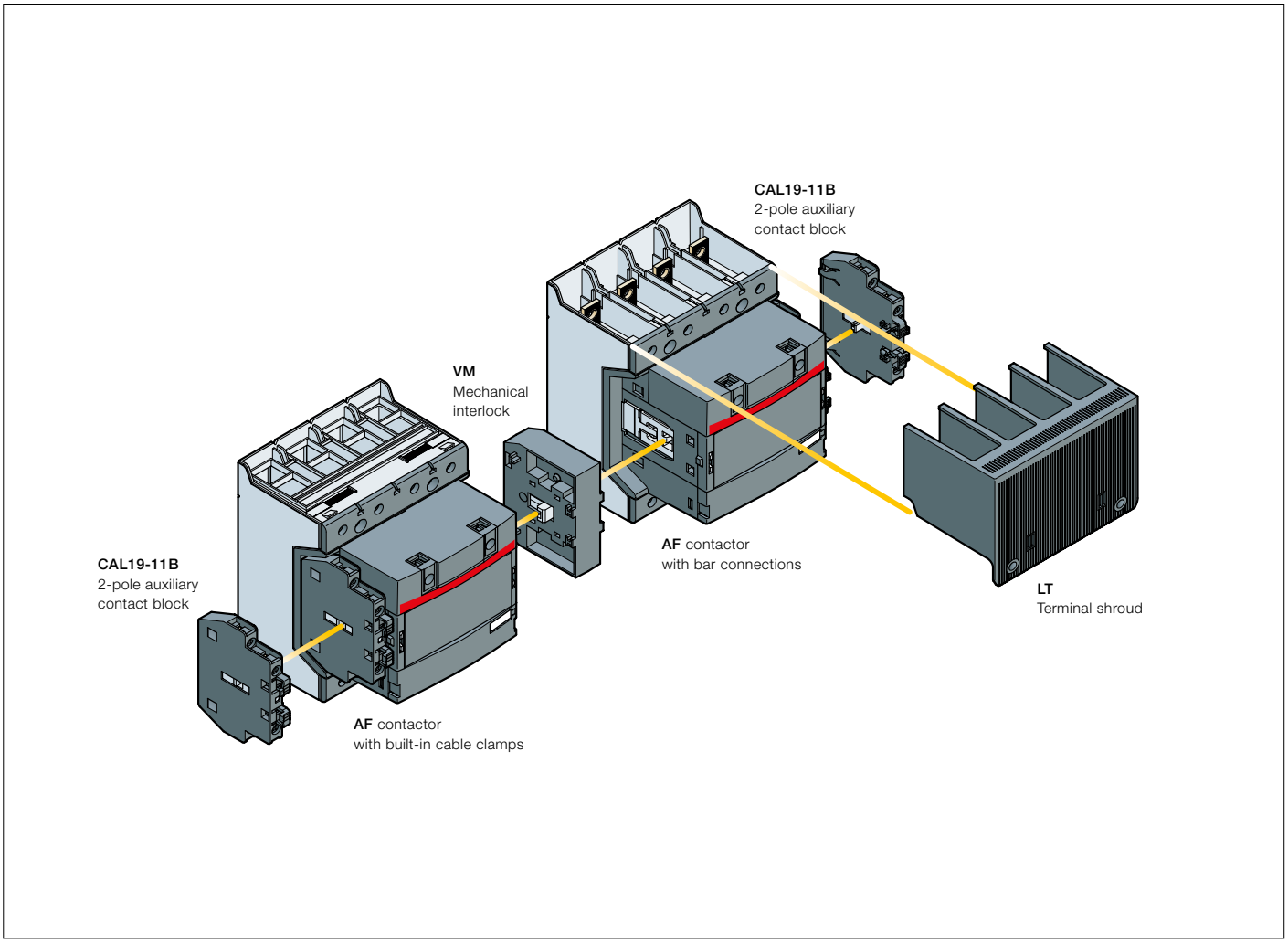


AF265, AF305, AF370

1SFC101200C0201 - Rev. A

AF116 ... AF370 4-pole contactors
with 1 N.O. + 1 N.C. auxiliary contacts
Main accessories

Main accessories (other accessories available)



Main accessory fitting details

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

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

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

1SFC101205C0201

AF116 ... AF370 4-pole contactors
with 1 N.O. + 1 N.C. auxiliary contacts
Main accessories

1SFC101071V0001

CAL19-11

1SFC101035V0001

VM19

Ordering details (1)

For contactors	Auxiliary contacts		Type	Order code		Pkg qty	Weight (1 pce) kg
Side-mounted instantaneous auxiliary contact blocks							
AF116 ... AF370	1	1	CAL19-11	1SFN010820R1011		2	0.050
	1	1	CAL19-11B	1SFN010820R3311		2	0.050
Mechanical interlock unit							
AF116 ... AF370			VM19	1SFN030300R1000		1	0.054
AF116 ... AF146 and AF190, AF205			VM140/190	1SFN034403R1000		1	0.088
AF190, AF205 and AF265 ... AF370			VM205/265	1SFN035203R1000		1	0.090
Terminal shrouds							
AF116 ... AF140, with compression lugs			LT140-40L	1SFN124203R2000		2	0.090
AF190 ... AF205, with cable clamps			LT205-40C	1SFN124801R2000		2	0.060
AF190 ... AF205, with compression lugs			LT205-40L	1SFN124803R2000		2	0.290
AF265 ... AF370, with cable clamps			LT370-40C	1SFN125401R2000		2	0.040
AF265 ... AF370, with compression lugs			LT370-40L	1SFN125403R2000		2	0.370

For contactors	Dimensions		Type	Order code		Pkg qty	Weight (1 pce) kg
	hole Ø mm	bar mm					
Terminal enlargements							
AF190 ... AF205	10.5	20 x 5	LW205-40	1SFN074807R2000		1	0.306
AF265 ... AF370	10.5	25 x 5	LW370-40	1SFN075407R2000		1	0.540

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

AF116 ... AF140 4-pole contactors
160 to 200 A AC-1
AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts

AF140-40-22

AF140-40-22B

5

Description

AF116 ... AF140 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 350 V DC. These contactors are of the block type design with 4 main poles.

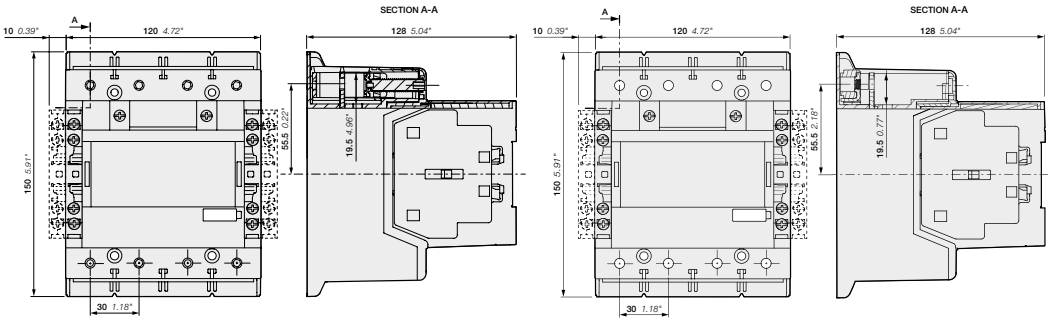
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption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

Ordering details

IEC Rated operational current θ ≤ 40 °C AC-1 A	UL / CSA General use rating 600 V AC A	Rated control circuit voltage Uc min. ... Uc max. V 50/60 Hz	 V DC	Auxiliary contacts fitted	Type (1)	Order code		Weight Pkg (1 pce) kg
4 N.O. main poles								
For connection with built-in cable clamps								
160	160	24...60	20...60	2 2	AF116-40-22-11	1SFL427101R1122		2.290
		48...130	48...130	2 2	AF116-40-22-12	1SFL427101R1222		2.290
		100...250	100...250	2 2	AF116-40-22-13	1SFL427101R1322		2.290
		250...500	250...500	2 2	AF116-40-22-14	1SFL427101R1422		2.290
200	175	24...60	20...60	2 2	AF140-40-22-11	1SFL447101R1122		2.290
		48...130	48...130	2 2	AF140-40-22-12	1SFL447101R1222		2.290
		100...250	100...250	2 2	AF140-40-22-13	1SFL447101R1322		2.290
		250...500	250...500	2 2	AF140-40-22-14	1SFL447101R1422		2.290
With bar connections								
160	160	24...60	20...60	2 2	AF116-40-22B-11	1SFL427102R1122		2.190
		48...130	48...130	2 2	AF116-40-22B-12	1SFL427102R1222		2.190
		100...250	100...250	2 2	AF116-40-22B-13	1SFL427102R1322		2.190
		250...500	250...500	2 2	AF116-40-22B-14	1SFL427102R1422		2.190
200	175	24...60	20...60	2 2	AF140-40-22B-11	1SFL447102R1122		2.190
		48...130	48...130	2 2	AF140-40-22B-12	1SFL447102R1222		2.190
		100...250	100...250	2 2	AF140-40-22B-13	1SFL447102R1322		2.190
		250...500	250...500	2 2	AF140-40-22B-14	1SFL447102R1422		2.190

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

Main dimensions mm, *inches*

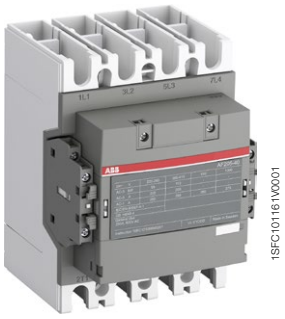


AF116, AF140-40-11

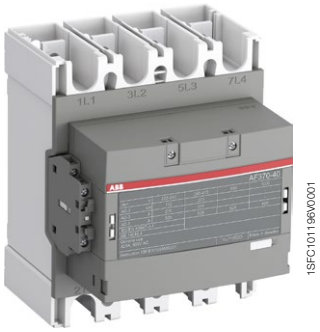
AF116, AF140-40-11B

1SFC101201C0201 - Rev. B

AF190 ... AF370 4-pole contactors
275 to 525 A AC-1
AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts



AF205-40-22



AF370-40-22

Description

AF190 ... AF370 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 1000 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

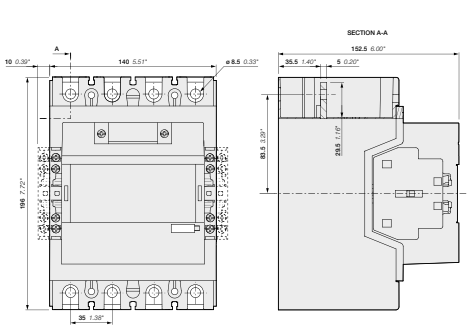
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption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

Ordering details

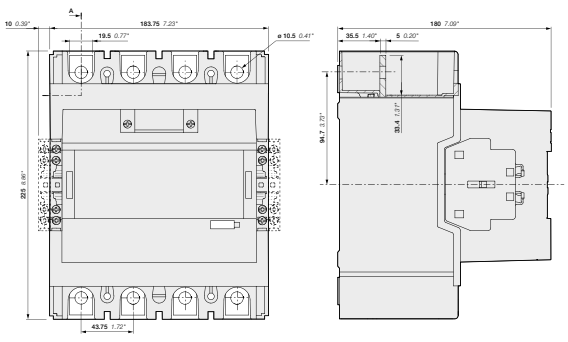
IEC Rated operational current θ ≤ 40 °C AC-1 A	UL / CSA General use rating 600 V AC A	Rated control circuit voltage Uc min. ... Uc max. V 50/60 Hz	 V DC	Auxiliary contacts fitted		Type (1)	Order code		Weight Pkg (1 pce) kg
4 N.O. main poles									
275	230	24...60	20...60	2	2	AF190-40-22-11	1SFL487102R1122		3.940
		48...130	48...130	2	2	AF190-40-22-12	1SFL487102R1222		3.940
		100...250	100...250	2	2	AF190-40-22-13	1SFL487102R1322		3.940
		250...500	250...500	2	2	AF190-40-22-14	1SFL487102R1422		3.940
350	250	24...60	20...60	2	2	AF205-40-22-11	1SFL527102R1122		3.940
		48...130	48...130	2	2	AF205-40-22-12	1SFL527102R1222		3.940
		100...250	100...250	2	2	AF205-40-22-13	1SFL527102R1322		3.940
		250...500	250...500	2	2	AF205-40-22-14	1SFL527102R1422		3.940
400	300	24...60	20...60	2	2	AF265-40-22-11	1SFL547102R1122		6.400
		48...130	48...130	2	2	AF265-40-22-12	1SFL547102R1222		6.400
		100...250	100...250	2	2	AF265-40-22-13	1SFL547102R1322		6.400
		250...500	250...500	2	2	AF265-40-22-14	1SFL547102R1422		6.400
500	350	24...60	20...60	2	2	AF305-40-22-11	1SFL587102R1122		6.400
		48...130	48...130	2	2	AF305-40-22-12	1SFL587102R1222		6.400
		100...250	100...250	2	2	AF305-40-22-13	1SFL587102R1322		6.400
		250...500	250...500	2	2	AF305-40-22-14	1SFL587102R1422		6.400
525	420	24...60	20...60	2	2	AF370-40-22-11	1SFL607102R1122		6.400
		48...130	48...130	2	2	AF370-40-22-12	1SFL607102R1222		6.400
		100...250	100...250	2	2	AF370-40-22-13	1SFL607102R1322		6.400
		250...500	250...500	2	2	AF370-40-22-14	1SFL607102R1422		6.400

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

Main dimensions mm, *inches*



AF190, AF205

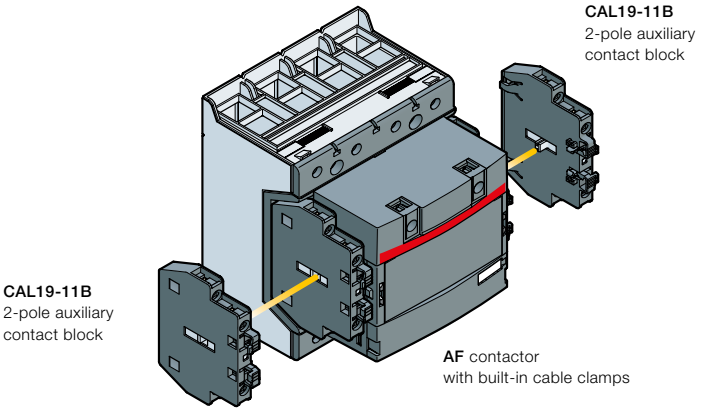


AF265, AF305, AF370

1SFC101202C0201 - Rev. B

AF116 ... AF370 4-pole contactors
with 2 N.O. + 2 N.C. auxiliary contacts
Main accessories

Main accessories (other accessories available)



Main accessory fitting details

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

(1) The CEL19 auxiliary contact blocks can replace the CAL19-11 and CAL19-11B. Though, no auxiliary contact block can be mounted outside the CEL19.

1SFC101207C0201 - Rev. B

AF116 ... AF370 4-pole contactors
with 2 N.O. + 2 N.C. auxiliary contacts
Main accessories

CAL19-11

Ordering details (1)

For contactors	Auxiliary contacts	Type	Order code		Pkg qty	Weight (1 pce) kg
Side-mounted instantaneous auxiliary contact blocks						
AF116 ... AF370	1 1	CAL19-11B	1SFN010820R3311		2	0.050
Terminal shrouds						
AF116 ... AF140, with compression lugs		LT140-40L	1SFN124203R2000		2	0.090
AF190 ... AF205, with cable clamps		LT205-40C	1SFN124801R2000		2	0.060
AF190 ... AF205, with compression lugs		LT205-40L	1SFN124803R2000		2	0.290
AF265 ... AF370, with cable clamps		LT370-40C	1SFN125401R2000		2	0.040
AF265 ... AF370, with compression lugs		LT370-40L	1SFN125403R2000		2	0.370

For contactors	Dimensions hole Ø mm	bar mm	Type	Order code		Pkg qty	Weight (1 pce) kg
Terminal enlargements							
AF190 ... AF205	10.5	20 x 5	LW205-40	1SFN074807R2000		1	0.306
AF265 ... AF370	10.5	25 x 5	LW370-40	1SFN075407R2000		1	0.540

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

1SFC101208C0201

EK550, EK1000 4-pole contactors
800 to 1000 A AC-1
AC operated - with 1 N.O. + 1 N.C. auxiliary contacts

EK1000-40-11

Description

EK550 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 1000 V AC and 600 V DC, EK1000 up to 1000 V AC.

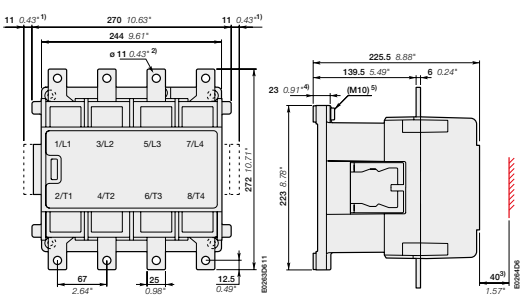
These contactors are of the block type design with:
- 4 main poles
- control circuit: AC operated
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

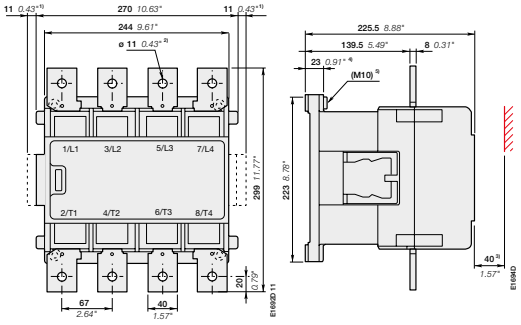
IEC Rated operational current θ ≤ 40 °C AC-1 A	UL/CSA General use rating 600 V AC A	Rated control circuit voltage Uc (1) V 50 Hz	 V 60 Hz	Auxiliary contacts fitted		Type	Order code		Weight Pkg (1 pce) kg
800	540	48	-	1	1	EK550-40-11	SK827041-AD		17.200
		110	110...120	1	1	EK550-40-11	SK827041-EF		17.200
		110...115	115...127	1	1	EK550-40-11	SK827041-EG		17.200
		220	220...240	1	1	EK550-40-11	SK827041-EL		17.200
		220...230	230...255	1	1	EK550-40-11	SK827041-EM		17.200
		400...415	-	1	1	EK550-40-11	SK827041-AR		17.200
1000	-	48	-	1	1	EK1000-40-11	SK827044-AD		17.500
		110	110...120	1	1	EK1000-40-11	SK827044-EF		17.500
		110...115	115...127	1	1	EK1000-40-11	SK827044-EG		17.500
		220	220...240	1	1	EK1000-40-11	SK827044-EL		17.500
		220...230	230...255	1	1	EK1000-40-11	SK827044-EM		17.500
		400...415	-	1	1	EK1000-40-11	SK827044-AR		17.500

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



EK550



EK1000

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.

1SFC101217C0201

EK550, EK1000 4-pole contactors
800 to 1000 A AC-1
DC operated - with 2 N.O. + 1 N.C. auxiliary contacts

1SFC98099-069

EK1000-40-21

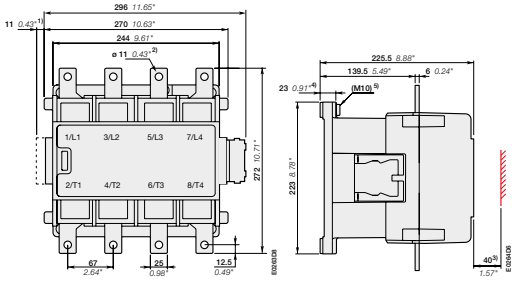
Description

EK550 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 1000 V AC and 600 V DC, EK1000 up to 1000 V AC.
These contactors are of the block type design with:
– 4 main poles
– control circuit: DC operated
– add-on auxiliary contact blocks for side mounting and a wide range of accessories.

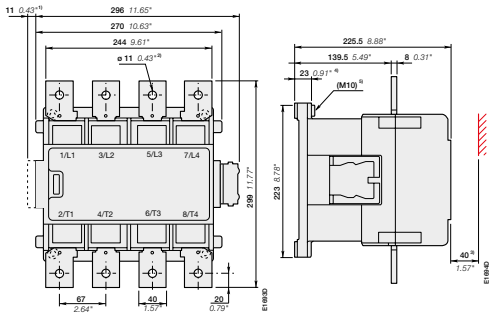
Ordering details

IEC Rated operational current $\theta \leq 40$ °C AC-1 A	UL / CSA General use rating 600 V AC A	Rated control circuit voltage Uc V DC	Auxiliary contacts fitted		Type	Order code		Weight Pkg (1 pce) kg
800	540	24	2	1	EK550-40-21	SK827041-DB		17.200
		48	2	1	EK550-40-21	SK827041-DD		17.200
		75	2	1	EK550-40-21	SK827041-DG		17.200
		110	2	1	EK550-40-21	SK827041-DE		17.200
		125	2	1	EK550-40-21	SK827041-DU		17.200
		220	2	1	EK550-40-21	SK827041-DF		17.200
1000	-	24	2	1	EK1000-40-21	SK827044-DB		17.500
		36	2	1	EK1000-40-21	SK827044-DC		17.500
		48	2	1	EK1000-40-21	SK827044-DD		17.500
		60	2	1	EK1000-40-21	SK827044-DT		17.500
		75	2	1	EK1000-40-21	SK827044-DG		17.500
		110	2	1	EK1000-40-21	SK827044-DE		17.500
		125	2	1	EK1000-40-21	SK827044-DU		17.500
		220	2	1	EK1000-40-21	SK827044-DF		17.500

Main dimensions mm, *inches*



EK550



EK1000

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.

1SFC101218C0201

EK550, EK1000 4-pole Contactors
800 to 1000 A AC-1
AC operated - with 2 N.O. + 2 N.C. auxiliary contacts

EK1000-40-22

Description

EK550 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and for controlling power circuits up to 1000 V AC and 600 V DC, EK1000 up to 1000 V AC. These contactors are of the block type design with:

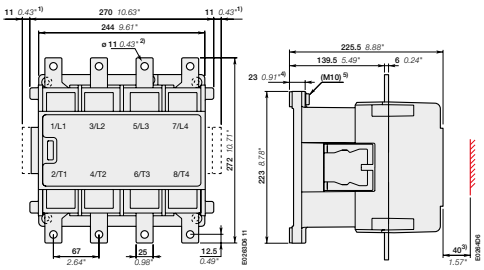
– 4 main poles
– control circuit: AC operated
– add-on auxiliary contact blocks for side mounting and a wide range of accessories

Ordering details

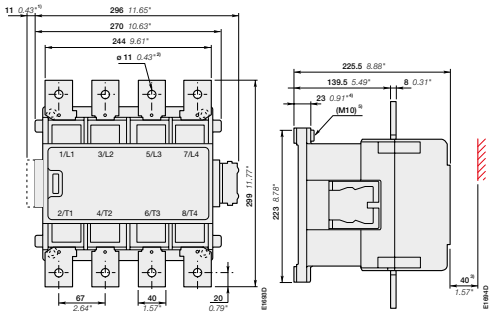
IEC	UL/CSA	Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational current θ ≤ 40 °C AC-1	General use rating 600 V AC								Pkg (1 pce)
A	A	V 50 Hz	V 60 Hz						kg
800	540	48	-	2	2	EK550-40-22	SK827043-AD		17.200
		110	110...120	2	2	EK550-40-22	SK827043-EF		17.200
		110...115	115...127	2	2	EK550-40-22	SK827043-EG		17.200
		220	220...240	2	2	EK550-40-22	SK827043-EL		17.200
		220...230	230...255	2	2	EK550-40-22	SK827043-EM		17.200
		400...415	-	2	2	EK550-40-22	SK827043-AR		17.200
1000	-	48	-	2	2	EK1000-40-22	SK827045-AD		17.500
		110	110...120	2	2	EK1000-40-22	SK827045-EF		17.500
		110...115	115...127	2	2	EK1000-40-22	SK827045-EG		17.500
		220	220...240	2	2	EK1000-40-22	SK827045-EL		17.500
		220...230	230...255	2	2	EK1000-40-22	SK827045-EM		17.500
		380	380...415	2	2	EK1000-40-22	SK827045-EP		17.500
		380...400	400...440	2	2	EK1000-40-22	SK827045-ER		17.500
		400...415	-	2	2	EK1000-40-22	SK827045-AR		17.500

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



EK550



EK1000

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

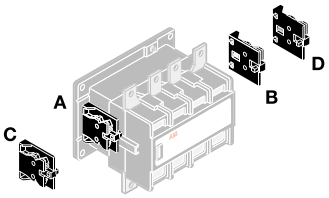
1SFC101219C0201

Notes

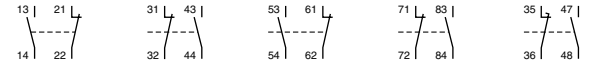
EK550, EK1000 4-pole contactors
with 1 N.O. + 1 N.C. auxiliary contacts and 2 N.O. + 1 N.C. auxiliary contacts

Main accessory fitting details

Mounting positions of the auxiliary contact



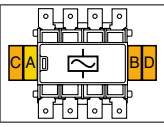
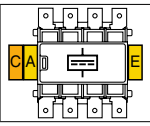
Auxiliary contact types and connecting diagrams



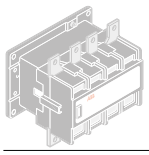
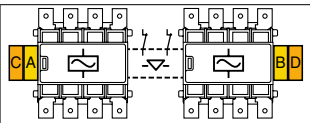
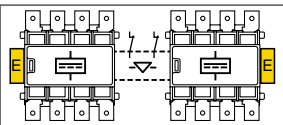
CAL16-11 A | CAL16-11 B | CAL16-11 C | CAL16-11 D | CCL16-11 E (1)

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

EK 4-pole contactors

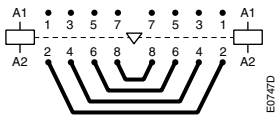
Contactor types	Main poles	Available auxiliary contacts	Add-on auxiliary contact blocks 2-pole CAL16-11 ...	Mounting and positioning (Factory mounted auxiliary contacts / Add-on CAL16-11 auxiliary contacts)
AC operated, 50 Hz, 60 Hz or 50/60 Hz				
EK550, EK1000	4 0	1 1	+ 1 x CAL16-11B + 1 x CAL16-11C + 1 x CAL16-11D	
DC operated				
EK550, EK1000	4 0	2 1	+ 1 x CAL16-11C	

EK 4-pole reversing contactors with VH800 mechanical and electrical interlock units

"Left hand" contactors	Interlocking	"Right hand" contactors	Add-on auxiliary contact blocks 2-pole CAL16-11 ...	Mounting and positioning (Factory mounted auxiliary contacts / Add-on CAL16-11 auxiliary contacts)
				
AC operated, 50 Hz, 60 Hz or 50/60 Hz				
EK550, EK1000	VH800	EK550, EK1000	+ 1 x CAL16-11C 1 x CAL16-11D	
DC operated				
EK550, EK1000	VH800	EK550, EK1000	–	

1SFC101220C0201

EK550, EK1000 4-pole contactors
with 1 N.O. + 1 N.C. auxiliary contacts and 2 N.O. + 1 N.C. auxiliary contacts



BSS550 ... BSS1000

RC-EH

Ordering details (1)

For contactors	Auxiliary contacts		Type	Order code		Pkg qty	Weight (1 pce) kg
Side-mounted auxiliary contact blocks							
EK	1	1	CAL16-11B	SK829002-B		1	0.050
	1	1	CAL16-11C	SK829002-C		1	0.050
	1	1	CAL16-11D	SK829002-D		1	0.050
	1	1	CCL16-11E (2)	SK829002-E		1	0.050
Mechanical interlock unit for two horizontal mounted contactors							
EK550, EK1000			VH800	SK829070-F		1	6.000
Connecting sets							
EK550			BSS550	SK829090-E		1	3.300
EK1000			BSS1000	SK829090-H		1	5.500

Surge suppressors

For contactors	Rated control circuit voltage Uc V	AC	DC	Type	Order code		Pkg qty	Weight (1 pce) kg
EK550, EK1000	48...110	●	–	RC-EH800/110	SK829007-C		1	0.015
EK550, EK1000	24...125	–	●	RC-EH800/110	SK829007-C		1	0.015
EK550, EK1000	220...600	●	–	RC-EH800/600	SK829007-D		1	0.015

(1) See "Main accessory fitting details" table.
(2) Mounting of CCL16-11E blocks does not allow an additional second block to be added on top of it.
All DC operated EK contactors are equipped with one CCL16-11E on the right side.

1SFC101220C0201

AF09 ... AF80 4-pole contactors
Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC / DC operated	AF09	AF16	AF26	AF38	AF40	AF52	AF80
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1						
Rated operational voltage Ue max.		690 V						
Rated frequency (without derating)		50 / 60 Hz						
Conventional free-air thermal current Ith								
acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C		35 A	35 A	55 A	55 A	105 A	105 A	125 A
With conductor cross-sectional area		6 mm²	6 mm²	16 mm²	16 mm²	35 mm²	35 mm²	50 mm²
AC-1 Utilization category								
For air temperature close to contactor								
Ie / Rated operational current AC-1	**θ ≤ 40 °C**	25 A	30 A	45 A	55 A	70 A	100 A	125 A
Ue max. ≤ 690 V, 50/60 Hz	**θ ≤ 60 °C**	25 A	30 A	40 A	45 A	60 A	80 A	105 A
	θ ≤ 70 °C	22 A	26 A	32 A	37 A	50 A	70 A	90 A
With conductor cross-sectional area		4 mm²	6 mm²	10 mm²	16 mm²	35 mm²	35 mm²	50 mm²
AC-3 Utilization category								
For air temperature close to contactor θ ≤ 60 °C								
Ie / Max. rated operational current AC-3 (1)								
	220-230-240 V	9 A	18 A	23.2 A	23.2 A	40 A	53 A	80 A
M 3~ 3-phase motors	**380-400 V**	9 A	18 A	22 A	22 A	40 A	53 A	80 A
	415 V	9 A	18 A	21.2 A	21.2 A	40 A	53 A	80 A
	440 V	9 A	18 A	20 A	20 A	40 A	53 A	80 A
	500 V	9.5 A	15 A	17.6 A	17.6 A	35 A	45 A	65 A
	690 V	7 A	10.5 A	10.5 A	10.5 A	25 A	35 A	49 A
Rated operational power AC-3 (1)								
	220-230-240 V	2.2 kW	4 kW	5.5 kW	5.5 kW	11 kW	15 kW	22 kW
M 3~ 1500 r.p.m. 50 Hz, 1800 r.p.m. 60 Hz, 3-phase motors	**380-400 V**	4 kW	7.5 kW	11 kW (3)	11 kW (3)	18.5 kW	22 kW	37 kW
	415 V	4 kW	9 kW	11 kW	11 kW	22 kW	30 kW	45 kW
	440 V	4 kW	9 kW	11 kW	11 kW	22 kW	30 kW	45 kW
	500 V	5.5 kW	9 kW	11 kW	11 kW	22 kW	30 kW	45 kW
	690 V	5.5 kW	9 kW	9 kW	9 kW	22 kW	30 kW	45 kW
Rated making capacity AC-3		10 x Ie AC-3 acc. to IEC 60947-4-1						
Rated breaking capacity AC-3		8 x Ie AC-3 acc. to IEC 60947-4-1						
Short-circuit protection device for contactors								
Without thermal overload relay - Motor protection excluded								
Ue ≤ 500 V AC - gG type fuse		25 A	32 A	50 A	63 A	80 A	110 A	160 A
Rated short-time withstand current Icw	**1 s**	300 A	300 A	450 A	450 A	1000 A	1000 A	1200 A
At 40 °C ambient temperature,	**10 s**	150 A	150 A	300 A	300 A	600 A	600 A	780 A
in free air from a cold state	**30 s**	80 A	80 A	225 A	225 A	350 A	350 A	450 A
	1 min	60 A	60 A	150 A	150 A	250 A	250 A	300 A
	15 min	35 A	35 A	55 A	55 A	110 A	110 A	140 A
Maximum breaking capacity N.O. main pole	**at 440 V**	250 A	250 A	-	-	950 A	950 A	1100 A
cos φ = 0.45	**at 690 V**	106 A	106 A	-	-	600 A	600 A	750 A
N.C. Main pole	**at 440 V**	-	-	-	-	600 A	-	900 A
	at 690 V	-	-	-	-	300 A	-	750 A
Power dissipation per pole	**Ie / AC-1**	0.8 W	1.2 W	1.6 W	2.3 W	3 W	6.3 W	8 W
	Ie / AC-3	0.1 W	0.35 W	0.42 W	0.42 W	1 W	1.7 W	3.2 W
Max. electrical switching frequency	**AC-1**	600 cycles/h						

(1) For the corresponding kW/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor Rated Operational Powers and Currents"
(2) For the protection of motor starters against short circuits, see "Coordination with Short-circuit Protection Devices".
(3) 400 V 3-phase motors only.

1SBC101989S0201 - Rev. B

AF116 ... AF370 4-pole contactors
Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC / DC operated	AF116	AF140	AF190	AF205	AF265	AF305	AF370	EK550	EK1000
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1								
Rated operational voltage Ue max.		690 V		1000 V						
Rated frequency (without derating)		50 / 60 Hz								
Conventional free-air thermal current Ith										
acc. to IEC 60947-1, open contactors, θ ≤ 40 °C		160 A	200 A	275 A	350 A	400 A	500 A	525 A	800 A	1000 A
With conductor cross-sectional area		70 mm²	95 mm²	150 mm²	240 mm² (3)	240 mm²	300 mm² (4)	2x 185 mm² (4)	2x 240 mm²	2x 300 mm²
AC-1 Utilization category										
For air temperature close to contactor										
Ie / Rated operational current AC-1	**θ ≤ 40 °C**	160 A	200 A	275 A	350 A	400 A	500 A	525 A	800 A	1000 A
Ue max. ≤ 690 V, 50/60 Hz	**θ ≤ 60 °C**	145 A	175 A	250 A	300 A	350 A	400 A	425 A	650 A	800 A
	θ ≤ 70 °C	130 A	160 A	200 A	240 A	290 A	325 A	350 A	575 A	720 A
Ue max. ≤ 1000 V, 50/60 Hz	**θ ≤ 40 °C**	-	-	250 A	275 A	350 A	375 A	400 A	800 A	1000 A
	θ ≤ 60 °C (2)	-	-	225 A	250 A	300 A	325 A	350 A	650 A	800 A
	θ ≤ 70 °C	-	-	185 A	200 A	240 A	260 A	290 A	575 A	720 A
With conductor cross-sectional area		70 mm²	95 mm²	150 mm²	240 mm² (3)	240 mm²	300 mm² (4)	2x 185 mm² (4)	2x 240 mm²	2x 300 mm²
AC-3 Utilization category										
For air temperature close to contactor θ ≤ 60 °C (2)										
Ie / Max. rated operational current AC-3 (1)										
	220-230-240 V	116 A	140 A	190 A	205 A	265 A	305 A	370 A	550 A	-
	380-400 V	116 A	140 A	190 A	205 A	265 A	305 A	370 A	550 A	-
M 3~ 3-phase motors	**415 V**	116 A	140 A	190 A	205 A	265 A	305 A	370 A	550 A	-
	440 V	116 A	140 A	190 A	205 A	265 A	305 A	370 A	550 A	-
	500 V	-	-	-	-	-	-	-	550 A	-
	690 V	-	-	-	-	-	-	-	550 A	-
	1000 V	-	-	-	-	-	-	-	175 A	-
Rated operational power AC-3 (1)										
	220-230-240 V	30 kW	37 kW	55 kW	55 kW	75 kW	90 kW	110 kW	160 kW	-
	380-400 V	55 kW	75 kW	90 kW	110 kW	132 kW	160 kW	200 kW	280 kW	-
M 3~ 1500 r.p.m. 50 Hz, 1800 r.p.m. 60 Hz, 3-phase motors	**415 V**	55 kW	75 kW	90 kW	110 kW	132 kW	160 kW	200 kW	315 kW	-
	440 V	75 kW	90 kW	110 kW	132 kW	160 kW	160 kW	200 kW	315 kW	-
	500 V	-	-	-	-	-	-	-	400 kW	-
	690 V	-	-	-	-	-	-	-	500 kW	-
	1000 V	-	-	-	-	-	-	-	250 kW	-
Rated making capacity AC-3		10 x Ie AC-3 acc. to IEC 60947-4-1								
Rated breaking capacity AC-3		8 x Ie AC-3 acc. to IEC 60947-4-1								
Short-circuit protection device for contactors										
Without thermal overload relay - Motor protection excluded										
Ue ≤ 500 V AC - gG type fuse		200 A	250 A	355 A	400 A	630 A	630 A	630 A	800 A	1000 A
Rated short-time withstand current Icw	**1 s**	1300 A	1460 A	1900 A	2050 A	2650 A	3050 A	3700 A	5500 A	6800 A
At 40 °C ambient temperature,	**10 s**	928 A	1168 A	1520 A	1640 A	2120 A	2440 A	2960 A	5300 A	6400 A
in free air from a cold state	**30 s**	536 A	674 A	878 A	947 A	1224 A	1409 A	1709 A	3700 A	4400 A
	1 min	379 A	477 A	621 A	670 A	865 A	996 A	1208 A	3000 A	3400 A
	15 min	160 A	200 A	275 A	350 A	400 A	500 A	525 A	1000 A	1200 A
Maximum breaking capacity	**at 440 V**	2000 A	3000 A	3300 A	3500 A	3800 A	4600 A	5000 A	5400 A	-
cos φ = 0.45	**at 690 V**	-	-	-	-	-	-	-	5400 A	-
Power dissipation per pole	**Ie / AC-1**	12 W	18 W	15 W	25 W	32 W	50 W	72 W	60 W	80 W
	Ie / AC-3	-	-	-	-	-	-	-	25 W	-
Max. electrical switching frequency	**AC-1**	300 cycles/h								
	AC-3	300 cycles/h								-
	AC-2, AC4	-							120 cycles/h	-

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
(2) θ ≤ 55 °C for EK550, EK1000
(3) For currents above 275 A use terminal enlargements or terminal extensions.
(4) For currents above 450 A use terminal enlargements or terminal extensions.

1SFC101209C0201 - Rev. B

AF09 ... AF80 4-pole contactors
Technical data

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

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

Note: 4-pole contactors fitted with 2 N.O. + 2 N.C. main poles, see "General technical data".
(1) 20 A for AF09..-22-00 and AF16..-22-00.

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

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

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

1SBC100066S0201

AF116 ... AF370 4-pole contactors
Technical data

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

Contactor types	AC / DC operated	AF116	AF140	AF190	AF205	AF265	AF305	AF370	EK550	EK1000
Standards		UL 60947-4-1							UL 508, CSA C22.2 N°14	
Max. operational voltage		600 V								
UL / CSA general use rating										
600 V AC		160 A	175 A	230 A	250 A	300 A	350 A	420 A	540 A	-
With conductor cross-sectional area		AWG 2/0	AWG 3/0	MCM 250	MCM 250	MCM 400	MCM 500	2//MCM 300	-	-
1 pole	**90 V DC**	200 A	200 A	-	-	-	-	-	-	-
	100 V DC	-	-	250 A	350 A	-	-	-	-	-
	110 V DC	-	-	-	-	400 A	500 A	520 A	-	-
2 poles in serie	**175 V DC**	200 A	200 A	-	-	-	-	-	-	-
	200 V DC	-	-	250 A	350 A	-	-	-	-	-
	225 V DC	-	-	-	-	400 A	500 A	520 A	-	-
3 poles in serie	**260 V DC**	200 A	200 A	-	-	-	-	-	-	-
	300 V DC	-	-	250 A	350 A	-	-	-	-	-
	340 V DC	-	-	-	-	400 A	500 A	520 A	-	-
4 poles in series	**350 V DC**	200 A	200 A	-	-	-	-	-	-	-
	400 V DC	-	-	250 A	350 A	-	-	-	-	-
	450 V DC	-	-	-	-	400 A	500 A	520 A	-	-
With conductor cross-sectional area		AWG 2/0	AWG 3/0	MCM 250	MCM 250	MCM 400	MCM 500	2//MCM 300	-	-
Max. electrical switching frequency										
For general use		300 cycles/h								

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

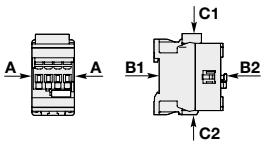
Contactor types	AC / DC operated	AF116	AF140	AF190	AF205	AF265	AF305	AF370	EK550	EK1000
Lighting application - UL/CSA - breaking all lines										
Electrical discharge lamps (ballast)										
1-phase per pole	**347 V AC**	160 A	200 A	250 A	300 A	400 A	450 A	520 A	-	-
3-phase break all lines	**600 V AC**	160 A	200 A	250 A	300 A	400 A	450 A	520 A	-	-

1SBC100067S0201

AF09 ... AF80 4-pole contactors
Technical data

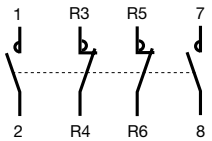
General technical data

Contactor types	AC / DC operated		AF09	AF16	AF26	AF38	AF40	AF52	AF80
Rated insulation voltage Ui									
acc. to IEC 60947-4-1			690 V						1000 V
acc. to UL / CSA			600 V						
Rated impulse withstand voltage Uimp.			6 kV						8 kV
Electromagnetic compatibility			Devices complying with IEC 60947-1 / EN 60947-1 - Environment A and B (1)						
Ambient air temperature close to contactor									
Operation			-40...+70 °C						
Storage			-60...+80 °C						
Climatic withstand			Category B according to IEC 60947-1 Annex Q						
Maximum operating altitude (without derating)			3000 m						
Mechanical durability									
Number of operating cycles			10 millions operating cycles						
Max. switching frequency			3600 cycles/h						
Shock withstand									
acc. to IEC 60068-2-27 and EN 60068-2-27									
Mounting position 1									
		Shock direction	1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position						
	4 N.O. Main poles	**A**	30 g				20 g		
		B1	25 g Closed position / 5 g Open position				20 g Closed position / 5 g Open position		
		B2	15 g				10 g		
		C1	25 g				20 g		
		C2	25 g				20 g		
	2 N.O. + 2 N.C. Main poles	**A**	30 g		30 g Closed position / 25 g Open position		20 g		
		B1	25 g Closed position / 5 g Open position		25 g Closed position / 5 g Open position		20 g Closed position / 5 g Open position		20 g Closed position / 4 g Open position
		B2	15 g		15 g Closed position / 10 g Open position		10 g		
		C1	25 g		25 g Closed position / 20 g Open position		20 g		
		C2	25 g		25 g Closed position / 20 g Open position		20 g		
Vibration withstand			5 ... 300 Hz				5 ... 300 Hz		
acc. to IEC 60068-2-6			4 g Closed position / 2 g Open position				3 g Closed position / 2 g Open position		



(1) Environment B: all AF09 ... AF38 contactors produced since week 08-2013. AF09 ... AF38-..-..-12 (48...130 V 50/60 Hz-DC) compliant to environment A only.
For environment B: select AF09 ... AF38-..-..-22.

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

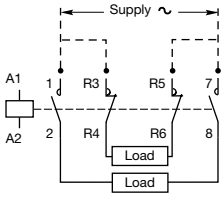


These contactors are suitable for controlling 2 separate circuits, i.e. 2 loads with 2 separate supplies, or 1 circuit comprising 2 separate loads with a single supply (see diagrams below). When the contactor operates there is no mechanical overlapping between the N.O. poles and the N.C. poles: BREAK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

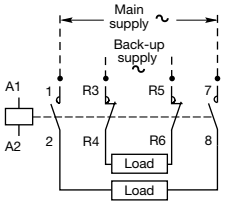
These contactors are not suitable for a reversing starter or for controlling a single load from 2 separate supplies.

Block diagrams

– Single supply and 2 separate loads



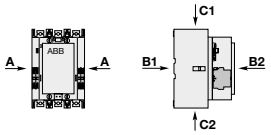
– 2 separate supplies and 2 separate loads



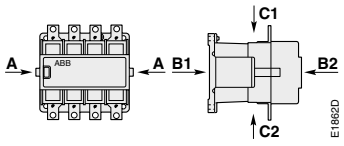
1SBC101990S0201 - Rev. A

AF116 ... EK1000 4-pole contactors
Technical data

General technical data

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

General technical data

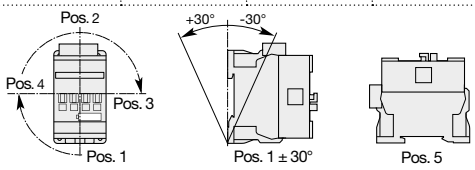
Contactor types	AC or DC operated	EK550	EK1000
Rated insulation voltage Ui			
acc. to IEC 60947-4-1		1000 V	
acc. to UL		600 V	
Rated impulse withstand voltage Uimp.		8 kV	
Electromagnetic compatibility		EK contactors complying with IEC 60947-1 / EN 60947-1 - Environment A	
Ambient air temperature close to contactor			
Operation	Fitted with thermal overload relay	-25 to +55 °C	-
	Without thermal overload relay	-40 to +70 °C	-
Storage		-50 to +70 °C	-
Climatic withstand		Category B acc. to IEC 60068-2-30	
Maximum operating altitude (without derating)		≤ 3000 m	
Mechanical durability			
Number of operating cycles		5 millions operating cycles	3 millions operating cycles
Max. switching frequency		60 cycles/h	
Shock withstand			
acc. to IEC 60068-2-27 and EN 60068-2-27			
Mounting position 1			
Closed or open position			
	**Shock direction**	1/2 sinusoidal shock for 15 ms: no change in contact position, closed or open position	
	A	10 g	
	B1	10 g	
	B2	10 g	
	C1	10 g	
	C2	10 g	

AF09 ... AF80 4-pole contactors
Technical data

Magnet system characteristics

Contactor types	AC / DC operated	AF09	AF16	AF26	AF38	AF40	AF52	AF80
Coil operating limits acc. to IEC 60947-4-1	**AC supply**	At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max. At θ ≤ 70 °C 0.85 x Uc min...Uc max.				at θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max		
	DC supply	At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max. At θ ≤ 70 °C (AF) 0.85 x Uc min...Uc max. - (AF..Z) 0.85 x Uc min...1.1 x Uc max.				at θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max		
AC control voltage 50/60 Hz								
Rated control circuit voltage Uc		24...500 V AC						
Coil consumption	**Average pull-in value**	(AF) 50 VA - (AF..Z) 16 VA				40 VA		
	Average holding value	(AF) 2.2 VA / 2 W - (AF..Z) 1.7 VA / 1.5 W				4 VA / 2 W		
DC control voltage								
Rated control circuit voltage Uc		12...500 V DC				20...500 V DC		
Coil consumption	**Average pull-in value**	(AF) 50 W - (AF..Z) 12...16 W				40 W		
	Average holding value	(AF) 2 W - (AF..Z) 1.7 W				2 W		
PLC-output control		(AF..Z) ≥ 500 mA 24 V DC				-		
Drop-out voltage		≤ 60 % of Uc min.				≤ 60 % of Uc min.		
Voltage sag immunity acc. to SEMI F47-0706		(AF..Z) conditions of use on request				conditions of use on request		
Dips withstand -20 °C ≤ θ ≤ +60 °C		(AF..Z) 22 ms average for Uc ≥ 24 V 50/60 Hz or Uc ≥ 20 V DC				24 ms average		
Operating time								
Between coil energization and:	**N.O. contact closing**	40...95 ms				48...120 ms		
	N.C. contact opening	38...90 ms				44...115 ms		
Between coil de-energization and:	**N.O. contact opening**	11...95 ms				16...110 ms		
	N.C. contact closing	13...98 ms				18...113 ms		

Mounting characteristics and conditions for use

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

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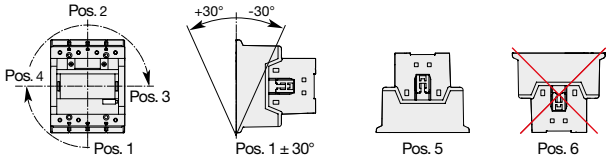
1SBC101991S0201

AF116 ... AF370 4-pole contactors
Technical data

Magnet system characteristics

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

Mounting characteristics and conditions for use

Contactor types	AC / DC operated	AF116	AF140	AF190	AF205	AF265	AF305	AF370
Mounting positions								
		Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 4-pole contactor AF116 ... AF370						
Mounting distances		The contactors can be assembled side by side						
Fixing								
On rail acc. to IEC 60715, EN 60715		-						
By screws (not supplied)		4 x M4		4 x M5				

1SFC101210C0201 - Rev. A

EK550 ... EK1000 4-pole contactors
Technical data

Magnet system characteristics

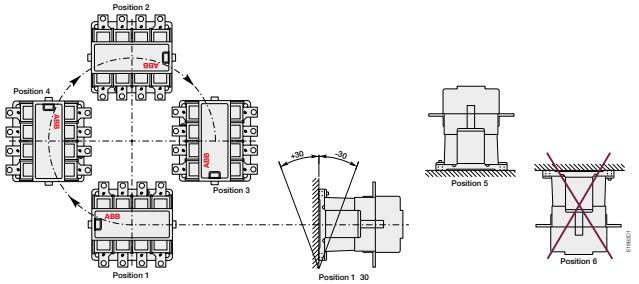
Contactor types	AC operated	EK550	EK1000
Coil operating limits	**AC supply**	At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max.	
acc. to IEC 60947-4-1		Please also refer to "Mounting characteristics and conditions for use"	
AC control voltage			
Rated control circuit voltage	**50 Hz**	48...500 V	
	60 Hz	110...600 V	
Coil consumption **Average pull-in value**	**50 Hz**	3500 VA	
	60 Hz	4000 VA	
	50/60 Hz (1)	3800 / 3400 VA	
Average holding value	**50 Hz**	125 VA / 50 W	
	60 Hz	140 VA / 60 W	
	50/60 Hz (1)	140 VA /60 W	
Drop-out voltage in % of Uc min.		approx. 45...65 %	
Operating time			
Between coil energization and:	**N.O. contact closing**	30...60 ms	
	N.C. contact opening	25...55 ms	
Between coil de-energization and:	**N.O. contact opening**	10...20 ms	
	N.C. contact closing	13...23 ms	

(1) "A" coil voltage: see "Coil voltage code table".

Magnet system characteristics

Contactor types	DC operated	EK550	EK1000
Coil operating limits	**DC supply**	At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max.	
acc. to IEC 60947-4-1		Please also refer to "Mounting characteristics and conditions for use"	
DC control voltage			
Rated control circuit voltage		24...220 V	
Coil consumption	**Average pull-in value**	1100 W	
	Average holding value	20 W	
Drop-out voltage		approx. 15...50 % of Uc min.	
Coil time constant			
Open	**L/R**	12 ms	
Closed	**L/R**	60 ms	
Operating time			
Between coil energization and:	**N.O. contact closing**	60...80 ms	
	N.C. contact opening	55...75 ms	
Between coil de-energization and:	**N.O. contact opening**	10...35 ms	
	N.C. contact closing	13...38 ms	

Mounting characteristics and conditions for use

Contactor types	AC / DC operated	EK550	EK1000
Mounting positions			
		Max. N.O. or N.C. built-in and add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 4-pole contactor EK550, EK1000	
Control voltage / Ambient temperature			
Mounting positions 1, 1±30°, 2, 3, 4, 5	**at θ ≤ 70 °C**	0.85...1.1 x Uc	
Mounting positions 6	**at θ ≤ 70 °C**	Unauthorized	
Mounting distances		The contactors can be assembled side by side	
Fixing			
On rail according to IEC 60715, EN 60715		–	
By screws (supplied)		4 x M6 (2)	

(2) Damping elements are supplied.

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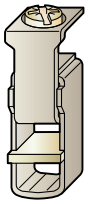
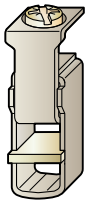
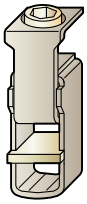
AF09 ... AF80 4-pole contactors
Technical data

Connecting characteristics

Contactor types			AF09	AF16	AF26	AF38	AF40	AF52	AF80
Main terminals			Screw terminals with cable clamp		 Screw terminals with double connector 2 x (5.5 width x 6.8 depth)		 Screw terminals with double connector 2 x (9.3 width x 7.9/10.3 depth)		 Screw terminals with double connector 2 x (12.4 width x 9.3/11.1 depth)
Connection capacity (min. ... max.)									
Main conductors (poles)									
Rigid	Solid (≤ 4 mm²)	**1 x**	1...6 mm²		1.5...16 mm²		6...35 mm²		6...70 mm²
	Stranded (≥ 6 mm²)	**2 x**	1...6 mm²		1.5...16 mm²		6...35 mm²		6...50 mm²
Flexible with non insulated ferrule		**1 x**	0.75...6 mm²		1.5...16 mm²		4...35 mm²		6...50 mm²
		2 x	0.75...6 mm²		1.5...16 mm²		4...35 mm²		6...50 mm²
Flexible with insulated ferrule		**1 x**	0.75...4 mm²		1.5...16 mm²		4...35 mm²		6...50 mm²
		2 x	0.75...2.5 mm²		1.5...16 mm²		4...35 mm²		6...50 mm²
Bars or lugs		**L <**	9.6 mm		-		9.2 mm		12.2 mm
Connection capacity acc. to UL/CSA		**1 or 2 x**	AWG 16...10		AWG 16...6		AWG 10...2		AWG 6...1
Stripping length			10 mm		12 mm		16 mm		17 mm
Tightening torque			1.5 Nm / 13 lb.in		2.5 Nm / 22 lb.in		4 Nm / 35 lb.in		6 Nm / 53 lb.in
Auxiliary conductors (coil terminals)									
Rigid solid		**1 x**	1...2.5 mm²						
		2 x	1...2.5 mm²						
Flexible with non insulated ferrule		**1 x**	0.75...2.5 mm²						
		2 x	0.75...2.5 mm²						
Flexible with insulated ferrule		**1 x**	0.75...2.5 mm²						
		2 x	0.75...1.5 mm²						
Lugs		**L <**	8 mm						
Connection capacity acc. to UL/CSA		**1 or 2 x**	AWG 18...14						
Stripping length			10 mm						
Tightening torque			1.2 Nm / 11 lb.in						
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529									
Main terminals			IP20				IP10		
Coil terminals			IP20						
Screw terminals			Delivered in open position, screws of unused terminals must be tightened						
Main terminals			M3.5		M4.5		M6		M8
	Screwdriver type		Flat Ø 5.5 / Pozidriv 2				Flat Ø 6.5 / Pozidriv 2		hexagon socket (s = 4 mm)
Coil terminals			M3.5						
	Screwdriver type		Flat Ø 5.5 / Pozidriv 2						

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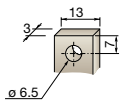
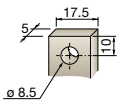
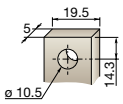
AF116 ... AF370 4-pole contactors
Technical data

Connecting characteristics

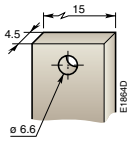
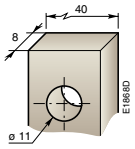
Contactor types	AC / DC operated	AF116	AF140	AF190	AF205	AF265	AF305	AF370
Main terminals Flat type								
Connection capacity (min. ... max.)								
Main conductors (poles)								
Cu cable - Stranded	**1 x**	10...95 mm²		6...150 mm²		16...300 mm²		
Clamp type		LD... included (1)		1SDA066917R1		1SDA055016R1		
Tightening torque		8 Nm		14 Nm		25 Nm		
Cu cable - Stranded	**2 x**	10...95 mm²		50...120 mm²		70...185 mm²		
Clamp type		LD... included (1)		1SFN074709R1000, LZ185-2C/120		1SCA022194R0890, OZXB4		
Tightening torque		8 Nm		16 Nm		22 Nm		
Al cable - Stranded	**1 x**	–		95...185 mm²		185...240 mm²		
Clamp type		–		1SDA054988R1		1SDA055020R1		
Tightening torque		–		31 Nm		43 Nm		
Cu cable - Flexible	**1 x**	10...70 mm²		6...120 mm²		16...240 mm²		
Clamp type		LD... included (1)		1SDA066917R1		1SDA055016R1		
Tightening torque		8 Nm		14 Nm		25 Nm		
Cu cable - Flexible	**2 x**	10...70 mm²		50...95 mm²		70...185 mm²		
Clamp type		LD... included (1)		1SFN074709R1000, LZ185-2C/120		1SCA022194R0890, OZXB4		
Tightening torque		8 Nm		16 Nm		22 Nm		
Lugs	**L ≤**	22 mm (.866 in)		24 mm (.945 in)		32 mm (1.260 in)		
	Ø >	6 mm (.236 in)		8 mm (.315 in)		10 mm (.394 in)		
Socket type		LL... included		LL... included		LL... included		
Tightening torque		9 Nm / 80 lb.in		18 Nm / 160 lb.in		28 Nm / 248 lb.in		
Connection capacity acc. to UL / CSA	**1 x**	AWG 6...3/0		6...300 MCM		4...400 MCM		
Clamp type		LD... included (1)		ATK185 (2)		ATK300 (2)		
Tightening torque		8 Nm / 71 lb.in		34 Nm / 301 lb.in		42 Nm / 372 lb.in		
Connection capacity acc. to UL / CSA	**2 x**	AWG 6...3/0		–		4...500 MCM		
Clamp type		LD... included (1)		–		ATK300/2 (2)		
Tightening torque		8 Nm / 71 lb.in		–		42 Nm / 372 lb.in		
Auxiliary conductors (coil terminals)								
Solid / stranded	**1 x**	1...4 mm²						
	2 x	1...4 mm²						
Flexible	**1 x**	0.75...2.5 mm²						
	2 x	0.75...2.5 mm²						
Flexible with non insulated ferrule	**1 x**	0.75...2.5 mm²						
	2 x	0.75...2.5 mm²						
Flexible with insulated ferrule	**1 x**	0.75...2.5 mm²						
	2 x	0.75...2.5 mm²						
Lugs	**L <**	8 mm						
	I >	3.5 mm						
Connection capacity acc. to UL / CSA	**1 or 2 x**	AWG 18...14						
Stripping length		9 mm						
Tightening torque		1.00 Nm / 9 lb.in						
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529								
Main terminals		IP00						
Coil terminals		IP20						
Screw terminals								
Main terminals		M6		M8		M10		
Screwdriver type		Screws and bolts						
Coil terminals (delivered in open position)		M3.5						
Screwdriver type		Flat Ø 5.5 mm / Pozidriv 2						

(1) LD... not included for AF116 ... AF146-30-..B.
(2) Available in North America only.

1SFC101213C0201 - Rev. A

EK550 ... EK1000 4-pole contactors
Technical data

Connecting characteristics

Contactor types	AC or DC operated		EK550	EK1000
Main terminals Flat type				
Connection capacity (min. ... max.)				
Main conductors (poles)				
Rigid with connector	Cu cable	**1 x**	70...300 mm²	-
	Al/Cu cable	**1 x**	70...300 mm²	95...300 mm²
	Al/Cu cable	**2 x**	35...185 mm²	95...300 mm²
Bars or lugs		**L** ≤	55 mm	
		Ø >	10 mm	
Connection capacity acc. to UL/CSA		**1 or 2 x**	3 x 4 - 500 MCM	-
Tightening torque	Recommended		18 Nm / 160 lb.in	
	Max.		22 Nm	
Auxiliary conductors (coil terminals)				
Rigid solid		**1 x**	0.5...2.5 mm²	
		2 x	0.5...2.5 mm²	
Flexible with ferrule		**1 x**	0.5...2.5 mm²	
		2 x	0.5...2.5 mm²	
Bars or lugs		**L** ≤	8 mm	
		I >	3.7 mm	
Connection capacity acc. to UL/CSA		**1 or 2 x**	18...14 AWG	
Tightening torque	Recommended		1.00 Nm / 9 lb.in	
	Max.		1.20 Nm	
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529				
Main terminals			IP00	
Coil terminals			IP20	
Screw terminals				
Main terminals			M10	
			Screws and bolts	
Coil terminals (delivered in open positions)			M3.5	
		Screwdriver type	Flat Ø 5.5 mm / Pozidriv 2	

1SFC101214C0201

4-pole contactors
Electrical durability and utilization categories

General

Utilization categories determine the current making and breaking conditions relating to the characteristics of the loads to be controlled by the contactors. International standard IEC 60947-4-1 and European standard EN 60947-4-1 are the standards to be referred to.
If Ic is the current to be broken by the contactor and Ie the rated operational current normally drawn by the load, then:
– Categories AC-1: Ic = Ie
Generally speaking Ic = m x Ie where m is a multiple of the load operational current.
On next pages, the curves corresponding to categorie AC-1 represent the electrical durability variation of standard contactors in relation to the breaking current Ic.

Electrical durability curves:
– categories AC-1: the curves represent the electrical durability variation of standard contactors in relation to the breaking current Ic.
Electrical durability is expressed in millions of operating cycles.

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Curve utilization mode

Electrical durability forecast and contactor selection for categories AC-1

– Note the characteristics of the load to be controlled:
  - Operational voltage ..... Ue
  - Current normally drawn ..... Ie (Ue / Ie / kW relation for motors, see "Motor rated operational powers and currents").
  - Utilization category..... AC-1
  - Breaking current ..... Ic = Ie for AC-1
– Define the number of operating cycles N required.
– On the diagram corresponding to the operational category, select the contactor with the curve immediately above the intersection point (Ic ; N).

Case of uninterrupted duty

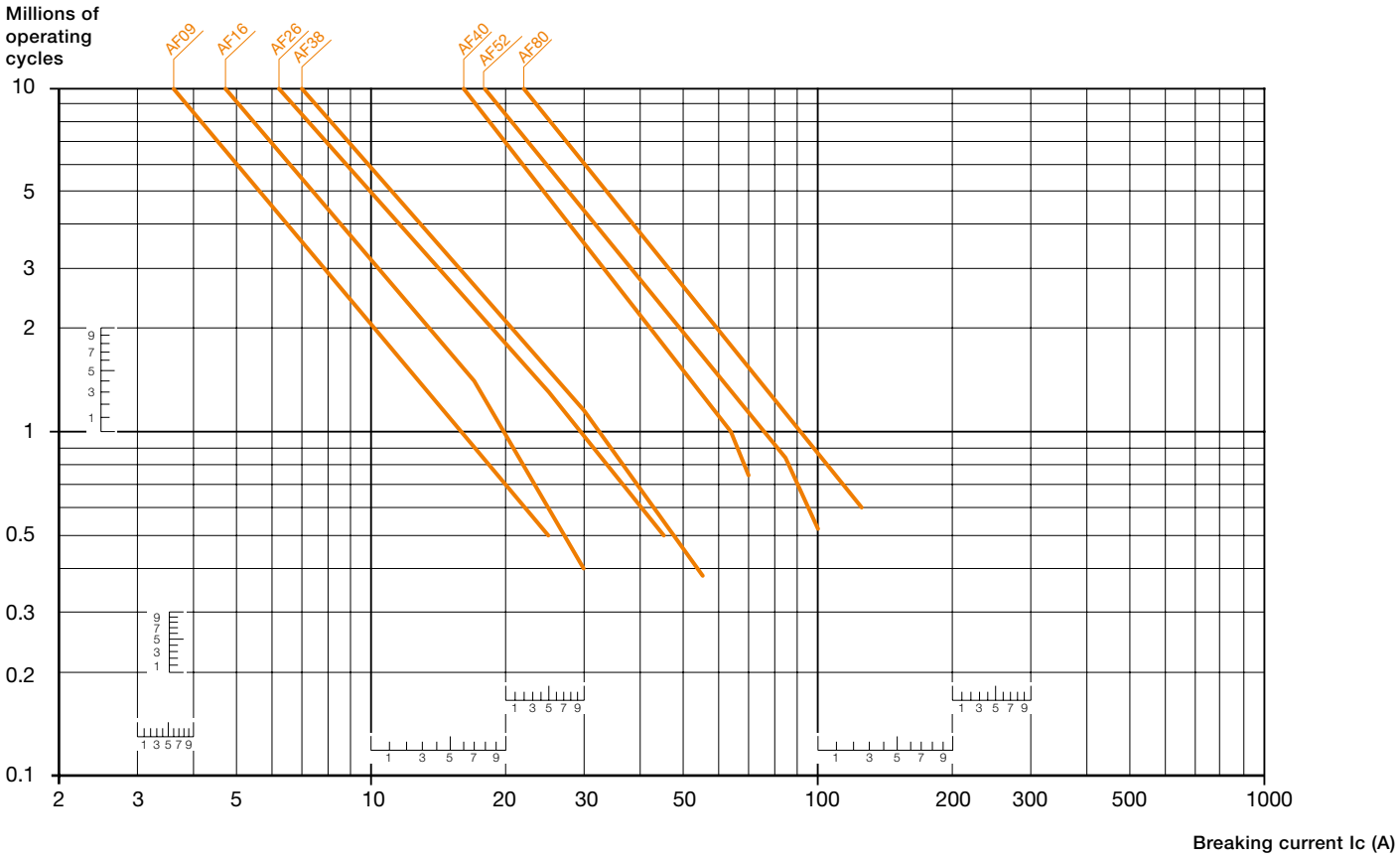
For uninterrupted duty, some verifications of preventing maintenance are necessary to check the functionality of the concerned product (consult us).
The combined effect of environmental conditions and the proper temperature of the product may require some disposals. As a matter of fact, for this duty, the use duration prevails over the number of operating cycles.

1SBC100064S0201 - Rev. A

4-pole contactors
Electrical durability

Electrical durability for AC-1 utilization category - Ue ≤ 690 V

Switching non-inductive or slightly inductive loads. The breaking current Ic for AC-1 is equal to the rated operational current of the load.
Ambient temperature and maximum electrical switching frequency: see "Technical data".



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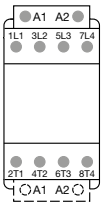
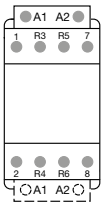
AF09 ... AF80 4-pole contactors
Terminal marking and positioning

AF09 ... AF38 contactors - AC / DC operated

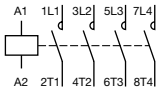
Standard devices without addition of auxiliary contacts



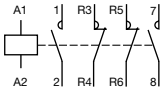
AF09 ... AF80..-40-00



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



AF09 ... AF80..-40-00



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

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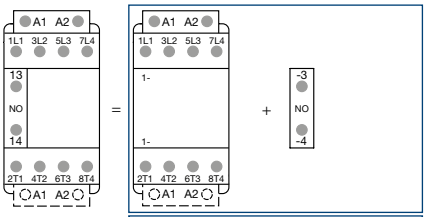
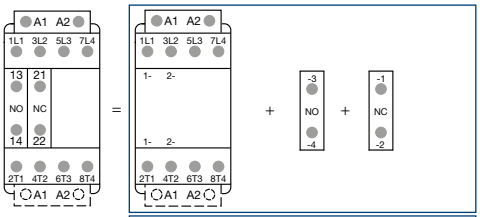
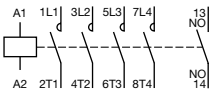
Other possible contact combinations with auxiliary contacts added by the user



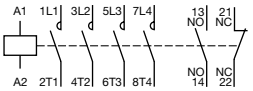
Combination 10 = AF09 ... AF80..-40-00 + CA4-10



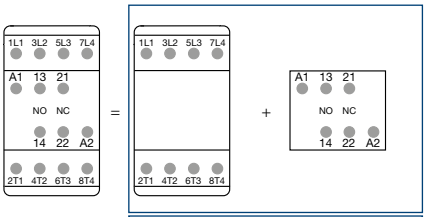
Combination 11 = AF09 ... AF80..-40-00 + CA4-10 + CA4-01



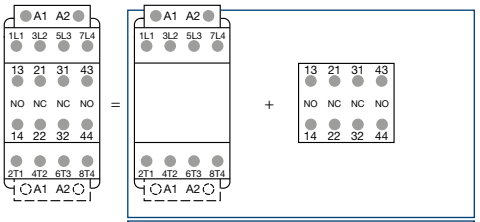
Combination 10



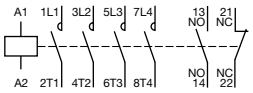
Combination 11



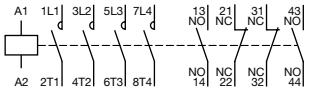
Combination 11 = AF09 ... AF80..-40-00 + CAT4-11E



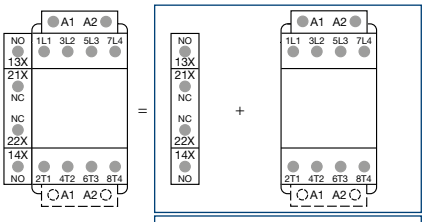
Combination 22 = AF09 ... AF80..-40-00 + CA4-22E



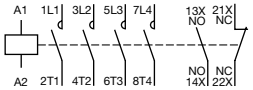
Combination 11



Combination 22



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



Combination 11

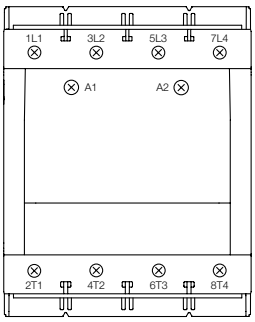
Note: Only AF09..Z ... AF38..Z contactor with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole

1SBC101480S0201 - Rev. A

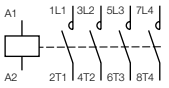
AF116 ... AF370 4-pole contactors
Terminal marking and positioning

AF116 ... AF370 contactors - AC / DC operated

Standard devices without addition of auxiliary contacts

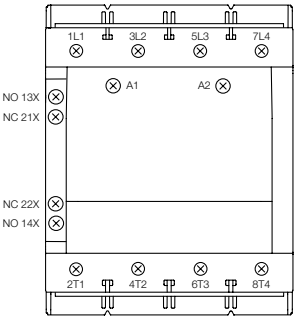


AF116 ... AF370-40-00

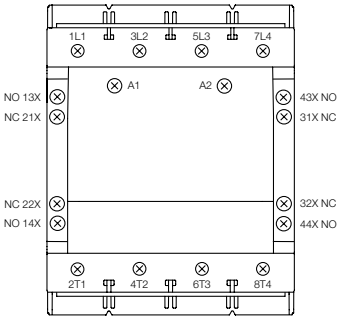


AF116 ... AF370-40-00

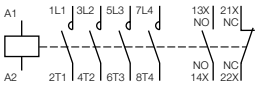
Standard devices with factory mounted auxiliary contacts



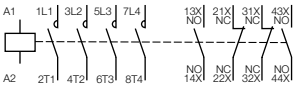
AF116 ... AF370-40-11



AF116 ... AF370-40-22



AF116 ... AF370-40-11



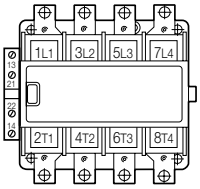
AF116 ... AF370-40-22

5

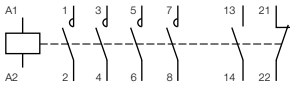
EK 4-pole contactors
Terminal marking and positioning

EK550, EK1000 contactors - AC operated

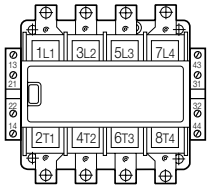
Standard devices



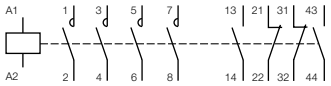
EK550, EK1000-40-11



EK550, EK1000-40-11

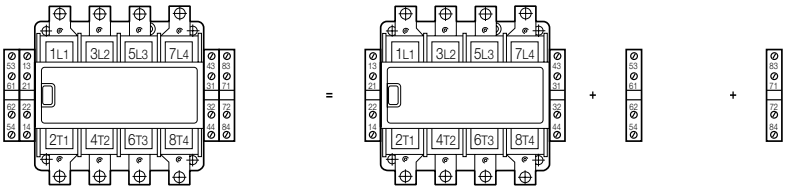


EK550, EK1000-40-22

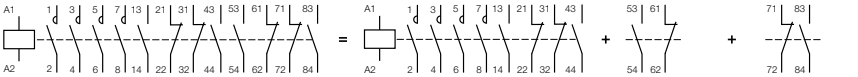


EK550, EK1000-40-22

Other possible contact combinations with auxiliary contacts added by the user



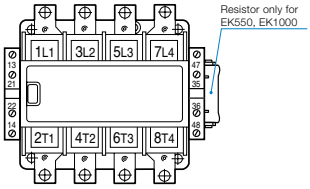
Combination 44 = EK550, EK1000-40-22 + CAL16-11C + CAL16-11D



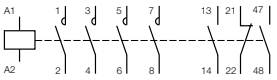
Combination 44 = EK550, EK1000-40-22 + CAL16-11C + CAL16-11D

EK550, EK1000 contactors - with multifrequency coil or DC operated

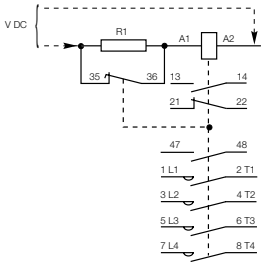
Standard devices



EK550, EK1000-40-21

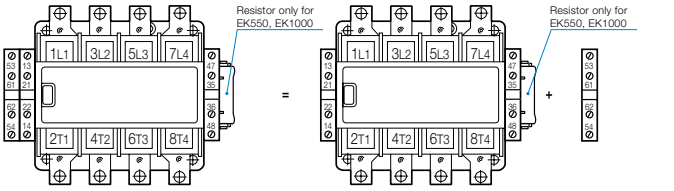


EK550, EK1000-40-21

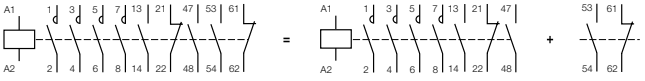


EK550, EK1000 DC operated

Other possible contact combinations with auxiliary contacts added by the user



Combination 32 = EK550, EK1000-40-21 + CAL16-11C



Combination 32 = EK550, EK1000-40-21 + CAL16-11C

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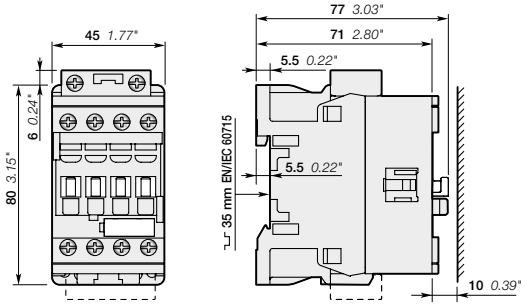
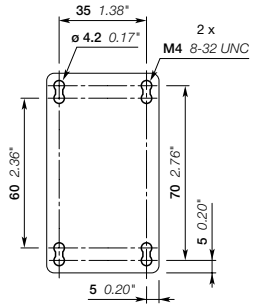
AF09, AF16 4-pole contactors

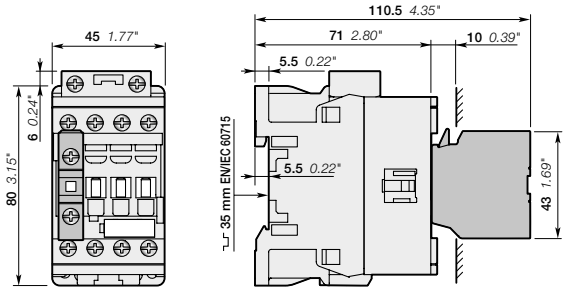
Main dimensions mm, *inches*



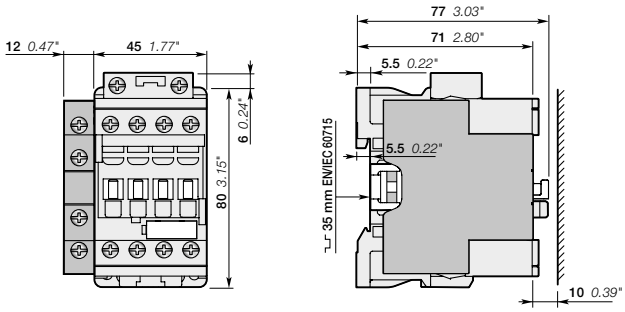
AF09, AF16



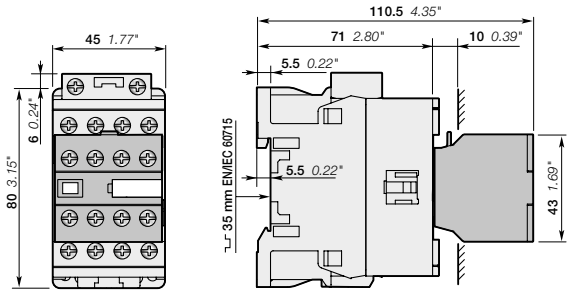
AF09, AF16



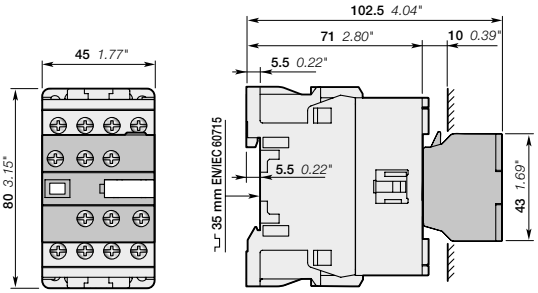
AF09, AF16
+ CA4, CC4 1-pole auxiliary contact block



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



AF09, AF16
+ CA4 4-pole auxiliary contact block

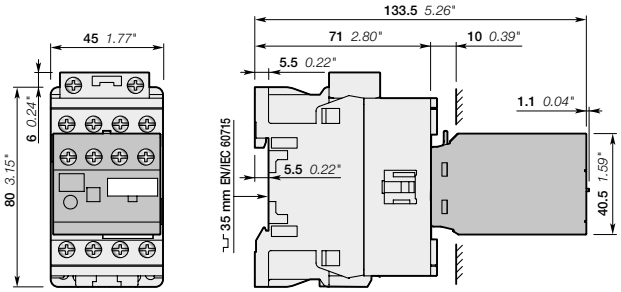


AF09, AF16
+ CAT4 2-pole auxiliary contact and coil terminal block

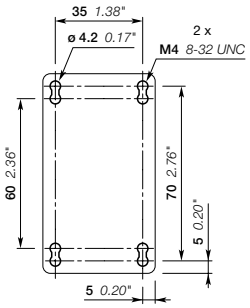
Note: contactor lateral distance to grounded component 2 mm *0.08"* min.

AF09, AF16 4-pole contactors

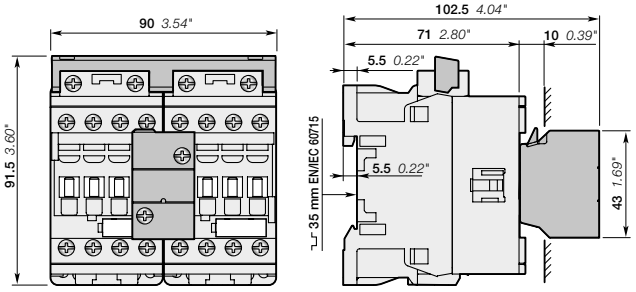
Main dimensions mm, *inches*



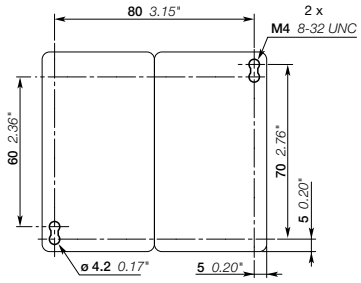
AF09, AF16
+ TEF4 electronic timer



AF09, AF16



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



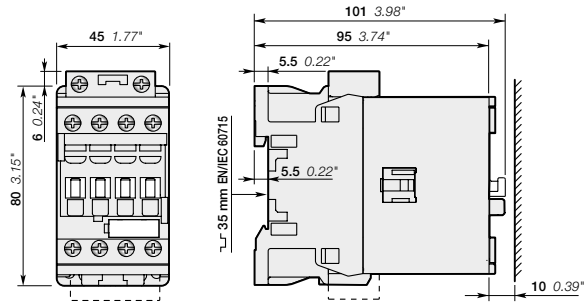
AF09..-40-00, AF16..-40-00
+ VEM4 mechanical and electrical interlock set

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

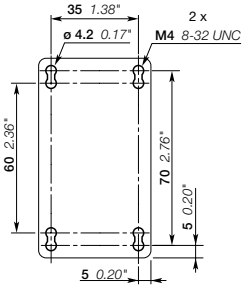
1SBC101485S0201 - Rev. A

AF26, AF38 4-pole contactors

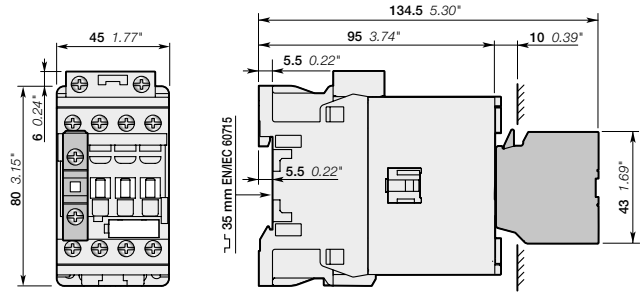
Main dimensions mm, *inches*



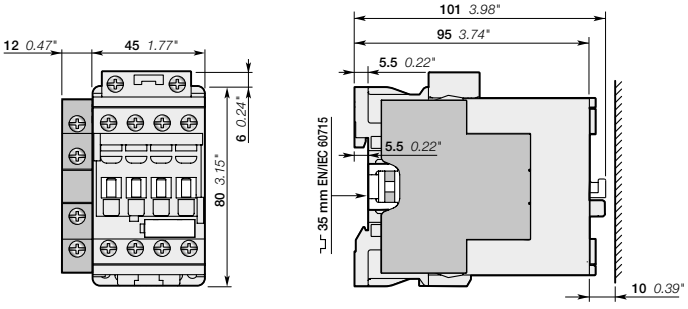
AF26, AF38



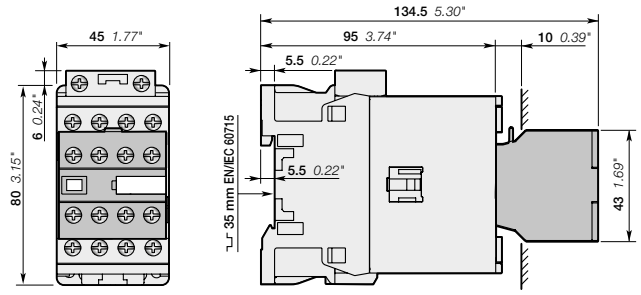
AF26, AF38



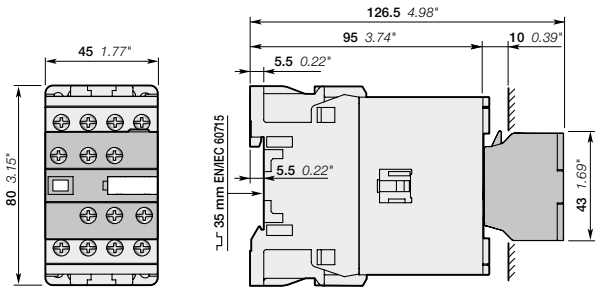
AF26, AF38
+ CA4, CC4 1-pole auxiliary contact block



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



AF26, AF38
+ CA4 4-pole auxiliary contact block



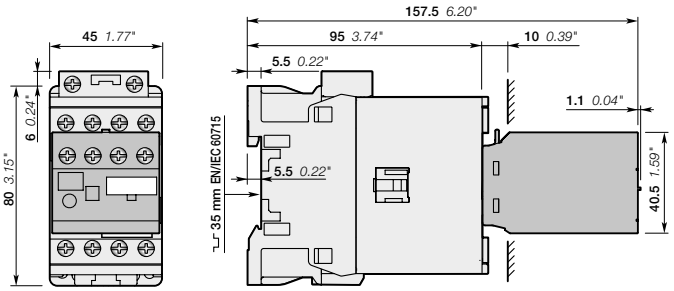
AF26, AF38
+ CAT4 2-pole auxiliary contact and coil terminal block

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

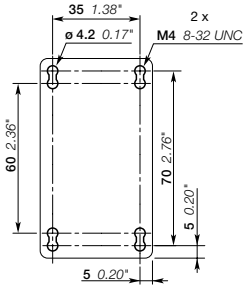
1SBC101486S0201 - Rev. A

AF26, AF38 4-pole contactors

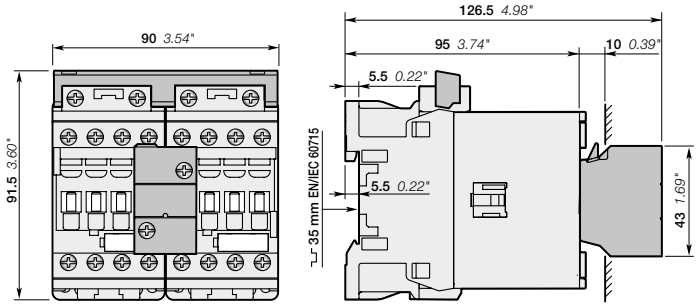
Main dimensions mm, *inches*



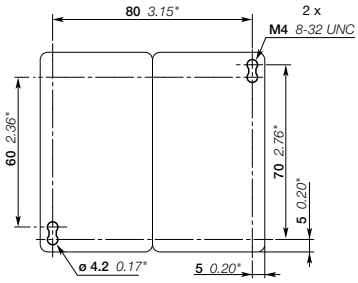
AF26, AF38
+ TEF4 electronic timer



AF26, AF38



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



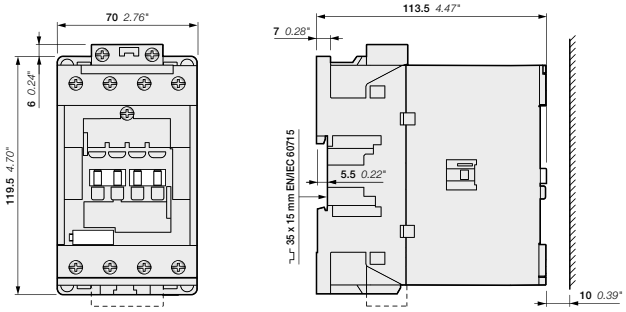
AF26..-40-00, AF38..-40-00
+ VEM4 mechanical and electrical interlock set

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

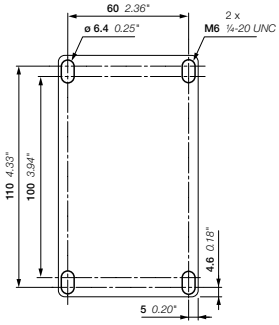
1SBC101486S0201 - Rev. A

AF40, AF52 4-pole contactors

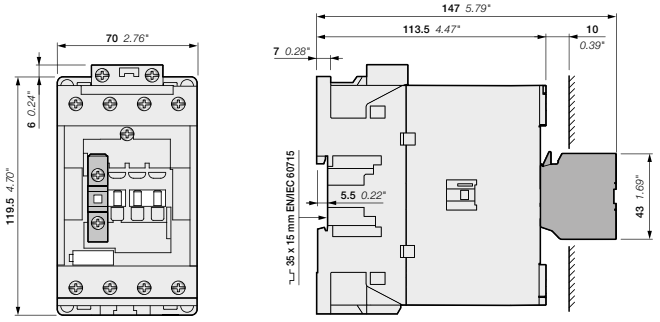
Main dimensions mm, *inches*



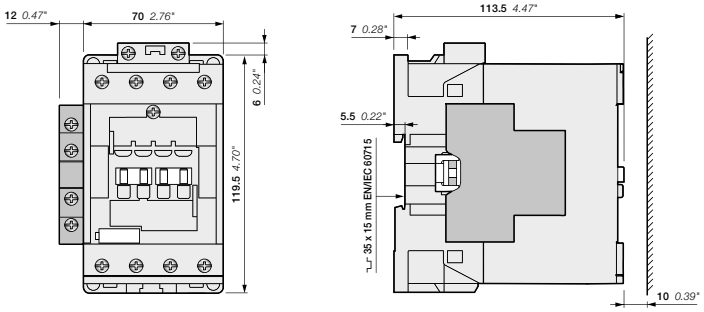
AF40, AF52



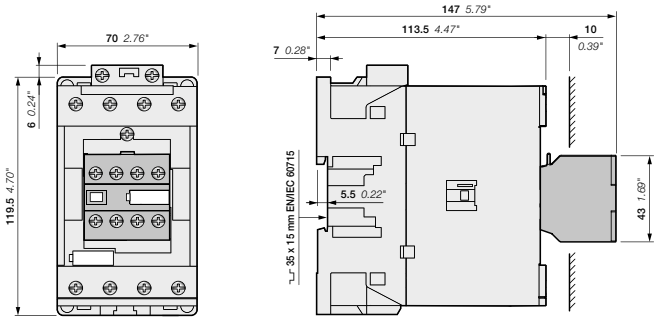
AF40, AF52



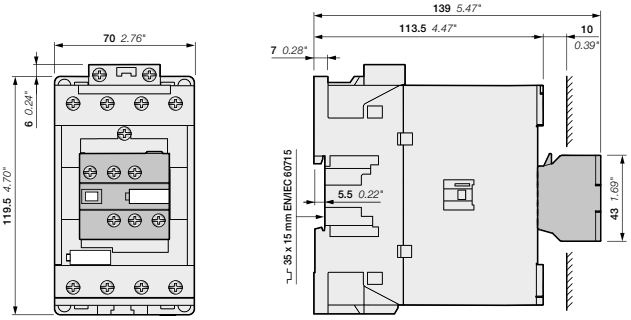
AF40, AF52
+ CA4, CC4 1-pole auxiliary contact block



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



AF40, AF52
+ CA4 4-pole auxiliary contact block

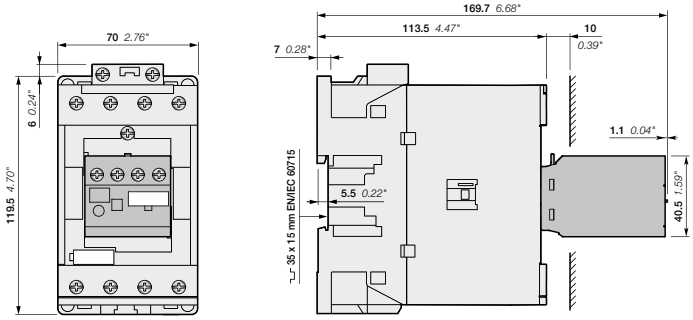


AF40, AF52
+ CAT4 2-pole auxiliary contact and coil terminal block

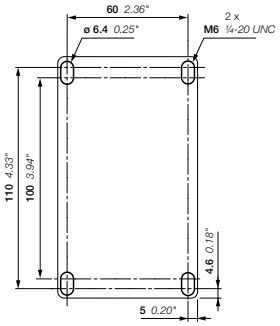
1SBC101977S0201

AF40, AF52 4-pole contactors

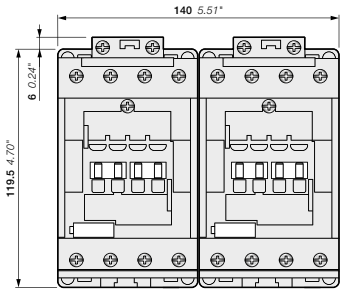
Main dimensions mm, *inches*

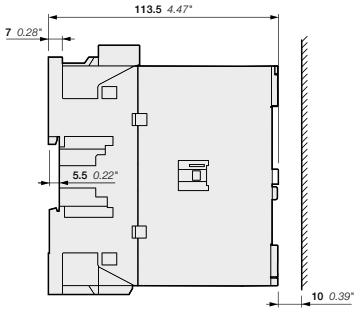


AF40, AF52
+ TEF4 electronic timer

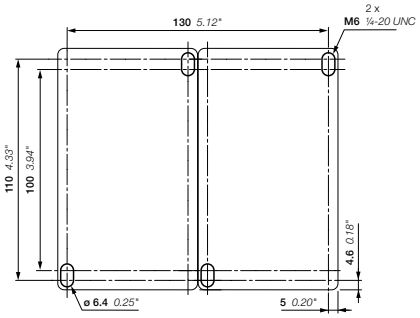


AF40, AF52





AF40, AF52
+ VM96-4 mechanical interlock unit



AF40, AF52
+ VM96-4 mechanical interlock unit

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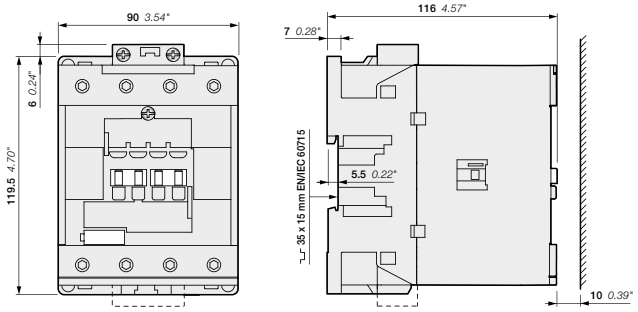
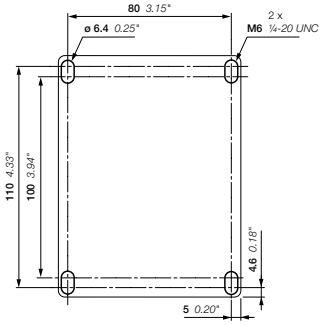
1SBC101977S0201

AF80 4-pole contactors

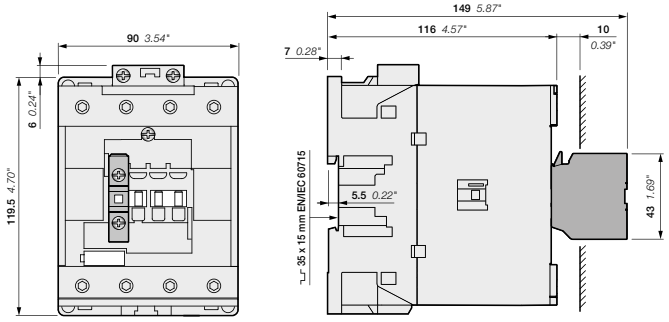
Main dimensions mm, *inches*



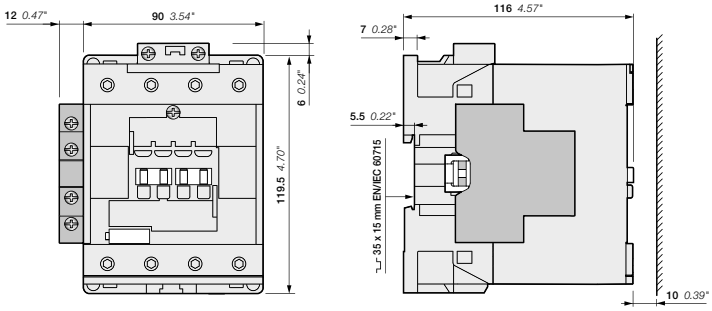
AF80



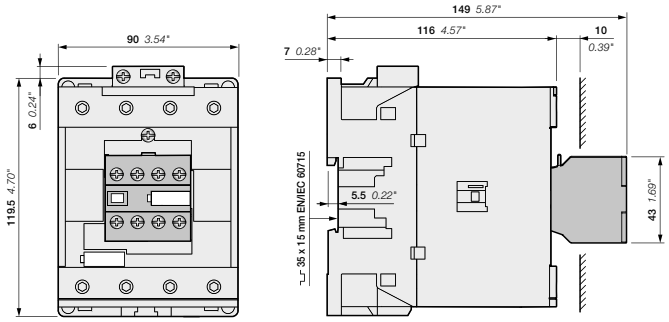
AF80



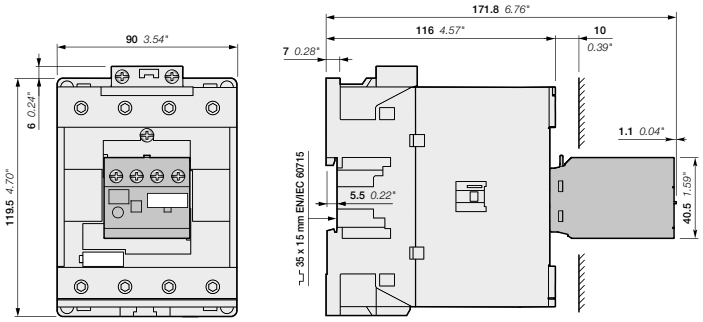
AF80
+ CA4, CC4 1-pole auxiliary contact block



AF80
+ CAL4-11 2-pole auxiliary contact block



AF80
+ CA4 4-pole auxiliary contact block

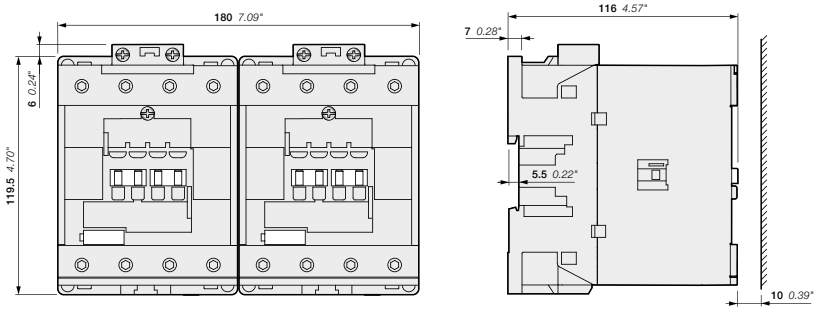


AF80
+ TEF4 Electronic timer

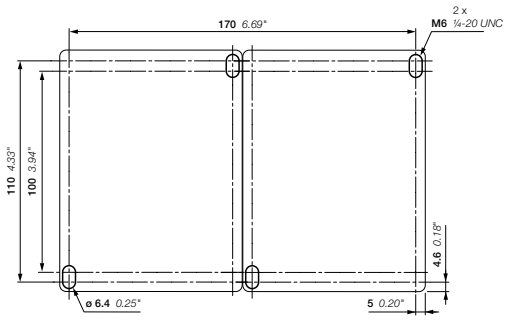
1SBC101978S0201

AF80 4-pole contactors

Main dimensions mm, *inches*



AF80
+ CA4, CC4 1-pole auxiliary contact block



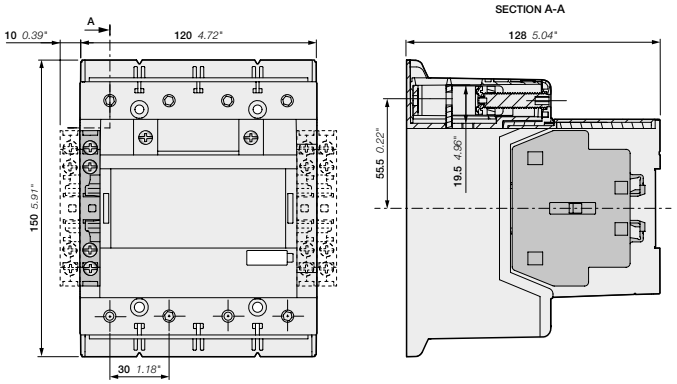
AF80
+ VM96-4 mechanical interlock unit

5

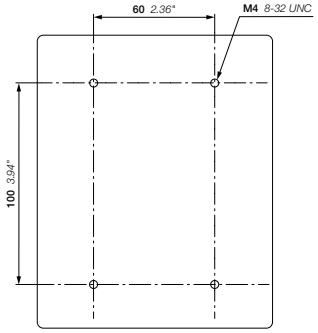
1SBC101978S0201

AF116, AF140 4-pole contactors

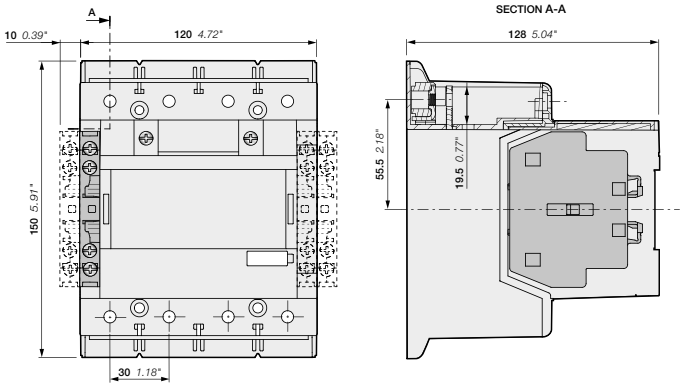
Main dimensions mm, *inches*



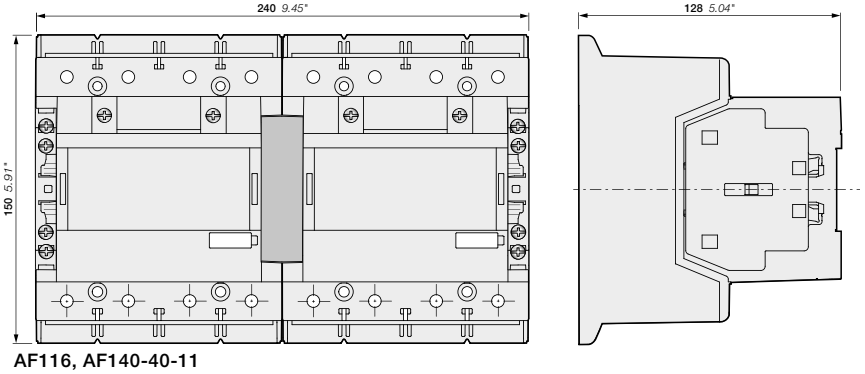
AF116, AF140-40-00 + CAL19 2-pole auxiliary contact block
AF116, AF140-40-11



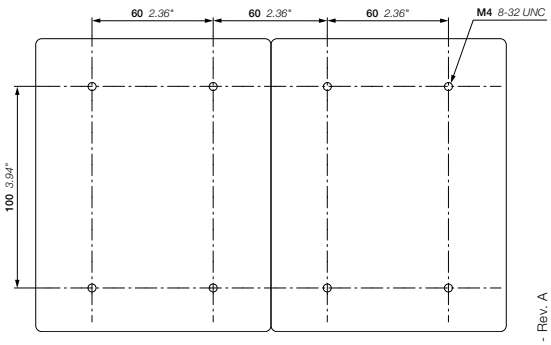
AF116, AF140-40-..(B)



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



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

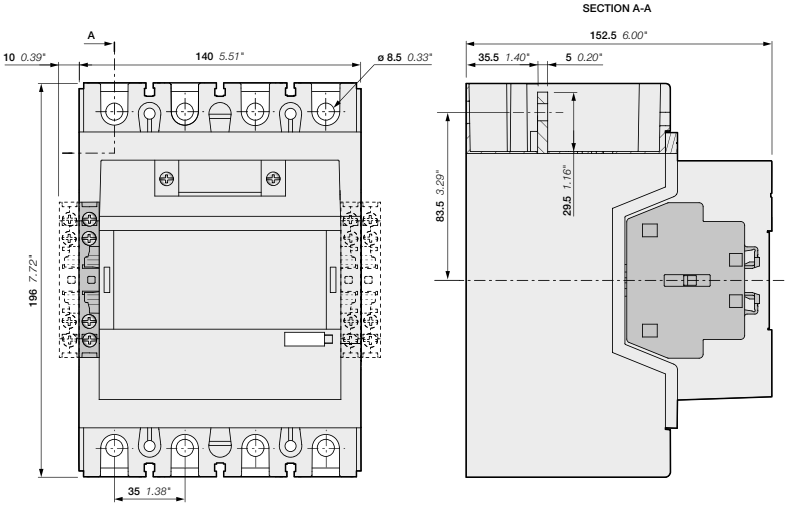


AF116, AF140
+ VM19 mechanical interlocking unit

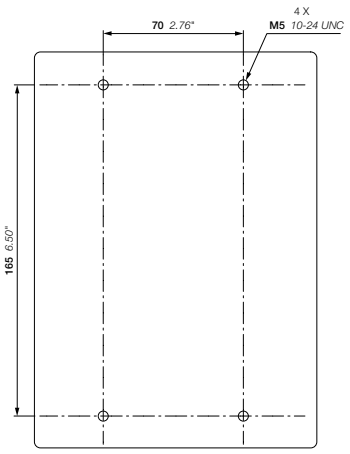
1SFC101228C0201 - Rev. A

AF190, AF205 4-pole contactors

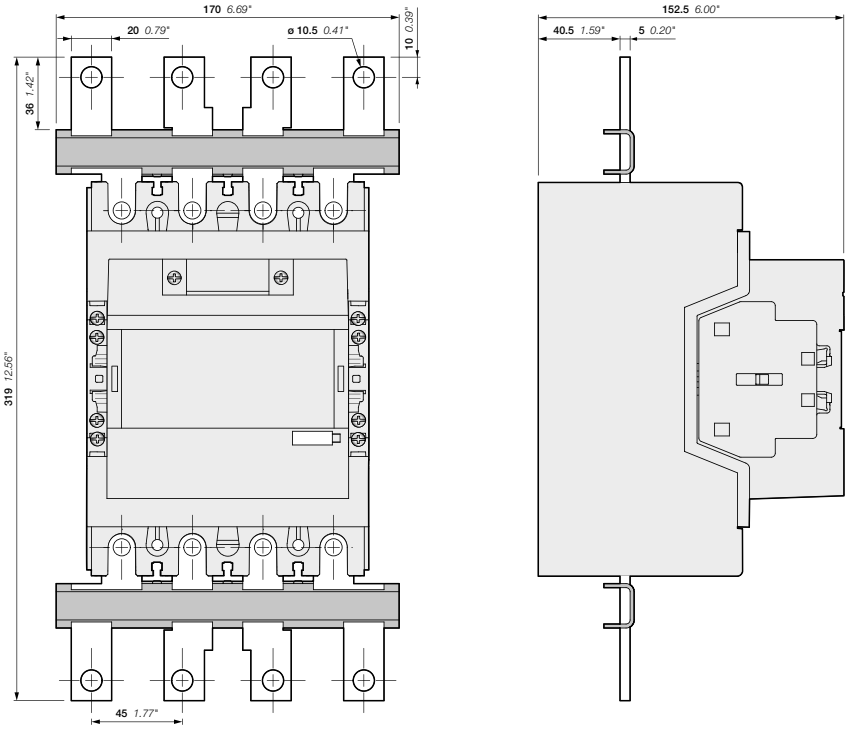
Main dimensions mm, *inches*



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



AF190, AF205-40

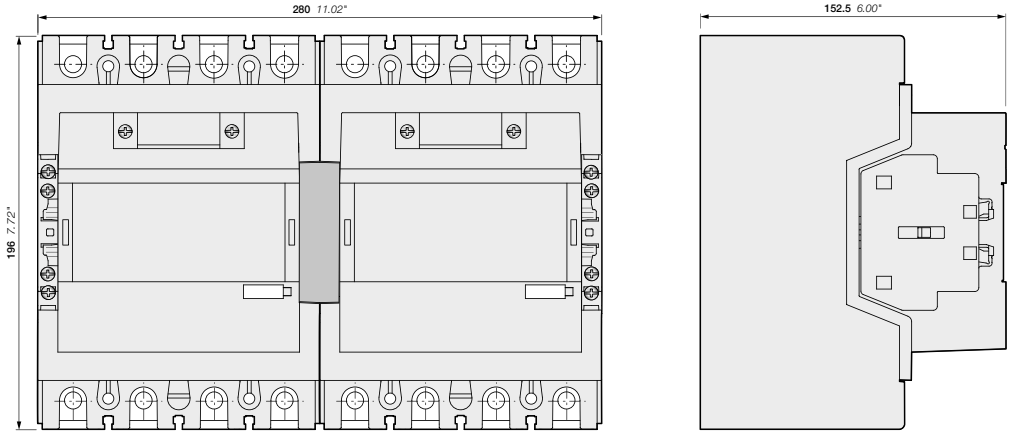


AF190, AF205-40-11
+ LW205-40 terminal enlargement

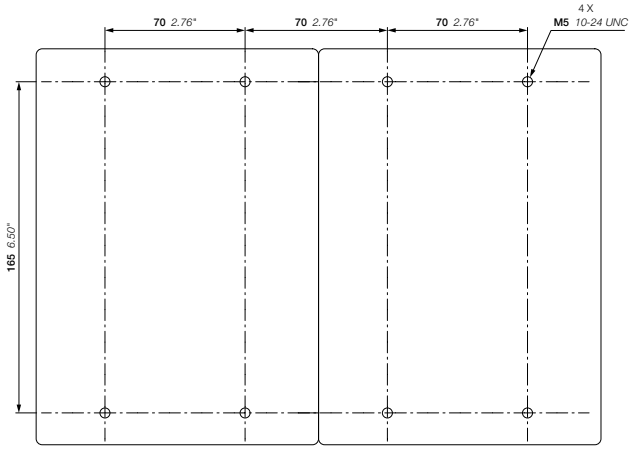
1SFC101229C0201 - Rev. A

AF190, AF205 4-pole contactors

Main dimensions mm, *inches*



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

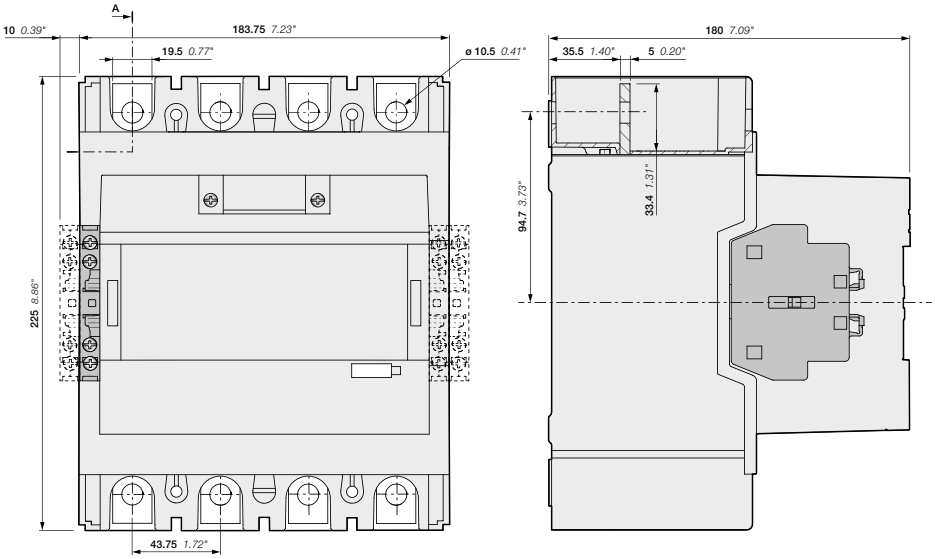


AF190, AF205
+ VM19 mechanical interlocking unit

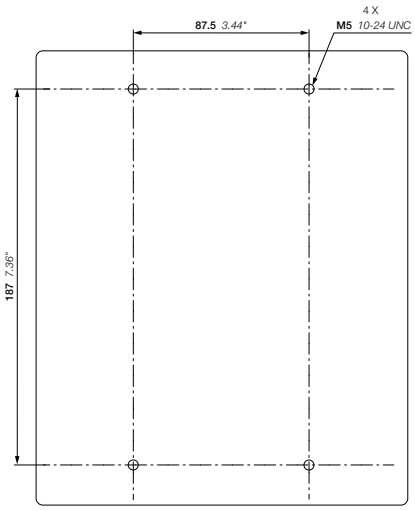
5

AF265, AF305, AF370 4-pole contactors

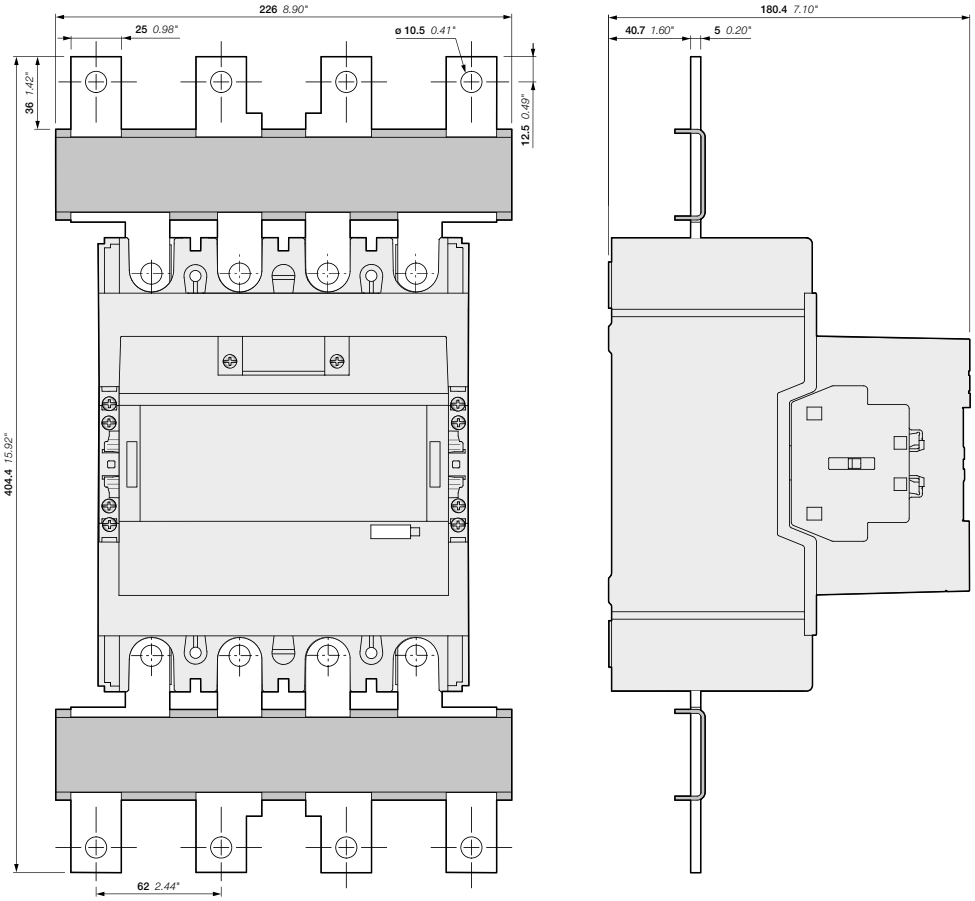
Main dimensions mm, *inches*



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



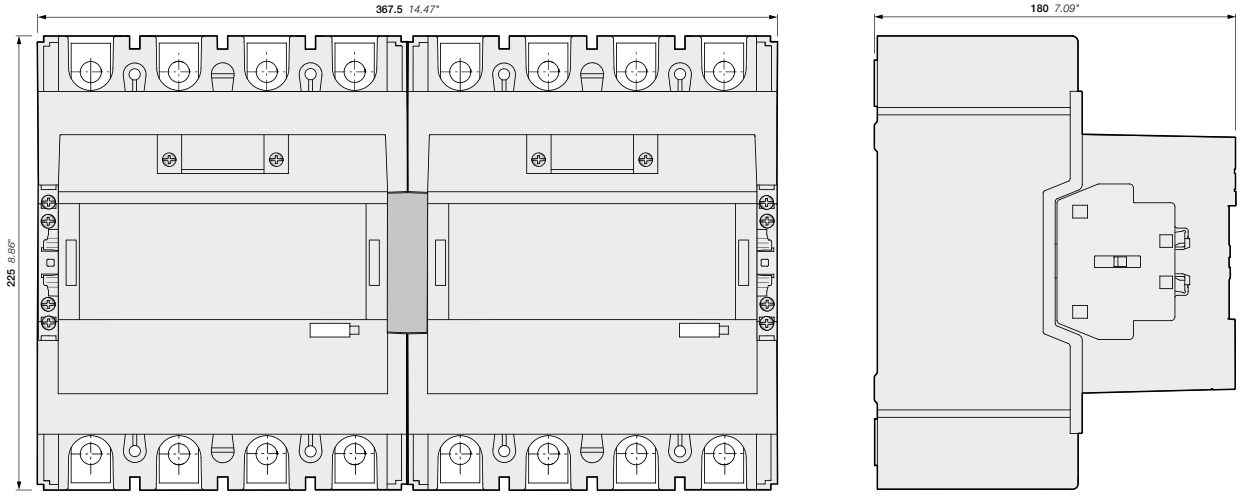
AF265, AF305, AF370



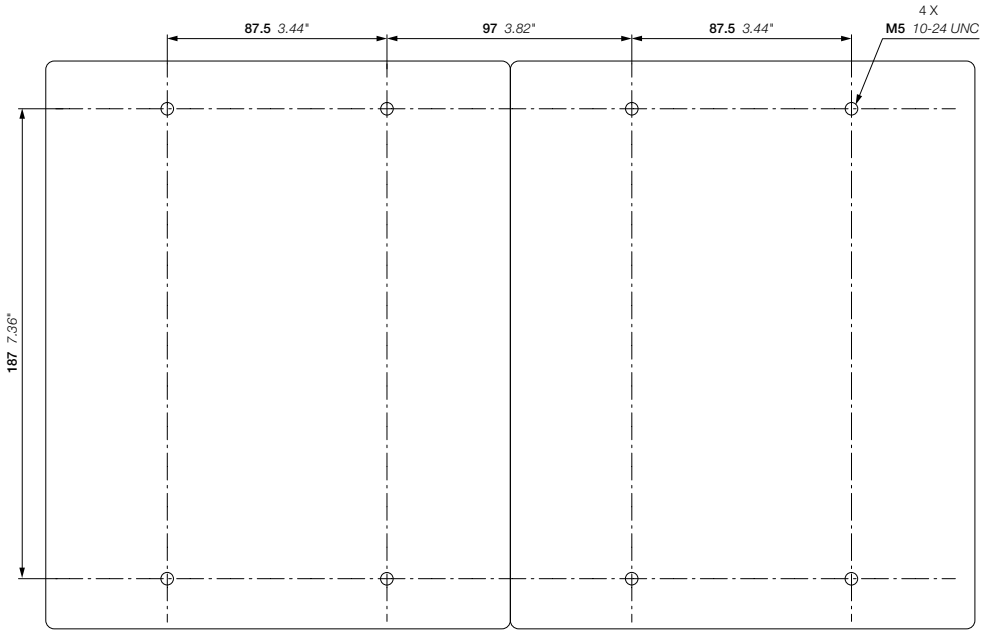
AF265, AF305, AF370-40-11
+ LW370-40 terminal enlargement

1SFC101230C0201 - Rev. A

Main dimensions mm, *inches*



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

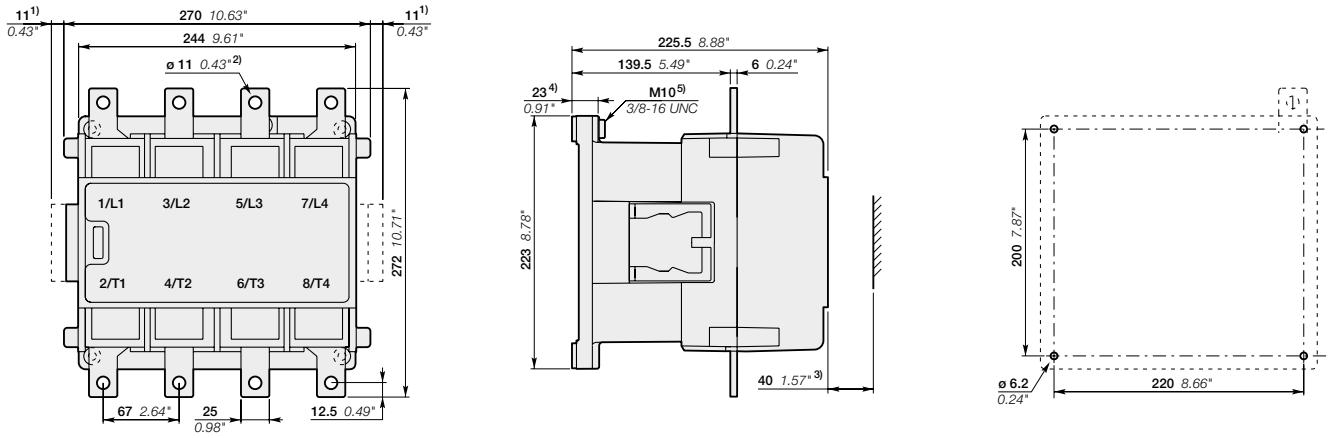


AF265, AF305, AF370
+ VM19 mechanical interlocking unit

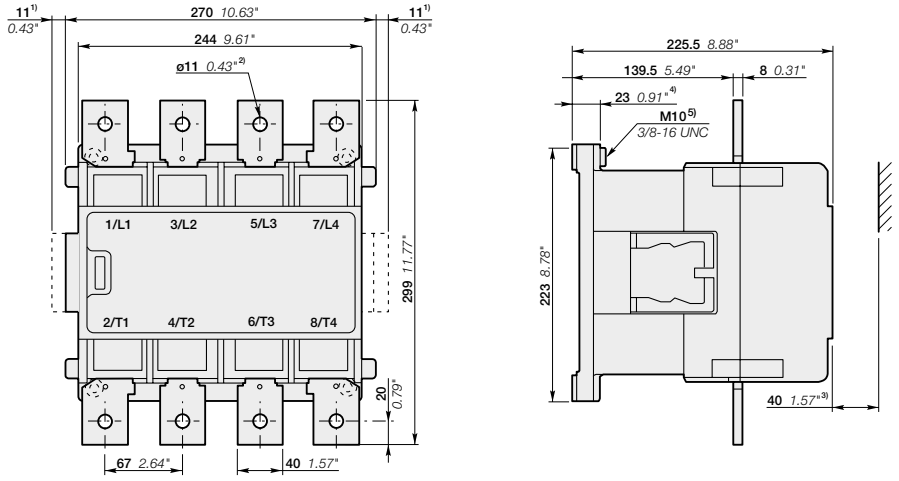
1SFC101230C0201 - Rev. A

EK550, EK1000 4-pole contactors
AC operated

Main dimensions mm, *inches*

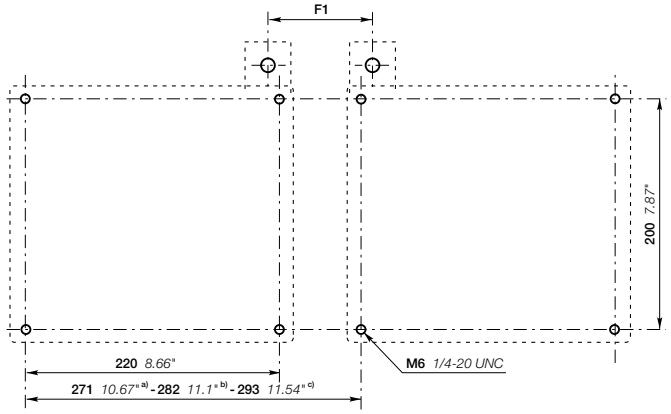


EK550



EK1000

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



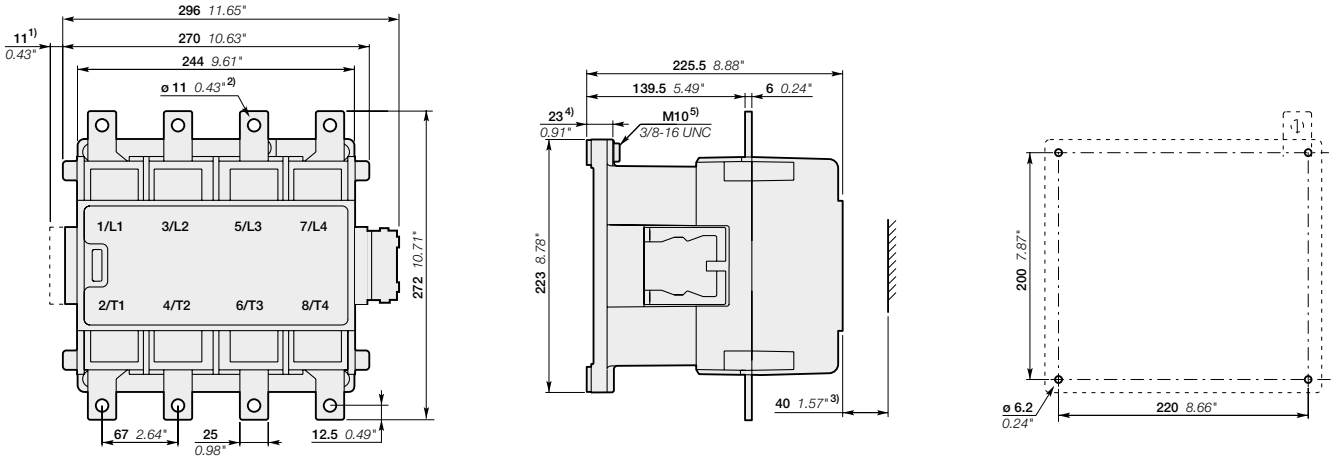
EK1000

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

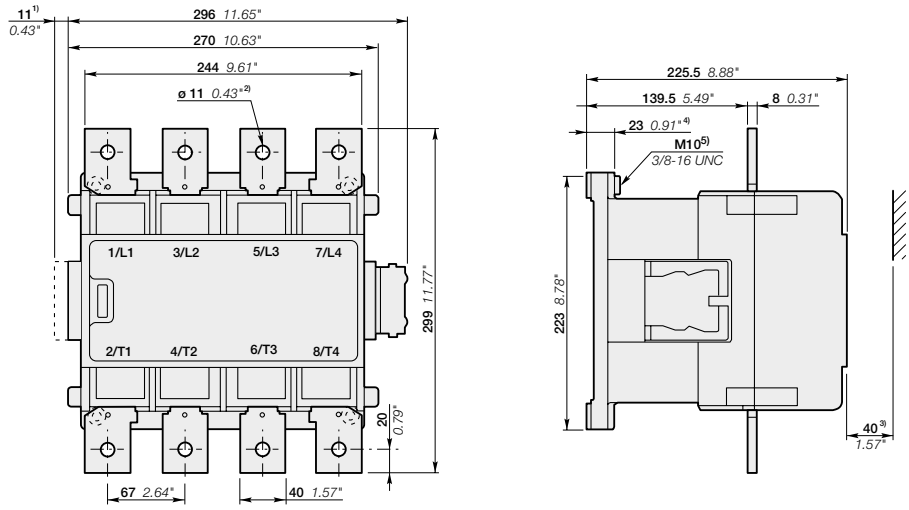
1SBC101651S0201 - Rev. A

EK550, EK1000 4-pole contactors
DC operated

Main dimensions mm, *inches*

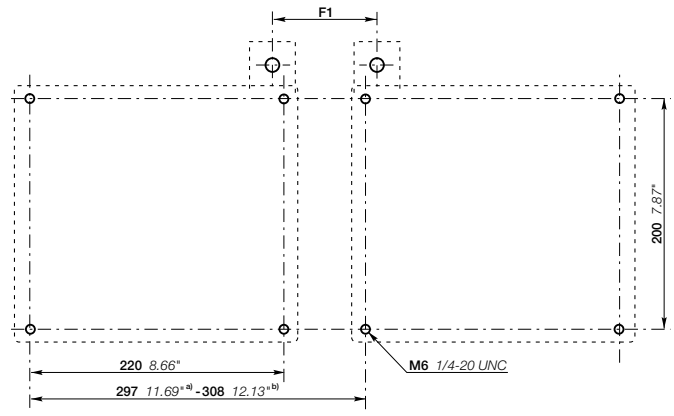


EK550



EK1000

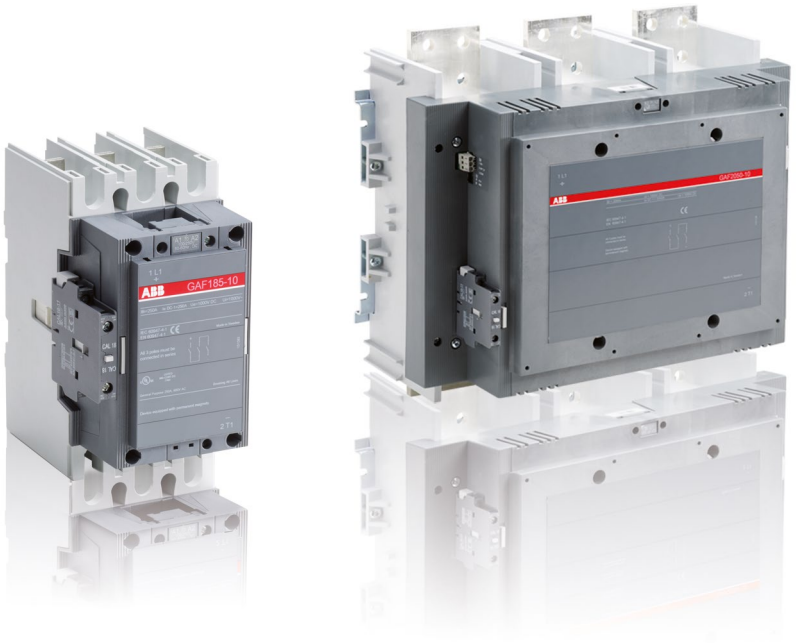
1) Dimension for extra auxiliary contact block
2) Screw, nut and washer by-packed
3) Min. distance to uninsulated wall
4) Damping elements are included
5) Earthing screw



EK1000

a) Min. dim.
b) Includes space for two auxiliary contact blocks and the dc-unit between the contactors

1SBC101653S0201 - Rev. A


GAF185-10

Contactors for DC switching

General description 5/254

Selection table for DC switching

AF09 ... AF96 contactors **5**/256

AF116 ... AF2050 contactors **5**/257

EK550 ... EK1000 contactors **5**/258

Ordering details

100 A DC-1

GA75 AC operated **5**/260

GAE75 DC operated **5**/261

250 to 400 A DC-1

GAF185 ... GAF300 AC / DC operated **5**/262

600 to 875 A DC-1

GAF460 ... GAF750 AC / DC operated **5**/263

1040 to 1750 A DC-1

GAF1250 ... GAF2050 AC / DC operated **5**/264

Technical data 5/265

Terminal marking and positionning 5/272

Main dimensions 5/273

Voltage code table 5/417

Contactors for DC switching applications
DC-1, DC-3, DC-5 applications according to IEC 60947-4-1

The circuit switching on DC is more difficult than on AC, as alternating current go to zero according to the frequency of the supply source while DC current has a continuous value.
The main parameters to be considered for selecting a contactor are the current, the voltage and the L/R time constant of the controlled load.

Time constant and utilization categories

In DC applications, the nature of load to switch (resistor, inductance or a combination) is characterized by the ratio of the inductance to the resistance (L (inductance of operated circuit) / R (resistance of operated circuit) = mH/Ω = ms)
This ratio L/R is called the time constant of the circuit.

DC current utilization categories are defined according to IEC 60947-4-1:
- DC-1 non inductive or slightly inductive loads, resistance furnaces (L/R ≤ 1 ms)
- DC-3 shunt motors: starting, plugging, inching, dynamic breaking of DC motors (L/R ≤ 2 ms)
- DC-5 series motors: starting, plugging, inching, dynamic breaking of DC motors (L/R ≤ 7.5 ms).

The higher the time constant value is, the more difficult it is to break the arc.
The addition of a resistor in parallel with an inductive winding helps in the elimination of the arcs, by reducing the time constant.

Operational voltage

- The higher the operational voltage value is, the more difficult it is to break the arc.
- The use of main poles connected in series will allow to increase the value of switched voltage.
  However, the maximum switched voltage must be within the max operational voltage of the contactor.
  All the poles required for breaking must be connected in series between the load and the source polarity not linked to earth (or chassis) (see recommended connection diagrams).

ABB offer a large choice of possibilities for DC switching applications (see selection tables):

- Standard 3-pole or 4-pole contactors with either 1- pole breaking or breaking with poles connected in series.
- Special contactors designed for DC breaking with permanent magnets fitted on the main poles for use with the 3 poles connected in series and considered as 1-pole devices:
  - GA75 and GAE75 contactors: the 3 poles are connected in series via two supplied and fitted insulated connections (25 mm²)
  - GAF145 … GAF2050 contactors: the 3 poles must be connected in series by the user according to conductor cross-sectional area (refer to main pole technical data) or by using LP connection bars to be ordered separately.

Selection tables

The enclosed selection tables will guide your choice through all contactor variants according to utilization category, for operational voltage up to 1000 V DC-1 and operational current up to 2050 A in ambient temperatures from -25 °C up to 40 °C.
For higher values of current or voltage or heavy DC switching applications see bar mounted R contactors.

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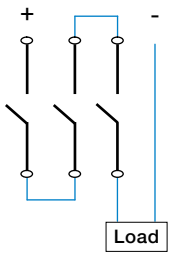
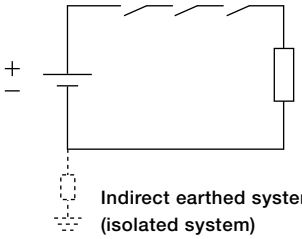
Connection diagrams

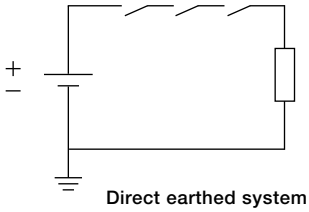
Recommended connection

In the example below, the 3 poles are connected in series without the load in between.
This connection is recommended in systems according to the following configurations.

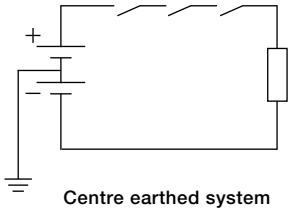




Indirect earthed system
(isolated system)



Direct earthed system

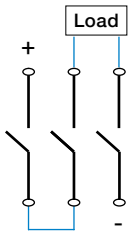


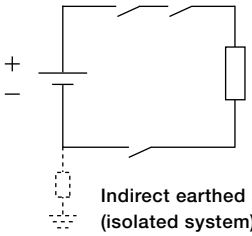
Centre earthed system

5

Alternative connection (not possible for GA75, GAE75)

The load could be placed in between the contacts in a indirect earthed system. If not connected according to the configuration below, a fault to earth could result in one or two contacts breaking the full load which the contactor is not approved for.





Indirect earthed system
(isolated system)

Points to consider

The above relates to power circuit switching. The SCPD (Short Circuit Protection Device) must comply with applicable protection rules.

Polarity:

For all GA, GAE, GAF types, connection polarities must be respected.
(See instruction leaflet and see markings on the main terminals or the contactor front)

1SBC101980S0201

AF09 ... AF96 contactors
DC circuit switching

General

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

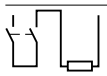
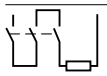
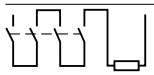
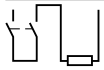
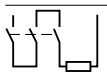
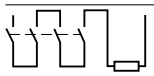
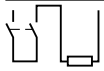
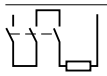
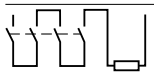
– For selecting a contactor it is essential to determine the current, the voltage and the L/R time constant of the controlled load
– For information, typical time constant values are quoted hereafter: non inductive loads such as resistance furnaces (L/R ≈ 1 ms), inductive loads such as shunt motors (L/R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

Technical data

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

5

Selection table

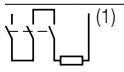
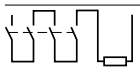
Contactor types		AF09	AF12	AF16	AF26		AF30	AF38		AF40	AF52	AF65	AF80	AF96
		3 or 4-pole			3-pole	4-pole	3-pole	3-pole	4-pole	3-pole	3-pole	3-pole	3-pole	3-pole
Utilization category DC-1, L/R ≤ 1 ms														
	≤ 72 V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A	70 A	100 A	105 A	125 A	130 A
	110 V	10 A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

For additional ratings ≥ 440 V, please consult us.

1SBC101911S0201

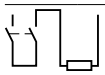
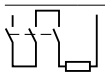
AF116 ... AF2050 contactors
DC circuit switching

Selection table

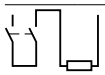
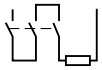
Contactor types		AF116	AF140	AF146	AF190	AF205	AF265	AF305	AF370	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050
		3 or 4-pole		3-pole	3 or 4-pole					3-pole							
Utilization category DC-1, L/R ≤ 1 ms																	
	≤ 72 V	160	200	200	250	350	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A
	90 V	160	200	200	250	350	400	500	520	-	-	-	-	-	-	-	-
	100 V	-	-	-	250	350	400	500	520	-	-	-	-	-	-	-	-
	110 V	-	-	-	-	-	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A
	≤ 72 V	160	200	200	250	350	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A
	110 V	160	200	200	250	350	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A
	175 V	160	200	200	250	350	400	500	520	600 A	700 A	800 A	1050 A	-	-	-	-
	200 V	-	-	-	250	350	400	500	520	600 A	700 A	800 A	1050 A	-	-	-	-
	220 V	-	-	-	-	-	400	500	520	600 A	700 A	800 A	1050 A	-	-	-	-
 (1)	≤ 72 V	160	200	200	250	350	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A
	110 V	160	200	200	250	350	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A
	220 V	160	200	200	250	350	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A
	260 V	160	200	200	250	350	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A
	300 V	-	-	-	250	350	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A
	340 V	-	-	-	-	-	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A
	440 V	-	-	-	-	-	-	-	-	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A
	600 V	-	-	-	-	-	-	-	-	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A
	850 V	-	-	-	-	-	-	-	-	-	-	800 A	1050 A	1250 A	1350 A	1650 A	2050 A
	< 350 V	200	200	-	250	350	400	500	520	-	-	-	-	-	-	-	-
	400 V	-	-	-	250	350	400	500	520	-	-	-	-	-	-	-	-
	440 V	-	-	-	-	-	400	500	520	-	-	-	-	-	-	-	-

(1) AF2650 at 780 V DC = 2650 A

Utilization category DC-3, L/R ≤ 2 ms

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

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

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

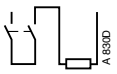
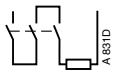
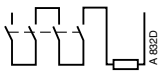
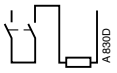
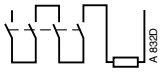
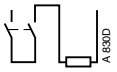
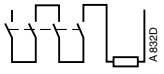
For additional ratings ≥ 440 V, please consult us.

1SBC101944S0201 - Rev. A

EK550, EK1000 contactors
DC circuit switching

5

Selection table

Contactor types			EK550	EK1000
Utilization category DC-1, L/R ≤ 1 ms				
	≤ 72 V	**A**	550	–
	110 V	**A**	550	–
	≤ 72 V	**A**	800	–
	110 V	**A**	800	–
	220 V	**A**	800	–
	≤ 72 V	**A**	800	–
	110 V	**A**	800	–
	220 V	**A**	800	–
	440 V	**A**	650	–
	600 V	**A**	650	–
	≤ 72 V	**A**	800	–
	110 V	**A**	800	–
	220 V	**A**	800	–
	440 V	**A**	650	–
	600 V	**A**	650	–
Utilization category DC-3, L/R ≤ 2 ms				
	≤ 72 V	**A**	550	–
	≤ 72 V	**A**	650	–
	110 V	**A**	650	–
	220 V	**A**	650	–
	≤ 72 V	**A**	650	–
	110 V	**A**	650	–
	220 V	**A**	650	–
	440 V	**A**	650	–
	600 V	**A**	650	–
	≤ 72 V	**A**	650	–
	110 V	**A**	650	–
	220 V	**A**	650	–
	440 V	**A**	650	–
	600 V	**A**	650	–
Utilization category DC-5, L/R ≤ 7.5 ms				
	≤ 72 V	**A**	650	–
	110 V	**A**	650	–
	220 V	**A**	650	–
	≤ 72 V	**A**	650	–
	110 V	**A**	650	–
	220 V	**A**	650	–
	440 V	**A**	650	–
	600 V	**A**	650	–
	≤ 72 V	**A**	650	–
	110 V	**A**	650	–
	220 V	**A**	650	–
	440 V	**A**	650	–
	600 V	**A**	650	–

1SBC101986S0201

Notes

GA75 1-pole contactors
100 A DC-1
AC operated

GA75-10-11

Description

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

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

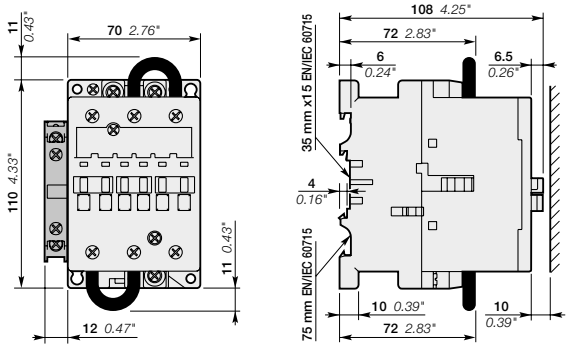
– main poles arc chutes fitted with permanent magnets specially designed for DC breaking. The connection polarities must be respected.
– control circuit: AC operated
– add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

IEC	UL / CSA	Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational current θ ≤ 55 °C 440 V DC-1	General use rating 440 V DC								Pkg (1 pce)
A	A	V 50 Hz	V 60 Hz						kg
100	100	24	24	0	0	GA75-10-00	1SBL411025R8100		1.220
				1	1	GA75-10-11	1SBL411025R8111		1.260
		48	48	0	0	GA75-10-00	1SBL411025R8300		1.220
				1	1	GA75-10-11	1SBL411025R8311		1.260
		110	110...120	0	0	GA75-10-00	1SBL411025R8400		1.220
				1	1	GA75-10-11	1SBL411025R8411		1.260
		220...230	230...240	0	0	GA75-10-00	1SBL411025R8000		1.220
				1	1	GA75-10-11	1SBL411025R8011		1.260
		230...240	240...260	0	0	GA75-10-00	1SBL411025R8800		1.220
				1	1	GA75-10-11	1SBL411025R8811		1.260
		380...400	400...415	0	0	GA75-10-00	1SBL411025R8500		1.220
				1	1	GA75-10-11	1SBL411025R8511		1.260
		400...415	415...440	0	0	GA75-10-00	1SBL411025R8600		1.220
				1	1	GA75-10-11	1SBL411025R8611		1.260

(1) Other control voltages see voltage codes table.

Main dimensions mm, *inches*



GA75-10-11

1SBC101423S0201

GAE75 1-pole contactors
100 A DC-1
DC operated

GAE75-10-11

Description

GAE75 contactors are designed for controlling shunt or series motors and resistive or slightly inductive loads up to 1000 V DC.

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

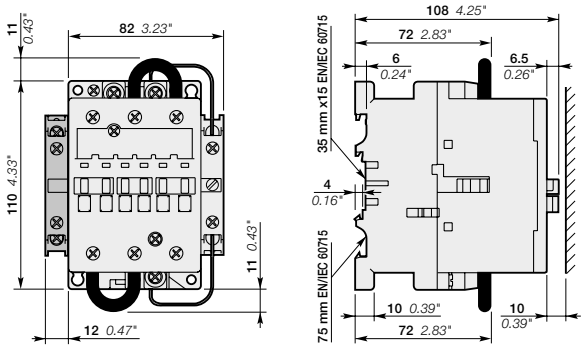
– main poles arc chutes fitted with permanent magnets specially designed for DC breaking. The connection polarities must be respected.
– control circuit: DC operated with double winding coil (and factory mounted lagging contact for "holding" winding insertion)
– add-on auxiliary contact blocks for side mounting and a wide range of accessories

Ordering details

IEC	UL/CSA	Rated control circuit voltage Uc (1)	Auxiliary contacts fitted		Type	Order code		Weight Pkg (1 pce)
Rated operational current θ ≤ 55 °C 440 V DC-1	General use rating 440 V DC							
A	A	V DC						kg
100	100	12	0	0	GAE75-10-00	1SBL419025R8000		1.260
			1	1	GAE75-10-11	1SBL419025R8011		1.300
		24	0	0	GAE75-10-00	1SBL419025R8100		1.260
			1	1	GAE75-10-11	1SBL419025R8111		1.300
		48	0	0	GAE75-10-00	1SBL419025R8300		1.260
			1	1	GAE75-10-11	1SBL419025R8311		1.300
		110	0	0	GAE75-10-00	1SBL419025R8600		1.260
			1	1	GAE75-10-11	1SBL419025R8611		1.300
		125	0	0	GAE75-10-00	1SBL419025R8700		1.260
			1	1	GAE75-10-11	1SBL419025R8711		1.300
		220	0	0	GAE75-10-00	1SBL419025R8800		1.260
			1	1	GAE75-10-11	1SBL419025R8811		1.300
		240	0	0	GAE75-10-00	1SBL419025R8900		1.260
			1	1	GAE75-10-11	1SBL419025R8911		1.300

(1) Other control voltages see voltage codes table.

Main dimensions mm, *inches*



GAE75-10-11

GAF185 ... GAF300 3-pole contactors
250 to 400 A DC-1
AC / DC operated with 1 N.O. + 1 N.C. auxiliary contact

GAF185-10-11

GAF300-10-11

5

Description

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

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

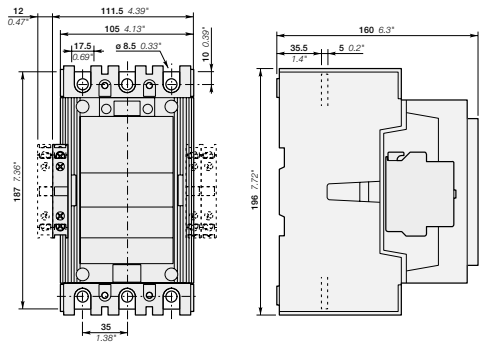
– main poles arc chutes fitted with permanent magnets specially designed for DC breaking. The connection polarities must be respected.
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 3 coils to cover control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

Ordering details

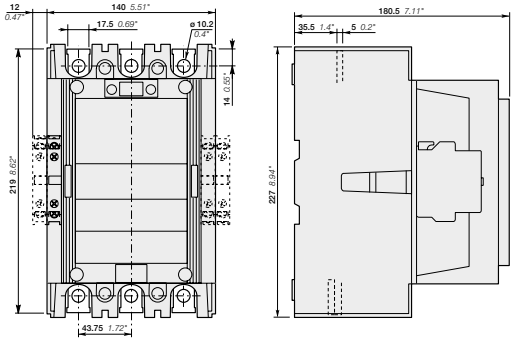
IEC	UL / CSA	Rated control circuit voltage Uc		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational current θ ≤ 55 °C 1000 V DC-1	General use rating θ ≤ 40 °C 1000 V DC								Pkg (1 pce)
A	A	V 50/60 Hz	V DC						kg
250	250	-	20...60	1	1	GAF185-10-11 (1)	1SFL497025R7211		3.600
		48...130	48...130	1	1	GAF185-10-11	1SFL497025R6911		3.600
		100...250	100...250	1	1	GAF185-10-11	1SFL497025R7011		3.600
400	400	-	20...60	1	1	GAF300-10-11 (1)	1SFL557025R7211		6.200
		48...130	48...130	1	1	GAF300-10-11	1SFL557025R6911		6.200
		100...250	100...250	1	1	GAF300-10-11	1SFL557025R7011		6.200

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

Main dimensions mm, *inches*



GAF185



GAF300

1SFC101023C0201 - Rev. A

GAF460 ... GAF750 3-pole contactors
600 to 875 A DC-1
AC / DC operated with 1 N.O. + 1 N.C. auxiliary contact

GAF460-10-11

GAF750-10-11

Description

GAF460 ... GAF750 contactors are designed for controlling resistive or slightly inductive loads up to 1000 V DC.

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

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

5

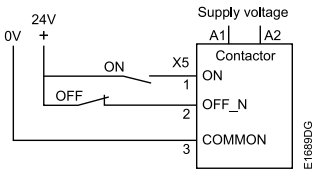
Ordering details

IEC	UL / CSA	Rated control circuit voltage Uc		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational current θ ≤ 55 °C 1000 V DC-1	General use rating θ ≤ 40 °C 1000 V DC								Pkg (1 pce)
A	A	V 50/60 Hz	V DC						kg
600	650	-	24...60	1	1	GAF460-10-11 (1)	1SFL597025R6811		12.000
		48...130	48...130	1	1	GAF460-10-11	1SFL597025R6911		12.000
		100...250	100...250	1	1	GAF460-10-11	1SFL597025R7011		12.000
		250...500	250...500	1	1	GAF460-10-11	1SFL597025R7111		12.000
875	900	-	24...60	1	1	GAF750-10-11 (1)	1SFL637025R6811		15.000
		48...130	48...130	1	1	GAF750-10-11	1SFL637025R6911		15.000
		100...250	100...250	1	1	GAF750-10-11	1SFL637025R7011		15.000
		250...500	250...500	1	1	GAF750-10-11	1SFL637025R7111		15.000

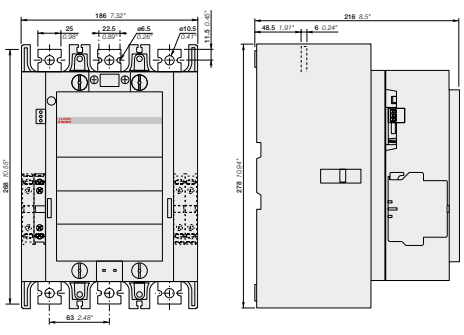
(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.

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

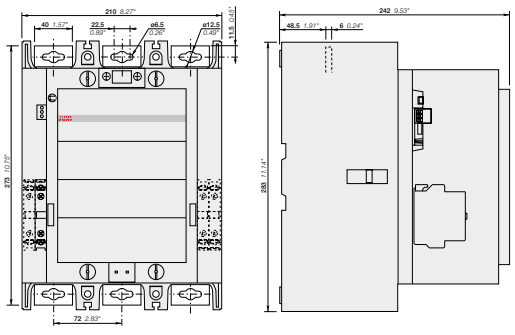
Control inputs



Main dimensions mm, *inches*



GAF460

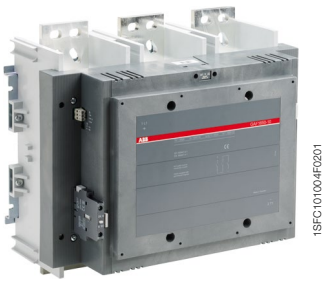


GAF750

1SFC101024C0201 - Rev. A

GAF1250 ... GAF2050 3-pole contactors
1040 to 1750 A DC-1
AC / DC operated with 1 N.O. + 1 N.C. auxiliary contact

GAF1250-10-11



GAF1650-10-11

5

Description

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

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

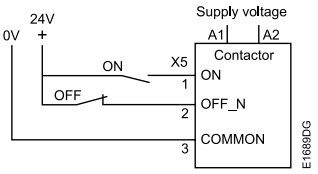
– main poles arc chutes fitted with permanent magnets specially designed for DC breaking. The connection polarities must be respected.
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control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

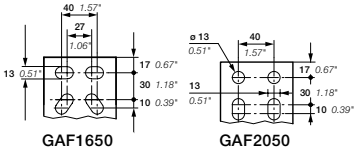
Ordering details

IEC Rated operational current θ ≤ 55 °C 1000 V DC-1	UL / CSA General use rating θ ≤ 40 °C 1000 V	Rated control circuit voltage Uc		Auxiliary contacts fitted		Type	Order code		Weight Pkg (1 pce)
A	A	V 50/60 Hz	V DC						kg
1040	1210	-	24...60	1	1	GAF1250-10-11	1SFL647025R6811		16.000
		48...130	48...130	1	1	GAF1250-10-11	1SFL647025R6911		16.000
		100...250	100...250	1	1	GAF1250-10-11	1SFL647025R7011		16.000
		250...500	250...500	1	1	GAF1250-10-11	1SFL647025R7111		16.000
1450	1650	100...250	100...250	1	1	GAF1650-10-11	1SFL677025R7011		35.000
1750	2050	100...250	100...250	1	1	GAF2050-10-11	1SFL707025R7011		35.000

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

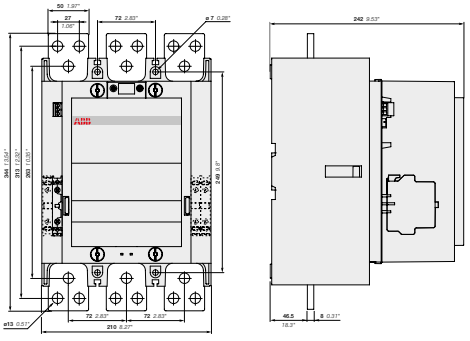
Control inputs



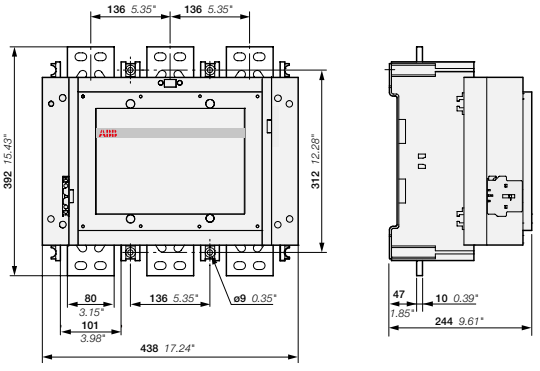


GAF1650 GAF2050

Main dimensions mm, *inches*



GAF1250



GAF1650, GAF2050

1SFC101025C0201 - Rev. B

GA75 ... GAF2050 contactors
Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC operated	GA75							
	DC operated	GAE75							
	AC / DC operated		GAF185	GAF300	GAF460	GAF750	GAF1250	GAF1650	GAF2050
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1							
Rated operational voltage Ue max.		1000 V DC							
DC-1 Utilization category, L/R ≤ 1 ms									
For air temperature close to contactor									
Ie / Rated operational current DC-1									
θ ≤ 40 °C	**220 V**	120 A	-						
	440 V	100 A	-						
	600 V	75 A	-						
	1000 V	35 A	275 A	500 A	700 A	1050 A	1250 A	1650 A	2050 A
θ ≤ 55 °C	**220 V**	100 A	-						
	440 V	100 A	-						
	600 V	75 A	-						
	1000 V	35 A	250 A	400 A	600 A	875 A	1040 A	1450 A	1750 A
θ ≤ 70 °C	**220 V**	85 A	-						
	440 V	85 A	-						
	600 V	75 A	-						
	1000 V	35 A	180 A	325 A	480 A	720 A	875 A	1270 A	1500 A
With conductor cross-sectional area (3)		(1)	150 mm²	300 mm² (2)	2x 240 mm²	2x 50x8 mm²	2x 100x5 mm²	3x 100x5 mm²	4x 100x5 mm²
DC-3 Utilization category, L/R ≤ 2 ms									
Ie / Rated operational current DC-3									
θ ≤ 55 °C	**220 V**	100 A	-						
	440 V	85 A	-						
DC-5 Utilization category, L/R ≤ 7.5 ms									
Ie / Rated operational current DC-5									
θ ≤ 55 °C	**220 V**	85 A	-						
	440 V	35 A	-						
Maximum electrical switching frequency		300 cycles/h							

(1) Refer to IEC 60947-1, table 9.
(2) For currents up to 370 A, use 2 x LP300 kits.For higher currents, use 300 mm² conductors of minimum length 500 mm together with terminal extension/enlargement (LX300/LW300).
(3) To minimize terminal temperature for GAF185 ... GAF2050, length of connection should be at least 0.5 m per pole.

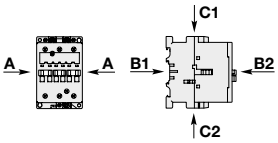
Main pole - Utilization characteristics according to UL / CSA

Contactor types	AC operated	GA75							
	DC operated	GAE75							
	AC / DC operated		GAF185	GAF300	GAF460	GAF750	GAF1250	GAF1650	GAF2050
Standards		UL 508, CSA C22.2 N°14		UL 60947-4-1, CSA C22.2 N°60947.4-1					
Maximum operational voltage		1000 V DC							
UL / CSA DC general use rating									
θ ≤ 40 °C	**440 V**	100 A	-						
	600 V	75 A	250 A	400 A					
	1000 V	35 A	250 A	400 A	650 A	900 A	1210 A	1650 A	2050 A
Maximum electrical switching frequency		300 cycles/h							

1SBC101982S0201 - Rev. B

GA75 and GAE75 contactors
Technical data

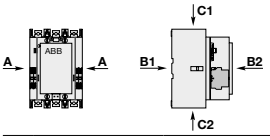
General technical data

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

1SBC101983S0201

GAF185 ... GAF2050 contactors
Technical data

General technical data

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

1SFC101178C0201

GA75 and GAE75 contactors
Technical data

Magnet system characteristics

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

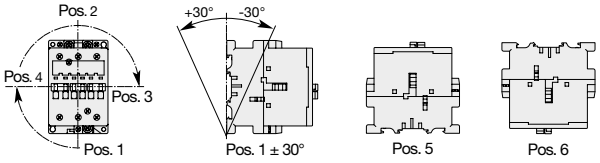
(1) 50/60 Hz coils: see "Voltage code table".

Magnet system characteristics

Contactor types		**DC operated**	**GAE75**
Coil operating limits		**AC supply**	At θ ≤ 55 °C 0.85...1.1 x Uc
acc. to IEC 60947-4-1			Please also refer to "Mounting characteristics and conditions for use"
DC control voltage			
Rated control circuit voltage Uc			12…250 V DC
Coil consumption		**Average pull-in value**	200 W
		Average holding value	4 W
Drop-out voltage			Approx. 15...40 % of Uc
Coil time constant			
Open		**L/R**	3 ms
Closed		**L/R**	15 ms
Operating time			
Between coil energization and:		**N.O. contact closing**	13…30 ms
		N.C. contact opening	10…27 ms
Between coil de-energization and:		**N.O. contact opening** (1)	5…15 ms
		N.C. contact closing (1)	8…18 ms

(1) The use of surge suppressors increases the opening time with a factor of 1.1 to 1.5 for a RV5 surge suppressor and a factor of 1.5 to 3 for RT5 surge suppressor.

Mounting characteristics and conditions for use

Contactor types		**AC operated**	**GA75**
		DC operated	**GAE75**
Mounting positions			
Control voltage / Ambient temperature			
Mounting positions	1, 1±30°, 2, 3, 4, 5	**at θ ≤ 55 °C**	0.85…1.1 x Uc
		at θ ≤ 70 °C	Uc
	6	**at θ ≤ 55 °C**	0.95…1.1 x Uc
		at θ ≤ 70 °C	Unauthorized
Mounting distances			The contactors can be assembled side by side
Fixing			
On rail according to IEC 60715, EN 60715			35 x 15 mm or 75 x 25 mm
By screws (not supplied)			2 x M6 screws placed diagonally

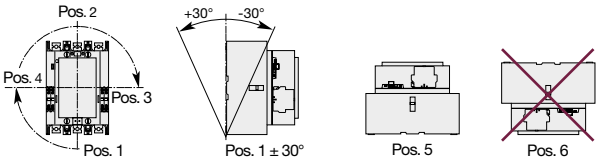
1SBC101981S0201

GAF185 ... GAF2050 contactors
Technical data

Magnet system characteristics

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

Mounting characteristics and conditions for use

Contactor types	AC / DC operated	GAF185	GAF300	GAF460	GAF750	GAF1250	GAF1650	GAF2050
Mounting positions								
Control voltage / Ambient temperature								
Mounting positions	1, 1±30°, 2, 3, 4, 5 **at θ ≤ 70 °C**	0.85 x Uc min...1.1 x Uc max.						
	6	Unauthorized						
Mounting distances		The contactors can be assembled side by side						
Fixing								
On rail according to IEC 60715, EN 60715		–						
By screws (not supplied)		4 x M5			4 x M6		4 x M8	

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GA75 and GAE75 contactors
Technical data

Connecting characteristics

Contactor types			**AC operated**	**GA75**
			DC operated	**GAE75**
Main terminals				Screw terminals with single connector (13 x 10 mm)
Connection capacity (min. ... max.)				
Main conductors (poles)				
Rigid	Solid (≤ 4 mm²)		**1 x**	6...50 mm²
	Stranded (≥ 6 mm²)		**2 x**	6...25 mm²
Flexible with ferrule			**1 x**	6...35 mm²
			2 x	6...16 mm²
Bars or lugs			**L ≤**	–
			I >	–
Connection capacity acc. to UL/CSA			**1 or 2 x**	AWG 8...1
Tightening torque	Recommended			4.00 Nm / 35 lb.in
	Max.			4.50 Nm
Auxiliary conductors (coil terminals)				
Rigid solid			**1 x**	1...4 mm²
			2 x	1...4 mm²
Flexible with ferrule			**1 x**	1...2.5 mm²
			2 x	0.75...2.5 mm²
Lugs			**L ≤**	8 mm
			I >	3.7 mm
Connection capacity acc. to UL / CSA			**1 or 2 x**	AWG 18...14
Tightening torque				
Coil terminals	Recommended			1.00 Nm / 9 lb.in
	Max.			1.20 Nm
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529				
Main terminals				IP10
Coil terminals				IP20
Screw terminals				Delivered in open position, screws of unused terminals must be tightened
Main terminals				M6
			Screwdriver type	Flat Ø 6.5 / Pozidriv 2
Coil terminals				M3.5
			Screwdriver type	Flat Ø 5.5 / Pozidriv 2

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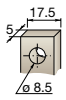
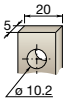
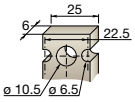
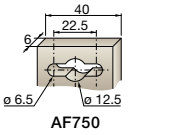
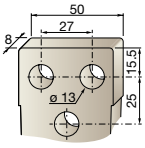
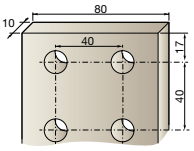
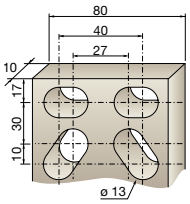
GAF185 ... GAF2050 contactors
Technical data

Connecting characteristics

Contactor types	AC / DC operated	GAF185	GAF300	GAF460	GAF750	GAF1250	GAF1650	GAF2050
Main terminals Flat type					 AF750  AF1250		 AF2050  AF1650	
Connection capacity (min. ... max.)								
Main conductors (poles)								
Rigid with connector	Single for Cu cable	6…185 mm²	16…240 mm²	240 mm²	300 mm²		–	
	Single for Al/Cu cable	25…150 mm²	120…240 mm²	240 mm²	300 mm²		–	
	Double for Al/Cu cable	–	2 x 95…120 mm²	2 x 240 mm²	3 x 185 mm²		–	
Bars or lugs	L ≤	24 mm	32 mm	47 mm	52 mm		100 mm	
	Ø >	8 mm	10 mm	10 mm	12 mm		12 mm	
Connection capacity acc. to UL/CSA	1 or 2 x	6 - 250 MCM	4 - 500 MCM	2//250 - 500 MCM	3// 2/0 - 500 MCM		1/0 - 750 MCM	
Tightening torque	Recommended	18 Nm / 160 lb.in	28 Nm / 247 lb.in	35 Nm / 310 lb.in	45 Nm / 398 lb.in		45 Nm / 398 lb.in	
	Max.	20 Nm	30 Nm	40 Nm	49 Nm		49 Nm	
Auxiliary conductors (coil terminals)								
Rigid solid	1 x	1…4 mm²						
	2 x	1…4 mm²						
Flexible with ferrule	1 x	0.75…2.5 mm²						
	2 x	0.75…2.5 mm²						
Lugs	L ≤	8 mm						
	I >	3.7 mm						
Connection capacity acc. to UL/CSA	1 or 2 x	AWG 18…14						
Tightening torque	Recommended	1.00 Nm / 9 lb.in						
	Max.	1.20 Nm						
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529								
Main terminals		IP00						
Coil terminals		IP20						
Screw terminals								
Main terminals		M8	M10	M10	M12			
		Screws and bolts						
Coil terminals (delivered in open position)		M3.5						
	Screwdriver type	Flat Ø 5.5 mm / Pozidriv 2						

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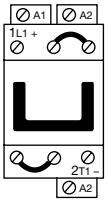
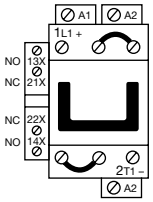
GA75 ... GAF2050 contactors
Terminal marking and positioning

GA75 contactors - AC operated
Standard devices without addition of auxiliary contacts



GA75-10-00



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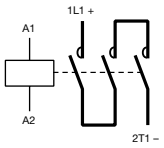

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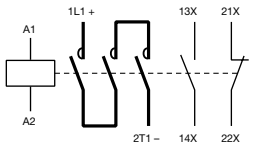

GA75-10-11

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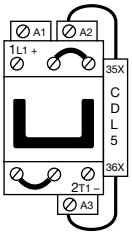
GAE75 contactors - DC operated
Standard devices without addition of auxiliary contacts



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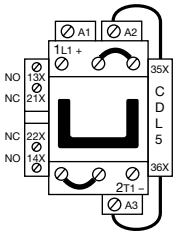

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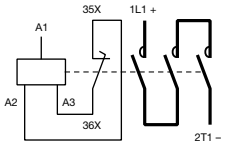

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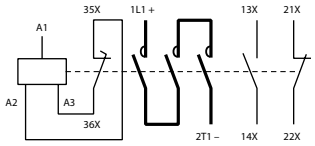
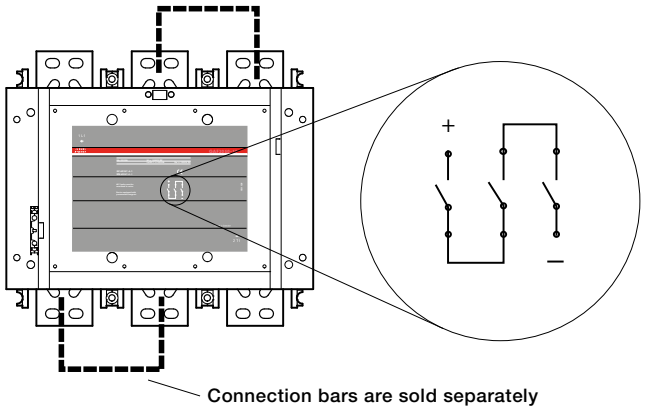
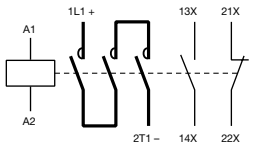


GAE75-10-11

GAF185 ... GAF2050 contactors - AC / DC operated



GAF185 ... GAF2050-10-11



GAF185 ... GAF2050-10-11

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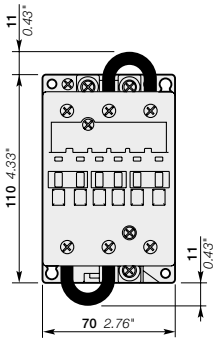
GA75 1-pole contactor
GAE75 1-pole contactor

Main dimensions mm, *inches*



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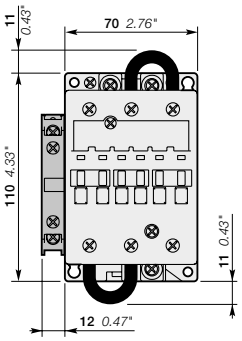

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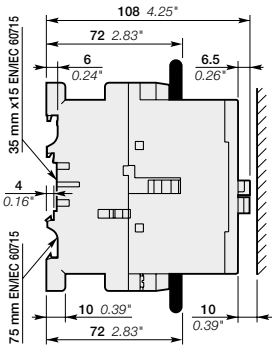
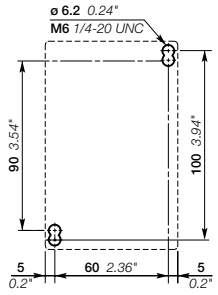
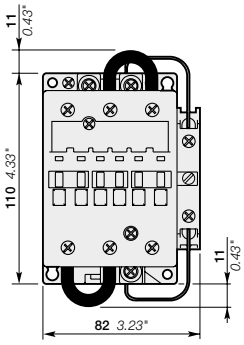




GA75



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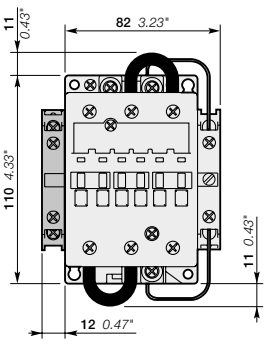

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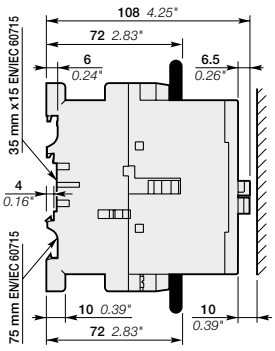

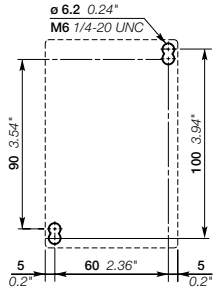

GAE75

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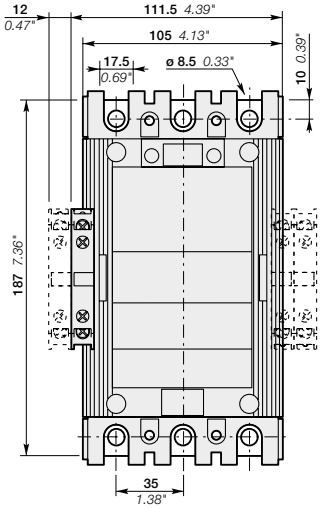
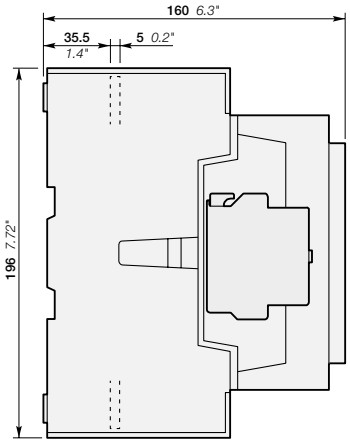
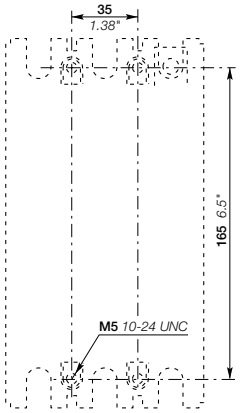
GAF185, GAF300 3-pole contactor

Main dimensions mm, *inches*



GAF185-30-11





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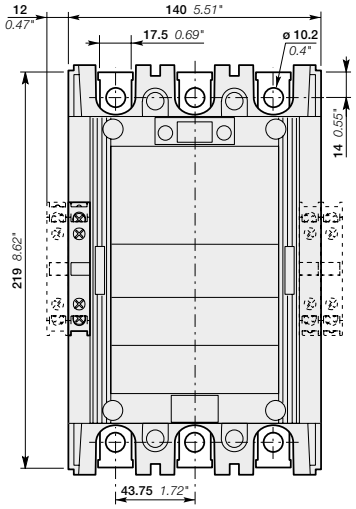
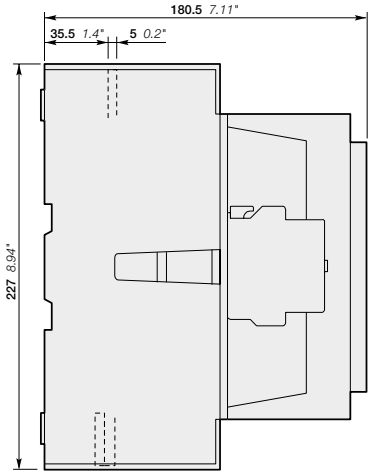
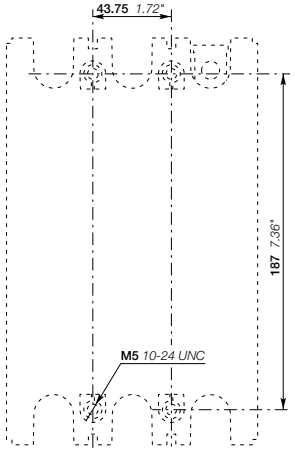


GAF300-30-11





GAF300-30-11

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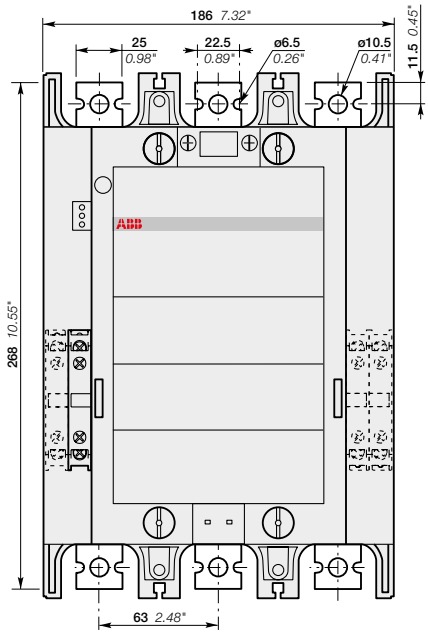
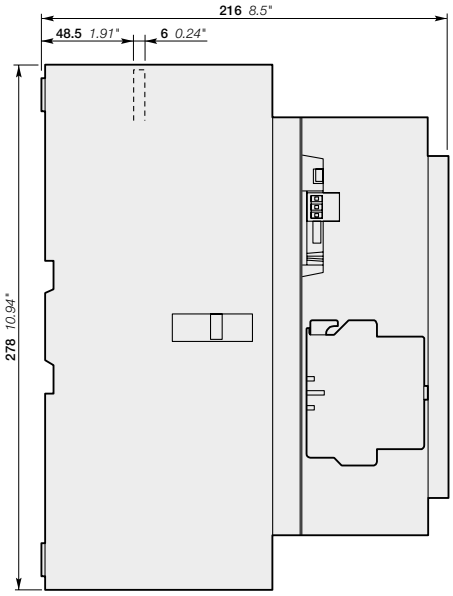
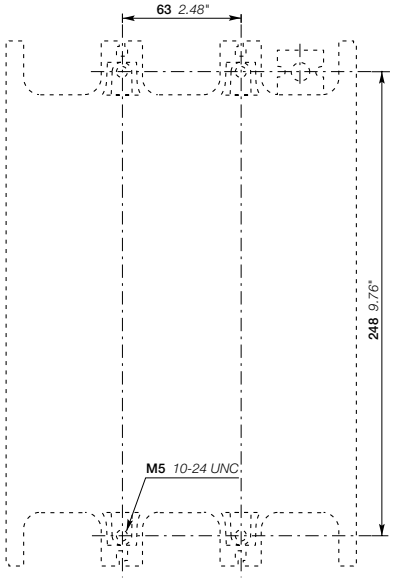
GAF460 3-pole contactor

Main dimensions mm, *inches*





GAF460-30-11



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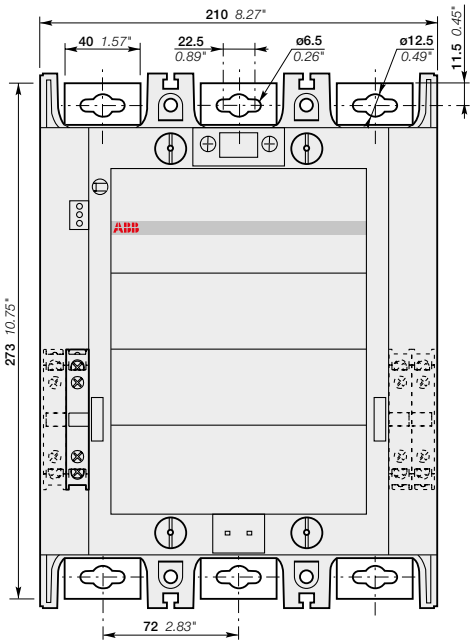
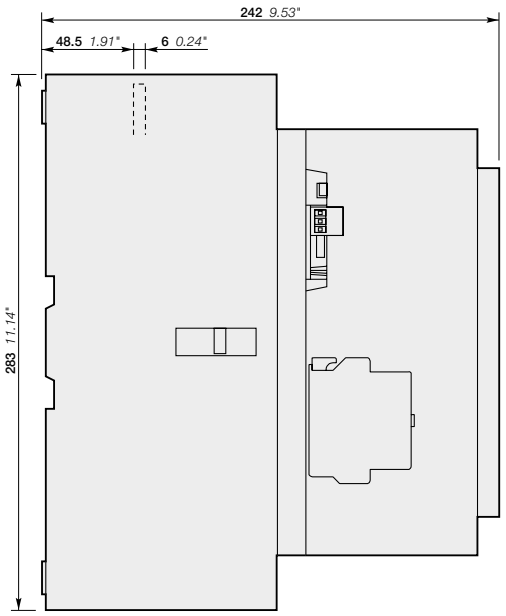
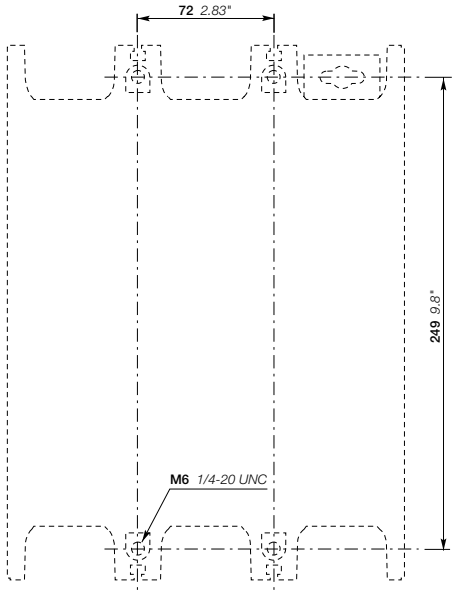
GAF750 3-pole contactor

Main dimensions mm, *inches*





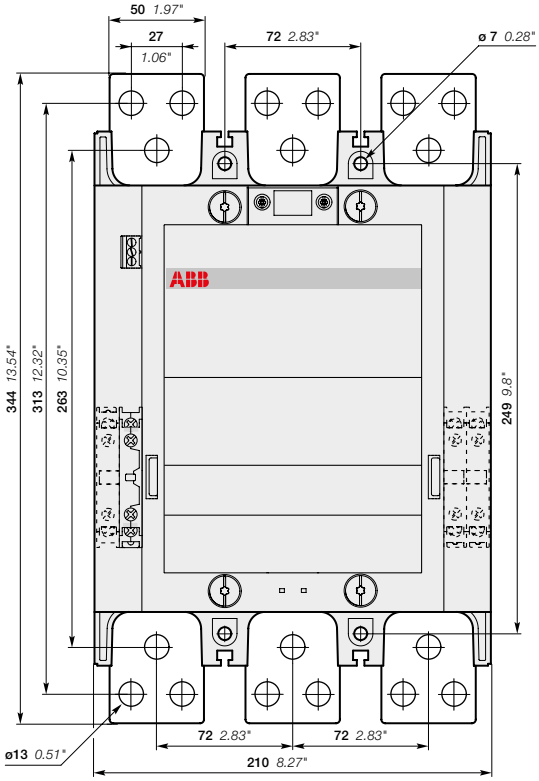
GAF750-30-11

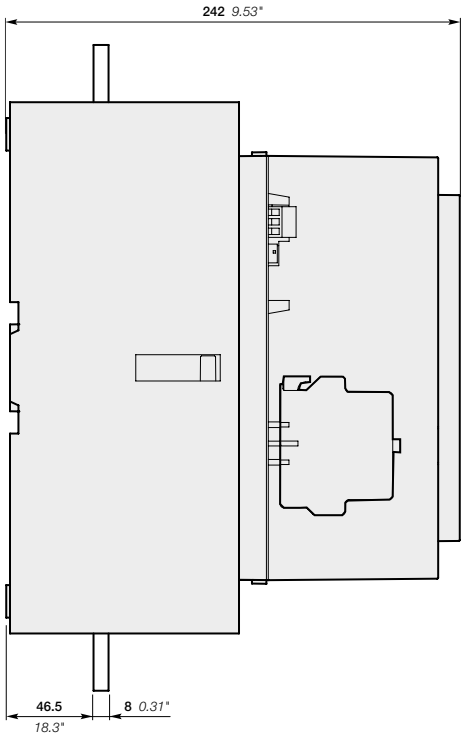


1SFC101182C0201

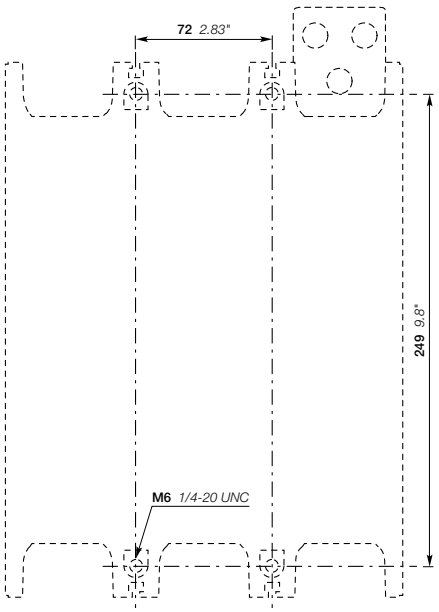
GAF1250 3-pole contactor

Main dimensions mm, *inches*





GAF1250-30-11



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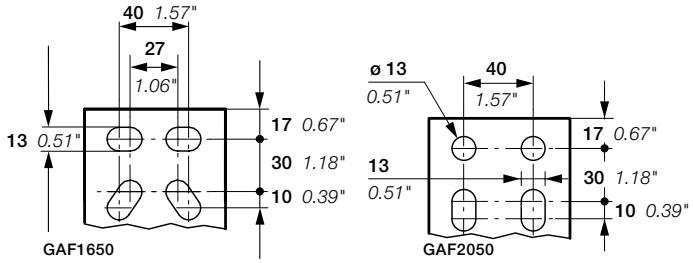
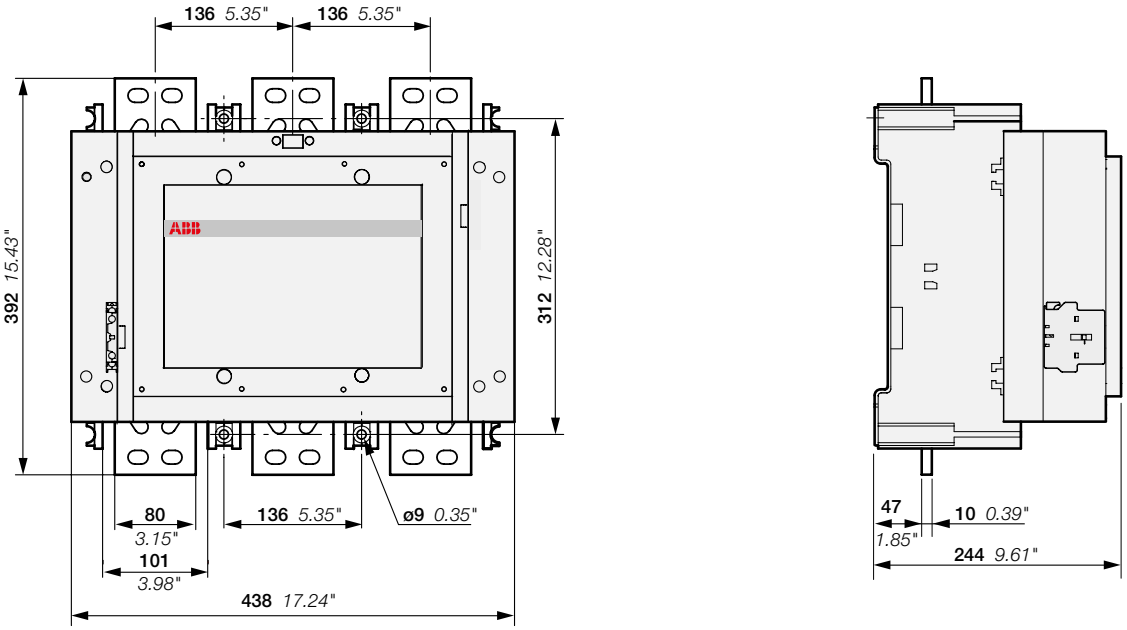
1SFC101183C0201

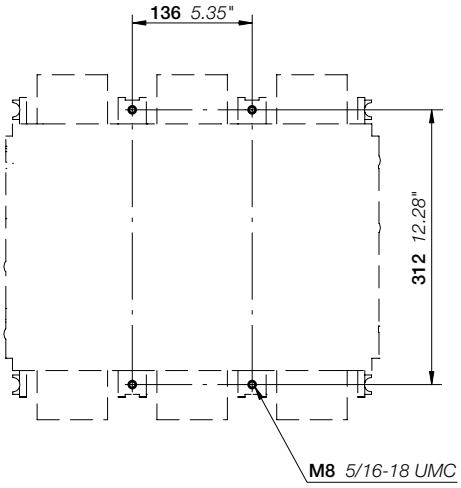
GAF1650, GAF2050 3-pole contactor

Main dimensions mm, *inches*





GAF1650, GAF2050-30-11



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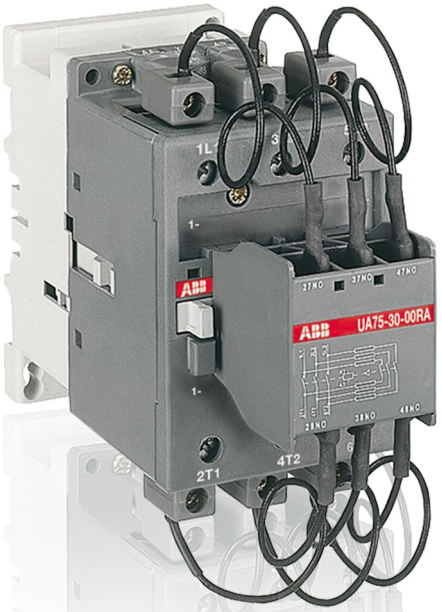
Notes


1L
3
5
1-
ABB
27NO
37NO
47NO
ABB UA75-30-00RA
1-
28NO
38NO
48NO
2T1
4T2
6

A1
A2
2
1
3
4
5
6
13NO
ABB
UA16-30-10
14NO

Contactors for capacitor switching

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UA16..RA up to UA110..RA - Unlimited peak current Î

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UA16 up to UA110 - Peak current Î ≤ 100 times the rms current

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AF 3-pole contactors for capacitor switching - Selection table 5/301

Voltage code table 5/417

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).

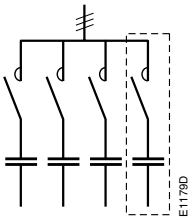
The inrush current peak, in the case of fixed correction, can reach 30 times the nominal current of the capacitor bank.

Single-step capacitor bank scheme
Use the 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 pages **"Calculation and dimensioning"**.

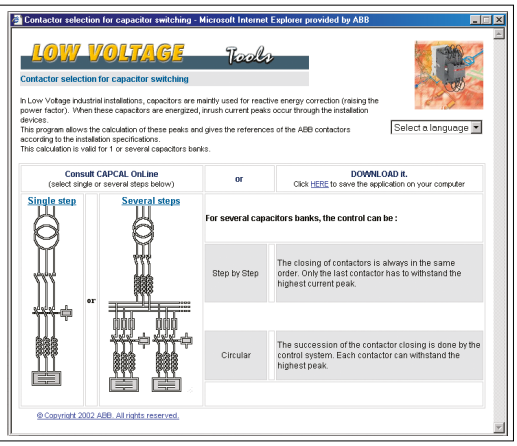
Alternatively by the **CAPCAL selection tool**, available on the ABB Website:
www.abb.com/lowvoltage

right hand side menu

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.



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Contactors for capacitor switching
The ABB solutions

ABB offers 2 contactor versions according to the value of the inrush current peak and the power of the capacitor bank.

UA..RA contactors for capacitor switching (UA16..RA to UA110..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 (UA16 to UA110)

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

5

UA16..RA … UA30..RA 3-pole contactors for capacitor switching
12.5 to 30 kvar - Unlimited peak current Î
AC operated

UA16-30-10RA

UA30-30-10RA

5

Description

UA..RA contactors for capacitor switching can be used for 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.

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

These contactors are of the block type design with:

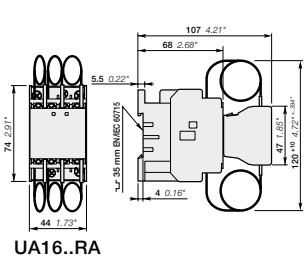
– 3 main poles and 1 built-in auxiliary contact
– the UA..RA contactors are fitted with a special front-mounted block, which ensures the serial insertion of 3 damping resistors into the circuit to limit the current peak on energization of the capacitor bank
  - their connection also ensures capacitor precharging in order to limit the second current peak occurring upon making of the main poles
  - the insertion of resistors allows to damp the highest current peak of the capacitor when switching on, whatever its level.
– control circuit: AC operated
– add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

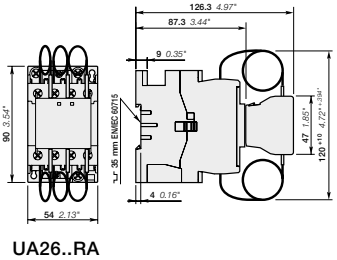
IEC	UL/CSA	Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power θ ≤ 40 °C 400 V AC-6b	Rated operational power θ ≤ 40 °C 480 V								Pkg (1 pce)
kvar	kvar	V 50 Hz	V 60 Hz						kg
12.5	16	24	24	1	0	UA16-30-10RA	1SBL181024R8110		0.460
		110	110…120	1	0	UA16-30-10RA	1SBL181024R8410		0.460
		220…230	230…240	1	0	UA16-30-10RA	1SBL181024R8010		0.460
		230…240	240…260	1	0	UA16-30-10RA	1SBL181024R8810		0.460
		380…400	400…415	1	0	UA16-30-10RA	1SBL181024R8510		0.460
		400…415	415…440	1	0	UA16-30-10RA	1SBL181024R8610		0.460
22	22	24	24	1	0	UA26-30-10RA	1SBL241024R8110		0.710
		110	110…120	1	0	UA26-30-10RA	1SBL241024R8410		0.710
		220…230	230…240	1	0	UA26-30-10RA	1SBL241024R8010		0.710
		230…240	240…260	1	0	UA26-30-10RA	1SBL241024R8810		0.710
		380…400	400…415	1	0	UA26-30-10RA	1SBL241024R8510		0.710
		400…415	415…440	1	0	UA26-30-10RA	1SBL241024R8610		0.710
30	28	24	24	1	0	UA30-30-10RA	1SBL281024R8110		0.810
		110	110…120	1	0	UA30-30-10RA	1SBL281024R8410		0.810
		220…230	230…240	1	0	UA30-30-10RA	1SBL281024R8010		0.810
		230…240	240…260	1	0	UA30-30-10RA	1SBL281024R8810		0.810
		380…400	400…415	1	0	UA30-30-10RA	1SBL281024R8510		0.810
		400…415	415…440	1	0	UA30-30-10RA	1SBL281024R8610		0.810

(1) Other control voltages see voltage code table.

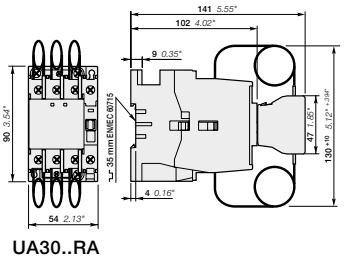
Main dimensions mm, *inches*



UA16..RA



UA26..RA



UA30..RA

1SBC101507S0201 - Rev. A

UA50..RA ... UA75..RA 3-pole contactors for capacitor switching
40 to 60 kvar - Unlimited peak current Î
AC operated

UA75-30-00 RA

Description

UA..RA contactors for capacitor switching can be used for 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.

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

These contactors are of the block type design with:

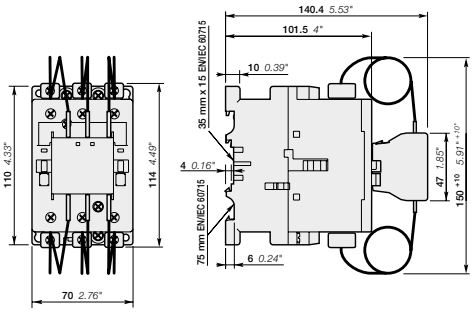
– 3 main poles
– the UA..RA contactors are fitted with a special front-mounted block, which ensures the serial insertion of 3 damping resistors into the circuit to limit the current peak on energization of the capacitor bank
  - their connection also ensures capacitor precharging in order to limit the second current peak occurring upon making of the main poles
  - the insertion of resistors allows to damp the highest current peak of the capacitor when switching on, whatever its level.
– control circuit: AC operated
– add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

IEC Rated operational power θ ≤ 40 °C 400 V AC-6b kvar	UL/CSA Rated operational power θ ≤ 40 °C 480 V kvar	Rated control circuit voltage Uc (1) V 50 Hz	V 60 Hz	Auxiliary contacts fitted		Type	Order code		Weight Pkg (1 pce) kg
40	50	24	24	0	0	UA50-30-00RA	1SBL351024R8100		1.350
		110	110...120	0	0	UA50-30-00RA	1SBL351024R8400		1.350
		220...230	230...240	0	0	UA50-30-00RA	1SBL351024R8000		1.350
		230...240	240...260	0	0	UA50-30-00RA	1SBL351024R8800		1.350
		380...400	400...415	0	0	UA50-30-00RA	1SBL351024R8500		1.350
		400...415	415...440	0	0	UA50-30-00RA	1SBL351024R8600		1.350
50	55	24	24	0	0	UA63-30-00RA	1SBL371024R8100		1.350
		110	110...120	0	0	UA63-30-00RA	1SBL371024R8400		1.350
		220...230	230...240	0	0	UA63-30-00RA	1SBL371024R8000		1.350
		230...240	240...260	0	0	UA63-30-00RA	1SBL371024R8800		1.350
		380...400	400...415	0	0	UA63-30-00RA	1SBL371024R8500		1.350
		400...415	415...440	0	0	UA63-30-00RA	1SBL371024R8600		1.350
60	64	24	24	0	0	UA75-30-00RA	1SBL411024R8100		1.350
		110	110...120	0	0	UA75-30-00RA	1SBL411024R8400		1.350
		220...230	230...240	0	0	UA75-30-00RA	1SBL411024R8000		1.350
		230...240	240...260	0	0	UA75-30-00RA	1SBL411024R8800		1.350
		380...400	400...415	0	0	UA75-30-00RA	1SBL411024R8500		1.350
		400...415	415...440	0	0	UA75-30-00RA	1SBL411024R8600		1.350

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



UA50..RA, UA63..RA, UA75..RA

UA95..RA ... UA110..RA 3-pole contactors for capacitor switching
70 to 80 kvar - Unlimited peak current Î
AC operated

UA110-30-00 RA

5

Description

UA..RA contactors for capacitor switching can be used for 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.

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

These contactors are of the block type design with:

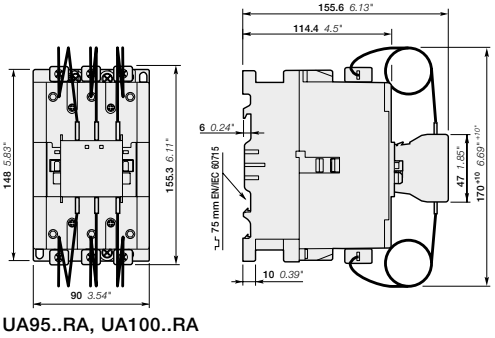
– 3 main poles
– the UA..RA contactors are fitted with a special front-mounted block, which ensures the serial insertion of 3 damping resistors into the circuit to limit the current peak on energization of the capacitor bank
  - their connection also ensures capacitor precharging in order to limit the second current peak occurring upon making of the main poles
  - the insertion of resistors allows to damp the highest current peak of the capacitor when switching on, whatever its level.
– control circuit: AC operated
– add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

IEC	UL/CSA	Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power θ ≤ 40 °C 400 V AC-6b	Rated operational power θ ≤ 40 °C 480 V	V 50 Hz	V 60 Hz						Pkg (1 pce) kg
70	80	24	24	0	0	UA95-30-00RA	1SFL431024R8100		2.000
		110	110...120	0	0	UA95-30-00RA	1SFL431024R8400		2.000
		220...230	230...240	0	0	UA95-30-00RA	1SFL431024R8000		2.000
		230...240	240...260	0	0	UA95-30-00RA	1SFL431024R8800		2.000
		380...400	400...415	0	0	UA95-30-00RA	1SFL431024R8500		2.000
		400...415	415...440	0	0	UA95-30-00RA	1SFL431024R8600		2.000
80	95	24	24	0	0	UA110-30-00RA	1SFL451024R8100		2.000
		110	110...120	0	0	UA110-30-00RA	1SFL451024R8400		2.000
		220...230	230...240	0	0	UA110-30-00RA	1SFL451024R8000		2.000
		230...240	240...260	0	0	UA110-30-00RA	1SFL451024R8800		2.000
		380...400	400...415	0	0	UA110-30-00RA	1SFL451024R8500		2.000
		400...415	415...440	0	0	UA110-30-00RA	1SFL451024R8600		2.000

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



UA95..RA, UA100..RA

1SBC101553S0201 - Rev. A

UA..RA 3-pole contactors for capacitor switching
Unlimited peak current Î

Main accessory fitting details

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 Auxiliary contact blocks 1-pole CA5-..		Side-mounted accessories Auxiliary contact blocks 2-pole CAL...
UA16-30-10RA	3	0	1	0	–		1 x CAL5-11
UA26-30-10RA	3	0	1	0	–		1 to 2 x CAL5-11
UA30-30-10RA	3	0	1	0	1 x CA5-...	+	1 to 2 x CAL5-11
UA50-30-00RA	3	0	0	0	1 to 2 x CA5-...	+	1 to 2 x CAL5-11
UA63-30-00RA	3	0	0	0			
UA75-30-00RA	3	0	0	0			
UA95-30-00RA	3	0	0	0	1 to 2 x CA5-...	+	1 to 2 x CAL18-11
UA110-30-00RA	3	0	0	0			

1SBC101509S0201

UA16..RA ... UA110..RA 3-pole contactors for capacitor switching
Unlimited peak current Î
Technical data

Main pole - Utilization characteristics according to IEC

Contactor types		AC operated	UA16..RA	UA26..RA	UA30..RA	UA50..RA	UA63..RA	UA75..RA	UA95..RA	UA110..RA
Standards			IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1							
Rated operational voltage Ue max.			690 V							
Rated frequency (without derating)			50 / 60 Hz							
AC-6b Utilization category										
Rated operational power AC-6b (1)										
For air temperature close to contactor	**θ ≤ 40 °C**	**230-240 V**	8 kvar	12.5 kvar	16 kvar	25 kvar	30 kvar	35 kvar	40 kvar	45 kvar
		400-415 V	12.5 kvar	22 kvar	30 kvar	40 kvar	50 kvar	60 kvar	70 kvar	80 kvar
		440 V	15 kvar	24 kvar	32 kvar	50 kvar	55 kvar	65 kvar	75 kvar	85 kvar
		500-550 V	18 kvar	30 kvar	34 kvar	55 kvar	65 kvar	75 kvar	85 kvar	95 kvar
		690 V	22 kvar	35 kvar	45 kvar	72 kvar	80 kvar	100 kvar	120 kvar	130 kvar
	θ ≤ 55 °C	**230-240 V**	7.5 kvar	11.5 kvar	16 kvar	24 kvar	27 kvar	30 kvar	35 kvar	40 kvar
		400-415 V	12.5 kvar	20 kvar	27.5 kvar	40 kvar	45 kvar	50 kvar	60 kvar	70 kvar
		440 V	13 kvar	20 kvar	30 kvar	43 kvar	48 kvar	53 kvar	65 kvar	75 kvar
		500-550 V	16 kvar	25 kvar	34 kvar	50 kvar	60 kvar	65 kvar	75 kvar	82 kvar
		690 V	21 kvar	31 kvar	45 kvar	65 kvar	75 kvar	80 kvar	105 kvar	110 kvar
	θ ≤ 70 °C	**230-240 V**	6 kvar	9 kvar	11 kvar	20 kvar	23 kvar	25 kvar	30 kvar	35 kvar
		400-415 V	10 kvar	15.5 kvar	19.5 kvar	35 kvar	39 kvar	41 kvar	53 kvar	60 kvar
		440 V	11 kvar	17 kvar	20.5 kvar	37 kvar	42.5 kvar	45 kvar	58 kvar	70 kvar
		500-550 V	12.5 kvar	20 kvar	25 kvar	46 kvar	50 kvar	55 kvar	70 kvar	78 kvar
		690 V	17 kvar	26 kvar	32 kvar	60 kvar	65 kvar	70 kvar	85 kvar	100 kvar
Max. permissible peak current Î			Unlimited							
Short-circuit protection device for contactors										
gG type fuse (2)			80 A	125 A	200 A				250 A	
Max. electrical switching frequency			240 cycles/h							
Electrical durability AC-6b		**Ue ≤ 440 V**	250 000 operating cycles							
		500 V ≤ Ue ≤ 690 V	100 000 operating cycles							

Multi-step capacitor bank scheme

(1) 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 x 50 = 45 kvar/380 V.
(2) The fuse ratings given represent the maximum ratings ensuring type 1 coordination according to the definition of standard IEC 60947-4-1.

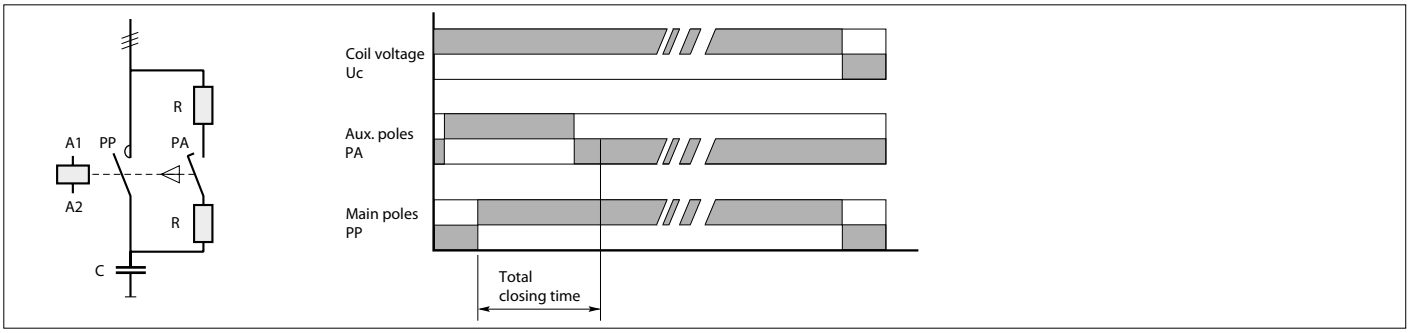
Main pole - Utilization characteristics according to UL / CSA

Contactor types		AC operated	UA16..RA	UA26..RA	UA30..RA	UA50..RA	UA63..RA	UA75..RA	UA95..RA	UA110..RA
Power - 60 Hz										
For air temperature close to contactor	**θ ≤ 40 °C**	**240 V**	8 kvar	11 kvar	14 kvar	25 kvar	27.5 kvar	32 kvar	40 kvar	45 kvar
		480 V	16 kvar	22 kvar	28 kvar	50 kvar	55 kvar	64 kvar	80 kvar	95 kvar
		600 V	20 kvar	27 kvar	35 kvar	62 kvar	70 kvar	80 kvar	100 kvar	120 kvar
Max. permissible peak Current Î			Unlimited							

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.

1SBC101510S0201 - Rev. A

UA16..RA … UA110..RA 3-pole contactors for capacitor switching
Unlimited peak current Î
Technical data

Connecting characteristics

Contactor types			AC operated	UA16..RA	UA26..RA	UA30..RA	UA50..RA UA63..RA UA75..RA	UA95..RA UA110..RA
Connection capacity (min. ... max.)								
Main conductors (poles)								
Rigid	Solid (≤ 4 mm²)		**1 x**	1...4 mm²	1.5...6 mm²	2.5...16 mm²	6...50 mm²	10...95 mm²
	Stranded (≥ 6 mm²)		**2 x**	-	-	2.5...16 + 2.5...6 mm²	6...25 + 6...16 mm²	6...35 mm²
Flexible with ferrule			**1 x**	0.75...2.5 mm²	1.5...4 mm²	2.5...10 mm²	6...35 mm²	10...70 mm²
			2 x	-	-	2.5...10 + 2.5...4 mm²	6...16 + 6...10 mm²	6...35 mm²
Bars or lugs			**L ≤**	7.7 mm	10 mm	-	-	-
			I >	3.7 mm	4.2 mm	-	-	-
Connection capacity acc. to UL/CSA			**1 or 2 x**	AWG 18...10	AWG 12...8	AWG 8...4	AWG 8...1	AWG 6...2/0
Tightening torque	Recommended			1 Nm / 9 lb.in	1.7 Nm / 15 lb.in	2.3 Nm / 20 lb.in	4 Nm / 35 lb.in	8 Nm / 53 lb.in
	Max.			1.2 Nm	2.2 Nm	2.6 Nm	4.5 Nm	9 Nm
Auxiliary conductors (built-in auxiliary terminals + coil terminals)								
Rigid solid			**1 x**	1...4 mm²				0.75...2.5 mm²
			2 x	1...4 mm²				0.75...2.5 mm²
Flexible with ferrule			**1 x**	0.75...2.5 mm²			1...2.5 mm²	0.75...2.5 mm²
			2 x	0.75...2.5 mm²				
Lugs	Coil terminals		**L ≤**	8 mm				
			I >	3.7 mm				
	Built-in auxiliary terminals		**L ≤**	7.7 mm	10 mm	8 mm	-	-
			I >	3.7 mm	4.2 mm	3.7 mm	-	-
Connection capacity acc. to UL/CSA			**1 or 2 x**	AWG 18...14				
Tightening torque								
Coil terminals	Recommended			1 Nm / 9 lb.in				
	Max.			1.2 Nm				
Built-in auxiliary terminals	Recommended			1 Nm / 9 lb.in				
	Max.			1.2 Nm				
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529								
Main terminals				IP20		IP10		
Coil terminals				IP20				
Built-in auxiliary terminals				IP20			-	-
Screw terminals				Delivered in open position, screws of unused terminals must be tightened				
Main terminals				M 3.5	M 4	M 5	M6	M8
		Screwdriver type		Flat Ø 5.5 / Pozidriv 2		Flat Ø 6.5 / Pozidriv 2		Hexagon socket (s = 4 mm)
Coil terminals				M 3.5				
		Screwdriver type		Flat Ø 5.5 / Pozidriv 2				
Built-in auxiliary terminals				M 3.5	M 4	M 3.5	-	-
		Screwdriver type		Flat Ø 5.5 / Pozidriv 2			-	-

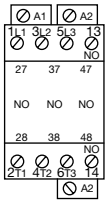
Other technical characteristics are the same as those of standard A contactors.

1SBC101513S0201

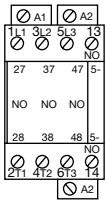
UA..RA contactors
Terminal marking and positioning

UA..RA contactors - AC operated

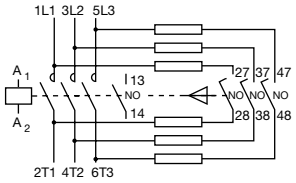
Standard devices without addition of auxiliary contacts



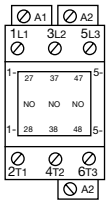
UA16-30-10 RA
UA26-30-10 RA



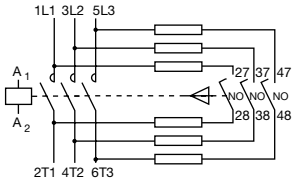
UA30-30-10 RA



UA16 ... 30-30-10 RA



UA50 ... 110-30-00 RA



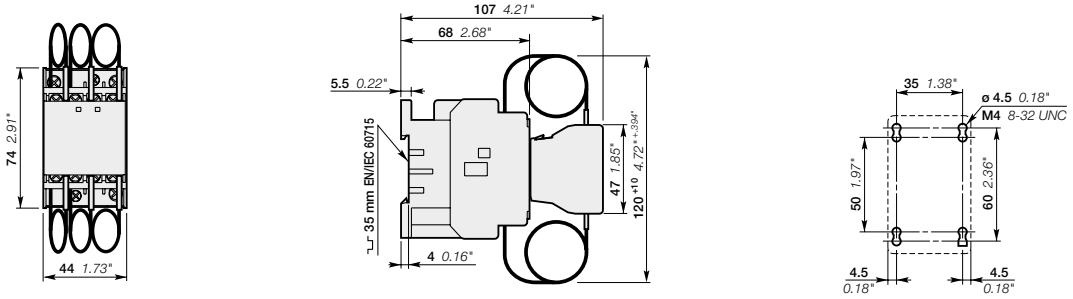
UA50 ... 110-30-00 RA

5

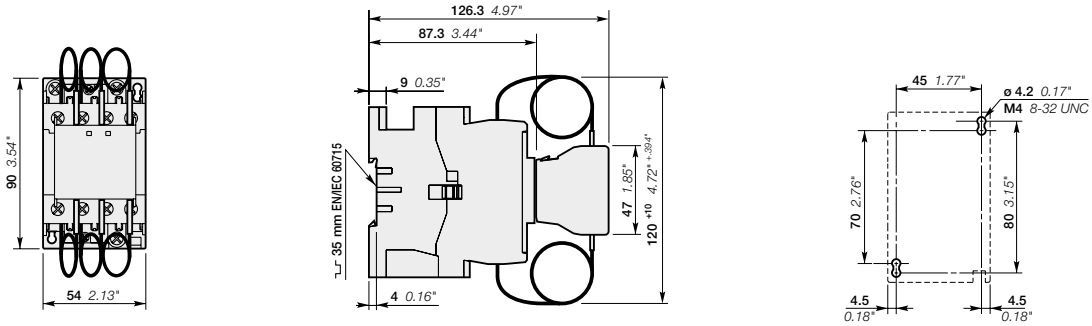
1SBC101574S0201

UA..RA 3-pole contactors for capacitor switching
Unlimited peak current Î

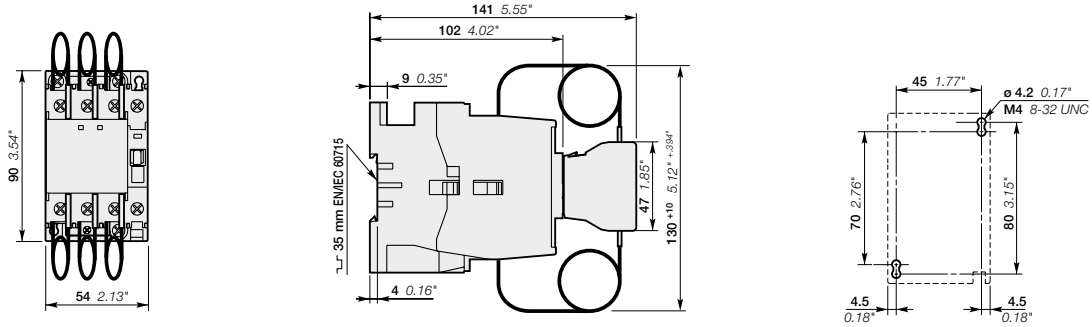
Main dimensions mm, *inches*



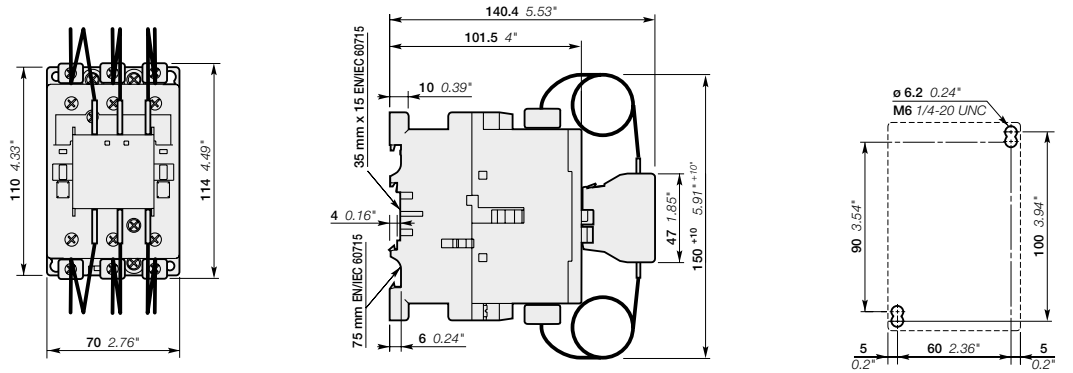
UA16..RA



UA26..RA



UA30..RA



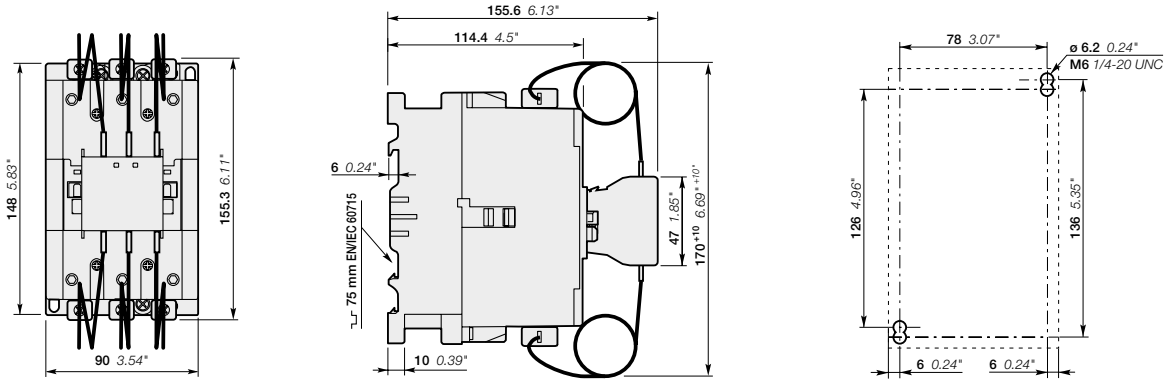
UA50..RA, UA63..RA, UA75..RA

5

1SBC101575S0201

UA..RA 3-pole contactors for capacitor switching
Unlimited peak current Î

Main dimensions mm, *inches*



UA95..RA, UA110..RA

5

1SBC101575S0201

UA16 ... UA30 3-pole contactors for capacitor switching
12.5 to 27.5 kvar - Peak current Î ≤ 100 times the rms current AC operated

UA16-30-10

UA30-30-10

Description

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

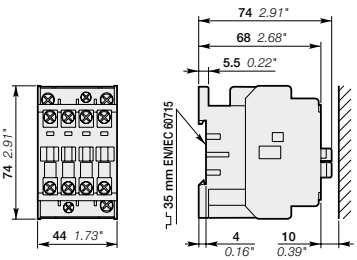
These contactors are of the block type design with:
- 3 main poles and 1 built-in auxiliary contact
- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

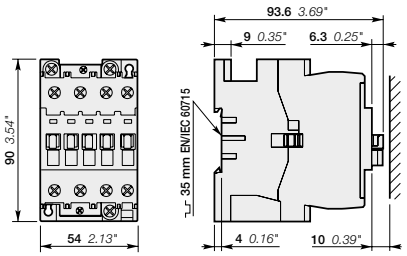
IEC		UL/CSA	Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power θ ≤ 40 °C 400 V AC-6b	Max peak current Î	Rated operational power θ ≤ 40 °C 480 V								Pkg (1 pce)
kvar	kA	kvar	V 50 Hz	V 60 Hz						kg
12.5	1.8	-	24	24	1	0	UA16-30-10	1SBL181022R8110		0.340
			48	48	1	0	UA16-30-10	1SBL181022R8310		0.340
			110	110...120	1	0	UA16-30-10	1SBL181022R8410		0.340
			220...230	230...240	1	0	UA16-30-10	1SBL181022R8010		0.340
			230...240	240...260	1	0	UA16-30-10	1SBL181022R8810		0.340
			380...400	400...415	1	0	UA16-30-10	1SBL181022R8510		0.340
			400...415	415...440	1	0	UA16-30-10	1SBL181022R8610		0.340
20	3	25	24	24	1	0	UA26-30-10	1SBL241022R8110		0.600
			48	48	1	0	UA26-30-10	1SBL241022R8310		0.600
			110	110...120	1	0	UA26-30-10	1SBL241022R8410		0.600
			220...230	230...240	1	0	UA26-30-10	1SBL241022R8010		0.600
			230...240	240...260	1	0	UA26-30-10	1SBL241022R8810		0.600
			380...400	400...415	1	0	UA26-30-10	1SBL241022R8510		0.600
			400...415	415...440	1	0	UA26-30-10	1SBL241022R8610		0.600
27.5	3.5	32	24	24	1	0	UA30-30-10	1SBL281022R8110		0.710
			48	48	1	0	UA30-30-10	1SBL281022R8310		0.710
			110	110...120	1	0	UA30-30-10	1SBL281022R8410		0.710
			220...230	230...240	1	0	UA30-30-10	1SBL281022R8010		0.710
			230...240	240...260	1	0	UA30-30-10	1SBL281022R8810		0.710
			380...400	400...415	1	0	UA30-30-10	1SBL281022R8510		0.710
			400...415	415...440	1	0	UA30-30-10	1SBL281022R8610		0.710

(1) Other control voltages see voltage code table.

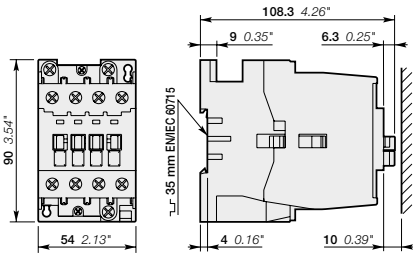
Main dimensions mm, *inches*



UA16



UA26



UA30

UA50 … UA75 3-pole contactors for capacitor switching
33 to 50 kvar - Peak current Î ≤ 100 times the rms current
AC operated

UA50-30-00

Description

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

These contactors are of the block type design with:

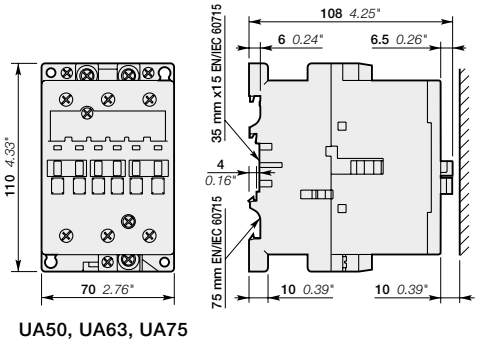
– 3 main poles
– control circuit: AC operated
– add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

IEC		UL/CSA	Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power θ ≤ 40 °C 400 V AC-6b	Max peak current Î	Rated operational power θ ≤ 40 °C 480 V								Pkg (1 pce)
kvar	kA	kvar	V 50 Hz	V 60 Hz						kg
33	5	40	24	24	0	0	UA50-30-00	1SBL351022R8100		1.160
			48	48	0	0	UA50-30-00	1SBL351022R8300		1.160
			110	110…120	0	0	UA50-30-00	1SBL351022R8400		1.160
			220…230	230…240	0	0	UA50-30-00	1SBL351022R8000		1.160
			230…240	240…260	0	0	UA50-30-00	1SBL351022R8800		1.160
			380…400	400…415	0	0	UA50-30-00	1SBL351022R8500		1.160
			400…415	415…440	0	0	UA50-30-00	1SBL351022R8600		1.160
45	6.5	-	24	24	0	0	UA63-30-00	1SBL371022R8100		1.160
			48	48	0	0	UA63-30-00	1SBL371022R8300		1.160
			110	110…120	0	0	UA63-30-00	1SBL371022R8400		1.160
			220…230	230…240	0	0	UA63-30-00	1SBL371022R8000		1.160
			230…240	240…260	0	0	UA63-30-00	1SBL371022R8800		1.160
			380…400	400…415	0	0	UA63-30-00	1SBL371022R8500		1.160
			400…415	415…440	0	0	UA63-30-00	1SBL371022R8600		1.160
50	7.5	55	24	24	0	0	UA75-30-00	1SBL411022R8100		1.160
			48	48	0	0	UA75-30-00	1SBL411022R8300		1.160
			110	110…120	0	0	UA75-30-00	1SBL411022R8400		1.160
			220…230	230…240	0	0	UA75-30-00	1SBL411022R8000		1.160
			230…240	240…260	0	0	UA75-30-00	1SBL411022R8800		1.160
			380…400	400…415	0	0	UA75-30-00	1SBL411022R8500		1.160
			400…415	415…440	0	0	UA75-30-00	1SBL411022R8600		1.160

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



UA50, UA63, UA75

1SBC101521S0201

UA95 ... UA110 3-pole contactors for capacitor switching
65 to 75 kvar - Peak current Î ≤ 100 times the rms current
AC operated

UA110-30-00

Description

UA contactors can be used for the switching of capacitor banks whose inrush current peaks are less or equal to 100 times nominal rms current.
The capacitors must be discharges (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making.

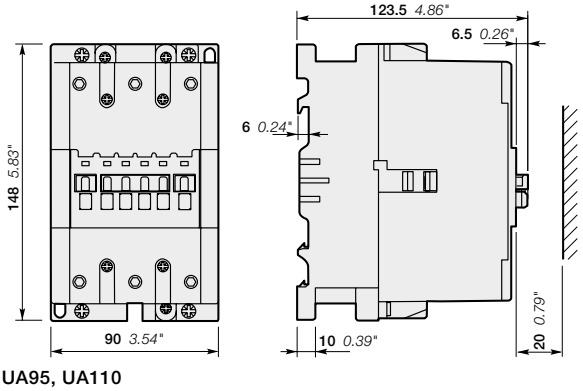
These contactors are of the block type design with:
– 3 main poles
– control circuit: AC operated
– add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

IEC		UL/CSA	Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power θ ≤ 40 °C 400 V AC-6b	Max peak current Î	Rated operational power θ ≤ 40 °C 480 V								Pkg (1 pce)
kvar	kA	kvar	V 50 Hz	V 60 Hz						kg
65	9.3	70	24	24	0	0	UA95-30-00	1SFL431022R8100		2.000
			48	48	0	0	UA95-30-00	1SFL431022R8300		2.000
			110	110...120	0	0	UA95-30-00	1SFL431022R8400		2.000
			220...230	230...240	0	0	UA95-30-00	1SFL431022R8000		2.000
			230...240	240...260	0	0	UA95-30-00	1SFL431022R8800		2.000
			380...400	400...415	0	0	UA95-30-00	1SFL431022R8500		2.000
			400...415	415...440	0	0	UA95-30-00	1SFL431022R8600		2.000
75	10.5	80	24	24	0	0	UA110-30-00	1SFL451022R8100		2.000
			48	48	0	0	UA110-30-00	1SFL451022R8300		2.000
			110	110...120	0	0	UA110-30-00	1SFL451022R8400		2.000
			220...230	230...240	0	0	UA110-30-00	1SFL451022R8000		2.000
			230...240	240...260	0	0	UA110-30-00	1SFL451022R8800		2.000
			380...400	400...415	0	0	UA110-30-00	1SFL451022R8500		2.000
			400...415	415...440	0	0	UA110-30-00	1SFL451022R8600		2.000

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



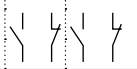
UA95, UA110

1SFC101059C0201

UA... 3-pole contactors for capacitor switching
Peak current Î ≤ 100 times the rms current

Main accessory fitting details

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

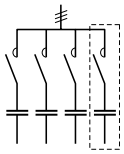
Contactor types	Main poles	Available auxiliary contacts	Front-mounted accessories Auxiliary contact blocks						Side-mounted accessories Auxiliary contact blocks
			1-pole CA5-..		4-pole CA5-..		Pneumatic timer TP.. A		2-pole CAL...
UA16-30-10	3 0	1 0	1 to 4 x CA5-..	or	1 x CA5-.. (4-pole)	or	1 x TP.. A	+	1 to 2 x CAL5-11
UA26-30-10	3 0	1 0	1 to 4 x CA5-..	or	1 x CA5-.. (4-pole)	or	1 x TP.. A	+	1 to 2 x CAL5-11
UA30-30-10	3 0	1 0	1 to 5 x CA5-..	or	1 x CA5-.. (4-pole) + 1 x 1-pole CA5-..	or	1 x TP.. A + 1 x CA5-.. (1-pole)	+	1 to 2 x CAL5-11
UA50-30-00 UA63-30-00 UA75-30-00	3 0 3 0 3 0	0 0 0 0 0 0	1 to 6 x CA5-..	or	1 x CA5-.. (4-pole) + 2 x 1-pole CA5-..	or	1 x TP.. A + 2 x CA5-.. (1-pole)	+	1 to 2 x CAL5-11
UA95-30-00 UA110-30-00	3 0 3 0	0 0 0 0	1 to 6 x CA5-..	or	1 x CA5-.. (4-pole) + 2 x 1-pole CA5-..		–	+	1 to 2 x CAL18-11

1SBC101533S0201

UA16 ... UA110 3-pole contactors for capacitor switching
Peak current Î ≤ 100 times the rms current
Technical data

Main pole - Utilization characteristics according to IEC

Contactor types		AC operated	UA16	UA26	UA30	UA50	UA63	UA75	UA95	UA110
Standards			IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1							
Rated operational voltage Ue max.			690 V							
Rated frequency (without derating)			50 / 60 Hz							
AC-6b Utilization category										
Rated operational power AC-6b (1)										
For air temperature close to contactor	**θ ≤ 40 °C**	**230-240 V**	7.5 kvar	12 kvar	16 kvar	20 kvar	25 kvar	30 kvar	35 kvar	40 kvar
		400-415 V	12.5 kvar	20 kvar	27.5 kvar	33 kvar	45 kvar	50 kvar	65 kvar	75 kvar
		440 V	13.7 kvar	22 kvar	30 kvar	36 kvar	50 kvar	55 kvar	65 kvar	75 kvar
		500-550 V	15.5 kvar	22 kvar	34 kvar	40 kvar	50 kvar	62 kvar	70 kvar	80 kvar
		690 V	21.5 kvar	30 kvar	45 kvar	55 kvar	70 kvar	75 kvar	80 kvar	90 kvar
	θ ≤ 55 °C	**230-240 V**	6.7 kvar	11 kvar	16 kvar	20 kvar	25 kvar	30 kvar	35 kvar	40 kvar
		400-415 V	11.7 kvar	18.5 kvar	27.5 kvar	33 kvar	43 kvar	50 kvar	65 kvar	70 kvar
		440 V	13 kvar	20 kvar	30 kvar	36 kvar	48 kvar	53 kvar	65 kvar	75 kvar
		500-550 V	14.7 kvar	22 kvar	34 kvar	40 kvar	50 kvar	62 kvar	70 kvar	80 kvar
		690 V	20 kvar	30 kvar	45 kvar	55 kvar	70 kvar	75 kvar	80 kvar	90 kvar
	θ ≤ 70 °C	**230-240 V**	6 kvar	8.5 kvar	11 kvar	19 kvar	21 kvar	22 kvar	30 kvar	35 kvar
		400-415 V	10 kvar	14.5 kvar	19 kvar	32 kvar	37 kvar	39 kvar	55 kvar	65 kvar
		440 V	11 kvar	16 kvar	20 kvar	35 kvar	41 kvar	43 kvar	55 kvar	70 kvar
		500-550 V	12.5 kvar	19.5 kvar	23.5 kvar	40 kvar	45 kvar	47.5 kvar	60 kvar	75 kvar
		690 V	17 kvar	25 kvar	32 kvar	52 kvar	60 kvar	65 kvar	70 kvar	85 kvar
Max. permissible peak current Î		**Ue ≤ 500 V**	1.8 kA	3 kA	3.5 kA	5 kA	6.5 kA	7.5 kA	9.3 kA	10.5 kA
		Ue > 500 V	1.6 kA	2.7 kA	3.1 kA	4.5 kA	5.8 kA	6.75 kA	8 kA	9 kA
Short-circuit protection device for contactors										
gG type fuse			sized 1.5...1.8 In of the capacitor							
Max. electrical switching frequency			240 cycles/h							
Electrical durability AC-6b		**Ue ≤ 690 V**	100 000 operating cycles							



Multi-step capacitor bank scheme

(1) 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 x 50 = 45 kvar/380 V.

If, in an application, the current peak is greater than the maximum peak current Î 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").

Main pole - Utilization characteristics according to UL / CSA

Contactor types		AC operated	UA16	UA26	UA30	UA50	UA63	UA75	UA95	UA110
Power - 60 Hz										
For air temperature close to contactor	**θ ≤ 40 °C**	**240 V**	-	12.5 kvar	16 kvar	20 kvar	-	27.5 kvar	35 kvar	40 kvar
		480 V	-	25 kvar	32 kvar	40 kvar	-	55 kvar	70 kvar	80 kvar
		600 V	-	30 kvar	40 kvar	50 kvar	-	70 kvar	75 kvar	85 kvar

If, in an application, the current peak is greater than the maximum peak current Î 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").

1SBC101536S0201

UA16 … UA110 3-pole contactors for capacitor switching
Peak current Î ≤ 100 times the rms current
Technical data

Connecting characteristics

Contactor types			AC operated	UA16	UA26	UA30	UA50 UA63 UA75	UA95 UA110
Connection capacity (min. ... max.)								
Main conductors (poles)								
	Rigid	Solid (≤ 4 mm²)	**1 x**	1...4 mm²	1.5...6 mm²	2.5...16 mm²	6...50 mm²	10...95 mm²
		Stranded (≥ 6 mm²)	**2 x**	1...4 mm²	1.5...6 mm²	2.5...16 mm²	6...25 mm²	6...35 mm²
	Flexible with ferrule		**1 x**	0.75...2.5 mm²	0.75...4 mm²	2.5...10 mm²	6...35 mm²	10...70 mm²
			2 x	0.75...2.5 mm²	0.75...4 mm²	2.5...10 mm²	6...16 mm²	6...35 mm²
	Bars or lugs		**L ≤**	7.7 mm	10 mm	-	-	-
			I >	3.7 mm	4.2 mm	-	-	-
Connection capacity acc. to UL/CSA			**1 or 2 x**	AWG 18...10	AWG 12...8	AWG 8...4	AWG 8...1	AWG 6...2/0
Tightening torque		Recommended		1 Nm / 9 lb.in	1.7 Nm / 15 lb.in	2.3 Nm / 20 lb.in	4 Nm / 35 lb.in	8 Nm / 71 lb.in
		Max.		1.2 Nm	2.2 Nm	2.6 Nm	4.5 Nm	9 Nm
Auxiliary conductors (built-in auxiliary terminals + coil terminals)								
	Rigid solid		**1 x**	1...4 mm²				0.75...2.5 mm²
			2 x	1...4 mm²				0.75...2.5 mm²
	Flexible with ferrule		**1 x**	0.75...2.5 mm²			1...2.5 mm²	0.75...2.5 mm²
			2 x	0.75...2.5 mm²				
	Lugs	Coil terminals	**L ≤**	8 mm				
			I >	3.7 mm				
		Built-in auxiliary terminals	**L ≤**	7.7 mm	10 mm	8 mm	-	-
			I >	3.7 mm	4.2 mm	3.7 mm	-	-
Connection capacity acc. to UL/CSA				AWG 18...14				
Tightening torque								
Coil terminals		Recommended		1 Nm / 9 lb.in				
		Max.		1.2 Nm				
Built-in auxiliary terminals		Recommended		1 Nm / 9 lb.in				
		Max.		1.2 Nm				
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529								
Main terminals				IP20			IP10	
Coil terminals				IP20				
Built-in auxiliary terminals				IP20			-	-
Screw terminals				Delivered in open position, screws of unused terminals must be tightened				
Main terminals				M3.5	M4	M5	M6	M8
		Screwdriver type		Flat Ø 5.5 / Pozidriv 2		Flat Ø 6.5 / Pozidriv 2		Hexagon socket (s = 4 mm)
Coil terminals				M3.5				
		Screwdriver type		Flat Ø 5.5 / Pozidriv 2				
Built-in auxiliary terminals				M3.5	M4	M3.5	-	-
		Screwdriver type		Flat Ø 5.5 / Pozidriv 2			-	-

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

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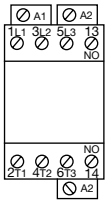
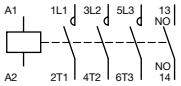
UA... contactors
Terminal marking and positioning

UA... contactors - AC operated

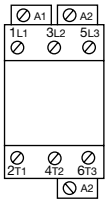
Standard devices without addition of auxiliary contacts



UA16 ... UA30-30-10



UA16 ... UA30-30-10



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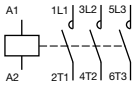
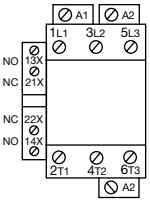
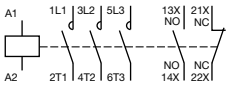


UA50 ... UA110-30-00

Standard devices with factory mounted auxiliary contacts



UA50 ... UA110-30-11



UA50 ... UA110-30-11

5

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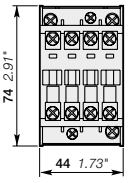
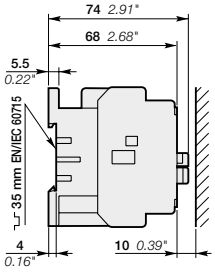
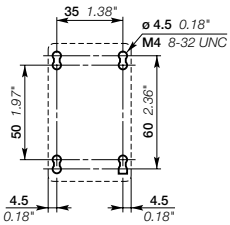
UA.. 3-pole contactors for capacitor switching

Main dimensions mm, *inches*



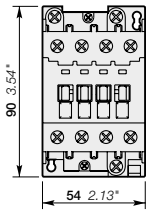


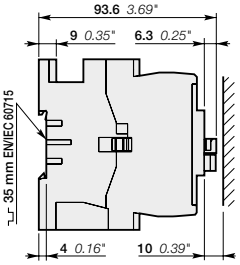
UA16



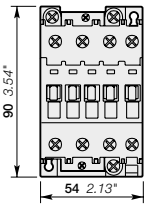
UA16 drilling plan

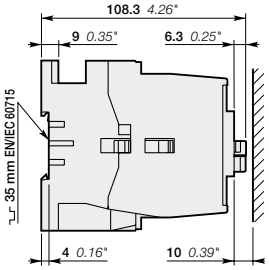
5



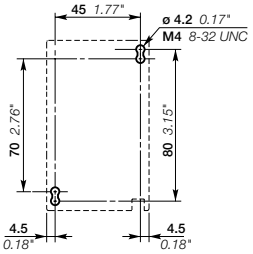


UA26

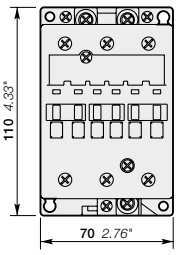




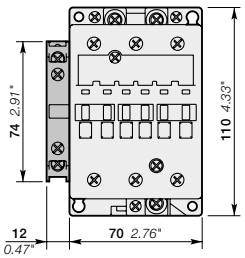
UA30



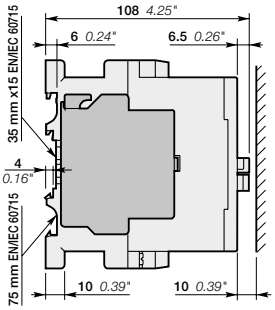
UA26, UA30 drilling plan

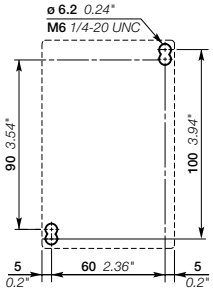


UA50, UA63, UA75-30-00

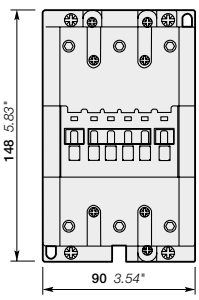


UA50, UA63, UA75-30-11

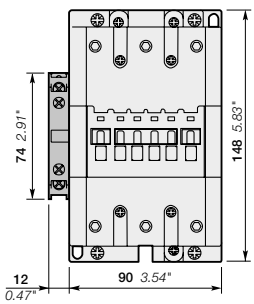




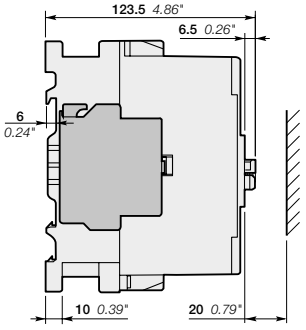
Drilling plan

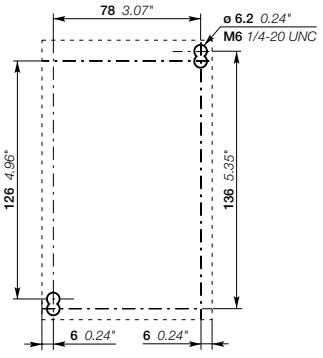


UA95, UA110-30-00



UA95, UA110-30-11





Drilling plan

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AF 3-pole contactors for capacitor switching
Single step - Peak current Î ≤ 30 times the rms curent

Description

The AF116 … AF1650 3-pole 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 this conditions, electrical durability of contactors is equal to 100 000 operating cycles.

AF116 ... AF370 3-pole contactors

Contactor types			AF116	AF140	AF146	AF190	AF205	AF265	AF305	AF370
AC-6b Utilization category										
For air temperature close to contactor										
Rated operational power AC-6b										
	θ ≤ 40 °C	**230-240 V**	40 kvar	45 kvar	50 kvar	60 kvar	75 kvar	85 kvar	100 kvar	110 kvar
		400-415 V	75 kvar	85 kvar	90 kvar	110 kvar	130 kvar	145 kvar	165 kvar	200 kvar
		440 V	75 kvar	90 kvar	93 kvar	115 kvar	135 kvar	155 kvar	180 kvar	200 kvar
		500-550 V	83 kvar	95 kvar	110 kvar	140 kvar	160 kvar	180 kvar	210 kvar	240 kvar
		690 V	80 kvar	95 kvar	110 kvar	135 kvar	170 kvar	200 kvar	240 kvar	280 kvar
		1000 V	-	-	100 kvar	140 kvar	150 kvar	155 kvar	160 kvar	170 kvar
	θ ≤ 55 °C	**230-240 V**	40 kvar	45 kvar	50 kvar	60 kvar	75 kvar	85 kvar	100 kvar	110 kvar
		400-415 V	70 kvar	85 kvar	90 kvar	110 kvar	130 kvar	145 kvar	165 kvar	200 kvar
		440 V	75 kvar	90 kvar	93 kvar	115 kvar	135 kvar	155 kvar	180 kvar	200 kvar
		500-550 V	83 kvar	95 kvar	110 kvar	135 kvar	160 kvar	180 kvar	210 kvar	240 kvar
		690 V	80 kvar	95 kvar	110 kvar	135 kvar	170 kvar	200 kvar	240 kvar	280 kvar
		1000 V	-	-	100 kvar	140 kvar	150 kvar	155 kvar	160 kvar	170 kvar
	θ ≤ 70 °C	**230-240 V**	35 kvar	40 kvar	42 kvar	45 kvar	57 kvar	70 kvar	85 kvar	100 kvar
		400-415 V	65 kvar	70 kvar	74 kvar	83 kvar	105 kvar	135 kvar	155 kvar	180 kvar
		440 V	65 kvar	75 kvar	80 kvar	85 kvar	110 kvar	140 kvar	163 kvar	180 kvar
		500-550 V	78 kvar	90 kvar	96 kvar	102 kvar	130 kvar	165 kvar	196 kvar	220 kvar
		690 V	75 kvar	90 kvar	110 kvar	135 kvar	160 kvar	200 kvar	240 kvar	260 kvar
		1000 V	-	-	95 kvar	120 kvar	130 kvar	140 kvar	150 kvar	160 kvar
Max. permissible peak current I		**Ue ≤ 500 V**	4 kA	4 kA	4 kA	5 kA	6.5 kA	8 kA	8 kA	8 kA

Single-step capacitor bank scheme

AF400 ... AF1650 3-pole contactors

Contactor types			AF400	AF460	AF580	AF750	AF1350	AF1650
AC-6b Utilization category								
For air temperature close to contactor								
Rated operational power AC-6b								
	θ ≤ 40 °C	**230-240 V**	120 kvar	140 kvar	170 kvar	220 kvar	250 kvar	300 kvar
		400-415 V	210 kvar	240 kvar	285 kvar	400 kvar	450 kvar	500 kvar
		440 V	220 kvar	260 kvar	300 kvar	410 kvar	500 kvar	550 kvar
		500-550 V	260 kvar	325 kvar	350 kvar	490 kvar	550 kvar	600 kvar
		690 V	300 kvar	325 kvar	440 kvar	600 kvar	650 kvar	800 kvar
		1000 V	250 kvar	300 kvar	350 kvar	450 kvar	-	-
	θ ≤ 55 °C	**230-240 V**	120 kvar	140 kvar	170 kvar	220 kvar	250 kvar	300 kvar
		400-415 V	210 kvar	240 kvar	285 kvar	400 kvar	450 kvar	500 kvar
		440 V	220 kvar	260 kvar	300 kvar	410 kvar	500 kvar	550 kvar
		500-550 V	260 kvar	325 kvar	350 kvar	480 kvar	550 kvar	600 kvar
		690 V	300 kvar	325 kvar	440 kvar	600 kvar	650 kvar	800 kvar
		1000 V	250 kvar	300 kvar	350 kvar	450 kvar	-	-
	θ ≤ 70 °C	**230-240 V**	105 kvar	120 kvar	160 kvar	190 kvar	230 kvar	280 kvar
		400-415 V	195 kvar	225 kvar	275 kvar	370 kvar	430 kvar	480 kvar
		440 V	200 kvar	230 kvar	290 kvar	380 kvar	470 kvar	520 kvar
		500-550 V	241 kvar	300 kvar	340 kvar	435 kvar	530 kvar	570 kvar
		690 V	300 kvar	325 kvar	440 kvar	600 kvar	630 kvar	750 kvar
		1000 V	220 kvar	270 kvar	300 kvar	400 kvar	-	-
Max. permissible peak current I		**Ue ≤ 500 V**	10 kA	10 kA	12 kA	12 kA	18 kA	20 kA

Single-step capacitor bank scheme

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Other contactor application data

Contactor selection

Control of three-phase slip-ring motors **5**/304
Autotransformer starters **5**/306
Three-phase transformer switching **5**/307
Lighting circuit switching **5**/309
Parallel connection of main poles **5**/318
Temporary or intermittent duty **5**/319

Influence of the length of conductors used in contactor control circuit **5/320**

Voltage code table **5/417**

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:

$$\text{L.F. (\%)} = \frac{\text{Operating cycle}}{\text{Cycle time (Operating cycle + Rest cycle)}} \times 100$$

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 Ie / AC-2 rated operational stator current, as a function of load factor.
Temperature of 60 °C for AF09 ... AF370 and 55 °C for AF400 ... AF1650 maximum near the contactor.
Maximum switching frequency and electrical durability in AC-2 category: see "Technical data".

Contactor types				AF09	AF12	AF16	AF26	AF30	AF38	AF40	AF52	AF65	AF80	AF96
Load factor	**15 %**	Ie / AC-2	**A**	18	24	33	52	64	76	79	106	124	154	184
	25 %	Ie / AC-2	**A**	15	20	31	44	54	65	68	90	111	136	163
	40 %	Ie / AC-2	**A**	13	17	26	38	46	55	58	77	94	116	139
	60 %	Ie / AC-2	**A**	11	14	22	31	38	46	48	64	78	96	115
S7 acc. to IEC 60034-1: periodical continuous duty with electrical breaking			**A**	9	12	18	26	32	38	40	53	65	80	96

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 60 °C for AF09 to AF370 and 55 °C for AF400 to AF1650.
The table below lists the factors to be applied to the AC-1 current of the contactors in order to obtain the maximal permissible value of the rotor current after contactor closing for star connection. If delta connection is used, increase by 50 % this 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 Ie / 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		AF09	AF12	AF16	AF26	AF30	AF38	AF40	AF52	AF65	AF80	AF96
Rated operational current Ie / AC-1 for air temperature near the contactor ≤ 60 °C	**A**	25	28	30	40	42	42	60	80	90	100	105

Rotor short-circuit contactor

The duty of this contactor is characterized 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: 60 °C for AF09 to AF370 and 55 °C for AF400 to AF1650 maximum near the contactor.

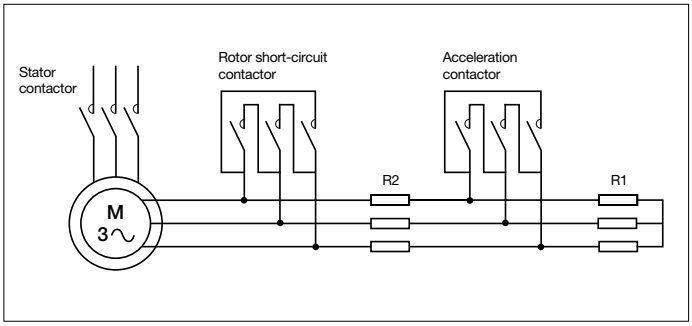
Contactor types				AF09	AF12	AF16	AF26	AF30	AF38	AF40	AF52	AF65	AF80	AF96
Load factor	**15 %**	Ie	**A**	63	71	76	102	107	107	152	203	228	254	266
	25 %	Ie	**A**	57	64	69	92	96	96	137	183	206	229	241
	40 %	Ie	**A**	49	55	59	78	82	82	117	157	176	196	206
	60 %	Ie	**A**	43	48	51	68	72	72	103	137	154	171	180
S7 acc. to IEC 60034-1: periodical continuous duty with electrical breaking			**A**	36	41	44	58	61	61	87	116	131	145	152
Rated operational rotor voltage: – Maximum values for starting and breaking			**V**	1380 (1600 in star connection)									2000 (2300 in star connection)	
– Maximum values for starting and electrical braking			**V**	690 (730 in star connection)									690 (730 in star connection)	

1SBC101969S0201 - Rev. B

Control of three-phase slip-ring motors
Contactor selection

Example of a three-stroke starter

– The first stroke corresponds to energization 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.



Contactor types				AF116	AF140	AF190	AF205	AF265	AF305	AF370	AF400	AF460	AF580	AF750	AF1350	AF1650
Load factor	**15 %**	Ie / AC-2	**A**	220	335	360	425	530	625	750	850	950	1150	1500	1720	2100
	25 %	Ie / AC-2	**A**	185	270	300	350	440	515	620	680	780	975	1250	1430	1750
	40 %	Ie / AC-2	**A**	150	215	250	300	370	430	515	580	650	800	1050	1200	1470
	60 %	Ie / AC-2	**A**	135	180	220	255	315	370	430	480	550	700	900	1030	1250
S7 acc. to IEC 60034-1: periodical continuous duty with electrical breaking			**A**	116	140	190	210	265	305	370	400	460	580	750	860	1050

Contactors		AF116	AF140	AF190	AF205	AF265	AF305	AF370	AF400	AF460	AF580	AF750	AF1350	AF1650
Rated operational current Ie / AC-1 for air temperature near the contactor ≤ 60 °C (AF116-AF370) ≤ 55 °C (AF400-AF1650)	**A**	145	175	250	300	350	400	500	500	600	700	800	1150	1450

Contactor types				AF116	AF140	AF190	AF205	AF265	AF305	AF370	AF400	AF460	AF580	AF750	AF1350	AF1650
Load factor	**15 %**	Ie	**A**	330	540	580	750	830	950	1050	1200	1400	1650	1900	2400	2800
	25 %	Ie	**A**	300	490	530	650	725	830	915	1050	1250	1450	1650	2100	2500
	40 %	Ie	**A**	260	425	460	575	630	720	800	950	1100	1300	1450	1850	2200
	60 %	Ie	**A**	230	375	400	500	575	650	700	810	975	1150	1300	1650	1950
S7 acc. to IEC 60034-1: periodical continuous duty with electrical breaking			**A**	200	300	350	380	480	550	640	700	840	980	1150	1500	1800
Rated operational rotor voltage:																
– Maximum values for starting and breaking			**V**	2200 (2600 in star connection)				3000 (3600 in star connection)								
– Maximum values for starting and electrical braking			**V**	690 (730 in star connection)												

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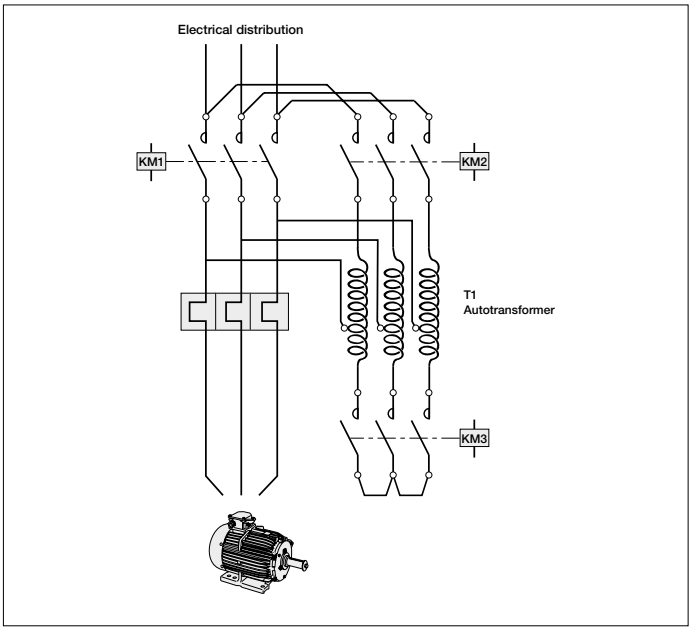
Autotransformer starters
Contactor selection

General

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



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Selection Table (Id starting current / In nominal current < 8 - Acceleration time ≤ 20s - 30 cycles / h max.)

kW motor ratings 50/60 Hz					Contactors					
					KM1	KM2				KM3
					line	autotransformer taps:				star
220/240 V	380/400 V	415 V	440 V	690 V		90 %	80 %	70 %	60 %	
4	7.5	7.5	7.5	9	AF16	AF16	AF12	AF09	AF09	AF09
6.5	11	11	11	15	AF26	AF26	AF16	AF16	AF09	AF16
11	18.5	18.5	18.5	22	AF38	AF30	AF26	AF26	AF16	AF26
15	22	30	30	30	AF52	AF52	AF38	AF30	AF26	AF30
18.5	30	37	37	37	AF65	AF52	AF40	AF30	AF26	AF38
22	37	45	45	45	AF80	AF65	AF52	AF40	AF30	AF40
25	45	55	55	55	AF96	AF80	AF65	AF52	AF38	AF52
30	55	55	75	55	AF116	AF116	AF80	AF65	AF52	AF65
37	75	75	90	75	AF140	AF140	AF96	AF80	AF65	AF65
45	75	75	90	90	AF146	AF140	AF96	AF80	AF65	AF65
55	90	90	110	132	AF190	AF146	AF116	AF96	AF65	AF80
55	110	110	132	160	AF205	AF190	AF140	AF116	AF80	AF96
75	132	132	160	200	AF265	AF265	AF190	AF140	AF96	AF116
90	160	160	160	250	AF305	AF265	AF205	AF190	AF116	AF140
110	200	200	200	315	AF370	AF370	AF265	AF190	AF140	AF190
132	250	250	250	355	AF460	AF400	AF305	AF265	AF190	AF205
160	315	355	355	500	AF580	AF580	AF400	AF305	AF205	AF305
220	400	425	450	600	AF750	AF750	AF580	AF400	AF305	AF400
257	475	500	560	900	AF1350	AF750	AF580	AF460	AF400	AF460
315	560	600	670	1000	AF1650	AF1350	AF750	AF580	AF460	AF580

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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.

Selection Table

The tables below show the operational ratings for:

– current peaks up to 20 to 30 times the transformer nominal current
– maximum switching frequency of 60 operating cycles per hour
– air ambient temperature ≤ 40 °C.

AC / DC operated contactors		AF09	AF12	AF16	AF26	AF30	AF38	AF40	AF52	AF65	AF80	AF96
Operational power at Ue: 50/60 Hz - according to AC-6a												
220 / 240 V	kVA	4	5	6	10	13	14	15	19	21	23	25
380 / 400 V	kVA	7	8	10	17	22	25	26	33	36	39	44
415 / 440 V	kVA	8	9	11	18	24	27	28.5	36	40	43	48
500 V	kVA	9	11	13	22	28	32	34.5	43	48	52	57
660 / 690 V	kVA	12.5	14	18	29	37	43	45.5	57	64	68	75
Max. permissible Îpeak	A	350	400	500	800	1000	1200	1250	1550	1750	1900	2100

AC / DC operated contactors		AF116	AF140	AF190	AF205	AF265	AF305	AF370	AF400	AF460	AF580	AF750	AF1350	AF1650
Operational power at Ue: 50/60 Hz - according to AC-6a														
220 / 240 V	kVA	26	30	42	45	55	63	76	95	100	110	130	160	190
380 / 400 V	kVA	46	52	73	75	94	108	132	165	170	190	240	275	350
415 / 440 V	kVA	50	57	80	80	103	118	144	180	190	210	270	325	390
500 V	kVA	60	68	96	100	124	143	173	220	230	250	320	–	–
660 / 690 V	kVA	80	90	127	130	164	188	228	290	300	310	410	–	–
Max. permissible Îpeak	A	2100	2400	3300	3500	4300	4900	6000	7700	8400	9300	12000	–	–

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Notes

Lighting circuit switching
Contactor selection

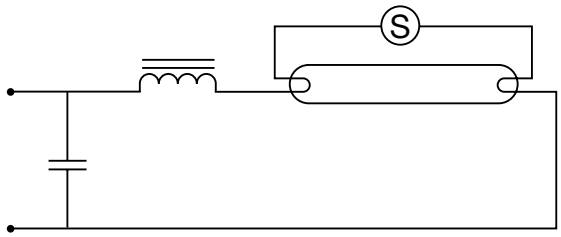
General

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.

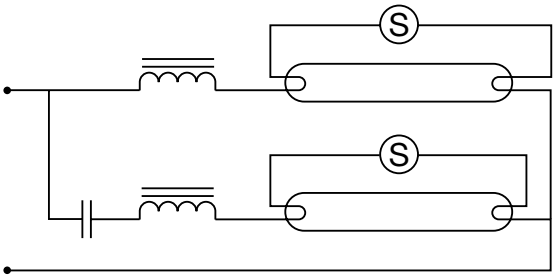
Lighting circuits

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.

Individual compensation (parallel compensation)



Serial compensation in dual mounting



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 60 °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 100 W / 230 V 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 AF09 is limited to 38 lamps per phase, you must thus select contactor AF12 which accepts up to 43 lamps per phase.

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Lighting circuit switching
Contactor selection AF09 ... AF146 3-pole contactors

Selection table

3-pole AC / DC operated contactors			AF09	AF12	AF16	AF26	AF30	AF38	AF40	AF52	AF65	AF80	AF96	AF116	AF140	AF146
Lamp characteristics			Maximum permissible number of lamps per phase													
W	A	µF														
Incandescent and halogen lamps																**according to AC-5b**
Voltage: 220/240 V AC																
60	0.27	-	64	72	77	103	129	148	177	207	233	259	277	430	519	541
100	0.45	-	38	43	46	62	77	89	106	124	140	155	166	258	311	324
200	0.91	-	19	21	23	30	38	44	52	61	69	77	82	127	154	160
300	1.37	-	12	14	15	20	25	29	35	41	46	51	54	85	102	107
500	2.28	-	7	8	9	12	15	17	21	24	27	30	33	51	61	64
1000	4.55	-	3	4	4	6	7	8	10	12	13	15	16	25	31	32
Fluorescent lamps without compensation - Fluorescent lamps with electronic starter																**according to AC-5a**
Voltage: 220/240 V AC																
20	0.38	-	46	51	55	73	84	92	126	147	157	184	210	305	368	384
40	0.45	-	38	43	46	62	71	77	106	124	133	155	177	258	311	324
65	0.70	-	25	27	30	40	45	50	68	80	85	100	114	166	200	209
80	0.80	-	21	24	26	35	40	43	60	70	75	87	100	145	175	183
100	1.15	-	15	16	18	24	27	30	41	48	52	60	69	101	122	127
110	1.20	-	14	16	17	23	26	29	40	46	50	58	66	97	117	122
Fluorescent lamps with parallel compensation																**according to AC-5a**
Voltage: 220/240 V AC																
20	0.18	5	53	53	53	155	168	176	266	309	325	388	444	644	778	811
40	0.26	5	53	53	53	107	123	134	184	215	230	269	307	446	538	562
65	0.42	7	37	37	37	66	76	83	114	133	142	166	190	276	333	348
80	0.52	7	33	37	37	53	61	67	92	107	115	134	153	223	269	281
100	0.65	16	16	16	16	43	49	53	73	86	92	107	123	178	215	225
110	0.70	18	14	14	14	40	45	49	68	80	85	100	114	166	200	209
Fluorescent lamps in dual mounting																**according to AC-5a**
Voltage: 220/240 V AC																
2 x 20	2 x 0.14	-	62	69	75	100	114	125	171	200	214	250	285	414	500	521
2 x 40	2 x 0.25	-	35	39	42	56	64	70	96	112	120	140	160	232	280	292
2 x 65	2 x 0.40	-	21	24	26	35	40	43	60	70	75	87	100	145	175	183
2 x 80	2 x 0.48	-	18	20	21	29	33	36	50	58	62	72	83	121	146	152
2 x 100	2 x 0.60	-	14	16	17	23	26	29	40	46	50	58	66	97	117	122
2 x 110	2 x 0.65	-	13	15	16	21	24	26	36	43	46	53	61	89	108	112
Compact fluorescent lamps																**according to AC-5a**
Voltage: 220/240 V AC																
5	0.045	-	388	433	466	622	711	777	1066	1244	1333	1555	1777	2578	3111	3244
7	0.075	-	233	260	280	373	426	466	640	746	800	933	1066	1547	1867	1947
11	0.105	-	166	185	200	266	304	333	457	533	571	666	761	1105	1333	1390
15	0.135	-	129	144	155	207	237	259	355	414	444	518	592	859	1037	1081
20	0.160	-	109	121	131	175	200	218	300	350	375	437	500	725	875	913
23	0.180	-	97	108	116	155	177	194	266	311	333	388	444	644	778	811

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Lighting circuit switching
Contactor selection AF190 ... AF2650 3-pole contactors

Selection table

3-pole AC / DC operated contactors			AF190	AF205	AF265	AF305	AF370	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650
Lamp characteristics			Maximum permissible number of lamps per phase													
W	A	µF														
Incandescent and halogen lamps																**according to AC-5b**
Voltage: 220/240 V AC																
60	0.27	-	704	759	981	1130	1370	1481	1704	2148	2778	3009	3250	3972	4935	6380
100	0.45	-	422	456	589	678	822	889	1022	1289	1667	1806	1950	2383	2961	3828
200	0.91	-	209	225	291	335	407	440	505	637	824	893	964	1179	1464	1893
300	1.37	-	139	150	193	223	270	292	336	423	547	593	641	783	973	1257
500	2.28	-	83	90	116	134	162	175	202	254	329	356	385	470	584	755
1000	4.55	-	42	45	58	67	81	88	101	127	165	179	193	236	293	379
Fluorescent lamps without compensation - Fluorescent lamps with electronic starter																**according to AC-5a**
Voltage: 220/240 V AC																
20	0.38	-	500	539	697	803	974	1053	1211	1526	1974	2138	2309	2822	3507	4533
40	0.45	-	422	456	589	678	822	889	1022	1289	1667	1806	1950	2383	2961	3828
65	0.70	-	271	293	379	436	529	571	657	829	1071	1161	1254	1532	1904	2461
80	0.80	-	238	256	331	381	463	500	575	725	938	1016	1097	1341	1666	2153
100	1.15	-	165	178	230	265	322	348	400	504	652	707	763	933	1159	1498
110	1.20	-	158	171	221	254	308	333	383	483	625	677	731	894	1110	1435
Fluorescent lamps with parallel compensation																**according to AC-5a**
Voltage: 220/240 V AC																
20	0.18	5	1056	1139	1472	1694	2056	2222	2556	3222	4167	4514	4875	5958	7403	9569
40	0.26	5	731	788	1019	1173	1423	1538	1769	2231	2885	3125	3375	4125	5125	6625
65	0.42	7	452	488	631	726	881	952	1095	1381	1786	1935	2089	2554	3173	4101
80	0.52	7	365	394	510	587	712	769	885	1115	1442	1563	1688	2063	2563	3313
100	0.65	16	292	315	408	469	569	615	708	892	1154	1250	1350	1650	2050	2650
110	0.70	18	271	293	379	436	529	571	657	829	1071	1161	1254	1532	1904	2461
Fluorescent lamps in dual mounting																**according to AC-5a**
Voltage: 220/240 V AC																
2 x 20	2 x 0.14	-	679	732	946	1089	1321	1429	1643	2071	2679	2902	3134	3830	4759	6152
2 x 40	2 x 0.25	-	380	410	530	610	740	800	920	1160	1500	1625	1755	2145	2665	3445
2 x 65	2 x 0.40	-	238	256	331	381	463	500	575	725	938	1016	1097	1341	1666	2153
2 x 80	2 x 0.48	-	198	214	276	318	385	417	479	604	781	846	914	1117	1388	1794
2 x 100	2 x 0.60	-	158	171	221	254	308	333	383	483	625	677	731	894	1110	1435
2 x 110	2 x 0.65	-	146	158	204	235	285	308	354	446	577	625	675	825	1025	1325
Compact fluorescent lamps																**according to AC-5a**
Voltage: 220/240 V AC																
5	0.045	-	4222	4556	5889	6778	8222	8889	10222	12889	16667	18056	19500	23833	29611	38278
7	0.075	-	2533	2733	3533	4067	4933	5333	6133	7733	10000	10833	11700	14300	17767	22967
11	0.105	-	1810	1952	2524	2905	3524	3810	4381	5524	7143	7738	8357	10214	12690	16405
15	0.135	-	1407	1519	1963	2259	2741	2963	3407	4296	5556	6019	6500	7944	9870	12759
20	0.160	-	1188	1281	1656	1906	2313	2500	2875	3625	4688	5078	5484	6703	8328	10766
23	0.180	-	1056	1139	1472	1694	2056	2222	2556	3222	4167	4514	4875	5958	7403	9569

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Lighting circuit switching
Contactor selection AF09 ... AF146 3-pole contactors

Selection table

3-pole AC / DC operated contactors			AF09	AF12	AF16	AF26	AF30	AF38	AF40	AF52	AF65	AF80	AF96	AF116	AF140	AF146
Lamp characteristics			Maximum permissible number of lamps per phase													
W	A	µF														
Low pressure sodium vapour lamps without compensation																
Voltage: 220/240 V AC																
35	1.4	-	9	10	12	15	15	16	23	31	35	39	42	70	85	89
55	1.4	-	9	10	12	15	15	16	23	31	35	39	42	70	85	89
90	2.1	-	6	7	8	10	10	10	15	20	23	26	28	47	57	59
135	3.1	-	4	4	5	6	7	7	10	14	15	17	19	32	38	40
180	3.1	-	4	4	5	6	7	7	10	14	15	17	19	32	38	40
Low pressure sodium vapour lamps with parallel compensation																
Voltage: 220/240 V AC																
35	0.6	20	12	12	12	35	36	38	55	73	81	91	100	164	198	207
55	0.6	20	12	12	12	35	36	38	55	73	81	91	100	164	198	207
90	0.9	25	10	10	10	23	24	25	36	48	55	61	66	110	132	138
135	0.9	45	5	5	5	18	18	19	34	34	36	57	59	110	132	138
180	0.9	45	5	5	5	18	18	19	34	34	36	57	59	110	132	138
High pressure sodium vapour lamps without compensation																
Voltage: 220/240 V AC																
150	1.8	-	7	8	9	11	12	12	18	24	27	30	33	45	54	57
250	3.0	-	4	5	5	7	7	7	11	14	16	18	20	27	33	34
400	4.4	-	3	3	3	4	5	5	7	10	11	12	13	18	22	23
600	6.2	-	2	2	2	3	3	3	5	7	7	8	9	13	16	16
1000	10.3	-	1	1	1	2	2	2	3	4	4	5	5	8	10	10
High pressure sodium vapour lamps with parallel compensation																
Voltage: 220/240 V AC																
150	1.0	20	12	12	12	21	22	23	33	43	49	55	60	93	112	117
250	1.5	36	7	7	7	14	14	15	22	29	33	36	40	62	75	78
400	2.5	48	5	5	5	8	8	9	13	17	19	22	24	37	45	47
600	3.3	65	3	3	3	6	6	6	10	13	15	16	18	28	34	35
1000	6.2	100	2	2	2	3	3	3	5	7	7	8	9	15	18	19
High pressure mercury vapour lamps without compensation																
Voltage: 220/240 V AC																
50	0.60	-	22	25	28	35	36	38	55	73	82	91	100	152	190	214
80	0.80	-	16	18	21	26	27	28	41	55	61	68	75	114	143	160
125	1.15	-	11	13	14	18	19	20	28	38	43	47	52	79	99	112
250	2.15	-	6	6	7	9	10	10	15	20	23	25	27	42	53	60
400	3.25	-	4	4	5	6	6	7	10	13	15	16	18	28	35	39
700	5.40	-	2	2	3	3	4	4	6	8	9	10	11	17	21	24
1000	7.50	-	1	2	2	2	2	3	4	5	6	7	8	12	15	17
Voltage: 380/415 V AC																
2000	8.00	-	1	1	2	2	2	2	4	5	6	6	7	11	14	16
High pressure mercury vapour lamps with compensation																
Voltage: 220/240 V AC																
50	0.28	7	36	36	36	75	78	82	117	157	176	196	214	326	407	458
80	0.43	8	31	31	31	48	51	53	76	102	115	127	139	212	265	298
125	0.66	10	20	22	25	31	33	34	50	66	75	83	90	138	173	194
250	1.28	18	10	11	13	16	17	17	25	34	38	42	46	71	89	100
400	2.05	25	6	7	8	10	10	11	16	21	24	26	29	44	56	63
700	3.55	40	3	4	4	5	6	6	9	12	13	15	16	26	32	36
1000	4.83	60	2	3	3	4	4	4	6	9	10	11	12	19	24	27
Voltage: 380/415 V AC																
2000	5.45	35	2	2	3	3	4	4	6	8	9	10	11	17	21	24

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Lighting circuit switching
Contactor selection AF190 ... AF2650 3-pole contactors

Selection table

3-pole AC / DC operated contactors			AF190	AF205	AF265	AF305	AF370	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650
Lamp characteristics			Maximum permissible number of lamps per phase													
W	A	µF														
Low pressure sodium vapour lamps without compensation																
Voltage: 220/240 V AC																
35	1.4	-	115	124	161	185	225	243	279	352	455	493	533	651	809	1046
55	1.4	-	115	124	161	185	225	243	279	352	455	493	533	651	809	1046
90	2.1	-	77	83	107	123	150	162	186	235	304	329	355	434	539	697
135	3.1	-	52	56	73	84	101	110	126	159	206	223	241	294	365	472
180	3.1	-	52	56	73	84	101	110	126	159	206	223	241	294	365	472
Low pressure sodium vapour lamps with parallel compensation																
Voltage: 220/240 V AC																
35	0.6	20	269	290	375	432	524	567	652	822	1063	1151	1243	1519	1888	2440
55	0.6	20	269	290	375	432	524	567	652	822	1063	1151	1243	1519	1888	2440
90	0.9	25	179	194	250	288	349	378	434	548	708	767	829	1013	1258	1627
135	0.9	45	179	194	250	288	349	378	434	548	708	767	829	1013	1258	1627
180	0.9	45	179	194	250	288	349	378	434	548	708	767	829	1013	1258	1627
High pressure sodium vapour lamps without compensation																
Voltage: 220/240 V AC																
150	1.8	-	74	80	103	119	144	156	179	226	292	313	338	413	513	663
250	3.0	-	44	48	62	71	86	93	107	135	175	188	203	248	308	398
400	4.4	-	30	33	42	49	59	64	73	92	119	128	138	169	210	271
600	6.2	-	21	23	30	34	42	45	52	65	85	91	98	120	149	192
1000	10.3	-	13	14	18	21	25	27	31	39	51	55	59	72	90	116
High pressure sodium vapour lamps with parallel compensation																
Voltage: 220/240 V AC																
150	1.0	20	152	164	212	244	296	320	368	464	600	625	675	825	1025	1325
250	1.5	36	101	109	141	163	197	213	245	309	400	417	450	550	683	883
400	2.5	48	61	66	85	98	118	128	147	186	240	250	270	330	410	530
600	3.3	65	46	50	64	74	90	97	112	141	182	189	205	250	311	402
1000	6.2	100	25	26	34	39	48	52	59	75	97	101	109	133	165	214
High pressure mercury vapour lamps without compensation																
Voltage: 220/240 V AC																
50	0.60	-	261	333	380	475	570	570	665	760	998	1188	1283	1568	1948	2518
80	0.80	-	196	249	285	356	428	428	499	570	748	891	962	1176	1461	1888
125	1.15	-	136	173	198	248	297	297	347	397	520	620	669	818	1016	1313
250	2.15	-	73	93	106	133	159	159	186	212	278	331	358	437	543	703
400	3.25	-	48	61	70	88	105	105	123	140	184	219	237	289	360	465
700	5.40	-	29	37	42	53	63	63	74	84	111	132	143	174	216	280
1000	7.50	-	21	27	30	38	46	46	53	61	80	95	103	125	156	201
Voltage: 380/415 V AC																
2000	8.00	-	20	25	29	36	43	43	50	57	75	89	96	118	146	189
High pressure mercury vapour lamps with compensation																
Voltage: 220/240 V AC																
50	0.28	7	560	713	814	1018	1221	1221	1425	1629	2138	2545	2748	3359	4173	5395
80	0.43	8	365	464	530	663	795	795	928	1060	1392	1657	1790	2187	2717	3513
125	0.66	10	238	302	345	432	518	518	605	691	907	1080	1166	1425	1770	2289
250	1.28	18	122	156	178	223	267	267	312	356	468	557	601	735	913	1180
400	2.05	25	76	97	111	139	167	167	195	222	292	348	375	459	570	737
700	3.55	40	44	56	64	80	96	96	112	128	169	201	217	265	329	425
1000	4.83	60	32	41	47	59	71	71	83	94	124	148	159	195	242	313
Voltage: 380/415 V AC																
2000	5.45	35	29	37	42	52	63	63	73	84	110	131	141	173	214	277

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Lighting circuit switching
Contactor selection AF09 ... AF146 3-pole contactors

Selection table

3-pole AC / DC operated contactors			AF09	AF12	AF16	AF26	AF30	AF38	AF40	AF52	AF65	AF80	AF96	AF116	AF140	AF146
Lamp characteristics			Maximum permissible number of lamps per phase													
W	A	µF														
Metal halide vapour lamps without compensation																
Voltage: 220/240 V AC																
250	3	-	4	5	5	7	7	7	11	14	16	18	20	27	33	38
400	4	-	3	3	4	5	5	5	8	11	12	13	15	20	25	28
1000	9.5	-	1	1	1	2	2	2	3	4	5	5	6	8	11	12
2000	16.5	-	0	0	1	1	1	1	2	2	3	3	3	5	6	7
Voltage: 380/415 V AC																
2000	10.5	-	1	1	1	2	2	2	3	4	4	5	5	8	10	11
Metal halide vapour lamps with compensation																
Voltage: 220/240 V AC																
250	1.32	33	7	7	7	15	16	17	25	33	37	41	45	69	86	97
400	2.22	45	5	5	5	9	9	10	14	19	22	24	27	41	51	58
1000	5.14	85	2	2	3	4	4	4	6	8	9	10	11	18	22	25
2000	11.5	148	1	1	1	1	1	2	2	3	4	4	5	8	10	11
Voltage: 380/415 V AC																
2000	6.10	60	2	2	2	3	3	3	5	7	8	9	9	15	19	21

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Lighting circuit switching
Contactor selection AF190 ... AF2650 3-pole contactors

Selection table

3-pole AC / DC operated contactors			AF190	AF205	AF265	AF305	AF370	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650
Lamp characteristics			Maximum permissible number of lamps per phase													
W	A	µF														
Metal halide vapour lamps without compensation																
Voltage: 220/240 V AC																
250	3	-	46	58	67	83	100	100	117	133	175	208	225	275	342	442
400	4	-	34	44	50	63	75	75	88	100	131	156	169	206	256	331
1000	9.5	-	14	18	21	26	32	32	37	42	55	66	71	87	108	139
2000	16.5	-	8	11	12	15	18	18	21	24	32	38	41	50	62	80
Voltage: 380/415 V AC																
2000	10.5	-	13	17	19	24	29	29	33	38	50	60	64	79	98	126
Metal halide vapour lamps with compensation																
Voltage: 220/240 V AC																
250	1.32	33	119	151	173	216	259	259	302	345	453	540	583	713	885	1144
400	2.22	45	71	90	103	128	154	154	180	205	270	321	347	424	526	680
1000	5.14	85	30	39	44	55	67	67	78	89	116	139	150	183	227	294
2000	11.5	148	14	17	20	25	30	30	35	40	52	62	67	82	102	131
Voltage: 380/415 V AC																
2000	6.10	60	26	33	37	47	56	56	65	75	98	117	126	154	192	248

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Lighting circuit switching
Contactor selection AF09 ... AF370 4-pole contactors

Selection table

4-pole AC / DC operated contactors			AF09	AF16	AF26	AF38	AF40	AF52	AF80	AF116	AF140	AF190	AF205	AF265	AF305	AF370
Lamp characteristics			Maximum permissible number of lamps per phase													
W	A	µF														
Incandescent and halogen lamps																**according to AC-5b**
Voltage: 220/240 V AC																
60	0.27	-	64	77	103	114	177	207	259	430	519	704	759	981	1130	1370
100	0.45	-	38	46	62	68	106	124	155	258	311	422	456	589	678	822
200	0.91	-	19	23	30	34	52	61	77	127	154	209	225	291	335	407
300	1.37	-	12	15	20	22	35	41	51	85	102	139	150	193	223	270
500	2.28	-	7	9	12	13	21	24	30	51	61	83	90	116	134	162
1000	4.55	-	3	4	6	6	10	12	15	25	31	42	45	58	67	81
Fluorescent lamps without compensation - Fluorescent lamps with electronic starter																**according to AC-5a**
Voltage: 220/240 V AC																
20	0.38	-	46	55	73	81	126	147	184	305	368	500	539	697	803	974
40	0.45	-	38	46	62	68	106	124	155	258	311	422	456	589	678	822
65	0.70	-	25	30	40	44	68	80	100	166	200	271	293	379	436	529
80	0.80	-	21	26	35	38	60	70	87	145	175	238	256	331	381	463
100	1.15	-	15	18	24	26	41	48	60	101	122	165	178	230	265	322
110	1.20	-	14	17	23	25	40	46	58	97	117	158	171	221	254	308
Fluorescent lamps with parallel compensation																**according to AC-5a**
Voltage: 220/240 V AC																
20	0.18	5	53	53	110	110	266	309	309	644	778	1056	1139	1472	1694	2056
40	0.26	5	53	53	107	110	184	215	269	446	538	731	788	1019	1173	1423
65	0.42	7	37	37	66	73	114	133	166	276	333	452	488	631	726	881
80	0.52	7	33	37	53	59	92	107	134	223	269	365	394	510	587	712
100	0.65	16	16	16	34	34	73	86	96	178	215	292	315	408	469	569
110	0.70	18	14	14	30	30	68	80	86	166	200	271	293	379	436	529
Fluorescent lamps in dual mounting																**according to AC-5a**
Voltage: 220/240 V AC																
2 x 20	2 x 0.14	-	62	75	100	110	171	200	250	414	500	679	732	946	1089	1321
2 x 40	2 x 0.25	-	35	42	56	62	96	112	140	232	280	380	410	530	610	740
2 x 65	2 x 0.40	-	21	26	35	38	60	70	87	145	175	238	256	331	381	463
2 x 80	2 x 0.48	-	18	21	29	32	50	58	72	121	146	198	214	276	318	385
2 x 100	2 x 0.60	-	14	17	23	25	40	46	58	97	117	158	171	221	254	308
2 x 110	2 x 0.65	-	13	16	21	23	36	43	53	89	108	146	158	204	235	285
Compact fluorescent lamps																**according to AC-5a**
Voltage: 220/240 V AC																
5	0.045	-	388	466	622	688	1066	1244	1555	2578	3111	4222	4556	5889	6778	8222
7	0.075	-	233	280	373	413	640	746	933	1547	1867	2533	2733	3533	4067	4933
11	0.105	-	166	200	266	295	457	533	666	1105	1333	1810	1952	2524	2905	3524
15	0.135	-	129	155	207	229	355	414	518	859	1037	1407	1519	1963	2259	2741
20	0.160	-	109	131	175	193	300	350	437	725	875	1188	1281	1656	1906	2313
23	0.180	-	97	116	155	172	266	311	388	644	778	1056	1139	1472	1694	2056
Low pressure sodium vapour lamps without compensation																
Voltage: 220/240 V AC																
35	1.4	-	9	12	15	16	23	31	39	70	85	115	124	161	185	225
55	1.4	-	9	12	15	16	23	31	39	70	85	115	124	161	185	225
90	2.1	-	6	8	10	10	15	20	26	47	57	77	83	107	123	150
135	3.1	-	4	5	6	7	10	14	17	32	38	52	56	73	84	101
180	3.1	-	4	5	6	7	10	14	17	32	38	52	56	73	84	101
Low pressure sodium vapour lamps with parallel compensation																
Voltage: 220/240 V AC																
35	0.6	20	12	12	27	27	55	73	77	164	198	269	290	375	432	524
55	0.6	20	12	12	27	27	55	73	77	164	198	269	290	375	432	524
90	0.9	25	10	10	22	22	36	48	61	110	132	179	194	250	288	349
135	0.9	45	5	5	12	12	34	34	34	110	132	179	194	250	288	349
180	0.9	45	5	5	12	12	34	34	34	110	132	179	194	250	288	349

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Lighting circuit switching
Contactor selection AF09 ... AF370 4-pole contactors

Selection table

4-pole AC / DC operated contactors			AF09	AF16	AF26	AF38	AF40	AF52	AF80	AF116	AF140	AF190	AF205	AF265	AF305	AF370
Lamp characteristics			Maximum permissible number of lamps per phase													
W	A	µF														
High pressure sodium vapour lamps without compensation																
Voltage: 220/240 V AC																
150	1.8	-	7	9	11	12	18	24	30	45	54	74	80	103	119	144
250	3,0	-	4	5	7	7	11	14	18	27	33	44	48	62	71	86
400	4.4	-	3	3	4	5	7	10	12	18	22	30	33	42	49	59
600	6.2	-	2	2	3	3	5	7	8	13	16	21	23	30	34	42
1000	10.3	-	1	1	2	2	3	4	5	8	10	13	14	18	21	25
High pressure sodium vapour lamps with parallel compensation																
Voltage: 220/240 V AC																
150	1,0	20	12	12	21	23	33	43	55	93	112	152	164	212	244	296
250	1.5	36	7	7	14	15	22	29	36	62	75	101	109	141	163	197
400	2.5	48	5	5	8	9	13	17	22	37	45	61	66	85	98	118
600	3.3	65	3	3	6	6	10	13	16	28	34	46	50	64	74	90
1000	6.2	100	2	2	3	3	5	7	8	15	18	25	26	34	39	48
High pressure mercury vapour lamps without compensation																
Voltage: 220/240 V AC																
50	0.60	-	22	28	35	38	55	73	91	152	190	261	333	380	475	570
80	0.80	-	16	21	26	28	41	55	68	114	143	196	249	285	356	428
125	1.15	-	11	14	18	20	28	38	47	79	99	136	173	198	248	297
250	2.15	-	6	7	9	10	15	20	25	42	53	73	93	106	133	159
400	3.25	-	4	5	6	7	10	13	16	28	35	48	61	70	88	105
700	5.40	-	2	3	3	4	6	8	10	17	21	29	37	42	53	63
1000	7.50	-	1	2	2	3	4	5	7	12	15	21	27	30	38	46
Voltage: 380/415 V AC																
2000	8	-	1	2	2	2	4	5	6	11	14	20	25	29	36	43
High pressure mercury vapour lamps with compensation																
Voltage: 220/240 V AC																
50	0.28	7	36	36	75	79	117	157	196	326	407	560	713	814	1018	1221
80	0.43	8	31	31	48	53	76	102	127	212	265	365	464	530	663	795
125	0.66	10	20	25	31	34	50	66	83	138	173	238	302	345	432	518
250	1.28	18	10	13	16	17	25	34	42	71	89	122	156	178	223	267
400	2.05	25	6	8	10	11	16	21	26	44	56	76	97	111	139	167
700	3.55	40	3	4	5	6	9	12	15	26	32	44	56	64	80	96
1000	4.83	60	2	3	4	4	6	9	11	19	24	32	41	47	59	71
Voltage: 380/415 V AC																
2000	5,45	35	2	3	3	4	6	8	10	17	21	29	37	42	52	63
Metal halide vapour lamps without compensation																
Voltage: 220/240 V AC																
250	3	-	4	5	7	7	11	14	18	27	33	46	58	67	83	100
400	4	-	3	4	5	5	8	11	13	20	25	34	44	50	63	75
1000	9.5	-	1	1	2	2	3	4	5	8	11	14	18	21	26	32
2000	16.5	-	0	1	1	1	2	2	3	5	6	8	11	12	15	18
Voltage: 380/415 V AC																
2000	10.5	-	1	1	2	2	3	4	5	8	10	13	17	19	24	29
Metal halide vapour lamps with compensation																
Voltage: 220/240 V AC																
250	1.32	33	7	7	15	16	25	33	41	69	86	119	151	173	216	259
400	2.22	45	5	5	9	10	14	19	24	41	51	71	90	103	128	154
1000	5.14	85	2	3	4	4	6	8	10	18	22	30	39	44	55	67
2000	11.5	148	1	1	1	2	2	3	4	8	10	14	17	20	25	30
Voltage: 380/415 V AC																
2000	6.10	60	2	2	3	3	5	7	9	15	19	26	33	37	47	56

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Parallel connection of main poles

General

Purpose: Increasing the AC resistive load by wiring connection of main poles in parallel.

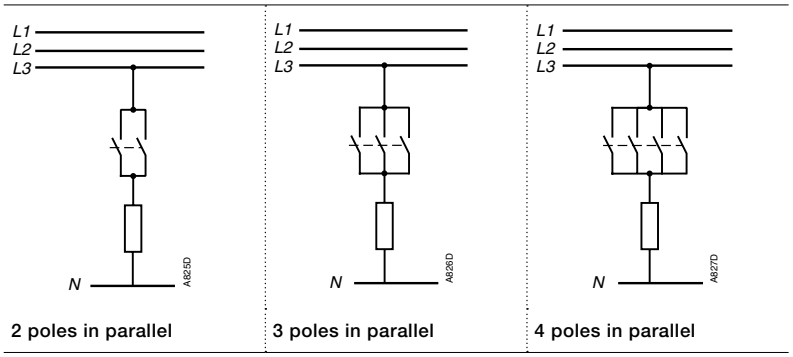
Remarks:

– Parallel connection of main poles to increase the DC resistive load is not acceptable
– Parallel connection of main poles does not increase the breaking capacity.

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

Note: The poles can be connected in parallel via following connecting strips. See details and permissible current in "Accessory" part.

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



2 poles in parallel | 3 poles in parallel | 4 poles in parallel

Contactors			Factor to be applied to the rated operational current Ie / AC-1 to obtain the permissible current Ie / AC-1 with "n" poles in parallel		
AC operated	DC operated	Cycles / h			
3-pole contactors					
AF09 ... AF96	AF09 ... AF96	600	1.6	2.2	–
AF116 ... AF1250	AF116 ... AF1250	300	1.6	2.2	–
AF1350 ... AF2650	AF1350 ... AF2650	30	1.6	2.2	–
4-pole contactors					
AF09 ... AF38 A45 ... A75	AF09 ... AF38	600	1.6	2.2	2.6
AF45 ... AF75	AE45 ... AE75 TAE45 ... TAE75 AF45 ... AF75	300	1.6	2.2	2.6
EK	EK	300	1.6	2.2	2.8

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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 Ie / AC-1 to obtain the permissible operational current Ie / 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
Prefered classes acc. to IEC 60947-4-1	1	–	3	–	12	–	30	–	120
Current flow time per cycle	Factors applicable to Ie / 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	1.5
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:

AF09 contactor (intermittent duty, resistive load)

Rated operational current Ie / AC-1 at 60 °C (see "Technical data: main pole utilization characteristics")	25 A
Switching frequency	2 operating cycles/h
Current flow time per cycle	20 s
Factor to be applied to the current Ie / AC-1	2.7
Permissible current: 2.7 x 25 =	67 A

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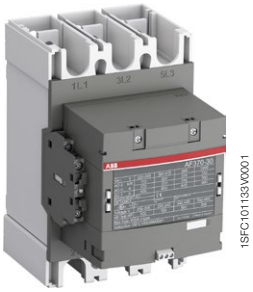
Influence of the length of conductors used in contactor control circuit

AF40-30-00



AF370-30-11

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 AC or DC)
– **no opening:** due to excessive capacitance (in AC).

Contactor Closing (contactor with AC or DC 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 %.

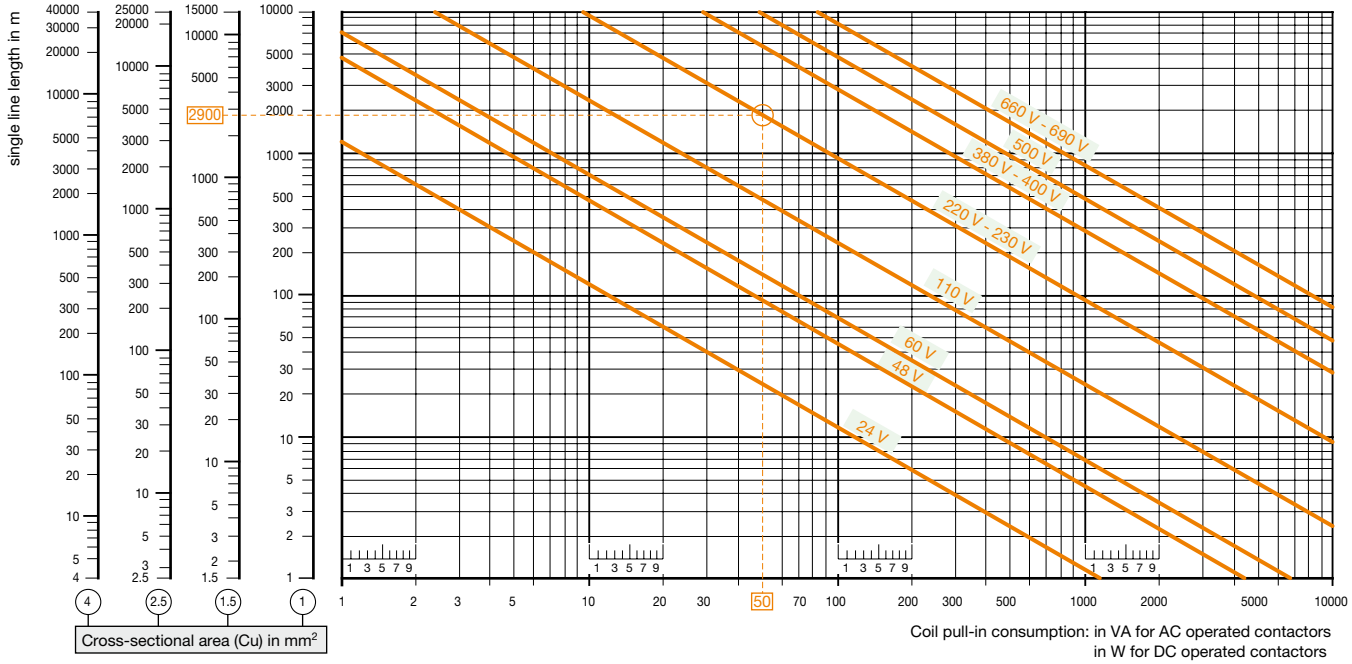
Coil pull-in consumption (average value)

3-pole contactors	AC control supply 50/60 Hz	DC control supply
AF09, AF12, AF16, AF26, AF30, AF38	50 VA	50 W
AF09Z, AF12Z, AF16Z, AF26Z, AF30Z, AF38Z	20 VA	20 W
AF40, AF52, AF65	25 VA	25 W
AF80, AF96	40 VA	40 W
AF116, AF140, AF146	180 VA	170 W
AF190, AF205	195 VA	185 W
AF265, AF305, AF370	405 VA	465 W
AF400, AF460	1005 VA	960 W
AF580, AF750, AF1250	940 VA	900 W
AF1350, AF1650, AF2050, AF2650	2450 VA	2290 W

4-pole contactors	AC control supply 50/60 Hz	DC control supply
AF09, AF16, AF26, AF38	50 VA	50 W
AF09Z, AF16Z, AF26Z, AF38Z	20 W	20 W
AF40, AF52, AF80	40 VA	40 W
AF116, AF140	185 VA	170 W
AF190, AF205	190 VA	180 W
AF265, AF305, AF370	405 VA	445 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 **AF09 contactor**: Coil voltage: 230 V 50 Hz, contactor coil pull-in power consumption: 50 VA, control circuit conductor cross-sectional area: Cu 1.5 mm². Max. permissible length: 2900 m.

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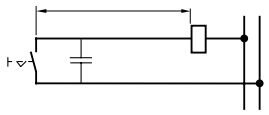
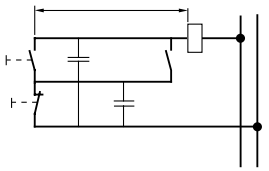
Influence of the length of conductors used in contactor control circuit

Single control line length



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



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 AC operated coil)

Under certain conditions, **an AC 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 Uc).

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 "**Rp**" resistance in parallel with the contactor coil:

$$R_P = \frac{10^3}{C} \quad \text{(with C in µF)}$$

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.

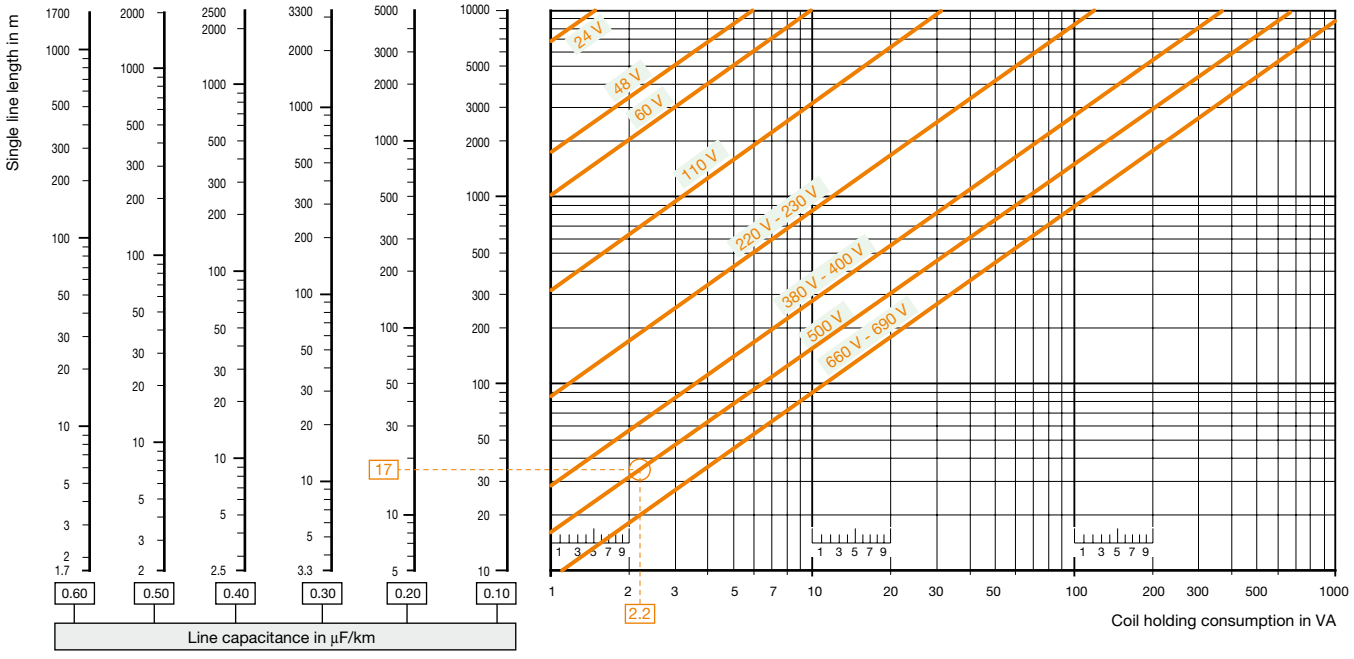
Coil holding consumption (average value)

3-pole contactors	AC control supply 50/60 Hz
AF09, AF12, AF16, AF26, AF30, AF38	2.2 VA
AF09Z, AF12Z, AF16Z, AF26Z, AF30Z, AF38Z	1.7 VA
AF40, AF52, AF65, AF80, AF96	4 VA
AF116, AF140, AF146	8.9 VA
AF190, AF205	9.3 VA
AF265, AF305, AF370	16.6 VA
AF400, AF460, AF580, AF750, AF1250	12 VA
AF1350, AF1650, AF2050, AF2650	48 VA

4-pole contactors	AC control supply 50/60 Hz
AF09, AF16, AF26, AF38	2.2 VA
AF09Z, AF16Z, AF26Z, AF38Z	1.7 VA
AF40, AF52, AF80	4 VA
AF116, AF140, AF190, AF205	8 VA
AF265, AF305, AF370	16 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.



Example **AF16 contactor:** Coil voltage Uc = 500 V, 50 Hz, 2.2 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: 17 m.

1SBC100063S0201

NF 4-pole and 8-pole contactor relays

Ordering details 4-pole contactor relays

NF AC / DC operated **5**/324

NFZ AC / DC operated - low consumption **5**/325

Main accessories **5**/326

Ordering details 8-pole contactor relays

NF AC / DC operated **5**/328

NFZ AC / DC operated - low consumption **5**/329

Main accessories **5**/330

Technical data 5/332

Terminal marking and positioning 5/335

Main dimensions 5/337

Voltage code table 5/417

NF 4-pole contactor relays
AC / DC operated

NF22E

Description

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

These contactor relays are of the block type design with:

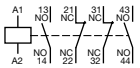
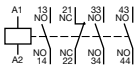
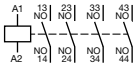
– 4 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)

– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
- can manage large control voltage variations
- only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
- reduced panel energy consumption
- very distinct closing and opening.

– built-in surge suppression

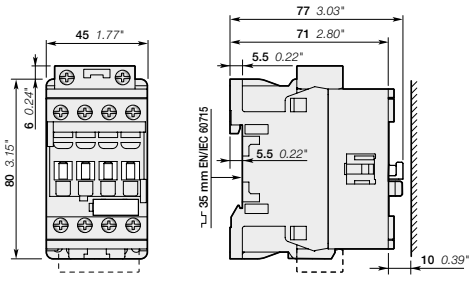
– add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

Number of contacts	Rated control circuit voltage Uc min. ... Uc max.			Type	Order code		Weight Pkg (1 pce)
	V 50/60 Hz	V DC					kg
	24...60	-	(1)	NF22E-41	1SBH137001R4122		0.270
	48...130	48...130		NF22E-12	1SBH137001R1222		0.270
	100...250	100...250		NF22E-13	1SBH137001R1322		0.270
	250...500	250...500		NF22E-14	1SBH137001R1422		0.310
	24...60	-	(1)	NF31E-41	1SBH137001R4131		0.270
	48...130	48...130		NF31E-12	1SBH137001R1231		0.270
	100...250	100...250		NF31E-13	1SBH137001R1331		0.270
	250...500	250...500		NF31E-14	1SBH137001R1431		0.310
	24...60	-	(1)	NF40E-41	1SBH137001R4140		0.270
	48...130	48...130		NF40E-12	1SBH137001R1240		0.270
	100...250	100...250		NF40E-13	1SBH137001R1340		0.270
	250...500	250...500		NF40E-14	1SBH137001R1440		0.310

(1) For 24...60 V 50/60 Hz - 20...60 V DC, use NF..E-21.

Main dimensions mm, *inches*



NF22E, NF31E, NF40E

1SBC101558S0201 - Rev. B

NFZ 4-pole contactor relays
AC / DC operated - low consumption

NFZ22E

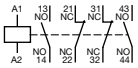
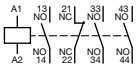
Description

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

These contactor relays are of the block type design with:

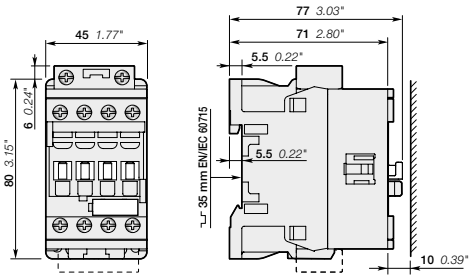
– 4 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
  - can manage large control voltage variations
  - only 4 control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

Ordering details

Number of contacts	Rated control circuit voltage Uc min. ... Uc max.		Type	Order code		Weight Pkg (1 pce)
	V 50/60 Hz	V DC				kg
	–	12...20	NFZ22E-20	1SBH136001R2022		0.310
	24...60	20...60	NFZ22E-21	1SBH136001R2122		0.310
	48...130	48...130	NFZ22E-22	1SBH136001R2222		0.310
	100...250	100...250	NFZ22E-23	1SBH136001R2322		0.310
	–	12...20	NFZ31E-20	1SBH136001R2031		0.310
	24...60	20...60	NFZ31E-21	1SBH136001R2131		0.310
	48...130	48...130	NFZ31E-22	1SBH136001R2231		0.310
	100...250	100...250	NFZ31E-23	1SBH136001R2331		0.310
	–	12...20	NFZ40E-20	1SBH136001R2040		0.310
	24...60	20...60	NFZ40E-21	1SBH136001R2140		0.310
	48...130	48...130	NFZ40E-22	1SBH136001R2240		0.310
	100...250	100...250	NFZ40E-23	1SBH136001R2340		0.310

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

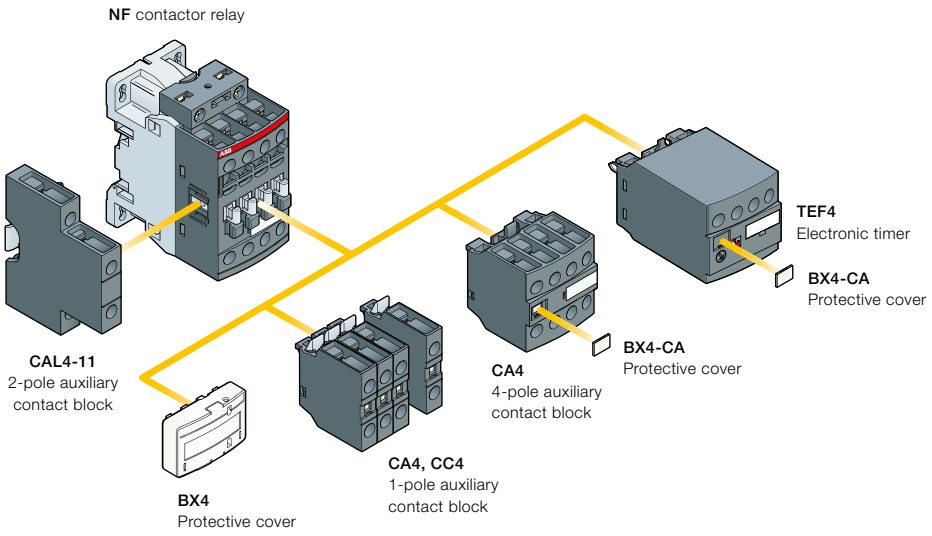
Main dimensions mm, *inches*



NFZ22E, NFZ31E, NFZ40E

NF 4-pole contactor relays
Main accessories

Contactor relays and main accessories (other accessories available)



Main accessory fitting details

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

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

1SBC101518S0201 - Rev. A

NF 4-pole contactor relays
Main accessories

CA4-10

CA4-22N

CAL4-11

TEF4-ON

LDC4

BX4

BX4-CA

Ordering details (1)

For contactor relays	Auxiliary contacts				Type	Order code		Pkg qty	Weight (1 pce) kg
Front-mounted instantaneous auxiliary contact blocks									
4-pole NF	1	0	–	–	CA4-10	1SBN010110R1010		1	0.014
	1	0	–	–	CA4-10-T	1SBN010110T1010		10	0.014
	0	1	–	–	CA4-01	1SBN010110R1001		1	0.014
	0	1	–	–	CA4-01-T	1SBN010110T1001		10	0.014
	4	0	–	–	CA4-40N	1SBN010140R1240		1	0.055
	3	1	–	–	CA4-31N	1SBN010140R1231		1	0.055
	2	2	–	–	CA4-22N	1SBN010140R1222		1	0.055
	1	3	–	–	CA4-13N	1SBN010140R1213		1	0.055
NF..40E	0	4	–	–	CA4-04N	1SBN010140R1204		1	0.055
Front-mounted auxiliary contact blocks with N.O. leading contact and N.C. lagging contact									
4-pole NF	–	–	1	0	CC4-10	1SBN010111R1010		1	0.014
	–	–	0	1	CC4-01	1SBN010111R1001		1	0.014
Side-mounted instantaneous auxiliary contact blocks									
NF	1	1	–	–	CAL4-11	1SBN010120R1011		1	0.040
	1	1	–	–	CAL4-11-T	1SBN010120T1011		10	0.040

For contactors	Time delay range selected by switch	Delay type	Auxiliary contacts		Type	Order code		Pkg qty	Weight (1 pce) kg
Electronic timers									
NF	0.1...1 s 1...10 s 10...100 s	ON-delay	1	1	TEF4-ON	1SBN020112R1000		1	0.065
		OFF-delay	1	1	TEF4-OFF	1SBN020114R1000		1	0.065

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

Additional coil terminal block					
NF	LDC4	1SBN070156T1000		10	0.010
Protective covers					
All 1-stack contactor relays	BX4	1SBN110108T1000		10	0.006
4-pole CA4 auxiliary contact blocks and TEF4 electronic timer	BX4-CA	1SBN110109W1000		50	0.001

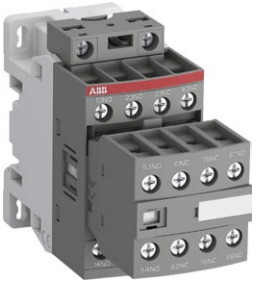
(1) For more information, refer to main catalog "Accessories" section.

1SBC101519S0201 - Rev. A

NF 8-pole contactor relays
AC / DC operated

NF44E

NF33/11



NF51/11

5

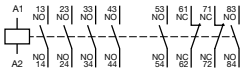
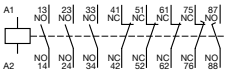
Description

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

These contactor relays are of the block type design with:

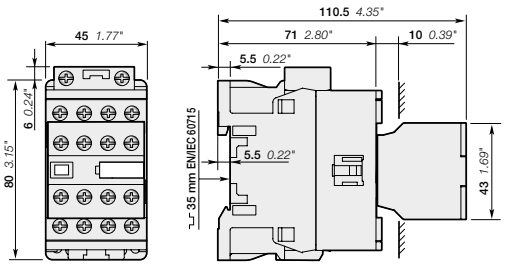
– 8 poles with a permanently fixed 4-pole auxiliary contact block. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol) except for NF33/11 and NF51/11 variants
– overlapping of lagging / leading contacts for NF33/11 and NF51/11 variants
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
  - can manage large control voltage variations
  - only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - reduced panel energy consumption
  - very distinct closing and opening
– built-in surge suppression
– add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

Number of contacts 1st stack	2nd stack	Rated control circuit voltage Uc min. ... Uc max. V 50/60 Hz	V DC		Type	Order code		Weight Pkg (1 pce) kg
8-pole contactor relays								
		24...60	-	(1)	NF44E-41	1SBH137001R4144		0.320
		48...130	48...130		NF44E-12	1SBH137001R1244		0.320
		100...250	100...250		NF44E-13	1SBH137001R1344		0.320
		250...500	250...500		NF44E-14	1SBH137001R1444		0.360
		24...60	-	(1)	NF53E-41	1SBH137001R4153		0.320
		48...130	48...130		NF53E-12	1SBH137001R1253		0.320
		100...250	100...250		NF53E-13	1SBH137001R1353		0.320
		250...500	250...500		NF53E-14	1SBH137001R1453		0.360
		24...60	-	(1)	NF62E-41	1SBH137001R4162		0.320
		48...130	48...130		NF62E-12	1SBH137001R1262		0.320
		100...250	100...250		NF62E-13	1SBH137001R1362		0.320
		250...500	250...500		NF62E-14	1SBH137001R1462		0.360
		24...60	-	(1)	NF71E-41	1SBH137001R4171		0.320
		48...130	48...130		NF71E-12	1SBH137001R1271		0.320
		100...250	100...250		NF71E-13	1SBH137001R1371		0.320
		250...500	250...500		NF71E-14	1SBH137001R1471		0.360
		24...60	-	(1)	NF80E-41	1SBH137001R4180		0.320
		48...130	48...130		NF80E-12	1SBH137001R1280		0.320
		100...250	100...250		NF80E-13	1SBH137001R1380		0.320
		250...500	250...500		NF80E-14	1SBH137001R1480		0.360
8-pole contactor relays with overlapping of lagging / leading contacts								
		24...60	-	(1)	NF33/11-41	1SBH137001R4139		0.320
		48...130	48...130		NF33/11-12	1SBH137001R1239		0.320
		100...250	100...250		NF33/11-13	1SBH137001R1339		0.320
		250...500	250...500		NF33/11-14	1SBH137001R1439		0.320
		24...60	-	(1)	NF51/11-41	1SBH137001R4159		0.320
		48...130	48...130		NF51/11-12	1SBH137001R1259		0.320
		100...250	100...250		NF51/11-13	1SBH137001R1359		0.320
		250...500	250...500		NF51/11-14	1SBH137001R1459		0.320

(1) For 24...60 V 50/60 Hz - 20...60 V DC, use NF..-21.

Main dimensions mm, *inches*



NF44E, NF53E, NF62E, NF71E, NF80E, NF33/11, NF51/11

1SBC101560S0201 - Rev. C

NFZ 8-pole contactor relays
AC / DC operated

NFZ44E

NFZ33/11

NFZ51/11

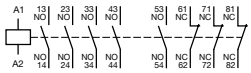
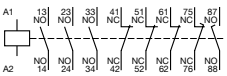
Description

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

These contactor relays are of the block type design with:

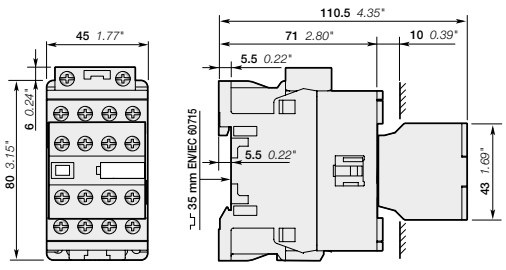
– 8 poles with a permanently fixed 4-pole auxiliary contact block. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol) except for NFZ33/11 and NFZ51/11 variants
– overlapping of lagging / leading contacts for NFZ33/11 and NFZ51/11 variants
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
  - can manage large control voltage variations
  - only 4 coils to cover control voltages between 24 ... 250 V 50/60 Hz and 12 ... 250 V DC
  - allow direct control by PLC-output ≥ 24 V DC 500 mA
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
– built-in surge suppression
– add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

Number of contacts 1st stack	2nd stack	Rated control circuit voltage Uc min. ... Uc max. V 50/60 Hz	V DC	Type	Order code		Weight Pkg (1 pce) kg
8-pole contactor relays							
		-	12...20	NFZ44E-20	1SBH136001R2044		0.360
		24...60	20...60	NFZ44E-21	1SBH136001R2144		0.360
		48...130	48...130	NFZ44E-22	1SBH136001R2244		0.360
		100...250	100...250	NFZ44E-23	1SBH136001R2344		0.360
		-	12...20	NFZ53E-20	1SBH136001R2053		0.360
		24...60	20...60	NFZ53E-21	1SBH136001R2153		0.360
		48...130	48...130	NFZ53E-22	1SBH136001R2253		0.360
		100...250	100...250	NFZ53E-23	1SBH136001R2353		0.360
		-	12...20	NFZ62E-20	1SBH136001R2062		0.360
		24...60	20...60	NFZ62E-21	1SBH136001R2162		0.360
		48...130	48...130	NFZ62E-22	1SBH136001R2262		0.360
		100...250	100...250	NFZ62E-23	1SBH136001R2362		0.360
		-	12...20	NFZ71E-20	1SBH136001R2071		0.360
		24...60	20...60	NFZ71E-21	1SBH136001R2171		0.360
		48...130	48...130	NFZ71E-22	1SBH136001R2271		0.360
		100...250	100...250	NFZ71E-23	1SBH136001R2371		0.360
		-	12...20	NFZ80E-20	1SBH136001R2080		0.360
		24...60	20...60	NFZ80E-21	1SBH136001R2180		0.360
		48...130	48...130	NFZ80E-22	1SBH136001R2280		0.360
		100...250	100...250	NFZ80E-23	1SBH136001R2380		0.360
8-pole contactor relays with overlapping of lagging / leading contacts							
		-	12...20	NFZ33/11-20	1SBH136001R2039		0.360
		24...60	20...60	NFZ33/11-21	1SBH136001R2139		0.360
		48...130	48...130	NFZ33/11-22	1SBH136001R2239		0.360
		100...250	100...250	NFZ33/11-23	1SBH136001R2339		0.360
		-	12...20	NFZ51/11-20	1SBH136001R2059		0.360
		24...60	20...60	NFZ51/11-21	1SBH136001R2159		0.360
		48...130	48...130	NFZ51/11-22	1SBH136001R2259		0.360
		100...250	100...250	NFZ51/11-23	1SBH136001R2359		0.360

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

Main dimensions mm, *inches*

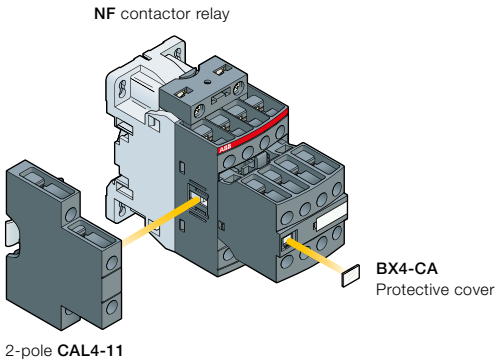


NFZ44E, NFZ53E, NFZ62E, NFZ71E, NFZ80E, NFZ33/11, NFZ51/11

1SBC101561S0201 - Rev. B

NF 8-pole contactor relays
Main accessories

Contactor relays and main accessories (other accessories available)



Main accessory fitting details

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

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

1SBC101598S0201 - Rev. B

NF 8-pole contactor relays
Main accessories

CAL4-11

LDC4

BX4-CA

Ordering details (1)

For contactor relays	Auxiliary contacts				Type	Order code		Pkg qty	Weight (1 pce) kg
Side-mounted instantaneous auxiliary contact blocks									
NF	1	1	–	–	CAL4-11	1SBN010120R1011		1	0.040
	1	1	–	–	CAL4-11-T	1SBN010120T1011		10	0.040
Additional coil terminal block									
NF					LDC4	1SBN070156T1000		10	0.010
Protective covers									
NF					BX4-CA	1SBN110109W1000		50	0.001

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

5

1SBC101654S0201 - Rev. A

NF contactor relays
Technical data

Contact utilization characteristics according to IEC

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

Contact utilization characteristics according to UL / CSA

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

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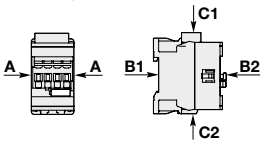
NF contactor relays
Technical data

General technical data

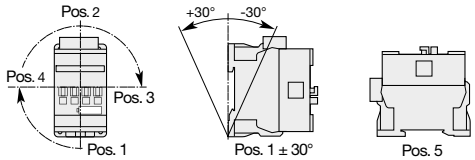
Contactor relay types	**AC / DC operated**	**NF**
Rated insulation voltage Ui		
acc. to IEC 60947-5-1		690 V
acc. to UL / CSA		600 V
Rated impulse withstand voltage Uimp.		6 kV
Electromagnetic compatibility		Devices complying with IEC 60947-1 / EN 60947-1 - Environment A and B (1)
Ambient air temperature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

(1) Environment B: all NF contactor relays produced since week 08-2013. NF..E-12 (48...130 V 50/60 Hz-DC) compliant to environment A only.
For environment B: select NF..E-22.

Magnet system characteristics

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

Mounting characteristics

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

1SBC101563S0201 - Rev. A

NF contactor relays
Technical data

Connecting characteristics

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

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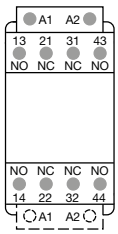
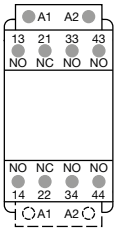
NF contactor relays
Terminal marking and positioning

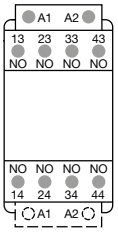
Standard devices without addition of auxiliary contacts



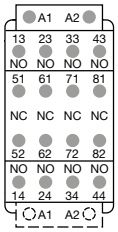
NF..22E



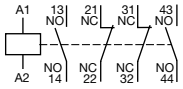
NF..31E



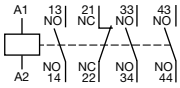
NF..40E



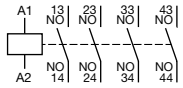
NF..44E



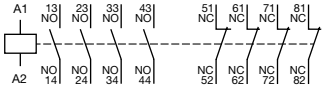
NF..22E



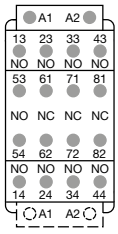
NF..31E



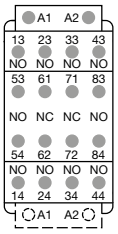
NF..40E



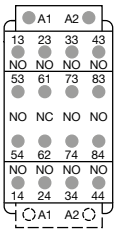
NF..44E



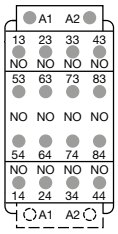
NF..53E



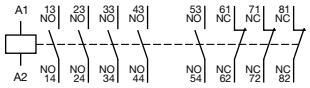
NF..62E



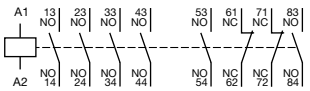
NF..71E



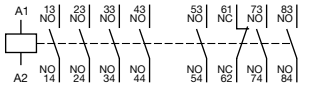
NF..80E



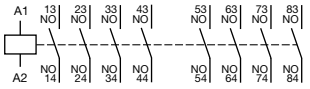
NF..53E



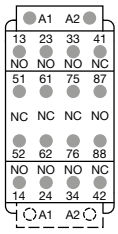
NF..62E



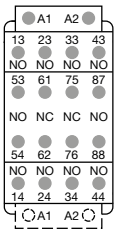
NF..71E



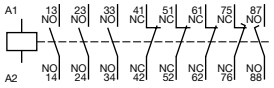
NF..80E



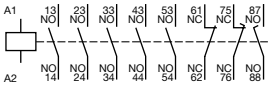
NF..33/11



NF..51/11

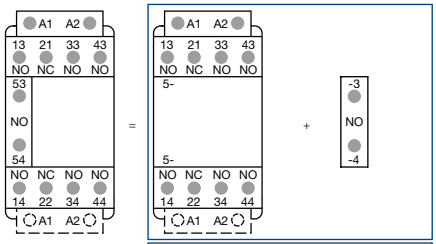


NF..33/11

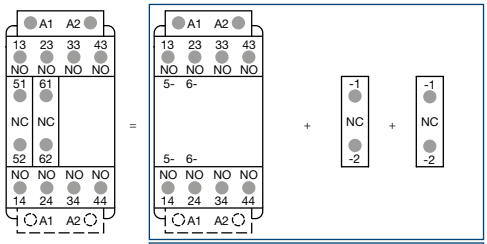


NF..51/11

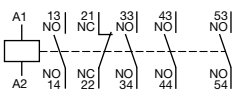
Other possible contact combinations with auxiliary contacts added by the user



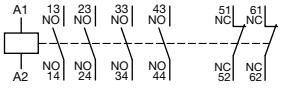
Combination 41 = NF..31E + CA4-10



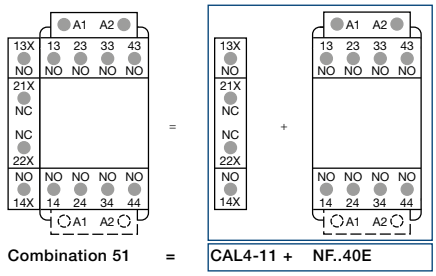
Combination 42 = NF..40E + CA4-01+CA4-01



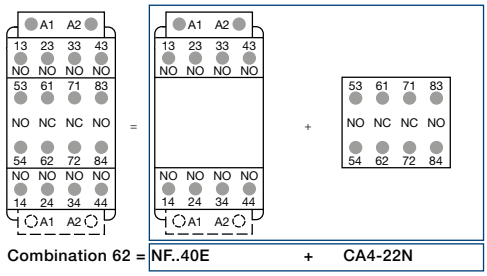
Combination 41 E



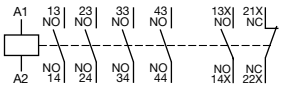
Combination 42 E



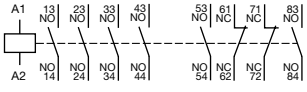
Combination 51 = CAL4-11 + NF..40E



Combination 62 = NF..40E + CA4-22N



Combination 51 E



Combination 62 E

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

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NF add-on auxiliary contacts
Terminal marking and positioning

1-pole auxiliary contacts

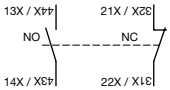
CA4-01

CA4-10

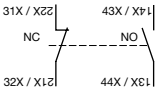
CC4-01

CC4-10

2-pole auxiliary contacts

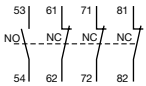


CAL4-11
(Left side-mounted)

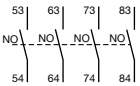


CAL4-11
(Right side-mounted)

4-pole auxiliary contacts

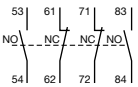


CA4-13N

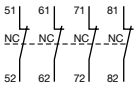


CA4-40N

CA4-31N



CA4-22N



CA4-04N

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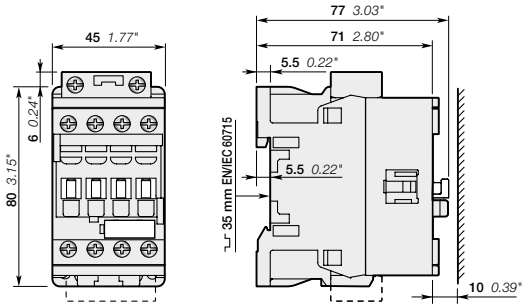
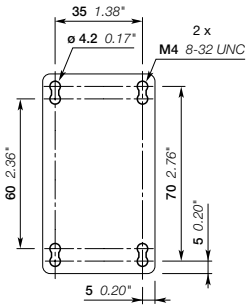
NF contactor relays

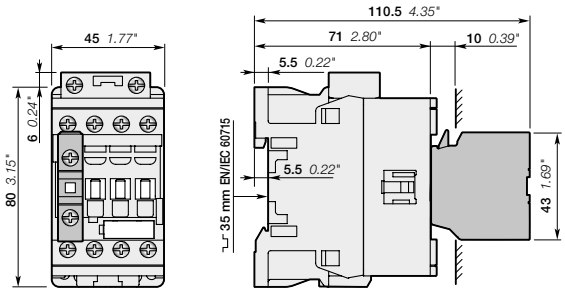
Main dimensions mm, *inches*



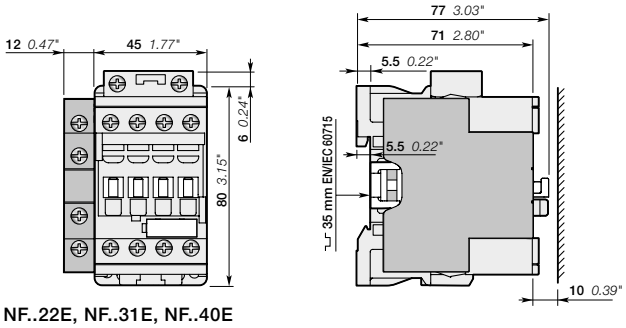
NF..22E, NF..31E, NF..40E



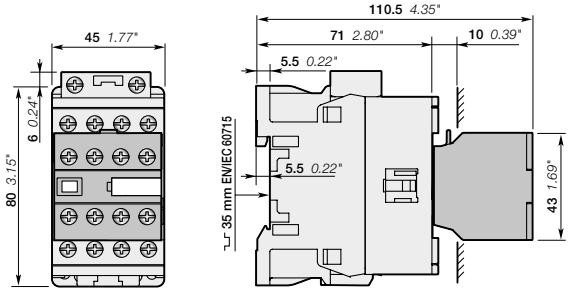
NF



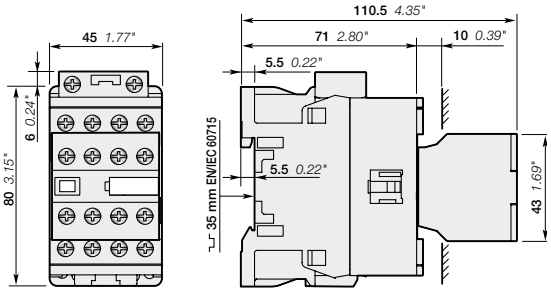
NF..22E, NF..31E, NF..40E
+ CA4, CC4 1-pole auxiliary contact block



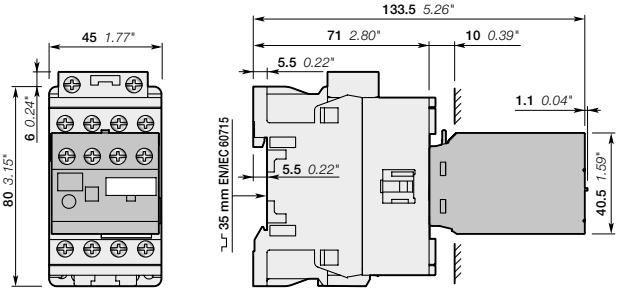
NF..22E, NF..31E, NF..40E
+ CAL4-11 2-pole auxiliary contact block



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



NF..44E, NF..53E, NF..62E, NF..71E, NF..80E, NF..33/11, NF..51/11



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

Note: Contactor relay lateral distance to grounded component 2 mm *0.08*" min.

Accessories

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

Auxiliary contact blocks **5**/342
Electronic timers **5**/355
Interlocks **5**/358
Impulse contact blocks **5**/360
Interface relays **5**/362
Mechanical latching units **5**/364
Other accessories **5**/366
Additional terminal blocks **5**/368
Terminal shrouds **5**/369
Connections **5**/370
Terminal connecting strips and shorting bars **5**/371
Connection accessories for starting solutions **5**/372
Connection sets for star-delta starter **5**/373
Connection bars **5**/374
Mounting plates **5**/375
Adapter plates **5**/376
Low Voltage Ride Through (LVRT) modules **5**/377
Contactor coils, main contact sets and arc chutes **5**/378

Accessories for UA, UA..RA, GA75, GAE75, GAF contactors

Auxiliary contact blocks **5**/382
Electronic timers **5**/388
Mechanical and electrical interlock units **5**/392
CA5, CE5, CAL, CEL18 and TEF5 fitting details **5**/394
Function markers - Mounting piece **5**/395
Surge suppressors for contactor coils **5**/396
Interface relays **5**/398
Mechanical latching units **5**/400
Additional terminal blocks and others accessories **5**/402
Terminals for control lead connections **5**/403
Connection bar for contactors **5**/404
Contactor coils and main contact sets **5**/405

Accessories for EK550, EK1000 4-pole contactors

Auxiliary contact blocks **5**/408
Mechanical interlock units, terminal shrouds and connection sets **5**/412
Surge suppressors for contactor coils **5**/413
Main contact sets - Arc chutes **5**/415
Contactor coils **5**/416

Voltage code table **5/417**

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

Auxiliary contact blocks **5**/342
Electronic timers **5**/355
Interlocks **5**/358
Impulse contact blocks **5**/360
Interface relays **5**/362
Mechanical latching units **5**/364
Other accessories **5**/366
Additional terminal blocks **5**/368
Terminal shrouds **5**/369
Terminals for control lead connections **5**/370
Connections **5**/371
Terminal connecting strips and shorting bars **5**/372
Connection accessories for starting solutions **5**/373
Connection sets for star-delta starter **5**/374
Connection bars **5**/375
Adapter plates **5**/376
Low Voltage Ride Through (LVRT) modules **5**/377
Contactor coils, main contact sets and arc chutes **5**/378

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

CA4-10

CAL4-11

CA4-22E

CAT4-11E

Description

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

Types of auxiliary contact blocks for front mounting:

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

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

Types of auxiliary contact blocks for side mounting:

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

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

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

Ordering details (1)

For contactors	Auxiliary contacts	Type	Order code		Pkg qty	Weight (1 pce) kg
Front-mounted instantaneous auxiliary contact blocks						
AF09 ... AF96	1 0 – –	CA4-10	1SBN010110R1010		1	0.014
4-pole NF	1 0 – –	CA4-10-T	1SBN010110T1010		10	0.014
	0 1 – –	CA4-01	1SBN010110R1001		1	0.014
	0 1 – –	CA4-01-T	1SBN010110T1001		10	0.014
AF09 ... AF16..-30-10	2 2 – –	CA4-22M	1SBN010140R1122		1	0.055
	3 1 – –	CA4-31M	1SBN010140R1131		1	0.055
	1 3 – –	CA4-13M	1SBN010140R1113		1	0.055
	0 4 – –	CA4-04M	1SBN010140R1104		1	0.055
AF26 ... AF96..-30-00	2 2 – –	CA4-22E	1SBN010140R1022		1	0.055
AF09 ... AF80..-40-00	3 1 – –	CA4-31E	1SBN010140R1031		1	0.055
AF09 ... AF80..-22-00	4 0 – –	CA4-40E	1SBN010140R1040		1	0.055
AF26 ... AF96..-30-00 AF09 ... AF16..-40-00 AF40 ... AF80..-40-00	0 4 – –	CA4-04E	1SBN010140R1004		1	0.055
AF09 ... AF16..-30-01	2 2 – –	CA4-22U	1SBN010140R1322		1	0.055
	3 1 – –	CA4-31U	1SBN010140R1331		1	0.055
	4 0 – –	CA4-40U	1SBN010140R1340		1	0.055
4-pole NF	2 2 – –	CA4-22N	1SBN010140R1222		1	0.055
	3 1 – –	CA4-31N	1SBN010140R1231		1	0.055
	4 0 – –	CA4-40N	1SBN010140R1240		1	0.055
	1 3 – –	CA4-13N	1SBN010140R1213		1	0.055
NF..40E	0 4 – –	CA4-04N	1SBN010140R1204		1	0.055
Front-mounted auxiliary contact blocks with N.O. leading contact and N.C. lagging contact						
AF09 ... AF96	– – 1 0	CC4-10	1SBN010111R1010		1	0.014
4-pole NF	– – 0 1	CC4-01	1SBN010111R1001		1	0.014
Side-mounted instantaneous auxiliary contact blocks						
AF09 ... AF96	1 1 – –	CAL4-11	1SBN010120R1011		1	0.040
NF	1 1 – –	CAL4-11-T	1SBN010120T1011		10	0.040
Front-mounted instantaneous auxiliary contact and A1/A2 coil terminal blocks						
AF09 ... AF16..-30-10	1 1 – –	CAT4-11M	1SBN010151R1111		1	0.040
AF26 ... AF65..-30-00 AF09 ... AF52..-40-00 AF09 ... AF40..-22-00	1 1 – –	CAT4-11E	1SBN010151R1011		1	0.040
AF09 ... AF16..-30-01	1 1 – –	CAT4-11U	1SBN010151R1311		1	0.040

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

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

Contact utilization characteristics according to IEC

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

Contact utilization characteristics according to UL / CSA

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

Connecting characteristics

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

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

CE5-10W

Description

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

Types of auxiliary contact blocks for front mounting:

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

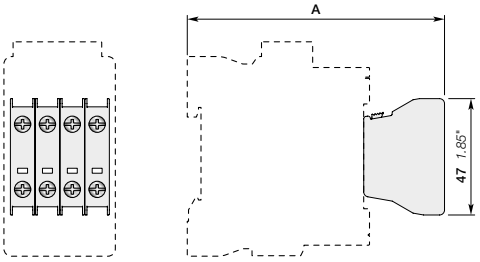
The auxiliary contact blocks are equipped with screw type connecting terminals delivered open, protected-against accidental direct contact and bear the corresponding function marking.

Ordering details (1)

For contactors	Auxiliary contacts	Type	Order code		Pkg qty	Weight (1 pce) kg
AF09 ... AF96 NF	1 – – –	CE5-10D0.1	1SBN010015R1010		1	0.020
	– 1 – –	CE5-01D0.1	1SBN010015R1001		1	0.020
	1 – – –	CE5-10D2	1SBN010017R1010		1	0.020
	– 1 – –	CE5-01D2	1SBN010017R1001		1	0.020
	1 – – –	CE5-10W0.1	1SBN010016R1010		1	0.020
	– 1 – –	CE5-01W0.1	1SBN010016R1001		1	0.020
	1 – – –	CE5-10W2	1SBN010018R1010		1	0.020
	– 1 – –	CE5-01W2	1SBN010018R1001		1	0.020

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

Main dimensions mm, *inches*



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

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Auxiliary contact blocks for severe industrial environments

Technical data

		Front mounted	
Types		1-pole **CE5-..0.1**	1-pole **CE5-..2**

Contact utilization characteristics according to IEC

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

Contact utilization characteristics according to UL / CSA

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

Connecting characteristics

Connection capacity (min. ... max.)			
Rigid solid	**1 x**	1...4 mm²	
	2 x	1...4 mm²	
Flexible with ferrule	**1 x**	0.75...2.5 mm²	
	2 x	0.75...2.5 mm²	
Lugs	**L ≤**	7.7 mm	
	I >	3.7 mm	
Connecting capacity acc. to UL / CSA	**1 or 2 x**	AWG 18...14	
Tightening torque		1 Nm	
Degree of protection	**Terminals**	IP20	
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529	**Microswitches**	IP40 for CE5-..D0.1	IP40 for CE5-..D2
		IP67 for CE5-..W0.1	IP67 for CE5-..W2
Screw terminals		Delivered in open position, screws of unused terminals must be tightened	
All terminals		M3.5	
Screwdriver type		Flat Ø 5.5 / Pozidriv 2	

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

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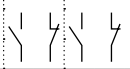
Auxiliary contact blocks for severe industrial environments

For AF contactors

Main accessory fitting details

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

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

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1SBC101907S0201 - Rev. A

Auxiliary contact blocks for severe industrial environments

For NF contactor relays

Main accessory fitting details

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

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

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Auxiliary contact blocks for AF116 ... AF2650 contactors

1SFC101071V0001

CAL19-11

1SFC101082V0001

CAL18-11

Description

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

Types of auxiliary contact blocks for side mounting:

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

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

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

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

Ordering details (1)

For contactors	Auxiliary contacts		Type	Order code		Pkg qty	Weight (1 pce) kg
Side-mounted instantaneous auxiliary contact blocks							
AF116 ... AF370	1	1	CAL19-11	1SFN010820R1011		2	0.040
	1	1	CAL19-11B	1SFN010820R3311		2	0.040
AF400 ... AF2650	1	1	CAL18-11	1SFN010720R1011		2	0.050
	1	1	CAL18-11B	1SFN010720R3311		2	0.050

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

Auxiliary contact blocks for AF116 ... AF2650 contactors

Technical data

Types		CAL18	CAL19
Contact utilization characteristics according to IEC			
Standards		IEC 60947-5-1 and EN 60947-5-1	
Rated insulation voltage Ui acc. to IEC 60947-5-1		690 V	
Rated impulse withstand voltage Uimp.		6 kV	
Rated operational voltage Ue max.		24...690 V AC	
Conventional thermal current Ith - θ ≤ 40 °C		16 A	
Rated frequency (without derating)		50/60 Hz	
Ie / Rated operational current AC-15			
acc. to IEC 60947-5-1	**24-127 V 50/60 Hz**	6 A	
	220-240 V 50/60 Hz	4 A	
	380-440 V 50/60 Hz	3 A	
	500-690 V 50/60 Hz	2 A	
Making capacity acc. to IEC 60947-5-1		10 x Ie AC-15	
Breaking capacity acc. to IEC 60947-5-1		10 x Ie AC-15	
Ie / Rated operational current DC-13			
acc. to IEC 60947-5-1	**24 V DC**	6 A / 144 W	3 A / 72 W
	48 V DC	2.8 A / 134 W	1.5 A / 72 W
	72 V DC	1 A / 72 W	1 A / 72 W
	110 V DC	0.55 A / 60 W	0.55 A / 60 W
	125 V DC	0.55 A / 69 W	0.55 A / 69 W
	220 V DC	0.3 A / 66 W	0.3 A / 69 W
	250 V DC	0.3 A / 75 W	0.3 A / 75 W
Short-circuit protection device gG type fuse		10 A	
Rated short-time withstand current Icw	**for 1.0 s**	100 A	
θ = 40 °C	**for 0.1 s**	140 A	
Minimum switching capacity		24 V / 50 mA (0.5 million of operating cycles)	24 V / 50 mA
with failure rate acc. to IEC 60947-5-4		≤ 10^{-6}	
Power dissipation per pole at 6 A		0.15 W	
Mechanical durability Number of operating cycles		3 millions (A/AF400 ... AF750)	
		0.5 million (AF1250 ... AF2050)	5 millions operating cycles
Max. switching frequency		3600 cycles/h	300 cycles/h
Max. electrical switching frequency	**AC-15**	1200 cycles/h	300 cycles/h
	DC-13	900 cycles/h	300 cycles/h
Mirror contacts acc. to annex F of IEC 60947-4-1		N.C. auxiliary contacts are mirror contacts (1)	

(1) CAL19: for 3-pole contactors only.

Contact utilization characteristics according to UL / CSA

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

Connecting characteristics

Connection capacity (min. ... max.)			
	Solid / stranded	**1 x**	1...4 mm²
		2 x	1...4 mm²
	Flexible with non insulated ferrule	**1 x**	0.75...2.5 mm²
		2 x	0.75...2.5 mm²
	Flexible with insulated ferrule	**1 x**	0.75...2.5 mm²
		2 x	0.75...2.5 mm²
	Lugs	**L ≤**	8 mm
		I >	3.7 mm
Connection capacity acc. to UL/CSA		**1 or 2 x**	AWG18...14
Stripping length			9 mm
Tightening torque			1 Nm
Degree of protection			
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			IP20
Screw terminals			Delivered in open position, screws of unused terminals must be tightened
All terminals			M3.5
Screwdriver type			Flat Ø 5.5 / Pozidriv 2

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Auxiliary contact blocks for AF116 ... AF2650 contactors for severe industrial environments

1SFC101214V0001

CEL19

1SFC101083V0001

CEL18

Description

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

Types of auxiliary contact blocks for side mounting:

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

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

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

Ordering details (1)

For contactors	Auxiliary contacts		Type	Order code		Pkg qty	Weight (1 pce) kg
Side-mounting instantaneous auxiliary contact blocks							
AF116 ... AF370	1	0	CEL19-10	1SFN010832R1010		1	0.040
	0	1	CEL19-01	1SFN010832R1001		1	0.040
AF400 ... AF2650	1	0	CEL18-10	1SFN010716R1010		1	0.050
	0	1	CEL18-01	1SFN010716R1001		1	0.050

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

Auxiliary contact blocks for AF116 ... AF2650 contactors for severe industrial environments

Technical data

Types			CEL18, CEL19
Contact utilization characteristics according to IEC			
Standards			IEC 60947-5-1 and EN 60947-5-1
Rated insulation voltage Ui acc. to IEC 60947-5-1			250 V
Rated operational voltage Ue max.			125 V
Conventional thermal current Ith - θ ≤ 40 °C			0.1 A
Ie / Rated operational current AC-14			
acc. to IEC 60947-5-1		**24-127 V 50/60 Hz**	0.1 A
Making capacity acc. to IEC 60947-5-1			6 x Ie AC-14
Breaking capacity acc. to IEC 60947-5-1			6 x Ie AC-14
Ie / Rated operational current DC-12			
acc. to IEC 60947-5-1		**24 V DC**	0.1 A
		48 V DC	0.1 A
		72 V DC	0.1 A
		110 V DC	0.1 A
		220 V DC	–
Short-circuit protection device			0.1 A (FF type fuses) (1)
Minimum switching capacity			
with failure rate acc. to IEC 60947-5-4			3 V / 1 mA
Mechanical durability	Number of operating cycles		1 million (2)
	Max. switching frequency		1200 cycles/h (2)
Electrical durability	Number of operating cycles		0.7 millions (2)
	Max. switching frequency	**AC-14, AC15**	1200 cycles/h (2)
		DC-12	900 cycles/h (2)
Mirror contacts acc. to annex F of IEC 60947-4-1			N.C. auxiliary contacts are mirror contacts
Contact utilization characteristics according to UL / CSA			
Standards			UL 508, CSA C22.2 N°14
Max. operational voltage			125 V
Pilot duty			
AC thermal rated current			0.1 A
Connecting characteristics			
Connection capacity (min. ... max.)			
Rigid solid		**1 x**	1...4 mm²
		2 x	1...4 mm²
Flexible with ferrule		**1 x**	0.75...2.5 mm²
		2 x	0.75...2.5 mm²
Lugs		**L ≤**	7.7 mm
		I >	3.7 mm
Connection capacity acc. to UL/CSA		**1 or 2 x**	AWG 18...14
Tightening torque			1 Nm
Degree of protection		**Terminals**	IP20
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		**Microswitches**	IP67
Screw terminals			Delivered in open position, screws of unused terminals must be tightened
All terminals			M3.5
Screwdriver type			Flat Ø 5.5 / Pozidriv 2

(1) or HRC fuses for very fast action (6.3 x 32 mm size).
(2) For CEL19, please consult us.

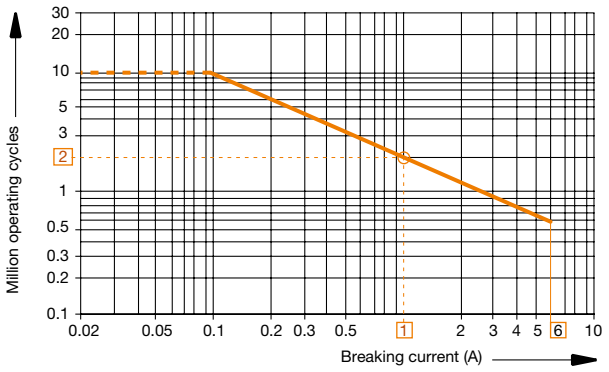
1SFC101129C0201 - Rev. A

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

Electrical durability for AC-15 utilization category

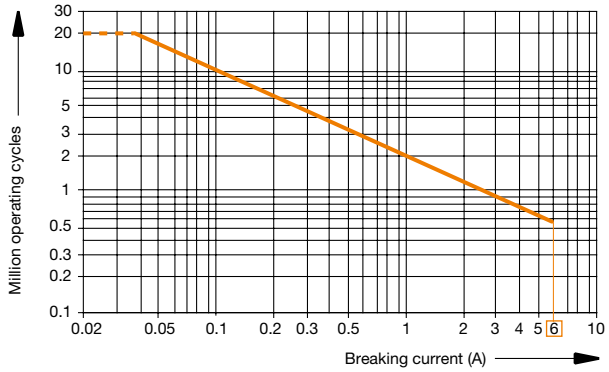
AC-15 utilization category according to IEC 60947-5-1 / EN 60947-5-1:
- making current: 10 x Ie with cos φ = 0.7 and Ue
- breaking current: Ie with cos φ = 0.4 and Ue.

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



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

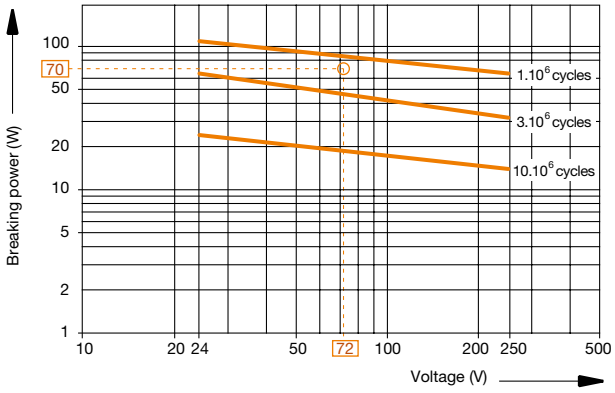
Example:
Breaking current = 1 A
On the opposite curve at intersection "O" 1 A the corresponding value for the electrical durability is approximately 2 millions operating cycles.



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

Electrical durability for DC-13 utilization category

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



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

Example:
Control of DC electro-magnet:
Ue voltage = 72 V DC 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 millions operating cycles.

1SBC101641S0201 - Rev. A

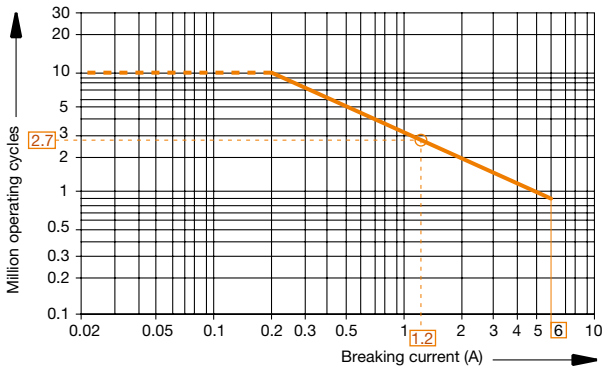
Auxiliary contact blocks for AF116 ... AF2650 contactors
Electrical durability

Electrical durability for AC-15 utilization category

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

– making current: 10 x Ie with cos φ = 0.7 and Ue
– breaking current: Ie with cos φ = 0.4 and Ue.

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



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

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

1SFC101117C0201 - Rev. A

Add-on auxiliary contacts
Terminal marking and positioning

1-pole auxiliary contacts

CA4-01

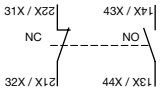
CA4-10

CC4-01

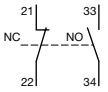
CC4-10

2-pole auxiliary contacts

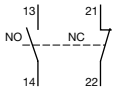
CAL4-11
(Left-side mounted)



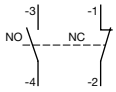
CAL4-11
(Right-side mounted)



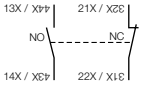
CAT4-11M



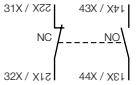
CAT4-11E



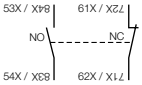
CAT4-11U



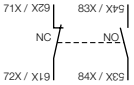
CAL18-11, CAL19-11
(Left-side mounted)



CAL18-11, CAL19-11
(Right-side mounted)

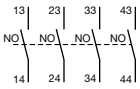


CAL18-11B, CAL19-11B
(Left-side mounted)

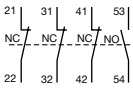


CAL18-11B, CAL19-11B
(Right-side mounted)

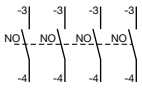
4-pole auxiliary contacts



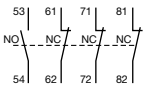
CA4-40E



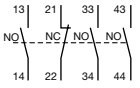
CA4-13M



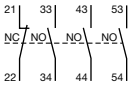
CA4-40U



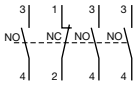
CA4-13N



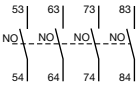
CA4-31E



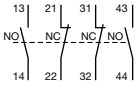
CA4-31M



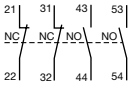
CA4-31U



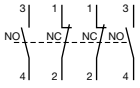
CA4-40N



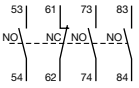
CA4-22E



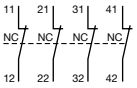
CA4-22M



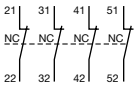
CA4-22U



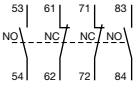
CA4-31N



CA4-04E



CA4-04M



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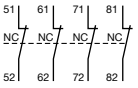

CA4-04N

1SBC101660S0201 - Rev. A

Electronic timers

TEF4-ON

TEF4-OFF

Description

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

Compact solution in cabinet compared to separate timers

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

Safe and cost-reduced wiring

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

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

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

Ordering details

For contactors, contactor relays	Time delay range selected by switch	Delay type	Rated control circuit voltage Uc V 50/60 Hz or DC	Auxiliary contacts		Type	Order code		Weight Pkg (1 pce) kg
AF09 ... AF96 NF	0.1...1 s	ON-delay	24...240	1	1	TEF4-ON	1SBN020112R1000		0.065
	1...10 s 10...100 s	OFF-delay	24...240	1	1	TEF4-OFF	1SBN020114R1000		0.065

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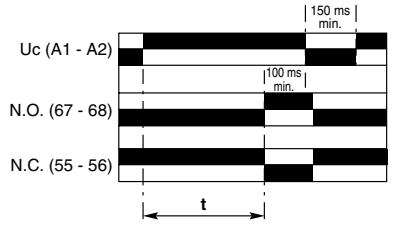
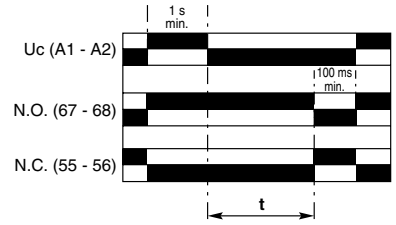
1SBC101669S0201 - Rev. A

Electronic timers
Technical data

Contact utilization characteristics according to IEC

Types			TEF4-ON	TEF4-OFF
Standards			IEC 60947-5-1 and EN 60947-5-1	
Rated insulation voltage Ui acc. to IEC 60947-5-1			400 V	
Rated impulse withstand voltage Uimp			4 kV	
Rated operational voltage Ue max.			240 V	
Rated frequency (without derating)			50 / 60 Hz	
Conventional thermal current Ith - θ ≤ 40 °C			5 A	
Ie / Rated operational current AC-15				
acc. to IEC 60947-5-1		**24-127 V 50/60 Hz**	3 A	
		220-240 V 50/60 Hz	1.5 A	
Making capacity acc. to IEC 60947-5-1			10 x Ie AC-15	
Breaking capacity acc. to IEC 60947-5-1			10 x Ie AC-15	
Ie / Rated operational current DC-13				
acc. to IEC 60947-5-1		**24 V DC**	1 A / 24 W	
Short-circuit protection device gG type fuse			6 A	
Rated short-time withstand current Icw		**for 1.0 s**	8 A	
θ = 40 °C		**for 0.1 s**	8 A	
Minimum switching capacity			12 V / 3 mA	
with failure rate acc. to IEC 60947-5-4		**24 V DC**	10^{-7}	
Power dissipation per pole at 3 A			0.1 W	
Function diagram			ON-delay	OFF-delay
				
			Bistable relay inside. Before use, once apply Uc then switch it off in order to initialize position of the contacts.	
Control circuit voltage				
AC control voltage	Rated control circuit voltage Uc		24...240 V AC	
50/60 Hz	Average consumption		1.5 mA RMS	1 mA RMS
DC control voltage	Rated control circuit voltage Uc		24...240 V DC	
	Average consumption		1.5 mA	1 mA
Rated frequency limits			50 / 60 Hz	
Supply voltage range			0.85...1.1 x Uc (at θ ≤ 70 °C)	
Overvoltage protection			Varistor included	
Time delay range (t) selected by switch		**0.1...1 s**		
		1...10 s		
		10...100 s		
On-load reiteration accuracy under constant conditions			≤ 1 %	
Minimum ON period			0.1 s	1 s
Recovery time			0.15 s	0.1 s
Ambient air temperature	Operation		-25 °C ... +70 °C	
	Storage		-40 °C ... +80 °C	
Climatic withstand			Category B according to IEC 60947-1 Annex Q	
Maximum operating altitude			2000 m	
Mounting positions			Mounting positions 1, 1 +/- 30°, 2, 3, 4, 5	
Shock withstand			1/2 sinusoidal shock for 11 ms: no change in contact position	
acc. to IEC 60068-2-27 and EN 60068-2-27			Same as contactor or contactor relay	
(Mounting position 1)				
Vibration withstand			5...300 Hz	
acc. to IEC 60068-2-6			3 g closed position / 2 g open position	
Mechanical durability				
	Number of operating cycles		5 millions operating cycles	
	Max. switching frequency		3600 cycles/h	1800 cycles/h
Max. electrical switching frequency				
		AC-15	1200 cycles/h	
		DC-13	900 cycles/h	

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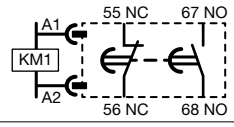
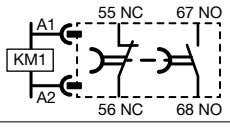
1SBC101670S0201 - Rev. B

Electronic timers
Technical data

Contact utilization characteristics according to UL / CSA

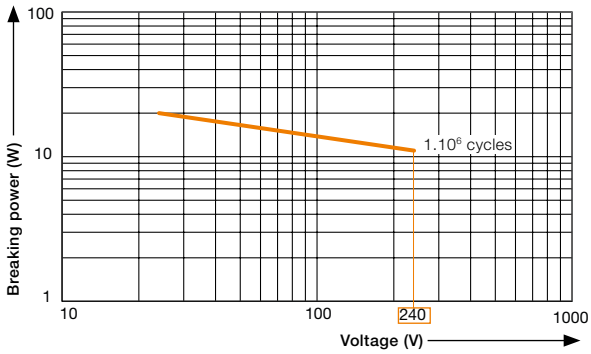
Types		TEF4-ON	TEF4-OFF
Standards		UL 508, CSA C22.2 N°14	
Rated insulation voltage Ui acc. to UL / CSA		300 V	
Max. operational voltage		240 V	
Pilot duty		B300, R300	
AC thermal rated current		5 A	
AC maximum volt-ampere making		3600 VA	
AC maximum volt-ampere breaking		360 VA	
DC thermal rated current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

Connecting characteristics

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

Electrical durability for DC-13 utilization category

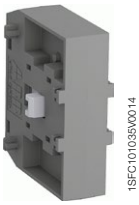
DC-13 utilization category according to IEC 60947-5-1 / EN 60947-5-1: making and breaking current Ie and Ue.



1SBC101670S0201 - Rev. B

Interlocks

VM4



VM19

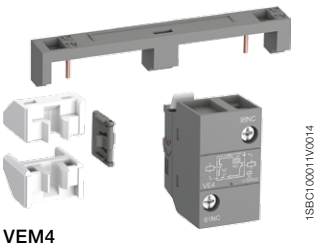
Mechanical interlock units

Description

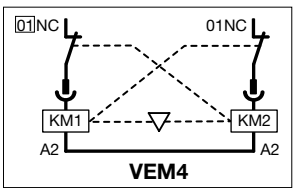
The VM mechanical interlock units are designed for the interlocking of two AF contactors.
When mounted between two contactors, the VM mechanical interlock unit prevents one of the contactors from closing as long as the other contactor is closed.
The mechanical interlock units VM4 and VM96-4 include 2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

Ordering details

For contactors	Mounting	Type	Order code		Pkg qty	Weight (1 pce) kg
Mechanical interlock units for two contactors mounted side by side						
AF09 ... AF38..-30-.. AF09 ... AF38..-40-00		VM4	1SBN030105T1000		10	0.005
AF40 ... AF96-30-.. AF40 ... AF80-40-00		VM96-4	1SBN033405T1000		10	0.006
For same size contactors: AF116 ... AF146 AF190, AF205 AF265 ... AF370		VM19	1SFN030300R1000		1	0.054
AF116 ... AF146 and AF190, AF205		VM140/190	1SFN034403R1000		1	0.088
AF190, AF205 and AF265 ... AF370		VM205/265	1SFN035203R1000		1	0.090
AF400 ... AF1250	PN.. mounting plate to be ordered separately	VM750H	1SFN035700R1000		1	0.200
AF1350 ... AF2650	Plate included	VM1650H	1SFN036503R1001		1	6.000
Mechanical interlock units for two contactors mounted one above the other						
AF400 ... AF1250	Additional plate (not supplied)	VM750V	1SFN035701R1000		1	0.200



VEM4



BB4

Mechanical and electrical interlock sets

Description

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

Ordering details

For contactors	Auxiliary contacts	Type	Order code		Pkg qty	Weight (1 pce) kg
Mechanical and electrical interlock set						
For same size contactors: AF09 ... AF16..-30-.. AF26 ... AF38..-30-00 AF09, AF16..-40-00 AF26, AF38..-40-00	0 2	VEM4	1SBN030111R1000		1	0.035
Fixing clips						
AF09 ... AF96		BB4	1SBN110120W1000		50	0.002

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

1SBC101595S0201 - Rev. B

Interlocks
Technical data

Mechanical interlock unit

Types		VM4, VM96	VM19 ... VM750	VM1650H
Mechanical durability	Number of operating cycles	5 millions operating cycles	1 million operating cycles	500 000 operating cycles
	Max. mechanical switching frequency	1800 cycles/h	300 cycles/h	

Mechanical and electrical interlock set

Contact utilization characteristics according to IEC

Types		VEM4
Standards		IEC 60947-5-1 and EN 60947-5-1
Rated insulation voltage Ui acc. to IEC 60947-5-1		690 V
Rated impulse withstand voltage Uimp.		6 kV
Rated control circuit voltage Uc		
	AC 50/60 Hz control voltage	24...500 V AC
	DC control voltage	20...500 V DC
Conventional thermal current Ith - θ ≤ 40 °C		16 A
Mechanical durability	Number of operating cycles	5 millions operating cycles
	Max. mechanical switching frequency	1800 cycles/h
Electrical durability	Max. electrical switching frequency	1200 cycles/h

Contact utilization characteristics according to UL / CSA

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

Connecting characteristics

Types		VEM4
Connection capacity (min. ... max.)		
Rigid solid	**1 x**	1...2.5 mm²
	2 x	1...2.5 mm²
Flexible with ferrule	**1 x**	0.75...2.5 mm²
	2 x	0.75...2.5 mm²
Flexible with insulated ferrule	**1 x**	0.75...2.5 mm²
	2 x	0.75...1.5 mm²
Lugs	**L <**	8 mm
Connection capacity acc. to UL / CSA	**1 or 2 x**	AWG 18...14
Stripping length		10 mm
Tightening torque		1.2 Nm / 11 lb.in
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		IP20
Screw terminals		Delivered in open position, screws of unused terminals must be tightened
All terminals		M3.5
Screwdriver type		Flat Ø 5.5 / Pozidriv 2

1SBC101594S0201 - Rev. A

Impulse contact blocks

CB5

Description

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

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

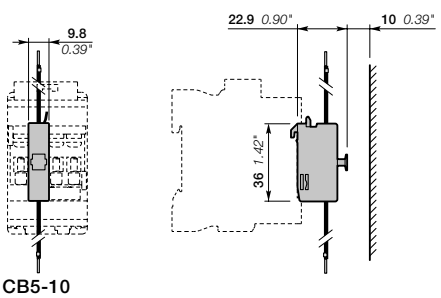
These blocks are equipped with 2 connecting leads 0.5 mm^2 with end, approximately 18 cm long.

Mounting: Clipped onto the front face of the contactors.

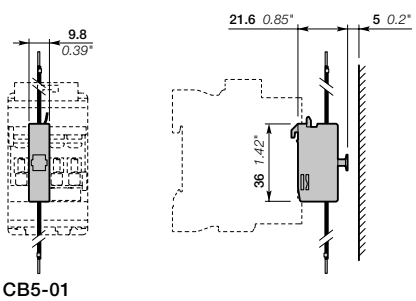
Ordering details

For contactors	Contacts		Type	Order code		Pkg qty	Weight (1 pce) kg
AF09 ... AF96	1	–	CB5-10	1SBN010013R1010		1	0.012
	–	1	CB5-01	1SBN010013R1001		1	0.012

Main dimensions mm, *inches*



CB5-10



CB5-01

1SBC101655S0201 - Rev. C

Notes

RA4 interface relays

RA4

Description

RA4 interface relay is designed to receive 24 V DC 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 AF09 ... AF96 contactors or the NF contactor relays. RA4 interface relay is made up of a miniature electromechanical relay equipped with a N.O. contact and with a low consumption 24 V DC 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 RA4 is protected from surge thanks to the built-in surge protection of AF09 ... AF96. Furthermore, the RA4 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 RA4 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 RA4.

Mounting

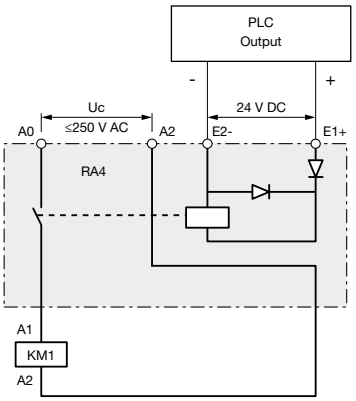
Remove the coil terminal block from the contactor and clip the interface relay without any screwing operation.

Ordering details

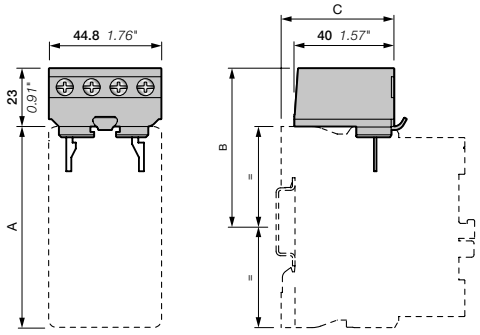
For contactors (1)	Coil voltages (2)	Rated control circuit voltage Uc	Type	Order code		Pkg qty	Weight (1 pce)
	V AC 50/60 Hz	V DC					kg
AF09 ... AF96	24 ... 250	24	RA4	1SBN060100R1000		1	0.040
NF			RA4-T (3)	1SBN060100T1000		10	0.040

(1) LDC4 additional terminal blocks and CAT4 auxiliary contact blocks not suitable with RA4.
(2) Main use with contactor coils 41, 11, 12, 13.
(3) On request. Please contact your ABB local sales organization

Wiring diagram



Main dimensions mm, *inches*



RA4 mounted on	AF09 ... AF38	AF40 ... AF96
A	80 mm / *3.15"*	119.5 mm / *4.70"*
B	63 mm / *2.48"*	83 mm / *3.27"*
C	45 mm / *1.77"*	40 mm / *1.57"*

1SBC101060S0201

RA4 interface relays
Technical data

Utilization characteristics according to IEC

Type		RA4
Standards		IEC 60947 5-1
Rated insulation voltage Ui acc. to IEC 60947 5-1		250 V AC 50/60 Hz
Ambient air temperature		
In free air operation	**at Uc = 24 V DC (between E1 and E2)**	-25 ... +70 °C
	from 0.85 to 1.1 x Uc	-25 ... +60 °C
Storage		-40 ... +70 °C
Climatic withstand		Category B according to IEC 60947-1 Annex Q
Maximum operating altitude		≤3000 m
Mounting positions		Mounting positions 1, 1 ±30°, 2, 3, 4, 5

Connecting characteristics

Connection capacity (min. ... max.)		
Rigid solid	**1 x**	1 ... 2.5 mm²
	2 x	1 ... 2.5 mm²
Flexible with non insulated ferrule	**1 x**	0.75 ... 2.5 mm²
	2 x	0.75 ... 2.5 mm²
Flexible with insulated ferrule	**1 x**	0.75 ... 2.5 mm²
	2 x	0.75 ... 1.5 mm²
Lugs	**L <**	8 mm
Connection capacity acc. to UL/CSA	**1 or 2 x**	AWG 18 ... 14
Stripping length		10 mm
Tightening torque		1.2 Nm / 11 lb.in
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		IP20 protection against direct contact in acc. with EN 50274 RA4 wired and mounted on the associated contactor
Screw terminals		Delivered in open position
All terminals		M3.5
Screwdriver type		Flat Ø 5.5 / Pozidriv 2

Working data

Surge suppression		
For interface relay coil		Included inside AF built-in surge protection
Protection against polarity reversal between terminals E1 and E2		Diode
Interface relay operating time		Closing and drop-out ≤10 ms
Total operating time interface relay + contactor (1)		
Between energization and:	**N.O. contact closing**	42 ... 95 ms (AF09 ... AF38, NF) 44 ... 105 ms (AF40 ... AF96)
	N.C. contact opening	40 ... 90 ms (AF09 ... AF38, NF) 40 ... 100 ms (AF40 ... AF96)
Between de-energization and:	**N.O. contact opening**	15 ... 57 ms (AF09 ... AF38, NF) 21 ... 107 ms (AF40 ... AF96)
	N.C. contact closing	17 ... 60 ms (AF09 ... AF38, NF) 23 ... 112 ms (AF40 ... AF96)

(1) For contactor coils 41, 11, 12, 13.

Electrical input data

Control voltage (E1 and E2 terminals) **Uc**		
Rated value		24 V DC
Max. range at ambient temperature 20 °C		19 ... 30 V DC
Max. consumption for Uc = 24 V DC, θ = 20 °C		0.3 W
"0" status (relay open)	**for Uc**	≤2.4 V DC
	for Ic	<1 mA
"1" status (relay closed)	**for Uc**	≥19 V DC
Max. short supply interruption immunity time		2 ms

Electrical output data

Switching voltage (A0 and A2 terminals)	≤250 V AC
Electrical durability	
Switching frequency	600 cycles/h
Number of operating cycles	2 million operating cycles

1SBC101061S0201

Mechanical latching unit

WA4

Description

The WA4 mechanical latching unit for AF09 ... AF96 contactors and NF contactor relays ensures that the contactor or contactor relay remains switched on even if there is a lack or a failure of voltage. Standard contactors can be easily converted into compact latched contactors.

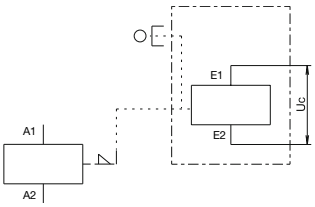
The WA4 block contains a mechanical latching device with electromagnetic impulse unlatching (AC or DC) or manual unlatching.

Operation

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

Contactor opening can be controlled:

– electrically by an impulse (AC or DC) on the WA4 block coil (the coil is not designed to be permanently energized)
– manually by pressing the pushbutton on the front face of the WA4 block.



Wiring diagram

Mounting

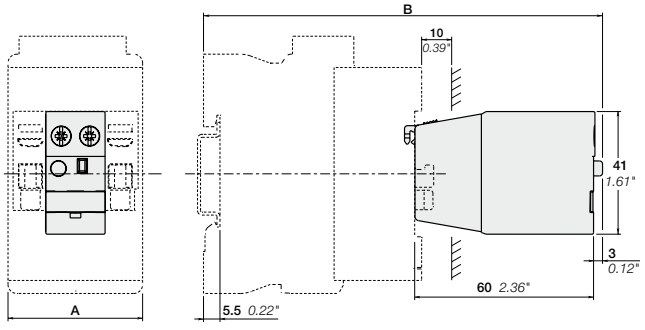
The WA4 block is clipped onto the front face of the 1-stack contactor where it takes up two slots in central position (see fig. below).
The two other slots may accept CA4 single pole auxiliary contacts (1 block on each side of the mechanical latch).

Additional CAL4 can be fitted on the side of the contactor in respect to the total number of built-in or additional N.O. and N.C. auxiliary contacts as described in the accessory fitting details part of each contactor type.

Ordering details

For contactors and contactor relays	Rated control circuit voltage Uc		Type	Order code		Pkg qty	Weight (1 pce)
	V AC 50/60 Hz	V DC					kg
AF09 ... AF65, NF 1-stack	24...60	24...60	WA4-11	1SBN040100R1011		1	0.080
	48...130	48...130	WA4-12	1SBN040100R1012		1	0.080
	100...250	100...250	WA4-13	1SBN040100R1013		1	0.080
	250...500	250...500	WA4-14	1SBN040100R1014		1	0.080
AF80, AF96	24...60	24...60	WA4-96-11	1SBN040200R1011		1	0.080
	48...130	48...130	WA4-96-12	1SBN040200R1012		1	0.080
	100...250	100...250	WA4-96-13	1SBN040200R1013		1	0.080
	250...500	250...500	WA4-96-14	1SBN040200R1014		1	0.080
Mechanical latching unit for 24 V DC - 500 mA PLC control							
AF09 ... AF38, NF 1-stack	–	24	WA4-10	1SBN040100R1010		1	0.080

Main dimensions mm, *inches*



WA4 + AF09 ... AF96, NF 1-stack

For contactors and contactor relays	A mm *in.*	B mm *in.*
AF09 ... 16(Z)-30-.. AF09 ... 16(Z)-40/22-00 NF(Z)	45 *1.77"*	133.5 *5.25"*
AF26 ... 38(Z)-30-00	45 *1.77"*	142.5 *5.61"*
AF26 ... 38(Z)-40/22-00	45 *1.77"*	157.5 *1.77"*
AF40 ... 65-30-00	55 *2.16"*	167 *6.57"*
AF40-40/22-00	70 *2.75"*	170 *6.70"*
AF52-40-00	70 *2.75"*	170 *6.70"*
AF80, 96-30-00	70 *2.75"*	172 *6.77"*
AF80-40/22-00	90 *3.54"*	172 *6.77"*

1SBC100204S0201

Mechanical latching unit
Technical data

Types		WA4, WA4-96	WA4
Coil voltage code		11, 12, 13, 14	10
Standards		IEC 60947-4-1	
Rated insulation voltage Ui			
acc. to IEC 60947-1		690 V AC	
Coil operating limits	**AC supply**	At θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max	–
acc. to IEC 60947-4-1	**DC supply**	At θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max	At θ ≤ 70 °C 0.85 x Uc ... 1.1 x Uc
Control circuit voltage			
AC control voltage 50/60 Hz			
Rated control circuit voltage Uc		24 ... 500 V AC 50/60 Hz	–
Coil consumption	Average pull-in value	15 ... 100 VA	–
DC control voltage 50/60 Hz			
Rated control circuit voltage Uc		24 ... 500 V DC	24 V DC
Coil consumption	Average pull-in value	15 ... 100 W	12 W
Max. electrical impulse time			
On AC control supply (with load factor 1.6%)		4 s	–
On DC control supply (with load factor 1.6%)		4 s	
Min. electrical impulse time			
For latching, energizing of the contactor coil		120 ms	
For unlatching, energizing of the mechanical latching unit coil		50 ms	
Operating time			
On contactor closing (latching) between coil energization and:			
N.O. contact closing		No difference with the operation of a contactor without mechanical latching unit	
N.C. contact opening		No difference with the operation of a contactor without mechanical latching unit	
On contactor opening (unlatching) between mechanical latching unit coil energization and:			
N.O. contact opening		8 ... 15 ms	
N.C. contact closing		10 ... 17 ms	
Ambient air temperature			
Operation		-25 ... +70 °C	
Storage		-60 ... +80 °C	
Climatic withstand		Category B according to IEC 60947-1 Annex Q	
Max. operating altitude		≤ 3000 m	
Mounting positions		Mounting positions 1, 1+/- 30°, 2, 3, 4, 5	
Mechanical durability		AF09 ... AF38, NF: 1 million operating cycles	
		AF40 ... AF65: 0.5 million operating cycles	
		AF80, AF96: 0.2 million operating cycles	
Max. switching frequency			
with on-load factor of 1.6%	**cycles/h**	600	

Connecting characteristics

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

1SBC100205S0201

Other accessories

1SBC100020V0014

LDC4

Ordering details

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

Additional coil terminal blocks

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

AF09 ... AF96, NF	LDC4	1SBN070156T1000		10	0.010

1SBC100021V0014

BX4

Protective covers

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

AF09 ... AF96 1-stack contactors and NF contactor relays	BX4	1SBN110108T1000		10	0.006
4-pole CA4, 2-pole CAT4 auxiliary contact blocks and TEF4 electronic timer	BX4-CA	1SBN110109W1000		50	0.001

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

1SBC100023V0014

BX4-CA

1SNC160101F0014

BA4

Function markers AF09 ... AF370

Box of 16 blank cards (16 markers by card) printable on HTP500 thermal transfer printer and AMS 500 marking table to identify your contactors, overload relays or manual motor starters.
Marker dimensions: 7 x 20 mm (*.276" x .787"*).

AF09 ... AF370 contactors, TF thermal overload relays, EF electronic overload relays and MS116, MS132 manual motor starters	BA4	1SNA235156R2700		16	0.011
AMS 500 support plate for 8 BA4	SPRC 1	1SNA360010R1500		1	0.220
HTP500 support plate	HTP500-BA4	1SNA235712R2400		1	0.290

1SBC100044V0014

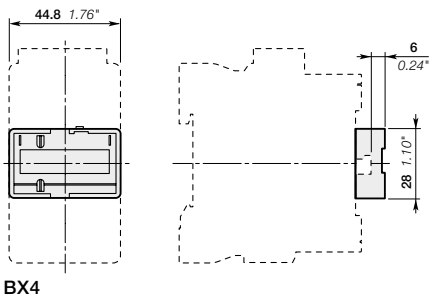
BA5-50

Function markers AF400 ... AF2650

Set of 50 function markers designed to be clipped onto the front face of devices. Details can be added to these markers using a ball point pen, indelible felt-tip pen or pentel white.
Self-adhesive labels (not supplied) can also be added to them.
Marker dimensions: 7 x 19 mm (*.276" x .748"*).

AF400 ... AF2650 and accessories	BA5-50	1SBN110000R1000		1	0.017

Main dimensions mm, *inches*



BX4

1SBC101733S0201

Other accessories

BP38-4

BDT4
For AF09 ... AF65, NF

BDT4
For AF80 ... AF96

Ordering details

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

Mounting pieces

Mounting piece for replacing installed contactors fixed by screws by AF contactors.

From contactor	To contactor					
A26 ... A40, AL26 ... AL40	AF09 ... AF38	BP38-4	1SBN112303T1000		10	0.003
A40 ... A75, AE50 ... AE75, AF50 ... AF75	AF40 ... AF65	BP65-4	1SBN113403T1000		10	0.004
A95, A110, AE95, AE110, AF95, AF110	AF80 ... AF96	BP96-4	1SBN113903T1000		10	0.005

Test block

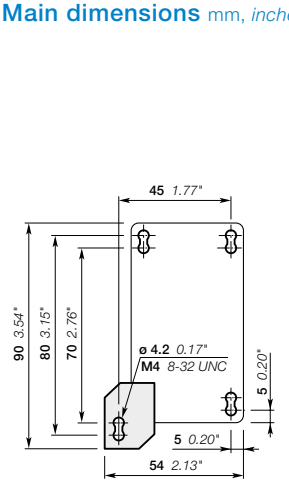
BDT4 test block is suitable for switching on contactor off-load.

Marking on the block indicates the contactor type to fit with.

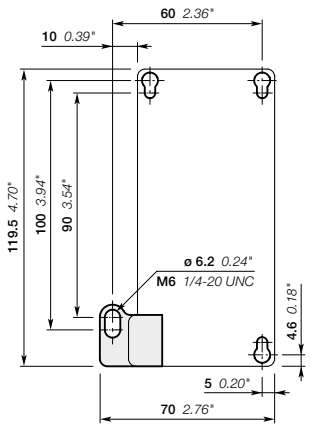
AF09 ... AF96, NF	BDT4	1SBN110122T1000		10	0.007

5

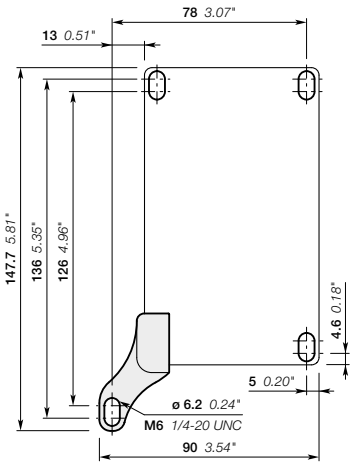
Main dimensions mm, *inches*



BP38-4



BP65-4



BP96-4

1SBC101752S0201

Additional terminal blocks

LD38-4

Description

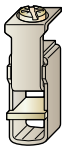
The LD terminal block is designed to increase the connecting capacity of 3-pole AF26 ... AF38 contactors on which it is fitted and for preparation of the wiring before final connection to the contactor.
LD38-4 blocks are 3-pole terminal blocks with tunnel terminals.

Ordering details

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
AF26 ... AF38	LD38-4	1SBN072308R1000		2	0.070

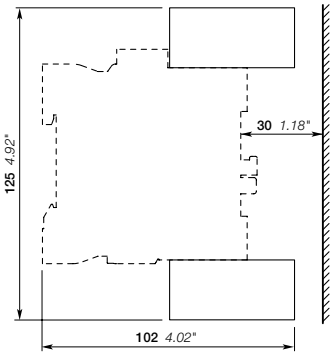
5

Technical data

Types	LD38-4
Rated insulation voltage Ui	
acc. to IEC 60947-4-1	690 V
acc. to UL / CSA	600 V
Main terminals	 Screw terminals with double connector 2 x (7 width x 5.8/9.2 depth)
Connection capacity (min. ... max.)	
Rigid Solid (≤ 4 mm²)	1x 2.5...25 mm²
Stranded (≥ 6 mm²)	1x 2.5...25 mm² + 1x 2.5...16mm²
Flexible with non insulated ferrule	1x 2.5...16 mm²
	1x 2.5...16mm² + 1x 2.5...10mm²
Flexible with insulated ferrule	1x 2.5...16mm²
	1x 2.5...16mm² + 1x 2.5...10mm²
Connection capacity acc. to UL / CSA	1x AWG 8-4
	2x AWG 8-6
Stripping length	14 mm
Tightening torque	2.5 Nm / 22 lb.in
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529	IP20
Screw terminals	Delivered in closed position, screws of unused terminals must be tightened
Main terminals	M5
Screwdriver type	Flat Ø 6.5 / Pozidriv 2

Note: The utilization of LD38-4 additional terminal blocks does not allow the use of BER and BEY connection sets.

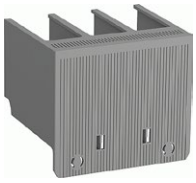
Main dimensions mm, *inches*



1SBC101734S0201

Terminal shrouds

LT65-30



LT140-30L

LT370-30C

LT460-AC

LT80-40

LT205-40

Description

Main terminal protection for AF40 ... AF1250 contactors.
The auxiliary contact blocks and coils are designed to provide an IP 20 degree of protection.
The main terminals, equipped with compression lugs or cable clamps, can be protected against accidental direct contact after wiring (EN 50274) by the addition of terminal shrouds (see table below).

Ordering details

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
3-pole contactors					
AF40 ... AF65	LT65-30	1SBN123401R1000		1	0.015
AF80, AF96	LT96-30	1SBN123901R1000		1	0.020
AF116 ... AF146, with compression lugs	LT140-30L	1SFN124203R1000		2	0.070
AF190, AF205, with cable clamps	LT205-30C	1SFN124801R1000		2	0.050
AF190, AF205, with compression lugs	LT205-30L	1SFN124803R1000		2	0.220
AF190, AF205, with shorting bar or between contactor and TOL/EOL in DOL starters	LT205-30Y	1SFN124804R1000		1	0.050
AF265 ... AF370, with cable clamps	LT370-30C	1SFN125401R1000		2	0.035
AF265 ... AF370, with compression lugs	LT370-30L	1SFN125403R1000		2	0.280
AF265 ... AF370, with shorting bar or between contactor and TOL/EOL in DOL starters	LT370-30Y	1SFN125404R1000		1	0.075
AF265 ... AF370, for use with extending cable clamps, ATK300/2 and OZXB4	LT370-30D	1SFN125406R1000		1	0.15
AF400, AF460 with cable clamps	LT460-AC	1SFN125701R1000		2	0.100
AF400, AF460 with compression lugs	LT460-AL	1SFN125703R1000		2	0.800
AF580, AF750 with cable clamps	LT750-AC	1SFN126101R1000		2	0.120
AF580, AF1250 with compression lugs	LT750-AL	1SFN126103R1000		2	0.825
4-pole contactors					
AF40, AF52	LT52-40	1SBN123402R1000		1	0.020
AF80	LT80-40	1SBN123902R1000		1	0.025
AF116 ... AF140, with compression lugs	LT140-40L	1SFN124203R2000		2	0.090
AF190 ... AF205, with cable clamps	LT205-40C	1SFN124801R2000		2	0.035
AF190 ... AF205, with compression lugs	LT205-40L	1SFN124803R2000		2	0.140
AF265 ... AF370, with cable clamps	LT370-40C	1SFN125401R2000		2	0.040
AF265 ... AF370, with compression lugs	LT370-40L	1SFN125403R2000		2	0.165

Note: With LT65-30, LT96-30, LT52-40, LT80-40, use rigid cables or flexible cables with insulated ferrules including a stripping length ≥ 18 mm.

1SFC101099C0201 - Rev. C

Connections

1SFC101050V0001

LW140

LW205-40

Terminal enlargements

Description

Enlargement pieces designed to increase the width of the contactor terminal pads in order to allow larger connections to be mounted.

Ordering details

For contactors	Dimensions		Type	Order code		Pkg qty	Weight (1 pce)
	hole Ø mm	bar mm					kg
3-pole contactors							
AF116 ... AF146	6.5	13 x 3	LW140	1SFN074207R1000		1	0.115
AF190, AF205	10.5	17.5 x 5	LW205	1SFN074807R1000		1	0.260
AF265 ... AF370	10.5	25 x 5	LW370	1SFN075407R1000		1	0.340
AF400, AF460	10.5	25 x 5	LW460	1SFN075707R1000		1	0.730
AF580, AF750	13	40 x 6	LW750	1SFN076107R1000		1	1.230
AF1250	13	50 x 10	LW1250	1SFN076407R1000		1	2.000
4-pole contactors							
AF190 ... AF205	10.5	20 x 5	LW205-40	1SFN074807R2000		1	0.306
AF265 ... AF370	10.5	25 x 5	LW370-40	1SFN075407R2000		1	0.540

Terminal extension

Description

Extension pieces designed to extend the main terminals of contactors for combined mounting of contactors and connection sets.

Ordering details

For 3-pole contactors	Dimensions		Type	Order code		Pkg qty	Weight (1 pce)
	hole Ø mm	bar mm					kg
AF116 ... AF146	6.5	13 x3	LX140	1SFN074210R1000		1	0.072
AF190, AF205	8.5	17.5 x 5	LX205	1SFN074810R1000		1	0.180
AF265 ... AF370	10.5	20 x 5	LX370	1SFN075410R1000		1	0.234
AF400, AF460	10.5	25 x 5	LX460	1SFN075710R1000		1	0.500
AF580, AF750	13	40 x 6	LX750	1SFN076110R1000		1	0.850

1SFC101049V0001

LX140

Connection sockets

Description

Connection socket can be used to replace built-in cable clamps in AF116 ... AF146.

Ordering details

For contactor	Type	Order code		Pkg qty	Weight (1 pce)
					kg
3-pole contactors					
AF116 ... AF146	LL146-30	1SFN074211R1000		6	0.102
AF190 ... AF205	LL205-30	1SFN074811R1000		1	0.166
AF265 ... AF370	LL370-30	1SFN075411R1000		1	0.173
AF400 ... AF460	LE460	1SFN075716R1000		6	0.600
AF580 ... AF750	LE750	1SFN076116R1000		6	0.750
4-pole contactors					
AF116 ... AF140	LL146-40	1SFN074211R2000		8	0.132
AF190 ... AF205	LL205-40	1SFN074811R2000		2	0.216
AF265 ... AF370	LL370-40	1SFN075411R2000		2	0.224

1SFC101073V0001

LL146-30

Connection module

Description

Connection module can be fixed on AF116 ... AF146 delivered with bar terminals.

Ordering details

For contactor	Type	Order code		Pkg qty	Weight (1 pce)
					kg
3-pole contactors					
AF116 ... AF146	LD146-30	1SFN074208R1000		2	0.165
4-pole contactors					
AF116 ... AF140	LD146-40	1SFN074208R2000		2	0.225

1SFC101046V0001

LD146-30

1SFC101100C0201 - Rev. C

Terminal connecting strips and shorting bars

1SBC100024V0014

LY16-4

1SFC101088V0001

LY185

1SBC100035V0014

LH38-4

1SBC100037V0014

LF16-4

1SBC100036V0014

LG16-4

Description

Parallel and series connection of 3-pole contactors:

– To obtain a star point (3 parallel-connected poles)
– To connect poles in parallel and thus increase the AC load passing through the flow path made up of the parallel-connected poles: LP, LY, LH, LF, LG.
The relevant cable cross-sectional area may limit the maximum permissible current. Consult information in table below
– To connect poles in series and thus increase the DC voltage controlled by the poles: LP, LY (only LY16-4 and LY38-4 secable strips).

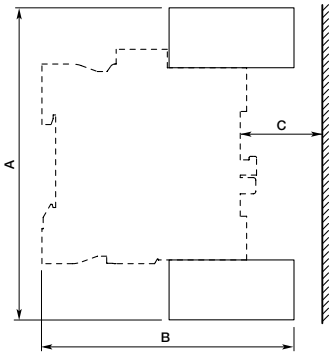
Types	for connection of "n" poles	with terminal	insulated
LP	n = 2	no	no (1)
LY	n = 2 (secable LY16-4, LY38-4 connecting strips)	no	yes
	n = 3	no	yes (1)
LH	n = 2	yes	no
LF	n = 3	yes	yes
LG	n = 4	yes	yes

(1) LP460 ... LP750, LY185 ... LY750 not insulated. Use terminal shrouds.

Ordering details

For contactors	max. nominal continuous current with "n" poles				Cable cross-sectional area	Type	Order code		Pkg qty	Weight (1 pce)
	in parallel			in series						
	2 poles	3 poles	4 poles	2 poles						
	A				mm²					kg
AF09	30	33	–	25	6	LY16-4	1SBN071303T1000		10	0.006
AF12	32	36	–	27						
AF16	34	40	–	30						
AF26	50	60	–	45	10	LY38-4	1SBN072303T1000		10	0.012
AF116 ... AF146	–	240	–		–	LY140	1SFN074203R1000		1	0.055
AF190, AF205	–	400	–		–	LY185	1SFN074703R1000		1	0.200
AF265 ... AF370	–	670	–		–	LY300	1SFN075103R1000		1	0.300
AF400, AF460	–	1000	–		–	LY460	1SFN075703R1000		1	0.450
AF580, AF750	–	1650	–		–	LY750	1SFN076103R1000		1	0.800
AF190, AF205	300	–	–		–	LP185	1SFN074712R1000		2	0.300
AF265 ... AF370	475	–	–		–	LP300	1SFN075112R1000		2	0.400
AF400, AF460	725	–	–		–	LP460	1SFN075712R1000		2	0.550
AF580, AF750	1200	–	–		–	LP750	1SFN076112R1000		2	0.950
AF09	45		–	–	10	LH38-4	1SBN072304R1000		2	0.012
AF12	50		–	–	10					
AF16	54		–	–	16					
AF26	81		–	–	25					
AF30, AF38	90		–	–	25					
AF09		62	–		16	LF16-4	1SBN071305R1000		2	0.020
AF12		70	–		25					
AF16		75	–		25					
AF26		112	–		35	LF38-4	1SBN072305R1000		2	0.040
AF30, AF38		125	–		50					
AF09	–	–	70	–	25	LG16-4	1SBN071306R1000		2	0.025
AF12	–	–	78	–	25					
AF16	–	–	84	–	25					

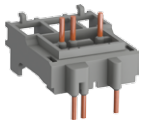
Main dimensions



Type	For contactors	Dimensions					
		A		B		C	
		mm	*inch*	mm	*inch*	mm	*inch*
LH38-4	AF09 ... AF16	111.20	*4.38"*	83	*3.27"*	22	*0.87"*
	AF26 ... AF38	114	*4.49"*	86	*3.39"*	16	*0.63"*
LF16-4	AF09 ... AF16	121	*4.76"*	87	*3.43"*	23	*0.91"*
LF38-4	AF26 ... AF38	135.20	*5.32"*	103	*4.06"*	31	*1.22"*
LG16-4	AF09 ... AF16	124.20	*4.89"*	87	*3.43"*	23	*0.91"*

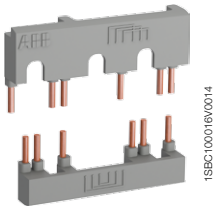
1SBC101735S0201 - Rev. A

Connection accessories for starting solutions

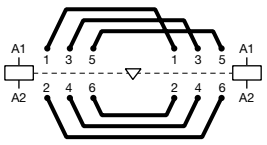


BEA16-4

BPR65-4

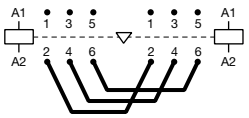


BER16-4

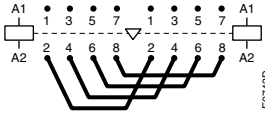


BER, BEM
Reversing connections

BEP140-30



BEP, BES
3-pole phase to phase connections



BEP
4-pole changeover connections

Connecting links with manual motor starters

Description

The BEA insulated 3-pole connecting links are used to connect AF09 ... AF65 contactors with the MS116 or MS132 or MS165 manual motor starters. The BEA insulated 3-pole connecting links ensure the electrical and mechanical connection between the contactor and the associated manual motor starter. BPR65-4 35 mm rail hooks used with BEA65-4 connecting link, allow direct mounting on 2 rails 35 mm of MS165 manual motor starters with AF40 ... AF65 contactors.

Ordering details

For 3-pole contactors	Manual motor starter	Type	Order code		Pkg qty	Weight (1 pce) kg
AF09 ... AF16	MS116-0.16 ... MS116-25, MS132-0.16... MS132-25	BEA16-4	1SBN081306T1000		10	0.025
AF26 ... AF38	MS116-0.16 ... MS116-16, MS132-0.16 ... MS132-10	BEA26-4	1SBN082306T1000		10	0.025
	MS116-20 ... MS116-32, MS132-12 ... MS132-32	BEA38-4	1SBN082306T2000		10	0.030
AF40 ... AF65	MS165-16 ... MS165-65	BEA65-4	1SBN083406R1000		1	0.090
	MS165-16 ... MS165-65 (1)	BPR65-4 (2)	1SBN113405R1000		1	0.014

(1) Applicable for MS165 manufactured after week 31, 2016 (date code > 16214).
(2) Use one BPR65-4 for each contactor AF40 ... AF65.

Connection sets for reversing contactors

Description

The BER and BEM connection sets are used to connect the main poles of two 3-pole contactors mounted side by side. The BER connection sets are made up of 1 upstream and 1 downstream connections. The BEM connection sets are made up of 3 upstream and 3 downstream connections. BER and BEM connection sets are insulated and made of solid copper bars.

Ordering details

For 3-pole contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
AF09 ... AF16	BER16-4	1SBN081311R1000		1	0.045
AF26 ... AF38	BER38-4	1SBN082311R1000		1	0.100
AF40 ... AF65	BER65-4	1SBN083411R1000		1	0.175
AF80, AF96	BER96-4	1SBN083911R1000		1	0.250
AF116 ... AF146	BER140-4	1SFN084211R1000		1	0.615
AF190, AF205	BER205-4	1SFN084811R1000		1	1.237
AF265 ... AF370	BER370-4	1SFN085411R1000		1	2.140
AF400, AF460	BEM460-30	1SFN085701R1000		1	4.400
AF580, AF750	BEM750-30	1SFN086101R1000		1	7.300

Phase to phase connections

Description

The BEP and BES connection sets are used to connect phase to phase the main poles of two contactors mounted side by side. 4-pole contactors will then operate as source reversing contactors. The BEP connection sets are made up of 1 upstream or downstream connections. The BES connection sets are made up of 3 upstream or downstream connections. BEP and BES connection sets are insulated and made of solid copper bars.

Ordering details

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
3-pole contactors					
AF116 ... AF146	BEP140-30	1SFN084214R1000		1	0.320
AF190, AF205	BEP205-30	1SFN084814R1000		1	0.534
AF265 ... AF370	BEP370-30	1SFN085414R1000		1	0.926
AF400, AF460	BES460	1SFN085704R1000		1	2.200
AF580, AF750	BES750	1SFN086104R1000		1	3.700
4-pole contactors					
AF116 ... AF140	BEP140-40	1SFN084214R2000		1	0.420
AF190 ... AF205	BEP205-40	1SFN084814R2000		1	0.710
AF265 ... AF370	BEP370-40	1SFN085414R2000		1	1.230

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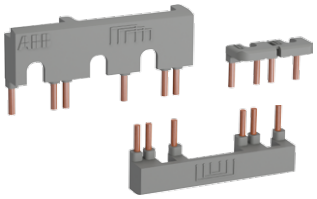
Connection sets for star-delta starter



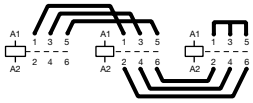
BEY16-4

Description

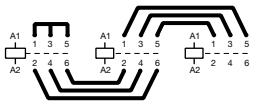
The BEY and BED connection sets are used to connect the main poles of the Line, Delta and Star contactors of a star-delta starter.

The connection sets are made up of:

– Line contactor / delta contactor:
  - BEY: upstream phase-to-phase connection
  - BED: upstream connection in parallel
– Delta contactor / star contactor: downstream connection in parallel
– Star contactor: star point upstream
– Insulated, solid copper bar.



AF09 ... AF370
Line-delta-star connection



AF400 ... AF750
Star-delta-line connection

Ordering details

For 3-pole line, delta & star contactors	Interlock unit between delta & star contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
AF09 ... AF16	With or without VM4 or VEM4	BEY16-4	1SBN081313R2000		1	0.050
AF26 ... AF38	With or without VM4 or VEM4	BEY38-4	1SBN082713R2000		1	0.110
AF40 ... AF65	With or without VM96-4	BEY65-4	1SBN083413R2000		1	0.200
AF80, AF96	With or without VM96-4	BEY96-4	1SBN083913R2000		1	0.250
AF116 ... AF146	With or without VM19	BEY140-4	1SFN084413R1000		1	1.040
AF190 ... AF205 (line and delta) AF116 ... AF146 (star)	With or without VM140/190	BEY190-4	1SFN084813R1000		1	1.154
AF190, AF205	With or without VM19	BEY205-4	1SFN085213R1000		1	1.205
AF265 ... AF370 (line and delta) AF190 ... AF205 (star)	With or without VM205/265	BEY265-4	1SFN085413R1000		1	2.020
AF265 ... AF370	With or without VM19	BEY370-4	1SFN085813R1000		1	2.110
AF400 ... AF460	With or without VM750H	BED460	1SFN085703R1000		1	4.700
AF580 ... AF750 (line and delta) AF400 ... AF460 (star)	With or without VM750H	BED580	1SFN085903R1000		1	6.300
AF580 ... AF750	With or without VM750H	BED750	1SFN086103R1000		1	7.700

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Connection bars

1SFC101061V0001

BEA140/XT2

1SFC101064V0001

BEA205/T4

1SFC101065V0001

BEA370/T5

Connection bars between contactors and MCCB

Description

Connection between contactors/starters and moulded case circuit breakers.
These connection sets are solid copper bars.

Ordering details

For 3-pole contactors	MCCB	Type	Order code		Pkg qty	Weight (1 pce) kg
Vertical assembly						
AF116 ... AF146	XT2	BEA140/XT2	1SFN084206R1000		1	0.058
AF116 ... AF146	XT3	BEA140/XT3	1SFN084206R1002		1	0.070
AF116 ... AF146	XT4	BEA140/XT4	1SFN084206R1001		1	0.068
AF190, AF205	XT4	BEA205/XT4	1SFN084806R1000		1	0.200
AF190, AF205	T4	BEA205/T4	1SFN084806R1001		1	0.190
AF265 ... AF370	T5	BEA370/T5	1SFN085406R1000		1	0.350
AF400 ... AF750	T6	BEA750/T6	1SFN086106R1000		1	0.410
AF400 ... AF750	T5	BEA750/T5	1SFN086106R1001		1	0.410
Vertical assembly with control wire terminals (also suitable when using busbar kits for starter combinations)						
AF400 ... AF750	T5	BEA750D/T5	1SFN086106R1003		1	0.720
AF400 ... AF750	T6	BEA750D/T6	1SFN086106R1002		1	0.720
Horizontal assembly (also suitable when using busbar kits for starter combinations)						
AF400, AF460	T4	BEA460H/T4	1SFN085907R1000		1	2.450

Connection bars between contactors and switch fuse

Description

Connection between contactors/starters and moulded case circuit breakers.
These connection sets are solid copper bars.

Ordering details

For 3-pole contactors	Switch fuse	Type	Order code		Pkg qty	Weight (1 pce) kg
Vertical assembly						
AF400, AF460	OESA400	BEF460/OESA400	1SFN085708R1000		1	0.340
AF460 ... AF750	OESA630 to OESA800	BEF750/OESA800	1SFN086108R1000		1	0.740
Horizontal assembly						
AF400, AF460	OESA400...LR	OESA460H/OESA400	1SFN085709R1000		1	1.250

Note: The BEF connection bars provided for the A145 ... A300 contactors can be used for the AF145 ... AF300 contactors.

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Mounting plates

1SFC101087V0001

PN460

Description

Mounting plates with fixing holes for the specified 3-pole contactors and overload relays.

Ordering details

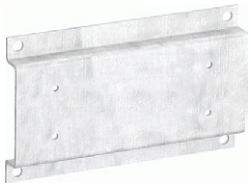
For 3-pole contactors		For overload relays	Type	Order code		Pkg qty	Weight (1 pce) kg
Mounting plates for Direct on line starters							
AF400, AF460		E500DU	PN460-11	1SFN095705R1000		1	2.120
AF580, AF750		E800DU	PN750-11	1SFN096105R1000		1	2.500

For two contactors side by side with space for mechanical interlock		For one or two overload relays	Type	Order code		Pkg qty	Weight (1 pce) kg
Mounting plates for mechanical interlocked contactors, reversing starters and two speed starters for double windings							
AF400, AF460		E500DU	PN460-21	1SFN095701R1000		1	3.490
AF580, AF750		E800DU	PN750-21	1SFN096101R1000		1	4.230

For main and delta contactors	For star contactor (1)	For overload relays	Type	Order code		Pkg qty	Weight (1 pce) kg
Mounting plates for star-delta starters and two speed starters for single windings							
AF400, AF460	A300, AF400	E500DU	PN460-41	1SFN095703R1000		1	5.310
AF580, AF750	AF400 ... AF580	E800DU	PN750-41	1SFN096103R1000		1	6.320

(1) Space for mechanical interlock included.

Adapter plates



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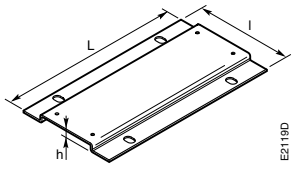
PR146-1

Description

Adapter plates with fixing holes for replacing installed contactors.

Ordering details

From contactors	To contactor	Type	Order code		Pkg qty	Weight (1 pce)
						kg
A95, AF95, A110, AF110	AF116, AF140, AF146	PR146-1	1SFN094200R1000		1	0.300
EH150, EH160, EH175, EH210, EG160	AF190, AF205	PR210-1	1SFN094900R1000		1	0.440
EH250, EH260, EH300	AF265, AF305, AF370	PR300-1	1SFN095300R1000		1	0.560
EH370, EH550, EG315	AF400, AF460, AF580	PR460-1	1SFN095700R1000		1	0.900
EH700, EH800	AF750	PR750-1	1SFN096100R1000		1	0.500
OKYM150, OKYM175	AF190	PR185-2	1SFN095100R1001		1	0.500
OKYM200, OKYM250	AF265, AF305, AF370	PR300-2	1SFN095300R1001		1	0.500
OKYM315	AF400, AF460	PR400-2	1SFN095700R1002		1	0.820
OKYM400	AF400, AF460	PR460-2	1SFN095700R1001		1	0.800
OKYM500	AF580	PR580-2	1SFN096100R1002		1	0.700
EH550, EG630, OKYM630	AF580, AF750	PR750-2	1SFN096100R1001		1	1.100



E2119D

Dimensions (mm)

Type of the plate	Dimensions			Fixing holes
	L	l	h	mm
PR146-1	150	90	15	4 x ø 6.5
PR210-1	200	132	11.5	4 x ø 7
PR300-1	200	172	11.5	4 x ø 7
PR460-1	278	198	11.5	4 x ø 7
PR750-1	283	244	11.5	4 x ø 7
PR185-2	202	152	11.2	4 x ø 11
PR300-2	202	152	11.2	4 x ø 11
PR400-2	278	151	11.5	4 x ø 11
PR460-2	278	176	11.5	4 x ø 11
PR580-2	283	176	11.5	4 x ø 11
PR750-2	283	255	11.5	4 x ø 14

Fixing holes according to the plate types

Low Voltage Ride Through (LVRT) modules

RU19/120

Description

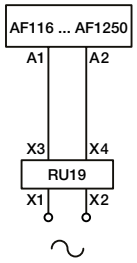
RU19 is designed to meet the Low Voltage Ride Through (LVRT) requirements for grid connections by staying operational during voltage dips preventing disturbances on the grid it self.

The RU19 is a separate module connected to the contactors coil connection A1-A2 creating a delay function of the opening of the contactor. When controlled by PLC, the contactor is operated directly whitout delay functionality. The RU19 can be screw or DIN rail mounted.

Ordering details

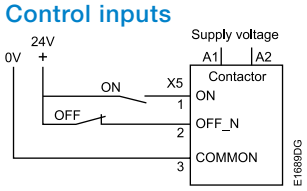
For contactor	Rated control circuit voltage Uc V 50/60 Hz	Type	Order code		Weight Pkg (1 pce) kg
AF116 ... AF370 use coil 33 AF400 ... AF1250 use coil 69	110...120	RU19/120	1SFN170801R1001		0.400
AF116 ... AF370 use coil 33 AF400 ... AF1250 use coil 70	230...240	RU19/240	1SFN170801R1002		0.400

AF116 ... AF1250

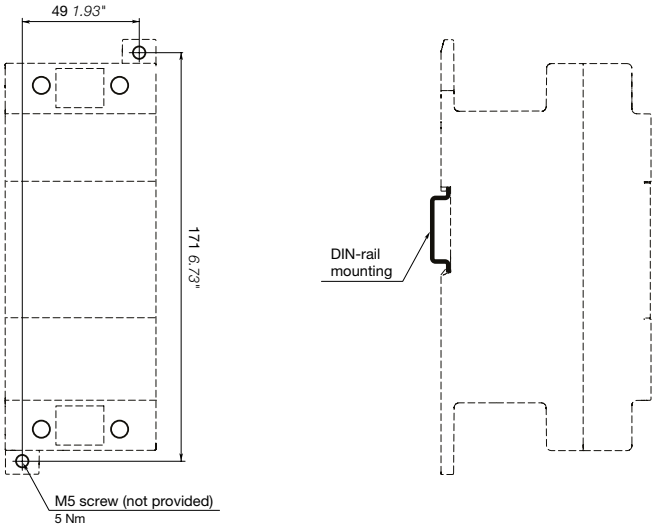


For direct opening of AF400 ... AF1250 contactors, connect through built in PLC interface.

Control inputs



Main dimensions mm, *inches*



RU19/240

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5

Contactor coils, main contact sets and arc chutes

1SFC101007F0201

ZAF1650

Contactor coils

Ordering details

For contactors	Rated control circuit voltage Uc min. ... Uc max.		Type	Order code		Pkg qty	Weight (1 pce)
	V 50/60 Hz	V DC					kg
AF400, AF460	-	24...60	ZAF460	1SFN155770R6806		1	0.525
	48...130	48...130	ZAF460	1SFN155770R6906		1	0.525
	100...250	100...250	ZAF460	1SFN155770R7006		1	0.525
	250...500	250...500	ZAF460	1SFN155770R7106		1	0.525
AF580 ... AF1250	-	24...60	ZAF750	1SFN156170R6806		1	1.335
	48...130	48...130	ZAF750	1SFN156170R6906		1	1.335
	100...250	100...250	ZAF750	1SFN156170R7006		1	1.335
	250...500	250...500	ZAF750	1SFN156170R7106		1	1.335
AF1350 ... AF2050	100...250	100...250	ZAF1650 (1)	1SFN156570R7026		1 set	0.900
			ZP1650 (2)	1SFN166521R1070		1	0.300
AF2650	100...250	100...250	ZAF2650 (1)	1SFN156670R7026		1 set	0.900
			ZP2650 (2)	1SFN166621R1070		1	0.300

ZAF460, ZAF750 : printed circuit board included.
(1) One set of two coil.
(2) Printed circuit board.

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ZL1650

Main contact sets

Description

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

Ordering details

For 3-pole contactors		Type	Order code		Pkg qty	Weight (1 pce) kg
AF400		ZL400	1SFN165703R1000		1	1.320
AF460		ZL460	1SFN165903R1000		1	1.320
AF580		ZL580	1SFN166103R1000		1	1.840
AF750		ZL750	1SFN166303R1000		1	1.840
AF1250		ZL1250	1SFN166403R1000		1	1.840
AF1350	For contactors produced before 2014-01-13, with serial number before 1S160100514O3xxxx	ZL1350	1SFN166503R1000		1	2 500
	For contactors produced since 2014-01-13, with serial number above 1S160100514O3xxxx	ZL1350-1	1SFN166503R1001		1	4 500
AF1650	For contactors produced before 2014-01-13, with serial number before 1S160100514O3xxxx	ZL1650	1SFN166703R1000		1	3 500
	For contactors produced since 2014-01-13, with serial number above 1S160100514O3xxxx	ZL1650-1	1SFN166703R1001		1	4 500
AF2050	For contactors produced before 2014-01-13, with serial number before 1S160100514O3xxxx	ZL2050	1SFN167003R1000		1	3 500
	For contactors produced since 2014-01-13, with serial number above 1S160100514O3xxxx	ZL2050-1	1SFN167003R1001		1	4 500
AF2650 (3)		ZL2650	1SFN166603R1000		1	1.200

(3) Does not include fixed contacts and screws.

Arc chutes

Ordering details

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
AF400, AF460	ZW460	1SFN165710R1000		1	1.380
AF580, AF750, AF1250	ZW750	1SFN166110R1000		1	1.500
AF1350, AF1650, AF2050	ZW1650	1SFN166510R1001		1	4.560
AF2650	ZW2650	1SFN166610R1000		1	4.000

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Notes

Accessories for UA, UA..RA contactors and GA75, GAE75, GAF contactors

Auxiliary contact blocks **5**/382
Electronic timers **5**/388
Mechanical and electrical interlock units **5**/392
CA5, CE5, CAL, CEL18 and TEF5 fitting details **5**/394
Function markers - Mounting piece **5**/395
Surge suppressors for contactor coils **5**/396
Interface relays **5**/398
Mechanical latching units **5**/400
Additional terminal blocks and others accessories **5**/402
Terminals for control lead connections **5**/403
Contactor bar for contactors **5**/504
Contactor coils and main contact sets **5**/405

Voltage code table **5/417**

Auxiliary contact blocks

CA5-10

CA5-40E

CAL5-11

CAL18-11

Description

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

Types of auxiliary contact blocks for front mounting:

– CA5 1 or 4-pole block, instantaneous with N.O., N.C. contacts

– CC5 1-pole block, with N.O. leading contact or N.C. lagging contact.

Select the 4-pole auxiliary contact blocks CA5 type, according to the contactor type for compliance with the standard requirements (see "Terminal Marking and Positioning").

Types of auxiliary contact blocks for side mounting:

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

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

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

Ordering details (1)

For contactors	Auxiliary contacts				Type	Order code		Pkg qty	Weight (1 pce)
									kg
Front-mounted instantaneous auxiliary contact blocks, 1-pole									
UA16 ... UA110	1	0	–	–	CA5-10	1SBN010010R1010		10	0.014
	0	1	–	–	CA5-01	1SBN010010R1001		10	0.014
	–	–	1	0	CC5-10	1SBN010011R1010		10	0.014
	–	–	0	1	CC5-01	1SBN010011R1001		10	0.014
Front-mounted instantaneous auxiliary contact blocks, 4-pole									
UA16 ... UA30	2	2	–	–	CA5-22M	1SBN010040R1122		2	0.060
	3	1	–	–	CA5-31M	1SBN010040R1131		2	0.060
	1	3	–	–	CA5-13M	1SBN010040R1113		2	0.060
	0	4	–	–	CA5-04M	1SBN010040R1104		2	0.060
	1	1	1	1	CA5-11/11M	1SBN010040R1118		2	0.060
UA50 ... UA110	2	2	–	–	CA5-22E	1SBN010040R1022		2	0.060
	3	1	–	–	CA5-31E	1SBN010040R1031		2	0.060
	4	0	–	–	CA5-40E	1SBN010040R1040		2	0.060
	0	4	–	–	CA5-04E	1SBN010040R1004		2	0.060
	1	1	1	1	CA5-11/11E	1SBN010040R1018		2	0.060
Side-mounted instantaneous auxiliary contact blocks, 2-pole									
UA16 ... UA75	1	1	–	–	CAL5-11	1SBN010020R1011		2	0.050
UA95, UA110	1	1	–	–	CAL18-11	1SFN010720R1011		2	0.050

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

Note:

– The front-mounted auxiliary contact blocks provided for the UA75 contactors can be used with the GA and GAE types

– The CAL auxiliary contact blocks can be used with GA contactors:

GA75-10-00: 2 x CAL5-11 blocks
GA75-10-11: 1 x CAL5-11 block
GAE75-10-00: 1 x CAL5-11 block
GAE75-10-11: no add-on block.

– The CAL auxiliary contact blocks can be used with UA..RA contactors. See "Accessory fitting details" for this contactor type.

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Auxiliary contact blocks

Technical data

			Front mounted	Side mounted	
Types			1-pole **CA5**, 1-pole **CC5**, 4-pole **CA5**	**CAL5-11**	**CAL18-11, CAL18-11B**
Contact utilization characteristics according to IEC					
Standards			IEC 60947-5-1 and EN 60947-5-1		
Rated insulation voltage Ui acc. to IEC 60947-5-1			690 V		
Rated operational voltage Ue max.			24...690 V AC		
Conventional thermal current Ith - θ ≤ 40 °C			16 A		
Ie / Rated operational current AC-15					
acc. to IEC 60947-5-1		**24-127 V 50/60 Hz**	6 A		
		220-240 V 50/60 Hz	4 A		
		380-440 V 50/60 Hz	3 A		
		500-690 V 50/60 Hz	2 A		
Making capacity acc. to IEC 60947-5-1			10 x Ie AC-15		
Breaking capacity acc. to IEC 60947-5-1			10 x Ie AC-15		
Ie / Rated operational current DC-13					
acc. to IEC 60947-5-1		**24 V DC**	6 A / 144 W		
		48 V DC	2.8 A / 134 W		
		72 V DC	1 A / 72 W		
		110 V DC	0.55 A / 60 W		
		125 V DC	0.55 A / 69 W		
		220 V DC	0.3 A / 66 W		
		250 V DC	0.3 A / 75 W		
Short-circuit protection device gG type fuse			10 A		
Rated short-time withstand current Icw		**for 1.0 s**	100 A		
θ = 40 °C		**for 0.1 s**	140 A		
Minimum switching capacity					
A40 ... A75 contactors			17 V / 1 mA		–
with failure rate acc. to IEC 60947-5-4			≤ 10^{-7}		–
A95 ... A110 contactors			24 V / 50 mA	–	24 V / 50 mA (0.5 million of operating cycles)
with failure rate acc. to IEC 60947-5-4			–	–	≤ 10^{-6}
Power dissipation per pole at 6 A			0.1 W		0.15 W
Mechanical durability	Number of operating cycles		10 millions (UA16 ... UA75) 3 millions (UA95 ... UA110)	10 millions	5 millions (UA95 ... UA110) 3 millions (GAF185 ... GAF750) 0.5 million (GAF1250 ... GAF2050)
	Max. switching frequency		3600 cycles/h		
Electrical durability	Number of operating cycles		see "Electrical durability" curves		
	Max. switching frequency	**AC-15**	1200 cycles/h		
		DC-13	900 cycles/h		

Contact utilization characteristics according to UL / CSA

Standards			UL 508, CSA C22.2 N°14		
Max. operational voltage			600 V AC, 250 V DC		
Pilot duty			A600, Q300		
AC thermal rated current			10 A		

Connecting characteristics

Connection capacity (min. ... max.)					
	Rigid solid	**1 x**	1...4 mm²		
		2 x	1...4 mm²		
	Flexible with ferrule	**1 x**	0.75...2.5 mm²		
		2 x	0.75...2.5 mm²		
	Lugs	**L ≤**	7.7 mm	8 mm	
		l >	3.7 mm	3.7 mm	
Tightening torque			1 Nm		
Degree of protection		**Terminals**	IP20		
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529					
Screw terminals			Delivered in open position, screws of unused terminals must be tightened		
All terminals			M3.5		
Screwdriver type			Flat Ø 5.5 / Pozidriv 2		

1SBC101522S0201 - Rev. B

Auxiliary contact blocks
for severe industrial environments

CE5-01W

Description

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

Types of auxiliary contact blocks for front mounting:

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

Types of auxiliary contact blocks for side mounting:

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

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

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

5

Ordering details (1)

For contactors	Auxiliary contacts				Type	Order code		Pkg qty	Weight (1 pce) kg
Front-mounting instantaneous auxiliary contact blocks, 1-pole									
UA16 ... UA75	1	–	–	–	CE5-10D0.1	1SBN010015R1010		1	0.020
	–	1	–	–	CE5-01D0.1	1SBN010015R1001		1	0.020
	1	–	–	–	CE5-10D2	1SBN010017R1010		1	0.020
	–	1	–	–	CE5-01D2	1SBN010017R1001		1	0.020
	1	–	–	–	CE5-10W0.1	1SBN010016R1010		1	0.020
	–	1	–	–	CE5-01W0.1	1SBN010016R1001		1	0.020
	1	–	–	–	CE5-10W2	1SBN010018R1010		1	0.020
	–	1	–	–	CE5-01W2	1SBN010018R1001		1	0.020
Side-mounting instantaneous auxiliary contact blocks, 1-pole microswitch auxiliary contact N.O. or N.C.									
UA95, UA110 GAF185 ... GAF2050	1	0	–	–	CEL18-10	1SFN010716R1010		1	0.050
UA95, UA110 GAF185 ... GAF2050	0	1	–	–	CEL18-01	1SFN010716R1001		1	0.050

(1) For each contactor type, refer to "Accessory fitting details" table.
Note: The front-mounted auxiliary contact blocks provided for the UA contactors can be used with the GA and GAE types.
The side-mounted auxiliary contact blocks provided for the UA95, UA110 contactors can be used with the GAF types.

1SBC101577S0201 - Rev. C

Auxiliary contact blocks

Technical data

			Front-mounted		Side-mounted
Types			1-pole **CE5-..0.1**	1-pole **CE5-..2**	**CEL18-10, CEL18-01**
Contact utilization characteristics according to IEC					
Standards			IEC 60947-5-1 and EN 60947-5-1		
Rated insulation voltage Ui acc. to IEC 60947-5-1			250 V		
Rated operational voltage Ue max.			125 V	250 V	125 V
Conventional thermal current Ith - θ ≤ 40 °C			0.1 A	2 A	0.1 A
Ie / Rated operational current			**AC-14**	**AC-15**	**AC-14**
acc. to IEC 60947-5-1		**24-127 V 50/60 Hz**	0.1 A	2 A	0.1 A
		220-240 V 50/60 Hz	–	2 A	–
Making capacity acc. to IEC 60947-5-1			6 x Ie AC-14	10 x Ie AC-15	6 x Ie AC-14
Breaking capacity acc. to IEC 60947-5-1			6 x Ie AC-14	10 x Ie AC-15	6 x Ie AC-14
Ie / Rated operational current			**DC-12**		
acc. to IEC 60947-5-1		**24 V DC**	0.1 A	2 A	0.1 A
		48 V DC	0.1 A	1 A	0.1 A
		72 V DC	0.1 A	0.3 A	0.1 A
		110 V DC	0.1 A	0.2 A	0.1 A
		125 V DC	–	0.2 A	–
		220 V DC	–	0.1 A	–
Short-circuit protection device			0.1 A (FF type fuses) (1)	10 A (FF type fuses) (1)	0.1 A (FF type fuses) (1)
Minimum switching capacity					
A40 ... A75 contactors			3 V / 1 mA	17 V / 1 mA	3 V / 1 mA
With failure rate acc. to IEC 60947-5-4			–	≤ 10^{-7}	–
A95 ... A110 contactors			3 V / 1 mA	17 V / 1 mA	–
With failure rate acc. to IEC 60947-5-4			–	≤ 10^{-7}	–
Mechanical durability	Number of operating cycles		5 millions for CE5-..D0.1	5 millions for CE5-..D2	1 million
			2.5 millions for CE5-..W0.1	2.5 millions for CE5-..W2	–
	Max. switching frequency		3600 cycles/h		1200 cycles/h
Electrical durability	Number of operating cycles		2.5 millions for CE5-..D0.1	1 million for CE5-..D2	0.7 millions
			0.7 millions for CE5-..W0.1	0.3 millions for CE5-..W2	
	Max. switching frequency	**AC-14, AC-15**	1200 cycles/h		
		DC-12	900 cycles/h		
Contact utilization characteristics according to UL / CSA					
Standards			UL 508, CSA C22.2 N°14		
Max. operational voltage			125 V AC / 110 V DC	250 V AC / 220 V DC	125 V
Pilot duty					
AC thermal rated current			0.1 A	2 A	0.1 A
Connecting characteristics					
Connection capacity (min. ... max.)					
	Rigid solid	**1 x**	1...4 mm²		
		2 x	1...4 mm²		
	Flexible with ferrule	**1 x**	0.75...2.5 mm²		
		2 x	0.75...2.5 mm²		
	Bars or lugs	**L ≤**	7.7 mm		
		I >	3.7 mm		
Connection capacity acc. to UL/CSA		**1 or 2 x**	AWG 18...14		
Tightening torque			1 Nm		
Degree of protection		**Terminals**	IP20		
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		**Microswitches**	IP40 for CE5-..D0.1	IP40 for CE5-..D2	IP67
			IP67 for CE5-..W0.1	IP67 for CE5-..W2	
Screw terminals			Delivered in open position, screws of unused terminals must be tightened		
All terminals			M3.5		
Screwdriver type			Flat Ø 5.5 / Pozidriv 2		

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

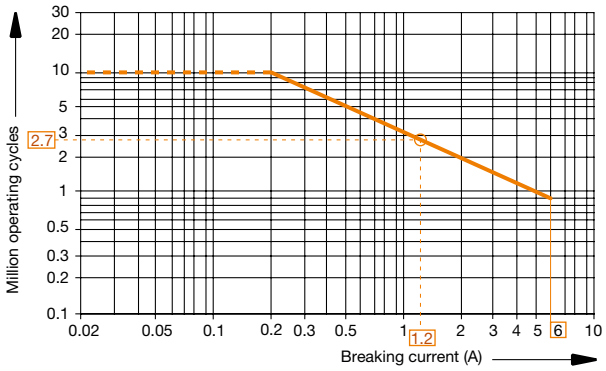
1SBC101584S0201

Auxiliary contacts for AF45 ... AF95B 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 x Ie with cos φ = 0.7 and Ue
- breaking current: Ie with cos φ = 0.4 and Ue.

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

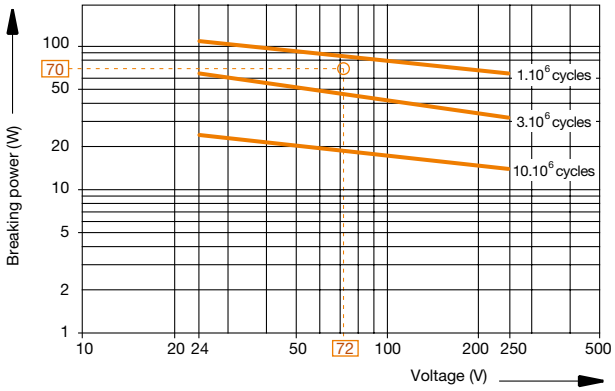


– 1-pole and 4-pole CA5,
  1-pole CC5,
  2-pole CAL5 and CAL18 add-on auxiliary contacts.

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 $2.7.10^6$ operating cycles.

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 = Ie with Ue value.



– 1-pole and 4-pole CA5,
  1-pole CC5,
  2-pole CAL5 and CAL18 add-on auxiliary contacts.

Example:
Control of DC electro-magnet: Ue voltage = 72 V DC 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.

1SBC101588S0201 - Rev. A

Add-on auxiliary contacts
Terminal marking and positioning

1-pole auxiliary contacts

CA5-01

CA5-10

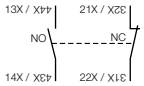
CE5-01, CEL18-01

CE5-10, CEL18-10

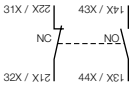
CC5-01

CC5-10

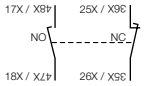
2-pole auxiliary contacts



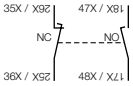
CAL5-11, CAL18-11
(Left-side mounted)



CAL5-11, CAL18-11
(Right-side mounted)

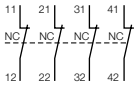


CCL5-11
(Left-side mounted)

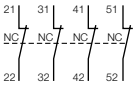


CCL5-11
(Right-side mounted)

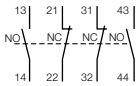
4-pole auxiliary contacts



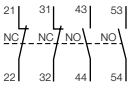
CA5-04E



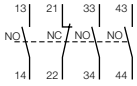
CA5-04M



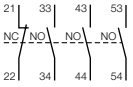
CA5-22E



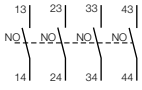
CA5-22M



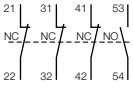
CA5-31E



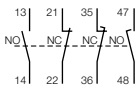
CA5-31M



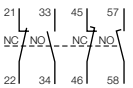
CA5-40E



CA5-13M



CA5-11/11E



CA5-11/11M

1SBC101586S0201 - Rev. A

Electronic timers

1SBC101396F0014

TEF5-OFF

5

Description

TEF5 frontal electronic timers are used for realizing timing function and are available in ON-delay and OFF-delay versions.

Compact solution in cabinet compared to separate timers

TEF5 electronic timers are front-mounted and locked on contactors.
A mechanical indicator allows to show the state of the contactor.

TEF5 electronic timers are supplied by direct wiring to the coil terminals A1 - A2 of the contactor or contactor relay. A varistor is integrated on the timer to offer a built-in protection against surges in the contactor coil.

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

TEF5-ON or TEF5-OFF allow time-delayed functions up to 100 s in 3 distinct time ranges, independently of the control system. The time delay ranges are selected by a switch and the time delay can be adjusted by means of a rotary switch. The timing function is activated by closing or opening the device on which the timer is mounted. The OFF-delay version operates without additional control supply.

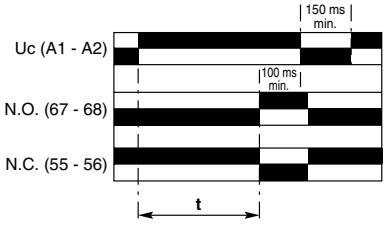
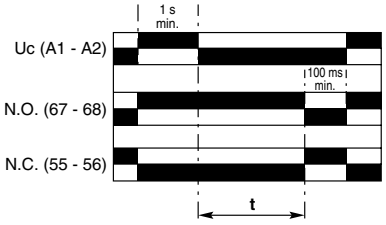
Ordering details

For contactors, contactor relays	Time delay range selected by switch	Delay type	Rated control circuit voltage Uc V 50/60 Hz or DC	Auxiliary contacts		Type	Order code		Weight Pkg (1 pce) kg
UA16 ... UA75 GA75, GAE75	0.1...1 s 1...10 s 10...100 s	ON-delay	24...240	1	1	TEF5-ON	1SBN020312R1000		0.065
		OFF-delay	24...240	1	1	TEF5-OFF	1SBN020314R1000		0.065

1SBC101675S0201 - Rev. B

Electronic timers
Technical data

Contact utilization characteristics according to IEC

Types			TEF5-ON	TEF5-OFF
Standards			IEC 60947-5-1 and EN 60947-5-1	
Rated insulation voltage Ui				
acc. to IEC 60947-5-1			400 V	
Rated impulse withstand voltage Uimp			4 kV	
Rated operational voltage Ue max.			240 V	
Rated frequency (without derating)			50 / 60 Hz	
Conventional thermal current Ith - θ ≤ 40 °C			5 A	
Ie / Rated operational current AC-15				
acc. to IEC 60947-5-1		**24-127 V 50/60 Hz**	3 A	
		220-240 V 50/60 Hz	1.5 A	
Making capacity			10 x Ie AC-15 acc. to IEC 60947-5-1	
Breaking capacity			10 x Ie AC-15 acc. to IEC 60947-5-1	
Ie / Rated operational current DC-13				
acc. to IEC 60947-5-1		**24 V DC**	1 A / 24 W	
Short-circuit protection device gG type fuse			6 A	
Rated short-time withstand current Icw		**for 1.0 s**	8 A	
θ = 40 °C		**for 0.1 s**	8 A	
Minimum switching capacity			12 V / 3 mA	
with failure rate acc. to IEC 60947-5-4		**24 V DC**	10^{-7}	
Power dissipation per pole at 3 A			0.1 W	
Function diagram			ON-delay	OFF-delay
				
			Bistable relay inside. Before use, once apply Uc then switch it off in order to initialize position of the contacts.	
Control circuit voltage				
AC control voltage	Rated control circuit voltage Uc		24...240 V AC	
50/60 Hz	Average consumption		1.5 mA RMS	1 mA RMS
DC control voltage	Rated control circuit voltage Uc		24...240 V DC	
	Average consumption		1.5 mA	1 mA
Rated frequency limits			50 / 60 Hz	
Supply voltage range			0.85...1.1 x Uc (at θ ≤ 70 °C)	
Overvoltage protection			Varistor included	
Time delay range (t) selected by switch		**0.1...1 s**		
		1...10 s		
		10...100 s		
On-load reiteration accuracy under constant conditions			≤ 1 %	
Minimum ON period			0.1 s	1 s
Recovery time			0.15 s	0.1 s
Ambient air temperature	Operation		-25 °C ... +70 °C	
	Storage		-40 °C ... +80 °C	
Climatic withstand			Category B according to IEC 60947-1 Annex Q	
Maximum operating altitude			2000 m	
Mounting positions			Acc. to mounting positions permitted on contactors or contactor relays	
Shock withstand			1/2 sinusoidal shock for 11 ms: no change in contact position	
acc. to IEC 60068-2-27 and EN 60068-2-27			Same as contactor or contactor relay	
(Mounting position 1)				
Mechanical durability				
	Number of operating cycles		5 millions operating cycles	
	Max. switching frequency		3600 cycles/h	1800 cycles/h
Max. electrical switching frequency				
		AC-15	1200 cycles/h	
		DC-13	900 cycles/h	

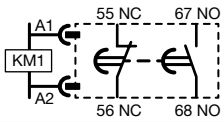
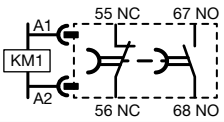
1SBC101674S0201 - Rev. A

Electronic timers
Technical data

Contact utilization characteristics according to UL / CSA

Types		**TEF5-ON**	**TEF5-OFF**
Standards		UL 508, CSA C22.2 N°14	
Rated insulation voltage Ui			
acc. to UL / CSA		300 V	
Max. operational voltage		240 V	
Pilot duty		B300, R300	
AC thermal rated current		5 A	
AC maximum volt-ampere making		3600 VA	
AC maximum volt-ampere breaking		360 VA	
DC thermal rated current		1 A	
DC maximum volt-ampere making-breaking		28 VA	

Connecting characteristics

Connection capacity (min. ... max.)		
Rigid solid	**1 x**	1...2.5 mm²
	2 x	1...2.5 mm²
Flexible with non insulated ferrule	**1 x**	0.75...2.5 mm²
	2 x	0.75...2.5 mm²
Flexible with insulated ferrule	**1 x**	0.75...2.5 mm²
	2 x	0.75...1.5 mm²
Lugs	**L ≤**	8 mm
	I >	3.7 mm
Connection capacity acc. to UL / CSA	**1 or 2 x**	AWG 18...14
Stripping length		10 mm
Tightening torque		1 N.m / 9 lb.in
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		IP20
Screw terminals		Delivered in open position, screws of unused terminals should be tightened
All terminals		M3.5
Screwdriver type		Flat Ø 5.5 / Pozidriv 2
Terminal Marking		 

1SBC101674S0201 - Rev. A

Notes

Mechanical and electrical interlock units

VE5-2

Description

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

VE interlock units are used for mechanical and electrical interlocking of two AC or DC operated contactors mounted side by side.

Ordering details

For contactors	Mounting	Type	Order code		Pkg qty	Weight (1 pce) kg
Mechanical and electrical interlock units for two horizontal mounted contactors						
GA75, GAE75	Rail mounting	VE5-2	1SBN030210R1000		1	0.146

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Mechanical and electrical interlock units

Technical data

Types		VE5-2

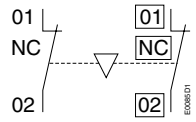
Contact utilization characteristics according to IEC

Standards		IEC 60947-5-1 and EN 60947-5-1
Rated insulation voltage Ui acc. to IEC 60947-5-1		690 V
Rated operational voltage Ue max.		24...690 V
Conventional thermal current Ith - θ ≤ 40 °C		16 A
Ie / Rated operational current AC-15		
acc. to IEC 60947-5-1	**24-127 V 50/60 Hz**	6 A
	220-240 V 50/60 Hz	4 A
	380-440 V 50/60 Hz	3 A
	500-690 V 50/60 Hz	2 A
Making capacity acc. to IEC 60947-5-1		10 x Ie AC-15
Breaking capacity acc. to IEC 60947-5-1		10 x Ie AC-15
Ie / Rated operational current DC-13		
acc. to IEC 60947-5-1	**24 V DC**	6 A
	48 V DC	2.8 A
	72 V DC	1 A
	125 V DC	0.55 A
	250 V DC	0.3 A
Short-circuit protection device - gG type fuse		10 A
Rated short-time withstand current Icw	**for 1.0 s**	100 A
θ = 40 °C	**for 0.1 s**	140 A
Power dissipation per pole at 6 A		0.15 W
Mechanical durability		
Number of operating cycles		5 millions operating cycles
Max. switching frequency		600 cycles/h

Utilization characteristics according to UL/CSA

Standards	UL 508, CSA C22.2 N°14
Max. operational voltage	600 V

Connecting characteristics

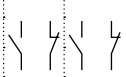
Connection capacity (min. ... max.)		
Rigid solid	**1 x**	1...4 mm²
	2 x	1...4 mm²
Flexible with ferrule	**1 x**	0.75...2.5 mm²
	2 x	0.75...2.5 mm²
Lugs	**L <**	8 mm
	I >	3.5 mm
Tightening torque		
Recommended		1 Nm
Max.		1.2 Nm
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		IP20
Screw terminals		delivered in open position, screws of unused terminals must be tightened
All terminals		M3.5
Screwdriver type		Flat Ø 5.5 / Pozidriv 2
Terminal marking		

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 TEF5 electronic timer according to application use with time lapse for GA75, GAE75 contators.

1SBC101331S0201 - Rev. B

CA5, CE5, CAL, CEL18 and TEF5 fitting details

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

Contactor types	Main poles	Built-in auxiliary contacts	Front-mounted accessories: Auxiliary contact blocks						Front-mounted accessories: Electronic timer		Side-mounted accessories: Auxiliary contact blocks		Side-mounted accessories: Interlock unit
			1-pole CA5		4-pole CA5						2-pole CAL		
			1-pole CE5						TEF5		1-pole CEL18		VE5
UA contactors													
UA16 ... UA26	3 0	1 0	1 to 4 x CA5 1 to 2 x CE5 max. (1)	or	1 x 4-pole CA5 + 1 x 1-pole CA5 or CE5 (1)	or	1 x TEF5 + 1 x 1-pole CA5	+	1 to 2 x CAL5-11		–		
UA30	3 0	1 0	1 to 5 x CA5 1 to 3 x CE5 max. (1)	or	1 x 4-pole CA5 + 1 x 1-pole CA5 or CE5 (1)	or	1 x TEF5 + 1 x 1-pole CA5	+	1 to 2 x CAL5-11		–		
UA50 ... UA75	3 0	0 0	1 to 6 x CA5 1 to 5 x CE5 max. (2)	or	1 x 4-pole CA5 + 2 x 1-pole CA5 or CE5 (1)	or	1 x TEF5 + 2 x 1-pole CA5	+	1 to 2 x CAL5-11		–		
	3 0	1 1	1 to 6 x CA5 1 to 5 x CE5 max. (2)	or	1 x 4-pole CA5 + 2 x 1-pole CA5 or CE5 (1)	or	1 x TEF5 + 2 x 1-pole CA5	+	1 x CAL5-11		–		
UA95, UA110	3 0	0 0	1 to 6 x CA5 1 to 5 x CE5 max. (2)	or	1 x 4-pole CA5 + 2 x 1-pole CA5 or CE5 (1)		–	+	1 to 2 x CAL18-11 or 1 to 2 x CEL18		–		
	3 0	1 1	1 to 6 x CA5 1 to 5 x CE5 max. (2)	or	1 x 4-pole CA5 + 2 x 1-pole CA5 or CE5 (1)		–	+	1 x CAL18-11 or 1 x CEL18		–		
UA..RA contactors													
UA16-30-10RA UA26-30-10RA	3 0 3 0	1 0 1 0	–		–		–	+	1 x CAL5-11		–		
UA30-30-10RA	3 0	1 0	1 x CA5 1 x CE5		–		–	+	1 to 2 x CAL5-11		–		
UA50-30-00RA UA63-30-00RA UA75-30-00RA	3 0 3 0 3 0	0 0 0 0 0 0	1 to 2 x CA5 1 to 2 x CE5		–		–	+	1 to 2 x CAL5-11		–		
UA95-30-00RA UA110-30-00RA	3 0 3 0	0 0 0 0	1 to 2 x CA5 1 to 2 x CE5		–		–	+	1 to 2 x CAL18-11 or 1 to 2 x CEL18		–		
GA75, GAE75 contactors													
GA75	1 0	0 0	1 to 6 x CA5 1 to 5 x CE5 max. (2)	or	1 x 4-pole CA5 + 2 x 1-pole CA5 or CE5 (2)	or	1 x TEF5 + 2 x 1-pole CA5	+	1 to 2 x CAL5-11	or	1 x VE5-2 + 1 x CAL5-11		
	1 0	1 1	1 to 6 x CA5 1 to 5 x CE5 max. (2)	or	1 x 4-pole CA5 + 2 x 1-pole CA5 or CE5 (2)	or	1 x TEF5 + 2 x 1-pole CA5	+	1 x CAL5-11	or	1 x VE5-2		
GAE75	1 0	0 0	1 to 6 x CA5 1 to 5 x CE5 max. (2)	or	1 x 4-pole CA5 + 2 x 1-pole CA5 or CE5 (2)	or	1 x TEF5 + 2 x 1-pole CA5	+	1 x CAL5-11	or	1 x VE5-2		
	1 0	1 1	1 to 6 x CA5 1 to 5 x CE5 max. (2)	or	1 x 4-pole CA5 + 2 x 1-pole CA5 or CE5 (2)	or	1 x TEF5 + 2 x 1-pole CA5		–		–		

Notes regarding combination of CE5 with other accessories:
(1) The total number of N.O. or N.C. CE5 and other additional N.C. CA5 auxiliary contacts is limited to 3. CES auxiliary contacts not allowed in mounting position 5.
(2) The total number of N.O. or N.C. CE5 and other additional N.C. CA5 auxiliary contacts is limited to 5.

1SBC101585S0201 - Rev. A

Function markers
Mounting piece

1SBC575874F0301

BA5-50

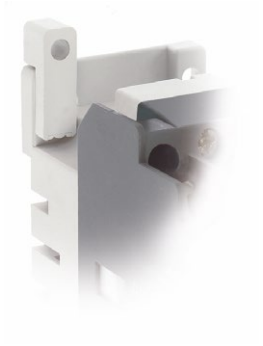
BA5-50 Function markers

Description

Set of 50 function markers designed to be clipped onto the front face of devices. Details can be added to these markers using a ball point pen, indelible felt-tip pen or pentel white.
Self-adhesive labels (not supplied) can also be added to them.
Marker dimensions: 7 x 19 mm (0.276" x 0.748").

Ordering details

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
UA, UA..RA and accessories GA75, GAE75	BA5-50	1SBN110000R1000		1	0.017


1SBC586724F0302

BP16

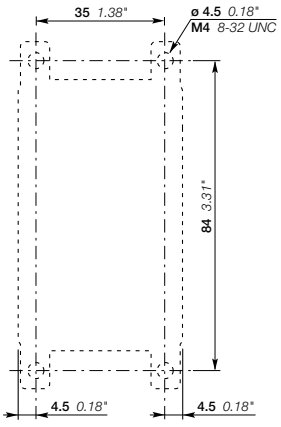
BP16 Mounting piece

Description

Mounting piece for screw fixing (M4, not supplied) of UA, UA..RA series contactors indicated in the table below.
Easy handling of screwdrivers and screw driving.
Add-on mounting piece on contactor's rear face, offering a wide fixing facility.

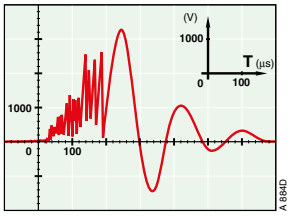
Ordering details

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
UA16, UA16..RA	BP16	1SBN111403R1000		100	0.141



Drilling plan for UA16, UA16..RA contactors with BP16

Surge suppressors for contactor coils



Description

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 Ûs to the peak value Ûc of the coil rated control voltage Uc:

$$k = \frac{\hat{U}s\ max.}{\hat{U}c} \qquad \text{in DC: } k = \frac{\hat{U}s\ max.}{Uc} \qquad \text{or in AC: } k = \frac{\hat{U}s\ max.}{Uc\sqrt{2}}$$

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

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.

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1SBC574001F0301

RV5/50

1SBC573891F0301

RC5-1/50

Ordering details

For contactors	Rated control circuit voltage Uc			Type	Order code		Pkg qty	Weight (1 pce)
	V	AC	DC					kg
UA, UA..RA GA75, GAE75	24...50	●	●	RV5/50	1SBN050010R1000		2	0.015
	50...133	●	●	RV5/133	1SBN050010R1001		2	0.015
	110...250	●	●	RV5/250	1SBN050010R1002		2	0.015
	250...440	●	●	RV5/440	1SBN050010R1003		2	0.015
UA, UA..RA GA75	24...50	●	–	RC5-2/50	1SBN050200R1000		2	0.015
	50...133	●	–	RC5-2/133	1SBN050200R1001		2	0.015
	110...250	●	–	RC5-2/250	1SBN050200R1002		2	0.015
	250...440	●	–	RC5-2/440	1SBN050200R1003		2	0.015
GAE75	12...32	–	●	RT5/32	1SBN050020R1000		2	0.015
	25...65	–	●	RT5/65	1SBN050020R1001		2	0.015
	50...90	–	●	RT5/90	1SBN050020R1002		2	0.015
	77...150	–	●	RT5/150	1SBN050020R1003		2	0.015
	150...264	–	●	RT5/264	1SBN050020R1004		2	0.015

1SBC101527S0201 - Rev. B

Surge suppressors for contactor coils

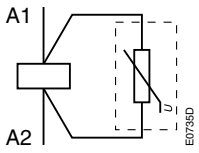
Technical data

Varistor	RV5/50	RV5/133	RV5/250	RV5/440
Rated control circuit voltage Uc	24...50 V AC	50...133 V AC	110...250 V AC	250...440 V AC
	24...50 V DC	50...133 V DC	110...250 V DC	250...440 V DC
Residual overvoltage (clipping voltage)	132 V AC	270 V AC	480 V AC	825 V AC
	132 V DC	270 V DC	480 V DC	825 V DC
Opening time growth factor	1.1...1.5			
Operating temperature	-20...+70 °C			
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 Uvdr*, thus voltage front up to this point. *Uvdr = Varistor operating voltage (voltage dependent resistor), tolerance ± 10 %.			

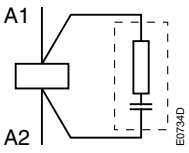
RC type	RC5-2/50	RC5-2/133	RC5-2/250	RC5-2/440
Rated control circuit voltage Uc	24...50 V AC	50...133 V AC	110...250 V AC	250...440 V AC
Residual overvoltage (clipping voltage)	2 to 3 x Uc max.			
Opening time growth factor	1.2...1.3			
Operating temperature	-20...+70 °C			
Connection to the coil terminals (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.			

Transil diode	RT5/32	RT5/65	RT5/90	RT5/150	RT5/264
Rated control circuit voltage Uc	12...32 V DC	25...65 V DC	50...90 V DC	77...150 V DC	150...264 V DC
Residual overvoltage (clipping voltage)	50 V DC	100 V DC	150 V DC	210 V DC	390 V DC
Opening time growth factor	1.5...3				
Operating temperature	-20...+70 °C				
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.				

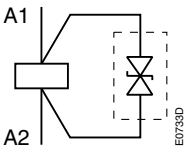
Wiring diagrams



Varistor

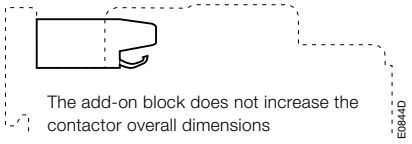


RC type



Transil diode

Dimensions



RV5, RC5, RT5

1SBC101335S0201 - Rev. A

Interface relays

RA5-1

Description

RA5-1 interface relay is designed to receive 24 V DC 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 contactors.

RA5-1 interface relay is made up of a miniature electromechanical relay equipped with a N.O. contact and with a low consumption 24 V DC 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 RA5-1 is equipped with surge suppressors:

– on the 24 V DC relay coil via a diode,

– on the power contactor coil via a varistor.

Furthermore, the RA5-1 is protected against relay pole reversal by a diode inserted between the E1 and E2 input terminals.

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Ordering details

For contactors	Coil voltages V 50/60 Hz	Rated control circuit voltage Uc V DC	Type	Order code		Pkg qty	Weight (1 pce) kg
UA, UA..RA GA75	24...250	24	RA5-1	1SBN060300R1000		1	0.050
			RA5-1	1SBN060300T1000		10	0.050

1SBC101528S0201 - Rev. B

Interface relays

Technical data

Type	RA5-1

Utilization characteristics according to IEC

Standards		IEC 60255-5
Rated insulation voltage Ui acc. to IEC 60947-4-1		250 V AC
Ambient air temperature		
In free air operation	**at Uc = 24 V DC (between E1 and E2)**	-25…+70 °C
	from 0.85 to 1.1 x Uc	-25…+55 °C
Storage		-40…+70 °C
Climatic withstand		Complies with that of associated contactors
Maximum operating altitude		3000 m
Mounting positions		No limitation
Fixing		Using the contactor A1 and A2 teminal connecting parts

Connecting characteristics

Connection capacity (min. ... max.)		
Rigid solid	**1 x**	1…4 mm²
	2 x	1…4 mm²
Flexible with ferrule	**1 x**	0.75…2.5 mm²
	2 x	0.75…2.5 mm²
Lugs	**L <**	8 mm
	I >	3.5 mm
Tightening torque		
Recommended		1 Nm
Max.		1.2 Nm
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		RA5-1 wired and mounted on the associated contactor
Screw terminals		Delivered in open position, screws of unused terminals must be tightened
All terminals		M3.5
Screwdriver type		Flat Ø 5.5 / Pozidriv 2

Working data

Surge suppression		
For contactor coil		Varistor
For interface relay coil		Diode
Protection against polarity reversal between terminals E1 and E2		Diode
Interface relay operating time		Closing and drop-out ≤ 10 ms
Total operating time, interface relay + contactor		
Between energization and:	**N.O. contact closing**	20…37 ms
	N.C. contact opening	17…32 ms
Between de-energization and:	**N.O. contact opening**	17…25 ms
	N.C. contact closing	20…28 ms

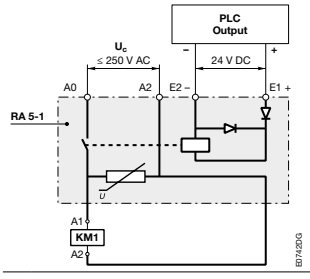
Electrical input data

Control voltage (E1 and E2 terminals) **Uc**		
Rated value		24 V DC
Max. range at ambient temperature 20 °C		19…30 V DC
Max. consumption for Uc = 24 V DC, θ = 20 °C		0.3 W
"0" status (relay open)	**for Uc**	≤ 2.4 V DC
	for Ic	< 1 mA
"1" status (relay closed)	**for Uc**	≥ 19 V DC
Max. short supply interruption immunity time		2 ms

Electrical output data

Switching voltage (A0 and A2 terminals)	≤ 250 V AC
Electrical durability	
Number of operating cycles	2 millions (600 cycles/h) on UA16(RA) ... UA75(RA), GA75, GAE75 contactors
	0.5 million (600 cycles/h) on UA95(RA) and UA110(RA) contactors

Connection

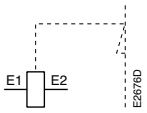


The "E1+" and "E2-" input terminals must be connected, according to their polarity, to the PLC output.
The RA5-1 is equipped with two terminal pads for connection to the A1 and the A2 terminals of the contactor coil.
This coil is supplied between the A0 and the A2 terminals of the RA 5-1.
Mounting: terminals pads clamped inside the contactor coil terminals.

1SBC101337S0201 Rev. A

Mechanical latching units

WB75-A



Terminal marking

Description

For converting standard contactors into latched contactors.

The WB75-A block contains a mechanical latching device with electromagnetic impulse unlatching (AC or DC) or manual unlatching.

Captive screw type connecting terminals, built-in cable clamps, M3.5 (+,-) pozidriv 2 screw with screw-driver guidance; delivered untightened and protected against accidental direct contact.

Operation

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

Contactor opening can be controlled:

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

Mounting

The WB75-A block is clipped onto the front face of the 1-stack contactor where it takes up two slots. The two other slots may accept CA5... single pole auxiliary contacts (1 block on each side of the mechanical latch).

Ordering details

For contactors	Rated control circuit voltage Uc		Type	Order code		Pkg qty	Weight (1 pce)
	V 50 Hz or DC	V 60 Hz					kg
UA16 ... UA75, GA75, GAE75	24	24...28	WB75-A	FPTN372726R1001		1	0.120
	42	42...48	WB75-A	FPTN372726R1002		1	0.120
	48	48...55	WB75-A	FPTN372726R1003		1	0.120
	110	110...127	WB75-A	FPTN372726R1004		1	0.120
	220...230	220...255	WB75-A	FPTN372726R1006		1	0.120
	230...240	230...277	WB75-A	FPTN372726R1005		1	0.120
	380...415	380...440	WB75-A	FPTN372726R1007		1	0.120
	415...440	440...480	WB75-A	FPTN372726R1008		1	0.120

1SBC101526S0201 - Rev. B

Mechanical latching units

Technical data

Type			WB75-A

Utilization characteristics according to IEC

Rated insulation voltage Ui acc. to IEC 60947-1			690 V
Max. electrical impulse time			
On AC coil (with load factor 5 %)			20 s
On DC coil (with load factor 3 %)			8 s
Min. electrical impulse time			
For latching (energizing of the contactor coil)		**AC**	50 ms (UA, GA contactors)
		DC	50 ms (GAE contactors)
For pull-out (energizing of the WB block coil)		**AC**	30 ms (UA, GA contactors)
		DC	50 ms (GAE contactors)
Coil operating limits		**AC or DC supply**	0.85…1.1 x Uc
AC control voltage 50/60 Hz			
Rated control circuit voltage Uc			24…480 V AC
Coil consumption		**Average pull-in value**	90 VA
		Average holding value	60 VA
DC control voltage			
Rated control circuit voltage Uc			24…440 V DC
Coil consumption		**Average pull-in value**	110 W
		Average holding value	110 W
Operating time			
On contactor closing (latching) Between coil energization and:			
		N.O. contact closing	No difference with the operation of a contactor without mechanical latching unit
		N.C. contact opening	No difference with the operation of a contactor without mechanical latching unit
On contactor opening (unlatching) Between WB coil energization and:			
		N.O. contact opening	5…25 ms
		N.C. contact closing	7…28 ms
Mechanical durability			
		Number of operating cycles	1 million operating cycles
Max. switching frequency			3600 cycles/h with on-load factor of 8 %

Connecting characteristics

Connection capacity (min. ... max.)			
Rigid solid		**1 x**	1...4 mm²
		2 x	1...4 mm²
Flexible with ferrule		**1 x**	0.75...2.5 mm²
		2 x	0.75...2.5 mm²
Lugs		**L <**	8 mm
		I >	3.5 mm
Tightening torque	Recommended		1 Nm
	Max.		1.2 Nm
Screw terminals			Delivered in open position, screws of unused terminals must be tightened
All terminals			M3.5
Screwdriver type			Flat Ø 5.5 / Pozidriv 2

1SBC101333S0201

Additional terminal blocks and other accessories

LD75

3

Terminal blocks

Description

The LD terminal blocks are designed to increase the connecting capacity of the contactor on which they are fitted and for preparation of the wiring before final connection on the contactor.

The LD blocks are 3-pole terminal blocks with tunnel terminals.

The LD75 terminal blocks are fixed in the 3 independent slots located above the built-in connectors.

Ordering details

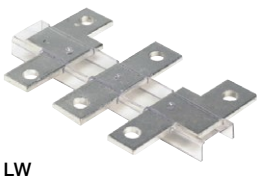
For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
UA50(RA) ... UA75(RA)	LD75	1SBN073508R1000		1	0.115

Technical data

Types				LD75
Rated insulation voltage Ui				
acc. to IEC 60947-4-1				690 V
acc. to UL / CSA				600 V
Main terminals				Screw terminals with single connector 10x11 mm
Connection capacity (min. ... max.)				
	Rigid	Solid (≤ 4 mm²)	1 x	6...50 mm²
		Stranded (≥ 6 mm²)	2 x	6...25 mm²
	Flexible with ferrule		1 x	6...35 mm²
			2 x	6...16 mm²
	Bars			10 mm
Tightening torque				4 Nm
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529				IP10
Screw terminals				Delivered in closed position
				M6
			Screwdriver type	pozidriv 2

Note: The utilization of LD additional terminal blocks leaves the possibility to connect the following cables directly into the contactor main terminals.

	LD75
Possible cross section of rigid cable in the contactor terminals	50 mm²



LW

Terminal enlargements

Description

Enlargement pieces designed to increase the width of the contactor terminal pads in order to allow larger connections to be mounted.

Sets containing 3 tin plated copper bars fixed by an isolating spacer.

Ordering details

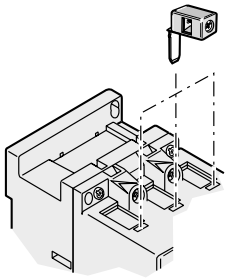
For contactors	Dimensions		Type	Order code		Pkg qty	Weight (1 pce) kg
	hole Ø mm	bar mm					
UA95, UA110	6.5	15 x 3	LW110	1SFN074307R1000		1	0.100

1SBC101534S0201 - Rev. B

Terminals for control lead connections

LK75-L

LK75-F



LK positioning

Description

Terminals designed to connect the control conductors to the main poles of the UA and GA contactors and derivative versions.

Accessories clipped into the slots placed above each power terminal connector.

The LK75 are fitted with a pin designed to hold them in place until the connector has been fully clamped with its power cable.

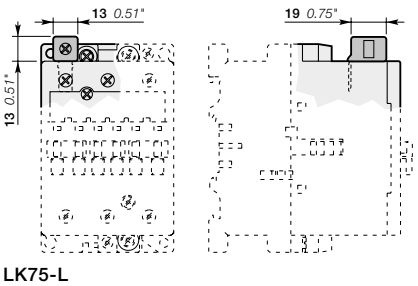
– Degree of protection IP20
– Connecting terminal delivered in open position: cable clamp and M3.5 (+,-) pozidriv 2 screw.
– Cable cross-sectional area:
  - 1 or 2 rigid conductors .....1...4 mm²
  - 1 or 2 flexible conductors with cable end .....0.75...2.5 mm²
– Tightening torque for the LK screw:
  - recommended.....1.00 Nm
  - maxi.....1.20 Nm

Ordering details

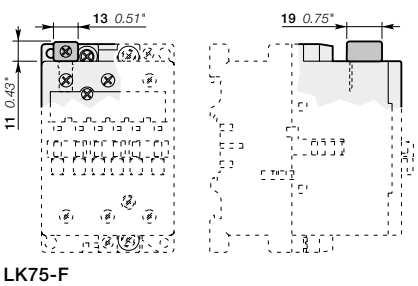
For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
Right and left on: UA50(RA) ... UA75(RA) GA75, GAE75	LK75-L	1SBN073552R1003		2	0.006
Opposite on: UA50(RA) ... UA75(RA) GA75, GAE75	LK75-F	1SBN073552R1002		2	0.006

Note: The LK terminals provided for the UA contactors can be used with the AM types.

Main dimensions mm, *inches*



LK75-L



LK75-F

Connection bar for contactor

1SFC101114F0001

LP185

1SFC101117F0001

LP2050

Ordering details

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
Connection bar for contactor					
GAF185	LP185	1SFN074712R1000		2	0.300
GAF300	LP300	1SFN075112R1000		2	0.400
GAF460	LP460	1SFN075712R1000		4	0.550
GAF750	LP750	1SFN076112R1000		4	0.950
GAF1250	LP1250	1SFN076412R1000		2	1.900
GAF1650, GAF2050	LP2050	1SFN076512R1000		4	2.900

Maximum continuous current with two parrallel connection strips per pole

Connexion kit (includes 4 pcs of connection strips)	Ie max
2 x LP185	220 A
2 x LP300	370 A
1 x LP460	600 A
1 x LP750	800 A
1 x LP1250	900 A
1 x LP2050	1650 A

1SFC101185C0201 - Rev. A

Contactor coils and main contact sets

ZA16

Contactor coils

Ordering details

For contactors	Rated control circuit voltage Uc		Type	Order code		Pkg qty	Weight (1 pce)
	V 50 Hz	V 60 Hz					kg
UA16,	24	24	ZA16	1SBN151410R8106		1	0.093
	110	110...120	ZA16	1SBN151410R8406		1	0.093
	220...230	230...240	ZA16	1SBN151410R8006		1	0.093
	230...240	240...260	ZA16	1SBN151410R8806		1	0.093
	380...400	400...415	ZA16	1SBN151410R8506		1	0.093
	400...415	415...440	ZA16	1SBN151410R8606		1	0.093
UA26, UA30,	24	24	ZA40	1SBN152410R8106		1	0.148
	110	110...120	ZA40	1SBN152410R8406		1	0.148
	220...230	230...240	ZA40	1SBN152410R8006		1	0.148
	230...240	240...260	ZA40	1SBN152410R8806		1	0.148
	380...400	400...415	ZA40	1SBN152410R8506		1	0.148
	400...415	415...440	ZA40	1SBN152410R8606		1	0.148
UA50 ... UA75	24	24	ZA75	1SBN153510R8106		1	0.166
GA75	110	110...120	ZA75	1SBN153510R8406		1	0.166
	220...230	230...240	ZA75	1SBN153510R8006		1	0.166
	230...240	240...260	ZA75	1SBN153510R8806		1	0.166
	380...400	400...415	ZA75	1SBN153510R8506		1	0.166
	400...415	415...440	ZA75	1SBN153510R8606		1	0.166
UA95, UA110	24	24	ZA110	1SFN154310R8106		1	0.170
	110	110...120	ZA110	1SFN154310R8406		1	0.170
	220...230	230...240	ZA110	1SFN154310R8006		1	0.170
	230...240	240...260	ZA110	1SFN154310R8806		1	0.170
	380...400	400...415	ZA110	1SFN154310R8506		1	0.170
	400...415	415...440	ZA110	1SFN154310R8606		1	0.170
GAF460	-	24...60	ZAF460	1SFN155770R6806		1	0.525
	48...130	48...130	ZAF460	1SFN155770R6906		1	0.525
	100...250	100...250	ZAF460	1SFN155770R7006		1	0.525
	250...500	250...500	ZAF460	1SFN155770R7106		1	0.525
GAF750 ... AF1250	-	24...60	ZAF750	1SFN156170R6806		1	1.335
	48...130	48...130	ZAF750	1SFN156170R6906		1	1.335
	100...250	100...250	ZAF750	1SFN156170R7006		1	1.335
	250...500	250...500	ZAF750	1SFN156170R7106		1	1.335
GAF1650 ... GAF2050	100...250	100...250	ZAF1650 (1)	1SFN156570R7026		1 set	0.900
			ZP1650 (2)	1SFN166521R1070		1	0.300

ZAF460, ZAF750 : printed circuit board included.
(1) One set of two coil.
(2) Printed circuit board.

ZAF1650

Main contact sets

Description

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

Ordering details

For contactors	Type	Order code		Pkg qty	Weight (1 pce)
					kg
UA50	ZLU50	1SBN163502R1000		1	0.115
UA63	ZLU63	1SBN163702R1000		1	0.145
UA75	ZLU75	1SBN164102R1000		1	0.145
UA95	ZLU95	1SFN164302R1000		1	0.190
UA110	ZLU110	1SFN164502R1000		1	0.190

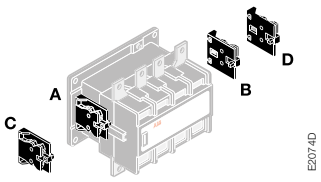
1SFC101143C0201 - Rev B

Accessories for EK550, EK1000 4-pole contactors

Auxiliary contact blocks **5**/408
Mechanical interlock units, terminal shrouds and connection sets **5**/412
Surge suppressors for contactor coils **5**/413
Main contact sets - Arc chutes **5**/415
Contactor coils **5**/416

Voltage code table **5/417**

Auxiliary contact blocks



Mounting positions of the CAL16-11

Description

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

Types of auxiliary contact blocks for standard industrial environments:

– CAL instantaneous with N.O. + N.C. contacts
– CCL N.O. leading contact + N.C. lagging 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.
Mounting: Screwed onto the right and / or lefthand side of the EK550, EK1000 contactors.

Ordering details

For contactors	Number of blocks	Auxiliary contacts				Type	Order code		Pkg qty	Weight (1 pce) kg
2-pole auxiliary contacts N.O. + N.C.										
EK	1	1	1	–	–	CAL16-11A	SK829002-A		1	0.050
	1	1	1	–	–	CAL16-11B	SK829002-B		1	0.050
	1	1	1	–	–	CAL16-11C	SK829002-C		1	0.050
	1	1	1	–	–	CAL16-11D	SK829002-D		1	0.050
	1	1	–	–	1	CCL16-11E (1)	SK829002-E		1	0.050

(1) Mounting of CCL16-11E blocks does not allow an additional second block to be added on top of it.
All DC operated EK contactors are equipped with one CCL16-11E on the right side.

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Auxiliary contact blocks

Technical data

Types		2-pole CAL 16-11, 2-pole CCL 16-11

Contact utilization characteristics according to IEC

Standards		IEC 60947-5-1 and EN 60947-5-1
Rated insulation voltage Ui acc. to IEC 60947-5-1		690 V
Rated operational voltage Ue max.		24...690 V
Conventional thermal current Ith - θ ≤ 40 °C		10 A
Rated frequency (without derating)		50/60 Hz
Ie / Rated operational current AC-15		
acc. to IEC 60947-5-1	**24-127 V**	6 A
	220-240 V	6 A
	380-440 V	4 A
	500-690 V	1 A
Making capacity acc. to IEC 60947-5-1		10 x Ie AC-15
Breaking capacity acc. to IEC 60947-5-1		10 x Ie AC-15
Ie / Rated operational current DC-13		
acc. to IEC 60947-5-1	**24 V DC**	6 A
	48 V DC	6 A
	72 V DC	4 A
	125 V DC	1.8 A
	250 V DC	0.6 A
Short-circuit protection device gG type fuse		10 A
Rated short-time withstand current Icw	**for 1.0 s**	50 A
θ = 40 °C	**for 0.1 s**	100 A
Minimum switching capacity		0.25 VA / 12 V or 0.25 VA / 5 mA
with failure rate acc. to IEC 60947-5-4		
Power dissipation per pole at 6 A		0.2 W
Mechanical durability	Number of operating cycles	10 millions operating cycles
	Max. switching frequency	3600 cycles/h
Electrical durability	Number of operating cycles	see "Electrical durability" curves
	Max. switching frequency	1200 cycles/h

Contact utilization characteristics according to UL / CSA

Max. operational voltage		600 V
Pilot duty		A600

Connecting characteristics

Connection capacity (min. ... max.)			
	Rigid solid	**1 x**	0.5...2.5 mm²
		2 x	0.5...2.5 mm²
	Flexible with ferrule	**1 x**	0.5...2.5 mm²
		2 x	0.5...2.5 mm²
	Flexible with insulated ferrule	**1 x**	0.5...1.5 mm²
		2 x	0.5...1.5 mm²
	Lugs	**L ≤**	8 mm
		I >	3.7 mm
Tightening torque	Recommended		1.00 Nm
	Max.		1.20 Nm
Degree of protection			IP20
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			
Screw terminals			Delivered in open position, screws of unused terminals must be tightened
All terminals			M3.5
Screwdriver type			Pozidriv 2

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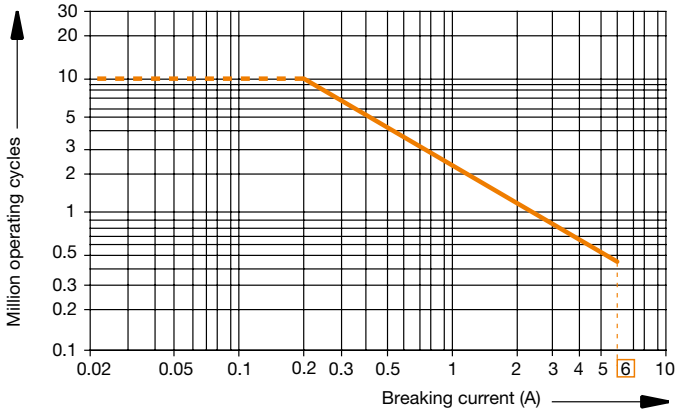
Auxiliary contacts
Electrical durability

Electrical Durability for AC-15 Utilization Category

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

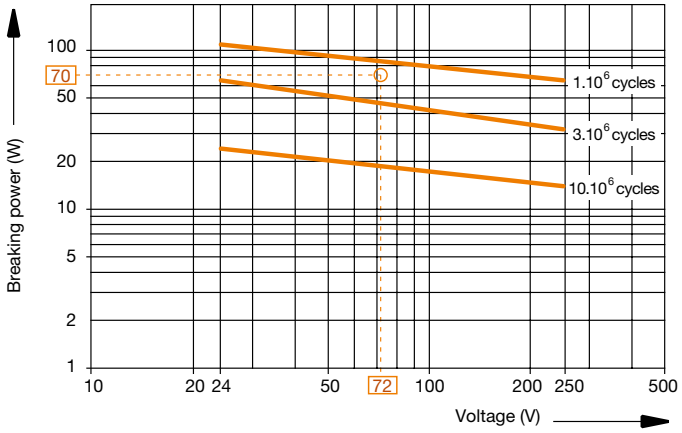
This curve represents the electrical durability of the auxiliary contacts in relation to the breaking current.
The curve has been drawn for resistive and inductive loads up to 690 V, 40...60 Hz.



2-pole CAL16... and CCL16... 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 = Ie with Ue value.



2-pole CAL16... and CCL16... auxiliary contact blocks

Example:
Control of d.c. electro-magnet: Ue voltage = 72 V d.c. and breaking power = 70 W.
On the opposite curve at intersection "O" 72 V / 70 W the correspon-ding value for the electrical durability is approxi-mately 2.10^6 cycles.

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Add-on auxiliary contacts
Terminal marking and positioning

2-pole auxiliary contacts

CAL16-11A

CAL16-11B

CAL16-11C

CAL16-11 D

CAL16-11E

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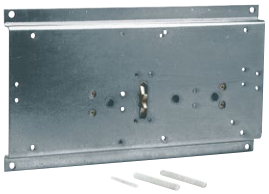
Mechanical interlock units, terminal shrouds and connection sets



Mechanical interlock units

Description

The mechanical interlock unit prevents one of the contactors from closing as long as the other contactor is closed.

VH800 interlock unit is used for the mechanical interlocking of two horizontal mounted EK550, EK1000 contactors. Mounting plate is included.

Ordering details

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
Mechanical interlock unit for two horizontal mounted contactors					
EK550, EK1000	VH800	SK829070-F		1	6.000

5

Terminal shrouds

Description

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 direct contact with live parts in acc. with EN 50274.

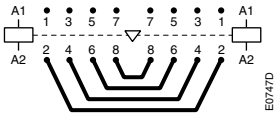
On EK550, EK1000 contactors:

– The auxiliary contact blocks and coils are designed to provide an IP20 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

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
EK550	LT550-EK	SK178001-LB		1	0.190
EK1000	LT1000-EK	SK178001-MB		1	0.200



BSS550, BSS1000

Connection sets

Description

Connection between the main poles of two 4-pole contactors mounted side by side so that they operate as source reversing contactors.

These sets are made up of four downstream connections.

BSS550, BSS1000 – Bare, solid copper bars.

Ordering details

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
Mechanical and electrical interlock units for two horizontal mounted contactors					
EK550	BSS550	SK829090-E		1	3.300
EK1000	BSS1000	SK829090-H		1	5.500

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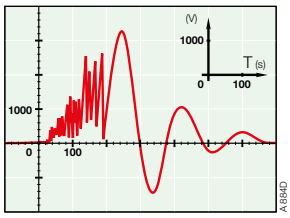
Surge suppressors for contactor coils



RC-EH

Description

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 Ûs to the peak value Ûc of the coil rated control voltage Uc:

$$k = \frac{\hat{U}s\ max.}{\hat{U}c} \qquad \text{in DC: } k = \frac{\hat{U}s\ max.}{Uc} \qquad \text{or in AC: } k = \frac{\hat{U}s\ max.}{Uc\sqrt{2}}$$

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

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	Rated control circuit voltage Uc			Type	Order code		Pkg qty	Weight (1 pce)
	V	AC	DC					kg
EK550, EK1000	48...110	●	–	RC-EH800/110	SK829007-C		1	0.015
EK550, EK1000	24...125	–	●	RC-EH800/110	SK829007-C		1	0.015
EK550, EK1000	220...600	●	–	RC-EH800/600	SK829007-D		1	0.015

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Surge suppressors for contactor coils

Technical data

Varistor + RC	RC-EH800/110	RC-EH800/600
Rated control circuit voltage Uc	48...110 V AC	220...600 V AC
	24...125 V DC	–
Residual overvoltage (clipping voltage)	205 V AC	1100 V AC
	205 V DC	–
Opening time growth factor	1.1 ... 1.15	
Operating temperature	-20 ... +70 °C	
Connection to the coil terminals (parallel mounting)	Flexible, accessible leads, equipped with forked lugs	
Fixing	Glued to the top part of the contactor base	
Advantages	- High energy absorption: good damping - Unpolarized system - The RC system damps the voltage front under the Uvdr (1) threshold.	

(1) Uvdr = Varistor operating (voltage dependant resistor), tolerance ±10 %.

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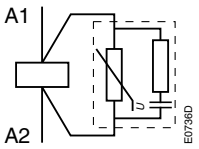
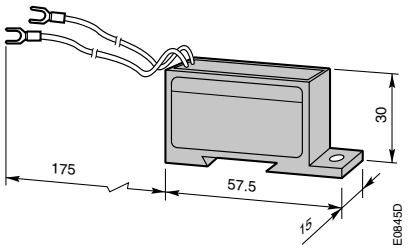
Wiring diagrams



Varistor + RC

Main dimensions mm



RC-EH

Main contact sets
Arc chutes

KZK

Main contact sets

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 EK550, EK1000 contactors.

Ordering details

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
EK550	KZK550	SK827204-B		1	2.400
EK1000	KZK1000	SK827204-F		1	3.000

5

Arc chutes

Description

The arc chutes sets for EK 4-pole contactors contain 8 pieces.

Ordering details

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
EK550	KWK550	5223351-Z		1	3.170
EK1000	KWK1000	5223351-AN		1	3.170

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Contactor coils

KH800

For AC operated coil

Description

Coils for EK550, EK1000 - AC operated.

Ordering details

For contactors	Rated control circuit voltage Uc (1)		Type	Order code		Pkg qty	Weight (1 pce)
	V 50 Hz	V 60 Hz					kg
EK550, EK1000	48	-	KH800	SK828100-AD		1	0.950
	110	110...120	KH800	SK828100-EF		1	0.950
	110...115	115...127	KH800	SK828100-EG		1	0.950
	220	220...240	KH800	SK828100-EL		1	0.950
	220...230	230...255	KH800	SK828100-EM		1	0.950
	380...400	400...440	KH800	SK828100-ER		1	0.950
	400...415	-	KH800	SK828100-AR		1	0.950

(1) Other control voltages, see voltage code table.

For DC operated coil

Description

Coils for EK550, EK1000 - DC operated with sets including a DC coil, an economy resistor and a insertion contact.

Ordering details

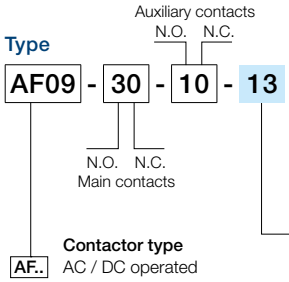
For contactors	Rated control circuit voltage Uc (1)	Type	Order code		Pkg qty	Weight (1 pce)
	V DC					kg
EK550, EK1000	24	KP800	SK828150-DB		1 set	1.060
	110	KP800	SK828150-DE		1 set	1.060
	125	KP800	SK828150-DU		1 set	1.060
	220	KP800	SK828150-DF		1 set	1.060

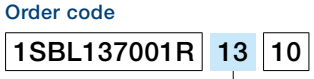
(1) Other control voltages, see voltage code table.

Voltage code table

The below tables indicate the available coil voltages and corresponding digits for order codes. When placing an order, please give the order code. Select a standard contactor from ordering detail pages. Change the **coil voltage code** in the order code according to the table below. Example: for contactor AF400-30-11 and coil 100...250 V 50/60 Hz, the order code is 1SFL577001R**70**11.

AF09 ... AF370 3-pole contactors
AF09 ... AF370 4-pole contactors





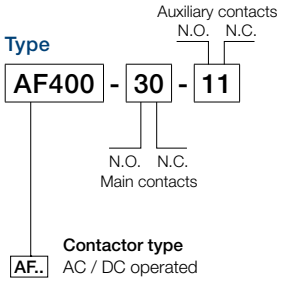
	AC coil code 50/60 Hz	DC coil code
41	24...60 V	-
11	24...60 V	20...60 V
12	48...130 V	48...130 V
13	**100...250 V**	**100...250 V**
14	250...500 V	250...500 V

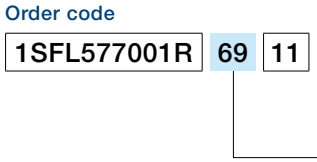
Coil 41: not available for AF116 ... AF370

AF116 ... AF370 3-pole contactors with built-in PLC interface

	AC coil code 50/60 Hz	DC coil code
33	100...250 V	100...250 V
34	250...500 V	250...500 V

AF400 ... AF2650 3-pole contactors

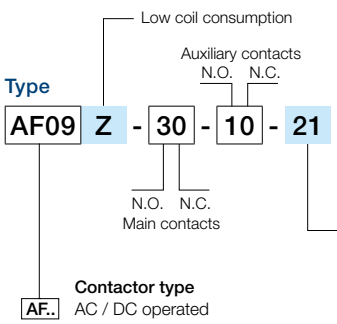


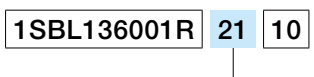


	AC coil code 50/60 Hz	DC coil code
68	-	24...60 V
69	**48...130 V**	**48...130 V**
70	100...250 V	100...250 V
71	250...500 V	250...500 V

Coil 68, 69, 71: not available for AF1350 ... AF2650

AF09 ... AF38 3- and 4-pole contactors - low consumption





	AC coil code 50/60 Hz	DC coil code
20	-	12...20 V
21	**24...60 V**	**20...60 V**
22	48...130 V	48...130 V
23	100...250 V	100...250 V

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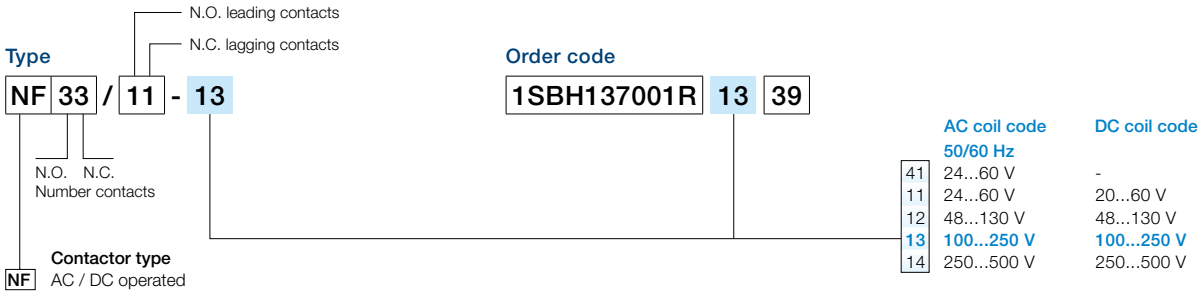
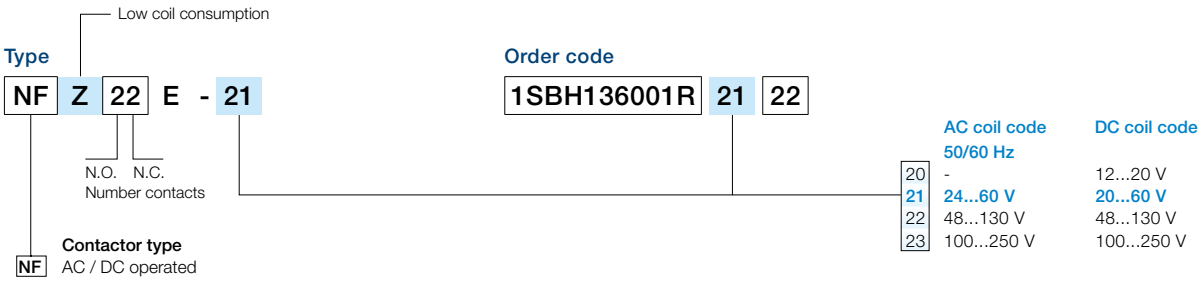
Voltage code table

NF contactor relays

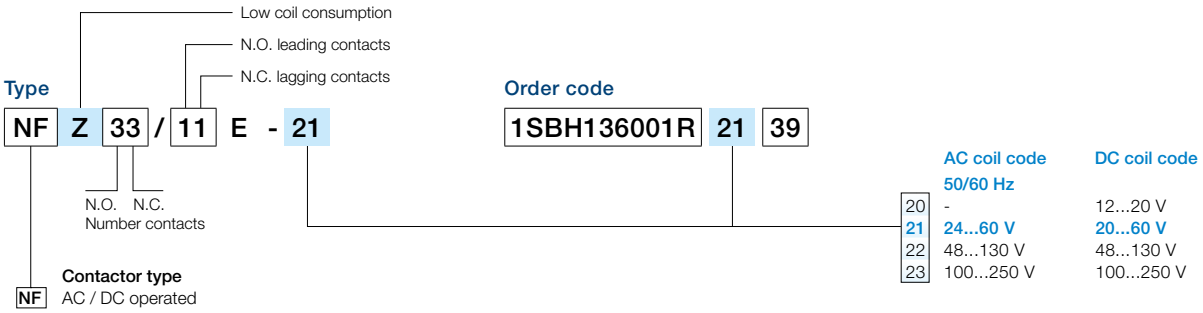
NF contactor relays with overlapping of lagging / leading contacts



NF contactor relays - low consumption



NF contactor relays with overlapping of lagging / leading contacts - low consumption



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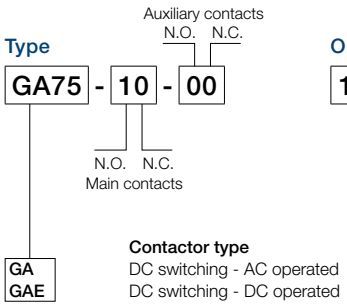
Voltage code table

GA contactors



Order code

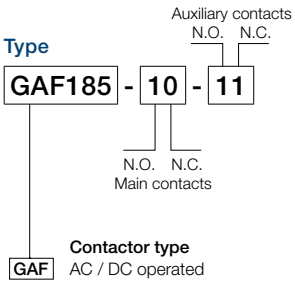
1SBL411025R 82 00

Contactors: GA AC coil code		
	50 Hz	60 Hz
81	**24 V**	**24 V**
82	**42 V**	**42 V**
83	**48 V**	**48 V**
84	**110 V**	**110**...120 V
89	110...**115 V**	**115**...127 V
80	220...**230 V**	**230**...240 V
88	230...**240 V**	**240**...260 V
42	230...240 V	277 V
85	380...**400 V**	**400**...415 V
86	400...**415 V**	**415**...440 V

Codes in bold for dual frequency coils.

Contactors: GAE DC coil code	
80	12 V
81	24 V
82	42 V
83	48 V
86	110 V
87	125 V
88	220 V
89	240 V
38	250 V

GAF185 ... GAF300 contactors

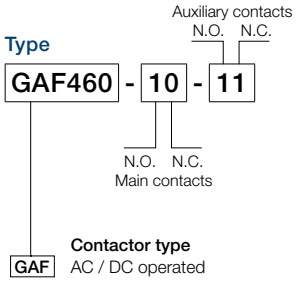


Order code

1SFL497025R 69 11

	AC coil code 50/60 Hz	DC coil code
72	-	20...60 V
69	**48...130 V**	**48...130 V**
70	100...250 V	100...250 V

GAF460 ... GAF1250 contactors



Order code

1SFL597025R 69 11

	AC coil code 50/60 Hz	DC coil code
68	-	24...60 V
69	**48...130 V**	**48...130 V**
70	100...250 V	100...250 V
71	250...500 V	250...500 V

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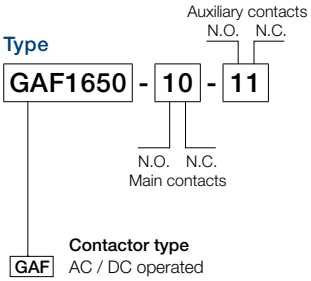
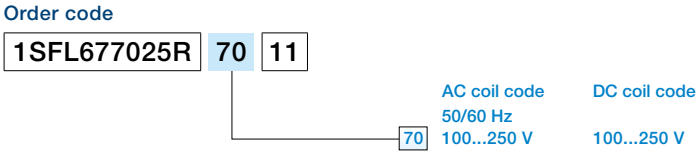
Voltage code table

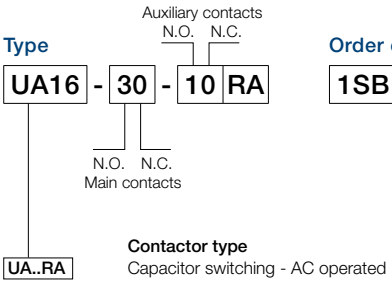
GAF1650, GAF2050 contactors





5

UA..RA contactors

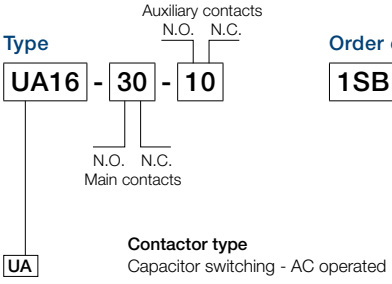


Contactors: UA..RA

AC coil code	50 Hz	60 Hz
81	**24 V**	**24 V**
84	**110 V**	**110**...120 V
89	110...**115 V**	**115**...127 V
36	190 V	220 V
80	220...**230 V**	**230**...240 V
88	230...**240 V**	**240**...260 V
85	380...**400 V**	**400**...415 V
86	400...**415 V**	**415**...440 V
75	**200 V**	**200**...220 V

Codes in bold for dual frequency coils.

UA contactors



Contactors: UA

AC coil code	50 Hz	60 Hz
81	**24 V**	**24 V**
83	**48 V**	**48 V**
84	**110 V**	**110**...120 V
89	110...**115 V**	**115**...127 V
36	190 V	220 V
80	220...**230 V**	**230**...240 V
88	230...**240 V**	**240**...260 V
42	230...240 V	277 V
85	380...**400 V**	**400**...415 V
86	400...**415 V**	**415**...440 V
75	**200 V**	**200**...220 V

Codes in bold for dual frequency coils.

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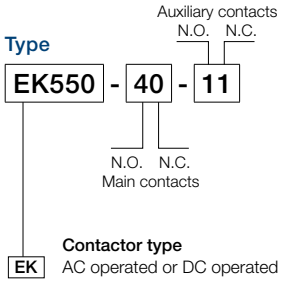
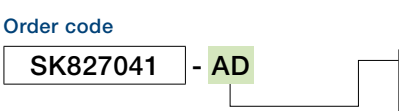
Voltage code table

EK550, EK1000 contactors





AC coil code

	50 Hz	60 Hz
AD	48 V	-
AE	-	110 V
AF	110 V	120 V
AG	127 V	-
AZ	-	208 V
AH	190 V	220 V
AK	-	240 V
AL	220...230 V	240 V
AM	230...240 V	-
AN	-	380 V
AP	380...400 V	440 V
AR	400...415 V	-
AS	-	480 V
AT	440 V	-
AU	500 V	-
AV	-	600 V

Dual frequency coil code

	50 Hz	60 Hz
EF	110 V	110...120 V
EG	110...115 V	115...127 V
EL	220 V	220...240 V
EM	220...230 V	230...255 V
EP	380 V	380...415 V
ER	380...400 V	400...440 V

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

DC coil code

DB	24 V
DC	36 V
DD	48 V
DT	60 V
DG	75 V
DE	110 V
DU	125 V
DF	220 V

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Questionnaire for product specifications: Block contactors

Tel.: ..... e-mail: .....
Segments: .....

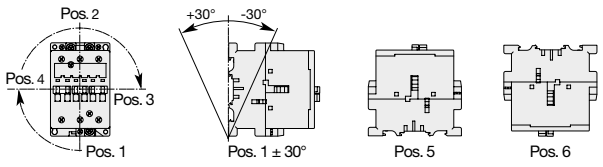
Tel.: ..... e-mail: .....
Date: .....

Application

Type: ..... No of phases: .....
Utilisation category (AC/DC): ..... % AC4 if any: .....
Rated operational voltage Ue: ..... V Cos φ: .....
Frequency: ..... Hz 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: ..... operating cycles
Number of main poles N.O.: ..... N.C.: .....
Other information: .....

Installation

Ambient temperature: .....
Ambient environment: .....
Humidity: ..... %
Chemical pollution: .....
Other: .....
Mounting position, see drawing below (Position 6: please consult factory): .....



Wiring: ☐ Clamping screws or cage connectors
☐ Cable lugs (ring tongue)
Other: ..... Cross section: .....
Additional comments: .....

Control circuit

Rated control Uc voltage:..... V ☐ DC ☐ AC f: ..... Hz
Minimum / maximum: ..... V to V
Surge suppressor: ..... type: .....
Interface with PLC: ..... mA ..... V DC
Accessories: .....
Number of auxiliary contacts: N.O.: ..... N.C.: .....
Low level contacts: ..... mA ..... V ☐ DC ☐ AC

Protection

Short circuit protection: .....
Type: ☐ Fuse ☐ Circuit breaker ☐ Manual motor starter
Max short circuit current: ..... A
Motor protection: ☐ Overload relay ☐ Manual Motor Starter ☐ Electronic overload relay

Logistic and packaging

Quantity by batch: .....
Delivery order: .....
Expected quantity: ..... per year
Expected first delivery date: ..... and Qty: .....
Quantity on first 6 month: ..... on first year: .....

Approvals and other requirements

Reference standards: .....
Required approvals: .....
Customer specifications: .....
Shock and vibrations: .....
Specific quality assurance clauses: .....
Other comments: .....

1SBC101701S0201

Questionnaire for product specifications: Block contactors

Other comments: .....
.....
.....
.....
.....
.....
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.....

User Guide for the questionnaire

This document is used to define the contactor specifications according to the complete information on the application. Do not hesitate to join some complementary documents if necessary (schemes, tables, customer specification...).

Please see below some definitions to help you :

Operating cycle
Includes one making operation and one breaking operation.

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 the contactor is able to carry out

Load Factor
Ratio of the on-load operating time to the total cycle time x 100 (%).

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.

Temporary Duty
Duty in which the main contacts of the contactor remain closed for periods insufficient to allow the equipment to reach stabilized temperature, the unload periods being separated by off-load periods of sufficient duration to restore the ambient temperature

Continuous Duty
Duty in which the main contacts of the contactor remain closed, with a continuous current during enough time to reach thermal stabilization, but no more than eight hours without interruption.

Ambient Temperature
Air temperature close to the contactor.

Mounting Position
Comply with the manufacturer's instructions. Restrictions could be taken into account for certain mounting positions.
A contactor's duty is characterized by the utilization category together with the rated operational voltage and current indicated:
Utilization categories for contactors according to IEC 60947-4-1
Utilization categories for contactor relays according to IEC 60947-5-1
See our catalog p7/8

Making and breaking current
Current at contactor closing or at contactor opening

Time constant L/R (for DC circuit)
Ratio of the inductance to the resistance (L/R = mH/Ω = ms)

1SBC101701S0201

ABB
ABB
ABB
ABB

AS..S, AF..S 3-pole contactors and NS..S, NF..S contactor relays with spring terminals

AS..S 3-pole contactors - with spring terminals

Ordering details **6**/4
Technical data **6**/10
Electrical durability **6**/16
Terminal marking and postioning **6**/18
Main dimensions **6**/20
Accessories **6**/34
Voltage code table **6**/41

NS..S contactor relays - with spring terminals

Ordering details **6**/22
Technical data **6**/26
Terminal marking and postioning **6**/30
Main dimensions **6**/32
Accessories **6**/34
Voltage code table **6**/41

AF..S 3-pole contactors - with spring terminals

Overview **6**/44
Ordering details **6**/46
Technical data **6**/52
Electrical durability **6**/57
Terminal marking and postioning **6**/61
Main dimensions **6**/62
Accessories **6**/80
Voltage code table **6**/88

NF..S contactor relays - with spring terminals

Overview **6**/66
Ordering details **6**/68
Technical data **6**/74
Terminal marking and postioning **6**/77
Main dimensions **6**/78
Accessories **6**/80
Voltage code table **6**/88

ABB
24 V DC

ABB

AS..S 3-pole contactors and NS..S contactor relays with spring terminals

AS..S 3-pole contactors - with spring terminals

AS09..S ... AS16..S	AC operated	**6**/4
ASL09..S ... ASL16..S	DC operated	**6**/5
AS09..S ... AS16..S	AC operated - 2-stack	**6**/6
ASL09..S ... ASL16..S	DC operated - 2-stack	**6**/7
Main accessories		**6**/8
Technical data		**6**/10
Electrical durability		**6**/16
Terminal marking and postioning		**6**/18
Main dimensions		**6**/20

NS..S contactors relays - with spring terminals

NS..S	AC operated	**6**/22
NSL..S	DC operated	**6**/23
Main accessories		**6**/24
Technical data		**6**/26
Terminal marking and postioning		**6**/30
Main dimensions		**6**/32

Accessories

Auxiliary contact blocks - with spring terminals	**6**/34
Surge suppressors for contactor coils	**6**/38
Connecting links for starting solution and other accessories	**6**/40

Voltage code table **6/41**

AS09..S ... AS16..S 3-pole contactors
4 to 7.5 kW
AC operated - with spring terminals

AS09-30-10S

Description

AS09 ... AS16 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

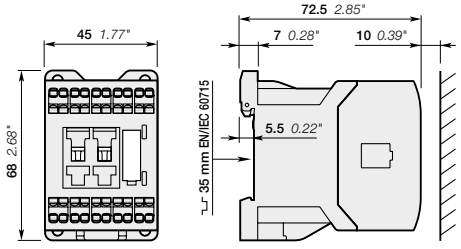
– spring terminals
– 3 main poles and 1 built-in auxiliary contact
– control circuit: AC operated
– add-on auxiliary contact blocks for front mounting and a comprehensive range of accessories.

Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50 Hz	V 60 Hz						kg
4	20	5	12	24	24	1	0	AS09-30-10S-20	1SBL101004R2010		0.220
						0	1	AS09-30-01S-20	1SBL101004R2001		0.220
				230	230	1	0	AS09-30-10S-26	1SBL101004R2610		0.220
						0	1	AS09-30-01S-26	1SBL101004R2601		0.220
5.5	22	7.5	12	24	24	1	0	AS12-30-10S-20	1SBL111004R2010		0.220
						0	1	AS12-30-01S-20	1SBL111004R2001		0.220
				230	230	1	0	AS12-30-10S-26	1SBL111004R2610		0.220
						0	1	AS12-30-01S-26	1SBL111004R2601		0.220
7.5	22	10	15.2	24	24	1	0	AS16-30-10S-20	1SBL121004R2010		0.220
						0	1	AS16-30-01S-20	1SBL121004R2001		0.220
				230	230	1	0	AS16-30-10S-26	1SBL121004R2610		0.220
						0	1	AS16-30-01S-26	1SBL121004R2601		0.220

Note: for multiple packaging, please contact your ABB local sales organization.
(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



AS09..S, AS12..S, AS16..S

1SBC101454S0201 - Rev. A

ASL09..S ... ASL16..S 3-pole contactors
4 to 7.5 kW
DC operated - with spring terminals

ASL09-30-10S

Description

ASL09..S ... ASL16..S contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

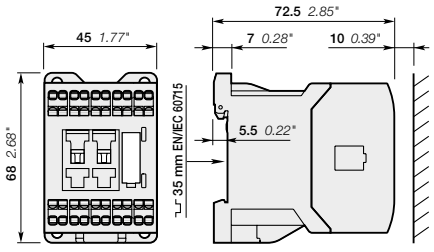
– spring terminals
– 3 main poles and 1 built-in auxiliary contact
– control circuit: low consumption (3 W at pull-in and holding) DC operated with solid core magnet. Suitable for direct control by PLC outputs (the polarity on the coil terminals A1+ and A2- must be respected)
– add-on auxiliary contact blocks for front mounting and comprehensive range of accessories.

Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc (1)	Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							Pkg (1 pce)
kW	A	hp	A	V DC						kg
4	20	5	12	24	1	0	ASL09-30-10S-81	1SBL103004R8110		0.280
					0	1	ASL09-30-01S-81	1SBL103004R8101		0.280
5.5	22	7.5	12	24	1	0	ASL12-30-10S-81	1SBL113004R8110		0.280
					0	1	ASL12-30-01S-81	1SBL113004R8101		0.280
7.5	22	10	15.2	24	1	0	ASL16-30-10S-81	1SBL123004R8110		0.280
					0	1	ASL16-30-01S-81	1SBL123004R8101		0.280

Note: for multiple packaging, please contact your ABB local sales organization.
(1) Other control voltages see voltage code table.

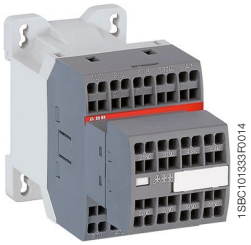
Main dimensions mm, *inches*



ASL09..S, ASL12..S, ASL16..S

1SBC101455S0201 - Rev. A

AS09..S ... AS16..S 2-stack 3-pole contactors
4 to 7.5 kW
AC operated - with spring terminals



AS09-30-32S

Description

AS09..S ... AS16..S contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

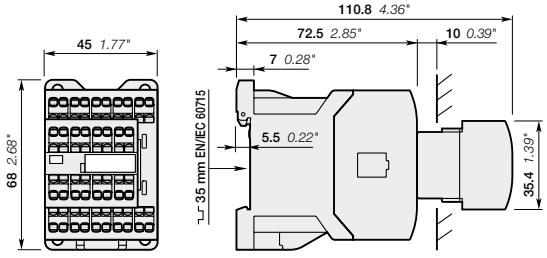
- spring terminals
- 1st stack with 3 main poles and 1 N.O. built-in auxiliary contact
- 2nd stack with permanently fixed 2 N.O. + 2 N.C. auxiliary contact block
- the auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
- control circuit: AC operated
- a comprehensive range of accessories.

Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50 Hz	V 60 Hz						kg
4	20	5	12	24	24	3	2	AS09-30-32S-20	1SBL101004R2032		0.260
				230	230	3	2	AS09-30-32S-26	1SBL101004R2632		0.260
5.5	22	7.5	12	24	24	3	2	AS12-30-32S-20	1SBL111004R2032		0.260
				230	230	3	2	AS12-30-32S-26	1SBL111004R2632		0.260
7.5	22	10	15.2	24	24	3	2	AS16-30-32S-20	1SBL121004R2032		0.260
				230	230	3	2	AS16-30-32S-26	1SBL121004R2632		0.260

Note: for multiple packaging, please contact your ABB local sales organization.
(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



AS09..S, AS12..S, AS16..S

1SBC101456S0201 - Rev. A

ASL09..S ... ASL16..S 2-stack 3-pole contactors
4 to 7.5 kW
DC operated - with spring terminals

ASL09-30-32S

Description

ASL09..S ... ASL16..S contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

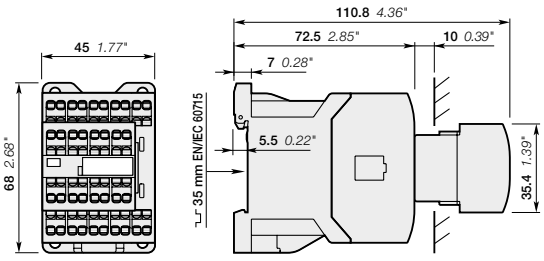
- spring terminals
- 1st stack with 3 main poles and 1 N.O. built-in auxiliary contact
- 2nd stack with permanently fixed 2 N.O. + 2 N.C. auxiliary contact block
- the auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
- control circuit: low consumption (3 W at pull-in and holding) DC operated with solid core magnet. Suitable for direct control by PLC outputs (the polarity on the coil terminals A1+ and A2- must be respected)
- a comprehensive range of accessories.

Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc (1)	Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							Pkg (1 pce)
kW	A	hp	A	V DC						kg
4	20	5	12	24	3	2	ASL09-30-32S-81	1SBL103004R8132		0.320
5.5	22	7.5	12	24	3	2	ASL12-30-32S-81	1SBL113004R8132		0.320
7.5	22	10	15.2	24	3	2	ASL16-30-32S-81	1SBL123004R8132		0.320

Note: for multiple packaging, please contact your ABB local sales organization.
(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*

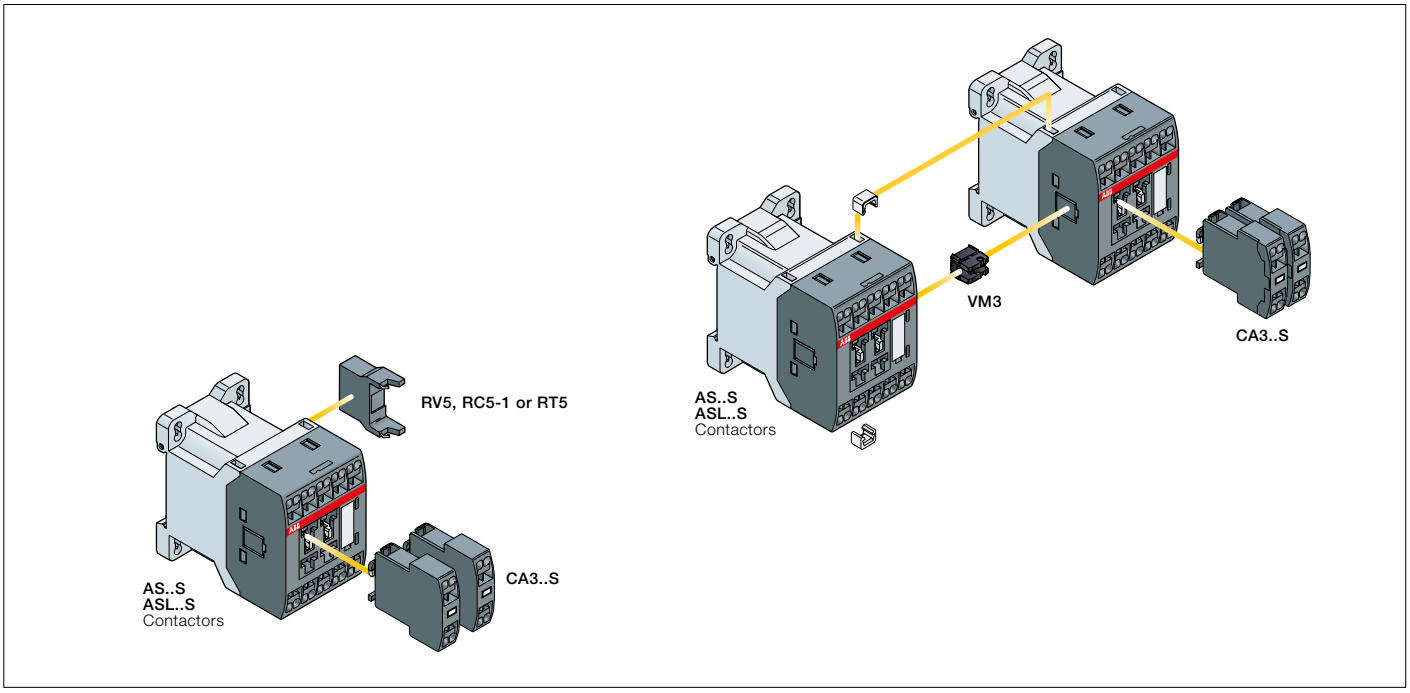


ASL09..S, ASL12..S, ASL16..S

AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals

Main accessories

Contactor and main accessories (other accessories available)



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Main accessory fitting details

Contactor types	Main poles	Built-in auxiliary contacts	Front-mounted accessories: Auxiliary contact blocks 1-pole CA3..S		Mechanical interlock unit (between 2 contactors) VM3		Side-mounted accessories: Surge suppressors		
AS09..S ... AS16..S	3 0	1 0	2 max.	+	1	+	RV5	or	RC5-1
AS09..S ... AS16..S	3 0	0 1							
AS09..S ... AS16..S	3 0	3 2	–		1	+	RV5	or	RC5-1
ASL09..S ... ASL16..S	3 0	1 0	2 max.	+	1	+	RV5	or	RT5
ASL09..S ... ASL16..S	3 0	0 1							
ASL09..S ... ASL16..S	3 0	3 2	–		1	+	RV5	or	RT5

1SBC101412S0201

AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals

Main accessories

CA3-10S

Front-mounted instantaneous auxiliary contact blocks

For contactors	Auxiliary contacts		Type	Order code		Pkg qty	Weight (1 pce) kg
AS09..S ... AS16..S	1	0	CA3-10S	1SBN011019T1010		10	0.011
ASL09..S ... ASL16..S	0	1	CA3-01S	1SBN011019T1001		10	0.011

VM3

Mechanical interlock unit

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
AS09..S ... AS16..S, ASL09..S ... ASL16..S	VM3	1SBN031005T1000		10	0.002

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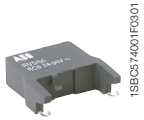


RV5

Surge suppressors

For contactors	Rated control circuit voltage - Uc			Type	Order code		Pkg qty	Weight (1 pce) kg
	V	AC	DC					
AS09..S ... AS16..S, ASL09..S ... ASL16..S	24...50	●	●	RV5/50	1SBN050010R1000		2	0.015
	50...133	●	●	RV5/133	1SBN050010R1001		2	0.015
	110...250	●	●	RV5/250	1SBN050010R1002		2	0.015
	250...440	●	●	RV5/440	1SBN050010R1003		2	0.015
AS09..S ... AS16..S	24...50	●	–	RC5-1/50	1SBN050100R1000		2	0.012
	50...133	●	–	RC5-1/133	1SBN050100R1001		2	0.012
	110...250	●	–	RC5-1/250	1SBN050100R1002		2	0.012
	250...440	●	–	RC5-1/440	1SBN050100R1003		2	0.012
ASL09..S ... ASL16..S	12...32	–	●	RT5/32	1SBN050020R1000		2	0.015
	25...65	–	●	RT5/65	1SBN050020R1001		2	0.015
	50...90	–	●	RT5/90	1SBN050020R1002		2	0.015
	77...150	–	●	RT5/150	1SBN050020R1003		2	0.015
	150...264	–	●	RT5/264	1SBN050020R1004		2	0.015

BEA16-3U

Connecting links with manual motor starters

For contactors	Manual motor starter	Type	Order code		Pkg qty	Weight (1 pce) kg
AS09..S ... AS16..S ASL09..S ... ASL16..S	MS116-0.16 ... MS116-16 MS132-0.16 ... MS132-16	BEA16-3U	1SBN081020R1000		1	0.045

1SBC101412S0201

AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals
Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC operated	AS09..S	AS12..S	AS16..S
	DC operated	ASL09..S	ASL12..S	ASL16..S
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1		
Rated operational voltage Ue max.		690 V		
Rated frequency (without derating)		50 / 60 Hz		
Conventional free-air thermal current Ith				
acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C		20 A	22 A	22 A
With conductor cross-sectional area		2.5 mm²	2.5 mm²	2.5 mm²
AC-1 Utilization category				
For air temperature close to contactor				
Ie / Rated operational current AC-1	**θ ≤ 40 °C**	20 A	22 A	22 A
Ue max. ≤ 690 V, 50/60 Hz	**θ ≤ 60 °C**	15 A	17 A	17 A
	θ ≤ 70 °C	12 A	14 A	14 A
With conductor cross-sectional area		2.5 mm²		
AC-3 Utilization category				
For air temperature close to contactor θ ≤ 60 °C				
Ie / Max. rated operational current AC-3 (1)				
	220-230-240 V	9 A	12 A	15.7 A
	400 V	9 A	12 A	15.5 A
3-phase motors	**415 V**	9 A	12 A	15.5 A
	440 V	8 A	11 A	13.6 A
	500 V	8 A	11 A	12.5 A
	690 V	5 A	7 A	9 A
Rated operational power AC-3 (1)				
	220-230-240 V	2.2 kW	3 kW	4 kW
	400 V	4 kW	5.5 kW	7.5 kW
1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors	**415 V**	4 kW	5.5 kW	7.5 kW
	440 V	4 kW	5.5 kW	7.5 kW
	500 V	4 kW	5.5 kW	7.5 kW
	690 V	4 kW	5.5 kW	7.5 kW
Rated making capacity AC-3		10 x Ie AC-3 acc. to IEC 60947-4-1		
Rated breaking capacity AC-3		8 x Ie AC-3 acc. to IEC 60947-4-1		
AC-8a Utilization category				
(without thermal overload relay - Ue 400 V 50/60 Hz - θ ≤ 40 °C)				
Ie / Rated operational current AC-8a		12 A	16 A	22 A
Rated operational power AC-8a		5.5 kW	7.5 kW	11 kW
Short-circuit protection device for contactors				
without thermal overload relay - Motor protection excluded (2)				
Ue ≤ 500 V AC - gG type fuse		25 A		
Rated short-time withstand current Icw	**1 s**	230 A	250 A	250 A
at 40 °C ambient temperature,	**10 s**	100 A	124 A	124 A
in free air from a cold state	**30 s**	65 A	75 A	75 A
	1 min	50 A	55 A	55 A
	15 min	20 A	22 A	22 A
Maximum breaking capacity				
cos φ = 0.45	**at 440 V**	155 A		
	at 690 V	90 A		
Power dissipation per pole	**Ie / AC-1**	0.9 W	1.1 W	1.1 W
	Ie / AC-3	0.18 W	0.33 W	0.55 W
Max. electrical switching frequency	**AC-1**	600 cycles/h		
	AC-3	1200 cycles/h		
	AC-4	300 cycles/h		

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

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

1SBC101490S0201

AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals
Technical data

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

Contactor types	AC operated	AS09..S	AS12..S	AS16..S
	DC operated	ASL09..S	ASL12..S	ASL16..S
Standards		UL 508, CSA C22.2 N°14		
Max. operational voltage		690 V		
NEMA size		00	00	00
NEMA continuous amp rating	Thermal current	9 A		
NEMA maximum horse power ratings 1-phase, 60 Hz	115 V AC	1/3 hp	1/3 hp	1/3 hp
	230 V AC	1 hp	1 hp	1 hp
NEMA maximum horse power ratings 3-phase, 60 Hz	200 V AC	1-1/2 hp	1-1/2 hp	1-1/2 hp
	230 V AC	1-1/2 hp	1-1/2 hp	1-1/2 hp
	460 V AC	2 hp	2 hp	2 hp
	575 V AC	2 hp	2 hp	2 hp
UL / CSA General use rating				
600 V AC		12 A	12 A	15.2 A
With conductor cross-sectional area		AWG 14	AWG 14	AWG 12
UL / CSA maximum 1-phase motor rating				
Full load current	120 V AC	7.2 A	9.8 A	13.8 A
	240 V AC	8 A	10 A	12 A
Horse power rating	120 V AC	1/3 hp	1/2 hp	3/4 hp
	240 V AC	1 hp	1-1/2 hp	2 hp
UL / CSA maximum 3-phase motor rating				
Full load current (1)	200-208 V AC	7.8 A	7.8 A	11 A
	220-240 V AC	6.8 A	9.6 A	15.2 A
	440-480 V AC	7.6 A	11 A	14 A
	550-600 V AC	9 A	11 A	11 A
Horse power rating (1)	200-208 V AC	2 hp	2 hp	3 hp
	220-240 V AC	2 hp	3 hp	5 hp
	440-480 V AC	5 hp	7-1/2 hp	10 hp
	550-600 V AC	7-1/2 hp	10 hp	10 hp
Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded				
Fuse rating		40 A	50 A	60 A
Fuse type, 600 V		J		
Max. electrical switching frequency				
For general use		600 cycles/h		
For motor use		1200 cycles/h		

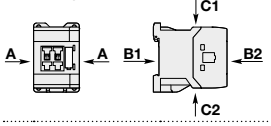
(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

General technical data

Contactor types	AC operated	AS09..S	AS12..S	AS16..S
	DC operated	ASL09..S	ASL12..S	ASL16..S
Rated insulation voltage Ui				
acc. to IEC 60947-4-1		690 V		
acc. to UL / CSA		600 V		
Rated impulse withstand voltage Uimp.		6 kV		
Ambient air temperature close to contactor				
Operation		-40...+70 °C		
Storage		-60...+80 °C		
Climatic withstand		Category B according to IEC 60947-1 Annex Q		
Maximum operating altitude (without derating)		3000 m		
Mechanical durability				
Number of operating cycles		10 millions operating cycles		
Max. switching frequency		3600 cycles/h		
Shock withstand		1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position		

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

Mounting position 1



Shock direction	AS contactors - AC operated	ASL contactors - DC operated
A	20 g	20 g closed position / 10 g open position
B1	10 g closed position / 5 g open position	15 g closed position / 5 g open position
B2	15 g	10 g
C1	20 g closed position / 9 g open position	15 g closed position / 8 g open position
C2	20 g closed position / 14 g open position	14 g closed position / 8 g open position

Vibration withstand acc. to IEC 60068-2-6	5...300 Hz / 3 g closed position / 2 g open position

1SBC101490S0201

AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals
Technical data

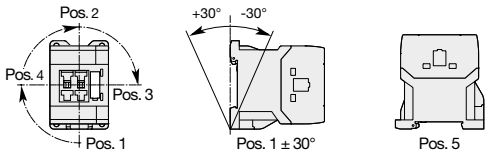
Magnet system characteristics for AS09..S ... AS16..S contactors

Contactor types		AC operated	AS09..S	AS12..S	AS16..S
Coil operating limits		**AC supply**			
acc. to IEC 60947-4-1			0.85...1.1 x Uc (at θ ≤ 60 °C); Uc (at θ ≤ 70 °C)		
AC control voltage	Rated control circuit voltage Uc	**at 50 Hz**	24...415 V		
		at 60 Hz	24...415 V		
	Coil consumption	**Average pull-in value 50 Hz**	33 VA		
		60 Hz	33 VA		
		50/60 Hz	33 VA		
		Average holding value 50 Hz	6.5 VA / 1.5 W		
		60 Hz	5 VA / 1.2 W		
		50/60 Hz	6.5 VA / 1.5 W		
Drop-out voltage			Approx. 30...50 % of Uc		
Operating time					
Between coil energization and:		**N.O. contact closing**	9...24 ms		
		N.C. contact opening	6...18 ms		
Between coil de-energization and:		**N.O. contact opening (1)**	5...19 ms		
		N.C. contact closing (1)	7...22 ms		
			(1) The use of RC5-1 surge suppressor increases opening time by a factor of 2 to 3.		

Magnet system characteristics for ASL09..S ... ASL16..S contactors

Contactor types		DC operated	ASL09..S	ASL12..S	ASL16..S
Coil operating limits		**DC supply**			
acc. to IEC 60947-4-1			0.85...1.1 x Uc (at θ ≤ 60 °C); Uc (at θ ≤ 70 °C)		
DC control voltage	Rated control circuit voltage Uc		12...240 V DC		
	Coil consumption	**Average pull-in value**	3 W		
		Average holding value	3 W		
Drop-out voltage			Approx. 10...40 % of Uc		
Coil time constant	Open	**L/R**	12 ms		
	Closed	**L/R**	40 ms		
Operating time					
Between coil energization and:		**N.O. contact closing**	36...59 ms		
		N.C. contact opening	31...53 ms		
Between coil de-energization and:		**N.O. contact opening (1)**	13...17 ms		
		N.C. contact closing (1)	15...20 ms		
			(1) The use of RT5 surge suppressor increases opening time by a factor of 1.1 to 1.2		

Mounting characteristics and conditions for use

Contactor types		AC operated	AS09..S	AS12..S	AS16..S
		DC operated	ASL09..S	ASL12..S	ASL16..S
Mounting positions					
Mounting distances			The contactors can be assembled side by side.		
Fixing	On rail according to IEC 60715, EN 60715		35 x 7.5 mm or 35 x 15 mm		
	By screws (not supplied)		2 x M4 screws placed diagonally		

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1SBC101490S0201

AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals
Technical data

Connecting characteristics

Contactor types	AC operated	AS09..S	AS12..S	AS16..S
	DC operated	ASL09..S	ASL12..S	ASL16..S
Main terminals		Spring terminals		
Connection capacity (min. ... max.)				
Main conductors (poles)				
Rigid	1 x	0.75...2.5 mm²		
	2 x	0.75...2.5 mm²		
Flexible with non insulated ferrule	1 x	0.75...2.5 mm²		
	2 x	0.75...2.5 mm²		
Flexible with insulated ferrule	1 x	0.75...1.5 mm²		
	2 x	0.75...1.5 mm²		
Connection capacity acc. to UL / CSA	1 or 2 x	AWG 18...12		
Stripping length		10 mm		
Auxiliary conductors (built-in auxiliary terminals + coil terminals)				
Rigid solid	1 x	0.75...2.5 mm²		
	2 x	0.75...2.5 mm²		
Flexible with non insulated ferrule	1 x	0.75...2.5 mm²		
	2 x	0.75...2.5 mm²		
Flexible with insulated ferrule	1 x	0.75...1.5 mm²		
	2 x	0.75...1.5 mm²		
Connection capacity acc. to UL / CSA	1 or 2 x	AWG 18...14		
Stripping length		10 mm		
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529				
All terminals		IP20		
Screwdriver type		Flat Ø 3.5		

1SBC101490S0201

AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals
Technical data

Built-in auxiliary contacts according to IEC

Contactor types	**AC operated**	AS09..S	AS12..S	AS16..S
	DC operated	ASL09..S	ASL12..S	ASL16..S
Rated operational voltage Ue max.		690 V		
Rated frequency (without derating)		50 / 60 Hz		
Conventional free air thermal current Ith - θ ≤ 40 °C		10 A		
Ie / Rated operational current AC-15				
acc. to IEC 60947-5-1	**24-127 V 50/60 Hz**	6 A		
	220-240 V 50/60 Hz	4 A		
	400-440 V 50/60 Hz	3 A		
	500 V 50/60 Hz	2 A		
	690 V 50/60 Hz	2 A		
Making capacity AC-15		10 x Ie AC-15 acc. to IEC 60947-5-1		
Breaking capacity AC-15		10 x Ie AC-15 acc. to IEC 60947-5-1		
Ie / Rated operational current DC-13				
acc. to IEC 60947-5-1	**24 V DC**	6 A / 144 W		
	48 V DC	2.8 A / 134 W		
	72 V DC	1 A / 72 W		
	110 V DC	0.55 A / 60 W		
	125 V DC	0.55 A / 69 W		
	220 V DC	0.27 A / 60 W		
	250 V DC	0.27 A / 68 W		
Short-circuit protection device gG type fuse		10 A		
Rated short-time withstand current Icw	**for 1.0 s**	100 A		
	for 0.1 s	140 A		
Minimum switching capacity		12 V / 3 m		
with failure rate acc. to IEC 60947-5-4		10^{-7}		
Non-overlapping time between N.O. and N.C. contacts		1.5 ms		
Power dissipation per pole at 6 A		0.1 W		
Max. electrical switching frequency	**AC-15**	1200 cycles/h		
	DC-13	900 cycles/h		
Mechanically linked contacts acc. to annex L of IEC 60947-5-1		Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA3 aux. contact blocks) are mechanically linked contacts.		
Mirror contacts acc. to annex F of IEC 60947-4-1		Built-in N.C. auxiliary contacts or additional N.C. auxiliary contacts (CA3 aux. contact blocks) are mirror contacts.		

Built-in auxiliary contacts according to UL / CSA

Contactor types	**AC operated**	AS09..S	AS12..S	AS16..S
	DC operated	ASL09..S	ASL12..S	ASL16..S
Max. operational voltage		600 V AC, 250 V DC		
Pilot duty		A600, Q300		
AC thermal rated current		10 A		
AC maximum volt-ampere making		7200 VA		
AC maximum volt-ampere breaking		720 VA		
DC thermal rated current		2.5 A		
DC maximum volt-ampere making-breaking		69 VA		

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1SBC101490S0201

Notes

1SBC101490S0201

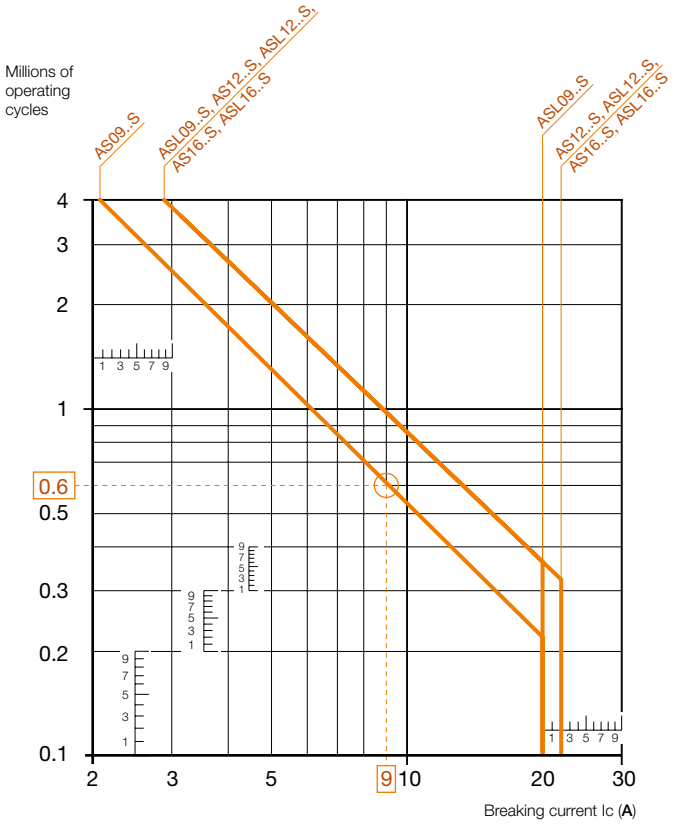
AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals

Electrical durability

Electrical durability for AC-1 utilization category - Ue ≤ 690 V

Note: AC-1 maximum current is selected according to ambient temperature. Please see technical data.

Switching non-inductive or slightly inductive loads. The breaking current Ic for AC-1 is equal to the rated operational current of the load. Maximum electrical switching frequency: 600 cycles / hour.



Example:

Breaking current = 9 A.

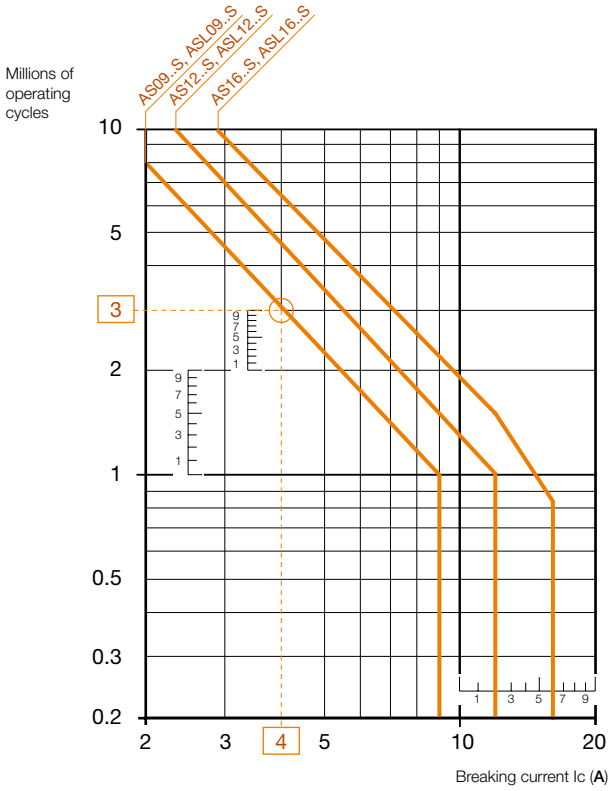
On the opposite curve at intersection "○" 9 A the corresponding value for the electrical durability is approximately 0.6 millions operating cycles.

1SBC101946S0201

AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals
Electrical durability

Electrical durability for AC-3 utilization category - Ue ≤ 440 V - Ambient temperature ≤ 60 °C

Switching cage motors: starting and switching off running motors. The breaking current Ic for AC-3 is equal to the rated operational current Ie (Ie = motor full load current). Maximum electrical switching frequency: 1200 cycles / hour.



Example:

Breaking current = 4 A.

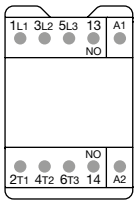
On the opposite curve at intersection "○" 4 A the corresponding value for the electrical durability is approximately 3 millions operating cycles.

1SBC101945S0201

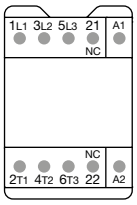
AS09..S ... AS16..S 3-pole contactors - with spring terminals
Terminal marking and positioning

AS..S contactors - AC operated

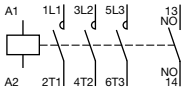
Standard devices without addition of auxiliary contacts



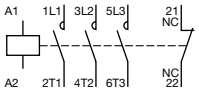
AS09 ... AS16-30-10S



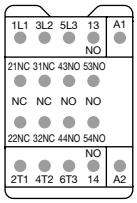
AS09 ... AS16-30-01S



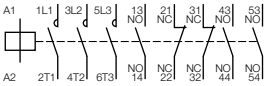
AS09 ... AS16-30-10S



AS09 ... AS16-30-01S

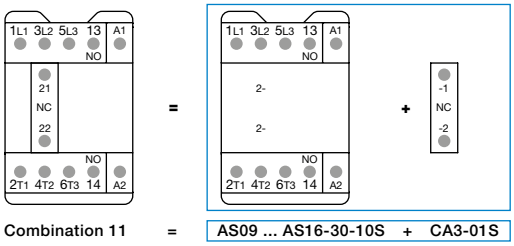


AS09 ... AS16-30-32S

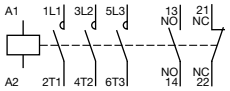


AS09 ... AS16-30-32S

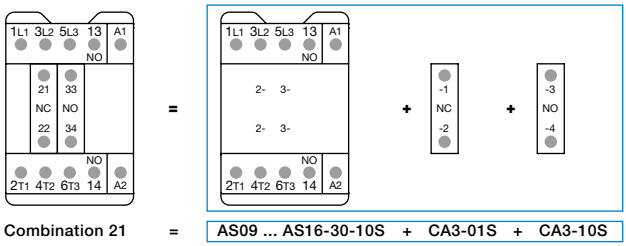
Other possible contact combinations with auxiliary contact blocks added by the user



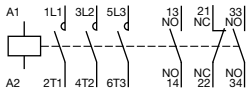
Combination 11 = AS09 ... AS16-30-10S + CA3-01S



Combination 11

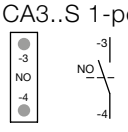


Combination 21 = AS09 ... AS16-30-10S + CA3-01S + CA3-10S

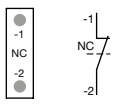


Combination 21

CA3..S 1-pole auxiliary contact blocks



CA3-10S



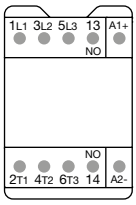
CA3-01S

1SBC101413S0201

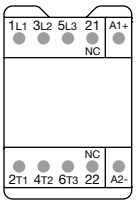
ASL09..S ... ASL16..S 3-pole contactors - with spring terminals
Terminal marking and positioning

ASL..S contactors - DC operated (the polarity A1+, A2- must be respected)

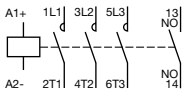
Standard devices without addition of auxiliary contacts



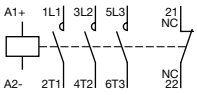
ASL09 ... ASL16-30-10S



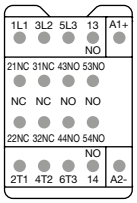
ASL09 ... ASL16-30-01S



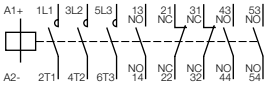
ASL09 ... ASL16-30-10S



ASL09 ... ASL16-30-01S

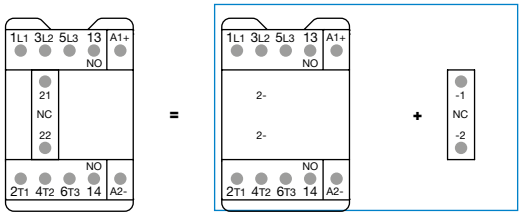


ASL09 ... ASL16-30-32

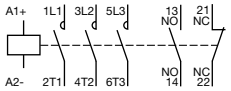


ASL09 ... ASL16-30-32S

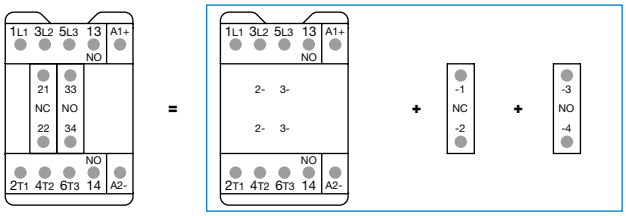
Other possible contact combinations with auxiliary contact blocks added by the user



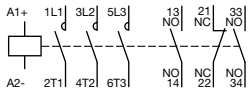
Combination 11 = ASL09 ... ASL16-30-10S + CA3-01S



Combination 11

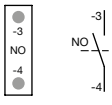


Combination 21 = ASL09 ... ASL16-30-10S + CA3-01S + CA3-10S

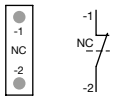


Combination 21

CA3..S 1-pole auxiliary contact blocks



CA3-10S



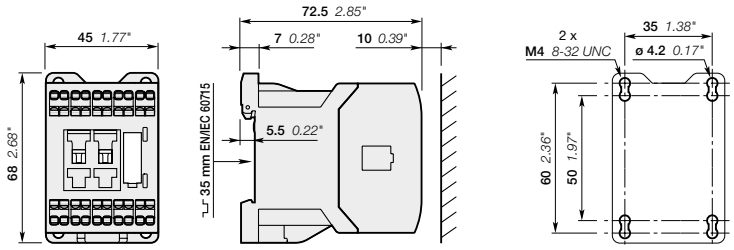
CA3-01S

6

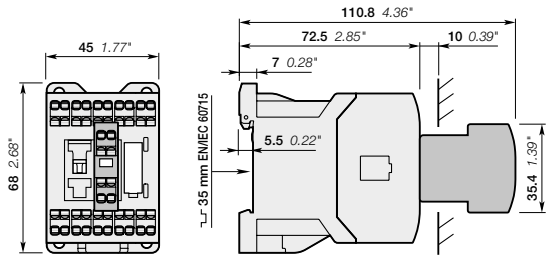
1SBC101413S0201

AS09..S ... AS16..S 3-pole contactors - with spring terminals

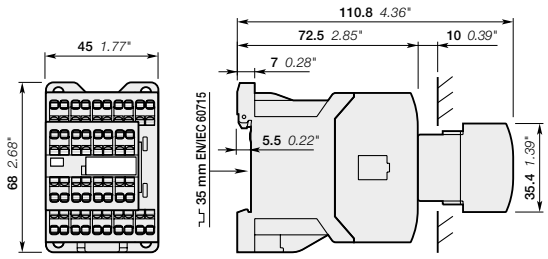
Main dimensions mm, *inches*



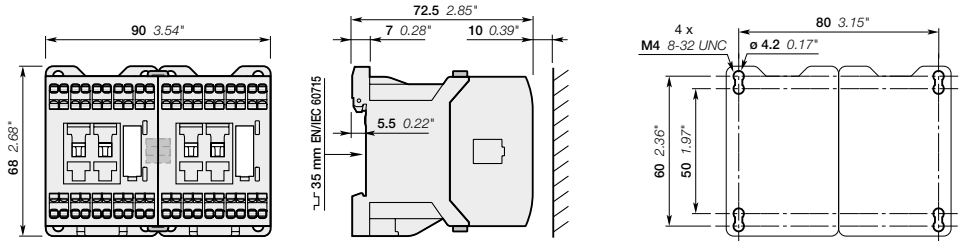
AS09..S, AS12..S, AS16..S



AS09..S, AS12..S, AS16..S
+ CA3..S front-mounted 1-pole auxiliary contact block



AS09...16-30-32S

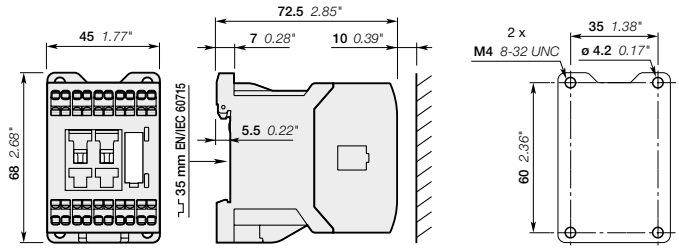


AS09..S, AS12..S, AS16..S
+ VM3 mechanical interlock unit including two BB3 fixing clips

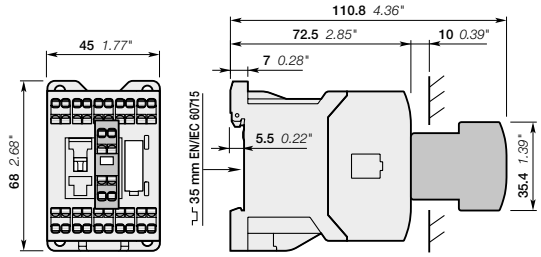
1SBC101414S0201

ASL09..S ... ASL16..S 3-pole contactors - with spring terminals

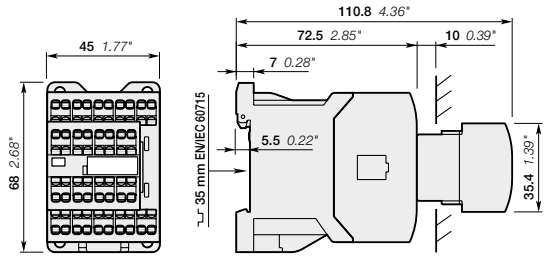
Main dimensions mm, *inches*



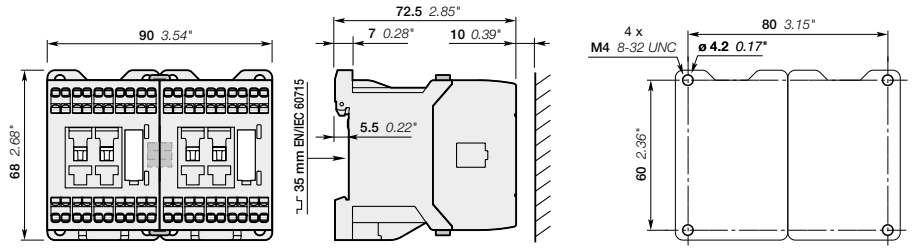
ASL09..S, ASL12..S, ASL16..S



ASL09..S, ASL12..S, ASL16..S
+ CA3..S front-mounted 1-pole auxiliary contact block



ASL09...16-30-32S



ASL09..S, ASL12..S, ASL16..S
+ VM3 mechanical interlock unit including two BB3 fixing clips

1SBC101414S0201

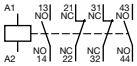
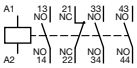
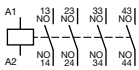
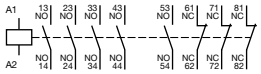
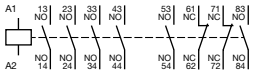
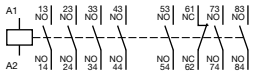
NS..S contactor relays - with spring terminals
AC operated

NS22ES

Description

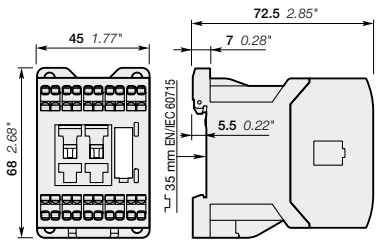
NS..S contactor relays are used for switching auxiliary and control circuits.
These contactor relays are designed with:
- spring terminals
- 4 poles or 8 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: AC operated
- add-on auxiliary contact blocks for front mounting and a comprehensive range of accessories.

Ordering details

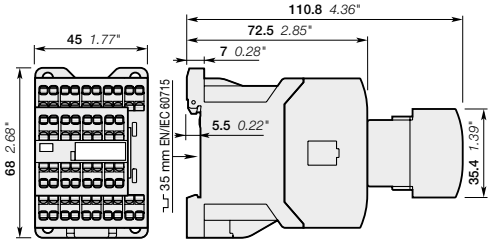
Number of contacts 1st stack	2nd stack	Rated control circuit voltage Uc (1) V 50 Hz	V 60 Hz	Type	Order code		Weight Pkg (1 pce) kg
		24	24	NS22ES-20	1SBH101004R2022		0.220
		230	230	NS22ES-26	1SBH101004R2622		0.220
		24	24	NS31ES-20	1SBH101004R2031		0.220
		230	230	NS31ES-26	1SBH101004R2631		0.220
		24	24	NS40ES-20	1SBH101004R2040		0.220
		230	230	NS40ES-26	1SBH101004R2640		0.220
		24	24	NS44ES-20	1SBH101004R2044		0.260
		230	230	NS44ES-26	1SBH101004R2644		0.260
		24	24	NS53ES-20	1SBH101004R2053		0.260
		230	230	NS53ES-26	1SBH101004R2653		0.260
		24	24	NS62ES-20	1SBH101004R2062		0.260
		230	230	NS62ES-26	1SBH101004R2662		0.260
		24	24	NS71ES-20	1SBH101004R2071		0.260
		230	230	NS71ES-26	1SBH101004R2671		0.260
		24	24	NS80ES-20	1SBH101004R2080		0.260
		230	230	NS80ES-26	1SBH101004R2680		0.260

Note: for multiple packaging, please contact your ABB local sales organization.
(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



NS22ES, NS31ES, NS40ES



NS44ES, NS53ES, NS62ES, NS71ES, NS80ES

1SBC101481S0201 - Rev. A

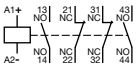
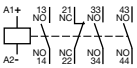
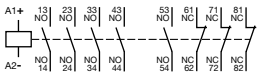
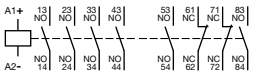
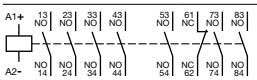
NSL..S contactor relays - with spring terminals
DC operated

NSL22ES

Description

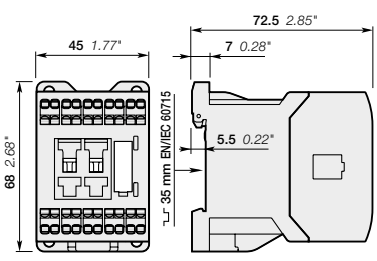
NSL..S contactor relays are used for switching auxiliary and control circuits.
These contactor relays are designed with:
- spring terminals
- 4 poles or 8 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: low coil consumption (3 W at pull-in and holding) DC operated with solid core magnet. Suitable for direct control by PLC outputs (the polarity on the coil terminals A1+ and A2- must be respected)
- add-on auxiliary contact blocks for front mounting and a comprehensive range of accessories.

Ordering details

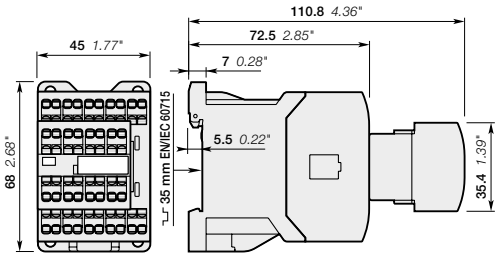
Number of contacts 1st stack	2nd stack	Rated control circuit voltage Uc (1) V DC	Type	Order code		Weight Pkg (1 pce) kg
		24	NSL22ES-81	1SBH103004R8122		0.280
		24	NSL31ES-81	1SBH103004R8131		0.280
		24	NSL40ES-81	1SBH103004R8140		0.280
		24	NSL44ES-81	1SBH103004R8144		0.320
		24	NSL53ES-81	1SBH103004R8153		0.320
		24	NSL62ES-81	1SBH103004R8162		0.320
		24	NSL71ES-81	1SBH103004R8171		0.320
		24	NSL80ES-81	1SBH103004R8180		0.320

Note: for multiple packaging, please contact your ABB local sales organization.
(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



NSL22ES, NSL31ES, NSL40ES

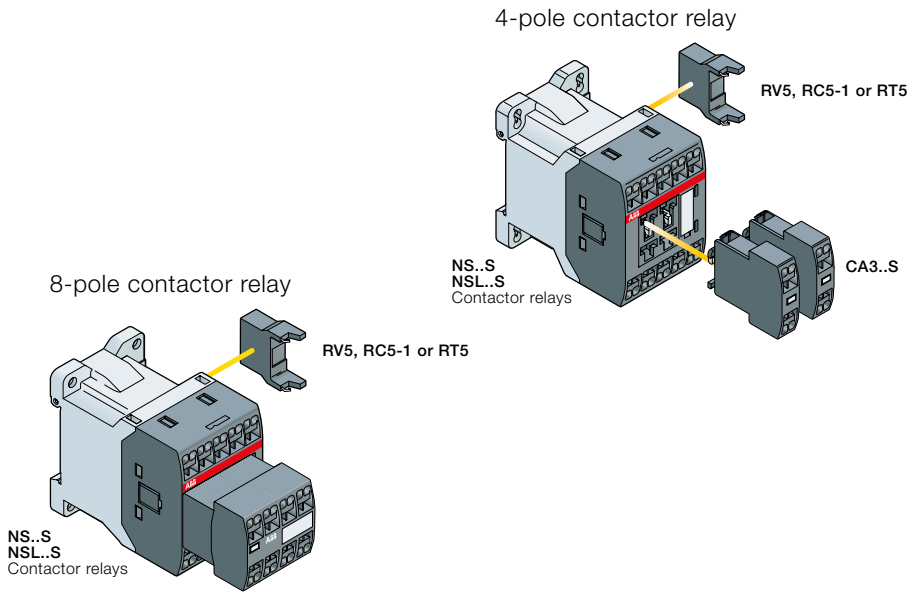


NSL44ES, NSL53ES, NSL62ES, NSL71ES, NSL80ES

1SBC101482S0201 - Rev. A

NS..S and NSL..S contactor relays - with spring terminals
Main accessories

Contactor relays and main accessories



6

Main accessory fitting details

Contactor types	Main poles			Front-mounted accessories Auxiliary contact blocks 1-pole CA3..S		Side-mounted accessories Surge suppressors		
NS..S	2	2	E	2 max.	+	RV5	or	RC5-1
NS..S	3	1	E					
NS..S	4	0	E					
NS..S	4	4	E	–		RV5	or	RC5-1
NS..S	5	3	E					
NS..S	6	2	E					
NS..S	7	1	E					
NS..S	8	0	E					
NSL..S	2	2	E	2 max.	+	RV5	or	RT5
NSL..S	3	1	E					
NSL..S	4	0	E					
NSL..S	4	4	E	–		RV5	or	RT5
NSL..S	5	3	E					
NSL..S	6	2	E					
NSL..S	7	1	E					
NSL..S	8	0	E					

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NS..S and NSL..S contactor relays - with spring terminals
Main accessories

CA3-10S

Front mounted instantaneous auxiliary contact blocks

For contactor relays	Auxiliary contacts		Type	Order code		Pkg qty	Weight (1 pce) kg
NS..S, NSL..S	1	0	CA3-10S	1SBN011019T1010		10	0.011
	0	1	CA3-01S	1SBN011019T1001		10	0.011

RV5

Surge suppressors

For contactor relays	Rated control circuit voltage - Uc			Type	Order code		Pkg qty	Weight (1 pce) kg
	V	AC	DC					
NS..S, NSL..S	24...50	●	●	RV5/50	1SBN050010R1000		2	0.015
	50...133	●	●	RV5/133	1SBN050010R1001		2	0.015
	110...250	●	●	RV5/250	1SBN050010R1002		2	0.015
	250...440	●	●	RV5/440	1SBN050010R1003		2	0.015
NS..S	24...50	●	–	RC5-1/50	1SBN050100R1000		2	0.012
	50...133	●	–	RC5-1/133	1SBN050100R1001		2	0.012
	110...250	●	–	RC5-1/250	1SBN050100R1002		2	0.012
	250...440	●	–	RC5-1/440	1SBN050100R1003		2	0.012
NSL..S	12...32	–	●	RT5/32	1SBN050020R1000		2	0.015
	25...65	–	●	RT5/65	1SBN050020R1001		2	0.015
	50...90	–	●	RT5/90	1SBN050020R1002		2	0.015
	77...150	–	●	RT5/150	1SBN050020R1003		2	0.015
	150...264	–	●	RT5/264	1SBN050020R1004		2	0.015

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NS..S and NSL..S contactor relays - with spring terminals
Technical data

Contact utilization characteristics according to IEC

Contactor relay types	**AC operated**	**NS..S**
	DC operated	**NSL..S**
Standards		IEC 60947-5-1 and EN 60947-5-1
Rated operational voltage Ue max.		690 V
Rated frequency (without derating)		50 / 60 Hz
Conventional free-air thermal current Ith θ ≤ 40 °C		10 A
Ie / Rated operational current AC-15		
acc. to IEC 60947-5-1	**24-127 V 50/60 Hz**	6 A
	220-240 V 50/60 Hz	4 A
	400-440 V 50/60 Hz	3 A
	500 V 50/60 Hz	2 A
	690 V 50/60 Hz	2 A
Making capacity AC-15		10 x Ie AC-15 acc. to IEC 60947-5-1
Breaking capacity AC-15		10 x Ie AC-15 acc. to IEC 60947-5-1
Ie / Rated operational current DC-13		
acc. to IEC 60947-5-1	**24 V DC**	6 A / 144 W
	48 V DC	2.8 A / 134 W
	72 V DC	1 A / 72 W
	110 V DC	0.55 A / 60 W
	125 V DC	0.55 A / 69 W
	220 V DC	0.27 A / 60 W
	250 V DC	0.27 A / 68 W
Short-circuit protection device for contactors		
Ue ≤ 500 V AC - gG type fuse		10 A
Rated short-time withstand current Icw	**for 1.0 s**	100 A
at 40 °C ambient temperature,in free air from a cold state	**for 0.1 s**	140 A
Minimum switching capacity		12 V / 3 mA
with failure rate acc. to IEC 60947-5-4		10^{-7}
Non-overlapping time between N.O. and N.C. contacts		1.5 ms
Power dissipation per pole at 6 A		0.1 W
Max. electrical switching frequency	**AC-15**	1200 cycles/h
	DC-13	900 cycles/h
Mechanically linked contacts acc. to annex L of IEC 60947-5-1		Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA3..S aux. contact blocks) are mechanically linked contacts.

Contact utilization characteristics according to UL / CSA

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

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NS..S and NSL..S contactor relays - with spring terminals
Technical data

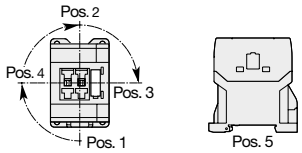
Magnet system characteristics for NS..S contactor relays

Contactor relay types		**AC operated**	NS..S
Coil operating limits		**AC supply**	
acc. to IEC 60947-5-1			0.85...1.1 x Uc (at θ ≤ 60 °C); Uc (at θ ≤ 70 °C)
AC control voltage	Rated control circuit voltage Uc	**at 50 Hz**	24...415 V
		at 60 Hz	24...415 V
	Coil consumption	**Average pull-in value 50 Hz**	33 VA
		60 Hz	33 VA
		50/60 Hz	33 VA
		Average holding value 50 Hz	6.5 VA / 1.5 W
		60 Hz	5 VA / 1.2 W
		50/60 Hz	6.5 VA / 1.5 W
Drop-out voltage			Approx. 30...50 % of Uc
Operating time			
	Between coil energization and:	**N.O. contact closing**	9...24 ms
		N.C. contact opening	6...18 ms
	Between coil de-energization and:	**N.O. contact opening (1)**	5...19 ms
		N.C. contact closing (1)	7...22 ms
			(1) The use of RC5-1 surge suppressor increases opening time by a factor of 2 to 3.

Magnet system characteristics for NSL..S contactor relays

Contactor relay types		**DC operated**	NSL..S
Coil operating limits		**DC supply**	
acc. to IEC 60947-5-1			0.85...1.1 x Uc (at θ ≤ 60 °C); Uc (at θ ≤ 70 °C)
DC control voltage			
	Rated control circuit voltage Uc		12...240 V DC
	Coil consumption	Average pull-in value	3 W
		Average holding value	3 W
Drop-out voltage			Approx. 10...40 % of Uc
Coil time constant	Open	**L/R**	12 ms
	Closed	**L/R**	40 ms
Operating time			
	Between coil energization and:	**N.O. contact closing**	36...59 ms
		N.C. contact opening	31...53 ms
	Between coil de-energization and:	**N.O. contact opening (1)**	13...17 ms
		N.C. contact closing (1)	15...20 ms
			(1) The use of RT5 surge suppressor increases opening time by a factor of 1.1 to 1.2.

Mounting characteristics and conditions for use

Contactor relay types		**AC operated**	NS..S
		DC operated	NSL..S
Mounting positions			
Mounting distances			The contactor relays can be assembled side by side.
Fixing	On rail according to IEC 60715, EN 60715		35 x 7.5 mm or 35 x 15 mm
	By screws (not supplied)		2 x M4 screws placed diagonally

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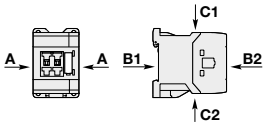
NS..S and NSL..S contactor relays - with spring terminals
Technical data

General technical data

Contactor relay types	**AC operated**	NS..S	
	DC operated	NSL..S	
Rated insulation voltage Ui			
acc. to IEC 60947-5-1		690 V	
acc. to UL / CSA		600 V	
Rated impulse withstand voltage Uimp.		6 kV	
Ambient air temperature close to contactor relay			
Operation in free air		-40...+70 °C	
Storage		-60...+80 °C	
Climatic withstand		Category B according to IEC 60947-1 Annex Q	
Maximum operating altitude (without derating)		3000 m	
Mechanical durability			
Number of operating cycles		20 millions operating cycles	
Max. switching frequency		3600 cycles/h	
Shock withstand		1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position	
acc. to IEC 60068-2-27 and EN 60068-2-27	**Shock direction**		
Mounting position 1		**NS contactor relays - AC operated**	**NSL contactor relays - DC operated**
	**A**	20 g	20 g closed position / 10 g open position
	B1	5 g	15 g closed position / 5 g open position
	B2	15 g	10 g
	C1	19 g closed position / 8 g open position	19 g closed position / 8 g open position
	C2	16 g closed position / 13 g open position	14 g closed position / 8 g open position
Vibration withstand		5...300 Hz	
acc. to IEC 60068-2-6		3 g closed position / 2 g open position	

Connecting characteristics

Contactor relay types	**AC operated**	NS..S
	DC operated	NSL..S
Main terminals		Spring terminals
Connection capacity (min. ... max.)		
Pole and coil terminals		
Rigid solid	**1 x**	0.75...2.5 mm²
	2 x	0.75...2.5 mm²
Flexible with non insulated ferrule	**1 x**	0.75...2.5 mm²
	2 x	0.75...2.5 mm²
Flexible with insulated ferrule	**1 x**	0.75...1.5 mm²
	2 x	0.75...1.5 mm²
Connection capacity acc. to UL / CSA	**1 or 2 x**	AWG 18...14
Stripping length		10 mm
Degree of protection		
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		
All terminals		IP20
Screwdriver type		Flat Ø 3.5

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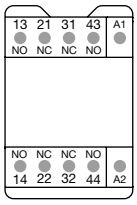
Notes

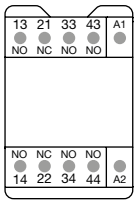
NS..S contactor relays - with spring terminals
Terminal marking and positioning

NS..S contactor relays - AC operated

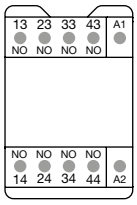
Standard devices without addition of auxiliary contact blocks



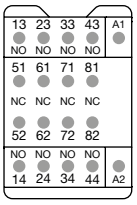
NS22ES



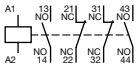
NS31ES



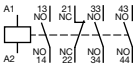
NS40ES



NS44ES



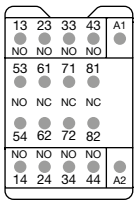
NS22ES



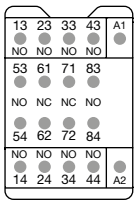
NS31ES

NS40ES

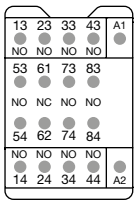
NS44ES



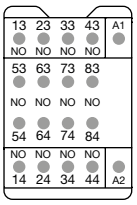
NS53ES



NS62ES



NS71ES



NS80ES

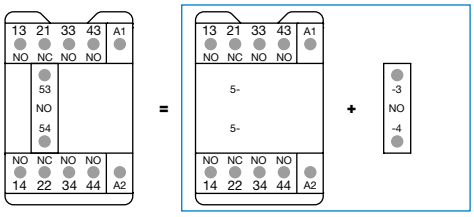
NS53ES

NS62ES

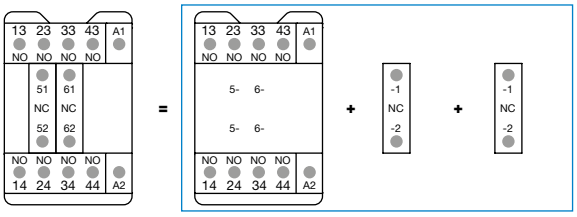
NS71ES

NS80ES

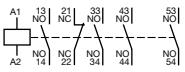
Other possible contact combinations with auxiliary contact blocks added by the user



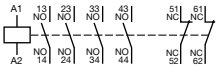
Combination 41E = NS31ES + CA3-10S



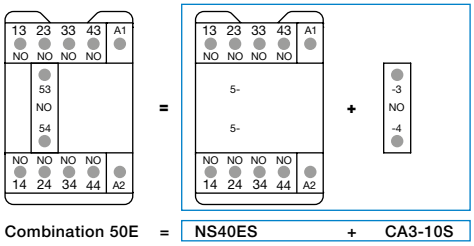
Combination 42E = NS40ES + CA3-01S + CA3-01S



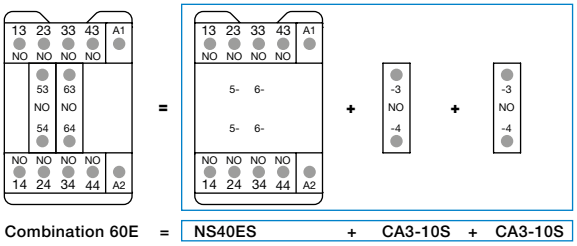
Combination 41E



Combination 42E

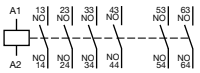


Combination 50E = NS40ES + CA3-10S



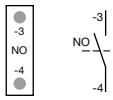
Combination 60E = NS40ES + CA3-10S + CA3-10S

Combination 50E

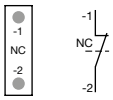


Combination 60E

CA3..S 1-pole auxiliary contact blocks



CA3-10S



CA3-01S

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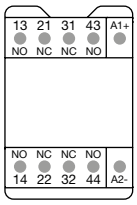
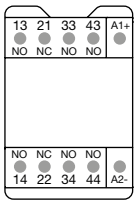
NSL..S contactor relays - with spring terminals
Terminal marking and positioning

NSL..S contactor relays - DC operated (the polarity A1+, A2- must be respected)

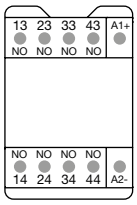
Standard devices without addition of auxiliary contact blocks



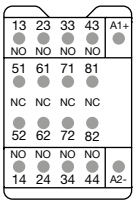
NSL22ES



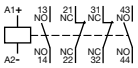
NSL31ES



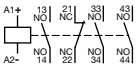
NSL40ES



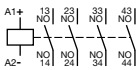
NSL44ES



NSL22ES

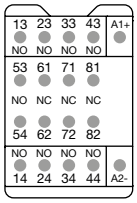


NSL31ES

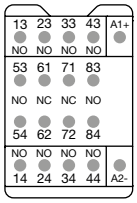


NSL40ES

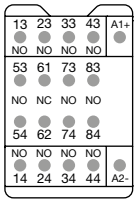
NSL44ES



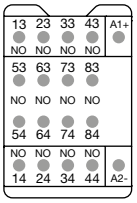
NSL53ES



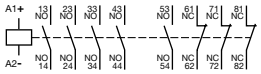
NSL62ES



NSL71ES



NSL80ES



NSL53ES

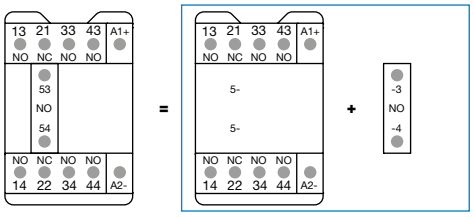
NSL62ES

NSL71ES

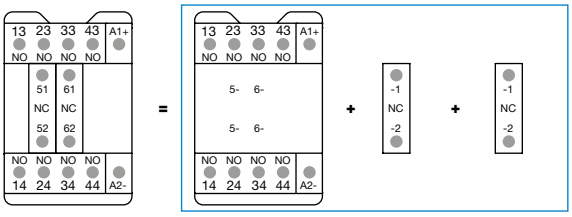
NSL80ES

6

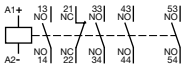
Other possible contact combinations with auxiliary contact blocks added by the user



Combination 41E = NSL31ES + CA3-10S

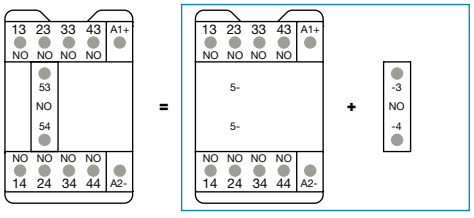


Combination 42E = NS4L0ES + CA3-01S + CA3-01S

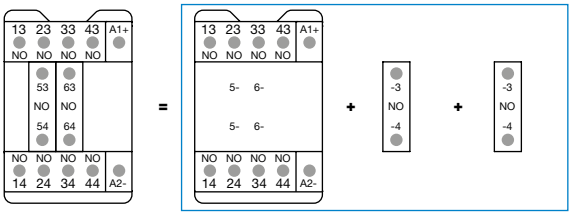


Combination 41E

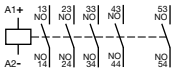
Combination 42E



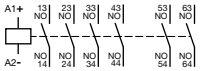
Combination 50E = NSL40ES + CA3-10S



Combination 60E = NSL40ES + CA3-10S + CA3-10S

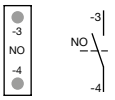


Combination 50E

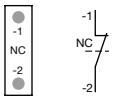


Combination 60E

CA3..S 1-pole auxiliary contact blocks



CA3-10S



CA3-01S

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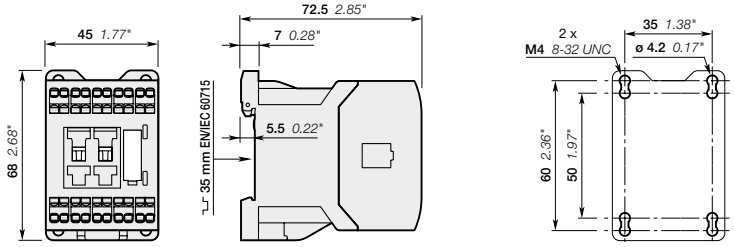
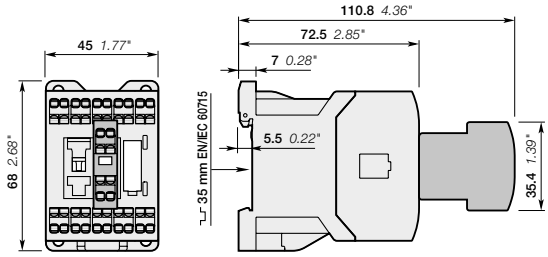
NS..S contactor relays - with spring terminals

Main dimensions mm, *inches*

4-pole contactor relays

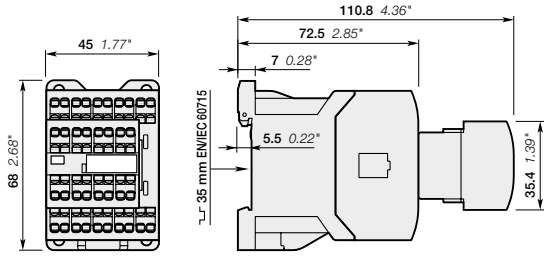


NS22ES, NS31ES, NS40ES



NS22ES, NS31ES, NS40ES
+ CA3..S front-mounted 1-pole auxiliary contact block

8-pole contactor relays



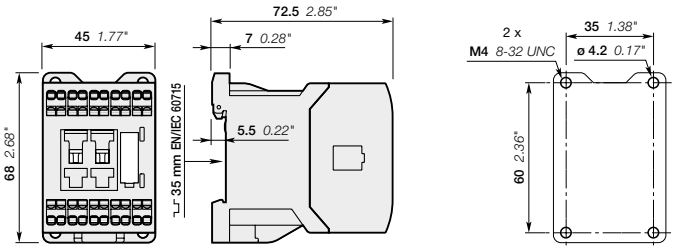
NS44ES, NS53ES, NS62ES, NS71ES, NS80ES

1SBC101417S0201

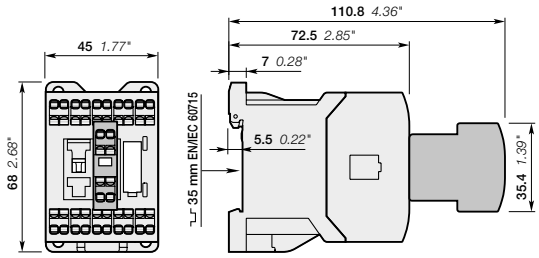
NSL..S contactor relays - with spring terminals

Main dimensions mm, *inches*

4-pole contactor relays

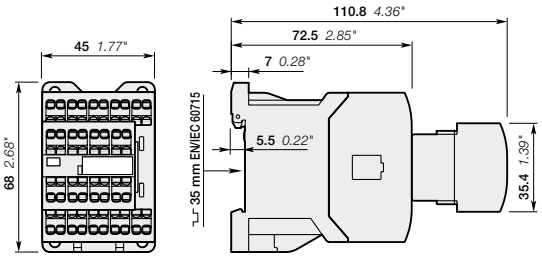


NSL22ES, NSL31ES, NSL40ES



NSL22ES, NSL31ES, NSL40ES
+ CA3..S front-mounted 1-pole auxiliary contact block

8-pole contactor relays



NSL44ES, NSL53ES, NSL62ES, NSL71ES, NSL80ES

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Auxiliary contact blocks - with spring terminals
Accessories

CA3-10S

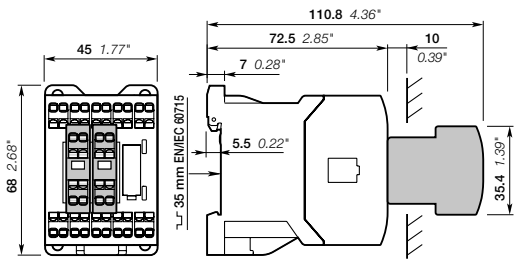
Description

The auxiliary contact blocks are used for the operation of auxiliary circuits and control circuits.
CA3 1-pole auxiliary contact blocks, designed for standard industrial environments, are equipped with:
– N.O. or N.C. contacts.
– spring-type connecting terminals.
All 1-pole auxiliary contact blocks are protected against accidental direct contact and bear the corresponding function marking.
A maximum of two 1-pole auxiliary contact blocks can be front-mounted on 1-stack contactors or 1-stack contactor relays.

Ordering details

For contactors	For contactor relays	Contact blocks		Type	Order code		Pkg qty	Weight (1 pce) kg
1-pole auxiliary contact blocks with spring terminals								
AS09..S ... AS16..S	NS..S, NSL..S	1	–	CA3-10S	1SBN011019T1010		10	0.011
ASL09..S ... ASL16..S		–	1	CA3-01S	1SBN011019T1001		10	0.011

Main dimensions mm, *inches*



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Auxiliary contact blocks - with spring terminals
Front mounting

Technical data

Types		1-pole **CA3..S**

Contact utilization characteristics according to IEC

Standards		IEC 60947-5-1 and EN 60947-5-1
Rated insulation voltage Ui acc. to IEC 60947-5-1		690 V
Rated impulse withstand voltage Uimp		6 kV
Rated operational voltage Ue max.		690 V
Conventional thermal current Ith - θ ≤ 40 °C		10 A
Ie / Rated operational current AC-15		
acc. to IEC 60947-5-1	**24-127 V 50/60 Hz**	6 A
	220-240 V 50/60 Hz	4 A
	400-440 V 50/60 Hz	3 A
	500 V 50/60 Hz	2 A
	690 V 50/60 Hz	2 A
Making capacity		10 x Ie AC-15 acc. to IEC 60947-5-1
Breaking capacity		10 x Ie AC-15 acc. to IEC 60947-5-1
Ie / Rated operational current DC-13		
acc. to IEC 60947-5-1	**24 V DC**	6 A / 144 W
	48 V DC	2.8 A / 134 W
	72 V DC	1 A / 72 W
	110 V DC	0.55 A / 60 W
	125 V DC	0.55 A / 69 W
	220 V DC	0.27 A / 60 W
	250 V DC	0.27 A / 68 W
Short-circuit protection device gG type fuse		10 A
Rated short-time withstand current Icw	**for 1.0 s**	100 A
θ = 40 °C	**for 0.1 s**	140 A
Minimum switching capacity		12 V / 3 mA
with failure rate acc. to IEC 60947-5-4		10^{-7}
Power dissipation per pole at 6 A		0.1 W
Mechanical durability		
Number of operating cycles		10 millions operating cycles
Max. switching frequency		3600 cycles/h
Max. electrical switching frequency	**AC-15**	1200 cycles/h
	AC-13	900 cycles/h
Mechanically linked contact acc. to annex L of IEC 60947-5-1		Additional N.O. or N.C. auxiliary contacts (CA3..S aux. contact blocks) are mechanically linked contacts
Mirror contacts acc. to annex F of IEC 60947-4-1		Additional N.C. auxiliary contacts (CA3..S aux. contact blocks) are mirror contacts

Contact utilization characteristics according to UL / CSA

Standards	UL 508, CSA C22.2 N°14
Max. operational voltage	690 V AC, 250 V DC
Pilot duty	A600, Q300
AC thermal rated current	10 A
AC maximum volt-ampere making	7200 VA
AC maximum volt-ampere breaking	720 VA
DC thermal rated current	2.5 A
DC maximum volt-ampere making-breaking	69 VA

Connecting characteristics

Connection capacity (min. ... max.)		
Rigid solid	**1 x**	0.75...2.5 mm²
	2 x	0.75...2.5 mm²
Flexible with non insulated ferrule	**1 x**	0.75...2.5 mm²
	2 x	0.75...2.5 mm²
Flexible with insulated ferrule	**1 x**	0.75...1.5 mm²
	2 x	0.75...1.5 mm²
Connection capacity acc. to UL / CSA	**1 or 2 x**	AWG 18...14
Stripping length		10 mm
Degree of protection		
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		IP20
Screw terminals		
All terminals		Spring terminals
Screwdriver type		Flat Ø 3.5

6

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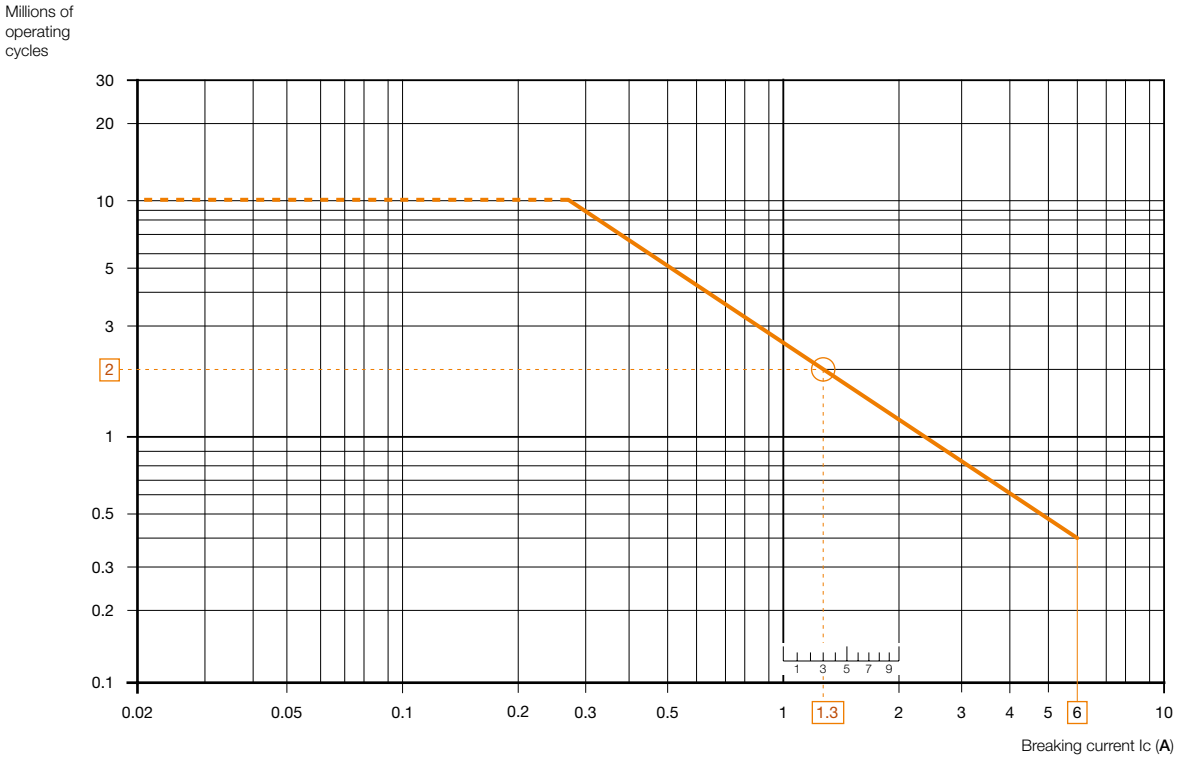
Auxiliary contact blocks for AS09..S ... AS16..S, ASL09..S ... ASL16..S contactors and NS, NSL contactor relays - with spring terminals
Electrical durability

Electrical durability for AC-15 utilization category - Ue ≤ 400 V

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

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

The curve has been drawn for resistive and inductive loads up to 400 V:
- AS09..S ... AS16..S and ASL09..S ... ASL16..S contactor built-in auxiliary contacts
- 1-pole CA3..S
- NS..S and NSL..S contactor relays.



Example:
Breaking current = 1.3 A
On the opposite curve at intersection "○" 1.3 A the corresponding value for the electrical durability is approximately 2 millions operating cycles.

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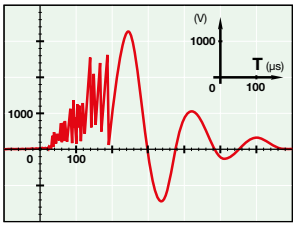
Notes

Surge suppressors for contactor coils
Accessories



Description

The operation of inductive circuits causes overvoltages, in particular on opening 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 the breakdown of insulators and even the 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 Ûs to the peak value Ûc of the coil rated control voltage Uc:

$$k = \frac{\hat{U}s\ max.}{\hat{U}c} \qquad \text{in DC} \quad k = \frac{\hat{U}s\ max.}{Uc} \qquad \text{in AC} \quad k = \frac{\hat{U}s\ max.}{Uc\ \sqrt{2}}$$

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

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 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.

1SBC101042F0014

RV5

1SBC101042F0014

RC5-1

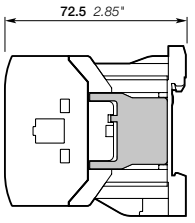
1SBC101042F0014

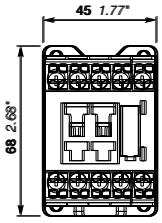
RT5

Ordering details

For contactors	For contactor relays	Rated control circuit voltage - Uc			Type	Order code		Pkg qty	Weight (1 pce)
		V	DC	AC					kg
AS..S, ASL..S	NS..S, NSL..S	24...50	●	●	RV5/50	1SBN050010R1000		2	0.015
		50...133	●	●	RV5/133	1SBN050010R1001		2	0.015
		110...250	●	●	RV5/250	1SBN050010R1002		2	0.015
		250...440	●	●	RV5/440	1SBN050010R1003		2	0.015
AS..S	NS..S	24...50	–	●	RC5-1/50	1SBN050100R1000		2	0.012
		50...133	–	●	RC5-1/133	1SBN050100R1001		2	0.012
		110...250	–	●	RC5-1/250	1SBN050100R1002		2	0.012
		250...440	–	●	RC5-1/440	1SBN050100R1003		2	0.012
ASL..S	NSL..S	12...32	●	–	RT5/32	1SBN050020R1000		2	0.015
		25...65	●	–	RT5/65	1SBN050020R1001		2	0.015
		50...90	●	–	RT5/90	1SBN050020R1002		2	0.015
		77...150	●	–	RT5/150	1SBN050020R1003		2	0.015
		150...264	●	–	RT5/264	1SBN050020R1004		2	0.015

Main dimensions mm, *inches*





Easy connection to the coil terminals
(parallel mounting)
Clip-on for both fixing and connection.

No additional space
Clipped onto the right side part of the contactor base without changing contactor overall dimensions and keeping a free access to coil terminals.

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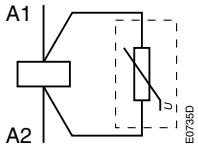
Surge suppressors for contactor coils
Technical data

Varistor	RV5/50	RV5/133	RV5/250	RV5/440
Rated control circuit voltage Uc	24...50 V AC	50...133 V AC	110...250 V AC	250...440 V AC
	24...50 V DC	50...133 V DC	110...250 V DC	250...440 V DC
Residual overvoltage (clipping voltage)	132 V AC	270 V AC	480 V AC	825 V AC
	132 V DC	270 V DC	480 V DC	825 V DC
Opening time growth factor	none			
Operating temperature	-20...+70 °C			
Advantages	High energy absorption: good damping - Unpolarized system.			
Drawback	Clipping as from Uvdr*, thus voltage front up to this point. *Uvdr = Varistor operating voltage (voltage dependent resistor), tolerance ± 10 %.			

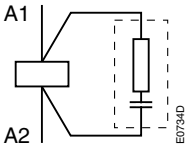
RC type	RC5-1/50	RC5-1/133	RC5-1/250	RC5-1/440
Rated control circuit voltage Uc	24...50 V AC	50...133 V AC	110...250 V AC	250...440 V AC
Residual overvoltage (clipping voltage)	2 to 3 x Uc max.			
Opening time growth factor	2...3			
Operating temperature	-20...+70 °C			
Advantages	Very fast clipping - Attenuation of steep fronts and thus of high frequencies.			

Transil diode	RT5/32	RT5/65	RT5/90	RT5/150	RT5/264
Rated control circuit voltage Uc	12...32 V DC	25...65 V DC	50...90 V DC	77...150 V DC	150...264 V DC
Residual overvoltage (clipping voltage)	50 V DC	100 V DC	150 V DC	210 V DC	390 V DC
Opening time growth factor	1.1...1.2				
Operating temperature	-20...+70 °C				
Advantages	Good energy absorption - Unpolarized system - Simple, reliable system.				
Drawback	Delay on drop out which does not however reduce contactor breaking capacity.				

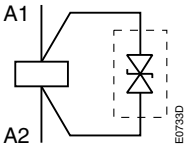
Wiring diagrams



Varistor



RC type



Transil diode

1SBC101602S0201

Connecting links for starting solutions and other accessories

BEA16-3U

Connecting links

The BEA16-3U insulated connecting links are used to connect an AS..S AC operated contactor or an ASL..S DC operated contactor with a manual motor starter.
The connecting link ensure the electrical and mechanical connection between the contactor and the manual motor starter.

Ordering details

For contactors	Manual motor starter	Type	Order code		Pkg qty	Weight (1 pce) kg
AS09..S ... AS16..S ASL09..S ... ASL16..S	MS116-0.16 ... MS116-16 MS132-0.16 ... MS132-16	BEA16-3U	1SBN081020R1000		1	0.045

BDT4

Test block

BDT4 test block is suitable for switching on contactor off-load.

Marking on the block indicates the contactor type to fit with.

Ordering details

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
AS..S, ASL..S, NS..S, NSL..S	BDT4	1SBN110122T1000		10	0.007

BA4

Function markers

Box of 16 blank cards (16 markers by card) printable on HTP500 thermal transfer printer and AMS 500 marking table to identify your contactors, overload relays or manual motor starters.
Marker dimensions: 7 x 20 mm (*.276" x .787"*).

Ordering details

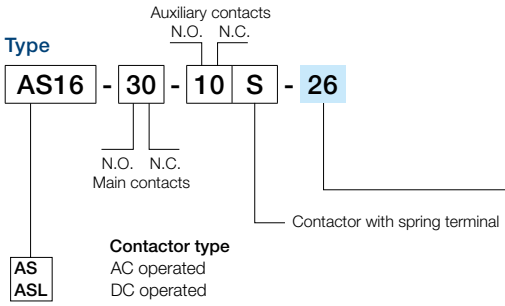
For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
AS..S, ASL..S, NS..S, NSL..S	BA4	1SNA235156R2700		16	0.011
AMS 500 support plate for 8 BA4	SPRC 1	1SNA360010R1500		1	0.220
HTP500 support plate	HTP500-BA4	1SNA235712R2400		1	0.290

1SBC101782S0201

Voltage code table

The below tables indicate the available coil voltages and corresponding digits for order codes. When placing an order, please give either type or order code. Select a standard contactor from ordering detail pages. Change the **coil voltage code** in the type or in the order code according to the table below. Example: for contactor AS09-30-10S and coil 42 V 50/60 Hz, type is AS09-30-10S-**21** and order code is 1SBL101004R**21**10.

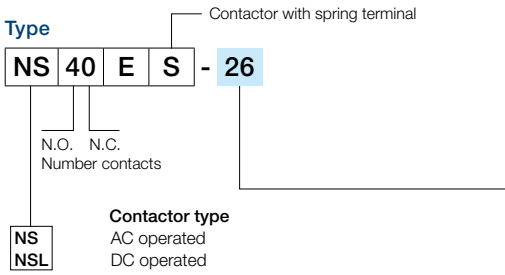
3-pole contactors - with spring terminals



AC coil code	50 Hz	60 Hz
20	24 V	24 V
21	42 V	42 V
22	48 V	48 V
23	110 V	110 V
24	115 V	115 V
16	–	120 V
25	220 V	220 V
26	**230 V**	**230 V**
27	240 V	240 V
17	–	277 V
13	380 V	–
28	400 V	400 V
29	415 V	415 V

DC coil code	
80	12 V
81	24 V
83	48 V
84	60 V
86	110 V
87	125 V
88	220 V
89	240 V

Contactor relays - with spring terminals



AC coil code	50 Hz	60 Hz
20	24 V	24 V
21	42 V	42 V
22	48 V	48 V
23	110 V	110 V
24	115 V	115 V
16	–	120 V
25	220 V	220 V
26	**230 V**	**230 V**
27	240 V	240 V
17	–	277 V
13	380 V	–
28	400 V	400 V
29	415 V	415 V

DC coil code	
80	12 V
81	24 V
83	48 V
84	60 V
86	110 V
87	125 V
88	220 V
89	240 V

1SBC101621S0201 - Rev. A

ABB
1L1
3L2
5L3
13NO
2
3
4
5
2T1
4T2
6T3
14NO

ABB
1L1
3L2
5L3
13NO
21NC
31NC
41NC
14NO
22NC
32NC
42NC

AF..S 3-pole contactors and NF..S contactor relays with spring terminals

AF..S 3-pole contactors - with spring terminals

Overview **6**/44

1-stack contactors

AF09..S ... AF26..S AC / DC operated **6**/46

AF09Z..S ... AF26Z..S AC / DC operated - low consumption **6**/47

2-stack contactors

AF09..S ... AF26..S AC / DC operated **6**/48

AF09Z..S ... AF26Z..S AC / DC operated - low consumption **6**/49

Main accessories **6**/50

Technical data **6**/52

Electrical durability **6**/57

Terminal marking and positioning **6**/61

Main dimensions **6**/62

NF..S contactor relays - with spring terminals

Overview **6**/66

4-pole contactor relays

NF..S AC / DC operated **6**/68

NFZ..S AC / DC operated - low consumption **6**/69

8-pole contactor relays

NF..S AC / DC operated **6**/70

NFZ..S AC / DC operated - low consumption **6**/71

Main accessories **6**/72

Technical data **6**/74

Terminal marking and positioning **6**/77

Main dimensions **6**/78

Accessories

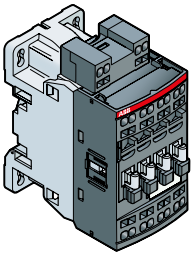
Auxiliary contact blocks - with spring terminals **6**/80

Electronic timers - with spring terminals **6**/84

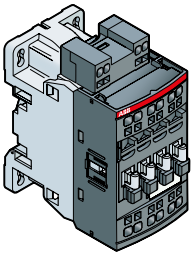
Other accessories **6**/87

Voltage code table **6/88**

3-pole contactors - with spring terminals
Main accessories



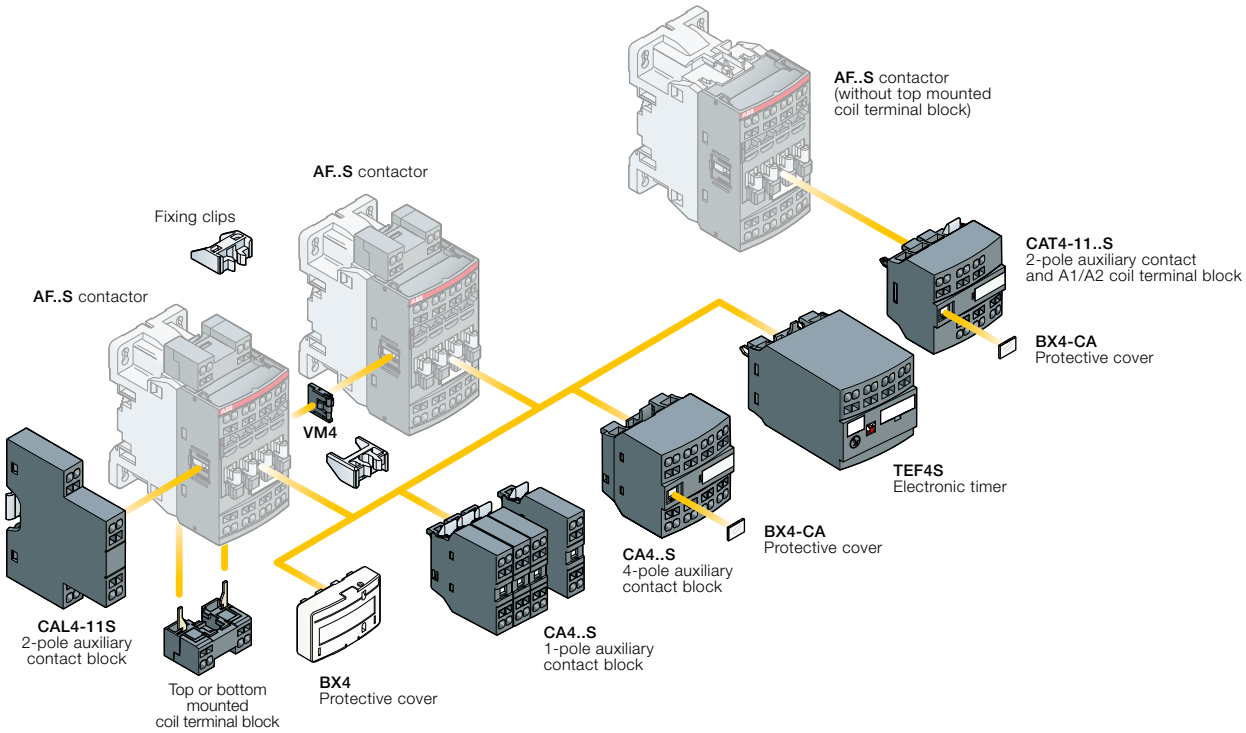
AF09..S ... AF16..S
3-pole contactors



AF26..S
3-pole contactors

6

Main accessories for contactors



1SBC101677S0201

3-pole contactors - with spring terminals

Spring terminals

AC / DC Control voltage					AF09..S	AF12..S	AF16..S	AF26..S
Switching of 3-phase cage motors								
IEC	AC-3	Rated operational power		400 V	**4 kW**	**5.5 kW**	**7.5 kW**	**11 kW**
		Rated operational current	θ ≤ 60 °C	400 V	9 A	12 A	18 A	26 A
			θ ≤ 60 °C	415 V	9 A	12 A	18 A	26 A
			θ ≤ 60 °C	690 V	7 A	9 A	10.5 A	17 A
UL/CSA	3-phase motor rating			440-480 V	**5 hp**	**7.5 hp**	**10 hp**	**–**
NEMA size					00	0	**–**	**–**
Switching of resistive circuits								
IEC	AC-1	Rated operational current	θ ≤ 40 °C	690 V	**22 A**	**24 A**	**24 A**	**35 A**
			θ ≤ 60 °C	690 V	18 A	20 A	20 A	30 A
			θ ≤ 70 °C	690 V	15 A	16 A	16 A	25 A
	With conductor cross-sectional area				2.5 mm^2	2.5 mm^2	2.5 mm^2	4 mm^2
UL/CSA	**General use rating**	600 V AC			**20 A**	**20 A**	**20 A**	**–**
	With conductor cross-sectional area				AWG 12	AWG 12	AWG 12	**–**

Main accessories

Auxiliary contact blocks	Front mounting		1-pole **CA4-10S** or **CA4-01S** 4-pole **CA4..S**
			2-pole **CAT4-11..S** (with coil front connection)
	Side mounting		2-pole **CAL4-11S**
Interlock	Mechanical		**VM4** Including 2 fixing clips
Additional coil terminal block			**LDC4S**
Protective covers			**BX4** For all 1-stack contactors **BX4-CA** For 4-pole CA4..S and 2-pole CAT4..S auxiliary contact blocks

1SBC101677S0201

AF09..S ... AF26..S 3-pole contactors - with spring terminals
4 to 11 kW
AC / DC operated

AF09-30-10S

AF26-30-00S

Description

AF09..S ... AF26..S contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles:

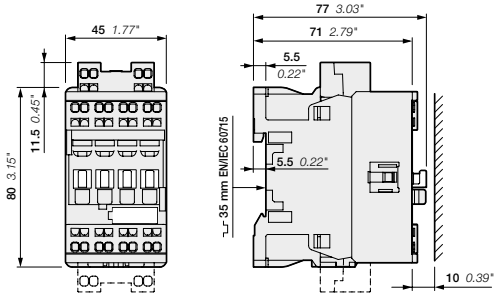
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
 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

Ordering details

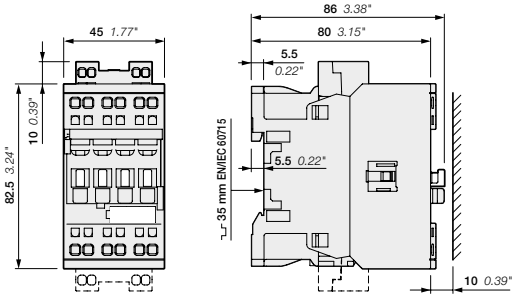
IEC Rated operational power 400 V AC-3	current θ≤ 40 °C AC-1	UL/CSA 3-phase motor rating 480 V	General use rating 600 V AC	Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Type	Order code		Weight Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC						kg
4	22	5	20	24...60	- (1)	1	0	AF09-30-10S-41	1SBL137004R4110		0.270
						0	1	AF09-30-01S-41	1SBL137004R4101		0.270
				48...130	48...130	1	0	AF09-30-10S-12	1SBL137004R1210		0.270
						0	1	AF09-30-01S-12	1SBL137004R1201		0.270
				100...250	100...250	1	0	AF09-30-10S-13	1SBL137004R1310		0.270
						0	1	AF09-30-01S-13	1SBL137004R1301		0.270
				250...500	250...500	1	0	AF09-30-10S-14	1SBL137004R1410		0.310
						0	1	AF09-30-01S-14	1SBL137004R1401		0.310
5.5	24	7.5	20	24...60	- (1)	1	0	AF12-30-10S-41	1SBL157004R4110		0.270
						0	1	AF12-30-01S-41	1SBL157004R4101		0.270
				48...130	48...130	1	0	AF12-30-10S-12	1SBL157004R1210		0.270
						0	1	AF12-30-01S-12	1SBL157004R1201		0.270
				100...250	100...250	1	0	AF12-30-10S-13	1SBL157004R1310		0.270
						0	1	AF12-30-01S-13	1SBL157004R1301		0.270
				250...500	250...500	1	0	AF12-30-10S-14	1SBL157004R1410		0.310
						0	1	AF12-30-01S-14	1SBL157004R1401		0.310
7.5	24	10	20	24...60	- (1)	1	0	AF16-30-10S-41	1SBL177004R4110		0.270
						0	1	AF16-30-01S-41	1SBL177004R4101		0.270
				48...130	48...130	1	0	AF16-30-10S-12	1SBL177004R1210		0.270
						0	1	AF16-30-01S-12	1SBL177004R1201		0.270
				100...250	100...250	1	0	AF16-30-10S-13	1SBL177004R1310		0.270
						0	1	AF16-30-01S-13	1SBL177004R1301		0.270
				250...500	250...500	1	0	AF16-30-10S-14	1SBL177004R1410		0.310
						0	1	AF16-30-01S-14	1SBL177004R1401		0.310
11	35	–	–	24...60	- (1)	0	0	AF26-30-00S-41	1SBL237004R4100		0.320
				48...130	48...130	0	0	AF26-30-00S-12	1SBL237004R1200		0.320
				100...250	100...250	0	0	AF26-30-00S-13	1SBL237004R1300		0.320
				250...500	250...500	0	0	AF26-30-00S-14	1SBL237004R1400		0.360

(1) For 24...60 V 50/60 Hz - 20...60 V DC, use AF..-30-..S-11 (see voltage code table).
AF..-30-..S-11 not suitable for direct control by PLC-output.

Main dimensions mm, *inches*



AF09..S, AF12..S, AF16..S



AF26..S

1SBC101688S0201 - Rev. A

AF09Z..S ... AF26Z..S 3-pole contactors - with spring terminals
4 to 11 kW
AC / DC operated - low consumption

AF09Z-30-10S

AF26Z-30-00S

Description

AF09Z..S ... AF26Z..S contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles:

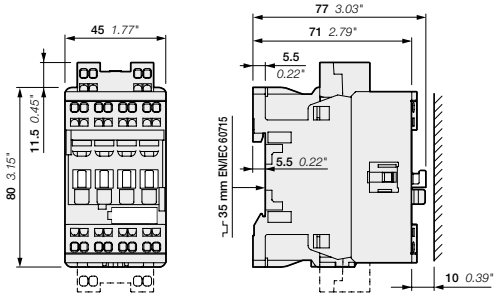
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
  - can manage large control voltage variations
  - allow direct control by PLC-output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

Ordering details

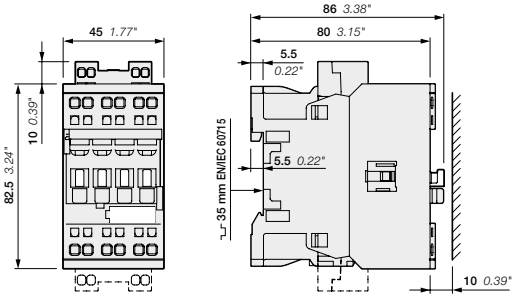
IEC		UL/CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC						kg
4	22	5	20	–	12...20	1	0	AF09Z-30-10S-20	1SBL136004R2010		0.310
						0	1	AF09Z-30-01S-20	1SBL136004R2001		0.310
				24...60	20...60	1	0	AF09Z-30-10S-21	1SBL136004R2110		0.310
						0	1	AF09Z-30-01S-21	1SBL136004R2101		0.310
				48...130	48...130	1	0	AF09Z-30-10S-22	1SBL136004R2210		0.310
						0	1	AF09Z-30-01S-22	1SBL136004R2201		0.310
				100...250	100...250	1	0	AF09Z-30-10S-23	1SBL136004R2310		0.310
						0	1	AF09Z-30-01S-23	1SBL136004R2301		0.310
5.5	24	7.5	20	–	12...20	1	0	AF12Z-30-10S-20	1SBL156004R2010		0.310
						0	1	AF12Z-30-01S-20	1SBL156004R2001		0.310
				24...60	20...60	1	0	AF12Z-30-10S-21	1SBL156004R2110		0.310
						0	1	AF12Z-30-01S-21	1SBL156004R2101		0.310
				48...130	48...130	1	0	AF12Z-30-10S-22	1SBL156004R2210		0.310
						0	1	AF12Z-30-01S-22	1SBL156004R2201		0.310
				100...250	100...250	1	0	AF12Z-30-10S-23	1SBL156004R2310		0.310
						0	1	AF12Z-30-01S-23	1SBL156004R2301		0.310
7.5	24	10	20	–	12...20	1	0	AF16Z-30-10S-20	1SBL176004R2010		0.310
						0	1	AF16Z-30-01S-20	1SBL176004R2001		0.310
				24...60	20...60	1	0	AF16Z-30-10S-21	1SBL176004R2110		0.310
						0	1	AF16Z-30-01S-21	1SBL176004R2101		0.310
				48...130	48...130	1	0	AF16Z-30-10S-22	1SBL176004R2210		0.310
						0	1	AF16Z-30-01S-22	1SBL176004R2201		0.310
				100...250	100...250	1	0	AF16Z-30-10S-23	1SBL176004R2310		0.310
						0	1	AF16Z-30-01S-23	1SBL176004R2301		0.310
11	35	–	–	–	12...20	0	0	AF26Z-30-00S-20	1SBL236004R2000		0.360
				24...60	20...60	0	0	AF26Z-30-00S-21	1SBL236004R2100		0.360
				48...130	48...130	0	0	AF26Z-30-00S-22	1SBL236004R2200		0.360
				100...250	100...250	0	0	AF26Z-30-00S-23	1SBL236004R2300		0.360

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

Main dimensions mm, *inches*



AF09Z..S, AF12Z..S, AF16Z..S



AF26Z..S

1SBC101709S0201 - Rev. A

AF09..S ... AF26..S 2-stack 3-pole contactors - with spring terminals
4 to 11 kW
AC / DC operated

AF09-30-22S

AF26-30-11S

AF26-30-22S

Description

AF09..S ... AF26..S contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles (1st stack):

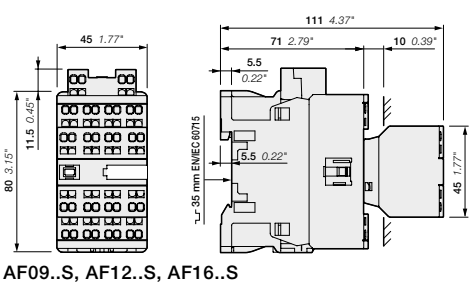
- 2nd stack with permanently fixed auxiliary contact block. The built-in auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC) only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening.
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

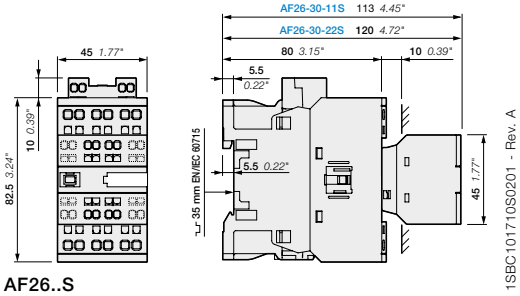
IEC Rated operational power 400 V AC-3 kW	current θ≤ 40 °C AC-1 A	UL/CSA 3-phase motor rating 480 V hp	General use rating 600 V AC A	Rated control circuit voltage Uc min. ... Uc max. V 50/60 Hz	V DC	Auxiliary contacts fitted		Type	Order code		Weight Pkg (1 pce) kg
4	22	5	20	24...60	- (1)	2	2	AF09-30-22S-41	1SBL137004R4122		0.320
				48...130	48...130	2	2	AF09-30-22S-12	1SBL137004R1222		0.320
				100...250	100...250	2	2	AF09-30-22S-13	1SBL137004R1322		0.320
				250...500	250...500	2	2	AF09-30-22S-14	1SBL137004R1422		0.360
5.5	24	7.5	20	24...60	- (1)	2	2	AF12-30-22S-41	1SBL157004R4122		0.320
				48...130	48...130	2	2	AF12-30-22S-12	1SBL157004R1222		0.320
				100...250	100...250	2	2	AF12-30-22S-13	1SBL157004R1322		0.320
				250...500	250...500	2	2	AF12-30-22S-14	1SBL157004R1422		0.360
7.5	24	10	20	24...60	- (1)	2	2	AF16-30-22S-41	1SBL177004R4122		0.320
				48...130	48...130	2	2	AF16-30-22S-12	1SBL177004R1222		0.320
				100...250	100...250	2	2	AF16-30-22S-13	1SBL177004R1322		0.320
				250...500	250...500	2	2	AF16-30-22S-14	1SBL177004R1422		0.360
11	35	–	–	24...60	- (1)	1	1	AF26-30-11S-41	1SBL237004R4111		0.360
						2	2	AF26-30-22S-41	1SBL237004R4122		0.380
				48...130	48...130	1	1	AF26-30-11S-12	1SBL237004R1211		0.360
						2	2	AF26-30-22S-12	1SBL237004R1222		0.380
				100...250	100...250	1	1	AF26-30-11S-13	1SBL237004R1311		0.360
						2	2	AF26-30-22S-13	1SBL237004R1322		0.380
				250...500	250...500	1	1	AF26-30-11S-14	1SBL237004R1411		0.400
						2	2	AF26-30-22S-14	1SBL237004R1422		0.420

(1) For 24...60 V 50/60 Hz - 20...60 V DC, use AF..-30-..S-11 (see voltage code table).
AF..-30-..S-11 not suitable for direct control by PLC-output.

Main dimensions mm, *inches*



AF09..S, AF12..S, AF16..S



AF26..S

1SBC101710S0201 - Rev. A

AF09Z..S ... AF26Z..S 2-stack 3-pole contactors - with spring terminals
4 to 11 kW
AC / DC operated - low consumption

AF09Z-30-22S

AF26Z-30-11S

AF26Z-30-22S

Description

AF09Z..S ... AF26Z..S contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles (1st stack):

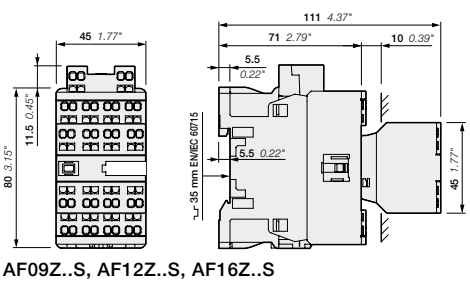
– 2nd stack with permanently fixed auxiliary contact block. The built-in auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
  - can manage large control voltage variations
  - allow direct control by PLC-output ≥ 24 V DC 500 mA
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
– built-in surge suppression
– add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

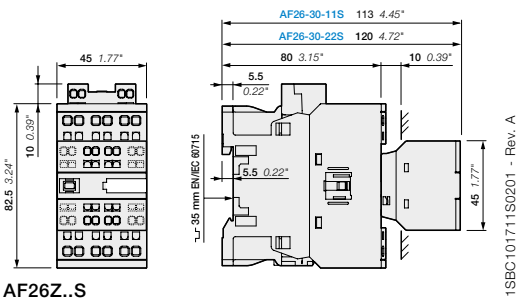
IEC		UL/CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC						kg
4	22	5	20	–	12...20	2	2	AF09Z-30-22S-20	1SBL136004R2022		0.360
				24...60	20...60	2	2	AF09Z-30-22S-21	1SBL136004R2122		0.360
				48...130	48...130	2	2	AF09Z-30-22S-22	1SBL136004R2222		0.360
				100...250	100...250	2	2	AF09Z-30-22S-23	1SBL136004R2322		0.360
5.5	24	7.5	20	–	12...20	2	2	AF12Z-30-22S-20	1SBL156004R2022		0.360
				24...60	20...60	2	2	AF12Z-30-22S-21	1SBL156004R2122		0.360
				48...130	48...130	2	2	AF12Z-30-22S-22	1SBL156004R2222		0.360
				100...250	100...250	2	2	AF12Z-30-22S-23	1SBL156004R2322		0.360
7.5	24	10	20	–	12...20	2	2	AF16Z-30-22S-20	1SBL176004R2022		0.360
				24...60	20...60	2	2	AF16Z-30-22S-21	1SBL176004R2122		0.360
				48...130	48...130	2	2	AF16Z-30-22S-22	1SBL176004R2222		0.360
				100...250	100...250	2	2	AF16Z-30-22S-23	1SBL176004R2322		0.360
11	35	–	–	–	12...20	1	1	AF26Z-30-11S-20	1SBL236004R2011		0.400
						2	2	AF26Z-30-22S-20	1SBL236004R2022		0.420
				24...60	20...60	1	1	AF26Z-30-11S-21	1SBL236004R2111		0.400
						2	2	AF26Z-30-22S-21	1SBL236004R2122		0.420
				48...130	48...130	1	1	AF26Z-30-11S-22	1SBL236004R2211		0.400
						2	2	AF26Z-30-22S-22	1SBL236004R2222		0.420
				100...250	100...250	1	1	AF26Z-30-11S-23	1SBL236004R2311		0.400
						2	2	AF26Z-30-22S-23	1SBL236004R2322		0.420

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

Main dimensions mm, *inches*



AF09Z..S, AF12Z..S, AF16Z..S



AF26Z..S

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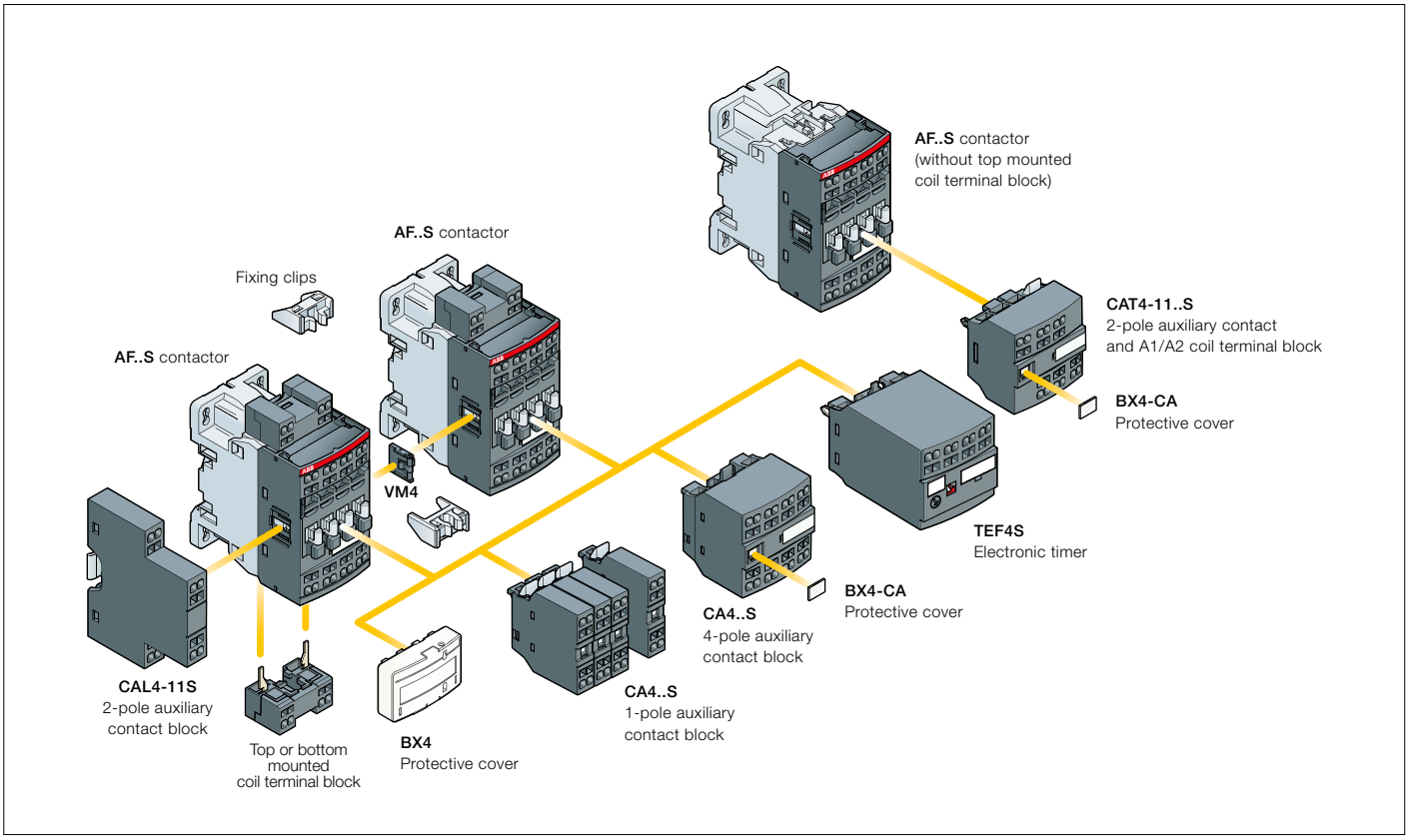
AF09..S ... AF26..S 3-pole contactors - with spring terminals
Main accessories

Contactor and main accessories (other accessories available)



Main accessory fitting details

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

Contactor types	Main poles		Built-in auxiliary contacts		Front-mounted accessories										Side-mounted accessories		
					Auxiliary contact blocks						Electronic timer		Mechanical interlock unit (between 2 contactors)		Auxiliary contact blocks		
															Left side		Right side
					1-pole CA4..S		2-pole CAT4-11..S		4-pole CA4..S		TEF4S		VM4		2-pole CAL4-11S		
	Max. N.C. built-in and add-on N.C. auxiliary contacts: 4 N.C. max. on positions 1, 2, 3, 4 and 3 N.C. max. on positions 1 ±30°, 5																
AF09..S ... AF16..S	3	0	0	1	4 max.	or	1	or	1	or	1		–	+	1		–
					2 max.		–		–	or	1		–	+	1	+	1
					3 max.		–		–		–	+	1	+	1	or	1
AF09..S ... AF16..S	3	0	1	0	4 max.	or	1	or	1	or	1		–	+	1		–
AF26..S	3	0	0	0	2 max.	or	1		–	or	1		–	+	1	+	1
					3 max.		–		–		–	+	1	+	1	or	1
AF26..S	3	0	1	1	–		–		–		–		–		1	+	1
AF09..S ... AF26..S	3	0	2	2	–		–		–		–		–		1		–

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AF09..S ... AF26..S 3-pole contactors - with spring terminals
Main accessories

CA4-10S

CA4-22MS

CAL4-11S

CAT4-11ES

TEF4S-OFF

VM4

LDC4S

BX4

BX4-CA

Ordering details (1)

For contactors	Auxiliary contacts		Type	Order code		Pkg qty	Weight (1 pce) kg
Front-mounted instantaneous auxiliary contact blocks							
AF09..S ... AF26..S	1	0	CA4-10S	1SBN010119R1010		1	0.016
	1	0	CA4-10S-T	1SBN010119T1010		10	0.016
	0	1	CA4-01S	1SBN010119R1001		1	0.016
	0	1	CA4-01S-T	1SBN010119T1001		10	0.016
AF09 ... AF16..-30-10S	2	2	CA4-22MS	1SBN010145R1122		1	0.060
	3	1	CA4-31MS	1SBN010145R1131		1	0.060
AF26..S	2	2	CA4-22ES	1SBN010145R1022		1	0.060
	3	1	CA4-31ES	1SBN010145R1031		1	0.060
	4	0	CA4-40ES	1SBN010145R1040		1	0.060
Side-mounted instantaneous auxiliary contact blocks							
AF09..S ... AF26..S	1	1	CAL4-11S	1SBN010130R1011		1	0.045
Front-mounted instantaneous auxiliary contact and A1/A2 coil terminal blocks							
AF09 ... AF16..-30-10S	1	1	CAT4-11MS	1SBN010153R1111		1	0.045
AF26..S	1	1	CAT4-11ES	1SBN010153R1011		1	0.045
AF09 ... AF16..-30-01S	1	1	CAT4-11US	1SBN010153R1311		1	0.045

Note: CAT4 not fittable on AF..Z contactors with DC control voltage 12…20 V DC.

Ordering details (1)

For contactors	Time delay range selected by switch	Delay type	Rated control circuit voltage Uc V 50/60 Hz or DC	Auxiliary contacts		Type	Order code		Pkg qty	Weight (1 pce) kg
Front-mounted electronic timer										
AF09..S ... AF26..S	0.1...1 s 1...10 s 10...100 s	ON-delay	24...240	1	1	TEF4S-ON	1SBN020113R1000		1	0.065
		OFF-delay	24...240	1	1	TEF4S-OFF	1SBN020115R1000		1	0.065

Ordering details (1)

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
Mechanical interlock unit					
AF09..S ... AF26..S	VM4	1SBN030105T1000		10	0.005

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

Additional coil terminal block					
AF09..S ... AF26..S	LDC4S	1SBN070157T1000		10	0.010
Protective covers					
All 1-stack contactors	BX4	1SBN110108T1000		10	0.006
For 4-pole CA4..S and 2-pole CAT4..S auxiliary contact blocks	BX4-CA	1SBN110109W1000		50	0.001

(1) See "Main accessory fitting details" table.
Note: Following accessories can be used on 3-pole contactors AF09 ... AF96 with screw terminals :
- 1 or 4-pole CA4...S auxiliary contact blocks
- 2-pole CAL4-11S auxiliary contact blocks
- TEF4S electronic timer
- LDC4S coil terminal block.

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AF09..S ... AF26..S 3-pole contactors - with spring terminals
Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC / DC operated	AF09..S	AF12..S	AF16..S	AF26..S
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1			
Rated operational voltage Ue max.		690 V			
Rated frequency (without derating)		50/60 Hz			
Conventional free-air thermal current Ith					
acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C		24 A	24 A	24 A	35 A
With conductor cross-sectional area		2.5 mm²	2.5 mm²	2.5 mm²	4 mm²
AC-1 Utilization category					
For air temperature close to contactor					
Ie / Rated operational current AC-1	**θ ≤ 40 °C**	22 A	24 A	24 A	35 A
Ue max. ≤ 690 V, 50/60 Hz	**θ ≤ 60 °C**	18 A	20 A	20 A	30 A
	θ ≤ 70 °C	15 A	16 A	16 A	25 A
With conductor cross-sectional area		2.5 mm²	2.5 mm²	2.5 mm²	4 mm²
AC-3 Utilization category					
For air temperature close to contactor θ ≤ 60 °C					
Ie / Max. rated operational current AC-3 (1)					
	220-230-240 V	9 A	12 A	18 A	26 A
M 3~ 3-phase motors	**380-400 V**	9 A	12 A	18 A	26 A
	415 V	9 A	12 A	18 A	26 A
	440 V	9 A	12 A	18 A	26 A
	500 V	9.5 A	12.5 A	15 A	23 A
	690 V	7 A	9 A	10.5 A	17 A
Rated operational power AC-3 (1)					
	220-230-240 V	2.2 kW	3 kW	4 kW	6.5 kW
M 3~ 1500 r.p.m. 50 Hz, 1800 r.p.m. 60 Hz, 3-phase motors	**380-400 V**	4 kW	5.5 kW	7.5 kW	11 kW
	415 V	4 kW	5.5 kW	9 kW	11 kW
	440 V	4 kW	5.5 kW	9 kW	15 kW
	500 V	5.5 kW	7.5 kW	9 kW	15 kW
	690 V	5.5 kW	7.5 kW	9 kW	15 kW
Rated making capacity AC-3		10 x Ie AC-3 acc. to IEC 60947-4-1			
Rated breaking capacity AC-3		8 x Ie AC-3 acc. to IEC 60947-4-1			
AC-8a Utilization category					
(without thermal overload relay - Ue 400 V 50/60 Hz - θ ≤ 40 °C)					
Ie / Rated operational current AC-8a		12 A	16 A	22 A	30 A
Rated operational power AC-8a		5.5 kW	7.5 kW	11 kW	15 kW
Short-circuit protection device for contactors					
without thermal overload relay - Motor protection excluded (2)					
Ue ≤ 500 V AC - gG type fuse		25 A	25 A	25 A	40 A
Rated short-time withstand current Icw	**1 s**	300 A	300 A	300 A	700 A
at 40 °C ambient temperature,	**10 s**	150 A	150 A	150 A	350 A
in free air from a cold state	**30 s**	80 A	80 A	80 A	225 A
	1 min	60 A	60 A	60 A	150 A
	15 min	24 A	24 A	24 A	35 A
Maximum breaking capacity					
cos φ = 0.45	**at 440 V**	250 A	250 A	250 A	500 A
	at 690 V	106 A	106 A	106 A	200 A
Power dissipation per pole	**Ie / AC-1**	0.9 W	1.1 W	1.1 W	1.8 W
	Ie / AC-3	0.15 W	0.3 W	0.6 W	1 W
Max. electrical switching frequency	**AC-1**	600 cycles/h			
	AC-3	1200 cycles/h			
	AC-2, AC-4	300 cycles/h			150 cycles/h

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

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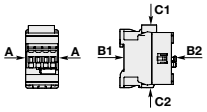
AF09..S ... AF26..S 3-pole contactors - with spring terminals
Technical data

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

Contactor types	AC / DC operated	AF09..S	AF12..S	AF16..S	AF26..S
Standards		UL 508, CSA C22.2 N°14			–
Max. operational voltage		690 V			
NEMA size		00	0	–	–
NEMA continuous amp rating	Thermal current	9 A	18 A	–	–
NEMA maximum horse power ratings 1-phase, 60 Hz	**115 V AC**	1/3 hp	1 hp	–	–
	230 V AC	1 hp	2 hp	–	–
NEMA maximum horse power ratings 3-phase, 60 Hz	**200 V AC**	1-1/2 hp	3 hp	–	–
	230 V AC	1-1/2 hp	3 hp	–	–
	460 V AC	2 hp	5 hp	–	–
	575 V AC	2 hp	5 hp	–	–
UL / CSA General use rating					
600 V AC		20 A	20 A	20 A	–
With conductor cross-sectional area		AWG 12	AWG 12	AWG 12	–
UL / CSA maximum 1-phase motor rating					
Full load current	**120 V AC**	13.8 A	16 A	16 A	–
	240 V AC	10 A	12 A	12 A	–
Horse power rating	**120 V AC**	3/4 hp	1 hp	1 hp	–
	240 V AC	1 1/2 hp	2 hp	2 hp	–
UL / CSA maximum 3-phase motor rating					
Full load current (1)	**200-208 V AC**	7.8 A	11 A	11 A	–
	220-240 V AC	6.8 A	9.6 A	15.2 A	–
	440-480 V AC	7.6 A	11 A	14 A	–
	550-600 V AC	9 A	11 A	11 A	–
Horse power rating (1)	**200-208 V AC**	2 hp	3 hp	3 hp	–
	220-240 V AC	2 hp	3 hp	5 hp	–
	440-480 V AC	5 hp	7.5 hp	10 hp	–
	550-600 V AC	7.5 hp	10 hp	10 hp	–
Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded					
Fuse rating		30	30	60	–
Fuse type, 600 V		J	J	J	–
Max. electrical switching frequency					
For general use		600 cycles/h	600 cycles/h	600 cycles/h	–
For motor use		1200 cycles/h	1200 cycles/h	1200 cycles/h	–

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

General technical data

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

(2) Environment B: all AF09 … AF38 contactors produced since week 08-2013. AF09 … AF38-..-..-12 (48...130 V 50/60 Hz-DC) compliant to environment A only.
For environment B: select AF09 … AF38-..-..-22.

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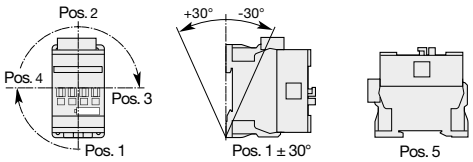
AF09..S ... AF26..S 3-pole contactors - with spring terminals
Technical data

Magnet system characteristics

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

Mounting characteristics and conditions for use

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

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AF09..S ... AF26..S 3-pole contactors - with spring terminals
Technical data

Connecting characteristics

Contactor types	AC / DC operated	AF09..S	AF12..S	AF16..S	AF26..S
Main terminals		Spring terminals			
Connection capacity (min. ... max.)					
Main conductors (poles)					
Rigid Solid (≤ 4 mm²)	**1 x**	1...2.5 mm²			1.5...4 mm²
	2 x	1...2.5 mm²			1.5...4 mm²
Flexible with non insulated ferrule	**1 x**	0.75...2.5 mm²			1.5...4 mm²
	2 x	0.75...2.5 mm²			1.5...4 mm²
Flexible with insulated ferrule	**1 x**	0.75...1.5 mm²			1.5...4 mm²
	2 x	0.75...1.5 mm²			1.5...4 mm²
Connection capacity acc. to UL/CSA	**1 or 2 x**	AWG 18...12			–
Stripping length		10 mm			14 mm
Auxiliary conductors (built-in auxiliary terminals + coil terminals)					
Rigid solid	**1 x**	1...2.5 mm²			
	2 x	1...2.5 mm²			
Flexible with non insulated ferrule	**1 x**	0.75...2.5 mm²			
	2 x	0.75...2.5 mm²			
Flexible with insulated ferrule	**1 x**	0.75...1.5 mm²			
	2 x	0.75...1.5 mm²			
Connection capacity acc. to UL/CSA	**1 or 2 x**	AWG 18...14			–
Stripping length		10 mm			
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529					
Main terminals		IP20			
Coil terminals		IP20			
Built-in auxiliary terminals		IP20			
Screwdriver type		Flat Ø 3.5			

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AF09..S ... AF26..S 3-pole contactors - with spring terminals
Technical data

Built-in auxiliary contacts according to IEC

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

Built-in auxiliary contacts according to UL / CSA

Contactor types	AC / DC operated	AF09..S	AF12..S	AF16..S	AF26..S
Max. operational voltage		600 V AC, 600 V DC			–
Pilot duty		A600, Q600			–
AC thermal rated current		10 A			–
AC maximum volt-ampere making		7200 VA			–
AC maximum volt-ampere breaking		720 VA			–
DC thermal rated current		2.5 A			–
DC maximum volt-ampere making-breaking		69 VA			–

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AF09..S ... AF26..S 3-pole contactors - with spring terminals
Contactor electrical durability and utilization categories

General

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

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

– Categories AC-1 and AC-3: Ic = Ie
– Category AC-2: Ic = 2.5 x Ie
– Category AC-4: Ic = 6 x Ie

Generally speaking Ic = m x Ie where m is a multiple of the load operational current.

On next pages, the curves corresponding to categories AC-1, AC-3, AC-2 and AC-4 represent the electrical durability variation of standard contactors in relation to the breaking current Ic.

Electrical durability is expressed in millions of operating cycles.

Curve utilization mode

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

- Note the characteristics of the load to be controlled:
– Operational voltage ..... Ue
– Current normally drawn ..... Ie (Ue / Ie / kW relation for motors, see "Motor rated operational powers and currents").
– Utilization category ..... AC-1, AC-2, AC-3 or AC-4
– Breaking current ..... Ic = Ie for AC-1 and for AC-3 ; Ic = 2.5 x Ie for AC-2 ; Ic = 6 x Ie 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 (Ic ; N).

Electrical durability forecast and contactor selection for mixed duty motor control: AC-3 (Ic = Ie) type switching off while "motor running" and, occasionally, AC-4 (Ic = 6 x Ie) type switching off while "motor accelerating"

- Note the characteristics of the motor to be controlled:
– Operational voltage ..... Ue
– Current normally drawn while "motor running" ..... Ie (Ue / Ie / kW relation for motors, see "Motor rated operational powers and currents")
– Breaking current for AC-3 ..... Ic = Ie
– Breaking current for AC-4 while "motor accelerating" ..... Ic = 6 x Ie
– 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 (Ue / Ie) 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 Ic = Ie (AC-3)
– The number of operating cycles B for Ic = 6 x Ie (AC-4)
- Calculate the estimated number of cycles N’ (N’ is always below A)

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

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

Case of uninterrupted duty

For uninterrupted duty, some verifications of preventing maintenance are necessary to check the functionality of the concerned product (consult us). The combinated effect of environmental conditions and the proper temperature of the product may require some disposals. As a matter of fact, for this duty, the use duration prevails over the number of operating cycles.

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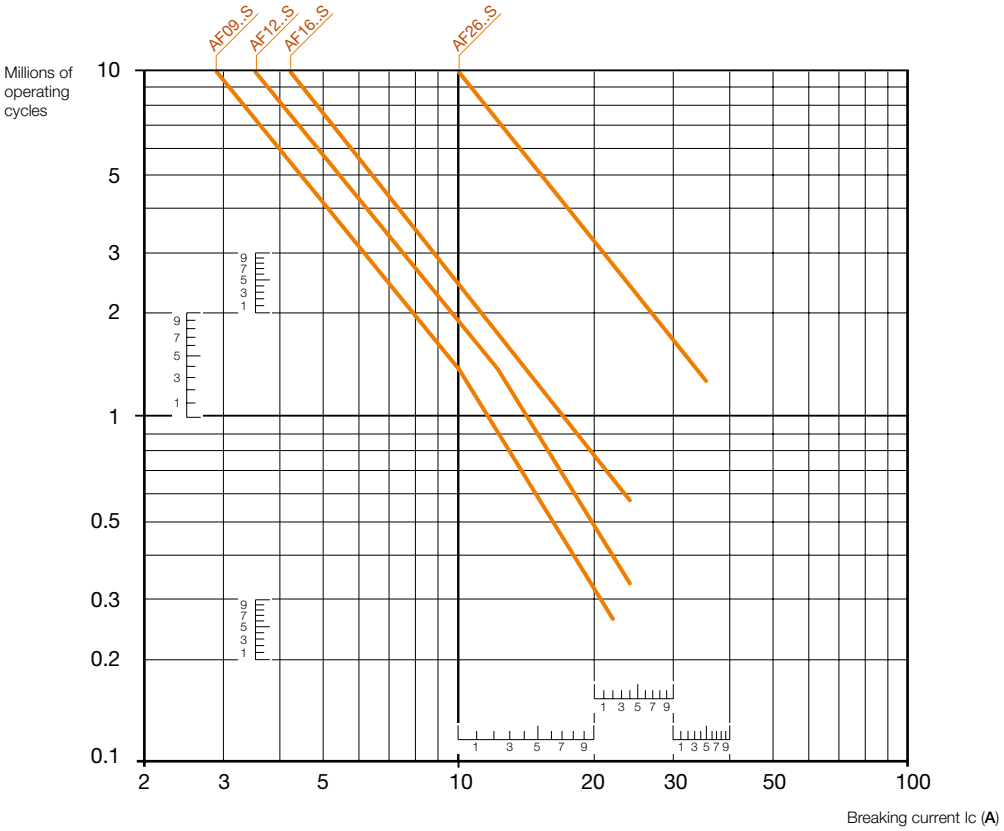
AF09..S ... AF26..S 3-pole contactors - with spring terminals
Electrical durability

Electrical durability for AC-1 utilization category - Ue ≤ 690 V. Ambient temperature ≤ 60 °C

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

Maximum electrical switching frequency: see "Technical data".



AF09..S ... AF26..S 3-pole contactors AC-1 electrical durability

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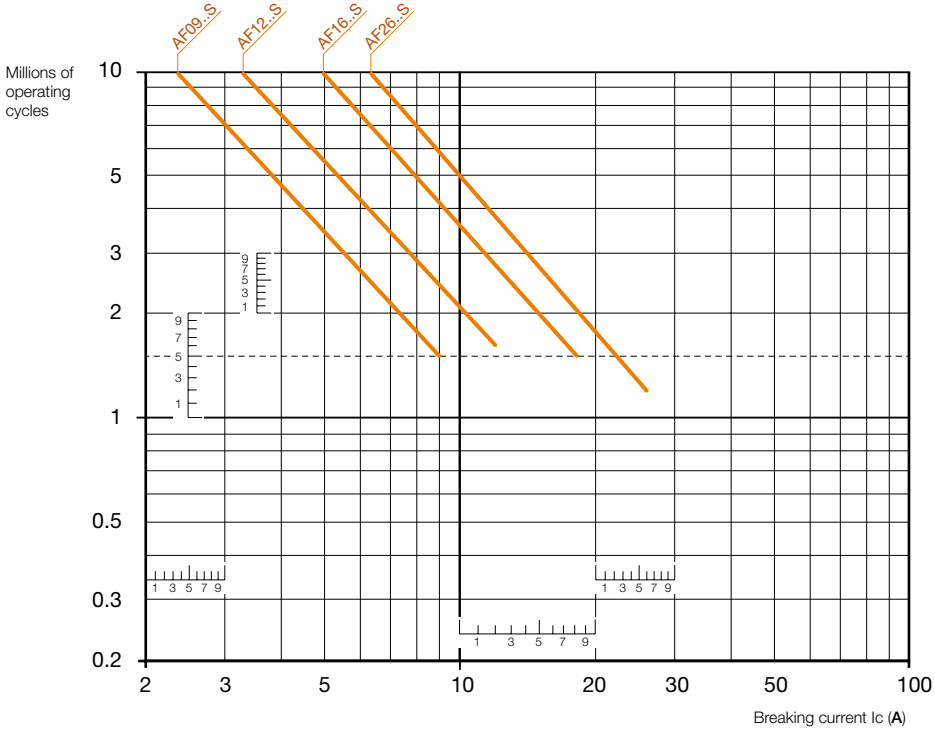
AF09..S ... AF26..S 3-pole contactors - with spring terminals
Electrical durability

Electrical durability for AC-3 utilization category

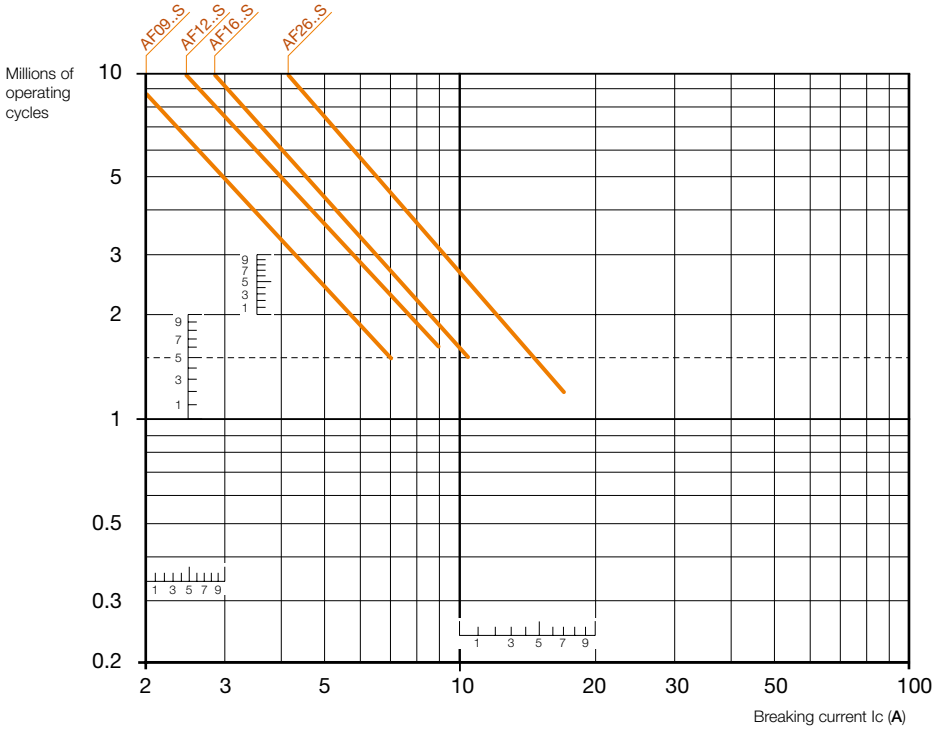
Switching cage motors: starting and switching off running motors. The breaking current Ic for AC-3 is equal to the rated operational current Ie (Ie = motor full load current). Maximum electrical switching frequency: see "Technical data".

AC-3 - Ue ≤ 440 V - Ambient temperature ≤ 60 °C



AF09..S ... AF26..S 3-pole contactors AC-3 electrical durability for Ue ≤ 440 V

AC-3 - 440 V < Ue ≤ 690 V - Ambient temperature ≤ 60 °C



AF09..S ... AF26..S 3-pole contactors AC-3 electrical durability for 440 V < Ue ≤ 690 V

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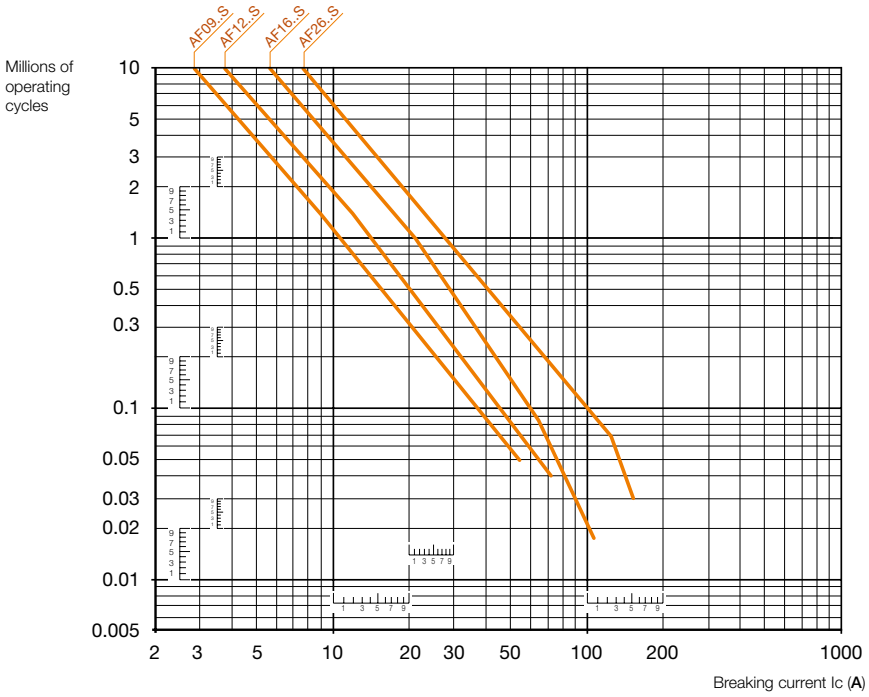
AF09..S ... AF26..S 3-pole contactors - with spring terminals
Electrical durability

Electrical durability for AC-2 or AC-4 utilization category

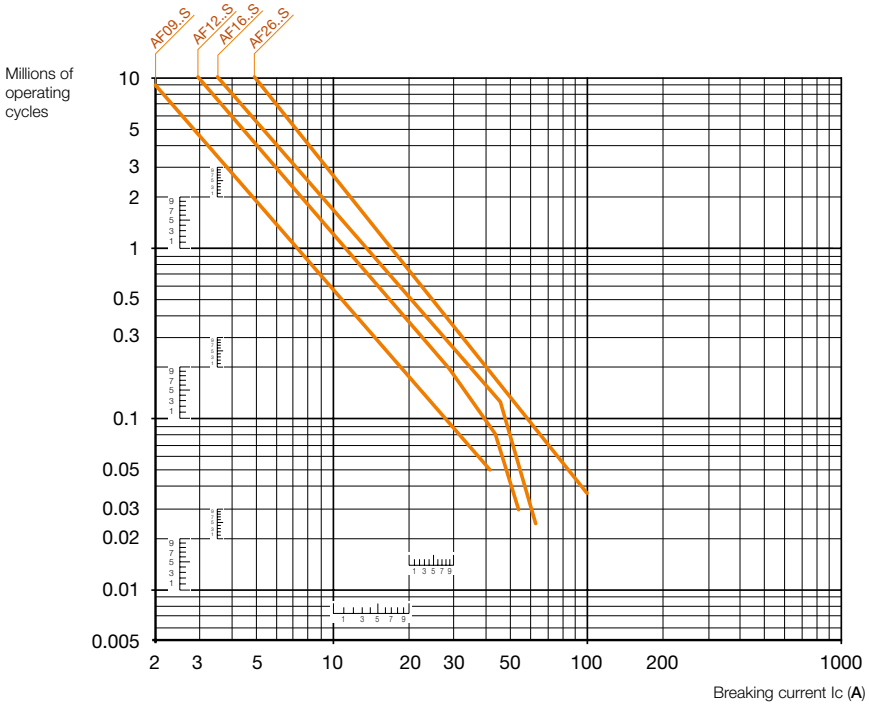
Switching cage motors: starting, reverse operation and step-by-step operation. The breaking current Ic is equal to 2.5 x Ie for AC-2 and 6 x Ie for AC-4, keeping in mind that Ie is the motor rated operational current (Ie = motor full-load current).
Maximum electrical switching frequency: see "Technical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

AC-2 or AC-4 - Ue ≤ 440 V - Ambient temperature ≤ 60 °C



AF09..S ... AF26..S 3-pole contactors AC-2 or AC-4 electrical durability for 440 V < Ue ≤ 690 V

AC-2 or AC-4 - 440 V < Ue ≤ 690 V - Ambient temperature ≤ 60 °C



AF09..S ... AF26..S 3-pole contactors AC-2 or AC-4 electrical durability for 440 V < Ue ≤ 690 V

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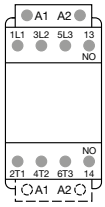
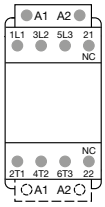
AF09..S ... AF26..S 3-pole contactors - with spring terminals
Terminal marking and positioning

AF09..S ... AF26..S contactors - AC / DC operated

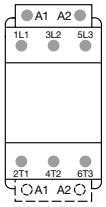
Standard devices without addition of auxiliary contacts



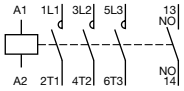
AF09 ... AF16..-30-10S



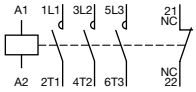
AF09 ... AF16..-30-01S



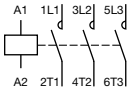
AF26..-30-00S



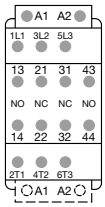
AF09 ... AF16..-30-10S



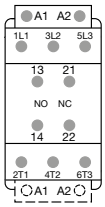
AF09 ... AF16..-30-01S



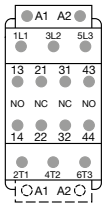
AF26..-30-00S



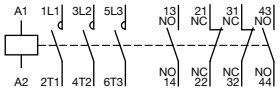
AF09 ... AF16..-30-22S



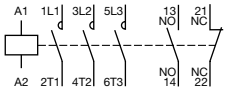
AF26..-30-11S



AF26..-30-22S

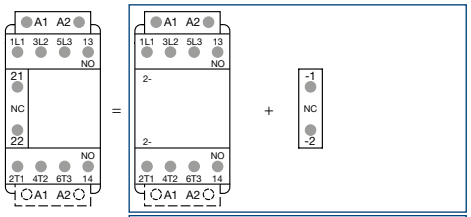


AF09 ... AF26..-30-22S

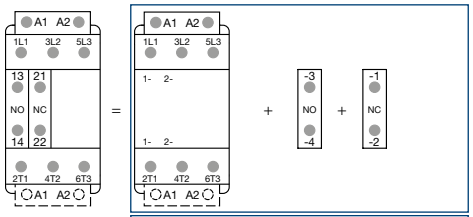


AF26..-30-11S

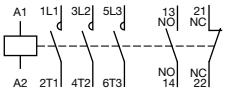
Other possible contact combinations with auxiliary contacts added by the user



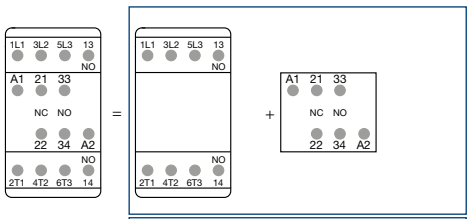
Combination 11 = AF09 ... AF16..-30-10S + CA4-01S



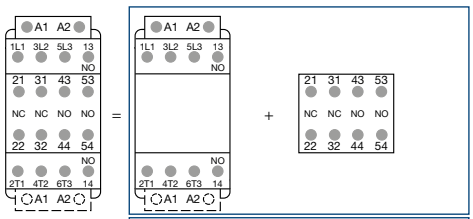
Combination 11 = AF26..-30-00S + CA4-10S + CA4-01S



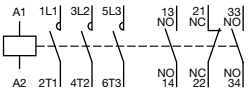
Combination 11



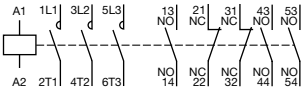
Combination 21 = AF09 ... AF16..-30-10S + CAT4-11MS



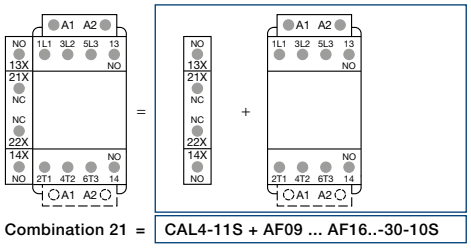
Combination 32 = AF09 ... AF16..-30-10S + CA4-22MS



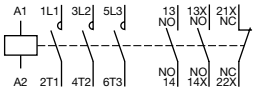
Combination 21



Combination 32



Combination 21 = CAL4-11S + AF09 ... AF16..-30-10S



Combination 21

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

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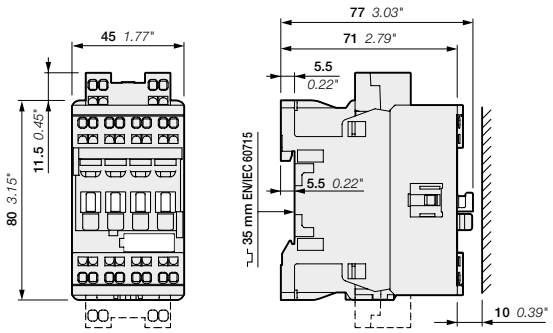
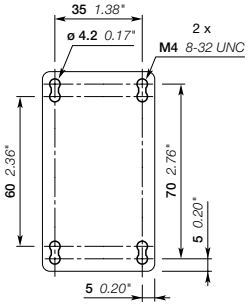
AF09..S ... AF16..S 3-pole contactors - with spring terminals

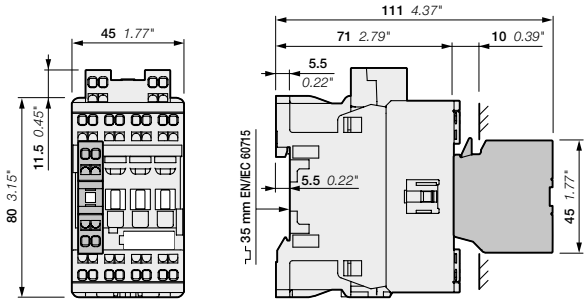
Main dimensions mm, *inches*



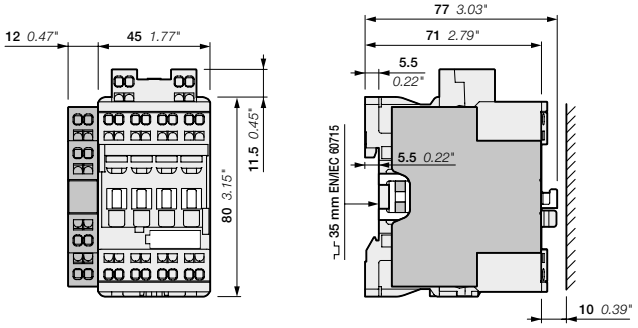


AF09..S, AF12..S, AF16..S

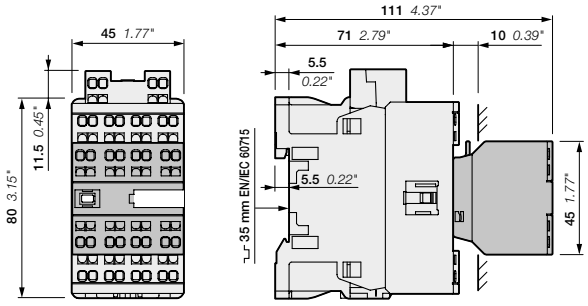
6



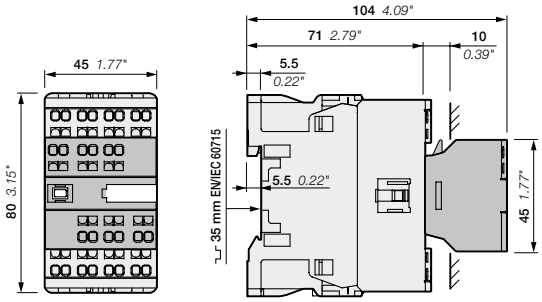
AF09..S, AF12..S, AF16..S
+ CA4..S 1-pole auxiliary contact block



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



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



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

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

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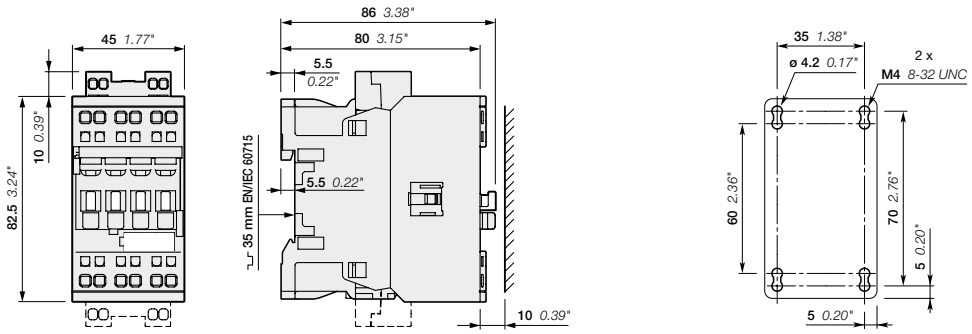
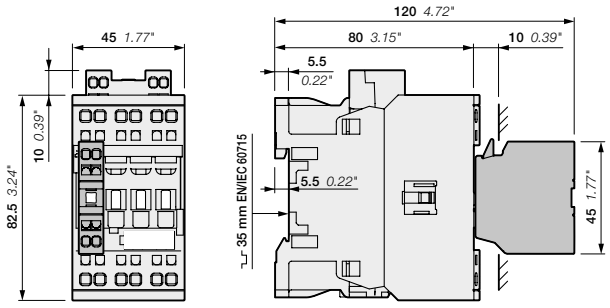
AF26..S 3-pole contactors - with spring terminals

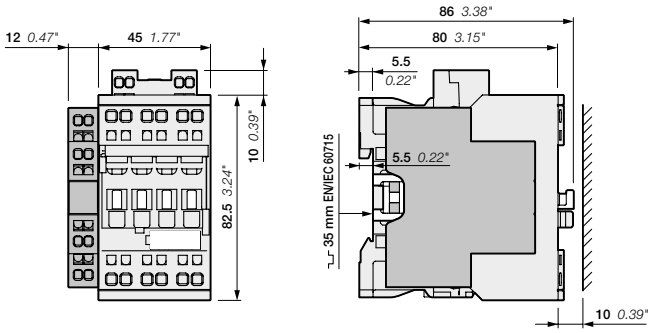
Main dimensions mm, *inches*



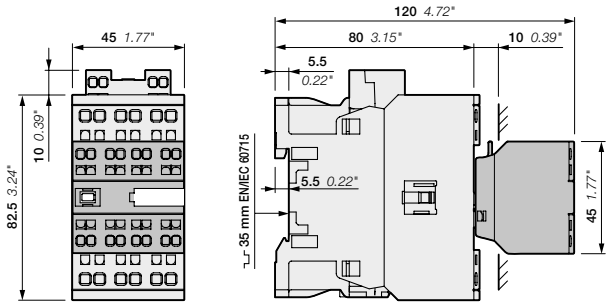
AF26..S



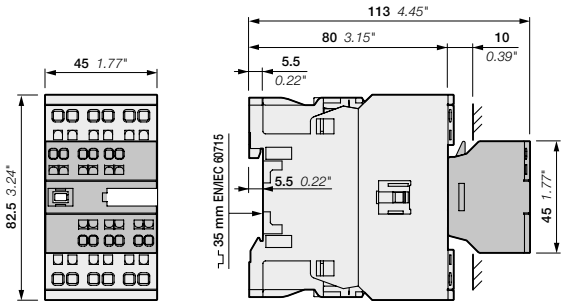
AF26..S
+ CA4..S 1-pole auxiliary contact block



AF26..S
+ CAL4-11S 2-pole auxiliary contact block



AF26..S
+ CA4..S 4-pole auxiliary contact block



AF26..S
+ CAT4..S 2-pole auxiliary contact and coil terminal block

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

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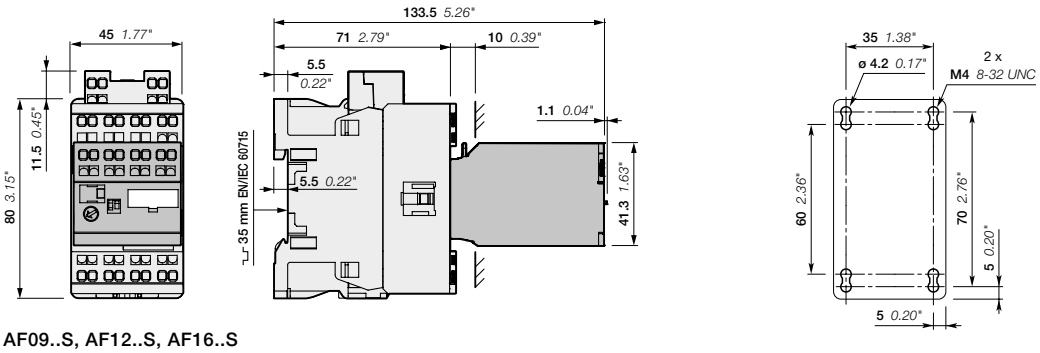
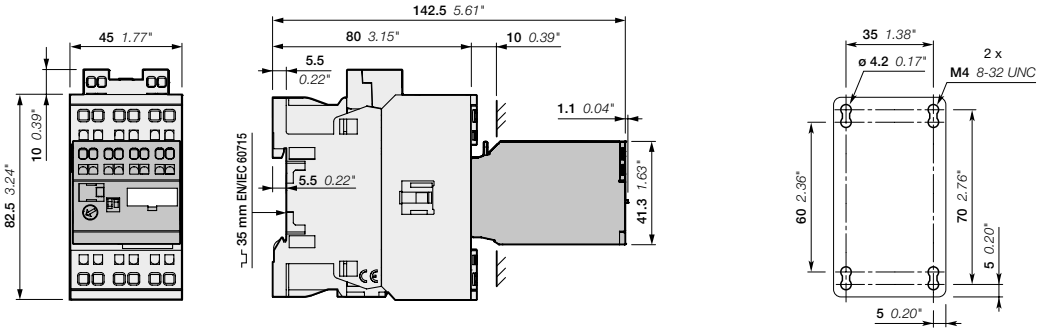
AF09..S ... AF26..S 3-pole contactors - with spring terminals

Main dimensions mm, *inches*



AF09..S, AF12..S, AF16..S
+ TEF4S

6



AF26..S
+ TEF4S

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

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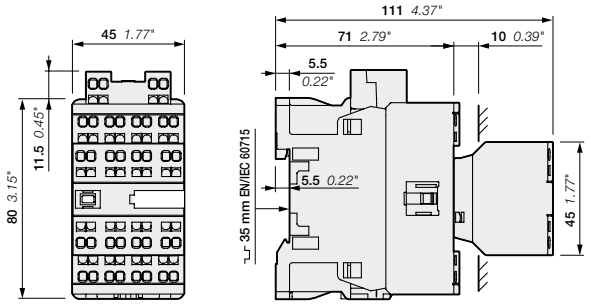
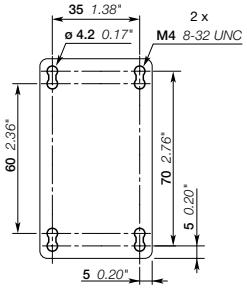
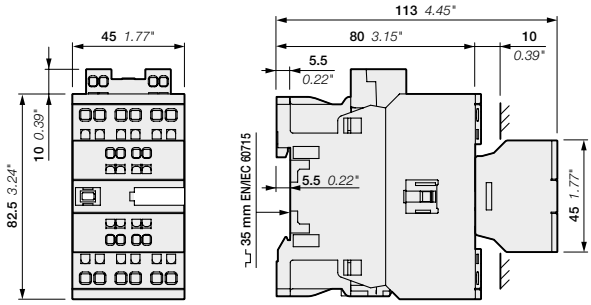
AF09..S ... AF26..S 2-stack 3-pole contactors - with spring terminal

Main dimensions mm, *inches*

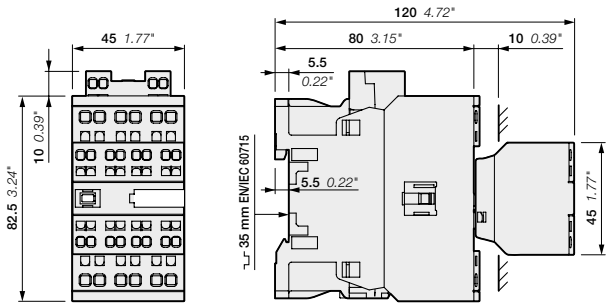




AF09, AF12, AF16..-30-22S



AF26..-30-11S

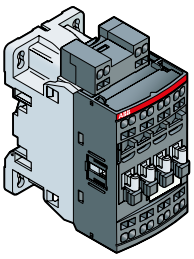


AF26..-30-22S

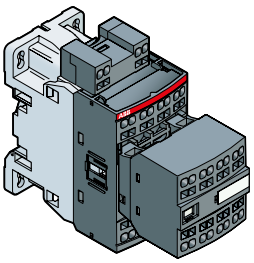
Note: contactor lateral distance to grounded component 2 mm 0.08" min.

1SBC101665S0201

Contactor relays - with spring terminals
Main accessories



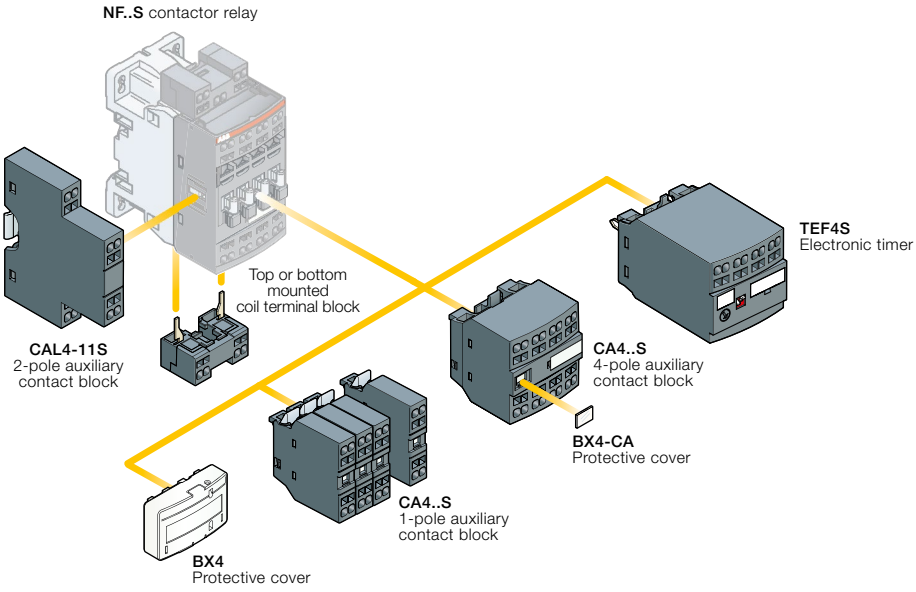
NF22ES, NF31ES and NF40ES
4-pole contactor relays



NF44ES, NF53ES, NF62ES, NF71ES and NF80ES
8-pole contactor relays

6

Main accessories for contactor relays



1SBC101678S0201

Contactor relays - with spring terminals

Spring terminals

AC / DC Control voltage	NF22ES	NF31ES	NF40ES
	2N.O. + 2N.C.	3N.O. + 1N.C.	4N.O.

AC / DC Control supply	NF44ES	NF53ES	NF62ES	NF71ES	NF80ES
	4N.O. + 4N.C.	5N.O. + 3N.C.	6N.O. + 2N.C.	7N.O. + 1N.C.	8N.O.

Control circuit switching

IEC	**AC-15** Rated operational current	**240 V**	4 A
		400 V	3 A
		690 V	2 A
	DC-13 Rated operational current	**24 V**	6 A / 144 W
		250 V	0.27 A / 68 W
UL/CSA	**Pilot Duty**		A600, Q600

Main accessories

Auxiliary contact blocks	Front mounting		1-pole **CA4-10S** or **CA4-01S** 4-pole **CA4..S**
	Side mounting		2-pole **CAL4-11S**
Additional coil terminal block			**LDC4S**
Protective covers			**BX4** For all 1-stack contactor relays **BX4-CA** For 4-pole CA4..S auxiliary contact blocks

1SBC101678S0201

NF..S 4-pole contactor relays - with spring terminals
AC / DC operated

NF22ES

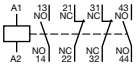
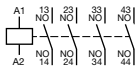
Description

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

These contactors relays are of the block type design with:

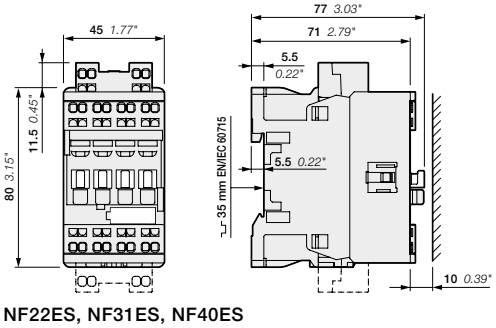
– 4 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
  - can manage large control voltage variations
  - only 4 control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

Ordering details

Number of contacts	Rated control circuit voltage Uc min. ... Uc max. V 50/60 Hz	V DC		Type	Order code		Weight Pkg (1 pce) kg
	24...60	-	(1)	NF22ES-41	1SBH137004R4122		0.270
	48...130	48...130		NF22ES-12	1SBH137004R1222		0.270
	100...250	100...250		NF22ES-13	1SBH137004R1322		0.270
	250...500	250...500		NF22ES-14	1SBH137004R1422		0.310
	24...60	-	(1)	NF31ES-41	1SBH137004R4131		0.270
	48...130	48...130		NF31ES-12	1SBH137004R1231		0.270
	100...250	100...250		NF31ES-13	1SBH137004R1331		0.270
	250...500	250...500		NF31ES-14	1SBH137004R1431		0.310
	24...60	-	(1)	NF40ES-41	1SBH137004R4140		0.270
	48...130	48...130		NF40ES-12	1SBH137004R1240		0.270
	100...250	100...250		NF40ES-13	1SBH137004R1340		0.270
	250...500	250...500		NF40ES-14	1SBH137004R1440		0.310

(1) For 24...60 V 50/60 Hz - 20...60 V DC, use NF..ES-11 (see voltage code table).
NF..ES-11 not suitable for direct control by PLC-output.

Main dimensions mm, *inches*



NF22ES, NF31ES, NF40ES

1SBC101691S0201 - Rev. A

NFZ..S 4-pole contactor relays - with spring terminals
AC / DC operated - low consumption

NFZ22ES

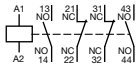
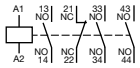
Description

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

These contactors relays are of the block type design with:

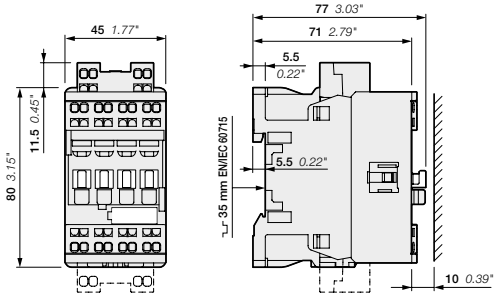
– 4 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
  - can manage large control voltage variations
  - only 4 control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

Ordering details

Number of contacts	Rated control circuit voltage Uc min. ... Uc max.		Type	Order code		Weight Pkg (1 pce)
	V 50/60 Hz	V DC				kg
	–	12...20	NFZ22ES-20	1SBH136004R2022		0.310
	24...60	20...60	NFZ22ES-21	1SBH136004R2122		0.310
	48...130	48...130	NFZ22ES-22	1SBH136004R2222		0.310
	100...250	100...250	NFZ22ES-23	1SBH136004R2322		0.310
	–	12...20	NFZ31ES-20	1SBH136004R2031		0.310
	24...60	20...60	NFZ31ES-21	1SBH136004R2131		0.310
	48...130	48...130	NFZ31ES-22	1SBH136004R2231		0.310
	100...250	100...250	NFZ31ES-23	1SBH136004R2331		0.310
	–	12...20	NFZ40ES-20	1SBH136004R2040		0.310
	24...60	20...60	NFZ40ES-21	1SBH136004R2140		0.310
	48...130	48...130	NFZ40ES-22	1SBH136004R2240		0.310
	100...250	100...250	NFZ40ES-23	1SBH136004R2340		0.310

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

Main dimensions mm, *inches*



NFZ22ES, NFZ31ES, NFZ40ES

1SBC101712S0201 - Rev. A

NF..S 8-pole contactor relays - with spring terminals
AC / DC operated

NF44ES

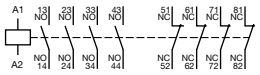
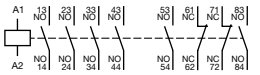
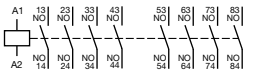
Description

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

These contactors relays are of the block type design with:

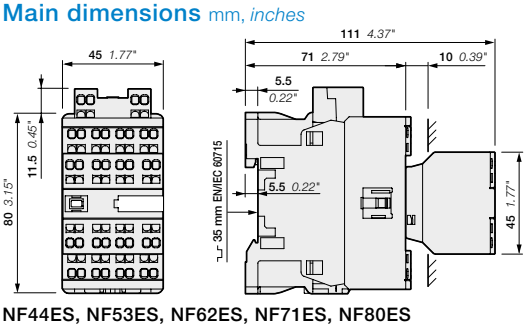
– 8 poles with a permanently fixed 4-pole auxiliary contact block. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
  - can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

Ordering details

Number of contacts 1st stack	2nd stack	Rated control circuit voltage Uc min. ... Uc max. V 50/60 Hz	V DC		Type	Order code		Weight Pkg (1 pce) kg
		24...60	-	(1)	NF44ES-41	1SBH137004R4144		0.320
		48...130	48...130		NF44ES-12	1SBH137004R1244		0.320
		100...250	100...250		NF44ES-13	1SBH137004R1344		0.320
		250...500	250...500		NF44ES-14	1SBH137004R1444		0.360
		24...60	-	(1)	NF53ES-41	1SBH137004R4153		0.320
		48...130	48...130		NF53ES-12	1SBH137004R1253		0.320
		100...250	100...250		NF53ES-13	1SBH137004R1353		0.320
		250...500	250...500		NF53ES-14	1SBH137004R1453		0.360
		24...60	-	(1)	NF62ES-41	1SBH137004R4162		0.320
		48...130	48...130		NF62ES-12	1SBH137004R1262		0.320
		100...250	100...250		NF62ES-13	1SBH137004R1362		0.320
		250...500	250...500		NF62ES-14	1SBH137004R1462		0.360
		24...60	-	(1)	NF71ES-41	1SBH137004R4171		0.320
		48...130	48...130		NF71ES-12	1SBH137004R1271		0.320
		100...250	100...250		NF71ES-13	1SBH137004R1371		0.320
		250...500	250...500		NF71ES-14	1SBH137004R1471		0.360
		24...60	-	(1)	NF80ES-41	1SBH137004R4180		0.320
		48...130	48...130		NF80ES-12	1SBH137004R1280		0.320
		100...250	100...250		NF80ES-13	1SBH137004R1380		0.320
		250...500	250...500		NF80ES-14	1SBH137004R1480		0.360

(1) For 24...60 V 50/60 Hz - 20...60 V DC, use NF..ES-11 (see voltage code table).
NF..ES-11 not suitable for direct control by PLC-output.

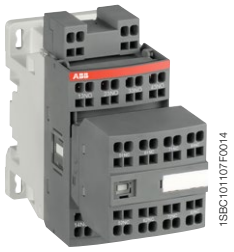
Main dimensions mm, *inches*



NF44ES, NF53ES, NF62ES, NF71ES, NF80ES

1SBC101713S0201 - Rev. A

NFZ..S 8-pole contactor relays - with spring terminals
AC / DC operated - low consumption



NFZ44ES

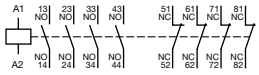
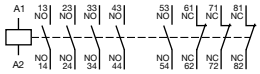
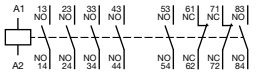
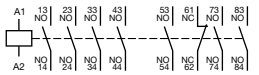
Description

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

These contactors relays are of the block type design with:

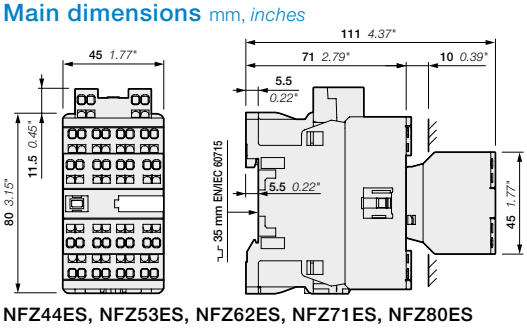
– 8 poles with a permanently fixed 4-pole auxiliary contact block. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
  - can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

Ordering details

Number of contacts 1st stack	2nd stack	Rated control circuit voltage Uc min. ... Uc max. V 50/60 Hz	V DC	Type	Order code		Weight Pkg (1 pce) kg
		–	12...20	NFZ44ES-20	1SBH136004R2044		0.360
		24...60	20...60	NFZ44ES-21	1SBH136004R2144		0.360
		48...130	48...130	NFZ44ES-22	1SBH136004R2244		0.360
		100...250	100...250	NFZ44ES-23	1SBH136004R2344		0.360
		–	12...20	NFZ53ES-20	1SBH136004R2053		0.360
		24...60	20...60	NFZ53ES-21	1SBH136004R2153		0.360
		48...130	48...130	NFZ53ES-22	1SBH136004R2253		0.360
		100...250	100...250	NFZ53ES-23	1SBH136004R2353		0.360
		–	12...20	NFZ62ES-20	1SBH136004R2062		0.360
		24...60	20...60	NFZ62ES-21	1SBH136004R2162		0.360
		48...130	48...130	NFZ62ES-22	1SBH136004R2262		0.360
		100...250	100...250	NFZ62ES-23	1SBH136004R2362		0.360
		–	12...20	NFZ71ES-20	1SBH136004R2071		0.360
		24...60	20...60	NFZ71ES-21	1SBH136004R2171		0.360
		48...130	48...130	NFZ71ES-22	1SBH136004R2271		0.360
		100...250	100...250	NFZ71ES-23	1SBH136004R2371		0.360
		–	12...20	NFZ80ES-20	1SBH136004R2080		0.360
		24...60	20...60	NFZ80ES-21	1SBH136004R2180		0.360
		48...130	48...130	NFZ80ES-22	1SBH136004R2280		0.360
		100...250	100...250	NFZ80ES-23	1SBH136004R2380		0.360

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

Main dimensions mm, *inches*

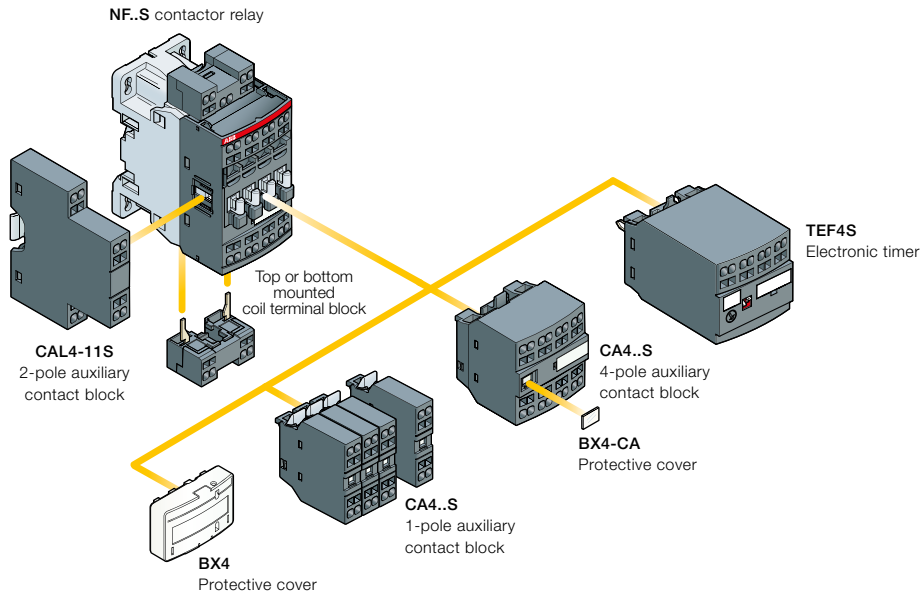


NFZ44ES, NFZ53ES, NFZ62ES, NFZ71ES, NFZ80ES

1SBC101714S0201 - Rev. A

NF..S contactor relays - with spring terminals
Main accessories

Contactor relays and main accessories (other accessories available)



6

Main accessory fitting details

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

Contactor relay types	Main poles	Front-mounted accessories							Side-mounted accessories		
		Auxiliary contact blocks			Electronic timer				Auxiliary contact blocks		
		1-pole CA4..S		4-pole CA4..S	TEF4S				Left side 2-pole CAL4-11S		Right side
		Max. add-on N.C. auxiliary contacts: 3 N.C. max. on positions 1, 2, 3, 4 and 2 N.C. max. on positions 1 ±30°, 5									
NF..	2 2 ES	4 max.	or	1	or	1	+		1		–
	3 1 ES	2 max.		–	or	1	+		1	+	1
		Max. add-on N.C. auxiliary contacts: 4 N.C. max. on positions 1, 2, 3, 4 and 3 N.C. max. on positions 1 ±30°, 5									
NF..	4 0 ES	4 max.	or	1	or	1	+		1		–
		2 max.		–	or	1	+		1	+	1
NF..	4 4 ES	–		–		–			1		–
	5 3 ES										
	6 2 ES										
	7 1 ES										
	8 0 ES										

1SBC101666S0201

NF..S contactor relays - with spring terminals
Main accessories

CA4-10S

CA4-22NS

CAL4-11S

TEF4S-OFF

LDC4S

BX4

BX4-CA

Ordering details (1)

For contactor relays	Auxiliary contacts		Type	Order code		Pkg qty	Weight (1 pce) kg
Front-mounted instantaneous auxiliary contact blocks							
NF..S	1	0	CA4-10S	1SBN010119R1010		1	0.016
	1	0	CA4-10S-T	1SBN010119T1010		10	0.016
	0	1	CA4-01S	1SBN010119R1001		1	0.016
	0	1	CA4-01S-T	1SBN010119T1001		10	0.016
NF..S	2	2	CA4-22NS	1SBN010145R1222		1	0.060
	3	1	CA4-31NS	1SBN010145R1231		1	0.060
	4	0	CA4-40NS	1SBN010145R1240		1	0.060
Side-mounted instantaneous auxiliary contact blocks							
NF..S	1	1	CAL4-11S	1SBN010130R1011		1	0.045

Ordering details (1)

For contactor relays	Time delay range selected by switch	Delay type	Rated control circuit voltage Uc V 50/60 Hz or DC	Auxiliary contacts		Type	Order code		Pkg qty	Weight (1 pce) kg
Front-mounted electronic timer										
NF..S	0.1...1 s 1...10 s 10...100 s	ON-delay	24...240	1	1	TEF4S-ON	1SBN020113R1000		1	0.065
		OFF-delay	24...240	1	1	TEF4S-OFF	1SBN020115R1000		1	0.065

Ordering details (1)

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
Additional coil terminal block					
NF..S	LDC4S	1SBN070157T1000		10	0.010
Protective covers					
All 1-stack contactor relays	BX4	1SBN110108T1000		10	0.006
For 4-pole CA4..S auxiliary contact blocks	BX4-CA	1SBN110109W1000		50	0.001

(1) See "Main accessory fitting details" table.

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NF..S contactor relays - with spring terminals
Technical data

Contact utilization characteristics according to IEC

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

Contact utilization characteristics according to UL / CSA

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

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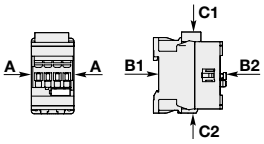
NF..S contactor relays - with spring terminals
Technical data

General technical data

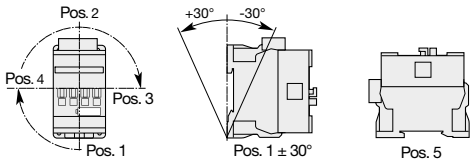
Contactor relay types	**AC / DC operated**	**NF..S**
Rated insulation voltage Ui		
acc. to IEC 60947-5-1		690 V
acc. to UL/CSA		600 V
Rated impulse withstand voltage Uimp.		6 kV
Electromagnetic compatibility		Devices complying with IEC 60947-1 / EN 60947-1 - Environment A and B (1)
Ambient air temperature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

(1) Environment B: all NF contactor relays produced since week 08-2013. NF..E-12 (48...130 V 50/60 Hz-DC) compliant to environment A only.
For environment B: select NF..E-22.

Magnet system characteristics

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

Mounting characteristics

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

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NF..S contactor relays - with spring terminals
Technical data

Connecting characteristics

Contactor relay types	AC / DC operated	NF..S
Main terminals		Spring terminals
Connection capacity (min. ... max.)		
Pole and coil terminals		
Rigid	**1 x**	1...2.5 mm²
	2 x	1...2.5 mm²
Flexible with non insulated ferrule	**1 x**	0.75...2.5 mm²
	2 x	0.75...2.5 mm²
Flexible with insulated ferrule	**1 x**	0.75...1.5 mm²
	2 x	0.75...1.5 mm²
Connection capacity acc. to UL/CSA	**1 or 2 x**	AWG 18...12
Stripping length		10 mm
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		
All terminals		IP20
Screwdriver type		Flat Ø 3.5

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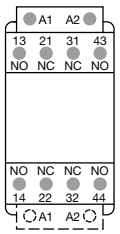
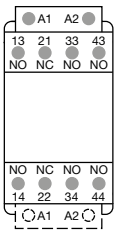
NF..S contactor relays - with spring terminals
Terminal marking and positioning

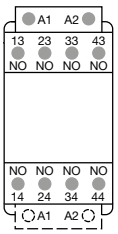
Standard devices without addition of auxiliary contacts



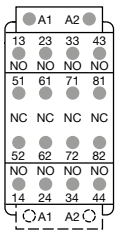
NF..22ES



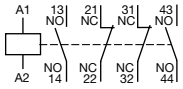
NF..31ES



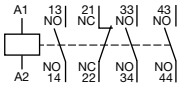
NF..40ES



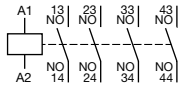
NF..44ES



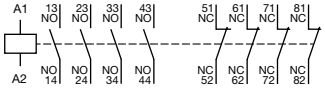
NF..22ES



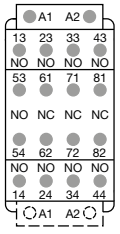
NF..31ES



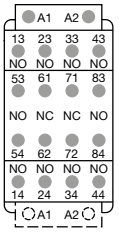
NF..40ES



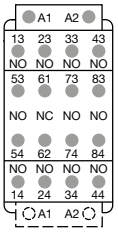
NF..44ES



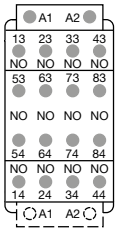
NF..53ES



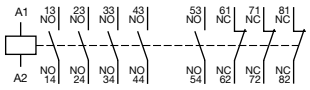
NF..62ES



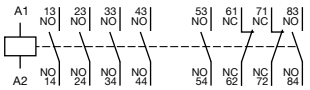
NF..71ES



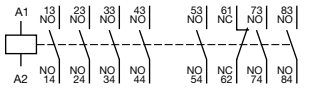
NF..80ES



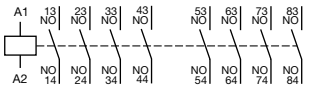
NF..53ES



NF..62ES



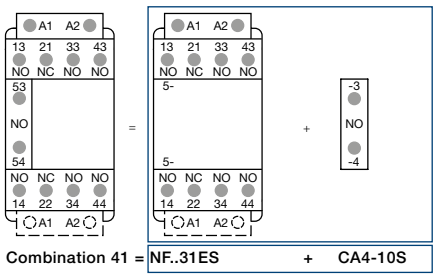
NF..71ES



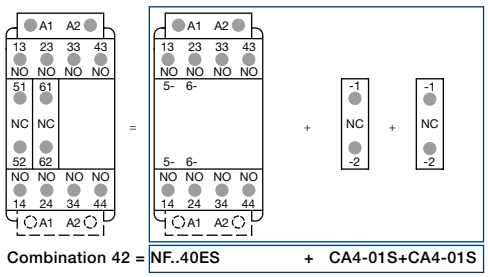
NF..80ES

6

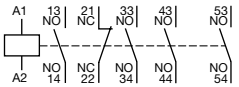
Other possible contact combinations with auxiliary contacts added by the user



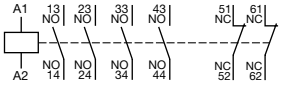
Combination 41 = NF..31ES + CA4-10S



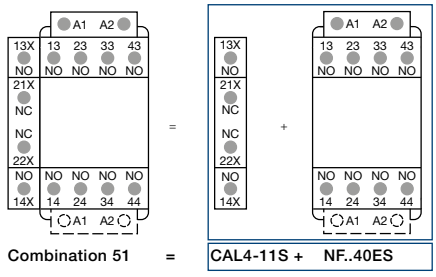
Combination 42 = NF..40ES + CA4-01S+CA4-01S



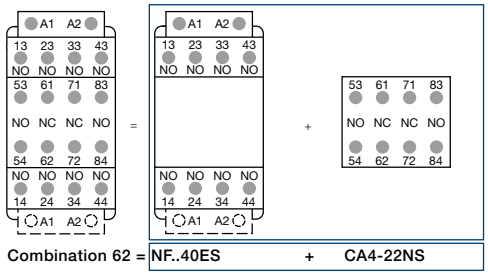
Combination 41E



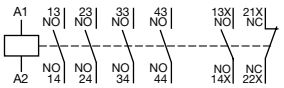
Combination 42E



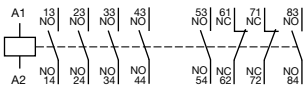
Combination 51 = CAL4-11S + NF..40ES



Combination 62 = NF..40ES + CA4-22NS



Combination 51E



Combination 62E

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

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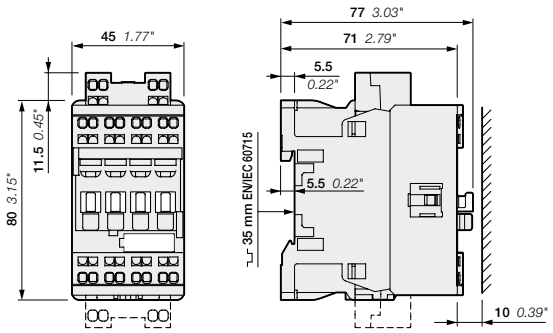
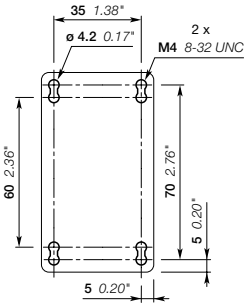
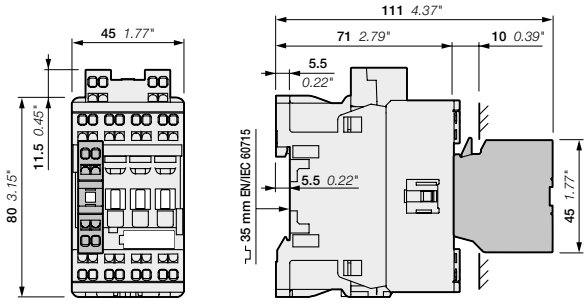
NF..S contactor relays - with spring terminals

Main dimensions mm, *inches*

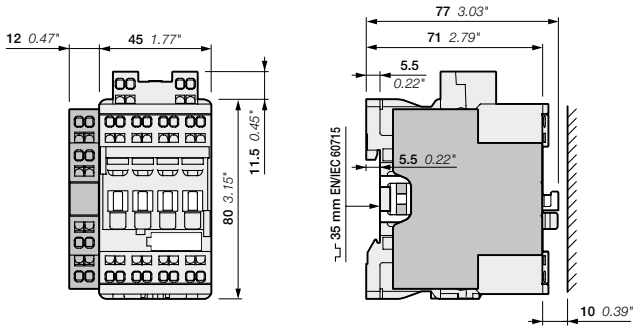




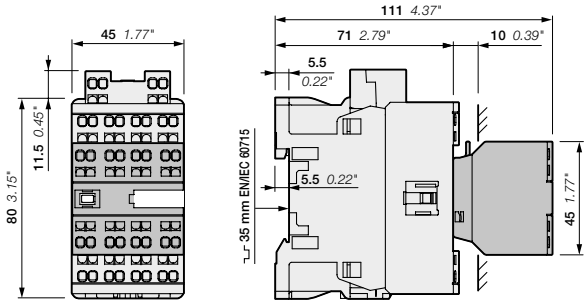
NF..22ES, NF..31ES, NF..40ES



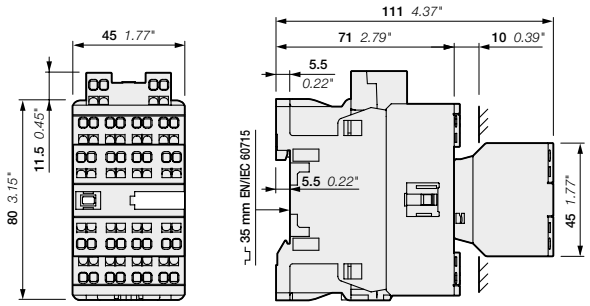
NF..22ES, NF..31ES, NF..40ES
+ CA4..S 1-pole auxiliary contact block



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



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



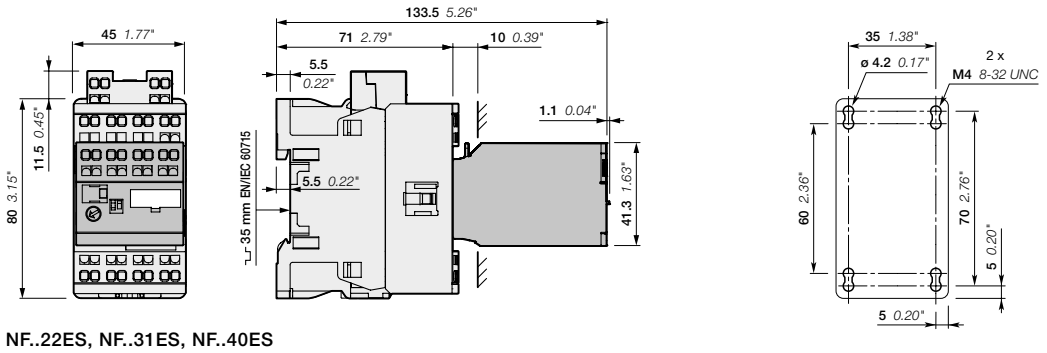
NF..44ES, NF..53ES, NF..62ES, NF..71ES, NF..80ES

Note: Contactor relay lateral distance to grounded component 2 mm *0.08"* min.

1SBC101668S0201

NF..S contactor relays - with spring terminals

Main dimensions mm, *inches*



NF..22ES, NF..31ES, NF..40ES
+ TEF4S

Note: Contactor relay lateral distance to grounded component 2 mm *0.08*" min.

1SBC101704S0201

Auxiliary contact blocks - with spring terminals

CA4-10S

CAL4-11S

CA4-22MS

CAT4-11ES

Description

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

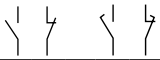
Types of auxiliary contact blocks for front mounting:

– CA4..S 1 or 4-pole block, with instantaneous N.O., N.C. contacts
– CAT4..S 2-pole block, front-mounted, instantaneous N.O. + N.C. contacts with A1 / A2 coil terminal connection on front face
– CAL4..S 2-pole block, with instantaneous N.O. + N.C. contacts clipped onto the right and/or left side of the contactors.

Select the type of 2 or 4-pole auxiliary contact blocks CAT4 or CA4 (-..ES, -..MS, -..US or -..NS) according to the device type for compliance with the standard requirements (see terminal and marking positioning).

The auxiliary contact blocks are equipped with spring terminals protected against accidental direct contact and bear the corresponding function marking.

Ordering details (1)

For contactors	Auxiliary contacts				Type	Order code		Pkg qty	Weight (1 pce)
									kg
Front-mounted instantaneous auxiliary contact blocks									
AF09..S ... AF38..S 4-pole NF..S	1	0	–	–	CA4-10S	1SBN010119R1010		1	0.016
	1	0	–	–	CA4-10S-T	1SBN010119T1010		10	0.016
	0	1	–	–	CA4-01S	1SBN010119R1001		1	0.016
	0	1	–	–	CA4-01S-T	1SBN010119T1001		10	0.016
AF09 ... AF16..-30-10S	2	2	–	–	CA4-22MS	1SBN010145R1122		1	0.060
	3	1	–	–	CA4-31MS	1SBN010145R1131		1	0.060
AF26..S	2	2	–	–	CA4-22ES	1SBN010145R1022		1	0.060
	3	1	–	–	CA4-31ES	1SBN010145R1031		1	0.060
	4	0	–	–	CA4-40ES	1SBN010145R1040		1	0.060
4-pole NF..S	2	2	–	–	CA4-22NS	1SBN010145R1222		1	0.060
	3	1	–	–	CA4-31NS	1SBN010145R1231		1	0.060
	4	0	–	–	CA4-40NS	1SBN010145R1240		1	0.060
Side-mounted instantaneous auxiliary contact blocks									
AF09..S ... AF26..S NF..S	1	1	–	–	CAL4-11S	1SBN010130R1011		1	0.045
Front-mounted instantaneous auxiliary contact and A1/A2 coil terminal blocks									
AF09 ... AF16..-30-10S	1	1	–	–	CAT4-11MS	1SBN010153R1111		1	0.045
AF26..S	1	1	–	–	CAT4-11ES	1SBN010153R1011		1	0.045
AF09 ... AF16..-30-01S	1	1	–	–	CAT4-11US	1SBN010153R1311		1	0.045

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

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Auxiliary contact blocks - with spring terminals

Technical data

Types		1-pole **CA4..S**, 4-pole **CA4..S**, 2-pole **CAT4..S**, 2-pole **CAL4..S**

Contact utilization characteristics according to IEC

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

Contact utilization characteristics according to UL / CSA

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

Connecting characteristics

Connection capacity (min. ... max.)			
	Rigid solid	**1 x**	1 ... 2.5 mm²
		2 x	1 ... 2.5 mm²
	Flexible with ferrule	**1 x**	0.75 ... 2.5 mm²
		2 x	0.75 ... 2.5 mm²
	Flexible with insulated ferrule	**1 x**	0.75 ... 2.5 mm²
		2 x	0.75 ... 1.5 mm²
Connection capacity acc. to UL/CSA		**1 or 2 x**	AWG 18 ... 14
Stripping length			10 mm
Degree of protection			
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			IP20
Screwdriver type			Flat Ø 3.5

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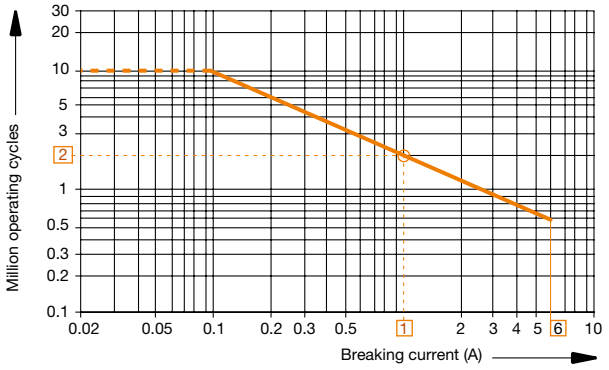
Auxiliary contact blocks for AF09..S ... AF26..S contactors and NF..S contactor relays - with spring terminals
Electrical durability

Electrical durability for AC-15 utilization category

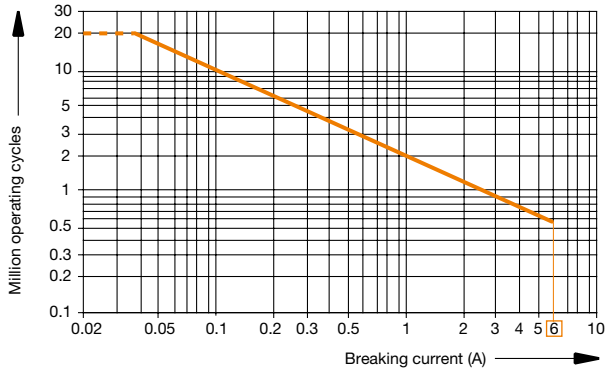
AC-15 utilization category according to IEC 60947-5-1 / EN 60947-5-1:
- making current: 10 x Ie with cos ϕ = 0.7 and Ue
- breaking current: Ie with cos ϕ = 0.4 and Ue.

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



- AF09..S ... AF26..S contactor built-in auxiliary contacts
- 1-pole and 4-pole CA4..S, 2-pole CAT4..S, 2-pole CAL4..S add-on auxiliary contacts.

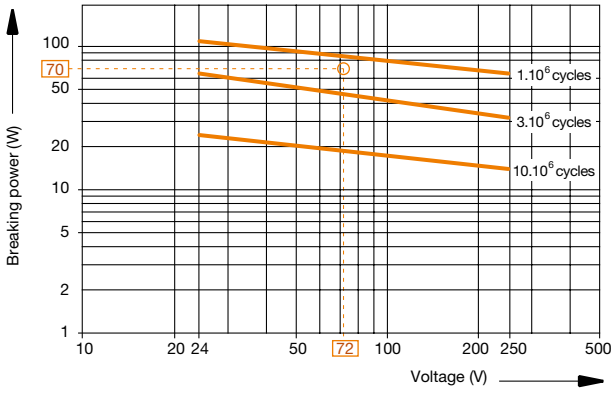
Example:
Breaking current = 1 A
On the opposite curve at intersection "O" 1 A the corresponding value for the electrical durability is approximately 2 millions operating cycles.



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

Electrical durability for DC-13 utilization category

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



- AF09..S ... AF26..S contactor built-in auxiliary contacts 1-pole and 4-pole CA4..S, 2-pole CAT4..S, 2-pole CAL4..S add-on auxiliary contacts,
- NF..S contactor relays.

Example:
Control of DC electro-magnet:
Ue voltage = 72 V DC 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 millions operating cycles.

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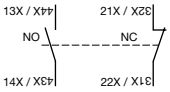
Add-on auxiliary contacts - with spring terminals
Terminal marking and positioning

1-pole auxiliary contacts

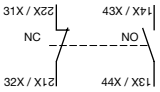
CA4-01S

CA4-10S

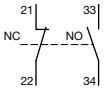
2-pole auxiliary contacts



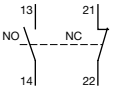
CAL4-11S
(Left side-mounted)



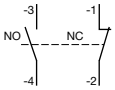
CAL4-11S
(Right side-mounted)



CAT4-11MS

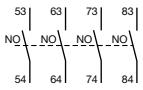


CAT4-11ES

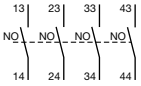


CAT4-11US

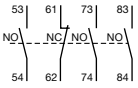
4-pole auxiliary contacts



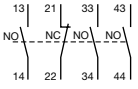
CA4-40NS



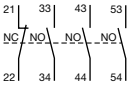
CA4-40ES



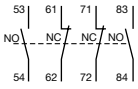
CA4-31NS



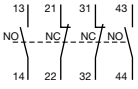
CA4-31ES



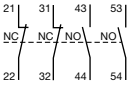
CA4-31MS



CA4-22NS



CA4-22ES



CA4-22MS

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Electronic timers - with spring terminals

TEF4S-ON

Description

TEF4S frontal electronic timers are used for realizing timing function and are available in ON-delay and OFF-delay versions.

Compact solution in cabinet compared to separate timers

TEF4S electronic timers are front-mounted and locked on AF..S contactors or NF..S contactor relays. A mechanical indicator allows to show the state of the contactor.

Safe and cost-reduced wiring

TEF4S electronic timers are supplied by a direct plug-in parallel connection to the coil terminals A1 - A2 of the contactor or contactor relay. A varistor is integrated on the timer to offer a built-in protection against surges in the contactor coil.

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

TEF4S-ON or TEF4S-OFF allow time-delayed functions up to 100 s in 3 distinct time ranges, independently of the control system. The time delay ranges are selected by a switch and the time delay can be adjusted by means of a rotary switch. The timing function is activated by closing or opening the device on which the timer is mounted. The OFF-delay version operates without additional control supply.

TEF4S-OFF

Ordering details

For contactors, contactor relays	Time delay range selected by switch	Delay type	Rated control circuit voltage Uc V 50/60 Hz or DC	Auxiliary contacts		Type	Order code		Weight Pkg (1 pce) kg
AF09..S ... AF26..S NF..S	0.1...1 s 1...10 s 10...100 s	ON-delay	24...240	1	1	TEF4S-ON	1SBN020113R1000		0.065
		OFF-delay	24...240	1	1	TEF4S-OFF	1SBN020115R1000		0.065

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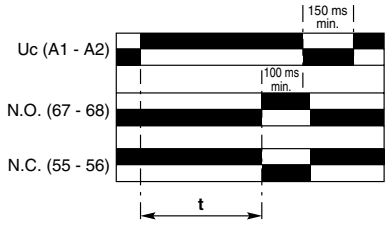
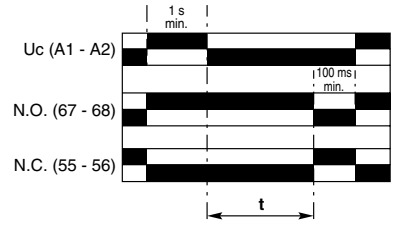
Electronic timers - with spring terminals
Technical data

Contact utilization characteristics according to IEC

			TEF4S-ON	TEF4S-OFF
Types				
Standards			IEC 60947-5-1 and EN 60947-5-1	
Rated insulation voltage Ui acc. to IEC 60947-5-1			400 V	
Rated impulse withstand voltage Uimp			4 kV	
Rated operational voltage Ue max.			240 V	
Rated frequency (without derating)			50 / 60 Hz	
Conventional thermal current Ith - θ ≤ 40 °C			5 A	
Ie / Rated operational current AC-15				
acc. to IEC 60947-5-1		**24-127 V 50/60 Hz**	3 A	
		220-240 V 50/60 Hz	1.5 A	
Making capacity acc. to IEC 60947-5-1			10 x Ie AC-15	
Breaking capacity acc. to IEC 60947-5-1			10 x Ie AC-15	
Ie / Rated operational current DC-13				
acc. to IEC 60947-5-1		**24 V DC**	1 A / 24 W	
Short-circuit protection device gG type fuse			6 A	
Rated short-time withstand current Icw		**for 1.0 s**	8 A	
θ = 40 °C		**for 0.1 s**	8 A	
Minimum switching capacity			12 V / 3 mA	
with failure rate acc. to IEC 60947-5-4		**24 V DC**	10^{-7}	
Power dissipation per pole at 3 A			0.1 W	
Function diagram			ON-delay	OFF-delay
				
			Bistable relay inside. Before use, once apply Uc then switch it off in order to initialize position of the contacts.	
Control circuit voltage				
AC control voltage	Rated control circuit voltage Uc		24...240 V AC	
50/60 Hz	Average consumption		1.5 mA RMS	1 mA RMS
DC control voltage	Rated control circuit voltage Uc		24...240 V DC	
	Average consumption		1.5 mA	1 mA
Rated frequency limits			50 / 60 Hz	
Supply voltage range			0.85...1.1 x Uc (at θ ≤ 70 °C)	
Overvoltage protection			Varistor included	
Time delay range (t) selected by switch		**0.1...1 s**		
		1...10 s		
		10...100 s		
On-load reiteration accuracy under constant conditions			≤ 1 %	
Minimum ON period			0.1 s	1 s
Recovery time			0.15 s	0.1 s
Ambient air temperature	Operation		-25 °C ... +70 °C	
	Storage		-40 °C ... +80 °C	
Climatic withstand			Category B according to IEC 60947-1 Annex Q	
Maximum operating altitude			2000 m	
Mounting positions			Mounting positions 1, 1 +/- 30°, 2, 3, 4, 5	
Shock withstand			1/2 sinusoidal shock for 11 ms: no change in contact position	
acc. to IEC 60068-2-27 and EN 60068-2-27			Same as contactor or contactor relay	
(Mounting position 1)				
Vibration withstand			5...300 Hz	
acc. to IEC 60068-2-6			3 g closed position / 2 g open position	
Mechanical durability				
	Number of operating cycles		5 millions operating cycles	
	Max. switching frequency		3600 cycles/h	1800 cycles/h
Max. electrical switching frequency				
		AC-15	1200 cycles/h	
		DC-13	900 cycles/h	

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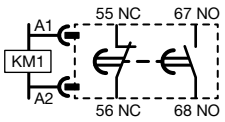
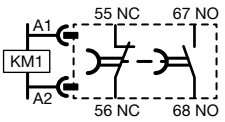
Electronic timers - with spring terminals
Technical data

Contact utilization characteristics according to UL / CSA

Types		TEF4S-ON	TEF4S-OFF
Standards		UL 508, CSA C22.2 N°14	
Rated insulation voltage Ui acc. to UL / CSA		300 V	
Max. operational voltage		240 V	
Pilot duty		B300, R300	
AC thermal rated current		5 A	
AC maximum volt-ampere making		3600 VA	
AC maximum volt-ampere breaking		360 VA	
DC thermal rated current		1 A	
DC maximum volt-ampere making-breaking		28 VA	

Connecting characteristics

Connection capacity (min. ... max.)			
	Rigid solid	**1 x**	1...2.5 mm²
		2 x	1...2.5 mm²
	Flexible with non insulated ferrule	**1 x**	0.75...2.5 mm²
		2 x	0.75...2.5 mm²
	Flexible with insulated ferrule	**1 x**	0.75...1.5 mm²
		2 x	0.75...1.5 mm²
Connection capacity acc. to UL / CSA		**1 or 2 x**	AWG 18...14
Stripping length			10 mm
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			IP20
Screwdriver type			Flat Ø 3.5
Terminal Marking			
			

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1SBC101672S0201

Other accessories

VM4

BB4

LDC4S

BX4

BX4-CA

BP38-4

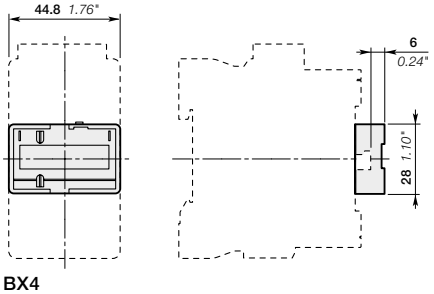
BA4

BDT4

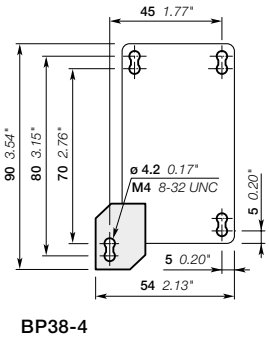
Ordering details

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
Mechanical interlock unit					
VM4 mechanical interlock unit for the interlocking of two AF contactors. When mounted between two contactors without additional width, the VM4 mechanical interlock unit prevents one of the contactors from closing as long as the other contactor is closed. The mechanical interlock unit includes 2 fixing clips (BB4).					
AF09..S ... AF26..S	VM4	1SBN030105T1000		10	0.005
Fixing clips					
AF09..S ... AF26..S	BB4	1SBN110120W1000		50	0.002
Additional coil terminal block - with spring terminals					
Additional coil terminal block for a bottom access to the coil terminals of contactors or contactor relays.					
AF09..S ... AF26..S and NF..S	LDC4S	1SBN070157T1000		10	0.010
Protective covers					
Sealable and transparent protective covers BX4 and non-removable BX4-CA to protect the devices against accidental contact.					
All 1-stack contactors and contactor relays	BX4	1SBN110108T1000		10	0.006
For 4-pole CA4 and 2-pole CAT4 auxiliary contact blocks	BX4-CA	1SBN110109W1000		50	0.001
Mounting piece					
Mounting piece for replacement of A / AL26 ... A / AL40 contactors fixed by screws by AF contactors in 45 mm width.					
AF09..S ... AF26..S	BP38-4	1SBN112303T1000		10	0.003
Function markers					
Box of 16 blank cards (16 markers by card) printable on HTP500 thermal transfer printer and AMS 500 marking table to identify your contactors, overload relays or manual motor starters. Marker dimensions: 7 x 20 mm *(.276" x .787")*.					
Box of 16 blank cards	BA4	1SNA235156R2700		16	0.011
AMS 500 support plate for 8 BA4	SPRC 1	1SNA360010R1500		1	0.220
HTP500 support plate	HTP500-BA4	1SNA235712R2400		1	0.290
Test block					
BDT4 test block is suitable for switching on contactor off-load. Marking on the block indicates the contactor type to fit with.					
AF..S, NF..S	BDT4	1SBN110122T1000		10	0.007

Main dimensions mm, *inches*



BX4



BP38-4

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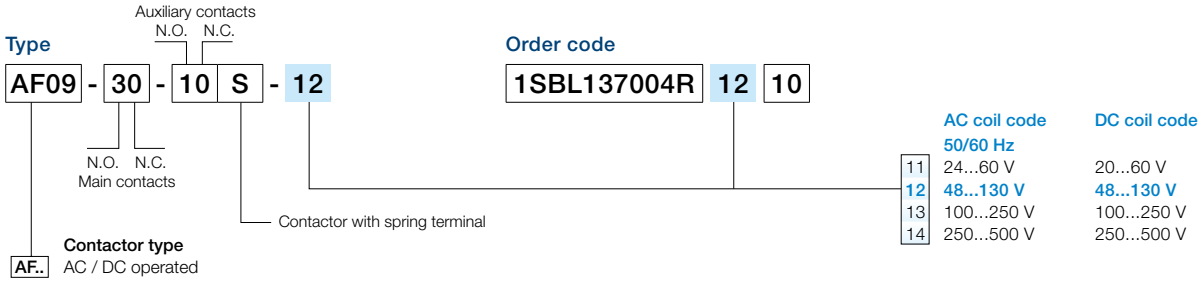
1SBC101708S0201 - Rev. A

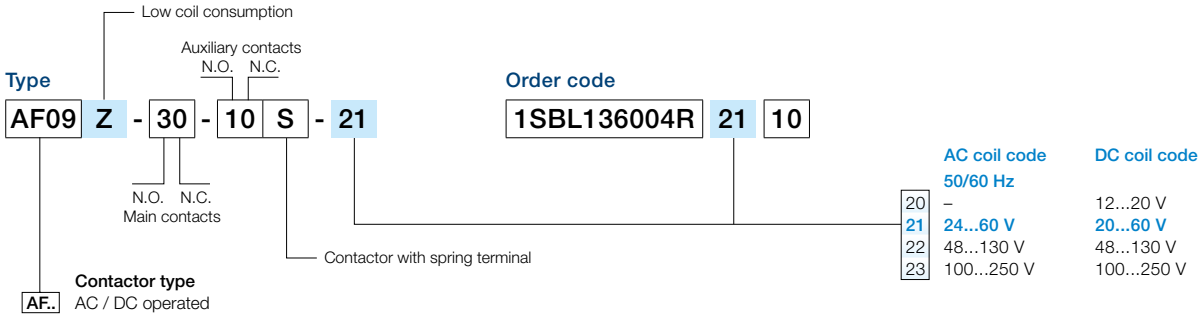
Voltage code table

The below tables indicate the available coil voltages and corresponding digits for order codes.

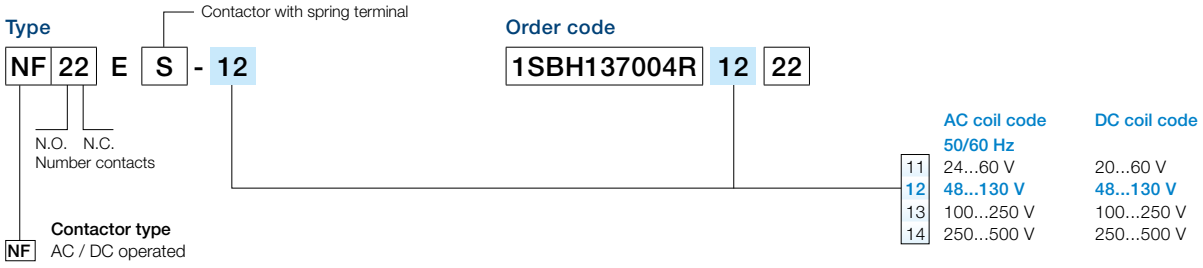
3-pole contactors - with spring terminals



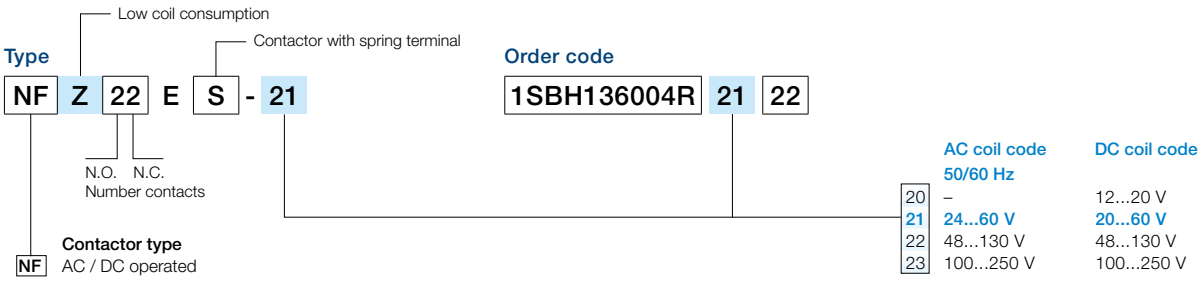
3-pole contactors - low consumption - with spring terminals



Contactor relays - with spring terminals



Contactor relays - low consumption - with spring terminals



1SBC101729S0201

Notes

ABB
T16
TRIP CLASS 10
STOP
TEST
RESET
95 NC 96
97 NO 98
2T1
4T2
6T3
ABB
TF42
STOP
TEST
RESET
95 NC 96
97 NO 98
2T1
4T2
6T3
ABB
EF19
TRIP CLASS
RESET
STOP
TEST
95 NC 96
97 NO 98
ABB
EF45
TRIP CLASS
RESET
STOP
TEST
95 NC 96
97 NO 98

Overload relays

Overview 7/2

Thermal overload relays 7/4

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TF42 thermal overload relays – 0.10 to 38.0 A **7**/8

TF65 thermal overload relays – 22.0 to 67.0 A **7**/13

TF96 thermal overload relays – 40.0 to 96.0 A **7**/17

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TA200DU thermal overload relays – 66 to 200 A **7**/25

Electronic overload relays 7/29

E16DU, EF19, EF45 electronic overload relays – 0.10 to 45.0 A **7**/29

EF65, EF96, EF146 electronic overload relays – 20 to 150 A **7**/33

EF205, EF370 electronic overload relays – 63 to 380 A **7**/37

EF460, EF750 electronic overload relays – 150 to 800 A **7**/41

General accessories 7/44

Thermal and electronic overload relays

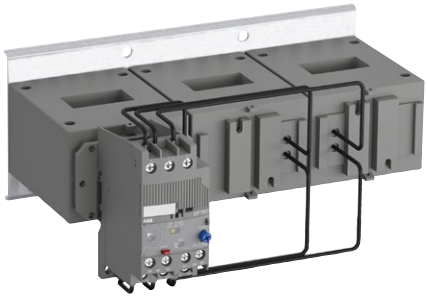
Thermal overload relays

IEC: rated operational power AC-3	**400 V**	0.06 ... 7.5 kW	0.06 ... 7.5 kW	0.06 ... 18.5 kW	11 ... 37 kW
UL/CSA: 3-phase hp-ratings	**480 V**	1/2 ... 10 hp	1/2 ... 10 hp	1/2 ... 25 hp	15 ... 50 hp
Fitting to contactors		B6, B7	AS09 ... AS16	AF09 ... AF38	AF40, AF52, AF65
Type		**T16**	**T16**	**TF42**	**TF65**
Current range		0.10 ... 16 A	0.10 ... 16 A	0.10 ... 38 A	22 ... 67 A
Trip class		10	10	10	10
Single mounting kit		DB16	DB16	DB42	DB65

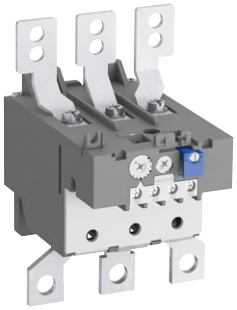
Electronic overload relays
with integrated CT

IEC: rated operational power AC-3	**400 V**	0.06 ... 7.5 kW	0.06 ... 7.5 kW	4 ... 22 kW	7.5 ... 37 kW
UL/CSA: 3-phase hp-ratings	**480 V**	1/2 ... 10 hp	1/2 ... 10 hp	5 ... 30 hp	15 ... 50 hp
Fitting to contactors		B6, B7, BC6, BC7, VB6, VB7, VBC6, VBC7	AF09 ... AF16	AF26 ... AF38	AF40, AF52, AF65
Type		**E16DU**	**EF19**	**EF45**	**EF65**
Current range		0.10 ... 18.9 A	0.10 ... 18.9 A	9 ... 45 A	20 ... 70 A
Trip class		10E, 20E, 30E selectable			
Single mounting kit		DB16E	DB19EF	DB45EF	-

Electronic overload relays
with external separate CT



IEC: rated operational power AC-3	**400 V**	75 ... 250 kW	132 ... 400 kW
UL/CSA: 3-phase hp-ratings	**480 V**	100 ... 400 hp	200 ... 500 hp
Fitting to contactors		AF400, AF460	AF580, AF750, AF1250
Type		**EF460**	**EF750**
Current range		150 ... 500 A	250 ... 800 A
Trip class		10E, 20E, 30E selectable	



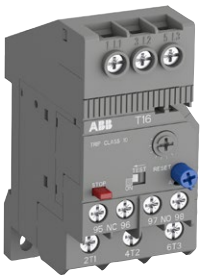
	18.5 … 45 kW	37 … 75 kW	37 … 110 kW
	30 … 75 hp	50 … 100 hp	50 … 150 hp
	AF80, AF96	AF116, AF140	AF190, AF205
	TF96	**TF140DU**	**TA200DU**
	40 … 96 A	66 … 142 A	66 … 200 A
	10	10A	10A
	DB96	-	DB200

	22 … 55 kW	30 … 75 kW	37 … 110 kW	75 … 200 kW
	30 … 75 hp	50 … 100 hp	50 … 150 hp	100 … 300 hp
	AF80, AF96	AF116, AF140, AF146	AF190, AF205	AF265, AF305, AF370
	EF96	**EF146**	**EF205**	**EF370**
	36 … 100 A	54 … 150 A	63 … 210 A	115 … 380 A
	10E, 20E, 30E selectable			
	DB96	-	-	-

T16 thermal overload relays – 0.10 to 16.0 A
Ordering details

2CDC231009F0013

T16



2CDC231025F0013

T16 + DB16

1SFC151224F0002

KPR-101L

2CDC231002F0011

DB16

Description

The T16 thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure. The devices have trip class 10.

The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications

Ordering details

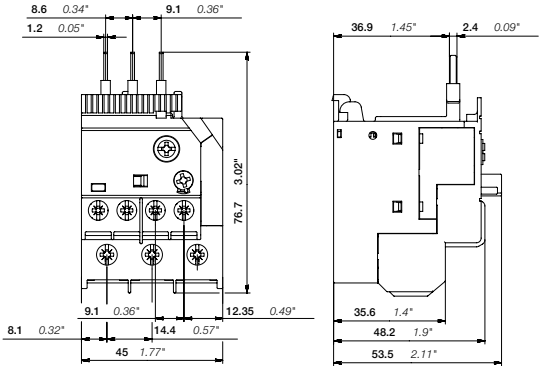
Setting range A	Short-circuit protective device	Trip class	Type	Order code		Weight (1 pce) kg
0.10 ... 0.13	0.5 A, fuse type T	10	T16-0.13	1SAZ711201R1005		0.100
0.13 ... 0.17	1.0 A, fuse type T	10	T16-0.17	1SAZ711201R1008		0.100
0.17 ... 0.23	1.0 A, fuse type T	10	T16-0.23	1SAZ711201R1009		0.100
0.23 ... 0.31	1.0 A, fuse type T	10	T16-0.31	1SAZ711201R1013		0.100
0.31 ... 0.41	2.0 A, fuse type gG	10	T16-0.41	1SAZ711201R1014		0.100
0.41 ... 0.55	2.0 A, fuse type gG	10	T16-0.55	1SAZ711201R1017		0.100
0.55 ... 0.74	4.0 A, fuse type gG	10	T16-0.74	1SAZ711201R1021		0.100
0.74 ... 1.00	6.0 A, fuse type gG	10	T16-1.0	1SAZ711201R1023		0.100
1.00 ... 1.30	6.0 A, fuse type gG	10	T16-1.3	1SAZ711201R1025		0.100
1.30 ... 1.70	10.0 A, fuse type gG	10	T16-1.7	1SAZ711201R1028		0.100
1.70 ... 2.30	10.0 A, fuse type gG	10	T16-2.3	1SAZ711201R1031		0.100
2.30 ... 3.10	10.0 A, fuse type gG	10	T16-3.1	1SAZ711201R1033		0.100
3.10 ... 4.20	20.0 A, fuse type gG	10	T16-4.2	1SAZ711201R1035		0.100
4.20 ... 5.70	20.0 A, fuse type gG	10	T16-5.7	1SAZ711201R1038		0.100
5.70 ... 7.60	35.0 A, fuse type gG	10	T16-7.6	1SAZ711201R1040		0.100
7.60 ... 10.0	35.0 A, fuse type gG	10	T16-10	1SAZ711201R1043		0.104
10.0 ... 13.0	40.0 A, fuse type gG	10	T16-13	1SAZ711201R1045		0.104
13.0 ... 16.0	40.0 A, fuse type gG	10	T16-16	1SAZ711201R1047		0.104

Ordering details accessories

Suitable for	Description	Type	Order code		Weight (1 pce) kg
T16	Single mounting kit	DB16	1SAZ701901R0001		0.032
T16	Reset push button*	KPR-101L	1SFA616162R1014		0.027

*Note: for more information see catalog 1SFC151004C0201

Main dimensions mm, *inches*



T16

2CDC232009F0008

2CDC106036C0201

T16 thermal overload relays – 0.10 to 16.0 A
Technical data

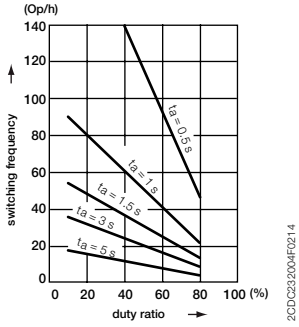
Main circuit – Utilization characteristics according to IEC/EN

Type	T16
Standards	IEC/EN 60947–4–1, IEC/EN 60947-5-1, IEC/EN 60947-1
Rated operational voltage U_e	690 V AC - V DC
Rated frequency	50/60 Hz
Trip class	10
Number of poles	3
Duty time	100%
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	690 V AC

Auxiliary circuit according to IEC/EN

Type		T16
Rated operational voltage U_e		600 V
Conventional free air thermal current I_{th}	**N.C., 95-96**	6 A
	N.O., 97-98	4 A
Rated frequency		DC, 50/60 Hz
Number of poles		1 N.O. + 1 N.C.
I_e / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category		
110-120 V	**N.C., 95-96**	3.00 A
	N.O., 97-98	0.75 A
220-230-240 V	**N.C., 95-96**	3.00 A
	N.O., 97-98	0.75 A
440 V	**N.C., 95-96**	0.75 A
	N.O., 97-98	0.75 A
480-500 V	**N.C., 95-96**	0.75 A
	N.O., 97-98	0.75 A
I_e / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category		
24 V	**N.C., 95-96**	1.25 A
	N.O., 97-98	1.25 A
60 V	**N.C., 95-96**	0.55 A
	N.O., 97-98	0.55 A
110-120-125 V	**N.C., 95-96**	0.55 A
	N.O., 97-98	0.55 A
250 V	**N.C., 95-96**	0.27 A
	N.O., 97-98	0.27 A
Minimum switching capacity		17 V / 3 mA
Short-circuit protective device	**N.C., 95-96**	6 A, fuse type gG
	N.O., 97-98	4 A, fuse type gG
Rated impulse withstand voltage U_{imp}		6 kV
Rated insulation voltage U_i		690 V

Technical diagram – Intermittent periodic duty



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t_a: Motor starting time

2CDC106036C0201

T16 thermal overload relays – 0.10 to 16.0 A
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	T16
Standards	UL 508, CSA 22.2 No. 14
Maximum operational voltage	600 V AC
Trip rating	125% of FLA
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"
Short-circuit protective device	See table "Full load amps and short-circuit protective device"

Auxiliary circuit according to UL/CSA

Type		T16
Contact rating	N.C., 95-96	B600, Q300
	N.O., 97-98	D300, Q300
Conventional thermal current	N.C., 95-96	5 A
	N.O., 97-98	2.5 A

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device			
		480 / 600 V AC		480 / 600 V AC	
		Short circuit rating RMS symmetrical	Fuse type	Short circuit rating RMS symmetrical	Fuse type
T16-0.13	0.13 A	18 kA	1 A, K5	100 kA	30 A, Class J
T16-0.17	0.17 A	18 kA	1 A, K5	100 kA	30 A, Class J
T16-0.23	0.23 A	18 kA	1 A, K5	100 kA	30 A, Class J
T16-0.31	0.31 A	18 kA	3 A, K5	100 kA	30 A, Class J
T16-0.41	0.41 A	18 kA	3 A, K5	100 kA	30 A, Class J
T16-0.55	0.55 A	18 kA	3 A, K5	100 kA	30 A, Class J
T16-0.74	0.74 A	18 kA	3 A, K5	100 kA	30 A, Class J
T16-1.0	1.00 A	18 kA	6 A, K5	100 kA	30 A, Class J
T16-1.3	1.30 A	18 kA	6 A, K5	100 kA	30 A, Class J
T16-1.7	1.70 A	18 kA	6 A, K5	100 kA	30 A, Class J
T16-2.3	2.30 A	18 kA	10 A, K5	100 kA	30 A, Class J
T16-3.1	3.10 A	18 kA	10 A, K5	100 kA	30 A, Class J
T16-4.2	4.20 A	18 kA	15 A, K5	100 kA	30 A, Class J
T16-5.7	5.70 A	18 kA	20 A, K5	100 kA	30 A, Class J
T16-7.6	7.60 A	18 kA	25 A, K5	100 kA	30 A, Class J
T16-10	10.0 A	18 kA	35 A, K5	100 kA	45 A, Class J
T16-13	13.0 A	18 kA	40 A, K5	100 kA	45 A, Class J
T16-16	16.0 A	18 kA	60 A, K5	100 kA	45 A, Class J

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T16 thermal overload relays – 0.10 to 16.0 A
Technical data

General technical data

Type		T16
Pollution degree		3
Phase loss sensitive		Yes
Ambient air temperature		
Operation	Open - compensated	-25 ... +60 °C
	Open	-25 ... +60 °C
Storage		-50 ... +80 °C
Ambient air temperature compensation		Acc. to IEC/EN60947-4-1
Maximum operating altitude permissible		2000 m
Resistance to shock acc. to IEC 60068-2-27		25g / 11 ms
Resistance to vibrations acc. to IEC 60068-2-6		3g / 3 ... 150 Hz
Mounting position		Position 1-5
Mounting		Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit on DIN rail (35 mm)
Degree of protection	Housing	IP20
	Main circuit terminals	IP10

Electrical connection

Main circuit

Type			T16
Connecting capacity			
	Rigid	**1 x**	0.75 ... 4 mm²
		2 x	0.75 ... 1.5 mm² or 1.5 ... 4 mm² [1]
	Flexible	**1 x or 2 x**	0.75 ... 4 mm²
	Stranded acc. to UL/CSA	**1 x or 2 x**	AWG 18-10
	Flexible acc. to UL/CSA	**1 x or 2 x**	AWG 18-10
Stripping length			12 mm
Tightening torque			1.1 ... 1.5 Nm / 9 ... 13 lb.in
Recommended screw driver			M4 (Pozidriv 2)

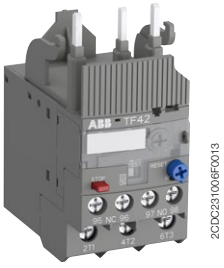
Auxiliary circuit

Type			T16
Connecting capacity			
	Rigid	**1 x or 2 x**	0.75 ... 4 mm²
	Flexible with ferrule	**1 x or 2 x**	0.75 ... 2.5 mm²
	Flexible with insulated ferrule	**1 x**	0.75 ... 2.5 mm²
		2 x	0.75 ... 1.5 mm²
	Flexible	**1 x or 2 x**	0.75 ... 1 mm² or 1 ... 2.5 mm² [1]
	Stranded acc. to UL/CSA	**1 x or 2 x**	AWG 18-12
	Flexible acc. to UL/CSA	**1 x or 2 x**	AWG 18-12
Stripping length			9 mm
Tightening torque			1.1 ... 1.5 Nm / 9 ... 13 lb.in
Recommended screw driver			M3 (Pozidriv 2)

[1] Only connect two different "conductor/wire" cross-sections, if they are within the indicated ranges

2CDC106036C0201

TF42 thermal overload relays – 0.10 to 38.0 A
Ordering details



TF42

TF42 + DB42

Description

The TF42 thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure. The devices have trip class 10.

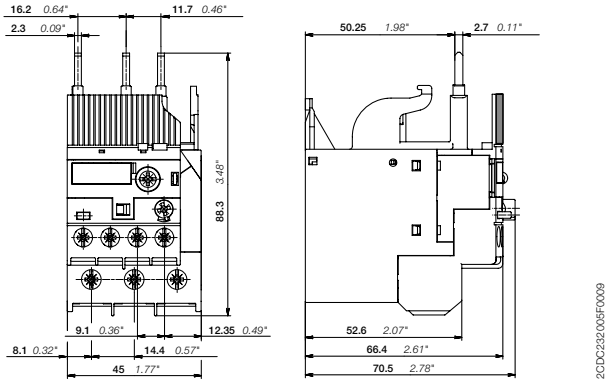
The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications
- With ATEX certification

Ordering details

Setting range A	Short-circuit protective device	Trip class	Type	Order code		Weight (1 pce) kg
0.10 ... 0.13	0.5 A, fuse type T	10	TF42-0.13	1SAZ721201R1005		0.130
0.13 ... 0.17	1.0 A, fuse type T	10	TF42-0.17	1SAZ721201R1008		0.130
0.17 ... 0.23	1.0 A, fuse type T	10	TF42-0.23	1SAZ721201R1009		0.130
0.23 ... 0.31	1.0 A, fuse type T	10	TF42-0.31	1SAZ721201R1013		0.130
0.31 ... 0.41	2.0 A, fuse type gG	10	TF42-0.41	1SAZ721201R1014		0.130
0.41 ... 0.55	2.0 A, fuse type gG	10	TF42-0.55	1SAZ721201R1017		0.130
0.55 ... 0.74	4.0 A, fuse type gG	10	TF42-0.74	1SAZ721201R1021		0.130
0.74 ... 1.00	6.0 A, fuse type gG	10	TF42-1.0	1SAZ721201R1023		0.130
1.00 ... 1.30	6.0 A, fuse type gG	10	TF42-1.3	1SAZ721201R1025		0.130
1.30 ... 1.70	10.0 A, fuse type gG	10	TF42-1.7	1SAZ721201R1028		0.130
1.70 ... 2.30	10.0 A, fuse type gG	10	TF42-2.3	1SAZ721201R1031		0.130
2.30 ... 3.10	10.0 A, fuse type gG	10	TF42-3.1	1SAZ721201R1033		0.130
3.10 ... 4.20	20.0 A, fuse type gG	10	TF42-4.2	1SAZ721201R1035		0.130
4.20 ... 5.70	20.0 A, fuse type gG	10	TF42-5.7	1SAZ721201R1038		0.130
5.70 ... 7.60	35.0 A, fuse type gG	10	TF42-7.6	1SAZ721201R1040		0.130
7.60 ... 10.0	35.0 A, fuse type gG	10	TF42-10	1SAZ721201R1043		0.130
10.0 ... 13.0	40.0 A, fuse type gG	10	TF42-13	1SAZ721201R1045		0.130
13.0 ... 16.0	40.0 A, fuse type gG	10	TF42-16	1SAZ721201R1047		0.130
16.0 ... 20.0	63.0 A, fuse type gG	10	TF42-20	1SAZ721201R1049		0.145
20.0 ... 24.0	63.0 A, fuse type gG	10	TF42-24	1SAZ721201R1051		0.145
24.0 ... 29.0	63.0 A, fuse type gG	10	TF42-29	1SAZ721201R1052		0.145
29.0 ... 35.0	80.0 A, fuse type gG	10	TF42-35	1SAZ721201R1053		0.145
35.0 ... 38.0/40.0	80.0 A, fuse type gG	10	TF42-38	1SAZ721201R1055		0.145

Main dimensions mm, *inches*



TF42

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TF42 thermal overload relays – 0.10 to 38.0 A
Ordering details

2CDC231001F0011

DB42

1SFC151224F0002

KPR-101L

Ordering details accessories

Suitable for	Description	Type	Order code		Weight (1 pce) kg
TF42	Single mounting kit	DB42	1SAZ701902R0001		0.087
TF42	Reset push button*	KPR-101L	1SFA616162R1014		0.019
TF42	Remote reset coil 24-30 V AC/DC	DRS-F-01	1SAX101911R1001		0.077
TF42	Remote reset coil 48-60 V AC/DC	DRS-F-02	1SAX101911R1002		0.077
TF42	Remote reset coil 110-127 V AC/DC	DRS-F-03	1SAX101911R1003		0.077
TF42	Remote reset coil 220-240 V AC/DC	DRS-F-04	1SAX101911R1004		0.077

*Note: for more information see catalog 1SFC151004C0201

2CDC106046C0201

TF42 thermal overload relays – 0.10 to 38.0 A
Technical data

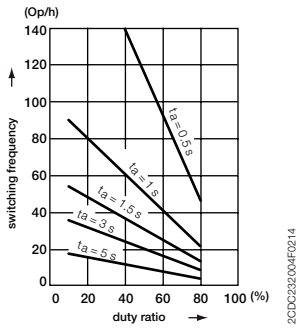
Main circuit – Utilization characteristics according to IEC/EN

Type	TF42
Standards	IEC/EN 60947–4–1, IEC/EN 60947-5-1, IEC/EN 60947-1
Rated operational voltage U_e	690 V AC
Rated frequency	50/60 Hz
Trip class	10
Number of poles	3
Duty time	100%
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	690 V AC

Auxiliary circuit according to IEC/EN

Type		TF42
Rated operational voltage U_e		600 V
Conventional free air thermal current I_{th}	**N.C., 95-96**	6 A
	N.O., 97-98	4 A
Rated frequency		DC, 50/60 Hz
Number of poles		1 N.O. + 1 N.C.
I_e / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category		
110-120 V	**N.C., 95-96**	3.00 A
	N.O., 97-98	0.75 A
220-230-240 V	**N.C., 95-96**	3.00 A
	N.O., 97-98	0.75 A
440 V	**N.C., 95-96**	0.75 A
	N.O., 97-98	0.75 A
480-500 V	**N.C., 95-96**	0.75 A
	N.O., 97-98	0.75 A
I_e / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category		
24 V	**N.C., 95-96**	1.25 A
	N.O., 97-98	1.25 A
110-120-125 V	**N.C., 95-96**	0.55 A
	N.O., 97-98	0.55 A
250 V	**N.C., 95-96**	0.27 A
	N.O., 97-98	0.27 A
Minimum switching capacity		17 V / 3 mA
Short-circuit protective device	**N.C., 95-96**	6 A, fuse type gG
	N.O., 97-98	4 A, fuse type gG
Rated impulse withstand voltage U_{imp}		6 kV
Rated insulation voltage U_i		690 V

Technical diagram – Intermittent periodic duty



t_a: Motor starting time

2CDC106046C0201

TF42 thermal overload relays – 0.10 to 38.0 A
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	TF42
Standards	UL 508, CSA 22.2 No. 14
Maximum operational voltage	600 V AC
Trip rating	125% of FLA
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"
Short-circuit protective device	See table "Full load amps and short-circuit protective device"

Auxiliary circuit according to UL/CSA

Type		TF42
Contact rating	N.C., 95-96	B600, Q300
	N.O., 97-98	D300, Q300
Conventional thermal current	N.C., 95-96	5 A
	N.O., 97-98	2.5 A

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device			
		480 / 600 V AC		480 / 600 V AC	
		Short circuit rating RMS symmetrical	Fuse type	Short circuit rating RMS symmetrical	Fuse type
TF42-0.13	0.13 A	18 kA	1 A, K5	100 kA	30 A, Class J
TF42-0.17	0.17 A	18 kA	1 A, K5	100 kA	30 A, Class J
TF42-0.23	0.23 A	18 kA	1 A, K5	100 kA	30 A, Class J
TF42-0.31	0.31 A	18 kA	3 A, K5	100 kA	30 A, Class J
TF42-0.41	0.41 A	18 kA	3 A, K5	100 kA	30 A, Class J
TF42-0.55	0.55 A	18 kA	3 A, K5	100 kA	30 A, Class J
TF42-0.74	0.74 A	18 kA	3 A, K5	100 kA	30 A, Class J
TF42-1.0	1.00 A	18 kA	6 A, K5	100 kA	30 A, Class J
TF42-1.3	1.30 A	18 kA	6 A, K5	100 kA	30 A, Class J
TF42-1.7	1.70 A	18 kA	6 A, K5	100 kA	30 A, Class J
TF42-2.3	2.30 A	18 kA	10 A, K5	100 kA	30 A, Class J
TF42-3.1	3.10 A	18 kA	10 A, K5	100 kA	30 A, Class J
TF42-4.2	4.20 A	18 kA	15 A, K5	100 kA	30 A, Class J
TF42-5.7	5.70 A	18 kA	20 A, K5	100 kA	30 A, Class J
TF42-7.6	7.60 A	18 kA	25 A, K5	100 kA	30 A, Class J
TF42-10	10.0 A	18 kA	35 A, K5	100 kA	45 A, Class J
TF42-13	13.0 A	18 kA	40 A, K5	100 kA	45 A, Class J
TF42-16	16.0 A	18 kA	60 A, K5	100 kA	45 A, Class J
TF42-20	20.0 A	18 kA	80 A, K5	100 kA	60 A, Class J
TF42-24	24.0 A	18 kA	80 A, K5	100 kA	60 A, Class J
TF42-29	29.0 A	18 kA	100 A, K5	100 kA	100 A, Class J
TF42-35	35.0 A	18 kA	150 A, K5	100 kA	175 A, Class J
TF42-38	38.0 A	18 kA	150 A, K5	100 kA	175 A, Class J

2CDC106046C0201

TF42 thermal overload relays – 0.10 to 38.0 A
Technical data

General technical data

Type		TF42
Pollution degree		3
Phase loss sensitive		Yes
Ambient air temperature		
Operation	Open - compensated	-25 ... +60 °C
	Open	-25 ... +60 °C
Storage		-50 ... +80 °C
Ambient air temperature compensation		Acc. to IEC/EN60947-4-1
Maximum operating altitude permissible		2000 m
Resistance to shock acc. to IEC 60068-2-27		25g / 11 ms
Resistance to vibrations acc. to IEC 60068-2-6		3g / 3 ... 150 Hz
Mounting position		Position 1-5
Mounting		Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit on DIN rail (35 mm)
Degree of protection	Housing	IP20
	Main circuit terminals	IP10

Electrical connection

Main circuit

Type			TF42 (TF42-0.13 ... TF42-16)	TF42 (TF42-20 ... TF42-38)
Connecting capacity				
	Rigid	**1 x or 2 x**	0.75 ... 4 mm²	1.5 ... 2.5 mm² or 2.5 ... 10 mm² [1]
	Flexible with insulated ferrule	**1 x or 2 x**	0.75 ... 4 mm²	2.5 ... 4 mm² or 4 ... 6 mm² [1]
	Stranded acc. to UL/CSA	**1 x or 2 x**	AWG 18-10	AWG 14-6
	Flexible acc. to UL/CSA	**1 x or 2 x**	AWG 18-10	AWG 14-6
Stripping length			12 mm	
Tightening torque			1.5 - 2.5 Nm / 13 ... 22 lb.in	2.5 - 2.7 Nm / 22 lb.in
Recommended screw driver			M4 (Pozidriv 2)	

Auxiliary circuit

Type			TF42
Connecting capacity			
	Rigid	**1 x or 2 x**	0.75 ... 4 mm²
	Flexible with ferrule	**1 x or 2 x**	0.75 ... 2.5 mm²
	Flexible with insulated ferrule	**1 x**	0.75 ... 2.5 mm²
		2 x	0.75 ... 1.5 mm²
	Flexible	**1 x or 2 x**	0.75 ... 1 mm² or 1 ... 2.5 mm² [1]
	Stranded acc. to UL/CSA	**1 x or 2 x**	AWG 18-12
	Flexible acc. to UL/CSA	**1 x or 2 x**	AWG 18-12
Stripping length			9 mm
Tightening torque			1.1 ... 1.5 Nm / 9 ... 13 lb.in
Recommended screw driver			M3 (Pozidriv 2)

[1] Only connect two different "conductor/wire" cross-sections, if they are within the indicated ranges.

2CDC106046C0201

TF65 thermal overload relays – 22.0 to 67.0 A
Ordering details

TF65

DB65

DB65 + TF65

KPR-101L

Description

The TF65 thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure. The devices have trip class 10.

The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications
- With ATEX certification [1)]

Ordering details

Setting range A	Short-circuit protective device	Trip class	Type	Order code		Weight (1 pce) kg
22.0 ... 28.0	80 A, gG Type Fuses	10	TF65-28	1SAZ811201R1001		0.456
25.0 ... 33.0	80 A, gG Type Fuses	10	TF65-33	1SAZ811201R1002		0.456
30.0 ... 40.0	100 A, gG Type Fuses	10	TF65-40	1SAZ811201R1003		0.456
36.0 ... 47.0	125 A, gG Type Fuses	10	TF65-47	1SAZ811201R1004		0.456
44.0 ... 53.0	125 A, gG Type Fuses	10	TF65-53	1SAZ811201R1005		0.456
50.0 ... 60.0	125 A, gG Type Fuses	10	TF65-60	1SAZ811201R1006		0.466
57.0 ... 67.0	160 A, gG Type Fuses	10	TF65-67	1SAZ811201R1007		0.466

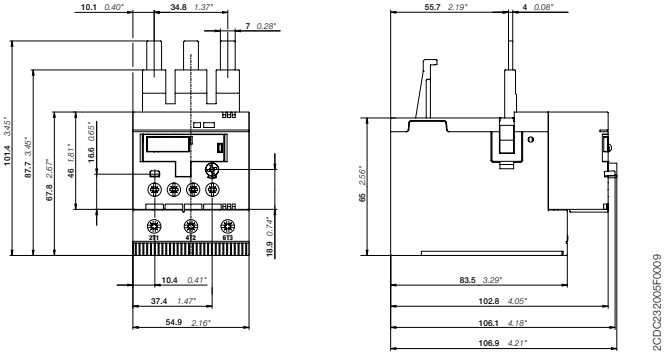
Ordering details accessories

Suitable for	Description	Type	Order code		Weight (1 pce) kg
TF65	Single mounting kit	DB65	1SAZ801901R1001		0.132
TF65	Reset push button [2)]	KPR-101L	1SFA616162R1014		0.019
TF65	Remote reset coil 24-30 V AC / DC	DRS-F-01	1SAX101911R1001		0.077
TF65	Remote reset coil 48-60 V AC / DC	DRS-F-02	1SAX101911R1002		0.077
TF65	Remote reset coil 110-127 V AC / DC	DRS-F-03	1SAX101911R1003		0.077
TF65	Remote reset coil 220-240 V AC / DC	DRS-F-04	1SAX101911R1004		0.077

[1)] ATEX is valid for products, produced from week 26, 2015

[2)] Note: for more information see catalog 1SFC151004C0201

Main dimensions mm, *inches*



TF65

2CDC106063C0201

TF65 thermal overload relays – 22.0 to 67.0 A
Technical data

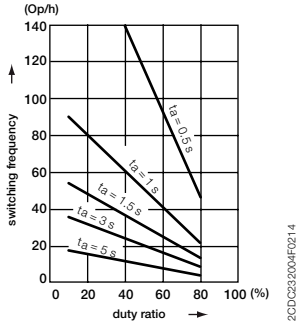
Main circuit – Utilization characteristics according to IEC/EN

Type	TF65
Standards	IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1
Rated operational voltage U_e	690 V AC
Rated frequency	50/60 Hz
Trip class	10
Number of poles	3
Duty time	100%
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"
Rated impulse withstand voltage U_{imp}	8 kV
Rated insulation voltage U_i	690 V

Auxiliary circuit according to IEC/EN

Type		TF65
Rated operational voltage U_e		600 V
Conventional free air thermal current I_{th}	**N.C., 95-96**	6 A
	N.O., 97-98	4 A
Rated frequency		DC, 50/60 Hz
Number of poles		1 N.O. + 1 N.C.
I_e / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category		
110-120 V	**N.C., 95-96**	3.00 A
	N.O., 97-98	0.75 A
220-230-240 V	**N.C., 95-96**	3.00 A
	N.O., 97-98	0.75 A
440 V	**N.C., 95-96**	0.75 A
	N.O., 97-98	0.75 A
480-500 V	**N.C., 95-96**	0.75 A
	N.O., 97-98	0.75 A
I_e / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category		
24 V	**N.C., 95-96**	1.25 A
	N.O., 97-98	1.25 A
110-120-125 V	**N.C., 95-96**	0.55 A
	N.O., 97-98	0.55 A
250 V	**N.C., 95-96**	0.27 A
	N.O., 97-98	0.27 A
Minimum switching capacity		17 V / 3 mA
Short-circuit protective device	**N.C., 95-96**	6 A, gG Type Fuses
	N.O., 97-98	4 A, gG Type Fuses
Rated impulse withstand voltage U_{imp}		6 kV
Rated insulation voltage U_i		690 V

Technical diagram – Intermittent periodic duty



t_a: Motor starting time

2CDC106063C0201

TF65 thermal overload relays – 22.0 to 67.0 A
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	TF65
Standards	UL 60947-1, UL 60947-4-1
Maximum operational voltage	600 V AC
Trip rating	125% of FLA
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"
Short-circuit protective device	See table "Full load amps and short-circuit protective device"

Auxiliary circuit according to UL/CSA

Type		TF65
Contact rating	N.C., 95-96	B600, Q600
	N.O., 97-98	D300, Q600
Conventional thermal current	N.C., 95-96	6 A
	N.O., 97-98	4 A

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device			
		480 / 600 V AC		480 / 600 V AC	
		Short circuit rating RMS symmetrical	Fuse type	Short circuit rating RMS symmetrical	Fuse type
TF65-28	28 A	5 kA	100 A, K5 / RK5	18 kA	110 A, Class J
TF65-33	33 A	5 kA	100 A, K5 / RK5	18 kA	110 A, Class J
TF65-40	40 A	5 kA	100 A, K5 / RK5	18 kA	110 A, Class J
TF65-47	47 A	5 kA	125 A, K5 / RK5	18 kA	125 A, Class J
TF65-53	53 A	10 kA	125 A, K5 / RK5	18 kA	125 A, Class J
TF65-60	60 A	10 kA	150 A, K5 / RK5	18 kA	150 A, Class J
TF65-67	67 A	10 kA	150 A, K5 / RK5	18 kA	150 A, Class J

2CDC106063C0201

TF65 thermal overload relays – 22.0 to 67.0 A
Technical data

General technical data

Type			TF65
Pollution degree			3
Phase loss sensitive			Yes
Ambient air temperature			
	Operation (1)	Open - compensated	-40 ... +70 °C
		Open	-40 ... +70 °C
	Storage		-50 ... +80 °C
Ambient air temperature compensation			Acc. to IEC/EN 60947-4-1
Maximum operating altitude permissible			2000 m
Resistance to shock acc. to IEC 60068-2-27			25g / 11 ms
Resistance to vibrations acc. to IEC 60068-2-6			5g / 3 ... 150 Hz
Mounting position			Position 1 to 6
Mounting			Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit on DIN rail (35 mm)
Degree of protection	Housing		IP20
	Main circuit terminals		IP10

(1) Valid for TF65 produced from week 11, 2016. Otherwise, -25 ...+60 °C range is valid.
Derating might be applicable for temperatures > 50°C. Data on request

Electrical connection

7

Main circuit

Type			TF65
Connecting capacity			
	Rigid	**1 x or 2 x**	2.5 ... 16 mm²
		1 x	2.5 ... 35 mm²
	Flexible with ferrule	**1 x or 2 x**	2.5 ... 10 mm²
		1 x	2.5 ... 35 mm²
	Flexible with insulated ferrule	**1 x or 2 x**	2.5 ... 10 mm²
		1 x	2.5 ... 35 mm²
	Flexible	**1 x or 2 x**	2.5 ... 16 mm²
		1 x	2.5 ... 35 mm²
	Stranded acc. to UL/CSA	**1 x**	AWG 12 ... 2
		2 x	AWG 12 ... 6
	Flexible acc. to UL/CSA	**1 x**	AWG 12 ... 2
		2 x	AWG 12 ... 6
Stripping length			17 mm
Tightening torque			4.0 - 4.5 Nm / 35 ... 40 lb.in
Recommended screw driver			M6 (Pozidriv 2)

Auxiliary circuit

Type			TF65
Connecting capacity			
	Rigid	**1 x or 2 x**	0.75 ... 4 mm²
	Flexible with ferrule	**1 x or 2 x**	0.75 ... 4 mm²
	Flexible with insulated ferrule	**1 x**	0.75 ... 2.5 mm²
		2 x	0.75 ... 1.5 mm²
	Flexible	**1 x or 2 x**	0.75 ... 1 mm² or 1 ... 2.5 mm²
	Stranded acc. to UL/CSA	**1 x or 2 x**	AWG 18 ... 12
	Flexible acc. to UL/CSA	**1 x or 2 x**	AWG 18 ... 12
Stripping length			9 mm
Tightening torque			1.1 ... 1.5 Nm / 9 ... 13 lb.in
Recommended screw driver			M3 (Pozidriv 2)

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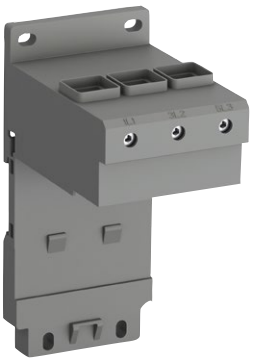
TF96 thermal overload relays – 40.0 to 96.0 A
Ordering details

TF96



DB96

DB96 + TF96

KPR-101L

Description

The TF96 thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure. The devices have trip class 10.

The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications
- With ATEX certification [1)]

Ordering details

Setting range A	Short-circuit protective device	Trip class	Type	Order code		Weight (1 pce) kg
40.0 ... 51.0	125 A, gG Type Fuses	10	TF96-51	1SAZ911201R1001		0.620
48.0 ... 60.0	160 A, gG Type Fuses	10	TF96-60	1SAZ911201R1002		0.620
57.0 ... 68.0	160 A, gG Type Fuses	10	TF96-68	1SAZ911201R1003		0.620
65.0 ... 78.0	200 A, gG Type Fuses	10	TF96-78	1SAZ911201R1004		0.620
75.0 ... 87.0	200 A, gG Type Fuses	10	TF96-87	1SAZ911201R1005		0.620
84.0 ... 96.0	250 A, gG Type Fuses	10	TF96-96	1SAZ911201R1006		0.630

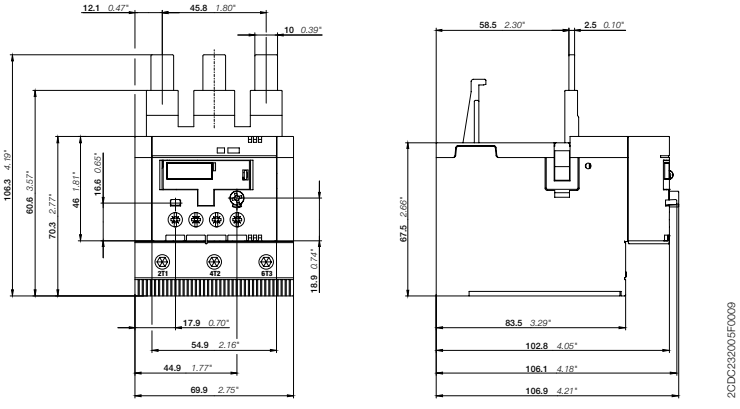
Ordering details accessories

Suitable for	Description	Type	Order code		Weight (1 pce) kg
TF96, EF96	Single mounting kit	DB96	1SAZ901901R1001		0.190
TF96	Reset push button [2)]	KPR-101L	1SFA616162R1014		0.019
TF96	Remote reset coil 24-30 V AC/DC	DRS-F-01	1SAX101911R1001		0.077
TF96	Remote reset coil 48-60 V AC/DC	DRS-F-02	1SAX101911R1002		0.077
TF96	Remote reset coil 110-127 V AC/DC	DRS-F-03	1SAX101911R1003		0.077
TF96	Remote reset coil 220-240 V AC/DC	DRS-F-04	1SAX101911R1004		0.077

[1)] ATEX is valid for products, produced from week 26, 2015

[2)] Note: for more information see catalog 1SFC151004C0201

Main dimensions mm, *inches*



TF96

TF96 thermal overload relays – 40.0 to 96.0 A
Technical data

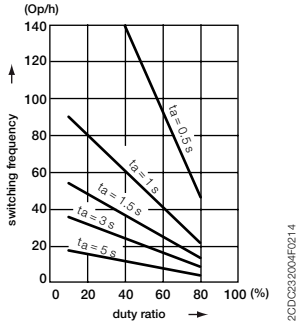
Main circuit – Utilization characteristics according to IEC/EN

Type		TF96
Standards		IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1
Rated operational voltage U_e		690 V AC
Rated frequency		50/60 Hz
Trip class		10
Number of poles		3
Duty time		100%
Operating frequency without early tripping		Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"
Rated impulse withstand voltage U_{imp}		8 kV
Rated insulation voltage U_i		690 V

Auxiliary circuit according to IEC/EN

Type		TF96
Rated operational voltage U_e		600 V
Conventional free air thermal current I_{th}	**N.C., 95-96**	6 A
	N.O., 97-98	4 A
Rated frequency		DC, 50/60 Hz
Number of poles		1 N.O. + 1 N.C.
I_e / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category		
110-120 V	**N.C., 95-96**	3.00 A
	N.O., 97-98	0.75 A
220-230-240 V	**N.C., 95-96**	3.00 A
	N.O., 97-98	0.75 A
440 V	**N.C., 95-96**	0.75 A
	N.O., 97-98	0.75 A
480-500 V	**N.C., 95-96**	0.75 A
	N.O., 97-98	0.75 A
I_e / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category		
24 V	**N.C., 95-96**	1.25 A
	N.O., 97-98	1.25 A
110-120-125 V	**N.C., 95-96**	0.55 A
	N.O., 97-98	0.55 A
250 V	**N.C., 95-96**	0.27 A
	N.O., 97-98	0.27 A
Minimum switching capacity		17 V / 3 mA
Short-circuit protective device	**N.C., 95-96**	6 A, fuse type gG
	N.O., 97-98	4 A, fuse type gG
Rated impulse withstand voltage U_{imp}		6 kV
Rated insulation voltage U_i		690 V

Technical diagram – Intermittent periodic duty



t_a: Motor starting time

2CDC106064C0201

TF96 thermal overload relays – 40.0 to 96.0 A
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	TF96
Standards	UL 60947-1, UL 60947-4-1
Maximum operational voltage	600 V AC
Trip rating	125% of FLA
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"
Short-circuit protective device	See table "Full load amps and short-circuit protective device"

Auxiliary circuit according to UL/CSA

Type		TF96
Contact rating	N.C., 95-96	B600, Q600
	N.O., 97-98	D300, Q600
Conventional thermal current	N.C., 95-96	6 A
	N.O., 97-98	4 A

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device			
		480 / 600 V AC		480 / 600 V AC	
		Short circuit rating RMS symmetrical	Fuse type	Short circuit rating RMS symmetrical	Fuse type
TF96-51	51 A	5 kA	150 A, K5 / RK5	18 kA	125 A, Class J
TF96-60	60 A	10 kA	150 A, K5 / RK5	18 kA	150 A, Class J
TF96-68	68 A	10 kA	150 A, K5 / RK5	18 kA	150 A, Class J
TF96-78	78 A	10 kA	175 A, K5 / RK5	18 kA	175 A, Class J
TF96-87	87 A	10 kA	200 A, K5 / RK5	18 kA	200 A, Class J
TF96-96	96 A	10 kA	250 A, K5 / RK5	18 kA	200 A, Class J

2CDC106064C0201

TF96 thermal overload relays – 40.0 to 96.0 A
Technical data

General technical data

Type		TF96
Pollution degree		3
Phase loss sensitive		Yes
Ambient air temperature		
Operation (1)	Open - compensated	-40 ... +70 °C
	Open	-40 ... +70 °C
Storage		-50 ... +80 °C
Ambient air temperature compensation		Acc. to IEC/EN60947-4-1
Maximum operating altitude permissible		2000 m
Resistance to shock acc. to IEC 60068-2-27		25g / 11 ms
Resistance to vibrations acc. to IEC 60068-2-6		5g / 3 ... 150 Hz
Mounting position		Position 1 to 6
Mounting		Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit on DIN rail (35 mm)
Degree of protection	Housing	IP20
	Main circuit terminals	IP10

(1) Valid for TF96 produced from week 11, 2016. Otherwise, -25 ...+60 °C range is valid.
Derating might be applicable for temperatures > 50°C. Data on request.

Electrical connection

7

Main circuit

Type			TF96
Connecting capacity			
	Rigid	**1 x or 2 x**	6 ... 35 mm²
		1 x	6 ... 50 mm²
	Flexible with ferrule	**1 x or 2 x**	6 ... 35 mm²
		1 x	6 ... 50 mm²
	Flexible with insulated ferrule	**1 x or 2 x**	6 ... 16 mm²
		1 x	6 ... 50 mm²
	Flexible	**1 x or 2 x**	6 ... 35 mm²
		1 x	6 ... 50 mm²
	Stranded acc. to UL/CSA	**1 x**	AWG 8 ... 1
		2 x	AWG 8 ... 3
	Flexible acc. to UL/CSA	**1 x**	AWG 8 ... 1
		2 x	AWG 8 ... 3
Stripping length			20 mm [1]
Tightening torque			6 ... 9 Nm / 53 ... 80 lb.in [2]
Recommended screw driver			M8 (Hexagon)

(2) Valid for products, produced from week 27, 2015

Auxiliary circuit

Type			TF96
Connecting capacity			
	Rigid	**1 x or 2 x**	0.75 ... 4 mm²
	Flexible with ferrule	**1 x or 2 x**	0.75 ... 4 mm²
	Flexible with insulated ferrule	**1 x**	0.75 ... 2.5 mm²
		2 x	0.75 ... 1.5 mm²
	Flexible	**1 x or 2 x**	0.75 ... 1 mm² or 1 ... 2.5 mm²
	Stranded acc. to UL/CSA	**1 x or 2 x**	AWG 18 ...12
	Flexible acc. to UL/CSA	**1 x or 2 x**	AWG 18 ... 12
Stripping length			9 mm
Tightening torque			1.1 ... 1.5 Nm / 9 ... 13 lb.in
Recommended screw driver			M3 (Pozidriv 2)

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TF140DU thermal overload relays – 66 to 142 A
Ordering details

TF140DU

KPR-101L

Description

The TF140DU thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure. The devices have trip class 10A.

The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

– Manual or automatic reset selectable
– Phase loss sensitive acc. to IEC/EN 60947-4-1
– TEST and STOP function – Trip indication on the front
– Temperature compensation
– Suitable for three- and single-phase applications
– ATEX variants available

Ordering details

Setting range A	Short-circuit protective device	Trip class	Type	Order code		Weight (1 pce) kg
66 ... 90	200 A, fuse type gG	10A	TF140DU-90	1SAZ431201R1001		0.820
80 ... 110	224 A, fuse type gG	10A	TF140DU-110	1SAZ431201R1002		0.820
100 ... 135	224 A, fuse type gG	10A	TF140DU-135	1SAZ431201R1003		0.820
110 ... 142	250 A, fuse type gG	10A	TF140DU-142	1SAZ431201R1004		0.820
66 ... 90	200 A, fuse type gG	10A	TF140DU-90-V1000*	1SAZ431301R1001		0.820
80 ... 110	224 A, fuse type gG	10A	TF140DU-110-V1000*	1SAZ431301R1002		0.820
100 ... 135	224 A, fuse type gG	10A	TF140DU-135-V1000*	1SAZ431301R1003		0.820
110 ... 142	250 A, fuse type gG	10A	TF140DU-142-V1000*	1SAZ431301R1004		0.820

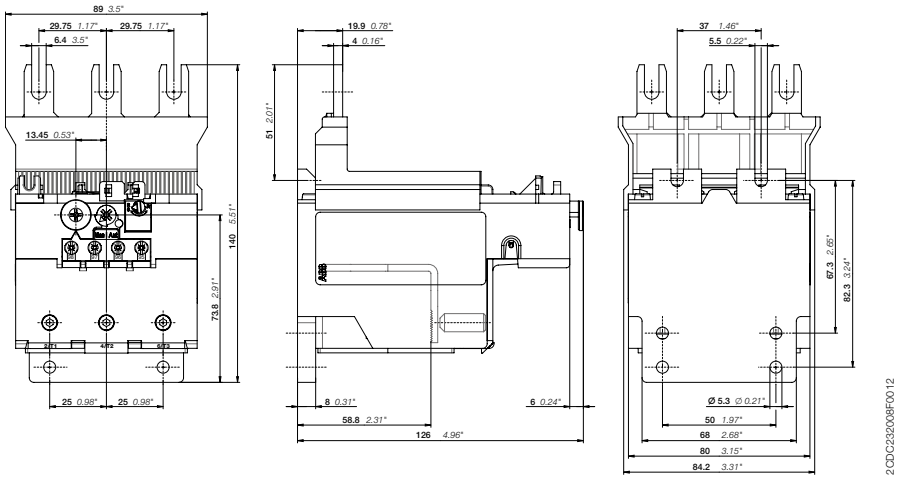
*Note: ATEX variant

Ordering details accessories

Suitable for	Description	Type	Order code		Weight (1 pce) kg
TF140DU	Reset push button*	KPR-101L	1SFA616162R1014		0.027

*Note: for more information see catalog 1SFC151004C0201

Main dimensions mm, *inches*



TF140DU

TF140DU thermal overload relays – 66 to 142 A
Technical data

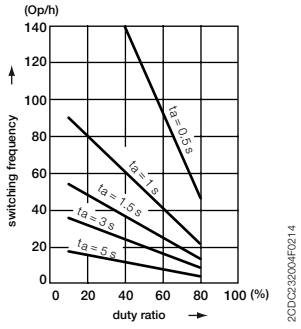
Main circuit – Utilization characteristics according to IEC/EN

Type	**TF140DU / TF140DU-V1000**
Standards	IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1
Rated operational voltage U_e	690 V AC
Rated frequency	DC, 50/60 Hz
Frequency range	0 ... 400 Hz
Trip class	10A
Number of poles	3
Duty time	100%
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"
Rated impulse withstand voltage U_{imp}	8 kV
Rated insulation voltage U_i	690 V

Auxiliary circuit according to IEC/EN

Type		**TF140DU / TF140DU-V1000**
Rated operational voltage U_e		500 V AC, 440 V DC
Conventional free air thermal current I_{th}	**N.C., 95-96**	10 A
	N.O., 97-98	6 A
Rated frequency		DC, 50/60 Hz
Number of poles		1 N.O. + 1 N.C.
I_e / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category		
110-120 V	**N.C., 95-96**	3.00 A
	N.O., 97-98	1.50 A
220-230-240 V	**N.C., 95-96**	1.50 A
	N.O., 97-98	1.50 A
440 V	**N.C., 95-96**	1.00 A
	N.O., 97-98	1.00 A
480-500 V	**N.C., 95-96**	1.00 A
	N.O., 97-98	1.00 A
I_e / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category		
24 V	**N.C., 95-96**	1.25 A
	N.O., 97-98	1.25 A
60 V	**N.C., 95-96**	0.25 A
	N.O., 97-98	0.25 A
110-120-125 V	**N.C., 95-96**	0.25 A
	N.O., 97-98	0.25 A
250 V	**N.C., 95-96**	0.12 A
	N.O., 97-98	0.04 A
Minimum switching capacity		17 V / 3 mA
Short-circuit protective device	**N.C., 95-96**	10 A, fuse type gG
	N.O., 97-98	6 A, fuse type gG
Rated impulse withstand voltage U_{imp}		6 kV
Rated insulation voltage U_i		690 V

Technical diagram – Intermittent periodic duty



2CDC232004F0214

t_a: Motor starting time

2CDC106054C0201

TF140DU thermal overload relays – 66 to 142 A
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	TF140DU / TF140DU-V1000
Standards	UL 508, CSA 22.2 No. 14, UL 60947-4-1A
Maximum operational voltage	600 V AC
Trip rating	125% of FLA
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"
Short-circuit protective device	See table "Full load amps and short-circuit protective device"

Auxiliary circuit according to UL/CSA

Type		TF140DU / TF140DU-V1000
Contact rating	N.C., 95-96	B600
	N.O., 97-98	C300
Conventional thermal current	N.C./N.O.	10 A / 6 A

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device					
		480 / 600 V AC		480 / 600 V AC		480 / 600 V AC	
		Short circuit rating RMS symmetrical	Fuse type	Short circuit rating RMS symmetrical	Fuse type	Short circuit rating RMS symmetrical	Listed circuit breaker
TF140DU-90 / TF140DU-90-V1000	90 A	10 kA	250 A, K5 / RK5	100 kA	250 A, Class J	100 kA	250 A
TF140DU-110 / TF140DU-110-V1000	110 A	10 kA	250 A, K5 / RK5	100 kA	250 A, Class J	100 kA	250 A
TF140DU-135 / TF140DU-135-V1000	135 A	10 kA	250 A, K5 / RK5	100 kA	250 A, Class J	100 kA	250 A
TF140DU-142 / TF140DU-142-V1000	142 A	10 kA	250 A, K5 / RK5	100 kA	250 A, Class J	100 kA	250 A

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TF140DU thermal overload relays – 66 to 142 A
Technical data

General technical data

Type			TF140DU / TF140DU-V1000
Pollution degree			3
Phase loss sensitive			Yes
Ambient air temperature			
	Operation	Open - compensated	-25 ... +55 °C
		Open	-25 ... +55 °C
	Storage		-40 ... +70 °C
Ambient air temperature compensation			Acc. to IEC/EN 60947-4-1
Maximum operating altitude permissible			2000 m
Resistance to shock acc. to IEC 60068-2-27			12g / 11 ms
Mounting position			Position 1-5
Mounting			Mount on the contactor and tighten the screws of the main circuit terminals
Degree of protection		Housing	IP20
		Main circuit terminals	IP00

Electrical connection

Main circuit

Type			TF140DU / TF140DU-V1000
Connecting capacity			
	Rigid	**1 x**	16 ... 70 mm²
		2 x	-
	Flexible	**1 x**	16 ... 70 mm²
		2 x	-
	Stranded acc. to UL/CSA	**1 x or 2 x**	AWG 6-2/0
	Flexible acc. to UL/CSA	**1 x or 2 x**	AWG 6-2/0
Stripping length			25 mm
Tightening torque			8 ... 10 Nm / 77 ... 88 lb.in
Recommended screw driver			M8 (Hexagon)

Auxiliary circuit

Type			TF140DU / TF140DU-V1000
Connecting capacity			
	Rigid	**1 x or 2 x**	0.75 ... 4 mm²
	Flexible with ferrule	**1 x or 2 x**	0.75 ... 2.5 mm²
	Flexible with insulated ferrule	**1 x or 2 x**	0.75 ... 2.5 mm²
	Flexible	**1 x or 2 x**	0.75 ... 2.5 mm²
	Stranded acc. to UL/CSA	**1 x or 2 x**	AWG 18-14
	Flexible acc. to UL/CSA	**1 x or 2 x**	AWG 18-14
Stripping length			9 mm
Tightening torque			0.8 ... 1.3 Nm / 12 lb.in
Recommended screw driver			M3.5 (Pozidriv 2)

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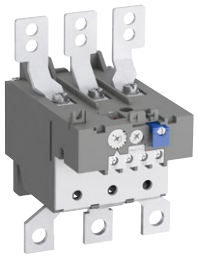
TA200DU thermal overload relays – 66 to 200 A
Ordering details



TA200DU

KPR-101L

Description

The TA200DU thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure. The devices have trip class 10A.

The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications
- ATEX variants available

Ordering details

Setting range A	Short-circuit protective device	Trip class	Type	Order code		Weight (1 pce) kg
66 ... 90	200 A, fuse type gG / 125 A aM	10A	TA200DU-90	1SAZ421201R1001		0.755
80 ... 110	224 A, fuse type gG / 160 A aM	10A	TA200DU-110	1SAZ421201R1002		0.760
100 ... 135	224 A, fuse type gG / 200 A aM	10A	TA200DU-135	1SAZ421201R1003		0.760
110 ... 150	250 A, fuse type gG / 200 A aM	10A	TA200DU-150	1SAZ421201R1004		0.760
130 ... 175	315 A, fuse type gG / 250 A aM	10A	TA200DU-175	1SAZ421201R1005		0.770
150 ... 200	315 A, fuse type gG / 250 A aM	10A	TA200DU-200	1SAZ421201R1006		0.785
66 ... 90	200 A, fuse type gG / 125 A aM	10A	TA200DU-90-V1000 [1]	1SAZ421301R1001		0.755
80 ... 110	224 A, fuse type gG / 160 A aM	10A	TA200DU-110-V1000 [1]	1SAZ421301R1002		0.760
100 ... 135	224 A, fuse type gG / 200 A aM	10A	TA200DU-135-V1000 [1]	1SAZ421301R1003		0.760
110 ... 150	250 A, fuse type gG / 200 A aM	10A	TA200DU-150-V1000 [1]	1SAZ421301R1004		0.760
130 ... 175	315 A, fuse type gG / 250 A aM	10A	TA200DU-175-V1000 [1]	1SAZ421301R1005		0.770
150 ... 200	315 A, fuse type gG / 250 A aM	10A	TA200DU-200-V1000 [1]	1SAZ421301R1006		0.785

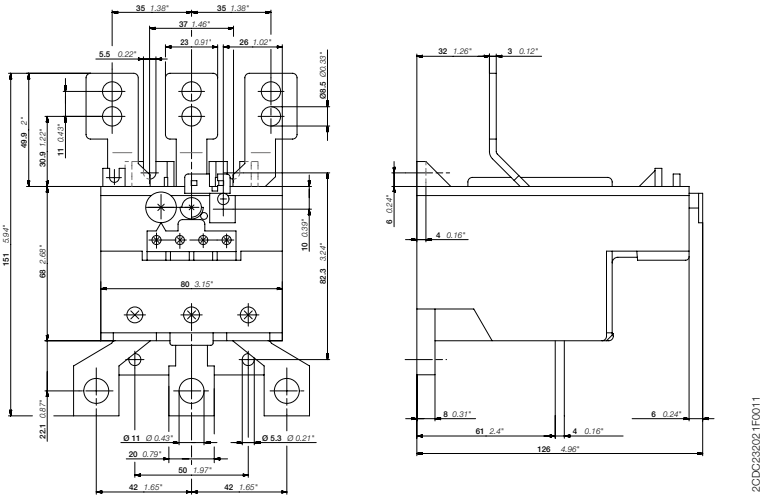
[1] ATEX variant

Ordering details accessories

Suitable for	Description	Type	Order code		Weight (1 pce) kg
TA200DU	Terminal shroud	LT200/A	1SAZ401901R1001		0.090
TA200DU	Single mounting kit	DB200	1SAZ401110R0001		0.225
TA200DU	Reset push button*	KPR-101L	1SFA616162R1014		0.027

*Note: for more information see catalog 1SFC151004C0201

Main dimensions mm, *inches*



TA200DU

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TA200DU thermal overload relays – 66 to 200 A
Technical data

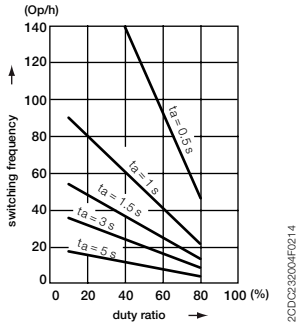
Main circuit – Utilization characteristics according to IEC/EN

Type	TA200DU / TA200DU-V1000
Standards	IEC/EN 60947-1, IEC/EN 60947-4-1
Rated operational voltage U_e	690 V AC
Rated frequency	DC, 50/60 Hz
Frequency range	0 ... 400 Hz
Trip class	10A
Number of poles	3
Duty time	100%
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	690 V AC

Auxiliary circuit according to IEC/EN

Type		TA200DU / TA200DU-V1000
Rated operational voltage U_e		500 V AC, 440 V DC
Conventional free air thermal current I_{th}	**N.C., 95-96**	10 A
	N.O., 97-98	6 A
Rated frequency		DC, 50/60 Hz
Number of poles		1 N.O. + 1 N.C.
I_e / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category		
110-120 V	**N.C., 95-96**	3.00 A
	N.O., 97-98	1.50 A
220-230-240 V	**N.C., 95-96**	3.00 A
	N.O., 97-98	1.50 A
440 V	**N.C., 95-96**	1.00 A
	N.O., 97-98	1.00 A
480-500 V	**N.C., 95-96**	1.00 A
	N.O., 97-98	1.00 A
I_e / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category		
24 V	**N.C., 95-96**	1.25 A
	N.O., 97-98	1.25 A
60 V	**N.C., 95-96**	0.25 A
	N.O., 97-98	0.25 A
110-120-125 V	**N.C., 95-96**	0.25 A
	N.O., 97-98	0.25 A
250 V	**N.C., 95-96**	0.12 A
	N.O., 97-98	0.04 A
Minimum switching capacity		17 V / 3 mA
Short-circuit protective device	**N.C., 95-96**	10 A, fuse type gG
	N.O., 97-98	6 A, fuse type gG
Rated impulse withstand voltage U_{imp}		6 kV
Rated insulation voltage U_i		690 V

Technical diagram – Intermittent periodic duty



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t_a: Motor starting time

2CDC106038C0201

TA200DU thermal overload relays – 66 to 200 A
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	TA200DU / TA200DU-V1000
Standards	UL 508, CSA 22.2 No. 14
Maximum operational voltage	600 V AC
Trip rating	125% of FLA
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"
Short-circuit protective device	See table "Full load amps and short-circuit protective device"

Auxiliary circuit according to UL/CSA

Type		TA200DU / TA200DU-V1000
Contact rating	N.C., 95-96	C600
	N.O., 97-98	B600
Conventional thermal current		5 A

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device 480 / 600 V AC						
		Short circuit rating RMS symmetrical	Fuse type	Listed circuit breaker	Short circuit rating RMS symmetrical	Fuse type	Short circuit rating RMS symmetrical	Listed circuit breaker
TA200DU-90 / TA200DU-90-V1000	90 A	10 kA	250 A, K5 / RK5	225 A	100 kA	250 A, Class J	100 kA	250 A
TA200DU-110 / TA200DU-110-V1000	110 A	10 kA	250 A, K5 / RK5	225 A	100 kA	250 A, Class J	100 kA	250 A
TA200DU-135 / TA200DU-135-V1000	135 A	10 kA	300 A, K5 / RK5	225 A	100 kA	250 A, Class J	100 kA	250 A
TA200DU-150 / TA200DU-150-V1000	150 A	10 kA	300 A, K5 / RK5	225 A	100 kA	250 A, Class J	100 kA	250 A
TA200DU-175 / TA200DU-175-V1000	175 A	10 kA	300 A, K5 / RK5	225 A	100 kA	300 A, Class J	100 kA	300 A
TA200DU-200 / TA200DU-200-V1000	200 A	10 kA	400 A, K5 / RK5	400 A	100 kA	400 A, Class J	100 kA	400 A

2CDC106038C0201

TA200DU thermal overload relays – 66 to 200 A
Technical data

General technical data

Type		TA200DU / TA200DU-V1000
Pollution degree		3
Phase loss sensitive		Yes
Ambient air temperature		
Operation	Open - compensated	-25 ... +55 °C
	Open	-25 ... +55 °C
Storage		-40 ... +70 °C
Ambient air temperature compensation		Acc. to IEC/EN60947-4-1
Maximum operating altitude permissible		2000 m
Resistance to shock acc. to IEC 60068-2-27		12g / 15 ms
Mounting position		Position 1-6
Mounting		Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit
Degree of protection	Housing	IP20
	Main circuit terminals	IP00

Electrical connection

Main circuit

Type			TA200DU / TA200DU-V1000
Connecting capacity			
	Rigid	**1 x**	25 ... 120 mm²
	Flexible	**1 x**	25 ... 120 mm²
	Stranded acc. to UL/CSA	**1 x**	AWG 4 ... 0000
	Flexible acc. to UL/CSA	**1 x**	AWG 4 ... 0000
	Lugs		L > 10 mm
Tightening torque			25 Nm / 220 lb.in
Recommended screw driver			Open bars

Auxiliary circuit

Type			TA200DU / TA200DU-V1000
Connecting capacity			
	Rigid	**1 x or 2 x**	0.75 ... 4 mm²
	Flexible with ferrule	**1 x or 2 x**	0.75 ... 2.5 mm²
	Flexible with insulated ferrule	**1 x or 2 x**	0.75 ... 2.5 mm²
	Flexible	**1 x or 2 x**	0.75 ... 2.5 mm²
	Stranded acc. to UL/CSA	**1 x or 2 x**	AWG 18 ... 14
	Flexible acc. to UL/CSA	**1 x or 2 x**	AWG 18 ... 14
Stripping length			9 mm
Tightening torque			0.8 ... 1.3 Nm / 12 lb.in
Recommended screw driver			M3.5 (Pozidriv 2)

2CDC106038C0201

E16DU, EF19, EF45 electronic overload relays – 0.10 to 45.0 A
Ordering details

2CDC231001F0007

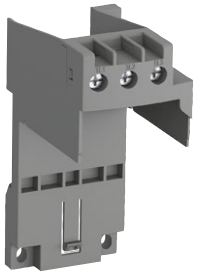
E16DU-1.0

1SBC101147F0010

EF19-18.9

1SBC101149F0010

EF45-30


2CDC231024V0013

DB19EF

2CDC231002V0014

DB45EF

1SFC151224F0002

KPR-101L

Description

The E16DU, EF19 and EF45 are self-supplied electronic overload relays, which means no extra external supply is needed. It offers reliable protection for motors in the event of overload or phase failure. Easy to use like a thermal overload relay and compatible with standard motor applications, the electronic overload relay is convincing, above all, due to its wide setting range, high accuracy, high operational temperature range and the possibility to select a trip class (10E, 20E, 30E). Further features are the temperature compensation, trip contact (N.C.), signal contact (N.O.), automatic or manual reset selectable, trip-free mechanism, STOP and TEST function and a trip indication. The overload relays are connected directly to the contactors. The EF19 and EF45 have ATEX and IECEx certification [1].

Ordering details

Setting range A	Short-circuit protective device	Trip class	Type	Order code		Weight (1 pce) kg
E16DU electronic overload relays						
0.10 ... 0.32	1 A, fuse type gG	10E, 20E, 30E	E16DU-0.32	1SAX111001R1101		0.150
0.30 ... 1.00	4 A, fuse type gG	10E, 20E, 30E	E16DU-1.0	1SAX111001R1102		0.150
0.80 ... 2.70	10 A, fuse type gG	10E, 20E, 30E	E16DU-2.7	1SAX111001R1103		0.150
2.00 ... 6.30	20 A, fuse type gG	10E, 20E, 30E	E16DU-6.3	1SAX111001R1104		0.150
5.70 ... 18.9	50 A, fuse type gG	10E, 20E, 30E	E16DU-18.9	1SAX111001R1105		0.150
EF19 electronic overload relays [1]						
0.10 ... 0.32	1 A, fuse type gG	10E, 20E, 30E	EF19-0.32	1SAX121001R1101		0.158
0.30 ... 1.00	4 A, fuse type gG	10E, 20E, 30E	EF19-1.0	1SAX121001R1102		0.158
0.80 ... 2.70	10 A, fuse type gG	10E, 20E, 30E	EF19-2.7	1SAX121001R1103		0.158
1.90 ... 6.30	20 A, fuse type gG	10E, 20E, 30E	EF19-6.3	1SAX121001R1104		0.158
5.70 ... 18.9	50 A, fuse type gG	10E, 20E, 30E	EF19-18.9	1SAX121001R1105		0.158
EF45 electronic overload relays [1]						
9.00 ... 30.0	160 A, fuse type gG	10E, 20E, 30E	EF45-30	1SAX221001R1101		0.362
15.0 ... 45.0	160 A, fuse type gG	10E, 20E, 30E	EF45-45	1SAX221001R1102		0.362

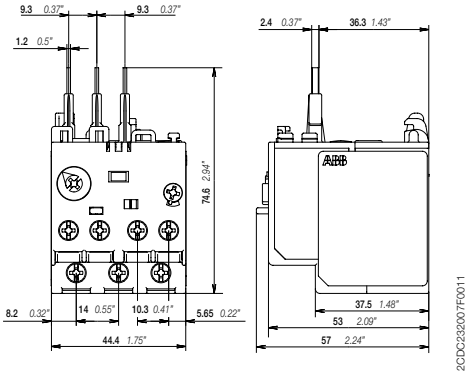
[1] ATEX is valid for products produced from week 42, 2014. IECEx is valid for products produced from week 15, 2017.

Ordering details accessories

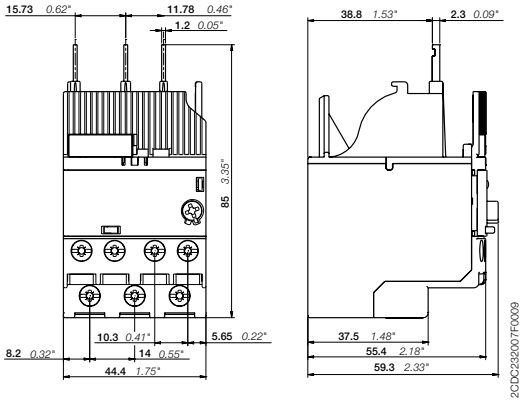
Suitable for	Description	Type	Order code		Weight (1 pce) kg
E16DU	Single mounting kit	DB16E	1SAX101110R0001		0.035
EF19	Single mounting kit	DB19EF	1SAX101910R1001		0.046
EF45	Single mounting kit	DB45EF	1SAX201910R0001		0.100
E16DU, EF19, EF45	Reset push button [2]	KPR-101L	1SFA616162R1014		0.019

[2] Note: for more information see catalog 1SFC151004C0201

Main dimensions mm, *inches*



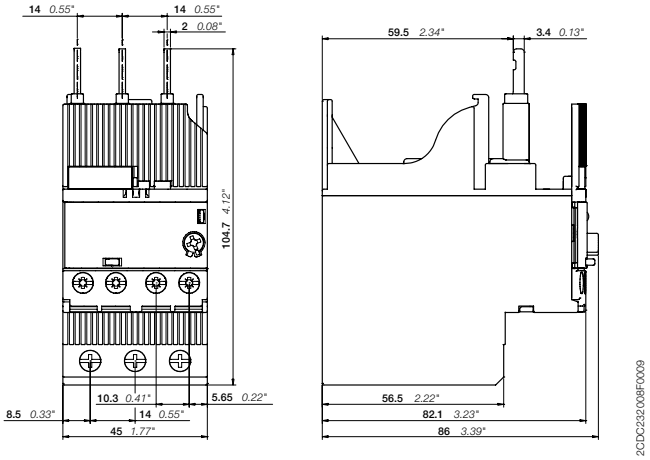
E16DU



EF19

2CDC107033C0F01

E16DU, EF19, EF45 electronic overload relays – 0.10 to 45.0 A
Technical data



EF45

7

Main circuit – Utilization characteristics according to IEC/EN

Type	E16DU	EF19	EF45
Standards	IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1		
Rated operational voltage U_e	690 V AC		
Rated frequency	50/60 Hz – not suitable for DC applications		
Trip class	10E, 20E, 30E, selectable		
Number of poles	3		
Duty time	100%		
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"		
Rated impulse withstand voltage U_{imp}	6 kV		
Rated insulation voltage U_i	690 V AC		

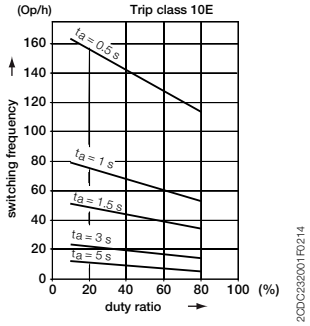
Auxiliary circuit according to IEC/EN

Type		E16DU	EF19	EF45
Rated operational voltage U_e		600 V AC / DC		
Conventional free air thermal current I_{th}		6 A		
Rated frequency		DC, 50/60 Hz		
Number of poles		1 N.C. + 1 N.O.		
I_e / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category				
110-120 V	**50/60 Hz**	3.00 A		
220-230-240 V	**50/60 Hz**	3.00 A		
440 V	**50/60 Hz**	1.10 A		
480-500 V	**50/60 Hz**	0.75 A		
I_e / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category				
24 V		1.50 A		
60 V		0.55 A		
110-120-125 V		0.55 A		
250 V		0.27 A		
Minimum switching capacity		12 V / 3 mA		
Short-circuit protective devices		6 A, fuse type gG		
Rated impulse withstand voltage U_{imp}		6 kV		
Rated insulation voltage U_i		690 V		

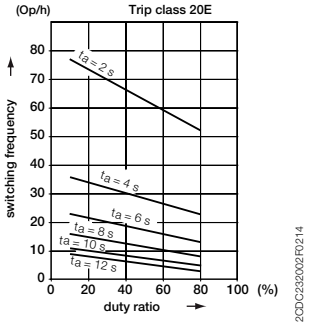
2CDC107033C0201

E16DU, EF19, EF45 electronic overload relays – 0.10 to 45.0 A
Technical data

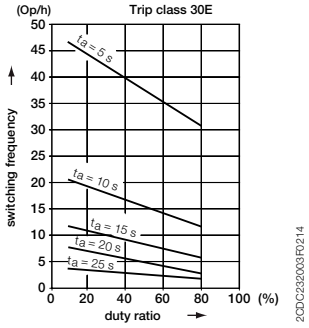
Technical diagram – Intermittent periodic duty



Trip class 10E



Trip class 20E



Trip class 30E

Main circuit – Utilization characteristics according to UL/CSA

Type	E16DU	EF19	EF45
Standards	UL 508, CSA 22.2 No. 14		
Maximum operational voltage	600 V AC		
Trip rating	125% of FLA		
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"		
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"		
Short-circuit protective device	See table "Full load amps and short-circuit protective device"		

Auxiliary circuit according to UL/CSA

Type		E16DU	EF19	EF45
Contact rating	N.C., 95-96	B600, Q300	B600, Q600	
	N.O., 97-98	B600, Q300	B600, Q600	
Conventional free-air thermal current		6 A		

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device					
		480 V AC		600 V AC			
		SCCR	Fuse type	SCCR	Fuse type	SCCR	Fuse type
E16DU-0.32	0.32 A	50 kA	2 A, Class J	5 kA	2 A, K5 / RK5	100 kA	2 A, Class J
E16DU-1.0	1.00 A	50 kA	2 A, K5 / RK5	5 kA	2 A, K5 / RK5	100 kA	2 A, Class J
E16DU-2.7	2.70 A	50 kA	4 A, K5 / RK5	5 kA	4 A, K5 / RK5	100 kA	4 A, Class J
E16DU-6.3	6.30 A	50 kA	15 A, K5 / RK5	5 kA	15 A, K5 / RK5	100 kA	15 A, Class J
E16DU-18.9	18.90 A	50 kA	30 A, K5 / RK5	5 kA	30 A, K5 / RK5	100 kA	30 A, Class J

Type	Full load amps (FLA)	Short-circuit protective device					
		480 V AC		600 V AC			
		SCCR	Fuse type	SCCR	Fuse type	SCCR	Fuse type
EF19-0.32	0.32 A	50 kA	2 A, Class J	5 kA	2 A, K5 / RK5	100 kA	2 A, Class J
EF19-1.0	1.00 A	50 kA	2 A, K5 / RK5	5 kA	2 A, K5 / RK5	100 kA	2 A, Class J
EF19-2.7	2.70 A	50 kA	4 A, K5 / RK5	5 kA	4 A, K5 / RK5	100 kA	4 A, Class J
EF19-6.3	6.30 A	50 kA	15 A, K5 / RK5	5 kA	15 A, K5 / RK5	100 kA	15 A, Class J
EF19-18.9	18.90 A	50 kA	30 A, K5 / RK5	5 kA	30 A, K5 / RK5	100 kA	30 A, Class J

Type	Full load amps (FLA)	Short-circuit protective device					
		480 V AC		600 V AC			
		SCCR	Fuse type	SCCR	Fuse type	SCCR	Fuse type
EF45-30	30 A	18 kA	150 A, K5 / RK5	18 kA	150 A, K5 / RK5	100 kA	150 A, Class J
EF45-45	45 A	18 kA	200 A, K5 / RK5	18 kA	200 A, K5 / RK5	100 kA	200 A, Class J

2CDC107033C0201

E16DU, EF19, EF45 electronic overload relays – 0.10 to 45.0 A
Technical data

General data

			E16DU	EF19	EF45
Type					
Pollution degree			3		
Phase loss sensitive			Yes		
Ambient air temperature					
	Operation	Open - compensated	-25 ... +70 °C		
	Storage		-50 ... +85 °C		
Ambient air temperature compensation			Acc. to IEC/EN60947-4-1		
Maximum operating altitude permissible			2000 m		
Resistance to shock acc. to IEC 60068-2-27			15g / 11 ms pulse	25g / 11 ms pulse	
Resistance to vibrations acc. to IEC 60068-2-6			5g / 3 ... 150 Hz	3g / 3 ... 150 Hz	
Mounting position			Position 1-6		
Mounting			Mount on the contactor and tighten the screws of the main circuit terminals		
Degree of protection	Housing		IP20		
	Main circuit terminals		IP20		

Electrical connection

Main circuit

			E16DU	EF19	EF45
Type					
Connecting capacity					
	Rigid	**1 or 2 x**	1 ... 4 mm²	1 ... 4 mm²	2.5 ... 16 mm²
	Flexible with insulated ferrule	**1 or 2 x**	0.75 ... 2.5 mm²	0.75 ... 2.5 mm²	2.5 ... 10 mm²
	Stranded acc. to UL/CSA	**1 or 2 x**	AWG 16-10	AWG 16-10	AWG 14-6
	Flexible acc. to UL/CSA	**1 or 2 x**	AWG 16-10	AWG 16-10	AWG 14-6
Stripping length			9 mm	9 mm	13 mm
Tightening torque			0.8 ... 1.5 Nm / 7 ... 13 lb.in	0.8 ... 1.5 Nm / 7 ... 13 lb.in	2.3 ... 2.6 Nm / 20 ... 22 lb.in
Recommended screw driver			M3.5 (Pozidriv 2)	M3.5 (Pozidriv 2)	M3.5 (Pozidriv 2)

Auxiliary circuit

			E16DU	EF19	EF45
Type					
Connecting capacity					
	Rigid	**1 or 2 x**	1 ... 4 mm²	1 ... 4 mm²	1 ... 4 mm²
	Flexible with ferrule	**1 or 2 x**	0.75 ... 2.5 mm²	0.75 ... 2.5 mm²	0.75 ... 2.5 mm²
	Flexible with insulated ferrule	**1 or 2 x**	0.75 ... 2.5 mm²	0.75 ... 2.5 mm²	0.75 ... 2.5 mm²
	Flexible	**1 or 2 x**	0.75 ... 2.5 mm²	0.75 ... 2.5 mm²	0.75 ... 2.5 mm²
	Stranded acc. to UL/CSA	**1 or 2 x**	AWG 16-10	AWG 18-10	AWG 18-10
	Flexible acc. to UL/CSA	**1 or 2 x**	AWG 16-10	AWG 18-10	AWG 18-10
Stripping length			9 mm	9 mm	9 mm
Tightening torque			0.8 ... 1.2 Nm / 7 ... 11 lb.in	0.8 ... 1.2 Nm / 7 ... 11 lb.in	0.8 ... 1.2 Nm / 7 ... 11 lb.in
Recommended screw driver			M3 (Pozidriv 2)	M3 (Pozidriv 2)	M3 (Pozidriv 2)

2CDC107033C0201

EF65, EF96, EF146 electronic overload relays – 20 to 150 A
Ordering details

2CDC231001F0012

EF65-70

2CDC231002F0012

EF96-100

2CDC231003F0012

EF146-150

2CDC231001V0015

DB96

2CDC231002V0015

DB96 + EF96

1SFC151224F0002

KPR-101L

Description

The EF65, EF96 and EF146 are self-supplied electronic overload relays, which means no extra external supply is needed. It offers reliable protection for motors in the event of overload or phase failure. Easy to use like a thermal overload relay and compatible with standard motor applications, the electronic overload relay is convincing, above all, due to its wide setting range, high accuracy, high operational temperature range and the possibility to select a trip class (10E, 20E, 30E). Further features are the temperature compensation, trip contact (N.C.), signal contact (N.O.), automatic or manual reset selectable, trip-free mechanism, STOP and TEST function and a trip indication. The overload relays are connected directly to the contactors. The EF65, EF96 and EF146 have ATEX and IECEx certification [1].

Ordering details

Setting range A	Short-circuit protective device	Trip class	Type	Order code		Weight (1 pce) kg
20 ... 56	160 A, fuse type gG	10E, 20E, 30E	EF65-56	1SAX331001R1102		0.821
25 ... 70	160 A, fuse type gG	10E, 20E, 30E	EF65-70	1SAX331001R1101		0.821
20 ... 56	160A, fuse type gG	10E, 20E, 30E	EF96-56	1SAX341001R1102		0.802
36 ... 100	200 A, fuse type gG	10E, 20E, 30E	EF96-100	1SAX341001R1101		0.802
54 ... 150	315 A, fuse type gG	10E, 20E, 30E	EF146-150	1SAX351001R1101		0.879

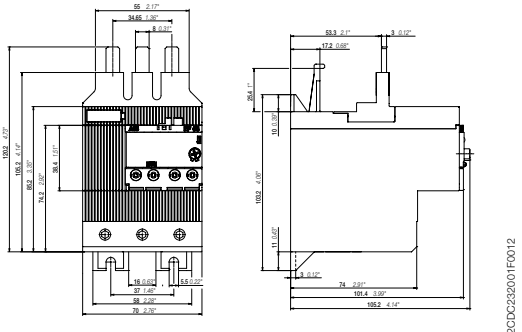
[1] ATEX is valid for products produced from week 42, 2014. ATEX certification is valid for EF65-56 produced from week 47, 2015. IECEx is valid for products produced from week 15, 2017.

Ordering details accessories

Suitable for	Description	Type	Order code		Weight (1 pce) kg
EF96, TF96	Single mounting kit	DB96	1SAZ901901R1001		0.190
EF65, EF96, EF146	Reset push button [2]	KPR-101L	1SFA616162R1014		0.019

[2] Note: for more information see catalog 1SFC151004C0201

Main dimensions mm, *inches*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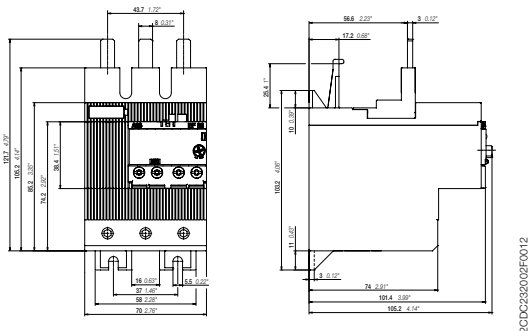
EF65-56 / EF65-70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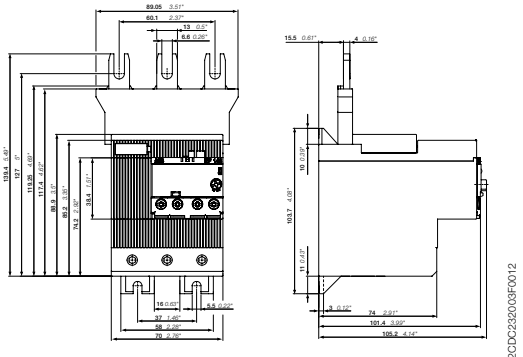
EF96-56 / EF96-100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EF146-150

2CDC107098C0201

EF65, EF96, EF146 electronic overload relays – 20 to 150 A
Technical data

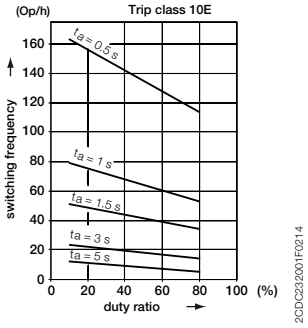
Main circuit – Utilization characteristics according to IEC/EN

Type	EF65, EF96, EF146
Standards	IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1
Rated operational voltage U_e	1000 V AC
Rated frequency	50/60 Hz – not suitable for DC applications
Trip class	10E, 20E, 30E, selectable
Number of poles	3
Duty time	100%
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"
Rated impulse withstand voltage U_{imp}	8 kV
Rated insulation voltage U_i	1000 V

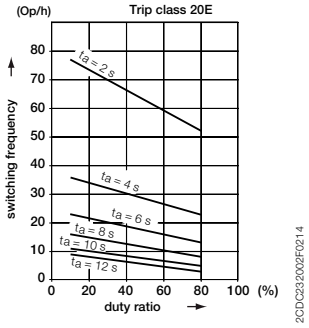
Auxiliary circuit according to IEC/EN

Type		EF65, EF96, EF146
Rated operational voltage U_e		600 V AC / DC
Conventional free air thermal current I_{th}		6 A
Rated frequency		DC, 50/60 Hz
Number of poles		1 N.C. + 1 N.O.
I_e / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category		
110-120 V	**50/60 Hz**	3.00 A
220-230-240 V	**50/60 Hz**	3.00 A
400 V	**50/60 Hz**	1.10 A
480-500 V	**50/60 Hz**	0.75 A
I_e / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category		
24 V		1.50 A
60 V		0.55 A
110-120-125 V		0.55 A
250 V		0.27 A
Minimum switching capacity		12 V / 3 mA
Short-circuit protective device		6 A, fuse type gG
Rated impulse withstand voltage U_{imp}		6 kV
Rated insulation voltage U_i		690 V

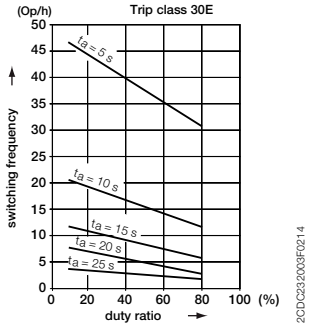
Technical diagram – Intermittent periodic duty



Trip class 10E



Trip class 20E



Trip class 30E

2CDC107078C0201

EF65, EF96, EF146 electronic overload relays – 20 to 150 A
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	EF65, EF96, EF146
Standards	UL 508, CSA 22.2 No. 14, UL 60947-4-1A
Maximum operational voltage	600 V AC
Trip rating	125% of FLA
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"
Short-circuit protective device	See table "Full load amps and short-circuit protective device"

Auxiliary circuit according to UL/CSA

Type		EF65, EF96, EF146
Contact rating	N.C., 95-96	B600, Q600
	N.O., 97-98	B600, Q600
Conventional thermal current		6 A

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device					
		480 V AC		600 V AC			
		SCCR	Fuse type	SCCR	Fuse type	SCCR	Fuse type
EF65-56	56 A	10 kA	150 A, K5/RK5	10 kA	150 A, K5/RK5	100 kA	150 A, J
EF65-70	70 A	10 kA	150 A, K5/RK5	10 kA	150 A, K5/RK5	100 kA	150 A, J
EF96-65	56 A	10 kA	150 A, K5/RK5	10 kA	150 A, K5/RK5	100 kA	150 A, J
EF96-100	100 A	10 kA	200 A, K5/RK5	10 kA	200 A, K5/RK5	100 kA	225 A, J
EF146-150	150 A	10 kA	250 A, K5/RK5	10 kA	250 A, K5/RK5	100 kA	350 A, J

2CDC107098C0201

EF65, EF96, EF146 electronic overload relays – 20 to 150 A
Technical data

General data

Type			EF65, EF96, EF146
Pollution degree			3
Phase loss sensitive			Yes
Ambient air temperature			
	Operation	Open - compensated	-25 ... +70 °C
	Storage		-50 ... +85 °C
Ambient air temperature compensation			Acc. to IEC/EN 60947-4-1
Maximum operating altitude permissible			2000 m
Resistance to shock acc. to IEC 60068-2-27			15g / 11 ms
Resistance to vibrations acc. to IEC 60068-2-6			5g / 3 ... 150 Hz
Mounting position			Position 1-6
Mounting			Mount on the contactor and tighten the screws of the main circuit terminals
Degree of protection	Housing		IP20
	Main circuit terminals		IP10

Electrical connection

Main circuit

Type			EF65	EF96	EF146
Connecting capacity					
	Rigid [1]	**1 x**	4 ... 35 mm²	4 ... 70 mm²	10 ... 95 mm²
		2 x	4 ... 35 mm²	4 ... 35 mm²	10 ... 35 mm²
	Flexible [1]	**1 x**	4 ... 35 mm²	4 ... 50 mm²	10 ... 70 mm²
		2 x	2.5 ... 35 mm²	4 ... 35 mm²	10 ... 35 mm²
	Stranded acc. to UL/CSA	**1 x**	AWG 10-2	AWG 10-2	AWG 6-00
		2 x			AWG 6-2
	Flexible acc. to UL/CSA	**1 x**	AWG 10-2	AWG 10-2	AWG 6-00
		2 x			AWG 6-2
Stripping length			20 mm	20 mm	20 mm
Tightening torque			4 Nm / 35 lb.in	6 Nm / 55 lb.in	10 Nm / 70 lb.in
Recommended screw driver			M8 (Pozidriv 2)	M8 (Hexagon 4)	M8 (Hexagon 4)

[1] Only one wire size allowed when using 2 wires

Auxiliary circuit

Type			EF65, EF96, EF146
Connecting capacity			
	Rigid	**1 or 2 x**	1 ... 4 mm²
	Flexible with ferrule	**1 or 2 x**	0.75 ... 2.5 mm²
	Flexible with insulated ferrule	**1 or 2 x**	0.75 ... 2.5 mm²
	Flexible	**1 or 2 x**	0.75 ... 2.5 mm²
	Stranded acc. to UL/CSA	**1 or 2 x**	AWG 18-10
	Flexible acc. to UL/CSA	**1 or 2 x**	AWG 18-10
Stripping length			9 mm
Tightening torque			0.8 ... 1.2 Nm / 7 ... 11 lb.in
Recommended screw driver			M3.5 (Pozidriv 2)

2CDC107078C0201

EF205, EF370 electronic overload relays – 63 to 380 A
Ordering details

EF205-210

EF370-380

KPR-101L

Description

The EF205 and EF370 are self-supplied electronic overload relays, which means no extra external supply is needed. It offers reliable protection for motors in the event of overload or phase failure. Easy to use like a thermal overload relay and compatible with standard motor applications, the electronic overload relay is convincing, above all, due to its wide setting range, high accuracy, high operational temperature range and the possibility to select a trip class (10E, 20E, 30E). Further features are the temperature compensation, trip contact (N.C.), signal contact (N.O.), automatic or manual reset selectable, trip-free mechanism, STOP and TEST function and a trip indication. The overload relays are connected directly to the contactors. The EF205 and EF370 have ATEX and IECEx certification [1].

Ordering details

Setting range A	Short-circuit protective device	Trip class	Type	Order code		Weight (1 pce) kg
63 ... 210	1250 A, fuse type gG	10E, 20E, 30E	EF205-210	1SAX531001R1101		1.210
115 ... 380	1600 A, fuse type gG	10E, 20E, 30E	EF370-380	1SAX611001R1101		1.430

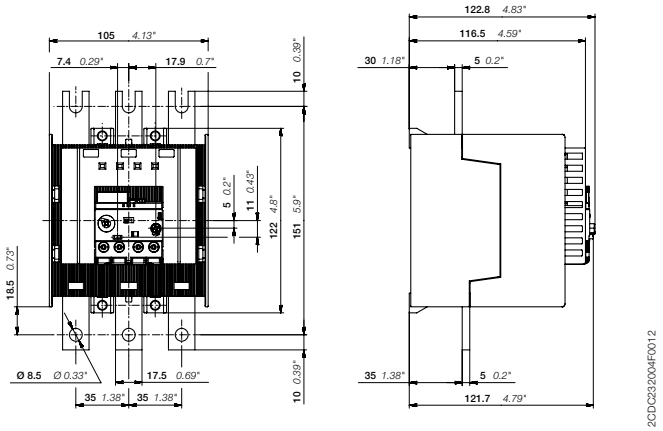
[1] ATEX is valid for products produced from week 42, 2015. IECEx is valid for products produced from week 15, 2017.

Ordering details accessories

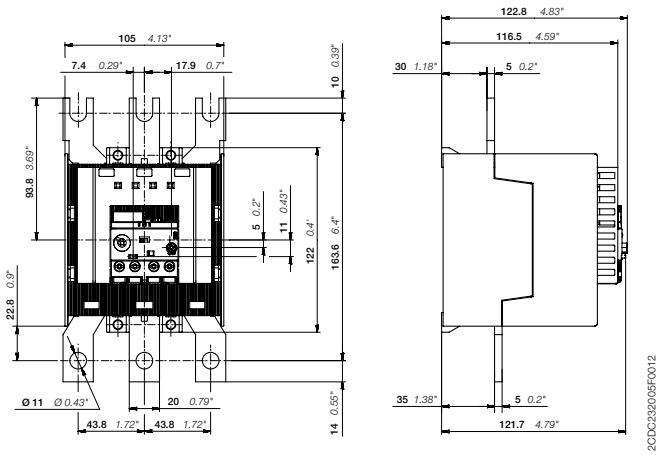
Suitable for	Description	Type	Order code		Weight (1 pce) kg
EF205, EF370	Reset push button [2]	KPR-101L	1SFA616162R1014		0.027
EF205	Terminal shroud	LT200E	1SAX501904R0001		0.085
EF370	Terminal shroud	LT320E	1SAX601904R0001		0.105

[2] Note: for more information see catalog 1SFC151005C0201 rev B

Main dimensions mm, *inches*



EF205-210



EF370-380

2CDC107040C0201

EF205, EF370 electronic overload relays – 63 to 380 A
Technical data

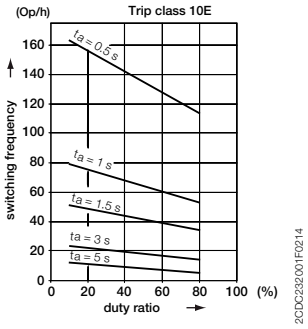
Main circuit – Utilization characteristics according to IEC/EN

Type	EF205, EF370
Standards	IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1
Rated operational voltage U_e	1000 V AC
Rated frequency	50/60 Hz – not suitable for DC applications
Trip class	10E, 20E, 30E, selectable
Number of poles	3
Duty time	100%
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"
Rated impulse withstand voltage U_{imp}	8 kV
Rated insulation voltage U_i	1000 V

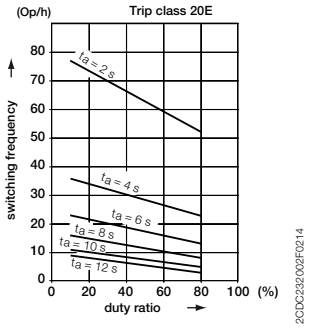
Auxiliary circuit according to IEC/EN

Type		EF205, EF370
Rated operational voltage U_e		600 V AC / DC
Conventional free air thermal current I_{th}		6 A
Rated frequency		DC, 50/60 Hz
Number of poles		1 N.C. + 1 N.O.
I_e / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category		
110-120 V	**50/60 Hz**	3.00 A
220-230-240 V	**50/60 Hz**	3.00 A
400 V	**50/60 Hz**	1.10 A
480-500 V	**50/60 Hz**	0.75 A
I_e / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category		
24 V		1.50 A
60 V		0.55 A
110-120-125 V		0.55 A
250 V		0.27 A
Minimum switching capacity		12 V / 3 mA
Short-circuit protective device		6 A, fuse type gG
Rated impulse withstand voltage U_{imp}		6 kV
Rated insulation voltage U_i		690 V

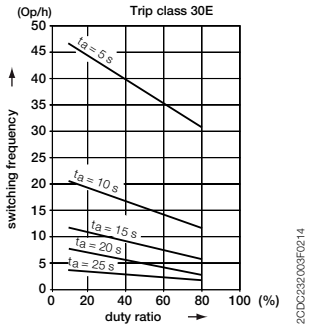
Technical diagram – Intermittent periodic duty



Trip class 10E



Trip class 20E



Trip class 30E

2CDC107040C0901

EF205, EF370 electronic overload relays – 63 to 380 A
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	EF205, EF370
Standards	UL 508, CSA 22.2 No. 14, UL 60947-4-1A
Maximum operational voltage	600 V AC
Trip rating	125% of FLA
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"
Short-circuit protective device	See table "Full load amps and short-circuit protective device"

Auxiliary circuit according to UL/CSA

Type		EF205, EF370
Contact rating	N.C., 95-96	B600, Q600
	N.O., 97-98	B600, Q600
Conventional thermal current		6 A

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device					
		480 V AC		600 V AC			
		SCCR	Fuse type	SCCR	Fuse type	SCCR	Fuse type
EF205-210	210 A	10 kA	400 A, R5/RK5	10kA	400 A, R5/RK5	100 kA	400 A, J
EF370-380	380 A	18 kA	800 A, L/T	18kA	800 A, L/T	-	-

2CDC107040C0201

EF205, EF370 electronic overload relays – 63 to 380 A
Technical data

General data

			EF205	EF370
Type				
Pollution degree			3	
Phase loss sensitive			Yes	
Ambient air temperature				
	Operation	Open - compensated	-25 ... +70 °C	
	Storage		-50 ... +85 °C	
Ambient air temperature compensation			Acc. to IEC/EN 60947-4-1	
Maximum operating altitude permissible			2000 m	
Resistance to shock acc. to IEC 60068-2-27			25g / 11 ms	
Resistance to vibrations acc. to IEC 60068-2-6			5g / 3 ... 150 Hz	
Mounting position			Position 1-6	
Mounting			Mount on the contactor and tighten the screws of the main circuit terminals	
Degree of protection	Housing		IP20	
	Main circuit terminals		IP20	

Electrical connection

Main circuit

			EF205	EF370
Type				
Connecting capacity				
	Rigid	**1 x**	16 ... 185 mm²	50 ... 240 mm²
		2 x	16 ... 120 mm²	50 ... 150 mm²
	Flexible	**1 x**	16 ... 185 mm²	50 ... 240 mm²
		2 x	16 ... 120 mm²	50 ... 150 mm²
	Lugs	**L ≤**	24 mm	32 mm
	Bars	**Ø >**	8 mm	10 mm
	Stranded acc. to UL/CSA	**1 x**	AWG 6-0000	AWG 1-500 kcmil
		2 x	AWG 6-0000	AWG 1-500 kcmil
	Flexible acc. to UL/CSA	**1 x**	AWG 6-0000	AWG 1-500 kcmil
		2 x	AWG 6-0000	AWG 1-500 kcmil
Stripping length			-	-
Tightening torque			18 Nm / 160 lb.in	28 Nm / 247 lb.in
Recommended screw driver			M8	M10

Auxiliary circuit

			EF205, EF370
Type			
Connecting capacity			
	Rigid	**1 or 2 x**	1 ... 4 mm²
	Flexible with ferrule	**1 or 2 x**	0.75 ... 2.5 mm²
	Flexible with insulated ferrule	**1 or 2 x**	0.75 ... 2.5 mm²
	Flexible	**1 or 2 x**	0.75 ... 2.5 mm²
	Stranded acc. to UL/CSA	**1 or 2 x**	AWG 18-10
	Flexible acc. to UL/CSA	**1 or 2 x**	AWG 18-10
Stripping length			9 mm
Tightening torque			0.8 ... 1.2 Nm / 7 ... 11 lb.in
Recommended screw driver			M3.5 (Pozidriv 2)

2CDC107040C0901

EF460, EF750 electronic overload relays – 150 to 800 A
Ordering details

2CDC231013F0013

EF460-500

2CDC231014F0013

EF750-800

1SFC151224F0002

KPR-101L

Description

The EF460 and EF750 are self-supplied electronic overload relays, which means no extra external supply is needed. It offers reliable protection for motors in the event of overload or phase failure. Easy to use like a thermal overload relay and compatible with standard motor applications, the electronic overload relay is convincing, above all, due to its wide setting range, high accuracy, high operational temperature range and the possibility to select a trip class (10E, 20E, 30E). Further features are the temperature compensation, trip contact (N.C.), signal contact (N.O.), automatic or manual reset selectable, trip-free mechanism, STOP and TEST function and a trip indication. Busbar kits are available as accessory for contactor mounting. The EF460 and EF750 have ATEX and IECEx certification [1].

Ordering details

Setting range A	Short-circuit protective device	Trip class	Type	Order code		Weight (1 pce) kg
EF460 electronic overload relay [1]						
150 ... 500	690 V: 630 A, Type gG 1000 V: 1600 A, Type gG	10E, 20E, 30E	EF460-500	1SAX721001R1101		1.170
EF750 electronic overload relay [1]						
250 ... 800	690 V: 800 A, Type gG 1000 V: 1600 A, Type gG	10E, 20E, 30E	EF750-800	1SAX821001R1101		3.905

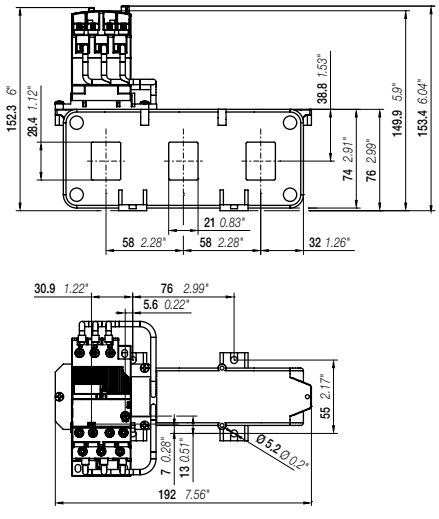
[1] ATEX is valid for products produced from week 42, 2014. IECEx is valid for products produced from week 15, 2017.

Ordering details accessories

Suitable for	Description	Type	Order code		Weight (1 pce) kg
EF460, EF750	Reset push button [2]	KPR-101L	1SFA616162R1014		0.027
EF460	Terminal shroud	LT460EF	1SAX701904R0002		0.320
EF750	Terminal shroud	LT750EF	1SAX801904R0002		0.440
EF460	DT500/AF460-S Mounting Kit short for mounting of EF460DU on AF460	DT500/ AF460-S	1SAX701902R1011		0.635
EF460	DT500/AF460-L Mounting Kit long for mounting of EF460DU on AF460	DT500/ AF460-L	1SAX701902R1001		0.740
EF750	DT800/AF750-S Mounting Kit short for mounting of EF750DU on AF750	DT800/ AF750-S	1SAX801902R1011		1.000
EF750	DT800/AF750-L Mounting Kit long for mounting of EF750DU on AF750	DT800/ AF750-L	1SAX801902R1001		1.475

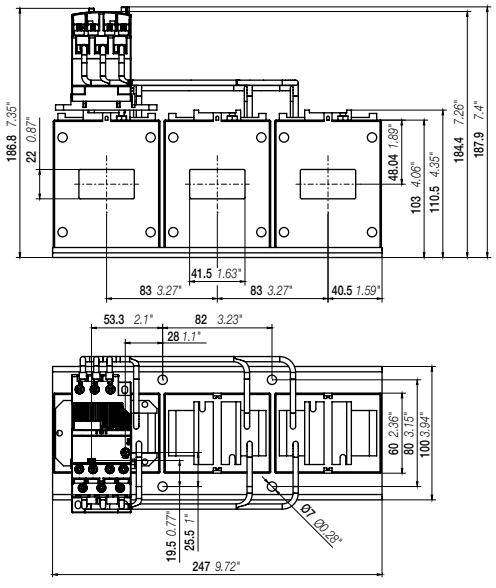
[2] Note: for more information see catalog 1SFC151004C0201

Main dimensions mm, *inches*



2CDC232008F0013

EF460-500



2CDC232009F0013

EF750-800

2CDC1070045C0201

EF460, EF750 electronic overload relays – 150 to 800 A
Technical data

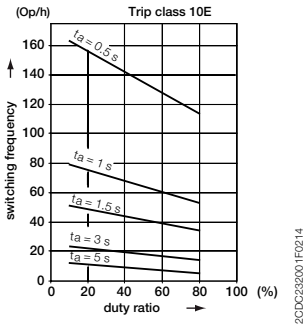
Main circuit – Utilization characteristics according to IEC/EN

Type	EF460	EF750
Standards	IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1	
Rated operational voltage U_e	1000 V AC	
Rated frequency	50/60 Hz – not suitable for DC applications	
Trip class	10E, 20E, 30E, selectable	
Number of poles	3	
Duty time	100%	
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"	
Rated impulse withstand voltage U_{imp}	8 kV	
Rated insulation voltage U_i	1000 V AC	

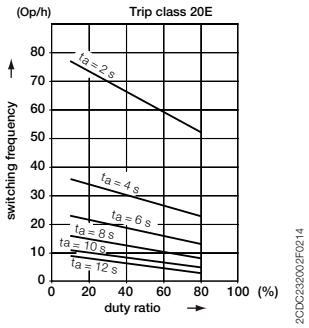
Auxiliary circuit according to IEC/EN

Type		EF460	EF750
Rated operational voltage U_e		600 V AC / DC	
Conventional free air thermal current I_{th}		6 A	
Rated frequency		DC, 50/60 Hz	
Number of poles		1 N.C. + 1 N.O.	
I_e / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category			
110-120 V	**50/60 Hz**	3.00 A	
220-230-240 V	**50/60 Hz**	3.00 A	
400 V	**50/60 Hz**	1.10 A	
480-500 V	**50/60 Hz**	0.75 A	
I_e / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category			
24 V		1.50 A	
60 V		0.55 A	
110-120-125 V		0.55 A	
250 V		0.27 A	
Minimum switching capacity		12 V / 3 mA	
Short-circuit protective device		6 A, fuse type gG	
Rated impulse withstand voltage U_{imp}		6 kV	
Rated insulation voltage U_i		690 V	

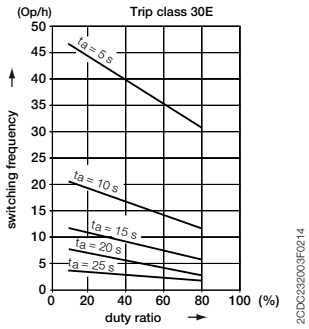
Technical diagram – Intermittent periodic duty



Trip class 10E



Trip class 20E



Trip class 30E

2CDC107045C0201

EF460, EF750 electronic overload relays – 150 to 800 A
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	EF460	EF750
Standards	UL60947-1, UL60947-4-1	
Maximum operational voltage	600 V AC	
Trip rating	125% of FLA	

Auxiliary circuit according to UL/CSA

Type		EF460	EF750
Contact rating	N.C., 95-96	B600, Q300	
	N.O., 97-98	B600, Q300	
Conventional thermal current		5 A	

General data

Type		EF460	EF750
Pollution degree		3	
Phase loss sensitive		Yes	
Ambient air temperature			
Operation	Open - compensated	-25 ... +70 °C	
Storage		-25 ... +70 °C	
Ambient air temperature compensation		Acc. to IEC/EN60947-4-1	
Maximum operating altitude permissible		2000 m	
Resistance to shock acc. to IEC 60068-2-27		25g / 11 ms	
Resistance to vibrations acc. to IEC 60068-2-6		3g / 3 ... 150 Hz	
Degree of protection	Housing	IP20	
	Main circuit terminals	IP00	

Electrical connection

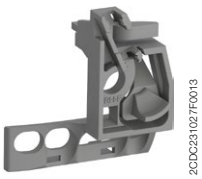
Auxiliary circuit

Type			EF460	EF750
Connecting capacity				
	Rigid	1 or 2 x	1 ... 4 mm²	
	Flexible with ferrule	1 or 2 x	0.75 ... 2.5 mm²	
	Flexible with insulated ferrule	1 or 2 x	0.75 ... 2.5 mm²	
	Flexible	1 or 2 x	0.75 ... 2.5 mm²	
	Stranded acc. to UL/CSA	1 or 2 x	AWG 18-10	
	Flexible acc. to UL/CSA	1 or 2 x	AWG 18-10	
Stripping length			9 mm	
Tightening torque			0.8 ... 1.2 Nm / 7 ... 11 lb.in	
Recommended screw driver			M3.5 (Pozidriv 2)	

2CDC107045C0201

Thermal and electronic overload relays
General accessories

WRB-400



WRH-F

Description

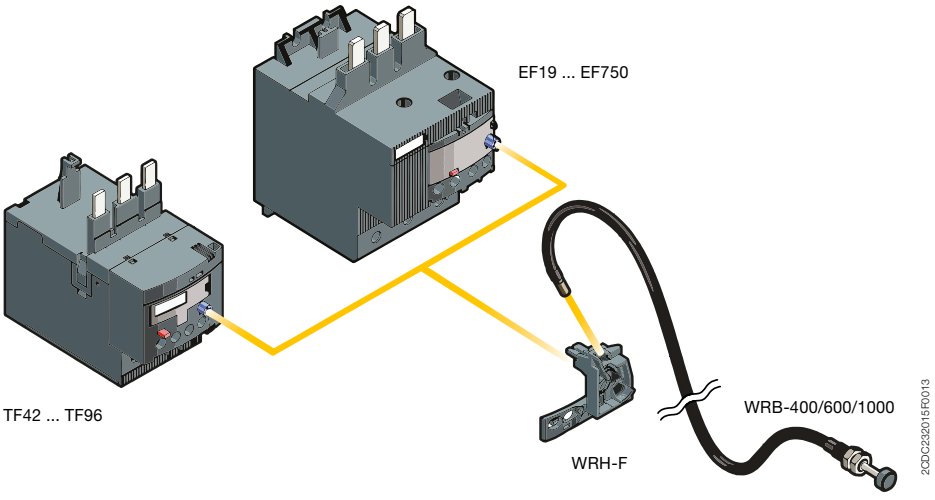
The wire reset is a general accessory for thermal and electronic overloads relays. In installations which are difficult to access, like a motor control centre or compact cubical, the accessory allows the user to remotely reset the overload relays.

The wire reset consists of two parts, the bowden wire with actuator and the holder. The actuator should be mounted into a door of a panel. The holder will be mounted on the overload relay. The actuator and holder are connected via the bowden wire.

Ordering details

Suitable for	Description	Length mm	Type	Order code		Weight (1 pce) kg
Holder						
TF42, TF65, TF96, EF19, EF45, EF65, EF96, EF146, EF205, EF370, EF460, EF750	Holder for tool less direct mounting		WRH-F	1SAZ701903R1001		0.006
Bowden wire with actuator						
WRH-F	Bowden wire with actuator, hole diameter: 7.3 mm, maximum panel thickness: 12 mm	400	WRB-400	1SAZ701903R1011		0.030
		600	WRB-600	1SAZ701903R1012		0.040
		1000	WRB-1000	1SAZ701903R1013		0.060
IP54 gasket						
WRB-400 WRB-600 WRB-1000	IP54 Panel seal gasket		WRBG	1SAZ701903R1030		0.037

Overload relays with accessory wire reset (WRH, WRB)



2CDC131059C0201

Notes

RESET
STOP
START

ABB

DRAS and DRAF enclosed starters

DRAS enclosed starter

Ordering details **8**/2
Control supply wiring versions **8**/3
Wiring diagram **8**/3
Main dimensions **8**/3
Voltage code table **8**/4

DRAF enclosed starter

Experience reliable and easy to install motor starting **8**/6
Ordering details **8**/8
Control supply wiring versions **8**/10
Wiring diagram **8**/10
Main dimensions **8**/10

DRAS09 ... DRAS16 enclosed direct-on-line starters
4 to 7.5 kW, protected by thermal overload relays
AC or DC operated

DRAS
+ T16 to be ordered separately

Description

Enclosed direct-on-line (DOL) starters are used for controlling 3-phase asynchronous motors up to 690 V AC.

Each starter is delivered assembled and wired. It contains:

– IP65 compact plastic enclosure with double insulation, equipped with:
  - 1 green flush "I" ON button and 1 red protruding "O" OFF/RESET button
  - 2 quarter-turn, quick fastening screws and a base with 6 cable inlets and outlets via knockouts.
– 1 AS or ASL 3-pole contactor with holding contact
– 1 PE and 1 neutral terminal.

3 versions of control supply wiring are available: phase-to-phase, separate supply or phase-to-neutral.

T16 thermal overload relay has to be ordered separately and choses according to motor's nominal current (see table below).

DRAS, DRASL enclosed DOL starters

IEC - AC-3				Rated control circuit voltage Uc Other control voltages see AS voltage code table		Control supply wiring	Type	Order code		Weight Pkg (1 pce)
Rated operational power 220 V 230 V 240 V	400 V	500 V	max. current θ ≤ 40 °C Ue=400 V							
kW	kW	kW	A	V 50/60 Hz	V DC					kg
AC operated with AS 3-pole contactors										
2.2	4	4	9	24	-	Separate supply	DRAS09-20S	1SBK104235R2000		0.650
				230	-	Phase-to-neutral	DRAS09-26N	1SBK104135R2600		0.650
				240	-	Phase-to-neutral	DRAS09-27N	1SBK104135R2700		0.650
				400	-	Phase-to-phase	DRAS09-28P	1SBK104035R2800		0.650
				415	-	Phase-to-phase	DRAS09-29P	1SBK104035R2900		0.650
3	5.5	5.5	12	24	-	Separate supply	DRAS12-20S	1SBK114235R2000		0.650
				230	-	Phase-to-neutral	DRAS12-26N	1SBK114135R2600		0.650
				240	-	Phase-to-neutral	DRAS12-27N	1SBK114135R2700		0.650
				400	-	Phase-to-phase	DRAS12-28P	1SBK114035R2800		0.650
				415	-	Phase-to-phase	DRAS12-29P	1SBK114035R2900		0.650
4	7.5	7.5	15.5	24	-	Separate supply	DRAS16-20S	1SBK124235R2000		0.650
				230	-	Phase-to-neutral	DRAS16-26N	1SBK124135R2600		0.650
				240	-	Phase-to-neutral	DRAS16-27N	1SBK124135R2700		0.650
				400	-	Phase-to-phase	DRAS16-28P	1SBK124035R2800		0.650
				415	-	Phase-to-phase	DRAS16-29P	1SBK124035R2900		0.650
DC operated with ASL 3-pole contactors										
2.2	4	4	9	-	24	Separate supply	DRASL09-81S	1SBK104335R8100		0.700
				-	48		DRASL09-83S	1SBK104335R8300		0.700
3	5.5	5.5	12	-	24	Separate supply	DRASL12-81S	1SBK114335R8100		0.700
				-	48		DRASL12-83S	1SBK114335R8300		0.700
4	7.5	7.5	15.5	-	24	Separate supply	DRASL16-81S	1SBK124335R8100		0.700
				-	48		DRASL16-83S	1SBK124335R8300		0.700

T16

T16 thermal overload relays to be ordered separately

Setting range A	Short-circuit protective device	Trip class	Type	Order code		Weight (1 pce) kg
0.10...0.13	0.5 A, Fuse type T	10	T16-0.13	1SAZ711201R1005		0.100
0.13...0.17	1.0 A, Fuse type T		T16-0.17	1SAZ711201R1008		0.100
0.17...0.23			T16-0.23	1SAZ711201R1009		0.100
0.23...0.31			T16-0.31	1SAZ711201R1013		0.100
0.31...0.41	2.0 A, Fuse type gG		T16-0.41	1SAZ711201R1014		0.100
0.41...0.55			T16-0.55	1SAZ711201R1017		0.100
0.55...0.74	4.0 A, Fuse type gG		T16-0.74	1SAZ711201R1021		0.100
0.74...1.00	6.0 A, Fuse type gG		T16-1.0	1SAZ711201R1023		0.100
1.00...1.30			T16-1.3	1SAZ711201R1025		0.100
1.30...1.70	10.0 A, Fuse type gG		T16-1.7	1SAZ711201R1028		0.100
1.70...2.30			T16-2.3	1SAZ711201R1031		0.100
2.30...3.10			T16-3.1	1SAZ711201R1033		0.100
3.10...4.20	20.0 A, Fuse type gG		T16-4.2	1SAZ711201R1035		0.100
4.20...5.70			T16-5.7	1SAZ711201R1038		0.100
5.70...7.60	35.0 A, Fuse type gG		T16-7.6	1SAZ711201R1040		0.100
7.60...10.0			T16-10	1SAZ711201R1043		0.104
10.0...13.0	40.0 A, Fuse type gG		T16-13	1SAZ711201R1045		0.104
13.0...16.0			T16-16	1SAZ711201R1047		0.104

Empty enclosure with push-button

Empty enclosure with push-button

-	-	-	FR16AS-12VARS	1SBN101035R1000		0.394

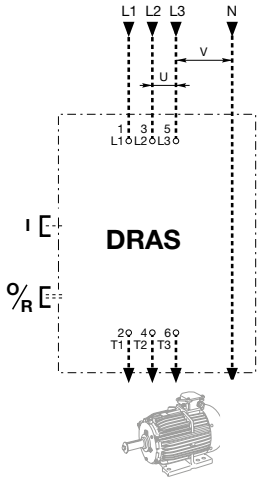
To be completed with AS or ASL contactor, T16 thermal overload relay and MCB-10B (1SFA611610R2001) contact block.

1SBC133001S0201

8

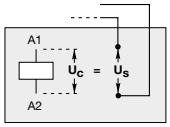
DRAS09 … DRAS16 and DRASL09 … DRASL16 enclosed direct-on-line starters

Control supply wiring versions



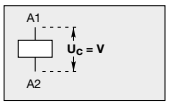
DRAS..S, DRASL..S

Separate supply



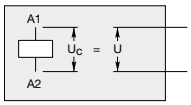
DRAS..N

Phase-to-neutral

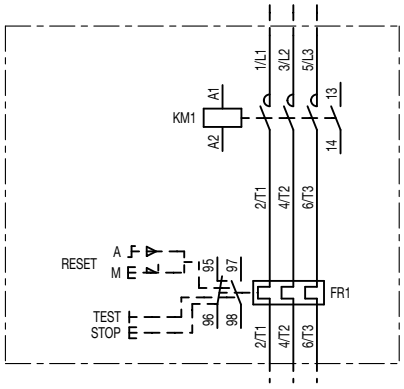


DRAS..P

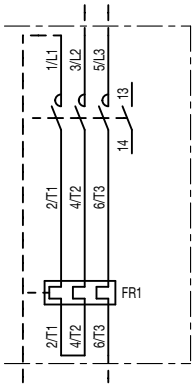
Phase-to-phase



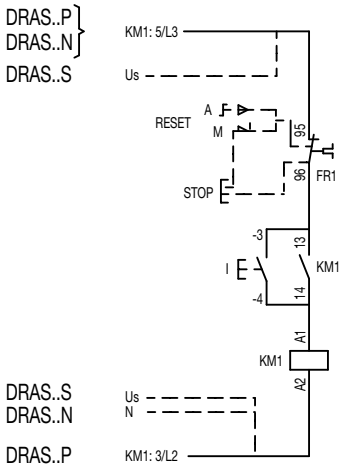
Wiring diagram



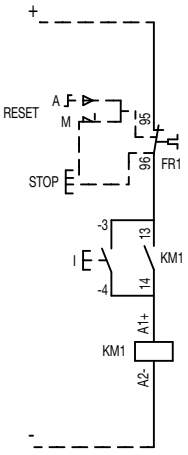
Power circuit



1-phase

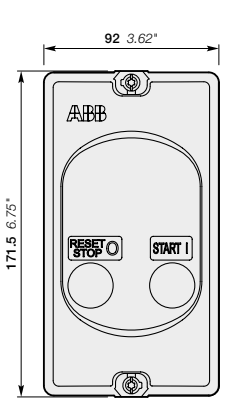


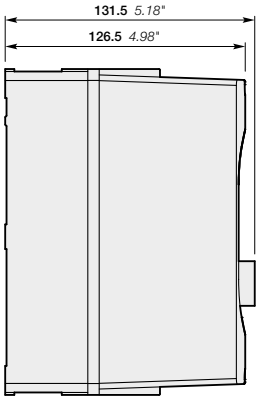
AC local control
DRAS09 ... DRAS16 + T16



DC local control
DRASL09 ... DRASL16..S + T16

Main dimensions mm, *inches*





DRAS09, DRAS12, DRAS16
DRASL09, DRASL12, DRASL16

Cable inlets		Cable outlet
Enclosure top	Enclosure back	Enclosure bottom
2 x ø 20.5/25.5 mm	2 x ø 20.5 mm	2 x ø 20.5/25.5 mm
2 x ø *0.81/1.00*"	2 x ø *0.81*"	2 x ø *0.81/1.00*"

ø 20.5mm - ø *0.81*" for ISO M20
ø 25.5mm - ø *1.00*" for ISO M25

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Voltage code table

DRAS09 ... DRAS16 and DRASL09 ... DRASL16 enclosed DOL starters

Type

DR AS16 - 26N

Contactor type

AS	AC operated
ASL	DC operated

AS contactors AC coil code	50 Hz	60 Hz
20 S	24 V	24 V
21 S	42 V	42 V
22 S	48 V	48 V
16 N	-	120 V
23 N	110 V	110 V
24 N	115 V	115 V
25 N	220 V	220 V
26 N	**230 V**	**230 V**
27 N	240 V	240 V
13 P	380 V	380 V
17 P	-	277 V
28 P	400 V	400 V
29 P	415 V	415 V

ASL contactors DC coil code	
81 S	24 V
83 S	48 V

Control supply wiring	
S	Separate supply
N	Phase-to-neutral
P	Phase-to-phase

8

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Notes

DRAF enclosed direct-on-line starters
Experience reliable and easy to install motor starting

Improve installation efficiency

- Easy to connect and to operate
- Pre-wired control circuit and easy to follow wiring instructions
- Coil energy consumption down by 80%.

Reliable in harsh condition

- High number of electrical and mechanical operations
- Robust IP66 and type 4X enclosure
- Double electrical insulation.

Continuous operation

- AF contactors manage voltage fluctuation, chattering free
- Protected motor with thermal overload relay
- Safety through coordinated product.

For machine or wall mounting

Main applications

Control of stand alone motors like for heat pumps, air conditioning units, small machine tools, compressors, pumping, irrigation...

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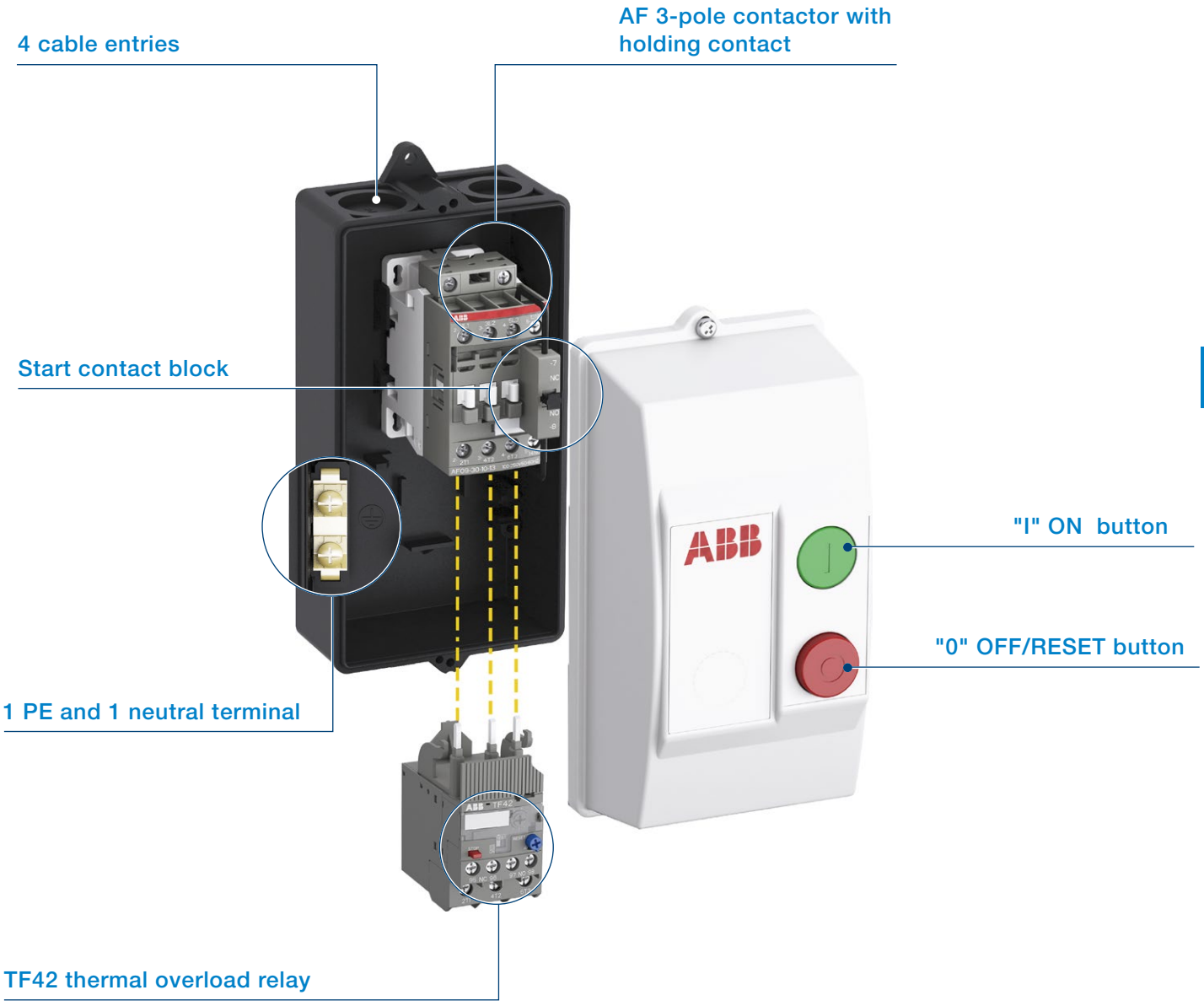
Motor starting solutions up to 7.5 kW and 10 hp



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DRAF09 … DRAF16 enclosed direct-on-line starters
Up to 7.5 kW and 10 hp, protected by thermal overload relays AC operated

DRAF
+ TF42 to be ordered separately

Description

Enclosed direct-on-line (DOL) starters are used for controlling 3-phase asynchronous motors up to 690 V AC.

Each starter is delivered assembled and wired. It contains:

– IP66 and type 4X plastic enclosure with double insulation, equiped with:
  - 1 green flush "I" ON button and 1 red protruding "O" OFF/RESET button
  - 4 cable inlets and outlets via knockouts.
– 1 AF 3-pole contactor with holding contact
– 1 CB5-10 start contact block
– 1 PE and 1 neutral terminal.

Control supply wiring:
IEC starters type: phase-to-phase, separate supply or phase-to-neutral.
UL starters type: separate supply.

TF42 thermal overload relay to be ordered separately and choses according to motor's nominal current (see table in the next page).

DRAF enclosed DOL starters

IEC - AC-3					Control supply wiring	Rated control circuit voltage Uc min ... Uc max (1)	Type	Order code		Weight Pkg (1 pce)
Rated operational power				max. current θ ≤ 40 °C Ue=400 V						
220 V 230 V 240 V	380 V 400 V	500 V	690 V							
kW	kW	kW	kW	A		V 50/60 Hz				kg
IEC starters type										
2.2	4	5.5	5.5	9	Separate supply	24…60	DRAF09-11S	1SBK134237R1100		0.820
					Phase-to-neutral	100…250	DRAF09-13N	1SBK134137R1300		0.820
					Phase-to-phase	250…500	DRAF09-14P	1SBK134037R1400		0.820
3	5.5	7.5	7.5	12	Separate supply	24…60	DRAF12-11S	1SBK154237R1100		0.820
					Phase-to-neutral	100…250	DRAF12-13N	1SBK154137R1300		0.820
					Phase-to-phase	250…500	DRAF12-14P	1SBK154037R1400		0.820
4	7.5	9	9	18	Separate supply	24…60	DRAF16-11S	1SBK174237R1100		0.820
					Phase-to-neutral	100…250	DRAF16-13N	1SBK174137R1300		0.820
					Phase-to-phase	250…500	DRAF16-14P	1SBK174037R1400		0.820

(1) Select DRAF..S with separate supply for 24…60 V DC control circuit voltage (change A2 - Us wire to blue color acc. to IEC 60947-4-1).

UL starter type with separate control supply wiring

UL / CSA						Rated control circuit voltage Uc min ... Uc max	Type	Order code		Weight Pkg (1 pce)
Horse power ratings										
Single phase motor		Three phase motor								
120 V	240 V	200 V 208 V	220 V 240 V	440 V 480 V	550 V 600 V					
hp	hp	hp	hp	hp	hp	V 50/60 Hz				kg
UL starters type										
0.75	1.5	2	2	5	7.5	24…60	DRAF09-11U	1SBK134238R1100		0.820
						100…250	DRAF09-13U	1SBK134238R1300		0.820
						250…500	DRAF09-14U	1SBK134238R1400		0.820
1	2	3	3	7.5	10	24…60	DRAF12-11U	1SBK154238R1100		0.820
						100…250	DRAF12-13U	1SBK154238R1300		0.820
						250…500	DRAF12-14U	1SBK154238R1400		0.820
1.5	3	5	5	10	15	24…60	DRAF16-11U	1SBK174238R1100		0.820
						100…250	DRAF16-13U	1SBK174238R1300		0.820
						250…500	DRAF16-14U	1SBK174238R1400		0.820

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DRAF09 … DRAF16 enclosed direct-on-line starters
Up to 7.5 kW and 10 hp, protected by thermal overload relays
AC operated

TF42

Empty enclosure with push-button

TF42 thermal overload relays to be ordered separately

Setting range A	Short-circuit protective device	Trip class	Type	Order code		Weight (1 pce) kg
0.10 ... 0.13	0.5 A, Fuse type T	10	TF42-0.13	1SAZ721201R1005		0.130
0.13 ... 0.17	1.0 A, Fuse type T	10	TF42-0.17	1SAZ721201R1008		0.130
0.17 ... 0.23	1.0 A, Fuse type T	10	TF42-0.23	1SAZ721201R1009		0.130
0.23 ... 0.31	1.0 A, Fuse type T	10	TF42-0.31	1SAZ721201R1013		0.130
0.31 ... 0.41	2.0 A, Fuse type gG	10	TF42-0.41	1SAZ721201R1014		0.130
0.41 ... 0.55	2.0 A, Fuse type gG	10	TF42-0.55	1SAZ721201R1017		0.130
0.55 ... 0.74	4.0 A, Fuse type gG	10	TF42-0.74	1SAZ721201R1021		0.130
0.74 ... 1.00	6.0 A, Fuse type gG	10	TF42-1.0	1SAZ721201R1023		0.130
1.00 ... 1.30	6.0 A, Fuse type gG	10	TF42-1.3	1SAZ721201R1025		0.130
1.30 ... 1.70	10.0 A, Fuse type gG	10	TF42-1.7	1SAZ721201R1028		0.130
1.70 ... 2.30	10.0 A, Fuse type gG	10	TF42-2.3	1SAZ721201R1031		0.130
2.30 ... 3.10	10.0 A, Fuse type gG	10	TF42-3.1	1SAZ721201R1033		0.130
3.10 ... 4.20	20.0 A, Fuse type gG	10	TF42-4.2	1SAZ721201R1035		0.130
4.20 ... 5.70	20.0 A, Fuse type gG	10	TF42-5.7	1SAZ721201R1038		0.130
5.70 ... 7.60	35.0 A, Fuse type gG	10	TF42-7.6	1SAZ721201R1040		0.130
7.60 ... 10.0	35.0 A, Fuse type gG	10	TF42-10	1SAZ721201R1043		0.130
10.0 ... 13.0	40.0 A, Fuse type gG	10	TF42-13	1SAZ721201R1045		0.130
13.0 ... 16.0	40.0 A, Fuse type gG	10	TF42-16	1SAZ721201R1047		0.130
16.0 ... 20.0	63.0 A, Fuse type gG	10	TF42-20	1SAZ721201R1049		0.145

Empty enclosure with push-button

mm cable inlet/outlet suitable for IEC starter types	–	FR16AF-12	1SBN101337R1000		0.53
Inch cable inlet/outlet suitable for UL starter types	–	FR16AF-12U	1SBN101338R1000		0.53

To be completed with AF contactor, TF42 thermal overload relay and CB5-10 (1SBN010013R1010) start contact block.

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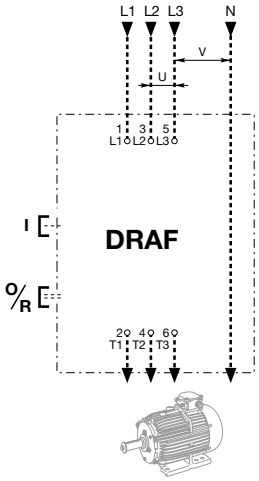
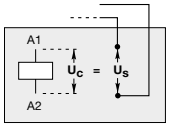
DRAF09 … DRAF16 enclosed direct-on-line starters

Control supply wiring versions

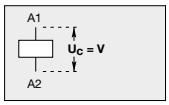


DRAF..S
DRAF..U
Separate supply



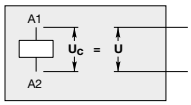
DRAF..N

Phase-to-neutral



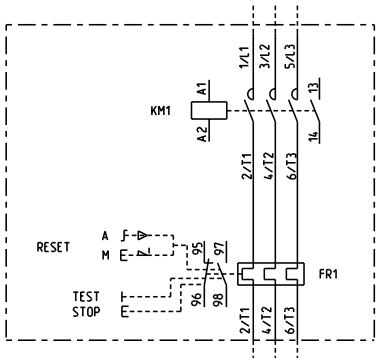
DRAF..P

Phase-to-phase

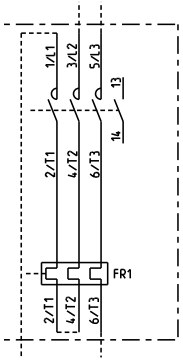


Wiring diagram

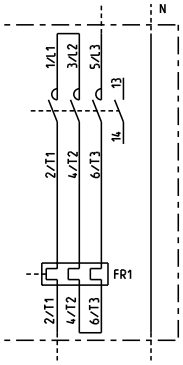
Power circuit



3-phase motor

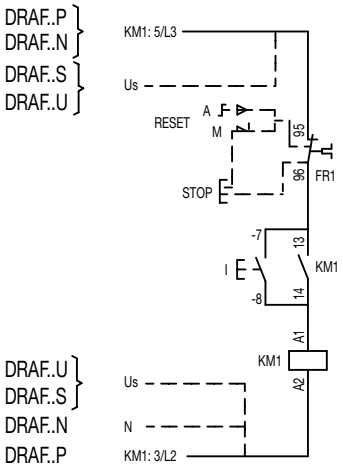


Phase-to-phase
Single phase motor

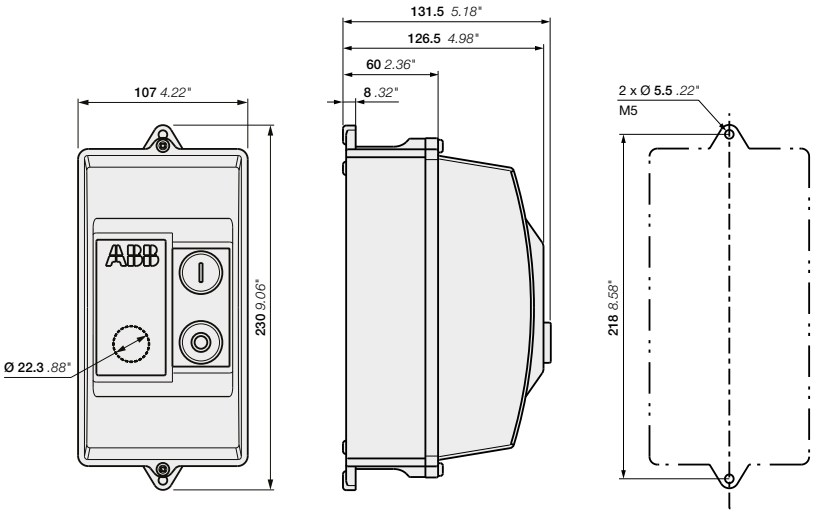


Phase-to-neutral
Single phase motor

AC local control



Main dimensions mm, *inches*



DRAF09, DRAF12, DRAF16

IEC starter types - ISO M20

Cable inlet	Cable outlet
Enclosure top	Enclosure bottom
2 x ø 20 mm 2 x ø *0.79"*	2 x ø 20 mm 2 x ø *0.79"*

UL starter types - NPT

Cable inlet	Cable outlet
Enclosure top	Enclosure bottom
1 x *3/4"* 1 x *1/2"*	1 x *3/4"* 1 x *1/2"*

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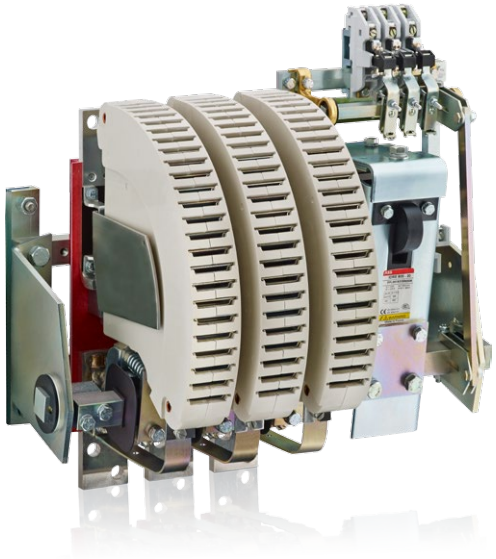
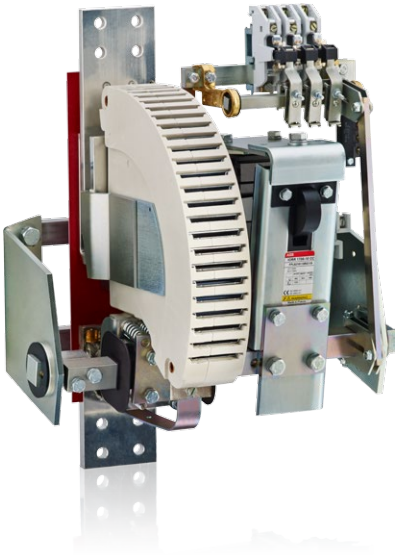
Notes





R contactors

Presentation 9/2

Overview

R contactors for the AC circuits switching **9**/4

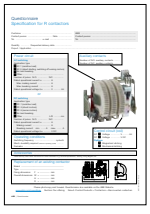
R contactors for the DC circuits switching **9**/6

Questionnaire 9/8

Download

For additional information refer to our main catalog.

Download main catalog



Submit your request with the dedicated form. Our expert will define the right contactor for your application.

Download the form

R contactors
Tailored to your needs

With over 100 years of experience in control, ABB has designed its R contactors to meet the particular requirements of power applications from 63 A up to 5000 A in AC and DC.

With a variable number of poles and advanced features, these tailor-made bar mounted contactors remain the most flexible solution. Robustness and reliability bring our technology far beyond the limits of standard contactors. Our know-how enables us to offer R contactors perfectly suited to your applications whatever the environment.

Performance
- High making and breaking capacity
- Current up to 5000 A
- Voltage up to 1000 V AC or 1500 V DC.

Flexibility
- Variable number of poles
- Combination of N.O. and N.C. poles
- Adjustable number of auxiliary contacts.

Reliability
- Robust construction
- Durability up to 5 millions of operating cycles
- Experienced and proven for years.

... you can trust

Easy maintenance
- Direct access to all the contactor parts for inspection or replacement
- Complete and didactic instruction manual for installation, inspection or maintenance
- Dedicated R contactors service support available by ABB.

From standard to tailor-made solution
- Pre-sales support to identify and define customer requirements
- Customized support with development of solutions from specifications
- Specialists available to optimize your configuration.

Sustainability of control for a wide variety of applications
- Iron and steel industries
- Mining
- Cranes
- Induction furnaces
- Hydroelectric power stations
- Photovoltaic power plants
- Power distribution
- Energy storage
- Railway substation
- Lighting equipment
- Pump stations.

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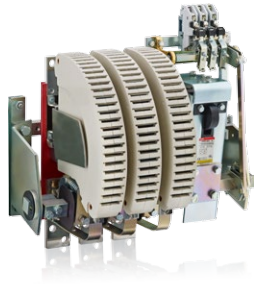
R contactors
Get the right product

Conventional applications

AC circuit switching

Up to 500 V AC
IOR contactors

From 500 up to 1000 V AC
IOR..MT contactors



AC-1 Rated operational current up to 5000 A
AC-3 Rated power up to 1500 kW (1520 A - 440 V)

DC circuit switching

Up to 1500 V DC with poles in series
IOR..CC contactors

DC-1 Rated operational current up to 5000 A
DC-3 / DC-5 operational current up to 2000 A

Advanced applications

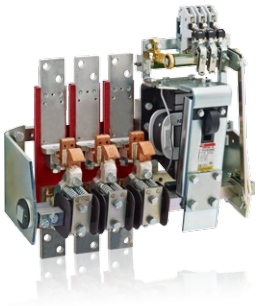
N.O./N.C. main poles combination

AC circuit switching
NOR..MT contactors

DC circuit switching
NOR..CC contactors

Power circuit coupling

Up to 1000 V AC / 1500 V DC
LOR couplers

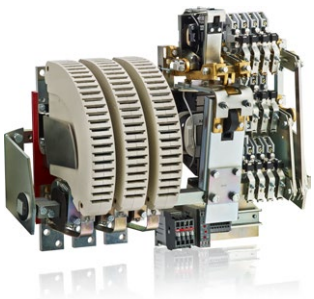


Slip-ring motor control

Uer up to 5000 V AC
FOR contactors

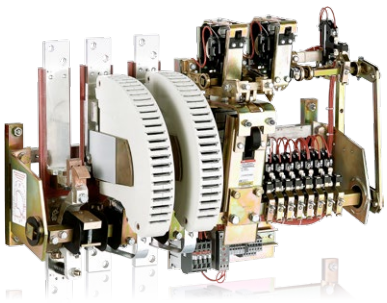
Energy saving and safety requirements

Equipped with latching
..AMA, ..AME contactor types



Alternator field discharge

Umax 2250 V DC
AM-CC-JORE contactors



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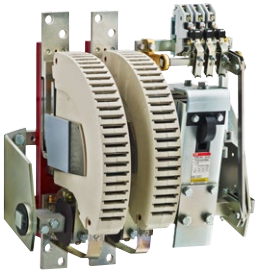
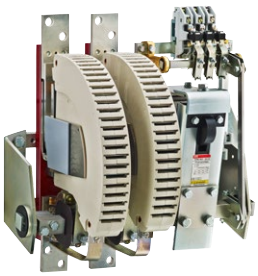
R contactors for AC circuit switching

Rated operational voltage
Ue from 500 up to **1000 V AC**



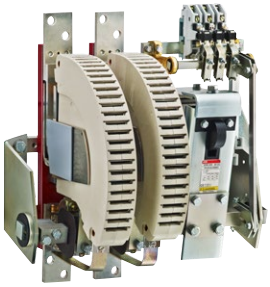
Contactor type	AC control circuit			IORR63..MT	IORR125..MT	IORR200..MT	IORR400..MT	IORR500..MT	IORR800..MT
	DC control circuit			IORE63..MT	IORE125..MT	IORE200..MT	IORE400..MT	IORE500..MT	IORE800..MT
Categories		**Ue**							
AC-1	at 40 °C		**Ie**	85 A	170 A	260 A	400 A	550 A	800 A
AC-3		690 V AC	**Ie**	85 A	160 A	260 A	400 A	550 A	800 A
		1000 V AC max.	**Ie**	56 A	105 A	180 A	280 A	380 A	580 A
AC-3		690 V AC	**Power**	**80 kW**	**150 kW**	**240 kW**	**400 kW**	**540 kW**	**780 kW**

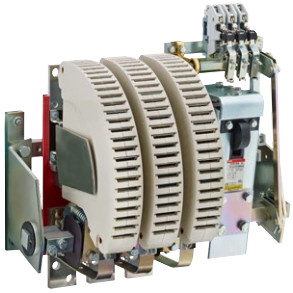
9

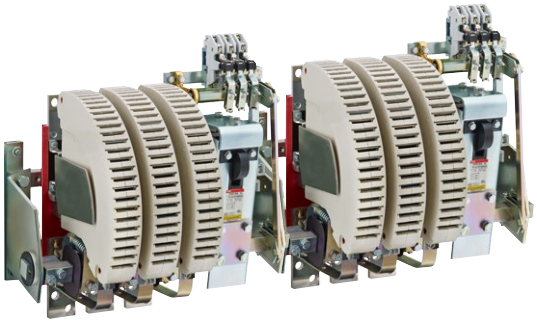


Rated operational voltage
Ue up to **500 V AC**

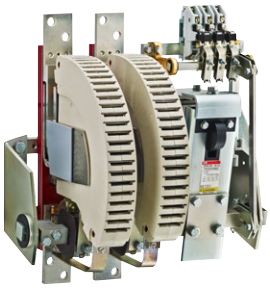
Contactor type	AC control circuit			–					IORR800
	DC control circuit			–					IORE800
Categories		**Ue**							
AC-1	at 40 °C		**Ie**	From 85 A to 550 A, select above IOR..-MT					900 A
AC-3		380-415-440 V AC	**Ie**	–					800 A
		500 V AC max.	**Ie**	–					800 A
AC-3		400 V AC	**Power**	–					**450 kW**

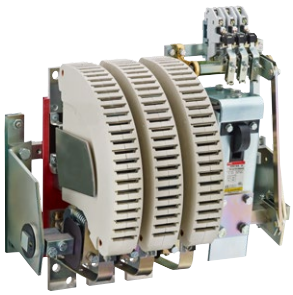


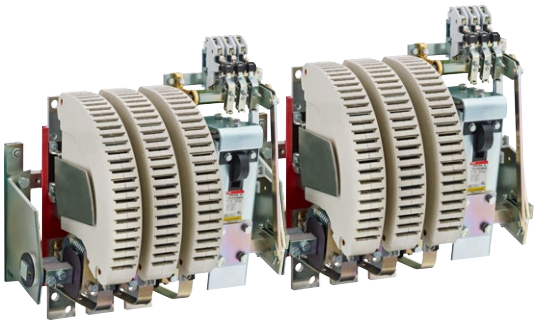




IORR1400..MT	IORR1700..MT	IORR2100..MT	IORR2500..MT	IORR3200..MT	IORR3800..MT	IORR4500..MT	IORR5100..MT
IORE1400..MT	IORE1700..MT	IORE2100..MT	IORE2500..MT	IORE3200..MT	IORE3800..MT	IORE4500..MT	IORE5100..MT
1250 A	1650 A	1850 A	2200 A	3000 A	3500 A	4000 A	4500 A
970 A	1170 A	1270 A	–	–	–	–	–
610 A	680 A	810 A	–	–	–	–	–
1000 kW	**1200 kW**	**1300 kW**	–	–	–	–	–







IORR1000	IORR1400	IORR1700	IORR2100	IORR2500	IORR3200	IORR3800	IORR4500	IORR5100
IORE1000	IORE1400	IORE1700	IORE2100	IORE2500	IORE3200	IORE3800	IORE4500	IORE5100
1000 A	1350 A	1650 A	2000 A	2400 A	3200 A	3800 A	4500 A	5000 A
800 A	1080 A	1260 A	1520 A	–	–	–	–	–
800 A	1080 A	1220 A	1340 A	–	–	–	–	–
450 kW	**630 kW**	**750 kW**	**900 kW**	–	–	–	–	–

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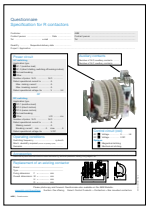


Submit your request with the dedicated form. Our expert will define the right contactor for your application.

Download the form

1SBC104002S0201 - Rev. A

R contactors for DC circuit switching

Rated operational voltage
Ue up to **1500 V DC**

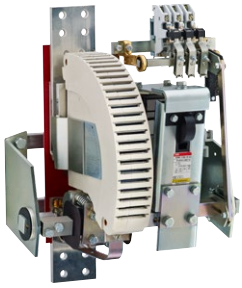
Contactor type	AC control circuit	~	IORR63..CC	IORR125..CC	IORR200..CC	IORR400..CC	IORR500..CC
	DC control circuit	⎓	IORE63..CC	IORE125..CC	IORE200..CC	IORE400..CC	IORE500..CC
Number of poles in series	**Categories**	**Ue max.**					
1 pole	**DC-1**	500 V DC	**Ie**	85 A	170 A	275 A	400 A	550 A
	DC-3 / DC-5	500 V DC	**Ie**	68 A	125 A	205 A	350 A	500 A
2 poles	**DC-1**	1000 V DC	**Ie**	85 A	170 A	275 A	400 A*	550 A*
	DC-3 / DC-5	1000 V DC	**Ie**	68 A	125 A	205 A	350 A	500 A
3 poles	**DC-1**	1500 V DC	**Ie**	85 A*	170 A*	275 A*	400 A*	550 A*
	DC-3 / DC-5	1500 V DC	**Ie**	68 A*	125 A*	205 A*	350 A*	500 A*

* Ue max. = 1500 V DC, version with increased insulation for 1000 V DC < Ue ≤ 1500 V DC, please consult us.

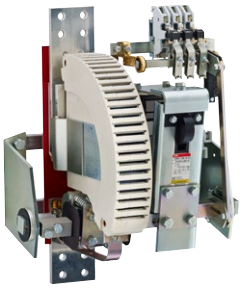
9

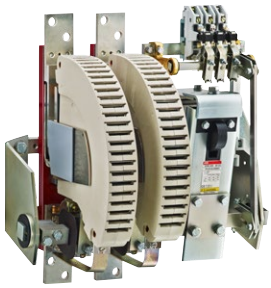
Contactors
UL / CSA approved

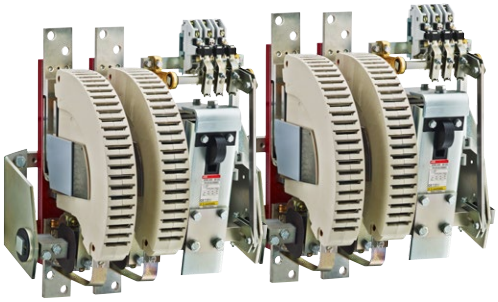
Rated operational voltage
Ue up to **600 V DC**



Contactor type	AC control circuit	~	IORR800-10-CC	IORR1000-10-CC	IORR1400-10-CC	IORR1700-10-CC	IORR2100-10-CC
	DC control circuit	⎓	IORE800-10-CC	IORE1000-10-CC	IORE1400-10-CC	IORE1700-10-CC	IORE2100-10-CC
		U max.					
1 pole	**General use**	600 V DC	**Ie**	800 A	1000 A	1300 A	1700 A	2000 A







	IORR800..CC IORE800..CC	IORR1000..CC IORE1000..CC	IORR1400..CC IORE1400..CC	IORR1700..CC IORE1700..CC	IORR2100..CC IORE2100..CC	IORR2500..CC IORE2500..CC	IORR3200..CC IORE3200..CC	IORR3800..CC IORE3800..CC	IORR4500..CC IORE4500..CC	IORR5100..CC IORE5100..CC
Ue max.										
750 V DC	800 A	1000 A	1250 A	1600 A	2000 A	2300 A	3200 A	3800 A	4500 A	5000 A
600 V DC	720 A	1000 A	1250 A	1600 A	2000 A	On request	On request	On request	On request	On request
1500 V DC	800 A	1000 A	1250 A	1600 A	2000 A	2300 A	3200 A	3800 A	4500 A	5000 A
1000 V DC	720 A	1000 A	1250 A	1600 A	2000 A	On request	On request	On request	On request	On request
1500 V DC	800 A	1000 A	1250 A	1600 A	2000 A	2300 A	3200 A	3800 A	4500 A	5000 A
1500 V DC	720 A	1000 A	1250 A	1600 A	2000 A	On request	On request	On request	On request	On request

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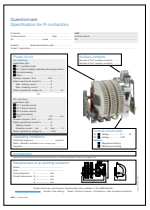


Submit your request with the dedicated form. Our expert will define the right contactor for your application.

Download the form

1SBC104001S0201 - Rev. A

Questionnaire
Specification for R contactors

Customer .....
Contact person ..... Date .....
Tel. ..... e-mail .....

ABB .....
Contact person .....
Tel. .....

Quantity ..... Requested delivery date .....
Project / Application .....

Power circuit

AC switching

Application type
☐ AC-1 (resistive load)
☐ AC-3 (direct starting, switching off running motors)
☐ No load breaking
☐ Other .....
Number of poles: N.O. ..... N.C. .....
Rated operational current Ie ..... A
Max. making current ..... A
Max. breaking current ..... A
Rated operational voltage Ue ..... V ..... Hz

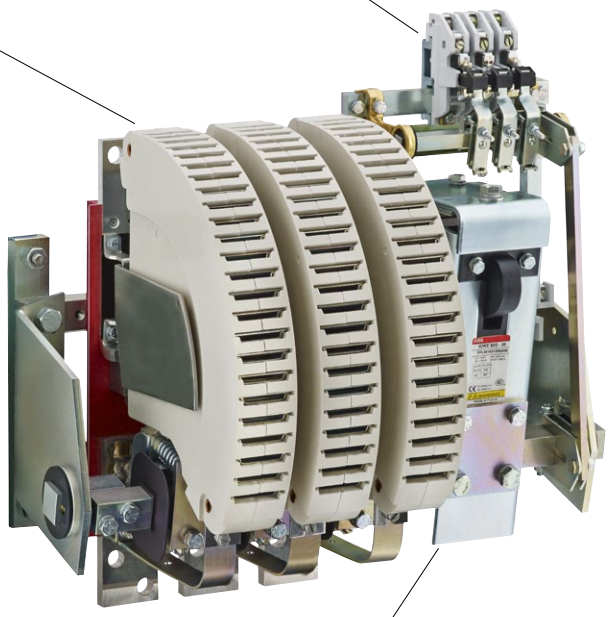
or

DC switching

Application type
☐ DC-1 (resistive load)
☐ DC-3 (shunt motors)
☐ DC-5 (series motors)
☐ No load breaking
☐ Other ..... L/R ..... ms
Number of poles: N.O. ..... N.C. .....
Rated operational current Ie ..... A
Making current ..... A
Breaking current min. ..... A max. ..... A
Rated operational voltage Ue ..... V DC

Auxiliary contacts

Number of N.O. auxiliary contacts .....
Number of N.C. auxiliary contacts .....



Control circuit (coil)

AC ☐ Voltage ..... V ..... Hz
DC ☐ Voltage ..... V DC

Options

☐ Latching (magnetical or mechanical latching acc. to contactor rating)

Operating conditions

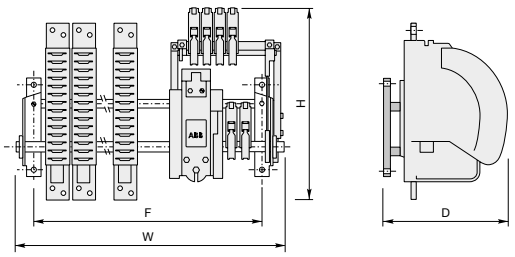
Switching frequency ..... cycles/h
Mech. durability required (millions of operating cycles) .....
Remarks .....

Accessories

Please add any other useful documents for further information e.g. technical specification, drawing, wiring diagram, etc.

Replacement of an existing contactor

Brand .....
Type .....
Fixing dimension F = ... mm
Overall dimensions W = ... mm
H = ... mm
D = ... mm



Questionnaire also available on the ABB Website:
www.abb.com/lowvoltage Section: Our offering Select: Control Products > Contactors > R bar contactors

1SBC104004S0201 - Rev. B

Questionnaire
Specification for R contactors

Other information / Application type

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

Questionnaire also available on the ABB Website:
www.abb.com/lowvoltage Section: Our offering Select: Control Products > Contactors > R bar contactors

1SBC104004S0201 - Rev. B

Electronic compact starters

Presentation **10/3**

HF0.6, HF2.4, HF9 electronic compact starters

Direct-on-line starter **10**/8

Reversing starter **10**/9

Technical data **10**/10

Technical diagrams **10**/14

Electronic compact starters: HF range
A compact solution with great functionality

ABB's electronic compact starter, up to 3 kW / 400 V, is a 22.5 mm wide product. Even though it's compact it has, direct-on-line, reversed starting, motor overload protection, and emergency stop all included. It is well suited for paper machines, conveyors or machine tools.

Saving space

Up to 90% less space required
Decrease your cabinet size. ABB's electronic compact starter is 22.5 mm wide while still containing motor starting functionalities and embedding motor protection and safety.

Safety and protection

Integrated safety function
Protect your personnel with emergency stop version complying with SIL3, PL e safety standards.

Extend equipment life time and decrease maintenance cost as our starters service life is 10 times higher than electromechanical solutions.

Easy to install

Up to 75% reduced time in wiring
Wiring time upon installation is reduced to a minimum as motor protection, reversing function and emergency stop are already part of the product.

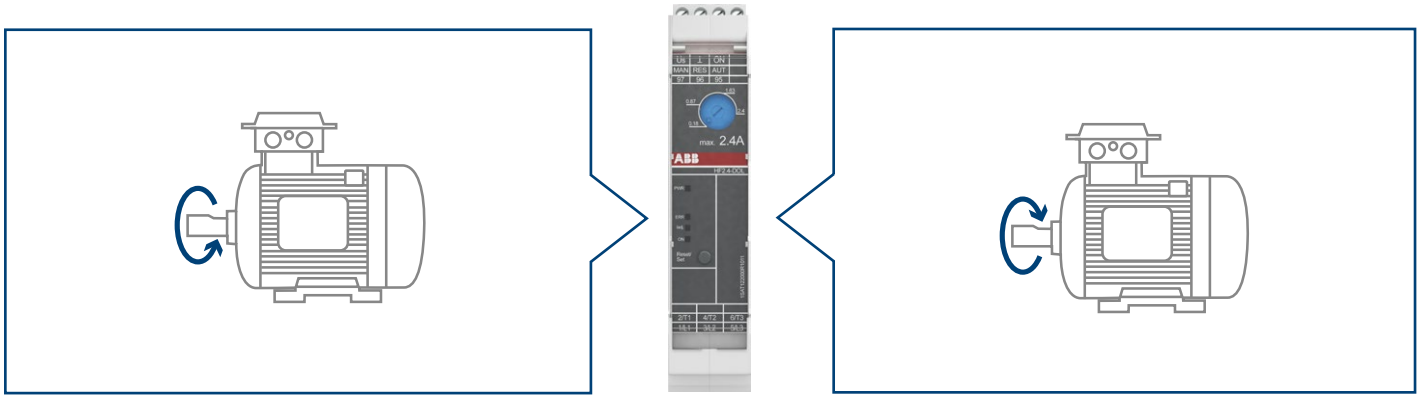
Only one component to install reduces the risk of wiring errors.

2CDC130017C0201

Electronic compact starters
All-in-one: four functions in one starter

Direct-on-line
ABB's direct-on-line starter comes with a function that runs the motor in a forward direction. An integrated electronic overload relay also helps protect the motor.

Reversing capability
With contactor and overload relay functionalities integrated in one device, the electronic compact starter enables the motor to run direct-on-line and reversed. An electronic overload relay is integrated and protects the motor.



Direct-on-line and reversing function in only one product

Emergency stop
ABB´s safety range supports safety applications complying to SIL3 and PL e safety levels. It is also possible to combine units with modular safety relays such as ABB's new SSR10.

Overload protection
ABB offers three variants with wide setting ranges, using an electronic relay to protect the motor from overload. Protection against phase asymmetry and phase failure is also integrated.

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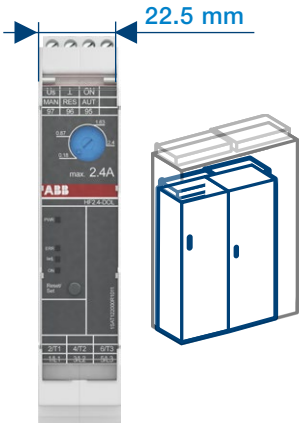
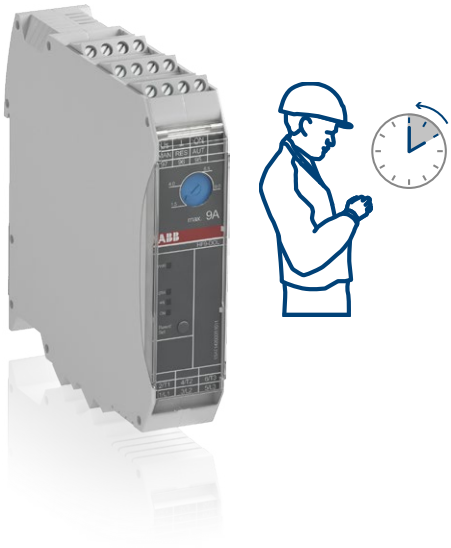
Electronic compact starters
Features and benefits

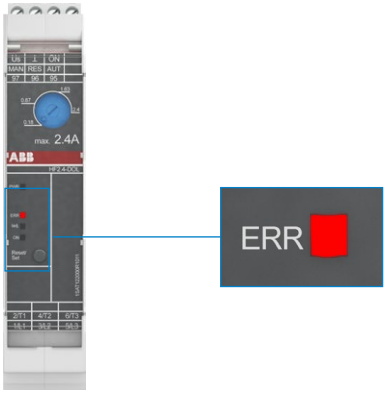
Space-saving
Using an HF electronic compact starter saves space – especially when group-mounting units. With a width of just 22.5 mm and high function density, the unit fits any control cabinet. Smaller footprints for more compact systems are also possible.



Less wiring
The control circuit is connected on the upper side of the device with the main circuit on the underside. The all-in-one functionality reduces wiring, saving time and money – and reducing faults.



Reset function
After the overload function has tripped, the electronic compact starter can be reset automatically, manually or remotely.
The LEDs on the device are visualizing that an error has occurred. Additionally, a feedback relay will be activated.



Longer working life
ABB's hybrid technology improves durability and reduces power losses. Semiconductors switch on and off the unit and the relays remain active while the motor is running. With a lifespan of 30 million cycles now achievable, maintenance costs are reduced.

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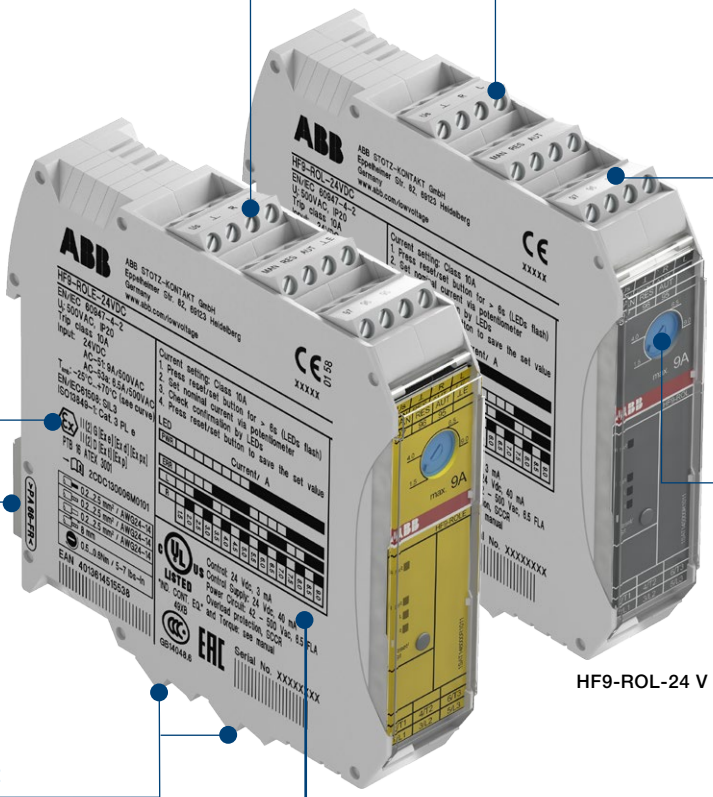
Electronic compact starters
Hybrid technology

Hybrid technology – efficient and durable – is the key feature of this range. Smart use of semiconductors eliminates the wearing of contact materials. A microcontroller ensures the precise interaction of the components, providing the smoother switching that helps extend its long lifespan.



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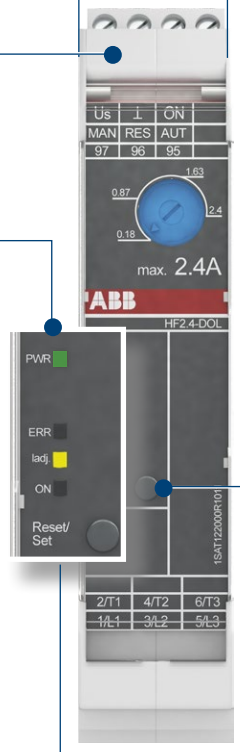
Electronic compact starters - HF range
Hybrid technology

Thanks to laser labeling and fewer connection points compared to conventional solutions, hybrid technology makes wiring easy. The screw connections for both the control and the main circuit have an optimized angle to provide access.

Group mounting in confined spaces is no problem

22.5 mm

Only one component for up to four functions leads to shorter wiring time



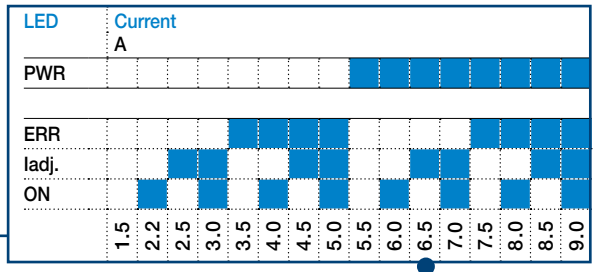
HF2.4-DOL-24 V DC

Easy-to-read starter status with LED indicators: Precise current setting with LED confirmation

Users can easily adjust the current and get visual feedback via the LEDs.

Reset: direct manual reset of device with button, convenient remote or automatic reset after thermal trip

For example, if 6.5 A is set, the lights confirm the selection:



Note: **PWR**: Control supply voltage, **ERR** : Error/Message, **ladj.**: Current setting, **ON**: Motor is running

2CDC130018C0201

HF0.6, HF2.4, HF9 electronic compact starters
Direct-on-line starter

HF0.6-DOL-24VDC

HF0.6-DOLE-24VDC

Description

The HF-DOL-range is used for the direct-on-line start of motors and the switching of non-resistive loads. With contactor and overload relay functionalities integrated into one device, the results are faster wiring times and fewer faults. The range covers 0.6 A, 2.4 A and up to 9 A - for motors up to 3 kW – 500 V AC. The integrated electronic overload protection has a wide setting range that enables just three models to cover all requirements.

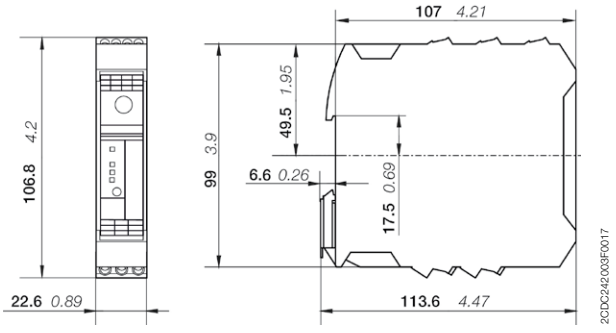
The control supply voltage is 24 V DC. For the control and main connection points ABB offers screw connections. ABB also offers a HF-DOLE safety range with emergency stop function. This offers Safety Integrity Level 3, in accordance with functional safety standard IEC 61508-1 and Performance Level 'e' in accordance with ISO 13849-1. The safety range is ATEX-certified.

Ordering details

Rated operational current AC-53a	Rated operational power AC-53a	Rated operational current AC-51	Setting range	Full load amps motor use	Type	Order code		Weight (1 pce)
A	kW	A	A	A				kg
Direct-on-line starter with overload protection								
0.6	0.18 (400V)	0.6	0.075 ... 0.6	0.6	HF0.6-DOL-24VDC	1SAT112000R1011		0.205
2.4	0.75 (400V)	2.4	0.18 ... 2.4	2.4	HF2.4-DOL-24VDC	1SAT122000R1011		0.218
6.5	3.00 (400V)	9.0	1.5 ... 9.0	6.5	HF9-DOL-24VDC	1SAT142000R1011		0.206
Direct-on-line starter with overload protection and emergency stop								
0.6	0.18 (400V)	0.6	0.075 ... 0.6	0.6	HF0.6-DOLE-24VDC	1SAT113000R1011		0.205
2.4	0.75 (400V)	2.4	0.18 ... 2.4	2.4	HF2.4-DOLE-24VDC	1SAT123000R1011		0.218
6.5	3.00 (400V)	9.0	1.5 ... 9.0	6.5	HF9-DOLE-24VDC	1SAT143000R1011		0.206

10

Main dimensions mm, *inches*



HF0.6, HF2.4, HF9

HF0.6, HF2.4, HF9 electronic compact starters
Reversing starter

HF0.6-ROL-24VDC

HF0.6-ROLE-24VDC

HF9-R-24VDC

Description

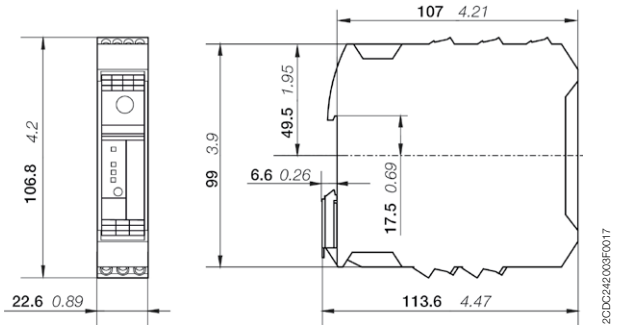
The HF-ROL-range is used for forward and reverse running motors, as well as for switching non resistive loads. With contactor and overload relay functionalities integrated into one device, the results are faster wiring times and fewer faults. The range covers 0.6 A, 2.4 A and up to 9 A - for motors up to 3 kW – 500 V AC. The integrated electronic overload protection has a wide setting range that enables just three models to cover all requirements.

The control supply voltage is 24 V DC. For the control and main connection points ABB offers screw connections. ABB also offers a HF-ROLE safety range with emergency stop function. This offers Safety Integrity Level 3, in accordance with functional safety standard IEC 61508-1 and Performance Level 'e' in accordance with ISO 13849-1. The safety range is ATEX-certified.

Ordering details

Rated operational current AC-53a	Rated operational power AC-53a	Rated operational current AC-51	Setting range	Full load amps motor use	Type	Order code		Weight (1 pce)
A	kW	A	A	A				kg
Reversing starter								
6.5	3.00 (400V)	9.0	-	6.5	HF9-R-24VDC	1SAT144000R1011		0.174
Reversing starter with overload protection								
0.6	0.18 (400V)	0.6	0.075 ... 0.6	0.6	HF0.6-ROL-24VDC	1SAT115000R1011		0.217
2.4	0.75 (400V)	2.4	0.18 ... 2.4	2.4	HF2.4-ROL-24VDC	1SAT125000R1011		0.219
6.5	3.00 (400V)	9.0	1.5 ... 9.0	6.5	HF9-ROL-24VDC	1SAT145000R1011		0.218
Reversing starter with overload protection and emergency stop								
0.6	0.18 (400V)	0.6	0.075 ... 0.6	0.6	HF0.6-ROLE-24VDC	1SAT116000R1011		0.218
2.4	0.75 (400V)	2.4	0.18 ... 2.4	2.4	HF2.4-ROLE-24VDC	1SAT126000R1011		0.270
6.5	3.00 (400V)	9.0	1.5 ... 9.0	6.5	HF9-ROLE-24VDC	1SAT146000R1011		0.289

Main dimensions mm, *inches*



HF0.6, HF2.4, HF9

HF0.6, HF2.4, HF9 electronic compact starters
Technical data

Main circuit – Utilization characteristics according to IEC/EN

Type		HF-DOL/ROL	HF-DOLE/ROLE	HF-R
Standards		IEC/EN 60947-1, IEC/EN 60947-4-2	IEC/EN 60947-1, IEC/EN 60947-4-2, IEC/EN 61508, IS0 13849	IEC/EN 60947-1, IEC/EN 60947-4-2
Rated operational voltage U_e		500 V AC		
Operational voltage	Minimum	42 V AC		
	Maximum	550 V AC		
Setting range		see ordering details		
Rated frequency		50/60 Hz		
Trip class		10A		
Number of poles		3		
Number of protected poles		3		
Mechanical durability		10000 cycles		
Electrical durability		30 Mio. cycles		
Rated impulse withstand voltage U_{imp}		6 kV		
Rated insulation voltage U_i		500 V		
Rated operational current I_e AC-51		see ordering details		
Rated operational current I_e AC-53a		see ordering details		
Rated uninterrupted current I_U		see ordering details, Rated operational current I_e		
Overvoltage category		III		
Delay time	Off, minimum, switched off with pushbutton	1 s	1 s	-
	Off, maximum, switched off with pushbutton	3 s	3 s	-
	Off, typical, switched off via control input voltage	30 ms	30 ms	30 ms
	Off, maximum, switched off via control input voltage	-	HF2.4, HF0.6: 40 ms HF9: 80 ms	-
	Off, typical, switched off via supply voltage	25 ms	25 ms	25 ms
	Off, maximum, switched off via supply voltage	-	500 ms	-
Switch off time	By phase failure	1.8 s	1.8 s	-
	By phase asymmetry at 33%	120 s	120 s	-
	By phase asymmetry at 67%	1.8 s	1.8 s	-
Overspeed tripping	Operating threshold	HF9-DOL/ROL/DOLE/ROLE: >45 A		
	Response time	HF9-DOL/ROL/DOLE/ROLE: 2 s		
Power loss	Minimum	1.1 W		
	Maximum	HF0.6: 1.5 W HF2.4: 3.3 W HF09: 14.6 W		
Switching frequency		≤ 2 Hz; 120 starts/min; 7200 starts/h		
Overvoltage category		III		

HF0.6, HF2.4, HF9 electronic compact starters
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type		HF
Standards		UL 60947-1; UL 60947-4-2
Rated operational voltage		500 V AC
Operational voltage	Minimum	42 V AC
	Maximum	550 V AC
Ampere Rating UL/CSA		see ordering details, Full load amps motor use
Horse power rating	Nominal switching performance full load (power factor = 0.4)	HF0.6: 0.4 hp HF2.4: 1.2 hp HF9: 3.0 hp
	Nominal switching performance full load (power factor = 0.8)	HF0.6: 0.6 hp HF2.4: 2.2 hp HF9: 6.1 hp
Full loads Amps (FLA)		see ordering details
Short-circuit current rating (SCCR) (500 V AC, 30 A Class J or CC)		100 kA

General technical data

Type		HF
Utilization category		AC51, AC53a
Pollution degree		2
Phase loss sensitive		Yes
Ambient air temperature	Operation	-25 ... + 70 °C
	Operation compensated	-40 ... + 80 °C
Mounting position		Position 1, load side bottom
Mounting in DIN Rail		TH35-15 (35 x 15 mm Mounting Rail) acc. to IEC 60715, TH35-7.5 (35 x 7.5 mm Mounting Rail) acc. to IEC 60715
Degree of protection	Housing	IP20
	Main circuit terminals	IP20

Control circuit

Type		HF
Rated control circuit voltage U_C		24 V DC
Input voltage U_{IN}	Switching Threshold at Signal <0>	-3 ... 9.6 V
	Switching Threshold at Signal <1>	19.2 ... 30 V
Input current I_C		3 mA

Supply circuit

Type	HF
Rated control supply voltage U_S	24 V DC
Control supply voltage	19.2 ... 30 V DC
Rated control supply current I_S	0.04 A

HF0.6, HF2.4, HF9 electronic compact starters
Technical data

Safety related data

Type		HF-DOLE/ROLE
Standards		IEC/EN 60947-1, IEC/EN 60947-4-2, IEC/EN 61508, IS0 13849
Safe shut down	for ambient temperature 40°C ... 60°C	
Safety integrity level acc. to	IEC 61508-1	SIL 3
Performance level		Up to e
Mean time to failure (MTTF) acc. to IEC60050-191-12-07		DOLE: 43 years ROLE: 39.3 years
Mean time to dangerous failure, motor protection		447 years
Mean time to dangerous failure, safe shutdown		DOLE: 518 years ROLE: 517 years
Failure in time	Safe, detectabled λ_{sd}	DOLE: 543 FIT ROLE: 664 FIT
	Safe, undetectable λ_{su}	DOLE: 852 FIT ROLE: 968 FIT
	Dangerous, detectable λ_{dd}	218 FIT
	Dangerous, undetectable λ_{du}	DOLE: 2.4 FIT ROLE: 2.67 FIT
Safe failure fraction (SFF)		DOLE: 99.85% ROLE: 99.86%
Diagnostic coverage (DC)		DOLE: 98.91% ROLE: 98.79%
Probability of dangerous failure per hour (PFH)		DOLE: 2.4 ROLE: 2.67
Motor overload protection	for ambient temperature 40°C ... 60°C	
Safety integrity level acc. to	IEC 61508-1	SIL 3
Performance level		Up to e
Mean time to failure (MTTF) acc. to IEC60050-191-12-07		DOLE: 43 years ROLE: 39.3 years
Mean time to dangerous failure, safe shutdown		DOLE: 518 years ROLE: 517 years
Failure in time	Safe, detectabled	DOLE: 517 FIT ROLE: 637 FIT
	Safe, undetectable	DOLE: 809 FIT ROLE: 870 FIT
	Dangerous, detectable	239 FIT
	Dangerous, undetectable	17 FIT
Safe failure fraction (SFF)		DOLE: 98.92% ROLE: 99.03%
Diagnostic coverage		DOLE: 98.91w ROLE: 98.79%

HF0.6, HF2.4, HF9 electronic compact starters
Technical data

Connecting characteristics

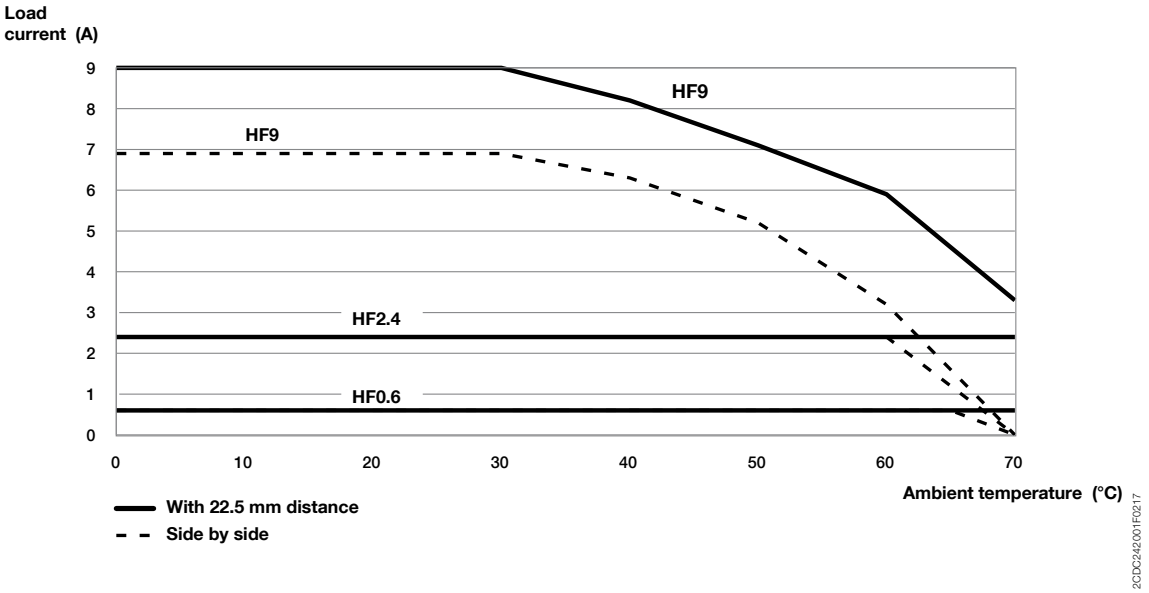
Main circuit		
Type		HF
Connecting capacity		
Rigid	**1 x**	2 ... 2.5 mm²
Flexible	**1 x**	2 ... 2.5 mm²
Flexible with ferrule	**1 x**	2 ... 2.5 mm²
Connecting capacity acc. to UL/CSA		
Rigid	**1 x**	24 ... 14 AWG
Flexible	**1 x**	24 ... 14 AWG
Flexible with ferrule	**1 x**	24 ... 14 AWG
Stripping length		8 mm
Tightening torque		0.5 ... 0.6 N·m
Tightening torque UL/CSA		5 ... 7 in·lb
Terminal type		Screw terminals
Recommended screw driver		M3

Control circuit		
Type		HF
Connecting capacity		
Rigid	**1 x**	2 ... 2.5 mm²
Flexible	**1 x**	2 ... 2.5 mm²
Flexible with ferrule	**1 x**	2 ... 2.5 mm²
Connecting capacity acc. to UL/CSA		
Rigid	**1 x**	24 ... 14 AWG
Flexible	**1 x**	24 ... 14 AWG
Flexible with ferrule	**1 x**	24 ... 14 AWG
Stripping length		8 mm
Tightening torque		0.5 ... 0.6 N·m
Tightening torque UL/CSA		5 ... 7 in·lb
Terminal type		Screw terminals
Recommended screw driver		M3

HF0.6, HF2.4, HF9 electronic compact starters
Technical diagrams

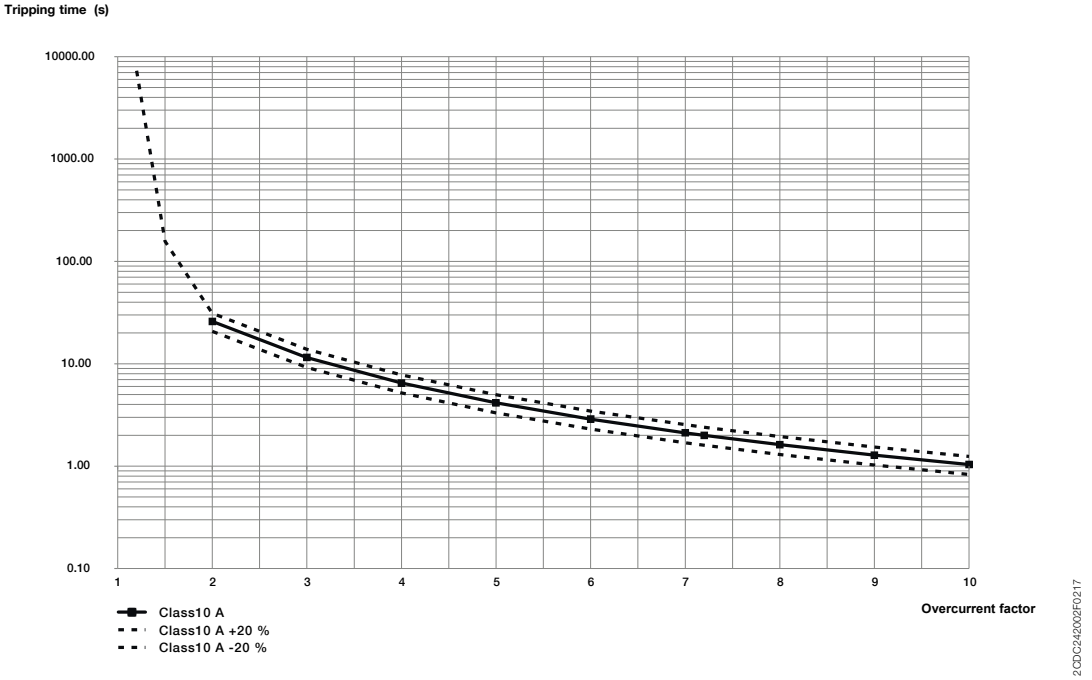
Derating curve

Please consider the derating curves for group mounting with and without ≥22.5 mm distance and the overload protection for tripping class 10A.



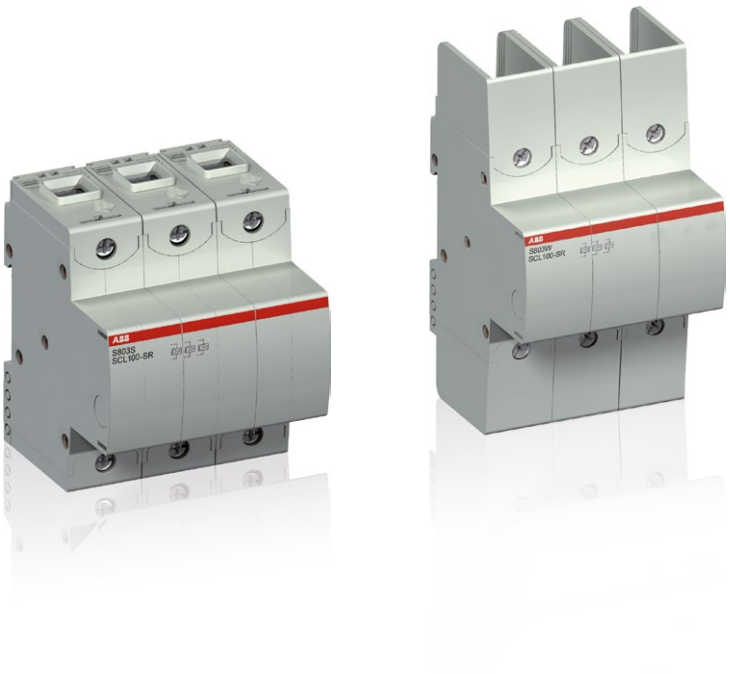
Derating curve HF range - electronic compact starters

Tripping characteristics



Tripping characteristics class 10A HF range - electronic compact starters

Notes


SR03S
SCL100-SR
SR03W
SCL100-SR

Self resetting current limiting module

S800-SCL-SR

Ordering details **11**/2

Technical data **11**/3

S800-SCL-SR
Self-resetting current limiting module

S800S-SCL-SR

S803W-SCL-SR

Description

S800-SCL-SR is ABB's innovative self-resetting current limiting module which considerably increases the short-circuit breaking capacity of downstream manual motor starters and high performance MCBs. S800-SCL-SR is a self resetting current limiting module based on the S800 technology.

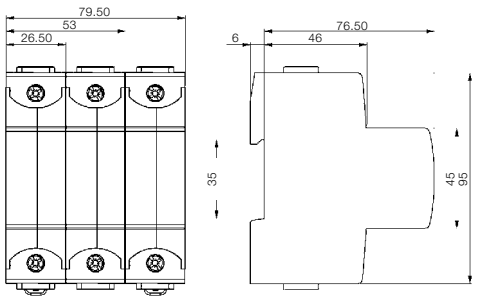
It limits the short-circuit current until the downstream means of protection trips. Its current continuity makes it as the ideal solution for group protection: All parallel branches remain operative. This leads to an Expanded application range of the low voltage switchgear whose short-circuit capabilities are usually limited. S800-SCL-SR can be combined with S800S high performance MCB or with manual motor starters. S800-SCL-SR can also back up a single circuit breaker or a group of circuit breakers or motor starters (group protection). Terminals and outside dimensions are identical to the S800 range.

Ordering details

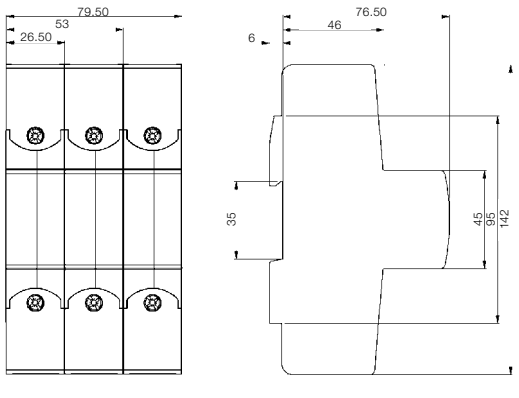
Self-resetting short-circuit limiter IEC version [A]	Type designation	Product number	EAN number 7612271	Weight [kg]	Pack. unit
1-pole					
32	S801S-SCL32-SR	2CCS801901R0539	412012	0.25	1
63	S801S-SCL63-SR	2CCS801901R0599	412036	0.25	1
100	S801S-SCL100-SR	2CCS801901R0639	411992	0.25	1
2-pole					
32	S802S-SCL32-SR	2CCS802901R0539	412074	0.5	1
63	S802S-SCL63-SR	2CCS802901R0599	412098	0.5	1
100	S802S-SCL100-SR	2CCS802901R0639	412050	0.5	1
3-pole					
32	S803S-SCL32-SR	2CCS803901R0539	411930	0.75	1
63	S803S-SCL63-SR	2CCS803901R0599	411947	0.75	1
100	S803S-SCL100-SR	2CCS803901R0639	411954	0.75	1

Self-resetting short-circuit limiter IEC/UL version [A]	Type designation	Product number	EAN number 7612271	Weight [kg]	Pack. unit
3-pole					
32	S803W-SCL32-SR	2CCS803917R0539	412319	0.75	1
63	S803W-SCL63-SR	2CCS803917R0599	412326	0.75	1
100	S803W-SCL100-SR	2CCS803917R0639	412302	0.75	1

Main dimensions mm, inches



S800S-SCL-SR/S803S-SCL



S803W-SCL-SR

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11

S800S-SCL-SR/S803W-SCL-SR
Technical data

			S800S-SCL-SR	S803W-SCL-SR
Rated operational current I_e		[A]	32, 63, 100	32, 63, 100
Pole			1, 2, 3	3
Rated operational voltage U_e				
(AC) according to IEC 60947-2	50/60 Hz	[V]	400/690	690
(AC) according to UL 508	50/60 Hz	[V]		600
Rated insulation voltage U_i		[V]	690	690
Rated impulse withstand voltage U_{imp}		[kV]	8	8
Rated ultimate short-circuit breaking capacity				
I_{cu} = I_{cs} according to IEC 60947-2*				
(AC) 50/60 Hz 240/415 V		[kA]	100	100
(AC) 50/60 Hz 254/440 V		[kA]	100	100
(AC) 50/60 Hz 277/480 V		[kA]	65	65
(AC) 50/60 Hz 289/500 V		[kA]	65	65
(AC) 50/60 Hz 346/600 V		[kA]	65	65
(AC) 50/60 Hz 400/690 V		[kA]	50	50
Short-circuit rating according to UL 508, CSA 22.2*				
(AC) 50/60 Hz 480 V		[kA]	65	65
(AC) 50/60 Hz 600 V		[kA]	65	65
*) Valid only for approved combinations				
Rated frequency		[Hz]	50/60	50/60
Mounting position			any	any
Connections C_u				
		[mm²]	1 … 50 rigid (solid/stranded)	1 … 50 rigid (solid/stranded)
		[mm²]	1 … 70 flexible	1 … 70 flexible
				14–1 AWG
Tightening torque				
		[Nm]	min. 3/max. 4	min. 3/max. 4
		[in. lbs.]		min. 26.5/max. 25
Feeding			optional	optional
Mouting on DIN top hat rail			EN 60715	EN 60715
Ambient air temperature		[°C]	–40 … +70	–40 … +70
Storage temperature		[°C]	–40 … +85	–40 … +85
Degree of protection			IP20	IP20
Classification acc. to NF F 16-101, NF F 16-102			I3, F2	I3, F2
Damp Heat			IEC 60068-2-30, 55 °C / 95 % r.h.	IEC 60068-2-30, 55 °C / 95 % r.h.
Vibration			IEC 60068-2-6, 5–10 Hz / 3 mm and 10–500 Hz / 2 g at 0.5 x I_e	IEC 60068-2-6, 5–10 Hz / 3 mm and 10–500 Hz / 2 g at 0.5 x I_e
Random Vibration 0.5 x I_e			IEC 60068-2-64, 5–500 Hz / 2 g at 0.5 x I_e	IEC 60068-2-64, 5–500 Hz / 2 g at
Resistance to climatic conditions			IEC 60068-2-1 /-2-2 /-2-30	IEC 60068-2-1 /-2-2 /-2-30
Standard			IEC 60947-2 IEC 60947-4-1	IEC 60947-2 IEC 60947-4-1 UL 508, CSA 22.2 No. 14

Internal resistance at 25°C ambient temperature and nominal power losses

Rated current I_n [A]	Internal resistance R_i [mΩ/pole]	Power losses P_{vn} [W/pole]
32	2.8	3.6
63	1.3	5.7
100	0.7	7.8

Influence of ambient temperature – single mounted devices

Rated current I_n [A]	10°C	15°C	20°C	25°C	30°C	35°C	40°C	45°C	50°C	55°C	60°C	65°C	70°C
32	38.2	37.2	35.8	35.2	34.2	33.3	32	30.7	29.8	28.8	27.8	26.5	25.1
63	75.3	73.2	70.6	69.3	67.4	65.5	63	60.5	58.6	56.7	54.8	52.3	49.8
100	119.5	116.2	112	110	107	104	100	96	93	90	87	84	80

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S800-SCL-SR
Technical data

Short circuit breaking capacity

		S800S-SCL-SR	S803W-SCL-SR
Rated ultimate short-circuit breaking capacity			
I_{cu} = I_{cs} according to IEC 60947-2			
(AC) 50/60 Hz 240/415 V	[kA]	100	100
(AC) 50/60 Hz 254/440 V	[kA]	100	100
(AC) 50/60 Hz 277/480 V	[kA]	65	65
(AC) 50/60 Hz 289/500 V	[kA]	65	65
(AC) 50/60 Hz 346/600 V	[kA]	65	65
(AC) 50/60 Hz 400/690 V	[kA]	50	50
Short-circuit rating according to UL 508, CSA 22.2			
(AC) 50/60 Hz 480 V	[kA]		65
(AC) 50/60 Hz 600 V	[kA]		65

Coordination

Type	230 V AC						400 V AC						440 V AC					
			Fuse		Current Limiter				Fuse		Current Limiter				Fuse		Current Limiter	
	Ics	Icu	gG, aM		S803x-SCL-SR		Ics	Icu	gG, aM		S803x-SCL-SR		Ics	Icu	gG, aM		S803x-SCL-SR	
	kA	kA	kA	A	kA	A	kA	kA	kA	A	kA	A	kA	kA	kA	A	kA	A
MS132-0.16																		
MS132-0.25																		
MS132-0.4																		
MS132-0.63																		
MS132-1.0	No back-up required						No back-up required						No back-up required					
MS132-1.6																		
MS132-2.5													20	20	100	35	100	32, 63,100
MS132-4.0													20	20	100	63	100	32, 63,100
MS132-6.3													20	20	100	100	100	32, 63,100
MS132-10													20	20	100	100	100	32, 63,100
MS132-12													20	20	100	125	100	32, 63,100
MS132-16													20	20	100	125	100	32, 63,100
MS132-20													20	20	100	125	100	32, 63,100
MS132-25	50	50	100	125	100	63,100	50	50	100	125	100	63,100	20	20	100	125	100	63,100
MS132-32	25	50	100	125	100	63,100	25	50	100	125	100	63,100	20	20	100	125	100	63,100

Type	500 V AC							690 V AC					
			Fuse		Current Limiter					Fuse		Current Limiter	
	Ics	Icu	gG, aM		S803x-SCL-SR			Ics	Icu	gG, aM		S803x-SCL-SR	
	kA	kA	kA	A	kA	A	kA	kA	kA	A	kA	A	
MS132-0.16													
MS132-0.25													
MS132-0.4													
MS132-0.63													
MS132-1.0	No back-up required							No back-up required					
MS132-1.6													
MS132-2.5	20	20	100	35	65*	32, 63,100		3	3	80	35	50**	32, 63,100
MS132-4.0	20	20	100	63	65*	32, 63,100		3	3	80	63	50**	32, 63,100
MS132-6.3	20	20	100	100	65*	32, 63,100		3	3	80	100	50**	32, 63,100
MS132-10	20	20	100	100	65*	32, 63,100		3	3	80	100	50**	32, 63,100
MS132-12	20	20	100	125	65*	32, 63,100		3	3	80	125	50**	32, 63,100
MS132-16	20	20	100	125	65*	32, 63,100		3	3	80	125	50**	32, 63,100
MS132-20	20	20	100	125	65*	32, 63,100		3	3	80	125	50**	32, 63,100
MS132-25	10	10	100	125	65*	63,100		3	3	80	125	50**	63,100
MS132-32	10	10	100	125	65*	63,100		3	3	80	125	50**	63,100

* 100 kA when two current limiters are used in series.
** 80 kA when two current limiters are used in series.

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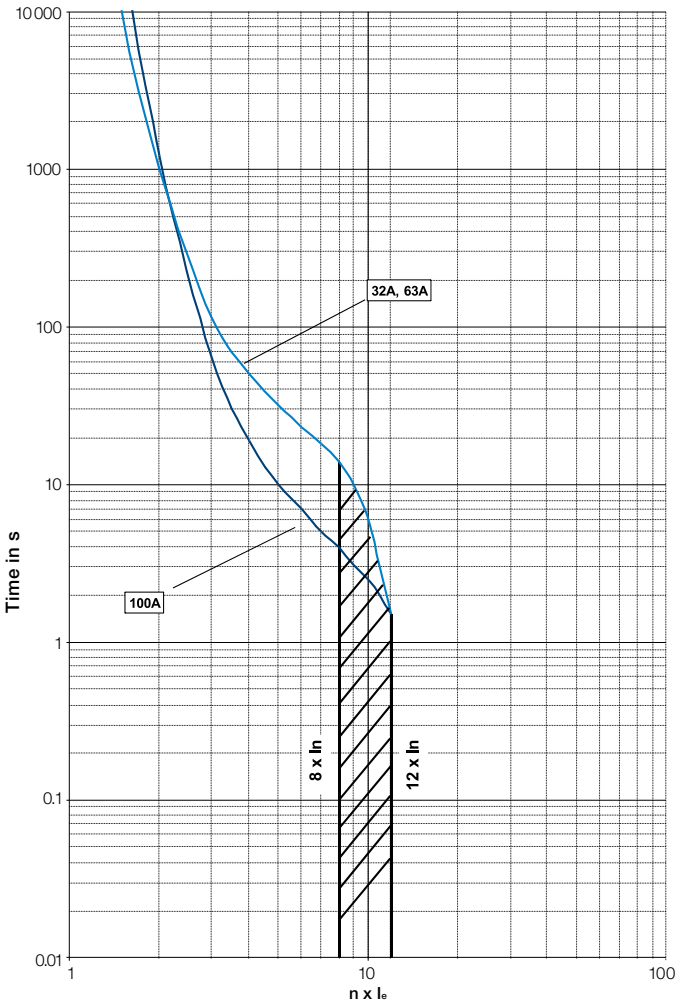
S800-SCL-SR and S803S-SCL
Technical data

Installation requirements

The total sum of the rated currents of all downstream motor starters or circuit breakers shall not exceed the rated current of the S800-SCL-SR. Furthermore the sum of all load currents including inrush currents shall not exceed the maximum permissible load of the S800-SCL-SR.

Maximum load



Multiple of the rated operational current I_e

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ABB
DX122
Inputs DI 230VAC
Relay DO
230VAC/1A
READY
DIAG
ERROR
VI150
RDY
Diag
ERR

12

Motor control and protection

Motor control and protection

Benefits and advantages **12**/2

Motor management system - UMC100.3

Ordering details

Universal Motor Controller UMC100.3 **12**/3

Operating panel UMC100-PAN **12**/4

Expansion modules **12**/5

Fieldbus communication interfaces **12**/6

Fieldbus communication interfaces - Accessories **12**/7

Ethernet communication interfaces **12**/8

Ethernet communication interfaces - Accessories **12**/9

Universal motor controller

Ordering details

Configuration software overview **12**/10

Devices for extension of protection functions **12**/11

Technical data

UMC100.3 **12**/12

Motor control and protection
Benefits and advantages

UMC100.3 is a flexible, modular and expandable motor management system for constant-speed low-voltage range motors. It's most important tasks include motor protection, prevention of plant standstills and the reduction of down time. This is made possible by early information relating to possible motor problems which avoids unplanned plant standstills. Even if a motor trips, quick diagnosis of the cause of the fault serves to reduce downtime.

UMC100.3 combines in a very compact unit:

Motor protection
- Overload, underload
- Overvoltage, undervoltage
- Blocked rotor, low / high current
- Phase failure, imbalance, phase sequence
- Earth leakage
- Thermistor protection
- Limitation of starts per time
- One single version with integrated measuring system covers the rated motor current from 0.24 to 63 A

Motor control
- Integrated and easy to parametrize motor starter functions like direct, reverse, star-delta,...
- Additionally free programmable logic for application specific control functions
- Expansion modules DX111, DX122 for more I/Os
- Expansion modules VI150, VI155 for 3-phase voltage measuring
- Analog and temperature module AI111

Motor diagnostics
- Quick and comprehensive access to all relevant data via fieldbus and/or operator panel
- Current, thermal load
- Phase voltages
- Power factor
- Energy

Communication
- Communication-independent basic device
- Freely selectable fieldbus protocol with FieldBusPlug
- Profibus DP
- DeviceNet
- Modbus RTU
- Ethernet Modbus TCP
- Profinet

Typical application segments
- Oil & gas
- Cement
- Paper
- Mining
- Steel
- Chemical industry

Further information

UMC Catalog	2CDC 190 022 C0206
UMC Brochure	2CDC 135 011 B0203

Motor management system - UMC100.3
Ordering details - Universal Motor Controller UMC100.3

UMC100.3 DC

UMC100.3 UC

Description

Intelligent motor management system for single and three-phase motors with I_e = 0.24 - 63 A in one single device. Compact housing with integrated current transformer for cable cross section up to 25 mm² (max. Ø with Insulation 11 mm). Higher currents with additional external current transformer. Thermal overload protection according to EN/IEC 60947-4-1, selectable trip classes 5E, 10E, 20E, 30E, 40E. Some functions require an additional expansion module.

- Motor protection functions:
  Over-/underload, over-/undercurrent, over-/undervoltage, rotor blocking, phase failure / imbalance / sequence
  Earth fault detection integrated or with external sensor CEM11
  Hot motor protection with thermistor or temperature measurement
- Motor control functions:
  Easily configurable motor control functions: direct, reverse, star-delta starter, pole-changing, overload relay, actuator mode, softstarter mode. Additionally free programmable application specific logic with function blocks
- Service and diagnostic data:
  Operating hours, number of motor starts and overload trips, energy, standstill and operation hours supervision, motor status, faults and warnings, fault history (16 events)
  Motor current, phase voltages, thermal load, power factor (cos φ), active power, apparent power, energy, total harmonic distortion (THD).
- Integrated I/Os:
  6 digital inputs, 1 PTC input, 4 digital outputs. Maximum number of I/Os with expansion modules:
  14 digital inputs, 1 PTC input, 9 digital outputs, 6 analogue inputs, 1 analogue output
- Communication interfaces for fieldbuses and ethernet networks, Interface for operator panel UMC100-PAN, bus interface for connection of expansion modules
- Versions for supply voltage 24 V DC and 110 – 240 V AC/DC and with ATEX approval

Ordering details

Designation	Supply voltage	Type	Order code	Price 1 pce	Weight (1 pce) kg (lb)
Universal Motor Controller	24 V DC	UMC100.3 DC	1SAJ530000R0100		0.275 (0.606)
Universal Motor Controller	110-240 V AC/DC	UMC100.3 UC	1SAJ530000R1100		0.315 (0.694)
Universal Motor Controller, ATEX	24 V DC	UMC100.3 DC EX	1SAJ530000R0200		0.275 (0.606)
Universal Motor Controller, ATEX	110-240 V AC/DC	UMC100.3 UC EX	1SAJ530000R1200		0.315 (0.694)

Motor management system - UMC100.3
Ordering details - Operating panel UMC100-PAN

UMC100-PAN

Description

Operator panel for Universal Motor Controller UMC100. Backlit graphical and multilingual full-text display, LEDs for status. Assembly directly on UMC100 or on the control cabinet door via extension cable and door mounting set.

Functions:

- Monitoring: Shows motor status and diagnostics
- Operate: Start, stop, fault reset
- Parametrize: Setting and changing of motor and fieldbus parameters (password protection possible)
- Copy settings
- USB port for up/download of parameters and logic

Supports 8 languages: English, French, German, Italian, Spanish, Polish, Portuguese, Russian
Replaces all former UMC100 operator panels

Ordering details

Designation	Type	Order code	Price 1 pce	Weight (1 pce) kg (lb)
Operating panel	UMC100-PAN	1SAJ590000R0103		0.047 (1.036)
0.7 m ext. cable with door mounting set	UMCPAN-CAB.070	1SAJ510003R0002		0.070 (0.154)
1.5 m ext. cable with door mounting set	UMCPAN-CAB.150	1SAJ510004R0002		0.088 (0.194)
3 m ext. cable with door mounting set	UMCPAN-CAB.300	1SAJ510002R0002		0.176 (0.388

Motor management system - UMC100.3
Ordering details - Expansion modules

DX111-FBP

DX122-FBP

VI150-FBP

VI155-FBP

Description

Up to 4 expansion-modules can be connected to one UMC100.3

– 1 digital expansion module DX111 or DX122
– 1 voltage expansion module VI150 or VI155
– 2 analog/temperature expansion modules AI111

Supply voltage is 24 V DC; the 110-240 V AC/DC version of the UMC100.3 provides the 24 V DC supply for expansion modules

DX111
I/O-expansion module with 8 digital inputs 24 V DC, 4 relay outputs, 1 analog output 0/4-20 mA or 0…10 V

DX122
I/O-expansion module with 8 digital inputs 110 / 230 V AC, 4 relay outputs, 1 analog output 0/4-0 mA or 0-10 V

VI15x
Voltage modules for the determination of phase voltages, power factor (cos φ), apparent power, energy, total harmonic distortion (THD).
For use in grounded networks (VI150) or in all networks (VI155), 150-690 V AC

AI111
Analog / temperature expansion module, 3 inputs PT100, PT1000, KTY83, KTY84, NTC, 0–10 V, 0/4-20 mA
1 or 2 modules AI111 can be connected to an UMC100.3.

Ordering details

Designation	Type	Order code	Price 1 pce	Weight (1 pce) kg (lb)
I/O module for UMC100, 24 V DC digital input	DX111	1SAJ611000R0101		0.220 (0.485)
I/O module for UMC100, 110 – 230 V AC digital input	DX122	1SAJ622000R0101		0.220 (0.485)
3 phase voltage module for grounded networks	VI150	1SAJ650000R0100		0.110 (0.243)
3 phase voltage module for all networks	VI155	1SAJ655000R0100		0.110 (0.243)
Analog/temperature module 3 analogue inputs	AI111	1SAJ613000R0101		
Connection cable UMC100 - I/O module, length 0.30 m	UMCIO-CAB.030	1SAJ691000R0001		0.011 (0.024)
Connection cable IO-module - IO-module, length 0,30 m	IOIO-CAB.030	1SAJ692000R0001		0.011 (0.024)
Terminal set for UMC100.3 DC (spare parts)	UMCTB	1SAJ929160R0001		0.043 (0.095)
Terminal set for UMC100.3 UC (spare parts)	UMCTB	1SAJ929160R0002		0.045 (0.099)

Motor management system - UMC100.3
Ordering details - Fieldbus communication interfaces

2CDC 341 015 S0014

PDP32.0

2CDC 341 016 S0014

MRP31.0

2CDC 341 017 S0014

DNP31.0

2CDC 341 018 S0014

PDR31.0

Description

Fieldbus communication interfaces enable the UMC100.3 to communicate via fieldbus.
The interfaces can be used in 2 ways

- Mounted directly on a UMC100.3: in this case the interface is supplied from the UMC100.3, no further accessory is required
- Mounted separately on a SMK3.0 adapter in the cable chamber of an MCC: in this case the interface plugged on SMK3.0 needs to be supplied with 24 V DC
  Ready made cables for the application in withdrawable systems are available as well as terminal blocks for making own cables
  CDP18: Cable for use inside the drawer
  CDP24: Cable from SMK3.0 to drawer outside

PDP32
- Communication interface for PROFIBUS DP; supports the protocols PROFIBUS DP/V0 and V1
- PNO certified PROFIBUS slave
- Data transfer rate up to 12 Mbit/s
- Diagnostic LEDs
- Fieldbus connection via 9-pole Sub-D connector or terminal blocks
- GSD download from UMC100.3 webpage

MRP31
- Communication interface for Modbus RTU
- Data transfer rate up to 57,6 kbit/s
- Diagnostic LEDs
- Fieldbus connection via terminal blocks

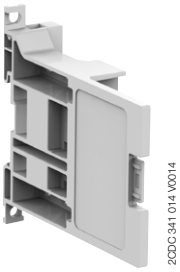
DNP31
- Communication interface for DeviceNet
- ODVA certified DeviceNet slave
- Data transfer rate up to 500 kbit/s
- Diagnostic LEDs
- Fieldbus connection via terminal blocks
- EDS download from UMC100.3 webpage

PDR31.0
- External active fieldbus termination for Profibus DP; the PDR31.0 needs to be mounted on a SMK3.0 adapter and supplied by 24 V DC

Ordering details

Designation	Type	Order code	Price 1 pce	Weight (1 pce) kg (lb)
Profibus DP communication interface	PDP32.0	1SAJ242000R0001		0.050 (0.110)
Modbus RTU communication interface; terminal block for fieldbus connection included	MRP31.0	1SAJ251000R0001		0.039 (0.086)
DeviceNet communication interface; terminal block for fieldbus connection included	DNP31.0	1SAJ231000R0001		
Profibus DP active bus termination	PDR31.0	1SAJ243000R0001		0.030 (0.066)

Motor management system - UMC100.3
Ordering details - Fieldbus communication interfaces - Accessories



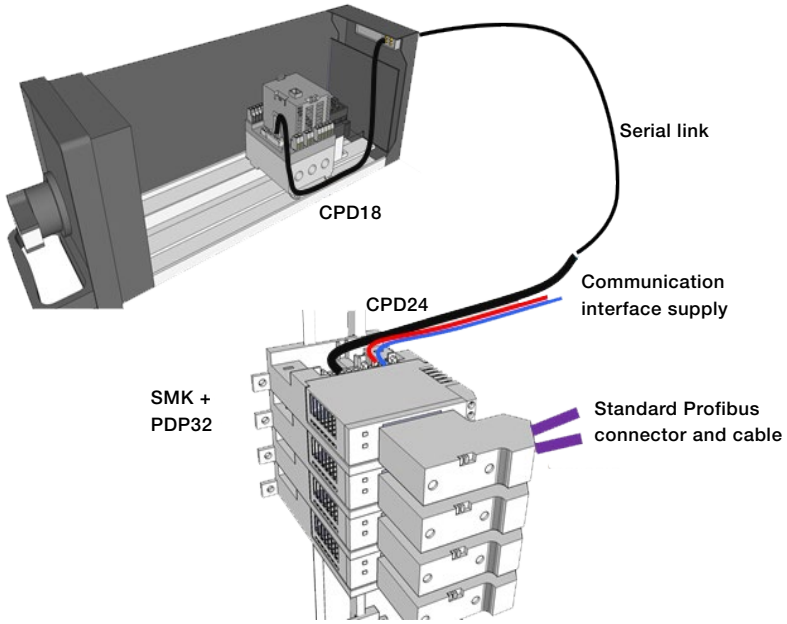
SMK3.0

Adapter and ready-made cables

Adapter SMK3.0 for external mounting of a fieldbus communication interface outside a drawer. SMK3.0 can be mounted on a DIN-rail or fixed by screws. 24 V DC supply required.
Ready-made cables for inside and outside the drawer, including terminal block on one side and open end on the other.
Terminal blocks are also separate available for making own cables.

Ordering details

Designation	Type	Order code	Price 1 pce	Weight (1 pce) kg (lb)
Adapter for separate mounting of a communication interface; terminal block for 24 V DC supply included	SMK3.0	1SAJ929600R0001		0.038 (0.084)
Cable for drawer inside, length 1.5 m	CDP18.150	1SAJ929180R0015		0.060 (0.132)
Cable from SMK3.0 to drawer outside, length 1.5 m	CDP24.150	1SAJ929240R0015		0.060 (0.132)
Terminal block 2-pol for SMK3.0 supply / 10 pcs per pck. (spare parts)	SMK3-X2.10	1SAJ929610R0001		0.017 (0.037)
Terminal block 5-pol for SMK3.0 comm. / 10 pcs per pck. (spare parts)	SMK3-X1.10	1SAJ929620R0001		0.041 (0.090)



Motor management system - UMC100.3
Ordering details - Ethernet communication interfaces

MTQ22

PNQ22

Description

Ethernet communication interfaces enable the UMC100.3 to communicate via an ethernet network

- Up to 4 motor controllers UMC100.3 can be connected to one interface
- Supports all network topologies
- Ring topology with redundancy (MRP protocol)
- No special ethernet connectors required in MCCs
- Easy to use in widthdrawable applications
- Integrated ethernet switch
- 24 V DC supply voltage
- DIN-rail mounting

MTQ22
- Ethernet communication interface with protocol Modbus TCP
- Supports multimaster mode
- Master supervision with timeout control
- Micro USB port for configuration via PC

PNQ22
- Ethernet communication interface with protocol Profinet IO
- Integrated into AC800xA
- Time stamped events (with AC800)
- GSDML download from UMC100.3 webpage

Ordering details

Designation	Type	Order code	Price 1 pce	Weight (1 pce) kg (lb)
Ethernet Modbus TCP interface	MTQ22.0	1SAJ260000R0100		0.172 (0.379)
Ethernet Profinet IO interface	PNQ22.0	1SAJ261000R0100		0.172 (0.379)

Motor management system - UMC100.3
Ordering details - Ethernet communication interfaces - Accessories

Ready-made cables

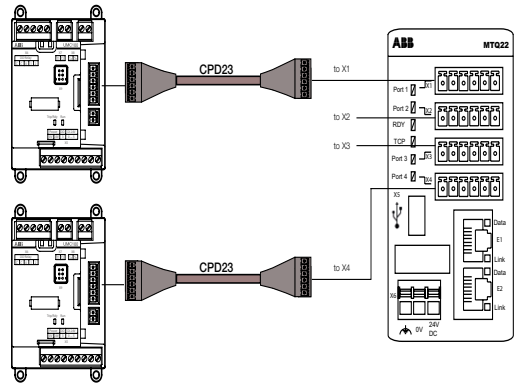
Ready made cables are available for the application in withdrawable systems as well as for fixed installations.
Cables are including terminal blocks. Terminal blocks for making own cables are also available:

– CDP18 cable for use inside and outside a drawer
– CDP23 cable from ethernet interface to UMC100.3

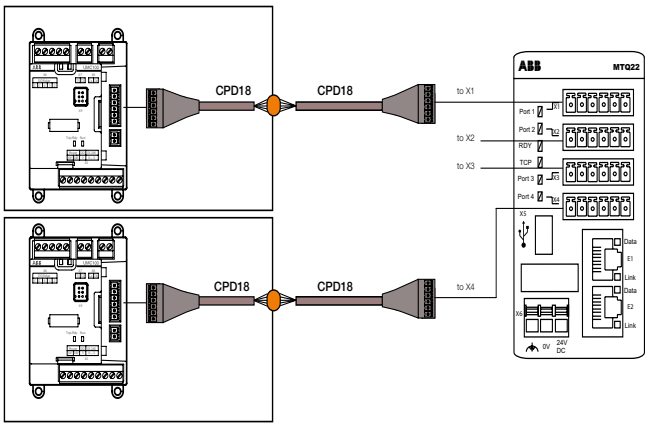
Ordering details

Designation	Type	Order code	Price 1 pce	Weight (1 pce) kg (lb)
Cable for drawer in- and outside, length 1.5 m	CDP18.150	1SAJ929180R0015		0.060 (0.132)
Cable ethernet interface - UMC100.3, length 1.5 m	CDP23.150	1SAJ929230R0015		0.100 (0.220)
Cable ethernet interface – UMC100.3, length 3 m	CDP23.300	1SAJ929230R0030		0.160 (0.353)
Terminal bloc for MTQ22/PNQ22 X1…X4, 4 pcs	ETHTB-FBP.4	1SAJ929200R0001		0.015 (0.033)
Terminal bloc for MTQ22/PNQ22 X1…X4, 50 pcs	ETHTB-FBP.50	1SAJ929200R0002		0.015 (0.033)

UMC100.3, fix mounted application with solution MTQ22 / PNQ22



UMC100.3, withdrawable application with MTQ22 / PNQ22



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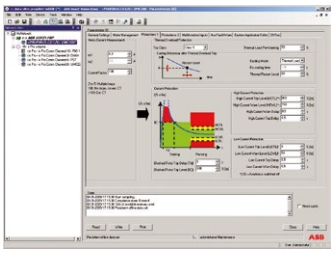
Universal Motor Controller
Ordering details - Configuration software overview



Configuration software for the UMC100-FBP motor management system
The software screwdriver for your application

Asset Vision Basic is an FDT frame application with a modern and simple graphical user interface. It provides effective basic functionality for configuration, diagnosis and maintenance of intelligent low voltage switching devices from ABB. Furthermore, due to the open FDT interface, other ABB and 3rd party DTMs can also be used.

Asset Vision Basic is the optimal tool for configuring FBP devices during commissioning, in the workshop or as second master in a PROFIBUS network of a process control system.

System requirements: Windows XP / Windows 7

Overview of features:

- Online/offline configuration and parameterization of devices
- Reading parameterization and configuration information from the device
- Online display of measuring and status data
- Online operation and error acknowledgement
- Creation of customer-specific logics
- Archiving

Connection to the device can either be via PROFIBUS or as point to point connection directly to the device.

Connection to a Profibus DP network	UTP22-FBP
Connection to an UMC100.3	With micro-USB cable via operator panel
Connection to an UMC100-FBP	With interface UTF21-FBP

UTP22-FBP

UTF21-FBP

Ordering details

Designation	Type	Order code	Price 1 pce	Weight (1 pce) kg (lb)
USB interface for PROFIBUS networks	UTP22-FBP	1SAJ924013R0001		0.261 (0.575)
PDP22/PDQ22 Device Type Manager (DTM) incl. FDT/DTM frame application	PBDTM-FBP	1SAJ924012R0006		0.062 (0.137)
USB to FBP-interface cable	UTF21-FBP.0	1SAJ929400R0002		0.100 (0.220)

Universal Motor Controller
Ordering details - Devices for extension of protection functions

CEM11-FBP

Earth fault monitors CEM11-FBP for use with Universal Motor Controller UMC100-FBP

Ordering details

Earth fault currents [mA]	Through-hole diameter	Type	Order code	Price 1 pce	Weight (1 pce) kg (lb)
80[1], 300, 550, 750, 1000, 1200, 1500, 1700	20 mm	CEM11-FBP.20	1SAJ929200R0020		0.130 (0.287)
100[1], 500, 1000, 1400, 2000, 2400, 3000, 3400	35 mm	CEM11-FBP.35	1SAJ929200R0035		0.200 (0.441)
120[1], 1000, 2000, 2800, 4000, 4800, 6000, 6800	60 mm	CEM11-FBP.60	1SAJ929200R0060		0.330 (0.728)
300[1], 2000, 4000, 5600, 8000, 9600, 12000, 13600	120 mm	CEM11-FBP.120	1SAJ929200R0120		0.940 (2.072)

[1] lower values have higher inaccuracy

CT4L185R/4, CT4L310R/4

CT5L500R/4, CT5L850R/4

Current transformers for use with Universal Motor Controller UMC100-FBP

Linear type transformers, 3-phase, with terminal block, for conductors Cu 2.5 mm2. For use with UMC100 and nominal motor currents >63 A

Ordering details

Designation	Recommended current range	Type	Order code	Price 1 pce	Weight (1 pce) kg (lb)
Current transformer	60…185 A AC	CT4L185R/4	1SAJ929500R0185		1.600 (3.527)
Current transformer	180…310 A AC	CT4L310R/4	1SAJ929500R0310		1.500 (3.307)
Current transformer	300…500 A AC	CT5L500R/4	1SAJ929501R0500		1.700 (3.748)
Current transformer	500…850 A AC	CT5L850R/4	1SAJ929501R0850		1.900 (4.189)

Motor management system - UMC100.3
Technical data - UMC100.3

	UMC100.3	
Control voltage circuit	**1SAJ530000R0*****	**1SAJ530000R1*****
Supply voltage	24 V DC (+30 % ... -20 %) (19.2 ... 31.2 V DC) including ripple	110V - 240V AC/DC -15% / +10%
Total power dissipation Conditions: all digital inputs high, all relay outputs activated Please refer to the product manual for more detailed information.	min. 3 W	min P: 3.5 W / S: 8 W
Reverse polarity protection	yes	not relevant
Controller Unit		
LEDs: Red / green / yellow	Red: Motor has been tripped due to a thermal overload condition or another fault. Yellow: Motor is running Green: Ready for operation	
Digital inputs		
Number of digital inputs	6 (DI0 ... DI5) Type 1 accord. to EN 61131-2	
Supply for digital inputs	24 V DC	
Isolation	No	
Input signal bounce suppression	Typ. 2 ms	
Signal 0 range including ripple	-31.2 ... +5 V	
Signal 1 range including ripple	+15 ... +31.2 V	
Input current per channel (24 V DC)	Typ. 6.0 mA	
Input resistor to 0 V	3.9 k Ω	
Cable length	unshielded max. 600 m shielded max. 1000 m	
Relay Outputs		
Number of relay outputs	3 x monostable with one common root	
Voltage range of contacts	12-250 V AC/DC	
Lowest switched power for correct signals	1 W or 1 VA	
Switching capacity per relay contact acc. to EN 60947-5-1 (electromagnetic load)	AC-15 240 V AC: max. 1.5 A AC-15 120 V AC: max. 3 A DC-13 250 V DC max. 0.11 A DC-13 125 V DC max. 0.22 A DC-13 24 V DC max. 1 A	
Short-circuit protection	6 A gG	
U_{imp}	4 kV	
Switching of inductive power	Inductive loads need additional measures for spark suppression. Diodes for DC voltage and varistors / RC elements for AC voltage are suitable. Some DC coil contactors contain rectifiers which suppress sparks perfectly.	
Relay contact service life	Mechanical 500 000 switching cycles Electrical (250 V AC): 0.5 A: 100 000 cycles 1.5 A 50 000 switching	
Internal clearance and creepage distances relay contacts to 24 V circuits	> 5.5 mm (safety insulation up to 250 V AC) (EN 60947-1, Pollution degree 2)	
Pollution degree terminals	3	
Supply power down/up, behaviour: Valid for all motor control functions, except transparent and overload relay.	Whenever the supply voltage of the UMC is switched off and on, the starting of the motor needs a new RUN signal.	
Transistor output	**1SAJ530000R0*****	**1SAJ530000R1*****
Max. output current	200 mA	50 mA
Short circuit protected	Yes	Yes
Output voltage if high	UMC100 supply voltage, nominal 24 V DC	nominal 24V DC
Isolation	No	3.4 - 3.8 kΩ
Thermistor Motor Protection (PTC - binary) Type A		
Broken wire resistance Voltage at broken wires between terminals T1/T2	> 4.8 kΩ 12 V DC (typ.)	
Response resistance	3.4-3.8 kΩ	
Reset resistance	1.5-1.65 kΩ	
Short circuit resistance Current at short circuit conditions	< 21 Ω 1.5 mA (typ.)	
Response time	800 ms	
Max. cold resistance of PTC sensor chain	< 1.5 kΩ	
Line length	2.5 mm^2: 2 x 250 m 1.5 mm^2: 2 x 150 m 0.5 mm^2: 2 x 50 m	
Isolation	No	

Motor management system - UMC100.3
Technical data - UMC100.3

Environmental and mechanical data	1SAJ530000R0***	1SAJ530000R1***
Mounting	On DIN rail (EN 50022-35) or with 4 screws M4	
Mounting position	Any	
Dimensions (W x H x D)	70 x 105 x 106 mm	
Net weight	0.3 kg	0.35 kg
Tightening torque	ø 3,5 mm / 0.138 in : 0.5 Nm, 4.5 in.lb	
Wire size with wire end ferrule	1 x 0.2-2.5mm² (1 x 28 ... 12 AWG)	
Wire size with rigid	1 x 0.2-2.5mm² (1 x 28 ... 12 AWG)	
Tightening torque for screw mounting	0.8 Nm	
Degree of protection	UMC: IP20	
Temperature range storage	-25 ... +70 °C	
Temperature range operation	0 ... +60 °C with two output relays activated	0 ... +60°C with two relay outputs activated and 24V DC supply output loaded with 200 mA 0 ... +50°C with two relay outputs activated and 24V DC supply output loaded with 400 mA

Performance Data	1SAJ530000R0***	1SAJ530000R1***
Reaction time UMC100 DI to UMC100 Relay Output (incl.hardware delays)	typ. 10 ms (Transparent Control Function)	
Reaction time UMC100 DI to DX111 Relay Output (incl.hardware delays)	typ. 10 ms (Transparent Control Function)	
Reaction time from DX111 DI to UMC100 Relay Ouput (incl.hardware delays)	typ. 14 ms (Transparent Control Function)	
Number of supported function blocks:	See 2CDC 135 014 D02xx	

Certifications and approvals
General technical data

Certifications and approvals 13/2

General technical data

Coordination with short-circuit protection devices **13**/8

Standards, specifications and certifying organizations **13**/10

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Standards and utilization categories **13**/14

North American standards and utilization categories **13**/16

Degrees of protection **13**/17

Climatic withstand of devices **13**/18

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						Approvals: ship classification societies							
Mark														
Abbreviation	CSA	UL	cULus	CCC	GOST or EAC	KC	BV	DNV-GL	LR	RINa	ABS	RMRS	CCS	ClassNK
Approved in	Canada	USA	North America	China	Russia	Korea	France		Gr.Britain	Italy	USA	Russia	China shipping	Japan
3-pole contactors with screw terminals														
4 to 7.5 KW														
AC operated AS09, AS12, AS16			■ E312527	■										
DC operated ASL09, ASL12, ASL16			■ E312527	■										
4 to 45 kW														
AC / DC operated AF09, AF12, AF16, AF26, AF30, AF38			■ E312527	■	■	■	■	■	■	■	■	■		■
AC / DC operated AF40, AF52, AF65, AF80, AF96			■ E312527	■	■	■	■	■	■	■	■	■		■
55 to 200 kW														
AC / DC operated (2) AF116, AF140, AF146			■ E36588	■	■		■	■	■	■	■		■	■
AC / DC operated (2) AF190, AF205, AF265, AF305, AF370			■ E36588	■	■		■	■	■	■	■		■	■
200 to 560 kW														
AC / DC operated AF400, AF460, AF580, AF750			■ E36588	■	■		■	■	■	■	■		■	■
AC / DC operated AF1250			■ E73397	■	■					■	■		■	
AC / DC operated AF1350, AF1650			■ E36588	■	■		■	■	■	■	■		■	■
AC / DC operated AF2050			■ E73397	■	■					■	■		■	
AC / DC operated AF2650			■ E73397	■	■					■			■	
4-pole contactors with screw terminals														
25 to 125 A, AC-1														
AC / DC operated AF09, AF16, AF26, AF38			■ E319322	■	■	■	■	■	■	■	■	■		■
AC / DC operated AF40, AF52, AF80			■ E312527	■	■	■					■			■
160 to 525 A, AC-1														
AC / DC operated AF116, AF140, AF190, AF205, AF265, AF305, AF370			■ E73397	■	■	■ (1)	■	■	■					■
800 to 1000 A AC-1														
AC operated EK550			■ E36588	■	■									
AC operated EK1000				■	■									
DC operated EK550			■ E36588	■	■									
DC operated EK1000				■	■									

(1) AF116 ... AF265 only. KC only applicable to devices up to 300 A. (2) Marine approvals for AF116 ... AF370 with built-in PLC interface: only DNV is available.
All AF contactors are (RCM) marked.

1SBC100059S0201 - Rev. D

Certifications and approvals

	Certifications						Approvals: ship classification societies							
Mark														
Abbreviation	CSA	UL	cULus	CCC	GOST or EAC	KC	BV	DNV-GL	LR	RINa	ABS	RMRS	CCS	ClassNK
Approved in	Canada	USA	North America	China	Russia	Korea	France		Gr.Britain	Italy	USA	Russia	China shipping	Japan
DC switching contactors														
AC operated GA75	■	■ E319322		■										
DC operated GAE75	■	■ E319322		■										
AC / DC operated GAF185 ... GAF300			■ E73397	■										
AC / DC operated GAF460, GAF750, GAF1250, GAF1650, GAF2050			■ E73397	■										
Capacitor switching contactors														
AC operated UA16		■ E312527		■	■									
AC operated UA26 ... UA75	■	■ E312527		■	■									
AC operated UA95, UA110			■ E36588	■	■									
AC operated UA16..RA		■ E312527		■	■									
AC operated UA26..RA ... UA75..RA	■	■ E312527		■	■									
AC operated UA95..RA, UA110..RA			■ E36588	■	■									
Contactor relays with screw terminals														
AC operated 4-pole, 8-pole - NS..			■ E252354	■										
DC operated 4-pole, 8- pole - NSL..			■ E252354	■										
AC / DC operated 4-pole, 8-pole - NF..			■ E252354	■	■		■	■	■	■	■	■		

All GAF and NF contactors are (RCM) marked.

3-pole contactors with spring terminals														
4 to 7.5 KW														
AC operated AS09..S, AS12..S, AS16..S			■ E312527	■										
DC operated ASL09..S, ASL12..S, ASL16..S			■ E312527	■										
4 to 11 KW														
AC / DC operated AF09..S AF12..S, AF16..S			■ E312527	■	■		■	■		■	■	■		■
AF26..S				■	■		■	■		■	■	■		■
Contactor relays with spring terminals														
AC operated 4-pole, 8-pole - NS..			■ E252354	■										
DC operated 4-pole, 8- pole - NSL..			■ E252354	■										
AC / DC operated 4-pole, 8-pole - NFS..			■ E252354	■	■		■	■		■	■	■		

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Certifications and approvals

Mark	Certifications					Approvals: ship classification societies							
Abbreviation	CSA	UL	cULus	CCC	GOST or EAC	BV	DNV-GL	LR	RINa	ABS	RMRS	CCS	ClassNK
Approved in	Canada	USA	North America	China	Russia	France		Gr.Britain	Italy	USA	Russia	China shipping	Japan
Accessories for AS09 ... AS16 contactors													
Auxiliary contacts													
CA3			■ E252354	■	■								
CA3..S			■ E252354	■									
Mechanical interlock unit													
VM3			■ E312527		■	□	□	□	□	□	□	□	
Connecting links													
BEA16-3			■ E312527		■	□	□	□	□	□	□	□	
BEA16-3U			■ E312527			□	□	□	□	□	□	□	
BER16C-3			■ E312527		■	□	□	□	□	□	□	□	
BEY16C-3			■ E312527		■	□	□	□	□	□	□	□	
Electronic timer													
TEF3			■ E252354		■								
Surge suppressors													
RT5, RC5-1, RV5			■ E312527		■								
Accessories for AF09 ... AF2650 and EK contactors and NF contactor relays													
Auxiliary contacts													
CA4, CC4			■ E252354	■	■	■ (CA4)	■ (CA4)	■	■	■	■		□
CAT4			■ E252354	■	■	■	■	■	■	■	■		□
CAL4			■ E252354	■	■	■	■	■	■	■	■		□
CAL19			■ E76003	■	■	■	■	■	■	■		■	□
CAL18			■ E76003	■	■	■	■	■	■	■		■	□
CAL16			■ E76003	■	■								
CE5...D0.1			■ E319322	■	■								
CE5...D2			■ E319322	■	■								
CE5...W0.1			■ E319322	■	■								
CE5...W2			■ E319322		■								
CEL18			■ E76003		■								
CA4..S, CAL4..S, CAT4..S			■ E252354	■	■	■	■		■	■	■		
Electronic timer													
TEF4, TEF45			■ E252354		■								
Mechanical / electrical interlock unit													
VEM4			■ E312527	■	■								
Mechanical interlock units													
VM4, VM96-4			■ E312527		■	□	□	□	□	□	□	□	□
VM19			■ E36588		■	□	□	□	□	□	□	□	
VM140/190			■ E36588		■	□	□	□	□	□	□	□	
VM205/265			■ E36588		■	□	□	□	□	□	□	□	
VM 750			■ E36588		■	□	□	□	□	□	□	□	
VM1650H			■ E36588		■	□	□	□	□	□	□	□	
Interface relay													
RA4			■ E252354		■								

□ Marine approvals not needed for this accessory.

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Certifications and approvals

	Certifications					Approvals: ship classification societies							
Mark													
Abbreviation Approved in	CSA Canada	UL USA	cULus North America	CCC China	GOST or EAC Russia	BV France	DNV-GL	LR Gr.Britain	RINa Italy	ABS USA	RMRS Russia	CCS China shipping	ClassNK Japan
Latching unit													
WB75-A		■ E252354			■								
WA4			■ E312527										
Connecting links with manual motor starters													
BEA16-4, BEA26-4, BEA38-4, BEA65-4			■ E312527		■	□	□	□	□	□	□	□	□
Connection sets for reversing contactors													
BER16-4, BER38-4			■ E312527		■	□	□	□	□	□	□	□	□
BER65-4, BER96-4			■ E312527		■	□	□	□	□	□	□	□	□
BER140-4, BER205-4, BER370-4			■ E36588		■	□	□	□	□	□	□	□	□
BEM460-30, BEM750-30			■ E36588		■	□	□	□	□	□	□	□	□
Connection sets for star-delta starters													
BEY16-4, BEY38-4			■ E312527		■	□	□	□	□	□	□	□	□
BEY65-4, BEY96-4			■ E312527		■	□	□	□	□	□	□	□	□
BEY190-4, BEY205-4, BEY265-4, BEY370-4			■ E36588		■	□	□	□	□	□	□	□	□
BED460, BED580, BED750			■ E36588		■	□	□	□	□	□	□	□	□
Phase to phase connections													
BEP140-30, BEP205-30, BEP370-30			■ E36588		■	□	□	□	□	□	□	□	□
BEP140-40, BEP205-40, BEP370-40					■	□	□	□	□	□	□	□	□
BES460, BES750			■ E36588		■	□	□	□	□	□	□	□	□
Connection bars between contactors and MCCB													
BEA140/XT2, BEA140/XT3			■ E36588		■	□	□	□	□	□	□	□	□
BEA205/XT4			■ E36588			□	□	□	□	□	□	□	□
BEA370/T5			■ E36588			□	□	□	□	□	□	□	□
Terminal connecting strips and shorting bars													
LY16-4, LY38-4			■ E312527		■	□	□	□	□	□	□	□	□
LY110, LY185, LY300, LY460, LY750			■ E36588		■	□	□	□	□	□	□	□	□
LP185, LP300, LP460, LP750			■ E36588		■	□	□	□	□	□	□	□	□
LH38-4			■ E312527		■	□	□	□	□	□	□	□	□
LF16-4, LF38-4			■ E312527		■	□	□	□	□	□	□	□	□
LG16-4			■ E312527		■	□	□	□	□	□	□	□	□
LK96-4B, LK96-4F, LK96-4L			■ E312527			□	□	□	□	□	□	□	□
Additional coil terminal blocks													
LD38-4			■ E312527			□	□	□	□	□	□	□	□
Additional terminal blocks													
LDC4			■ E312527			□	□	□	□	□	□	□	□
Protective covers													
BX4, BX4-CA			■ E252354			□	□	□	□	□	□	□	□
Terminal shrouds													
LT65-30 ... LT96-30			–			□	□	□	□	□	□	□	□
LT52-40 ... LT80-40			–			□	□	□	□	□	□	□	□
LT140 ... LT750			■ E36588		■	□	□	□	□	□	□	□	□
LT140-40 ... LT370-40			■ E73397		■	□	□	□	□	□	□	□	□
Terminal enlargement													
LW			■ E36588		■	□	□	□	□	□	□	□	□

(1) In progress. □ Marine approvals not needed for this accessory.

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Certifications and approvals

	Certifications								Approvals: ship classification societies						
Mark															
Abbreviation	CSA	UL	cULus	CCC	GOST or EAC	ATEX	IEC Ex	KC	BV	DNV-GL	LR	RINa	ABS	RMRS	ClassNK
Approved in	Canada	USA	North America	China	Russia			Korea	France		Gr.Britain	Italy	USA	Russia	Japan
Teminal extension															
LX			■ E36588		■	□			□	□	□	□	□	□	□
Connection socket															
LL			■ E36588		■	□			□	□	□	□	□	□	□
Connection modules															
LD146-30, LD146-40			■ E36588		■	□			□	□	□	□	□	□	□
Function marker															
BA4			■ E252354			□			□	□	□	□	□	□	□
Fixing clip															
BB4			■ E312527			□			□	□	□	□	□	□	□
Manual motor starters															
MS116			■ E137861	■	■			■ (4)	■ (1)	■	■		■	■	
MS132			■ E137861 E345003	■	■	■		■ (4)	■	■	■	■	■	■	
MS165			■ E137861 E345003	■	■	■ (2)		■ (3)	■	■	■		■	■	
MS495	■	■ E167205 E195536		■	■	■			■	■	■			■	
MS497	■	■ E167205 E195536		■	■	■			■	■	■			■	
Manual motor starters magnetic only															
MO132			■ E137861 E345003	■	■			■ (4)	■	■	■	■	■	■	
MO165			■ E137861 E345003	■	■			■ (3)	■	■	■		■	■	
MO495	■	■ E167205			■					■					
MO496	■	■ E167205			■					■					
Circuit breaker for transformer protection															
MS132-T			■ E137861	■				■ (4)							
Mini contactors															
3-pole contactors															
AC operated B6, B7			■ E191658	■	■			■	■	■	■			■	
DC operated BC6, BC7, B7D			■ E191658	■	■			■	■	■	■			■	
DC operated B6S, B7S			■ E191658	■	■			■	■	■	■			■	
3-pole reversing contactors															
AC operated VB6, VB7			■ E191658	■	■			■		■				■	
DC operated VBC6, VBC7			■ E191658	■	■			■		■				■	
AC operated VB6A, VB7A			■ E191658	■	■			■		■				■	
DC operated VBC6A, VBC7A			■ E191658	■	■			■		■				■	
3-pole interface contactors															
DC operated BC6, BC7			■ E191658	■	■				■	■	■			■	
3-pole contactor - large coil voltage range															
DC operated TBC7				■	■			■							

(1) MS116 up to 16 A only. (2) ATEX certification for MS165 is valid for production from week 49, 2015. (3) KC certification for MS165/MO165 is valid for production from week 2, 2016. (4) KC certification for MS116/MS132/MO132/MS132-T is valid for production from week 6, 2016. □ Marine approvals not needed for this accessory.

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Certifications and approvals

	Certifications								Approvals: ship classification societies						
Mark															
Abbreviation	CSA	UL	cULus	CCC	GOST or EAC	ATEX	IEC Ex	KC	BV	DNV-GL	LR	RINa	ABS	RMRS	ClassNK
Approved in	Canada	USA	North America	China	Russia			Korea	France		Gr.Britain	Italy	USA	Russia	Japan
4-pole contactors															
AC operated B6, B7			■ E191658	■	■			■	■	■	■			■	
DC operated BC6, B7D			■ E191658	■	■			■	■	■	■			■	
4-pole contactor - large coil voltage range															
DC operated TBC7				■	■			■							
Contactor relays															
AC operated K6			■ E48139	■	■									■	
DC operated KC6			■ E48139	■	■									■	
Interface contactor relays															
DC operated KC6			■ E48139	■	■									■	
DC operated K6S			■ E48139	■	■									■	
Contactor relays - large coil voltage range															
DC operated TKC6					■										
Thermal overload relays															
T16			■ E48139	■	■				■	■	■	■	■	■	
TF42			■ E48139	■	■	■			■	■	■	■	■	■	
TF65			■ E48139	■	■	■ (3)			■	■	■	■	■	■	
TF96			■ E48139	■	■	■ (3)			■	■	■	■	■	■	
TF140DU			■ E48139	■	■				■	■	■	■	■	■	
TF140DU-V1000			■ E48139	■	■	■			■	■	■	■	■	■	
TA200DU			■ E48139	■	■				■	■ (4)	■		■	■	
TA200DU-V1000			■ E48139	■	■	■			■	■ (4)	■		■	■	
Electronic overload relays															
0.10...45 A															
E16DU			■ E48139	■	■									■	
EF19			■ E48139	■	■	■	■ (1)		■	■	■	■	■	■	
EF45			■ E48139	■	■	■	■ (1)		■	■	■	■	■	■	
20...150 A															
EF65			■ E48139	■	■	■ (2)	■ (1)		■	■	■	■ (2)	■	■	
EF96			■ E48139	■	■	■	■ (1)		■	■	■	■	■	■	
EF146			■ E48139	■	■	■	■ (1)		■	■	■	■	■	■	
63...380 A															
EF205			■ E48139	■	■	■	■ (1)		■	■	■	■	■	■	
EF370			■ E48139	■	■	■	■ (1)		■	■	■	■	■	■	
150...800 A															
EF460			■ E48139	■	■	■	■ (1)		■	■	■	■	■	■	
EF750			■ E48139	■	■	■	■ (1)		■	■	■	■	■	■	
Electronic compact starter															
HF range			■ E191658	■	■	■									

(1) IECEx is valid for product produced from week15, 2017. (2) EF65-56 has no RINa approval and ATEX certification is valid for EF65-56 produced from week 47, 2015. (3) ATEX is valid for products produced from week 26, 2015. All electronic overload relays are (RCM) marked : EF produced from week 47, 2015; E produced from week 14, 2016. (4) 2 separate certificate available: 1 for DNV and 1 for GL.

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Coordination with short-circuit protection devices

In compliance with standards IEC 60947-4-1 and EN 60947-4-1, we define for the contactors and starters the type, rating and characteristics of the short-circuit protection devices SCPD which allow selective protection against overloads and ensure protection against short circuits.

Basic functions

Any starter is designed to:
– start motors,
– ensure continuous functioning of motors,
– disconnect motors from the supply line,
– guarantee protection of motors against overloads.

The starter is typically made up of a switching device (contactor) and an overload protection device (thermal overload relay or electronic overload relay).

These two devices MUST be coordinated with equipment capable of providing protection against short circuit (SCPD: short circuit protective device): typically a circuit breaker with magnetic release only or a switch fuse. These are not necessarily part of the starter.

Applicable standards

IEC 60947-4-1 (EN 60947-4-1) precisely defines the different points to be considered in order to carry out correct coordination.

Complete coordination for a combination includes the following points:
– Selectivity test between the overload relay and the short-circuit protection device SCPD.
– Short-circuit condition tests:
  - at prospective "r" currents - These currents depend on the rated operational current of the starter (**Ie** AC-3) and are given by the standard (Table 13). For example:
    r = 1kA for **Ie** AC-3 < 16 A
    r = 3 kA for 16 A < **Ie** AC-3 < 63 A
    r = 5 kA for 63 A < **Ie** AC-3 < 125 A etc.
  - at the rated conditional short-circuit current "**Iq**" - This is the maximum prospective current that the combination can withstand, for example 50 kA.

Types of coordination

IEC 60947-4-1 (EN 60947-4-1) defines two types of coordination according to the expected level of service continuity. Acceptable extreme damage for the switchgear is divided into two types.

Type 1: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will not be able to then operate without being repaired or having parts replaced.

Type 2: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts light welding is acceptable. In this case, the manufacturer must stipulate the measures to be taken with respect to maintenance of the equipment.

The complete ABB offer

ABB has acquired years of experience with respect to problems of coordination and is able to make a complete offer based on tests performed in its qualified laboratories. This offer includes 400 V, 500 V, 690 V networks.

A complete data base of coordination tables, according to IEC 60947-4-1 (EN 60947-4-1), is available on the ABB Website.

In the coordination tables the following short-circuit protection devices are recommended:
– Moulded case circuit-breakers (MCCBs)
– Miniature circuit-breakers (MCBs)
– Switch-disconnector-fuses (aM, gG and BS)
– Manual Motor Starters (MMS).

General remarks applicable to all tables

– Each table is defined for a maximum ambient temperature of 40 °C. For higher temperatures, apply a derating factor according to the following rules:
  - Fuses: factor of 0.8 applied to **In** for an ambient temperature of 70 °C
  - MCCBs and MCBs: factor of 0.8 applied to **In** 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 **In** 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 < **ts** < 30 s
  Tripping classes of thermal overload relays according to IEC 60947-4-1 (EN 60947-4-1): 10A and 10
  Tripping classes of electronic overload relays according to IEC 60947-4-1 (EN 60947-4-1): 10E, 20E, 30E selectable
– In the tables with MCCBs, these are fitted with the magnetic relay alone. Setting is always carried out at > 12.3 **Ie** AC-3 so that the transient current peak occurring during starting does not lead to tripping.

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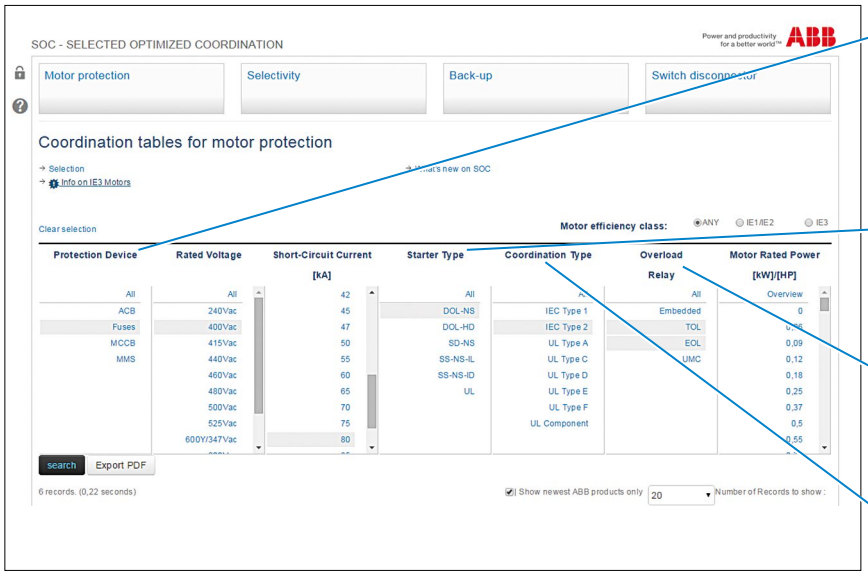
Coordination with short-circuit protection devices

A complete data base of coordination tables, according to **IEC 60947-4-1** (EN 60947-4-1) **or UL 508 / UL 60947-4-1**, is available on the ABB Website: see below.

Selection

Simple or multiple selections all from the same screen.



Short-circuit protection devices
- Air circuit breakers
- Fuses "gG" or "aM"
- Miniature circuit breaker
- Moulded case circuit breaker
- Manual motor starter

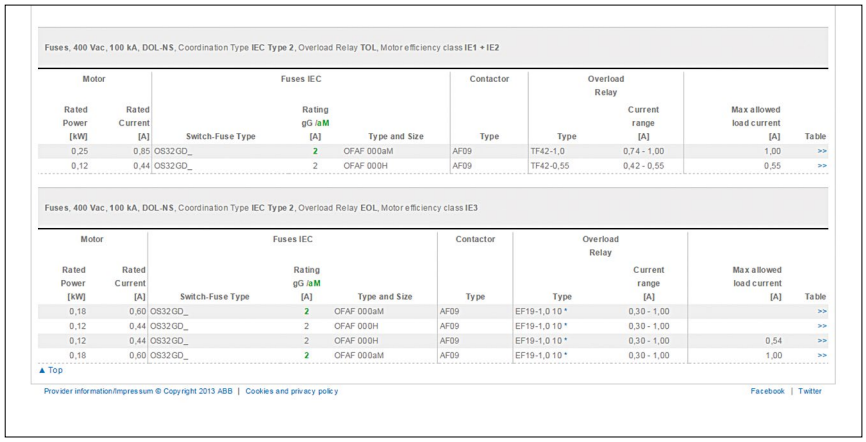
Starter type
- Direct-on-line normal start
- Direct-on-line heavy duty
- Star-delta normal start
- Soft starter normal start

Overload relay
- TOL : thermal overload relay
- EOL : electronic overload relay
- UMC : Universal motor controller

Coordination
- IEC type 1 or type 2
- UL type A to Type F

Results

- Search results displayed at the bottom of the selection page.
- Only the most appropriate solutions to your application, will be displayed at the bottom of the page.
  "Enable Smart Current Search" function featured for the short-circuit current where "near to" selected values also are included in the result.
- Possible to print the page to a pdf file or from your printer.
- "Clear selection" function to deselect all selected.



Access

To find the coordination tables for motor protection, please see:
http://applications.it.abb.com/SOC/Page/Selection.aspx

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Standards, specifications and certifying organizations

Definitions

ABB low voltage devices are developed and manufactured in accordance with the applicable regulations as stated in the international IEC standards, the European EN standards and the national ones such as NF, DIN, GB and BS. For devices installed in ships, an approval issued by independent classification societies is demanded by the maritime insurance companies.

CB scheme

Certification Body certificates (CB certificates) are available to prove the complete conformity to standards

The IEC CB (Certification Body) scheme is multilateral agreement between the National Certification Bodies to allow international certification of electrical and electronic products so that a single certification allows worldwide market access.

The CB Scheme was established by the International Electrotechnical Committee for conformity testing to standards for electrical equipment (IECEE).

Certified products

In some cases, products are validated and tested according to a standard by a certification body and the manufacturer is regularly visited by this body in order to check the respect of the design and the materials used. This process creates a certified product. This is the case of UL (Underwriters Laboratories) and CSA (Canadian Standard Association) for instance (see below).

Specifications

International Specifications

The International Electrotechnical Commission, IEC, which is part of the International Standards Organization, ISO, publishes IEC publications which act as a basis for the world market.

European Specifications and National Specifications

The European committee for electrotechnical standardization (CENELEC), which groups together European countries, publishes EN standards.

These European standards may differ very little from IEC international standards and have similar numbering.

The same applies for national standards which use, without exception, the same numbering and reproduce the texts of these unified standards in their entirety. Contradicting national standards are withdrawn.

European Directives

The guarantee of the free movement of goods within the European Community means that any regulatory differences between member states have been eliminated. The European directives set up common rules that are included in the legislation of each state while contradictory regulations are cancelled.

Three directives are essential:

– **Low Voltage Directive** 2006/95/EC (until April 2016, 19th) and 2014/35/EC (from April 2016, 20th) concerns electrical equipment from 0 to 1000 V AC and from 0 to 1500 V DC.

This specifies that compliance with the requirements that it sets out is acquired if the equipment conforms to the standards harmonized on an European level. EN 60947-1 and EN 60947-4-1 for contactors.

– **Machinery Directive** 2006/42/EC for safety specifications of machines and equipment on complete machines.

– **Electromagnetic Compatibility Directive** 2004/108/EC (until April 2016, 19th) and 2014/30/EC (from April 2016, 20th) which concerns all devices able to create electromagnetic disturbance.

CE Marking:

CE marking indicates that the marked equipment conforms to the relevant EU directive.

CE marking is part of an administrative procedure and guarantees free movement of the product within the European Community.

Standards in Canada and the USA

Canadian and American specifications are more or less equivalent but differ greatly from IEC standards.

UL Underwriters Laboratories USA

CSA Canadian Standard Association Canada

UL (USA) specifications make the following distinction between devices:

Listed Product

A product that has been produced under UL's listing and follow-up service program in accordance with the terms of UL's service agreement and that bears the UL listing mark as the manufacturer's declaration that the product complies with UL's requirements.

Recognized Component

A part or subassembly covered under UL's recognition service and intended for factory installation in listed (or other) products. Recognized components are incomplete in certain construction features or restricted in performance capabilities and not intended for separate installation in the field, rather they are intended for use as components of incomplete equipment submitted for investigation by UL. Final acceptance of the component in the complete equipment is dependent upon its installation and use in accordance with all applicable use conditions and ratings noted in the component report issued by UL, in the guide information and in the individual client's Recognized Component information page.

The combined UL signs for the USA and Canada are recognized by the authorities of both countries.

Compulsory China Certification (CCC): The CCC mark is a compulsory certification mark in the field of safety for products sold on the Chinese market.

GOST / EAC: Russia (please consult your local ABB sales office)

C-Tick: The C-Tick mark certifies compliance with the Australian EMC requirements. The mark is also recognized in New Zealand

ANCE: Mexico

Marine Approvals

The following specifications must be respected when these devices are used on ships:

Standards, specifications and certifying organizations

BV	Bureau Veritas France
DNV	Det Norske Veritas Norway
GL	Germanischer Lloyd Germany
LRS	Lloyd's Register of Shipping Great Britain
ABS	America Bureau of Shipping
RMRS	Russian Maritime Register of Shipping RMRS
RRR	Russian River Register
MRS	Maritime Register of Shipping Russia
PRS	Polski Rejestr Statkow Poland
RINA	Registro Italiano Navale Italy

Specifications (cont.)

International Standards

IEC 60947-1 Low-voltage switchgear and controlgear – Part 1: General rules

IEC 60947-4-1 Low-voltage switchgear and controlgear – Part 4: Contactors and motor starters – Section 1: Electromechanical contactors and motor starters

IEC 60947- 5-1 Low-voltage switchgear and controlgear – Part 5: Control circuit devices and switching elements – Section 1: Electromechanical control circuit devices

IEC 60947-5-4 Low-voltage switchgear and controlgear – Part 5-4: Control circuit devices and switching elements. Method of assessing the performance of low-energy contacts. Special tests

IEC 60947- 6-1 Low-voltage switchgear and controlgear – Part 6: Multiple function equipment – Section 1: Automatic transfer switching equipment

IEC 60204-1 Electrical equipment of industrial machines – Part 1: General requirements

IEC 60715 Dimensions of low-voltage switchgear and controlgear. Standardized mounting on rails for mechanical support of electrical devices in switchgear and controlgear installations

European Standards

EN 50 005 Low-voltage switchgear and controlgear for industrial use – Terminal marking and distinctive number: General rules

(Annex L of IEC 60947-1).

EN 50 011 Low-voltage switchgear and controlgear for industrial use – Terminal marking, distinctive number and distinctive letter for particular contactor relays (Annex M of IEC 60947-5-1)

EN 60947-1 Low-voltage switchgear and controlgear – Part 1: General rules.

EN 60947-4-1 Low-voltage switchgear and controlgear – Part 4: Contactors and motor starters – Section 1: Electromechanical contactors and motor starters.

EN 60947-5-1 Low-voltage switchgear and controlgear – Part 5: Control circuit devices and switching elements – Section 1: Electromechanical control circuit devices.

EN 60947-5-4 Low-voltage switchgear and controlgear – Part 5-4: Control circuit devices and switching elements. Method of assessing the performance of low-energy contacts. Special tests.

EN 60947- 6-1 Low-voltage switchgear and controlgear – Part 6: Multiple function equipment – Section 1: Automatic transfer switching equipment.

EN 60204-1 Electrical equipment of industrial machines – Part 1: General requirements.

EN 60 715 Dimensions of low-voltage switchgear and controlgear. Standardized mounting on rails for mechanical support of electrical devices in switchgear and controlgear installations.

National Standards

European countries national standards reproduce the corresponding EN... standards. Codification is built by addition of a prefix to EN numbering.

For instance:

- France **NF** EN...
- Germany **DIN** EN...
- Great Britain **BS** EN...
- Italy **CEI** EN...
- Sweden **SS** EN...

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Terms and technical definitions

Circuits

– auxiliary circuit: All the conductive parts of a contactor designed to be inserted in a different circuit from the main circuit and the contactor control circuits.
– control circuit: All the conductive parts of a contactor (other than the main circuit and the auxiliary circuit) used to control the contactor's closing operation or opening operation or both.
– main circuit: All the conductive parts of a contactor designed to be inserted in the circuit that it controls.

Thermal overload relay tripping classes

IEC 60947-4-1 defines tripping classes 10 A, 10, 20 and 30. Types 10 A, 10, etc. correspond to the maximum tripping time for a making current at 7.2 times the setting current.

Furthermore, for each class the standard specifies the tripping time for 1.5 times the setting current and sets the non tripping condition at 1.05 times the setting current.

All these data are summarized in the table below.

Extract from IEC 60947-4-1:

Tripping class		10 A	10	20	30
Max. tripping time for 1.5 times the setting current (warm state)	**s**	120	240	480	720
Tripping time for 7.2 times the setting current (cold state)	**s**	2 - 10	4 - 10	6 - 20	9 - 30
For 1.05 times the setting current		No tripping			

Electromagnetic compatibility

AF... contactors comply with IEC 60947-1, 60947-4-1 and EN 60947-1, 60947-4-1 standards.

Definitions:

Environment A: "Mainly relates to low-voltage non public or industrial networks/locations/installations (EN 50082-2 article 4) including highly disturbing sources".

Environment B: "Mainly relates to low-voltage public networks (EN 50082-1 article 5) such as residential, commercial and light industrial locations/installations. Highly disturbing sources such as arc welders are not covered by this environment".

Notice for AF09…AF2650 contactors:

– AF09 … AF38 contactors and NF contactor relays (produced since week 08-2013), AF40 ... AF96 contactors have been designed for environment B.
– AF09 … AF38-..-..-12 contactors and NF..E-12 contactor relays (48...130 V 50/60 Hz-DC), AF116 ... AF2650 contactors: these products have been designed for environment A.
Use of this product in environment B may cause unwanted electromagnetic disturbances in which case the user may be required to take adequate mitigation measures.

Note: for 48...130 V 50/60 Hz-DC in environment B, AF09 … AF38-..-..-22 contactor or NF..E-22 contactor relays can be selected.

Definitions according to SEMI F47-0706

SEMI F47-0706 defines the voltage sag immunity required for semi-conductor processing, metrology and automated test equipment, and on subsystems and components which are used in the construction of semiconductor processing equipment including but not limited to:

– Power supplies
– Generators
– Robots and factory interface
– Chillers, pumps, blowers
– AC operated contactors and contactor relays...

voltage sag: an rms reduction in the AC voltage, at the power frequency, for durations from a half cycle to a few seconds.

The IEC terminology for this phenomenon is voltage dip.

voltage sag immunity: the ability of equipment to withstand momentary electrical power interruptions or sags.

Coordination of protections against short circuit

The goal here is to protect electromechanical starters and softstarters.

Any starter is designed to:

– start motors,
– ensure continuous functioning of motors,
– disconnect motors from the supply line,
– guarantee protection of motors against overloads.

The starter is typically made up of a switching device (contactor) and an overload protection device (thermal overload relay or electronic overload relay). These two devices MUST be coordinated with equipment capable of providing protection against short circuit (SCPD: short circuit protective device): typically a circuit breaker with magnetic release only or a switch fuse. These are not necessarily part of the starter.

The characteristics of the starter must comply with the international standard IEC 60947-4-1 which defines the above items as follows:

contactor: a mechanical switching device having only one position of rest, operated otherwise than by hand, capable of making, carrying and breaking currents under normal circuit conditions including overload conditions.

overload release: overload relay or release which operates in the case of overload and also in case of loss of phase.

circuit-breaker: defined by IEC 60947-2 as a mechanical switching device, capable of making, carrying and breaking currents under normal circuit conditions and also making, carrying for a specified time and breaking currents under specified abnormal circuit conditions.

IEC publication 60947-4-1 defines coordination types "1" and "2":

– Type "1" coordination requires that, in the event of a short-circuit, the contactor or starter does not endanger persons or installations and will not then be able to operate without being repaired or parts being replaced.
– Type "2" coordination requires that, in short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts being light welded is acceptable. In this case, the manufacturer must stipulate the measures to be taken with respect to maintenance of the equipment.

Rated operational current Ie.

Current rated by the manufacturer. It is mainly based on the rated operational voltage Ue, the rated frequency, the utilization category, the rated duty and the type of protective enclosure, if necessary.

Conventional free air thermal current Ith

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.

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Terms and technical definitions

Electrical durability
Number of on-load operating cycles that the contactor is able to carry out. It depends on the operational current, the operational voltage and the utilization category.

Mechanical durability
Number of no-current operating cycles that a contactor is able to carry out.

Assessed failure rate
Defined according to IEC 60947-5-4. This rate is given in standard industrial environments for the contactor relays and for the built-in auxiliary contact of contactors.

Load factor
Ratio of the on-load operating time to the total cycle time x 100.

Switching frequency
Number of switching cycles per hour.

Plugging
Stopping or fast reversal in rotation direction of a motor by two supply leads being interchanged while the motor is running.

Inching
Energization of a motor's circuit repeatedly or for short periods with the aim of obtaining small movements of the driven mechanism.

Coil operating limits
Expressed in multiples of the nominal control circuit voltage Uc 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 = mH/Ω = ms).
- Short-time withstand current: Current that the contactor is able to withstand in closed position for a short time interval and in specified conditions.
- Closing time: Time interval between the coil energization and the instant the contacts touch on all the poles.
- Opening time: Time interval between the coil de-energization and the instant the contacts separate on all the poles.

Rated control voltage Uc
Control voltage value for which the control circuit is sized.

Rated operational voltage Ue
Voltage to which the contactor's utilization characteristics refer. In three-phase it is the phase-to-phase voltage.

Rated insulation voltage Ui
Reference voltage for dielectric tests and creepage distances.

Rated impulse withstand voltage Uimp
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.

Mirror contacts
Definitions of mirror contact acc. 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.

Mechanically linked contact
Definitions of mechanically linked elements acc. to IEC 60947-5-1, Annex L.
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.

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Standards and utilization categories

Utilization categories:

A contactor's duty is characterised by the utilization category together with the rated operational voltage and current indicated.

Utilization categories for contactors according to IEC 60947-4-1:

Alternating current:	AC-1	Non-inductive or slightly inductive loads, resistance furnaces.
	AC-2	Slip-ring motors: starting, switching off.
	AC-3	Cage motors: starting, switching off running motors.
	AC-4	Cage motors: starting, plugging, inching.
	AC-5a	Discharge lamp switching.
	AC-5b	Incandescent lamp switching.
	AC-6a	Transformer switching.
	AC-6b	Capacitor bank switching.
	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 DC motors.
	DC-5	Series motors: starting, plugging, inching, dynamic breaking of DC motors.
	DC-6	Incandescent lamp switching.

Utilization categories for contactor relays according to IEC 60947-5-1:

Alternating current:	AC-12	Control of resistive loads and static loads with opto-coupler isolation.
	AC-13	Control of static loads with transformer isolation.
	AC-14	Control of weak electromagnetic loads (≤ 72 VA).
	AC-15	Control of electromagnetic loads (> 72 VA).
Direct current:	DC-12	Control of resistive loads and static loads with opto-coupler isolation.
	DC-13	Control of DC electromagnets.
	DC-14	Control of DC electromagnets having economy resistors.

In fact some applications, and the specific criteria characterizing the various loads controlled by contactors, may modify the utilization characteristics of the contactors. The main applications concerned are:

Capacitor bank switching

Account must be taken of high peaks when the current is made and of harmonic currents during continuous duty. For this application, IEC publication 60947-4-1 stipulates utilization category AC-6b. The operational currents or powers acceptable for the contactors are determined by our electrical tests; IEC publication 60947-4-1 gives the calculating formula for determining the operational current (Table 9).

Transformer switching

Account must be taken of the peaks due to magnetization phenomena when the current is made.

For this application, IEC publication 60947-4-1 stipulates utilization category AC-6a. The operational currents or powers acceptable for the contactors are determined using the values obtained for AC-3 or AC-4 category tests and the calculating formula given in IEC 60947-4-1 (Table 9).

Lighting circuit switching

The current peaks occurring on energization of the circuit and the power factor depend on the type of lamps, the connection mode and whether or not there is compensation.

For this application, IEC publication 60947-4-1 stipulates two standard utilization categories:

– AC-5a for discharge lamp switching.
– AC-5b for incandescent lamp switching.

Slip-ring motor switching

The contactors used for short-circuiting rotor resistors can be used for rotor voltages up to 2 times the rated operational voltage.

The conditions of use of rotor contactors depend on the connection mode of the main poles. IEC 60947-4-1 stipulates AC-2 utilization category for startor contactor.

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Standards and utilization categories

Utilization categories (cont.)

DC power circuit switching

Arc suppression is more difficult in direct current than in alternating current. Higher the time constant and voltage, heavier the breaking conditions: consequently several poles have to be connected in series.

AC high current circuit switching

Possibility of increasing performances by connecting poles in parallel.

Circuit switching during temporary and intermittent duty

In these cases higher operational currents are acceptable.

Influence of the length of the conductors used in the contactor control circuit

According to the operational voltages, the cross-sectional areas, the coil consumption and the control layout, difficulties due to line resistances and capacitances may appear during contactor closing and opening orders.

Making and breaking conditions for utilization categories

Utilization category		Durability test conditions						Occasional operation Making and breaking capacities - 50 operating cycles					
		Making conditions			Breaking conditions			Making conditions			Breaking conditions		
		I/Ie	U/Ue	Cos. ϕ or L/R (ms)	I/Ie	U/Ue	Cos. ϕ or L/R (ms)	Ic/Ie	Ur/Ue	Cos. ϕ or L/R (ms)	Ic/Ie	Ur/Ue	Cos. ϕ or L/R (ms)
Contactors for AC circuit switching													
AC-1		1	1	0.95	1	1	0.95	1.5	1.05	0.8	1.5	1.05	0.8
AC-2		2.5	1	0.65	2.5	1	0.65	4	1.05	0.65	4	1.05	0.65
AC-3	Ie < 17 A	6	1	0.65	1	0.17	0.65	10	1.05	0.45	8	1.05	0.45
	17 < Ie < 100 A	6	1	0.35	1	0.17	0.35	10	1.05	0.45	8	1.05	0.45
	Ie > 100 A	6	1	0.35	1	0.17	0.35	10	1.05	0.35	8	1.05	0.35
AC-4	Ie < 17 A	6	1	0.65	6	1	0.65	12	1.05	0.45	10	1.05	0.45
	17 < Ie < 100 A	6	1	0.35	6	1	0.35	12	1.05	0.45	10	1.05	0.45
	Ie > 100 A	6	1	0.35	6	1	0.35	12	1.05	0.35	10	1.05	0.35
Contactors for DC circuit switching													
DC-1		1	1	1	1	1	1	1.5	1.05	1	1.5	1.05	1
DC-3		2.5	1	2	2.5	1	2	4	1.05	2.5	4	1.05	2.5
DC-5		2.5	1	7.5	2.5	1	7.5	4	1.05	15	4	1.05	15
Contactor relays for AC circuit switching													
AC-14	(≤ 72 VA)	–	–	–	–	–	–	6	1.1	0.7	6	1.1	0.7
AC-15	(> 72 VA)	10	1	0.7	1	1	0.4	10	1.1	0.3	10	1.1	0.3

Contactor relays for AC circuit switching

Utilization category	Standard operation						Occasional operation Making and breaking capacities - 50 operating cycles					
	Making conditions			Breaking conditions			Making conditions			Breaking conditions		
	I/Ie	U/Ue	$T_{0.95}$	I/Ie	U/Ue	$T_{0.95}$	Ic/Ie	Ur/Ue	$T_{0.95}$	Ic/Ie	Ur/Ue	$T_{0.95}$
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 DC magnetic loads up to the highest limit of P = 50 W (6 x P = 300 ms). It is accepted that loads having drawn energy above 50 W are made up of weaker loads in parallel. As a consequence, the 300 ms value must form the highest limit whatever the value of the power drawn.

Key:

U (I) = applied voltage (current)

Ur = recovery voltage

L/R = test circuit time constant

Ue (Ie) = rated operational voltage (current)

Ic = making and breaking current expressed in DC or in AC like the r.m.s. value of the symmetrical components

$T_{0.95}$ = time required to reach 95 % of the current in steady-state conditions, expressed in milliseconds

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North American standards and utilization categories

Depending on the utilization category or intended rating for a contactor, North American standards require two main tests: an endurance test to simulate conventional device making and breaking capacity over its lifetime, and an overload test to simulate periodic conditions demanding higher making and breaking capacity than is conventional for the application. The test setups differ in regards to current, power factor, and number of electrical operating cycles.

The tables below provide a comparison of the types of load testing for contactors rated up to 100 A.

AC load testing for contactors rated up to 100 A

Harmonized test			Rating designation	Endurance (conventional) test			Overload (conditional) test			Required load marking
IEC	UL	CSA		Multiple of current	Power factor	Number of cycles	Multiple of current	Power factor	Number of cycles	
General use, non-inductive or slighting inductive loads, resistance furnaces and heaters										
■	■	■	AC-1: general use	1	0.8	6 000	1.5	0.8	50	–
	■	■	AC resistance	1	1	6 000	1.5	1	50	"Resistive"
	■	■	AC resistance air heating	1	1	100 000	1.5	1	50	"Resistance"
		■	AC electrical heating control	1	1	250 000	1.5	1	50	–
Motor loads										
■	■	■	AC-2: slip-ring motors	2	0.65	6 000	4	0.65	50	–
■			AC-3: squirrel cage motors	2	0.45	6 000	10 for make 8 for make break	0.45	50 make + 50 make break	–
	■	■	AC motor (across-the-line switching)	2	0.40 – 0.50	1 000	LRA (~6)	0.40 – 0.50	50	–
	■	■	Elevator control, AC motor	2	0.50	500 000	n/a	n/a	n/a	"Elevator duty"
■	■	■	AC-4: plugging, inching, jogging	6	0.45	6 000	12 for make 10 for make break	0.45	50 make + 50 make break	–
Lamps and lighting loads										
■	■	■	AC-5a: electric discharge lamps	2	0.45	6 000	3	0.45	50	"Ballast"
■	■	■	AC-5b: incandescent lamps	1	Lamp	6 000	1.5	Lamp	50	"Tungsten"
Transformers and capacitors										
■			AC-6a: transformers	The manufacturer shall verify the AC-6a rating by testing with a transformer, or may derive the rating from the values for AC-3.						
■			AC-6b: capacitors	Capacitive ratings may be derived by capacitor switching tests or assigned on the basis of established practice and experience.						
	■	■	Capacitive switching (kVar)	1	Capacitor	6 000	1.5	Capacitor	50	–
Hermetic refrigerant compressor motors										
■	■	■	AC-8a: hermetic refrigerant compressor	1	0.8	30 000	6	0.45	50	"Hermetic refrigeration compressor"
■	■	■	AC-8b: hermetic refrigerant compressor (recycle rating)	6	0.45	6 000	6	0.45	50	–

Note: the information above is an overview of UL 60947-4-1 tables 1, 7, 10, 5.4.1DV.1.1, 8.2.4.1DV.1.1, and 8.2.4.2DV.1.1 and is intended for comparison purposes only.

DC load testing for contactors rated up to 100 A

Harmonized test			Rating designation	Endurance test			Overload test			Required load marking
IEC	UL	CSA		Multiple of current	L/R ms	Number of cycles	Multiple of current	L/R ms	Number of cycles	
General use, non-inductive or slighting inductive loads, resistance furnaces and heaters										
■	■	■	DC-1: general use	1	1	6 000	1.5	1	50	–
	■	■	DC resistance	1	1	6 000	1.5	1	50	"Resistive"
	■	■	DC resistance air heating	1	1	100 000	1.5	1	50	"Resistance"
Motor loads										
■			DC-3: shunt motors	2.5	2	6 000	4	2.5	50	–
	■	■	DC motor (across-the-line switching)	2	n/a	1 000	10	n/a	50	–
	■	■	Elevator control, DC motor	2	n/a	500 000	Not applicable			"Elevator duty"
■			DC-5: series motors	2.5	7.5	6 000	4	15	50	–
Lamps and lighting loads										
■	■	■	DC-6: incandescent lamps	1	Lamp	6 000	1.5	Lamp	50	"Tungsten"

Note: the information above is an overview of UL 60947-4-1 tables 1, 7, 10, 5.4.1DV.1.1, 8.2.4.1DV.1.1, and 8.2.4.2DV.1.1 and is intended for comparison purposes only.

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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.

1SBC101627S0201

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 m^3 of enclosure).

The table below gives the cases where heating is necessary.

Environment		Operating conditions	Climate	Internal heating of enclosure
Inside premises	No running water no condensation	Continuous or not	All climates	Without
	With running water	Continuous	All climates	Without
		Frequent or long stops	Temperate	Without
			Tropical	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
		Frequent or long stops	Temperate	Without
			Tropical	With

The entrance of dust, insects, dirt, etc. in devices may be prevented if the appropriate degree of protection according to IEC 60529 is chosen (See "Degree of protection" table).

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Notes

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Order code classification

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1SAJ231000R0001	DNP31.0	12/6
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1SAJ243000R0001	PDR31.0	12/6
1SAJ251000R0001	MRP31.0	12/6
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1SAJ261000R0100	PNQ22.0	12/8
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1SAJ510003R0002	UMCPAN-CAB.070	12/4
1SAJ510004R0002	UMCPAN-CAB.150	12/4
1SAJ530000R0100	UMC100.3 DC	12/3
1SAJ530000R0200	UMC100.3 DC EX	12/3
1SAJ530000R1100	UMC100.3 UC	12/3
1SAJ530000R1200	UMC100.3 UC EX	12/3
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	1SBN151410R8406	5/405
	1SBN151410R8506	5/405
	1SBN151410R8606	5/405
	1SBN151410R8806	5/405
ZA40	1SBN152410R8006	5/405
	1SBN152410R8106	5/405
	1SBN152410R8406	5/405
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	1SBN152410R8606	5/405
	1SBN152410R8806	5/405
ZA75	1SBN153510R8006	5/405
	1SBN153510R8106	5/405
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Marketing material

http://new.abb.com/low-voltage/products/motor-protection

Videos, prints, technical presentations and more

Videos

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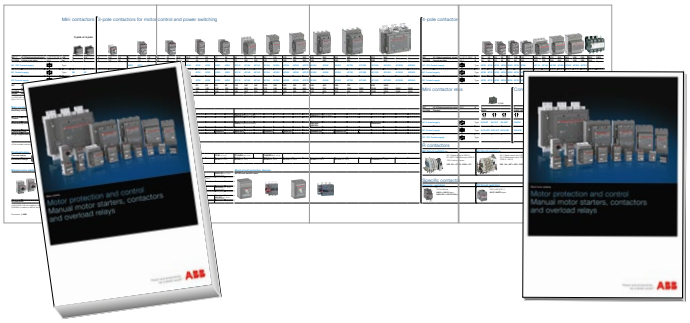

Main catalog : 1SBC100192C0206
Short form catalog : 1SBC100195C0203
Panorama : 1SBC100196L0203

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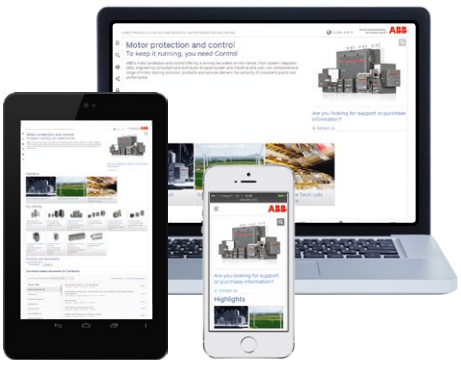
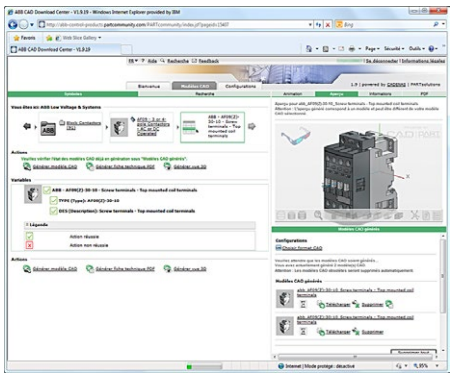
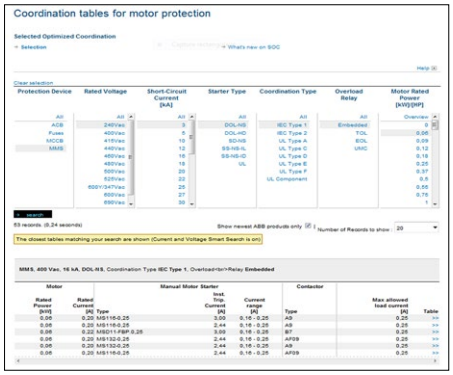


Tools



Cadenas portal: Download 2D or 3D files according to your needs (STEP, IGES...)



SOC II: Select the Optimized Coordination tables for your starter according to IEC or UL standard

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