US Catalog | March 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 (1800 r.p.m. at 60 Hz 1500 r.p.m. at 50 Hz).
These values are given for guidance and may vary according to the motor manufacturer and depending on the number of poles.

UL / CSA	Motor nominal current: standardized values (according to UL 60947-4-1A Annex G and UL 508 CSA C22.2 No.14)						
Motor power	120 V 1-ph	240 V 1-ph, 3-ph	208 V 3-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
1/10	3	1.5	–	–	–	–	–
1/8	3.8	1.9	–	–	–	–	–
1/6	4.4	2.2	–	–	–	–	–
1/4	5.8	2.9	–	–	–	–	–
1/3	7.2	3.6	–	–	–	–	–
1/2	9.8	4.9	2.4	2.2	1.3	1.1	0.9
3/4	13.8	6.9	3.5	3.2	1.8	1.6	1.3
1	16	8	4.6	4.2	2.3	2.1	1.7
1-1/2	20	10	6.6	6	3.3	3	2.4
2	24	12	7.5	6.8	4.3	3.4	2.7
3	34	17	10.6	9.6	6.1	4.8	3.9
5	56	28	16.7	15.2	9.7	7.6	6.1
7-1/2	80	40	24.2	22	14	11	9
10	100	50	30.8	28	18	14	11
15	135	68	46.2	42	27	21	17
20	–	88	59.4	54	34	27	22
25	–	110	74.8	68	44	34	27
30	–	136	88	80	51	40	32
40	–	176	114	104	66	52	41
50	–	216	143	130	83	65	52
60	–	–	169	154	103	77	62
75	–	–	211	192	128	96	77
100	–	–	273	248	165	124	99
125	–	–	343	312	208	156	125
150	–	–	396	360	240	180	144
200	–	–	528	480	320	240	192
250	–	–	–	604	403	302	242
300	–	–	–	722	482	361	289
350	–	–	–	828	560	414	336
400	–	–	–	954	636	477	382
450	–	–	–	1030	–	515	412
500	–	–	–	1180	786	590	472

IEC	Motor nominal current: standardized values in blue (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

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

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**	**11**	**15**	**18.5**	**18.5**	**22**	**30**	**37**	**45**
UL/CSA	**3-phase motor rating**	480 V	**hp**	**3**	**5**	**5**	**7.5**	**10**	**15**	**20**	**25**	**30**	**40**	**50**	**60**	**60**
AC / DC Control supply			Type	—	—	AF09	AF12	AF16	AF26	AF30	AF38	AF40	AF52	AF65	AF80	AF96
AC Control supply			Type	B6	B7	AF09	AF12	AF16	AF26	AF30	AF38	AF40	AF52	AF65	AF80	AF96
DC Control supply			Type	BC6	BC7	AF09	AF12	AF16	AF26	AF30	AF38	AF40	AF52	AF65	AF80	AF96
IEC	**AC-3 Rated operational current**	θ ≤ 60 °C [2], 400 V	**A**	**8.5**	**11.5**	**9**	**12**	**18**	**26**	**32**	**38**	**40**	**53**	**65**	**80**	**96**
	AC-1 Rated operational current	θ ≤ 40 °C, 690 V	**A**	**20** (400 V)	**20** (400 V)	**25**	**28**	**30**	**45**	**50**	**50**	**70**	**100**	**105**	**125**	**130**
UL/CSA	**General use rating**	600 V	**A**	**12** (300 V)	**16**	**25**	**28**	**30**	**45**	**50**	**50**	**60**	**80**	**90**	**105**	**115**
NEMA	**NEMA Size**			—	—	**00**	**0**	—	**1**	—	—	**2**	—	—	**3**	—

[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**	**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		**TEF4-ON** **TEF4-OFF**			
Interlocking units [3]	Mechanical		**VM4**		**VM96-4**	
	Mechanical / Electrical		**VEM4**			
Connection sets	For reversing contactors	**BSM6-30**	**BER16-4**	**BER38-4**	**BER65-4**	**BER96-4**
Surge suppressors	Varistor (AC/DC)	**RV-BC6**	Built-in surge protection			
	RC type (AC)					
	Transil diode (DC)	**RD7**				

[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)	**TF42** (0.10...38 A)		**TF65** (22...67 A)	**TF96** (40...96 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)	**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 10A	**MS116** (0.10...32 A) Ics up to 50 kA for class 10A		**MS165** [4] (10...65 A) Ics up to 100 kA	**MS5100** (40...100 A) Ics up to 50 kA
		MS132 (0.10...32 A) Ics up to 100 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...32A)	**MO132** (0.16...32 A) Ics up to 100 kA		**MO165** [4] (16...65 A) Ics up to 100 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
Accessories	For contactor mounting	**BEA7/132**	**BEA16-4**	**BEA38-4**	**BEA65-4** [5]	

[4] MS165/MO165 are suitable for use with AF09 ... AF30 for North american applications.
[5] BEA65-4 suitable for MS165 and MO165 only.






55	75	75	90	110	132	160	200	200	250	315	400	—	475	560	—	—
75	100	100	125	150	200	250	300	350	400	500	600	—	800	900	—	—
AF116	AF140	AF146	AF190	AF205	AF265	AF305	AF370	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650
AF116	AF140	AF146	AF190	AF205	AF265	AF305	AF370	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650
AF116	AF140	AF146	AF190	AF205	AF265	AF305	AF370	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650
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
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)			**E1250DU** (375...1250 A)			

Short-circuit protection devices

MCCB and switch-fuses




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	—	—	—

Bar 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





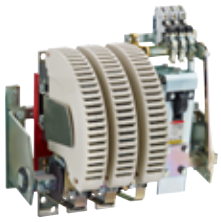



25	30	45	55	70	100	125	160	200	275	350	400	500	525	800	1000
25	30	45	55	60	80	105	160	175	230	250	300	350	420	540	–
AF09	AF16	AF26	AF38	AF40	AF52	AF80	AF116	AF140	AF190	AF205	AF265	AF305	AF370	—	—
AF09	AF16	AF26	AF38	AF40	AF52	AF80	AF116	AF140	AF190	AF205	AF265	AF305	AF370	EK550	EK1000
AF09	AF16	AF26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

Contactor relays

3			
A600, Q600			
2 2		3 1	4 0
NF22E		NF31E	NF40E
NF22E		NF31E	NF40E
NF22E		NF31E	NF40E

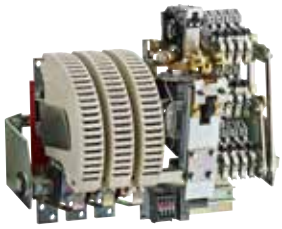
AC Circuit switching



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

Manual motor starters

For direct product details information, use order code, ex:
www.abb.com/productdetails/MS132-4.0

MS and MO manual motor starters
A complete motor protection concept

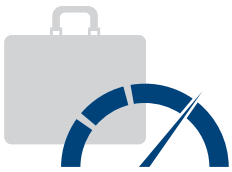
Fuseless protection saves costs, space and ensures a quick reaction under overload and short-circuit condition by switching off the motor within milliseconds. The full range of motor starters offers protection from 0.1 A to up to 100 A. The new family range has a harmonized range of accessories and offers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

Protection and control
A full motor protection solution

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.

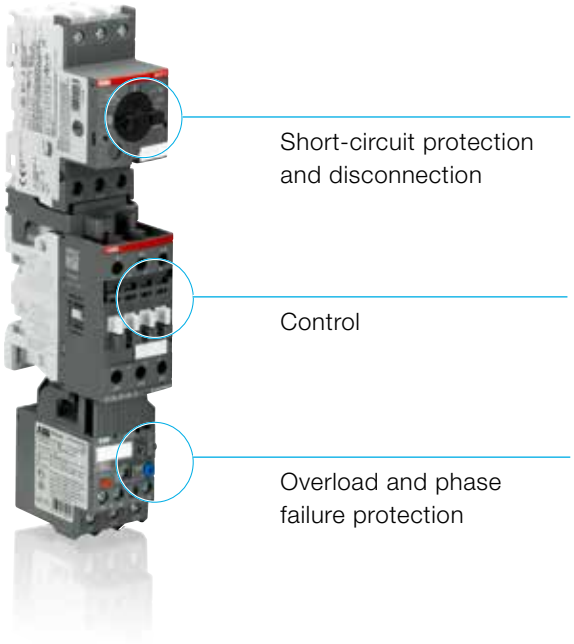
MS116 **MS132/MO132** **MS165/MO165**

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.

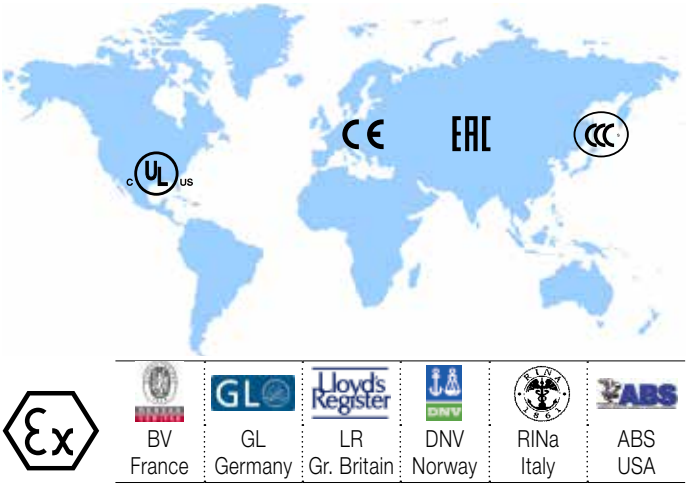
Always an option
The MS116 and MS132 offer protection up to 32 A and a short-circuit breaking capacity of 50 kA and 100 kA, respectively – all in a 45 mm housing. They are designed for high performance in addition to their compact size.

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.

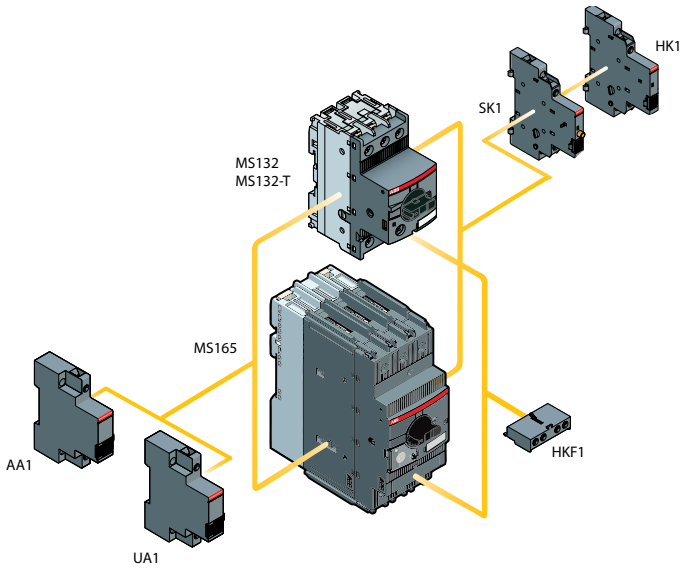
Transformer protection
MS132-T is an inrush compensated circuit breaker for control transformer protection. With the right selection, it provides overcurrent protection on the primary side of the transformer. This avoids expensive protection on the secondary side.



Protection wherever you are
The manual motor starter range is worldwide applicable. With its wide range of certifications, it covers standards like IEC, cULus, 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.

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.

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	-
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 Ie	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 80A

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 480V

	Standard range MS116	Performance range MS132, MS165, MS5100	

Selection parameters

Rated operational power HP @ 480V	Setting range for thermal release	Type	SCCR group installation at 480V	Type	SCCR group installation at 480V	Type	SCCR group installation at 480V
–	0.1 ... 0.16 A	MS116-0.16	30 kA	MS132-0.16	65 kA		
–	0.16 ... 0.25 A	MS116-0.25	30 kA	MS132-0.25	65 kA		
–	0.25 ... 0.4 A	MS116-0.4	30 kA	MS132-0.4	65 kA		
–	0.4 ... 0.63 A	MS116-0.63	30 kA	MS132-0.63	65 kA		
–	0.63 ... 1.0 A	MS116-1.0	30 kA	MS132-1.0	65 kA		
3/4	1.0 ... 1.6 A	MS116-1.6	30 kA	MS132-1.6	65 kA		
1	1.6 ... 2.5 A	MS116-2.5	30 kA	MS132-2.5	65 kA		
2	2.5 ... 4.0 A	MS116-4.0	18 kA	MS132-4.0	65 kA		
3	4.0 ... 6.3 A	MS116-6.3	18 kA	MS132-6.3	65 kA		
5	6.3 ... 10 A	MS116-10	18 kA	MS132-10	65 kA		
7.5	8 ... 12 A	MS116-12	18 kA	MS132-12	35 kA		
10	10 ... 16 A	MS116-16	18 kA	MS132-16	35 kA	MS165-16	65 kA
10	14 ... 20 A					MS165-20	65 kA
10	16 ... 20 A	MS116-20	18 kA	MS132-20	35 kA		
10	18 ... 25 A					MS165-25	65 kA
15	20 ... 25 A	MS116-25	18 kA	MS132-25	35 kA		
15	25 ... 32 A	MS116-32	18 kA	MS132-32	35 kA		
20	23 ... 32 A					MS165-32	65 kA
20	30 ... 42 A					MS165-42	65 kA
30	40 ... 54 A					MS165-54	65 kA
40	40 ... 54 A					MS165-54	65 kA
50	52 ... 65 A					MS165-65	65 kA
75	40 ... 100 A					MS5100-100	65 kA
100	40 ... 100 A					MS5100-100	65 kA




	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

	Magnetic only MO132, MO165, MO5100				Transformer protection MS132-T	
	Type	**SCCR group installation at 480V**	**Type**	**SCCR group installation at 480V**	**Type**	**SCCR group installation at 480V**
	MO132-0.16	65 kA			MS132-0.16T	65 kA
	MO132-0.25	65 kA			MS132-0.25T	65 kA
	MO132-0.4	65 kA			MS132-0.4T	65 kA
	MO132-0.63	65 kA			MS132-0.63T	65 kA
	MO132-1.0	65 kA			MS132-1.0T	65 kA
	MO132-1.6	65 kA			MS132-1.6T	65 kA
	MO132-2.5	65 kA			MS132-2.5T	65 kA
	MO132-4.0	65 kA			MS132-4.0T	65 kA
	MO132-6.3	65 kA			MS132-6.3T	65 kA
	MO132-10	65 kA			MS132-10T	65 kA
	MO132-12	35 kA			MS132-12T	30 kA
	MO132-16	35 kA	MO165-16	65 kA	MS132-16T	30 kA
			MO165-20	65 kA		
	MO132-20	35 kA			MS132-20T	30 kA
	MO132-25	35 kA	MO165-25	65 kA	MS132-25T	30 kA
	MO132-32	35 kA				
			MO165-32	65 kA	Transformer protection: The instantaneous short-circuit current setting is 20 times the rated operational current.	
			MO165-42	65 kA		
			MO165-54	65 kA		
			MO5100-70			
			MO165-65	65 kA		
			MO5100-80			
			MO5100-100			

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

MS116-16

MS116-25

Description

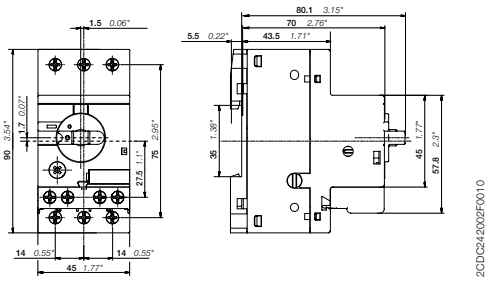
MS116 is a compact and economic range for motor protection up to 25 HP (600 V) / 32 A in width of 45 mm. Additional features include the build-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication. The manual motor starter is 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

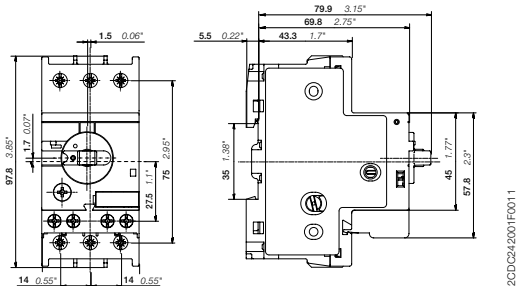
Rated operational power			Setting range	Short-circuit current rating (SCCR), group installation at 480V AC	Rate instantaneous short-circuit current setting I_i	Catalog number	Global code	Weight (1 pc)
240 V	480 V	600 V						
HP	HP	HP	A	kA	A			kg
–	–	–	0.10 ... 0.16	30	2.00	MS116-0.16	1SAM250000R1001	0.23
–	–	–	0.16 ... 0.25	30	3.10	MS116-0.25	1SAM250000R1002	0.23
–	–	–	0.25 ... 0.40	30	5.00	MS116-0.4	1SAM250000R1003	0.23
–	–	–	0.40 ... 0.63	30	7.90	MS116-0.63	1SAM250000R1004	0.23
–	–	1/2	0.63 ... 1.00	30	12.5	MS116-1.0	1SAM250000R1005	0.23
–	3/4	3/4	1.00 ... 1.60	30	20.0	MS116-1.6	1SAM250000R1006	0.27
1/2	1	1.5	1.60 ... 2.50	30	31.3	MS116-2.5	1SAM250000R1007	0.27
1	2	3	2.50 ... 4.00	18	50.0	MS116-4.0	1SAM250000R1008	0.27
1.5	3	5	4.00 ... 6.30	18	78.8	MS116-6.3	1SAM250000R1009	0.27
3	5	7.5	6.30 ... 10.0	18	150	MS116-10	1SAM250000R1010	0.27
3	7.5	10	8.00 ... 12.0	18	180	MS116-12	1SAM250000R1012	0.27
5	10	10	10.0 ... 16.0	18	240	MS116-16	1SAM250000R1011	0.27
5	10	15	16.0 ... 20.0	18	300	MS116-20	1SAM250000R1013	0.31
7.5	15	20	20.0 ... 25.0	18	375	MS116-25	1SAM250000R1014	0.31
10	20	25	25.0 ... 32.0	18	480	MS116-32	1SAM250000R1015	0.31

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

Main dimensions *mm, inches*



MS116 ≤ 16 A & MS116-HKF1-11 ≤ 16 A



MS116 ≥ 20 A & MS116-HKF1-11 ≥ 20 A

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


1SBC101232F0010

MS132-10


2CDC241001F0011

MS132-32

Description

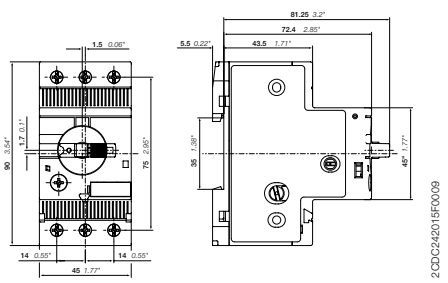
MS132 is a compact and powerful range for motor protection up to 25 HP (600 V) / 32 A in width of 45 mm. This type has also a clear and reliable indication of fault in a separate window in the event of short-circuit tripping. Additional features include the build-in disconnect function, temperature compensation, 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

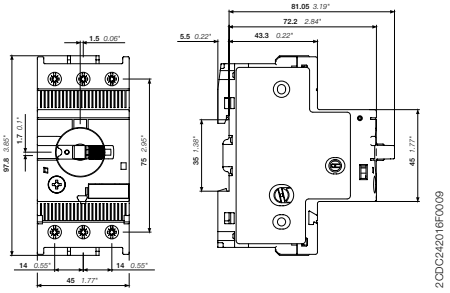
Rated operational power			Setting range	Short-circuit current rating (SCCR), group installation at 480V AC	Rated instantaneous short-circuit current setting I_i	Catalog number	Global code	Weight (1 pc)
240 V	480 V	600 V						
HP	HP	HP	A	kA	A			kg
–	–	–	0.10 ... 0.16	65	2.00	MS132-0.16	1SAM350000R1001	0.22
–	–	–	0.16 ... 0.25	65	3.10	MS132-0.25	1SAM350000R1002	0.22
–	–	–	0.25 ... 0.40	65	5.00	MS132-0.4	1SAM350000R1003	0.22
–	–	–	0.40 ... 0.63	65	7.90	MS132-0.63	1SAM350000R1004	0.22
–	–	1/2	0.63 ... 1.00	65	12.5	MS132-1.0	1SAM350000R1005	0.22
–	3/4	3/4	1.00 ... 1.60	65	20.0	MS132-1.6	1SAM350000R1006	0.27
1/2	1	1.5	1.60 ... 2.50	65	31.3	MS132-2.5	1SAM350000R1007	0.27
1	2	3	2.50 ... 4.00	65	50.0	MS132-4.0	1SAM350000R1008	0.27
1.5	3	5	4.00 ... 6.30	65	78.8	MS132-6.3	1SAM350000R1009	0.27
3	5	7.5	6.30 ... 10.0	65	150	MS132-10	1SAM350000R1010	0.27
3	7.5	10	8.00 ... 12.0	35	180	MS132-12	1SAM350000R1012	0.31
5	10	10	10.0 ... 16.0	35	240	MS132-16	1SAM350000R1011	0.31
5	10	15	16.0 ... 20.0	35	300	MS132-20	1SAM350000R1013	0.31
7.5	15	20	20.0 ... 25.0	35	375	MS132-25	1SAM350000R1014	0.31
10	20	25	25.0 ... 32.0	35	480	MS132-32	1SAM350000R1015	0.31

Notes: Manual motor starters should always be selected so that the actual motor current is within the setting range. SCCR 65kA when used with current limiter series S803W-SCLxxx-SR for 0.16–32A.

Main dimensions mm, *inches*


2CDC242015F0009

MS132 ≤ 10 A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MS132 ≥ 12 A

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

MS165-65

Description

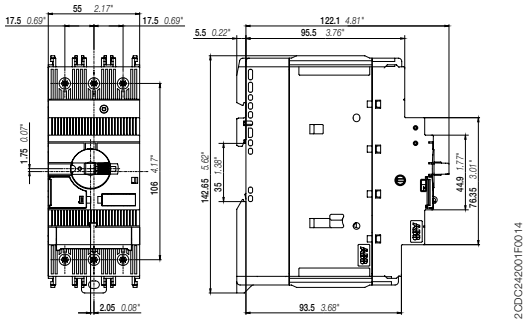
MS165 is a compact and powerful range for motor protection up to 60 HP (600 V) / 65 A in width of 55 mm. This type has also a clear and reliable indication of fault in a separate window in the event of short-circuit tripping. Additional features include the build-in disconnect function, temperature compensation, 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			Setting range	Short-circuit current rating (SCCR), group installation at 480V AC	Rated instantaneous short-circuit current setting I_i	Catalog number	Global code	Weight (1 pc)
240 V HP	480 V HP	600 V HP	A	kA	A			kg
5	10	10	10 ... 16	65	240	MS165-16	1SAM451000R1011	0.95
5	10	15	14 ... 20	65	300	MS165-20	1SAM451000R1012	0.95
7.5	15	20	18 ... 25	65	375	MS165-25	1SAM451000R1013	0.96
10	20	30	23 ... 32	65	480	MS165-32	1SAM451000R1014	0.97
15	30	40	30 ... 42	65	630	MS165-42	1SAM451000R1015	0.97
20	40	50	40 ... 54	65	810	MS165-54	1SAM451000R1016	0.97
20	50	60	52 ... 65	65	975	MS165-65	1SAM451000R1017	0.98

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

Main dimensions mm, *inches*



MS165

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.

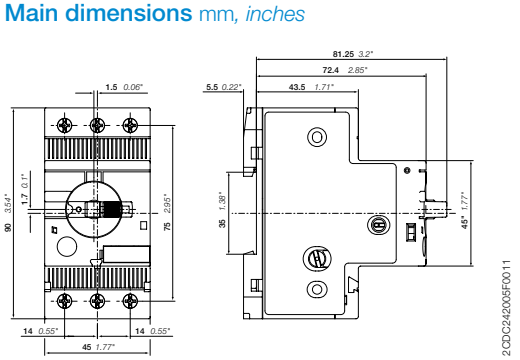
Fuse-less protection with a manual motor starter saves costs, space and ensures a quick reaction under short-circuit condition, by switching off the motor within milliseconds. Fuse-less starter combinations are setup together with contactors and overload relays.

Ordering details

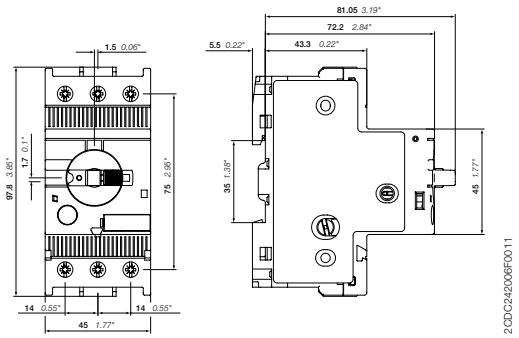
Rated operational power			Rated operational current	Short-circuit current rating (SCCR), group installation at 480V AC	Rated instantaneous short-circuit current setting I_i	Catalog number	Global code	Weight (1 pc)
240 V	480 V	600 V						
HP	HP	HP	A	kA	A			kg
–	–	–	0.16	65	2.00	MO132-0.16	1SAM360000R1001	0.22
–	–	–	0.25	65	3.10	MO132-0.25	1SAM360000R1002	0.22
–	–	–	0.40	65	5.00	MO132-0.4	1SAM360000R1003	0.22
–	–	–	0.63	65	7.90	MO132-0.63	1SAM360000R1004	0.22
–	–	1/2	1.0	65	12.5	MO132-1.0	1SAM360000R1005	0.22
–	3/4	3/4	1.6	65	20.0	MO132-1.6	1SAM360000R1006	0.27
1/2	1	1.5	2.5	65	31.3	MO132-2.5	1SAM360000R1007	0.27
1	2	3	4.0	65	50.0	MO132-4.0	1SAM360000R1008	0.27
1.5	3	5	6.3	65	78.8	MO132-6.3	1SAM360000R1009	0.27
3	5	7.5	10	65	125	MO132-10	1SAM360000R1010	0.27
3	7.5	10	12	35	150	MO132-12	1SAM360000R1012	0.31
5	10	10	16	35	200	MO132-16	1SAM360000R1011	0.31
5	10	15	20	35	250	MO132-20	1SAM360000R1013	0.31
7.5	15	20	25	35	313	MO132-25	1SAM360000R1014	0.31
10	20	25	32	35	400	MO132-32	1SAM360000R1015	0.31

Note: For overload protection of motors, an appropriate thermal or electronic overload relay must be used.

Main dimensions mm, *inches*



MO132 ≤ 10 A



MO132 ≥ 12 A

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

MO165-65

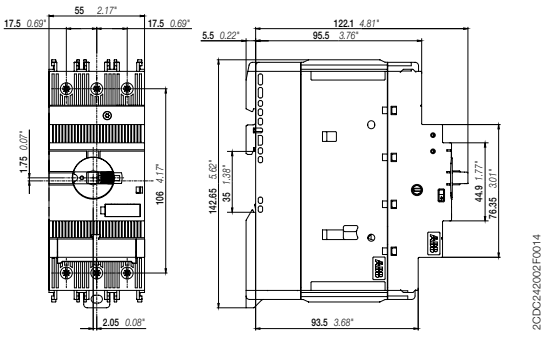
Description

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			Rated operational current	Short-circuit current rating (SCCR), group installation at 480V AC	Rated instantaneous short-circuit current setting I_i	Catalog number	Global code	Weight (1 pc)
240 V	480 V	600 V						
HP	HP	HP	A	kA	A			kg
5	10	10	16	65	240	MO165-16	1SAM461000R1011	0.95
5	10	15	20	65	300	MO165-20	1SAM461000R1012	0.95
7.5	15	20	25	65	375	MO165-25	1SAM461000R1013	0.96
10	20	30	32	65	480	MO165-32	1SAM461000R1014	0.97
15	30	40	42	65	630	MO165-42	1SAM461000R1015	0.97
20	40	50	54	65	810	MO165-54	1SAM461000R1016	0.97
20	50	60	65	65	975	MO165-65	1SAM461000R1017	0.98

Main dimensions mm, *inches*



M0165

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


2CDC241001F0014

MS132-10T


2CDC241002F0014

MS132-25T

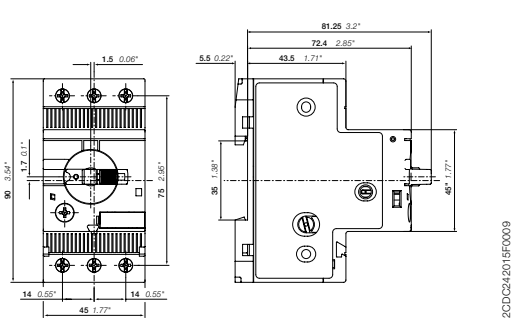
Description

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 25 KW (600 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 current rating (SCCR), group installation at 480V AC kA	Rated instantaneous short-circuit current setting I_i A	Catalog number	Global code	Weight (1 pc) kg
0.10 ... 0.16	65	3.2	MS132-0.16T	1SAM340000R1001	0.22
0.16 ... 0.25	65	5	MS132-0.25T	1SAM340000R1002	0.22
0.25 ... 0.40	65	8	MS132-0.4T	1SAM340000R1003	0.22
0.40 ... 0.63	65	12.6	MS132-0.63T	1SAM340000R1004	0.22
0.63 ... 1.00	65	20	MS132-1.0T	1SAM340000R1005	0.22
1.00 ... 1.60	65	32	MS132-1.6T	1SAM340000R1006	0.27
1.60 ... 2.50	65	50	MS132-2.5T	1SAM340000R1007	0.27
2.50 ... 4.00	65	80	MS132-4.0T	1SAM340000R1008	0.27
4.00 ... 6.30	65	126	MS132-6.3T	1SAM340000R1009	0.27
6.30 ... 10.0	65	200	MS132-10T	1SAM340000R1010	0.27
8.00 ... 12.0	35	240	MS132-12T	1SAM340000R1012	0.31
10.0 ... 16.0	35	320	MS132-16T	1SAM340000R1011	0.31
16.0 ... 20.0	35	400	MS132-20T	1SAM340000R1013	0.31
20.0 ... 25.0	35	500	MS132-25T	1SAM340000R1014	0.31

Main dimensions mm, *inches*



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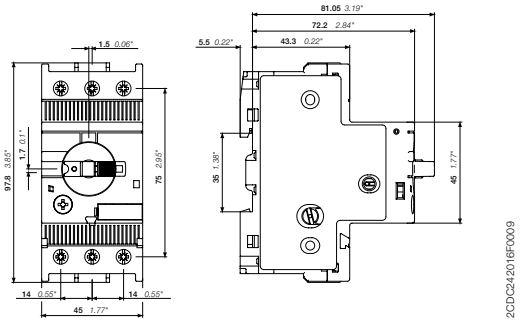
MS132T ≤ 10 A

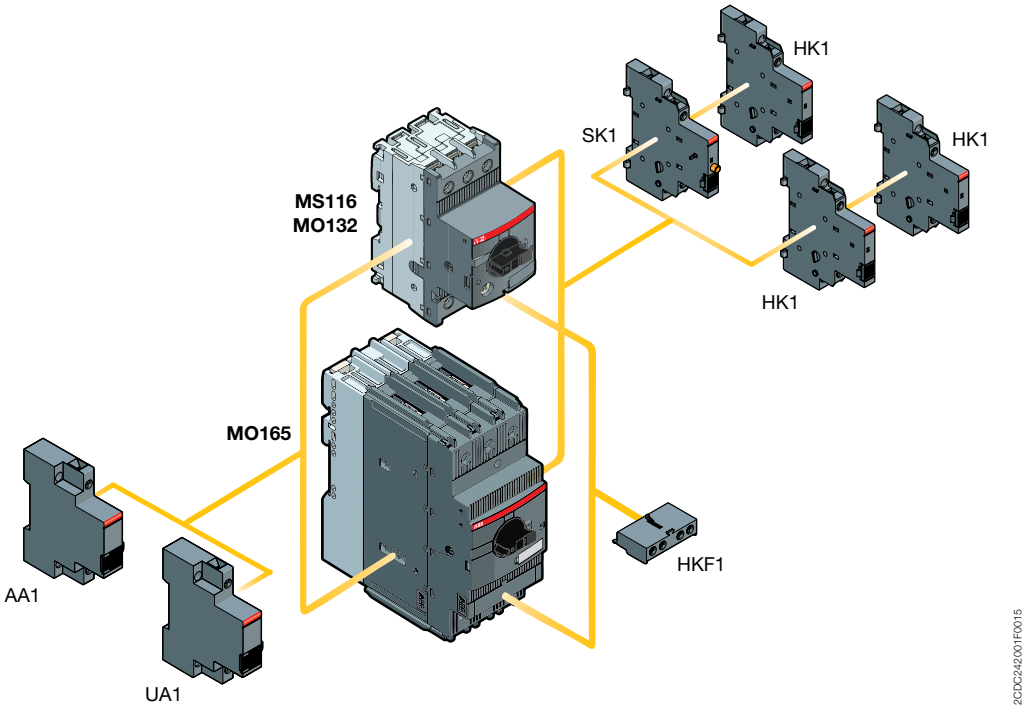


2CDC242016F0009

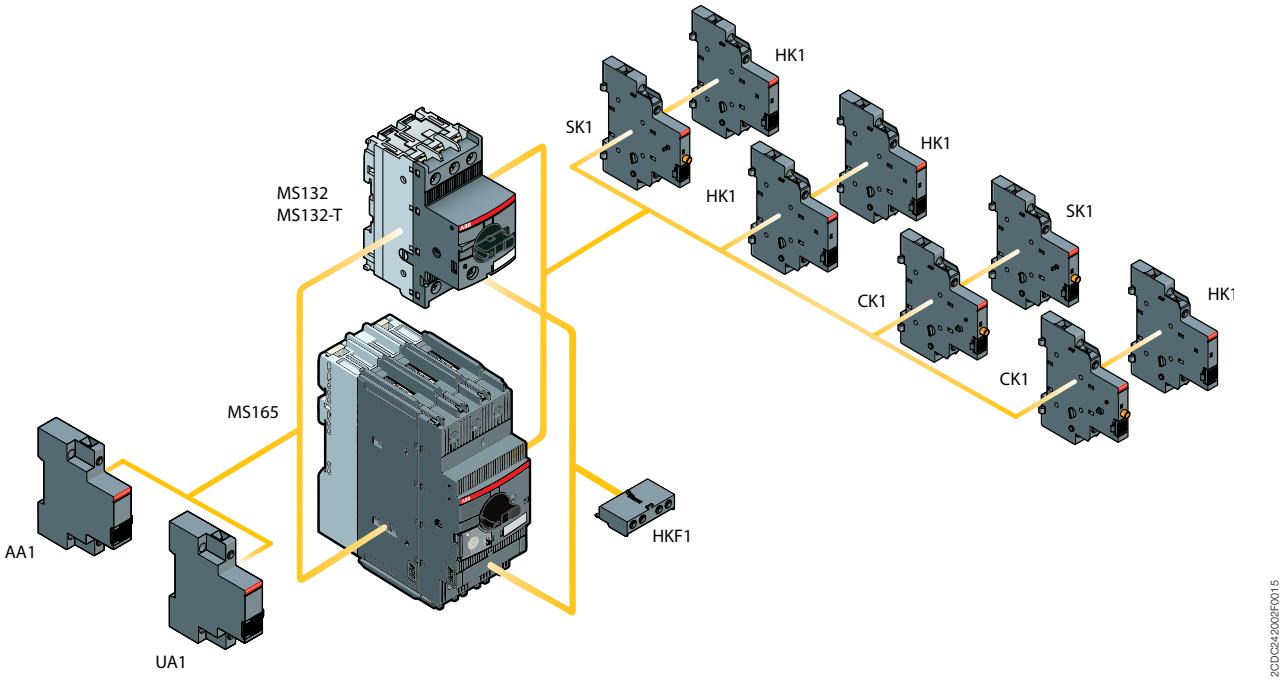
MS132T ≥ 12 A

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)



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

HKF1-11

HK1-11

SK1-11

CK1-11

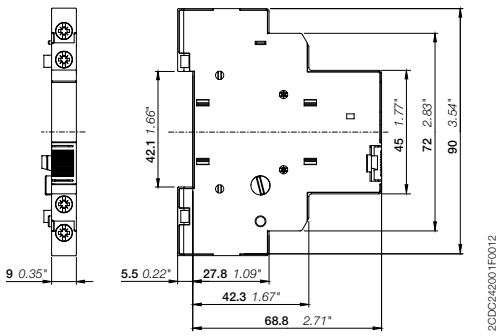
Description

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 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	Catalog number	Global code	Pkg qty pcs	Weight (1 pc) kg
Auxiliary contacts – mountable on the front							
MS116, MS132, MS165 MO132, MO165 MS132-T	1	1		HKF1-11	1SAM201901R1001	10	0.02
	1	0		HKF1-10	1SAM201901R1003	10	0.01
	0	1		HKF1-01	1SAM201901R1004	10	0.02
	2	0		HKF1-20	1SAM201901R1002	10	0.02
Auxiliary contacts – mountable on the right							
MS116, MS132, MS165 MO132, MO165 MS132-T	1	1	max. 2 pieces	HK1-11	1SAM201902R1001	2	0.04
	2	0	max. 2 pieces	HK1-20	1SAM201902R1002	2	0.04
	0	2	max. 2 pieces	HK1-02	1SAM201902R1003	2	0.04
	2	0	with lead contacts	HK1-20L	1SAM201902R1004	2	0.04
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	0.04
	2	0	for tripped alarm, max. 2 pieces	SK1-20	1SAM201903R1002	2	0.04
	0	2	for tripped alarm, max. 2 pieces	SK1-02	1SAM201903R1003	2	0.04
MS132, MS165, MS132-T	1	1	for short-circuit alarm, max. 2 pieces	CK1-11	1SAM201903R1003	2	0.04
	2	0	for short-circuit alarm, max. 2 pieces	CK1-20	1SAM301901R1002	2	0.04
	0	2	for short-circuit alarm, max. 2 pieces	CK1-02	1SAM301901R1003	2	0.04

Main dimensions mm, *inches*



HK1

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

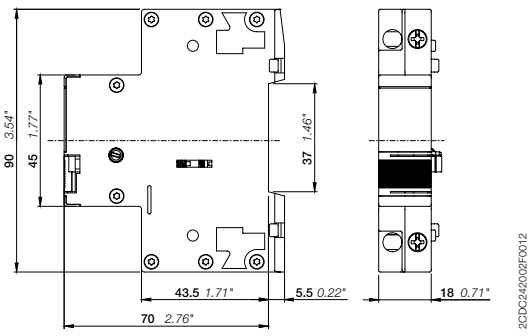
AA1-24

UA1-24

Ordering details

Suitable for	Rated control supply voltage 50 Hz V AC	Rated control supply voltage 60 Hz V AC	Catalog number	Global code	Pkg qty pcs	Weight (1 pc) kg
Shunt trips – mountable on the left						
MS116, MS132, MS165, MO132, MO165, MS132-T	20 ... 24	20 ... 24	AA1-24	1SAM201910R1001	1	0.10
	110	110	AA1-110	1SAM201910R1002	1	0.10
	200 ... 240	200 ... 240	AA1-230	1SAM201910R1003	1	0.10
	350 ... 415	350 ... 415	AA1-400	1SAM201910R1004	1	0.10
Undervoltage releases – mountable on the left						
MS116, MS132, MS165, MO132, MO165, MS132-T	20	24	UA1-20	1SAM201904R1010	1	0.10
	24	-	UA1-24	1SAM201904R1001	1	0.10
	48	-	UA1-48	1SAM201904R1002	1	0.10
	60	-	UA1-60	1SAM201904R1003	1	0.10
	110	120	UA1-120	1SAM201904R1004	1	0.10
	-	208	UA1-208	1SAM201904R1008	1	0.10
	230	240	UA1-230	1SAM201904R1005	1	0.10
	400	-	UA1-400	1SAM201904R1006	1	0.10
	415	480	UA1-415	1SAM201904R1007	1	0.10
	-	575	UA1-575	1SAM201904R1009	1	0.10

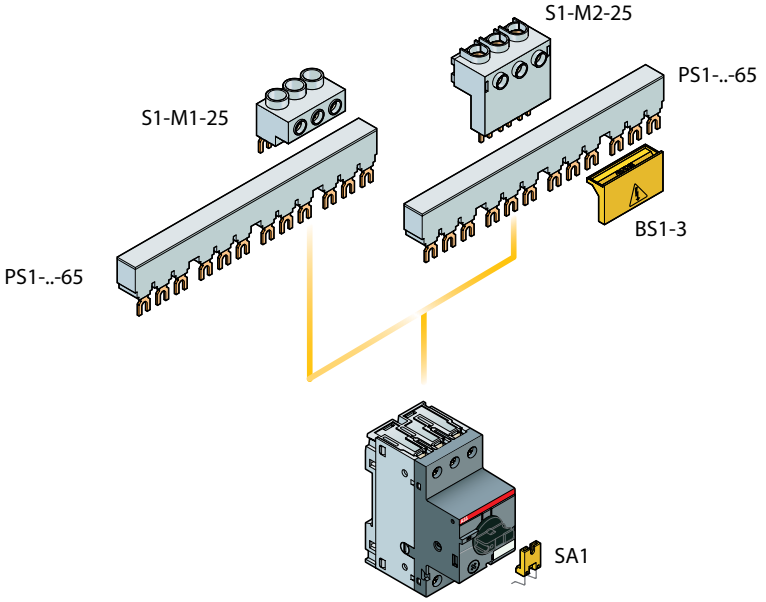
Main dimensions mm, *inches*



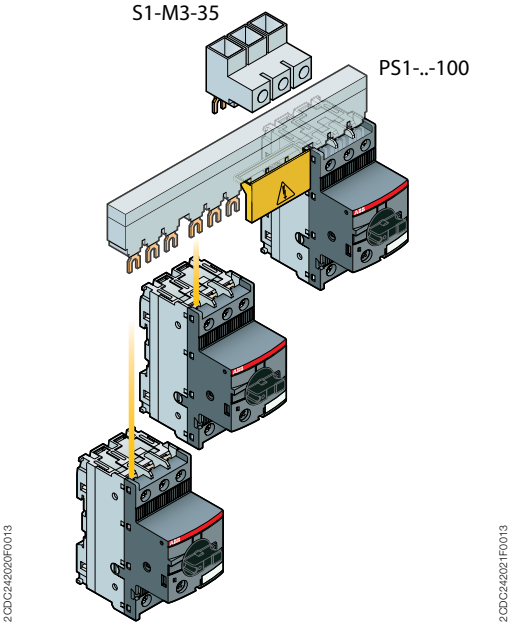
AA1, UA1

Main accessories
MS116, MS132, MS165, MO132, MO165

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

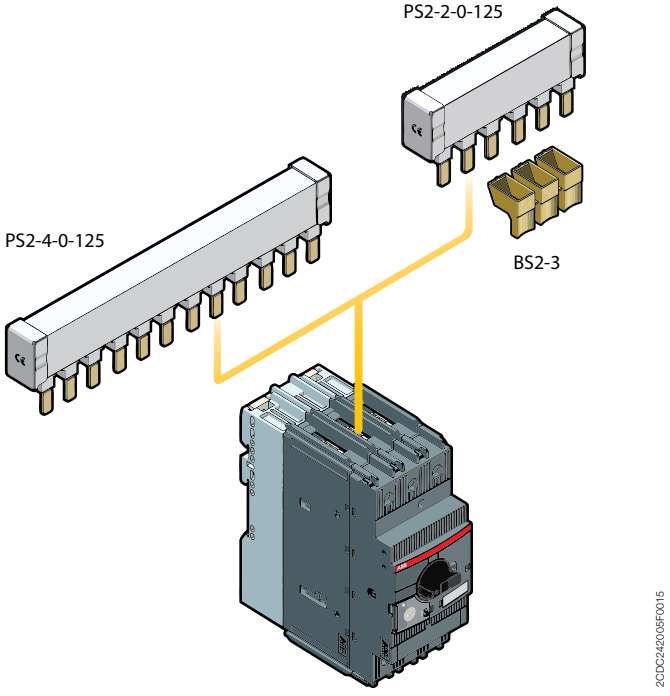


Three-phase busbar up to 65 A

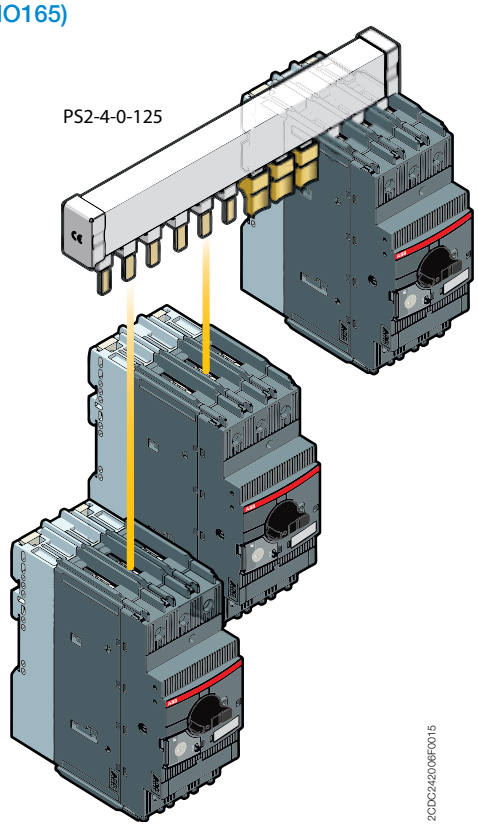


Three-phase busbar up to 92 A

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

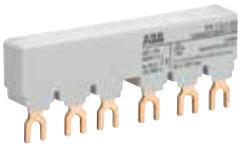


Three-phase busbar up to 125 A



Three-phase busbar up to 125 A

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 92 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.

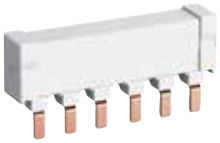
Ordering details

Suitable for	Rated operational current A	Number of MMS	Number of lateral aux.	Catalog number	Global code	Pkg qty pcs	Weight (1 pc) kg
Three-phase busbars							
MS116, MS132, MO132	65	2	0	PS1-2-0-65	1SAM201906R1102	10	0.03
	65	3	0	PS1-3-0-65	1SAM201906R1103	10	0.06
	65	4	0	PS1-4-0-65	1SAM201906R1104	10	0.08
	65	5	0	PS1-5-0-65	1SAM201906R1105	10	0.10
	65	2	1	PS1-2-1-65	1SAM201906R1112	10	0.04
	65	3	1	PS1-3-1-65	1SAM201906R1113	10	0.06
	65	4	1	PS1-4-1-65	1SAM201906R1114	10	0.09
	65	5	1	PS1-5-1-65	1SAM201906R1115	10	0.11
	65	2	2	PS1-2-2-65	1SAM201906R1122	10	0.04
	65	3	2	PS1-3-2-65	1SAM201906R1123	10	0.07
	65	4	2	PS1-4-2-65	1SAM201906R1124	10	0.10
	65	5	2	PS1-5-2-65	1SAM201906R1125	10	0.12
MS116, MS132, MO132	92	3	0	PS1-3-0-100	1SAM201916R1103	10	0.08
	92	4	0	PS1-4-0-100	1SAM201916R1104	10	0.12
	92	5	0	PS1-5-0-100	1SAM201916R1105	10	0.15
	92	3	1	PS1-3-1-100	1SAM201916R1113	10	0.09
	92	4	1	PS1-4-1-100	1SAM201916R1114	10	0.13
	92	5	1	PS1-5-1-100	1SAM201916R1115	10	0.17
	92	3	2	PS1-3-2-100	1SAM201916R1123	10	0.11

Suitable for	Rated operational current A	Rated cross section mm²	Mounting form	Catalog number	Global code	Pkg qty pcs	Weight (1 pc) kg
Three-phase feeder terminals							
MS116, MS132, MO132	63	25	Flat	S1-M1-25	1SAM201907R1101	10	0.04
	63	25	High	S1-M2-25	1SAM201907R1102	10	0.05
	63	25	UL/CSA Type E/F	S1-M3-25	1SAM201907R1103	10	0.04
	92	35	UL/CSA Type E/F	S1-M3-35	1SAM201913R1103	10	0.06

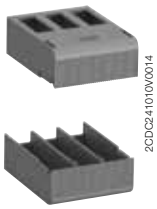
Suitable for	Description	Catalog number	Global code	Pkg qty pcs	Weight (1 pc) kg
MS116, MS132, MO132	Protection cover for busbars	BS1-3	1SAM201908R1001	50	0.01
MS116, MS132, MO132, MS132-T	Screw fixing kit	MS116-SMF	1SAM201909R1001	1	0.02
	Padlock + two keys	SA2	GJF1101903R0002	10	0.02
MS116	Lock handle	SA1	GJF1101903R0001	10	0.01
	Lock handle box SA1/SA2	SA3	GJF1101903R0003	10	0.05
Accessories for single-phase connection (IEC only)					
MS116, MS132, MO132, MS132-T	Phase connecting link	PB1-1-32	1SAM201914R1001	1	0.01
	Phase power infeed block	S1-PB1-25	1SAM201914R1002	1	0.01

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.	Catalog number	Global code	Pkg qty pcs	Weight (1 pc) kg
Three-phase busbars							
MS165, MO165	125	2	0	PS2-2-0-125	1SAM401920R1002	10	0.10
	125	3	0	PS2-3-0-125	1SAM401920R1003	10	0.16
	125	4	0	PS2-4-0-125	1SAM401920R1004	10	0.23
	125	2	2	PS2-2-2-125	1SAM401920R1022	10	0.12
	125	3	2	PS2-3-2-125	1SAM401920R1023	10	0.20
	125	4	2	PS2-4-2-125	1SAM401920R1024	10	0.28

Note: Other busbar types available on request.

Suitable for	Description	Catalog number	Global code	Pkg qty pcs	Weight (1 pc) kg
MS165, MO165	Terminal shroud	KA165	1SAM401922R1001	10	0.03
	Protection cover for busbars	BS2-3	1SAM401921R1001	50	0.01
	Padlock + two keys	SA2	GJF1101903R0002	10	0.02

Main accessories
MS116, MS132, MO132


2CDC241004F0010

IB132-Y


2CDC241005F0010

IB132-G


2CDC241002F0010

DMS132-Y


2CDC241001F0010

DMS132-G

Description

IB132 are 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.

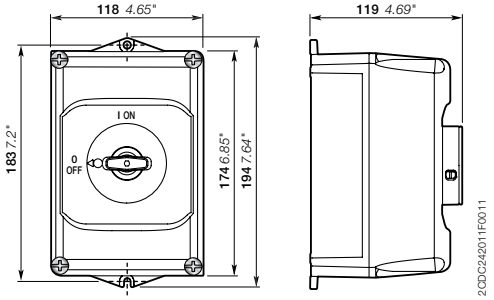
DMS132 are UL/CSA Type 12 door mounting kits for MMS installation in any enclosure. Additional mounting of auxiliary, signaling, shunt trips and undervoltage release is possible. The handle is lockable in OFF position. For detailed specification see installation instruction.

Ordering details

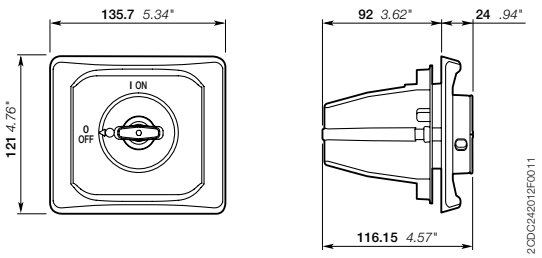
Suitable for	Description	Color	Catalog number	Global code	Pkg qty pcs	Weight (1 pc) kg
UL/CSA Type 12 enclosures						
MS116, MS132, MO132	Padlockable max. 3 padlocks with bail diameter 4 ... 6.5 mm	Yellow/red	IB132-Y	1SAM201911R1011	1	0.37
		Grey/black	IB132-G	1SAM201911R1010	1	0.37
UL/CSA Type 12 door mounting kits						
MS116, MS132, MO132	Padlockable max. 3 padlocks with bail diameter 4 ... 6.5 mm	Yellow/red	DMS132-Y	1SAM201912R1011	1	0.17
		Grey/black	DMS132-G	1SAM201912R1010	1	0.17

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

Main dimensions mm, *inches*



IB132



DMS132

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

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 Ue acc. to UL/CSA		600 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	-	-

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 Ue		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	50/60 Hz	50/60 Hz	50/60 Hz	50/60 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 Uimp		6 kV	6 kV	8 kV	6 kV	8 kV	6 kV
Rated insulation voltage Ui		690 V	690 V	1000 V	690 V	1000 V	690 V
Rated operational current Ie		See ordering details					

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

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.

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

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

hp Horsepower
FLA Full Load Amps
LRA Locked Rotor Amps

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

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.
Note: SCCR 65kA when used with current limiter series S803W-SCLxxx-SR for 0.16–32A.

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

UL/CSA Maximum short-circuit current ratings – MS132/MO132 with AF contactors

Type	Combination Motor Controllers (Type F)[1]			Type	Combination Motor Controllers (Type F)[1]			
	Minimum contactor size	480Y / 277 V	600Y / 347 V		Minimum contactor		480Y / 277 V	600Y / 347 V
		kA	kA		Size	TOL	kA	kA
MS132-0.16	AF09	100	50	**MO132-0.16**	AF09	TF42	65	50
MS132-0.25	AF09	100	50	**MO132-0.25**	AF09	TF42	65	50
MS132-0.40	AF09	100	50	**MO132-0.40**	AF09	TF42	65	50
MS132-0.63	AF09	100	50	**MO132-0.63**	AF09	TF42	65	50
MS132-1.0	AF09	100	50	**MO132-1.0**	AF09	TF42	65	50
MS132-1.6	AF09	100	50	**MO132-1.6**	AF09	TF42	65	50
MS132-2.5	AF09	100	50	**MO132-2.5**	AF09	TF42	65	50
MS132-4.0	AF09	100	50	**MO132-4.0**	AF09	TF42	65	50
MS132-6.3	AF09	100	47	**MO132-6.3**	AF09	TF42	65	47
MS132-10	AF09	100	30	**MO132-10**	AF09	TF42	65	30
MS132-12	AF09	65	30	**MO132-12**	AF09	TF42	65	30
MS132-16	AF12	65	30	**MO132-16**	AF12	TF42	65	30
MS132-20	AF26	65	-	**MO132-20**	AF16	TF42	65	30
MS132-25	AF26	50	-	**MO132-25**	AF26	TF42	50	30
MS132-32	AF38	50	-	**MO132-32**	AF38	TF42	50	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								Manual self-protected Combination Motor Controllers (Type E)	
	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
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	30
MS165-54			65	30	65	30	65	30	65	30
MS165-65			65	30	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 – MS165/MO165 with AF contactors

Type	Combination Motor Controllers (Type F)			Type	Combination Motor Controllers (Type F)			
	Minimum contactor size	480Y / 277 V	600Y / 347 V		Minimum contactor size		480Y / 277 V	600Y / 347 V
		kA	kA			TOL	kA	kA
MS165-16	AF09	65	50	**MO165-16**	AF09	TF42	65	30
MS165-20	AF26	65	50	**MO165-20**	AF26	TF42	65	30
MS165-25	AF26	65	50	**MO165-25**	AF26	TF42	65	30
MS165-32	AF26	65	50	**MO165-32**	AF26	TF42	65	50
MS165-42	AF40	65	-	**MO165-42**	AF40	TF65	65	-
MS165-54	AF40	65	-	**MO165-54**	AF40	TF65	65	-
MS165-65	AF40	65	-	**MO165-65**	AF40	TF65	65	-

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.

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

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)	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	-
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	IP20	IP20	IP10	IP20	IP10	IP20

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

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

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 16-3
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 16-3
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

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 Ue			690 V AC / 600 DC	250 V AC / 250 V DC
Conventional free-air thermal current Ith			6 A	5 A
Rated frequency			50/60 Hz	
Rated impulse withstand voltage Uimp			6 kV	
Rated insulation voltage Ui			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	
Ie / 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	-
Ie / 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

		HK1, SK1, CK1	HKF1
Type			
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 Ue 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

			HK1, SK1, CK1	HKF1
Type				
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	

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

General technical data

Type			UA1	AA1
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 Us	0.7 ... 1.1 x Us
	Coil operating voltage		0.85 ... 1.1 x Us	-
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 Uimp			6 kV	6 kV
Rated insulation voltage Ui			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

Type			UA1	AA1
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	

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

Note: Technical data for PS2-xxx on request.

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

MS5100-100

MS495-40

MS497-100

Description

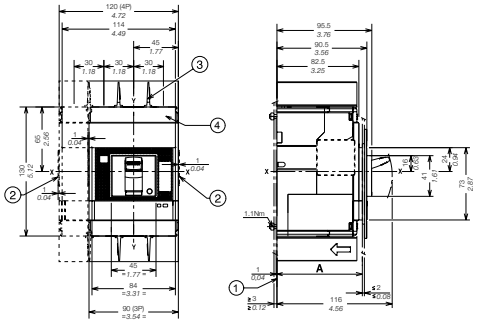
Manual motor starters (MMS) are protection devices for the main circuit. They combine motor control and protection in a single device. MMS are used mainly to switch motors manually ON/OFF and protect them and the installation fuse-less against short-circuit, overload and phase failures [1]. Fuse-less 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

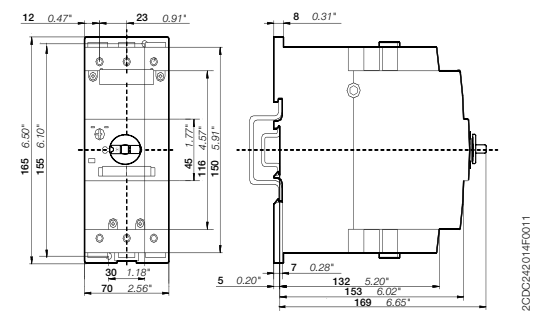
Rated operational power			Setting range	Short-circuit current rating (SCCR), group installation at 480V AC	Rated instantaneous short-circuit current setting I_i	Catalog number	Global code	Weight (1 pc)
240 V HP	480 V HP	600 V HP	A	kA	A			kg
MS5100 manual motor starters								
30	75	100	40-100	65	240-1300	MS5100-100	1SDA082034R1	1.200
MS495 manual motor starters								
25	50	60	45-63	65	819	MS495-63	1SAM550000R1007	2.247
30	60	75	57-75	65	975	MS495-75	1SAM550000R1008	2.253
30	75	100	70-90	65	1170	MS495-90	1SAM550000R1009	2.280
40	75	100	80-100	65	1235	MS495-100	1SAM550000R1010	2.295
MS497 manual motor starters								
10	25	30	22-32	65	418	MS497-32	1SAM580000R1004	2.222
15	30	40	28-40	65	520	MS497-40	1SAM580000R1005	2.203
20	40	50	36-50	65	650	MS497-50	1SAM580000R1006	2.230
25	50	60	45-63	65	819	MS497-63	1SAM580000R1007	2.255
30	60	75	57-75	65	975	MS497-75	1SAM580000R1008	2.266
30	75	100	70-90	65	1170	MS497-90	1SAM580000R1009	2.268
40	75	100	80-100	65	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															
MS495-63	No back-up fuse required up to I_{cc} = 100 kA			25	50	160	20	50	160	6	12	160	3	6	80
MS495-75				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

MS495-40: No need for back-up fuse in networks with a prospective current of up to 50 kA at 400 V.
With an approbiate 125 A type gG fuse the device can be used in a network with a prospective current of up to 100 kA.
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														
MS497-32	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	100	No back-up fuse required up to I_{cc} = 100 kA	11	22	100	7	12	63
MS497-40			50	100		50	100		9	18	160	6	12	80
MS497-50			50	100		50	100		7.5	15	160	5	10	100
MS497-63			50	100		50	70	200	7.5	15	160	4	7.5	100
MS497-75			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

MS497-32: No need for back-up fuse in networks with a prospective current of up to 100 kA at 440 V.
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.

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[1]	100	30	30	75	100
MS495-63	63	63	20	25	50	60
MS495-75	75	75	25	25	60	75
MS495-90	90	90	30	30	75	100
MS495-100	100	100	40	40	75	100
MS497-32	32	32	10	10	25	30
MS497-40	40	40	15	15	30	40
MS497-50	50	50	15	20	40	50
MS497-63	63	63	20	25	50	60
MS497-75	75	75	25	25	60	75
MS497-90	90	90	30	30	75	100
MS497-100	100	100	30	40	75	100

[1] 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
MS495-63	250	500	65	30	65	30	65	30	65	30
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	-
MS497-32	120	500	65	30	65	30	65	30	65	30
MS497-40	160	500	65	30	65	30	65	30	65	30
MS497-50	200	500	65	30	65	30	65	30	65	30
MS497-63	250	500	65	30	65	30	65	30	65	30
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

Technical data
MS5100, MS495, MS497 manual motor starters

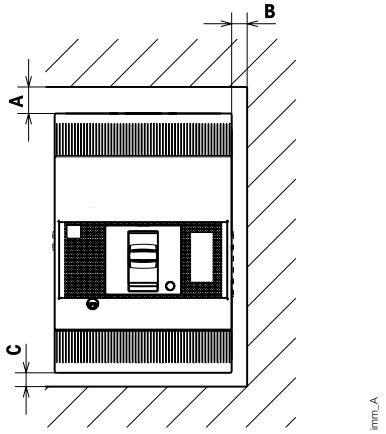
General technical data

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

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

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

MO5100-100

MO495-75

MO496-100

Description

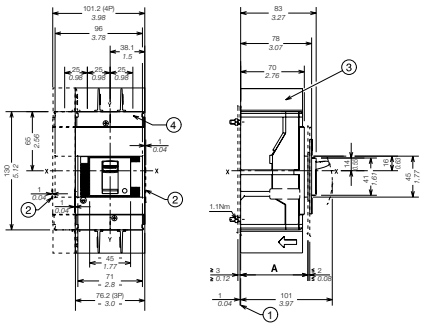
The manual motor starter magnetic only is used to manually switch on and off motors and to protect them reliably and without the need for a fuse from short-circuits.

Ordering detail

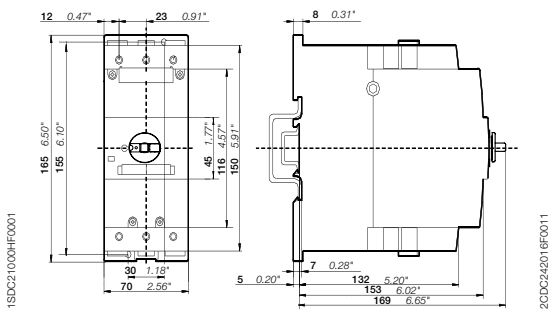
Rated operational power [1]			Ratd operational current	Short-circuit current rating (SCCR), group installation at 480V AC	Rated instantaneous short-circuit current setting I_i	Catalog number	Global code	Weight (1 pc)
240 V	480 V	600 V						
HP	HP	HP	A	kA	A			kg
MO5100 manual motor starter magnetic only								
25	50	-	70	65	210-770	MO5100-70	1SDA082031R1	1.100
25	60	-	80	65	240-880	MO5100-80	1SDA082032R1	1.100
30	75	-	100	65	300-1100	MO5100-100	1SDA082033R1	1.100
MO495 manual motor starter magnetic only								
25	50	60	63	65	819	MO495-63	1SAM560000R1007	2.244
30	60	75	75	65	975	MO495-75	1SAM560000R1008	2.247
30	75	100	90	65	1170	MO495-90	1SAM560000R1009	2.269
40	75	100	100	65	1235	MO495-100	1SAM560000R1010	2.292
MO496 manual motor starter magnetic only								
10	25	30	32	65	416	MO496-32	1SAM590000R1004	2.208
15	30	40	40	65	520	MO496-40	1SAM590000R1005	2.218
20	40	50	50	65	650	MO496-50	1SAM590000R1006	2.218
25	50	60	63	65	819	MO496-63	1SAM590000R1007	2.248
30	60	75	75	65	975	MO496-75	1SAM590000R1008	2.278
30	75	100	90	65	1170	MO496-90	1SAM590000R1009	2.266
40	75	100	100	65	1235	MO496-100	1SAM590000R1010	2.293

[1] For overload protection of motors, an appropriate thermal or electronic overload relay must be used.

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															
MO495-63	No back-up fuse required up to I_{cc} = 100 kA			25	50	160	20	50	160	6	12	160	3	6	80
MO495-75				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														
MO496-32	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	100	No back-up fuse required up to I_{cc} = 100 kA	11	22	100	7	12	63
MO496-40		50	100		50	100		9	18	160	6	12	80
MO496-50		50	100		50	100		7.5	15	160	5	10	100
MO496-63		50	100		50	70	200	7.5	15	160	4	7.5	100
MO496-75		50	100		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

MO496-32: No need for back-up fuse in networks with a prospective current of up to 100 kA at 440 V.
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.

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	-
MO495-63	63	63	20	25	50	60
MO495-75	75	75	25	25	60	75
MO495-90	90	90	30	30	75	100
MO495-100	100	100	40	40	75	100
MO496-32	32	32	10	10	25	30
MO496-40	40	40	15	15	30	40
MO496-50	50	50	15	20	40	50
MO496-63	63	63	20	25	50	60
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	-	-
MO495-63	60	500	65	30	65	30
MO495-75	250	500	65	30	65	30
MO495-90	300	500	65	30	65	30
MO495-100	350	500	65	10	65	10
MO496-32	120	500	65	30	65	30
MO496-40	160	500	65	30	65	30
MO496-50	200	500	65	30	65	30
MO496-63	250	500	65	30	65	30
MO496-75	300	500	65	30	65	30
MO496-90	350	500	65	10	65	10
MO496-100	400	500	65	10	65	10

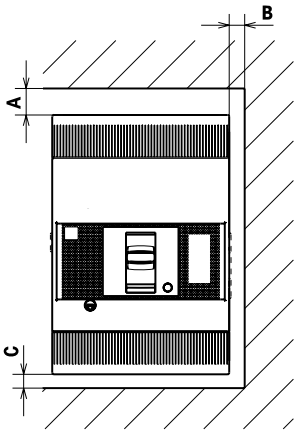
Technical data
MO5100, MO495, MO496 manual motor starters magnetic only

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

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

Connecting characteristics

Main circuit

			MO495	MO496
Type				
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)

		MS5100
Type		
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

Main accessories
MS5100, MO5100 manual motor starters

AUX-C

SOR-C

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	Catalog number	Global code	Pkg qty pcs	Weight (1 pc) kg
Auxiliary contacts - mountable inside the breaker on the left slot (cabled version)							
MS5100, MO5100			Changeover	AUX-C 1Q+1SY 250V AC	1SDA066431R1	2	0.06
			Changeover	AUX-C 2Q+1SY 250V AC	1SDA066433R1	3	0.09
MS5100			Changeover	AUX-C 2Q+2SY+1SA 250V AC	1SDA066438R1	5	0.15
			Changeover	AUX-C 3Q+1SY 250V AC	1SDA066434R1	4	0.12
			Changeover	AUX-C 3Q+2SY 250V AC	1SDA066436R1	5	0.15
MO5100			Changeover	AUX-C 1Q+1SY 24V DC	1SDA066446R1	2	0.06

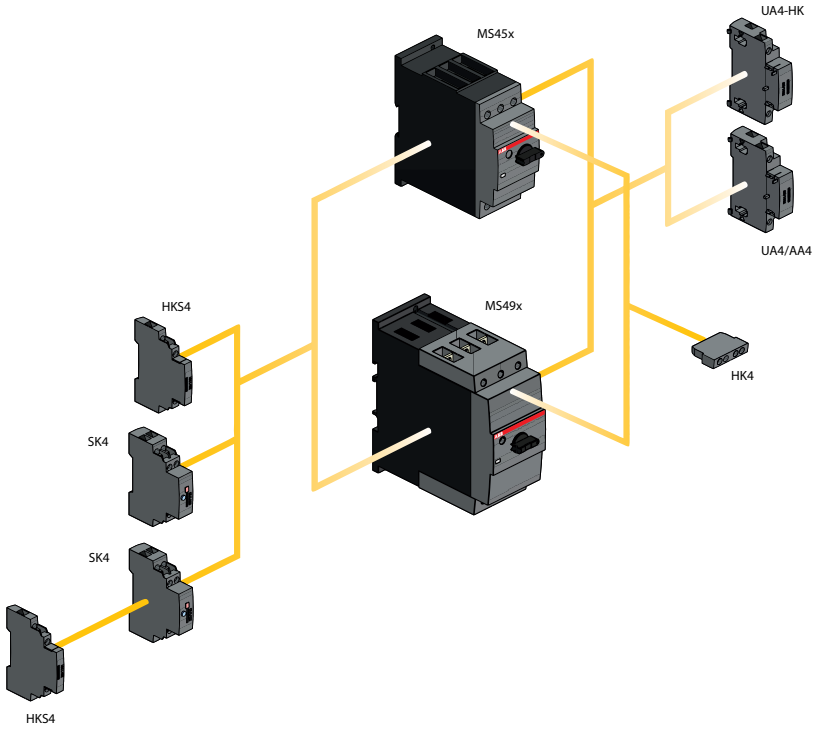
Suitable for	Rated control supply voltage V	Description	Catalog number	Global code	Pkg qty pcs	Weight (1 pc) kg
Shunt trips units - mountable inside the breaker on the left slot (cabled version)						
MS5100, MO5100		Normally NON energized	SOR-C 12V DC	1SDA066321R1	1	0.14
		Normally NON energized	SOR-C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

Suitable for	Description	Catalog number	Global code	Pkg qty pcs	Weight (1 pc) 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

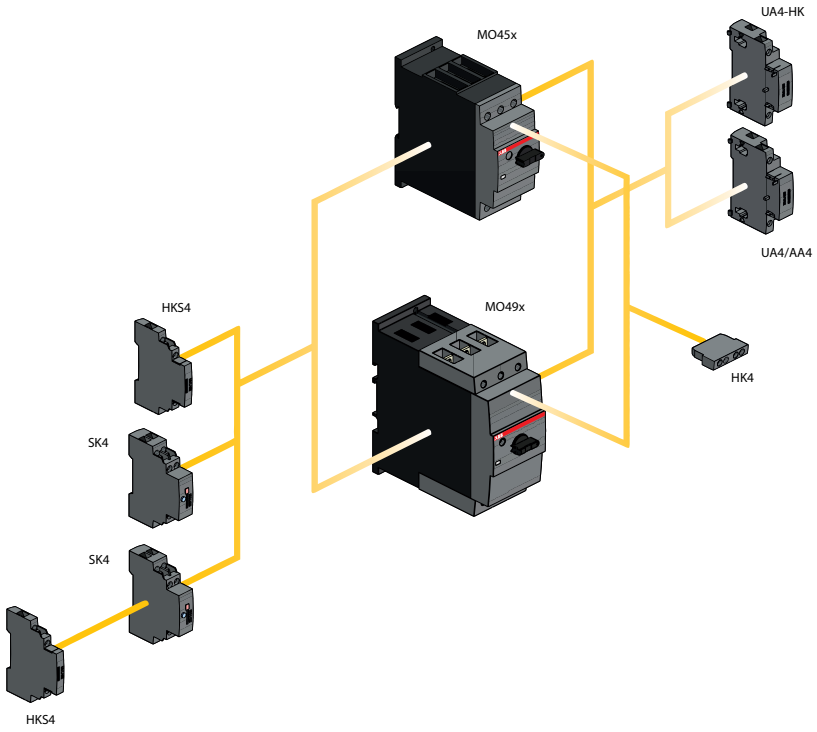
[1] UL Listed

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	Catalog number	Global code	Pkg qty pcs	Weight (1 pc) 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	Catalog number	Global code	Pkg qty pcs	Weight (1 pc) kg
Shunt trip units – mountable on the right						
MS49x, MO49x	20 ... 24	50/60	AA4-24	1SAM401907R1001	1	0.135
	90 ... 110	50/60	UA4-120	1SAM401907R1002	1	0.135
	200 ... 240	50/60	AA4-240	1SAM401907R1003	1	0.128
	350 ... 415	50/60	AA4-400	1SAM401907R1004	1	0.125
Undervoltage releases – mountable on the right						
MS49x, MO49x	24	50/60	UA4-24	1SAM401905R1004	1	0.134
	110/120	50/60	UA4-110	1SAM401905R1001	1	0.134
	230/240	50/60	UA4-240	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	Catalog number	Global code	Pkg qty pcs	Weight (1 pc) 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.

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	-

Connecting characteristics

Auxiliary circuit

Type			HK4-11	HK4-W	HKS4	SK4
Connecting capacity						
	 Rigid	1 x	0.5... 2.5 mm²			
		2 x	0.5 ... 1.5 mm² or 0.75 ... 2.5 mm			
	 Flexible with ferrule	1 x	0.5 ... 2.5 mm²			
		2 x	0.5 ... 1.5 mm² or 0.75 ... 2.5 mm			
	 Flexible	1 x	0.5 ... 2.5 mm²			
		2 x	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			

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

MSHD-LB

MSHD-LY

1SAM101923R0002

MSH-AR

MSAH1

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.

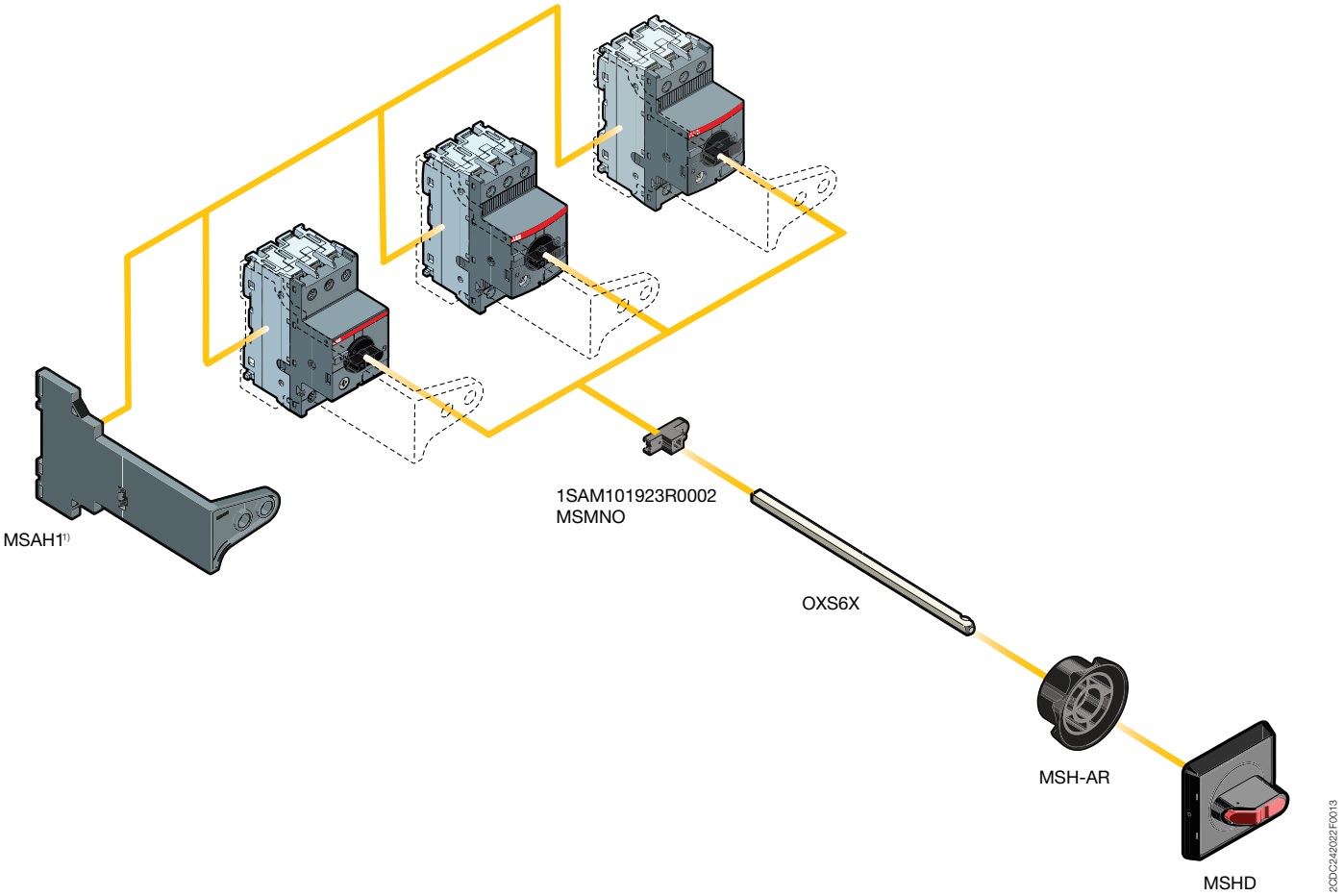
Most accessories fit for 6 mm shafts with a maximum length of 180 mm. The degree of protection for handles MSHD is IP64 (UL/CSA Type 1, 3R, 12).

Ordering details

Suitable for	Description	Shaft length mm	Color	Catalog number	Global code	Pkg qty pcs	Weight (1 pc) 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.			1SAM101923R0002 [3]	1SAM101923R0002	1	0.002
				1SAM101923R0012 [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.			1SAM201920R1000	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

General accessories
MS1xx, MO1xx, MS4xx, MO4xx



[1)] MSAH1 fits to MS116,MS132 and MO132

Notes


B6-30-10
A1
A2

B mini contactors
K mini contactor relays

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

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

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:

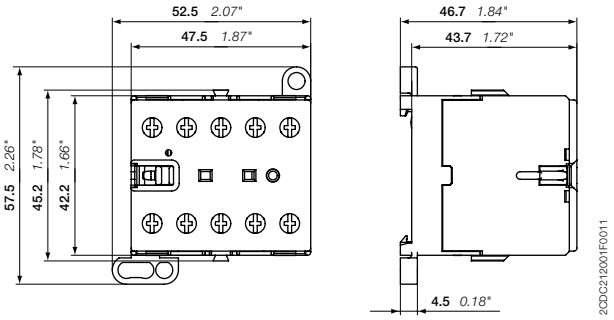
- 3 main poles and one built-in auxiliary contact
- control circuit: AC operated
  - low coil consumption (3.5 VA at pull-in and at holding)
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories
- hum-free coil
- designed for rail or wall mounting

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c		Auxiliary contacts fitted		Catalog number	Global code	Pkg qty	Weight (1 pce)
Rated operational power	current $\theta \le 40$ °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
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

Note: Other types on request

Main dimensions mm, *inches*



B6, B7

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

BC6-30-10

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:

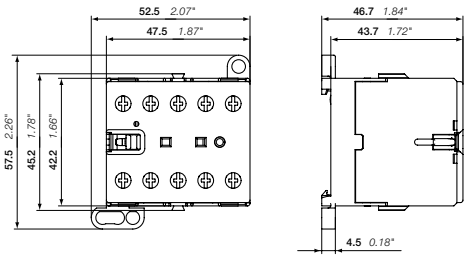
– 3 main poles and one built-in auxiliary contact
– control circuit: DC operated, low consumption (3.5 W at pull-in and at holding)
– hum-free coil
– add-on auxiliary contact blocks for front or side mounting and a wide range of accessories
– designed for rail or wall mounting

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c	Auxiliary contacts fitted	Catalog number	Global 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	BC6-30-10-07	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

Note: Other types on request

Main dimensions mm, *inches*



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BC6, BC7, B7D

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

VB7-30-10

3

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:

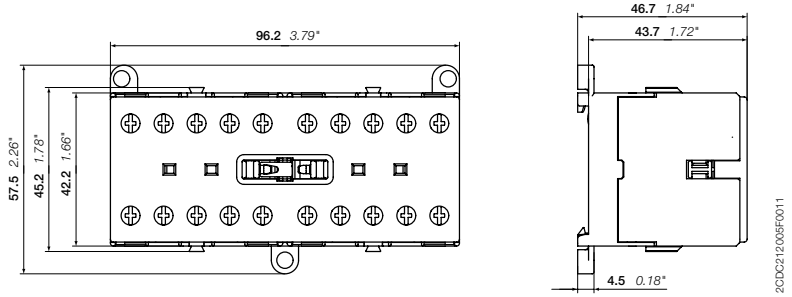
- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc.
- control circuit: AC operated
  - low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- add-on 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	Catalog number	Global 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

Note: Other types on request

Main dimensions mm, *inches*



VB6, VB7

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

VBC6-30-10

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:

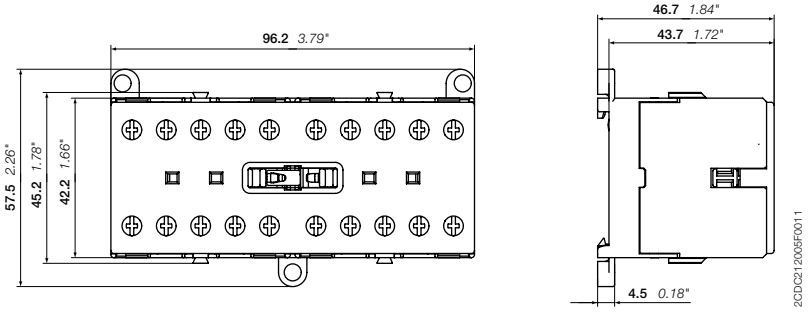
- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc.
- control circuit: DC operated
  - low coil consumption (3.5 W at pull-in and at holding)
- hum-free coil
- add-on 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	Catalog number	Global 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	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

Note: Other types on request

Main dimensions mm, *inches*



VBC6, VBC7

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

VB6A-30-10

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:

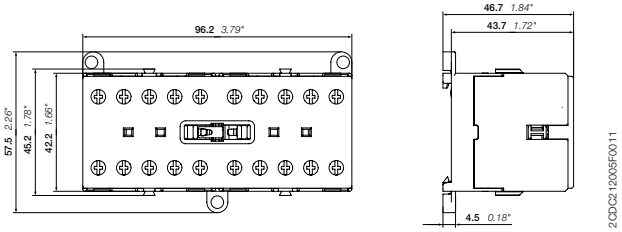
- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the 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	Catalog number	Global 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
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

Note: Other types on request

Main dimensions mm, *inches*



VB6A, VB7A

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

VBC6A-30-10

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:

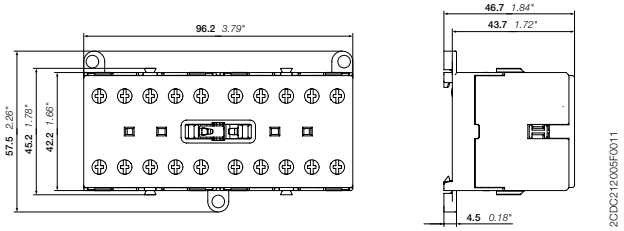
- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the 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	Catalog number	Global 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
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

Note: Other types on request

Main dimensions mm, inches



VBC6A, VBC7A

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

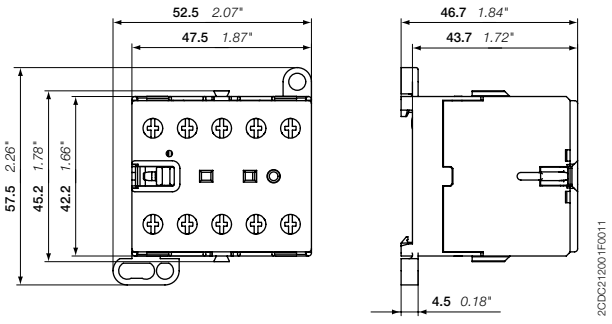
IEC		UL/CSA		Rated control circuit voltage U_c	Auxiliary contacts fitted	Catalog number	Global code	Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3 kW	current $\theta \leq 40$ °C AC-1 A	3-phase motor rating 480 V hp	General use rating	V DC					kg
DC operation 24 V / 1.4 W									
4	20	3	300 V / 12 A	24	1 0	BC6-30-10-1.4	GJL1213001R8101	10	0.175
					0 1	BC6-30-01-1.4	GJL1213001R8011	10	0.175
5.5	20	5	600 V / 16 A	24	1 0	BC7-30-10-1.4	GJL1313001R8101	10	0.175
					0 1	BC7-30-01-1.4	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	GJL1213001R5101	10	0.175
					0 1	BC6-30-01-2.4	GJL1213001R5011	10	0.175
5.5	20	5	600 V / 16 A	17 ... 32	1 0	BC7-30-10-2.4	GJL1313001R5101	10	0.175
					0 1	BC7-30-01-2.4	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	GJL1213001R7101	10	0.175
					0 1	B6S-30-01-1.7	GJL1213001R7011	10	0.175
5.5	20	5	600 V / 16 A	24	1 0	B7S-30-10-1.7	GJL1313001R7101	10	0.175
					0 1	B7S-30-01-1.7	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	GJL1213001R7102	10	0.175
					0 1	B6S-30-01-2.8	GJL1213001R7012	10	0.175
5.5	20	5	600 V / 16 A	17 ... 32	1 0	B7S-30-10-2.8	GJL1313001R7102	10	0.175
					0 1	B7S-30-01-2.8	GJL1313001R7012	10	0.175

Note: Other types on request

Main dimensions mm, inches



BC6, BC7

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

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:

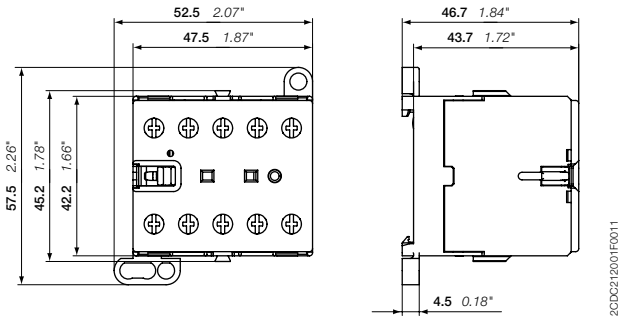
- 3 main poles and one built-in auxiliary contact
- control circuit: DC operated
  - low coil consumption (5 W at pull-in and at holding)
- hum-free coil
- expanded ambient temperature range -30 … +70 °C and wide range voltage supply
- no auxiliary contact block permitted for mounting
- designed for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

Note: Other types on request

Main dimensions mm, inches



TBC7

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

B6-22-00

3

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:

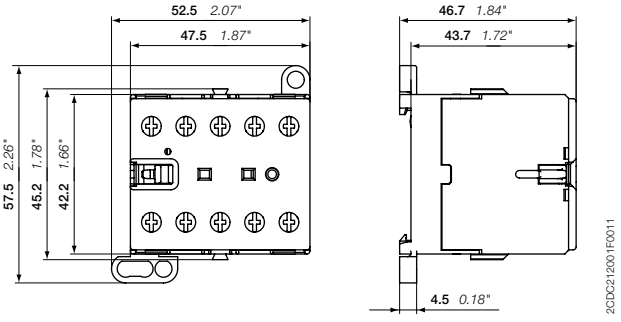
- 4 main poles
- control circuit: AC operated
  - low coil consumption (3.5 VA at pull-in and at holding)
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories
- hum-free coil
- designed for rail or wall mounting

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	Catalog number	Global 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

Note: Other types on request

Main dimensions mm, inches



B6, B7

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:

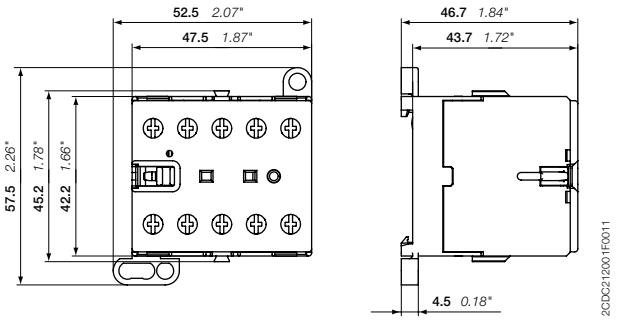
- 4 main poles
- control circuit: DC operated
  - low coil consumption (3.5 W at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for front or side mounting
- designed for rail or wall mounting

Ordering details

IEC	UL/CSA	Rated control circuit voltage U_c	Auxiliary contacts fitted	Catalog number	Global code	Pkg qty	Weight (1 pce)
Rated operational current $\theta \leq 40$ °C AC-1 A	General use rating	V DC					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

Note: 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

3

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:

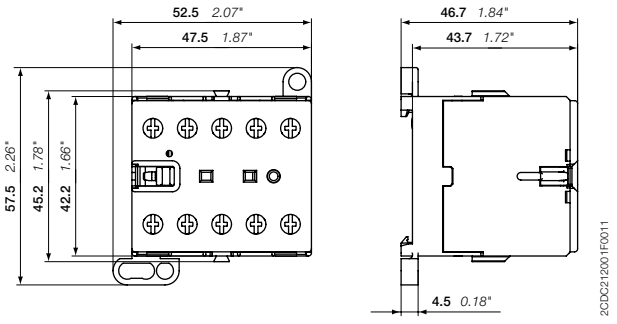
- 4 main poles
- control circuit: DC operated
  - low coil consumption (5 W at pull-in and at holding)
- hum-free coil
- expanded ambient temperature range -30 … +70 °C and wide range voltage supply
- no auxiliary contact block permitted for mounting
- designed for rail or wall mounting
- material is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

Note: Other types on request

Main dimensions mm, inches



TBC7

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

K6-22Z

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:

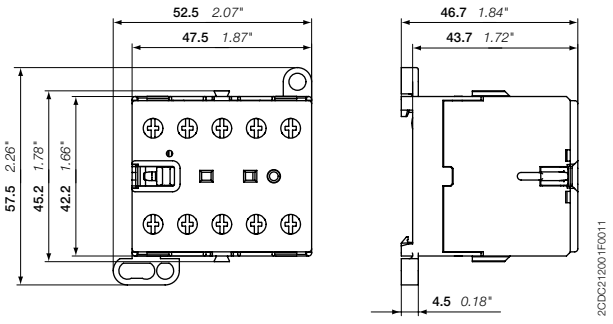
- 4-poles with various contact combinations
- control circuit: AC operated
  - low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for front or side mounting
- designed for rail or wall mounting

Ordering details

Rated control circuit voltage U_c		Catalog number	Global 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

Note: Other types on request

Main dimensions mm, inches



K6

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

KC6-22Z

3

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:

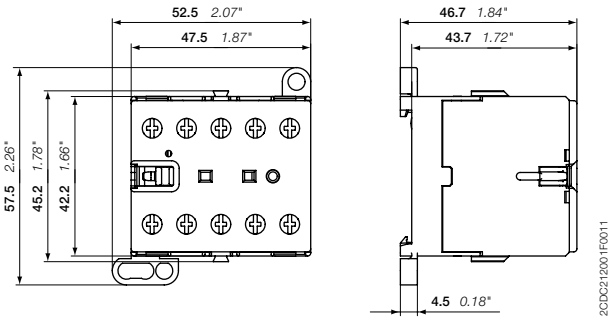
- 4-poles with various contact combinations
- control circuit: DC operated
  - low coil consumption (3.5 W at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for front or side mounting
- designed for rail or wall mounting

Ordering details

Rated control circuit voltage U_c V DC	Catalog number	Global 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

Note: Other types on request

Main dimensions mm, inches



KC6

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:

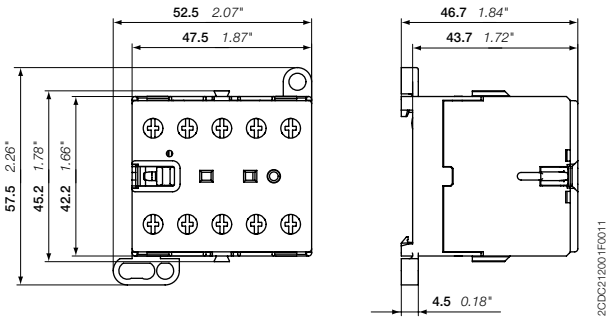
- 4-poles with various contact combinations
- control circuit: DC operated
  - low coil consumption (1.4 ... 2.8 W at pull-in and at holding)
- hum-free coil
- no auxiliary contact block permitted for mounting
- designed for rail or wall mounting

Ordering details

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

Note: Other types on request

Main dimensions mm, inches



KC6

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

TKC6-31Z

3

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:

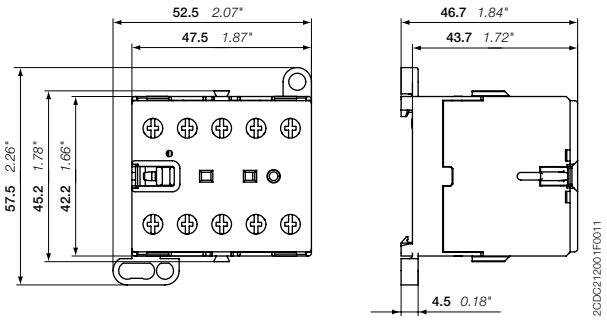
- 4-poles with various contact combinations
- control circuit: DC operated, hum free, low consumption (5 W at pull-in and at holding)
- expanded ambient temperature range -30 … +70 °C and wide range voltage supply
- material is suitable for railway applications
- humfree operating DC coil
- no auxiliary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

Note: Other types on request

Main dimensions mm, inches



TKC6

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:

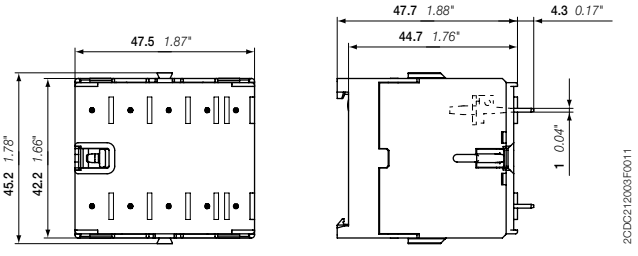
- 3 main poles and one built-in auxiliary contact
- control circuit: AC operated
  - low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for side mounting
- designed for soldering on PCB boards

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c		Auxiliary contacts fitted	Catalog number	Global 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	12	3	300 V / 12 A	24	24	1 0	B6-30-10-P01	GJL1211009R0101	10	0.170
						0 1	B6-30-01-P01	GJL1211009R0011	10	0.170
				42	42	1 0	B6-30-10-P02	GJL1211009R0102	10	0.170
						0 1	B6-30-01-P02	GJL1211009R0012	10	0.170
				48	48	1 0	B6-30-10-P03	GJL1211009R0103	10	0.170
						0 1	B6-30-01-P03	GJL1211009R0013	10	0.170
				110 ... 127	110 ... 127	1 0	B6-30-10-P84	GJL1211009R8104	10	0.170
						0 1	B6-30-01-P84	GJL1211009R8014	10	0.170
				220 ... 240	220 ... 240	1 0	B6-30-10-P80	GJL1211009R8100	10	0.170
						0 1	B6-30-01-P80	GJL1211009R8010	10	0.170
				380 ... 415	380 ... 415	1 0	B6-30-10-P85	GJL1211009R8105	10	0.170
						0 1	B6-30-01-P85	GJL1211009R8015	10	0.170
B7 mini contactors										
5.5	12	5	600 V / 16 A	24	24	1 0	B7-30-10-P01	GJL1311009R0101	10	0.170
						0 1	B7-30-01-P01	GJL1311009R0011	10	0.170
				42	42	1 0	B7-30-10-P02	GJL1311009R0102	10	0.170
						0 1	B7-30-01-P02	GJL1311009R0012	10	0.170
				48	48	1 0	B7-30-10-P03	GJL1311009R0103	10	0.170
						0 1	B7-30-01-P03	GJL1311009R0013	10	0.170
				110 ... 127	110 ... 127	1 0	B7-30-10-P84	GJL1311009R8104	10	0.170
						0 1	B7-30-01-P84	GJL1311009R8014	10	0.170
				220 ... 240	220 ... 240	1 0	B7-30-10-P80	GJL1311009R8100	10	0.170
						0 1	B7-30-01-P80	GJL1311009R8010	10	0.170
				380 ... 415	380 ... 415	1 0	B7-30-10-P85	GJL1311009R8105	10	0.170
						0 1	B7-30-01-P85	GJL1311009R8015	10	0.170

Note: 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:

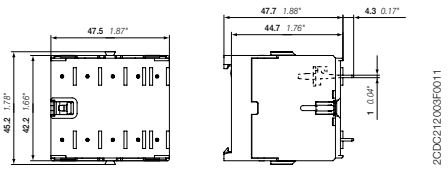
- 3 main poles and one built-in auxiliary contact
- control circuit: DC operated
  - low coil consumption (3.5 W at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for side mounting
- designed for soldering on PCB boards

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c	Auxiliary contacts fitted	Catalog number	Global 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-P07	GJL1213009R0107	10	0.170
					0 1	BC6-30-01-P07	GJL1213009R0017	10	0.170
				24	1 0	BC6-30-10-P01	GJL1213009R0101	10	0.170
					0 1	BC6-30-01-P01	GJL1213009R0011	10	0.170
				48	1 0	BC6-30-10-P16	GJL1213009R1106	10	0.170
					0 1	BC6-30-01-P16	GJL1213009R1016	10	0.170
				60	1 0	BC6-30-10-P03	GJL1213009R0103	10	0.170
					0 1	BC6-30-01-P03	GJL1213009R0013	10	0.170
				110 ... 125	1 0	BC6-30-10-P04	GJL1213009R0104	10	0.170
					0 1	BC6-30-01-P04	GJL1213009R0014	10	0.170
				220 ... 240	1 0	BC6-30-10-P05	GJL1213009R0105	10	0.170
					0 1	BC6-30-01-P05	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-P07	GJL1313009R0107	10	0.170
					0 1	BC7-30-01-P07	GJL1313009R0017	10	0.170
				24	1 0	BC7-30-10-P01	GJL1313009R0101	10	0.170
					0 1	BC7-30-01-P01	GJL1313009R0011	10	0.170
				48	1 0	BC7-30-10-P16	GJL1313009R1106	10	0.170
					0 1	BC7-30-01-P16	GJL1313009R1016	10	0.170
				60	1 0	BC7-30-10-P03	GJL1313009R0103	10	0.170
					0 1	BC7-30-01-P03	GJL1313009R0013	10	0.170
				110 ... 125	1 0	BC7-30-10-P04	GJL1313009R0104	10	0.170
					0 1	BC7-30-01-P04	GJL1313009R0014	10	0.170
				220 ... 240	1 0	BC7-30-10-P05	GJL1313009R0105	10	0.170
					0 1	BC7-30-01-P05	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-P01	GJL1213109R0101	10	0.170
				48	1 0	BC6-21-10-P16	GJL1213109R1106	10	0.170
				60	1 0	BC6-21-10-P03	GJL1213109R0103	10	0.170
				110 ... 125	1 0	BC6-21-10-P04	GJL1213109R0104	10	0.170
				220 ... 240	1 0	BC6-21-10-P05	GJL1213109R0105	10	0.170

Note: Other types on request

Main dimensions mm, inches



B6, B7

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:

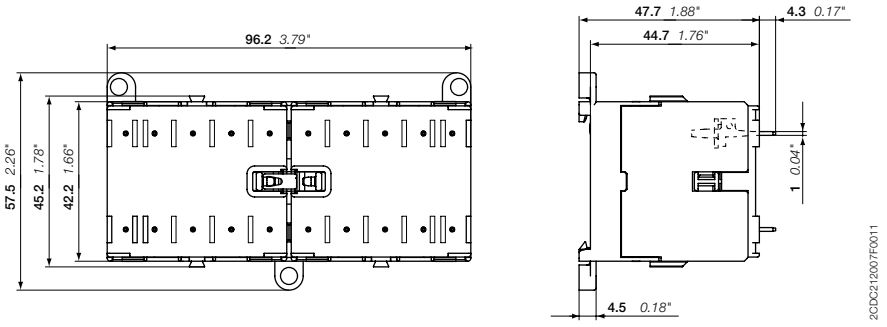
- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc
- control circuit: AC operated
  - low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- no auxiliary 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	Catalog number	Global 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
VB6 mini reversing contactors										
4	12	3	300 V / 12 A	24	24	1 0	VB6-30-10-P01	GJL1211909R0101	5	0.345
						0 1	VB6-30-01-P01	GJL1211909R0011	5	0.345
				42	42	1 0	VB6-30-10-P02	GJL1211909R0102	5	0.345
						0 1	VB6-30-01-P02	GJL1211909R0012	5	0.345
				48	48	1 0	VB6-30-10-P03	GJL1211909R0103	5	0.345
						0 1	VB6-30-01-P03	GJL1211909R0013	5	0.345
				110 ... 127	110 ... 127	1 0	VB6-30-10-P84	GJL1211909R8104	5	0.345
						0 1	VB6-30-01-P84	GJL1211909R8014	5	0.345
				220 ... 240	220 ... 240	1 0	VB6-30-10-P80	GJL1211909R8100	5	0.345
						0 1	VB6-30-01-P80	GJL1211909R8010	5	0.345
				380 ... 415	380 ... 415	1 0	VB6-30-10-P85	GJL1211909R8105	5	0.345
						0 1	VB6-30-01-P85	GJL1211909R8015	5	0.345
VB7 mini reversing contactors										
5.5	12	5	600 V / 16 A	24	24	1 0	VB7-30-10-P01	GJL1311909R0101	5	0.345
						0 1	VB7-30-01-P01	GJL1311909R0011	5	0.345
				42	42	1 0	VB7-30-10-P02	GJL1311909R0102	5	0.345
						0 1	VB7-30-01-P02	GJL1311909R0012	5	0.345
				48	48	1 0	VB7-30-10-P03	GJL1311909R0103	5	0.345
						0 1	VB7-30-01-P03	GJL1311909R0013	5	0.345
				110 ... 127	110 ... 127	1 0	VB7-30-10-P84	GJL1311909R8104	5	0.345
						0 1	VB7-30-01-P84	GJL1311909R8014	5	0.345
				220 ... 240	220 ... 240	1 0	VB7-30-10-P80	GJL1311909R8100	5	0.345
						0 1	VB7-30-01-P80	GJL1311909R8010	5	0.345
				380 ... 415	380 ... 415	1 0	VB7-30-10-P85	GJL1311909R8105	5	0.345
						0 1	VB7-30-01-P85	GJL1311909R8015	5	0.345

Note: 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

3

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:

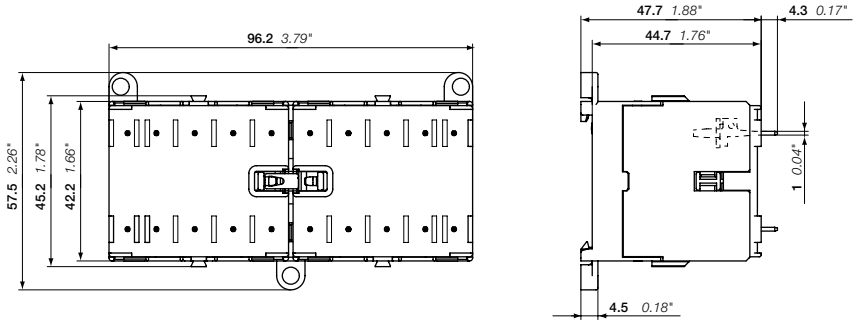
- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc
- control circuit: DC operated
  - low coil consumption (3.5 W at pull-in and at holding)
- hum-free coil
- no auxiliary 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	Catalog number	Global 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
VBC6 mini reversing contactors									
4	12	3	300 V / 12 A	12	1 0	VBC6-30-10-P07	GJL1213909R0107	5	0.345
					0 1	VBC6-30-01-P07	GJL1213909R0017	5	0.345
				24	1 0	VBC6-30-10-P01	GJL1213909R0101	5	0.345
					0 1	VBC6-30-01-P01	GJL1213909R0011	5	0.345
				48	1 0	VBC6-30-10-P06	GJL1213909R0106	5	0.345
					0 1	VBC6-30-06-P06	GJL1213909R0016	5	0.345
				60	1 0	VBC6-30-10-P03	GJL1213909R0103	5	0.345
					0 1	VBC6-30-01-P03	GJL1213909R0013	5	0.345
				110 ... 125	1 0	VBC6-30-10-P04	GJL1213909R0104	5	0.345
					0 1	VBC6-30-01-P04	GJL1213909R0014	5	0.345
				220 ... 240	1 0	VBC6-30-10-P05	GJL1213909R0105	5	0.345
					0 1	VBC6-30-01-P05	GJL1213909R0015	5	0.345
VBC7 mini reversing contactors									
5.5	12	5	600 V / 16 A	12	1 0	VBC7-30-10-P07	GJL1313909R0107	5	0.345
					0 1	VBC7-30-01-P07	GJL1313909R0017	5	0.345
				24	1 0	VBC7-30-10-P01	GJL1313909R0101	5	0.345
					0 1	VBC7-30-01-P01	GJL1313909R0011	5	0.345
				48	1 0	VBC7-30-10-P16	GJL1313909R1106	5	0.345
					0 1	VBC7-30-01-P16	GJL1313909R1016	5	0.345
				60	1 0	VBC7-30-10-P03	GJL1313909R0103	5	0.345
					0 1	VBC7-30-01-P03	GJL1313909R0013	5	0.345
				110 ... 125	1 0	VBC7-30-10-P04	GJL1313909R0104	5	0.345
					0 1	VBC7-30-01-P04	GJL1313909R0014	5	0.345
				220 ... 240	1 0	VBC7-30-10-P05	GJL1313909R0105	5	0.345
					0 1	VBC7-30-01-P05	GJL1313909R0015	5	0.345

Note: Other types on request

Main dimensions mm, inches



VBC6, VBC7

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:

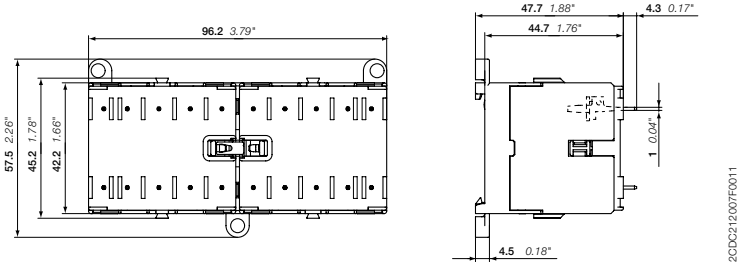
- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the 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	Catalog number	Global 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-P01	GJL1211919R0101	5	0.345
						0 1	VB6A-30-01-P01	GJL1211919R0011	5	0.345
				42	42	1 0	VB6A-30-10-P02	GJL1211919R0102	5	0.345
						0 1	VB6A-30-01-P02	GJL1211919R0012	5	0.345
				48	48	1 0	VB6A-30-10-P03	GJL1211919R0103	5	0.345
						0 1	VB6A-30-01-P03	GJL1211919R0013	5	0.345
				110 ... 127	110 ... 127	1 0	VB6A-30-10-P84	GJL1211919R8104	5	0.345
						0 1	VB6A-30-01-P84	GJL1211919R8014	5	0.345
				220 ... 240	220 ... 240	1 0	VB6A-30-10-P80	GJL1211919R8100	5	0.345
						0 1	VB6A-30-01-P80	GJL1211919R8010	5	0.345
				380 ... 415	380 ... 415	1 0	VB6A-30-10-P85	GJL1211919R8105	5	0.345
						0 1	VB6A-30-01-P85	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-P01	GJL1311919R0101	5	0.345
						0 1	VB7A-30-01-P01	GJL1311919R0011	5	0.345
				42	42	1 0	VB7A-30-10-P02	GJL1311919R0102	5	0.345
						0 1	VB7A-30-01-P02	GJL1311919R0012	5	0.345
				48	48	1 0	VB7A-30-10-P03	GJL1311919R0103	5	0.345
						0 1	VB7A-30-01-P03	GJL1311919R0013	5	0.345
				110 ... 127	110 ... 127	1 0	VB7A-30-10-P84	GJL1311919R8104	5	0.345
						0 1	VB7A-30-01-P84	GJL1311919R8014	5	0.345
				220 ... 240	220 ... 240	1 0	VB7A-30-10-P80	GJL1311919R8100	5	0.345
						0 1	VB7A-30-01-P80	GJL1311919R8010	5	0.345
				380 ... 415	380 ... 415	1 0	VB7A-30-10-P85	GJL1311919R8105	5	0.345
						0 1	VB7A-30-01-P85	GJL1311919R8015	5	0.345

Note: 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

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:

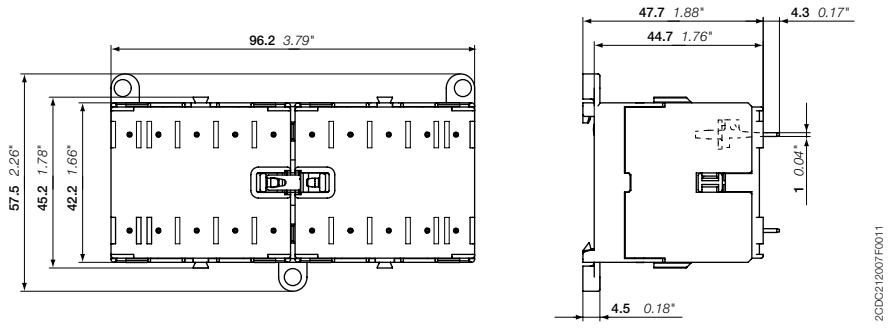
- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the 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.
- 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	Catalog number	Global 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						
kW	A	hp		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-P07	GJL1313919R0107	5	0.345
					0 1	VBC7A-30-01-P07	GJL1313919R0017	5	0.345
				24	1 0	VBC7A-30-10-P01	GJL1313919R0101	5	0.345
					0 1	VBC7A-30-01-P01	GJL1313919R0011	5	0.345
				48	1 0	VBC7A-30-10-P16	GJL1313919R1106	5	0.345
					0 1	VBC7A-30-01-P16	GJL1313919R1016	5	0.345
				60	1 0	VBC7A-30-10-P03	GJL1313919R0103	5	0.345
					0 1	VBC7A-30-01-P03	GJL1313919R0013	5	0.345
				110 ... 125	1 0	VBC7A-30-10-P04	GJL1313919R0104	5	0.345
					0 1	VBC7A-30-01-P04	GJL1313919R0014	5	0.345
				220 ... 240	1 0	VBC7A-30-10-P05	GJL1313919R0105	5	0.345
					0 1	VBC7A-30-01-P05	GJL1313919R0015	5	0.345

Note: Other types on request

Main dimensions mm, inches



VBC7A

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

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:

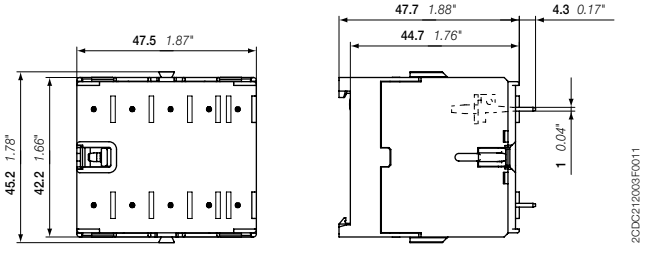
- 4-poles with various contact combinations
- control circuit: AC operated
  - low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact block for side mounting
- designed for soldering on PCB boards

Ordering details

Rated control circuit voltage U_c 50 Hz V AC	60 Hz V AC	Catalog number	Global code	Pkg qty	Weight (1 pce) kg
K6 4-pole mini contactor relays					
24	24	K6-22Z-P01	GJH1211009R0221	10	0.170
42	42	K6-22Z-P02	GJH1211009R0222	10	0.170
48	48	K6-22Z-P03	GJH1211009R0223	10	0.170
110 ...127	110 ...127	K6-22Z-P84	GJH1211009R8224	10	0.170
220 ... 240	220 ... 240	K6-22Z-P80	GJH1211009R8220	10	0.170
380 ... 415	380 ... 415	K6-22Z-P85	GJH1211009R8225	10	0.170
24	24	K6-31Z-P01	GJH1211009R0311	10	0.170
42	42	K6-31Z-P02	GJH1211009R0312	10	0.170
48	48	K6-31Z-P03	GJH1211009R0313	10	0.170
110 ...127	110 ...127	K6-31Z-P84	GJH1211009R8314	10	0.170
220 ... 240	220 ... 240	K6-31Z-P80	GJH1211009R8310	10	0.170
380 ... 415	380 ... 415	K6-31Z-P85	GJH1211009R8315	10	0.170
24	24	K6-40E-P01	GJH1211009R0401	10	0.170
42	42	K6-40E-P02	GJH1211009R0402	10	0.170
48	48	K6-40E-P03	GJH1211009R0403	10	0.170
110 ...127	110 ...127	K6-40E-P84	GJH1211009R8404	10	0.170
220 ... 240	220 ... 240	K6-40E-P80	GJH1211009R8400	10	0.170
380 ... 415	380 ... 415	K6-40E-P85	GJH1211009R8405	10	0.170

Note: Other types on request

Main dimensions mm, inches



K6

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:

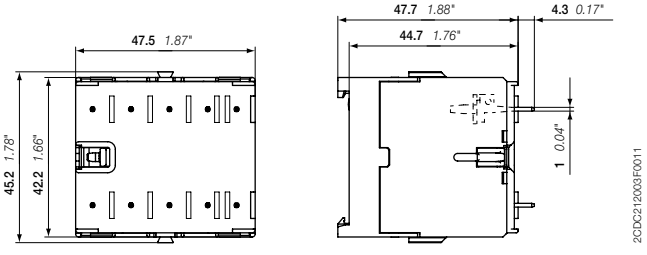
- 4-poles with various contact combinations
- control circuit: DC operated
  - low coil consumption (3.5 W at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact block for side mounting
- designed for soldering on PCB boards

Ordering details

Rated control circuit voltage U_c V DC	Catalog number	Global code	Pkg qty	Weight (1 pce) kg
K6 4-pole mini contactor relays				
12	KC6-22Z-P07	GJH1213009R0227	10	0.170
24	KC6-22Z-P01	GJH1213009R0221	10	0.170
48	KC6-22Z-P16	GJH1213009R1226	10	0.170
110 ... 125	KC6-22Z-P04	GJH1213009R0224	10	0.170
220 ... 240	KC6-22Z-P05	GJH1213009R0225	10	0.170
24	KC6-31Z-P01	GJH1213009R0311	10	0.170
48	KC6-31Z-P16	GJH1213009R1316	10	0.170
110 ... 125	KC6-31Z-P04	GJH1213009R0314	10	0.170
220 ... 240	KC6-31Z-P05	GJH1213009R0315	10	0.170
12	KC6-40E-P07	GJH1213009R0407	10	0.170
24	KC6-40E-P01	GJH1213009R0401	10	0.170
48	KC6-40E-P16	GJH1213009R1406	10	0.170
110 ... 125	KC6-40E-P04	GJH1213009R0404	10	0.170
220 ... 240	KC6-40E-P05	GJH1213009R0405	10	0.170

Note: Other types on request

Main dimensions mm, inches



KC6

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:

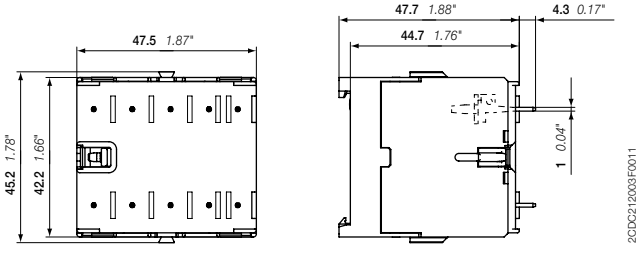
- 3 main poles and one built-in auxiliary contact
- control circuit: DC operated
  - low coil consumption (1.4 ... 2.4 W at pull-in and at holding)
- hum-free coil
- no auxiliary contact block permitted for mounting
- designed for soldering on PCB boards

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c	Auxiliary contacts fitted	Catalog number	Global 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-P1.4	GJL1213009R8101	10	0.170
					0 1	BC6-30-01-P1.4	GJL1213009R8011	10	0.170
5.5	12	5	600 V / 16 A	24	1 0	BC7-30-10-P1.4	GJL1313009R8101	10	0.170
					0 1	BC7-30-01-P1.4	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-P2.4	GJL1213009R5101	10	0.170
					0 1	BC6-30-01-P2.4	GJL1213009R5011	10	0.170
5.5	12	5	600 V / 16 A	17 ... 32	1 0	BC7-30-10-P2.4	GJL1313009R5101	10	0.170
					0 1	BC7-30-01-P2.4	GJL1313009R5011	10	0.170

Note: 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:

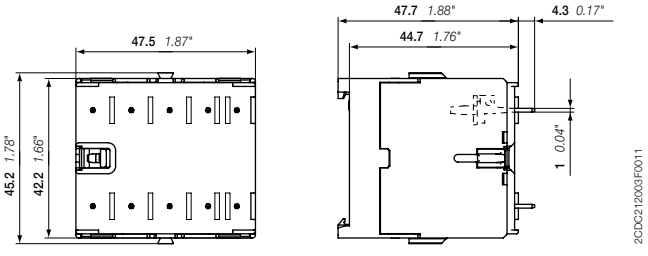
- 4-poles with various contact combinations
- control circuit: DC operated
  - low coil consumption (3.5 W at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact block for side mounting
- designed for soldering on PCB boards

Ordering details

Rated control circuit voltage U_c V DC	Catalog number	Global code	Pkg qty	Weight (1 pce) kg
DC operation 24 V / 1.4 W				
24	KC6-31Z-P1.4	GJH1213009R8311	10	0.170
24	KC6-40E-P1.4	GJH1213009R8401	10	0.170
DC operation 17 ... 32 V / 2.4 W				
17 ... 32	KC6-31Z-P2.4	GJH1213009R5311	10	0.170
17 ... 32	KC6-40E-P2.4	GJH1213009R5401	10	0.170

Note: Other types on request

Main dimensions mm, inches



KC6

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:

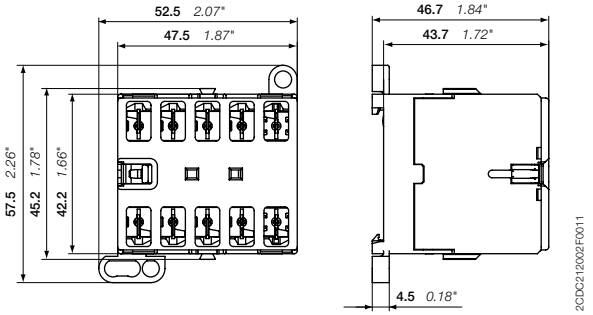
- flat pin connection for plug-in wiring and shake proven connection
- 3 main poles and one built-in auxiliary contact
- control circuit: AC operated
  - low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for side mounting
- designed for rail or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

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c		Auxiliary contacts fitted	Catalog number	Global code	Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current $\theta \le 40$ °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	20	3	300 V / 12 A	24	24	1 0	B6-30-10-F01	GJL1211003R0101	10	0.170
						0 1	B6-30-01-F01	GJL1211003R0011	10	0.170
				42	42	1 0	B6-30-10-F02	GJL1211003R0102	10	0.170
						0 1	B6-30-01-F02	GJL1211003R0012	10	0.170
				48	48	1 0	B6-30-10-F03	GJL1211003R0103	10	0.170
						0 1	B6-30-01-F03	GJL1211003R0013	10	0.170
				110 ... 127	110 ... 127	1 0	B6-30-10-F84	GJL1211003R8104	10	0.170
						0 1	B6-30-01-F84	GJL1211003R8014	10	0.170
				220 ... 240	220 ... 240	1 0	B6-30-10-F80	GJL1211003R8100	10	0.170
						0 1	B6-30-01-F80	GJL1211003R8010	10	0.170
				380 ... 415	380 ... 415	1 0	B6-30-10-F85	GJL1211003R8105	10	0.170
						0 1	B6-30-01-F85	GJL1211003R8015	10	0.170
B7 mini contactors										
5.5	20	5	600 V / 16 A	24	24	1 0	B7-30-10-F01	GJL1311003R0101	10	0.170
						0 1	B7-30-01-F01	GJL1311003R0011	10	0.170
				42	42	1 0	B7-30-10-F02	GJL1311003R0102	10	0.170
						0 1	B7-30-01-F02	GJL1311003R0012	10	0.170
				48	48	1 0	B7-30-10-F03	GJL1311003R0103	10	0.170
						0 1	B7-30-01-F03	GJL1311003R0013	10	0.170
				110 ... 127	110 ... 127	1 0	B7-30-10-F84	GJL1311003R8104	10	0.170
						0 1	B7-30-01-F84	GJL1311003R8014	10	0.170
				220 ... 240	220 ... 240	1 0	B7-30-10-F80	GJL1311003R8100	10	0.170
						0 1	B7-30-01-F80	GJL1311003R8010	10	0.170
				380 ... 415	380 ... 415	1 0	B7-30-10-F85	GJL1311003R8105	10	0.170
						0 1	B7-30-01-F85	GJL1311003R8015	10	0.170

Note: 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:

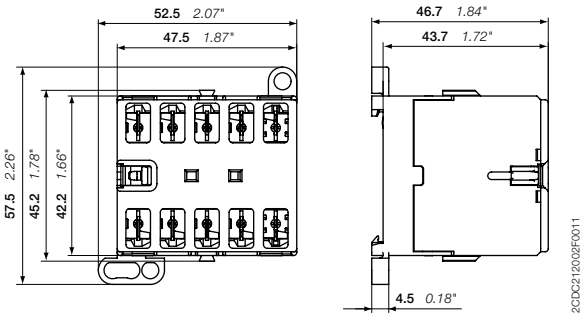
- flat pin connection for plug-in wiring and shake proven connection
- 3 main poles and one built-in auxiliary contact
- control circuit: DC operated
  - low coil consumption (3.5 W at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for side mounting
- designed for rail or wall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

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c	Auxiliary contacts fitted	Catalog number	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-F07	GJL1213003R0107	10	0.170
					0 1	BC6-30-01-F07	GJL1213003R0017	10	0.170
				24	1 0	BC6-30-10-F01	GJL1213003R0101	10	0.170
					0 1	BC6-30-01-F01	GJL1213003R0011	10	0.170
				48	1 0	BC6-30-10-F16	GJL1213003R1106	10	0.170
					0 1	BC6-30-01-F16	GJL1213003R1016	10	0.170
				60	1 0	BC6-30-10-F03	GJL1213003R0103	10	0.170
					0 1	BC6-30-01-F03	GJL1213003R0013	10	0.170
				110 ... 125	1 0	BC6-30-10-F04	GJL1213003R0104	10	0.170
					0 1	BC6-30-01-F04	GJL1213003R0014	10	0.170
				220 ... 240	1 0	BC6-30-10-F05	GJL1213003R0105	10	0.170
					0 1	BC6-30-01-F05	GJL1213003R0015	10	0.170
BC7 mini contactors									
5.5	20	5	600 V / 16 A	12	1 0	BC7-30-10-F07	GJL1313003R0107	10	0.170
					0 1	BC7-30-01-F07	GJL1313003R0017	10	0.170
				24	1 0	BC7-30-10-F01	GJL1313003R0101	10	0.170
					0 1	BC7-30-01-F01	GJL1313003R0011	10	0.170
				48	1 0	BC7-30-10-F16	GJL1313003R1106	10	0.170
					0 1	BC7-30-01-F16	GJL1313003R1016	10	0.170
				60	1 0	BC7-30-10-F03	GJL1313003R0103	10	0.170
					0 1	BC7-30-01-F03	GJL1313003R0013	10	0.170
				110 ... 125	1 0	BC7-30-10-F04	GJL1313003R0104	10	0.170
					0 1	BC7-30-01-F04	GJL1313003R0014	10	0.170
				220 ... 240	1 0	BC7-30-10-F05	GJL1313003R0105	10	0.170
					0 1	BC7-30-01-F05	GJL1313003R0015	10	0.170

Other types on request

Main dimensions mm, inches



BC6, BC7

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

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:

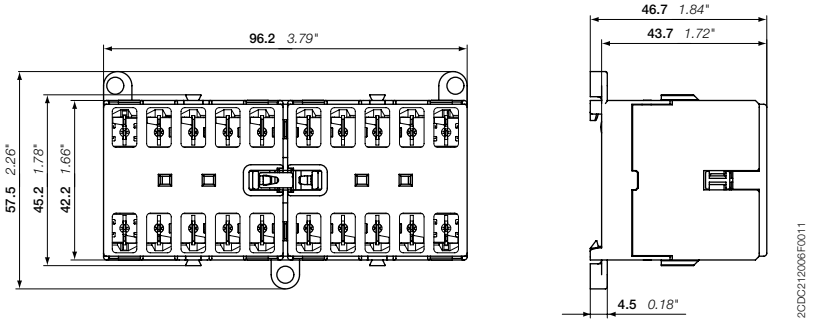
- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc.
- flat pin connection for plug-in wiring and shake proven connection
- control circuit: AC operated
  - low coil consumption (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	Catalog number	Global 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
VB7 mini reversing contactors										
5.5	20	5	600 V / 16 A	24	24	1 0	VB7-30-10-F01	GJL1311903R0101	5	0.345
						0 1	VB7-30-01-F01	GJL1311903R0011	5	0.345
				42	42	1 0	VB7-30-10-F02	GJL1311903R0102	5	0.345
						0 1	VB7-30-01-F02	GJL1311903R0012	5	0.345
				48	48	1 0	VB7-30-10-F03	GJL1311903R0103	5	0.345
						0 1	VB7-30-01-F03	GJL1311903R0013	5	0.345
				110 ... 127	110 ... 127	1 0	VB7-30-10-F84	GJL1311903R8104	5	0.345
						0 1	VB7-30-01-F84	GJL1311903R8014	5	0.345
				220 ... 240	220 ... 240	1 0	VB7-30-10-F80	GJL1311903R8100	5	0.345
						0 1	VB7-30-01-F80	GJL1311903R8010	5	0.345
				380 ... 415	380 ... 415	1 0	VB7-30-10-F85	GJL1311903R8105	5	0.345
						0 1	VB7-30-01-F85	GJL1311903R8015	5	0.345

Note: Other types on request

Main dimensions mm, inches



VB7

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

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:

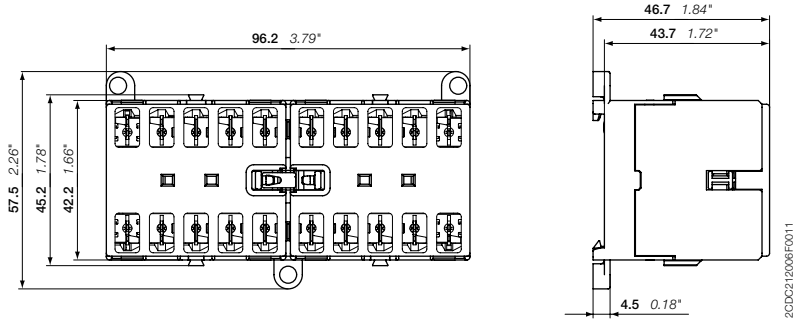
- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc
- flat pin connection for plug-in wiring and shake proven connection
- control circuit: DC operated
  - low coil consumption (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	Catalog number	Global 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-F07	GJL1313903R0107	5	0.345
					0 1	VBC7-30-01-F07	GJL1313903R0017	5	0.345
				24	1 0	VBC7-30-10-F01	GJL1313903R0101	5	0.345
					0 1	VBC7-30-01-F01	GJL1313903R0011	5	0.345
				48	1 0	VBC7-30-10-F16	GJL1313903R1106	5	0.345
					0 1	VBC7-30-01-F16	GJL1313903R1016	5	0.345
				60	1 0	VBC7-30-10-F03	GJL1313903R0103	5	0.345
					0 1	VBC7-30-01-F03	GJL1313903R0013	5	0.345
				110 ... 125	1 0	VBC7-30-10-F04	GJL1313903R0104	5	0.345
					0 1	VBC7-30-01-F04	GJL1313903R0014	5	0.345
				220 ... 240	1 0	VBC7-30-10-F05	GJL1313903R0105	5	0.345
					0 1	VBC7-30-01-F05	GJL1313903R0015	5	0.345

Note: Other types on request

Main dimensions mm, inches



VBC7

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:

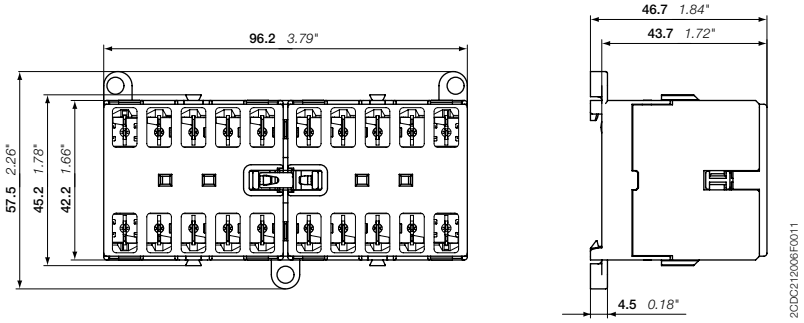
- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the 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	Catalog number	Global 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				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-F01	GJL1311913R0101	5	0.345
						0 1	VB7A-30-01-F01	GJL1311913R0011	5	0.345
				42	42	1 0	VB7A-30-10-F02	GJL1311913R0102	5	0.345
						0 1	VB7A-30-01-F02	GJL1311913R0012	5	0.345
				48	48	1 0	VB7A-30-10-F03	GJL1311913R0103	5	0.345
						0 1	VB7A-30-01-F03	GJL1311913R0013	5	0.345
				110 ... 127	110 ... 127	1 0	VB7A-30-10-F84	GJL1311913R8104	5	0.345
						0 1	VB7A-30-01-F84	GJL1311913R8014	5	0.345
				220 ... 240	220 ... 240	1 0	VB7A-30-10-F80	GJL1311913R8100	5	0.345
						0 1	VB7A-30-01-F80	GJL1311913R8010	5	0.345
				380 ... 415	380 ... 415	1 0	VB7A-30-10-F85	GJL1311913R8105	5	0.345
						0 1	VB7A-30-01-F85	GJL1311913R8015	5	0.345

Note: 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:

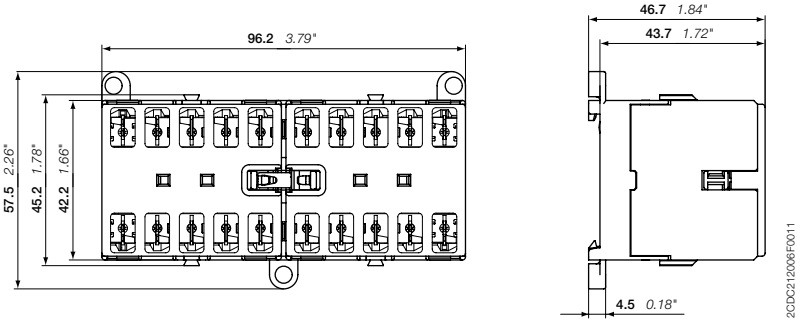
- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the 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	Catalog number	Global 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
VBC7A mini reversing contactors with safety blocking function									
5.5	20	5	600 V / 16 A	12	1 0	VBC7A-30-10-F07	GJL1313913R0107	5	0.345
					0 1	VBC7A-30-01-F07	GJL1313913R0017	5	0.345
				24	1 0	VBC7A-30-10-F01	GJL1313913R0101	5	0.345
					0 1	VBC7A-30-01-F01	GJL1313913R0011	5	0.345
				48	1 0	VBC7A-30-10-F16	GJL1313913R1106	5	0.345
					0 1	VBC7A-30-01-F16	GJL1313913R1016	5	0.345
				60	1 0	VBC7A-30-10-F03	GJL1313913R0103	5	0.345
					0 1	VBC7A-30-01-F03	GJL1313913R0013	5	0.345
				110 ... 125	1 0	VBC7A-30-10-F04	GJL1313913R0104	5	0.345
					0 1	VBC7A-30-01-F04	GJL1313913R0014	5	0.345
				220 ... 240	1 0	VBC7A-30-10-F05	GJL1313913R0105	5	0.345
					0 1	VBC7A-30-01-F05	GJL1313913R0015	5	0.345

Note: Other types on request

Main dimensions mm, inches



VBC7A

BC6, BC7 3-pole interface 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 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:

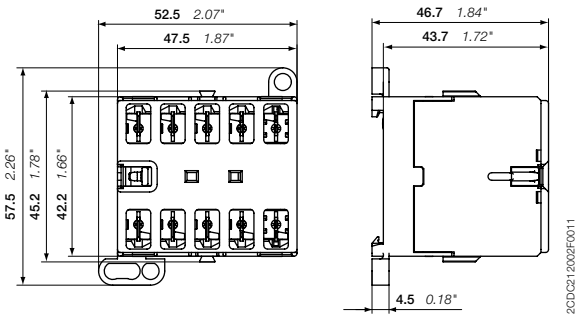
– flat pin connection for plug-in wiring and shake proven connection
– 3 main poles and one built-in auxiliary contact
– control circuit: DC operated
  – low coil consumption (1.4 ... 2.4 W at pull-in and at holding)
– hum-free coil
– no auxiliary contact block permitted for mounting
– designed for rail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

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c	Auxiliary contacts fitted	Catalog number	Global 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-F1.4	GJL1213003R8101	10	0.170
					0 1	BC6-30-01-F1.4	GJL1213003R8011	10	0.170
5.5	20	5	600 V / 16 A	24	1 0	BC7-30-10-F1.4	GJL1313003R8101	10	0.170
					0 1	BC7-30-01-F1.4	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-F2.4	GJL1213003R5101	10	0.170
					0 1	BC6-30-01-F2.4	GJL1213003R5011	10	0.170
5.5	20	5	600 V / 16 A	17 ... 32	1 0	BC7-30-10-F2.4	GJL1313003R5101	10	0.170
					0 1	BC7-30-01-F2.4	GJL1313003R5011	10	0.170

Note: Other types on request

Main dimensions mm, inches



BC6, BC7

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

K6-22Z-F

3

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:

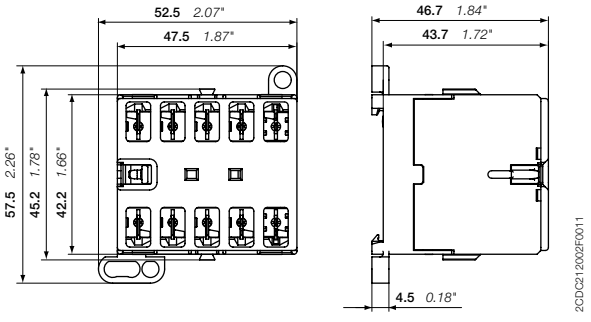
- flat pin connection for plug-in wiring and shake proven connection
- 4-poles with various contact combinations
- control circuit: AC operated
  - low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for side mounting
- for rail and wall mounting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

Ordering details

Rated control circuit voltage U_c		Catalog number	Global 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-F01	GJH1211003R0221	10	0.170
42	42	K6-22Z-F02	GJH1211003R0222	10	0.170
48	48	K6-22Z-F03	GJH1211003R0223	10	0.170
110 ...127	110 ...127	K6-22Z-F84	GJH1211003R8224	10	0.170
220 ... 240	220 ... 240	K6-22Z-F80	GJH1211003R8220	10	0.170
380 ... 415	380 ... 415	K6-22Z-F85	GJH1211003R8225	10	0.170
24	24	K6-31Z-F01	GJH1211003R0311	10	0.170
42	42	K6-31Z-F02	GJH1211003R0312	10	0.170
48	48	K6-31Z-F03	GJH1211003R0313	10	0.170
110 ...127	110 ...127	K6-31Z-F84	GJH1211003R8314	10	0.170
220 ... 240	220 ... 240	K6-31Z-F80	GJH1211003R8310	10	0.170
380 ... 415	380 ... 415	K6-31Z-F85	GJH1211003R8315	10	0.170
24	24	K6-40E-F01	GJH1211003R0401	10	0.170
42	42	K6-40E-F02	GJH1211003R0402	10	0.170
48	48	K6-40E-F03	GJH1211003R0403	10	0.170
110 ...127	110 ...127	K6-40E-F84	GJH1211003R8404	10	0.170
220 ... 240	220 ... 240	K6-40E-F80	GJH1211003R8400	10	0.170
380 ... 415	380 ... 415	K6-40E-F85	GJH1211003R8405	10	0.170

Note: Other types on request

Main dimensions mm, inches



K6

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

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:

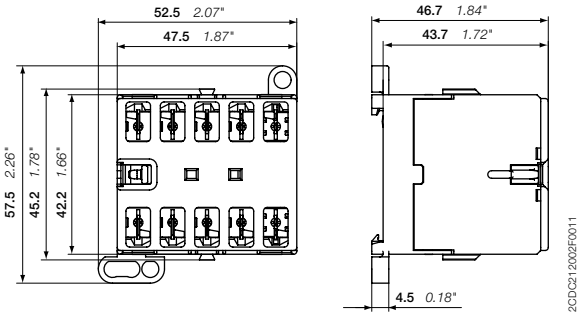
- flat pin connection for plug-in wiring and shake proven connection
- 4-poles with various contact combinations
- control circuit: AC operated
  - low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for side mounting
- for rail and wall mounting

Ordering details

Rated control circuit voltage U_c V DC	Catalog number	Global code	Pkg qty	Weight (1 pce) kg
K6 4-pole mini contactor relays				
12	KC6-22Z-F07	GJH1213003R0227	10	0.170
24	KC6-22Z-F01	GJH1213003R0221	10	0.170
48	KC6-22Z-F16	GJH1213003R1226	10	0.170
110 ... 125	KC6-22Z-F04	GJH1213003R0224	10	0.170
220 ... 240	KC6-22Z-F05	GJH1213003R0225	10	0.170
12	KC6-31Z-F07	GJH1213003R0317	10	0.170
24	KC6-31Z-F01	GJH1213003R0311	10	0.170
48	KC6-31Z-F16	GJH1213003R1316	10	0.170
110 ... 125	KC6-31Z-F04	GJH1213003R0314	10	0.170
220 ... 240	KC6-31Z-F05	GJH1213003R0315	10	0.170
24	KC6-40E-F01	GJH1213003R0401	10	0.170
48	KC6-40E-F16	GJH1213003R1406	10	0.170
110 ... 125	KC6-40E-F04	GJH1213003R0404	10	0.170
220 ... 240	KC6-40E-F05	GJH1213003R0405	10	0.170

Note: Other types on request

Main dimensions mm, inches



KC6

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:

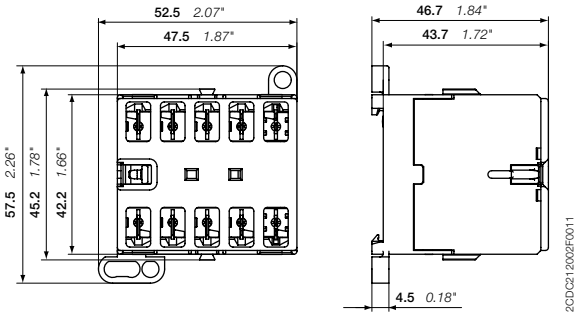
- flat pin connection for plug-in wiring and shake proven connection
- 4-poles with various contact combinations
- control circuit: AC operated
  - low coil consumption (1.4 ... 2.4 W at pull-in and at holding)
- hum-free coil
- no auxiliary contact block permitted for mounting
- for rail and wall mounting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

Ordering details

Rated control circuit voltage U_c V DC	Catalog number	Global code	Pkg qty	Weight (1 pce) kg
DC operation 24 V / 1.4 W				
24	KC6-31Z-F1.4	GJH1213003R8311	10	0.170
24	KC6-40E-F1.4	GJH1213003R8401	10	0.170
DC operation 17 ... 32 V / 2.4 W				
17 ... 32	KC6-31Z-F51	GJH1213003R5311	10	0.170
17 ... 32	KC6-40E-F51	GJH1213003R5401	10	0.170

Note: Other types on request

Main dimensions mm, inches



KC6

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	Catalog number	Global 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	Catalog number	Global 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
		Flat pin, 2.8 mm	RV-BC6-F/60	GHV2501902R0003	10	0.005
	50 ... 250	Cable lug	RV-BC6/250	GHV2501903R0002	10	0.005
		Flat pin, 2.8 mm	RV-BC6-F/250	GHV2501903R0003	10	0.010
	380	Cable lug	RV-BC6/380	GHV2501904R0002	10	0.005
		Flat pin, 2.8 mm	RV-BC6-F/380	GHV2501904R0003	10	0.010
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

K6, KC6 4-pole mini contactor relays
Accessories

CAF6-11K

CA6-11K

CA6-11K-P

CA6-11K-F

LT6-B

RV-BC6/250

Ordering details

Suitable for	Auxiliary contacts	Catalog number	Global 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	Catalog number	Global code	Pkg qty	Weight (1 pce) kg
Surge suppressors for contactor coils						
KC6	24 ... 60	Cable lug	RV-BC6/60	GHV2501902R0002	10	0.005
		Flat pin, 2.8 mm	RV-BC6-F/60	GHV2501902R0003	10	0.005
	50 ... 250	Cable lug	RV-BC6/250	GHV2501903R0002	10	0.005
		Flat pin, 2.8 mm	RV-BC6-F/250	GHV2501903R0003	10	0.010
	380	Cable lug	RV-BC6/380	GHV2501904R0002	10	0.005
		Flat pin, 2.8 mm	RV-BC6-F/380	GHV2501904R0003	10	0.010

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	

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, $\theta \leq 40$ °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 $\theta \leq 40$ °C			
I_e / Rated operational current AC-1 $U_{e\,max} \leq 690$ 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 $\theta \leq 55$ °C			
I_e / Rated operational current AC-1 $U_{e\,max} \leq 690$ 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 $\theta \leq 55$ °C			
I_e / Rated operational current AC-3 3-phase motors	220 / 230 / 240 V	8.9 / 8.5 / 8.1 A	11.8 / 11.3 / 10.8 A
	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 1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors	220-230-240 V	2.2 kW	3 kW
	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 $\theta \leq 55$ °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 $\theta \leq 55$ °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 $\theta \leq 55$ °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 $U_e \leq 500$ 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	

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	

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

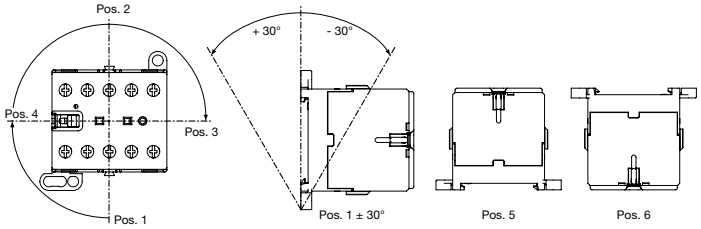
Contactor types		**DC operated**	BC6, VBC6	BC7, VBC7
Coil operating limits acc. to IEC 60947-4-1		**DC supply**	0.85 ... 1.1 x U_c	
AC control voltage				
	Rated control circuit voltage U_C		See ordering tables	
	Coil consumption [1]	Average pull-in value	3.5 VA / 3.5 W	
		Average holding value	3.5 VA / 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	

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

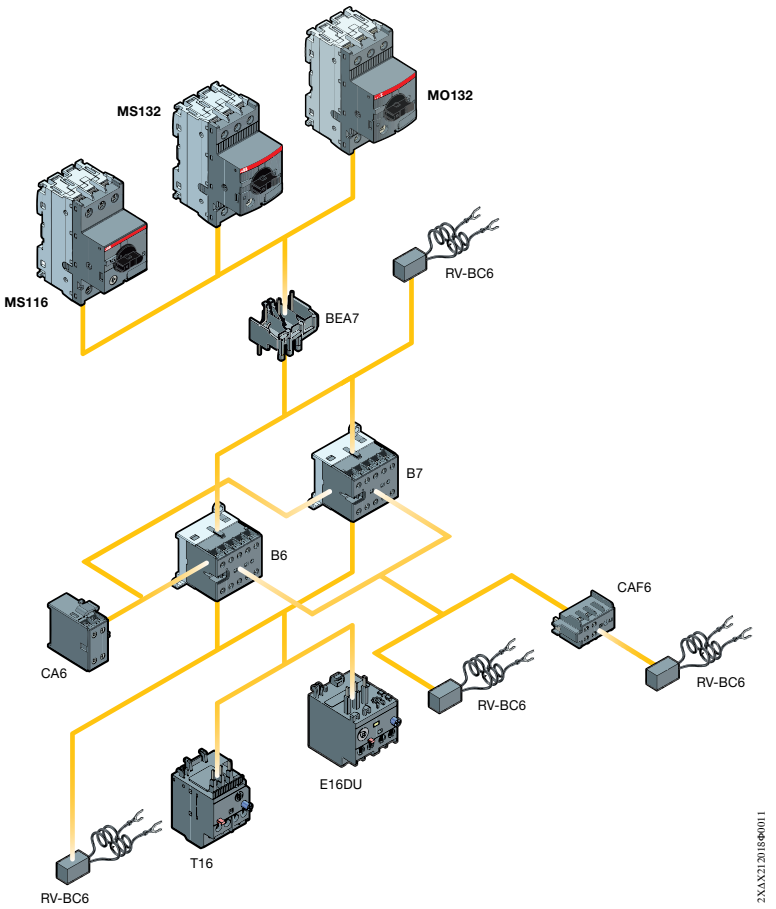
Auxiliary contacts for front mounting, side mounting and built-in according to IEC

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} $\theta \leq 40$ °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
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



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

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

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

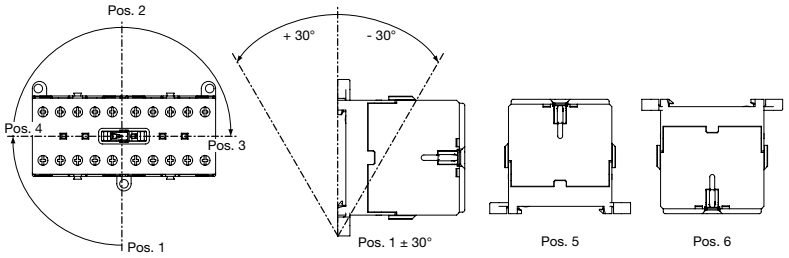
Contactor relay types		**AC operated**	K6
Coil operating limits acc. to IEC 60947-4-1		**AC supply**	0.85 ... 1.1 x U_c
AC control voltage			
Coil consumption	Average pull-in value		3.5 VA / 3.5 W
	Average holding value		3.5 VA / 3.5 W
Drop-out voltage in % of U_c min.			Approx. 20 ... 75%

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 %

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

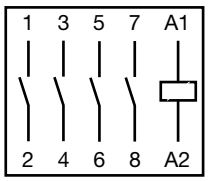
Connecting characteristics

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

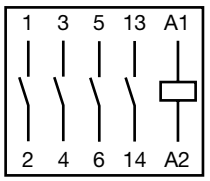
[1] Soldering pin connection acc. to DIN 40801: 0.8 x 1 mm / 0.8 x 2.54 mm
Flat pin connection acc. to DIN 46248: 1 x 6.3 mm / 1 x 2.8 mm

Mini contactors
Location of the connection terminals and terminal designation

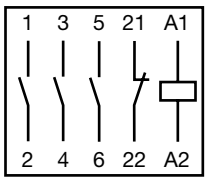
Mini contactors



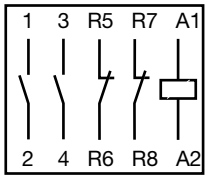
B6(7)-40-00 ...
BC6(7)-40-00 ...



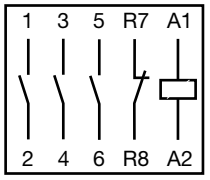
B6(7)-30-10 ...
BC6(7)-30-10 ...



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

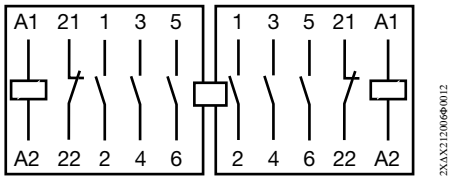


B6(7)-22-00 ...
BC6(7)-22-00 ...

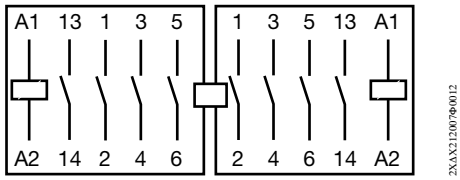


B6(7)-31-00 ...
BC6(7)-31-00 ...

Compact reversing contactors

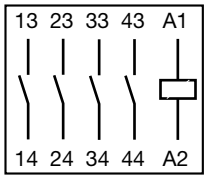


VB6(7)-30-01 ...
VBC6(7)-30-01 ...

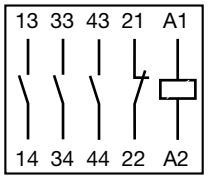


VB6(7)-30-10 ...
VBC6(7)-30-10 ...

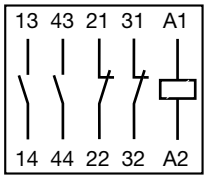
Mini contactor relays



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



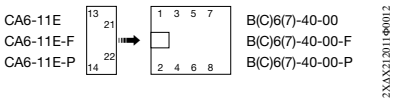
K6-31Z ...
KC6-31Z ...

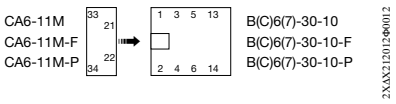


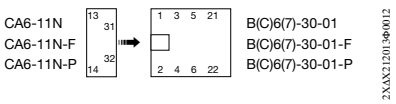
K6-22Z ...
KC6-22Z ...

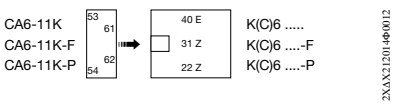
Auxiliary switches

CA6...

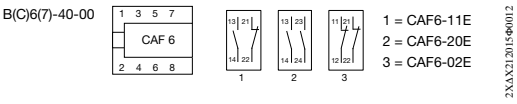


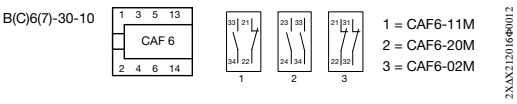


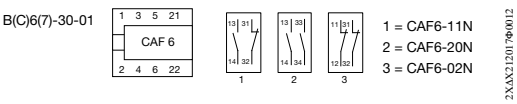


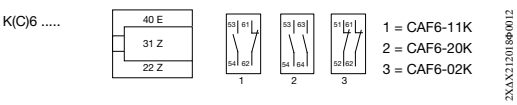


CAF...





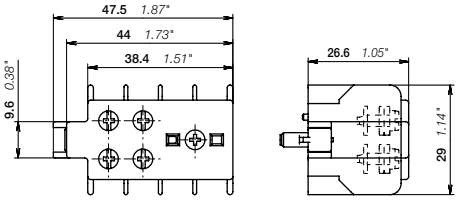




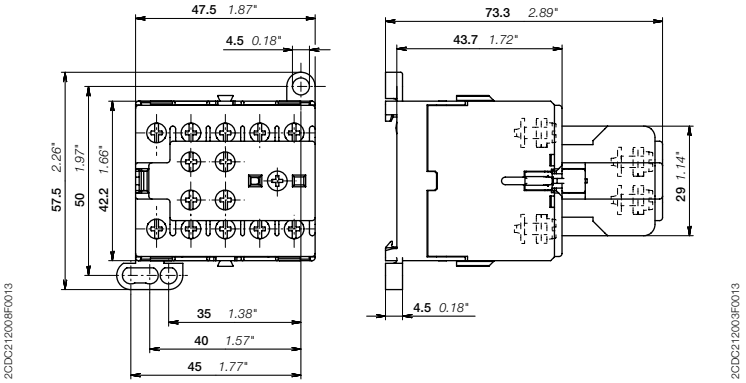
Mini contactors and contactor relays
Dimension drawings with accessories

Main dimensions mm, *inches*

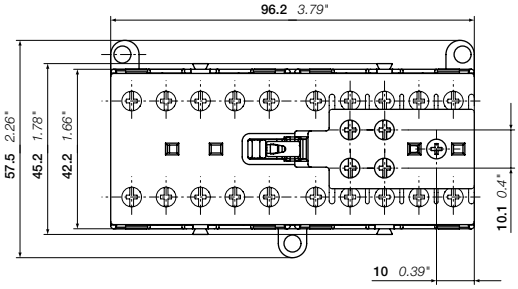
Front mounted auxiliary contact blocks, with screw terminals

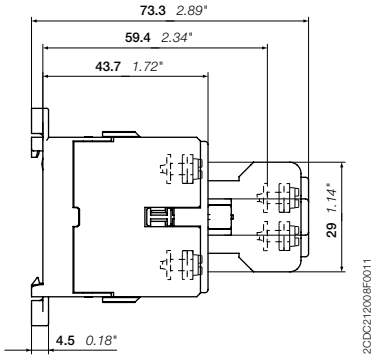


CAF6



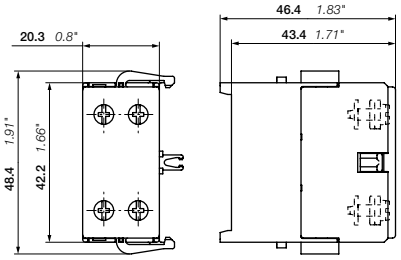
Mini contactors or contactor relays + CAF6



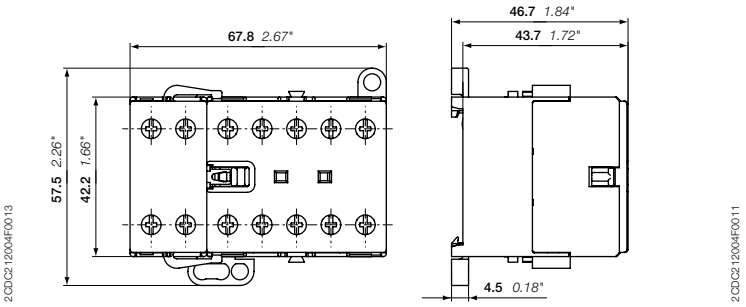


Mini reversing contactors + CAF6 (max. 2 contact blocks)

Side mounted auxiliary contact blocks, with screw terminals



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

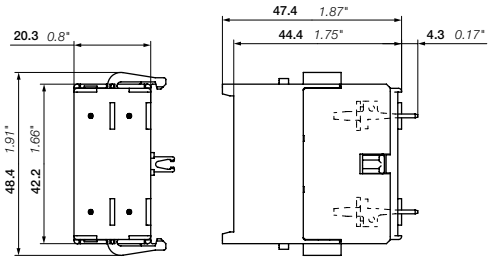


Mini contactors or contactor relays + CA6-11E, CA6-11M, CA6-11N

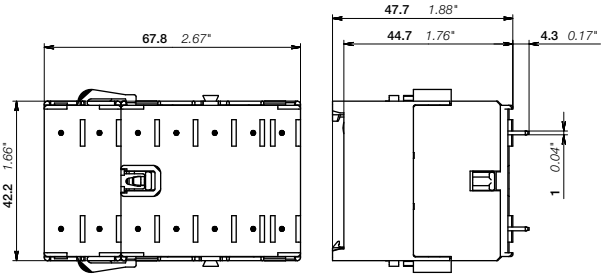
Mini contactors and contactor relays
Dimension drawings with accessories

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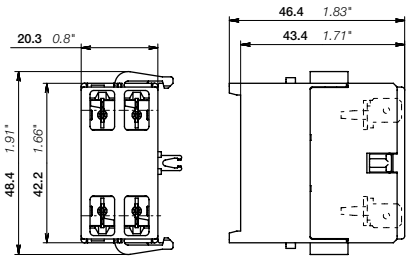
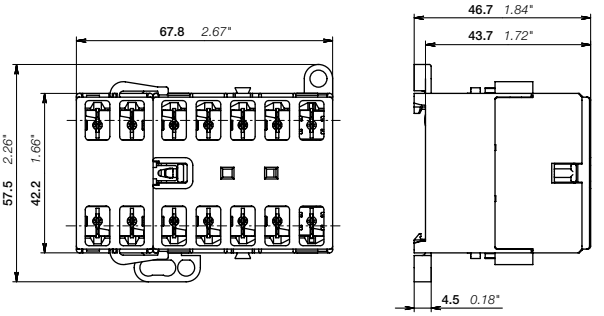
Mini contactors or contactor relays + CA6-11E-P, CA6-11M-P, CA6-11N-P

Side mounted auxiliary contact blocks, with flat pin connection



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



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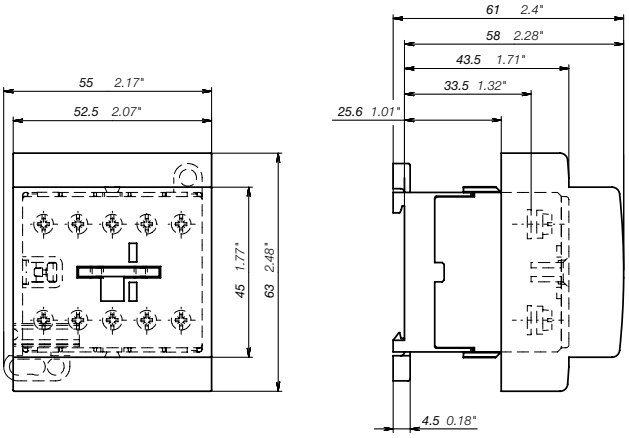
Mini contactors or contactor relays + CA6-11E-F, CA6-11M-F, CA6-11N-F

Front mounted cover cap for DIN rail panel installation



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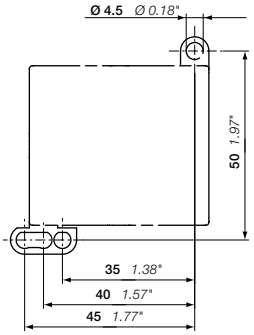
Mini contactors or contactor relays + LT6-B cover cap

Mini contactors and contactor relays
Dimension drawings with accessories

Main dimensions mm, *inches*

Drilling plans for wall mounting



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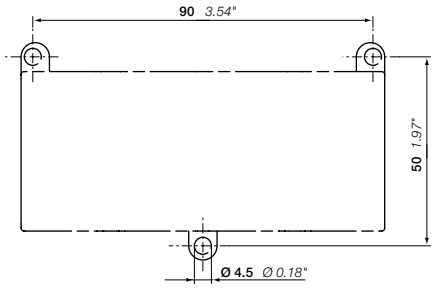
Mini contactors or contactor relays with screw terminals and flat pin connection



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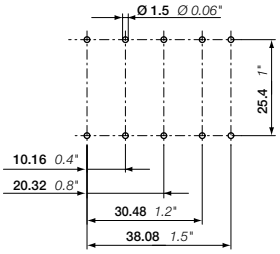
Mini reversing contactors with screw terminals and flat pin connection

Drilling plans for PCBA



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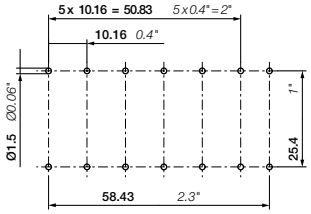
Mini contactors or contactor relays with soldering pins



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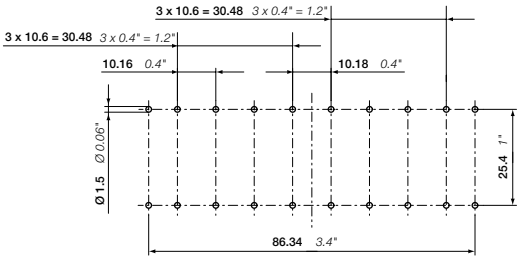
Mini contactors or contactor relays with soldering pins + CA6-11E-P, CA6-11M-P, CA6-11N-P



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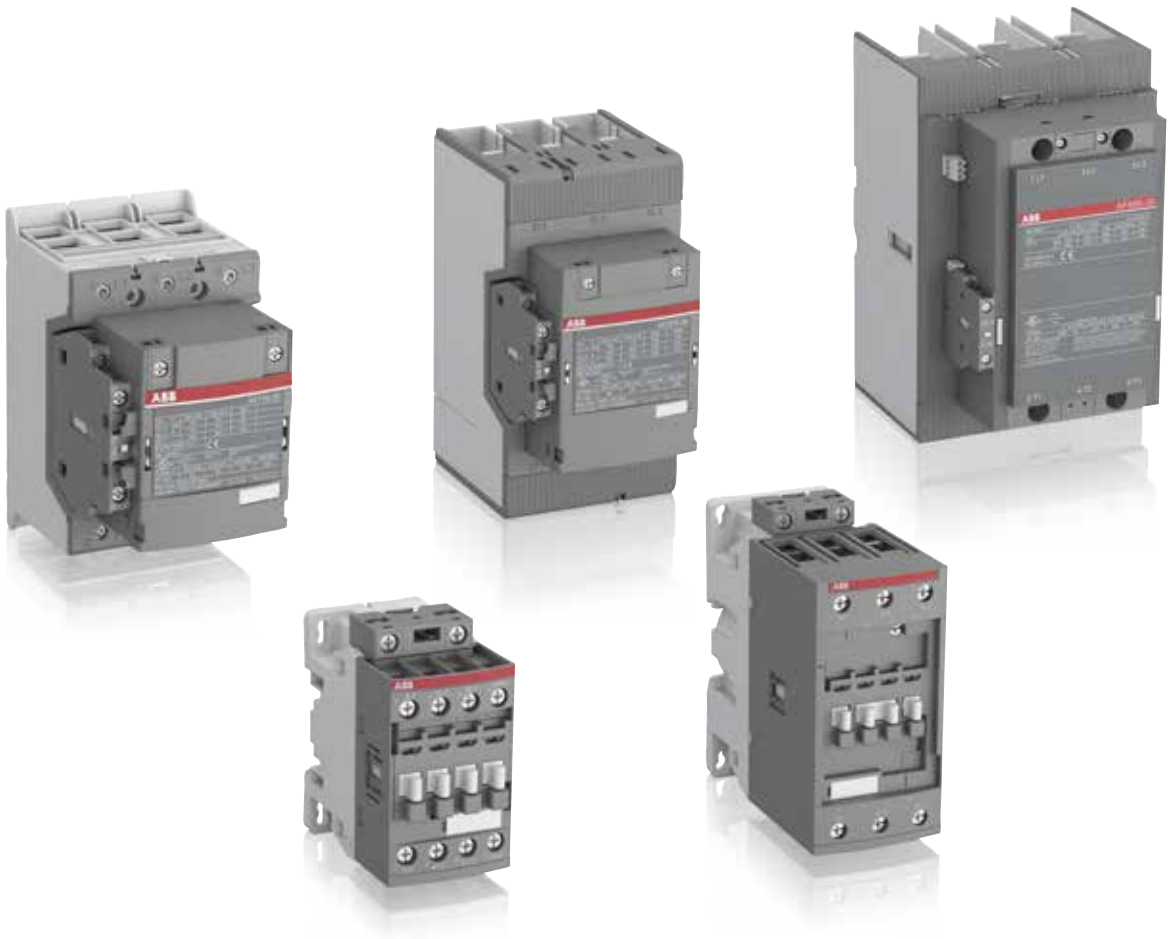
Mini reversing contactors with soldering pins

Notes

AF, EK contactors and NF contactor relays



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

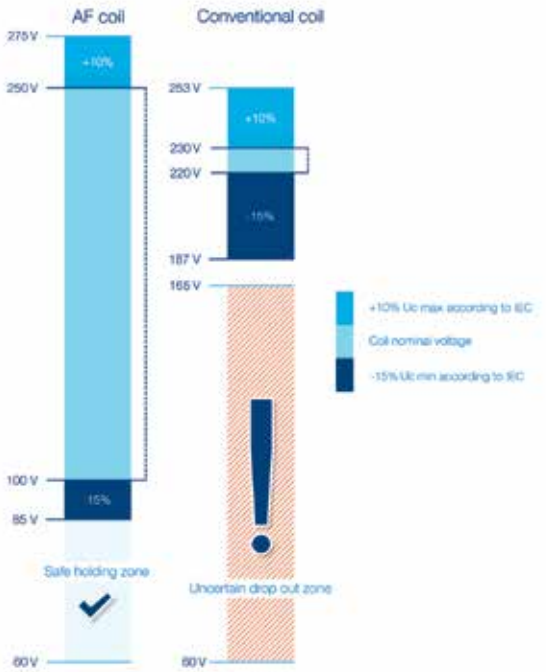
Simplify design

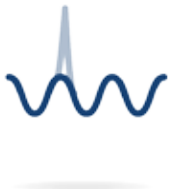
Use the same part number in Europe, Asia and North America as one contactor coil now handles 100 V – 250 V AC / DC, 50 / 60 Hz.
By reducing contactor coil energy consumption by up to 80%, panels can be built smaller and transformers more compact.

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.

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.

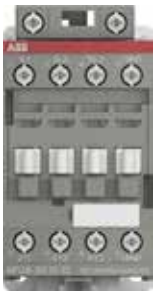
Compact size
The AF contactor is compact in size and has had its width reduced by up to 30% thanks to an 80% coil consumption reduction.

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.

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.

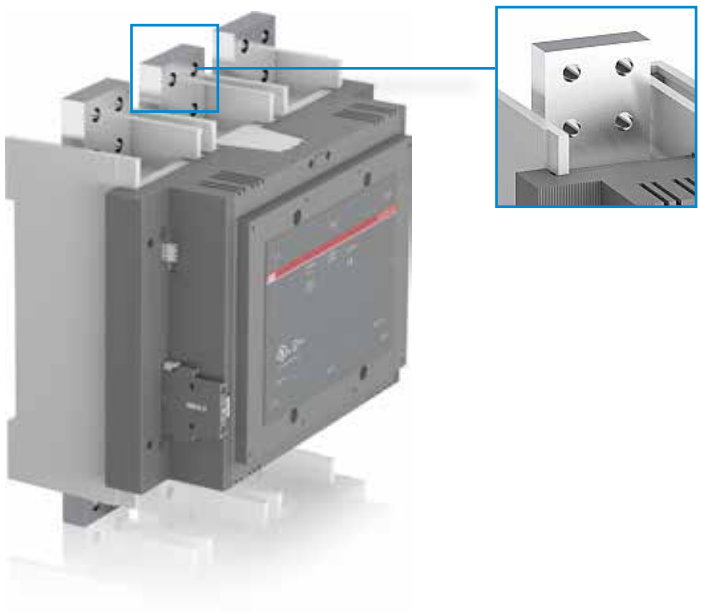


Top-mounted

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.

Notes

Motor starting solution, in kit form

Open starting combinations
Catalog order explanation

Contactor size	Options	Auxilary contacts fitted per contactor	Coil voltage	–	Component device	Max amperage

Contactor size

AF09/AF09Z
AF12/AF12Z
AF16/AF16Z
AF26/AF26Z
AF30/AF30Z
AF38/AF38Z
AF40
AF52
AF65
AF80
AF96
AF116
AF140
AF146
AF190
AF205
AF265
AF305
AF370
AFN00/AFN00Z
AFN0/AFN0Z
AFN1/AFN1Z
AFN2
AFN3
AFN4
AFN5

Options

R	Reversing
S	Single phase

Note: For multi-speed devices, please contact technical support

Auxilary contacts fitted per contactor

10	1 Normally open/ 0 Normally closed (AF09-AF16, AFZ09-AFZ16, AFN00-AFN0)
01	0 Normally open/ 1 Normally closed (AF09-AF16, AFZ09-AFZ16, AFN00-AFN0)
00	0 Normally open/ 0 Normally closed (AF26-AF370, AFZ26-AFZ38, AFN1-AFN5)
11	1 Normally open/ 1 Normally closed (AF26-AF370, AFZ26-AFZ38, AFN1-AFN5)
22	1 Normally open/ 2 Normally closed (AF26-AF370, AFZ26-AFZ38, AFN1-AFN5)

Coil voltage

41	24-60VAC (AF09-AF96)
11	24-60VAC/20-60VDC (AF09-AF370)
12	48-130VAC/DC (AF09-AF370)
13	100-250VAC/DC (AF09-AF370)
14	250-500VAC/DC (AF09-AF370)
20	12-20VDC (AFZ09-AF38Z)
21	24-60VAC/20-60VDC (AFZ09-AF38Z)
22	48-130VAC/DC (AFZ09-AF38Z)
23	100-250VAC/DC (AFZ09-AF38Z)

Component device

TF	Thermal overload
TA	Thermal overload (200A)
EF	Electronic overload
MS	Manual motor starters
MO	Magnetic only MMS

Max amperages

TF	TA	EF	MS
7.6	175	18.9	0.25
10	200	30	0.4
13		45	0.63
16		56	1
20		70	1.6
24		100	2.5
29		150	4
35		210	6.3
38		380	10
40			12
47			16
53			20
60			25
68			32
78			42
87			54
96			65
110			75
135			90
142			

Primary listing of available amperages. See standard combinations table for associated component devices. For other amperages, please contact technical service.

Notes:
3 Pole only
Contactors AF(Z)9 to AF(Z)16 contain 1NO or 1NC built in auxillary
AC voltages apply to 50Hz and 60Hz
Reversing combinations above AF116 supplied with mounting plate
Type F coordination available for AF and MS combinations
Connnection links supplied between AF09-AF80 with MS
For other combinations, please contact customer service

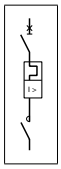
Standard combinations

	Contactor size	Fitted component device
Thermal overloads	AF09-AF38	TF42
	AF40-AF65	TF65
	AF80-AF96	TF96
	AF116-AF146	TF140DU
	AF190-AF205	TA200DU
Electrical overloads	AF09-AF16	EF19
	AF26-AF38	EF45
	AF40-AF65	EF65
	AF80-AF96	EF96
	AF116-AF146	EF146
	AF190-AF205	EF205
	AF265-AF370	EF370
Manual motor starters MS/MO	AF09-AF38	MS132
	AF40-AF65	MS165
	AF80-AF96	MS495

Example of part shown: AF09R1013-MS10

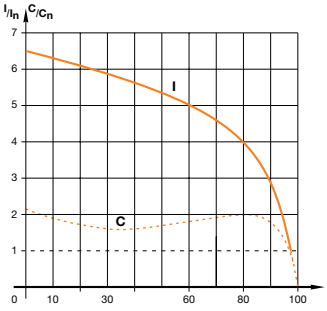
DOL and reversing starters protected by manual motor starters
With AF contactors - open type version in kit form

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

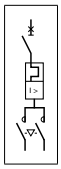
Coordination types

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.

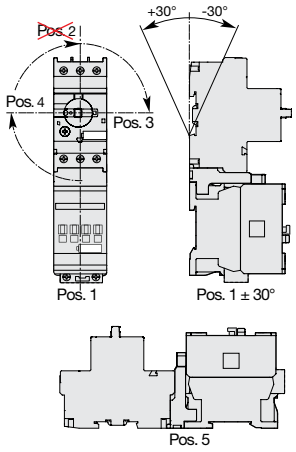
Reversing starter
MS132-10 + BEA16-4 + BER16-4 + VEM4 + AF09-30-10



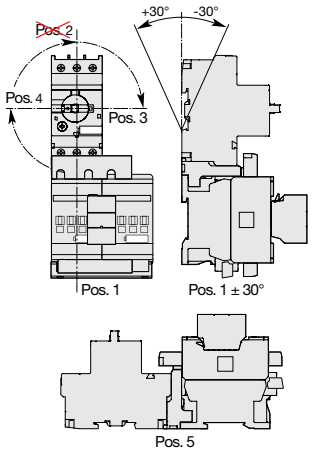
Main technical data

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

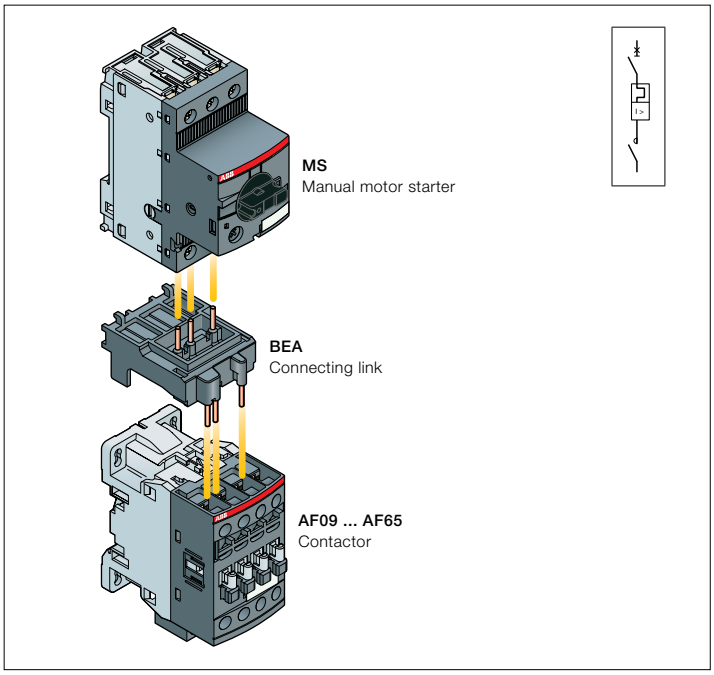


DOL starters



Reversing starters

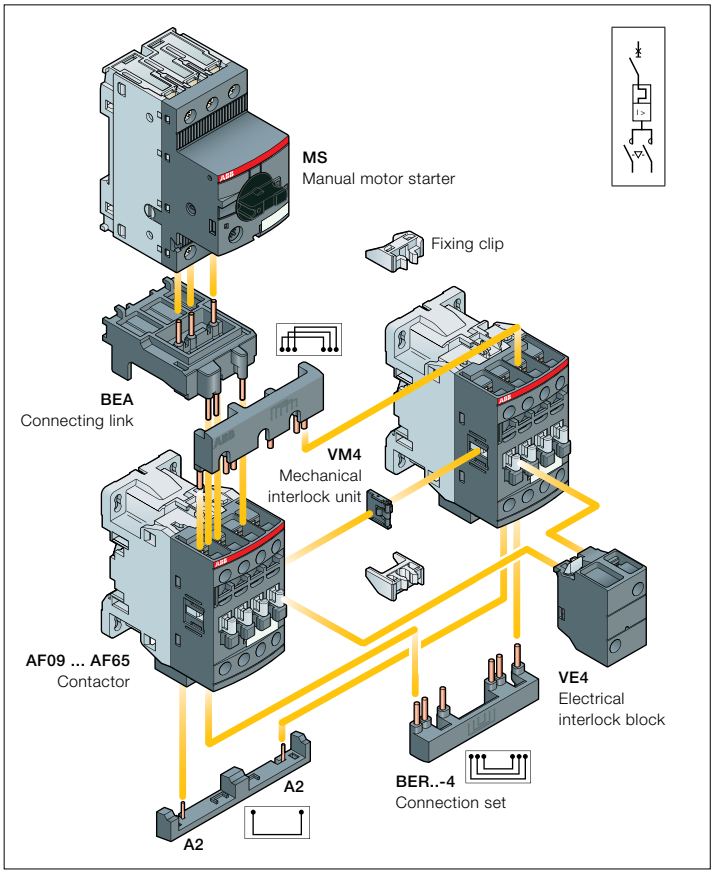
DOL and reversing starters protected by manual motor starters
With AF contactors - open type version in kit form



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:

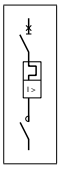
- BEA..-4 connecting link 3-pole insulated: it is used to electrically and mechanically connect MS116, MS132 or MS165 manual motor starter and AF09 ... AF65 contactor, AC or DC operated
- For AF09 ... AF38, use VEM4 mechanical and electrical interlock set for reversing starter in 90 mm width. It includes:
  - 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.

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.

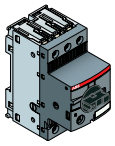
For the full coordination tables:
www.abb.com/lowvoltage then go to the right menu: "Support", select: "Online Product Selection Tools" then select "Coordination Tables for motor protection"

DOL starters protected by MS manual motor starters
Coordination type 1

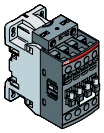
Coordination type 1, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz



Manual motor starters



Contactors



Accessories

BEA..-4

CA4-10

IEC AC-3, 400 V Rated operational power kW	current A	Catalog number[1]	Global code	Current setting range A	Magnetic tripping current A	Rated control circuit voltage Uc min. ... Uc max.[2] V 50/60 Hz	V DC	Catalog number[3]	Global code	Allowed setting current A	Catalog number	Global 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		CA4-10	1SBN010110R1010
22	41	MS165-54	1SAM451000R1016	40.0...54.0	810	24...60	20...60	AF52-30-00-11	1SBL367001R1100	53		
						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			

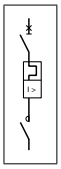
[1] MS116 manual motor starter can be selected according to the current setting range indicated on the coordination line, up to:
- 15 kW, 400 V - AC-3 at 16 kA
- 4 kW, 400 V - AC-3 at 50 kA.

[2] For other control voltages, see "Voltage code table".

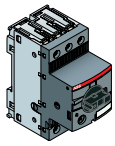
[3] AF38 3-pole contactor can be selected for coordination type 1, 16 kA and 50 kA, 18.5 kW, 400 V - AC-3 (BEA65-4 available for AF40 ... AF65 only).

DOL starters protected by MS manual motor starters
Coordination type 2

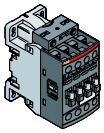
Coordination type 2, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz



Manual motor starters



Contactors



Accessories

BEA..-4

CA4-10

IEC AC-3, 400 V Rated operational power kW	current A	Manual motor starters: Catalog number[1]	Global 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	Catalog number[3]	Global code	Allowed setting current A	Accessories: Catalog number[4]	Global 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		CA4-10	1SBN010110R1010
22	41	MS165-54	1SAM451000R1016	40.0...54.0	810	24...60	20...60	AF52-30-00-11	1SBL367001R1100	53		
						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.

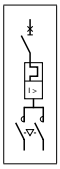
[2] For other control voltages, see "Voltage code table".

[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).

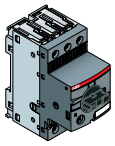
[4] BEA26-4 should be selected with MS116-12 ... MS116-16 and AF26 ... AF38.
BEA38-4 can only be selected with MS116-20 ... MS116-32.

Reversing starters protected by MS manual motor starters
Coordination type 1

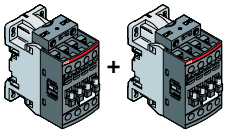
Coordination type 1, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz



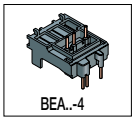
Manual motor starters

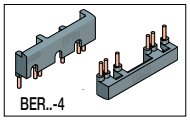


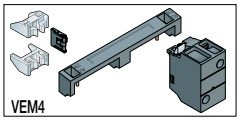
Contactors



Accessories







IEC AC-3, 400 V Rated operational power kW	current A	Catalog number [1]	Global code	Current setting range A	Magnetic tripping current A	Rated control circuit voltage Uc min. ... Uc max.[2] V 50/60 Hz	V DC	Catalog number [3]	Global code	Allowed setting current A	Catalog number	Global 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	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		+ BER65-4	1SBN083411R1000
22	41	MS165-54	1SAM451000R1016	40.0...54.0	810	24...60	20...60	AF52-30-00-11	1SBL367001R1100	53	+ VM96-4	1SBN033405T1000
						100...250	100...250	AF52-30-00-13	1SBL367001R1300		+ 2x CA4-10	1SBN010110R1010
30	55	MS165-65	1SAM451000R1017	52.0...65.0	975	24...60	20...60	AF65-30-00-11	1SBL387001R1100	65	+ 2x CA4-01	1SBN010110R1001
						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	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

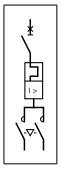
[1] MS116 manual motor starter can be selected according to the current setting range indicated on the coordination line, up to:
- 15 kW, 400 V - AC-3 at 16 kA
- 4 kW, 400 V - AC-3 at 50 kA.

[2] For other control voltages, see "Voltage code table".

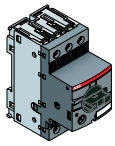
[3] AF38 3-pole contactor can be selected for coordination type 1, 16 kA and 50 kA, 18.5 kW, 400 V - AC-3 (BEA65-4 available for AF40 ... AF65 only).

Reversing starters protected by MS manual motor starters
Coordination type 2

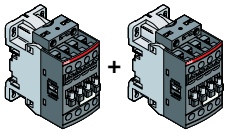
Coordination type 2, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz



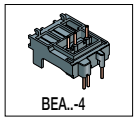
Manual motor starters

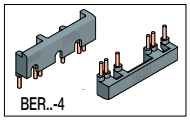


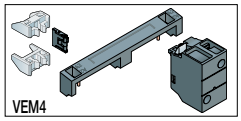
Contactors



Accessories







IEC AC-3, 400 V Rated operational power kW	current A	Catalog number [1]	Global code	Current setting range A	Magnetic tripping current A	Rated control circuit voltage Uc min. ... Uc max. [2] V 50/60 Hz	V DC	Catalog number [3]	Global code	Allowed setting current A	Catalog number [4]	Global 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		+ BER65-4	1SBN083411R1000
22	41	MS165-54	1SAM451000R1016	40.0...54.0	810	24...60	20...60	AF52-30-00-11	1SBL367001R1100	53	+ VM96-4	1SBN033405T1000
						100...250	100...250	AF52-30-00-13	1SBL367001R1300		+ 2x CA4-10	1SBN010110R1010
30	55	MS165-65	1SAM451000R1017	52.0...65.0	975	24...60	20...60	AF65-30-00-11	1SBL387001R1100	65	+ 2x CA4-01	1SBN010110R1001
						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	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".

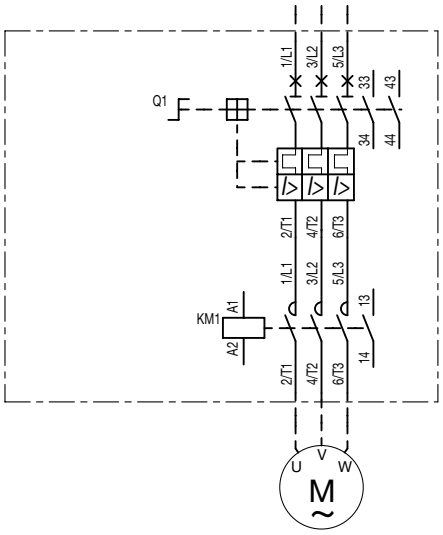
[3] AF26 3-pole contactor can be selected for coordination type 2, 16 kA, 7.5 kW, 400 V - AC-3.
AF38 3-pole contactor can be selected for coordination type 2, 16 kA and 50 kA, 18.5 kW, 400 V - AC-3 (BEA65-4 available for AF40 ... AF65 only).

[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.

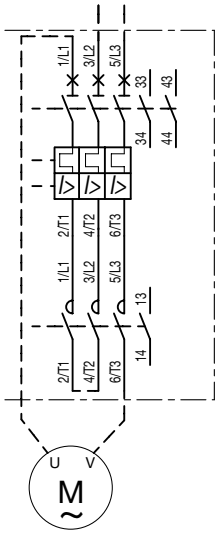
DOL and reversing starters protected by manual motor starters
With AF contactors - open type version in kit form
Wiring diagrams

Direct-on-line starters

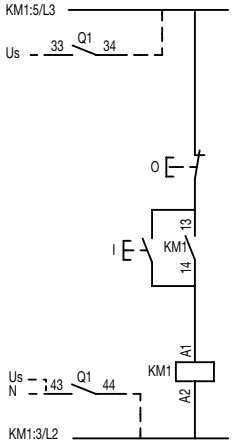
Power circuit



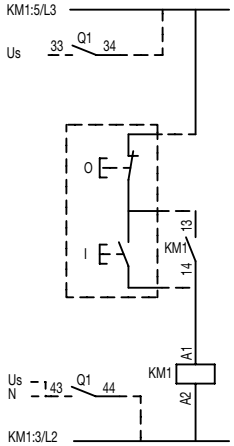
1-phase



AC or DC local control



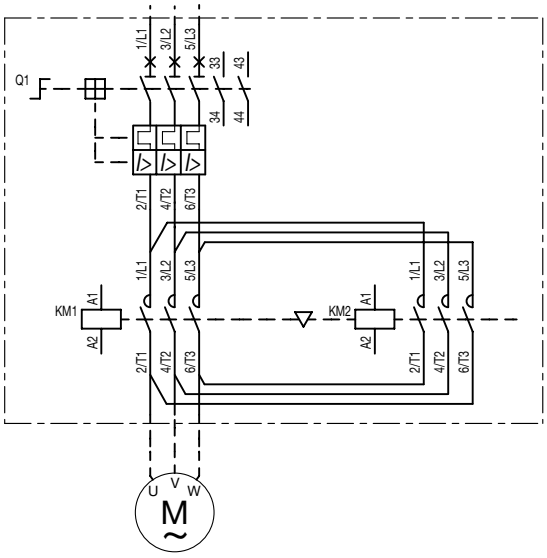
AC or DC remote control



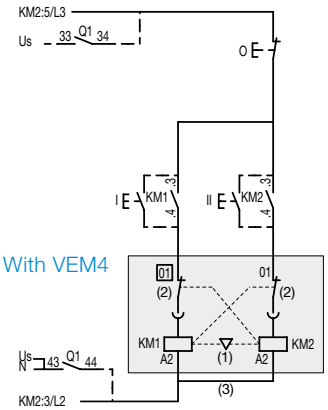
Note: coil Uc 12-20 V DC : A1+, A2-

Reversing starters

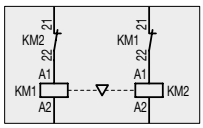
Power circuit



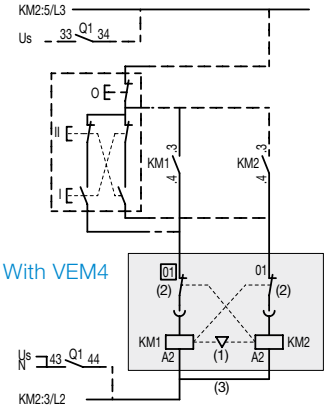
AC or DC local control



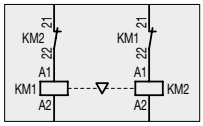
With VM



AC or DC remote control



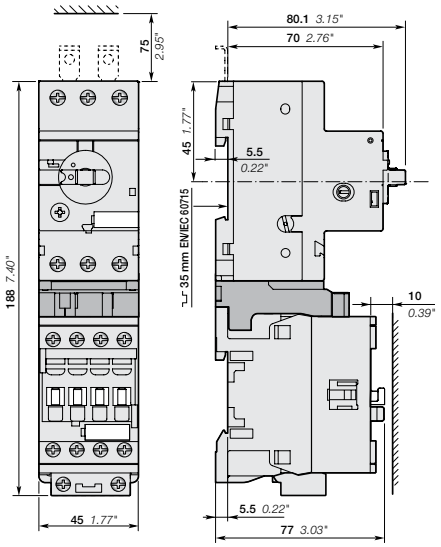
With VM



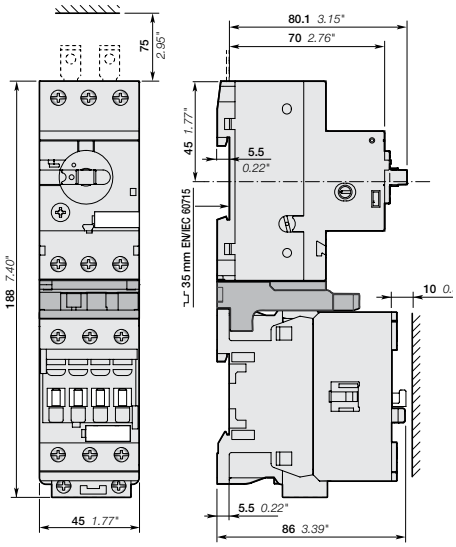
Note: - VEM4 = VM4 (1) + VE4 (2) with A2-A2 (3) connection
(Except for coil Uc 12-20 V DC : use VM4 with CA4).
- coil Uc 12-20 V DC : A1+, A2-

DOL starters protected by M116 manual motor starters
With AF contactors - open type version in kit form

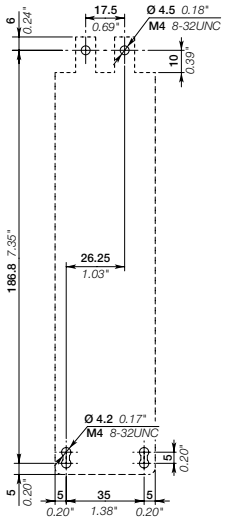
Main dimensions mm, *inches*



MS116-0.16 ... MS116-16
+ BEA16-4
+ AF09, AF12, AF16



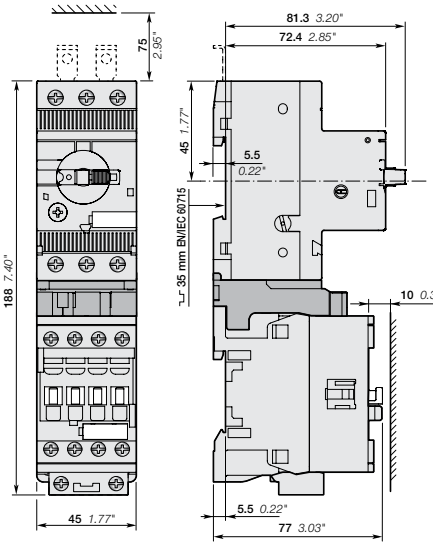
MS116-0.16 ... MS116-16
+ BEA26-4
+ AF26, AF30, AF38



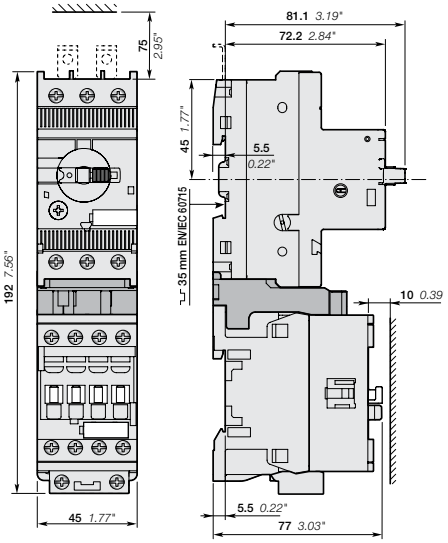
Note: contactor lateral distance to grounded component 2 mm *0.08*" min.

DOL starters protected by M132 manual motor starters
With AF contactors - open type version in kit form

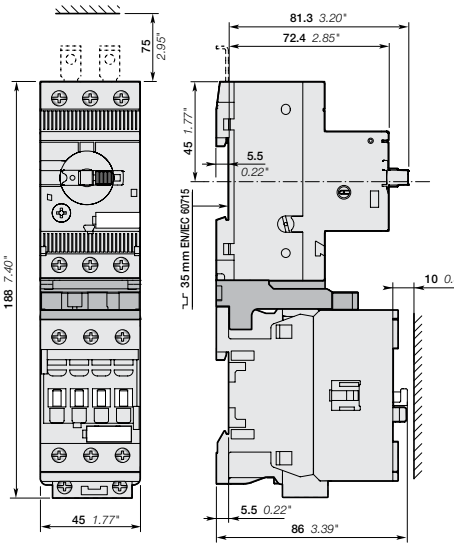
Main dimensions mm, *inches*



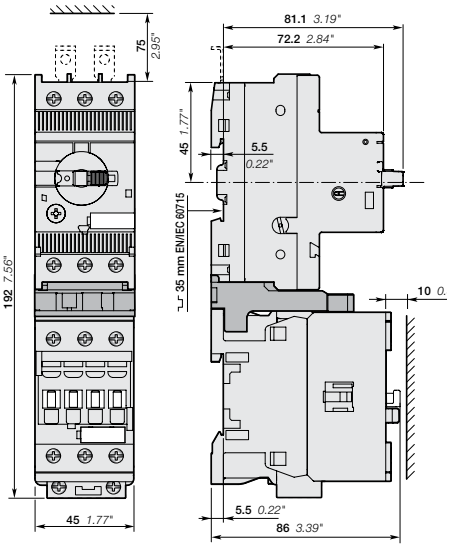
MS132-0.16 ... MS132-10
+ BEA16-4
+ AF09, AF12, AF16



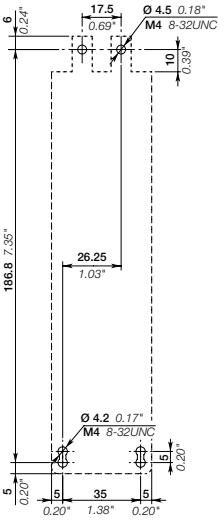
MS132-12 ... MS132-25
+ BEA16-4
+ AF09, AF12, AF16



MS132-0.16 ... MS132-10
+ BEA26-4
+ AF26, AF30, AF38



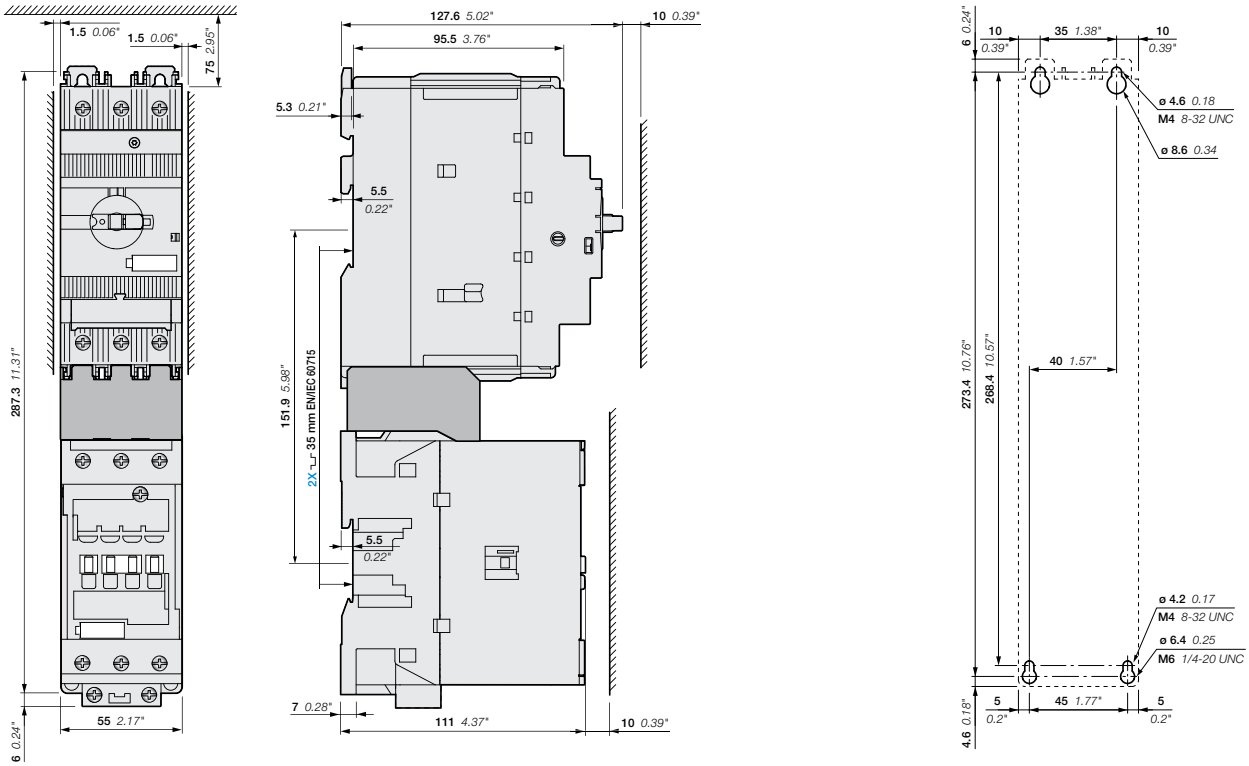
MS132-12 ... MS132-32
+ BEA38-4
+ AF26, AF30, AF38



Note: contactor lateral distance to grounded component 2 mm *0.08*" min.

DOL starters protected by M165 manual motor starters
With AF contactors - open type version in kit form

Main dimensions mm, *inches*

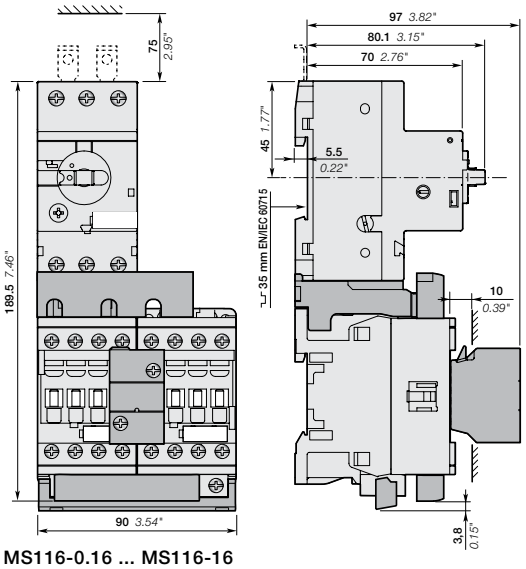


MS165
+ BEA65-4
+ AF40, AF52, AF65

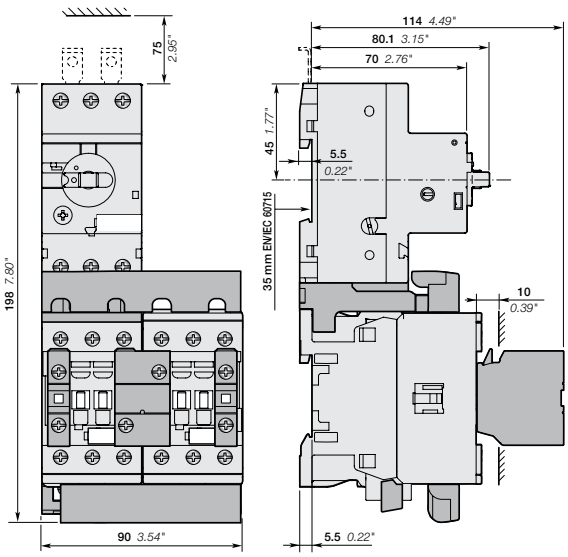
Note: for Ue > 400 V, contactor lateral distance to grounded component 1.5 mm *0.06*" min.

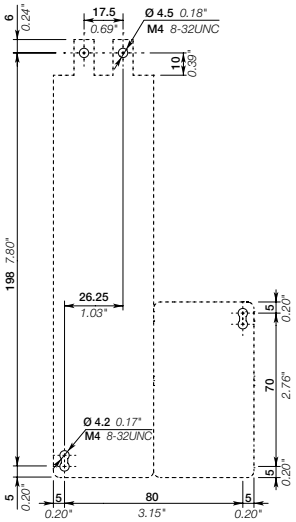
Reversing starters protected by M116 manual motor starters
With AF contactors - open type version in kit form

Main dimensions mm, *inches*



MS116-0.16 ... MS116-16
+ BEA16-4, BER16-4, VEM4
+ AF09, AF12, AF16



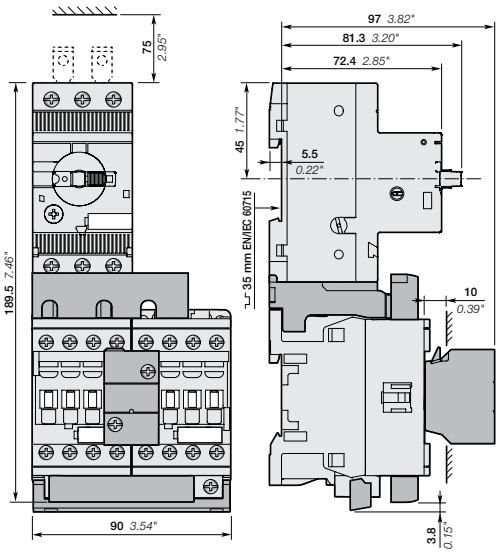


MS116-0.16 ... MS116-16
+ BEA26-4, BER38-4, VEM4, CA4-10
+ AF26, AF30, AF38

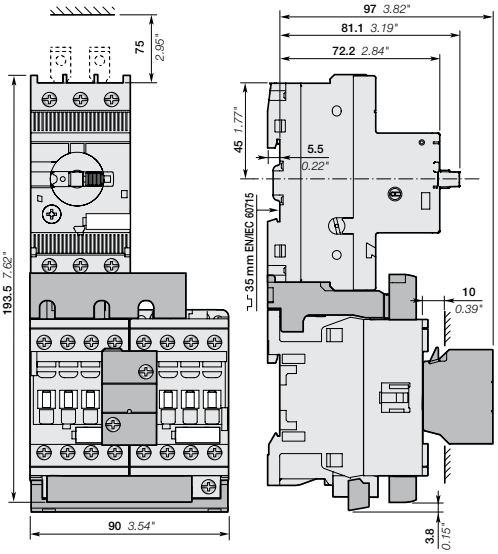
Note: contactor lateral distance to grounded component 2 mm *0.08*" min.

Reversing starters protected by M132 manual motor starters
With AF contactors - open type version in kit form

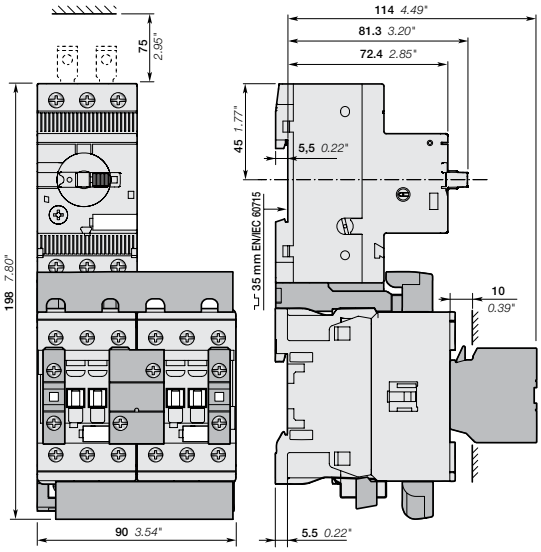
Main dimensions mm, *inches*



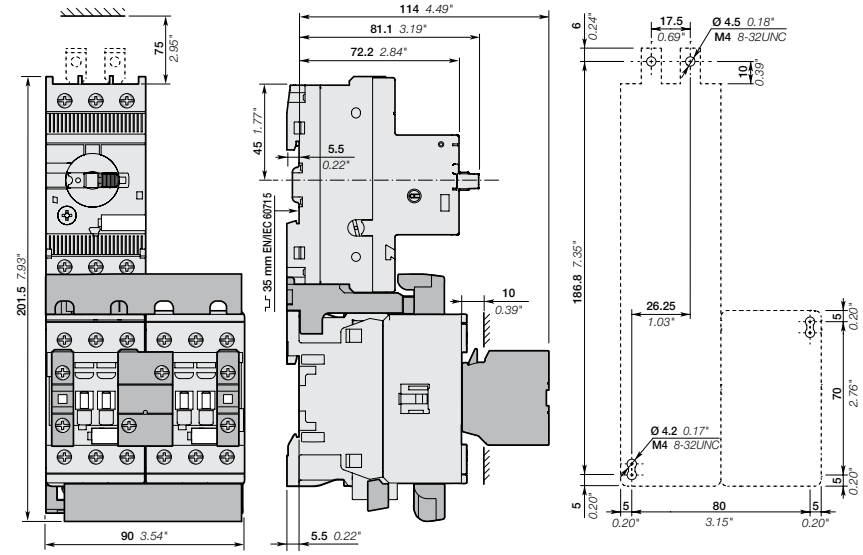
MS132-0.16 ... MS132-10
+ BEA16-4, BER16-4, VEM4
+ AF09, AF12, AF16



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

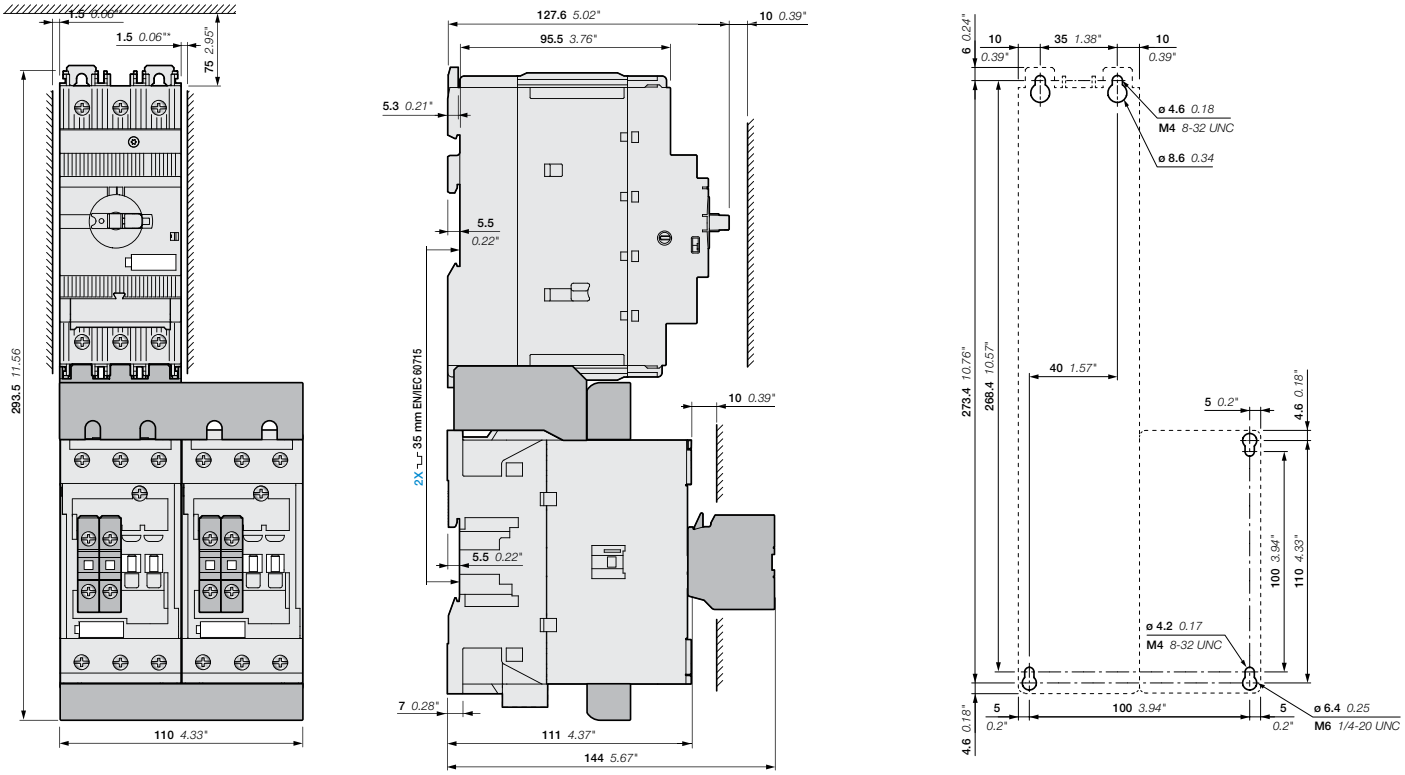


MS132-12 ... MS132-32
+ BEA38-4, BER38-4, VEM4, CA4-10
+ AF26, AF30, AF38

Note: contactor lateral distance to grounded component 2 mm *0.08*" min.

Reversing starters protected by M165 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

Note: for Ue > 400 V, contactor lateral distance to grounded component 1.5 mm *0.06*" min.

Notes

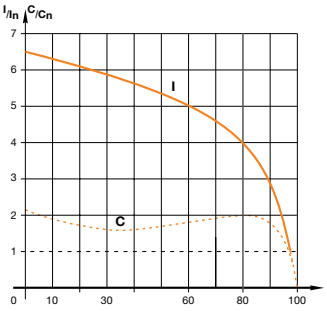
DOL starters protected by moulded-case circuit-breakers and overload relays

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

XT2S 160 + BEA140/XT2 + AF140-30-11 + EF146

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:

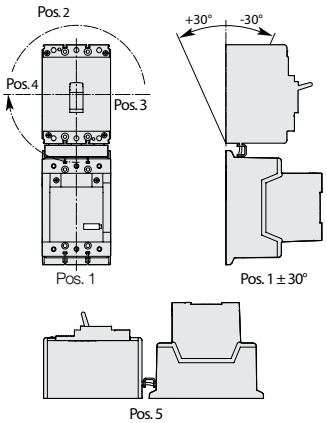
Type 1: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will not be able to then operate without being repaired or having parts replaced.

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.

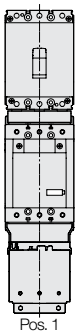
Main technical data

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



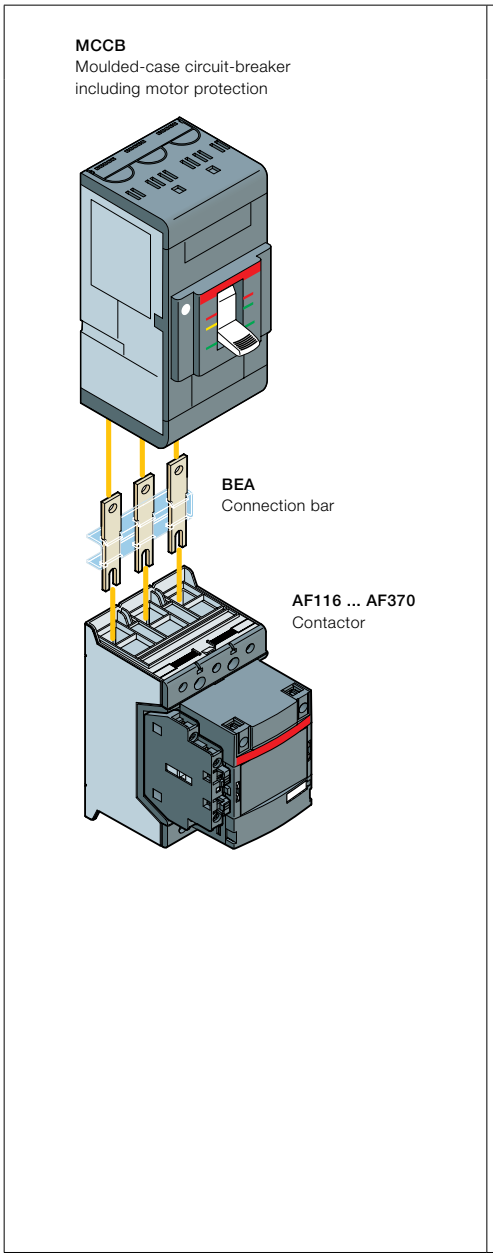
Direct-on-line
MCCB + AF

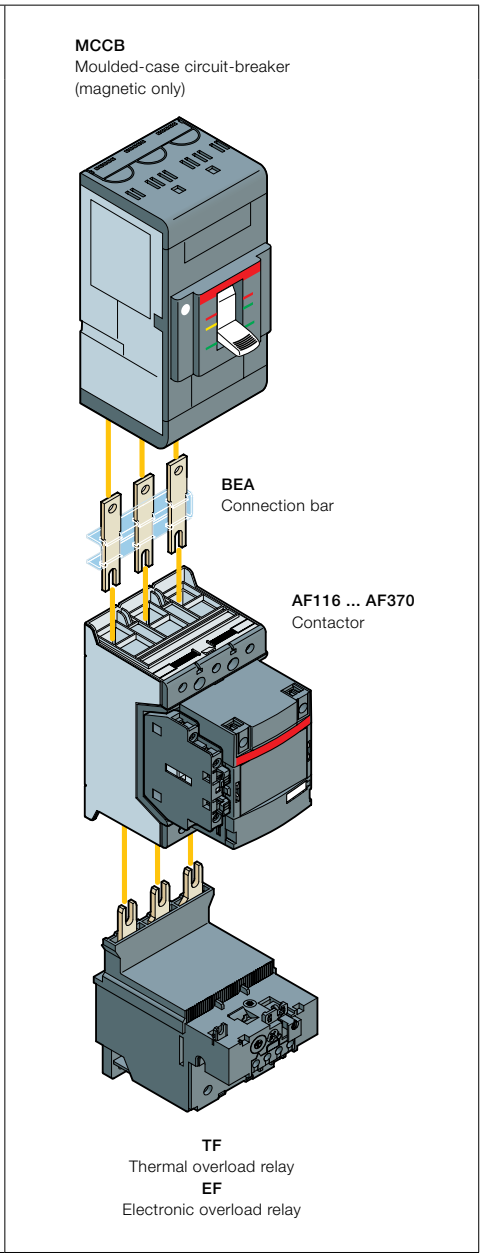


Direct-on-line
MCCB + AF + OL

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.

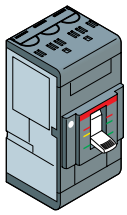
Select now easily and quickly your starter in the following pages for coordination type 1 or 2 at 400 V, 50/60 Hz, Iq = 50 kA up to 200 kW.

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"

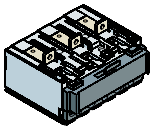
DOL starters protected by MCCB including motor protection
Coordination type 1 or 2

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

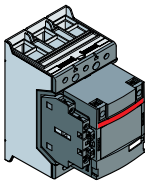
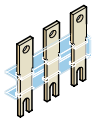
MCCB



+

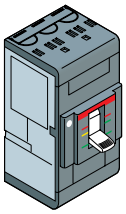
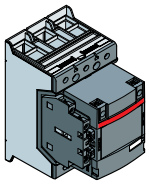


IEC		Magnetic triping current setting	Max. allowed thermal setting	Base			Trip unit		
AC-3, 400 V				Catalog number	Global code		Catalog number	Global code	
Rated power kW	Rated current A	A							
55	97	1440	116	XT2S 160	1SDA068164R1	+	Ekip M-LIU In160	1SDA067355R1	
75	132	1920	140	XT2S 160	1SDA068164R1	+	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.		Catalog number	Global code		Catalog number	Global 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				

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
		

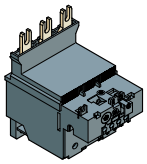
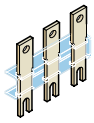
4

Thermal overload relays

IEC AC-3, 400 V Rated power kW	Rated current A	Magnetic triping current A	Catalog number	Global code	Control voltage Uc min. ... Uc max. V 50/60 Hz	V DC	Catalog number	Global 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

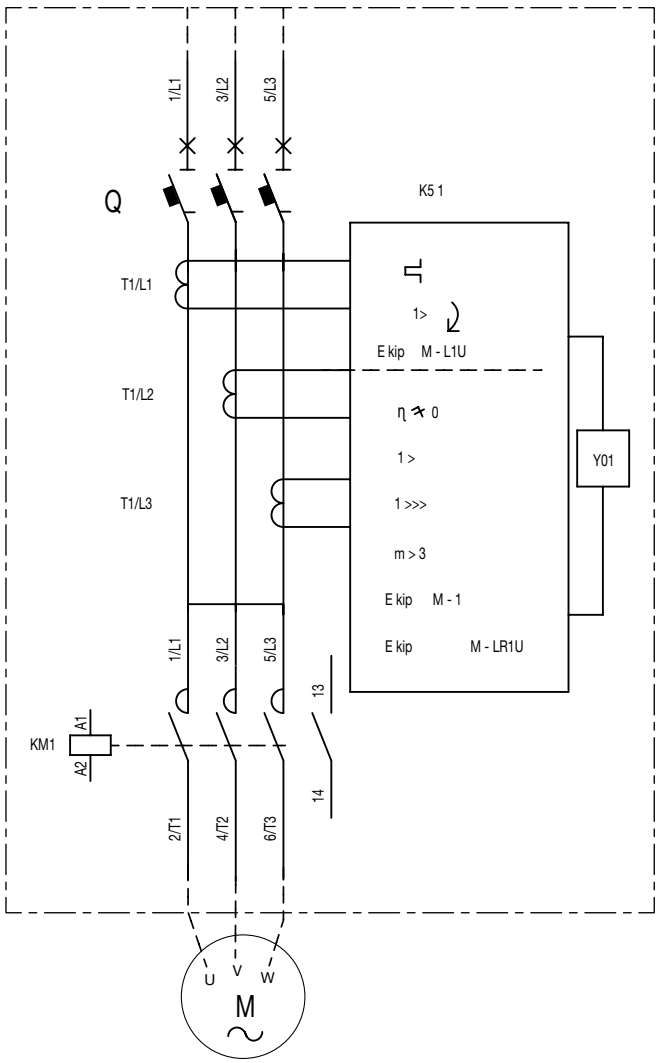
	Overload relays					Connection bars	
							
	Setting ranges A	Max. allowed setting current A	Catalog number	Global code		Catalog number	Global code
	80...110	110	TF140DU-110	1SAZ431201R1002		BEA140/XT2	1SFN084206R1000
	110...142	140	TF140DU-142	1SAZ431201R1004			
	130...175	175	TA200DU-175	1SAZ421201R1005		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			

DOL starters protected by moulded-case circuit-breakers and overload relays

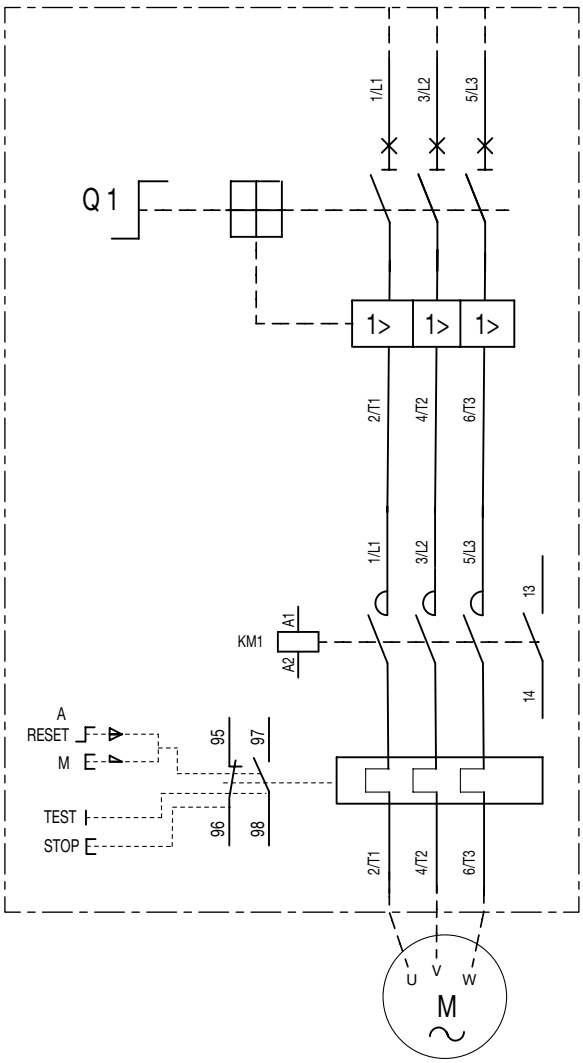
With AF contactors - Open type version in kit form

Direct-on-line starters

Protected by MCCB including motor protection

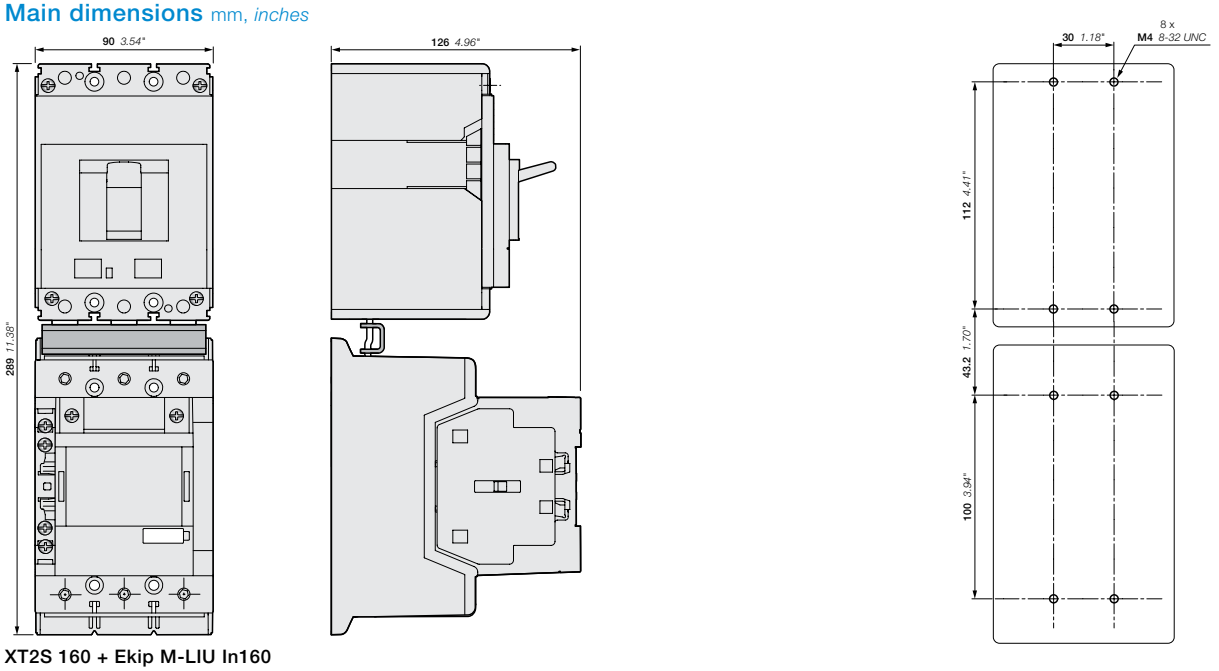


Protected by MCCB (magnetic only) and overload relays

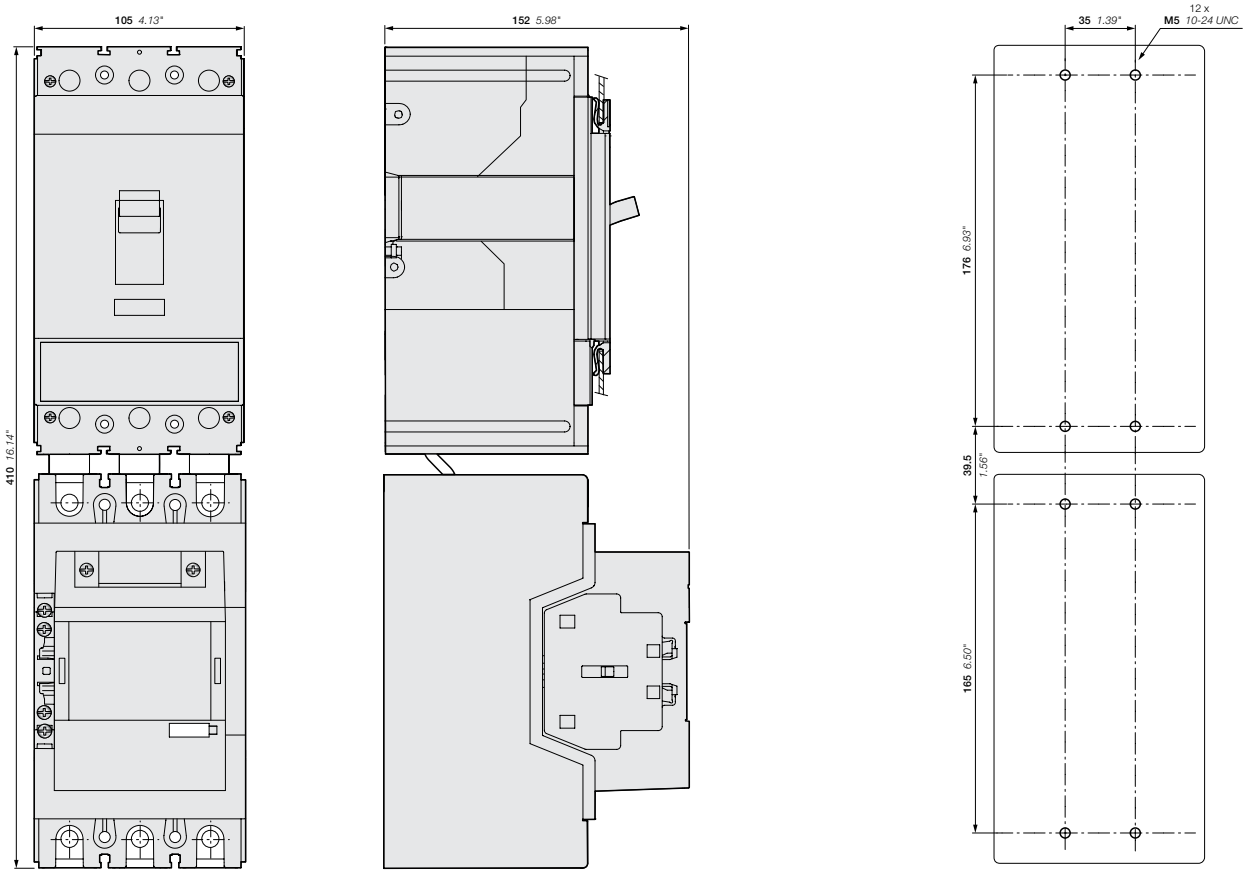


DOL starters protected by MCCB, including motor protection
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*



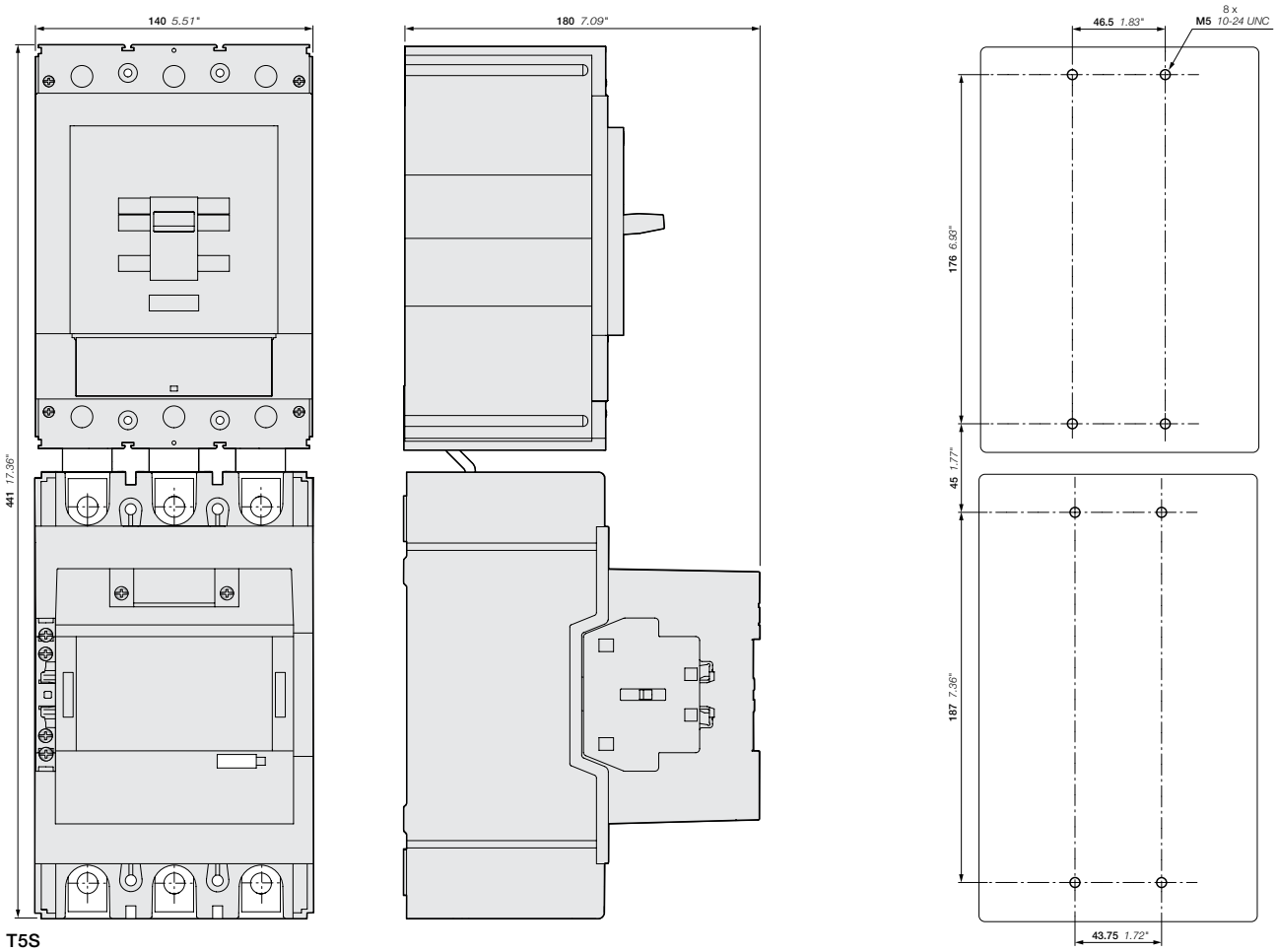
XT2S 160 + Ekip M-LIU In160
+ BEA140/XT2
+ AF116, AF140, AF146



T4S
+ BEA205/T4
+ AF190, AF205

DOL starters protected by MCCB, including motor protection
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*

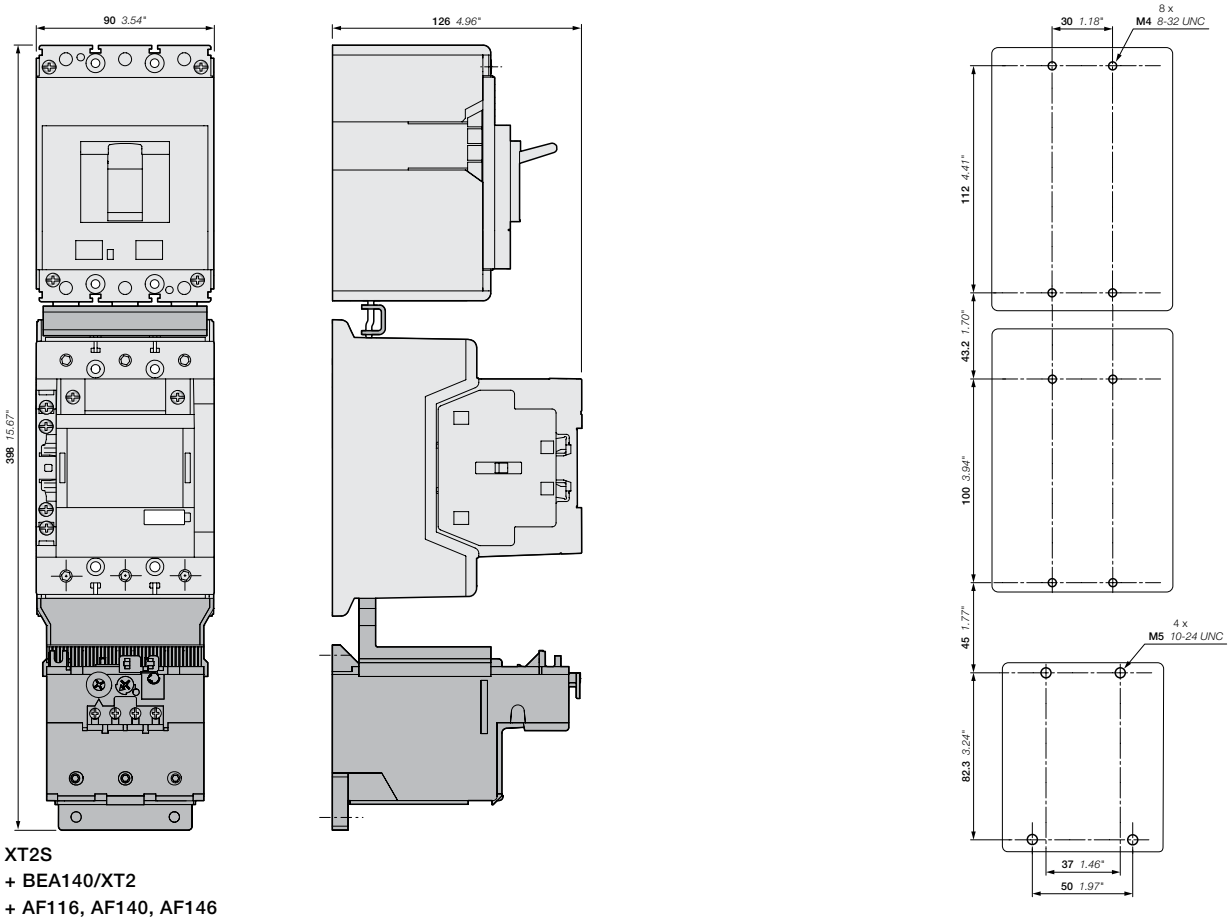


T5S
+ BEA370/T5
+ AF265, AF305, AF370

DOL starters protected by MCCB (magnetic only) and thermal overload relays

With AF contactors - Open type version in kit form

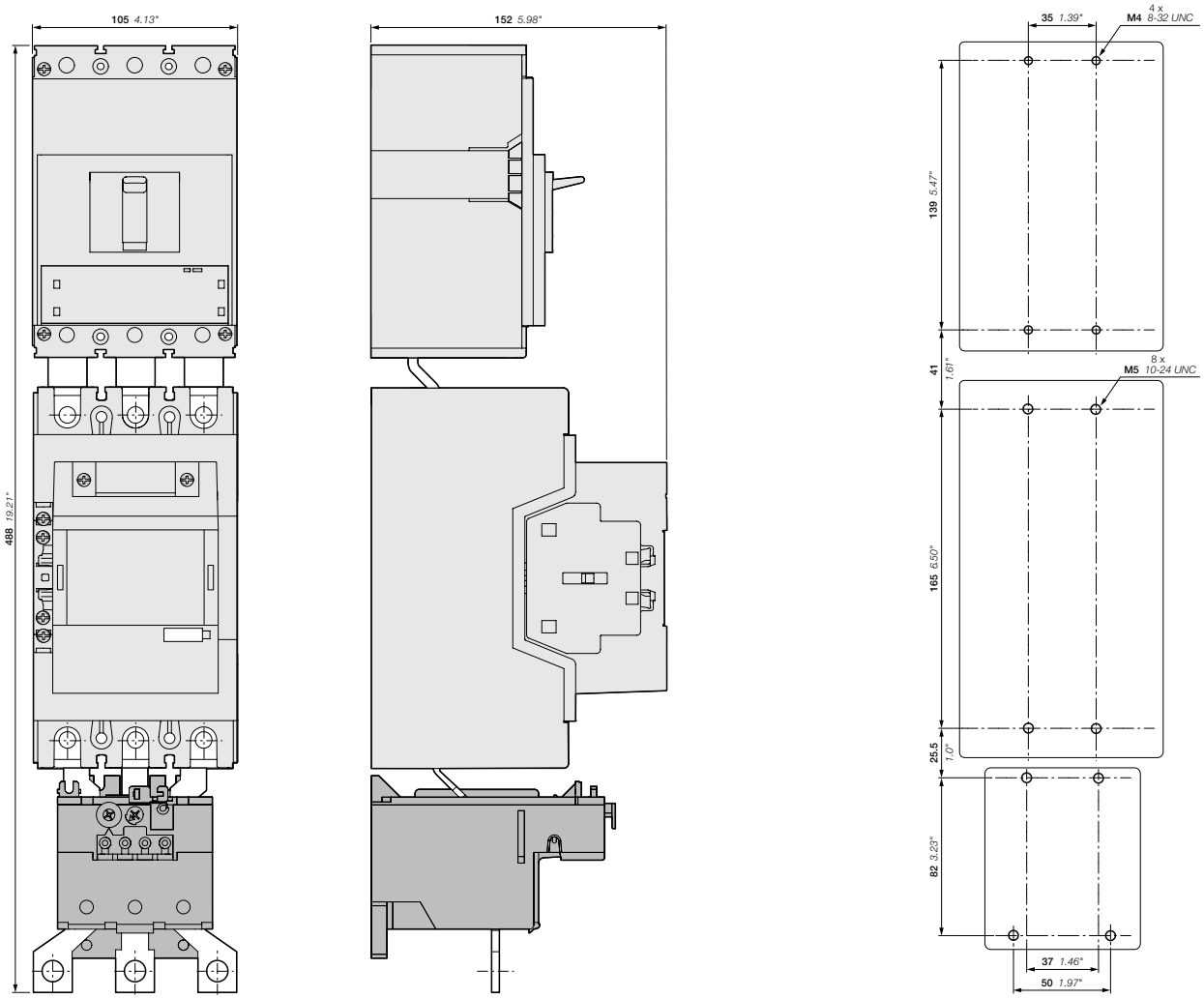
Main dimensions mm, *inches*



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

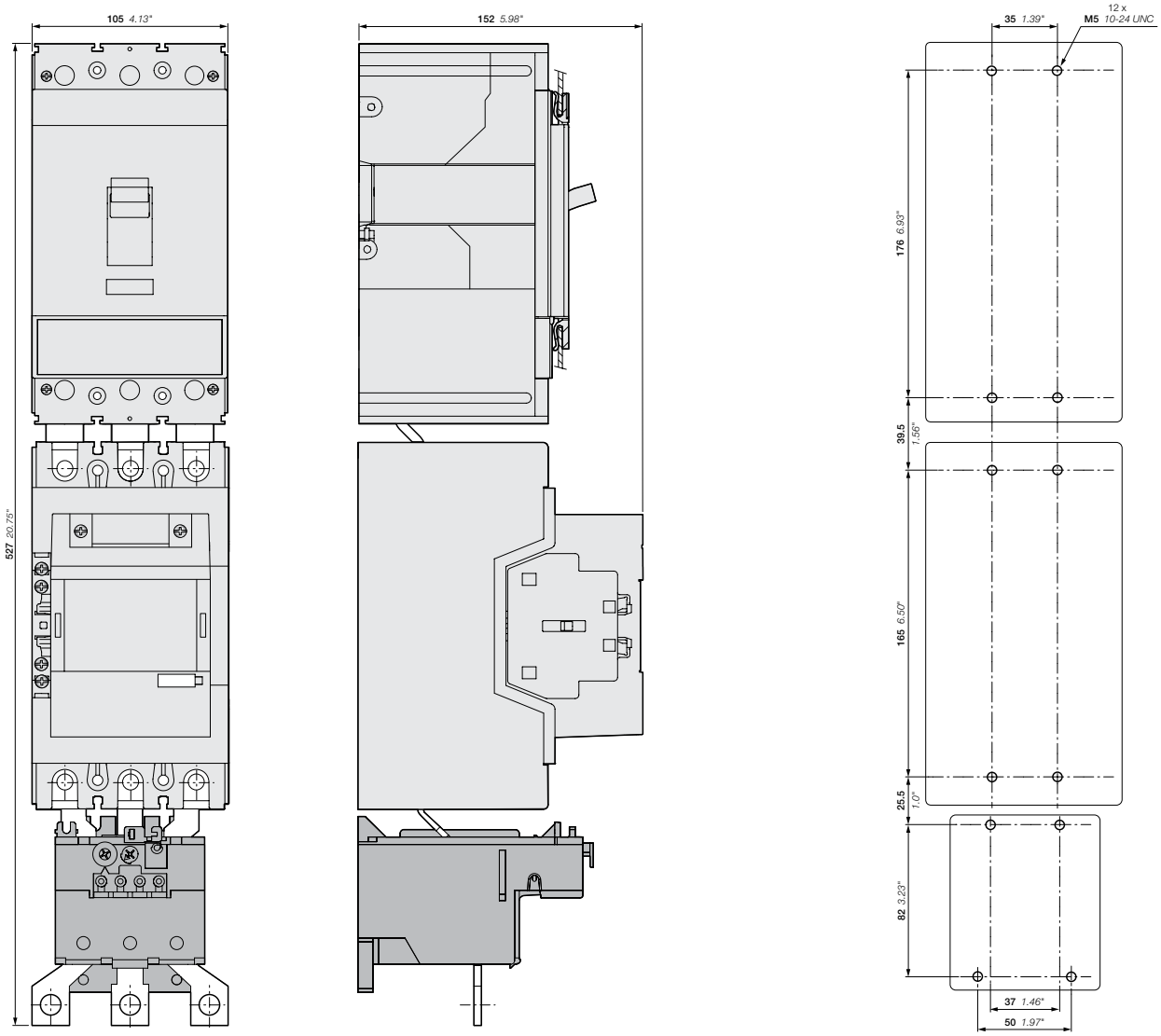
Main dimensions mm, *inches*



XT4S
+ BEA205/XT4
+ AF190, AF205
+ TA200DU thermal overload relay

DOL starters protected by MCCB (magnetic only) and thermal overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*

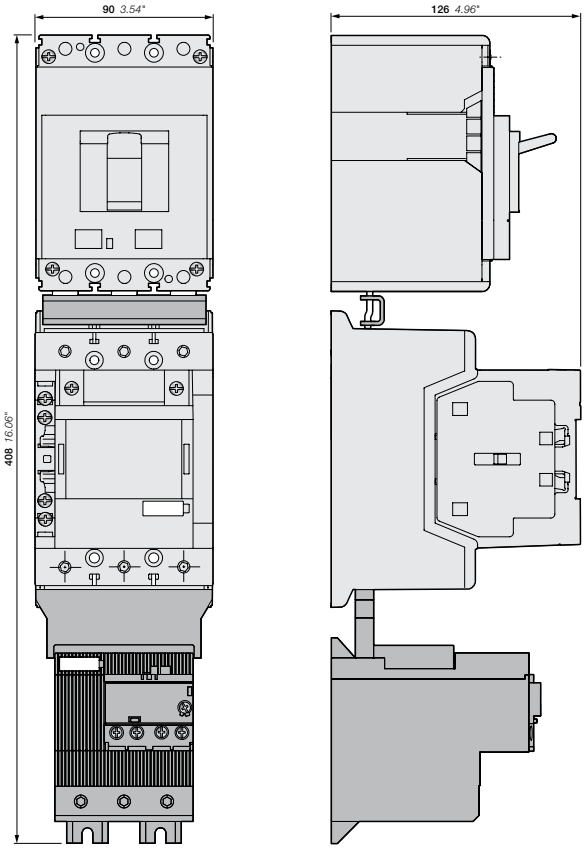


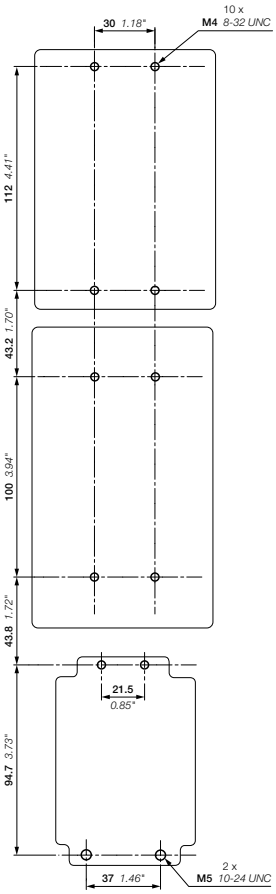
T4S
+ BEA205/T4
+ AF190, AF205
+ TA200DU thermal overload relay

DOL starters protected by MCCB (magnetic only) and electronic overload relays

With AF contactors - Open type version in kit form

Main dimensions mm, *inches*

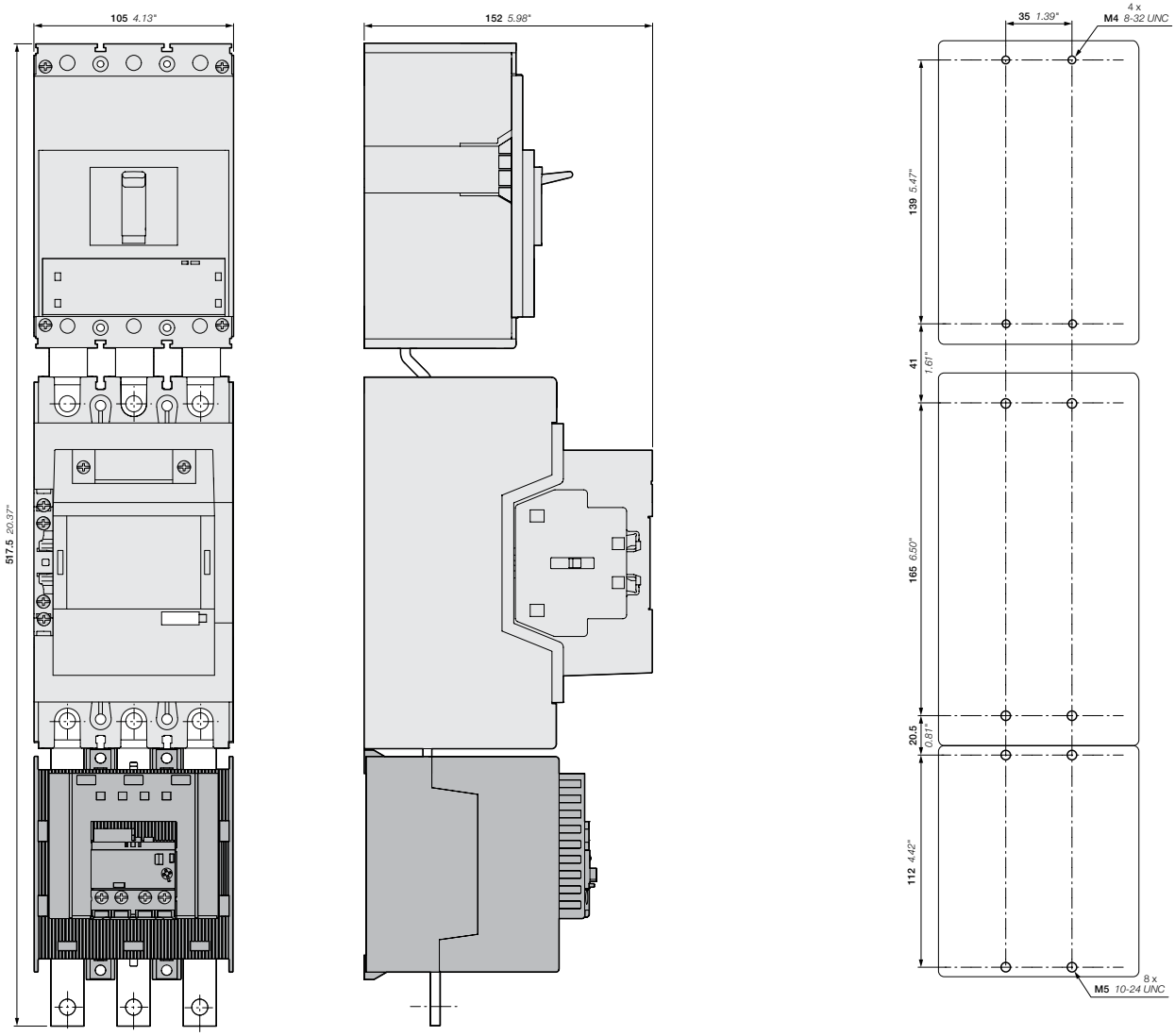




XT2S
+ BEA140/XT2
+ AF116, AF140, AF146
+ EF146 electronic overload relay

DOL starters protected by MCCB (magnetic only) and electronic overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*

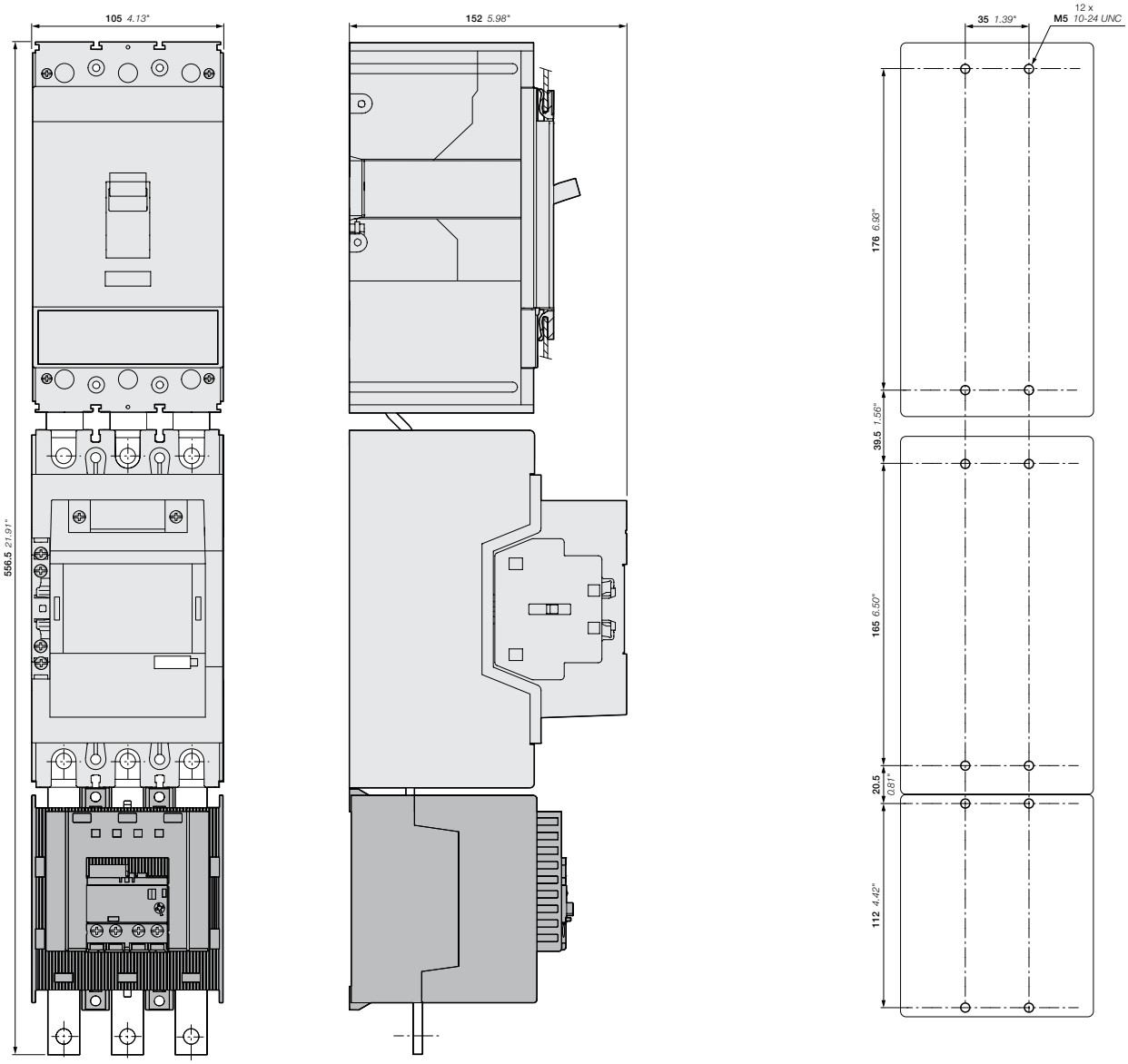


XT4S
+ BEA205/XT4
+ AF190, AF205
+ EF205 electronic overload relay

DOL starters protected by MCCB (magnetic only) and electronic overload relays

With AF contactors - Open type version in kit form

Main dimensions mm, *inches*

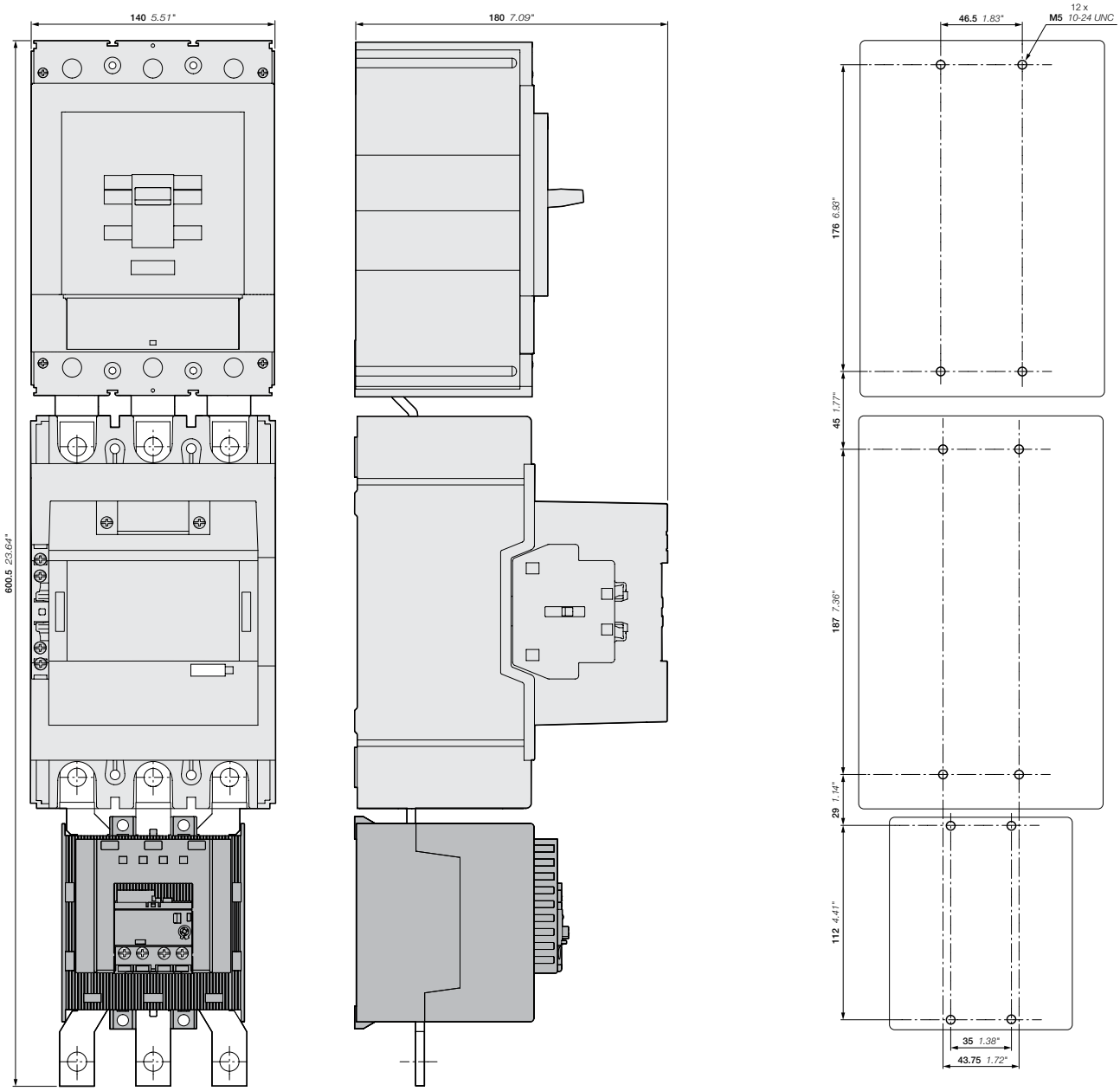


T4S
+ BEA205/T4
+ AF190, AF205
+ EF205 electronic overload relay

DOL starters protected by MCCB (magnetic only) and electronic overload relays

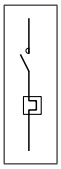
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*



T5S
+ BEA370/T5
+ AF265, AF305, AF370
+ EF370 electronic overload relay

DOL and reversing starters protected by overload relays
With AF contactors - Open type version in kit form

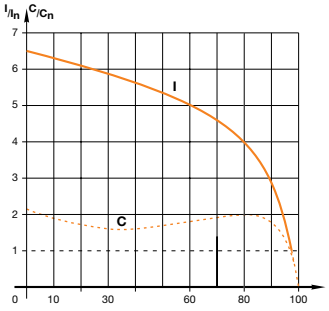


AF09-30-10 + TF42

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.

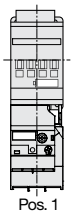
AF09-30-10 + BER16-4 + VEM4 + TF42

AF140-30-11 + BER140-4 + VM19 + TF140DU

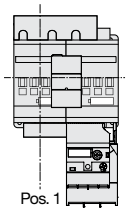
Main technical data

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



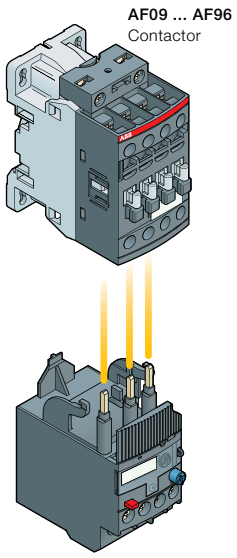
Direct-on-line



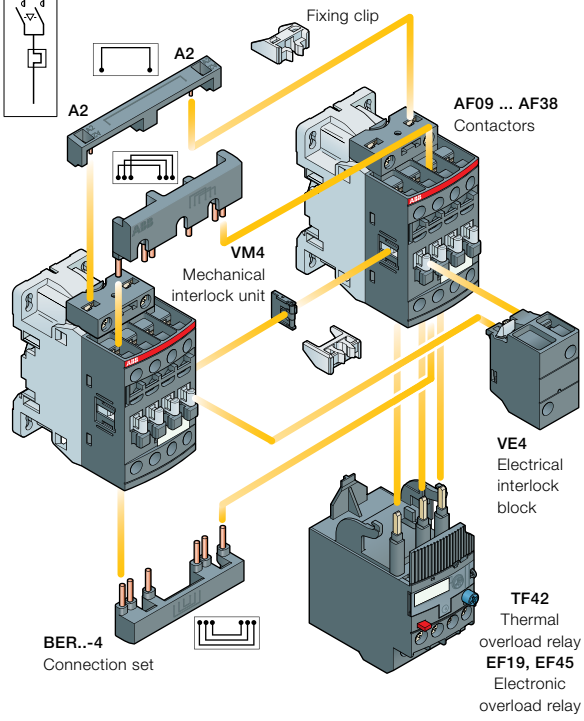
Reversing

DOL and reversing starters protected by overload relays
With AF contactors - Open type version in kit form

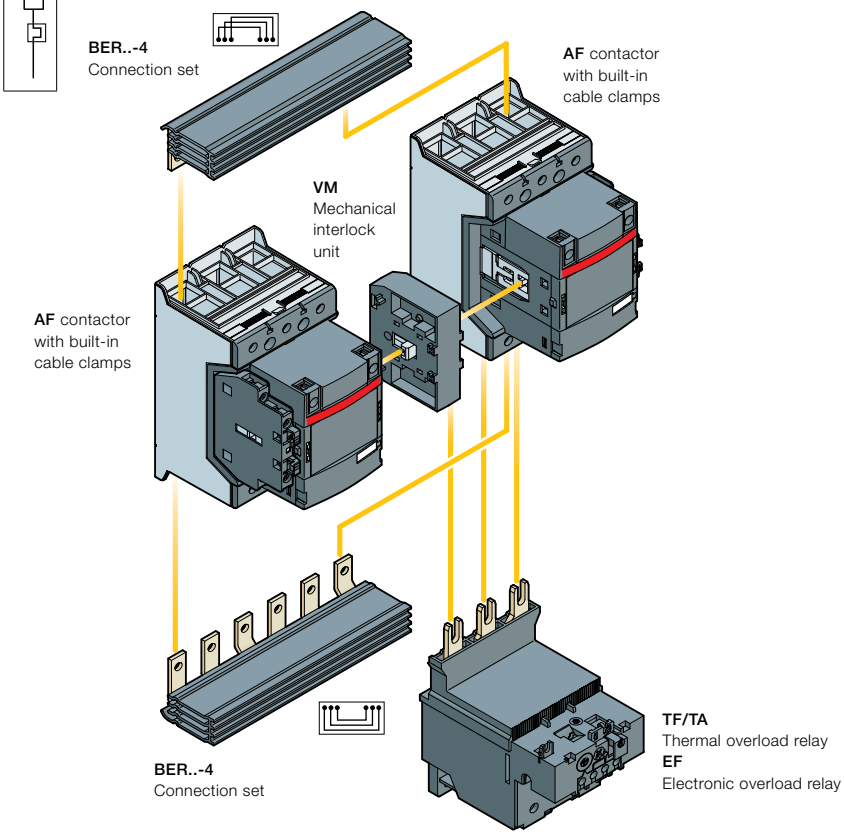
Direct-On-Line starters



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.

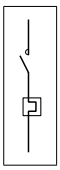
You can also easily assemble reversing starter thanks to our complete range of accessories:

- 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"

Direct-on-line starters protected by thermal overload relays
With AF contactors - Open type version in kit form

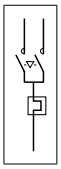


Contactors					Thermal overload relays			Accessories
IEC AC-3, 400 V		Control voltage Uc min. ... Uc max. [1]		Catalog number	Global code	Setting ranges	Catalog number	Global code	
Rated power	Rated current								
kW	A	V 50/60 Hz	V DC			A			
4	8.5	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	7.60...10.0	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				

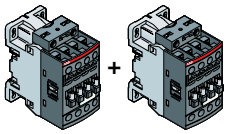
[1] For other control voltages, see "Voltage code table".

Note : for rated power above 110 kW, refer to "Starters protected by electronic overload relays".

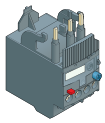
Reversing starters protected by thermal overload relays
With AF contactors - Open type version in kit form



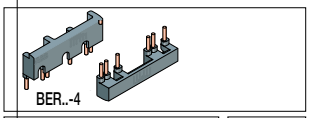
Contactors

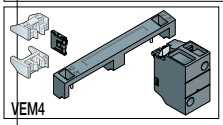


Thermal overload relays



Accessories



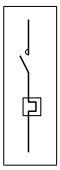


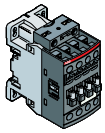
IEC AC-3, 400 V Rated power kW	Rated current A	Control voltage Uc min. ... Uc max. [1] V 50/60 Hz	V DC	Catalog number	Global code	Setting ranges A	Catalog number	Global code	Catalog number	Global code
4	8.5	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	7.60...10.0	TF42-10	1SAZ721201R1043	BER16-4 + VEM4	1SBN081311R1000 1SBN030111R1000
		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	BER38-4 + VEM4 + 2x CA4-10	1SBN082311R1000 1SBN030111R1000 1SBN010110R1010
		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	BER65-4 + VM96-4 + 2x CA4-10 + 2x CA4-01	1SBN083411R1000 1SBN033405T1000 1SBN010110R1010 1SBN010110R1001
		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	BER96-4 + VM96-4 + 2x CA4-10 + 2x CA4-01	1SBN083911R1000 1SBN033405T1000 1SBN010110R1010 1SBN010110R1001
		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	BER140-4 + VM19	1SFN084211R1000 1SFN030300R1000
		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	BER205-4 + VM19	1SFN084811R1000 1SFN030300R1000
		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					

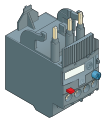
[1] For other control voltages, see "Voltage code table".

Note : for rated power above 110 kW, refer to "Starters protected by electronic overload relays".

Direct-on-line starters protected by electronic overload relays
With AF contactors - Open type version in kit form



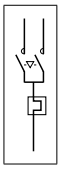




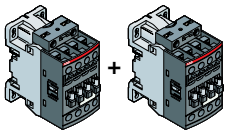
Contactors						Electronic overload relays			Accessories
IEC AC-3, 400 V Rated power	Rated current	Control voltage Uc min. ... Uc max. [1]		Catalog number	Global code	Setting ranges	Catalog number	Global code	
kW	A	V 50/60 Hz	V DC			A			
4	8.5	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	5.70...18.9	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".

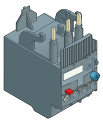
Reversing starters protected by electronic overload relays
With AF contactors - Open type version in kit form



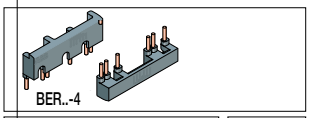
Contactors

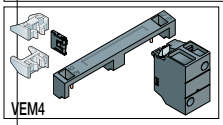


Electronic overload relays



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	Catalog number	Global code	Setting ranges A	Catalog number	Global code	Catalog number	Global code
4	8.5	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	5.70...18.9	EF19-18.9	1SAX121001R1105	BER16-4 + VEM4	1SBN081311R1000 1SBN030111R1000
		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	BER38-4 + VEM4 + 2x CA4-10	1SBN082311R1000 1SBN030111R1000 1SBN010110R1010
		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	BER65-4 + VM96-4 + 2x CA4-10 + 2x CA4-01	1SBN083411R1000 1SBN033405T1000 1SBN010110R1010 1SBN010110R1001
		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	BER96-4 + VM96-4 + 2x CA4-10 + 2x CA4-01	1SBN083911R1000 1SBN033405T1000 1SBN010110R1010 1SBN010110R1001
		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	BER140-4 + VM19	1SFN084211R1000 1SFN030300R1000
		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	BER205-4 + VM19	1SFN084811R1000 1SFN030300R1000
		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	BER370-4 + VM19	1SFN085411R1000 1SFN030300R1000
		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".

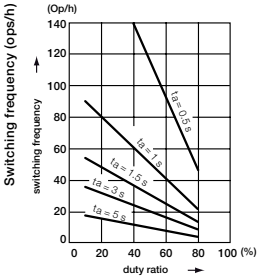
DOL and reversing starters protected by overload relays
With AF contactors - Open type version in kit form
Switching frequency diagrams

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

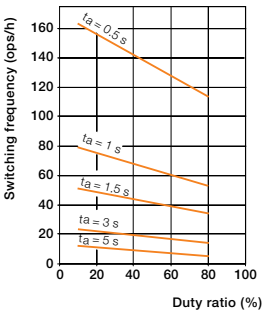
Example:

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

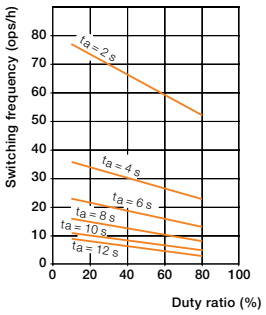
Intermittent periodic duty

Trip class 10E

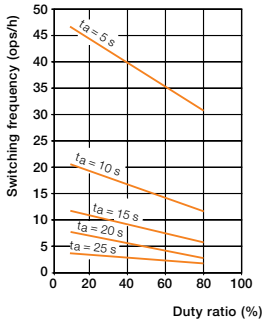


ta: motor starting time

Trip class 20E



Trip class 30E



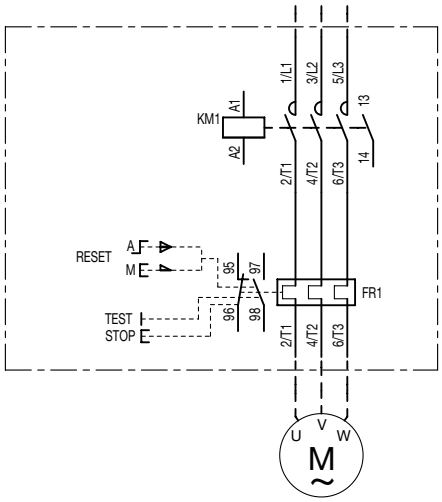
Exemple for trip class 10E:

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.

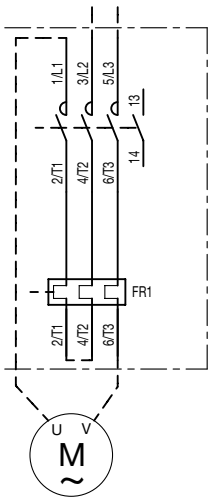
DOL and reversing starters protected by overload relays
With AF contactors - Open type version in kit form
Wiring diagrams

Direct-on-line starters

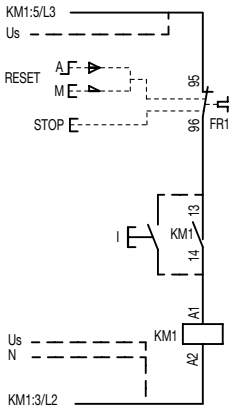
Power circuit



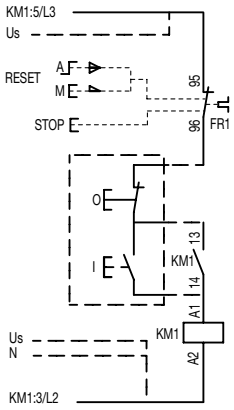
1-phase



AC or DC local control



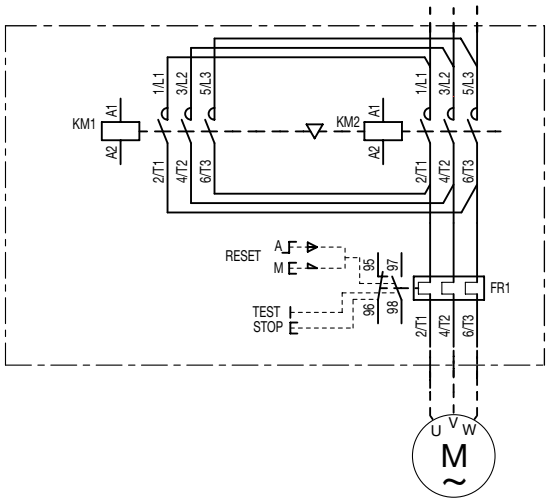
AC or DC remote control



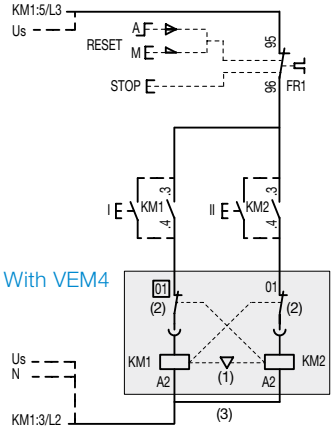
Note: coil Uc 12-20 V DC : A1+, A2-

Reversing starters

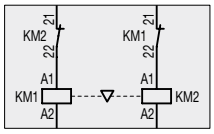
Power circuit



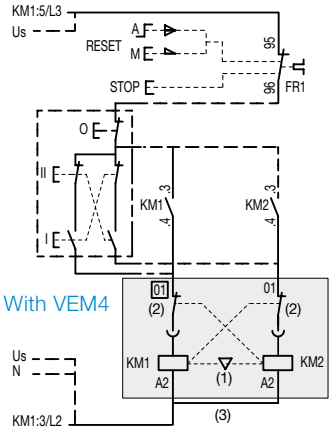
AC or DC local control



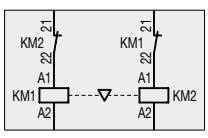
With VM



AC or DC remote control



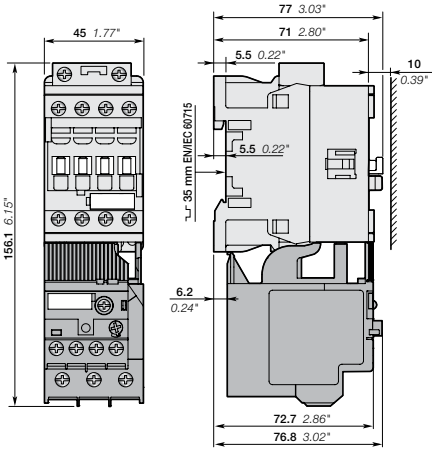
With VM



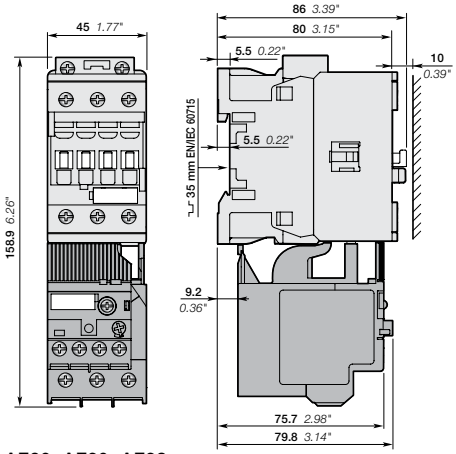
Note: - VEM4 = VM4 (1) + VE4 (2) with A2-A2 (3) connection
(Except for coil Uc 12-20 V DC : use VM4 with CA4).
- coil Uc 12-20 V DC : A1+, A2-

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

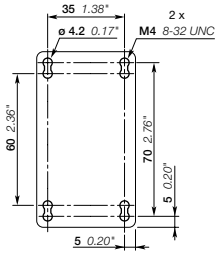
Main dimensions mm, *inches*



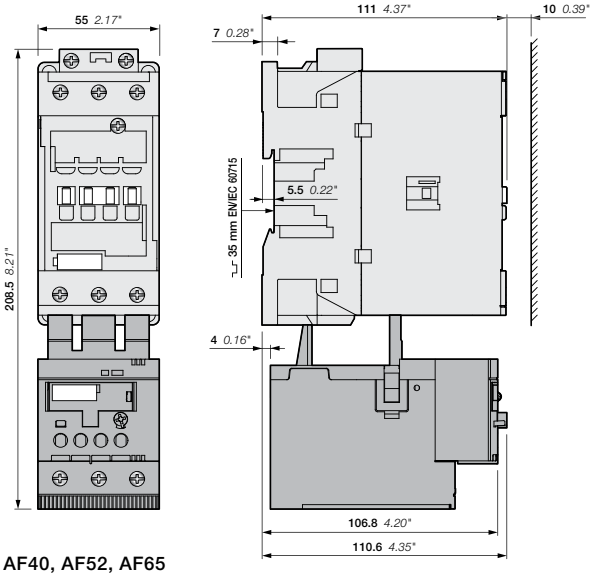
AF09, AF12, AF16
+ TF42 thermal overload relay



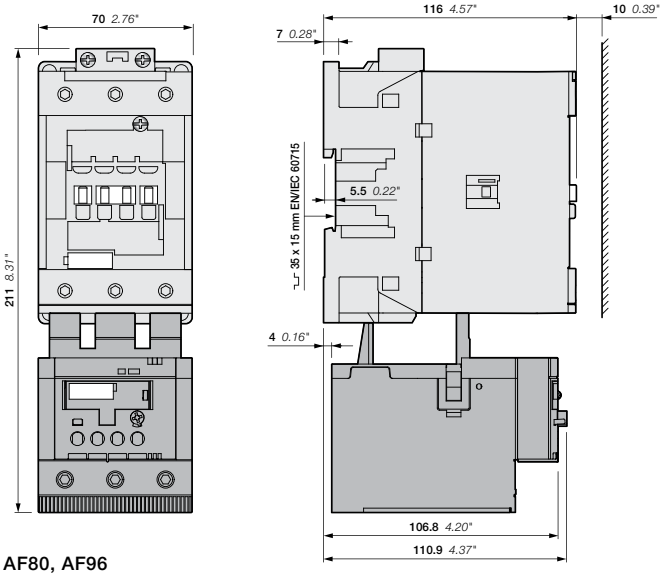
AF26, AF30, AF38
+ TF42 thermal overload relay



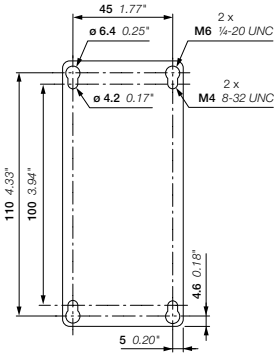
Note: contactor lateral distance to grounded component 2 mm *0.08*" min.



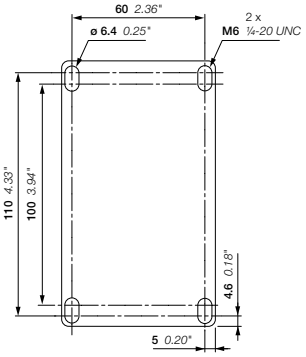
AF40, AF52, AF65
+ TF65 thermal overload relay



AF80, AF96
+ TF96 thermal overload relay



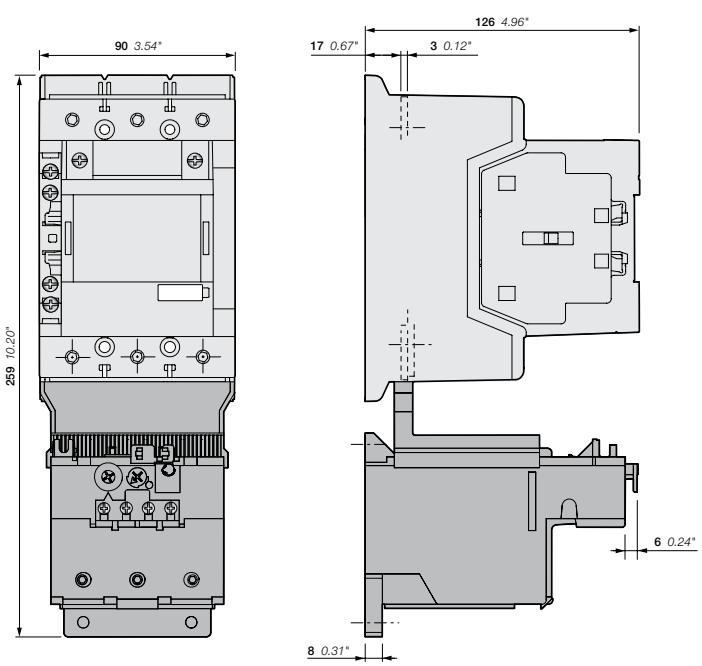
AF40, AF52, AF65
+ TF65 thermal overload relay



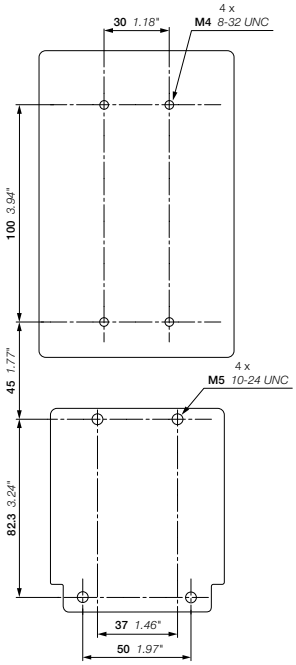
AF80, AF96
+ TF96 thermal overload relay

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

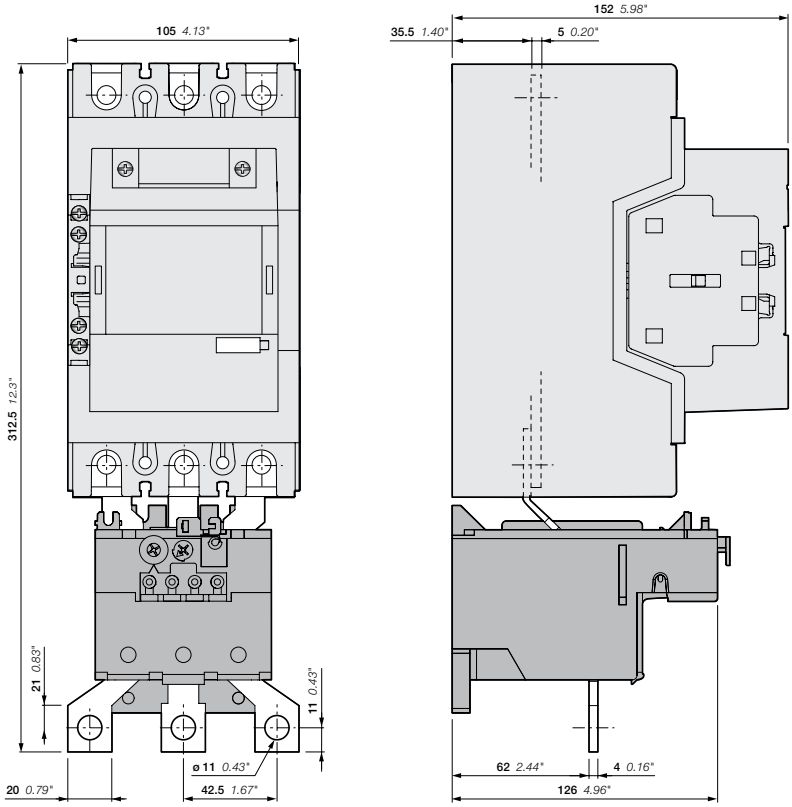
Main dimensions mm, *inches*



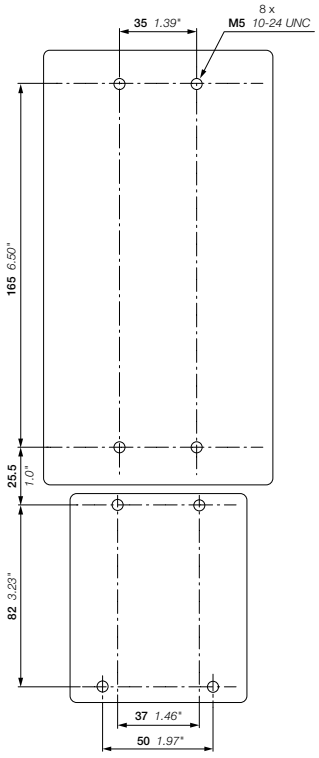
AF116, AF140-30-11(B)
+ TF140 thermal overload relay



AF116, AF140-30-11(B)
+ TF140 thermal overload relay



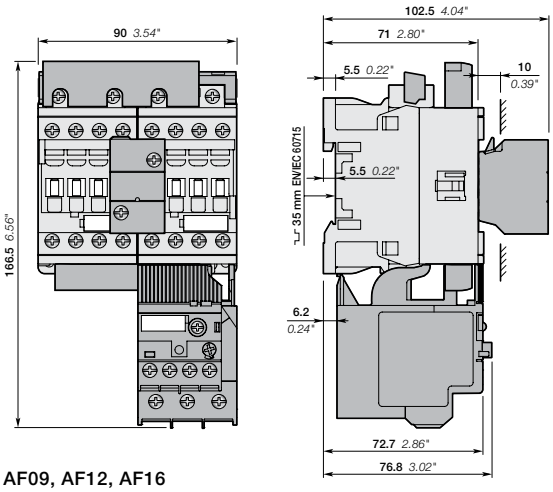
AF190, AF205-30-11
+ TA200DU thermal overload relay



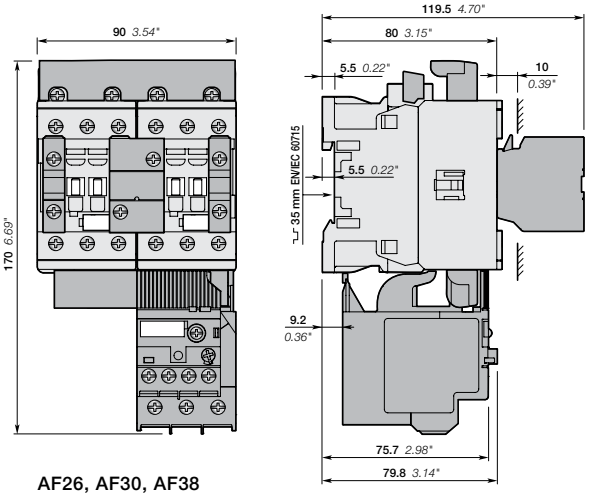
AF190, AF205
+ TA200DU thermal overload relay

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

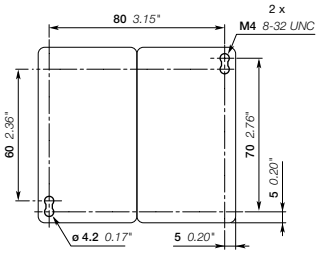
Main dimensions mm, *inches*



AF09, AF12, AF16
+ BER16-4, VEM4
+ TF42 thermal overload relay



AF26, AF30, AF38
+ BER38-4, VEM4, CA4-10
+ TF42 thermal overload relay

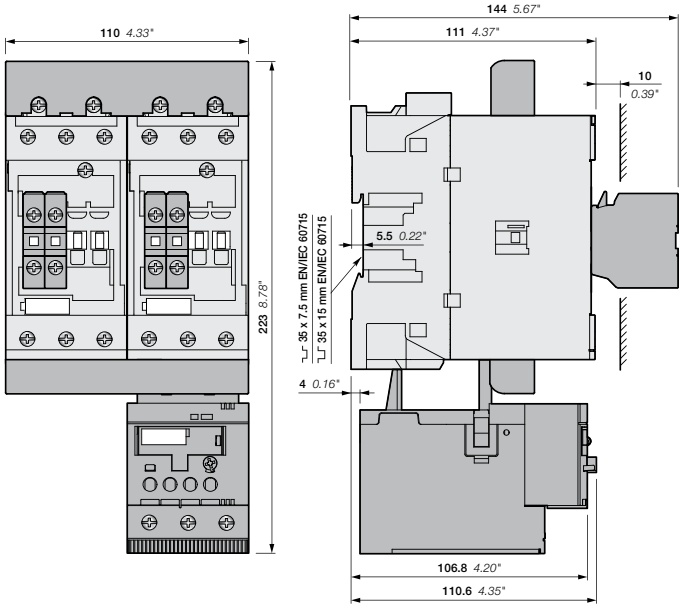


AF09, AF12, AF16, AF26, AF30, AF38

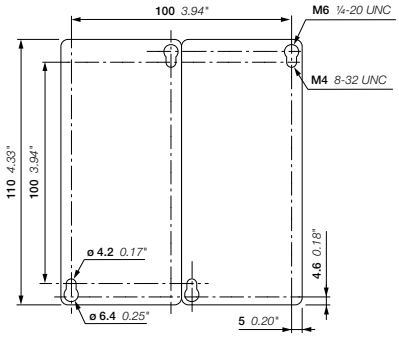
Note: contactor lateral distance to grounded component 2 mm *0.08*" min.

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

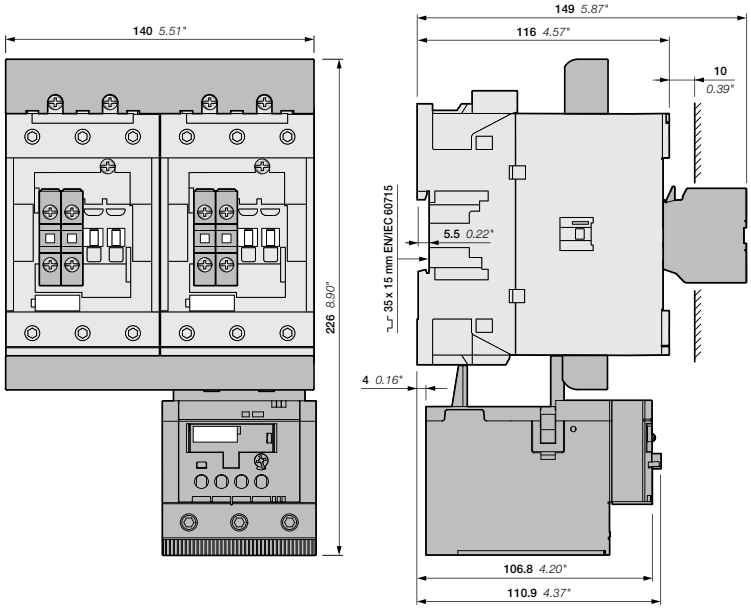
Main dimensions mm, *inches*



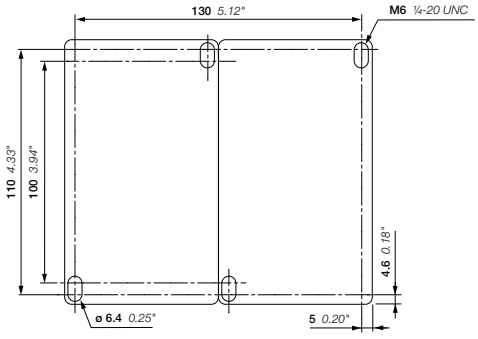
AF40, AF52, AF65
+ BER65-4, VM96-4
+ TF65 thermal overload relay



AF40, AF52, AF65
+ BER65-4, VM96-4
+ TF65 thermal overload relay



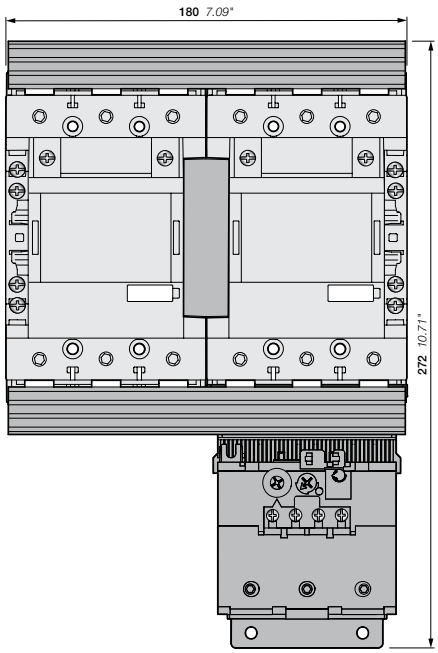
AF80, AF96
+ BER96-4, VM96-4
+ TF96 thermal overload relay

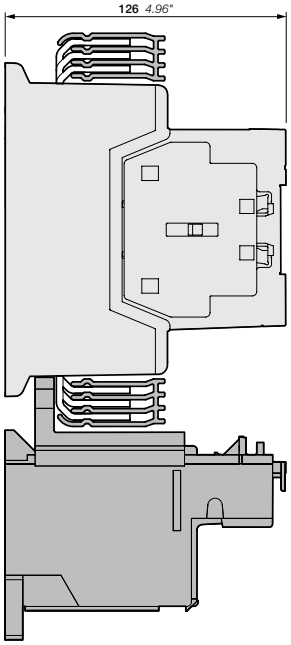


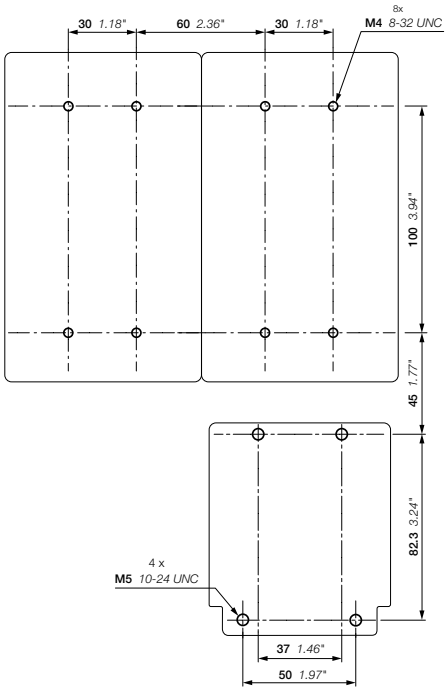
AF80, AF96
+ BER96-4, VM96-4
+ TF96 thermal overload relay

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

Main dimensions mm, *inches*



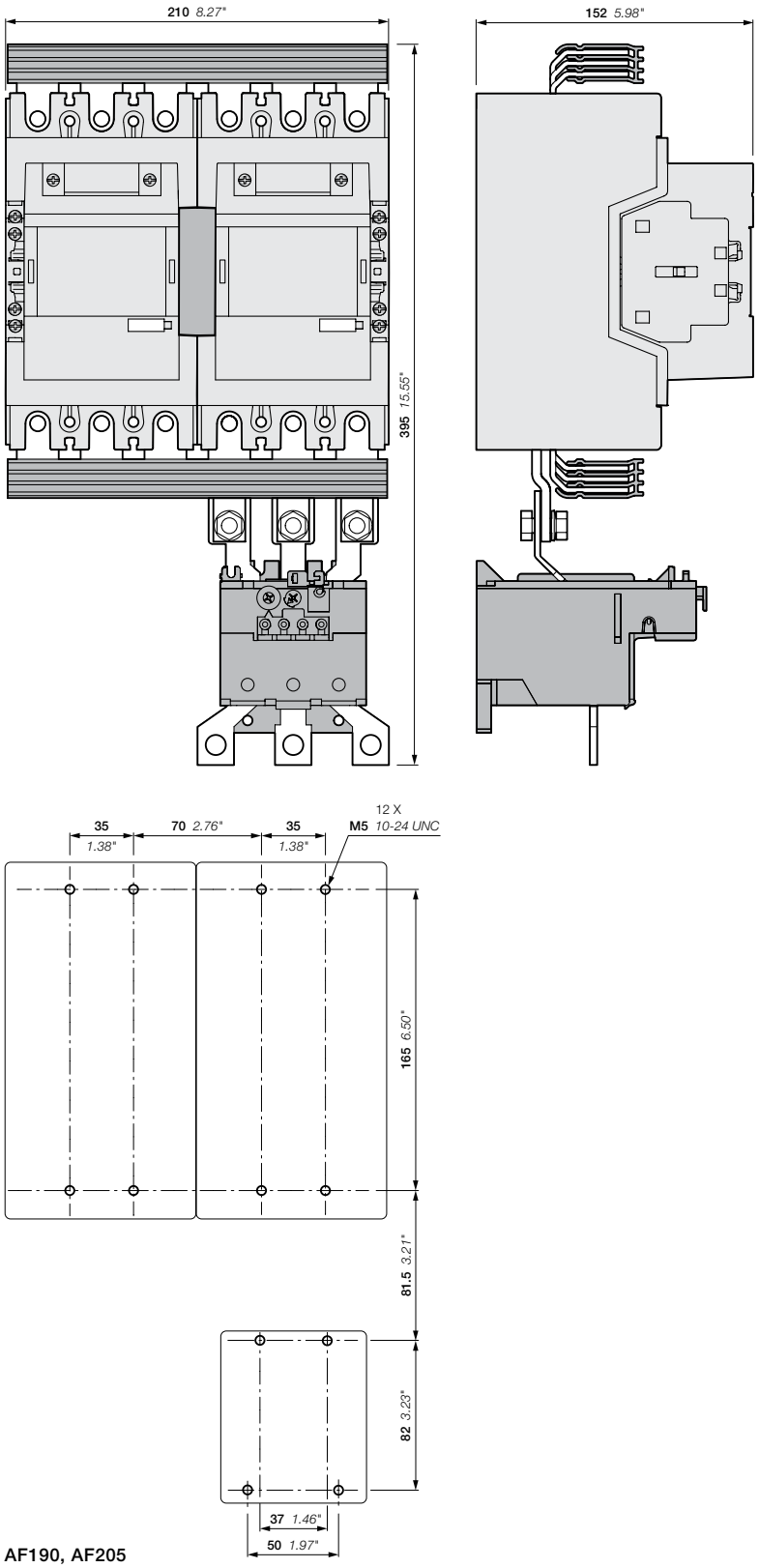




AF116, AF140, AF146
+ BER140-4, VM19
+ TF140 thermal overload relay

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

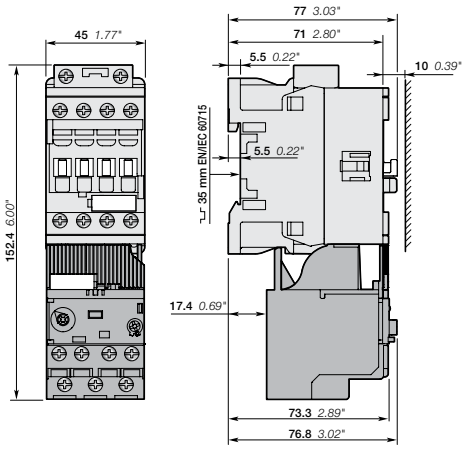
Main dimensions mm, *inches*



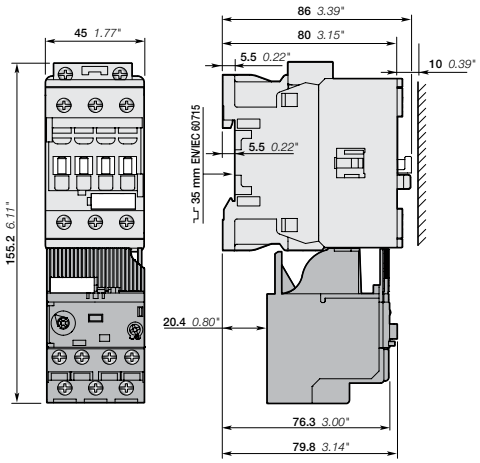
AF190, AF205
+ BER205-4, VM19
+ TA200DU thermal overload relay

DOL starters protected by electronic overload relays
With AF contactors - open type version in kit form

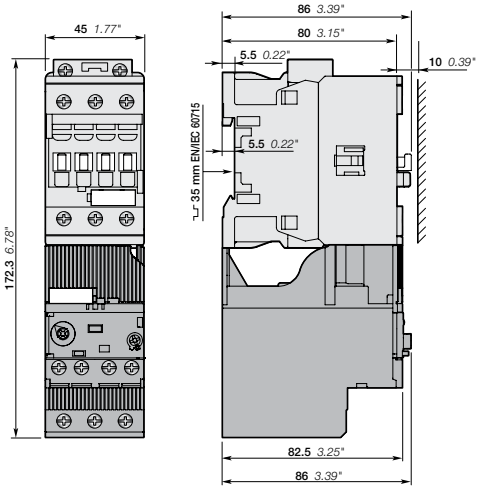
Main dimensions mm, *inches*



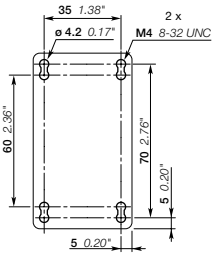
AF09, AF12, AF16
+ EF19 electronic overload relay



AF26, AF30, AF38
+ EF19 electronic overload relay



AF26, AF30, AF38
+ EF45 electronic overload relay

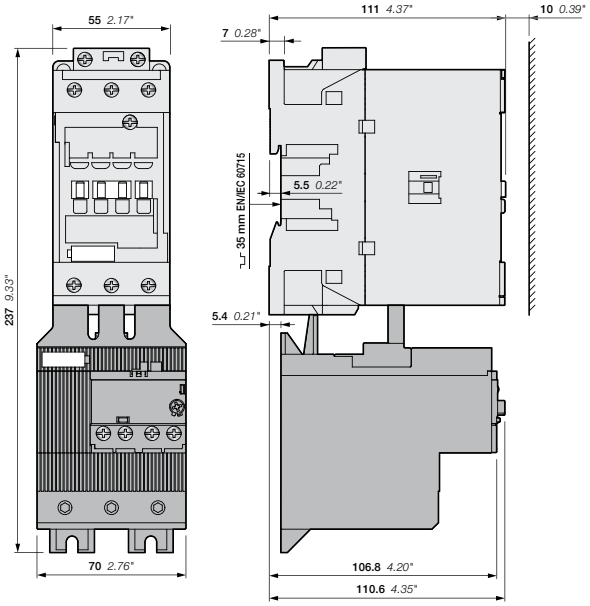


AF09, AF12, AF16, AF26, AF30, AF38
+ EF electronic overload relay

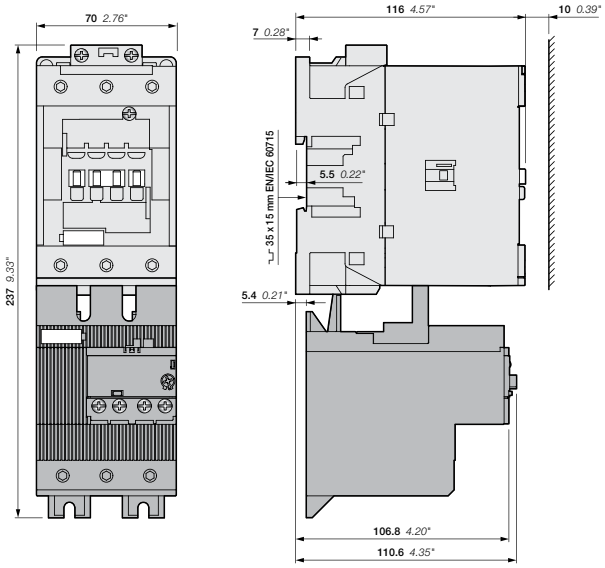
Note: contactor lateral distance to grounded component 2 mm *0.08*" min.

DOL starters protected by electronic overload relays
With AF contactors - open type version in kit form

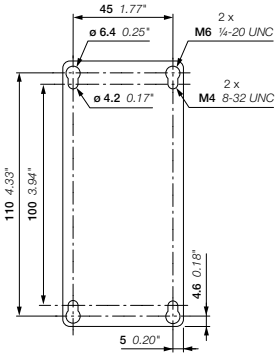
Main dimensions mm, *inches*



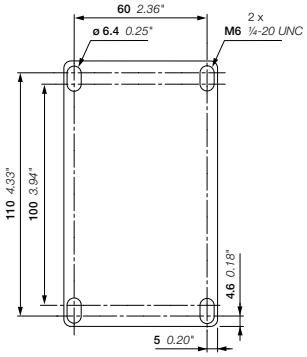
AF40, AF52, AF65
+ EF65 electronic overload relay



AF80, AF96
+ EF96 electronic overload relay



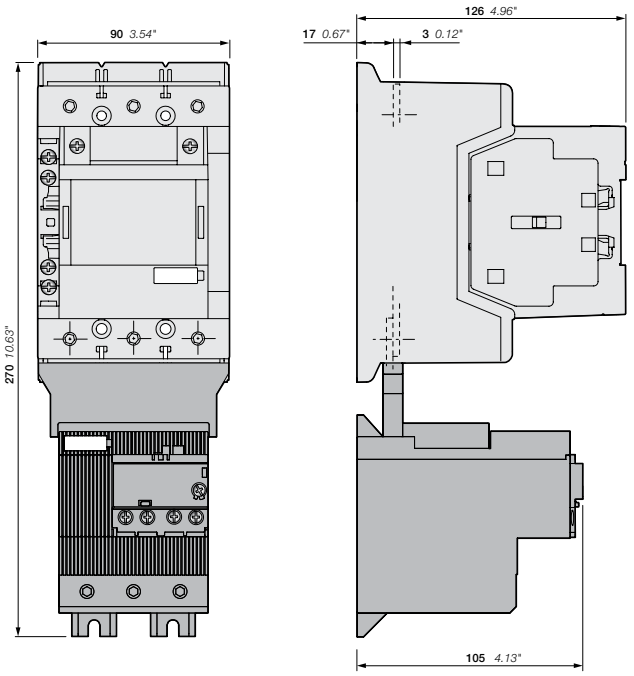
AF40, AF52, AF65
+ EF65 electronic overload relay



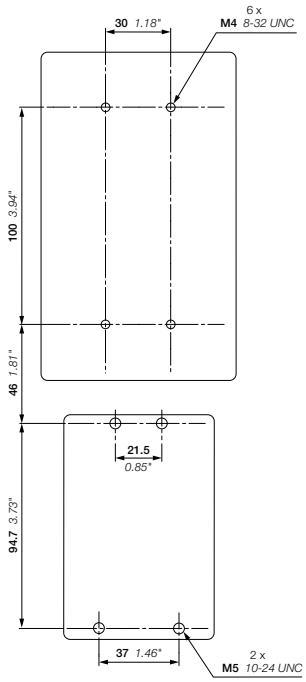
AF80, AF96
+ EF96 electronic overload relay

DOL starters protected by electronic overload relays
With AF contactors - open type version in kit form

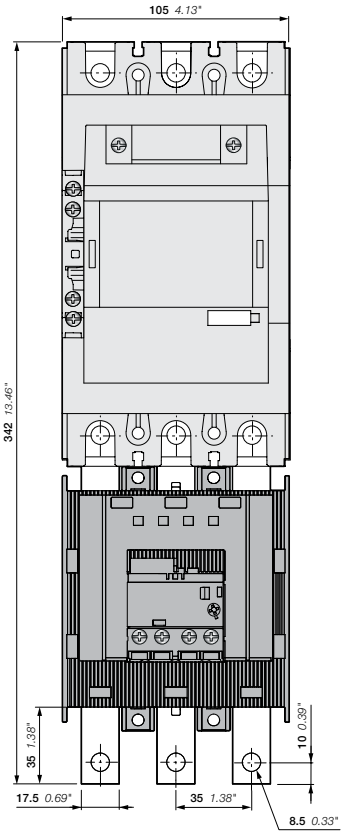
Main dimensions mm, *inches*

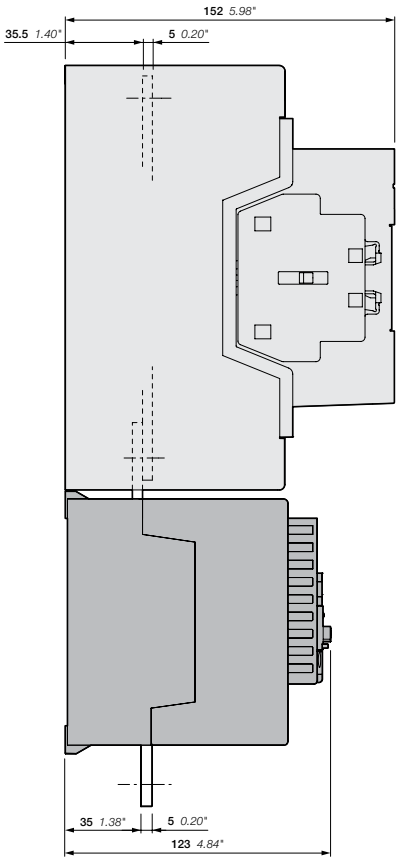


AF116, AF140, AF146-30-11(B)
+ EF146 electronic overload relay

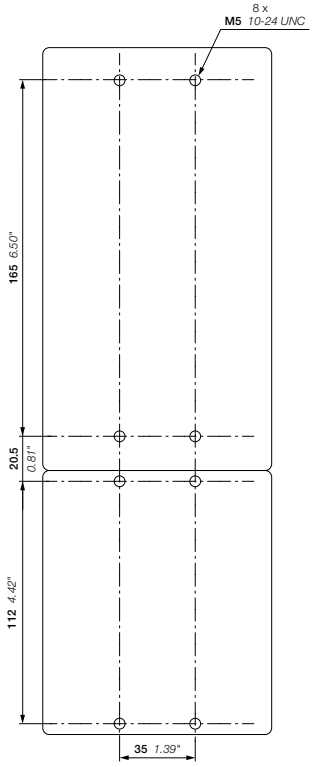


AF116, AF140, AF146-30-11(B)
+ EF146 electronic overload relay





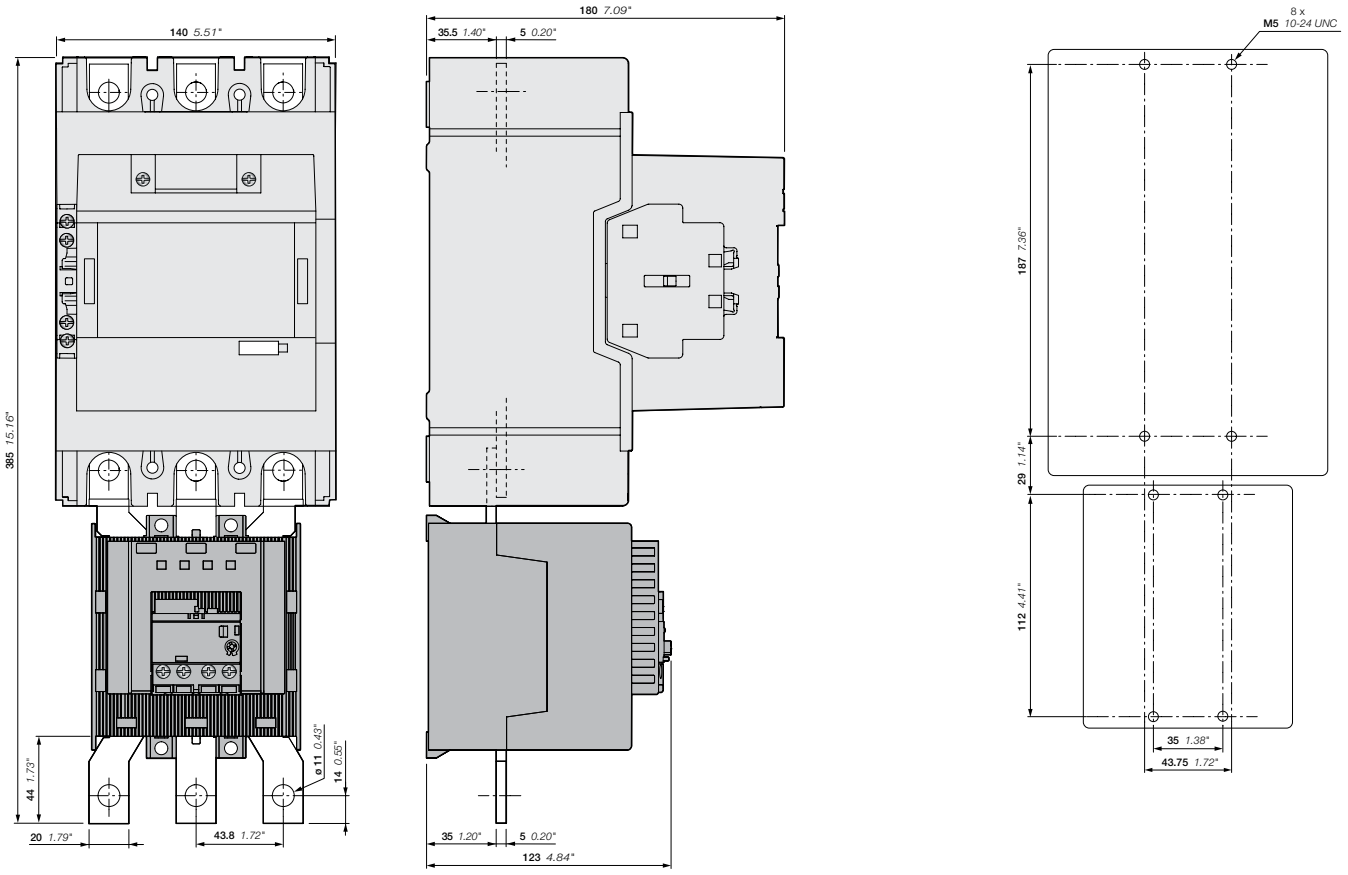
AF190, AF205-30-11
+ EF205 electronic overload relay



AF190, AF205
+ EF205 electronic overload relay

DOL starters protected by electronic overload relays
With AF contactors - open type version in kit form

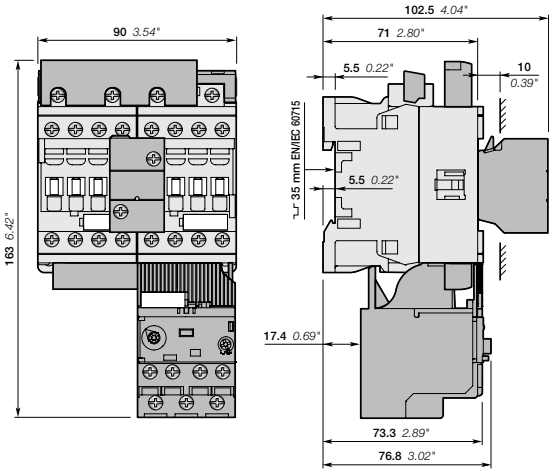
Main dimensions mm, *inches*



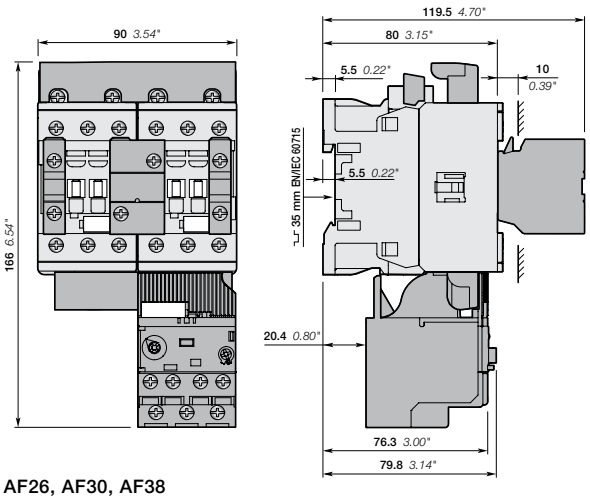
AF265, AF305, AF370-30-11
+ EF370 electronic overload relay

Reversing starters protected by electronic overload relays
With AF contactors - open type version in kit form

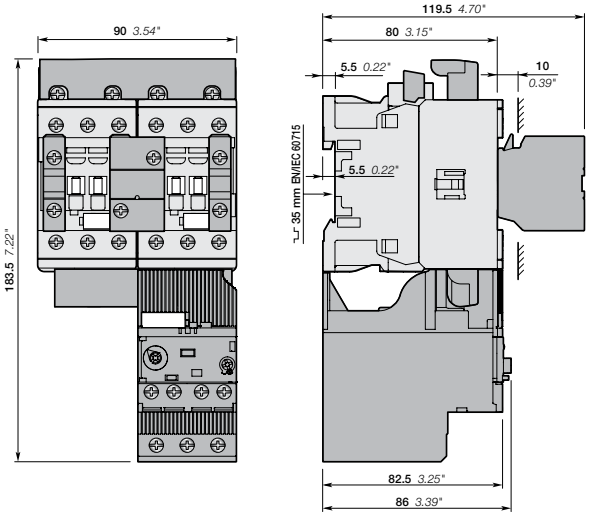
Main dimensions mm, *inches*



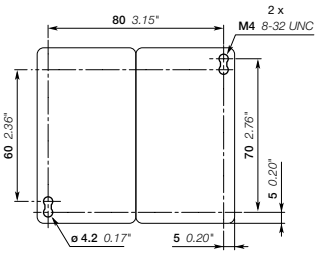
AF09, AF12, AF16
+ BER16-4, VEM4
+ EF19 electronic overload relay



AF26, AF30, AF38
+ BER38-4, VEM4, CA4-10
+ EF19 electronic overload relay



AF26, AF30, AF38
+ BER38-4, VEM4, CA4-10
+ EF45 electronic overload relay

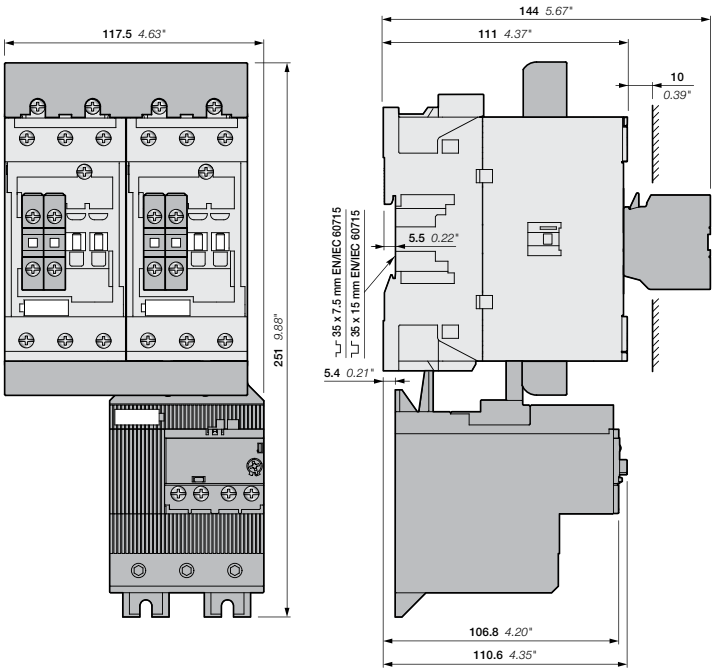


AF09, AF12, AF16, AF26, AF30, AF38

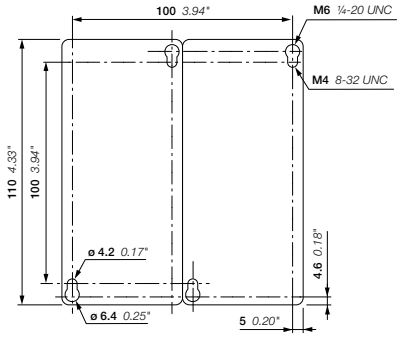
Note: contactor lateral distance to grounded component 2 mm *0.08*" min.

Reversing starters protected by electronic overload relays
With AF contactors - open type version in kit form

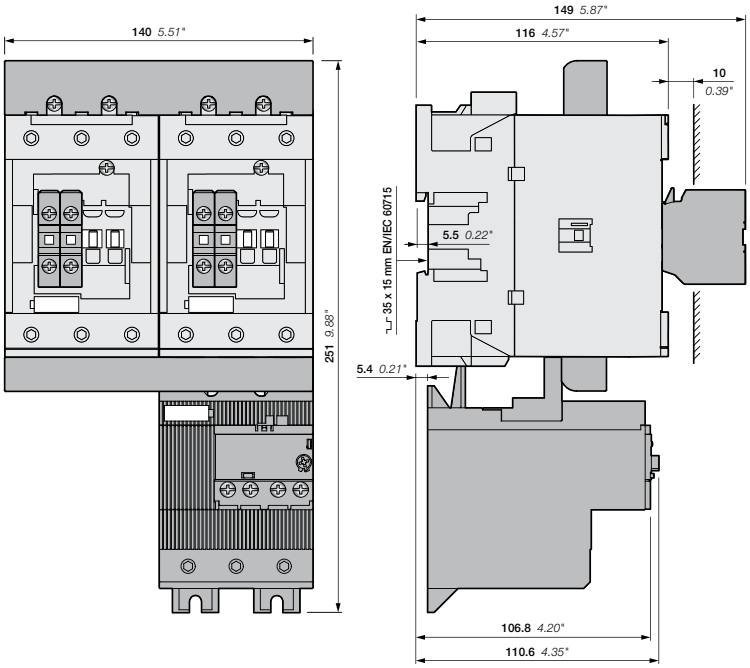
Main dimensions mm, *inches*



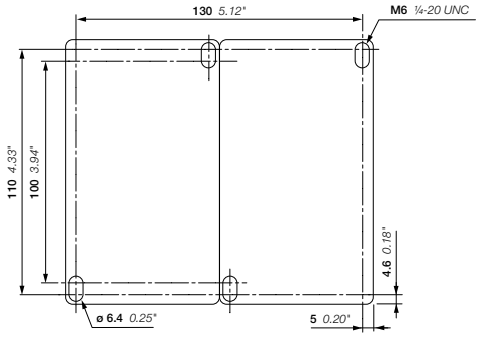
AF40, AF52, AF65
+ BER65-4, VM96-4
+ EF65 electronic overload relay



AF40, AF52, AF65
+ BER65-4, VM96-4
+ EF65 electronic overload relay



AF80, AF96
+ BER96-4, VM96-4
+ EF96 electronic overload relay

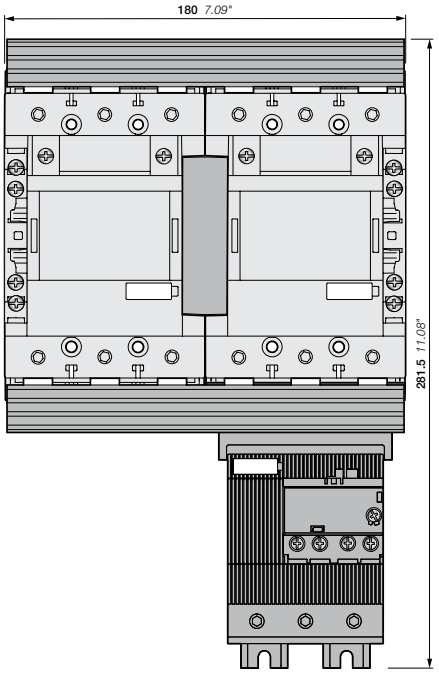


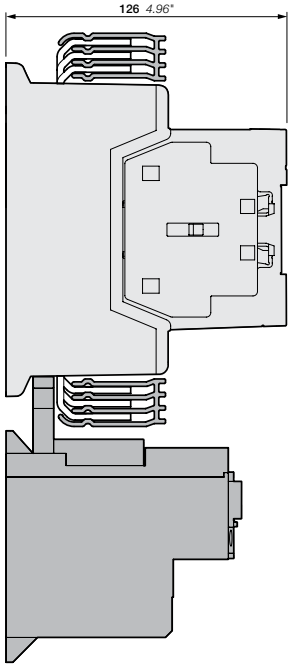
AF80, AF96
+ BER96-4, VM96-4
+ EF96 electronic overload relay

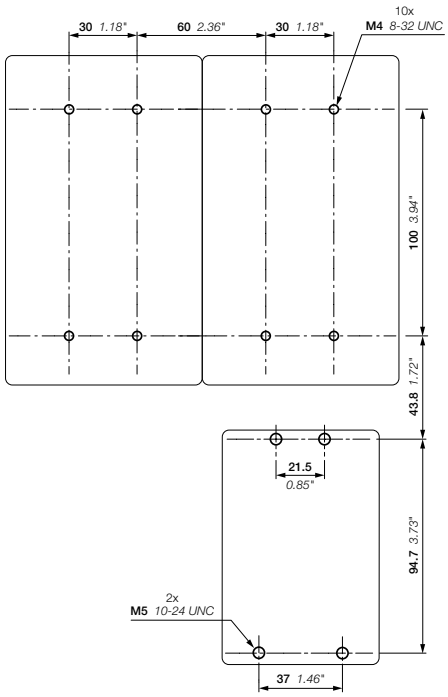
4

Reversing starters protected by electronic overload relays
With AF contactors - open type version in kit form

Main dimensions mm, *inches*



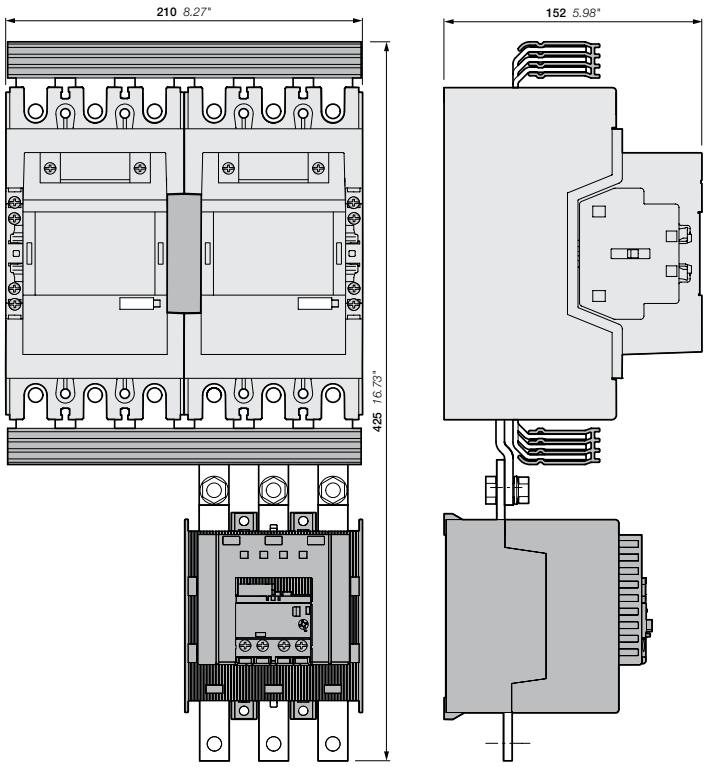


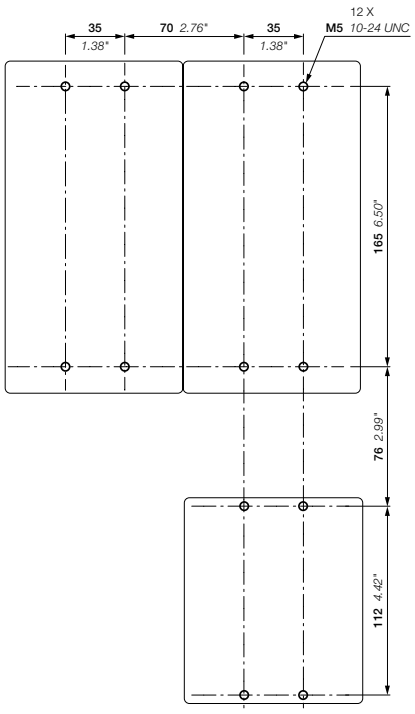


AF116, AF140, AF146
+ BER140-4, VM19
+ EF146 electronic overload relay

Reversing starters protected by electronic overload relays
With AF contactors - open type version in kit form

Main dimensions mm, *inches*

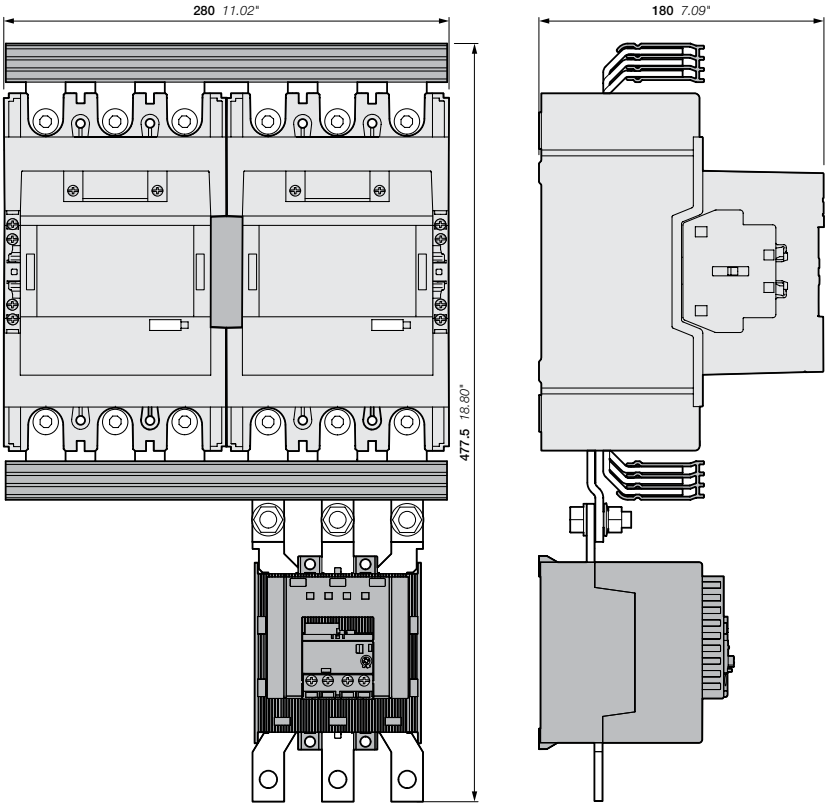


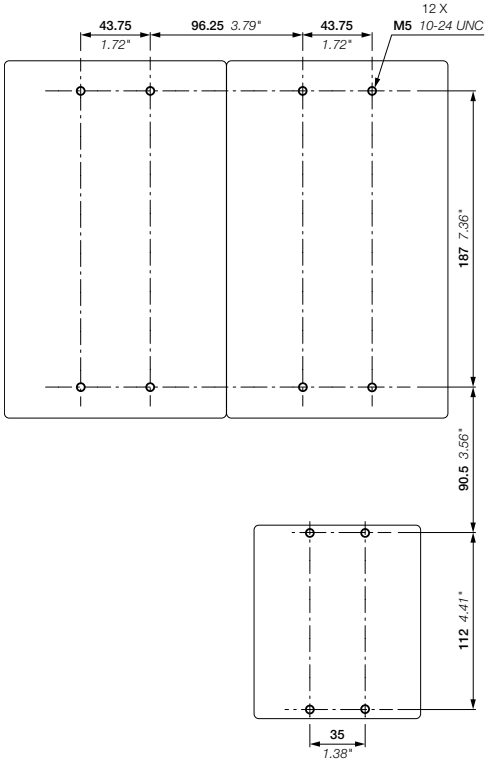


AF190, AF205
+ BER205-4, VM19
+ EF205 electronic overload relay

Reversing starters protected by electronic overload relays
With AF contactors - open type version in kit form

Main dimensions mm, *inches*

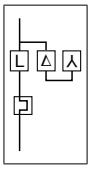




AF265, AF305, AF370
+ BER370-4, VM19
+ EF370 electronic overload relay

Notes

Star-delta starters protected by overload relays
With AF contactors - Open type version in kit form



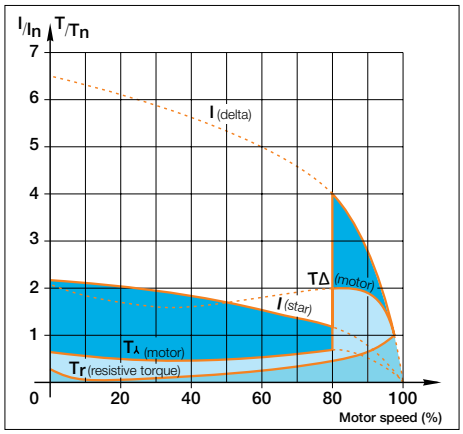
AF16-30-10 + AF16-30-10 + AF09-30-10 + BEY16-4 + VEM4 + TF42

AF140-30-11 + AF140-30-11 + AF140-30-11 + BEY140-4 + VM19 + EF146

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.



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...

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:

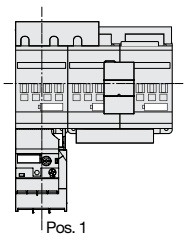
1st stage: "Star" connection - Press the "On" button on the control circuit to close the KM2 "Star" contactor. The KM1 "line" contactor then closes and the motor starts. Countdown of programmed starting time (6 to 10 s) then begins.

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 countdown 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.

Mounting positions

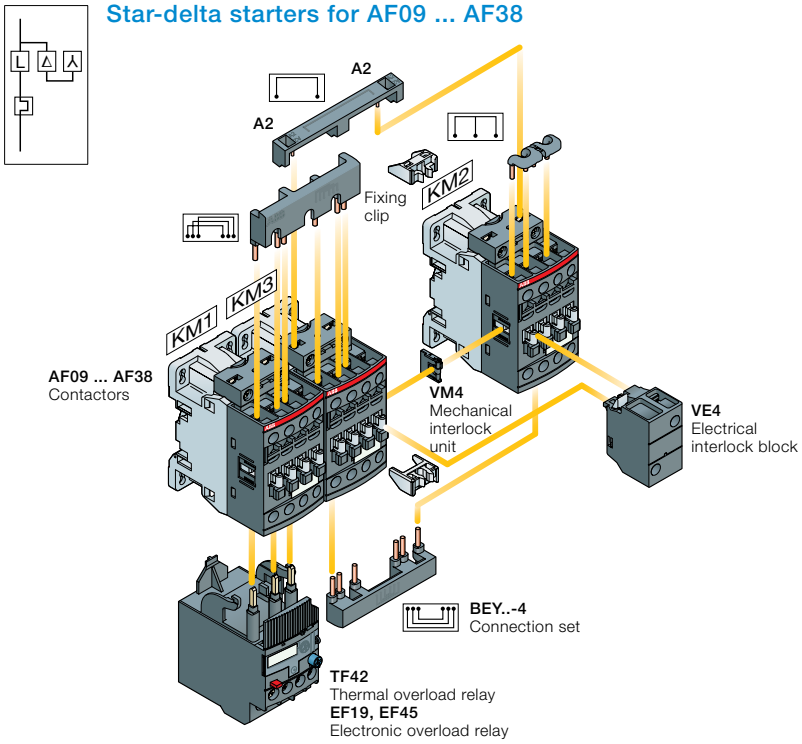


Main technical data

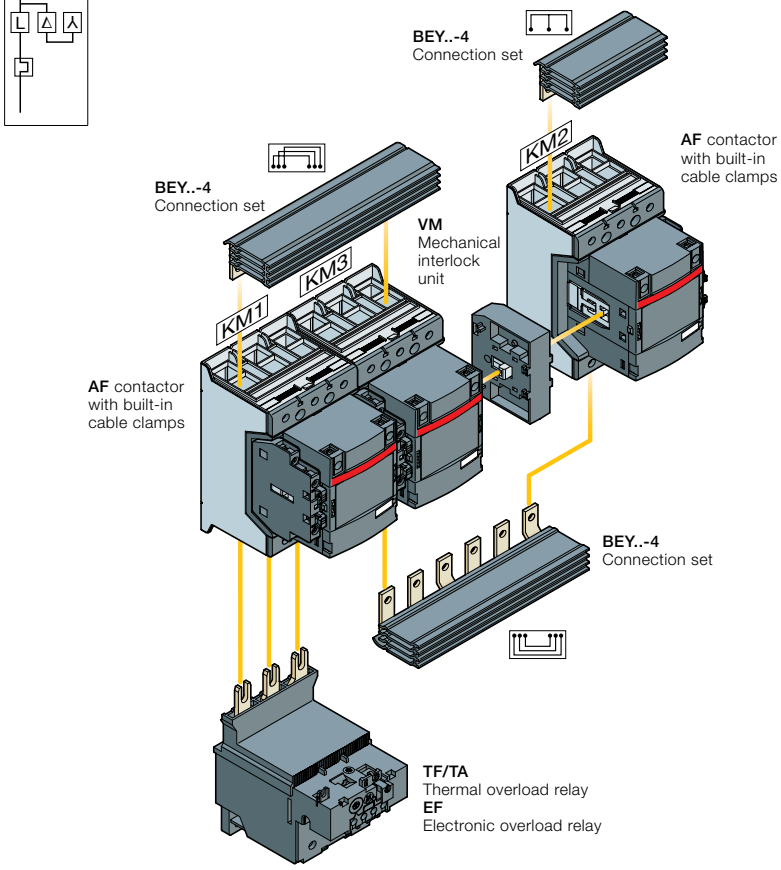
Standards	IEC 60947-4-1 / EN 60947-4-1
Rated operational voltage Ue max.	690 V - 50/60 Hz
Rated insulation voltage Ui	
acc. to IEC 60947-4-1	690 V
acc. to UL / CSA	600 V
Ambient air temperature	
Close to the device	≤ 60 °C (TF42: 38 A above ≤ 50 °C)
Degree of protection	IP20
Switching frequency	Refer to "Switching frequency diagrams" page

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

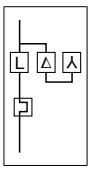
You can easily assemble star-delta starter thanks to our complete range of accessories:

- 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.

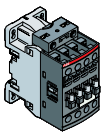
Select now easily and quickly your starter in the following pages at 400 V, up to 200 kW.

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"

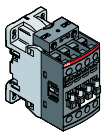
Star-delta starters protected by thermal overload relays
With AF contactors - Open type version in kit form



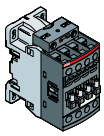
Line contactor KM1



Delta contactor KM3



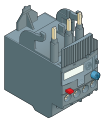
Star contactor KM2



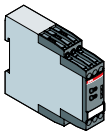
IEC AC-3 Rated power 220 V kW	230/240 V kW	380 V kW	400 V kW	415 V kW	440 V kW	500 V kW	690 V kW	Rated current 400 V A	Control voltage Uc min. ... Uc max. [1] V 50/60 Hz	V DC	Catalog number	Global code	Catalog number	Global code	Catalog number	Global code
4	4	7.5	7.5	7.5	7.5	9	9	15.5	24...60	20...60	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

[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.

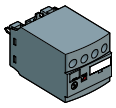
Thermal overload relays [2]



Electronic timers [3]



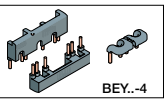
CT-ERS



TEF4-ON
Uc = 24...240 V
50/60 Hz or DC

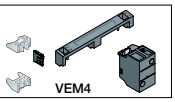
Accessories

Connection sets



BEY..-4

Mechanical and electrical interlock sets



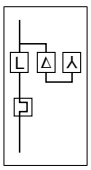
VEM4

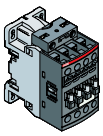
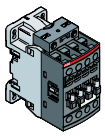
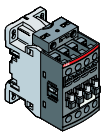
Auxiliary contact blocks

CA4

Setting ranges A	Catalog number	Global code		Catalog number	Global code		Catalog number	Global code		Catalog number	Global 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		-	-

Star-delta starters protected by electronic overload relays
With AF contactors - Open type version in kit form

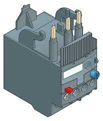


	Line contactor KM1	Delta contactor KM3	Star contactor KM2
			

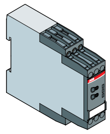
IEC AC-3 Rated power 220 V kW	230/240 V kW	380 V kW	400 V kW	415 V kW	440 V kW	500 V kW	690 V kW	Rated current 400 V A	Control voltage Uc min. ... Uc max.[1] V 50/60 Hz	V DC	Catalog number	Global code	Catalog number	Global code	Catalog number	Global code
4	4	7.5	7.5	7.5	7.5	9	9	15.5	24...60	20...60	AF09Z-30-10-21	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.

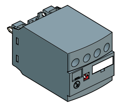
Electronic overload relays[2]



Electronic timers[3]



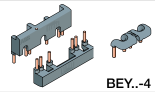
CT-ERS



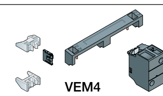
TEF4-ON
Uc = 24...240 V
50/60 Hz or DC

Accessories

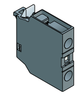
Connection sets



Mechanical and electrical interlock sets



Auxiliary contact blocks



Setting ranges A	Catalog number	Global code	Catalog number	Global code	Catalog number	Global code	Catalog number	Global 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	-	-

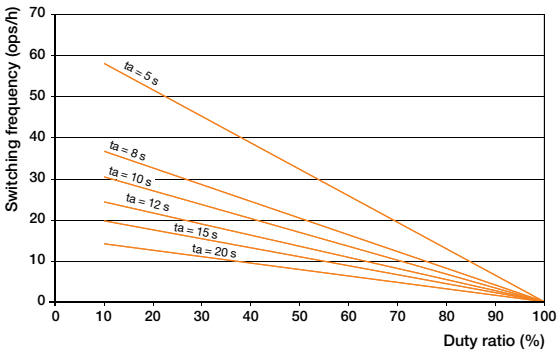
Star-delta starters protected by overload relays
With AF contactors - Open type version in kit form
Switching frequency diagrams

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.

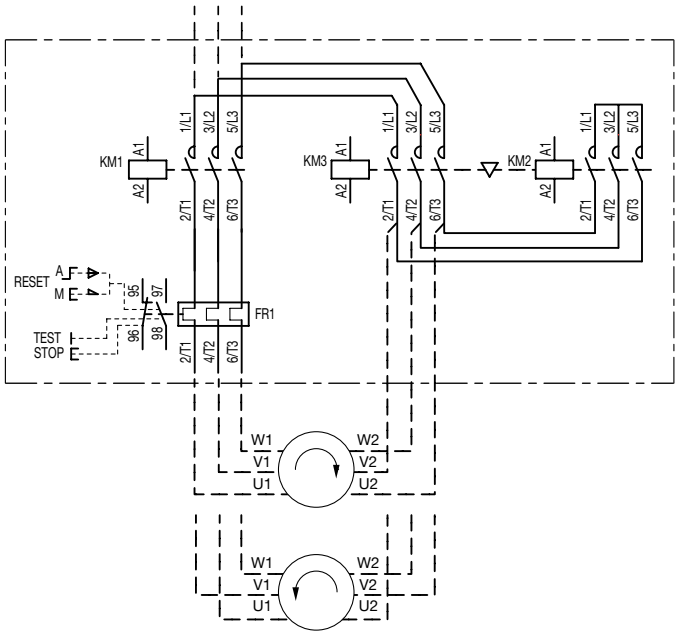
Electronic overload relay

Please consult us

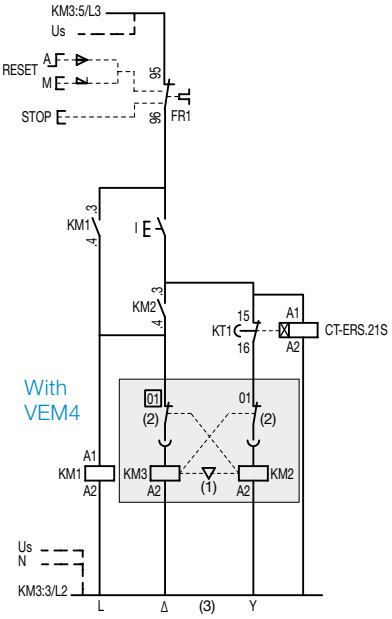
Star-delta starters protected by overload relays
With AF contactors - Open type version in kit form
Wiring diagrams with CT-ERS.21S timer

Star-delta starters

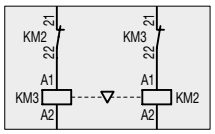
Power circuit



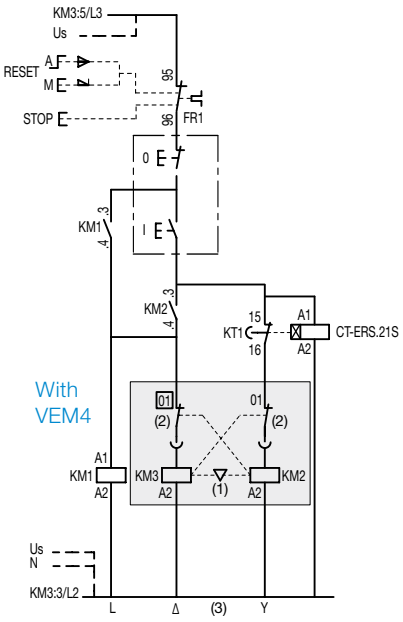
AC or DC local control with CT-ERS.21S timer



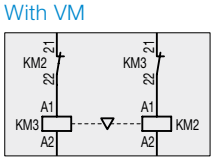
With VM



AC or DC remote control with CT-ERS.21S timer



With VM

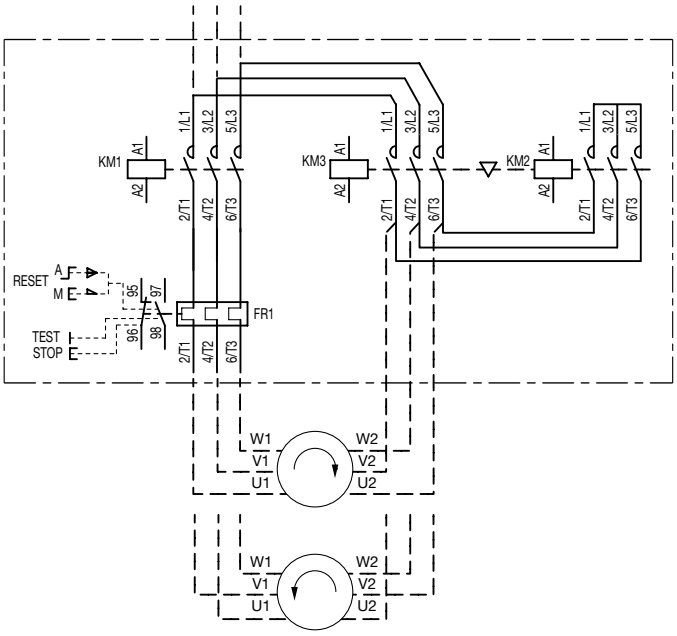


Note: - VEM4 = VM4 (1) + VE4 (2) with A2-A2 (3) connection
(Except for coil Uc 12-20 V DC : use VM4 with CA4).
- coil Uc 12-20 V DC : A1+, A2-

Star-delta starters protected by overload relays
With AF contactors - Open type version in kit form
Wiring diagrams with TEF4-ON timer

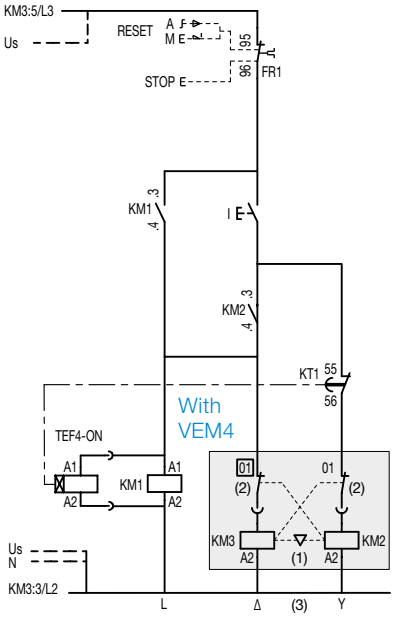
Star-delta starters

Power circuit

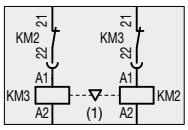


AC or DC local control with TEF4-ON timer

Uc = 24...240 V 50/60 Hz or DC

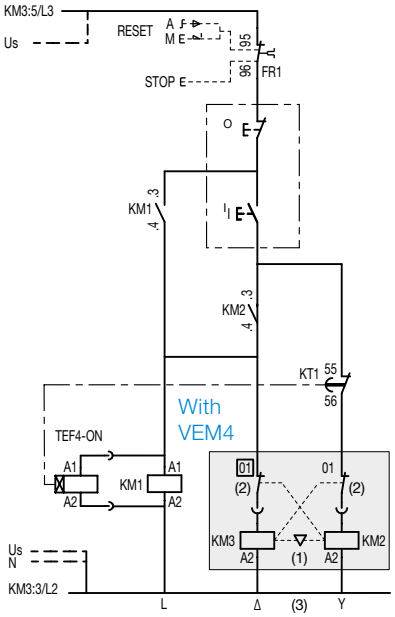


With VM

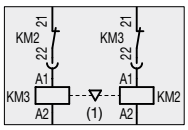


AC or DC remote control with TEF4-ON timer

Uc = 24...240 V 50/60 Hz or DC



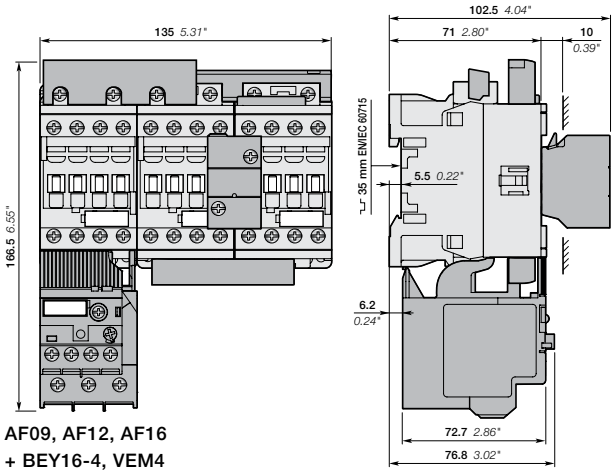
With VM



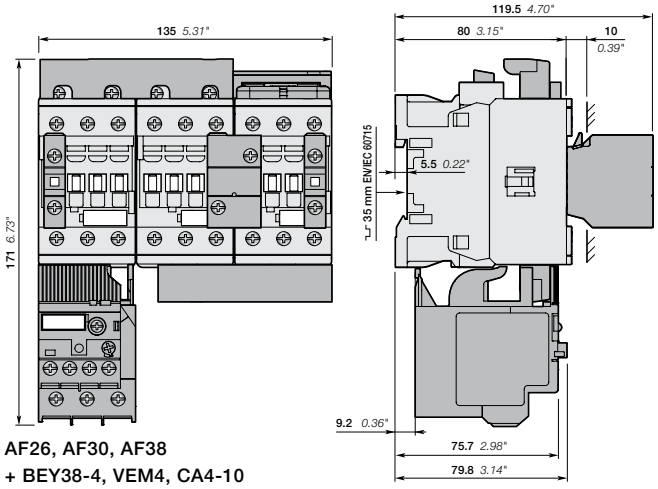
Note: VEM4 = VM4 (1) + VE4 (2) with A2-A2 (3) connection

Star-delta starters protected by thermal overload relays
With AF contactors - Open type version in kit form

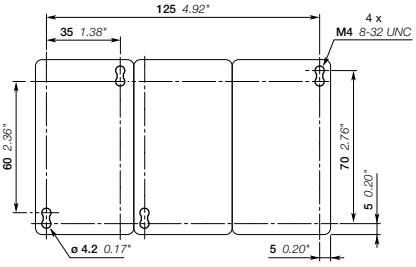
Main dimensions mm, *inches*



AF09, AF12, AF16
+ BEY16-4, VEM4
+ TF42 thermal overload relay



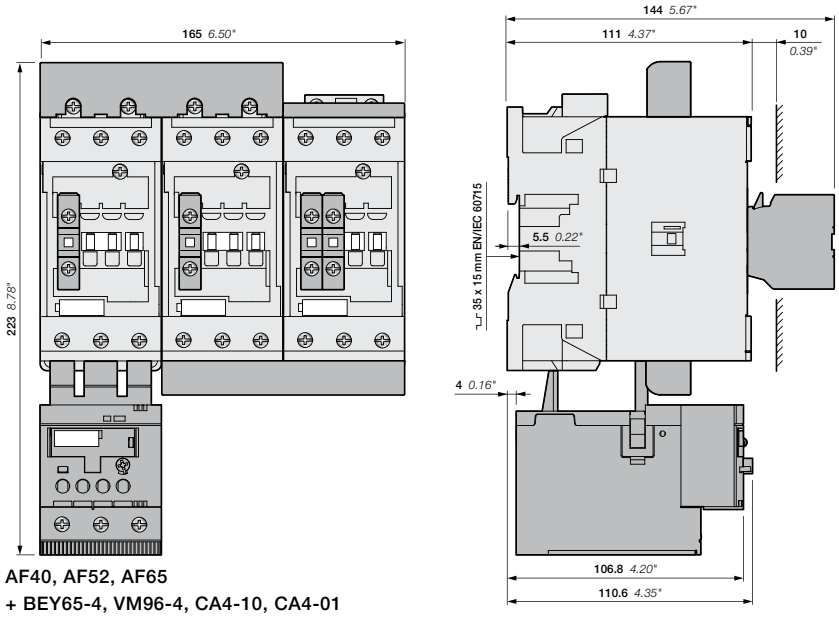
AF26, AF30, AF38
+ BEY38-4, VEM4, CA4-10
+ TF42 thermal overload relay



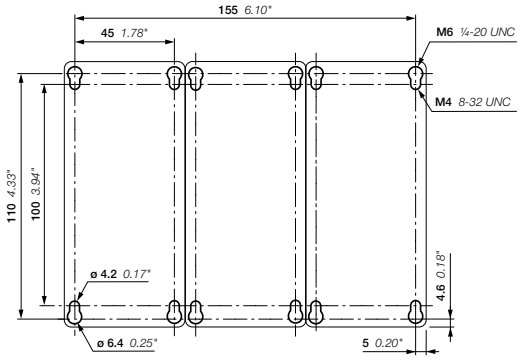
Note: contactor lateral distance to grounded component 2 mm *0.08*" min.

Star-delta starters protected by thermal overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*

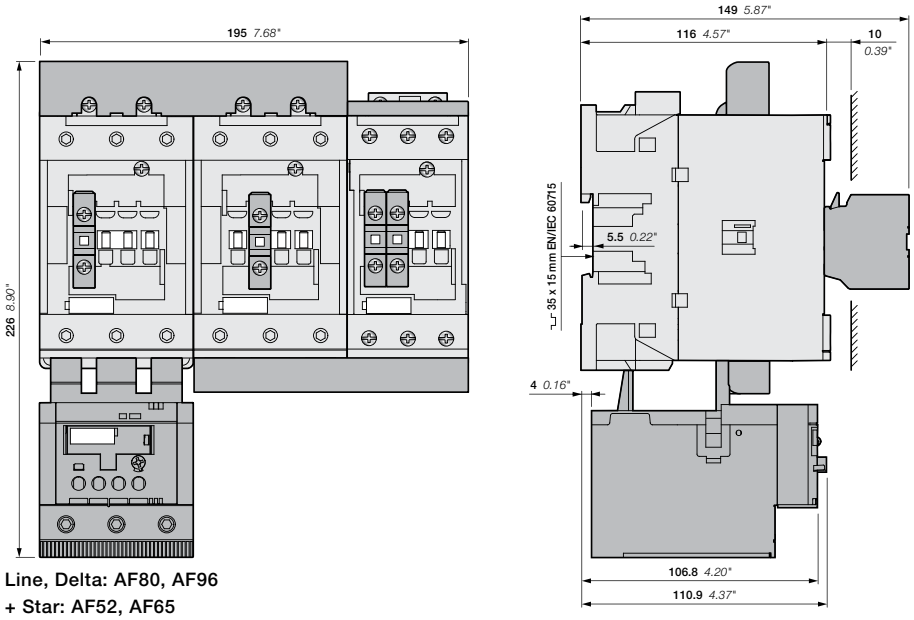


AF40, AF52, AF65
+ BEY65-4, VM96-4, CA4-10, CA4-01
+ TF65 thermal overload relay

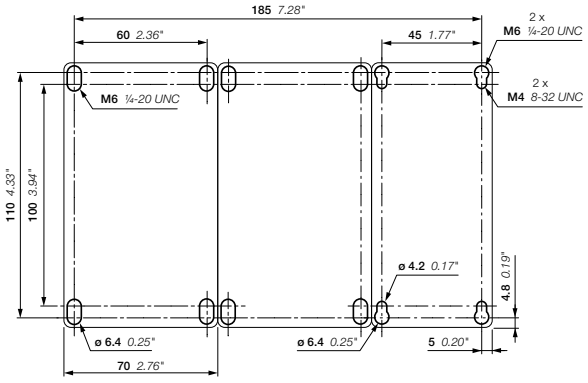


Star-delta starters protected by thermal overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*

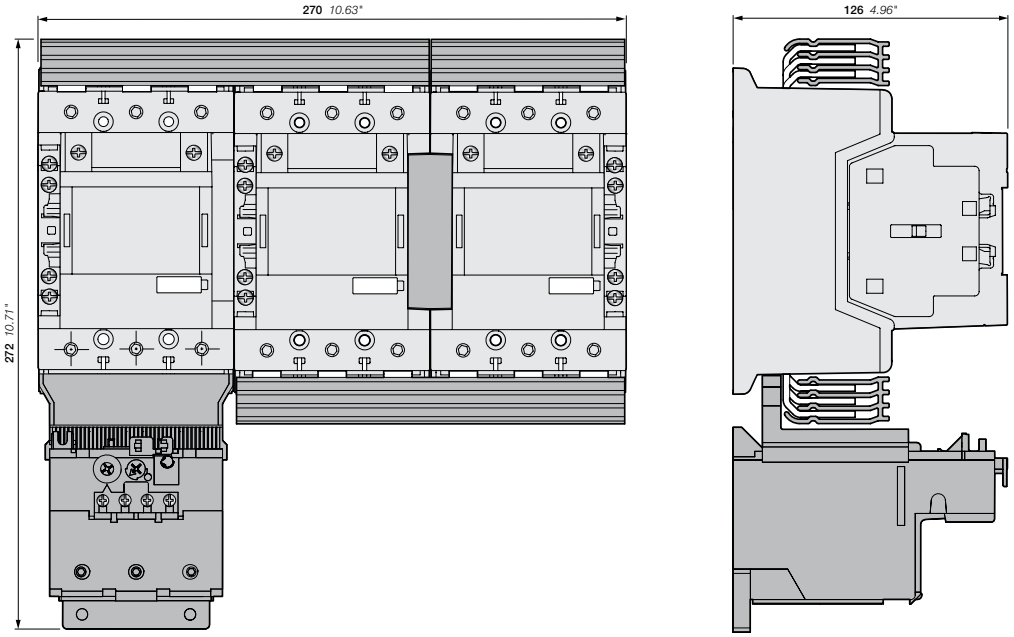


Line, Delta: AF80, AF96
+ Star: AF52, AF65
+ BEY96-4, VM96-4, CA4-10, CA4-01
+ TF96 thermal overload relay

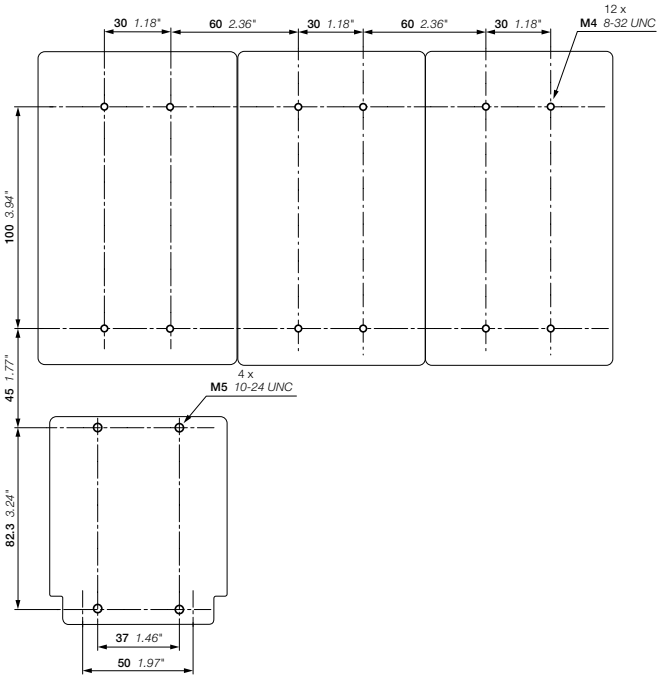


Star-delta starters protected by thermal overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*

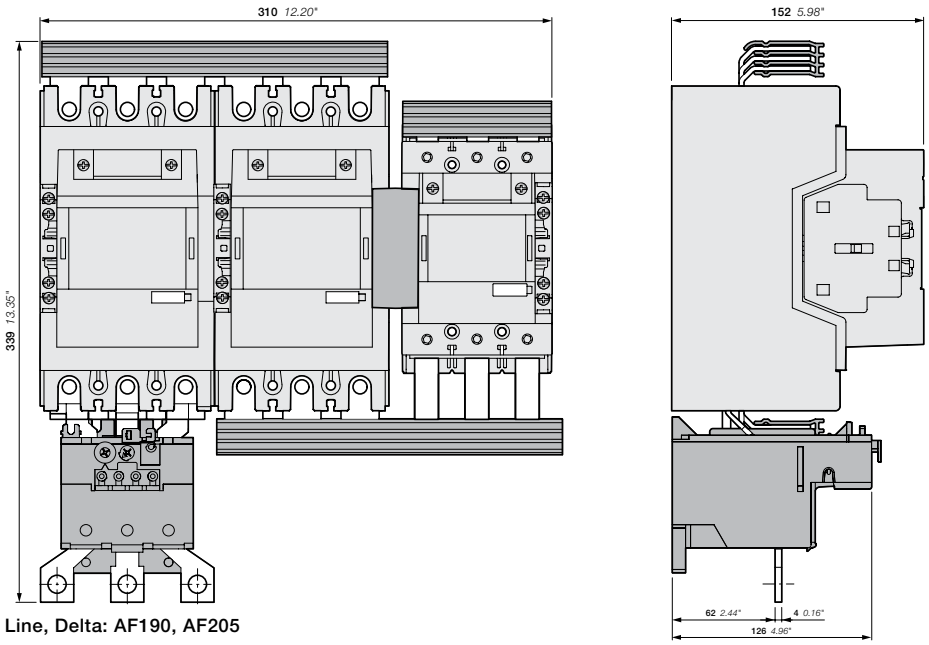


AF116, AF140, AF146
+ BEY140-4, VM19
+ TF140 thermal overload relay

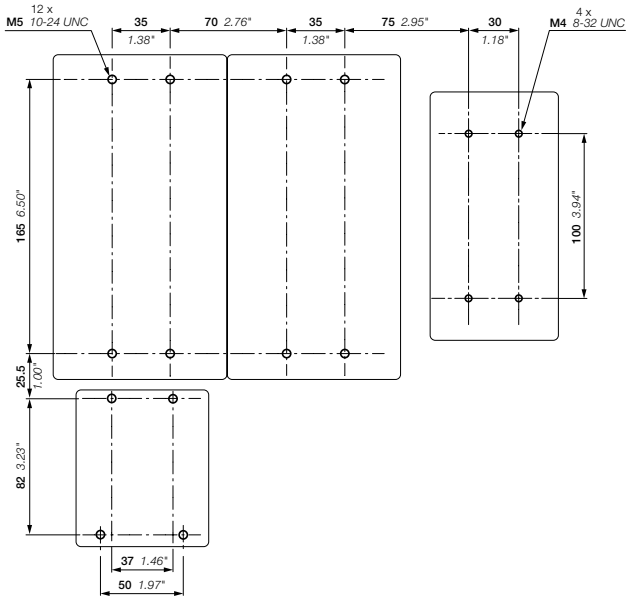


Star-delta starters protected by thermal overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*

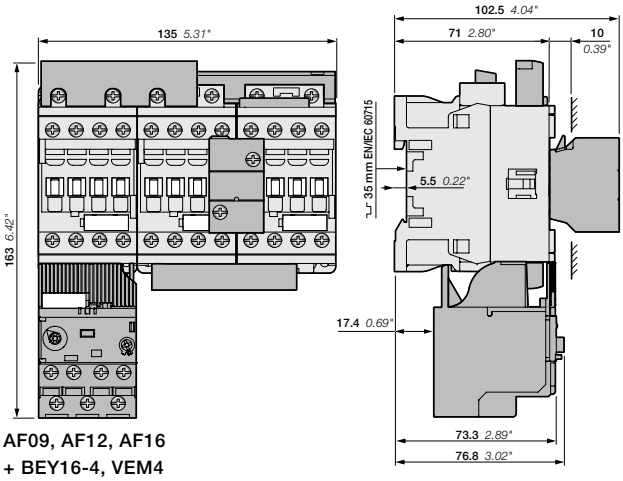


Line, Delta: AF190, AF205
+ Star: AF116, AF140, AF146
+ BEY190-4, VM140/190
+ TA200 thermal overload relay

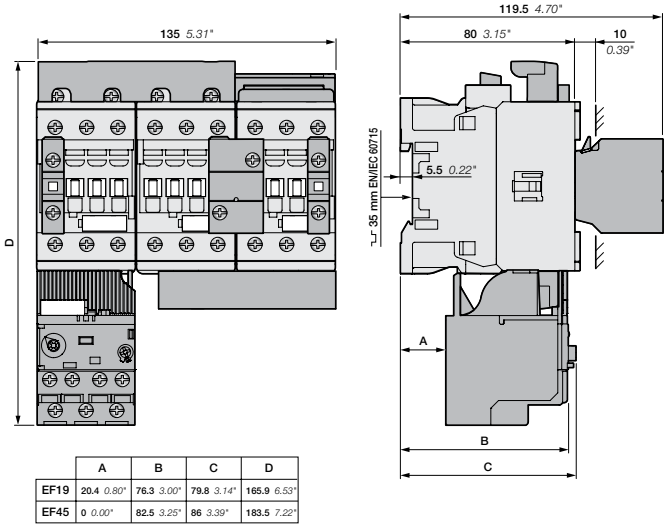


Star-delta starters protected by electronic overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*

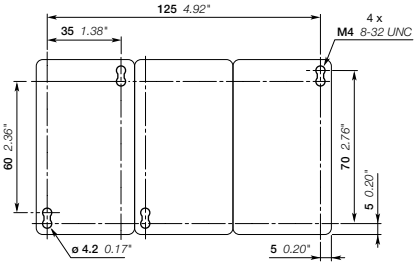


AF09, AF12, AF16
+ BEY16-4, VEM4
+ EF19 electronic overload relay



	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"*

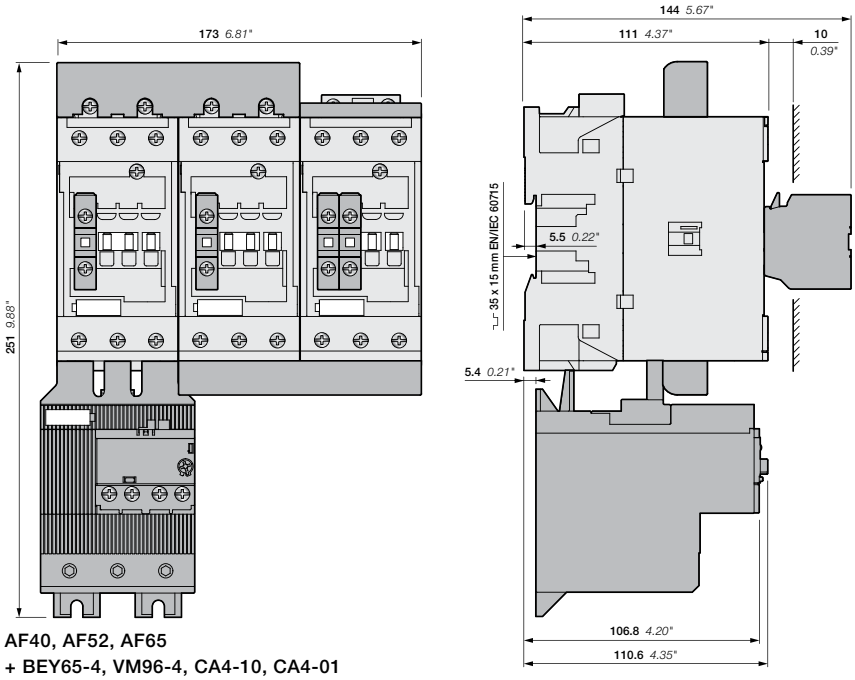
AF26, AF30, AF38
+ BEY38-4, VEM4, CA4-10
+ EF19/EF45 electronic overload relay



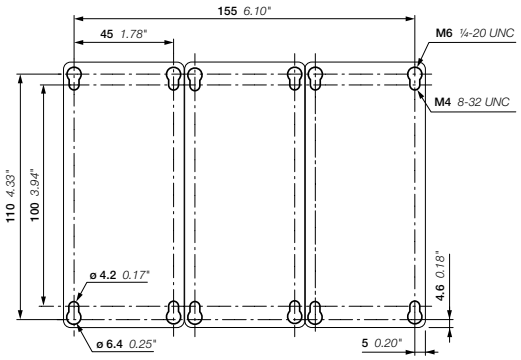
Note: contactor lateral distance to grounded component 2 mm *0.08"* min.

Star-delta starters protected by electronic overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*

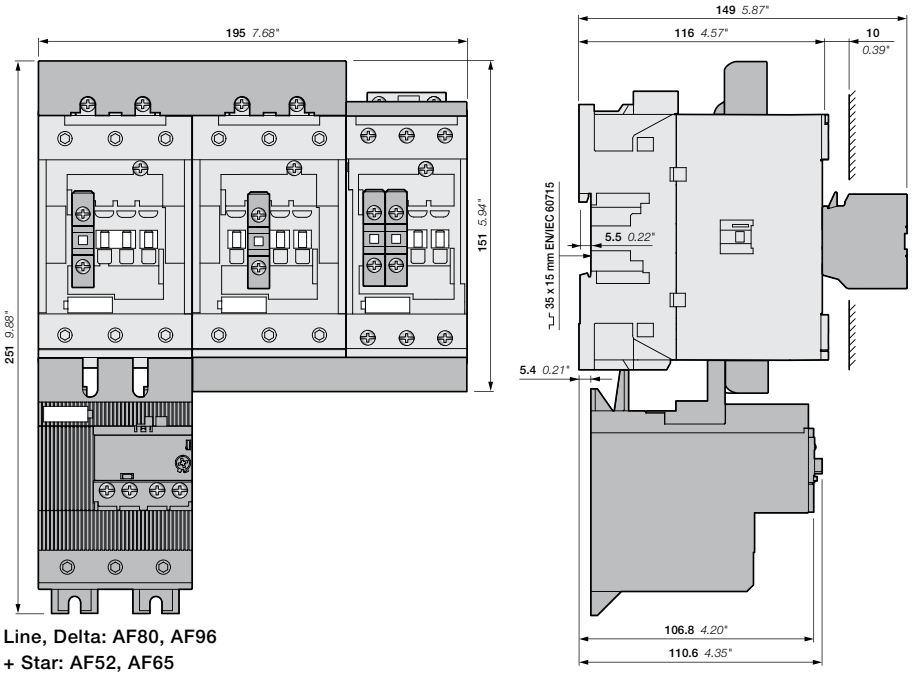


AF40, AF52, AF65
+ BEY65-4, VM96-4, CA4-10, CA4-01
+ EF65 electronic overload relay

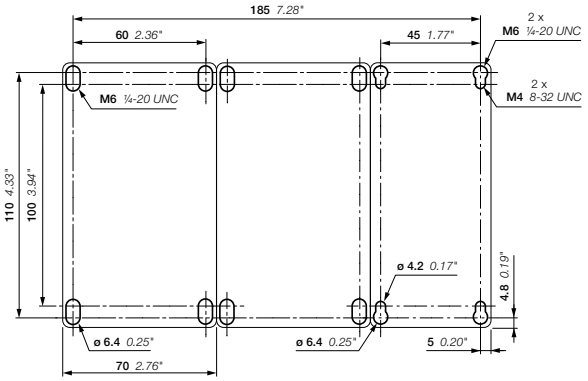


Star-delta starters protected by electronic overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*

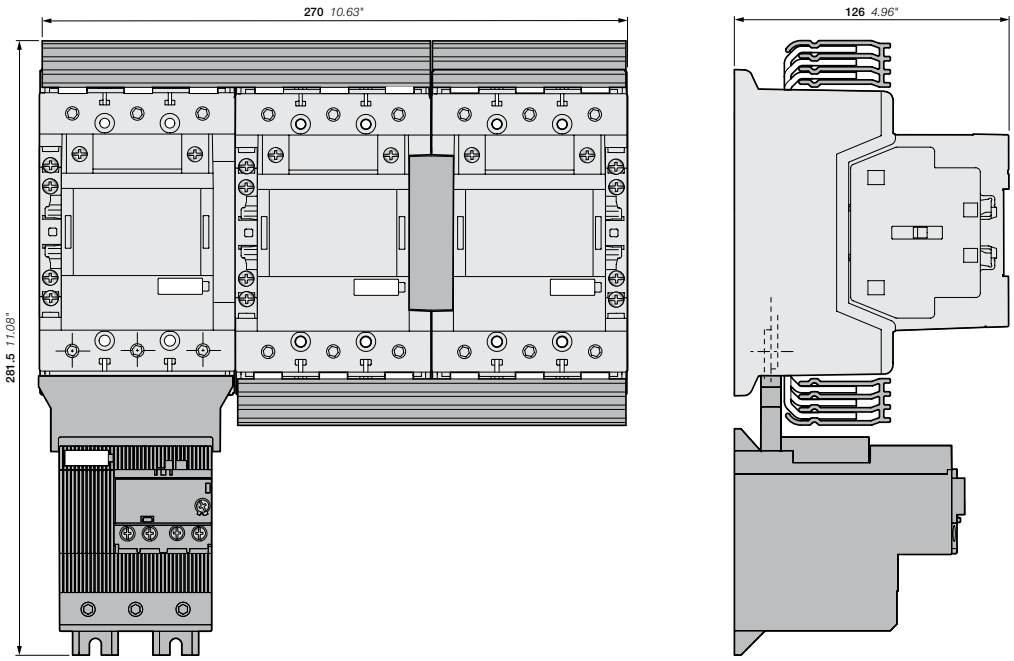


Line, Delta: AF80, AF96
+ Star: AF52, AF65
+ BEY96-4, VM96-4, CA4-10, CA4-01
+ EF96 electronic overload relay

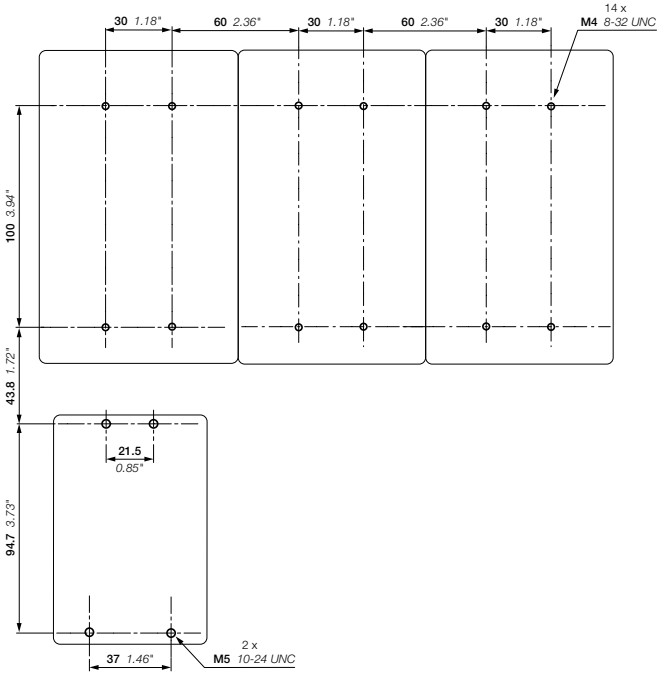


Star-delta starters protected by electronic overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*

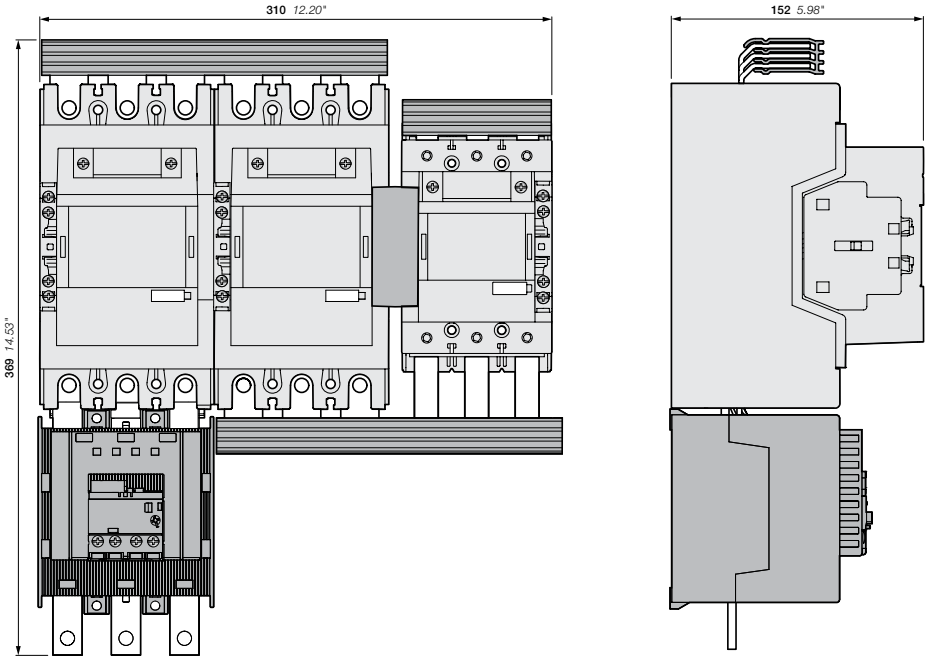


AF116, AF140, AF146
+ BEY140-4, VM19
+ EF146 electronic overload relay

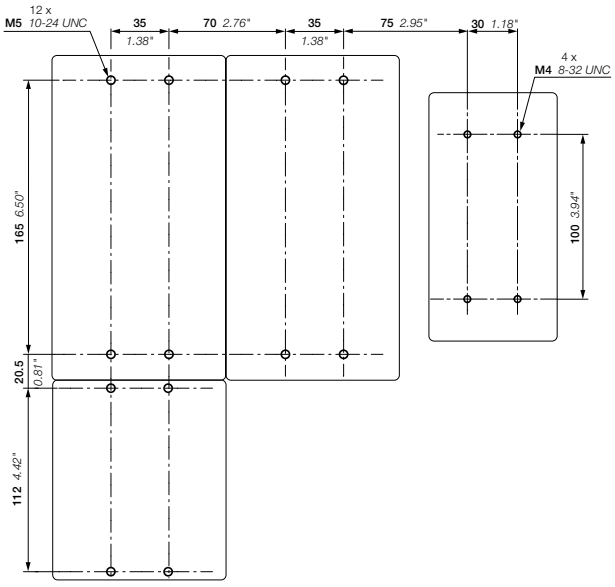


Star-delta starters protected by electronic overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*

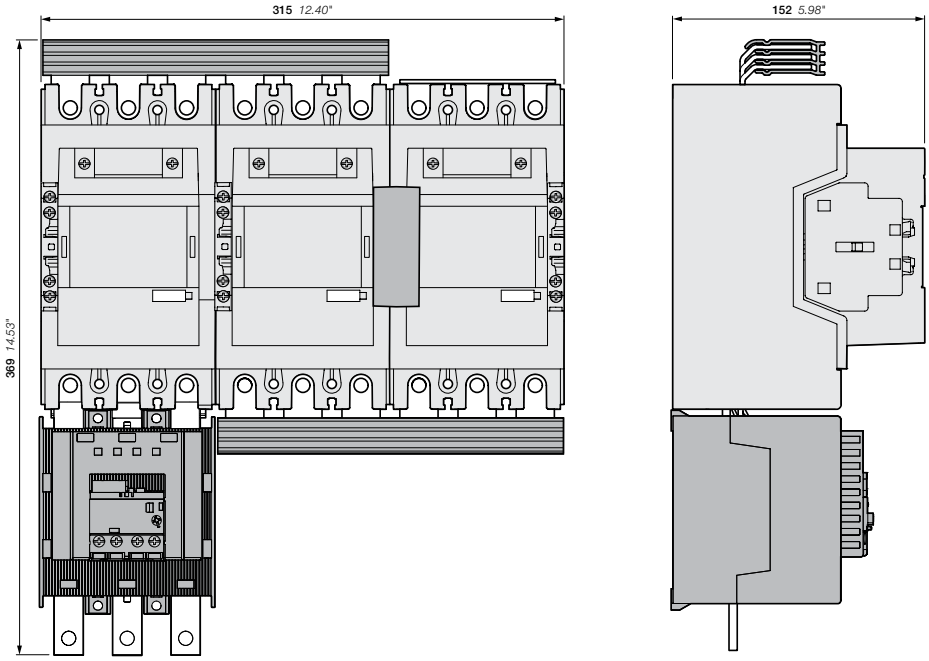


Line, Delta: AF190, AF205
+ Star: AF116, AF140, AF146
+ BEY190-4, VM140/190
+ EF205 electronic overload relay

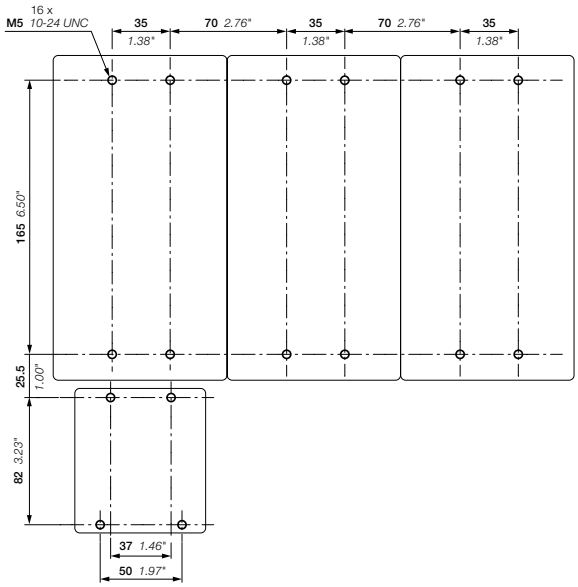


Star-delta starters protected by electronic overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*

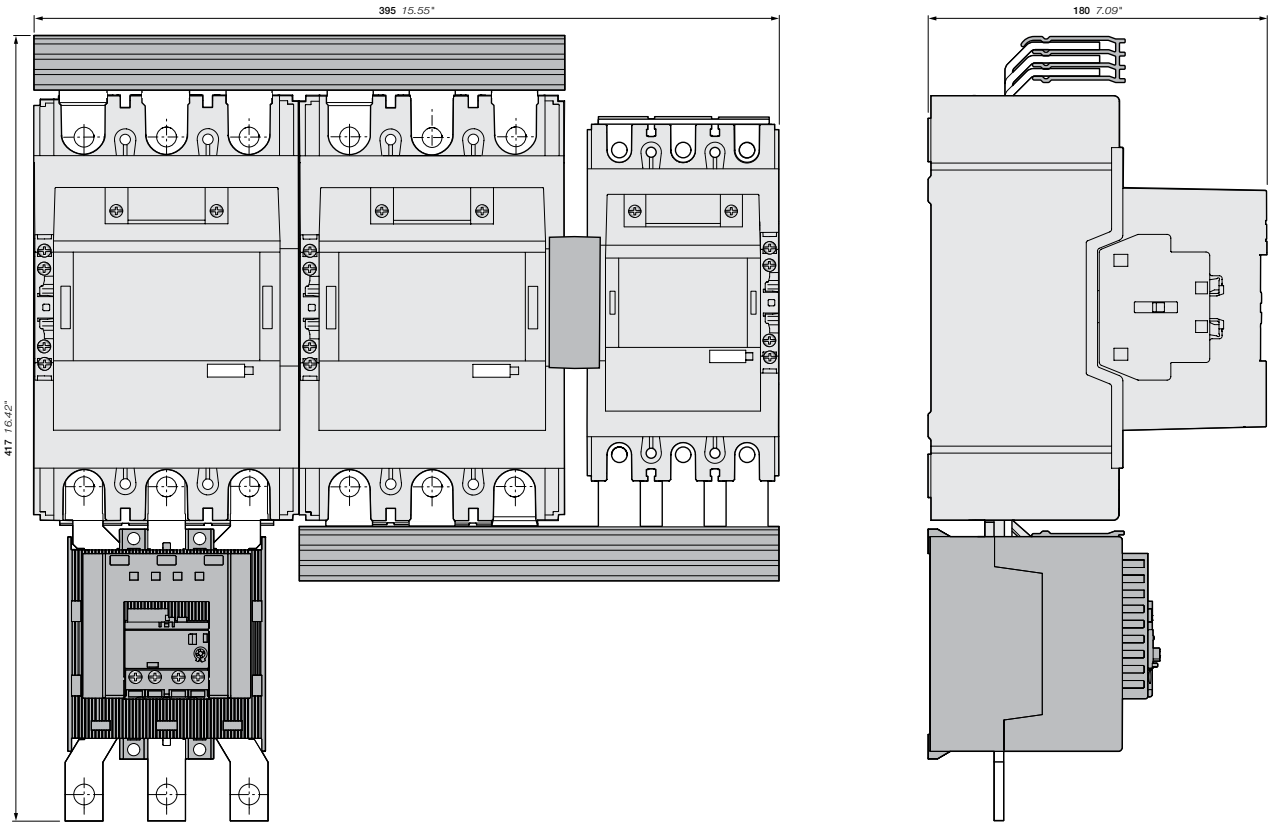


AF190, AF205
+ BEY205-4, VM19
+ EF205 electronic overload relay

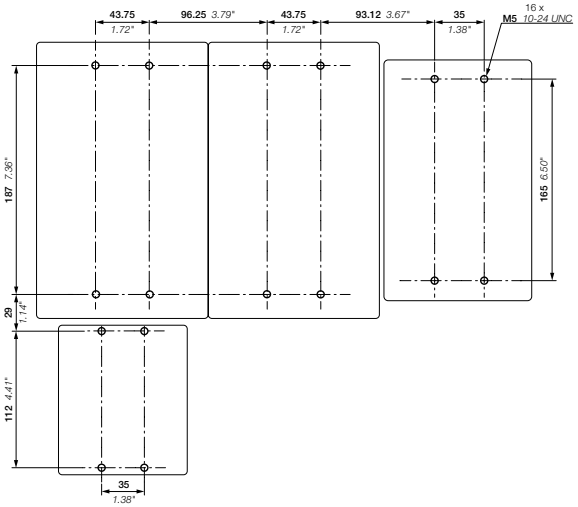


Star-delta starters protected by electronic overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*

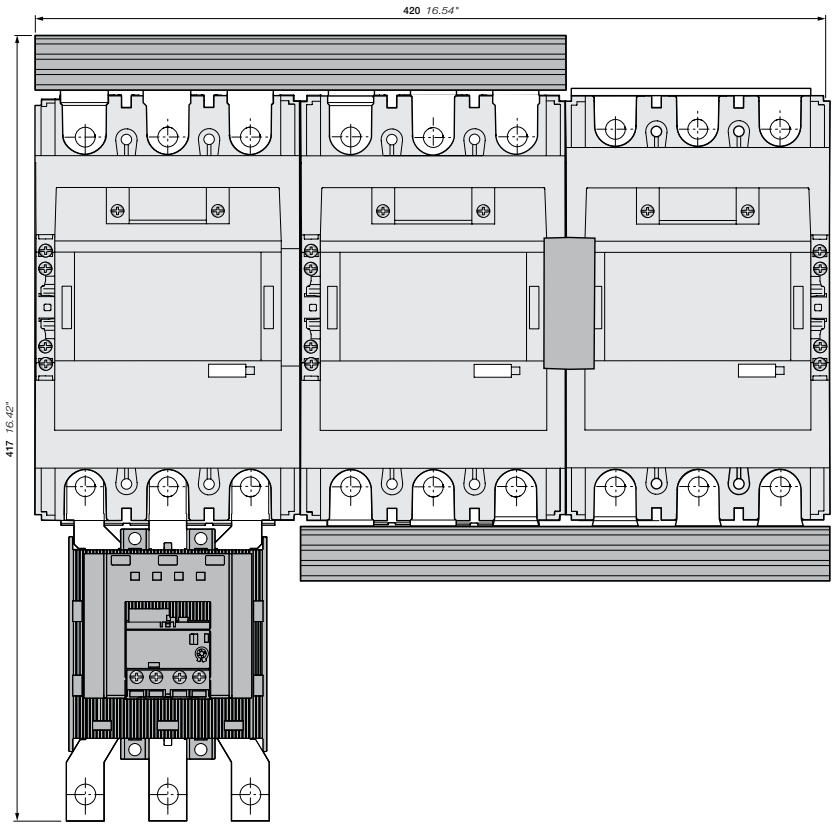


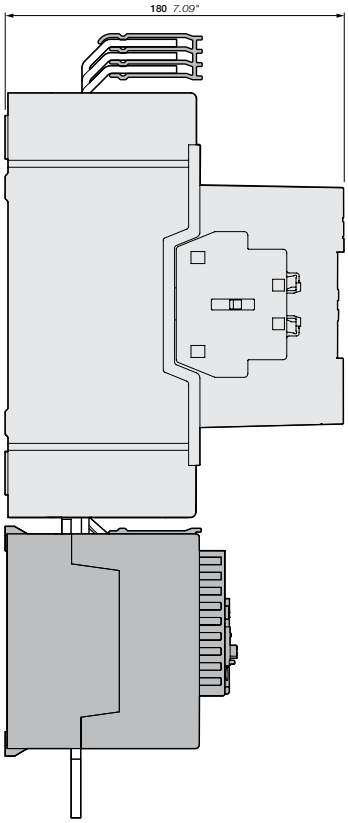
Line, Delta: AF265, AF305, AF370
+ Star: AF190, AF205
+ BEY265-4, VM205/265
+ EF370 electronic overload relay



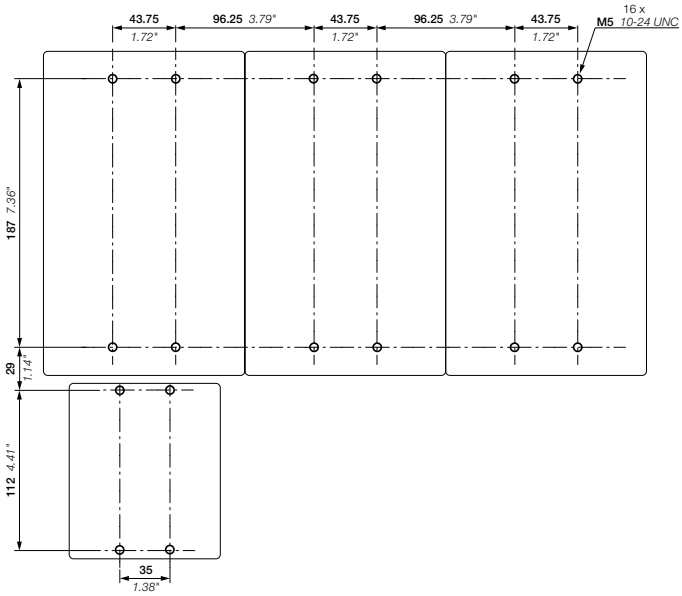
Star-delta starters protected by electronic overload relays
With AF contactors - Open type version in kit form

Main dimensions mm, *inches*





AF265, AF305, AF370
+ BEY370-4, VM19
+ EF370 electronic overload relay



AF 3-pole contactors

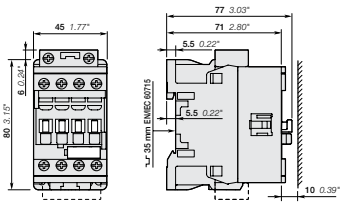
Ordering details

AF09 ... AF38 3-pole contactors
7.5 to 30 HP
AC / DC operated

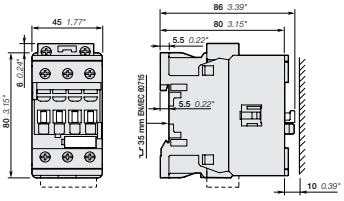
AF09-30-10

AF26-30-00

Main dimensions *mm, inches*



AF09, AF12, AF16



AF26, AF30, AF38

Description

AF09 ... AF38 contactors are mainly used for controlling 3-phase motors and power circuits up to 600 V AC and 250 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

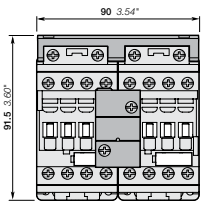
Ordering details

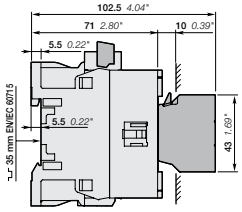
UL/CSA											
General use rating 600V AC	Motor rating HP					Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted[2]		Catalog number	Weight
	1- phase		3 - phase								Pkg (1 pce)
A	120V	240V	220-240V	440-480V	550-600V	V 50/60 Hz	V DC				kg
25	0.75	1.5	2	5	7.5	24...60		1	0	AF09-30-10-41	0.27
								0	1	AF09-30-01-41	0.27
						24...60	20...60[1]	1	0	AF09-30-10-11	0.27
								0	1	AF09-30-01-11	0.27
						48...130	48...130	1	0	AF09-30-10-12	0.27
								0	1	AF09-30-01-12	0.27
						100...250	100...250	1	0	AF09-30-10-13	0.27
								0	1	AF09-30-01-13	0.27
						250...500	250...500	1	0	AF09-30-10-14	0.31
								0	1	AF09-30-01-14	0.31
28	1	2	3	7.5	10	24...60		1	0	AF12-30-10-41	0.27
								0	1	AF12-30-01-41	0.27
						24...60	20...60[1]	1	0	AF12-30-10-11	0.27
								0	1	AF12-30-01-11	0.27
						48...130	48...130	1	0	AF12-30-10-12	0.27
								0	1	AF12-30-01-12	0.27
						100...250	100...250	1	0	AF12-30-10-13	0.27
								0	1	AF12-30-01-13	0.27
						250...500	250...500	1	0	AF12-30-10-14	0.31
								0	1	AF12-30-01-14	0.31
30	1.5	3	5	10	15	24...60		1	0	AF16-30-10-41	0.27
								0	1	AF16-30-01-41	0.27
						24...60	20...60[1]	1	0	AF16-30-10-11	0.27
								0	1	AF16-30-01-11	0.27
						48...130	48...130	1	0	AF16-30-10-12	0.27
								0	1	AF16-30-01-12	0.27
						100...250	100...250	1	0	AF16-30-10-13	0.27
								0	1	AF16-30-01-13	0.27
						250...500	250...500	1	0	AF16-30-10-14	0.31
								0	1	AF16-30-01-14	0.31
45	2	3	7.5	15	20	24...60		0	0	AF26-30-00-41	0.31
						24...60	20...60[1]	0	0	AF26-30-00-11	0.31
						48...130	48...130	0	0	AF26-30-00-12	0.31
						100...250	100...250	0	0	AF26-30-00-13	0.31
						250...500	250...500	0	0	AF26-30-00-14	0.35
50	2	5	10	20	25	24...60		0	0	AF30-30-00-41	0.31
						24...60	20...60[1]	0	0	AF30-30-00-11	0.31
						48...130	48...130	0	0	AF30-30-00-12	0.31
						100...250	100...250	0	0	AF30-30-00-13	0.31
						250...500	250...500	0	0	AF30-30-00-14	0.35
50	2	5	10	25	30	24...60		0	0	AF38-30-00-41	0.31
						24...60	20...60[1]	0	0	AF38-30-00-11	0.31
						48...130	48...130	0	0	AF38-30-00-12	0.31
						100...250	100...250	0	0	AF38-30-00-13	0.31
						250...500	250...500	0	0	AF38-30-00-14	0.35

[1] AF..-30-..-11 May not be suitable for all PLC applications. Refer to manufacturing specifications.
[2] Auxiliary contacts available in -11 and -22 for AF26-AF38. See accessories for additional options.

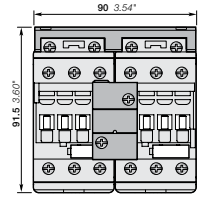
AF09R ... AF38R 3-pole reversing contactors
7.5 to 30 HP
AC / DC operated

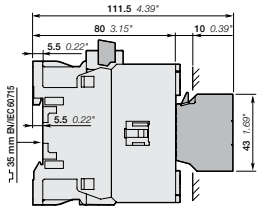
Main dimensions *mm, inches*





AF09R, AF12R, AF16R
+ VEM4 mechanical and electrical interlock set





AF26R, AF30R, AF38R
+ VEM4 mechanical and electrical interlock set

Description

AF09R ... AF38R reversing contactors are mainly used for controlling 3-phase motors and power circuits up to 600 V AC and 250 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

Note: Normally closed contacts included as part of the electrical interlock. Normally open auxiliaries are either integral or front-mount.

4

Ordering details

UL/CSA											
General use rating 600V AC	Motor rating HP					Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted[2]		Catalog number	Weight Pkg (1 pce)
	1- phase		3 - phase								
A	120V	240V	220-240V	440-480V	550-600V	V 50/60 Hz	V DC				kg
25	0.75	1.5	2	5	7.5	24...60		2	2	AF09R-30-22-41	0.62
							20...60[1]	2	2	AF09R-30-22-11	0.62
						48...130	48...130	2	2	AF09R-30-22-12	0.62
						100...250	100...250	2	2	AF09R-30-22-13	0.62
						250...500	250...500	2	2	AF09R-30-22-14	0.70
28	1	2	3	7.5	10	24...60		2	2	AF12R-30-22-41	0.62
							20...60[1]	2	2	AF12R-30-22-11	0.62
						48...130	48...130	2	2	AF12R-30-22-12	0.62
						100...250	100...250	2	2	AF12R-30-22-13	0.62
						250...500	250...500	2	2	AF12R-30-22-14	0.70
30	1.5	3	5	10	15	24...60		2	2	AF16R-30-22-41	0.62
							20...60[1]	2	2	AF16R-30-22-11	0.62
						48...130	48...130	2	2	AF16R-30-22-12	0.62
						100...250	100...250	2	2	AF16R-30-22-13	0.62
						250...500	250...500	2	2	AF16R-30-22-14	0.70
45	2	3	7.5	15	20	24...60		0	2	AF26R-30-02-41	0.76
								2	2	AF26R-30-22-41	0.76
						24...60	20...60[1]	0	2	AF26R-30-02-11	0.76
							20...60	2	2	AF26R-30-22-11	0.76
						48...130	48...130	0	2	AF26R-30-02-12	0.76
								2	2	AF26R-30-22-12	0.76
						100...250	100...250	0	2	AF26R-30-02-13	0.76
								2	2	AF26R-30-22-13	0.76
						250...500	250...500	0	2	AF26R-30-02-14	0.84
								2	2	AF26R-30-22-14	0.76
50	2	5	10	20	25	24...60		0	2	AF30R-30-02-41	0.76
								2	2	AF30R-30-22-41	0.76
						24...60	20...60[1]	0	2	AF30R-30-02-11	0.76
							20...60	2	2	AF30R-30-22-11	0.76
						48...130	48...130	0	2	AF30R-30-02-12	0.76
								2	2	AF30R-30-22-12	0.76
						100...250	100...250	0	2	AF30R-30-02-13	0.76
								2	2	AF30R-30-22-13	0.76
						250...500	250...500	0	2	AF30R-30-02-14	0.84
								2	2	AF30R-30-22-14	0.76
50	2	5	10	25	30	24...60		0	2	AF38R-30-02-41	0.76
								2	2	AF38R-30-22-41	0.76
						24...60	20...60[1]	0	2	AF38R-30-02-11	0.76
							20...60	2	2	AF38R-30-22-11	0.76
						48...130	48...130	0	2	AF38R-30-02-12	0.76
								2	2	AF38R-30-22-12	0.76
						100...250	100...250	0	2	AF38R-30-02-13	0.76
								2	2	AF38R-30-22-13	0.76
						250...500	250...500	0	2	AF38R-30-02-14	0.84
								2	2	AF38R-30-22-14	0.76

[1] AF..-30-..-11 May not be suitable for all PLC applications. Refer to manufacturing specifications.

AF09 ... AF38Z 3-pole contactors
7.5 to 30 HP
AC / DC operated - low consumption

AF09Z-30-10

AF26Z-30-00

Description

AF09Z ... AF38Z contactors are mainly used for controlling 3-phase motors up to 600 V AC and 250 V DC. These contactors are of the block type design with 3 main poles.

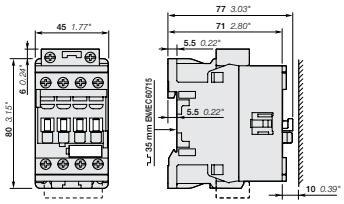
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
  - can manage large control voltage variations
  - allow direct control by PLC-output ≥ 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

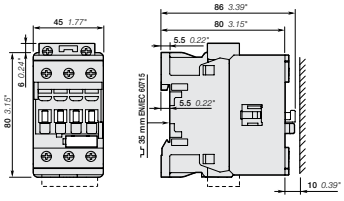
UL/CSA General use rating 600V AC	Motor rating HP 1 - phase		Motor rating HP 3 - phase			Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted[1]		Catalog number	Weight Pkg (1 pce)
A	120V	240V	220-240V	440-480V	550-600V	V 50/60 Hz	V DC				kg
25	0.75	1.5	2	5	7.5	-	12...20	1	0	AF09Z-30-10-20	0.31
								0	1	AF09Z-30-01-20	0.31
						24...60	20...60	1	0	AF09Z-30-10-21	0.31
								0	1	AF09Z-30-01-21	0.31
						48...130	48...130	1	0	AF09Z-30-10-22	0.31
								0	1	AF09Z-30-01-22	0.31
						100...250	100...250	1	0	AF09Z-30-10-23	0.31
								0	1	AF09Z-30-01-23	0.31
28	1	2	3	7.5	10	-	12...20	1	0	AF12Z-30-10-20	0.31
								0	1	AF12Z-30-01-20	0.31
						24...60	20...60	1	0	AF12Z-30-10-21	0.31
								0	1	AF12Z-30-01-21	0.31
						48...130	48...130	1	0	AF12Z-30-10-22	0.31
								0	1	AF12Z-30-01-22	0.31
						100...250	100...250	1	0	AF12Z-30-10-23	0.31
								0	1	AF12Z-30-01-23	0.31
30	1.5	3	5	10	15	-	12...20	1	0	AF16Z-30-10-20	0.31
								0	1	AF16Z-30-01-20	0.31
						24...60	20...60	1	0	AF16Z-30-10-21	0.31
								0	1	AF16Z-30-01-21	0.31
						48...130	48...130	1	0	AF16Z-30-10-22	0.31
								0	1	AF16Z-30-01-22	0.31
						100...250	100...250	1	0	AF16Z-30-10-23	0.31
								0	1	AF16Z-30-01-23	0.31
45	2	3	7.5	15	20	-	12...20	0	0	AF26Z-30-00-20	0.35
						24...60	20...60	0	0	AF26Z-30-00-21	0.35
						48...130	48...130	0	0	AF26Z-30-00-22	0.35
						100...250	100...250	0	0	AF26Z-30-00-23	0.35
50	2	5	10	20	25	-	12...20	0	0	AF30Z-30-00-20	0.35
						24...60	20...60	0	0	AF30Z-30-00-21	0.35
						48...130	48...130	0	0	AF30Z-30-00-22	0.35
						100...250	100...250	0	0	AF30Z-30-00-23	0.35
50	2	5	10	25	30	-	12...20	0	0	AF38Z-30-00-20	0.35
						24...60	20...60	0	0	AF38Z-30-00-21	0.35
						48...130	48...130	0	0	AF38Z-30-00-22	0.35
						100...250	100...250	0	0	AF38Z-30-00-23	0.35

[1] Auxiliary contacts available in -22 for AF26ZR-AF38ZR (i.e., AF26ZR-30-22-11).
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

AF09ZR ... AF38ZR 3-pole reversing contactors
7.5 to 30 HP
AC / DC operated - low consumption

Description

AF09ZR ... AF38ZR reversing contactors are mainly used for controlling 3-phase motors and power circuits up to 600 V AC and 250 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

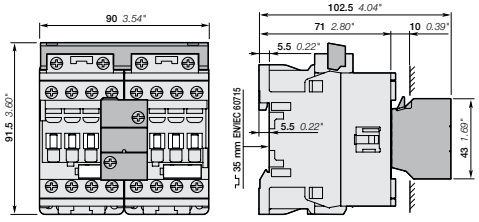
Note: For mechanically and electrically interlocked devices without power bus, replace the R in the catalog number with an M (ie. AF09R-30-22-13 becomes AF09M-30-22-13).

Ordering details

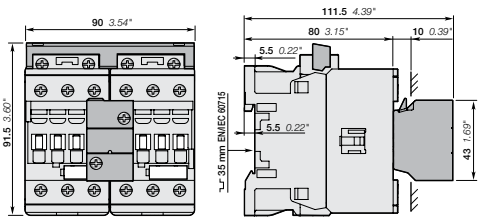
UL/CSA General use rating 600V AC	Motor rating HP 1- phase		3 - phase			Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted per contactor[1]		Catalog number	Weight Pkg (1 pce)
A	120V	240V	220-240V	440-480V	550-600V	V 50/60 Hz	V DC				kg
25	0.75	1.5	2	5	7.5	-	12...20	1	1	AF09ZR-30-22-20	0.70
						24...60	20...60	1	1	AF09ZR-30-22-21	0.70
						48...130	48...130	1	1	AF09ZR-30-22-22	0.70
						100...250	100...250	1	1	AF09ZR-30-22-23	0.70
28	1	2	3	7.5	10	-	12...20	1	1	AF12ZR-30-22-20	0.70
						24...60	20...60	1	1	AF12ZR-30-22-21	0.70
						48...130	48...130	1	1	AF12ZR-30-22-22	0.70
						100...250	100...250	1	1	AF12ZR-30-22-23	0.70
30	1.5	3	5	10	15	-	12...20	1	1	AF16ZR-30-22-20	0.70
						24...60	20...60	1	1	AF16ZR-30-22-21	0.70
						48...130	48...130	1	1	AF16ZR-30-22-22	0.70
						100...250	100...250	1	1	AF16ZR-30-22-23	0.70
45	2	3	7.5	15	20	-	12...20	0	1	AF26ZR-30-02-20	0.84
						24...60	20...60	0	1	AF26ZR-30-02-21	0.84
						48...130	48...130	0	1	AF26ZR-30-02-22	0.84
						100...250	100...250	0	1	AF26ZR-30-02-23	0.84
50	2	5	10	20	25	-	12...20	0	1	AF30ZR-30-02-20	0.84
						24...60	20...60	0	1	AF30ZR-30-02-21	0.84
						48...130	48...130	0	1	AF30ZR-30-02-22	0.84
						100...250	100...250	0	1	AF30ZR-30-02-23	0.84
50	2	5	10	25	30	-	12...20	0	1	AF38ZR-30-02-20	0.84
						24...60	20...60	0	1	AF38ZR-30-02-21	0.84
						48...130	48...130	0	1	AF38ZR-30-02-22	0.84
						100...250	100...250	0	1	AF38ZR-30-02-23	0.84

[1] Auxiliary contacts available in -22 for AF26ZR–AF38ZR.
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*



AF09ZR, AF12ZR, AF16ZR
+ VEM4 mechanical and electrical interlock set



AF26ZR, AF30ZR, AF38ZR
+ VEM4 mechanical and electrical interlock set

AF40 ... AF96 3-pole contactors
40 to 75 HP
AC / DC operated

AF40-30-00

AF80-30-00

4

Description

AF40 ... AF96 contactors are mainly used for controlling 3-phase motors and power circuits up to 600 V AC and 250 V DC. These contactors are of the block type design with 3 main poles.

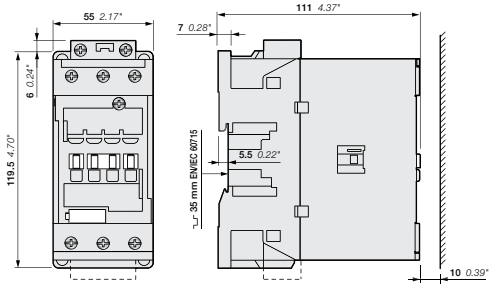
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - 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

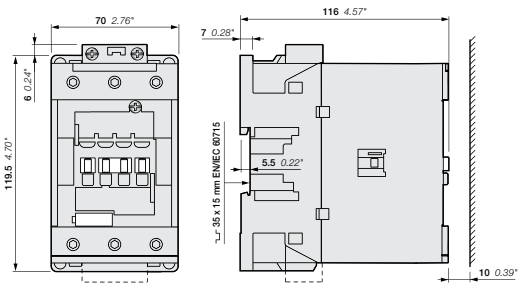
UL / CSA						Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted[2]		Catalog number	Weight
General use rating 600V AC	Motor rating. HP										Pkg (1 pce)
	1-Phase		3-Phase								
A	120V	240V	220-240V	440-480V	550-600V	V 50/60 Hz	V DC				kg
60	3	7.5	15	30	40	24...60		0	0	AF40-30-00-41	0.97
						24...60	20...60[1]	0	0	AF40-30-00-11	0.97
						48...130	48...130	0	0	AF40-30-00-12	0.97
						100...250	100...250	0	0	AF40-30-00-13	0.95
						250...500	250...500	0	0	AF40-30-00-14	0.95
80	3	10	20	40	50	24...60		0	0	AF52-30-00-41	0.97
						24...60	20...60[1]	0	0	AF52-30-00-11	0.97
						48...130	48...130	0	0	AF52-30-00-12	0.97
						100...250	100...250	0	0	AF52-30-00-13	0.95
						250...500	250...500	0	0	AF52-30-00-14	0.95
90	5	15	25	50	60	24...60		0	0	AF65-30-00-41	0.97
						24...60	20...60[1]	0	0	AF65-30-00-11	0.97
						48...130	48...130	0	0	AF65-30-00-12	0.97
						100...250	100...250	0	0	AF65-30-00-13	0.95
						250...500	250...500	0	0	AF65-30-00-14	0.95
105	7.5	15	30	60	75	24...60		0	0	AF80-30-00-41	1.22
						24...60	20...60[1]	0	0	AF80-30-00-11	1.22
						48...130	48...130	0	0	AF80-30-00-12	1.22
						100...250	100...250	0	0	AF80-30-00-13	1.17
						250...500	250...500	0	0	AF80-30-00-14	1.17
115	7.5	20	30	60	75	24...60		0	0	AF96-30-00-41	1.22
						24...60	20...60[1]	0	0	AF96-30-00-11	1.22
						48...130	48...130	0	0	AF96-30-00-12	1.22
						100...250	100...250	0	0	AF96-30-00-13	1.17
						250...500	250...500	0	0	AF96-30-00-14	1.17

[1] AF..-30-..-11 May not be suitable for all PLC applications. Refer to manufacturing specifications.
[2] Auxiliary contacts available in -11 and -22. See accessories for additional options.

Main dimensions *mm, inches*



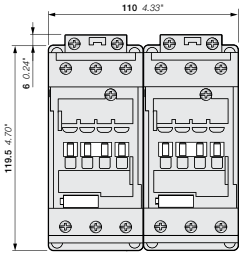
AF40, AF52, AF65

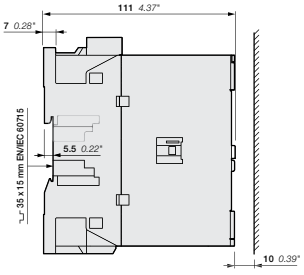


AF80, AF96

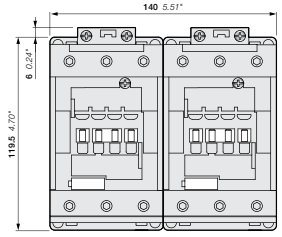
AF40R ... AF96R 3-pole reversing contactors
40 to 75 HP
AC / DC operated

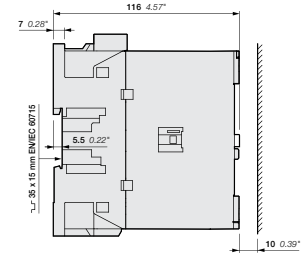
Main dimensions *mm, inches*





AF40R, AF52R, AF65R
+ VM96-4 mechanical interlock set





AF80R, AF96R
+ VM96-4 mechanical interlock set

Description

AF40R ... AF96R reversing contactors are mainly used for controlling 3-phase motors to 600 V AC and 250 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

Note: For mechanically and electrically interlocked devices without power bus, replace the R in the catalog number with an M (ie. AF09R-30-22-13 becomes AF09M-30-22-13).

4

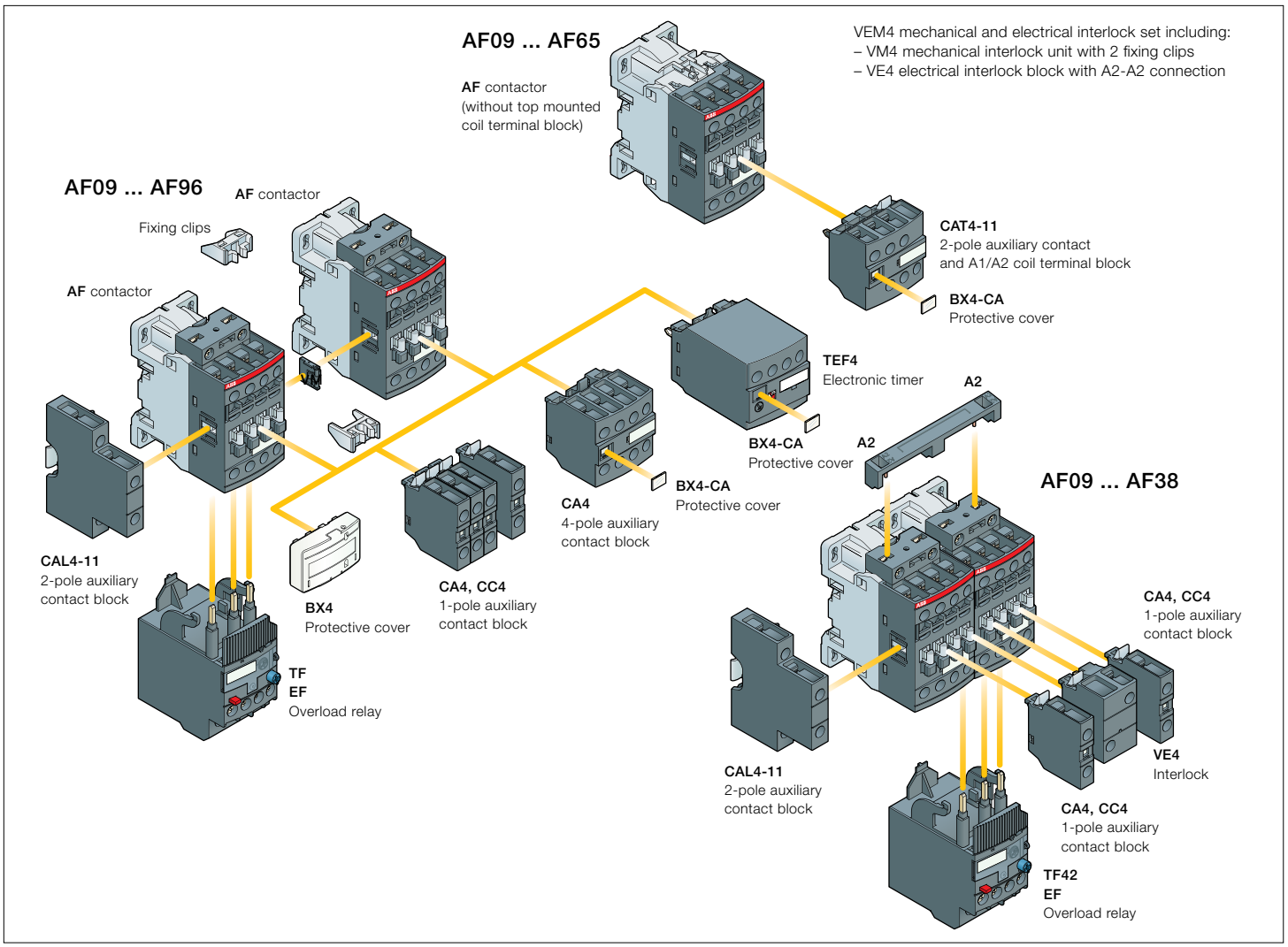
Ordering details

UL / CSA						Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Catalog number	Weight Pkg (1 pce)
General use rating 600V AC	Motor rating. HP										
	1-Phase		3-Phase								
A	120V	240V	220-240V	440-480V	550-600V	V 50/60 Hz	V DC				kg
60	3	7.5	15	30	40	24...60		2	2	AF40R-30-22-41	2.20
						24...60	20...60[1]	2	2	AF40R-30-22-11	2.20
						48...130	48...130	2	2	AF40R-30-22-12	2.20
						100...250	100...250	2	2	AF40R-30-22-13	2.16
						250...500	250...500	2	2	AF40R-30-22-14	2.16
80	3	10	20	40	50	24...60		2	2	AF52R-30-22-41	2.20
						24...60	20...60[1]	2	2	AF52R-30-22-11	2.20
						48...130	48...130	2	2	AF52R-30-22-12	2.20
						100...250	100...250	2	2	AF52R-30-22-13	2.16
						250...500	250...500	2	2	AF52R-30-22-14	2.16
90	5	15	25	50	60	24...60		2	2	AF65R-30-22-41	2.20
						24...60	20...60[1]	2	2	AF65R-30-22-11	2.20
						48...130	48...130	2	2	AF65R-30-22-12	2.20
						100...250	100...250	2	2	AF65R-30-22-13	2.16
						250...500	250...500	2	2	AF65R-30-22-14	2.16
105	7.5	15	30	60	75	24...60		2	2	AF80R-30-22-41	2.78
						24...60	20...60[1]	2	2	AF80R-30-22-11	2.78
						48...130	48...130	2	2	AF80R-30-22-12	2.78
						100...250	100...250	2	2	AF80R-30-22-13	2.68
						250...500	250...500	2	2	AF80R-30-22-14	2.68
115	7.5	20	30	60	75	24...60		2	2	AF96R-30-22-41	2.78
						24...60	20...60[1]	2	2	AF96R-30-22-11	2.78
						48...130	48...130	2	2	AF96R-30-22-12	2.78
						100...250	100...250	2	2	AF96R-30-22-13	2.68
						250...500	250...500	2	2	AF96R-30-22-14	2.68

[1] AF..-30-..-11 May not be suitable for all PLC applications. Refer to manufacturing specifications.

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
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)

Note: 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.

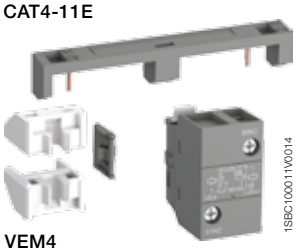
AF09 ... AF96 3-pole contactors
Main accessories

CA4-10

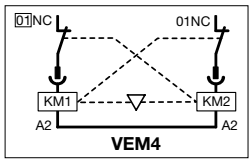
CAL4-11

CA4-22E

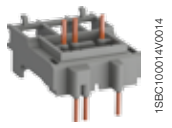
CAT4-11E



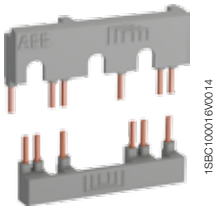
VEM4



TEF4-ON



BEA16-4



BER16-4

Ordering details[1)]

For contactors	Auxiliary contacts				Catalog number	Pkg qty	Weight (1 pce) kg
Front-mounted instantaneous auxiliary contact blocks							
AF09 ... AF96	1	0	–	–	CA4-10	1	0.014
	0	1	–	–	CA4-01	1	0.014
AF09 ... AF16..-30-10	2	2	–	–	CA4-22M	1	0.055
AF26 ... AF96..-30-00	2	2	–	–	CA4-22E	1	0.055
AF09 ... AF16..-30-01	2	2	–	–	CA4-22U	1	0.055
Front-mounted auxiliary contact blocks with N.O. leading contact and N.C. lagging contact							
AF09 ... AF96	–	–	1	0	CC4-10	1	0.014
	–	–	0	1	CC4-01	1	0.014
Side-mounted instantaneous auxiliary contact blocks							
AF09 ... AF96	1	1	–	–	CAL4-11	1	0.040
Front-mounted instantaneous auxiliary contact and A1/A2 coil terminal blocks							
AF09 ... AF16..-30-10	1	1	–	–	CAT4-11M	1	0.040
AF26 ... AF65..-30-00	1	1	–	–	CAT4-11E	1	0.040
AF09 ... AF16..-30-01	1	1	–	–	CAT4-11U	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	10	0.005
AF40 ... AF96	VM96-4	10	0.006

Note: VM4 and VM96-4 include 2 fixing clips (BB4) to maintain together both contactors.

Mechanical and electrical interlock set

AF09 ... AF38	0	2	–	–	VEM4	1	0.035

Notes: - 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		Catalog number	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	1	0.065
		OFF-delay	1	1	TEF4-OFF	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	10	0.025
AF26 ... AF38	with	MS116-0.16 ... MS116-16, MS132-0.16 ... MS132-10	BEA26-4	10	0.025
	with	MS116-20 ... MS116-32, MS132-12 ... MS132-32	BEA38-4	10	0.030
AF40 ... AF65	with	MS165-16 ... MS165-65	BEA65-4	1	0.09

Connection sets for reversing contactors

AF09 ... AF16	BER16-4	1	0.045
AF26 ... AF38	BER38-4	1	0.100
AF40 ... AF65	BER65-4	1	0.175
AF80 ... AF96	BER96-4	1	0.250

Connection sets for star-delta starting

AF09 ... AF16	With or without VM4	BEY16-4	1	0.050
AF26 ... AF38	With or without VM4	BEY38-4	1	0.110
AF40 ... AF65	With or without VM96-4	BEY65-4	1	0.200
AF80 ... AF96	With or without VM96-4	BEY96-4	1	0.250

[1)] For more information, refer to "Accessories" section.

AF116 ... AF140 3-pole contactors
100 to 125 HP
AC / DC operated

AF140-30-11

Description

AF116 ... AF140 contactors are mainly used for controlling 3-phase motors and power circuits up to 600 V AC. These contactors are of the block type design with 3 main poles.

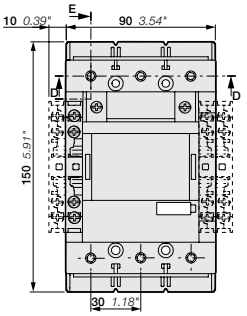
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - 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

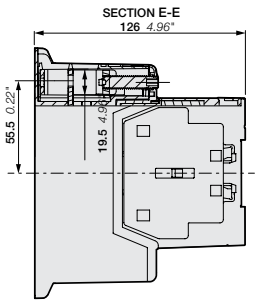
Ordering details

UL / CSA					Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted[1]		Catalog number	Weight
General use rating 600V AC	Motor Rating HP 3-phase									Pkg (1 pce)
	200-208V	220-240V	440-480V	550-600V						
A					V 50/60 Hz	V DC				kg
For connection with built-in cable clamps										
160	30	40	75	100	24...60	20...60	1	1	AF116-30-11-11	1.75
					48...130	48...130	1	1	AF116-30-11-12	1.75
					100...250	100...250	1	1	AF116-30-11-13	1.75
					250...500	250...500	1	1	AF116-30-11-14	1.75
200	40	50	100	125	24...60	20...60	1	1	AF140-30-11-11	1.75
					48...130	48...130	1	1	AF140-30-11-12	1.75
					100...250	100...250	1	1	AF140-30-11-13	1.75
					250...500	250...500	1	1	AF140-30-11-14	1.75
200	40	50	100	125	24...60	20...60	1	1	AF146-30-11-11	1.75
					48...130	48...130	1	1	AF146-30-11-12	1.75
					100...250	100...250	1	1	AF146-30-11-13	1.75
					250...500	250...500	1	1	AF146-30-11-14	1.75
With bar connections										
160	30	40	75	100	24...60	20...60	1	1	AF116-30-11B-11	1.50
					48...130	48...130	1	1	AF116-30-11B-12	1.50
					100...250	100...250	1	1	AF116-30-11B-13	1.50
					250...500	250...500	1	1	AF116-30-11B-14	1.50
200	40	50	100	125	24...60	20...60	1	1	AF140-30-11B-11	1.50
					48...130	48...130	1	1	AF140-30-11B-12	1.50
					100...250	100...250	1	1	AF140-30-11B-13	1.50
					250...500	250...500	1	1	AF140-30-11B-14	1.50
200	40	50	100	125	24...60	20...60	1	1	AF146-30-11B-11	1.50
					48...130	48...130	1	1	AF146-30-11B-12	1.50
					100...250	100...250	1	1	AF146-30-11B-13	1.50
					250...500	250...500	1	1	AF146-30-11B-14	1.50

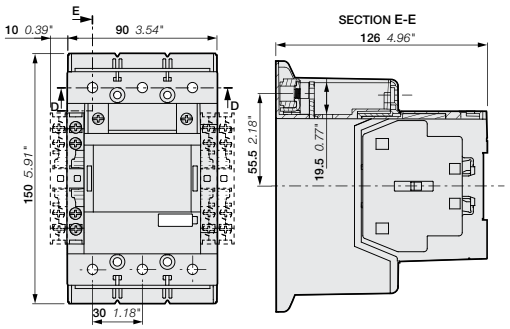
[1] Auxiliary contacts available in -00 and -22. See accessories for additional options.

Main dimensions *mm, inches*





AF116, AF140-30-11



AF116, AF140-30-11B

AF116 ... AF146 3-pole contactors with built-in PLC interface
100 to 125 HP
AC / DC operated

AF140-30-11

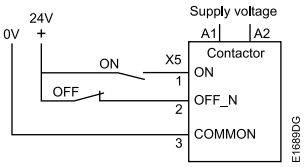
Description

AF116 ... AF140 contactors are mainly used for controlling 3-phase motors and power circuits up to 600 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 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

4

Control inputs

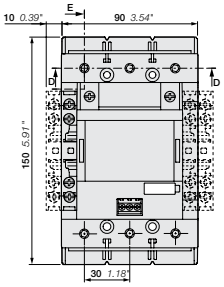


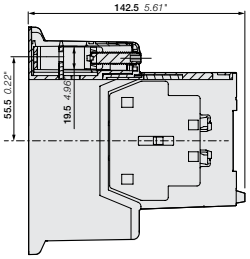
Ordering details

UL / CSA General use rating 600V AC	Motor Rating HP 3-phase				Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted[1]		Catalog number	Weight Pkg (1 pce)
A	200-208V	220-240V	440-480V	550-600V	V 50/60 Hz	V DC				kg
For connection with built-in cable clamps										
160	55	160	75	160	100...250	100...250	1	1	AF116-30-11-33	1.75
					250...500	250...500	1	1	AF116-30-11-34	1.75
200	75	200	100	200	100...250	100...250	1	1	AF140-30-11-33	1.75
					250...500	250...500	1	1	AF140-30-11-34	1.75
200	75	225	100	200	100...250	100...250	1	1	AF146-30-11-33	1.75
					250...500	250...500	1	1	AF146-30-11-34	1.75
With bar connections										
160	55	160	75	160	100...250	100...250	1	1	AF116-30-11B-33	1.50
					250...500	250...500	1	1	AF116-30-11B-34	1.50
200	75	200	100	200	100...250	100...250	1	1	AF140-30-11B-33	1.50
					250...500	250...500	1	1	AF140-30-11B-34	1.50
200	75	225	100	200	100...250	100...250	1	1	AF146-30-11B-33	1.50
					250...500	250...500	1	1	AF146-30-11B-34	1.50

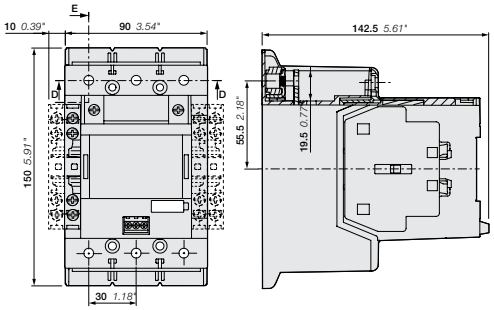
[1] Auxiliary contacts available in -00 and -22. See accessories for additional options.
Note: AF116 ... AF140 are equipped with low voltage inputs for control, for example by a PLC.

Main dimensions *mm, inches*





AF116, AF140-30-11



AF116, AF140-30-11B

AF190 ... AF370 3-pole contactors
150 to 350 HP
AC / DC operated

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. These contactors are of the block type design with 3 main poles.

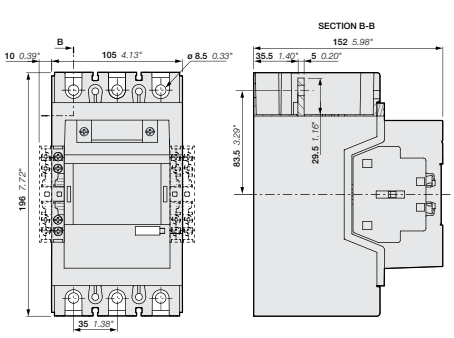
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - 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

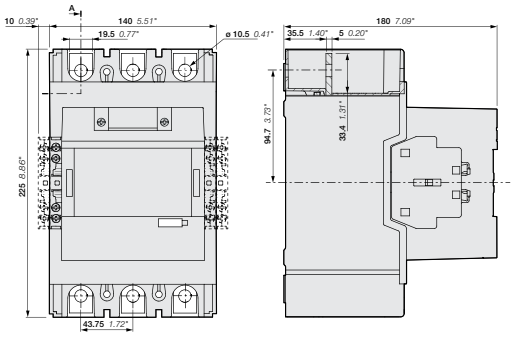
UL / CSA					Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted [1]		Catalog number	Weight
General use rating 600V AC	Motor Rating HP 3-phase									
A	200-208V	220-240V	440-480V	550-600V	V 50/60 Hz	V DC				Pkg (1 pce)
250	50	60	125	150	24...60	20...60	1	1	AF190-30-11-11	3.00
					48...130	48...130	1	1	AF190-30-11-12	3.00
					100...250	100...250	1	1	AF190-30-11-13	3.00
					250...500	250...500	1	1	AF190-30-11-14	3.00
300	60	75	150	200	24...60	20...60	1	1	AF205-30-11-11	3.00
					48...130	48...130	1	1	AF205-30-11-12	3.00
					100...250	100...250	1	1	AF205-30-11-13	3.00
					250...500	250...500	1	1	AF205-30-11-14	3.00
350	75	100	200	250	24...60	20...60	1	1	AF265-30-11-11	4.60
					48...130	48...130	1	1	AF265-30-11-12	4.60
					100...250	100...250	1	1	AF265-30-11-13	4.60
					250...500	250...500	1	1	AF265-30-11-14	4.60
400	100	125	250	300	24...60	20...60	1	1	AF305-30-11-11	4.60
					48...130	48...130	1	1	AF305-30-11-12	4.60
					100...250	100...250	1	1	AF305-30-11-13	4.60
					250...500	250...500	1	1	AF305-30-11-14	4.60
520	125	150	300	350	24...60	20...60	1	1	AF370-30-11-11	4.60
					48...130	48...130	1	1	AF370-30-11-12	4.60
					100...250	100...250	1	1	AF370-30-11-13	4.60
					250...500	250...500	1	1	AF370-30-11-14	4.60

[1] Auxiliary contacts available in -00 and -22. See accessories for additional options.

Main dimensions *mm, inches*



AF190, AF205



AF265, AF305, AF370

AF190 ... AF370 3-pole contactors with built-in PLC interface
150 to 350 HP
AC / DC operated

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. 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

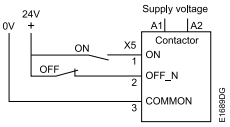
4

Ordering details

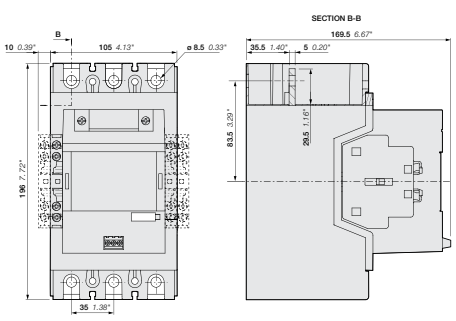
UL / CSA					Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted [1]		Catalog number	Weight
General use rating 600V AC	Motor Rating HP 3-phase									Pkg (1 pce)
A	200-208V	220-240V	440-480V	550-600V	V 50/60 Hz	V DC				
250	50	60	125	150	100...250	100...250	1	1	AF190-30-11-33	3.00
					250...500	250...500	1	1	AF190-30-11-34	3.00
300	60	75	150	200	100...250	100...250	1	1	AF205-30-11-33	3.00
					250...500	250...500	1	1	AF205-30-11-34	3.00
350	75	100	200	250	100...250	100...250	1	1	AF265-30-11-33	4.60
					250...500	250...500	1	1	AF265-30-11-34	4.60
400	100	125	250	300	100...250	100...250	1	1	AF305-30-11-33	4.60
					250...500	250...500	1	1	AF305-30-11-34	4.60
520	125	150	300	350	100...250	100...250	1	1	AF370-30-11-33	4.60
					250...500	250...500	1	1	AF370-30-11-34	4.60

[1] Auxiliary contacts available in -00 and -22. See accessories for additional options.
Note: AF190 ... AF370 are equipped with low voltage inputs for control, for example by a PLC.

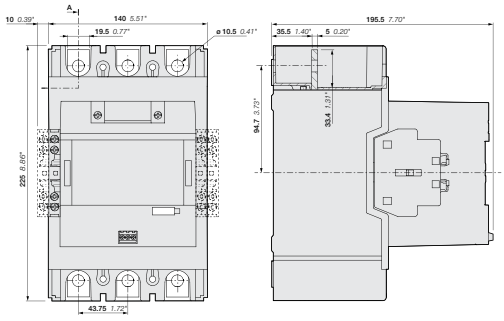
Control inputs



Main dimensions *mm, inches*



AF190, AF205



AF265, AF305, AF370

AF116R ... AF146R 3-pole reversing contactors
100 to 125 HP
AC / DC operated

Description

AF116R ... AF140 reversing contactors are mainly used for controlling 3-phase motors and power circuits up to 600 V AC. These contactors are of the block type design with 3 main poles.

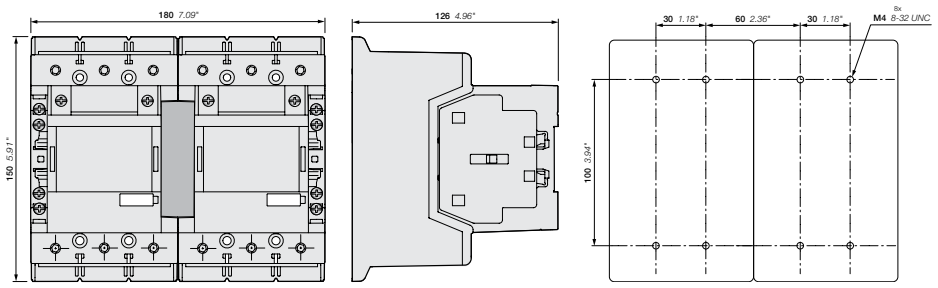
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - 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

Note: For mechanically and electrically interlocked devices without power bus, replace the R in the catalog number with an M (ie. AF09R-30-22-13 becomes AF09M-30-22-13).

Ordering details

UL / CSA					Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Catalog number	Weight
General use rating 600V AC	Motor Rating HP 3-phase									Pkg (1 pce)
A	200-208V	220-240V	440-480V	550-600V	V 50/60 Hz	V DC				kg
For connection with built-in cable clamps										
160	30	40	75	100	24...60	20...60	2	2	AF116R-30-22-11	5.66
					48...130	48...130	2	2	AF116R-30-22-12	5.66
					100...250	100...250	2	2	AF116R-30-22-13	5.66
					250...500	250...500	2	2	AF116R-30-22-14	5.66
200	40	50	100	125	24...60	20...60	2	2	AF140R-30-22-11	5.66
					48...130	48...130	2	2	AF140R-30-22-12	5.66
					100...250	100...250	2	2	AF140R-30-22-13	5.66
					250...500	250...500	2	2	AF140R-30-22-14	5.66
200	40	50	100	125	24...60	20...60	2	2	AF146R-30-22-11	5.66
					48...130	48...130	2	2	AF146R-30-22-12	5.66
					100...250	100...250	2	2	AF146R-30-22-13	5.66
					250...500	250...500	2	2	AF146R-30-22-14	5.66

Main dimensions *mm, inches*



AF116, AF140
+ VM19 mechanical interlocking unit

AF116, AF140
+ VM19 mechanical interlocking unit

AF190R ... AF370R 3-pole reversing contactors
150 to 350 HP
AC / DC operated

Description

AF190R ... AF370R reversing contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC. These contactors are of the block type design with 3 main poles.

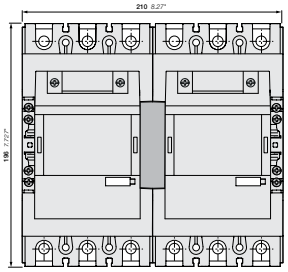
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - 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

Note: For mechanically and electrically interlocked devices without power bus, replace the R in the catalog number with an M (ie. AF09R-30-22-13 becomes AF09M-30-22-13).

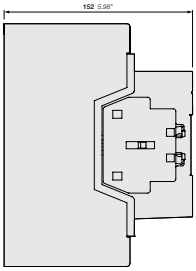
Ordering details

UL / CSA					Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Catalog number	Weight
General use rating 600V AC	Motor Rating HP 3-phase									Pkg (1 pce)
A	200-208V	220-240V	440-480V	550-600V	V 50/60 Hz	V DC				
250	50	60	125	150	24...60	20...60	2	2	AF190R-30-22-11	9.24
					48...130	48...130	2	2	AF190R-30-22-12	9.24
					100...250	100...250	2	2	AF190R-30-22-13	9.24
					250...500	250...500	2	2	AF190R-30-22-14	9.24
300	60	75	150	200	24...60	20...60	2	2	AF205R-30-22-11	9.24
					48...130	48...130	2	2	AF205R-30-22-12	9.24
					100...250	100...250	2	2	AF205R-30-22-13	9.24
					250...500	250...500	2	2	AF205R-30-22-14	9.24
350	75	100	200	250	24...60	20...60	2	2	AF265R-30-22-11	13.42
					48...130	48...130	2	2	AF265R-30-22-12	13.42
					100...250	100...250	2	2	AF265R-30-22-13	13.42
					250...500	250...500	2	2	AF265R-30-22-14	13.42
400	100	125	250	300	24...60	20...60	2	2	AF305R-30-22-11	13.42
					48...130	48...130	2	2	AF305R-30-22-12	13.42
					100...250	100...250	2	2	AF305R-30-22-13	13.42
					250...500	250...500	2	2	AF305R-30-22-14	13.42
520	125	150	300	350	24...60	20...60	2	2	AF370R-30-22-11	13.42
					48...130	48...130	2	2	AF370R-30-22-12	13.42
					100...250	100...250	2	2	AF370R-30-22-13	13.42
					250...500	250...500	2	2	AF370R-30-22-14	13.42

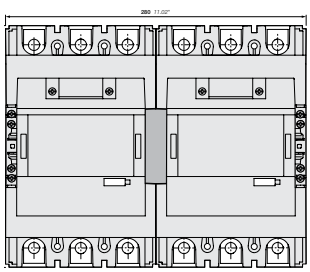
Main dimensions *mm, inches*



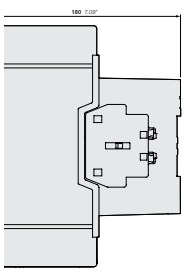
AF190, AF205-30-11
+ VM19 mechanical interlocking unit



AF190, AF205

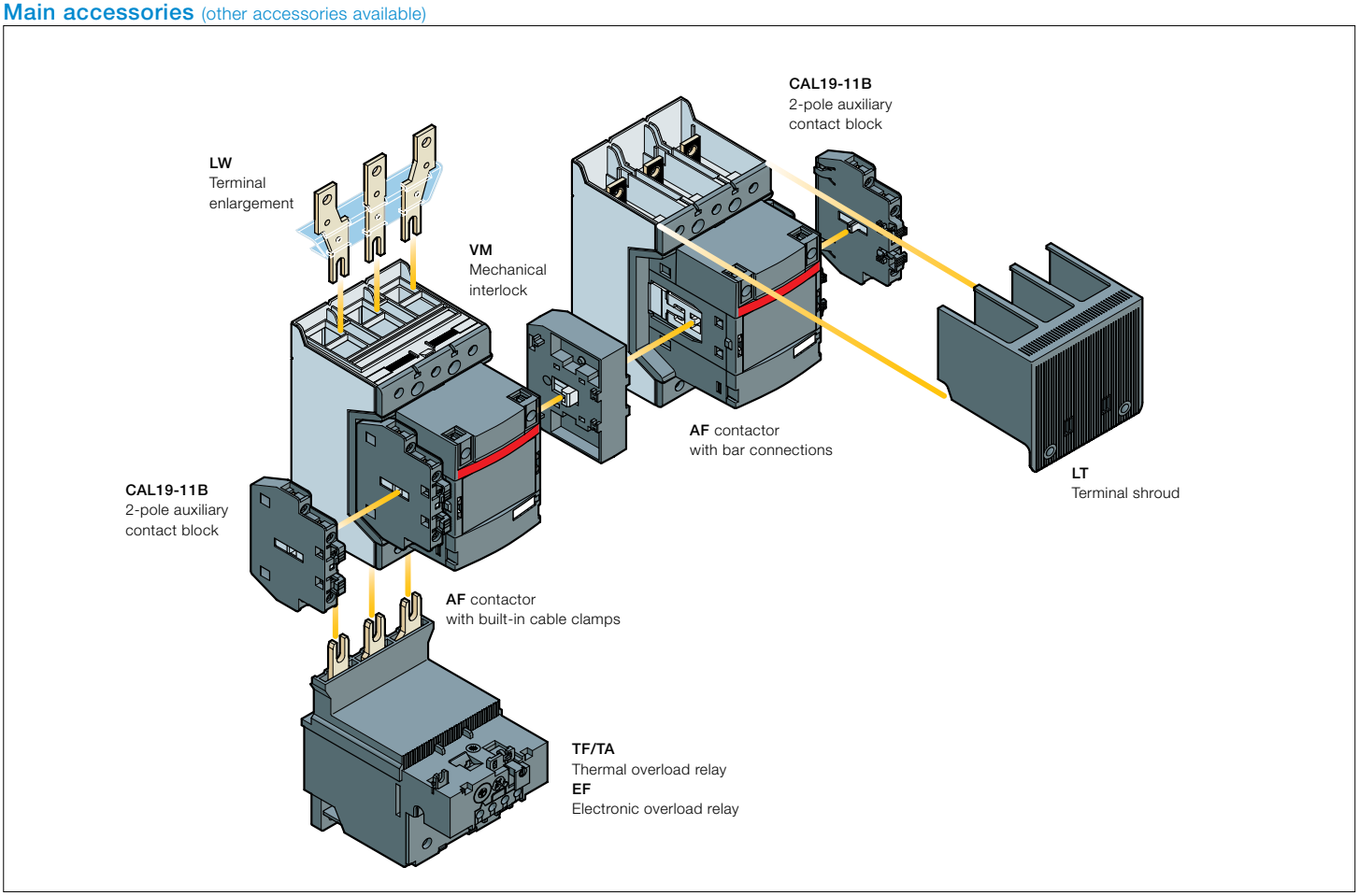


AF265R ... AF370R
+ VM19 mechanical interlocking unit



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		CAL19-11B		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").

Overload relays fitting details[3]

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)

Note: 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] Direct mounting - No kit required.

AF116 ... AF370 3-pole contactors
Main accessories


1SFC101071V0001

CAL19-11


1SFC101035V0001

VM19


1SFC101041V0001

LT370-30C


1SFC101049V0001

LX140

Ordering details[1)]

For contactors	Auxiliary contacts		Catalog number	Pkg qty	Weight (1 pce) kg
Side-mounted instantaneous auxiliary contact blocks					
AF116 ... AF370	1	1	CAL19-11	2	0.05
	1	1	CAL19-11B	2	0.05
Mechanical interlock unit					
AF116 ... AF370			VM19	1	0.05
AF116 ... AF146 and AF190, AF205			VM140/190	1	0.09
AF190, AF205 and AF265 ... AF370			VM205/265	1	0.09
Connection sets for reversing contactors					
AF116 ... AF146			BER140-4	1	0.62
AF190 ... AF205			BER205-4	1	1.24
AF265 ... AF370			BER370-4	1	2.14
Terminal shrouds					
AF116 ... AF146, with compression lugs			LT140-30L	2	0.07
AF190, AF205, with cable clamps			LT205-30C	2	0.05
AF190, AF205, with compression lugs			LT205-30L	2	0.22
AF190, AF205, with shorting bar or between contactor and OL			LT205-30Y	1	0.05
AF265 ... AF370, with cable clamps			LT370-30C	2	0.04
AF265 ... AF370, with compression lugs			LT370-30L	2	0.28
AF265 ... AF370, with shorting bar or between contactor and OL			LT370-30Y	1	0.08
AF265 ... AF370, for use with terminal lugs, ATK 300/2			LT370-30D	1	0.15

For contactors	Dimensions hole Ø mm	bar mm	Catalog number	Pkg qty	Weight (1 pce) kg
Terminal enlargements					
AF116...AF146	6.5	13 x 3	LW140	1	0.12
AF190...AF205	10.5	17.5 x 5	LW205	1	0.26
AF265...AF370	10.5	20 x 5	LW370	1	0.34
Terminal extension					
AF116...AF146	6.5	13 x 3	LX140	1	0.07
AF190...AF205	8.5	17.5 x 5	LX205	1	0.18
AF265...AF370	10.5	20 x 5	LX370	1	0.23

For contactors	Cable range	Catalog number	Pkg qty	Weight (1 pce) kg
Connector terminal lug kits				
AF190...AF205	4-300 MCM	ATK185	3	0.16
AF265...AF370	4-400 MCM	ATK300	3	0.17
AF265...AF370	[2)] 4-500 MCM	ATK300/2	3	0.25

[1)] For more information, refer to "Accessories" section.

AF400 ... AF750 3-pole contactors
400 to 700 HP
AC / DC operated

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[1]. These contactors are of the block type design with 3 main poles.

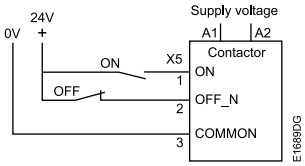
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 48...500 V 50/60 Hz and 24...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - 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

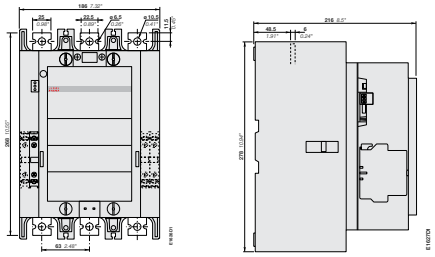
UL/CSA General use rating 600V AC	Motor Rating HP 3-phase				Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Catalog number	Weight Pkg (1 pce)
A	200-208V	220-240V	440-480V	550-600V	V 50/60 Hz	V DC				kg
550	125	150	350	400	-	24...60	1	1	AF400-30-11-68[2]	12.00
					48...130	48...130	1	1	AF400-30-11-69	12.00
					100...250	100...250	1	1	AF400-30-11-70	12.00
					250...500	250...500	1	1	AF400-30-11-71	12.00
650	150	200	400	500	-	24...60	1	1	AF460-30-11-68[2]	12.00
					48...130	48...130	1	1	AF460-30-11-69	12.00
					100...250	100...250	1	1	AF460-30-11-70	12.00
					250...500	250...500	1	1	AF460-30-11-71	12.00
750	200	250	500	600	-	24...60	1	1	AF580-30-11-68[2]	15.00
					48...130	48...130	1	1	AF580-30-11-69	15.00
					100...250	100...250	1	1	AF580-30-11-70	15.00
					250...500	250...500	1	1	AF580-30-11-71	15.00
900	400	500	600	700	-	24...60	1	1	AF750-30-11-68[2]	15.00
					48...130	48...130	1	1	AF750-30-11-69	15.00
					100...250	100...250	1	1	AF750-30-11-70	15.00
					250...500	250...500	1	1	AF750-30-11-71	15.00

[1] Up to 850 V DC for AF580, AF750.
[2] The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.
Note: AF400R ... AF750R are equipped with low voltage inputs for control, for example by a PLC.

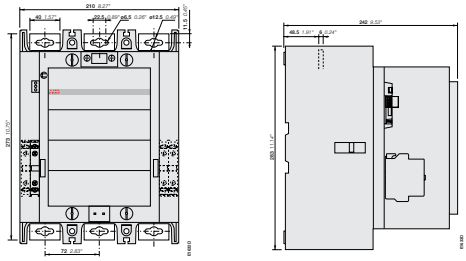
Control inputs



Main dimensions *mm, inches*



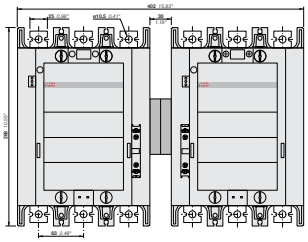
AF400, AF460

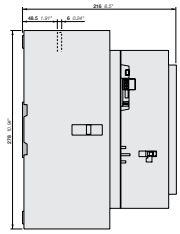


AF580, AF750

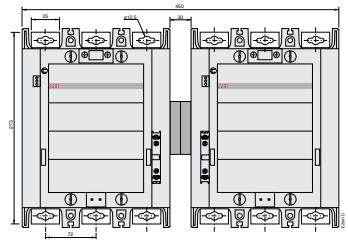
AF400R ... AF750R 3-pole reversing contactors
400 to 700 HP
AC / DC operated

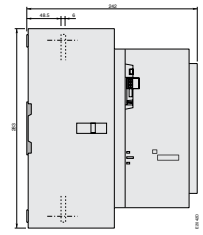
Main dimensions *mm, inches*





AF400R, AF460R





AF580R, AF750R

Description

AF400R ... AF750R reversing contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC or 600 V DC[1]. 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.

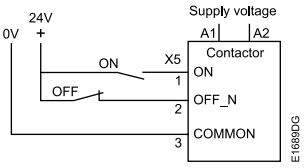
Note: For mechanically and electrically interlocked devices without power bus, replace the R in the catalog number with an M (ie. AF09R-30-22-13 becomes AF09M-30-22-13).

Ordering details

UL/CSA					Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Catalog number	Weight
General use rating 600V AC	Motor Rating HP 3-phase									Pkg (1 pce)
A	200-208V	220-240V	440-480V	550-600V	V 50/60 Hz	V DC				kg
550	125	150	350	400	-	24...60	2	2	AF400R-30-11-68[2]	32.10
					48...130	48...130	2	2	AF400R-30-11-69	32.10
					100...250	100...250	2	2	AF400R-30-11-70	32.10
					250...500	250...500	2	2	AF400R-30-11-71	32.10
650	150	200	400	500	-	24...60	2	2	AF460R-30-11-68[2]	32.10
					48...130	48...130	2	2	AF460R-30-11-69	32.10
					100...250	100...250	2	2	AF460R-30-11-70	32.10
					250...500	250...500	2	2	AF460R-30-11-71	32.10
750	200	250	500	600	-	24...60	2	2	AF580R-30-11-68[2]	41.80
					48...130	48...130	2	2	AF580R-30-11-69	41.80
					100...250	100...250	2	2	AF580R-30-11-70	41.80
					250...500	250...500	2	2	AF580R-30-11-71	41.80
900	400	500	600	700	-	24...60	2	2	AF750R-30-11-68[2]	41.80
					48...130	48...130	2	2	AF750R-30-11-69	41.80
					100...250	100...250	2	2	AF750R-30-11-70	41.80
					250...500	250...500	2	2	AF750R-30-11-71	41.80

[1] Up to 850 V DC for AF580, AF750.
[2] The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.
Note: AF400R ... AF750R are equipped with low voltage inputs for control, for example by a PLC.

Control inputs



AF1250 ... AF2650 3-pole contactors
900 to 1000 HP and 1210 to 2700 A
AC / DC operated

AF1250-30-11

AF2650-30-11

Description

AF1250 ... AF2650 contactors are mainly used for controlling power circuits up to 600 V AC or 600 V DC. These contactors are of the block type design with 3 main poles.

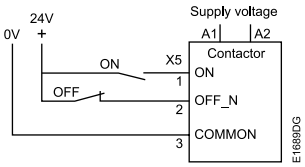
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
  - only 4 coils for AF1250 to cover control voltages between 48...500 V 50/60 Hz and 24...500 V DC
  - only 1 coil for AF1350 ... AF2650 to cover control voltages between 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

UL/CSA					Rated control circuit voltage Uc[1]		Auxiliary contacts fitted		Catalog number	Weight Pkg (1 pce)
General use rating 600V AC	Motor Rating HP 3-phase									
A	200-208V	220-240V	440-480V	550-600V	V 50/60 Hz	V DC				kg
1210	-	-	-	-	-	24...60	1	1	AF1250-30-11-68[1]	16.00
					48...130	48...130	1	1	AF1250-30-11-69	16.00
					100...250	100...250	1	1	AF1250-30-11-70	16.00
					250...500	250...500	1	1	AF1250-30-11-71	16.00
1350	-	400	800	1000	100...250	100...250	1	1	AF1350-30-11-70	34.00
1650	-	450	900	1150	100...250	100...250	1	1	AF1650-30-11-70	35.00
2100	-	-	-	-	100...250	100...250	1	1	AF2050-30-11-70	35.00
2700	-	-	-	-	100...250	100...250	1	1	AF2650-30-11-70	45.00

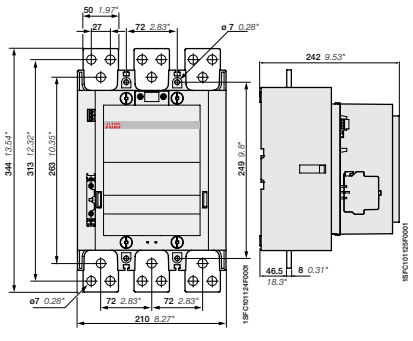
[1] May not be suitable for all PLC applications. Refer to manufacturing specifications.
Notes: AF2650 - Maximum operational voltage = 1000 V according to UL / CSA.
Use of lug kits for AF1350 and AF1650 in general use applications reduces the ratings to 1050A and 1350A respectively.
Recommend busbar connection for full ratings.
AF1250 ... AF2650 are equipped with low voltage inputs for control, for example by a PLC.

Control inputs

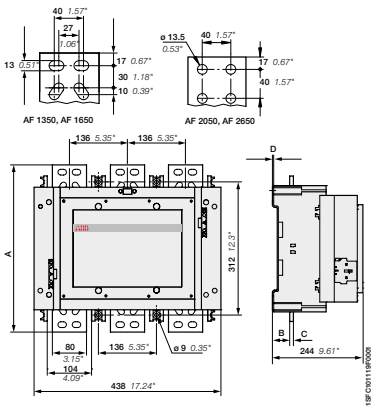


	AF1350, AF1650, AF2050	AF2650
A	392 mm / *15.43*"	422 mm / *16.61*"
B	47 mm / *1.85*"	53.5 mm / *2.11*"
C	10 mm / *0.39*"	25 mm / *0.98*"
D	3 mm / *0.12*"	-

Main dimensions *mm, inches*



AF1250



AF1350, AF1650, AF2050, AF2650

AF1350..T ... AF2650..T 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

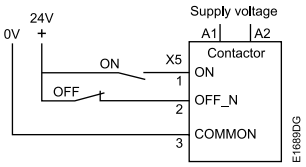
4

Ordering details

IEC		UL/CSA		Rated control circuit voltage	Auxiliary contacts fitted[1]		Catalog number	Global code	Weight
Rated operational power	current	3-phase motor rating	General use rating	Uc					Pkg (1 pce)
400 V AC-3	690 V AC-1	480 V	600 V AC						
kW	A	hp	A	V 50/60 Hz					kg
475	1350	800	1350	220 ... 240	1	1	AF1350T-30-11-70	1SFL657001R9101	34.00
560	1650	900	1650	220 ... 240	1	1	AF1650T-30-11-70	1SFL677001R9101	35.00
-	2050	-	2100	220 ... 240	1	1	AF2050T-30-11-70	1SFL707001R9101	35.00
-	2650	-	2700	220 ... 240	1	1	AF2650T-30-11-70	1SFL667001R9101	45.00

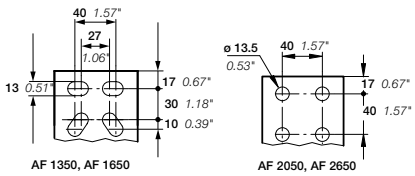
[1] Types -00 and -22 on request.

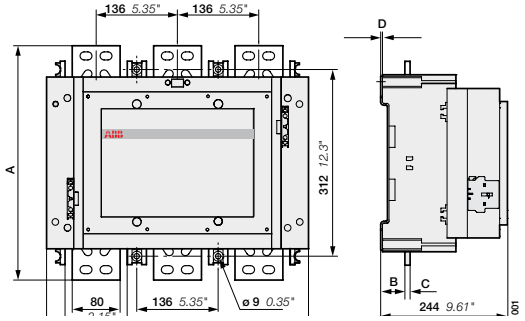
Control inputs



	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*

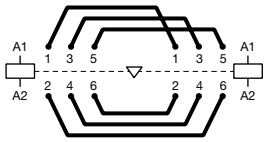




AF1350-30T-11, AF1650-30T-11, AF2050-30T-11, AF2650-30T-11

AF09N - AF1650N, AC/DC operated
NEMA rated, 3 pole

AF09N00ZR-30-22



Power bus diagram

AF80N3

AF40N2M-3022

Description

AF09N00 ... AF1650N8 NEMA contactors are mainly used for controlling 3-phase motors and power circuits up to 600 VAC. These contactors are of the block type design with 3 main poles.

Ordering Details: Non-Reversing

CSA/UL Ratings

NEMA Size	Continous Currents	Maximum Motor Horsepower Ratings				Auxiliary Contacts		Catalog number state coil voltage code ☐☐ (see table below)	Weight Kg
		208 V	240 V	480 V	600 V				
00	9	1.5	1.5	2	2	1	0	AF09N00-30-10-☐☐	0.27
						0	1	AF09N00-30-01-☐☐	0.27
0	18	3	3	5	5	1	0	AF12N0-30-10-☐☐	0.31
						0	1	AF12N0-30-01-☐☐	0.31
1	27	7.5	7.5	10	10	1	1	AF26N1-30-11-☐☐	0.39
2	45	10	15	25	25	1	1	AF40N2-30-11-☐☐	1.01
3	90	25	30	50	50	1	1	AF80N3-30-11-☐☐	1.26
4	135	40	50	100	100	1	1	AF140N4-30-11-☐☐	1.75
5	270	75	100	200	200	1	1	AF265N5-30-11-☐☐	4.61
6	540	150	200	400	400	1	1	AF460N6-3011-☐☐	12.00
7	810	–	300	600	600	1	1	AF750N7-3011-☐☐	15.00
8	1215	–	450	900	900	1	1	AF1650N8-3011-70	35.00

Ordering Details: Reversing with Mechanical and Electrical Interlock

CSA/UL Ratings

NEMA Size	Continous Currents	Maximum Motor Horsepower Ratings				Auxiliary Contacts		Catalog number state coil voltage code ☐☐ (see table below)	Weight Kg
		208 V	240 V	480 V	600 V				
00	9	1.5	1.5	2	2	2	2	AF09N00R-3022-☐☐	0.62
0	18	3	3	5	5	2	2	AF12N0R-3022-☐☐	0.70
1	27	7.5	7.5	10	10	2	2	AF26N1R-3022-☐☐	0.92
2	45	10	15	25	25	2	2	AF40N2R-3022-☐☐	2.23
3	90	25	30	50	50	2	2	AF80N3R-3022-☐☐	2.81
4	135	40	50	100	100	2	2	AF140N4R-3022-☐☐	5.66
5	270	75	100	200	200	2	2	AF265N5R-3022-☐☐	13.42
6	540	150	200	400	400	2	2	AF460N6R-3011-☐☐	32.10
7	810	–	300	600	600	2	2	AF750N7R-3011-☐☐	41.80
8	1215	–	450	900	900	2	2	AF1650N8R-3011-70	76.00

Notes: Low consumption NEMA available for AF09Z, AF12Z, AF26Z (i.e. AF09N00Z-30-10-21, AF12N0Z-30-10-21, AF26N1Z-30-10-21).
Low consumption NEMA reversing available (i.e. AF09N00ZR-3022-21, AF12N0ZR-3022-21, AF26N1ZR-3022-21).
Bar connection NEMA available (i.e. AF140N4-30-11B-13).

Coil voltages and codes AF09N ... AF265N

Voltage V - 50Hz/60Hz	Voltage V - d.c.	Code ☐ ☐
24...60		4 1
24...60	20...60	1 1
48 ... 130	48 ... 130	1 2
100 ... 250	100 ... 250	1 3
250 ... 500	250 ... 500	1 4

Note: AF09N-AF26N Normally closed contacts included as part of the electrical interlock. Normally open auxiliaries are either integral or front-mount.

Note: Available in the US and Canada only.

Note: For mechanically and electrically interlocked devices without power bus, replace the R in the catalog number with an M (ie. AF40N2R-3022-13 becomes AF40N2M-3022-13).

Coil voltages and codes AF460N ... AF1650N

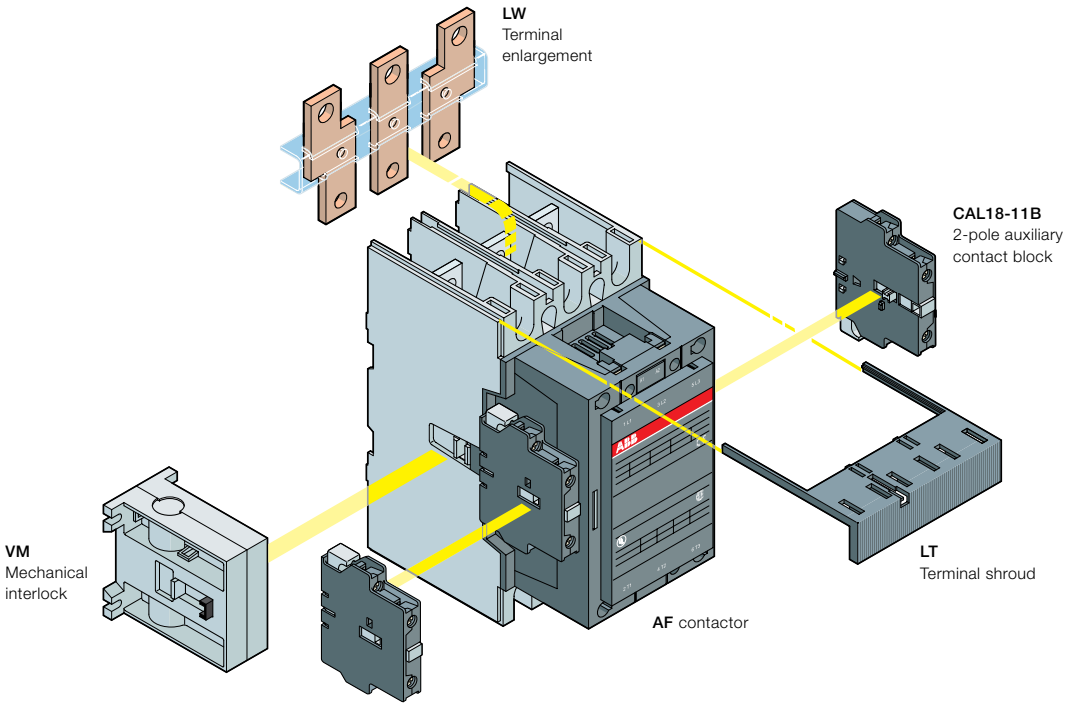
Voltage 50Hz/60Hz	Voltage V d.c.	Code ☐ ☐
–	20...60	6 8[1]
48...130	48...130	6 9
100...250	100...250	7 0[2]
250...500	250...500	7 1

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

[2] Only coil available for AF1650N.

AF400 ... AF2650 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 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)[4]
AF580, AF750	–	EF750 (250...800 A)[4]
AF1350, AF1650	–	E1250DU (375...1250 A)[4]

Note: 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.
[4] Mounting kit required (see "Motor protection").

AF400 ... AF2650 3-pole contactors
Main accessories

CAL18-11

VM750H

LT460-AC

Ordering details[1)]

For contactors	Auxiliary contacts		Catalog number	Pkg qty	Weight (1 pce) kg
Side-mounted instantaneous auxiliary contact blocks					
AF400 ... AF2650	1	1	CAL18-11	2	0.05
	1	1	CAL18-11B	2	0.05
Mechanical interlock unit					
AF400 ... AF1250			VM750H	1	0.20
AF1350 ... AF2650			VM1650H	1	6.00
Terminal shrouds					
AF400, AF460 with cable clamps			LT460-AC	2	0.10
AF400, AF460 with compression lugs			LT460-AL	2	0.80
AF580 ... AF750 with cable clamps			LT750-AC	2	0.12
AF580 ... AF750 with compression lugs			LT750-AL	2	0.83

For contactors	Dimensions hole Ø mm	bar mm	Catalog number	Pkg qty	Weight (1 pce) kg
Terminal enlargements					
AF400, AF460	10.5	25 x 5	LW460	1	0.73
AF580, AF750	13	40 x 6	LW750	1	1.23
AF1250	13	50 x 10	LW1250	1	2.00
Terminal extension					
AF400, AF460	10.5	25 x 5	LX460	1	0.50
AF580, AF750	13	40 x 6	LX750	1	0.85

[1)] For more information, refer to "Accessories" section.

For contactors	Cable range	Catalog number	Pkg qty	Weight (1 pce)
Connector terminal lug kits				
AF400 ... AF580	(2) 2/0 ... 500 MCM	ATK580/2	3	0.35
AF580 ... AF750	(3) 2/0 ... 500 MCM	ATK750/3	3	1.07
AF1350	(4) 4/0 ... 500 MCM[1)]	ATK1350/4	3	1.88
AF1350 ... AF1650	(4) 1/0 ... 750 MCM[1)]	ATK1650/4	3	4.38
AF1350 ... AF1650	(6) 1/0 ... 750 MCM[1)]	ATK1650/6	3	3.35
Spare terminal hardware				
AF190, AF205		LE185	1 set	0.20
AF265...AF370		LE300	1 set	0.30
AF400...AF580		LE460	1 set	0.60
AF580, AF750		LE750	1 set	0.75

[1)] Use of lug kits for AF1350 and AF1650 in general use application reduces the rating to 1050A and 13050A respectively.
Note: Recommand busbar connection for full ratings.

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 series	**160 V DC**	25 A	28 A	30 A	45 A	50 A	50 A
3 poles in series	**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
	550-600 V AC	9 A	11 A	17 A	22 A	27 A	32 A
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
	550-600 V AC	7-1/2 hp	10 hp	15 hp	20 hp	25 hp	30 hp
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”.

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 series	**160 V DC**	60 A	80 A	90 A	105 A	115 A
3 poles in series	**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".

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 / 60947-4-1A and CSA 60947-1 / 60947-4-1A							
Maximum operational voltage		600V							
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 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 series	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 series	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	450 A	400 A	500 A	600 A	800 A
Fuse type, 600 V		J							L
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.

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 508, CSA C22.2 N°14								
Maximum operational voltage		600 V					1000 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
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 A	450 hp	–	–
	440-480 V AC	350 hp	400 hp	500 hp	600 hp	–	800 A	900 hp	–	–
	550-600 V AC	400 hp	500 hp	600 hp	700 hp	–	1000 A	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 circuit-breaker			
Fuse type, 600 V		L								
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”.

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-..

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[1)]									
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	20 hp	30 hp	40 hp	40 hp	50 hp
	220-240 V AC	20 hp	20 hp	20 hp	25 hp	30 hp	40 hp	50 hp	60 hp
	440-480 V AC	40 hp	40 hp	40 hp	60 hp	75 hp	100 hp	100 hp	125 hp
	550-600 V AC	50 hp	50 hp	50 hp	75 hp	100 hp	125 hp	150 hp	150 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

[1)] AF190-AF370 produced since 07-2017

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
M 3~ 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
M 3~ 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, in free air from a cold state	**10 s**	150 A	150 A	150 A	350 A	350 A	350 A
	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".

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 60947-1, 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	30 A
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".

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	240 mm² [3]	300 mm²	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	240 mm² [3]	300 mm²	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
	**415 V**	116 A	140 A	146 A	190 A	205 A	265 A	305 A	370 A
3-phase motors	**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	160 A	185 A	260 A	290 A	350 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
	**415 V**	55 kW	75 kW	75 kW	90 kW	110 kW	132 kW	160 kW	200 kW
1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors	**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	110 kW	132 kW	160 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.

AF400 … AF2650 3-pole contactors
Technical data

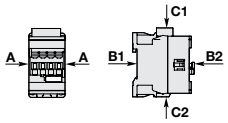
Main pole - Utilization characteristics according to IEC

Contactor types	AC / DC w	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	1050 A	–	–
	380-400 V	400 A	460 A	580 A	750 A	–	860 A	1050 A	–	–
M 3~ 3-phase motors	**415 V**	400 A	460 A	580 A	750 A	–	860 A	1050 A	–	–
	440 V	400 A	460 A	580 A	750 A	–	860 A	1050 A	–	–
	500 V	400 A	460 A	580 A	750 A	–	800 A	950 A	–	–
	690 V	350 A	400 A	500 A	650 A	–	800 A	950 A	–	–
	1000 V	155 A	200 A	250 A	300 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	600 kW	–	–
	440 V	220 kW	250 kW	355 kW	450 kW	–	560 kW	670 kW	–	–
	500 V	250 kW	315 kW	400 kW	520 kW	–	560 kW	700 kW	–	–
	690 V	315 kW	355 kW	500 kW	600 kW	–	750 kW	900 kW	–	–
	1000 V	220 kW	280 kW	355 kW	400 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.

AF09 ... AF38 3-pole contactors
Technical data

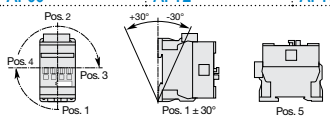
General technical data

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					
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					

Magnet system characteristics

Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Coil operating limits	**AC supply**	At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max.					
acc. to IEC 60947-4-1		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		(AF..Z) conditions of use on request					
acc. to SEMI F47-0706							
Dips withstand		(AF..Z) 22 ms average for Uc ≥ 24 V 50/60 Hz or Uc ≥ 20 V DC					
-20 °C ≤ θ ≤ +60 °C							
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					

AF40 ... AF96 3-pole contactors
Technical data

General technical data

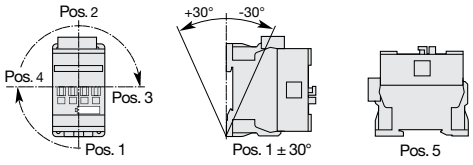
Contactor types	AC / DC operated	AF40	AF52	AF65	AF80	AF96
Rated insulation voltage Ui						
acc. to IEC 60947-4-1		690 V			1000 V	
acc. to UL / CSA		600 V				
Rated impulse withstand voltage Uimp.		6 kV			8 kV	
Electromagnetic compatibility		Devices complying with IEC 60947-1 / EN 60947-1				
Ambient air temperature close to contactor						
Operation — Fitted with thermal overload relay		[1]				
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				

[1] On request.

Magnet system characteristics

Contactor types	AC / DC operated	AF40	AF52	AF65	AF80	AF96
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.				
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				

AF116 ... AF370 3-pole contactors
Technical data

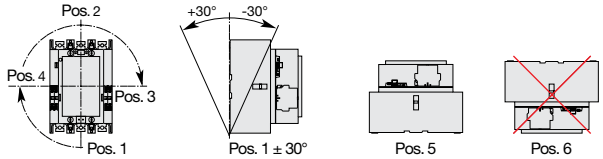
General technical data

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	Fitted with thermal overload relay	-25 to +55 °C						
	Without thermal overload relay	-40 to +70 °C						
Storage		-40 to +70 °C						
Maximum operating altitude (without derating)		3000 m						
Mechanical durability								
Number of operating cycles		5 million operating cycles						
Maximum switching frequency		300 cycles/h						

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								
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		
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 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		
Drop-out voltage		55 % of Uc min						
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		

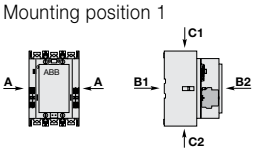
Mounting characteristics and conditions for use

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 3-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 M5						

AF400 ... AF2650 3-pole contactors
Technical data

General technical data

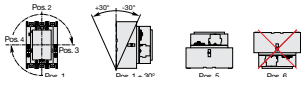
Contactor types	AC / DC operated	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650
Rated insulation voltage Ui										
acc. to IEC 60947-4-1		1000 V								
acc. to UL		600 V								1000 V
Rated impulse withstand voltage Uimp.		8 kV								
Electromagnetic compatibility		AF contactors complying 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								
Operation Without electronic overload relay		-40 to +70 °C								
Storage		-40 to +70 °C								
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 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					–			



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										
Coil consumption										
AC control voltage 50/60 Hz										
24...60 V AC	Average pull-in value	900 VA		780 VA			-			
	Average holding value	12 VA		12 VA			-			
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										
20...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 AC	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			

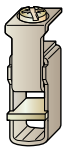
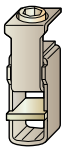
AF09 ... AF38 3-pole contactors
Technical data

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		
Rigid 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					

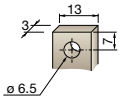
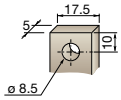
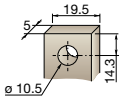
AF40 ... AF96 3-pole contactors
Technical data

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	
Rigid **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				

AF116 ... AF370 3-pole contactors
Technical data

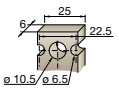
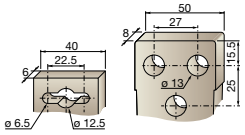
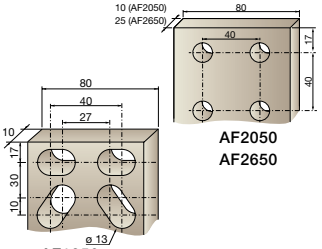
Connecting characteristics

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	**W ≤**	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 ... AF140-30-..B.
[2] Available in North America only.

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 AF2050 AF2650			
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	**W ≤**	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-400 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								

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										

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).

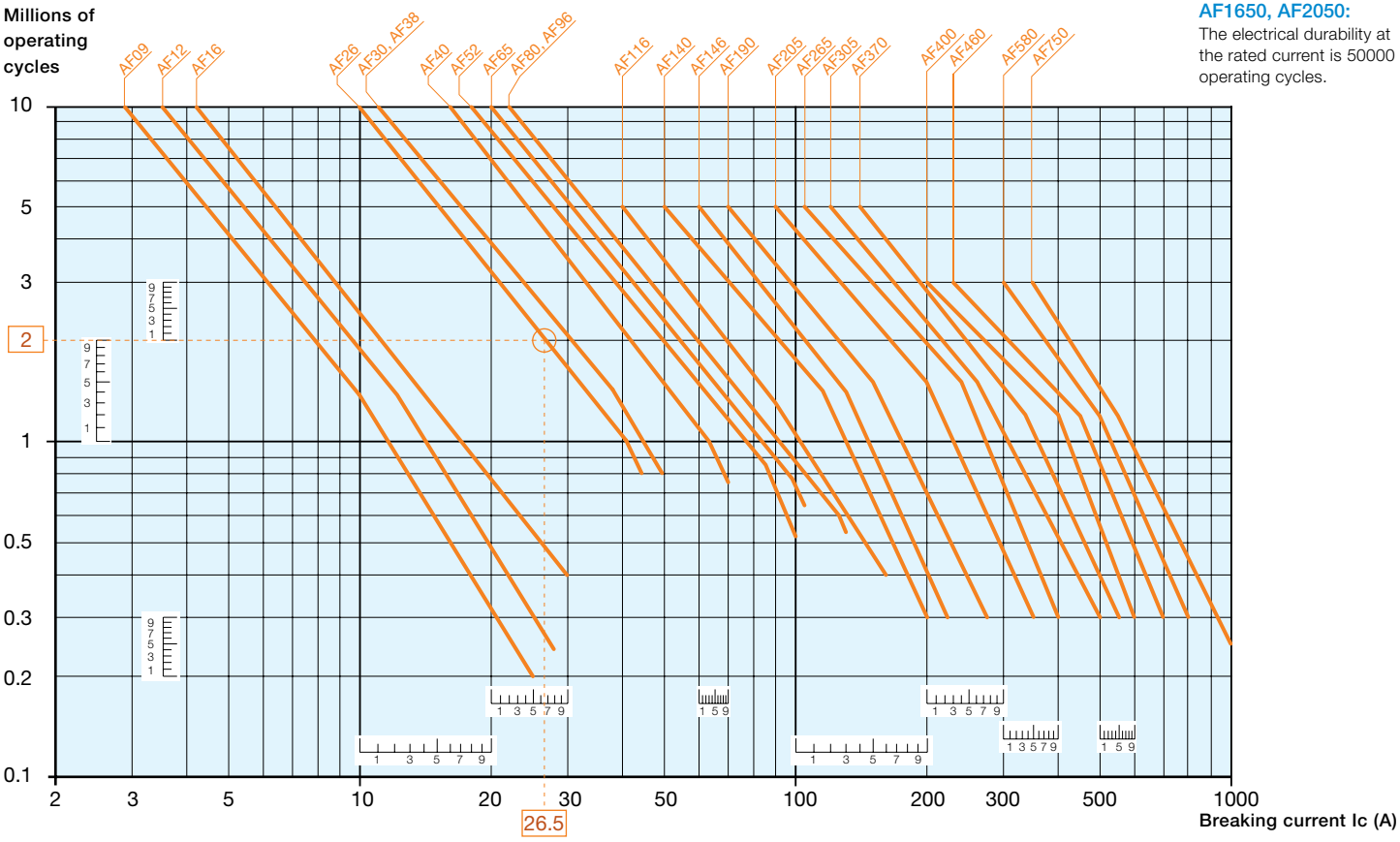
The combined effect of environmental conditions and the proper temperature of the product may require some disposals. As a matter of fact, for this duty, the use duration prevails over the number of operating cycles.

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.

4

Example:

Ic / AC-1 = 26.5 A – Electrical durability required = 2 millions operating cycles.

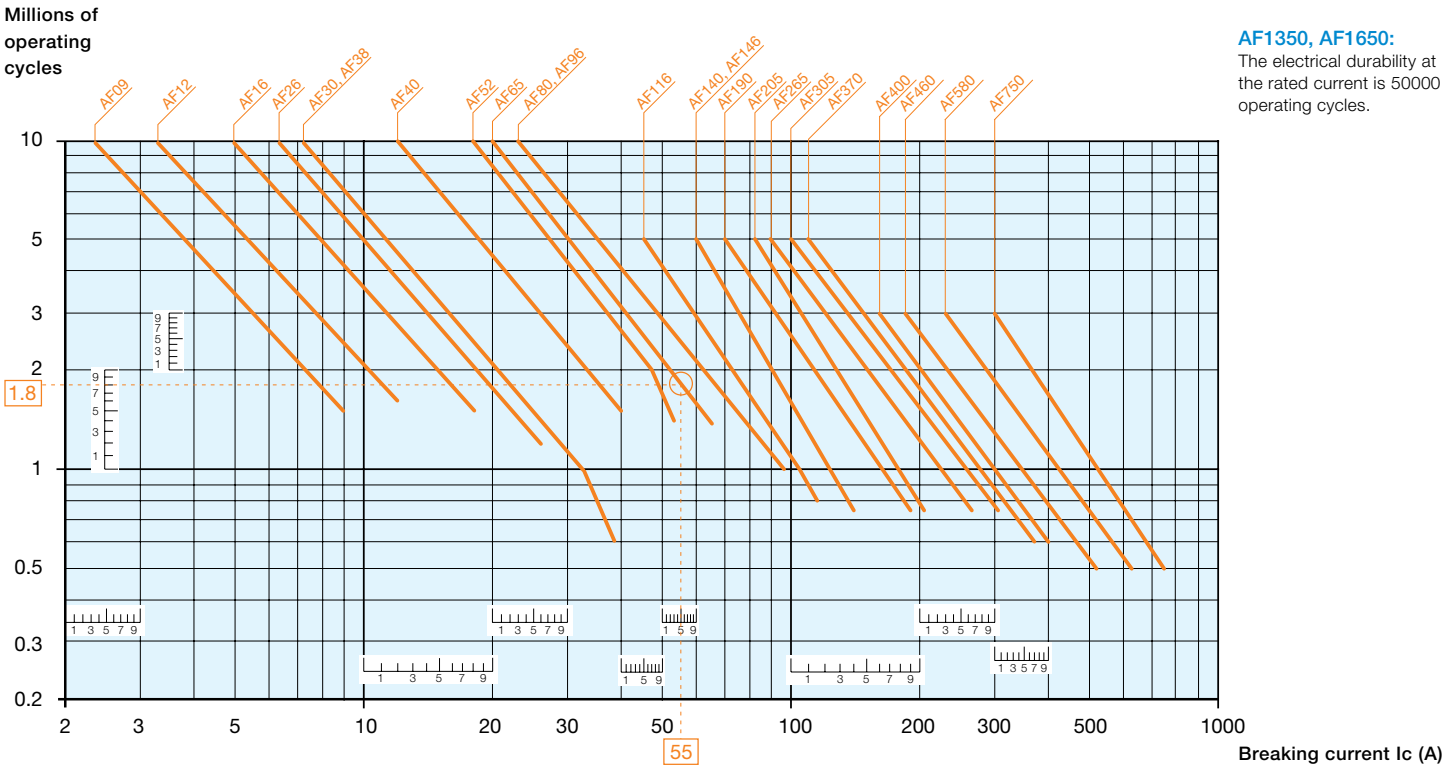
Using the AC-1 curves above select the AF26 contactor at intersection "○" (26.5 A / 2 millions operating cycles).

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:

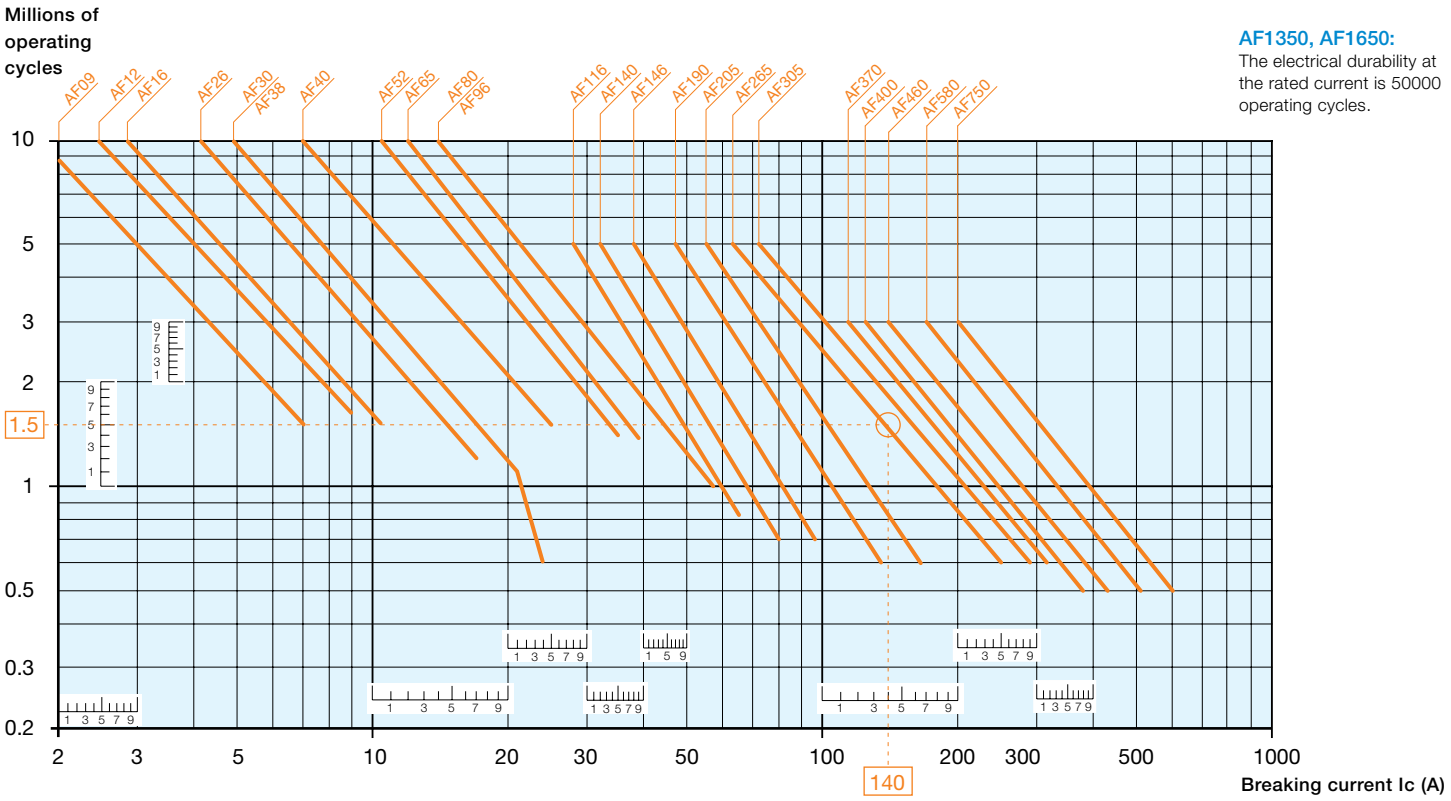
Motor power 30 kW for AC-3 - Ue = 400 V and Ie = 55 A utilization – Electrical durability required = 1.8 million operating cycles.
For AC-3: Ic = Ie. Select the AF65 contactor at intersection "○" (55 A / 1.8 million operating cycles) on the curves (AC-3 - Ue ≤ 440 V).

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.

4

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).

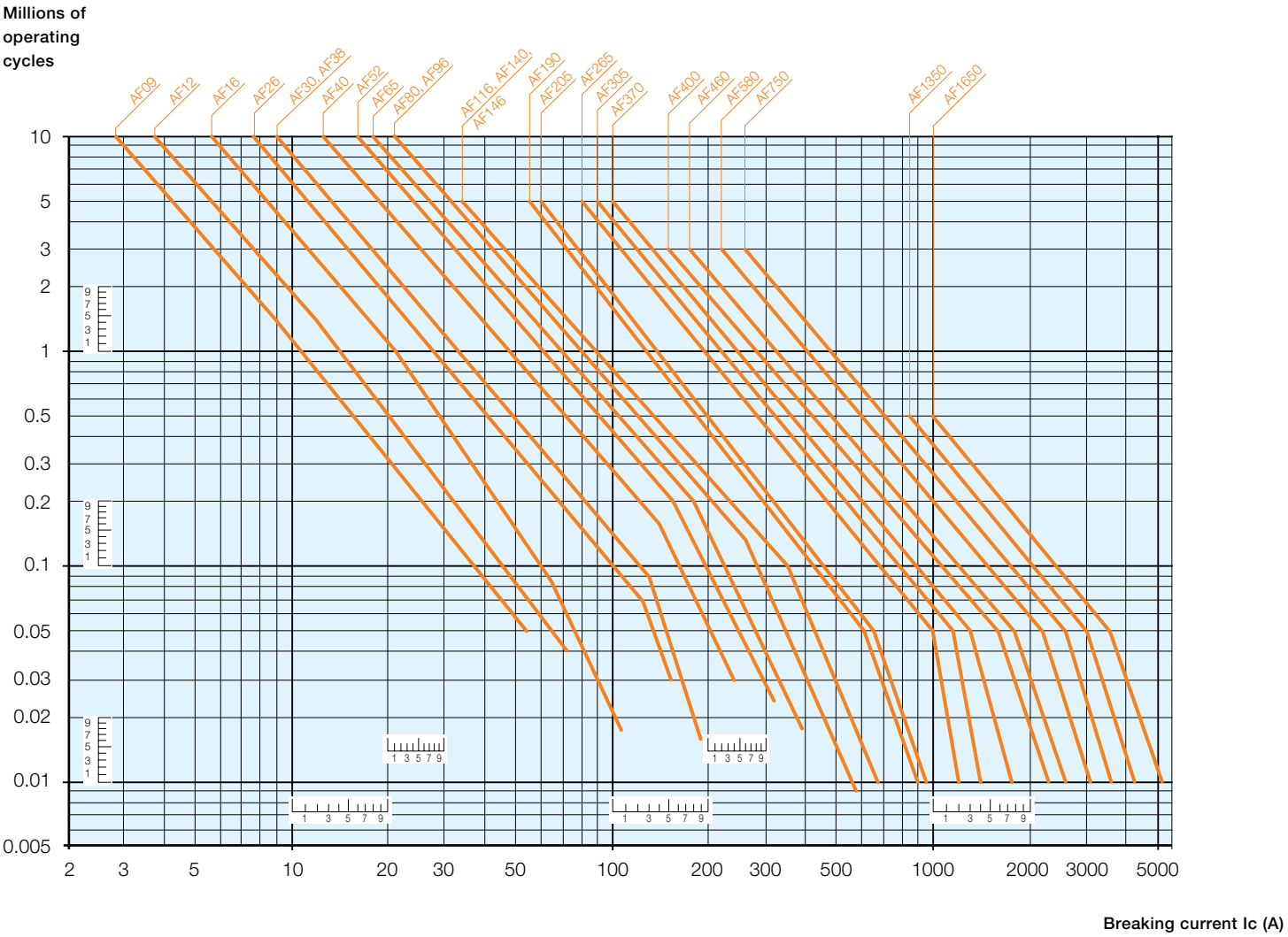
3-pole contactors
Electrical durability

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".



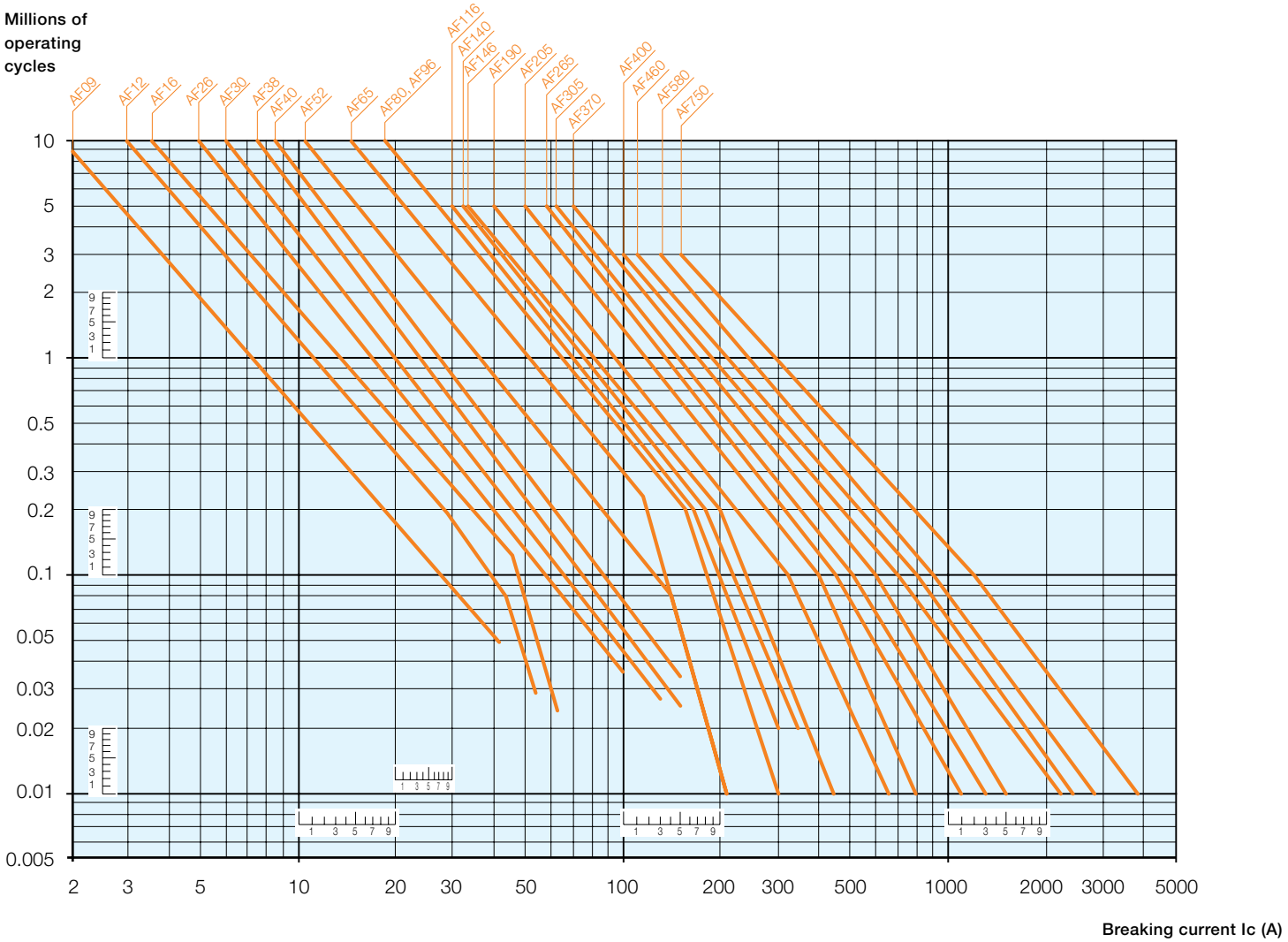
3-pole contactors
Electrical durability

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".

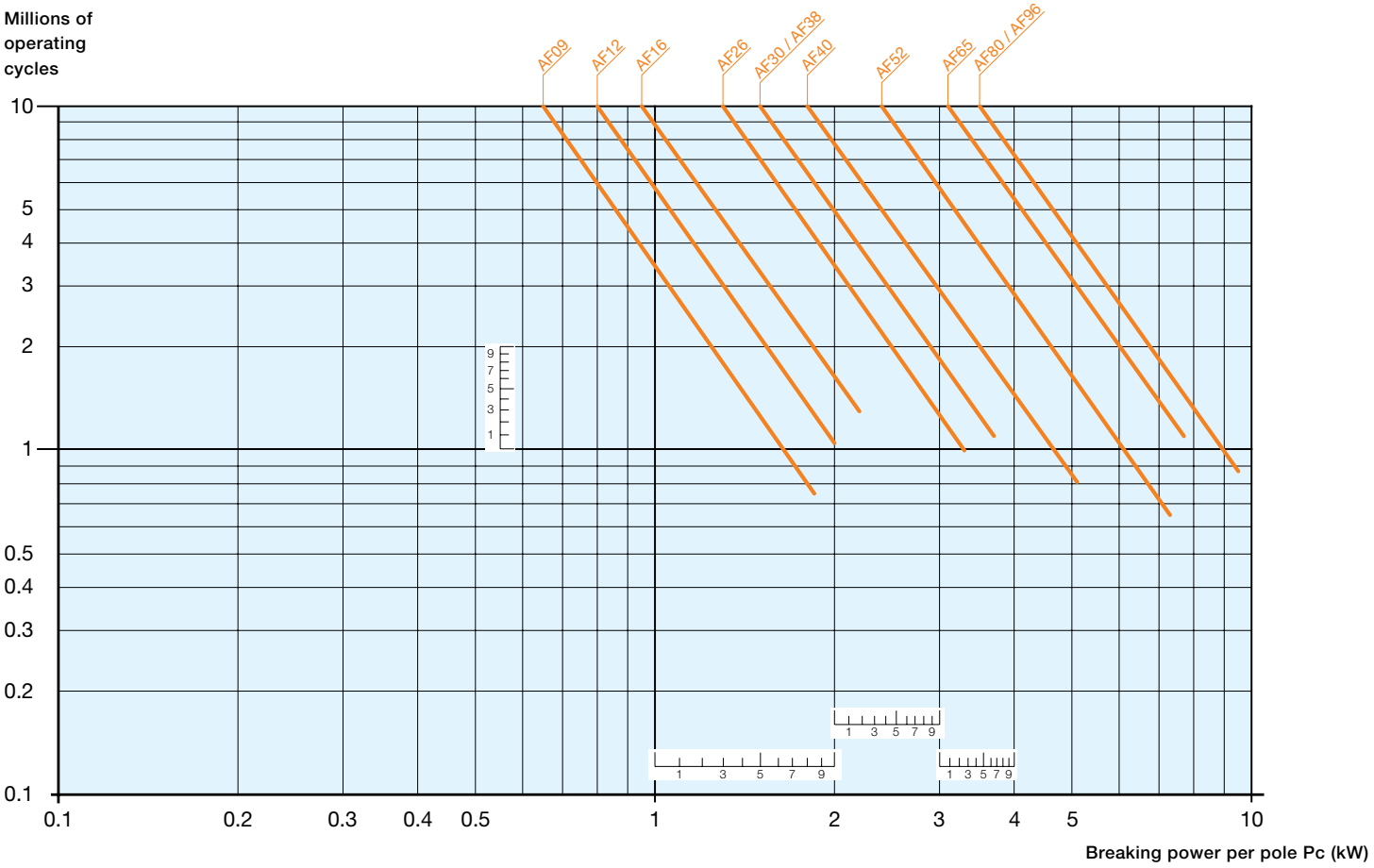


3-pole contactors
Electrical durability

Electrical durability for DC-1 utilization category

Switching Non inductive or slightly inductive loads, resistance furnaces.
The breaking power per pole Pc is: Pc = (Uc x Ic) / n
Uc: breaking voltage Uc = Ue
Ic: breaking current Ic = Ie
n: number of poles in series

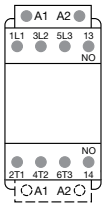
Ambient temperature and maximum electrical switching frequency: see "Technical data".



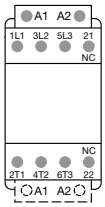
AF09 ... AF96 3-pole contactors
Terminal marking and positioning

AF09 ... AF96 contactors - AC / DC operated

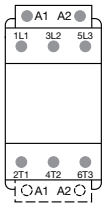
Standard devices without addition of auxiliary contacts



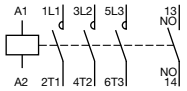
AF09 ... AF16..-30-10



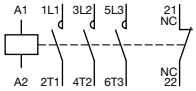
AF09 ... AF16..-30-01



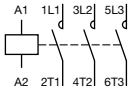
AF26 ... AF96..-30-00



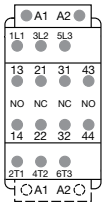
AF09 ... AF16..-30-10



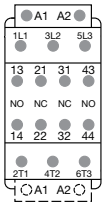
AF09 ... AF16..-30-01



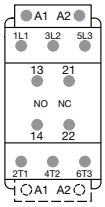
AF26 ... AF96..-30-00



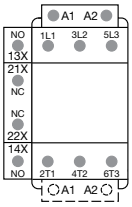
AF09 ... AF16..-30-22



AF26 ... AF96..-30-22

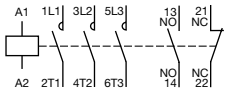


AF26 ... AF38..-30-11

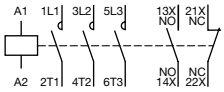


AF40 ... AF96..-30-11

AF09 ... AF96..-30-22

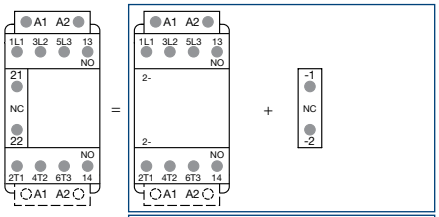


AF26 ... AF38..-30-11

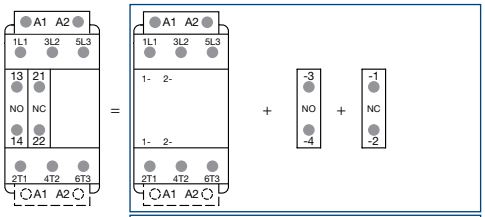


AF40 ... AF96..-30-11

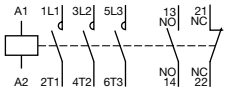
Other possible contact combinations with auxiliary contacts added by the user



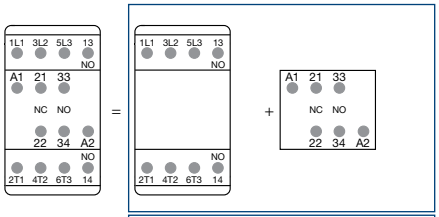
Combination 11 = AF09 ... AF16..-30-10 + CA4-01



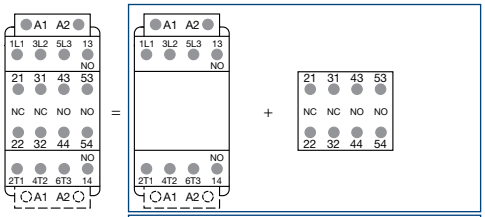
Combination 11 = AF26 ... AF96..-30-00 + CA4-10 + CA4-01



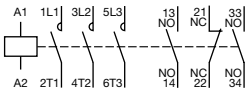
Combination 11



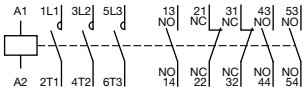
Combination 21 = AF09 ... AF16..-30-10 + CAT4-11M



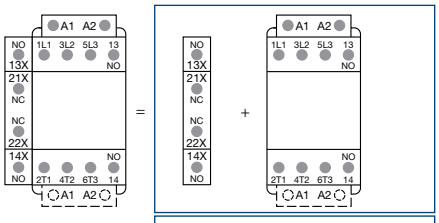
Combination 32 = AF09 ... AF16..-30-10 + CA4-22M



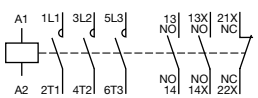
Combination 21



Combination 32



Combination 21 = CAL4-11 + AF09 ... AF16..-30-10



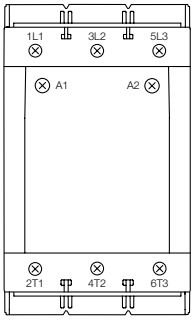
Combination 21

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

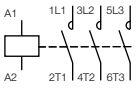
AF116 ... AF370 3-pole contactors
Terminal marking and positioning

AF116 ... AF370 contactors - AC / DC operated

Standard devices without addition of auxiliary contacts

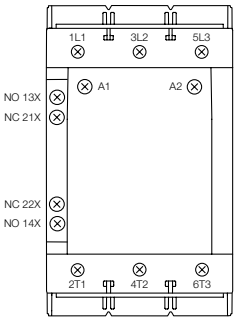


AF116 ... AF370-30-00

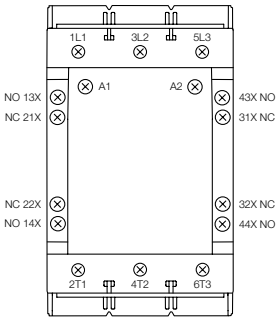


AF116 ... AF370-30-00

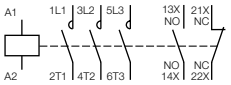
Standard devices with factory mounted auxiliary contacts



AF116 ... AF370-30-11



AF116 ... AF370-30-22



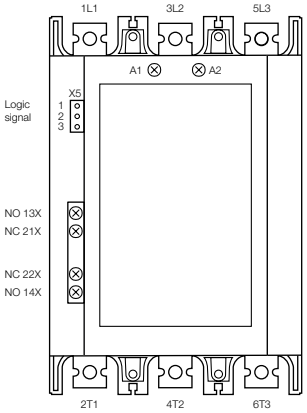
AF116 ... AF370-30-11

AF116 ... AF370-30-22

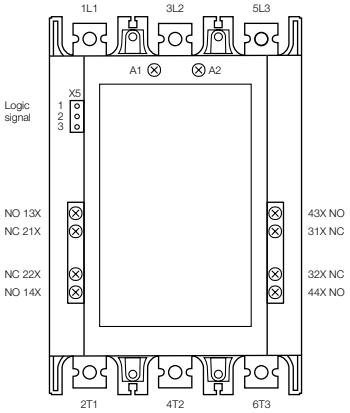
AF400 ... AF2650 3-pole contactors
Terminal marking and positioning

AF400 ... AF1250 contactors - AC / DC operated

Standard devices with factory mounted auxiliary contacts

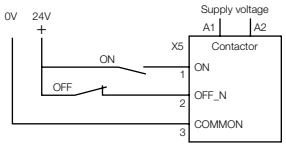


AF400 ... AF1250-30-11

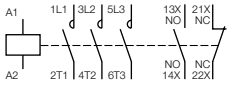


AF400 ... AF1250-30-22

Control with logic signal



AF400 ... AF1250-30-11, AF400 ... AF1250-30-22

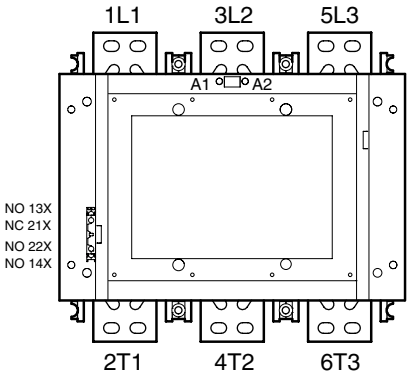


AF400 ... AF1250-30-11

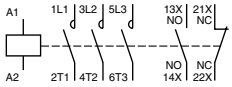
AF400 ... AF1250-30-22

AF1350 ... AF2650 contactors - AC / DC operated

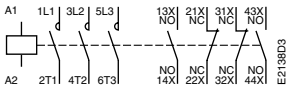
Standard devices with factory mounted auxiliary contacts



AF1350 ... AF2650-30-11

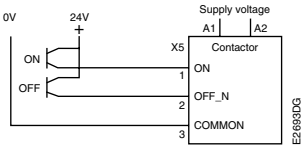


AF1350 ... AF2650-30-11



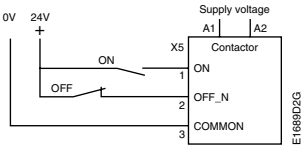
AF1350 ... AF2650-30-22

Wiring diagrams
when used with transistor output



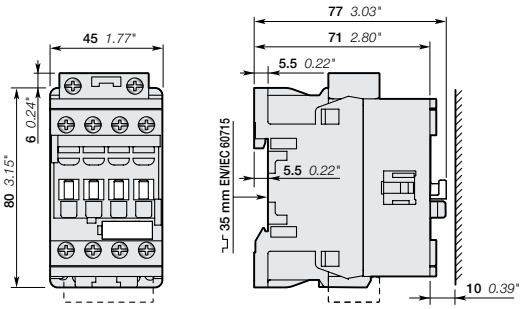
AF1350, AF1650

when used with transistor output

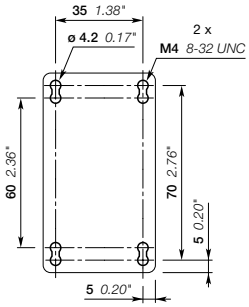


AF09, AF12, AF16 3-pole contactors

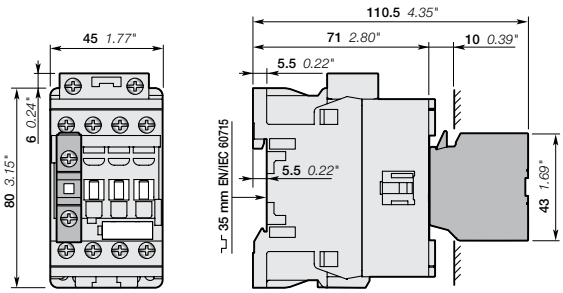
Main dimensions mm, inches



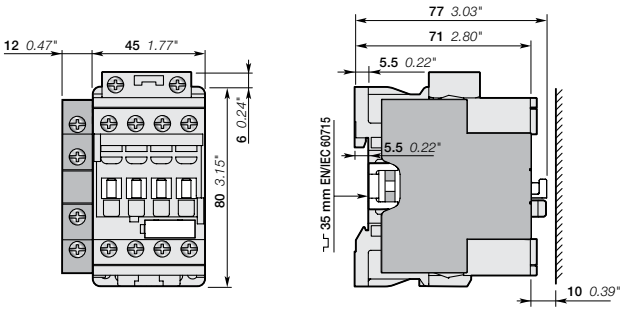
AF09, AF12, AF16



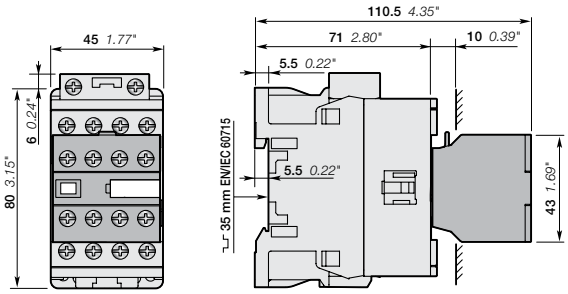
AF09, AF12, AF16



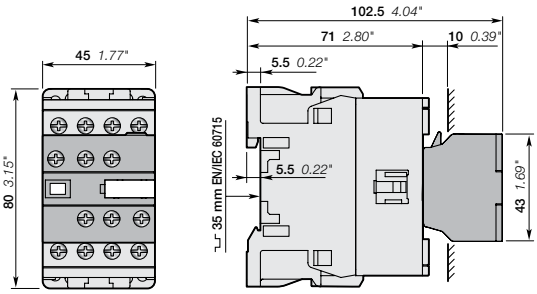
AF09, AF12, AF16
+ CA4, CC4 1-pole auxiliary contact block



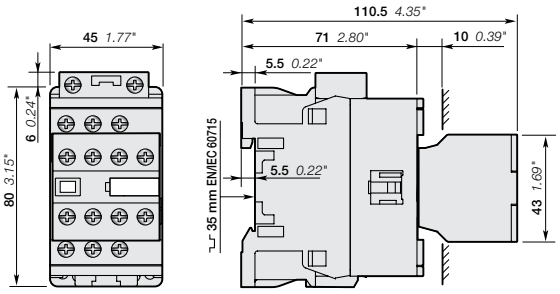
AF09, AF12, AF16
+ CAL4-11 2-pole auxiliary contact block



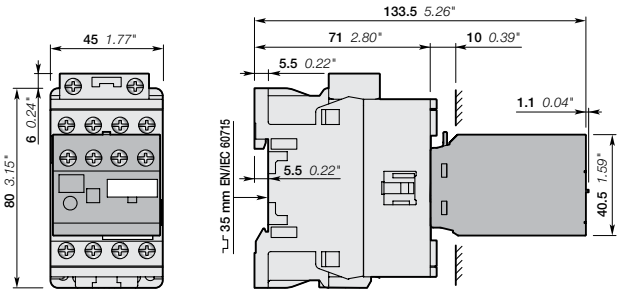
AF09, AF12, AF16
+ CA4 4-pole auxiliary contact block



AF09, AF12, AF16
+ CAT4 2-pole auxiliary contact and coil terminal block



AF09, AF12, AF16..-30-22

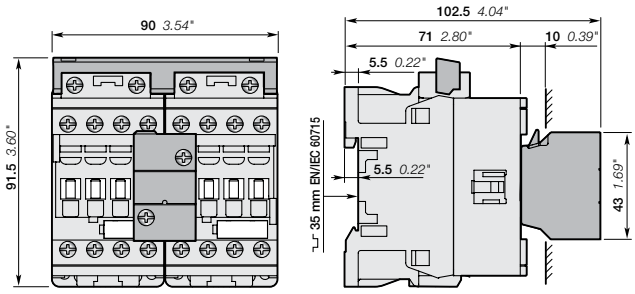


AF09, AF12, AF16
+ TEF4 electronic timer

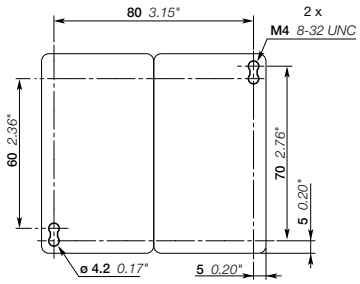
Note: contactor lateral distance to grounded component 2 mm *0.08*" min.

AF09, AF12, AF16 3-pole contactors

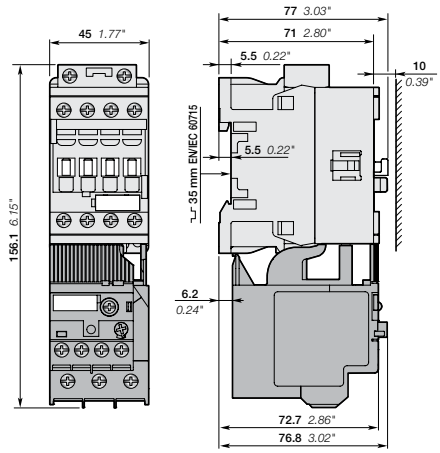
Main dimensions mm, inches



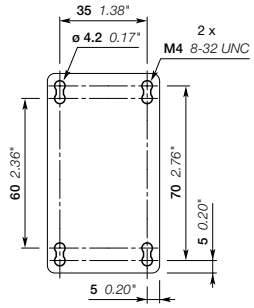
AF09, AF12, AF16
+ VEM4 mechanical and electrical interlock set



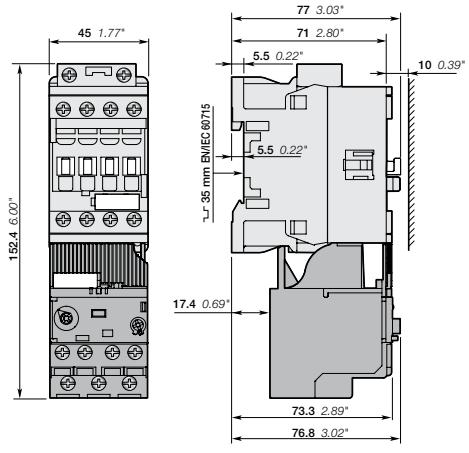
AF09, AF12, AF16
+ VEM4 mechanical and electrical interlock set



AF09, AF12, AF16
+ TF42 thermal overloard relay



AF09, AF12, AF16
+ TF42, EF19

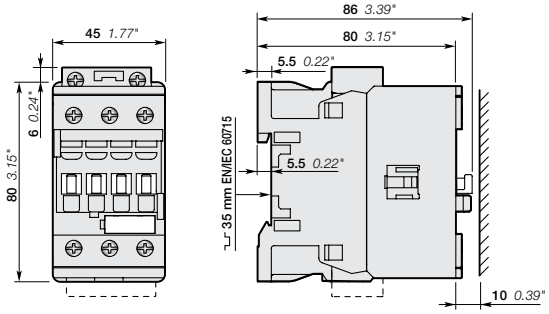


AF09, AF12, AF16 3-pole contactors
+ EF19 electronic overload relay

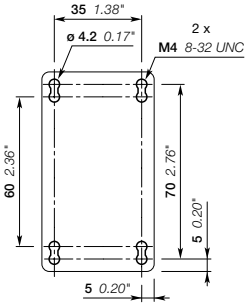
Note: contactor lateral distance to grounded component 2 mm *0.08*" min.

AF26, AF30, AF38 3-pole contactors

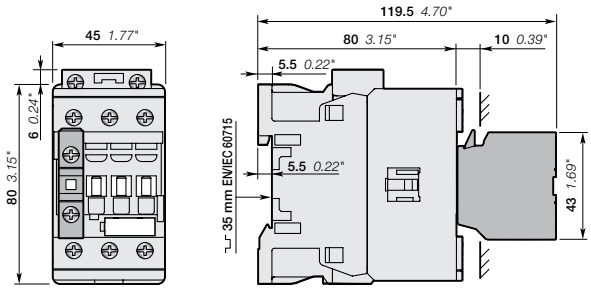
Main dimensions mm, inches



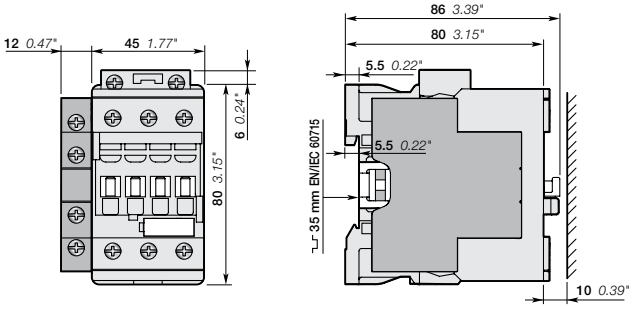
AF26, AF30, AF38



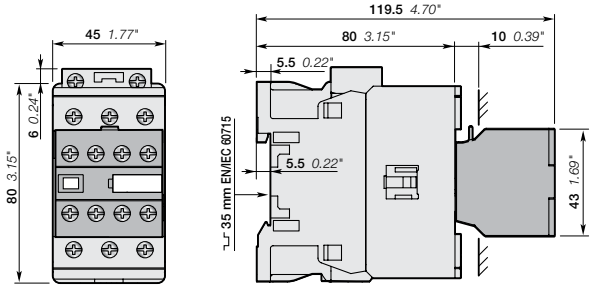
AF26, AF30, AF38



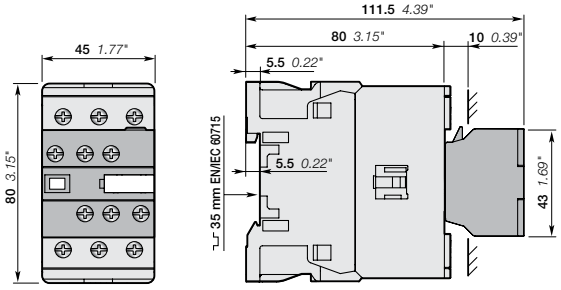
AF26, AF30, AF38
+ CA4, CC4 1-pole auxiliary contact block



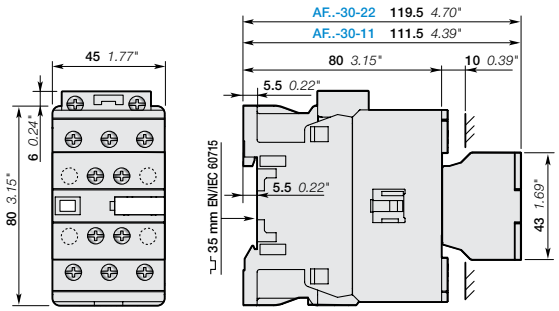
AF26, AF30, AF38
+ CAL4-11 2-pole auxiliary contact block



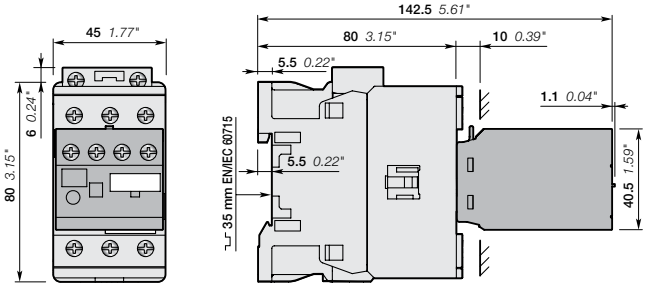
AF26, AF30, AF38
+ CA4 4-pole auxiliary contact block



AF26, AF30, AF38
+ CAT4 2-pole auxiliary contact and coil terminal block



AF26, AF30, AF38-30-11
AF26, AF30, AF38-30-22

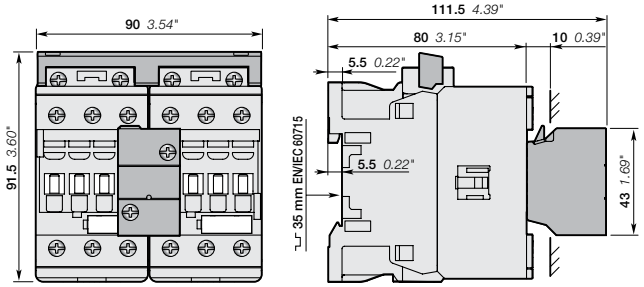


AF26, AF30, AF38
+ TEF4 electronic timer

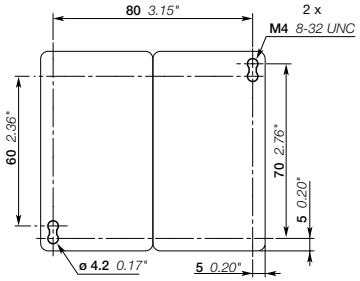
Note: contactor lateral distance to grounded component 2 mm *0.08*" min.

AF26, AF30, AF38 3-pole contactors

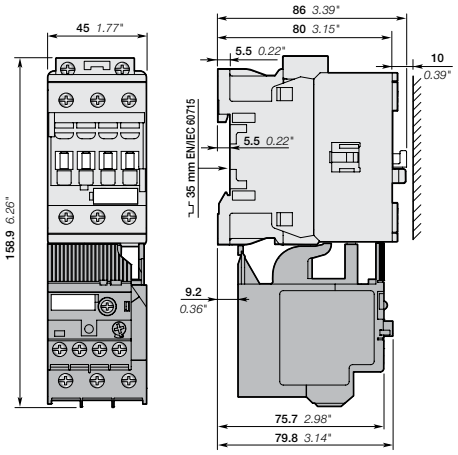
Main dimensions mm, inches



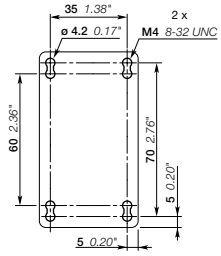
AF26, AF30, AF38
+ VEM4 mechanical and electrical interlock set



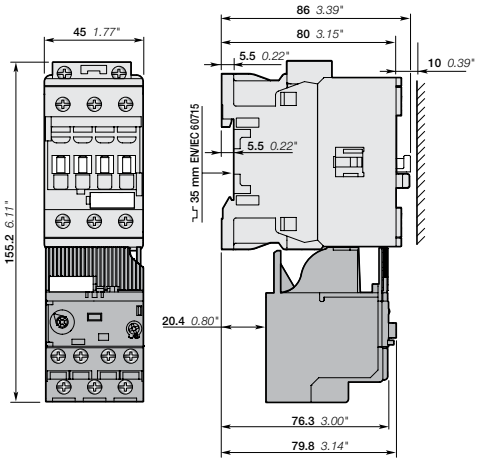
AF26, AF30, AF38
+ VEM4 mechanical and electrical interlock set



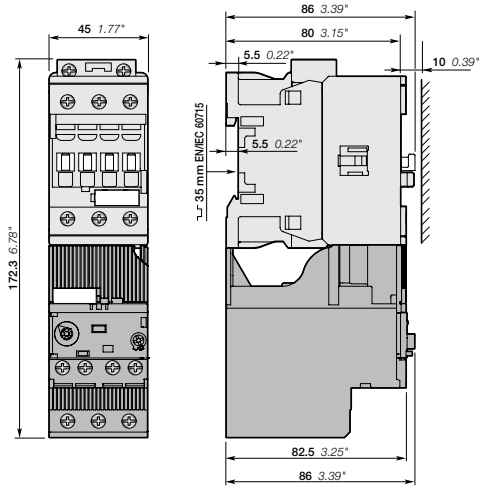
AF26, AF30, AF38
+ TF42 thermal overload relay



AF26, AF30, AF38
+ TF42, EF19, EF45



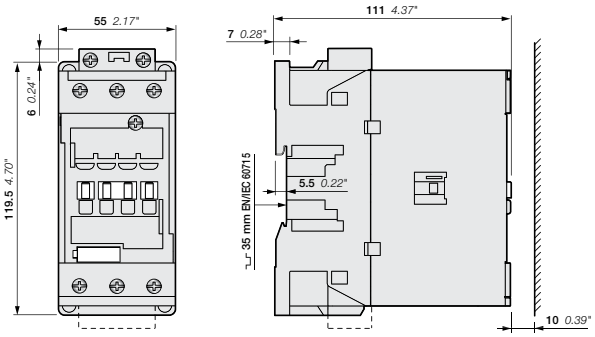
AF26 3-pole contactors
+ EF19 electronic overload relay



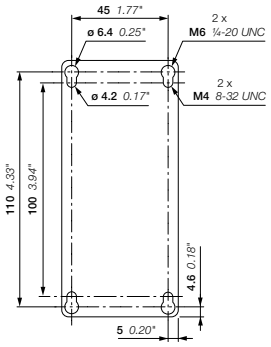
AF26, AF30, AF38, 3-pole contactors
+ EF45 electronic overload relay

Note: contactor lateral distance to grounded component 2 mm *0.08"* min.

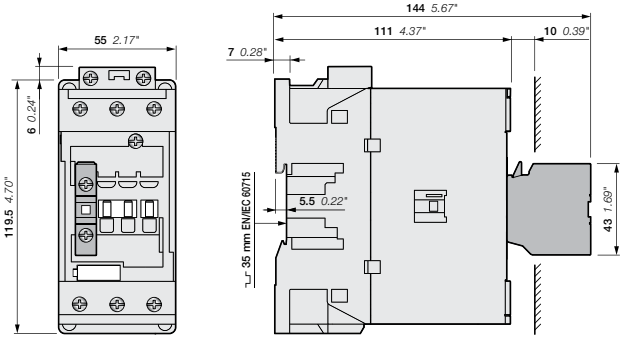
Main dimensions mm, inches



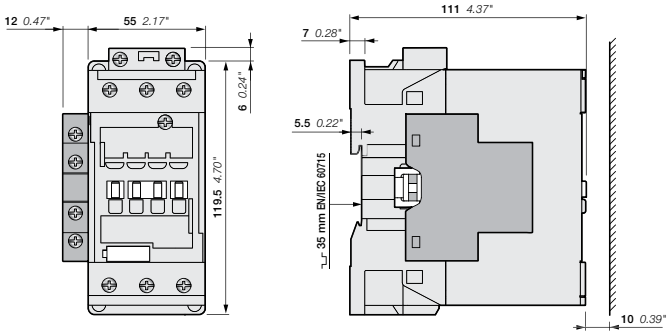
AF40, AF52, AF65



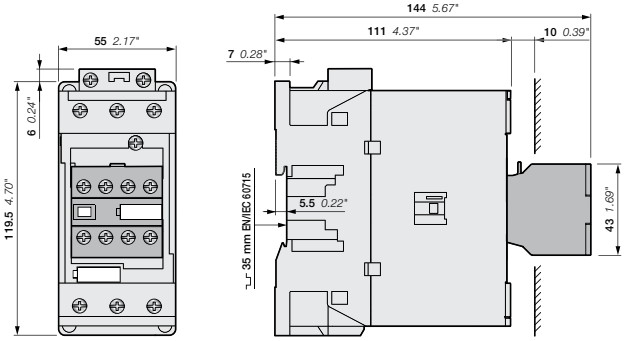
AF40, AF52, AF65



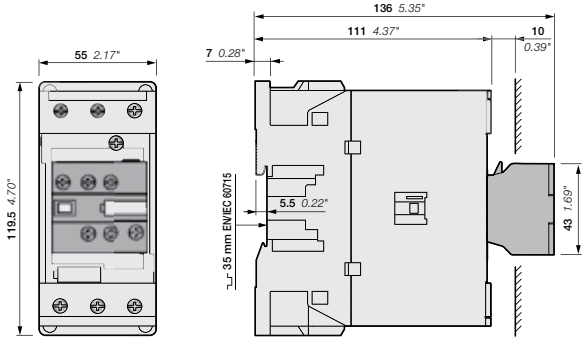
AF40, AF52, AF65
+ CA4, CC4 1-pole auxiliary contact block



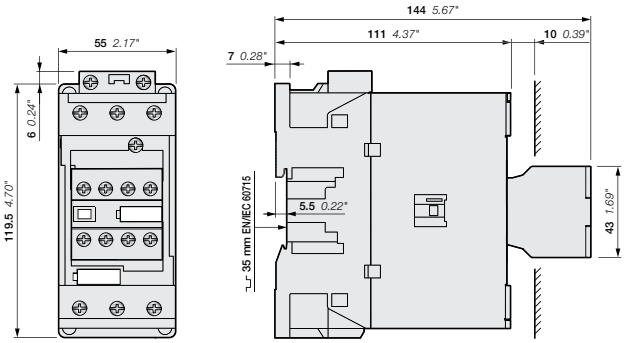
AF40, AF52, AF65-30-00 + CAL4-11 2-pole auxiliary contact block
AF40, AF52, AF65-30-11



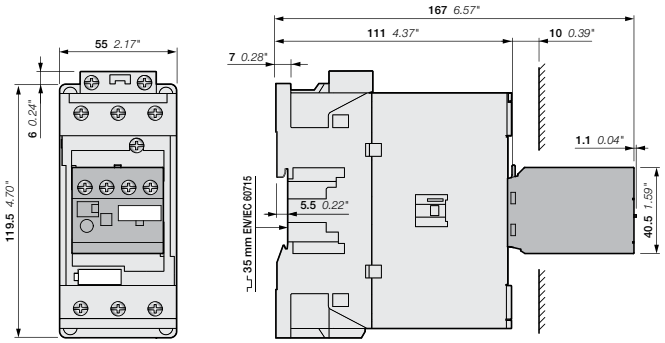
AF40, AF52, AF65
+ CA4 4-pole auxiliary contact block



AF40, AF52, AF65
+ CAT4 2-pole auxiliary contact and coil terminal block



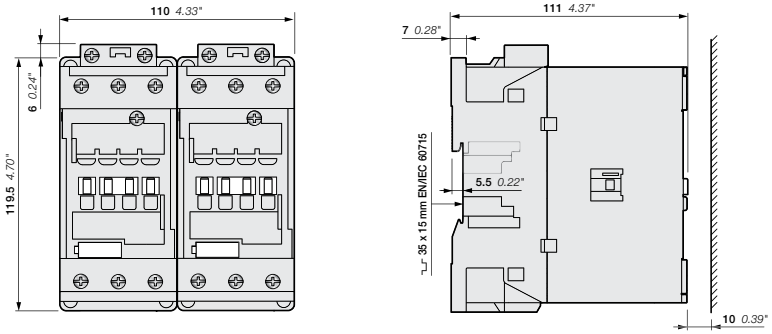
AF40, AF52, AF65..-30-22



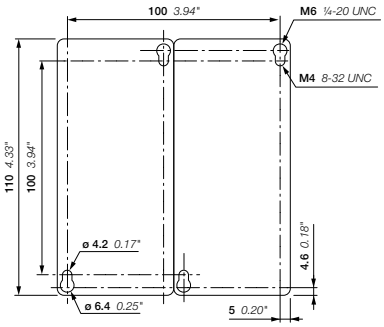
AF40, AF52, AF65
+ TEF4 electronic timer

AF40 ... AF65 3-pole contactors

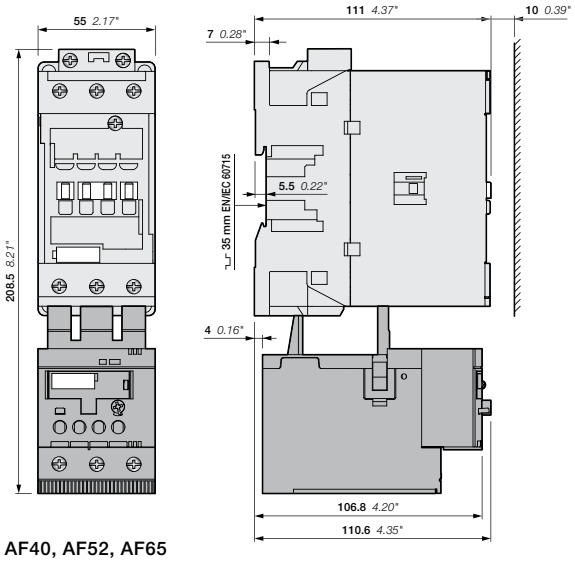
Main dimensions mm, inches



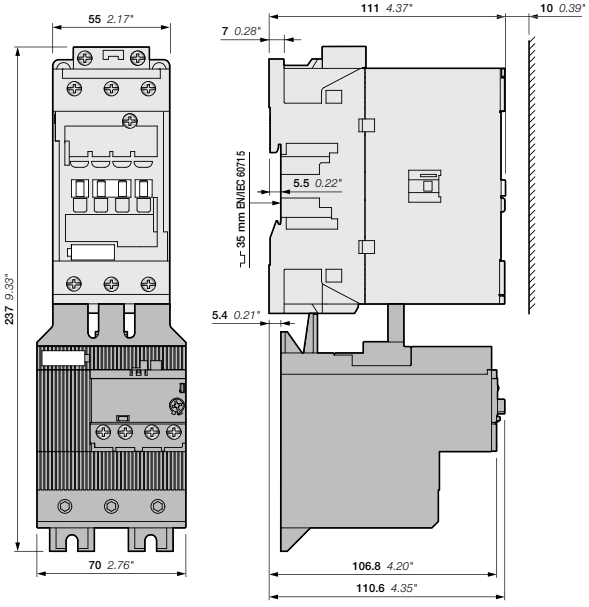
AF40, AF52, AF65
+ VM96-4 mechanical interlock set



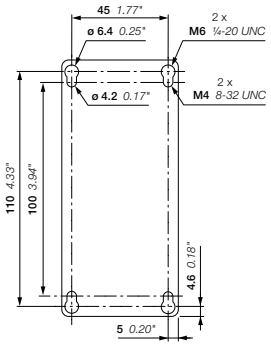
AF40, AF52, AF65
+ VM96-4 mechanical interlock set



AF40, AF52, AF65
+ TF65 thermal overload relay

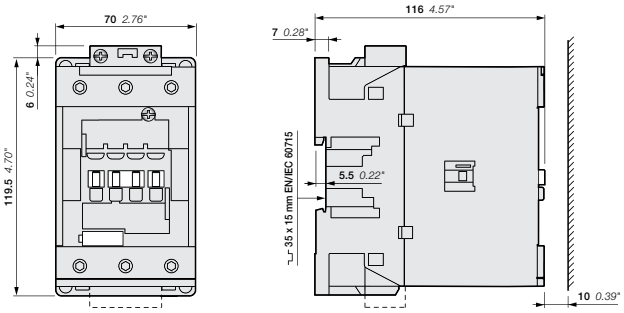


AF40, AF52, AF65
+ EF65 electronic overload relay

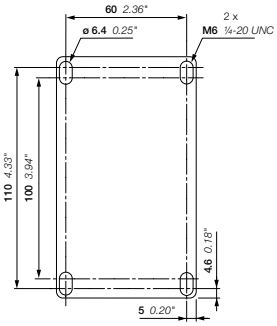


AF40, AF52, AF65
+ TF65, EF65

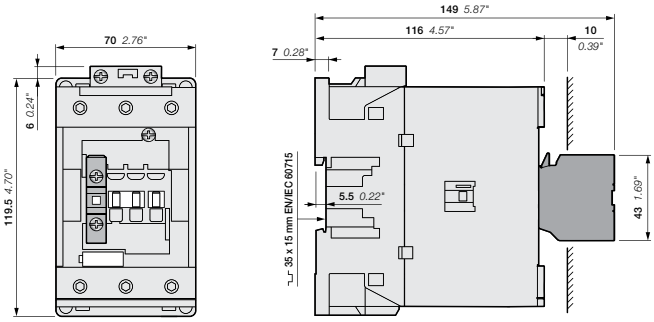
Main dimensions mm, inches



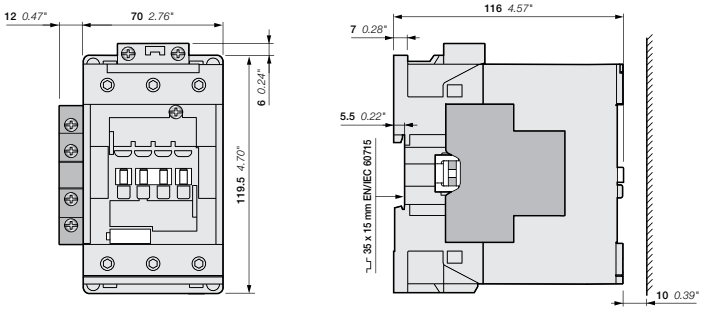
AF80, AF96



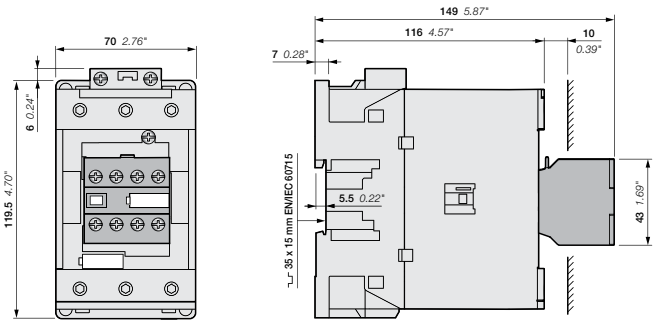
AF80, AF96



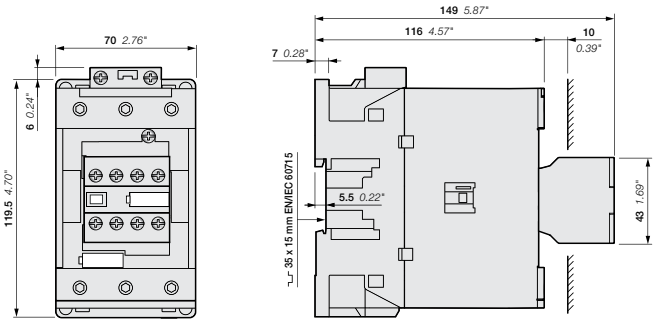
AF80, AF96
+ CA4, CC4 1-pole auxiliary contact block



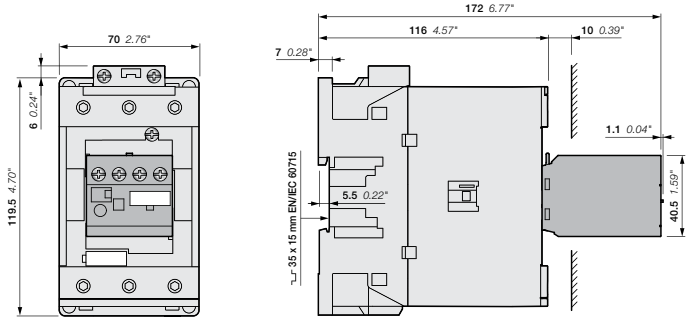
AF80, AF96-30-00 + CAL4-11 2-pole auxiliary contact block
AF80, AF96-30-11



AF80, AF96
+ CA4 4-pole auxiliary contact block



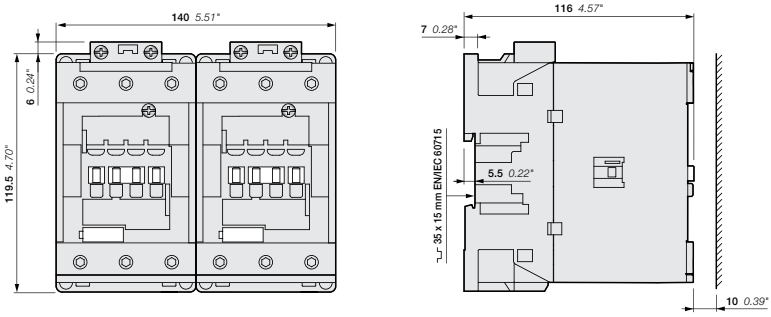
AF80, AF96..-30-22



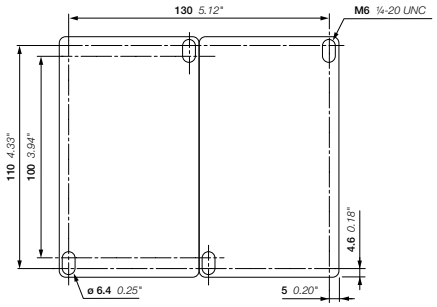
AF80, AF96
+ TEF4 electronic timer

AF80 ... AF96 3-pole contactors

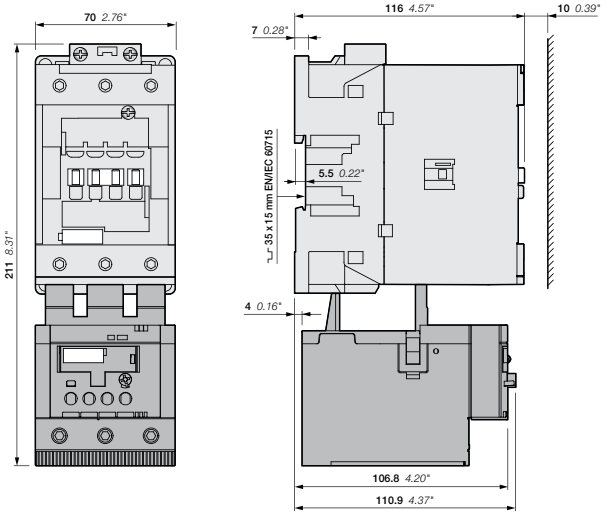
Main dimensions mm, inches



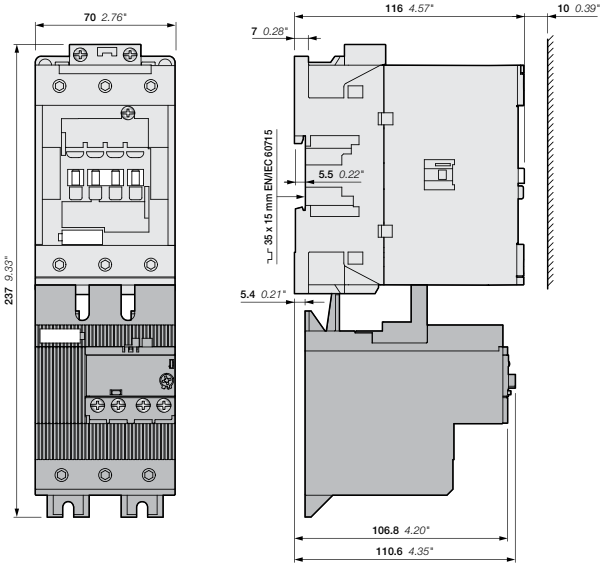
AF80, AF96
+ VM96-4 mechanical interlock set



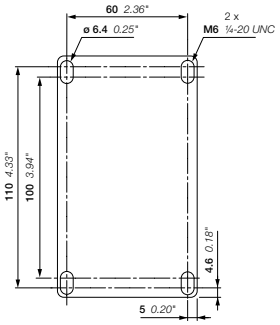
AF80, AF96
+ VM96-4 mechanical interlock set



AF80, AF96
+ TF96 thermal overload relay



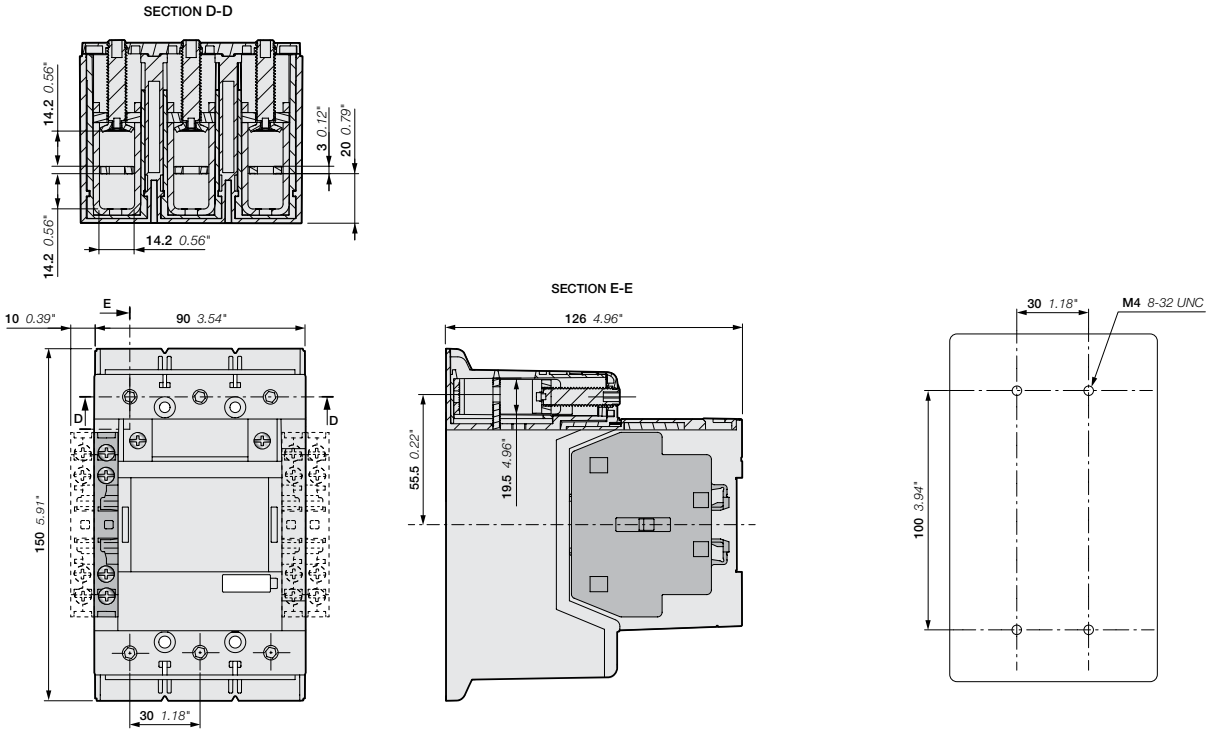
AF80, AF96
+ EF96 electronic overload relay



AF80, AF96
+ TF96, EF96

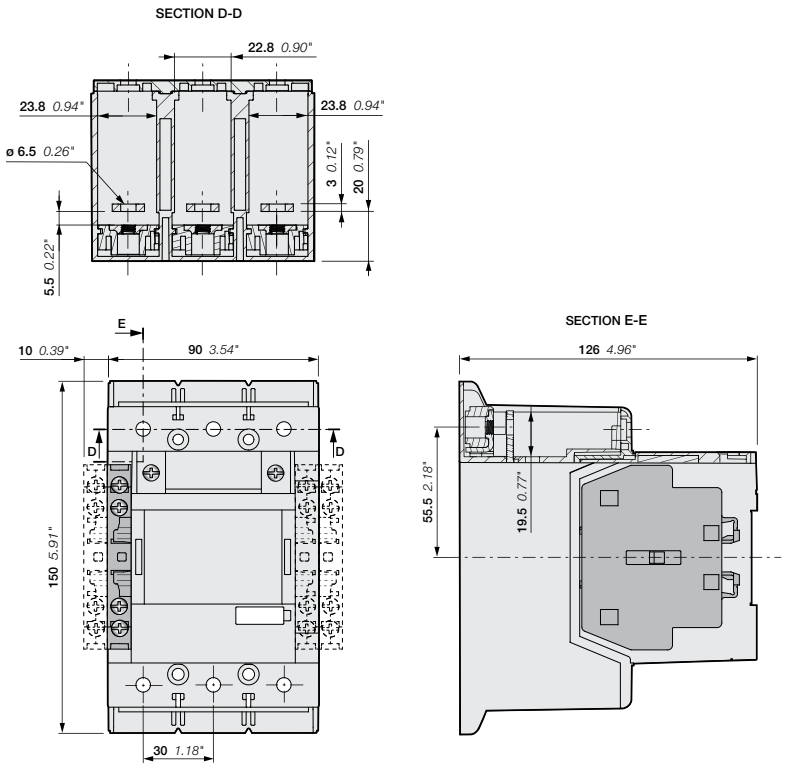
AF116, AF140, 3-pole contactors

Main dimensions mm, inches



AF116, AF140-30-00 + CAL19 2-pole auxiliary contact block
AF116, AF140-30-11

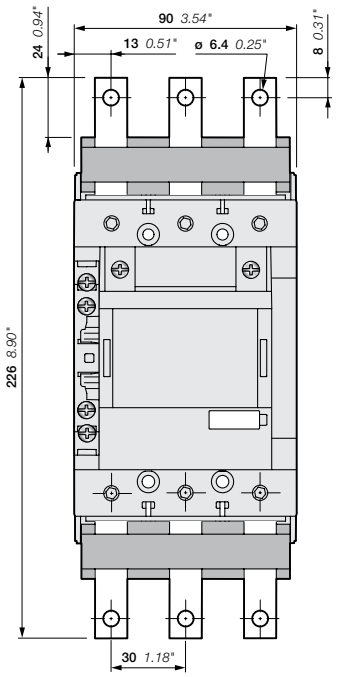
AF116, AF140



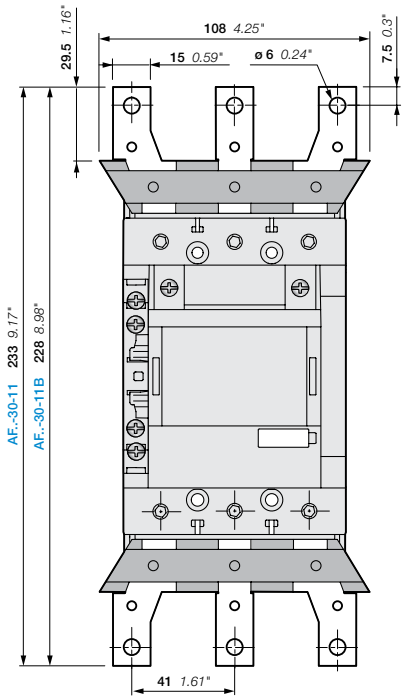
AF116, AF140-30-00B + CAL19 2-pole auxiliary contact block
AF116, AF140-30-11B

AF116, AF140, 3-pole contactors

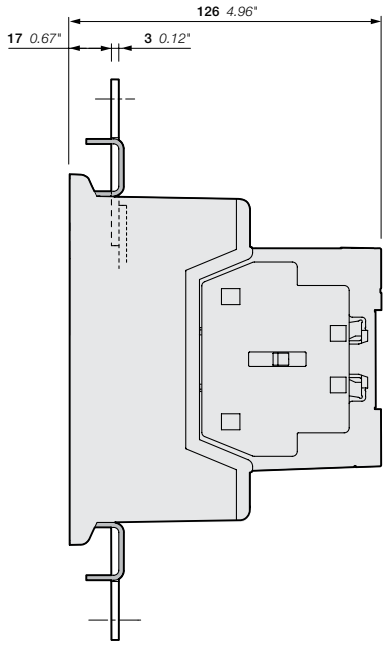
Main dimensions mm, inches

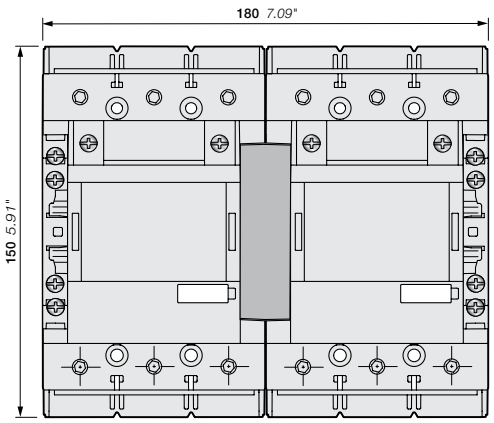


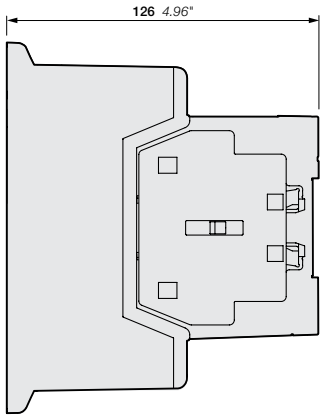
AF116, AF140-30-11
+ LX140 terminal extension



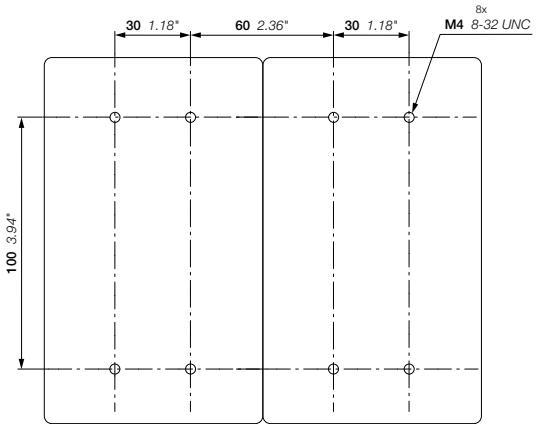
AF116, AF140-30-11(B)
+ LW140(B) terminal enlargement







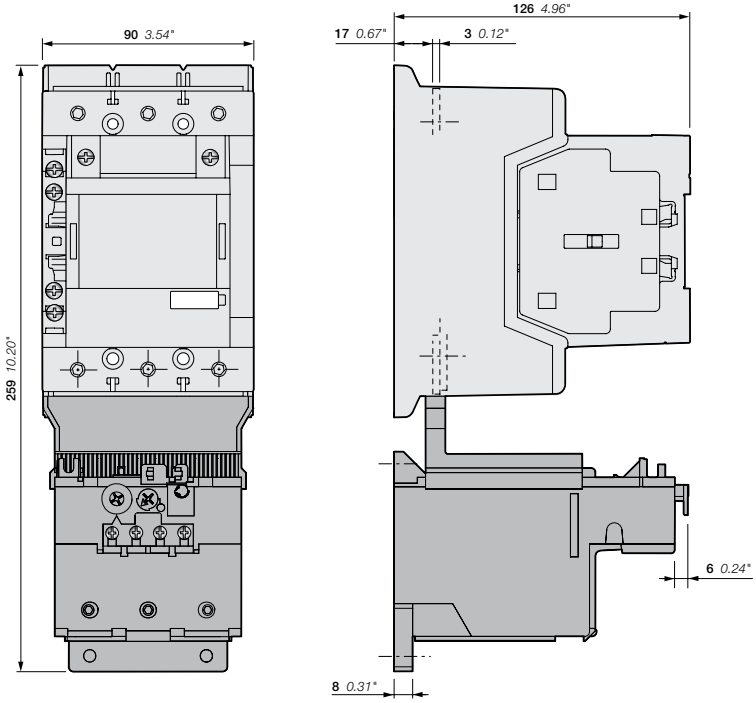
AF116, AF140-30-11
+ VM19 mechanical interlocking unit



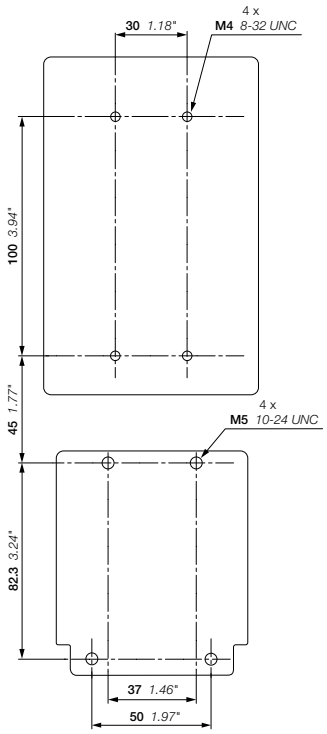
AF116, AF140-30-11
+ VM19 mechanical interlocking unit

AF116, AF140, 3-pole contactors

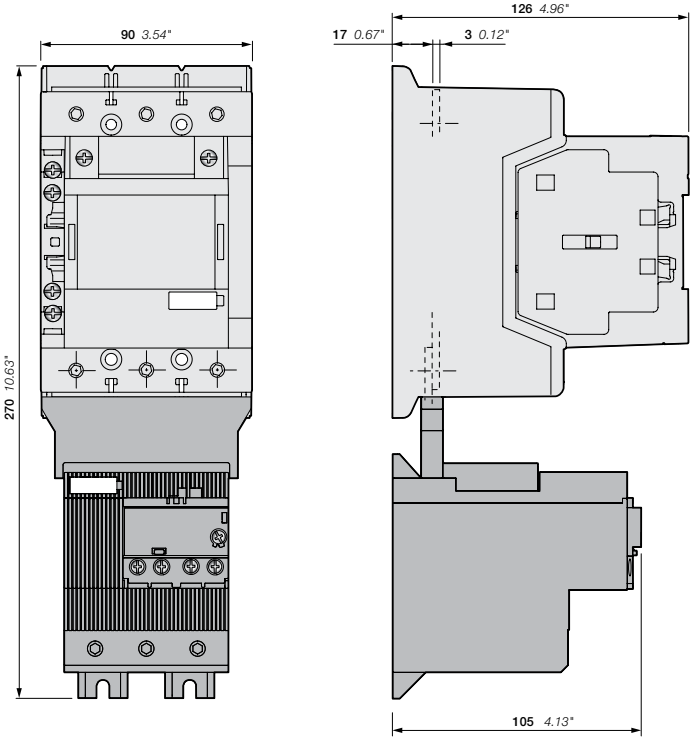
Main dimensions mm, inches



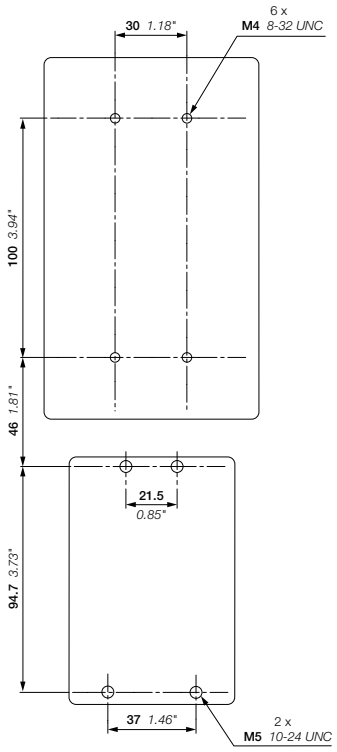
AF116, AF140-30-11
+ TF140 thermal overload relay



AF116, AF140-30-11
+ TF140 thermal overload relay



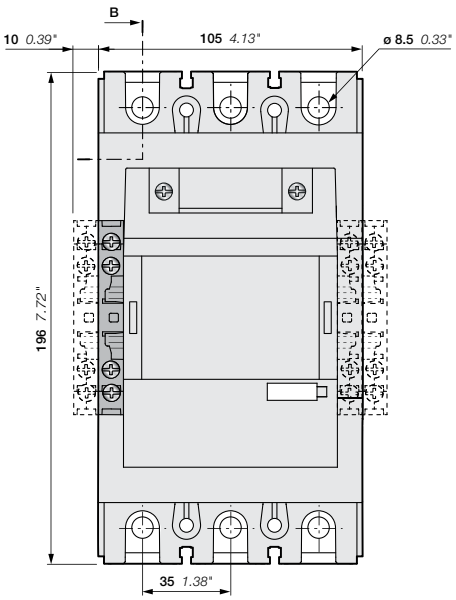
AF116, AF140-30-11
+ EF146 electronic overload relay

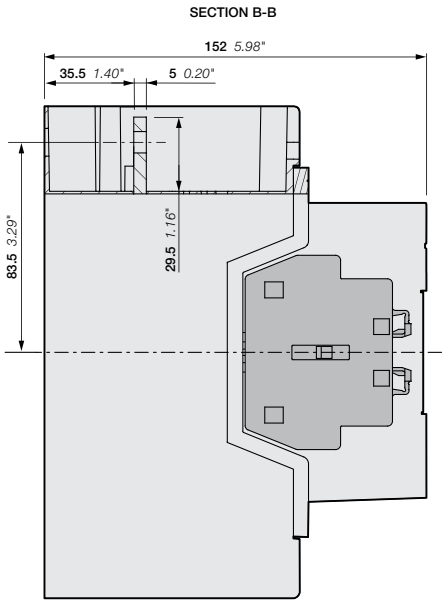


AF116, AF140-30-11
+ EF146 electronic overload relay

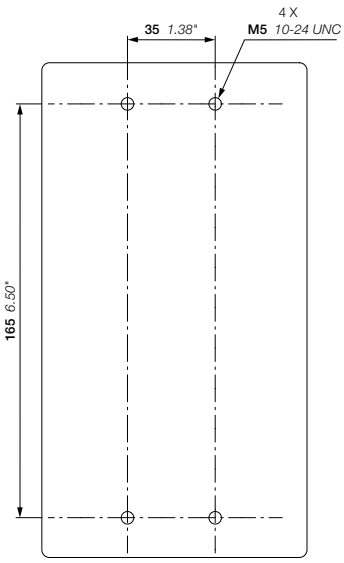
AF190, AF205 3-pole contactors

Main dimensions mm, inches

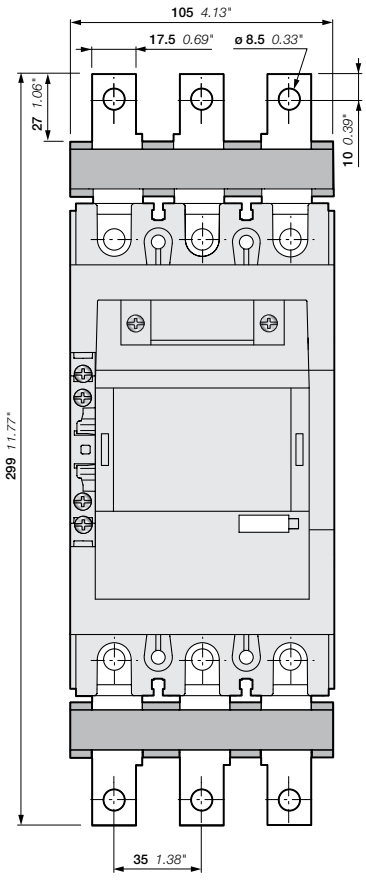




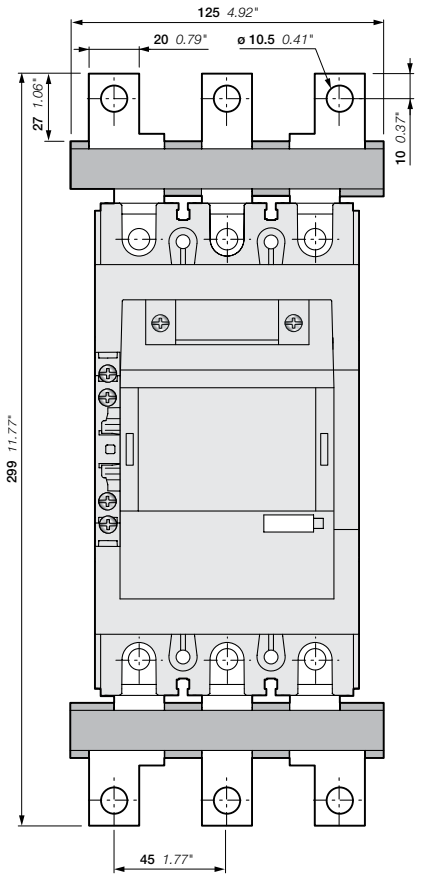
AF190, AF205-30-00 + CAL19 2-pole auxiliay contact block
AF190, AF205-30-11



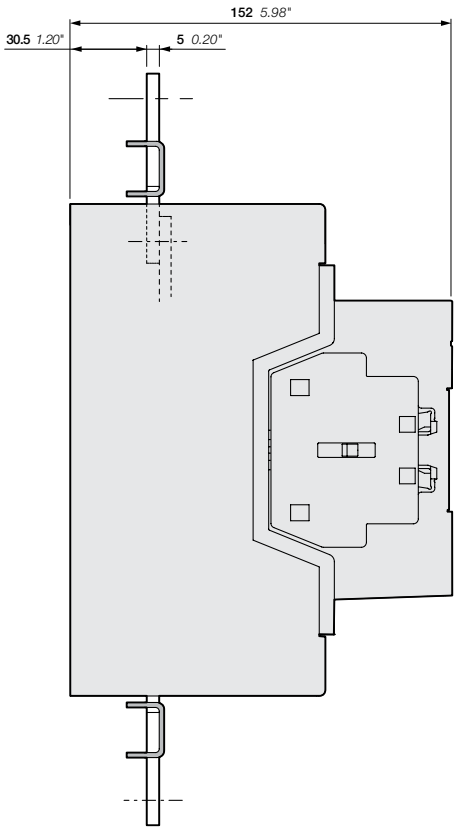
AF190, AF205



AF190, AF205-30-11
+ LX185 terminal extension

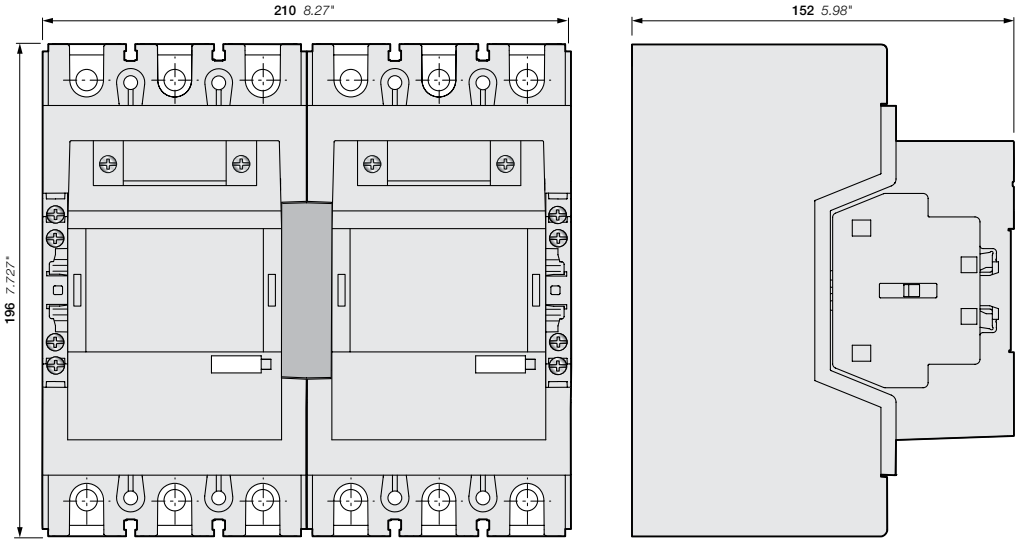


AF190, AF205-30-11
+ LW185 terminal enlargement

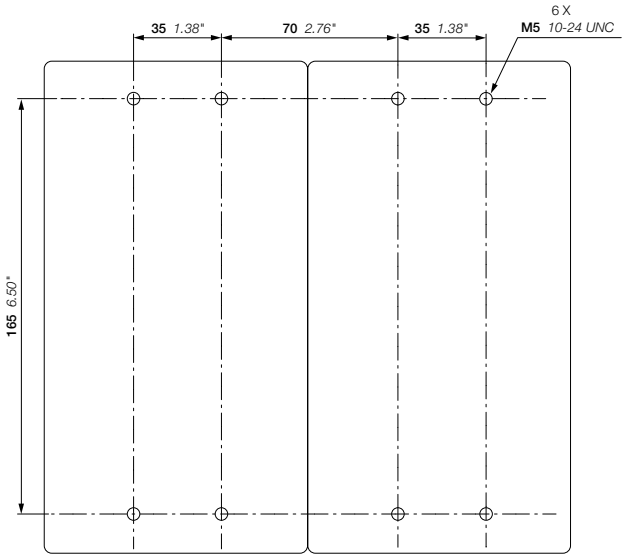


AF190, AF205 3-pole contactors

Main dimensions mm, inches



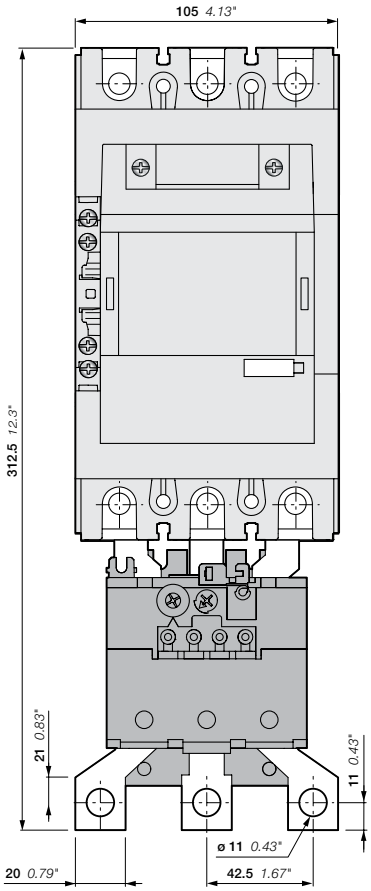
AF190, AF205-30-11
+ VM19 mechanical interlocking unit

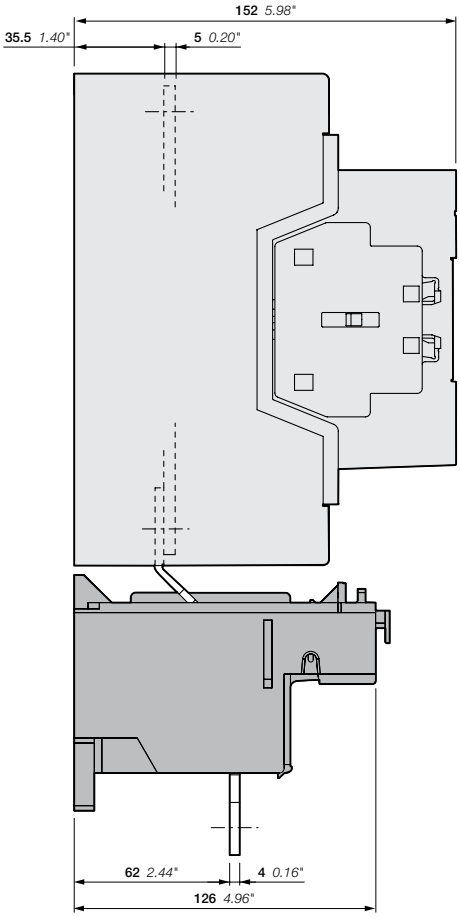


AF190, AF205
+ VM19 mechanical interlocking unit

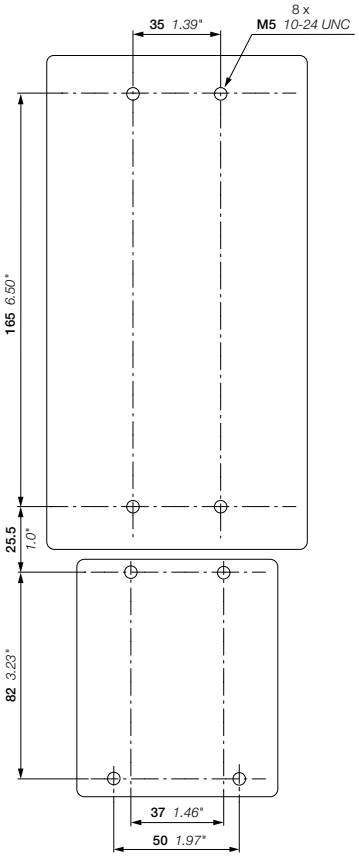
AF190, AF205 3-pole contactors

Main dimensions mm, inches





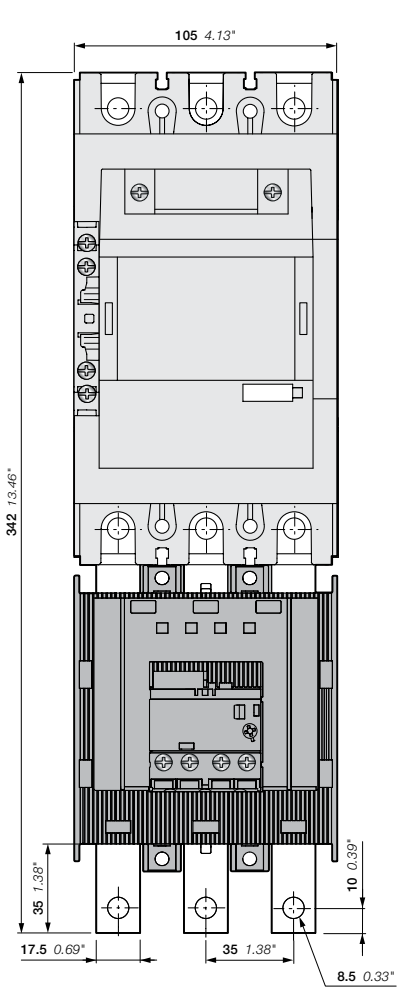
AF190, AF205-30-11
+ TA200DU thermal overload relay

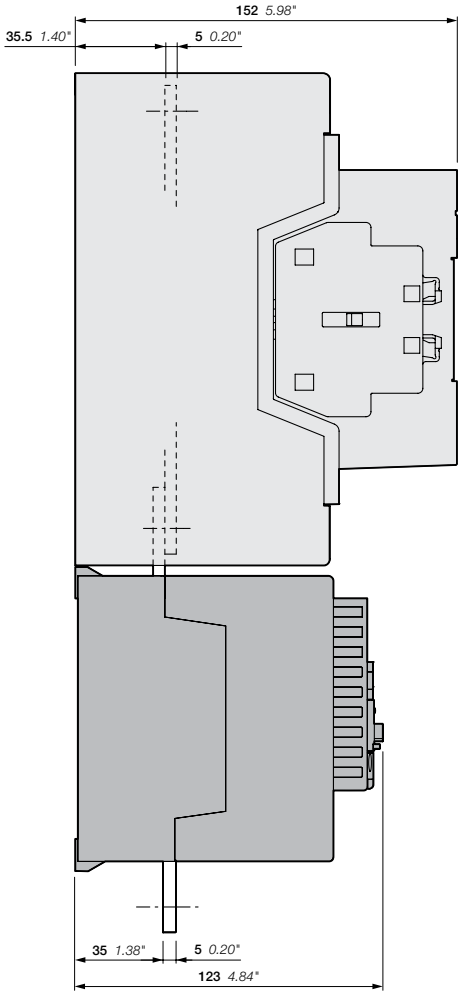


AF190, AF205
+ TA200DU thermal overload relay

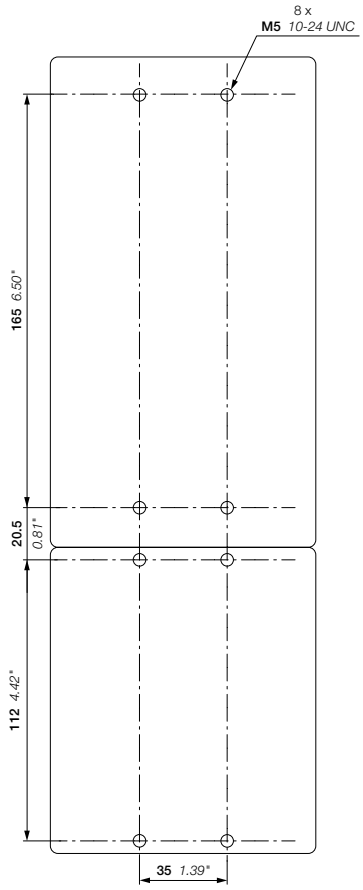
AF190, AF205 3-pole contactors

Main dimensions mm, inches





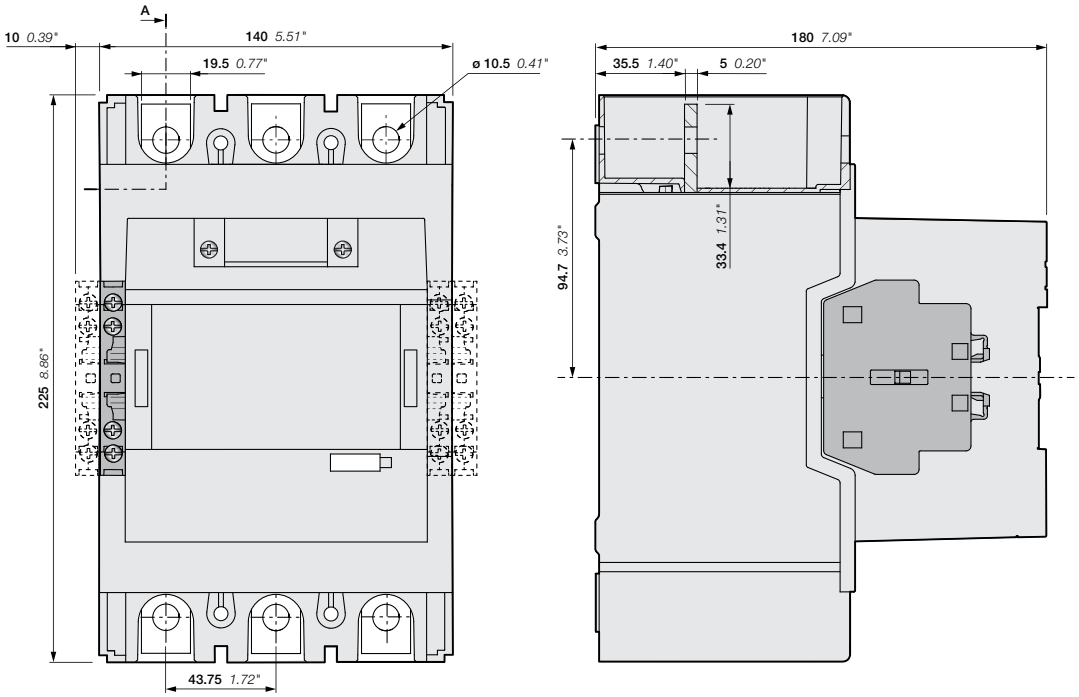
AF190, AF205-30-11
+ EF205 electronic overload relay



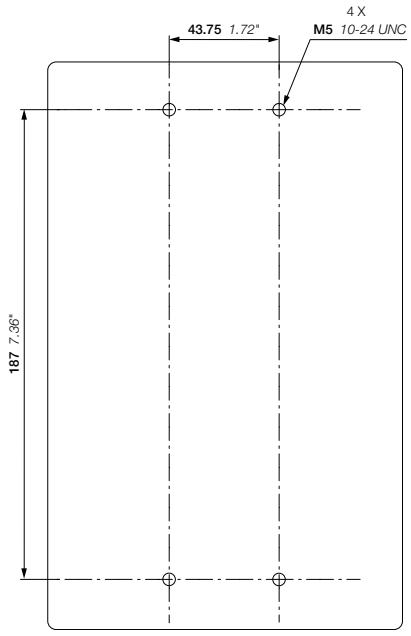
AF190, AF205
+ EF205 electronic overload relay

AF265, AF305, AF370 3-pole contactors

Main dimensions mm, inches



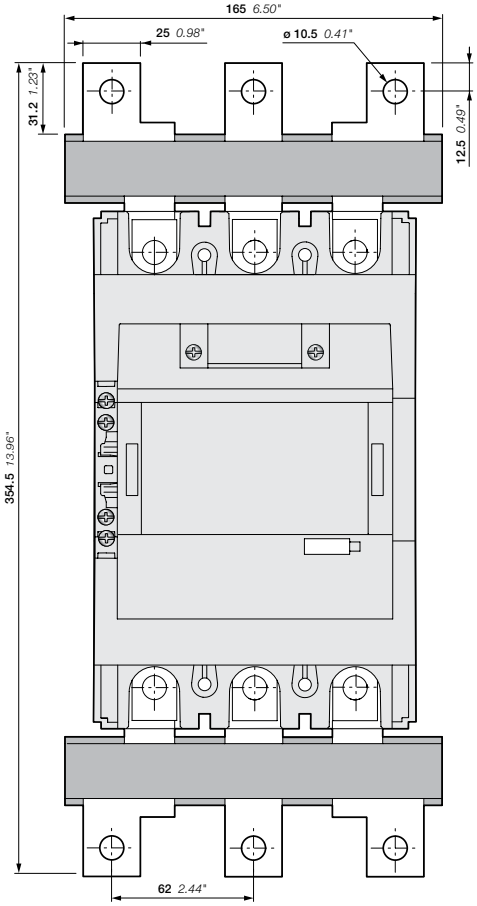
AF265, AF305, AF370-30-00 + CAL19 2-pole contact block
AF265, AF305, AF370-30-11



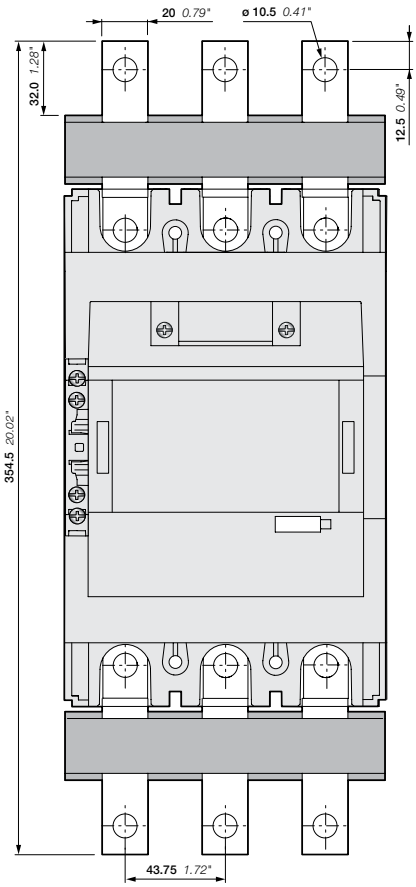
AF265, AF305, AF370

AF265, AF305, AF370 3-pole contactors

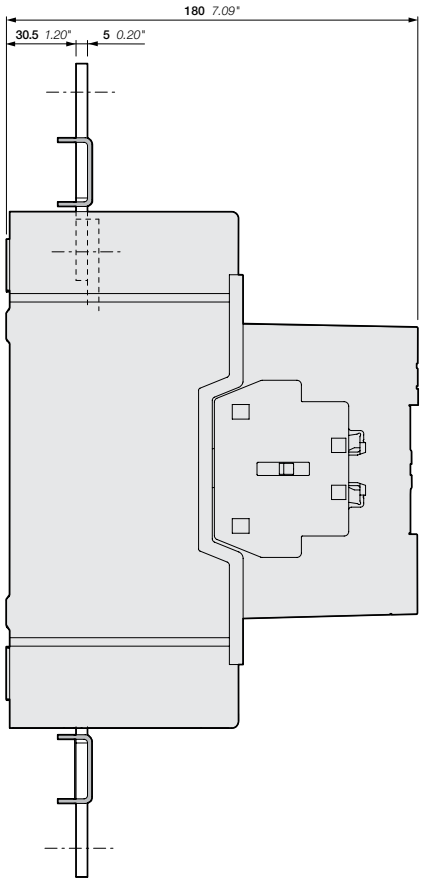
Main dimensions mm, inches



AF265, AF305, AF370-30-11
+ LX300 terminal extension

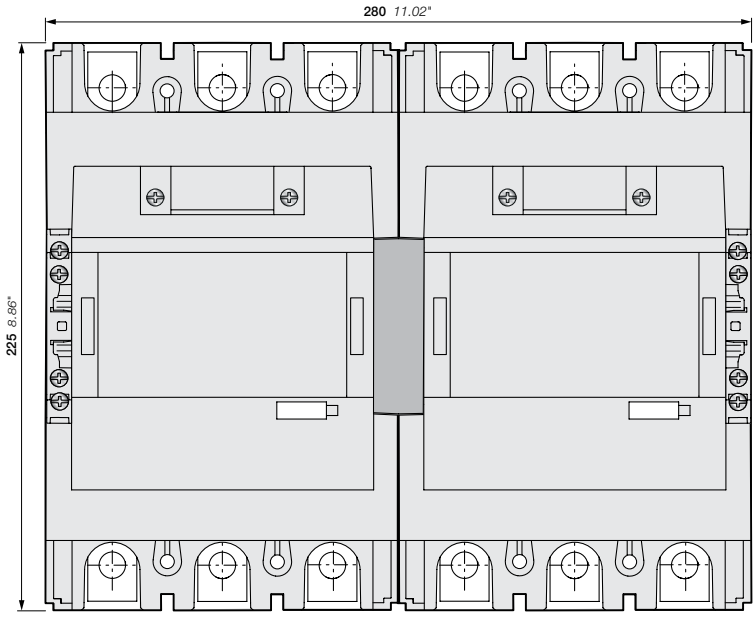


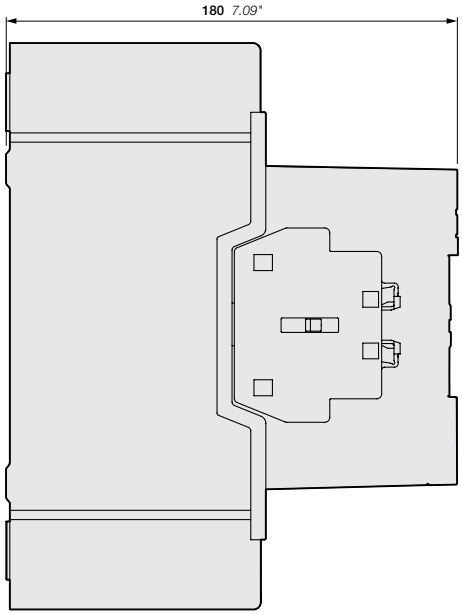
AF265, AF305, AF370-30-11
+ LW300 terminal enlargement



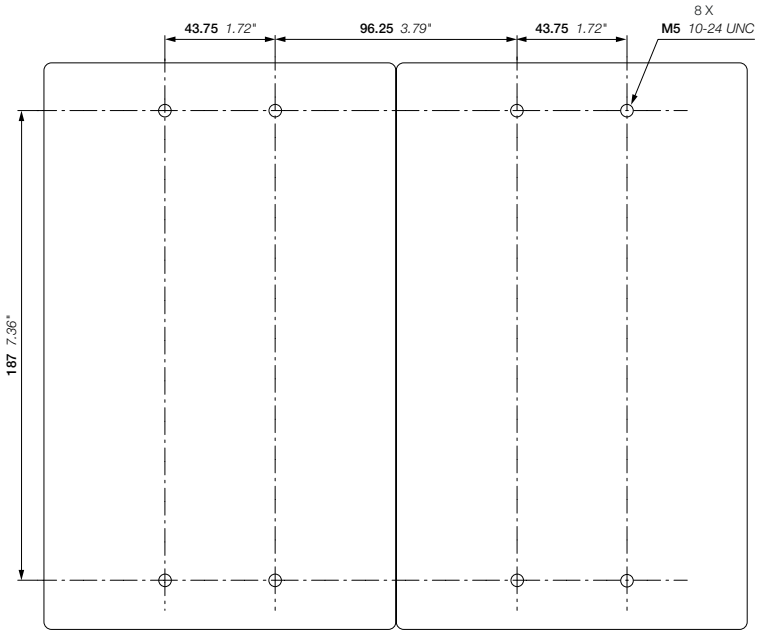
AF265, AF305, AF370 3-pole contactors

Main dimensions mm, inches





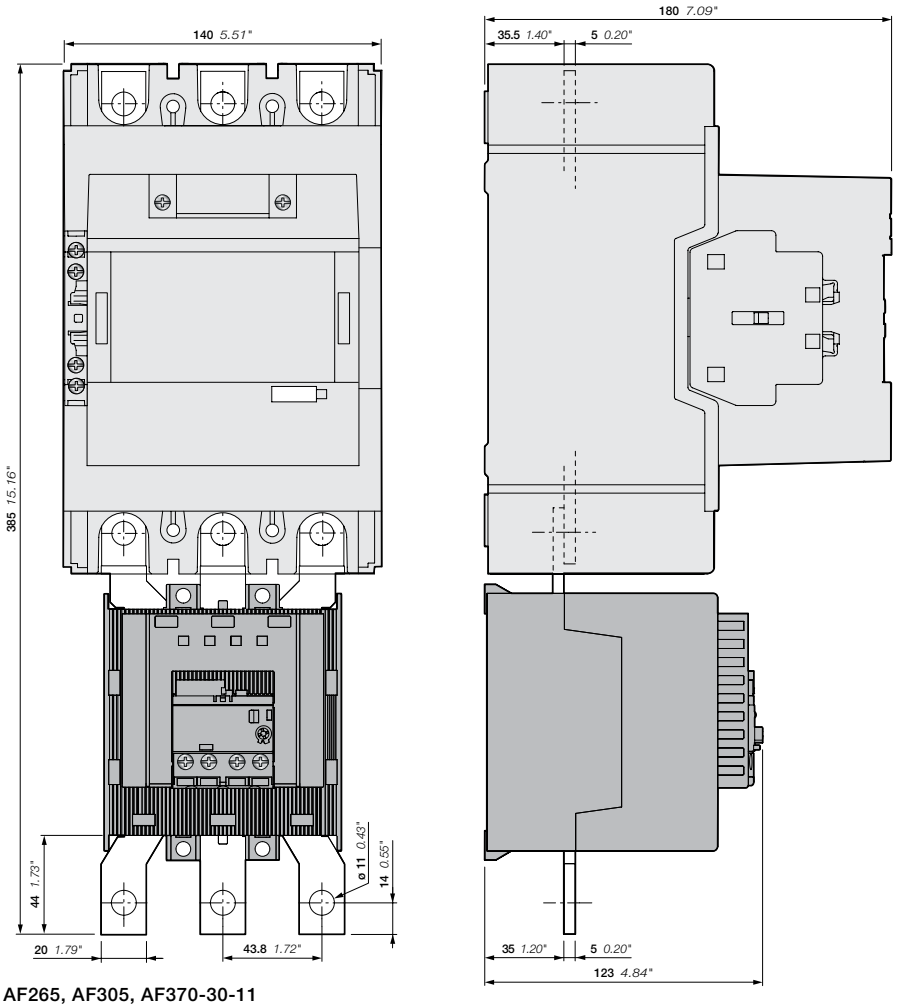
AF265, AF305, AF370-30-11
+ VM19 mechanical interlocking unit



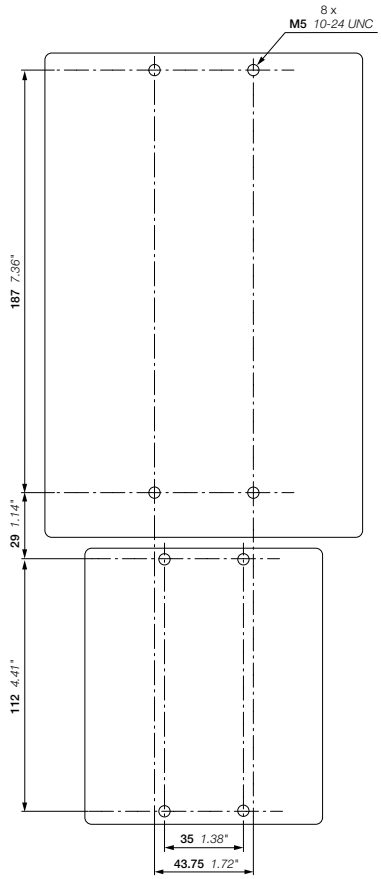
AF265, AF305, AF370
+ VM19 mechanical interlocking unit

AF265, AF305, AF370 3-pole contactors

Main dimensions mm, inches



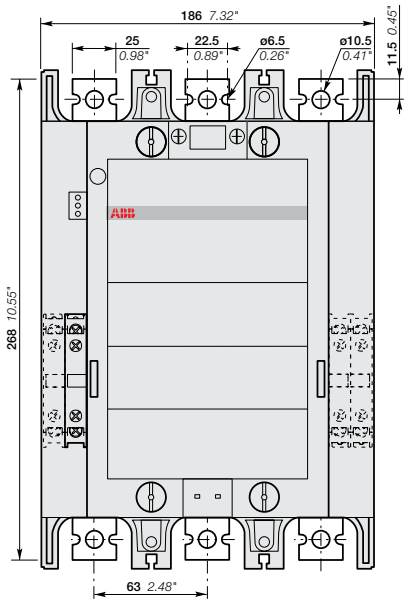
AF265, AF305, AF370-30-11
+ EF370 electronic overload relay



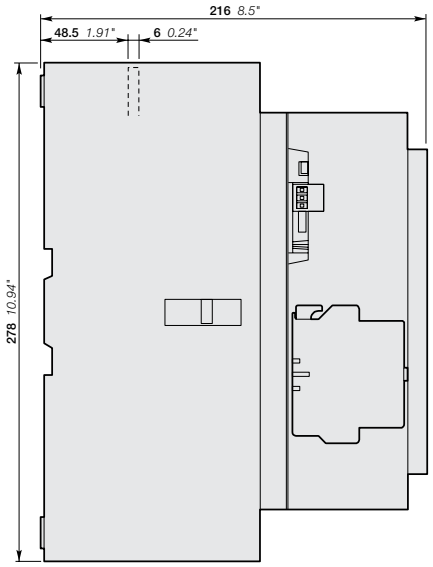
AF265, AF305, AF370
+ EF370 electronic overload relay

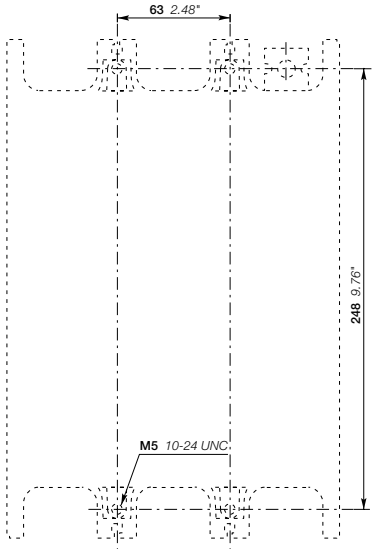
AF400 and AF460 3-pole contactors

Main dimensions mm, inches

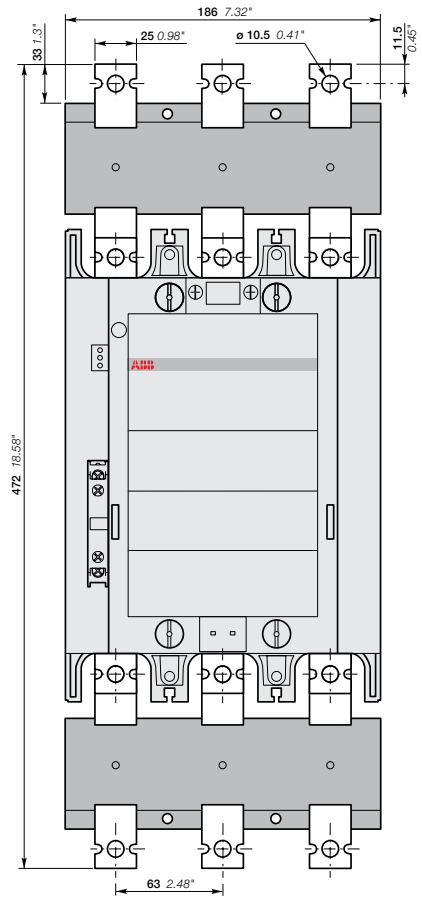


AF400, AF460-30-11

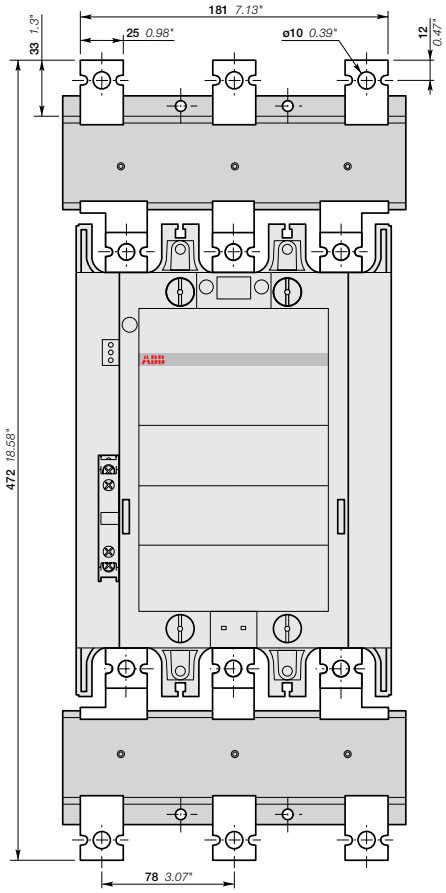




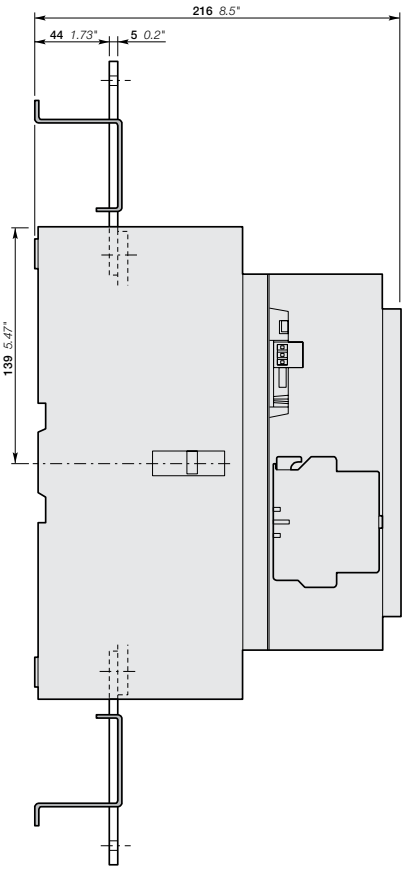
AF400, AF460



AF400, AF460-30-11
+ LX460 terminal extension

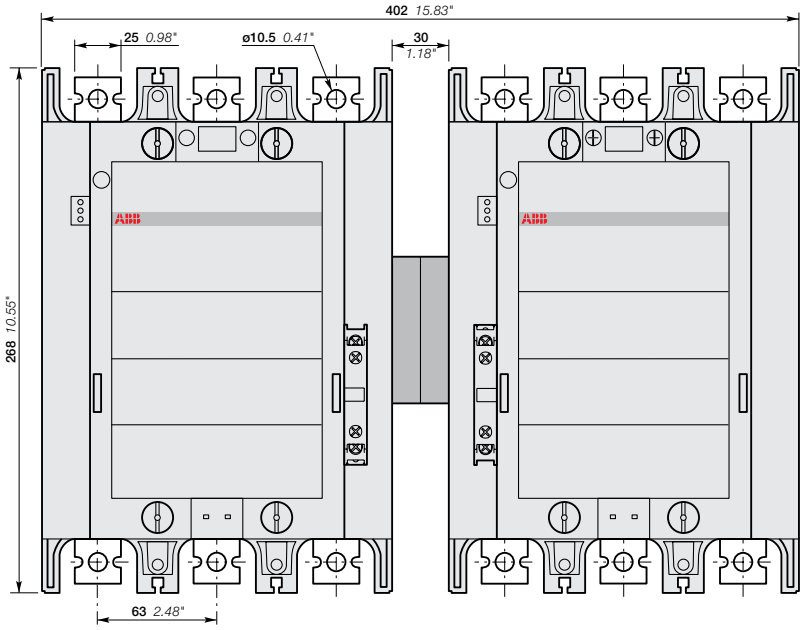


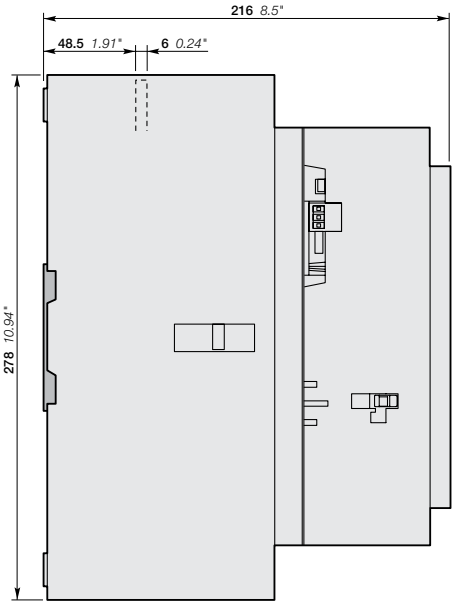
AF400, AF460-30-11
+ LW460 terminal enlargement



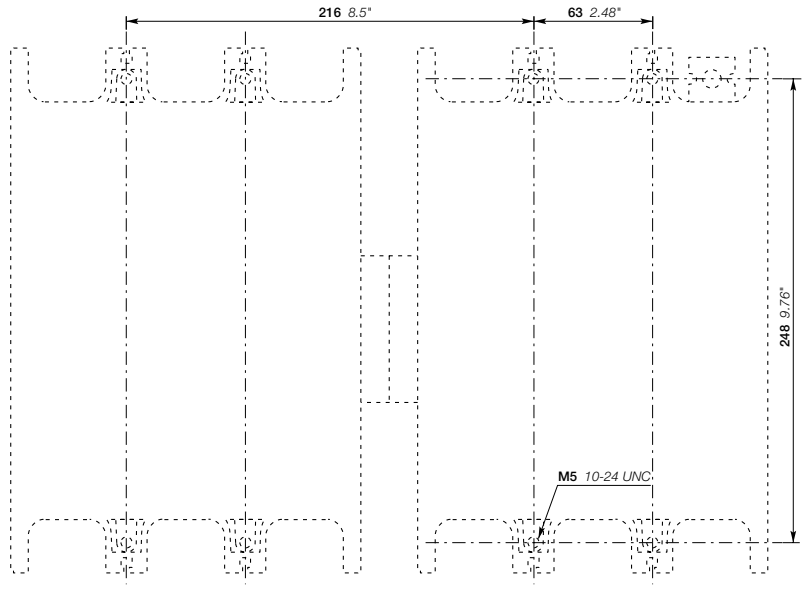
AF400 and AF460 3-pole contactors

Main dimensions mm, inches





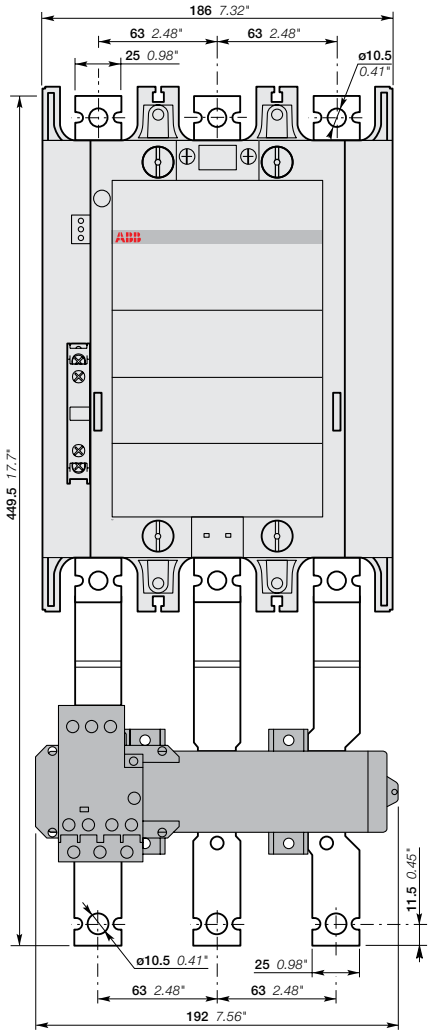
AF400, AF460-30-11
+ VM750H mechanical interlock unit

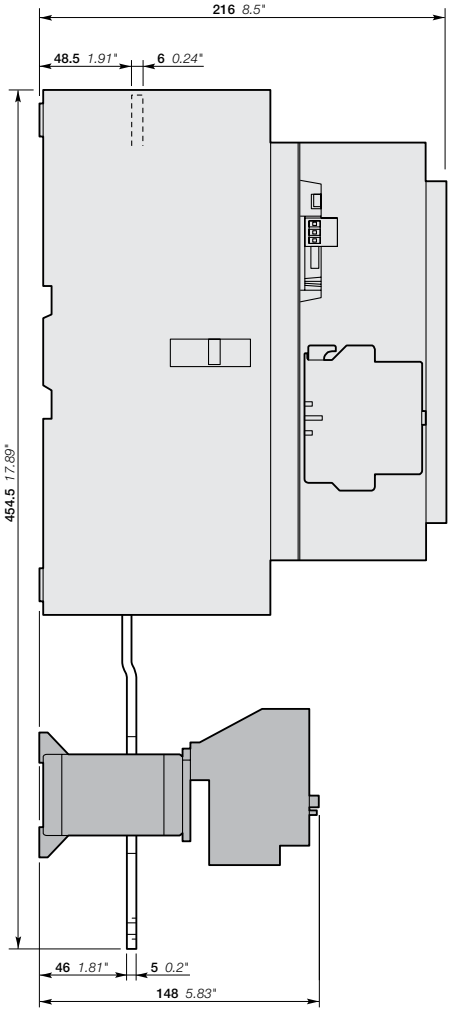


AF400, AF460
+ VM750H mechanical interlock unit

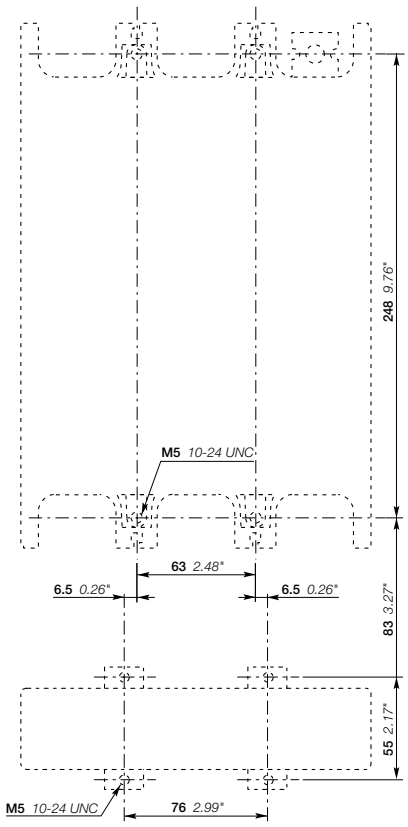
AF400 and AF460 3-pole contactors

Main dimensions mm, inches





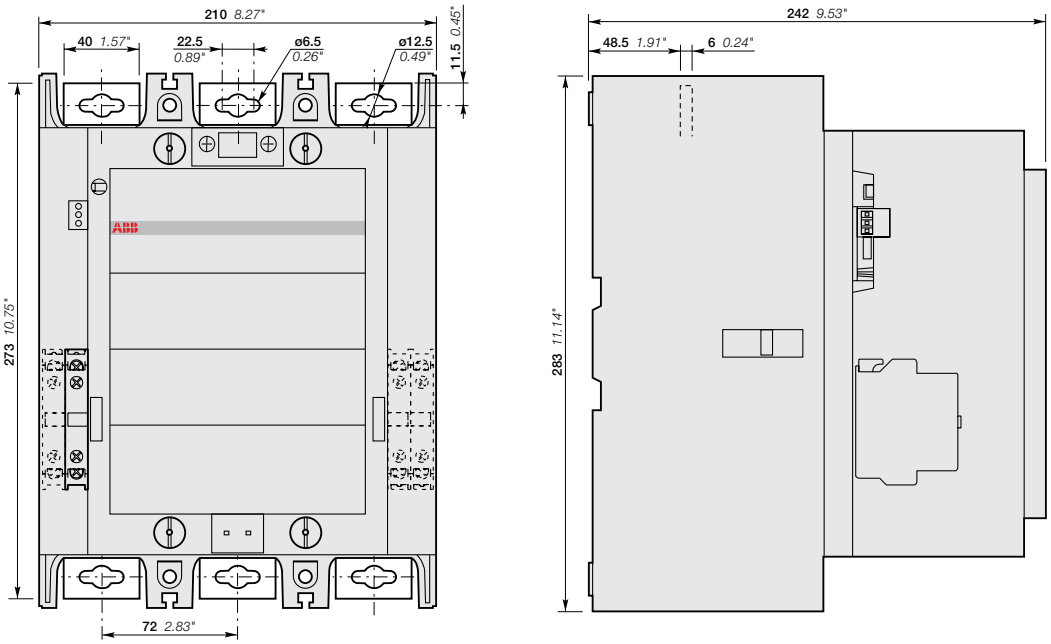
AF400, AF460-30-11
+ E500DU electronic O/L relay



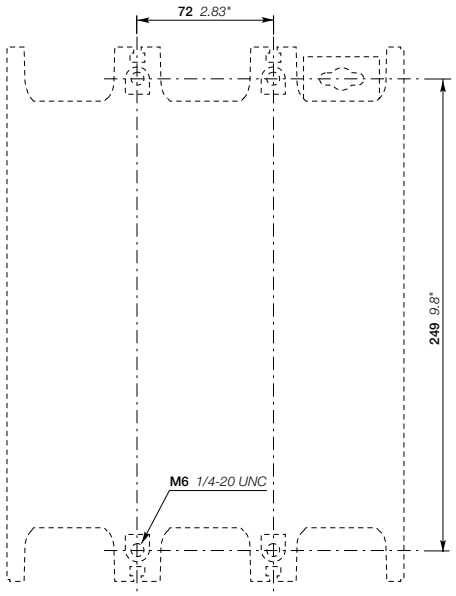
AF400, AF460
+ E500DU electronic O/L relay

AF580 and AF750 3-pole contactors

Main dimensions mm, inches



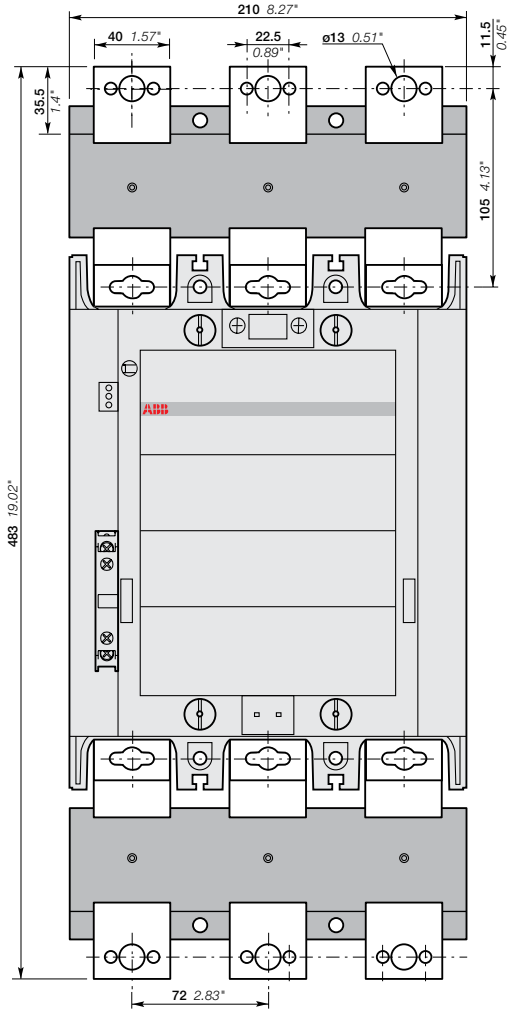
AF580 and AF750-30-11

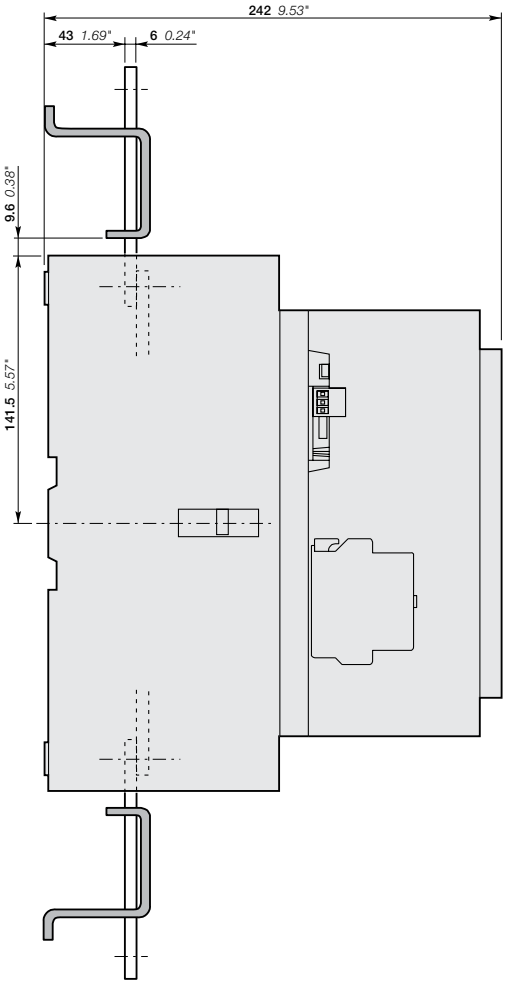


AF580 and AF750

AF580 and AF750 3-pole contactors

Main dimensions mm, inches

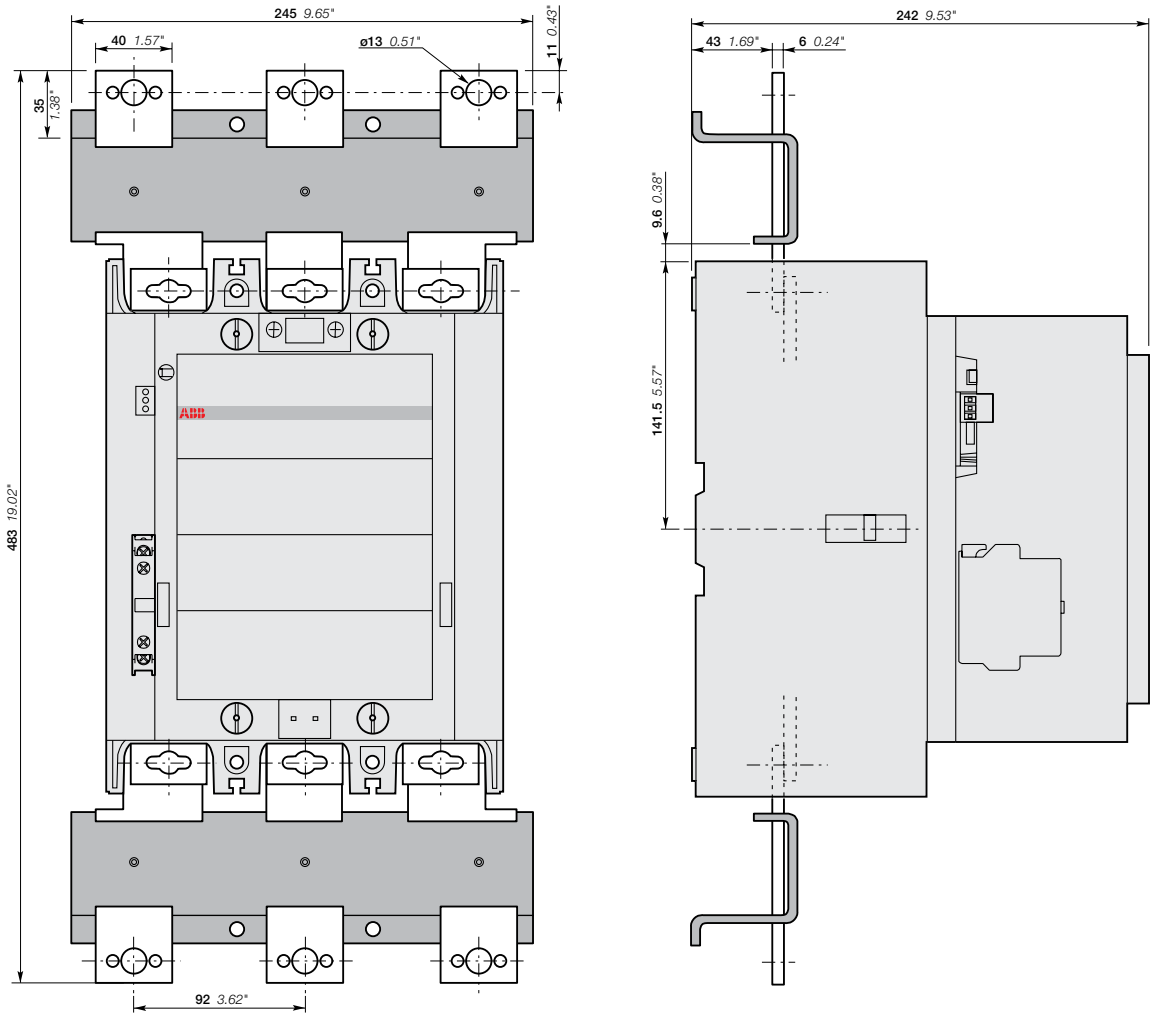




AF580 and AF750-30-11
+ LX750 terminal extension

AF580 and AF750 3-pole contactors

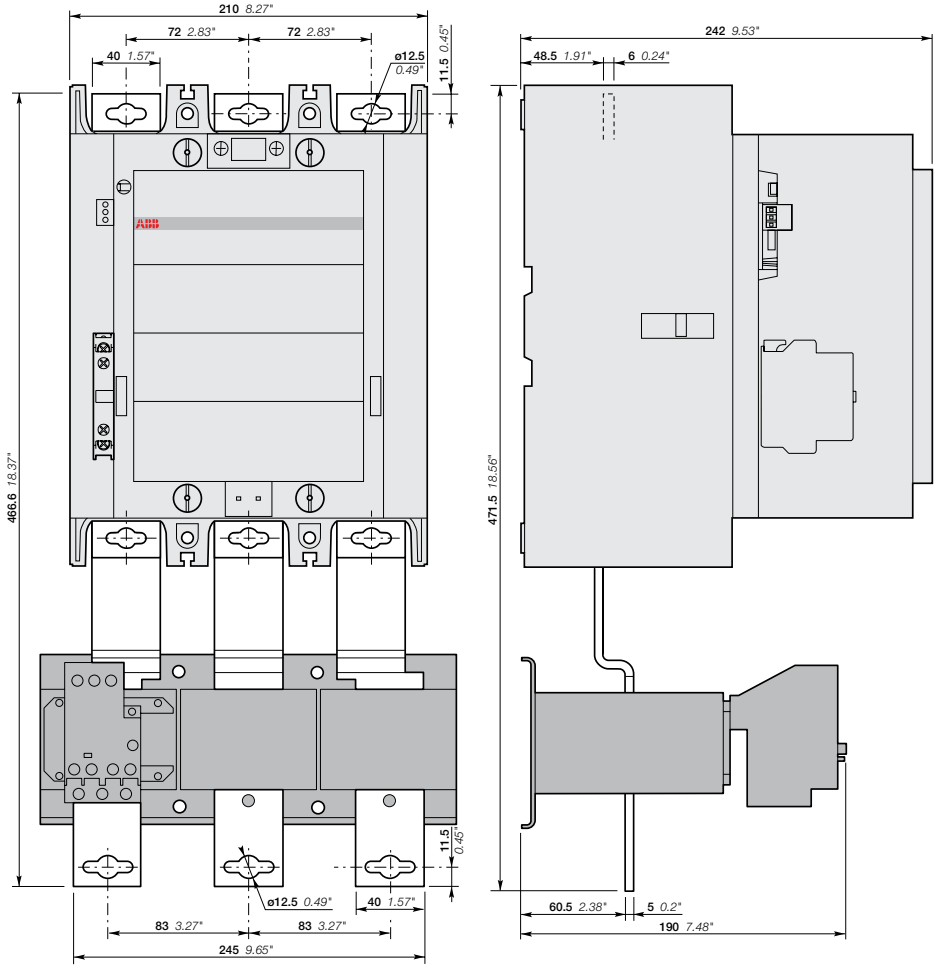
Main dimensions mm, inches



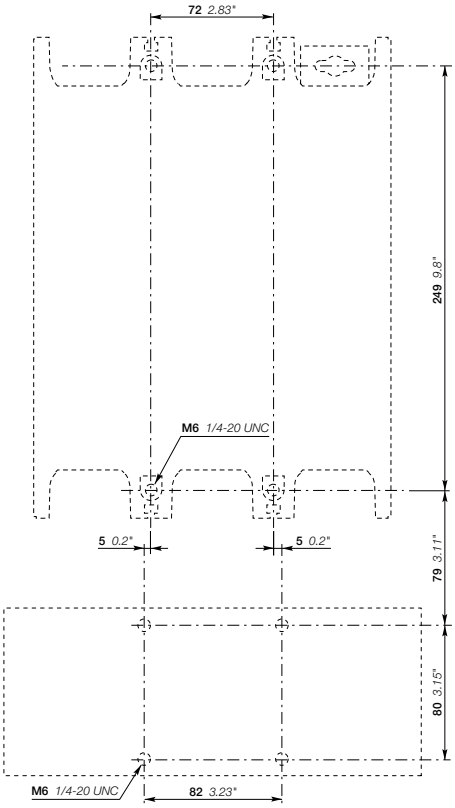
AF580 and AF750-30-11
+ LW750 terminal enlargement

AF580 and AF750 3-pole contactors

Main dimensions mm, inches



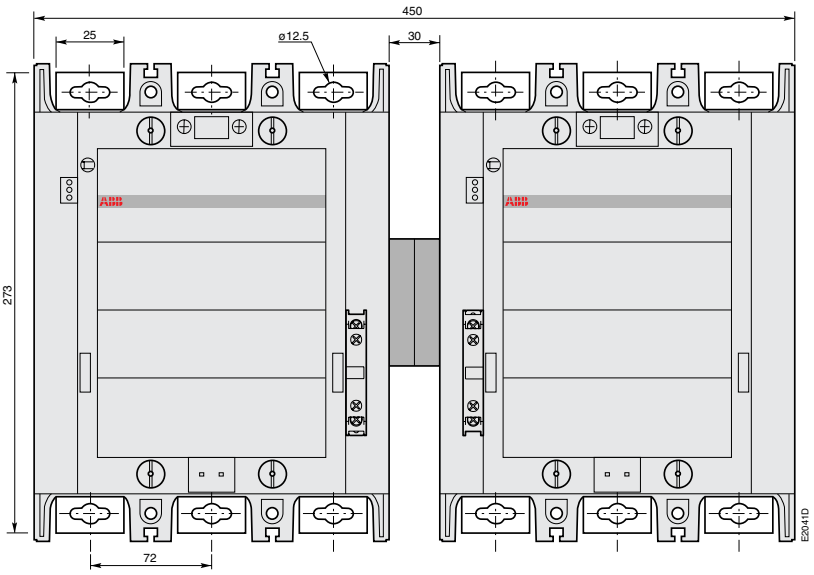
AF580 and AF750-30-11
+ E800DU electronic O/L relay

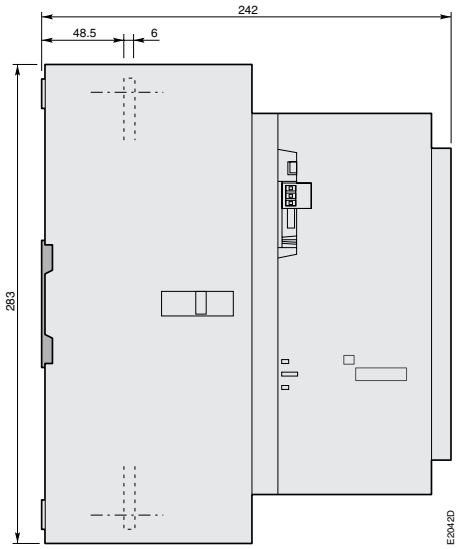


AF580 and AF750
+ E800DU electronic O/L relay

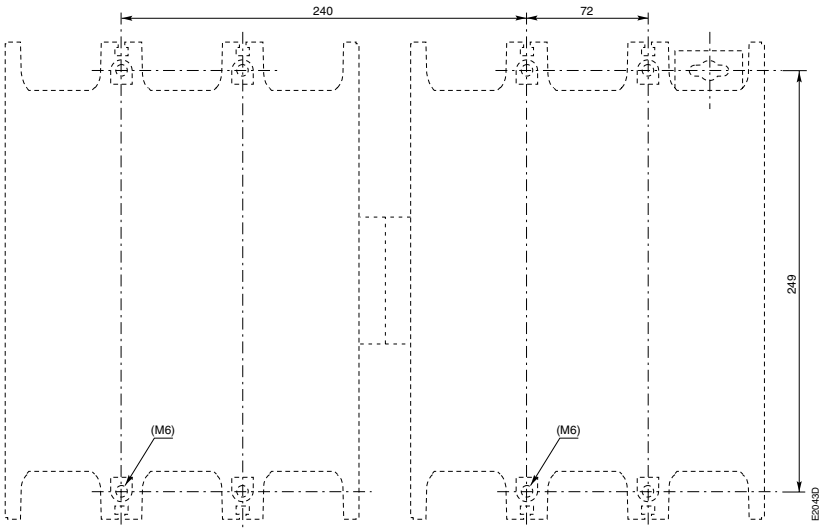
AF580 and AF750 3-pole contactors

Main dimensions mm, inches





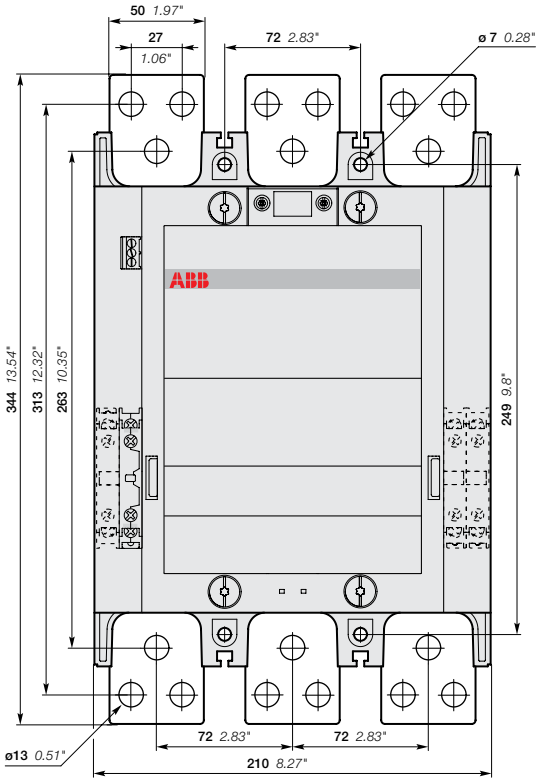
AF580 and AF750-30-11
+ VM 750H mechanical interlock unit

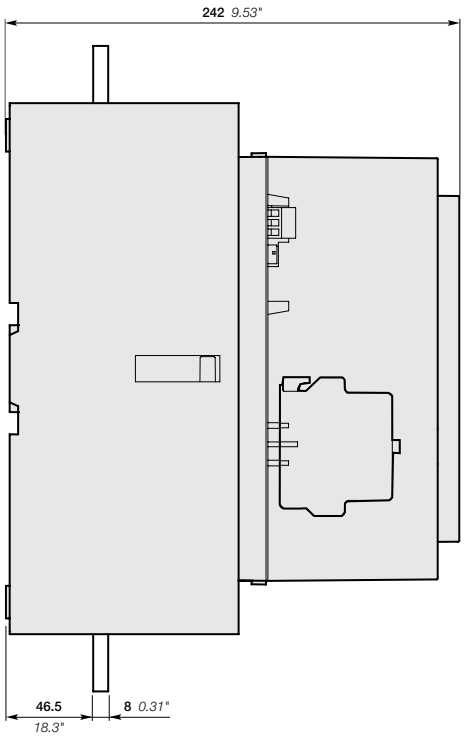


AF580 and AF750
+ VM 750H mechanical interlock unit

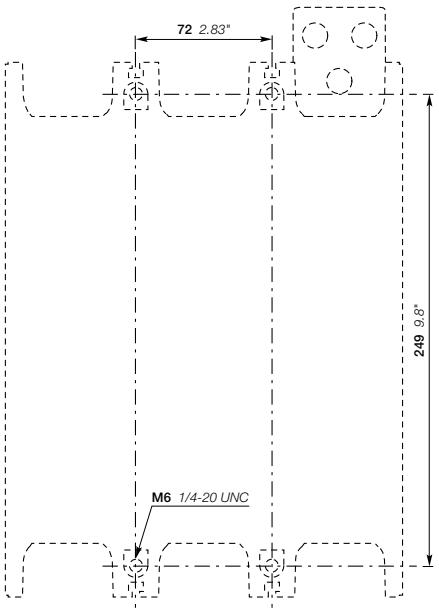
AF1250 3-pole contactors

Main dimensions mm, inches





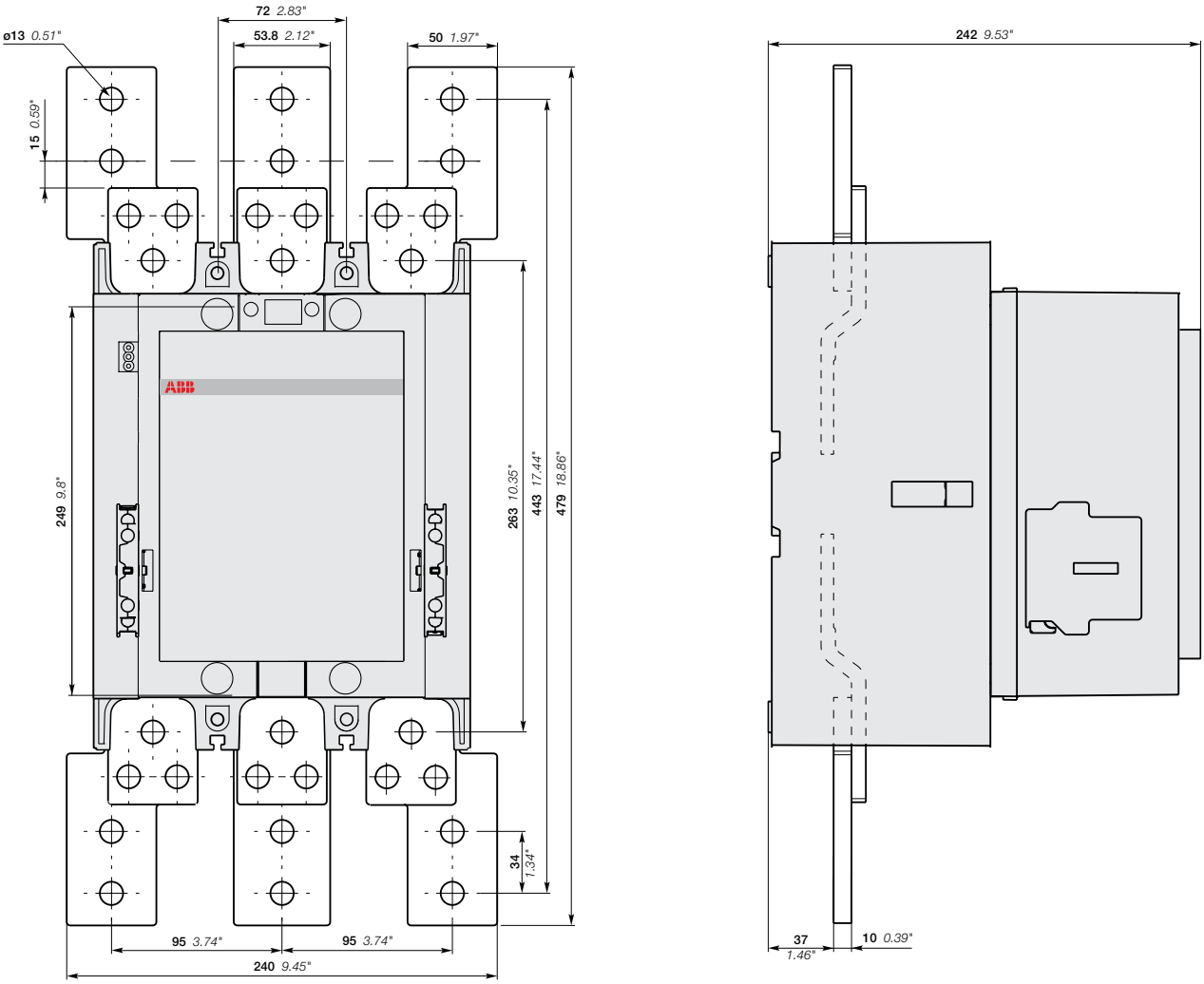
AF1250-30-11



AF1250

AF1250 3-pole contactors

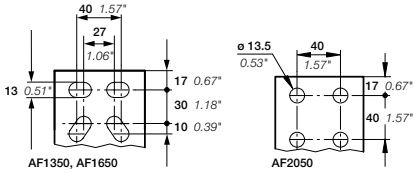
Main dimensions mm, inches

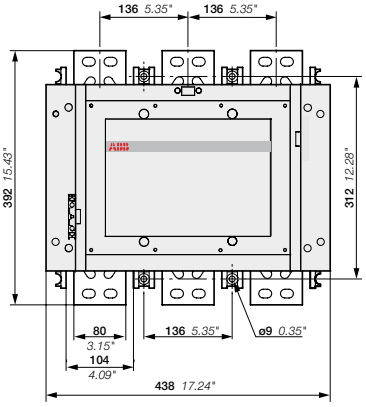


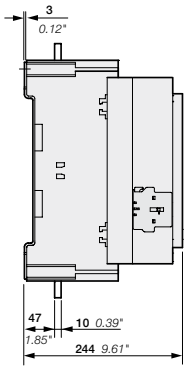
AF1250-30-11
+ LW1250 terminal enlargement

AF1350, AF1650, AF2050 and AF2650 3-pole contactors

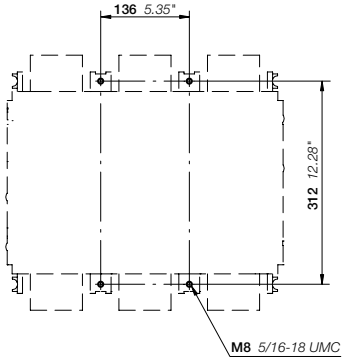
Main dimensions mm, inches



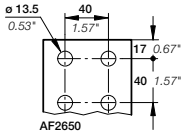


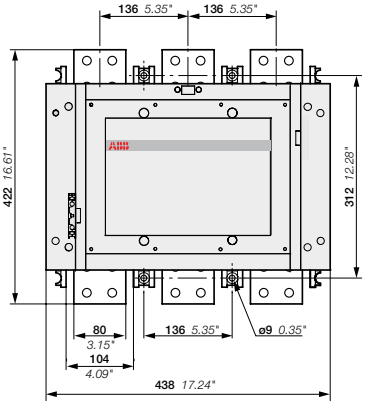


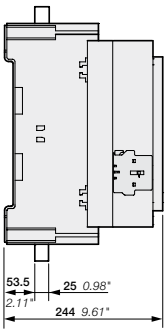
AF1350, AF1650, AF2050-30-11



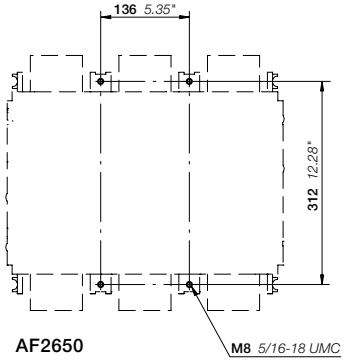
AF1350, AF1650, AF2050





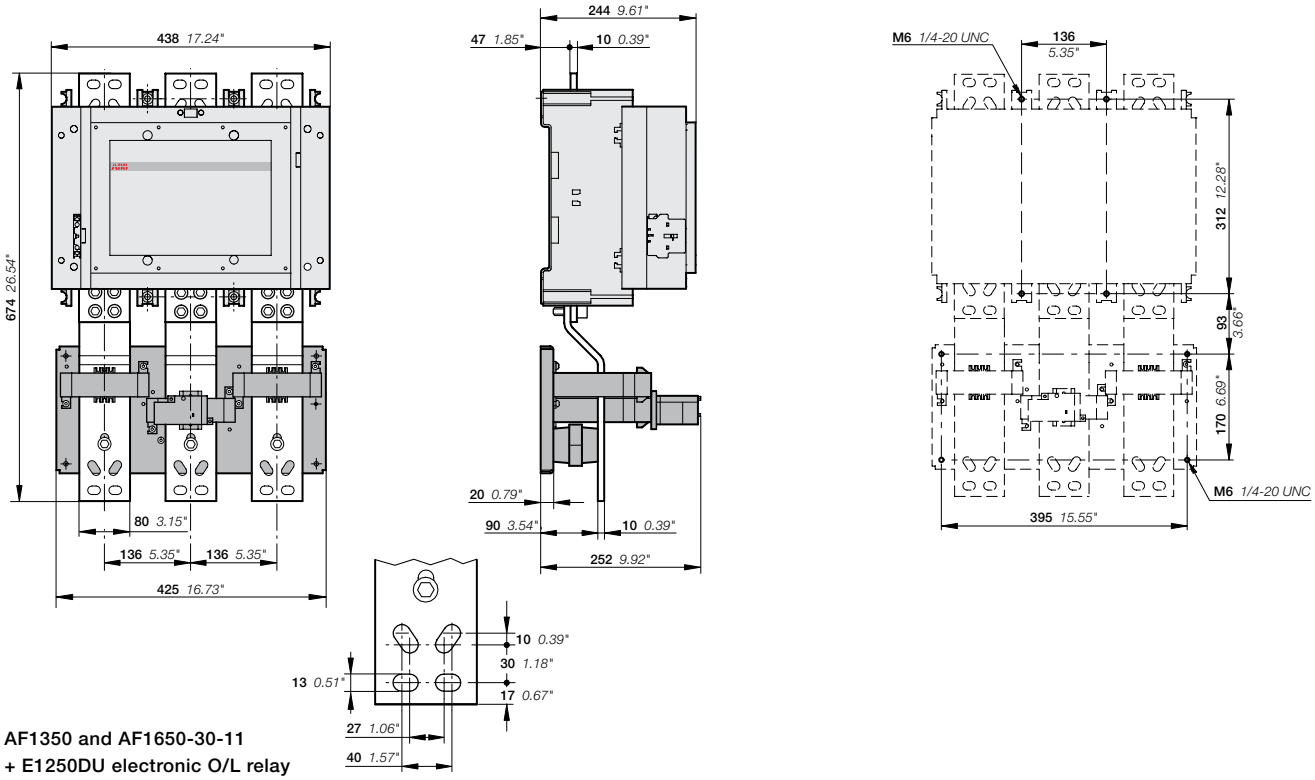


AF2650-30-11

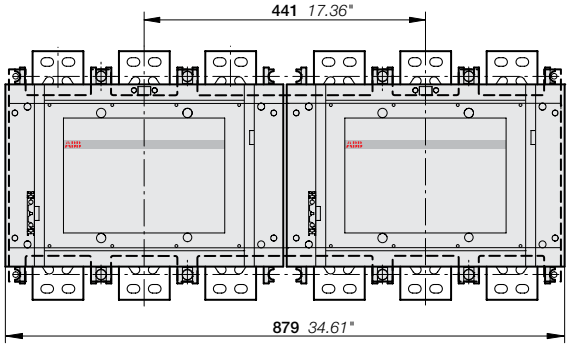


AF2650

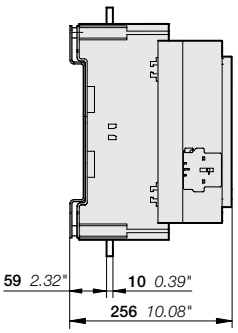
Main dimensions mm, inches



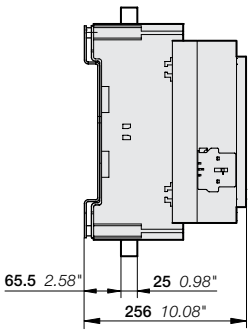
AF1350 and AF1650-30-11
+ E1250DU electronic O/L relay



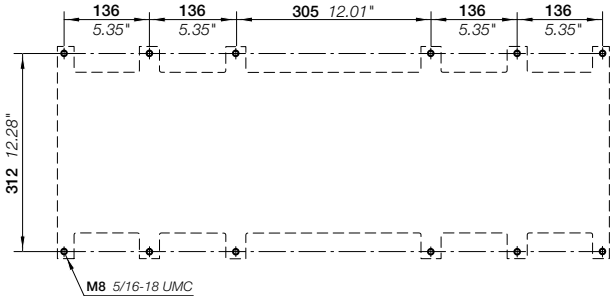
AF1350, AF1650, AF2050, AF2650-30-11
+ VM 1650H mechanical interlock unit



AF1350, AF1650, AF2050



AF2650



AF1350, AF1650, AF2050, AF2650
+ VM 1650H mechanical interlock unit

Notes

AF and EK 4-pole contactors

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

AF09 ... AF38 4-pole contactors
25 to 55 A
AC / DC operated

AF09-40-00

4

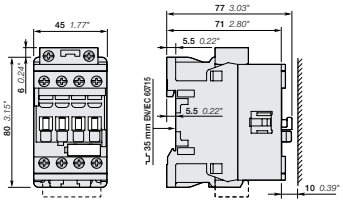
AF26-40-00

Description

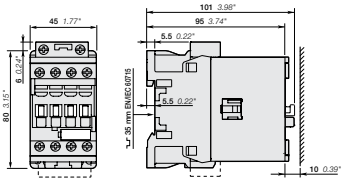
AF09 ... AF38 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 600 V AC and 250 V DC. These contactors are of the block type design with 4 main poles.

– 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

Main dimensions mm, inches



AF09, AF16



AF26, AF38

Ordering details

UL/CSA General use rating 600 V AC	Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Catalog number	Weight Pkg (1 pce)
A	V 50/60 Hz	V DC				kg
4 N.O. main poles						
25	24...60	-[1]	0	0	AF09-40-00-41	0.27
	24...60	20...60[1]	0	0	AF09-40-00-11	0.27
	48...130	48...130	0	0	AF09-40-00-12	0.27
	100...250	100...250	0	0	AF09-40-00-13	0.27
	250...500	250...500	0	0	AF09-40-00-14	0.31
30	24...60	-[1]	0	0	AF16-40-00-41	0.27
	24...60	20...60[1]	0	0	AF16-40-00-11	0.27
	48...130	48...130	0	0	AF16-40-00-12	0.27
	100...250	100...250	0	0	AF16-40-00-13	0.27
	250...500	250...500	0	0	AF16-40-00-14	0.31
45	24...60	-[1]	0	0	AF26-40-00-41	0.36
	24...60	20...60[1]	0	0	AF26-40-00-11	0.36
	48...130	48...130	0	0	AF26-40-00-12	0.36
	100...250	100...250	0	0	AF26-40-00-13	0.36
	250...500	250...500	0	0	AF26-40-00-14	0.40
55	24...60	-[1]	0	0	AF38-40-00-41	0.36
	24...60	20...60[1]	0	0	AF38-40-00-11	0.36
	48...130	48...130	0	0	AF38-40-00-12	0.36
	100...250	100...250	0	0	AF38-40-00-13	0.36
	250...500	250...500	0	0	AF38-40-00-14	0.40
2 N.O. + 2 N.C. main poles						
25	24...60	-[1]	0	0	AF09-22-00-41	0.27
	24...60	20...60[1]	0	0	AF09-22-00-11	0.27
	48...130	48...130	0	0	AF09-22-00-12	0.27
	100...250	100...250	0	0	AF09-22-00-13	0.27
	250...500	250...500	0	0	AF09-22-00-14	0.31
30	24...60	-[1]	0	0	AF16-22-00-41	0.27
	24...60	20...60[1]	0	0	AF16-22-00-11	0.27
	48...130	48...130	0	0	AF16-22-00-12	0.27
	100...250	100...250	0	0	AF16-22-00-13	0.27
	250...500	250...500	0	0	AF16-22-00-14	0.31
45	24...60	-[1]	0	0	AF26-22-00-41	0.36
	24...60	20...60[1]	0	0	AF26-22-00-11	0.36
	48...130	48...130	0	0	AF26-22-00-12	0.36
	100...250	100...250	0	0	AF26-22-00-13	0.36
	250...500	250...500	0	0	AF26-22-00-14	0.40
55	24...60	-[1]	0	0	AF38-22-00-41	0.36
	24...60	20...60[1]	0	0	AF38-22-00-11	0.36
	48...130	48...130	0	0	AF38-22-00-12	0.36
	100...250	100...250	0	0	AF38-22-00-13	0.36
	250...500	250...500	0	0	AF38-22-00-14	0.40

[1] AF..-..-..-11 May not be suitable for all PLC applications. Refer to manufacturing specifications.

AF09Z ... AF38Z 4-pole contactors
25 to 55 A
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 600 V AC and 250 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.

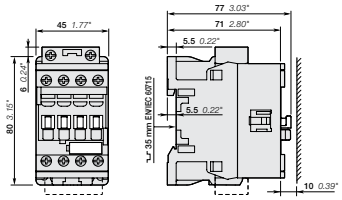
4

Ordering details

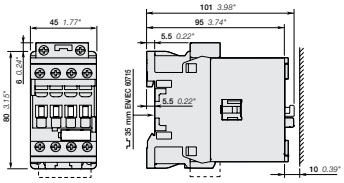
UL/CSA General use rating 600 V AC	Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Catalog number	Weight Pkg (1 pce)
A	V 50/60 Hz	V DC				kg
4 N.O. main poles						
25	-	12...20	0	0	AF09Z-40-00-20	0.31
	24...60	20...60	0	0	AF09Z-40-00-21	0.31
	48...130	48...130	0	0	AF09Z-40-00-22	0.31
	100...250	100...250	0	0	AF09Z-40-00-23	0.31
30	-	12...20	0	0	AF16Z-40-00-20	0.31
	24...60	20...60	0	0	AF16Z-40-00-21	0.31
	48...130	48...130	0	0	AF16Z-40-00-22	0.31
	100...250	100...250	0	0	AF16Z-40-00-23	0.31
45	-	12...20	0	0	AF26Z-40-00-20	0.40
	24...60	20...60	0	0	AF26Z-40-00-21	0.40
	48...130	48...130	0	0	AF26Z-40-00-22	0.40
	100...250	100...250	0	0	AF26Z-40-00-23	0.40
55	-	12...20	0	0	AF38Z-40-00-20	0.40
	24...60	20...60	0	0	AF38Z-40-00-21	0.40
	48...130	48...130	0	0	AF38Z-40-00-22	0.40
	100...250	100...250	0	0	AF38Z-40-00-23	0.40
2 N.O. + 2 N.C. main poles						
25	-	12...20	0	0	AF09Z-22-00-20	0.31
	24...60	20...60	0	0	AF09Z-22-00-21	0.31
	48...130	48...130	0	0	AF09Z-22-00-22	0.31
	100...250	100...250	0	0	AF09Z-22-00-23	0.31
30	-	12...20	0	0	AF16Z-22-00-20	0.31
	24...60	20...60	0	0	AF16Z-22-00-21	0.31
	48...130	48...130	0	0	AF16Z-22-00-22	0.31
	100...250	100...250	0	0	AF16Z-22-00-23	0.31
45	-	12...20	0	0	AF26Z-22-00-20	0.40
	24...60	20...60	0	0	AF26Z-22-00-21	0.40
	48...130	48...130	0	0	AF26Z-22-00-22	0.40
	100...250	100...250	0	0	AF26Z-22-00-23	0.40
55	-	12...20	0	0	AF38Z-22-00-20	0.40
	24...60	20...60	0	0	AF38Z-22-00-21	0.40
	48...130	48...130	0	0	AF38Z-22-00-22	0.40
	100...250	100...250	0	0	AF38Z-22-00-23	0.40

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

AF40 ... AF80 4-pole contactors
60 to 105 A
AC / DC operated

AF40-40-00

AF80-40-00

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 600 V AC and 250 V DC. These contactors are of the block type design with 4 main poles.

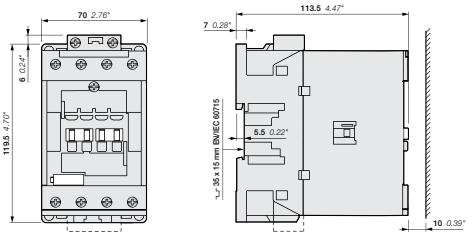
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltages ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - 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

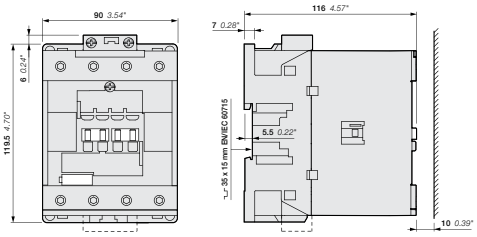
UL/CSA General use rating 600 V AC	Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Catalog number	Weight Pkg (1 pce)
A	V 50/60 Hz	V DC				kg
4 N.O. Main Poles						
60	24...60	-	0	0	AF40-40-00-41	1.21
	24...60	20...60[1]	0	0	AF40-40-00-11	1.21
	48...130	48...130	0	0	AF40-40-00-12	1.21
	100...250	100...250	0	0	AF40-40-00-13	1.16
	250...500	250...500	0	0	AF40-40-00-14	1.16
80	24...60	-	0	0	AF52-40-00-41	1.21
	24...60	20...60[1]	0	0	AF52-40-00-11	1.21
	48...130	48...130	0	0	AF52-40-00-12	1.21
	100...250	100...250	0	0	AF52-40-00-13	1.16
	250...500	250...500	0	0	AF52-40-00-14	1.16
105	24...60	-	0	0	AF80-40-00-41	1.49
	24...60	20...60[1]	0	0	AF80-40-00-11	1.49
	48...130	48...130	0	0	AF80-40-00-12	1.49
	100...250	100...250	0	0	AF80-40-00-13	1.44
	250...500	250...500	0	0	AF80-40-00-14	1.44
2 N.O. + 2 N.C. Main Poles						
60	24...60	-	0	0	AF40-22-00-41	1.21
	24...60	20...60[1]	0	0	AF40-22-00-11	1.21
	48...130	48...130	0	0	AF40-22-00-12	1.21
	100...250	100...250	0	0	AF40-22-00-13	1.16
	250...500	250...500	0	0	AF40-22-00-14	1.16
105	24...60	-	0	0	AF80-22-00-41	1.49
	24...60	20...60[1]	0	0	AF80-22-00-11	1.49
	48...130	48...130	0	0	AF80-22-00-12	1.49
	100...250	100...250	0	0	AF80-22-00-13	1.44
	250...500	250...500	0	0	AF80-22-00-14	1.44

[1] AF..-..-..-11 May not be suitable for all PLC applications. Refer to manufacturing specifications.

Main dimensions mm, inches



AF40, AF52

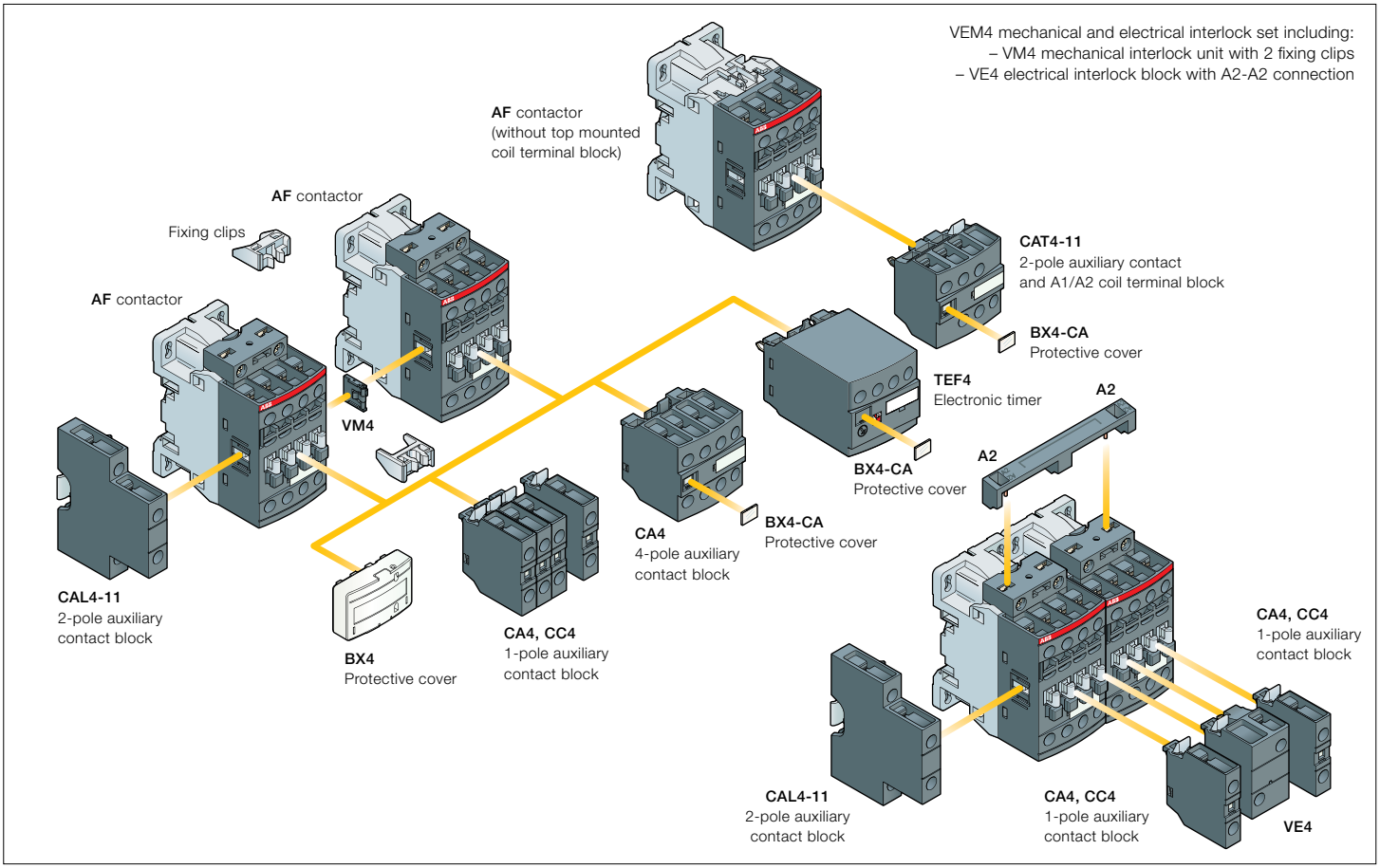


AF80

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											Side-mounted accessories		
					Auxiliary contact blocks						Electronic timer		Electrical and mechanical interlock set (between 2 contactors)			Auxiliary contact blocks		
					1-pole CA4											Left side		Right side
					1-pole CC4		2-pole CAT4-11		4-pole CA4		TEF4		VEM4			2-pole CAL4-11		
	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

AF09 ... AF80 4-pole contactors
Main accessories

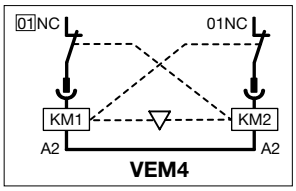
CA4-10

CAL4-11

CA4-22E

CAT4-11E

VEM4



TEF4-ON

Ordering details[1)]

For contactors	Auxiliary contacts				Catalog number	Pkg qty	Weight (1 pce) kg
Front-mounted instantaneous auxiliary contact blocks							
AF09 ... AF80-40-00 AF09 ... AF80-22-00	1	0	–	–	CA4-10	1	0.02
	0	1	–	–	CA4-01	1	0.02
	2	2	–	–	CA4-22E	1	0.06
	3	1	–	–	CA4-31E	1	0.06
	4	0	–	–	CA4-40E	1	0.06
AF09 ... AF16-40-00	0	4	–	–	CA4-04E	1	0.06
AF40 ... AF80-40-00	0	4	–	–	CA4-04E	1	0.06
Front-mounted auxiliary contact blocks with N.O. leading contact and N.C. lagging contact							
AF09 ... AF80-40-00	–	–	1	0	CC4-10	1	0.02
AF09 ... AF80-22-00	–	–	0	1	CC4-01	1	0.02
Side-mounted instantaneous auxiliary contact blocks							
AF09 ... AF80-40-00 AF09 ... AF80-22-00	1	1	–	–	CAL4-11	1	0.04
Front-mounted instantaneous auxiliary contact and A1/A2 coil terminal blocks							
AF09 ... AF52-40-00 AF09 ... AF40-22-00	1	1	–	–	CAT4-11E	1	0.04

Note: CAT4 not suitable for AF..Z contactors with DC control voltage 12...20 V DC.

Mechanical interlock unit

AF09 ... AF38-40-00					VM4	10	0.01
AF40 ... AF80-40-00					VM96-4	10	0.01

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	1	0.04

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		Catalog number	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	1	0.07
		OFF-delay	1	1	TEF4-OFF	1	0.07

Note: Rated control circuit voltage Uc 24...240 V 50/60 Hz or DC.
[1)] For more information, refer to "Accessories" section.

4

AF116 … AF140 4-pole contactors
160 to 200 A
AC / DC operated

AF140-40-11

AF140-40-00

AF140-40-00B

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 600 V AC. These contactors are of the block type design with 4 main poles.

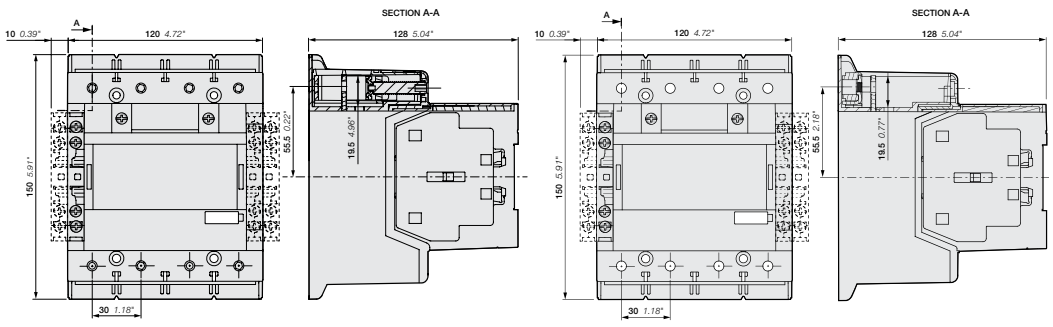
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - 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

UL / CSA General use rating 600 V AC	Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted[1]		Catalog number	Weight Pkg (1 pce)
A	V 50/60 Hz	V DC				kg
4 N.O. main poles						
For connection with built-in cable clamps						
160	24...60	20...60	1	1	AF116-40-11-11	2.27
	48...130	48...130	1	1	AF116-40-11-12	2.27
	100...250	100...250	1	1	AF116-40-11-13	2.27
	250...500	250...500	1	1	AF116-40-11-14	2.27
200	24...60	20...60	1	1	AF140-40-11-11	2.27
	48...130	48...130	1	1	AF140-40-11-12	2.27
	100...250	100...250	1	1	AF140-40-11-13	2.27
	250...500	250...500	1	1	AF140-40-11-14	2.27
With bar connections						
160	24...60	20...60	1	1	AF116-40-00B-11	2.15
	48...130	48...130	1	1	AF116-40-00B-12	2.15
	100...250	100...250	1	1	AF116-40-00B-13	2.15
	250...500	250...500	1	1	AF116-40-00B-14	2.15
200	24...60	20...60	1	1	AF140-40-00B-11	2.15
	48...130	48...130	1	1	AF140-40-00B-12	2.15
	100...250	100...250	1	1	AF140-40-00B-13	2.15
	250...500	250...500	1	1	AF140-40-00B-14	2.15

[1] Auxiliary contact arrangements available in 00, 11, 22

Main dimensions mm, inches



AF116, AF140-40-11 **AF116, AF140-40-11B**

AF190 … AF370 4-pole contactors
230 to 420 A
AC / DC operated

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 600 V AC. These contactors are of the block type design with 4 main poles.

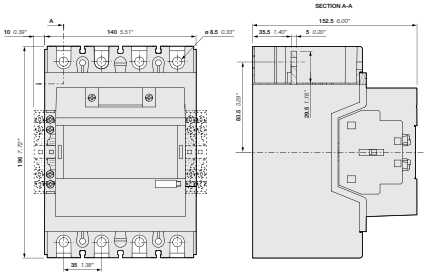
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - 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

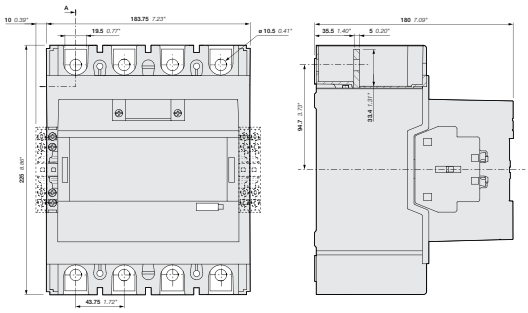
UL / CSA General use rating 600 V AC	Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted[1]		Catalog number	Weight Pkg (1 pce)
A	V 50/60 Hz	V DC				kg
4 N.O. main poles						
230	24...60	20...60	1	1	AF190-40-11-11	3.92
	48...130	48...130	1	1	AF190-40-11-12	3.92
	100...250	100...250	1	1	AF190-40-11-13	3.92
	250...500	250...500	1	1	AF190-40-11-14	3.92
250	24...60	20...60	1	1	AF205-40-11-11	3.92
	48...130	48...130	1	1	AF205-40-11-12	3.92
	100...250	100...250	1	1	AF205-40-11-13	3.92
	250...500	250...500	1	1	AF205-40-11-14	3.92
300	24...60	20...60	1	1	AF265-40-11-11	6.38
	48...130	48...130	1	1	AF265-40-11-12	6.38
	100...250	100...250	1	1	AF265-40-11-13	6.38
	250...500	250...500	1	1	AF265-40-11-14	6.38
350	24...60	20...60	1	1	AF305-40-11-11	6.38
	48...130	48...130	1	1	AF305-40-11-12	6.38
	100...250	100...250	1	1	AF305-40-11-13	6.38
	250...500	250...500	1	1	AF305-40-11-14	6.38
420	24...60	20...60	1	1	AF370-40-11-11	6.38
	48...130	48...130	1	1	AF370-40-11-12	6.38
	100...250	100...250	1	1	AF370-40-11-13	6.38
	250...500	250...500	1	1	AF370-40-11-14	6.38

[1] Auxiliary contact arrangements available in 00, 11, 22

Main dimensions mm, inches



AF190, AF205



AF265, AF305, AF370

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

4

Description

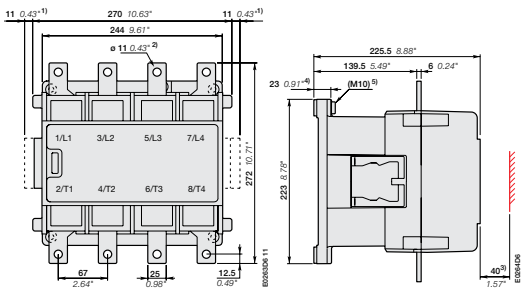
EK550 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 1000 V AC and 600 V DC, EK1000 up to 1000 V AC. These contactors are of the block type design with:
– 4 main poles
– control circuit: AC operated
– add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

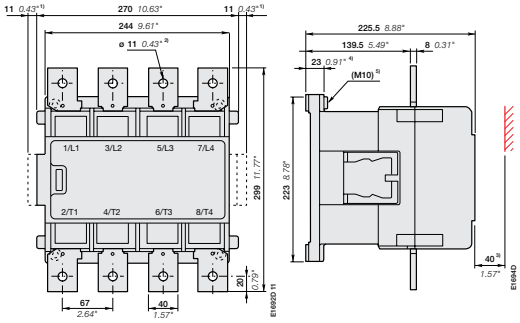
IEC Rated operational current θ ≤ 40 °C AC-1 A	UL/CSA General use rating 600 V AC A	Rated control circuit voltage Uc [1] V 50 Hz	 V 60 Hz	Auxiliary contacts fitted NO	 NC	Catalog number	Global code	Weight Pkg (1 pce) kg
		110	120	1	1	EK550C4P-1L	SK827041-AF	17.200
		220	220...240	1	1	EK550C4P-2L	SK827041-EL	17.200
		-	480	1	1	EK550C4P-4L	SK827041-AS	17.200
		110	120	1	1	EK1000C4P-1L	SK827044-AF	17.500
		220	220...240	1	1	EK1000C4P-2L	SK827044-EL	17.500
		-	480	1	1	EK1000C4P-4L	SK827044-AS	17.500

[1] For other coil voltages or auxiliary configurations, contact technical support.

Main dimensions mm, inches



EK550



EK1000

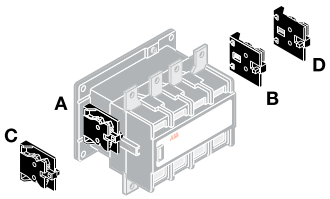
1) Dimension for extra auxiliary contact block.
2) Screw, nut and washer by-packed.
3) Min. distance to uninsulated wall.
4) Damping elements are included.
5) Earthing screw.

Notes

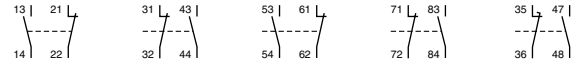
EK550, EK1000 4-pole contactors
with 1 N.O. + 1 N.C. auxiliary contacts and 2 N.O. + 1 N.C. auxiliary contacts

Main accessory fitting details

Mounting positions of the auxiliary contact



Auxiliary contact types and connecting diagrams

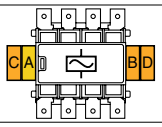
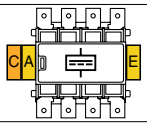


CAL16-11 A | CAL16-11 B | CAL16-11 C | CAL16-11 D | CCL16-11 E [1]

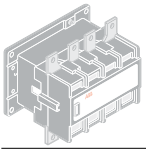
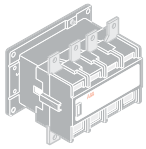
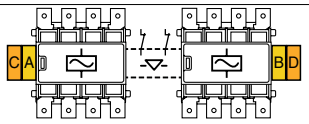
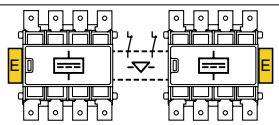
[1] Contact 35-36 used for some types of EK... contactors

4

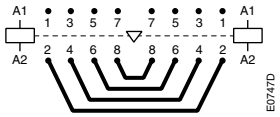
EK 4-pole contactors

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	–	

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		Catalog number	Global 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			EHMI800Bp	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			Catalog number	Global 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

[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.
Note: All DC operated EK contactors are equipped with one CCL16-11E on the right side.

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]								
 3-phase motors	**220-230-240 V**	9 A	18 A	23.2 A	23.2 A	40 A	53 A	80 A
	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
 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.

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 60947-4-1, 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	-
	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	-
	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	-

M 3~ 3-phase motors

M 3~ 1500 r.p.m. 50 Hz, 1800 r.p.m. 60 Hz, 3-phase motors

[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.

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".

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								

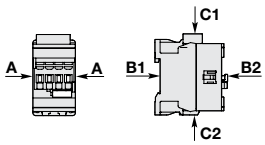
Main pole utilization characteristics - 4 N.O. non-reversing contactors

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	-	-

AF09 ... AF80 4-pole contactors
Technical data

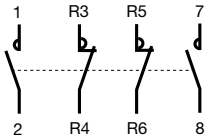
General technical data

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 closed position / 25 g open position				20 g		
		B1	25 g closed position / 5 g open position				20 g closed position / 4 g open position		
		B2	15 g closed position / 10 g open position				10 g		
		C1	25 g closed position / 20 g open position				20 g		
		C2	25 g closed position / 20 g open position				20 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.

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

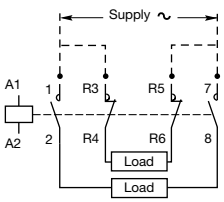


These contactors are suitable for controlling 2 separate circuits, i.e. 2 loads with 2 separate supplies, or 1 circuit comprising 2 separate loads with a single supply (see diagrams below). When the contactor operates there is no mechanical overlapping between the N.O. poles and the N.C. poles: BREAK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

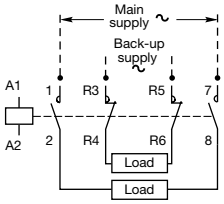
These contactors are not suitable for a reversing starter or for controlling a single load from 2 separate supplies.

Block diagrams

– Single supply and 2 separate loads

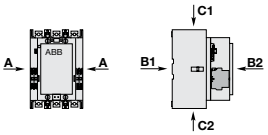


– 2 separate supplies and 2 separate loads

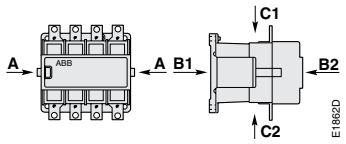


AF116 ... EK1000 4-pole contactors
Technical data

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

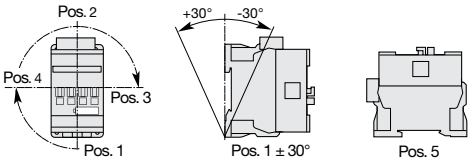
Contactor types	AC or DC operated	EK550	EK1000
Rated insulation voltage Ui			
acc. to IEC 60947-4-1		1000 V	
acc. to UL		600 V	
Rated impulse withstand voltage Uimp.		8 kV	
Electromagnetic compatibility		EK contactors complying with IEC 60947-1 / EN 60947-1 - Environment A	
Ambient air temperature close 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

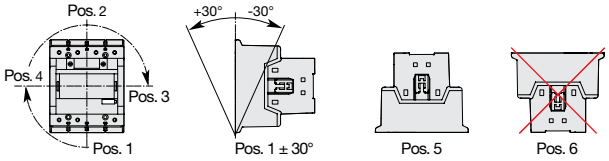
Contactor types	AF09	AF16	AF26	AF38	AF40	AF52	AF80
Mounting positions							
	Max. add-on N.C. auxiliary contacts: see accessory fitting details for a 4-pole contactor AF09 ... AF80						
Mounting distances	The contactors can be assembled side by side						
Fixing							
On rail according to IEC 60715, 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		

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				

EK550 ... EK1000 4-pole contactors
Technical data

Magnet system characteristics

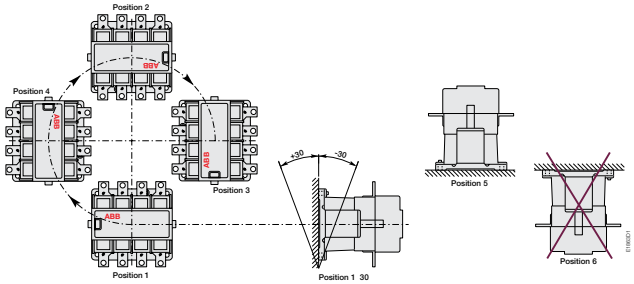
Contactor types		AC operated	EK550	EK1000
Coil operating limits		AC supply	At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max.	
acc. to IEC 60947-4-1			Please also refer to "Mounting characteristics and conditions for use"	
AC control voltage				
Rated control circuit voltage		50 Hz	48...500 V	
		60 Hz	110...600 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	

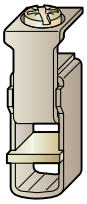
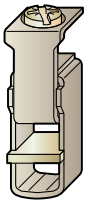
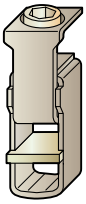
Mounting characteristics and conditions for use

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	
	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.

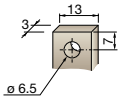
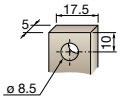
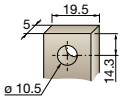
AF09 ... AF80 4-pole contactors
Technical data

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						

AF116 ... AF370 4-pole contactors
Technical data

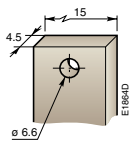
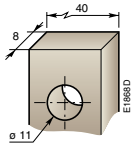
Connecting characteristics

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.

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	

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.

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).

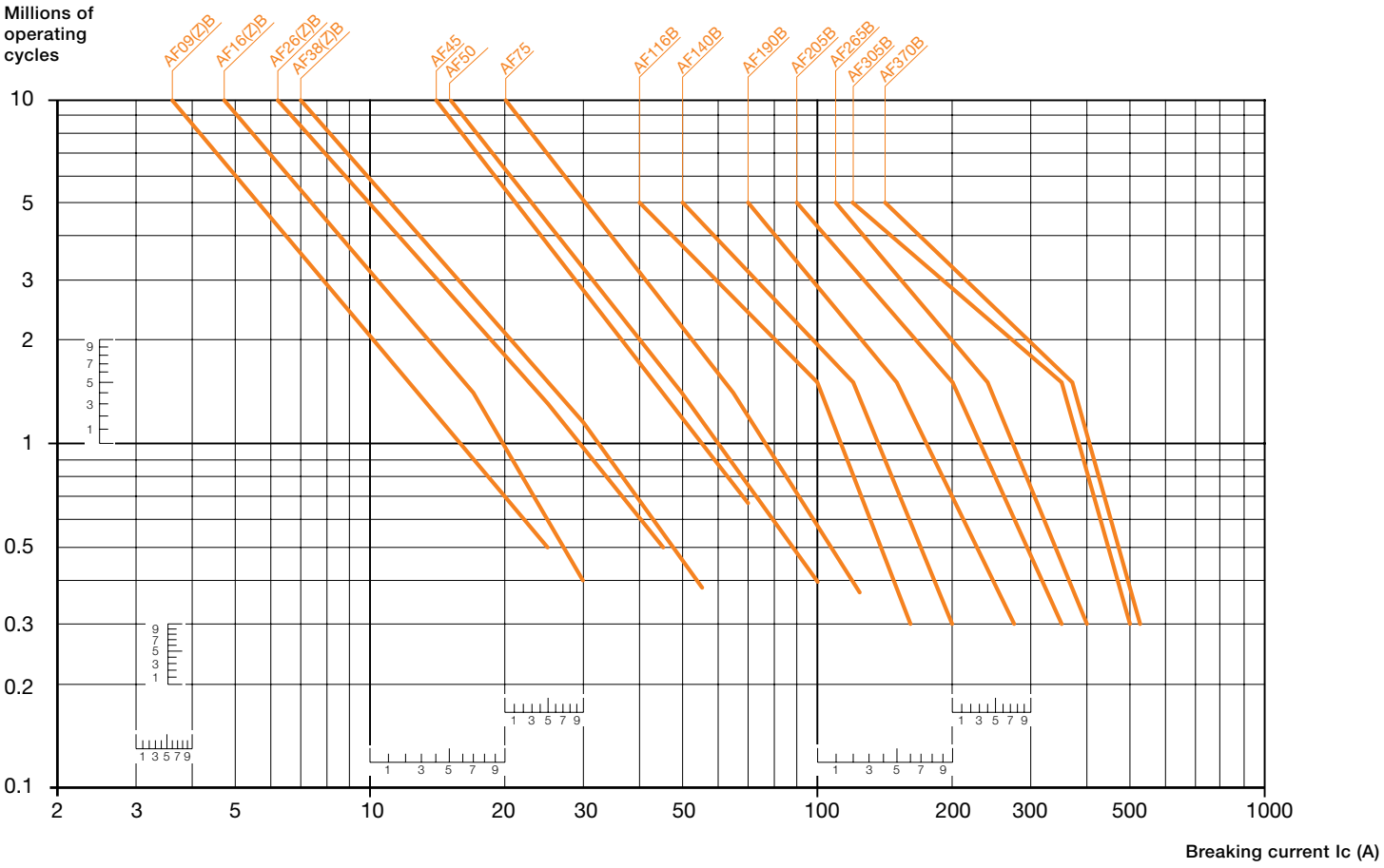
The combined effect of environmental conditions and the proper temperature of the product may require some disposals. As a matter of fact, for this duty, the use duration prevails over the number of operating cycles.

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.

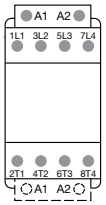
Ambient temperature and maximum electrical switching frequency: see "Technical data".



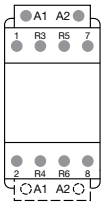
AF09 ... AF80 4-pole contactors
Terminal marking and positioning

AF09 ... AF38 contactors - AC / DC operated

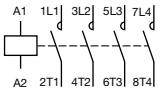
Standard devices without addition of auxiliary contacts



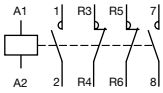
AF09 ... AF80..-40-00



AF09 ... AF40..-22-00
AF80-22-00

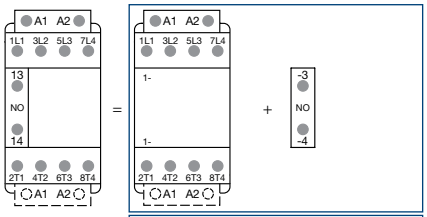


AF09 ... AF80..-40-00

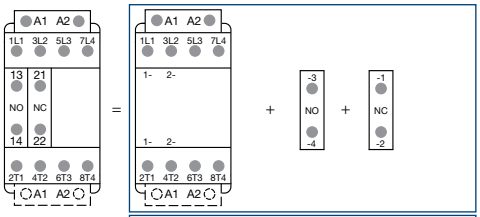


AF09 ... AF40..-22-00
AF80-22-00

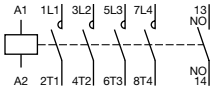
Other possible contact combinations with auxiliary contacts added by the user



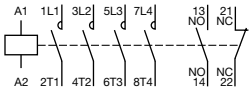
Combination 10 = AF09 ... AF80..-40-00 + CA4-10



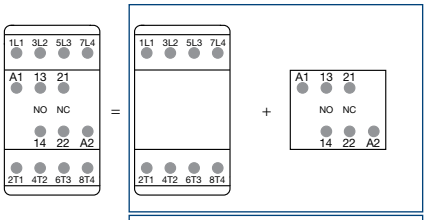
Combination 11 = AF09 ... AF80..-40-00 + CA4-10 + CA4-01



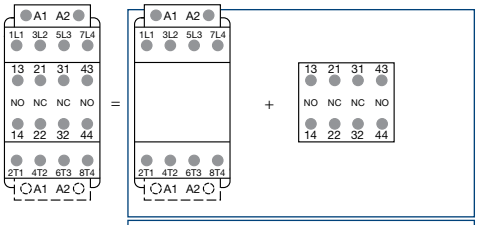
Combination 10



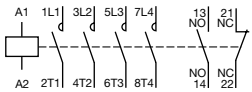
Combination 11



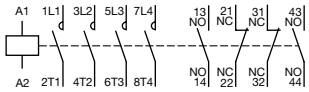
Combination 11 = AF09 ... AF80..-40-00 + CAT4-11E



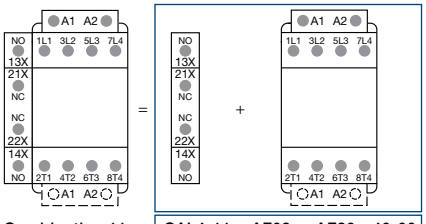
Combination 22 = AF09 ... AF80..-40-00 + CA4-22E



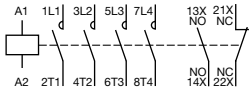
Combination 11



Combination 22



Combination 11 = CAL4-11 + AF09 ... AF80..-40-00



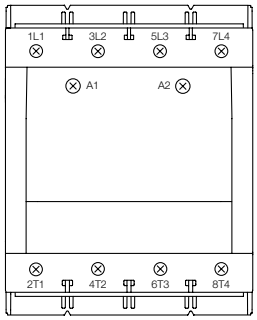
Combination 11

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

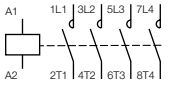
AF116 ... AF370 4-pole contactors
Terminal marking and positioning

AF116 ... AF370 contactors - AC / DC operated

Standard devices without addition of auxiliary contacts

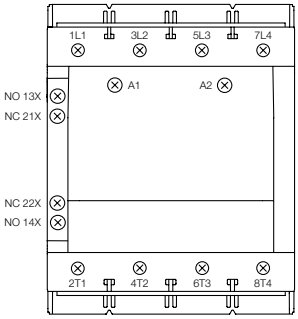


AF116 ... AF370-40-00

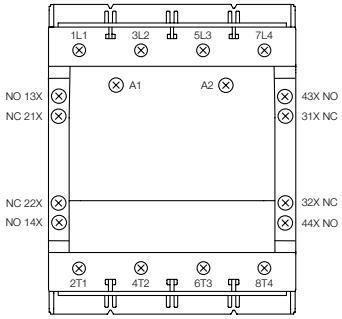


AF116 ... AF370-40-00

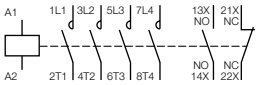
Standard devices with factory mounted auxiliary contacts



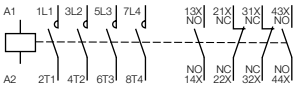
AF116 ... AF370-40-11



AF116 ... AF370-40-22



AF116 ... AF370-40-11

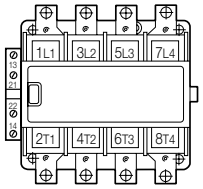


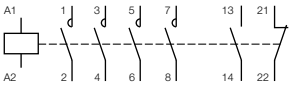
AF116 ... AF370-40-22

EK 4-pole contactors
Terminal marking and positioning

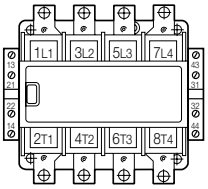
EK550, EK1000 contactors - AC operated

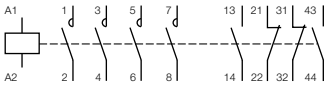
Standard devices





EK550, EK1000-40-11 **EK550, EK1000-40-11**

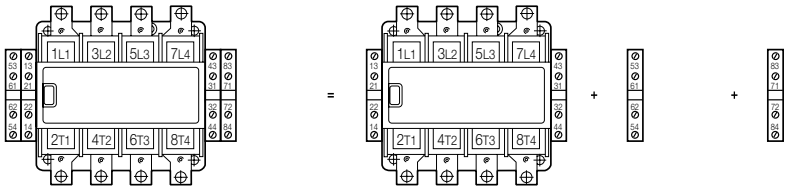




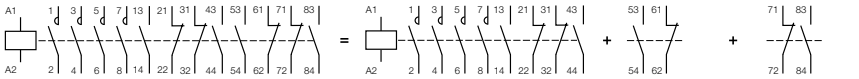
EK550, EK1000-40-22 **EK550, EK1000-40-22**

4

Other possible contact combinations with auxiliary contacts added by the user



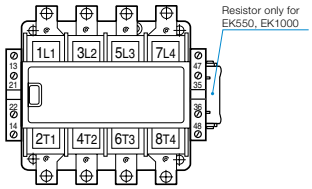
Combination 44 = **EK550, EK1000-40-22** + **CAL16-11C** + **CAL16-11D**



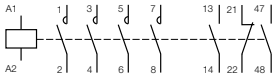
Combination 44 = **EK550, EK1000-40-22** + **CAL16-11C** + **CAL16-11D**

EK550, EK1000 contactors - with multifrequency coil or DC operated

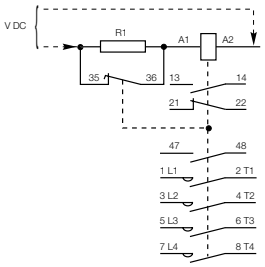
Standard devices



EK550, EK1000-40-21

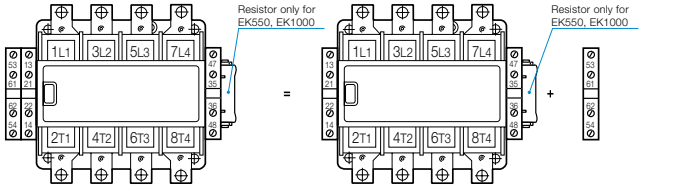


EK550, EK1000-40-21

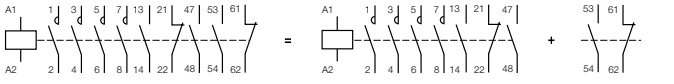


EK550, EK1000 DC operated

Other possible contact combinations with auxiliary contacts added by the user



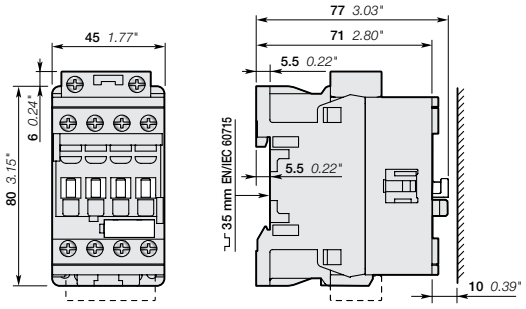
Combination 32 = **EK550, EK1000-40-21** + **CAL16-11C**



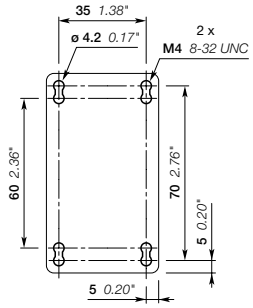
Combination 32 = **EK550, EK1000-40-21** + **CAL16-11C**

AF09, AF16 4-pole contactors

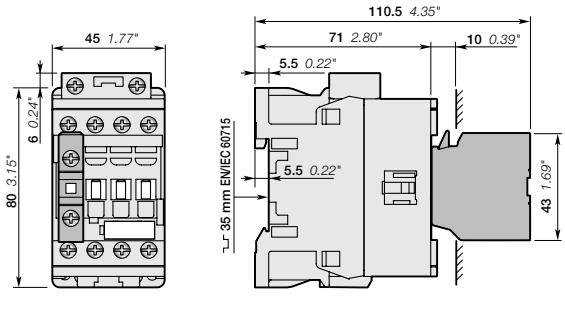
Main dimensions mm, inches



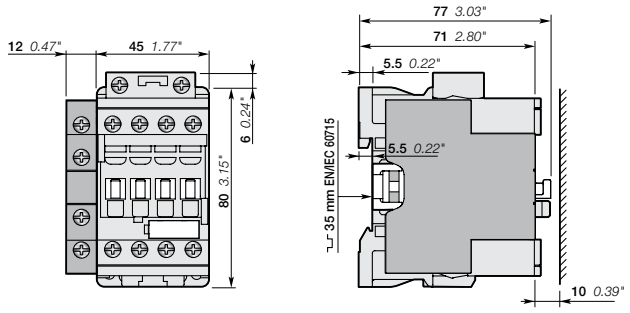
AF09, AF16



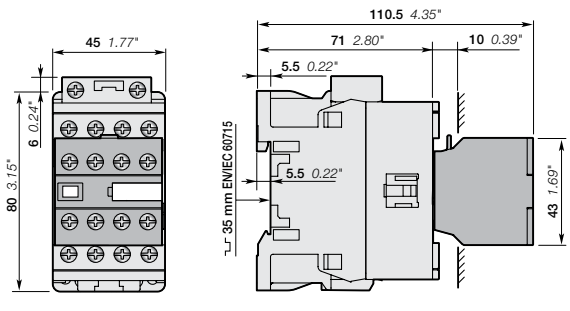
AF09, AF16



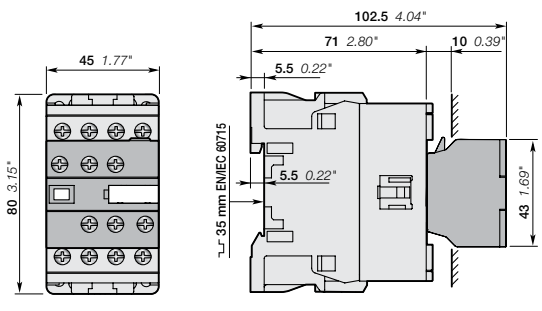
AF09, AF16
+ CA4, CC4 1-pole auxiliary contact block



AF09, AF16
+ CAL4-11 2-pole auxiliary contact block



AF09, AF16
+ CA4 4-pole auxiliary contact block

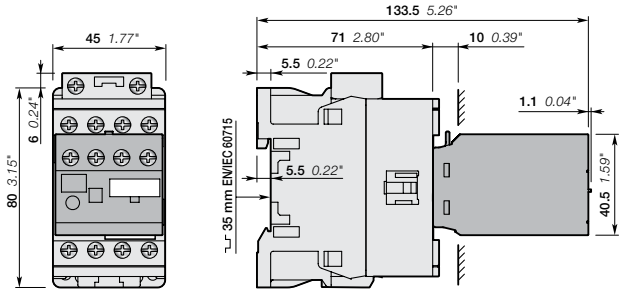


AF09, AF16
+ CAT4 2-pole auxiliary contact and coil terminal block

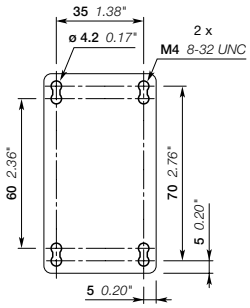
Note: contactor lateral distance to grounded component 2 mm *0.08*" min.

AF09, AF16 4-pole contactors

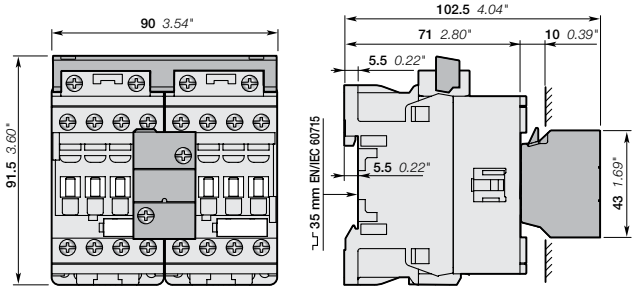
Main dimensions mm, inches



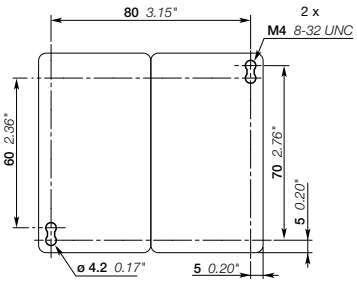
AF09, AF16
+ TEF4 electronic timer



AF09, AF16



AF09..-40-00, AF16..-40-00
+ VEM4 mechanical and electrical interlock set

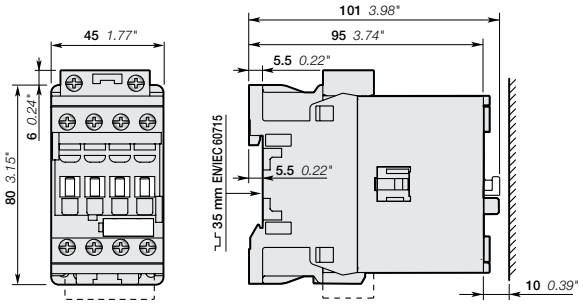


AF09..-40-00, AF16..-40-00
+ VEM4 mechanical and electrical interlock set

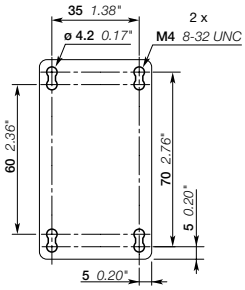
Note: contactor lateral distance to grounded component 2 mm *0.08"* min.

AF26, AF38 4-pole contactors

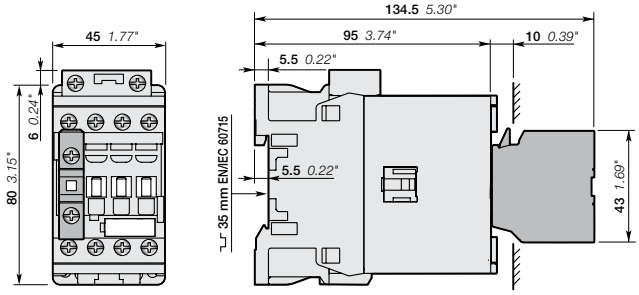
Main dimensions mm, inches



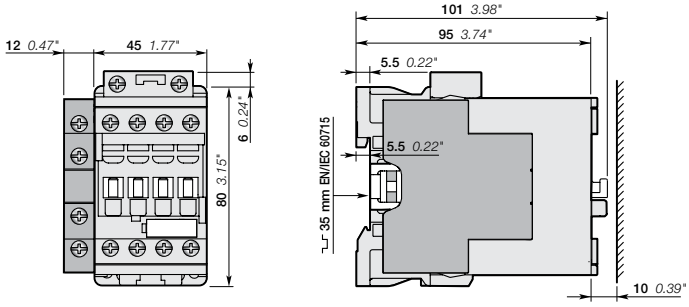
AF26, AF38



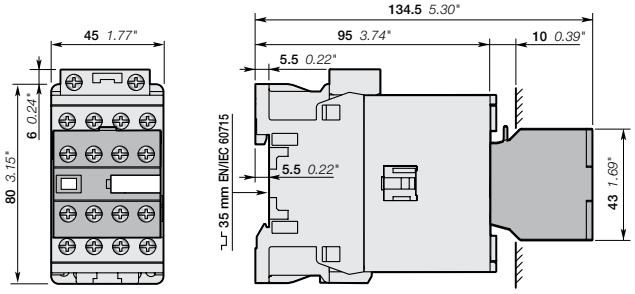
AF26, AF38



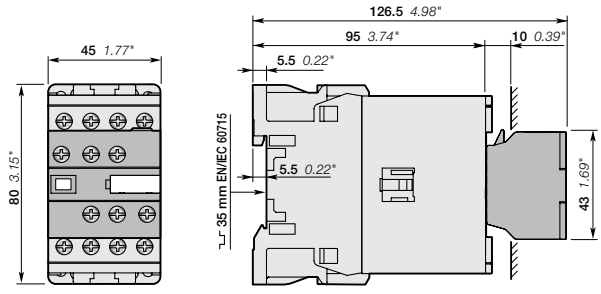
AF26, AF38
+ CA4, CC4 1-pole auxiliary contact block



AF26, AF38
+ CAL4-11 2-pole auxiliary contact block



AF26, AF38
+ CA4 4-pole auxiliary contact block

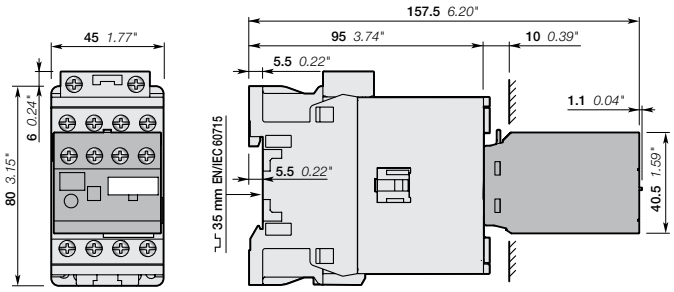


AF26, AF38
+ CAT4 2-pole auxiliary contact and coil terminal block

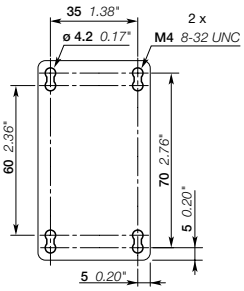
Note: contactor lateral distance to grounded component 2 mm *0.08*" min.

AF26, AF38 4-pole contactors

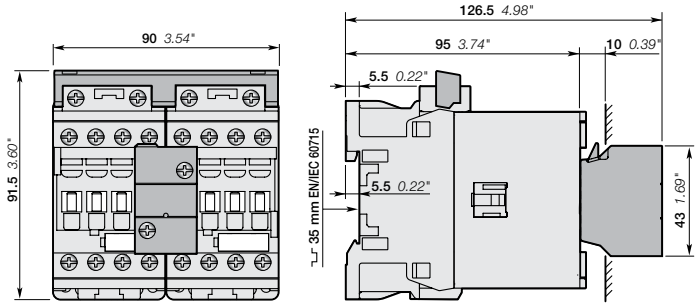
Main dimensions mm, inches



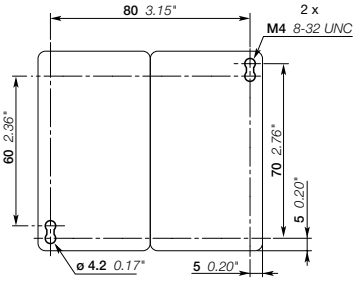
AF26, AF38
+ TEF4 electronic timer



AF26, AF38



AF26..-40-00, AF38..-40-00
+ VEM4 mechanical and electrical interlock set

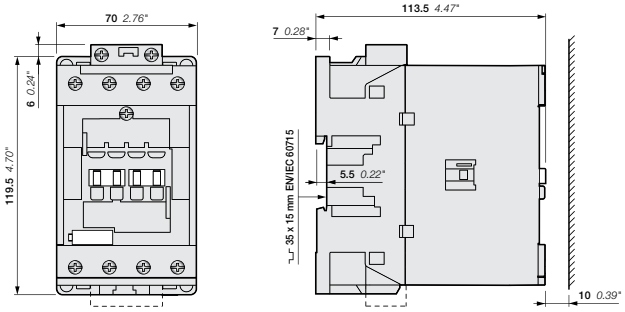


AF26..-40-00, AF38..-40-00
+ VEM4 mechanical and electrical interlock set

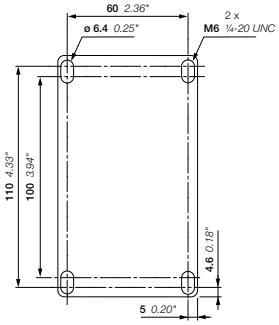
Note: contactor lateral distance to grounded component 2 mm *0.08*" min.

AF40, AF52 4-pole contactors

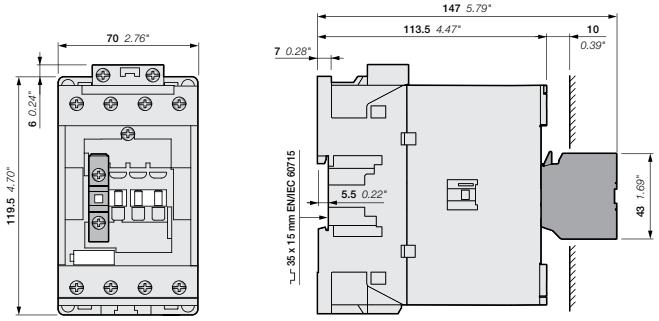
Main dimensions mm, *inches*



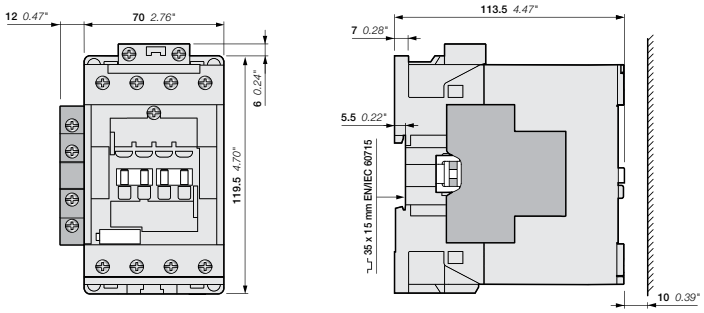
AF40, AF52



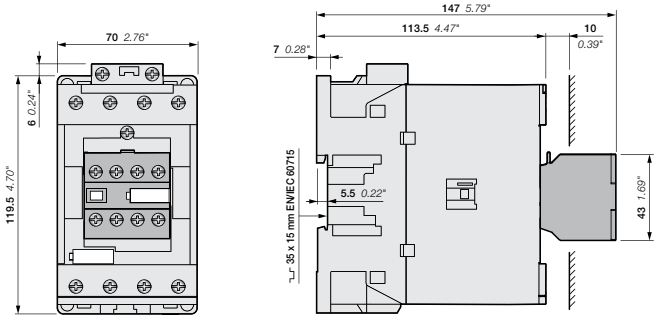
AF40, AF52



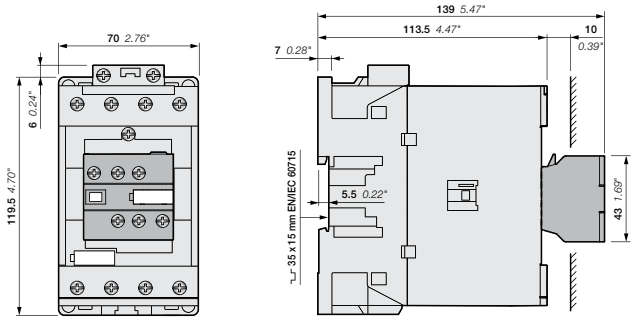
AF40, AF52
+ CA4, CC4 1-pole auxiliary contact block



AF40, AF52
+ CAL4-11 2-pole auxiliary contact block



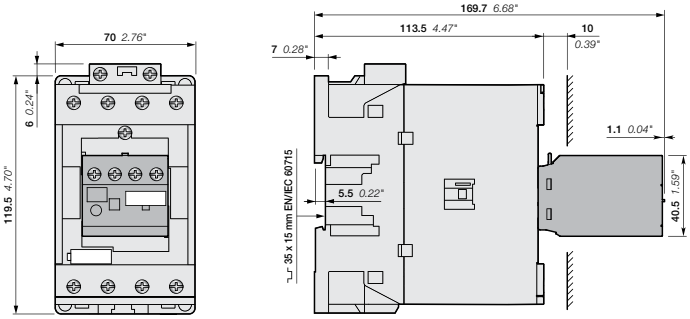
AF40, AF52
+ CA4 4-pole auxiliary contact block



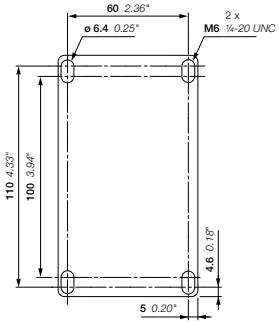
AF40, AF52
+ CAT4 2-pole auxiliary contact and coil terminal block

AF40, AF52 4-pole contactors

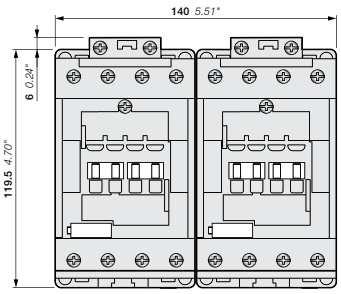
Main dimensions mm, *inches*

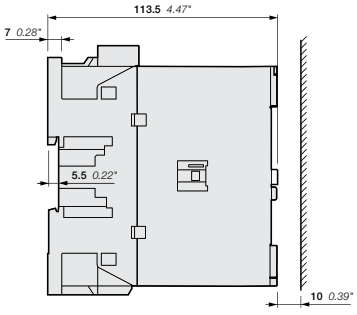


AF40, AF52
+ TEF4 electronic timer

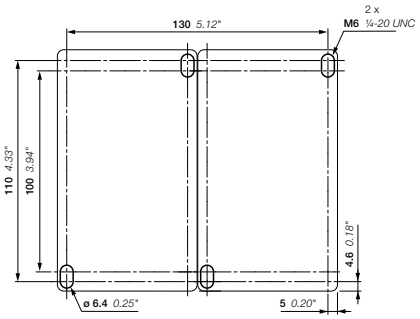


AF40, AF52





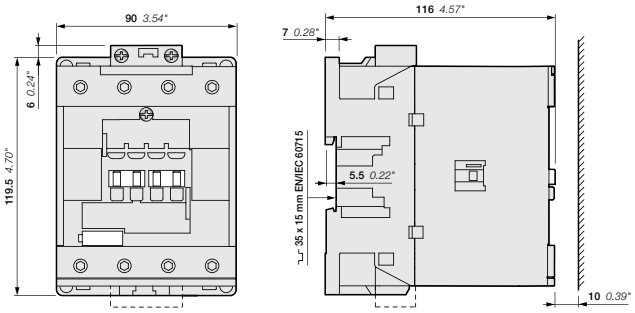
AF40, AF52
+ VM96-4 mechanical interlock unit



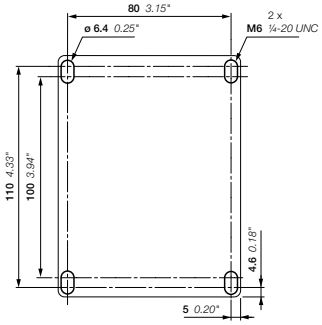
AF40, AF52
+ VM96-4 mechanical interlock unit

AF80 4-pole contactors

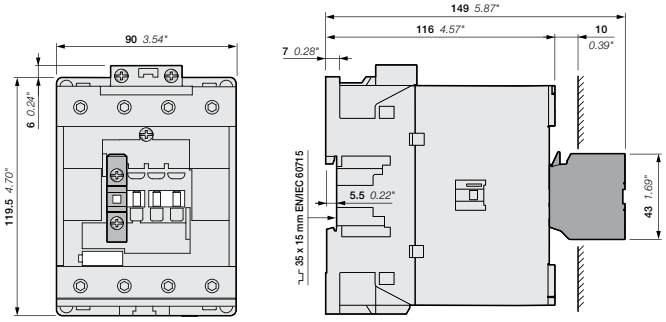
Main dimensions mm, *inches*



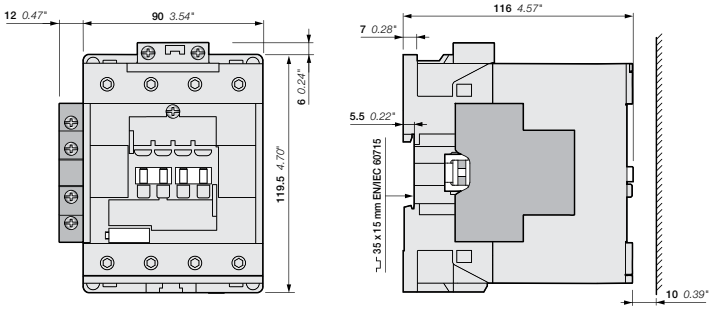
AF80



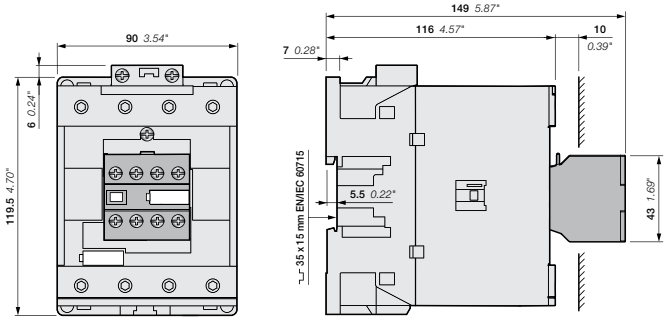
AF80



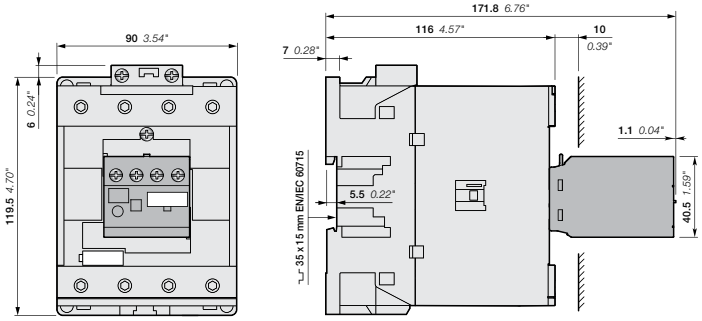
AF80
+ CA4, CC4 1-pole auxiliary contact block



AF80
+ CAL4-11 2-pole auxiliary contact block



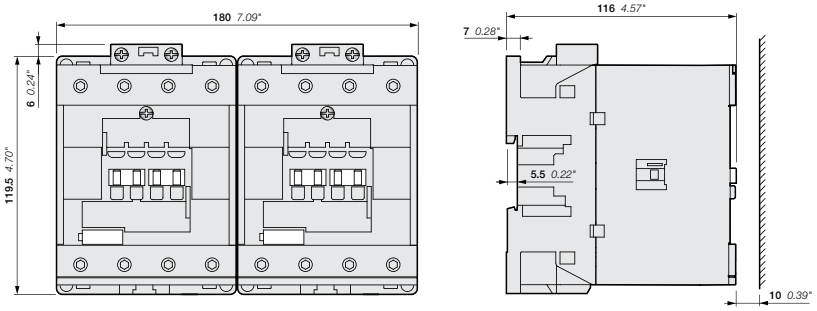
AF80
+ CA4 4-pole auxiliary contact block



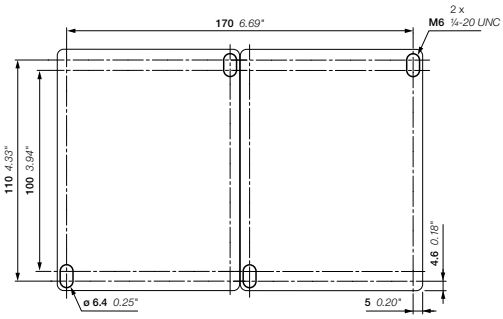
AF80
+ TEF4 Electronic timer

AF80 4-pole contactors

Main dimensions mm, *inches*



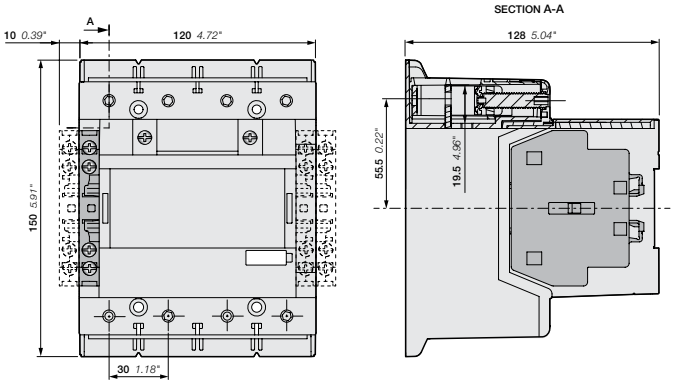
AF80
+ CA4, CC4 1-pole auxiliary contact block



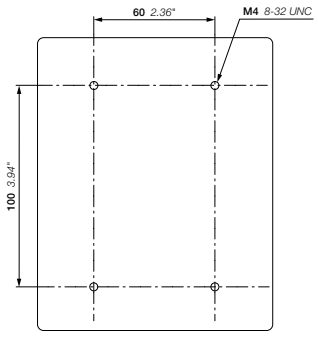
AF80
+ VM96-4 mechanical interlock unit

AF116, AF140 4-pole contactors

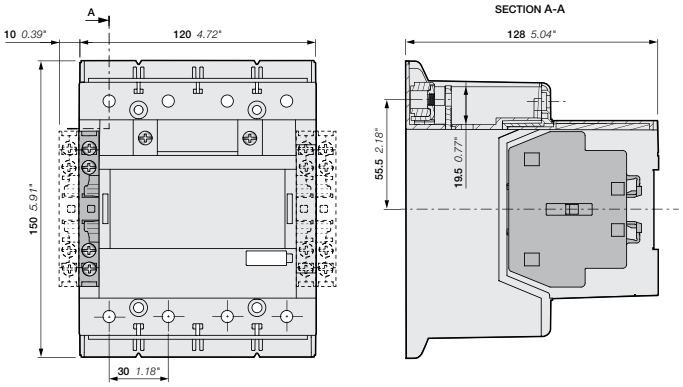
Main dimensions mm, *inches*



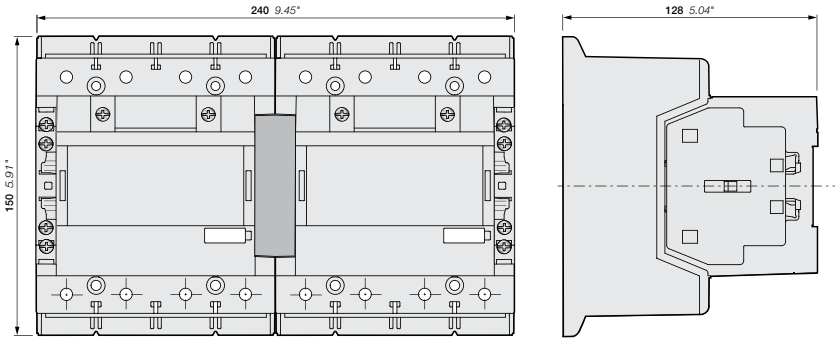
AF116, AF140-40-00 + CAL19 2-pole auxiliary contact block
AF116, AF140-40-11



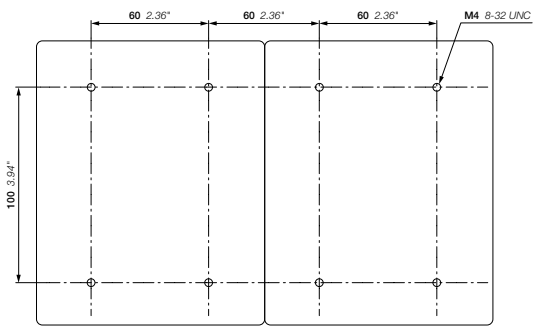
AF116, AF140-40-..(B)



AF116, AF140-40-00B + CAL19 2-pole auxiliary contact block
AF116, AF140-40-11B



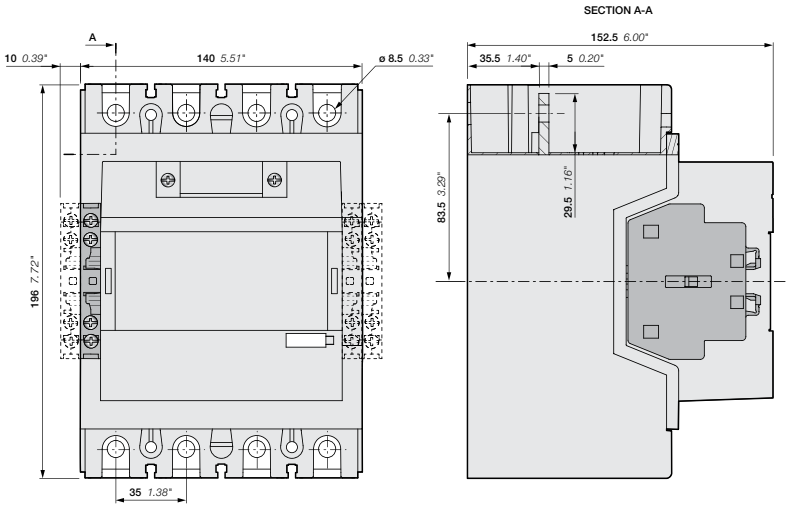
AF116, AF140-40-11
+ VM19 mechanical interlocking unit



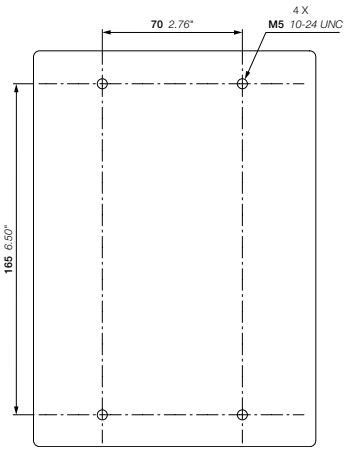
AF116, AF140
+ VM19 mechanical interlocking unit

AF190, AF205 4-pole contactors

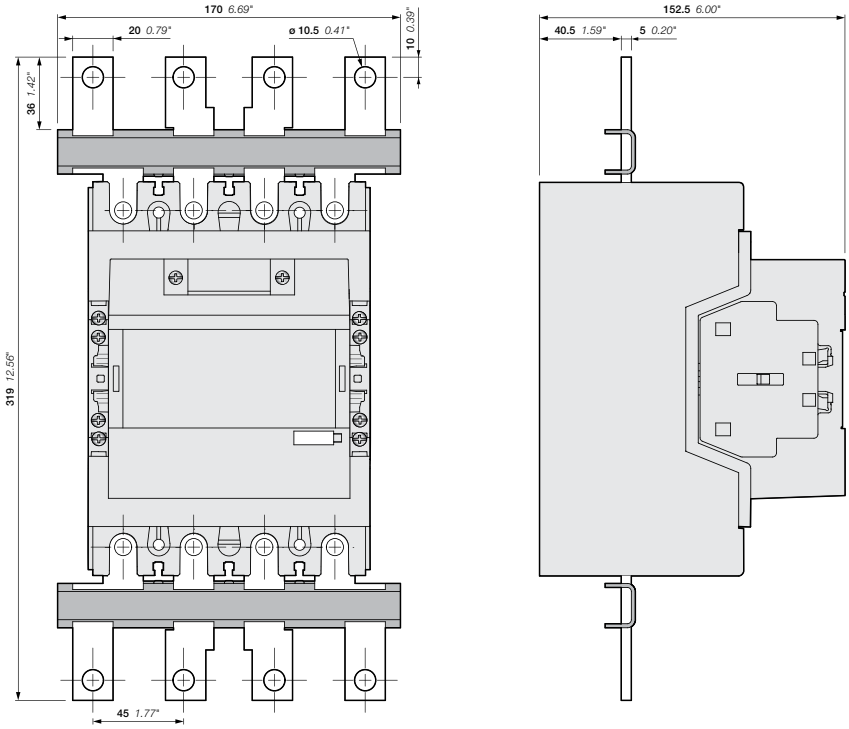
Main dimensions mm, *inches*



AF190, AF205-40-00 + CAL19 2-pole auxiliary contact block
AF190, AF205-40-11



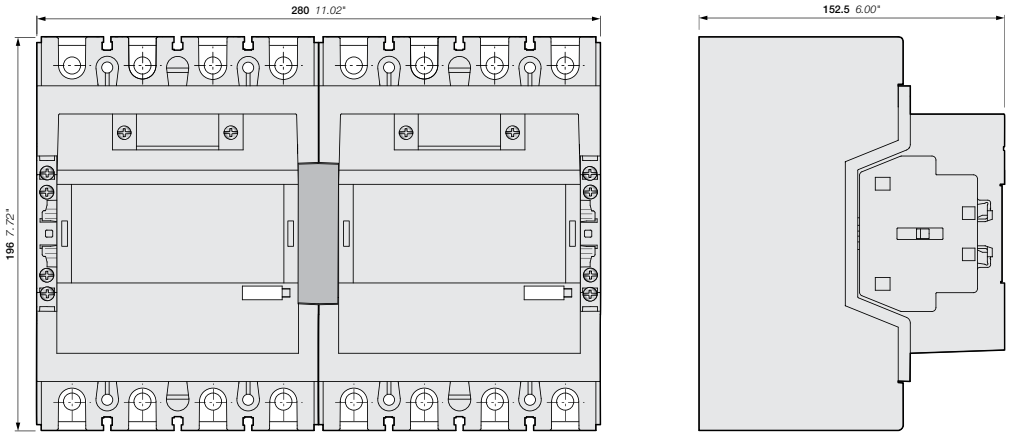
AF190, AF205-40



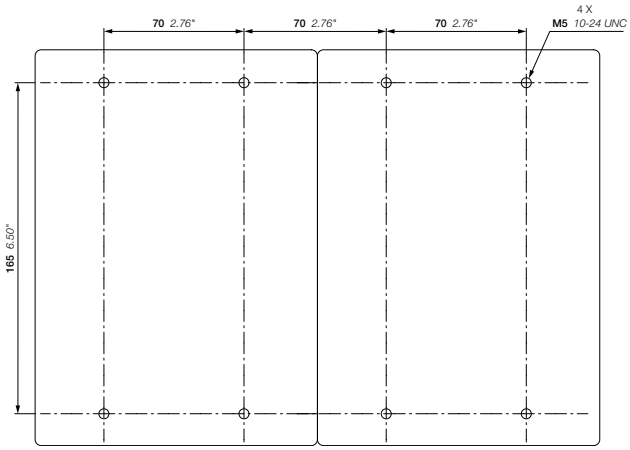
AF190, AF205-40-11
+ LW205-40 terminal enlargement

AF190, AF205 4-pole contactors

Main dimensions mm, *inches*



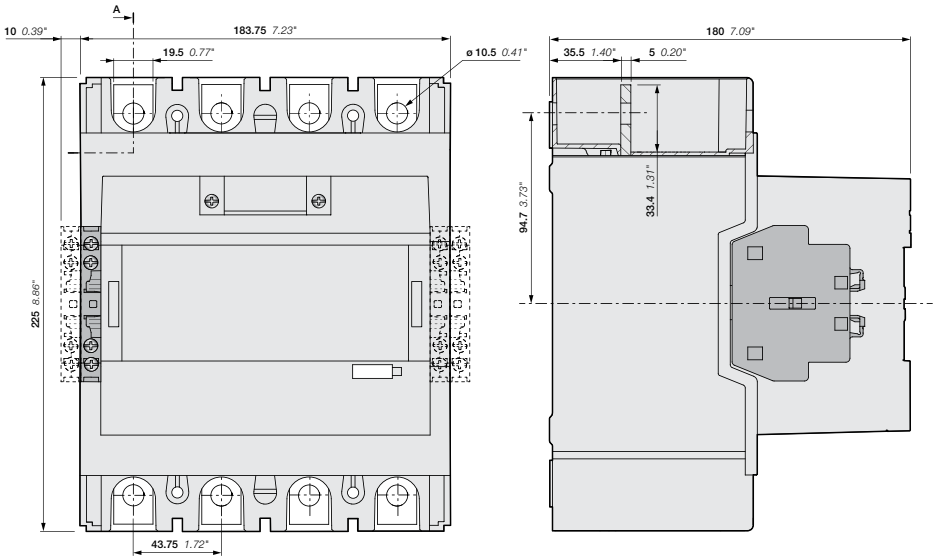
AF190, AF205-40-11
+ VM19 mechanical interlocking unit



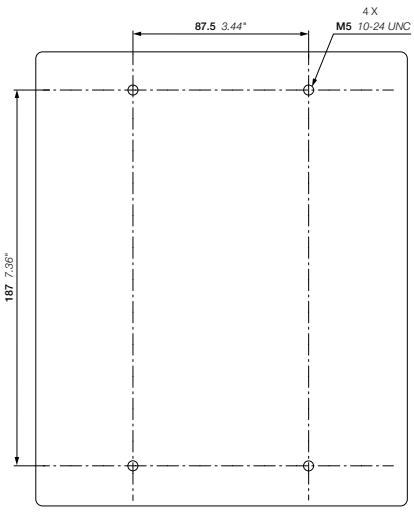
AF190, AF205
+ VM19 mechanical interlocking unit

AF265, AF305, AF370 4-pole contactors

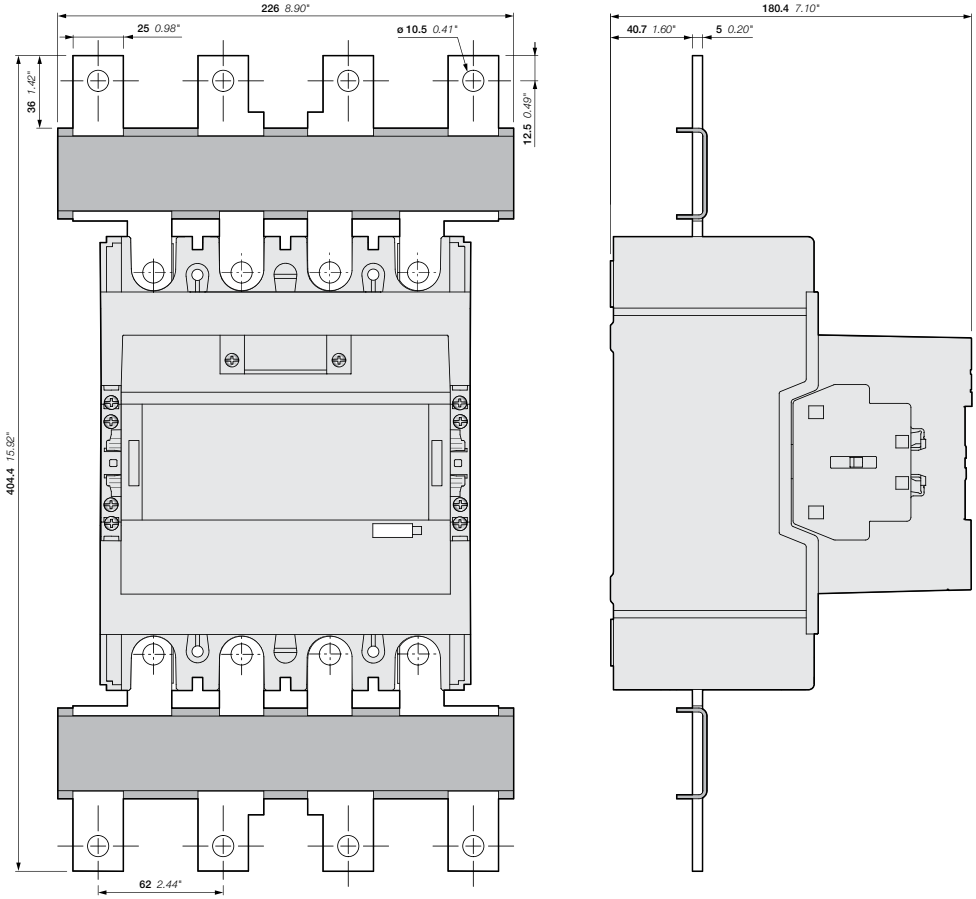
Main dimensions mm, *inches*



AF265, AF305, AF370-40-00 + CAL19 2-pole auxiliary contact block
AF265, AF305, AF370-40-11



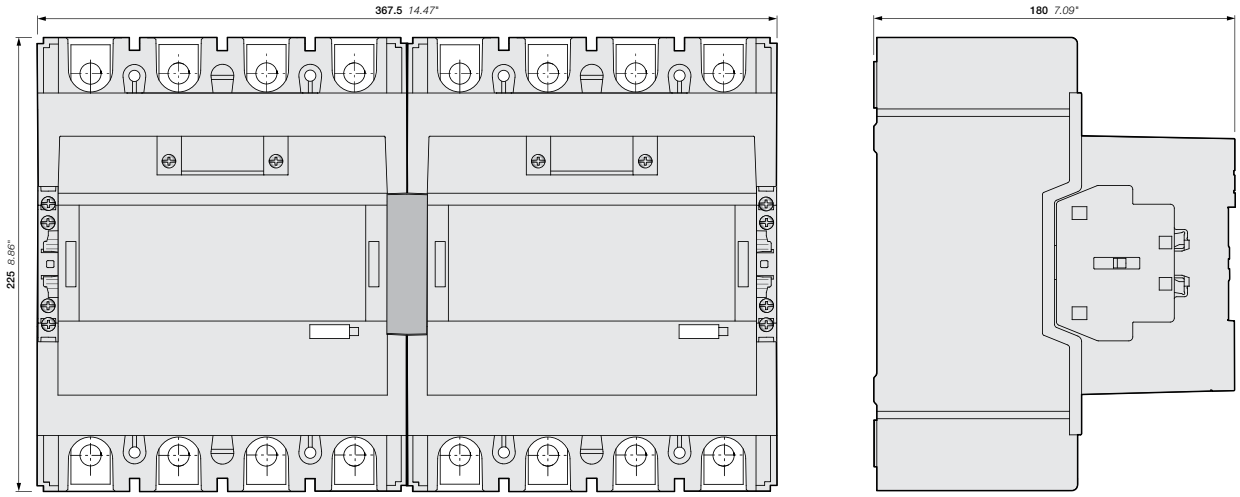
AF265, AF305, AF370



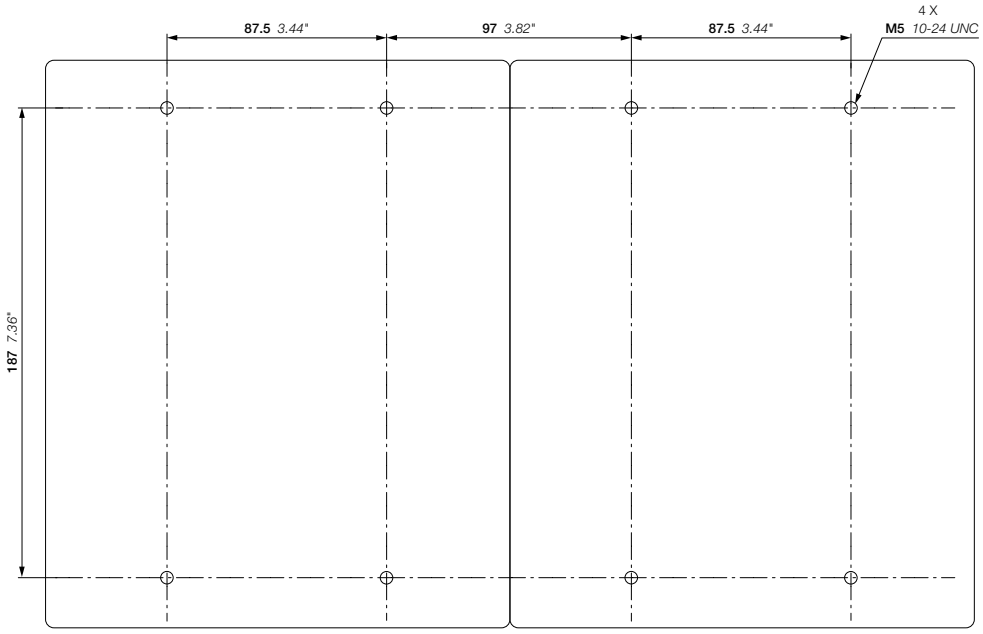
AF265, AF305, AF370-40-11
+ LW370-40 terminal enlargement

AF265, AF305, AF370 4-pole contactors

Main dimensions mm, *inches*



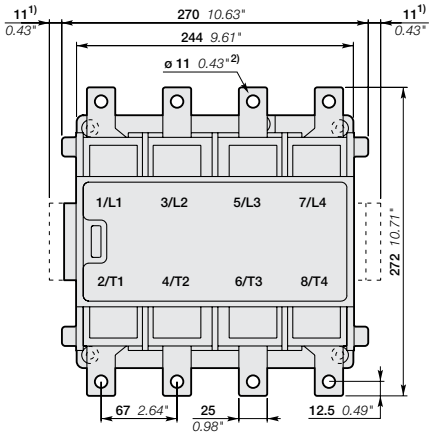
AF265, AF305, AF370-40-11
+ VM19 mechanical interlocking unit

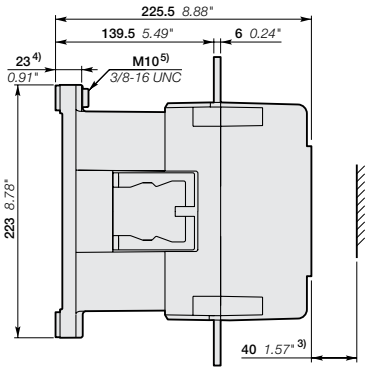


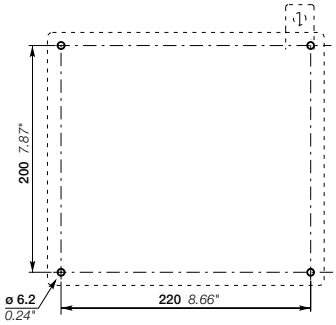
AF265, AF305, AF370
+ VM19 mechanical interlocking unit

EK550, EK1000 4-pole contactors
AC operated

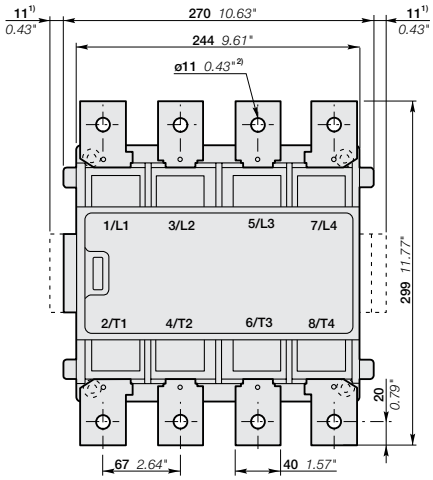
Main dimensions mm, inches

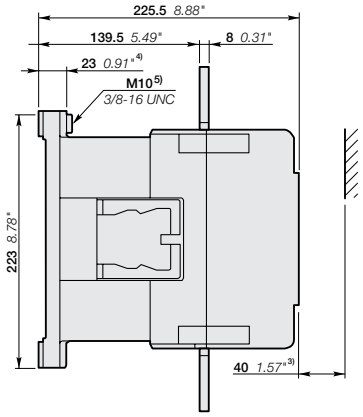






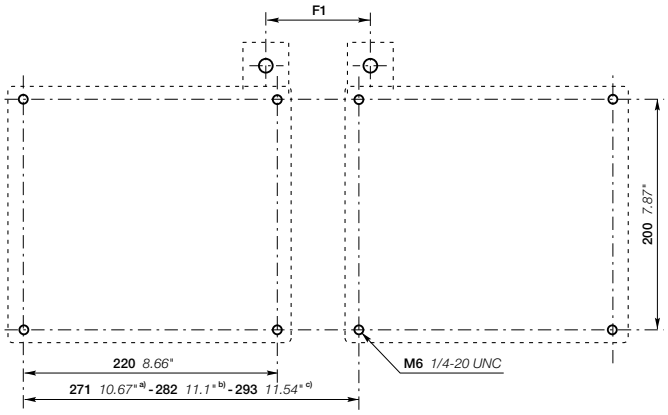
EK550





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

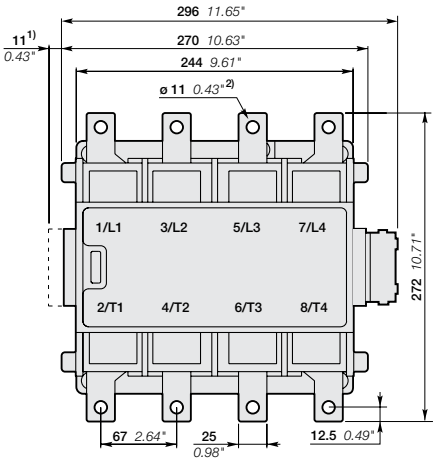


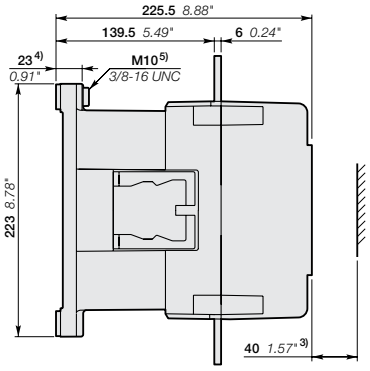
EK1000

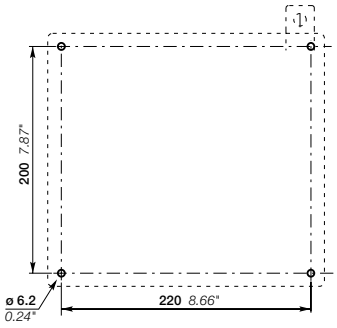
a) Min. dim Makes distance F1 = 70
b) Includes space for three auxiliary contact blocks between the contactors
c) Includes space for four auxiliary contact blocks between the contactors

EK550, EK1000 4-pole contactors
DC operated

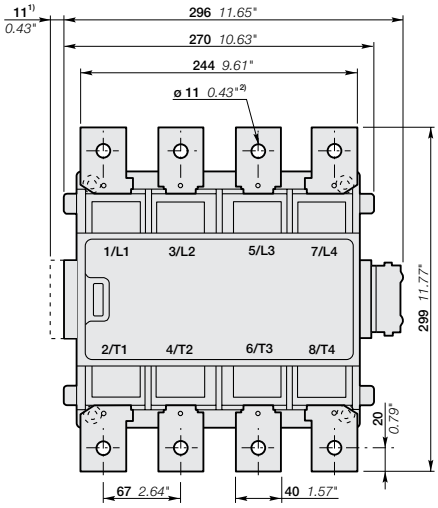
Main dimensions mm, inches

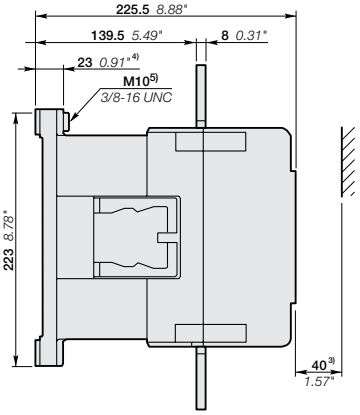






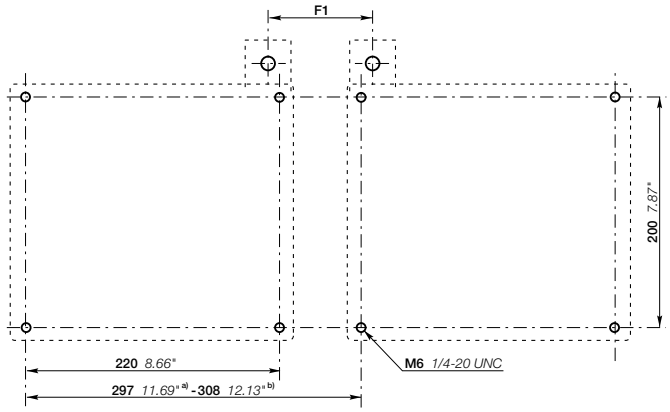
EK550





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

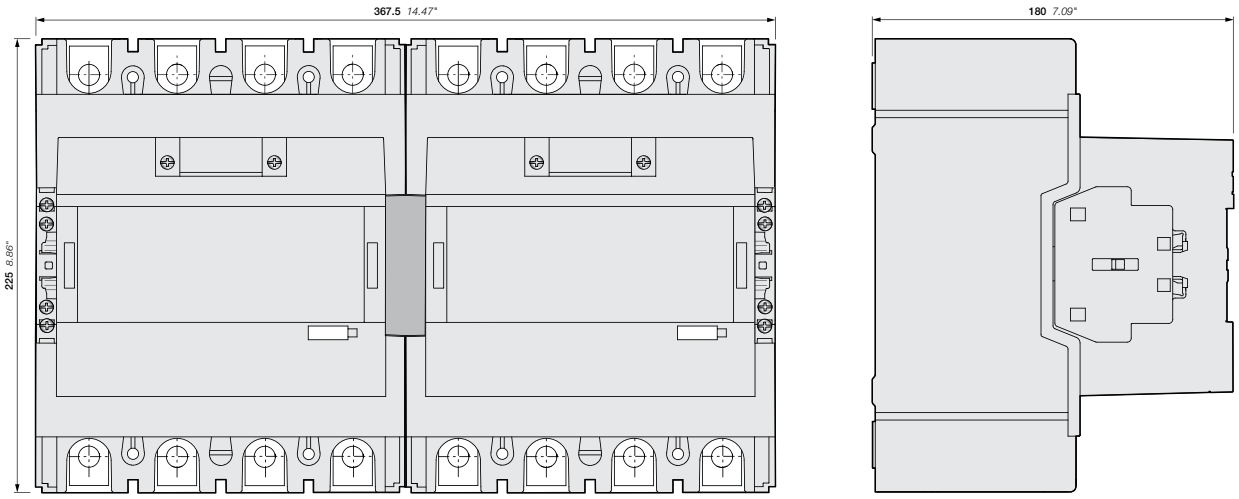


EK1000

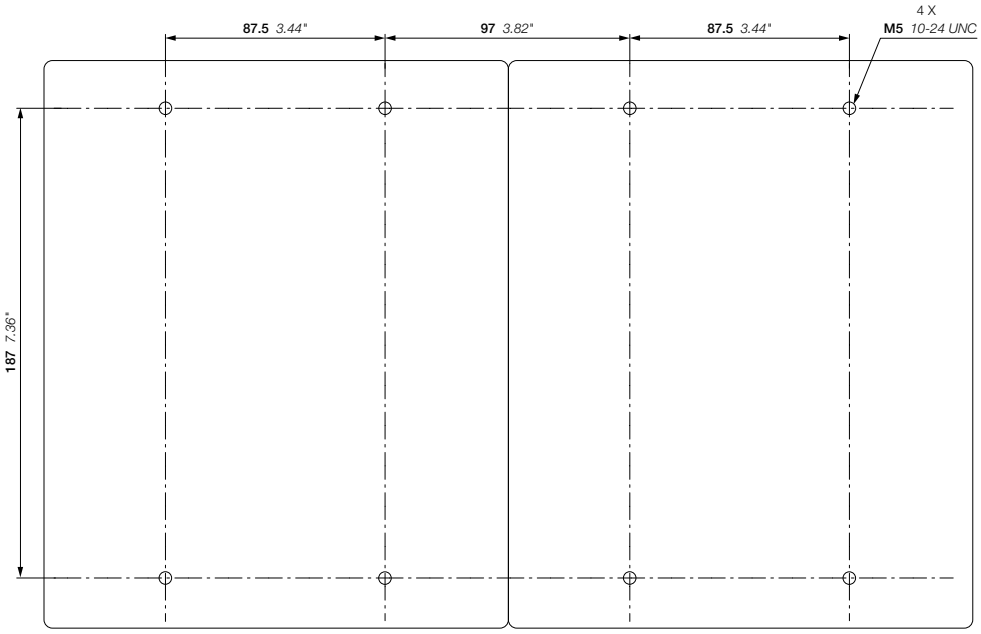
a) Min. dim.
b) Includes space for two auxiliary contact blocks and the dc-unit between the contactors

AF265, AF305, AF370 4-pole contactors

Main dimensions mm, inches



AF265, AF305, AF370-40-11
+ VM19 mechanical interlocking unit



AF265, AF305, AF370
+ VM19 mechanical interlocking unit

Notes

Contactors for DC switching, lighting, welding and drive

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.

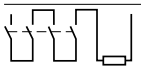
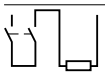
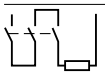
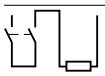
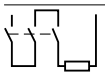
Selection table

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.

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	-	-	-	-
	≤ 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	-	-	-	-	-	-	-	-
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.

GA75 1-pole contactors
100 A DC
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.

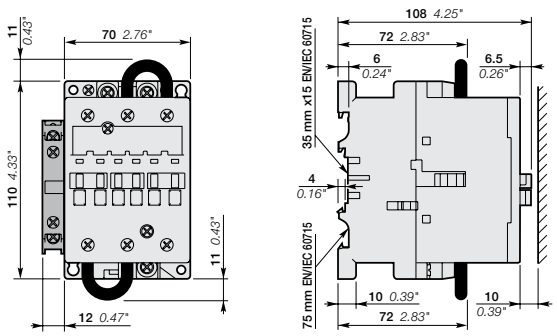
4

Ordering details

UL / CSA		Rated control circuit voltage		Auxiliary contacts fitted		Catalog number	Weight
General use rating		Uc[1]					Pkg (1 pce)
440 V DC	1000 V DC						
A	A	V 50 Hz	V 60 Hz				kg
100	35	24	24	1	1	GA75-10-11-81	1.26
		110	110...120	1	1	GA75-10-11-84	1.26
		220...230	230...240	1	1	GA75-10-11-80	1.26

[1] Other control voltages see voltage codes table.
Note: Contact tech support for additional voltages.

Main dimensions mm, inches



GA75-10-11

GAF75 1-pole contactors
100 A DC
AC/DC operated

GAF75-10-11

Description

GAF75 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.

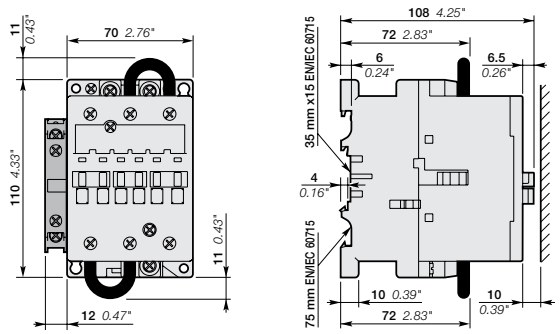
- main poles arc chutes fitted with permanent magnets specially designed for DC breaking. The connection polarities must be respected.
- control circuit : AC/DC operated
- add-on auxiliary contact blocks for side mounting and a wide range of accessories

Ordering details

UL / CSA General use rating 440 V DC A	1000 V DC A	Rated control circuit voltage Uc[1] 50/60 Hz	DC	Auxiliary contacts fitted		Catalog number	Weight Pkg (1 pce) kg
100	35	–	20 ... 60	1	1	GAF75-10-11-72	1.30
		48 ... 130	48 ... 130	1	1	GAF75-10-11-69	1.30
		100 ... 250	100 ... 250	1	1	GAF75-10-11-70	1.30

[1] Other control voltages see voltage codes table.
Note: Contact tech support for additional voltages.

Main dimensions mm, inches



GAF75-10-11

GAF185 ... GAF300 3-pole contactors
250 to 400 A DC
AC / DC operated with 1 N.O. + 1 N.C. auxiliary contact

GAF185-10-11

GAF300-10-11

4

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

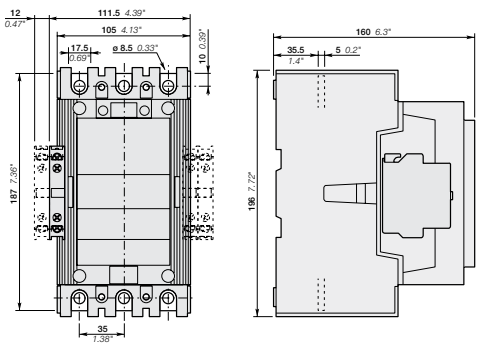
Ordering details

UL / CSA General use rating θ ≤ 40 °C 1000 V DC	Rated control circuit voltage Uc		Auxiliary contacts fitted		Catalog number	Weight Pkg (1 pce)
A	V 50/60 Hz	V DC				kg
250[1]	-	20...60	1	1	GAF185-10-11-72[2]	3.60
	48...130	48...130	1	1	GAF185-10-11-69	3.60
	100...250	100...250	1	1	GAF185-10-11-70	3.60
400	-	20...60	1	1	GAF300-10-11-72[2]	6.20
	48...130	48...130	1	1	GAF300-10-11-69	6.20
	100...250	100...250	1	1	GAF300-10-11-70	6.20

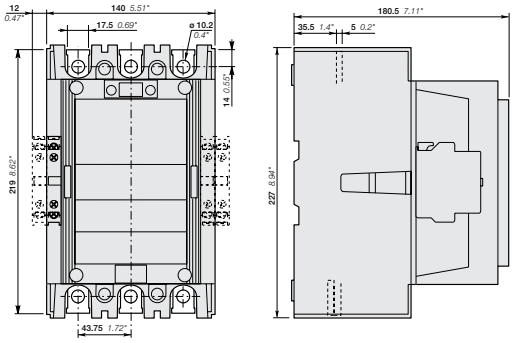
[1] At 660 V DC.

[2] 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

GAF460 ... GAF750 3-pole contactors
650 to 900 A DC
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.

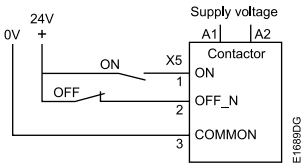
– main poles arc chutes fitted with permanent magnets specially designed for DC breaking. The connection polarities must be respected.
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control 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

Ordering details

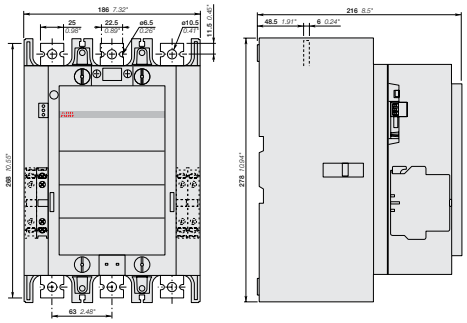
UL / CSA General use rating θ ≤ 40 °C 1000 V DC	Rated control circuit voltage Uc		Auxiliary contacts fitted		Catalog number	Weight Pkg (1 pce)
A	V 50/60 Hz	V DC				kg
650	-	24...60	1	1	GAF460-10-11-68[1]	12.00
	48...130	48...130	1	1	GAF460-10-11-69	12.00
	100...250	100...250	1	1	GAF460-10-11-70	12.00
	250...500	250...500	1	1	GAF460-10-11-71	12.00
900	-	24...60	1	1	GAF750-10-11-68[1]	15.00
	48...130	48...130	1	1	GAF750-10-11-69	15.00
	100...250	100...250	1	1	GAF750-10-11-70	15.00
	250...500	250...500	1	1	GAF750-10-11-71	15.00

[1] The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.
Note: GAF460 ... GAF750 are equipped with low voltage inputs for control, for example by a PLC.

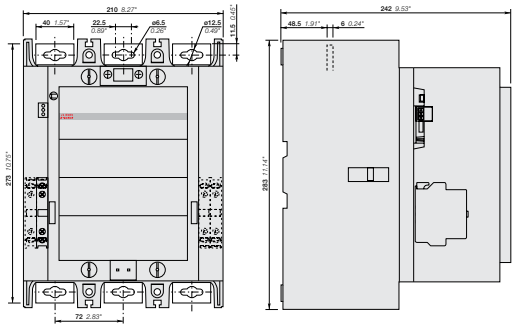
Control inputs



Main dimensions mm, inches



GAF460



GAF750

GAF1250 ... GAF2050 3-pole contactors
1210 to 2050 A DC
AC / DC operated with 1 N.O. + 1 N.C. auxiliary contact

GAF1250-10-11

GAF1650-10-11

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.

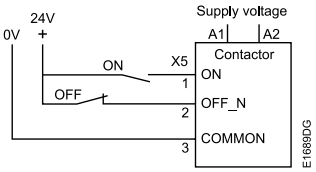
- main poles arc chutes fitted with permanent magnets specially designed for DC breaking. The connection polarities must be respected.
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control 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

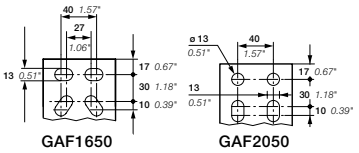
Ordering details

UL / CSA General use rating θ ≤ 40 °C 1000 V	Rated control circuit voltage Uc		Auxiliary contacts fitted		Catalog number	Weight Pkg (1 pce)
A	V 50/60 Hz	V DC				kg
1210	-	24...60	1	1	GAF1250-10-11-68	16.00
	48...130	48...130	1	1	GAF1250-10-11-69	16.00
	100...250	100...250	1	1	GAF1250-10-11-70	16.00
	250...500	250...500	1	1	GAF1250-10-11-71	16.00
1650	100...250	100...250	1	1	GAF1650-10-11-70	35.00
2050	100...250	100...250	1	1	GAF2050-10-11-70	35.00

Note: GAF1250 ... AF2050 are equipped with low voltage inputs for control, for example by a PLC.

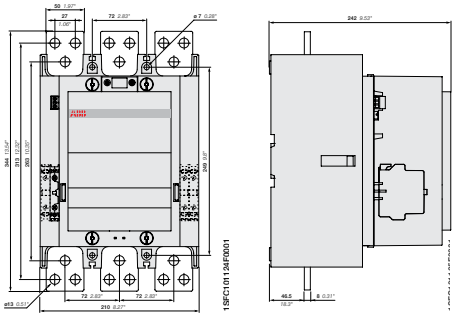
Control inputs



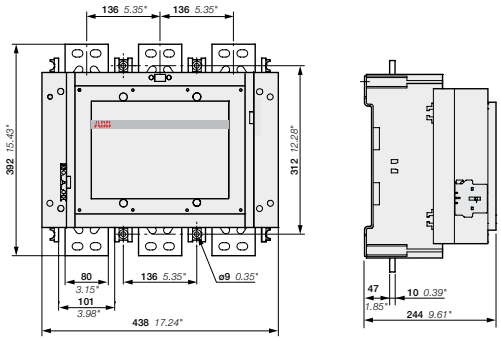


GAF1650 GAF2050

Main dimensions mm, inches



GAF1250



GAF1650, GAF2050

GAF185 ... GAF2050 3-pole contactors
Main accessories

LP185

LP2050

Ordering details

For contactors	Auxiliary contacts		Catalog number	Pkg qty	Weight (1 pce) kg
Auxiliary contact blocks, low energy microswitch 0.1 A, N.O. or N.C.					
GAF185 ... GAF2050	0	1	CEL18-01		0.05
	1	0	CEL18-10		0.05
Connection bar for contactor					
GAF185			LP185	2	0.30
GAF300			LP300	2	0.40
GAF460			LP460	4	0.55
GAF750			LP750	4	0.95
GAF1250			LP1250	2	1.90
GAF1650, GAF2050			LP2050	4	2.90

GA75 ... GAF2050 contactors
Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC operated	GA75							
	AC / DC operated	GAF75	GAF185	GAF300	GAF460	GAF750	GAF1250	GAF1650	GAF250
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		[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							

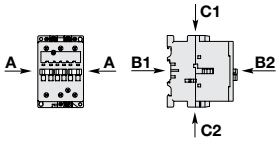
[1] Refer to IEC 60947-1, table 9.
[2] For currents above 450 A, use 300 mm² and terminal extension/enlargement pieces (LX300/LW300).

Main pole - Utilization characteristics according to UL / CSA

Contactor types	AC operated	GA75							
	AC / DC operated	GAF75	GAF185	GAF300	GAF460	GAF750	GAF1250	GAF1650	GAF250
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							

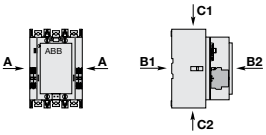
GA75 and GAF75 contactors
Technical data

General technical data

Contactor types	**AC operated**	GA75
	AC/DC operated	GAF75
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

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					-	

GA75 and GAF75 contactors
Technical data

Magnet system characteristics

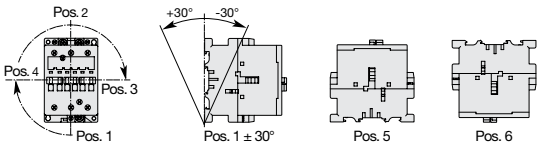
Contactor types		**AC operated**	GA75
Coil operating limits		**AC supply**	At θ ≤ 55 °C 0.85...1.1 x Uc
acc. to IEC 60947-4-1			Please also refer to "Mounting characteristics and conditions for use"
AC control voltage			
Rated control circuit voltage Uc		**at 50 Hz**	24…690 V
		at 60 Hz	24…690 V
Coil 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		**AC/DC operated**	GAF75
Coil operating limits		**AC/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/DC control voltage			
Rated control circuit voltage Uc			20…250 V AC/DC
Coil consumption		**Average pull-in value**	210 VA / 190 W
		Average holding value	7.5 VA / 2.8 W
Drop-out voltage			55 % of Uc min
Coil time constant			
Open		**L/R**	3 ms
Closed		**L/R**	15 ms
Operating time			
Between coil energization and:		**N.O. contact closing**	30…100 ms
		N.C. contact opening	27…95 ms
Between coil de-energization and:		**N.O. contact opening**	30…110 ms
		N.C. contact closing	35…115 ms

Mounting characteristics and conditions for use

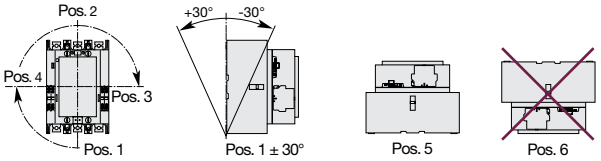
Contactor types		**AC operated**	GA75
		AC/DC operated	GAF75
Mounting positions			
Control voltage / Ambient temperature			
Mounting positions	1, 1±30°, 2, 3, 4, 5	**at θ ≤ 70 °C**	0.85 x Uc min ... 1.1 x Uc max (max 55 °C for GA75)
	6	**at θ ≤ 70 °C**	Unauthorized
Mounting distances			The contactors can be assembled side by side
Fixing			
On rail according to IEC 60715, EN 60715			35 x 15 mm or 75 x 25 mm
By screws (not supplied)			2 x M6 screws placed diagonally

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	

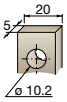
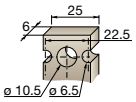
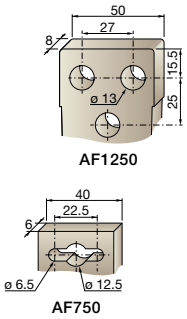
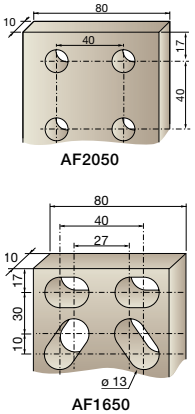
GA75 and GAF75 contactors
Technical data

Connecting characteristics

Contactor types			**AC operated**	GA75
			AC/DC operated	GAF75
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

GAF185 ... GAF2050 contactors
Technical data

Connecting characteristics

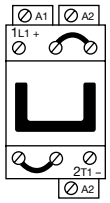
Contactor types	AC / DC operated	GAF185	GAF300	GAF460	GAF750	GAF1250	GAF1650	GAF2050
Main terminals Flat type								
Connection capacity (min. ... max.)								
Main conductors (poles)								
Rigid with connector	Single for Cu cable	6…185 mm²	16…240 mm²	240 mm²	300 mm²		–	
	Single for Al/Cu cable	25…150 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[1)]	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						

[1)] With LW110 enlargement piece: see "Accessories".

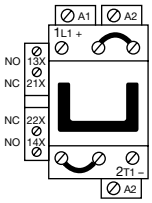
GA75 ... GAF2050 contactors
Terminal marking and positioning

GA(F)75 contactors - AC operated, AC/DC operated

Standard devices without addition of auxiliary contacts



GA(F)75-10-00



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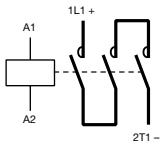

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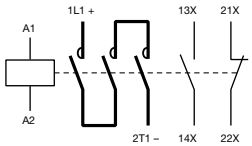
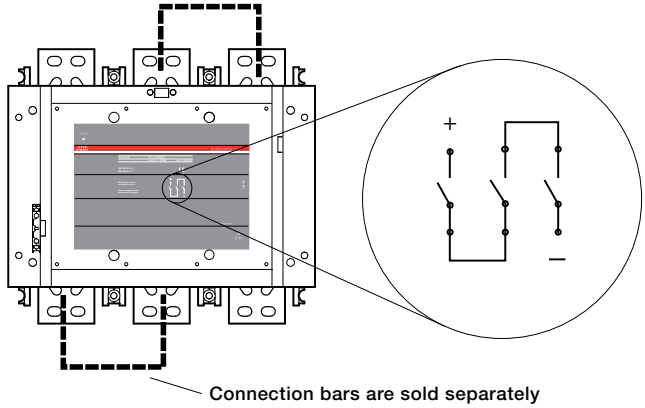
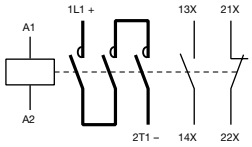


GA(F)75-10-11

GAF185 ... GAF2050 contactors - AC / DC operated



GAF185 ... GAF2050-10-11



GAF185 ... GAF2050-10-11

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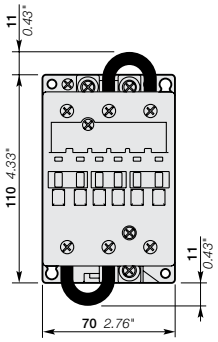
GA(F)75 1-pole contactor

Main dimensions mm, inches



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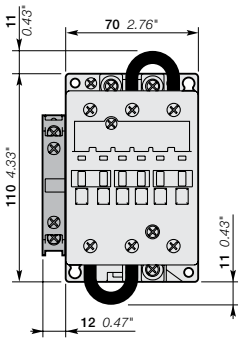
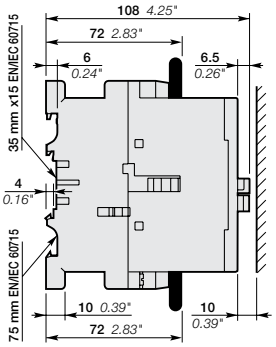
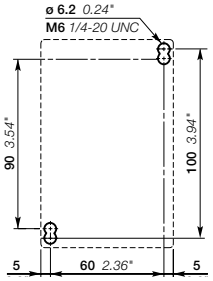


GA(F)75-10-11

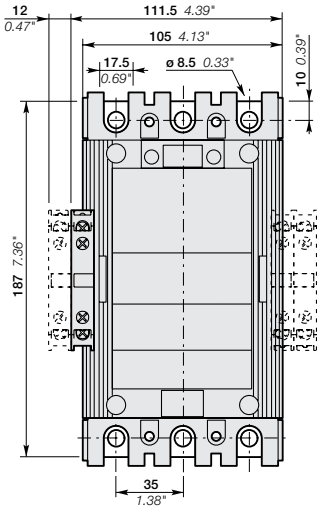




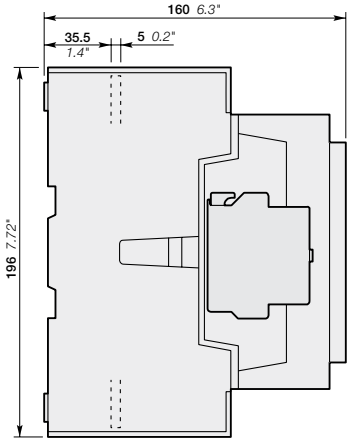
GA(F)75

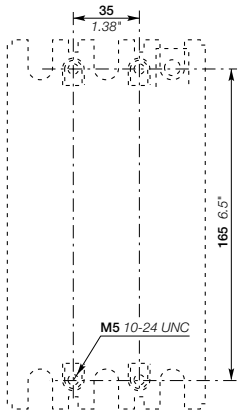
GAF185, GAF300 3-pole contactor

Main dimensions mm, inches



GAF185-30-11





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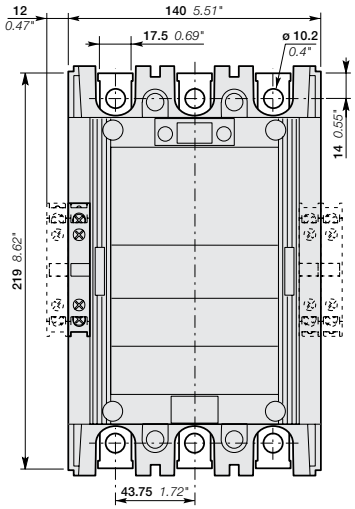
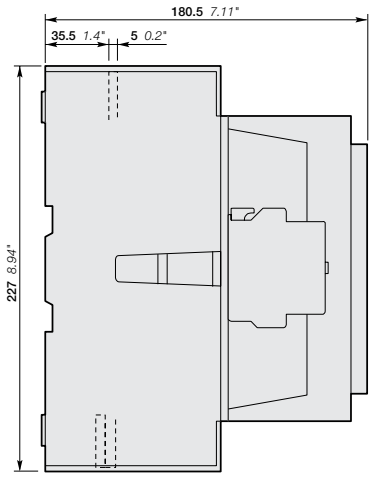
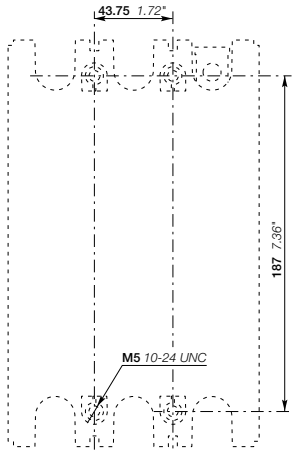


GAF300-30-11

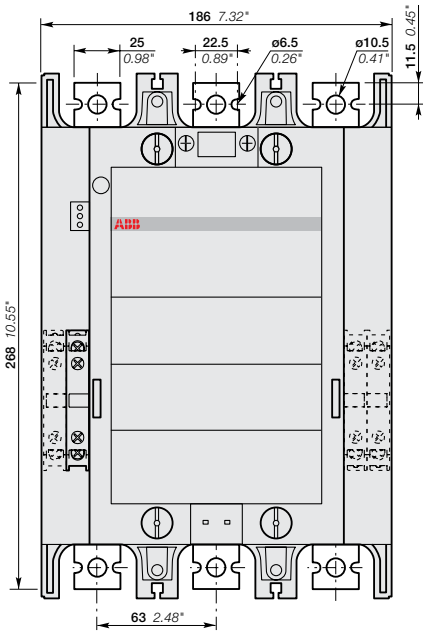


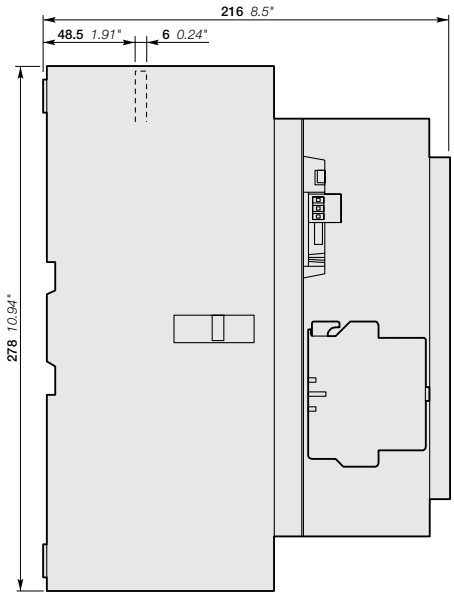


GAF300-30-11

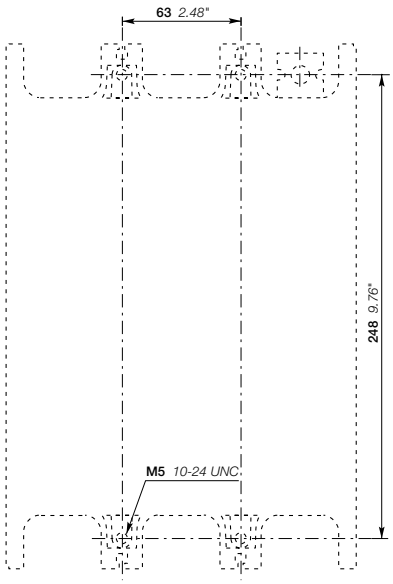
GAF460 3-pole contactor

Main dimensions mm, inches



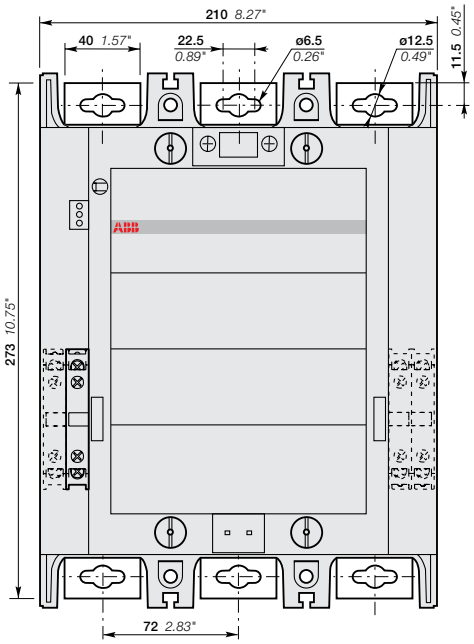


GAF460-30-11

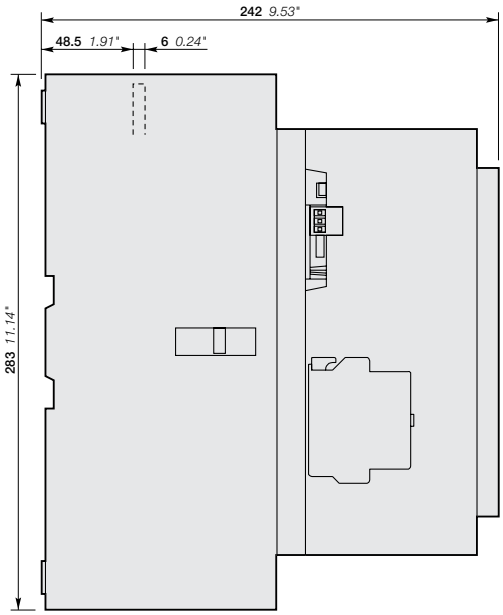


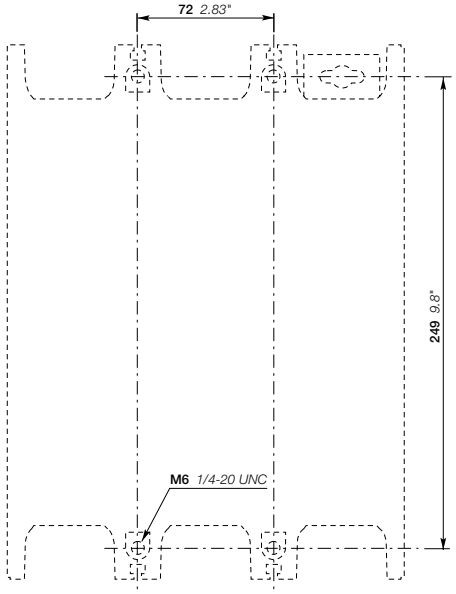
GAF750 3-pole contactor

Main dimensions mm, inches



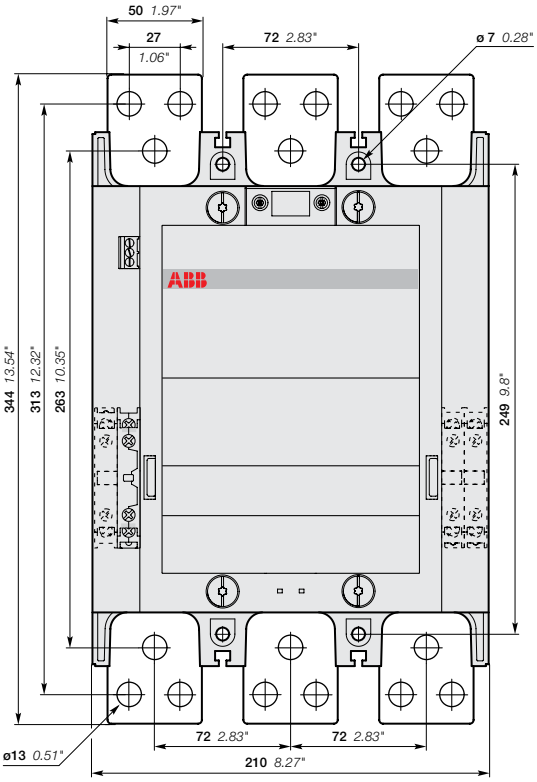
GAF750-30-11

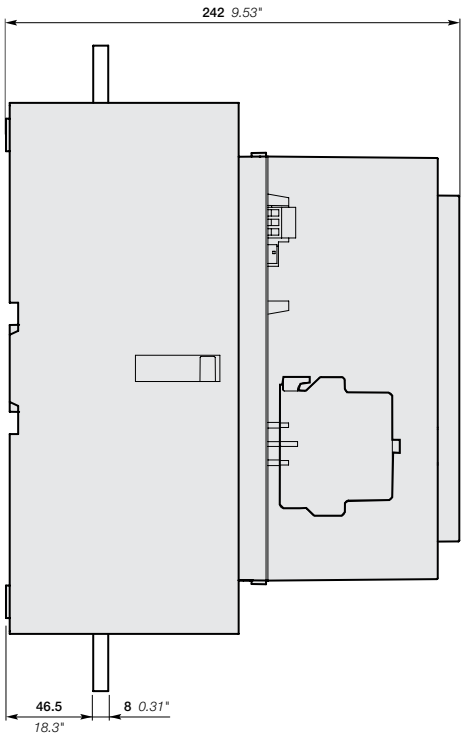




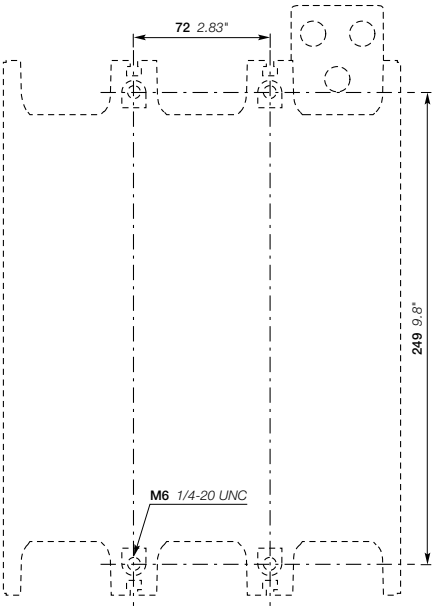
GAF1250 3-pole contactor

Main dimensions mm, inches



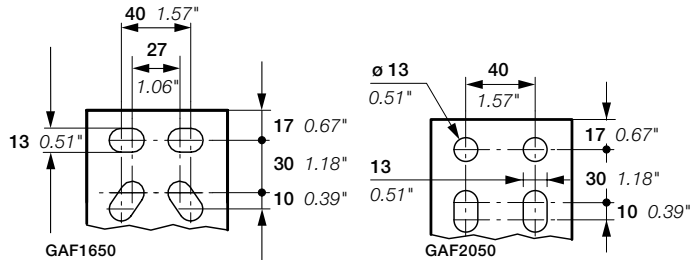


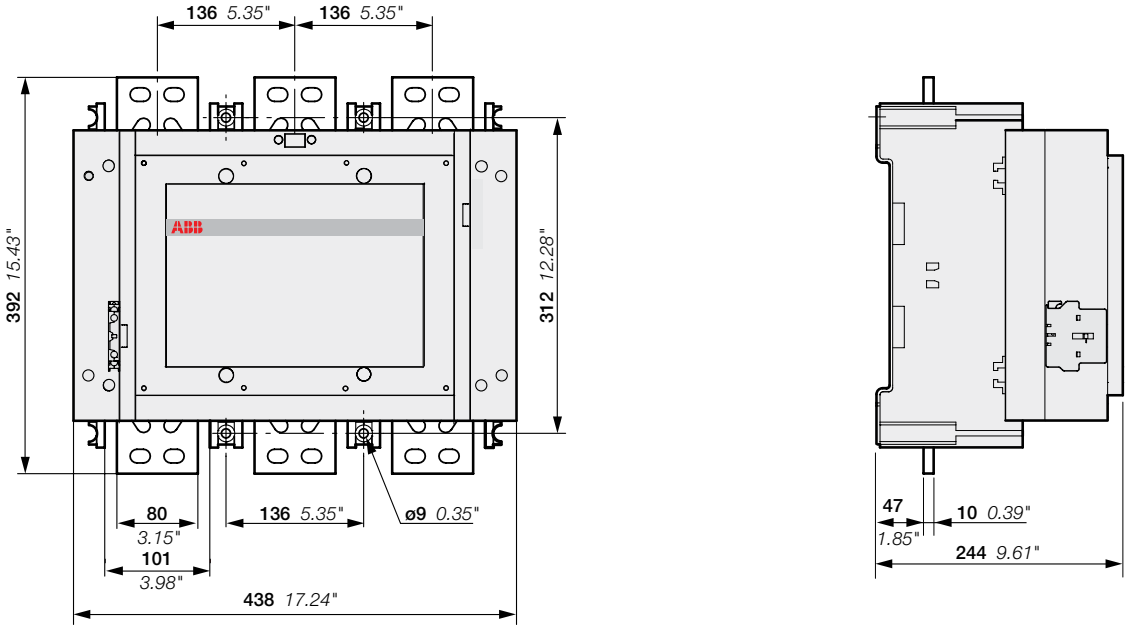
GAF1250-30-11



GAF1650, GAF2050 3-pole contactor

Main dimensions mm, inches





GAF1650, GAF2050-30-11

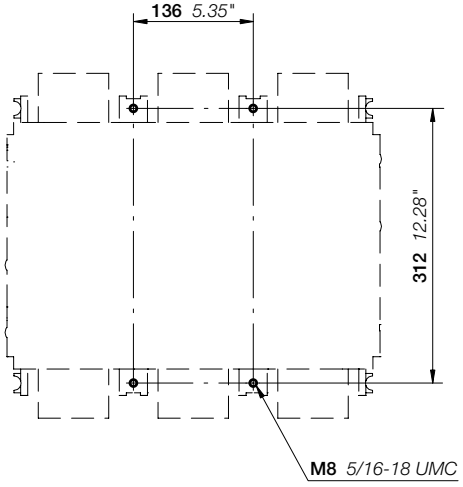



ABB
UA75-30-00RA
1L
1-
3
5
2T1
4T2


ABB
UA16-30-10

Contactors for capacitor switching

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).

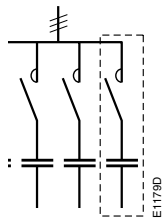
The inrush current peak, in the case of fixed correction, can reach 30 times the nominal current of the capacitor bank.

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 $\mathbf{I_n}$ 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 $\mathbf{I_T}$ of:

$$\mathbf{I_T} = 1.3 \times 1.15 \times \mathbf{I_n} = 1.5 \times \mathbf{I_n}$$

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 $\hat{\mathbf{I}}$).

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"**.

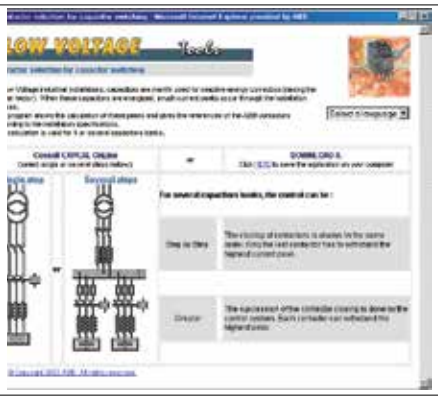
Alternatively by the **CAPCAL selection tool**, available on the ABB Website:
www.abb.com/lowvoltage

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.



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.

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

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:

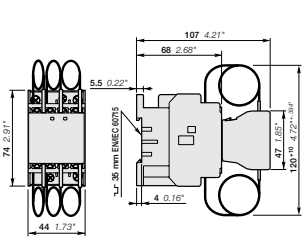
– 3 main poles and 1 built-in auxiliary contact
– the UA..RA contactors are fitted with a special front-mounted block, which ensures the serial insertion of 3 damping resistors into the circuit to limit the current peak on energization of the capacitor bank
  - their connection also ensures capacitor 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

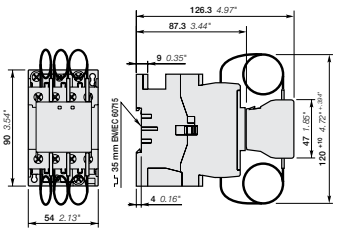
IEC	UL/CSA	Rated control circuit voltage Uc[1]		Auxiliary contacts fitted		Catalog number	Global code	Weight
Rated operational power θ ≤ 40 °C 400 V AC-6b	Rated operational power θ ≤ 40 °C 480 V							Pkg (1 pce)
kvar	kvar	V 50 Hz	V 60 Hz					kg
12.5	16	24	24	1	0	UA16-30-10-RA-81	1SBL181024R8110	0.460
		48	48	1	0	UA16-30-10-RA-83	1SBL181024R8310	0.460
		110	110…120	1	0	UA16-30-10-RA-84	1SBL181024R8410	0.460
		220…230	230…240	1	0	UA16-30-10-RA-80	1SBL181024R8010	0.460
		230…240	240…260	1	0	UA16-30-10-RA-88	1SBL181024R8810	0.460
		380…400	400…415	1	0	UA16-30-10-RA-85	1SBL181024R8510	0.460
		400…415	415…440	1	0	UA16-30-10-RA-86	1SBL181024R8610	0.460
22	22	24	24	1	0	UA26-30-10-RA-81	1SBL241024R8110	0.710
		48	48	1	0	UA26-30-10-RA-83	1SBL241024R8310	0.710
		110	110…120	1	0	UA26-30-10-RA-84	1SBL241024R8410	0.710
		220…230	230…240	1	0	UA26-30-10-RA-80	1SBL241024R8010	0.710
		230…240	240…260	1	0	UA26-30-10-RA-88	1SBL241024R8810	0.710
		380…400	400…415	1	0	UA26-30-10-RA-85	1SBL241024R8510	0.710
		400…415	415…440	1	0	UA26-30-10-RA-86	1SBL241024R8610	0.710
30	28	24	24	1	0	UA30-30-10-RA-81	1SBL281024R8110	0.810
		48	48	1	0	UA30-30-10-RA-83	1SBL281024R8310	0.810
		110	110…120	1	0	UA30-30-10-RA-84	1SBL281024R8410	0.810
		220…230	230…240	1	0	UA30-30-10-RA-80	1SBL281024R8010	0.810
		230…240	240…260	1	0	UA30-30-10-RA-88	1SBL281024R8810	0.810
		380…400	400…415	1	0	UA30-30-10-RA-85	1SBL281024R8510	0.810
		400…415	415…440	1	0	UA30-30-10-RA-86	1SBL281024R8610	0.810

[1] Other control voltages see voltage code table.

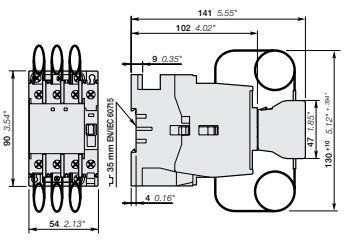
Main dimensions mm, inches



UA16..RA



UA26..RA



UA30..RA

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.

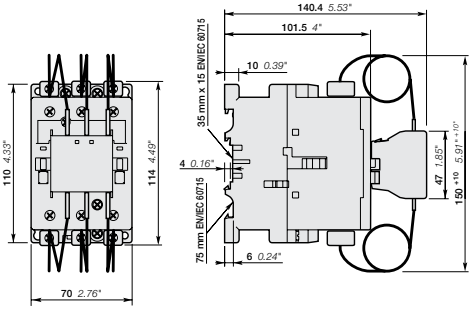
4

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		Catalog number	Global code	Weight Pkg (1 pce) kg
40	50	24	24	0	0	UA50-30-00-RA-81	1SBL351024R8100	1.350
		48	48	0	0	UA50-30-00-RA-83	1SBL351024R8300	1.350
		110	110…120	0	0	UA50-30-00-RA-84	1SBL351024R8400	1.350
		220…230	230…240	0	0	UA50-30-00-RA-80	1SBL351024R8000	1.350
		230…240	240…260	0	0	UA50-30-00-RA-88	1SBL351024R8800	1.350
		380…400	400…415	0	0	UA50-30-00-RA-85	1SBL351024R8500	1.350
		400…415	415…440	0	0	UA50-30-00-RA-86	1SBL351024R8600	1.350
50	55	24	24	0	0	UA63-30-00-RA-81	1SBL371024R8100	1.350
		48	48	0	0	UA63-30-00-RA-83	1SBL371024R8300	1.350
		110	110…120	0	0	UA63-30-00-RA-84	1SBL371024R8400	1.350
		220…230	230…240	0	0	UA63-30-00-RA-80	1SBL371024R8000	1.350
		230…240	240…260	0	0	UA63-30-00-RA-88	1SBL371024R8800	1.350
		380…400	400…415	0	0	UA63-30-00-RA-85	1SBL371024R8500	1.350
		400…415	415…440	0	0	UA63-30-00-RA-86	1SBL371024R8600	1.350
60	64	24	24	0	0	UA75-30-00-RA-81	1SBL411024R8100	1.350
		48	48	0	0	UA75-30-00-RA-83	1SBL411024R8300	1.350
		110	110…120	0	0	UA75-30-00-RA-84	1SBL411024R8400	1.350
		220…230	230…240	0	0	UA75-30-00-RA-80	1SBL411024R8000	1.350
		230…240	240…260	0	0	UA75-30-00-RA-88	1SBL411024R8800	1.350
		380…400	400…415	0	0	UA75-30-00-RA-85	1SBL411024R8500	1.350
		400…415	415…440	0	0	UA75-30-00-RA-86	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

4

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:

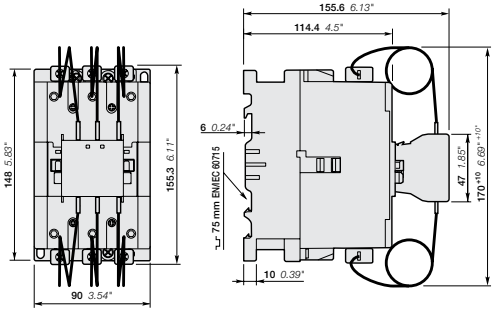
– 3 main poles
– the UA..RA contactors are fitted with a special front-mounted block, which ensures the serial insertion of 3 damping resistors into the circuit to limit the current peak on energization of the capacitor bank
  - their connection also ensures capacitor precharging in order to limit the 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		Catalog number	Global 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	UA95-30-00-RA-81	1SFL431024R8100	2.000
		48	48	0	0	UA95-30-00-RA-83	1SFL431024R8300	2.000
		110	110…120	0	0	UA95-30-00-RA-84	1SFL431024R8400	2.000
		220…230	230…240	0	0	UA95-30-00-RA-80	1SFL431024R8000	2.000
		230…240	240…260	0	0	UA95-30-00-RA-88	1SFL431024R8800	2.000
		380…400	400…415	0	0	UA95-30-00-RA-85	1SFL431024R8500	2.000
		400…415	415…440	0	0	UA95-30-00-RA-86	1SFL431024R8600	2.000
80	95	24	24	0	0	UA110-30-00-RA-81	1SFL451024R8100	2.000
		48	48	0	0	UA110-30-00-RA-83	1SFL451024R8300	2.000
		110	110…120	0	0	UA110-30-00-RA-84	1SFL451024R8400	2.000
		220…230	230…240	0	0	UA110-30-00-RA-80	1SFL451024R8000	2.000
		230…240	240…260	0	0	UA110-30-00-RA-88	1SFL451024R8800	2.000
		380…400	400…415	0	0	UA110-30-00-RA-85	1SFL451024R8500	2.000
		400…415	415…440	0	0	UA110-30-00-RA-86	1SFL451024R8600	2.000

[1] Other control voltages see voltage code table.

Main dimensions mm, inches



UA95..RA, UA100..RA

UA..RA 3-pole contactors for capacitor switching
Unlimited peak current Î

Main accessory fitting details

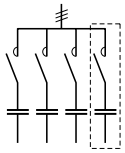
Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

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			

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							

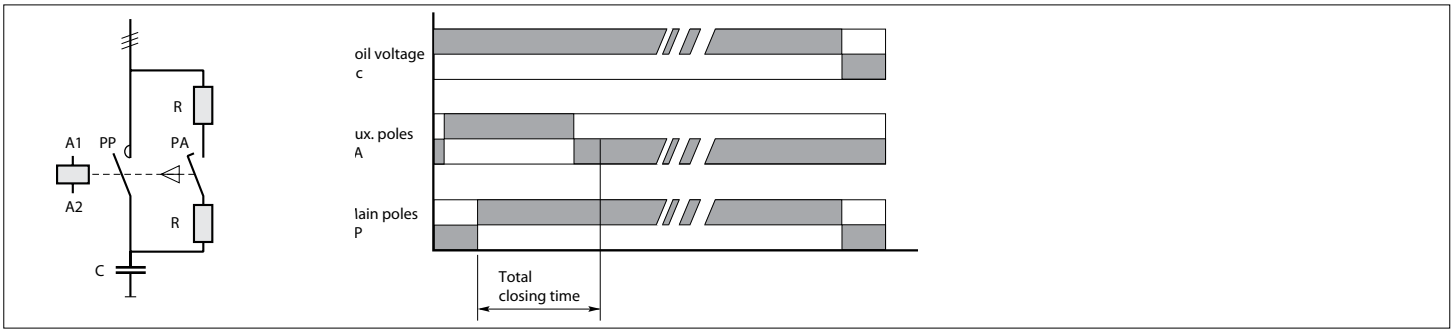
Operating principle

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.

UA16..RA … UA110..RA 3-pole contactors for capacitor switching
Unlimited peak current Î
Technical data

Connecting characteristics

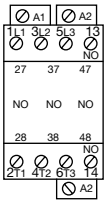
Contactor types			AC operated	UA16..RA	UA26..RA	UA30..RA	UA50..RA UA63..RA UA75..RA	UA95..RA UA110..RA
Connection capacity (min. ... max.)								
Main conductors (poles)								
Rigid	Solid (≤ 4 mm²)		**1 x**	1...4 mm²	1.5...6 mm²	2.5...16 mm²	6...50 mm²	10...95 mm²
	Stranded (≥ 6 mm²)		**2 x**	-	-	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			-	-

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

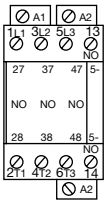
UA..RA contactors
Terminal marking and positioning

UA..RA contactors - AC operated

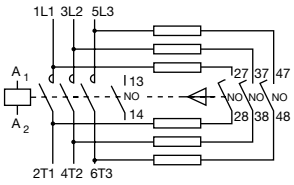
Standard devices without addition of auxiliary contacts



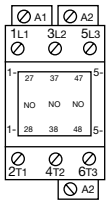
UA16-30-10 RA
UA26-30-10 RA



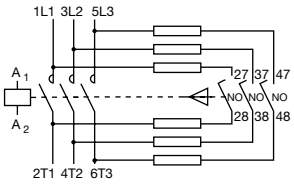
UA30-30-10 RA



UA16 ... 30-30-10 RA



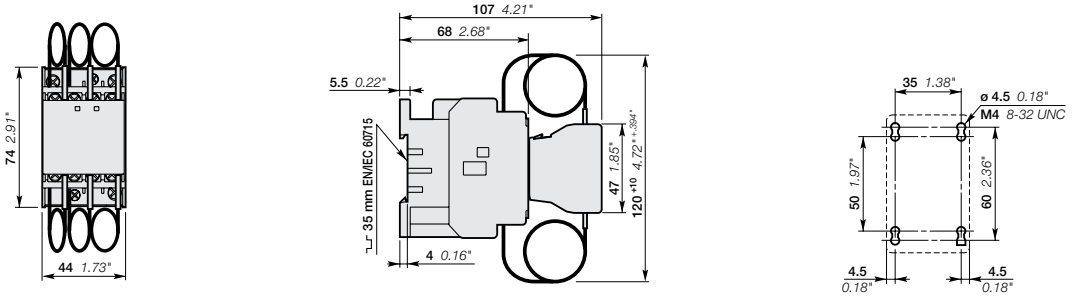
UA50 ... 110-30-00 RA



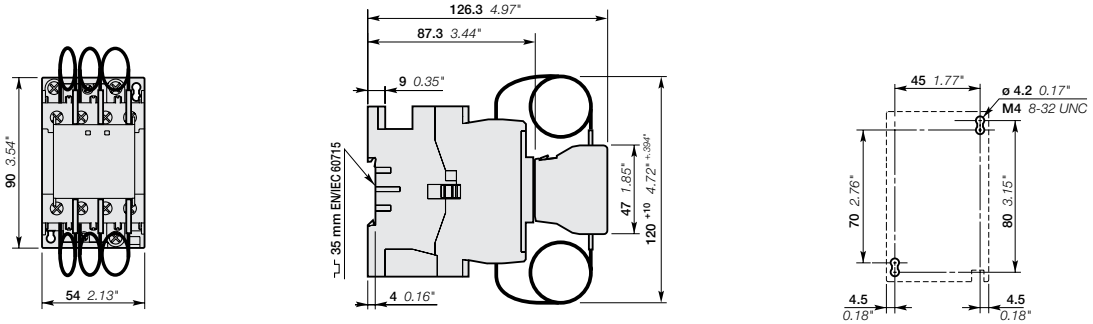
UA50 ... 110-30-00 RA

UA..RA 3-pole contactors for capacitor switching
Unlimited peak current Î

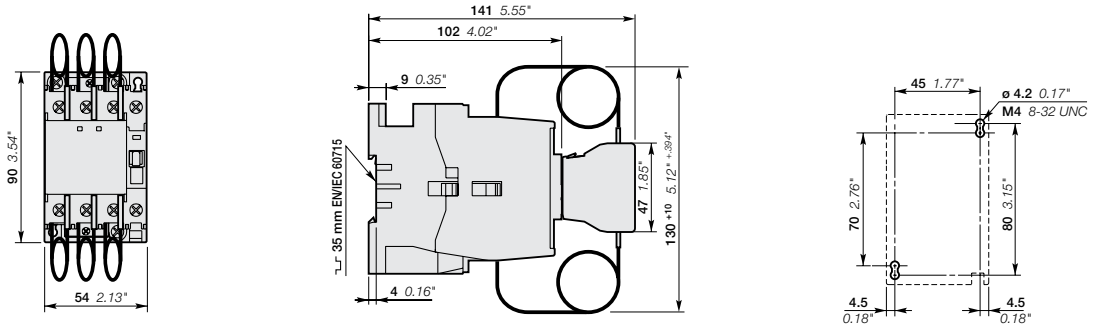
Main dimensions mm, inches



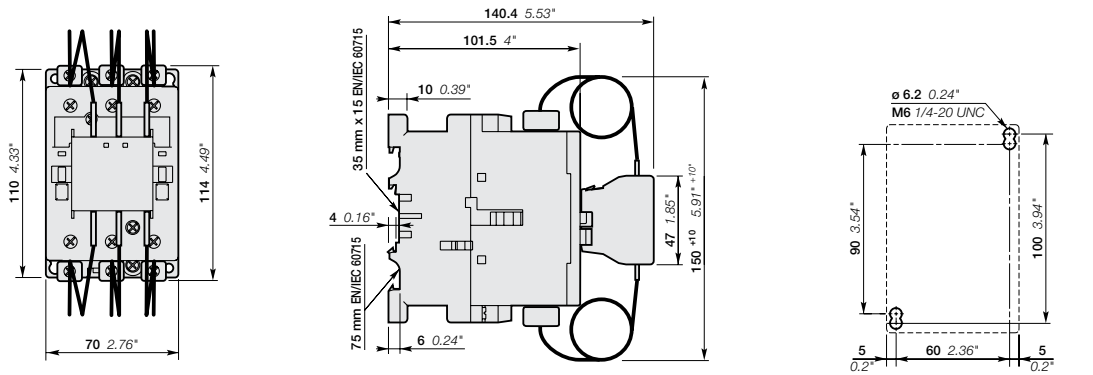
UA16..RA



UA26..RA



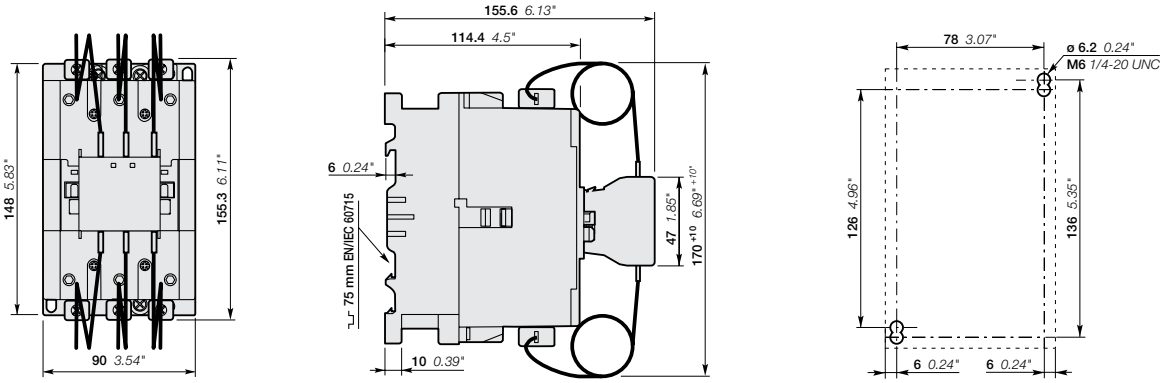
UA30..RA



UA50..RA, UA63..RA, UA75..RA

UA..RA 3-pole contactors for capacitor switching
Unlimited peak current Î

Main dimensions mm, inches



UA95..RA, UA110..RA

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:

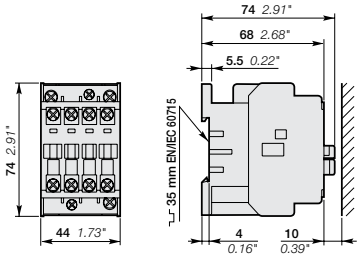
– 3 main poles and 1 built-in auxiliary contact
– control circuit: AC operated
– add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

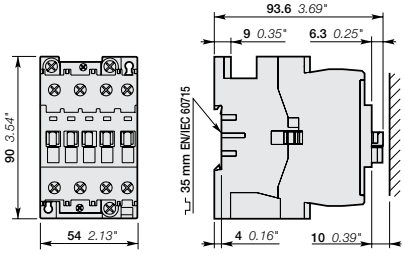
IEC Rated operational power θ ≤ 40 °C 400 V AC-6b kvar	Max peak current Î kA	UL/CSA Rated operational power θ ≤ 40 °C 480 V kvar	Rated control circuit voltage Uc[1] V 50 Hz	V 60 Hz	Auxiliary contacts fitted		Catalog number	Global code	Weight Pkg (1 pce) kg
12.5	1.8	-	24	24	1	0	UA16-30-10-81	1SBL181022R8110	0.340
			48	48	1	0	UA16-30-10-83	1SBL181022R8310	0.340
			110	110...120	1	0	UA16-30-10-84	1SBL181022R8410	0.340
			220...230	230...240	1	0	UA16-30-10-80	1SBL181022R8010	0.340
			230...240	240...260	1	0	UA16-30-10-88	1SBL181022R8810	0.340
			380...400	400...415	1	0	UA16-30-10-85	1SBL181022R8510	0.340
			400...415	415...440	1	0	UA16-30-10-86	1SBL181022R8610	0.340
20	3	25	24	24	1	0	UA26-30-10-81	1SBL241022R8110	0.600
			48	48	1	0	UA26-30-10-83	1SBL241022R8310	0.600
			110	110...120	1	0	UA26-30-10-84	1SBL241022R8410	0.600
			220...230	230...240	1	0	UA26-30-10-80	1SBL241022R8010	0.600
			230...240	240...260	1	0	UA26-30-10-88	1SBL241022R8810	0.600
			380...400	400...415	1	0	UA26-30-10-85	1SBL241022R8510	0.600
			400...415	415...440	1	0	UA26-30-10-86	1SBL241022R8610	0.600
27.5	3.5	32	24	24	1	0	UA30-30-10-81	1SBL281022R8110	0.710
			48	48	1	0	UA30-30-10-83	1SBL281022R8310	0.710
			110	110...120	1	0	UA30-30-10-84	1SBL281022R8410	0.710
			220...230	230...240	1	0	UA30-30-10-80	1SBL281022R8010	0.710
			230...240	240...260	1	0	UA30-30-10-88	1SBL281022R8810	0.710
			380...400	400...415	1	0	UA30-30-10-85	1SBL281022R8510	0.710
			400...415	415...440	1	0	UA30-30-10-86	1SBL281022R8610	0.710

[1] Other control voltages see voltage code table.

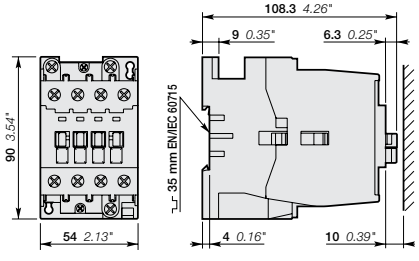
Main dimensions mm, inches



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

4

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:

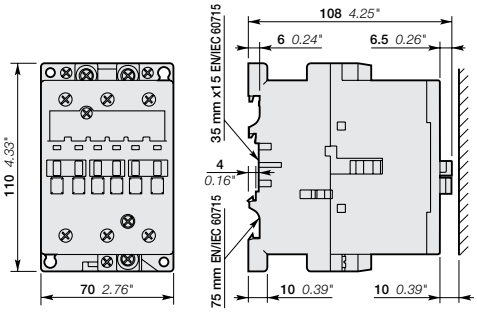
– 3 main poles
– control circuit: AC operated
– add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

IEC		UL/CSA	Rated control circuit voltage Uc[1]		Auxiliary contacts fitted		Catalog number	Global 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	UA50-30-00-81	1SBL351022R8100	1.160
			48	48	0	0	UA50-30-00-83	1SBL351022R8300	1.160
			110	110…120	0	0	UA50-30-00-84	1SBL351022R8400	1.160
			220…230	230…240	0	0	UA50-30-00-80	1SBL351022R8000	1.160
			230…240	240…260	0	0	UA50-30-00-88	1SBL351022R8800	1.160
			380…400	400…415	0	0	UA50-30-00-85	1SBL351022R8500	1.160
			400…415	415…440	0	0	UA50-30-00-86	1SBL351022R8600	1.160
45	6.5	-	24	24	0	0	UA63-30-00-81	1SBL371022R8100	1.160
			48	48	0	0	UA63-30-00-83	1SBL371022R8300	1.160
			110	110…120	0	0	UA63-30-00-84	1SBL371022R8400	1.160
			220…230	230…240	0	0	UA63-30-00-80	1SBL371022R8000	1.160
			230…240	240…260	0	0	UA63-30-00-88	1SBL371022R8800	1.160
			380…400	400…415	0	0	UA63-30-00-85	1SBL371022R8500	1.160
			400…415	415…440	0	0	UA63-30-00-86	1SBL371022R8600	1.160
50	7.5	55	24	24	0	0	UA75-30-00-81	1SBL411022R8100	1.160
			48	48	0	0	UA75-30-00-83	1SBL411022R8300	1.160
			110	110…120	0	0	UA75-30-00-84	1SBL411022R8400	1.160
			220…230	230…240	0	0	UA75-30-00-80	1SBL411022R8000	1.160
			230…240	240…260	0	0	UA75-30-00-88	1SBL411022R8800	1.160
			380…400	400…415	0	0	UA75-30-00-85	1SBL411022R8500	1.160
			400…415	415…440	0	0	UA75-30-00-86	1SBL411022R8600	1.160

[1] Other control voltages see voltage code table.

Main dimensions mm, inches



UA50, UA63, UA75

UA50 … UA75 3-pole contactors for capacitor switching
33 to 50 kvar - Peak current Î < 100 Times the rms current
AC operated - with 1 N.O. + 1 N.C. auxiliary contacts

UA50-30-11

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:

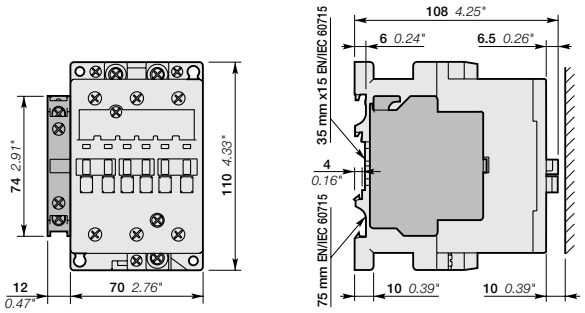
– 3 main poles
– control circuit: AC operated
– add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

IEC		UL/CSA	Rated control circuit voltage Uc[1]		Auxiliary contacts fitted		Catalog number	Global code	Weight
Rated operational power θ ≤ 40 °C 400 V AC-6b	Max peak current Î	Rated operational power θ ≤ 40 °C 400 V							Pkg (1 pce)
kvar	kA	kvar	V 50 Hz	V 60 Hz					kg
33	5	40	24	24	1	1	UA50-30-11-81	1SBL351022R8111	1.200
			48	48	1	1	UA50-30-11-83	1SBL351022R8311	1.200
			110	110…120	1	1	UA50-30-11-84	1SBL351022R8411	1.200
			220…230	230…240	1	1	UA50-30-11-80	1SBL351022R8011	1.200
			230…240	240…260	1	1	UA50-30-11-88	1SBL351022R8811	1.200
			380…400	400…415	1	1	UA50-30-11-85	1SBL351022R8511	1.200
			400…415	415…440	1	1	UA50-30-11-86	1SBL351022R8611	1.200
45	6.5	-	24	24	1	1	UA63-30-11-81	1SBL371022R8111	1.200
			48	48	1	1	UA63-30-11-83	1SBL371022R8311	1.200
			110	110…120	1	1	UA63-30-11-84	1SBL371022R8411	1.200
			220…230	230…240	1	1	UA63-30-11-80	1SBL371022R8011	1.200
			230…240	240…260	1	1	UA63-30-11-88	1SBL371022R8811	1.200
			380…400	400…415	1	1	UA63-30-11-85	1SBL371022R8511	1.200
			400…415	415…440	1	1	UA63-30-11-86	1SBL371022R8611	1.200
50	7.5	55	24	24	1	1	UA75-30-11-81	1SBL411022R8111	1.200
			48	48	1	1	UA75-30-11-83	1SBL411022R8311	1.200
			110	110…120	1	1	UA75-30-11-84	1SBL411022R8411	1.200
			220…230	230…240	1	1	UA75-30-11-80	1SBL411022R8011	1.200
			230…240	240…260	1	1	UA75-30-11-88	1SBL411022R8811	1.200
			380…400	400…415	1	1	UA75-30-11-85	1SBL411022R8511	1.200
			400…415	415…440	1	1	UA75-30-11-86	1SBL411022R8611	1.200

[1] Other control voltages see voltage code table.

Main dimensions mm, inches



UA50, UA63, UA75 with 1 N.O. + 1 N.C. auxiliary contacts

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.

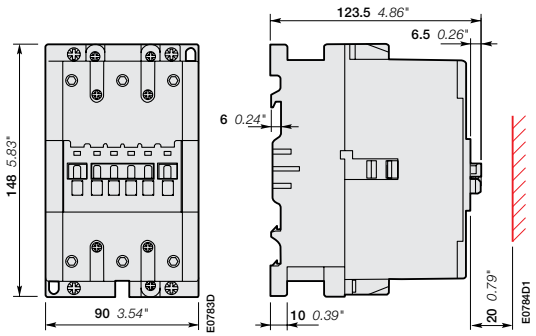
These contactors are of the block type design with:
- 3 main poles
- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

IEC		UL/CSA	Rated control circuit voltage Uc[1]		Auxiliary contacts fitted		Catalog number	Global 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	UA95-30-00-81	1SFL431022R8100	2.000
			48	48	0	0	UA95-30-00-83	1SFL431022R8300	2.000
			110	110...120	0	0	UA95-30-00-84	1SFL431022R8400	2.000
			220...230	230...240	0	0	UA95-30-00-80	1SFL431022R8000	2.000
			230...240	240...260	0	0	UA95-30-00-88	1SFL431022R8800	2.000
			380...400	400...415	0	0	UA95-30-00-85	1SFL431022R8500	2.000
			400...415	415...440	0	0	UA95-30-00-86	1SFL431022R8600	2.000
75	10.5	80	24	24	0	0	UA110-30-00-81	1SFL451022R8100	2.000
			48	48	0	0	UA110-30-00-83	1SFL451022R8300	2.000
			110	110...120	0	0	UA110-30-00-84	1SFL451022R8400	2.000
			220...230	230...240	0	0	UA110-30-00-80	1SFL451022R8000	2.000
			230...240	240...260	0	0	UA110-30-00-87	1SFL451022R8800	2.000
			380...400	400...415	0	0	UA110-30-00-85	1SFL451022R8500	2.000
			400...415	415...440	0	0	UA110-30-00-86	1SFL451022R8600	2.000

[1] Other control voltages see voltage code table.

Main dimensions mm, inches



UA95, UA110

UA95 ... UA110 3-pole contactors for capacitor switching
65 to 75 kvar - Peak current Î < 100 times the rms current
AC operated with 1 N.O. + 1 N.C. auxiliary contacts

UA110-30-11

Description

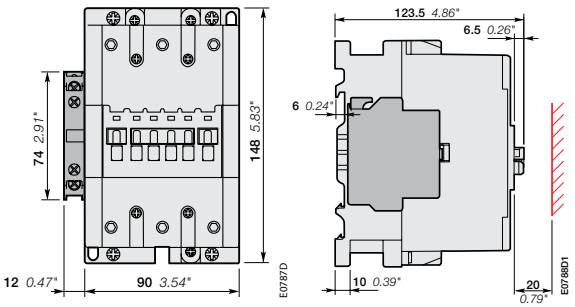
UA contactors can be used for the switching of capacitor banks whose inrush current peaks are less or equal to 100 times nominal rms current.
The capacitors must be discharges (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making.
These contactors are 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		Catalog number	Global code	Weight
Rated operational power AC-6b θ ≤ 40 °C 400 V	Max peak current Î	Rated operational power 40 °C 400 V							Pkg (1 pce)
kvar	kA	kvar	V 50 Hz	V 60 Hz					kg
65	9.3	70	24	24	1	1	UA95-30-11-81	1SFL431022R8111	2.040
			48	48	1	1	UA95-30-11-83	1SFL431022R8311	2.040
			110	110...120	1	1	UA95-30-11-84	1SFL431022R8411	2.040
			220...230	230...240	1	1	UA95-30-11-80	1SFL431022R8011	2.040
			230...240	240...260	1	1	UA95-30-11-88	1SFL431022R8811	2.040
			380...400	400...415	1	1	UA95-30-11-85	1SFL431022R8511	2.040
			400...415	415...440	1	1	UA95-30-11-86	1SFL431022R8611	2.040
75	10.5	80	24	24	1	1	UA110-30-11-81	1SFL451022R8111	2.040
			48	48	1	1	UA110-30-11-83	1SFL451022R8311	2.040
			110	110...120	1	1	UA110-30-11-84	1SFL451022R8411	2.040
			220...230	230...240	1	1	UA110-30-11-80	1SFL451022R8011	2.040
			230...240	240...260	1	1	UA110-30-11-88	1SFL451022R8811	2.040
			380...400	400...415	1	1	UA110-30-11-85	1SFL451022R8511	2.040
			400...415	415...440	1	1	UA110-30-11-86	1SFL451022R8611	2.040

[1] Other control voltages see voltage code table.

Main dimensions mm, inches



UA95, UA110

UA... 3-pole contactors for capacitor switching
Peak current Î ≤ 100 times the rms current

Main accessory fitting details

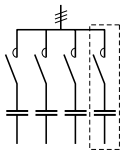
Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

Contactor types	Main poles		Available auxiliary contacts		Front-mounted accessories Auxiliary contact blocks						Pneumatic timer		Side-mounted accessories Auxiliary contact blocks
					1-pole CA5-..		4-pole CA5-..				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	3	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
UA63-30-00	3	0	0	0									
UA75-30-00	3	0	0	0									
UA95-30-00	3	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
UA110-30-00	3	0	0	0									

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").

UA16 ... UA110 3-pole contactors for capacitor switching
Peak current Î ≤ 100 times the rms current
Technical data

Connecting characteristics

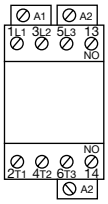
Contactor types			AC operated	UA16	UA26	UA30	UA50 UA63 UA75	UA95 UA110
Connection capacity (min. ... max.)								
Main conductors (poles)								
Rigid	Solid (≤ 4 mm²)		**1 x**	1...4 mm²	1.5...6 mm²	2.5...16 mm²	6...50 mm²	10...95 mm²
	Stranded (≥ 6 mm²)		**2 x**	1...4 mm²	1.5...6 mm²	2.5...16 mm²	6...25 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			-	-

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

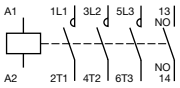
UA... contactors
Terminal marking and positioning

UA... contactors - AC operated

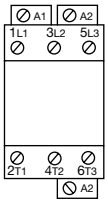
Standard devices without addition of auxiliary contacts



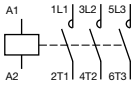
UA16 ... UA30-30-10



UA16 ... UA30-30-10

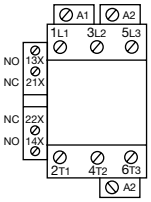


UA50 ... UA110-30-00

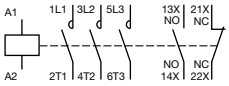


UA50 ... UA110-30-00

Standard devices with factory mounted auxiliary contacts



UA50 ... UA110-30-11

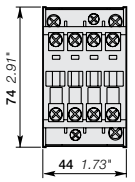


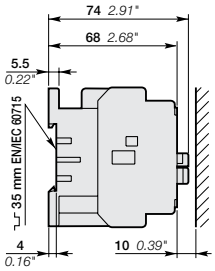
UA50 ... UA110-30-11

4

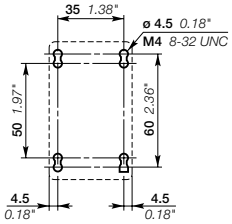
UA.. 3-pole contactors for capacitor switching

Main dimensions mm, inches

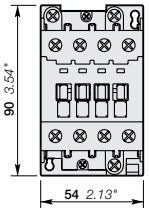


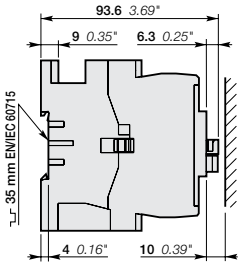


UA16

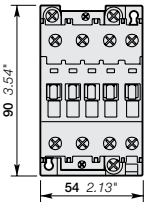


UA16 drilling plan

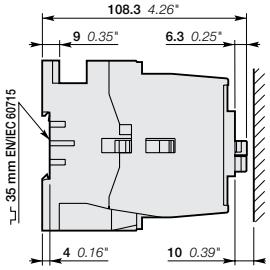


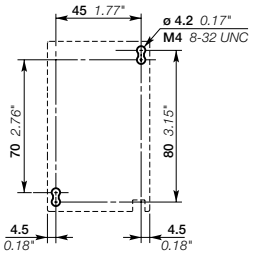


UA26

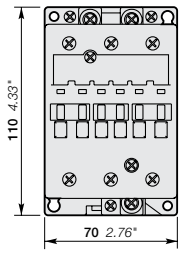


UA30

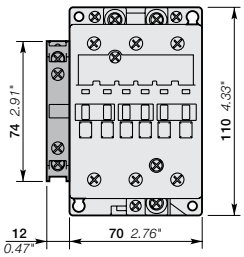




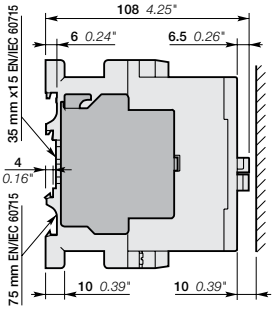
UA26, UA30 drilling plan

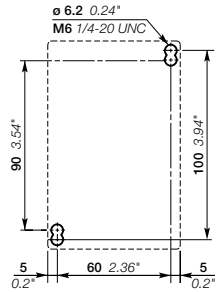


UA50, UA63, UA75-30-00

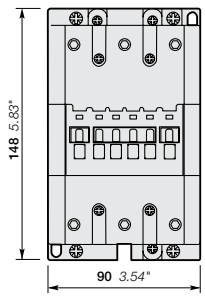


UA50, UA63, UA75-30-11

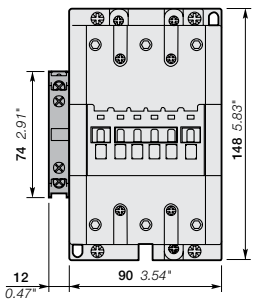




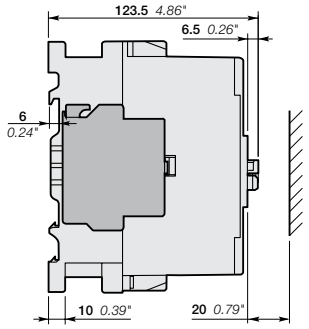
Drilling plan

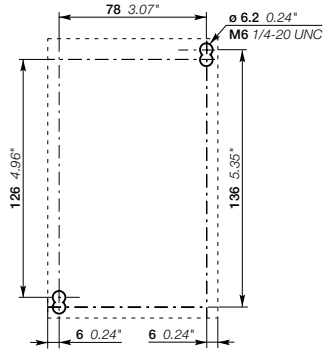


UA95, UA110-30-00



UA95, UA110-30-11





Drilling plan

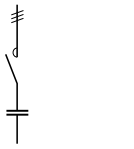
AF 3-pole contactors for capacitor switching
Single step - Peak current Î ≤ 30 times the rms curent

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

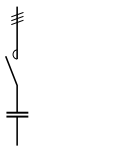
Contactor types			AF116	AF140	AF146	AF190	AF205	AF265	AF305	AF370
AC-6b Utilization category										
For air temperature close to contactor										
Rated operational power AC-6b										
	θ ≤ 40 °C	**230-240 V**	40 kvar	45 kvar	50 kvar	60 kvar	75 kvar	85 kvar	100 kvar	110 kvar
		400-415 V	75 kvar	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

Other contactor application data

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

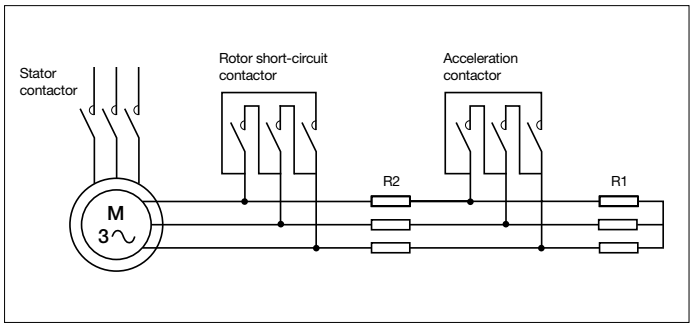
The duty of this contactor is characterized by small closing stresses. The decisive factor is the thermal stress. Delta connection of the contactor is considered (reduce currents by 35 % if star connection is used).
The following table gives the permissible values of the rated operational rotor current, 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)	

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

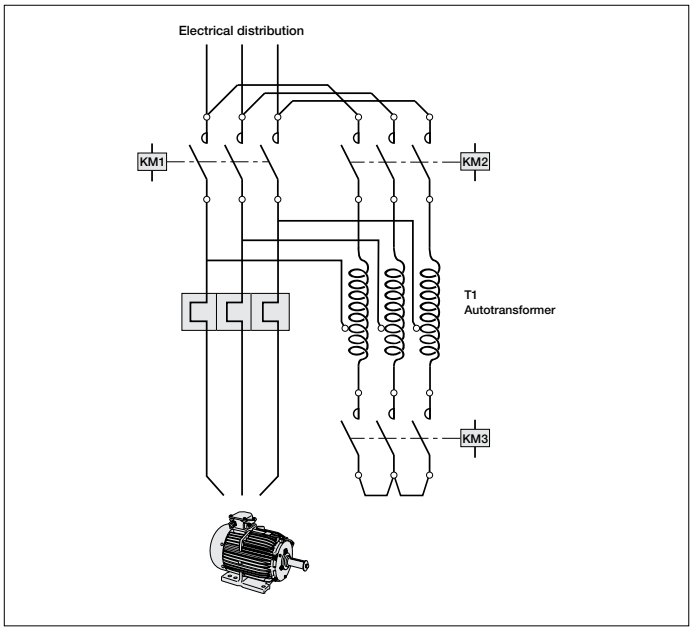
Contactors		AF116	AF140	AF190	AF205	AF265	AF305	AF370	AF400	AF460	AF580	AF750	AF1350	AF1650
Rated operational current Ie / AC-1 for air temperature near the contactor ≤ 60 °C (AF116-AF370) ≤ 55 °C (AF400-AF1650)	**A**	145	175	250	300	350	400	500	500	600	700	800	1150	1450

Contactor types				AF116	AF140	AF190	AF205	AF265	AF305	AF370	AF400	AF460	AF580	AF750	AF1350	AF1650
Load factor	**15 %**	Ie / AC-2	**A**	330	540	580	750	830	950	1050	1200	1400	1650	1900	2400	2800
	25 %	Ie / AC-2	**A**	300	490	530	650	725	830	915	1050	1250	1450	1650	2100	2500
	40 %	Ie / AC-2	**A**	260	425	460	575	630	720	800	950	1100	1300	1450	1850	2200
	60 %	Ie / AC-2	**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)												

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.



Selection Table (Id starting current / In nominal current < 8 - Acceleration time ≤ 20s - 30 cycles / h max.)

kW motor ratings 50/60 Hz					Contactors KM1 line	KM2 autotransformer taps:				KM3 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

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 $\hat{I}$peak	**A**	350	400	500	800	1000	1200	1250	1550	1750	1900	2100

AC / DC operated contactors		AF116	AF140	AF190	AF205	AF265	AF370	AF400	AF460	AF580	AF750	AF1250	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 $\hat{I}$peak	**A**	2100	2400	3300	3500	4300	4900	6000	7700	8400	9300	12000	–	–

Notes

Lighting circuit switching
Contactor selection

AF09-40-00

AF80-40-00

General

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

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

Lighting circuits

In a given circuit, the number and power rating of lamps are defined and cannot result in overload. Only short-circuit protection has to be provided. J fuses or modular circuit-breakers will be chosen for this purpose. The lamps have very specific technical data, according to their construction type.

– Incandescent lamps have a very high current on closing: more than 15 times nominal current They do not introduce a large phase displacement between current and voltage.
– Fluorescent tubes are equipped with a ballast whose purpose is two-fold: contribute to ignition and limit current to nominal value once steady state is reached. This ballast is a reactor that considerably lowers the power factor. It may or may not be compensated.

Selection Tables - Lighting Contactors

Amp rating	Number of poles	Electrically held	Mechanically held[1)]
20	4	AF09-40-00- ☐☐	AF09L-40-00- ☐☐
20	8	AF09-80-00- ☐☐	AF09L-80-00- ☐☐
20	12	AF09-120-00- ☐☐	AF09L-120-00- ☐☐
30	4	AF16-40-00- ☐☐	AF16L-40-00- ☐☐
30	8	AF16-80-00- ☐☐	AF16L-80-00- ☐☐
30	12	AF16-120-00- ☐☐	AF16L-120-00- ☐☐
45	4	AF26-40-00- ☐☐	AF26L-40-00- ☐☐
45	8	AF26-80-00- ☐☐	AF26L-80-00- ☐☐
45	12	AF26-120-00- ☐☐	AF26L-120-00- ☐☐
50	4	AF38-40-00- ☐☐	AF38L-40-00- ☐☐
65	3	AF40-30-00- ☐☐	AF40L-30-00- ☐☐
80	3	AF52-30-00- ☐☐	AF52L-30-00- ☐☐
90	3	AF65-30-00- ☐☐	AF65L-30-00- ☐☐
105	3	AF80-30-00- ☐☐	AF80L-30-00- ☐☐
115	3	AF96-30-00- ☐☐	AF96L-30-00- ☐☐
160	3	AF116-30-11- ☐☐	
200	3	AF140-30-11- ☐☐	
250	3	AF190-30-11- ☐☐	
300	3	AF205-30-11- ☐☐	
400	3	AF265-30-11- ☐☐	

[1)] See accesories section for mechanical latch technical data.

Coil voltages and codes

Voltage (V) 50/60Hz	Voltage Code : ☐ ☐
24 ... 60	11
48 ... 130	12
100 ... 250	13
250 ... 500	14

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

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

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

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

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

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

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

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

Parallel connection of main poles

General

Purpose: Increasing the AC resistive load by wiring connection of main poles in parallel.

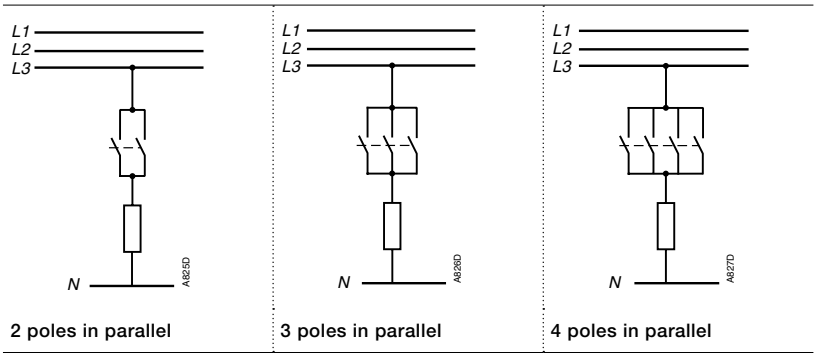
Remarks:

– 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

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

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

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 %.

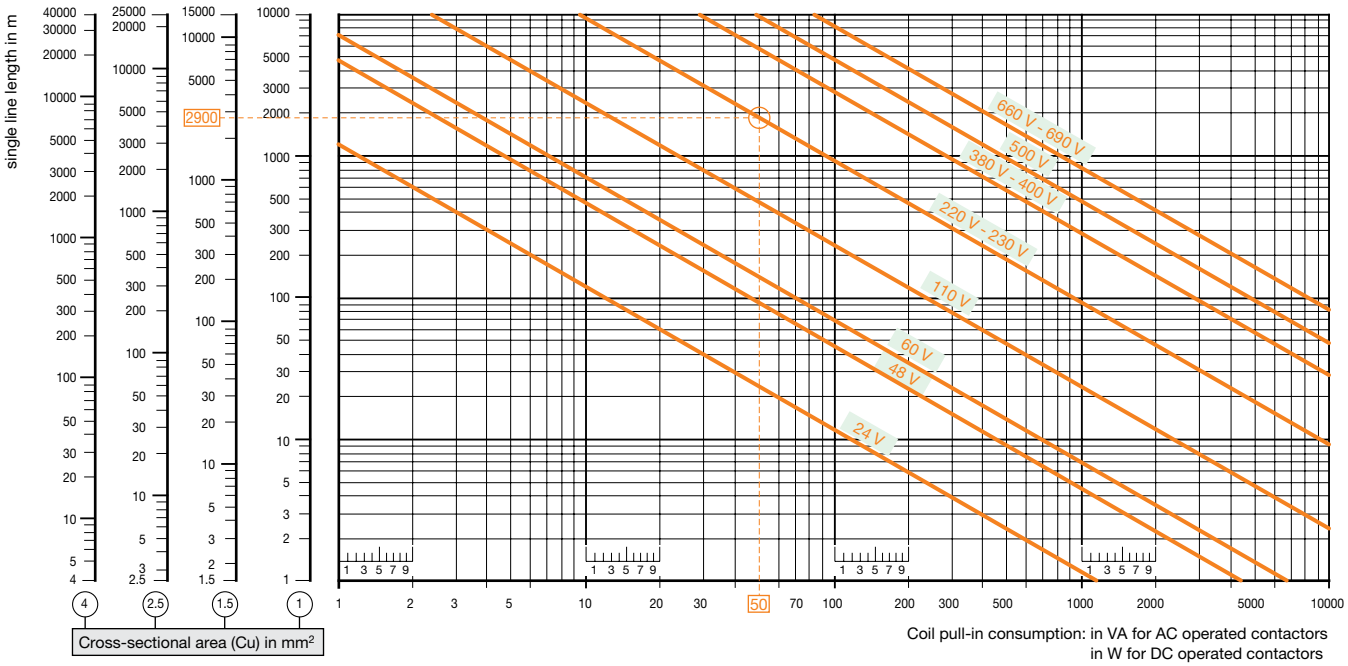
Coil pull-in consumption (average value)

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:

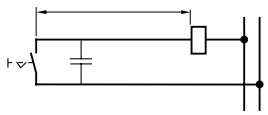
Depending on the coil pull-in power consumption on the supply voltage and on the control circuit conductor cross-sectional area.



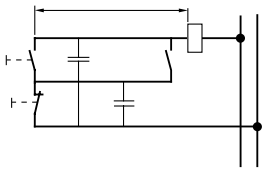
Example **AF09 contactor**: Coil voltage: 230 V 50 Hz, contactor coil pull-in power consumption: 50 VA, control circuit conductor cross-sectional area: Cu 1.5 mm². Max. permissible length: 2900 m.

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.

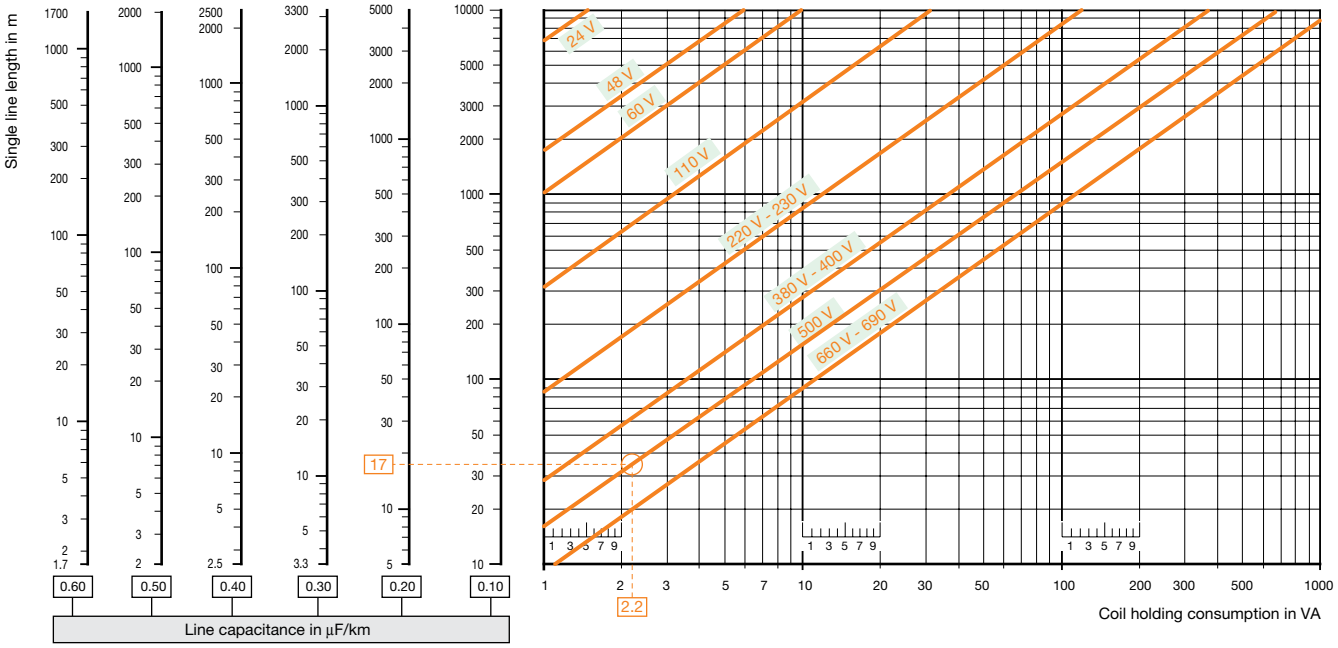
Coil holding consumption (average value)

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.

NF 4-pole and 8-pole contactor relays

NF 4-pole contactor relays
AC / DC operated

NF22E

4

Description

NF contactor relays are used for switching auxiliary and control circuits.

These contactor relays are of the block type design with:

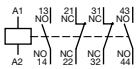
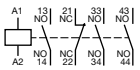
– 4 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)

– 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

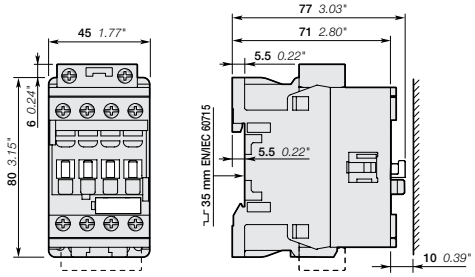
– add-on auxiliary contact blocks for front or side mounting and a wide range of accessories

Ordering details

Number of contacts	Rated control circuit voltage Uc min. ... Uc max.		Catalog number	Weight Pkg (1 pce)
	V 50/60 Hz	V DC		kg
	24...60		NF22E-41	0.27
	24...60	20...60[1]	NF22E-11	0.27
	48...130	48...130	NF22E-12	0.27
	100...250	100...250	NF22E-13	0.27
	250...500	250...500	NF22E-14	0.31
	24...60		NF31E-41	0.27
	24...60	20...60[1]	NF31E-11	0.27
	48...130	48...130	NF31E-12	0.27
	100...250	100...250	NF31E-13	0.27
	250...500	250...500	NF31E-14	0.31
	24...60		NF40E-41	0.27
	24...60	20...60[1]	NF40E-11	0.27
	48...130	48...130	NF40E-12	0.27
	100...250	100...250	NF40E-13	0.27
	250...500	250...500	NF40E-14	0.31

[1] NF..E-11 May not suitable for all PLC application. Refer to manufacturing specifications.

Main dimensions *mm, inches*



NF22E, NF31E, NF40E

NFZ 4-pole contactor relays
AC / DC operated - low consumption

NFZ22E

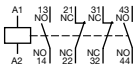
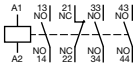
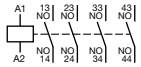
Description

NFZ contactor relays are used for switching auxiliary and control circuits.

These contactor relays are of the block type design with:

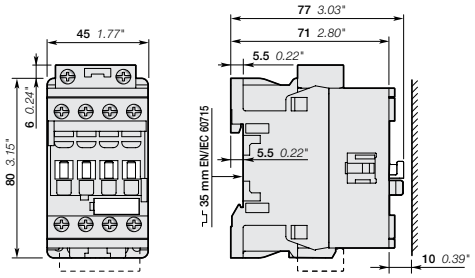
– 4 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
  - can manage large control voltage variations
  - only 4 control 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.		Catalog number	Weight Pkg (1 pce)
	V 50/60 Hz	V DC		kg
	–	12...20	NFZ22E-20	0.31
	24...60	20...60	NFZ22E-21	0.31
	48...130	48...130	NFZ22E-22	0.31
	100...250	100...250	NFZ22E-23	0.31
	–	12...20	NFZ31E-20	0.31
	24...60	20...60	NFZ31E-21	0.31
	48...130	48...130	NFZ31E-22	0.31
	100...250	100...250	NFZ31E-23	0.31
	–	12...20	NFZ40E-20	0.31
	24...60	20...60	NFZ40E-21	0.31
	48...130	48...130	NFZ40E-22	0.31
	100...250	100...250	NFZ40E-23	0.31

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.

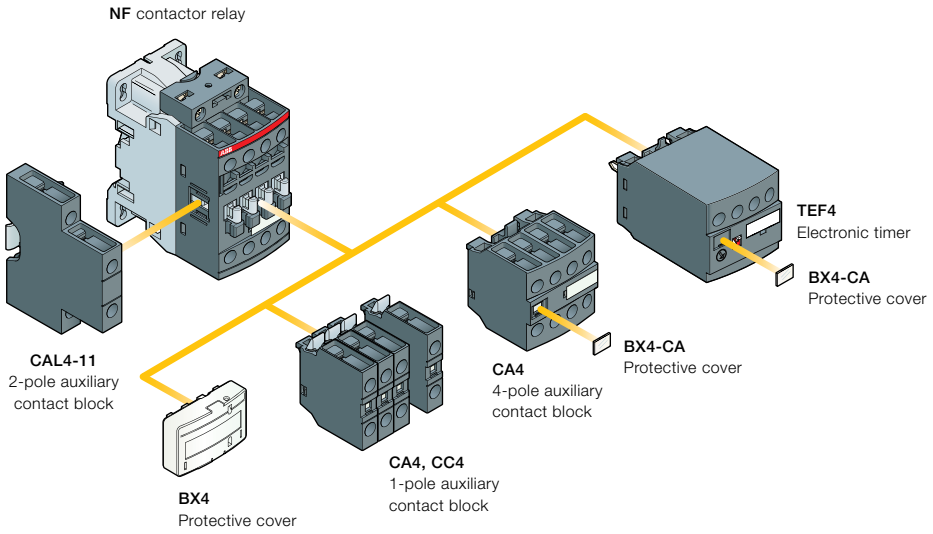
Main dimensions *mm, inches*



NFZ22E, NFZ31E, NFZ40E

NF 4-pole contactor relays
Main accessories

Contactor relays and main accessories (other accessories available)



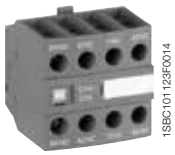
Main accessory fitting details

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

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		Catalog number	Pkg qty	Weight (1 pce) kg
Front-mounted instantaneous auxiliary contact blocks					
4-pole NF	1 0	– –	CA4-10	1	0.02
	0 1	– –	CA4-01	1	0.02
	4 0	– –	CA4-40N	1	0.06
	3 1	– –	CA4-31N	1	0.06
	2 2	– –	CA4-22N	1	0.06
	1 3	– –	CA4-13N	1	0.06
NF..40E	0 4	– –	CA4-04N	1	0.06
Front-mounted auxiliary contact blocks with N.O. leading contact and N.C. lagging contact					
4-pole NF	– –	1 0	CC4-10	1	0.02
	– –	0 1	CC4-01	1	0.02
Side-mounted instantaneous auxiliary contact blocks					
NF	1 1	– –	CAL4-11	1	0.04

For contactors	Time delay range selected by switch	Delay type	Auxiliary contacts	Catalog number	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	1	0.07
		OFF-delay	1 1	TEF4-OFF	1	0.07

Note: Rated control circuit voltage Uc 24...240 V 50/60 Hz or DC.

Additional coil terminal block			
NF	LDC4	10	0.01
Protective covers			
All 1-stack contactor relays	BX4	10	0.01
4-pole CA4 auxiliary contact blocks and TEF4 electronic timer	BX4-CA	50	0.01

[1)] For more information, refer to "Accessories" section.

NF 8-pole contactor relays
AC / DC operated

NF44E

NF33/11

NF51/11

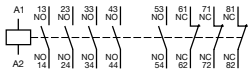
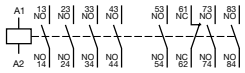
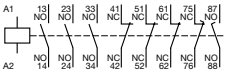
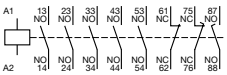
Description

NF contactor relays are used for switching auxiliary and control circuits.

These contactor relays are of the block type design with:

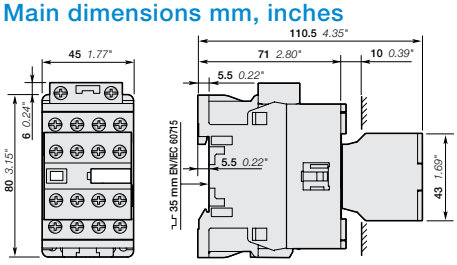
– 8 poles with a permanently fixed 4-pole auxiliary contact block. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol) except for NF33/11 and NF51/11 variants
– overlapping of lagging / leading contacts for NF33/11 and NF51/11 variants
– control circuit: AC or DC 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	Catalog number	Global 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

NFZ 8-pole contactor relays
AC / DC operated

NFZ44E

NFZ33/11

NFZ51/11

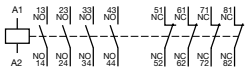
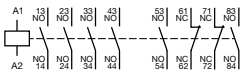
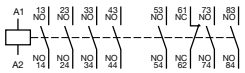
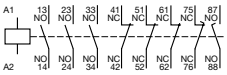
Description

NFZ contactor relays are used for switching auxiliary and control circuits.

These contactor relays are of the block type design with:

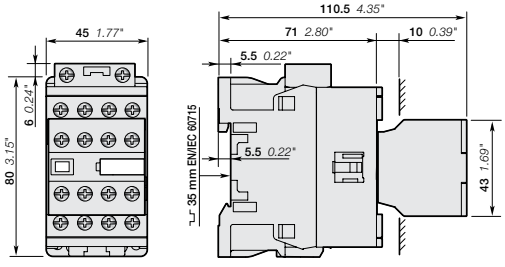
– 8 poles with a permanently fixed 4-pole auxiliary contact block. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol) except for NFZ33/11 and NFZ51/11 variants
– overlapping of lagging / leading contacts for NFZ33/11 and NFZ51/11 variants
– control circuit: AC or 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	Catalog number	Global 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

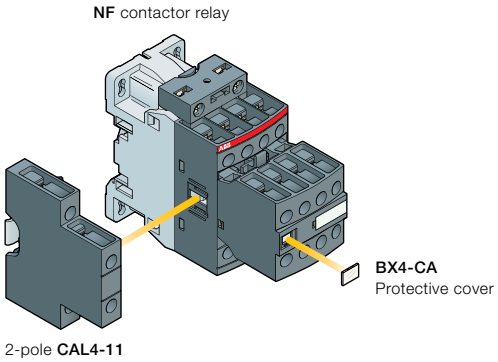
Main dimensions mm, inches



NFZ44E, NFZ53E, NFZ62E, NFZ71E, NFZ80E, NFZ33/11, NFZ51/11

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	–	–	+ 1	–

NF 8-pole contactor relays
Main accessories

CAL4-11

LDC4

BX4-CA

Ordering details[1)]

For contactor relays	Auxiliary contacts		Catalog number	Pkg qty	Weight (1 pce) kg
					
Side-mounted instantaneous auxiliary contact blocks					
NF	1	1	CAL4-11	1	0.04
Additional coil terminal block					
NF			LDC4	10	0.01
Protective covers					
NF			BX4-CA	50	0.01

[1)] For more information, refer to "Accessories" section.

NF contactor relays
Technical data

Contact utilization characteristics according to UL / CSA

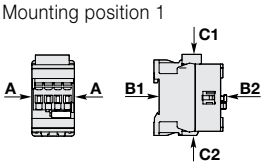
Contactor relay types	AC / DC operated	NF
Standards		UL 508, CSA C22.2 N°14
Max. operational voltage		600 V AC, 600 V DC
Pilot duty		A600, Q600
AC thermal rated current		10 A
AC maximum volt-ampere making		7200 VA
AC maximum volt-ampere breaking		720 VA
DC thermal rated current		2.5 A
DC maximum volt-ampere making-breaking		69 VA

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.

NF contactor relays
Technical data

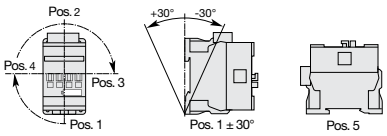
General technical data

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
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

Magnet system characteristics

Contactor relay types	AC / DC operated	NF
Coil operating limits	**AC supply**	At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max.
acc. to IEC 60947-5-1		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

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

Auxiliary contacts for safety circuits

Definitions from Standards

Mechanically linked contact elements , **IEC 60947-5-1, Annex L 3.0** (known as "forced contacts", "positively activated contacts" or "linked contacts").

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

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

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

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

Mechanically Linked Contacts Elements for Control Relays

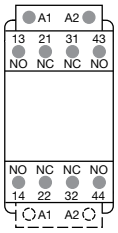
The tables below are giving the recommended association between contactor relays offering mechanically linked auxiliary contacts according to IEC 60947-5-1, Annex L (2000).

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

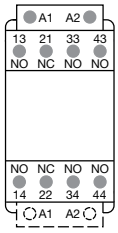
Contactors Relays	Built-in Auxiliary Contacts	
Type		
NF 22 E	2	2
NF 31 E	3	1
NF 44 E	4	4
NF 53 E	5	3
NF 62 E	6	2
NF 71 E	7	1

NF contactor relays
Terminal marking and positioning

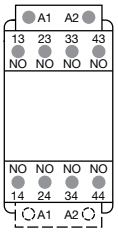
Standard devices without addition of auxiliary contacts



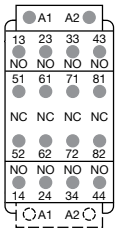
NF..22E



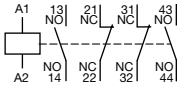
NF..31E



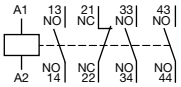
NF..40E



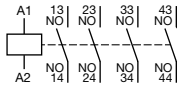
NF..44E



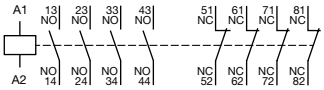
NF..22E



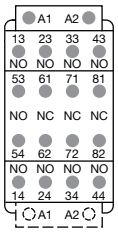
NF..31E



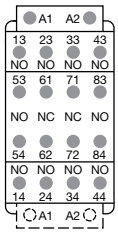
NF..40E



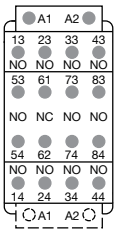
NF..44E



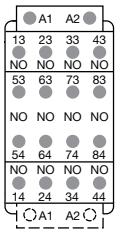
NF..53E



NF..62E

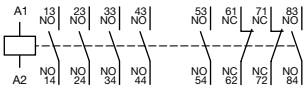


NF..71E



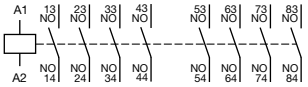
NF..80E

NF..53E



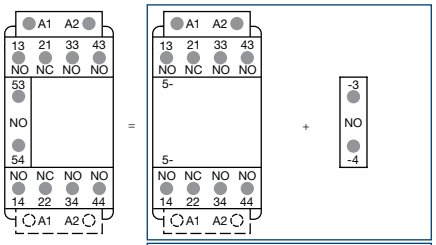
NF..62E

NF..71E

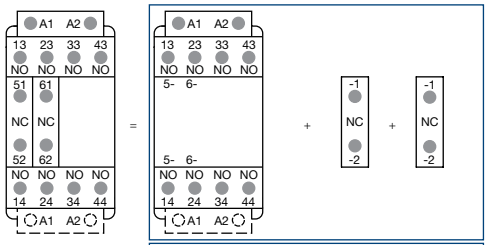


NF..80E

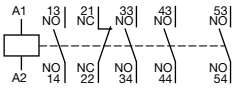
Other possible contact combinations with auxiliary contacts added by the user



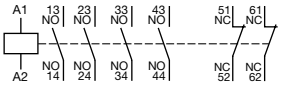
Combination 41 = NF..31E + CA4-10



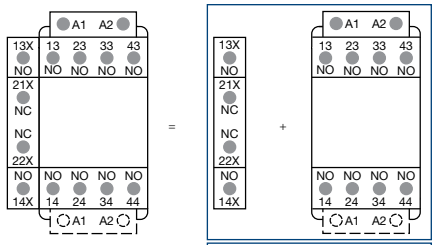
Combination 42 = NF..40E + CA4-01+CA4-01



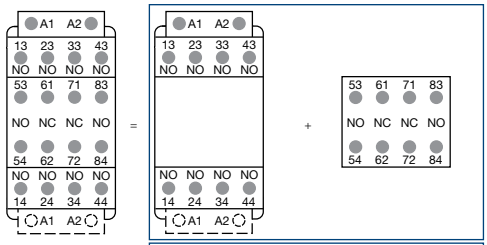
Combination 41 E



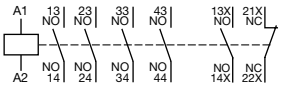
Combination 42 E



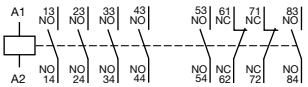
Combination 51 = CAL4-11 + NF..40E



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

NF add-on auxiliary contacts
Terminal marking and positioning

1-pole auxiliary contacts

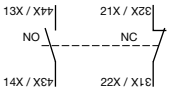
CA4-01

CA4-10

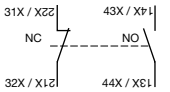
CC4-01

CC4-10

2-pole auxiliary contacts

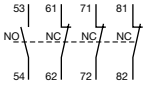


CAL4-11
(Left side-mounted)

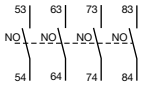


CAL4-11
(Right side-mounted)

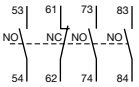
4-pole auxiliary contacts



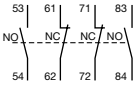
CA4-13N



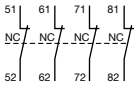
CA4-40N



CA4-31N



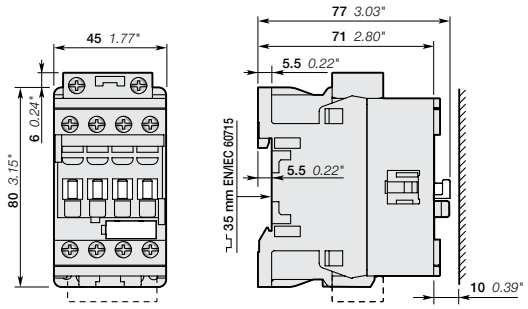
CA4-22N



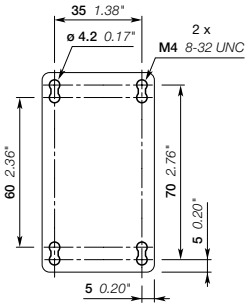
CA4-04N

NF contactor relays

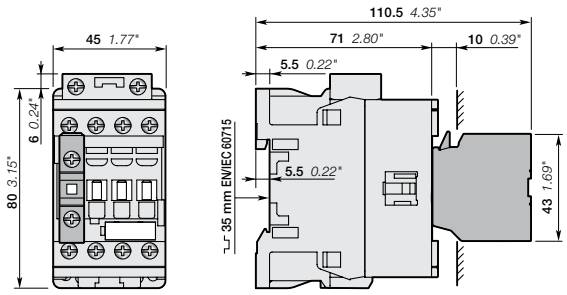
Main dimensions *mm, inches*



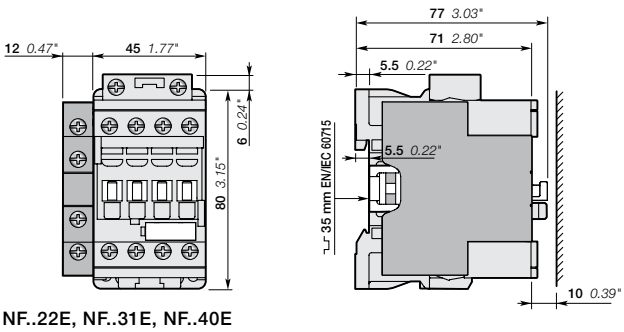
NF..22E, NF..31E, NF..40E



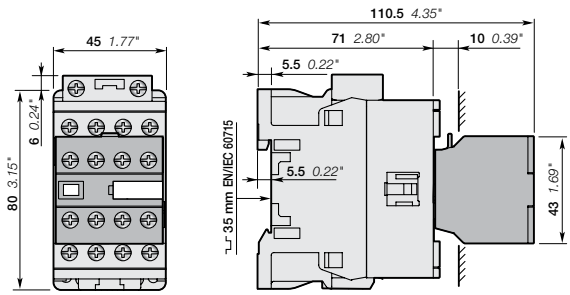
NF



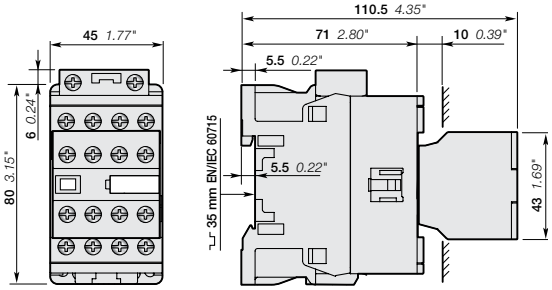
NF..22E, NF..31E, NF..40E
+ CA4, CC4 1-pole auxiliary contact block



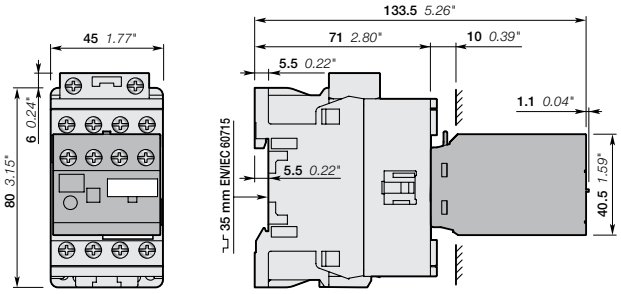
NF..22E, NF..31E, NF..40E
+ CAL4-11 2-pole auxiliary contact block



NF..22E, NF..31E, NF..40E
+ CA4 4-pole auxiliary contact block



NF..44E, NF..53E, NF..62E, NF..71E, NF..80E



NF..22E, NF..31E, NF..40E
+ TEF4 electronic timer

Note: Contactor relay lateral distance to grounded component 2 mm *0.08"* min.

Notes

Accessories

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				Catalog number	Pkg qty	Weight (1 pce) kg
Front-mounted instantaneous auxiliary contact blocks							
AF09 ... AF96 4-pole NF	1	0	–	–	CA4-10	1	0.02
	0	1	–	–	CA4-01	1	0.02
AF09 ... AF16..-30-10	2	2	–	–	CA4-22M	1	0.06
	3	1	–	–	CA4-31M	1	0.06
	1	3	–	–	CA4-13M	1	0.06
	0	4	–	–	CA4-04M	1	0.06
AF26 ... AF96..-30-00 AF09 ... AF38..-40-00 AF09 ... AF38..-22-00	2	2	–	–	CA4-22E	1	0.06
	3	1	–	–	CA4-31E	1	0.06
	4	0	–	–	CA4-40E	1	0.06
AF26 ... AF96..-30-00 AF09 ... AF16..-40-00	0	4	–	–	CA4-04E	1	0.06
AF09 ... AF16..-30-01	2	2	–	–	CA4-22U	1	0.06
	3	1	–	–	CA4-31U	1	0.06
	4	0	–	–	CA4-40U	1	0.06
4-pole NF	2	2	–	–	CA4-22N	1	0.06
	3	1	–	–	CA4-31N	1	0.06
	4	0	–	–	CA4-40N	1	0.06
	1	3	–	–	CA4-13N	1	0.06
NF..40E	0	4	–	–	CA4-04N	1	0.06
Front-mounted auxiliary contact blocks with N.O. leading contact and N.C. lagging contact							
AF09 ... AF96 4-pole NF	–	–	1	0	CC4-10	1	0.02
	–	–	0	1	CC4-01	1	0.02
Side-mounted instantaneous auxiliary contact blocks							
AF09 ... AF96, NF	1	1	–	–	CAL4-11	1	0.04
Front-mounted instantaneous auxiliary contact and A1/A2 coil terminal blocks							
AF09 ... AF16..-30-10	1	1	–	–	CAT4-11M	1	0.04
AF26 ... AF65..-30-00 AF09 ... AF38..-40-00 AF09 ... AF38..-22-00	1	1	–	–	CAT4-11E	1	0.04
AF09 ... AF16..-30-01	1	1	–	–	CAT4-11U	1	0.04

[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.

Auxiliary contact blocks for AF09 ... AF96 contactors and NF contactor relays
Technical data

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

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

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

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.

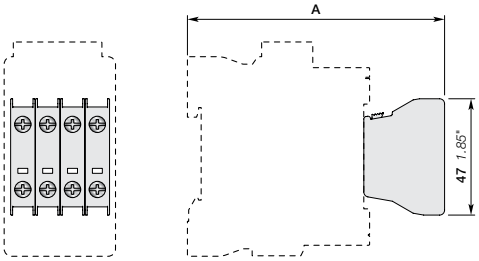
4

Ordering details[1)]

For contactors	Auxiliary contacts				Catalog number	Pkg qty	Weight (1 pce) kg
AF09 ... AF96 NF	1	–	–	–	CE5-10D0.1	1	0.02
	–	1	–	–	CE5-01D0.1	1	0.02
	1	–	–	–	CE5-10D2	1	0.02
	–	1	–	–	CE5-01D2	1	0.02
	1	–	–	–	CE5-10W0.1	1	0.02
	–	1	–	–	CE5-01W0.1	1	0.02
	1	–	–	–	CE5-10W2	1	0.02
	–	1	–	–	CE5-01W2	1	0.02

[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"

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	
	l >	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).

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 1-pole CE5		1-pole CA4 1-pole CC4		Electrical and mechanical interlock set (Between 2 contactors) VEM4		Side-mounted accessories Auxiliary contact blocks 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 2 2	0 0 0 0 2 0 0 2 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.		–		–		–

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		–

Auxiliary contact blocks for AF116 ... AF2650 contactors

1SFC101071V0001

CAL19-11

1SFC101082V0001

CAL18-11

4

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		Catalog number	Pkg qty	Weight (1 pce)
					kg
Side-mounted instantaneous auxiliary contact blocks					
AF116 ... AF370	1	1	CAL19-11	2	0.04
	1	1	CAL19-11B	2	0.04
AF400 ... AF2650	1	1	CAL18-11	2	0.05
	1	1	CAL18-11B	2	0.05

[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 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	

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
Mechanically linked contacts acc. to annex L of IEC 60947-5-1			N.O. or N.C. auxiliary contacts are mechanically linked contacts	
Mirror contacts acc. to annex F of IEC 60947-4-1			N.C. auxiliary contacts are mirror contacts	

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	

Auxiliary contact blocks for AF116 ... AF2650 contactors for severe industrial environments

1SFC101083V0001

CEL18

4

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:

– 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 lef-thand 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		Catalog number	Pkg qty	Weight (1 pce)
					kg
Side-mounting instantaneous auxiliary contact blocks					
AF116...AF370	1	0	CEL19-10	1	0.04
	0	1	CEL19-01	1	0.04
AF400 ... AF2650	1	0	CEL18-10	1	0.05
	0	1	CEL18-01	1	0.05

[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

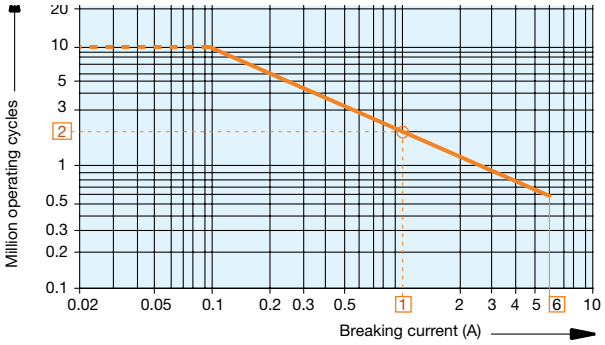
[1] or HRC fuses for very fast action (6.3 x 32 mm size).
[2] For CEL19, please consult us.

Auxiliary contact blocks for AF09 ... AF96 contactors and NF contactor relays
Electrical durability

Electrical durability for AC-15 utilization category

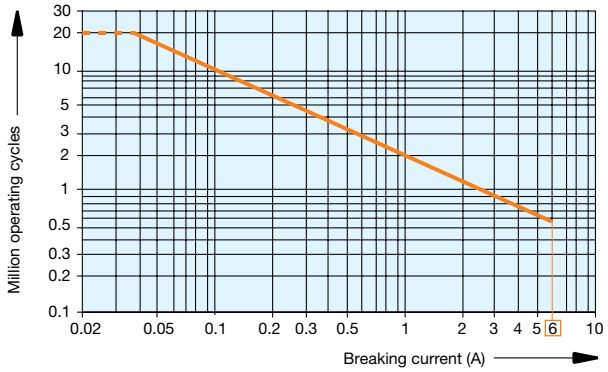
AC-15 utilization category according to IEC 60947-5-1 / EN 60947-5-1:
- making current: 10 x Ie with cos φ = 0.7 and Ue
- breaking current: Ie with cos φ = 0.4 and Ue.

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.

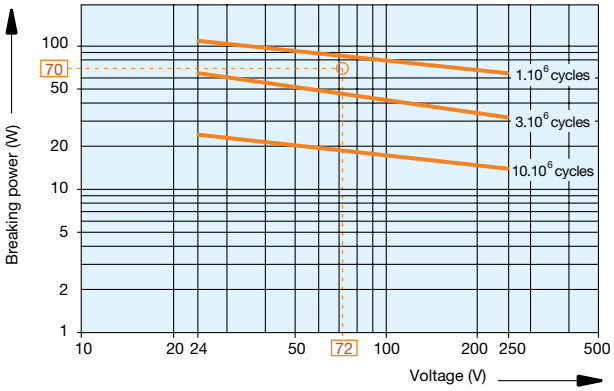
Example:
Breaking current = 1 A
On the opposite curve at intersection "○" 1 A the corresponding value for the electrical durability is approximately 2 millions operating cycles.



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 "○" 72 V / 70 W the corresponding value for the electrical durability is approximately 2 millions operating cycles.

Auxiliary contacts for AF116 ... AF2650 contactors
Electrical durability

Electrical durability for AC-15 utilization category

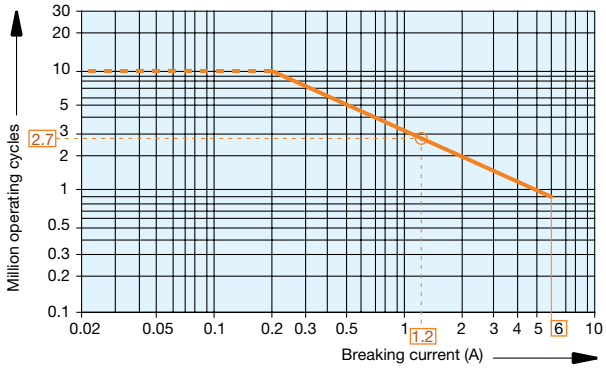
AC-15 utilization category according to IEC 60947-5-1 / EN 60947-5-1:

– 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 "○" 1.2 A the corresponding value for the electrical durability is approximately 2.7 millions operating cycles.

Add-on auxiliary contacts
Terminal marking and positioning

1-pole auxiliary contacts

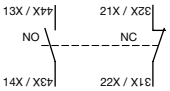
CA4-01

CA4-10

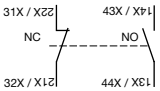
CC4-01

CC4-10

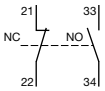
2-pole auxiliary contacts



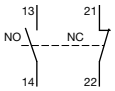
CAL4-11
(Left-side mounted)



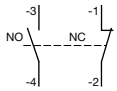
CAL4-11
(Right-side mounted)



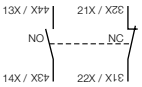
CAT4-11M



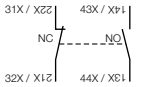
CAT4-11E



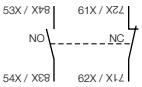
CAT4-11U



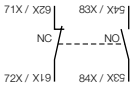
CAL18-11, CAL19-11
(Left-side mounted)



CAL18-11, CAL19-11
(Right-side mounted)

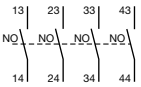


CAL18-11B, CAL19-11B
(Left-side mounted)

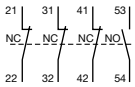


CAL18-11B, CAL19-11B
(Right-side mounted)

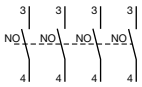
4-pole auxiliary contacts



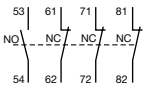
CA4-40E



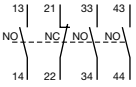
CA4-13M



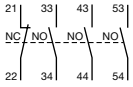
CA4-40U



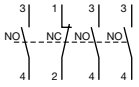
CA4-13N



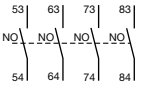
CA4-31E



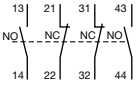
CA4-31M



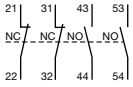
CA4-31U



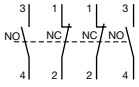
CA4-40N



CA4-22E

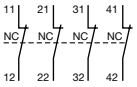


CA4-22M

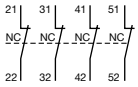


CA4-22U

CA4-31N



CA4-04E



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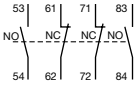

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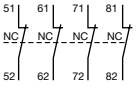


CA4-04N

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

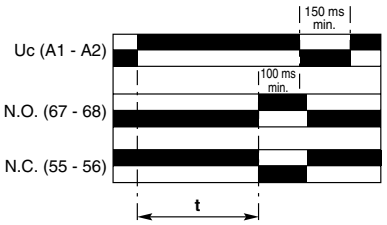
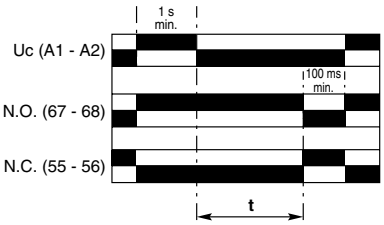
TEF4-ON or TEF4-OFF allow time-delayed functions up to 100 s in 3 distinct time ranges, independently of the control system. The time delay ranges are selected by a switch and the time delay can be adjusted by means of a rotary switch. The timing function is activated by closing or opening the device on which the timer is mounted. The OFF-delay version operates without additional control supply.

Ordering details

For contactors, and contactor relays	Time delay range selected by switch	Delay type	Rated control circuit voltage Uc V 50/60 Hz or DC	Auxiliary contacts		Catalog number	Weight Pkg (1 pce) kg
AF09 ... AF96 NF	0.1...1 s 1...10 s 10...100 s	ON-delay	24...240	1	1	TEF4-ON	0.065
		OFF-delay	24...240	1	1	TEF4-OFF	0.065

Electronic timers
Technical data

Contact utilization characteristics according to IEC

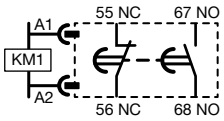
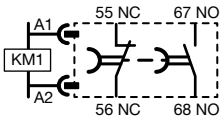
Types			TEF4-ON	TEF4-OFF
Standards			IEC 60947-5-1 and EN 60947-5-1	
Rated insulation voltage Ui acc. to IEC 60947-5-1			400 V	
Rated impulse withstand voltage Uimp			4 kV	
Rated operational voltage Ue max.			240 V	
Rated frequency (without derating)			50 / 60 Hz	
Conventional thermal current Ith - θ ≤ 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	

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
		I >	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			 

VM4

Mechanical interlock units

Description

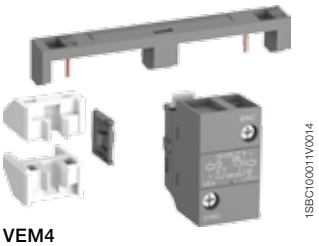
The VM mechanical interlock units are designed for the interlocking of two AF contactors.
When mounted between two contactors, the VM mechanical interlock unit prevents one of the contactors from closing as long as the other contactor is closed.

The mechanical interlock units VM4 and VM96-4 include 2 fixing clips (BB4).

VM19

Ordering details

For contactors	Mounting	Catalog number	Pkg qty	Weight (1 pce) kg
Mechanical interlock units for two contactors mounted side by side				
AF09 ... AF38..-30- AF09 ... AF38..-40-00		VM4	10	0.01
AF40 ... AF96		VM96-4	10	0.01
For same size contactors: AF116 ... AF140 AF190, AF205 AF265 ... AF370		VM19	1	0.06
AF116 ... AF140 and AF190, AF205		VM140/190	1	0.09
AF190, AF205 and AF265 ... AF370		VM205/265	1	0.09
AF400 ... AF1250	PN.. mounting plate to be ordered separately	VM750H	1	0.20
AF1350 ... AF2650	Plate included	VM1650H	1	6.00
Mechanical interlock units for two contactors mounted one above the other				
AF400 ... AF1250	Additional plate (not supplied)	VM750V	1	0.20



VEM4

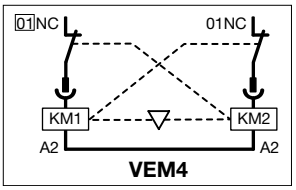
Mechanical and electrical interlock sets

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	Catalog number	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	1	0.04
Fixing clips				
AF09 ... AF38		BB4	50	0.01

Note: VEM4 not suitable for AF..Z contactors with DC control voltage 12...20 V DC.

BB4

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 UL / CSA

Types	VEM4
Standards	UL 508, CSA C22.2 N°14
Max. operational voltage	500 V AC, 500 V DC

4

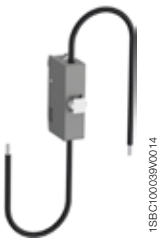
Contact utilization characteristics according to IEC

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

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

Impulse contact blocks



CB5

4

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)

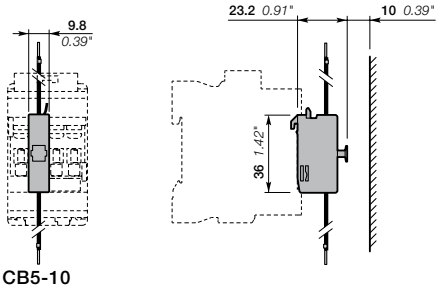
These blocks are equipped with 2 connecting leads 0.5 mm^2 with end, approximately 18 cm long.

Mounting: Clipped onto the front face of the contactors.

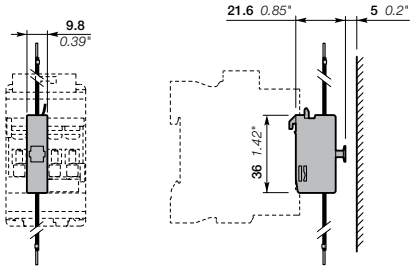
Ordering details

For contactors	Contacts		Catalog number	Pkg qty	Weight (1 pce) kg
AF09 ... AF96	1	–	CB5-10	1	0.012
	–	1	CB5-01	1	0.012

Main dimensions mm, inches



CB5-10



CB5-01

Notes

RA4 interface relays

RA4

4

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

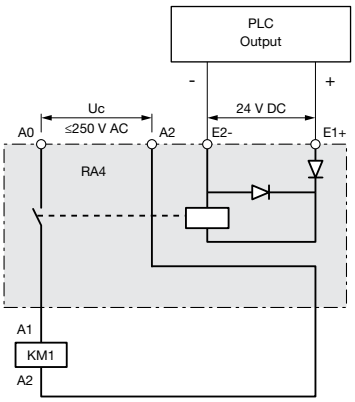
Remove the coil terminal block from the contactor and clip the interface relay without any screwing operation.

Ordering details

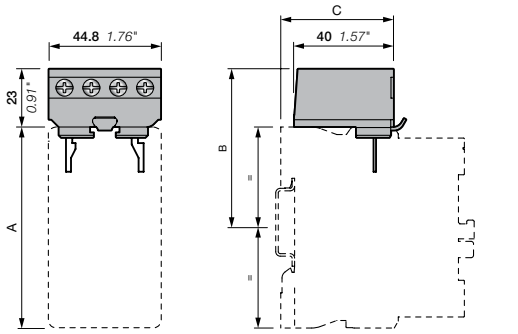
For contactors[1]	Coil voltages[2]	Rated control circuit voltage Uc	Catalog number	Global code	Pkg qty	Weight (1 pce)
	V AC 50/60 Hz	V DC				kg
AF09 ... AF96 NF	24 ... 250	24	AF-RA4	1SBN060100R1000	1	0.040
			AF-RA4-T [3]	1SBN060100T1000	10	0.040

[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*"

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

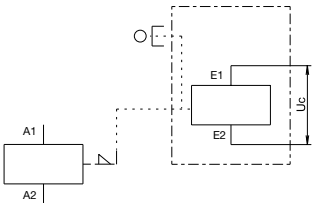
Control voltage (E1 and E2 terminals) **Uc**		
Rated value		24 V DC
Max. range at ambient temperature 20 °C		19 ... 30 V DC
Max. consumption for Uc = 24 V DC, θ = 20 °C		0.3 W
"0" status (relay open)	**for Uc**	≤2.4 V DC
	for Ic	<1 mA
"1" status (relay closed)	**for Uc**	≥19 V DC
Max. short supply interruption 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

Mechanical latching unit

WA4



Wiring diagram

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.

Mounting

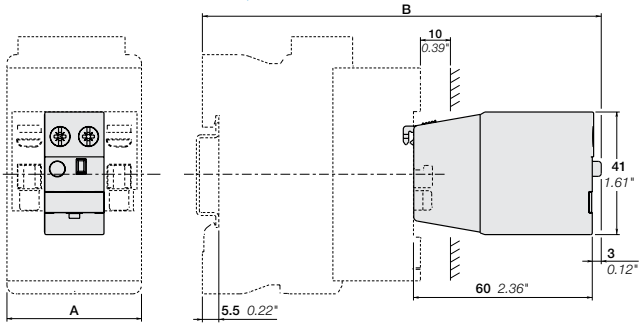
The WA4 block is clipped onto the front face of the 1-stack contactor where it takes up two slots in central position (see fig. below).
The two other slots may accept CA4 single pole auxiliary contacts (1 block on each side of the mechanical latch).

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		Catalog number	Global 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"*

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

Other accessories


1SBC100020V0014

LDC4


1SBC100021V0014

BX4


1SBC100023V0014

BX4-CA


1SNC160101F0014

BA4


1SBC100044V0014

BA5-50

Ordering details

For contactors	Catalog number	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	10	0.01

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	10	0.01
4-pole CA4, 2-pole CAT4 auxiliary contact blocks and TEF4 electronic timer	BX4-CA	50	0.01

Note: BX4 produced since 13045 (day 045 - year 2013) are suitable for AF40 ... AF96.

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"*).

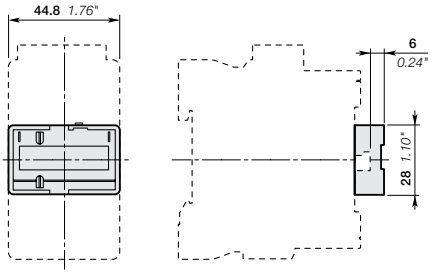
AF09 ... AF370 contactors, TF thermal overload relays, EF electronic overload relays and MS116, MS132 manual motor starters	BA4	16	0.01
AMS 500 support plate for 8 BA4	SPRC 1	1	0.22
HTP500 support plate	HTP500-BA4	1	0.29

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	1	0.02

Main dimensions *mm, inches*



BX4

Other accessories

BP38-4

BDT4
For AF09 ... AF65, NF

BDT4
For AF80 ... AF96

Ordering details

For contactors	Catalog number	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	10	0.01
A40 ... A75, AE50 ... AE75, AF50 ... AF75	AF40 ... AF65	BP65-4	10	0.01
A95, A110, AE95, AE110, AF95, AF110	AF80 ... AF96	BP96-4	10	0.01

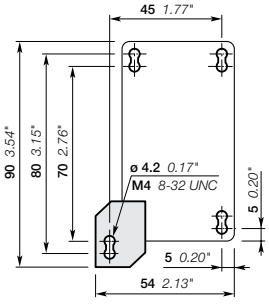
Test block

BDT4 test block is suitable for switching on contactor off-load.

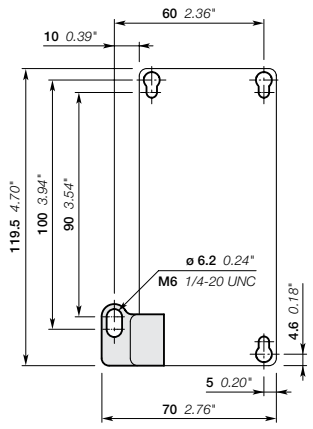
Marking on the block indicates the contactor type to fit with.

AF09 ... AF96, NF	BDT4	10	0.02

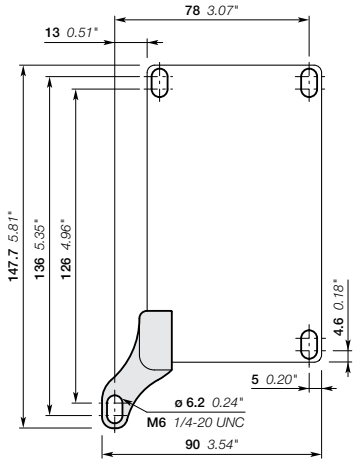
Main dimensions *mm, inches*



BP38-4



BP65-4



BP96-4

Terminal shrouds

LT140-30L

LT370-30C

LT460-AC

Description

Main terminal protection for AF116 ... AF1250 contactors.

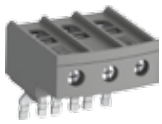
The auxiliary contact blocks and coils are designed to provide an IP 20 degree of protection.

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	Catalog number	Pkg qty	Weight (1 pce) kg
3-pole contactors			
AF116 ... AF140, with compression lugs	LT140-30L	2	0.07
AF190, AF205, with cable clamps	LT205-30C	2	0.05
AF190, AF205, with compression lugs	LT205-30L	2	0.22
AF190, AF205, with shorting bar or between contactor OL relay	LT205-30Y	1	0.05
AF265 ... AF370, with cable clamps	LT370-30C	2	0.04
AF265 ... AF370, with compression lugs	LT370-30L	2	0.28
AF265 ... AF370, with shorting bar or between contactor and OL relay	LT370-30Y	1	0.08
AF265 ... AF370, for use with extending cable clamps, ATK300/2	LT370-30D	1	0.15
AF400, AF460 with cable clamps	LT460-AC	2	0.10
AF400, AF460 with compression lugs	LT460-AL	2	0.80
AF580, AF750 with cable clamps	LT750-AC	2	0.12
AF580, AF1250 with compression lugs	LT750-AL	2	0.83
4-pole contactors			
AF116 ... AF140, with compression lugs	LT140-40L	2	0.09
AF190 ... AF205, with cable clamps	LT205-40C	2	0.04
AF190 ... AF205, with compression lugs	LT205-40L	2	0.14
AF265 ... AF370, with cable clamps	LT370-40C	2	0.04
AF265 ... AF370, with compression lugs	LT370-40L	2	0.17

Additional terminal blocks



LD38-4

Description

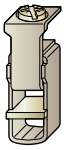
The LD terminal block is designed to increase the connecting capacity of 3-pole AF26 ... AF38 contactors on which it is fitted and for preparation of the wiring before final connection to the contactor.
LD38-4 blocks are 3-pole terminal blocks with tunnel terminals.

Ordering details

For contactors	Catalog number	Pkg qty	Weight (1 pce) kg
AF26 ... AF38	LD38-4	2	0.07

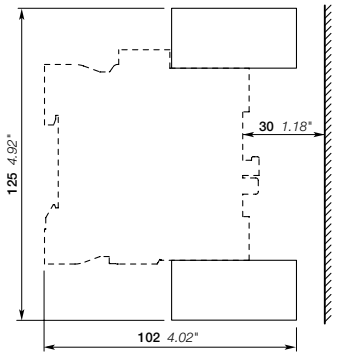
4

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*




1SFC101050V0001

LW140

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		Catalog number	Pkg qty	Weight (1 pce)
	hole Ø mm	bar mm			kg
3-pole contactors					
AF116 ... AF140	6.5	13 x 3	LW140	1	0.12
AF190, AF205	10.5	17.5 x 5	LW205	1	0.26
AF265 ... AF370	10.5	20 x 5	LW370	1	0.34
AF400, AF460	10.5	25 x 5	LW460	1	0.73
AF580, AF750	13	40 x 6	LW750	1	1.23
AF1250	13	50 x 10	LW1250	1	2.00
4-pole contactors					
AF190 ... AF205	10.5	20 x 5	LW205-40	1	0.31
AF265 ... AF370	10.5	25 x 5	LW370-40	1	0.54


1SFC101049V0001

LX140

Terminal extension

Description

Extension pieces designed to extend the main terminals of contactors for combined mounting of contactors and connection sets.

Ordering details

For contactors	Dimensions		Catalog number	Pkg qty	Weight (1 pce)
	hole Ø mm	bar mm			kg
AF116 ... AF140	6.5	13 x3	LX140	1	0.072
AF190, AF205	8.5	17.5 x 5	LX205	1	0.180
AF265 ... AF370	10.5	20 x 5	LX370	1	0.234
AF400, AF460	10.5	25 x 5	LX460	1	0.500
AF580, AF750	13	40 x 6	LX750	1	0.850


1SFC101073V0001

LL146-30

Connection sockets

Description

Connection socket can be used to replace built-in cable clamps in AF116 ... AF140.

Ordering details

For contactors	Catalog number	Pkg qty	Weight (1 pce)
			kg
3-pole contactors			
AF116 ... AF140	LL146-30	6	0.10
4-pole contactors			
AF116 ... AF140	LL146-40	8	0.13
AF190 ... AF205	LL205-40	2	0.22
AF265 ... AF370	LL370-40	2	0.23


1SFC101046V0001

LD146-30

Connection module

Description

Connection module can be fixed on AF116 ... AF140 delivered with bar terminals.

Ordering details

For contactors	Catalog number	Pkg qty	Weight (1 pce)
			kg
3-pole contactors			
AF116 ... AF140	LD146-30	2	0.17
4-pole contactors			
AF116 ... AF140	LD146-40	2	0.23

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.
  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 load controlled by the poles: LP, LY (only LY16-4 and LY38-4 secable strips).

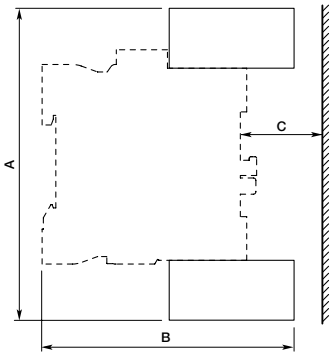
Types	for connection of "n" poles	with terminal	insulated
LP	n = 2	no	no[1]
LY	n = 2 (secable LY16-4, LY38-4 connecting strips)	no	yes
	n = 3	no	yes[1]

[1] LP460 ... LP750, LY185 ... LY750 not insulated. Use terminal shrouds.

Ordering details

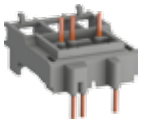
For contactors	max. nominal continuous current with "n" poles				Cable cross-sectional area	Catalog number	Pkg qty	Weight (1 pce)
	in parallel			in series				
	2 poles	3 poles	4 poles	2 poles				
	A				mm² / AWG			kg
AF09	30	33	–	25	6 / 10	LY16-4	10	0.01
AF12	32	36	–	27				
AF16	34	40	–	30				
AF26	50	60	–	45	10 / 8	LY38-4	10	0.01
AF116 ... AF140	–	240	–		–	LY140	1	0.06
AF190, AF205	–	400	–		–	LY185	1	0.20
AF265 ... AF370	–	670	–		–	LY300	1	0.30
AF400, AF460	–	1000	–		–	LY460	1	0.45
AF580, AF750	–	1650	–		–	LY750	1	0.80
AF190, AF205	300	–	–		–	LP185	2	0.30
AF265 ... AF370	475	–	–		–	LP300	2	0.40
AF400, AF460	725	–	–		–	LP460	2	0.55
AF580, AF750	1200	–	–		–	LP750	2	0.95
AF09	45		–	–	10 / 8	LH38-4	2	0.01
AF12	50		–	–	10 / 8			
AF16	54		–	–	16 / 6			
AF26	81		–	–	25 / 4			
AF30, AF38	91		–	–	25 / 4			
AF09		62	–		16 / 6	LF16-4	2	0.02
AF12		70	–		25 / 4			
AF16		75	–		25 / 4			
AF26		112	–		35 / 2	LF38-4	2	0.04
AF30, AF38		125	–		50 / 1			
AF09	–	–	70	–	25 / 4	LG16-4	2	0.03
AF12	–	–	78	–	25 / 4			
AF16	–	–	84	–	25 / 4			

Main dimensions *mm, inches*

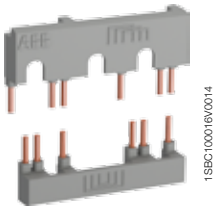


Type	For contactors	Dimensions					
		A		B		C	
		mm	*inch*	*mm*	*inch*	*mm*	*inch*
LH38-4	AF09 ... AF16	111.20	*4.38"*	83	*3.27"*	22	*0.87"*
	AF26 ... AF38	114	*4.49"*	86	*3.39"*	16	*0.63"*
LF16-4	AF09 ... AF16	121	*4.76"*	87	*3.43"*	23	*0.91"*
LF38-4	AF26 ... AF38	135.20	*5.32"*	103	*4.06"*	31	*1.22"*
LG16-4	AF09 ... AF16	124.20	*4.89"*	87	*3.43"*	23	*0.91"*

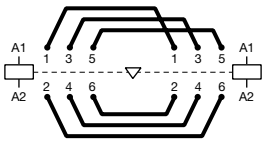
Connection accessories for starting solutions



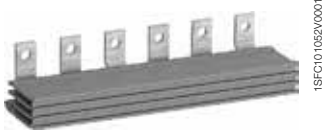
BEA16-4



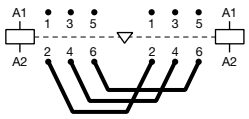
BER16-4



BER, BEM
Reversing connections



BEP140-30



BEP, BES
Phase to phase 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, 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.

Ordering details

For 3-pole contactors	Manual motor starter	Catalog number	Pkg qty	Weight (1 pce) kg
AF09 ... AF16	MS116-0.16 ... MS116-25, MS132-0.16... MS132-25	BEA16-4	10	0.03
AF26 ... AF38	MS116-0.16 ... MS116-16, MS132-0.16 ... MS132-10	BEA26-4	10	0.03
	MS116-20 ... MS116-32, MS132-12 ... MS132-32	BEA38-4	10	0.03
AF40 ... AF65	MS165-16 ... MS165-65	BEA65-4	1	0.09

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	Catalog number	Pkg qty	Weight (1 pce) kg
AF09 ... AF16	BER16-4	1	0.045
AF26 ... AF38	BER38-4	1	0.100
AF40 ... AF65	BER65-4	1	0.175
AF80, AF96	BER96-4	1	0.250
AF116 ... AF140	BER140-4	1	0.615
AF190, AF205	BER205-4	1	1.237
AF265 ... AF370	BER370-4	1	2.140
AF400, AF460	BEM460-30	1	4.400
AF580, AF750	BEM750-30	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 3 contactors mounted side by side.

The BEP connection sets are made up of 1 upstream or downstream connections.

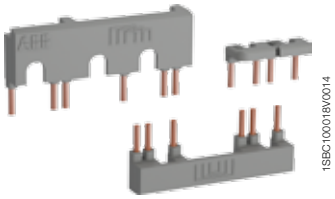
The BES connection sets are made up of 3 upstream or downstream connections.

BEP and BES connection sets are insulated and made of solid copper bars.

Ordering details

For 3-pole contactors	Catalog number	Pkg qty	Weight (1 pce) kg
3-pole contactors			
AF116 ... AF140	BEP140-30	1	0.32
AF190, AF205	BEP205-30	1	0.53
AF265 ... AF370	BEP370-30	1	0.93
AF400, AF460	BES460-30	1	2.20
AF580, AF750	BES750-30	1	3.70
4-pole contactors			
AF116 ... AF140	BEP140-30	1	0.42
AF190 ... AF205	BEP205-30	1	0.71
AF265 ... AF370	BEP370-30	1	1.23

Connection sets for star-delta starter



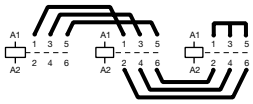
BEY16-4

Description

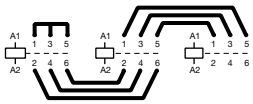
The BEY and BED connection sets are used to connect the main poles of the Line, Delta and Star contactors of a star-delta starter.

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

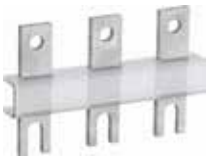


AF400 ... AF750
Star-delta-line connection

Ordering details

For 3-pole line, delta and star contactors	Interlock unit between delta and star contactors	Catalog number	Pkg qty	Weight (1 pce) kg
AF09 ... AF16	With or without VM4 or VEM4	BEY16-4	1	0.05
AF26 ... AF38	With or without VM4 or VEM4	BEY38-4	1	0.11
AF40 ... AF65	With or without VM96-4	BEY65-4	1	0.20
AF80, AF96	With or without VM96-4	BEY96-4	1	0.25
AF116 ... AF140	With or without VM19	BEY140-4	1	1.04
AF190 ... AF205 (line and delta) AF140 (star)	With or without VM140/190	BEY190-4	1	1.15
AF190, AF205	With or without VM19	BEY205-4	1	1.21
AF265 ... AF370 (line and delta) AF190 ... AF205 (star)	With or without VM205/265	BEY265-4	1	2.02
AF265 ... AF370	With or without VM19	BEY370-4	1	2.11
AF400 ... AF460	With or without VM750H	BED460	1	4.70
AF580 ... AF750 (line and delta) AF400 ... AF460 (star)	With or without VM750H	BED580	1	6.30
AF580 ... AF750	With or without VM750H	BED750	1	7.70

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 contactors	MCCB	Catalog number	Pkg qty	Weight (1 pce) kg
Vertical assembly				
AF116 ... AF140	XT2	BEA140/XT2	1	0.06
AF116 ... AF140	XT4	BEA140/XT4	1	0.07
AF190, AF205	XT4	BEA205/XT4	1	0.20
AF190, AF205	T4	BEA205/T4	1	0.19
AF265 ... AF370	T5	BEA370/T5	1	0.35
AF400 ... AF750	T6	BEA750/T6	1	0.41
AF400 ... AF750	T5	BEA750/T5	1	0.41
Vertical assembly with control wire terminals (also suitable when using busbar kits for starter combinations)				
AF400 ... AF750	T5	BEA750D/T5	1	0.72
AF400 ... AF750	T6	BEA750D/T6	1	0.72
Horizontal assembly (also suitable when using busbar kits for starter combinations)				
AF400, AF460	T4	BEA460H/T4	1	2.45

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 contactors	Switch fuse	Catalog number	Pkg qty	Weight (1 pce) kg
Vertical assembly				
AF400, AF460	OESA400	BEF460/OESA400	1	0.34
AF460 ... AF750	OESA630 to OESA800	BEF750/OESA800	1	0.74
Horizontal assembly				
AF400, AF460	OESA400...LR	OESA460H/OESA400	1	1.25

Mounting plates

1SFC101087V0001

PN460

Description

Mounting plates with fixing holes for the specified contactors and overload relays.

Ordering details

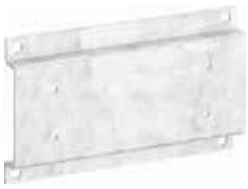
For contactors		For overload relays	Catalog number	Pkg qty	Weight (1 pce) kg
Mounting plates for direct on line starters					
AF400, AF460		EF460	PN460-11	1	2.12
AF580, AF750		EF750	PN750-11	1	2.50

For two contactors side by side with space for mechanical interlock		For one or two overload relays	Catalog number	Pkg qty	Weight (1 pce) kg
Mounting plates for mechanical interlocked contactors, reversing starters and two speed starters for double windings					
AF400, AF460		EF460	PN460-21	1	3.49
AF580, AF750		EF750	PN750-21	1	4.23

For main and delta contactors	For star contactor[1)]	For overload relays	Catalog number	Pkg qty	Weight (1 pce) kg
Mounting plates for star-delta starters and two speed starters for single windings					
AF400, AF460	AF400	EF460	PN460-41	1	5.31
AF580, AF750	AF400 ... AF580	EF750	PN750-41	1	6.32

[1)] Space for mechanical interlock included.

Adapter plates



1SFC101048V0001

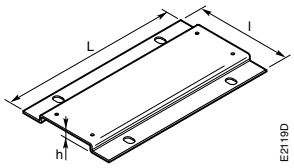
PR146-1

Description

Adapter plates with fixing holes for replacing installed contactors.

Ordering details

From contactors	To contactor	Catalog number	Pkg qty	Weight (1 pce) kg
A95, AF95, A110, AF110	AF116, AF140	PR146-1	1	0.30
EH150, EH160, EH175, EH210, EG160	AF190, AF205	PR210-1	1	0.44
EH250, EH260, EH300	AF265, AF305, AF370	PR300-1	1	0.56
EH370, EH550, EG315	AF400, AF460, AF580	PR460-1	1	0.90
EH700, EH800	AF750	PR750-1	1	0.50
OKYM150, OKYM175	AF190	PR185-2	1	0.50
OKYM200, OKYM250	AF265, AF305, AF370	PR300-2	1	0.50
OKYM315	AF400, AF460	PR400-2	1	0.82
OKYM400	AF400, AF460	PR460-2	1	0.80
OKYM500	AF580	PR580-2	1	0.70
EH550, EG630, OKYM630	AF580, AF750	PR750-2	1	1.10



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

Contactor coils, main contact sets and arc chutes

1SFC101007F0201

ZAF1650

Contactor coils

Ordering details

For contactors	Rated control circuit voltage Uc min. ... Uc max.		Catalog number	Pkg qty	Weight (1 pce)
	V 50/60 Hz	V DC			kg
AF400, AF460	-	24…60	ZAF460-68	1	0.52
	48…130	48…130	ZAF460-69	1	0.52
	100…250	100…250	ZAF460-70	1	0.52
	250…500	250…500	ZAF460-71	1	0.52
AF580 ... AF1250	-	24…60	ZAF750-68	1	1.33
	48…130	48…130	ZAF750-69	1	1.33
	100…250	100…250	ZAF750-70	1	1.33
	250…500	250…500	ZAF750-71	1	1.33
AF1350 ... AF2050	100...250	100...250	ZAF1650-70[1]	1 set	0.90
			ZP1650[2]	1	0.30
AF2650	100...250	100...250	ZAF2650-70[1]	1 set	0.90
			ZP2650[2]	1	0.30

[1] One set of two coils.
[2] Printed circuit board.

1SFC101009F0201

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 contactors	Catalog number	Pkg qty	Weight (1 pce)
			kg
AF400	ZL400	1	1.320
AF460	ZL460	1	1.320
AF580	ZL580	1	1.840
AF750	ZL750	1	1.840
AF1250	ZL1250	1	1.840
AF1350	ZL1350	1	2.500
AF1650	ZL1650	1	3.500
AF2050	ZL2050	1	3.500
AF2650	ZL2650[1]	1	1.200

[1] Does not include fixed contacts and screws

Arc chutes

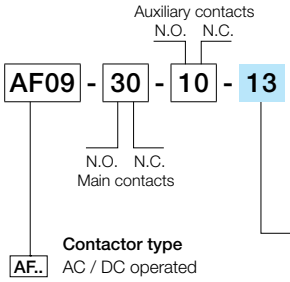
Ordering details

For contactors	Catalog number	Pkg qty	Weight (1 pce)
			kg
AF400, AF460	ZW460	1	1.380
AF580, AF750, AF1250	ZW750	1	1.500
AF1350, AF1650, AF2050	ZW1650	1	4.000
AF2650	ZW2650	1	4.000

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 AF400-30-11-70.

AF09 ... AF370 3-pole contactors
AF09 ... AF370 4-pole contactors



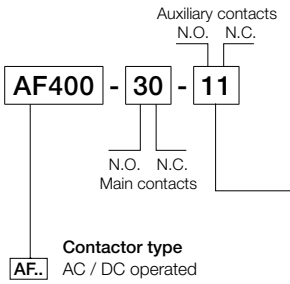
	AC coil code 50/60 Hz	DC coil code
41	24...60 V	-
11	24...60 V	20...60 V
12	48...130 V	48...130 V
13	**100...250 V**	**100...250 V**
14	250...500 V	250...500 V

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

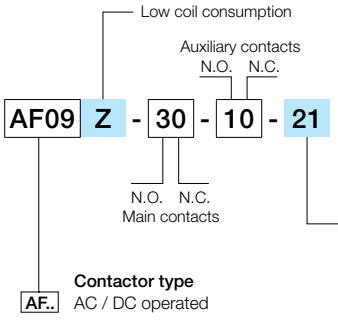
AF400 ... AF2650 3-pole contactors



	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



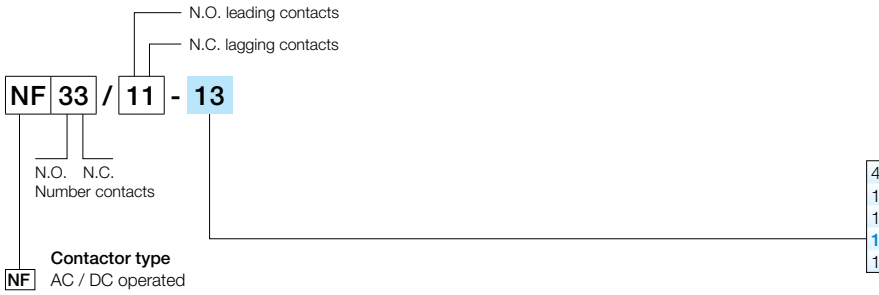
	AC coil code 50/60 Hz	DC coil code
20	-	12...20 V
21	**24...60 V**	**20...60 V**
22	48...130 V	48...130 V
23	100...250 V	100...250 V

Voltage code table

NF contactor relays

	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

NF contactor relays with overlapping of lagging / leading contacts

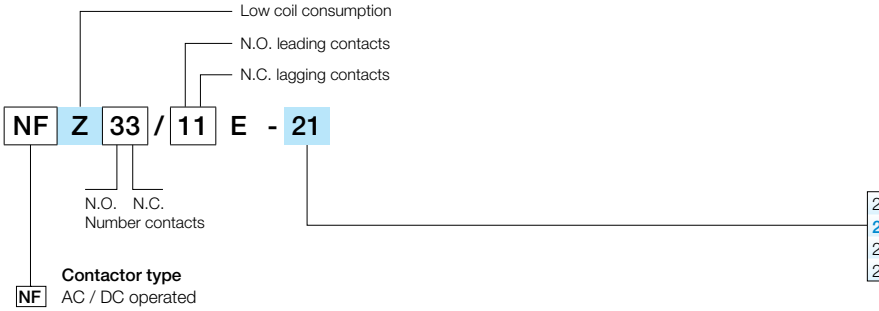


	AC coil code 50/60 Hz	DC coil code
41	24...60 V	-
11	24...60 V	20...60 V
12	48...130 V	48...130 V
13	**100...250 V**	**100...250 V**
14	250...500 V	250...500 V

NF contactor relays - 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

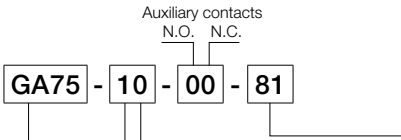
NF contactor relays with overlapping of lagging / leading contacts - low consumption



	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

Voltage code table

UA, UA..RA contactors
GA contactors



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GA	DC switching - AC operated
GAE	DC switching - DC operated
UA, UA..RA	Capacitor switching - AC operated

Contactor type

Contactors: UA, UA..RA, GA
AC coil code

	50 Hz	60 Hz
81	**24 V**	**24 V**
16	26 V	28 V
17	28 V	32 V
82	**42 V**	**42 V**
20	42 V	48 V
83	**48 V**	**48 V**
73	**60 V**	**60 V**
74	**100 V**	**100**...110 V
26	105 V	110...127 V
84	**110 V**	**110**...120 V
89	110...**115 V**	**115**...127 V
29	120 V	140 V
30	125...127 V	150 V
34	175 V	208 V
36	190 V	220 V
40	210 V	240 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
50	400 V	440 V
51	400...415 V	480 V
87	415...**440 V**	**440**...460 V
53	440 V	500 V
55	500 V	600 V
56	550 V	-
58	660...690 V	-
59	-	690 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
21	50 V
84	60 V
85	75 V
86	110 V
87	125 V
88	220 V
89	240 V
38	250 V


ABB
TF42
EF19
EF45

Overload relays

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-ABB	DB16-ABB	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		DB16-ABB	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	-	-	-

	250 … 710 kW
	350 … 500 hp
	AF1350, AF1650
	E1250DU
	375 … 1250 A
	10E, 20E, 30E selectable

T16 thermal overload relays – 0.10 to 16.0 A
Ordering details


2CDC231009F0013

T16


2CDC231025F0013

T16 + DB16-ABB


1SFC151224F0002

KPR-101L


2CDC231002F0011

DB16-ABB

5

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

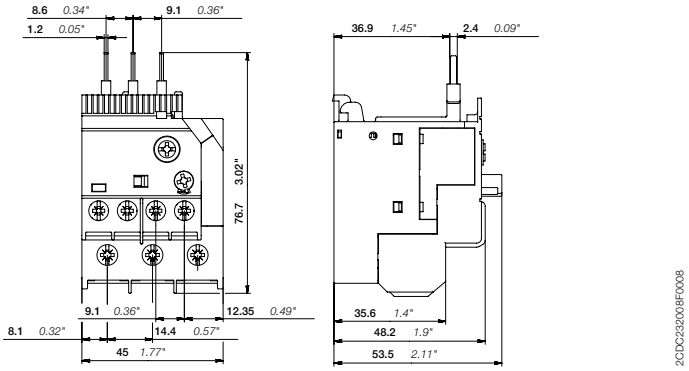
Setting range A	Short-circuit protective device	Trip class	Catalog number	Global code	Weight (1 pc) kg
0.10 ... 0.13	0.5 A, fuse type T	10	T16-0.13	1SAZ711201R1005	0.100
0.13 ... 0.17	1.0 A, fuse type T	10	T16-0.17	1SAZ711201R1008	0.100
0.17 ... 0.23	1.0 A, fuse type T	10	T16-0.23	1SAZ711201R1009	0.100
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	Catalog number	Global code	Weight (1 pc) kg
T16	Single mounting kit	DB16-ABB	1SAZ701901R0001	0.032
T16	Reset push button[1)]	KPR-101L	1SFA616162R1014	0.027

[1)] More information see catalog 1SFC151004C0201

Main dimensions mm, *inches*



2CDC232008F0008

T16

T16 thermal overload relays – 0.10 to 16.0 A
Technical data

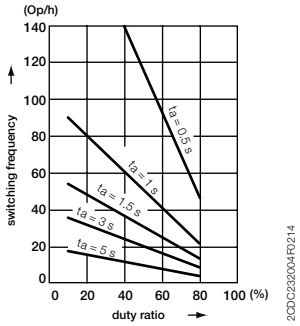
Main circuit – Utilization characteristics according to IEC/EN

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



t_a: Motor starting time

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

5

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

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** **2 x**	0.75 ... 4 mm² 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** **2 x**	0.75 ... 2.5 mm² 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

TF42 thermal overload relays for contactor AF09 ... AF38
0.10 ... 38.0 A


1SBC101326F0010

TF42


2CDC231001F0011

DB42


2CDC231026F0013

TF42 + DB42


1SFC151224V0001

KPR3-101L

5

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

Ordering details

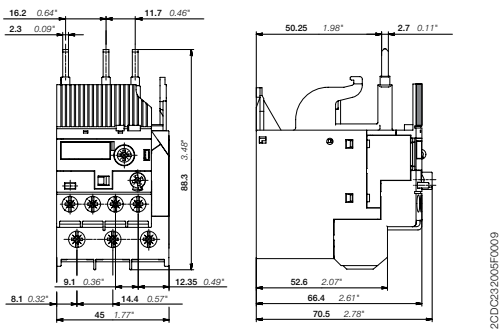
Setting range A	Short-circuit protective device 100kA 600 VAC	Trip class	Fitting to contactors	Catalog number	Global code	Weight (1 pce) kg
0.10 ... 0.13	1 A, Fuse class J	10	AF09 ... AF38	TF42-0.13	1SAZ721201R1005	0.13
0.13 ... 0.17	1 A, Fuse class J	10	AF09 ... AF38	TF42-0.17	1SAZ721201R1008	0.13
0.17 ... 0.23	1 A, Fuse class J	10	AF09 ... AF38	TF42-0.23	1SAZ721201R1009	0.13
0.23 ... 0.31	3 A, Fuse class J	10	AF09 ... AF38	TF42-0.31	1SAZ721201R1013	0.13
0.31 ... 0.41	3 A, Fuse class J	10	AF09 ... AF38	TF42-0.41	1SAZ721201R1014	0.13
0.41 ... 0.55	3 A, Fuse class J	10	AF09 ... AF38	TF42-0.55	1SAZ721201R1017	0.13
0.55 ... 0.74	3 A, Fuse class J	10	AF09 ... AF38	TF42-0.74	1SAZ721201R1021	0.13
0.74 ... 1.00	6 A, Fuse class J	10	AF09 ... AF38	TF42-1.0	1SAZ721201R1023	0.13
1.00 ... 1.30	6 A, Fuse class J	10	AF09 ... AF38	TF42-1.3	1SAZ721201R1025	0.13
1.30 ... 1.70	6 A, Fuse class J	10	AF09 ... AF38	TF42-1.7	1SAZ721201R1028	0.13
1.70 ... 2.30	10 A, Fuse class J	10	AF09 ... AF38	TF42-2.3	1SAZ721201R1031	0.13
2.30 ... 3.10	10 A, Fuse class J	10	AF09 ... AF38	TF42-3.1	1SAZ721201R1033	0.13
3.10 ... 4.20	15 A, Fuse class J	10	AF09 ... AF38	TF42-4.2	1SAZ721201R1035	0.13
4.20 ... 5.70	20 A, Fuse class J	10	AF09 ... AF38	TF42-5.7	1SAZ721201R1038	0.13
5.70 ... 7.60	25 A, Fuse class J	10	AF09 ... AF38	TF42-7.6	1SAZ721201R1040	0.13
7.60 ... 10.0	35 A, Fuse class J	10	AF09 ... AF38	TF42-10	1SAZ721201R1043	0.13
10.0 ... 13.0	40 A, Fuse class J	10	AF09 ... AF38	TF42-13	1SAZ721201R1045	0.13
13.0 ... 16.0	60 A, Fuse class J	10	AF09 ... AF38	TF42-16	1SAZ721201R1047	0.13
16.0 ... 20.0	80 A, Fuse class J	10	AF09 ... AF38	TF42-20	1SAZ721201R1049	0.15
20.0 ... 24.0	80 A, Fuse class J	10	AF09 ... AF38	TF42-24	1SAZ721201R1051	0.15
24.0 ... 29.0	100 A, Fuse class J	10	AF09 ... AF38	TF42-29	1SAZ721201R1052	0.15
29.0 ... 35.0	150 A, Fuse class J	10	AF09 ... AF38	TF42-35	1SAZ721201R1053	0.15
35.0 ... 38.0/40.0	150 A, Fuse class J	10	AF09 ... AF38	TF42-38	1SAZ721201R1055	0.15

Ordering details accessories

For thermal overload relays A	Description	Catalog number	Global code	Weight (1 pce) kg
TF42	Single mounting kit	DB42	1SAZ701902R0001	0.09
TF42	Reset push button[1)]	KPR3-101L	1SFA616162R1014	0.03

[1)] More information see catalog AC1400

Main dimensions *mm, inches*



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TF42

TF42 thermal overload relays
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	1 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

TF42 thermal overload relays
Technical data

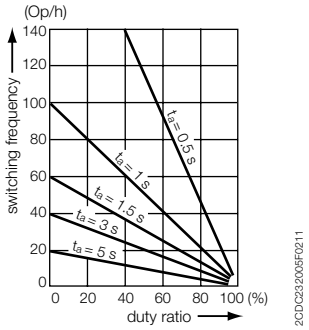
Main circuit – Utilization characteristics according to IEC/EN

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

TF42 thermal overload relays
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

5

Electrical connection

Main circuit

			TF42 (TF42-0.13 ... TF42-16)	TF42 (TF42-20 ... TF42-38)
Type				
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
	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 torques			1.5 - 2.5 Nm / 13 ... 22 lb.in	2.5 - 2.7 Nm / 22 lb.in
Connection screw			M4 (Pozidriv 2)	

[1] Only connect two different “conductor/wire” cross-sections, if they are within the indicated ranges

Auxiliary circuit

			TF42
Type			
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** **2 x**	0.75 ... 2.5 mm² 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 torques			1.1 ... 1.5 Nm / 9 ... 13 lb.in
Connection screw			M3 (Pozidriv 2)

TF65 thermal overload relays for contactor AF40 ... AF65
22 ... 67A

TF65

DB65

DB65 + TF65

KPR3-101L

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

Ordering details

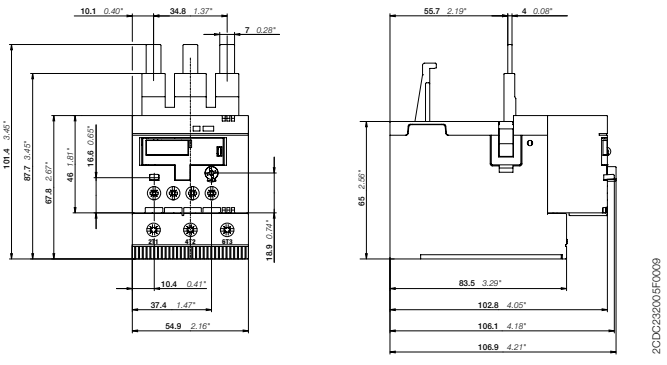
Setting range A	Short-circuit protective device 100 kA 600 VAC	Trip class	Fitting to contactors	Catalog number	Global code	Weight (1 pce) kg
22 ... 28	100 A, Fuse class J	10	AF40 ... AF65	TF65-28	1SAZ811201R1001	0.46
25 ... 33	100 A, Fuse class J	10	AF40 ... AF65	TF65-33	1SAZ811201R1002	0.46
30 ... 40	100 A, Fuse class J	10	AF40 ... AF65	TF65-40	1SAZ811201R1003	0.46
36 ... 47	125 A, Fuse class J	10	AF40 ... AF65	TF65-47	1SAZ811201R1004	0.46
44 ... 53	125 A, Fuse class J	10	AF40 ... AF65	TF65-53	1SAZ811201R1005	0.46
50 ... 60	150 A, Fuse class J	10	AF40 ... AF65	TF65-60	1SAZ811201R1006	0.47
57 ... 67	150 A, Fuse class J	10	AF40 ... AF65	TF65-67	1SAZ811201R1007	0.47

Ordering details accessories

For thermal overload relays A	Description	Catalog number	Global code	Weight (1 pce) kg
TF65	Reset push button[1)]	KPR3-101L	1SFA616162R1014	0.03
TF65	Single mounting kit	DB65	1SAZ801901R1001	0.13

[1)] For more information, see catalog AC1400.

Main dimensions *mm, inches*



TF65

TF65 thermal overload relays
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	TF65
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		TF65
Contact rating	N.C., 95-96	B600, Q600
	N.O., 97-98	D300, Q600
Conventional thermal current	N.C., 95-96	5 A
	N.O., 97-98	1 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	100 kA	100 A, Class J
TF65-33	33 A	5 kA	100 A, K5 / RK5	100 kA	100 A, Class J
TF65-40	40 A	5 kA	100 A, K5 / RK5	100 kA	100 A, Class J
TF65-47	47 A	5 kA	125 A, K5 / RK5	100 kA	125 A, Class J
TF65-53	53 A	10 kA	125 A, K5 / RK5	100 kA	125 A, Class J
TF65-60	60 A	10 kA	150 A, K5 / RK5	100 kA	150 A, Class J
TF65-67	67 A	10 kA	150 A, K5 / RK5	100 kA	150 A, Class J

TF65 thermal overload relays
Technical data

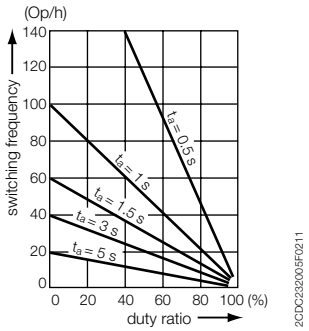
Main circuit – Utilization characteristics according to IEC/EN

Type	**TF65**
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		**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, 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

TF65 thermal overload relays
Technical data

General technical data

Type			TF65
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			5g / 3 ... 150 Hz
Mounting position			Position 1
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

5

Electrical connection

Main circuit

Type			TF65
Connecting capacity			
	Rigid	**1 x or 2 x**	2.5 ... 16 mm² (1 x 2.5 ... 35 mm²)
	Flexible with insulated ferrule	**1 x or 2 x**	2.5 ... 16 mm² (1 x 2.5 ... 35 mm²)
	Stranded acc. to UL/CSA	**1 x or 2 x**	AWG 12-6 (1 x AWG 12 ... 2)
	Flexible acc. to UL/CSA	**1 x or 2 x**	AWG 12-6 (1 x AWG 12 ... 2)
Stripping length			17 mm
Tightening torques			4.0 - 4.5 Nm / 35 ... 40 lb.in
Connection screw			M6 (Pozidriv 2)

[1] Only connect two different "conductor/wire" cross-sections, if they are within the indicated ranges

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 ... 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
	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 torques			1.1 ... 1.5 Nm / 9 ... 13 lb.in
Connection screw			M3 (Pozidriv 2)

TF96 thermal overload relays for AF80 ... AF96
40 ... 96A

TF96

DB96

DB96 + TF96

KPR3-101L

5

Description

The TF69 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

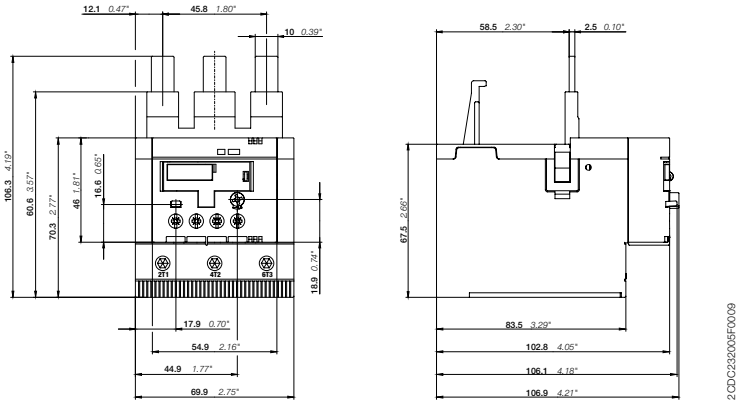
Setting range A	Short-circuit protective device 100 kA 600 VAC	Trip class	Fitting to contactors	Catalog number	Global code	Weight (1 pce) kg
40 ... 51	125 A, Fuse class J	10	AF80 ... AF96	TF96-51	1SAZ911201R1001	0.62
48 ... 60	150 A, Fuse class J	10	AF80 ... AF96	TF96-60	1SAZ911201R1002	0.62
57 ... 68	150 A, Fuse class J	10	AF80 ... AF96	TF96-68	1SAZ911201R1003	0.62
65 ... 78	175 A, Fuse class J	10	AF80 ... AF96	TF96-78	1SAZ911201R1004	0.62
75 ... 87	200 A, Fuse class J	10	AF80 ... AF96	TF96-87	1SAZ911201R1005	0.62
84 ... 96	225 A, Fuse class J	10	AF80 ... AF96	TF96-96	1SAZ911201R1006	0.63

Ordering details accessories

For thermal overload relays A	Description	Catalog number	Global code	Weight (1 pce) kg
TF96	Reset push button[1)]	KPR-101L	1SFA616162R1014	0.03
TF96, EF96	Single mounting kit	DB96	1SAZ901901R1001	0.19

[1)] For more information, see catalog AC1400.

Main dimensions *mm, inches*



TF96

TF96 thermal overload relays
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	TF96
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		TF96
Contact rating	**N.C., 95-96**	B600, Q600
	N.O., 97-98	D300, Q600
Conventional thermal current	**N.C., 95-96**	5 A
	N.O., 97-98	1 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	100 kA	125 A, Class J
TF96-60	60 A	10 kA	150 A, K5 / RK5	100 kA	150 A, Class J
TF96-68	68 A	10 kA	150 A, K5 / RK5	100 kA	150 A, Class J
TF96-78	78 A	10 kA	175 A, K5 / RK5	100 kA	175 A, Class J
TF96-87	87 A	10 kA	200 A, K5 / RK5	100 kA	200 A, Class J
TF96-96	96 A	10 kA	250 A, K5 / RK5	100 kA	225 A, Class J

TF96 thermal overload relays
Technical data

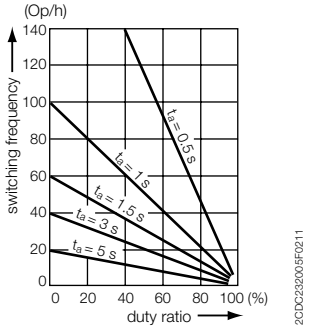
Main circuit – Utilization characteristics according to IEC/EN

Type	TF96
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		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

TF96 thermal overload relays
Technical data

General technical data

Type		TF96
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			TF96
Connecting capacity			
	Rigid	**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)
	Stranded acc. to UL/CSA	**1 x or 2 x**	AWG 8-3 (1 x AWG 8 ... 1)
	Flexible acc. to UL/CSA	**1 x or 2 x**	AWG 8-3 (1 x AWG 8 ... 1)
Stripping length			22 mm
Tightening torques			6.5 - 9 Nm / 57 ... 80 lb.in
Connection screw			M8 (Hexagon 4)

[1] Only connect two different “conductor/wire” cross-sections, if they are within the indicated ranges

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 ... 2.5 mm²
	Flexible with insulated ferrule	**1 x** **2 x**	0.75 ... 2.5 mm² 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 torques			1.1 ... 1.5 Nm / 9 ... 13 lb.in
Connection screw			M3 (Pozidriv 2)

TF140DU thermal overload relays for contactor AF116 ... AF140
66 ... 142 A

TF140DU-110

KPR3-101L

5

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

Ordering details

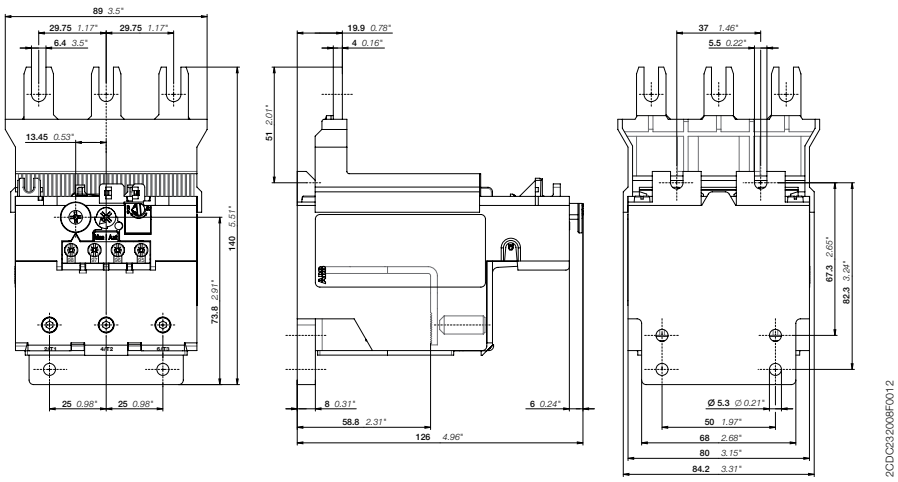
Setting range A	Short-circuit protective device 100 kA 600 VAC	Trip class	Fitting to contactors	Catalog number	Global code	Weight (1 pce) kg
66 ... 90	250 A, Fuse class J	10A	AF116 ... AF140	TF140DU-90	1SAZ431201R1001	0.82
80 ... 110	250 A, Fuse class J	10A	AF116 ... AF140	TF140DU-110	1SAZ431201R1002	0.82
100 ... 135	250 A, Fuse class J	10A	AF116 ... AF140	TF140DU-135	1SAZ431201R1003	0.82
110 ... 142	250 A, Fuse class J	10A	AF116 ... AF140	TF140DU-142	1SAZ431201R1004	0.82

Ordering details accessories

For thermal overload relays A	Description	Catalog number	Global code	Weight (1 pce) kg
TF140DU	Reset push button[1)]	KPR3-101L	1SFA616162R1014	0.03

[1)] For more information, see catalog AC1400.

Main dimensions *mm, inches*



TF140DU

TF140DU thermal overload relays
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	TF140DU
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
Contact rating	N.C., 95-96	B600
	N.O., 97-98	C300
Conventional thermal current	N.C./N.O.	5 A / 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		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	90 A	10 kA	250 A, K5 / RK5	100 kA	250 A, Class J	100 kA	250 A
TF140DU-110	110 A	10 kA	250 A, K5 / RK5	100 kA	250 A, Class J	100 kA	250 A
TF140DU-135	135 A	10 kA	250 A, K5 / RK5	100 kA	250 A, Class J	100 kA	250 A
TF140DU-142	142 A	10 kA	250 A, K5 / RK5	100 kA	250 A, Class J	100 kA	250 A

TF140DU thermal overload relays
Technical data

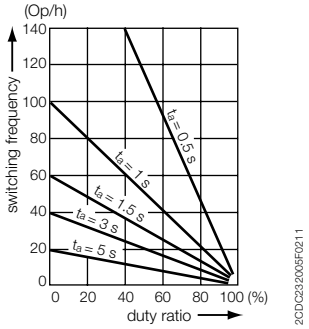
Main circuit – Utilization characteristics according to IEC/EN

Type	TF140DU
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
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



t_a: Motor starting time

TF140DU thermal overload relays
Technical data

General technical data

Type		TF140DU
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

5

Electrical connection

Main circuit

Type			TF140DU
Connecting capacity			
	Rigid	**1 x** **2 x**	16 ... 70 mm² -
	Flexible	**1 x** **2 x**	16 ... 70 mm² -
	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 torques			8 ... 10 Nm / 77 ... 88 lb.in
Connection screw			M8 (Hexagon)

Auxiliary circuit

Type			TF140DU
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 torques			0.8 ... 1.3 Nm / 12 lb.in
Connection screw			M3.5 (Pozidriv 2)

TA200DU thermal overload relays for contactor AF190 ... AF205
66 ... 200 A

2CDC231010F0011

TA200DU-200

1SFC151224V0001

KPR3-101L

5

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

Ordering details

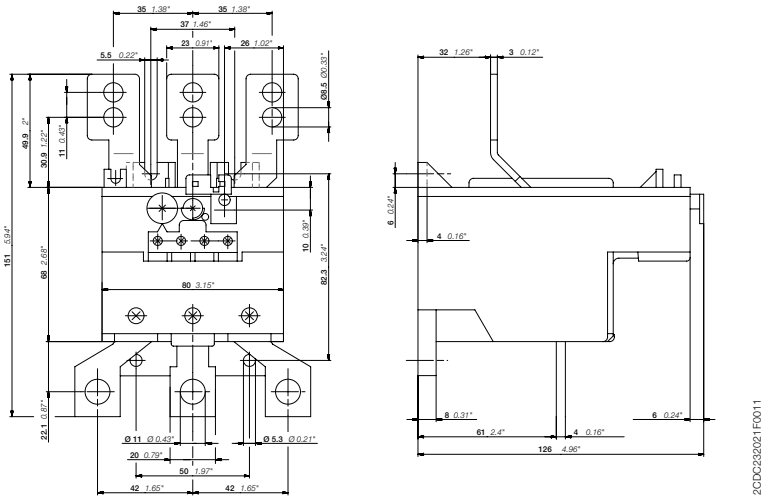
Setting range A	Short-circuit protective device 100 kA 600 VAC	Trip class	Fitting to contactors	Catalog number	Global code	Weight (1 pce) kg
66 ... 90	250 A, Fuse class J	10A	AF190 ... AF205	TA200DU90	1SAZ421201R1001	0.76
80 ... 110	250 A, Fuse class J	10A	AF190 ... AF205	TA200DU110	1SAZ421201R1002	0.76
100 ... 135	250 A, Fuse class J	10A	AF190 ... AF205	TA200DU135	1SAZ421201R1003	0.76
110 ... 150	250 A, Fuse class J	10A	AF190 ... AF205	TA200DU150	1SAZ421201R1004	0.76
130 ... 175	300 A, Fuse class J	10A	AF190 ... AF205	TA200DU175	1SAZ421201R1005	0.77
150 ... 200	400 A, Fuse class J	10A	AF190 ... AF205	TA200DU200	1SAZ421201R1006	0.79

Ordering details accessories

For thermal overload relays A	Description	Catalog number	Global code	Weight (1 pce) kg
TA200DU	Terminal shroud	LT200/A	1SAZ401901R1001	0.09
TA200DU	Single mounting kit	DB200	1SAZ401110R0001	0.23
TA200DU	Reset push button[1)]	KPR3-101L	1SFA616162R1014	0.03

[1)] For more information, see catalog AC1400.

Main dimensions *mm, inches*



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TA200DU

TA200DU thermal overload relays
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	TA200DU
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
Contact rating	N.C., 95-96	C600
	N.O., 97-98	B600
Conventional thermal current	N.C. / N.O.	2.5 A / 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	90 A	10 kA	250 A, K5 / RK5	225 A	100 kA	250 A, Class J	100 kA	250 A
TA200DU-110	110 A	10 kA	250 A, K5 / RK5	225 A	100 kA	250 A, Class J	100 kA	250 A
TA200DU-135	135 A	10 kA	300 A, K5 / RK5	225 A	100 kA	250 A, Class J	100 kA	250 A
TA200DU-150	150 A	10 kA	300 A, K5 / RK5	225 A	100 kA	250 A, Class J	100 kA	250 A
TA200DU-175	175 A	10 kA	300 A, K5 / RK5	225 A	100 kA	300 A, Class J	100 kA	300 A
TA200DU-200	200 A	10 kA	400 A, K5 / RK5	400 A	100 kA	400 A, Class J	100 kA	400 A

TA200DU thermal overload relays
Technical data

Main circuit – Utilization characteristics according to IEC/EN

Type	TA200DU
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

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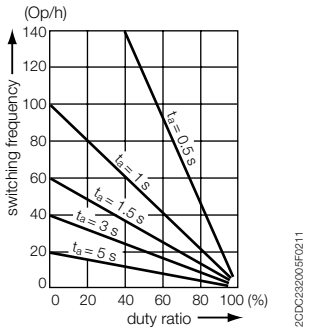
Auxiliary circuit according to IEC/EN

Type		TA200DU
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



t_a: Motor starting time

TA200DU thermal overload relays
Technical data

General technical data

Type		TA200DU
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

5

Electrical connection

Main circuit

Type			TA200DU
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 torques			25 Nm / 220 lb.in
Connection screw			Open bars

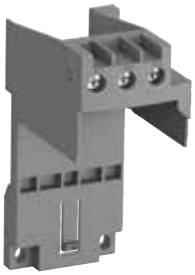
Auxiliary circuit

Type			TA200DU
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 torques			0.8 ... 1.3 Nm / 12 lb.in
Connection screw			M3.5 (Pozidriv 2)

EF19, EF45 electronic overload relays for contactor AF09 ... AF38
0.10 to 45.0 A

EF19-18.9

EF45-30



DB19EF

DB45EF

KPR3-101L

5

Description

The 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.

Ordering details

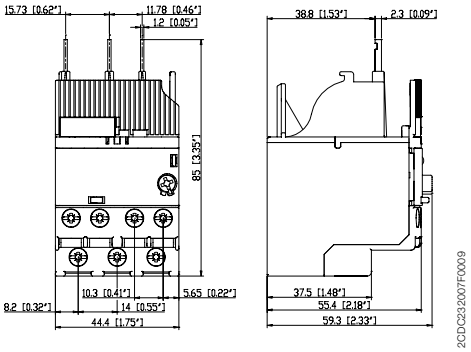
Setting range A	Short-circuit protective device 100 kA 600 VAC	Trip class	Fitting to connectors	Catalog number	Global code	Weight (1 pce) kg
EF19 electronic overload relays						
0.10 ... 0.32	2 A, Fuse class J	10E, 20E, 30E	AF09 ... AF38	EF19-0.32	1SAZ421201R1001	0.16
0.30 ... 1.00	2 A, Fuse class J	10E, 20E, 30E	AF09 ... AF38	EF19-1.0	1SAZ421201R1002	0.16
0.80 ... 2.70	4 A, Fuse class J	10E, 20E, 30E	AF09 ... AF38	EF19-2.7	1SAZ421201R1003	0.16
1.90 ... 6.30	15 A, Fuse class J	10E, 20E, 30E	AF09 ... AF38	EF19-6.3	1SAZ421201R1004	0.16
5.70 ... 18.9	30 A, Fuse class J	10E, 20E, 30E	AF09 ... AF38	EF19-18.9	1SAZ421201R1005	0.16
EF45 electronic overload relays						
9.00 ... 30.0	150 A, Fuse class J	10E, 20E, 30E	AF26 ... AF38	EF45-30	1SAX221001R1101	0.36
15.0 ... 45.0	200 A, Fuse class J	10E, 20E, 30E	AF26 ... AF38	EF45-45	1SAX221001R1102	0.36

Ordering details accessories

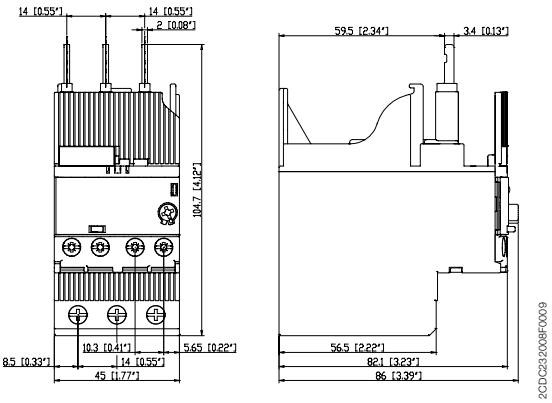
Suitable for	Description	Catalog number	Global code	Weight (1 pce) kg
EF19, EF45	Reset push button[1)]	KPR3-101L	1SAZ401901R1001	0.03
EF19	Single mounting kit	DB19EF	1SAZ401110R0001	0.05
EF45	Single mounting kit	DB45EF	1SFA616162R1014	0.10

[1)] For more information, see catalog AC1400.

Main dimensions *mm, inches*



EF19



EF45

EF19, EF45 electronic overload relays
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	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		EF19	EF45
Contact rating	N.C., 95-96	B600, Q600	
	N.O., 97-98	B600, Q600	
Conventional thermal current		5 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
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

EF19, EF45 electronic overload relays
Technical data

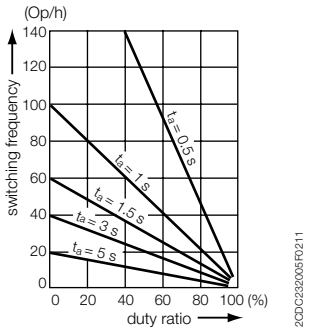
Main circuit – Utilization characteristics according to IEC/EN

Type	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		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 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



t_a: Motor starting time

EF19, EF45 electronic overload relays
Technical data

General data

			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	
Resistance to vibrations acc. to IEC 60068-2-6			1g / 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

			EF19	EF45
Type				
Connecting capacity				
	Rigid	**1 or 2 x**	1 ... 4 mm²	2.5 ... 16 mm²
	Flexible with insulated ferrule	**1 or 2 x**	0.75 ... 2.5 mm²	2.5 ... 10 mm²
	Stranded acc. to UL/CSA	**1 or 2 x**	AWG 16-10	AWG 14-6
	Flexible acc. to UL/CSA	**1 or 2 x**	AWG 16-10	AWG 14-6
Stripping length			9 mm	13 mm
Tightening torques			0.8 ... 1.5 Nm / 7 ... 13 lb.in	2.3 ... 2.6 Nm / 20 ... 22 lb.in
Connection screw			M3.5 (Pozidriv 2)	

Auxiliary circuit

			EF19	EF45
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 torques			0.8 ... 1.2 Nm / 7 ... 11 lb.in	
Connection screw			M3 (Pozidriv 2)	

EF65, EF96, EF146 electronic overload relays
20 to 150 A


2CDC231001F0013

EF65-70


2CDC231016F0012

EF96-100


2CDC231017F0012

EF146-150


2CDC231001V0015

DB96


2CDC231002V0015

DB96 + EF96


1SFC151224V0001

KPR3-101L

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.

Ordering details

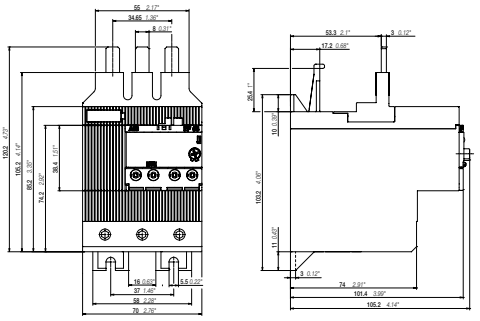
Setting range A	Short-circuit protective device 100 kA 600 VAC	Trip class	Fitting to contactors	Catalog number	Global code	Weight (1 pce) kg
20 ... 56	150 A, Fuse class J	10E, 20E, 30E	AF40 ... AF65	EF65-56	1SAX331001R1102	0.79
25 ... 70	150 A, Fuse class J	10E, 20E, 30E	AF40 ... AF65	EF65-70	1SAX331001R1101	0.79
36 ... 100	200 A, Fuse class J	10E, 20E, 30E	AF80 ... AF96	EF96-100	1SAX341001R1101	0.80
54 ... 150	250 A, Fuse class J	10E, 20E, 30E	AF116 ... AF140	EF146-150	1SAX351001R1101	0.89

Ordering details accessories

Suitable for	Description	Catalog number	Global code	Weight (1 pce) kg
EF96, TF96	Single mounting kit	DB96	1SAZ901901R1001	0.19
EF65, EF96, EF146	Reset push button[1)]	KPR3-101L	1SFA616162R1014	0.03

[1)] For more information, see catalog AC1400.

Main dimensions *mm, inches*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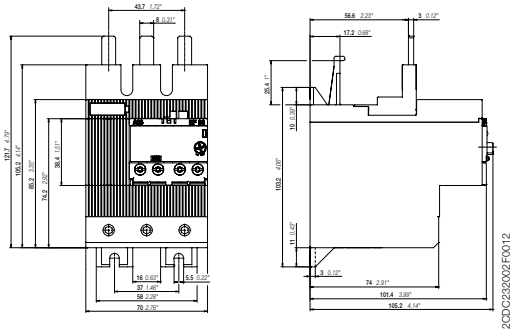
EF65-70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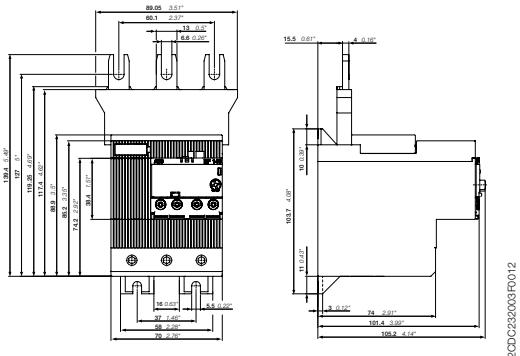
EF96-100


2CDC232003R0012

EF146-150

EF65, EF96, EF146 electronic overload relays
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		5 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, R5/RK5	10kA	150 A, R5/RK5	100 kA	150 A, J
EF65-70	70 A	10 kA	150 A, R5/RK5	10kA	150 A, R5/RK5	100 kA	150 A, J
EF96-100	100 A	10 kA	200 A, R5/RK5	10kA	200 A, R5/RK5	100 kA	200 A, J
EF146-150	150 A	10 kA	250 A, R5/RK5	10kA	250 A, R5/RK5	100 kA	250 A, J

EF65, EF96, EF146 electronic overload relays
Technical data

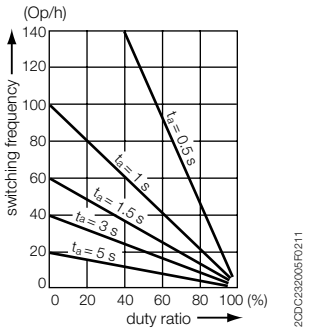
Main circuit – Utilization characteristics according to IEC/EN

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



t_a: Motor starting time

EF65, EF96, EF146 electronic overload relays
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

5

Electrical connection

Main circuit

Type			EF65	EF96	EF146
Connecting capacity					
	Rigid	**1 x** **2 x**	4 ... 35 mm² 4 ... 35 mm²	6 ... 70 mm² 6 ... 35 mm²	10 ... 95 mm² 10 ... 35 mm²
	Flexible	**1 x** **2 x**	4 ... 35 mm² 4 ... 35 mm²	6 ... 50 mm² 6 ... 35 mm²	10 ... 70 mm² 10 ... 35 mm²
	Stranded acc. to UL/CSA	**1 x** **2 x**	AWG 10-2	AWG 8-2	AWG 6-00 AWG 6-2
	Flexible acc. to UL/CSA	**1 x** **2 x**	AWG 10-2	AWG 8-2	AWG 6-00 AWG 6-2
Stripping length			20 mm	20 mm	20 mm
Tightening torques			4 Nm / 35 lb.in	6 Nm / 55 lb.in	8 Nm / 70 lb.in
Connection screw			M8 (Pozidriv 2)	M8 (Hexagon 4)	M8 (Hexagon 4)

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 torques			0.8 ... 1.2 Nm / 7 ... 11 lb.in
Connection screw			M3.5 (Pozidriv 2)

EF205, EF370 electronic overload relays
63 to 380 A

EF205-210

EF370-380

KPR3-101L

5

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.

Ordering details

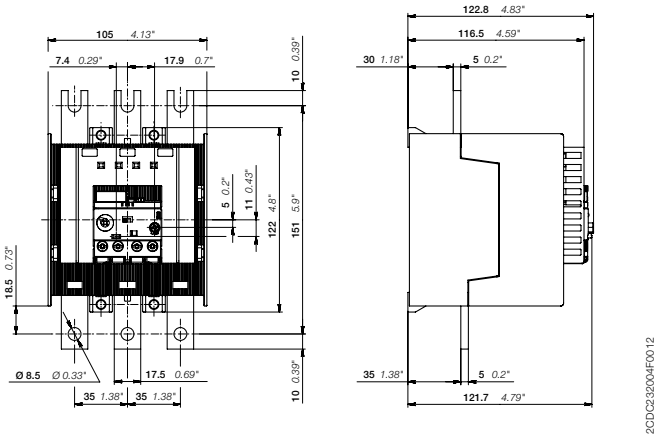
Setting range A	Short-circuit protective device 100 kA 600 VAC	Trip class	Fitting to contactors	Catalog number	Global code	Weight (1 pce) kg
63 ... 210	400 A, Fuse class J	10E, 20E, 30E	AF190 ... AF205	EF205-210	1SAX531001R1101	1.21
115 ... 380	600 A, Fuse class J	10E, 20E, 30E	AF265 ... AF370	EF370-380	1SAX611001R1101	1.43

Ordering details accessories

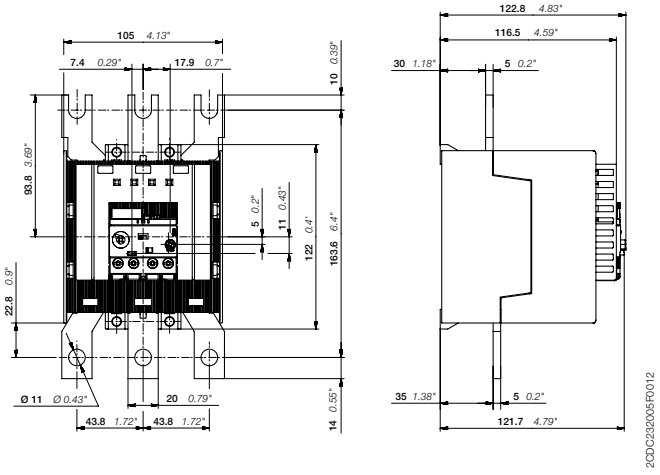
For thermal overload relays A	Description	Catalog number	Global code	Weight (1 pce) kg
EF205, EF370	Reset push button[1)]	KPR3-101L	1SFA616162R1014	0.03

[1)] For more information, see catalog AC1400.

Main dimensions *mm, inches*



EF205-210



EF370-380

EF205, EF370 electronic overload relays
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		5 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	100 kA	600 A, J

EF205, EF370 electronic overload relays
Technical data

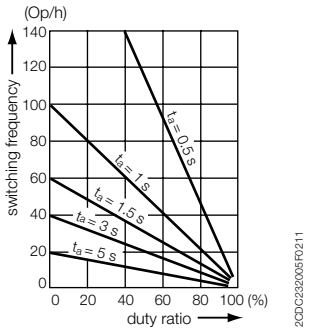
Main circuit – Utilization characteristics according to IEC/EN

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



t_a: Motor starting time

EF205, EF370 electronic overload relays
Technical data

General data

Type		EF205, EF370
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

Type			EF205	EF370
Connecting capacity				
	Rigid	**1 x** **2 x**	16 ... 185 mm² 16 ... 120 mm²	50 ... 240 mm² 50 ... 150 mm²
	Flexible	**1 x** **2 x**	16 ... 185 mm² 16 ... 120 mm²	50 ... 240 mm² 50 ... 150 mm²
	Lugs	**L ≤**	24 mm	32 mm
	Bars	**Ø >**	8 mm	10 mm
	Stranded acc. to UL/CSA	**1 x** **2 x**	AWG 6-0000 AWG 6-0000	AWG 1-500 kcmil AWG 1-500 kcmil
	Flexible acc. to UL/CSA	**1 x** **2 x**	AWG 6-0000 AWG 6-0000	AWG 1-500 kcmil AWG 1-500 kcmil
Stripping length			-	-
Tightening torques			18 Nm / 160 lb.in	28 Nm / 247 lb.in
Connection screw			M8	M10

Auxiliary circuit

Type			EF205, EF370
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 torques			0.8 ... 1.2 Nm / 7 ... 11 lb.in
Connection screw			M3.5 (Pozidriv 2)

EF460, EF750, E1250DU electronic overload relays
150 to 1250 A

EF460-500

EF750-800

E1250DU

KPR3-101L

Description

The EF460 up to E1250DU 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.

Ordering details

Setting range A	Short-circuit protective device 100 kA 600 VAC	Trip class	Fitting to contactors	Catalog number	Global code	Weight (1 pce) kg
EF460 electronic overload relay						
150 ... 500	800 A, Fuse class L	10E, 20E, 30E	AF400 ... AF460	EF460-500	1SAX721001R1101	1.17
EF750 electronic overload relay						
250 ... 800	1200 A, Fuse class L	10E, 20E, 30E	AF580 ... AF750	EF750-800	1SAX821001R1101	3.90
E1250DU electronic overload relay						
375 ... 1250	2000 A, Fuse class L[1]	10E, 20E, 30E	AF1350 ... AF1650	E1250DU1250	1SFA739001R1000	12.18

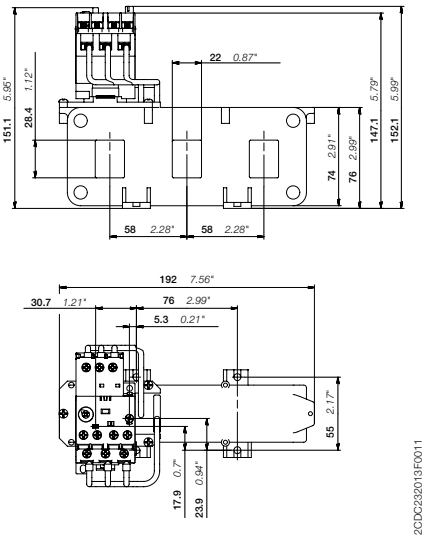
[1] Short-circuit rating 85 kA 600 VAC

Ordering details accessories

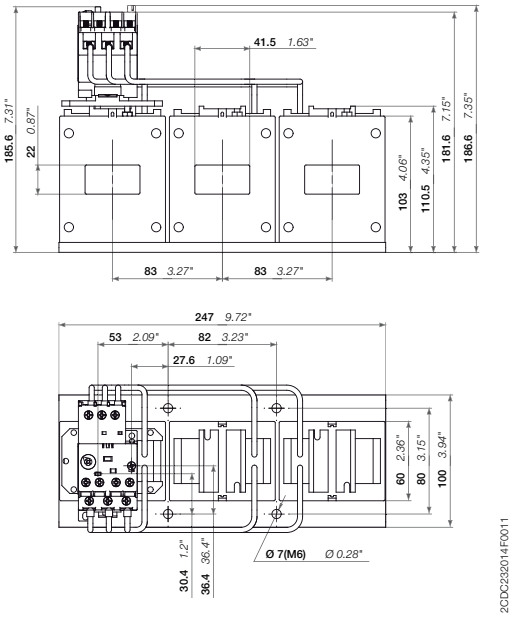
For electronic overload relays	Description	Catalog number	Global code	Weight (1 pce) kg
EF460	Terminal shroud for EF460	LT460EF	1SAX701904R0002	0.36
EF750	Terminal shroud for EF750	LT750EF	1SAX801904R0002	0.10
EF460, EF750	Reset push button[1]	KPR3-101L	SFA616162R1014	0.03

[1] For more information, see catalog AC1400.

Main dimensions *mm, inches*



EF460



EF750

EF460, EF750, E1250DU electronic overload relays
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	EF460	EF750	E1250DU
Standards	UL 508, CSA 22.2 No. 14		
Maximum operational voltage	600 V AC		
Trip rating	125 % of FLA		

Auxiliary circuit according to UL/CSA

Type		EF460	EF750	E1250DU
Contact rating	**N.C., 95-96**	B600, Q300		
	N.O., 97-98	B600, Q300		
Conventional thermal current		5 A		

General data

Type		EF460	EF750	E1250DU
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		
Resistance to vibrations acc. to IEC 60068-2-6		5g / 3 ... 150 Hz		
Degree of protection	Housing	IP20		
	Main circuit terminals	IP20		

Electrical connection

Auxiliary circuit

Type			EF460	EF750	E1250DU
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 16-10		
	Flexible acc. to UL/CSA	**1 or 2 x**	AWG 16-10		
Stripping length			9 mm		
Tightening torques			0.8 ... 1.2 Nm / 7 lb.in		
Connection screw			M3.5 (Pozidriv 2)		

EF460, EF750, E1250DU electronic overload relays
Technical data

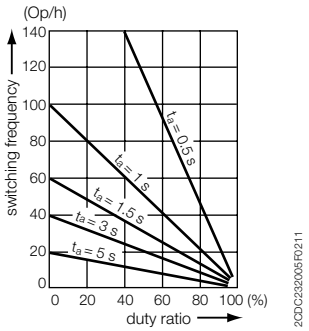
Main circuit – Utilization characteristics according to IEC/EN

Type	EF460	EF750	E1250DU
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	E1250DU
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**	0.72 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}		8 kV		
Rated insulation voltage U_i		690 V		

Technical diagram – Intermittent periodic duty



t_a: Motor starting time

Thermal and electronic overload relays
General accessories

WRB-400

WRH-F

Description

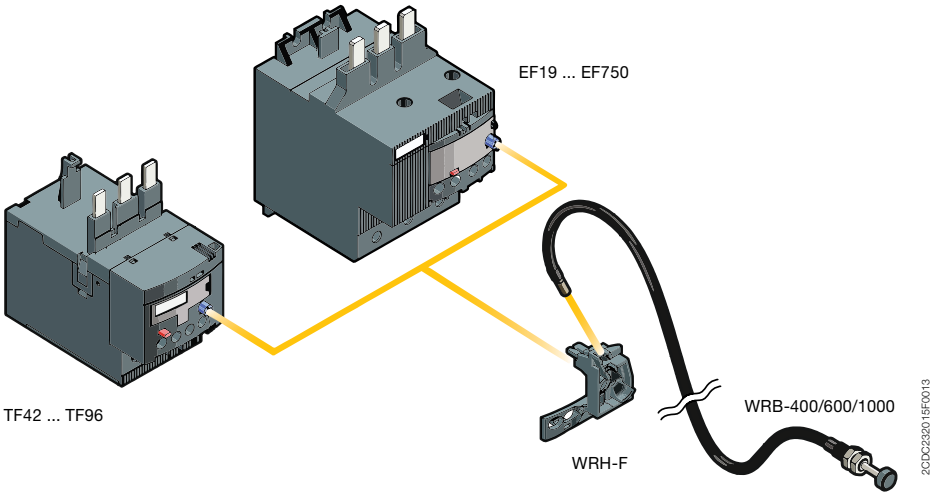
The wire reset is a general accessory for thermal and electronic overloads relays. In installations which are difficult to access, like a motor control centre or compact cubical, the accessory allows the user to remotely reset the overload relays.

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	Catalog number	Global code	Weight (1 pc) kg
Holder					
TF42, TF65, TF96, EF19, EF45, EF65, EF96, EF146, EF205, EF370, EF460, EF750	Holder for tool less direct mounting		WRH-F	WRH-F 1SAZ701903R1001 0.006	0.01
Bowden wire with actuator					
WRH-F	Bowden wire with actuator, hole diameter: 7.3 mm, maximum panel thickness: 12 mm	400	WRB-400	1SAZ701903R1011	0.03
		600	WRB-600	1SAZ701903R1012	0.04
		1000	WRB-1000	1SAZ701903R1013	0.06
IP54 gasket					
WRB-400 WRB-600 WRB-1000	IP54 Panel seal gasket		WRBG	1SAZ701903R1030	0.04

Overload relays with accessory wire reset (WRH, WRB)




ABB

DRAF enclosed starters

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

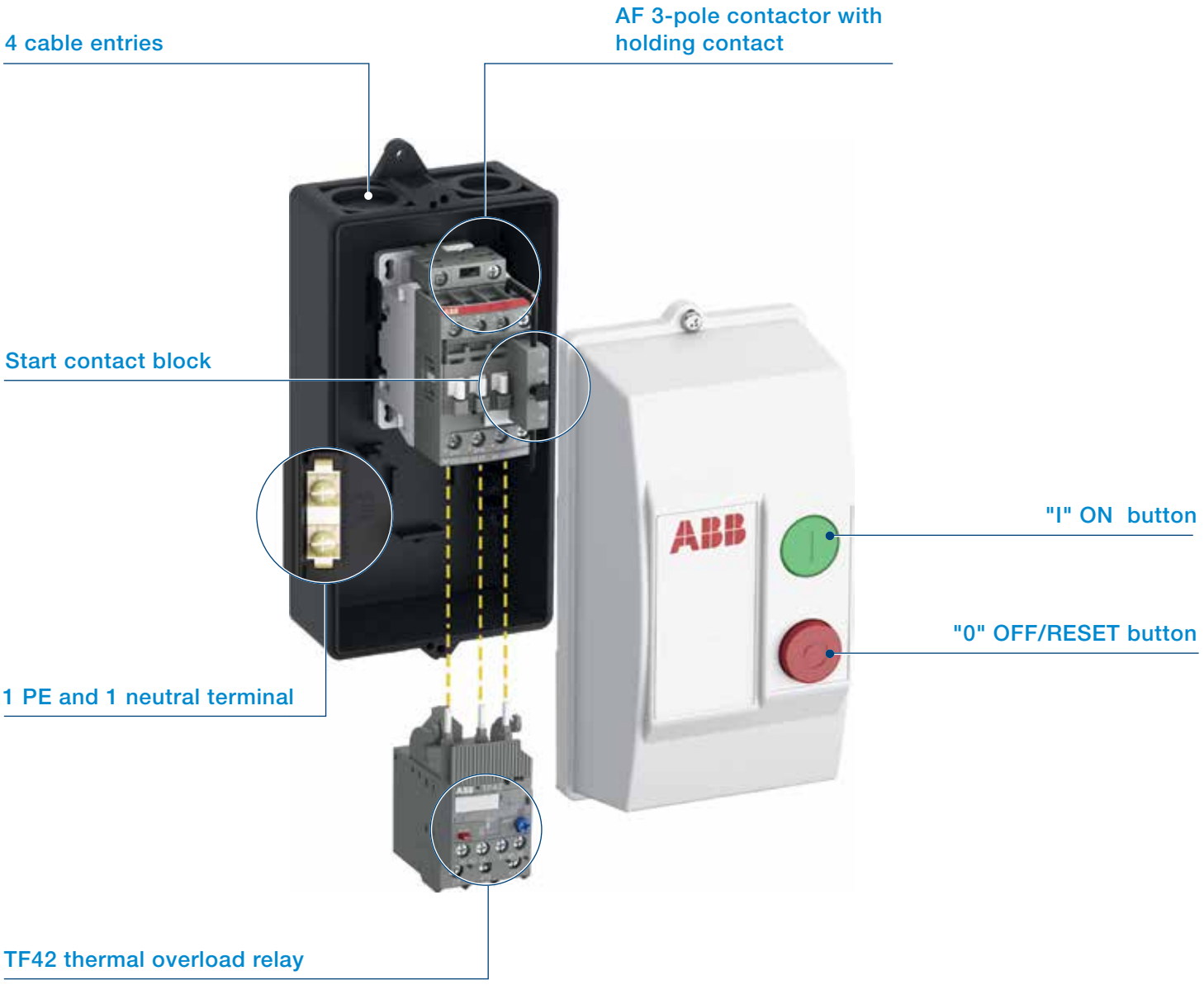
- AF contactors manage voltage fluctuation, chattering free
- Protected motor with thermal overload relay
- Safety through coordinated product.

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...

Motor starting solutions up to 7.5 kW and 10 hp



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).

6

DRAF enclosed DOL starters

IEC - AC-3					Control supply wiring	Rated control circuit voltage Uc min ... Uc max[1]	Catalog number	Global code	Weight
Rated operational power				max. current θ ≤ 40 °C Ue=400 V					Pkg (1 pce)
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	Catalog number	Global code	Weight
Horse power ratings									
Single phase motor		Three phase motor							Pkg (1 pce)
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

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	Catalog number	Global 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

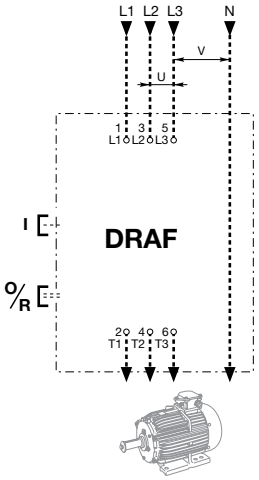
Empty enclosure with push-button

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

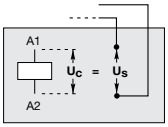
Note: To be completed with AF contactor, TF42 thermal overload relay and CB5-10 (1SBN010013R1010) start contact block.

DRAF09 … DRAF16 enclosed direct-on-line starters

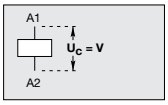
Control supply wiring versions



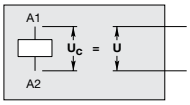
DRAF..S
DRAF..U
Separate supply



DRAF..N
Phase-to-neutral



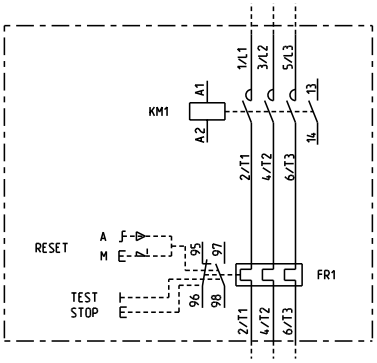
DRAF..P
Phase-to-phase



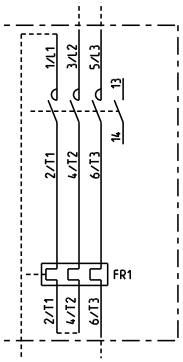
6

Wiring diagram

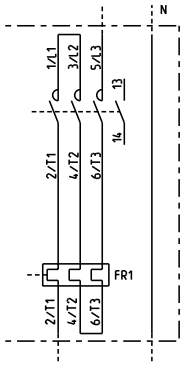
Power circuit



3-phase motor

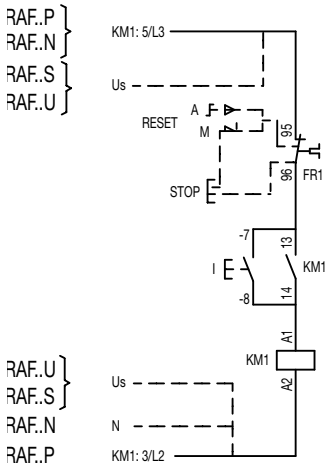


Phase-to-phase
Single phase motor

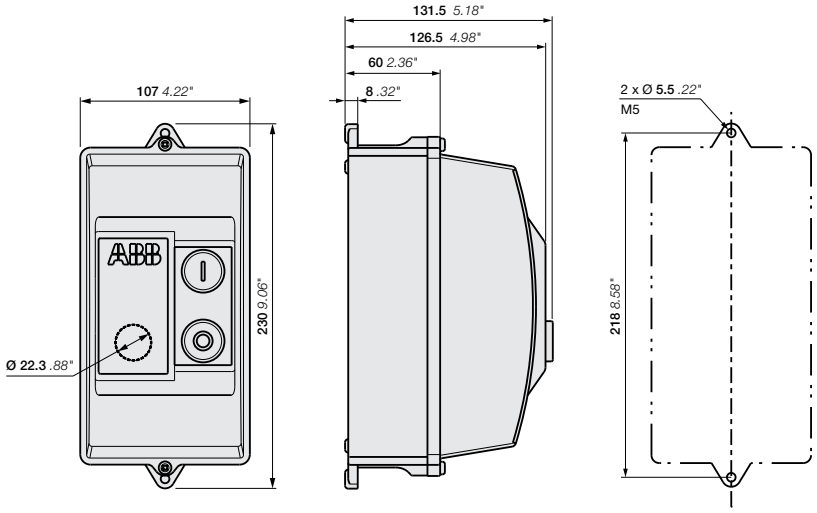


Phase-to-neutral
Single phase motor

AC local control



Main dimensions mm, *inches*



DRAF09, DRAF12, DRAF16

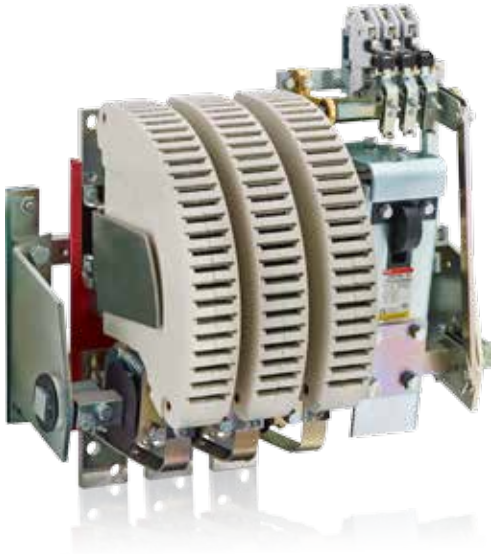
IEC starter types - ISO M20

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"*

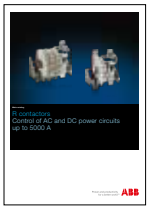
Notes



Bar contactors

7

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

Bar contactors
Tailored to your needs

With over 100 years of experience in control, ABB has designed its Bar 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 Bar 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 Bar 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

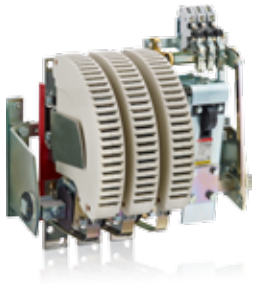
- Iron and steel industries
- Mining
- Cranes
- Induction furnaces
- Hydroelectric power stations
- Photovoltaic power plants
- Power distribution
- Energy storage
- Railway substation
- Lighting equipment
- Pump stations.

Bar contactors
Get the right product

Conventional applications

AC circuit switching

Up to 500 V AC
IOR contactors



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

From 500 up to 1000 V AC
IOR..MT contactors

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

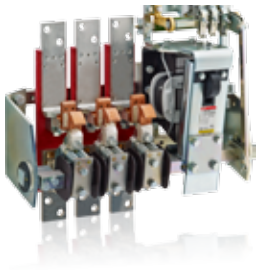
N.O./N.C. main poles combination

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

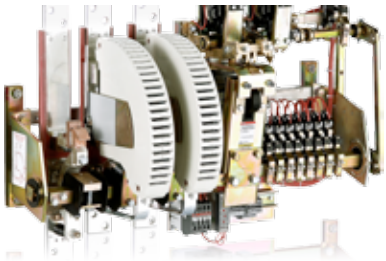
Uer up to 5000 V AC
FOR contactors

Energy saving and safety requirements

Equipped with latching
..AMA, ..AME contactor types

Alternator field discharge

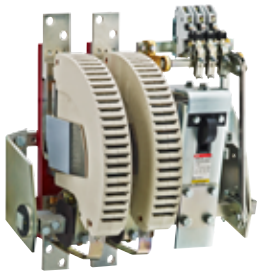
Umax 2250 V DC
AM-CC-JORE contactors



Bar contactors for AC circuit switching

Rated operational voltage
Ue from 500 up to **1000 V AC**

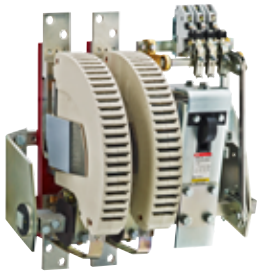




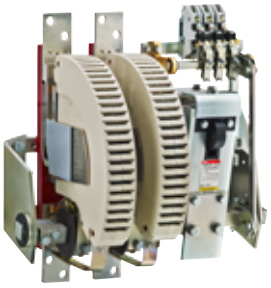
Contactor type	AC control circuit ~			IORR63..MT	IORR125..MT	IORR200..MT	IORR400..MT	IORR500..MT	IORR800..MT
	DC control circuit ⎓			IORE63..MT	IORE125..MT	IORE200..MT	IORE400..MT	IORE500..MT	IORE800..MT
Categories		**Ue**							
AC-1	at 40 °C		**Ie**	85 A	170 A	260 A	400 A	550 A	800 A
AC-3		690 V AC	**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**

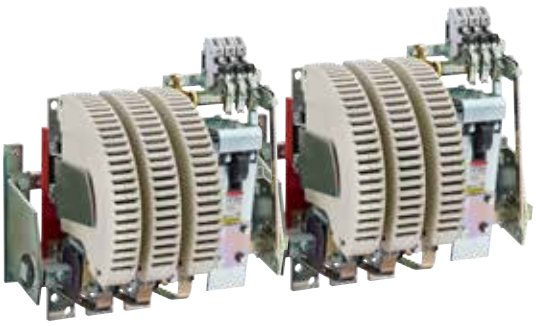
7

Rated operational voltage
Ue up to **500 V AC**

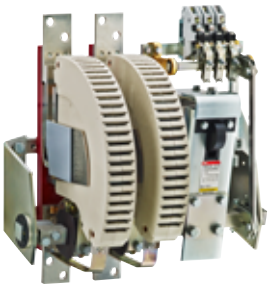


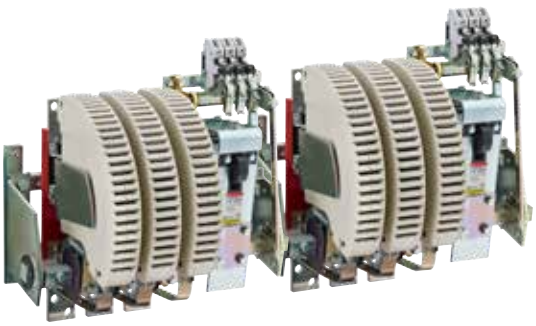
Contactor type	AC control circuit ~			–	IORR800
	DC control circuit ⎓			–	IORE800
Categories		**Ue**			
AC-1	at 40 °C		**Ie**	From 85 A to 550 A, select above IOR..-MT	900 A
AC-3		380-415-440 V AC	**Ie**	–	800 A
		500 V AC max.	**Ie**	–	800 A
AC-3		400 V AC	**Power**	–	**450 kW**





IORR1400..MT IORE1400..MT	IORR1700..MT IORE1700..MT	IORR2100..MT IORE2100..MT	IORR2500..MT IORE2500..MT	IORR3200..MT IORE3200..MT	IORR3800..MT IORE3800..MT	IORR4500..MT IORE4500..MT	IORR5100..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 IORE1000	IORR1400 IORE1400	IORR1700 IORE1700	IORR2100 IORE2100	IORR2500 IORE2500	IORR3200 IORE3200	IORR3800 IORE3800	IORR4500 IORE4500	IORR5100 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**	–	–	–	–	–

Bar contactors for DC circuit switching

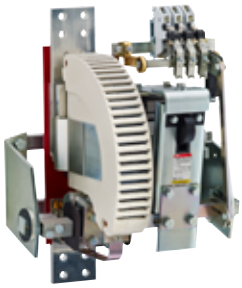
Rated operational voltage
Ue up to **1500 V DC**

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*

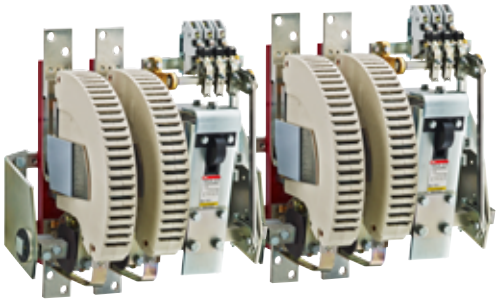
* Ue max. = 1500 V DC, version with increased insulation for 1000 V DC < Ue ≤ 1500 V DC, please consult us.

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	IORR1000..CC	IORR1400..CC	IORR1700..CC	IORR2100..CC	IORR2500..CC	IORR3200..CC	IORR3800..CC	IORR4500..CC	IORR5100..CC
		IORE800..CC	IORE1000..CC	IORE1400..CC	IORE1700..CC	IORE2100..CC	IORE2500..CC	IORE3200..CC	IORE3800..CC	IORE4500..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

Questionnaire
Specification for Bar 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

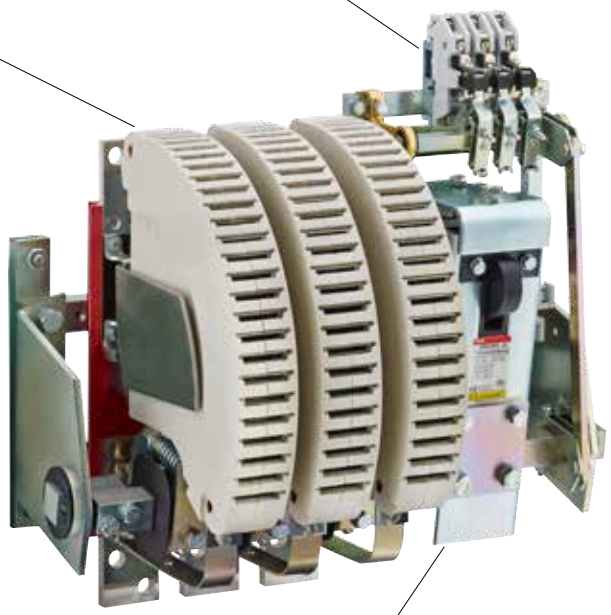
or

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

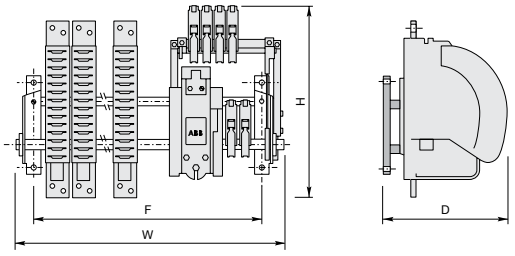
Switching frequency ..... cycles/h
Mech. durability required (millions of operating cycles) .....
Remarks .....

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

Questionnaire
Specification for Bar 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

Certifications and approvals
General technical data

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	GL	LR	DNV	RINa	ABS	RMRS	CCS
Approved in	Canada	USA	North America	China	Russia	Korea	France	Germany	Gr.Britain	Norway	Italy	USA	Russia	China shipping
3-pole contactors														
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	■	■	■	■	■ (3)	■	■ (3)	■	■	■	
AC / DC operated AF40, AF52, AF65, AF80, AF96			E312527	■	■	■	■	■ (3)	■	■ (3)	■	■	■	
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														
25 to 125 A, AC-1														
AC / DC operated AF09, AF16, AF26, AF38			E312527	■	■	■	■	■ (3)	■	■ (3)	■	■	■	
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. (3) DNV-GL certificate.
All AF contactors are (RCM) marked.

Certifications and approvals

	Certifications						Approvals: ship classification societies							
Mark														
Abbreviation	CSA	UL	cULus	CCC	GOST or EAC	KC	BV	GL	LR	DNV	RINa	ABS	RMRS	CCS
Approved in	Canada	USA	North America	China	Russia	Korea	France	Germany	Gr.Britain	Norway	Italy	USA	Russia	China shipping
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														
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	■	■		■	■	■	■	■	(1)	■	

(1) in progress.
All GAF and NF contactors are (RCM) marked.

8

Certifications and approvals

	Certifications					Approvals: ship classification societies							
Mark													
Abbreviation	CSA	UL	cULus	CCC	GOST or EAC	BV	GL	LR	DNV	RINa	ABS	RMRS	CCS
Approved in	Canada	USA	North America	China	Russia	France	Germany	Gr.Britain	Norway	Italy	USA	Russia	China shipping
Accessories for AS09 ... AS16 contactors													
Auxiliary contacts													
CA3			■ 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			■ E312527		■								
RC5-1			■ E312527		■								
RV5			■ E312527		■								
Accessories for AF09 ... AF2650 and EK contactors and NF contactor relays													
Auxiliary contacts													
CA4, CC4			■ E252354	■	■	■ (CA4)	■ (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		■								
Electronic timer													
TEF4			■ 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.

Certifications and approvals

	Certifications					Approvals: ship classification societies							
Mark	CSA	UL	cULus	CCC	GOST or EAC	BV	GL	LR	DNV	RINa	ABS	RMRS	CCS
Abbreviation	CSA	UL	cULus	CCC	GOST or EAC	BV	GL	LR	DNV	RINa	ABS	RMRS	CCS
Approved in	Canada	USA	North America	China	Russia	France	Germany	Gr.Britain	Norway	Italy	USA	Russia	China shipping
Latching unit													
WB75-A		■ E252354			■								
WA4		(1)											
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						□	□	□	□	□	□	□	□
BES460-30 , BES750-30			■ E36588		■	□	□	□	□	□	□	□	□
Connection bars between contactors and MCCB													
BEA140/XT2			■ 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		■	□	□	□	□	□	□	□	□
LK96-4			■ 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	KC	BV	GL	LR	DNV	RINa	ABS	RMRS
Approved in	Canada	USA	North America	China	Russia		Korea	France	Germany	Gr.Britain	Norway	Italy	USA	Russia
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	■			■			■ (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.

Certifications and approvals

	Certifications							Approvals: ship classification societies						
Mark														
Abbreviation	CSA	UL	cULus	CCC	GOST or EAC	ATEX	KC	BV	GL	LR	DNV	RINa	ABS	RMRS
Approved in	Canada	USA	North America	China	Russia		Korea	France	Germany	Gr.Britain	Norway	Italy	USA	Russia
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	■	■			■	■	■	■		■	■
TA200DU-V1000			■ E48139	■	■	■		■	■	■	■		■	■
Electronic overload relays														
0.10...45 A														
E16DU			■ E48139	■	■									■
EF19			■ E48139	■	■	■		■		■	■	■	■	■
EF45			■ E48139	■	■	■		■		■	■	■	■	■
20...150 A														
EF65			■ E48139	■	■	■ (2)		■		■	■	■ (2)	■	■
EF96			■ E48139	■	■	■		■		■	■	■	■	■
EF146			■ E48139	■	■	■		■		■	■	■	■	■
63...380 A														
EF205			■ E48139	■	■	■		■		■	■	■	■	■
EF370			■ E48139	■	■	■		■		■	■	■	■	■
150...800 A														
EF460			■ E48139	■	■	■		■		■	■	■	■	■
EF750			■ E48139	■	■	■		■		■	■	■	■	■
150...1250 A														
E1250DU			■ E76003											■

(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.

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

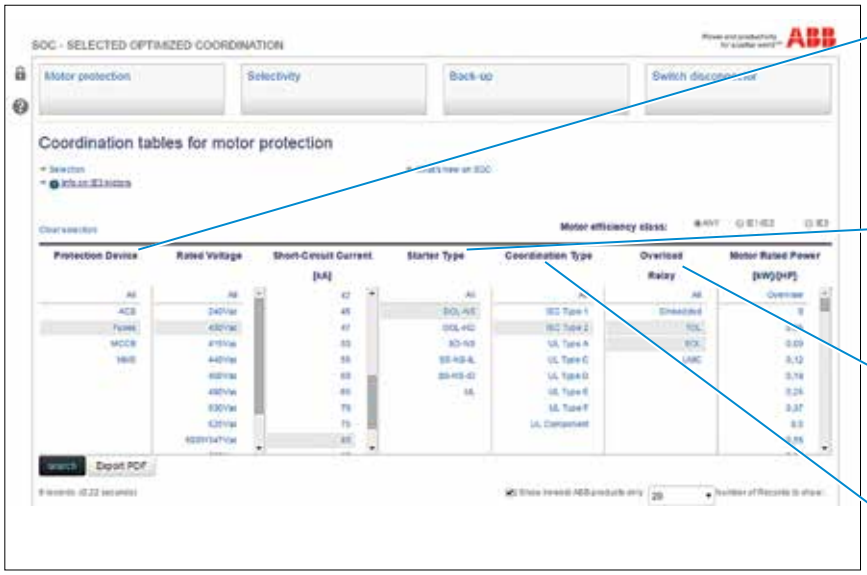
– Each table is defined for a maximum ambient temperature of 40 °C. For higher temperatures, apply a derating factor according to the following rules:
  - Fuses: factor of 0.8 applied to **In** for an ambient temperature of 70 °C
  - MCCBs and MCBs: factor of 0.8 applied to **In** for an ambient temperature 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.

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

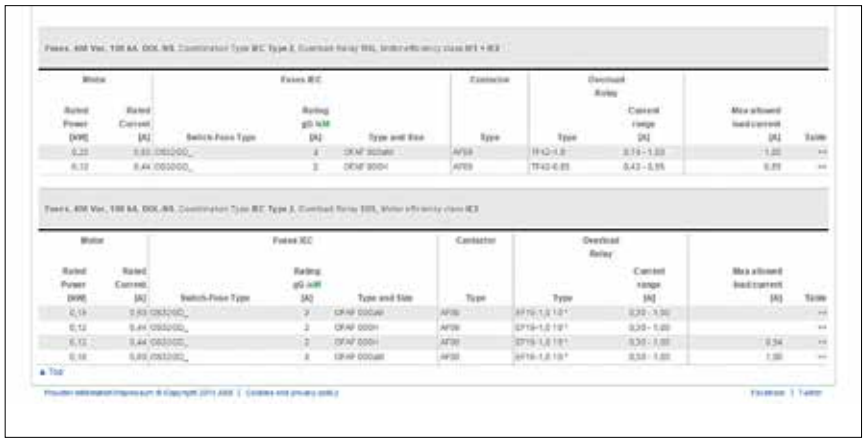
Starter type
- Direct-on-line normal start
- Direct-on-line heavy duty
- Star-delta normal start
- Soft starter normal start

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

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:

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

Standards, specifications and certifying organizations

Specifications (cont.)

International Standards

IEC 60947-1 Low-voltage switchgear and controlgear – Part 1: General rules
IEC 60947-4-1 Low-voltage switchgear and controlgear – Part 4: Contactors and motor starters – Section 1: Electromechanical contactors and motor starters
IEC 60947- 5-1 Low-voltage switchgear and controlgear – Part 5: Control circuit devices and switching elements – Section 1: Electromechanical control circuit devices
IEC 60947-5-4 Low-voltage switchgear and controlgear – Part 5-4: Control circuit devices and switching elements. Method of assessing the performance of low-energy contacts. Special tests
IEC 60947- 6-1 Low-voltage switchgear and controlgear – Part 6: Multiple function equipment – Section 1: Automatic transfer switching equipment
IEC 60204-1 Electrical equipment of industrial machines – Part 1: General requirements
IEC 60715 Dimensions of low-voltage switchgear and controlgear. Standardized mounting on rails for mechanical support of electrical devices in switchgear and controlgear installations

European Standards

EN 50 005 Low-voltage switchgear and controlgear for industrial use – Terminal marking and distinctive number: General rules (Annex L of IEC 60947-1).
EN 50 011 Low-voltage switchgear and controlgear for industrial use – Terminal marking, distinctive number and distinctive letter for particular contactor relays (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...

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			

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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 semiconductor 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.

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.

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.

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

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	6000	1.5	0.8	50	–
	■	■	AC resistance	1	1	6000	1.5	1	50	"Resistive"
	■	■	AC resistance air heating	1	1	100000	1.5	1	50	"Resistance"
		■	AC electrical heating control	1	1	250000	1.5	1	50	–
Motor loads										
■	■	■	AC-2: slip-ring motors	2	0.65	6000	4	0.65	50	–
■			AC-3: squirrel cage motors	2	0.45	6000	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	1000	LRA (~6)	0.40 – 0.50	50	–
	■	■	Elevator control, AC motor	2	0.50	500000	n/a	n/a	n/a	"Elevator duty"
■	■	■	AC-4: plugging, inching, jogging	6	0.45	6000	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	6000	3	0.45	50	"Ballast"
■	■	■	AC-5b: incandescent lamps	1	Lamp	6000	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	6000	1.5	Capacitor	50	–
Hermetic refrigerant compressor motors										
■	■	■	AC-8a: hermetic refrigerant compressor	1	0.8	30000	6	0.45	50	"Hermetic refrigeration compressor"
■	■	■	AC-8b: hermetic refrigerant compressor (recycle rating)	6	0.45	6000	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	6000	1.5	1	50	–
	■	■	DC resistance	1	1	6000	1.5	1	50	"Resistive"
	■	■	DC resistance air heating	1	1	100000	1.5	1	50	"Resistance"
Motor loads										
■			DC-3: shunt motors	2.5	2	6000	4	2.5	50	–
	■	■	DC motor (across-the-line switching)	2	n/a	1000	10	n/a	50	–
	■	■	Elevator control, DC motor	2	n/a	500000	Not applicable			"Elevator duty"
■			DC-5: series motors	2.5	7.5	6000	4	15	50	–
Lamps and lighting loads										
■	■	■	DC-6: incandescent lamps	1	Lamp	6000	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.

Degrees of protection

General

In an installation, the degree of protection required for electrical equipment depends on the environmental characteristics. The degree of protection, ensured by the enclosure of equipment or by the cubicle containing the equipment is expressed by the IP code which gives the level of protection against access to hazardous parts, the ingress of foreign bodies and/or the ingress of water, in compliance with IEC 60529, IEC 60947-1.
Besides the IP symbol, the complete code has two figures followed (optionally) by two additional letters. A short description of the elements used in IP coding is given below.

IP... code	Figures or letters	Specifications for installation protection	Protection of persons
First figure		**Against ingress of foreign bodies**	**Against access to hazardous parts with:**
	0	No protection	No protection
	1	Diameter > 50 mm	Back of hand
	2	Diameter > 12.5 mm	Finger
	3	Diameter > 2.5 mm	Tool
	4	Diameter > 1 mm	Wire
	5	Limited protection against dust	Wire
	6	Total protection against dust	Wire
Second figure		**Against entrance of water having a harmful effect**	
	0	No protection	
	1	Vertical dripping	
	2	Dripping at a vertical angle of < 15°	
	3	Rain at a vertical angle of < 60°	
	4	Splashing	
	5	Low pressure water jet	
	6	Powerful water jets	
	7	Temporary immersion	
	8	Permanent immersion	
Additional letter (optional) for use with:		**Against ingress of foreign bodies**	**Against access to hazardous parts with:**
First figure 0	**A**	Stopped by a barrier with a 50 mm Ø sphere	Back of hand
First figure 0 or 1	**B**	Entrance of test finger limited to 80 mm	Finger
First figure 1 or 2	**C**	Wire with 2.5 mm Ø and length of 100 mm	Tool
First figure 2 or 3	**D**	Wire with 1 mm Ø and length of 100 mm	Wire
Additional letter (optional)		**Specific additional information**	
	H	High voltage apparatus	–
	M	Moving parts which are moving during water test	
	S	Moving parts which are stationary during water test	
	W	Specified atmospheric conditions	

Note: The type of enclosure or cubicle in which the equipment must be installed prevails with respect to the degree of protection.

Climatic withstand of devices

The life time of devices are mainly influenced by series of climatic factors which cause their corrosion.
In practice, besides climatic conditions, there are other factors which may damage equipment such as fungi, insects (termites), dust, work site dirt and aggressive environment (salty or sulphurous atmosphere, etc.) which can often only be identified at the place of installation.
Climatic stress, definitions and test conditions are dealt with in national publications such as the DIN 50 series and UTE 63-100 publication which are attached to international publications such as IEC 60068.

The test conditions are:

Description	Symbolization	Time of one cycle	Cycle phase time	Temperature in test chamber	Relative humidity
Humidity and variable temperature	IEC 60068-2-30 Test Db	24 hours	12 hours including rise in temperature	40 °C	95 %
			12 hours including cooling (open device)	25 °C	95 %

ABB contactors have been used for many years in the most countries, with hot and humid climates for example: Brazil, Indonesia, India or on ships.
Experience has shown that ABB devices can be used in most countries throughout the world.
The climate of the country in which the apparatus is installed is not the determining choice factor.

Account must be taken of:

– the immediate environment of the devices (sheltered, ventilated, temperature),
– the aggressivity of the immediate atmosphere at the place of installation,
– the length and frequency of non operating periods.

In the case of frequent condensation (i.e. the formation of condensation caused by rapid changes in temperature), heating resistors must be installed in cubicles (100 to 250 W per m³ of enclosure).

The table below gives the cases where heating is necessary.

Environment		Operating conditions	Climate	Internal heating of enclosure
Inside premises	No running water no condensation	Continuous or not	All climates	Without
	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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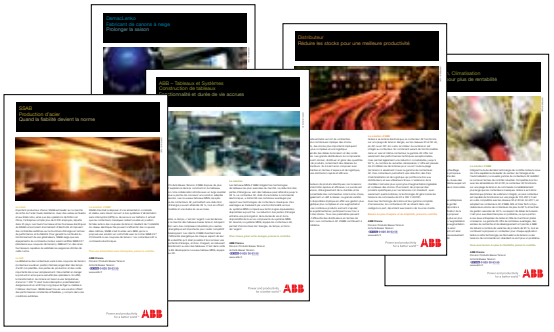

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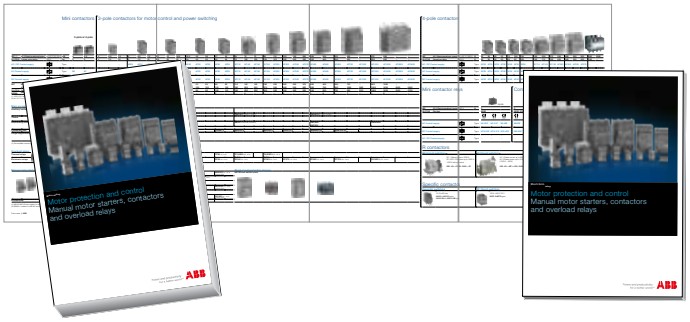

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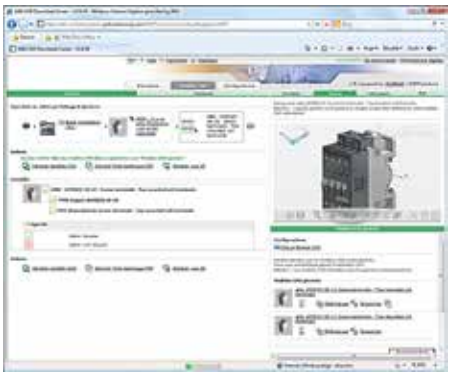

Cadenas portal: Download 2D or 3D files according to your needs (STEP, IGES...)

SOC II: Select the Optimized Coordination tables for your starter according to IEC or CSA/UL standard

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