Main catalog

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

Power and productivity
for a better world™

Motor rated operational powers and currents

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

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

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

1SBC101589S0201

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

Overview 1

Manual motor starters 2

B mini contactors 3

AS contactors 4

AF, A and EK contactors 5

Overload relays 6

R contactors 7

Motor management system 8

General technical data 9

Index 10

1SBC101622C0201

Extensive range of contactors

1

High performance contactors for your applications from 9 to 5000 A

Mini contactors for compact equipments, up to 5.5 kW (400 V AC) / 3 hp (480 V AC)
Contactors for all industrial applications, up to 2050 A and motor starting, up to 560 kW (400 V AC) / 900 hp (480 V AC)
Contactors for heavy duty applications, up to 5000 A, 1000 V AC / 1500 V DC

- Complete and harmonized 3 and 4-pole ranges.
- High performance and high quality materials.
- Compact dimensions easy to integrate in all designs.
- AF contactors with electronic coil interface:
  - wide voltage range AC / DC, sag and dips immunity,
  - built-in surge suppressor.
- Complying with the latest international standards.

The right choice for many applications

- Pumps
- HVAC
- Compressors
- Power supply solutions
- Packing machines
- Cranes
- Elevators and escalators
- Moulding machines
  Wood machines
- Robot
- Windmill
- Solar system
- Water heating
- Fuel cells
- Traction

1SBC101623C0201

Motor starting solutions

- Perfect match in starter assembly with a large range of accessories.
- Short-circuit protection, type 1 and 2 coordination.
- Large offer of accessories for direct-on-line, reversing and star-delta starters which allows:
  - time / cost saving,
  - secure connection,
  - aesthetic starters,
  - easy assembly and wiring.

1SBC101623C0201

3-pole contactors

Mini contactors

Contactors for all industrial

New

New

New

IEC	**AC-3 Rated operational power**	θ ≤ 55 °C*, 400 V	**kW**	**4**	**5.5**	**4**	**5.5**	**7.5**	**4**	**5.5**	**7.5**	**11**	**15**	**18.5**
UL/CSA	**3-phase motor rating**	480 V	**hp**	**3**	**5**	**5**	**7.5**	**10**	**5**	**7.5**	**10**	**15**	**20**	**20**
AC Control supply			Type	**B6**	**B7**	**AS09**	**AS12**	**AS16**	**AF09**	**AF12**	**AF16**	**AF26**	**AF30**	**AF38**
DC Control supply			Type	**BC6**	**BC7**	**ASL09**	**ASL12**	**ASL16**	**AF09**	**AF12**	**AF16**	**AF26**	**AF30**	**AF38**
AC / DC Control supply			Type	**–**	**–**	**–**	**–**	**–**	**AF09**	**AF12**	**AF16**	**AF26**	**AF30**	**AF38**
IEC	**AC-3 Rated operational current**	θ ≤ 55 °C*, 400 V	**A**	**9**	**12**	**9**	**12**	**15.5**	**9**	**12**	**18**	**26**	**32**	**38**
	AC-1 Rated operational current	θ ≤ 40 °C, 690 V	**A**	**16** (400 V)	**20** (400 V)	**22**	**24**	**24**	**25**	**28**	**30**	**45**	**50**	**50**
UL/CSA	**General use rating**	600 V	**A**	**12** (300 V)	**16**	**20**	**20**	**20**	**25**	**28**	**30**	**45**	**50**	**50**
NEMA	**NEMA Size**			**–**	**–**	**00**	**00**	**0**	**00**	**0**	**–**	**1**	**–**	**–**

* θ ≤ 60 °C for AS(L)09 ... AS(L)16 and AF09 ... AF38 contactors

Main accessories

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

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

Overload relays

Thermal relays	Class 10 (10A or 20 for TA42DU to TA80DU)	**T16** (0.10...16 A)	**T16** (0.10...16 A)	**TF42** (0.10...38 A)	
Accessories for thermal overload relays	Remote tripping coil				
	Remote reset coil				
	Wall/separate mounting kit	**DB16**	**DB16**	**DB42**	
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)
Accessories for electronic overload relays	Wall/separate mounting kit	**DB16E**		**DB16E** (to use with E16DU), **DB45** (to use with E45DU)	

Manual motor starters

	Thermal / magnetic protection	Class 10	**MS116** for class 10A (0.10...32 A) Ics up to 50 kA	**MS116** for class 10A (0.10...32 A) Ics up to 50 kA	**MS450**
			MS132 (0.10...32 A) Ics up to 100 kA	**MS132** (0.10...32 A) Ics up to 100 kA	
					MS497
		Class 20			**MS451**
	Magnetic only types		**MO132** (0.16...32A)	**MO132** (0.16...32 A)	
Accessories	For contactor mounting		**BEA7/132**	**BEA16-3**	**BEA16-4** / **BEA38-4**
	Auxiliary trip units, auxiliary contacts, busbars		**HKF1, HK1, UA1, AA1, PS1, S1, SK1, CK1** (MS132, MO132 only)	**HKF1, HK1, UA1, AA1, PS1, S1, SK1, CK1** (MS132, MO132 only)	**HK4,**

	18.5	22	30	37	45	55	75	90	110	140	160	200	250	315	400	—	475	560	—
	30	40	60	60	60	75	100	125	150	200	250	350	400	500	600	—	800	900	—
	A40	A50	A63	A75	A95	A110	A145	A185	A210	A260	A300	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050
	AL40	AE50	AE63	AE75	AF95	AF110	AF145	AF185	AF210	AF260	AF300	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050
	—	AF50	AF63	AF75	AF95	AF110	AF145	AF185	AF210	AF260	AF300	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050
	37	50	65	75	96	110	145	185	210	260	305	400	460	580	750	—	860	1050	—
	60	100	115	125	145	160	250	275	350	400	500	600	700	800	1050	1260	1350	1650	2050
	60	80	90	105	125	140	230	250	300	350	400	550	650	750	900	1210	1350	1650	2100
	—	2	—	3	—	—	4	—	—	5	—	—	6	—	7	—	—	8	—

	CA5-10 (1 x N.O.), **CA5-01** (1 x N.C.)																	
	CAL5-11 (1 x N.O. + 1 x N.C.)			**CAL18-11** (1 x N.O. + 1 x N.C.)														
	TP40DA, TP180DA Direct timing **TP40IA, TP180IA** Inverse timing																	

	VM5-1						**VM300H / VM300V**						**VM750H / VM750V**				**VM1650H**	
	VE5-1	**VE5-2**																
	BER40V	**BEM75-30**		**BEM110-30**			**BEM185-30**		**BEM300-30**				**BEM460-30**		**BEM750-30**			
	RV5 (24...440 V)																	
	RC5-1 (24...440 V)	**RC5-2** (24...440 V)					**RC5-3** (250...440V)											
	RT5 (12...264 V)																	

	TA42DU (18...42 A)	**TA75DU** (18...80 A)		**TA80DU** (29...80 A) **TA110DU** (65...110 A)			**TA200DU** (66...200 A)		**TA450DU/SU** (130...310 A) class 30 for SU									
									DS25-A									
									DR25-A									
	DB80			**DB80, DB200**			**DB200**		**DT450/A**									
	E45DU (9...45 A)	**E80DU** (27...80 A)		**E140DU** (50...140 A)			**E200DU** (60...200 A)		**E320DU** (100...320 A)			**E500DU** (150...500 A)		**E800DU** (250...800 A)			**E1250DU** (375...1250 A)	
	DB45E, DB80E			**DB140E**														

Circuit breakers

	(28...50 A) Ics up to 50 kA																	
		MS495 (45...100 A) Ics up to 50 kA																
	(22...100 A) Ics up to 100 kA																	
	(11...50 A) Ics up to 50 kA																	
		MS496 (28...100 A) Ics up to 100 kA																
	MO450 (40...50 A) Ics up to 50 kA			**MO495** (63...100 A) Ics up to 50 kA														
	MO496 (16...100 A) Ics up to 100 kA																	
	BEA40/450	**BEA50/450, BEA75/495**																
	HKS4, UA4, AA4, PS4, S4, SK4																	

Tmax Circuit breaker and accessories

1SBC101637S0201

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 Control supply			Type	**B6**	**B7**
DC Control supply			Type	**BC6**	**BC7**
AC / DC Control supply			Type	–	–

Contactor relays

Mini contactor relays

IEC	**AC-15 Rated operational current**	400 V	**A**	**3**		
UL/CSA	**Pilot duty**			**A 600**		
				2 2	3 1	4 0
AC Control supply			Type	**K6-22Z**	**K6-31Z**	**K6-40E**
DC Control supply			Type	**KC6-22Z**	**KC6-31Z**	**KC6-40E**
AC / DC Control supply			Type	–	–	–

R contactors

DC Circuit switching

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

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

Specific contactors

DC Circuit switching

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

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

Contactors

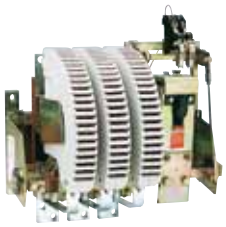
New | New

25	30	45	55	70	100	125	200	250	300	350	550	800	1000
25	30	45	55	80	80	105	170	200	250	300	420	540	–
AF09	AF16	AF26	AF38	A45	A50	A75	EK110	EK150	EK175	EK210	EK370	EK550	EK1000
AF09	AF16	AF26	AF38	AE45	AE50	AE75	EK110	EK150	EK175	EK210	EK370	EK550	EK1000
AF09	AF16	AF26	AF38	AF45	AF50	AF75	–	–	–	–	–	–	–

Contactor relays

3			3		
A 600, Q 300			A 600, Q 600		
2 2	3 1	4 0	2 2	3 1	4 0
NS22E	NS31E	NS40E	NF22E	NF31E	NF40E
NSL22E	NSL31E	NSL40E	NF22E	NF31E	NF40E
–	–	–	NF22E	NF31E	NF40E

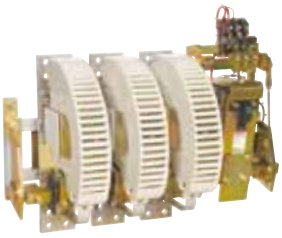
AC Circuit switching



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

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

Special versions



AC/DC Coupling: LOR.. contactors

Slip ring motor control: FOR .. contactors

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

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

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

Capacitor switching

12.5 to 80 kvar

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

Magnetical latching

3 N.O. poles,
22 to 160 kW, 400 V, AC-3

2 N.O. + 2 N.C. poles,
70 to 125 A, AC-1

AM45 to **AM300** types

1SBC101638S0201

ABB's new control and protection devices
Up to 18.5 kW / 20 hp

1

One product family

ABB presents a new generation of first-class specialized components: manual motor starters, contactors, overload relays and softstarters for motor starting solutions up to 18.5 kW / 20 hp

- Harmonized design & colour
- Compact and modular
- Low energy consumption
- Small number of parts
- Minimum need for accessories
- Optimized wiring and configuration
- High ratings and service capability
- Increased application possibilities
- Reliability proven over many years of experience

1SBC101105S0202

Simplicity for your design

Our engineers have taken modularity and uniformity to the next level in terms of flexibility and practicality for your applications. We offer you flexibility, increased application possibilities, exchangeability and reduced panel size.

Safety and reliability

ABB's new line of industrial motor control and protection devices has been developed in order to meet the main safety standards of the toughest industrial scenarios where high reliability and safety level are required.

Increased availability for your equipment

Designing with simplicity in mind, our engineers have made it possible to integrate the entire family into just a few components. We offer you reduced inventory, greater exchangeability, to help you to have fewer mistakes and shortages and less down time.

Energy efficiency and sustainability

Reducing energy consumption and protecting the environment has long been at the top of ABB's list of priorities, and we are proud to introduce a first-class proposal.

1SBC101105S0202

Large choice of starting solutions in kit form

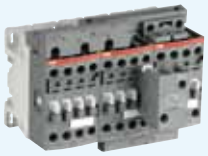
Short-circuit and overload protection
- Type 1 or type 2 coordination guaranteed with manual motor starters
- Choice of thermal or electronic overload relays

Simple construction
- All starters in 45 mm width module

Time/cost saving
- Same frame size for AC or DC control supply
- Easy, fast and secure assembly, fitting and wiring of components

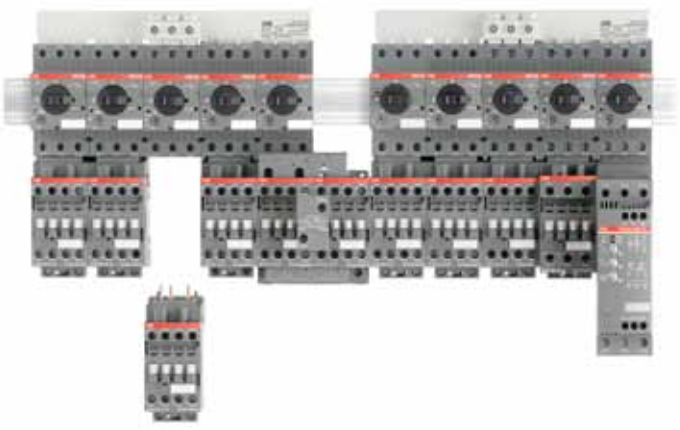
Direct-on-line and reversing starters
- Protection by manual motor starters or by fuses with overload relays
- Reversing starters in 90 mm width including mechanical and electrical interlocking

Softstarters
Protection by manual motor starters or by fuses with overload relays



Star-delta starters
Protection by fuses with overload relays

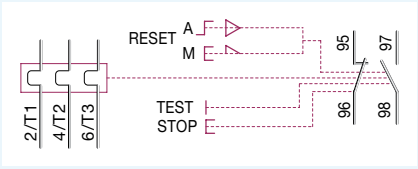
Standardized busbars and optimized interconnection accessories
- Same 3-phase busbar and feeder range up to 100 A for manual motor starters
- Direct 35 mm rail mounting: no additional mounting plate required
- Complete range of connection links with manual motor starters and connection sets to build reversing and star-delta starters
- Easy installation and dismounting of contactors: no unwiring of manual motor starters

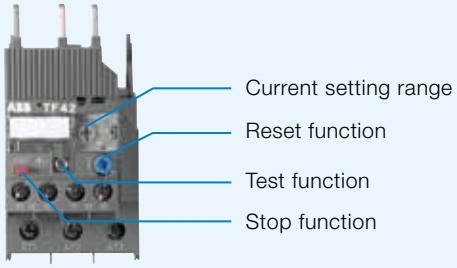


1SBC101105S0202

Protect your motors with thermal or electronic overload relays

- One range of TF42 thermal overload relays, trip class 10
- One range of EF19 and EF45 electronic overload relays up to 45 A, 7 setting ranges, trip class 10E, 20E, 30E
- Adjustable current setting ranges
- Overload protection with phase loss sensitivity
- Temperature compensation:
  - up to +60 °C for thermal overload relays
  - up to +70 °C for electronic overload relays
- Automatic or manual reset, sealable
- Stop and test function

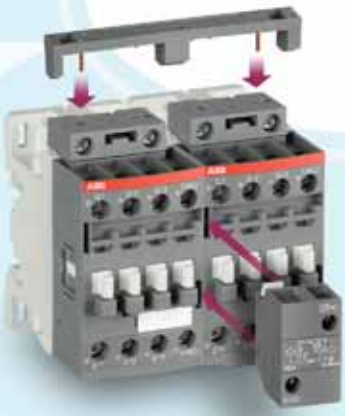


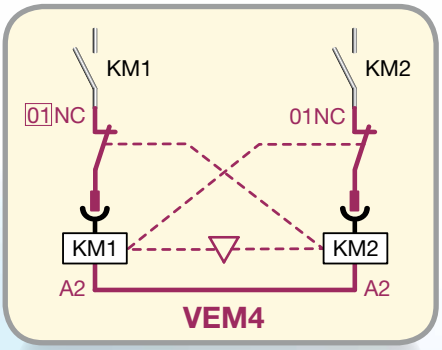


Interlock your reversing contactors quickly in 90 mm width:

- Easy with VM4 mechanical interlock unit
- Simple with VEM4 set including mechanical interlock unit and electrical interlock block with A2-A2 connection
- 50% wiring cost savings in one click!

Fixing the electrical interlock block to the contactor front face connects the 2 built-in N.C. interlocking contacts with the two coil supplies



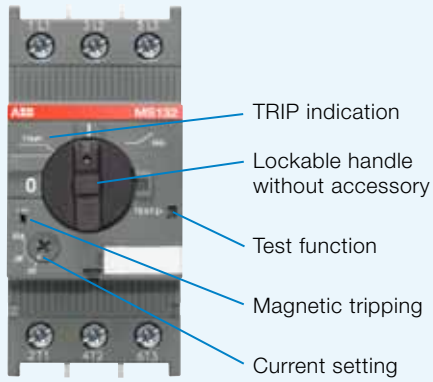


1SBC101105S0202

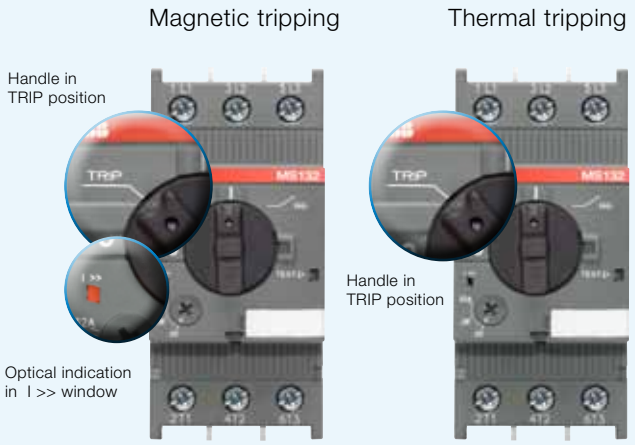
MS116 and MS132 manual motor starters
Harmonized design in 45 mm width

Types	MS116	MS132
Setting range	0.1 ... 32 A	0.1 ... 32 A
Switch position	ON / OFF	ON / OFF / TRIP
Magnetic trip indication	–	yes
Lockable handle without accessories	–	yes
Max. breaking capacity I_{cs}	up to 50 kA	up to 100 kA
Trip class	10A	10

ON/OFF switch functionality



Clear tripping identification



One range of accessories for MS116 and MS132

- Common auxiliary contacts, signaling contacts and auxiliary trip units
- Common busbar systems

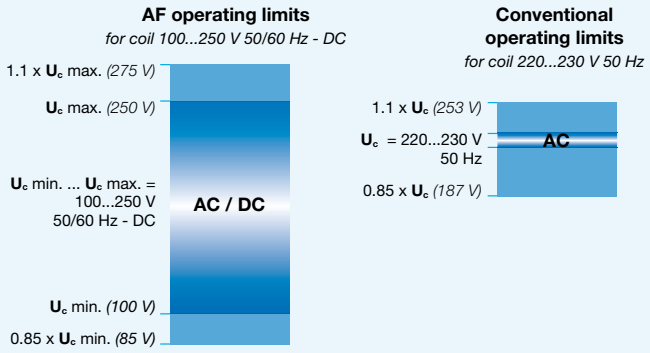
1SBC101105S0202

AF09 ... AF38 3-pole contactors
Simple design with 2 frame sizes in 45 mm width

Types	AF09	AF12	AF16	AF26	AF30	AF38
Rated operational power 400 V AC-3	4 kW	5.5 kW	7.5 kW	11 kW	15 kW	18.5 kW
Rated operational current AC-1 (40 °C)	25 A	28 A	30 A	45 A	50 A	50 A
UL 3-phase motor power 480 V	5 hp	7.5 hp	10 hp	15 hp	20 hp	20 hp

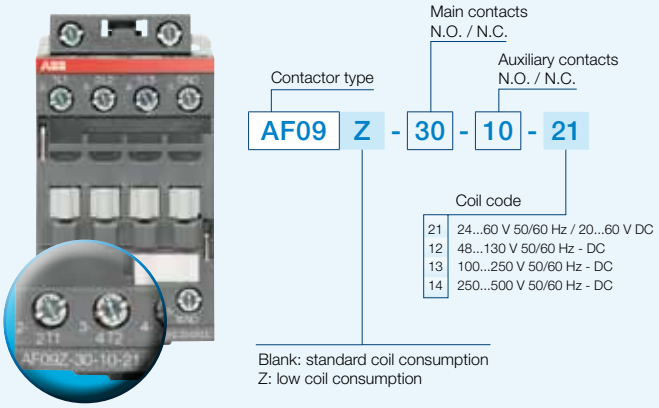
A unique contactor for AC or DC control supply

- Manages large control voltage variations
- Includes an electronic coil interface with extended operating limits 0.85 x **U_c** min. ... 1.1 x **U_c** max.



Only four coils for easier selection

Control voltages covering 24...500 V 50/60 Hz and 20...500 V DC



Reduced panel energy consumption

- With low holding AC and DC coil consumption
- From 30% (AF coil) to 80% (AF..Z coil) reduction of AC pull-in consumption

Built-in surge protection

- No extra surge suppressor required

Improve your equipment reliability with AF..Z contactors

- Withstands control voltage short dips
- Withstands control voltage sags according to SEMI F47-0706 standards
- Additional AF..Z coils available for control voltages between 12...20 V DC and 48...250 V 50/60 Hz - DC

Direct control by PLC-output ≥ 500 mA, 24 V DC

No use of interface relay

1SBC101105S0202

Switching of auxiliary and control circuits

Optimize your auxiliary contact block configuration

- AF09...AF16 3-pole contactors equipped with a built-in auxiliary contact N.O. or N.C.
- Up to 6 additional auxiliary contacts:
  - front-mounted 1 or 4-pole CA4 blocks
  - side-mounted 2-pole CAL4 blocks
- Reduced panel dimension using up to 2 side-mounted 2-pole CAL4 blocks

Make your control circuit safe

- **Mirror contact** .....
  according to IEC 60947-4-1 Annex F 2.1
- **Mechanically linked contacts** .....
  according to IEC 60947-5-1 Annex L 3.0

Free choice of your coil terminal access

Top-mounted coil terminal block

Coil terminal block transferable to bottom position

Additional LDC4 coil terminal block mounted in bottom position

Front-mounted 2-pole CAT4 auxiliary contact block for front coil connection

Protect your equipment against accidental contact

Sealable and transparent protective covers on contactors (BX4) and overload relays

Non-removable protective covers (BX4-CA) for auxiliary contact blocks

Complete choice of contactor relays

- Same advantages and accessories as AF contactors
- Only four coils for easier selection

Contactor relay type

Auxiliary contacts N.O. / N.C.

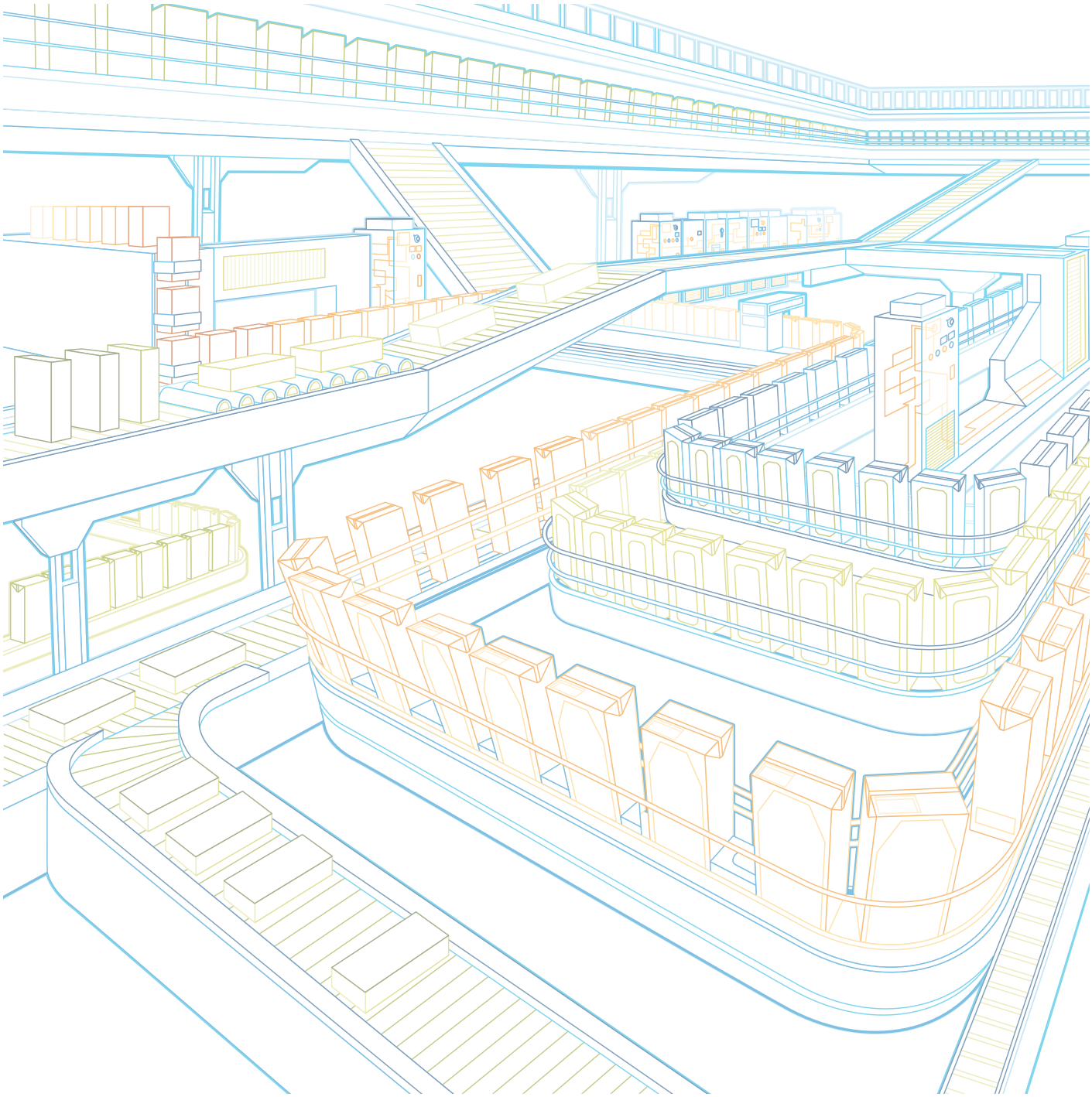
NF Z 22 E - 21

Coil code

21	24...60 V 50/60 Hz / 20...60 V DC
12	48...130 V 50/60 Hz - DC
13	100...250 V 50/60 Hz - DC
14	250...500 V 50/60 Hz - DC

Blank: standard coil consumption
Z: low coil consumption

1SBC101105S0202



Somm_MMSb

Manual motor starters

0.10 to 32 A – with thermal and electromagnetic protection

Ics up to 50 kA

MS116 manual motor starters **2**/2
Technical data **2**/3
Main accessories **2**/6

Ics up to 100 kA

MS132 manual motor starters **2**/12
Technical data **2**/13
Main accessories **2**/16

0.10 to 32 A – with electromagnetic protection

MO132 manual motor starters **2**/22
Technical data **2**/23
Main accessories **2**/24

22 to 100 A – with thermal and electromagnetic protection

MS450, MS495, MS497 manual motor starters **2**/30
Technical data **2**/31
Main accessories **2**/33

16 to 100 A – with electromagnetic protection

MO450, MO495, MO496 manual motor starters **2**/38
Technical data **2**/39
Main accessories **2**/41

0.10 to 25 A – with thermal and electromagnetic protection

MS325 manual motor starters **2**/46
Technical data **2**/47
Main accessories **2**/50

0.4 to 25 A – with electromagnetic protection

MO325 manual motor starters **2**/55
Technical data **2**/56
Main accessories **2**/58

Somm_MMSb

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

MS116-16

MS116-25

MS116-0.16-HKF1-11

MS116-32-HKF1-11

Description

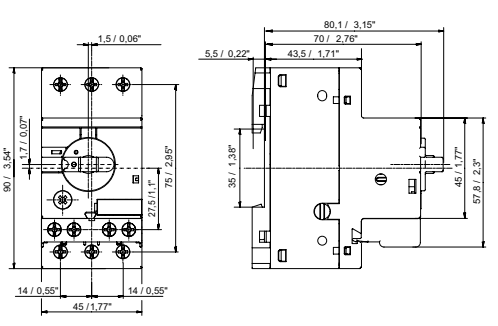
Manual motor starters (MMS) are protection devices for the main circuit. They combine motor control and protection in a single device. MMS are used mainly to switch motors manually ON/OFF and protect them and the installation fuse less against short-circuit, overload and phase failures. Fuse less protection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

MS116 is a compact and economic range for motor protection up to 7.5 kW (400 V) / 32 A in width of 45 mm. Further features are the build-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication. The manual motor starter is suitable for three- and single-phase applications. Auxiliary contacts, signalling contacts, undervoltage releases, shunt trips, three-phase bus bars, power in-feed blocks and locking devices for protection against unauthorized changes are available as accessory.

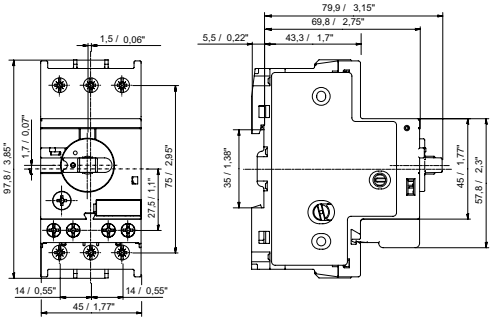
Ordering details

Rated operational power 400 V AC-3	Rated operational current	Short-circuit breaking capacity I_{CS} at 400 V AC	Rated instantaneous short-circuit current setting I_i	Type	Order code		Weight (1 pce)
kW	A	kA	A				kg
0.03	0.10 ... 0.16	50	1.56	MS116-0.16	1SAM250000R1001		0.225
0.06	0.16 ... 0.25	50	2.44	MS116-0.25	1SAM250000R1002		0.225
0.09	0.25 ... 0.40	50	3.90	MS116-0.4	1SAM250000R1003		0.225
0.12	0.40 ... 0.63	50	6.14	MS116-0.63	1SAM250000R1004		0.225
0.25	0.63 ... 1.00	50	11.50	MS116-1.0	1SAM250000R1005		0.225
0.55	1.00 ... 1.60	50	18.40	MS116-1.6	1SAM250000R1006		0.265
0.75	1.60 ... 2.50	50	28.75	MS116-2.5	1SAM250000R1007		0.265
1.5	2.50 ... 4.00	50	50.00	MS116-4.0	1SAM250000R1008		0.265
2.2	4.00 ... 6.30	50	78.75	MS116-6.3	1SAM250000R1009		0.265
4.0	6.30 ... 10.0	50	150	MS116-10	1SAM250000R1010		0.265
5.5	8.00 ... 12.0	25	180	MS116-12	1SAM250000R1012		0.265
7.5	10.0 ... 16.0	16	240	MS116-16	1SAM250000R1011		0.265
9.0	16.0 ... 20.0	10	300	MS116-20	1SAM250000R1013		0.310
12.5	20.0 ... 25.0	10	375	MS116-25	1SAM250000R1014		0.310
15.5	25.0 ... 32.0	10	480	MS116-32	1SAM250000R1015		0.310
0.03	0.10 ... 0.16	50	1.56	MS116-0.16-HKF1-11	1SAM250005R1001		0.240
0.06	0.16 ... 0.25	50	2.44	MS116-0.25-HKF1-11	1SAM250005R1002		0.240
0.09	0.25 ... 0.40	50	3.90	MS116-0.4-HKF1-11	1SAM250005R1003		0.240
0.12	0.40 ... 0.63	50	6.14	MS116-0.63-HKF1-11	1SAM250005R1004		0.240
0.25	0.63 ... 1.00	50	11.50	MS116-1.0-HKF1-11	1SAM250005R1005		0.240
0.55	1.00 ... 1.60	50	18.40	MS116-1.6-HKF1-11	1SAM250005R1006		0.280
0.75	1.60 ... 2.50	50	28.75	MS116-2.5-HKF1-11	1SAM250005R1007		0.280
1.5	2.50 ... 4.00	50	50.00	MS116-4.0-HKF1-11	1SAM250005R1008		0.280
2.2	4.00 ... 6.30	50	78.75	MS116-6.3-HKF1-11	1SAM250005R1009		0.280
4.0	6.30 ... 10.0	50	150	MS116-10.0-HKF1-11	1SAM250005R1010		0.280
5.5	8.00 ... 12.0	25	180	MS116-12.0-HKF1-11	1SAM250005R1012		0.280
7.5	10.0 ... 16.0	16	240	MS116-16.0-HKF1-11	1SAM250005R1011		0.280
9.0	16.0 ... 20.0	10	300	MS116-20-HKF1-11	1SAM250005R1013		0.326
12.5	20.0 ... 25.0	10	375	MS116-25-HKF1-11	1SAM250005R1014		0.326
15.5	25.0 ... 32.0	10	480	MS116-32-HKF1-11	1SAM250005R1015		0.326

Main dimensions mm, *inches*



MS116 ≤ 16 A & MS116-HKF1-11 ≤ 16 A



MS116 ≥ 20 A & MS116-HKF1-11 ≥ 20 A

2CDC131039C0201_1s10

MS116 manual motor starters
Technical data

Main circuit – Utilization characteristics according to IEC/EN

Type	MS116
Standards	IEC/EN 60947–2, IEC/EN 60947-4-1, IEC/EN 60947-1
Rated operational voltage U_e	690 V AC
Rated frequency	50/60 Hz
Trip class	10A
Number of poles	3
Duty time	100 %
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	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	230 V AC			400 V AC			440 V AC			500 V AC			690 V AC		
	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A
MS116-0.16	No back-up fuse required up to I_{cc} = 50 kA									No back-up fuse required up to I_{cc} = 30 kA					
MS116-0.25															
MS116-0.4															
MS116-0.63															
MS116-1.0															
MS116-1.6															
MS116-2.5							10	10	25	10	10	25	5	5	25
MS116-4.0							6	6	25	6	6	25	2	2	25
MS116-6.3							6	6	63	6	6	63	2	2	40
MS116-10							6	6	63	6	6	63	2	2	50
MS116-12	25	25	80	25	25	80	6	6	63	6	6	63	2	2	50
MS116-16	16	16	80	16	16	80	6	6	63	4	4	63	2	2	63
MS116-20	10	15	-	10	15	-	3	6	-	3	4	-	2	2	-
MS116-25	10	15	-	10	15	-	3	6	-	3	4	-	2	2	-
MS116-32	10	10	-	10	10	-	3	6	-	3	4	-	2	2	-

MS116-10: No need for back-up fuse in networks with a prospective current of up to 50 kA at 400 V.
MS116-16: No need for back-up fuse in networks with a prospective current of up to 16 kA at 400 V.
With an approbiate 80 A type gG fuse the device can be used in a network with a prospective current of up to 100 kA.
MS116-32: No need for back-up fuse in networks with a prospective current of up to 15 kA at 400 V.

2CDC131039C0201_2s10

MS116 manual motor starters
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type		MS116
Standards		UL 508, CSA 22.2 No. 14
Maximum operational voltage		600 V AC
Manual motor controller ratings		See table "UL 508 – Manual motor controller"
Trip rating		125 % FLA
Motor ratings	Horse power	See table "Motor rating, three phase"
	Full load amps (FLA)	See table "Motor rating, three phase"
	Locked rotor amps (LRA)	See table "Motor rating, three phase"

Motor rating, three phase

hp Horse power

FLA Full load amps

LRA Locked rotor amps

Type	110-120 V AC			220-240 V AC			440-480 V AC			500-600 V AC		
	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
MS116-0.25	-	0.25	1.5	-	0.25	1.5	-	0.25	1.5	-	0.25	1.5
MS116-0.4	-	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
MS116-1.0	-	1.0	6.0	-	1.0	6.0		1.0	6.0	1/2	0.9	8
MS116-1.6	-	1.6	9.6	-	1.6	9.6	3/4	1.6	12.5	3/4	1.3	10
MS116-2.5	-	2.5	15.0	1/2	2.2	20	1	2.1	15	1-1/2	2.4	16
MS116-4.0	-	4.0	16.0	1	4.2	30	2	3.4	25	3	3.9	25.6
MS116-6.3	1/2	4.4	40	1-1/2	6.4	40	3	4.8	32	5	6.1	36.8
MS116-10	1	8.4	60	3	9.6	64	5	7.6	46	7-1/2	9	50.8
MS116-12	1-1/2	12	80	3	9.6	64	7-1/2	11	63.5	10	11	64.8
MS116-16	2	13.6	100	5	15.2	92	10	14	81	10	11	64.8
MS116-20	3	19.2	128	5	15.2	92	10	14	81	15	17	93
MS116-25	3	19.2	128	7-1/2	22	127	15	21	116	20	22	116
MS116-32	5	30.4	184	10	28	162	20	27	145	25	27	146

UL 508 – Manual motor controller

Type	Maximum fuse type K5 o. RK5 per UL/NEC	Maximum short-circuit current for motor disconnect[1]		for group installation	
	480 V / 600 V	480 V	600 V	480 V	600 V
	A	kA	kA	kA	kA
MS116-0.16	100	30	5	18	5
MS116-0.25	100	30	5	18	5
MS116-0.4	100	30	5	18	5
MS116-0.63	100	30	5	18	5
MS116-1.0	100	30	5	18	5
MS116-1.6	100	30	5	18	5
MS116-2.5	100	30	5	18	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] Suitable as motor disconnect only when provided with padlock SA1 or SA3...

2CDC131039C0201_3s10

MS116 manual motor starters
Technical data

General technical data

Type		MS116
Pollution degree		3
Phase loss sensitive		Yes
Ambient air temperature		
Operation	Open - compensated without derating	-25 ... +55 °C
	Open	-25 ... +70 °C
	Enclosed (IB132)	0 ... +40 °C
Storage		-50 ... +80 °C
Ambient air temperature compensation		Continuous
Maximum operating altitude permissible		2000 m
Resistance to shock acc. to IEC 60068-2-27		25 g / 11 ms
Resistance to vibrations acc. to IEC 60068-2-6		5 g / 3 ... 150 Hz
Mounting position		Position 1-6 (optional for single mounting)
Mounting		DIN-rail (EN 60715)
Group mounting		On request
Minimum distance to other units same type	Horizontal	0 mm
	Vertical	150 mm
Minimum distance to electrical conductive board	Horizontal, up to 400 V	0 mm
	Horizontal, up to 690 V	> 1.5 mm
	Vertical	75 mm
Degree of protection	Enclosure / terminals	IP20

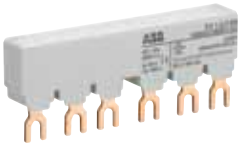
Connecting characteristics

Main circuit

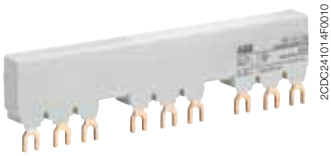
Type			MS116 ≤ 16 A	MS116 ≥ 20 A
Connecting capacity				
	Solid	**1 or 2 x**	1 ... 4 mm²	2.5 ... 6 mm²
	Flexible	**1 or 2 x**	0.75 ... 2.5 mm²	1 ... 6 mm²
	Stranded acc. to UL/CSA	**1 or 2 x**	AWG 16-12	AWG 12-8
	Flexible acc. to UL/CSA	**1 or 2 x**	AWG 16-12	AWG 12-8
Stripping length			9 mm	10 mm
Tightening torques			0.8 ... 1.2 Nm / 10 ... 12 lb.in	2.0 Nm / 18 lb.in
Connection screw			M3.5 (Pozidriv 2 / 5.5 mm)	M4 (Pozidriv 2 / 6.5 mm)

2CDC131039C0201_4s10

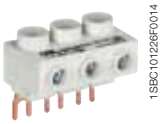
MS116 manual motor starters
Main accessories



PS1-2-0-65



PS1-3-1-100



S1-M1-25

S1-M2-25

SA1

Description

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

Ordering details

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

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

Description	Type	Order code		Pkg qty	Weight (1 pce) kg
Protection cover for busbars	BS1-3	1SAM201908R1001		50	0.003
Lock handle	SA1	GJF1101903R0001		10	0.003
Padlock	SA2	GJF1101903R0002		10	0.020
Lock handle box SA1/SA2	SA3	GJF1101903R0003		10	0.050
Screw fixing kit	FS116	1SAM201909R1001		1	0.020

2CDC131039C0201_5s10

MS116 manual motor starters
Main accessories

1SBC101208F0014

HKF1-11

1SBC101209F0014

HK1-11

1SBC101210F0014

SK1-11

1SBC101211F0014

AA1-24

1SBC101212F0014

UA1-24

Description

MS116 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. The signalling contact signals tripping regardless if it was caused by short-circuit or overload. 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.

Ordering details

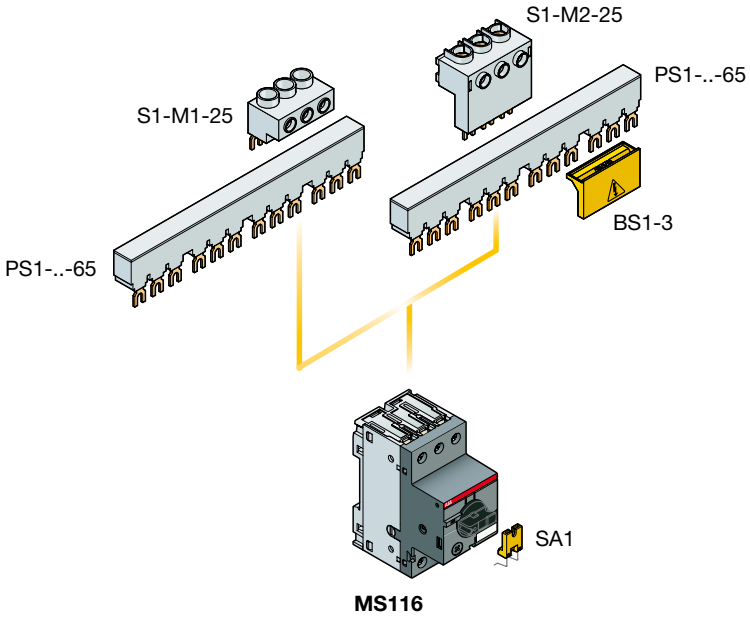
Auxiliary contacts N.O.	Auxiliary contacts N.C.	Description	Type	Order code		Pkg qty	Weight (1 pce) kg
Auxiliary contacts – mountable on the front							
1	1		HKF1-11	1SAM201901R1001		10	0.015
1	1		HKF1-20	1SAM201901R1002		10	0.015
Auxiliary contacts – mountable on the right							
1	1	max. 2 pieces	HK1-11	1SAM201902R1001		2	0.035
2	0	max. 2 pieces	HK1-20	1SAM201902R1002		2	0.035
0	2	max. 2 pieces	HK1-02	1SAM201902R1003		2	0.035
2	0	with lead contacts	HK1-20L	1SAM201902R1004		2	0.035
Signalling contacts – mountable on the right							
1	1	for tripped alarm, max. 2 pieces	SK1-11	1SAM201903R1001		2	0.035
2	0	for tripped alarm, max. 2 pieces	SK1-20	1SAM201903R1002		2	0.035
0	2	for tripped alarm, max. 2 pieces	SK1-02	1SAM201903R1003		2	0.035

Rated control supply voltage V	Frequency Hz	Type	Order code		Pkg qty	Weight (1 pce) kg
Shunt trip units – mountable on the left						
24	50/60	AA1-24	1SAM201910R1001		1	0.100
110	50/60	AA1-110	1SAM201910R1002		1	0.100
200 ... 240	50/60	AA1-230	1SAM201910R1003		1	0.100
350 ... 415	50/60	AA1-400	1SAM201910R1004		1	0.100
Undervoltage releases – mountable on the left						
24	50	UA1-24	1SAM201904R1001		1	0.100
48	50	UA1-48	1SAM201904R1002		1	0.100
60	50	UA1-60	1SAM201904R1003		1	0.100
110 ... 120	50/60	UA1-120	1SAM201904R1004		1	0.100
208	60	UA1-208	1SAM201904R1008		1	0.100
230 ... 240	50/60	UA1-230	1SAM201904R1005		1	0.100
400	50	UA1-400	1SAM201904R1006		1	0.100
415 ... 480	50/60	UA1-415	1SAM201904R1007		1	0.100

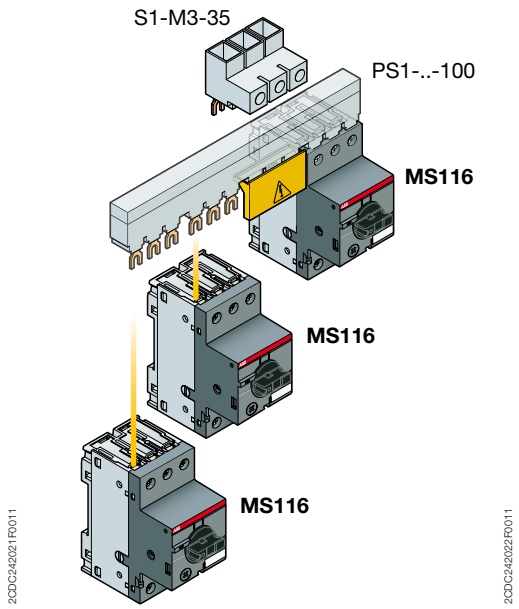
2CDC131039C0201_6s10 - Rev. A

MS116 manual motor starters
Main accessories

Manual motor starter with three-phase busbar systems



Three-phase busbar up to 65 A



Three-phase busbar up to 100 A

General technical data

Type		PS1-xxx-65	PS1-xxx-100	S1-Mx-25	S1-Mx-35
Standards		IEC/EN 60947-2, IEC/EN 60947-4-1, IEC/EN 60947-1			
Rated operational voltage U_e		690 V			
Rated operational current I_e		65 A	100 A	65 A	100 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		25 g / 11 ms			
Resistance to vibrations acc. to IEC 60068-2-6		3 g / 3 ... 150 Hz			

Electrical connection

Main circuit

Type			S1-Mx-25	S1-Mx-35
Connecting capacity				
	Solid	1 x	6 ... 25 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
	Flexible acc. to UL/CSA	1 x	AWG 10-6	AWG 8-2
Stripping length			10 mm	12 mm
Tightening torques			2.5 Nm / 22 lb.in	4.5 Nm / 40 lb.in
Connection screw			PZ2 (6 mm)	Hexagon SW4

2CDC131039C0201_7s10

MS116 manual motor starters
Main accessories

General technical data

Type		HK1	SK1	HKF1
Standards		IEC/EN 60947-2, IEC/EN 60947-4-1, IEC/EN 60947-1		
Rated operational voltage U_e		690 V AC / 600 V DC		250 V AC / 250 V DC
Conventional free-air thermal current I_{th}		65 A	100 A	100 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		
Ambient air temperature	Operation	-25 ... +70 °C		
	Storage	-50 ... +80 °C		
Resistance to shock acc. to IEC 60068-2-27		25 g / 11 ms		
Resistance to vibrations acc. to IEC 60068-2-6		3 g / 3 ... 150 Hz		
Number of poles		1 N.C. + 1 N.O. / 2 N.O. / 2 N.C.	1 N.C. + 1 N.O.	1 N.C. + 1 N.O.
I_e / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category				
	24 V, 120 V, 50/60 Hz	6 A		3 A
	240 V, 50/60 Hz	4 A		1.5 A
	400 V, 50/60 Hz	3 A		-
	440 V, 600 V, 690 V, 50/60 Hz	1 A		-
I_e / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category				
	24 V	2 A		1 A
	125 V	0.55 A		0.27 A
	250 V	0.27 A		0.11 A
	440 V, 600 V	0.15 A		-
Minimum switching capacity		17 V / 3 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		Front of MMS
Mounting positions		1-6		
Mechanical durability		50000 cycles		-
Electrical durability		50000 cycles		-

Electrical connection

Main circuit

Type		HK1	SK1	HKF1
Connecting capacity				
Solid	**1 or 2 x**	1 ... 1.5 mm²		1 ... 2.5 mm²
Flexible	**1 or 2 x**	0.75 ... 1.5 mm²		
Stranded acc. to UL/CSA	**1 or 2 x**	AWG 16-14		
Flexible acc. to UL/CSA	**1 or 2 x**	AWG 16-14		
Stripping length		8 mm		
Tightening torques		0.8 ... 1.2 Nm / 7 lb.in		
Connection screw		M3 (Pozidriv 2)		

2CDC131039C0201_8s10

MS116 manual motor starters
Main accessories

IB132-Y

IB132-G

DMS132-Y

DMS132-G

Description

IB132 are IP65 enclosures for single MMS installation. Additional mounting of auxiliary and signalling contacts, shunt trips and undervoltage release is possible. The handle is lockable in OFF position. For detailed specification see installation instruction.

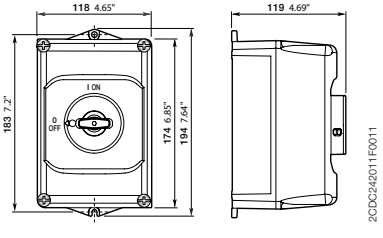
DMS132 are IP65 door mounting kits for MMS installation in any enclosure. Additional mounting of auxiliary, signalling, shunt trips and undervoltage release is possible. The handle is lockable in OFF position. For detailed specification see installation instruction.

Ordering details

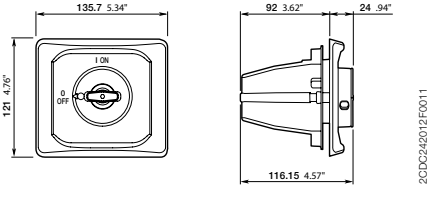
Description	Color	Type	Order code		Pkg qty	Weight (1 pce) kg
Enclosures IP65						
Padlockable max. 3 padlocks with bail diameter 4 ... 6.5 mm	Yellow/red	IB132-Y	1SAM201911R1011		1	0.370
	Grey/black	IB132-G	1SAM201911R1010		1	0.370
Door mounting kit IP65						
Padlockable max. 3 padlocks with bail diameter 4 ... 6.5 mm	Yellow/red	DMS132-Y	1SAM201912R1011		1	0.170
	Grey/black	DMS132-G	1SAM201912R1010		1	0.170

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

Main dimensions mm, *inches*



IB132



DMS132

2CDC131039C0201_9s10

MS116 manual motor starters
Main accessories

MSHD-LB

MSHD-LY

MSMN

MSOX-30

MSH-AR

Description

The complete set includes handle, shaft and driver. All accessories fit 6 mm shafts of maximum 180 mm length. The degree of protection for handles MSHD is IP64.

Ordering details

Description	Shaft length mm	Type	Order code		Pkg qty	Weight (1 pce) kg
Shafts						
For selector type 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

Description	Color	Type	Order code		Pkg qty	Weight (1 pce) kg
Selector type handles IP64						
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	1SAM201920R1002		1	0.065

[1] Indication I-O and ON-OFF

Description	Type	Order code		Pkg qty	Weight (1 pce) kg
Driver					
Coupling driver for use with 6 mm OXS6... types up to 180 mm.	MSMN [1]	1SAM101923R0002		1	0.002
	MSMNO [2]	1SAM101923R0012		1	0.002

[1] Coded - Positioning of ON indication dependent from mounting orientation of the MS
[2] Uncoded - Positioning of ON indication independent from mounting orientation of the MS

Description	Shaft length mm	Type	Order code		Pkg qty	Weight (1 pce) kg
Driver shafts						
Driver shaft - combination driver & shaft. Shaft diameter 6 mm.	32	MSOX-32 [1]	1SAM101924R0003		1	0.010
	30	MSOX-30 [2]	1SAM101924R0013		1	0.010

[1] MSOX-32 is for normal vertical use
[2] MSOX-30 is for horizontal use

Description	Type	Order code		Pkg qty	Weight (1 pce) kg
Shaft alignment ring					
The MSH-AR support the long axis for alignment to the handle inlet. It makes closing panel doors more easy.	MSH-AR	1SAM201920R1000		1	0.010

2CDC131039C0201_10s10

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

MS132-10

MS132-32

MS132-0.16-HKF1-11

MS132-32-HKF1-11

Description

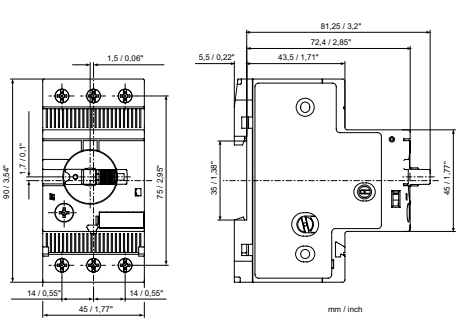
Manual motor starters (MMS) are protection devices for the main circuit. They combine motor control and protection in a single device. MMS are used mainly to switch motors manually ON/OFF and protect them and the installation fuse less against short-circuit, overload and phase failures. Fuse less protection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

MS132 is a compact and powerful range for motor protection up 15 kW (400 V) / 32 A in width of 45 mm. Further features are the build-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication. The manual motor starter is suitable for three- and single-phase applications. The handle is lockable to protect against unauthorized changes. Auxiliary contacts, signalling contacts, undervoltage releases, shunt trips, three-phase bus bars, power in-feed blocks.

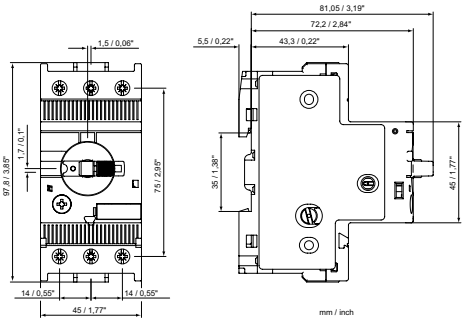
Ordering details

Rated operational power 400 V AC-3	Setting range	Short-circuit breaking capacity I_{cs} at 400 V AC	Rated instantaneous short-circuit current setting I_i	Type	Order code		Weight (1 pce)
kW	A	kA	A				kg
0.03	0.10 ... 0.16	100	1.56	MS132-0.16	1SAM350000R1001		0.215
0.06	0.16 ... 0.25	100	2.44	MS132-0.25	1SAM350000R1002		0.215
0.09	0.25 ... 0.40	100	3.90	MS132-0.4	1SAM350000R1003		0.215
0.12	0.40 ... 0.63	100	6.14	MS132-0.63	1SAM350000R1004		0.215
0.25	0.63 ... 1.00	100	11.50	MS132-1.0	1SAM350000R1005		0.215
0.55	1.00 ... 1.60	100	18.40	MS132-1.6	1SAM350000R1006		0.265
0.75	1.60 ... 2.50	100	28.75	MS132-2.5	1SAM350000R1007		0.265
1.5	2.50 ... 4.00	100	50.00	MS132-4.0	1SAM350000R1008		0.265
2.2	4.00 ... 6.30	100	78.75	MS132-6.3	1SAM350000R1009		0.265
4.0	6.30 ... 10.0	100	150	MS132-10	1SAM350000R1010		0.265
5.5	8.00 ... 12.0	100	180	MS132-12	1SAM350000R1012		0.310
7.5	10.0 ... 16.0	100	240	MS132-16	1SAM350000R1011		0.310
9.0	16.0 ... 20.0	100	300	MS132-20	1SAM350000R1013		0.310
12.5	20.0 ... 25.0	50	375	MS132-25	1SAM350000R1014		0.310
15.5	25.0 ... 32.0	25	480	MS132-32	1SAM350000R1015		0.310
0.03	0.10 ... 0.16	100	1.56	MS132-0.16-HKF1-11	1SAM350005R1001		0.231
0.06	0.16 ... 0.25	100	2.44	MS132-0.25-HKF1-11	1SAM350005R1002		0.231
0.09	0.25 ... 0.40	100	3.90	MS132-0.4-HKF1-11	1SAM350005R1003		0.231
0.12	0.40 ... 0.63	100	6.14	MS132-0.63-HKF1-11	1SAM350005R1004		0.231
0.25	0.63 ... 1.00	100	11.50	MS132-1.0-HKF1-11	1SAM350005R1005		0.231
0.55	1.00 ... 1.60	100	18.40	MS132-1.6-HKF1-11	1SAM350005R1006		0.281
0.75	1.60 ... 2.50	100	28.75	MS132-2.5-HKF1-11	1SAM350005R1007		0.281
1.5	2.50 ... 4.00	100	50.00	MS132-4.0-HKF1-11	1SAM350005R1008		0.281
2.2	4.00 ... 6.30	100	78.75	MS132-6.3-HKF1-11	1SAM350005R1009		0.281
4.0	6.30 ... 10.0	100	150	MS132-10.0-HKF1-11	1SAM350005R1010		0.281
5.5	8.00 ... 12.0	100	180	MS132-12.0-HKF1-11	1SAM350005R1012		0.326
7.5	10.0 ... 16.0	100	240	MS132-16.0-HKF1-11	1SAM350005R1011		0.326
9.0	16.0 ... 20.0	100	300	MS132-20-HKF1-11	1SAM350005R1013		0.326
12.5	20.0 ... 25.0	50	375	MS132-25-HKF1-11	1SAM350005R1014		0.326
15.5	25.0 ... 32.0	25	480	MS132-32-HKF1-11	1SAM350005R1015		0.326

Main dimensions mm, *inches*



MS132 ≤ 10 A



MS132 ≥ 12 A

MS132 manual motor starters
Technical data

Main circuit – Utilization characteristics according to IEC/EN

Type	MS132
Standards	IEC/EN 60947–2, IEC/EN 60947-4-1, IEC/EN 60947-1
Rated operational voltage U_e	690 V AC / 250 V DC
Rated frequency	DC, 50/60 Hz
Trip class	10 (10A for 1SAM350000R1001)
Number of poles	3
Duty time	100 %
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	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	230 V AC			400 V AC			440 V AC			500 V AC			690 V AC		
	I_{CS} kA	I_{CU} kA	gG, aM A	I_{CS} kA	I_{CU} kA	gG, aM A	I_{CS} kA	I_{CU} kA	gG, aM A	I_{CS} kA	I_{CU} kA	gG, aM A	I_{CS} kA	I_{CU} kA	gG, aM A
MS132-0.16	No back-up fuse required up to I_{CC} = 100 kA														
MS132-0.25															
MS132-0.4															
MS132-0.63															
MS132-1.0															
MS132-1.6															
MS132-2.5															
MS132-4.0							20	20	35	20	20	35	3	3	on request
MS132-6.3							20	20	63	20	20	63	3	3	on request
MS132-10							20	20	100	20	20	100	3	3	on request
MS132-12							20	20	100	20	20	100	3	3	on request
MS132-16							20	20	125	20	20	125	3	3	on request
MS132-20							20	20	125	20	20	125	3	3	on request
MS132-25	50	50	125	50	50	125	20	20	125	10	10	125	3	3	on request
MS132-32	25	50	125	25	50	125	20	20	125	10	10	125	3	3	on request

MS132-16: No need for back-up fuse in networks with a prospective current of up to 100 kA at 400 V.
MS132-32: 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

2CDC131040C0201_2s10

MS132 manual motor starters
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type		MS132
Standards		UL 508, CSA 22.2 No. 14
Maximum operational voltage		600 V AC
Manual motor controller ratings		See table "UL 508 – Manual motor controller"
Trip rating		125 % FLA
Motor ratings	Horse power	See table "Motor rating, three phase"
	Full load amps (FLA)	See table "Motor rating, three phase"
	Locked rotor amps (LRA)	See table "Motor rating, three phase"

Motor rating, three phase

hp Horse power

FLA Full load amps

LRA Locked rotor amps

Type	110-120 V AC			220-240 V AC			440-480 V AC			500-600 V AC		
	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
MS132-0.25	-	0.25	1.5	-	0.25	1.5	-	0.25	1.5	-	0.25	1.5
MS132-0.4	-	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
MS132-1.0	-	1.0	6.0	-	1.0	6.0	-	1.0	6.0	1/2	1.0	6.0
MS132-1.6	-	1.6	9.6	-	1.6	9.6	3/4	1.6	9.6	3/4	1.6	9.6
MS132-2.5	-	2.5	15.0	1/2	2.5	15.0	1	2.5	15.0	1-1/2	2.5	15.0
MS132-4.0	-	4.0	24.0	1	4.0	24.0	2	4.0	24.0	3	3.9	26.0
MS132-6.3	1/2	6.3	37.8	1-1/2	6.3	37.8	3	4.8	32.0	5	6.1	37.0
MS132-10	3/4	10.0	60.0	3	9.6	64.0	5	7.6	46.0	7-1/2	9.0	51.0
MS132-12	1-1/2	12.0	72.0	3	9.6	64.0	7-1/2	11.0	64.0	10	11.0	65.0
MS132-16	2	16.0	84.0	5	15.2	92.0	10	14.0	81.0	10	11.0	65.0
MS132-20	3	19.2	128.0	5	15.2	92.0	10	14.0	81.0	15	17.0	93.0
MS132-25	3	19.2	128.0	7-1/2	22.0	127.0	15	21.0	116.0	20	22.0	116.0
MS132-32	5	30.4	184.0	10	28.0	162.0	20	27.0	145.0	25	27.0	146.0

UL 508 – Manual motor controller

Type	Maximum short-circuit current for motor disconnect[1)]		for group installation		for self-protected combination motor controller (type E) in combination with feeder block S1-M3-xx		for tap conductor protection	
	480 V kA	600 V kA	480 V kA	600 V kA	480Y / 277 V kA	600Y / 347 V kA	480 V kA	600 V kA
MS132-0.16	65	47	65	47	65	47	65	47
MS132-0.25	65	47	65	47	65	47	65	47
MS132-0.4	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	18	65	30	65	18	65	18
MS132-6.3	65	18	65	30	65	-	65	18
MS132-10	65	18	65	30	65	-	65	18
MS132-12	30	18	30	30	30	-	30	18
MS132-16	30	18	30	30	30	-	30	18
MS132-20	30	18	30	30	30	-	30	18
MS132-25	30	18	30	30	30	-	30	18
MS132-32	30	18	30	30	30	-	30	18

2CDC131040C0201_3s10

MS132 manual motor starters
Technical data

General technical data

Type		MS132
Pollution degree		3
Phase loss sensitive		Yes
Ambient air temperature		
Operation	Open - compensated without derating	-25 ... +60 °C
	Open	-25 ... +70 °C
	Enclosed (IB132)	0 ... +40 °C
Storage		-50 ... +80 °C
Ambient air temperature compensation		Continuous
Maximum operating altitude permissible		2000 m
Resistance to shock acc. to IEC 60068-2-27		25 g / 11 ms
Resistance to vibrations acc. to IEC 60068-2-6		5 g / 3 ... 150 Hz
Mounting position		Position 1-6 (optional for single mounting)
Mounting		DIN-rail (EN 60715)
Group mounting		On request
Minimum distance to other units same type	Horizontal	0 mm
	Vertical	150 mm
Minimum distance to electrical conductive board	Horizontal, up to 400 V	0 mm
	Horizontal, up to 690 V	> 1.5 mm
	Vertical	75 mm
Degree of protection	Enclosure / terminals	IP20

Connecting characteristics

Main circuit

Type			MS132-0.16 ... MS132-10	MS132-12 ... MS132-16	MS132-20 ... MS132-32
Connecting capacity					
Solid		**1 or 2 x**	1 ... 4 mm²	1 ... 4 mm²	2.5 ... 6 mm²
Flexible		**1 or 2 x**	0.75 ... 2.5 mm²	0.75 ... 2.5 mm²	1 ... 6 mm²
	Stranded acc. to UL/CSA	**1 or 2 x**	AWG 16-12	AWG 16-12	AWG 12-8
	Flexible acc. to UL/CSA	**1 or 2 x**	AWG 16-12	AWG 16-12	AWG 12-8
Stripping length			9 mm	10 mm	10 mm
Tightening torques			0.8 ... 1.2 Nm / 10 ... 12 lb.in	1.5 Nm / 14 lb.in	2.0 Nm / 18 lb.in
Connection screw			M3.5 (Pozidriv 2)	M4 (Pozidriv 2)	M4 (Pozidriv 2)

2CDC131040C0201_4s10

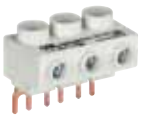
MS132 manual motor starters
Main accessories

2CDC241007F0010

PS1-3-1-65

2CDC241014F0010

PS1-3-1-100


1SBC101226F0014

S1-M1-25

1SBC101266F0014

S1-M2-25

1SBC101214F0014

S1-M3-25

SK0109B91

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 100 A are in the assortment. Between 2 and 5 manual motor starters with none, one or two lateral auxiliary contacts can be connected. Different three-phase feeder terminals are available according to the application.

Ordering details

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

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

Description	Type	Order code		Pkg qty	Weight (1 pce) kg
Protection cover for busbars	BS1-3	1SAM201908R1001		50	0.003
Padlock	SA2	GJF1101903R0002		10	0.020
Screw fixing kit	FS116	1SAM201909R1001		1	0.020

2CDC131040C0201_5s10

MS132 manual motor starters
Main accessories

HKF1-11

HK1-11

SK1-11

CK1-11

AA1-24

UA1-24

Description

MS132 manual motor starters can be equipped with auxiliary contacts for lateral/front mounting, signalling contact for lateral mounting, undervoltage release and shunt trips. Two different signalling 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 signalling contact SK signals tripping regardless if it was caused by short-circuit or overload. The signalling contact CK signals tripping in case it was caused by short-circuit. 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.

Ordering details

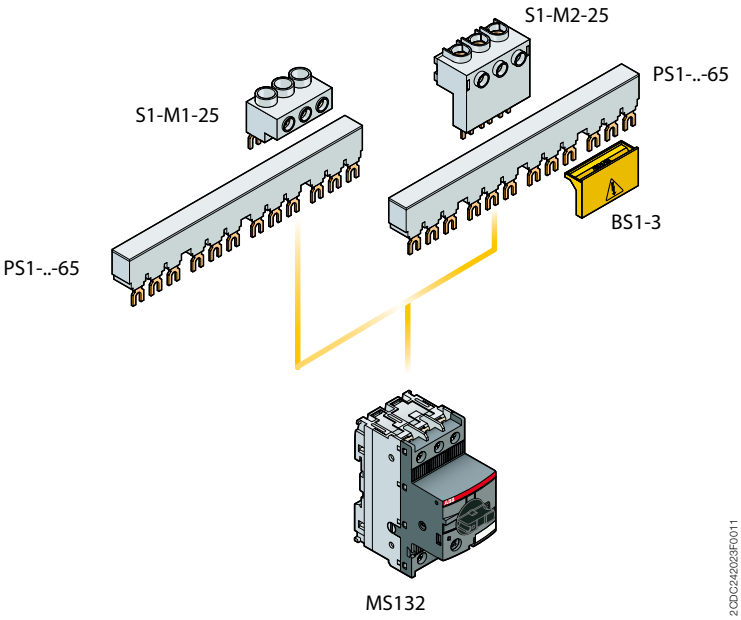
Auxiliary contacts N.O.	Auxiliary contacts N.C.	Description	Type	Order code		Pkg qty	Weight (1 pce) kg
Auxiliary contacts – mountable on the front							
1	1		HKF1-11	1SAM201901R1001		10	0.015
1	1		HKF1-20	1SAM201901R1002		10	0.015
Auxiliary contacts – mountable on the right							
1	1	max. 2 pieces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

Rated control supply voltage V	Frequency Hz	Type	Order code		Pkg qty	Weight (1 pce) kg
Shunt trip units – mountable on the left						
24	50/60	AA1-24	1SAM201910R1001		1	0.100
110	50/60	AA1-110	1SAM201910R1002		1	0.100
200 ... 240	50/60	AA1-230	1SAM201910R1003		1	0.100
350 ... 415	50/60	AA1-400	1SAM201910R1004		1	0.100
Undervoltage releases – mountable on the left						
24	50	UA1-24	1SAM201904R1001		1	0.100
48	50	UA1-48	1SAM201904R1002		1	0.100
60	50	UA1-60	1SAM201904R1003		1	0.100
110 ... 120	50/60	UA1-120	1SAM201904R1004		1	0.100
208	60	UA1-208	1SAM201904R1008		1	0.100
230 ... 240	50/60	UA1-230	1SAM201904R1005		1	0.100
400	50	UA1-400	1SAM201904R1006		1	0.100
415 ... 480	50/60	UA1-415	1SAM201904R1007		1	0.100

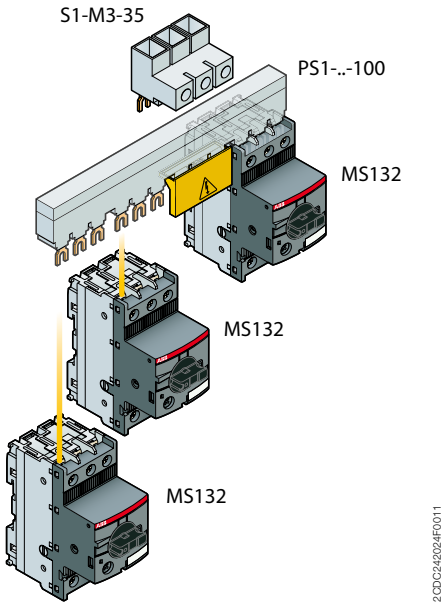
2CDC131040C0201_6s10 - Rev. A

MS132 manual motor starters
Main accessories

Manual motor starter with three-phase busbar systems



Three-phase busbar up to 65 A



Three-phase busbar up to 100 A

General technical data

Type		PS1-xxx-65	PS1-xxx-100	S1-Mx-25	S1-Mx-35
Standards		IEC/EN 60947-2, IEC/EN 60947-4-1, IEC/EN 60947-1			
Rated operational voltage U_e		690 V			
Rated operational current I_e		65 A	100 A	65 A	100 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		25 g / 11 ms			
Resistance to vibrations acc. to IEC 60068-2-6		3 g / 3 ... 150 Hz			

Electrical connection

Main circuit

Type			S1-Mx-25	S1-Mx-35
Connecting capacity				
	Solid	1 x	6 ... 25 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
	Flexible acc. to UL/CSA	1 x	AWG 10-6	AWG 8-2
Stripping length			10 mm	12 mm
Tightening torques			2.5 Nm / 22 lb.in	4.5 Nm / 40 lb.in
Connection screw			PZ2 (6 mm)	Hexagon SW4

2CDC131040C0201_7s10

MS132 manual motor starters
Main accessories

General technical data

Type		HK1	SK1	CK1	HKF1
Standards		IEC/EN 60947-2, IEC/EN 60947-4-1, IEC/EN 60947-1			
Rated operational voltage U_e		690 V AC / 600 V DC			250 V AC / 250 V DC
Conventional free-air thermal current I_{th}		65 A	100 A	65 A	100 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			
Ambient air temperature	Operation	-25 ... +70 °C			
	Storage	-50 ... +80 °C			
Resistance to shock acc. to IEC 60068-2-27		25 g / 11 ms			
Resistance to vibrations acc. to IEC 60068-2-6		3 g / 3 ... 150 Hz			
Number of poles		1 N.C. + 1 N.O. / 2 N.O. / 2 N.C.	1 N.C. + 1 N.O.	1 N.C. + 1 N.O. / 2 N.O. / 2 N.C.	1 N.C. + 1 N.O.
I_e / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category					
	24 V, 120 V, 50/60 Hz	6 A			3 A
	240 V, 50/60 Hz	4 A			1.5 A
	400 V, 50/60 Hz	3 A			-
	440 V, 600 V, 690 V, 50/60 Hz	1 A			-
I_e / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category					
	24 V	2 A			1 A
	125 V	0.55 A			0.27 A
	250 V	0.27 A			0.11 A
	440 V, 600 V	0.15 A			-
Minimum switching capacity		17 V / 3 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			Front of MMS
Mounting positions		1-6			
Mechanical durability		50000 cycles		100000 cycles	-
Electrical durability		50000 cycles		100000 cycles	-

Electrical connection

Main circuit

Type			HK1	SK1	CK1	HKF1
Connecting capacity						
	Solid	**1 or 2 x**	1 ... 1.5 mm²			1 ... 2.5 mm²
	Flexible	**1 or 2 x**	0.75 ... 1.5 mm²			
	Stranded acc. to UL/CSA	**1 or 2 x**	AWG 16-14			
	Flexible acc. to UL/CSA	**1 or 2 x**	AWG 16-14			
Stripping length			8 mm			
Tightening torques			0.8 ... 1.2 Nm / 7 lb.in			
Connection screw			M3 (Pozidriv 2)			

2CDC131040C0201_8s10

MS132 manual motor starters
Main accessories

IB132-Y

IB132-G

DMS132-Y

DMS132-G

Description

IB132 are IP65 enclosures for single MMS installation. Additional mounting of auxiliary and signalling contacts, shunt trips and undervoltage release is possible. The handle is lockable in OFF position. For detailed specification see installation instruction.

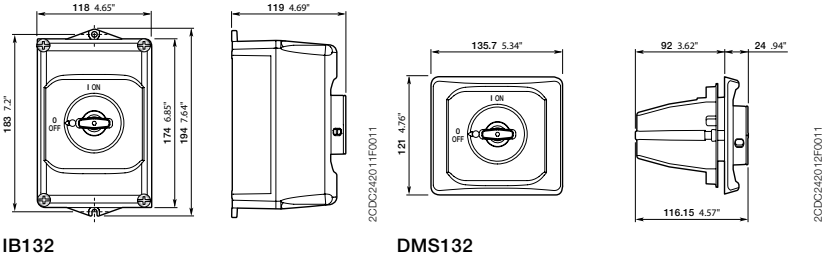
DMS132 are IP65 door mounting kits for MMS installation in any enclosure. Additional mounting of auxiliary, signalling, shunt trips and undervoltage release is possible. The handle is lockable in OFF position. For detailed specification see installation instruction.

Ordering details

Description	Colour	Type	Order code		Pkg qty	Weight (1 pce) kg
Enclosures IP65						
Padlockable max. 3 padlocks with bail diameter 4 ... 6.5 mm	Yellow/red	IB132-Y	1SAM201911R1011		1	0.370
	Grey/black	IB132-G	1SAM201911R1010		1	0.370
Door mounting kit IP65						
Padlockable max. 3 padlocks with bail diameter 4 ... 6.5 mm	Yellow/red	DMS132-Y	1SAM201912R1011		1	0.170
	Grey/black	DMS132-G	1SAM201912R1010		1	0.170

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

Main dimensions mm, *inches*



IB132 DMS132

MS132 manual motor starters
Main accessories

MSHD-LTB

MSHD-LTY

MSMN

MSOX-30

MSH-AR

Description

The complete set includes handle, shaft and driver. All accessories fit 6 mm shafts of maximum 180 mm length. The degree of protection for handles MSHD is IP64.

Ordering details

Description	Shaft length mm	Type	Order code		Pkg qty	Weight (1 pce) kg
Shafts						
For selector type 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

Description	Colour	Type	Order code		Pkg qty	Weight (1 pce) kg
Selector type handles IP64						
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-LTB [1]	1SAM201920R1011		1	0.065
	Yellow	MSHD-LTY [1]	1SAM201920R1012		1	0.065

[1] Indication I-O-T and ON-OFF-T

Description	Type	Order code		Pkg qty	Weight (1 pce) kg
Driver					
Coupling driver for use with 6 mm OXS6... types up to 180 mm.	MSMN [1]	1SAM101923R0002		1	0.002
	MSMNO [2]	1SAM101923R0012		1	0.002

[1] Coded - Positioning of ON indication dependent from mounting orientation of the MS
[2] Uncoded - Positioning of ON indication independent from mounting orientation of the MS

Description	Shaft length mm	Type	Order code		Pkg qty	Weight (1 pce) kg
Driver shafts						
Driver shaft - combination driver & shaft. Shaft diameter 6 mm.	32	MSOX-32 [1]	1SAM101924R0003		1	0.010
	30	MSOX-30 [2]	1SAM101924R0013		1	0.010

[1] MSOX-32 is for normal vertical use
[2] MSOX-30 is for horizontal use

Description	Type	Order code		Pkg qty	Weight (1 pce) kg
Shaft alignment ring					
The MSH-AR support the long axis for alignment to the handle inlet. It makes closing panel doors more easy.	MSH-AR	1SAM201920R1000		1	0.010

2CDC131040C0201_10s10

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

MO132-6.3

MO132-32

Description

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

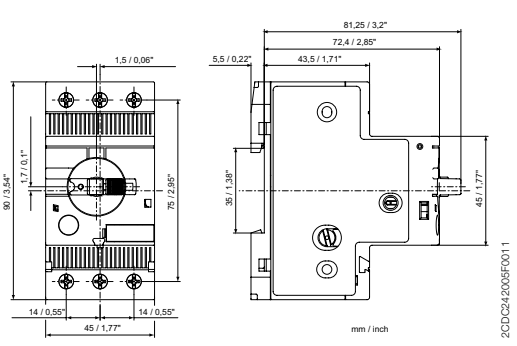
Fuse less protection with a manual motor starter saves costs, space and ensures a quick reaction under short-circuit condition, by switching off the motor within milliseconds. Fuse less starter combinations are setup together with contactors and overload relays.

Ordering details

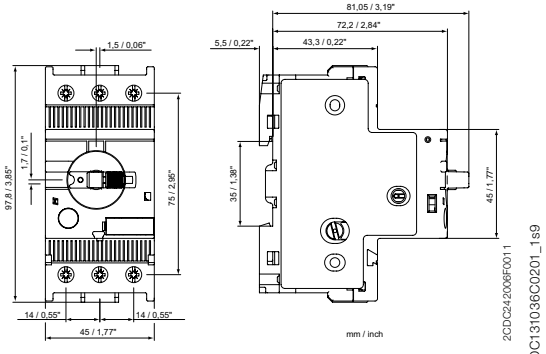
Rated operational power 400 V AC-3[1]	Rated operational current	Short-circuit breaking capacity I_{CS} at 400 V AC	Rated instantaneous short-circuit current setting I_i	Type	Order code		Weight (1 pce)
kW	A	kA	A				kg
0.03	0.16	100	1.56	MO132-0.16	1SAM360000R1001		0.215
0.06	0.25	100	2.44	MO132-0.25	1SAM360000R1002		0.215
0.09	0.40	100	3.90	MO132-0.4	1SAM360000R1003		0.215
0.12	0.63	100	6.14	MO132-0.63	1SAM360000R1004		0.215
0.25	1.0	100	11.50	MO132-1.0	1SAM360000R1005		0.215
0.55	1.6	100	18.40	MO132-1.6	1SAM360000R1006		0.265
0.75	2.5	100	28.75	MO132-2.5	1SAM360000R1007		0.265
1.5	4.0	50	50.00	MO132-4.0	1SAM360000R1008		0.265
2.2	6.3	50	78.75	MO132-6.3	1SAM360000R1009		0.265
4.0	10	50	125.00	MO132-10	1SAM360000R1010		0.265
5.5	12	50	150.00	MO132-12	1SAM360000R1012		0.310
7.5	16	50	200.00	MO132-16	1SAM360000R1011		0.310
9.0	20	50	250.00	MO132-20	1SAM360000R1013		0.310
12.5	25	50	313.00	MO132-25	1SAM360000R1014		0.310
15.5	32	25	400.00	MO132-32	1SAM360000R1015		0.310

[1] 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

2CDC131036C0201_1s9

MO132 manual motor starters magnetic only
Technical data

Main circuit – Utilization characteristics according to IEC/EN

Type	MO132
Standards	IEC/EN 60947–2, IEC/EN 60947-4-1, IEC/EN 60947-1
Rated operational voltage U_e	690 V AC
Rated frequency	50/60 Hz
Number of poles	3
Duty time	100 %
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	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	230 V AC			400 V AC			440 V AC			500 V AC			690 V AC		
	I_{CS} kA	I_{CU} kA	gG, aM A	I_{CS} kA	I_{CU} kA	gG, aM A	I_{CS} kA	I_{CU} kA	gG, aM A	I_{CS} kA	I_{CU} kA	gG, aM A	I_{CS} kA	I_{CU} kA	gG, aM A
MO132-0.16	No back-up fuse required up to I_{CC} = 100 kA														
MO132-0.25															
MO132-0.4															
MO132-0.63															
MO132-1.0															
MO132-1.6															
MO132-2.5															
MO132-4.0							20	20	35	20	20	35	3	3	*
MO132-6.3							20	20	63	20	20	63	3	3	*
MO132-10							20	20	100	20	20	100	3	3	*
MO132-12							20	20	100	20	20	100	3	3	*
MO132-16							20	20	125	20	20	125	3	3	*
MO132-20							20	20	125	20	20	125	3	3	*
MO132-25	50	50	125	50	50	125	10	10	125	10	10	125	3	3	*
MO132-32	25	50	125	25	50	125	10	10	125	10	10	125	3	3	*

*not available yet

General technical data

Type			MO132
Pollution degree			3
Phase loss sensitive			Yes
Ambient air temperature	Operation	Open	-25 ... +60 °C
	Storage		-50 ... +80 °C
Ambient air temperature compensation			Continuous
Maximum operating altitude permissible			2000 m
Resistance to shock acc. to IEC 60068-2-27			25 g / 11 ms
Resistance to vibrations acc. to IEC 60068-2-6			5 g / 3 ... 150 Hz
Mounting position			Position 1-6 (optional for single mounting)
Mounting			DIN-rail (EN 60715)
Group mounting			On request
Minimum distance to other units same type		Horizontal	0 mm
		Vertical	150 mm
Minimum distance to electrical conductive board		Horizontal, up to 400 V	0 mm
		Horizontal, up to 690 V	> 1.5 mm
		Vertical	75 mm
Degree of protection		Enclosure / terminals	IP20

Connecting characteristics

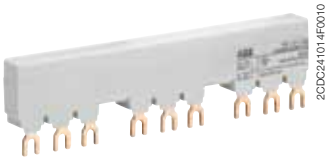
Main circuit

Type				MO132-0.16 ... MO132-10	MO132-12 ... MO132-16	MO132-20 ... MO132-32
Connecting capacity		Solid	**1 or 2 x**	1 ... 4 mm²	1 ... 4 mm²	2.5 ... 6 mm²
		Flexible	**1 or 2 x**	0.75 ... 2.5 mm²	0.75 ... 2.5 mm²	1 ... 6 mm²
		Stranded acc. to UL/CSA	**1 or 2 x**	AWG 16-12	AWG 16-12	AWG 12-8
		Flexible acc. to UL/CSA	**1 or 2 x**	AWG 16-12	AWG 16-12	AWG 12-8
Stripping length				9 mm	10 mm	10 mm
Tightening torques				0.8 ... 1.2 Nm / 10 ... 12 lb.in	1.5 Nm / 14 lb.in	2.0 Nm / 18 lb.in
Connection screw				M3.5 (Pozidriv 2)	M4 (Pozidriv 2)	M4 (Pozidriv 2)

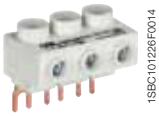
2CDC131036C0201_2s9

MO132 manual motor starters magnetic only
Main accessories

PS1-2-0-65



PS1-3-1-100



S1-M1-25

S1-M2-25

SA1

Description

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

Ordering details

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

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

Description	Type	Order code		Pkg qty	Weight (1 pce) kg
Protection cover for busbars	BS1-3	1SAM201908R1001		50	0.003
Padlock + two keys	SA2	GJF1101903R0002		10	0.020
Screw fixing kit	FS116	1SAM201909R1001		1	0.020

2CDC131036C0201_4s9

MO132 manual motor starters magnetic only
Main accessories

1SBC101208F0014

HKF1-11

1SBC101209F0014

HK1-11

1SBC101210F0014

SK1-11

1SBC101211F0014

AA1-24

1SBC101212F0014

UA1-24

Description

MO132 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.

Ordering details

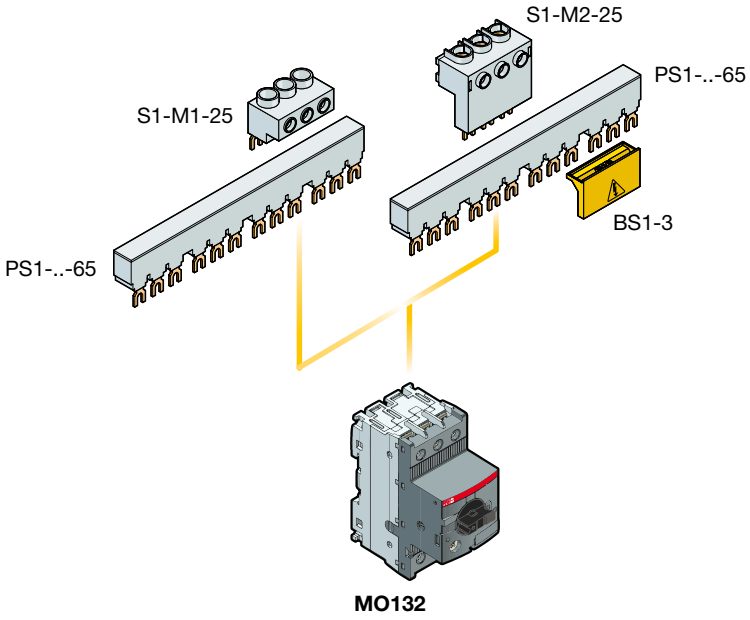
Auxiliary contacts N.O.	Auxiliary contacts N.C.	Description	Type	Order code		Pkg qty	Weight (1 pce) kg
Auxiliary contacts – mountable on the front							
1	1		HKF1-11	1SAM201901R1001		10	0.015
1	1		HKF1-20	1SAM201901R1002		10	0.015
Auxiliary contacts – mountable on the right							
1	1	Max. 2 pieces	HK1-11	1SAM201902R1001		2	0.035
2	0	Max. 2 pieces	HK1-20	1SAM201902R1002		2	0.035
0	2	Max. 2 pieces	HK1-02	1SAM201902R1003		2	0.035
2	0	With lead contacts	HK1-20L	1SAM201902R1004		2	0.035
Signalling contacts – mountable on the right							
1	1	For tripped alarm, max. 2 pieces	SK1-11	1SAM201903R1001		2	0.035
2	0	For tripped alarm, max. 2 pieces	SK1-20	1SAM201903R1002		2	0.035
0	2	For tripped alarm, max. 2 pieces	SK1-02	1SAM201903R1003		2	0.035

Rated control supply voltage V	Frequency Hz	Type	Order code		Pkg qty	Weight (1 pce) kg
Shunt trip units – mountable on the left						
24	50/60	AA1-24	1SAM201910R1001		1	0.100
110	50/60	AA1-110	1SAM201910R1002		1	0.100
200 ... 240	50/60	AA1-230	1SAM201910R1003		1	0.100
350 ... 415	50/60	AA1-400	1SAM201910R1004		1	0.100
Undervoltage releases – mountable on the left						
24	50	UA1-24	1SAM201904R1001		1	0.100
48	50	UA1-48	1SAM201904R1002		1	0.100
60	50	UA1-60	1SAM201904R1003		1	0.100
110 ... 120	50/60	UA1-120	1SAM201904R1004		1	0.100
208	60	UA1-208	1SAM201904R1008		1	0.100
230 ... 240	50/60	UA1-230	1SAM201904R1005		1	0.100
400	50	UA1-400	1SAM201904R1006		1	0.100
415 ... 480	50/60	UA1-415	1SAM201904R1007		1	0.100

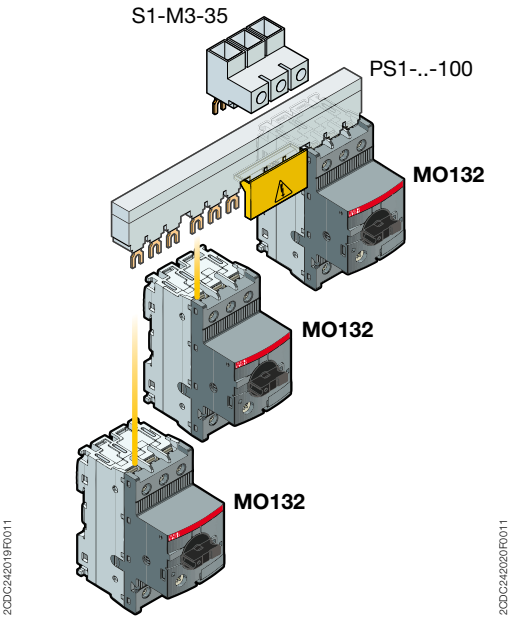
2CDC131036C0201_5s9

MO132 manual motor starters magnetic only
Main accessories

Manual motor starter with three-phase busbar systems



Three-phase busbar up to 65 A



Three-phase busbar up to 100 A

General technical data

Type		PS1-xxx-65	PS1-xxx-100	S1-Mx-25	S1-Mx-35
Standards		IEC/EN 60947-2, IEC/EN 60947-4-1, IEC/EN 60947-1			
Rated operational voltage U_e		690 V			
Rated operational current I_e		65 A	100 A	65 A	100 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		25 g / 11 ms			
Resistance to vibrations acc. to IEC 60068-2-6		3 g / 3 ... 150 Hz			

Electrical connection

Main circuit

Type			S1-Mx-25	S1-Mx-35
Connecting capacity				
	Solid	1 x	6 ... 25 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
	Flexible acc. to UL/CSA	1 x	AWG 10-6	AWG 8-2
Stripping length			10 mm	12 mm
Tightening torques			2.5 Nm / 22 lb.in	4.5 Nm / 40 lb.in
Connection screw			PZ2 (6 mm)	Hexagon SW4

2CDC131036C0201_6s9

MO132 manual motor starters magnetic only
Main accessories

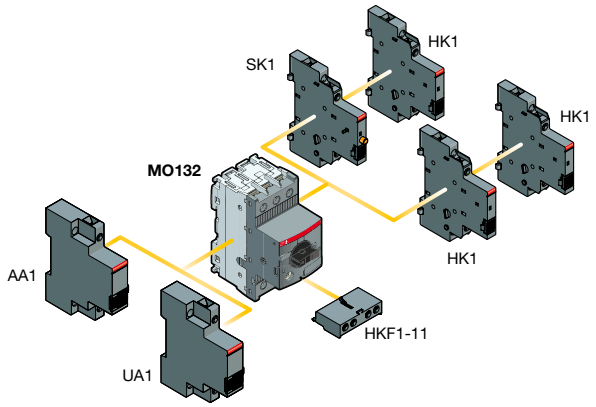
General technical data

Type		HK1	SK1	HKF1
Standards		IEC/EN 60947-2, IEC/EN 60947-4-1, IEC/EN 60947-1		
Rated operational voltage U_e		690 V AC / 600 DC		250 V AC / 250 V DC
Conventional free-air thermal current I_{th}		65 A	100 A	100 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		
Ambient air temperature	Operation	-25 ... +70 °C		
	Storage	-50 ... +80 °C		
Resistance to shock acc. to IEC 60068-2-27		25 g / 11 ms		
Resistance to vibrations acc. to IEC 60068-2-6		3 g / 3 ... 150 Hz		
Number of poles		1 N.C. + 1 N.O. / 2 N.O. / 2 N.C.	1 N.C. + 1 N.O.	1 N.C. + 1 N.O.
I_e / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category				
	24 V, 120 V, 50/60 Hz	6 A		3 A
	240 V, 50/60 Hz	4 A		1.5 A
	400 V, 50/60 Hz	3 A		-
	440 V, 600 V, 690 V, 50/60 Hz	1 A		-
I_e / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category				
	24 V	2 A		1 A
	125 V	0.55 A		0.27 A
	250 V	0.27 A		0.11 A
	440 V, 600 V	0.15 A		-
Minimum switching capacity		17 V / 3 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		Front of MMS
Mounting positions		1-6		
Mechanical durability		50000 cycles		-
Electrical durability		50000 cycles		-

Electrical connection

Main circuit

Type			HK1	SK1	HKF1
Connecting capacity					
	Solid	**1 or 2 x**	1 ... 1.5 mm²		1 ... 2.5 mm²
	Flexible	**1 or 2 x**	0.75 ... 1.5 mm²		
	Stranded acc. to UL/CSA	**1 or 2 x**	AWG 16-14		
	Flexible acc. to UL/CSA	**1 or 2 x**	AWG 16-14		
Stripping length			8 mm		
Tightening torques			0.8 ... 1.2 Nm / 7 lb.in		
Connection screw			M3 (Pozidriv 2)		



2CDC242018F0011

MO132 manual motor starters magnetic only
Main accessories

IB132-Y

IB132-G

DMS132-Y

DMS132-G

Description

IB132 are IP65 enclosures for single MMS installation. Additional mounting of auxiliary and signalling contacts, shunt trips and undervoltage release is possible. The handle is lockable in OFF position. For detailed specification see installation instruction.

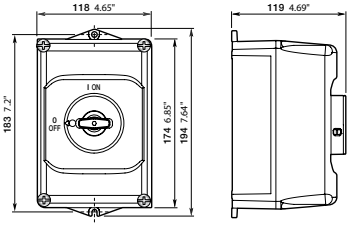
DMS132 are IP65 door mounting kits for MMS installation in any enclosure. Additional mounting of auxiliary, signalling, shunt trips and undervoltage release is possible. The handle is lockable in OFF position. For detailed specification see installation instruction.

Ordering details

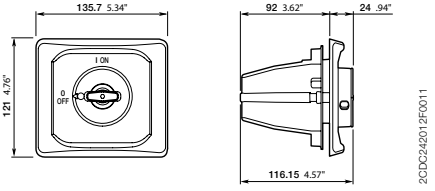
Description	Color	Type	Order code		Pkg qty	Weight (1 pce) kg
Enclosures IP65						
Padlockable max. 3 padlocks with bail diameter 4 ... 6.5 mm	Yellow/red	IB132-Y	1SAM201911R1011		1	0.370
	Grey/black	IB132-G	1SAM201911R1010		1	0.370
Door mounting kit IP65						
Padlockable max. 3 padlocks with bail diameter 4 ... 6.5 mm	Yellow/red	DMS132-Y	1SAM201912R1011		1	0.170
	Grey/black	DMS132-G	1SAM201912R1010		1	0.170

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

Main dimensions mm, *inches*



IB132



DMS132

2CDC131036C0201_8s9

MO132 manual motor starters magnetic only
Main accessories

MSHD-LTB

MSHD-LTY

MSMN

MSOX-30

MSH-AR

Description

The complete set includes handle, shaft and driver. All accessories fit 6 mm shafts of maximum 180 mm length. The degree of protection for handles MSHD is IP64.

Ordering details

Description	Shaft length mm	Type	Order code		Pkg qty	Weight (1 pce) kg
Shafts						
For selector type 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

Description	Color	Type	Order code		Pkg qty	Weight (1 pce) kg
Selector type handles IP64						
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-LTB [1]	1SAM201920R1011		1	0.065
	Yellow	MSHD-LTY [1]	1SAM201920R1012		1	0.065

[1] Indication I-O-T and ON-OFF-T

Description	Type	Order code		Pkg qty	Weight (1 pce) kg
Driver					
Coupling driver for use with 6 mm OXS6... types up to 180 mm.	MSMN [1]	1SAM101923R0002		1	0.002
	MSMNO [2]	1SAM101923R0012		1	0.002

[1] Coded - Positioning of ON indication dependent from mounting orientation of the MS
[2] Uncoded - Positioning of ON indication independent from mounting orientation of the MS

Description	Shaft length mm	Type	Order code		Pkg qty	Weight (1 pce) kg
Driver shafts						
Driver shaft - combination driver & shaft. Shaft diameter 6 mm.	32	MSOX-32 [1]	1SAM101924R0003		1	0.010
	30	MSOX-30 [2]	1SAM101924R0013		1	0.010

[1] MSOX-32 is for normal vertical use
[2] MSOX-30 is for horizontal use

Description	Type	Order code		Pkg qty	Weight (1 pce) kg
Shaft alignment ring					
The MSH-AR support the long axis for alignment to the handle inlet. It makes closing panel doors more easy.	MSH-AR	1SAM201920R1000		1	0.010

2CDC131036C0201_9s9

MS450, MS495, MS497 manual motor starters
22 to 100 A – with thermal and electromagnetic protection

2CDC241004F0009

MS450-40

1SBC101184F0014

MS495-40

2CDC241020F0011

MS497-100

Description

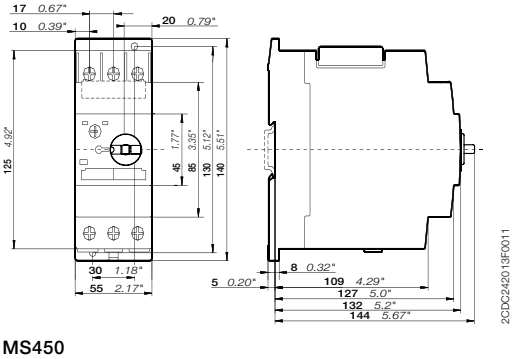
Manual motor starters (MMS) are protection devices for the main circuit. They combine motor control and protection in a single device. MMS are used mainly to switch motors manually ON/OFF and protect them and the installation fuse less against short-circuit, overload and phase failures. Fuse less protection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

Further features are the build-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication. The manual motor starter is suitable for three- and single-phase applications. The handle is lockable to protect against unauthorized changes. Auxiliary contacts, signalling contacts, undervoltage releases, shunt trips, three-phase busbars, power in-feed blocks are available as accessory.

Ordering details

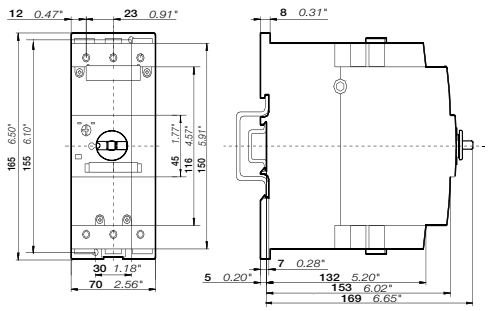
Rated operational power 400 V AC-3	Setting range	Short-circuit breaking capacity I_{cs} at 400 V AC	Rated instantaneous short-circuit current setting I_i	Type	Order code		Weight (1 pce)
kW	A	kA	A				kg
MS450 manual motor starter							
15.8	28.0 ... 40.0	25	520.00	MS450-40	1SAM450000R1005		1.047
22	36.0 ... 45.0	25	585.00	MS450-45	1SAM450000R1006		1.039
22	40.0 ... 50.0	25	650.00	MS450-50	1SAM450000R1007		1.027
MS495 manual motor starter							
30	45.0 ... 63.0	25	819.00	MS495-63	1SAM550000R1007		2.247
37	57.0 ... 75.0	25	975.00	MS495-75	1SAM550000R1008		2.253
45	70.0 ... 90.0	25	1170.00	MS495-90	1SAM550000R1009		2.280
55	80.0 ... 100.0	25	1235.00	MS495-100	1SAM550000R1010		2.295
MS497 manual motor starter							
15	22.0 ... 32.0	50	416.00	MS497-32	1SAM580000R1004		2.222
18.5	28.0 ... 40.0	50	520.00	MS497-40	1SAM580000R1005		2.203
22	36.0 ... 50.0	50	650.00	MS497-50	1SAM580000R1006		2.230
30	45.0 ... 63.0	50	819.00	MS497-63	1SAM580000R1007		2.255
37	57.0 ... 75.0	50	975.00	MS497-75	1SAM580000R1008		2.266
45	70.0 ... 90.0	50	1170.00	MS497-90	1SAM580000R1009		2.268
55	80.0 ... 100.0	50	1235.00	MS497-100	1SAM580000R1010		2.275

Main dimensions mm, *inches*



2CDC242013F0011

MS450



2CDC242014F0011

MS495, MS497

2CDC131042C0201

MS450, MS495, MS497 manual motor starters
Technical data

Main circuit – Utilization characteristics according to IEC/EN

Type	MS450, MS495, MS497
Standards	IEC/EN 60947–2, IEC/EN 60947-4-1, IEC/EN 60947-1
Rated operational voltage U_e	690 V AC / 450 V DC
Rated frequency	50/60 Hz
Trip class	10
Number of poles	3
Duty time	100 %
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	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 MS450															
MS450-40	No back-up fuse required up to I_{cc} = 100 kA			25	50	160	15	50	125	5	10	100	2	4	63
MS450-45				25	50	160	15	50	125	5	10	100	2	4	63
MS450-50				25	50	160	15	50	125	5	10	100	2	4	80

MS450: 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 MS495															
MS495-40	No back-up fuse required up to I_{cc} = 100 kA	25	50	125	20	50	125	6	12	125	3	6	63
MS495-50		25	50	125	20	50	125	6	12	125	3	6	80
MS495-63		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.

2CDC131042C0201

MS450, MS495, MS497 manual motor starters
Technical data

General technical data

Type		MS450	MS495	MS497
Pollution degree		3		
Phase loss sensitive		Yes		
Ambient air temperature				
Operation	Open - compensated without derating	-20 ... +60 °C		
	Open	-20 ... +70 °C		
	Enclosed	-20 ... +35 °C		
Storage		-50 ... +80 °C		
Ambient air temperature compensation		Continuous		
Maximum operating altitude permissible		2000 m		
Resistance to shock acc. to IEC 60068-2-27		25 g / 11 ms	-	
Resistance to vibrations acc. to IEC 60068-2-6		2 g / 5-150 Hz		
Mounting position		Position 1-6 (optional for single mounting)		
Mounting		DIN-rail 35 mm (EN 60715)	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	50 mm	-	
Minimum distance to electrical conductive board	Horizontal	10 mm	-	
	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	50 mm	-	
Degree of protection	Enclosure / terminals	IP20		

Connecting characteristics

Main circuit

Type			MS450	MS495	MS497
Connecting capacity					
	Solid	**1 or 2 x**	0.75 ... 16 mm²	2.5 ... 16 mm²	2.5 ... 16 mm²
	Flexible	**1 x**	0.75 ... 35 mm²	10 ... 70 mm²	10 ... 70 mm²
		2 x	0.75 ... 25 mm²	10 ... 50 mm²	10 ... 50 mm²
	Stranded acc. to UL/CSA	**1 x**	AWG 18-2	AWG 10-2/0	AWG 10-2/0
		2 x	AWG 18-2	AWG 10-1/0	AWG 10-1/0
	Flexible acc. to UL/CSA	**1 x**	AWG 18-2	AWG 10-2/0	AWG 10-2/0
		2 x	AWG 18-2	AWG 10-1/0	AWG 10-1/0
Stripping length			13 mm	17 mm	17 mm
Tightening torques			3 - 4.5 Nm / 27 ... 40 lb.in	4 - 6 Nm / 35 - 53 lb.in	4 - 6 Nm / 35 - 53 lb.in
Connection screw			Pozidriv 2	Hexagon 4	Hexagon 4

2CDC131042C0201

MS450, MS495, MS497 manual motor starters
Main accessories

SA2

Description
Three-phase busbars ensure a quick and safe connection and are therefor a cost effective solution. A variety of different three-phase busbars up to 108A are in the assortment. Between 2 and 4 manual motor starter with none or two lateral auxiliary contacts can be connected.

Ordering details

Rated operational current A	Number of MMS	Number of lateral aux.	Type	Order code		Pkg qty	Weight (1 pce) kg
Three-phase busbars for MS450 only							
108	2	0	PS4-2-0	1SAM401911R1001		5	0.134
108	3	0	PS4-3-0	1SAM401911R1002		5	0.206
108	4	0	PS4-4-0	1SAM401911R1003		5	0.280
108	2	1	PS4-2-2	1SAM401911R1004		5	0.148
108	3	1	PS4-3-2	1SAM401911R1005		5	0.250
108	4	1	PS4-4-2	1SAM401911R1006		5	0.362

Rated operational current A	Rated cross section mm²	Mounting form	Type	Order code		Pkg qty	Weight (1 pce) kg
Three-phase feeder terminals for MS450 only							
108	25	Flat	S4-M1	1SAM401911R1007		2	0.106

Description	For MMS	Type	Order code		Pkg qty	Weight (1 pce) kg
Protection cover for busbar	PS4	BS4-3	1SAM401911R1008		10	0.001
Disconnector module	MS450	TB450	1SAM401910R1001		1	0.315
Terminal shroud	MS450	KA450	1SAM401908R1001		1	0.154
Terminal shroud	MS495	KA495	1SAM501901R1001		10	0.018
Terminal shroud	MS495	KA495C [1]	1SAM501902R1001		10	0.038
Terminal insulation barrier for UL508E	MS495	DX495	1SAM401912R1001		1	0.154
Padlock + 2 keys	MS450, MS495, MS497	SA2	GJF1101903R0002		10	0.020

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

2CDC131042C0201

MS450, MS495, MS497 manual motor starters
Main accessories

HK4-11

HKS4-20

SK4-11

AA4-24

Description

MS450, MS495, MS497 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.

Ordering details

Auxiliary contacts N.O.	Auxiliary contacts N.C.	Description	Type	Order code		Pkg qty	Weight (1 pce) kg
Auxiliary contacts – mountable on the front							
1	1		HK4-11	1SAM401901R1001		10	0.017
		Changeover	HK4-W	1SAM401901R1002		10	0.015
Auxiliary contacts – mountable on the left							
1	1	Max. 1 pieces	HKS4-11	1SAM401902R1001		2	0.045
2	0	Max. 1 pieces	HKS4-20	1SAM401902R1002		2	0.045
0	2	Max. 1 pieces	HKS4-02	1SAM401902R1003		2	0.045
Signalling contacts – mountable on the right							
2	2	Separate signalling acc. UL508E 1 N.O. + 1 N.C. for short circuit and 1NO+NC for general tripping , max. 2 pieces	SK4-11	1SAM401904R1001		1	0.093

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

2CDC131042C0201

MS450, MS495, MS497 manual motor starters
Main accessories

General technical data

Type		PS4-xxx	S4-M1
Standards		IEC/EN 60947-1	
Rated operational voltage U_e		690 V AC	
Rated operational current I_e		108 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	25 mm²
Ambient air temperature	Operation	-25 ... +70 °C	
	Storage	-50 ... +80 °C	

Electrical connection

Main circuit

Type			S4-M1
Connecting capacity			
	Solid	**1 x**	2.5 ... 50 mm²
	Flexible	**1 x**	4 ... 16 mm²
	Stranded acc. to UL/CSA	**1 x**	AWG 14-4
	Flexible acc. to UL/CSA	**1 x**	AWG 14-4
Tightening torques			4 Nm
Connection screw			Pozidriv 2

2CDC131042C0201

MS450, MS495, MS497 manual motor starters
Main accessories

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		25 g / 11 ms			
Resistance to vibrations acc. to IEC 60068-2-6		2 g / 5 ... 150Hz			
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, 50/60 Hz	2 A	4 A	6 A	6 A
	230 V, 50/60 Hz	0.5 A	3 A	4 A	4 A
	400 V, 50/60 Hz	-	1.5 A	3 A	3 A
	690 V, 50/60 Hz	-	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			

Electrical connection

Main circuit

Type		HK4-11	HK4-W	HKS4	SK4
Connecting capacity					
Solid	**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 torques		0.8 ... 1.2 Nm / 7 ... 10.3 lb.in			
Connection screw		Pozidriv 2			

2CDC131042C0201

MS450, MS495, MS497 manual motor starters
Main accessories

MSHD-LTB

MSHD-LTY

MSMN

Description

The complete set includes handle, shaft and driver. All accessories fit 6 mm shafts of maximum 180 mm length. The degree of protection for handles MSHD is IP64.

Ordering details

Description	Shaft length mm	Type	Order code		Pkg qty	Weight (1 pce) kg
Shafts						
For selector type 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

Description	Color	Type	Order code		Pkg qty	Weight (1 pce) kg
Selector type handles IP64						
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-LTB [1]	1SAM201920R1011		1	0.065
	Yellow	MSHD-LTY [1]	1SAM201920R1012		1	0.065

[1] Indication I-O-T and ON-OFF-T

Description	Type	Order code		Pkg qty	Weight (1 pce) kg
Driver					
Coupling driver for use with 6 mm OXS6... types up to 180 mm.	MSMN [1]	1SAM101923R0002		1	0.002
	MSMNO [2]	1SAM101923R0012		1	0.002

[1] Coded - Positioning of ON indication dependent from mounting orientation of the MS
[2] Uncoded - Positioning of ON indication independent from mounting orientation of the MS

2CDC131042C0201

MO450, MO495, MO496 manual motor starters magnetic only
16 to 100 A – with electromagnetic protection

MO450-40

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.

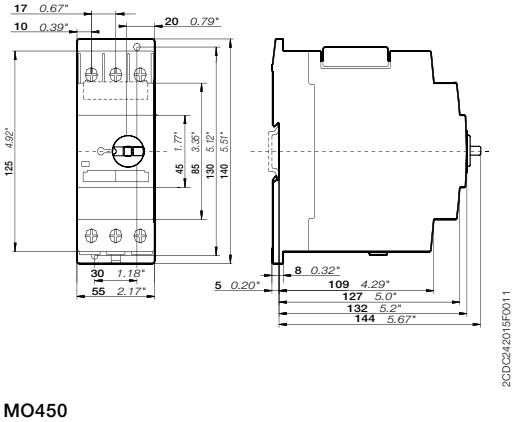
Further features are the build-in disconnect function, trip-free mechanism and a rotary handle with a clear switch position indication. The manual motor starter magnetic only is suitable for three- and single-phase applications. The handle is lockable to protect against unauthorized changes. Auxiliary contacts, signalling contacts, undervoltage releases, shunt trips, three-phase busbars, power in-feed blocks are available as accessory.

Ordering details

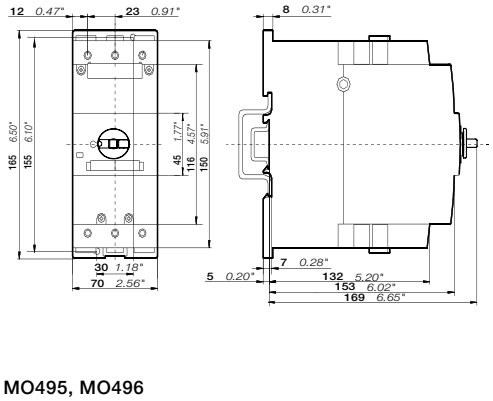
Rated operational power 400 V AC-3[1]	Rated operational current	Short-circuit breaking capacity I_{cs} at 400 V AC	Rated instantaneous short-circuit current setting I_i	Type	Order code		Weight (1 pce)
kW	A	kA	A				kg
MO450 manual motor starter							
15.8	40	25	520.00	MO450-40	1SAM460000R1005		1.033
22	45	25	585.00	MO450-45	1SAM460000R1006		1.040
22	50	25	650.00	MO450-50	1SAM460000R1007		1.019
MO495 manual motor starter							
30	63	25	819.00	MO495-63	1SAM560000R1007		2.244
37	75	25	975.00	MO495-75	1SAM560000R1008		2.247
45	90	25	1170.00	MO495-90	1SAM560000R1009		2.269
55	100	25	1235.00	MO495-100	1SAM560000R1010		2.292
MO496 manual motor starter							
7.5	16	50	208.00	MO496-16	1SAM590000R1001		2.175
9.0	20	50	260.00	MO496-20	1SAM590000R1002		2.188
12.5	25	50	325.00	MO496-25	1SAM590000R1003		2.219
15	32	50	416.00	MO496-32	1SAM590000R1004		2.208
18.5	40	50	520.00	MO496-40	1SAM590000R1005		2.218
22	50	50	650.00	MO496-50	1SAM590000R1006		2.218
30	63	50	819.00	MO496-63	1SAM590000R1007		2.248
37	75	50	975.00	MO496-75	1SAM590000R1008		2.278
45	90	50	1170.00	MO496-90	1SAM590000R1009		2.266
55	100	50	1235.00	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*



MO450



MO495, MO496

2CDC131038C0201

MO450, MO495, MO496 manual motor starters magnetic only
Technical data

Main circuit – Utilization characteristics according to IEC/EN

Type	MO450, MO495, MO496
Standards	IEC/EN 60947–2, IEC/EN 60947-4-1, IEC/EN 60947-1
Rated operational voltage U_e	690 V AC / 450 V DC
Rated frequency	50/60 Hz
Number of poles	3
Duty time	100 %
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	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 MO450															
MO450-40	No back-up fuse required up to I_{CC} = 100 kA			25	50	160	15	50	125	5	10	100	2	4	63
MO450-45				25	50	160	15	50	125	5	10	100	2	4	63
MO450-50				25	50	160	15	50	125	5	10	100	2	4	80

MO450: 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 MO495															
MO495-63		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															
MO496-16	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		
MO496-20		50	100		50	100		11	22	100	7	12	63		
MO496-25		50	100		50	100		11	22	100	7	12	63		
MO496-32		50	100		50	100		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.

2CDC131038C0201

MO450, MO495, MO496 manual motor starters magnetic only
Technical data

General technical data

Type		MO450	MO495	MO496
Pollution degree		3		
Phase loss sensitive		Yes		
Ambient air temperature				
Operation	Open - compensated without derating	-20 ... +60 °C		
	Open	-20 ... +70 °C		
	Enclosed	-20 ... +35 °C		
Storage		-50 ... +80 °C		
Ambient air temperature compensation		Continuous		
Maximum operating altitude permissible		2000 m		
Resistance to shock acc. to IEC 60068-2-27		25 g / 11 ms		
Resistance to vibrations acc. to IEC 60068-2-6		2 g / 5-150 Hz	-	
Mounting position		Position 1-6 (optional for single mounting)		
Mounting		DIN-rail 35 mm (EN 60715)	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	50 mm	-	
Minimum distance to electrical conductive board	Horizontal	10 mm	-	
	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	50 mm	-	
Degree of protection	Enclosure / terminals	IP20		

Connecting characteristics

Main circuit

Type			MO450	MO495	MO496
Connecting capacity					
Solid		**1 or 2 x**	0.75 ... 16 mm²	2.5 ... 16 mm²	2.5 ... 16 mm²
Flexible		**1 x**	0.75 ... 35 mm²	10 ... 70 mm²	10 ... 70 mm²
		2 x	0.75 ... 25 mm²	10 ... 50 mm²	10 ... 50 mm²
	Stranded acc. to UL/CSA	**1 x**	AWG 18-2	AWG 10-2/0	AWG 10-2/0
		2 x	AWG 18-2	AWG 10-1/0	AWG 10-1/0
	Flexible acc. to UL/CSA	**1 x**	AWG 18-2	AWG 10-2/0	AWG 10-2/0
		2 x	AWG 18-2	AWG 10-1/0	AWG 10-1/0
Stripping length			13 mm	17 mm	17 mm
Tightening torques			3 - 4.5 Nm / 27 ... 40 lb.in	4 - 6 Nm / 35 - 53 lb.in	4 - 6 Nm / 35 - 53 lb.in
Connection screw			Pozidriv 2	Hexagon 4	Hexagon 4

2CDC131038C0201

MO450, MO495, MO496 manual motor starters magnetic only
Main accessories

SA2

Description
Three-phase busbars ensure a quick and safe connection and are therefor a cost effective solution.
A variety of different three-phase busbars up to 108 A are in the assortment. Between 2 and 4 manual motor starter with none or two lateral auxiliary contacts can be connected.

Ordering details

Rated operational current A	Number of MMS	Number of lateral aux.	Type	Order code		Pkg qty	Weight (1 pce) kg
Three-phase busbars for MO450 only							
108	2	0	PS4-2-0	1SAM401911R1001		5	0.134
108	3	0	PS4-3-0	1SAM401911R1002		5	0.206
108	4	0	PS4-4-0	1SAM401911R1003		5	0.280
108	2	1	PS4-2-2	1SAM401911R1004		5	0.148
108	3	1	PS4-3-2	1SAM401911R1005		5	0.250
108	4	1	PS4-4-2	1SAM401911R1006		5	0.362

Rated operational current A	Rated cross section mm²	Mounting form	Type	Order code		Pkg qty	Weight (1 pce) kg
Three-phase feeder terminals for MO450 only							
108	25	Flat	S4-M1	1SAM401911R1007		2	0.106

Description	for MMS	Type	Order code		Pkg qty	Weight (1 pce) kg
Protection cover for busbar	PS4	BS4-3	1SAM401911R1008		10	0.001
Disconnector module	MO450	TB450	1SAM401910R1001		1	0.315
Terminal shroud	MO450	KA450	1SAM401908R1001		1	0.154
Terminal shroud	MO495	KA495	1SAM501901R1001		10	0.018
Terminal shroud	MO495	KA495C [1]	1SAM501902R1001		10	0.038
Terminal insulation barrier for UL508E	MO495	DX495	1SAM401912R1001		1	0.154
Padlock + 2 keys	MO450, MO495, MO496	SA2	GJF1101903R0002			

[1] is plugged onto the housing after removing the box terminals, if using cable lugs or buses

2CDC131038C0201

MO450, MO495, MO496 manual motor starters magnetic only
Main accessories

HK4-11

HKS4-20

SK4-11

AA4-24

Description

MO450, MO495, MO497 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.

Ordering details

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

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

2CDC131038C0201

MO450, MO495, MO496 manual motor starters magnetic only
Main accessories

General technical data

Type		PS4-xxx	S4-M1
Standards		IEC/EN 60947-1	
Rated operational voltage U_e		690 V AC	
Rated operational current I_e		108 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	25 mm²
Ambient air temperature	Operation	-25 ... +70 °C	
	Storage	-50 ... +80 °C	

Electrical connection

Main circuit

Type			S4-M1
Connecting capacity			
	Solid	**1 x**	2.5 ... 50 mm²
	Flexible	**1 x**	4 ... 16 mm²
	Stranded acc. to UL/CSA	**1 x**	AWG 14-4
	Flexible acc. to UL/CSA	**1 x**	AWG 14-4
Tightening torques			4 Nm
Connection screw			Pozidriv 2

2CDC131038C0201

MO450, MO495, MO496 manual motor starters magnetic only
Main accessories

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		25 g / 11 ms			
Resistance to vibrations acc. to IEC 60068-2-6		2 g / 5 ... 150Hz			
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, 50/60 Hz	2 A	4 A	6 A	6 A
	230 V, 50/60 Hz	0.5 A	3 A	4 A	4 A
	400 V, 50/60 Hz	-	1.5 A	3 A	3 A
	690 V, 50/60 Hz	-	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			

Electrical connection

Main circuit

Type			HK4-11	HK4-W	HKS4	SK4
Connecting capacity						
	Solid	**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 torques			0.8 ... 1.2 Nm / 7 ... 10.3 lb.in			
Connection screw			Pozidriv 2			

2CDC131038C0201

MO450, MO495, MO496 manual motor starters magnetic only
Main accessories

MSHD-LTB

MSHD-LTY

MSMN

Description

The complete set includes handle, shaft and driver. All accessories fit 6 mm shafts of maximum 180 mm length. The degree of protection for handles MSHD is IP64.

Ordering details

Description	Shaft length mm	Type	Order code		Pkg qty	Weight (1 pce) kg
Shafts						
For selector type 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

Description	Color	Type	Order code		Pkg qty	Weight (1 pce) kg
Selector type handles IP64						
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-LTB [1]	1SAM201920R1011		1	0.065
	Yellow	MSHD-LTY [1]	1SAM201920R1012		1	0.065

[1] Indication I-O-T and ON-OFF-T

Description	Type	Order code		Pkg qty	Weight (1 pce) kg
Driver					
Coupling driver for use with 6 mm OXS6... types up to 180 mm.	MSMN [1]	1SAM101923R0002		1	0.002
	MSMNO [2]	1SAM101923R0012		1	0.002

[1] Coded - Positioning of ON indication dependent from mounting orientation of the MS
[2] Uncoded - Positioning of ON indication independent from mounting orientation of the MS

2CDC131038C0201

MS325 manual motor starters
0.10 to 25 A – with thermal and electromagnetic protection

MS325-16

Description

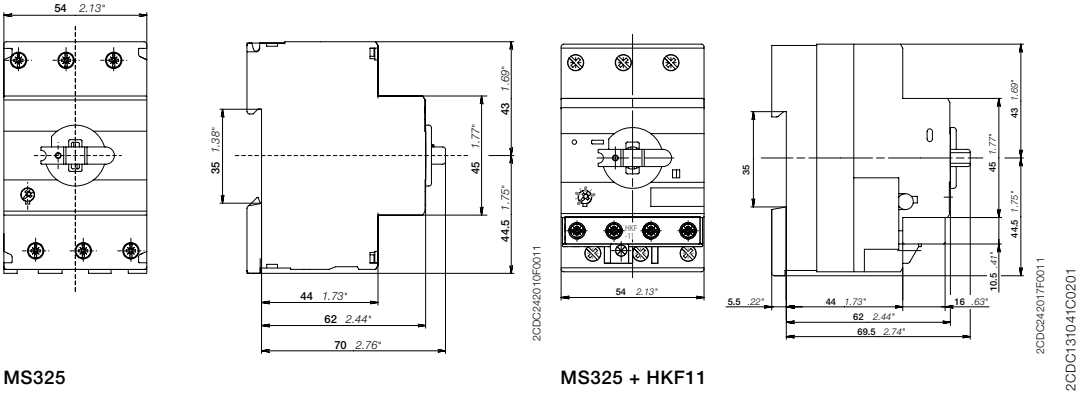
Manual motor starters (MMS) are protection devices for the main circuit. They combine motor control and protection in a single device. MMS are used mainly to switch motors manually ON/OFF and protect them and the installation fuse less against short-circuit, overload and phase failures. Fuse less protection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

MS325 is a compact and powerful range for motor protection up to 12.5 kW (400 V) / 25 A in width of 54 mm. Further features are the build-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication. The manual motor starters are suitable for three- and single-phase applications. Auxiliary contacts, signalling contacts, undervoltage releases, shunt trips, three-phase busbars, power in-feed blocks are available as accessories.

Ordering details

Rated operational power 400 V AC-3	Setting range	Short-circuit breaking capacity I_{cs} at 400 V AC	Rated instantaneous short-circuit current setting I_i	Type	Order code		Weight (1 pce)
kW	A	kA	A				kg
0.03	0.10 ... 0.16	100	1.56	MS325-0.16	1SAM150000R1001		0.280
0.06	0.16 ... 0.25	100	2.44	MS325-0.25	1SAM150000R1002		0.280
0.09	0.25 ... 0.40	100	3.9	MS325-0.4	1SAM150000R1003		0.280
0.12	0.40 ... 0.63	100	6.14	MS325-0.63	1SAM150000R1004		0.280
0.25	0.63 ... 1.00	100	11.5	MS325-1	1SAM150000R1005		0.310
0.55	1.00 ... 1.60	100	18.4	MS325-1.6	1SAM150000R1006		0.340
0.75	1.60 ... 2.50	100	28.75	MS325-2.5	1SAM150000R1007		0.340
1.5	2.50 ... 4.00	100	50	MS325-4	1SAM150000R1008		0.340
2.2	4.00 ... 6.30	100	78.75	MS325-6.3	1SAM150000R1009		0.340
4.0	6.30 ... 9.00	100	135	MS325-9	1SAM150000R1010		0.340
5.5	9.00 ... 12.5	75	180	MS325-12.5	1SAM150000R1011		0.340
7.5	12.5 ... 16.0	60	240	MS325-16	1SAM150000R1012		0.340
9.0	16.0 ... 20.0	55	300	MS325-20	1SAM150000R1013		0.340
12.5	20.0 ... 25.0	50	375	MS325-25	1SAM150000R1014		0.340
0.03	0.10 ... 0.16	100	1.56	MS325-0.16-HKF11	1SAM150005R0001		0.300
0.06	0.16 ... 0.25	100	2.44	MS325-0.25-HKF11	1SAM150005R0002		0.300
0.09	0.25 ... 0.40	100	3.9	MS325-0.4-HKF11	1SAM150005R0003		0.300
0.12	0.40 ... 0.63	100	6.14	MS325-0.63-HKF11	1SAM150005R0004		0.300
0.25	0.63 ... 1.00	100	11.5	MS325-1-HKF11	1SAM150005R0005		0.330
0.55	1.00 ... 1.60	100	18.4	MS325-1.6-HKF11	1SAM150005R0006		0.360
0.75	1.60 ... 2.50	100	28.75	MS325-2.5-HKF11	1SAM150005R0007		0.360
1.5	2.50 ... 4.00	100	50	MS325-4-HKF11	1SAM150005R0008		0.360
2.2	4.00 ... 6.30	100	78.75	MS325-6.3-HKF11	1SAM150005R0009		0.360
4.0	6.30 ... 9.00	100	135	MS325-9-HKF11	1SAM150005R0010		0.360
5.5	9.00 ... 12.5	75	180	MS325-12.5-HKF11	1SAM150005R0011		0.360
7.5	12.5 ... 16.0	60	240	MS325-16-HKF11	1SAM150005R0012		0.360
9.0	16.0 ... 20.0	55	300	MS325-20-HKF11	1SAM150005R0013		0.360
12.5	20.0 ... 25.0	50	375	MS325-25-HKF11	1SAM150005R0014		0.360

Main dimensions mm, *inches*



MS325

MS325 + HKF11

MS325 manual motor starters
Technical data

Main circuit – Utilization characteristics according to IEC/EN

Type	MS325
Standards	IEC/EN 60947–2, IEC/EN 60947-4-1, IEC/EN 60947-1
Rated operational voltage U_e	690 V AC / 440 V DC
Rated frequency	50/60 Hz
Trip class	10A
Number of poles	3
Duty time	100 %
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	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	230 V AC			400 V AC			440 V AC			500 V AC			690 V AC		
	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A	I_{cs} kA	I_{cu} kA	gG, aM A
MS325-0.16	No back-up fuse required up to I_{cc} = 100 kA														
MS325-0.25															
MS325-0.4															
MS325-0.63															
MS325-1															
MS325-1.6															
MS325-2.5													40	40	25
MS325-4										60	60	40	10	10	40
MS325-6.3							70	70	50	40	40	50	7	7	40
MS325-9							50	50	80	30	30	80	5	5	50
MS325-12.5				75	75	80	45	45	80	27	27	80	4.5	4.5	50
MS325-16				60	60	100	40	40	100	25	25	100	4	4	50
MS325-20				55	55	100	35	35	100	22	22	100	3.5	3.5	50
MS325-25				50	50	125	30	30	125	20	20	125	3	3	50

MS325-9: No need for back-up fuse in networks with a prospective current of up to 100 kA at 400 V.
MS325-16: No need for back-up fuse in networks with a prospective current of up to 60 kA at 400 V.
With an approbiate 100 A type gG fuse the device can be used in a network with a prospective current of up to 100 kA

2CDC131041C0201

MS325 manual motor starters
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type		MS325
Standards		UL 508, CSA 22.2 No. 14
Maximum operational voltage		600 V AC
Manual motor controller ratings		See table "UL 508 – Manual motor controller"
Trip rating		125 % FLA
Motor ratings	Horse power	See table "Motor rating, three phase"
	Full load amps (FLA)	See table "Motor rating, three phase"
	Locked rotor amps (LRA)	See table "Motor rating, three phase"

Motor rating, three phase

hp Horse power

FLA Full load amps

LRA Locked rotor amps

Type	220-240 V AC			440-480 V AC			500-600 V AC		
	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA
MS325-0.16	-	0.16	0.96	-	0.16	0.96	-	0.16	0.96
MS325-0.25	-	0.25	1.5	-	0.25	1.5	-	0.25	1.5
MS325-0.4	-	0.4	2.4	-	0.4	2.4	-	0.4	2.4
MS325-0.63	-	0.63	3.78	-	0.63	3.78	-	0.63	3.78
MS325-1	-	1.0	6.0	1/2	1.1	10.0	1/2	0.9	8.0
MS325-1.6	-	1.6	9.6	3/4	1.6	12.5	3/4	1.3	10.0
MS325-2.5	1/2	2.2	20.0	1	2.1	15.0	1-1/2	2.4	16.0
MS325-4	1	4.2	30.0	2	3.4	25.0	3	3.9	25.6
MS325-6.3	1-1/2	6.0	40.0	3	4.8	32.0	5	6.1	36.8
MS325-9	2-1/2	-	-	5	7.6	46.0	7-1/2	9.0	50.8
MS325-12.5	3	9.6	64.0	7-1/2	11.0	63.5	10	11.0	64.8
MS325-16	5	15.2	92.0	10	14.0	81.0	10	11.0	64.8
MS325-20	5	15.2	92.0	10	14.0	81.0	15	27.0	93.0
MS325-25	7-1/2	22.0	127.0	15	21.0	116.0	20	35.0	116.0

UL 508 – Manual motor controller

Type	Max. Circuit Breaker UL/NEC	Max. Circuit Breaker UL/NEC	Max. fuse type UL/NEC	Maximum fuse type K5 o. RK5 per UL/NEC	Maximum short-circuit current for motor disconnect[1]		for group installation		for Tap Conductor Protection	UL 508 Type E
	480 V	600 V	480 V	600 V	480 V	600 V	480 V	600 V	480Y/277V	480Y/277V
			A	A	kA	kA	kA	kA	kA	kA
MS325-0.16	-	S7H1200	1600 (class L)	1200	85	50	85	50	18	18
MS325-0.25	-	S7H1200	1600 (class L)	1200	85	50	85	50	18	18
MS325-0.4	-	S7H1200	1600 (class L)	1200	85	50	85	50	18	18
MS325-0.63	-	S7H1200	1600 (class L)	1200	85	50	85	50	18	18
MS325-1	-	S7H1200	1600 (class L)	1200	85	50	85	50	18	18
MS325-1.6	-	S7H1200	1600 (class L)	1200	85	50	85	50	18	18
MS325-2.5	-	S7H1200	1600 (class L)	1200	85	50	85	50	18	18
MS325-4	-	S7H1200	1600 (class L)	1200	85	50	85	50	18	18
MS325-6.3	S7H1200	S7H1200	600 (class K5)	1200	50	50	50	50	18	18
MS325-9	S7H1200	S4H2500	600 (class K5)	250	50	50	50	50	18	18
MS325-12.5	S4H250	S7H1200	400 (class K5)	1200	50	30	50	30	18	18
MS325-16	S4H250	S7H1200	400 (class K5)	1200	50	30	50	30	18	18
MS325-20	S4H250	S4H250	400 (class K5)	250	50	30	50	30	18	18
MS325-25	S4H250	S4H250	400 (class K5)	250	50	30	50	30	18	18

[1] Suitable as motor disconnect only when provided with padlock SA1 or SA3...

2CDC131041C0201

MS325 manual motor starters
Technical data

General technical data

Type		MS325
Pollution degree		3
Phase loss sensitive		Yes
Ambient air temperature		
Operation	Open - compensated without derating	-25 ... +70 °C
	Open	-25 ... +70 °C
	Enclosed (IB325)	0 ... +40 °C
Storage		-50 ... +80 °C
Ambient air temperature compensation		Continuous
Maximum operating altitude permissible		2000 m
Resistance to shock acc. to IEC 60068-2-27		15 g / 1/2 sinusoidal shock for 11 ms
Resistance to vibrations acc. to IEC 60068-2-6		5 g / 3 ... 150 Hz
Mounting position		Position 1-6 (optional for single mounting)
Mounting		DIN-rail (EN 60715)
Minimum distance to other units same type	Horizontal	0 mm
	Vertical	100 mm
Minimum distance to electrical conductive board	Horizontal, up to 400 V	> 1.5 mm
	Horizontal, up to 690 V	> 1.5 mm
	Vertical	75 mm
Degree of protection	Enclosure / terminals	IP20

Connecting characteristics

Main circuit

Type			MS325
Connecting capacity			
	Solid	**1 x**	1 x 1 ... 10 mm²
		2 x	2 x 1 ... 6 mm²
	Flexible	**1 x**	1 x 1 ... 6 mm²
		2 x	2 x 0.75 ... 4 mm²
	Stranded acc. to UL/CSA	**1 or 2 x**	AWG 14-8
	Flexible acc. to UL/CSA	**1 or 2 x**	AWG 14-8
Stripping length			10 mm
Tightening torques			1.4 Nm / 14 lb.in
Connection screw			M3.5 (Pozidriv 2)

2CDC131041C0201

MS325 manual motor starters
Main accessories

SA1

SA2

SA3

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 63 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.

Ordering details

Rated operational current A	Number of MMS	Number of lateral aux.	Type	Order code		Pkg qty	Weight (1 pce) kg
Three-phase busbars							
63	2	0	PS3-2-0	1SAM101937R0012		10	0.038
63	3	0	PS3-3-0	1SAM101937R0013		10	0.062
63	4	0	PS3-4-0	1SAM101937R0014		10	0.087
63	5	0	PS3-5-0	1SAM101937R0015		10	0.115
63	6	0	PS3-6-0	1SAM101937R0016		10	0.137
63	2	1	PS3-2-1	1SAM101937R0022		10	0.040
63	3	1	PS3-3-1	1SAM101937R0023		10	0.068
63	4	1	PS3-4-1	1SAM101937R0024		10	0.097
63	5	1	PS3-5-1	1SAM101937R0025		10	0.126
63	3	2	PS3-2-2	1SAM101937R0032		10	0.043
63	4	2	PS3-4-2	1SAM101937R0034		10	0.106

Rated operational current A	Rated cross section mm²	Mounting form	Type	Order code		Pkg qty	Weight (1 pce) kg
Three-phase feeder terminals							
63	25	Flat	S3-M1	1SAM101938R0001		10	0.041
63	25	High	S3-M2	1SAM101938R0002		10	0.053
63	35	UL type E and IEC	S3-M3	1SAM101938R0004		10	0.050

Description	Type	Order code		Pkg qty	Weight (1 pce) kg
Protection cover for busbars	BS3-3	1SAM101938R0003		50	0.001
Lock handle	SA1	GJF1101903R0001		10	0.003
Padlock	SA2	GJF1101903R0002		10	0.020
Lock handle box SA1/SA2	SA3	GJF1101903R0003		10	0.050

2CDC131041C0201

MS325 manual motor starters
Main accessories

63-00

HKF

SST 016 97

HK

SST 290 92 R

SK

Description

MS325 manual motor starters can be equipped with auxiliary contacts for lateral/front mounting, signalling contact for lateral mounting, undervoltage release and shunt trips. A variety of combinations is possible as required for the application. The auxiliary contacts change position with the main contacts. The signalling contact signals tripping regardless if it was caused by short-circuit or overload. 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

Ordering details

Auxiliary contacts N.O.	Auxiliary contacts N.C.	Description	Type	Order code		Pkg qty	Weight (1 pce) kg
Auxiliary contacts – mountable on the front							
1	1		HKF-11	1SAM101928R0001		10	0.015
2	0		HKF-20	1SAM101928R0002		10	0.020
Auxiliary contacts – mountable on the left							
1	1	Max. 2 pieces	HK-11	1SAM101901R0001		2	0.030
2	0	Max. 2 pieces	HK-20	1SAM101901R0002		2	0.030
0	2	Max. 2 pieces	HK-02	1SAM101901R0003		2	0.030
Signalling contacts – mountable on the left							
1	1	For tripped alarm, max. 1 pieces	SK-11	1SAM101904R0003		10	0.030
Signalling contacts – mountable on the right							
1	1	For short-circuit alarm	CK-11	1SAM101943R0001		10	0.035

Rated control supply voltage V	Frequency Hz	Type	Order code		Pkg qty	Weight (1 pce) kg
Shunt trip units – mountable as slide in						
24 ... 60	50/60	AA-24	1SAM101909R0001		10	0.025
110 ... 240	50/60	AA-230	1SAM101909R0002		10	0.025
220 ... 415	50/60	AA-400	1SAM101909R0003		10	0.025
Undervoltage releases – mountable as slide in						
24	50	UAF-24	1SAM101903R0024		10	0.02
48	50	UAF-48	1SAM101903R0048		10	0.02
60	50	UAF-60	1SAM101903R0060		10	0.02
110	50	UAF-110	1SAM101903R0110		10	0.02
230	50	UAF-230	1SAM101903R0230		10	0.02
400	50	UAF-400	1SAM101903R0400		10	0.02
415	50	UAF-415	1SAM101903R0415		10	0.02
500	50	UAF-500	1SAM101903R0500		10	0.02

2CDC131041C0201

MS325 manual motor starters
Main accessories

General technical data

Type		PS3	S3-M1/S3-M2	S3-M3
Standards		IEC/EN 60947-2, IEC/EN 60947-4-1, IEC/EN 60947-1		
Rated operational voltage U_e		690 V AC		
Rated operational current I_e		63 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	25 mm²	
Ambient air temperature	Operation	-25 ... +70 °C		
	Storage	-50 ... +80 °C		
Resistance to shock acc. to IEC 60068-2-27		15 g / 11 ms		
Resistance to vibrations acc. to IEC 60068-2-6		3 g / 3 ... 150 Hz		

Electrical connection

Main circuit

Type			PS3, S3-Mx
Connecting capacity			
	Solid	1 x	6 ... 25 mm²
	Flexible	1 x	6 ... 16 mm²
	Stranded acc. to UL/CSA	1 x	AWG 10-4
	Flexible acc. to UL/CSA	1 x	AWG 10-6
Stripping length			10 mm
Tightening torques			2.5 Nm / 22 lb.in
Connection screw			PZ2 (6 mm)

2CDC131041C0201

MS325 manual motor starters
Main accessories

IB325-Y

IB325-G

DMS325-Y

DMS325-G

Description

IB325 are IP65 enclosures for single MMS installation. Additional mounting of auxiliary and signalling contacts, shunt trips and undervoltage release is possible. The handle is lockable in OFF position. For detailed specification see installation instruction.

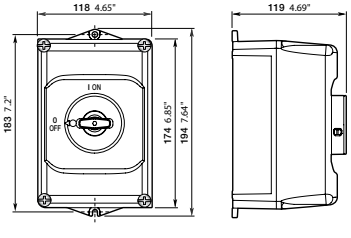
DMS325 are IP65 door mounting kits for MMS installation in any enclosure. Additional mounting of auxiliary, signalling, shunt trips and undervoltage release is possible. The handle is lockable in OFF position. For detailed specification see installation instruction.

Ordering details

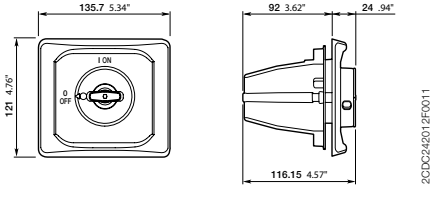
Description	Color	Type	Order code		Pkg qty	Weight (1 pce) kg
Enclosures IP65						
Padlockable max. 3 padlocks with bail diameter 4 ... 6.5 mm	Yellow/red	IB325-G	1SAM101940R1000		1	0.370
	Grey/black	IB325-Y	1SAM101940R1001		1	0.370
Door mounting kit IP65						
Padlockable max. 3 padlocks with bail diameter 4 ... 6.5 mm	Yellow/red	DMS325-G	1SAM101941R1000		1	0.170
	Grey/black	DMS325-Y	1SAM101941R1001		1	0.170

Indication I-O and ON-OFF

Main dimensions mm, *inches*



IB325



DMS325

MS325 manual motor starters
Main accessories

2CDC241003F0011

MSHD-LB

2CDC241002P0011

MSHD-LY

2CDC241004S0011

MSMN

2CDC241005S0011

MSOX-30

2CDC241001S0012

MSH-AR

Description

The complete set includes handle, shaft and driver. All accessories fit 6 mm shafts of maximum 180 mm length. The degree of protection for handles MSHD is IP64.

Ordering details

Description	Shaft length mm	Type	Order code		Pkg qty	Weight (1 pce) kg
Shafts						
For selector type 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

Description	Color	Type	Order code		Pkg qty	Weight (1 pce) kg
Selector type handles IP64						
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	1SAM201920R1002		1	0.065

[1] Indication I-O and ON-OFF

Description	Type	Order code		Pkg qty	Weight (1 pce) kg
Driver					
Coupling driver for use with 6 mm OXS6... types up to 180 mm.	MSMN [1]	1SAM101923R0002		1	0.002
	MSMNO [2]	1SAM101923R0012		1	0.002

[1] Coded - Positioning of ON indication dependent from mounting orientation of the MS
[2] Uncoded - Positioning of ON indication independent from mounting orientation of the MS

Description	Shaft length mm	Type	Order code		Pkg qty	Weight (1 pce) kg
Driver shafts						
Driver shaft - combination driver & shaft. Shaft diameter 6 mm.	32	MSOX-32 [1]	1SAM101924R0003		1	0.010
	30	MSOX-30 [2]	1SAM101924R0013		1	0.010

[1] MSOX-32 is for normal vertical use
[2] MSOX-30 is for horizontal use

Description	Type	Order code		Pkg qty	Weight (1 pce) kg
Shaft alignment ring					
The MSH-AR support the long axis for alignment to the handle inlet. It makes closing panel doors more easy.	MSH-AR	1SAM201920R1000		1	0.010

2CDC131041C0201

MO325 manual motor starters magnetic only
0.4 to 25 A – with electromagnetic protection

MO325-16

Description

The MO325 manual motor starters magnetic only are 54 mm width devices. These devices are used to manually switch on and off motors and to protect them reliably and without the need for a fuse from short-circuits.

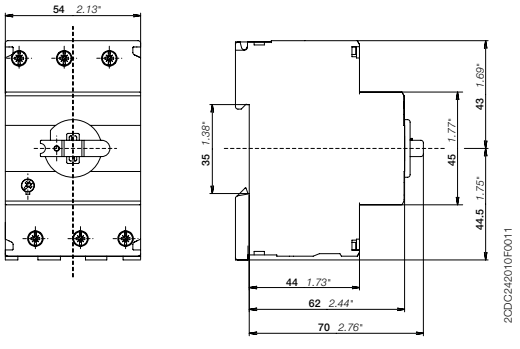
Further features are the build-in disconnect function, trip-free mechanism and a rotary handle with a clear switch position indication. The manual motor starter magnetic only is suitable for three- and single-phase applications. Auxiliary contacts, signalling contacts, undervoltage releases, shunt trips, three-phase busbars, power in-feed blocks are available as accessory.

Ordering details

Rated operational power 400 V AC-3[1]	Rated operational current	Short-circuit breaking capacity I_{cs} at 400 V AC	Rated instantaneous short-circuit current setting I_i	Type	Order code		Weight (1 pce)
kW	A	kA	A				kg
0.09	0.40	100	3.9	MO325-0.4	1SAM160000R1003		0.280
0.12	0.63	100	6.14	MO325-0.63	1SAM160000R1004		0.280
0.25	1.0	100	11.5	MO325-1	1SAM160000R1005		0.310
0.55	1.6	100	18.4	MO325-1.6	1SAM160000R1006		0.340
0.75	2.5	100	28.75	MO325-2.5	1SAM160000R1007		0.340
1.5	4.0	100	50	MO325-4	1SAM160000R1008		0.340
2.2	6.3	100	78.75	MO325-6.3	1SAM160000R1009		0.340
4.0	9.0	100	135	MO325-9	1SAM160000R1010		0.340
5.5	12.5	75	180	MO325-12.5	1SAM160000R1011		0.340
7.5	16	60	240	MO325-16	1SAM160000R1012		0.340
9.0	20	55	300	MO325-20	1SAM160000R1013		0.340
12.5	25	50	375	MO325-25	1SAM160000R1014		0.340

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

Main dimensions mm, *inches*



MO325

MO325 manual motor starters magnetic only
Technical data

Main circuit – Utilization characteristics according to IEC/EN

Type	MO325
Standards	IEC/EN 60947–2, IEC/EN 60947-4-1, IEC/EN 60947-1
Rated operational voltage U_e	690 V AC / 440 V DC
Rated frequency	50/60 Hz
Number of poles	3
Duty time	100 %
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	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	230 V AC			400 V AC			440 V AC			500 V AC			690 V AC		
	I_{CS} kA	I_{CU} kA	gG, aM A	I_{CS} kA	I_{CU} kA	gG, aM A	I_{CS} kA	I_{CU} kA	gG, aM A	I_{CS} kA	I_{CU} kA	gG, aM A	I_{CS} kA	I_{CU} kA	gG, aM A
MO325-0.4	No back-up fuse required up to I_{CC} = 100 kA														
MO325-0.63															
MO325-1															
MO325-1.6															
MO325-2.5															
MO325-4															
MO325-6.3													40	40	25
MO325-9										60	60	40	10	10	40
MO325-12.5							70	70	50	40	40	50	7	7	40
MO325-16							50	50	80	30	30	80	5	5	50
MO325-20				75	75	80	45	45	80	27	27	80	4.5	4.5	50
MO325-25				60	60	100	40	40	100	25	25	100	4	4	50

MO325-9: No need for back-up fuse in networks with a prospective current of up to 100 kA at 400 V.
MO325-16: No need for back-up fuse in networks with a prospective current of up to 60 kA at 400 V.
With an approbiate 100 A type gG fuse the device can be used in a network with a prospective current of up to 100 kA

2CDC131037C0201

MO325 manual motor starters magnetic only
Technical data

General technical data

Type		MO325
Pollution degree		3
Phase loss sensitive		Yes
Ambient air temperature		
Operation	Open - compensated without derating	-25 ... +70 °C
	Open	-25 ... +70 °C
	Enclosed (IB132)	0 ... +40 °C
Storage		-50 ... +80 °C
Ambient air temperature compensation		Continuous
Maximum operating altitude permissible		2000 m
Resistance to shock acc. to IEC 60068-2-27		15 g / 1/2 sinusoidal shock for 11 ms
Resistance to vibrations acc. to IEC 60068-2-6		5 g / 3 ... 150 Hz
Mounting position		Position 1-6 (optional for single mounting)
Group mounting		
Minimum distance to other units same type	Horizontal	0 mm
	Vertical	100 mm
Minimum distance to electrical conductive board	Horizontal, up to 400 V	> 1.5 mm
	Horizontal, up to 690 V	> 1.5 mm
	Vertical	75 mm
Degree of protection	Enclosure / terminals	IP20

Connecting characteristics

Main circuit

Type			MO325
Connecting capacity			
	Solid	**1 x**	1 x 1 ... 10 mm²
		2 x	2 x 1 ... 6 mm²
	Flexible	**1 x**	1 x 1 ... 6 mm²
		2 x	2 x 0.75 ... 4 mm²
	Stranded acc. to UL/CSA	**1 or 2 x**	AWG 14-8
	Flexible acc. to UL/CSA	**1 or 2 x**	AWG 14-8
Stripping length			10 mm
Tightening torques			1.4 Nm / 14 lb.in
Connection screw			M3.5 (Pozidriv 2)

2CDC131037C0201

MO325 manual motor starters magnetic only
Main accessories

SA1

SA2

SA3

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 63 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.

Ordering details

Rated operational current A	Number of MMS	Number of lateral aux.	Type	Order code		Pkg qty	Weight (1 pce) kg
Three-phase busbars							
63	2	0	PS3-2-0	1SAM101937R0012		10	0.038
63	3	0	PS3-3-0	1SAM101937R0013		10	0.062
63	4	0	PS3-4-0	1SAM101937R0014		10	0.087
63	5	0	PS3-5-0	1SAM101937R0015		10	0.115
63	6	0	PS3-6-0	1SAM101937R0016		10	0.137
63	2	1	PS3-2-1	1SAM101937R0022		10	0.040
63	3	1	PS3-3-1	1SAM101937R0023		10	0.068
63	4	1	PS3-4-1	1SAM101937R0024		10	0.097
63	5	1	PS3-5-1	1SAM101937R0025		10	0.126
63	3	2	PS3-2-2	1SAM101937R0032		10	0.043
63	4	2	PS3-4-2	1SAM101937R0034		10	0.106

Rated operational current A	Rated cross section mm²	Mounting form	Type	Order code		Pkg qty	Weight (1 pce) kg
Three-phase feeder terminals							
63	25	Flat	S3-M1	1SAM101938R0001		10	0.041
63	25	High	S3-M2	1SAM101938R0002		10	0.053
63	35	UL type E and IEC	S3-M3	1SAM101938R0004		10	0.050

Description	Type	Order code		Pkg qty	Weight (1 pce) kg
Protection cover for busbars	BS3-3	1SAM101938R0003		50	0.001
Lock handle	SA1	GJF1101903R0001		10	0.003
Padlock	SA2	GJF1101903R0002		10	0.020
Lock handle box SA1/SA2	SA3	GJF1101903R0003		10	0.050

2CDC131037C0201

MO325 manual motor starters magnetic only
Main accessories

63-00

HKF

SST 016 97

HK

SST 290 92 R

SK

Description

MS325 manual motor starters can be equipped with auxiliary contacts for lateral/front mounting, signalling contact for lateral mounting, undervoltage release and shunt trips. A variety of combinations is possible as required for the application. The auxiliary contacts change position with the main contacts. The signalling contact signals tripping regardless if it was caused by short-circuit or overload. 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

Ordering details

Auxiliary contacts N.O.	Auxiliary contacts N.C.	Description	Type	Order code		Pkg qty	Weight (1 pce) kg
Auxiliary contacts – mountable on the front							
1	1		HKF-11	1SAM101928R0001		10	0.015
2	0		HKF-20	1SAM101928R0002		10	0.020
Auxiliary contacts – mountable on the left							
1	1	Max. 2 pieces	HK-11	1SAM101901R0001		2	0.030
2	0	Max. 2 pieces	HK-20	1SAM101901R0002		2	0.030
0	2	Max. 2 pieces	HK-02	1SAM101901R0003		2	0.030
Signalling contacts – mountable on the left							
1	1	For tripped alarm, max. 1 pieces	SK-11	1SAM101904R0003		10	0.030
Signalling contacts – mountable on the right							
1	1	For short-circuit alarm	CK-11	1SAM101943R0001		10	0.035

Rated control supply voltage V	Frequency Hz	Type	Order code		Pkg qty	Weight (1 pce) kg
Shunt trip units – mountable as slide in						
24 ... 60	50/60	AA-24	1SAM101909R0001		10	0.025
110 ... 240	50/60	AA-230	1SAM101909R0002		10	0.025
220 ... 415	50/60	AA-400	1SAM101909R0003		10	0.025
Undervoltage releases – mountable as slide in						
24	50	UAF-24	1SAM101903R0024		10	0.02
48	50	UAF-48	1SAM101903R0048		10	0.02
60	50	UAF-60	1SAM101903R0060		10	0.02
110	50	UAF-110	1SAM101903R0110		10	0.02
230	50	UAF-230	1SAM101903R0230		10	0.02
400	50	UAF-400	1SAM101903R0400		10	0.02
415	50	UAF-415	1SAM101903R0415		10	0.02
500	50	UAF-500	1SAM101903R0500		10	0.02

2CDC131037C0201

MO325 manual motor starters magnetic only
Main accessories

General technical data

Type		PS3	S3-M1/S3-M2	S3-M3
Standards		IEC/EN 60947-2, IEC/EN 60947-4-1, IEC/EN 60947-1		
Rated operational voltage U_e		690 V AC		
Rated operational current I_e		63 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	25 mm²	
Ambient air temperature	Operation	-25 ... +70 °C		
	Storage	-50 ... +80 °C		
Resistance to shock acc. to IEC 60068-2-27		15 g / 11 ms		
Resistance to vibrations acc. to IEC 60068-2-6		3 g / 3 ... 150 Hz		

Electrical connection

Main circuit

Type			PS3, S3-Mx
Connecting capacity			
	Solid	1 x	6 ... 25 mm²
	Flexible	1 x	6 ... 16 mm²
	Stranded acc. to UL/CSA	1 x	AWG 10-4
	Flexible acc. to UL/CSA	1 x	AWG 10-6
Stripping length			10 mm
Tightening torques			2.5 Nm / 22 lb.in
Connection screw			PZ2 (6 mm)

2CDC131037C0201

MO325 manual motor starters magnetic only
Main accessories

IB325-Y

IB325-G

DMS325-Y

DMS325-G

Description

IB325 are IP65 enclosures for single MMS installation. Additional mounting of auxiliary and signalling contacts, shunt trips and undervoltage release is possible. The handle is lockable in OFF position. For detailed specification see installation instruction.

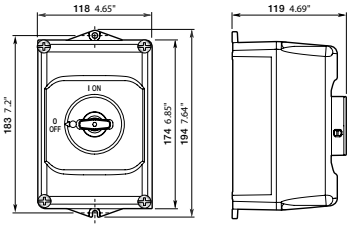
DMS325 are IP65 door mounting kits for MMS installation in any enclosure. Additional mounting of auxiliary, signalling, shunt trips and undervoltage release is possible. The handle is lockable in OFF position. For detailed specification see installation instruction.

Ordering details

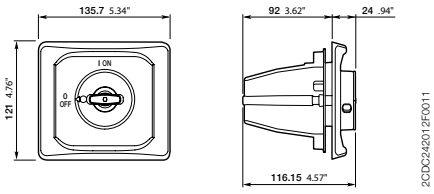
Description	Color	Type	Order code		Pkg qty	Weight (1 pce) kg
Enclosures IP65						
Padlockable max. 3 padlocks with bail diameter 4 ... 6.5 mm	Yellow/red	IB325-G	1SAM101940R1000		1	0.370
	Grey/black	IB325-Y	1SAM101940R1001		1	0.370
Door mounting kit IP65						
Padlockable max. 3 padlocks with bail diameter 4 ... 6.5 mm	Yellow/red	DMS325-G	1SAM101941R1000		1	0.170
	Grey/black	DMS325-Y	1SAM101941R1001		1	0.170

Indication I-O and ON-OFF

Main dimensions mm, *inches*



IB325



DMS325

2CDC131037C0201

MO325 manual motor starters magnetic only
Main accessories

MSHD-LB

MSHD-LY

MSMN

MSOX-30

MSH-AR

Description

The complete set includes handle, shaft and driver. All accessories fit 6 mm shafts of maximum 180 mm length. The degree of protection for handles MSHD is IP64.

Ordering details

Description	Shaft length mm	Type	Order code		Pkg qty	Weight (1 pce) kg
Shafts						
For selector type 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

Description	Color	Type	Order code		Pkg qty	Weight (1 pce) kg
Selector type handles IP64						
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 [2]	1SAM201920R1002		1	0.065

[1] Indication I-O and ON-OFF
[2] Indication I-O-T and ON-OFF-T

Description	Type	Order code		Pkg qty	Weight (1 pce) kg
Driver					
Coupling driver for use with 6 mm OXS6... types up to 180 mm.	MSMN [1]	1SAM101923R0002		1	0.002
	MSMNO [2]	1SAM101923R0012		1	0.002

[1] Coded - Positioning of ON indication dependent from mounting orientation of the MS
[2] Uncoded - Positioning of ON indication independent from mounting orientation of the MS

Description	Shaft length mm	Type	Order code		Pkg qty	Weight (1 pce) kg
Driver shafts						
Driver shaft - combination driver & shaft. Shaft diameter 6 mm.	32	MSOX-32 [1]	1SAM101924R0003		1	0.010
	30	MSOX-30 [2]	1SAM101924R0013		1	0.010

[1] MSOX-32 is for normal vertical use
[2] MSOX-30 is for horizontal use

Description	Type	Order code		Pkg qty	Weight (1 pce) kg
Shaft alignment ring					
The MSH-AR support the long axis for alignment to the handle inlet. It makes closing panel doors more easy.	MSH-AR	1SAM201920R1000		1	0.010

2CDC131037C0201

MS451, MS496 manual motor starters
11 to 100 A – with thermal and electromagnetic protection

MS451-50

MS496-100

Description

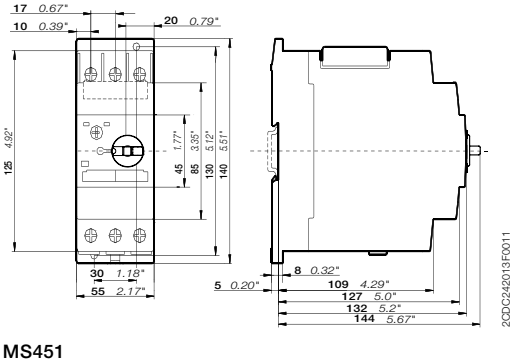
Manual motor starters (MMS) are protection devices for the main circuit. They combine motor control and protection in a single device. MMS are used mainly to switch motors manually ON/OFF and protect them and the installation fuse less against short-circuit, overload and phase failures. Fuse less protection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

Further features are the build-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication. The manual motor starter is suitable for three- and single-phase applications. The handle is lockable to protect against unauthorized changes. Auxiliary contacts, signalling contacts, undervoltage releases, shunt trips, three-phase busbars, power in-feed blocks are available as accessory.

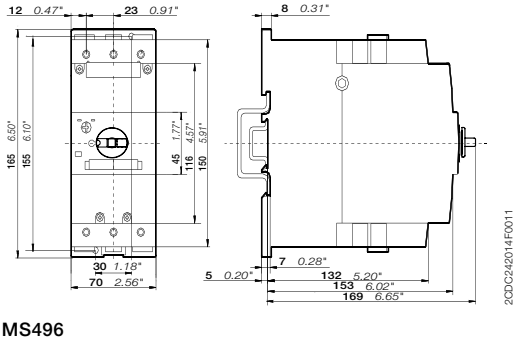
Ordering details

Rated operational power 400 V AC-3	Setting range	Short-circuit breaking capacity I_{cs} at 400 V AC	Rated instantaneous short-circuit current setting I_i	Type	Order code		Weight (1 pce)
kW	A	kA	A				kg
MS451 manual motor starter							
7.5	11.0 ... 16.0	25	208.00	MS451-16	1SAM470000R1001		1.067
9	14.0 ... 20.0	25	260.00	MS451-20	1SAM470000R1002		1.071
11	18.0 ... 25.0	25	325.00	MS451-25	1SAM470000R1003		1.054
15	22.0 ... 32.0	25	416.00	MS451-32	1SAM470000R1004		1.067
18.5	28.0 ... 40.0	25	520.00	MS451-40	1SAM470000R1005		1.076
22	36.0 ... 45.0	25	585.00	MS451-45	1SAM470000R1006		1.073
22	40.0 ... 50.0	25	650.00	MS451-50	1SAM470000R1007		1.071
MS496 manual motor starter							
18.5	28.0 ... 40.0	50	520.00	MS496-40	1SAM570000R1005		2.222
22	36.0 ... 50.0	50	650.00	MS496-50	1SAM570000R1006		2.265
30	45.0 ... 63.0	50	819.00	MS496-63	1SAM570000R1007		2.278
37	57.0 ... 75.0	50	975.00	MS496-75	1SAM570000R1008		2.268
45	70.0 ... 90.0	50	1170.00	MS496-90	1SAM570000R1009		2.313
55	80.0 ... 100.0	50	1300.00	MS496-100	1SAM570000R1010		2.322

Main dimensions mm, *inches*



MS451



MS496

2CDC131043C0201

MS451, MS496 manual motor starters
Technical data

Main circuit – Utilization characteristics according to IEC/EN

Type	MS451, MS496
Standards	IEC/EN 60947–2, IEC/EN 60947-4-1, IEC/EN 60947-1
Rated operational voltage U_e	690 V AC / 440 V DC
Rated frequency	50/60 Hz
Trip class	20
Number of poles	3
Duty time	100 %
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	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 MS451															
MS451-16	No back-up fuse required up to I_{cc} = 100 kA			25	50	100	25	50	100	6	12	63	3	5	63
MS451-20				25	50	100	25	50	100	6	12	80	3	5	63
MS451-25				25	50	100	15	50	100	6	12	80	3	5	63
MS451-32				25	50	125	15	50	125	5	10	100	2	4	63
MS451-40				25	50	160	15	50	125	5	10	100	2	4	63
MS451-45				25	50	160	15	50	125	5	10	100	2	4	63
MS451-50				25	50	160	15	50	125	5	10	100	2	4	80

MS451: 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 MS496															
MS496-40	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	9	18	160	6	12	80
MS496-50		50	100		50	100		7.5	15	160	5	10	100
MS496-63		50	100		50	70	200	7.5	15	160	4	7.5	100
MS496-75		50	100		50	70	200	5	10	160	3	6	125
MS496-90		50	100		50	70	200	5	10	160	3	6	160
MS496-100		50	100		50	70	200	5	10	160	3	6	160

MS496-40: No need for back-up fuse in networks with a prospective current of up to 100 kA at 440 V.
MS496-90: 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.

2CDC131043C0201

MS451, MS496 manual motor starters
Technical data

General technical data

Type			MS451	MS496
Pollution degree			3	
Phase loss sensitive			Yes	
Ambient air temperature				
	Operation	Open - compensated without derating	-25 ... +60 °C	
		Open	-25 ... +70 °C	
		Enclosed (IB132)	-25 ... +35 °C	
	Storage		-50 ... +80 °C	
Ambient air temperature compensation			Continuous	
Maximum operating altitude permissible			2000 m	
Resistance to shock acc. to IEC 60068-2-27			25 g / 11 ms	
Resistance to vibrations acc. to IEC 60068-2-6			2 g / 5-150 Hz	
Mounting position			Position 1-6 (optional for single mounting)	
Mounting				
Group mounting				
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	50 mm	-
Minimum distance to electrical conductive board		Horizontal	10 mm	-
		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	50 mm	-
Degree of protection		Enclosure / terminals	IP20	

Connecting characteristics

Main circuit

Type			MS451	MS496
Connecting capacity				
	Solid	**1 or 2 x**	0.75 ... 16 mm²	2.5 ... 16 mm²
	Flexible	**1 x**	0.75 ... 35 mm²	2.5 ... 50 mm²
		2 x	0.75 ... 25 mm²	2.5 ... 35 mm²
	Stranded acc. to UL/CSA	**1 x**	AWG 18-2	AWG 10-2/0
		2 x	AWG 18-2	AWG 10-1/0
	Flexible acc. to UL/CSA	**1 x**	AWG 18-2	AWG 10-2/0
		2 x	AWG 18-2	AWG 10-1/0
Stripping length			13 mm	17 mm
Tightening torques			3 - 4.5 Nm / 27 ... 40 lb.in	2.0 Nm / 18 lb.in
Connection screw			Pozidriv 2	Hexagon 4

2CDC131043C0201

MS451, MS496 manual motor starters
Main accessories

SA2

Description
Three-phase busbars ensure a quick and safe connection and are therefor a cost effective solution. A variety of different three-phase busbars up to 108 A are in the assortment. Between 2 and 4 manual motor starter with none or two lateral auxiliary contacts can be connected.

Ordering details

Rated operational current A	Number of MMS	Number of lateral aux.	Type	Order code		Pkg qty	Weight (1 pce) kg
Three-phase busbars for MS450 only							
108 A	2	0	PS4-2-0	1SAM401911R1001		5	0.134
108 A	3	0	PS4-3-0	1SAM401911R1002		5	0.206
108 A	4	0	PS4-4-0	1SAM401911R1003		5	0.280
108 A	2	1	PS4-2-2	1SAM401911R1004		5	0.148
108 A	3	1	PS4-3-2	1SAM401911R1005		5	0.250
108 A	4	1	PS4-4-2	1SAM401911R1006		5	0.362

Rated operational current A	Rated cross section mm²	Mounting form	Type	Order code		Pkg qty	Weight (1 pce) kg
Three-phase feeder terminals for MS450 only							
108 A	25	Flat	S4-M1	1SAM401911R1007		2	0.106

Description	For MMS	Type	Order code		Pkg qty	Weight (1 pce) kg
Protection cover for busbar	PS4	BS4-3	1SAM401911R1008		10	0.001
Disconnector module	MS451	TB450	1SAM401910R1001		1	0.315
Terminal shroud	MS451	KA450	1SAM401908R1001		1	0.154
Terminal shroud	MS496	KA495	1SAM501901R1001		10	0.018
Terminal shroud	MS496	KA495C [1)]	1SAM501902R1001		10	0.038
Terminal insulation barrier for UL508E	MS496	DX495	1SAM401912R1001		1	0.154
Padlock + 2 keys	MS451, MS496	SA2	GJF1101903R0002		10	0.020

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

2CDC131043C0201

MS451, MS496 manual motor starters
Main accessories

2CDC241026F0011

HK4-11

2CDC241022F0011

HKS4-20

2CDC241024F0011

SK4-11

2CDC241023F0011

AA4-24

Description

MS450, MS495, MS497 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.

Ordering details

Auxiliary contacts N.O.	Auxiliary contacts N.C.	Description	Type	Order code		Pkg qty	Weight (1 pce) kg
Auxiliary contacts – mountable on the front							
1	1		HK4-11	1SAM401901R1001		10	0.017
		Changeover	HK4-W	1SAM401901R1002		10	0.015
Auxiliary contacts – mountable on the left							
1	1	Max. 1 pieces	HKS4-11	1SAM401902R1001		2	0.045
2	0	Max. 1 pieces	HKS4-20	1SAM401902R1002		2	0.045
0	2	Max. 1 pieces	HKS4-02	1SAM401902R1003		2	0.045
Signalling contacts – mountable on the right							
2	2	Separate signalling acc. UL508E 1 N.O. + 1 N.C. for short circuit and 1NO+NC for general tripping , max. 2 pieces	SK4-11	1SAM401904R1001		1	0.093

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

2CDC131043C0201

MS451, MS496 manual motor starters
Main accessories

General technical data

Type			PS4-xxx	S4-M1
Standards			IEC/EN 60947-1	
Rated operational voltage U_e			690 V AC	
Rated operational current I_e			108 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	25 mm²
Ambient air temperature		Operation	-25 ... +70 °C	
		Storage	-50 ... +80 °C	

Electrical connection

Main circuit

Type			S4-M1
Connecting capacity			
	Solid	**1 x**	2.5 ... 50 mm²
	Flexible	**1 x**	4 ... 16 mm²
	Stranded acc. to UL/CSA	**1 x**	AWG 14-4
	Flexible acc. to UL/CSA	**1 x**	AWG 14-4
Tightening torques			4 Nm
Connection screw			Pozidriv 2

2CDC131043C0201

MS451, MS496 manual motor starters
Main accessories

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		25 g / 11 ms			
Resistance to vibrations acc. to IEC 60068-2-6		2 g / 5 ... 150Hz			
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, 50/60 Hz	2 A	4 A	6 A	6 A
	230 V, 50/60 Hz	0.5 A	3 A	4 A	4 A
	400 V, 50/60 Hz	-	1.5 A	3 A	3 A
	690 V, 50/60 Hz	-	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			

Electrical connection

Main circuit

Type			HK4-11	HK4-W	HKS4	SK4
Connecting capacity						
	Solid	**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 torques			0.8 ... 1.2 Nm / 7 ... 10.3 lb.in			
Connection screw			Pozidriv 2			

2CDC131043C0201

MS451, MS496 manual motor starters
Main accessories

MSHD-LTB

MSHD-LTY

MSMN

MSH-AR

Description

The complete set includes handle, shaft and driver. All accessories fit 6 mm shafts of maximum 180 mm length. The degree of protection for handles MSHD is IP64.

Ordering details

Description	Shaft length mm	Type	Order code		Pkg qty	Weight (1 pce) kg
Shafts						
For selector type 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

Description	Color mm	Type	Order code		Pkg qty	Weight (1 pce) kg
Selector type handles IP64						
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-LTB [1]	1SAM201920R1011		1	0.065
	Yellow	MSHD-LTY [1]	1SAM201920R1012		1	0.065

[1] Indication I-O-T and ON-OFF-T

Description	Type	Order code		Pkg qty	Weight (1 pce) kg
Driver					
Coupling driver for use with 6 mm OXS6... types up to 180 mm.	MSMN [1]	1SAM101923R0002		1	0.002
	MSMNO [2]	1SAM101923R0012		1	0.002

[1] Coded - Positioning of ON indication dependent from mounting orientation of the MS

[2] Uncoded - Positioning of ON indication independent from mounting orientation of the MS

Description	Type	Order code		Pkg qty	Weight (1 pce) kg
Shaft alignment ring					
The MSH-AR support the long axis for alignment to the handle inlet. It makes closing panel doors more easy.	MSH-AR	1SAM201920R1000		1	0.010

2CDC131043C0201

Notes

B6-30-10
A1
A2

B mini contactors
K mini contactor relays

With screw terminals

3-pole contactors

B6, B7	AC operated	**3**/2
BC6, BC7, B7D	DC operated	**3**/3

3-pole reversing contactors

VB6, VB7	AC operated	**3**/4
VBC6, VBC7	DC operated	**3**/5
VB6A, VB7A	AC operated	**3**/6
VBC6A, VBC7A	DC operated	**3**/7

3-pole interface contactors

BC6, BC7	DC operated	**3**/8

3-pole contactors - large coil voltage range

TBC7	DC operated	**3**/9

4-pole contactors

B6, B7	AC operated	**3**/10
BC6, B7D	DC operated	**3**/11

4-pole contactors - large coil voltage range

TBC7	DC operated	**3**/12

Contactor relays

K6	AC operated	**3**/14
KC6	DC operated	**3**/15

Interface contactor relays

KC6	DC operated	**3**/16

Contactor relays - large coil voltage range

TKC6	DC operated	**3**/17

With soldering pins

3-pole contactors

B6, B7	AC operated	**3**/18
BC6, BC7	DC operated	**3**/19

3-pole reversing contactors

VB6, VB7	AC operated	**3**/20
VBC6, VBC7	DC operated	**3**/21
VB6A, VB7A	AC operated	**3**/22
VBC7A	DC operated	**3**/23

Contactor relays

K6	AC operated	**3**/24
KC6	DC operated	**3**/25

3-pole interface contactors

BC6, BC7	DC operated	**3**/26

Interface contactors relays

KC6	DC operated	**3**/27

With flat pin connection

3-pole contactors

B6, B7	AC operated	**3**/28
BC6, BC7	DC operated	**3**/29

3-pole reversing contactors

VB7	AC operated	**3**/30
VBC7	DC operated	**3**/31
VB7A	AC operated	**3**/32
VBC7A	DC operated	**3**/33

3-pole interface contactors

BC6, BC7	DC operated	**3**/34

Contactors relays

K6	AC operated	**3**/35
KC6	DC operated	**3**/36

Interface contactors relays

KC6	DC operated	**3**/37

Accessories **3/38**

Technical data **3/40**

Somm_Minib

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

B6-30-10

B7-30-10

3

Description

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

These contactors are designed with:

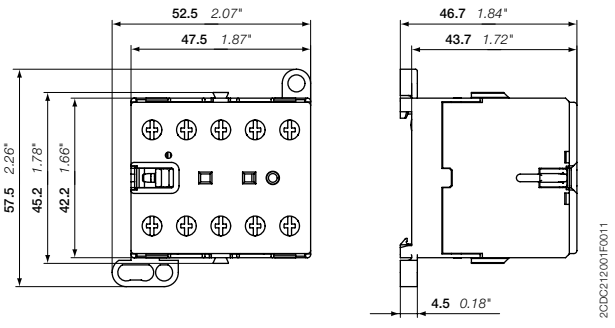
- 3 main poles and one built-in auxiliary contact
- control circuit: AC operated, low coil consumption (3.5 VA at pull-in and at holding)
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories
- hum-free coil
- designed for rail or wall mounting

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c		Auxiliary contacts fitted		Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC	50 Hz	60 Hz							
kW	A	hp	A	V AC	V AC							kg
B6 mini contactors												
4	16	3	3.4	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	7.6	24	24	1	0	B7-30-10-01	GJL1311001R0101		10	0.175
						0	1	B7-30-01-01	GJL1311001R0011		10	0.175
				42	42	1	0	B7-30-10-02	GJL1311001R0102		10	0.175
						0	1	B7-30-01-02	GJL1311001R0012		10	0.175
				48	48	1	0	B7-30-10-03	GJL1311001R0103		10	0.175
						0	1	B7-30-01-03	GJL1311001R0013		10	0.175
				110 ... 127	110 ... 127	1	0	B7-30-10-84	GJL1311001R8104		10	0.175
						0	1	B7-30-01-84	GJL1311001R8014		10	0.175
				220 ... 240	220 ... 240	1	0	B7-30-10-80	GJL1311001R8100		10	0.175
						0	1	B7-30-01-80	GJL1311001R8010		10	0.175
				380 ... 415	380 ... 415	1	0	B7-30-10-85	GJL1311001R8105		10	0.175
						0	1	B7-30-01-85	GJL1311001R8015		10	0.175

Other types on request

Main dimensions mm, *inches*



B6, B7

2CDC102008C0201

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

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:

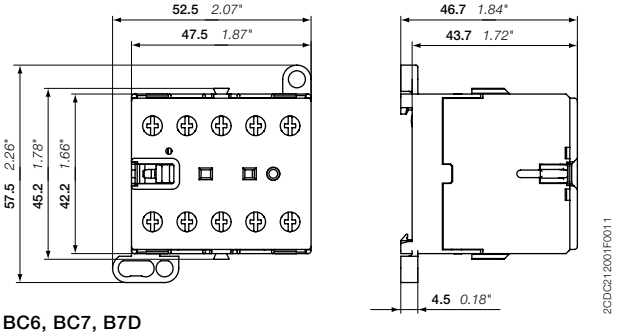
- 3 main poles and one built-in auxiliary contact
- control circuit: DC operated, low consumption (3.5 W at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories
- designed for rail or wall mounting

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							
kW	A	hp	A	V DC						kg
BC6 mini contactors										
4	16	3	3.4	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	7.6	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	7.6	24	1 0	B7D-30-10-01	GJL1317001R0101		10	0.175
					0 1	B7D-30-01-01	GJL1317001R0011		10	0.175
				220	1 0	B7D-30-10-05	GJL1317001R0105		10	0.175
					0 1	B7D-30-01-05	GJL1317001R0015		10	0.175

Other types on request

Main dimensions mm, *inches*



BC6, BC7, B7D

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

VB7-30-10

Description

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

These reversing contactors are designed with:

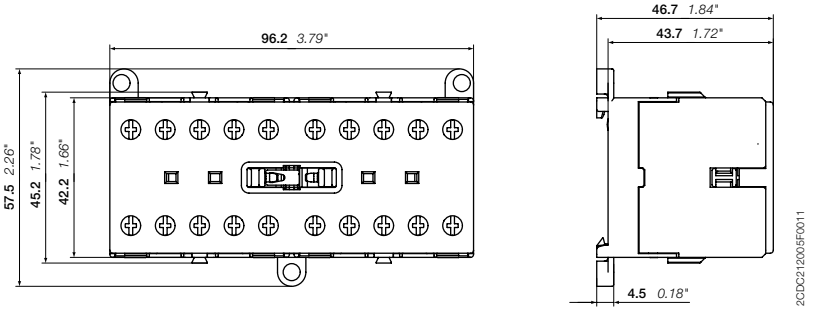
- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc.
- control circuit: AC operated, low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- add-on auxiliary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

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c		Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC	50 Hz	60 Hz						
kW	A	hp	A	V AC	V AC						kg
VB6 mini reversing contactors											
4	16	3	3.4	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	7.6	24	24	1 0	VB7-30-10-01	GJL1311901R0101		5	0.355
						0 1	VB7-30-01-01	GJL1311901R0011		5	0.355
				42	42	1 0	VB7-30-10-02	GJL1311901R0102		5	0.355
						0 1	VB7-30-01-02	GJL1311901R0012		5	0.355
				48	48	1 0	VB7-30-10-03	GJL1311901R0103		5	0.355
						0 1	VB7-30-01-03	GJL1311901R0013		5	0.355
				110 ... 127	110 ... 127	1 0	VB7-30-10-84	GJL1311901R8104		5	0.355
						0 1	VB7-30-01-84	GJL1311901R8014		5	0.355
				220 ... 240	220 ... 240	1 0	VB7-30-10-80	GJL1311901R8100		5	0.355
						0 1	VB7-30-01-80	GJL1311901R8010		5	0.355
				380 ... 415	380 ... 415	1 0	VB7-30-10-85	GJL1311901R8105		5	0.355
						0 1	VB7-30-01-85	GJL1311901R8015		5	0.355

Other types on request

Main dimensions mm, *inches*



VB6, VB7

2CDC102016C0201

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

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:

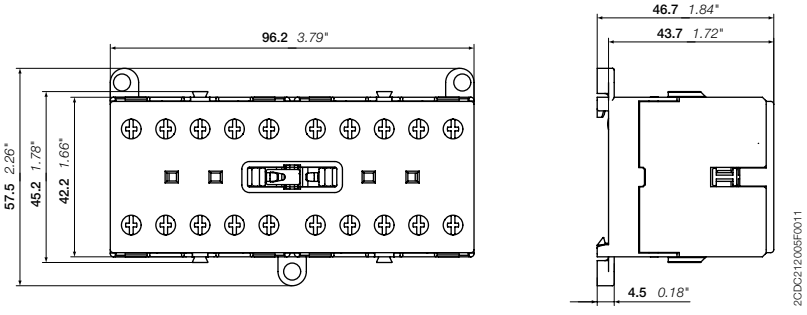
- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc.
- control circuit: DC operated, low coil consumption (3.5 W at pull-in and at holding)
- hum-free coil
- add-on auxiliary 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	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							
kW	A	hp	A	V DC						kg
VBC6 mini reversing contactors										
4	16	3	3.4	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	7.6	12	1 0	VBC7-30-10-07	GJL1313901R0107		5	0.355
					0 1	VBC7-30-01-07	GJL1313901R0017		5	0.355
				24	1 0	VBC7-30-10-01	GJL1313901R0101		5	0.355
					0 1	VBC7-30-01-01	GJL1313901R0011		5	0.355
				48	1 0	VBC7-30-10-16	GJL1313901R1106		5	0.355
					0 1	VBC7-30-01-16	GJL1313901R1016		5	0.355
				60	1 0	VBC7-30-10-03	GJL1313901R0103		5	0.355
					0 1	VBC7-30-01-03	GJL1313901R0013		5	0.355
				110 ... 125	1 0	VBC7-30-10-04	GJL1313901R0104		5	0.355
					0 1	VBC7-30-01-04	GJL1313901R0014		5	0.355
				220 ... 240	1 0	VBC7-30-10-05	GJL1313901R0105		5	0.355
					0 1	VBC7-30-01-05	GJL1313901R0015		5	0.355

Other types on request

Main dimensions mm, *inches*



VBC6, VBC7

2CDC102017C0201

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

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:

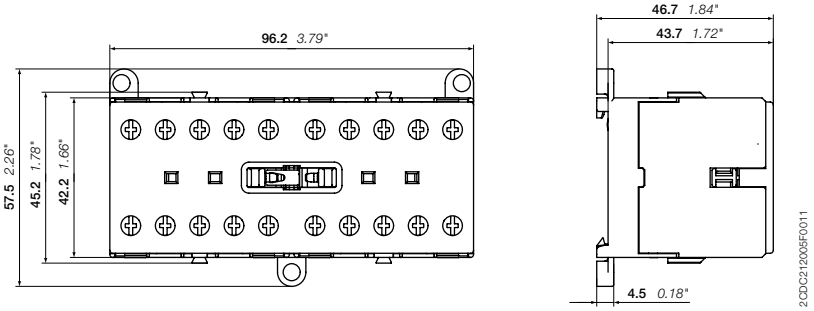
- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the 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		Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3 kW	current θ ≤ 55 °C AC-1 A	3-phase motor rating 480 V hp	General use rating 600 V AC A	50 Hz V AC	60 Hz V AC							kg
VB6A mini reversing contactors with safety blocking function												
4	16	3	3.4	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	7.6	24	24	1	0	VB7A-30-10-01	GJL1311911R0101		5	0.355
						0	1	VB7A-30-01-01	GJL1311911R0011		5	0.355
				42	42	1	0	VB7A-30-10-02	GJL1311911R0102		5	0.355
						0	1	VB7A-30-01-02	GJL1311911R0012		5	0.355
				48	48	1	0	VB7A-30-10-03	GJL1311911R0103		5	0.355
						0	1	VB7A-30-01-03	GJL1311911R0013		5	0.355
				110 ... 127	110 ... 127	1	0	VB7A-30-10-84	GJL1311911R8104		5	0.355
						0	1	VB7A-30-01-84	GJL1311911R8014		5	0.355
				220 ... 240	220 ... 240	1	0	VB7A-30-10-80	GJL1311911R8100		5	0.355
						0	1	VB7A-30-01-80	GJL1311911R8010		5	0.355
				380 ... 415	380 ... 415	1	0	VB7A-30-10-85	GJL1311911R8105		5	0.355
						0	1	VB7A-30-01-85	GJL1311911R8015		5	0.355

Other types on request

Main dimensions mm, *inches*



VB6A, VB7A

2CDC102018C0201

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:

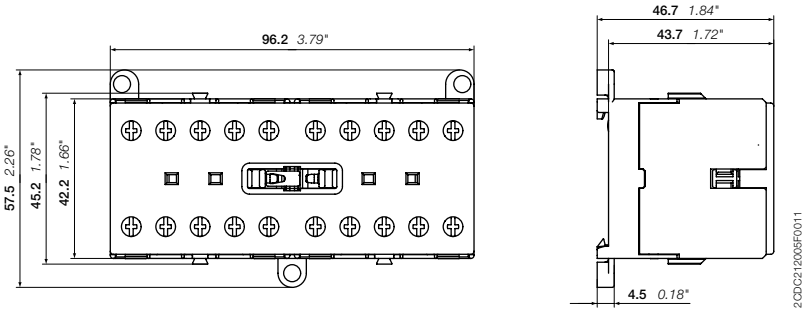
- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the 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	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							
kW	A	hp	A	V DC						kg
VBC6A mini reversing contactors with safety blocking function										
4	16	3	3.4	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	7.6	12	1 0	VBC7A-30-10-07	GJL1313911R0107		5	0.355
					0 1	VBC7A-30-01-07	GJL1313911R0017		5	0.355
				24	1 0	VBC7A-30-10-01	GJL1313911R0101		5	0.355
					0 1	VBC7A-30-01-01	GJL1313911R0011		5	0.355
				48	1 0	VBC7A-30-10-16	GJL1313911R1106		5	0.355
					0 1	VBC7A-30-01-16	GJL1313911R0016		5	0.355
				60	1 0	VBC7A-30-10-03	GJL1313911R0103		5	0.355
					0 1	VBC7A-30-01-03	GJL1313911R0013		5	0.355
				110 ... 125	1 0	VBC7A-30-10-04	GJL1313911R0104		5	0.355
					0 1	VBC7A-30-01-04	GJL1313911R0014		5	0.355
				220 ... 240	1 0	VBC7A-30-10-05	GJL1313911R0105		5	0.355
					0 1	VBC7A-30-01-05	GJL1313911R0015		5	0.355

Other types on request

Main dimensions mm, *inches*



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

3

Description

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

These contactors are designed with:

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

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3 kW	current θ ≤ 55 °C AC-1 A	3-phase motor rating 480 V hp	General use rating 600 V AC A	V DC						kg
DC operation 24 V / 1.4 W										
4	16	3	3.4	24	1 0	BC6-30-10-1.4-81	GJL1213001R8101		10	0.175
					0 1	BC6-30-01-1.4-81	GJL1213001R8011		10	0.175
5.5	20	5	7.6	24	1 0	BC7-30-10-1.4-81	GJL1313001R8101		10	0.175
					0 1	BC7-30-01-1.4-81	GJL1313001R8011		10	0.175
DC operation 17 ... 32 V / 2.4 W										
4	16	3	3.4	17 ... 32 (1)	1 0	BC6-30-10-2.4-51	GJL1213001R5101		10	0.175
					0 1	BC6-30-01-2.4-51	GJL1213001R5011		10	0.175
5.5	20	5	7.6	17 ... 32 (1)	1 0	BC7-30-10-2.4-51	GJL1313001R5101		10	0.175
					0 1	BC7-30-01-2.4-51	GJL1313001R5011		10	0.175

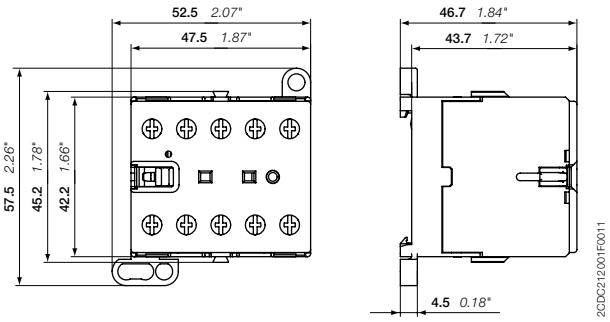
Connection to PLCs with integrated protective circuit

DC operation 24 V / 1.7 W										
4	16	3	3.4	24	1 0	B6S-30-10-1.7-71	GJL1213001R7101		10	0.175
					0 1	B6S-30-01-1.7-71	GJL1213001R7011		10	0.175
5.5	20	5	7.6	24	1 0	B7S-30-10-1.7-71	GJL1313001R7101		10	0.175
					0 1	B7S-30-01-1.7-71	GJL1313001R7011		10	0.175
DC operation 17 ... 32 V / 2.8 W										
4	16	3	3.4	17 ... 32 (1)	1 0	B6S-30-10-2.8-72	GJL1213001R7102		10	0.175
					0 1	B6S-30-01-2.8-72	GJL1213001R7012		10	0.175
5.5	20	5	7.6	17 ... 32 (1)	1 0	B7S-30-10-2.8-72	GJL1313001R7102		10	0.175
					0 1	B7S-30-01-2.8-72	GJL1313001R7012		10	0.175

Other types on request

(1) Uc min. and Uc max. limit values, including the voltage variation tolerances (-15 % and +10 %).

Main dimensions mm, *inches*



BC6, BC7

2CDC102010C0201

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

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

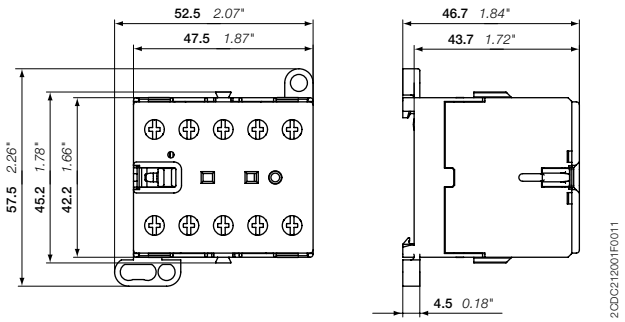
Ordering details

IEC		UL/CSA		Rated control circuit voltage U_{Cmin} ... U_{Cmax} (1)	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							
kW	A	hp	A	V DC						kg
TBC7 mini contactors										
5.5	20	5	7.6	17 ... 32	1 0	TBC7-30-10-51	GJL1313061R5101		10	0.185
					0 1	TBC7-30-01-51	GJL1313061R5011		10	0.185
				50 ... 90	1 0	TBC7-30-10-55	GJL1313061R5105		10	0.185
					0 1	TBC7-30-01-55	GJL1313061R5015		10	0.185
				77 ... 143	1 0	TBC7-30-10-62	GJL1313061R6102		10	0.185
					0 1	TBC7-30-01-62	GJL1313061R6012		10	0.185
				140 ... 260	1 0	TBC7-30-10-68	GJL1313061R6108		10	0.185
					0 1	TBC7-30-01-68	GJL1313061R6018		10	0.185

Other types on request

(1) Uc min. and Uc max. limit values, including the voltage variation tolerances (-15 % and +10 %).

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:

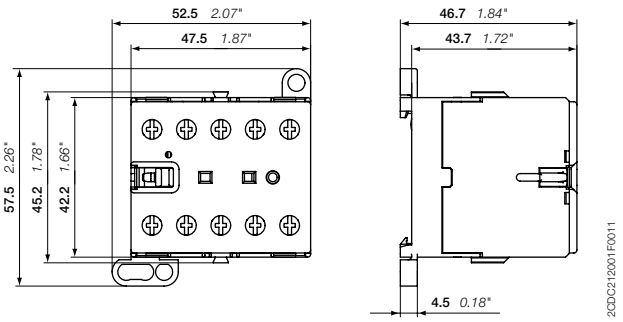
– 4 main poles
– control circuit: AC operated, low coil consumption (3.5 VA at pull-in and at holding)
– add-on auxiliary contact blocks for front or side mounting and a wide range of accessories
– hum-free coil
– designed for rail or wall mounting

Ordering details

IEC Rated operational current θ ≤ 55 °C AC-1 A	UL/CSA General use rating 600 V AC A	Rated control circuit voltage U_c 50/60 HZ V AC	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce) kg
4 N.O. main poles								
16	8.4	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	13.8	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								
16	8.4	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	13.8	24	0 0	B7-22-00-01	GJL1311501R0001		10	0.175
		42	0 0	B7-22-00-02	GJL1311501R0002		10	0.175
		48	0 0	B7-22-00-03	GJL1311501R0003		10	0.175
		110 ... 127	0 0	B7-22-00-84	GJL1311501R8004		10	0.175
		220 ... 240	0 0	B7-22-00-80	GJL1311501R8000		10	0.175

Other types on request

Main dimensions mm, *inches*



B6, B7

2CDC102009C0201

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

BC6-22-00

Description

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

These contactors are designed with:

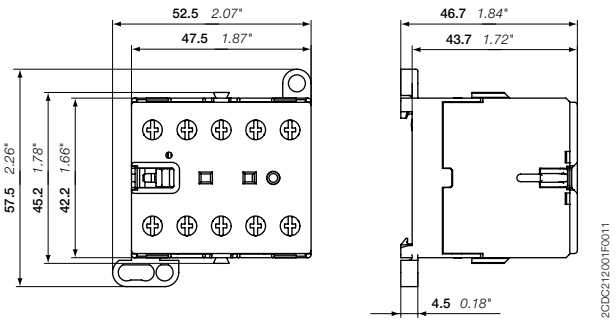
– 4 main poles
– control circuit: DC operated, low coil consumption (3.5 W at pull-in and at holding)
– hum-free coil
– add-on auxiliary contact blocks for front or side mounting
– designed for rail or wall mounting

Ordering details

IEC Rated operational current θ ≤ 55 °C AC-1 A	UL/CSA General use rating 600 V AC A	Rated control circuit voltage U_C V DC	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce) kg
4 N.O. main poles								
20	13.8	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								
16	8.4	12	0 0	BC6-22-00-07	GJL1213501R0007		10	0.175
		24	0 0	BC6-22-00-01	GJL1213501R0001		10	0.175
		42	0 0	BC6-22-00-02	GJL1213501R0002		10	0.175
		48	0 0	BC6-22-00-16	GJL1213501R1006		10	0.175
		60	0 0	BC6-22-00-03	GJL1213501R0003		10	0.175
		110 ... 125	0 0	BC6-22-00-04	GJL1213501R0004		10	0.175
		220 ... 240	0 0	BC6-22-00-05	GJL1213501R0005		10	0.175

Other types on request

Main dimensions mm, *inches*



BC6, B7D

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

TBC7-31-00

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

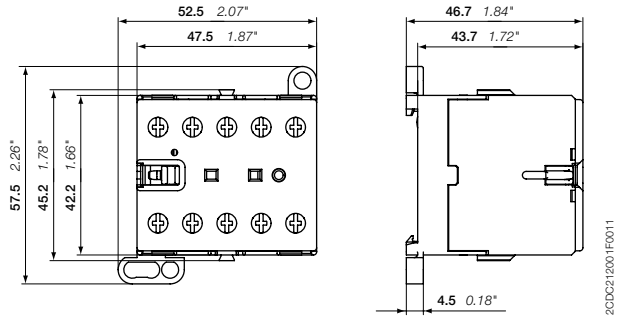
Ordering details

IEC Rated operational current θ ≤ 55 °C AC-1 A	UL/CSA General use rating 600 V AC A	Rated control circuit voltage $U_{C\,min}$ ... $U_{C\,max}$ (1) V DC	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce) kg
3 N.O. + 1 N.C. main poles								
5.5	20	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								
5.5	20	50 ... 90	0 0	TBC7-22-00-55	GJL1313561R5005		10	0.185
		77 ... 143	0 0	TBC7-22-00-62	GJL1313561R6002		10	0.185
		140 ... 260	0 0	TBC7-22-00-68	GJL1313561R6008		10	0.185

Other types on request

(1) Uc min. and Uc max. limit values, including the voltage variation tolerances (-15 % and +10 %).

Main dimensions mm, *inches*



TBC7

2CDC102022C0201

Notes

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

K6-22Z

K6-31Z

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:

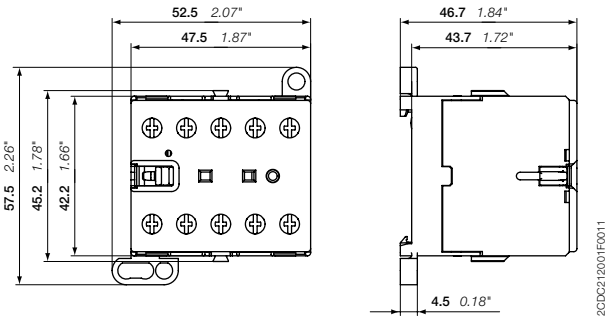
- 4 poles with various contact combinations
- control circuit: AC operated, low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for front or side mounting
- designed for rail or wall mounting

Ordering details

Rated control circuit voltage U_c		Auxiliary contacts fitted		Type	Order code		Pkg qty	Weight (1 pce)
50 Hz	60 Hz							
V AC	V AC							kg
K6 4-pole mini contactor relays								
24	24	2	2	K6-22Z-01	GJH1211001R0221		10	0.175
42	42	2	2	K6-22Z-02	GJH1211001R0222		10	0.175
48	48	2	2	K6-22Z-03	GJH1211001R0223		10	0.175
110 ...127	110 ...127	2	2	K6-22Z-84	GJH1211001R8224		10	0.175
220 ... 240	220 ... 240	2	2	K6-22Z-80	GJH1211001R8220		10	0.175
380 ... 415	380 ... 415	2	2	K6-22Z-85	GJH1211001R8225		10	0.175
24	24	3	1	K6-31Z-01	GJH1211001R0311		10	0.175
42	42	3	1	K6-31Z-02	GJH1211001R0312		10	0.175
48	48	3	1	K6-31Z-03	GJH1211001R0313		10	0.175
110 ...127	110 ...127	3	1	K6-31Z-84	GJH1211001R8314		10	0.175
220 ... 240	220 ... 240	3	1	K6-31Z-80	GJH1211001R8310		10	0.175
380 ... 415	380 ... 415	3	1	K6-31Z-85	GJH1211001R8315		10	0.175
24	24	4	0	K6-40E-01	GJH1211001R0401		10	0.175
42	42	4	0	K6-40E-02	GJH1211001R0402		10	0.175
48	48	4	0	K6-40E-03	GJH1211001R0403		10	0.175
110 ...127	110 ...127	4	0	K6-40E-84	GJH1211001R8404		10	0.175
220 ... 240	220 ... 240	4	0	K6-40E-80	GJH1211001R8400		10	0.175
380 ... 415	380 ... 415	4	0	K6-40E-85	GJH1211001R8405		10	0.175

Other types on request

Main dimensions mm, *inches*



K6

2CDC102011C0201

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

KC6-22Z

Description

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

These contactors are designed with:

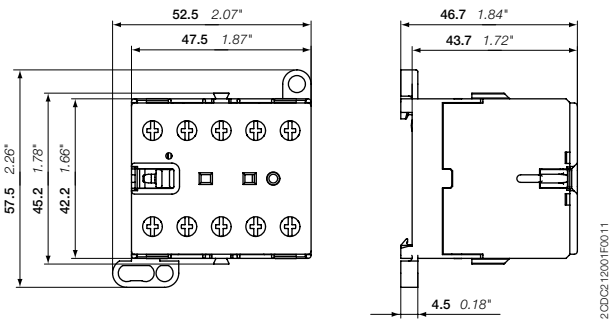
– 4 poles with various contact combinations
– control circuit: DC operated, low coil consumption (3.5 W at pull-in and at holding)
– hum-free coil
– add-on auxiliary contact blocks for front or side mounting
– designed for rail or wall mounting

Ordering details

Rated control circuit voltage U_c	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
V DC						kg
KC6 4-pole mini contactor relays						
12	2 2	KC6-22Z-07	GJH1213001R0227		10	0.175
24	2 2	KC6-22Z-01	GJH1213001R0221		10	0.175
48	2 2	KC6-22Z-16	GJH1213001R1226		10	0.175
60	2 2	KC6-22Z-13	GJH1213001R1223		10	0.175
110 ... 125	2 2	KC6-22Z-04	GJH1213001R0224		10	0.175
220 ... 240	2 2	KC6-22Z-05	GJH1213001R0225		10	0.175
12	3 1	KC6-31Z-07	GJH1213001R0317		10	0.175
24	3 1	KC6-31Z-01	GJH1213001R0311		10	0.175
48	3 1	KC6-31Z-16	GJH1213001R1316		10	0.175
60	3 1	KC6-31Z-13	GJH1213001R1313		10	0.175
110 ... 125	3 1	KC6-31Z-04	GJH1213001R0314		10	0.175
220 ... 240	3 1	KC6-31Z-05	GJH1213001R0315		10	0.175
12	4 0	KC6-40E-07	GJH1213001R0407		10	0.175
24	4 0	KC6-40E-01	GJH1213001R0401		10	0.175
48	4 0	KC6-40E-16	GJH1213001R1406		10	0.175
60	4 0	KC6-40E-13	GJH1213001R1403		10	0.175
110 ... 125	4 0	KC6-40E-04	GJH1213001R0404		10	0.175
220 ... 240	4 0	KC6-40E-05	GJH1213001R0405		10	0.175

Other types on request

Main dimensions mm, *inches*



KC6

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

KC6-31Z

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:

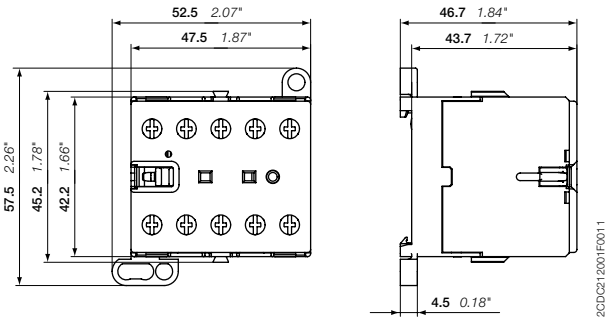
– 4 poles with various contact combinations
– control circuit: DC operated, low coil consumption (1.4 ... 2.8 W at pull-in and at holding)
– hum-free coil
– no auxiliary contact block permitted for mounting
– designed for rail or wall mounting

Ordering details

Rated control circuit voltage U_c	Auxiliary contacts fitted		Type	Order code		Pkg qty	Weight (1 pce)
V DC							kg
DC operation 24 V / 1.4 W							
24	3	1	KC6-31Z-1.4-81	GJH1213001R8311		10	0.175
24	4	0	KC6-40E-1.4-81	GJH1213001R8401		10	0.175
DC operation 17 ... 32 V / 2.4 W							
17 ... 32 (1)	3	1	KC6-31Z-2.4-51	GJH1213001R5311		10	0.175
17 ... 32 (1)	4	0	KC6-40E-2.4-51	GJH1213001R5401		10	0.175
DC operation 24 V / 1.7 W							
24	2	2	K6S-22Z-1.7-71	GJH1213001R7221		10	0.175
24	3	1	K6S-31Z-1.7-71	GJH1213001R7311		10	0.175
24	4	0	K6S-40E-1.7-71	GJH1213001R7401		10	0.175
DC operation 17 ... 32 V / 2.8 W							
17 ... 32 (1)	2	2	K6S-22Z-2.8-72	GJH1213001R7222		10	0.175
17 ... 32 (1)	3	1	K6S-31Z-2.8-72	GJH1213001R7312		10	0.175
17 ... 32 (1)	4	0	K6S-40E-2.8-72	GJH1213001R7402		10	0.175

Other types on request
(1) Uc min. and Uc max. limit values, including the voltage variation tolerances (-15 % and +10 %).

Main dimensions mm, *inches*



KC6

2CDC102013C0201

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

TKC6-31Z

Description

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

These contactors are designed with:

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

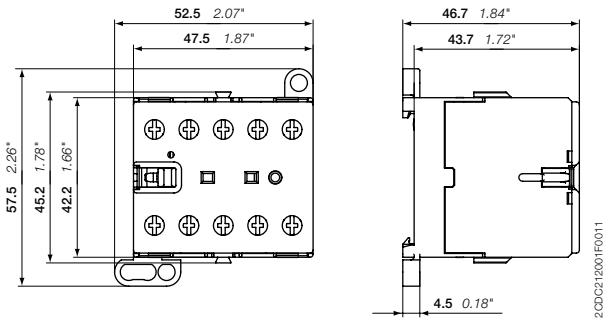
Ordering details

Rated control circuit voltage $U_{C\,min}$ ... $U_{C\,max}$ (1) V DC	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce) kg
17 ... 32	2 2	TKC6-22Z-51	GJH1213061R5221		10	0.180
50 ... 90	2 2	TKC6-22Z-55	GJH1213061R5225		10	0.180
77 ... 143	2 2	TKC6-22Z-62	GJH1213061R6222		10	0.180
140 ... 260	2 2	TKC6-22Z-68	GJH1213061R6228		10	0.180
17 ... 32	3 1	TKC6-31Z-51	GJH1213061R5311		10	0.180
50 ... 90	3 1	TKC6-31Z-55	GJH1213061R5315		10	0.180
77 ... 143	3 1	TKC6-31Z-62	GJH1213061R6312		10	0.180
140 ... 260	3 1	TKC6-31Z-68	GJH1213061R6318		10	0.180
17 ... 32	4 0	TKC6-40E-51	GJH1213061R5401		10	0.180
50 ... 90	4 0	TKC6-40E-55	GJH1213061R5405		10	0.180
77 ... 143	4 0	TKC6-40E-62	GJH1213061R6402		10	0.180
140 ... 260	4 0	TKC6-40E-68	GJH1213061R6408		10	0.180

Other types on request

(1) Uc min. and Uc max. limit values, including the voltage variation tolerances (-15 % and +10 %).

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

3

Description

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

These contactors are designed with:

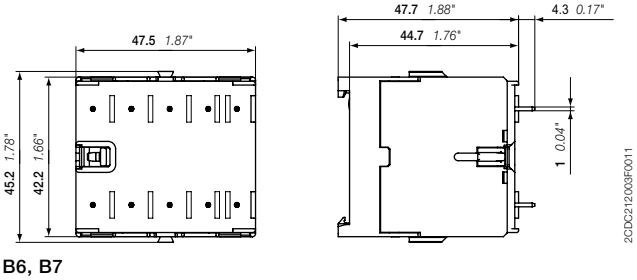
- 3 main poles and one built-in auxiliary contact
- control circuit: AC operated, low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for side mounting
- designed for soldering on PCB boards

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c		Auxiliary contacts fitted		Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC	50 Hz	60 Hz							
kW	A	hp	A	V AC	V AC							kg
B6 mini contactors												
4	12	3	3.4	24	24	1	0	B6-30-10-P-01	GJL1211009R0101		10	0.170
						0	1	B6-30-01-P-01	GJL1211009R0011		10	0.170
				42	42	1	0	B6-30-10-P-02	GJL1211009R0102		10	0.170
						0	1	B6-30-01-P-02	GJL1211009R0012		10	0.170
				48	48	1	0	B6-30-10-P-03	GJL1211009R0103		10	0.170
						0	1	B6-30-01-P-03	GJL1211009R0013		10	0.170
				110 ... 127	110 ... 127	1	0	B6-30-10-P-84	GJL1211009R8104		10	0.170
						0	1	B6-30-01-P-84	GJL1211009R8014		10	0.170
				220 ... 240	220 ... 240	1	0	B6-30-10-P-80	GJL1211009R8100		10	0.170
						0	1	B6-30-01-P-80	GJL1211009R8010		10	0.170
				380 ... 415	380 ... 415	1	0	B6-30-10-P-85	GJL1211009R8105		10	0.170
						0	1	B6-30-01-P-85	GJL1211009R8015		10	0.170
B7 mini contactors												
5.5	12	5	7.6	24	24	1	0	B7-30-10-P-01	GJL1311009R0101		10	0.170
						0	1	B7-30-01-P-01	GJL1311009R0011		10	0.170
				42	42	1	0	B7-30-10-P-02	GJL1311009R0102		10	0.170
						0	1	B7-30-01-P-02	GJL1311009R0012		10	0.170
				48	48	1	0	B7-30-10-P-03	GJL1311009R0103		10	0.170
						0	1	B7-30-01-P-03	GJL1311009R0013		10	0.170
				110 ... 127	110 ... 127	1	0	B7-30-10-P-84	GJL1311009R8104		10	0.170
						0	1	B7-30-01-P-84	GJL1311009R8014		10	0.170
				220 ... 240	220 ... 240	1	0	B7-30-10-P-80	GJL1311009R8100		10	0.170
						0	1	B7-30-01-P-80	GJL1311009R8010		10	0.170
				380 ... 415	380 ... 415	1	0	B7-30-10-P-85	GJL1311009R8105		10	0.170
						0	1	B7-30-01-P-85	GJL1311009R8015		10	0.170

Other types on request

Main dimensions mm, *inches*



B6, B7

2CDC102023C0201

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

BC7-30-10-P

Description

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

These contactors are designed with:

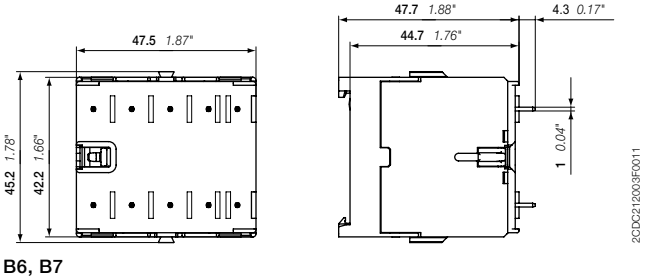
– 3 main poles and one built-in auxiliary contact
– control circuit: DC operated, low coil consumption (3.5 W at pull-in and at holding)
– hum-free coil
– add-on auxiliary contact blocks for side mounting
– designed for soldering on PCB boards

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3 kW	current θ ≤ 55 °C AC-1 A	3-phase motor rating 480 V hp	General use rating 600 V AC A	V DC						kg
BC6 mini contactors with 3 N.O. main poles										
4	12	3	3.4	12	1 0	BC6-30-10-P-07	GJL1213009R0107		10	0.170
					0 1	BC6-30-01-P-07	GJL1213009R0017		10	0.170
				24	1 0	BC6-30-10-P-01	GJL1213009R0101		10	0.170
					0 1	BC6-30-01-P-01	GJL1213009R0011		10	0.170
				48	1 0	BC6-30-10-P-16	GJL1213009R1106		10	0.170
					0 1	BC6-30-01-P-16	GJL1213009R1016		10	0.170
				60	1 0	BC6-30-10-P-03	GJL1213009R0103		10	0.170
					0 1	BC6-30-01-P-03	GJL1213009R0013		10	0.170
				110 ... 125	1 0	BC6-30-10-P-04	GJL1213009R0104		10	0.170
					0 1	BC6-30-01-P-04	GJL1213009R0014		10	0.170
				220 ... 240	1 0	BC6-30-10-P-05	GJL1213009R0105		10	0.170
					0 1	BC6-30-01-P-05	GJL1213009R0015		10	0.170
BC7 mini contactors with 3 N.O. main poles										
5.5	12	5	7.6	12	1 0	BC7-30-10-P-07	GJL1313009R0107		10	0.170
					0 1	BC7-30-01-P-07	GJL1313009R0017		10	0.170
				24	1 0	BC7-30-10-P-01	GJL1313009R0101		10	0.170
					0 1	BC7-30-01-P-01	GJL1313009R0011		10	0.170
				48	1 0	BC7-30-10-P-16	GJL1313009R1106		10	0.170
					0 1	BC7-30-01-P-16	GJL1313009R1016		10	0.170
				60	1 0	BC7-30-10-P-03	GJL1313009R0103		10	0.170
					0 1	BC7-30-01-P-03	GJL1313009R0013		10	0.170
				110 ... 125	1 0	BC7-30-10-P-04	GJL1313009R0104		10	0.170
					0 1	BC7-30-01-P-04	GJL1313009R0014		10	0.170
				220 ... 240	1 0	BC7-30-10-P-05	GJL1313009R0105		10	0.170
					0 1	BC7-30-01-P-05	GJL1313009R0015		10	0.170
BC6 mini contactors 2 N.O. + 1 N.C. main poles										
4	12	3	3.4	24	1 0	BC6-21-10-P-01	GJL1213109R0101		10	0.170
				48	1 0	BC6-21-10-P-16	GJL1213109R1106		10	0.170
				60	1 0	BC6-21-10-P-03	GJL1213109R0103		10	0.170
				110 ... 125	1 0	BC6-21-10-P-04	GJL1213109R0104		10	0.170
				220 ... 240	1 0	BC6-21-10-P-05	GJL1213109R0105		10	0.170

Other types on request

Main dimensions mm, *inches*



B6, B7

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

VB7-30-10-P

Description

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

These reversing contactors are designed with:

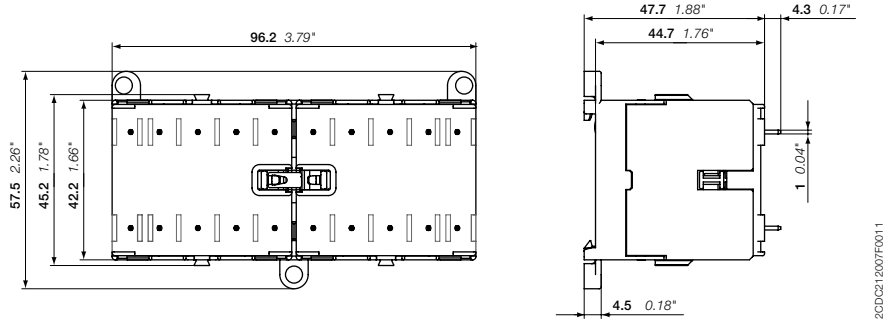
- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc
- control circuit: AC operated, low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- no auxiliary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

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c		Auxiliary contacts fitted		Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC	50 Hz	60 Hz							
kW	A	hp	A	V AC	V AC							kg
VB6 mini reversing contactors												
4	12	3	3.4	24	24	1	0	VB6-30-10-P-01	GJL1211909R0101		5	0.345
						0	1	VB6-30-01-P-01	GJL1211909R0011		5	0.345
				42	42	1	0	VB6-30-10-P-02	GJL1211909R0102		5	0.345
						0	1	VB6-30-01-P-02	GJL1211909R0012		5	0.345
				48	48	1	0	VB6-30-10-P-03	GJL1211909R0103		5	0.345
						0	1	VB6-30-01-P-03	GJL1211909R0013		5	0.345
				110 ... 127	110 ... 127	1	0	VB6-30-10-P-84	GJL1211909R8104		5	0.345
						0	1	VB6-30-01-P-84	GJL1211909R8014		5	0.345
				220 ... 240	220 ... 240	1	0	VB6-30-10-P-80	GJL1211909R8100		5	0.345
						0	1	VB6-30-01-P-80	GJL1211909R8010		5	0.345
				380 ... 415	380 ... 415	1	0	VB6-30-10-P-85	GJL1211909R8105		5	0.345
						0	1	VB6-30-01-P-85	GJL1211909R8015		5	0.345
VB7 mini reversing contactors												
5.5	12	5	7.6	24	24	1	0	VB7-30-10-P-01	GJL1311909R0101		5	0.345
						0	1	VB7-30-01-P-01	GJL1311909R0011		5	0.345
				42	42	1	0	VB7-30-10-P-02	GJL1311909R0102		5	0.345
						0	1	VB7-30-01-P-02	GJL1311909R0012		5	0.345
				48	48	1	0	VB7-30-10-P-03	GJL1311909R0103		5	0.345
						0	1	VB7-30-01-P-03	GJL1311909R0013		5	0.345
				110 ... 127	110 ... 127	1	0	VB7-30-10-P-84	GJL1311909R8104		5	0.345
						0	1	VB7-30-01-P-84	GJL1311909R8014		5	0.345
				220 ... 240	220 ... 240	1	0	VB7-30-10-P-80	GJL1311909R8100		5	0.345
						0	1	VB7-30-01-P-80	GJL1311909R8010		5	0.345
				380 ... 415	380 ... 415	1	0	VB7-30-10-P-85	GJL1311909R8105		5	0.345
						0	1	VB7-30-01-P-85	GJL1311909R8015		5	0.345

Other types on request

Main dimensions mm, *inches*



VB6, VB7

2CDC102025C0201

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

VBC7-30-10-P

Description

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

These reversing contactors are designed with:

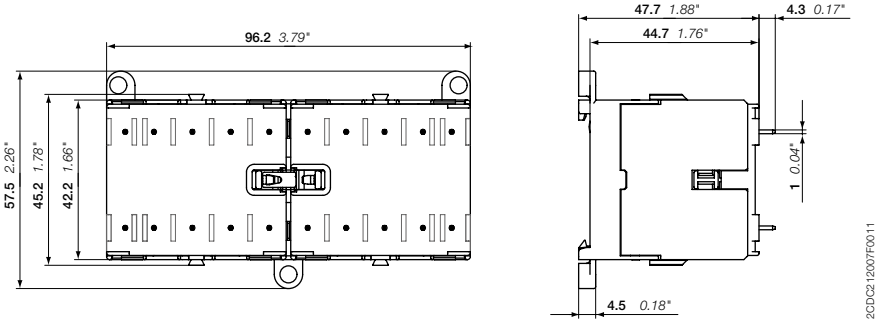
- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc
- control circuit: DC operated, low coil consumption (3.5 W at pull-in and at holding)
- hum-free coil
- no auxiliary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

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3 kW	current θ ≤ 55 °C AC-1 A	3-phase motor rating 480 V hp	General use rating 600 V AC A	V DC						kg
VBC6 mini reversing contactors										
4	12	3	3.4	12	1 0	VBC6-30-10-P-07	GJL1213909R0107		5	0.345
					0 1	VBC6-30-01-P-07	GJL1213909R0017		5	0.345
				24	1 0	VBC6-30-10-P-01	GJL1213909R0101		5	0.345
					0 1	VBC6-30-01-P-01	GJL1213909R0011		5	0.345
				48	1 0	VBC6-30-10-P-06	GJL1213909R0106		5	0.345
					0 1	VBC6-30-06-P-06	GJL1213909R0016		5	0.345
				60	1 0	VBC6-30-10-P-03	GJL1213909R0103		5	0.345
					0 1	VBC6-30-01-P-03	GJL1213909R0013		5	0.345
				110 ... 125	1 0	VBC6-30-10-P-04	GJL1213909R0104		5	0.345
					0 1	VBC6-30-01-P-04	GJL1213909R0014		5	0.345
				220 ... 240	1 0	VBC6-30-10-P-05	GJL1213909R0105		5	0.345
					0 1	VBC6-30-01-P-05	GJL1213909R0015		5	0.345
VBC7 mini reversing contactors										
5.5	12	5	7.6	12	1 0	VBC7-30-10-P-07	GJL1313909R0107		5	0.345
					0 1	VBC7-30-01-P-07	GJL1313909R0017		5	0.345
				24	1 0	VBC7-30-10-P-01	GJL1313909R0101		5	0.345
					0 1	VBC7-30-01-P-01	GJL1313909R0011		5	0.345
				48	1 0	VBC7-30-10-P-16	GJL1313909R1106		5	0.345
					0 1	VBC7-30-01-P-16	GJL1313909R1016		5	0.345
				60	1 0	VBC7-30-10-P-03	GJL1313909R0103		5	0.345
					0 1	VBC7-30-01-P-03	GJL1313909R0013		5	0.345
				110 ... 125	1 0	VBC7-30-10-P-04	GJL1313909R0104		5	0.345
					0 1	VBC7-30-01-P-04	GJL1313909R0014		5	0.345
				220 ... 240	1 0	VBC7-30-10-P-05	GJL1313909R0105		5	0.345
					0 1	VBC7-30-01-P-05	GJL1313909R0015		5	0.345

Other types on request

Main dimensions mm, *inches*



VBC6, VBC7

2CDC102026C0201

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

VB7-30-01-P

Description

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

These reversing contactors are designed with:

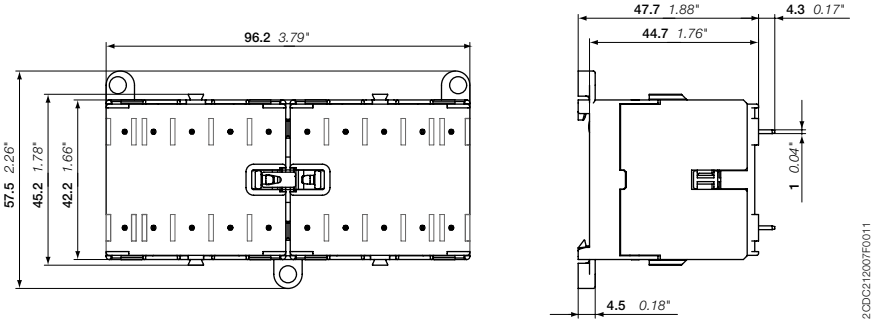
- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the contactor is de-energised i.e. the coil is not damaged if the mechanical interlock prevents switch-on of the contactor with the coil voltage applied.
- control circuit: AC operated
  - low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- no auxiliary contact block permitted for mounting
- designed for soldering on PCB boards

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c		Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC	50 Hz	60 Hz						
kW	A	hp	A	V AC	V AC						kg
VB6A mini reversing contactors with safety blocking function											
4	12	3	3.4	24	24	1 0	VB6A-30-10-P-01	GJL1211919R0101		5	0.345
						0 1	VB6A-30-01-P-01	GJL1211919R0011		5	0.345
				42	42	1 0	VB6A-30-10-P-02	GJL1211919R0102		5	0.345
						0 1	VB6A-30-01-P-02	GJL1211919R0012		5	0.345
				48	48	1 0	VB6A-30-10-P-03	GJL1211919R0103		5	0.345
						0 1	VB6A-30-01-P-03	GJL1211919R0013		5	0.345
				110 ... 127	110 ... 127	1 0	VB6A-30-10-P-84	GJL1211919R8104		5	0.345
						0 1	VB6A-30-01-P-84	GJL1211919R8014		5	0.345
				220 ... 240	220 ... 240	1 0	VB6A-30-10-P-80	GJL1211919R8100		5	0.345
						0 1	VB6A-30-01-P-80	GJL1211919R8010		5	0.345
				380 ... 415	380 ... 415	1 0	VB6A-30-10-P-85	GJL1211919R8105		5	0.345
						0 1	VB6A-30-01-P-85	GJL1211919R8015		5	0.345
VB7A mini reversing contactors with safety blocking function											
5.5	12	5	7.6	24	24	1 0	VB7A-30-10-P-01	GJL1311919R0101		5	0.345
						0 1	VB7A-30-01-P-01	GJL1311919R0011		5	0.345
				42	42	1 0	VB7A-30-10-P-02	GJL1311919R0102		5	0.345
						0 1	VB7A-30-01-P-02	GJL1311919R0012		5	0.345
				48	48	1 0	VB7A-30-10-P-03	GJL1311919R0103		5	0.345
						0 1	VB7A-30-01-P-03	GJL1311919R0013		5	0.345
				110 ... 127	110 ... 127	1 0	VB7A-30-10-P-84	GJL1311919R8104		5	0.345
						0 1	VB7A-30-01-P-84	GJL1311919R8014		5	0.345
				220 ... 240	220 ... 240	1 0	VB7A-30-10-P-80	GJL1311919R8100		5	0.345
						0 1	VB7A-30-01-P-80	GJL1311919R8010		5	0.345
				380 ... 415	380 ... 415	1 0	VB7A-30-10-P-85	GJL1311919R8105		5	0.345
						0 1	VB7A-30-01-P-85	GJL1311919R8015		5	0.345

Other types on request

Main dimensions mm, *inches*



VB6A, VB7A

2CDC102027C0201

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

VBC7A-30-10-P

Description

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

These reversing contactors are designed with:

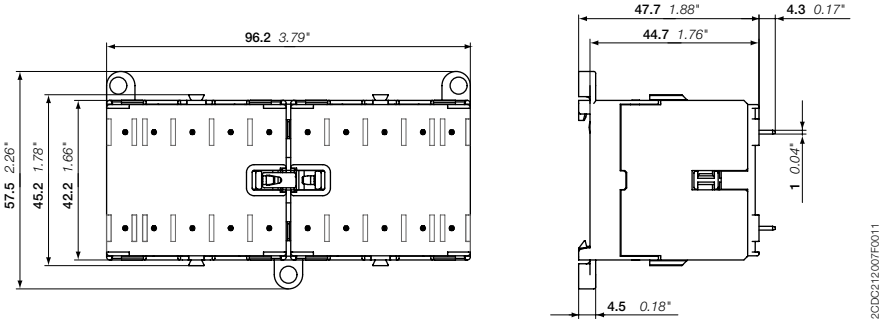
- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the contactor is de-energised i.e. the coil is not damaged if the mechanical interlock prevents switch-on of the contactor with the coil voltage applied.
- control circuit: AC operated
  - low coil consumption (3.5 W at pull-in and at holding)
- hum-free coil
- no auxiliary contact block permitted for mounting
- designed for soldering on PCB boards

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							
kW	A	hp	A	V DC						kg
VBC7A mini reversing contactors with safety blocking function										
5.5	12	5	7.6	12	1 0	VBC7A-30-10-P-07	GJL1313919R0107		5	0.345
					0 1	VBC7A-30-01-P-07	GJL1313919R0017		5	0.345
				24	1 0	VBC7A-30-10-P-01	GJL1313919R0101		5	0.345
					0 1	VBC7A-30-01-P-01	GJL1313919R0011		5	0.345
				48	1 0	VBC7A-30-10-P-16	GJL1313919R1106		5	0.345
					0 1	VBC7A-30-01-P-16	GJL1313919R1016		5	0.345
				60	1 0	VBC7A-30-10-P-03	GJL1313919R0103		5	0.345
					0 1	VBC7A-30-01-P-03	GJL1313919R0013		5	0.345
				110 ... 125	1 0	VBC7A-30-10-P-04	GJL1313919R0104		5	0.345
					0 1	VBC7A-30-01-P-04	GJL1313919R0014		5	0.345
				220 ... 240	1 0	VBC7A-30-10-P-05	GJL1313919R0105		5	0.345
					0 1	VBC7A-30-01-P-05	GJL1313919R0015		5	0.345

Other types on request

Main dimensions mm, *inches*



VBC7A

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

K6-22Z-P

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:

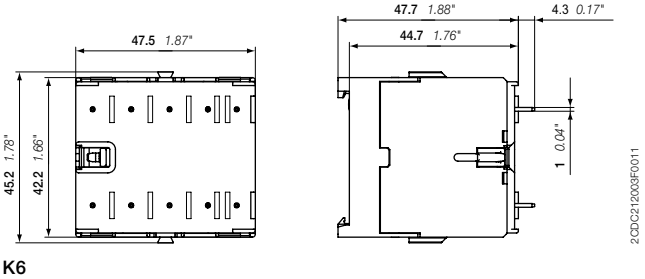
– 4 poles with various contact combinations
– control circuit: AC operated, low coil consumption (3.5 VA at pull-in and at holding)
– hum-free coil
– add-on auxiliary contact block for side mounting
– designed for soldering on PCB boards

Ordering details

Rated control circuit voltage U_c		Auxiliary contacts fitted		Type	Order code		Pkg qty	Weight (1 pce)
50 Hz V AC	60 Hz V AC							kg
K6 4-pole mini contactor relays								
24	24	2	2	K6-22Z-P-01	GJH1211009R0221		10	0.170
42	42	2	2	K6-22Z-P-02	GJH1211009R0222		10	0.170
48	48	2	2	K6-22Z-P-03	GJH1211009R0223		10	0.170
110 ...127	110 ...127	2	2	K6-22Z-P-84	GJH1211009R8224		10	0.170
220 ... 240	220 ... 240	2	2	K6-22Z-P-80	GJH1211009R8220		10	0.170
380 ... 415	380 ... 415	2	2	K6-22Z-P-85	GJH1211009R8225		10	0.170
24	24	3	1	K6-31Z-P-01	GJH1211009R0311		10	0.170
42	42	3	1	K6-31Z-P-02	GJH1211009R0312		10	0.170
48	48	3	1	K6-31Z-P-03	GJH1211009R0313		10	0.170
110 ...127	110 ...127	3	1	K6-31Z-P-84	GJH1211009R8314		10	0.170
220 ... 240	220 ... 240	3	1	K6-31Z-P-80	GJH1211009R8310		10	0.170
380 ... 415	380 ... 415	3	1	K6-31Z-P-85	GJH1211009R8315		10	0.170
24	24	4	0	K6-40E-P-01	GJH1211009R0401		10	0.170
42	42	4	0	K6-40E-P-02	GJH1211009R0402		10	0.170
48	48	4	0	K6-40E-P-03	GJH1211009R0403		10	0.170
110 ...127	110 ...127	4	0	K6-40E-P-84	GJH1211009R8404		10	0.170
220 ... 240	220 ... 240	4	0	K6-40E-P-80	GJH1211009R8400		10	0.170
380 ... 415	380 ... 415	4	0	K6-40E-P-85	GJH1211009R8405		10	0.170

Other types on request

Main dimensions mm, *inches*



K6

2CDC102030C0201

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

2CDC211025F0011

KC6-22Z-P

2CDC211023F0011

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

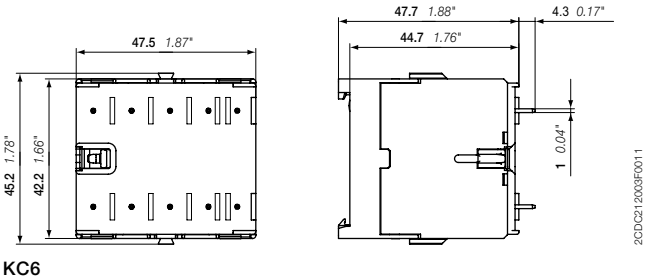
3

Ordering details

Rated control circuit voltage U_c	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
V DC						kg
K6 4-pole mini contactor relays						
12	2 2	KC6-22Z-P-07	GJH1213009R0227		10	0.170
24	2 2	KC6-22Z-P-01	GJH1213009R0221		10	0.170
48	2 2	KC6-22Z-P-16	GJH1213009R1226		10	0.170
110 ... 125	2 2	KC6-22Z-P-04	GJH1213009R0224		10	0.170
220 ... 240	2 2	KC6-22Z-P-05	GJH1213009R0225		10	0.170
24	3 1	KC6-31Z-P-01	GJH1213009R0311		10	0.170
48	3 1	KC6-31Z-P-16	GJH1213009R1316		10	0.170
110 ... 125	3 1	KC6-31Z-P-04	GJH1213009R0314		10	0.170
220 ... 240	3 1	KC6-31Z-P-05	GJH1213009R0315		10	0.170
12	4 0	KC6-40E-P-07	GJH1213009R0407		10	0.170
24	4 0	KC6-40E-P-01	GJH1213009R0401		10	0.170
48	4 0	KC6-40E-P-16	GJH1213009R1406		10	0.170
110 ... 125	4 0	KC6-40E-P-04	GJH1213009R0404		10	0.170
220 ... 240	4 0	KC6-40E-P-05	GJH1213009R0405		10	0.170

Other types on request

Main dimensions mm, *inches*



KC6

2CDC102031C0201

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

BC7-30-10-P

3

Description

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

These contactors are designed with:

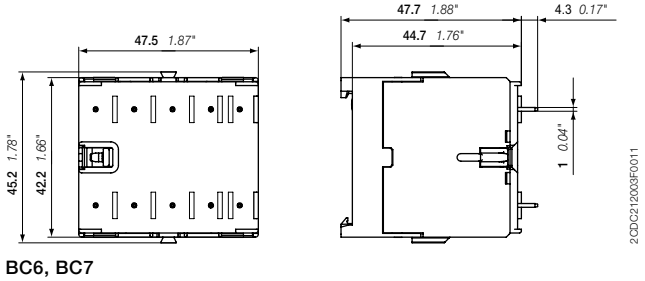
– 3 main poles and one built-in auxiliary contact
– control circuit: DC operated, low coil consumption (1.4 ... 2.4 W at pull-in and at holding)
– hum-free coil
– no auxiliary contact block permitted for mounting
– designed for soldering on PCB boards

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_C	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3 kW	current θ ≤ 55 °C AC-1 A	3-phase motor rating 480 V hp	General use rating 600 V AC A	V DC						kg
DC operation 24 V / 1.4 W										
4	12	3	3.4	24	1 0	BC6-30-10-P-1.4-81	GJL1213009R8101		10	0.170
					0 1	BC6-30-01-P-1.4-81	GJL1213009R8011		10	0.170
5.5	12	5	7.6	24	1 0	BC7-30-10-P-1.4-81	GJL1313009R8101		10	0.170
					0 1	BC7-30-01-P-1.4-81	GJL1313009R8011		10	0.170
DC operation 17 ... 32 V / 2.4 W, I_{th} < 8 A										
4	12	3	3.4	17 ... 32	1 0	BC6-30-10-P-2.4-51	GJL1213009R5101		10	0.170
					0 1	BC6-30-01-P-2.4-51	GJL1213009R5011		10	0.170
5.5	12	5	7.6	17 ... 32	1 0	BC7-30-10-P-2.4-51	GJL1313009R5101		10	0.170
					0 1	BC7-30-01-P-2.4-51	GJL1313009R5011		10	0.170

Other types on request

Main dimensions mm, *inches*



BC6, BC7

2CDC102029C0201

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

KC6-31Z-P-1.4

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:

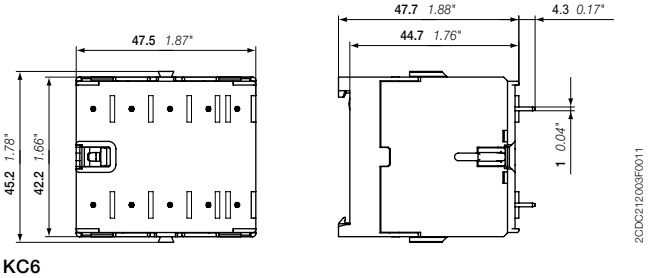
- 4 poles with various contact combinations
- control circuit: DC operated, low coil consumption (3.5 W at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact block for side mounting
- designed for soldering on PCB boards

Ordering details

Rated control circuit voltage U_c	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
V DC						kg
DC operation 24 V / 1.4 W						
24	3 1	KC6-31Z-P-1.4-81	GJH1213009R8311		10	0.170
24	4 0	KC6-40E-P-1.4-81	GJH1213009R8401		10	0.170
DC operation 17 ... 32 V / 2.4 W						
17 ... 32	3 1	KC6-31Z-P-2.4-51	GJH1213009R5311		10	0.170
17 ... 32	4 0	KC6-40E-P-2.4-51	GJH1213009R5401		10	0.170

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:

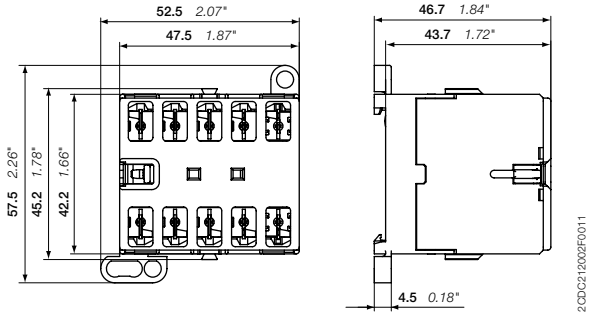
- flat pin connection for plug-in wiring and shake proven connection
- 3 main poles and one built-in auxiliary contact
- control circuit: AC operated
  - low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for side mounting
- designed for rail or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

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c		Auxiliary contacts fitted		Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC	50 Hz	60 Hz							
kW	A	hp	A	V AC	V AC							kg
B6 mini contactors												
4	16	3	3.4	24	24	1	0	B6-30-10-F-01	GJL1211003R0101		10	0.170
						0	1	B6-30-01-F-01	GJL1211003R0011		10	0.170
				42	42	1	0	B6-30-10-F-02	GJL1211003R0102		10	0.170
						0	1	B6-30-01-F-02	GJL1211003R0012		10	0.170
				48	48	1	0	B6-30-10-F-03	GJL1211003R0103		10	0.170
						0	1	B6-30-01-F-03	GJL1211003R0013		10	0.170
				110 ... 127	110 ... 127	1	0	B6-30-10-F-84	GJL1211003R8104		10	0.170
						0	1	B6-30-01-F-84	GJL1211003R8014		10	0.170
				220 ... 240	220 ... 240	1	0	B6-30-10-F-80	GJL1211003R8100		10	0.170
						0	1	B6-30-01-F-80	GJL1211003R8010		10	0.170
				380 ... 415	380 ... 415	1	0	B6-30-10-F-85	GJL1211003R8105		10	0.170
						0	1	B6-30-01-F-85	GJL1211003R8015		10	0.170
B7 mini contactors												
5.5	20	5	7.6	24	24	1	0	B7-30-10-F-01	GJL1311003R0101		10	0.170
						0	1	B7-30-01-F-01	GJL1311003R0011		10	0.170
				42	42	1	0	B7-30-10-F-02	GJL1311003R0102		10	0.170
						0	1	B7-30-01-F-02	GJL1311003R0012		10	0.170
				48	48	1	0	B7-30-10-F-03	GJL1311003R0103		10	0.170
						0	1	B7-30-01-F-03	GJL1311003R0013		10	0.170
				110 ... 127	110 ... 127	1	0	B7-30-10-F-84	GJL1311003R8104		10	0.170
						0	1	B7-30-01-F-84	GJL1311003R8014		10	0.170
				220 ... 240	220 ... 240	1	0	B7-30-10-F-80	GJL1311003R8100		10	0.170
						0	1	B7-30-01-F-80	GJL1311003R8010		10	0.170
				380 ... 415	380 ... 415	1	0	B7-30-10-F-85	GJL1311003R8105		10	0.170
						0	1	B7-30-01-F-85	GJL1311003R8015		10	0.170

Other types on request

Main dimensions mm, *inches*



B6, B7

2CDC102033C0201

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

BC6-30-10-F

BC7-30-10-F

Description

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

These contactors are designed with:

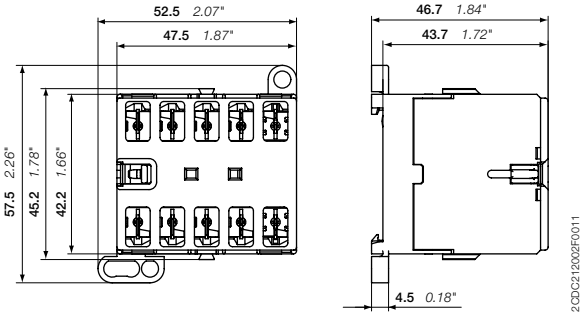
- flat pin connection for plug-in wiring and shake proven connection
- 3 main poles and one built-in auxiliary contact
- control circuit: DC operated
  - low coil consumption (3.5 W at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for side mounting
- designed for rail or wall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

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							
kW	A	hp	A	V DC						kg
BC6 mini contactors										
4	16	3	3.4	12	1 0	BC6-30-10-F-07	GJL1213003R0107		10	0.170
					0 1	BC6-30-01-F-07	GJL1213003R0017		10	0.170
				24	1 0	BC6-30-10-F-01	GJL1213003R0101		10	0.170
					0 1	BC6-30-01-F-01	GJL1213003R0011		10	0.170
				48	1 0	BC6-30-10-F-16	GJL1213003R1106		10	0.170
					0 1	BC6-30-01-F-16	GJL1213003R1016		10	0.170
				60	1 0	BC6-30-10-F-03	GJL1213003R0103		10	0.170
					0 1	BC6-30-01-F-03	GJL1213003R0013		10	0.170
				110 ... 125	1 0	BC6-30-10-F-04	GJL1213003R0104		10	0.170
					0 1	BC6-30-01-F-04	GJL1213003R0014		10	0.170
				220 ... 240	1 0	BC6-30-10-F-05	GJL1213003R0105		10	0.170
					0 1	BC6-30-01-F-05	GJL1213003R0015		10	0.170
BC7 mini contactors										
5.5	20	5	7.6	12	1 0	BC7-30-10-F-07	GJL1313003R0107		10	0.170
					0 1	BC7-30-01-F-07	GJL1313003R0017		10	0.170
				24	1 0	BC7-30-10-F-01	GJL1313003R0101		10	0.170
					0 1	BC7-30-01-F-01	GJL1313003R0011		10	0.170
				48	1 0	BC7-30-10-F-16	GJL1313003R1106		10	0.170
					0 1	BC7-30-01-F-16	GJL1313003R1016		10	0.170
				60	1 0	BC7-30-10-F-03	GJL1313003R0103		10	0.170
					0 1	BC7-30-01-F-03	GJL1313003R0013		10	0.170
				110 ... 125	1 0	BC7-30-10-F-04	GJL1313003R0104		10	0.170
					0 1	BC7-30-01-F-04	GJL1313003R0014		10	0.170
				220 ... 240	1 0	BC7-30-10-F-05	GJL1313003R0105		10	0.170
					0 1	BC7-30-01-F-05	GJL1313003R0015		10	0.170

Other types on request

Main dimensions mm, *inches*



BC6, BC7

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:

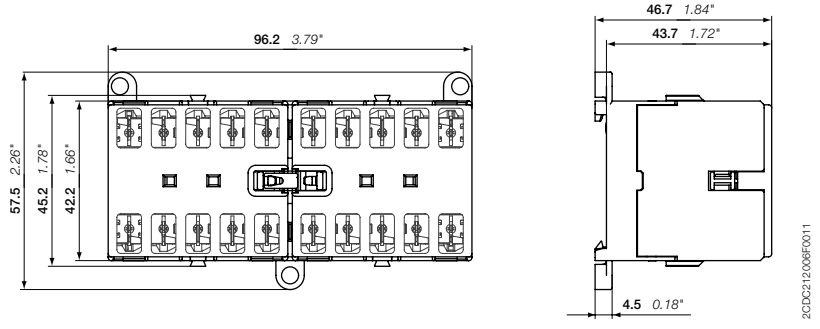
- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc.
- flat pin connection for plug-in wiring and shake proven connection
- control circuit: AC operated
  - low coil consumption (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	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC	50 Hz	60 Hz						
kW	A	hp	A	V AC	V AC						kg
VB7 mini reversing contactors											
5.5	20	5	7.6	24	24	1 0	VB7-30-10-F-01	GJL1311903R0101		5	0.345
						0 1	VB7-30-01-F-01	GJL1311903R0011		5	0.345
				42	42	1 0	VB7-30-10-F-02	GJL1311903R0102		5	0.345
						0 1	VB7-30-01-F-02	GJL1311903R0012		5	0.345
				48	48	1 0	VB7-30-10-F-03	GJL1311903R0103		5	0.345
						0 1	VB7-30-01-F-03	GJL1311903R0013		5	0.345
				110 ... 127	110 ... 127	1 0	VB7-30-10-F-84	GJL1311903R8104		5	0.345
						0 1	VB7-30-01-F-84	GJL1311903R8014		5	0.345
				220 ... 240	220 ... 240	1 0	VB7-30-10-F-80	GJL1311903R8100		5	0.345
						0 1	VB7-30-01-F-80	GJL1311903R8010		5	0.345
				380 ... 415	380 ... 415	1 0	VB7-30-10-F-85	GJL1311903R8105		5	0.345
						0 1	VB7-30-01-F-85	GJL1311903R8015		5	0.345

Other types on request

Main dimensions mm, *inches*



VB7

2CDC102035C0201

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

VBC7-30-10-F

Description

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

These reversing contactors are designed with:

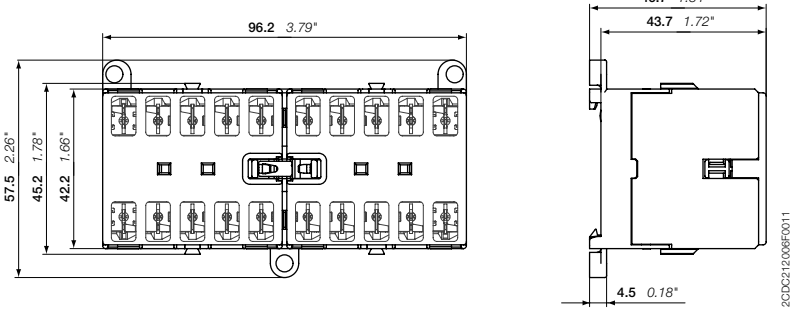
- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc
- flat pin connection for plug-in wiring and shake proven connection
- control circuit: DC operated
  - low coil consumption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

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							
kW	A	hp	A	V DC						kg
VBC7 mini reversing contactors										
5.5	20	5	7.6	12	1 0	VBC7-30-10-F-07	GJL1313903R0107		5	0.345
					0 1	VBC7-30-01-F-07	GJL1313903R0017		5	0.345
				24	1 0	VBC7-30-10-F-01	GJL1313903R0101		5	0.345
					0 1	VBC7-30-01-F-01	GJL1313903R0011		5	0.345
				48	1 0	VBC7-30-10-F-16	GJL1313903R1106		5	0.345
					0 1	VBC7-30-01-F-16	GJL1313903R1016		5	0.345
				60	1 0	VBC7-30-10-F-03	GJL1313903R0103		5	0.345
					0 1	VBC7-30-01-F-03	GJL1313903R0013		5	0.345
				110 ... 125	1 0	VBC7-30-10-F-04	GJL1313903R0104		5	0.345
					0 1	VBC7-30-01-F-04	GJL1313903R0014		5	0.345
				220 ... 240	1 0	VBC7-30-10-F-05	GJL1313903R0105		5	0.345
					0 1	VBC7-30-01-F-05	GJL1313903R0015		5	0.345

Other types on request

Main dimensions mm, *inches*



VBC7

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

3

Description

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

These reversing contactors are designed with:

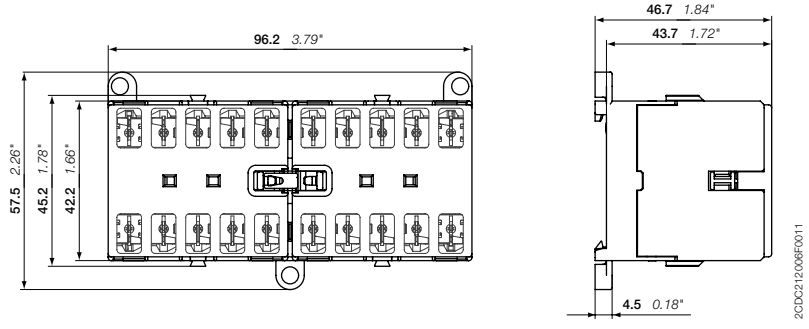
- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the contactor is de-energised i.e. the coil is not damaged if the mechanical interlock prevents switch-on of the contactor with the coil voltage applied.
- flat pin connection for plug-in wiring and shake proven connection
- control circuit: AC operated
  - low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- no auxiliary contact block permitted for mounting
- for rail and wall mounting

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c		Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC	50 Hz	60 Hz						
kW	A	hp	A	V AC	V AC					pce	kg
VB7A mini reversing contactors with safety blocking function											
5.5	20	5	7.6	24	24	1 0	VB7A-30-10-F-01	GJL1311913R0101		5	0.345
						0 1	VB7A-30-01-F-01	GJL1311913R0011		5	0.345
				42	42	1 0	VB7A-30-10-F-02	GJL1311913R0102		5	0.345
						0 1	VB7A-30-01-F-02	GJL1311913R0012		5	0.345
				48	48	1 0	VB7A-30-10-F-03	GJL1311913R0103		5	0.345
						0 1	VB7A-30-01-F-03	GJL1311913R0013		5	0.345
				110 ... 127	110 ... 127	1 0	VB7A-30-10-F-84	GJL1311913R8104		5	0.345
						0 1	VB7A-30-01-F-84	GJL1311913R8014		5	0.345
				220 ... 240	220 ... 240	1 0	VB7A-30-10-F-80	GJL1311913R8100		5	0.345
						0 1	VB7A-30-01-F-80	GJL1311913R8010		5	0.345
				380 ... 415	380 ... 415	1 0	VB7A-30-10-F-85	GJL1311913R8105		5	0.345
						0 1	VB7A-30-01-F-85	GJL1311913R8015		5	0.345

Other types on request

Main dimensions mm, *inches*



VB7A

2CDC102037C0201

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

Description

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

These reversing contactors are designed with:

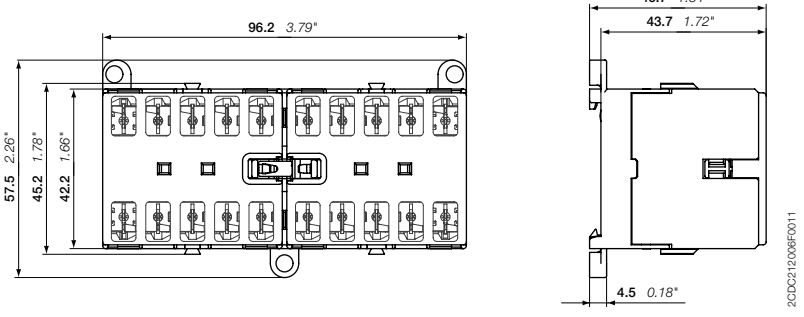
- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the contactor is de-energised i.e. the coil is not damaged if the mechanical interlock prevents switch-on of the contactor with the coil voltage applied.
- flat pin connection for plug-in wiring and shake proven connection
- control circuit: DC operated
  - low coil consumption (3.5 W at pull-in and at holding)
- hum-free coil
- no auxiliary contact block permitted for mounting
- for rail and wall mounting

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							
kW	A	hp	A	V DC						kg
VBC7A mini reversing contactors with safety blocking function										
5.5	20	5	7.6	12	1 0	VBC7A-30-10-F-07	GJL1313913R0107		5	0.345
					0 1	VBC7A-30-01-F-07	GJL1313913R0017		5	0.345
				24	1 0	VBC7A-30-10-F-01	GJL1313913R0101		5	0.345
					0 1	VBC7A-30-01-F-01	GJL1313913R0011		5	0.345
				48	1 0	VBC7A-30-10-F-16	GJL1313913R1106		5	0.345
					0 1	VBC7A-30-01-F-16	GJL1313913R1016		5	0.345
				60	1 0	VBC7A-30-10-F-03	GJL1313913R0103		5	0.345
					0 1	VBC7A-30-01-F-03	GJL1313913R0013		5	0.345
				110 ... 125	1 0	VBC7A-30-10-F-04	GJL1313913R0104		5	0.345
					0 1	VBC7A-30-01-F-04	GJL1313913R0014		5	0.345
				220 ... 240	1 0	VBC7A-30-10-F-05	GJL1313913R0105		5	0.345
					0 1	VBC7A-30-01-F-05	GJL1313913R0015		5	0.345

Other types on request

Main dimensions mm, *inches*



VBC7A

2CDC102038C0201

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

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:

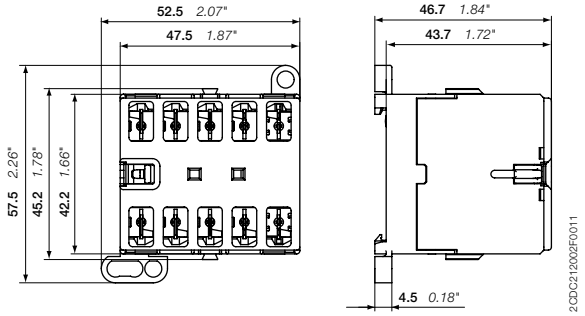
- flat pin connection for plug-in wiring and shake proven connection
- 3 main poles and one built-in auxiliary contact
- control circuit: DC operated
  - low coil consumption (1.4 ... 2.4 W at pull-in and at holding)
- hum-free coil
- no auxiliary contact block permitted for mounting
- designed for rail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

Ordering details

IEC		UL/CSA		Rated control circuit voltage U_c	Auxiliary contacts fitted		Type	Order code		Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3 kW	current θ ≤ 55 °C AC-1 A	3-phase motor rating 480 V hp	General use rating 600 V AC A	V DC							kg
DC operation 24 V / 1.4 W											
4	16	3	3.4	24	1	0	BC6-30-10-F-1.4-81	GJL1213003R8101		10	0.170
					0	1	BC6-30-01-F-1.4-81	GJL1213003R8011		10	0.170
5.5	20	5	7.6	24	1	0	BC7-30-10-F-1.4-81	GJL1313003R8101		10	0.170
					0	1	BC7-30-01-F-1.4-81	GJL1313003R8011		10	0.170
DC operation 17 ... 32 V / 2.4 W											
4	16	3	3.4	17 ... 32	1	0	BC6-30-10-F-2.4-51	GJL1213003R5101		10	0.170
					0	1	BC6-30-01-F-2.4-51	GJL1213003R5011		10	0.170
5.5	20	5	7.6	17 ... 32	1	0	BC7-30-10-F-2.4-51	GJL1313003R5101		10	0.170
					0	1	BC7-30-01-F-2.4-51	GJL1313003R5011		10	0.170

Other types on request

Main dimensions mm, *inches*



BC6, BC7

2CDC102039C0201

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

K6-22Z-F

Description

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

These contactors are designed with:

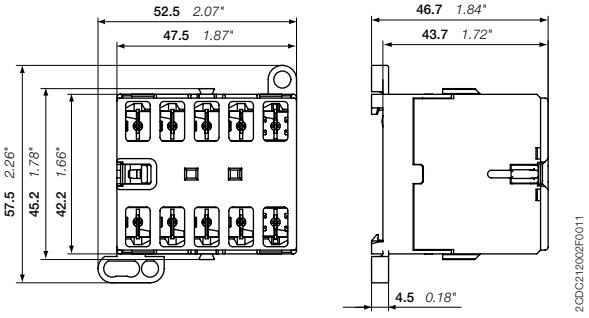
- flat pin connection for plug-in wiring and shake proven connection
- 4-poles with various contact combinations
- control circuit: AC operated
  - low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for side mounting
- for rail and wall mounting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

Ordering details

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

Other types on request

Main dimensions mm, *inches*



K6

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:

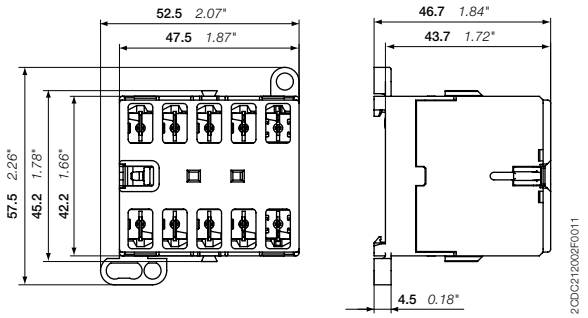
- flat pin connection for plug-in wiring and shake proven connection
- 4-poles with various contact combinations
- control circuit: AC operated
  - low coil consumption (3.5 VA at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for side mounting
- for rail and wall mounting

Ordering details

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

Other types on request

Main dimensions mm, *inches*



KC6

2CDC102041C0201

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

KC6-31Z-F-05

Description

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

These contactors are designed with:

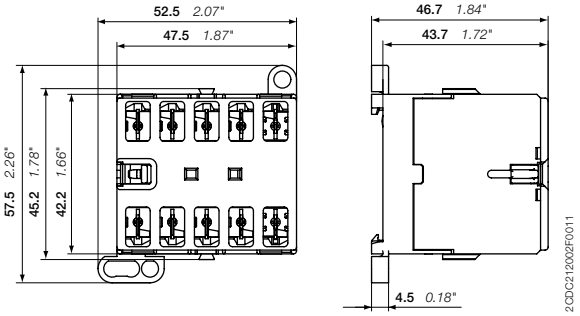
- flat pin connection for plug-in wiring and shake proven connection
- 4-poles with various contact combinations
- control circuit: AC operated
  - low coil consumption (1.4 ... 2.4 W at pull-in and at holding)
- hum-free coil
- no auxiliary contact block permitted for mounting
- for rail and wall mounting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

Ordering details

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

Other types on request

Main dimensions mm, *inches*



KC6

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

Ordering details

For contactors	Auxiliary contacts	Type	Order code	Pkg qty	Weight (1 pce) kg
Front mounted instantaneous auxiliary contact blocks (not allowed for mounting on TBC, B6S, B7S, interface contactors) [1]					
B6-, B7-40-00, BC6-, BC7-40-00 VB6, VB7, VBC6, VBC7, VB6A, VB7A VBC6A, VBC7A	1 1	CAF6-11E	GJL1201330R0002	10	0.020
	2 0	CAF6-20E	GJL1201330R0006	10	0.020
	0 2	CAF6-02E	GJL1201330R0010	10	0.020
B6-, B7-30-10, BC6-, BC7-30-10 VB6, VB7, VBC6, VBC7, VB6A, VB7A VBC6A, VBC7A	1 1	CAF6-11M	GJL1201330R0003	10	0.020
	2 0	CAF6-20M	GJL1201330R0007	10	0.020
	0 2	CAF6-02M	GJL1201330R0011	10	0.020
B6-, B7-30-01, BC6-, BC7-30-01 VB6, VB7, VBC6, VBC7, VB6A, VB7A VBC6A, VBC7A	1 1	CAF6-11N	GJL1201330R0004	10	0.020
	2 0	CAF6-20N	GJL1201330R0008	10	0.020
	0 2	CAF6-02N	GJL1201330R0012	10	0.020
Side mounted instantaneous auxiliary contact block [1]					
B6-, B7-40-00, BC6-, BC7-40-00	1 1	CA6-11E	GJL1201317R0002	10	0.030
B6-, B7-30-10, BC6-, BC7-30-10	1 1	CA6-11M	GJL1201317R0003	10	0.030
B6-, B7-30-01, BC6-, BC7-30-01	1 1	CA6-11N	GJL1201317R0004	10	0.030
Side mounted instantaneous auxiliary contact block with soldering pins [2]					
B6-, B7-40-00-P, BC6-,BC7-40-00-P	1 1	CA6-11E-P	GJL1201319R0002	10	0.025
B6-, B7-30-10-P, BC6-, BC7-30-10-P	1 1	CA6-11M-P	GJL1201319R0003	10	0.025
B6-, B7-30-01-P, BC6-, BC7-30-01-P	1 1	CA6-11N-P	GJL1201319R0004	10	0.025
Side mounted instantaneous auxiliary contact block with flat pin connection [2]					
B6-, B7-40-00-F, BC6-,BC7-40-00-F	1 1	CA6-11E-F	GJL1201318R0002	10	0.025
B6-, B7-30-10-F, BC6-, BC7-30-10-F	1 1	CA6-11M-F	GJL1201318R0003	10	0.025
B6-, B7-30-01-F, BC6-, BC7-30-01-F	1 1	CA6-11N-F	GJL1201318R0004	10	0.025
Soldering receptacle (I_e < 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.

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

Overload relays fitting details [2]

Contactor types	Thermal overload relays	Electronic overload relays
B6, B7, BC6, BC7	T16 (0.10...16 A)	E16DU (0.10...18.9 A)

[2] Direct mounting - No kit required. Ordering details, see overload relays section.

2CDC102042C0201

K6, KC6 4-pole mini contactor relays
Accessories

2CDC211019F0011

CAF6-11K

2CDC211009F0010

CA6-11K

2CDC211011F0010

CA6-11K-P

2CDC211010F0010

CA6-11K-F

2CDC211006F0010

LT6-B

2CDC211007F0010

RV-BC6/250

Ordering details

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

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

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

2CDC102042C0201

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 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1	
Rated operational voltage $U_{e\,max}$		690 V AC	
Rated frequency (without derating)		DC or 50 / 60 Hz	
Conventional free-air thermal current I_{th} acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C, with conductor cross-sectional area		20 A	
AC-1 Utilization category for air temperature close to contactor θ ≤ 40 °C			
I_e / Rated operational current AC-1 $U_{e\,max}$ ≤ 690 V, 50/60 Hz	**220-230-240 V**	Screw terminal types: 20 A Soldering pin types: 12 A Flat pin types: 16 A	
	380-400 V	Screw terminal types: 20 A Soldering pin types: 12 A Flat pin types: 16 A	
	440 V	Screw terminal types: 20 A Soldering pin types: 12 A Flat pin types: 16 A	
	500 V	12 A	
	690 V	6 A	
AC-1 Utilization category for air temperature close to contactor θ ≤ 55 °C			
I_e / Rated operational current AC-1 $U_{e\,max}$ ≤ 690 V, 50/60 Hz	**220-230-240 V**	Screw terminal types: 16 A Soldering pin types: 12 A Flat pin types: 16 A	Screw terminal types: 20 A Soldering pin types: 12 A Flat pin types: 16 A
	380-400 V	Screw terminal types: 16 A Soldering pin types: 12 A Flat pin types: 16 A	Screw terminal types: 20 A Soldering pin types: 12 A Flat pin types: 16 A
	440 V	Screw terminal types: 16 A Soldering pin types: 12 A Flat pin types: 16 A	Screw terminal types: 20 A Soldering pin types: 12 A Flat pin types: 16 A
	500 V	12 A	
	690 V	6 A	
AC-3 Utilization category for air temperature close to contactor θ ≤ 55 °C			
I_e / Rated operational current AC-3 3-phase motors 	**220-230-240 V**	9 A	12 A
	380-400 V	8 A	12 A
	440 V	8 A	12 A
	500 V	6.5 A	9 A
	690 V	3.5 A	3.5 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	3 kW	4 kW
	690 V	3 kW	3 kW
DC-1 Utilization category for air temperature close to contactor θ ≤ 55 °C			
I_e / Rated operational current DC-1	**110 V**	-	4 A
	220 V	-	0.6 A
DC-3 Utilization category for air temperature close to contactor θ ≤ 55 °C			
I_e / Rated operational current DC-3	**110 V**	-	1.5 A
	220 V	-	0.25 A
DC-5 Utilization category for air temperature close to contactor θ ≤ 55 °C			
I_e / Rated operational current DC-5	**110 V**	-	0.4 A
	220 V	-	0.2 A
Rated making capacity AC-3		10 x I_e AC-3 acc. to IEC 60947-4-1	
Rated breaking capacity AC-3		8 x I_e AC-3 acc. to IEC 60947-4-1	
Short-circuit protection device for contactors without thermal O/L relay - motor protection excluded U_e ≤ 500 V AC - gG type fuse		Coordination type 1: 25 A / Coordination type 2: 20 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	

2CDC102043C0201

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	16 A
UL/CSA maximum 1-phase motor rating				
	Full load current	**120 V AC**	8.4 A	13.8 A
		240 V AC	6.8 A	10.0 A
	Horse power rating	**120 V AC**	1 hp	0.75 hp
		240 V AC	2 hp	1.5 hp
UL/CSA maximum 3-phase motor rating				
	Full load current [1]	**200-208 V AC**	4.6 A	7.5 A
		220-240 V AC	6.8 A	9.6 A
		440-480 V AC	3.4 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 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
Short-circuit protection device for contactors				
without thermal overload relay - motor protection excluded				
	Fuse rating	**600 V**	40 A	
	Fuse type	**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 ... +55 °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. to 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. to IEC 60068-2-27 and EN 60068-2-27		5 g / 3 ... 150 Hz	
	acc. to IEC/EN 60947-1 Annex. Q		Category E	

2CDC102043C0201

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

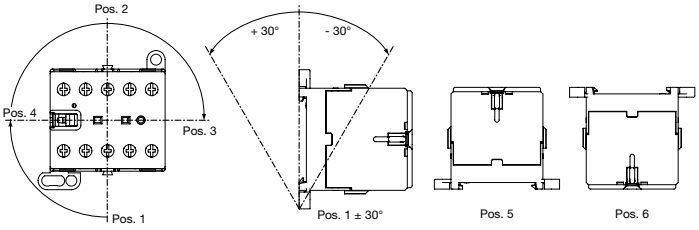
Contactor types		**DC operated**	BC6, VBC6	BC7, VBC7
Coil operating limits acc. to IEC 60947-4-1		**DC supply**	0.85 ... 1.1 x U_c	
AC control voltage				
	Rated control circuit voltage U_C		See ordering tables	
	Coil consumption [1]	Average pull-in value	3.5 VA / 3.5 W	
		Average holding value	3.5 VA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

2CDC102043C0201

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

Built-in auxiliary contacts according to IEC

Contactor types	**AC operated**	**B6, VB6, VB6A**	**B7, VB7, VB7A**
	DC operated	**BC6, VBC6, VBC6A**	**BC7, TBC7, VBC7, VBC7A**
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)		DC or 50 / 60 Hz	
Conventional free-air thermal current I_{th} θ ≤ 40 °C		6 A	
I_e / Rated operational current AC-15 acc. to IEC 60947-5-1	**24 V 50/60 Hz**	4 A	
	110-120 V 50/60 Hz	4 A	
	220-230-240 V 50/60 Hz	4 A	
	380-400 V 50/60 Hz	3 A	
	440 V 50/60 Hz	3 A	
I_e / Rated operational current DC-13 acc. to IEC 60947-5-1	**24 V DC**	2.5 A	
	110 V DC	0.7 A	
	220 - 240 V DC	0.4 A	
Short-circuit protection device		6 A, Type gG	
Minimum switching capacity with failure rate acc. to IEC 60947-5-4		17 V / 5 mA	
Maximum electrical switching frequency	**AC-15**	600 cycles/h	
	DC-13	600 cycles/h	

Built-in auxiliary contacts according to UL/CSA

Contactor types	**AC operated**	**B6, VB6, VB6A**	**B7, VB7, VB7A**
	DC operated	**BC6, VBC6, VBC6A**	**BC7, VBC7, VBC7A**
Max. operational voltage		600 V AC	
Pilot duty		A600	
AC thermal rated current		5 A	

2CDC102043C0201

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

2CDC102043C0201

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 60947-1 / 60947-5-1 and EN 60947-1 / 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} θ ≤ 40 °C		6 A
I_e / Rated operational current AC-15 acc. to IEC 60947-5-1	24 V 50/60 Hz	4 A
	110-120 V 50/60 Hz	4 A
	220-230-240 V 50/60 Hz	4 A
	380-400 V 50/60 Hz	3 A
	440 V 50/60 Hz	3 A
	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 ≤ 500 V AC, gG fuse type		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
Standards		UL 508, CSA C22.2 No14
Maximum operational voltage		600 V AC
Pilot duty		A600

2CDC102043C0201

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			Kategorie 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%

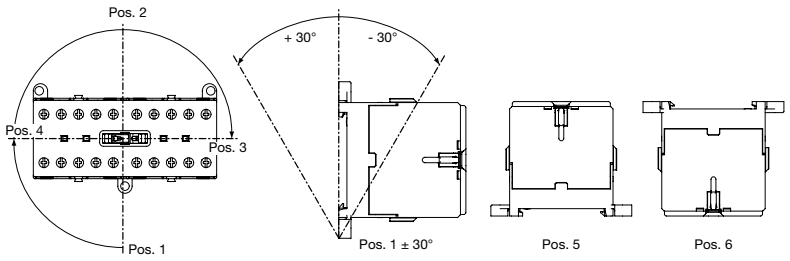
Magnet system characteristics for KC6, TKC6 contactor relays

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 %

2CDC102043C0201

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 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
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

2CDC102043C0201

1SBC101501S0201

AS contactors, NS contactor relays

Overview 4/2

Motor starting solutions - open type version, in kit form with screw trminals 4/5

3-pole contactors and contactor relays with screw terminals 4/29

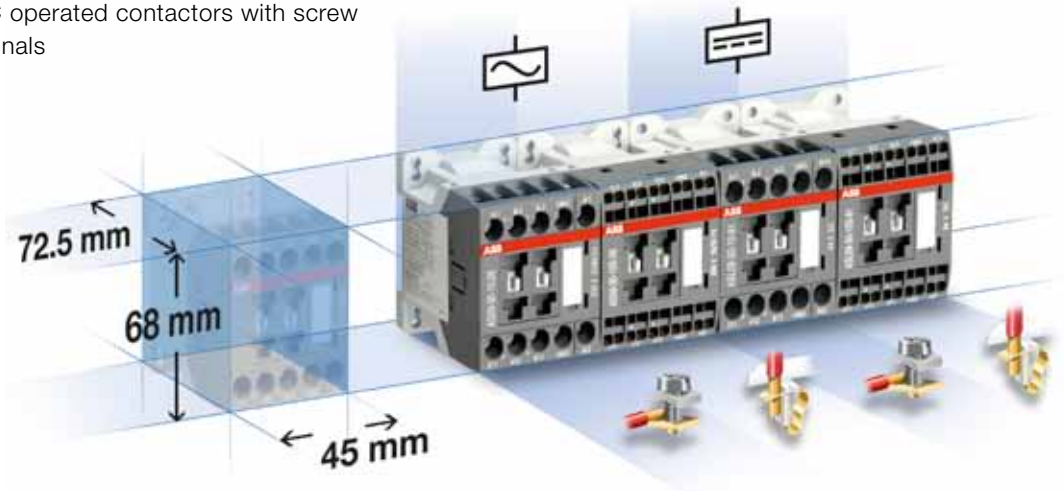
3-pole contactors and contactor relays with spring terminals 4/85

1SBC101501S0201

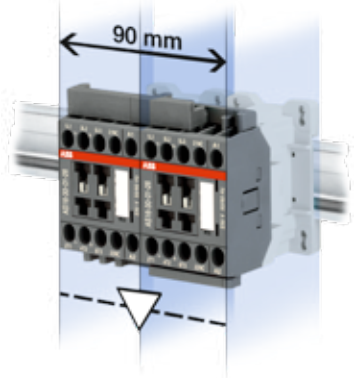
Compact
Optimize your equipment dimensions!

One frame size for contactors up to 7.5 kW - 400 V

Same dimensions
for AC and DC operated contactors with screw or spring terminals

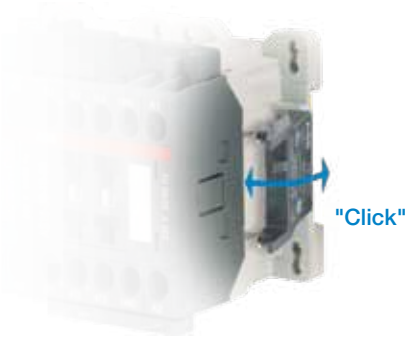


Reversing contactors
including mechanical and electrical interlocking without additional width



Direct control by PLC
removing any use of interface relay and reducing panel power consumption

Side clipped-on surge suppressors
integrated into overall contactor dimensions allowing free access to coil terminals



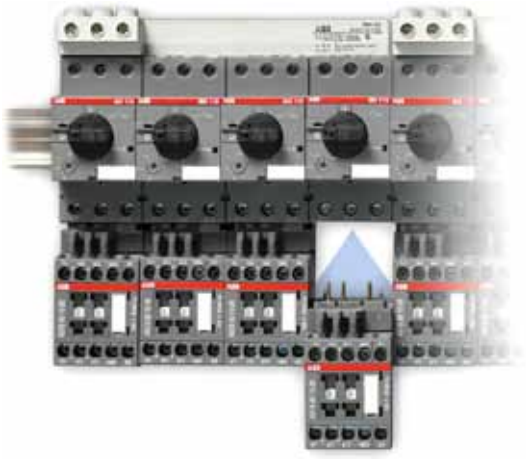
Multiple packaging available for all products

1SBC101277S0201

Simple
Choose reliable and time-saving solutions

Select compact starters:
- Direct-on-line and reversing starters up to 7.5 kW – 400 V
- Star-delta starters up to 11 KW – 400 V.

Protect your motors against short-circuits and overloads
- Type 1 or type 2 coordination guaranteed between contactors and short-circuit protection devices (manual motor starters or fuses)



Time/cost saving solutions with
- Connection sets for reversing and star-delta starter
- Easy, fast and secure assembly, fitting and wiring of components
- Direct 35 mm rail mounting: no additional mounting plate required
- Easy installation and dismounting of contactors: no unwiring of manual motor starters.

4

Compliant to International standards
Complies with RoHS European directives

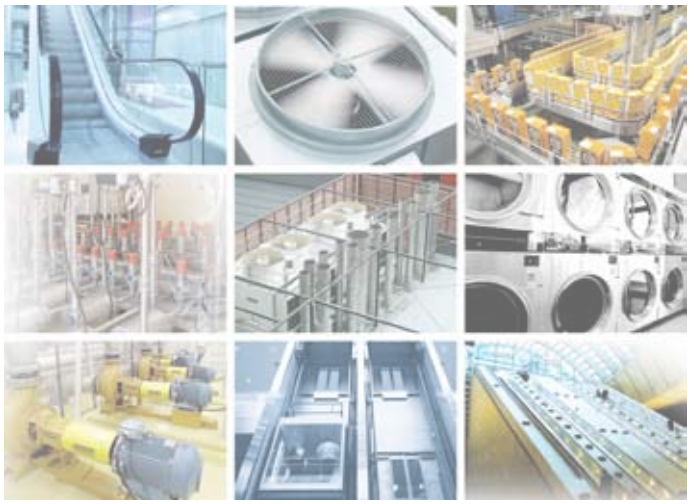
Make your control circuits safe

High reliability for low signals

Mechanically linked contacts according to IEC 60947-5-1 Annex L 3.0

Mirror contact according to IEC 60947-4-1 Annex F 2.1

Time and space-saving solutions, suitable for your applications
- Escalators
- Elevators
- Conveyors
- Compressors
- Door control
- Hvac
- Pumps
- Washing machines...



1SBC101277S0201

1SBC101282S0201

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

Starters protected by manual motor starters

Overview **4**/6
Direct-on-line starters **4**/8
Reversing starters **4**/12
Dimensions **4**/16

Starters protected by thermal overload relays

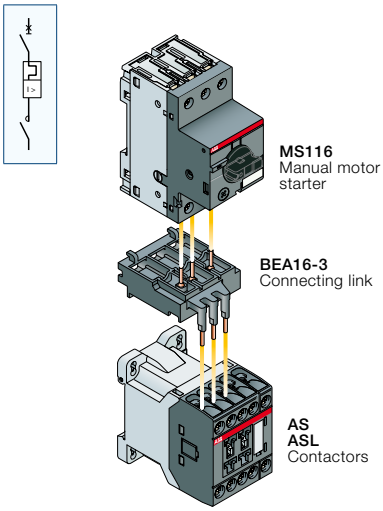
Overview **4**/6
Direct-on-line and reversing starters **4**/18
Star-delta starters **4**/22
Dimensions **4**/26

1SBC101282S0201

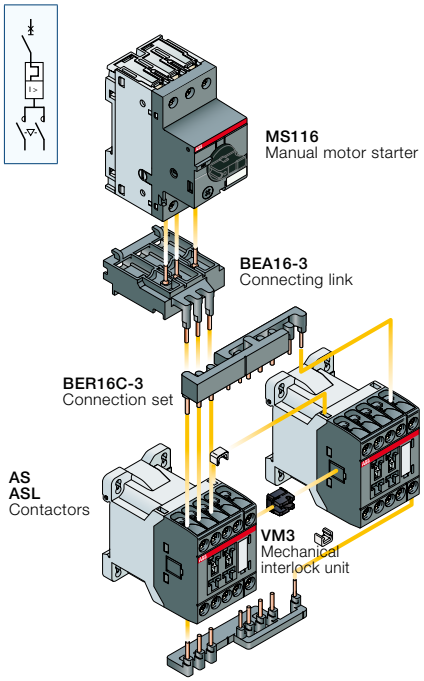
Motor starting solutions
Open type version, in kit form

Starters protected by manual motor starters

Direct-on-line starters

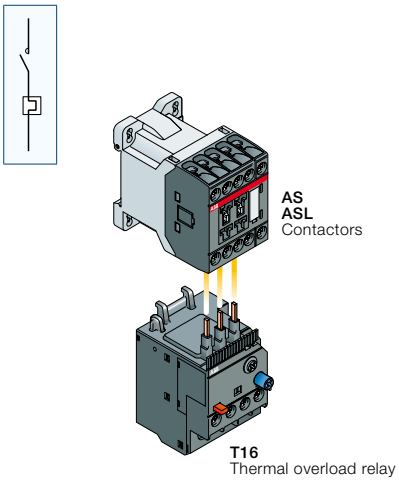


Reversing starters

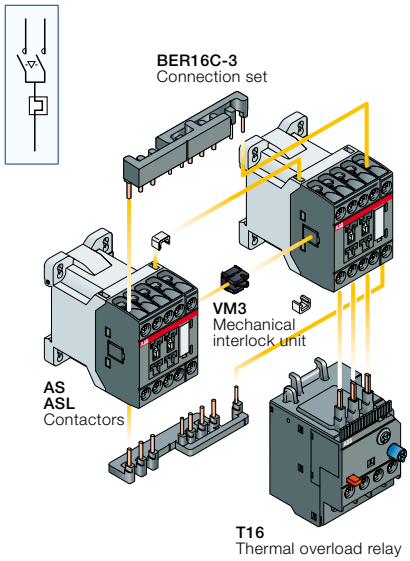


Starters protected by thermal overload relays

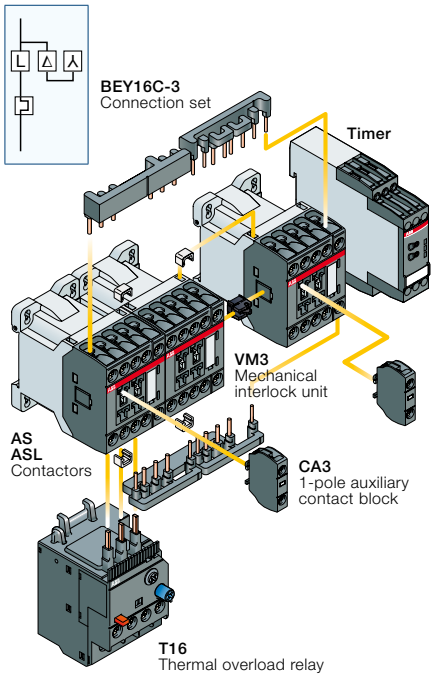
Direct-on-line starters



Reversing starters



Star-delta starters



1SBC101271S0201

Starters protected by manual motor starters

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

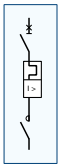
Starters protected by thermal overload relays

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

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

1SBC101271S0201

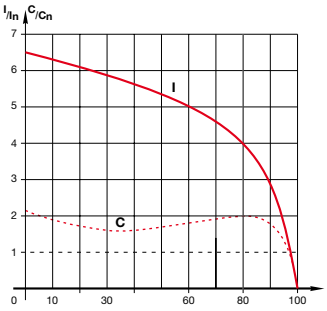
Direct-on-line starters protected by manual motor starters
With AS, ASL contactors - open type version in kit form



MS116 + BEA16-3 + AS16-30-10

Application

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



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

Coordination types

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

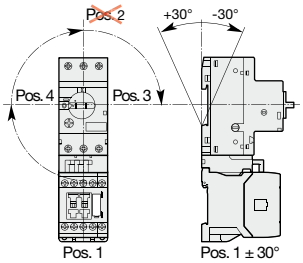
Type 1: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will not be able to then operate without being repaired or having parts replaced.

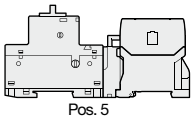
Type 2: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts light welding is acceptable.

Main technical data

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

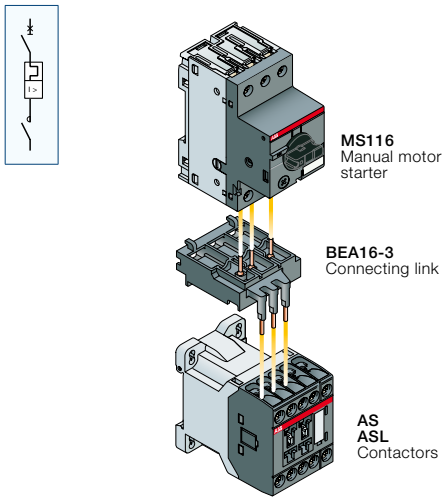
Mounting positions





1SBC101272S0201

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



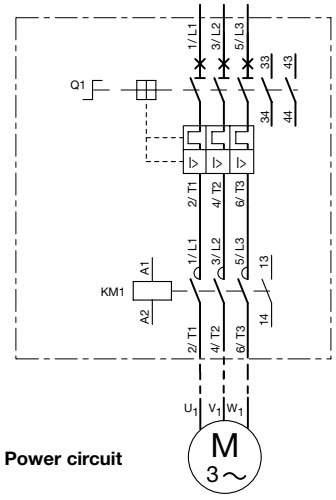
Description

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

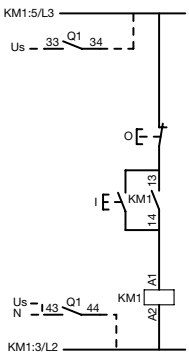
Select now easily and quickly your starter in the following pages for coordination type 1 or 2 at 400 V, 50 / 60 Hz, Iq = 16 kA or Iq = 50 kA up to 7.5 kW.

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

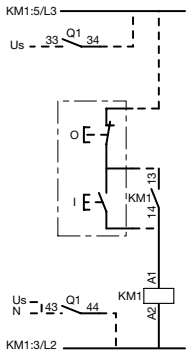
Wiring diagrams



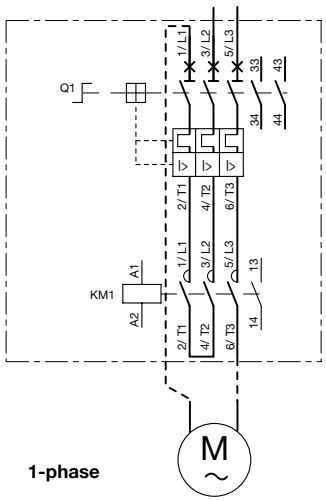
Power circuit



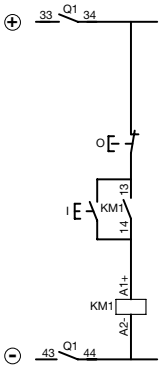
AC local control



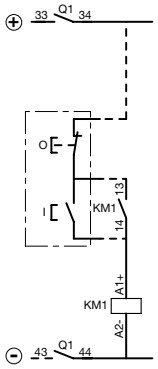
AC remote control



1-phase



DC local control



DC remote control

1SBC101272S0201

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

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

			Manual motor starters				Contactors				
IEC AC-3, 400 V Rated operational power	current	Type	Order code	Current setting range	Magnetic tripping current	Rated control circuit voltage Uc (1)		Type	Order code	Allowed setting current
kW	A			A	A	V 50 Hz	V 60 Hz			A
Coordination type 1										
Coordination type 2										
Iq = 16 kA										
Iq = 50 kA										
0.06	0.2	MS116-0.25	1SAM250000R1002	0.16...0.25	2.44	24	24	AS09-30-10-20	1SBL101001R2010	0.25
						-	120	AS09-30-10-16	1SBL101001R1610	
						230	230	AS09-30-10-26	1SBL101001R2610	
						400	400	AS09-30-10-28	1SBL101001R2810	
0.09	0.3	MS116-0.4	1SAM250000R1003	0.25...0.40	3.9	24	24	AS09-30-10-20	1SBL101001R2010	0.4
						-	120	AS09-30-10-16	1SBL101001R1610	
						230	230	AS09-30-10-26	1SBL101001R2610	
						400	400	AS09-30-10-28	1SBL101001R2810	
0.12	0.44	MS116-0.63	1SAM250000R1004	0.40...0.63	6.14	24	24	AS09-30-10-20	1SBL101001R2010	0.63
						-	120	AS09-30-10-16	1SBL101001R1610	
						230	230	AS09-30-10-26	1SBL101001R2610	
						400	400	AS09-30-10-28	1SBL101001R2810	
0.18	0.6	MS116-1.0	1SAM250000R1005	0.63...1.00	11.5	24	24	AS09-30-10-20	1SBL101001R2010	1
						-	120	AS09-30-10-16	1SBL101001R1610	
						230	230	AS09-30-10-26	1SBL101001R2610	
						400	400	AS09-30-10-28	1SBL101001R2810	
0.25	0.85	MS116-1.0	1SAM250000R1005	0.63...1.00	11.5	24	24	AS09-30-10-20	1SBL101001R2010	1
						-	120	AS09-30-10-16	1SBL101001R1610	
						230	230	AS09-30-10-26	1SBL101001R2610	
						400	400	AS09-30-10-28	1SBL101001R2810	
0.37	1.1	MS116-1.6	1SAM250000R1006	1.00...1.60	18.4	24	24	AS09-30-10-20	1SBL101001R2010	1.6
						-	120	AS09-30-10-16	1SBL101001R1610	
						230	230	AS09-30-10-26	1SBL101001R2610	
						400	400	AS09-30-10-28	1SBL101001R2810	
0.55	1.5	MS116-1.6	1SAM250000R1006	1.00...1.60	18.4	24	24	AS09-30-10-20	1SBL101001R2010	1.6
						-	120	AS09-30-10-16	1SBL101001R1610	
						230	230	AS09-30-10-26	1SBL101001R2610	
						400	400	AS09-30-10-28	1SBL101001R2810	
0.75	1.9	MS116-2.5	1SAM250000R1007	1.60...2.50	28.75	24	24	AS09-30-10-20	1SBL101001R2010	2.5
						-	120	AS09-30-10-16	1SBL101001R1610	
						230	230	AS09-30-10-26	1SBL101001R2610	
						400	400	AS09-30-10-28	1SBL101001R2810	
1.1	2.7	MS116-4.0	1SAM250000R1008	2.50...4.00	50	24	24	AS09-30-10-20	1SBL101001R2010	4
						-	120	AS09-30-10-16	1SBL101001R1610	
						230	230	AS09-30-10-26	1SBL101001R2610	
						400	400	AS09-30-10-28	1SBL101001R2810	
1.5	3.6	MS116-4.0	1SAM250000R1008	2.50...4.00	50	24	24	AS09-30-10-20	1SBL101001R2010	4
						-	120	AS09-30-10-16	1SBL101001R1610	
						230	230	AS09-30-10-26	1SBL101001R2610	
						400	400	AS09-30-10-28	1SBL101001R2810	
2.2	4.9	MS116-6.3	1SAM250000R1009	4.00...6.30	78.75	24	24	AS09-30-10-20	1SBL101001R2010	6.3
						-	120	AS09-30-10-16	1SBL101001R1610	
						230	230	AS09-30-10-26	1SBL101001R2610	
						400	400	AS09-30-10-28	1SBL101001R2810	
3	6.5	MS116-10	1SAM250000R1010	6.30...10.0	150	24	24	AS12-30-10-20	1SBL111001R2010	10
						-	120	AS12-30-10-16	1SBL111001R1610	
						230	230	AS12-30-10-26	1SBL111001R2610	
						400	400	AS12-30-10-28	1SBL111001R2810	
4	8.5	MS116-10	1SAM250000R1010	6.30...10.0	150	24	24	AS12-30-10-20	1SBL111001R2010	10
						-	120	AS12-30-10-16	1SBL111001R1610	
						230	230	AS12-30-10-26	1SBL111001R2610	
						400	400	AS12-30-10-28	1SBL111001R2810	
5.5	11.5	MS116-12	1SAM250000R1012	8.00...12.0	180	24	24	AS12-30-10-20	1SBL111001R2010	12
						-	120	AS12-30-10-16	1SBL111001R1610	
						230	230	AS12-30-10-26	1SBL111001R2610	
						400	400	AS12-30-10-28	1SBL111001R2810	
7.5	15.5	MS116-16	1SAM250000R1011	10.0...16.0	240	24	24	AS16-30-10-20	1SBL121001R2010	15.5
						-	120	AS16-30-10-16	1SBL121001R1610	
						230	230	AS16-30-10-26	1SBL121001R2610	
						400	400	AS16-30-10-28	1SBL121001R2810	

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

(1) Other control voltages see voltage code table.

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

1SBC101383S0201

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

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

Manual motor starters							Contactors				
IEC AC-3, 400 V Rated operational power kW	current A	Type	Order code		Current setting range A	Magnetic tripping current A	Rated control circuit voltage Uc (1) V DC	Type	Order code		Allowed setting current A
Coordination type 1											
Coordination type 2											
Iq = 16 kA											
Iq = 50 kA											
0.06	0.2	MS116-0.25	1SAM250000R1002		0.16...0.25	2.44	24	ASL09-30-10-81	1SBL103001R8110		0.25
							48	ASL09-30-10-83	1SBL103001R8310		
							110	ASL09-30-10-86	1SBL103001R8610		
							220	ASL09-30-10-88	1SBL103001R8810		
0.09	0.3	MS116-0.4	1SAM250000R1003		0.25...0.40	3.9	24	ASL09-30-10-81	1SBL103001R8110		0.4
							48	ASL09-30-10-83	1SBL103001R8310		
							110	ASL09-30-10-86	1SBL103001R8610		
							220	ASL09-30-10-88	1SBL103001R8810		
0.12	0.44	MS116-0.63	1SAM250000R1004		0.40...0.63	6.14	24	ASL09-30-10-81	1SBL103001R8110		0.63
							48	ASL09-30-10-83	1SBL103001R8310		
							110	ASL09-30-10-86	1SBL103001R8610		
							220	ASL09-30-10-88	1SBL103001R8810		
0.18	0.6	MS116-1.0	1SAM250000R1005		0.63...1.00	11.5	24	ASL09-30-10-81	1SBL103001R8110		1
							48	ASL09-30-10-83	1SBL103001R8310		
							110	ASL09-30-10-86	1SBL103001R8610		
							220	ASL09-30-10-88	1SBL103001R8810		
0.25	0.85	MS116-1.0	1SAM250000R1005		0.63...1.00	11.5	24	ASL09-30-10-81	1SBL103001R8110		1
							48	ASL09-30-10-83	1SBL103001R8310		
							110	ASL09-30-10-86	1SBL103001R8610		
							220	ASL09-30-10-88	1SBL103001R8810		
0.37	1.1	MS116-1.6	1SAM250000R1006		1.00...1.60	18.4	24	ASL09-30-10-81	1SBL103001R8110		1.6
							48	ASL09-30-10-83	1SBL103001R8310		
							110	ASL09-30-10-86	1SBL103001R8610		
							220	ASL09-30-10-88	1SBL103001R8810		
0.55	1.5	MS116-1.6	1SAM250000R1006		1.00...1.60	18.4	24	ASL09-30-10-81	1SBL103001R8110		1.6
							48	ASL09-30-10-83	1SBL103001R8310		
							110	ASL09-30-10-86	1SBL103001R8610		
							220	ASL09-30-10-88	1SBL103001R8810		
0.75	1.9	MS116-2.5	1SAM250000R1007		1.60...2.50	28.75	24	ASL09-30-10-81	1SBL103001R8110		2.5
							48	ASL09-30-10-83	1SBL103001R8310		
							110	ASL09-30-10-86	1SBL103001R8610		
							220	ASL09-30-10-88	1SBL103001R8810		
1.1	2.7	MS116-4.0	1SAM250000R1008		2.50...4.00	50	24	ASL09-30-10-81	1SBL103001R8110		4
							48	ASL09-30-10-83	1SBL103001R8310		
							110	ASL09-30-10-86	1SBL103001R8610		
							220	ASL09-30-10-88	1SBL103001R8810		
1.5	3.6	MS116-4.0	1SAM250000R1008		2.50...4.00	50	24	ASL09-30-10-81	1SBL103001R8110		4
							48	ASL09-30-10-83	1SBL103001R8310		
							110	ASL09-30-10-86	1SBL103001R8610		
							220	ASL09-30-10-88	1SBL103001R8810		
2.2	4.9	MS116-6.3	1SAM250000R1009		4.00...6.30	78.75	24	ASL09-30-10-81	1SBL103001R8110		6.3
							48	ASL09-30-10-83	1SBL103001R8310		
							110	ASL09-30-10-86	1SBL103001R8610		
							220	ASL09-30-10-88	1SBL103001R8810		
3	6.5	MS116-10	1SAM250000R1010		6.30...10.0	150	24	ASL12-30-10-81	1SBL113001R8110		10
							48	ASL12-30-10-83	1SBL113001R8310		
							110	ASL12-30-10-86	1SBL113001R8610		
							220	ASL12-30-10-88	1SBL113001R8810		
4	8.5	MS116-10	1SAM250000R1010		6.30...10.0	150	24	ASL12-30-10-81	1SBL113001R8110		10
							48	ASL12-30-10-83	1SBL113001R8310		
							110	ASL12-30-10-86	1SBL113001R8610		
							220	ASL12-30-10-88	1SBL113001R8810		
5.5	11.5	MS116-12	1SAM250000R1012		8.00...12.0	180	24	ASL12-30-10-81	1SBL113001R8110		12
							48	ASL12-30-10-83	1SBL113001R8310		
							110	ASL12-30-10-86	1SBL113001R8610		
							220	ASL12-30-10-88	1SBL113001R8810		
7.5	15.5	MS116-16	1SAM250000R1011		10.0...16.0	240	24	ASL16-30-10-81	1SBL123001R8110		15.5
							48	ASL16-30-10-83	1SBL123001R8310		
							110	ASL16-30-10-86	1SBL123001R8610		
							220	ASL16-30-10-88	1SBL123001R8810		

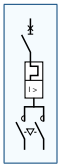
Note: for multiple packaging, please contact your ABB local sales organization.

(1) Other control voltages see voltage code table.

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

1SBC101383S0201

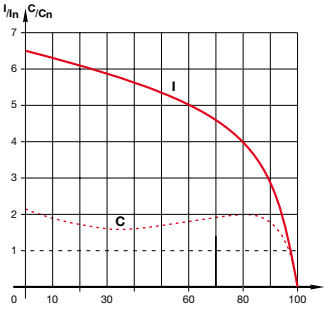
Reversing starters protected by manual motor starters
With AS, ASL contactors - open type version in kit form



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

Application

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



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

Coordination types

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

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

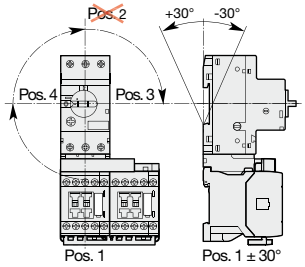
Type 2: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts light welding is acceptable.

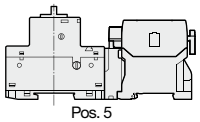
Main technical data

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

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

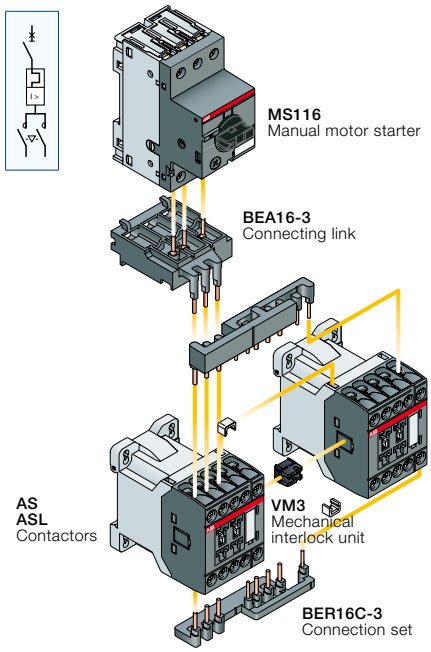
Mounting positions





1SBC101274S0201

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



Description

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

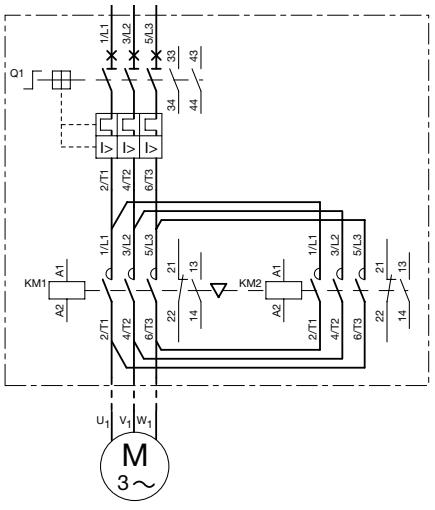
- BEA16-3 connecting link 3-pole insulated: it is used to electrically and mechanically connect MS116 manual motor starter and AS or ASL contactors.
- VM3 mechanical interlock unit: just clip it between the 2 contactors without increasing starter width.
- BER16C-3 connection set: it assures a safe and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

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

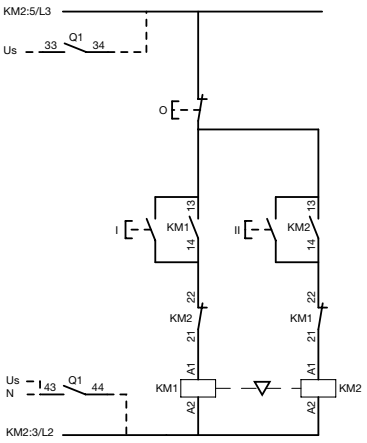
For complete coordination tables with MS116 or MS132, please contact your ABB local sales organization.

4

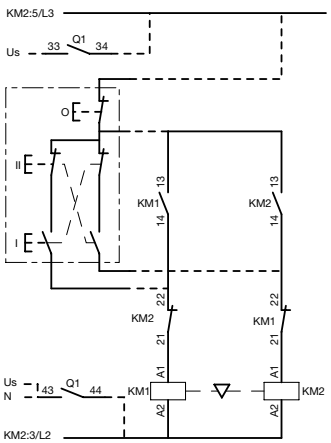
Wiring diagrams



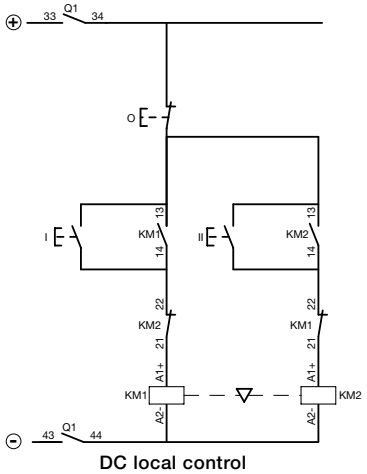
Power circuit



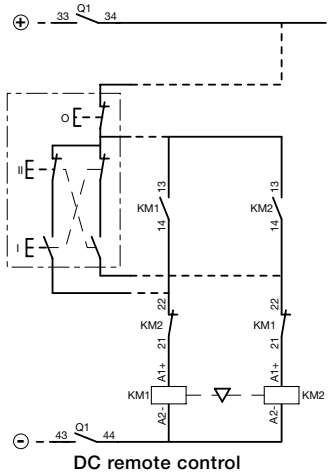
AC local control



AC remote control



DC local control



DC remote control

1SBC101274S0201

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

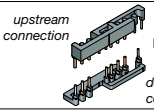
Coordination type 1 or type 2, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz

	Manual motor starters						Contactors				
IEC AC-3, 400 V Rated operational power kW	current A	Type	Order code	Current setting range A	Magnetic tripping current A	Rated control circuit voltage Uc (1) V 50 Hz	V 60 Hz	Type	Order code	Allowed setting current A
Coordination type 1										
Coordination type 2										
Iq = 16 kA										
Iq = 50 kA										
0.06	0.2	MS116-0.25	1SAM250000R1002	0.16...0.25	2.44	24	24	AS09-30-01-20	1SBL101001R2001	0.25
						-	120	AS09-30-01-16	1SBL101001R1601	
						230	230	AS09-30-01-26	1SBL101001R2601	
						400	400	AS09-30-01-28	1SBL101001R2801	
0.09	0.3	MS116-0.4	1SAM250000R1003	0.25...0.40	3.9	24	24	AS09-30-01-20	1SBL101001R2001	0.4
						-	120	AS09-30-01-16	1SBL101001R1601	
						230	230	AS09-30-01-26	1SBL101001R2601	
						400	400	AS09-30-01-28	1SBL101001R2801	
0.12	0.44	MS116-0.63	1SAM250000R1004	0.40...0.63	6.14	24	24	AS09-30-01-20	1SBL101001R2001	0.63
						-	120	AS09-30-01-16	1SBL101001R1601	
						230	230	AS09-30-01-26	1SBL101001R2601	
						400	400	AS09-30-01-28	1SBL101001R2801	
0.18	0.6	MS116-1.0	1SAM250000R1005	0.63...1.00	11.5	24	24	AS09-30-01-20	1SBL101001R2001	1
						-	120	AS09-30-01-16	1SBL101001R1601	
						230	230	AS09-30-01-26	1SBL101001R2601	
						400	400	AS09-30-01-28	1SBL101001R2801	
0.25	0.85	MS116-1.0	1SAM250000R1005	0.63...1.00	11.5	24	24	AS09-30-01-20	1SBL101001R2001	1
						-	120	AS09-30-01-16	1SBL101001R1601	
						230	230	AS09-30-01-26	1SBL101001R2601	
						400	400	AS09-30-01-28	1SBL101001R2801	
0.37	1.1	MS116-1.6	1SAM250000R1006	1.00...1.60	18.4	24	24	AS09-30-01-20	1SBL101001R2001	1.6
						-	120	AS09-30-01-16	1SBL101001R1601	
						230	230	AS09-30-01-26	1SBL101001R2601	
						400	400	AS09-30-01-28	1SBL101001R2801	
0.55	1.5	MS116-1.6	1SAM250000R1006	1.00...1.60	18.4	24	24	AS09-30-01-20	1SBL101001R2001	1.6
						-	120	AS09-30-01-16	1SBL101001R1601	
						230	230	AS09-30-01-26	1SBL101001R2601	
						400	400	AS09-30-01-28	1SBL101001R2801	
0.75	1.9	MS116-2.5	1SAM250000R1007	1.60...2.50	28.75	24	24	AS09-30-01-20	1SBL101001R2001	2.5
						-	120	AS09-30-01-16	1SBL101001R1601	
						230	230	AS09-30-01-26	1SBL101001R2601	
						400	400	AS09-30-01-28	1SBL101001R2801	
1.1	2.7	MS116-4.0	1SAM250000R1008	2.50...4.00	50	24	24	AS09-30-01-20	1SBL101001R2001	4
						-	120	AS09-30-01-16	1SBL101001R1601	
						230	230	AS09-30-01-26	1SBL101001R2601	
						400	400	AS09-30-01-28	1SBL101001R2801	
1.5	3.6	MS116-4.0	1SAM250000R1008	2.50...4.00	50	24	24	AS09-30-01-20	1SBL101001R2001	4
						-	120	AS09-30-01-16	1SBL101001R1601	
						230	230	AS09-30-01-26	1SBL101001R2601	
						400	400	AS09-30-01-28	1SBL101001R2801	
2.2	4.9	MS116-6.3	1SAM250000R1009	4.00...6.30	78.75	24	24	AS09-30-01-20	1SBL101001R2001	6.3
						-	120	AS09-30-01-16	1SBL101001R1601	
						230	230	AS09-30-01-26	1SBL101001R2601	
						400	400	AS09-30-01-28	1SBL101001R2801	
3	6.5	MS116-10	1SAM250000R1010	6.30...10.0	150	24	24	AS12-30-01-20	1SBL111001R2001	10
						-	120	AS12-30-01-16	1SBL111001R1601	
						230	230	AS12-30-01-26	1SBL111001R2601	
						400	400	AS12-30-01-28	1SBL111001R2801	
4	8.5	MS116-10	1SAM250000R1010	6.30...10.0	150	24	24	AS12-30-01-20	1SBL111001R2001	10
						-	120	AS12-30-01-16	1SBL111001R1601	
						230	230	AS12-30-01-26	1SBL111001R2601	
						400	400	AS12-30-01-28	1SBL111001R2801	
5.5	11.5	MS116-12	1SAM250000R1012	8.00...12.0	180	24	24	AS12-30-01-20	1SBL111001R2001	12
						-	120	AS12-30-01-16	1SBL111001R1601	
						230	230	AS12-30-01-26	1SBL111001R2601	
						400	400	AS12-30-01-28	1SBL111001R2801	
7.5	15.5	MS116-16	1SAM250000R1011	10.0...16.0	240	24	24	AS16-30-01-20	1SBL121001R2001	15.5
						-	120	AS16-30-01-16	1SBL121001R1601	
						230	230	AS16-30-01-26	1SBL121001R2601	
						400	400	AS16-30-01-28	1SBL121001R2801	

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

(1) Other control voltages see voltage code table.

BEA16-3



VM3

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

1SBC101273S0201

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

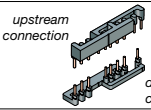
Coordination type 1 or type 2, AC-3, 16 or 50 kA, 400 V, 50/60 Hz

	Manual motor starters					Contactors				
IEC AC-3, 400 V Rated operational power	current	Type	Order code		Current setting range	Magnetic tripping current	Rated control circuit voltage Uc (1)	Type	Order code		Allowed setting current
kW	A				A	A	V DC				A
Coordination type 1 / Coordination type 2 / Iq = 16 kA / Iq = 50 kA											
0.06	0.2	MS116-0.25	1SAM250000R1002		0.16...0.25	2.44	24	ASL09-30-01-81	1SBL103001R8101		0.25
							48	ASL09-30-01-83	1SBL103001R8301		
							110	ASL09-30-01-86	1SBL103001R8601		
							220	ASL09-30-01-88	1SBL103001R8801		
0.09	0.3	MS116-0.4	1SAM250000R1003		0.25...0.40	3.9	24	ASL09-30-01-81	1SBL103001R8101		0.4
							48	ASL09-30-01-83	1SBL103001R8301		
							110	ASL09-30-01-86	1SBL103001R8601		
							220	ASL09-30-01-88	1SBL103001R8801		
0.12	0.44	MS116-0.63	1SAM250000R1004		0.40...0.63	6.14	24	ASL09-30-01-81	1SBL103001R8101		0.63
							48	ASL09-30-01-83	1SBL103001R8301		
							110	ASL09-30-01-86	1SBL103001R8601		
							220	ASL09-30-01-88	1SBL103001R8801		
0.18	0.6	MS116-1.0	1SAM250000R1005		0.63...1.00	11.5	24	ASL09-30-01-81	1SBL103001R8101		1
							48	ASL09-30-01-83	1SBL103001R8301		
							110	ASL09-30-01-86	1SBL103001R8601		
							220	ASL09-30-01-88	1SBL103001R8801		
0.25	0.85	MS116-1.0	1SAM250000R1005		0.63...1.00	11.5	24	ASL09-30-01-81	1SBL103001R8101		1
							48	ASL09-30-01-83	1SBL103001R8301		
							110	ASL09-30-01-86	1SBL103001R8601		
							220	ASL09-30-01-88	1SBL103001R8801		
0.37	1.1	MS116-1.6	1SAM250000R1006		1.00...1.60	18.4	24	ASL09-30-01-81	1SBL103001R8101		1.6
							48	ASL09-30-01-83	1SBL103001R8301		
							110	ASL09-30-01-86	1SBL103001R8601		
							220	ASL09-30-01-88	1SBL103001R8801		
0.55	1.5	MS116-1.6	1SAM250000R1006		1.00...1.60	18.4	24	ASL09-30-01-81	1SBL103001R8101		1.6
							48	ASL09-30-01-83	1SBL103001R8301		
							110	ASL09-30-01-86	1SBL103001R8601		
							220	ASL09-30-01-88	1SBL103001R8801		
0.75	1.9	MS116-2.5	1SAM250000R1007		1.60...2.50	28.75	24	ASL09-30-01-81	1SBL103001R8101		2.5
							48	ASL09-30-01-83	1SBL103001R8301		
							110	ASL09-30-01-86	1SBL103001R8601		
							220	ASL09-30-01-88	1SBL103001R8801		
1.1	2.7	MS116-4.0	1SAM250000R1008		2.50...4.00	50	24	ASL09-30-01-81	1SBL103001R8101		4
							48	ASL09-30-01-83	1SBL103001R8301		
							110	ASL09-30-01-86	1SBL103001R8601		
							220	ASL09-30-01-88	1SBL103001R8801		
1.5	3.6	MS116-4.0	1SAM250000R1008		2.50...4.00	50	24	ASL09-30-01-81	1SBL103001R8101		4
							48	ASL09-30-01-83	1SBL103001R8301		
							110	ASL09-30-01-86	1SBL103001R8601		
							220	ASL09-30-01-88	1SBL103001R8801		
2.2	4.9	MS116-6.3	1SAM250000R1009		4.00...6.30	78.75	24	ASL09-30-01-81	1SBL103001R8101		6.3
							48	ASL09-30-01-83	1SBL103001R8301		
							110	ASL09-30-01-86	1SBL103001R8601		
							220	ASL09-30-01-88	1SBL103001R8801		
3	6.5	MS116-10	1SAM250000R1010		6.30...10.0	150	24	ASL12-30-01-81	1SBL113001R8101		10
							48	ASL12-30-01-83	1SBL113001R8301		
							110	ASL12-30-01-86	1SBL113001R8601		
							220	ASL12-30-01-88	1SBL113001R8801		
4	8.5	MS116-10	1SAM250000R1010		6.30...10.0	150	24	ASL12-30-01-81	1SBL113001R8101		10
							48	ASL12-30-01-83	1SBL113001R8301		
							110	ASL12-30-01-86	1SBL113001R8601		
							220	ASL12-30-01-88	1SBL113001R8801		
5.5	11.5	MS116-12	1SAM250000R1012		8.00...12.0	180	24	ASL12-30-01-81	1SBL113001R8101		12
							48	ASL12-30-01-83	1SBL113001R8301		
							110	ASL12-30-01-86	1SBL113001R8601		
							220	ASL12-30-01-88	1SBL113001R8801		
7.5	15.5	MS116-16	1SAM250000R1011		10.0...16.0	240	24	ASL16-30-01-81	1SBL123001R8101		15.5
							48	ASL16-30-01-83	1SBL123001R8301		
							110	ASL16-30-01-86	1SBL123001R8601		
							220	ASL16-30-01-88	1SBL123001R8801		

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

(1) Other control voltages see voltage code table.

BEA16-3



VM3

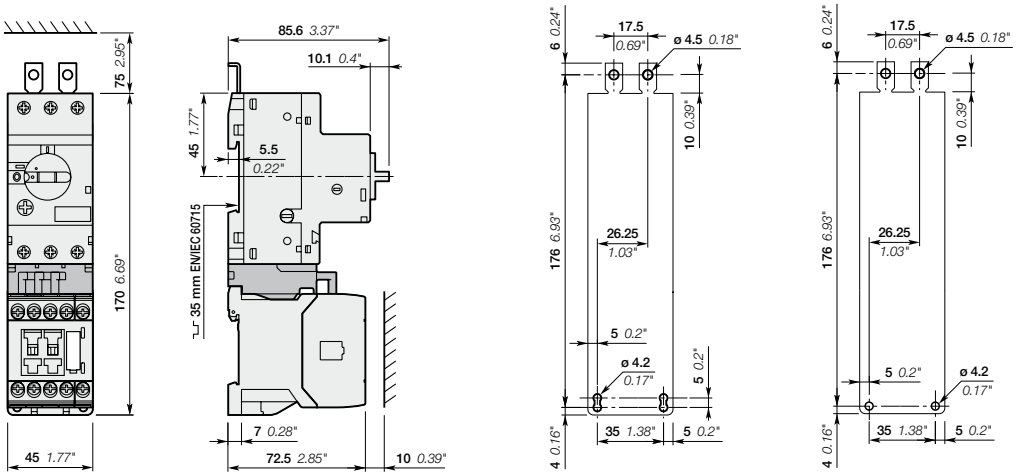
Main accessories	Type	Order code
Connecting link for manual motor starter	BEA16-3	1SBN081006T1000
Connection set for reversing starter	BER16C-3	1SBN081012R1000
Mechanical interlock unit	VM3	1SBN031005T1000

1SBC101273S0201

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

Main dimensions mm, *inches*

Direct-on-line starters



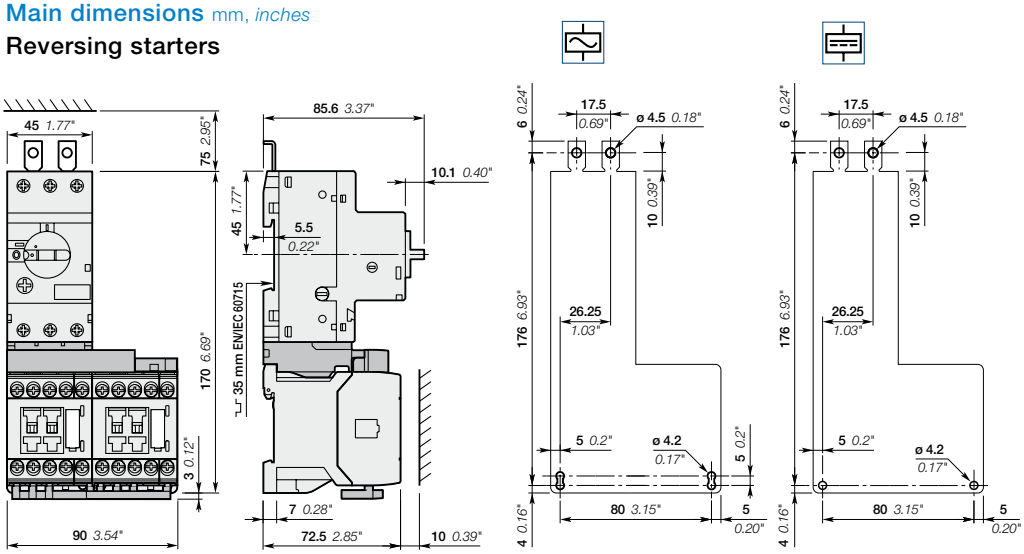
MS116
+ BEA16-3
+ AS09, ASL09, AS12, ASL12, AS16, ASL16

1SBC101279S0201

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

Main dimensions mm, *inches*

Reversing starters

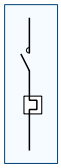


MS116
+ BEA16-3 + BER16C-3 + VM3
+ AS09, ASL09, AS12, ASL12, AS16, ASL16

4

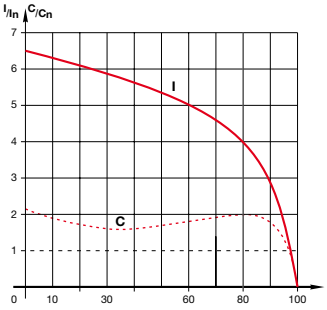
DOL & reversing starters protected by thermal overload relays
With AS, ASL contactors - open type version in kit form

AS09-30-10 + T16



Application

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



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

AS09-30-01 + BER16C + VM3 + T16

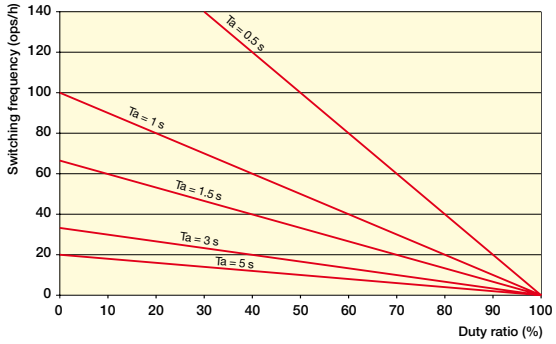
Coordination types

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

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

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

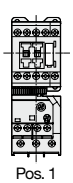
Main technical data

Standards	IEC 60947-4-1 / EN 60947-4-1
Rated operational voltage Ue max.	690 V - 50/60 Hz
Rated insulation voltage Ui according to IEC 60947-4-1	690 V
Air temperature close to the device	≤ 60 °C
Degree of protection	IP20
Switching frequency Thermal overload relays cannot be operated at any arbitrary switching frequency in order to avoid tripping. Applications involving up to 15 operations per hour are acceptable. Higher switching frequencies are permitted if the duty ratio and the motor starting time are allowed for and if the motor's making current does not appreciably exceed 6 times the rated operating current. Please refer to the adjacent diagram for guideline values for the permitted switching frequency. Example: Starting time of the motor: 1 second Duty ratio: 40 % means a permitted switching frequency of max. 60 operating cycles per hour.	 Duty ratio in %, Ta: motor starting time

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

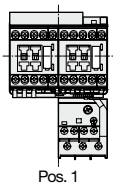
Mounting positions

Direct-on-line



Pos. 1

Reversing

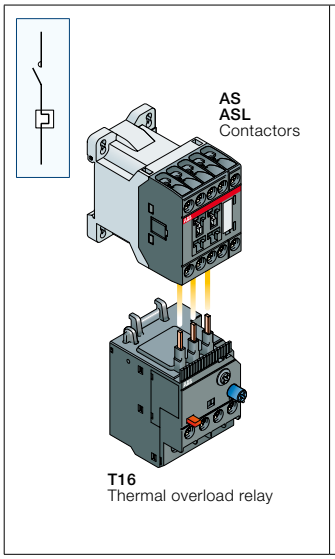


Pos. 1

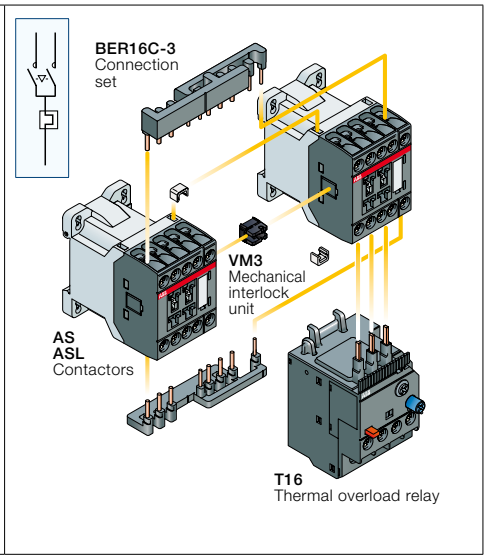
1SBC101275S0201

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

Direct-on-line starters



Reversing starters



Description

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

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

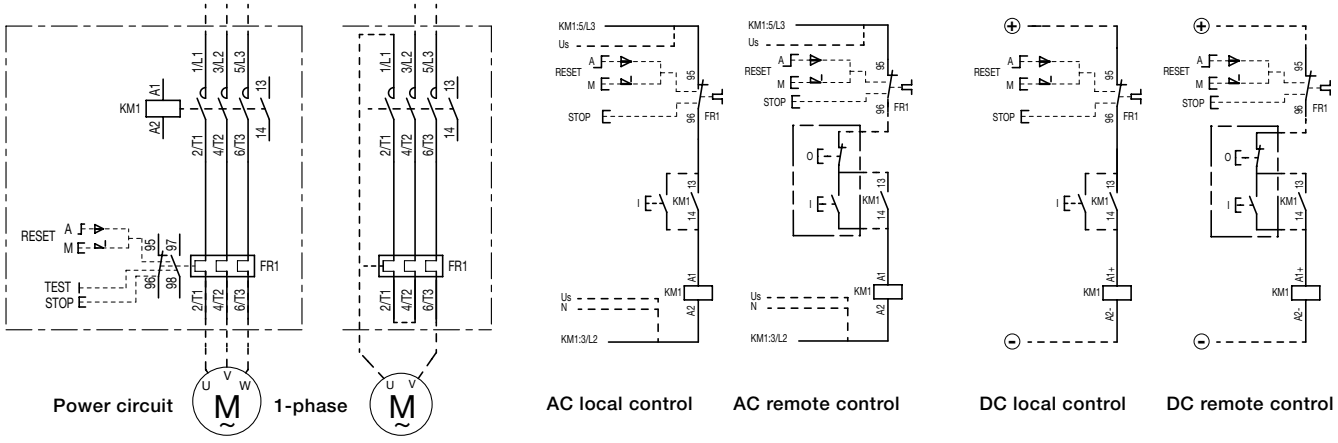
- VM3 mechanical interlock unit: just clip it between the 2 contactors without increasing starter length.
- BER16C-3 connection set: it assures a safe and simple reversing connection between both contactor main terminals and an electrical interlocking between coil and N.C. built-in auxiliary contact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

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

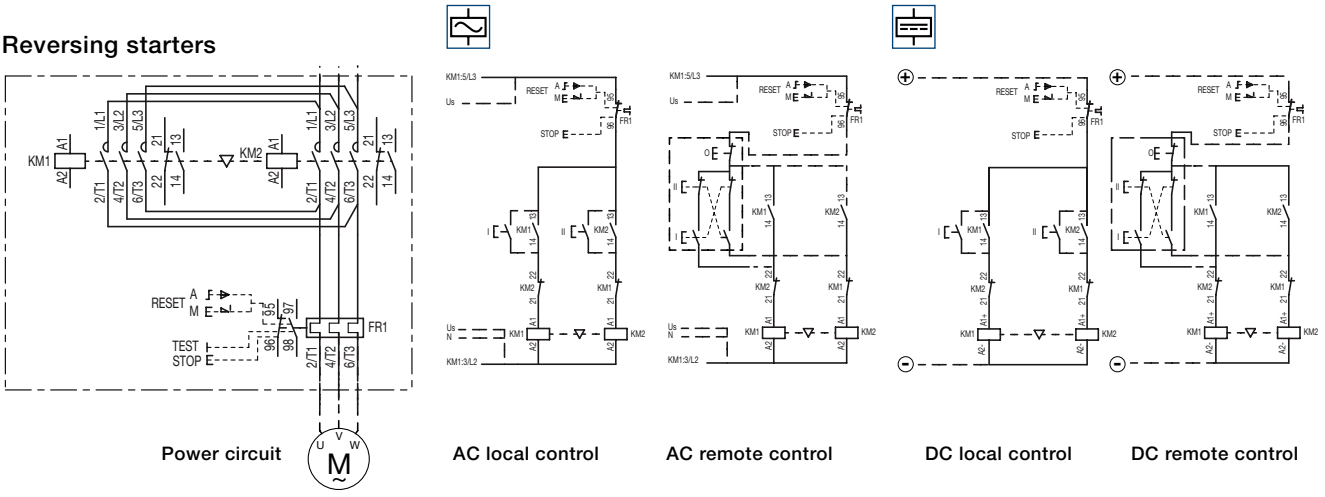
For complete coordination tables, please contact your ABB local sales organization.

Wiring diagrams

Direct-on-line starters



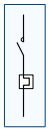
Reversing starters

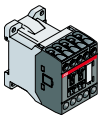
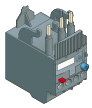


1SBC101275S0201

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

Contactors - AC operated



Contactors						Thermal overload relays			Accessories
									
IEC AC-3, 400 V Rated operational power	current	Rated control circuit voltage Uc (1)		Type	Order code	Setting ranges	Type	Order code	
kW	A	V 50 Hz	V 60 Hz			A ... A			
4	8.5	24	24	AS09-30-10-20	1SBL101001R2010	7.60...10.0	T16-10	1SAZ711201R1043	-
		-	120	AS09-30-10-16	1SBL101001R1610				
		230	230	AS09-30-10-26	1SBL101001R2610				
		400	400	AS09-30-10-28	1SBL101001R2810				
5.5	11.5	24	24	AS12-30-10-20	1SBL111001R2010	10.0...13.0	T16-13	1SAZ711201R1045	-
		-	120	AS12-30-10-16	1SBL111001R1610				
		230	230	AS12-30-10-26	1SBL111001R2610				
		400	400	AS12-30-10-28	1SBL111001R2810				
7.5	15.5	24	24	AS16-30-10-20	1SBL121001R2010	13.0...16.0	T16-16	1SAZ711201R1047	-
		-	120	AS16-30-10-16	1SBL121001R1610				
		230	230	AS16-30-10-26	1SBL121001R2610				
		400	400	AS16-30-10-28	1SBL121001R2810				

Contactors - DC operated

IEC AC-3, 400 V Rated operational power	current	Rated control circuit voltage Uc (1)	Type	Order code	Setting ranges	Type	Order code	
kW	A	DC			A ... A			
4	8.5	24	ASL09-30-10-81	1SBL103001R8110	7.60...10.0	T16-10	1SAZ711201R1043	-
		48	ASL09-30-10-83	1SBL103001R8310				
		110	ASL09-30-10-86	1SBL103001R8610				
		220	ASL09-30-10-88	1SBL103001R8810				
5.5	11.5	24	ASL12-30-10-81	1SBL113001R8110	10.0...13.0	T16-13	1SAZ711201R1045	-
		48	ASL12-30-10-83	1SBL113001R8310				
		110	ASL12-30-10-86	1SBL113001R8610				
		220	ASL12-30-10-88	1SBL113001R8810				
7.5	15.5	24	ASL16-30-10-81	1SBL123001R8110	13.0...16.0	T16-16	1SAZ711201R1047	-
		48	ASL16-30-10-83	1SBL123001R8310				
		110	ASL16-30-10-86	1SBL123001R8610				
		220	ASL16-30-10-88	1SBL123001R8810				

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

see table below for all setting ranges

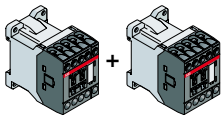
Setting ranges	Type	Order code	
A ... A			
0.10...0.13	T16-0.13	1SAZ711201R1005	
0.13...0.17	T16-0.17	1SAZ711201R1008	
0.17...0.23	T16-0.23	1SAZ711201R1009	
0.23...0.31	T16-0.31	1SAZ711201R1013	
0.31...0.41	T16-0.41	1SAZ711201R1014	
0.41...0.55	T16-0.55	1SAZ711201R1017	
0.55...0.74	T16-0.74	1SAZ711201R1021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

1SBC101280S0201

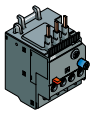
Reversing starters protected by thermal overload relays
With AS, ASL contactors - open type version in kit form

Contactors - AC operated

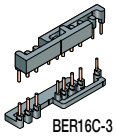
Contactors

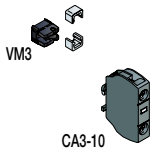


Thermal overload relays



Accessories





IEC AC-3, 400 V Rated operational power	current	Rated control circuit voltage Uc (1)		Type	Order code	Setting ranges	Type	Order code	Type	Order code
kW	A	V 50 Hz	V 60 Hz			A ... A				
4	8.5	24	24	AS09-30-01-20	1SBL101001R2001	7.60...10.0	T16-10	1SAZ711201R1043	BER16C-3 + VM3 + 2x CA3-10	1SBN081012R1000 + 1SBN031005T1000 + 1SBN011010T1010
		-	120	AS09-30-01-16	1SBL101001R1601					
		230	230	AS09-30-01-26	1SBL101001R2601					
		400	400	AS09-30-01-28	1SBL101001R2801					
5.5	11.5	24	24	AS12-30-01-20	1SBL111001R2001	10.0...13.0	T16-13	1SAZ711201R1045	BER16C-3 + VM3 + 2x CA3-10	1SBN081012R1000 + 1SBN031005T1000 + 1SBN011010T1010
		-	120	AS12-30-01-16	1SBL111001R1601					
		230	230	AS12-30-01-26	1SBL111001R2601					
		400	400	AS12-30-01-28	1SBL111001R2801					
7.5	15.5	24	24	AS16-30-01-20	1SBL121001R2001	13.0...16.0	T16-16	1SAZ711201R1047	BER16C-3 + VM3 + 2x CA3-10	1SBN081012R1000 + 1SBN031005T1000 + 1SBN011010T1010
		-	120	AS16-30-01-16	1SBL121001R1601					
		230	230	AS16-30-01-26	1SBL121001R2601					
		400	400	AS16-30-01-28	1SBL121001R2801					

Contactors - DC operated

IEC AC-3, 400 V Rated operational power	current	Rated control circuit voltage Uc (1)	Type	Order code	Setting ranges	Type	Order code	Type	Order code
kW	A	DC			A ... A				
4	8.5	24	ASL09-30-10-81	1SBL103001R8110	7.60...10.0	T16-10	1SAZ711201R1043	BER16C-3 + VM3 + 2x CA3-10	1SBN081012R1000 + 1SBN031005T1000 + 1SBN011010T1010
		48	ASL09-30-10-83	1SBL103001R8310					
		110	ASL09-30-10-86	1SBL103001R8610					
		220	ASL09-30-10-88	1SBL103001R8810					
5.5	11.5	24	ASL12-30-10-81	1SBL113001R8110	10.0...13.0	T16-13	1SAZ711201R1045	BER16C-3 + VM3 + 2x CA3-10	1SBN081012R1000 + 1SBN031005T1000 + 1SBN011010T1010
		48	ASL12-30-10-83	1SBL113001R8310					
		110	ASL12-30-10-86	1SBL113001R8610					
		220	ASL12-30-10-88	1SBL113001R8810					
7.5	15.5	24	ASL16-30-10-81	1SBL123001R8110	13.0...16.0	T16-16	1SAZ711201R1047	BER16C-3 + VM3 + 2x CA3-10	1SBN081012R1000 + 1SBN031005T1000 + 1SBN011010T1010
		48	ASL16-30-10-83	1SBL123001R8310					
		110	ASL16-30-10-86	1SBL123001R8610					
		220	ASL16-30-10-88	1SBL123001R8810					

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

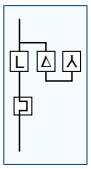
(1) Other control voltages see voltage code table.

see table below for all setting ranges

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

1SBC101280S0201

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



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

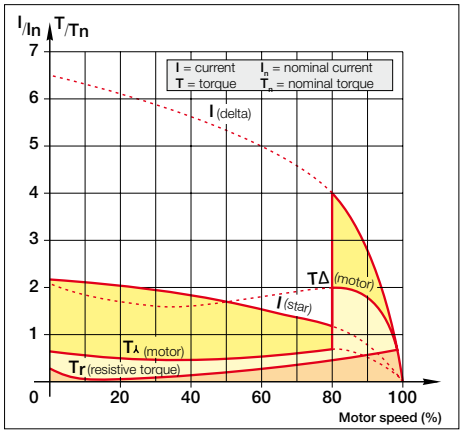
Application

Star-delta starting is the most common method to reduce the starting current of a motor.
This system can be used on all the squirrel cage motors, which are normally used in delta connection. In this type of starting, it is recommended to choose motors having high starting torque i.e. much higher than the resistive torque in order to reach sufficient high speed when the motor is connected in star.

When starting:

– Inrush current is reduced to a third of direct starting current
– Motor torque is reduced to a third or even less of direct starting torque.

Transient current is generated when switching from star to delta connection.
During the initial starting phase ("star" connection), the resistive torque of the driven load must remain, irrespective of speed, less than the "star" motor torque until "star-delta" switching occurs.
This starting mode is therefore ideal for machines having low starting torque such as pumps, centrifugal compressors, wood-working machines...



Precaution

– Motor nominal voltage in delta connection must be equal to that of the mains. Example: a motor for 400 V star-delta starting must be designed for 400 V in "delta" connection. Its usual designation is "400 V / 690 V motor". The motor must be constructed with 6 terminal windings
– In order to prevent a high current peak, at least 85 % of nominal speed must be reached before switching from star to delta

Sequence

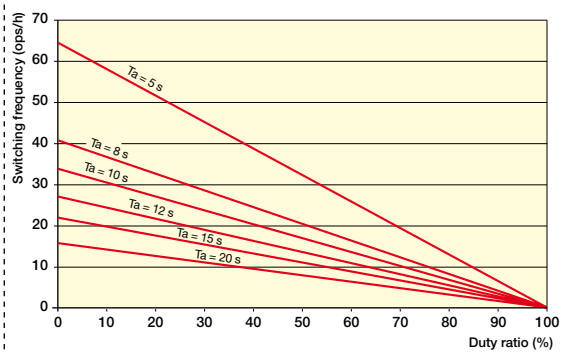
Starting is a three-stage process:

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

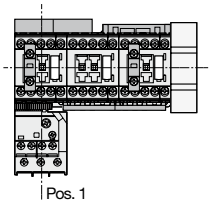
2nd stage: "Star" to "Delta" switching - when programmed starting time is over, the KM2 "Star" contactor opens.

3rd stage: "Delta" connection - A transition time (or dwelling time) of 50 ms is fixed between opening of the "star" contactor and closing of the "delta" contactor by the use of CT-SDS timer. This prevent short-circuit between "star" and "delta".

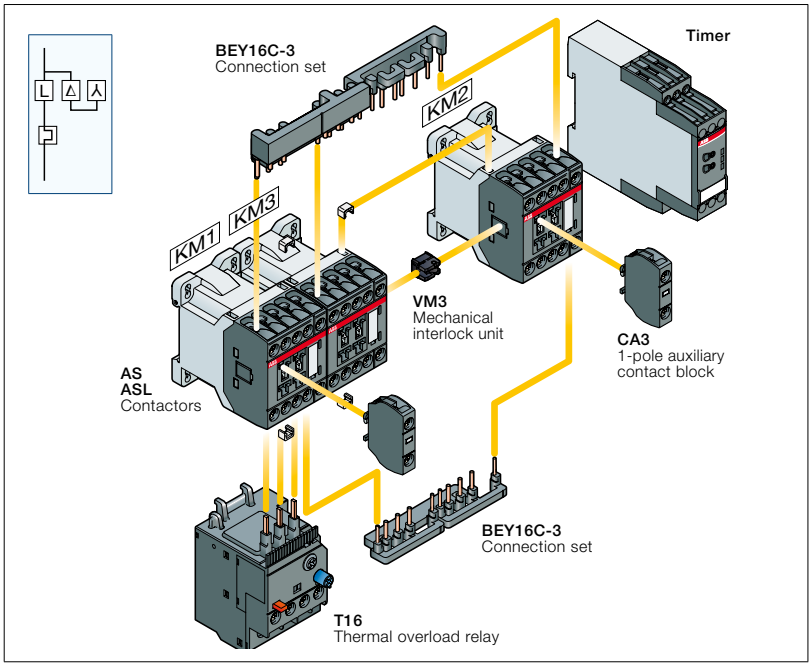
Main technical data

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

Mounting positions



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



Description

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

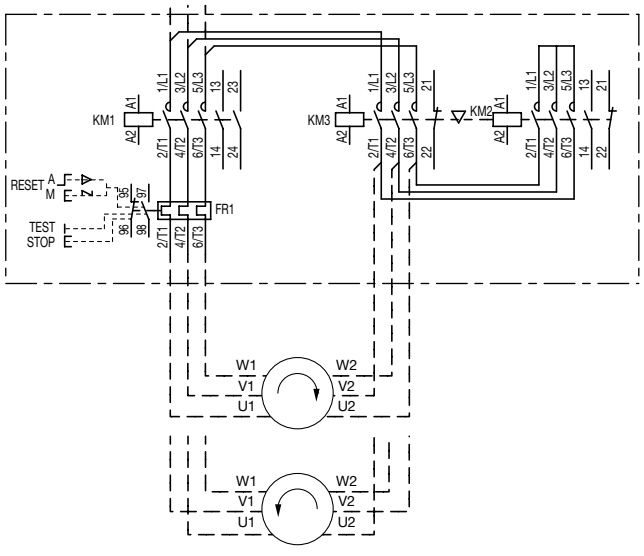
- VM3 mechanical interlock unit: just clip it between the 2 contactors without increasing starter length.
- BEY16C-3 connection set: it assures a safe and simple connection between contactors main terminals and an electrical interlocking between coil and N.C. built-in auxiliary contact terminals of star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

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

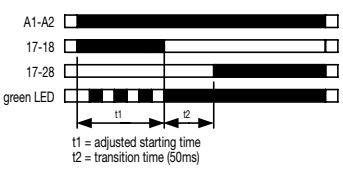
For complete coordination tables, please contact your ABB local sales organization.

4

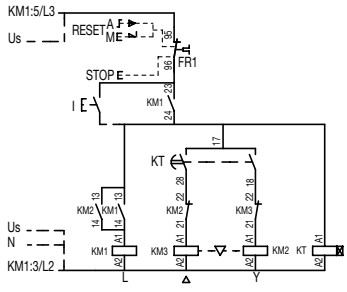
Wiring diagrams



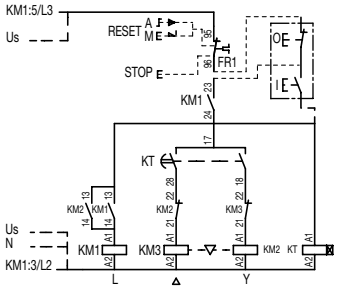
Function diagram Electronic Timer



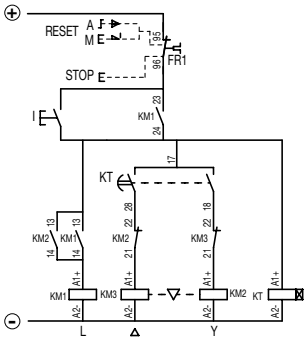
t1 = adjusted starting time
t2 = transition time (50ms)



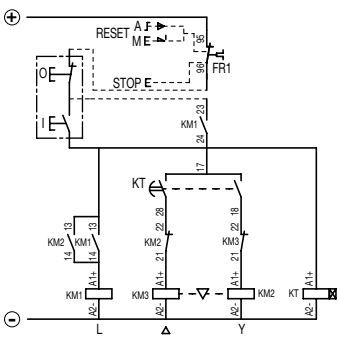
AC local control



AC remote control



DC local control

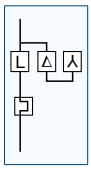


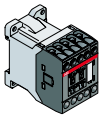
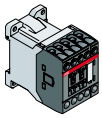
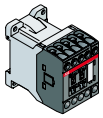
DC remote control

1SBC101288S0201

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

Contactors - AC operated



				Line contactor KM1		Delta contactor KM3		Star contactor KM2	
									
IEC AC-3, 400 V Rated operational power	current	Rated control circuit voltage Uc (1)		Type	Order code	Type	Order code	Type	Order code
kW	A	V 50 Hz	V 60 Hz						
7.5	15.5	24	24	AS09-30-10-20	1SBL101001R2010	AS09-30-01-20	1SBL101001R2001	AS09-30-01-20	1SBL101001R2001
		-	120	AS09-30-10-16	1SBL101001R1610	AS09-30-01-16	1SBL101001R1601	AS09-30-01-16	1SBL101001R1601
		230	230	AS09-30-10-26	1SBL101001R2610	AS09-30-01-26	1SBL101001R2601	AS09-30-01-26	1SBL101001R2601
		400	400	AS09-30-10-28	1SBL101001R2810	AS09-30-01-28	1SBL101001R2801	AS09-30-01-28	1SBL101001R2801
11	22	24	24	AS12-30-10-20	1SBL111001R2010	AS12-30-01-20	1SBL111001R2001	AS09-30-01-20	1SBL101001R2001
		-	120	AS12-30-10-16	1SBL111001R1610	AS12-30-01-16	1SBL111001R1601	AS09-30-01-16	1SBL101001R1601
		230	230	AS12-30-10-26	1SBL111001R2610	AS12-30-01-26	1SBL111001R2601	AS09-30-01-26	1SBL101001R2601
		400	400	AS12-30-10-28	1SBL111001R2810	AS12-30-01-28	1SBL111001R2801	AS09-30-01-28	1SBL101001R2801

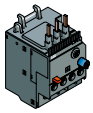
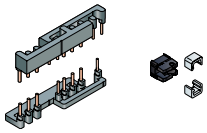
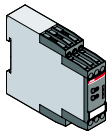
Contactors - DC operated

IEC AC-3, 400 V Rated operational power	current	Rated control circuit voltage Uc (1)	Type	Order code	Type	Order code	Type	Order code
kW	A	DC						
7.5	15.5	24	ASL09-30-10-81	1SBL103001R8110	ASL09-30-01-81	1SBL103001R8101	ASL09-30-01-81	1SBL103001R8101
		48	ASL09-30-10-83	1SBL103001R8310	ASL09-30-01-83	1SBL103001R8301	ASL09-30-01-83	1SBL103001R8301
		110	ASL09-30-10-86	1SBL103001R8610	ASL09-30-01-86	1SBL103001R8601	ASL09-30-01-86	1SBL103001R8601
		220	ASL09-30-10-88	1SBL103001R8810	ASL09-30-01-88	1SBL103001R8801	ASL09-30-01-88	1SBL103001R8801
11	22	24	ASL12-30-10-81	1SBL113001R8110	ASL12-30-01-81	1SBL113001R8101	ASL09-30-01-81	1SBL103001R8101
		48	ASL12-30-10-83	1SBL113001R8310	ASL12-30-01-83	1SBL113001R8301	ASL09-30-01-83	1SBL103001R8301
		110	ASL12-30-10-86	1SBL113001R8610	ASL12-30-01-86	1SBL113001R8601	ASL09-30-01-86	1SBL103001R8601
		220	ASL12-30-10-88	1SBL113001R8810	ASL12-30-01-88	1SBL113001R8801	ASL09-30-01-88	1SBL103001R8801

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

1SBC101281S0201

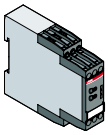
Star-delta starters protected by thermal overload relays
With AS, ASL contactors - open type version in kit form

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

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

see table below for all setting ranges

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


CT-SDS...

Ordering details - Main accessories

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

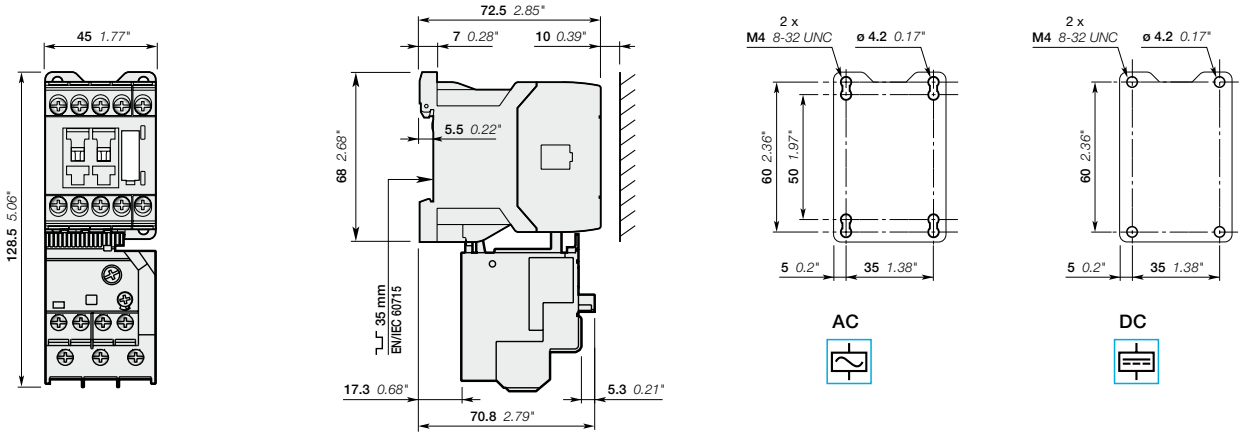
* 7 time ranges (0.05 s - 10 min), 50 ms transition time, 2 n/o contacts, 3 LEDs

1SBC101281S0201

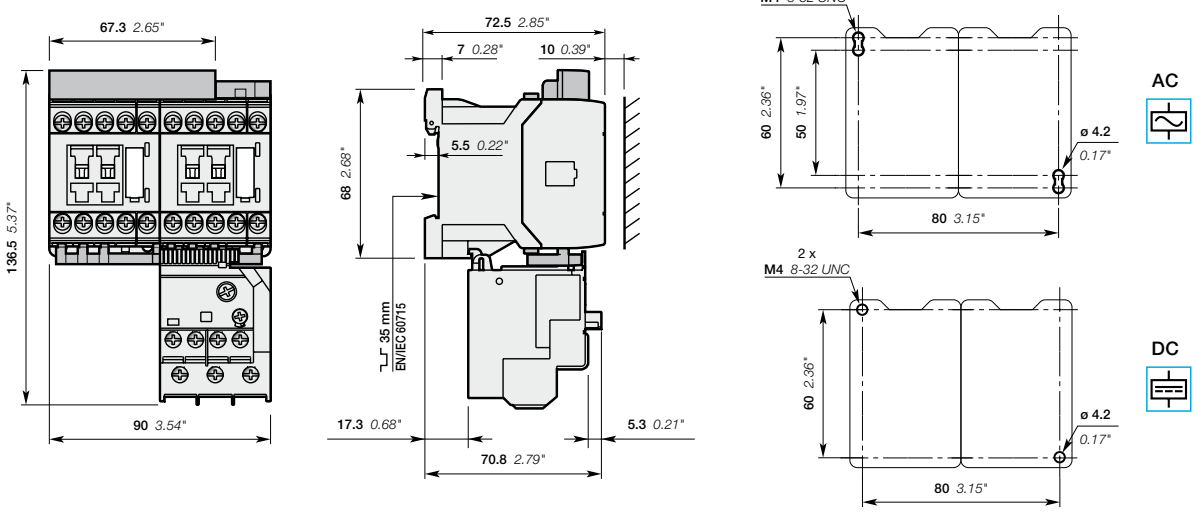
Protected by thermal overload relays
With AS, ASL contactors - open type version in kit form

Main dimensions mm, *inches*

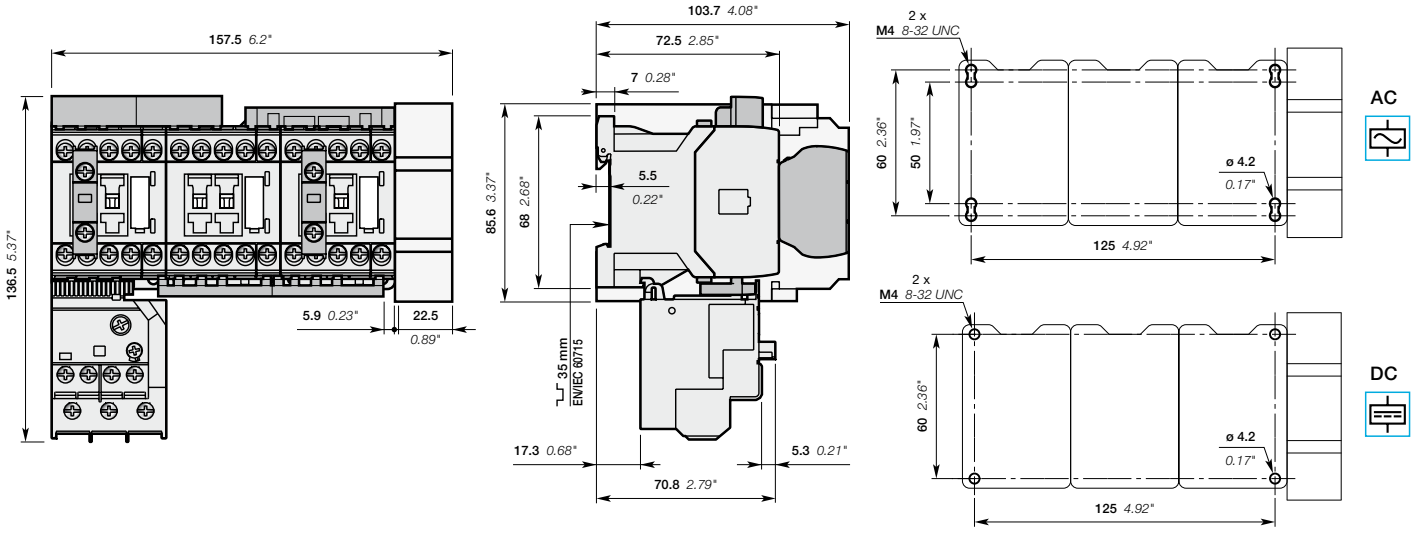
Direct-on-line starters



Reversing starters



Star-delta starters



1SBC101293S0201

Notes

1SBC101605S0201

3-pole contactors and contactor relays with screw terminals

3-pole contactors

Overview **4**/30
AS09 ... AS16 AC operated **4**/32
ASL09 ... ASL16 DC operated **4**/33
AS09 ... AS16 AC operated - 2-stack **4**/34
ASL09 ... ASL16 DC operated - 2-stack **4**/35
Main accessories **4**/36
Technical data **4**/38

3-pole reversing contactors

VAS09 ... VAS16 AC operated **4**/44
VASL09 ... VASL16 DC operated **4**/45
Technical data **4**/46

Terminal marking and postioning **4**/50
Dimensions **4**/52

Contactor relays

Overview **4**/58
NS AC operated **4**/60
NSL DC operated **4**/61
Main accessories **4**/62
Technical data **4**/64
Terminal marking and positioning **4**/68
Dimensions **4**/70

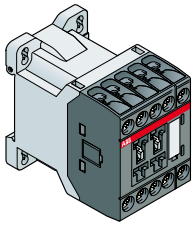
Accessories

Auxiliary contact blocks **4**/72
Electronic timers **4**/74
Surge suppressors **4**/78
Mechanical interlock unit and fixing clips **4**/80
Connection accessories for starting solutions **4**/81

Voltage code table **4/82**

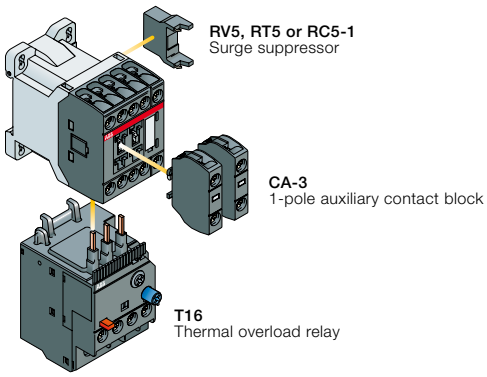
1SBC101605S0201

3-pole contactors
Main accessories



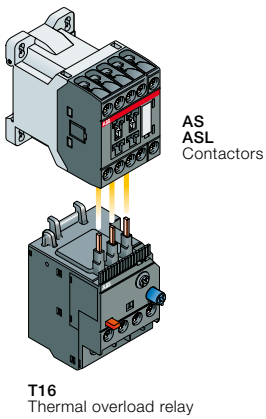
AS09 ... AS16
3-pole contactors

Main accessories for contactors

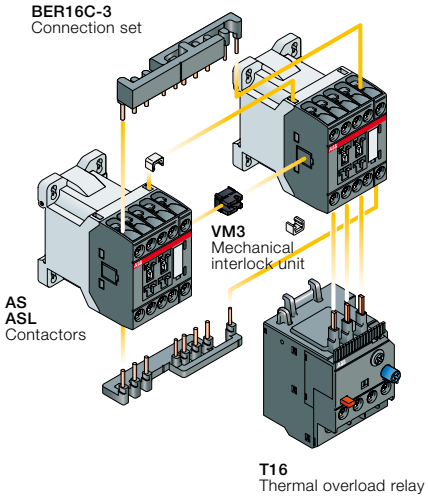


Main accessories for starting solutions

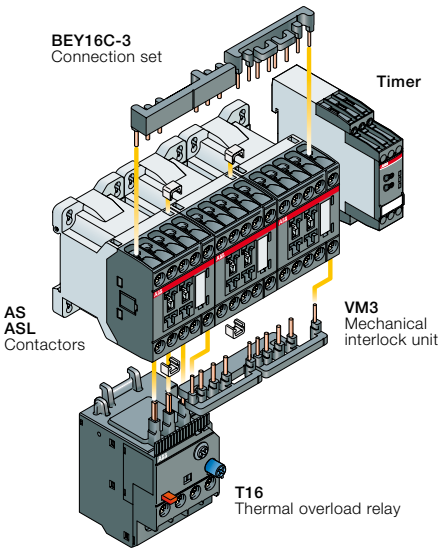
Direct-on-line starter



Reversing starter



Star-delta starter



1SBC101292S0201

3-pole contactors

Screw terminals

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

Switching of 3-phase cage motors

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

Protection of 3-phase motors

Thermal overload relays

T16...

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

Switching of resistive circuits

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

Main accessories

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

1SBC101292S0201

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

AS09-30-10

4

Description

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

These contactors are of the block type design with:

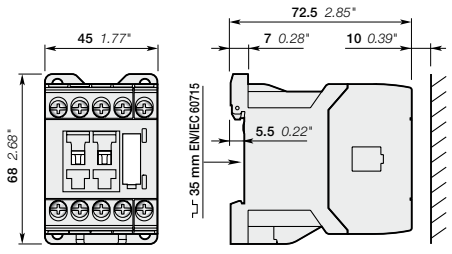
– 3 main poles and 1 built-in auxiliary contact
– control circuit: AC operated
– add-on auxiliary contact blocks for front mounting and a comprehensive range of accessories.

Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50 Hz	V 60 Hz						kg
4	22	5	20	24	24	1	0	AS09-30-10-20	1SBL101001R2010		0.220
						0	1	AS09-30-01-20	1SBL101001R2001		0.220
				-	120	1	0	AS09-30-10-16	1SBL101001R1610		0.220
						0	1	AS09-30-01-16	1SBL101001R1601		0.220
				230	230	1	0	AS09-30-10-26	1SBL101001R2610		0.220
						0	1	AS09-30-01-26	1SBL101001R2601		0.220
				400	400	1	0	AS09-30-10-28	1SBL101001R2810		0.220
						0	1	AS09-30-01-28	1SBL101001R2801		0.220
5.5	24	7.5	20	24	24	1	0	AS12-30-10-20	1SBL111001R2010		0.220
						0	1	AS12-30-01-20	1SBL111001R2001		0.220
				-	120	1	0	AS12-30-10-16	1SBL111001R1610		0.220
						0	1	AS12-30-01-16	1SBL111001R1601		0.220
				230	230	1	0	AS12-30-10-26	1SBL111001R2610		0.220
						0	1	AS12-30-01-26	1SBL111001R2601		0.220
				400	400	1	0	AS12-30-10-28	1SBL111001R2810		0.220
						0	1	AS12-30-01-28	1SBL111001R2801		0.220
7.5	24	10	20	24	24	1	0	AS16-30-10-20	1SBL121001R2010		0.220
						0	1	AS16-30-01-20	1SBL121001R2001		0.220
				-	120	1	0	AS16-30-10-16	1SBL121001R1610		0.220
						0	1	AS16-30-01-16	1SBL121001R1601		0.220
				230	230	1	0	AS16-30-10-26	1SBL121001R2610		0.220
						0	1	AS16-30-01-26	1SBL121001R2601		0.220
				400	400	1	0	AS16-30-10-28	1SBL121001R2810		0.220
						0	1	AS16-30-01-28	1SBL121001R2801		0.220

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

Main dimensions mm, *inches*



AS09, AS12, AS16

1SBC101301S0201

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

ASL09-30-10

Description

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

These contactors are of the block type design with:

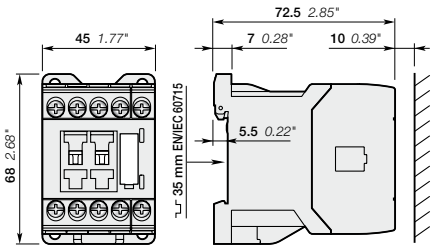
– 3 main poles and 1 built-in auxiliary contact
– control circuit: low consumption (3 W at pull-in and holding) DC operated with solid core magnet. Suitable for direct control by PLC outputs (the polarity on the coil terminals A1+ and A2- must be respected)
– add-on auxiliary contact blocks for front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

Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc (1)	Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							Pkg (1 pce)
kW	A	hp	A	V DC						kg
4	22	5	20	24	1	0	ASL09-30-10-81	1SBL103001R8110		0.280
					0	1	ASL09-30-01-81	1SBL103001R8101		0.280
				48	1	0	ASL09-30-10-83	1SBL103001R8310		0.280
					0	1	ASL09-30-01-83	1SBL103001R8301		0.280
				110	1	0	ASL09-30-10-86	1SBL103001R8610		0.280
					0	1	ASL09-30-01-86	1SBL103001R8601		0.280
				220	1	0	ASL09-30-10-88	1SBL103001R8810		0.280
					0	1	ASL09-30-01-88	1SBL103001R8801		0.280
5.5	24	7.5	20	24	1	0	ASL12-30-10-81	1SBL113001R8110		0.280
					0	1	ASL12-30-01-81	1SBL113001R8101		0.280
				48	1	0	ASL12-30-10-83	1SBL113001R8310		0.280
					0	1	ASL12-30-01-83	1SBL113001R8301		0.280
				110	1	0	ASL12-30-10-86	1SBL113001R8610		0.280
					0	1	ASL12-30-01-86	1SBL113001R8601		0.280
				220	1	0	ASL12-30-10-88	1SBL113001R8810		0.280
					0	1	ASL12-30-01-88	1SBL113001R8801		0.280
7.5	24	10	20	24	1	0	ASL16-30-10-81	1SBL123001R8110		0.280
					0	1	ASL16-30-01-81	1SBL123001R8101		0.280
				48	1	0	ASL16-30-10-83	1SBL123001R8310		0.280
					0	1	ASL16-30-01-83	1SBL123001R8301		0.280
				110	1	0	ASL16-30-10-86	1SBL123001R8610		0.280
					0	1	ASL16-30-01-86	1SBL123001R8601		0.280
				220	1	0	ASL16-30-10-88	1SBL123001R8810		0.280
					0	1	ASL16-30-01-88	1SBL123001R8801		0.280

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

Main dimensions mm, *inches*



ASL09, ASL12, ASL16

1SBC101302S0201

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

AS09-30-32

4

Description

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

These contactors are of the block type design with:

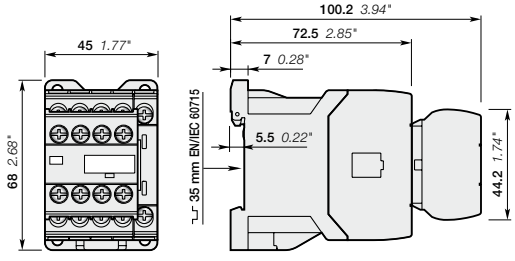
– 1st stack with 3 main poles and 1 N.O. built-in auxiliary contact
– 2nd stack with permanently fixed 2 N.O. + 2 N.C. auxiliary contact block. The auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
– control circuit: AC operated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

Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50 Hz	V 60 Hz						kg
4	22	5	20	24	24	3	2	AS09-30-32-20	1SBL101001R2032		0.260
				-	120	3	2	AS09-30-32-16	1SBL101001R1632		0.260
				230	230	3	2	AS09-30-32-26	1SBL101001R2632		0.260
				400	400	3	2	AS09-30-32-28	1SBL101001R2832		0.260
5.5	24	7.5	20	24	24	3	2	AS12-30-32-20	1SBL111001R2032		0.260
				-	120	3	2	AS12-30-32-16	1SBL111001R1632		0.260
				230	230	3	2	AS12-30-32-26	1SBL111001R2632		0.260
				400	400	3	2	AS12-30-32-28	1SBL111001R2832		0.260
7.5	24	10	20	24	24	3	2	AS16-30-32-20	1SBL121001R2032		0.260
				-	120	3	2	AS16-30-32-16	1SBL121001R1632		0.260
				230	230	3	2	AS16-30-32-26	1SBL121001R2632		0.260
				400	400	3	2	AS16-30-32-28	1SBL121001R2832		0.260

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

Main dimensions mm, *inches*



AS09, AS12, AS16

1SBC101303S0201

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

ASL09-30-32

Description

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

These contactors are of the block type design with:

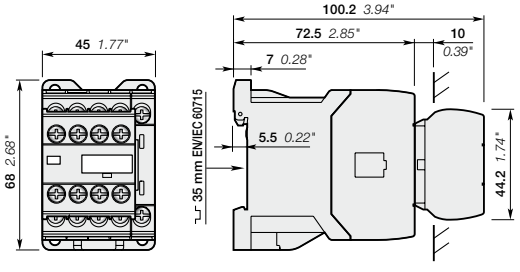
– 1st stack with 3 main poles and 1 N.O. built-in auxiliary contact
– 2nd stack with permanently fixed 2 N.O. + 2 N.C. auxiliary contact block. The auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
– control circuit: low consumption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

Ordering details

IEC Rated operational power 400 V AC-3 kW	current θ ≤ 40 °C AC-1 A	UL/CSA 3-phase motor rating 480 V hp	General use rating 600 V AC A	Rated control circuit voltage Uc (1) V DC	Auxiliary contacts fitted		Type	Order code		Weight Pkg (1 pce) kg
4	22	5	20	24	3	2	ASL09-30-32-81	1SBL103001R8132		0.320
				48	3	2	ASL09-30-32-83	1SBL103001R8332		0.320
				110	3	2	ASL09-30-32-86	1SBL103001R8632		0.320
				220	3	2	ASL09-30-32-88	1SBL103001R8832		0.320
5.5	24	7.5	20	24	3	2	ASL12-30-32-81	1SBL113001R8132		0.320
				48	3	2	ASL12-30-32-83	1SBL113001R8332		0.320
				110	3	2	ASL12-30-32-86	1SBL113001R8632		0.320
				220	3	2	ASL12-30-32-88	1SBL113001R8832		0.320
7.5	24	10	20	24	3	2	ASL16-30-32-81	1SBL123001R8132		0.320
				48	3	2	ASL16-30-32-83	1SBL123001R8332		0.320
				110	3	2	ASL16-30-32-86	1SBL123001R8632		0.320
				220	3	2	ASL16-30-32-88	1SBL123001R8832		0.320

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

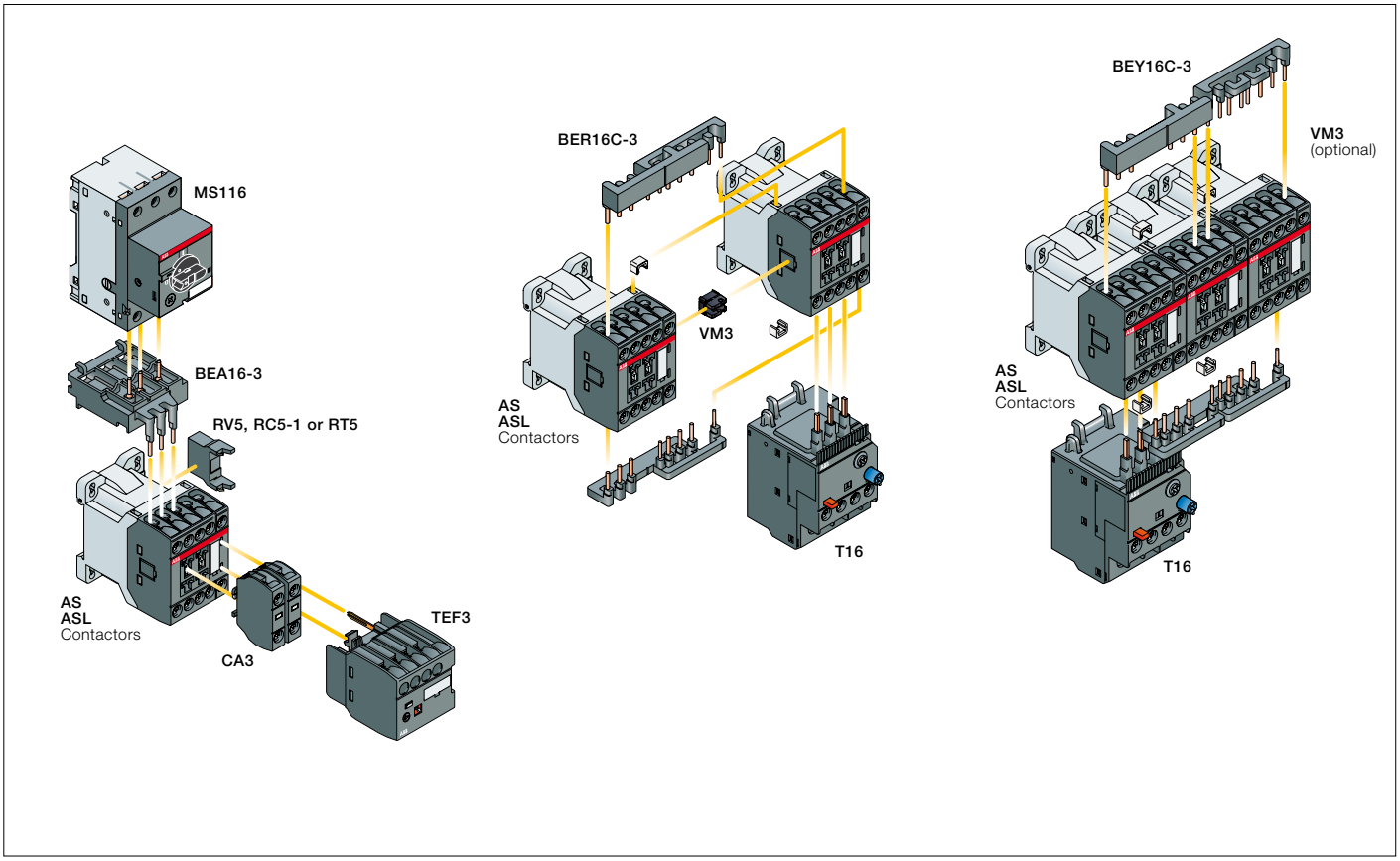
Main dimensions mm, *inches*



ASL09, ASL12, ASL16

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

Contactor and main accessories (other accessories available)



Main accessory fitting details

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

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

Overload relays fitting details (1)

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

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

1SBC101297S0201

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

Main accessories

CA3-10

Front-mounted instantaneous auxiliary contact blocks

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

TEF3-ON

Front-mounted electronic timer

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

VM3

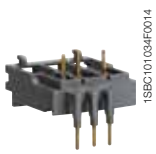
Mechanical interlock unit

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

RV5

Surge suppressors

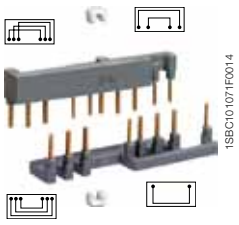
For contactors	Rated control circuit voltage - Uc V	AC	DC	Type	Order code		Pkg qty	Weight (1 pce) kg
AS09 ... AS16, ASL09 ... ASL16	24...50	●	●	RV5/50	1SBN050010R1000		2	0.015
	50...133	●	●	RV5/133	1SBN050010R1001		2	0.015
	110...250	●	●	RV5/250	1SBN050010R1002		2	0.015
	250...440	●	●	RV5/440	1SBN050010R1003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



BEA16-3

Connecting links with manual motor starters

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

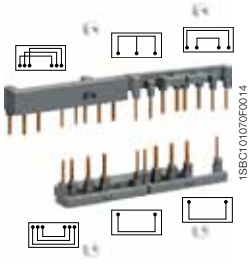


BER16C-3

Connection sets for reversing contactors

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

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



BEY16C-3

Connection sets for star-delta starting

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

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

1SBC101297S0201

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

Main pole - Utilization characteristics according to IEC

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

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

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

1SBC101489S0201

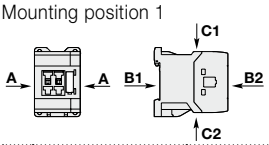
AS09 ... AS16 and ASL09 ... ASL16 3-pole contactors
Technical data

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

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

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

General technical data

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

1SBC101489S0201

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

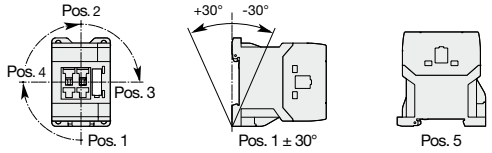
Magnet system characteristics for AS09 ... AS16 contactors

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

Magnet system characteristics for ASL09 ... ASL16 contactors

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

Mounting characteristics and conditions for use

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

1SBC101489S0201

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

Connecting characteristics

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

1SBC101489S0201

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

Built-in auxiliary contacts according to IEC

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

Built-in auxiliary contacts according to UL / CSA

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

1SBC101489S0201

Notes

VAS09 ... VAS16 3-pole reversing contactors
4 to 7.5 kW
AC operated

VAS09EM

Description

VAS09 ... VAS16 reversing contactors are used for controlling 3-phase motors up to 690 V AC.
These reversing contactors include 2 AS09 ... AS16 contactors fitted with 1 N.C. auxiliary contact, 1 VM3 mechanical interlock and BER16C-3 reversing connection set including electrical interlocking.

Up to 2 add-on CA3 1-pole auxiliary contact blocks can be mounted per contactor.

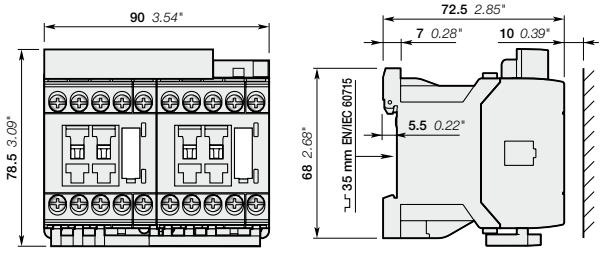
The reversing contactors are available with or without surge suppressor mounted on each contactor.

Ordering details

IEC Rated operational power 400 V AC-3 kW	UL/CSA 3-phase motor rating 480 V hp	Rated control circuit voltage Uc (1) V 50 Hz	V 60 Hz	Auxiliary contacts fitted	Type	Order code		Pkg qty	Weight (1 pce) kg
Reversing contactors without integrated surge suppressor									
4	5	24	24	0 2	VAS09EM-20M	1SBK103600M2000		18	0.480
		-	120	0 2	VAS09EM-16M	1SBK103600M1600		18	0.480
		230	230	0 2	VAS09EM-26M	1SBK103600M2600		18	0.480
		400	400	0 2	VAS09EM-28M	1SBK103600M2800		18	0.480
5.5	7.5	24	24	0 2	VAS12EM-20M	1SBK113600M2000		18	0.480
		-	120	0 2	VAS12EM-16M	1SBK113600M1600		18	0.480
		230	230	0 2	VAS12EM-26M	1SBK113600M2600		18	0.480
		400	400	0 2	VAS12EM-28M	1SBK113600M2800		18	0.480
7.5	10	24	24	0 2	VAS16EM-20M	1SBK123600M2000		18	0.480
		-	120	0 2	VAS16EM-16M	1SBK123600M1600		18	0.480
		230	230	0 2	VAS16EM-26M	1SBK123600M2600		18	0.480
		400	400	0 2	VAS16EM-28M	1SBK123600M2800		18	0.480
Reversing contactors with RC5-1 integrated surge suppressor									
4	5	24	24	0 2	VAS09SEM-20M	1SBK103800M2000		18	0.510
		-	120	0 2	VAS09SEM-16M	1SBK103800M1600		18	0.510
		230	230	0 2	VAS09SEM-26M	1SBK103800M2600		18	0.510
		400	400	0 2	VAS09SEM-28M	1SBK103800M2800		18	0.510
5.5	7.5	24	24	0 2	VAS12SEM-20M	1SBK113800M2000		18	0.510
		-	120	0 2	VAS12SEM-16M	1SBK113800M1600		18	0.510
		230	230	0 2	VAS12SEM-26M	1SBK113800M2600		18	0.510
		400	400	0 2	VAS12SEM-28M	1SBK113800M2800		18	0.510
7.5	10	24	24	0 2	VAS16SEM-20M	1SBK123800M2000		18	0.510
		-	120	0 2	VAS16SEM-16M	1SBK123800M1600		18	0.510
		230	230	0 2	VAS16SEM-26M	1SBK123800M2600		18	0.510
		400	400	0 2	VAS16SEM-28M	1SBK123800M2800		18	0.510

(1) Other control voltages see voltage code table.
Note: Minimum switchover delay of 50 ms must be introduced between respective opening and closing of AC operated reversing contactors.

Main dimensions mm, *inches*



VAS09, VAS12, VAS16

1SBC101462S0201

VASL09 ... VASL16 3-pole reversing contactors
4 to 7.5 kW
DC operated

VASL09EM

Description

VASL09 ... VASL16 reversing contactors are used for controlling 3-phase motors up to 690 V AC.

These reversing contactors include 2 ASL09 ... ASL16 contactors fitted with 1 N.C. auxiliary contact, 1 VM3 mechanical interlock and BER16C-3 reversing connection set including electrical interlocking.

Up to 2 add-on CA3 1-pole auxiliary contact blocks can be mounted per contactor.

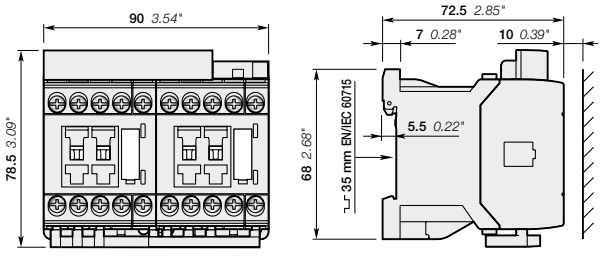
The reversing contactors are available with or without surge suppressor mounted on each contactor.

Ordering details

IEC Rated operational power 400 V AC-3 kW	UL/CSA 3-phase motor rating 480 V hp	Rated control circuit voltage Uc (1) V DC	Auxiliary contacts fitted		Type	Order code		Pkg qty	Weight (1 pce) kg
Reversing contactors without integrated surge suppressor									
4	5	24	0	2	VASL09EM-81M	1SBK103700M8100		18	0.600
		48	0	2	VASL09EM-83M	1SBK103700M8300		18	0.600
		110	0	2	VASL09EM-86M	1SBK103700M8600		18	0.600
		220	0	2	VASL09EM-88M	1SBK103700M8800		18	0.600
5.5	7.5	24	0	2	VASL12EM-81M	1SBK113700M8100		18	0.600
		48	0	2	VASL12EM-83M	1SBK113700M8300		18	0.600
		110	0	2	VASL12EM-86M	1SBK113700M8600		18	0.600
		220	0	2	VASL12EM-88M	1SBK113700M8800		18	0.600
7.5	10	24	0	2	VASL16EM-81M	1SBK123700M8100		18	0.600
		48	0	2	VASL16EM-83M	1SBK123700M8300		18	0.600
		110	0	2	VASL16EM-86M	1SBK123700M8600		18	0.600
		220	0	2	VASL16EM-88M	1SBK123700M8800		18	0.600
Reversing contactors with RV5 integrated surge suppressor									
4	5	24	0	2	VASL09SEM-81M	1SBK103900M8100		18	0.630
		48	0	2	VASL09SEM-83M	1SBK103900M8300		18	0.630
		110	0	2	VASL09SEM-86M	1SBK103900M8600		18	0.630
		220	0	2	VASL09SEM-88M	1SBK103900M8800		18	0.630
5.5	7.5	24	0	2	VASL12SEM-81M	1SBK113900M8100		18	0.630
		48	0	2	VASL12SEM-83M	1SBK113900M8300		18	0.630
		110	0	2	VASL12SEM-86M	1SBK113900M8600		18	0.630
		220	0	2	VASL12SEM-88M	1SBK113900M8800		18	0.630
7.5	10	24	0	2	VASL16SEM-81M	1SBK123900M8100		18	0.630
		48	0	2	VASL16SEM-83M	1SBK123900M8300		18	0.630
		110	0	2	VASL16SEM-86M	1SBK123900M8600		18	0.630
		220	0	2	VASL16SEM-88M	1SBK123900M8800		18	0.630

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



VASL09, VASL12, VASL16

1SBC101473S0201

VAS09 ... VAS16 and
VASL09 ... VASL16 3-pole reversing contactors
Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	**AC operated**	VAS09	VAS12	VAS16
	DC operated	VASL09	VASL12	VASL16
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1		
Rated operational voltage Ue max.		690 V		
Rated frequency (without derating)		50 / 60 Hz		
Conventional free-air thermal current Ith				
acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C		22 A	25 A	25 A
With conductor cross-sectional area		2.5 mm²	4 mm²	4 mm²
AC-3 Utilization category				
For air temperature close to contactor θ ≤ 60 °C				
Ie / Max. rated operational current AC-3 (1)				
	220-230-240 V	9 A	12 A	15.7 A
	400 V	9 A	12 A	15.5 A
	415 V	9 A	12 A	15.5 A
	440 V	8 A	11 A	13.6 A
	500 V	8 A	11 A	12.5 A
	690 V	5 A	7 A	9 A
Rated operational power AC-3 (1)				
	220-230-240 V	2.2 kW	3 kW	4 kW
	400 V	4 kW	5.5 kW	7.5 kW
	415 V	4 kW	5.5 kW	7.5 kW
	440 V	4 kW	5.5 kW	7.5 kW
	500 V	4 kW	5.5 kW	7.5 kW
	690 V	4 kW	5.5 kW	7.5 kW
Rated making capacity AC-3		10 x Ie AC-3 acc. to IEC 60947-4-1		
Rated breaking capacity AC-3		8 x Ie AC-3 acc. to IEC 60947-4-1		
Short-circuit protection device for contactors				
without thermal overload relay - Motor protection excluded (2)				
Ue ≤ 500 V AC - gG type fuse		25 A		
Rated short-time withstand current Icw	**1 s**	230 A	250 A	250 A
at 40 °C ambient temperature,	**10 s**	100 A	124 A	124 A
in free air from a cold state	**30 s**	65 A	75 A	75 A
	1 min	50 A	55 A	55 A
	15 min	22 A	24 A	24 A
Maximum breaking capacity				
cos φ = 0.45	**at 440 V**	155 A		
	at 690 V	90 A		
Power dissipation per pole				
	Ie / AC-3	0.16 W	0.3 W	0.5 W
Max. electrical switching frequency	**AC-3**	600 cycles/h		

3-phase motors

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

1SBC101500S0201

VAS09 ... VAS16 and
VASL09 ... VASL16 3-pole reversing contactors
Technical data

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

Contactor types	AC operated	VAS09	VAS12	VAS16
	DC operated	VASL09	VASL12	VASL16
Standards		UL 508, CSA C22.2 N°14		
Max. operational voltage		690 V		
NEMA size		00	00	0
NEMA continuous amp rating	Thermal current	9 A	9 A	18 A
NEMA maximum horse power ratings 1-phase, 60 Hz	**115 V AC**	1/3 hp	1/3 hp	1 hp
	230 V AC	1 hp	1 hp	2 hp
NEMA maximum horse power ratings 3-phase, 60 Hz	**200 V AC**	1 1/2 hp	1 1/2 hp	3 hp
	230 V AC	1 1/2 hp	1 1/2 hp	3 hp
	460 V AC	2 hp	2 hp	5 hp
	575 V AC	2 hp	2 hp	5 hp
UL / CSA maximum 1-phase motor rating				
Full load current	**120 V AC**	7.2 A	9.8 A	13.8 A
	240 V AC	8 A	10 A	12 A
Horse power rating	**120 V AC**	1/3 hp	1/2 hp	3/4 hp
	240 V AC	1 hp	1-1/2 hp	2 hp
UL / CSA maximum 3-phase motor rating				
Full load current (1)	**200-208 V AC**	7.8 A	7.8 A	11 A
	220-240 V AC	6.8 A	9.6 A	15.2 A
	440-480 V AC	7.6 A	11 A	14 A
	550-600 V AC	9 A	11 A	11 A
Horse power rating (1)	**200-208 V AC**	2 hp	2 hp	3 hp
	220-240 V AC	2 hp	3 hp	5 hp
	440-480 V AC	5 hp	7-1/2 hp	10 hp
	550-600 V AC	7-1/2 hp	10 hp	10 hp
Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded				
Fuse rating		40 A	50 A	60 A
Fuse type, 600 V		J		
Max. electrical switching frequency				
For motor use		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	VAS09	VAS12	VAS16
	DC operated	VASL09	VASL12	VASL16
Rated insulation voltage Ui				
acc. to IEC 60947-4-1		690 V		
acc. to UL / CSA		600 V		
Rated impulse withstand voltage Uimp.		6 kV		
Ambient air temperature close to contactor				
Operation	Fitted with thermal overload relay	-25...+60 °C		
	Without thermal overload relay	-40...+70 °C		
Storage		-60...+80 °C		
Climatic withstand		Category B according to IEC 60947-1 Annex Q		
Maximum operating altitude (without derating)		3000 m		
Mechanical durability				
Number of operating cycles		5 millions operating cycles		
Max. switching frequency		1800 cycles/h		

VAS09 ... VAS16 and VASL09 ... VASL16 3-pole reversing contactors
Technical data

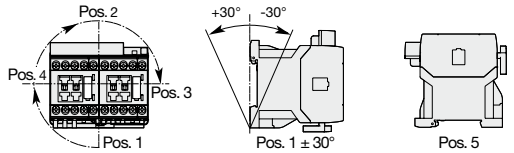
Magnet system characteristics for VAS09 ... VAS16 contactors

Contactor types		AC operated	VAS09	VAS12	VAS16
Coil operating limits		**AC supply**			
acc. to IEC 60947-4-1			0.85...1.1 x Uc (at θ ≤ 60 °C); Uc (at θ ≤ 70 °C)		
AC control voltage	Rated control circuit voltage Uc	**at 50 Hz**	24...415 V		
		at 60 Hz	24...415 V		
	Coil consumption	**Average pull-in value 50 Hz**	33 VA		
		60 Hz	33 VA		
		50/60 Hz	33 VA		
		Average holding value 50 Hz	6.5 VA / 1.5 W		
		60 Hz	5 VA / 1.2 W		
		50/60 Hz	6.5 VA / 1.5 W		
Drop-out voltage			Approx. 30...50 % of Uc		
Operating time					
Between coil energization and:		**N.O. contact closing**	9...24 ms		
		N.C. contact opening	6...18 ms		
Between coil de-energization and:		**N.O. contact opening (1)**	5...19 ms		
		N.C. contact closing (1)	7...22 ms		
			(1) The use of RC5-1 surge suppressor increases opening time by a factor of 2 to 3.		

Magnet system characteristics for VASL09 ... VASL16 contactors

Contactor types		DC operated	VASL09	VASL12	VASL16
Coil operating limits		**DC supply**			
acc. to IEC 60947-4-1			0.85...1.1 x Uc (at θ ≤ 60 °C); Uc (at θ ≤ 70 °C)		
DC control voltage	Rated control circuit voltage Uc		12...240 V DC		
	Coil consumption	**Average pull-in value**	3 W		
		Average holding value	3 W		
Drop-out voltage			Approx. 10...40 % of Uc		
Coil time constant	Open	**L/R**	12 ms		
	Closed	**L/R**	40 ms		
Operating time					
Between coil energization and:		**N.O. contact closing**	36...59 ms		
		N.C. contact opening	31...53 ms		
Between coil de-energization and:		**N.O. contact opening (1)**	13...17 ms		
		N.C. contact closing (1)	15...20 ms		
			(1) The use of RT5 surge suppressor increases opening time by a factor of 1.1 to 1.2		

Mounting characteristics and conditions for use

Contactor types		AC operated	VAS09	VAS12	VAS16
		DC operated	VASL09	VASL12	VASL16
Mounting positions					
Mounting distances			The reversing 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		

4

1SBC101500S0201

VAS09 ... VAS16 and
VASL09 ... VASL16 3-pole reversing contactors
Technical data

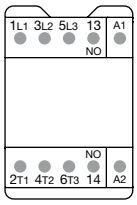
Connecting characteristics

Contactor types			**AC operated**	VAS09	VAS12	VAS16
			DC operated	VASL09	VASL12	VASL16
Main terminals						
				Screw terminals with cable clamp		
Connection capacity (min. ... max.)						
Main conductors (poles)						
	Rigid solid		**1 x**	0.75...4 mm²		
	Flexible with non insulated ferrule		**1 x**	0.75...2.5 mm²		
	Flexible with insulated ferrule		**1 x**	0.75...1.5 mm²		
	Connection capacity acc. to UL / CSA		**1 x**	AWG 18...12		
	Stripping length			9 mm		
	Tightening torque	Recommended		1.00 Nm / 9 lb.in		
		Max.		1.20 Nm		
Auxiliary conductors						
(built-in auxiliary terminals + coil terminals)						
	Rigid solid		**1 x**	0.75...2.5 mm²		
	Flexible with non insulated ferrule		**1 x**	0.75...2.5 mm²		
	Flexible with insulated ferrule		**1 x**	0.75...1.5 mm²		
	Connection capacity acc. to UL / CSA		**1 x**	AWG 18...14		
	Stripping length			9 mm		
	Tightening torque					
	Coil terminals	Recommended		1.00 Nm / 9 lb.in		
		Max.		1.20 Nm		
	Built-in auxiliary terminals	Recommended		1.00 Nm / 9 lb.in		
		Max.		1.20 Nm		
Degree of protection						
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529						
	All terminals			IP20		
Screw terminals				Delivered in open position, screws of unused terminals must be tightened		
	All terminals			M3		
			Screwdriver type	Flat Ø 5.5 / Pozidriv 2		

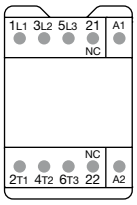
1SBC101500S0201

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

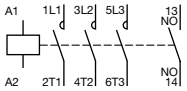
AS contactors - AC operated
Standard devices without addition of auxiliary contacts



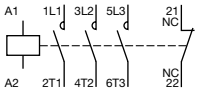
AS09 ... AS16-30-10



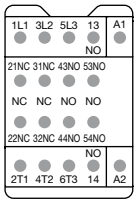
AS09 ... AS16-30-01



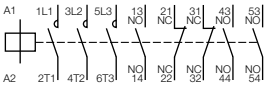
AS09 ... AS16-30-10



AS09 ... AS16-30-01

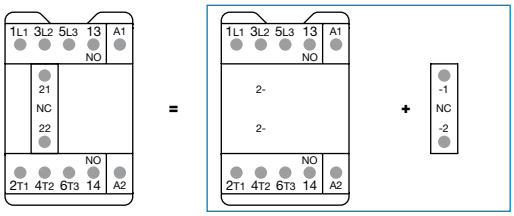


AS09 ... AS16-30-32

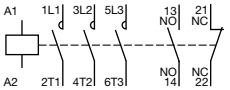


AS09 ... AS16-30-32

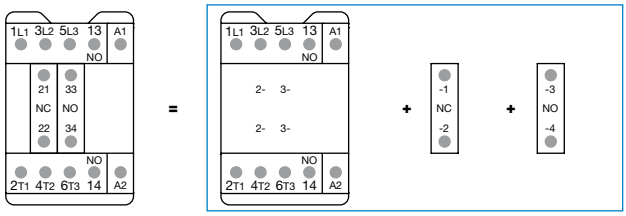
Other possible contact combinations with auxiliary contact blocks added by the user



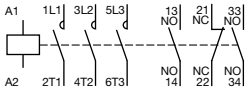
Combination 11 = AS09 ... AS16-30-10 + CA3-01



Combination 11

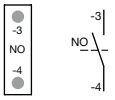


Combination 21 = AS09 ... AS16-30-10 + CA3-01 + CA3-10

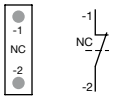


Combination 21

CA3 1-pole auxiliary contact blocks

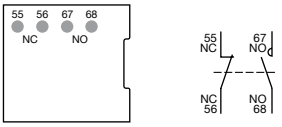


CA3-10



CA3-01

TEF3 front-mounted electronic timer



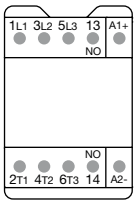
TEF3

1SBC101404S0201

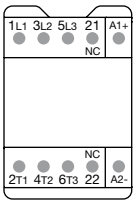
ASL09 ... ASL16 3-pole contactors
Terminal marking and positioning

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

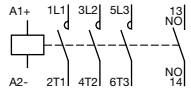
Standard devices without addition of auxiliary contacts



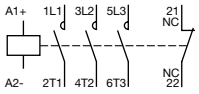
ASL09 ... ASL16-30-10



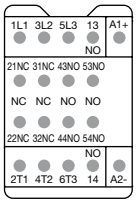
ASL09 ... ASL16-30-01



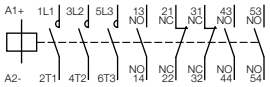
ASL09 ... ASL16-30-10



ASL09 ... ASL16-30-01

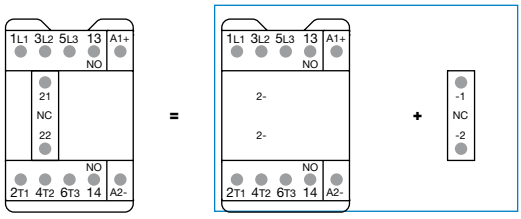


ASL09 ... ASL16-30-32

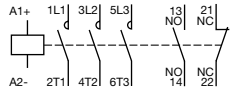


ASL09 ... ASL16-30-32

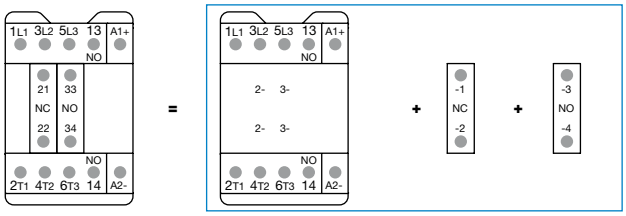
Other possible contact combinations with auxiliary contact blocks added by the user



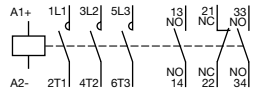
Combination 11 = **ASL09 ... ASL16-30-10 + CA3-01**



Combination 11

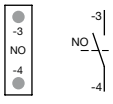


Combination 21 = **ASL09 ... ASL16-30-10 + CA3-01 + CA3-10**

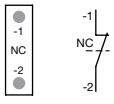


Combination 21

CA3 1-pole auxiliary contact blocks

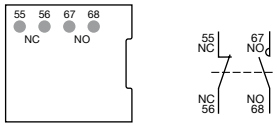


CA3-10



CA3-01

TEF3 front-mounted electronic timer



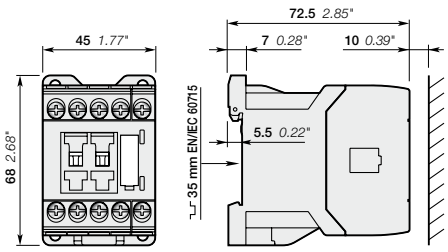
TEF3

4

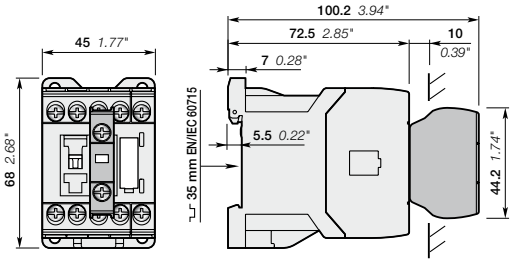
1SBC101404S0201

AS09 ... AS16 3-pole contactors

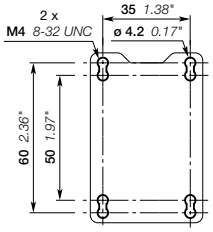
Main dimensions mm, *inches*

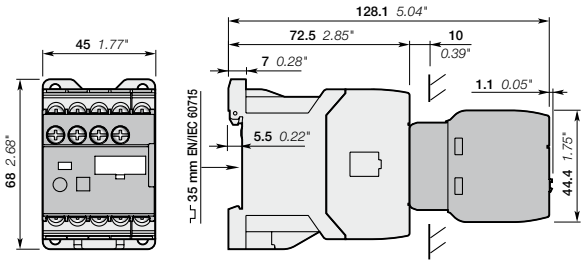


AS09, AS12, AS16

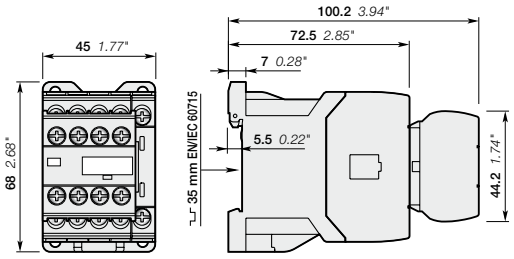


AS09, AS12, AS16
+ CA3 front-mounted 1-pole auxiliary contact block





AS09, AS12, AS16
+ TEF3 electronic timer

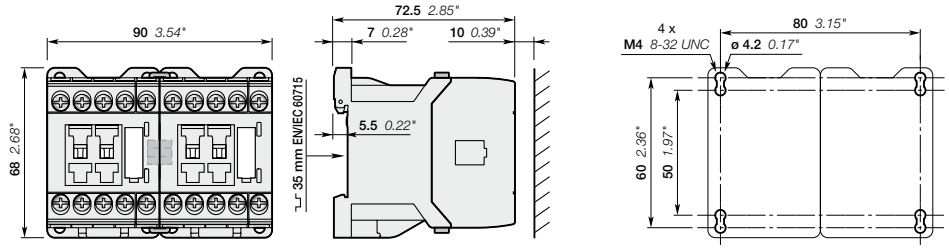


AS09 ... 16-30-32

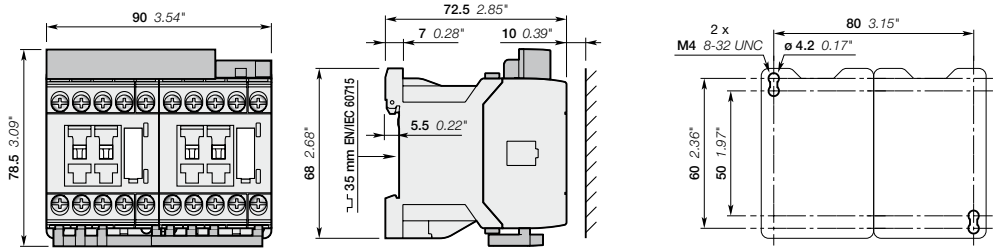
1SBC101405S0201

AS09 ... AS16 3-pole contactors

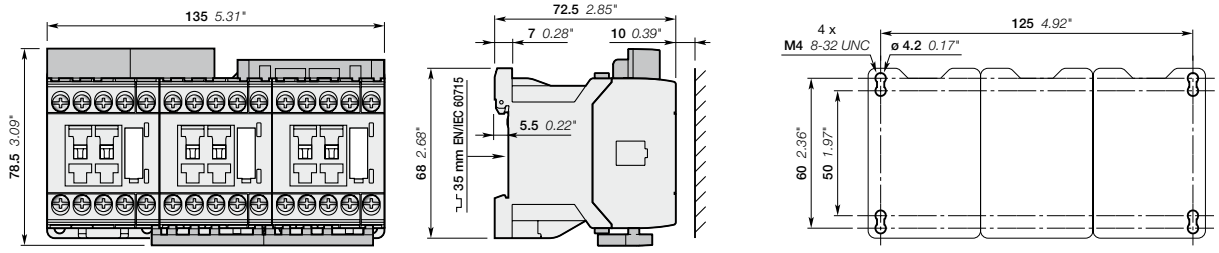
Main dimensions mm, *inches*



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



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

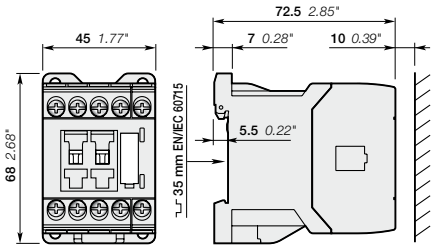


AS09, AS12, AS16
+ BEY16C-3 connection set for star-delta starter including four BB3 fixing clips

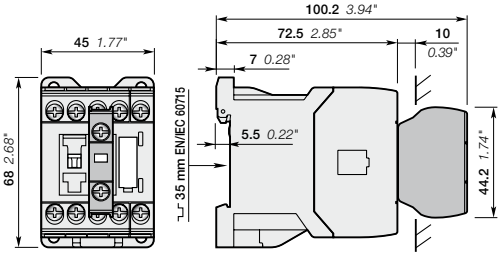
1SBC101405S0201

ASL09 ... ASL16 3-pole contactors

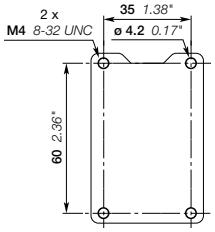
Main dimensions mm, *inches*

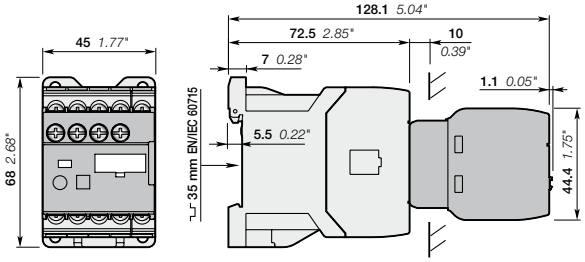


ASL09, ASL12, ASL16

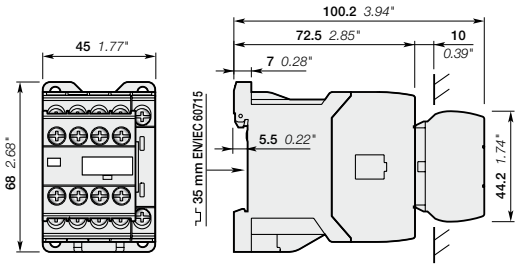


ASL09, ASL12, ASL16
+ CA3 front-mounted 1-pole auxiliary contact block





ASL09, ASL12, ASL16
+ TEF3 electronic timer

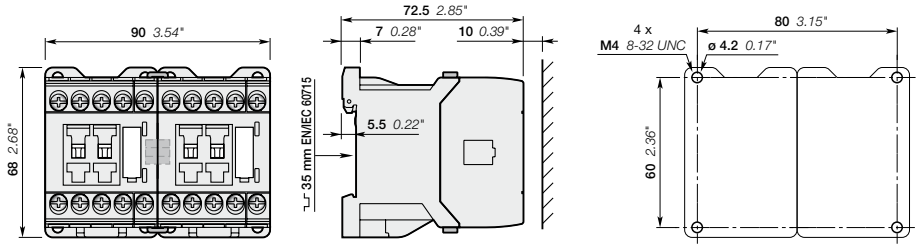


ASL09 ... 16-30-32

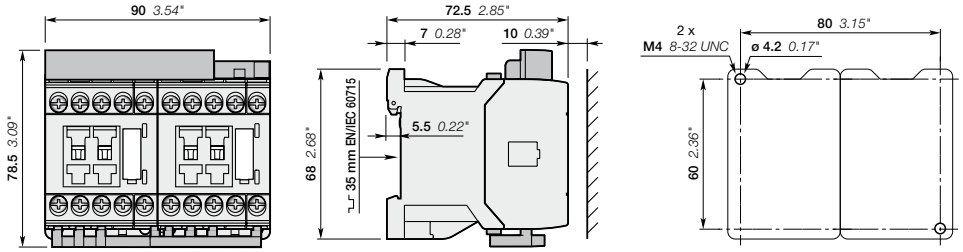
1SBC101406S0201

ASL09 ... ASL16 3-pole contactors

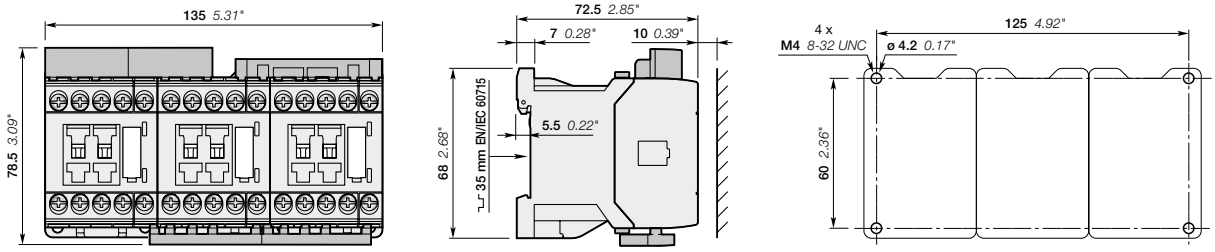
Main dimensions mm, *inches*



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



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

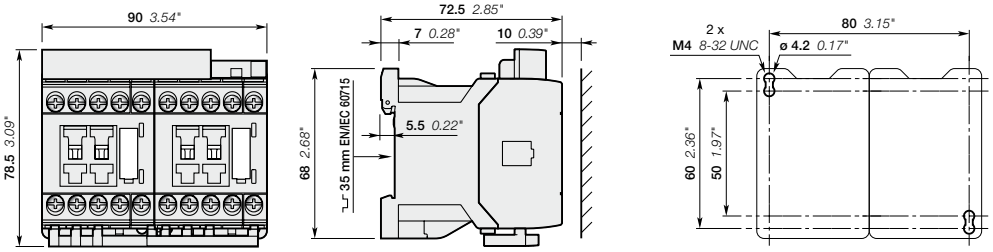


ASL09, ASL12, ASL16
+ BEY16C-3 connection set for star-delta starter including four BB3 fixing clips

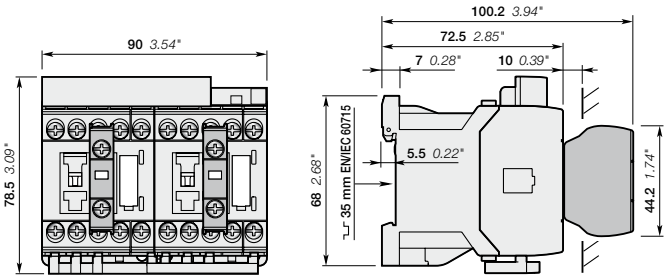
1SBC101406S0201

VAS09 ... VAS16 reversing contactors

Main dimensions mm, *inches*



VAS09, VAS12, VAS16

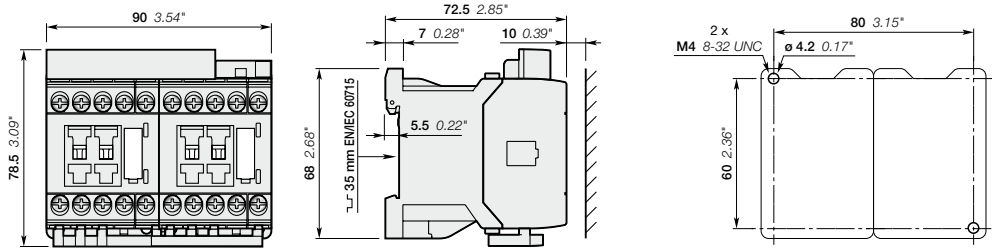


VAS09, VAS12, VAS16
+ CA3 front-mounted 1-pole auxiliary contact block

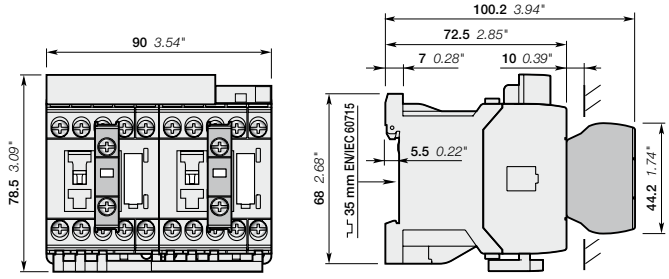
1SBC101407S0201

VASL09 ... VASL16 reversing contactors

Main dimensions mm, *inches*



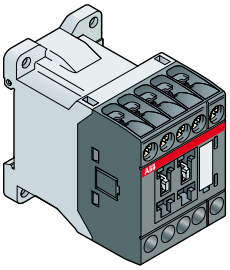
VASL09, VASL12, VASL16



VASL09, VASL12, VASL16
+ CA3 front-mounted 1-pole auxiliary contact block

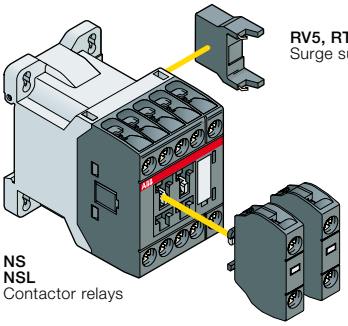
1SBC101408S0201

Contactor relays
Main accessories



NS, NSL
Contactor relays

4-pole contactor relays

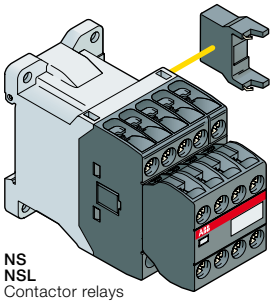


RV5, RT5 or RC5-1
Surge suppressor

CA-3
1-pole auxiliary contact block

NS
NSL
Contactor relays

8-pole contactor relays



RV5, RT5 or RC5-1
Surge suppressor

NS
NSL
Contactor relays

1SBC101409S0201

Contactor relays

Screw terminals

NS

NSL

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

NS

NSL

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

Control circuit switching

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

Main accessories

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

1SBC101409S0201

NS contactor relays
AC operated

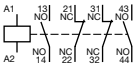
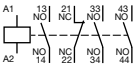
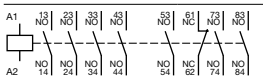
NS22E

4

Description

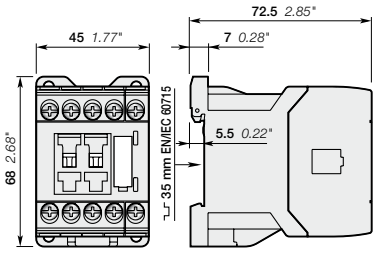
NS contactor relays are used for switching auxiliary and control circuits.
These contactor relays are designed with:
– 4 poles or 8 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
– control circuit: AC operated
– add-on auxiliary contact blocks for front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

Ordering details

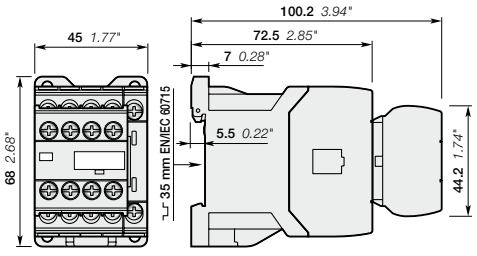
Number of contacts 1st stack	2nd stack	Rated control circuit voltage Uc (1) V 50 Hz	V 60 Hz	Type	Order code		Weight Pkg (1 pce) kg
		24	24	NS22E-20	1SBH101001R2022		0.220
		-	120	NS22E-16	1SBH101001R1622		0.220
		230	230	NS22E-26	1SBH101001R2622		0.220
		400	400	NS22E-28	1SBH101001R2822		0.220
		24	24	NS31E-20	1SBH101001R2031		0.220
		-	120	NS31E-16	1SBH101001R1631		0.220
		230	230	NS31E-26	1SBH101001R2631		0.220
		400	400	NS31E-28	1SBH101001R2831		0.220
		24	24	NS40E-20	1SBH101001R2040		0.220
		-	120	NS40E-16	1SBH101001R1640		0.220
		230	230	NS40E-26	1SBH101001R2640		0.220
		400	400	NS40E-28	1SBH101001R2840		0.220
		24	24	NS44E-20	1SBH101001R2044		0.260
		-	120	NS44E-16	1SBH101001R1644		0.260
		230	230	NS44E-26	1SBH101001R2644		0.260
		400	400	NS44E-28	1SBH101001R2844		0.260
		24	24	NS53E-20	1SBH101001R2053		0.260
		-	120	NS53E-16	1SBH101001R1653		0.260
		230	230	NS53E-26	1SBH101001R2653		0.260
		400	400	NS53E-28	1SBH101001R2853		0.260
		24	24	NS62E-20	1SBH101001R2062		0.260
		-	120	NS62E-16	1SBH101001R1662		0.260
		230	230	NS62E-26	1SBH101001R2662		0.260
		400	400	NS62E-28	1SBH101001R2862		0.260
		24	24	NS71E-20	1SBH101001R2071		0.260
		-	120	NS71E-16	1SBH101001R1671		0.260
		230	230	NS71E-26	1SBH101001R2671		0.260
		400	400	NS71E-28	1SBH101001R2871		0.260
		24	24	NS80E-20	1SBH101001R2080		0.260
		-	120	NS80E-16	1SBH101001R1680		0.260
		230	230	NS80E-26	1SBH101001R2680		0.260
		400	400	NS80E-28	1SBH101001R2880		0.260

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

Main dimensions mm, *inches*



NS22E, NS31E, NS40E



NS44E, NS53E, NS62E, NS71E, NS80E

1SBC101475S0201

NSL contactor relays
DC operated

NSL22E

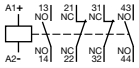
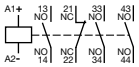
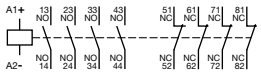
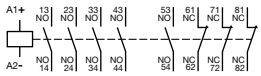
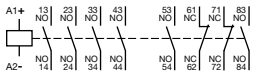
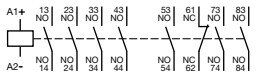
Description

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

These contactor relays are designed with:

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

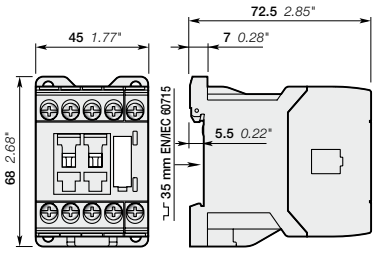
Ordering details

Number of contacts 1st stack	2nd stack	Rated control circuit voltage Uc (1) V DC	Type	Order code	Weight Pkg (1 pce) kg
		24	NSL22E-81	1SBH103001R8122	0.280
		48	NSL22E-83	1SBH103001R8322	0.280
		110	NSL22E-86	1SBH103001R8622	0.280
		220	NSL22E-88	1SBH103001R8822	0.280
		24	NSL31E-81	1SBH103001R8131	0.280
		48	NSL31E-83	1SBH103001R8331	0.280
		110	NSL31E-86	1SBH103001R8631	0.280
		220	NSL31E-88	1SBH103001R8831	0.280
		24	NSL40E-81	1SBH103001R8140	0.280
		48	NSL40E-83	1SBH103001R8340	0.280
		110	NSL40E-86	1SBH103001R8640	0.280
		220	NSL40E-88	1SBH103001R8840	0.280
		24	NSL44E-81	1SBH103001R8144	0.320
		48	NSL44E-83	1SBH103001R8344	0.320
		110	NSL44E-86	1SBH103001R8644	0.320
		220	NSL44E-88	1SBH103001R8844	0.320
		24	NSL53E-81	1SBH103001R8153	0.320
		48	NSL53E-83	1SBH103001R8353	0.320
		110	NSL53E-86	1SBH103001R8653	0.320
		220	NSL53E-88	1SBH103001R8853	0.320
		24	NSL62E-81	1SBH103001R8162	0.320
		48	NSL62E-83	1SBH103001R8362	0.320
		110	NSL62E-86	1SBH103001R8662	0.320
		220	NSL62E-88	1SBH103001R8862	0.320
		24	NSL71E-81	1SBH103001R8171	0.320
		48	NSL71E-83	1SBH103001R8371	0.320
		110	NSL71E-86	1SBH103001R8671	0.320
		220	NSL71E-88	1SBH103001R8871	0.320
		24	NSL80E-81	1SBH103001R8180	0.320
		48	NSL80E-83	1SBH103001R8380	0.320
		110	NSL80E-86	1SBH103001R8680	0.320
		220	NSL80E-88	1SBH103001R8880	0.320

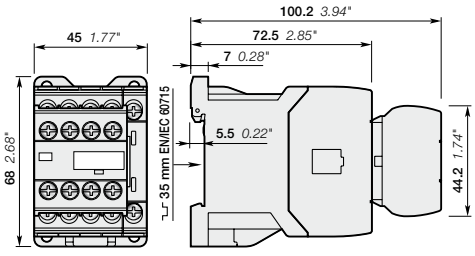
Note: for multiple packaging, please contact your ABB local sales organization.

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



NSL22E, NSL31E, NSL40E

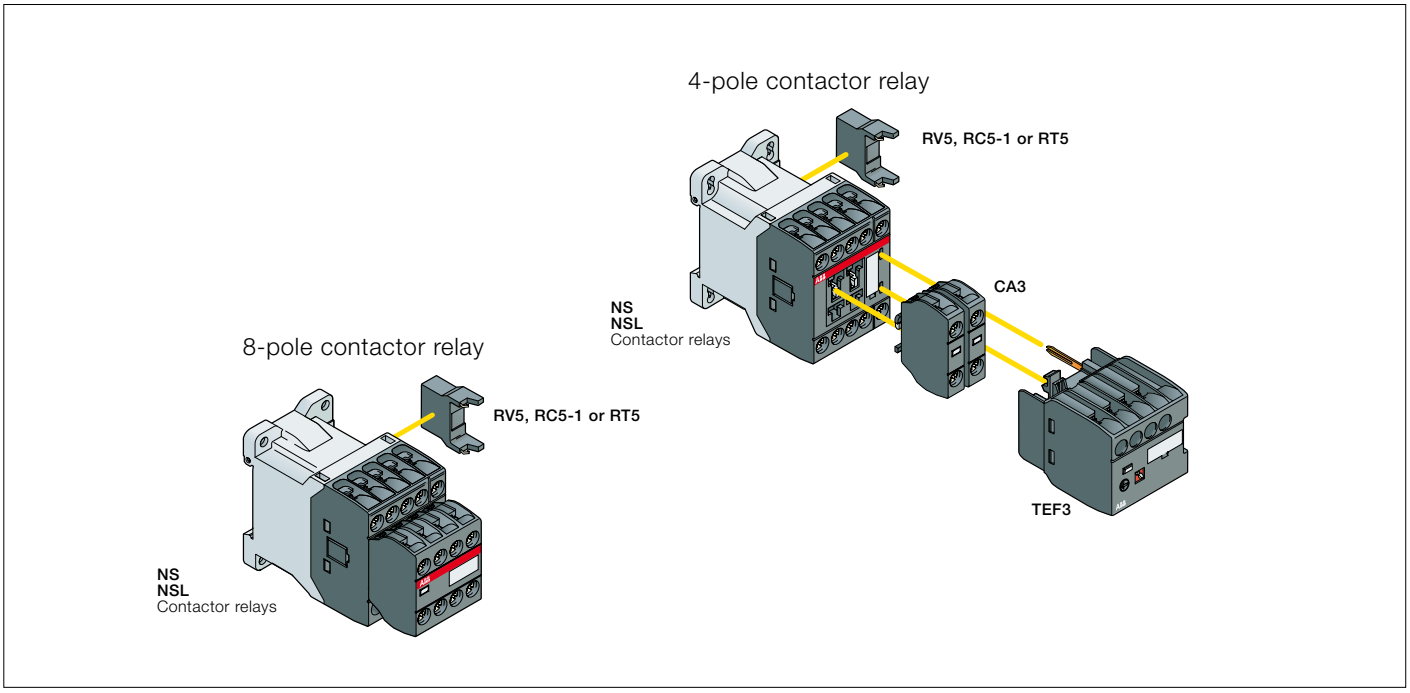


NSL44E, NSL53E, NSL62E, NSL71E, NSL80E

1SBC101479S0201

NS and NSL contactor relays
Main accessories

Contactor relays and main accessories (other accessories available)



Main accessory fitting details

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

1SBC101298S0201

NS and NSL contactor relays
Main accessories

CA3-10

Front-mounted instantaneous auxiliary contact blocks

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

TEF3-ON

Front-mounted electronic timer

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

RV5

Surge suppressors

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

1SBC101298S0201

NS and NSL contactor relays
Technical data

Contact utilization characteristics according to IEC

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

Contact utilization characteristics according to UL / CSA

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

4

1SBC101502S0201

NS and NSL contactor relays
Technical data

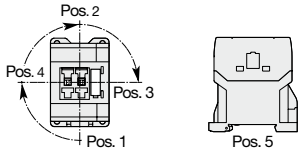
Magnet system characteristics for NS contactor relays

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

Magnet system characteristics for NSL contactor relays

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

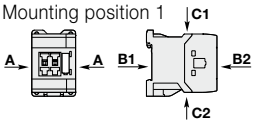
Mounting characteristics and conditions for use

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

1SBC101502S0201

NS and NSL contactor relays
Technical data

General technical data

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

Connecting characteristics

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

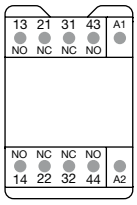
1SBC101502S0201

Notes

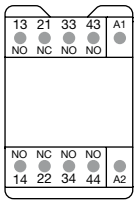
NS contactor relays
Terminal marking and positioning

NS contactor relays - AC operated

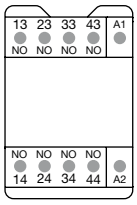
Standard devices without addition of auxiliary contact blocks



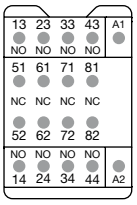
NS22E



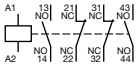
NS31E



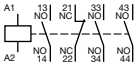
NS40E



NS44E

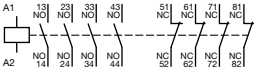


NS22E

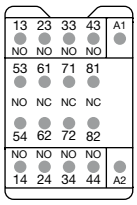


NS31E

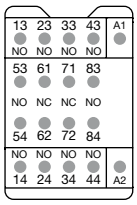
NS40E



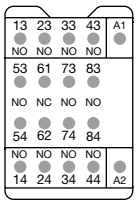
NS44E



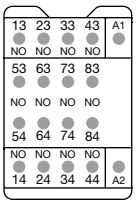
NS53E



NS62E



NS71E



NS80E

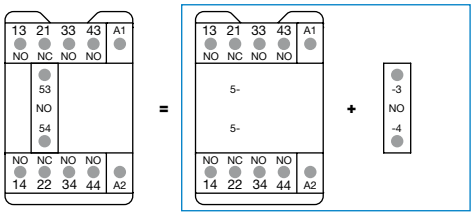
NS53E

NS62E

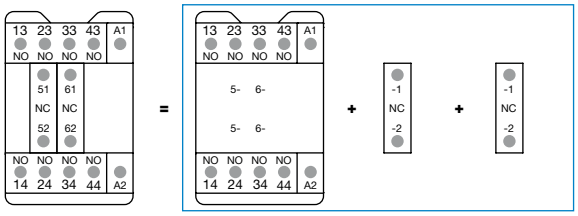
NS71E

NS80E

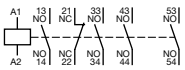
Other possible contact combinations with auxiliary contact blocks added by the user



Combination 41E = NS31E + CA3-10

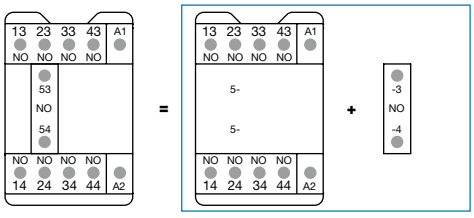


Combination 42E = NS40E + CA3-01 + CA3-01

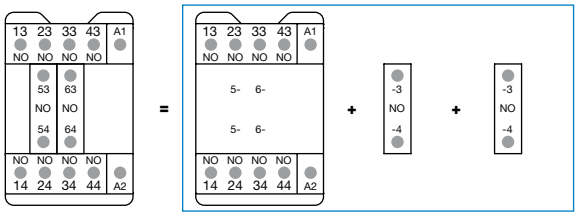


Combination 41E

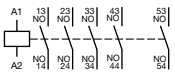
Combination 42E



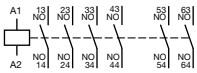
Combination 50E = NS40E + CA3-10



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

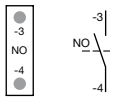


Combination 50E

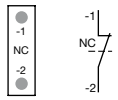


Combination 60E

CA3 1-pole auxiliary contact blocks

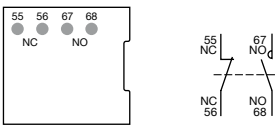


CA3-10



CA3-01

TEF3 front-mounted electronic timer

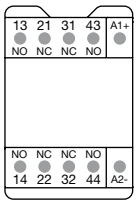


TEF3

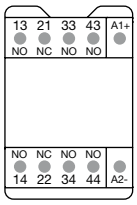
1SBC101410S0201

NSL contactor relays
Terminal marking and positioning

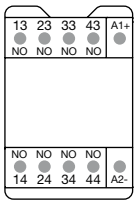
NSL contactor relays - DC operated (the polarity A1+, A2- must be respected)
Standard devices without addition of auxiliary contact blocks



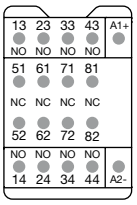
NSL22E



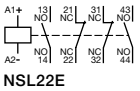
NSL31E



NSL40E

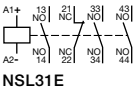


NSL44E

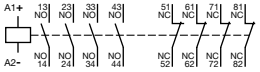


NSL22E

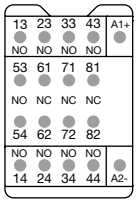
NSL40E



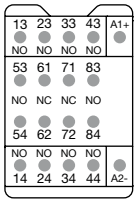
NSL31E



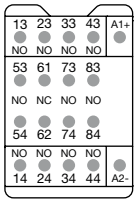
NSL44E



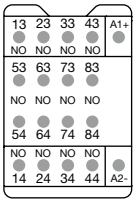
NSL53E



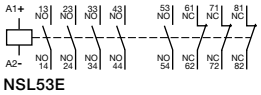
NSL62E



NSL71E

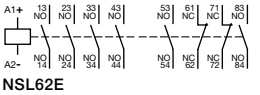


NSL80E

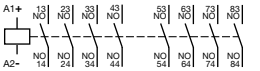


NSL53E

NSL71E

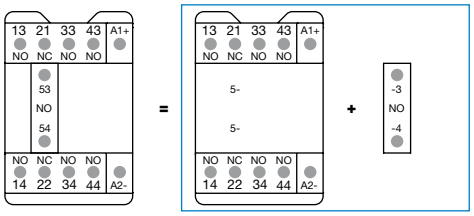


NSL62E

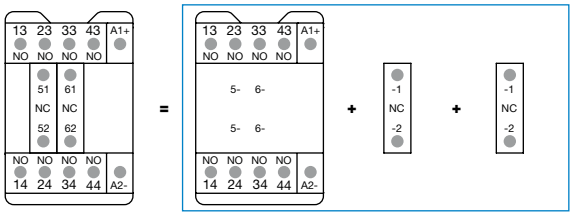


NSL80E

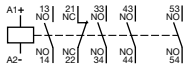
Other possible contact combinations with auxiliary contact blocks added by the user



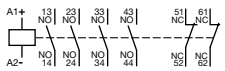
Combination 41E = NSL31E + CA3-10



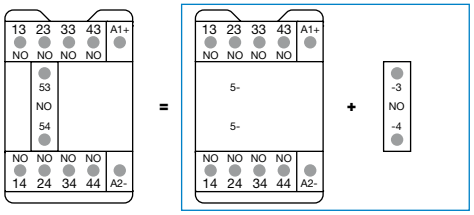
Combination 42E = NSL40E + CA3-01 + CA3-01



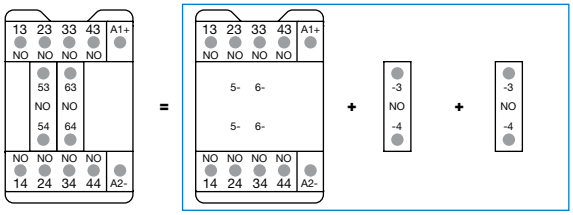
Combination 41E



Combination 42E

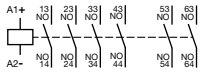


Combination 50E = NSL40E + CA3-10



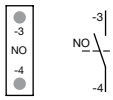
Combination 60E = NSL40E + CA3-10 + CA3-10

Combination 50E

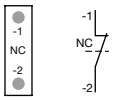


Combination 60E

CA3 1-pole auxiliary contact blocks

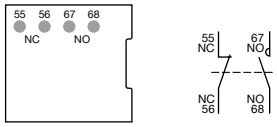


CA3-10



CA3-01

TEF3 front-mounted electronic timer



TEF3

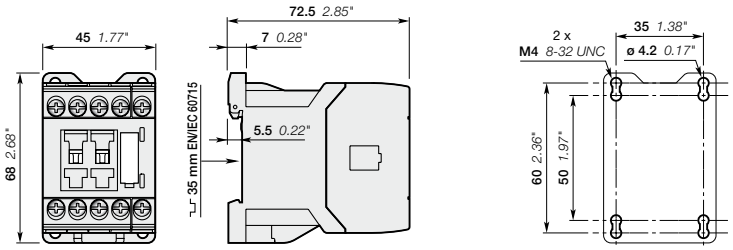
4

1SBC101410S0201

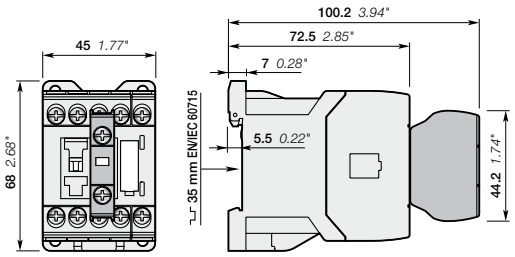
NS contactor relays

Main dimensions mm, *inches*

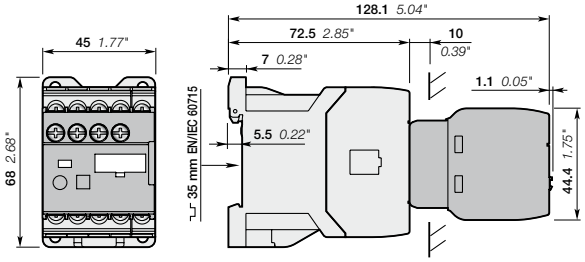
4-pole contactor relays



NS22E, NS31E, NS40E

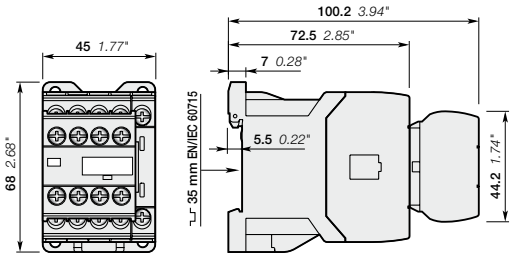


NS22E, NS31E, NS40E
+ CA3 front-mounted 1-pole auxiliary contact block



NS22E, NS31E, NS40E
+ TEF3 electronic timer

8-pole contactor relays



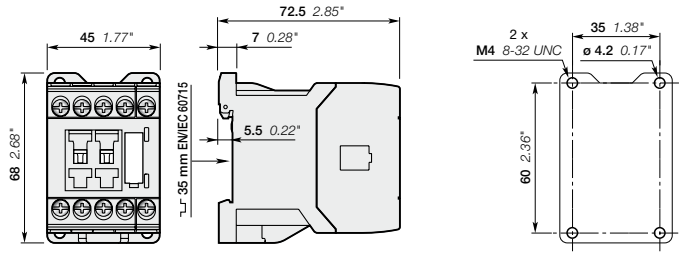
NS44E, NS53E, NS62E, NS71E, NS80E

1SBC101411S0201

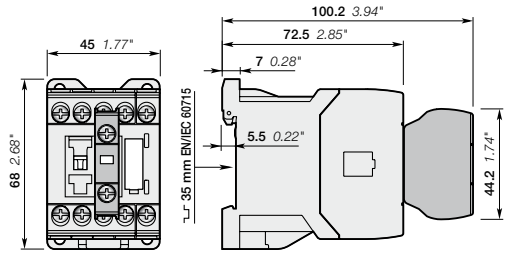
NSL contactor relays

Main dimensions mm, *inches*

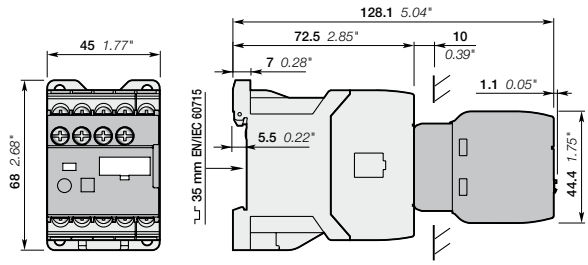
4-pole contactor relays



NSL22E, NSL31E, NSL40E

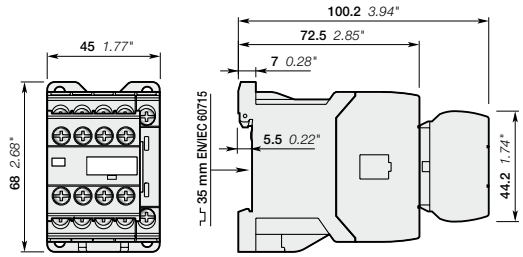


NSL22E, NSL31E, NSL40E
+ CA3 front-mounted 1-pole auxiliary contact block



NSL22E, NSL31E, NSL40E
+ TEF3 electronic timer

8-pole contactor relays



NSL44E, NSL53E, NSL62E, NSL71E, NSL80E

1SBC101411S0201

Auxiliary contact blocks
Accessories

CA3-10

4

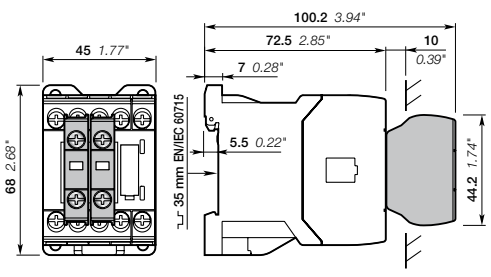
Description

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

Ordering details

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

Main dimensions mm, *inches*



1SBC101492S0201

Auxiliary contact blocks
Technical data

Contact utilization characteristics according to IEC

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

Contact utilization characteristics according to UL / CSA

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

Connecting characteristics

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

4

1SBC101493S0201

Electronic timers

TEF3-ON

TEF3-OFF

Description

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

Compact solution in cabinet compared to separate timers

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

Safe and cost-reduced wiring

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

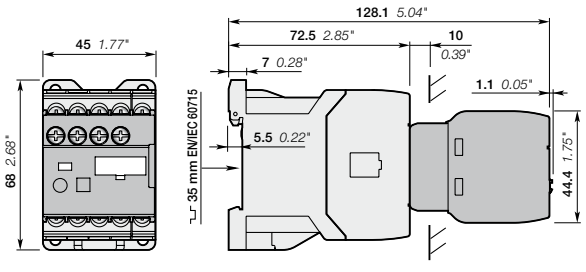
Available for a wide control voltage range 24...240 V AC/DC

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

Ordering details

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

Main dimensions mm, *inches*

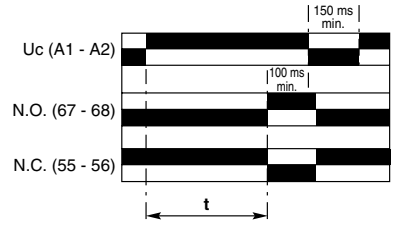
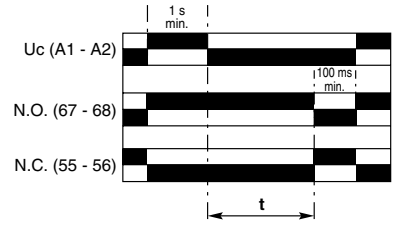


1SBC101504S0201

Notes

TEF3 electronic timers
Technical data

Contact utilization characteristics according to IEC

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

4

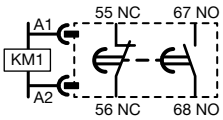
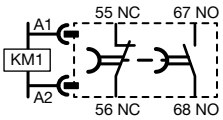
1SBC101505S0201

TEF3 electronic timers
Technical data

Contact utilization characteristics according to UL / CSA

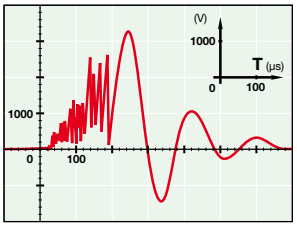
Types			TEF3-ON	TEF3-OFF
Standards			UL 508, CSA C22.2 N°14	
Rated insulation voltage Ui acc. to UL / CSA			300 V	
Max. operational voltage			240 V	
Pilot duty			B300, R300	
AC thermal rated current			5 A	
AC maximum volt-ampere making			3600 VA	
AC maximum volt-ampere breaking			360 VA	
DC thermal rated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

Connecting characteristics

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

1SBC101505S0201

Surge suppressors for contactor coils



1SBC101042F0014

RV5

1SBC101042F0014

RC5-1

1SBC101042F0014

RT5

Description

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

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

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

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

Overvoltage Factor

The overvoltage factor k is defined as the ratio of the maximum overvoltage peak value Ûs to the peak value Ûc of the coil rated control voltage Uc:

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

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

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

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

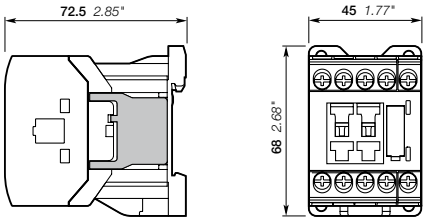
We have chosen the following solutions: transil diodes, varistors and RC blocks.

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

Ordering details

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

Main dimensions mm, *inches*



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

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

1SBC101494S0201

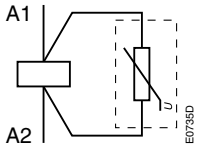
Surge suppressors for contactor coils
Technical data

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

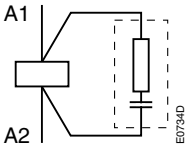
RC type	RC5-1/50	RC5-1/133	RC5-1/250	RC5-1/440
Rated control circuit voltage Uc	24...50 V AC	50...133 V AC	110...250 V AC	250...440 V AC
Residual overvoltage (clipping voltage)	2 to 3 x Uc max.			
Opening time growth factor	2...3			
Operating temperature	-20...+70 °C			
Advantages	Very fast clipping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

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

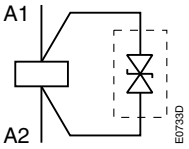
Wiring diagrams



Varistor



RC type



Transil diode

1SBC101602S0201

Mechanical interlock unit and fixing clips

VM3

Mechanical interlock unit

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

Ordering details

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

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

BB3

Fixing clips

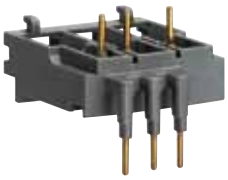
BB3 is a set of 50 fixing clips.

Ordering details

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

1SBC101496S0201

Connection accessories for starting solutions



BEA16-3

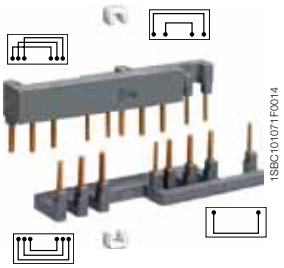
Connecting links

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

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

Ordering details

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



BER16C-3

Connection sets for reversing contactors

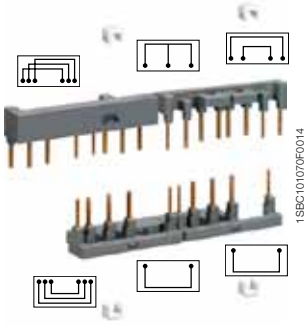
The BER16C-3 connection sets are used for the connections between the main poles of two 3-pole contactors mounted side by side as reversing contactors, including electrical interlocking between built-in N.C. auxiliary contact and coil terminals.

The connection sets are made up of:

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

Ordering details

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



BEY16C-3

Connection sets for star-delta starting

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

The connection sets are made up of:

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

Ordering details

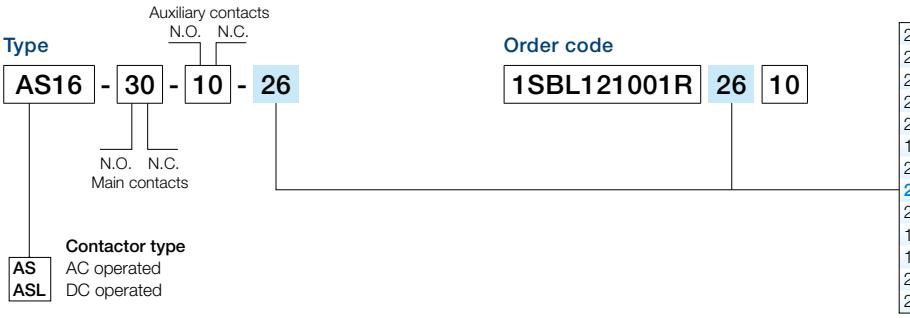
For contactors			Mech. interlock unit between star & delta contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
Line	Delta	Star						
AS09 AS12	AS09 AS12	AS09 AS09	with or without VM3	BEY16C-3	1SBN081018R2000		1	0.041

1SBC101495S0201

Voltage code table

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

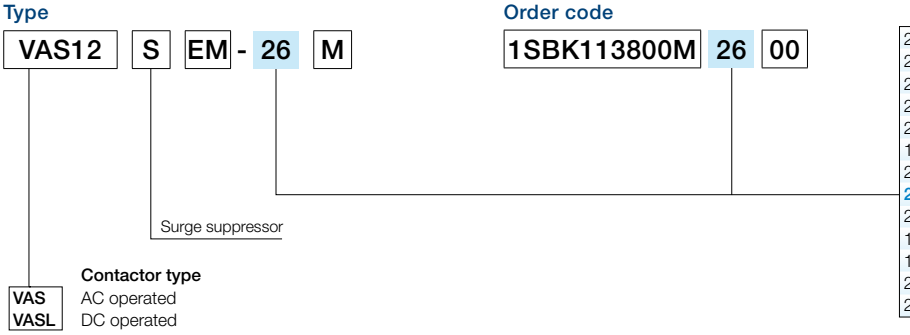
3-pole contactors



AC coil code	50 Hz	60 Hz
20	24 V	24 V
21	42 V	42 V
22	48 V	48 V
23	110 V	110 V
24	115 V	115 V
16	–	120 V
25	220 V	220 V
26	**230 V**	**230 V**
27	240 V	240 V
17	–	277 V
13	380 V	–
28	400 V	400 V
29	415 V	415 V

DC coil code	
80	12 V
81	24 V
83	48 V
84	60 V
86	110 V
87	125 V
88	220 V
89	240 V

3-pole reversing contactors

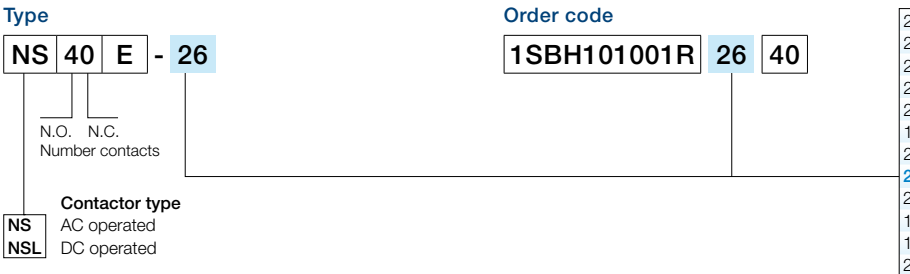


AC coil code	50 Hz	60 Hz
20	24 V	24 V
21	42 V	42 V
22	48 V	48 V
23	110 V	110 V
24	115 V	115 V
16	–	120 V
25	220 V	220 V
26	**230 V**	**230 V**
27	240 V	240 V
17	–	277 V
13	380 V	–
28	400 V	400 V
29	415 V	415 V

DC coil code	
80	12 V (1)
81	24 V
83	48 V
84	60 V
86	110 V
87	125 V
88	220 V
89	240 V

(1) Not for VASL..SEM

Contactor relays



AC coil code	50 Hz	60 Hz
20	24 V	24 V
21	42 V	42 V
22	48 V	48 V
23	110 V	110 V
24	115 V	115 V
16	–	120 V
25	220 V	220 V
26	**230 V**	**230 V**
27	240 V	240 V
17	–	277 V
13	380 V	–
28	400 V	400 V
29	415 V	415 V

DC coil code	
80	12 V
81	24 V
83	48 V
84	60 V
86	110 V
87	125 V
88	220 V
89	240 V

1SBC101600S0201

Notes

1SBC101636S0201

3-pole contactors and contactor relays with spring terminals

3-pole contactors

AS09..S ... AS16..S	AC operated	**4**/86
ASL09..S ... ASL16..S	DC operated	**4**/87
AS09..S ... AS16..S	AC operated - 2-stack	**4**/88
ASL09..S ... ASL16..S	DC operated - 2-stack	**4**/89
Main accessories		**4**/90
Technical data		**4**/92
Terminal marking and postioning		**4**/98
Dimensions		**4**/100

Contactors relays

NS..S	AC operated	**4**/102
NSL..S	DC operated	**4**/103
Main accessories		**4**/104
Technical data		**4**/106
Terminal marking and postioning		**4**/110
Dimensions		**4**/112

Accessories

Auxiliary contact blocks - with spring terminals	**4**/114
Surge suppressors	**4**/116

Voltage code table **4/118**

1SBC101636S0201

AS09..S ... AS16..S 3-pole contactors
4 to 7.5 kW
AC operated - with spring terminals

AS09-30-10S

Description

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

These contactors are of the block type design with:

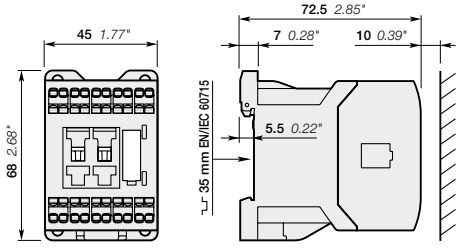
– spring terminals
– 3 main poles and 1 built-in auxiliary contact
– control circuit: AC operated
– add-on auxiliary contact blocks for front mounting and a comprehensive range of accessories.

Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50 Hz	V 60 Hz						kg
4	20	5	12	24	24	1	0	AS09-30-10S-20	1SBL101004R2010		0.220
						0	1	AS09-30-01S-20	1SBL101004R2001		0.220
				-	120	1	0	AS09-30-10S-16	1SBL101004R1610		0.220
						0	1	AS09-30-01S-16	1SBL101004R1601		0.220
				230	230	1	0	AS09-30-10S-26	1SBL101004R2610		0.220
						0	1	AS09-30-01S-26	1SBL101004R2601		0.220
				400	400	1	0	AS09-30-10S-28	1SBL101004R2810		0.220
						0	1	AS09-30-01S-28	1SBL101004R2801		0.220
5.5	22	7.5	12	24	24	1	0	AS12-30-10S-20	1SBL111004R2010		0.220
						0	1	AS12-30-01S-20	1SBL111004R2001		0.220
				-	120	1	0	AS12-30-10S-16	1SBL111004R1610		0.220
						0	1	AS12-30-01S-16	1SBL111004R1601		0.220
				230	230	1	0	AS12-30-10S-26	1SBL111004R2610		0.220
						0	1	AS12-30-01S-26	1SBL111004R2601		0.220
				400	400	1	0	AS12-30-10S-28	1SBL111004R2810		0.220
						0	1	AS12-30-01S-28	1SBL111004R2801		0.220
7.5	22	10	15.2	24	24	1	0	AS16-30-10S-20	1SBL121004R2010		0.220
						0	1	AS16-30-01S-20	1SBL121004R2001		0.220
				-	120	1	0	AS16-30-10S-16	1SBL121004R1610		0.220
						0	1	AS16-30-01S-16	1SBL121004R1601		0.220
				230	230	1	0	AS16-30-10S-26	1SBL121004R2610		0.220
						0	1	AS16-30-01S-26	1SBL121004R2601		0.220
				400	400	1	0	AS16-30-10S-28	1SBL121004R2810		0.220
						0	1	AS16-30-01S-28	1SBL121004R2801		0.220

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

Main dimensions mm, *inches*



AS09..S, AS12..S, AS16..S

1SBC101454S0201

ASL09..S ... ASL16..S 3-pole contactors
4 to 7.5 kW
DC operated - with spring terminals

ASL09-30-10S

Description

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

These contactors are of the block type design with:

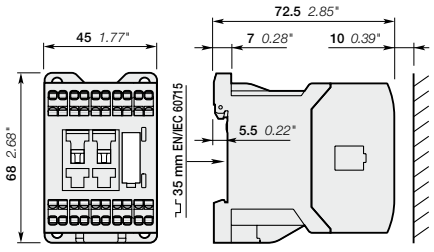
- spring terminals
- 3 main poles and 1 built-in auxiliary contact
- control circuit: low consumption (3 W at pull-in and holding) DC operated with solid core magnet. Suitable for direct control by PLC outputs (the polarity on the coil terminals A1+ and A2- must be respected)
- add-on auxiliary contact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

Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc (1)	Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							Pkg (1 pce)
kW	A	hp	A	V DC						kg
4	20	5	12	24	1	0	ASL09-30-10S-81	1SBL103004R8110		0.280
					0	1	ASL09-30-01S-81	1SBL103004R8101		0.280
				48	1	0	ASL09-30-10S-83	1SBL103004R8310		0.280
					0	1	ASL09-30-01S-83	1SBL103004R8301		0.280
				110	1	0	ASL09-30-10S-86	1SBL103004R8610		0.280
					0	1	ASL09-30-01S-86	1SBL103004R8601		0.280
				220	1	0	ASL09-30-10S-88	1SBL103004R8810		0.280
					0	1	ASL09-30-01S-88	1SBL103004R8801		0.280
5.5	22	7.5	12	24	1	0	ASL12-30-10S-81	1SBL113004R8110		0.280
					0	1	ASL12-30-01S-81	1SBL113004R8101		0.280
				48	1	0	ASL12-30-10S-83	1SBL113004R8310		0.280
					0	1	ASL12-30-01S-83	1SBL113004R8301		0.280
				110	1	0	ASL12-30-10S-86	1SBL113004R8610		0.280
					0	1	ASL12-30-01S-86	1SBL113004R8601		0.280
				220	1	0	ASL12-30-10S-88	1SBL113004R8810		0.280
					0	1	ASL12-30-01S-88	1SBL113004R8801		0.280
7.5	22	10	15.2	24	1	0	ASL16-30-10S-81	1SBL123004R8110		0.280
					0	1	ASL16-30-01S-81	1SBL123004R8101		0.280
				48	1	0	ASL16-30-10S-83	1SBL123004R8310		0.280
					0	1	ASL16-30-01S-83	1SBL123004R8301		0.280
				110	1	0	ASL16-30-10S-86	1SBL123004R8610		0.280
					0	1	ASL16-30-01S-86	1SBL123004R8601		0.280
				220	1	0	ASL16-30-10S-88	1SBL123004R8810		0.280
					0	1	ASL16-30-01S-88	1SBL123004R8801		0.280

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

Main dimensions mm, *inches*



ASL09..S, ASL12..S, ASL16..S

1SBC101455S0201

AS09..S ... AS16..S 2-stack 3-pole contactors
4 to 7.5 kW
AC operated - with spring terminals

AS09-30-32S

4

Description

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

These contactors are of the block type design with:

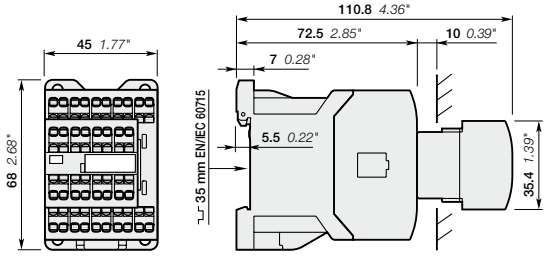
- spring terminals
- 1st stack with 3 main poles and 1 N.O. built-in auxiliary contact
- 2nd stack with permanently fixed 2 N.O. + 2 N.C. auxiliary contact block
- the auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
- control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

Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50 Hz	V 60 Hz						kg
4	20	5	12	24	24	3	2	AS09-30-32S-20	1SBL101004R2032		0.260
				-	120	3	2	AS09-30-32S-16	1SBL101004R1632		0.260
				230	230	3	2	AS09-30-32S-26	1SBL101004R2632		0.260
				400	400	3	2	AS09-30-32S-28	1SBL101004R2832		0.260
5.5	22	7.5	12	24	24	3	2	AS12-30-32S-20	1SBL111004R2032		0.260
				-	120	3	2	AS12-30-32S-16	1SBL111004R1632		0.260
				230	230	3	2	AS12-30-32S-26	1SBL111004R2632		0.260
				400	400	3	2	AS12-30-32S-28	1SBL111004R2832		0.260
7.5	22	10	15.2	24	24	3	2	AS16-30-32S-20	1SBL121004R2032		0.260
				-	120	3	2	AS16-30-32S-16	1SBL121004R1632		0.260
				230	230	3	2	AS16-30-32S-26	1SBL121004R2632		0.260
				400	400	3	2	AS16-30-32S-28	1SBL121004R2832		0.260

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

Main dimensions mm, *inches*



AS09..S, AS12..S, AS16..S

1SBC101456S0201

ASL09..S ... ASL16..S 2-stack 3-pole contactors
4 to 7.5 kW
DC operated - with spring terminals

ASL09-30-32S

Description

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

These contactors are of the block type design with:

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

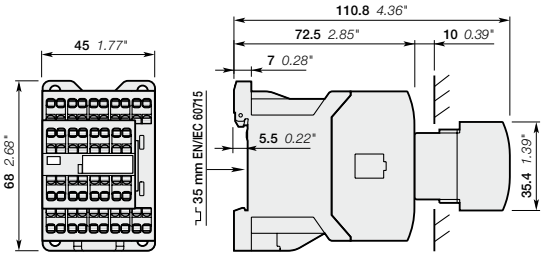
4

Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc (1)	Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							Pkg (1 pce)
kW	A	hp	A	V DC						kg
4	20	5	12	24	3	2	ASL09-30-32S-81	1SBL103004R8132		0.320
				48	3	2	ASL09-30-32S-83	1SBL103004R8332		0.320
				110	3	2	ASL09-30-32S-86	1SBL103004R8632		0.320
				220	3	2	ASL09-30-32S-88	1SBL103004R8832		0.320
5.5	22	7.5	12	24	3	2	ASL12-30-32S-81	1SBL113004R8132		0.320
				48	3	2	ASL12-30-32S-83	1SBL113004R8332		0.320
				110	3	2	ASL12-30-32S-86	1SBL113004R8632		0.320
				220	3	2	ASL12-30-32S-88	1SBL113004R8832		0.320
7.5	22	10	15.2	24	3	2	ASL16-30-32S-81	1SBL123004R8132		0.320
				48	3	2	ASL16-30-32S-83	1SBL123004R8332		0.320
				110	3	2	ASL16-30-32S-86	1SBL123004R8632		0.320
				220	3	2	ASL16-30-32S-88	1SBL123004R8832		0.320

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

Main dimensions mm, *inches*



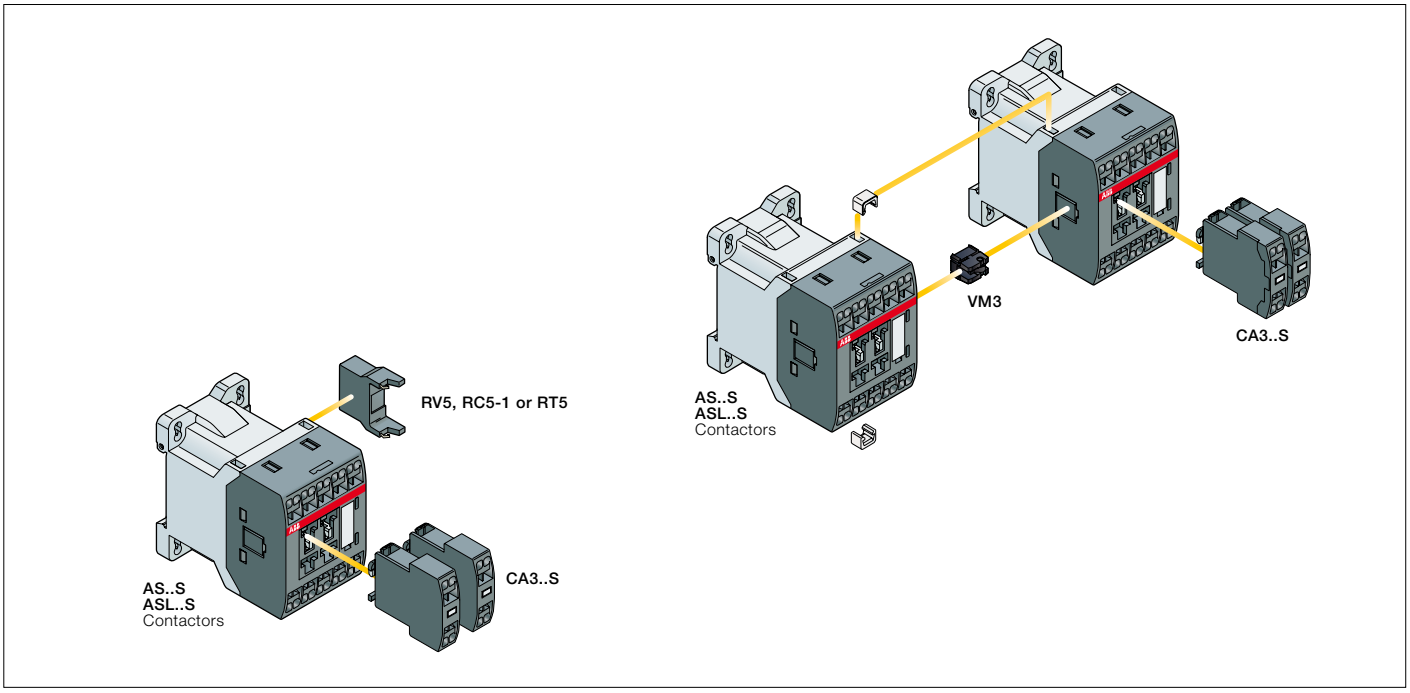
ASL09..S, ASL12..S, ASL16..S

1SBC101457S0201

AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals

Main accessories

Contactor and main accessories (other accessories available)



Main accessory fitting details

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

1SBC101412S0201

AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals

Main accessories

CA3-10S

Front-mounted instantaneous auxiliary contact blocks

For contactors	Auxiliary contacts		Type	Order code		Pkg qty	Weight (1 pce) kg
AS09..S ... AS16..S	1	0	CA3-10S	1SBN011019T1010		10	0.011
ASL09..S ... ASL16..S	0	1	CA3-01S	1SBN011019T1001		10	0.011

VM3

Mechanical interlock unit

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

RV5

Surge suppressors

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

BEA16-3U

Connecting links with manual motor starters

For contactors	Manual motor starter	Type	Order code		Pkg qty	Weight (1 pce) kg
AS09..S ... AS16..S ASL09..S ... ASL16..S	MS116-0.16 ... MS116-16 MS132-0.16 ... MS132-16	BEA16-3U	1SBN081020R1000		1	0.045

4

1SBC101412S0201

AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC operated	AS09..S	AS12..S	AS16..S
	DC operated	ASL09..S	ASL12..S	ASL16..S
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1		
Rated operational voltage Ue max.		690 V		
Rated frequency (without derating)		50 / 60 Hz		
Conventional free-air thermal current Ith				
acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C		20 A	22 A	22 A
With conductor cross-sectional area		2.5 mm²	2.5 mm²	2.5 mm²
AC-1 Utilization category				
For air temperature close to contactor				
Ie / Rated operational current AC-1	**θ ≤ 40 °C**	20 A	22 A	22 A
Ue max. ≤ 690 V, 50/60 Hz	**θ ≤ 60 °C**	15 A	17 A	17 A
	θ ≤ 70 °C	12 A	14 A	14 A
With conductor cross-sectional area		2.5 mm²		
AC-3 Utilization category				
For air temperature close to contactor θ ≤ 60 °C				
Ie / Max. rated operational current AC-3 (1)				
	220-230-240 V	9 A	12 A	15.7 A
M 3~ 3-phase motors	**400 V**	9 A	12 A	15.5 A
	415 V	9 A	12 A	15.5 A
	440 V	8 A	11 A	13.6 A
	500 V	8 A	11 A	12.5 A
	690 V	5 A	7 A	9 A
Rated operational power AC-3 (1)				
	220-230-240 V	2.2 kW	3 kW	4 kW
M 3~ 1500 r.p.m. 50 Hz, 1800 r.p.m. 60 Hz, 3-phase motors	**400 V**	4 kW	5.5 kW	7.5 kW
	415 V	4 kW	5.5 kW	7.5 kW
	440 V	4 kW	5.5 kW	7.5 kW
	500 V	4 kW	5.5 kW	7.5 kW
	690 V	4 kW	5.5 kW	7.5 kW
Rated making capacity AC-3		10 x Ie AC-3 acc. to IEC 60947-4-1		
Rated breaking capacity AC-3		8 x Ie AC-3 acc. to IEC 60947-4-1		
AC-8a Utilization category				
(without thermal overload relay - Ue 400 V 50/60 Hz - θ ≤ 40 °C)				
Ie / Rated operational current AC-8a		12 A	16 A	22 A
Rated operational power AC-8a		5.5 kW	7.5 kW	11 kW
Short-circuit protection device for contactors				
without thermal overload relay - Motor protection excluded (2)				
Ue ≤ 500 V AC - gG type fuse		25 A		
Rated short-time withstand current Icw	**1 s**	230 A	250 A	250 A
at 40 °C ambient temperature,	**10 s**	100 A	124 A	124 A
in free air from a cold state	**30 s**	65 A	75 A	75 A
	1 min	50 A	55 A	55 A
	15 min	20 A	22 A	22 A
Maximum breaking capacity				
cos φ = 0.45	**at 440 V**	155 A		
	at 690 V	90 A		
Power dissipation per pole	**Ie / AC-1**	0.9 W	1.1 W	1.1 W
	Ie / AC-3	0.18 W	0.33 W	0.55 W
Max. electrical switching frequency	**AC-1**	600 cycles/h		
	AC-3	1200 cycles/h		
	AC-4	300 cycles/h		

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

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

1SBC101490S0201

AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals Technical data

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

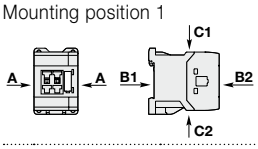
Contactor types	AC operated	AS09..S	AS12..S	AS16..S
	DC operated	ASL09..S	ASL12..S	ASL16..S
Standards		UL 508, CSA C22.2 N°14		
Max. operational voltage		690 V		
NEMA size		00	00	00
NEMA continuous amp rating	Thermal current	9 A		
NEMA maximum horse power ratings 1-phase, 60 Hz	115 V AC	1/3 hp	1/3 hp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

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

General technical data

Contactor types	AC operated	AS09..S	AS12..S	AS16..S
	DC operated	ASL09..S	ASL12..S	ASL16..S
Rated insulation voltage Ui				
acc. to IEC 60947-4-1		690 V		
acc. to UL / CSA		600 V		
Rated impulse withstand voltage Uimp.		6 kV		
Ambient air temperature close to contactor				
Operation		-40...+70 °C		
Storage		-60...+80 °C		
Climatic withstand		Category B according to IEC 60947-1 Annex Q		
Maximum operating altitude (without derating)		3000 m		
Mechanical durability				
Number of operating cycles		10 millions operating cycles		
Max. switching frequency		3600 cycles/h		
Shock withstand		1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position		

acc. to IEC 60068-2-27 and EN 60068-2-27	Shock direction	AS contactors - AC operated	ASL contactors - DC operated
Mounting position 1	A	20 g	20 g closed position / 10 g open position
	B1	10 g closed position / 5 g open position	15 g closed position / 5 g open position
	B2	15 g	10 g
	C1	20 g closed position / 9 g open position	15 g closed position / 8 g open position
	C2	20 g closed position / 14 g open position	14 g closed position / 8 g open position



Vibration withstand acc. to IEC 60068-2-6	5...300 Hz / 3 g closed position / 2 g open position

1SBC101490S0201

AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals
Technical data

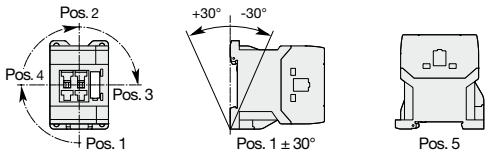
Magnet system characteristics for AS09..S ... AS16..S contactors

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

Magnet system characteristics for ASL09..S ... ASL16..S contactors

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

Mounting characteristics and conditions for use

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

1SBC101490S0201

AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals
Technical data

Connecting characteristics

Contactor types	AC operated	AS09..S	AS12..S	AS16..S
	DC operated	ASL09..S	ASL12..S	ASL16..S
Main terminals		Spring terminals		
Connection capacity (min. ... max.)				
Main conductors (poles)				
Rigid	**1 x**	0.75...2.5 mm²		
	2 x	0.75...2.5 mm²		
Flexible with non insulated ferrule	**1 x**	0.75...2.5 mm²		
	2 x	0.75...2.5 mm²		
Flexible with insulated ferrule	**1 x**	0.75...1.5 mm²		
	2 x	0.75...1.5 mm²		
Connection capacity acc. to UL / CSA	**1 or 2 x**	AWG 18...12		
Stripping length		10 mm		
Auxiliary conductors (built-in auxiliary terminals + coil terminals)				
Rigid solid	**1 x**	0.75...2.5 mm²		
	2 x	0.75...2.5 mm²		
Flexible with non insulated ferrule	**1 x**	0.75...2.5 mm²		
	2 x	0.75...2.5 mm²		
Flexible with insulated ferrule	**1 x**	0.75...1.5 mm²		
	2 x	0.75...1.5 mm²		
Connection capacity acc. to UL / CSA	**1 or 2 x**	AWG 18...14		
Stripping length		10 mm		
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529				
All terminals		IP20		
Screwdriver type		Flat Ø 3.5		

1SBC101490S0201

AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals
Technical data

Built-in auxiliary contacts according to IEC

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

Built-in auxiliary contacts according to UL / CSA

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

1SBC101490S0201

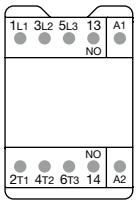
Notes

1SBC101490S0201

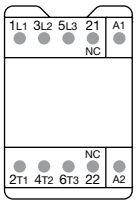
AS09..S ... AS16..S 3-pole contactors - with spring terminals
Terminal marking and positioning

AS..S contactors - AC operated

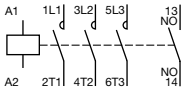
Standard devices without addition of auxiliary contacts



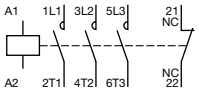
AS09 ... AS16-30-10S



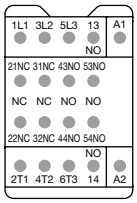
AS09 ... AS16-30-01S



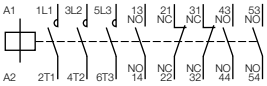
AS09 ... AS16-30-10S



AS09 ... AS16-30-01S

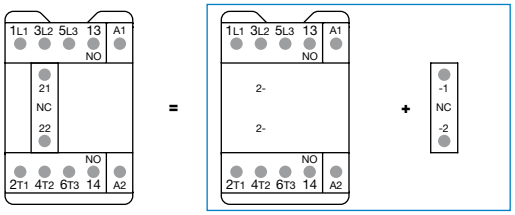


AS09 ... AS16-30-32S

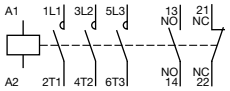


AS09 ... AS16-30-32S

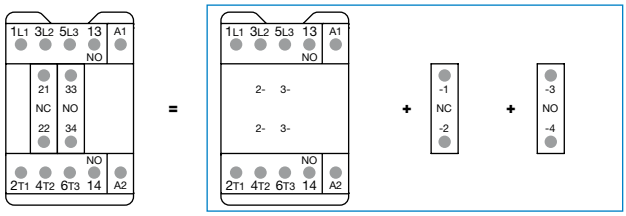
Other possible contact combinations with auxiliary contact blocks added by the user



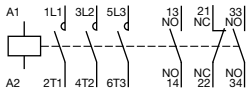
Combination 11 = AS09 ... AS16-30-10S + CA3-01S



Combination 11

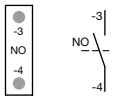


Combination 21 = AS09 ... AS16-30-10S + CA3-01S + CA3-10S

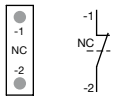


Combination 21

CA3..S 1-pole auxiliary contact blocks



CA3-10S



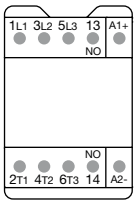
CA3-01S

1SBC101413S0201

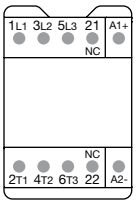
ASL09..S ... ASL16..S 3-pole contactors - with spring terminals
Terminal marking and positioning

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

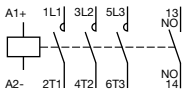
Standard devices without addition of auxiliary contacts



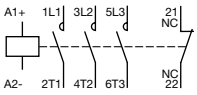
ASL09 ... ASL16-30-10S



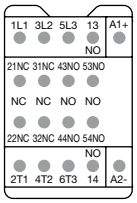
ASL09 ... ASL16-30-01S



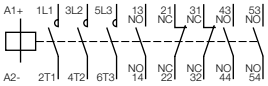
ASL09 ... ASL16-30-10S



ASL09 ... ASL16-30-01S

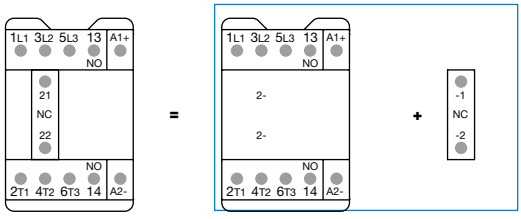


ASL09 ... ASL16-30-32

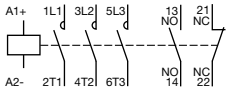


ASL09 ... ASL16-30-32S

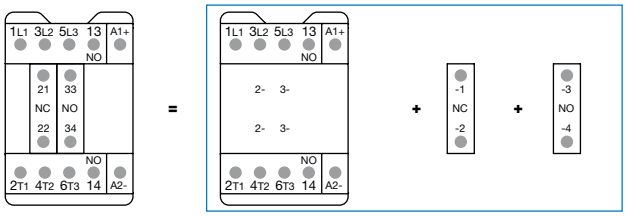
Other possible contact combinations with auxiliary contact blocks added by the user



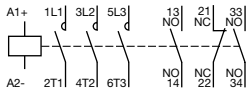
Combination 11 = ASL09 ... ASL16-30-10S + CA3-01S



Combination 11

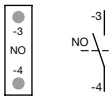


Combination 21 = ASL09 ... ASL16-30-10S + CA3-01S + CA3-10S

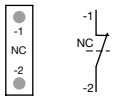


Combination 21

CA3..S 1-pole auxiliary contact blocks



CA3-10S



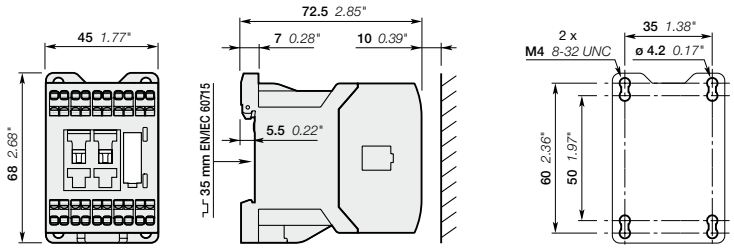
CA3-01S

4

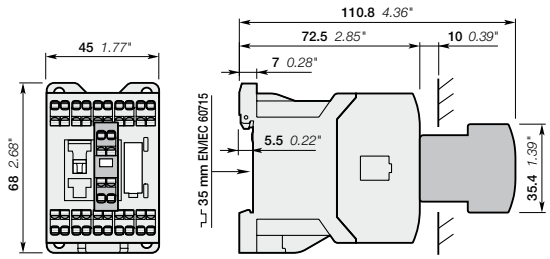
1SBC101413S0201

AS09..S ... AS16..S 3-pole contactors - with spring terminals

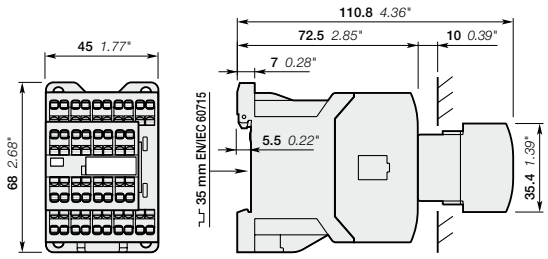
Main dimensions mm, *inches*



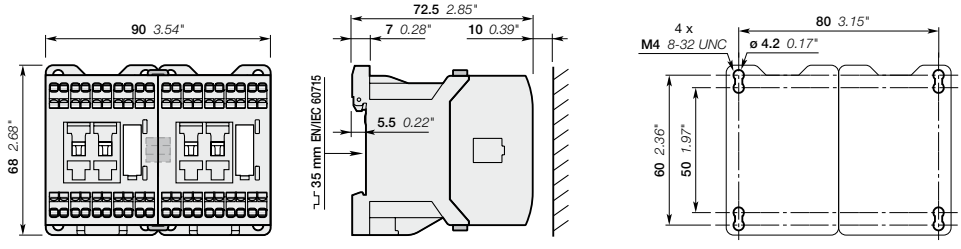
AS09..S, AS12..S, AS16..S



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



AS09...16-30-32S

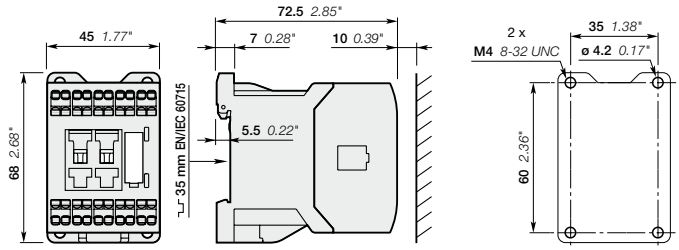


AS09..S, AS12..S, AS16..S
+ VM3 mechanical interlock unit including two BB3 fixing clips

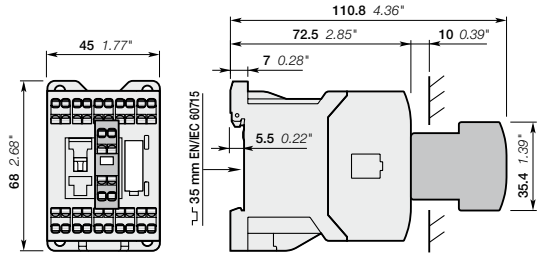
1SBC101414S0201

ASL09..S ... ASL16..S 3-pole contactors - with spring terminals

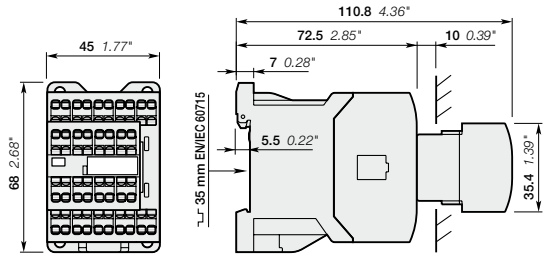
Main dimensions mm, *inches*



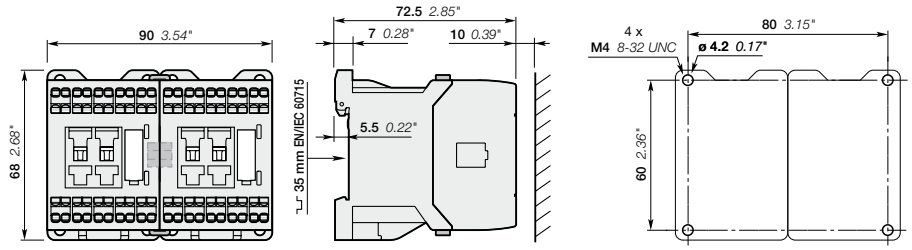
ASL09..S, ASL12..S, ASL16..S



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



ASL09...16-30-32S



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

4

1SBC101414S0201

NS..S contactor relays - with spring terminals
AC operated

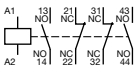
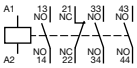
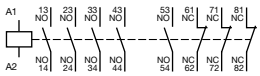
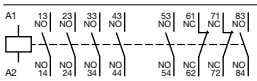
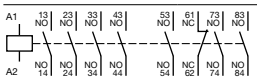
NS22ES

4

Description

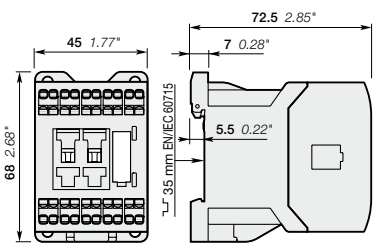
NS..S contactor relays are used for switching auxiliary and control circuits.
These contactor relays are designed with:
- spring terminals
- 4 poles or 8 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: AC operated
- add-on auxiliary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

Ordering details

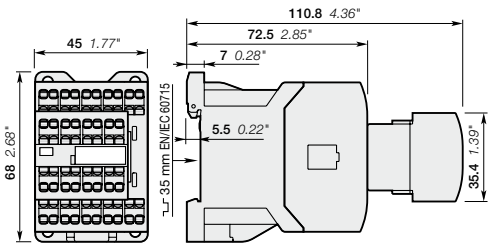
Number of contacts 1st stack	2nd stack	Rated control circuit voltage Uc (1) V 50 Hz	V 60 Hz	Type	Order code		Weight Pkg (1 pce) kg
		24	24	NS22ES-20	1SBH101004R2022		0.220
		-	120	NS22ES-16	1SBH101004R1622		0.220
		230	230	NS22ES-26	1SBH101004R2622		0.220
		400	400	NS22ES-28	1SBH101004R2822		0.220
		24	24	NS31ES-20	1SBH101004R2031		0.220
		-	120	NS31ES-16	1SBH101004R1631		0.220
		230	230	NS31ES-26	1SBH101004R2631		0.220
		400	400	NS31ES-28	1SBH101004R2831		0.220
		24	24	NS40ES-20	1SBH101004R2040		0.220
		-	120	NS40ES-16	1SBH101004R1640		0.220
		230	230	NS40ES-26	1SBH101004R2640		0.220
		400	400	NS40ES-28	1SBH101004R2840		0.220
		24	24	NS44ES-20	1SBH101004R2044		0.260
		-	120	NS44ES-16	1SBH101004R1644		0.260
		230	230	NS44ES-26	1SBH101004R2644		0.260
		400	400	NS44ES-28	1SBH101004R2844		0.260
		24	24	NS53ES-20	1SBH101004R2053		0.260
		-	120	NS53ES-16	1SBH101004R1653		0.260
		230	230	NS53ES-26	1SBH101004R2653		0.260
		400	400	NS53ES-28	1SBH101004R2853		0.260
		24	24	NS62ES-20	1SBH101004R2062		0.260
		-	120	NS62ES-16	1SBH101004R1662		0.260
		230	230	NS62ES-26	1SBH101004R2662		0.260
		400	400	NS62ES-28	1SBH101004R2862		0.260
		24	24	NS71ES-20	1SBH101004R2071		0.260
		-	120	NS71ES-16	1SBH101004R1671		0.260
		230	230	NS71ES-26	1SBH101004R2671		0.260
		400	400	NS71ES-28	1SBH101004R2871		0.260
		24	24	NS80ES-20	1SBH101004R2080		0.260
		-	120	NS80ES-16	1SBH101004R1680		0.260
		230	230	NS80ES-26	1SBH101004R2680		0.260
		400	400	NS80ES-28	1SBH101004R2880		0.260

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

Main dimensions mm, *inches*



NS22ES, NS31ES, NS40ES



NS44ES, NS53ES, NS62ES, NS71ES, NS80ES

1SBC101481S0201

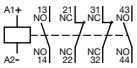
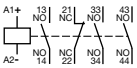
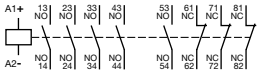
NSL..S contactor relays - with spring terminals
DC operated

NSL22ES

Description

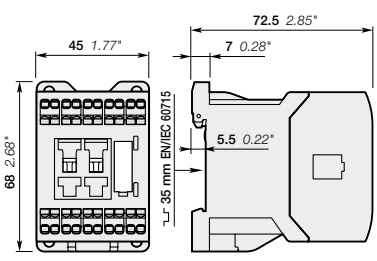
NSL..S contactor relays are used for switching auxiliary and control circuits.
These contactor relays are designed with:
- spring terminals
- 4 poles or 8 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: low coil consumption (3 W at pull-in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

Ordering details

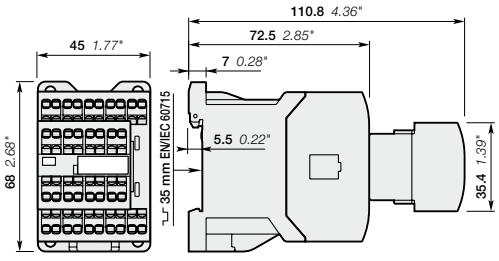
Number of contacts 1st stack	2nd stack	Rated control circuit voltage Uc (1) V DC	Type	Order code		Weight Pkg (1 pce) kg
		24	NSL22ES-81	1SBH103004R8122		0.280
		48	NSL22ES-83	1SBH103004R8322		0.280
		110	NSL22ES-86	1SBH103004R8622		0.280
		220	NSL22ES-88	1SBH103004R8822		0.280
		24	NSL31ES-81	1SBH103004R8131		0.280
		48	NSL31ES-83	1SBH103004R8331		0.280
		110	NSL31ES-86	1SBH103004R8631		0.280
		220	NSL31ES-88	1SBH103004R8831		0.280
		24	NSL40ES-81	1SBH103004R8140		0.280
		48	NSL40ES-83	1SBH103004R8340		0.280
		110	NSL40ES-86	1SBH103004R8640		0.280
		220	NSL40ES-88	1SBH103004R8840		0.280
		24	NSL44ES-81	1SBH103004R8144		0.320
		48	NSL44ES-83	1SBH103004R8344		0.320
		110	NSL44ES-86	1SBH103004R8644		0.320
		220	NSL44ES-88	1SBH103004R8844		0.320
		24	NSL53ES-81	1SBH103004R8153		0.320
		48	NSL53ES-83	1SBH103004R8353		0.320
		110	NSL53ES-86	1SBH103004R8653		0.320
		220	NSL53ES-88	1SBH103004R8853		0.320
		24	NSL62ES-81	1SBH103004R8162		0.320
		48	NSL62ES-83	1SBH103004R8362		0.320
		110	NSL62ES-86	1SBH103004R8662		0.320
		220	NSL62ES-88	1SBH103004R8862		0.320
		24	NSL71ES-81	1SBH103004R8171		0.320
		48	NSL71ES-83	1SBH103004R8371		0.320
		110	NSL71ES-86	1SBH103004R8671		0.320
		220	NSL71ES-88	1SBH103004R8871		0.320
		24	NSL80ES-81	1SBH103004R8180		0.320
		48	NSL80ES-83	1SBH103004R8380		0.320
		110	NSL80ES-86	1SBH103004R8680		0.320
		220	NSL80ES-88	1SBH103004R8880		0.320

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

Main dimensions mm, *inches*



NSL22ES, NSL31ES, NSL40ES

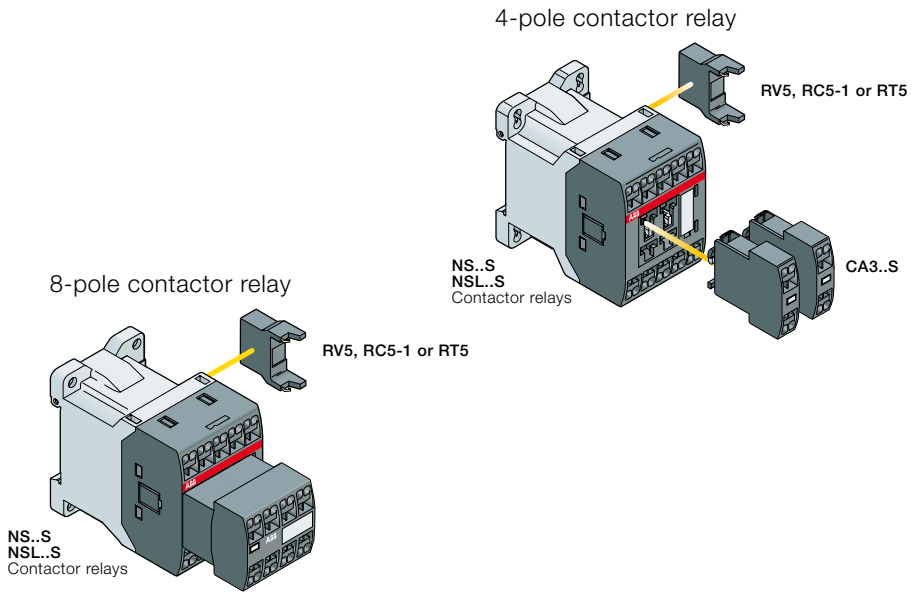


NSL44ES, NSL53ES, NSL62ES, NSL71ES, NSL80ES

1SBC101148250201

NS..S and NSL..S contactor relays - with spring terminals
Main accessories

Contactor relays and main accessories



Main accessory fitting details

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

1SBC101415S0201

NS..S and NSL..S contactor relays - with spring terminals
Main accessories

CA3-10S

Front mounted instantaneous auxiliary contact blocks

For contactor relays	Auxiliary contacts		Type	Order code		Pkg qty	Weight (1 pce) kg
NS..S, NSL..S	1	0	CA3-10S	1SBN011019T1010		10	0.011
	0	1	CA3-01S	1SBN011019T1001		10	0.011

RV5

Surge suppressors

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

1SBC101415S0201

NS..S and NSL..S contactor relays - with spring terminals
Technical data

Contact utilization characteristics according to IEC

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

Contact utilization characteristics according to UL / CSA

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

4

1SBC101503S0201

NS..S and NSL..S contactor relays - with spring terminals
Technical data

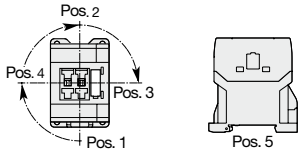
Magnet system characteristics for NS..S contactor relays

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

Magnet system characteristics for NSL..S contactor relays

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

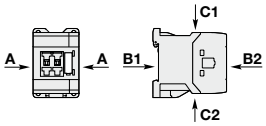
Mounting characteristics and conditions for use

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

1SBC101503S0201

NS..S and NSL..S contactor relays - with spring terminals
Technical data

General technical data

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

Connecting characteristics

Contactor relay types	**AC operated**	NS..S
	DC operated	NSL..S
Main terminals		Spring terminals
Connection capacity (min. ... max.)		
Pole and coil terminals		
Rigid solid	**1 x**	0.75...2.5 mm²
	2 x	0.75...2.5 mm²
Flexible with non insulated ferrule	**1 x**	0.75...2.5 mm²
	2 x	0.75...2.5 mm²
Flexible with insulated ferrule	**1 x**	0.75...1.5 mm²
	2 x	0.75...1.5 mm²
Connection capacity acc. to UL / CSA	**1 or 2 x**	AWG 18...14
Stripping length		10 mm
Degree of protection		
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		
All terminals		IP20
Screwdriver type		Flat Ø 3.5

1SBC101503S0201

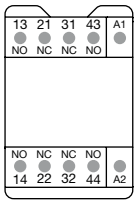
Notes

1SBC101503S0201

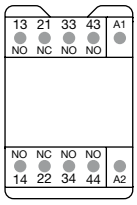
NS..S contactor relays - with spring terminals
Terminal marking and positioning

NS..S contactor relays - AC operated

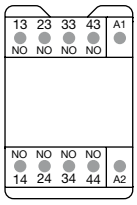
Standard devices without addition of auxiliary contact blocks



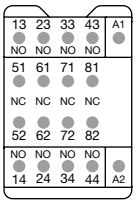
NS22ES



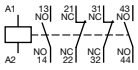
NS31ES



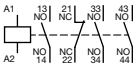
NS40ES



NS44ES

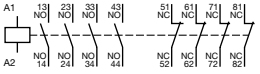


NS22ES

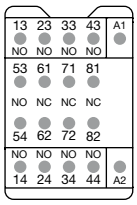


NS31ES

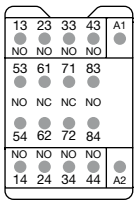
NS40ES



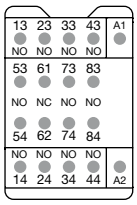
NS44ES



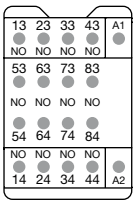
NS53ES



NS62ES



NS71ES



NS80ES

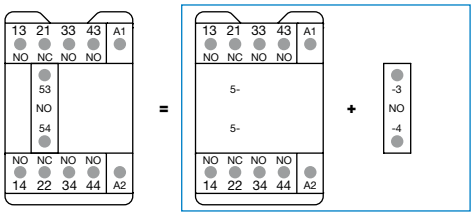
NS53ES

NS62ES

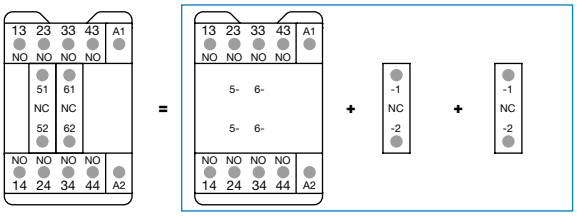
NS71ES

NS80ES

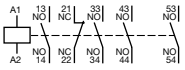
Other possible contact combinations with auxiliary contact blocks added by the user



Combination 41E = NS31ES + CA3-10S

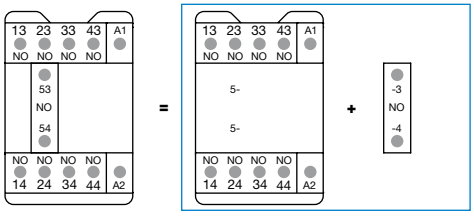


Combination 42E = NS40ES + CA3-01S + CA3-01S

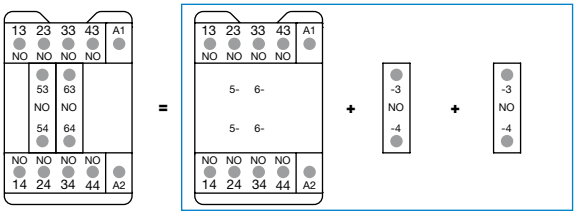


Combination 41E

Combination 42E

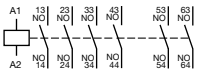


Combination 50E = NS40ES + CA3-10S



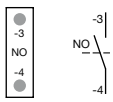
Combination 60E = NS40ES + CA3-10S + CA3-10S

Combination 50E

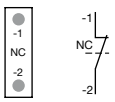


Combination 60E

CA3..S 1-pole auxiliary contact blocks



CA3-10S

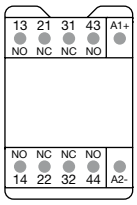


CA3-01S

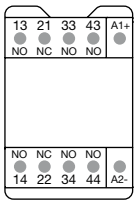
1SBC101416S0201

NSL..S contactor relays - with spring terminals
Terminal marking and positioning

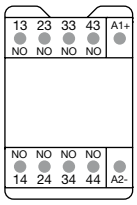
NSL..S contactor relays - DC operated (the polarity A1+, A2- must be respected)
Standard devices without addition of auxiliary contact blocks



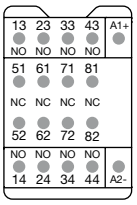
NSL22ES



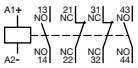
NSL31ES



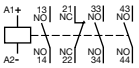
NSL40ES



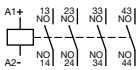
NSL44ES



NSL22ES

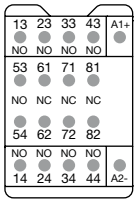


NSL31ES

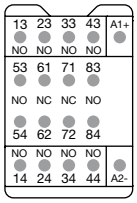


NSL40ES

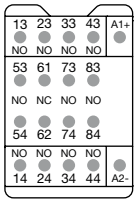
NSL44ES



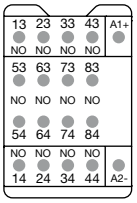
NSL53ES



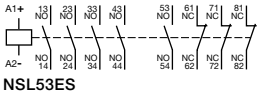
NSL62ES



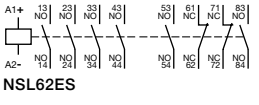
NSL71ES



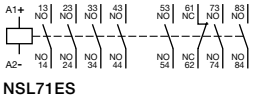
NSL80ES



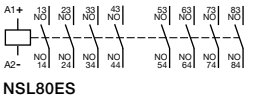
NSL53ES



NSL62ES

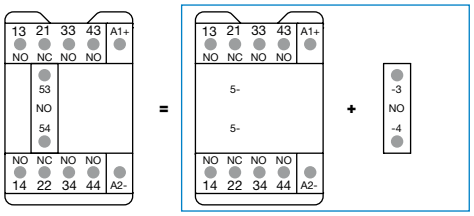


NSL71ES

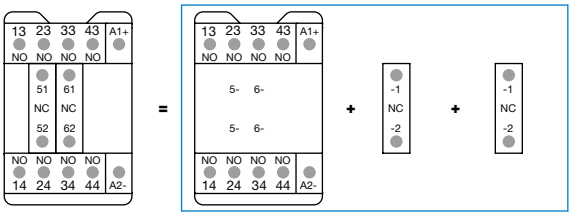


NSL80ES

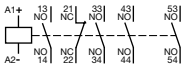
Other possible contact combinations with auxiliary contact blocks added by the user



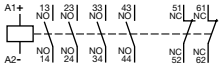
Combination 41E = NSL31ES + CA3-10S



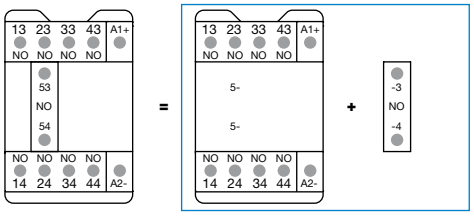
Combination 42E = NS4L0ES + CA3-01S + CA3-01S



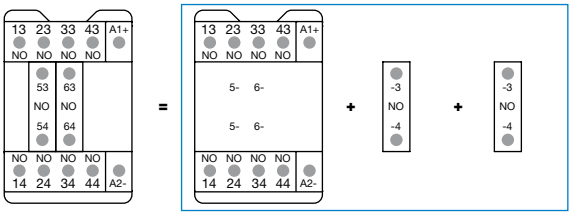
Combination 41E



Combination 42E

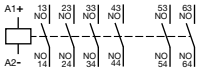


Combination 50E = NSL40ES + CA3-10S



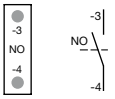
Combination 60E = NSL40ES + CA3-10S + CA3-10S

Combination 50E

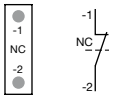


Combination 60E

CA3..S 1-pole auxiliary contact blocks



CA3-10S



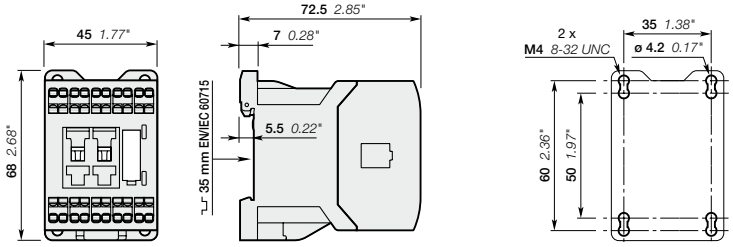
CA3-01S

4

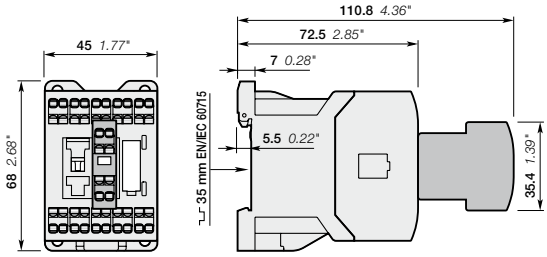
1SBC101416S0201

Main dimensions mm, *inches*

4-pole contactor relays

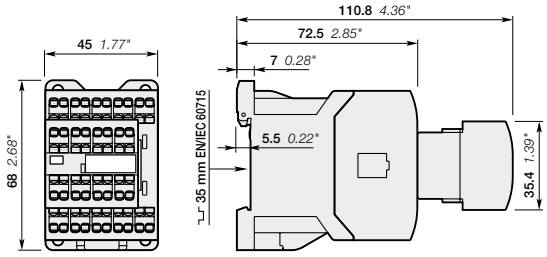


NS22ES, NS31ES, NS40ES



NS22ES, NS31ES, NS40ES
+ CA3..S front-mounted 1-pole auxiliary contact block

8-pole contactor relays



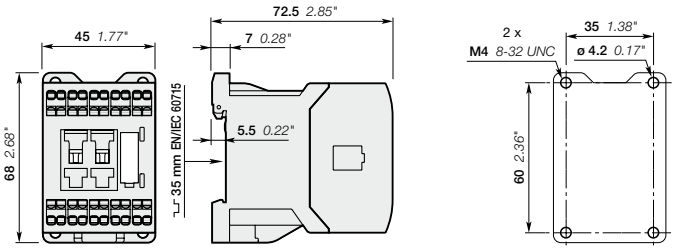
NS44ES, NS53ES, NS62ES, NS71ES, NS80ES

1SBC101417S0201

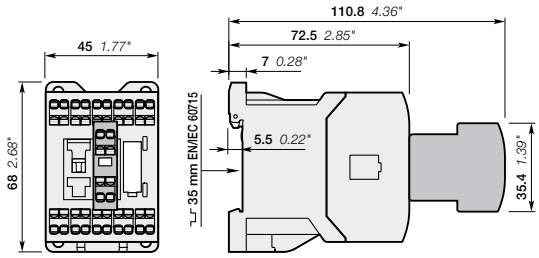
NSL..S contactor relays - with spring terminals

Main dimensions mm, *inches*

4-pole contactor relays

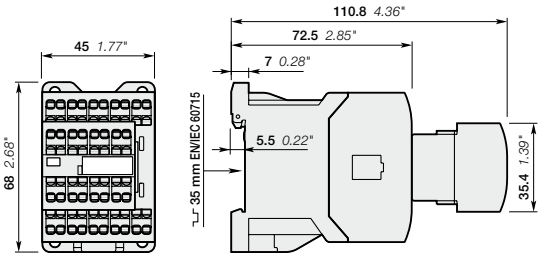


NSL22ES, NSL31ES, NSL40ES



NSL22ES, NSL31ES, NSL40ES
+ CA3..S front-mounted 1-pole auxiliary contact block

8-pole contactor relays



NSL44ES, NSL53ES, NSL62ES, NSL71ES, NSL80ES

1SBC101417S0201

Auxiliary contact blocks - with spring terminals
Accessories

CA3-10S

Description

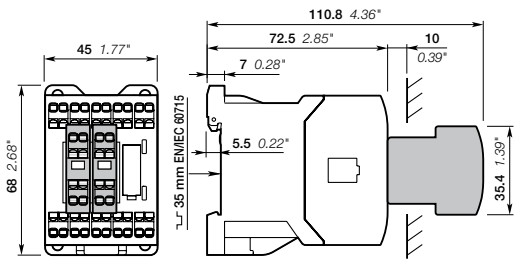
The auxiliary contact blocks are used for the operation of auxiliary circuits and control circuits.
CA3 1-pole auxiliary contact blocks, designed for standard industrial environments, are equipped with:
– N.O. or N.C. contacts.
– spring-type connecting terminals.
All 1-pole auxiliary contact blocks are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

4

Ordering details

For contactors	For contactor relays	Contact blocks		Type	Order code		Pkg qty	Weight (1 pce) kg
1-pole auxiliary contact blocks with spring terminals								
AS09..S ... AS16..S	NS..S, NSL..S	1	–	CA3-10S	1SBN011019T1010		10	0.011
ASL09..S ... ASL16..S		–	1	CA3-01S	1SBN011019T1001		10	0.011

Main dimensions mm, *inches*



1SBC101497S0201

Auxiliary contact blocks - with spring terminals
Front mounting

Technical data

Types		1-pole **CA3..S**

Contact utilization characteristics according to IEC

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

Contact utilization characteristics according to UL / CSA

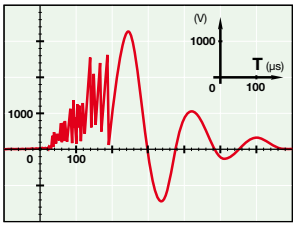
Standards	UL 508, CSA C22.2 N°14
Max. operational voltage	690 V AC, 250 V DC
Pilot duty	A600, Q300
AC thermal rated current	10 A
AC maximum volt-ampere making	7200 VA
AC maximum volt-ampere breaking	720 VA
DC thermal rated current	2.5 A
DC maximum volt-ampere making-breaking	69 VA

Connecting characteristics

Connection capacity (min. ... max.)			
	Rigid solid	**1 x**	0.75...2.5 mm²
		2 x	0.75...2.5 mm²
	Flexible with non insulated ferrule	**1 x**	0.75...2.5 mm²
		2 x	0.75...2.5 mm²
	Flexible with insulated ferrule	**1 x**	0.75...1.5 mm²
		2 x	0.75...1.5 mm²
Connection capacity acc. to UL / CSA		**1 or 2 x**	AWG 18...14
Stripping length			10 mm
Degree of protection			
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			IP20
Screw terminals			
All terminals			Spring terminals
Screwdriver type			Flat Ø 3.5

1SBC101498S0201

Surge suppressors for contactor coils
Accessories



4

1SBC101042F0014

RV5

1SBC101042F0014

RC5-1

1SBC101042F0014

RT5

Description

The operation of inductive circuits causes overvoltages, in particular on opening the contactor coil.
The electromagnetic energy stored in the coil during contactor closing is restored on opening in the form of surges, the slope and amplitude of which may rise to several kilovolts. A number of drawbacks are observed ranging from interference on the electronic devices to the breakdown of insulators and even the destruction of certain sensitive components.
The graph opposite reproduces the oscillogram showing voltage discharges at the terminals of a 42 V / 50 Hz coil without peak clipping. The coil was switched by 8 series-connected poles of a contactor relay.
Following a burst of discharges with a very steep slope, a damped oscillation emerges with a peak value of 3500 V.

Overvoltage Factor

The overvoltage factor k is defined as the ratio of the maximum overvoltage peak value Ûs to the peak value Ûc of the coil rated control voltage Uc:

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

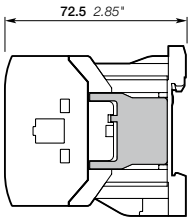
For example the following is obtained for the above graph: $k = \frac{3500}{42\ \sqrt{2}} \approx 60$

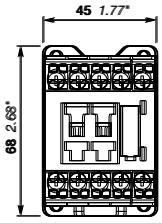
To reduce the harmful effects of these overvoltages, ABB has developed a range of surge suppressors designed to reduce the k factor defined above and to limit or even completely eliminate the high pre-damping voltage frequencies.
Each case is different, but the technical data tolerances and generous sizing of parts have enabled us to reduce the number of variants.
We have chosen the following solutions: transil diodes, varistors and RC blocks.
Note: A varistor is a resistor whose value decreases to a very large extent when a certain voltage is applied at its terminals.

Ordering details

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

Main dimensions mm, *inches*





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

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

1SBC101499S0201

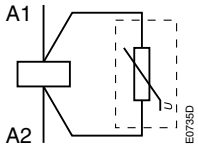
Surge suppressors for contactor coils
Technical data

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

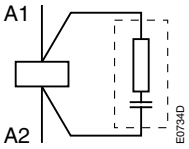
RC type	RC5-1/50	RC5-1/133	RC5-1/250	RC5-1/440
Rated control circuit voltage Uc	24...50 V AC	50...133 V AC	110...250 V AC	250...440 V AC
Residual overvoltage (clipping voltage)	2 to 3 x Uc max.			
Opening time growth factor	2...3			
Operating temperature	-20...+70 °C			
Advantages	Very fast clipping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

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

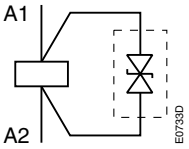
Wiring diagrams



Varistor



RC type



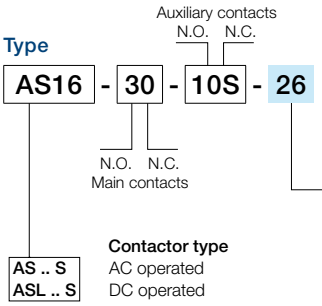
Transil diode

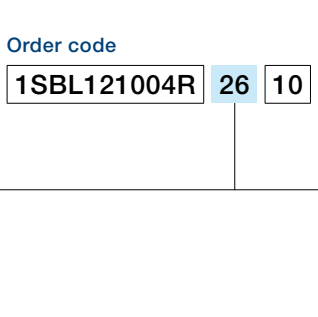
1SBC101602S0201

Voltage code table

The below tables indicate the available coil voltages and corresponding digits for order codes. When placing an order, please give either type or order code. Select a standard contactor from ordering detail pages. Change the **coil voltage code** in the type or in the order code according to the table below. Example: for contactor AS09-30-10S and coil 42 V 50/60 Hz, type is AS09-30-10S-**21** and order code is 1SBL101004R**21**10.

3-pole contactors - with spring terminals

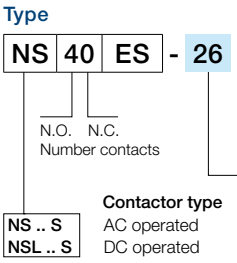


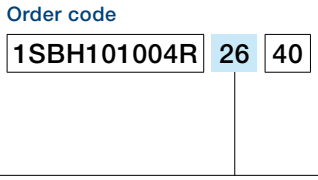


AC coil code	50 Hz	60 Hz
20	24 V	24 V
21	42 V	42 V
22	48 V	48 V
23	110 V	110 V
24	115 V	115 V
16	–	120 V
25	220 V	220 V
26	**230 V**	**230 V**
27	240 V	240 V
17	–	277 V
13	380 V	–
28	400 V	400 V
29	415 V	415 V

DC coil code	
80	12 V
81	24 V
83	48 V
84	60 V
86	110 V
87	125 V
88	220 V
89	240 V

Contactor relays - with spring terminals





AC coil code	50 Hz	60 Hz
20	24 V	24 V
21	42 V	42 V
22	48 V	48 V
23	110 V	110 V
24	115 V	115 V
16	–	120 V
25	220 V	220 V
26	**230 V**	**230 V**
27	240 V	240 V
17	–	277 V
13	380 V	–
28	400 V	400 V
29	415 V	415 V

DC coil code	
80	12 V
81	24 V
83	48 V
84	60 V
86	110 V
87	125 V
88	220 V
89	240 V

1SBC101621S0201

Notes

1SBC101720S0201

A, AF, EK contactors and NF contactor relays

AF, A 3-pole contactors

Contents **5**/3
Overview 3-pole contactors **5**/4
Ordering details 3-pole contactors **5**/6
Technical data 3-pole contactors **5**/58

AF, A and EK 4-pole contactors

Contents **5**/127
Overview 4-pole contactors **5**/128
Ordering details 4-pole contactors **5**/130
Technical data 4-pole contactors **5**/156

Contactors for capacitor switching

Contents **5**/189
Overview **5**/190
UA16..RA up to UA110..RA - Unlimited peak Î **5**/192
UA16 up to UA110 - Peak current Î ≤ 100 times the rms current **5**/201

Other contactors selection data **5/213**

NF contactor relays

Contents **5**/223
Ordering details **5**/224
Technical data **5**/232

Accessories for A, AF, EK contactors and NF contactor relays

Accessories for AF09 ... AF38 contactors and NF contactor relays **5**/241
Accessories for A40 ... AF2050 contactors **5**/253
Accessories for EK100 ... EK1000 contactors **5**/293

Voltage code table **5/310**

1SBC101720S0201

1SBC101721S0201

AF, A 3-pole contactors

Overview 5/4

Ordering details

4 to 18.5 kW / 5 to 20 hp

AF09 ... AF38	AC / DC operated	**5**/6
AF09Z ... AF38Z	AC / DC operated - low consumption	**5**/7

18.5 to 37 kW / 30 to 60 hp

A40	AC operated	**5**/10
A50 ... A75	AC operated	**5**/11
AL40	DC operated	**5**/12
AE50 ... AE75	DC operated	**5**/13
AF50 ... AF75	AC / DC operated	**5**/14
A50 ... A75	AC operated - with 1 N.O. + 1 N.C.	**5**/18
AE50 ... AE75	DC operated - with 1 N.O. + 1 N.C.	**5**/19
AF50 ... AF75	AC / DC operated - with 1 N.O. + 1 N.C.	**5**/20
TAL40	DC operated - large coil voltage range	**5**/24
TAE50 ... TAE75	DC operated	**5**/25

45 to 55 kW / 60 to 75 hp

A95 ... A110	AC operated	**5**/28
AF95 ... AF110	AC / DC operated	**5**/29
A95 ... A110	AC operated - with 1 N.O. + 1 N.C.	**5**/32
AF95 ... AF110	AC / DC operated - with 1 N.O. + 1 N.C.	**5**/33

75 to 560 kW / 100 to 900 hp

A145 ... A300	AC operated - with 1 N.O. + 1 N.C.	**5**/36
AF145 ... AF300	AC / DC operated - with 1 N.O. + 1 N.C.	**5**/37
AF400 ... AF750	AC / DC operated - with 1 N.O. + 1 N.C.	**5**/38
AF1250 ... AF2050	AC / DC operated - with 1 N.O. + 1 N.C.	**5**/39

4 to 55 kW / 60 to 75 hp - 2-stack

AF09 ... AF38	AC / DC operated	**5**/42
AF09Z ... AF38Z	AC / DC operated - low consumption	**5**/43
A40	AC operated	**5**/46
A50 ... A110	AC operated	**5**/47
AL40	DC operated	**5**/48

75 to 560 kW / 100 to 900 hp

A145 ... A300	AC operated - with 2 N.O. + 2 N.C.	**5**/52
AF145 ... AF300	AC / DC operated - with 2 N.O. + 2 N.C.	**5**/53
AF400 ... AF750	AC / DC operated - with 2 N.O. + 2 N.C.	**5**/54
AF1250 ... AF2050	AC / DC operated - with 2 N.O. + 2 N.C.	**5**/55

Technical data 5/58

Electrical durability **5**/80

Terminal marking and positioning 5/86

Main dimensions 5/90

1SBC101721S0201

3-pole contactors, for all industrial applications and motor starting

New

New

IEC	**AC-3 Rated operational power**	θ ≤ 55 °C*, 400 V	**kW**	4	5.5	7.5	11	15	18.5	18.5	22	30	37
UL/CSA	**3-phase motor rating**	480 V	**hp**	5	7.5	10	15	20	20	30	40	60	60
AC Control supply			Type	AF09	AF12	AF16	AF26	AF30	AF38	A40	A50	A63	A75
DC Control supply			Type	AF09	AF12	AF16	AF26	AF30	AF38	AL40	AE50	AE63	AE75
AC / DC Control supply			Type	AF09	AF12	AF16	AF26	AF30	AF38	–	AF50	AF63	AF75
IEC	**AC-3 Rated operational current**	θ ≤ 55 °C*, 400 V	**A**	9	12	18	26	32	38	37	50	65	75
	AC-1 Rated operational current	θ ≤ 40 °C, 690 V	**A**	25	28	30	45	50	50	60	100	115	125
UL/CSA	**General use rating**	600 V	**A**	25	28	30	45	50	50	60	80	90	105
NEMA	**NEMA Size**			00	0	–	1	–	–	–	2	–	3

* θ ≤ 60 °C for AF09 ... AF38 contactors

Main accessories

Auxiliary contact blocks	Front mounting	**CA4-10** (1 x N.O.), **CA4-01** (1 x N.C.)		**CA5-10** (1 x N.O.), **CA5-01** (1 x N.C.)	
	Side mounting	**CAL4-11** (1 x N.O. + 1 x N.C.)		**CAL5-11** (1 x N.O. + 1 x N.C.)	
Timers	Pneumatic (Front mounting)			**TP40DA, TP180DA** Direct timing **TP40IA, TP180IA** Inverse timing	
Interlocking units	Mechanical	**VM4**		**VM5-1**	
	Mechanical / Electrical	**VEM4**		**VE5-1**	**VE5-2**
Connection sets	For reversing contactors	**BER16-4**	**BER38-4**	**BER40V**	**BEM75-30**
Surge suppressors	Varistor (AC / DC)			**RV5** (24...440 V)	
AF contactors have built-in surge protection	RC type (AC)			**RC5-1** (24...440 V)	**RC5-2** (24...440 V)
	Transil diode (DC)			**RT5** (12...264 V)	

Overload relays

Thermal relays	Class 10 (10A or 20 for TA42DU to TA80DU)	**TF42** (0.10...38 A)		**TA42DU** (18...42 A)	**TA75DU** (18...80 A)
Accessories for thermal overload relays	Remote tripping coil				
	Remote reset coil				
	Wall/separate mounting kit	**DB42**		**DB80**	
Electronic relays	Class 10E, 20E, 30E	**EF19** (0.10...18.9 A)	**EF19** (0.10...18.9 A), **EF45** (9...45 A)	**E45DU** (9...45 A)	**E80DU** (27...80 A)
Accessories for electronic overload relays	Wall/separate mounting kit	**DB16E** (to use with E16DU), **DB45** (to use with E45DU)		**DB45E, DB80E**	

Manual motor starters

Thermal / magnetic protection	Class 10	**MS116** for class 10A (0.10...32 A) Ics up to 50 kA		**MS450** (28...50 A) Ics up to 50 kA		
		MS132 (0.10...32 A) Ics up to 100 kA			**MS495** (45...100 A) Ics up to 50 kA	
				MS497 (22...100 A) Ics up to 100 kA		
	Class 20			**MS451** (11...50 A) Ics up to 50 kA		
					MS496 (28...100 A) Ics up to 100 kA	
Magnetic only types		**MO132** (0.16...32 A)		**MO450** (40...50 A) Ics up to 50 kA		**MO495**
				MO496 (16...100 A) Ics up to 100 kA		
Accessories	For contactor mounting	**BEA16-4**	**BEA38-4**	**BEA40/450**	**BEA50/450,**	
	Auxiliary trip units, auxiliary contacts, busbars	**HKF1, HK1, UA1, AA1, PS1, S1, SK1** **CK1** (MS132, MO132 only)		**HK4, HKS4, UA4, AA4, PS4, S4, SK4**		

	45	55	75	90	110	140	160	200	250	315	400	–	475	560	–
	60	75	100	125	150	200	250	350	400	500	600	–	800	900	–
	A95	A110	A145	A185	A210	A260	A300	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050
	AF95	AF110	AF145	AF185	AF210	AF260	AF300	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050
	AF95	AF110	AF145	AF185	AF210	AF260	AF300	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050
	96	110	145	185	210	260	305	400	460	580	750	–	860	1050	–
	145	160	250	275	350	400	500	600	700	800	1050	1260	1350	1650	2050
	125	140	230	250	300	350	400	550	650	750	900	1210	1350	1650	2100
	–	–	4	–	–	5	–	–	6	–	7	–	–	8	–

	CAL18-11 (1 x N.O. + 1 x N.C.)						
		VM300H / VM300V		**VM750H / VM750V**		**VM1650H**	
	BEM110-30	**BEM185-30**	**BEM300-30**	**BEM460-30**	**BEM750-30**		
		RC5-3 (250...440V)					

	TA80DU (29...80 A) **TA110DU** (65...110 A)	**TA200DU** (66...200 A)	**TA450DU/SU** (130...310 A) class 30 for SU			
			DS25-A			
			DR25-A			
	DB80, DB200	**DB200**	**DT450/A**			
	E140DU (50...140 A)	**E200DU** (60...200 A)	**E320DU** (100...320 A)	**E500DU** (150...500 A)	**E800DU** (250...800 A)	**E1250DU** (375...1250 A)
	DB140E					

Circuit breakers

Tmax Circuit breaker and accessories

(63...100 A) Ics up to 50 kA

BEA75/495

1SBC101555S0201

AF09 ... AF38 3-pole contactors
4 to 18.5 kW
AC / DC operated

AF09-30-10

AF26-30-00

5

Description

AF09 ... AF38 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles.

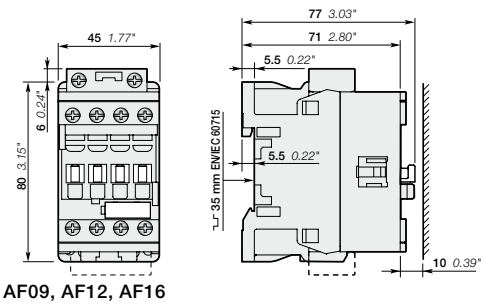
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening.
– built-in surge suppression
– add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

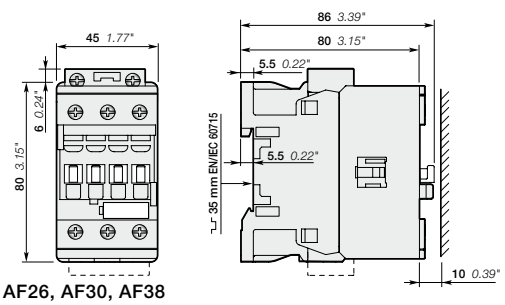
IEC		UL/CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC						kg
4	25	5	25	24...60	20...60 (1)	1	0	AF09-30-10-11	1SBL137001R1110		0.270
						0	1	AF09-30-01-11	1SBL137001R1101		0.270
				48...130	48...130	1	0	AF09-30-10-12	1SBL137001R1210		0.270
						0	1	AF09-30-01-12	1SBL137001R1201		0.270
				100...250	100...250	1	0	AF09-30-10-13	1SBL137001R1310		0.270
						0	1	AF09-30-01-13	1SBL137001R1301		0.270
				250...500	250...500	1	0	AF09-30-10-14	1SBL137001R1410		0.310
						0	1	AF09-30-01-14	1SBL137001R1401		0.310
5.5	28	7.5	28	24...60	20...60 (1)	1	0	AF12-30-10-11	1SBL157001R1110		0.270
						0	1	AF12-30-01-11	1SBL157001R1101		0.270
				48...130	48...130	1	0	AF12-30-10-12	1SBL157001R1210		0.270
						0	1	AF12-30-01-12	1SBL157001R1201		0.270
				100...250	100...250	1	0	AF12-30-10-13	1SBL157001R1310		0.270
						0	1	AF12-30-01-13	1SBL157001R1301		0.270
				250...500	250...500	1	0	AF12-30-10-14	1SBL157001R1410		0.310
						0	1	AF12-30-01-14	1SBL157001R1401		0.310
7.5	30	10	30	24...60	20...60 (1)	1	0	AF16-30-10-11	1SBL177001R1110		0.270
						0	1	AF16-30-01-11	1SBL177001R1101		0.270
				48...130	48...130	1	0	AF16-30-10-12	1SBL177001R1210		0.270
						0	1	AF16-30-01-12	1SBL177001R1201		0.270
				100...250	100...250	1	0	AF16-30-10-13	1SBL177001R1310		0.270
						0	1	AF16-30-01-13	1SBL177001R1301		0.270
				250...500	250...500	1	0	AF16-30-10-14	1SBL177001R1410		0.310
						0	1	AF16-30-01-14	1SBL177001R1401		0.310
11	45	15	45	24...60	20...60 (1)	0	0	AF26-30-00-11	1SBL237001R1100		0.310
				48...130	48...130	0	0	AF26-30-00-12	1SBL237001R1200		0.310
				100...250	100...250	0	0	AF26-30-00-13	1SBL237001R1300		0.310
				250...500	250...500	0	0	AF26-30-00-14	1SBL237001R1400		0.350
15	50	20	50	24...60	20...60 (1)	0	0	AF30-30-00-11	1SBL277001R1100		0.310
				48...130	48...130	0	0	AF30-30-00-12	1SBL277001R1200		0.310
				100...250	100...250	0	0	AF30-30-00-13	1SBL277001R1300		0.310
				250...500	250...500	0	0	AF30-30-00-14	1SBL277001R1400		0.350
18.5	50	20	50	24...60	20...60 (1)	0	0	AF38-30-00-11	1SBL297001R1100		0.310
				48...130	48...130	0	0	AF38-30-00-12	1SBL297001R1200		0.310
				100...250	100...250	0	0	AF38-30-00-13	1SBL297001R1300		0.310
				250...500	250...500	0	0	AF38-30-00-14	1SBL297001R1400		0.350

(1) AF..-30-..-11 not suitable for direct control by PLC-output.

Main dimensions mm, *inches*



AF09, AF12, AF16



AF26, AF30, AF38

1SBC101371S0201

AF09Z ... AF38Z 3-pole contactors
4 to 18.5 kW
AC / DC operated - low consumption

AF09Z-30-10

AF26Z-30-00

Description

AF09Z ... AF38Z contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles.

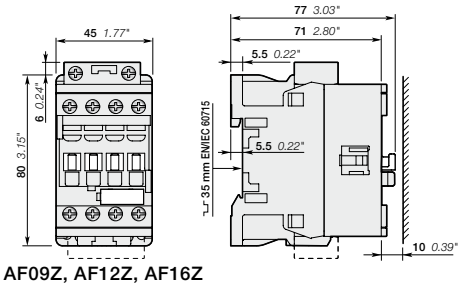
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...250 V 50/60 Hz and 12...250 V DC
  - can manage large control voltage variations
  - allow direct control by PLC-output ≥ 24 V DC 500 mA
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
– built-in surge suppression
– add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

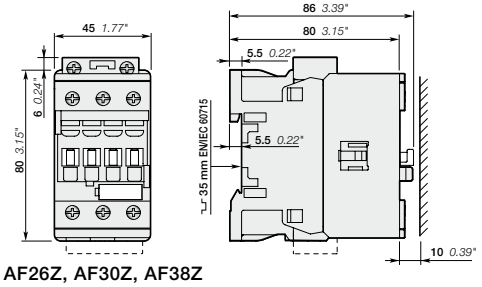
IEC		UL/CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC						kg
4	25	5	25	-	12...20	1	0	AF09Z-30-10-20	1SBL136001R2010		0.310
						0	1	AF09Z-30-01-20	1SBL136001R2001		0.310
				24...60	20...60	1	0	AF09Z-30-10-21	1SBL136001R2110		0.310
						0	1	AF09Z-30-01-21	1SBL136001R2101		0.310
				48...130	48...130	1	0	AF09Z-30-10-22	1SBL136001R2210		0.310
						0	1	AF09Z-30-01-22	1SBL136001R2201		0.310
				100...250	100...250	1	0	AF09Z-30-10-23	1SBL136001R2310		0.310
						0	1	AF09Z-30-01-23	1SBL136001R2301		0.310
5.5	28	7.5	28	-	12...20	1	0	AF12Z-30-10-20	1SBL156001R2010		0.310
						0	1	AF12Z-30-01-20	1SBL156001R2001		0.310
				24...60	20...60	1	0	AF12Z-30-10-21	1SBL156001R2110		0.310
						0	1	AF12Z-30-01-21	1SBL156001R2101		0.310
				48...130	48...130	1	0	AF12Z-30-10-22	1SBL156001R2210		0.310
						0	1	AF12Z-30-01-22	1SBL156001R2201		0.310
				100...250	100...250	1	0	AF12Z-30-10-23	1SBL156001R2310		0.310
						0	1	AF12Z-30-01-23	1SBL156001R2301		0.310
7.5	30	10	30	-	12...20	1	0	AF16Z-30-10-20	1SBL176001R2010		0.310
						0	1	AF16Z-30-01-20	1SBL176001R2001		0.310
				24...60	20...60	1	0	AF16Z-30-10-21	1SBL176001R2110		0.310
						0	1	AF16Z-30-01-21	1SBL176001R2101		0.310
				48...130	48...130	1	0	AF16Z-30-10-22	1SBL176001R2210		0.310
						0	1	AF16Z-30-01-22	1SBL176001R2201		0.310
				100...250	100...250	1	0	AF16Z-30-10-23	1SBL176001R2310		0.310
						0	1	AF16Z-30-01-23	1SBL176001R2301		0.310
11	45	15	45	-	12...20	0	0	AF26Z-30-00-20	1SBL236001R2000		0.350
				24...60	20...60	0	0	AF26Z-30-00-21	1SBL236001R2100		0.350
				48...130	48...130	0	0	AF26Z-30-00-22	1SBL236001R2200		0.350
				100...250	100...250	0	0	AF26Z-30-00-23	1SBL236001R2300		0.350
15	50	20	50	-	12...20	0	0	AF30Z-30-00-20	1SBL276001R2000		0.350
				24...60	20...60	0	0	AF30Z-30-00-21	1SBL276001R2100		0.350
				48...130	48...130	0	0	AF30Z-30-00-22	1SBL276001R2200		0.350
				100...250	100...250	0	0	AF30Z-30-00-23	1SBL276001R2300		0.350
18.5	50	20	50	-	12...20	0	0	AF38Z-30-00-20	1SBL296001R2000		0.350
				24...60	20...60	0	0	AF38Z-30-00-21	1SBL296001R2100		0.350
				48...130	48...130	0	0	AF38Z-30-00-22	1SBL296001R2200		0.350
				100...250	100...250	0	0	AF38Z-30-00-23	1SBL296001R2300		0.350

Note: Only AF..Z contactors with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.

Main dimensions mm, *inches*



AF09Z, AF12Z, AF16Z

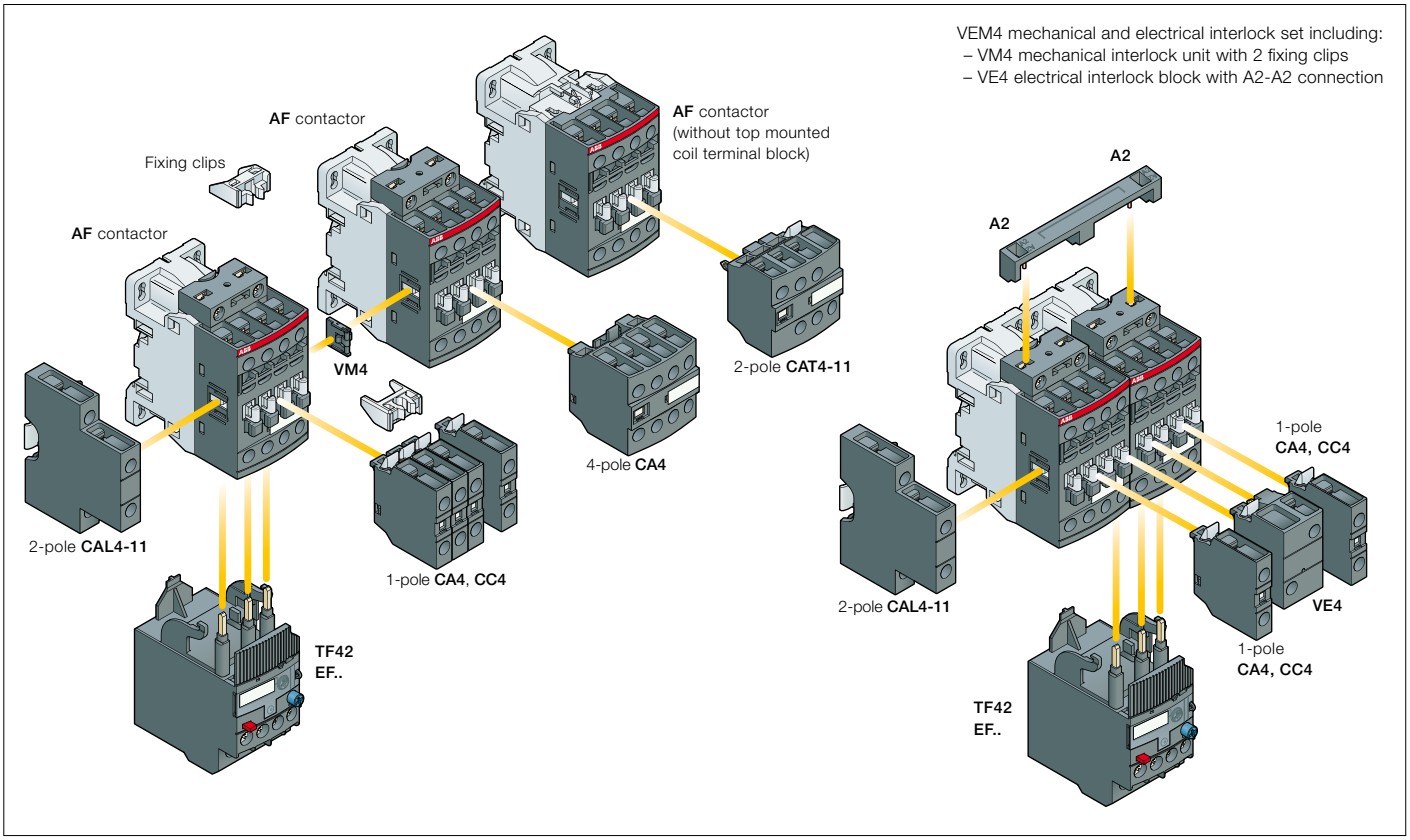


AF26Z, AF30Z, AF38Z

1SBC101372S0201

AF09 ... AF38 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								Electrical and mechanical interlock set (between 2 contactors)		Side-mounted accessories: Auxiliary contact blocks		
					1-pole CA4 / 1-pole CC4		2-pole CAT4-11		4-pole CA4				VEM4		2-pole CAL4-11 Left side		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		–	+	1		–
					2 max.		–		–		–	+	1	+	1
					3 max.		–		–	+	1	+	1	or	1
AF09 ... AF16	3	0	1	0	4 max.	or	1	or	1		–	+	1		–
AF26 ... AF38	3	0	0	0	2 max.	or	1		–		–	+	1	+	1
					3 max.		–		–	+	1	+	1	or	1

Overload relays fitting details (1)

Contactor types	Thermal overload relays	Electronic overload relays
AF09 ... AF38	TF42 (0.10...38 A)	EF19 (0.10...18.9 A)
AF26 ... AF38	–	EF45 (9...38 A)

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

1SBC101384S0201

AF09 ... AF38 3-pole contactors
Main accessories

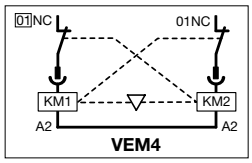
CA4-10

CAL4-11

CA4-22M

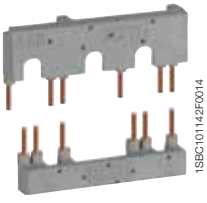
CAT4-11E

VEM4



VEM4

BEA16-4



BER16-4

LDC4

BX4

BX4-CA

Ordering details (1)

For contacts	Auxiliary contacts	Type	Order code		Pkg qty	Weight (1 pce) kg
Front-mounted instantaneous auxiliary contact blocks						
AF09 ... AF38	1 0 – –	CA4-10	1SBN010110R1010		1	0.014
	1 0 – –	CA4-10-T	1SBN010110T1010		10	0.014
	0 1 – –	CA4-01	1SBN010110R1001		1	0.014
	0 1 – –	CA4-01-T	1SBN010110T1001		10	0.014
AF09 ... AF16..-30-10	2 2 – –	CA4-22M	1SBN010140R1122		1	0.055
	3 1 – –	CA4-31M	1SBN010140R1131		1	0.055
	1 3 – –	CA4-13M	1SBN010140R1113		1	0.055
	0 4 – –	CA4-04M	1SBN010140R1104		1	0.055
AF26 ... AF38..-30-00	2 2 – –	CA4-22E	1SBN010140R1022		1	0.055
	3 1 – –	CA4-31E	1SBN010140R1031		1	0.055
	4 0 – –	CA4-40E	1SBN010140R1040		1	0.055
	0 4 – –	CA4-04E	1SBN010140R1004		1	0.055
AF09 ... AF16..-30-01	2 2 – –	CA4-22U	1SBN010140R1322		1	0.055
	3 1 – –	CA4-31U	1SBN010140R1331		1	0.055
	4 0 – –	CA4-40U	1SBN010140R1340		1	0.055
Front-mounted auxiliary contact blocks with N.O. leading contact and N.C. lagging contact						
AF09 ... AF38	– – 1 0	CC4-10	1SBN010111R1010		1	0.014
	– – 0 1	CC4-01	1SBN010111R1001		1	0.014
Side-mounted instantaneous auxiliary contact blocks						
AF09 ... AF38	1 1 – –	CAL4-11	1SBN010120R1011		1	0.040
	1 1 – –	CAL4-11-T	1SBN010120T1011		10	0.040
Front-mounted instantaneous auxiliary contact and A1/A2 coil terminal blocks						
AF09 ... AF16..-30-10	1 1 – –	CAT4-11M	1SBN010151R1111		1	0.040
AF26 ... AF38..-30-00	1 1 – –	CAT4-11E	1SBN010151R1011		1	0.040
AF09 ... AF16..-30-01	1 1 – –	CAT4-11U	1SBN010151R1311		1	0.040
Mechanical interlock unit						
AF09 ... AF38		VM4	1SBN030105T1000		10	0.005
Mechanical and electrical interlock set						
AF09 ... AF16 AF26 ... AF38	1 1 – –	VEM4	1SBN030111R1000		1	0.035
Connecting links with manual motor starters						
AF09 ... AF16	with MS116-0.16 ... MS116-25, MS132-0.16 ... MS132-25	BEA16-4	1SBN081306T1000		10	0.025
AF26 ... AF38	with MS116-0.16 ... MS116-16, MS132-0.16 ... MS132-10	BEA26-4	1SBN082306T1000		10	0.025
	with MS116-20 ... MS116-32, MS132-12 ... MS132-32	BEA38-4	1SBN082306T2000		10	0.030
Connection sets for reversing contactors						
AF09 ... AF16		BER16-4	1SBN081311R1000		1	0.045
AF26 ... AF38		BER38-4	1SBN082311R1000		1	0.100
Connection sets for star-delta starting						
AF09 ... AF16		BEY16-4	1SBN081313R2000		1	0.050
AF26 ... AF38		BEY38-4	1SBN082713R2000		1	0.110
Additional coil terminal block						
AF09 ... AF38		LDC4	1SBN070156T1000		10	0.010
Protective covers						
All 1-stack contactors		BX4	1SBN110108T1000		10	0.006
For 4-pole CA4 and 2-pole CAT4 auxiliary contact blocks		BX4-CA	1SBN110109W1000		50	0.001

Note: CAT4 not fittable on AF..Z contactors with DC control voltage 12...20 V DC.

Note: VM4 includes 2 fixing clips (BB4) to maintain together both contactors.

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 fittable on AF..Z contactors with DC control voltage 12...20 V DC.

Note: with or without VM4 or VEM4

(1) See "Main accessory fitting details" table.

1SBC101385S0201

A40 3-pole contactors
18.5 kW
AC operated

A40-30-10

5

Description

A40 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC or 220 V DC.

These contactors are of the block type design with:

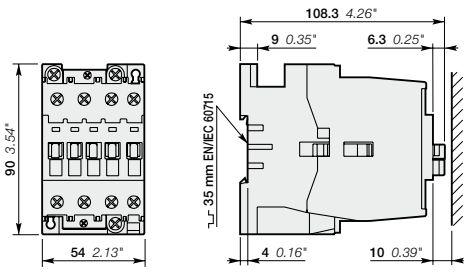
– 3 main poles and 1 built-in auxiliary contact
– control circuit: AC operated
– add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50 Hz	V 60 Hz						kg
18.5	60	30	60	24	24	1	0	A40-30-10	1SBL321001R8110		0.710
						0	1	A40-30-01	1SBL321001R8101		0.710
				48	48	1	0	A40-30-10	1SBL321001R8310		0.710
						0	1	A40-30-01	1SBL321001R8301		0.710
				110	110...120	1	0	A40-30-10	1SBL321001R8410		0.710
						0	1	A40-30-01	1SBL321001R8401		0.710
				220...230	230...240	1	0	A40-30-10	1SBL321001R8010		0.710
						0	1	A40-30-01	1SBL321001R8001		0.710
				230...240	240...260	1	0	A40-30-10	1SBL321001R8810		0.710
						0	1	A40-30-01	1SBL321001R8801		0.710
				380...400	400...415	1	0	A40-30-10	1SBL321001R8510		0.710
						0	1	A40-30-01	1SBL321001R8501		0.710
				400...415	415...440	1	0	A40-30-10	1SBL321001R8610		0.710
						0	1	A40-30-01	1SBL321001R8601		0.710

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



A40

1SBC101362S0201

A50 ... A75 3-pole contactors
22 to 37 kW
AC operated

A50-30-00

Description

A50 ... A75 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC / 1000 V AC or 220 V DC.

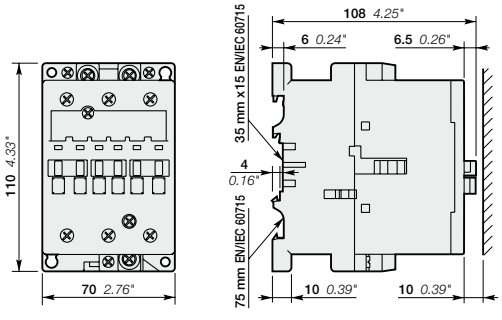
These contactors are of the block type design with:
- 3 main poles
- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50 Hz	V 60 Hz						kg
22	100	40	80	24	24	0	0	A50-30-00	1SBL351001R8100		1.160
				48	48	0	0	A50-30-00	1SBL351001R8300		1.160
				110	110...120	0	0	A50-30-00	1SBL351001R8400		1.160
				220...230	230...240	0	0	A50-30-00	1SBL351001R8000		1.160
				230...240	240...260	0	0	A50-30-00	1SBL351001R8800		1.160
				380...400	400...415	0	0	A50-30-00	1SBL351001R8500		1.160
				400...415	415...440	0	0	A50-30-00	1SBL351001R8600		1.160
30	115	60	90	24	24	0	0	A63-30-00	1SBL371001R8100		1.160
				48	48	0	0	A63-30-00	1SBL371001R8300		1.160
				110	110...120	0	0	A63-30-00	1SBL371001R8400		1.160
				220...230	230...240	0	0	A63-30-00	1SBL371001R8000		1.160
				230...240	240...260	0	0	A63-30-00	1SBL371001R8800		1.160
				380...400	400...415	0	0	A63-30-00	1SBL371001R8500		1.160
				400...415	415...440	0	0	A63-30-00	1SBL371001R8600		1.160
37	125	60	105	24	24	0	0	A75-30-00	1SBL411001R8100		1.160
				48	48	0	0	A75-30-00	1SBL411001R8300		1.160
				110	110...220	0	0	A75-30-00	1SBL411001R8400		1.160
				220...230	230...240	0	0	A75-30-00	1SBL411001R8000		1.160
				230...240	240...260	0	0	A75-30-00	1SBL411001R8800		1.160
				380...400	400...415	0	0	A75-30-00	1SBL411001R8500		1.160
				400...415	415...440	0	0	A75-30-00	1SBL411001R8600		1.160

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



A50, A63, A75

1SBC101363S0201

AL40 3-pole contactors
18.5 kW
DC operated

AL40-30-10

Description

AL40 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC or 220 V DC.

These contactors are of the block type design with:

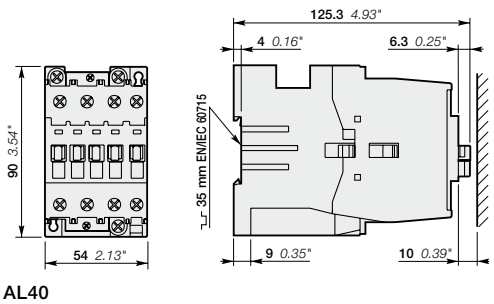
– 3 main poles and 1 built-in auxiliary contact
– control circuit: low consumption (3.5 W at pull-in and holding) DC operated with solid core magnet Suitable for direct control by PLC outputs (the polarity on the coil terminals A1+ and A2- must be respected)
– add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc (1)	Auxiliary contacts fitted		Type	Order code		Weight Pkg (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							
kW	A	hp	A	V DC						kg
18.5	60	30	60	12	1	0	AL40-30-10	1SBL323001R8010		0.850
					0	1	AL40-30-01	1SBL323001R8001		0.850
				24	1	0	AL40-30-10	1SBL323001R8110		0.850
					0	1	AL40-30-01	1SBL323001R8101		0.850
				48	1	0	AL40-30-10	1SBL323001R8310		0.850
					0	1	AL40-30-01	1SBL323001R8301		0.850
				60	1	0	AL40-30-10	1SBL323001R8410		0.850
					0	1	AL40-30-01	1SBL323001R8401		0.850
				110	1	0	AL40-30-10	1SBL323001R8610		0.850
					0	1	AL40-30-01	1SBL323001R8601		0.850
				125	1	0	AL40-30-10	1SBL323001R8710		0.850
					0	1	AL40-30-01	1SBL323001R8701		0.850
				220	1	0	AL40-30-10	1SBL323001R8810		0.850
					0	1	AL40-30-01	1SBL323001R8801		0.850
				240	1	0	AL40-30-10	1SBL323001R8910		0.850
					0	1	AL40-30-01	1SBL323001R8901		0.850

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



AL40

1SBC101365S0201

AE50 ... AE75 3-pole contactors
22 to 37 kW
DC operated

AE50-30-00

Description

AE50 ... AE75 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC / 1000 V AC or 220 V DC.

These contactors are of the block type design with:

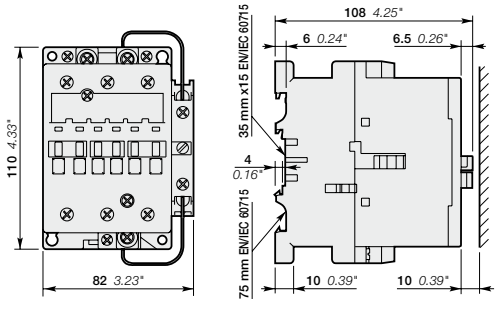
– 3 main poles
– control circuit: DC operated with double winding coil (and factory-mounted lagging contact for "holding" winding insertion)
– add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc (1)	Auxiliary contacts fitted		Type	Order code		Weight Pkg (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							
kW	A	hp	A	V DC						kg
22	100	40	80	12	0	0	AE50-30-00	1SBL359001R8000		1.200
				24	0	0	AE50-30-00	1SBL359001R8100		1.200
				48	0	0	AE50-30-00	1SBL359001R8300		1.200
				60	0	0	AE50-30-00	1SBL359001R8400		1.200
				110	0	0	AE50-30-00	1SBL359001R8600		1.200
				125	0	0	AE50-30-00	1SBL359001R8700		1.200
				220	0	0	AE50-30-00	1SBL359001R8800		1.200
				240	0	0	AE50-30-00	1SBL359001R8900		1.200
30	115	60	90	12	0	0	AE63-30-00	1SBL379001R8000		1.200
				24	0	0	AE63-30-00	1SBL379001R8100		1.200
				48	0	0	AE63-30-00	1SBL379001R8300		1.200
				60	0	0	AE63-30-00	1SBL379001R8400		1.200
				110	0	0	AE63-30-00	1SBL379001R8600		1.200
				125	0	0	AE63-30-00	1SBL379001R8700		1.200
				220	0	0	AE63-30-00	1SBL379001R8800		1.200
				240	0	0	AE63-30-00	1SBL379001R8900		1.200
37	125	60	105	12	0	0	AE75-30-00	1SBL419001R8000		1.200
				24	0	0	AE75-30-00	1SBL419001R8100		1.200
				48	0	0	AE75-30-00	1SBL419001R8300		1.200
				60	0	0	AE75-30-00	1SBL419001R8400		1.200
				110	0	0	AE75-30-00	1SBL419001R8600		1.200
				125	0	0	AE75-30-00	1SBL419001R8700		1.200
				220	0	0	AE75-30-00	1SBL419001R8800		1.200
				240	0	0	AE75-30-00	1SBL419001R8900		1.200

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



AE50, AE63, AE75

1SBC101366S0201

AF50 ... AF75 3-pole contactors
22 to 37 kW
AC / DC operated

AF50-30-00

5

Description

AF50 ... AF75 contactors are mainly used for controlling 3-phase motors and generally for controlling power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

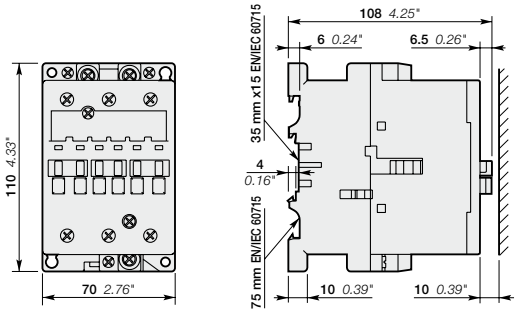
– 3 main poles
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
  - can manage large control voltage variations
  - only 3 coils to cover control voltages between 48...250 V 50/60 Hz and 20...250 V DC
  - reduced panel 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 front or side mounting and a wide range of accessories.

Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50 Hz	V 60 Hz						kg
22	100	40	80	-	20...60	0	0	AF50-30-00	1SBL357001R7200 (1)		1.180
				48...130	48...130	0	0	AF50-30-00	1SBL357001R6900		1.180
				100...250	100...250	0	0	AF50-30-00	1SBL357001R7000		1.180
30	115	60	90	-	20...60	0	0	AF63-30-00	1SBL377001R7200 (1)		1.180
				48...130	48...130	0	0	AF63-30-00	1SBL377001R6900		1.180
				100...250	100...250	0	0	AF63-30-00	1SBL377001R7000		1.180
37	125	60	105	-	20...60	0	0	AF75-30-00	1SBL417001R7200 (1)		1.180
				48...130	48...130	0	0	AF75-30-00	1SBL417001R6900		1.180
				100...250	100...250	0	0	AF75-30-00	1SBL417001R7000		1.180

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

Main dimensions mm, *inches*



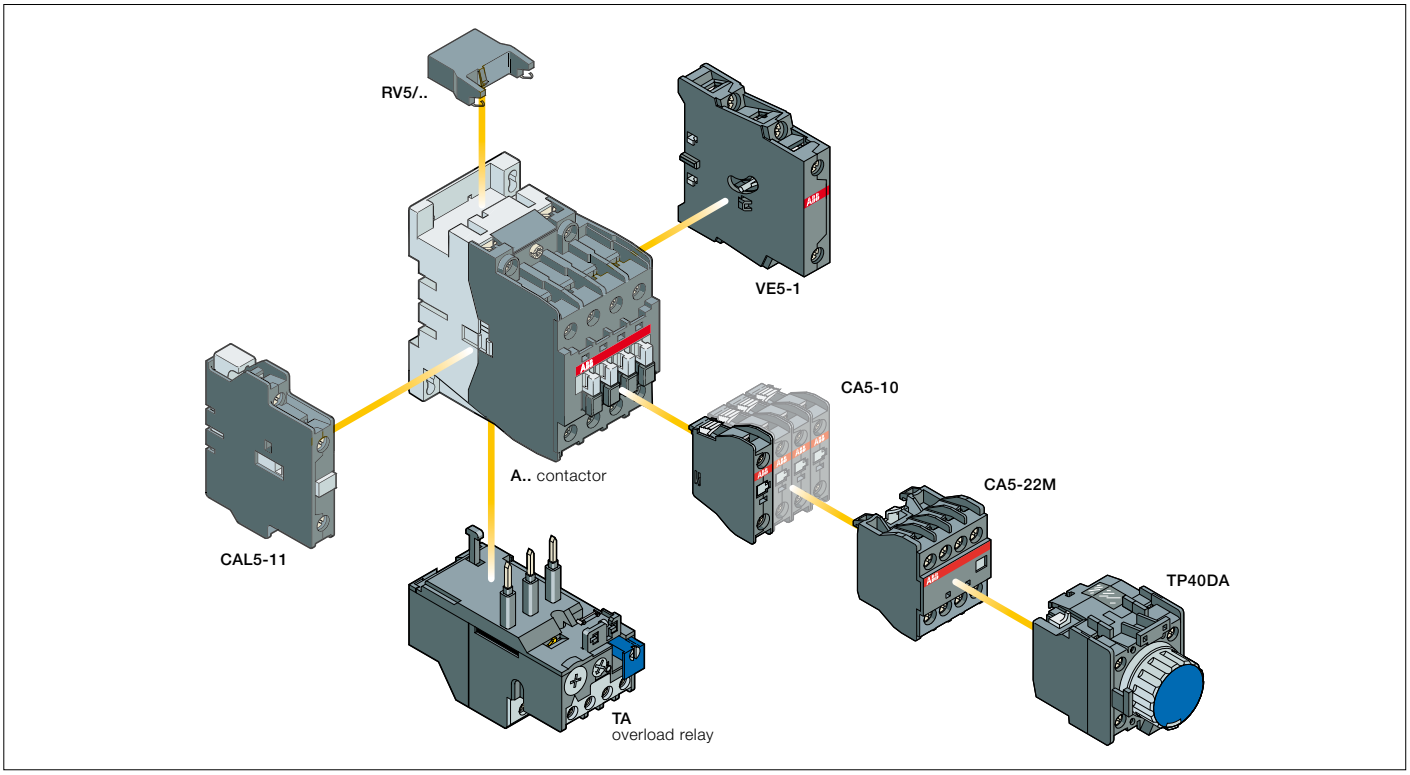
AF50, AF63, AF75

1SBC101368S0201

Notes

A40 … A75, AL, AE and AF50 … AF75 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				Pneumatic timer		Side-mounted accessories: Auxiliary contact blocks		Interlock unit
			1-pole CA5-..		4-pole CA5-..		TP.. A		2-pole CAL5-11		VM5-.. or VE5-..
A40	3 0 3 0	1 0 0 1 (2)	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	or	1 x VM5-1 or VE5-1 +1 x CAL5-11
A50 ... A75	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	or	1 x VE5-2 +1 x CAL5-11
AL40	3 0 3 0	1 0 0 1	1 to 5 x CA5-.. (2)	or	1 x CA5-.. (4-pole) (2) + 1 x 1-pole CA5-..		–	or	1 x CAL5-11 (3)	+	1 x VM5-1 or VE5-1 (1)
AE50 ... AE75	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 x CAL5-11	or	1 x VE5-2
AF50 ... AF75	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	or	1 x VE5-2 +1 x CAL5-11

(1) With VE5-1 interlock unit, a maximum of 3 N.O. auxiliary contacts are permitted. VE5-1, VM5-1 not allowed in mounting position 1 ±30°.
(2) 2 N.C. CA5-.. auxiliary contacts maximum in mounting position 5.
(3) CAL5-11 not allowed in mounting position 1±30°.

Overload relays fitting details (4)

Contactor types	Thermal overload relays	Electronic overload relays
A40, AL40	TA25DU (0.1...32 A) or TA42DU (18...42 A)	E45DU (9...45 A)
A50 … A75, AE50 … AE75, AF50 … AF75	TA75DU (18...80 A)	E80DU (27...80 A)

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

1SBC101386S0201

A40 … A75, AL, AE and AF50 … AF75 3-pole contactors
Main accessories

CA5-10

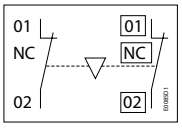
CAL5-11

RV5/50

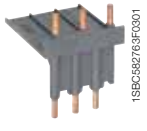
TP40DA

BX-TP

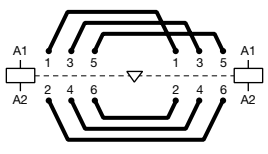
VE5-1



VE5-1, VE5-2
Terminal marking and positioning



BEA40/450



BER, BEM connection sets

Ordering details (1)

For contactors	Auxiliary contacts		Type	Order code		Pkg qty	Weight (1 pce)
							kg
Front-mounted instantaneous auxiliary contact blocks							
A40 … A75, AL40, AE50 … AE75, AF50 … AF75	1	–	CA5-10	1SBN010010R1010		10	0.014
	–	1	CA5-01	1SBN010010R1001		10	0.014
A40-30-10, AL40-30-10	2	2	CA5-22M	1SBN010040R1122		2	0.060
A40-30-01, AL40-30-01	2	2	CA5-22U	1SBN010040R1322		2	0.060
A50 … A75, AE50 … AE75, AF50 … AF75	2	2	CA5-22E	1SBN010040R1022		2	0.060
Side-mounted instantaneous auxiliary contact block							
A40 … A75, AL40, AE50 … AE75, AF50 … AF75	1	1	CAL5-11	1SBN010020R1011		2	0.050

Pneumatic timer blocks								
A40 … A75, AE50 … AE75, AF50 … AF75	delay on energization	0.1…40 s	1	1	TP40DA	1SBN020300R1000		1	0.070
		10…180 s	1	1	TP180DA	1SBN020300R1001		1	0.070
	delay on de-energization	0.1…40 s	1	1	TP40IA	1SBN020301R1000		1	0.070
		10…180 s	1	1	TP180IA	1SBN020301R1001		1	0.070
Timer accessory	plastic sealable cover		–	–	BX-TP	FPTN472657R0001		1	0.006
Interlock units								
A40, AL40	Mechanical		–	–	VM5-1	1SBN030100R1000		1	0.066
	Mechanical and electrical		–	2	VE5-1	1SBN030110R1000		1	0.076
A50 … A75, AE50 … AE75, AF50 … AF75	Mechanical and electrical		–	2	VE5-2	1SBN030210R1000		1	0.146

For contactors	Rated control circuit voltage Uc			Type	Order code		Pkg qty	Weight (1 pce)
	V	AC	DC					kg
Surge suppressors								
A40 … A75 AL40 AE40 … AE75	24…50	●	●	RV5/50	1SBN050010R1000		2	0.015
	50…133	●	●	RV5/133	1SBN050010R1001		2	0.015
	110…250	●	●	RV5/250	1SBN050010R1002		2	0.015
	250…440	●	●	RV5/440	1SBN050010R1003		2	0.015
A40	24…50	●	–	RC5-1/50	1SBN050100R1000		2	0.012
	50…133	●	–	RC5-1/133	1SBN050100R1001		2	0.012
	110…250	●	–	RC5-1/250	1SBN050100R1002		2	0.012
	250…440	●	–	RC5-1/440	1SBN050100R1003		2	0.012
A50 … A75	24…50	●	–	RC5-2/50	1SBN050200R1000		2	0.015
	50…133	●	–	RC5-2/133	1SBN050200R1001		2	0.015
	110…250	●	–	RC5-2/250	1SBN050200R1002		2	0.015
	250…440	●	–	RC5-2/440	1SBN050200R1003		2	0.015
AL40 AE50 … AE75	12…32	–	●	RT5/32	1SBN050020R1000		2	0.015
	25…65	–	●	RT5/65	1SBN050020R1001		2	0.015
	50…90	–	●	RT5/90	1SBN050020R1002		2	0.015
	77…150	–	●	RT5/150	1SBN050020R1003		2	0.015
	150…264	–	●	RT5/264	1SBN050020R1004		2	0.015

Connecting links with manual motor starters					
A40	For MS450 manual motor starter	BEA40/450	1SBN083206R1000	1	0.061
A50, AE50, AF50	For MS450 manual motor starter	BEA50/450	1SBN083506R1000	1	0.062
A50 … A75, AE50 … AE75, AF50 … AF75	For MS495 manual motor starter	BEA75/495	1SBN084106R1000	1	0.120
Connection sets for reversing contactors					
A40		BER40V	1SBN082411R1000	1	0.085
A50 … A75, AE50 … AE75, AF50 … AF75		BEM75-30	1SBN083501R1000	1	0.243

(1) See "Main accessory fitting details" table.

1SBC101387S0201

A50 ... A75 3-pole contactors
22 to 37 kW
AC operated - with 1 N.O. + 1 N.C. auxiliary contacts

A50-30-11

Description

A50 ... A75 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC / 1000 V AC or 220 V DC.

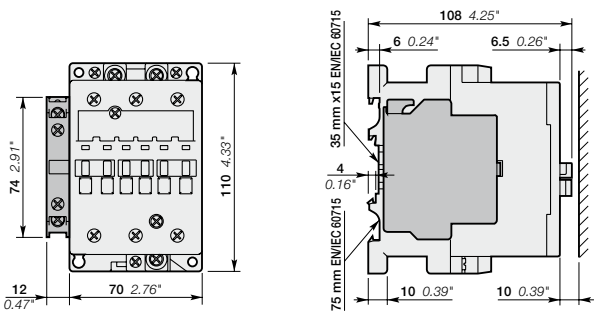
These contactors are of the block type design with:
- 3 main poles
- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

IEC Rated operational power 400 V AC-3 kW	current θ ≤ 40 °C AC-1 A	UL/CSA 3-phase motor rating 480 V hp	General use rating 600 V AC A	Rated control circuit voltage Uc (1) V 50 Hz	V 60 Hz	Auxiliary contacts fitted		Type	Order code		Weight Pkg (1 pce) kg
22	100	40	80	24	24	1	1	A50-30-11	1SBL351001R8111		1.200
				48	48	1	1	A50-30-11	1SBL351001R8311		1.200
				110	110...220	1	1	A50-30-11	1SBL351001R8411		1.200
				220...230	230...240	1	1	A50-30-11	1SBL351001R8011		1.200
				230...240	240...260	1	1	A50-30-11	1SBL351001R8811		1.200
				380...400	400...415	1	1	A50-30-11	1SBL351001R8511		1.200
				400...415	415...440	1	1	A50-30-11	1SBL351001R8611		1.200
30	115	60	90	24	24	1	1	A63-30-11	1SBL371001R8111		1.200
				48	48	1	1	A63-30-11	1SBL371001R8311		1.200
				110	110...220	1	1	A63-30-11	1SBL371001R8411		1.200
				220...230	230...240	1	1	A63-30-11	1SBL371001R8011		1.200
				230...240	240...260	1	1	A63-30-11	1SBL371001R8811		1.200
				380...400	400...415	1	1	A63-30-11	1SBL371001R8511		1.200
				400...415	415...440	1	1	A63-30-11	1SBL371001R8611		1.200
37	125	60	105	24	24	1	1	A75-30-11	1SBL411001R8111		1.200
				48	48	1	1	A75-30-11	1SBL411001R8311		1.200
				110	110...220	1	1	A75-30-11	1SBL411001R8411		1.200
				220...230	230...240	1	1	A75-30-11	1SBL411001R8011		1.200
				230...240	240...260	1	1	A75-30-11	1SBL411001R8811		1.200
				380...400	400...415	1	1	A75-30-11	1SBL411001R8511		1.200
				400...415	415...440	1	1	A75-30-11	1SBL411001R8611		1.200

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



A50, A63, A75 with 1 N.O. + 1 N.C. side mounted auxiliary contact block

1SBC101364S0201

AE50 ... AE75 3-pole contactors
22 to 37 kW
DC operated - with 1 N.O. + 1 N.C. auxiliary contacts

AE50-30-11

Description

AE50 ... AE75 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC / 1000 V AC or 220 V DC.

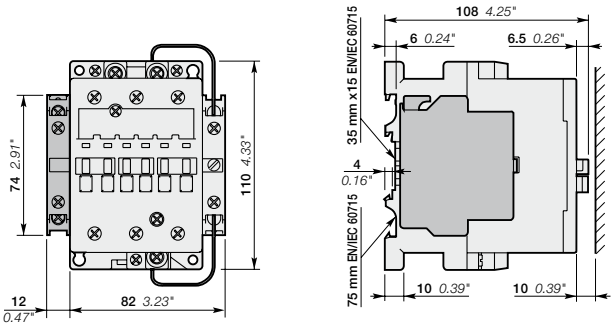
These contactors are of the block type design with:
- 3 main poles
- control circuit: DC operated with double winding coil (and factory-mounted lagging contact for "holding" winding insertion)
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories

Ordering details

IEC Rated operational power 400 V AC-3 kW	IEC current θ ≤ 40 °C AC-1 A	UL/CSA 3-phase motor rating 480 V hp	UL/CSA General use rating 600 V AC A	Rated control circuit voltage Uc (1) V DC	Auxiliary contacts fitted	Type	Order code		Weight Pkg (1 pce) kg
22	100	40	80	12	1 1	AE50-30-11	1SBL359001R8011		1.240
				24	1 1	AE50-30-11	1SBL359001R8111		1.240
				48	1 1	AE50-30-11	1SBL359001R8311		1.240
				60	1 1	AE50-30-11	1SBL359001R8411		1.240
				110	1 1	AE50-30-11	1SBL359001R8611		1.240
				125	1 1	AE50-30-11	1SBL359001R8711		1.240
				220	1 1	AE50-30-11	1SBL359001R8811		1.240
				240	1 1	AE50-30-11	1SBL359001R8911		1.240
30	115	60	90	12	1 1	AE63-30-11	1SBL379001R8011		1.240
				24	1 1	AE63-30-11	1SBL379001R8111		1.240
				48	1 1	AE63-30-11	1SBL379001R8311		1.240
				60	1 1	AE63-30-11	1SBL379001R8411		1.240
				110	1 1	AE63-30-11	1SBL379001R8611		1.240
				125	1 1	AE63-30-11	1SBL379001R8711		1.240
				220	1 1	AE63-30-11	1SBL379001R8811		1.240
				240	1 1	AE63-30-11	1SBL379001R8911		1.240
37	125	60	105	12	1 1	AE75-30-11	1SBL419001R8011		1.240
				24	1 1	AE75-30-11	1SBL419001R8111		1.240
				48	1 1	AE75-30-11	1SBL419001R8311		1.240
				60	1 1	AE75-30-11	1SBL419001R8411		1.240
				110	1 1	AE75-30-11	1SBL419001R8611		1.240
				125	1 1	AE75-30-11	1SBL419001R8711		1.240
				220	1 1	AE75-30-11	1SBL419001R8811		1.240
				240	1 1	AE75-30-11	1SBL419001R8911		1.240

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



AE50, AE63, AE75 with 1 N.O. + 1 N.C. side mounted auxiliary contact block

1SBC101367S0201

AF50 ... AF75 3-pole contactors
22 to 37 kW
AC / DC operated - with 1 N.O. + 1 N.C. auxiliary contacts

AF50-30-11

5

Description

AF50 ... AF75 contactors are mainly used for controlling 3-phase motors and generally for controlling power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

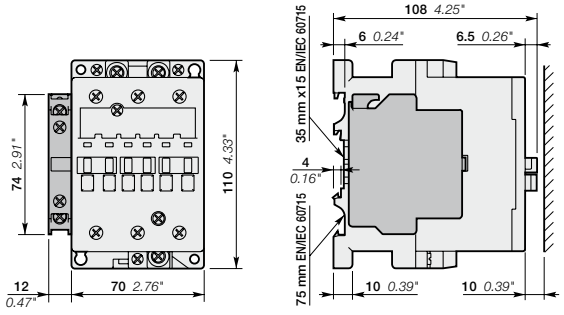
– 3 main poles
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
  - can manage large control voltage variations
  - only 3 coils to cover control voltages between 48...250 V 50/60 Hz and 20...250 V DC
  - reduced panel 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 front or side mounting and a wide range of accessories.

Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC						kg
22	100	40	80	-	20...60	1	1	AF50-30-11	1SBL357001R7211 (1)		1.220
				48...130	48...130	1	1	AF50-30-11	1SBL357001R6911		1.220
				100...250	100...250	1	1	AF50-30-11	1SBL357001R7011		1.220
30	115	60	90	-	20...60	1	1	AF63-30-11	1SBL377001R7211 (1)		1.220
				48...130	48...130	1	1	AF63-30-11	1SBL377001R6911		1.220
				100...250	100...250	1	1	AF63-30-11	1SBL377001R7011		1.220
37	125	60	105	-	20...60	1	1	AF75-30-11	1SBL417001R7211 (1)		1.220
				48...130	48...130	1	1	AF75-30-11	1SBL417001R6911		1.220
				100...250	100...250	1	1	AF75-30-11	1SBL417001R7011		1.220

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

Main dimensions mm, *inches*



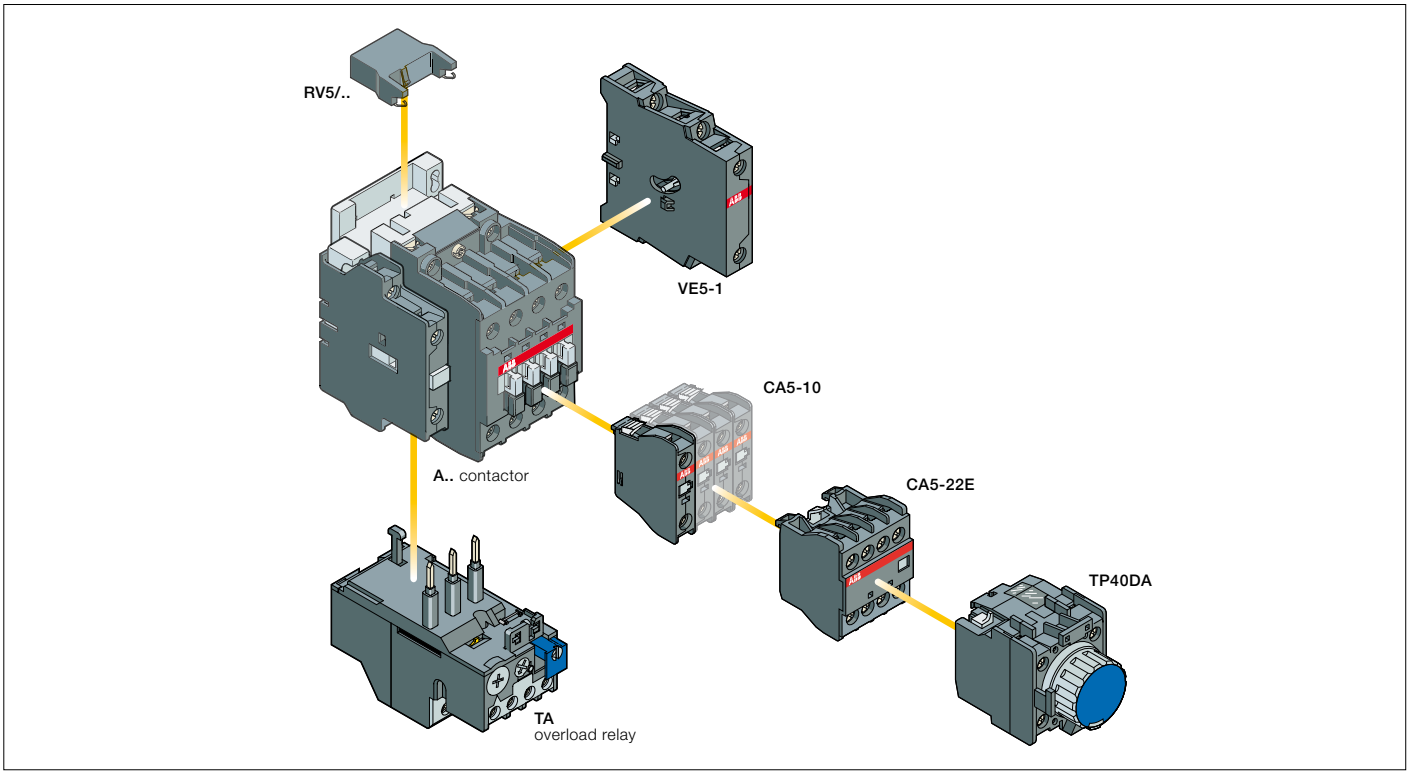
AF50, AF63, AF75 with 1 N.O. + 1 N.C. side mounted auxiliary contact block

1SBC101517S0201

Notes

A50 … A75, AE and AF50 … AF75 3-pole contactors
With 1 N.O. +1 N.C. auxiliary contacts
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					Pneumatic timer		Auxiliary contact blocks		Interlock unit
			1-pole CA5-..		4-pole CA5-..			TP.. A		2-pole CAL5-11		VM5-.. or VE5-..
A50 ... A75	3 0	1 1	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 x CAL5-11	or	1 x VE5-2
AE50 ... AE75	3 0	1 1	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)		–		–
AF50 ... AF75	3 0	1 1	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 x CAL5-11	or	1 x VE5-2

Overload relays fitting details (1)

Contactor types	Thermal overload relays	Electronic overload relays
A50 … A75, AE50 … AE75, AF50 … AF75	TA75DU (18...80 A)	E80DU (27...80 A)

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

1SBC101597S0201

A40 … A75, AL, AE and AF50 … AF75 3-pole contactors
Main accessories

CA5-10

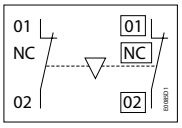
CAL5-11

RV5/50

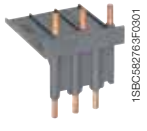
TP40DA

BX-TP

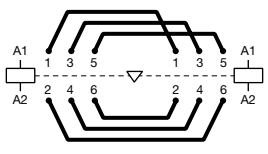
VE5-1



VE5-1, VE5-2
Terminal marking and positioning



BEA40/450



BER, BEM connection sets

Ordering details (1)

For contactors			Auxiliary contacts		Type	Order code		Pkg qty	Weight (1 pce)
									kg
Front-mounted instantaneous auxiliary contact blocks									
A40 … A75, AL40, AE50 … AE75, AF50 … AF75			1	–	CA5-10	1SBN010010R1010		10	0.014
			–	1	CA5-01	1SBN010010R1001		10	0.014
A40-30-10, AL40-30-10			2	2	CA5-22M	1SBN010040R1122		2	0.060
A40-30-01, AL40-30-01			2	2	CA5-22U	1SBN010040R1322		2	0.060
A50 … A75, AE50 … AE75, AF50 … AF75			2	2	CA5-22E	1SBN010040R1022		2	0.060
Side-mounted instantaneous auxiliary contact block									
A40 … A75, AL40, AE50 … AE75, AF50 … AF75			1	1	CAL5-11	1SBN010020R1011		2	0.050
Pneumatic timer blocks									
A40 … A75, AE50 … AE75, AF50 … AF75	delay on energization	0.1…40 s	1	1	TP40DA	1SBN020300R1000		1	0.070
		10…180 s	1	1	TP180DA	1SBN020300R1001		1	0.070
	delay on de-energization	0.1…40 s	1	1	TP40IA	1SBN020301R1000		1	0.070
		10…180 s	1	1	TP180IA	1SBN020301R1001		1	0.070
Timer accessory	plastic sealable cover		–	–	BX-TP	FPTN472657R0001		1	0.006
Interlock units									
A40, AL40	Mechanical		–	–	VM5-1	1SBN030100R1000		1	0.066
	Mechanical and electrical		–	2	VE5-1	1SBN030110R1000		1	0.076
A50 … A75, AE50 … AE75, AF50 … AF75	Mechanical and electrical		–	2	VE5-2	1SBN030210R1000		1	0.146

Surge suppressors

For contactors	Rated control circuit voltage Uc			Type	Order code		Pkg qty	Weight (1 pce)
	V	AC	DC					kg
A40 … A75 AL40 AE40 … AE75	24…50	●	●	RV5/50	1SBN050010R1000		2	0.015
	50…133	●	●	RV5/133	1SBN050010R1001		2	0.015
	110…250	●	●	RV5/250	1SBN050010R1002		2	0.015
	250…440	●	●	RV5/440	1SBN050010R1003		2	0.015
A40	24…50	●	–	RC5-1/50	1SBN050100R1000		2	0.012
	50…133	●	–	RC5-1/133	1SBN050100R1001		2	0.012
	110…250	●	–	RC5-1/250	1SBN050100R1002		2	0.012
	250…440	●	–	RC5-1/440	1SBN050100R1003		2	0.012
A50 … A75	24…50	●	–	RC5-2/50	1SBN050200R1000		2	0.015
	50…133	●	–	RC5-2/133	1SBN050200R1001		2	0.015
	110…250	●	–	RC5-2/250	1SBN050200R1002		2	0.015
	250…440	●	–	RC5-2/440	1SBN050200R1003		2	0.015
AL40 AE50 … AE75	12…32	–	●	RT5/32	1SBN050020R1000		2	0.015
	25…65	–	●	RT5/65	1SBN050020R1001		2	0.015
	50…90	–	●	RT5/90	1SBN050020R1002		2	0.015
	77…150	–	●	RT5/150	1SBN050020R1003		2	0.015
	150…264	–	●	RT5/264	1SBN050020R1004		2	0.015

Connecting links with manual motor starters

A40	For MS450 manual motor starter	BEA40/450	1SBN083206R1000		1	0.061
A50, AE50, AF50	For MS450 manual motor starter	BEA50/450	1SBN083506R1000		1	0.062
A50 … A75, AE50 … AE75, AF50 … AF75	For MS495 manual motor starter	BEA75/495	1SBN084106R1000		1	0.120

Connection sets for reversing contactors

A40	BER40V	1SBN082411R1000		1	0.085
A50 … A75, AE50 … AE75, AF50 … AF75	BEM75-30	1SBN083501R1000		1	0.243

(1) See "Main accessory fitting details" table.

1SBC101387S0201

TAL40 3-pole contactors
18.5 kW
DC operated - Large coil voltage range

TAL40-30-10

Description

TAL contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC or 220 V DC. These contactors are of the block type design with:

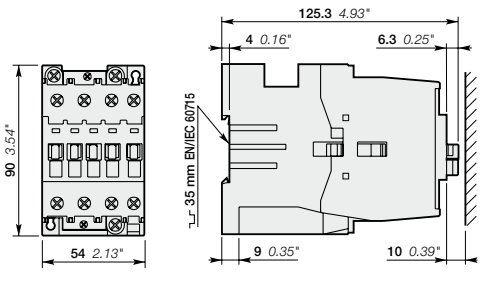
– 3 main poles and 1 built-in auxiliary contact
– control circuit: large voltage range DC operated with solid core magnet (the polarity on the coil terminals A1+ and A2- must be respected)
– add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc min. ... Uc max. (1)	Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							Pkg (1 pce)
kW	A	hp	A	V DC						kg
18.5	60	30	60	17...32	1	0	TAL40-30-10	1SBL323061R5110		0.850
					0	1	TAL40-30-01	1SBL323061R5101		0.850
				25...45	1	0	TAL40-30-10	1SBL323061R5210		0.850
					0	1	TAL40-30-01	1SBL323061R5201		0.850
				36...65	1	0	TAL40-30-10	1SBL323061R5410		0.850
					0	1	TAL40-30-01	1SBL323061R5401		0.850
				42...78	1	0	TAL40-30-10	1SBL323061R5810		0.850
					0	1	TAL40-30-01	1SBL323061R5801		0.850
				50...90	1	0	TAL40-30-10	1SBL323061R5510		0.850
					0	1	TAL40-30-01	1SBL323061R5501		0.850
				77...143	1	0	TAL40-30-10	1SBL323061R6210		0.850
					0	1	TAL40-30-01	1SBL323061R6201		0.850
				90...150	1	0	TAL40-30-10	1SBL323061R6610		0.850
					0	1	TAL40-30-01	1SBL323061R6601		0.850
				152...264	1	0	TAL40-30-10	1SBL323061R6810		0.850
					0	1	TAL40-30-01	1SBL323061R6801		0.850

(1) Uc min. and Uc max. limit values, including the voltage variation tolerances (-15 % and +10 %).

Main dimensions mm, *inches*



TAL40

1SBC101369S0201

TAE50 ... TAE75 3-pole contactors
22 to 37 kW
DC operated

TAE50-30-00

Description

TAE50 ... TAE75 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC / 1000 V AC or 220 V DC.

These contactors are of the block type design with:

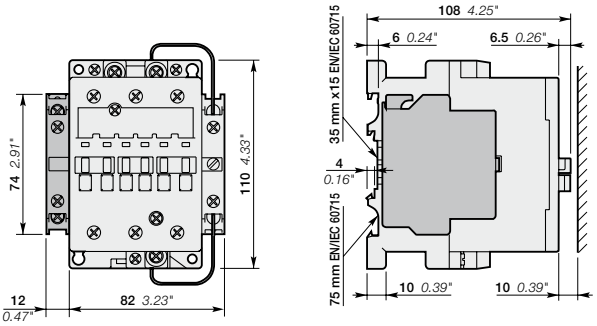
– 3 main poles
– control circuit: large voltage range DC operated with double winding coil (and factory-mounted lagging contact for "holding" winding insertion)
– add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

IEC Rated operational power 400 V AC-3 kW	current θ ≤ 40 °C AC-1 A	UL/CSA 3-phase motor rating 480 V hp	General use rating 600 V AC A	Rated control circuit voltage Uc min. ... Uc max. (1) V DC	Auxiliary contacts fitted	Type	Order code		Weight Pkg (1 pce) kg
22	100	40	80	17...32	0 0	TAE50-30-00	1SBL359061R5100		1.200
				25...45	0 0	TAE50-30-00	1SBL359061R5200		1.200
				36...65	0 0	TAE50-30-00	1SBL359061R5400		1.200
				42...78	0 0	TAE50-30-00	1SBL359061R5800		1.200
				50...90	0 0	TAE50-30-00	1SBL359061R5500		1.200
				77...143	0 0	TAE50-30-00	1SBL359061R6200		1.200
				90...150	0 0	TAE50-30-00	1SBL359061R6600		1.200
				152...264	0 0	TAE50-30-00	1SBL359061R6800		1.200
37	125	60	105	17...32	0 0	TAE75-30-00	1SBL419061R5100		1.200
				25...45	0 0	TAE75-30-00	1SBL419061R5200		1.200
				36...65	0 0	TAE75-30-00	1SBL419061R5400		1.200
				42...78	0 0	TAE75-30-00	1SBL419061R5800		1.200
				50...90	0 0	TAE75-30-00	1SBL419061R5500		1.200
				77...143	0 0	TAE75-30-00	1SBL419061R6200		1.200
				90...150	0 0	TAE75-30-00	1SBL419061R6600		1.200
				152...264	0 0	TAE75-30-00	1SBL419061R6800		1.200
Contactors with 1 N.O. + 1 N.C. side mounted auxiliary contact block									
22	100	40	80	17...32	1 1	TAE50-30-11	1SBL359061R5111		1.240
				25...45	1 1	TAE50-30-11	1SBL359061R5211		1.240
				36...65	1 1	TAE50-30-11	1SBL359061R5411		1.240
				42...78	1 1	TAE50-30-11	1SBL359061R5811		1.240
				50...90	1 1	TAE50-30-11	1SBL359061R5511		1.240
				77...143	1 1	TAE50-30-11	1SBL359061R6211		1.240
				90...150	1 1	TAE50-30-11	1SBL359061R6611		1.240
				152...264	1 1	TAE50-30-11	1SBL359061R6811		1.240
37	125	60	105	17...32	1 1	TAE75-30-11	1SBL419061R5111		1.240
				25...45	1 1	TAE75-30-11	1SBL419061R5211		1.240
				36...65	1 1	TAE75-30-11	1SBL419061R5411		1.240
				42...78	1 1	TAE75-30-11	1SBL419061R5811		1.240
				50...90	1 1	TAE75-30-11	1SBL419061R5511		1.240
				77...143	1 1	TAE75-30-11	1SBL419061R6211		1.240
				90...150	1 1	TAE75-30-11	1SBL419061R6611		1.240
				152...264	1 1	TAE75-30-11	1SBL419061R6811		1.240

(1) Uc min. and Uc max. limit values, including the voltage variation tolerances (-15 % and +10 %).

Main dimensions mm, *inches*

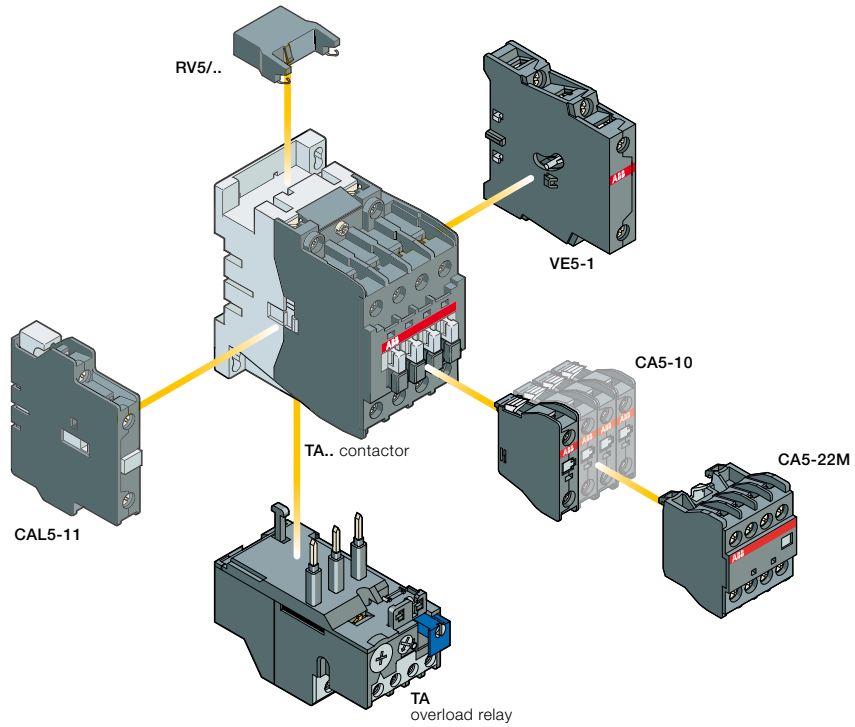


TAE50, TAE63, TAE75 with 1 N.O. + 1 N.C. side mounted auxiliary contact block

1SBC101370S0201

TAL40, TAE50 … TAE75 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	Available auxiliary contacts	Front-mounted accessories: Auxiliary contact blocks 1-pole CA5-..		4-pole CA5-..		Pneumatic timer TP.. A		Side-mounted accessories: Auxiliary contact blocks 2-pole CAL5-11		Interlock unit VM5-.. or VE5-..
TAL40	3 0 3 0	1 0 0 1	1 to 5 x CA5-.. (2)	or	1 x CA5-.. (4-pole) (2) + 1 x 1-pole CA5-..	or	–	or	1 x CAL5-11	+	1 x VM5-1 or VE5-1 (1)
TAE50 ... TAE75	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 x CAL5-11	or	1 x VE5-2
	3 0	1 1	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) With VE5-1 interlock unit, a maximum of 3 N.O. auxiliary contacts are permitted. VE5-1,VM5-1 not allowed in mounting position 1 ±30°.
(2) 2 N.C. CA5-.. auxiliary contacts maximum in mounting position 5.

Overload relays fitting details (3)

Contactor types	Thermal overload relays	Electronic overload relays
TAL40	TA25DU (0.1...32 A) or TA42DU (18...42 A)	E45DU (9...45 A)
TAE50 ... TAE75	TA75DU (18...80 A)	E80DU (27...80 A)

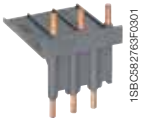
The addition of an overload relay on the contactor does not prevent fitting of many other accessories as shown above.
(3) Direct mounting - No kit required.

1SBC101388S0201

TAL40, TAE50 … TAE75 3-pole contactors
Main accessories

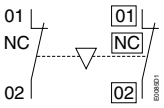
CA5-10

CAL5-11

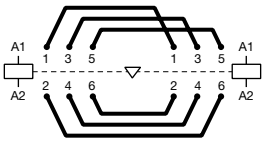


BEA40/450

VE5-1



VE5-1, VE5-2
Terminal marking and positioning



BER, BEM connection sets

Front-mounted instantaneous auxiliary contact blocks

For contactors	Auxiliary contacts		Type	Order code		Pkg qty	Weight (1 pce)
							kg
TAL40, TAE40 … TAE75	1	–	CA5-10	1SBN010010R1010		10	0.014
	–	1	CA5-01	1SBN010010R1001		10	0.014
TAL40-30-10	2	2	CA5-22M	1SBN010040R1122		2	0.060
TAL40-30-01	2	2	CA5-22U	1SBN010040R1322		2	0.060
TAE50 … TAE75	2	2	CA5-22E	1SBN010040R1022		2	0.060

Side-mounted instantaneous auxiliary contact block

TAL40, TAE50 … TAE75	1	1	CAL5-11	1SBN010020R1011		2	0.050

Interlock units

TAL40	Mechanical	–	–	VM5-1	1SBN030100R1000		1	0.066
	Mechanical and electrical	–	2	VE5-1	1SBN030110R1000		1	0.076
TAE50 … TAE75	Mechanical and electrical	–	2	VE5-2	1SBN030210R1000		1	0.146

Surge suppressors for contactors coils

For contactors	Rated control circuit voltage - Uc			Type	Order code		Pkg qty	Weight (1 pce)
	V	DC	AC					kg
TAL40 TAE50 … TAE75	24…50	●	●	RV5/50	1SBN050010R1000		2	0.015
	50…133	●	●	RV5/133	1SBN050010R1001		2	0.015
	110…250	●	●	RV5/250	1SBN050010R1002		2	0.015
	250…440	●	●	RV5/440	1SBN050010R1003		2	0.015
TAL40 TAE50 … TAE75	12…32	●	–	RT5/32	1SBN050020R1000		2	0.015
	25…65	●	–	RT5/65	1SBN050020R1001		2	0.015
	50…90	●	–	RT5/90	1SBN050020R1002		2	0.015
	77…150	●	–	RT5/150	1SBN050020R1003		2	0.015
	150…264	●	–	RT5/264	1SBN050020R1004		2	0.015

Connecting links with manual motor starters

For contactors		Type	Order code		Pkg qty	Weight (1 pce)
						kg
TAE50	For MS450 manual motor starter	BEA50/450	1SBN083506R1000		1	0.062
TAE50 … TAE75	For MS495 manual motor starter	BEA75/495	1SBN084106R1000		1	0.120

Connection sets for reversing contactors

TAL40	BER40V	1SBN082411R1000		1	0.085
TAE50 … TAE75	BEM75-30	1SBN083501R1000		1	0.243

5

1SBC101389S0201

A95 ... A110 3-pole contactors
45 to 55 kW
AC operated

A95-30-00

5

Description

A95 ... A110 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 / 1000 V AC or 220 V DC.
These contactors are of the block type design with:

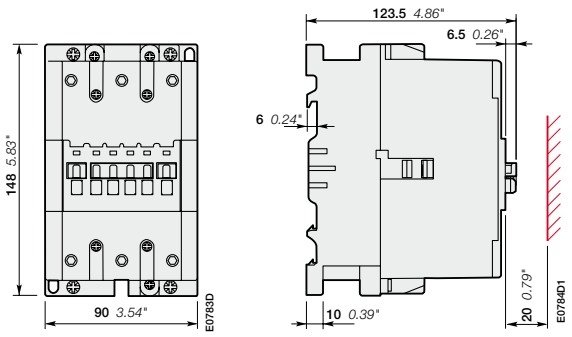
– 3 main poles
– control circuit: AC operated
– add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C 690 V AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50 Hz	V 60 Hz						kg
45	145	60	125	24	24	0	0	A95-30-00	1SFL431001R8100		2.000
				48	48	0	0	A95-30-00	1SFL431001R8300		2.000
				110	110...120	0	0	A95-30-00	1SFL431001R8400		2.000
				220...230	230...240	0	0	A95-30-00	1SFL431001R8000		2.000
				230...240	240...260	0	0	A95-30-00	1SFL431001R8800		2.000
				380...400	400...415	0	0	A95-30-00	1SFL431001R8500		2.000
				400...415	415...440	0	0	A95-30-00	1SFL431001R8600		2.000
55	160	75	140	24	24	0	0	A110-30-00	1SFL451001R8100		2.000
				48	48	0	0	A110-30-00	1SFL451001R8300		2.000
				110	110...120	0	0	A110-30-00	1SFL451001R8400		2.000
				220...230	230...240	0	0	A110-30-00	1SFL451001R8000		2.000
				230...240	240...260	0	0	A110-30-00	1SFL451001R8800		2.000
				380...400	400...415	0	0	A110-30-00	1SFL451001R8500		2.000
				400...415	415...440	0	0	A110-30-00	1SFL451001R8600		2.000

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



A95, A110

1SFC101007C0201

AF95 ... AF110 3-pole contactors
45 to 55 kW
AC / DC operated

AF95-30-00

Description

AF95 ... AF110 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 / 1000 V AC or 220 V DC.

These contactors are of the block type design with:

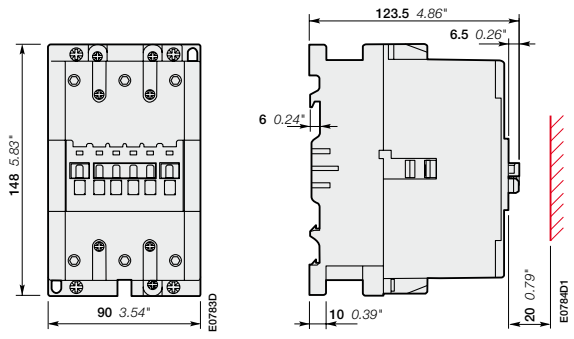
– 3 main poles
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
– can manage large control voltage variations
  - only 3 coils to cover control voltages between 48...250 V 50/60 Hz and 20...250 V DC
  - reduced panel 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 front or side mounting and a wide range of accessories.

Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C 690 V AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC						kg
45	145	60	125	-	20...60	0	0	AF95-30-00	1SFL437001R7200 (1)		2.030
				48...130	48...130	0	0	AF95-30-00	1SFL437001R6900		2.030
				100...250	100...250	0	0	AF95-30-00	1SFL437001R7000		2.030
55	160	75	140	-	20...60	0	0	AF110-30-00	1SFL457001R7200 (1)		2.030
				48...130	48...130	0	0	AF110-30-00	1SFL457001R6900		2.030
				100...250	100...250	0	0	AF110-30-00	1SFL457001R7000		2.030

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

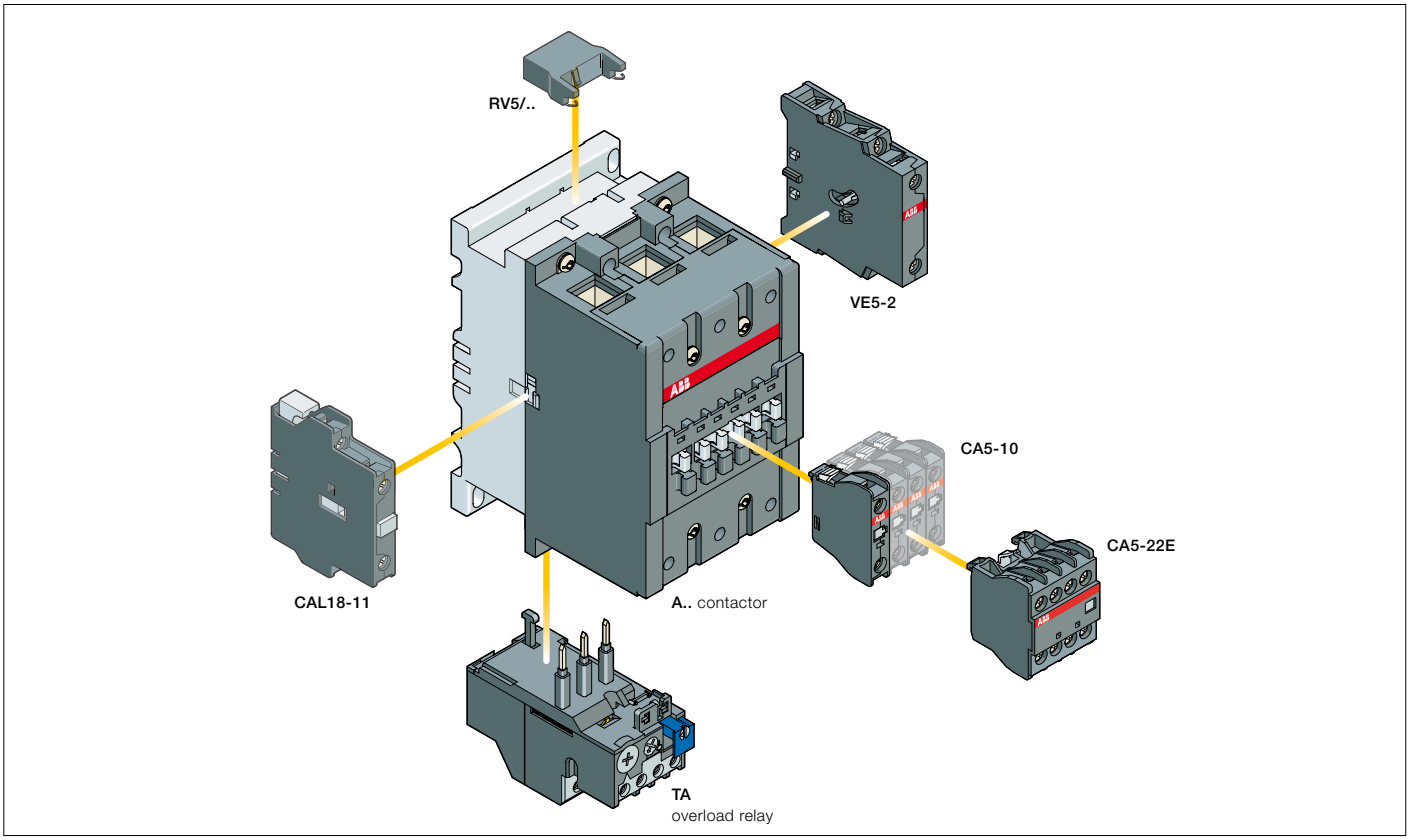
Main dimensions mm, *inches*



AF95, AF110

A95, A110 and
AF95, AF110 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		Available auxiliary contacts		Front-mounted accessories Auxiliary contact blocks				Side-mounted accessories Auxiliary contact blocks		Interlock unit
					1-pole CA5- ..		4-pole CA5- ..		2-pole CAL..		VE5-2
A95, A110	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	or	1 x VE5-2 +1 x CAL18-11
AF95, AF110	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	or	1 x VE5-2 +1 x CAL18-11

Overload relays fitting details (1)

Contactor types	Thermal overload relays	Electronic overload relays
A95, A110 AF95, AF110	TA80DU (29...80 A) or TA110DU (65...110 A)	E140DU (50...140 A)

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

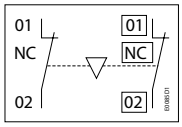
1SFC101026C0201

A95, A110 and AF95, AF110 3-pole contactors
Main accessories

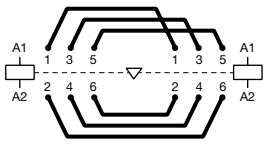
CA5-10

CAL18-11

RV5/50



VE5-1, VE5-2
Terminal marking and positioning



BEM... connection set

Ordering details (1)

For contactors	Auxiliary contacts		Type	Order code		Pkg qty	Weight (1 pce)
							kg
Front-mounted instantaneous auxiliary contact blocks							
A95, A110 and AF95, AF110	1	–	CA5-10	1SBN010010R1010		10	0.014
	–	1	CA5-01	1SBN010010R1001		10	0.014
A95, A110 and AF95, AF110	2	2	CA5-22E	1SBN010040R1022		2	0.060
Side-mounted instantaneous auxiliary contact blocks							
A95, A110 and AF95, AF110	1	1	CAL18-11	1SFN010720R1011		2	0.050
Mechanical and electrical interlock unit							
A95, A110 and AF95, AF110	–	2	VE5-2	1SBN030210R1000		1	0.146

Surge suppressors

For contactors	Rated control circuit voltage Uc			Type	Order code		Pkg qty	Weight (1 pce)
	V	AC	DC					kg
A95 ... A110	24...50	●	●	RV5/50	1SBN050010R1000		2	0.015
	50...133	●	●	RV5/133	1SBN050010R1001		2	0.015
	110...250	●	●	RV5/250	1SBN050010R1002		2	0.015
	250...440	●	●	RV5/440	1SBN050010R1003		2	0.015
A95 ... A110	24...50	●	–	RC5-2/50	1SBN050200R1000		2	0.015
	50...133	●	–	RC5-2/133	1SBN050200R1001		2	0.015
	110...250	●	–	RC5-2/250	1SBN050200R1002		2	0.015
	250...440	●	–	RC5-2/440	1SBN050200R1003		2	0.015
Connecting links with manual motor starters								
A95, A110 and AF95, AF110	For MS495			BEA110/495	1SBN084506R1000		1	0.124
Connection set for reversing contactors								
A95, A110 and AF95, AF110				BEM110-30	1SFN084301R1000		1	0.450
Mounting plate for mechanical interlocked contactors								
A95, A110 and AF95, AF110				PN110-21	1SFN094301R1000		1	0.600

(1) See "Main accessory fitting details" table.

1SFC101076C0201

A95 ... A110 3-pole contactors
45 to 55 kW
AC operated with 1 N.O. + 1 N.C. auxiliary contacts

A95-30-11

Description

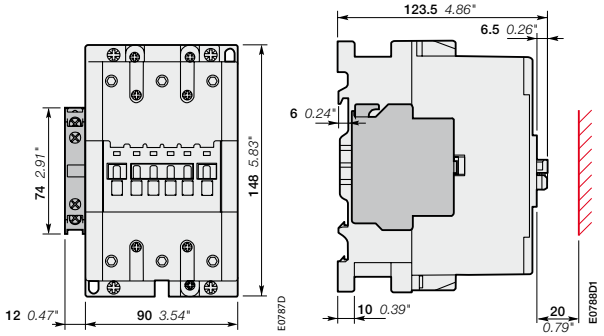
A95 ... A110 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 / 1000 V AC or 220 V DC.
These contactors are of the block type design with:
- 3 main poles
- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories

Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50 Hz	V 60 Hz						kg
45	145	60	125	24	24	1	1	A95-30-11	1SFL431001R8111		2.040
				48	48	1	1	A95-30-11	1SFL431001R8311		2.040
				110	110...120	1	1	A95-30-11	1SFL431001R8411		2.040
				220...230	230...240	1	1	A95-30-11	1SFL431001R8011		2.040
				230...240	240...260	1	1	A95-30-11	1SFL431001R8811		2.040
				380...400	400...415	1	1	A95-30-11	1SFL431001R8511		2.040
				400...415	415...440	1	1	A95-30-11	1SFL431001R8611		2.040
55	160	75	140	24	24	1	1	A110-30-11	1SFL451001R8111		2.040
				48	48	1	1	A110-30-11	1SFL451001R8311		2.040
				110	110...120	1	1	A110-30-11	1SFL451001R8411		2.040
				220...230	230...240	1	1	A110-30-11	1SFL451001R8011		2.040
				230...240	240...260	1	1	A110-30-11	1SFL451001R8811		2.040
				380...400	400...415	1	1	A110-30-11	1SFL451001R8511		2.040
				400...415	415...440	1	1	A110-30-11	1SFL451001R8611		2.040

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



A95, A110

1SFC101044C0201

AF95 ... AF110 3-pole contactors
45 to 55 kW
AC/DC operated with 1 N.O. + 1 N.C. auxiliary contacts

AF110-30-11

Description

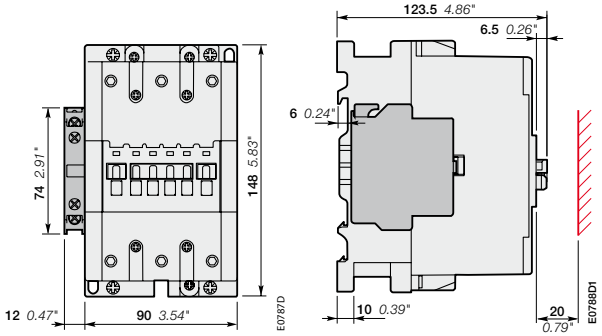
AF95 ... AF110 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 / 1000 V AC or 220 V DC.
These contactors are of the block type design with:
- 3 main poles
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
- can manage large control voltage variations
  - only 3 coils to cover control voltages between 48...250 V 50/60 Hz and 20...250 V DC
  - 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 front or side mounting and a wide range of accessories.

Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC						kg
45	145	60	125	-	20...60	1	1	AF95-30-11	1SFL437001R7211[1]		2.070
				48...130	48...130	1	1	AF95-30-11	1SFL437001R6911		2.070
				100...250	100...250	1	1	AF95-30-11	1SFL437001R7011		2.070
55	160	75	140	-	20...60	1	1	AF110-30-11	1SFL457001R7211[1]		2.070
				48...130	48...130	1	1	AF110-30-11	1SFL457001R6911		2.070
				100...250	100...250	1	1	AF110-30-11	1SFL457001R7011		2.070

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

Main dimensions mm, *inches*

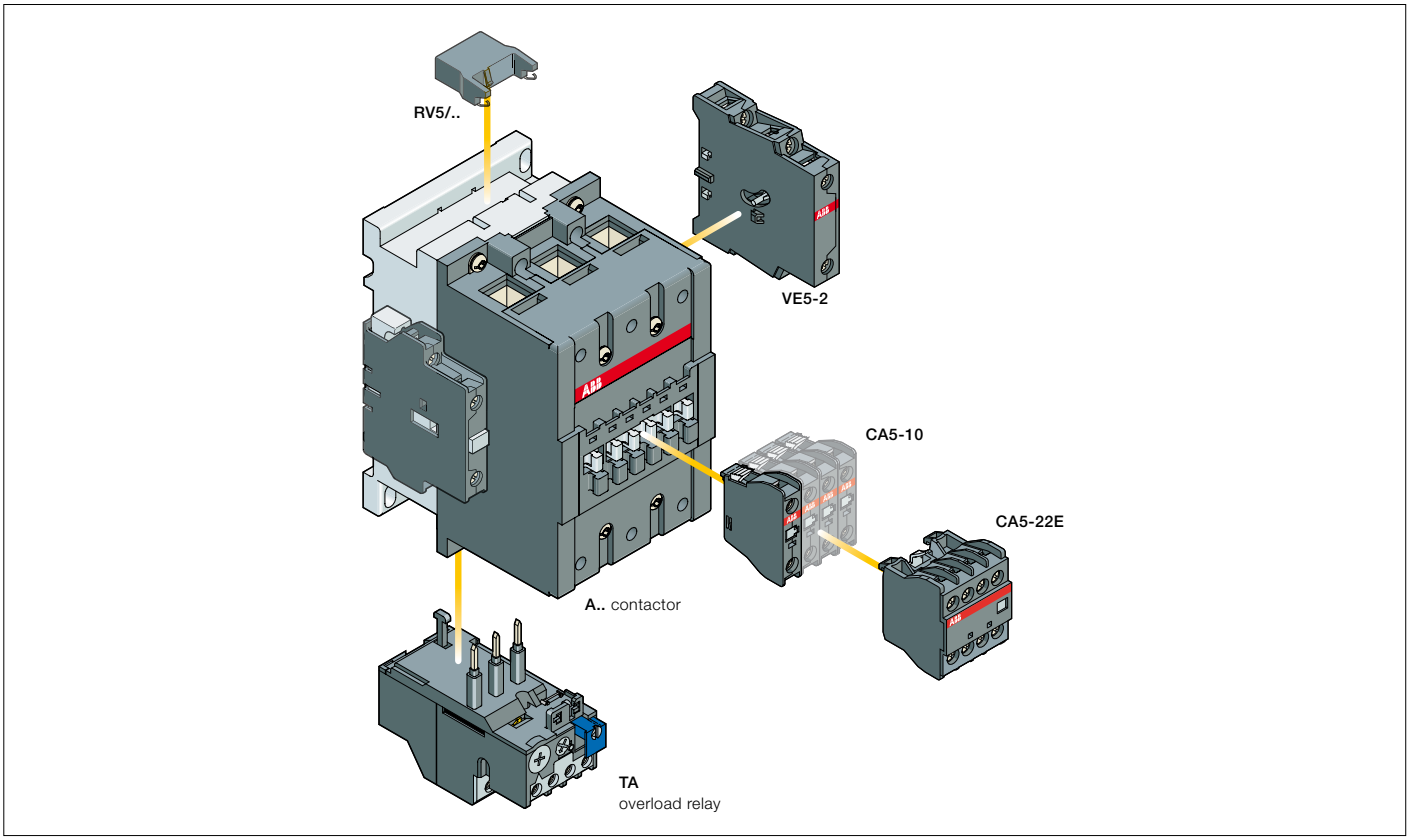


AF95, AF110

1SFC101045C0201

A95, A110 and AF95, AF110 3-pole contactors with 1 N.O. + 1 N.C. contacts
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		Available auxiliary contacts		Front-mounted accessories Auxiliary contact blocks 1-pole CA5- ..		4-pole CA5- ..		Side-mounted accessories Auxiliary contact blocks 2-pole CAL..		Interlock unit VE5-2
A95, A110	3	0	1	1	1 to 6 x CA5-..	or	1 x CA5-.. (4-pole) + 2 x 1-pole CA5-..	+	1 CAL18-11	or	1 x VE5-2
AF95, AF110	3	0	1	1	1 to 6 x CA5-..	or	1 x CA5-.. (4-pole) + 2 x 1-pole CA5-..	+	1 CAL18-11	or	1 x VE5-2

Overload relays fitting details (1)

Contactor types	Thermal overload relays	Electronic overload relays
A95, A110 AF95, AF110	TA80DU (29...80 A) or TA110DU (65...110 A)	E140DU (50...140 A)

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

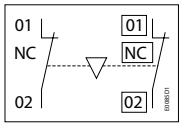
1SFC101075C0201

A95, A110 and
AF95, AF110 3-pole contactors
Main accessories

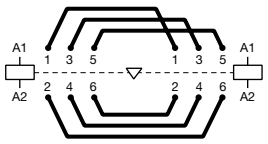
CA5-10

CAL18-11

RV5/50



VE5-1, VE5-2
Terminal marking and positioning



BEM... connection set

Ordering details (1)

For contactors	Auxiliary contacts		Type	Order code		Pkg qty	Weight (1 pce)
							kg
Front-mounted instantaneous auxiliary contact blocks							
A95, A110 and AF95, AF110	1	–	CA5-10	1SBN010010R1010		10	0.014
	–	1	CA5-01	1SBN010010R1001		10	0.014
A95, A110 and AF95, AF110	2	2	CA5-22E	1SBN010040R1022		2	0.060
Side-mounted instantaneous auxiliary contact blocks							
A95, A110 and AF95, AF110	1	1	CAL18-11	1SFN010720R1011		2	0.050
Mechanical and electrical interlock unit							
A95, A110 and AF95, AF110	–	2	VE5-2	1SBN030210R1000		1	0.146

Surge suppressors

For contactors	Rated control circuit voltage Uc			Type	Order code		Pkg qty	Weight (1 pce)
	V	AC	DC					kg
A95 ... A110	24...50	●	●	RV5/50	1SBN050010R1000		2	0.015
	50...133	●	●	RV5/133	1SBN050010R1001		2	0.015
	110...250	●	●	RV5/250	1SBN050010R1002		2	0.015
	250...440	●	●	RV5/440	1SBN050010R1003		2	0.015
A95 ... A110	24...50	●	–	RC5-2/50	1SBN050200R1000		2	0.015
	50...133	●	–	RC5-2/133	1SBN050200R1001		2	0.015
	110...250	●	–	RC5-2/250	1SBN050200R1002		2	0.015
	250...440	●	–	RC5-2/440	1SBN050200R1003		2	0.015
Connecting links with manual motor starters								
A95, A110 and AF95, AF110	For MS495			BEA110/495	1SBN084506R1000		1	0.124
Connection set for reversing contactors								
A95, A110 and AF95, AF110				BEM110-30	1SFN084301R1000		1	0.450
Mounting plate for mechanical interlocked contactors								
A95, A110 and AF95, AF110				PN110-21	1SFN094301R1000		1	0.600

(1) See "Main accessory fitting details" table.

1SFC101076C0201

A145 ... A300 3-pole contactors
75 to 160 kW
AC operated with 1 N.O. + 1 N.C. auxiliary contacts

A185-30-11

A300-30-11

Description

A145 ... A300 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 / 1000 V AC (2) or 220 V DC.

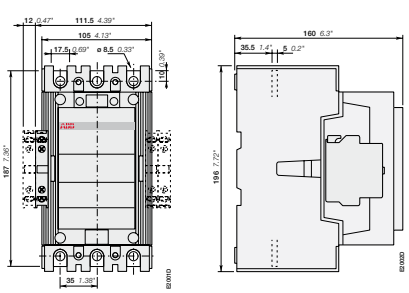
These contactors are of the block type design with:
- 3 main poles
- control circuit: AC operated
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

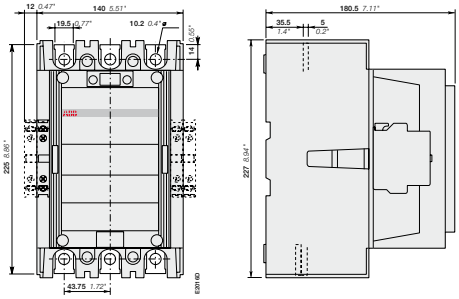
IEC		UL/CSA		Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C 690 V AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50 Hz	V 60 Hz						kg
75	250	100	230	24	24	1	1	A145-30-11	1SFL471001R8111		3.500
				48	48	1	1	A145-30-11	1SFL471001R8311		3.500
				110	110...120	1	1	A145-30-11	1SFL471001R8411		3.500
				220...230	230...240	1	1	A145-30-11	1SFL471001R8011		3.500
				230...240	240...260	1	1	A145-30-11	1SFL471001R8811		3.500
				380...400	400...415	1	1	A145-30-11	1SFL471001R8511		3.500
				400...415	415...440	1	1	A145-30-11	1SFL471001R8611		3.500
90	275	125	250	24	24	1	1	A185-30-11	1SFL491001R8111		3.500
				48	48	1	1	A185-30-11	1SFL491001R8311		3.500
				110	110...120	1	1	A185-30-11	1SFL491001R8411		3.500
				220...230	230...240	1	1	A185-30-11	1SFL491001R8011		3.500
				230...240	240...260	1	1	A185-30-11	1SFL491001R8811		3.500
				380...400	400...415	1	1	A185-30-11	1SFL491001R8511		3.500
				400...415	415...440	1	1	A185-30-11	1SFL491001R8611		3.500
110	350	150	300	24	24	1	1	A210-30-11	1SFL511001R8111		6.100
				48	48	1	1	A210-30-11	1SFL511001R8311		6.100
				110	110...120	1	1	A210-30-11	1SFL511001R8411		6.100
				220...230	230...240	1	1	A210-30-11	1SFL511001R8011		6.100
				230...240	240...260	1	1	A210-30-11	1SFL511001R8811		6.100
				380...400	400...415	1	1	A210-30-11	1SFL511001R8511		6.100
				400...415	415...440	1	1	A210-30-11	1SFL511001R8611		6.100
140	400	200	350	24	24	1	1	A260-30-11	1SFL531001R8111		6.100
				48	48	1	1	A260-30-11	1SFL531001R8311		6.100
				110	110...120	1	1	A260-30-11	1SFL531001R8411		6.100
				220...230	230...240	1	1	A260-30-11	1SFL531001R8011		6.100
				230...240	240...260	1	1	A260-30-11	1SFL531001R8811		6.100
				380...400	400...415	1	1	A260-30-11	1SFL531001R8511		6.100
				400...415	415...440	1	1	A260-30-11	1SFL531001R8611		6.100
160	500	250	400	24	24	1	1	A300-30-11	1SFL551001R8111		6.100
				48	48	1	1	A300-30-11	1SFL551001R8311		6.100
				110	110...120	1	1	A300-30-11	1SFL551001R8411		6.100
				220...230	230...240	1	1	A300-30-11	1SFL551001R8011		6.100
				230...240	240...260	1	1	A300-30-11	1SFL551001R8811		6.100
				380...400	400...415	1	1	A300-30-11	1SFL551001R8511		6.100
				400...415	415...440	1	1	A300-30-11	1SFL551001R8611		6.100

(1) Other control voltages see voltage code table.
(2) 690 V AC for A210 ... A300, 1000 V AC for A145, A185.

Main dimensions mm, *inches*



A145 ... A185



A210 ... A300

1SFC101009C0201

AF145 ... AF300 3-pole contactors
75 to 160 kW
AC / DC operated with 1 N.O. + 1N.C. auxiliary contacts

AF185-30-11

AF300-30-11

Description

AF145 ... AF300 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 / 1000 V AC (2) or 220 V DC.

These contactors are of the block type design with:

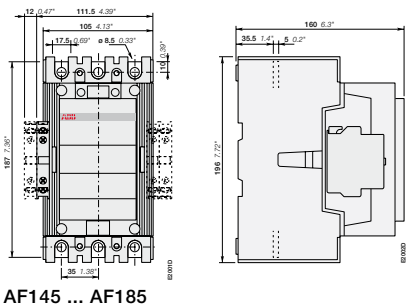
– 3 main poles
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
  - can manage large control voltage variations
  - only 3 coils to cover control voltages between 48...250 V 50/60 Hz and 20...250 V DC
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltages sags (SEMI F47 conditions of use on request).
– built-in surge suppression
– add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

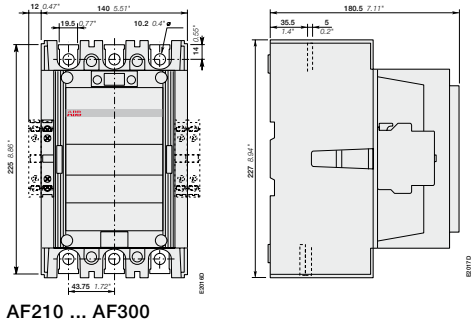
IEC		UL/CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C 690 V AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC						kg
75	250	100	230	-	20...60	1	1	AF145-30-11	1SFL477001R7211 (1)		3.600
				48...130	48...130	1	1	AF145-30-11	1SFL477001R6911		3.600
				100...250	100...250	1	1	AF145-30-11	1SFL477001R7011		3.600
90	275	125	250	-	20...60	1	1	AF185-30-11	1SFL497001R7211 (1)		3.600
				48...130	48...130	1	1	AF185-30-11	1SFL497001R6911		3.600
				100...250	100...250	1	1	AF185-30-11	1SFL497001R7011		3.600
110	350	150	300	-	20...60	1	1	AF210-30-11	1SFL517001R7211 (1)		6.200
				48...130	48...130	1	1	AF210-30-11	1SFL517001R6911		6.200
				100...250	100...250	1	1	AF210-30-11	1SFL517001R7011		6.200
140	400	200	350	-	20...60	1	1	AF260-30-11	1SFL537001R7211 (1)		6.200
				48...130	48...130	1	1	AF260-30-11	1SFL537001R6911		6.200
				100...250	100...250	1	1	AF260-30-11	1SFL537001R7011		6.200
160	500	250	400	-	20...60	1	1	AF300-30-11	1SFL557001R7211 (1)		6.200
				48...130	48...130	1	1	AF300-30-11	1SFL557001R6911		6.200
				100...250	100...250	1	1	AF300-30-11	1SFL557001R7011		6.200

(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.
(2) 690 V AC for AF210 ... AF300, 1000 V AC for AF145, AF185.

Main dimensions mm, *inches*



AF145 ... AF185



AF210 ... AF300

1SFC101011C0201

AF400 ... AF750 3-pole contactors
200 to 400 kW
AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts

AF460-30-11

AF750-30-11

Description

AF400 ... AF750 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC or 600 V DC (2).

These contactors are of the block type design with:

– 3 main poles
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...500 V AC and DC)
  - can manage large control voltage variations
  - only 4 coils to cover control voltages between 48...500 V 50/60 Hz and 24...500 V DC
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltages sags (SEMI F47 conditions of use on request).
– built-in surge suppression
– add-on auxiliary contact blocks for side mounting and a wide range of accessories.

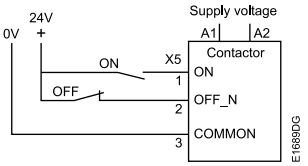
Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C 690 V AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC						kg
200	600	350	550	-	24...60	1	1	AF400-30-11	1SFL577001R6811 (1)		12.000
				48...130	48...130	1	1	AF400-30-11	1SFL577001R6911		12.000
				100...250	100...250	1	1	AF400-30-11	1SFL577001R7011		12.000
				250...500	250...500	1	1	AF400-30-11	1SFL577001R7111		12.000
250	700	400	650	-	24...60	1	1	AF460-30-11	1SFL597001R6811 (1)		12.000
				48...130	48...130	1	1	AF460-30-11	1SFL597001R6911		12.000
				100...250	100...250	1	1	AF460-30-11	1SFL597001R7011		12.000
				250...500	250...500	1	1	AF460-30-11	1SFL597001R7111		12.000
315	800	500	750	-	24...60	1	1	AF580-30-11	1SFL617001R6811 (1)		15.000
				48...130	48...130	1	1	AF580-30-11	1SFL617001R6911		15.000
				100...250	100...250	1	1	AF580-30-11	1SFL617001R7011		15.000
				250...500	250...500	1	1	AF580-30-11	1SFL617001R7111		15.000
400	1050	600	900	-	24...60	1	1	AF750-30-11	1SFL637001R6811 (1)		15.000
				48...130	48...130	1	1	AF750-30-11	1SFL637001R6911		15.000
				100...250	100...250	1	1	AF750-30-11	1SFL637001R7011		15.000
				250...500	250...500	1	1	AF750-30-11	1SFL637001R7111		15.000

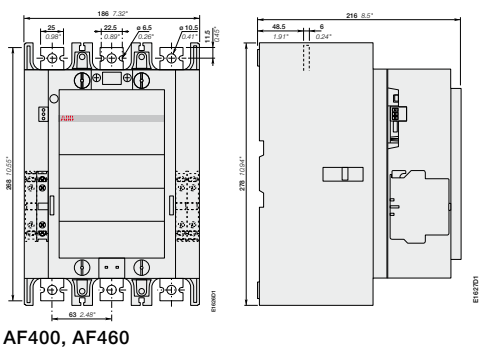
(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.
(2) Up to 850 V DC for AF580, AF750.

AF400 ... AF750 are equipped with low voltage inputs for control, for example by a PLC.

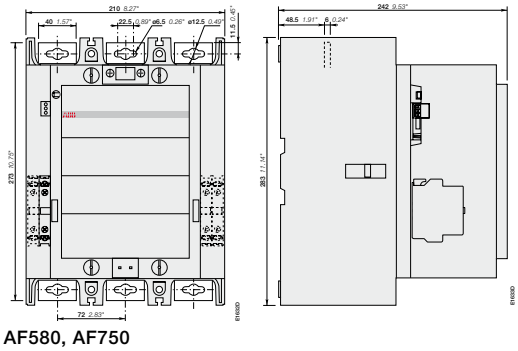
Control inputs



Main dimensions mm, *inches*



AF400, AF460



AF580, AF750

1SFC101013C0201

AF1250 ... AF2050 3-pole contactors
475 to 560 kW and 1250 to 2050 A AC-1
AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts

AF1250-30-11

AF1650-30-11

Description

AF1250 ... AF2050 contactors are mainly used for controlling power circuits up to 1000 V AC or 850 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)
  - can manage large control voltage variations
  - 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 ... AF2050 to cover control voltages between 100...250 V 50/60 Hz and 100...250 V DC
  - 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.

5

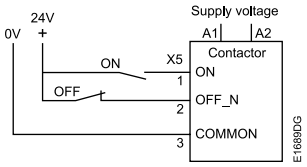
Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc min. ... Uc max. (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C 690 V AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC						kg
-	1260	-	1210	-	24...60	1	1	AF1250-30-11	1SFL647001R6811 (1)		16.000
				48...130	48...130	1	1	AF1250-30-11	1SFL647001R6911		16.000
				100...250	100...250	1	1	AF1250-30-11	1SFL647001R7011		16.000
				250...500	250...500	1	1	AF1250-30-11	1SFL647001R7111		16.000
475	1350	800	1350	100...250	100...250	1	1	AF1350-30-11	1SFL657001R7011		34.000
560	1650	900	1650	100...250	100...250	1	1	AF1650-30-11	1SFL677001R7011		35.000
-	2050	-	2100	100...250	100...250	1	1	AF2050-30-11	1SFL707001R7011		35.000

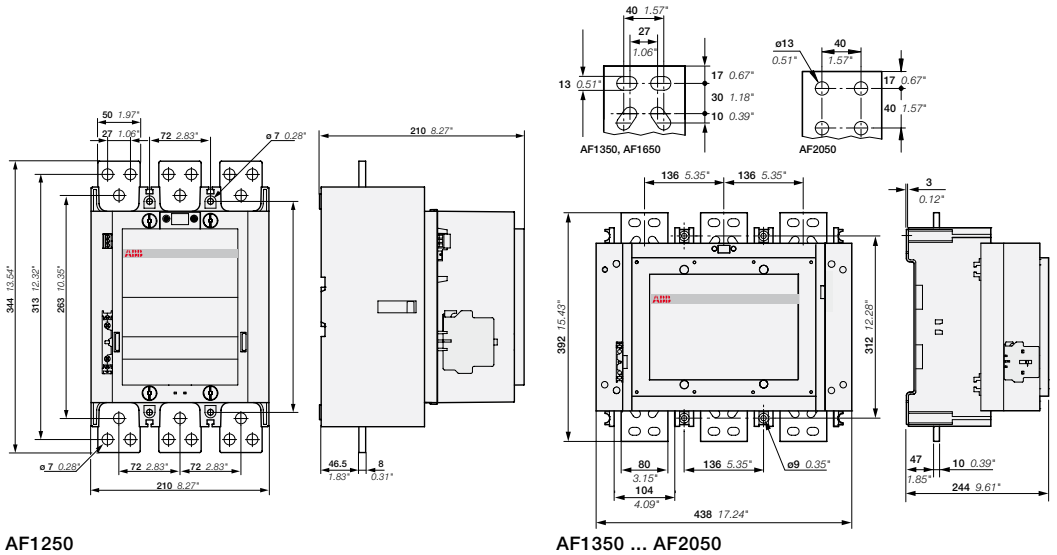
(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.

AF1250 ... AF2050 are equipped with low voltage inputs for control, for example by a PLC.

Control inputs



Main dimensions mm, *inches*

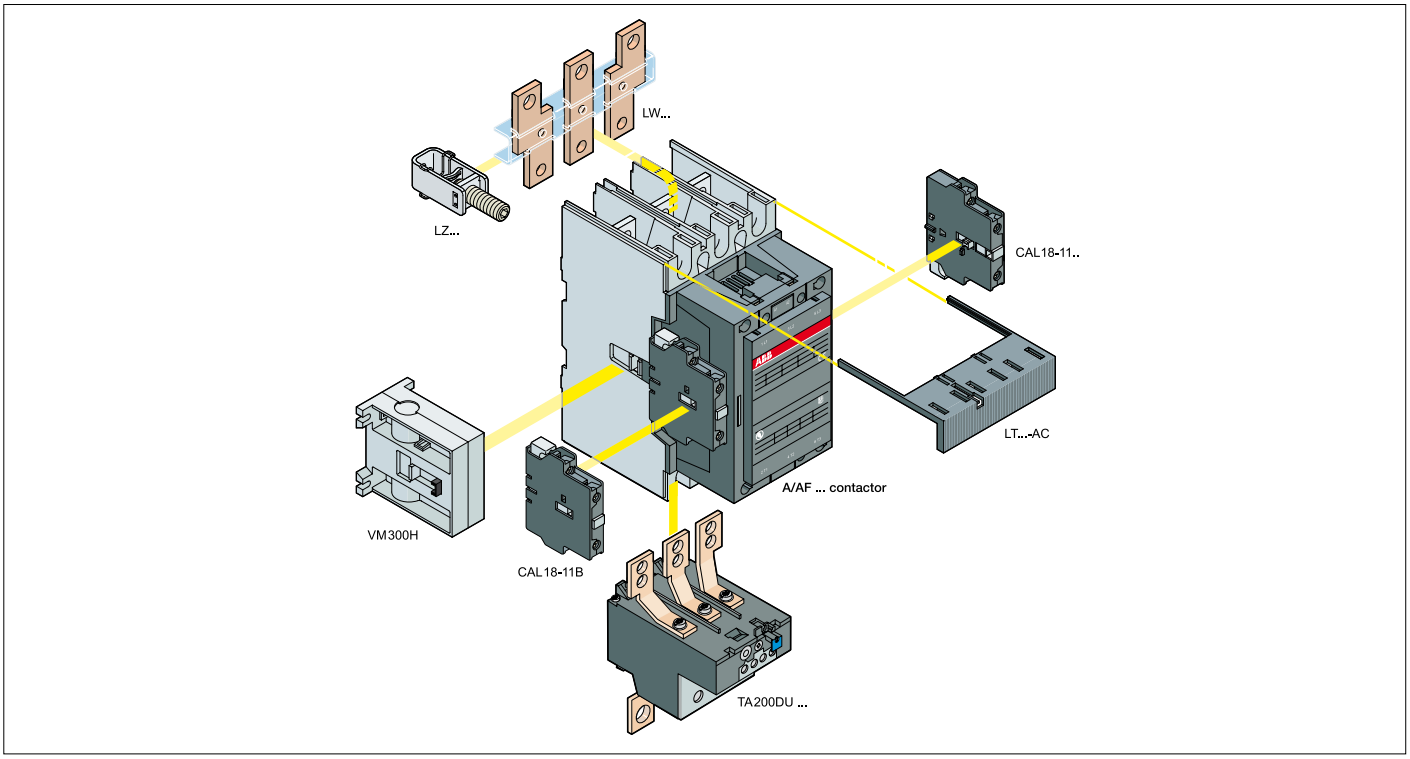


AF1250

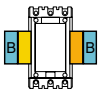
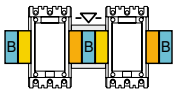
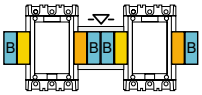
AF1350 ... AF2050

A145 ... A300 and AF145 ... AF2050 3-pole contactors with 1 N.O. + 1 N.C. auxiliary contacts

Main accessories (other accessories available) AF185 shown on picture



Main accessory fitting details

Contactor types	Main poles	Available auxiliary contacts	Side-mounted accessories: Add-on auxiliary contact blocks CAL18-11, CAL18-11B (3)			Mechanical interlock units (for two horizontal mounted contactors)	Mounting and positioning: Factory mounted auxiliary contacts / Add-on CAL18-11 auxiliary contacts / Add-on CAL18-11B auxiliary contacts
Contactors + auxiliary contact blocks							
A145 ... A300 AF145 ... AF2050	3 0	1 1	1 x CAL18-11	+	2 x CAL18-11B	–	
Contactors with mechanical interlocking + auxiliary contact blocks							
A145 ... A185 AF145 ... AF185	3 0	1 1	2 x CAL18-11 (1)	+	3 x CAL18-11B (1)	+ VM...H (2)	
A210 ... A300 AF210 ... AF2050	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
A145, A185	TA200DU (80...200 A) (4)	E200DU (60...200 A) (4)
A210, A300	TA450DU (100...310 A) (4) or TA450SU (130...310 A) (5)	E320DU (100...320 A) (4)
AF400, AF460	–	E500DU (150...500 A) (5)
AF580, AF750	–	E800DU (250...800 A) (5)
AF1350, AF1650	–	E1250DU (375...1250 A) (5)

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) Direct mounting - No kit required.
(5) Mounting kit required (see "Motor protection").

1SFC101027C0201

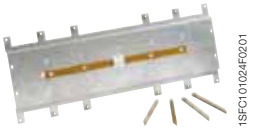
A145 ... A300 and AF145 ... AF2050 3-pole contactors
Main accessories

1SFC101033F0201

CAL18-11

1SBC580411F0301

VM300H


1SFC101024F0201

VM1650H

1SFT98099-019C3

LT... AC

1SFT9099-125

LT...AL

1SFT98000-014

LT...AY

1SFT98000-011C3

LW

1SFT98000-012C3

LX

1SFT98099-011C1

LZ...

1SBC580542F0302

LZ...

1SFT98099-095C2

LZ...

Ordering details (1)

For contactors	Auxiliary contacts	Type	Order code		Pkg qty	Weight (1 pce) kg
Side-mounted instantaneous auxiliary contact blocks						
A145 ... A300 and AF145 ... AF2050	1 1	CAL18-11	1SFN010720R1011		2	0.050
	1 1	CAL18-11B	1SFN010720R3311		2	0.050
Mechanical interlock unit for two horizontal mounted contactors						
A145 ... A300		VM300H	1SFN034700R1000		1	0.150
A210 ... A300		VM300/460H	1SFN035100R1000		1	0.150
AF400 ... AF1250		VM750H	1SFN035700R1000		1	0.200
AF1350 ... AF2050		VM1650H	1SFN036503R1000		1	6.000
Terminal shrouds						
A145 ... A185 with connectors		LT185-AC	1SFN124701R1000		2	0.050
A145 ... A185 with lugs		LT185-AL	1SFN124703R1000		2	0.220
A145 ... A185 with short. bar LY185 or between A145 and TA200DU or between A185 and TA200DU		LT185-AY	1SFN124704R1000		1	0.050
A210 ... A300 with connectors		LT300-AC	1SFN125101R1000		2	0.070
A210 ... A300 with lugs		LT300-AL	1SFN125103R1000		2	0.280
A210 ... A300 with short bar LY300		LT300-AY	1SFN125104R1000		1	0.075
AF400 ... AF460 with connectors		LT460-AC	1SFN125701R1000		2	0.100
AF400 ... AF460 with lugs		LT460-AL	1SFN125703R1000		2	0.800
AF580 ... AF750 with connectors		LT750-AC	1SFN126101R1000		2	0.120
AF580 ... AF750 with lugs		LT750-AL	1SFN126103R1000		2	0.825

Terminal enlargements

For contactors	Dimensions hole Ø mm	bar mm	Type	Order code		Pkg qty	Weight (1 pce) kg
A145, A185	10.5	20 x 5	LW185	1SFN074707R1000		1	0.250
A210 ... A300	10.5	25 x 5	LW300	1SFN075107R1000		1	0.450
AF400, AF460	10.5	25 x 5	LW460	1SFN075707R1000		1	0.730
AF580, AF750	13	40 x 6	LW750	1SFN076107R1000		1	1.230
AF1250	13	50 x 10	LW1250	1SFN076407R1000		1	2.000

Terminal extension

A145, A185	8.5	20 x 5	LX185	1SFN074710R1000		1	0.250
A210 ... A300	10.5	20 x 5	LX300	1SFN075110R1000		1	0.350
AF400, AF460	10.5	25 x 5	LX460	1SFN075710R1000		1	0.500
AF580, AF750	13	40 x 6	LX750	1SFN076110R1000		1	0.850

(1) For each contactor type, refer to "Main accessory fitting details" table.

Ordering details (1)

Cables	For contactors	Cable cross section mm²	Type	Order code		Pkg qty	Weight (1 pce) kg
Connector terminals							
Single Cu	A145, A185	6...185	–	1SDA023354R0001		3	0.200
	A210 ... A300	16...240	–	1SDA023368R0001		3	0.400
Single Al & Cu	A145, A185	35...95	–	1SDA023356R0001		3	0.100
	A145, A185	25...150	–	1SDA023357R0001		3	0.100
	A210 ... A300	120...240	–	1SDA023370R0001		3	0.200
Double Cu	A145, A185	2 x (50...120)	LZ185-2C/120	1SFN074709R1000		3	0.300
Double Al & Cu	A210 ... A300	2 x (95...120)	–	1SDA025766R0001		3	0.400
	AF400 ... AF750	2 x (120...240)	–	1SDA023380R0001		3	0.110
Triple Al & Cu	AF400 ... AF750	3 x (70...185)	–	1SDA023384R0001		3	0.265
Multi Al & Cu	AF1350, AF1650	4 x (120...240)	–	1SDA023387R0001		3	0.400

(1) For each contactor type, refer to "Main accessory fitting details" table.
Note: Connectors provided for the A... contactors can be used for the AF types.

1SFC101077C0201

AF09 ... AF38 2-stack 3-pole contactors
4 to 18.5 kW
AC / DC operated

AF09-30-22

AF26-30-11

AF26-30-22

Description

AF09 ... AF38 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles (1st stack):

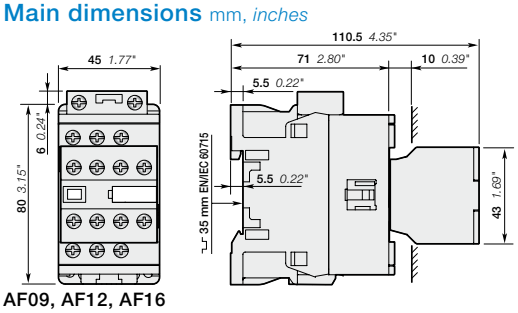
– 2nd stack with permanently fixed auxiliary contact block. The built-in auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 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.
– built-in surge suppression
– add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC						kg
4	25	5	25	24...60	20...60 (1)	2	2	AF09-30-22-11	1SBL137001R1122		0.320
				48...130	48...130	2	2	AF09-30-22-12	1SBL137001R1222		0.320
				100...250	100...250	2	2	AF09-30-22-13	1SBL137001R1322		0.320
				250...500	250...500	2	2	AF09-30-22-14	1SBL137001R1422		0.360
5.5	28	7.5	28	24...60	20...60 (1)	2	2	AF12-30-22-11	1SBL157001R1122		0.320
				48...130	48...130	2	2	AF12-30-22-12	1SBL157001R1222		0.320
				100...250	100...250	2	2	AF12-30-22-13	1SBL157001R1322		0.320
				250...500	250...500	2	2	AF12-30-22-14	1SBL157001R1422		0.360
7.5	30	10	30	24...60	20...60 (1)	2	2	AF16-30-22-11	1SBL177001R1122		0.320
				48...130	48...130	2	2	AF16-30-22-12	1SBL177001R1222		0.320
				100...250	100...250	2	2	AF16-30-22-13	1SBL177001R1322		0.320
				250...500	250...500	2	2	AF16-30-22-14	1SBL177001R1422		0.360
11	45	15	45	24...60	20...60 (1)	1	1	AF26-30-11-11	1SBL237001R1111		0.350
						2	2	AF26-30-22-11	1SBL237001R1122		0.360
				48...130	48...130	1	1	AF26-30-11-12	1SBL237001R1211		0.350
						2	2	AF26-30-22-12	1SBL237001R1222		0.360
				100...250	100...250	1	1	AF26-30-11-13	1SBL237001R1311		0.350
						2	2	AF26-30-22-13	1SBL237001R1322		0.360
				250...500	250...500	1	1	AF26-30-11-14	1SBL237001R1411		0.390
						2	2	AF26-30-22-14	1SBL237001R1422		0.400
15	50	20	50	24...60	20...60 (1)	1	1	AF30-30-11-11	1SBL277001R1111		0.350
						2	2	AF30-30-22-11	1SBL277001R1122		0.360
				48...130	48...130	1	1	AF30-30-11-12	1SBL277001R1211		0.350
						2	2	AF30-30-22-12	1SBL277001R1222		0.360
				100...250	100...250	1	1	AF30-30-11-13	1SBL277001R1311		0.350
						2	2	AF30-30-22-13	1SBL277001R1322		0.360
				250...500	250...500	1	1	AF30-30-11-14	1SBL277001R1411		0.390
						2	2	AF30-30-22-14	1SBL277001R1422		0.400
18.5	50	20	50	24...60	20...60 (1)	1	1	AF38-30-11-11	1SBL297001R1111		0.350
						2	2	AF38-30-22-11	1SBL297001R1122		0.360
				48...130	48...130	1	1	AF38-30-11-12	1SBL297001R1211		0.350
						2	2	AF38-30-22-12	1SBL297001R1222		0.360
				100...250	100...250	1	1	AF38-30-11-13	1SBL297001R1311		0.350
						2	2	AF38-30-22-13	1SBL297001R1322		0.360
				250...500	250...500	1	1	AF38-30-11-14	1SBL297001R1411		0.390
						2	2	AF38-30-22-14	1SBL297001R1422		0.400

(1) AF..-30-..-11 not suitable for direct control by PLC-output.

Main dimensions mm, *inches*



AF09, AF12, AF16 — AF26, AF30, AF38

1SBC101373S0201

AF09Z ... AF38Z 2-stack 3-pole contactors
4 to 18.5 kW
AC / DC operated - Low consumption

AF09Z-30-22

AF26Z-30-11

AF26Z-30-22

Description

AF09Z ... AF38Z contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles (1st stack):

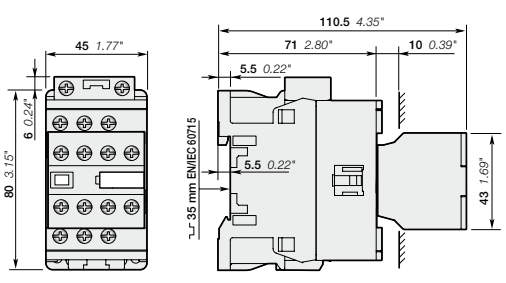
- 2nd stack with permanently fixed auxiliary contact block. The built-in auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...250 V 50/60 Hz and 12...250 V DC
  - can manage large control voltage variations, allow direct control by PLC-output ≥ 24 VDC 500 mA, reduced panel energy consumption, very distinct closing and opening,
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

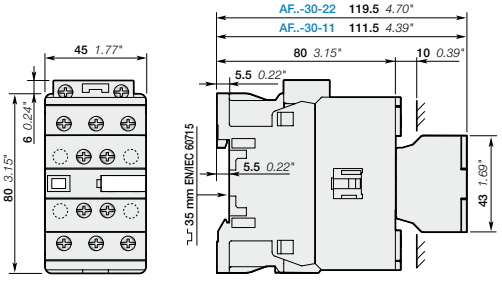
IEC		UL/CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Type	Order code		Weight Pkg (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC								
kW	A	hp	A	V 50/60 Hz	V DC						kg
4	25	5	25	-	12...20	2	2	AF09Z-30-22-20	1SBL136001R2022		0.360
				24...60	20...60	2	2	AF09Z-30-22-21	1SBL136001R2122		0.360
				48...130	48...130	2	2	AF09Z-30-22-22	1SBL136001R2222		0.360
				100...250	100...250	2	2	AF09Z-30-22-23	1SBL136001R2322		0.360
5.5	28	7.5	28	-	12...20	2	2	AF12Z-30-22-20	1SBL156001R2022		0.360
				24...60	20...60	2	2	AF12Z-30-22-21	1SBL156001R2122		0.360
				48...130	48...130	2	2	AF12Z-30-22-22	1SBL156001R2222		0.360
				100...250	100...250	2	2	AF12Z-30-22-23	1SBL156001R2322		0.360
7.5	30	10	30	-	12...20	2	2	AF16Z-30-22-20	1SBL176001R2022		0.360
				24...60	20...60	2	2	AF16Z-30-22-21	1SBL176001R2122		0.360
				48...130	48...130	2	2	AF16Z-30-22-22	1SBL176001R2222		0.360
				100...250	100...250	2	2	AF16Z-30-22-23	1SBL176001R2322		0.360
11	45	15	45	-	12...20	1	1	AF26Z-30-11-20	1SBL236001R2011		0.390
						2	2	AF26Z-30-22-20	1SBL236001R2022		0.400
				24...60	20...60	1	1	AF26Z-30-11-21	1SBL236001R2111		0.390
						2	2	AF26Z-30-22-21	1SBL236001R2122		0.400
				48...130	48...130	1	1	AF26Z-30-11-22	1SBL236001R2211		0.390
						2	2	AF26Z-30-22-22	1SBL236001R2222		0.400
				100...250	100...250	1	1	AF26Z-30-11-23	1SBL236001R2311		0.390
						2	2	AF26Z-30-22-23	1SBL236001R2322		0.400
15	50	20	50	-	12...20	1	1	AF30Z-30-11-20	1SBL276001R2011		0.390
						2	2	AF30Z-30-22-20	1SBL276001R2022		0.400
				24...60	20...60	1	1	AF30Z-30-11-21	1SBL276001R2111		0.390
						2	2	AF30Z-30-22-21	1SBL276001R2122		0.400
				48...130	48...130	1	1	AF30Z-30-11-22	1SBL276001R2211		0.390
						2	2	AF30Z-30-22-22	1SBL276001R2222		0.400
				100...250	100...250	1	1	AF30Z-30-11-23	1SBL276001R2311		0.390
						2	2	AF30Z-30-22-23	1SBL276001R2322		0.400
18.5	50	20	50	-	12...20	1	1	AF38Z-30-11-20	1SBL296001R2011		0.390
						2	2	AF38Z-30-22-20	1SBL296001R2022		0.400
				24...60	20...60	1	1	AF38Z-30-11-21	1SBL296001R2111		0.390
						2	2	AF38Z-30-22-21	1SBL296001R2122		0.400
				48...130	48...130	1	1	AF38Z-30-11-22	1SBL296001R2211		0.390
						2	2	AF38Z-30-22-22	1SBL296001R2222		0.400
				100...250	100...250	1	1	AF38Z-30-11-23	1SBL296001R2311		0.390
						2	2	AF38Z-30-22-23	1SBL296001R2322		0.400

Note: Only AF..Z contactors with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole

Main dimensions mm, *inches*



AF09Z, AF12Z, AF16Z

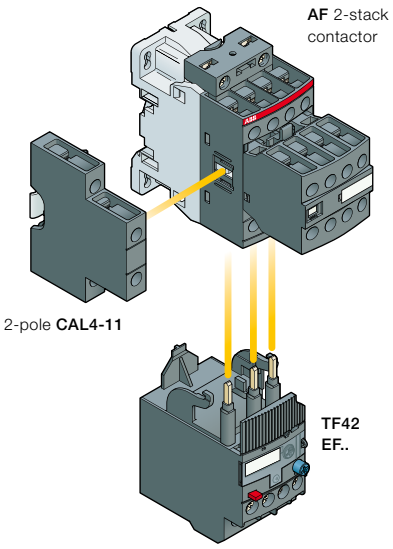


AF26Z, AF30Z, AF38Z

1SBC101374S0201

AF09 ... AF38 2-stack 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	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 ... AF38	3 0	2 2	–	–	–	–	1		–
AF26 ... AF38	3 0	1 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...18.9 A)
AF26 ... AF38	–	EF45 (9...38 A)

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

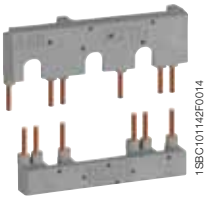
1SBC101390S0201

AF09 ... AF38 2-stack 3-pole contactors
Main accessories

CAL4-11

VM4

BEA16-4



BER16-4

LDC4

BX4-CA

Ordering Details

For contactors	Auxiliary contacts	Type	Order code		Pkg qty	Weight (1 pce) kg
Side-mounted instantaneous auxiliary contact blocks						
AF09 ... AF38	1 1 – –	CAL4-11	1SBN010120R1011		1	0.040
	1 1 – –	CAL4-11-T	1SBN010120T1011		10	0.040
Mechanical interlock unit						
AF09 ... AF38		VM4	1SBN030105T1000		10	0.005
Note: VM4 includes 2 fixing clips (BB4) to maintain together both contactors.						
Fixing clips						
AF09 ... AF38		BB4	1SBN110120W1000		50	0.002
Connecting links with manual motor starters						
AF09 ... AF16	with MS116-0.16 ... MS116-25, MS132-0.16 ... MS132-25	BEA16-4	1SBN081306T1000		10	0.025
AF26 ... AF38	with MS116-0.16 ... MS116-16, MS132-0.16 ... MS132-10	BEA26-4	1SBN082306T1000		10	0.025
	with MS116-20 ... MS116-32, MS132-12 ... MS132-32	BEA38-4	1SBN082306T2000		10	0.030
Connection sets for reversing contactors						
AF09 ... AF16		BER16-4	1SBN081311R1000		1	0.045
AF26 ... AF38		BER38-4	1SBN082311R1000		1	0.100
Connection sets for star-delta starting						
AF09 ... AF16		BEY16-4	1SBN081313R2000		1	0.050
AF26 ... AF38		BEY38-4	1SBN082713R2000		1	0.110
Note: With or without VM4						
Additional coil terminal block						
AF09 ... AF38		LDC4	1SBN070156T1000		10	0.010
Protective covers						
For 4-pole CA4 and 2-pole CAT4 auxiliary contact blocks		BX4-CA	1SBN110109W1000		50	0.001

1SBC101391S0201

A40 2-stack 3-pole contactors
18.5 kW
AC operated

A40-30-22

Description

A40 contactors are mainly used for controlling 3-phase motors and generally for controlling power circuits up to 690 V AC or 220 V DC.

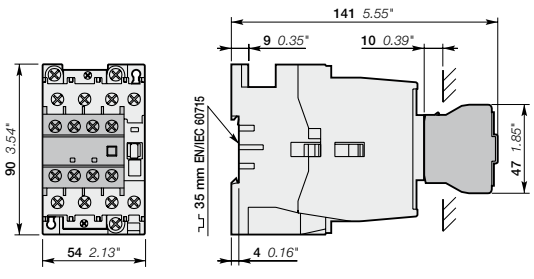
These contactors are of the block type design:
- 1st stack with 3 main poles and 1 built-in auxiliary contact
- 2nd stack with permanently fixed 2 N.O. + 2 N.C. auxiliary contact block. (The built-in auxiliary contact elements are mechanically linked).
- control circuit: AC operated with laminated magnet
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC			1st stack	2nd stack				Pkg (1 pce)
kW	A	hp	A	V 50 Hz	V 60 Hz						kg
18.5	60	30	60	24	24	1 0	2 2	A40-30-32	1SBL321001R8132		0.710
				48	48	1 0	2 2	A40-30-32	1SBL321001R8332		0.710
				110	110…120	1 0	2 2	A40-30-32	1SBL321001R8432		0.710
				220…230	230…240	1 0	2 2	A40-30-32	1SBL321001R8032		0.710
				230…240	240…260	1 0	2 2	A40-30-32	1SBL321001R8832		0.710
				380…400	400…415	1 0	2 2	A40-30-32	1SBL321001R8532		0.710
				400…415	415…440	1 0	2 2	A40-30-32	1SBL321001R8632		0.710

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



A40 2-stack

1SBC101398S0201

A50 ... A110 2-stack 3-pole contactors
22 to 55 kW
AC operated

A50-30-22

Description

A50 ... A110 contactors are mainly used for controlling 3-phase motors and generally for controlling power circuits up to 690 V AC / 1000 V AC or 220 V DC.

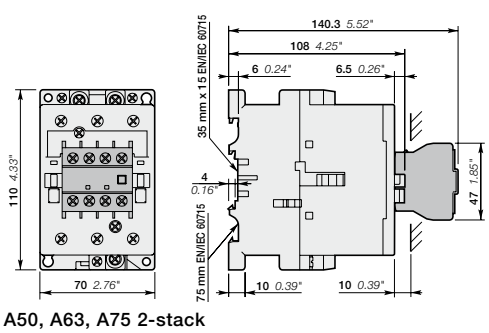
These contactors are of the block type design with:
- 1st stack with 3 main poles
- 2nd stack with permanently fixed 2 N.O. + 2 N.C.auxiliary contact block (the built-in auxiliary contact elements are mechanically linked)
- control circuit: AC operated with laminated magnet
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

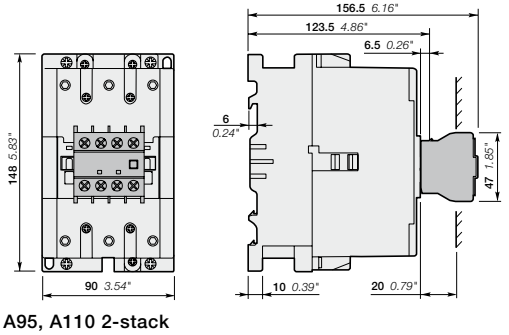
IEC Rated operational power 400 V AC-3 kW	current θ ≤ 40 °C AC-1 A	UL/CSA 3-phase motor rating 480 V hp	General use rating 600 V AC A	Rated control circuit voltage Uc (1) V 50 Hz	V 60 Hz	Auxiliary contacts fitted 1st stack	2nd stack	Type	Order code		Weight Pkg (1 pce) kg
22	100	40	80	24	24	0 0	2 2	A50-30-22	1SBL351001R8122		1.230
				48	48	0 0	2 2	A50-30-22	1SBL351001R8322		1.230
				110	110...120	0 0	2 2	A50-30-22	1SBL351001R8422		1.230
				220...230	230...240	0 0	2 2	A50-30-22	1SBL351001R8022		1.230
				230...240	240...260	0 0	2 2	A50-30-22	1SBL351001R8822		1.230
				380...400	400...415	0 0	2 2	A50-30-22	1SBL351001R8522		1.230
				400...415	415...440	0 0	2 2	A50-30-22	1SBL351001R8622		1.230
30	115	60	90	24	24	0 0	2 2	A63-30-22	1SBL371001R8122		1.230
				48	48	0 0	2 2	A63-30-22	1SBL371001R8322		1.230
				110	110...120	0 0	2 2	A63-30-22	1SBL371001R8422		1.230
				220...230	230...240	0 0	2 2	A63-30-22	1SBL371001R8022		1.230
				230...240	240...260	0 0	2 2	A63-30-22	1SBL371001R8822		1.230
				380...400	400...415	0 0	2 2	A63-30-22	1SBL371001R8522		1.230
				400...415	415...440	0 0	2 2	A63-30-22	1SBL371001R8622		1.230
37	125	60	105	24	24	0 0	2 2	A75-30-22	1SBL411001R8122		1.230
				48	48	0 0	2 2	A75-30-22	1SBL411001R8322		1.230
				110	110...120	0 0	2 2	A75-30-22	1SBL411001R8422		1.230
				220...230	230...240	0 0	2 2	A75-30-22	1SBL411001R8022		1.230
				230...240	240...260	0 0	2 2	A75-30-22	1SBL411001R8822		1.230
				380...400	400...415	0 0	2 2	A75-30-22	1SBL411001R8522		1.230
				400...415	415...440	0 0	2 2	A75-30-22	1SBL411001R8622		1.230
45	145	60	125	24	24	0 0	2 2	A95-30-22	1SFL431001R8122		2.070
				48	48	0 0	2 2	A95-30-22	1SFL431001R8322		2.070
				110	110...120	0 0	2 2	A95-30-22	1SFL431001R8422		2.070
				220...230	230...240	0 0	2 2	A95-30-22	1SFL431001R8022		2.070
				230...240	240...260	0 0	2 2	A95-30-22	1SFL431001R8822		2.070
				380...400	400...415	0 0	2 2	A95-30-22	1SFL431001R8522		2.070
				400...415	415...440	0 0	2 2	A95-30-22	1SFL431001R8622		2.070
55	160	75	140	24	24	0 0	2 2	A110-30-22	1SFL451001R8122		2.070
				48	48	0 0	2 2	A110-30-22	1SFL451001R8322		2.070
				110	110...120	0 0	2 2	A110-30-22	1SFL451001R8422		2.070
				220...230	230...240	0 0	2 2	A110-30-22	1SFL451001R8022		2.070
				230...240	240...260	0 0	2 2	A110-30-22	1SFL451001R8822		2.070
				380...400	400...415	0 0	2 2	A110-30-22	1SFL451001R8522		2.070
				400...415	415...440	0 0	2 2	A110-30-22	1SFL451001R8622		2.070

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



A50, A63, A75 2-stack



A95, A110 2-stack

1SBC101399S0201

AL40 2-stack 3-pole contactors
18.5 kW
DC operated

AL40-30-22

Description

AL40 contactors are mainly used for controlling 3-phase motors and generally for controlling power circuits up to 690 V AC or 220 V DC.

These contactors are of the block type design:

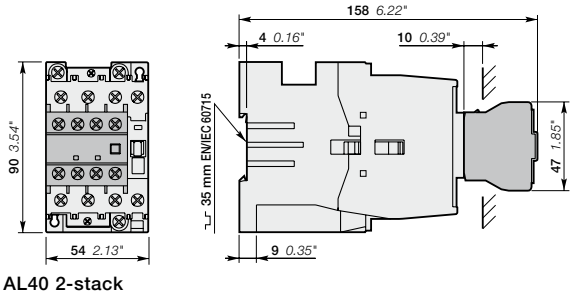
– 1st stack with 3 main poles
– 2nd stack with permanently fixed 2 N.O. + 2 N.C.auxiliary contact block (the built-in auxiliary contact elements are mechanically linked).
– control circuit: low consumption (3.5 W at pull-in and holding) DC operated with solid core magnet. Suitable for direct control by PLC outputs (the polarity on the coil terminals A1+ and A2- must be respected)
– add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc (1)	Auxiliary contacts fitted		Type	Order code		Weight Pkg (1 pce)
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC		1st stack	2nd stack				
kW	A	hp	A	V DC						kg
18.5	60	30	60	12	0 0	2 2	AL40-30-22	1SBL323001R8022		0.910
				24	0 0	2 2	AL40-30-22	1SBL323001R8122		0.910
				48	0 0	2 2	AL40-30-22	1SBL323001R8322		0.910
				60	0 0	2 2	AL40-30-22	1SBL323001R8422		0.910
				110	0 0	2 2	AL40-30-22	1SBL323001R8622		0.910
				125	0 0	2 2	AL40-30-22	1SBL323001R8722		0.910
				220	0 0	2 2	AL40-30-22	1SBL323001R8822		0.910
				240	0 0	2 2	AL40-30-22	1SBL323001R8922		0.910

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



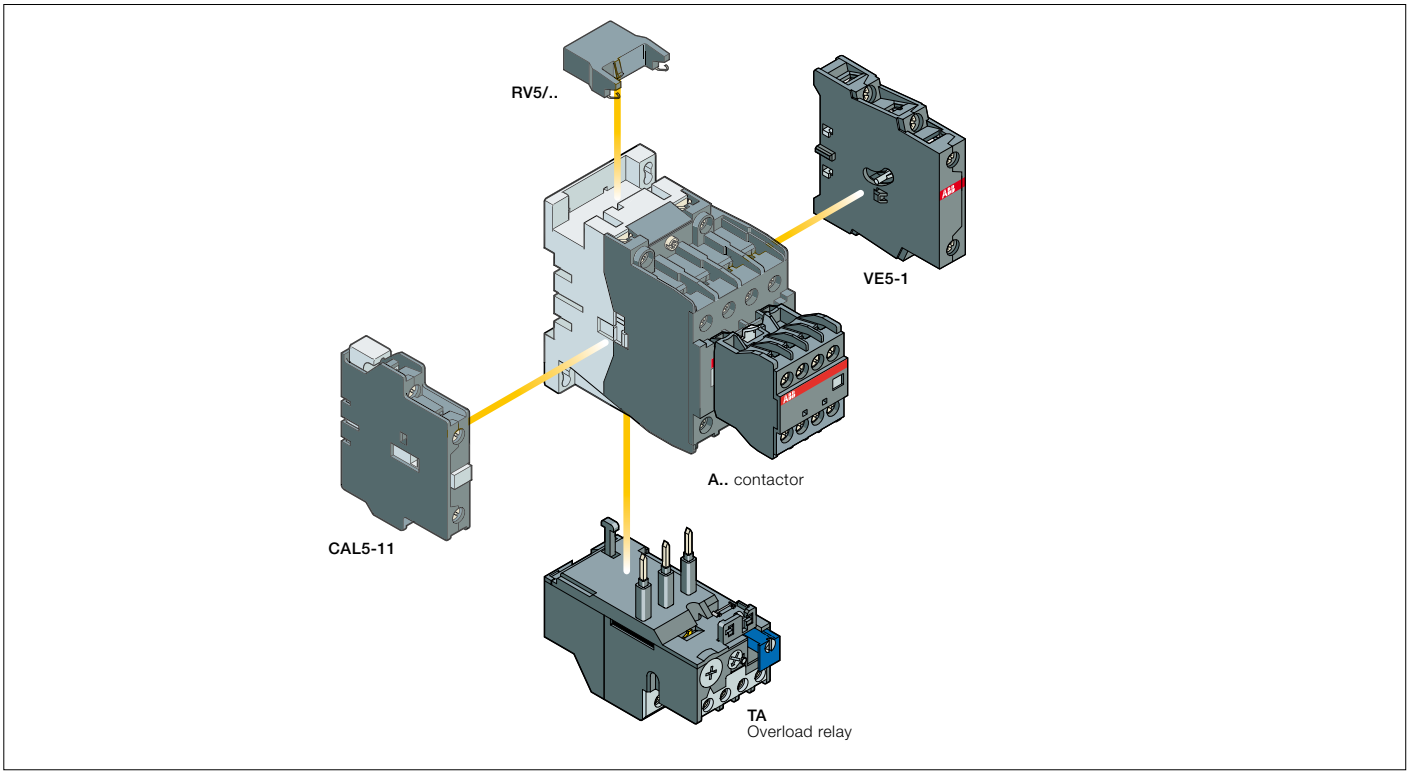
AL40 2-stack

1SBC101400S0201

Notes

A40…A110, AL40 2-stack 3-pole contactors
Main accessories

Contactor and main accessories (other accessories available)



5

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		Side-mounted accessories		
			Auxiliary contact blocks		Auxiliary contact blocks		Interlock unit
			1-pole CA5-..		2-pole CAL		VM5-.. or VE5-..
A40	3 0	3 2 (5)	1 x CA5-..	+	1 to 2 x CAL5-11	or	1 x VM5-1 or VE5-1 + 1 x CAL5-11
AL40	3 0	2 2	–		–		1 x VM5-1 or VE5-1 (2)
A50...A75	3 0	2 2	1 to 2 x CA5-..	+	1 to 2 x CAL5-11	or	1 x VE5-2 + 1 x CAL5-11
A95, A110	3 0	2 2	1 to 2 x CA5-..	+	1 to 2 x CAL 18-11	or	1 x VE5-2 + 1 x CAL18-11

(2) Not allowed in mounting position 1 ±30°.
(5) 2 N.C. CA5-.. auxiliary contacts maximum in mounting position 5.

Overload relays fitting details (4)

Contactor types	Thermal overload relays	Electronic overload relays
A40, AL40	TA25DU (0.1...32 A) or TA42DU (18...42 A)	E45DU (9...45 A)
A50 … A75, AE50 … AE75	TA75DU (18...80 A)	E80DU (27...80 A)
A95, A110	TA80DU (29...80 A) or TA110DU (65...110 A)	E140DU (50...140 A)

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

1SBC101401S0201

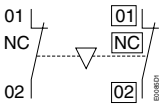
A40 … A110, AL40 2-stack 3-pole contactors
Main accessories

CA5-10

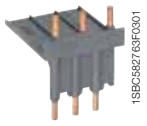
CAL5-11

RV5/50

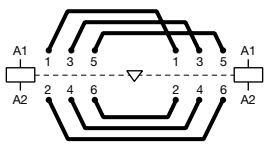
VE5-1



VE5-1, VE5-2
Terminal marking and positioning



BEA40/450



BER, BEM connection sets

Ordering Details

For contactors		Auxiliary contacts		Type	Order code		Pkg qty	Weight (1 pce) kg
Front-mounted instantaneous auxiliary contact block								
A40 … A110		1	–	CA5-10	1SBN010010R1010		10	0.014
		–	1	CA5-01	1SBN010010R1001		10	0.014
Side-mounted instantaneous auxiliary contact block								
A40 … A75		1	1	CAL5-11	1SBN010020R1011		2	0.050
A95, A110		1	1	CAL18-11	1SFN010720R1011		2	0.050
Interlock units								
A40, AL40	Mechanical	–	–	VM5-1	1SBN030100R1000		1	0.066
	Mechanical and electrical	–	2	VE5-1	1SBN030110R1000		1	0.076
A50 … A110	Mechanical and electrical	–	2	VE5-2	1SBN030210R1000		1	0.146

Surge suppressors for contactor coils

For contactors	Rated control circuit voltage - Uc V	DC	AC	Type	Order code		Pkg qty	Weight (1 pce) kg
A40 … A110, AL40	24…50	●	●	RV5/50	1SBN050010R1000		2	0.015
	50…133	●	●	RV5/133	1SBN050010R1001		2	0.015
	110…250	●	●	RV5/250	1SBN050010R1002		2	0.015
	250…440	●	●	RV5/440	1SBN050010R1003		2	0.015
A40	24…50	–	●	RC5-1/50	1SBN050100R1000		2	0.012
	50…133	–	●	RC5-1/133	1SBN050100R1001		2	0.012
	110…250	–	●	RC5-1/250	1SBN050100R1002		2	0.012
	250…440	–	●	RC5-1/440	1SBN050100R1003		2	0.012
A50 … A110	24…50	–	●	RC5-2/50	1SBN050200R1000		2	0.015
	50…133	–	●	RC5-2/133	1SBN050200R1001		2	0.015
	110…250	–	●	RC5-2/250	1SBN050200R1002		2	0.015
	250…440	–	●	RC5-2/440	1SBN050200R1003		2	0.015
AL40	12…32	●	–	RT5/32	1SBN050020R1000		2	0.015
	25…65	●	–	RT5/65	1SBN050020R1001		2	0.015
	50…90	●	–	RT5/90	1SBN050020R1002		2	0.015
	77…150	●	–	RT5/150	1SBN050020R1003		2	0.015
	150…264	●	–	RT5/264	1SBN050020R1004		2	0.015

Connecting links with manual motor starters

For contactors		Type	Order code		Pkg qty	Weight (1 pce) kg
A40	For MS450 manual motor starter	BEA40/450	1SBN083206R1000		1	0.061
A50	For MS450 manual motor starter	BEA50/450	1SBN083506R1000		1	0.062
A50 … A75	For MS495 manual motor starter	BEA75/495	1SBN084106R1000		1	0.120
A95, A110	For MS495 manual motor starter	BEA110/495	1SBN084506R1000		1	0.124

Connection sets for reversing contactors

A40	BER40V	1SBN082411R1000		1	0.085
A50 … A75	BEM75-30	1SBN083501R1000		1	0.243
A95, A110	BEM110-30	1SFN084301R1000		1	0.450

Mounting plates for mechanical interlocked contactors (1)

A95, A110	PN110-21	1SFN094301R1000		1	0.600

(1) For two contactors side by side with space for mechanical interlock.

1SBC101402S0201

A145 ... A300 3-pole contactors
75 to 160 kW
AC operated - with 2 N.O. + 2 N.C. auxiliary contacts

A185-30-22

A300-30-22

Description

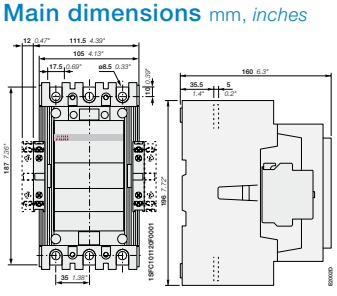
A145 ... A300 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 / 1000 V AC (2) or 220 V DC.
These contactors are of the block type design with:
- 3 main poles
- control circuit: AC operated
- add-on auxiliary contact blocks for side mounting and a wide range of accessories

Ordering details

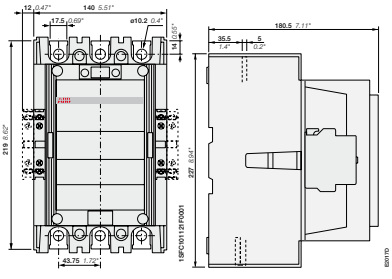
IEC		UL/CSA		Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C 690 V AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50 Hz	V 60 Hz						kg
75	250	100	230	24	24	2	2	A145-30-22	1SFL471001R8122		3.500
				48	48	2	2	A145-30-22	1SFL471001R8322		3.500
				110	110...120	2	2	A145-30-22	1SFL471001R8422		3.500
				220...230	230...240	2	2	A145-30-22	1SFL471001R8022		3.500
				230...240	240...260	2	2	A145-30-22	1SFL471001R8822		3.500
				380...400	400...415	2	2	A145-30-22	1SFL471001R8522		3.500
				400...415	415...440	2	2	A145-30-22	1SFL471001R8622		3.500
90	275	125	250	24	24	2	2	A185-30-22	1SFL491001R8122		3.500
				48	48	2	2	A185-30-22	1SFL491001R8322		3.500
				110	110...120	2	2	A185-30-22	1SFL491001R8422		3.500
				220...230	230...240	2	2	A185-30-22	1SFL491001R8022		3.500
				230...240	240...260	2	2	A185-30-22	1SFL491001R8822		3.500
				380...400	400...415	2	2	A185-30-22	1SFL491001R8522		3.500
				400...415	415...440	2	2	A185-30-22	1SFL491001R8622		3.500
110	350	150	300	24	24	2	2	A210-30-22	1SFL511001R8122		6.100
				48	48	2	2	A210-30-22	1SFL511001R8322		6.100
				110	110...120	2	2	A210-30-22	1SFL511001R8422		6.100
				220...230	230...240	2	2	A210-30-22	1SFL511001R8022		6.100
				230...240	240...260	2	2	A210-30-22	1SFL511001R8822		6.100
				380...400	400...415	2	2	A210-30-22	1SFL511001R8522		6.100
				400...415	415...440	2	2	A210-30-22	1SFL511001R8622		6.100
140	400	200	350	24	24	2	2	A260-30-22	1SFL531001R8122		6.100
				48	48	2	2	A260-30-22	1SFL531001R8322		6.100
				110	110...120	2	2	A260-30-22	1SFL531001R8422		6.100
				220...230	230...240	2	2	A260-30-22	1SFL531001R8022		6.100
				230...240	240...260	2	2	A260-30-22	1SFL531001R8822		6.100
				380...400	400...415	2	2	A260-30-22	1SFL531001R8522		6.100
				400...415	415...440	2	2	A260-30-22	1SFL531001R8622		6.100
160	500	250	400	24	24	2	2	A300-30-22	1SFL551001R8122		6.100
				48	48	2	2	A300-30-22	1SFL551001R8322		6.100
				110	110...120	2	2	A300-30-22	1SFL551001R8422		6.100
				220...230	230...240	2	2	A300-30-22	1SFL551001R8022		6.100
				230...240	240...260	2	2	A300-30-22	1SFL551001R8822		6.100
				380...400	400...415	2	2	A300-30-22	1SFL551001R8522		6.100
				400...415	415...440	2	2	A300-30-22	1SFL551001R8622		6.100

(1) Other control voltages see voltage code table.
(2) 690 V AC for A210 ... A300, 1000 V AC for A145, A185.

Main dimensions mm, *inches*



A145, A185



A210, A260, A300

1SFC101010C0201

AF145 ... AF300 3-pole contactors
75 to 160 kW
AC/DC operated with 2 N.O. + 2 N.C. auxiliary contacts

AF185-30-22

AF300-30-22

Description

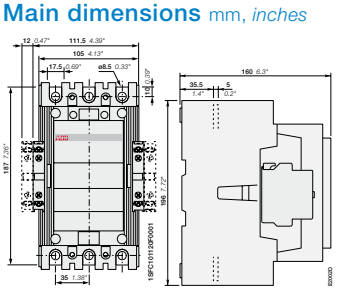
AF145 ... AF300 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 / 1000 V AC (2) or 220 V DC.
These contactors are of the block type design with:
- 3 main poles
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
  - can manage large control voltage variations
  - only 3 coils to cover control voltages between 48...250 V 50/60 Hz and 20...250 V DC
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltages sags (SEMI F47 conditions of use on request)
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories

Ordering details

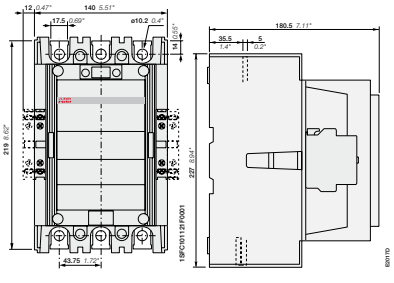
IEC		UL/CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C 690 V AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC						kg
75	250	100	230	-	20...60	2	2	AF145-30-22	1SFL477001R7222 (1)		3.600
				48...130	48...130	2	2	AF145-30-22	1SFL477001R6922		3.600
				100...250	100...250	2	2	AF145-30-22	1SFL477001R7022		3.600
90	275	125	250	-	20...60	2	2	AF185-30-22	1SFL497001R7222 (1)		3.600
				48...130	48...130	2	2	AF185-30-22	1SFL497001R6922		3.600
				100...250	100...250	2	2	AF185-30-22	1SFL497001R7022		3.600
110	350	150	300	-	20...60	2	2	AF210-30-22	1SFL517001R7222 (1)		6.200
				48...130	48...130	2	2	AF210-30-22	1SFL517001R6922		6.200
				100...250	100...250	2	2	AF210-30-22	1SFL517001R7022		6.200
140	400	200	350	-	20...60	2	2	AF260-30-22	1SFL537001R7222 (1)		6.200
				48...130	48...130	2	2	AF260-30-22	1SFL537001R6922		6.200
				100...250	100...250	2	2	AF260-30-22	1SFL537001R7022		6.200
160	500	250	400	-	20...60	2	2	AF300-30-22	1SFL557001R7222 (1)		6.200
				48...130	48...130	2	2	AF300-30-22	1SFL557001R6922		6.200
				100...250	100...250	2	2	AF300-30-22	1SFL557001R7022		6.200

1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.
(2) 690 V AC for AF210 ... AF300, 1000 V AC for AF145, AF185.

Main dimensions mm, *inches*



AF145, AF185



AF210, AF260, AF300

AF400 ... AF750 3-pole contactors
200 to 400 kW
AC/DC operated with 2 N.O. + 2 N.C. auxiliary contacts

AF460-30-22

AF750-30-22

Description

AF400 ... AF750 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC or 600 V DC (2).
These contactors are of the block type design with:
- 3 main poles
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...500 V AC and DC)
  - can manage large control voltage variations
  - only 4 coils to cover control voltages between 48...500 V 50/60 Hz and 24...500 V DC
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltages sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

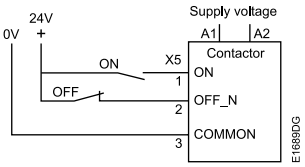
Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C 690 V AC-1	3-phase motor rating 480 V	General use rating 600 V AC	V 50/60 Hz	V DC						Pkg (1 pce)
kW	A	hp	A								kg
200	600	350	550	-	24...60	2	2	AF400-30-22	1SFL577001R6822 (1)		12.000
				48...130	48...130	2	2	AF400-30-22	1SFL577001R6922		12.000
				100...250	100...250	2	2	AF400-30-22	1SFL577001R7022		12.000
				250...500	250...500	2	2	AF400-30-22	1SFL577001R7122		12.000
250	700	400	650	-	24...60	2	2	AF460-30-22	1SFL597001R6822 (1)		12.000
				48...130	48...130	2	2	AF460-30-22	1SFL597001R6922		12.000
				100...250	100...250	2	2	AF460-30-22	1SFL597001R7022		12.000
				250...500	250...500	2	2	AF460-30-22	1SFL597001R7122		12.000
315	800	500	750	-	24...60	2	2	AF580-30-22	1SFL617001R6822 (1)		15.000
				48...130	48...130	2	2	AF580-30-22	1SFL617001R6922		15.000
				100...250	100...250	2	2	AF580-30-22	1SFL617001R7022		15.000
				250...500	250...500	2	2	AF580-30-22	1SFL617001R7122		15.000
400	1050	600	900	-	24...60	2	2	AF750-30-22	1SFL637001R6822 (1)		15.000
				48...130	48...130	2	2	AF750-30-22	1SFL637001R6922		15.000
				100...250	100...250	2	2	AF750-30-22	1SFL637001R7022		15.000
				250...500	250...500	2	2	AF750-30-22	1SFL637001R7122		15.000

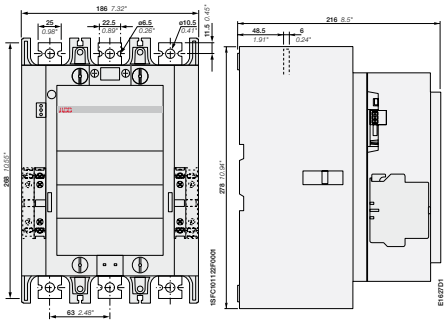
(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.
(2) Up to 850 V DC for AF580, AF750.

AF400...AF750 are equipped with low voltage inputs for control, for example by a PLC

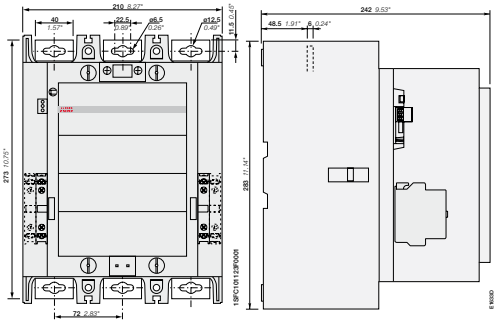
Control inputs



Main dimensions mm, *inches*



AF400, AF460



AF580, AF750

1SFC101014C0201

AF1250 ... AF2050 3-pole contactors
475 to 560 kW and 1250 to 2050 A AC-1
AC/DC operated with 2 N.O. + 2 N.C. aux.contacts

AF1250-30-22

Description

AF1250 ... AF2050 contactors are mainly used for controlling power circuits up to 1000 V AC or 850 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)
  - can manage large control voltage variations
    - 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 ... AF2050 to cover control voltages between 100...250 V 50/60 Hz and 100...250 V DC
    - 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.

AF1650-30-22

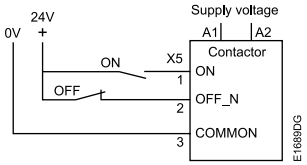
Ordering details

IEC		UL/CSA		Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C 690 V AC-1	3-phase motor rating 480 V	General use rating 600 V AC								Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC						kg
-	1260	-	1210	-	24...60	2	2	AF1250-30-22	1SFL647001R6822 (1)		16.000
				48...130	48...130	2	2	AF1250-30-22	1SFL647001R6922		16.000
				100...250	100...250	2	2	AF1250-30-22	1SFL647001R7022		16.000
				250...500	250...500	2	2	AF1250-30-22	1SFL647001R7122		16.000
475	1350	800	1350	100...250	100...250	2	2	AF1350-30-22	1SFL657001R7022		34.000
560	1650	900	1650	100...250	100...250	2	2	AF1650-30-22	1SFL677001R7022		35.000
-	2050	-	2100	100...250	100...250	2	2	AF2050-30-22	1SFL707001R7022		35.000

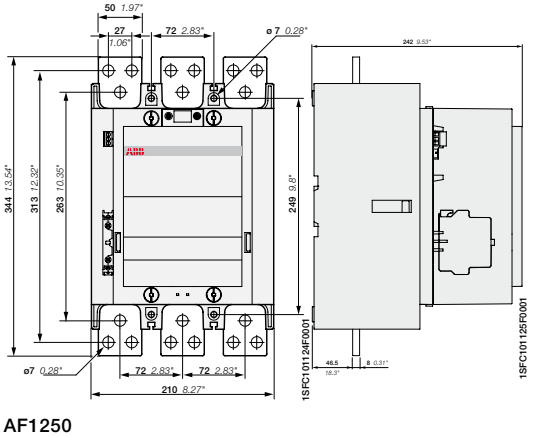
(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.

AF1250 ... AF2050 are equipped with low voltage inputs for control, for example by a PLC

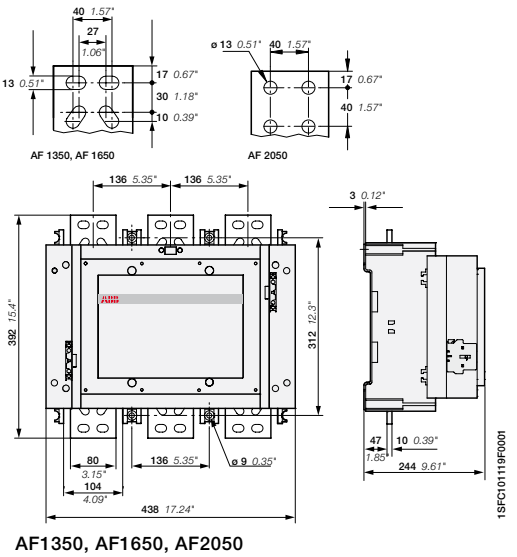
Control inputs



Main dimensions mm, *inches*



AF1250

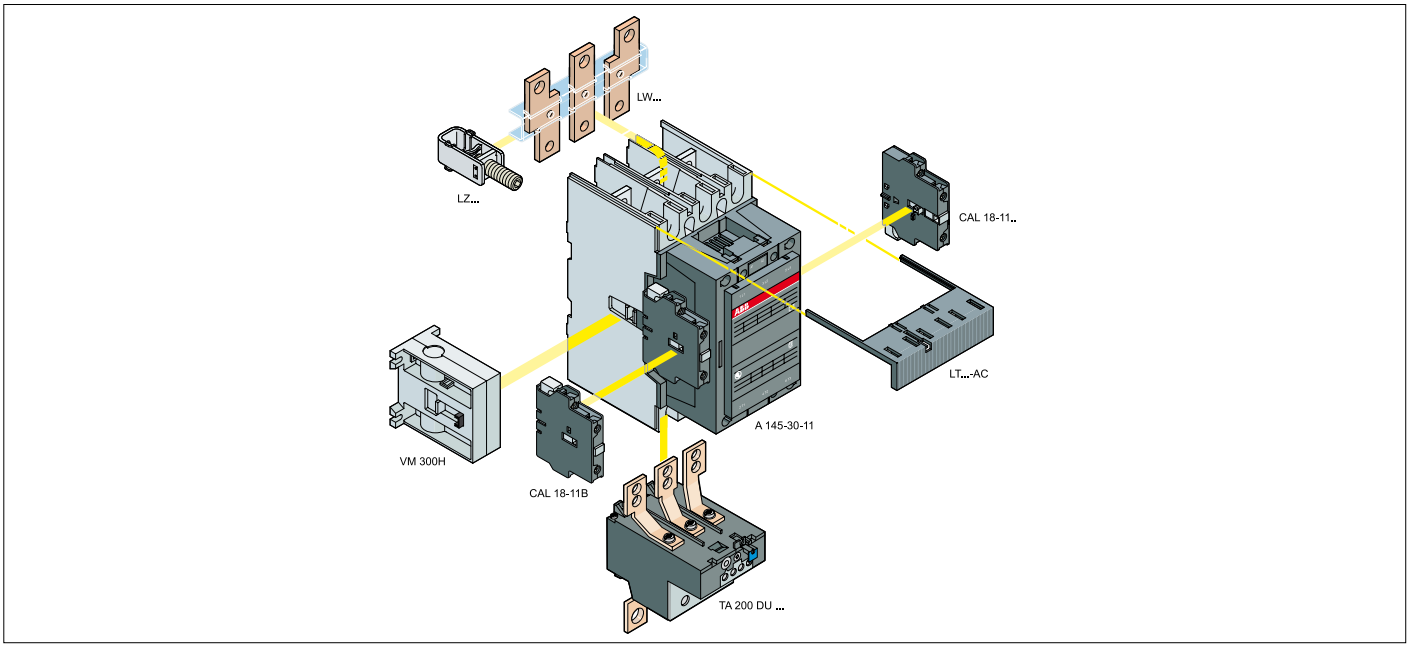


AF1350, AF1650, AF2050

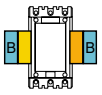
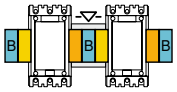
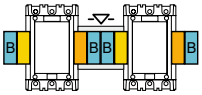
1SFC101016C0201

A145 ... A300 and AF145... AF2050 3-pole contactors with 2 N.O. + 2 N.C. auxiliary contacts

Main accessories (other accessories available)



Main accessory fitting details

Contactor types	Main poles	Available auxiliary contacts	Side-mounted accessories: Add-on auxiliary contact blocks CAL18-11, CAL18-11B (3)		Mechanical interlock units (for two horizontal mounted contactors)	Mounting and positioning: Factory mounted auxiliary contacts / Add-on CAL18-11 auxiliary contacts / Add-on CAL18-11B auxiliary contacts
Contactors + auxiliary contact blocks						
A145 ... A300 AF145 ... AF2050	3 0	2 2	–	2 x CAL18-11B	–	
Contactors with mechanical interlocking + auxiliary contact blocks						
A145 ... A185 AF145 ... AF185	3 0	2 2	–	3 x CAL18-11 B	+ VM...H (2)	
A210 ... A300 AF210 ... AF2050	3 0	2 2	–	4 x CAL18-11B	+ 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
A145, A185	TA200DU (80...200 A) (4)	E200DU (60...200 A) (4)
A210, A300	TA450DU (100...310 A) (4) or TA450SU (130...310 A) (5)	E320DU (100...320 A) (4)
AF400, AF460	–	E500DU (150...500 A) (5)
AF580, AF750	–	E800DU (250...800 A) (5)
AF1350, AF1650	–	E1250DU (375...1250 A) (5)

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) Direct mounting - No kit required.
(5) Mounting kit required (see "Motor protection").

1SFC101028C0201

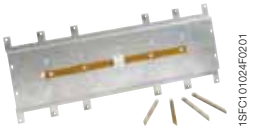
A145 ... A300 and AF145 ... AF2050 3-pole contactors
Main accessories

1SFC101033F0201

CAL18-11

1SBC580411F0301

VM300H


1SFC101024F0201

VM1650H

1SFT98099-019C3

LT... AC

1SFT9099-125

LT...AL

1SFT98000-014

LT...AY

1SFT98000-011C3

LW

1SFT98000-012C3

LX

1SFT98099-011C1

LZ...

1SBC580542F0302

LZ...

1SFT98099-095C2

LZ...

Ordering details (1)

For contactors	Auxiliary contacts	Type	Order code		Pkg qty	Weigl (1 pc kg
Side-mounted instantaneous auxiliary contact blocks						
A145 ... A300 and AF145 ... AF2050	1 1	CAL18-11	1SFN010720R1011		2	0.050
	1 1	CAL18-11B	1SFN010720R3311		2	0.050
Mechanical interlock unit for two horizontal mounted contactors						
A145 ... A300		VM300H	1SFN034700R1000		1	0.150
A210 ... A300		VM300/460H	1SFN035100R1000		1	0.150
AF400 ... AF1250		VM750H	1SFN035700R1000		1	0.200
AF1350 ... AF2050		VM1650H	1SFN036503R1000		1	6.000
Terminal shrouds						
A145 ... A185 with connectors		LT185-AC	1SFN124701R1000		2	0.050
A145 ... A185 with lugs		LT185-AL	1SFN124703R1000		2	0.220
A145 ... A185 with short. bar LY185 or between A145 and TA200DU or between A185 and TA200DU		LT185-AY	1SFN124704R1000		1	0.050
A210 ... A300 with connectors		LT300-AC	1SFN125101R1000		2	0.070
A210 ... A300 with lugs		LT300-AL	1SFN125103R1000		2	0.280
A210 ... A300 with short bar LY300		LT300-AY	1SFN125104R1000		1	0.075
AF400 ... AF460 with connectors		LT460-AC	1SFN125701R1000		2	0.100
AF400 ... AF460 with lugs		LT460-AL	1SFN125703R1000		2	0.800
AF580 ... AF750 with connectors		LT750-AC	1SFN126101R1000		2	0.120
AF580 ... AF750 with lugs		LT750-AL	1SFN126103R1000		2	0.825

Terminal enlargements

For contactors	Dimensions hole Ø mm	bar mm	Type	Order code		Pkg qty	Weigl (1 pc kg
A145, A185	10.5	20 x 5	LW185	1SFN074707R1000		1	0.250
A210 ... A300	10.5	25 x 5	LW300	1SFN075107R1000		1	0.450
AF400, AF460	10.5	25 x 5	LW460	1SFN075707R1000		1	0.730
AF580, AF750	13	40 x 6	LW750	1SFN076107R1000		1	1.230
AF1250	13	50 x 10	LW1250	1SFN076407R1000		1	2.000

Terminal extension

A145, A185	8.5	20 x 5	LX185	1SFN074710R1000		1	0.250
A210 ... A300	10.5	20 x 5	LX300	1SFN075110R1000		1	0.350
AF400, AF460	10.5	25 x 5	LX460	1SFN075710R1000		1	0.500
AF580, AF750	13	40 x 6	LX750	1SFN076110R1000		1	0.850

(1) For each contactor type, refer to "Main accessory fitting details" table.

Ordering details (1)

Cables	For contactors	Cable cross section mm²	Type	Order code		Pkg qty	Weigl (1 pc kg
Connector terminals							
Single Cu	A145, A185	6...185	–	1SDA023354R0001		3	0.200
	A210 ... A300	16...240	–	1SDA023368R0001		3	0.400
Single Al & Cu	A145, A185	35...95	–	1SDA023356R0001		3	0.100
	A145, A185	25...150	–	1SDA023357R0001		3	0.100
	A210 ... A300	120...240	–	1SDA023370R0001		3	0.200
Double Cu	A145, A185	2 x (50...120)	LZ185-2C/120	1SFN074709R1000		3	0.300
Double Al & Cu	A210 ... A300	2 x (95...120)	–	1SDA025766R0001		3	0.400
	AF400 ... AF750	2 x (120...240)	–	1SDA023380R0001		3	0.110
Triple Al & Cu	AF400 ... AF750	3 x (70...185)	–	1SDA023384R0001		3	0.265
Multi Al & Cu	AF1350, AF1650	4 x (120...240)	–	1SDA023387R0001		3	0.400

(1) For each contactor type, refer to "Main accessory fitting details" table.
Note: Connectors provided for the A... contactors can be used for the AF types.

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,	**10 s**	150 A	150 A	150 A	350 A	350 A	350 A
in free air from a cold state	**30 s**	80 A	80 A	80 A	225 A	225 A	225 A
	1 min	60 A	60 A	60 A	150 A	150 A	150 A
	15 min	35 A	35 A	35 A	50 A	50 A	50 A
Maximum breaking capacity							
cos φ = 0.45	**at 440 V**	250 A	250 A	250 A	500 A	500 A	500 A
	at 690 V	106 A	106 A	106 A	200 A	200 A	200 A
Power dissipation per pole	**Ie / AC-1**	0.8 W	1 W	1.2 W	1.8 W	2.4 W	2.4 W
	Ie / AC-3	0.1 W	0.2 W	0.35 W	0.6 W	0.9 W	1.3 W
Max. electrical switching frequency	**AC-1**	600 cycles/h					
	AC-3	1200 cycles/h					
	AC-2, AC-4	300 cycles/h			150 cycles/h		

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

1SBC101425S0201

A40 … A110, AL, AE, TAL, TAE and AF50 … AF110 3-pole contactors
Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	**AC operated**	A40	A50	A63	A75	A95	A110
	DC operated	AL40	AE50	AE63	AE75	–	–
		TAL40	TAE50	–	TAE75	–	–
	AC / DC operated	–	AF50	AF63	AF75	AF95	AF110
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1					
Rated operational voltage Ue max.		690 V	1000 V (690 V for AF.. contactors)			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		65 A	100 A	125 A	125 A	145 A	160 A
With conductor cross-sectional area		16 mm²	35 mm²	50 mm²	50 mm²	50 mm²	70 mm²
AC-1 Utilization category							
For air temperature close to contactor							
Ie / Rated operational current AC-1	**θ ≤ 40 °C**	60 A	100 A	115 A	125 A	145 A	160 A
Ue max. ≤ 690 V, 50/60 Hz	**θ ≤ 55 °C**	60 A	85 A	95 A	105 A	135 A	145 A
	θ ≤ 70 °C (3)	42 A	70 A	80 A	85 A	115 A	130 A
With conductor cross-sectional area		16 mm²	35 mm²	50 mm²	50 mm²	50 mm²	70 mm²
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	40 A	53 A	65 A	75 A	96 A	110 A
	380-400 V	37 A	50 A	65 A	75 A	96 A	110 A
3-phase motors	**415 V**	37 A	50 A	65 A	75 A	96 A	110 A
	440 V	37 A	45 A	65 A	70 A	93 A	100 A
	500 V	33 A	45 A	55 A	65 A	80 A	100 A
	690 V	25 A (4)	35 A	43 A	46 A	65 A	82 A
	1000 V	–	23 A (6)	25 A (6)	28 A (6)	30 A	30 A
Rated operational power AC-3 (1)							
	220-230-240 V	11 kW	15 kW	18.5 kW	22 kW	25 kW	30 kW
	380-400 V	18.5 kW	22 kW	30 kW	37 kW	45 kW	55 kW
1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors	**415 V**	18.5 kW	25 kW	37 kW	40 kW	55 kW	59 kW
	440 V	22 kW	25 kW	37 kW	40 kW	55 kW	59 kW
	500 V	22 kW	30 kW	37 kW	45 kW	55 kW	59 kW
	690 V	22 kW (4)	30 kW	37 kW	40 kW	55 kW	75 kW
	1000 V	–	30 kW (6)	33 kW (6)	37 kW (6)	40 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		50 A	63 A	85 A	95 A	120 A	140 A
Rated operational power AC-8a		22 kW	30 kW	45 kW	45 kW	55 kW	75 kW
Short-circuit protection device for contactors							
without thermal overload relay - Motor protection excluded (2)							
Ue ≤ 500 V AC - gG type fuse		63 A	100 A	125 A	160 A	160 A	200 A
Rated short-time withstand current Icw	**1 s**	600 A	1000 A			1320 A	
at 40 °C ambient temperature,	**10 s**	400 A	650 A			800 A	
in free air from a cold state	**30 s**	225 A	370 A			500 A	
	1 min	150 A	250 A			350 A	
	15 min	65 A	110 A	135 A	135 A	160 A	175 A
Maximum breaking capacity							
cos φ = 0.45	**at 440 V**	820 A (5)	1300 A			1160 A	
(cos φ = 0.35 for Ie > 100 A)	**at 690 V**	340 A (5)	630 A			800 A	
Power dissipation per pole	**Ie / AC-1**	3 W	5 W	6.5 W	7 W	6.5 W	7.5 W
	Ie / AC-3	1.3 W	1.3 W	1.5 W	2 W	2.7 W	3.6 W
Max. electrical switching frequency	**AC-1**	600 cycles/h	600 cycles/h (300 for AF.., AE.., TAE..)			300 cycles/h	
	AC-3	1200 cycles/h	600 cycles/h (300 for AF.., AE.., TAE..)			300 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".
(3) Unauthorized for TAL.., TAE.. contactors.
(4) AC-3, 690 V values for AL40 and TAL40 contactors: 18.5 kW, Ie = 21 A.
(5) Max. breaking capacity for AL40 and TAL40 contactors: 470 A at 440 V, 175 A at 690 V.
(6) AF contactors excluded.

1SBC101429S0201

A145 … A300 and AF145 … AF300 3-pole contactors
Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC operated	A145	A185	A210	A260	A300
	AC / DC operated	AF145	AF185	AF210	AF260	AF300
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1				
Rated operational voltage Ue max.		1000 V		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		250 A	275 A	350 A	400 A	500 A (4)
With conductor cross-sectional area (3)		120 mm²	150 mm²	185 mm²	240 mm²	300 mm² (4)
AC-1 Utilization category						
For air temperature close to contactor						
Ie / Rated operational current AC-1	**θ ≤ 40 °C**	250 A	275 A	350 A	400 A	500 A (4)
Ue max. ≤ 690 V, 50/60 Hz	**θ ≤ 55 °C**	230 A	250 A	300 A	350 A	400 A (4)
	θ ≤ 70 °C	180 A	180 A	240 A	290 A	325 A (4)
Ie / Rated operational current AC-1	**θ ≤ 40 °C**	180 A	200 A	–	–	–
Ue max. ≤ 1000 V, 50/60 Hz	**θ ≤ 55 °C**	180 A	200 A	–	–	–
	θ ≤ 70 °C	180 A	180 A	–	–	–
With conductor cross-sectional area		120 mm²	150 mm²	185 mm²	240 mm²	300 mm² (4)
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	145 A	185 A	210 A	260 A	305 A
	380-400 V	145 A	185 A	210 A	260 A	305 A
3-phase motors	**415 V**	145 A	185 A	210 A	260 A	300 A
	440 V	145 A	185 A	210 A	240 A	280 A
	500 V	145 A	170 A	210 A	240 A	280 A
	690 V	120 A	170 A	210 A	220 A	280 A
	1000 V	80 A	95 A	–	–	–
Rated operational power AC-3 (1)						
	220-230-240 V	45 kW	55 kW	59 kW	80 kW	90 kW
	380-400 V	75 kW	90 kW	110 kW	140 kW	160 kW
1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors	**415 V**	75 kW	90 kW	110 kW	140 kW	160 kW
	440 V	75 kW	90 kW	110 kW	140 kW	160 kW
	500 V	90 kW	110 kW	132 kW	180 kW	200 kW
	690 V	110 kW	132 kW	160 kW	200 kW	250 kW
	1000 V	110 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		315 A	355 A	400 A	500 A	500 A
Rated short-time withstand current Icw	**1 s**	1800 A	2000 A	2500 A	3500 A	3500 A
at 40 °C ambient temperature,	**10 s**	1200 A	1500 A	1700 A	2400 A	2400 A
in free air from a cold state	**30 s**	800 A	1000 A	1200 A	1500 A	1500 A
	1 min	600 A	800 A	1000 A	1100 A	1100 A
	15 min	280 A	320 A	400 A	500 A	500 A
Maximum breaking capacity						
cos φ = 0.45	**at 440 V**	1500 A	2000 A	2300 A	2600 A	3000 A
(cos φ = 0.35 for Ie > 100 A)	**at 690 V**	1200 A	1600 A	2000 A	2400 A	2500 A
Power dissipation per pole	**Ie / AC-1**	13 W	16 W	18 W	25 W	32 W
	Ie / AC-3	5 W	8 W	9 W	14 W	18 W
Max. electrical switching frequency	**AC-1**	300 cycles/h		300 cycles/h		
	AC-3	300 cycles/h		300 cycles/h		
	AC-2, AC-4	150 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".
(3) Conductors with preparation.
(4) Use terminal extension / enlargement pieces (LX 300 / LW 300).

1SFC101035C0201

AF400 … AF2050 3-pole contactors
Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC / DC operated	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050
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
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)
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
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
	θ ≤ 70 °C	400 A	480 A	580 A	720 A	875 A	1000 A	1270 A	1500 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
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
	θ ≤ 70 °C	400 A	480 A	580 A	720 A	875 A	1000 A	1270 A	1500 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)
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	–
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	–
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
at 40 °C ambient temperature,	**10 s**	4400 A	4400 A	6400 A	6400 A	7200 A	8000 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
	1 min	2500 A	2500 A	3500 A	3500 A	4000 A	4500 A	5500 A	5500 A
	15 min	840 A	840 A	1300 A	1300 A	1500 A	1600 A	2200 A	2200 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
(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
	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
	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.

1SFC101036C0201

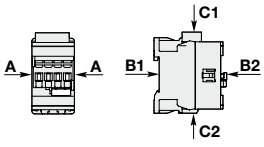
AF09 ... AF38 3-pole contactors
Technical data

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°14					
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
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	27 A
	550-600 V AC	9 A	11 A	17 A	22 A	27 A (2)	27 A (2)
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	20 hp
	550-600 V AC	7-1/2 hp	10 hp	15 hp	20 hp	25 hp (2)	25 hp (2)
Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded							
Fuse rating		60 A	60 A	60 A	150 A	150 A	150 A
Fuse type, 600 V		NTD					
Max. electrical switching frequency							
For general use		600 cycles/h					
For motor use		1200 cycles/h					

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see “Motor rated operational powers and currents”.
(2) For contactors produced since week 49-2011.

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 acc. to IEC 60068-2-6		5...300 Hz 4 g closed position / 2 g open position					

1SBC101426S0201

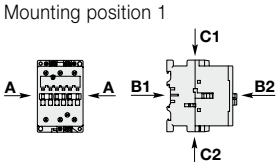
A40 … A110, AL, AE, TAL, TAE and AF50 … AF110 3-pole contactors
Technical data

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

Contactor types		AC operated	A40	A50	A63	A75	A95	A110
		DC operated	AL40, TAL40	AE50, TAE50	AE63	AE75, TAE75	–	–
		AC / DC operated	–	AF50	AF63	AF75	AF95	AF110
Standards			UL 508, CSA C22.2 N°14					
Max. 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	–	7-1/2	–	–	–	–
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	125 A	150 A
With conductor cross-sectional area			AWG 6	AWG 4	AWG 3	AWG 2	AWG 1	AWG 1/0
UL / CSA maximum 1-phase motor rating								
Full load current		**120 V AC**	34 A	34 A	56 A	80 A	80 A	100 A
		240 V AC	40 A	40 A	50 A	68 A	88 A	110 A
Horse power rating		**120 V AC**	3 hp	3 hp	5 hp	7.5 hp	7.5 hp	10 hp
		240 V AC	7.5 hp	7.5 hp	10 hp	15 hp	20 hp	25 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	92 A
		220-240 V AC	42 A	54 A	68 A	80 A	80 A	104 A
		440-480 V AC	40 A	52 A	77 A	77 A	77 A	96 A
		550-600 V AC	41 A	52 A	77 A	77 A	77 A	99 A
Horse power rating (1)		**200-208 V AC**	10 hp	15 hp	20 hp	25 hp	30 hp	30 hp
		220-240 V AC	15 hp	20 hp	25 hp	30 hp	30 hp	40 hp
		440-480 V AC	30 hp	40 hp	60 hp	60 hp	60 hp	75 hp
		550-600 V AC	40 hp	50 hp	75 hp	75 hp	75 hp	100 hp
Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded								
Fuse rating			150 A	175 A	200 A	200 A	200 A	200 A
Fuse type, 600 V			FRS-R		J			
Max. electrical switching frequency								
For general use			600 cycles/h	600 cycles/h (300 for AF.., AE..)			300 cycles/h	
For motor use			1200 cycles/h	600 cycles/h (300 for AF.., AE..)			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”.

General technical data

Contactor types		AC operated	A40	A50	A63	A75	A95	A110
		DC operated	AL40, TAL40	AE50, TAE50	AE63	AE75, TAE75	–	–
		AC / DC operated	–	AF50	AF63	AF75	AF95	AF110
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			AF contactors complying with IEC 60947-1 / EN 60947-1 - Environment A					
Ambient air temperature close to contactor								
Operation	Fitted with thermal overload relay		-25...+55 °C					
	Without thermal overload relay		-40...+70 °C (55 °C max. for TAL.., and TAE.. contactor)					
Storage			-60...+80 °C				-40...+70 °C	
Climatic withstand			acc. to IEC 60068-2-30 and 60068-2-11 UTE C 63-100 specification II				acc. to IEC 60068-2-30	
Maximum operating altitude (without derating)			3000 m					
Mechanical durability								
Number of operating cycles			10 millions operating cycles (5 millions for AE.. and TAE..)					
Max. switching frequency			3600 cycles/h (300 for AF contactors)					
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 (2)					
		**A**	20 g					
		B1	10 g closed position / 5 g open position					
		B2	15 g					
		C1	20 g					
		C2	20 g					

For AL40, TAL40
A : 20 g closed position / 10 g open position
B1 : 15 g closed position / 5 g open position
B2 : 10 g closed position / 10 g open position
C1 : 20 g closed position / 8 g open position
C2 : 14 g closed position / 8 g open position

(2) These values are not valid for rail mounting with contactors A95 ... A110 and AF95 ... AF110.

1SBC101432S0201

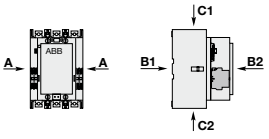
A145 … A300 and AF145 … AF300 3-pole contactors
Technical data

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

Contactor types		AC operated	A145	A185	A210	A260	A300
		AC / DC operated	AF145	AF185	AF210	AF260	AF300
Standards			UL 508, CSA C22.2 N°14				
Max. operational voltage			600 V				
NEMA size			4	–	–	5	–
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	50 hp			100 hp	
		460 V AC	100 hp			200 hp	
		575 V AC	200 hp			200 hp	
UL / CSA general use rating							
600 V AC			230 A	250 A	300 A	350 A	400 A
UL / CSA maximum 1-phase motor rating							
Full load current		**240 V AC**	–	–	–	–	–
Horse power rating		**240 V AC**	–	–	–	–	–
UL / CSA maximum 3-phase motor rating							
Full load current (1)		**200-208 V AC**	119.6 A	149.5 A	166.8 A	220.8 A	285.2 A
		220-240 V AC	130 A	145 A	192 A	248 A	248 A
		440-480 V AC	124 A	156 A	180 A	240 A	302 A
		550-600 V AC	125 A	144 A	192 A	242 A	289 A
Horse power rating (1)		**200-208 V AC**	40 hp	50 hp	60 hp	75 hp	100 hp
		220-240 V AC	50 hp	60 hp	75 hp	100 hp	100 hp
		440-480 V AC	100 hp	125 hp	150 hp	200 hp	250 hp
		550-600 V AC	125 hp	150 hp	200 hp	250 hp	300 hp
Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded							
Fuse rating			300 A	400 A	800 A	800 A	800 A
Fuse type, 600 V			J/K5				
Max. 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”.

General technical data

Contactor types		AC operated	A145	A185	A210	A260	A300
		AC / DC operated	AF145	AF185	AF210	AF260	AF300
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			AF 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				
	Fitted with electronic overload relay		-25 to +70 °C				
	Without electronic overload relay		-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				
Max. switching frequency			3600 cycles/h (300 for AF… contactors)				
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				

1SFC101037C0201

AF400 ... AF2050 3-pole contactors
Technical data

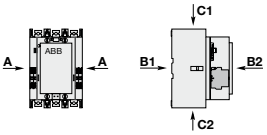
Main pole - Utilization characteristics according to UL / NEMA / CSA

Contactor types	AC / DC operated	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050
Standards		UL 508, CSA C22.2 N°14							
Max. operational voltage		600 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									
600 V AC		550 A	650 A	750 A	900 A	1210 A	1350 A	1650 A	2100 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							
Max. electrical switching frequency									
For general use		300 cycles/h					60 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”.

General technical data

Contactor types	AC / DC operated	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050
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		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							
Climatic withstand		acc. to IEC 60068-2-30							
Maximum operating altitude (without derating)		3000 m							
Mechanical durability									
Number of operating cycles		3 millions operating cycles				0.5 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					–		



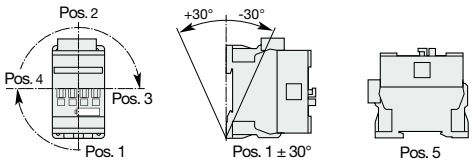
1SFC101038C0201

AF09 ... AF38 3-pole contactors
Technical data

Magnet system characteristics

Contactor types		AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Coil operating limits acc. to IEC 60947-4-1		**AC supply**	At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max. At θ ≤ 70 °C 0.85 x Uc min...Uc max.					
		DC supply	At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max. At θ ≤ 70 °C (AF) 0.85 x Uc min...Uc max. - (AF..Z) 0.85 x Uc min...1.1 x Uc max.					
AC control voltage 50/60 Hz	Rated control circuit voltage Uc		24...500 V AC					
	Coil consumption	**Average pull-in value**	(AF) 50 VA - (AF..Z) 16 VA					
		Average holding value	(AF) 2.2 VA / 2 W - (AF..Z) 1.7 VA / 1.5 W					
DC control voltage	Rated control circuit voltage Uc		12...500 V DC					
	Coil consumption	**Average pull-in value**	(AF) 50 W - (AF..Z) 12...16 W					
		Average holding value	(AF) 2 W - (AF..Z) 1.7 W					
PLC-output control			(AF..Z) ≥ 500 mA 24 V DC					
Drop-out voltage			≤ 60 % of Uc min.					
Voltage sag immunity acc. to SEMI F47-0706			(AF..Z) conditions of use on request					
Dips withstand -20 °C ≤ θ ≤ +60 °C			(AF..Z) 22 ms average					
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					

5

1SBC101427S0201

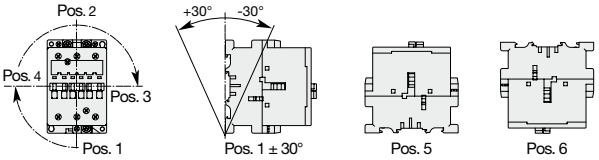
A40 … A110 3-pole contactors
Technical data

Magnet system characteristics

Contactor types			AC operated	A40	A50	A63	A75	A95	A110
Coil operating limits			**AC supply**	At θ ≤ 55 °C 0.85...1.1 x Uc				at θ ≤ 70 °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**	120 VA	180 VA			350 VA	
			60 Hz	140 VA	210 VA			450 VA	
			50/60 Hz (1)	125 VA / 120 VA	190 VA / 180 VA			410 VA / 365 VA	
		Average holding value	**50 Hz**	12 VA / 3 W	18 VA / 5.5 W			22 VA / 6.5 W	
			60 Hz	12 VA / 3 W	18 VA / 5.5 W			26 VA / 8 W	
			50/60 Hz (1)	12 VA / 3 W	18 VA / 5.5 W			27 VA / 7.5 W	
Drop-out voltage				Approx. 40...65 % of Uc					
Operating time									
Between coil energization and:		**N.O. contact closing**		8…21 ms	8…27 ms			10…25 ms	
		N.C. contact opening		6…18 ms	7…22 ms			7…22 ms	
Between coil de-energization and:		**N.O. contact opening**		4…11 ms	4…11 ms			7…15 ms	
		N.C. contact closing		7…14 ms	7…14 ms			10…18 ms	

(1) 50/60 Hz coils: see "Voltage code table".

Mounting characteristics and conditions for use

Contactor types			AC operated	A40	A50	A63	A75	A95	A110
Mounting positions								
				Max. built-in and add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 3-pole contactor A40 … A110					
Control voltage / Ambient temperature									
Mounting positions	1, 1±30°, 2, 3, 4, 5		**at θ ≤ 55 °C**	0.85...1.1 x Uc				0.85...1.1 x Uc	
			at θ ≤ 70 °C	Uc				0.85...1.1 x Uc	
	6		**at θ ≤ 55 °C**	0.95...1.1 x Uc				Unauthorized	
			at θ ≤ 70 °C	Unauthorized				Unauthorized	
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 or 75 x 25 mm			–	
	By screws (not supplied)			2 x M4 screws placed diagonally	2 x M6 screws placed diagonally			2 x M6 screws placed diagonally	

5

1SBC101436S0201

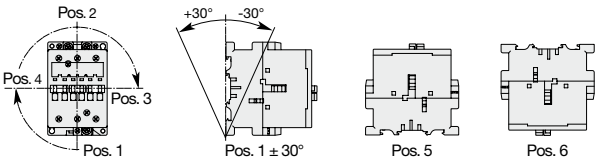
AL40 and AE50 … AE75 3-pole contactors
Technical data

Magnet system characteristics

Contactor types		DC operated	AL40	AE50	AE63	AE75
Coil operating limits acc. to IEC 60947-4-1		**DC supply**	at θ ≤ 55 °C 0.85...1.1 x Uc Please also refer to "Mounting characteristics and conditions for use"			
DC control voltage	Rated control circuit voltage Uc		12...250 V DC			
	Coil consumption	**Average pull-in value**	3.5 W	200 W		
		Average holding value	3.5 W	4 W		
Drop-out voltage			approx. 10...30 % of Uc	approx. 15...40 % of Uc		
Coil time constant	Open	**L/R**	38 ms	3 ms		
	Closed	**L/R**	62 ms	15 ms		
Operating time						
Between coil energization and:		**N.O. contact closing**	55...110 ms	13...30 ms		
		N.C. contact opening	25...75 ms	10...27 ms		
Between coil de-energization and:		**N.O. contact opening** (1)	12...18 ms	5...15 ms		
		N.C. contact closing (1)	18...28 ms	8...18 ms		

(1) The use of surge suppressors increases the opening time with a factor of 1.1 to 1.5 for a RV5 surge suppressor and a factor of 1.5 to 3 for a RT5 surge suppressor.

Mounting characteristics and conditions for use

Contactor types			DC operated	AL40	AE50	AE63	AE75
Mounting positions							
				Max. built-in and add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 3-pole contactor AL40, AE50 … AE75			
Control voltage / Ambient temperature							
Mounting positions	1, 1±30°, 2, 3, 4, 5		**at θ ≤ 55 °C**	0.85 x Uc...1.1 x Uc			
			at θ ≤ 70 °C	Uc			
	6		**at θ ≤ 55 °C**	Unauthorized	0.95 x Uc...1.1 x Uc		
			at θ ≤ 70 °C	Unauthorized			
Mounting distances				The contactors can be assembled side by side			
Fixing	On rail according to IEC 60715, EN 60715			35 x 7.5 mm or 35 x 15 mm	35 x 15 mm or 75 x 25 mm		
	By screws (not supplied)			2 x M4 screws placed diagonally	2 x M6 screws placed diagonally		

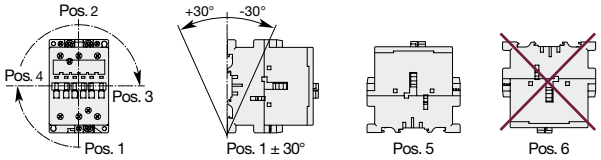
1SBC101438S0201

AF50 … AF110 3-pole contactors
Technical data

Magnet system characteristics

Contactor types		AC / DC operated	AF50	AF63	AF75	AF95	AF110
Coil operating limits acc. to IEC 60947-4-1		**AC or DC supply**	At θ ≤ 70 °C 0.85 x Uc min…1.1 x Uc max. Please also refer to "Mounting characteristics and conditions for use"				
AC control voltage	Rated control circuit voltage Uc		48…250 V 50/60 Hz				
50/60 Hz	Coil consumption	**Average pull-in value**	210 VA			350 VA	
		Average holding value	7 VA / 2.8 W			7 VA / 3.5 W	
DC control voltage	Rated control circuit voltage Uc		20…250 V DC				
	Coil consumption	**Average pull-in value**	190 W			400 W	
		Average holding value	2.8 W			2 W	
Drop-out voltage			55 % of Uc min.				
Voltage sag immunity acc. to SEMI F47			Conditions of use on request				
Dips withstand			≥ 20 ms				
Operating time							
Between coil energization and:		**N.O. contact closing**	30…100 ms			30…80 ms	
		N.C. contact opening	27…95 ms			27…77 ms	
Between coil de-energization and:		**N.O. contact opening**	30…110 ms			55…125 ms	
		N.C. contact closing	35…115 ms			60…130 ms	

Mounting characteristics and conditions for use

Contactor types		AC / DC operated	AF50	AF63	AF75	AF95	AF110
Mounting positions							
			Max. built-in and add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 3-pole contactor AF50 ... AF110				
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		35 x 15 mm or 75 x 25 mm			–	
	By screws (not supplied)		2 x M6 screws placed diagonally				

5

1SBC101437S0201

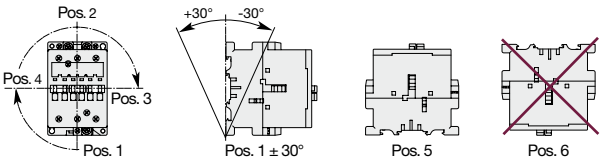
TAL40 and TAE50 ... TAE75 3-pole contactors
Technical data

Magnet system characteristics

Contactor types		DC operated	TAL40	TAE50	TAE75
Coil operating limits acc. to IEC 60947-4-1		**DC supply**	At θ ≤ 55 °C Uc min. ... Uc max. Please also refer to "Mounting characteristics and conditions for use"		
DC control voltage	Rated control circuit voltage Uc		17...264 V DC		
	Coil consumption for Uc min. ... Uc max.	**Average pull-in value**	2.7...9 W	120...250 W	
		Average holding value	2.7...9 W	1.7...6.5 W	
Drop-out voltage			approx. 9...25 % of Uc max.	approx. 10...35 % of Uc max.	
Coil time constant	Open	**L/R**	38 ms	3 ms	
	Closed	**L/R**	62 ms	15 ms	
Operating time					
Between coil energization and:		**N.O. contact closing**	55...110 ms	13...30 ms	
		N.C. contact opening	25...75 ms	10...27 ms	
Between coil de-energization and:		**N.O. contact opening**	12...18 ms (1)	5...15 ms (1)	
		N.C. contact closing	18...28 ms (1)	8...18 ms (1)	

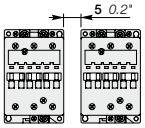
(1) The use of surge suppressors increases the opening time with a factor of 1.1 to 1.5 for a RV5 varistor suppressor and a factor of 1.5 to 3 for a RT5 diode suppressor.

Mounting characteristics and conditions for use

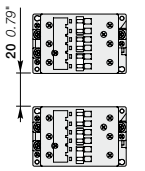
Contactor types			DC operated	TAL40	TAE50	TAE75
Mounting positions						
				Max. built-in and add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 3-pole contactor TAL40, TAE50 ... TAE75		
Control voltage / Ambient temperature						
Mounting positions	1, 1±30°, 2, 3, 4, 5		**at θ ≤ 55 °C**	Uc min ... Uc max		
			at θ ≤ 70 °C	Unauthorized		
	6			Unauthorized		
Mounting distances				The contactors can be assembled side by side - Except for TAL40 contactor: see below		
Fixing	On rail according to IEC 60715, EN 60715			35 x 7.5 mm or 35 x 15 mm	35 x 15 mm or 75 x 25 mm	
	By screws (not supplied)			2 x M4 screws placed diagonally	2 x M6 screws placed diagonally	

Mounting distance (for side by side mounting)

TAL40
Positions 1, 2, 5
20 °C < θ < 55 °C



TAL40
Positions 3, 4
20 °C < θ < 55 °C



1SBC101439S0201

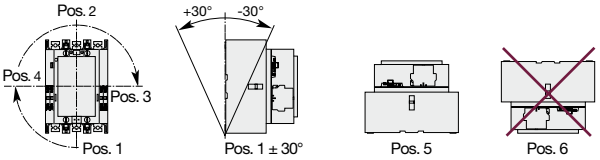
A145 … A300 3-pole contactors
Technical data

Magnet system characteristics

Contactor types			AC operated	A145	A185	A210	A260	A300
Coil operating limits			**AC supply**	At θ ≤ 70 °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**	550 VA		1350 VA		
			60 Hz	600 VA		1550 VA		
			50/60 Hz (1)	700 VA / 650 VA		1700 VA / 1550 VA		
		Average holding value	**50 Hz**	35 VA / 11 W		60 VA / 16 W		
			60 Hz	40 VA / 12 W		65 VA / 19 W		
			50/60 Hz (1)	44 VA / 13 W		80 VA / 21 W		
Drop-out voltage				Approx. 40…65 % of Uc min.				
Operating time								
	Between coil energization and:		**N.O. contact closing**	13…27 ms		17…35 ms		
			N.C. contact opening	8…22 ms		12…30 ms		
	Between coil de-energization and:		**N.O. contact opening**	5…10 ms		7…13 ms		
			N.C. contact closing	9…13 ms		10…16 ms		

(1) 50/60 Hz coils: see "Voltage code table".

Mounting characteristics and conditions for use

Contactor types			AC operated	A145	A185	A210	A260	A300
Mounting positions								
				Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 3-pole contactor A145 ... A300				
Control voltage / Ambient temperature								
	Mounting positions	1, 1±30°, 2, 3, 4, 5	**at θ ≤ 70 °C**	0.85 x Uc…1.1 x Uc				
		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				

5

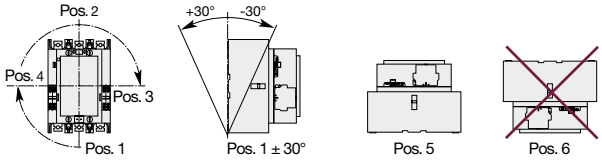
1SFC101039C0201

AF145 … AF300 3-pole contactors
Technical data

Magnet system characteristics

Contactor types		AC / DC operated	AF145	AF185	AF210	AF260	AF300
Coil operating limits acc. to IEC 60947-4-1		**AC or DC supply**	At θ ≤ 70 °C 0.85 x Uc min…1.1 x Uc max. Please also refer to "Mounting characteristics and conditions for use"				
AC control voltage	Rated control circuit voltage Uc		48…250 V AC				
50/60 Hz	Coil consumption	**Average pull-in value**	430 VA		470 VA		
		Average holding value	12 VA / 3.5 W		10 VA / 2.5 W		
DC control voltage	Rated control circuit voltage Uc		20…250 V DC				
	Coil consumption	**Average pull-in value**	500 W		520 W		
		Average holding value	2 W		2 W		
Drop-out voltage			55 % of Uc min.				
Voltage sag immunity acc. to SEMI F47			Conditions of use on request				
Dips withstand			≥ 20 ms				
Operating time							
Between coil energization and:		**N.O. contact closing**	30…115 ms				
		N.C. contact opening	30…115 ms				
Between coil de-energization and:		**N.O. contact opening**	25…80 ms				
		N.C. contact closing	25…80 ms				

Mounting characteristics and conditions for use

Contactor types		AC / DC operated	AF145	AF185	AF210	AF260	AF300
Mounting positions							
			Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 3-pole contactor AF145 ... AF2050				
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				

5

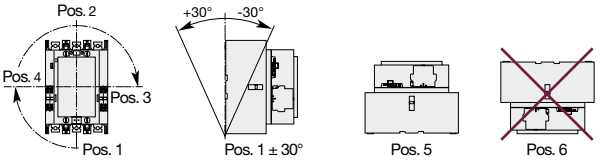
1SFC101040C0201

AF400 ... AF2050 3-pole contactors
Technical data

Magnet system characteristics

Contactor types		AC / DC operated	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050
Coil operating limits acc. to IEC 60947-4-1		**AC or DC supply**	At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max. Please also refer to "Mounting characteristics and conditions for use"							
AC control voltage	Rated control circuit voltage Uc		48...500 V AC					100...250 V		
50/60 Hz	Coil consumption	**Average pull-in value**	890 VA		850 VA			1900 VA		
		Average holding value	12 VA / 4 W		12 VA / 4.5 W			48 VA / 17 W		
DC control voltage	Rated control circuit voltage Uc		24...500 V DC					100...250 V		
	Coil consumption	**Average pull-in value**	990 W		950 W			1700 W		
		Average holding value	4 W		4.5 W			16 W		
Drop-out voltage			55 % of Uc min.							
Voltage sag immunity acc. to SEMI F47			Conditions of use on request							
Dips withstand			≥ 20 ms							
Operating time										
Coil supply between A1 - A2										
Between coil energization and:		**N.O. contact closing**	50...120 ms					50...80 ms		
		N.C. contact opening	50...120 ms					50...80 ms		
Between coil de-energization and:		**N.O. contact opening**	33...70 ms					35...55 ms		
		N.C. contact closing	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	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050
Mounting positions										
			Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 3-pole contactor AF400 ... AF2050							
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		

5

1SFC101041C0201

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					

1SBC101428S0201

A40 … A110, AL, AE, TAL, TAE and AF50 … AF110 3-pole contactors
Technical data

Connecting characteristics

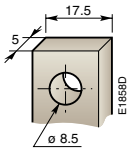
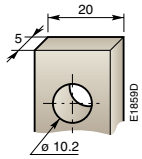
Contactor types			AC operated	A40	A50	A63	A75	A95	A110
			DC operated	AL40	AE50	AE63	AE75	–	–
				TAL40	TAE50	–	TAE75	–	–
			AC / DC operated	–	AF50	AF63	AF75	AF95	AF110
Main terminals				Screw terminals with double connector 2 x (5.6 x 6.5 mm)	Screw terminals with single connector (13 x 10 mm)			Screw terminals with single connector (14 x 14 mm)	
Connection capacity (min. ... max.)									
Main conductors (poles)									
Rigid	Solid (≤ 4 mm²)		**1 x**	2.5…16 mm²	6…50 mm²			10…95 mm²	
Rigid	Stranded (≥ 6 mm²)		**2 x**	2.5…16 mm²	6…25 mm²			6…35 mm²	
Flexible with ferrule			**1 x**	2.5…10 mm²	6…35 mm²			10…70 mm² (1)	
Flexible with ferrule			**2 x**	2.5…10 mm²	6…16 mm²			6…35 mm² (1)	
Bars or lugs			**L ≤**	–	–			30 mm (2)	
Bars or lugs			**I >**	–	–			6 mm	
Connection capacity acc. to UL/CSA			**1 or 2 x**	AWG 8…4	AWG 8…1			AWG 6…2/0	
Tightening torque		Recommended		2.30 Nm / 20 lb.in	4.00 Nm / 35 lb.in			8 Nm / 71 lb.in	
		Max.		2.60 Nm	4.50 Nm			9 Nm	
Auxiliary conductors (built-in auxiliary terminals + coil terminals)									
Rigid solid			**1 x**	1…4 mm²				0.75…2.5 mm²	
Rigid solid			**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	
Flexible with ferrule			**2 x**	0.75…2.5 mm²					
Lugs			**L ≤**	8 mm					
Lugs			**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					
Built-in auxiliary terminals		Recommended		1.00 Nm / 9 lb.in	–			–	
		Max.		1.20 Nm	–			–	
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529									
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				M5	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	–				

(1) A(F)95 / A(F)110: use flexible without ferrule.
(2) With LW110 enlargement piece, see “Accessories”.

1SBC101441S0201

A145 … A300 and
AF145 … AF300 3-pole contactors
Technical data

Connecting characteristics

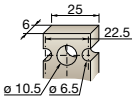
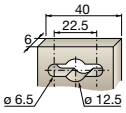
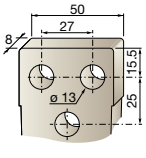
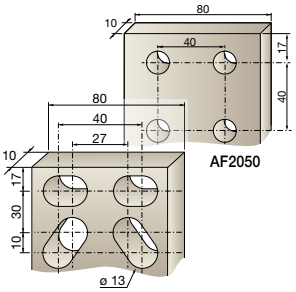
Contactor types		AC operated	A145	A185	A210	A260	A300
		AC / DC operated	AF145	AF185	AF210	AF260	AF300
Main terminals Flat type							
Connection capacity (min. ... max.)							
Main conductors (poles)							
Rigid with connector	Single for Cu cable		6…185 mm²		16…240 mm²		
	Single for Al/Cu cable		25…150 mm²		120…240 mm²		
	Double for Al/Cu cable		–		2 x 95…120 mm²		
Bars or lugs		**L** ≤	24 mm		32 mm		
		Ø >	8 mm		10 mm		
Connection capacity acc. to UL/CSA		**1 or 2 x**	6 - 250 MCM		4 - 500 MCM (1)		
Tightening torque	Recommended		18 Nm / 160 lb.in		28 Nm / 247 lb.in		
	Max.		20 Nm		30 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				
		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			M8		M10		
			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".

1SFC101042C0201

AF400 ... AF2050 3-pole contactors
Technical data

Connecting characteristics

Contactor types	AC / DC operated	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050
Main terminals Flat type									
				AF580 AF750		AF1250	AF1350 AF1650		
Connection capacity (min. ... max.)									
Main conductors (poles)									
Rigid with connector	Single for Cu cable	240 mm²		300 mm²			–		
	Single for Al/Cu cable	240 mm²		300 mm²			–		
	Double for Al/Cu cable	2 x 240 mm²		3 x 185 mm²			–		
Bars or lugs	**L ≤**	47 mm		52 mm			100 mm		
	Ø >	10 mm		12 mm			12 mm		
Connection capacity acc. to UL/CSA	**1 or 2 x**	2//250 - 500 MCM		3// 2/0 - 500 MCM			1/0 - 750 MCM		
Tightening torque	Recommended	35 Nm / 310 lb.in		45 Nm / 398 lb.in			45 Nm / 398 lb.in		
	Max.	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		M10		M12					
		Screws and bolts							
Coil terminals (delivered in open position)		M3.5							
	Screwdriver type	Flat Ø 5.5 mm / Pozidriv 2							

5

1SFC101043C0201

AF09 ... AF38 3-pole contactors
Technical data

Built-in auxiliary contacts according to IEC

Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
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
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					

5

1SBC101445S0201

A40, AL40 and TAL40 3-pole contactors
Technical data

Built-in auxiliary contacts according to IEC

Contactor types	**AC operated**	A40
	DC operated	AL40, TAL40
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
	380-440 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	2 A / 144 W
	110 V DC	1.1 A / 121 W
	125 V DC	1.1 A / 138 W
	220 V DC	0.55 A / 121 W
	250 V DC	0.55 A / 138 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		17 V / 5 mA
with failure rate acc. to IEC 60947-5-4		≤ 10^{-7} for AL40 and TAL40 contactors
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 of 4-pole CA5 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 (CA5, CAL5-11) are mirror contacts.

Built-in auxiliary contacts according to UL / CSA

Contactor types	**AC operated**	A40
	DC operated	AL40, TAL40
Max. operational voltage		600 V AC, 600 V DC
Pilot duty		A600, P300
AC thermal rated current		10 A
AC maximum volt-ampere making		7200 VA
AC maximum volt-ampere breaking		720 VA
DC thermal rated current		5 A
DC maximum volt-ampere making-breaking		138 VA

1SBC101446S0201

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.

5

Curve utilization mode

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

- Note the characteristics of the load to be controlled:
– Operational voltage ..... Ue
– Current normally drawn ..... Ie (Ue / Ie / kW relation for motors, see "Motor rated operational powers and currents").
– Utilization category ..... AC-1, AC-2, AC-3 or AC-4
– Breaking current ..... Ic = Ie for AC-1 and for AC-3 ; Ic = 2.5 x Ie for AC-2 ; Ic = 6 x Ie for AC-4
- Define the number of operating cycles N required.
- On the diagram corresponding to the operational category, select the contactor with the curve immediately above the intersection point (Ic ; N).

Electrical durability forecast and contactor selection for mixed duty motor control: AC-3 (Ic = Ie) type switching off while "motor running" and, occasionally, AC-4 (Ic = 6 x Ie) type switching off while "motor accelerating"

- Note the characteristics of the motor to be controlled:
– Operational voltage ..... Ue
– Current normally drawn while "motor running" ..... Ie (Ue / Ie / kW relation for motors, see "Motor rated operational powers and currents")
– Breaking current for AC-3 ..... Ic = Ie
– Breaking current for AC-4 while "motor accelerating" ..... Ic = 6 x Ie
– Percentage of AC-4 operating cycles ..... K (on the basis of the total number of operating cycles)
- Define the total number of operating cycles N required.
- Note the smallest contactor rating compatible for AC-3 (Ue / Ie) on Main pole utilization characteristic table (see “Technical data”).
- For the selected contactor make a note of the following in relation to the voltage using diagram AC-3 in next pages:
– The number of operating cycles A for Ic = Ie (AC-3)
– The number of operating cycles B for Ic = 6 x Ie (AC-4)
- Calculate the estimated number of cycles N’ (N’ is always below A)

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

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

Case of uninterrupted duty

For uninterrupted duty, some verifications of preventing maintenance are necessary to check the functionality of the concerned product (consult us).

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

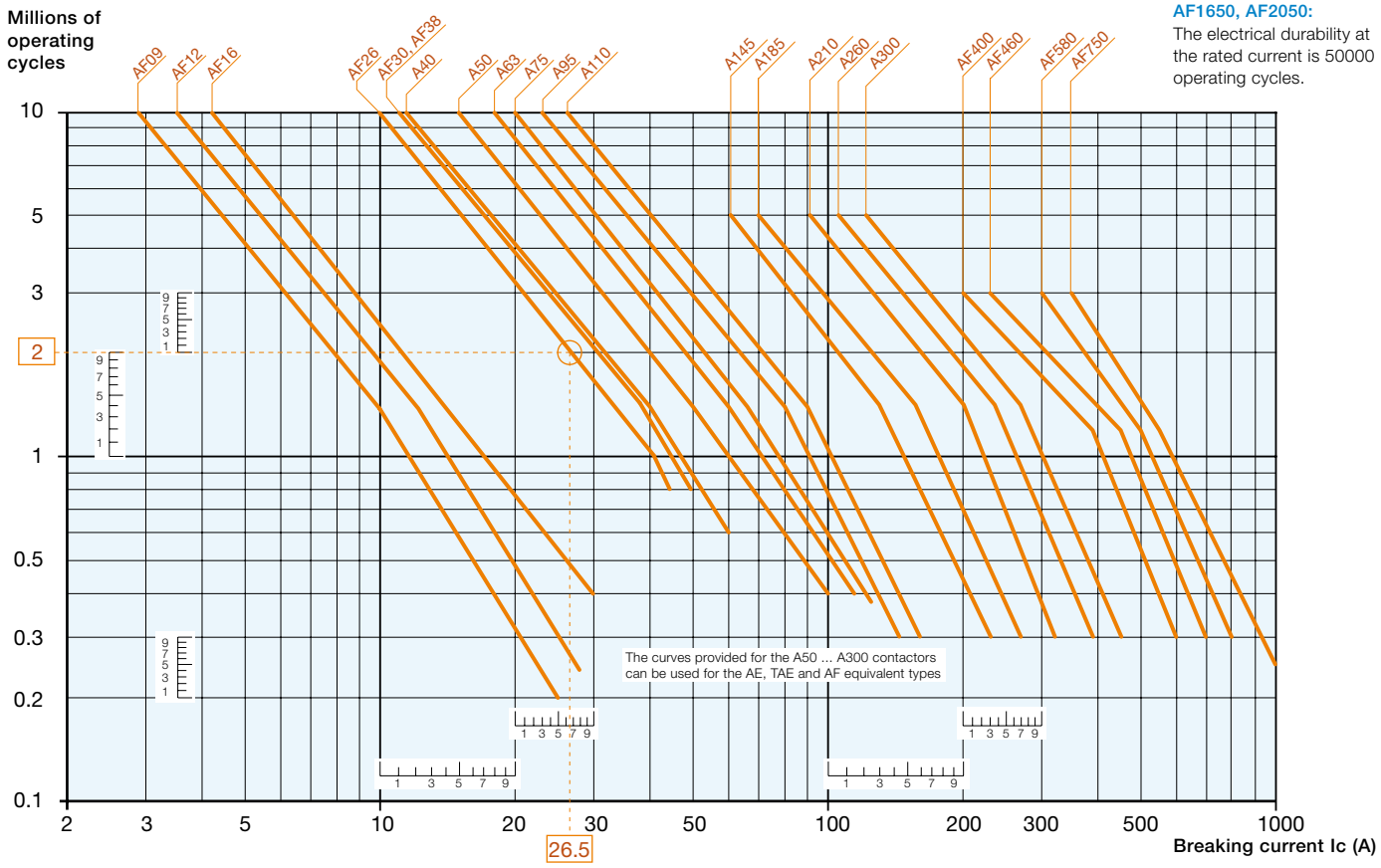
1SBC101314S0201

3-pole contactors
Electrical durability

Electrical durability for AC-1 utilization category - Ue ≤ 690 V
Ambient temperature ≤ 60 °C for AF09 ... AF38, ≤ 55 °C for A40 ... AF2050

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

Maximum electrical switching frequency: see "Technical data".



AF1250, AF1350, AF1650, AF2050:
The electrical durability at the rated current is 50000 operating cycles.

Example:

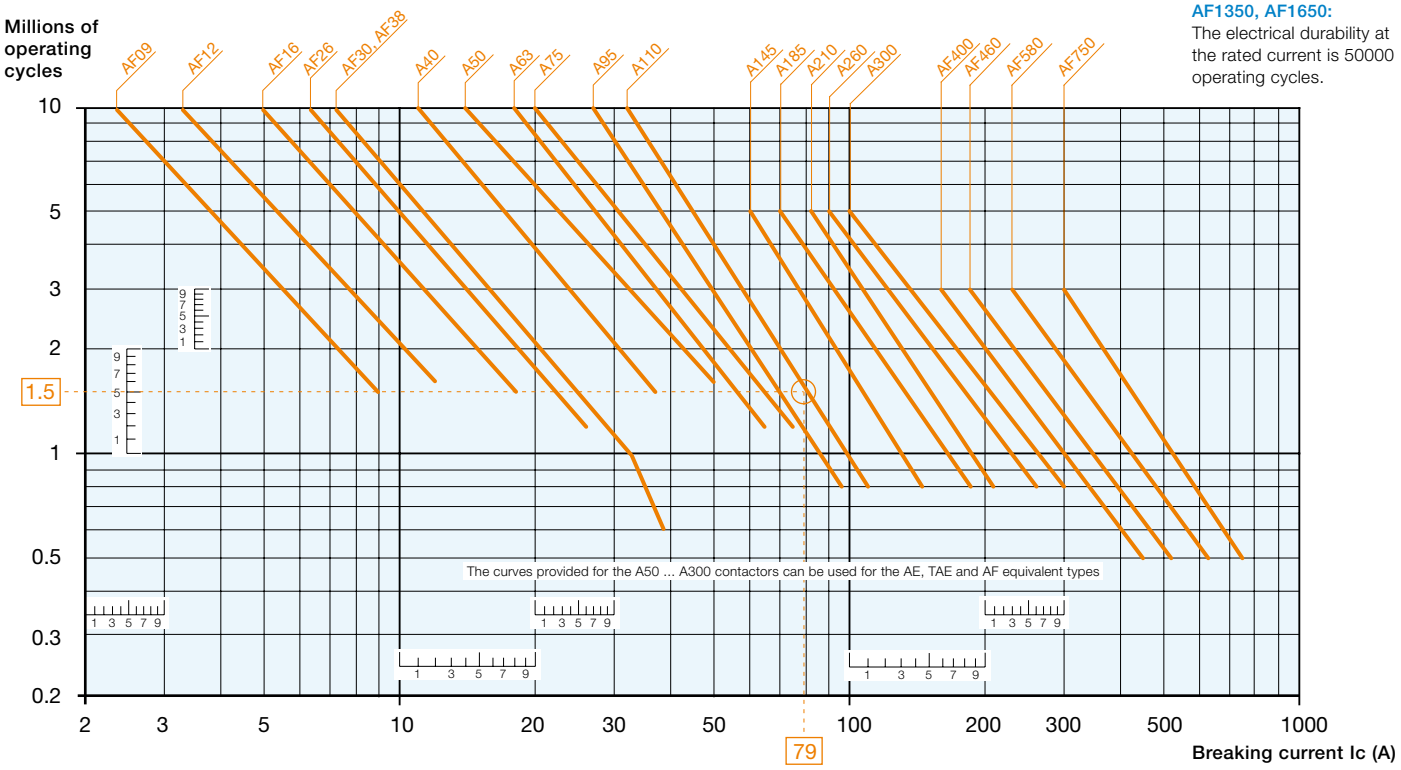
Ic / AC-1 = 26.5 A – Electrical durability required = 2 millions operating cycles.

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

1SBC101511S0201

3-pole contactors
Electrical durability

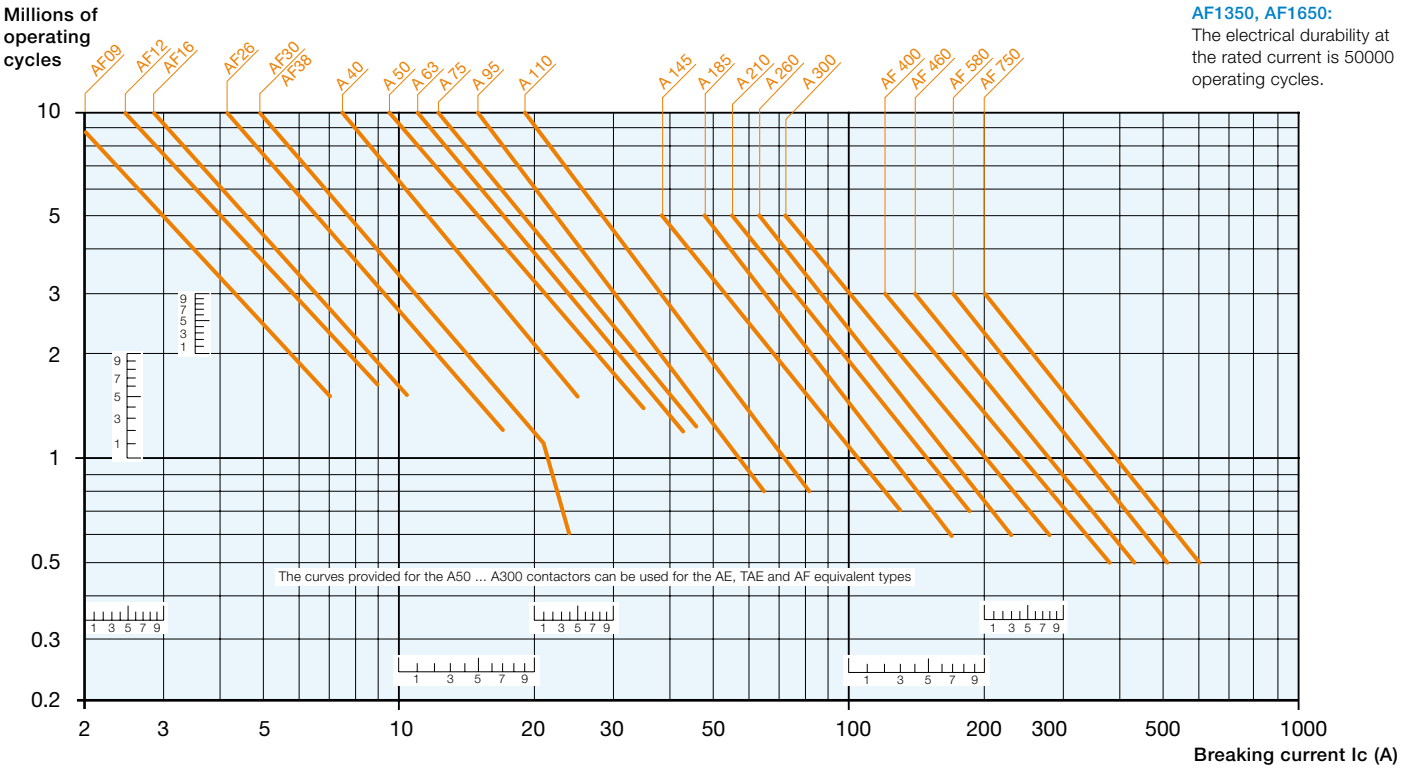
Electrical durability for AC-3 utilization category - Ue ≤ 440 V. Ambient temperature ≤ 60 °C for AF09 ... AF38, ≤ 55 °C for A40 ... AF1650
Switching cage motors: starting and switching off running motors. The breaking current Ic for AC-3 is equal to the rated operational current Ie (Ie = motor full load current). Maximum electrical switching frequency: see "Technical data".



AF1350, AF1650:
The electrical durability at the rated current is 50000 operating cycles.

Example:
Motor power 40 kW for AC-3 - Ue = 400 V and Ie = 79 A utilization – Electrical durability required = 1.5 million operating cycles.
For AC-3: Ic = Ie. Select the A110 contactor at intersection "○" (79 A / 1.5 million operating cycles) on the curves (AC-3 - Ue ≤ 440 V).

Electrical durability for AC-3 utilization category - 440 V < Ue ≤ 690 V.
Ambient temperature ≤ 60 °C for AF09 ... AF38, ≤ 55 °C for AF40 ... AF1650.



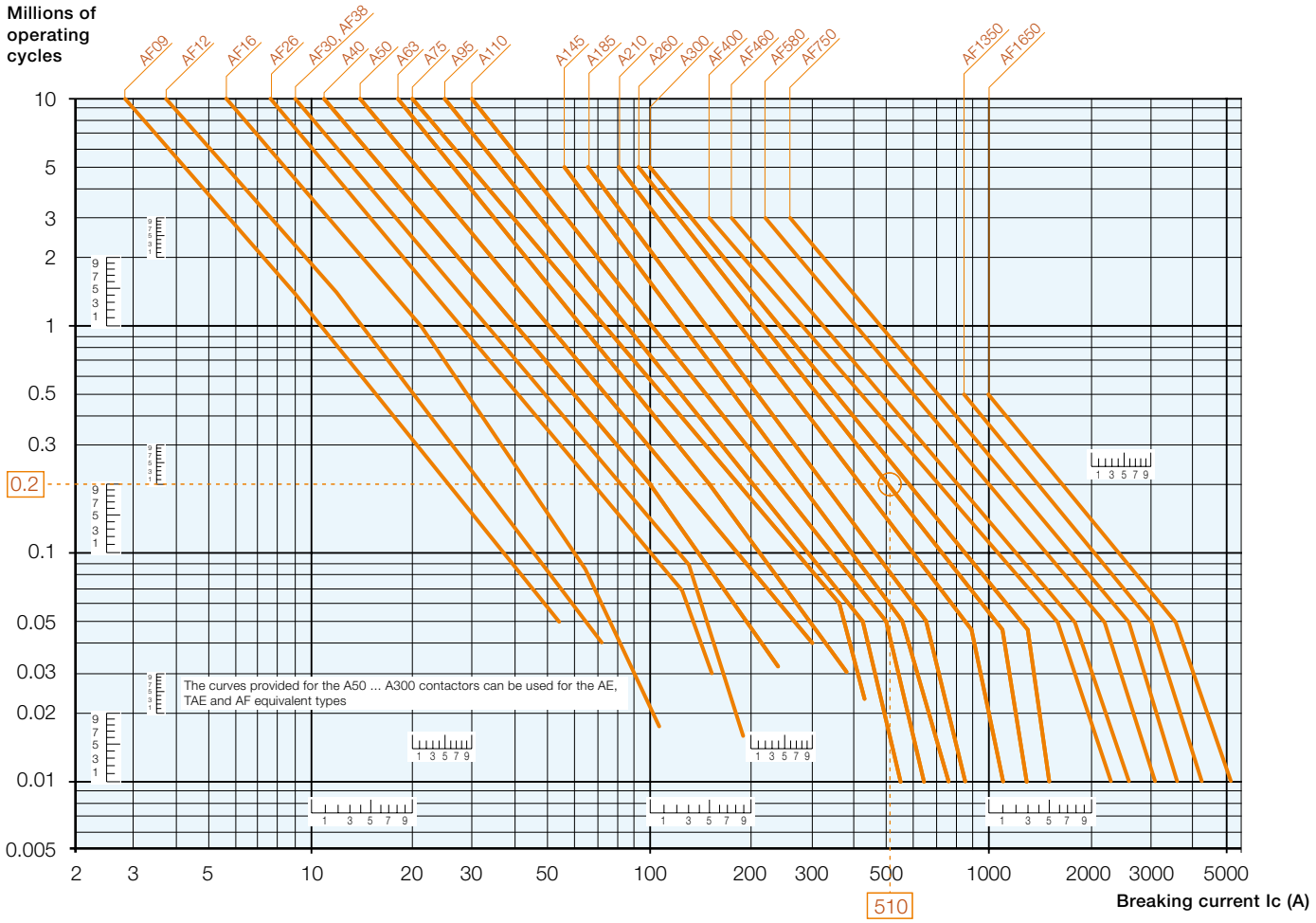
AF1350, AF1650:
The electrical durability at the rated current is 50000 operating cycles.

1SBC101512S0201 - Rev. A

3-pole contactors
Electrical durability

Electrical durability for AC-2 or AC-4 utilization category - Ue < 440 V
Ambient temperature ≤ 60 °C for AF09 ... AF38, ≤ 55 °C for A40 ... 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".



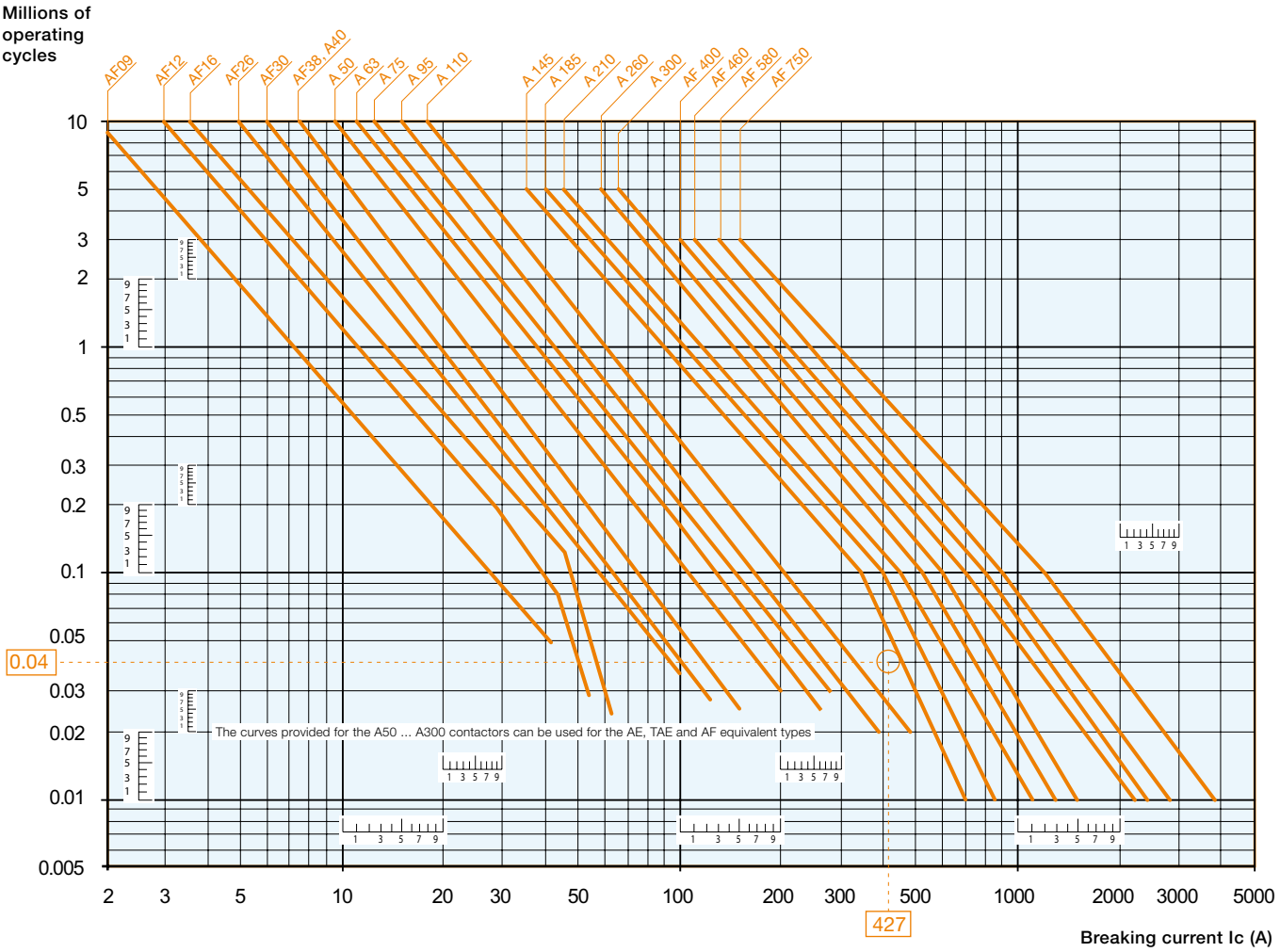
Example:
Motor power 45 kW for AC-4 - Ue = 400 V and Ie = 85 A utilization – Electrical durability required = 0.2 million operating cycles.
For AC-4: Ic = 6 x Ie = 510 A - Select the A260 contactor at intersection "○" (510 A / 0.2 million operating cycles) on the curves (AC-4 - Ue ≤ 440 V).

1SBC101516S0201

3-pole contactors
Electrical durability

Electrical durability for AC-2 or AC-4 utilization category - 440 V < Ue ≤ 690 V
Ambient temperature ≤ 55 °C for AF09 ... AF38, ≤ 55 °C for A40 ... 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".



Example:

Motor power 59 kW for AC-4 - Ue = 600 V and Ie = 71.1 A utilization – Electrical durability required = 0.04 million operating cycles. For AC-4: Ic = 6 x Ie = 426.6 A. Select the A145 contactor at intersection "○" (427 A / 0.04 million operating cycles) on the curves (AC-4 - 440 V < Ue ≤ 690 V).

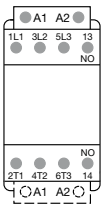
1SBC101642S0201

Notes

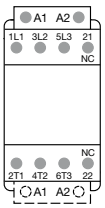
AF09 ... AF38 3-pole contactors
Terminal marking and positioning

AF09 ... AF38 contactors - AC / DC operated

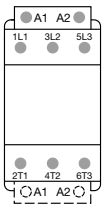
Standard devices without addition of auxiliary contacts



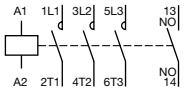
AF09...AF16..-30-10



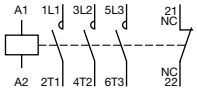
AF09...AF16..-30-01



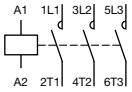
AF26...AF38..-30-00



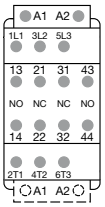
AF09...AF16..-30-10



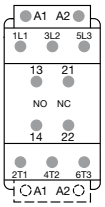
AF09...AF16..-30-01



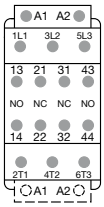
AF26...AF38..-30-00



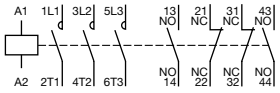
AF09...AF16..-30-22



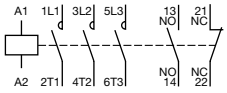
AF26...AF38..-30-11



AF26...AF38..-30-22

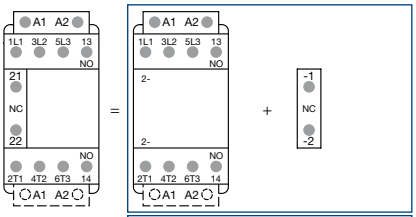


AF09...AF38..-30-22

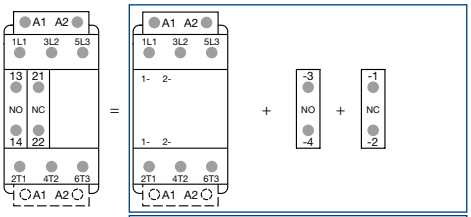


AF26...AF38..-30-11

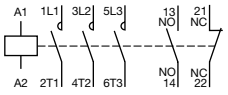
Other possible contact combinations with auxiliary contacts added by the user



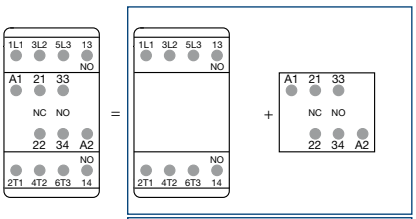
Combination 11 = AF09...AF16..-30-10 + CA4-01



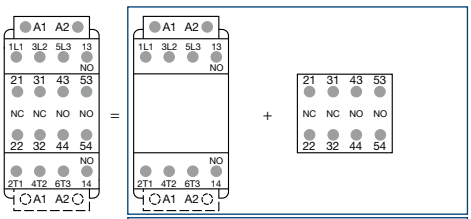
Combination 11 = AF26...AF38..-30-00 + CA4-10 + CA4-01



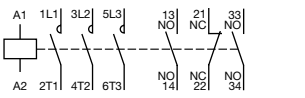
Combination 11



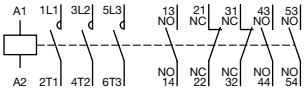
Combination 21 = AF09...AF16..-30-10 + CAT4-11M



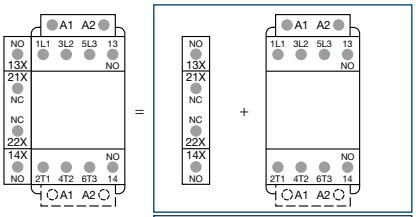
Combination 32 = AF09...AF16..-30-10 + CA4-22M



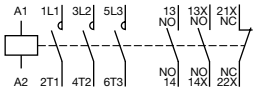
Combination 21



Combination 32



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



Combination 21

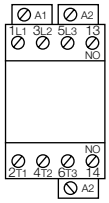
Note: Only AF..Z contactor with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole

1SBC101463S0201

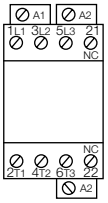
A40 ... A110 3-pole contactors
Terminal marking and positioning

A40 ... A110 contactors - AC operated

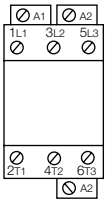
Standard devices without addition of auxiliary contacts



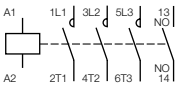
A40-30-10



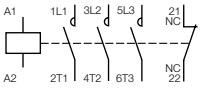
A40-30-01



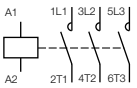
A50 ... A110-30-00



A40-30-10

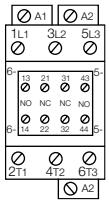


A40-30-01



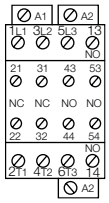
A50 ... A110-30-00

Standard devices with factory mounted auxiliary contacts

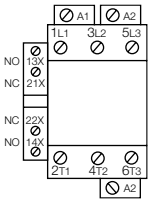


A50 ... A110-30-22

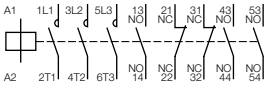
A50 ... A110-30-22



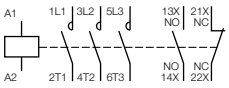
A40-30-32



A50 ... A110-30-11

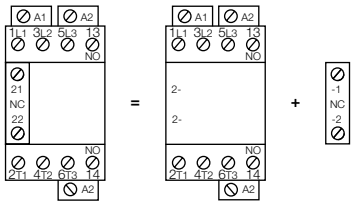


A40-30-32

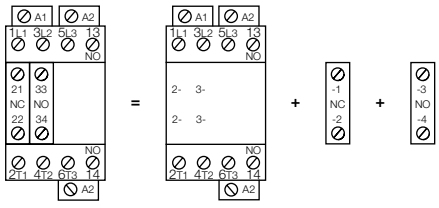


A50 ... A110-30-11

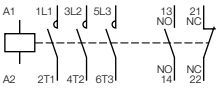
Other possible contact combinations with auxiliary contacts added by the user



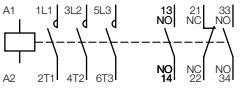
Combination 11 = A40-30-10 + CA5-01



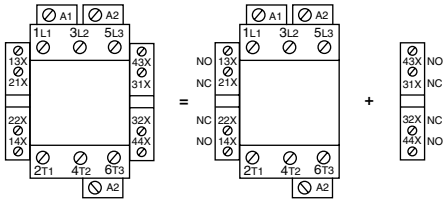
Combination 21 = A40-30-10 + CA5-01 + CA5-10



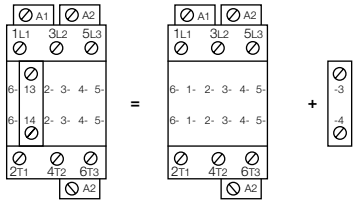
Combination 11



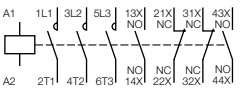
Combination 21



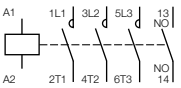
Combination 22 = A50 ... A75-30-11 + CAL5-11



Combination 10 = A50 ... A75-30-00 + CA5-10



Combination 22



Combination 10

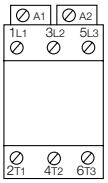
5

1SBC101464S0201

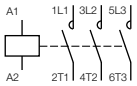
AF50 ... AF110, A145 ... A300 and AF145 ... AF300 3-pole contactors
Terminal marking and positioning

AF50 ... AF110 contactors - AC / DC operated

Standard devices without addition of auxiliary contacts

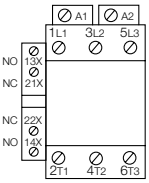


AF50 ... AF110-30-00

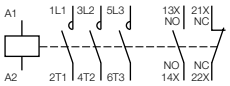


AF50 ... AF110-30-00

Standard devices with factory mounted auxiliary contacts



AF50 ... AF110-30-11

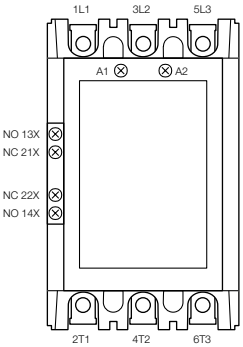


AF50 ... AF110-30-11

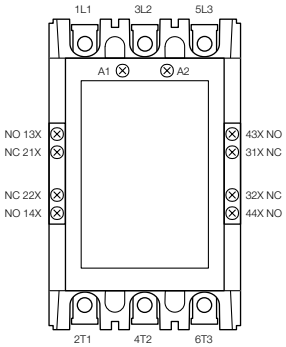
5

A145 ... A300 contactors - AC operated

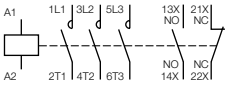
Standard devices with factory mounted auxiliary contacts



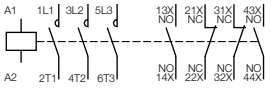
A145 ... A300-30-11



A145 ... A300-30-22



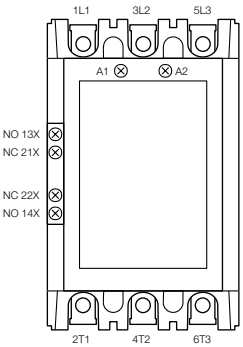
A145 ... A300-30-11



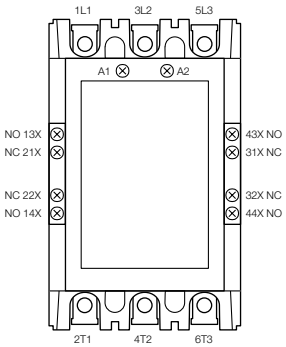
A145 ... A300-30-22

AF145 ... AF300 contactors - AC / DC operated

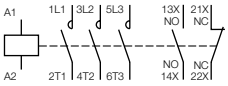
Standard devices with factory mounted auxiliary contacts



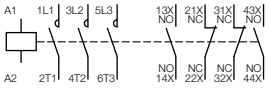
AF145 ... AF300-30-11



AF145 ... AF300-30-22



AF145 ... AF300-30-11

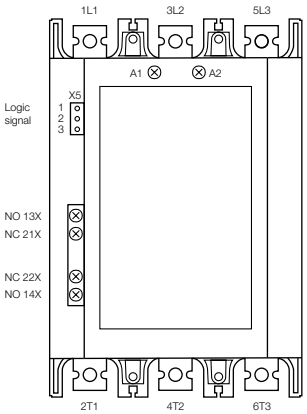


AF145 ... AF300-30-22

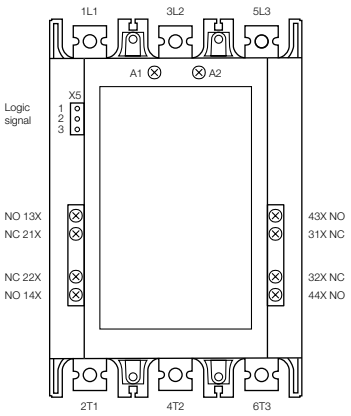
1SBC101465S0201

AF400 ... AF2050 3-pole contactors
Terminal marking and positioning

AF400 ... AF1250 contactors - AC / DC operated
Standard devices with factory mounted auxiliary contacts

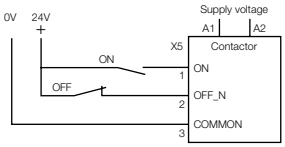


AF400 ... AF1250-30-11

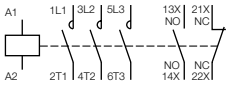


AF400 ... AF1250-30-22

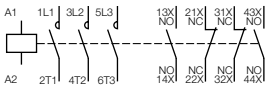
Control with logic signal



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

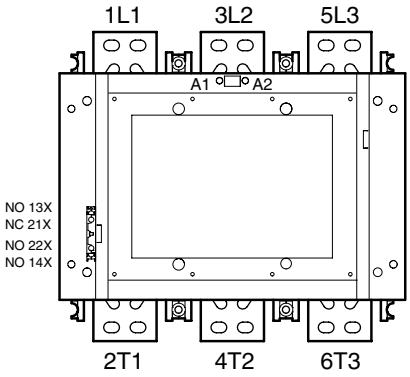


AF400 ... AF1250-30-11

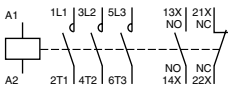


AF400 ... AF1250-30-22

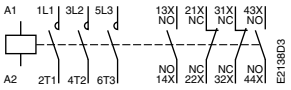
AF1350 ... AF2050 contactors - AC / DC operated
Standard devices with factory mounted auxiliary contacts



AF1350 ... AF2050-30-11

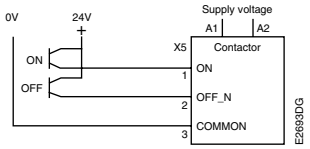


AF1350 ... AF2050-30-11



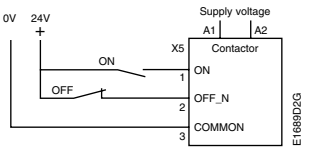
AF1350 ... AF2050-30-22

Wiring diagrams
when used with transistor output



AF1350, AF1650

when used with transistor output

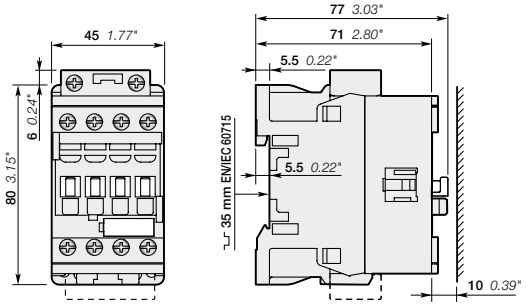


5

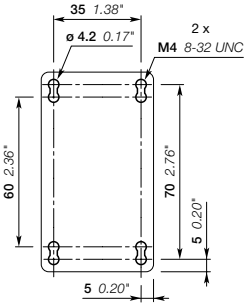
1SBC101466S0201

AF09, AF12, AF16 3-pole contactors

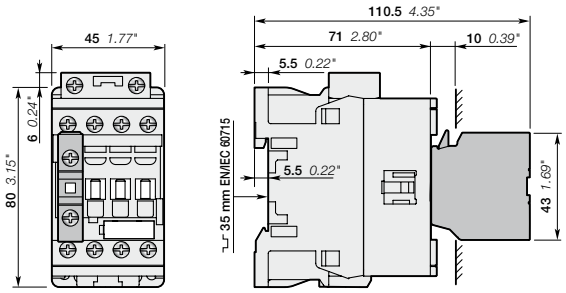
Main dimensions mm, *inches*



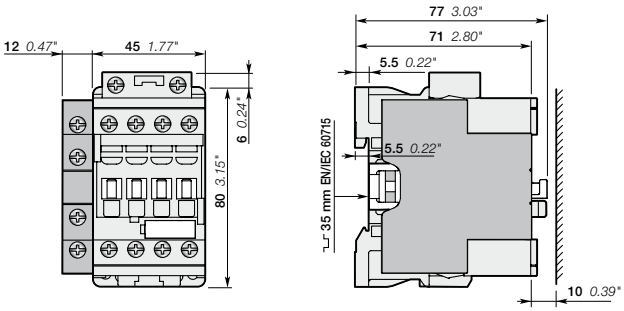
AF09, AF12, AF16



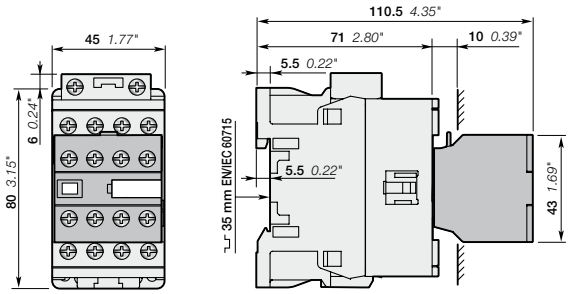
AF09, AF12, AF16



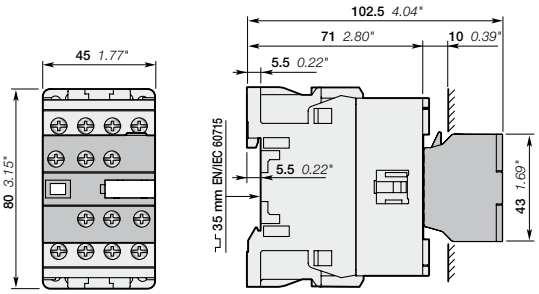
AF09, AF12, AF16
+ CA4, CC4 1-pole auxiliary contact block



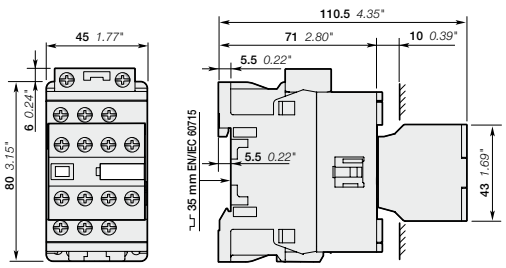
AF09, AF12, AF16
+ CAL4-11 2-pole auxiliary contact block



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



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



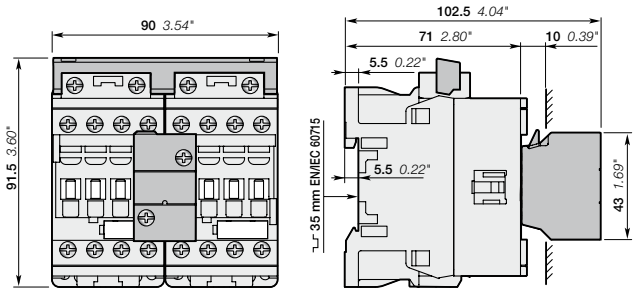
AF09, AF12, AF16..-30-22

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

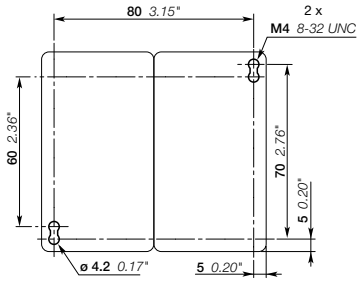
1SBC101682S0201

AF09, AF12, AF16 3-pole contactors

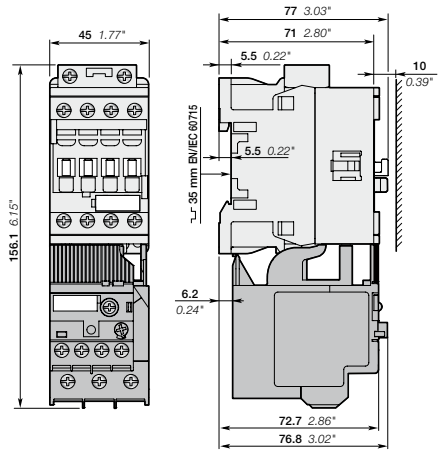
Main dimensions mm, *inches*



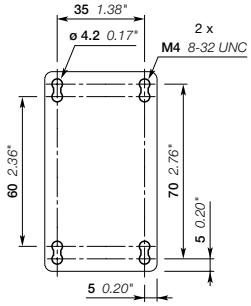
AF09, AF12, AF16
+ VEM4 mechanical and electrical interlock set



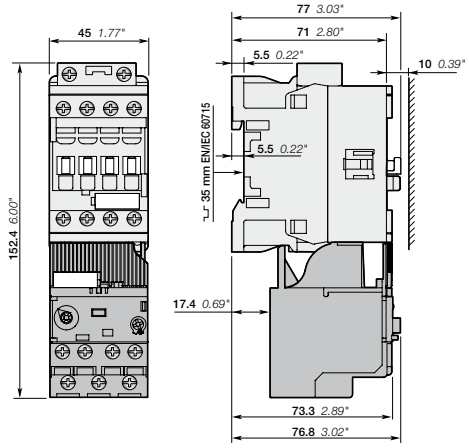
AF09, AF12, AF16
+ VEM4 mechanical and electrical interlock set



AF09, AF12, AF16
+ TF42 thermal overloard relay



AF09, AF12, AF16



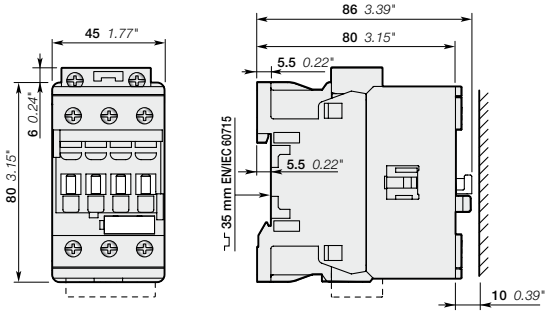
AF09, AF12, AF16 3-pole contactors
+ EF19 electronic overload relay

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

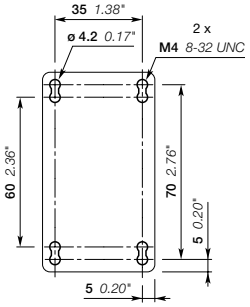
1SBC101682S0201

AF26, AF30, AF38 3-pole contactors

Main dimensions mm, *inches*

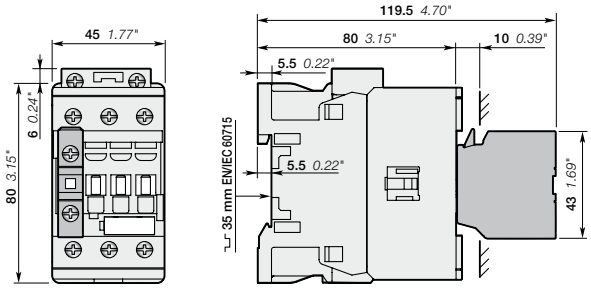


AF26, AF30, AF38

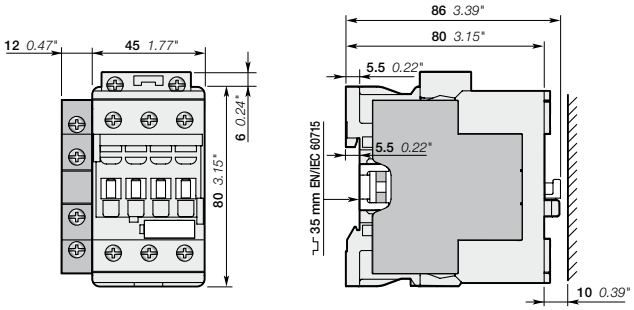


AF26, AF30, AF38

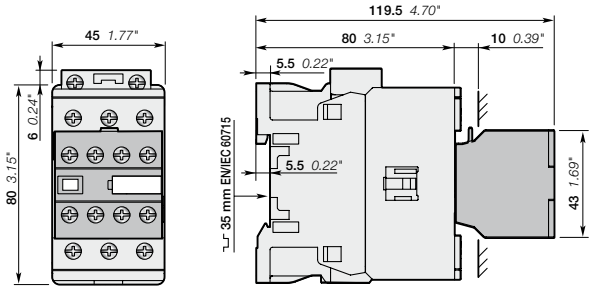
5



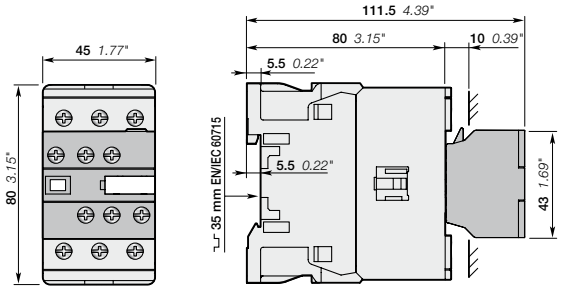
AF26, AF30, AF38
+ CA4, CC4 1-pole auxiliary contact block



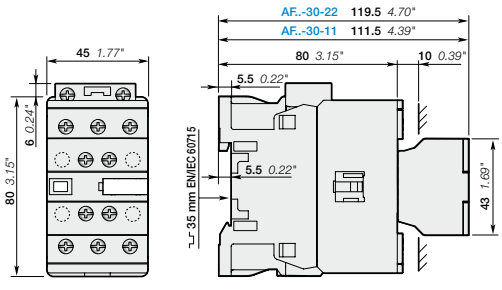
AF26, AF30, AF38
+ CAL4-11 2-pole auxiliary contact block



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



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



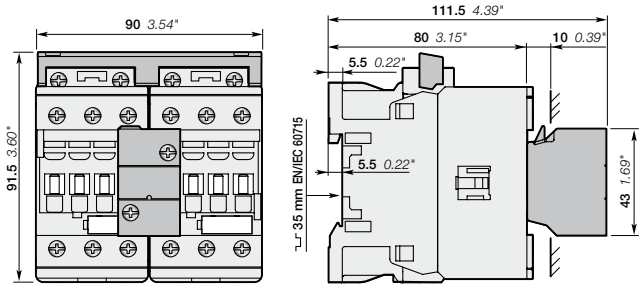
AF26, AF30, AF38

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

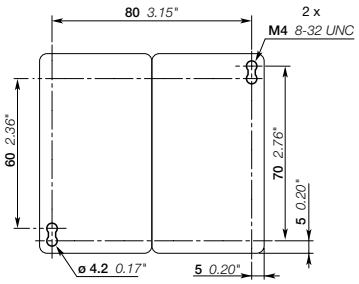
1SBC101683S0201

AF26, AF30, AF38 3-pole contactors

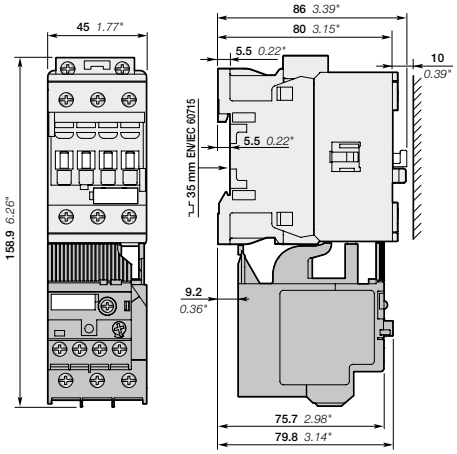
Main dimensions mm, *inches*



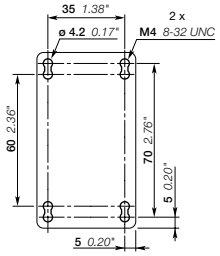
AF26, AF30, AF38
+ VEM4 mechanical and electrical interlock set

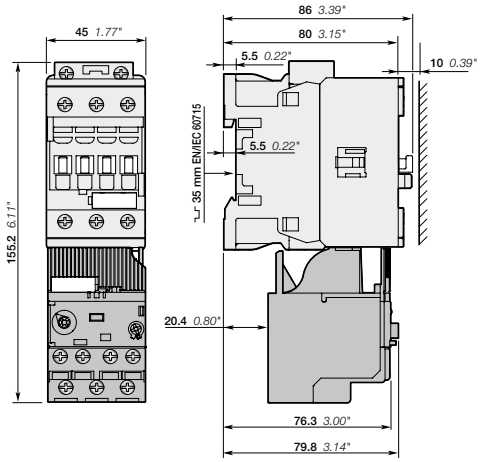


AF26, AF30, AF38
+ VEM4 mechanical and electrical interlock set

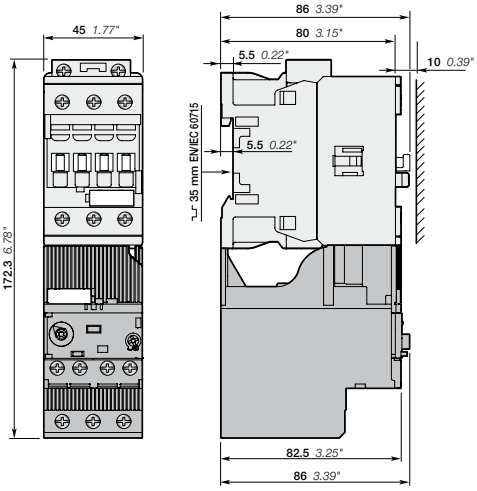


AF26, AF30, AF38
+ TF42 thermal overload relay





AF26 3-pole contactors
+ EF19 electronic overload relay



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

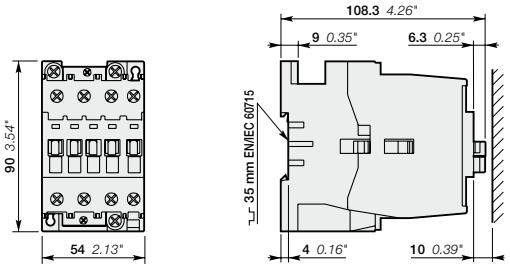
Note: contactor lateral distance to grounded component 2 mm *0.08"* min.

5

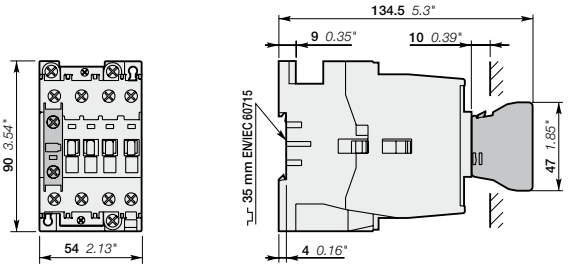
1SBC101683S0201

A40 3-pole contactors

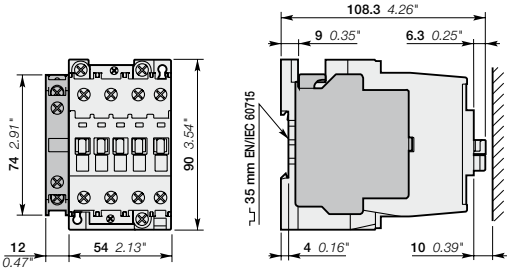
Main dimensions mm, *inches*



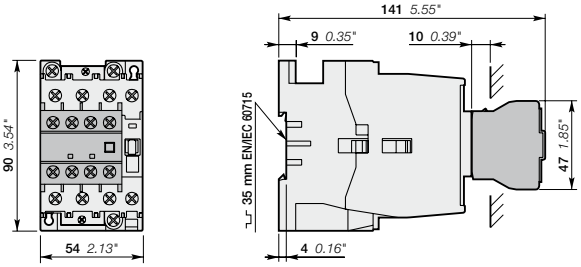
A40



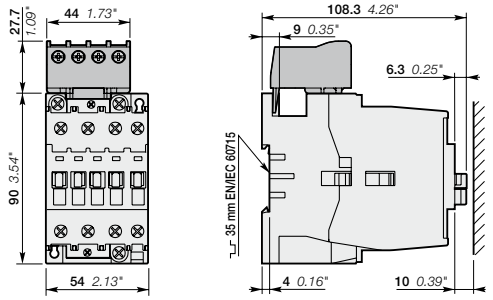
A40
+ CA5 front-mounted 1-pole auxiliary contact block



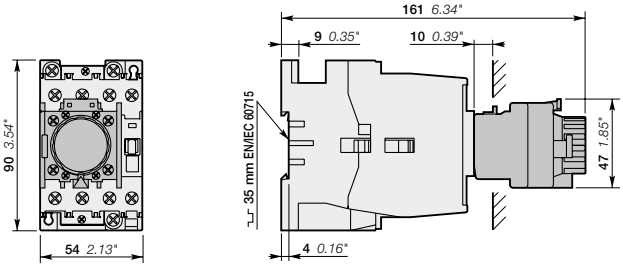
A40
+ CAL5 side-mounted 2-pole auxiliary contact block



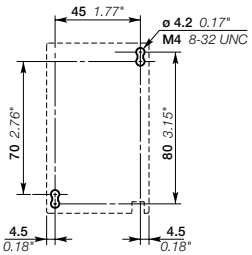
A40
+ CA5 front-mounted 4-pole auxiliary contact block
and corresponding 2-stack versions



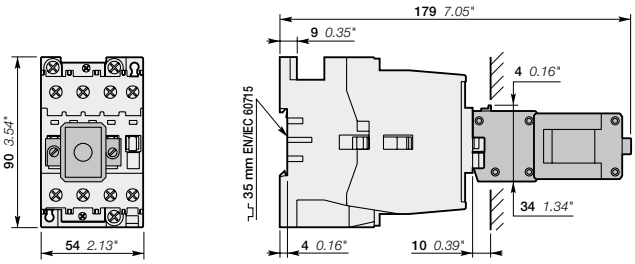
A40
+ RA5-1 interface relay



A40
+ TP pneumatic timer



A40

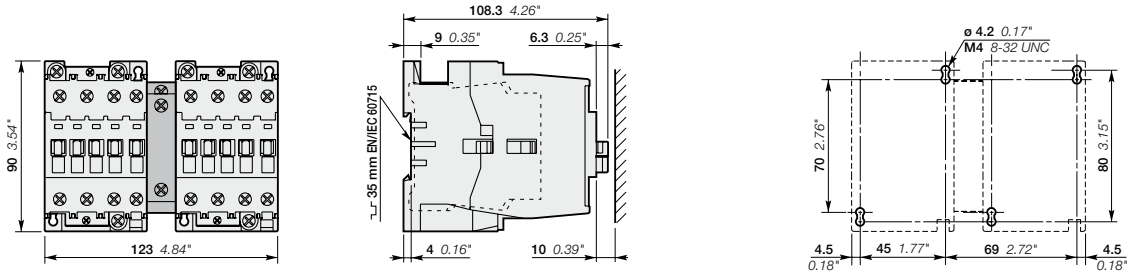


A40
+ WB75-A on-position latch

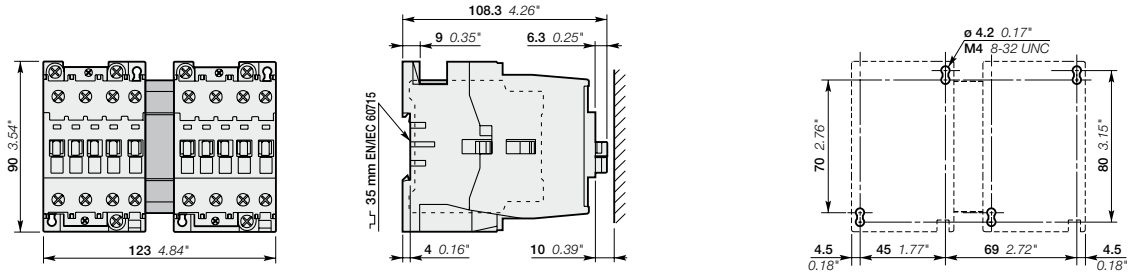
1SBC101147050201

A40 3-pole contactors

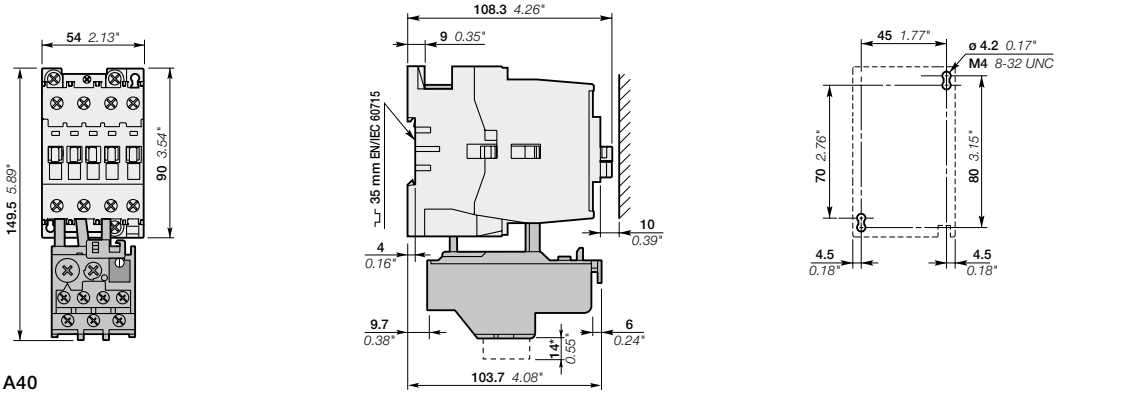
Main dimensions mm, *inches*



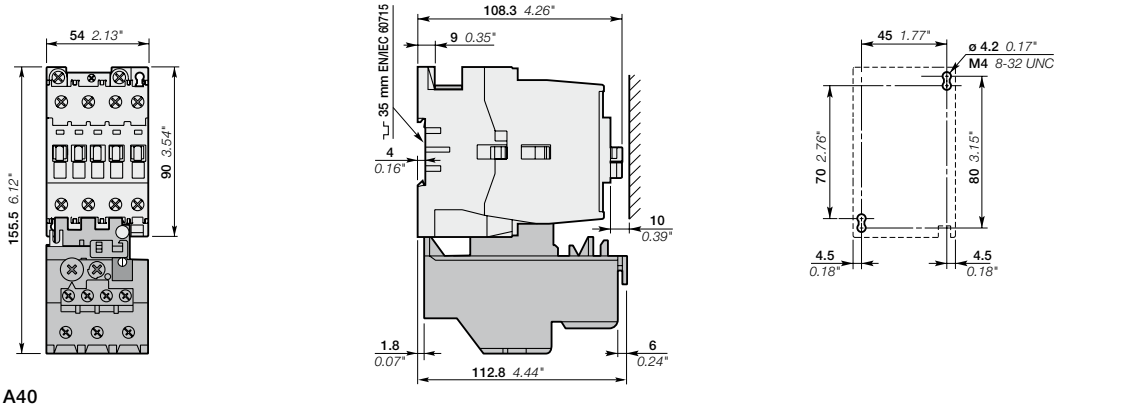
A40
+ VE5-1 electrical and mechanical interlock unit



A40
+ VM5-1 mechanical interlock unit



A40
+ TA25DU thermal overload relay
* For TA25DU32 only

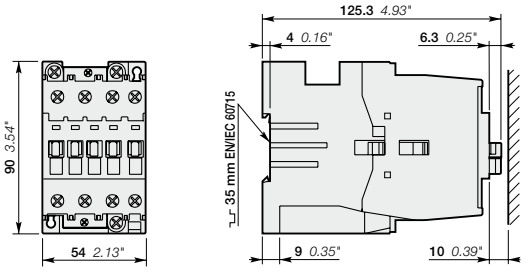


A40
+ TA42DU thermal overload relay

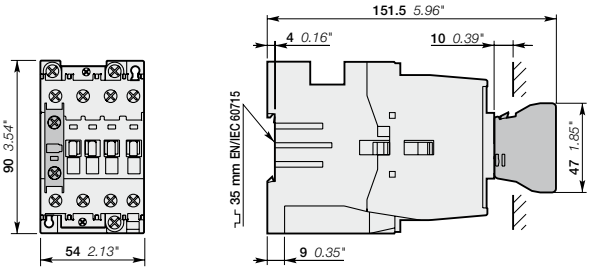
1SBC101147050201

AL40, TAL40 3-pole contactors
DC operated

Main dimensions mm, *inches*

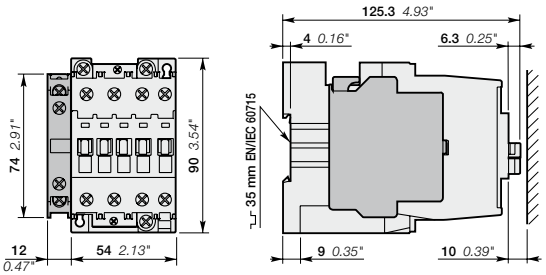


AL40, TAL40

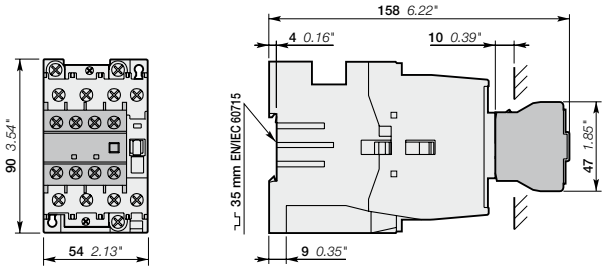


AL40, TAL40
+ CA5 front-mounted 1-pole auxiliary contact block

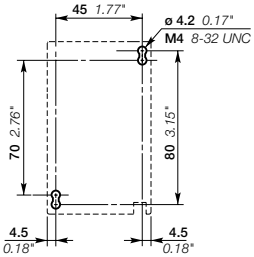
5



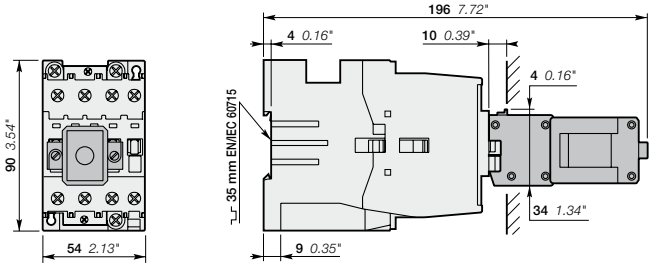
AL40, TAL40
+ CAL5 side-mounted 2-pole auxiliary contact block



AL40, TAL40
+ CA5 front-mounted 4-pole auxiliary contact block



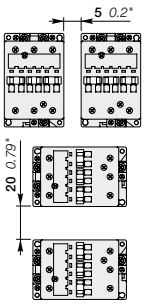
AL40, TAL40



AL40, TAL40
+ WB75-A on-position latch

Mounting distance (for side by side mounting)

TAL40
Position 1, 2, 5
20°C < θ < 55 °C

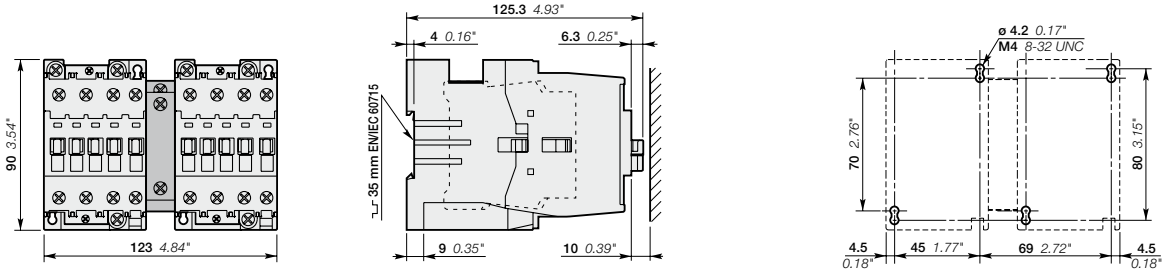


TAL40
Position 3, 4
20°C < θ < 55 °C

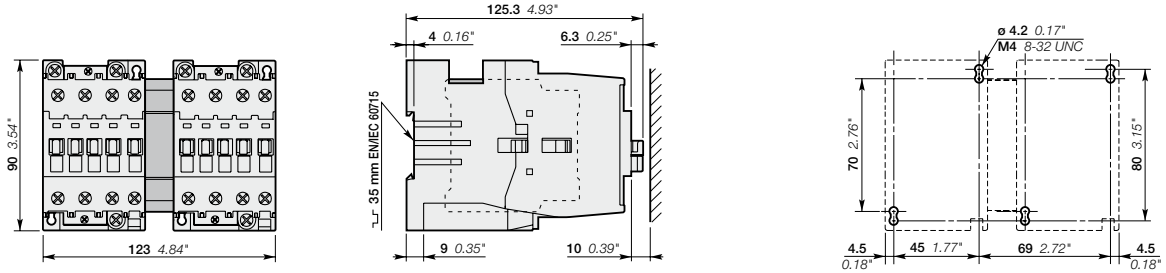
1SBC101471S0201

AL40, TAL40 3-pole contactors
DC operated

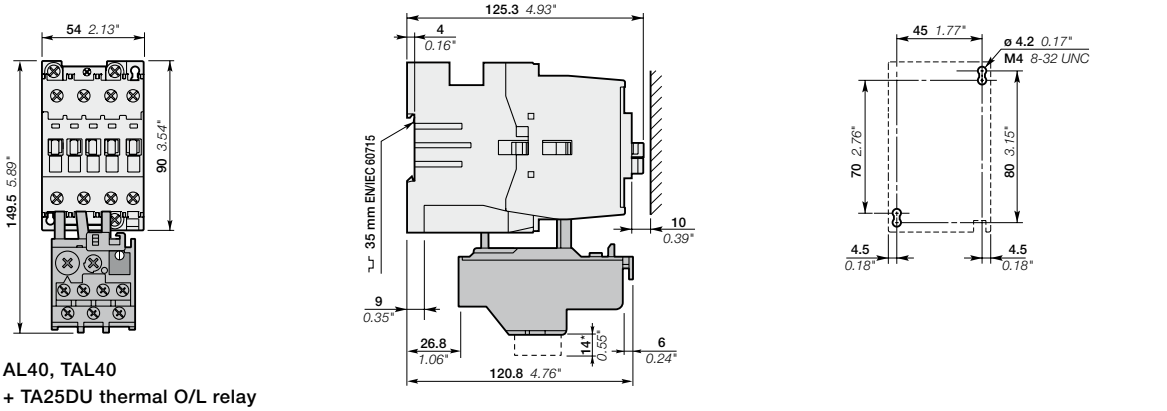
Main dimensions mm, *inches*



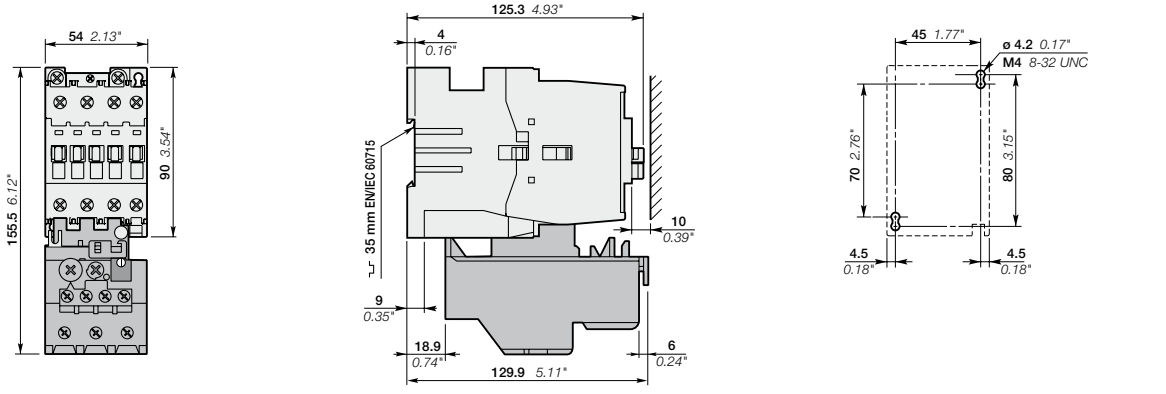
AL40, TAL40
+ VE5-1 electrical and mechanical interlock unit



AL40, TAL40
+ VM5-1 mechanical interlock unit



AL40, TAL40
+ TA25DU thermal O/L relay
* For TA25DU32 only

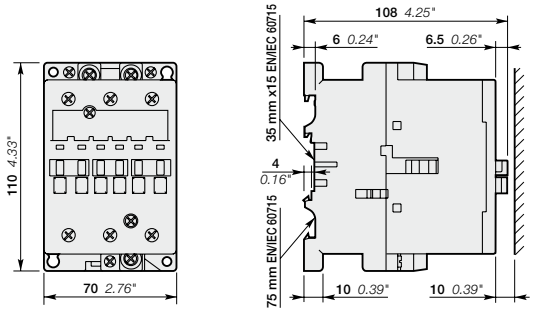


AL40, TAL40
+ TA42DU thermal O/L relay

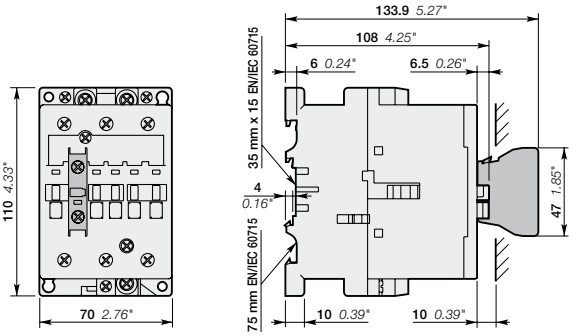
1SBC101471S0201

A50, A63 and A75 3-pole contactors
AF50, AF63 and AF75 3-pole contactors

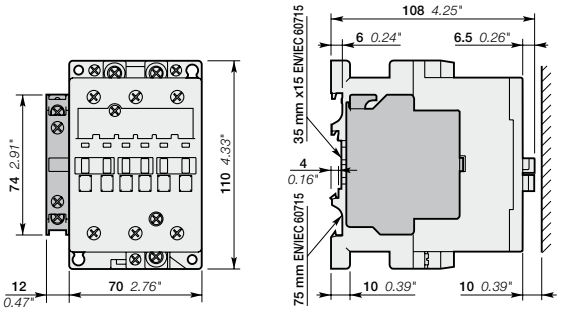
Main dimensions mm, *inches*



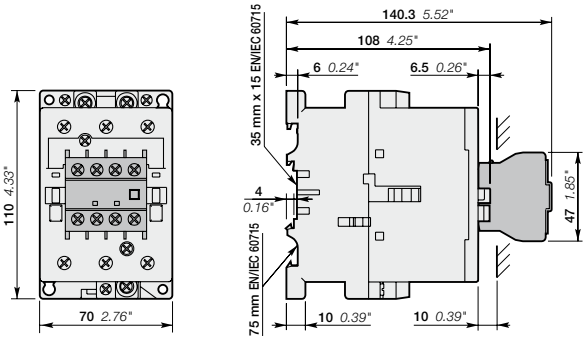
A50, A63, A75, AF50, AF63, AF75



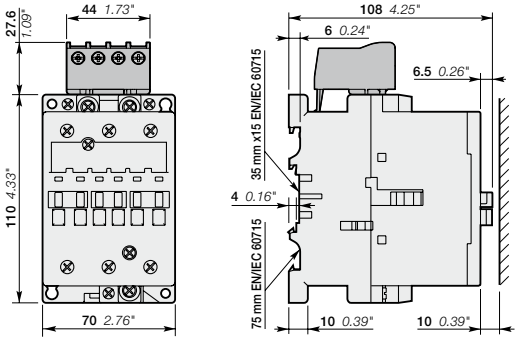
A50, A63, A75, AF50, AF63, AF75
+ CA5 front-mounted 1-pole auxiliary contact block



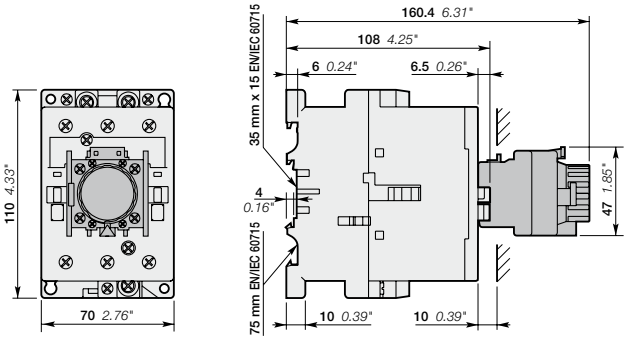
A50, A63, A75, AF50, AF63, AF75
+ CAL5 side-mounted 2-pole auxiliary contact block



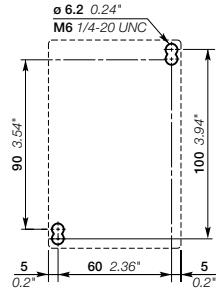
A50, A63, A75, AF50, AF63, AF75
+ CA5 front-mounted 4-pole auxiliary contact block
and corresponding 2-stack versions



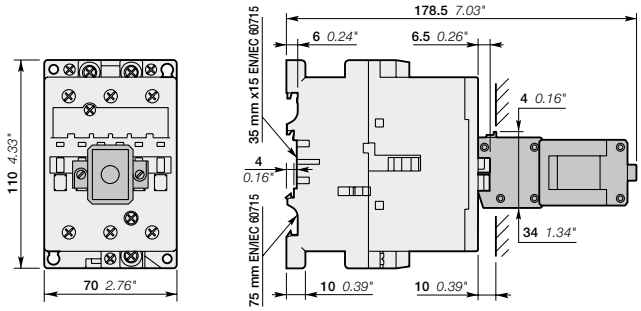
A50, A63, A75
+ RA5-1 interface relay



A50, A63, A75, AF50, AF63, AF75
+ TP pneumatic timer



A50, A63, A75, AF50, AF63, AF75

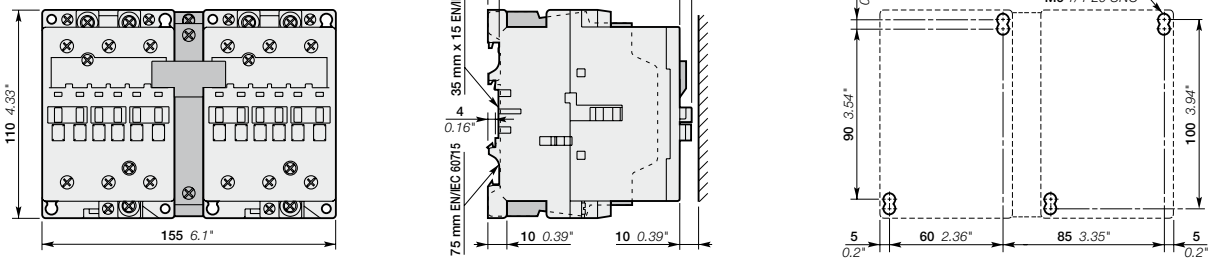


A50, A63, A75, AF50, AF63, AF75
+ WB75-A on-position latch

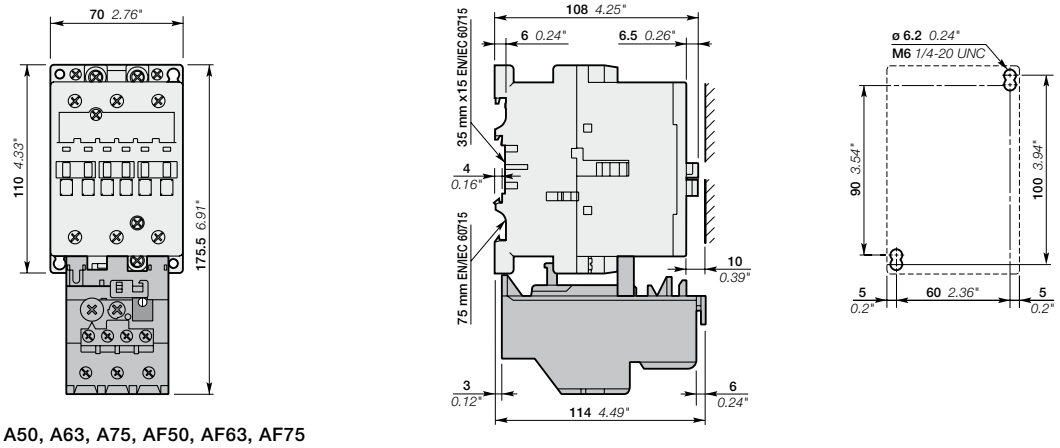
1SBC101472S0201

A50, A63 and A75 3-pole contactors
AF50, AF63 and AF75 3-pole contactors

Main dimensions mm, *inches*



A50, A63, A75, AF50, AF63, AF75
+ VE5-2 electrical and mechanical interlock unit



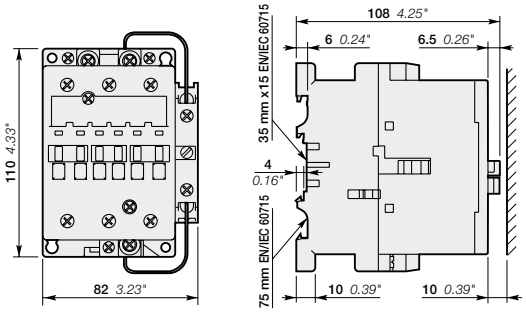
A50, A63, A75, AF50, AF63, AF75
+ TA75DU thermal overload relay

5

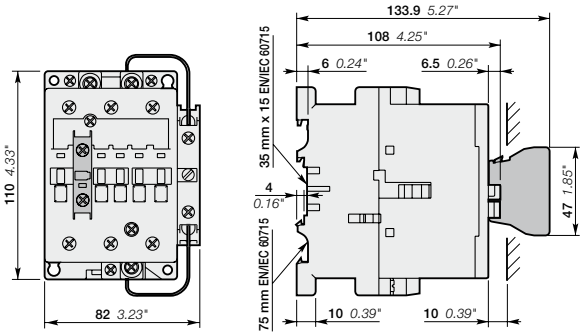
1SBC101472S0201

AE50, AE63 and AE75 3-pole contactors
TAE50 and TAE75 3-pole contactors
DC operated

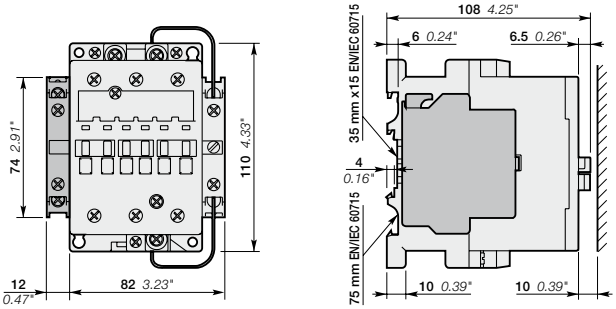
Main dimensions mm, *inches*



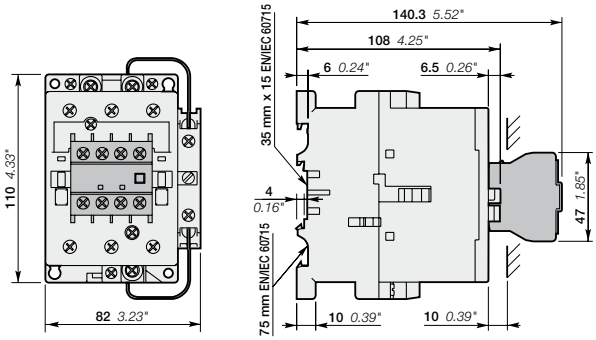
AE50, AE63, AE75, TAE50, TAE75



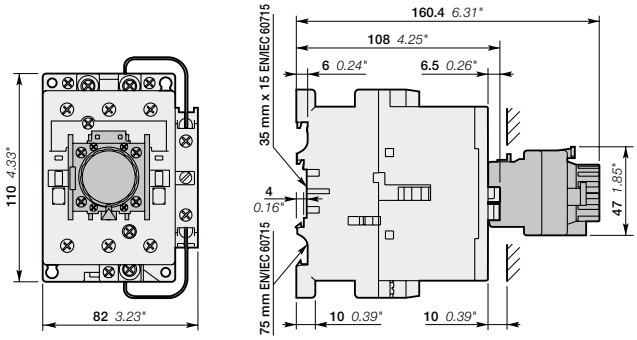
AE50, AE63, AE75, TAE50, TAE75
+ CA5 front-mounted 1-pole auxiliary contact block



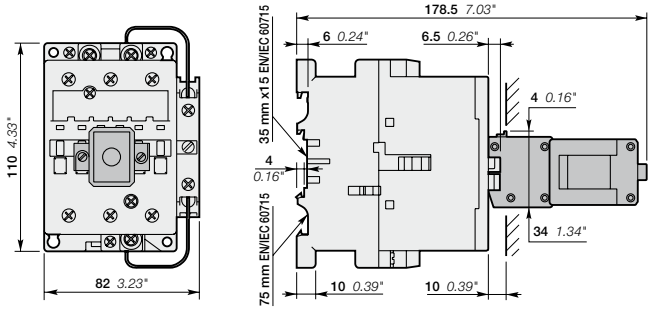
AE50, AE63, AE75, TAE50, TAE75
+ CAL 5 side-mounted 2-pole auxiliary contact block



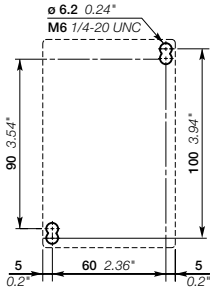
AE50, AE63, AE75, TAE50, TAE75
+ CA5 front-mounted 4-pole auxiliary contact block



AE50, AE63, AE75, TAE50, TAE75
+ TP pneumatic timer



AE50, AE63, AE75, TAE50, TAE75
+ WB75-A on-position latch



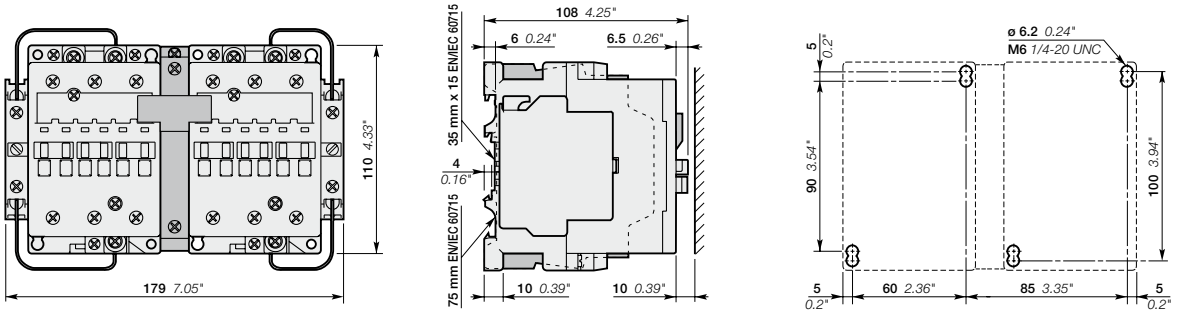
AE50, AE63, AE75, TAE50, TAE75

5

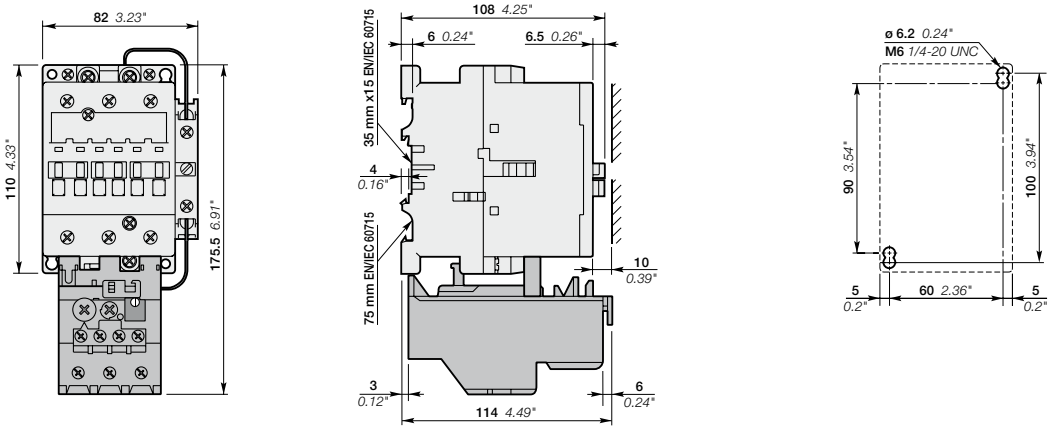
1SBC101474S0201

AE50, AE63 and AE75 3-pole contactors
TAE50 and TAE75 3-pole contactors
DC operated

Main dimensions mm, *inches*



AE50, AE63, AE75, TAE50, TAE75
+ VE5-2 electrical and mechanical interlock unit



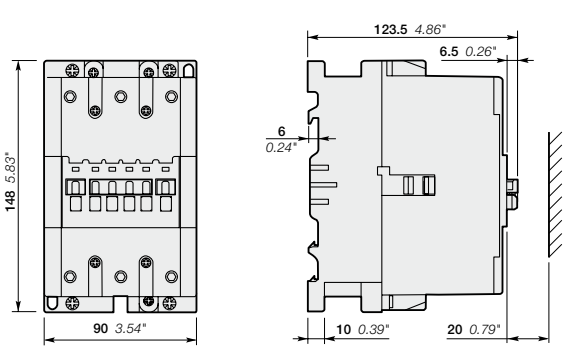
AE50, AE63, AE75, TAE50, TAE75
+ TA75DU thermal overload relay

5

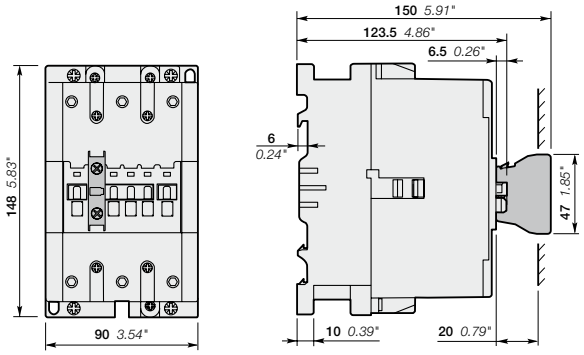
1SBC101474S0201

A95 and A110 3-pole contactors
AF95 and AF110 3-pole contactors

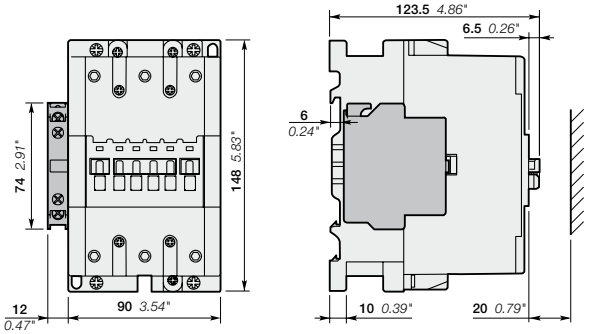
Main dimensions mm, *inches*



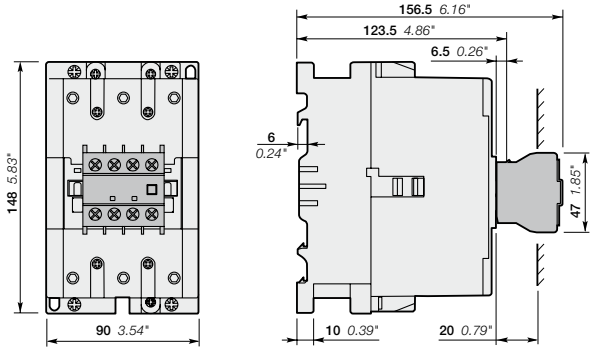
A95, A110, AF95, AF110



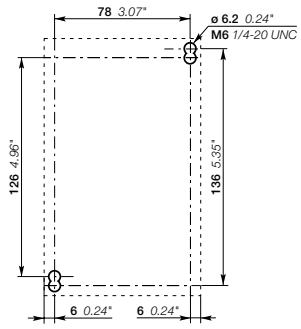
A95, A110, AF95, AF110
+ CA5 front-mounted 1-pole auxiliary contact block



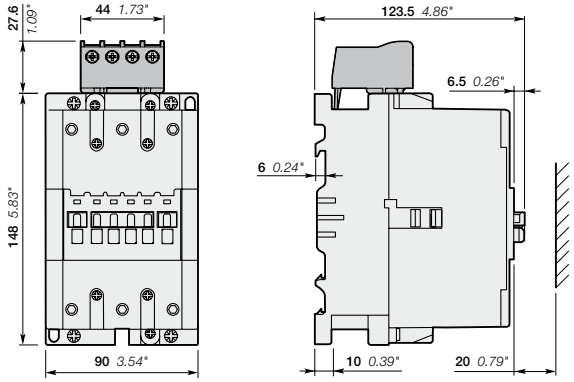
A95, A110, AF95, AF110
+ CAL18 side-mounted 2-pole auxiliary contact block



A95, A110, AF95, AF110
+ CA5 front-mounted 4-pole auxiliary contact block
and corresponding 2-stack versions



A95, A110, AF95, AF110

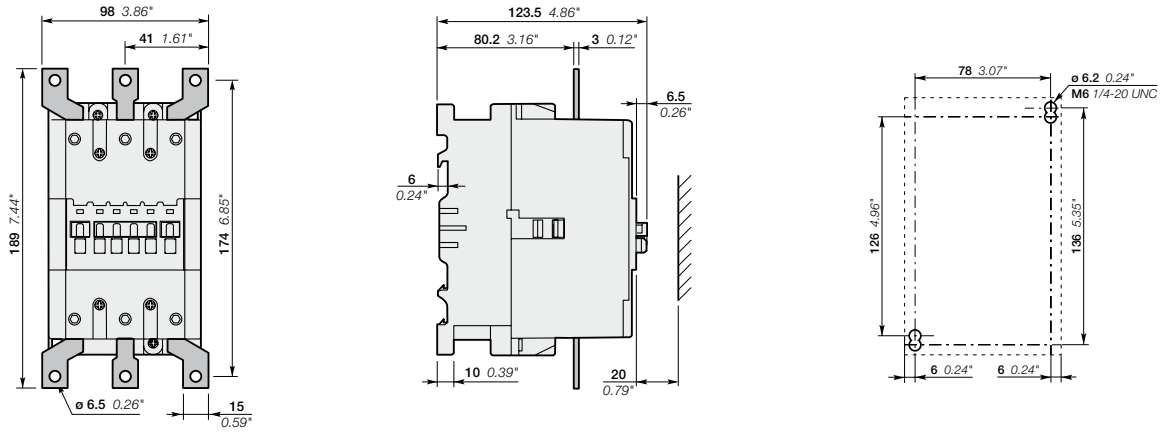


A95, A110
+ RA5-1 interface relay

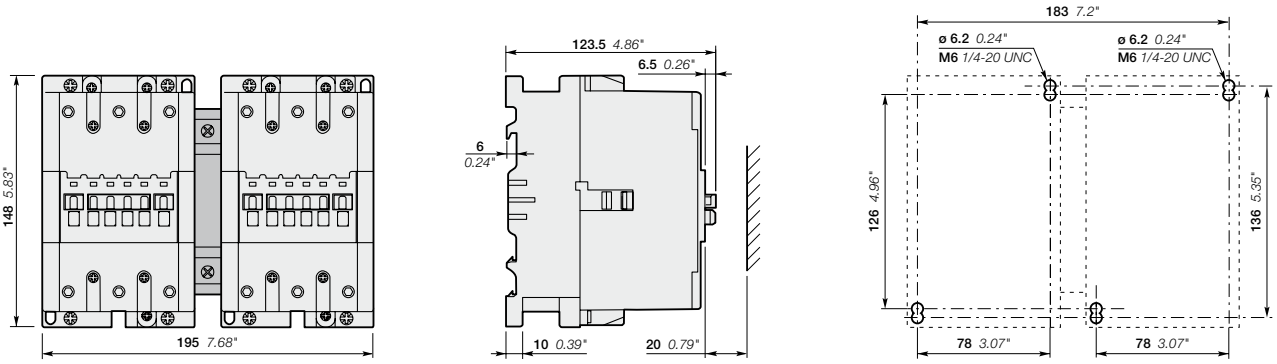
1SBC101643S0201

A95 and A110 3-pole contactors
AF95 and AF110 3-pole contactors

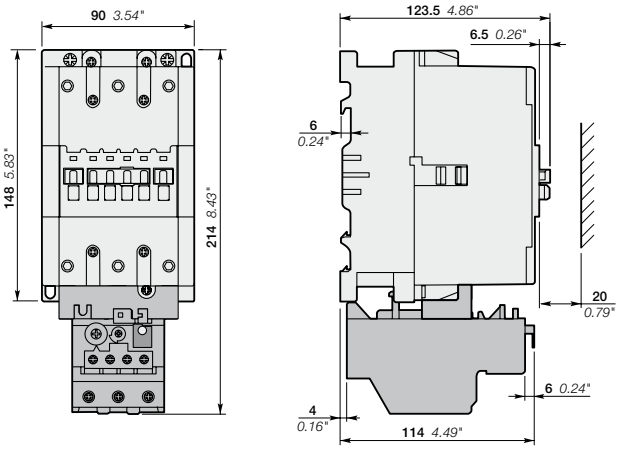
Main dimensions mm, *inches*



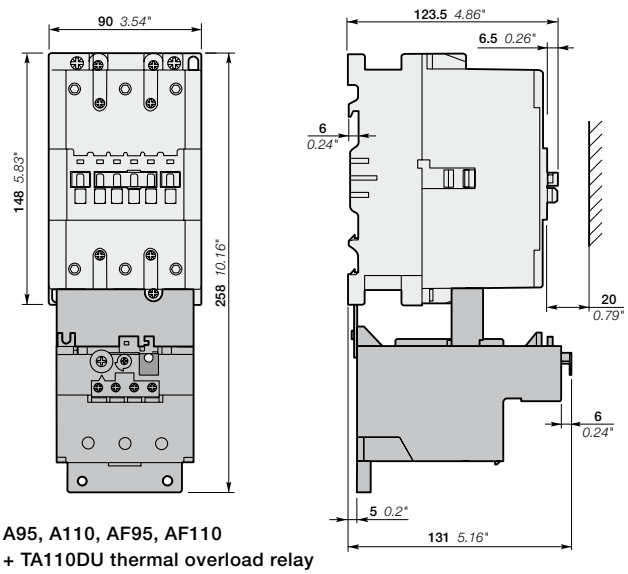
A95, A110, AF95, AF110
+ LW110 terminal enlargement



A95, A110, AF95, AF110
+ VE5-2 electrical and mechanical interlock unit



A95, A110, AF95, AF110
+ TA80DU thermal overload relay

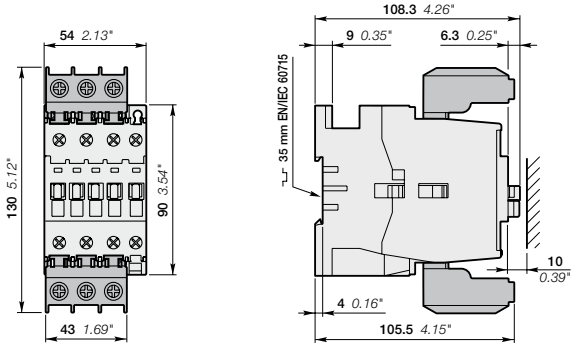


A95, A110, AF95, AF110
+ TA110DU thermal overload relay

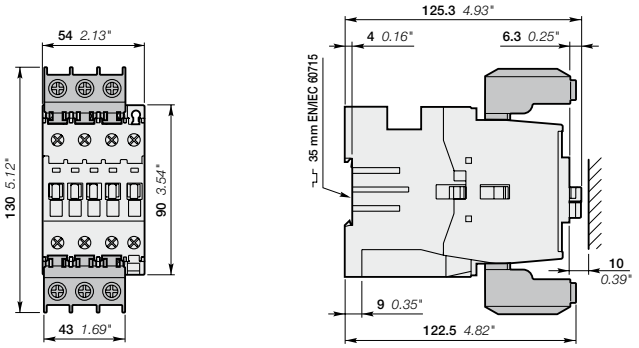
1SBC101643S0201

A40 ... A110 3-pole contactors
with LD.. additional terminal blocks

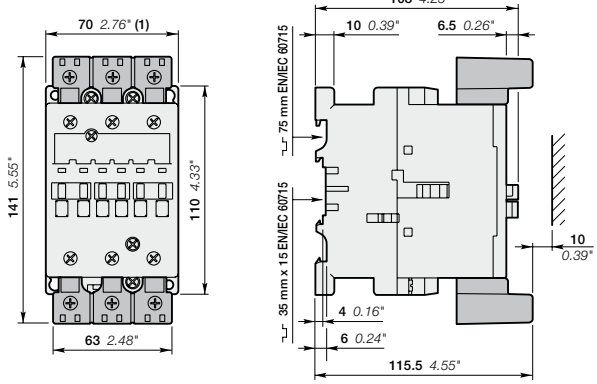
Main dimensions mm, *inches*



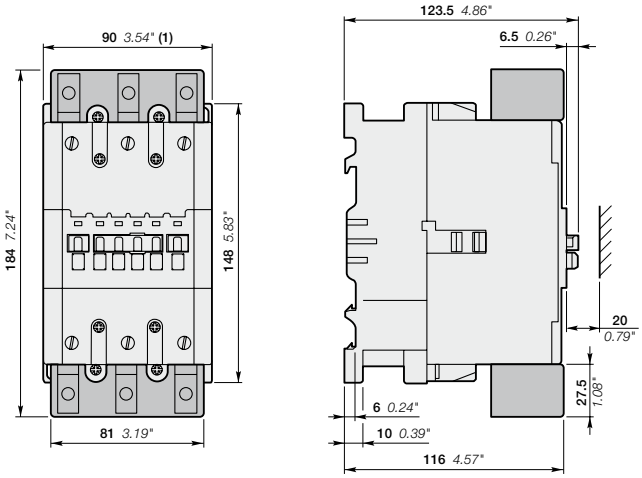
A40 contactors
+ 2 x LD40



AL40, TAL40 contactors
+ 2 x LD40



A50, A63, A75, AF50, AF63, AF75, AE50, AE63, AE75, TAE50, TAE75 contactors
+ 2 x LD75
(1) For AE... and TAE... contactors: 82 mm instead 70 mm (specific desing).

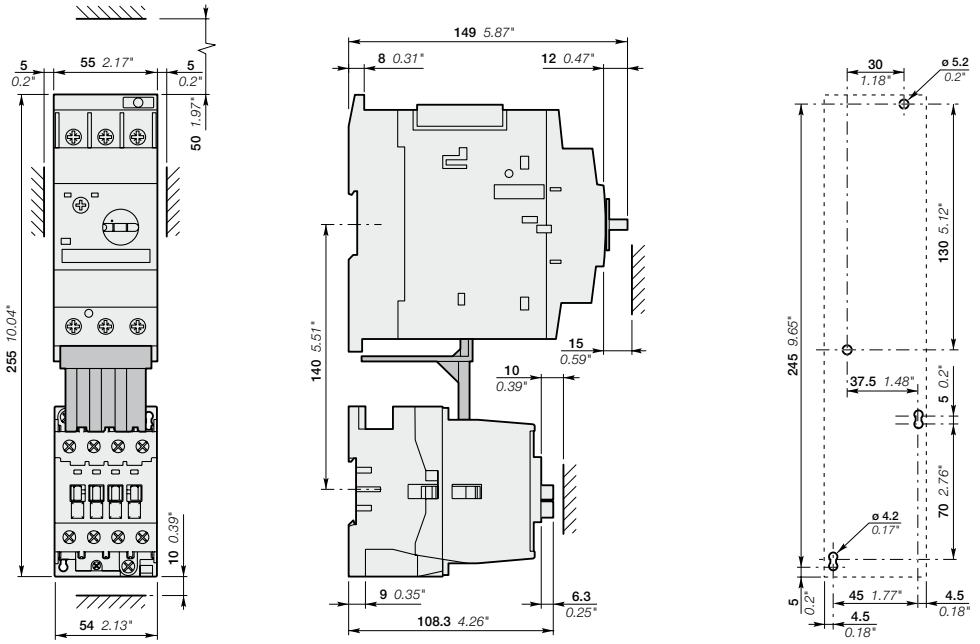


A95, A110, AF95, AF110, UA95, UA110 contactors
+ 2 x LD110
(1) For AE... and TAE... contactors: 102 mm instead 90 mm (specific desing).

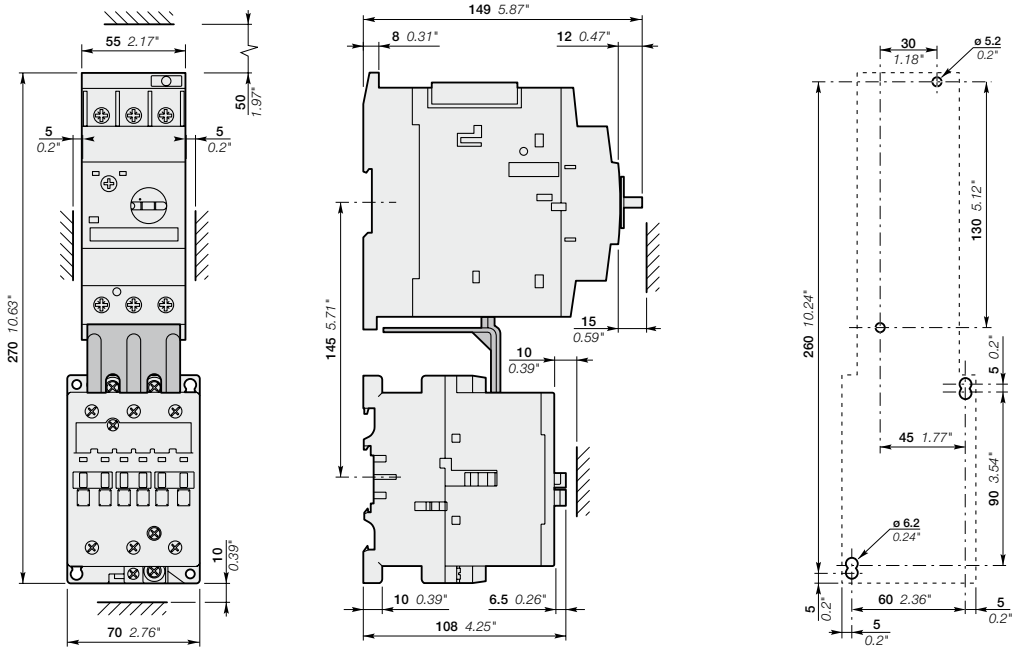
1SBC101476S0201

A40 ... A50 3-pole contactors
with BEA.. connecting links and MMS – Direct-on-line starter

Main dimensions mm, *inches*



A40 contactors
+ BEA40/450
+ MS450

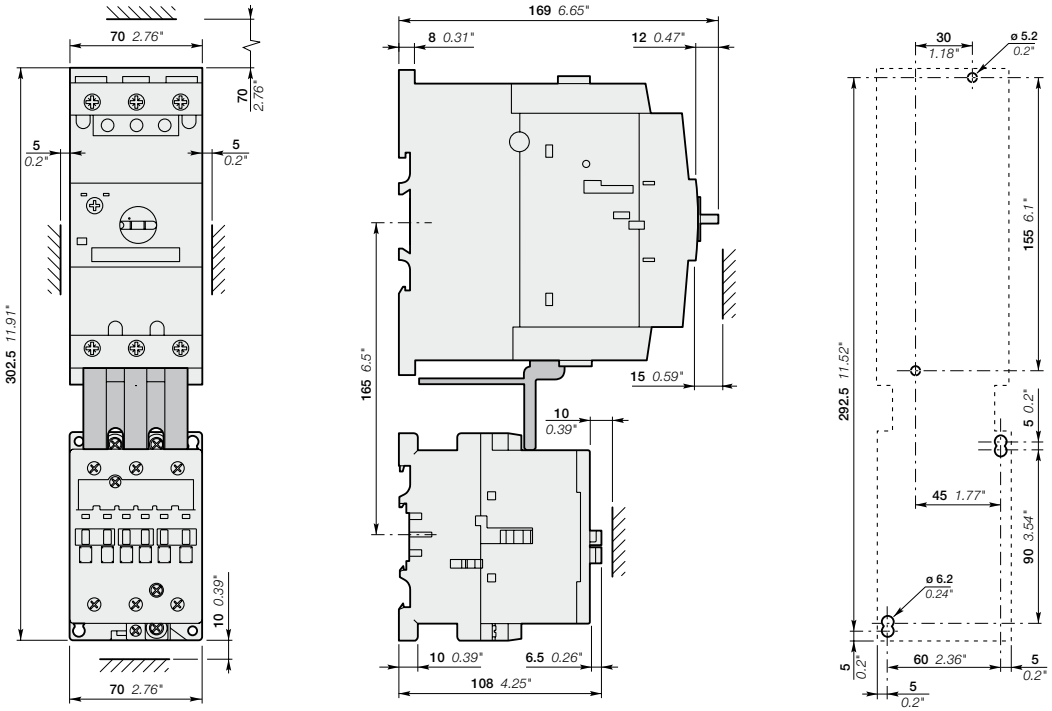


A50 contactor
+ BEA50/450
+ MS450

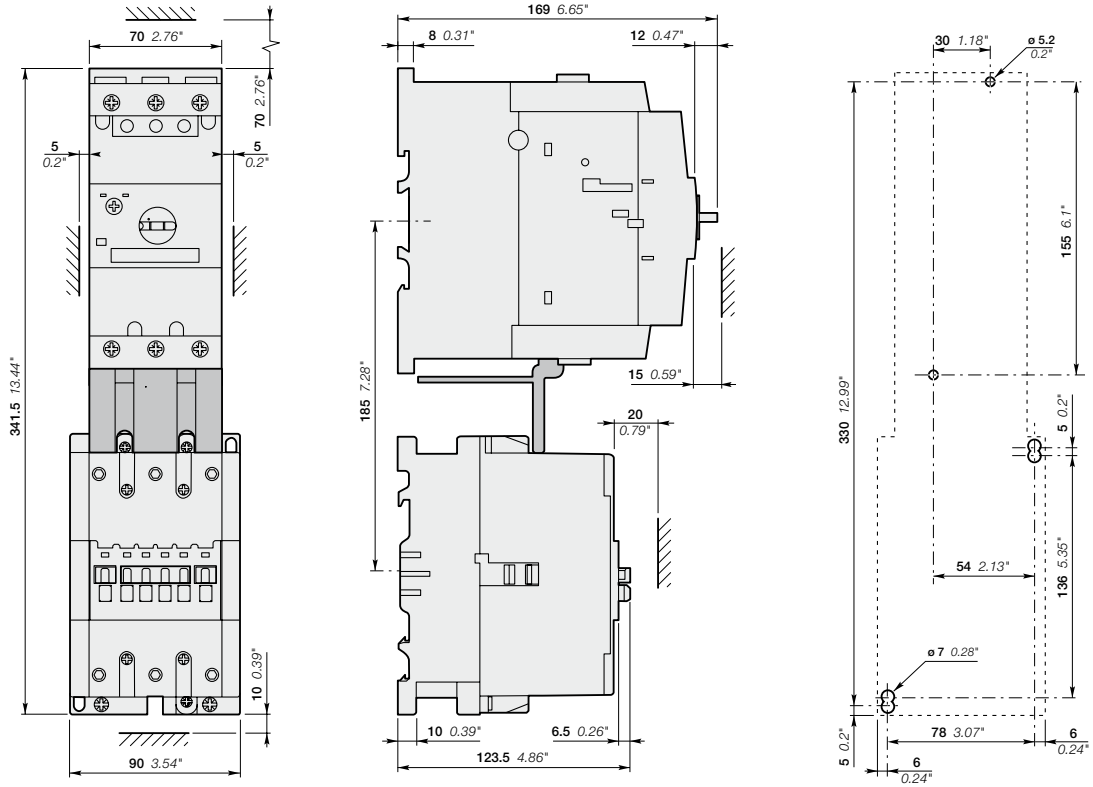
1SBC101477S0201

A75 ... A110 3-pole contactors
with BEA.. connecting links and MMS – Direct-on-line starter

Main dimensions mm, *inches*



A75 contactor
+ BEA75/495
+ MS495/496

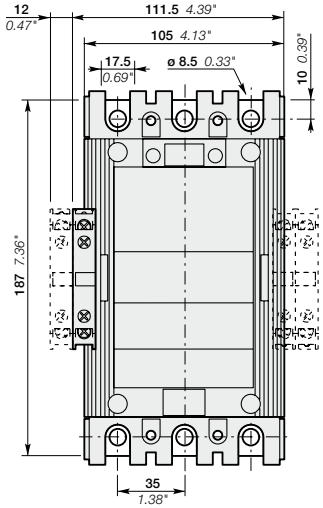


A95, A110 contactors
+ BEA110/495
+ MS495/496

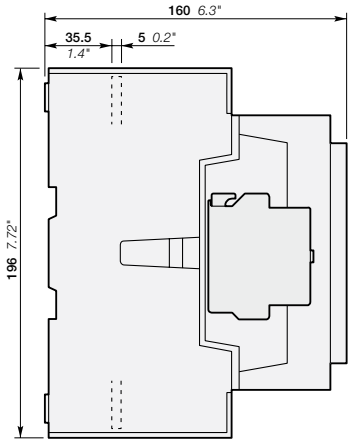
1SBC101478S0201

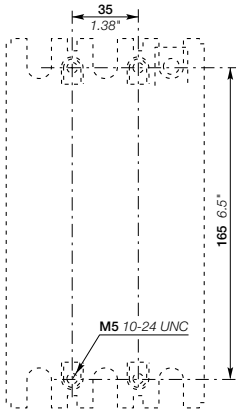
A145 and A185 3-pole contactors
AF145 and AF185 3-pole contactors

Main dimensions mm, *inches*

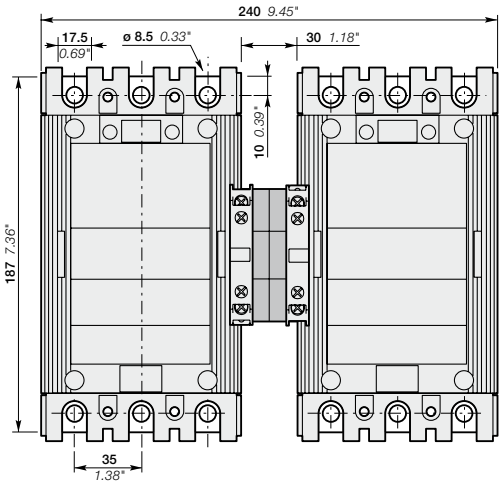


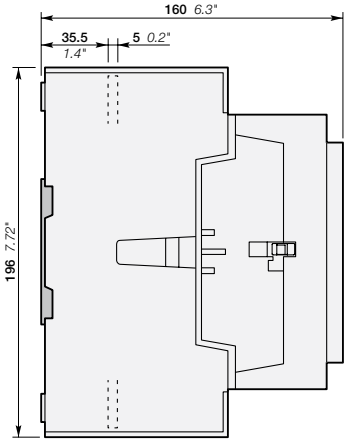
A145, A185, AF145, AF185 c/w 1 x **CAL18**



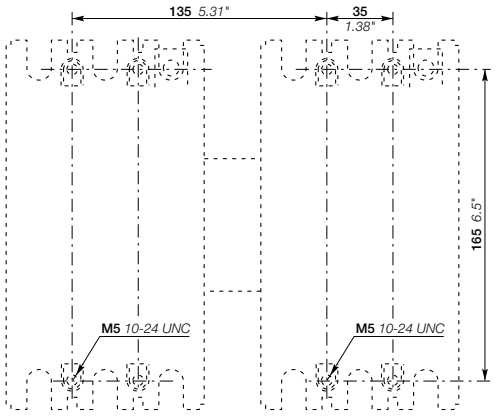


A145, A185, AF145, AF185 c/w 1 x **CAL18**





A145, A185, AF145, AF185 c/w 1 x **CAL18**
+ VM300H mechanical interlock unit



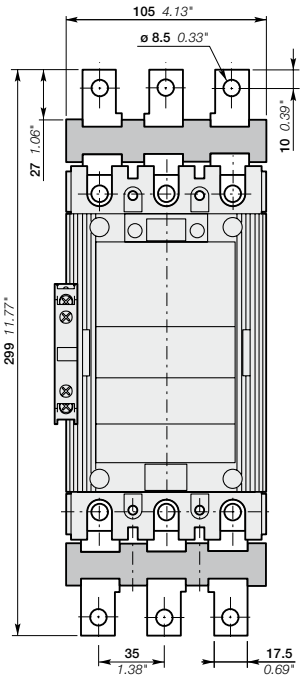
A145, A185, AF145, AF185 c/w 1 x **CAL18**
+ VM300H mechanical interlock unit

5

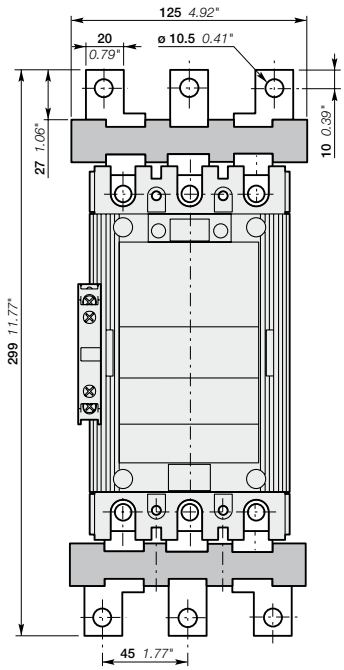
1SBC101644S0201

A145 and A185 3-pole contactors
AF145 and AF185 3-pole contactors

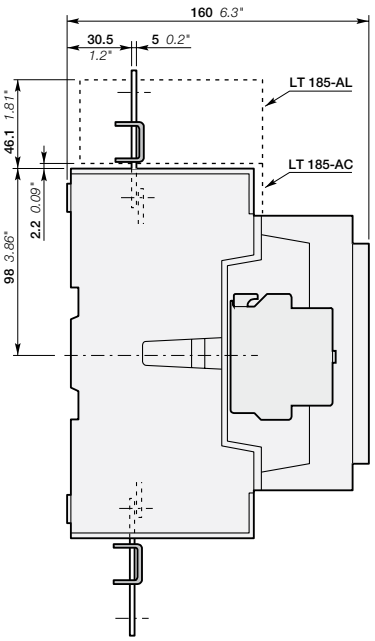
Main dimensions mm, *inches*

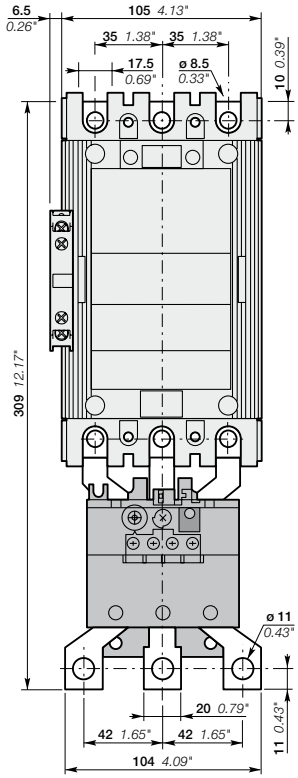


A145, A185, AF145, AF185 c/w 1 x **CAL18**
+ LX185 terminal extension

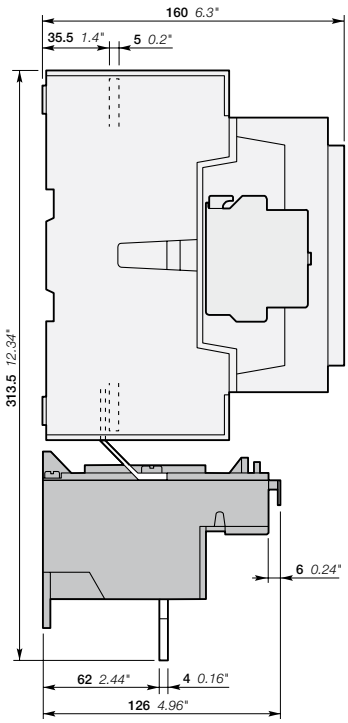


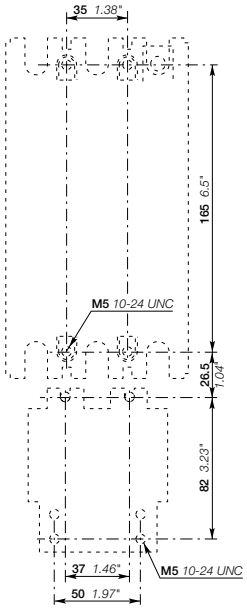
A145, A185, AF145, AF185 c/w 1 x **CAL18**
+ LW185 terminal enlargement





A145, A185, AF145, AF185 c/w 1 x **CAL18**
+ TA200DU thermal overload relay



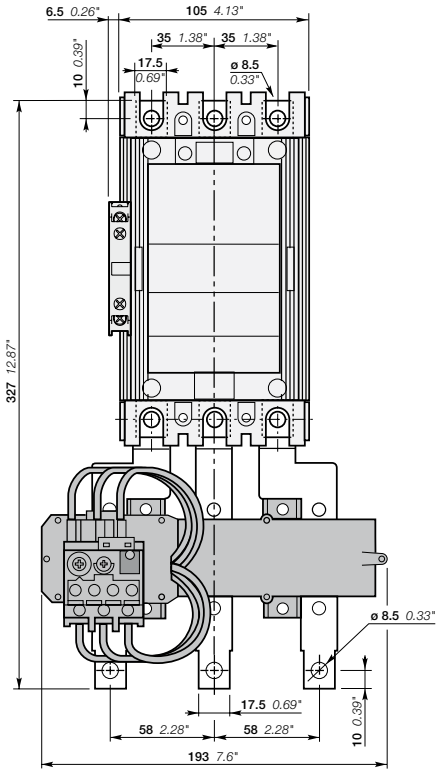


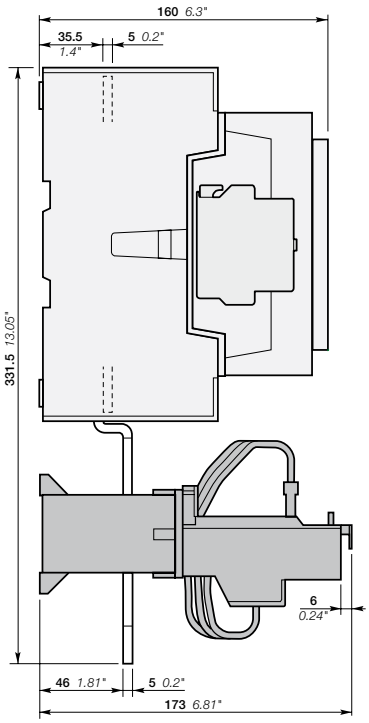
A145, A185, AF145, AF185 c/w 1 x **CAL18**
+ TA200DU thermal overload relay

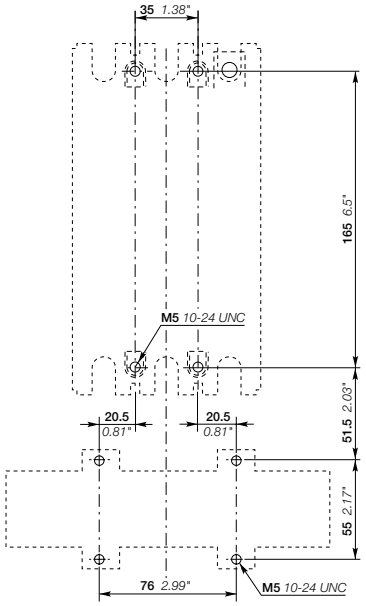
1SBC101644S0201

A145 and A185 3-pole contactors
AF145 and AF185 3-pole contactors

Main dimensions mm, *inches*

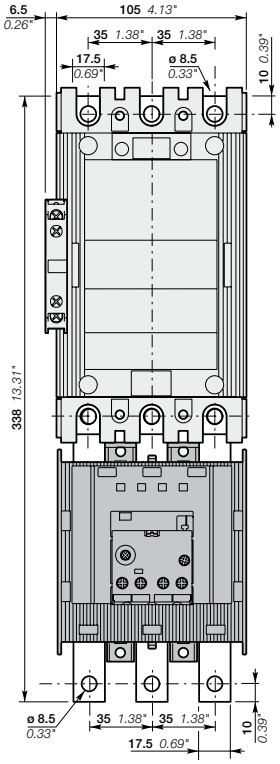


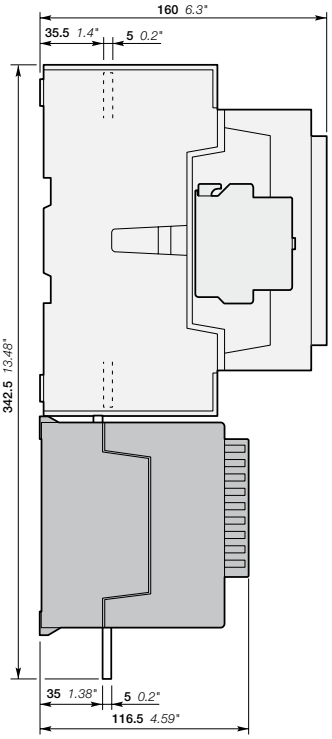


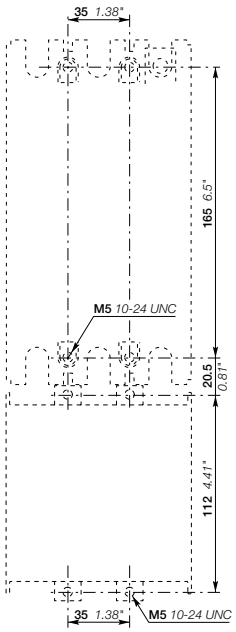


A145, A185, AF145, AF185 c/w 1 x **CAL18**
+ TA450DU/SU thermal overload relay

A145, A185, AF145, AF185 c/w 1 x **CAL18**
+ TA450DU/SU thermal overload relay







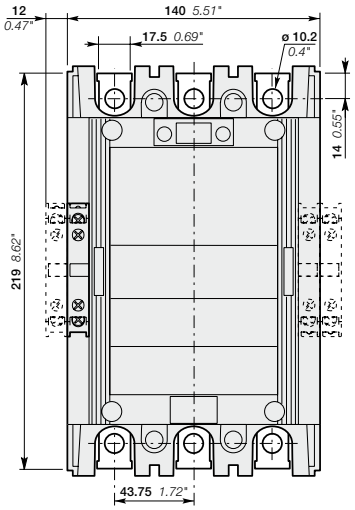
A145, A185, AF145, AF185 c/w 1 x **CAL18**
+ E200DU electronic overload relay

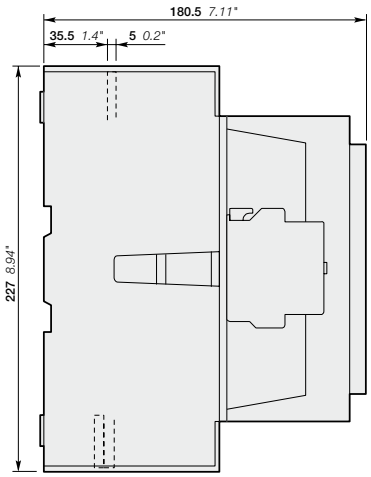
A145, A185, AF145, AF185 c/w 1 x **CAL18**
+ E200DU electronic overload relay

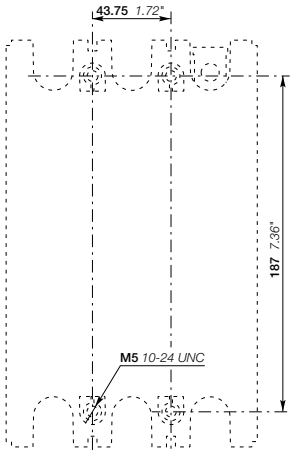
1SBC101644S0201

A210, A260 and A300 3-pole contactors
AF210, AF260 and AF300 3-pole contactors

Main dimensions mm, *inches*

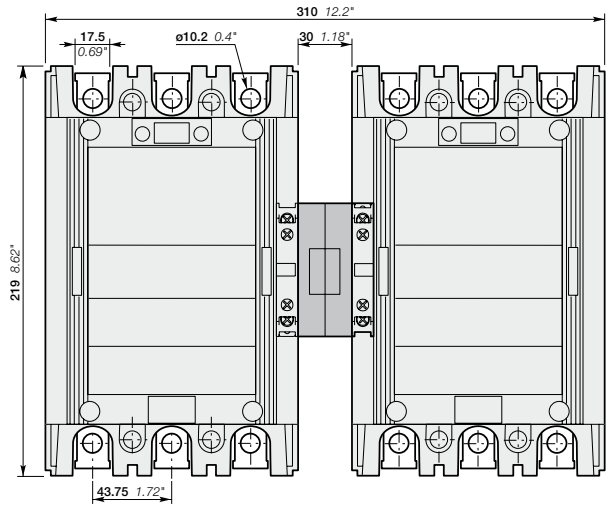


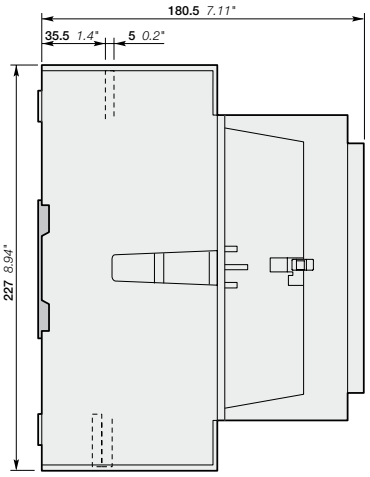




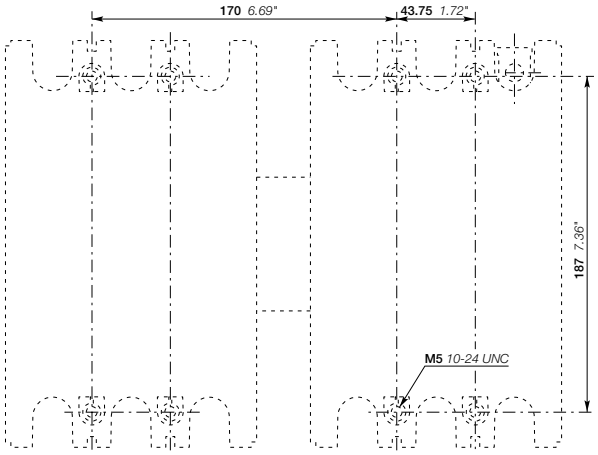
A210, A260, A300, AF210, AF260, AF300 c/w 1 x **CAL18**

A210, A260, A300, AF210, AF260, AF300 c/w 1 x **CAL18**





A210, A260, A300, AF210, AF260, AF300 c/w 1 x **CAL18**
+ M300H mechanical interlock unit

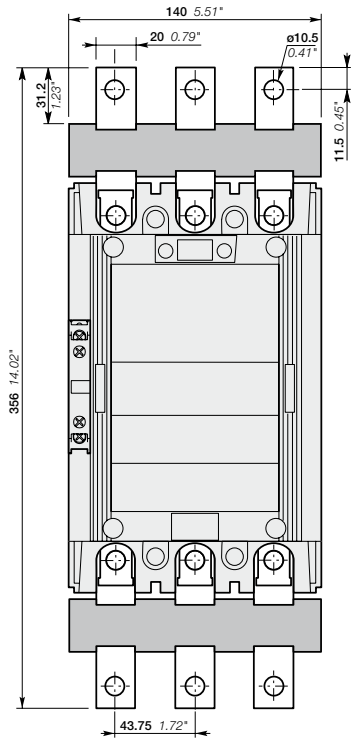


A210, A260, A300, AF210, AF260, AF300 c/w 1 x **CAL18**
+ M300H mechanical interlock unit

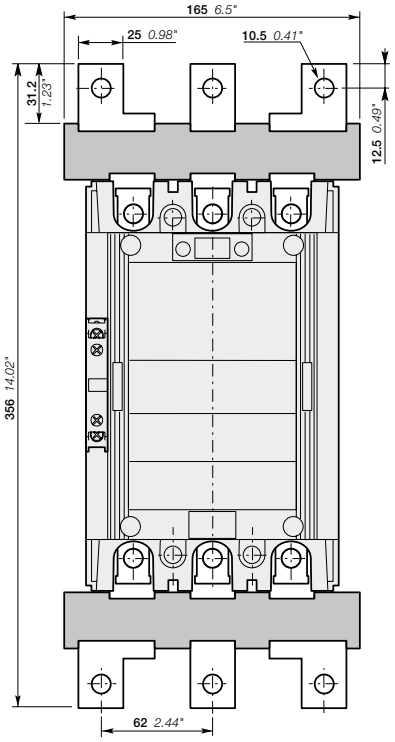
1SBC101645S0201

A210, A260 and A300 3-pole contactors
AF210, AF260 and AF300 3-pole contactors

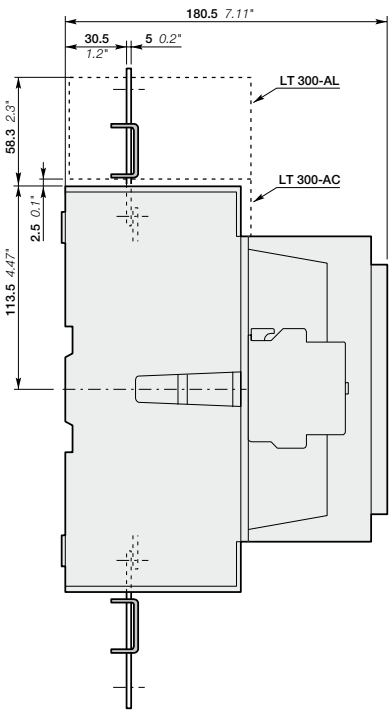
Main dimensions mm, *inches*

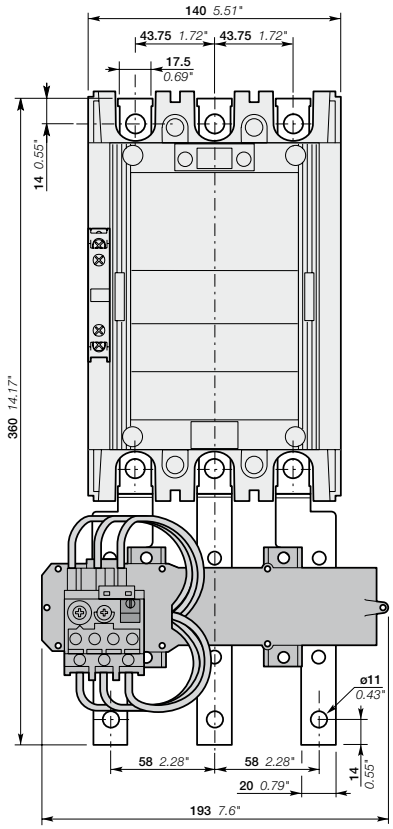


A210, A260, A300, AF210, AF260, AF300
c/w 1 x **CAL18 + LX300 terminal extension**

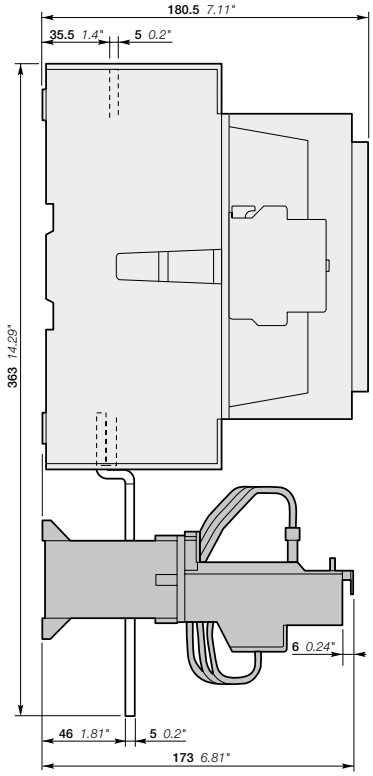


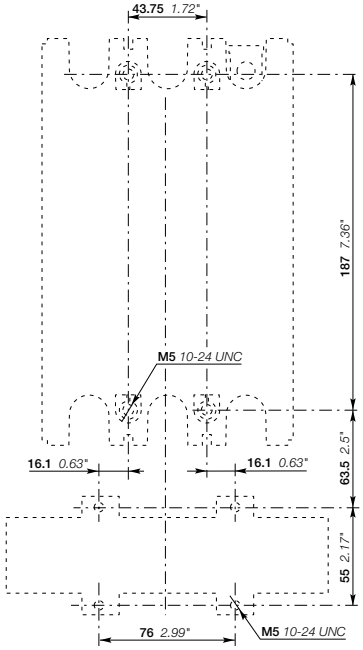
A210, A260, A300, AF210, AF260, AF300
c/w 1 x **CAL18 + LW300 terminal enlargement**





A210, A260, A300, AF210, AF260, AF300 c/w 1 x **CAL18**
+ TA450DU/SU thermal overload relay





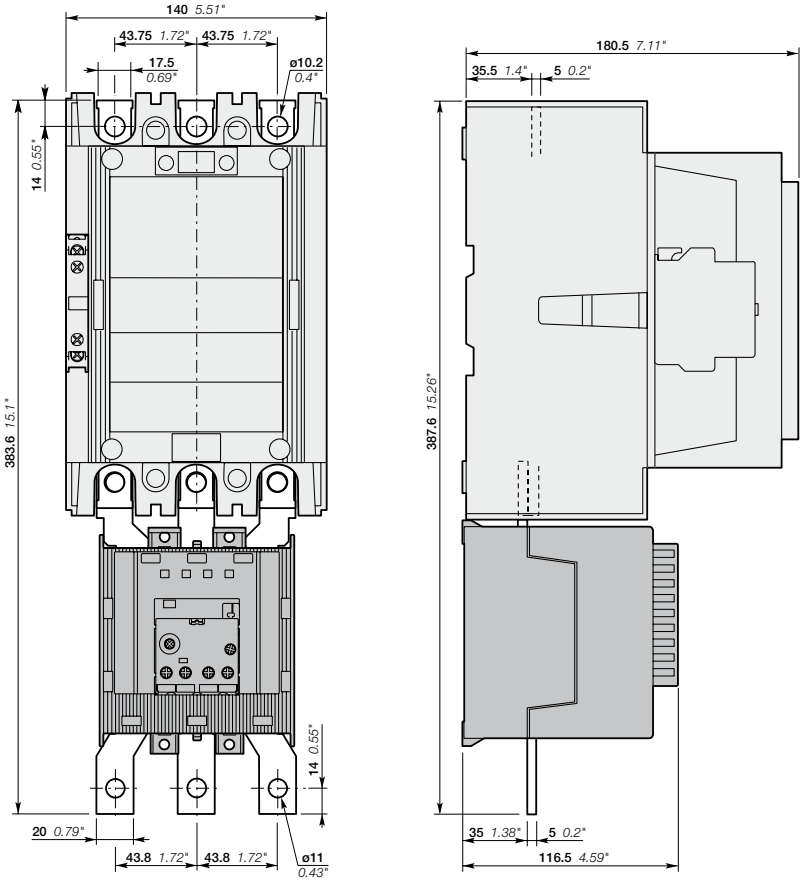
A210, A260, A300, AF210, AF260, AF300 c/w 1 x **CAL18**
+ TA450DU/SU thermal overload relay

5

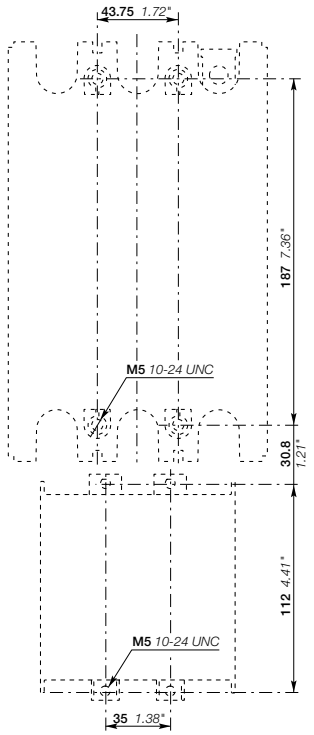
1SBC101645S0201

A210, A260 and A300 3-pole contactors
AF210, AF260 and AF300 3-pole contactors

Main dimensions mm, *inches*



A210, A260, A300, AF210, AF260, AF300 c/w 1 x **CAL18**
+ E320DU electronic overload relay

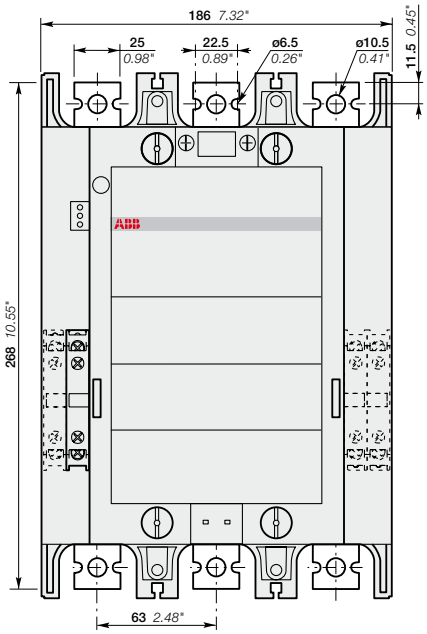


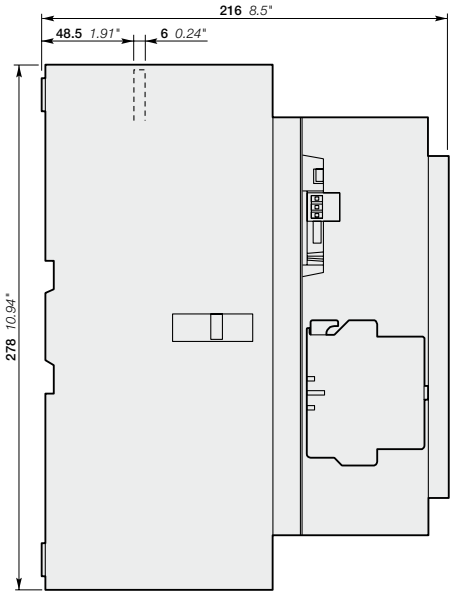
A210, A260, A300, AF210, AF260, AF300 c/w 1 x **CAL18**
+ E320DU electronic overload relay

1SBC101645S0201

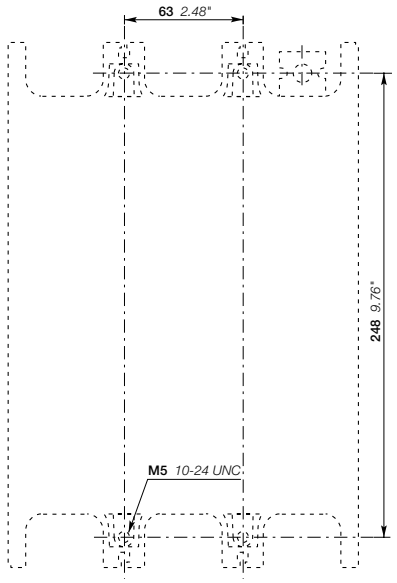
AF400 and AF460 3-pole contactors

Main dimensions mm, *inches*

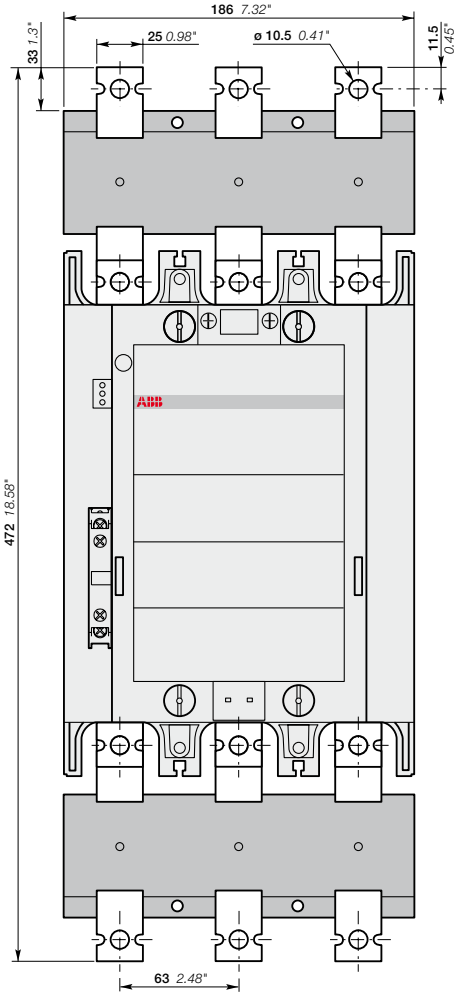




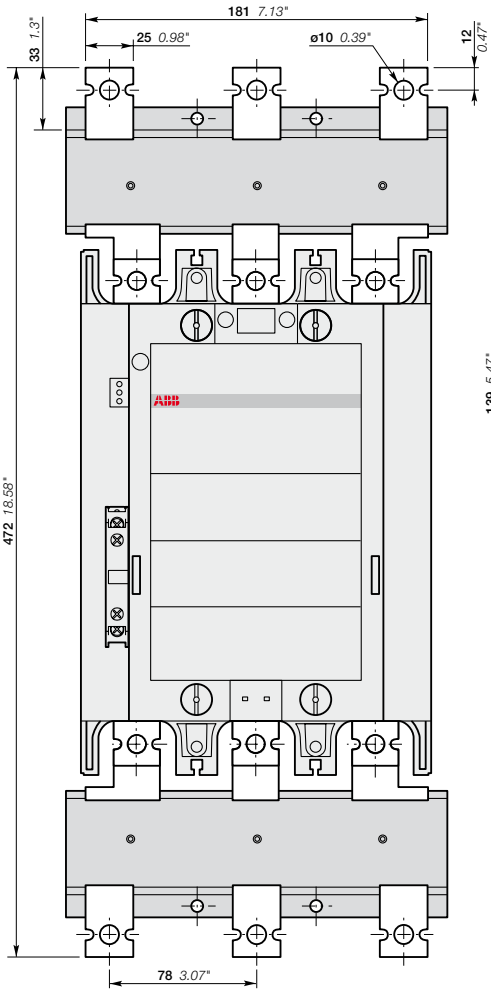
AF400, AF460 c/w 1 x CAL18



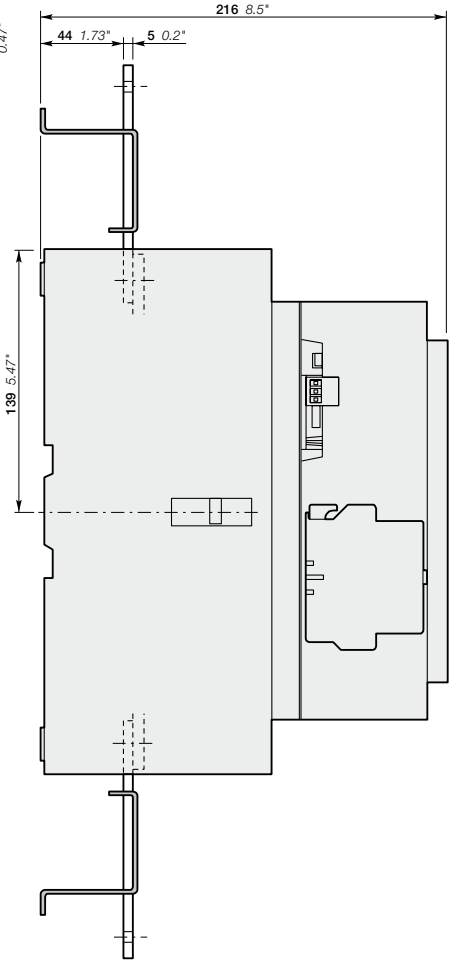
AF400, AF460 c/w 1 x CAL18



AF400, AF460 c/w 1 x CAL18
+ LX460 terminal extension



AF400, AF460 c/w 1 x CAL18
+ LW460 terminal enlargement

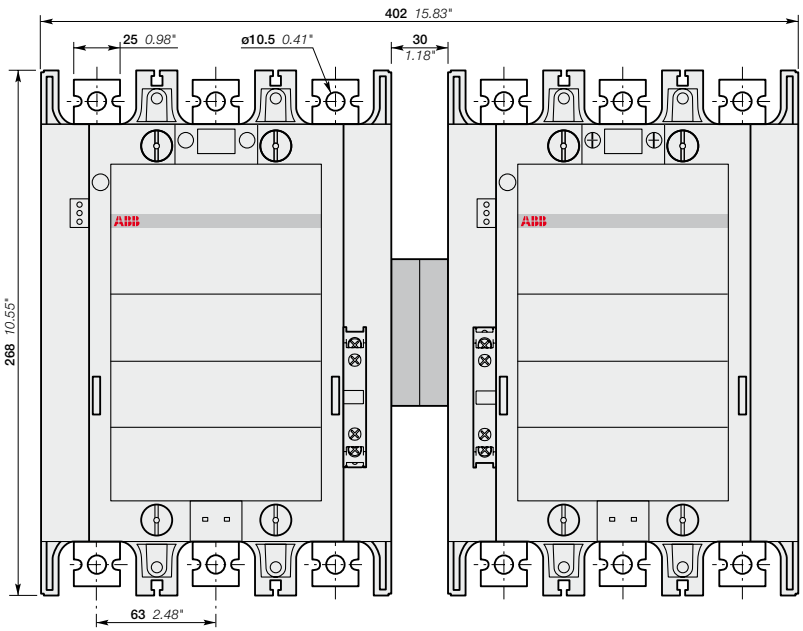


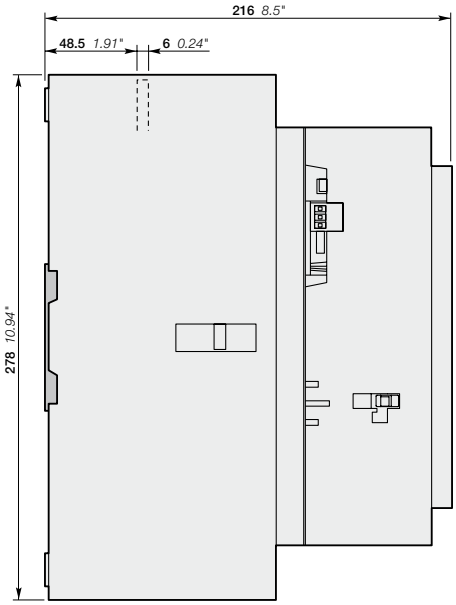
1SBC101646S0201

5

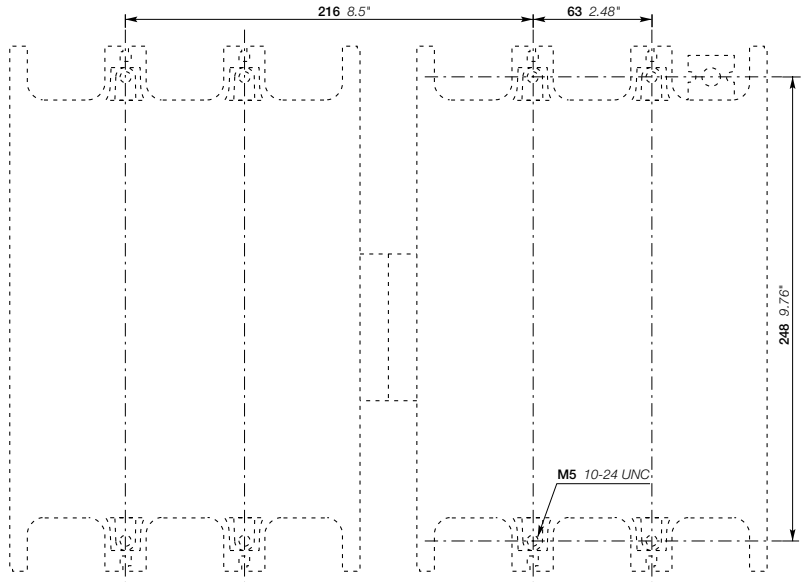
AF400 and AF460 3-pole contactors

Main dimensions mm, *inches*





AF400, AF460 c/w 1 x CAL18
+ VM750H mechanical interlock unit

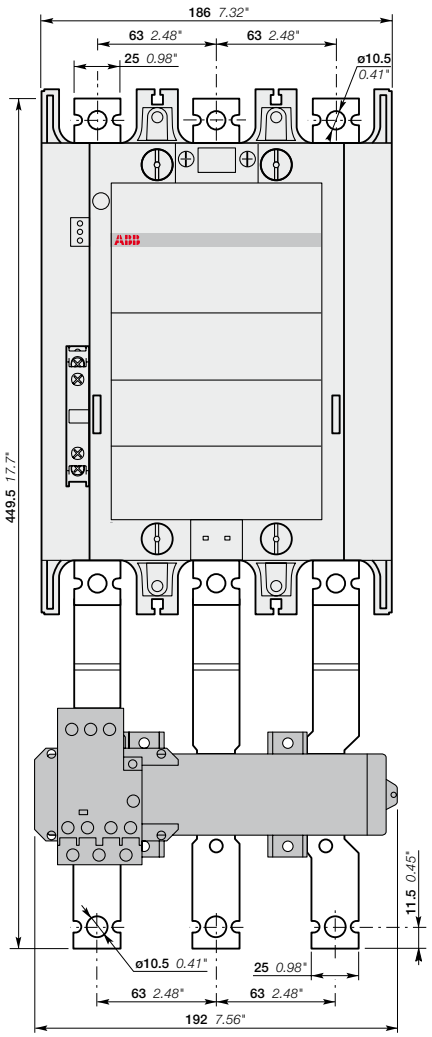


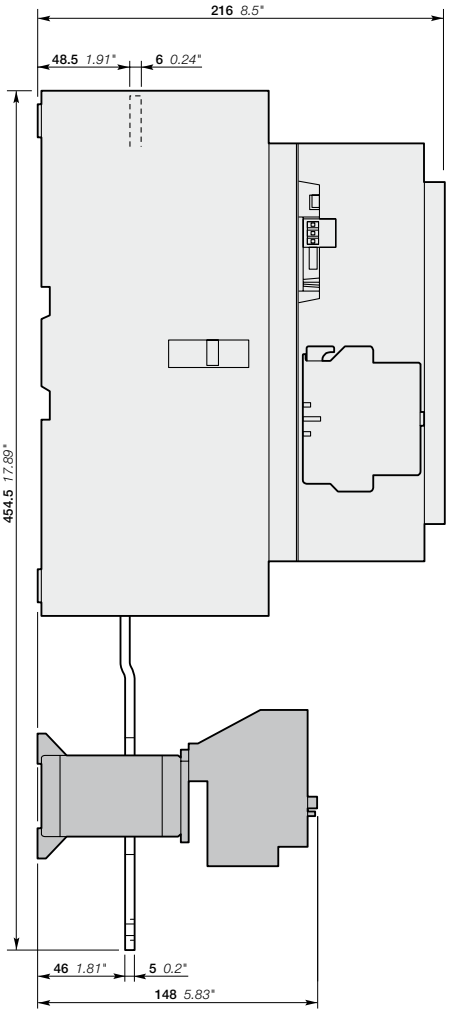
AF400, AF460 c/w 1 x CAL18
+ VM750H mechanical interlock unit

1SBC101646S0201

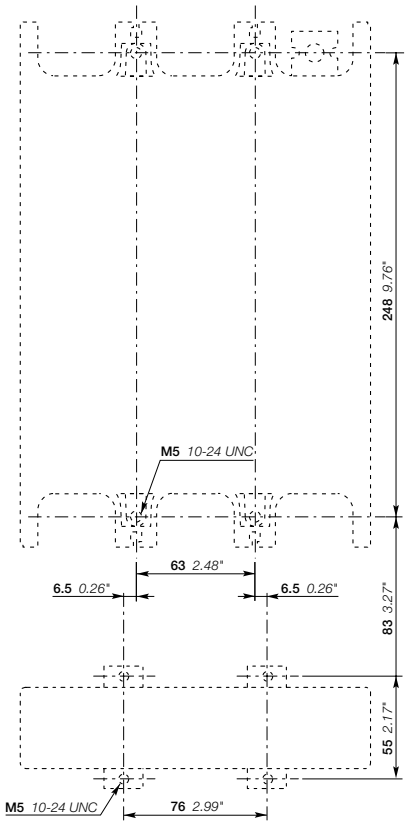
AF400 and AF460 3-pole contactors

Main dimensions mm, *inches*





AF400, AF460 c/w 1 x CAL18
+ E500DU electronic O/L relay



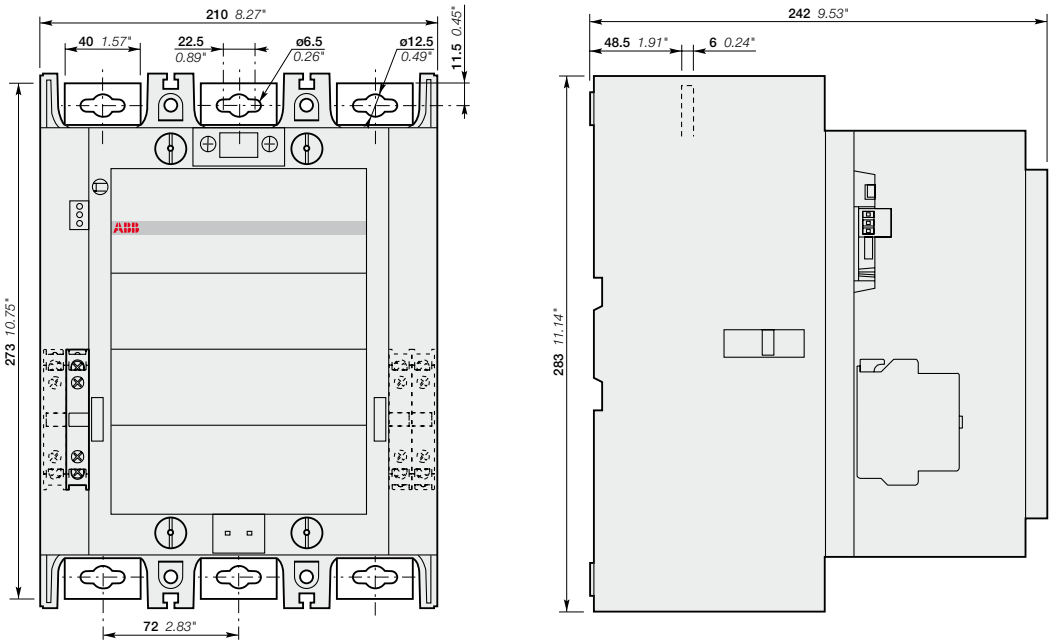
AF400, AF460 c/w 1 x CAL18
+ E500DU electronic O/L relay

5

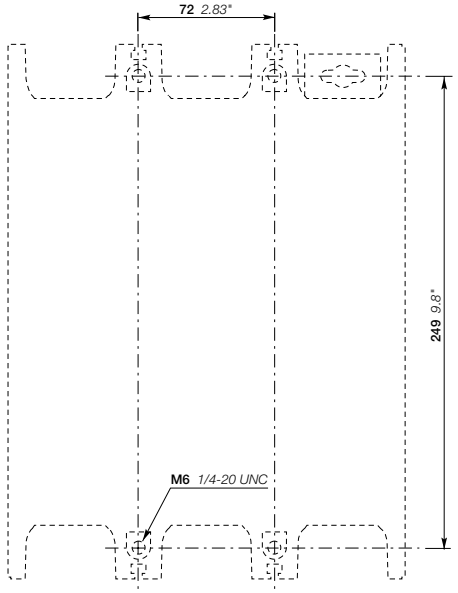
1SBC101646S0201

AF580 and AF750 3-pole contactors

Main dimensions mm, *inches*



AF580 and AF750 c/w 1 x CAL18



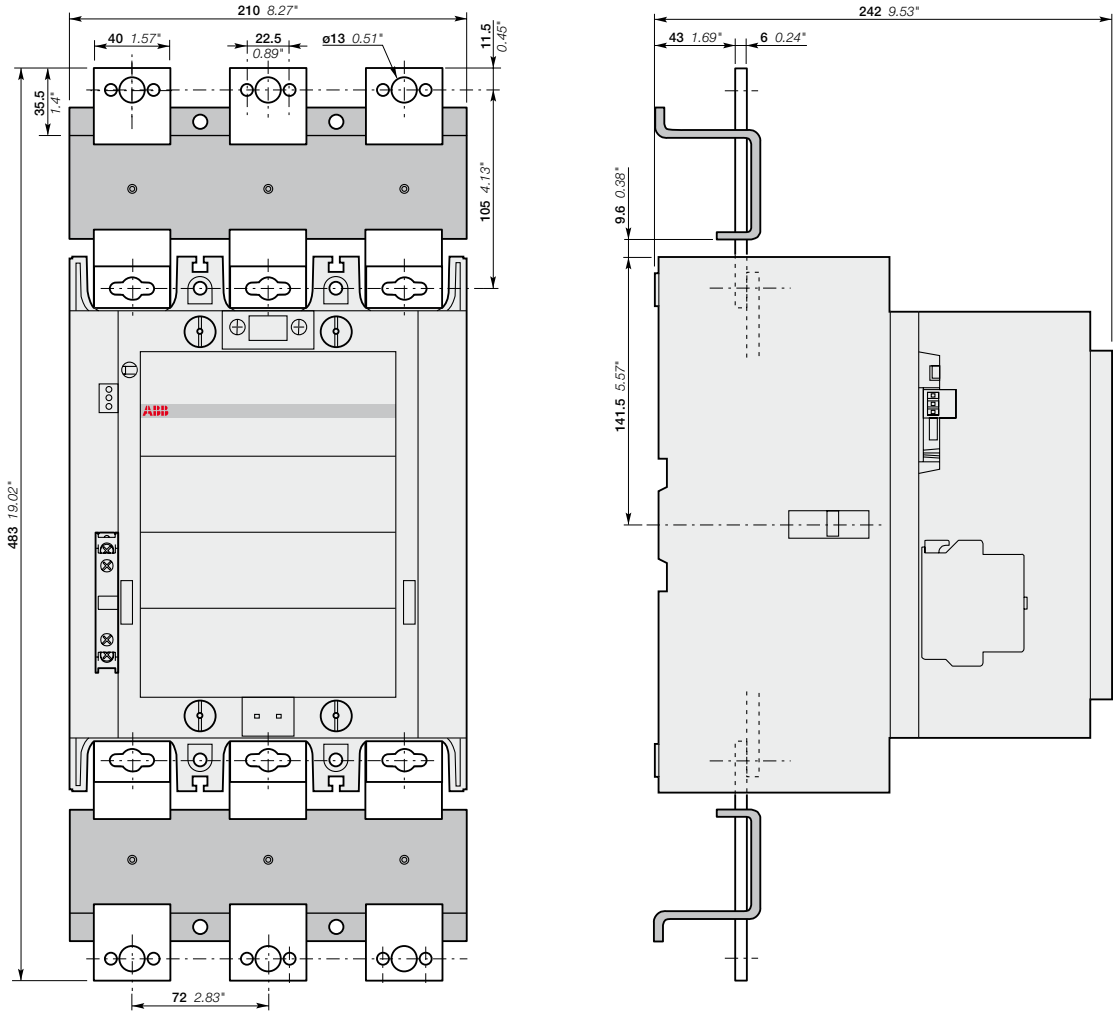
AF580 and AF750 c/w 1 x CAL18

5

1SBC101647S0201

AF580 and AF750 3-pole contactors

Main dimensions mm, *inches*

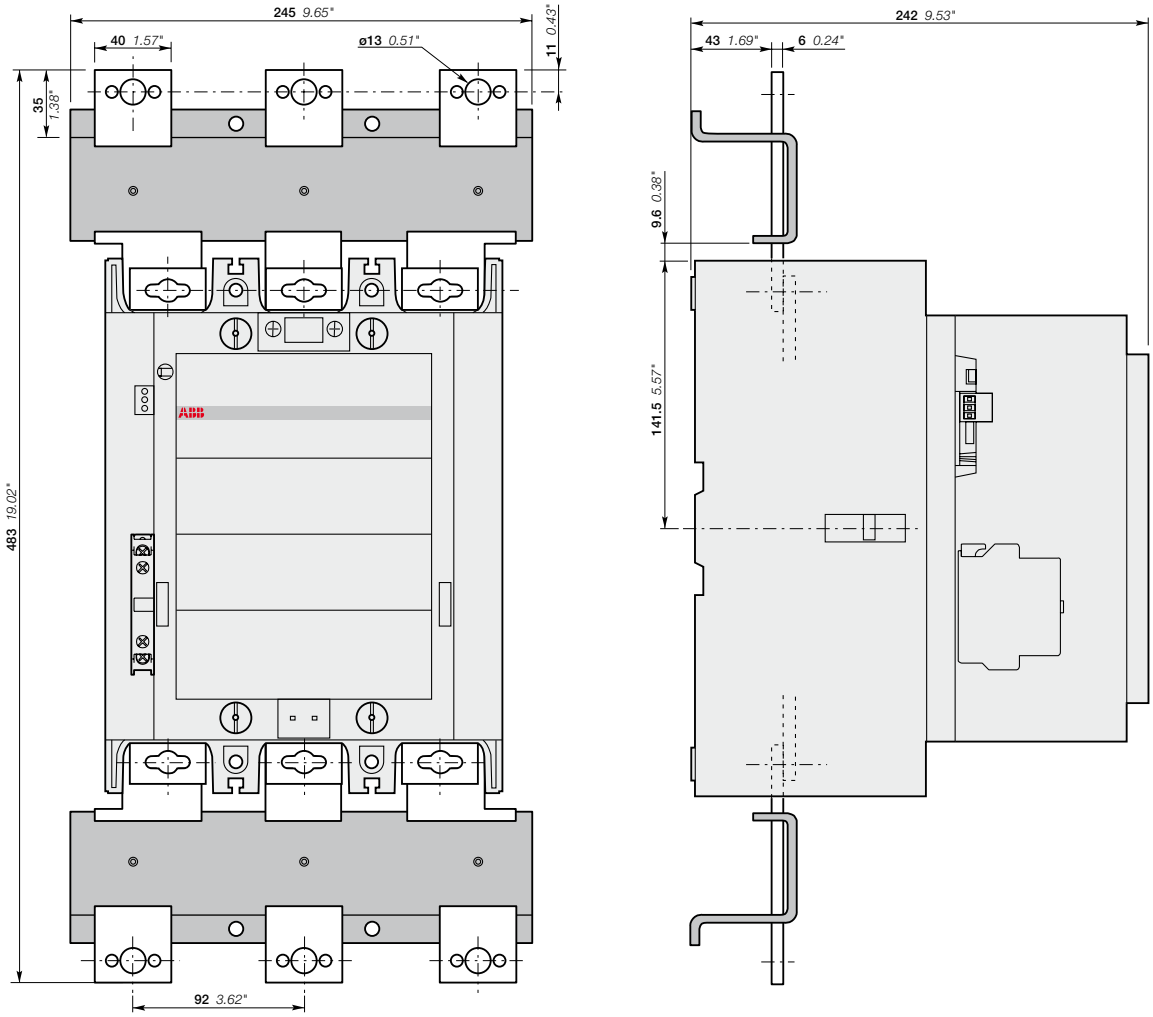


AF580 and AF750 c/w 1 x CAL18
+ LX750 terminal extension

1SBC101647S0201

AF580 and AF750 3-pole contactors

Main dimensions mm, *inches*

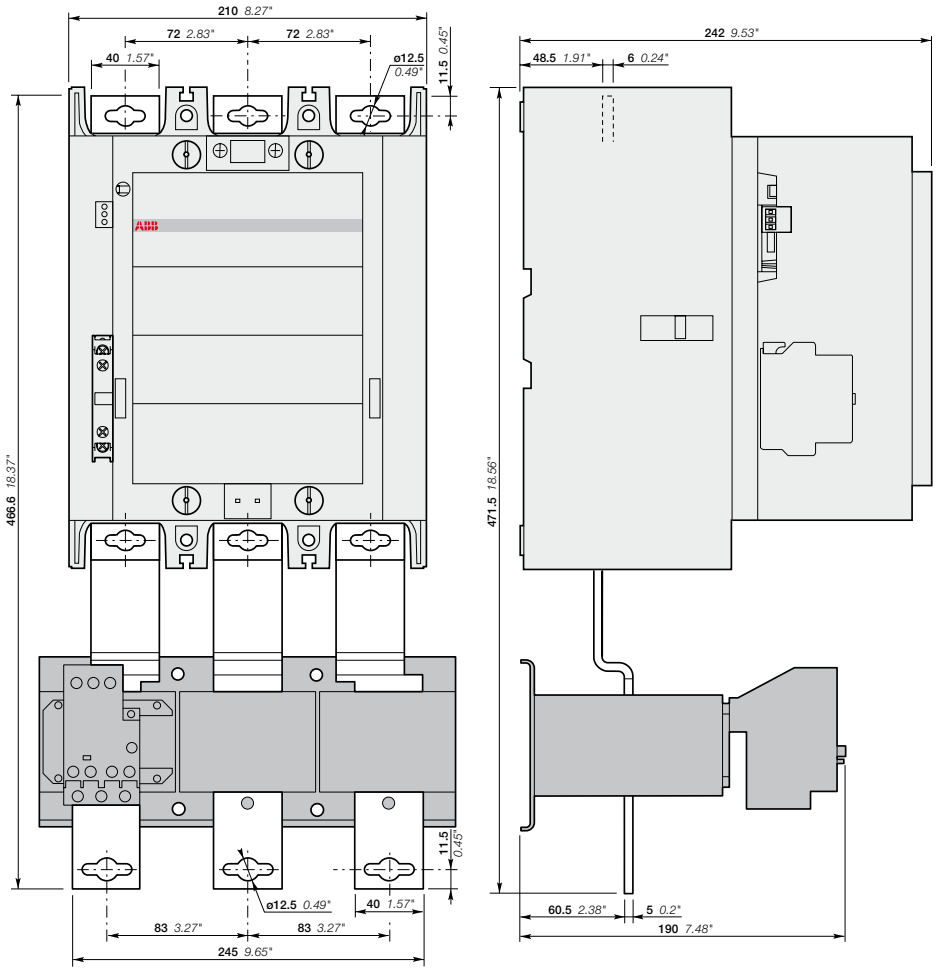


AF580 and AF750c/w 1 x CAL18
+ LW750 terminal enlargement

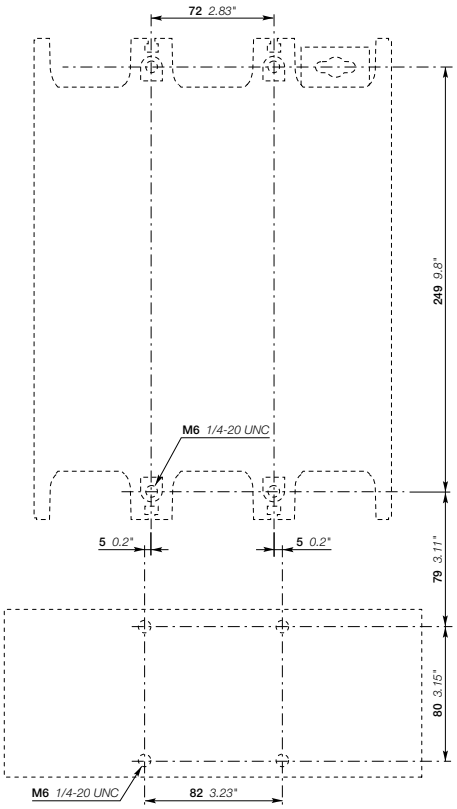
1SBC101647S0201

AF580 and AF750 3-pole contactors

Main dimensions mm, *inches*



AF580 and AF750 c/w 1 x CAL18
+ E800DU electronic O/L relay



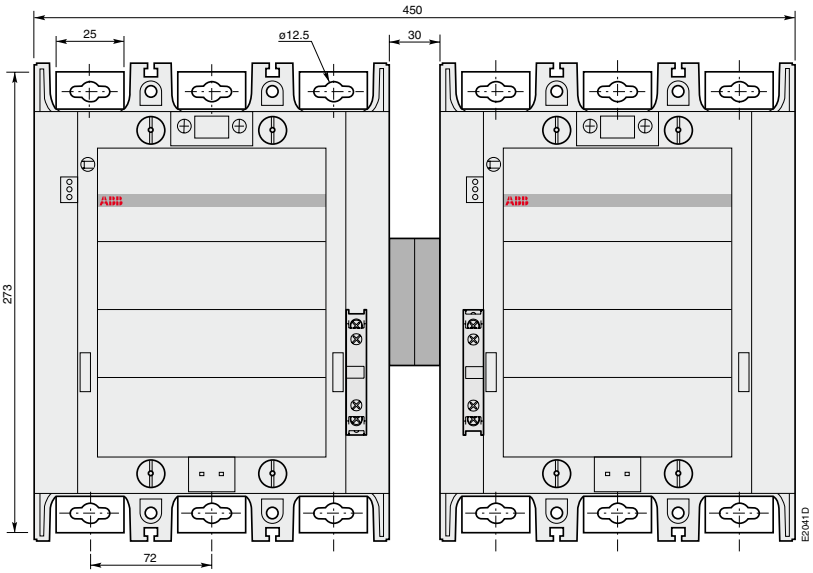
AF580 and AF750 c/w 1 x CAL18
+ E800DU electronic O/L relay

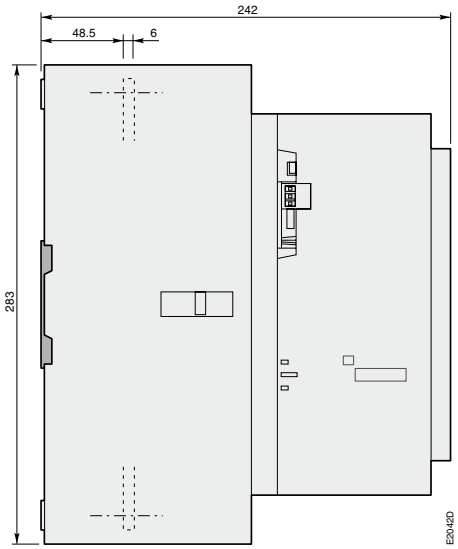
5

1SBC101647S0201

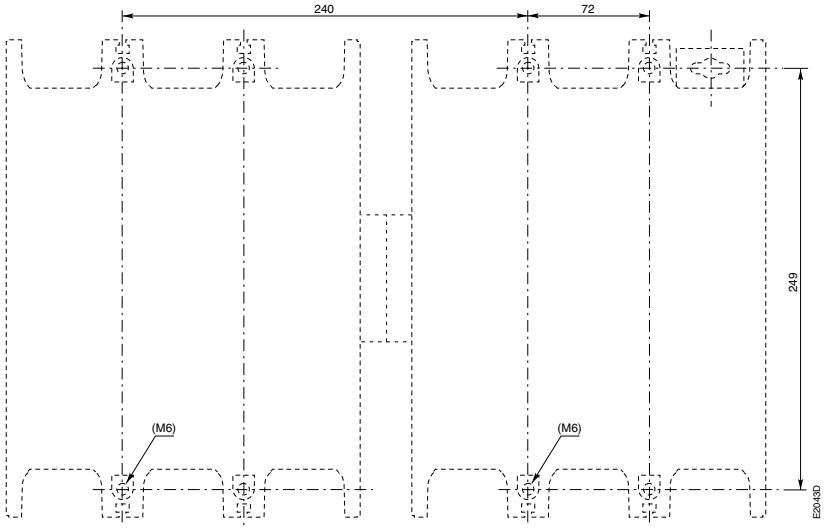
AF580 and AF750 3-pole contactors

Main dimensions mm, *inches*





AF580 and AF750 c/w 1 x **CAL18**
+ VM 750H mechanical interlock unit

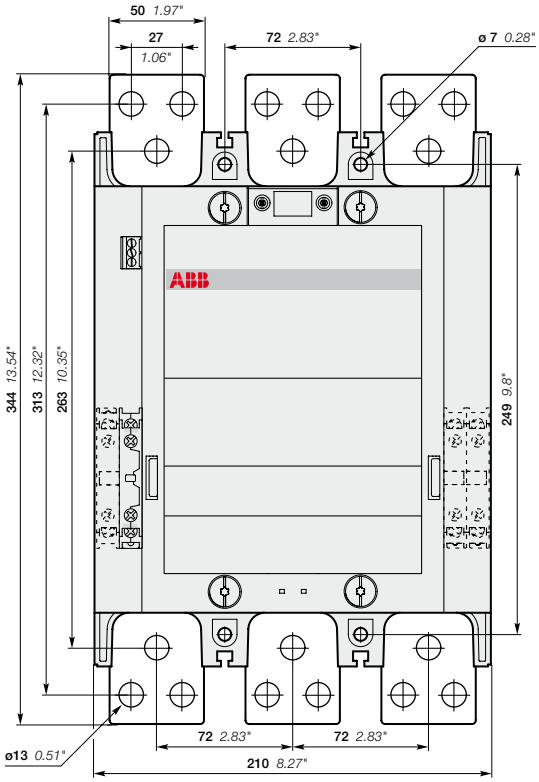


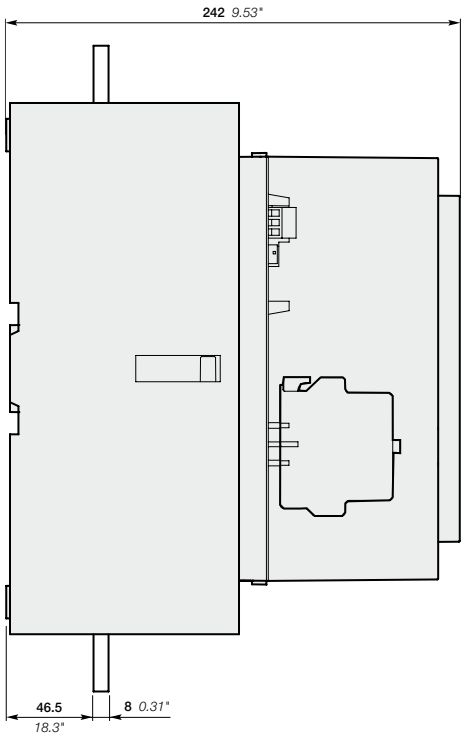
AF580 and AF750 c/w 1 x **CAL18**
+ VM 750H mechanical interlock unit

1SBC101647S0201

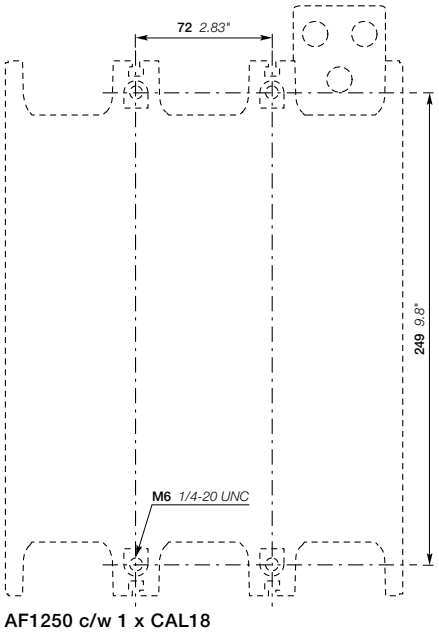
AF1250 3-pole contactors

Main dimensions mm, *inches*





AF1250 c/w 1 x CAL18

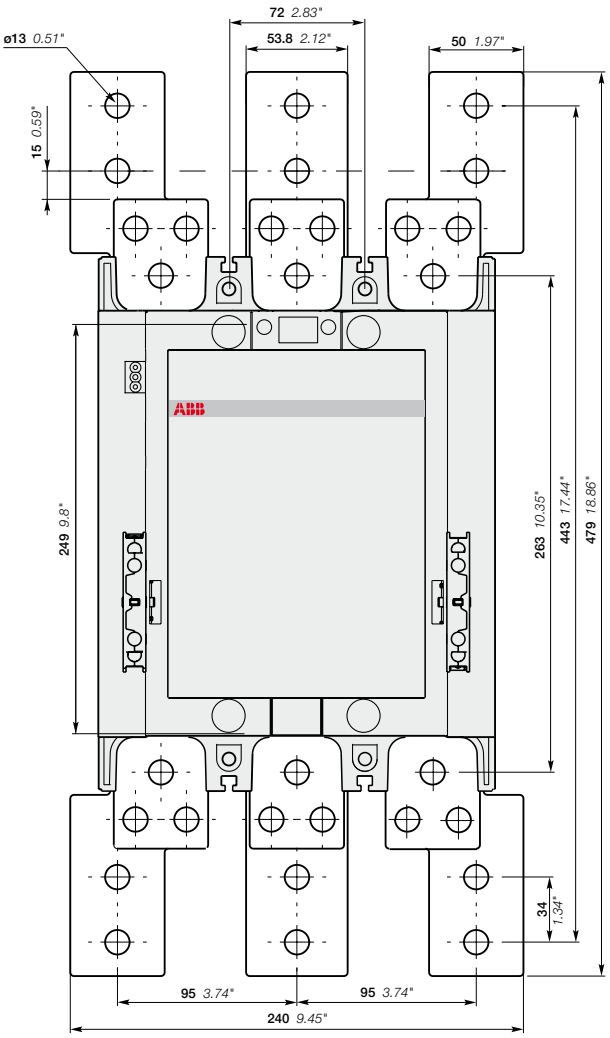


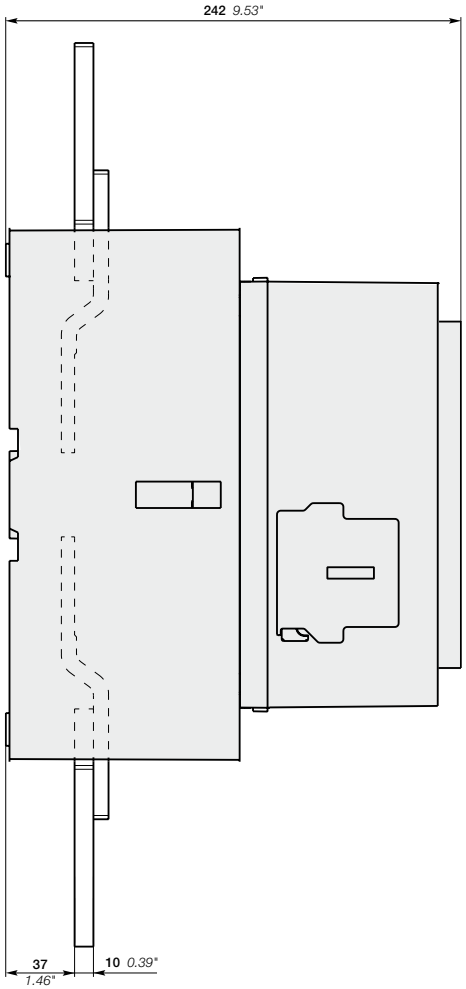
AF1250 c/w 1 x CAL18

1SBC101719S0201

AF1250 3-pole contactors

Main dimensions mm, *inches*



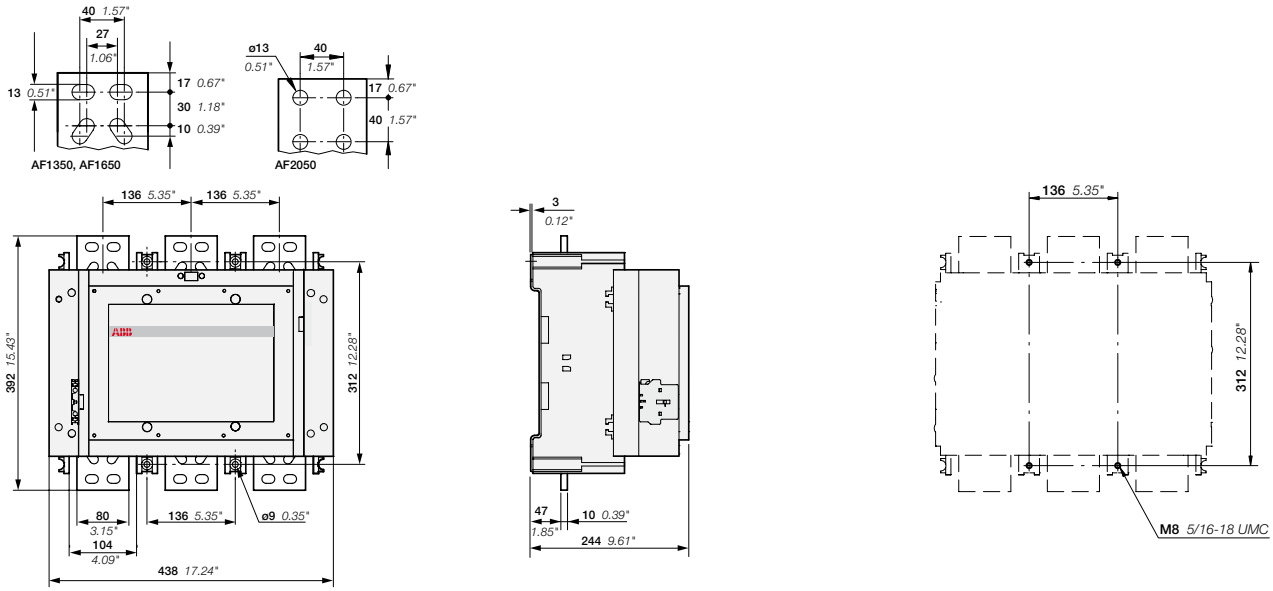


AF1250 c/w 1 x CAL18
+ LW1250 terminal enlargement

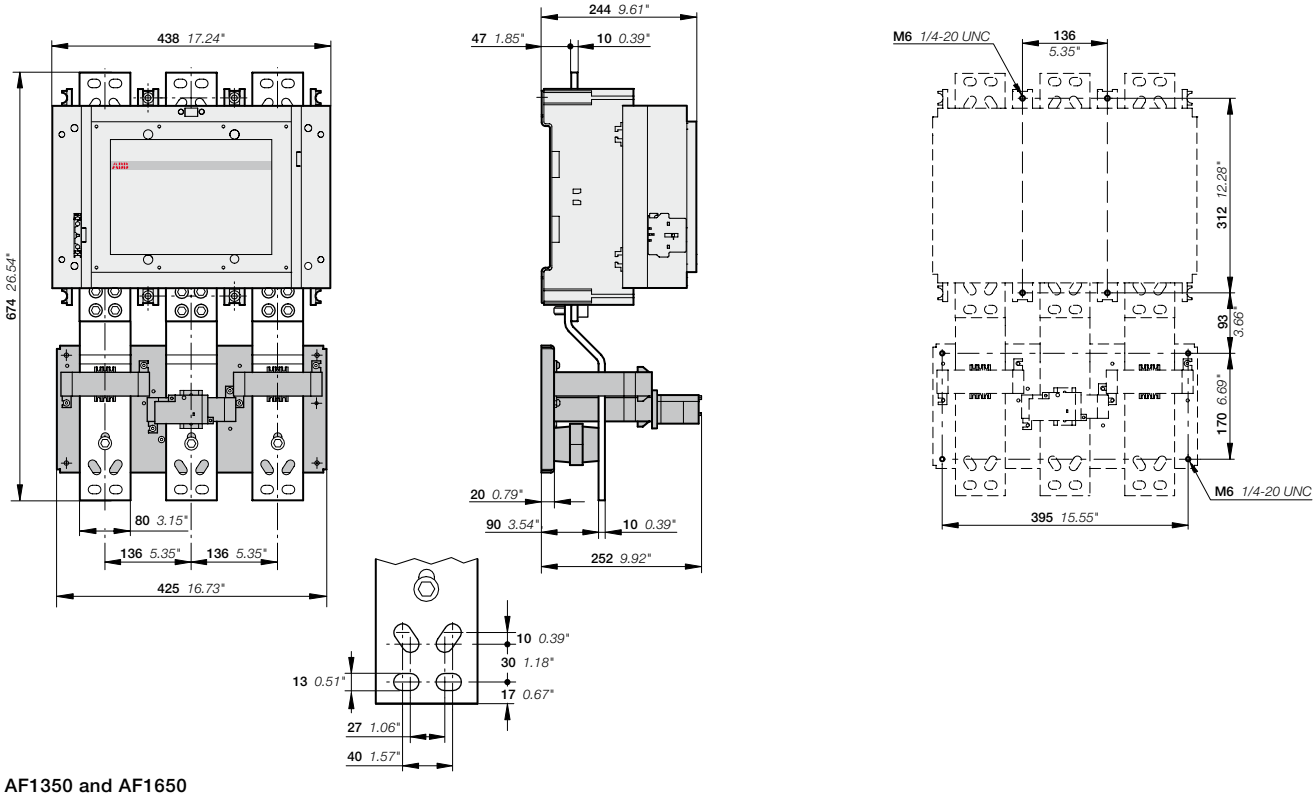
1SBC101719S0201

AF1350, AF1650 and AF2050 3-pole contactors

Main dimensions mm, *inches*



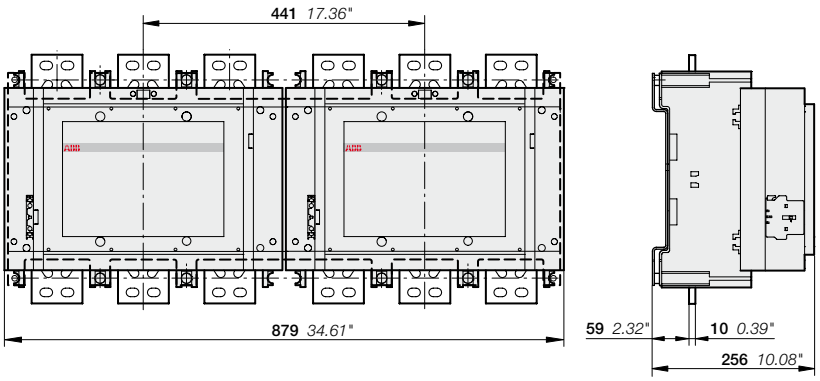
AF1350, AF1650, AF2050



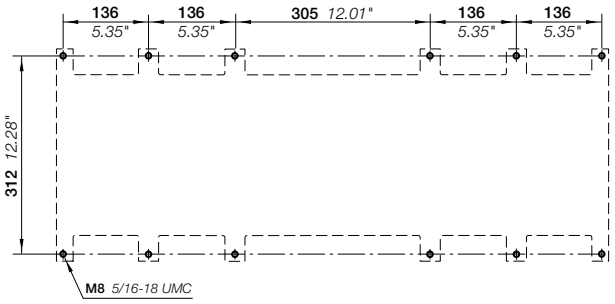
AF1350 and AF1650
+ E1250DU electronic O/L relay

AF1350, AF1650 and AF2050 3-pole contactors

Main dimensions mm, *inches*



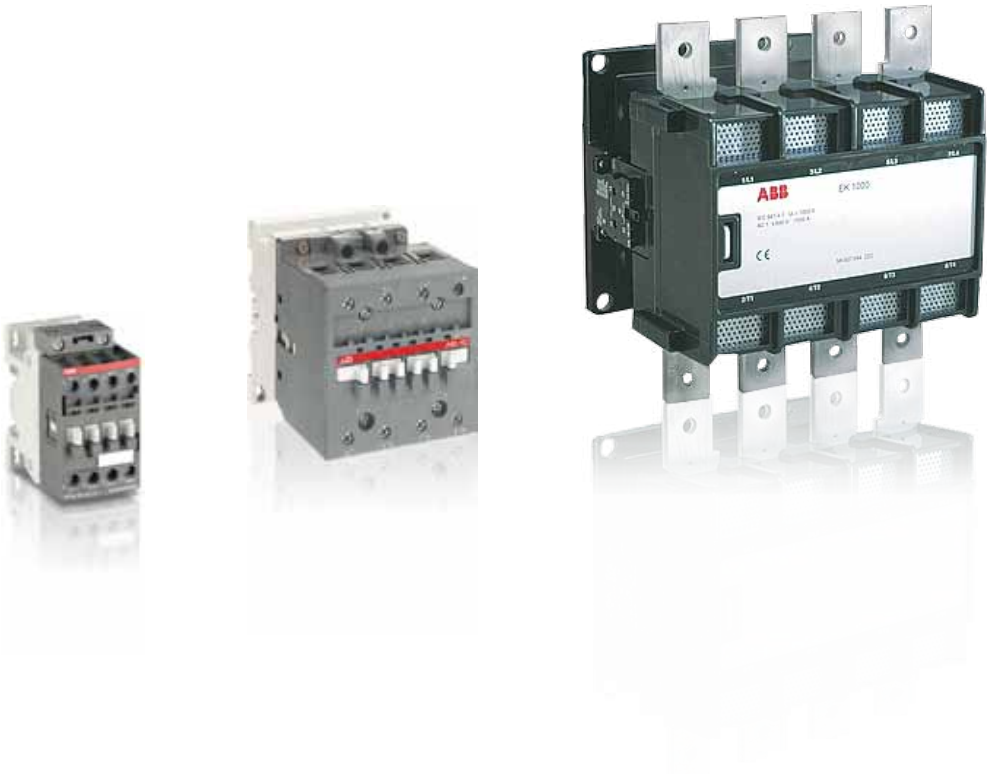
AF2050



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

1SBC101648S0201

Notes



1SBC101722S0201

AF, A and EK 4-pole contactors

Overview 5/128

Ordering details

25 to 55 A AC-1

AF09 ... AF38	AC / DC operated	**5**/130
AF09Z ... AF38Z	AC / DC operated - low consumption	**5**/131
Main accessories		**5**/132

70 to 125 A AC-1

A45 ... A75	AC operated	**5**/135
AE45 ... AE75	DC operated	**5**/136
AF45 ... AF75	AC / DC operated	**5**/137
Main accessories		**5**/138
TAE45 ... TAE75	DC operated - large coil voltage range	**5**/140
Main accessories		**5**/142

200 to 1000 A AC-1

EK110 ... EK150	AC operated - with 1 N.O. + 1 N.C.	**5**/144
EK110 ... EK150	DC operated - with 2 N.O. + 1 N.C.	**5**/145
EK175 ... EK550	AC operated - with 1 N.O. + 1 N.C.	**5**/146
EK175 ... EK550	DC operated - with 2 N.O. + 1 N.C.	**5**/147
EK1000	AC operated - with 1 N.O. + 1 N.C.	**5**/148
EK1000	DC operated - with 2 N.O. + 1 N.C.	**5**/149
EK110 ... EK150	AC operated - with 2 N.O. + 2 N.C.	**5**/150
EK175 ... EK550	AC operated - with 2 N.O. + 2 N.C.	**5**/151
EK1000	AC operated - with 2 N.O. + 2 N.C.	**5**/152
Main accessories		**5**/153

Technical data 5/156

Electrical durability **5**/171

Terminal marking and positionning 5/174

Main dimensions 5/177

1SBC101722S0201

4-pole contactors

					New		New					
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**	**80**	**80**	**105**
AC Control supply			Type	**AF09**	**AF16**	**AF26**	**AF38**	**A45**	**A50**	**A75**
DC Control supply			Type	**AF09**	**AF16**	**AF26**	**AF38**	**AE45**	**AE50**	**AE75**
AC / DC Control supply			Type	**AF09**	**AF16**	**AF26**	**AF38**	**AF45**	**AF50**	**AF75**
IEC	**AC-1 Rated operational current**	θ ≤ 40 °C	**A**	**25**	**30**	**45**	**55**	**70**	**100**	**125**
		θ ≤ 55 °C (1)	**A**	**25**	**30**	**40**	**45**	**60**	**85**	**105**
		θ ≤ 70 °C	**A**	**22**	**26**	**32**	**37**	**50**	**70**	**85**
	With conductor cross sectional area		**mm²**	**4**	**6**	**10**	**16**	**25**	**35**	**50**
	Rated operational voltage Ue max.		**V**	**690**	**690**	**690**	**690**	**690**	**690**	**690**
UL/CSA	**General use rating**	600 V	**A**	**25**	**30**	**45**	**55**	**65**	**80**	**105**

(1) θ ≤ 60 °C for AF09 ... AF38 contactors

Main accessories

Auxiliary contact blocks	Front mounting	**CA4-10** (1 x N.O.), **CA4-01** (1 x N.C.)	**CA5-10** (1 x N.O.), **CA5-01** (1 x N.C.)
	Side mounting	**CAL4-11** (1 x N.O. + 1 x N.C.)	**CAL5-11** (1 x N.O. + 1 x N.C.)
Timers	Pneumatic (Front mounting)		**TP40DA, TP180DA** Direct timing **TP40IA, TP180IA** Inverse timing
Interlocking units (compact reversing contactors)	Mechanical	**VM4**	
	Mechanical / Electrical	**VEM4**	**VE5-2**
Surge suppressors AF contactors have built-in surge protection	Varistor (AC / DC)		**RV5** (24...440 V)
	RC Type (AC)		**RC5-2** (24...440 V)
	Transil diode (DC)		**RT5** (12...264 V)

	200	250	300	350	550	800	1000
	170	200	250	300	420	540	–
	EK110	EK150	EK175	EK210	EK370	EK550	EK1000
	EK110	EK150	EK175	EK210	EK370	EK550	EK1000
	–	–	–	–	–	–	–
	200	250	300	350	550	800	1000
	180	230	270	310	470	650	800
	155	200	215	250	400	575	720
	95	150	185	240	2 x 185	2 x 240	2 x 300
	1000	1000	1000	1000	1000	1000	1000
	170	200	250	300	420	540	–

	CAL16-11 (1 x N.O. + 1 x N.C.)						
					VH800		
	VH145		VH300				
	RC-EH300				RC-EH800		

1SBC101569S0201

AF09 ... AF38 4-pole contactors
25 to 55 A AC-1
AC / DC operated

AF09-40-00

AF26-40-00

5

Description

AF09 ... AF38 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

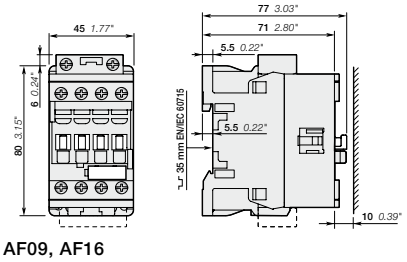
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening.
– built-in surge suppression
– add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

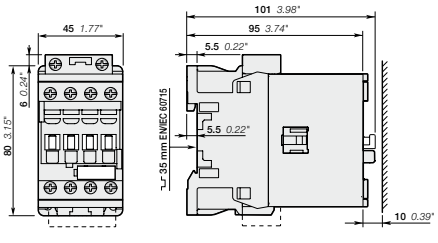
IEC Rated operational current θ ≤ 40 °C AC-1 A	UL/CSA General use rating 600 V AC A	Rated control circuit voltage Uc min. ... Uc max. V 50/60 Hz	 V DC	Auxiliary contacts fitted		Type	Order code		Weight Pkg (1 pce) kg
4 N.O. main poles									
25	25	24...60	20...60 (1)	0	0	AF09-40-00-11	1SBL137201R1100		0.270
		48...130	48...130	0	0	AF09-40-00-12	1SBL137201R1200		0.270
		100...250	100...250	0	0	AF09-40-00-13	1SBL137201R1300		0.270
		250...500	250...500	0	0	AF09-40-00-14	1SBL137201R1400		0.310
30	30	24...60	20...60 (1)	0	0	AF16-40-00-11	1SBL177201R1100		0.270
		48...130	48...130	0	0	AF16-40-00-12	1SBL177201R1200		0.270
		100...250	100...250	0	0	AF16-40-00-13	1SBL177201R1300		0.270
		250...500	250...500	0	0	AF16-40-00-14	1SBL177201R1400		0.310
45	45	24...60	20...60 (1)	0	0	AF26-40-00-11	1SBL237201R1100		0.360
		48...130	48...130	0	0	AF26-40-00-12	1SBL237201R1200		0.360
		100...250	100...250	0	0	AF26-40-00-13	1SBL237201R1300		0.360
		250...500	250...500	0	0	AF26-40-00-14	1SBL237201R1400		0.400
55	55	24...60	20...60 (1)	0	0	AF38-40-00-11	1SBL297201R1100		0.360
		48...130	48...130	0	0	AF38-40-00-12	1SBL297201R1200		0.360
		100...250	100...250	0	0	AF38-40-00-13	1SBL297201R1300		0.360
		250...500	250...500	0	0	AF38-40-00-14	1SBL297201R1400		0.400
2 N.O. + 2 N.C. main poles									
25	25	24...60	20...60 (1)	0	0	AF09-22-00-11	1SBL137501R1100		0.270
		48...130	48...130	0	0	AF09-22-00-12	1SBL137501R1200		0.270
		100...250	100...250	0	0	AF09-22-00-13	1SBL137501R1300		0.270
		250...500	250...500	0	0	AF09-22-00-14	1SBL137501R1400		0.310
30	30	24...60	20...60 (1)	0	0	AF16-22-00-11	1SBL177501R1100		0.270
		48...130	48...130	0	0	AF16-22-00-12	1SBL177501R1200		0.270
		100...250	100...250	0	0	AF16-22-00-13	1SBL177501R1300		0.270
		250...500	250...500	0	0	AF16-22-00-14	1SBL177501R1400		0.310
45	45	24...60	20...60 (1)	0	0	AF26-22-00-11	1SBL237501R1100		0.360
		48...130	48...130	0	0	AF26-22-00-12	1SBL237501R1200		0.360
		100...250	100...250	0	0	AF26-22-00-13	1SBL237501R1300		0.360
		250...500	250...500	0	0	AF26-22-00-14	1SBL237501R1400		0.400
55	55	24...60	20...60 (1)	0	0	AF38-22-00-11	1SBL297501R1100		0.360
		48...130	48...130	0	0	AF38-22-00-12	1SBL297501R1200		0.360
		100...250	100...250	0	0	AF38-22-00-13	1SBL297501R1300		0.360
		250...500	250...500	0	0	AF38-22-00-14	1SBL297501R1400		0.400

(1) AF..-..-..-11 not suitable for direct control by PLC-output.

Main dimensions mm, *inches*



AF09, AF16



AF26, AF38

1SBC101375S0201

AF09Z ... AF38Z 4-pole contactors
25 to 55 A AC-1
AC / DC operated - low consumption

AF09Z-40-00

AF26Z-40-00

Description

AF09Z ... AF38Z 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

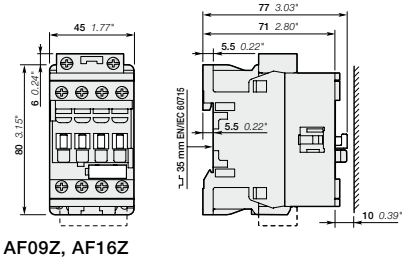
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...250 V 50/60 Hz and 12...250 V DC
  - can manage large control voltage variations
  - allow direct control by PLC-output ≥ 24 V DC 500 mA
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
– built-in surge suppression
– add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

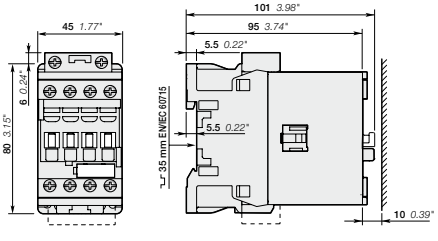
IEC Rated operational current θ ≤ 40 °C AC-1 A	UL/CSA General use rating 600 V AC A	Rated control circuit voltage Uc min. ... Uc max. V 50/60 Hz	V DC	Auxiliary contacts fitted		Type	Order code		Weight Pkg (1 pce) kg
4 N.O. main poles									
25	25	-	12...20	0	0	AF09Z-40-00-20	1SBL136201R2000		0.310
		24...60	20...60	0	0	AF09Z-40-00-21	1SBL136201R2100		0.310
		48...130	48...130	0	0	AF09Z-40-00-22	1SBL136201R2200		0.310
		100...250	100...250	0	0	AF09Z-40-00-23	1SBL136201R2300		0.310
30	30	-	12...20	0	0	AF16Z-40-00-20	1SBL176201R2000		0.310
		24...60	20...60	0	0	AF16Z-40-00-21	1SBL176201R2100		0.310
		48...130	48...130	0	0	AF16Z-40-00-22	1SBL176201R2200		0.310
		100...250	100...250	0	0	AF16Z-40-00-23	1SBL176201R2300		0.310
45	45	-	12...20	0	0	AF26Z-40-00-20	1SBL236201R2000		0.400
		24...60	20...60	0	0	AF26Z-40-00-21	1SBL236201R2100		0.400
		48...130	48...130	0	0	AF26Z-40-00-22	1SBL236201R2200		0.400
		100...250	100...250	0	0	AF26Z-40-00-23	1SBL236201R2300		0.400
55	55	-	12...20	0	0	AF38Z-40-00-20	1SBL296201R2000		0.400
		24...60	20...60	0	0	AF38Z-40-00-21	1SBL296201R2100		0.400
		48...130	48...130	0	0	AF38Z-40-00-22	1SBL296201R2200		0.400
		100...250	100...250	0	0	AF38Z-40-00-23	1SBL296201R2300		0.400
2 N.O. + 2 N.C. main poles									
25	25	-	12...20	0	0	AF09Z-22-00-20	1SBL136501R2000		0.310
		24...60	20...60	0	0	AF09Z-22-00-21	1SBL136501R2100		0.310
		48...130	48...130	0	0	AF09Z-22-00-22	1SBL136501R2200		0.310
		100...250	100...250	0	0	AF09Z-22-00-23	1SBL136501R2300		0.310
30	30	-	12...20	0	0	AF16Z-22-00-20	1SBL176501R2000		0.310
		24...60	20...60	0	0	AF16Z-22-00-21	1SBL176501R2100		0.310
		48...130	48...130	0	0	AF16Z-22-00-22	1SBL176501R2200		0.310
		100...250	100...250	0	0	AF16Z-22-00-23	1SBL176501R2300		0.310
45	45	-	12...20	0	0	AF26Z-22-00-20	1SBL236501R2000		0.400
		24...60	20...60	0	0	AF26Z-22-00-21	1SBL236501R2100		0.400
		48...130	48...130	0	0	AF26Z-22-00-22	1SBL236501R2200		0.400
		100...250	100...250	0	0	AF26Z-22-00-23	1SBL236501R2300		0.400
55	55	-	12...20	0	0	AF38Z-22-00-20	1SBL296501R2000		0.400
		24...60	20...60	0	0	AF38Z-22-00-21	1SBL296501R2100		0.400
		48...130	48...130	0	0	AF38Z-22-00-22	1SBL296501R2200		0.400
		100...250	100...250	0	0	AF38Z-22-00-23	1SBL296501R2300		0.400

Note: Only AF..Z contactors with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.

Main dimensions mm, *inches*



AF09Z, AF16Z

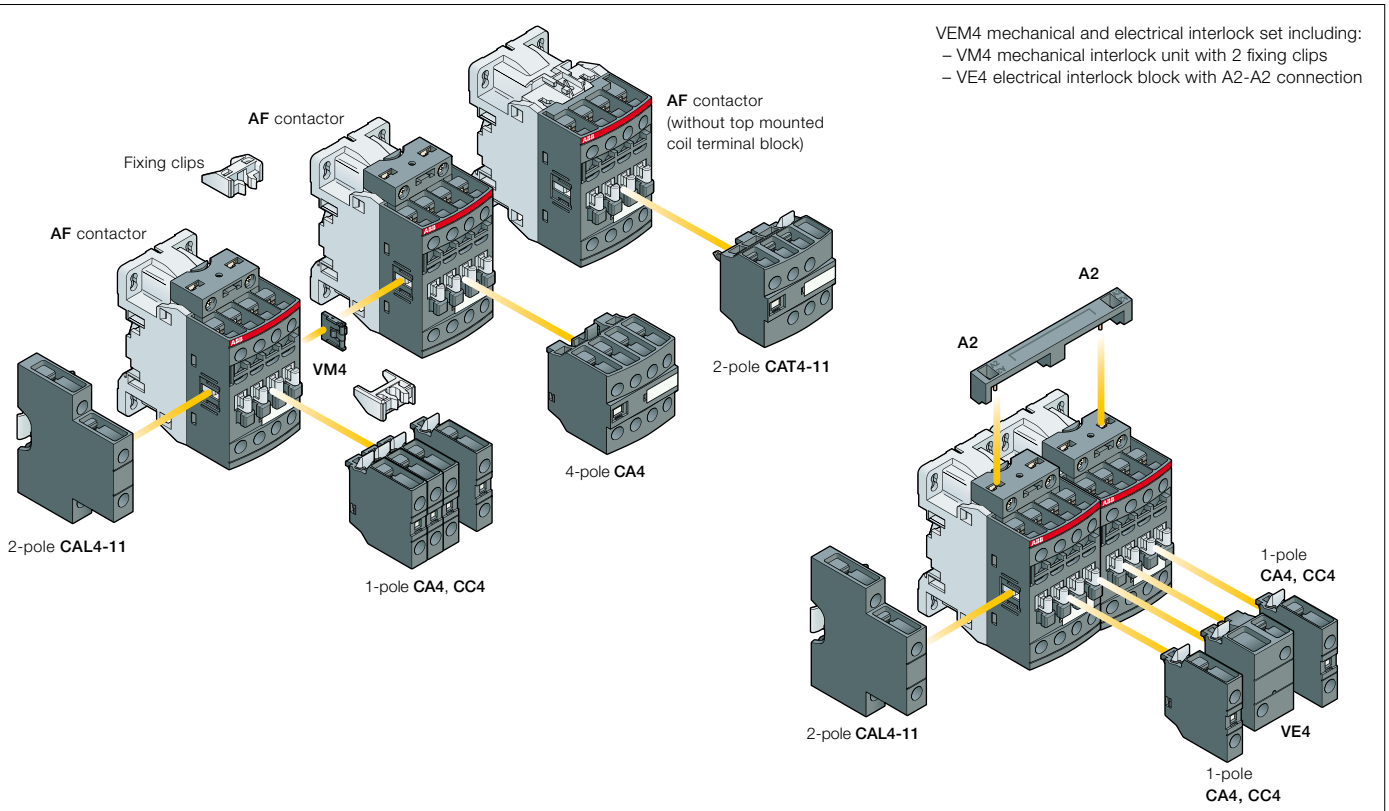


AF26Z, AF38Z

1SBC101376S0201

AF09 ... AF38 4-pole contactors
Main accessories

Contactor and main accessories (other accessories available)



Main accessory fitting details

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

Contactor types	Main poles		Built-in auxiliary contacts		Front-mounted accessories: Auxiliary contact blocks								Electrical and mechanical interlock set (between 2 contactors)		Side-mounted accessories: Auxiliary contact blocks		
					1-pole CA4										Left side		Right side
					1-pole CC4		2-pole CAT4-11		4-pole CA4				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				–	+	1		–
					2 max.	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				–	+	1		–
					2 max.	or	1		–				–	+	1	+	1
					3 max.		–		–		+		1	+	1	or	1
AF09, AF16	2	2	0	0	4 max.	or	1	or	1				–	+	1		–
AF26, AF38	2	2	0	0	2 max.	or	1		–				–	+	1	+	1

1SBC101392S0201

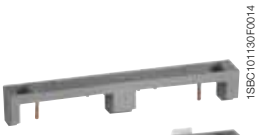
AF09 ... AF38 4-pole contactors
Main accessories

CA4-10

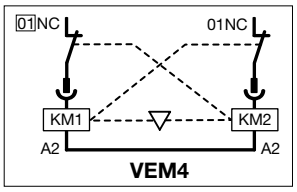
CAL4-11

CA4-22E

CAT4-11E



VEM4



LDC4

BX4

BX4-CA

Ordering details (1)

For contacts	Auxiliary contacts		Type	Order code		Pkg qty	Weight (1 pce) kg
Front-mounted instantaneous auxiliary contact blocks							
AF09 ... AF38..-40-00 AF09 ... AF38..-22-00	1 0	– –	CA4-10	1SBN010110R1010		1	0.014
	1 0	– –	CA4-10-T	1SBN010110T1010		10	0.014
	0 1	– –	CA4-01	1SBN010110R1001		1	0.014
	0 1	– –	CA4-01-T	1SBN010110T1001		10	0.014
	2 2	– –	CA4-22E	1SBN010140R1022		1	0.055
	3 1	– –	CA4-31E	1SBN010140R1031		1	0.055
	4 0	– –	CA4-40E	1SBN010140R1040		1	0.055
AF09 ... AF16..-40-00	0 4	– –	CA4-04E	1SBN010140R1004		1	0.055
Front-mounted auxiliary contact blocks with N.O. leading contact and N.C. lagging contact							
AF09 ... AF38..-40-00	– –	1 0	CC4-10	1SBN010111R1010		1	0.014
AF09 ... AF38..-22-00	– –	0 1	CC4-01	1SBN010111R1001		1	0.014
Side-mounted instantaneous auxiliary contact blocks							
AF09 ... AF38..-40-00	1 1	– –	CAL4-11	1SBN010120R1011		1	0.040
AF09 ... AF38..-22-00	1 1	– –	CAL4-11-T	1SBN010120T1011		10	0.040
Front-mounted instantaneous auxiliary contact and A1/A2 coil terminal blocks							
AF09 ... AF38..-40-00 AF09 ... AF38..-22-00	1 1	– –	CAT4-11E	1SBN010151R1011		1	0.040
Note: CAT4 not fittable on AF..Z contactors with DC control voltage 12...20 V DC.							
Mechanical interlock unit							
AF09 ... AF38..-40-00			VM4	1SBN030105T1000		10	0.005
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	1 1	– –	VEM4	1SBN030111R1000		1	0.035
Note: – VEM4 includes a VM4 mechanical interlock unit with 2 fixing clips (BB4), a VE4 electrical interlock block. VE4 block must be used with A2-A2 connection to respect the electrical connection diagram. – VEM4 not fittable on AF..Z contactors with DC control voltage 12...20 V DC.							
Additional coil terminal block							
AF09 ... AF38			LDC4	1SBN070156T1000		10	0.010
Protective covers							
All 1-stack contactors			BX4	1SBN110108T1000		10	0.006
For 4-pole CA4 and 2-pole CAT4 auxiliary contact blocks			BX4-CA	1SBN110109W1000		50	0.001

(1) See "Main accessory fitting details" table.

1SBC101393S0201

Notes

A45 ... A75 4-pole contactors
70 to 125 A AC-1
AC operated

A45-40-00

Description

A45 ... A75 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 220 V DC.

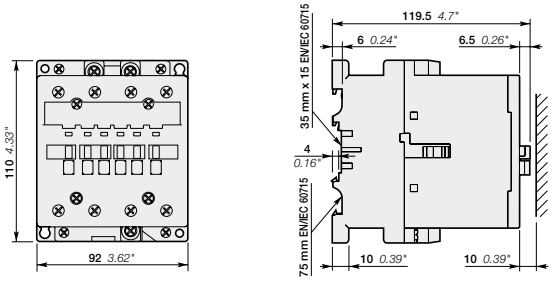
These contactors are of the block type design with:
- 4 main poles
- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

IEC 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	Type	Order code		Weight Pkg (1 pce) kg
4 N.O. main poles									
70	80	24	24	0	0	A45-40-00	1SBL331201R8100		1.390
		48	48	0	0	A45-40-00	1SBL331201R8300		1.390
		110	110...120	0	0	A45-40-00	1SBL331201R8400		1.390
		220...230	230...240	0	0	A45-40-00	1SBL331201R8000		1.390
		230...240	240...260	0	0	A45-40-00	1SBL331201R8800		1.390
		380...400	400...415	0	0	A45-40-00	1SBL331201R8500		1.390
		400...415	415...440	0	0	A45-40-00	1SBL331201R8600		1.390
100	80	24	24	0	0	A50-40-00	1SBL351201R8100		1.390
		48	48	0	0	A50-40-00	1SBL351201R8300		1.390
		110	110...120	0	0	A50-40-00	1SBL351201R8400		1.390
		220...230	230...240	0	0	A50-40-00	1SBL351201R8000		1.390
		230...240	240...260	0	0	A50-40-00	1SBL351201R8800		1.390
		380...400	400...415	0	0	A50-40-00	1SBL351201R8500		1.390
		400...415	415...440	0	0	A50-40-00	1SBL351201R8600		1.390
125	105	24	24	0	0	A75-40-00	1SBL411201R8100		1.390
		48	48	0	0	A75-40-00	1SBL411201R8300		1.390
		110	110...120	0	0	A75-40-00	1SBL411201R8400		1.390
		220...230	230...240	0	0	A75-40-00	1SBL411201R8000		1.390
		230...240	240...260	0	0	A75-40-00	1SBL411201R8800		1.390
		380...400	400...415	0	0	A75-40-00	1SBL411201R8500		1.390
		400...415	415...440	0	0	A75-40-00	1SBL411201R8600		1.390
2 N.O. + 2 N.C. main poles (2)									
70	80	24	24	0	0	A45-22-00	1SBL331501R8100		1.400
		48	48	0	0	A45-22-00	1SBL331501R8300		1.400
		110	110...120	0	0	A45-22-00	1SBL331501R8400		1.400
		220...230	230...240	0	0	A45-22-00	1SBL331501R8000		1.400
		230...240	240...260	0	0	A45-22-00	1SBL331501R8800		1.400
		380...400	400...415	0	0	A45-22-00	1SBL331501R8500		1.400
		400...415	415...440	0	0	A45-22-00	1SBL331501R8600		1.400
125	105	24	24	0	0	A75-22-00	1SBL411501R8100		1.400
		48	48	0	0	A75-22-00	1SBL411501R8300		1.400
		110	110...120	0	0	A75-22-00	1SBL411501R8400		1.400
		220...230	230...240	0	0	A75-22-00	1SBL411501R8000		1.400
		230...240	240...260	0	0	A75-22-00	1SBL411501R8800		1.400
		380...400	400...415	0	0	A75-22-00	1SBL411501R8500		1.400
		400...415	415...440	0	0	A75-22-00	1SBL411501R8600		1.400

(1) Other control voltages see voltage code table.
(2) These contactors are not suitable for a reversing starter or star-delta starter or for controlling a single load from 2 separate supplies. Please see technical data.

Main dimensions mm, *inches*



A45, A50, A75 4-pole

1SBC101377S0201

AE45 ... AE75 4-pole contactors
70 to 125 A AC-1
DC operated

AE50-40-00

5

Description

AE45 ... AE75 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

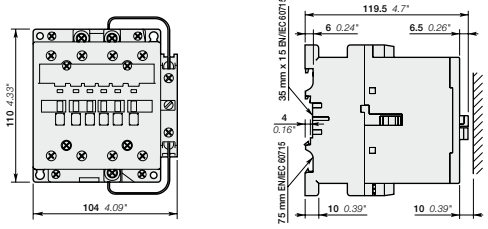
– 4 main poles
– control circuit: DC operated with double winding coil (and factory-mounted lagging contact for "holding" winding insertion)
– add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

IEC Rated operational current θ ≤ 40 °C AC-1 A	UL/CSA General use rating 600 V AC A	Rated control circuit voltage Uc (1) V DC	Auxiliary contacts fitted		Type	Order code		Weight Pkg (1 pce) kg
4 N.O. main poles								
70	80	12	0	0	AE45-40-00	1SBL339201R8000		1.430
		24	0	0	AE45-40-00	1SBL339201R8100		1.430
		48	0	0	AE45-40-00	1SBL339201R8300		1.430
		60	0	0	AE45-40-00	1SBL339201R8400		1.430
		110	0	0	AE45-40-00	1SBL339201R8600		1.430
		125	0	0	AE45-40-00	1SBL339201R8700		1.430
		220	0	0	AE45-40-00	1SBL339201R8800		1.430
		240	0	0	AE45-40-00	1SBL339201R8900		1.430
100	80	12	0	0	AE50-40-00	1SBL359201R8000		1.430
		24	0	0	AE50-40-00	1SBL359201R8100		1.430
		48	0	0	AE50-40-00	1SBL359201R8300		1.430
		60	0	0	AE50-40-00	1SBL359201R8400		1.430
		110	0	0	AE50-40-00	1SBL359201R8600		1.430
		125	0	0	AE50-40-00	1SBL359201R8700		1.430
		220	0	0	AE50-40-00	1SBL359201R8800		1.430
		240	0	0	AE50-40-00	1SBL359201R8900		1.430
125	105	12	0	0	AE75-40-00	1SBL419201R8000		1.430
		24	0	0	AE75-40-00	1SBL419201R8100		1.430
		48	0	0	AE75-40-00	1SBL419201R8300		1.430
		60	0	0	AE75-40-00	1SBL419201R8400		1.430
		110	0	0	AE75-40-00	1SBL419201R8600		1.430
		125	0	0	AE75-40-00	1SBL419201R8700		1.430
		220	0	0	AE75-40-00	1SBL419201R8800		1.430
		240	0	0	AE75-40-00	1SBL419201R8900		1.430
2 N.O. + 2 N.C. main poles (2)								
70	80	12	0	0	AE45-22-00	1SBL339501R8000		1.440
		24	0	0	AE45-22-00	1SBL339501R8100		1.440
		48	0	0	AE45-22-00	1SBL339501R8300		1.440
		60	0	0	AE45-22-00	1SBL339501R8400		1.440
		110	0	0	AE45-22-00	1SBL339501R8600		1.440
		125	0	0	AE45-22-00	1SBL339501R8700		1.440
		220	0	0	AE45-22-00	1SBL339501R8800		1.440
		240	0	0	AE45-22-00	1SBL339501R8900		1.440
125	105	12	0	0	AE75-22-00	1SBL419501R8000		1.440
		24	0	0	AE75-22-00	1SBL419501R8100		1.440
		48	0	0	AE75-22-00	1SBL419501R8300		1.440
		60	0	0	AE75-22-00	1SBL419501R8400		1.440
		110	0	0	AE75-22-00	1SBL419501R8600		1.440
		125	0	0	AE75-22-00	1SBL419501R8700		1.440
		220	0	0	AE75-22-00	1SBL419501R8800		1.440
		240	0	0	AE75-22-00	1SBL419501R8900		1.440

(1) Other control voltages see voltage code table.
(2) These contactors are not suitable for a reversing starter or star-delta starter or for controlling a single load from 2 separate supplies. Please see technical data.

Main dimensions mm, *inches*



AE45, AE50, AE75 4-pole

1SBC101378S0201

AF45 ... AF75 4-pole contactors
70 to 125 A AC-1
AC / DC operated

AF45-40-00

Description

AF45 ... AF75 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

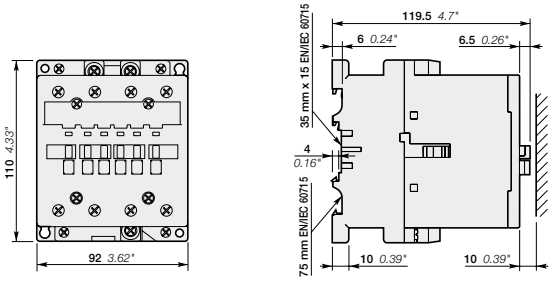
– 4 main poles
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
  - can manage large control voltage variations
  - only 3 coils to cover control voltages between 48...250 V 50/60 Hz and 20...250 V DC
  - reduced panel 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 front or side mounting and a wide range of accessories.

Ordering details

IEC	UL/CSA	Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational current θ ≤ 40 °C AC-1	General use rating 600 V AC								Pkg (1 pce)
A	A	V 50/60 Hz	V DC						kg
4 N.O. main poles									
70	80	-	20...60	0	0	AF45-40-00	1SBL337201R7200 (1)		1.420
		48...130	48...130	0	0	AF45-40-00	1SBL337201R6900		1.420
		100...250	100...250	0	0	AF45-40-00	1SBL337201R7000		1.420
100	80	-	20...60	0	0	AF50-40-00	1SBL357201R7200 (1)		1.420
		48...130	48...130	0	0	AF50-40-00	1SBL357201R6900		1.420
		100...250	100...250	0	0	AF50-40-00	1SBL357201R7000		1.420
125	105	-	20...60	0	0	AF75-40-00	1SBL417201R7200 (1)		1.420
		48...130	48...130	0	0	AF75-40-00	1SBL417201R6900		1.420
		100...250	100...250	0	0	AF75-40-00	1SBL417201R7000		1.420
2 N.O. + 2 N.C. main poles (2)									
70	80	-	20...60	0	0	AF45-22-00	1SBL337501R7200 (1)		1.420
		48...130	48...130	0	0	AF45-22-00	1SBL337501R6900		1.420
		100...250	100...250	0	0	AF45-22-00	1SBL337501R7000		1.420
125	105	-	20...60	0	0	AF75-22-00	1SBL417501R7200 (1)		1.420
		48...130	48...130	0	0	AF75-22-00	1SBL417501R6900		1.420
		100...250	100...250	0	0	AF75-22-00	1SBL417501R7000		1.420

(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) These contactors are not suitable for a reversing starter or star-delta starter or for controlling a single load from 2 separate supplies. Please see technical data.

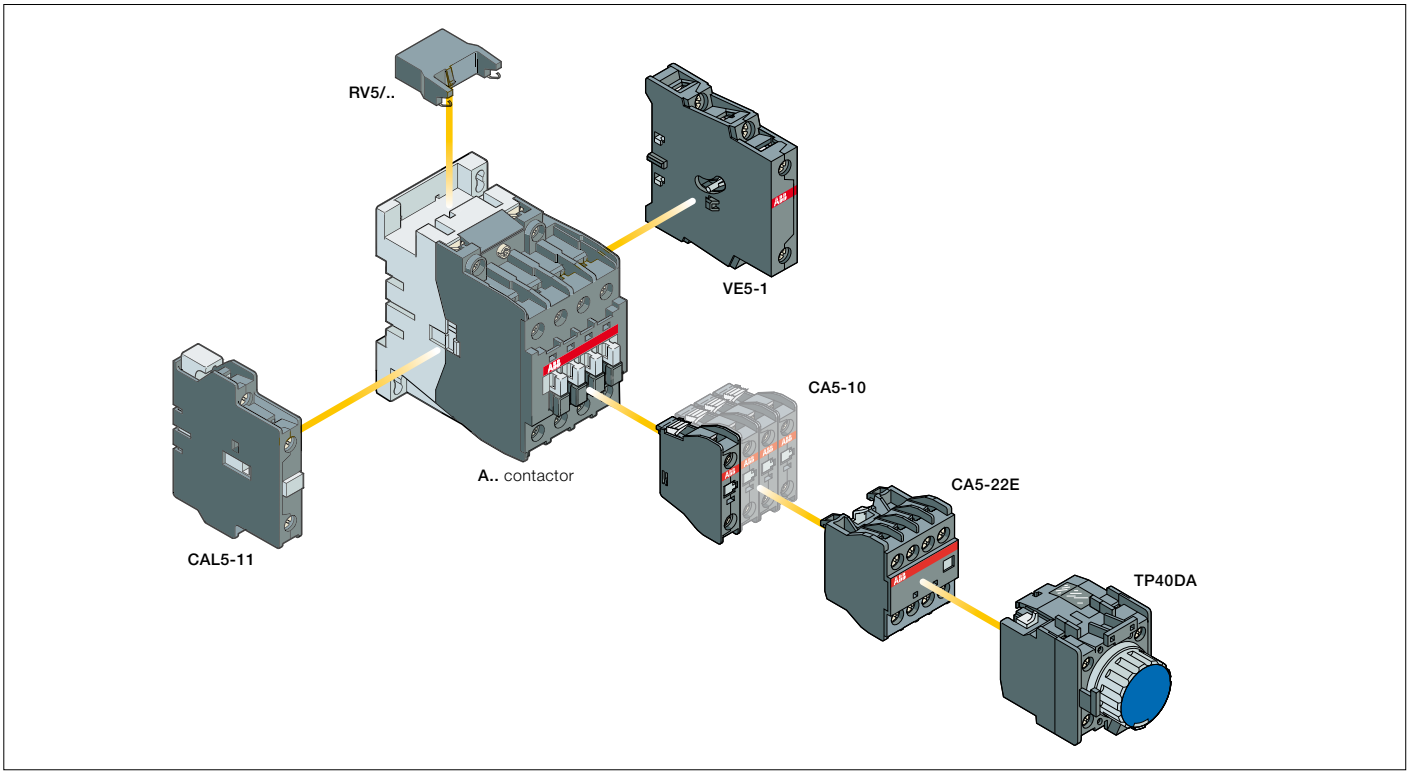
Main dimensions mm, *inches*



AF45, AF50, AF75 4-pole

A45 … A75, AE and AF45 … AF75 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	Available auxiliary contacts	Front-mounted accessories: Auxiliary contact blocks				Pneumatic timer		Side-mounted accessories: Auxiliary contact blocks		Interlock unit
			1-pole CA5-..		4-pole CA5-..		TP.. A		2-pole CAL5-11		VE5-..
A45 ... A75	4 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	or	1 x VE5-2 + 1 x CAL5-11
	2 2	0 0 (1)	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		–
AE45 ... AE75	4 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 x CAL5-11	or	1 x VE5-2
	2 2	0 0 (1)	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 x CAL5-11		–
AF50 ... AF75	4 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	or	1 x VE5-2 + 1 x CAL5-11
	2 2	0 0 (1)	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		–

(1) 2 x N.C. CA 5-.. auxiliary contacts maximum.

1SBC101394S0201

A45 … A75, AE and AF50 … AF75 4-pole contactors
Main accessories

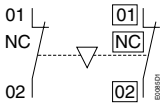
CA5-10

CAL5-11

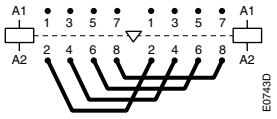
RV5/50

TP40DA

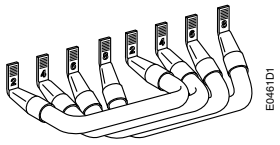
BX-TP



VE5-2
Terminal marking and positioning



BES... for 4 N.O. main pole connection



BES75-40

Ordering details (1)

For contactors	Auxiliary contacts	Type	Order code		Pkg qty	Weight (1 pce) kg
Front-mounted instantaneous auxiliary contact blocks						
A45 ... A75, AE45 ... AE75, AF50 ... AF75	1 –	CA5-10	1SBN010010R1010		10	0.014
	– 1	CA5-01	1SBN010010R1001		10	0.014
A45 ... A75, AE45 ... AE75, AF45 ... AF75	2 2	CA5-22E	1SBN010040R1022		2	0.060
Side-mounted instantaneous auxiliary contact blocks						
A45 ... A75, AE45 ... AE75, AF45 ... AF75	1 1	CAL5-11	1SBN010020R1011		2	0.050

Pneumatic timer blocks								
A45 ... A75, AE45 ... AE75, AF45 ... AF75	delay on energization	0.1...40 s	1 1	TP40DA	1SBN020300R1000		1	0.070
		10...180 s	1 1	TP180DA	1SBN020300R1001		1	0.070
	delay on de-energization	0.1...40 s	1 1	TP40IA	1SBN020301R1000		1	0.070
		10...180 s	1 1	TP180IA	1SBN020301R1001		1	0.070
Timer accessory	plastic sealable cover		– –	BX-TP	FPTN472657R0001		1	0.006
Interlock unit								
A45 ... A75-40-00, AF45 ... AF75-40-00	Mechanical and electrical		– 2	VE5-2	1SBN030210R1000		1	0.146

Surge suppressors

For contactors	Rated control circuit voltage Uc V	AC	DC	Type	Order code		Pkg qty	Weight (1 pce) kg
A45 ... A75, AE45 ... AE75	24...50	●	●	RV5/50	1SBN050010R1000		2	0.015
	50...133	●	●	RV5/133	1SBN050010R1001		2	0.015
	110...250	●	●	RV5/250	1SBN050010R1002		2	0.015
	250...440	●	●	RV5/440	1SBN050010R1003		2	0.015
A45 ... A75	24...50	●	–	RC5-2/50	1SBN050200R1000		2	0.015
	50...133	●	–	RC5-2/133	1SBN050200R1001		2	0.015
	110...250	●	–	RC5-2/250	1SBN050200R1002		2	0.015
	250...440	●	–	RC5-2/440	1SBN050200R1003		2	0.015
AE45 ... AE75	12...32	–	●	RT5/32	1SBN050020R1000		2	0.015
	25...65	–	●	RT5/65	1SBN050020R1001		2	0.015
	50...90	–	●	RT5/90	1SBN050020R1002		2	0.015
	77...150	–	●	RT5/150	1SBN050020R1003		2	0.015
	150...264	–	●	RT5/264	1SBN050020R1004		2	0.015

Connection sets for 4-pole changeover contactors

A45 ... A75-40-00, AE45 ... AE75-40-00, AF45 ... AF75-40-00	BES75-40	1SBN083302R1000		1	0.400

(1) See "Main accessory fitting details" table.

5

1SBC101395S0201

TAE45 ... TAE75 4-pole contactors
70 to 125 A AC-1
DC operated - Large coil voltage range

TAE50-40-00

5

Description

TAE45 ... TAE75 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 440 V DC.

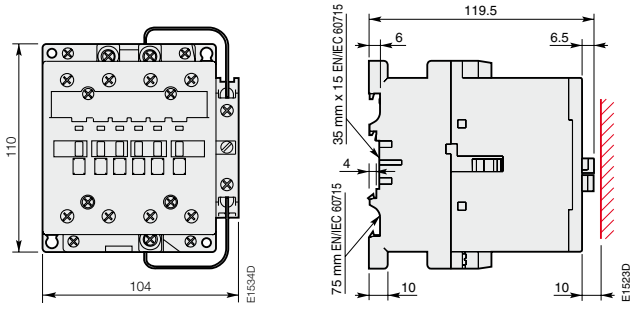
These contactors are of the block type design with:

– 4 main poles
– control circuit: large voltage range DC operated with double winding coil (and factory-mounted lagging contact for "holding" winding insertion)
– add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

IEC Rated operational current θ ≤ 40 °C AC-1 A	UL/CSA General use rating 600 V AC A	Rated control circuit voltage Uc min... Uc max V DC	Auxiliary contacts fitted	Type	Order code		Weight Pkg (1 pce) kg
4 N.O. main poles							
70	80	17...32	0 0	TAE45-40-00	1SBL339261R5100		1.430
		25...45	0 0	TAE45-40-00	1SBL339261R5200		1.430
		36...65	0 0	TAE45-40-00	1SBL339261R5400		1.430
		42...78	0 0	TAE45-40-00	1SBL339261R5800		1.430
		50...90	0 0	TAE45-40-00	1SBL339261R5500		1.430
		77...143	0 0	TAE45-40-00	1SBL339261R6200		1.430
		90...150	0 0	TAE45-40-00	1SBL339261R6600		1.430
		152...264	0 0	TAE45-40-00	1SBL339261R6800		1.430
100	80	17...32	0 0	TAE50-40-00	1SBL359261R5100		1.430
		25...45	0 0	TAE50-40-00	1SBL359261R5200		1.430
		36...65	0 0	TAE50-40-00	1SBL359261R5400		1.430
		42...78	0 0	TAE50-40-00	1SBL359261R5800		1.430
		50...90	0 0	TAE50-40-00	1SBL359261R5500		1.430
		77...143	0 0	TAE50-40-00	1SBL359261R6200		1.430
		90...150	0 0	TAE50-40-00	1SBL359261R6600		1.430
		152...264	0 0	TAE50-40-00	1SBL359261R6800		1.430
125	105	17...32	0 0	TAE75-40-00	1SBL419261R5100		1.430
		25...45	0 0	TAE75-40-00	1SBL419261R5200		1.430
		36...65	0 0	TAE75-40-00	1SBL419261R5400		1.430
		42...78	0 0	TAE75-40-00	1SBL419261R5800		1.430
		50...90	0 0	TAE75-40-00	1SBL419261R5500		1.430
		77...143	0 0	TAE75-40-00	1SBL419261R6200		1.430
		90...150	0 0	TAE75-40-00	1SBL419261R6600		1.430
		152...264	0 0	TAE75-40-00	1SBL419261R6800		1.430

Main dimensions mm, *inches*



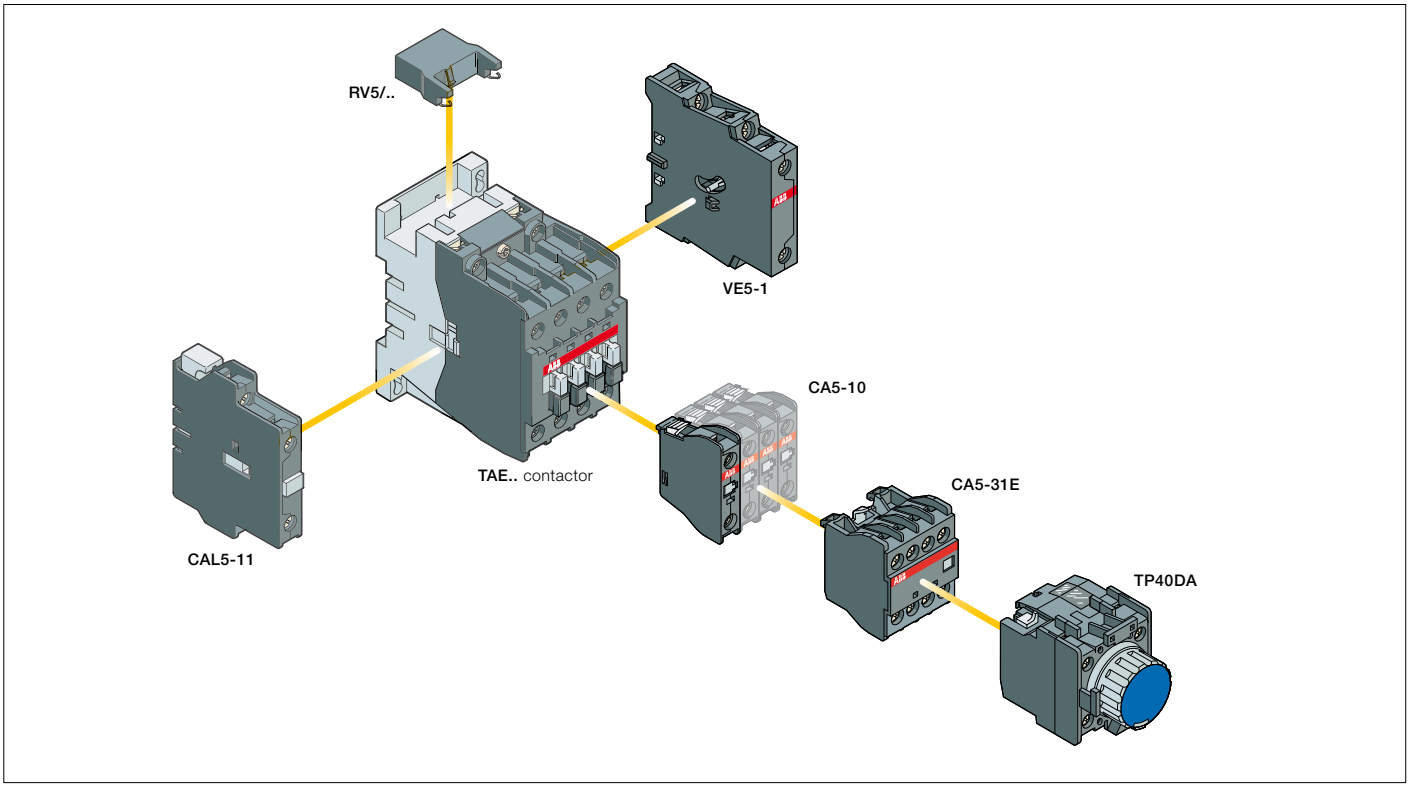
TAE45, TAE50, TAE75 4-pole

1SBC101396S0201

Notes

TAE45 … TAE75 4-pole contactors
Main accessories

Contactor and main accessories (other accessories available)



5

Main accessories 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						Side-mounted accessories		
			Auxiliary contact blocks				Pneumatic timer		Auxiliary contact blocks		Interlock unit
			1-pole CA5-..		4-pole CA5-..		TP.. A		2-pole CAL5-11		VE5-..
TAE45 ... TAE75	4 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 1-pole CA5-..	+	1 x CAL5-11	or	1 x VE5-2

1SBC101397S0201

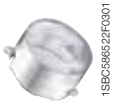
TAE45 ... TAE75 4-pole contactors
Main accessories

CA5-10

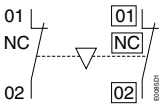
CAL5-11

RV5/50

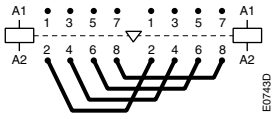
TP40DA



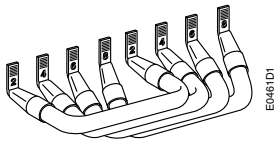
BX-TP



VE5-2
Terminal marking and positioning



BES... for 4 N.O. main pole connection



BES75-40

Ordering details (1)

For contactors	Auxiliary contacts	Type	Order code		Pkg qty	Weight (1 pce) kg
Front-mounted instantaneous auxiliary contact blocks						
TAE45 ... TAE75	1 –	CA5-10	1SBN010010R1010		10	0.014
	– 1	CA5-01	1SBN010010R1001		10	0.014
	2 2	CA5-22E	1SBN010040R1022		2	0.060
Side-mounted instantaneous auxiliary contact blocks						
TAE45 ... TAE75	1 1	CAL5-11	1SBN010020R1011		2	0.050

Pneumatic timer blocks								
TAE45 ... TAE75	delay on energization	0.1...40 s	1 1	TP40DA	1SBN020300R1000		1	0.070
		10...180 s	1 1	TP180DA	1SBN020300R1001		1	0.070
	delay on de-energization	0.1...40 s	1 1	TP40IA	1SBN020301R1000		1	0.070
		10...180 s	1 1	TP180IA	1SBN020301R1001		1	0.070
Timer accessory	plastic sealable cover		– –	BX-TP	FPTN472657R0001		1	0.006
Interlock unit								
TAE45 ... TAE75	Mechanical and electrical		– 2	VE5-2	1SBN030210R1000		1	0.146

Surge suppressors

For contactors	Rated control circuit voltage Uc V	AC	DC	Type	Order code		Pkg qty	Weight (1 pce) kg
TAE45 ... TAE75	24...50	●	●	RV5/50	1SBN050010R1000		2	0.015
	50...133	●	●	RV5/133	1SBN050010R1001		2	0.015
	110...250	●	●	RV5/250	1SBN050010R1002		2	0.015
	250...440	●	●	RV5/440	1SBN050010R1003		2	0.015
TAE45 ... TAE75	12...32	–	●	RT5/32	1SBN050020R1000		2	0.015
	25...65	–	●	RT5/65	1SBN050020R1001		2	0.015
	50...90	–	●	RT5/90	1SBN050020R1002		2	0.015
	77...150	–	●	RT5/150	1SBN050020R1003		2	0.015
	150...264	–	●	RT5/264	1SBN050020R1004		2	0.015

Connection sets for 4-pole changeover contacts

TAE45 ... TAE75		BES75-40	1SBN083302R1000		1	0.400

(1) See "Main accessory fitting details" table.

1SBC101649S0201

EK110 ... EK150 4-pole contactors
200 to 250 A AC-1
AC operated - with 1 N.O. + 1 N.C. auxiliary contacts

EK150-40-11

Description

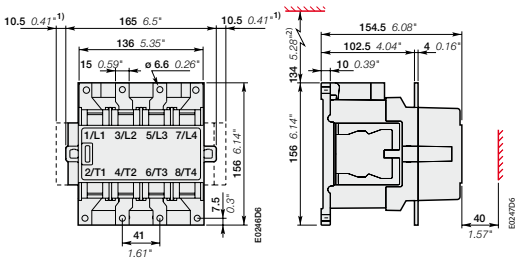
EK110 ... EK150 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and for controlling power circuits up to 1000 V AC and 440 V DC.
These contactors are of the block type design with:
– 4 main poles
– control circuit: AC operated
– add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

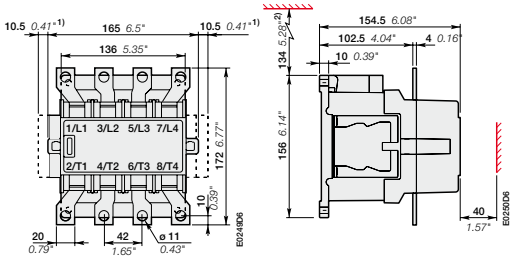
IEC	UL/CSA	Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational current θ ≤ 40 °C AC-1	General use rating 600 V AC								Pkg (1 pce)
A	A	V 50 Hz	V 60 Hz						kg
200	170	48	-	1	1	EK110-40-11	SK824440-AD		4.300
		-	110	1	1	EK110-40-11	SK824440-AE		4.300
		110	120	1	1	EK110-40-11	SK824440-AF		4.300
		220...230	-	1	1	EK110-40-11	SK824440-AL		4.300
		230...240	-	1	1	EK110-40-11	SK824440-AM		4.300
		-	380	1	1	EK110-40-11	SK824440-AN		4.300
		380...400	440	1	1	EK110-40-11	SK824440-AP		4.300
		400...415	-	1	1	EK110-40-11	SK824440-AR		4.300
250	200	48	-	1	1	EK150-40-11	SK824441-AD		4.350
		-	110	1	1	EK150-40-11	SK824441-AE		4.350
		110	120	1	1	EK150-40-11	SK824441-AF		4.350
		220...230	-	1	1	EK150-40-11	SK824441-AL		4.350
		230...240	-	1	1	EK150-40-11	SK824441-AM		4.350
		-	380	1	1	EK150-40-11	SK824441-AN		4.350
		380...400	440	1	1	EK150-40-11	SK824441-AP		4.350
		400...415	-	1	1	EK150-40-11	SK824441-AR		4.350

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



EK110



EK150

1) Dimension for extra auxiliary contact block.
2) Min. distance to uninsulated wall.

1SFC101017C0201

EK110 ... EK150 4-pole contactors
200 to 250 A AC-1
DC operated - with 2 N.O. + 1 N.C. auxiliary contacts

EK150-40-21

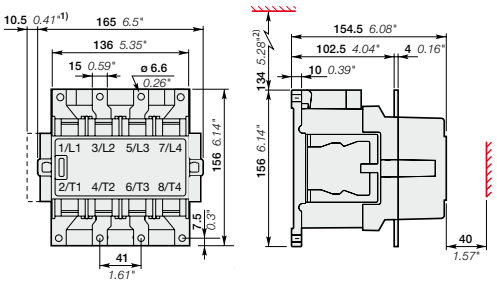
Description

EK110 ... EK150 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and for controlling power circuits up to 1000 V AC and 440 V DC.
These contactors are of the block type design with:
– 4 main poles
– control circuit: DC operated
– add-on auxiliary contact blocks for side mounting and a wide range of accessories.

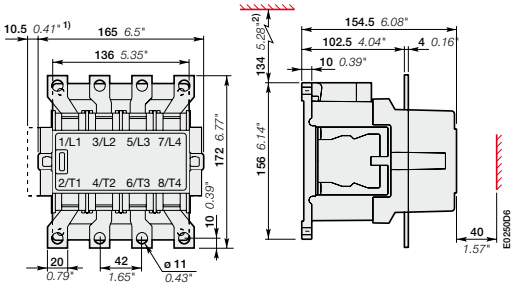
Ordering details

IEC	UL/CSA	Rated control circuit voltage Uc	Auxiliary contacts fitted		Type	Order code		Weight
Rated operational current θ ≤ 40 °C AC-1	General use rating 600 V AC							Pkg (1 pce)
A	A	V DC						kg
200	170	12	2	1	EK110-40-21	SK824440-DA		4.350
		24	2	1	EK110-40-21	SK824440-DB		4.350
		36	2	1	EK110-40-21	SK824440-DC		4.350
		48	2	1	EK110-40-21	SK824440-DD		4.350
		60	2	1	EK110-40-21	SK824440-DT		4.350
		75	2	1	EK110-40-21	SK824440-DG		4.350
		110	2	1	EK110-40-21	SK824440-DE		4.350
		125	2	1	EK110-40-21	SK824440-DU		4.350
		220	2	1	EK110-40-21	SK824440-DF		4.350
250	200	12	2	1	EK150-40-21	SK824441-DA		4.400
		24	2	1	EK150-40-21	SK824441-DB		4.400
		36	2	1	EK150-40-21	SK824441-DC		4.400
		48	2	1	EK150-40-21	SK824441-DD		4.400
		60	2	1	EK150-40-21	SK824441-DT		4.400
		75	2	1	EK150-40-21	SK824441-DG		4.400
		110	2	1	EK150-40-21	SK824441-DE		4.400
		125	2	1	EK150-40-21	SK824441-DU		4.400
		220	2	1	EK150-40-21	SK824441-DF		4.400

Main dimensions mm, *inches*



EK110



EK150

1) Dimension for extra auxiliary contact block.
2) Min. distance to uninsulated wall.

1SFC101061C0201

EK175 ... EK550 4-pole contactors
300 to 800 A AC-1
AC operated - with 1 N.O. + 1 N.C. auxiliary contacts

EK370-40-11

Description

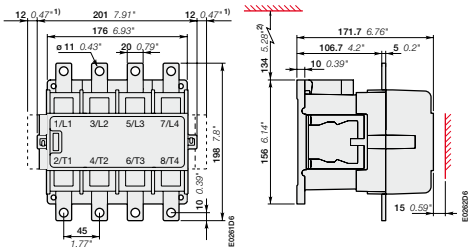
EK175 ... EK550 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and for controlling power circuits up to 1000 V AC and 600 V DC.
These contactors are of the block type design with:
– 4 main poles
– control circuit: AC operated
– add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

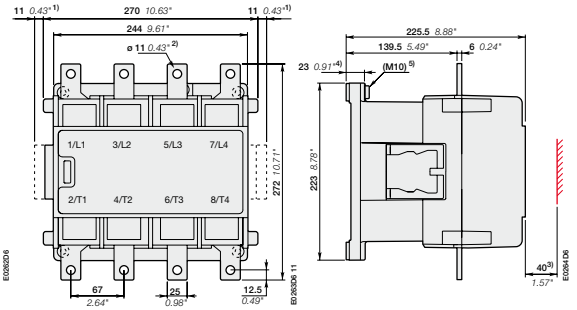
IEC	UL/CSA	Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational current θ ≤ 40 °C AC-1	General use rating 600 V AC								Pkg (1 pce)
A	A	V 50 Hz	V 60 Hz						kg
300	250	48	-	1	1	EK175-40-11	SK825440-AD		6.600
		-	110	1	1	EK175-40-11	SK825440-AE		6.600
		110	120	1	1	EK175-40-11	SK825440-AF		6.600
		220...230	-	1	1	EK175-40-11	SK825440-AL		6.600
		230...240	-	1	1	EK175-40-11	SK825440-AM		6.600
		-	380	1	1	EK175-40-11	SK825440-AN		6.600
		380...400	440	1	1	EK175-40-11	SK825440-AP		6.600
		400...415	-	1	1	EK175-40-11	SK825440-AR		6.600
350	300	48	-	1	1	EK210-40-11	SK825441-AD		6.600
		-	110	1	1	EK210-40-11	SK825441-AE		6.600
		110	120	1	1	EK210-40-11	SK825441-AF		6.600
		220...230	-	1	1	EK210-40-11	SK825441-AL		6.600
		230...240	-	1	1	EK210-40-11	SK825441-AM		6.600
		-	380	1	1	EK210-40-11	SK825441-AN		6.600
		380...400	440	1	1	EK210-40-11	SK825441-AP		6.600
		400...415	-	1	1	EK210-40-11	SK825441-AR		6.600
550	420	48	-	1	1	EK370-40-11	SK827040-AD		17.200
		110	110...120	1	1	EK370-40-11	SK827040-EF		17.200
		110...115	115...127	1	1	EK370-40-11	SK827040-EG		17.200
		220	220...240	1	1	EK370-40-11	SK827040-EL		17.200
		220...230	230...255	1	1	EK370-40-11	SK827040-EM		17.200
		380	380...415	1	1	EK370-40-11	SK827040-EP		17.200
		380...400	400...440	1	1	EK370-40-11	SK827040-ER		17.200
		400...415	-	1	1	EK370-40-11	SK827040-AR		17.200
800	540	48	-	1	1	EK550-40-11	SK827041-AD		17.200
		110	110...120	1	1	EK550-40-11	SK827041-EF		17.200
		110...115	115...127	1	1	EK550-40-11	SK827041-EG		17.200
		220	220...240	1	1	EK550-40-11	SK827041-EL		17.200
		220...230	230...255	1	1	EK550-40-11	SK827041-EM		17.200
		380	380...415	1	1	EK550-40-11	SK827041-EP		17.200
		380...400	400...440	1	1	EK550-40-11	SK827041-ER		17.200
		400...415	-	1	1	EK550-40-11	SK827041-AR		17.200

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



EK175, EK210
1) Dimension for extra auxiliary contact block.
2) Min. distance to uninsulated wall.



EK370, EK550
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.

1SFC101019C0201

EK175 ... EK550 4-pole contactors
300 to 800 A AC-1
DC operated - with 2 N.O. + 1 N.C. auxiliary contacts

EK370-40-21

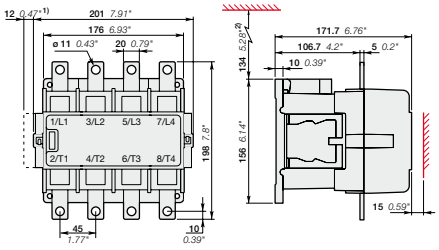
Description

EK175 ... 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. These contactors are of the block type design with:
– 4 main poles
– control circuit: DC operated with
– add-on auxiliary contact blocks for side mounting and a wide range of accessories.

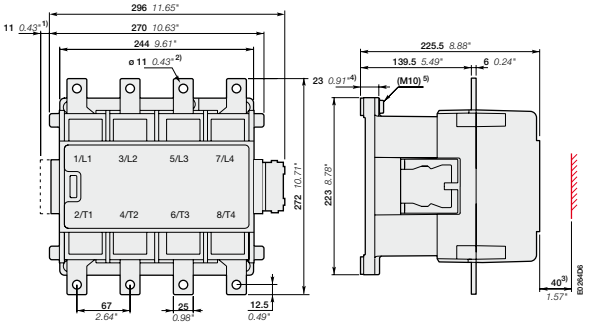
Ordering details

IEC	UL/CSA	Rated control circuit voltage Uc	Auxiliary contacts fitted		Type	Order code		Weight
Rated operational current θ ≤ 40 °C AC-1	General use rating 600 V AC							Pkg (1 pce)
A	A	V DC						kg
300	250	12	2	1	EK175-40-21	SK825440-DA		6.650
		24	2	1	EK175-40-21	SK825440-DB		6.650
		36	2	1	EK175-40-21	SK825440-DC		6.650
		48	2	1	EK175-40-21	SK825440-DD		6.650
		60	2	1	EK175-40-21	SK825440-DT		6.650
		75	2	1	EK175-40-21	SK825440-DG		6.650
		110	2	1	EK175-40-21	SK825440-DE		6.650
		125	2	1	EK175-40-21	SK825440-DU		6.650
		220	2	1	EK175-40-21	SK825440-DF		6.650
350	300	12	2	1	EK210-40-21	SK825441-DA		6.650
		24	2	1	EK210-40-21	SK825441-DB		6.650
		36	2	1	EK210-40-21	SK825441-DC		6.650
		48	2	1	EK210-40-21	SK825441-DD		6.650
		60	2	1	EK210-40-21	SK825441-DT		6.650
		75	2	1	EK210-40-21	SK825441-DG		6.650
		110	2	1	EK210-40-21	SK825441-DE		6.650
		125	2	1	EK210-40-21	SK825441-DU		6.650
		220	2	1	EK210-40-21	SK825441-DF		6.650
550	420	24	2	1	EK370-40-21	SK827040-DB		17.200
		36	2	1	EK370-40-21	SK827040-DC		17.200
		48	2	1	EK370-40-21	SK827040-DD		17.200
		60	2	1	EK370-40-21	SK827040-DT		17.200
		75	2	1	EK370-40-21	SK827040-DG		17.200
		110	2	1	EK370-40-21	SK827040-DE		17.200
		125	2	1	EK370-40-21	SK827040-DU		17.200
		220	2	1	EK370-40-21	SK827040-DF		17.200
800	540	24	2	1	EK550-40-21	SK827041-DB		17.200
		36	2	1	EK550-40-21	SK827041-DC		17.200
		48	2	1	EK550-40-21	SK827041-DD		17.200
		60	2	1	EK550-40-21	SK827041-DT		17.200
		75	2	1	EK550-40-21	SK827041-DG		17.200
		110	2	1	EK550-40-21	SK827041-DE		17.200
		125	2	1	EK550-40-21	SK827041-DU		17.200
		220	2	1	EK550-40-21	SK827041-DF		17.200

Main dimensions mm, *inches*



EK175 ... EK210
1) Dimension for extra auxiliary contact block.
2) Min. distance to uninsulated wall.



EK370 ... EK550
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.

1SFC101062C0201

EK1000 4-pole contactors
1000 A AC-1
AC operated - with 1 N.O. + 1 N.C. auxiliary contacts

EK1000-40-11

Description

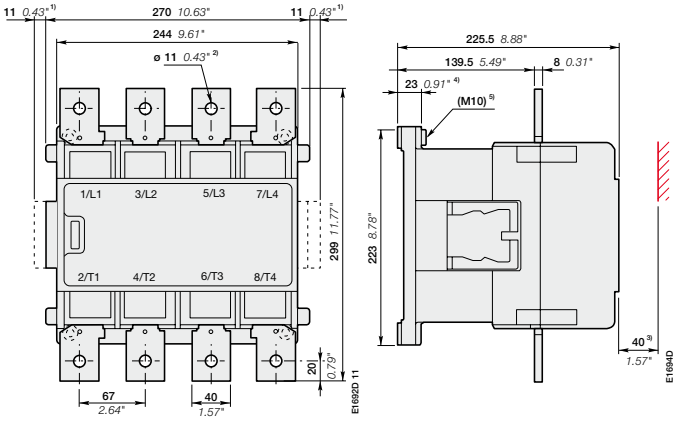
EK1000 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 1000 V AC.
These contactors are of the block type design with:
– 4 main poles
– control circuit: AC operated
– add-on auxiliary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

Ordering details

IEC	UL/CSA	Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational current θ ≤ 40 °C AC-1	General use rating 600 V AC								Pkg (1 pce)
A	A	V 50 Hz	V 60 Hz						kg
1000	-	48	-	1	1	EK1000-40-11	SK827044-AD		17.500
		110	110...120	1	1	EK1000-40-11	SK827044-EF		17.500
		110...115	115...127	1	1	EK1000-40-11	SK827044-EG		17.500
		220	220...240	1	1	EK1000-40-11	SK827044-EL		17.500
		220...230	230...255	1	1	EK1000-40-11	SK827044-EM		17.500
		380	380...415	1	1	EK1000-40-11	SK827044-EP		17.500
		380...400	400...440	1	1	EK1000-40-11	SK827044-ER		17.500
		400...415	-	1	1	EK1000-40-11	SK827044-AR		17.500

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



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.

1SFC101021C0201

EK1000 4-pole contactors
1000 A AC-1
DC operated - with 2 N.O. + 1 N.C. auxiliary contacts

EK1000-40-21

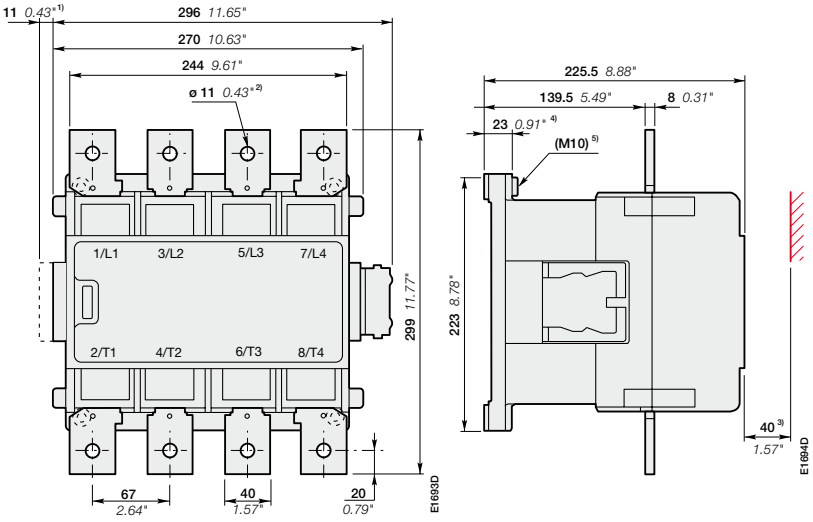
Description

EK1000 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.
These contactors are of the block type design with:
– 4 main poles
– control circuit: DC operated
– add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

IEC	UL/CSA	Rated control circuit voltage Uc	Auxiliary contacts fitted		Type	Order code		Weight
Rated operational current θ ≤ 40 °C AC-1	General use rating 600 V AC							Pkg (1 pce)
A	A	V DC						kg
1000	-	24	2	1	EK1000-40-21	SK827044-DB		17.500
		36	2	1	EK1000-40-21	SK827044-DC		17.500
		48	2	1	EK1000-40-21	SK827044-DD		17.500
		60	2	1	EK1000-40-21	SK827044-DT		17.500
		75	2	1	EK1000-40-21	SK827044-DG		17.500
		110	2	1	EK1000-40-21	SK827044-DE		17.500
		125	2	1	EK1000-40-21	SK827044-DU		17.500
		220	2	1	EK1000-40-21	SK827044-DF		17.500

Main dimensions mm, *inches*



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.

1SFC101063C0201

EK110 ... EK150 4-pole Contactors
200 to 250 A AC-1
AC Operated - with 2 N.O. + 2 N.C. auxiliary contacts

EK150-40-22

Description

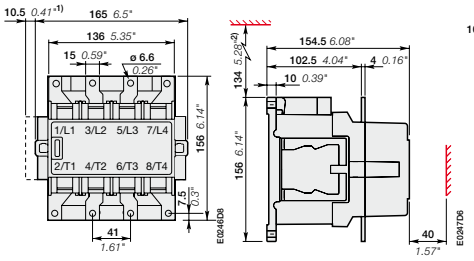
EK110 ... EK150 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and for controlling power circuits up to 1000 V AC and 440 V DC.
These contactors are of the block type design with:
– 4 main poles
– control circuit: AC operated
– add-on auxiliary contact blocks for side mounting and a wide range of accessories

Ordering details

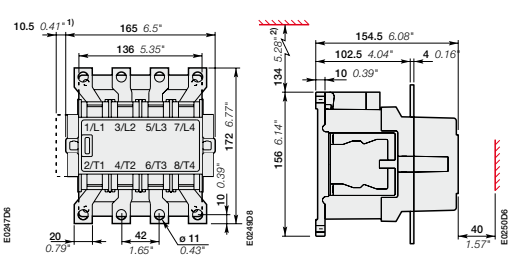
IEC	UL/CSA	Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational current θ ≤ 40 °C AC-1	General use rating 600 V AC								Pkg (1 pce)
A	A	V 50 Hz	V 60 Hz						kg
200	170	48	-	2	2	EK110-40-22	SK824450-AD		4.350
		-	110	2	2	EK110-40-22	SK824450-AE		4.350
		110	120	2	2	EK110-40-22	SK824450-AF		4.350
		220 ... 230	-	2	2	EK110-40-22	SK824450-AL		4.350
		230 ... 240	-	2	2	EK110-40-22	SK824450-AM		4.350
		-	380	2	2	EK110-40-22	SK824450-AN		4.350
		380 ... 400	440	2	2	EK110-40-22	SK824450-AP		4.350
		400 ... 415	-	2	2	EK110-40-22	SK824450-AR		4.350
250	200	48	-	2	2	EK150-40-22	SK824451-AD		4.400
		-	110	2	2	EK150-40-22	SK824451-AE		4.400
		110	120	2	2	EK150-40-22	SK824451-AF		4.400
		220 ... 230	-	2	2	EK150-40-22	SK824451-AL		4.400
		230 ... 240	-	2	2	EK150-40-22	SK824451-AM		4.400
		-	380	2	2	EK150-40-22	SK824451-AN		4.400
		380 ... 400	440	2	2	EK150-40-22	SK824451-AP		4.400
		400 ... 415	-	2	2	EK150-40-22	SK824451-AR		4.400

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



EK110



EK150

1) Dimension for extra auxiliary contact block
2) Min. distance to uninsulated wall

1SFC101018C0201

EK175 ... EK550 4-pole Contactors
300 to 800 A AC-1
AC Operated - with 2 N.O. + 2 N.C. auxiliary contacts

EK370-40-22

Description

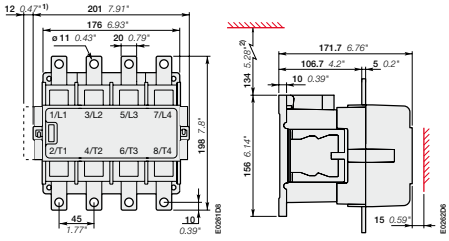
EK175 ... EK550 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and for controlling power circuits up to 1000 V AC and 600 V DC.
These contactors are of the block type design with:
– 4 main poles
– control circuit: AC operated
– add-on auxiliary contact blocks for side mounting and a wide range of accessories

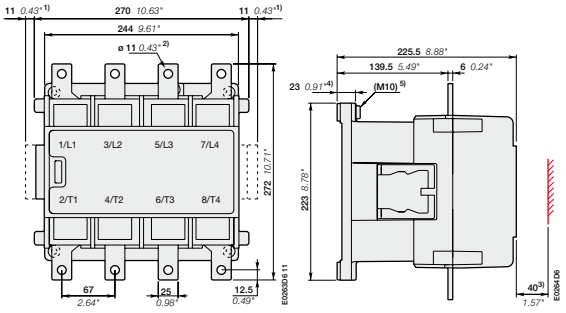
Ordering details

IEC	UL/CSA	Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational current θ ≤ 40 °C AC-1	General use rating 600 V AC								Pkg (1 pce)
A	A	V 50 Hz	V 60 Hz						kg
300	250	48	-	2	2	EK175-40-22	SK825448-AD		6.650
		-	110	2	2	EK175-40-22	SK825448-AE		6.650
		110	120	2	2	EK175-40-22	SK825448-AF		6.650
		220 ... 230	-	2	2	EK175-40-22	SK825448-AL		6.650
		230 ... 240	-	2	2	EK175-40-22	SK825448-AM		6.650
		-	380	2	2	EK175-40-22	SK825448-AN		6.650
		380 ... 400	440	2	2	EK175-40-22	SK825448-AP		6.650
		400 ... 415	-	2	2	EK175-40-22	SK825448-AR		6.650
350	300	48	-	2	2	EK210-40-22	SK825451-AD		6.650
		-	110	2	2	EK210-40-22	SK825451-AE		6.650
		110	120	2	2	EK210-40-22	SK825451-AF		6.650
		220 ... 230	-	2	2	EK210-40-22	SK825451-AL		6.650
		230 ... 240	-	2	2	EK210-40-22	SK825451-AM		6.650
		-	380	2	2	EK210-40-22	SK825451-AN		6.650
		380 ... 400	440	2	2	EK210-40-22	SK825451-AP		6.650
		400 ... 415	-	2	2	EK210-40-22	SK825451-AR		6.650
550	420	48	-	2	2	EK370-40-22	SK827042-AD		17.200
		110	110 ... 120	2	2	EK370-40-22	SK827042-EF		17.200
		110 ... 115	115 ... 127	2	2	EK370-40-22	SK827042-EG		17.200
		220	220 ... 240	2	2	EK370-40-22	SK827042-EL		17.200
		220 ... 230	230 ... 255	2	2	EK370-40-22	SK827042-EM		17.200
		380	380 ... 415	2	2	EK370-40-22	SK827042-EP		17.200
		380 ... 400	400 ... 440	2	2	EK370-40-22	SK827042-ER		17.200
		400 ... 415	-	2	2	EK370-40-22	SK827042-AR		17.200
800	540	48	-	2	2	EK550-40-22	SK827043-AD		17.200
		110	110 ... 120	2	2	EK550-40-22	SK827043-EF		17.200
		110 ... 115	115 ... 127	2	2	EK550-40-22	SK827043-EG		17.200
		220	220 ... 240	2	2	EK550-40-22	SK827043-EL		17.200
		220 ... 230	230 ... 255	2	2	EK550-40-22	SK827043-EM		17.200
		380	380 ... 415	2	2	EK550-40-22	SK827043-EP		17.200
		380 ... 400	400 ... 440	2	2	EK550-40-22	SK827043-ER		17.200
		400 ... 415	-	2	2	EK550-40-22	SK827043-AR		17.200

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*





EK175
1) Dimension for extra auxiliary contact block.
2) Min. distance to uninsulated wall.

EK370, EK550
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.

1SFC101020C0201

EK1000 4-pole Contactors
1000 A AC-1
AC Operated - with 2 N.O. + 2 N.C. auxiliary contacts

EK1000-40-22

Description

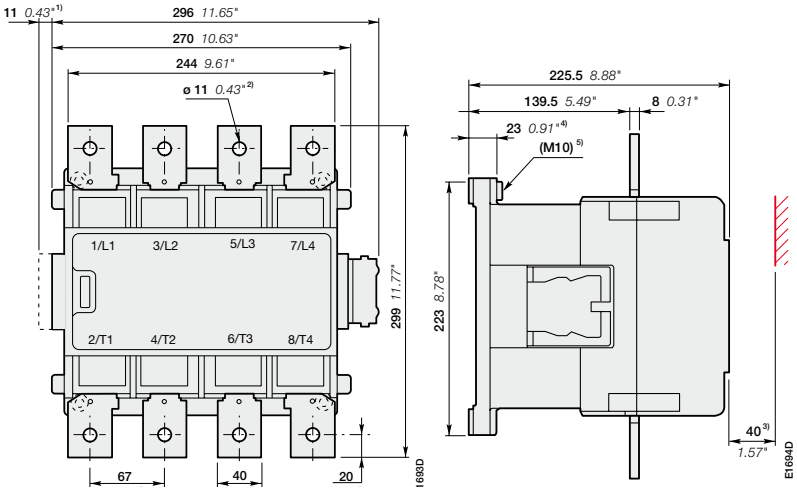
EK1000 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and for controlling power circuits up to 1000 V AC.
These contactors are of the block type design with:
– 4 main poles
– control circuit: AC operated
– add-on auxiliary contact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

Ordering details

IEC	UL/CSA	Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational current θ ≤ 40 °C AC-1	General use rating 600 V AC								Pkg (1 pce)
A	A	V 50 Hz	V 60 Hz						kg
1000	-	48	-	2	2	EK1000-40-22	SK827045-AD		17.500
		110	110 ... 120	2	2	EK1000-40-22	SK827045-EF		17.500
		110 ... 115	115 ... 127	2	2	EK1000-40-22	SK827045-EG		17.500
		220	220 ... 240	2	2	EK1000-40-22	SK827045-EL		17.500
		220 ... 230	230 ... 255	2	2	EK1000-40-22	SK827045-EM		17.500
		380	380 ... 415	2	2	EK1000-40-22	SK827045-EP		17.500
		380 ... 400	400 ... 440	2	2	EK1000-40-22	SK827045-ER		17.500
		400 ... 415	-	2	2	EK1000-40-22	SK827045-AR		17.500

(1) Other control voltages see voltage code table

Main dimensions mm, *inches*



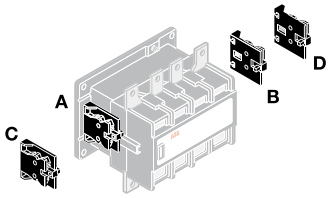
EK1000
1) Dimension for extra auxiliary contact block
2) Screw, nut and washer by-packed
3) Min. distance to uninsulated wall
4) Damping elements are included
5) Earthing screw

1SFC101022C0201

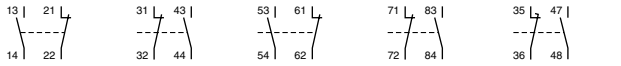
EK110 ... EK1000 4-pole contactors
with 1 N.O. + 1 N.C. auxiliary contacts, 2 N.O. + 1 N.C. auxiliary contacts and 2 N.O. + 2 N.C. auxiliary contacts

Main accessory fitting details

Mounting positions of the auxiliary contact



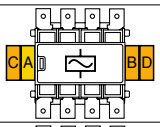
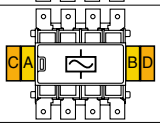
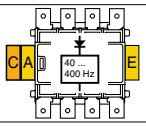
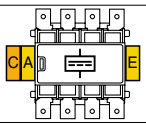
Auxiliary contact types and connecting diagrams



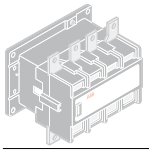
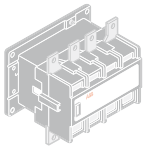
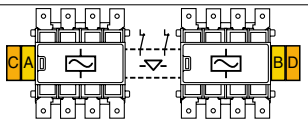
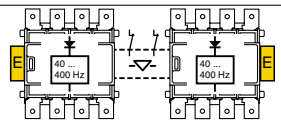
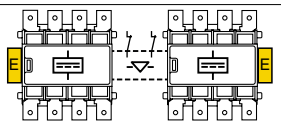
CAL16-11 A | CAL16-11 B | CAL16-11 C | CAL16-11 D | CCL16-11 E (1)

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

EK... 4-pole contactors

Contactor types	Main poles	Available auxiliary contacts		Add-on auxiliary contact blocks 2-pole CAL16-11 ...	Mounting and positioning (Factory mounted auxiliary contacts / Add-on CAL16-11 auxiliary contacts)
AC operated, 50 Hz, 60 Hz or 50/60 Hz					
EK110 ... EK1000	4 0	1	1	+ 1 x CAL16-11B + 1 x CAL16-11C + 1 x CAL16-11D	
EK110 ... EK1000	4 0	2	2	+ 1 x CAL16-11C 1 x CAL16-11D	
AC operated, 40...400 Hz					
EK110 ... EK210	4 0	2	1	+ 1 x CAL16-11C	
DC operated					
EK110 ... EK1000	4 0	2	1	+ 1 x CAL16-11C	

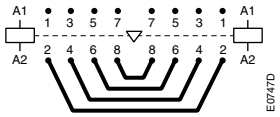
EK ... 4-pole reversing contactors with VH145 / VH300 mechanical and electrical interlock units

"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				
EK110 ... EK150 EK175, EK210 EK370 ... EK1000	VH145 VH300 VH800	EK110, EK150 EK175, EK210 EK370 ... EK1000	+ 1 x CAL16-11C 1 x CAL16-11D	
AC operated, 40...400 Hz				
EK110 ... EK150 EK175, EK210 EK370 ... EK1000	VH145 VH300 VH800	EK110, EK150 EK175, EK210 EK370 ... EK1000	–	
DC operated, 50 Hz, 60 Hz or 50/60 Hz				
EK110 ... EK150 EK175, EK210 EK370 ... EK1000	VH145 VH300 VH800	EK110, EK150 EK175, EK210 EK370 ... EK1000	–	

1SBC101730C0201

EK110 ... EK1000 4-pole contactors
with 1 N.O. + 1 N.C. auxiliary contacts, 2 N.O. + 1 N.C. auxiliary contacts and 2 N.O. + 2 N.C. auxiliary contacts

VH145



BSS100 ... BSS100

RC-EH300/48

Ordering details (1)

For contactors	Auxiliary contacts		Type	Order code		Pkg qty	Weight (1 pce)
							kg
Side-mounted auxiliary contact blocks							
EK...	1	1	CAL16-11B	SK829002-B		1	0.050
	1	1	CAL16-11C	SK829002-C		1	0.050
	1	1	CAL16-11D	SK829002-D		1	0.050
	1	1	CCL16-11E (2)	SK829002-E		1	0.050
Mechanical and electrical interlock unit for two horizontal mounted contactors							
EK110, EK150			VH145	SK829071-A		1	0.130
EK175, EK210			VH300	SK829071-B		1	0.130
Mechanical interlock unit for two horizontal mounted contactors							
EK370 ... EK1000			VH800	SK829070-F		1	6.000
Connecting sets							
EK110			BSS100	SK829090-B		1	0.400
EK150			BSS145	SK829090-F		1	0.700
EK175, EK210			BSS210	SK829090-G		1	1.000
EK370, EK550			BSS550	SK829090-E		1	3.300
EK1000			BSS1000	SK829090-H		1	5.500

(2) Mounting of CCL16-11E blocks does not allow an additional second block to be added on top of it.
All DC operated EK... contactors are equipped with one CCL16-11E on the right side.

Surge suppressors

For contactors	Rated control circuit voltage Uc			Type	Order code		Pkg qty	Weight (1 pce)
	V	AC	DC					kg
EK110 ... EK210	24...48	●	–	RC-EH300/48	SK829007-A		1	0.015
	110...415	●	–	RC-EH300/415	SK829007-B		1	0.015
EK370 ... EK1000	48...110	●	–	RC-EH800/110	SK829007-C		1	0.015
EK110 ... EK1000	24...125	–	●	RC-EH800/110	SK829007-C		1	0.015
EK370 ... EK1000	220...600	●	–	RC-EH800/600	SK829007-D		1	0.015

(1) See "Main accessory fitting details" table.

1SBC101730C0201

Notes

AF09 ... AF38 4-pole contactors
Technical data

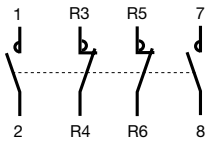
Main pole - Utilization characteristics according to IEC

Contactor types	AC / DC operated	AF09	AF16	AF26	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	55 A	55 A
With conductor cross-sectional area		6 mm²	6 mm²	16 mm²	16 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
Ue max. ≤ 690 V, 50/60 Hz	**θ ≤ 60 °C**	25 A	30 A	40 A	45 A
	θ ≤ 70 °C	22 A	26 A	32 A	37 A
With conductor cross-sectional area		4 mm²	6 mm²	10 mm²	16 mm²
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
Rated short-time withstand current Icw	**1 s**	300 A	300 A	450 A	450 A
At 40 °C ambient temperature,	**10 s**	150 A	150 A	300 A	300 A
in free air from a cold state	**30 s**	80 A	80 A	225 A	225 A
	1 min	60 A	60 A	150 A	150 A
	15 min	35 A	35 A	55 A	55 A
Power dissipation per pole	**Ie / AC-1**	0.8 W	1.2 W	1.6 W	2.3 W
Max. electrical switching frequency	**AC-1**	600 cycles/h			

Main pole - Utilization characteristics according to UL / CSA

Contactor types	AF09	AF16	AF26	AF38
Standards	UL 508, CSA C22.2 N°14			
Max. operational voltage	600 V			
UL / CSA general use rating				
600 V AC	25 A	30 A	45 A	55 A
With conductor cross-sectional area	AWG 10	AWG 10	AWG 8	AWG 6
Max. electrical switching frequency				
For general use	600 cycles/h			

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

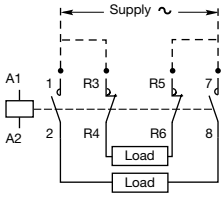


These contactors are suitable for controlling 2 separate circuits, i.e. 2 loads with 2 separate supplies, or 1 circuit comprising 2 separate loads with a single supply (see diagrams below). When the contactor operates there is no mechanical overlapping between the N.O. poles and the N.C. poles: BREAK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

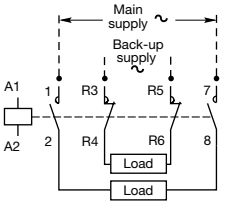
These contactors are not suitable for a reversing starter or for controlling a single load from 2 separate supplies.

Block diagrams

– Single supply and 2 separate loads



– 2 separate supplies and 2 separate loads



1SBC101547S0201

A45 … A75, AE, TAE and AF45 … AF75 4-pole contactors
Technical data

Main pole - Utilization characteristics according to IEC

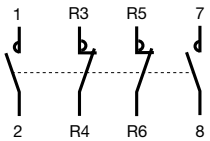
Contactor types	**AC operated**	A45	A50	A75
	DC operated	AE45	AE50	AE75
		TAE45	TAE50	TAE75
	AC / DC operated	AF45	AF50	AF75
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1		
Rated operational voltage Ue max.		1000 V (690 V for AF.. contactors)		
Rated frequency (without derating)		50 / 60 Hz		
Conventional free-air thermal current Ith				
acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C		100 A	100 A	125 A
With conductor cross-sectional area		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**	70 A	100 A	125 A
Ue max. ≤ 690 V, 50/60 Hz	**θ ≤ 55 °C**	60 A	85 A	105 A
	θ ≤ 70 °C (1)	50 A	70 A	85 A
With conductor cross-sectional area		25 mm²	35 mm²	50 mm²
Short-circuit protection device for contactors				
without thermal overload relay - Motor protection excluded				
Ue ≤ 500 V AC - gG type fuse		80 A	100 A	160 A
Rated short-time withstand current Icw	**1 s**	1000 A		
At 40 °C ambient temperature,	**10 s**	650 A		
in free air from a cold state	**30 s**	370 A		
	1 min	250 A		
	15 min	110 A	110 A	135 A
Power dissipation per pole	**Ie / AC-1**	2.5 W	5 W	7 W
Max. electrical switching frequency	**AC-1**	600 cycles/h (300 for AF.., AE.., TAE..)		

(1) Unauthorized for TAE.. contactors

Main pole - Utilization characteristics according to UL / CSA

Contactor types	**AC operated**	A45	A50	A75
	DC operated	AE45	AE50	AE75
		TAE45	TAE50	TAE75
	AC / DC operated	AF45	AF50	AF75
Standards		UL 508, CSA C22.2 N°14		
Max. operational voltage		600 V		
UL / CSA general use rating				
600 V AC		65 A	80 A	105 A
With conductor cross-sectional area		AWG 6	AWG 4	AWG 2
Max. electrical switching frequency				
For general use		600 cycles/h (300 for AF.., AE.. TAE..)		

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

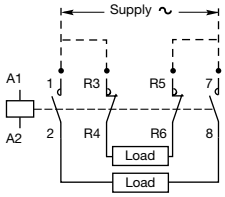


These contactors are suitable for controlling 2 separate circuits, i.e. 2 loads with 2 separate supplies, or 1 circuit comprising 2 separate loads with a single supply (see diagrams below). When the contactor operates there is no mechanical overlapping between the N.O. poles and the N.C. poles: BREAK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

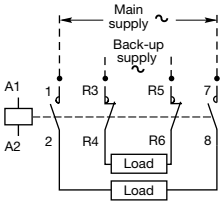
These contactors are not suitable for a reversing starter or for controlling a single load from 2 separate supplies.

Block diagrams

– Single supply and 2 separate loads



– 2 separate supplies and 2 separate loads



1SBC101548S0201

EK110 ... EK1000 4-pole contactors
Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC or DC operated	EK110	EK150	EK175	EK210	EK370	EK550	EK1000
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 60947-1, open contactors, θ ≤ 40 °C		200 A	250 A	300 A	350 A	550 A	800 A	1000 A
With conductor cross-sectional area		95 mm²	150 mm²	185 mm²	240 mm²	2x 185 mm²	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**	200 A	250 A	300 A	350 A	550 A	800 A	1000 A
Ue max. ≤ 1000 V, 50/60 Hz	**θ ≤ 55 °C**	180 A	230 A	270 A	310 A	470 A	650 A	800 A
	θ ≤ 70 °C	155 A	200 A	215 A	250 A	400 A	575 A	720 A
With conductor cross-sectional area		95 mm²	150 mm²	185 mm²	240 mm²	2x 185 mm²	2x 240 mm²	2x 300 mm²
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	120 A	145 A	210 A	210 A	400 A	550 A	-
	380-400 V	120 A	145 A	210 A	210 A	400 A	550 A	-
	415 V	120 A	145 A	210 A	210 A	400 A	550 A	-
3-phase motors	**440 V**	120 A	145 A	210 A	210 A	370 A	550 A	-
	500 V	120 A	145 A	210 A	210 A	370 A	550 A	-
	690 V	120 A	120 A	210 A	210 A	370 A	550 A	-
	1000 V	64 A	80 A	113 A	113 A	155 A	175 A	-
Rated operational power AC-3 (1)								
	220-230-240 V	30 kW	45 kW	59 kW	59 kW	110 kW	160 kW	-
	380-400 V	55 kW	75 kW	110 kW	110 kW	200 kW	280 kW	-
1500 r.p.m. 50 Hz	**415 V**	55 kW	75 kW	110 kW	110 kW	220 kW	315 kW	-
1800 r.p.m. 60 Hz	**440 V**	59 kW	75 kW	110 kW	110 kW	220 kW	315 kW	-
3-phase motors	**500 V**	75 kW	90 kW	132 kW	132 kW	250 kW	400 kW	-
	690 V	110 kW	110 kW	160 kW	160 kW	355 kW	500 kW	-
	1000 V	90 kW	110 kW	160 kW	160 kW	220 kW	250 A	-
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		250 A	250 A	355 A	355 A	630 A	800 A	1000 A
Rated short-time withstand current Icw	**1 s**	1700 A	1800 A	2300 A	2300 A	5500 A	5500 A	6800 A
at 40 °C ambient temperature,	**10 s**	900 A	1200 A	1680 A	1680 A	5300 A	5300 A	6400 A
in free air from a cold state	**30 s**	600 A	700 A	1000 A	1000 A	3700 A	3700 A	4400 A
	1 min	450 A	550 A	800 A	800 A	3000 A	3000 A	3400 A
	15 min	210 A	250 A	320 A	320 A	1000 A	1000 A	1200 A
Maximum breaking capacity								
cos φ = 0.45	**at 440 V**	1400 A	1500 A	2000 A	2000 A	5000 A	5400 A	-
(cos φ = 0.35 for Ie > 100 A)	**at 690 V**	1100 A	1200 A	1700 A	1700 A	5000 A	5400 A	-
Power dissipation per pole	**Ie / AC-1**	10 W	13 W	18 W	18 W	40 W	60 W	80 W
	Ie / AC-3	3 W	5 W	9 W	9 W	15 W	25 W	-
Max. electrical switching frequency	**AC-1**	300 cycles/h						
	AC-3	300 cycles/h						-
	AC-2, AC-4	150 cycles/h		120 cycles/h				-

Main pole - Utilization characteristics according to UL / CSA

Contactor types	AC or DC operated	EK110	EK150	EK175	EK210	EK370	EK550	EK1000
Standards		UL 508, CSA C22.2 N°14						-
Max. operational voltage		600 V						-
UL / CSA general use rating								
600 V AC		170 A	200 A	250 A	300 A	420 A	540 A	-
Short-circuit protection device for contactors								
without thermal overload relay - Motor protection excluded								
Fuse rating		400 A				1200 A		
Fuse type, 600 V		J				L		
Max. electrical switching frequency								
For general use		300 cycles/h						

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

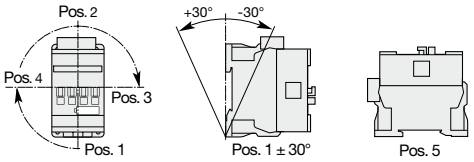
1SFC101029C0201

AF09 ... AF38 4-pole contactors
Technical data

Magnet system characteristics

Contactor types		AC / DC operated	AF09	AF16	AF26	AF38
Coil operating limits acc. to IEC 60947-4-1		**AC supply**	At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max. At θ ≤ 70 °C 0.85 x Uc min...Uc max.			
		DC supply	At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max. At θ ≤ 70 °C (AF) 0.85 x Uc min...Uc max. - (AF..Z) 0.85 x Uc min...1.1 x Uc max.			
AC control voltage	Rated control circuit voltage Uc		24...500 V AC			
50/60 Hz	Coil consumption	**Average pull-in value**	(AF) 50 VA - (AF..Z) 16 VA			
		Average holding value	(AF) 2.2 VA / 2 W - (AF..Z) 1.7 VA / 1.5 W			
DC control voltage	Rated control circuit voltage Uc		12...500 V DC			
	Coil consumption	**Average pull-in value**	(AF) 50 W - (AF..Z) 12...16 W			
		Average holding value	(AF) 2 W - (AF..Z) 1.7 W			
PLC-output control			(AF..Z) ≥ 500 mA 24 V DC			
Drop-out voltage			≤ 60 % of Uc min.			
Voltage sag immunity acc. to SEMI F47-0706			(AF..Z) conditions of use on request			
Dips withstand -20 °C ≤ θ ≤ +60 °C			(AF..Z) 22 ms average			
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		AF09	AF16	AF26	AF38
Mounting positions					
		Max. add-on N.C. auxiliary contacts: see accessory fitting details for a 4-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			

1SBC101549S0201

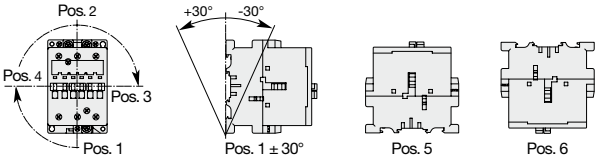
A45 ... A75 4-pole contactors
Technical data

Magnet system characteristics

Contactor types		AC operated	A45	A50	A75
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 "Coil voltage code table".

Mounting characteristics and conditions for use

Contactor types		AC operated	A45	A50	A75
Mounting positions					
			Pos. 5 unauthorized for A45-22-00, A75-22-00		
			Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 4-pole contactor A45 ... A75		
Control voltage / Ambient temperature					
	Mounting positions (1) 1, 1±30°, 2, 3, 4, 5	**at θ ≤ 55 °C**	0.85…1.1 x Uc		
		at θ ≤ 70 °C	Uc		
	6	**at θ ≤ 55 °C**	0.95…1.1 x Uc		
		at θ ≤ 70 °C	Unauthorized		
Mounting distances			The contactors can be assembled side by side		
Fixing	On rail according to IEC 60715, EN 60715		35 x 15 mm or 75 x 25 mm		
	By screws (not supplied)		2 x M6 screws placed diagonally		

(1) For 60 Hz coil voltage: (only for devices fitted with CA 5-.. and CAL 5-11 auxiliary contacts or TP timer).
– A45-40-00, A50-40-00 and A75-40-00 contactors.
Mounting positions 1 to 5 and ambient temperature ≤ 55 °C: tolerance reduced to 0.9...1.1 Uc (instead of 0.85...1.1 Uc) for coil voltage codes 70 to 79 and 80 to 89.
– A45-22-00 and A75-22-00 contactors.
Mounting positions 1 to 4 and ambient temperature ≤ 55 °C: tolerance reduced to 0.9...1.1 Uc (instead of 0.85...1.1 Uc) for coil voltage codes 70 to 79 and 80 to 89.
For mounting position 6 or ambient temperature of 55 to 70 °C the information given on this page remains applicable.

1SBC101550S0201

AE45 … AE75 4-pole contactors
Technical data

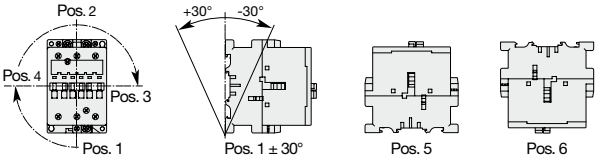
Magnet system characteristics

Contactor types		DC operated	AE45	AE50	AE75
Coil operating limits		**DC supply**	At θ ≤ 55 °C 0.85...1.1 x Uc		
acc. to IEC 60947-4-1			Please also refer to "Mounting characteristics and conditions for use"		
DC control voltage	Rated control circuit voltage Uc		12…250 V DC		
	Coil consumption	**Average pull-in value**	200 W		
		Average holding value	4 W		
Drop-out voltage			approx. 15...40 % of Uc		
Coil time constant	Open	**L/R**	3 ms		
	Closed	**L/R**	15 ms		
Operating time					
Between coil energization and:		**N.O. contact closing**	13…30 ms		
		N.C. contact opening	10…27 ms		
Between coil de-energization and:		**N.O. contact opening** (1)	5…15 ms		
		N.C. contact closing (1)	8…18 ms		

(1) The use of surge suppressors increases the opening time with a factor of 1.1 to 1.5 for RV5 surge suppressor and a factor of 1.5 to 3 for RT5 surge suppressor.

5

Mounting characteristics and conditions for use

Contactor types			DC operated	AE45	AE50	AE75
Mounting positions						
				Pos. 5 unauthorized for AE45-22-00, AE75-22-00		
				Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 4-pole contactor AE45 … AE75 (1)(2)		
Control voltage / Ambient temperature						
	Mounting positions	1, 1±30°, 2, 3, 4, 5	**at θ ≤ 55 °C**	0.85...1.1 x Uc		
			at θ ≤ 70 °C	Uc		
		6	**at θ ≤ 55 °C**	0.95...1.1 x Uc		
			at θ ≤ 70 °C	Unauthorized		
Mounting distances				The contactors can be assembled side by side		
Fixing	On rail according to IEC 60715, EN 60715			35 x 15 mm or 75 x 25 mm		
	By screws (not supplied)			2 x M6 screws placed diagonally		

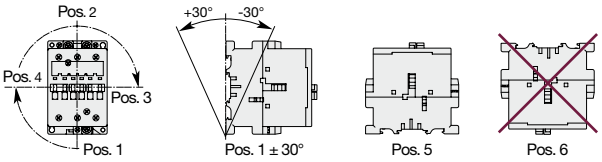
1SBC101552S0201

AF45 … AF75 4-pole contactors
Technical data

Magnet system characteristics

Contactor types		AC / DC operated	AF45	AF50	AF75
Coil operating limits acc. to IEC 60947-4-1		**AC or DC supply**	At θ ≤ 70 °C 0.85 x Uc min…1.1 x Uc max. Please also refer to "Mounting characteristics and conditions for use"		
AC control voltage	Rated control circuit voltage Uc		48…250 V		
50/60 Hz	Coil consumption	**Average pull-in value**	210 VA		
		Average holding value	7 VA / 2.8 W		
DC control voltage	Rated control circuit voltage Uc		20…250 V DC		
	Coil consumption	**Average pull-in value**	190 W		
		Average holding value	2.8 W		
Drop-out voltage			55 % of Uc min.		
Voltage sag immunity acc. to SEMI F47			Conditions of use on request		
Dips withstand			≥ 20 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 / DC operated	AF45	AF50	AF75
Mounting positions					
			Pos. 5 unauthorized for AF45-22-00, AF75-22-00 contactors		
			Max. and add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 4-pole contactor AF45 ... AF110		
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		35 x 15 mm or 75 x 25 mm		
	By screws (not supplied)		2 x M6 screws placed diagonally		

5

1SBC101551S0201

TAE45 ... TAE75 4-pole contactors
Technical data

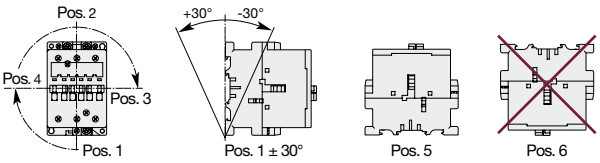
Magnet system characteristics

Contactor types		DC Operated	TAE45	TAE50	TAE75
Coil operating limits		**DC supply**	At θ ≤ 55 °C Uc min...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 Uc		17…264 V DC		
	Coil consumption	**Average pull-in value**	120…250 W		
		Average holding value	1.7…6.5 W		
Drop-out voltage			approx. 10...35 % of Uc max.		
Coil time constant	Open	**L/R**	3 ms		
	Closed	**L/R**	15 ms		
Operating time					
Between coil energization and:		**N.O. contact closing**	13…30 ms		
		N.C. contact opening	10…27 ms		
Between coil de-energization and:		**N.O. contact opening** (1)	5…15 ms		
		N.C. contact closing (1)	8…18 ms		

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

5

Mounting characteristics and conditions for use

Contactor types			DC Operated	TAE45	TAE50	TAE75
Mounting positions						
				Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 4-pole contactor TAE45 ... TAE75		
Control voltage / Ambient temperature						
	Mounting positions	1, 1±30°, 2, 3, 4, 5	**at θ ≤ 55 °C**	Uc min...Uc max		
			at θ ≤ 70 °C	unauthorized		
		6		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		

1SBC101554S0201

EK110 ... EK1000 4-pole contactors
Technical data

Magnet system characteristics

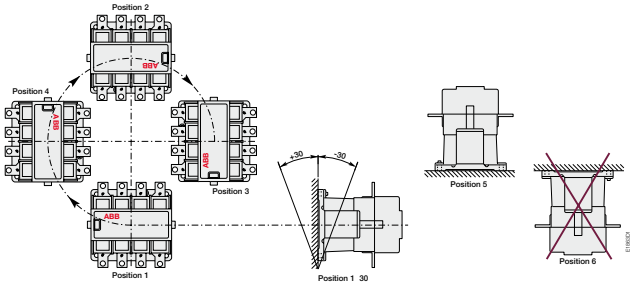
Contactor types		AC operated	EK110	EK150	EK175	EK210	EK370	EK550	EK1000
Coil operating limits acc. to IEC 60947-4-1		**AC supply**	At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max. Please also refer to "Mounting characteristics and conditions for use"						
AC control voltage	Rated control circuit voltage	**50 Hz**	24...500 V				48...500 V		
		60 Hz	24...600 V				110...600 V		
	Coil consumption	**Average pull-in value 50 Hz**	800 VA		1100 VA		3500 VA		
		60 Hz	900 VA		1200 VA		4000 VA		
		50/60 Hz (1)	500 /500 VA		630 / 630 VA		3800 / 3400 VA		
		Average holding value 50 Hz	44 VA / 15 W		52 VA / 18 W		125 VA / 50 W		
		60 Hz	52 VA /18 W		65 VA / 22 W		140 VA / 60 W		
		50/60 Hz (1)	2.5 VA / 2.5 W		2.5 VA / 2.5 W		140 VA /60 W		
Drop-out voltage in % of Uc min.			approx. 45...65 % (20...50 % for "E" coil voltage codes)					approx. 45...65 %	
Operating time									
Between coil energization and:		**N.O. contact closing**	20...40 (1) / 30...50 (2) ms					30...60 ms	
		N.C. contact opening	15...35 (1) / 25...45 (2) ms					25...55 ms	
Between coil de-energization and:		**N.O. contact opening**	7.5...15 (1) / 95...120 (2) ms					10...20 ms	
		N.C. contact closing	10...18 (1) / 100...125 (2) ms					13...23 ms	

(1) "A" coil voltage: see "Coil voltage code table".
(2) 50/60 Hz "E" coil voltage codes, see "Coil voltage code table".

Magnet system characteristics

Contactor types		DC operated	EK110	EK150	EK175	EK210	EK370	EK550	EK1000
Coil operating limits acc. to IEC 60947-4-1		**DC supply**	At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max. Please also refer to "Mounting characteristics and conditions for use"						
DC control voltage	Rated control circuit voltage		12...220				24...220		
	Coil consumption	**Average pull-in value**	500 W		630 W		1100 W		
		Average holding value	2.5 W		2.5 W		20 W		
Drop-out voltage			approx. 15...50 % of Uc min.						
Coil time constant	Open	**L/R**	8 ms				12 ms		
	Closed	**L/R**	50 ms				60 ms		
Operating time									
Between coil energization and:		**N.O. contact closing**	30...50 ms				60...80 ms		
		N.C. contact opening	27...47 ms				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

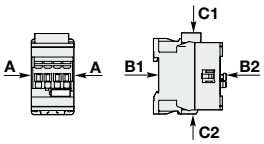
Contactor types		AC / DC operated	EK110	EK150	EK175	EK210	EK370	EK550	EK1000
Mounting positions			 Max. N.O. or N.C. built-in and add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 4-pole contactor EK110 ... EK1000						
Control voltage / Ambient temperature									
Mounting positions	1, 1±30°, 2, 3, 4, 5	**at θ ≤ 70 °C**	0.85...1.1 x Uc						
	2	**at θ ≤ 70 °C**	Unauthorized				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				4 x M6 (1)		

(1) Damping elements are supplied.

1SFC101032C0201

AF09 ... AF38 4-pole contactors
Technical data

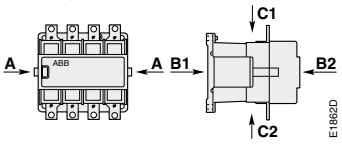
General technical data

Contactor types			AF09	AF16	AF26	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			-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			
		B1	25 g closed position / 5 g open position			
		B2	15 g			
		C1	25 g			
		C2	25 g			
	2 N.O. + 2 N.C. Main poles	**A**	30 g		30 g closed position / 25 g open position	
		B1	25 g closed position / 5 g open position		25 g closed position / 5 g open position	
		B2	15 g		15 g closed position / 10 g open position	
		C1	25 g		25 g closed position / 20 g open position	
		C2	25 g		25 g closed position / 20 g open position	
Vibration withstand			5...300 Hz			
acc. to IEC 60068-2-6			4 g closed position / 2 g open position			

1SBC101556S0201

EK110 ... EK1000 4-pole contactors
Technical data

General technical data

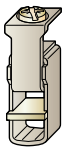
Contactor types	AC or DC operated	EK110	EK150	EK175	EK210	EK370	EK550	EK1000
Rated insulation voltage Ui								
acc. to IEC 60947-4-1		1000 V						
acc. to UL		600 V						
Rated impulse withstand voltage Uimp.		8 kV						
Electromagnetic compatibility		EK contactors complying with IEC 60947-1 / EN 60947-1 - 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		10 millions operating cycles				5 millions operating cycles		3 millions operating cycles
Max. switching frequency		3600 cycles/h				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						

5

1SFC101031C0201

AF09 ... AF38 4-pole contactors
Technical data

Connecting characteristics

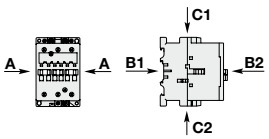
Contactor types			AF09 / AF16	AF26 / AF38
Main terminals			Screw terminals with cable clamp	 Screw terminals with double connector 2 x (5.5 width x 6.8 depth)
Connection capacity (min. ... max.)				
Main conductors (poles)				
Rigid	Solid (≤ 4 mm²)	**1 x**	1...6 mm²	1.5...16 mm²
	Stranded (≥ 6 mm²)	**2 x**	1...6 mm²	1.5...16 mm²
Flexible with non insulated ferrule		**1 x**	0.75...6 mm²	1.5...16 mm²
		2 x	0.75...6 mm²	1.5...16 mm²
Flexible with insulated ferrule		**1 x**	0.75...4 mm²	1.5...16 mm²
		2 x	0.75...2.5 mm²	1.5...16 mm²
Bars or lugs		**L <**	9.6 mm	-
Connection capacity acc. to UL/CSA		**1 or 2 x**	AWG 16...10	AWG 16...6
Stripping length			10 mm	12 mm
Tightening torque			1.5 Nm / 13 lb.in	2.5 Nm / 22 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	
Coil terminals			IP20	
Screw terminals			Delivered in open position, screws of unused terminals must be tightened	
Main terminals			M3.5	M4.5
		Screwdriver type	Flat Ø 5.5 / Pozidriv 2	
Coil terminals			M3.5	
		Screwdriver type	Flat Ø 5.5 / Pozidriv 2	

1SBC101565S0201

A45 ... A75, AE, TAE and AF45 ... AF75 4-pole contactors
Technical data

General technical data

Contactor types	**AC operated**	A45	A50	A75
	DC operated	AE45	AE50	AE75
		TAE45	TAE50	TAE75
	AC / DC operated	AF45	AF50	AF75
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 complying with IEC 60947-1 / EN 60947-1 - Environment A		
Ambient air temperature close to contactor				
Operation		-40...+70 °C (1)		
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 AE... and TAE... contactors)		
Max. switching frequency		3600 cycles/h (300 for AF...)		
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**	20 g		
	B1	10 g closed position / 5 g open position		
	B2	15 g		
	C1	20 g		
	C2	20 g		
2 N.O. + 2 N.C. Main poles	**A**	20 g		
	B1	10 g closed position / 5 g open position (2)		
	B2	15 g (3)		
	C1	20 g		
	C2	20 g		



(1) 55 °C max. for TAE... contactors.
(2) 3 g in open position for AF 45-22, AE 45-22, AF 75-22 and AE 75-22.
(3) 10 g for AF 45-22, AE 45-22, AF 75-22 and AE 75-22.

1SBC101557S0201

A45 … A75, AE, TAE and AF45 … AF75 4-pole contactors
Technical data

Connecting characteristics

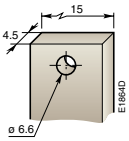
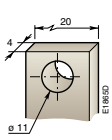
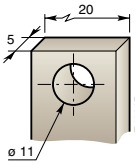
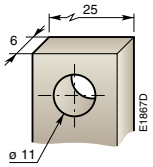
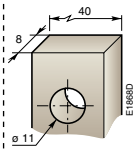
Contactor types			**AC operated**	A45	A50	A75
			DC operated	AE45	AE50	AE75
				TAE45	TAE50	TAE75
			AC / DC operated	AF45	AF50	AF75
Main terminals				Screw terminals with single connector (13 x 10 mm)		
Connection capacity (min. ... max.)						
Main conductors (poles)						
	Rigid	Solid (≤ 4 mm²)	**1 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 (built-in auxiliary terminals + 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		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		

5

1SBC101567S0201

EK110 ... EK1000 4-pole contactors
Technical data

Connecting characteristics

Contactor types		AC or DC operated	EK110	EK150	EK175	EK210	EK370	EK550	EK1000
Main terminals Flat type									
Connection capacity (min. ... max.)									
Main conductors (poles)									
Rigid with connector		Single for Cu cable	25...120 mm²	25...185 mm²	25...185 mm²		70...300 mm²		-
		Single for Al/Cu cable	10...70 mm²	35...120 mm²	35...120 mm²		70...300 mm²		95...300 mm²
		Double for Al/Cu cable	-	-	-		2 x 35...185		2 x 95...300
Bars or lugs	**L ≤**		30 mm	30 mm	33 mm	33 mm	55 mm	55 mm	55 mm
	Ø >		6 mm	10 mm	10 mm	10 mm	10 mm	10 mm	10 mm
Connection capacity acc. to UL/CSA	**1 or 2 x**		8 -3 /0 AWG		6 - 250 MCM		2 x 4 - 500 MCM	3 x 4 - 500 MCM	-
Tightening torque		Recommended	5 Nm/44 lb.in	18 Nm / 160 lb.in					
		Max.	6 Nm	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			M6		M10				
			Screws and bolts						
Coil terminals (delivered in open positions)			M3.5						
		Screwdriver type	Flat Ø 5.5 mm / Pozidriv 2						

1SFC101034C0201

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 Ic = Ie for category AC-1. The curve corresponding to category AC-1 represents 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 category AC-1

- Note the characteristics of the load to be controlled:
  – Operational voltage ..... Ue
  – Current normally drawn ..... Ie
  – 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

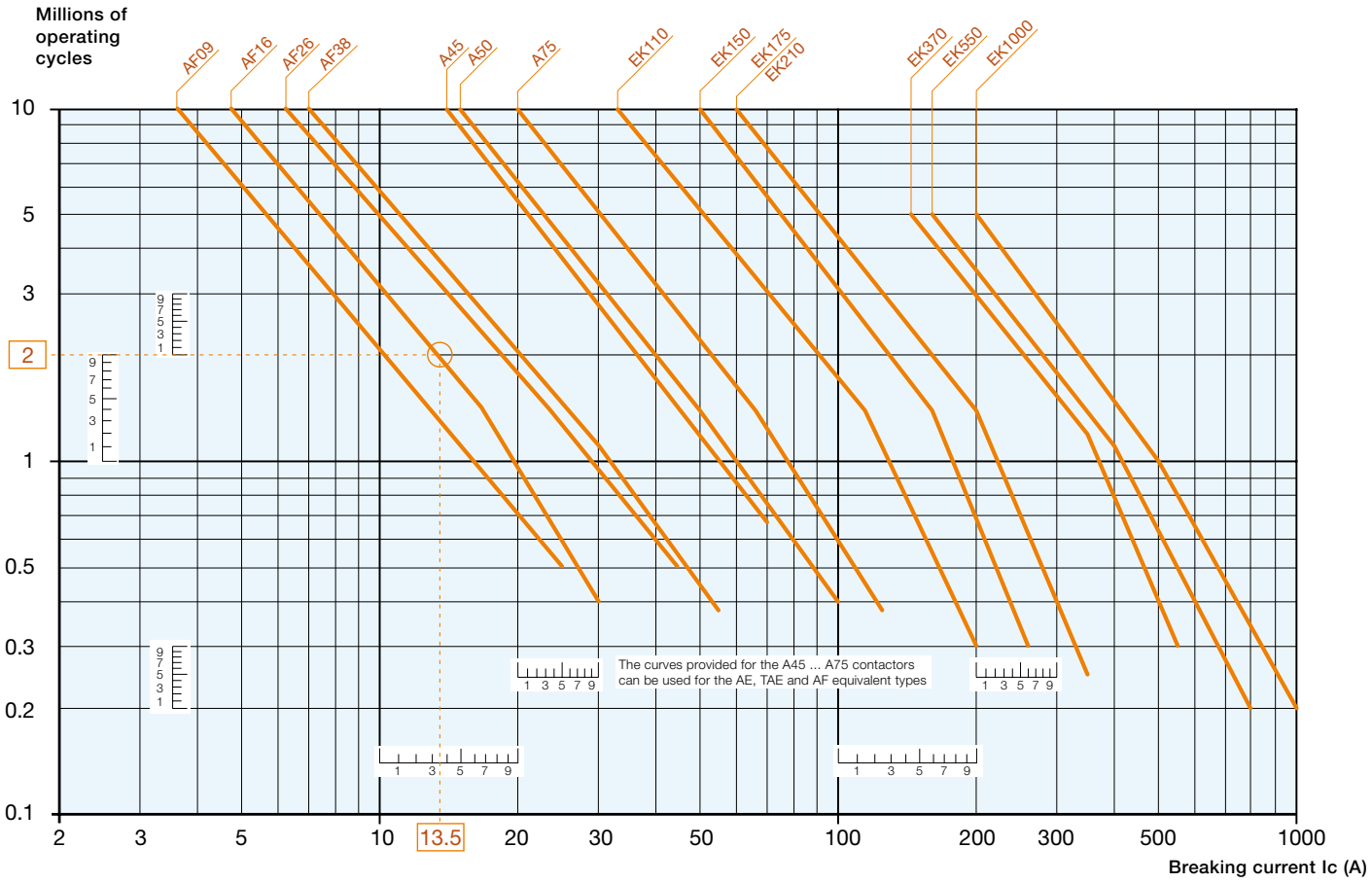
For uninterrupted duty, some verifications of preventing maintenance are necessary to check the functionality of the concerned product (consult us). The combinated effect of environmental conditions and the proper temperature of the product may require some disposals. As a matter of fact, for this duty, the use duration prevails over the number of operating cycles.

1SBC101546S0201

4-pole contactors
Electrical durability

Electrical durability for AC-1 utilization category - Ue ≤ 690 V
Ambient temperature ≤ 60 °C for AF09 ... AF38, ≤ 55 °C for A45 ... EK1000

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



Example:
I_c / AC-1 = 13.5 A – Electrical durability required = 2 millions operating cycles.
Using the AC-1 curves above select the AF16 contactor at intersection "○" (13.5 A / 2 millions operating cycles).

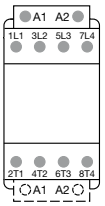
1SBC101568S0201

Notes

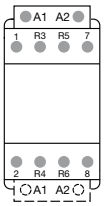
AF09 ... AF38 4-pole contactors
Terminal marking and positioning

AF09 ... AF38 contactors - AC / DC operated

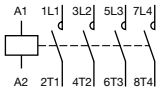
Standard devices without addition of auxiliary contacts



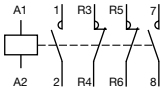
AF09 ... AF38..-40-00



AF09 ... AF38..-22-00



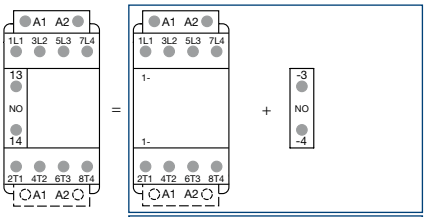
AF09 ... AF38..-40-00



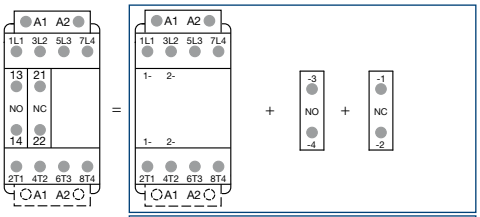
AF09 ... AF38..-22-00

5

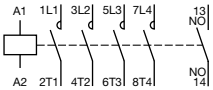
Other possible contact combinations with auxiliary contacts added by the user



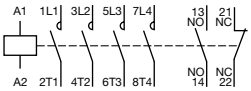
Combination 10 = AF09 ... AF38..-40-00 + CA4-10



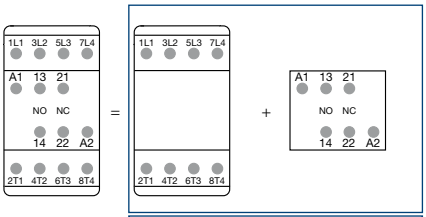
Combination 11 = AF09 ... AF38..-40-00 + CA4-10 + CA4-01



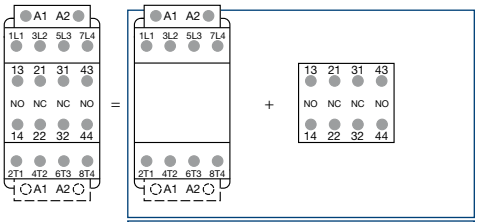
Combination 10



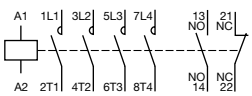
Combination 11



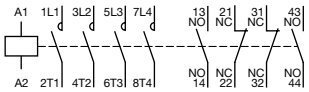
Combination 11 = AF09 ... AF38..-40-00 + CAT4-11E



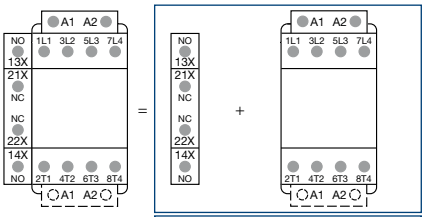
Combination 22 = AF09 ... AF38..-40-00 + CA4-22E



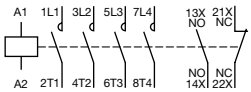
Combination 11



Combination 22



Combination 11 = CAL4-11 + AF09 ... AF38..-40-00



Combination 11

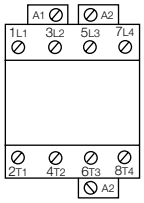
1SBC101480S0201

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

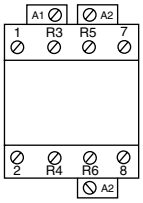
A..., AF..., AL..., AE..., TAE... 4-pole contactors
Terminal marking and positioning

A45 ... A75 contactors - AC operated

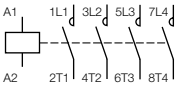
Standard devices without addition of auxiliary contacts



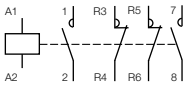
A45 ... A75-40-00



A45/75-22-00



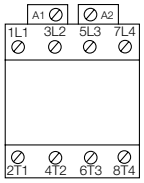
A45 ... A75-40-00



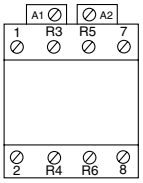
A45/75-22-00

AF45 ... AF75 contactors - AC / DC operated

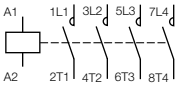
Standard devices without addition of auxiliary contacts



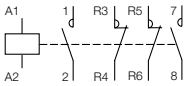
AF45 ... AF75-40-00



AF45/75-22-00



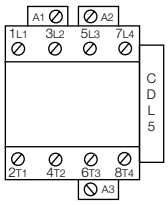
AF45 ... AF75-40-00



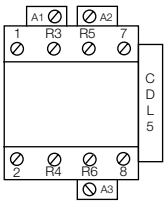
AF45/75-22-00

AE... and TAE... contactors - DC operated

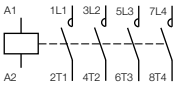
Standard devices without addition of auxiliary contacts



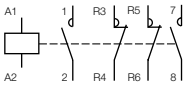
AE45 ... AE75-40-00
TAE45 ... TAE75-40-00



AE45/75-22-00



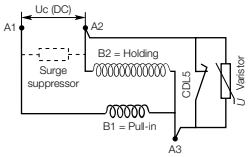
AE45 ... 75-40-00
TAE45 ... 75-40-00



AE45/75-22-00

Coil wiring

AE45 ... AE75
TAE45 ... TAE75



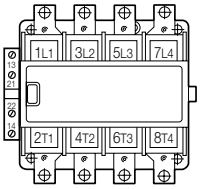
5

1SBC101483S0201

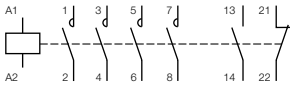
EK 4-pole contactors
Terminal marking and positioning

EK110 ... EK1000 contactors - AC operated

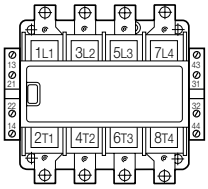
Standard devices



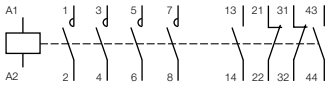
EK110 ... EK1000-40-11



EK110 ... EK1000-40-11

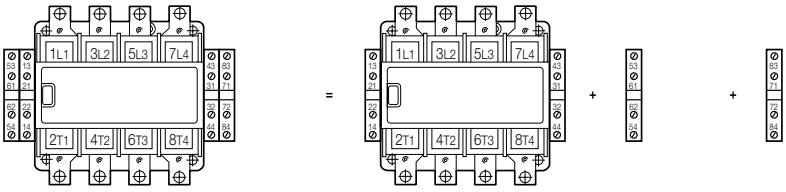


EK110 ... EK1000-40-22

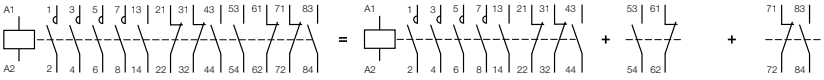


EK110 ... EK1000-40-22

Other possible contact combinations with auxiliary contacts added by the user



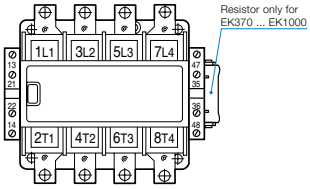
Combination 44 = EK110 ... EK1000-40-22 + CAL16-11C + CAL16-11D



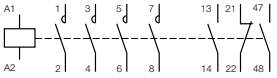
Combination 44 = EK110 ... EK1000-40-22 + CAL16-11C + CAL16-11D

EK110 ... EK1000 contactors - with multifrequency coil or DC operated

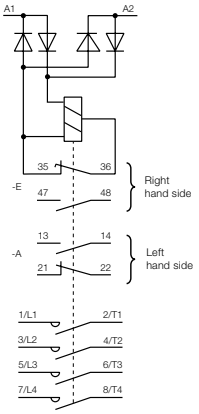
Standard devices



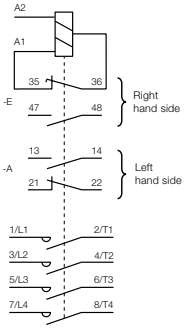
EK110 ... EK1000-40-21



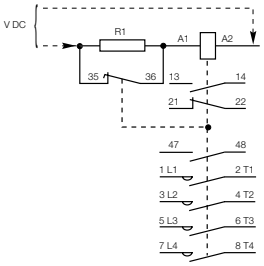
EK110 ... EK1000-40-21



EK110 ... EK210 multifrequency coil

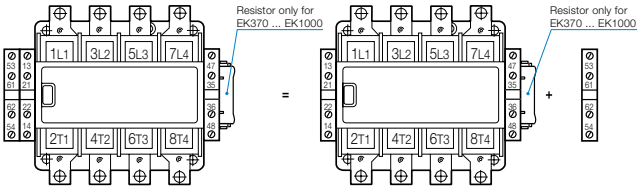


EK110 ... EK210 DC operated

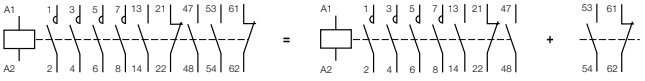


EK370 ... EK1000 DC operated

Other possible contact combinations with auxiliary contacts added by the user



Combination 32 = EK110 ... EK1000-40-21 + CAL16-11C

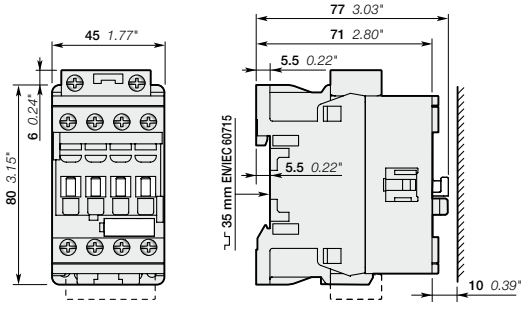


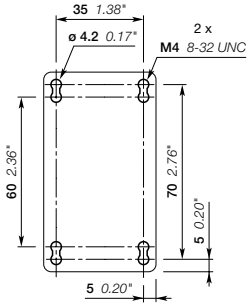
Combination 32 = EK110 ... EK1000-40-21 + CAL16-11C

1SBC101484S0201

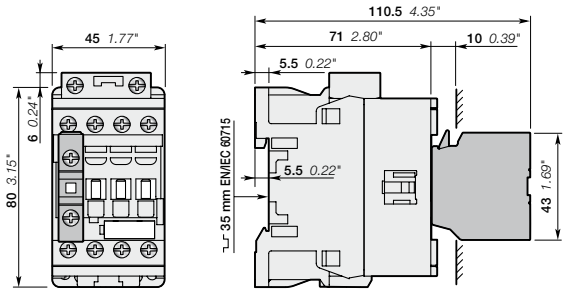
AF09, AF16 4-pole contactors

Main dimensions mm, *inches*

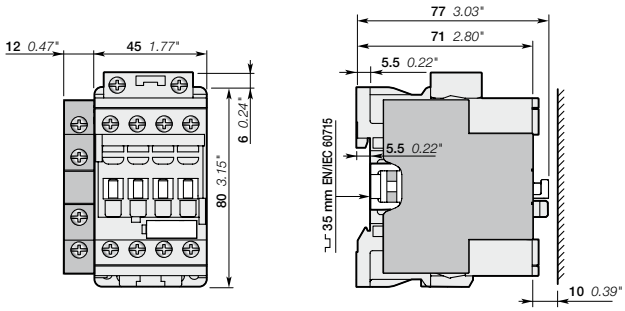




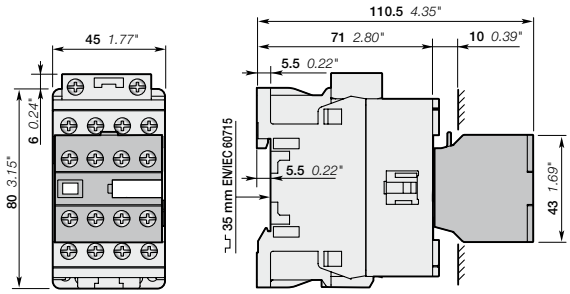
AF09, AF16



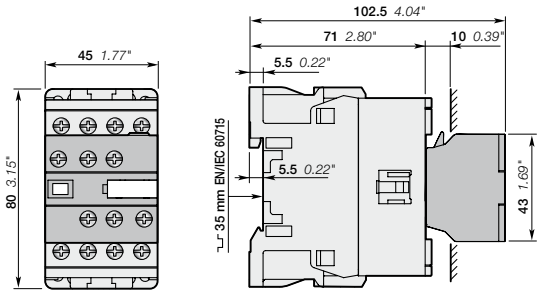
AF09, AF16
+ CA4, CC4 1-pole auxiliary contact block



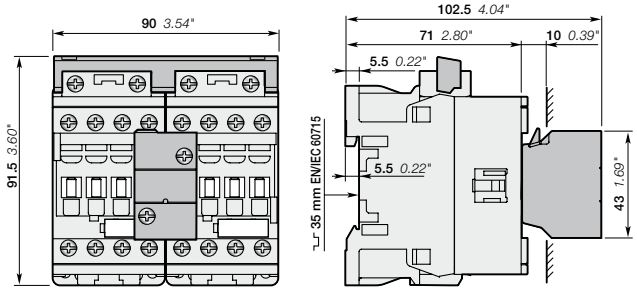
AF09, AF16
+ CAL4-11 2-pole auxiliary contact block



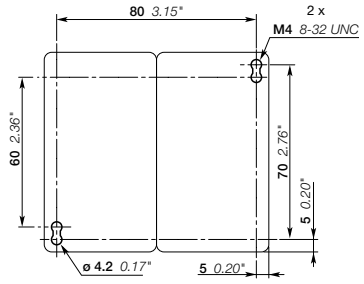
AF09, AF16
+ CA4 4-pole auxiliary contact block



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



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



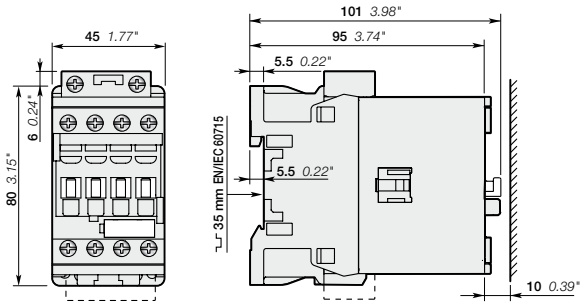
Note: contactor lateral distance to grounded component 2 mm *0.08"* min.

5

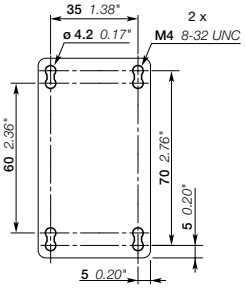
1SBC101485S0201

AF26, AF38 4-pole contactors

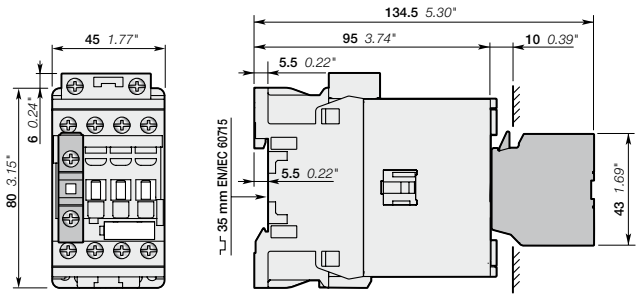
Main dimensions mm, *inches*



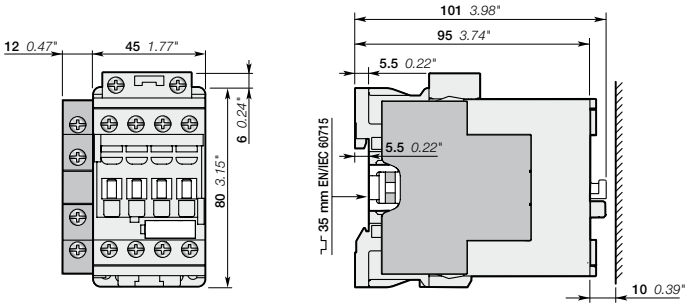
AF26, AF38



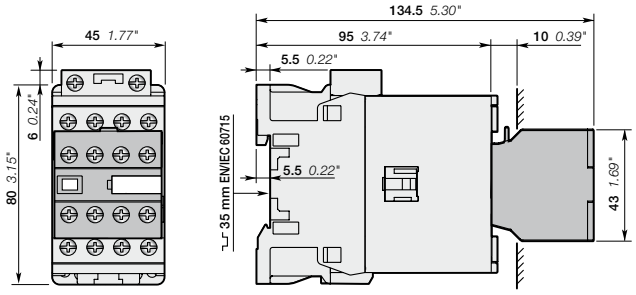
AF26, AF38



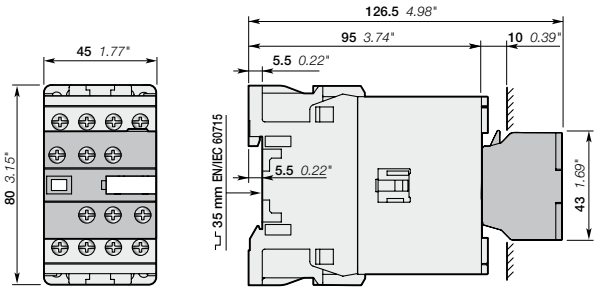
AF26, AF38
+ CA4, CC4 1-pole auxiliary contact block



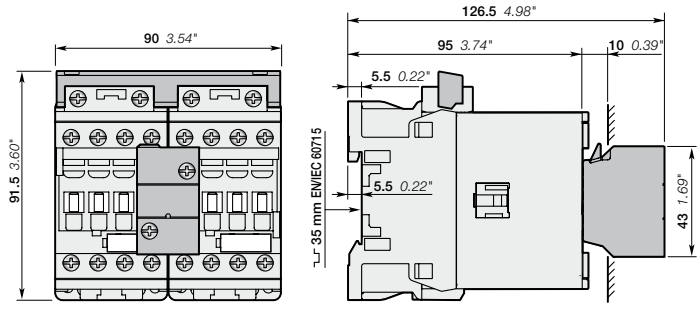
AF26, AF38
+ CAL4-11 2-pole auxiliary contact block



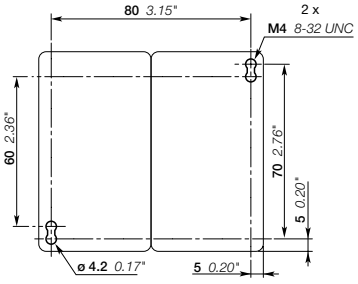
AF26, AF38
+ CA4 4-pole auxiliary contact block



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



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



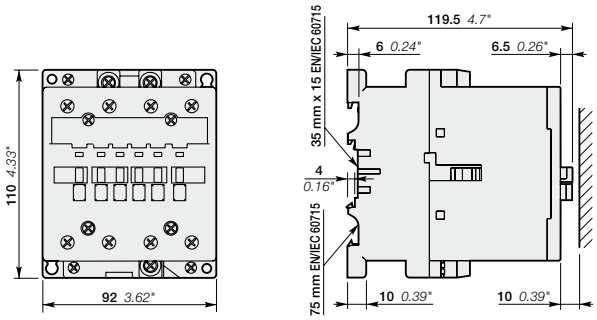
AF26..-40-00, AF38..-40-00
+ VEM4 mechanical and electrical interlock set

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

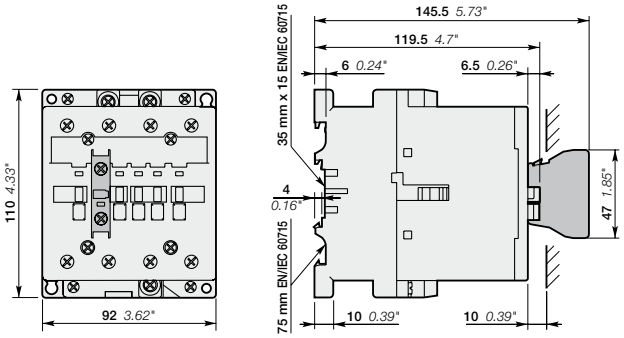
1SBC101486S0201

A45, A50 and A75 4-pole contactors
AF45, AF50 and AF75 4-pole contactors

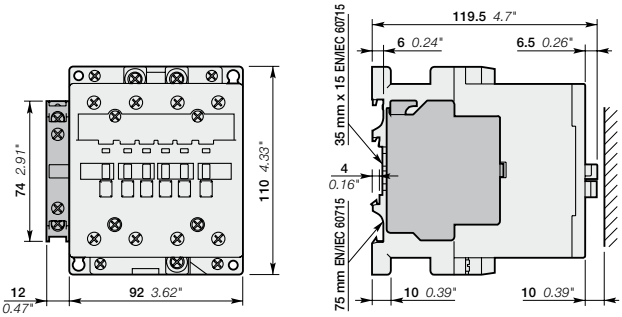
Main dimensions mm, *inches*



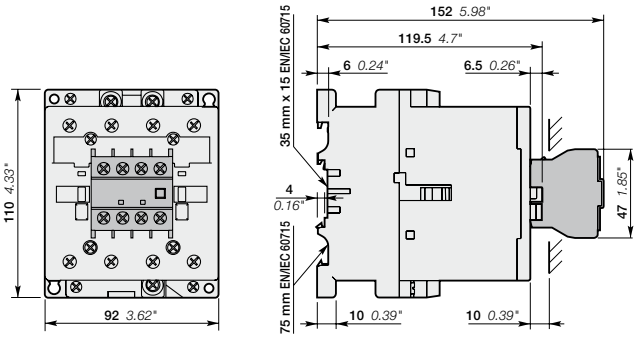
A45, A50, A75, AF45, AF50, AF75



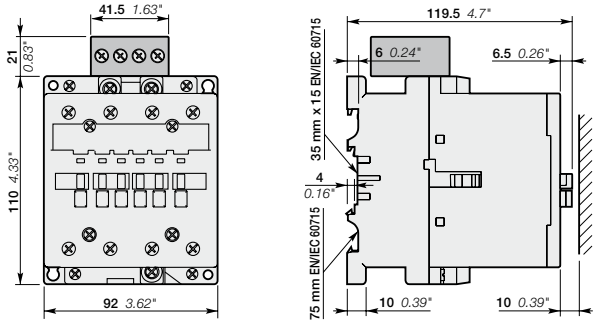
A45, A50, A75, AF45, AF50, AF75
+ CA5 front-mounted 1-pole auxiliary contact block



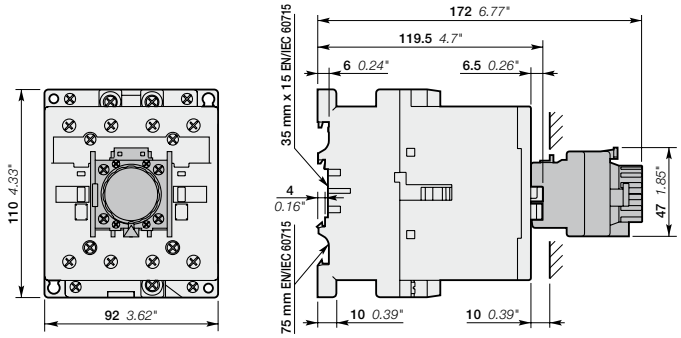
A45, A50, A75, AF45, AF50, AF75
+ CAL5 side-mounted 2-pole auxiliary contact block



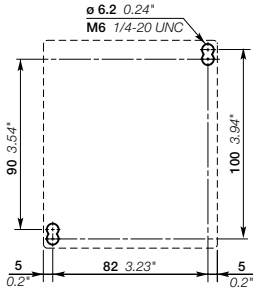
A45, A50, A75, AF45, AF50, AF75
+ CA5 front-mounted 4-pole auxiliary contact block



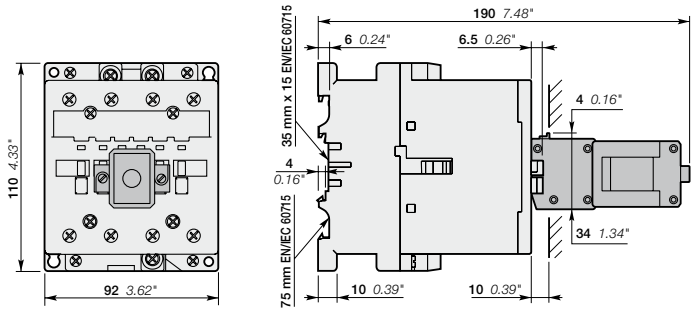
A45, A50, A75, AF45, AF50, AF75
+ RA5 interface relay



A45, A50, A75, AF45, AF50, AF75
+ TP pneumatic timer



A45, A50, A75, AF45, AF50, AF75



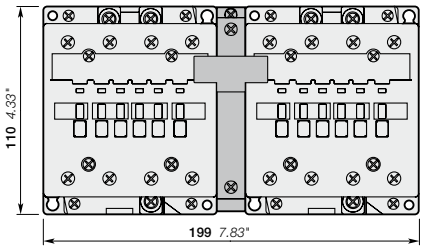
A45, A50, A75, AF45, AF50, AF75
+ WB75-A on-position latch

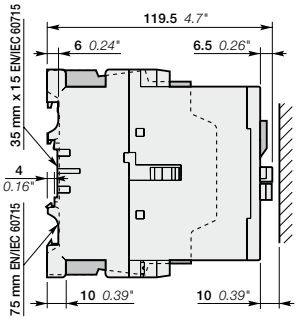
5

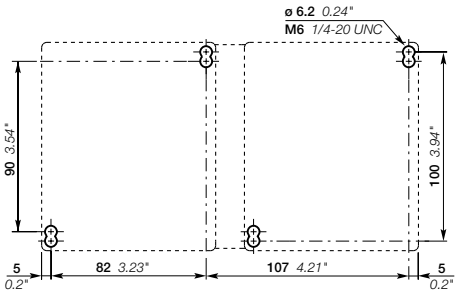
1SBC101487S0201

A45, A50 and A75 4-pole contactors
AF45, AF50 and AF75 4-pole contactors

Main dimensions mm, *inches*







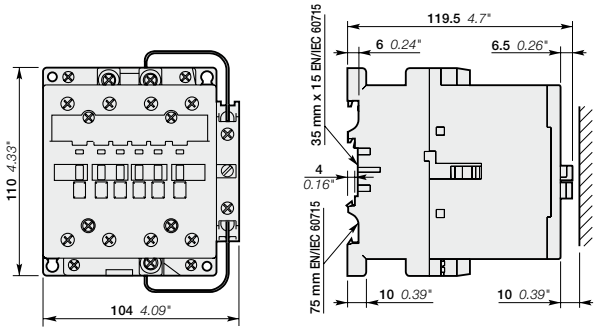
A45-40, A50-40, A75-40, AF45-40, AF50-40, AF75-40 + VE5-2 electrical and mechanical interlock unit

5

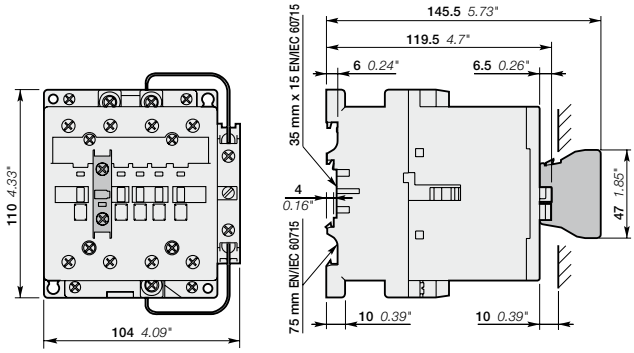
1SBC101487S0201

AE45, AE50 and AE75 4-pole contactors
TAE45, TAE50 and TAE75 4-pole contactors
DC operated

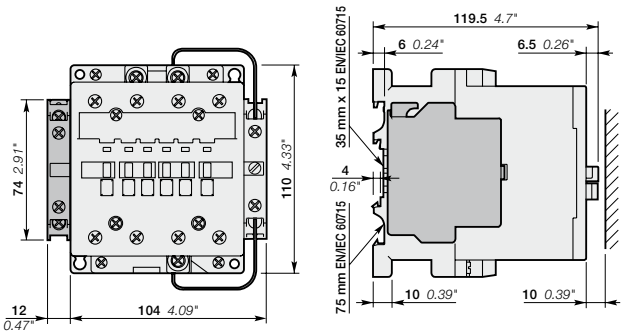
Main dimensions mm, *inches*



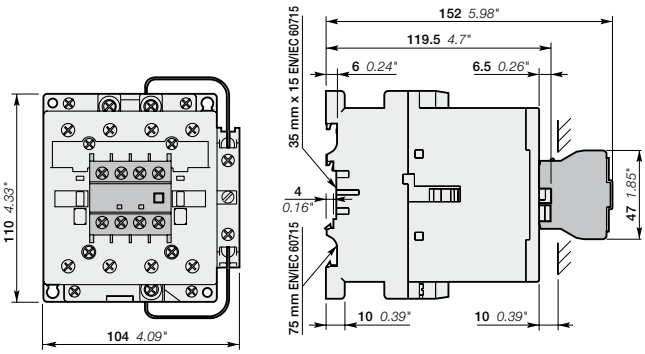
AE45, AE50, AE75, TAE45, TAE50, TAE75



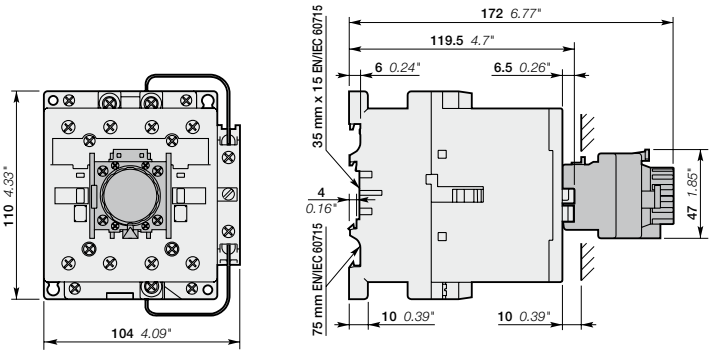
AE45, AE50, AE75, TAE45, TAE50, TAE75
+ CA5 front-mounted 1-pole auxiliary contact block



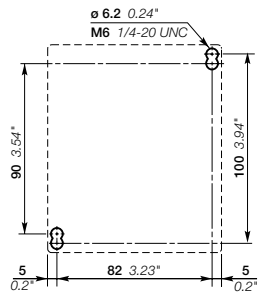
AE45, AE50, AE75, TAE45, TAE50, TAE75
+ CAL5 side-mounted 2-pole auxiliary contact block



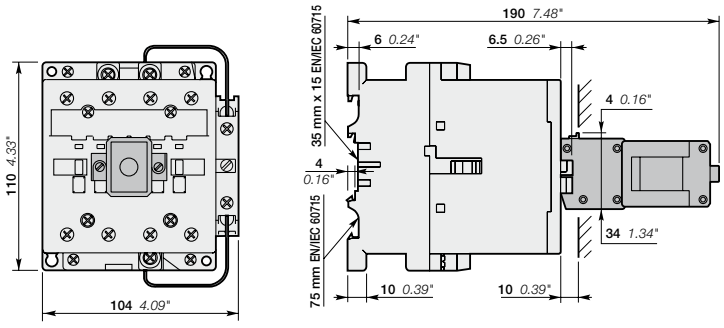
AE45, AE50, AE75, TAE45, TAE50, TAE75
+ CA5 front-mounted 4-pole auxiliary contact block



AE45, AE50, AE75, TAE45, TAE50, TAE75
+ TP pneumatic timer



AE45, AE50, AE75, TAE45, TAE50, TAE75



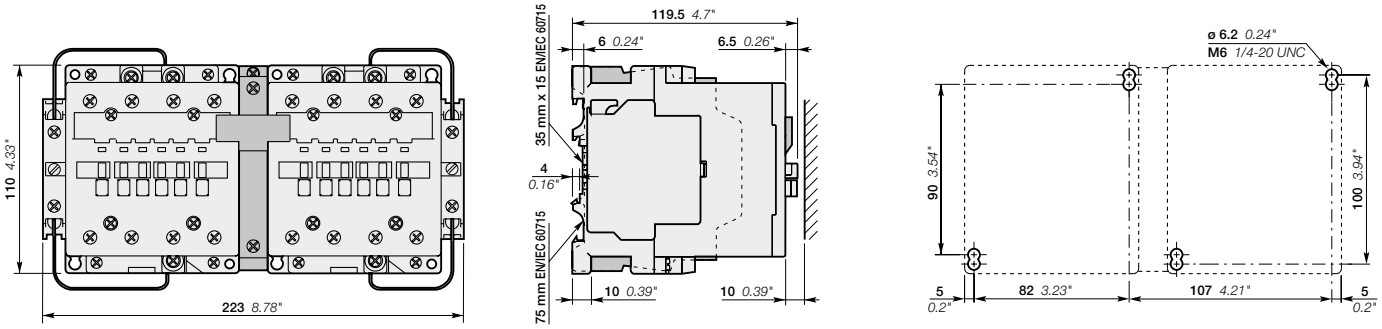
AE45, AE50, AE75, TAE45, TAE50, TAE75
+ WB75-A on-position latch

5

1SBC101488S0201

AE45, AE50 and AE75 4-pole contactors
TAE45, TAE50 and TAE75 4-pole contactors
DC operated

Main dimensions mm, *inches*



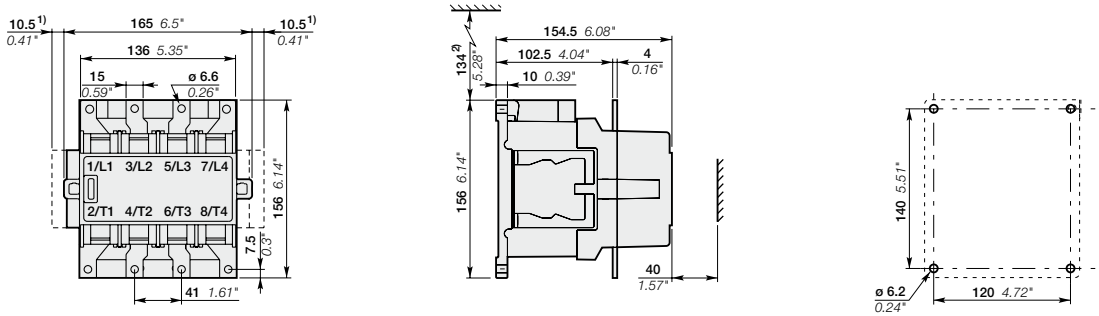
AE45-40, AE50-40, AE75-40, TAE45-40, TAE50-40, TAE75-40 + VE5-2 electrical and mechanical interlock unit

5

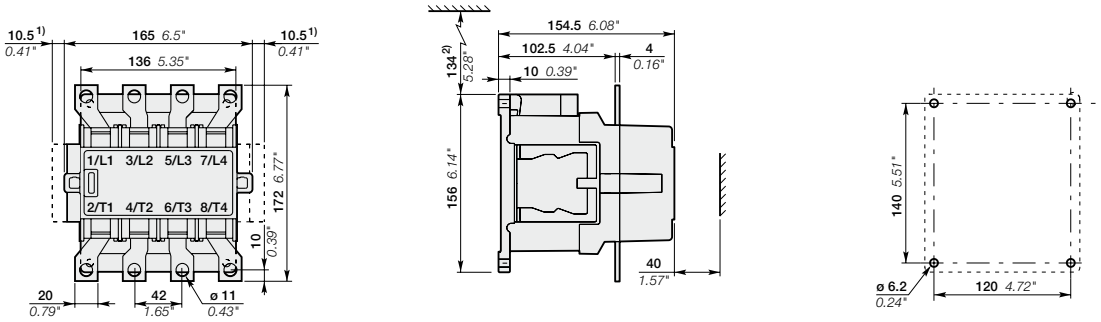
1SBC101488S0201

EK110 ... EK210 4-pole contactors
AC operated

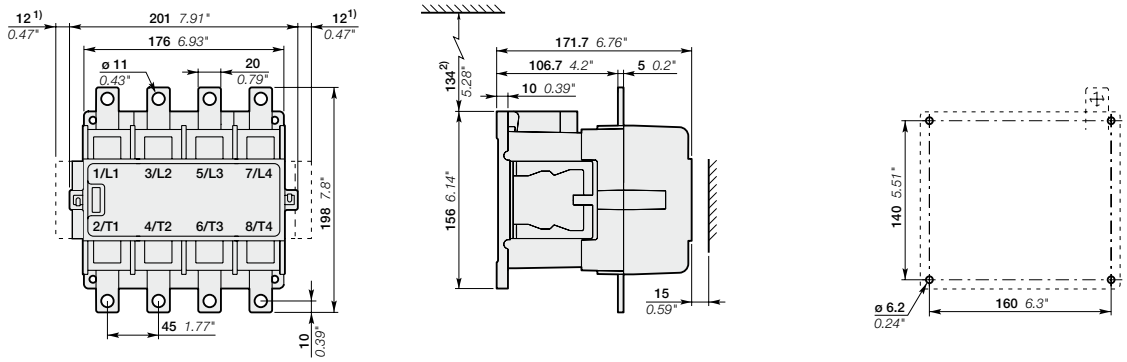
Main dimensions mm, *inches*



EK110



EK150



EK175, EK210

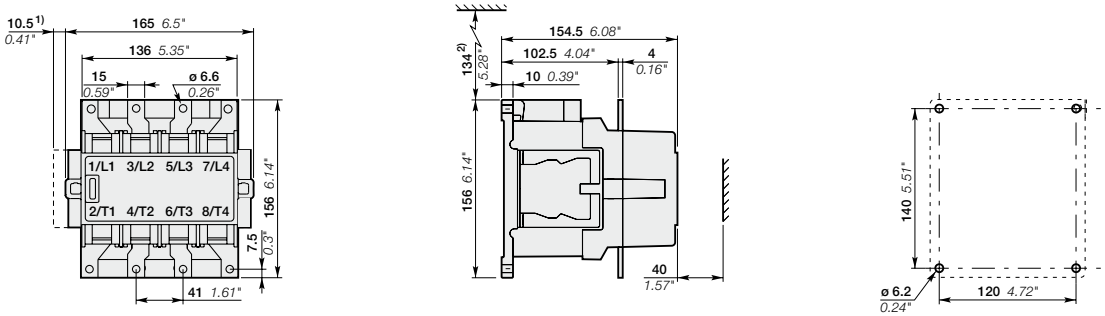
1) Dimension for extra auxiliary contact block
2) Min. distance to uninsulated wall

5

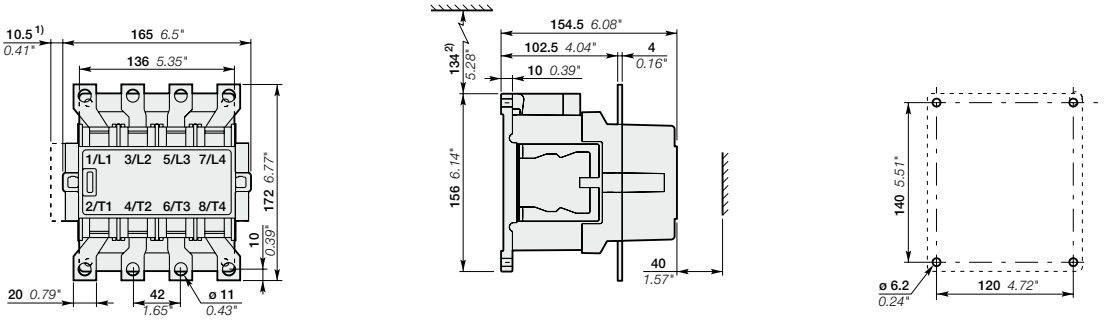
1SBC101650S0201

EK110 ... EK210 4-pole contactors
DC operated

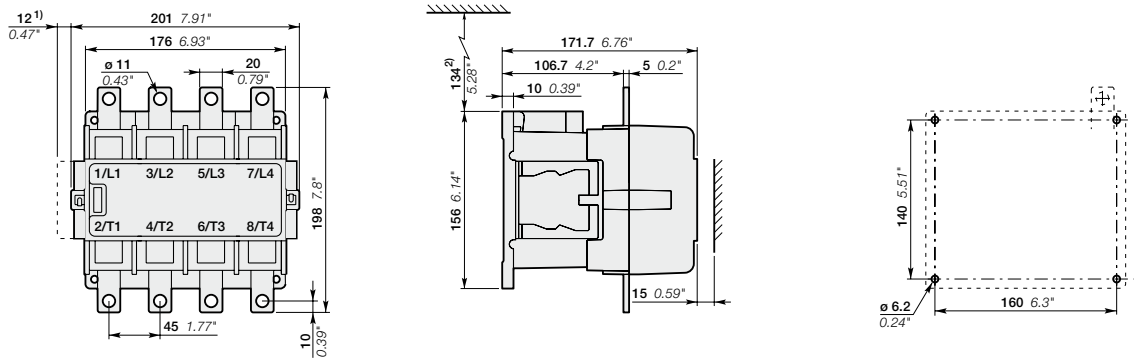
Main dimensions mm, *inches*



EK110



EK150



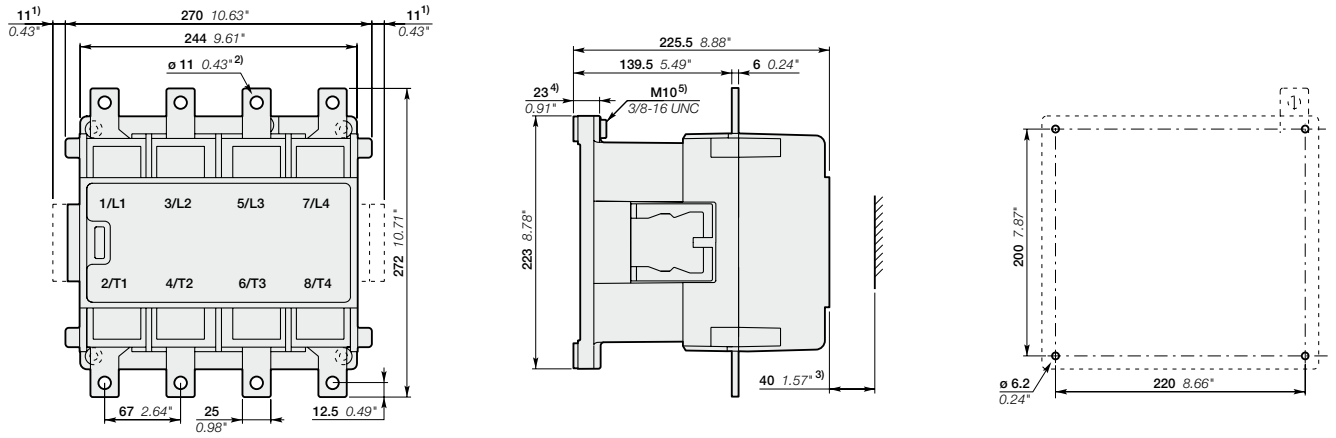
EK175, EK210

1) Dimension for extra auxiliary contact block
2) Min. distance to uninsulated wall

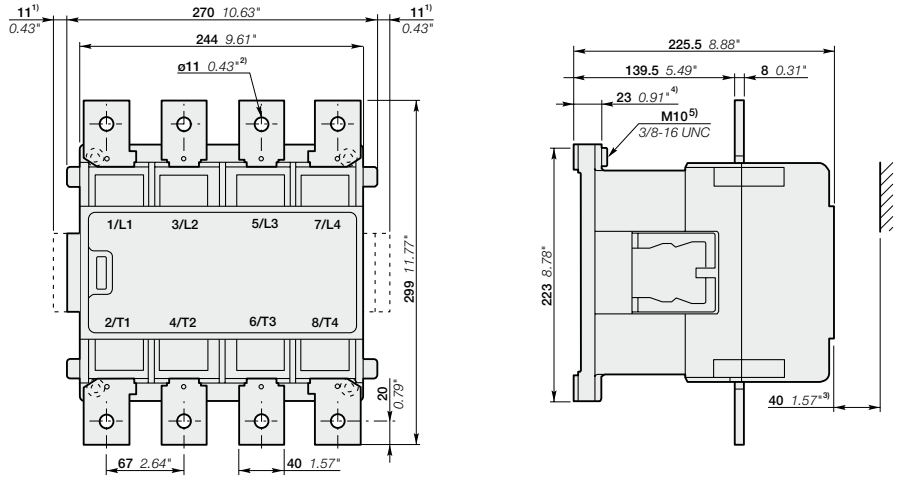
1SBC101652S0201

EK370 ... EK1000 4-pole contactors
AC operated

Main dimensions mm, *inches*

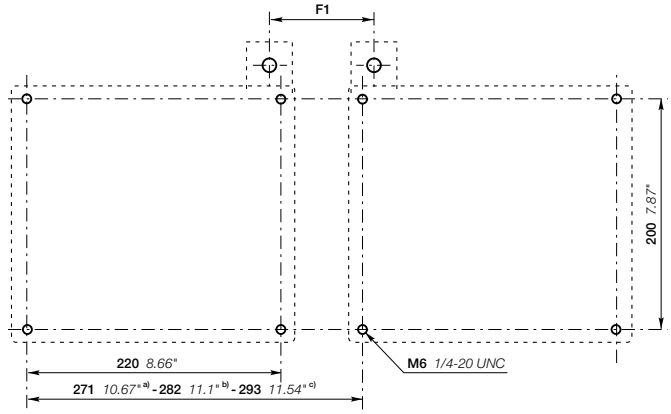


EK370, EK550



EK1000

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



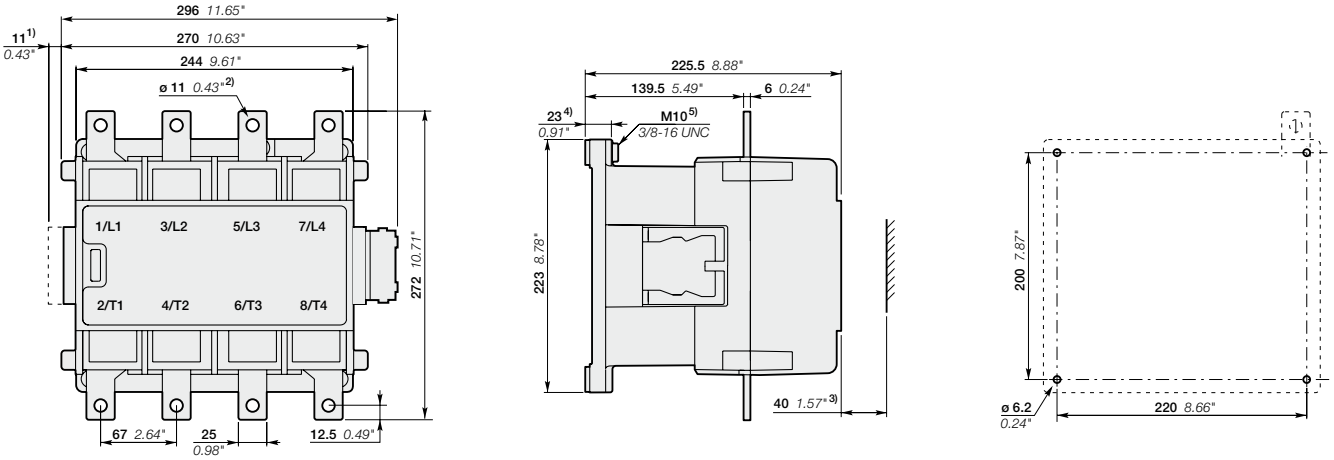
EK1000

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

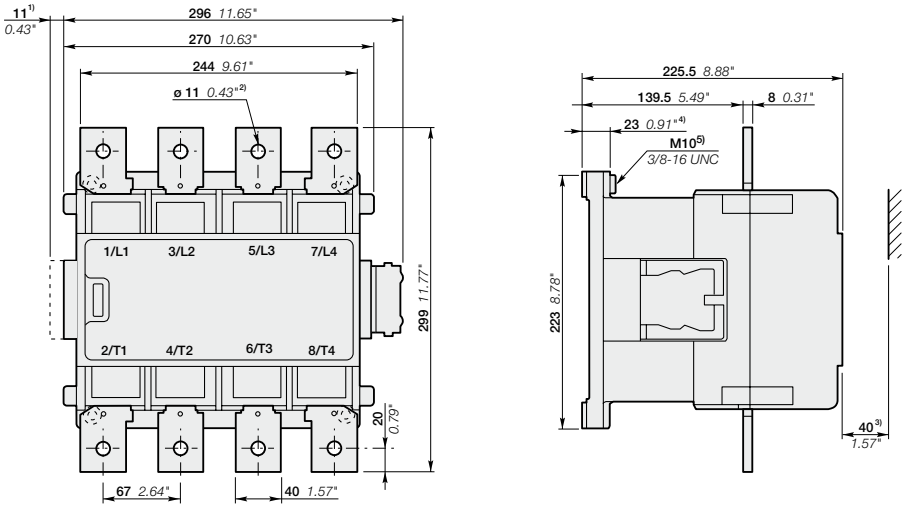
1SBC101651S0201

EK370 ... EK1000 4-pole contactors
DC operated

Main dimensions mm, *inches*

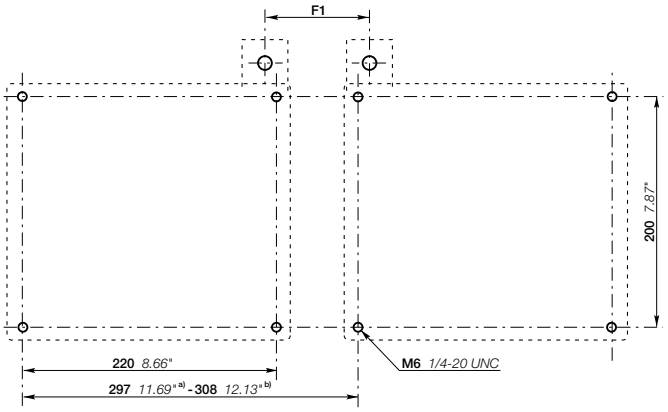


EK370, EK550



EK1000

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



EK1000

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

1SBC101653S0201

Notes

1SBC101723S0201

Contactors for capacitor switching

Overview 5/190

UA16..RA up to UA110..RA - Unlimited peak Î

Ordering details 5/192
Main accessories 5/195
Technical data 5/196
Terminal marking and positioning 5/198
Main dimensions 5/199

UA16 up to UA110 - Peak current Î ≤ 100 times the rms current

Ordering details 5/201
Main accessories 5/206
Technical data 5/207
Terminal marking and positioning 5/209
Main dimensions 5/210
Selection table 5/212

1SBC101723S0201

Contactors for capacitor switching
AC-6b utilization category according to IEC 60947-4-1

Capacitor transient conditions

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

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

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

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

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

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

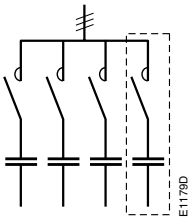
The inrush current peak, in the case of fixed correction, can reach 30 times the nominal current of the capacitor bank.

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

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

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

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



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

Steady state condition data

The presence of harmonics and the network's voltage tolerance lead to a current, estimated to be 1.3 times the nominal current $\mathbf{I_n}$ 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"**.

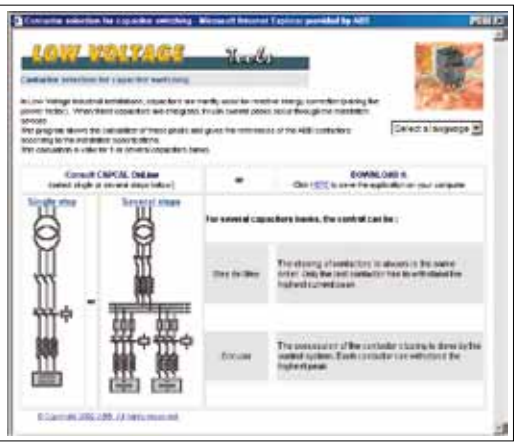
Alternatively by the **CAPCAL selection tool**, available on the ABB Website:
www.abb.com/lowvoltage

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.



1SBC101603S0201

Contactors for capacitor switching
The ABB solutions

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

UA..RA contactors for capacitor switching (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.

A... and AF... standard contactors

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

Please consult us.

5

1SBC101604S0201

UA16..RA … UA30..RA 3-pole contactors for capacitor switching
12.5 to 30 kvar - Unlimited peak current Î
AC operated

UA16-30-10RA

UA30-30-10RA

5

Description

UA..RA contactors for capacitor switching can be used for installations in which the peak current far exceeds 100 times nominal rms current. The contactors are delivered complete with their damping resistors and must be used without additional inductances.

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

These contactors are of the block type design with:

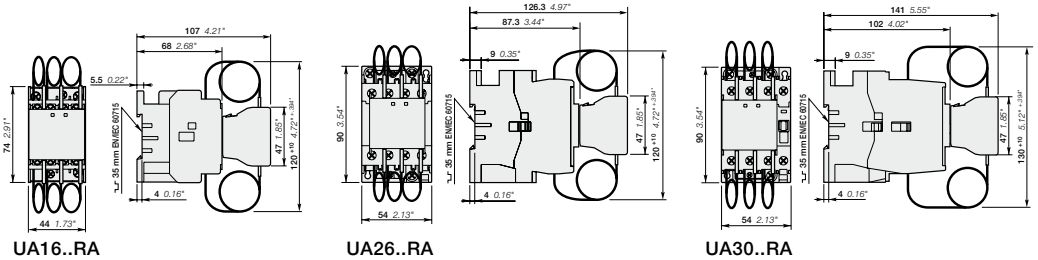
– 3 main poles and 1 built-in auxiliary contact
– the UA..RA contactors are fitted with a special front-mounted block, which ensures the serial insertion of 3 damping resistors into the circuit to limit the current peak on energization of the capacitor bank
  - their connection also ensures capacitor precharging in order to limit the second current peak occurring upon making of the main poles
  - the insertion of resistors allows to damp the highest current peak of the capacitor when switching on, whatever its level.
– control circuit: AC operated
– add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

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

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



UA50..RA ... UA75..RA 3-pole contactors for capacitor switching
40 to 60 kvar - Unlimited peak current Î
AC operated

UA75-30-00 RA

Description

UA..RA contactors for capacitor switching can be used for installations in which the peak current far exceeds 100 times nominal rms current. The contactors are delivered complete with their damping resistors and must be used without additional inductances.

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

These contactors are of the block type design with:

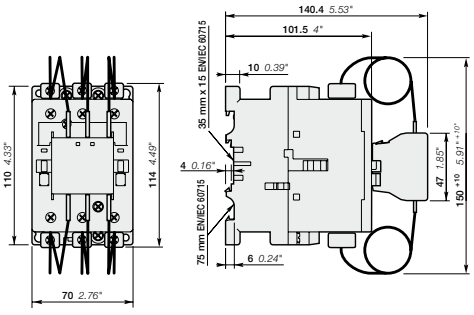
– 3 main poles
– the UA..RA contactors are fitted with a special front-mounted block, which ensures the serial insertion of 3 damping resistors into the circuit to limit the current peak on energization of the capacitor bank
  - their connection also ensures capacitor precharging in order to limit the second current peak occurring upon making of the main poles
  - the insertion of resistors allows to damp the highest current peak of the capacitor when switching on, whatever its level.
– control circuit: AC operated
– add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

IEC Rated operational power θ ≤ 40 °C 400 V AC-6b kvar	UL/CSA Rated operational power θ ≤ 40 °C 480 V kvar	Rated control circuit voltage Uc (1) V 50 Hz	V 60 Hz	Auxiliary contacts fitted		Type	Order code		Weight Pkg (1 pce) kg
40	50	24	24	0	0	UA50-30-00RA	1SBL351024R8100		1.350
		48	48	0	0	UA50-30-00RA	1SBL351024R8300		1.350
		110	110...120	0	0	UA50-30-00RA	1SBL351024R8400		1.350
		220...230	230...240	0	0	UA50-30-00RA	1SBL351024R8000		1.350
		230...240	240...260	0	0	UA50-30-00RA	1SBL351024R8800		1.350
		380...400	400...415	0	0	UA50-30-00RA	1SBL351024R8500		1.350
		400...415	415...440	0	0	UA50-30-00RA	1SBL351024R8600		1.350
50	55	24	24	0	0	UA63-30-00RA	1SBL371024R8100		1.350
		48	48	0	0	UA63-30-00RA	1SBL371024R8300		1.350
		110	110...120	0	0	UA63-30-00RA	1SBL371024R8400		1.350
		220...230	230...240	0	0	UA63-30-00RA	1SBL371024R8000		1.350
		230...240	240...260	0	0	UA63-30-00RA	1SBL371024R8800		1.350
		380...400	400...415	0	0	UA63-30-00RA	1SBL371024R8500		1.350
		400...415	415...440	0	0	UA63-30-00RA	1SBL371024R8600		1.350
60	64	24	24	0	0	UA75-30-00RA	1SBL411024R8100		1.350
		48	48	0	0	UA75-30-00RA	1SBL411024R8300		1.350
		110	110...120	0	0	UA75-30-00RA	1SBL411024R8400		1.350
		220...230	230...240	0	0	UA75-30-00RA	1SBL411024R8000		1.350
		230...240	240...260	0	0	UA75-30-00RA	1SBL411024R8800		1.350
		380...400	400...415	0	0	UA75-30-00RA	1SBL411024R8500		1.350
		400...415	415...440	0	0	UA75-30-00RA	1SBL411024R8600		1.350

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



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

UA95..RA ... UA110..RA 3-pole contactors for capacitor switching
70 to 80 kvar - Unlimited peak current Î
AC operated

UA110-30-00 RA

5

Description

UA..RA contactors for capacitor switching can be used for installations in which the peak current far exceeds 100 times nominal rms current. The contactors are delivered complete with their damping resistors and must be used without additional inductances.

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

These contactors are of the block type design with:

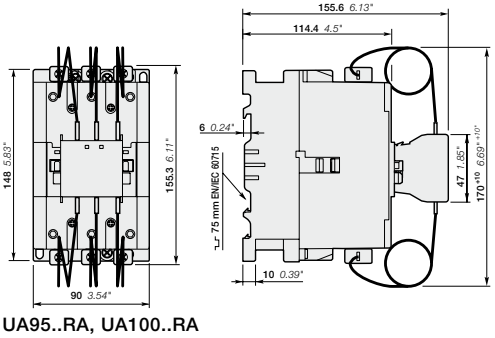
– 3 main poles
– the UA..RA contactors are fitted with a special front-mounted block, which ensures the serial insertion of 3 damping resistors into the circuit to limit the current peak on energization of the capacitor bank
  - their connection also ensures capacitor precharging in order to limit the second current peak occurring upon making of the main poles
  - the insertion of resistors allows to damp the highest current peak of the capacitor when switching on, whatever its level.
– control circuit: AC operated
– add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

IEC	UL/CSA	Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power θ ≤ 40 °C 400 V AC-6b	Rated operational power θ ≤ 40 °C 480 V	V 50 Hz	V 60 Hz						Pkg (1 pce)
									kg
70	80	24	24	0	0	UA95-30-00RA	1SFL431024R8100		2.000
		48	48	0	0	UA95-30-00RA	1SFL431024R8300		2.000
		110	110...120	0	0	UA95-30-00RA	1SFL431024R8400		2.000
		220...230	230...240	0	0	UA95-30-00RA	1SFL431024R8000		2.000
		230...240	240...260	0	0	UA95-30-00RA	1SFL431024R8800		2.000
		380...400	400...415	0	0	UA95-30-00RA	1SFL431024R8500		2.000
		400...415	415...440	0	0	UA95-30-00RA	1SFL431024R8600		2.000
80	95	24	24	0	0	UA110-30-00RA	1SFL451024R8100		2.000
		48	48	0	0	UA110-30-00RA	1SFL451024R8300		2.000
		110	110...120	0	0	UA110-30-00RA	1SFL451024R8400		2.000
		220...230	230...240	0	0	UA110-30-00RA	1SFL451024R8000		2.000
		230...240	240...260	0	0	UA110-30-00RA	1SFL451024R8800		2.000
		380...400	400...415	0	0	UA110-30-00RA	1SFL451024R8500		2.000
		400...415	415...440	0	0	UA110-30-00RA	1SFL451024R8600		2.000

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



UA95..RA, UA100..RA

1SBC101553S0201

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

Main accessory fitting details

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

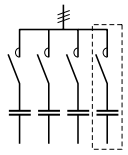
Contactor types	Main poles		Available auxiliary contacts		Front-mounted accessories Auxiliary contact blocks 1-pole CA5-..		Side-mounted accessories Auxiliary contact blocks 2-pole CAL...
UA16-30-10RA	3	0	1	0	–		1 x CAL5-11
UA26-30-10RA	3	0	1	0	–		1 to 2 x CAL5-11
UA30-30-10RA	3	0	1	0	1 x CA5-...	+	1 to 2 x CAL5-11
UA50-30-00RA	3	0	0	0	1 to 2 x CA5-...	+	1 to 2 x CAL5-11
UA63-30-00RA	3	0	0	0			
UA75-30-00RA	3	0	0	0			
UA95-30-00RA	3	0	0	0	1 to 2 x CA5-...	+	1 to 2 x CAL18-11
UA110-30-00RA	3	0	0	0			

1SBC101509S0201

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

Main pole - Utilization characteristics according to IEC

Contactor types		AC operated	UA16..RA	UA26..RA	UA30..RA	UA50..RA	UA63..RA	UA75..RA	UA95..RA	UA110..RA
Standards			IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1							
Rated operational voltage Ue max.			690 V							
Rated frequency (without derating)			50 / 60 Hz							
AC-6b Utilization category										
Rated operational power AC-6b										
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 (1)			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) The fuse ratings given represent the maximum ratings ensuring type 1 coordination according to the definition of standard IEC 60947-4-1.

Main pole - Utilization characteristics according to UL / CSA

Contactor types		AC operated	UA16..RA	UA26..RA	UA30..RA	UA50..RA	UA63..RA	UA75..RA	UA95..RA	UA110..RA
Power - 60 Hz										
For air temperature close to contactor	θ ≤ 40 °C	240 V	8 kvar	11 kvar	14 kvar	25 kvar	27.5 kvar	32 kvar	40 kvar	45 kvar
		480 V	16 kvar	22 kvar	28 kvar	50 kvar	55 kvar	64 kvar	80 kvar	95 kvar
		600 V	20 kvar	27 kvar	35 kvar	62 kvar	70 kvar	80 kvar	100 kvar	120 kvar
Max. permissible peak Current Î			Unlimited							

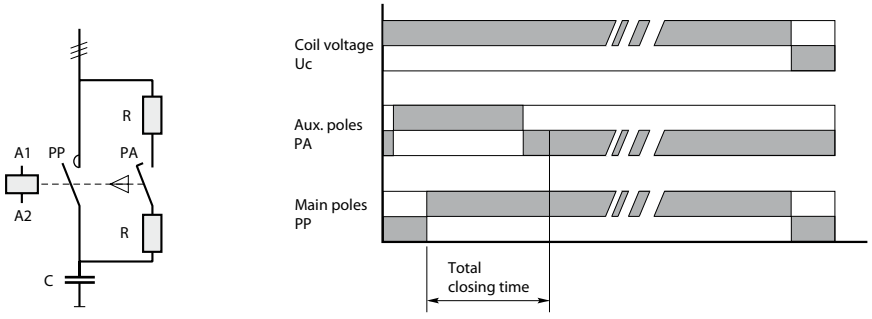
Operating principle

The front-mounted block mechanism of the UA..RA contactors ensures:
- early making of the auxiliary "PA" poles with respect to the main "PP" poles
- automatic return to the open position of the auxiliary "PA" poles after the main poles are closed.

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

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

The contactor can then begin a new cycle.



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

1SBC101510S0201

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

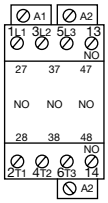
Connecting characteristics

Contactor types			AC operated	UA16..RA	UA26..RA	UA30..RA	UA50..RA UA63..RA UA75..RA	UA95..RA UA110..RA
Connection capacity (min. ... max.)								
Main conductors (poles)								
Rigid	Solid (≤ 4 mm²)		**1 x**	1...4 mm²	1.5...6 mm²	2.5...16 mm²	6...50 mm²	10...95 mm²
	Stranded (≥ 6 mm²)		**2 x**	-	-	2.5...16 + 2.5...6 mm²	6...25 + 6...16 mm²	6...35 mm²
Flexible with ferrule			**1 x**	0.75...2.5 mm²	1.5...4 mm²	2.5...10 mm²	6...35 mm²	10...70 mm²
			2 x	-	-	2.5...10 + 2.5...4 mm²	6...16 + 6...10 mm²	6...35 mm²
Bars or lugs			**L ≤**	7.7 mm	10 mm	-	-	-
			I >	3.7 mm	4.2 mm	-	-	-
Connection capacity acc. to UL/CSA			**1 or 2 x**	AWG 18...10	AWG 12...8	AWG 8...4	AWG 8...1	AWG 6...2/0
Tightening torque	Recommended			1 Nm / 9 lb.in	1.7 Nm / 15 lb.in	2.3 Nm / 20 lb.in	4 Nm / 35 lb.in	8 Nm / 53 lb.in
	Max.			1.2 Nm	2.2 Nm	2.6 Nm	4.5 Nm	9 Nm
Auxiliary conductors								
(built-in auxiliary terminals + coil terminals)								
Rigid solid			**1 x**	1...4 mm²				0.75...2.5 mm²
			2 x	1...4 mm²				0.75...2.5 mm²
Flexible with ferrule			**1 x**	0.75...2.5 mm²			1...2.5 mm²	0.75...2.5 mm²
			2 x	0.75...2.5 mm²				
Lugs	Coil terminals		**L ≤**	8 mm				
			I >	3.7 mm				
	Built-in auxiliary terminals		**L ≤**	7.7 mm	10 mm	8 mm	-	-
			I >	3.7 mm	4.2 mm	3.7 mm	-	-
Connection capacity acc. to UL/CSA			**1 or 2 x**	AWG 18...14				
Tightening torque								
Coil terminals	Recommended			1 Nm / 9 lb.in				
	Max.			1.2 Nm				
Built-in auxiliary terminals	Recommended			1 Nm / 9 lb.in				
	Max.			1.2 Nm				
Degree of protection								
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529								
Main terminals				IP20		IP10		
Coil terminals				IP20				
Built-in auxiliary terminals				IP20			-	-
Screw terminals				Delivered in open position, screws of unused terminals must be tightened				
Main terminals				M 3.5	M 4	M 5	M6	M8
		Screwdriver type		Flat Ø 5.5 / Pozidriv 2		Flat Ø 6.5 / Pozidriv 2		Hexagon socket (s = 4 mm)
Coil terminals				M 3.5				
		Screwdriver type		Flat Ø 5.5 / Pozidriv 2				
Built-in auxiliary terminals				M 3.5	M 4	M 3.5	-	-
		Screwdriver type		Flat Ø 5.5 / Pozidriv 2			-	-

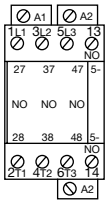
Other technical characteristics are the same as those of standard A contactors.

UA..RA contactors
Terminal marking and positioning

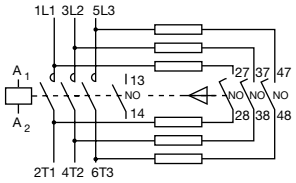
UA..RA contactors - AC operated
Standard devices without addition of auxiliary contacts



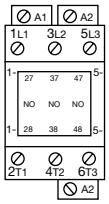
UA16-30-10 RA
UA26-30-10 RA



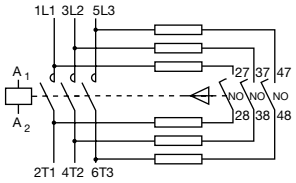
UA30-30-10 RA



UA16 ... 30-30-10 RA



UA50 ... 110-30-00 RA



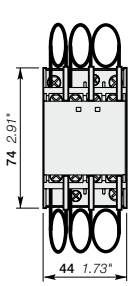
UA50 ... 110-30-00 RA

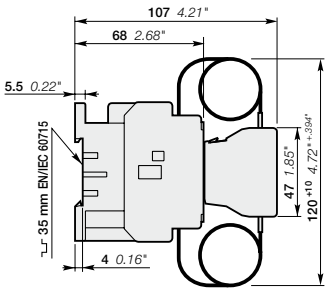
5

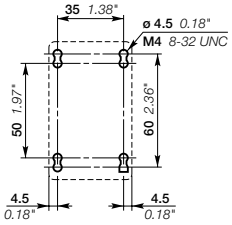
1SBC101574S0201

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

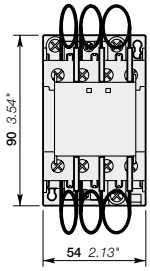
Main dimensions mm, *inches*

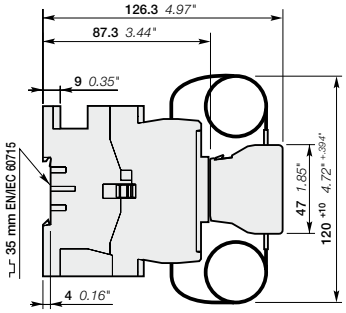


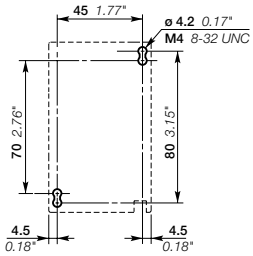




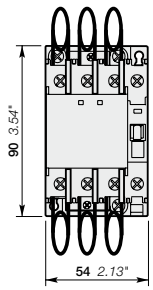
UA16..RA

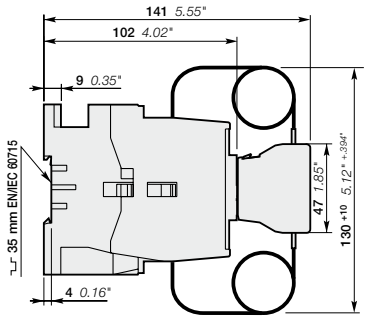


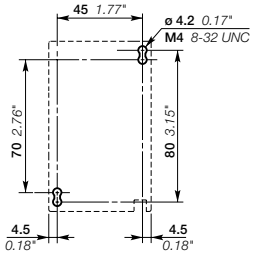




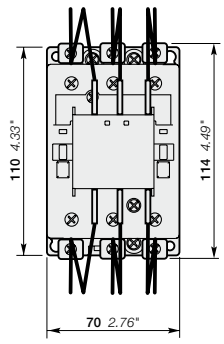
UA26..RA

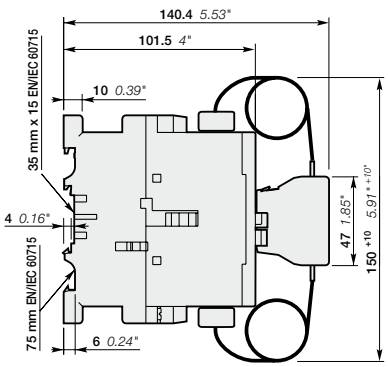


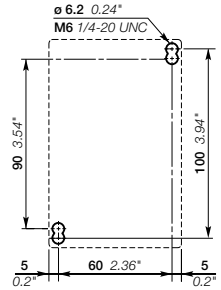




UA30..RA







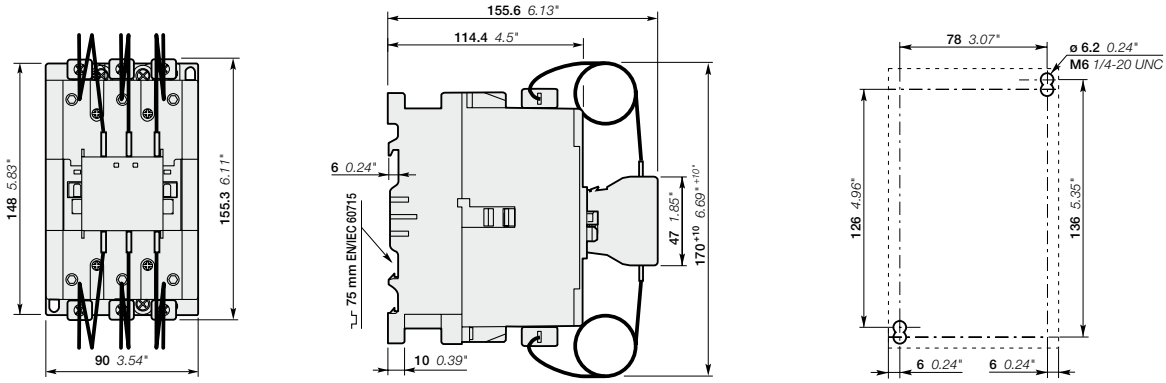
UA50..RA, UA63..RA, UA75..RA

5

1SBC101575S0201

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

Main dimensions mm, *inches*



UA95..RA, UA110..RA

5

1SBC101575S0201

UA16 ... UA30 3-pole contactors for capacitor switching
12.5 to 27.5 kvar - peak current Î ≤ 100 times the rms current
AC operated

UA16-30-10

UA30-30-10

Description

UA contactors can be used for the switching of capacitor banks whose inrush current peaks are less than or equal to 100 times nominal rms current.

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

These contactors are of the block type design with:

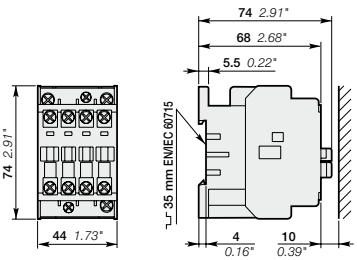
– 3 main poles and 1 built-in auxiliary contact
– control circuit: AC operated
– add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

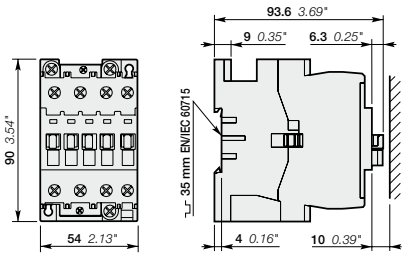
IEC		UL/CSA	Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power θ ≤ 40 °C 400 V AC-6b	Max peak current Î	Rated operational power θ ≤ 40 °C 480 V								Pkg (1 pce)
kvar	kA	kvar	V 50 Hz	V 60 Hz						kg
12.5	1.8	-	24	24	1	0	UA16-30-10	1SBL181022R8110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

(1) Other control voltages see voltage code table.

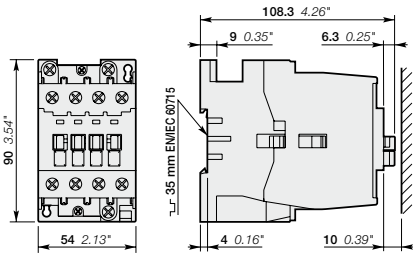
Main dimensions mm, *inches*



UA16



UA26



UA30

UA50 … UA75 3-pole contactors for capacitor switching
33 to 50 kvar - peak current Î ≤ 100 times the rms current
AC operated

UA50-30-00

Description

UA contactors can be used for the switching of capacitor banks whose inrush current peaks are less than or equal to 100 times nominal rms current.

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

These contactors are of the block type design with:

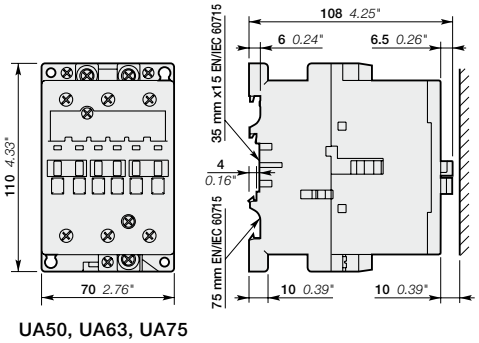
– 3 main poles
– control circuit: AC operated
– add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

IEC		UL/CSA	Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power θ ≤ 40 °C 400 V AC-6b	Max peak current Î	Rated operational power θ ≤ 40 °C 480 V								Pkg (1 pce)
kvar	kA	kvar	V 50 Hz	V 60 Hz						kg
33	5	40	24	24	0	0	UA50-30-00	1SBL351022R8100		1.160
			48	48	0	0	UA50-30-00	1SBL351022R8300		1.160
			110	110…120	0	0	UA50-30-00	1SBL351022R8400		1.160
			220…230	230…240	0	0	UA50-30-00	1SBL351022R8000		1.160
			230…240	240…260	0	0	UA50-30-00	1SBL351022R8800		1.160
			380…400	400…415	0	0	UA50-30-00	1SBL351022R8500		1.160
			400…415	415…440	0	0	UA50-30-00	1SBL351022R8600		1.160
45	6.5	-	24	24	0	0	UA63-30-00	1SBL371022R8100		1.160
			48	48	0	0	UA63-30-00	1SBL371022R8300		1.160
			110	110…120	0	0	UA63-30-00	1SBL371022R8400		1.160
			220…230	230…240	0	0	UA63-30-00	1SBL371022R8000		1.160
			230…240	240…260	0	0	UA63-30-00	1SBL371022R8800		1.160
			380…400	400…415	0	0	UA63-30-00	1SBL371022R8500		1.160
			400…415	415…440	0	0	UA63-30-00	1SBL371022R8600		1.160
50	7.5	55	24	24	0	0	UA75-30-00	1SBL411022R8100		1.160
			48	48	0	0	UA75-30-00	1SBL411022R8300		1.160
			110	110…120	0	0	UA75-30-00	1SBL411022R8400		1.160
			220…230	230…240	0	0	UA75-30-00	1SBL411022R8000		1.160
			230…240	240…260	0	0	UA75-30-00	1SBL411022R8800		1.160
			380…400	400…415	0	0	UA75-30-00	1SBL411022R8500		1.160
			400…415	415…440	0	0	UA75-30-00	1SBL411022R8600		1.160

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



UA50, UA63, UA75

1SBC101521S0201

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:

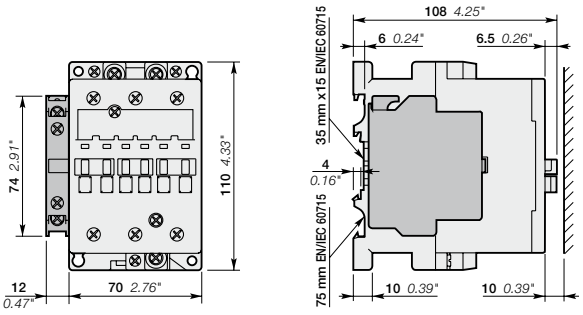
– 3 main poles
– control circuit: AC operated
– add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

IEC		UL/CSA	Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order 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	1SBL351022R8111		1.200
			48	48	1	1	UA50-30-11	1SBL351022R8311		1.200
			110	110...120	1	1	UA50-30-11	1SBL351022R8411		1.200
			220...230	230...240	1	1	UA50-30-11	1SBL351022R8011		1.200
			230...240	240...260	1	1	UA50-30-11	1SBL351022R8811		1.200
			380...400	400...415	1	1	UA50-30-11	1SBL351022R8511		1.200
			400...415	415...440	1	1	UA50-30-11	1SBL351022R8611		1.200
45	6.5	-	24	24	1	1	UA63-30-11	1SBL371022R8111		1.200
			48	48	1	1	UA63-30-11	1SBL371022R8311		1.200
			110	110...120	1	1	UA63-30-11	1SBL371022R8411		1.200
			220...230	230...240	1	1	UA63-30-11	1SBL371022R8011		1.200
			230...240	240...260	1	1	UA63-30-11	1SBL371022R8811		1.200
			380...400	400...415	1	1	UA63-30-11	1SBL371022R8511		1.200
			400...415	415...440	1	1	UA63-30-11	1SBL371022R8611		1.200
50	7.5	55	24	24	1	1	UA75-30-11	1SBL411022R8111		1.200
			48	48	1	1	UA75-30-11	1SBL411022R8311		1.200
			110	110...120	1	1	UA75-30-11	1SBL411022R8411		1.200
			220...230	230...240	1	1	UA75-30-11	1SBL411022R8011		1.200
			230...240	240...260	1	1	UA75-30-11	1SBL411022R8811		1.200
			380...400	400...415	1	1	UA75-30-11	1SBL411022R8511		1.200
			400...415	415...440	1	1	UA75-30-11	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

1SBC101529S0201

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

5

Description

UA contactors can be used for the switching of capacitor banks whose inrush current peaks are less or equal to 100 times nominal rms current.
The capacitors must be discharges (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making.

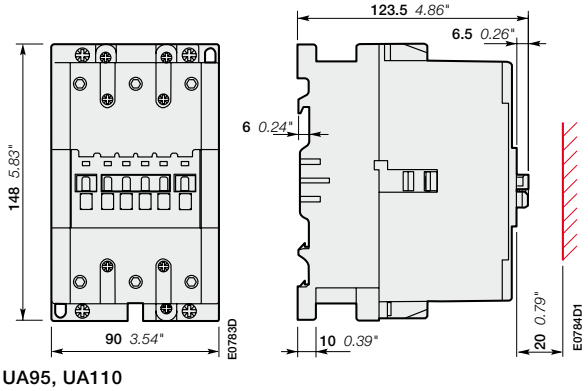
These contactors are of the block type design with:
– 3 main poles
– control circuit: AC operated
– add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

IEC		UL/CSA	Rated control circuit voltage Uc (1)		Auxiliary contacts fitted		Type	Order code		Weight
Rated operational power θ ≤ 40 °C 400 V AC-6b	Max peak current Î	Rated operational power θ ≤ 40 °C 480 V								Pkg (1 pce)
kvar	kA	kvar	V 50 Hz	V 60 Hz						kg
65	9.3	70	24	24	0	0	UA95-30-00	1SFL431022R8100		2.000
			48	48	0	0	UA95-30-00	1SFL431022R8300		2.000
			110	110...120	0	0	UA95-30-00	1SFL431022R8400		2.000
			220...230	230...240	0	0	UA95-30-00	1SFL431022R8000		2.000
			230...240	240...260	0	0	UA95-30-00	1SFL431022R8800		2.000
			380...400	400...415	0	0	UA95-30-00	1SFL431022R8500		2.000
			400...415	415...440	0	0	UA95-30-00	1SFL431022R8600		2.000
75	10.5	80	24	24	0	0	UA110-30-00	1SFL451022R8100		2.000
			48	48	0	0	UA110-30-00	1SFL451022R8300		2.000
			110	110...120	0	0	UA110-30-00	1SFL451022R8400		2.000
			220...230	230...240	0	0	UA110-30-00	1SFL451022R8000		2.000
			230...240	240...260	0	0	UA110-30-00	1SFL451022R8800		2.000
			380...400	400...415	0	0	UA110-30-00	1SFL451022R8500		2.000
			400...415	415...440	0	0	UA110-30-00	1SFL451022R8600		2.000

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



UA95, UA110

1SFC101059C0201

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

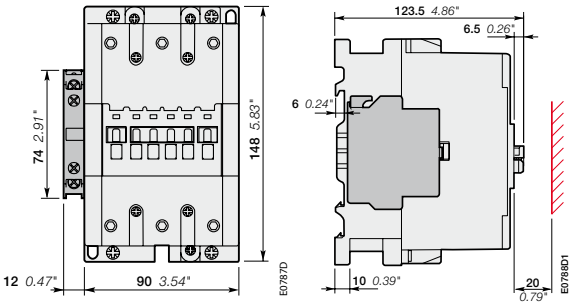
UA contactors can be used for the switching of capacitor banks whose inrush current peaks are less or equal to 100 times nominal rms current.
The capacitors must be discharges (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making.
These contactors are 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		Type	Order 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	1SFL431022R8111		2.040
			48	48	1	1	UA95-30-11	1SFL431022R8311		2.040
			110	110...120	1	1	UA95-30-11	1SFL431022R8411		2.040
			220...230	230...240	1	1	UA95-30-11	1SFL431022R8011		2.040
			230...240	240...260	1	1	UA95-30-11	1SFL431022R8811		2.040
			380...400	400...415	1	1	UA95-30-11	1SFL431022R8511		2.040
			400...415	415...440	1	1	UA95-30-11	1SFL431022R8611		2.040
75	10.5	80	24	24	1	1	UA110-30-11	1SFL451022R8111		2.040
			48	48	1	1	UA110-30-11	1SFL451022R8311		2.040
			110	110...120	1	1	UA110-30-11	1SFL451022R8411		2.040
			220...230	230...240	1	1	UA110-30-11	1SFL451022R8011		2.040
			230...240	240...260	1	1	UA110-30-11	1SFL451022R8811		2.040
			380...400	400...415	1	1	UA110-30-11	1SFL451022R8511		2.040
			400...415	415...440	1	1	UA110-30-11	1SFL451022R8611		2.040

(1) Other control voltages see voltage code table.

Main dimensions mm, *inches*



UA95, UA110

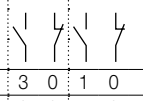
5

1SFC101060C0201

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								

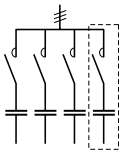
5

1SBC101533S0201

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

Main pole - Utilization characteristics according to IEC

Contactor types		AC operated	UA16	UA26	UA30	UA50	UA63	UA75	UA95	UA110
Standards			IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1							
Rated operational voltage Ue max.			690 V							
Rated frequency (without derating)			50 / 60 Hz							
AC-6b Utilization category										
Rated operational power AC-6b (1)										
For air temperature close to contactor	**θ ≤ 40 °C**	**230-240 V**	7.5 kvar	12 kvar	16 kvar	20 kvar	25 kvar	30 kvar	35 kvar	40 kvar
		400-415 V	12.5 kvar	20 kvar	27.5 kvar	33 kvar	45 kvar	50 kvar	65 kvar	75 kvar
		440 V	13.7 kvar	22 kvar	30 kvar	36 kvar	50 kvar	55 kvar	65 kvar	75 kvar
		500-550 V	15.5 kvar	22 kvar	34 kvar	40 kvar	50 kvar	62 kvar	70 kvar	80 kvar
		690 V	21.5 kvar	30 kvar	45 kvar	55 kvar	70 kvar	75 kvar	80 kvar	90 kvar
	θ ≤ 55 °C	**230-240 V**	6.7 kvar	11 kvar	16 kvar	20 kvar	25 kvar	30 kvar	35 kvar	40 kvar
		400-415 V	11.7 kvar	18.5 kvar	27.5 kvar	33 kvar	43 kvar	50 kvar	65 kvar	70 kvar
		440 V	13 kvar	20 kvar	30 kvar	36 kvar	48 kvar	53 kvar	65 kvar	75 kvar
		500-550 V	14.7 kvar	22 kvar	34 kvar	40 kvar	50 kvar	62 kvar	70 kvar	80 kvar
		690 V	20 kvar	30 kvar	45 kvar	55 kvar	70 kvar	75 kvar	80 kvar	90 kvar
	θ ≤ 70 °C	**230-240 V**	6 kvar	8.5 kvar	11 kvar	19 kvar	21 kvar	22 kvar	30 kvar	35 kvar
		400-415 V	10 kvar	14.5 kvar	19 kvar	32 kvar	37 kvar	39 kvar	55 kvar	65 kvar
		440 V	11 kvar	16 kvar	20 kvar	35 kvar	41 kvar	43 kvar	55 kvar	70 kvar
		500-550 V	12.5 kvar	19.5 kvar	23.5 kvar	40 kvar	45 kvar	47.5 kvar	60 kvar	75 kvar
		690 V	17 kvar	25 kvar	32 kvar	52 kvar	60 kvar	65 kvar	70 kvar	85 kvar
Max. permissible peak current Î		**Ue ≤ 500 V**	1.8 kA	3 kA	3.5 kA	5 kA	6.5 kA	7.5 kA	9.3 kA	10.5 kA
		Ue > 500 V	1.6 kA	2.7 kA	3.1 kA	4.5 kA	5.8 kA	6.75 kA	8 kA	9 kA
Short-circuit protection device for contactors										
gG type fuse			sized 1.5...1.8 In of the capacitor							
Max. electrical switching frequency			240 cycles/h							
Electrical durability AC-6b		**Ue ≤ 690 V**	100 000 operating cycles							



Multi-step capacitor bank scheme

(1) For 220 V and 380 V, multiply by 0.9 the rated values at 230 V and 400 V respectively.
Example: 50 kvar / 400 V corresponding to 0.9 x 50 = 45 kvar/380 V.

If, in an application, the current peak is greater than the maximum peak current Î specified in the tables above, select a higher rating, refer to the UA..RA contactors, or add inductances. (see application guide "Contactors for capacitor switching").

Main pole - Utilization characteristics according to UL / CSA

Contactor types		AC operated	UA16	UA26	UA30	UA50	UA63	UA75	UA95	UA110
Power - 60 Hz										
For air temperature close to contactor	**θ ≤ 40 °C**	**240 V**	-	12.5 kvar	16 kvar	20 kvar	-	27.5 kvar	35 kvar	40 kvar
		480 V	-	25 kvar	32 kvar	40 kvar	-	55 kvar	70 kvar	80 kvar
		600 V	-	30 kvar	40 kvar	50 kvar	-	70 kvar	75 kvar	85 kvar

If, in an application, the current peak is greater than the maximum peak current Î specified in the tables above, select a higher rating, refer to the UA..RA contactors, or add inductances. (see application guide "Contactors for capacitor switching").

1SBC101536S0201

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

Connecting characteristics

Contactor types		AC operated	UA16	UA26	UA30	UA50 UA63 UA75	UA95 UA110
Connection capacity (min. ... max.)							
Main conductors (poles)							
Rigid	Solid (≤ 4 mm²)	**1 x**	1...4 mm²	1.5...6 mm²	2.5...16 mm²	6...50 mm²	10...95 mm²
	Stranded (≥ 6 mm²)	**2 x**	1...4 mm²	1.5...6 mm²	2.5...16 mm²	6...25 mm²	6...35 mm²
Flexible with ferrule		**1 x**	0.75...2.5 mm²	0.75...4 mm²	2.5...10 mm²	6...35 mm²	10...70 mm²
		2 x	0.75...2.5 mm²	0.75...4 mm²	2.5...10 mm²	6...16 mm²	6...35 mm²
Bars or lugs		**L ≤**	7.7 mm	10 mm	-	-	-
		I >	3.7 mm	4.2 mm	-	-	-
Connection capacity acc. to UL/CSA		**1 or 2 x**	AWG 18...10	AWG 12...8	AWG 8...4	AWG 8...1	AWG 6...2/0
Tightening torque	Recommended		1 Nm / 9 lb.in	1.7 Nm / 15 lb.in	2.3 Nm / 20 lb.in	4 Nm / 35 lb.in	8 Nm / 71 lb.in
	Max.		1.2 Nm	2.2 Nm	2.6 Nm	4.5 Nm	9 Nm
Auxiliary conductors (built-in auxiliary terminals + coil terminals)							
Rigid solid		**1 x**	1...4 mm²				0.75...2.5 mm²
		2 x	1...4 mm²				0.75...2.5 mm²
Flexible with ferrule		**1 x**	0.75...2.5 mm²			1...2.5 mm²	0.75...2.5 mm²
		2 x	0.75...2.5 mm²				
Lugs	Coil terminals	**L ≤**	8 mm				
		I >	3.7 mm				
	Built-in auxiliary terminals	**L ≤**	7.7 mm	10 mm	8 mm	-	-
		I >	3.7 mm	4.2 mm	3.7 mm	-	-
Connection capacity acc. to UL/CSA			AWG 18...14				
Tightening torque							
Coil terminals	Recommended		1 Nm / 9 lb.in				
	Max.		1.2 Nm				
Built-in auxiliary terminals	Recommended		1 Nm / 9 lb.in				
	Max.		1.2 Nm				
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529							
Main terminals			IP20			IP10	
Coil terminals			IP20				
Built-in auxiliary terminals			IP20			-	-
Screw terminals			Delivered in open position, screws of unused terminals must be tightened				
Main terminals			M3.5	M4	M5	M6	M8
	Screwdriver type		Flat Ø 5.5 / Pozidriv 2		Flat Ø 6.5 / Pozidriv 2		Hexagon socket (s = 4 mm)
Coil terminals			M3.5				
	Screwdriver type		Flat Ø 5.5 / Pozidriv 2				
Built-in auxiliary terminals			M3.5	M4	M3.5	-	-
	Screwdriver type		Flat Ø 5.5 / Pozidriv 2			-	-

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

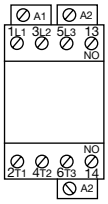
5

1SBC101537S0201

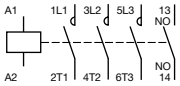
UA... contactors
Terminal marking and positioning

UA... contactors - AC operated

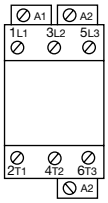
Standard devices without addition of auxiliary contacts



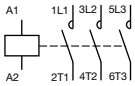
UA16 ... UA30-30-10



UA16 ... UA30-30-10

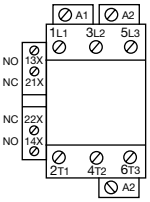


UA50 ... UA110-30-00

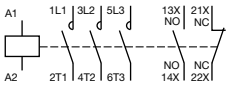


UA50 ... UA110-30-00

Standard devices with factory mounted auxiliary contacts



UA50 ... UA110-30-11



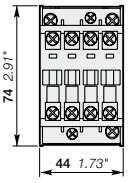
UA50 ... UA110-30-11

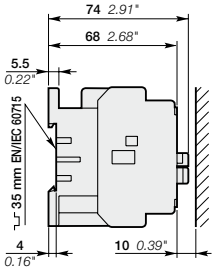
5

1SBC101571S0201

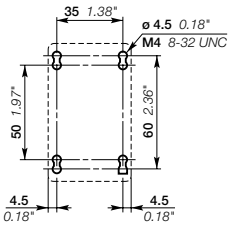
UA.. 3-pole contactors for capacitor switching

Main dimensions mm, *inches*



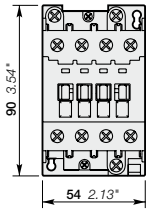


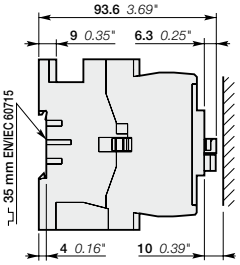
UA16



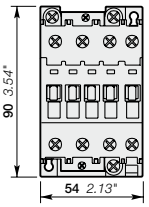
UA16 drilling plan

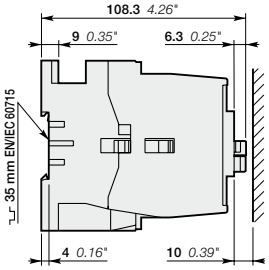
5



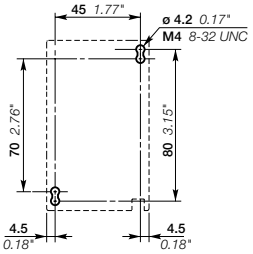


UA26

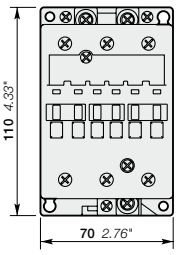




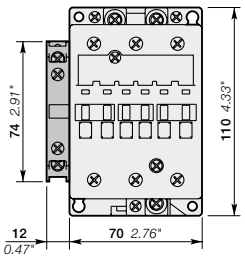
UA30



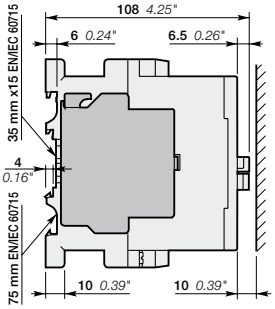
UA26, UA30 drilling plan

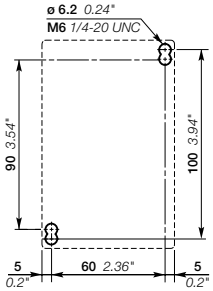


UA50, UA63, UA75-30-00

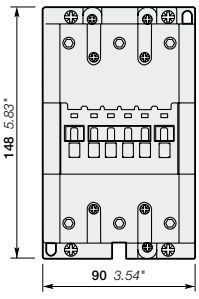


UA50, UA63, UA75-30-11

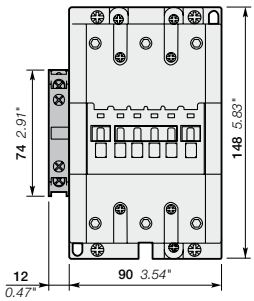




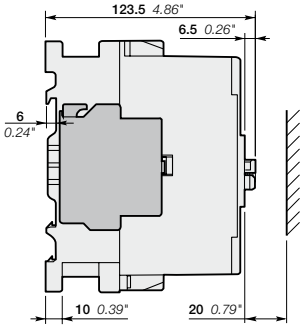
Drilling plan

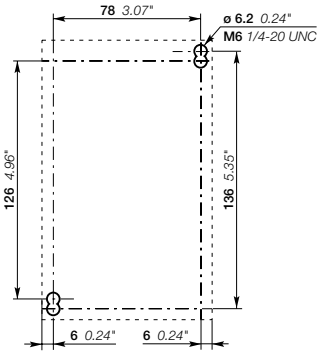


UA95, UA110-30-00



UA95, UA110-30-11



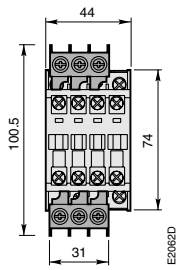


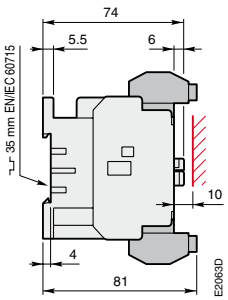
Drilling plan

1SBC101572S0201

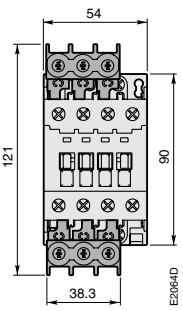
UA.. 3-pole contactors for capacitor switching

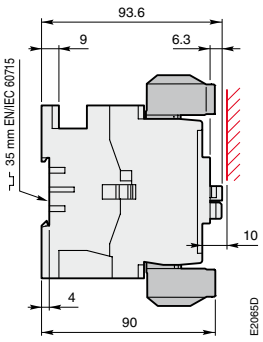
Main dimensions mm, *inches*



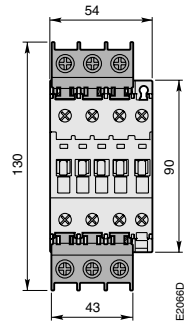


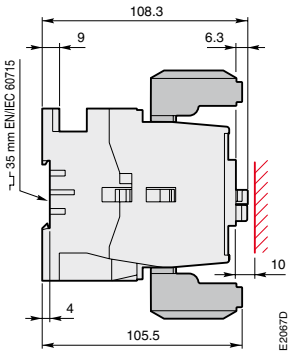
UA 16 contactors
+ 2 x LD 16



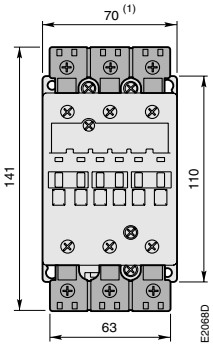


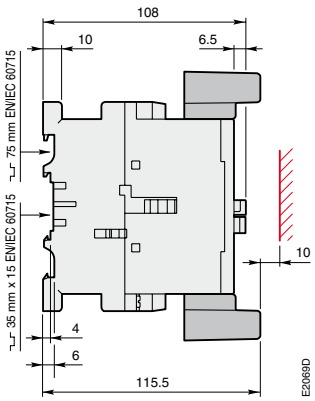
UA 26 contactors
+ 2 x LD 26



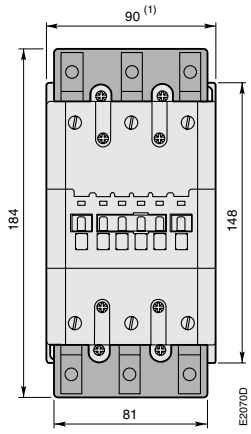


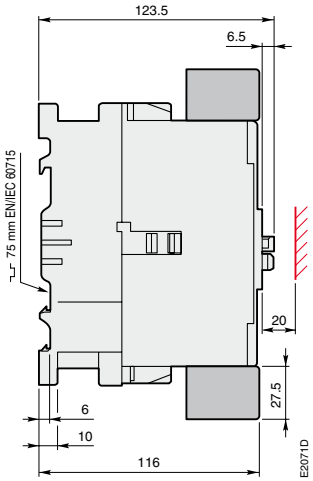
UA 30 contactors
+ 2 x LD 40





UA 50, UA 63, UA 75 contactors
+ 2 x LD 75





UA 95, UA 110 contactors
+ 2 x LD 110

1SBC101715S0201

A.. and AF.. standard 3-pole contactors for capacitor switching
Single step - peak current Î ≤ 30 times the rms current

Application

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

Selection table according to IEC

Type (1)	230/240 V			400/415 V			440 V			500/550 V			690 V			Max. peak current
	40 °C	55 °C	70 °C	40 °C	55 °C	70 °C	40 °C	55 °C	70 °C	40 °C	55 °C	70 °C	40 °C	55 °C	70 °C	
	kvar Power 50/60 Hz (AC-6b)															Î (kA)
A40	15	15	12	26	26	20	29	29	22	35	35	25	46	46	34.5	2.1
A/AF50	22	22	20	38	38	34	42	42	37	48	48	42	65	65	58.5	2.3
A/AF63	25	25	23	43	43	39	47	47	42.5	54	54	48.5	74	74	67	2.5
A/AF75	28	28	24.5	48	48	41	52	52	45	60	60	51	82	82	70	2.6
A/AF95	35	35	33	60	60	53	63	63	58	75	75	70	80	80	75	4
A/AF110	40	40	35	70	70	60	75	75	65	83	83	78	90	90	85	4
A/AF145	50	50	42	90	90	74	93	93	80	110	110	96	110	110	110	4
A/AF185	60	60	45	110	110	83	115	115	85	135	135	102	135	135	135	5
A/AF210	75	75	57	130	130	105	135	135	110	160	160	130	160	160	160	6.5
A/AF260	85	85	70	145	145	135	155	155	140	180	180	165	200	200	200	8
A/AF300	100	100	85	165	165	155	180	180	163	210	210	196	240	240	240	8
AF400	120	120	105	210	210	195	220	220	200	260	260	241	300	300	300	10
AF460	140	140	120	240	240	225	260	260	230	325	325	300	325	325	325	10
AF580	170	170	160	285	285	275	300	300	290	350	350	340	440	440	440	12
AF750	220	220	190	400	400	370	410	410	380	490	490	435	600	600	600	12

(1) For order codes, see A / AF ordering detail pages.
Note: For 3-pole A40 ... A110 contactors used with anti-resonance inductances (several mH, built specially to suppress inrush current), see the application guide "Contactors for capacitor switching".

If, in an application, the current peak is greater than the maximum peak current Î specified in the table above, select a higher rating, refer to the UA... contactors, or add inductances, see the application guide "Contactors for capacitor switching".
The capacitor bank will be protected by gG type fuses whose rating is equal to 1.5...1.8 times nominal current.

1SBC101541S0201

Other contactors selection data

Star-delta starting of three-phase asynchronous motors **5**/214
Autotransformer starters **5**/216
LV/LV three-phase transformer switching **5**/217
Temporary or intermittent duty **5**/218
Questionnaire for product specifications **5**/219

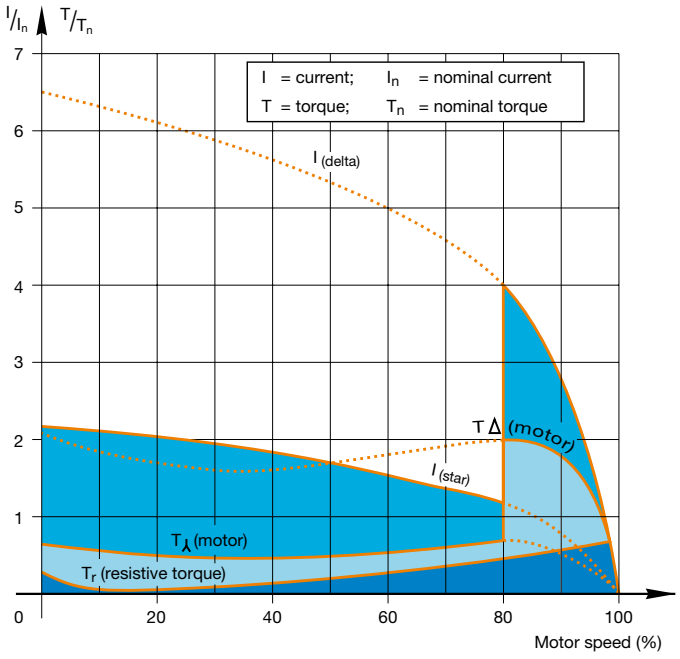
1SBC101707S0201

Star-delta starting of three-phase asynchronous motors
Contactor selection

General

Star-delta starting is the most common method to reduce the starting current of a motor. This system can be used on all the squirrel cage motors, which are normally used in delta connection.
In this type of starting, it is recommended to choose motors having high starting torque i.e. much higher than the resistive torque in order to reach sufficient high speed when the motor is connected in star.

Star-delta starting



Technical Data

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

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

Utilization

During the initial starting phase ("star" connection), the resistive torque of the driven load must remain, irrespective of speed, less than the "star" motor torque until "star-delta" switching occurs.
This starting mode is therefore ideal for machines having low starting torque such as:
- pumps
- centrifugal compressors
- wood-working machines, etc.

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

Precautions

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

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

Sequence

Starting is a three-stage process:

1st stage - "Star" connection

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

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

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

3rd stage - "Delta" connection

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

Note: When AF... contactor types are used as delta and star contactors or an A... contactor as star contactor with an AF... contactor as delta contactor, the use of a timer including a dwelling time (or transition time) e.g. TE5S is not recommended (For AF09..AF38, the use of a star-delta timer including a dwelling time as TE5S is not permitted). A timer set for the starting duration in star connection is enough. An electrical interlock between star and delta is mandatory such as VE 5 or through auxiliary contacts.
Furthermore, in open transition, the current interruption may reach up to 95 ms: it shall be checked that this duration is compatible with the application i.e. mainly if the decreasing in rotation speed is acceptable during the starting phase.

1SBC101700S0201

Star-delta starting of three-phase asynchronous motors
Contactor selection

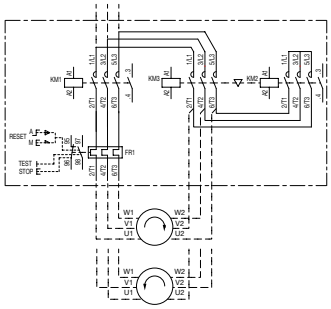
Rated operational power (1)					Max. starting time from a cold state (2)	Line contactor KM1	Delta contactor KM3	Star contactor KM2	Overload relay (4)	Timer (5)	Connection set
230 V AC-3 kW	400 V AC-3 kW	415 V AC-3 kW	500 V AC-3 kW	690 V AC-3 kW	seconds	Type	Type	Type	Type	Type	Type
4	7.5	7.5	9	9	15	AF09	AF09	AF09	TF42-10	CT-ERS.21S	BEY16-4
5.5	11	11	11	11	15	AF12	AF12	AF09	TF42-13	CT-ERS.21S	BEY16-4
9	15	15	15	15	15	AF16	AF16	AF09	TF42-20	CT-ERS.21S	BEY16-4
11	22	25	25	25	15	AF26	AF26	AF26	TF42-24	CT-ERS.21S	BEY38-4
15	25	25	30	30	15	AF30	AF30	AF26	TF42-29	CT-ERS.21S	BEY38-4
18.5	37	37	37	37	30	A40	A40	A40	TA42DU42	TE5S-240	BEY40-2
25	45	45	45	45	30	A50	A50	A40	TA75DU52	TE5S-240	BED50
30	55	55	63	59	30	A63	A63	A40	TA75DU63	TE5S-240	BED50
37	63	70	75	63	30	A75	A75	A50	TA75DU80	TE5S-240	BED75
45	75	75	90	90	20	A95	A95	A75	TA110DU90	TE5S-240	BED95
55	90	100	110	132	20	A110	A110	A95	TA110DU110	TE5S-240	BED110
110	200	200	250	315	20	A210	A210	A185	TA450	TE5S-240	BED210
140	220	250	295	355	20	A260	A260	A210	TA450	TE5S-240	BED300
160	250	250	355	450	20	A300	A300	A260	TA450	TE5S-240	BED300
180	355	355	450	560	20	AF400	AF400	A260	E500	C565	BED400
250	450	475	560	670	20	AF460	AF460	A300	E500	C565	BED400
315	560	600	700	750	20	AF580	AF580	AF400	E800	C565	BED580
400	670	670	750	900	20	AF750	AF750	AF460	E800	C565	BED580
450	830	900	960	1350	20	AF1350	AF1350	AF580 (3)	E1250	C565	–
560	1000	1050	1150	1600	20	AF1650	AF1650	AF750 (3)	E1250	C565	–
75	132	132	160	160	20	A145	A145	A110	TA200DU	TE5S-240	BED145
90	160	160	200	250	20	A185	A185	A145	TA200	TE5S-240	BED185

Notes:
(1) Ambient temperature ≤ 60 °C for AF09 ... AF38; ambient temperature ≤ 55 °C for A40 ... A(F)1650
(2) Usual time value = 6...10 s.
(3) 830...1000 KW use star contactor AF1350 in case of mechanical interlock.
(4) The setting current value is: nominal motor current x 0.58.
(5)7.5...25 kW 400 V: on-delay timer without dwelling-time (e.g.: CT-ERS.21S) is enough to countdown the programmed starting time during "Star connection"
37...250 kW 400 V: TE5S. Other control voltages, see voltage code on TE5S ordering details
355...1000 kW 400 V: contactor relay + TEF timer can be used as AF400 ... AF1650 contactors have a slight delay in closing.

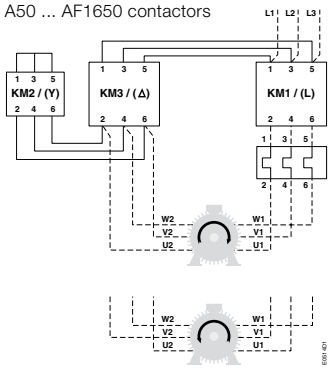
For motors above 670 kW/400 V, it is recommended to use Closed Transition Star-Delta starting. Contact your ABB Office for selection.

Power circuit diagram

AF09 ... A40 contactors

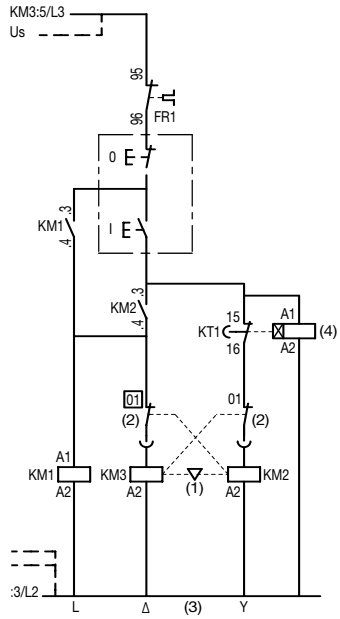


A50 ... AF1650 contactors



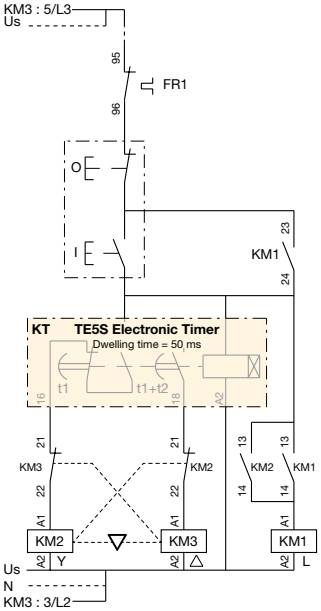
Control circuit diagrams - Remote control

AF09 ... AF38 contactors

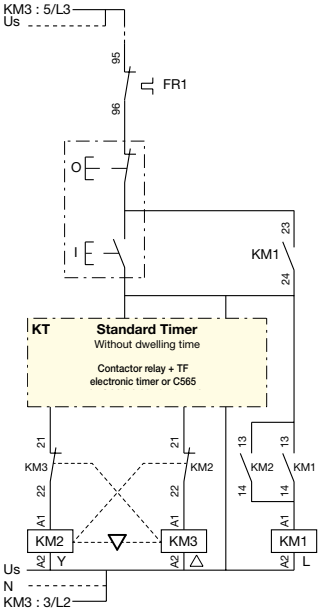


VEM4 = VM4 + VE4 with A2-A2 connection
(1) (2) (3)
(Except for coil Uc 12-20 V DC: use VM4 with CA4)
(4) On-delay timer without dwelling time e.g. CT-ERS.21

A40 ... A300 contactors



AF400 ... A1650 contactors

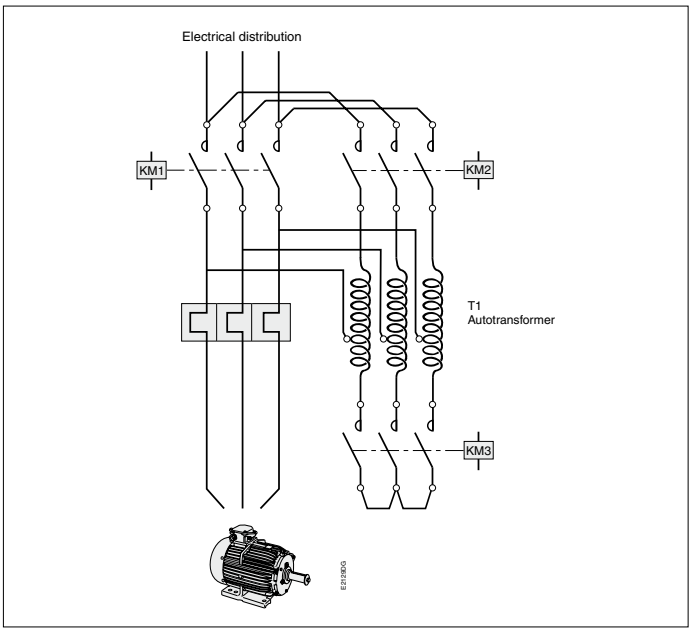


1SBC101698S0201

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.
At the contrary of the star-delta wiring, this autotransformer starting method needs three wires and three terminals on the motor.
At the starting period, the motor is wired to the autotransformer taps: the star contactor "KM3" and the autotransformer contactor "KM2" are closed, the motor is under reduced voltage. Consequently, the torque is reduced as the square of the applied voltage. The autotransformers are generally equipped of three taps at each phase in order to adapt the starting parameters to the field requirements.
When the motor reaches 80...95 % of its nominal speed, the star contactor opens. Then, the line contactor "KM1" is making and the autotransformer contactor is opening. This starting process is done without any network interruption.



Selection Table (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	22	22	30	A50	A50	AF38	AF30	AF26	AF30
18.5	30	30	30	37	A63	A50	A40	AF30	AF26	AF38
22	37	37	37	40	A75	A63	A50	AF38	AF30	A50
25	45	45	45	55	A95	A95	A63	A50	A40	A50
30	55	55	55	75	A110	A110	A95	A63	A50	A63
45	75	75	75	110	A145	A145	A110	A95	A75	A95
55	90	90	90	132	A185	A145	A145	A110	A95	A95
59	110	110	110	160	A210	A185	A145	A145	A95	A110
80	140	140	140	200	A260	A260	A185	A145	A110	A145
90	160	160	160	250	A300	A260	A210	A185	A145	A185
110	200	220	220	315	AF400	AF400	A260	A210	A185	A185
132	250	250	250	355	AF460	AF400	A300	A260	A185	A210
160	315	355	355	500	AF580	AF580	AF400	A300	A210	A300
220	400	425	450	600	AF750	AF750	AF580	AF400	A300	AF400
257	475	500	560	–	AF1350	AF750	AF580	AF460	AF400	AF460
315	560	600	670	–	AF1650	AF1350	AF750	AF580	AF460	AF580

The selection table for A9 ... A110 contactors can be used for the AL9 ... AE110 types.
The selection table for A50 ... A300 contactors can be used for the AF50 ... AF300 types.

1SBC101699S0201

LV/LV three-phase transformer switching
Contactor selection
AC-6a Utilization category according to IEC 60947-4-1

General

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

Selection table

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

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

Table for 9 to 110 A ratings

AC / DC operated		**AF09**	**AF12**	**AF16**	**AF26**	**AF30**	**AF38**	**–**	**AF50**	**AF63**	**AF75**	**AF95**	**AF110**
AC Operated contactors		**–**	**–**	**–**	**–**	**–**	**–**	**A40**	**A50**	**A63**	**A75**	**A95**	**A110**
DC Operated contactors		**–**	**–**	**–**	**–**	**–**	**–**	**AL40**	**AE50**	**AE63**	**AE75**	**–**	**–**
220/240 V	**kVA**	4	5	6	10	13	14	15	19	20	22	23	26
380/400 V	**kVA**	7	8	10	17	22	25	26	33	35	37.5	39	46
415/440 V	**kVA**	8	9	11	18	24	27	28.5	36	38	41	43	50
500 V	**kVA**	9	11	13	22	28	32	34.5	43	46	49	52	60
660/690 V	**kVA**	12.5	14	18	29	37	43	45.5	57	60.5	65	68	80
Max. permissible Ipeak	**A**	350	400	500	800	1000	1200	1200	1500	1600	1700	1800	2100

Table for 145 to 1650 A ratings

AC / DC operated		**AF145**	**AF185**	**AF210**	**AF260**	**AF300**	**AF400**	**AF460**	**AF580**	**AF750**	**AF1350**	**AF1650**	
AC Operated contactors		**A145**	**A185**	**A210**	**A260**	**A300**	**–**	**–**	**–**	**–**	**–**	**–**	
DC Operated contactors		**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	
220/240 V	**kVA**	35	45	50	55	60	95	100	110	130	160	190	
380/400 V	**kVA**	60	75	90	95	100	165	170	190	240	275	350	
415/440 V	**kVA**	65	80	100	110	115	180	190	210	270	325	390	
500 V	**kVA**	80	100	120	130	140	220	230	250	320	–	–	
660/690 V	**kVA**	105	130	150	170	180	290	300	310	410	–	–	
Max. permissible Ipeak	**kA**	3.0	3.5	4.2	4.6	5.0	7.7	8.4	9.3	12.0	–	–	

1SBC101696S0201

Temporary or intermittent duty
Contactor selection

Utilization of contactors for temporary / intermittent duty

The table below shows the factor (know 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
Preferred 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	1.6
30 s	2.4	2.3	2.3	2.2	2.1	2.1	1.9	1.7	–
40 s	2.2	2.1	2.1	2.0	1.9	1.9	1.7	1.5	–
60 s	1.9	1.8	1.8	1.8	1.7	1.7	1.5	–	–

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**

1SBC101697S0201

Questionnaire for product specifications: Block contactors

Tel.: ..... e-mail: .....
Segments: .....

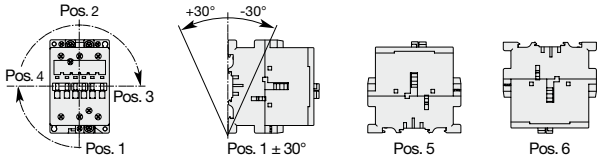
Tel.: ..... e-mail: .....
Date: .....

Application

Type: ..... No of phases: .....
Utilisation category (AC/DC): ..... % AC4 if any: .....
Rated operational voltage Ue: ..... V Cos φ: .....
Frequency: ..... Hz L/R: ..... ms
Nominal current In: ..... A
Making current: ..... A Breaking current: ..... A
Duty: ☐ continuous ☐ temporary ☐ intermittent
Load factor (% of ON time): ..... %
Number of cycles per hour: ..... or per year: .....
Expected durability: ..... operating cycles
Number of main poles N.O.: ..... N.C.: .....
Other information: .....

Installation

Ambient temperature: .....
Ambient environment: .....
Humidity: ..... %
Chemical pollution: .....
Other: .....
Mounting position, see drawing below (Position 6: please consult factory): .....



Wiring: ☐ Clamping screws or cage connectors
☐ Cable lugs (ring tongue)
Other: ..... Cross section: .....
Additional comments: .....

Control circuit

Rated control Uc voltage: ..... V ☐ DC ☐ AC f: ..... Hz
Minimum / maximum: ..... V to V
Surge suppressor: ..... type: .....
Interface with PLC: ..... mA ..... V DC
Accessories: .....
Number of auxiliary contacts: N.O.: ..... N.C.: .....
Low level contacts: ..... mA ..... V ☐ DC ☐ AC

Protection

Short circuit protection: .....
Type: ☐ Fuse ☐ Circuit breaker ☐ Manual motor starter
Max short circuit current: ..... A
Motor protection: ☐ Overload relay ☐ Manual Motor Starter ☐ Electronic overload relay

Logistic and packaging

Quantity by batch: .....
Delivery order: .....
Expected quantity: ..... per year
Expected first delivery date: ..... and Qty: .....
Quantity on first 6 month: ..... on first year: .....

Approvals and other requirements

Reference standards: .....
Required approvals: .....
Customer specifications: .....
Shock and vibrations: .....
Specific quality assurance clauses: .....
Other comments: .....

1SBC101701S0201

Questionnaire for product specifications: Block contactors

Other comments: .....
.....
.....
.....
.....
.....
.....
.....
.....

5 User Guide for the questionnaire

This document is used to define the contactor specifications according to the complete information on the application. Do not hesitate to join some complementary documents if necessary (schemes, tables, customer specification...).

Please see below some definitions to help you :

Operating cycle
Includes one making operation and one breaking operation.

Electrical Durability
Number of on-load operating cycles that the contactor is able to carry out. It depends on the utilization category.

Mechanical Durability
Number of no-current operating cycles that the contactor is able to carry out

Load Factor
Ratio of the on-load operating time to the total cycle time x 100 (%).

Intermittent Duty
Duty during which the contactor is successively closed or open for periods which are too short to enable the contactor to achieve thermal balance.

Temporary Duty
Duty in which the main contacts of the contactor remain closed for periods insufficient to allow the equipment to reach stabilized temperature, the unload periods being separated by off-load periods of sufficient duration to restore the ambient temperature

Continuous Duty
Duty in which the main contacts of the contactor remain closed, with a continuous current during enough time to reach thermal stabilization, but no more than eight hours without interruption.

Ambient Temperature
Air temperature close to the contactor.

Mounting Position
Comply with the manufacturer's instructions. Restrictions could be taken into account for certain mounting positions.
A contactor's duty is characterized by the utilization category together with the rated operational voltage and current indicated:
Utilization categories for contactors according to IEC 60947-4-1
Utilization categories for contactor relays according to IEC 60947-5-1
See our catalog p7/8

Making and breaking current
Current at contactor closing or at contactor opening

Time constant L/R (for DC circuit)
Ratio of the inductance to the resistance (L/R = mH/Ω = ms)

1SBC101701S0201

Notes

1SBC101724S0201

NF 4-pole and 8-pole contactor relays

Ordering details 4-pole contactor relays

NF AC / DC operated **5**/224

NFZ AC / DC operated - low consumption **5**/225

Main accessories **5**/226

Ordering details 8-pole contactor relays

NF AC / DC operated **5**/228

NFZ AC / DC operated - low consumption **5**/229

Main accessories **5**/230

Technical data 5/232

Terminal marking and positioning 5/235

Main dimensions 5/237

1SBC101724S0201

NF 4-pole contactor relays
AC / DC operated

NF22E

Description

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

These contactor relays are of the block type design with:

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

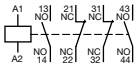
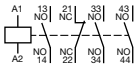
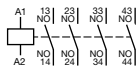
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
  - can manage large control voltage variations
  - only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - reduced panel energy consumption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

– built-in surge suppression

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

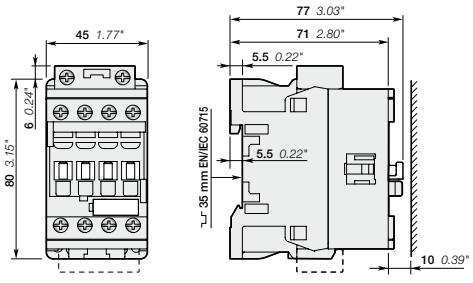
5

Ordering details

Number of contacts	Rated control circuit voltage Uc min. ... Uc max. V 50/60 Hz	V DC		Type	Order code		Weight Pkg (1 pce) kg
	24...60	20...60	(1)	NF22E-11	1SBH137001R1122		0.270
	48...130	48...130		NF22E-12	1SBH137001R1222		0.270
	100...250	100...250		NF22E-13	1SBH137001R1322		0.270
	250...500	250...500		NF22E-14	1SBH137001R1422		0.310
	24...60	20...60	(1)	NF31E-11	1SBH137001R1131		0.270
	48...130	48...130		NF31E-12	1SBH137001R1231		0.270
	100...250	100...250		NF31E-13	1SBH137001R1331		0.270
	250...500	250...500		NF31E-14	1SBH137001R1431		0.310
	24...60	20...60	(1)	NF40E-11	1SBH137001R1140		0.270
	48...130	48...130		NF40E-12	1SBH137001R1240		0.270
	100...250	100...250		NF40E-13	1SBH137001R1340		0.270
	250...500	250...500		NF40E-14	1SBH137001R1440		0.310

(1) NF..E-11 not suitable for direct control by PLC-output.

Main dimensions mm, *inches*



NF22E, NF31E, NF40E

1SBC101558S0201

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:

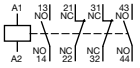
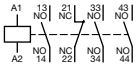
– 4 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)

– 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 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

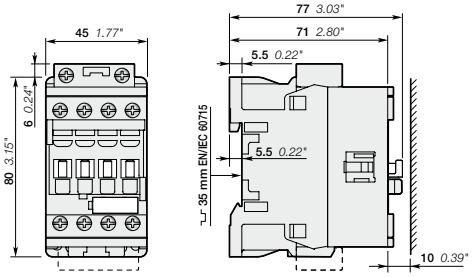
– add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

Number of contacts	Rated control circuit voltage Uc min. ... Uc max.		Type	Order code		Weight Pkg (1 pce)
	V 50/60 Hz	V DC				kg
	–	12...20	NFZ22E-20	1SBH136001R2022		0.310
	24...60	20...60	NFZ22E-21	1SBH136001R2122		0.310
	48...130	48...130	NFZ22E-22	1SBH136001R2222		0.310
	100...250	100...250	NFZ22E-23	1SBH136001R2322		0.310
	–	12...20	NFZ31E-20	1SBH136001R2031		0.310
	24...60	20...60	NFZ31E-21	1SBH136001R2131		0.310
	48...130	48...130	NFZ31E-22	1SBH136001R2231		0.310
	100...250	100...250	NFZ31E-23	1SBH136001R2331		0.310
	–	12...20	NFZ40E-20	1SBH136001R2040		0.310
	24...60	20...60	NFZ40E-21	1SBH136001R2140		0.310
	48...130	48...130	NFZ40E-22	1SBH136001R2240		0.310
	100...250	100...250	NFZ40E-23	1SBH136001R2340		0.310

Note: Only NFZ contactor relays with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.

Main dimensions mm, *inches*

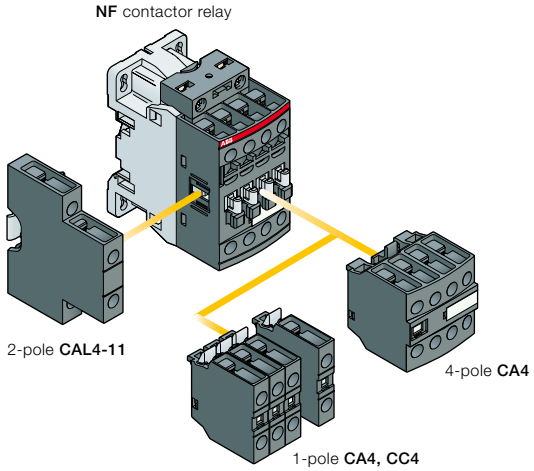


NFZ22E, NFZ31E, NFZ40E

1SBC101559S0201

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 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
				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	+	1		–
NF..	3	1	E	2 max.		–	+	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	+	1		–
				2 max.		–	+	1	+	1

1SBC101518S0201

NF 4-pole contactor relays
Main accessories

CA4-10

CA4-22N

CAL4-11

LDC4

BX4

BX4-CA

Ordering details (1)

For contactor relays	Auxiliary contacts				Type	Order code		Pkg qty	Weight (1 pce) kg
Front-mounted instantaneous auxiliary contact blocks									
4-pole NF	1	0	–	–	CA4-10	1SBN010110R1010		1	0.014
	1	0	–	–	CA4-10-T	1SBN010110T1010		10	0.014
	0	1	–	–	CA4-01	1SBN010110R1001		1	0.014
	0	1	–	–	CA4-01-T	1SBN010110T1001		10	0.014
	4	0	–	–	CA4-40N	1SBN010140R1240		1	0.055
	3	1	–	–	CA4-31N	1SBN010140R1231		1	0.055
	2	2	–	–	CA4-22N	1SBN010140R1222		1	0.055
	1	3	–	–	CA4-13N	1SBN010140R1213		1	0.055
NF..40E	0	4	–	–	CA4-04N	1SBN010140R1204		1	0.055
Front-mounted auxiliary contact blocks with N.O. leading contact and N.C. lagging contact									
4-pole NF	–	–	1	0	CC4-10	1SBN010111R1010		1	0.014
	–	–	0	1	CC4-01	1SBN010111R1001		1	0.014
Side-mounted instantaneous auxiliary contact blocks									
NF	1	1	–	–	CAL4-11	1SBN010120R1011		1	0.040
	1	1	–	–	CAL4-11-T	1SBN010120T1011		10	0.040
Additional coil terminal block									
NF					LDC4	1SBN070156T1000		10	0.010
Protective covers									
All 1-stack contactor relays					BX4	1SBN110108T1000		10	0.006
For 4-pole CA4 auxiliary contact blocks					BX4-CA	1SBN110109W1000		50	0.001

(1) See "Main accessory fitting details" table.

1SBC101519S0201

NF 8-pole contactor relays
AC / DC operated

NF44E

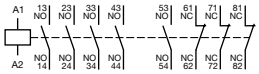
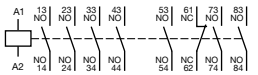
Description

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

These contactor relays are of the block type design with:

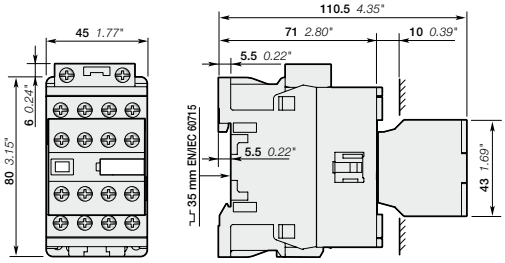
– 8 poles with a permanently fixed 4-pole auxiliary contact block. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
  - can manage large control voltage variations
  - only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - reduced panel energy consumption
  - very distinct closing and opening
– built-in surge suppression
– add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Ordering details

Number of contacts 1st stack	2nd stack	Rated control circuit voltage Uc min. ... Uc max. V 50/60 Hz	V DC		Type	Order code		Weight Pkg (1 pce) kg
		24...60	20...60	(1)	NF44E-11	1SBH137001R1144		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	20...60	(1)	NF53E-11	1SBH137001R1153		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	20...60	(1)	NF62E-11	1SBH137001R1162		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	20...60	(1)	NF71E-11	1SBH137001R1171		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	20...60	(1)	NF80E-11	1SBH137001R1180		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

(1) NF..E-11 not suitable for direct control by PLC-output.

Main dimensions mm, *inches*



NF44E, NF53E, NF62E, NF71E, NF80E

1SBC101560S0201

NFZ 8-pole contactor relays
AC / DC operated – Low consumption

NFZ44E

Description

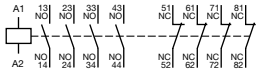
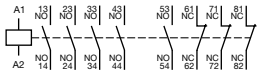
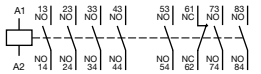
NFZ contactor relays are used for switching auxiliary and control circuits.

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)
– 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 VDC 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.

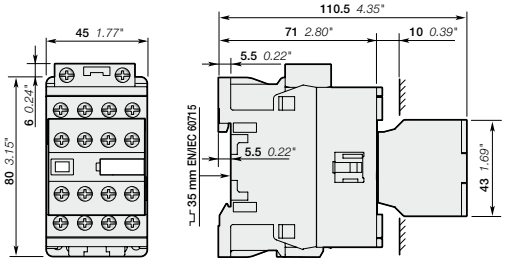
5

Ordering details

Number of contacts 1st stack	2nd stack	Rated control circuit voltage Uc min. ... Uc max. V 50/60 Hz	V DC	Type	Order code		Weight Pkg (1 pce) kg
		–	12...20	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

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*



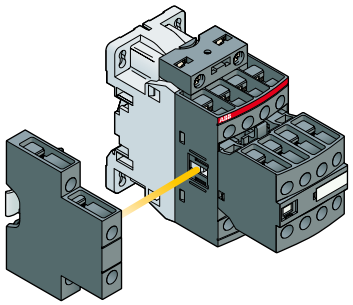
NFZ44E, NFZ53E, NFZ62E, NFZ71E, NFZ80E

1SBC101561S0201

NF 8-pole contactor relays
Main accessories

Contactor relays and main accessories (other accessories available)

NF contactor relay



2-pole **CAL4-11**

5

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			Side-mounted accessories Auxiliary contact blocks Left side 2-pole CAL4-11	Right side
NF..	4 4 E	–	–	+	1	–
	5 3 E					
	6 2 E					
	7 1 E					
	8 0 E					

1SBC101598S0201

NF 8-pole contactor relays
Main accessories

1SBC101112F0014

CAL4-11

1SBC101133F0014

LDC4

1SBC101138F0014

BX4-CA

Ordering details (1)

For contactor relays	Auxiliary contacts		Type	Order code		Pkg qty	Weight (1 pce) kg
Side-mounted instantaneous auxiliary contact blocks							
NF	1 1	– –	CAL4-11	1SBN010120R1011		1	0.040
	1 1	– –	CAL4-11-T	1SBN010120T1011		10	0.040
Additional coil terminal block							
NF			LDC4	1SBN070156T1000		10	0.010
Protective covers							
For 4-pole CA4 auxiliary contact blocks			BX4-CA	1SBN110109W1000		50	0.001

(1) See "Main accessory fitting details" table.

5

1SBC101654S0201

NF contactor relays
Technical data

Contact utilization characteristics according to IEC

Contactor relay types	AC / DC operated	NF
Standards		IEC 60947-1 / 60947-5-1 and EN 60947-1 / 60947-5-1
Rated operational voltage Ue max.		690 V
Rated frequency (without derating)		50 / 60 Hz
Conventional free-air thermal current Ith 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
Rated making capacity AC-15		10 x Ie AC-15 acc. to IEC 60947-5-1
Rated breaking capacity AC-15		10 x Ie AC-15 acc. to IEC 60947-5-1
Ie / Rated operational current DC-13		
acc. to IEC 60947-5-1	24 V DC	6 A / 144 W
	48 V DC	2.8 A / 134 W
	72 V DC	1 A / 72 W
	110 V DC	0.55 A / 60 W
	125 V DC	0.55 A / 69 W
	220 V DC	0.27 A / 60 W
	250 V DC	0.27 A / 68 W
	400 V DC	0.15 A / 60 W
	500 V DC	0.13 A / 65 W
	600 V DC	0.1 A / 60 W
Short-circuit protection device gG type fuse		10 A
Rated short-time withstand current Icw	for 1.0 s	100 A
	for 0.1 s	140 A
Minimum switching capacity		12 V / 3 mA
with failure rate acc. to IEC 60947-5-4		10^{-7}
Non-overlapping time between N.O. and N.C. contacts		≥ 2 ms
Power dissipation per pole at 6 A		0.1 W
Max. electrical switching frequency	AC-15	1200 cycles/h
	DC-13	900 cycles/h
Mechanically linked contacts acc. to annex L of IEC 60947-5-1		Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA4, CAL4 aux. contact blocks) are mechanically linked contacts.

Contact utilization characteristics according to UL / CSA

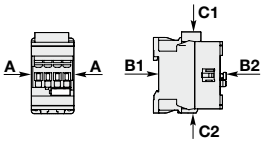
Contactor relay types	AC / DC operated	NF
Standards		UL 508, CSA C22.2 N°14
Max. operational voltage		600 V AC, 600 V DC
Pilot duty		A600, Q600
AC thermal rated current		10 A
AC maximum volt-ampere making		7200 VA
AC maximum volt-ampere breaking		720 VA
DC thermal rated current		2.5 A
DC maximum volt-ampere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

5

1SBC101562S0201

NF contactor relays
Technical data

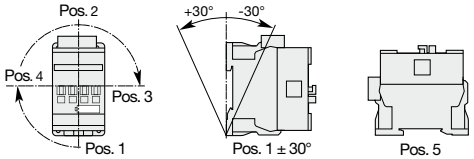
General technical data

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	Rated control circuit voltage Uc		24...500 V AC
50/60 Hz	Coil consumption	**Average pull-in value**	(NF) 50 VA - (NFZ) 16 VA
		Average holding value	(NF) 2.2 VA / 2 W - (NFZ) 1.7 VA / 1.5 W
DC control voltage	Rated control circuit voltage Uc		12...500 V DC
	Coil consumption	**Average pull-in value**	(NF) 50 W - (NFZ) 12...16 W
		Average holding value	(NF) 2 W - (NFZ) 1.7 W
PLC-output control			(NFZ) ≥ 500 mA 24 V DC
Drop-out voltage			≤ 60 % of Uc min.
Voltage sag immunity acc. to SEMI F47-0706			(NFZ) conditions of use on request
Dips withstand			
-20 °C ≤ θ ≤ +60 °C			(NFZ) 22 ms average
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

5

1SBC101563S0201

NF contactor relays
Technical data

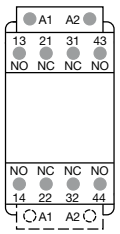
Connecting characteristics

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

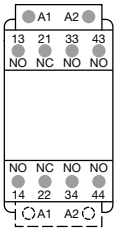
1SBC101564S0201

NF contactor relays
Terminal marking and positioning

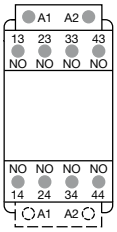
Standard devices without addition of auxiliary contacts



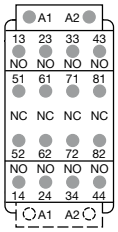
NF..22E



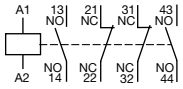
NF..31E



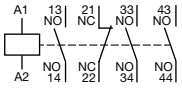
NF..40E



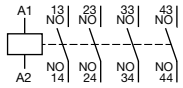
NF..44E



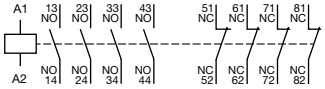
NF..22E



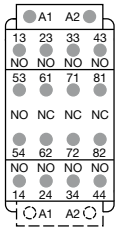
NF..31E



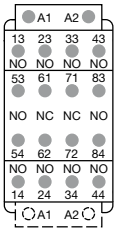
NF..40E



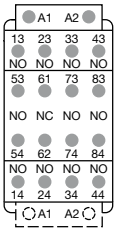
NF..44E



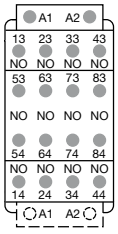
NF..53E



NF..62E

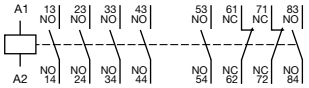


NF..71E

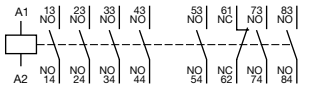


NF..80E

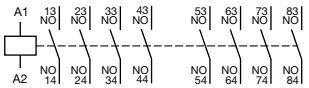
NF..53E



NF..62E

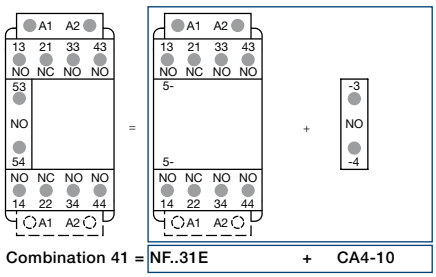


NF..71E

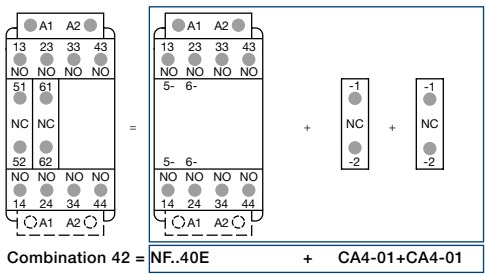


NF..80E

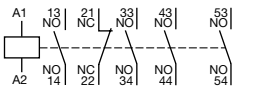
Other possible contact combinations with auxiliary contacts added by the user



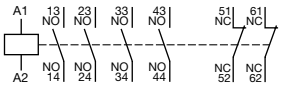
Combination 41 = NF..31E + CA4-10



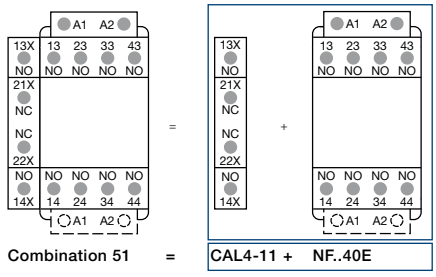
Combination 42 = NF..40E + CA4-01+CA4-01



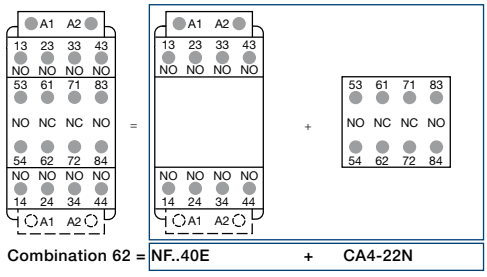
Combination 41 E



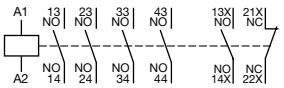
Combination 42 E



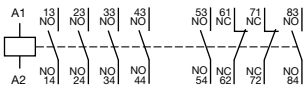
Combination 51 = CAL4-11 + NF..40E



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

1SBC101582S0201

NF add-on auxiliary contacts
Terminal marking and positioning

1-pole auxiliary contacts

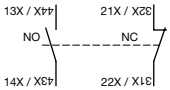
CA4-01

CA4-10

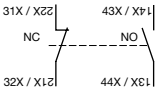
CC4-01

CC4-10

2-pole auxiliary contacts

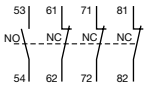


CAL4-11
(Left side-mounted)

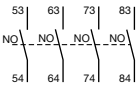


CAL4-11
(Right side-mounted)

4-pole auxiliary contacts

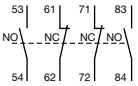


CA4-13N

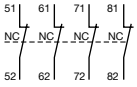


CA4-40N

CA4-31N



CA4-22N

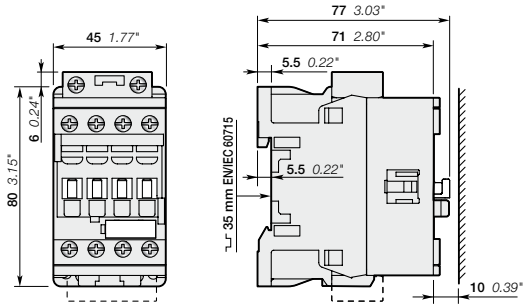


CA4-04N

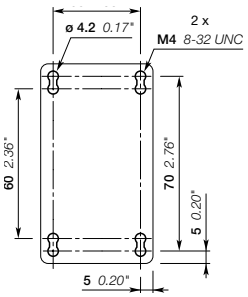
1SBC101582S0201

NF contactor relays

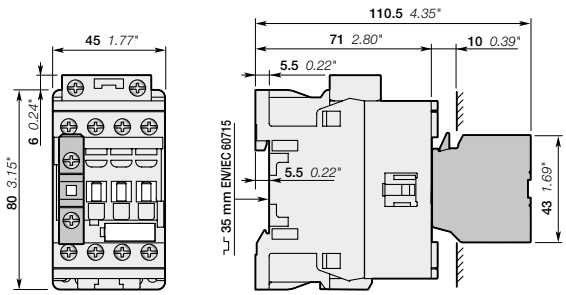
Main dimensions mm, *inches*



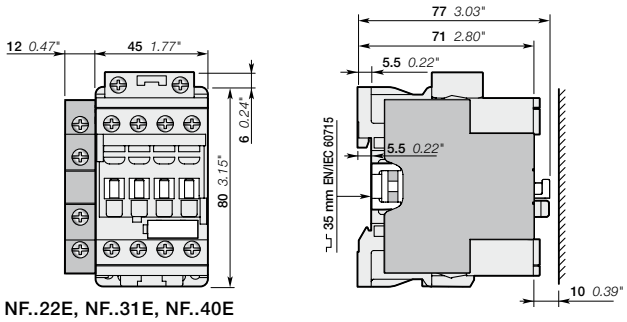
NF..22E, NF..31E, NF..40E



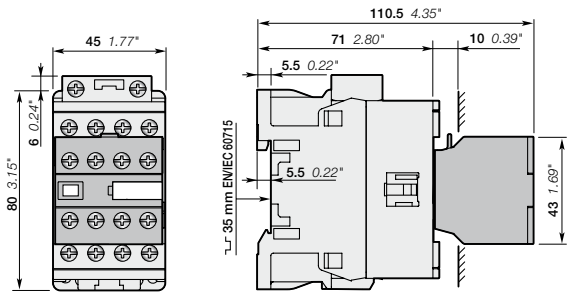
NF



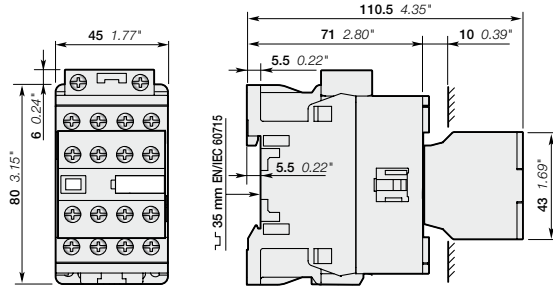
NF..22E, NF..31E, NF..40E
+ CA4, CC4 1-pole auxiliary contact block



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

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

1SBC101583S0201

1SBC101659S0201

Accessories

Accessories for AF09 ... AF38 contactors and NF contactor relays **5/241**

Auxiliary contact blocks **5**/242
Interlocks **5**/246
Mechanical latching unit **5**/248
Connection accessories for starting solutions **5**/250
Other accessories **5**/251
CB5... Impulse contact blocks **5**/252

Accessories for A40 ... AF2050 contactors **5/253**

Auxiliary contact blocks **5**/254
Pneumatic timer blocks **5**/258
Mechanical interlock units **5**/262
Mechanical and electrical interlock units **5**/262
Function markers - Mounting piece **5**/265
CB5... Impulse contact blocks **5**/266
Electronic timer for star-delta starters **5**/267
Surge suppressors for contactor coils **5**/269
Interface relays **5**/271
Mechanical latching unit **5**/273
Additional terminal blocks **5**/275
Terminals for control lead connections **5**/276
Terminal shrouds **5**/277
Terminal enlargements - Terminal extensions **5**/278
Connector terminals **5**/279
Terminal connecting strips and shorting bars **5**/280
Connecting links for contactors and manual motor starters **5**/281
Connection bars for contactor and MCCB **5**/282
Connection bars for contactor and switch fuse **5**/283
Connection sets **5**/284
Mounting plates for A95 ... AF750 contactors **5**/286
Adapter plates for A95 ... AF750 contactors **5**/287
Main contact sets - Arc chutes for 3-pole contactors **5**/288
Contactor coils **5**/289

Accessories for EK100 ... EK1000 contactors **5/291**

Auxiliary contact blocks **5**/292
Terminal shrouds **5**/296
Surge suppressors for contactor coils **5**/298
Mounting plates **5**/299
Connection sets **5**/300
Mechanical interlock units **5**/301
Mechanical and electrical interlock units **5**/301
KZK... main contact sets - KWK... arc chutes **5**/303
Contactor coils **5**/304

1SBC101659S0201

1SBC101725S0201

Accessories for AF09 … AF38 contactors and NF contactor relays

Auxiliary contact blocks **5**/242
Interlocks **5**/246
Mechanical latching unit **5**/248
Connection accessories for starting solutions **5**/250
Other accessories **5**/251
CB5... Impulse contact blocks **5**/252

1SBC101725S0201

Auxiliary contact blocks

CA4-10

CAL4-11

CA4-22M

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 lefthand side of the contactors.

The auxiliary contact blocks are equipped with screw type connecting terminals delivered open, protected against accidental direct contact and bear the corresponding function marking.

Ordering details (1)

For contactors	Auxiliary contacts				Type	Order code		Pkg qty	Weight (1 pce)
									kg
Front-mounted instantaneous auxiliary contact blocks									
AF09 ... AF38 4-pole NF	1	0	–	–	CA4-10	1SBN010110R1010		1	0.014
	1	0	–	–	CA4-10-T	1SBN010110T1010		10	0.014
	0	1	–	–	CA4-01	1SBN010110R1001		1	0.014
	0	1	–	–	CA4-01-T	1SBN010110T1001		10	0.014
AF09 ... AF16..-30-10	2	2	–	–	CA4-22M	1SBN010140R1122		1	0.055
	3	1	–	–	CA4-31M	1SBN010140R1131		1	0.055
	1	3	–	–	CA4-13M	1SBN010140R1113		1	0.055
	0	4	–	–	CA4-04M	1SBN010140R1104		1	0.055
AF26 ... AF38..-30-00 AF09 ... AF38..-40-00 AF09 ... AF38..-22-00	2	2	–	–	CA4-22E	1SBN010140R1022		1	0.055
	3	1	–	–	CA4-31E	1SBN010140R1031		1	0.055
	4	0	–	–	CA4-40E	1SBN010140R1040		1	0.055
AF26 ... AF38..-30-00 AF09 ... AF16..-40-00	0	4	–	–	CA4-04E	1SBN010140R1004		1	0.055
AF09 ... AF16..-30-01	2	2	–	–	CA4-22U	1SBN010140R1322		1	0.055
	3	1	–	–	CA4-31U	1SBN010140R1331		1	0.055
	4	0	–	–	CA4-40U	1SBN010140R1340		1	0.055
4-pole NF	4	0	–	–	CA4-40N	1SBN010140R1240		1	0.055
	3	1	–	–	CA4-31N	1SBN010140R1231		1	0.055
	2	2	–	–	CA4-22N	1SBN010140R1222		1	0.055
	1	3	–	–	CA4-13N	1SBN010140R1213		1	0.055
NF..40E	0	4	–	–	CA4-04N	1SBN010140R1204		1	0.055
Front-mounted auxiliary contact blocks with N.O. leading contact and N.C. lagging contact									
AF09 ... AF38 4-pole NF	–	–	1	0	CC4-10	1SBN010111R1010		1	0.014
	–	–	0	1	CC4-01	1SBN010111R1001		1	0.014
Side-mounted instantaneous auxiliary contact blocks									
AF09 ... AF38 NF	1	1	–	–	CAL4-11	1SBN010120R1011		1	0.040
	1	1	–	–	CAL4-11-T	1SBN010120T1011		10	0.040
Front-mounted instantaneous auxiliary contact and A1/A2 coil terminal blocks									
AF09 ... AF16..-30-10	1	1	–	–	CAT4-11M	1SBN010151R1111		1	0.040
AF26 ... AF38..-30-00 AF09 ... AF38..-40-00 AF09 ... AF38..-22-00	1	1	–	–	CAT4-11E	1SBN010151R1011		1	0.040
AF09 ... AF16..-30-01	1	1	–	–	CAT4-11U	1SBN010151R1311		1	0.040

(1) For each contactor or contactor relay type, refer to "Accessory fitting details" table.
Note: CAT4 not fittable on AF..Z contactors with DC control voltage 12…20 V DC.

1SBC101573S0201

Auxiliary contact blocks

Technical data

Types		1-pole **CA4**, 1-pole **CC4**, 4-pole **CA4**, 2-pole **CAT4**, 2-pole **CAL4**

Contact utilization characteristics according to IEC

Standards		IEC 60947-5-1 and EN 60947-5-1
Rated insulation voltage Ui acc. to IEC 60947-5-1		690 V
Rated impulse withstand voltage Uimp.		6 kV
Rated operational voltage Ue max.		24...690 V
Conventional thermal current Ith - θ ≤ 40 °C		16 A
Rated frequency (without derating)		50/60 Hz
Ie / Rated operational current AC-15		
acc. to IEC 60947-5-1	**24-127 V 50/60 Hz**	6 A
	220-240 V 50/60 Hz	4 A
	400-440 V 50/60 Hz	3 A
	500 V 50/60 Hz	2 A
	690 V 50/60 Hz	2 A
Making capacity acc. to IEC 60947-5-1		10 x Ie AC-15
Breaking capacity acc. to IEC 60947-5-1		10 x Ie AC-15
Ie / Rated operational current DC-13		
acc. to IEC 60947-5-1	**24 V DC**	6 A / 144 W
	48 V DC	2.8 A / 134 W
	72 V DC	1 A / 72 W
	110 V DC	0.55 A / 60 W
	125 V DC	0.55 A / 69 W
	220 V DC	0.27 A / 60 W
	250 V DC	0.27 A / 68 W
	400 V DC	0.15 A / 60 W
	500 V DC	0.13 A / 65 W
	600 V DC	0.1 A / 60 W
Short-circuit protection device gG type fuse		10 A
Rated short-time withstand current Icw	**for 1.0 s**	100 A
θ = 40 °C	**for 0.1 s**	140 A
Minimum switching capacity		12 V / 3 mA
with failure rate acc. to IEC 60947-5-4		10^{-7}
Power dissipation per pole at 6 A		0.1 W
Mechanical durability Number of operating cycles		10 millions operating cycles
Max. switching frequency		3600 cycles/h
Max. electrical switching frequency	**AC-15**	1200 cycles/h
	DC-13	900 cycles/h
Mechanically linked contacts acc. to annex L of IEC 60947-5-1		Additional N.O. or N.C. auxiliary contacts (CA4, CAL4, CAT4) are mechanically linked contacts
Mirror contacts acc. to annex F of IEC 60947-4-1		Additional N.C. auxiliary contacts (CA4, CAL4, CAT4) are mirror contacts

Contact utilization characteristics according to UL / CSA

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

Connecting characteristics

Connection capacity (min. ... max.)			
	Rigid solid	**1 x**	1...2.5 mm²
		2 x	1...2.5 mm²
	Flexible with ferrule	**1 x**	0.75...2.5 mm²
		2 x	0.75...2.5 mm²
	Flexible with insulated ferrule	**1 x**	0.75...2.5 mm²
		2 x	0.75...1.5 mm²
	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

5

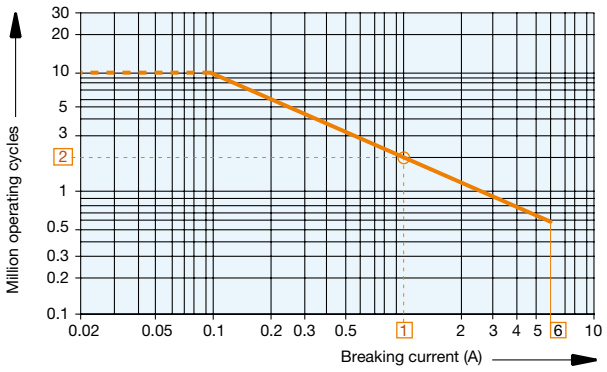
1SBC101593S0201

Auxiliary contacts
Electrical durability

Electrical durability for AC-15 utilization category

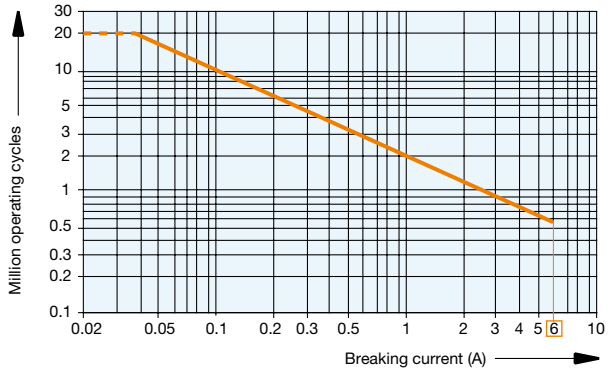
AC-15 utilization category according to IEC 60947-5-1 / EN 60947-5-1:
- making current: 10 x Ie with cos φ = 0.7 and Ue
- breaking current: Ie with cos φ = 0.4 and Ue.

This 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 ... AF38 contactor built-in auxiliary contacts
- 1-pole and 4-pole CA4, 2-pole CAT4,
  1-pole CC4,
  2-pole CAL4 add-on auxiliary contacts.

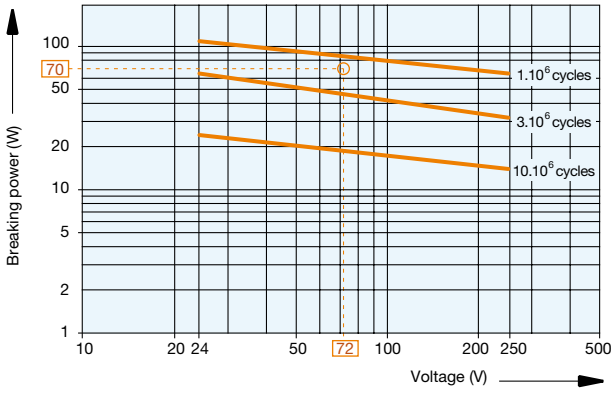
Example:
Breaking current = 1 A
On the opposite curve at intersection "○" 1 A the corresponding value for the electrical durability is approximately 2 millions operating cycles.



NF contactor relays.
(For add on auxiliary contacts see above curve).

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 ... AF38 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.

1SBC101641S0201

Add-on auxiliary contacts
Terminal marking and positioning

1-pole auxiliary contacts

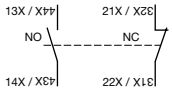
CA4-01

CA4-10

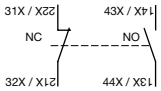
CC4-01

CC4-10

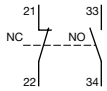
2-pole auxiliary contacts



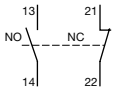
CAL4-11
(Left side-mounted)



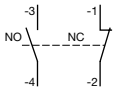
CAL4-11
(Right side-mounted)



CAT4-11M

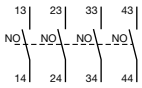


CAT4-11E

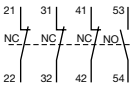


CAT4-11U

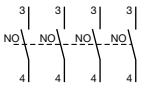
4-pole auxiliary contacts



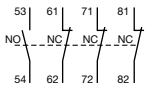
CA4-40E



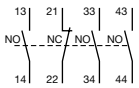
CA4-13M



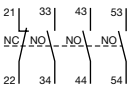
CA4-40U



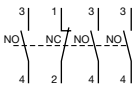
CA4-13N



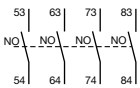
CA4-31E



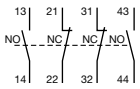
CA4-31M



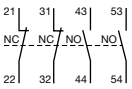
CA4-31U



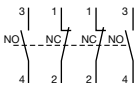
CA4-40N



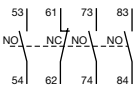
CA4-22E



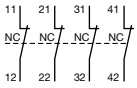
CA4-22M



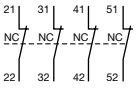
CA4-22U



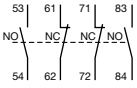
CA4-31N



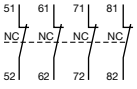
CA4-04E



CA4-04M



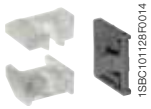
CA4-22N



CA4-04N

1SBC101660S0201

Interlocks



VM4

Mechanical interlock unit

VM4 mechanical interlock unit for the interlocking of two AF contactors.
When mounted between two contactors without additional width, the VM4 mechanical interlock unit prevents one of the contactors from closing as long as the other contactor is closed.
The mechanical interlock unit includes 2 fixing clips (BB4).

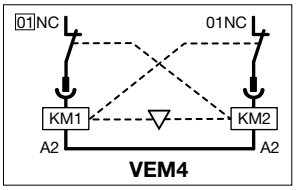
Ordering details

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
AF09 ... AF38..-30-.. AF09 ... AF38..-40-00	VM4	1SBN030105T1000		10	0.005

VEM4

Mechanical and electrical interlock set

VEM4 mechanical and electrical interlock set for the interlocking of two AF contactors.
VEM4 set includes a mechanical interlock unit VM4 with 2 fixing clips (BB4) and a VE4 electrical interlock block with A2-A2 connection.
Fixing the electrical interlock block to the contactor front face connects the 2 built-in N.C. interlocking contacts with the two coils. VE4 block must be used with A2-A2 connection to respect the electrical connection diagram.



Ordering details

For contactors	Auxiliary contacts		Type	Order code		Pkg qty	Weight (1 pce) kg
AF09 ... AF16..-30-.. AF26 ... AF38..-30-00 AF09, AF16..-40-00 AF26, AF38..40-00	1	1	VEM4	1SBN030111R1000		1	0.035

Note: VEM4 not fittable on AF..Z contactors with DC control voltage 12...20 V DC.

BB4

Fixing clips

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
AF09 ... AF38	BB4	1SBN110120W1000		50	0.002

1SBC101595S0201

Interlocks

Technical data

Types		VM4
Mechanical durability	Number of operating cycles	5 millions operating cycles
	Max. mechanical switching frequency	1800 cycles/h

Types		VEM4

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 control circuit voltage Uc		
	AC 50/60 Hz control voltage	24...500 V AC
	DC control voltage	20...500 V DC
Conventional thermal current Ith - θ ≤ 40 °C		16 A
Mechanical durability	Number of operating cycles	5 millions operating cycles
	Max. mechanical switching frequency	1800 cycles/h
Electrical durability	Max. electrical switching frequency	1200 cycles/h

Contact utilization characteristics according to UL / CSA

Standards	UL 508, CSA C22.2 N°14
Max. operational voltage	500 V AC, 500 V DC

Connecting characteristics

Connection capacity (min. ... max.)			
	Rigid solid	**1 x**	1...2.5 mm²
		2 x	1...2.5 mm²
	Flexible with ferrule	**1 x**	0.75...2.5 mm²
		2 x	0.75...2.5 mm²
	Flexible with insulated ferrule	**1 x**	0.75...2.5 mm²
		2 x	0.75...1.5 mm²
	Lugs	**L <**	8 mm
Connection capacity acc. to UL/CSA		**1 or 2 x**	AWG 18...14
Stripping length			10 mm
Tightening torque			1.2 Nm / 11 lb.in
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			IP20
Screw terminals			Delivered in open position, screws of unused terminals must be tightened
All terminals			M3.5
Screwdriver type			Flat Ø 5.5 / Pozidriv 2

1SBC101594S0201

Mechanical latching unit

WB75-A

Description

For converting standard contactors into latched contactors.

The WB75-A block contains a mechanical latching device with electromagnetic impulse unlatching (AC or DC) or manual unlatching.

Captive screw type connecting terminals, built-in cable clamps, M3.5 (+,-) pozidriv 2 screw with screw-driver guidance; delivered untightened and protected against accidental direct contact.

Operation

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

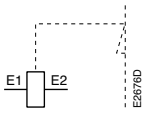
Contactor opening can be controlled:

– electrically by an impulse* (AC or DC) on the WB75-A block coil.
  * the coil is not designed to be permanently energized.
– manually by pressing the pushbutton on the front face of the WB75-A block.

Mounting

The WB75-A block is clipped onto the front face of the 1-stack contactor where it takes up two slots. The two other slots do not accept CA4 single pole auxiliary contacts. Up to 2 CAL4-11 auxiliary contact blocks can be side-mounted on contactors.

5



Terminal marking

Ordering details

For contactors	Rated control circuit voltage Uc		Type	Order code		Pkg qty	Weight (1 pce)
	V 50 Hz or DC	V 60 Hz					kg
AF09 ... AF38 NF	24	24...28	WB75-A	FPTN372726R1001		1	0.120
	42	42...48	WB75-A	FPTN372726R1002		1	0.120
	48	48...55	WB75-A	FPTN372726R1003		1	0.120
	110	110...127	WB75-A	FPTN372726R1004		1	0.120
	220...230	220...255	WB75-A	FPTN372726R1006		1	0.120
	230...240	230...277	WB75-A	FPTN372726R1005		1	0.120
	380...415	380...440	WB75-A	FPTN372726R1007		1	0.120
	415...440	440...480	WB75-A	FPTN372726R1008		1	0.120

Note: For WB75-A produced since week 06-2012.

1SBC101634S0201

Mechanical latching unit

Technical data

Type		**WB75-A**

Utilization characteristics according to IEC

Rated insulation voltage Ui acc. to IEC 60947-1		690 V
Max. electrical impulse time		
On AC coil (with load factor 5 %)		20 s
On DC coil (with load factor 3 %)		8 s
Min. electrical impulse time		
For latching (energizing of the contactor coil)	**AC**	120 ms (AF09 ... AF38)
	DC	120 ms (AF09 ... AF38)
For pull-out (energizing of the WB block coil)	**AC**	30 ms
	DC	50 ms
Coil operating limits	**AC or DC supply**	0.85...1.1 x Uc
AC control voltage 50/60 Hz		
Rated control circuit voltage Uc		24...480 V AC
Coil consumption	**Average pull-in value**	90 VA
	Average holding value	60 VA
DC control voltage		
Rated control circuit voltage Uc		24...440 V DC
Coil consumption	**Average pull-in value**	110 W
	Average holding value	110 W
Operating time		
On contactor closing (latching)		
Between coil energization and:		
	N.O. contact closing	No difference with the operation of a contactor without mechanical latching unit
	N.C. contact opening	No difference with the operation of a contactor without mechanical latching unit
On contactor opening (unlatching)		
Between WB.. coil energization and:		
	N.O. contact opening	5...25 ms
	N.C. contact closing	7...28 ms
Mechanical durability		
	Number of operating cycles	1 million operating cycles
Max. switching frequency		3600 cycles/h with on-load factor of 8%

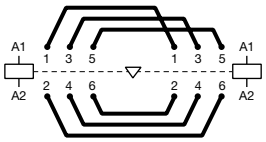
Connecting characteristics

Connection capacity (min. ... max.)		
Rigid solid	**1 x**	1...4 mm²
	2 x	1...4 mm²
Flexible with ferrule	**1 x**	0.75...2.5 mm²
	2 x	0.75...2.5 mm²
Lugs	**L <**	8 mm
	I >	3.5 mm
Tightening torque		
Recommended		1 Nm
Max.		1.2 Nm
Screw terminals		Delivered in open position, screws of unused terminals must be tightened
All terminals		M3.5
Screwdriver type		Flat Ø 5.5 / Pozidriv 2

1SBC101676S0201

Connection accessories for starting solutions

BEA16-4



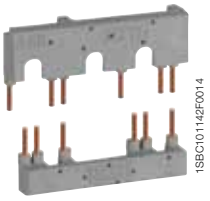
Connecting links with manual motor starters

The BEA..-4 connecting links are used to connect AF09 ... AF38 contactors with the MS116 or MS132 manual motor starters.

The BEA..-4 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	Type	Order code		Pkg qty	Weight (1 pce) kg
AF09 ... AF16	MS116-0.16 ... MS116-25, MS132-0.16... MS132-25	BEA16-4	1SBN081306T1000		10	0.025
AF26 ... AF38	MS116-0.16 ... MS116-16, MS132-0.16 ... MS132-10	BEA26-4	1SBN082306T1000		10	0.025
	MS116-20 ... MS116-32, MS132-12 ... MS132-32	BEA38-4	1SBN082306T2000		10	0.030



BER16-4

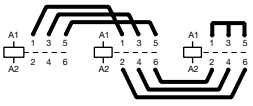
Connection sets for reversing contactors

BER16-4 and BER38-4 connection sets between the main poles of two 3-pole contactors mounted side by side.

The connection sets are made up of 1 upstream and 1 downstream connections: insulated, solid copper bars.

Ordering details

For 3-pole contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
AF09 ... AF16	BER16-4	1SBN081311R1000		1	0.045
AF26 ... AF38	BER38-4	1SBN082311R1000		1	0.100

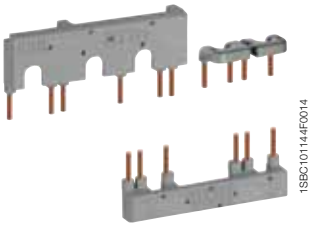


Connection sets for star-delta starting

BEY16-4 and BEY38-4 connection sets between 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: upstream phase-to-phase connection
– Delta contactor / star contactor: downstream connection in parallel
– Star contactor: star point upstream.



BEY16-4

Ordering details

For 3-pole line, delta & star contactors	Interlock unit between delta & star contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
AF09 ... AF16	With or without VM4 or VEM4	BEY16-4	1SBN081313R2000		1	0.050
AF26 ... AF38	With or without VM4 or VEM4	BEY38-4	1SBN082713R2000		1	0.110

1SBC101592S0201

Other accessories

LDC4

Ordering details

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg

Additional coil terminal block

Additional coil terminal block for a bottom access to the coil terminals of contactors or contactor relays.

AF09 ... AF38, NF	LDC4	1SBN070156T1000		10	0.010

BX4

Protective covers

Sealable and transparent protective covers BX4 and non-removable BX4-CA to protect the devices against accidental contact.

All 1-stack contactors and contactor relays	BX4	1SBN110108T1000		10	0.006
For 4-pole CA4 and 2-pole CAT4 auxiliary contact blocks	BX4-CA	1SBN110109W1000		50	0.001

Mounting piece

Mounting piece for replacement of A / AL26 ... A / AL40 contactors fixed by screws by AF contactors in 45 mm width.

AF09 ... AF38	BP38-4	1SBN112303T1000		10	0.003

BP38-4

Function markers

Box of 16 blank cards (16 markers by card) printable on HTP500 thermal transfer printer and AMS 500 marking table to identify your contactors, overload relays or manual motor starters.

Marker dimensions: 7 x 20 mm (.276" x .787").

Box of 16 blank cards	BA4	1SNA235156R2700		16	0.011
AMS 500 support plate for 8 BA4	SPRC 1	1SNA360010R1500		1	0.220
HTP500 support plate	HTP500-BA4	1SNA235712R2400		1	0.290

BA4

Terminal connecting strips and shorting bars

Parallel and series connection of 3-pole contactor:

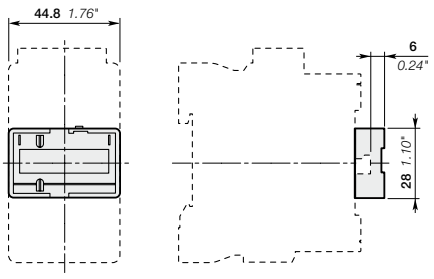
- To obtain a star point (3 parallel-connected poles)
- To connect poles in parallel and thus increase the AC load passing through the flow path made up of the parallel-connected poles
  The relevant cable cross-sectional area may limit the maximum permissible current. Consult the information in the table below
- To connect poles in series and thus increase the DC load controlled by the poles: LY16-4 and LY38-4 secable strips.

Types	for connection of "n" poles	with terminal	insulated
LY...	n = 2 (secable LY16-4, LY38-4 connecting strips)	no	yes
	n = 3	no	yes

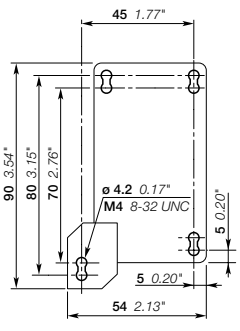
LY16-4

For contactors	max. nominal continuous current with "n" poles				Cable cross-sectional area	Type	Order code		Pkg qty	Weight (1 pce) kg
	in parallel			in series						
	2 poles A	3 poles A	4 poles A	2 poles A	mm²					
AF09	30	33	-	25	6	LY16-4	1SBN071303T1000		10	0.006
AF12	32	36	-	27						
AF16	34	40	-	30						
AF26 ... AF38	50	60	-	45	10	LY38-4	1SBN072303T1000		10	0.012

Main dimensions mm, *inches*



BX4



BP38-4

1SBC101596S0201

CB 5... Impulse Contact Blocks
Impulse Contact blocks

CB 5...

Application

Impulse contact blocks are available in two different types:
– CB 5-10: N.O. contact with a black pushbutton ("ON" function)
– CB 5-01: N.C. contact with a red pushbutton ("OFF" function).

Description

These blocks are equipped with 2 connecting leads 0.5 mm2 with end, approximately 10 cm long.

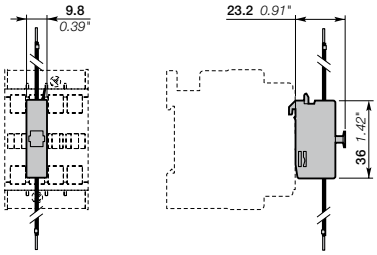
Mounting: Clipped onto the front face of the contactors.

Ordering details

For contactors	Contacts		Type	Order code		Pkg qty	Weight (1 pce) kg
AF09 ... AF38	1	–	CB 5-10	1SBN010013R1010		1	0.012
	–	1	CB 5-01	1SBN010013R1001		1	0.012

Note: The CB 5-10 and CB 5-01 blocks provided for the A... contactors can be used for the AF, AL, AL..Z, AE, TAL, TAE, UA, GA and GAE types.

Main dimensions mm, *inches*



CB5... impulse contact blocks

1SBC101655S0201

Accessories for A40 … AF2050 contactors

Auxiliary contact blocks **5**/254
Pneumatic timer blocks **5**/258
Mechanical interlock units **5**/262
Mechanical and electrical interlock units **5**/262
Function markers - Mounting piece **5**/265
CB5... Impulse contact blocks **5**/266
Electronic timer for star-delta starters **5**/268
Surge suppressors for contactor coils **5**/270
Interface relays **5**/272
Mechanical latching unit **5**/274
Additional terminal blocks **5**/276
Terminals for control lead connections **5**/277
Terminal shrouds **5**/278
Terminal enlargements - Terminal extensions **5**/279
Connector terminals **5**/280
Terminal connecting strips and shorting bars **5**/281
Connecting links for contactors and manual motor starters **5**/282
Connection bars for contactor and MCCB **5**/283
Connection bars for contactor and switch fuse **5**/284
Connection sets **5**/285
Mounting plates for A95 ... AF750 contactors **5**/287
Adapter plates for A95 ... AF750 contactors **5**/288
Main contact sets - Arc chutes for 3-pole contactors **5**/289
Contactor coils **5**/290

1SBC101726S0201

Auxiliary contact blocks

CA5-10

CA5-40E

CAL5-11

CAL18-11

Description

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

Types of auxiliary contact blocks for front mounting:

– CA5 1 or 4-pole block, instantaneous with N.O., N.C. contacts

– CC5 1-pole block, with N.O. leading contact or N.C. lagging contact.

Select the 4-pole auxiliary contact blocks CA5-..E, CA5-..M or CA5-..U type, according to the contactor type for compliance with the standard requirements (see "Terminal Marking and Positioning").

Types of auxiliary contact blocks for side mounting:

– CAL... 2-pole block instantaneous N.O. + N.C. contacts.

For clipping onto the right and/or lefthand side of the contactors.

The CAL18-11B is a second block for mounting in addition to a first CAL18-11 block, right and/or lefthand of the A145 ... A300 and AF145 ... AF2050 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

Front-mounted instantaneous auxiliary contact blocks, 1-pole

For contactors	Number of blocks (1)	Auxiliary contacts				Type	Order code		Pkg qty	Weight (1 pce) kg
A40, AL40, TAL40	1-5	1	0	–	–	CA5-10	1SBN010010R1010		10	0.014
A45 ... A110	1-6	0	1	–	–	CA5-01	1SBN010010R1001		10	0.014
AF45, AF110	1-6	–	–	1	0	CC5-10	1SBN010011R1010		10	0.014
AE45 ... AE75, TAE45 ... TAE75	1-6	–	–	0	1	CC5-01	1SBN010011R1001		10	0.014

Front-mounted instantaneous auxiliary contact blocks, 4-pole

A45 ... A110	1	4	0	–	–	CA5-40E	1SBN010040R1040		2	0.060
AE45 ... AE75	1	3	1	–	–	CA5-31E	1SBN010040R1031		2	0.060
AF45 ... AF110	1	2	2	–	–	CA5-22E	1SBN010040R1022		2	0.060
TAE45 ... TAE75	1	0	4	–	–	CA5-04E	1SBN010040R1004		2	0.060
		1	1	1	1	CA5-11/11E	1SBN010040R1018		2	0.060
A40-30-10	1	3	1	–	–	CA5-31M	1SBN010040R1131		2	0.060
AL40-30-10	1	2	2	–	–	CA5-22M	1SBN010040R1122		2	0.060
TAL40-30-10	1	1	3	–	–	CA5-13M	1SBN010040R1113		2	0.060
		0	4	–	–	CA5-04M	1SBN010040R1104		2	0.060
		1	1	1	1	CA5-11/11M	1SBN010040R1118		2	0.060
A40-30-01	1	4	0	–	–	CA5-40U	1SBN010040R1340		2	0.060
AL40-30-01	1	3	1	–	–	CA5-31U	1SBN010040R1331		2	0.060
TAL40-30-01	1	2	2	–	–	CA5-22U	1SBN010040R1322		2	0.060
		0	4	–	–	CA5-04U	1SBN010040R1304		2	0.060

Side-mounted instantaneous auxiliary contact blocks, 2-pole

A40 ... A75	1-2	1	1	–	–	CAL5-11	1SBN010020R1011		2	0.050
AL40, TAL40	1									
AE45 ... AE75, TAE45 ... TAE75	1									
AF45 ... AF75	1-2									
UA16 ... UA75	1-2									
A95 ... A300	1-2	1	1	–	–	CAL18-11	1SFN010720R1011		2	0.050
AF95 ... AF2050	1-2									
UA95, UA110	1-2									
A145 ... A300	1-2(2)	1	1	–	–	CAL18-11B	1SFN010720R3311		2	0.050
AF145 ... AF2050	1-2(2)									

(1) For each contactor type, refer to "Accessory fitting details" table.

(2) 2 blocks CAL18-11 + 2 blocks CAL18-11B.

Note:

– The front-mounted auxiliary contact blocks provided for the A... contactors can be used for the UA..., GA... and GAE... types

– The CAL... auxiliary contact blocks can be used for GA... contactors:

GA75-10-00: 2 x CAL5-11 blocks

GA75-10-11: 1 x CAL5-11 block

GAE75-10-00: 1 x CAL5-11 block

GAE75-10-11: no add-on block.

– The CAL... auxiliary contact blocks can be used for UA..RA contactors. See "Accessory fitting details" for this contactor type.

1SBC101520S0201

Auxiliary contact blocks

Technical data

			Front mounted	Side mounted	
Types			1-pole **CA5**, 1-pole **CC5**, 4-pole **CA5**	**CAL5-11, CCL5-11**	**CAL18-11, CAL18-11B**
Contact utilization characteristics according to IEC					
Standards			IEC 60947-5-1 and EN 60947-5-1		
Rated insulation voltage Ui acc. to IEC 60947-5-1			690 V		
Rated operational voltage Ue max.			24...690 V AC		
Conventional thermal current Ith - θ ≤ 40 °C			16 A		
Ie / Rated operational current AC-15					
acc. to IEC 60947-5-1		**24-127 V 50/60 Hz**	6 A		
		220-240 V 50/60 Hz	4 A		
		380-440 V 50/60 Hz	3 A		
		500-690 V 50/60 Hz	2 A		
Making capacity acc. to IEC 60947-5-1			10 x Ie AC-15		
Breaking capacity acc. to IEC 60947-5-1			10 x Ie AC-15		
Ie / Rated operational current DC-13					
acc. to IEC 60947-5-1		**24 V DC**	6 A / 144 W		
		48 V DC	2.8 A / 134 W		
		72 V DC	1 A / 72 W		
		110 V DC	0.55 A / 60 W		
		125 V DC	0.55 A / 69 W		
		220 V DC	0.3 A / 66 W		
		250 V DC	0.3 A / 75 W		
Short-circuit protection device gG type fuse			10 A		
Rated short-time withstand current Icw		**for 1.0 s**	100 A		
θ = 40 °C		**for 0.1 s**	140 A		
Minimum switching capacity					
A40 ... A75 contactors			17 V / 1 mA		–
with failure rate acc. to IEC 60947-5-4			≤ 10^{-7}		–
A95 ... A110 contactors			24 V / 50 mA	–	24 V / 50 mA (0.5 million of operating cycles)
with failure rate acc. to IEC 60947-5-4			–	–	≤ 10^{-6}
Power dissipation per pole at 6 A			0.1 W		0.15 W
Mechanical durability	Number of operating cycles		10 millions (A9 ... A75) 3 millions (A95 ... A110)	10 millions	5 millions (A/AF95 ... A/AF185) 3 millions (A/AF210 ... AF750) 0.5 million (AF1250 ... AF2050)
	Max. switching frequency		3600 cycles/h		
Electrical durability	Number of operating cycles		see "Electrical durability" curves		
	Max. switching frequency	**AC-15**	1200 cycles/h		
		DC-13	900 cycles/h		

Contact utilization characteristics according to UL / CSA

Standards	UL 508, CSA C22.2 N°14
Max. operational voltage	600 V AC, 250 V DC
Pilot duty	A600, Q300
AC thermal rated current	10 A

Connecting characteristics

Connection capacity (min. ... max.)				
	Rigid solid	**1 x**	1...4 mm²	
		2 x	1...4 mm²	
	Flexible with ferrule	**1 x**	0.75...2.5 mm²	
		2 x	0.75...2.5 mm²	
	Lugs	**L ≤**	7.7 mm	8 mm
		I >	3.7 mm	3.7 mm
Tightening torque			1 Nm	
Degree of protection		**Terminals**	IP20	
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529				
Screw terminals			Delivered in open position, screws of unused terminals must be tightened	
All terminals			M3.5	
Screwdriver type			Flat Ø 5.5 / Pozidriv 2	

1SBC101522S0201

Auxiliary contact blocks
for severe industrial environments

CE5-01W

Description

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

Types of auxiliary contact blocks for front mounting:

– CE... 1-pole block, instantaneous with N.O. contact or N.C. contact, designed in 2 protection versions:
  - CE5-.. D with built-in microswitch IP40, degree of protection (IP20 on terminals)
  - CE5-.. W with built-in microswitch IP67, degree of protection (IP20 on terminals).

Types of auxiliary contact blocks for side mounting:

– CEL18-... 1-pole block with built-in microswitch IP67 degree of protection (IP20 on terminals). Instantaneous N.O. or N.C. contact.

For clipping onto the right and/or lefthand 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	Number of blocks	Auxiliary contacts				Type	Order code		Pkg qty	Weight (1 pce) kg
Front-mounting instantaneous auxiliary contact blocks, 1-pole										
A40, AL40	1-5	1	–	–	–	CE5-10D0.1	1SBN010015R1010		1	0.020
A45 ... A110	1-6	–	1	–	–	CE5-01D0.1	1SBN010015R1001		1	0.020
AL40, TAL40	1-5	1	–	–	–	CE5-10D2	1SBN010017R1010		1	0.020
AE, AF, TAE45 ... TAE110	1-6	–	1	–	–	CE5-01D2	1SBN010017R1001		1	0.020
		1	–	–	–	CE5-10W0.1	1SBN010016R1010		1	0.020
		–	1	–	–	CE5-01W0.1	1SBN010016R1001		1	0.020
		1	–	–	–	CE5-10W2	1SBN010018R1010		1	0.020
		–	1	–	–	CE5-01W2	1SBN010018R1001		1	0.020
Side-mounting instantaneous auxiliary contact blocks, 1-pole microswitch auxiliary contact N.O. or N.C.										
A95 ... A300	1-2	1	0	–	–	CEL18-10	1SFN010716R1010		1	0.050
AF95 ... AF2050	1-2									
UA95, UA110	1-2									
A95 ... A300	1-2	0	1	–	–	CEL18-01	1SFN010716R1001		1	0.050
AF95 ... AF2050	1-2									
UA95, UA110	1-2									

(1) For each contactor type, refer to "Accessory fitting details" table.
Note: The front-mounted auxiliary contact blocks provided for the A... contactors can be used for the UA..., GA... and GAE... types.

1SBC101577S0201

Auxiliary contact blocks

Technical data

			Front-mounted		Side-mounted
Types			1-pole **CE5-..0.1**	1-pole **CE5-..2**	**CEL18-10, CEL18-01**
Contact utilization characteristics according to IEC					
Standards			IEC 60947-5-1 and EN 60947-5-1		
Rated insulation voltage Ui acc. to IEC 60947-5-1			250 V		
Rated operational voltage Ue max.			125 V	250 V	125 V
Conventional thermal current Ith - θ ≤ 40 °C			0.1 A	2 A	0.1 A
Ie / Rated operational current			**AC-14**	**AC-15**	**AC-14**
acc. to IEC 60947-5-1	**24-127 V 50/60 Hz**		0.1 A	2 A	0.1 A
	220-240 V 50/60 Hz		–	2 A	–
Making capacity acc. to IEC 60947-5-1			6 x Ie AC-14	10 x Ie AC-15	6 x Ie AC-14
Breaking capacity acc. to IEC 60947-5-1			6 x Ie AC-14	10 x Ie AC-15	6 x Ie AC-14
Ie / Rated operational current			**DC-12**		
acc. to IEC 60947-5-1		**24 V DC**	0.1 A	2 A	0.1 A
		48 V DC	0.1 A	1 A	0.1 A
		72 V DC	0.1 A	0.3 A	0.1 A
		110 V DC	0.1 A	0.2 A	0.1 A
		125 V DC	–	0.2 A	–
		220 V DC	–	0.1 A	–
Short-circuit protection device			0.1 A (FF type fuses) (1)	10 A (FF type fuses) (1)	0.1 A (FF type fuses) (1)
Minimum switching capacity					
A40 ... A75 contactors			3 V / 1 mA	17 V / 1 mA	3 V / 1 mA
With failure rate acc. to IEC 60947-5-4			–	≤ 10^{-7}	–
A95 ... A110 contactors			3 V / 1 mA	17 V / 1 mA	–
With failure rate acc. to IEC 60947-5-4			–	≤ 10^{-7}	–
Mechanical durability	Number of operating cycles		5 millions for CE5-..D0.1	5 millions for CE5-..D2	1 million
			2.5 millions for CE5-..W0.1	2.5 millions for CE5-..W2	–
	Max. switching frequency		3600 cycles/h		1200 cycles/h
Electrical durability	Number of operating cycles		2.5 millions for CE5-..D0.1	1 million for CE5-..D2	0.7 millions
			0.7 millions for CE5-..W0.1	0.3 millions for CE5-..W2	
	Max. switching frequency	**AC-14, AC-15**	1200 cycles/h		
		DC-12	900 cycles/h		
Contact utilization characteristics according to UL / CSA					
Standards			UL 508, CSA C22.2 N°14		
Max. operational voltage			125 V AC / 110 V DC	250 V AC / 220 V DC	125 V
Pilot duty					
AC thermal rated current			0.1 A	2 A	0.1 A
Connecting characteristics					
Connection capacity (min. ... max.)					
	Rigid solid	**1 x**	1...4 mm²		
		2 x	1...4 mm²		
	Flexible with ferrule	**1 x**	0.75...2.5 mm²		
		2 x	0.75...2.5 mm²		
	Bars or lugs	**L ≤**	7.7 mm		
		I >	3.7 mm		
Connection capacity acc. to UL/CSA		**1 or 2 x**	AWG 18...14		
Tightening torque			1 Nm		
Degree of protection		**Terminals**	IP20		
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		**Microswitches**	IP40 for CE5-..D0.1	IP40 for CE5-..D2	IP67
			IP67 for CE5-..W0.1	IP67 for CE5-..W2	
Screw terminals			Delivered in open position, screws of unused terminals must be tightened		
All terminals			M3.5		
Screwdriver type			Flat Ø 5.5 / Pozidriv 2		

(1) or HRC fuses for very fast action (6.3 x 32 mm size).

1SBC101584S0201

Pneumatic timer blocks

TP40DA

Description

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

Types

– TP40DA, TP180DA (blue button) for time delay on energization
– TP40IA, TP180IA (black button) for time delay on de-energization.

Pneumatic timer with 350° linear scale and setting via marked knurled knob.
Block equipped with 2 time-delayed auxiliary contacts: 1 N.O. and 1 N.C.
Captive screw type connecting terminals with built-in cable clamps. M3.5 (+,-) pozidriv 2 screw with screwdriver guidance, supplied untightened and protected against accidental direct contact.
Clipped onto the front panel of A40 ... A75 1-stack contactors.

Accessory

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

BX-TP

Ordering details (1)

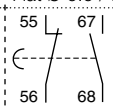
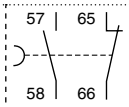
For contactors	Time delay setting	Type	Order code		Pkg qty	Weight (1 pce) kg
Pneumatic timer blocks for time delay on energization						
A40 ... A75 1-stack	0.1...40 s	TP40DA	1SBN020300R1000		1	0.070
	10...180 s	TP180DA	1SBN020300R1001		1	0.070
Pneumatic timer blocks for time delay on de-energization						
A40 ... A75 1-stack	0.1...40 s	TP40IA	1SBN020301R1000		1	0.070
	10...180 s	TP180IA	1SBN020301R1001		1	0.070
Accessory						
–		BX-TP	FPTN472657R0001		1	0.006

Note: The TP... timers provided for A40 ... A75 contactors can be used for the AF, AE, TAE, UA, GA and GAE contactors.
(1) For each contactor type, refer to "Accessory fitting details" table.

1SBC101524S0201

Pneumatic timer blocks

Technical data

Types		TP40DA	TP180DA	TP40IA	TP180IA
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 AC			
Rated operational voltage Ue max.		24...690 V AC			
Conventional free air thermal current Ith - θ ≤ 40 °C		10 A			
Ie / Rated operational current AC-15					
acc. to IEC 60947-5-1	**24-127 V 50/60 Hz**	6 A			
	220-240 V 50/60 Hz	4 A			
	380-440 V 50/60 Hz	3 A			
	500 V 50/60 Hz	1 A			
	690 V 50/60 Hz	0.5 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**	6 A / 144 W			
	48 V DC	2.8 A / 134 W			
	72 V DC	1 A / 72 W			
	110 V DC	0.55 A / 60 W			
	125 V DC	0.55 A / 69 W			
	220 V DC	0.3 A / 66 W			
	250 V DC	0.3 A / 75 W			
Short-circuit protection device - gG type fuse		10 A			
Rated short-time withstand current Icw	**for 1.0 s**	50 A			
θ = 40 °C	**for 0.1 s**	100 A			
Power dissipation per pole at 6 A		0.15 W			
N.O. and N.C. contact non-overlapping time		1...2 ms			
Resetting time		approx. 40 ms			
Accuracy (measured over 10 successive cycles)		± 2%			
Drift (variation in mean value during TP lifetime)		-15...+15%		-25...+15%	
Drift according to ambient temperature					
Between -20 °C and +20 °C		0.25 % per °C			
Between +20 °C and +65 °C		0.20 % per °C			
Mechanical durability					
	Number of operating cycles	5 millions operating cycles			
Electrical durability					
	Number of operating cycles	See "Electrical durability" curves			
Max. electrical switching frequency		1200 cycles/h			
Utilization characteristics according to UL/CSA					
Standards		UL 508, CSA C22.2 N°14			
Max. operational voltage		600 V			
Pilot duty		A600			
Connecting characteristics					
Connection capacity (min. ... max.)					
Rigid solid	**1 x**	1...2.5 mm²			
	2 x	1...2.5 mm²			
Flexible with ferrule	**1 x**	0.75...2.5 mm²			
	2 x	0.75...2.5 mm²			
Lugs	**L <**	8 mm			
	l >	3.5 mm			
Tightening torque					
Recommended		1 Nm			
Max.		1.2 Nm			
Screw terminals		Delivered in open position, screws of unused terminals must be tightened			
All terminals		M3.5			
Screwdriver type		Flat Ø 5.5 / Pozidriv 2			
Terminal marking					

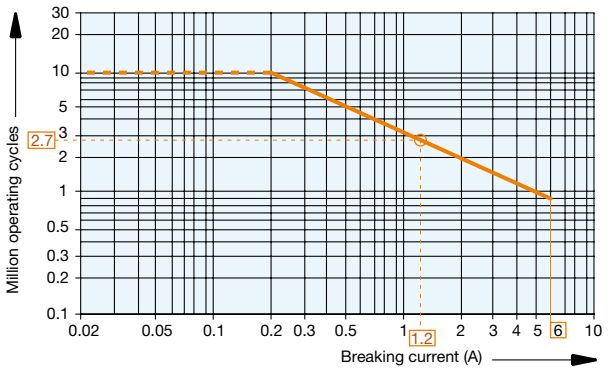
1SBC101328S0201

Auxiliary contacts
Electrical durability

Electrical durability for AC-15 utilization category

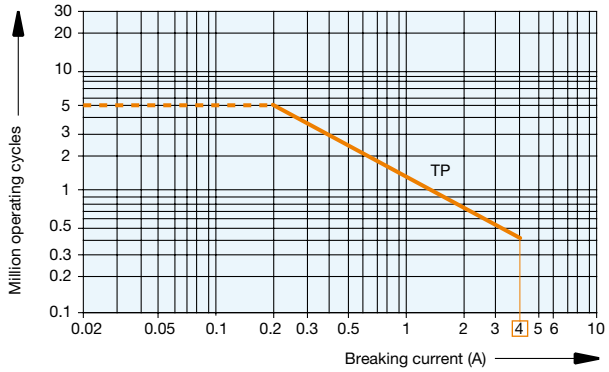
AC-15 utilization category according to IEC 60947-5-1 / EN 60947-5-1:
- making current: 10 x Ie with cos φ = 0.7 and Ue
- breaking current: Ie with cos φ = 0.4 and Ue.

This curves represent the electrical durability of the built-in or add-on auxiliary contacts or pneumatic timer contacts, in relation to the breaking current.
The curves have been drawn for resistive and inductive loads up to 690 V, 40...60 Hz.



- A40, AL40, TAL40 contactor built-in auxiliary contacts
- 1-pole and 4-pole CA5-..,
  1-pole CC5-..,
  2-pole CAL5-.., CAL18-.. and CCL5-.. add-on auxiliary contacts.

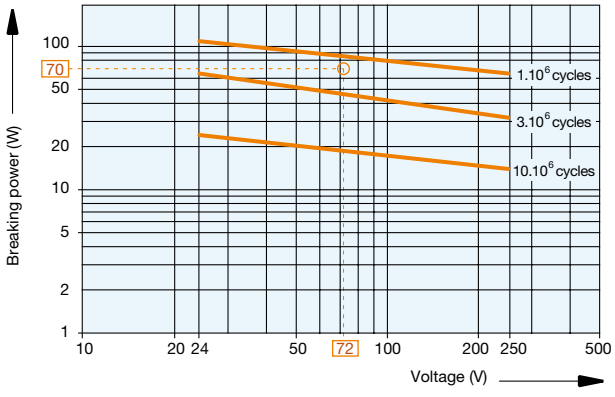
Example:
Breaking current = 1.2 A
On the opposite curve at intersection "○" 1.2 A the corresponding value for the electrical durability is approximately $2.7.10^6$ operating cycles.



- TP... pneumatic timer contacts.

Electrical durability for DC-13 utilization category

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



- A40, AL40, TAL40 contactor built-in auxiliary contacts
- 1-pole and 4-pole CA5-..,
  1-pole CC5-..,
  2-pole CAL5-.., CAL18-.. and CCL5-.. add-on auxiliary contacts.
- TP... pneumatic timer contacts.

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 2.10^6 operating cycles.

1SBC101588S0201

Add-on auxiliary contacts
Terminal marking and positioning

1-pole auxiliary contacts

CA5-01

CA5-10

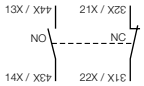
CE5-01, CEL18-01

CE5-10, CEL18-10

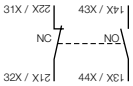
CC5-01

CC5-10

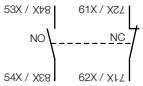
2-pole auxiliary contacts



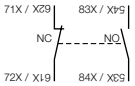
CAL5-11, CAL18-11
(L. h. s. mounted)



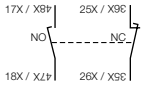
CAL5-11, CAL18-11
(R. h. s. mounted)



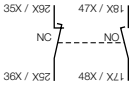
CAL18-11B
(L. h. s. mounted)



CAL18-11B
(R. h. s. mounted)

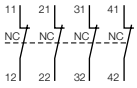


CCL5-11
(L. h. s. mounted)

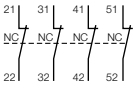


CCL5-11
(R. h. s. mounted)

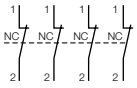
4-pole auxiliary contacts



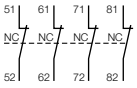
CA5-04E



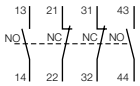
CA5-04M



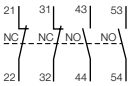
CA5-04U



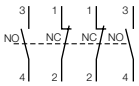
CA5-04N



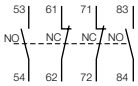
CA5-22E



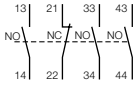
CA5-22M



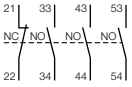
CA5-22U



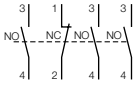
CA5-22N



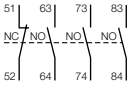
CA5-31E



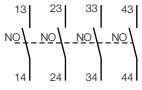
CA5-31M



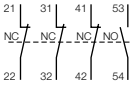
CA5-31U



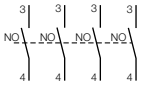
CA5-31N



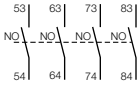
CA5-40E



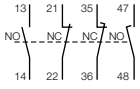
CA5-13M



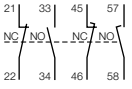
CA5-40U



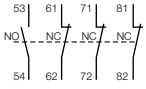
CA5-40N



CA5-11/11E



CA5-11/11M



CA5-13N

5

1SBC101586S0201

Mechanical interlock units
Mechanical and electrical interlock units

VM300H

Description

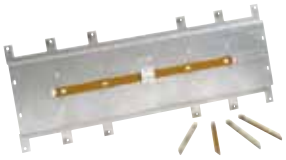
When mounted between two contactors, the mechanical interlock unit prevents one of the contactors from closing as long as the other contactor is closed.

– VM... interlock units for mechanical interlocking of two horizontal or vertical mounted AC or DC operated contactors
– VE... interlock units for mechanical and electrical interlocking of two horizontal mounted AC or DC operated contactors.

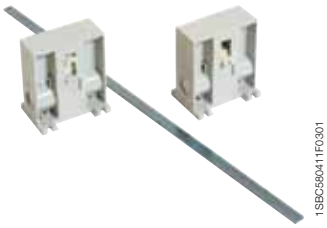
Ordering details (1)

Left side contactor	Right side contactor	Mounting	Type	Order code		Pkg qty	Weight (1 pce) kg
Mechanical interlock units for two horizontal mounted contactors (1)							
A40	A40	Rail mounting	VM5-1	1SBN030100R1000		1	0.066
A40	A45 ... A110	See table below with VE5-.. type	–	–		–	–
A45 ... A75	A45 ... A110		–	–		–	–
A95 ... A185	A45 ... A110		–	–		–	–
A95 ... A185	A145 ... A300	PN.. mounting plate to be ordered separately	VM300H	1SFN034700R1000		1	0.150
A210 ... A300	A145 ... A300		VM300H	1SFN034700R1000		1	0.150
A210 ... A300	AF400 ... AF460		VM300/460H	1SFN035100R1000		1	0.150
AF400 ... AF1250	AF400 ... AF1250		VM750H	1SFN035700R1000		1	0.200
AF1350 ... AF2050	AF1350 ... AF2050	Plate included	VM1650H	1SFN036503R1000		1	6.000

(1) Mechanical durability: VM5-1 = 5 millions cycles, VM300H ... VM750H = 1 million cycles.
The interlock units provided for A... contactors can be used for AF types.
The interlock units provided for A40.. contactors can be used for AL40.. and TAL40.. types.



VM1650H



VM300V

Up contactor	Down contactor	Mounting	Type	Order code		Pkg qty	Weight (1 pce) kg
Mechanical interlock units for two vertical mounted contactors (2)							
A95 ... A185	A145 ... A300	Additional plate (not supplied)	VM300V	1SFN034701R1000		1	0.150
A210 ... A300	A145 ... A300		VM300V	1SFN034701R1000		1	0.150
A210 ... A300	AF400 ... AF460		VM300/460V	1SFN035101R1000		1	0.150
AF400 ... AF1250	AF400 ... AF1250		VM750V	1SFN035701R1000		1	0.200

(2) Mechanical durability: VM300V ... VM750V = 1 million cycles.

VE5-1

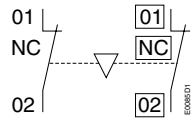
Left side contactor	Right side contactor	Mounting	Type	Order code		Pkg qty	Weight (1 pce) kg
Mechanical and electrical interlock units for two horizontal mounted contactors							
A40	A40	Rail mounting	VE5-1	1SBN030110R1000		1	0.076
A40 ... A75	A45 ... A75		VE5-2	1SBN030210R1000		1	0.146
A45 ... A75	A40 ... A75		VE5-2	1SBN030210R1000		1	0.146
A45 ... A75	A95 ... A110	PN.. mounting plate to be ordered separately	VE5-2 (3)	1SBN030210R1000		1	0.146
A95 ... A110	A45 ... A75		VE5-2 (3)	1SBN030210R1000		1	0.146
A95 ... A110	A95 ... A110		VE5-2	1SBN030210R1000		1	0.146

(3) The combination of A45 ... A75 contactors interlocked with A95, A110 contactors cannot be mounted on symmetrical rail (75 mm, IEC/EN 60715).
The interlock units provided for A... contactors can be used for AE, TAE, AF, GA and GAE types.
The interlock units provided for A40.. contactors can be used for AL40.. and TAL40.. types.

1SBC101525S0201

Mechanical interlock units
Mechanical and electrical interlock units

Technical data

Types		VE5-1	VE5-2
Contact utilization characteristics according to IEC			
Standards		IEC 60947-5-1 and EN 60947-5-1	
Rated insulation voltage Ui acc. to IEC 60947-5-1		690 V	
Rated operational voltage Ue max.		24...690 V	
Conventional thermal current Ith - θ ≤ 40 °C		16 A	
Ie / Rated operational current AC-15			
acc. to IEC 60947-5-1	**24-127 V 50/60 Hz**	6 A	
	220-240 V 50/60 Hz	4 A	
	380-440 V 50/60 Hz	3 A	
	500-690 V 50/60 Hz	2 A	
Making capacity acc. to IEC 60947-5-1		10 x Ie AC-15	
Breaking capacity acc. to IEC 60947-5-1		10 x Ie AC-15	
Ie / Rated operational current DC-13			
acc. to IEC 60947-5-1	**24 V DC**	6 A	
	48 V DC	2.8 A	
	72 V DC	1 A	
	125 V DC	0.55 A	
	250 V DC	0.3 A	
Short-circuit protection device - gG type fuse		10 A	
Rated short-time withstand current Icw	**for 1.0 s**	100 A	
θ = 40 °C	**for 0.1 s**	140 A	
Power dissipation per pole at 6 A		0.15 W	
Mechanical durability			
Number of operating cycles		5 millions operating cycles	
Max. switching frequency		600 cycles/h	
Utilization characteristics according to UL/CSA			
Standards		UL 508, CSA C22.2 N°14	
Max. operational voltage		600 V	
Connecting characteristics			
Connection capacity (min. ... max.)			
Rigid solid	**1 x**	1...4 mm²	
	2 x	1...4 mm²	
Flexible with ferrule	**1 x**	0.75...2.5 mm²	
	2 x	0.75...2.5 mm²	
Lugs	**L <**	8 mm	
	I >	3.5 mm	
Tightening torque			
Recommended		1 Nm	
Max.		1.2 Nm	
Degree of protection		IP20	
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			
Screw terminals		delivered in open position, screws of unused terminals must be tightened	
All terminals		M3.5	
Screwdriver type		Flat Ø 5.5 / Pozidriv 2	
Terminal marking			

Technical note: when, during switching, the arc time is estimated to more than 40 ms, the closing signal of one of the two contactors must be delayed with respect to the opening signal of the other contactor in order to prevent a short-circuit.
Use a TP40 pneumatic timer or TE5S electronic timer with time lapse, as applicable.

1SBC101331S0201

CA5-.., CE5-.., CAL.., CEL18-.. and TP.. fitting details

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

Contactor types	Main poles	Built-in auxiliary contacts	Front-mounted accessories: Auxiliary contact blocks 1-pole CA5-.. / 1-pole CE5-..		4-pole CA5-..		Pneumatic timer (9) TP..A		Side-mounted accessories: Auxiliary contact blocks 2-pole CAL.. / 1-pole CEL18-..		Interlock unit VM5-.. / VE5-..
3-pole contactors											
A40	3 0 3 0	1 0 0 1 (1)	1 to 5 x CA5-.. 1 to 3 x CE5-.. max. (5)	or	1 x 4-pole CA5-.. + 1 x 1-pole CA5-.. or CE5-.. (5)	or	1 x TP..A + 1 x 1-pole CA5-..	+	1 to 2 x CAL5-11	or	1 x VM5-1 or VE5-1 + 1 x CAL5-11
AL40, TAL40	3 0 3 0	1 0 0 1	1 to 5 x CA 5-.. (1) 1 to 2 x CE5-.. max. (8)	or	1 x 4-pole CA5-.. (1) + 1 x 1-pole CA5-.. no CE5-..		-	or	1 x CAL5-11 (2)	+	1 x VM5-1 or VE5-1 (3)
A50 ... A75 AF50 ... AF75	3 0	0 0	1 to 6 x CA5-.. 1 to 5 x CE5-.. max. (6)	or	1 x 4-pole CA5-.. + 2 x 1-pole CA5-.. or CE5-.. (6)	or	1 x TP..A + 2 x 1-pole CA5-..	+	1 to 2 x CAL5-11	or	1 x VE5-2 +1 x CAL5-11
	3 0	1 1	1 to 6 x CA5-.. 1 to 5 x CE5-.. max. (6)	or	1 x 4-pole CA5-.. + 2 x 1-pole CA5-.. or CE5-.. (6)	or	1 x TP..A + 2 x 1-pole CA5-..	+	1 x CAL5-11	or	1 x VE5-2
TAE50 ... TAE75	3 0	0 0	1 to 6 x CA5-.. 1 to 5 x CE5-.. max. (6)	or	1 x 4-pole CA5-.. + 2 x 1-pole CA5-.. or CE5-.. (6)	or	1 x TP..A + 2 x 1-pole CA5-..	+	1 x CAL5-11	or	1 x VE5-2
	3 0	1 1	1 to 6 x CA5-.. 1 to 5 x CE5-.. max. (6)	or	1 x 4-pole CA5-.. + 2 x 1-pole CA5-.. or CE5-.. (6)	or	1 x TP..A + 2 x 1-pole CA5-..		–		–
A95, A110 AF95, AF110	3 0	0 0	1 to 6 x CA5-.. 1 to 5 x CE5-.. max. (6)	or	1 x 4-pole CA5-.. + 2 x 1-pole CA5-.. or CE5-.. (6)		–	+	1 to 2 x CAL18-11 or 1 to 2 x CEL18-..	or	1 x VE5-2 + 1 x CAL18-11
	3 0	1 1	1 to 6 x CA5-.. 1 to 5 x CE5-.. max. (6)	or	1 x 4-pole CA5-.. + 2 x 1-pole CA5-.. or CE5-.. (6)		–	+	1 x CAL18-11 or 1 x CEL18-..	or	1 x VE5-2
2-stack 3-pole contactors											
A40	3 0	3 2 (1)	1 x CA5-.. or 1 x CE5-.. (7)		–		–		1 to 2 x CAL5-11	or	1 x VM5-1 or VE5-1 + 1 x CAL5-11
AL40	3 0	2 2	–		–		–		–		1 x VM5-1 or VE5-1
A50 ... A75	3 0	2 2	1 to 2 x CA5-.. 1 to 2 x CE5-.. max.		–		–	+	1 to 2 x CAL5-11	or	1 x VE5-2 + 1 x CAL5-11
A95, A110	3 0	2 2	1 to 2 x CA5-.. 1 to 2 x CE5-.. max.		–		–	+	1 to 2 x CAL18-11 or 1 to 2 x CEL18-..	or	1 x VE5-2 +1 x CAL18-11
4-pole contactors											
A45 ... A75 AF45 ... AF75	4 0	0 0	1 to 6 x CA5-.. 1 to 5 x CE5-.. max. (6)	or	1 x 4-pole CA5-.. + 2 x 1-pole CA5-.. or CE5-.. (6)	or	1 x TP..A + 2 x 1-pole CA5-..	+	1 to 2 x CAL5-11	or	1 x VE5-2 +1 x CAL5-11
	2 2	0 0 (4)	1 to 6 x CA5-.. no CE5-..	or	1 x 4-pole CA5-.. + 2 x 1-pole CA5-.. no CE5-..	or	1 x TP..A + 2 x 1-pole CA5-..	+	1 to 2 x CAL5-11		–
AE45 ... AE75	4 0	0 0	1 to 6 x CA5-.. 1 to 5 x CE5-.. max. (6)	or	1 x 4-pole CA5-.. + 2 x 1-pole CA5-.. or CE5-.. (6)	or	1 x TP..A + 2 x 1-pole CA5-..	+	1 x CAL5-11	or	1 x VE5-2
	2 2	0 0 (4)	1 to 6 x CA5-.. no CE5-..	or	1 x 4-pole CA5-.. + 2 x 1-pole CA5-.. no CE5-..	or	1 x TP..A + 2 x 1-pole CA5-..	+	1 x CAL5-11		–
TAE45 ... TAE75	4 0	0 0	1 to 6 x CA5-.. 1 to 5 x CE5-.. max. (6)	or	1 x 4-pole CA5-.. + 2 x 1-pole CA5-.. or CE5-.. (6)	or	1 x TP..A + 2 x 1-pole CA5-..	+	1 x CAL5-11	or	1 x VE5-2

(1) 2 N.C. CA5-.. auxiliary contacts maximum in mounting position 5.
(2) Not allowed in mounting position 1+30°.
(3) Not allowed in mounting position 1+30°. With VE5-1 interlock unit, a maximum of 3 N.O. auxiliary contacts are permitted.
(4) 2 x N.C. CA5-.. auxiliary contacts maximum.

Notes for combination of CE5 with other accessories:
(5) The total number of N.O. or N.C. CE5-.. and other additional N.C. CA5-.. auxiliary contacts is limited to 3. CE5-.. auxiliary contacts not allowed in mounting position 5
(6) The total number of N.O. or N.C. CE5-.. and other additional N.C. CA5-.. auxiliary contacts is limited to 5
(7) CE5-.. auxiliary contacts not allowed in mounting position 5
(8) The total number of CE5-.. is limited to 2 with no other additional CA5-.. auxiliary contacts
(9) Pneumatic timer TP..A not allowed with CE5-..

1SBC101585S0201

Function markers
Mounting piece

BA5-50

BA5-50 Function markers

Description

For marking contactors, thermal overload relays and accessories.
The BA5-50 is a set of 50 function markers designed to be clipped onto the front face of devices.
Effective marking surface: 7 x 19 mm.
Details can be added to these markers using a ball point pen, indelible felt-tip pen or pentel white.
Self-adhesive labels (not supplied) can also be added to them.

Ordering details

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
Contactors, thermal overload relays and accessories	BA5-50	1SBN110000R1000		1	0.017

BP16

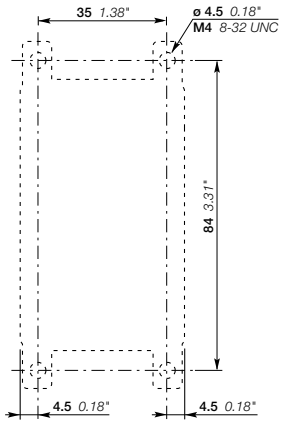
BP16 Mounting piece

Description

Mounting piece for screw fixing (M4, not supplied) of UA, UA..RA series contactors indicated in the table below.
Easy handling of screwdrivers and screw driving.
Add-on mounting piece on contactor's rear face, offering a wide fixing facility.

Ordering details

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
UA16, UA16..RA	BP16	1SBN111403R1000		100	0.141



Drilling plan for UA16, UA16..RA contactors with BP16

CB 5... Impulse Contact Blocks
Impulse Contact blocks

CB 5...

Description

Impulse contact blocks are available in two different types:
– CB 5-10: N.O. contact with a black pushbutton ("ON" function)
– CB 5-01: N.C. contact with a red pushbutton ("OFF" function).

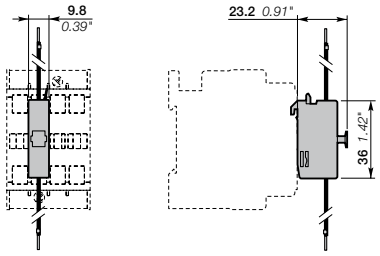
These blocks are equipped with 2 connecting leads 0.5 mm² with end, approximately 10 cm long.

Mounting: Clipped onto the front face of the contactors.

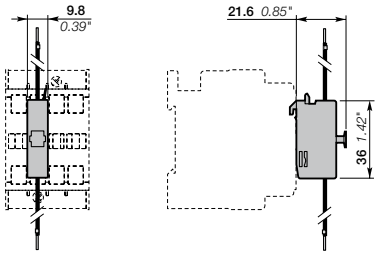
Ordering details

For contactors	Contacts		Type	Order code		Pkg qty	Weight (1 pce) kg
A40 ... A110	1	–	CB 5-10	1SBN010013R1010		1	0.012
	–	1	CB 5-01	1SBN010013R1001		1	0.012

Main dimensions mm, *inches*



CB 5-10 impulse contact blocks



CB 5-01 impulse contact blocks

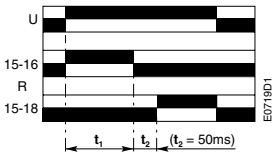
1SBC101716S0201

Notes

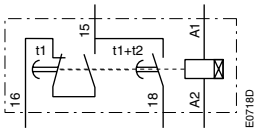
Electronic timer for star-delta starters

TE5S...

5



Chart



Equivalent diagram

Description

When used in star-delta starters, the TE5S lags the star connection and provides a lapse of 50 ms before the switch over to delta connection.

According to the type of device chosen, the electronic circuit has a 24 V AC / DC, 110 to 120 V AC, 220 to 240 V AC or 380 to 440 V AC supply. An output relay with reversing contact ensures high current switching. A two-position switch allows selection of one of the two time delay ranges: 0.8 to 8 s or 6 to 60 s. The 0.1 to 1.0 graduated button allows an initial setting without steps within the previously selected range which can then be adjusted using a chronometer.

Note: We recommend that you allow for temperature drift for the final adjustment of the time delay setting. Drift: -0.2 % per °C.

For example, a setting made at 20 °C will yield a time delay shorter by 7 % at 55 °C in a cubicle (-0.2 % per °C i.e. -0.2 x 35 = -7 %).

Regardless of these settings the TE5S provides a fixed "lapse" of 50 ms between the opening of contact 15-16 and the closing of contact 15-18. This time delay prevents from arc short-circuit during star to delta switching.

Operation

On energization, the green U indicator light (voltage applied) comes on. Contact 15-16 then immediately moves to the closed position.

Count-down of the programmed time immediately commences. When the time delay has elapsed, contact 15-16 opens and at the same time the 50 ms lapse, t2, begins after which contact 15-18 moves to the closed position. The yellow R indicator light comes on.

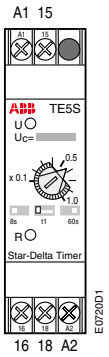
On de-energization, the U and R indicator lights go out and, after the 250 ms resetting time, the device is ready for a new cycle.

Mounting

On 35 x 7.5 mm or 35 x 15 mm mounting rail according to IEC/EN 60715.

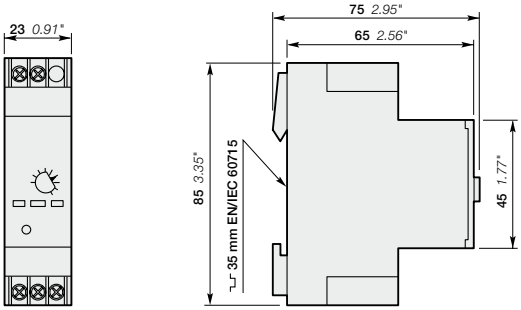
Ordering details

For contactors	Rated control circuit voltage Uc		Type	Order code		Pkg qty	Weight (1 pce)
	V 50/60 Hz	V DC					kg
A40 ... A300	24	24	TE5S-24	1SBN020010R1001		1	0.080
	110...120	–	TE5S-120	1SBN020010R1002		1	0.080
	220...240	–	TE5S-240	1SBN020010R1003		1	0.080
	380...440	–	TE5S-440	1SBN020010R1004		1	0.080



Front face

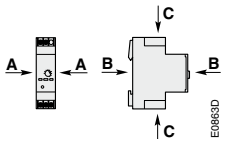
Main dimensions mm, *inches*



1SBC101523S0201

Electronic timer for star-delta starters

Technical data

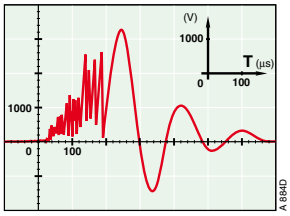
Types			TE5S-24	TE5S-120	TE5S-240	TE5S-440
Utilization characteristics according to IEC						
Standards			IEC 60947-5-1 and EN 60947-5-1			
Rated insulation voltage Ui acc. to IEC 60947-5-1			440 V			
Rated operational voltage Ue max.			24 V DC			–
			24…240 V AC			440 V AC
Conventional free air thermal current Ith			10 A			
Ie / Rated operational current AC-15						
acc. to IEC 60947-5-1		**24-120 V 50/60 Hz**	5 A			–
		220-240 V 50/60 Hz	4 A			–
		380-440 V 50/60 Hz	–			3 A
Ie / Rated operational current DC-13						
acc. to IEC 60947-5-1		**24 V DC**	4 A			–
Short-circuit protection device - gG type fuse			10 A			
Control circuit voltage						
AC control voltage	Rated supply voltage Uc		24 V AC	110…120 V AC	220…240 V AC	380…440 V AC
50/60 Hz	Average consumption		1.5 VA	3.5 VA	6.5 VA	12.5 VA
DC control voltage	Rated supply voltage Uc		24 V DC	–	–	–
	Average consumption		0.7 W	–	–	–
Rated frequency limits			48…63 Hz			
Supply voltage range			0.85…1.1 x Uc			
Overvoltage protection			Built-in varistor			
Load factor			100 %			
Time delay range (t1) selected by switch			0.8…8 s and 6…60 s			
Temperature drift			-0.2 % per °C			
Mechanical setting accuracy			± 15% of the setting range			
On-load reiteration accuracy under constant conditions			± 2% after 1 million operating cycles			
Minimum time lapse (t2)			50 ms			
Min. time lapse after 1 million of operating cycles			40 ms			
Resetting time (max.)			250 ms			
Front panel display		**green indicator light**	Energization			
		yellow indicator light	Output relay activated			
Ambient air temperature						
Operation			-25…+60 °C			
Storage			-40…+85 °C			
Shock withstand						
acc. to IEC 60068-2-27 and EN 6006-2-27						
		**Shock direction**				
		A	20 g / 11 ms			
		B	15 g / 11 ms			
		C	20 g / 11 ms			
Vibration withstand			10 to 300 Hz in the 3 directions			
acc. to IEC 60068-2-6 and EN 60068-2-6			3 g			
Mechanical durability	**Number of operating cycles**		5 millions operating cycles			
Electrical durability	**Number of operating cycles**		1 million operating cycles			
On-load maximum switching frequency			720 cycles/h			600 cycles/h
Fixing on rail according to IEC 60715, EN 60715			35 x 7.5 mm or 35 x 15 mm			

Connecting characteristics

Connection capacity (min. ... max.)			
	Rigid solid	**1 x**	1...2.5 mm²
		2 x	1...2.5 mm²
	Flexible with ferrule	**1 x**	0.75...2.5 mm²
		2 x	0.75...2.5 mm²
Tightening torque			
Recommended			0.6 Nm
Max.			0.8 Nm
Degree of protection			IP20
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			
Screw terminals			Delivered in open position, screws of unused terminals must be tightened
All terminals			M2.5
Screwdriver type			Flat Ø 4 / Pozidriv 1

1SBC101326S0201

Surge suppressors for contactor coils



Description

The operation of inductive circuits causes overvoltages, in particular on opening of the contactor coil.
The electromagnetic energy stored in the coil during contactor closing is restored on opening in the form of surges, the slope and amplitude of which may rise to several kilovolts. A number of drawbacks are observed ranging from interference on the electronic devices to breakdown of insulators and even destruction of certain sensitive components.
The graph opposite reproduces the oscillogram showing voltage discharges at the terminals of a 42 V / 50 Hz coil without peak clipping. The coil was switched by 8 series-connected poles of a contactor relay.
Following a burst of discharges with a very steep slope a damped oscillation emerges with a peak value of 3500 V.

Overvoltage Factor

The overvoltage factor k is defined as the ratio of the maximum overvoltage peak value Ûs to the peak value Ûc of the coil rated control voltage Uc:

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

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

To reduce the harmful effects of these overvoltages, ABB has developed a range of surge suppressors designed to reduce the k factor defined above and to limit or even completely eliminate the high pre-damping voltage frequencies.
Each case is different, but the technical data tolerances and the generous sizing of parts have enabled us to reduce the number of variants.
We have chosen the following solutions: transil diodes, varistors and RC blocks.
Note: A varistor is a resistor whose value decreases to a very large extent when a certain voltage is applied at its terminals.

5

1SBC574001F0301

RV5/50

1SBC573891F0301

RC5-1/50

Ordering details

For contactors	Rated control circuit voltage Uc			Type	Order code		Pkg qty	Weight (1 pce)
	V	AC	DC					kg
A40 ... A110, AL40, AE45 ... AE75, TAL40, TAE45 ... TAE75	24...50	●	●	RV5/50	1SBN050010R1000		2	0.015
	50...133	●	●	RV5/133	1SBN050010R1001		2	0.015
	110...250	●	●	RV5/250	1SBN050010R1002		2	0.015
	250...440	●	●	RV5/440	1SBN050010R1003		2	0.015
A40	24...50	●	–	RC5-1/50	1SBN050100R1000		2	0.012
	50...133	●	–	RC5-1/133	1SBN050100R1001		2	0.012
	110...250	●	–	RC5-1/250	1SBN050100R1002		2	0.012
	250...440	●	–	RC5-1/440	1SBN050100R1003		2	0.012
A45 ... A110	24...50	●	–	RC5-2/50	1SBN050200R1000		2	0.015
	50...133	●	–	RC5-2/133	1SBN050200R1001		2	0.015
	110...250	●	–	RC5-2/250	1SBN050200R1002		2	0.015
	250...440	●	–	RC5-2/440	1SBN050200R1003		2	0.015
A145 ... A300	250...440	●	–	RC5-3/440	1SFN050300R1003		2	0.028
AL40 AE45 ... AE75, TAL40, TAE45 ... TAE75	12...32	–	●	RT5/32	1SBN050020R1000		2	0.015
	25...65	–	●	RT5/65	1SBN050020R1001		2	0.015
	50...90	–	●	RT5/90	1SBN050020R1002		2	0.015
	77...150	–	●	RT5/150	1SBN050020R1003		2	0.015
	150...264	–	●	RT5/264	1SBN050020R1004		2	0.015

Note: The surge suppressors provided for A... contactors can be used for the UA, UA..RA and GA75 types.
The surge suppressors provided for AE45 ... AE75 contactors can be used for the GAE75 types.

1SBC101527S0201

Surge suppressors for contactor coils

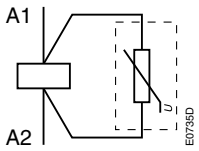
Technical data

Varistor	RV5/50	RV5/133	RV5/250	RV5/440
Rated control circuit voltage Uc	24...50 V AC	50...133 V AC	110...250 V AC	250...440 V AC
	24...50 V DC	50...133 V DC	110...250 V DC	250...440 V DC
Residual overvoltage (clipping voltage)	132 V AC	270 V AC	480 V AC	825 V AC
	132 V DC	270 V DC	480 V DC	825 V DC
Opening time growth factor	1.1...1.5			
Operating temperature	-20...+70 °C			
Connection to the coil terminals (parallel mounting)	Clip-on for both fixing and connection.			
Fixing	Clipped onto the top part of the contactor base without change in contactor overall dimensions.			
Advantages	High energy absorption: good damping - Unpolarized system.			
Drawback	Clipping as from Uvdr*, thus voltage front up to this point. *Uvdr = Varistor operating voltage (voltage dependent resistor), tolerance ± 10 %.			

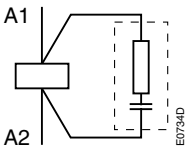
RC type	RC5-1/50 RC5-2/50	RC5-1/133 RC5-2/133	RC5-1/250 RC5-2/250	RC5-1/440 RC5-2/440 RC5-3/440
Rated control circuit voltage Uc	24...50 V AC	50...133 V AC	110...250 V AC	250...440 V AC
Residual overvoltage (clipping voltage)	2 to 3 x Uc max.			
Opening time growth factor	1.2...1.3			
Operating temperature	-20...+70 °C			
Connection to the coil terminals (parallel mounting)	Clip-on for both fixing and connection.			
Fixing	Clipped onto the top part of the contactor base without change in contactor overall dimensions.			
Advantages	Very fast clipping - Attenuation of steep fronts and thus of high frequencies. No operating delays.			

Transil diode	RT5/32	RT5/65	RT5/90	RT5/150	RT5/264
Rated control circuit voltage Uc	12...32 V DC	25...65 V DC	50...90 V DC	77...150 V DC	150...264 V DC
Residual overvoltage (clipping voltage)	50 V DC	100 V DC	150 V DC	210 V DC	390 V DC
Opening time growth factor	1.5...3				
Operating temperature	-20...+70 °C				
Connection to the coil terminals (parallel mounting)	Clip-on for both fixing and connection.				
Fixing	Clipped onto the top part of the contactor base without change in contactor overall dimensions.				
Advantages	Good energy absorption - Unpolarized system - Simple, reliable system.				
Drawback	A certain delay on drop out which does not however reduce contactor breaking capacity.				

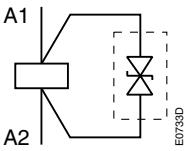
Wiring diagrams



Varistor

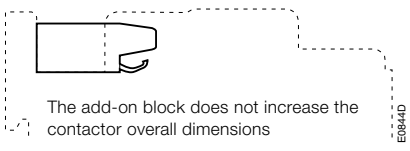


RC type



Transil diode

Dimensions



RV5, RC5, RT5

1SBC101335S0201

Interface relays

RA5-1

Description

RA5-1 interface relay is designed to receive 24 V DC signals delivered by PLC's or other sources with a low output power and to restore them with sufficient power to operate the coils of the relevant A40 ... A110 contactors.

RA5-1 interface relay is made up of a miniature electromechanical relay equipped with a N.O. contact and with a low consumption 24 V DC coil.

The interface relay coil is controlled by the PLC while the N.O. contact ensures switching of the power contactor.

Coil switching gives rise to overvoltages which have adverse effects on the electronic devices, insulators and, more generally, on component lifetime. The RA5-1 is equipped with surge suppressors:

– on the 24 V DC relay coil via a diode,

– on the power contactor coil via a varistor.

Furthermore, the RA5-1 is protected against relay pole reversal by a diode inserted between the E1 and E2 input terminals.

5

Ordering details

For contactors	Coil voltages V 50/60 Hz	Rated control circuit voltage Uc V DC	Type	Order code		Pkg qty	Weight (1 pce) kg
A40 ... A110	24...250	24	RA5-1	1SBN060300R1000		1	0.050
			RA5-1	1SBN060300T1000		10	0.050

Note: The interface relays provided for the A... contactors can be used for the UA, UA..RA and GA types.

1SBC101528S0201

Interface relays

Technical data

Type		RA5-1

Utilization characteristics according to IEC

Standards		IEC 60255-5
Rated insulation voltage Ui acc. to IEC 60947-4-1		250 V AC
Ambient air temperature		
In free air operation	**at Uc = 24 V DC (between E1 and E2)**	-25…+70 °C
	from 0.85 to 1.1 x Uc	-25…+55 °C
Storage		-40…+70 °C
Climatic withstand		Complies with that of associated contactors
Maximum operating altitude		3000 m
Mounting positions		No limitation
Fixing		Using the contactor A1 and A2 teminal connecting parts

Connecting characteristics

Connection capacity (min. ... max.)		
Rigid solid	**1 x**	1...4 mm²
	2 x	1...4 mm²
Flexible with ferrule	**1 x**	0.75...2.5 mm²
	2 x	0.75...2.5 mm²
Lugs	**L <**	8 mm
	I >	3.5 mm
Tightening torque		
Recommended		1 Nm
Max.		1.2 Nm
Degree of protection		Protection against direct contact in acc. with EN 50274
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		RA5-1 wired and mounted on the associated contactor
Screw terminals		Delivered in open position, screws of unused terminals must be tightened
All terminals		M3.5
Screwdriver type		Flat Ø 5.5 / Pozidriv 2

Working data

Surge suppression		
For contactor coil		Varistor
For interface relay coil		Diode
Protection against polarity reversal between terminals E1 and E2		Diode
Interface relay operating time		Closing and drop-out ≤ 10 ms
Total operating time, interface relay + contactor		
Between energization and:	**N.O. contact closing**	20…37 ms
	N.C. contact opening	17…32 ms
Between de-energization and:	**N.O. contact opening**	17…25 ms
	N.C. contact closing	20…28 ms

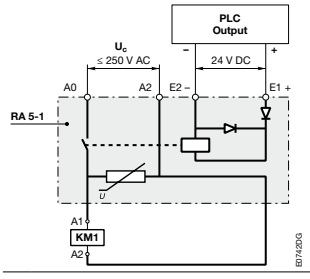
Electrical input data

Control voltage (E1 and E2 terminals) **Uc**		
Rated value		24 V DC
Max. range at ambient temperature 20 °C		19…30 V DC
Max. consumption for Uc = 24 V DC, θ = 20 °C		0.3 W
"0" status (relay open)	**for Uc**	≤ 2.4 V DC
	for Ic	< 1 mA
"1" status (relay closed)	**for Uc**	≥ 19 V DC
Max. short supply interruption immunity time		2 ms

Electrical output data

Switching voltage (A0 and A2 terminals)	≤ 250 V AC
Electrical durability	
Number of operating cycles	2 millions (600 cycles/h) on A40 ... A75 contactors
	0.5 million (600 cycles/h) on A95 and A110 contactors

Connection

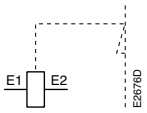


The "E1+" and "E2-" input terminals must be connected, according to their polarity, to the PLC output.
The RA5-1 is equipped with two terminal pads for connection to the A1 and the A2 terminals of the contactor coil.
This coil is supplied between the A0 and the A2 terminals of the RA 5-1.
Mounting: terminals pads clamped inside the contactor coil terminals.

1SBC101337S0201

Mechanical latching unit

WB75-A



Terminal marking

Description

For converting standard contactors into latched contactors.

The WB75-A block contains a mechanical latching device with electromagnetic impulse unlatching (AC or DC) or manual unlatching.

Captive screw type connecting terminals, built-in cable clamps, M3.5 (+,-) pozidriv 2 screw with screw-driver guidance; delivered untightened and protected against accidental direct contact.

Operation

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

Contactor opening can be controlled:

– electrically by an impulse* (AC or DC) on the WB75-A block coil.
  * the coil is not designed to be permanently energized.
– manually by pressing the pushbutton on the front face of the WB75-A block.

Mounting

The WB75-A block is clipped onto the front face of the 1-stack contactor where it takes up two slots. The two other slots may accept CA5... single pole auxiliary contacts (1 block on each side of the mechanical latch).

Ordering details

For contactors	Rated control circuit voltage Uc		Type	Order code		Pkg qty	Weight (1 pce)
	V 50 Hz or DC	V 60 Hz					kg
A40 ... A75, AF45 ... AF75, AL40, AE45 ... AE75, TAL40, TAE45 ... TAE75, UA16 ... UA75, GA75, GAE75	24	24...28	WB75-A	FPTN372726R1001		1	0.120
	42	42...48	WB75-A	FPTN372726R1002		1	0.120
	48	48...55	WB75-A	FPTN372726R1003		1	0.120
	110	110...127	WB75-A	FPTN372726R1004		1	0.120
	220...230	220...255	WB75-A	FPTN372726R1006		1	0.120
	230...240	230...277	WB75-A	FPTN372726R1005		1	0.120
	380...415	380...440	WB75-A	FPTN372726R1007		1	0.120
	415...440	440...480	WB75-A	FPTN372726R1008		1	0.120

1SBC101526S0201

Mechanical latching unit

Technical data

Type		WB75-A		
Utilization characteristics according to IEC				
Rated insulation voltage Ui acc. to IEC 60947-1		690 V		
Max. electrical impulse time				
On AC coil (with load factor 5 %)		20 s		
On DC coil (with load factor 3 %)		8 s		
Min. electrical impulse time				
For latching (energizing of the contactor coil)	**AC**	50 ms (A..., UA..., GA... contactors, N... contactor relays)	120 ms (AF... contactors)	
	DC	120 ms (AL..., AL..Z..., TAL... contactors and NL... NL Z... TNL... contactor relays)	120 ms (AF... contactors)	50 ms (AE..., TAE... contactors and GAE... contactors)
For pull-out (energizing of the WB block coil)	**AC**	30 ms		
	DC	50 ms		
Coil operating limits	**AC or DC supply**	0.85...1.1 x Uc		
AC control voltage 50/60 Hz				
Rated control circuit voltage Uc		24...480 V AC		
Coil consumption	**Average pull-in value**	90 VA		
	Average holding value	60 VA		
DC control voltage				
Rated control circuit voltage Uc		24...440 V DC		
Coil consumption	**Average pull-in value**	110 W		
	Average holding value	110 W		
Operating time				
On contactor closing (latching)				
Between coil energization and:				
	N.O. contact closing	No difference with the operation of a contactor without mechanical latching unit		
	N.C. contact opening	No difference with the operation of a contactor without mechanical latching unit		
On contactor opening (unlatching)				
Between WB.. coil energization and:				
	N.O. contact opening	5...25 ms		
	N.C. contact closing	7...28 ms		
Mechanical durability				
	Number of operating cycles	1 million operating cycles		
Max. switching frequency		3600 cycles/h with on-load factor of 8%		

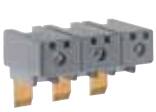
Connecting characteristics

Connection capacity (min. ... max.)			
Rigid solid	**1 x**	1...4 mm²	
	2 x	1...4 mm²	
Flexible with ferrule	**1 x**	0.75...2.5 mm²	
	2 x	0.75...2.5 mm²	
Lugs	**L <**	8 mm	
	I >	3.5 mm	
Tightening torque			
Recommended		1 Nm	
Max.		1.2 Nm	
Screw terminals		Delivered in open position, screws of unused terminals must be tightened	
All terminals		M3.5	
Screwdriver type		Flat Ø 5.5 / Pozidriv 2	

1SBC101333S0201

Additional terminal blocks

LD40



LD75

LD110

5

Description

The LD... terminal block is designed to increase the connecting capacity of the contactor on which it is fitted and for preparation of the wiring before final connection on the contactor.

The LD... blocks are 3-pole terminal blocks with tunnel terminals. The available range can be used on A40 to A110 contactors.

The LD75 and LD110 terminal blocks are fixed in the 3 independent slots located above the built-in connectors.

Ordering details

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
A40	LD40	1SBN072808R1000		1	0.075
A45, A75	LD75	1SBN073508R1000		1	0.115
A95, A110	LD110	1SFN074308R1000		1	0.150

Note: The LD... terminal blocks provided for the A... contactors can be used for the AF, AL, AE, TAL, TAE and UA types.

Technical data

Types				LD40	LD75	LD110
Rated insulation voltage Ui						
acc. to IEC 60947-4-1				690 V		
acc. to UL / CSA				600 V		
Main terminals						
				Screw terminals with single connector 8x10 mm	Screw terminals with single connector 10x11 mm	Screw terminals with single connector 12x12 mm
Connection capacity (min. ... max.)						
	Rigid	Solid (≤ 4 mm²)	1 x	4...35 mm²	6...50 mm²	10...70 mm²
		Stranded (≥ 6 mm²)	2 x	4...16 mm²	6...25 mm²	10...35 mm²
	Flexible with ferrule		1 x	4...25 mm²	6...35 mm²	10...50 mm²
			2 x	4...10 mm²	6...16 mm²	10...25 mm²
	Bars			8 mm	10 mm	12 mm
Tightening torque				2.5 Nm	4 Nm	6 Nm
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529				IP10		
Screw terminals				Delivered in closed position		
				M5	M6	M8
			Screwdriver type	pozidriv 2		Hexagon socket (s = 4 mm)

Note: The utilization of LD... additional terminal blocks keeps the possibility to connect the following cables directly in the contactor main terminals but the BED and BEM connecting sets can no longer be used.

	LD40	LD75	LD110
Possible cross section of rigid cable in the contactor terminals	10 mm²	50 mm²	95 mm²

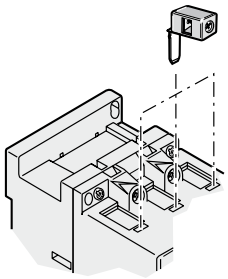
1SBC101534S0201

Terminals for control lead connections

LK75-L

LK75-F

LK110



LK... positioning

Description

Terminals designed to connect the control conductors to the main poles of the A45 ... A110 contactors and derivative versions.

Accessories clipped into the slots placed above each power terminal connector.

The LK75... are fitted with a pin designed to hold them in place until the connector has been fully clamped with its power cable.

The LK110 must be held in place until the connector has been clamped.

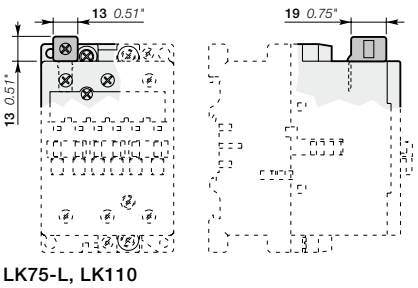
– Degree of protection IP20
– Connecting terminal delivered in open position: cable clamp and M3.5 (+,-) pozidriv 2 screw.
– Cable cross-sectional area:
  - 1 or 2 rigid conductors..... 1...4 mm²
  - 1 or 2 flexible conductors with cable end ..... 0.75...2.5 mm²
– Tightening torque for the LK... screw:
  - recommended ..... 1.00 Nm
  - maxi. ..... 1.20 Nm

Ordering details

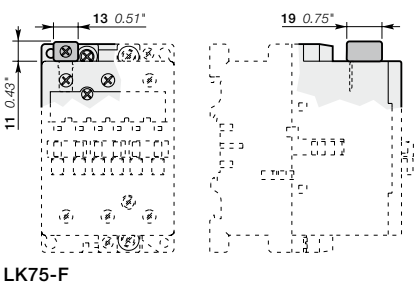
For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
Right and left on A45 ... A75	LK75-L	1SBN073552R1003		2	0.006
Opposite on A45 ... A75	LK75-F	1SBN073552R1002		2	0.006
Right and left on A95 ... A110	LK110	1SFN074352R1000		2	0.010

Note: The LK... terminals provided for the A... contactors can be used for the AF, AE, AM, TAE, UA, GA and GAE types.

Main dimensions mm, *inches*



LK75-L, LK110



LK75-F

1SBC101535S0201

Terminal shrouds

LT...-AC

LT ...-AL

LT...-AY

Description

Main terminal protection for A145 ... AF750 contactors.
The auxiliary contact blocks and coils are designed to provide an IP20 degree of protection.
The main terminals, equipped with lugs or connectors, can be protected against accidental direct contact after wiring (EN 50274) by the addition of terminal shrouds (see table below).

Ordering details

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
A145 ... A185 with connectors	LT185-AC	1SFN124701R1000		2	0.050
A145 ... A185 with lugs	LT185-AL	1SFN124703R1000		2	0.220
A145 ... A185 with short. bar LY185 or between A145 and TA200DU or between A185 and TA200DU	LT185-AY	1SFN124704R1000		1	0.050
A210 ... A300 with connectors	LT300-AC	1SFN125101R1000		2	0.070
A210 ... A300 with lugs	LT300-AL	1SFN125103R1000		2	0.280
A210 ... A300 with short. bar LY300	LT300-AY	1SFN125104R1000		1	0.075
AF400 ... AF460 with connectors	LT460-AC	1SFN125701R1000		2	0.100
AF400 ... AF460 with lugs	LT460-AL	1SFN125703R1000		2	0.800
AF580 ... AF750 with connectors	LT750-AC	1SFN126101R1000		2	0.120
AF580 ... AF1250 with lugs	LT750-AL	1SFN126103R1000		2	0.825

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

1SFC101048C0201

Terminal enlargements
Terminal extensions

LW...

LW... Terminal enlargements

Description

Enlargement pieces designed to increase the width of the contactor terminal pads in order to allow larger connections to be mounted.

Sets containing 3 tin plated copper bars fixed by an isolating spacer.

Ordering details

For contactors	Dimensions		Type	Order code		Pkg qty	Weight (1 pce)
	hole Ø mm	bar mm					kg
A95, A110	6.5	15 x 3	LW110	1SFN074307R1000		1	0.100
A145, A185	10.5	20 x 5	LW185	1SFN074707R1000		1	0.250
A210 ... A300	10.5	25 x 5	LW300	1SFN075107R1000		1	0.450
AF400, AF460	10.5	25 x 5	LW460	1SFN075707R1000		1	0.730
AF580, AF750	13	40 x 6	LW750	1SFN076107R1000		1	1.230
AF1250	13	50 x 10	LW1250	1SFN076407R1000		1	2.000

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

LX...

LX... Terminal extension

Description

Extension pieces designed to extend the main terminals of contactors for combined mounting of contactors and connection sets.

Sets containing 3 tin plated copper bars fixed by an isolating spacer.

Ordering details

For contactors	Dimensions		Type	Order code		Pkg qty	Weight (1 pce)
	hole Ø mm	bar mm					kg
A145, A185	8.5	20 x 5	LX185	1SFN074710R1000		1	0.250
A210 ... A300	10.5	20 x 5	LX300	1SFN075110R1000		1	0.350
AF400, AF460	10.5	25 x 5	LX460	1SFN075710R1000		1	0.500
AF580, AF750	13	40 x 6	LX750	1SFN076110R1000		1	0.850

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

1SFC101049C0201

Connector terminals

LZ...

LZ...

LZ...

Description

Connection of copper and aluminium cables to the terminal pads of the poles of A and AF contactors.

Ordering details

Cables	For contactors	Cable cross section mm²	Type	Order code		Pkg qty	Weight (1 pce) kg
Single Cu	A145, A185	6...185	–	1SDA023354R0001		3	0.200
	A210 ... A300	16...240	–	1SDA023368R0001		3	0.400
Single Al & Cu	A145, A185	35...95	–	1SDA023356R0001		3	0.100
	A145, A185	25...150	–	1SDA023357R0001		3	0.100
	A210 ... A300	120...240	–	1SDA023370R0001		3	0.200
Double Cu	A145, A185	2 x (50...120)	LZ185-2C/120	1SFN074709R1000		3	0.300
Double	A210 ... A300	2 x (95...120)	–	1SDA025766R0001		3	0.400
Al & Cu	AF400 ... AF750	2 x (120...240)	–	1SDA023380R0001		3	0.110
Triple Al & Cu	AF400 ... AF750	3 x (70...185)	–	1SDA023384R0001		3	0.265
Multi Al & Cu	AF1350, AF1650	4 x (120...240)	–	1SDA023387R0001		3	0.400

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

1SFC101051C0201

Terminal connecting strips and shorting bars

LP185

LY185

LH...

LF...

Description

Parallel and series connection of 3-pole and 4-pole contactor poles:

– To obtain a star point (3 parallel-connected poles): LY, LF, (LY allows 3 phases to be short-circuited).

– To connect poles in parallel and thus increase the AC load passing through the flow path made up of the parallel-connected poles: LP and LH (2 poles); LY and LF (3 poles) ; LG (4 poles).

For the maximum permissible current values with parallel-connected poles see "Parallel connection of main poles".

The relevant cable cross-sectional area may limit the maximum permissible current. Consult the information in the table below.

– To connect poles in series and thus increase the DC load controlled by the poles: LP and LH.

Types	for connection of "n" poles	with terminal	insulated
LP...	n = 2	no	yes (1)
LY...	n = 3	no	yes (1)
LH...	n = 2	yes	no
LF...	n = 3	yes	no

(1) LP460 ... LP750, LY185 ... LY750 not insulated. Use terminal shrouds.

Ordering details

For contactors	max. nominal continuous current with "n" poles A	Cable cross-sectional area mm²	Type	Order code		Pkg qty	Weight (1 pce) kg
A145, A185	300	–	LP185	1SFN074712R1000		2	0.300
A210 ... A300	475	–	LP300	1SFN075112R1000		2	0.400
AF400, AF460	725	–	LP460	1SFN075712R1000		4	0.550
AF580, AF750	1200	–	LP750	1SFN076112R1000		4	0.950
A95, A110	240	–	LY110	1SFN074303R1000		1	0.055
A145, A185	400	–	LY185	1SFN074703R1000		1	0.200
A210 ... A300	670	–	LY300	1SFN075103R1000		1	0.300
AF400, AF460	1000	–	LY460	1SFN075703R1000		1	0.450
AF580, AF750	1650	–	LY750	1SFN076103R1000		1	0.800
A45 ... A75	200	95	LH75	FPTN472734R0001		2	0.085
A40	140	50	LF40	1SBN073205R1000		2	0.037
A45 ... A75	275	150	LF75	FPTN472735R0001		2	0.095

Note: The strips and shorting bars provided for the A... contactors can be used for the AF, AL, AL..Z, AE, TAL and TAE types.

1SBC101540S0201

Connecting links for contactors and manual motor starters

BEA40/450

Description

The BEA... connecting links are used to connect a contactor to associated manual motor starters. These are then used together as DOL or reversing starters in type 1 or type 2 coordination, complying with IEC 60947-4-1 and EN 60947-4-1.

The BEA... insulated 3-pole connecting link (touch safe) ensures the electrical linking between the contactor and the corresponding manual motor starter.

Selection table

Ie max. AC-3 400 V A	Contactor & fixing	screws not supplied	Connecting link	MMS &	fixing screws not supplied	Connection set for the contactors	Interlock unit (see "Accessory fitting details")
Direct-on-line starter							
37	A40	2xM4	BEA40/450	MS450	2xM5	–	–
50	A50	2xM4	BEA50/450	MS450	2xM5	–	–
50	A50	2xM6	BEA75/495	MS495	2xM5	–	–
63	A63	2xM6	BEA75/495	MS495	2xM5	–	–
75	A75	2xM6	BEA75/495	MS495	2xM5	–	–
90	A95	2xM6	BEA110/495	MS495	2xM5	–	–
100	A110	2xM6	BEA110/495	MS495	2xM5	–	–
Reversing starter							
37	2xA40	4xM4	BEA40/450	MS450	2xM5	BER40V	VM5-1 / VE5-1
50	2xA50	4xM4	BEA50/450	MS450	2xM5	BEM75-30	VE5-2
50	2xA50	4xM6	BEA75/495	MS495	2xM5	BEM75-30	VE5-2
63	2xA63	4xM6	BEA75/495	MS495	2xM5	BEM75-30	VE5-2
75	2xA75	4xM6	BEA75/495	MS495	2xM5	BEM75-30	VE5-2
90	2xA95	4xM6	BEA110/495	MS495	2xM5	BEM110-30	VE5-2
100	2xA110	4xM6	BEA110/495	MS495	2xM5	BEM110-30	VE5-2

Ordering details

For contactors	Manual motor starter	Type	Order code		Pkg qty	Weight (1 pce) kg
A40	MS450	BEA40/450	1SBN083206R1000		1	0.061
A50	MS450	BEA50/450	1SBN083506R1000		1	0.062
A50, A63, A75	MS495	BEA75/495	1SBN084106R1000		1	0.120
A95, A110	MS495	BEA110/495	1SBN084506R1000		1	0.124

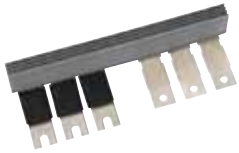
The BEA... connecting links provided for the A... contactors can be used for the AF..., AE..., and TAE... types.

1SBC101538S0201

Connection bars for contactor and MCCB

BEA300

BEA...D



BEA300H

Description

Connection between contactors/starters and moulded case circuit breakers.
These connection sets are solid copper bars.

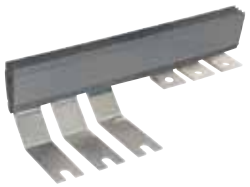
Ordering details

For contactors	MCCB	Type	Order code		Pkg qty	Weight (1 pce) kg
Vertical assembly						
A145, A185, AF145, AF185	T3	BEA185/T3	1SFN084706R1003		1	0.150
A145, A185, AF145, AF185	T4	BEA185/T4	1SFN084706R1005		1	0.150
A210, AF210	T4	BEA210/T4	1SFN085106R1003		1	0.160
A210 ... A300, AF210 ... AF300	T5	BEA300/T5	1SFN085106R1004		1	0.200
AF400 ... AF750	T6	BEA750/T6	1SFN086106R1000		1	0.410
AF400 ... AF750	T5	BEA750/T5	1SFN086106R1001		1	0.410
Vertical assembly with control wire terminals (also suitable when using busbar kits for starter combinations)						
A145, A185, AF145, AF185	T3	BEA185D/T3	1SFN084706R1004		1	0.175
A145, A185, AF145, AF185	T4	BEA185D/T4	1SFN084706R1006		1	0.175
A210, AF210	T4	BEA210D/T4	1SFN085106R1005		1	0.270
A210 ... A300, AF210 ... AF300	T5	BEA300D7T5	1SFN085506R1003		1	0.320
AF400 ... AF750	T6	BEA750D/T6	1SFN086106R1002		1	0.720
AF400 ... AF750	T5	BEA750D/T5	1SFN086106R1003		1	0.720
Horizontal assembly (also suitable when using busbar kits for starter combinations)						
A210 ... A300, AF210 ... AF300	T5	BEA300H/T5	1SFN085307R1002		1	1.280
AF400, AF460	T4	BEA460H/T4	1SFN085907R1000		1	2.450

1SFC101046C0201

Connection bars for contactor and switch fuse

BEF300/OESA400



BEF300H/OESA400

Description

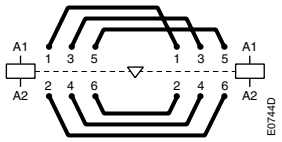
Connection between contactors/starters and switch fuse.
These connection sets are solid copper bars.

Ordering details

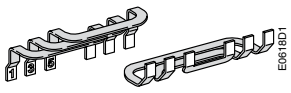
For contactors	Switch fuse	Type	Order code		Pkg qty	Weight (1 pce) kg
Vertical assembly						
A185	OESA250	BEF185/OESA250	1SFN084908R1000		1	0.260
A210 ... A300	OESA250 to OESA400	BEF300/OESA400	1SFN085108R1000		1	0.330
A145	OS160	OSZA15	1SCA022509R0120		1	0.170
AF400, AF460	OESA400	BEF460/OESA400	1SFN085708R1000		1	0.340
AF460 ... AF750	OESA630 to OESA800	BEF750/OESA800	1SFN086108R1000		1	0.740
Horizontal assembly						
A145	OS160...LR	OSZA15	1SCA022509R0120		1	0.170
A145, A185	OESA250...LR	BEF185H/OESA250	1SFN084709R1000		1	0.550
A210 ... A300	OESA250...LR to OESA400...LR	BEF300H/OESA400	1SFN085109R1000		1	1.200
AF400, AF460	OESA400...LR	OESA460H/OESA400	1SFN085709R1000		1	1.250

Note: The BEF... connection bars provided for the A145 ... A300 contactors can be used for the AF145 ... AF300 contactors.

Connection sets



BEM... connections



BEM75-30

BEM300-30

Connection sets for reversing contactors

Description

Connections between the main poles of two 3-pole contactors mounted side by side as reversing contactors. The sets are made up of three upstream connections and three downstream connections.

BER40V – Insulated, stranded, rigid copper wires

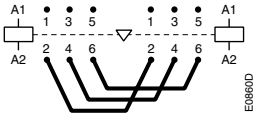
BEM75-30 ... BEM750-30 – Insulated, solid copper bars

On the A... contactors, the power supply by bars or cables equipped with lugs is directly connected to the terminal pads of the main poles. For flange connectors, LX... terminal extension pieces should be used.

Ordering details

For 3-pole contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
A40	BER40V	1SBN082411R1000		1	0.085
A50 ... A75	BEM75-30	1SBN083501R1000		1	0.243
A95, A110	BEM110-30	1SFN084301R1000		1	0.450
A145, A185	BEM185-30	1SFN084701R1000		1	0.900
A210 ... A300	BEM300-30	1SFN085101R1000		1	1.100
AF400, AF460	BEM460-30	1SFN085701R1000		1	4.400
AF580, AF750	BEM750-30	1SFN086101R1000		1	7.300

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



BES... for 3-pole connections

BES...

3-pole connections phase to phase

Description

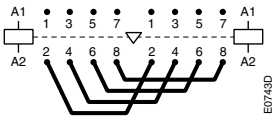
Connections between the main poles of two 3-pole contactors horizontal mounted.

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

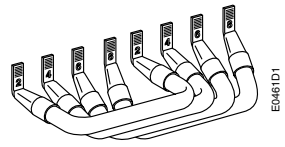
Ordering details

For 3-pole contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
A50 ... A75	BES75-30	1SBN083504R1000		1	0.130
A95, A110	BES110	1SFN084304R1000		1	0.250
A145, A185	BES185	1SFN084704R1000		1	0.500
A210 ... A300	BES300	1SFN085104R1000		1	1.000
AF400, AF460	BES460	1SFN085704R1000		1	2.200
AF580, AF750	BES750	1SFN086104R1000		1	3.700

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



BES... for 4 N.O. main pole connections



BES75-40

Connections for 4-pole changeover contactors

Description

Connection between the main poles of two 4-pole contactors mounted side by side so that they operate as source reversing contactors.

These sets are made up of four downstream connections, with insulated, stranded, rigid copper cables.

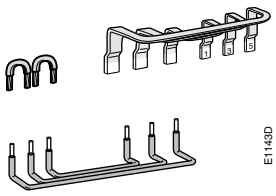
Ordering details

For 4-pole contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
A45, A50, A75	BES75-40	1SBN083302R1000		1	0.400

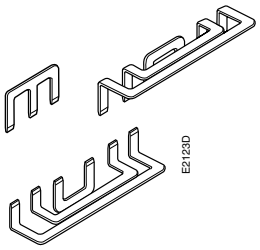
Note: The connections provided for the A... contactors can be used for the AF, AE and TAE types.

1SBC101543S0201

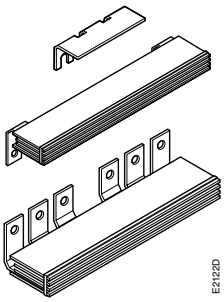
Connection sets



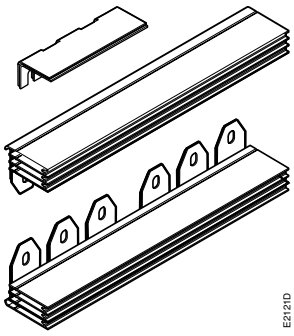
BED 75-1



BED 110



BED 185



BED 400

Connection sets for star-delta starter

Description

Connections between the main poles of a star-delta starter.
These sets are made up of:
– Three line contactor / delta contactor connections - Upstream side
– Three connections for star and delta contactors - Downstream side
– The necessary elements to create the star point upstream of the star contactor.
BED50 / BED50-1, BED75 / BED75-1 – Solid copper bars and insulated stranded copper wires.
BED95 ... BED750 – Insulated, solid copper bars.
BED50-1 ... BED75-1 connection sets are designed for star and delta contactors without mechanical interlock unit (contactors mounting joined side by side).
For mechanically interlocked star and delta contactors use BED50 ... BED75 connection sets.
BED95 ... BED750 are designed for both star and delta contactors with or without mechanical interlock unit.

Ordering details

For contactors		Interlock unit between star and delta contactors	Type	Order code		Weight Pkg (1 pce)
Line and delta	Star					kg
A63	A40	–	BED50-1	1SBN083503R1001		0.180
		VE5-2	BED50	1SBN083503R1000		0.280
A75	A50	–	BED75-1	1SBN084103R1001		0.180
		VE5-2	BED75	1SBN084103R1000		0.250
A95	A75	VE5-2	BED95	1SFN084303R1000		0.400
A110	A95	VE5-2	BED110	1SFN084503R1000		0.500
A145	A110	VM300H	BED145A	1SFN084703R1000		1.300
A185	A145	VM300H	BED185	1SFN084903R1000		1.100
A210	A185	VM300H	BED210	1SFN085103R1000		1.500
A260	A210	VM300H	BED300	1SFN085303R1000		2.100
A300	A260					
AF400	A260	VM300/460H	BED400	1SFN085503R1000		3.500
AF460	A300					
AF460	AF400	VM750H	BED460	1SFN085703R1000		4.700
AF580	AF400	VM750H	BED580	1SFN085903R1000		6.300
AF580	AF460					
AF750	AF580	VM750H	BED750	1SFN086103R1000		7.700

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

1SBC101545S0201

Mounting plates for A95 ... AF750 contactors

1SFT98001-016C3

PN300A-11

1SFT98001-017C3

PN300-21

1SFT98001-018C3

PN300-41

Description

Mounting plates with fixing holes for the specified contactors and overload relays.

Ordering details

For contactors		For overload relays	Type	Order code		Pkg qty	Weight (1 pce) kg
Mounting plates for Direct on line starters							
A145, A185		TA200DU, E200DU	PN185-11	1SFN094705R1000		1	1.100
A210 ... A300		TA450DU, E320DU	PN300A-11	1SFN095105R1000		1	1.650
AF400, AF460		E500DU	PN460-11	1SFN095705R1000		1	2.120
AF580, AF750		E800DU	PN750-11	1SFN096105R1000		1	2.500

For two contactors side by side with space for mechanical interlock		For one or two overload relays	Type	Order code		Pkg qty	Weight (1 pce) kg
Mounting plates for mechanical interlocked contactors, reversing starters and two speed starters for double windings							
A95, A110		TA80DU, TA110DU	PN110-21	1SFN094301R1000		1	0.600
A145, A185		TA200DU, E200DU	PN185-21	1SFN094701R1000		1	1.800
A210 ... A300		TA450DU, E320DU	PN300-21	1SFN095101R1000		1	2.530
AF400, AF460		E500DU	PN460-21	1SFN095701R1000		1	3.490
AF580, AF750		E800DU	PN750-21	1SFN096101R1000		1	4.230

For main and delta contactors	For star contactor (1)	For overload relays	Type	Order code		Pkg qty	Weight (1 pce) kg
Mounting plates for star-delta starters and two speed starters for single windings							
A95, A110	A75, A95	TA80DU or TA110DU	PN110-41	1SFN094303R1000		1	0.950
A145, A185	A110, A145	E200DU or TA200DU	PN185-41	1SFN094903R1000		1	2.440
A210 ... A300	A185 ... A300	E320DU or TA450DU	PN300-41	1SFN095503R1000		1	3.440
AF400, AF460	A300, AF400	E500DU	PN460-41	1SFN095703R1000		1	5.310
AF580, AF750	AF400 ... AF580	E800DU	PN750-41	1SFN096103R1000		1	6.320

(1) Space for mechanical interlock included

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

Adapter plates for A95 ... AF750 contactors

PR300-1

PR400-2

Description

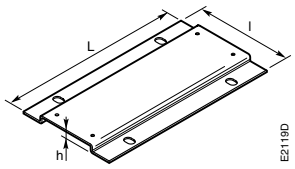
Adapter plates with fixing holes for specified old contactors to new contactors.

Ordering details

From old contactors	To new contactor	Type	Order code		Pkg qty	Weight (1 pce)
						kg
EH65, EH75, EH80, EH90, EG80	A95, A110	PR110-1	1SFN094500R1000		1	0.270
EH100, EH145	A110, A145	PR145-1	1SFN094700R1000		1	0.360
EH150, EH160, EH175, EH210, EG160	A185, A210	PR210-1	1SFN094900R1000		1	0.440
EH250, EH260, EH300	A210 ... A300	PR300-1	1SFN095300R1000		1	0.560
EH370, EH550, EG315	AF400 ... AF580	PR460-1	1SFN095700R1000		1	0.900
EH700, EH800	AF750	PR750-1	1SFN096100R1000		1	0.500
OKYM150, OKYM175	A185	PR185-2	1SFN095100R1001		1	0.500
OKYM200, OKYM250	A210 ... A300	PR300-2	1SFN095300R1001		1	0.500
OKYM315	AF400, AF460	PR400-2	1SFN095700R1002		1	0.820
OKYM400	AF400, AF460	PR460-2	1SFN095700R1001		1	0.800
OKYM500	AF580	PR580-2	1SFN096100R1002		1	0.700
EH550, EG630, OKYM630	AF580, AF750	PR750-2	1SFN096100R1001		1	1.100

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

Dimensions (mm)

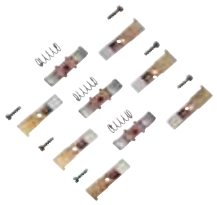


Type of the plate	Dimensions			Fixing holes
	L	l	h	mm
PR110-1	151	106	11.2	2 x ø 7
PR145-1	180	122	11.5	4 x ø 7
PR210-1	200	132	11.5	4 x ø 7
PR300-1	200	172	11.5	4 x ø 7
PR460-1	278	198	11.5	4 x ø 7
PR750-1	283	244	11.5	4 x ø 7
PR185-2	202	152	11.2	4 x ø 11
PR300-2	202	152	11.2	4 x ø 11
PR400-2	278	151	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

Note: The adapter plates provided for the A... contactors can also be used for the AF... contactors.
Fixing holes according to the plate types

1SFC101053C0201

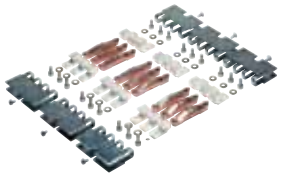
Main contact sets
Arc chutes
for 3-pole contactors


1SBC566543F0301

ZL50

1SFT98099-007C3

ZL185


1SFT101009F0201

ZL1650

ZL..., ZLU... Main contact sets

Description

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

Ordering details

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
A/AF/AE/TAE50-30	ZL50	1SBN163503R1000		1	0.115
A/AF/AE/TAE63-30	ZL63	1SBN163703R1000		1	0.130
A/AF/AE/TAE75-30	ZL75	1SBN164103R1000		1	0.145
A/AF95-30	ZL95	1SFN164303R1000		1	0.190
A/AF110-30	ZL110	1SFN164503R1000		1	0.190
A/AF145	ZL145	1SFN164703R1000		1	0.380
A/AF185	ZL185	1SFN164903R1000		1	0.380
A/AF210	ZL210	1SFN165103R1000		1	0.670
A/AF260	ZL260	1SFN165303R1000		1	0.670
A/AF300	ZL300	1SFN165503R1000		1	0.670
AF400	ZL400	1SFN165703R1000		1	1.320
AF460	ZL460	1SFN165903R1000		1	1.320
AF580	ZL580	1SFN166103R1000		1	1.840
AF750	ZL750	1SFN166303R1000		1	1.840
AF1250	ZL1250	1SFN166403R1000		1	1.840
AF1350	ZL1350	1SFN166503R1000		1	2.500
AF1650	ZL1650	1SFN166703R1000		1	3.500
AF2050	ZL2050	1SFN167003R1000		1	3.500
UA50	ZLU50	1SBN163502R1000		1	0.115
UA63	ZLU63	1SBN163702R1000		1	0.145
UA75	ZLU75	1SBN164102R1000		1	0.145
UA95	ZLU95	1SFN164302R1000		1	0.190
UA110	ZLU110	1SFN164502R1000		1	0.190

1SFT98099-018

ZW...

ZW... Arc chutes for 3-pole contactors

Ordering details

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
A145 ... A185 and AF145 ... AF185	ZW185	1SFN164710R1000		1	0.360
A210 ... A300 and AF210 ... AF300	ZW300	1SFN165110R1000		1	0.410
AF400, AF460	ZW460	1SFN165710R1000		1	1.380
AF580, AF750, AF1250	ZW750	1SFN166110R1000		1	1.500
AF1350, AF1650, AF2050	ZW1650	1SFN166510R1000		1	4.000

1SFC101054C0201

Contactor coils

ZA16

ZA185

Description

Coils for A40 ... A300, UA16 ... UA110 and UA16..RA ... UA110..RA AC operated contactors.

Ordering details

For contactors	Rated control circuit voltage Uc		Type	Order code		Pkg qty	Weight (1 pce)
	V 50 Hz	V 60 Hz					kg
UA16, UA16..RA	24	24	ZA16	1SBN151410R8106		1	0.093
	48	48	ZA16	1SBN151410R8306		1	0.093
	110	110...120	ZA16	1SBN151410R8406		1	0.093
	220...230	230...240	ZA16	1SBN151410R8006		1	0.093
	230...240	240...260	ZA16	1SBN151410R8806		1	0.093
	380...400	400...415	ZA16	1SBN151410R8506		1	0.093
	400...415	415...440	ZA16	1SBN151410R8606		1	0.093
A40 UA26, UA30, UA26..RA, UA30..RA	24	24	ZA40	1SBN152410R8106		1	0.148
	48	48	ZA40	1SBN152410R8306		1	0.148
	110	110...120	ZA40	1SBN152410R8406		1	0.148
	220...230	230...240	ZA40	1SBN152410R8006		1	0.148
	230...240	240...260	ZA40	1SBN152410R8806		1	0.148
	380...400	400...415	ZA40	1SBN152410R8506		1	0.148
	400...415	415...440	ZA40	1SBN152410R8606		1	0.148
A45 ... A75 UA50 ... UA75 UA50..RA ... UA75..RA GA75	24	24	ZA75	1SBN153510R8106		1	0.166
	48	48	ZA75	1SBN153510R8306		1	0.166
	110	110...120	ZA75	1SBN153510R8406		1	0.166
	220...230	230...240	ZA75	1SBN153510R8006		1	0.166
	230...240	240...260	ZA75	1SBN153510R8806		1	0.166
	380...400	400...415	ZA75	1SBN153510R8506		1	0.166
	400...415	415...440	ZA75	1SBN153510R8606		1	0.166
A95, A110 UA95, UA110 UA95..RA, UA110..RA	24	24	ZA110	1SFN154310R8106		1	0.170
	48	48	ZA110	1SFN154310R8306		1	0.170
	110	110...120	ZA110	1SFN154310R8406		1	0.170
	220...230	230...240	ZA110	1SFN154310R8006		1	0.170
	230...240	240...260	ZA110	1SFN154310R8806		1	0.170
	380...400	400...415	ZA110	1SFN154310R8506		1	0.170
	400...415	415...440	ZA110	1SFN154310R8606		1	0.170
A145 ... A185	24	24	ZA185	1SFN154710R8106		1	0.180
	48	48	ZA185	1SFN154710R8306		1	0.180
	110	110...120	ZA185	1SFN154710R8406		1	0.180
	220...230	230...240	ZA185	1SFN154710R8006		1	0.180
	230...240	240...260	ZA185	1SFN154710R8806		1	0.180
	380...400	400...415	ZA185	1SFN154710R8506		1	0.180
	400...415	415...440	ZA185	1SFN154710R8606		1	0.180
A210 ... A300	24	24	ZA300	1SFN155110R8106		1	0.400
	48	48	ZA300	1SFN155110R8306		1	0.400
	110	110...120	ZA300	1SFN155110R8406		1	0.400
	220...230	230...240	ZA300	1SFN155110R8006		1	0.400
	230...240	240...260	ZA300	1SFN155110R8806		1	0.400
	380...400	400...415	ZA300	1SFN155110R8506		1	0.400
	400...415	415...440	ZA300	1SFN155110R8606		1	0.400

1SFC101057C0201

Contactor coils

ZAF110

ZAF300

ZAF1650

Description

Coils for AF45 ... AF2050 AC / DC operated contactors.

Ordering details

For contactors	Rated control circuit voltage Uc min. ... Uc max.		Type	Order code		Pkg qty	Weight (1 pce)
	V 50/60 Hz	V DC					kg
AF45 ... AF75	-	20...60	ZAF75	1SBN153570R7206		1	0.170
	48...130	48...130	ZAF75	1SBN153570R6906		1	0.170
	100...250	100...250	ZAF75	1SBN153570R7006		1	0.170
AF95, AF110	-	20...60	ZAF110	1SFN154370R7206		1	0.200
	48...130	48...130	ZAF110	1SFN154370R6906		1	0.200
	100...250	100...250	ZAF110	1SFN154370R7006		1	0.200
AF145, AF185	-	20...60	ZAF185	1SFN154770R7206		1	0.225
	48...130	48...130	ZAF185	1SFN154770R6906		1	0.225
	100...250	100...250	ZAF185	1SFN154770R7006		1	0.225
AF210 ... AF300	-	20...60	ZAF300	1SFN155170R7206		1	0.450
	48...130	48...130	ZAF300	1SFN155170R6906		1	0.450
	100...250	100...250	ZAF300	1SFN155170R7006		1	0.450
AF400, AF460	-	24...60	ZAF460	1SFN155770R6806		1	0.525
	48...130	48...130	ZAF460	1SFN155770R6906		1	0.525
	100...250	100...250	ZAF460	1SFN155770R7006		1	0.525
	250...500	250...500	ZAF460	1SFN155770R7106		1	0.525
AF580 ... AF1250	-	24...60	ZAF750	1SFN156170R6806		1	1.335
	48...130	48...130	ZAF750	1SFN156170R6906		1	1.335
	100...250	100...250	ZAF750	1SFN156170R7006		1	1.335
	250...500	250...500	ZAF750	1SFN156170R7106		1	1.335
AF1350 ... AF2050	100...250	100...250	ZAF1650 (1)	1SFN156570R7026		1 set	0.900
			ZP1650 (2)	1SFN166521R1070		1	0.300

(1) One set of two coil.
(2) Printed circuit board.

1SFC101057C0201

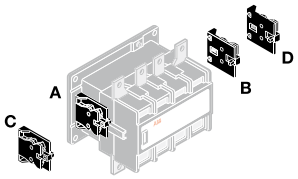
1SBC101727S0201

Accessories for EK100 ... EK1000 contactors

Auxiliary contact blocks **5**/294
Terminal shrouds **5**/298
Surge suppressors for contactor coils **5**/300
Mounting plates **5**/302
Connection sets **5**/303
Mechanical interlock units **5**/304
Mechanical and electrical interlock units **5**/304
Main contact sets - Arc chutes **5**/306
Contactor coils **5**/307

1SBC101727S0201

Auxiliary contact blocks



E2074D

Mounting positions of the CAL16-11

Description

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

Types of auxiliary contact blocks for standard industrial environments:

– CAL instantaneous with N.O. + N.C. contacts
– CCL N.O. leading contact + N.C. lagging contact.

The auxiliary contact blocks are equipped with screw type connecting terminals delivered open, protected against accidental direct contact, and bear the corresponding function marking.
Mounting: Screwed onto the right and / or lefthand side of the EK110 ... EK1000 contactors.

Ordering details

For contactors	Number of blocks	Auxiliary contacts				Type	Order code		Pkg qty	Weight (1 pce)
										kg
2-pole auxiliary contacts N.O. + N.C.										
EK	1	1	1	–	–	CAL16-11A	SK829002-A		1	0.050
	1	1	1	–	–	CAL16-11B	SK829002-B		1	0.050
	1	1	1	–	–	CAL16-11C	SK829002-C		1	0.050
	1	1	1	–	–	CAL16-11D	SK829002-D		1	0.050
	1	1	–	–	1	CCL16-11E (1)	SK829002-E		1	0.050

(1) Mounting of CCL16-11E blocks does not allow an additional second block to be added on top of it.
All DC operated EK... contactors are equipped with one CCL16-11E on the right side.

1SFC101065C0201

Auxiliary contact blocks

Technical data

Types		2-pole CAL 16-11, 2-pole CCL 16-11

Contact utilization characteristics according to IEC

Standards		IEC 60947-5-1 and EN 60947-5-1
Rated insulation voltage Ui acc. to IEC 60947-5-1		690 V
Rated operational voltage Ue max.		24...690 V
Conventional thermal current Ith - θ ≤ 40 °C		10 A
Rated frequency (without derating)		50/60 Hz
Ie / Rated operational current AC-15		
acc. to IEC 60947-5-1	**24-127 V**	6 A
	220-240 V	6 A
	380-440 V	4 A
	500-690 V	1 A
Making capacity acc. to IEC 60947-5-1		10 x Ie AC-15
Breaking capacity acc. to IEC 60947-5-1		10 x Ie AC-15
Ie / Rated operational current DC-13		
acc. to IEC 60947-5-1	**24 V DC**	6 A
	48 V DC	6 A
	72 V DC	4 A
	125 V DC	1.8 A
	250 V DC	0.6 A
Short-circuit protection device gG type fuse		10 A
Rated short-time withstand current Icw	**for 1.0 s**	50 A
θ = 40 °C	**for 0.1 s**	100 A
Minimum switching capacity		0.25 VA / 12 V or 0.25 VA / 5 mA
with failure rate acc. to IEC 60947-5-4		
Power dissipation per pole at 6 A		0.2 W
Mechanical durability	Number of operating cycles	10 millions operating cycles
	Max. switching frequency	3600 cycles/h
Electrical durability	Number of operating cycles	see "Electrical durability" curves
	Max. switching frequency	1200 cycles/h

Contact utilization characteristics according to UL / CSA

Max. operational voltage		600 V
Pilot duty		A600

Connecting characteristics

Connection capacity (min. ... max.)			
	Rigid solid	**1 x**	0.5...2.5 mm²
		2 x	0.5...2.5 mm²
	Flexible with ferrule	**1 x**	0.5...2.5 mm²
		2 x	0.5...2.5 mm²
	Flexible with insulated ferrule	**1 x**	0.5...1.5 mm²
		2 x	0.5...1.5 mm²
	Lugs	**L ≤**	8 mm
		I >	3.7 mm
Tightening torque	Recommended		1.00 Nm
	Max.		1.20 Nm
Degree of protection			IP20
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			
Screw terminals			Delivered in open position, screws of unused terminals must be tightened
All terminals			M3.5
Screwdriver type			Pozidriv 2

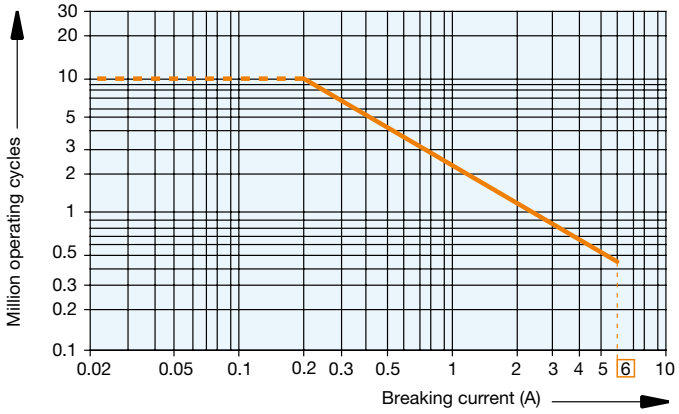
1SBC101656S0201

Auxiliary contacts
Electrical durability

Electrical Durability for AC-15 Utilization Category

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

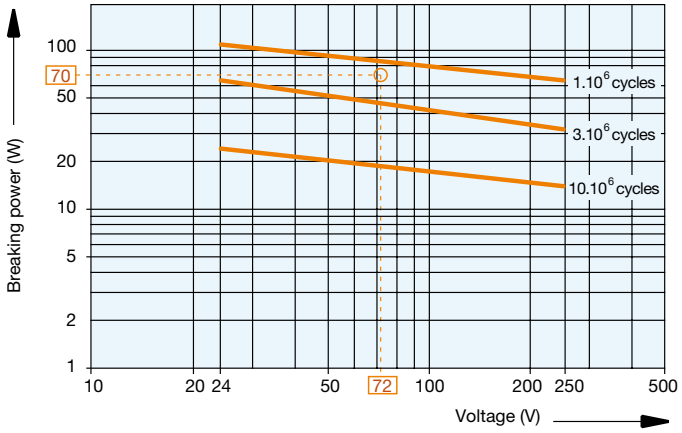
This curve represents the electrical durability of the auxiliary contacts in relation to the breaking current.
The curve has been drawn for resistive and inductive loads up to 690 V, 40...60 Hz.



2-pole CAL16... and CCL16... auxiliary contact blocks

Electrical Durability for DC-13 Utilization Category

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



2-pole CAL16... and CCL16... auxiliary contact blocks

Example:
Control of d.c. electro-magnet: Ue voltage = 72 V d.c. and breaking power = 70 W.
On the opposite curve at intersection "O" 72 V / 70 W the correspon-ding value for the electrical durability is approxi-mately 2.10^6 cycles.

1SBC101657S0201

Add-on auxiliary contacts
Terminal marking and positioning

2-pole auxiliary contacts

CAL16-11A

CAL16-11B

CAL16-11C

CAL16-11 D

CAL16-11E

1SBC101687S0201

Terminal shrouds

LT210-EK

Description

The use of terminal shrouds on the main terminals of EK... contactors is required in electrical panels or cubicles to be built in compliance with the rules for protection against direct contact with live parts in acc. with EN 50274.
On EK110 ... EK1000 contactors:

– The auxiliary contact blocks and coils are designed to provide an IP20 degree of protection
– The main terminals, equipped with lugs or connectors, can be protected against accidental direct contact after wiring (EN 50274) by the addition of terminal shrouds (see table below).

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

Ordering details

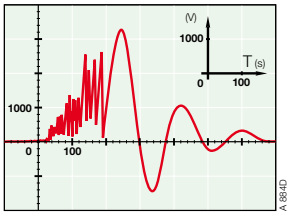
For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
EK110, EK150	LT150-EK	SK178001-HB		1	0.139
EK175, EK210	LT210-EK	SK178001-KB		1	0.152
EK370, EK550	LT550-EK	SK178001-LB		1	0.190
EK1000	LT1000-EK	SK178001-MB		1	0.200

5

1SFC101068C0201

Notes

Surge suppressors for contactor coils



Description

The operation of inductive circuits causes overvoltages, in particular on opening of the contactor coil.
The electromagnetic energy stored in the coil during contactor closing is restored on opening in the form of surges, the slope and amplitude of which may rise to several kilovolts. A number of drawbacks are observed ranging from interference on the electronic devices to breakdown of insulators and even destruction of certain sensitive components.
The graph opposite reproduces the oscillogram showing voltage discharges at the terminals of a 42 V / 50 Hz coil without peak clipping. The coil was switched by 8 series-connected poles of a contactor relay.
Following a burst of discharges with a very steep slope a damped oscillation emerges with a peak value of 3500 V.

Overvoltage Factor

The overvoltage factor k is defined as the ratio of the maximum overvoltage peak value Ûs to the peak value Ûc of the coil rated control voltage Uc:

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

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

To reduce the harmful effects of these overvoltages, ABB has developed a range of surge suppressors designed to reduce the k factor defined above and to limit or even completely eliminate the high pre-damping voltage frequencies.
Each case is different, but the technical data tolerances and the generous sizing of parts have enabled us to reduce the number of variants.
We have chosen the following solutions: transil diodes, varistors and RC blocks.
Note: A varistor is a resistor whose value decreases to a very large extent when a certain voltage is applied at its terminals.

RC-EH300/48

Ordering details

For contactors	Rated control circuit voltage Uc			Type	Order code		Pkg qty	Weight (1 pce)
	V	AC	DC					kg
EK110 ... EK210	24...48	●	–	RC-EH300/48	SK829007-A		1	0.015
	110...415	●	–	RC-EH300/415	SK829007-B		1	0.015
EK370 ... EK1000	48...110	●	–	RC-EH800/110	SK829007-C		1	0.015
EK110 ... EK1000	24...125	–	●	RC-EH800/110	SK829007-C		1	0.015
EK370 ... EK1000	220...600	●	–	RC-EH800/600	SK829007-D		1	0.015

1SFC101070C0201

Surge suppressors for contactor coils

Technical data

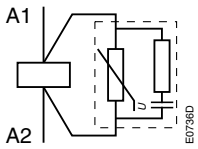
Varistor + RC	RC-EH800/110	RC-EH800/600
Rated control circuit voltage Uc	48 ... 110 V AC	220 ... 600 V AC
	24 ... 125 V DC	–
Residual overvoltage (clipping voltage)	205 V AC	1100 V AC
	205 V DC	–
Opening time growth factor	1.1 ... 1.15	
Operating temperature	-20 ... +70 °C	
Connection to the coil terminals (parallel mounting)	Flexible, accessible leads, equipped with forked lugs	
Fixing	Glued to the top part of the contactor base	
Advantages	- High energy absorption: good damping - Unpolarized system - The RC system damps the voltage front under the Uvdr* threshold.	

***Uvdr** = Varistor operating (voltage dependant resistor), tolerance ± 10 %

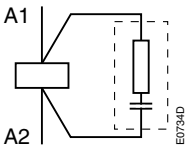
5

RC type	RC-EH300/48	RC-EH300/415
Rated control circuit voltage Uc	24 ... 48 V AC	110 ... 415 V AC
Residual overvoltage (clipping voltage)	2 to 3 x Uc max.	
Opening time growth factor	1.2 ... 3	
Operating temperature	-20 ... +70 °C	
Connection to the coil terminals (parallel mounting)	Flexible, accessible leads, equipped with forked lugs	
Fixing	Glued to the top part of the contactor base	
Advantages	- Very fast clipping - Attenuation of steep fronts and thus of high frequencies - No operating delays.	

Wiring diagrams

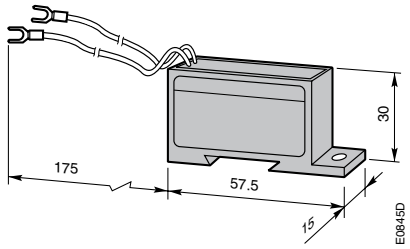


Varistor + RC



RC type

Main dimensions mm



RC-EH

1SFC101072C0201

Mounting plates

PN...

Description

Mounting plates for two horizontal mounted contactors with or without a mechanical interlock unit.

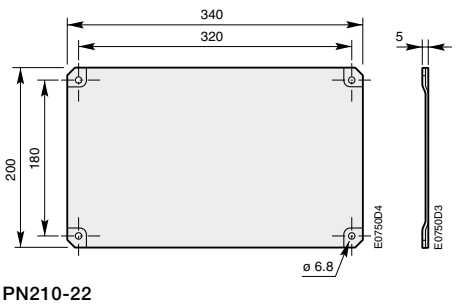
Ordering details

To use with: Left hand contactor	Mechanical interlock	Right hand contactor	Type	Order code		Pkg qty	Weight (1 pce) kg
EK110, EK150	VH145	EK110, EK150	PN210-22	SK829075-C		1	1.400
EK175, EK210	VH300	EK175, EK210	PN300-22	SK829075-E		1	2.070

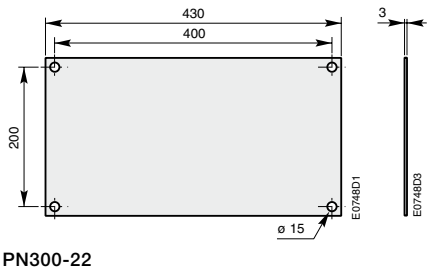
(1) Space for mechanical interlock included.

5

Main dimensions mm



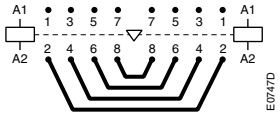
PN210-22



PN300-22

1SFC101069C0201

Connection sets



BSS100 ... BSS1000

Description

Connection between the main poles of two 4-pole contactors mounted side by side so that they operate as source reversing contactors.

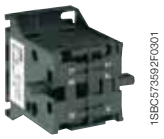
These sets are made up of four downstream connections.
BSS100 ... BSS210 – Insulated, flexible copper bars.
BSS550, BSS1000 – Bare, solid copper bars.

Ordering details

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
Mechanical and electrical interlock units for two horizontal mounted contactors					
EK110	BSS100	SK829090-B		1	0.400
EK150	BSS145	SK829090-F		1	0.700
EK175, EK210	BSS210	SK829090-G		1	1.000
EK370, EK550	BSS550	SK829090-E		1	3.300
EK1000	BSS1000	SK829090-H		1	5.500

1SFC101064C0201

Mechanical interlock units
Mechanical and electrical interlock units



VH145

Description

The mechanical interlock unit prevents one of the contactors from closing as long as the other contactor is closed.

– VH145, VH300 interlock units for mechanical and electrical interlocking of two horizontal mounted AC or DC operated EK110 ... EK1000 contactors.
– VH800 interlock unit for mechanical interlocking of two horizontal mounted AC or DC operated EK370 ... EK1000 contactors.

Ordering details

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
Mechanical and electrical interlock units for two horizontal mounted contactors					
EK110, EK150	VH145	SK829071-A		1	0.130
EK175, EK210	VH300	SK829071-B		1	0.130
Mechanical interlock unit for two horizontal mounted contactors					
EK370 ... EK1000	VH800	SK829070-F		1	6.000

Selection table

For contactors

Left	**Right**	EK110, EK150	EK175, EK210	EK370 ... EK1000
EK110, EK150		VH145	–	–
EK175, EK210		–	VH300	–
EK370 ... EK1000		–	–	VH800
Fixing		PN210-22 mounting plate (to be supplied separately)	PN300-22 mounting plate (to be supplied separately)	Mounting plate included

1SFC101067C0201

Mechanical interlocks units
Mechanical and electrical interlock units

Technical data

Types		VH145	VH300
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 insulation voltage Ui acc. to UL / CSA		600 V	
Rated operational voltage Ue max.		24 ... 690 V	
Conventional thermal current Ith - θ ≤ 40 °C		10 A	
Ie / Rated operational current AC-15			
acc. to IEC 60947-5-1	**24-127 V 50/60 Hz**	6 A	
	220-240 V 50/60 Hz	6 A	
	380-440 V 50/60 Hz	4 A	
	500-690 V 50/60 Hz	1 A	
Making capacity acc. to IEC 60947-5-1		10 x Ie AC-15	
Breaking capacity acc. to IEC 60947-5-1		10 x Ie AC-15	
Ie / Rated operational current DC-13			
acc. to IEC 60947-5-1	**24 V DC**	6 A	
	48 V DC	6 A	
	72 V DC	4 A	
	125 V DC	1.8 A	
	250 V DC	0.6 A	
Short-circuit protection device - gG type fuse		10 A	
Rated short-time withstand current Icw	**for 1.0 s**	100 A	
θ = 40 °C	**for 0.1 s**	140 A	
Power dissipation per pole at 6 A		0.15 W	
Mechanical durability			
Number of operating cycles		1 million operating cycles	
Max. switching frequency		600 cycles/h	
Connecting characteristics			
Connection capacity (min. ... max.)			
Rigid solid	**1 x**	1 ... 2.5 mm²	
	2 x	1 ... 2.5 mm²	
Flexible with ferrule	**1 x**	0.75 ... 2.5 mm²	
	2 x	0.75 ... 2.5 mm²	
Bars or lugs	**L <**	8 mm	
	l >	3.7 mm	
Tightening torque			
Recommended		1 Nm	
Max.		1.2 Nm	
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		IP20	
Screw terminals		Delivered in open position, screws of unused terminals must be tightened	
All terminals		M3.5	
Screwdriver type		Flat Ø 5.5 / Pozidriv 2	

Technical note: when, during switching, the arc time is estimated to more than 40 ms, the closing signal of one of the two contactors must be delayed with respect to the opening signal of the other contactor in order to prevent a short-circuit.
Use a TP40 pneumatic timer or TE5S electronic timer with time lapse, as applicable.

1SFC101073C0201

KZK... Main contact sets
KWK... Arc chutes

KZK370

KZK main contact sets

Description

The contact sets for 4-pole contactors consist of eight fixed contacts, four moving contacts, springs and the necessary screws. In addition, the sets include four moving arcing contacts for EK370 ... EK1000 contactors.

Ordering details

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
EK110	KZK110	SK824204-A		1	0.450
EK150	KZK150	SK824204-B		1	0.450
EK175	KZK175	SK825204-A		1	0.700
EK210	KZK210	SK825204-B		1	0.700
EK370	KZK370	SK827204-A		1	2.400
EK550	KZK550	SK827204-B		1	2.400
EK1000	KZK1000	SK827204-F		1	3.000

Arc chutes

Description

The arc chutes sets for EK 4-pole contactors contain 8 pieces.

Ordering details

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
EK110	KWK110	5223351-AH		1	0.660
EK150	KWK150	5223351-AK		1	0.660
EK175	KWK175	5223351-AL		1	1.260
EK210	KWK210	5223351-AM		1	1.260
EK370	KWK370	5223351-Y		1	3.170
EK550	KWK550	5223351-Z		1	3.170
EK1000	KWK1000	5223351-AN		1	3.170

1SFC101066C0201

Contactor coils

KH300

Description

Coils for EK110 ... EK1000 - AC operated.

Ordering details

For contactors	Rated control circuit voltage Uc (1)		Type	Order code		Pkg qty	Weight (1 pce)
	V 50 Hz	V 60 Hz					kg
EK110 ... EK150	48	-	KH210	SK825400-AD		1	0.360
	-	110	KH210	SK825400-AE		1	0.360
	110	120	KH210	SK825400-AF		1	0.360
	220...230	-	KH210	SK825400-AL		1	0.360
	230...240	-	KH210	SK825400-AM		1	0.360
	-	380	KH210	SK825400-AN		1	0.360
	380...400	440	KH210	SK825400-AP		1	0.360
	400...415	-	KH210	SK825400-AR		1	0.360
EK175 ... EK210	48	-	KH300	SK826400-AD		1	0.440
	-	110	KH300	SK826400-AE		1	0.440
	110	120	KH300	SK826400-AF		1	0.440
	220...230	-	KH300	SK826400-AL		1	0.440
	230...240	-	KH300	SK826400-AM		1	0.440
	-	380	KH300	SK826400-AN		1	0.440
	380...400	440	KH300	SK826400-AP		1	0.440
	400...415	-	KH300	SK826400-AR		1	0.440
EK370 ... EK1000	48	-	KH800	SK828100-AD		1	0.950
	110	110...120	KH800	SK828100-EF		1	0.950
	110...115	115...127	KH800	SK828100-EG		1	0.950
	220	220...240	KH800	SK828100-EL		1	0.950
	220...230	230...255	KH800	SK828100-EM		1	0.950
	380	380...415	KH800	SK828100-EP		1	0.950
	380...400	400...440	KH800	SK828100-ER		1	0.950
	400...415	-	KH800	SK828100-AR		1	0.950

(1) Other control voltages, see voltage code table.

Contactor coils

Description

– Coils for EK110 ... EK1000 - DC operated with sets including a DC coil, an economy resistor and a insertion contact.
– Coils for EK110 ... EK210 - Multi-frequency coil and an insertion contact for contactor with built-in rectifier.

Ordering details

For contactors	Rated control circuit voltage Uc (1) V DC	Type	Order code		Pkg qty	Weight (1 pce) kg
EK110 ... EK150	12	KP210	SK825450-DA		1 set	0.450
	24	KP210	SK825450-DB		1 set	0.450
	36	KP210	SK825450-DC		1 set	0.450
	48	KP210	SK825450-DD		1 set	0.450
	60	KP210	SK825450-DT		1 set	0.450
	75	KP210	SK825450-DG		1 set	0.450
	110	KP210	SK825450-DE		1 set	0.450
	125	KP210	SK825450-DU		1 set	0.450
	220	KP210	SK825450-DF		1 set	0.450
EK175 ... EK210	12	KP300	SK826450-DA		1 set	0.550
	24	KP300	SK826450-DB		1 set	0.550
	36	KP300	SK826450-DC		1 set	0.550
	48	KP300	SK826450-DD		1 set	0.550
	60	KP300	SK826450-DT		1 set	0.550
	75	KP300	SK826450-DG		1 set	0.550
	110	KP300	SK826450-DE		1 set	0.550
	125	KP300	SK826450-DU		1 set	0.550
	220	KP300	SK826450-DF		1 set	0.550
EK3700 ... EK1000	24	KP800	SK828150-DB		1 set	1.060
	36	KP800	SK828150-DC		1 set	1.060
	48	KP800	SK828150-DD		1 set	1.060
	60	KP800	SK828150-DT		1 set	1.060
	75	KP800	SK828150-DG		1 set	1.060
	110	KP800	SK828150-DE		1 set	1.060
	125	KP800	SK828150-DU		1 set	1.060
	220	KP800	SK828150-DF		1 set	1.060

Ordering details

For contactors	Rated control circuit voltage Uc (1) V AC 40...400 Hz	Type	Order code		Pkg qty	Weight (1 pce) kg
EK110 ... EK150	110...120	KP210	SK825450-EF		1 set	0.450
	115...127	KP210	SK825450-EG		1 set	0.450
	220...230	KP210	SK825450-EL		1 set	0.450
	230...240	KP210	SK825450-EM		1 set	0.450
	380...400	KP210	SK825450-EP		1 set	0.450
	400...415	KP210	SK825450-ER		1 set	0.450
EK175 ... EK210	110...120	KP300	SK826450-EF		1 set	0.450
	115...127	KP300	SK826450-EG		1 set	0.450
	220...230	KP300	SK826450-EL		1 set	0.450
	230...240	KP300	SK826450-EM		1 set	0.450
	380...400	KP300	SK826450-EP		1 set	0.450
	400...415	KP300	SK826450-ER		1 set	0.450

(1) Other control voltages, see voltage code table.

1SFC101079C0201

Contactor coils

Description

Coils for EK110 ... EK1000 - DC operated.

Ordering details

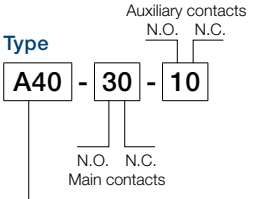
For contactors	Rated control circuit voltage Uc V DC	Type	Order code		Pkg qty	Weight (1 pce) kg
EK110 ... EK150	12	KH210	SK825400-DA		1 set	0.360
	24	KH210	SK825400-DB		1 set	0.360
	36	KH210	SK825400-DC		1 set	0.360
	48	KH210	SK825400-DD		1 set	0.360
	60	KH210	SK825400-DT		1 set	0.360
	75	KH210	SK825400-DG		1 set	0.360
	110	KH210	SK825400-DE		1 set	0.360
	125	KH210	SK825400-DU		1 set	0.360
	220	KH210	SK825400-DF		1 set	0.360
EK175 ... EK210	12	KH300	SK826400-DA		1 set	0.440
	24	KH300	SK826400-DB		1 set	0.440
	36	KH300	SK826400-DC		1 set	0.440
	48	KH300	SK826400-DD		1 set	0.440
	60	KH300	SK826400-DT		1 set	0.440
	75	KH300	SK826400-DG		1 set	0.440
	110	KH300	SK826400-DE		1 set	0.440
	125	KH300	SK826400-DU		1 set	0.440
	220	KH300	SK826400-DF		1 set	0.440
EK3700 ... EK1000	24	KH800	SK828100-DB		1 set	0.950
	36	KH800	SK828100-DC		1 set	0.950
	48	KH800	SK828100-DD		1 set	0.950
	60	KH800	SK828100-DT		1 set	0.950
	75	KH800	SK828100-DG		1 set	0.950
	110	KH800	SK828100-DE		1 set	0.950
	125	KH800	SK828100-DU		1 set	0.950
	220	KH800	SK828100-DF		1 set	0.950

1SBC101658C0201

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 A50-30-00 and coil 42 V 50/60 Hz, the order code is 1SBL351001R**82**00.

Contactors



Contactor type

A	AC operated
AL, AE	DC operated
TAL, TAE (1)	DC operated large coil voltage range
AF, NF, GAF (1)	AC / DC operated with electronic coil interface
UA, UA..RA	Capacitor switching - AC operated
GA	DC switching - AC operated
GAE	DC switching - DC operated
AM (1)	Magnetically latched - DC operated

(1) TAL, TAE, AF, NF, GAF, AM all coil codes included in ordering detail pages.

AC coil code
Contactors: A, UA, UA..RA, GA

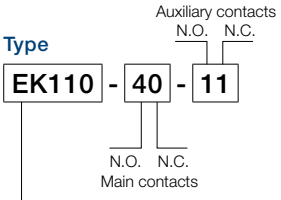
	50 Hz	60 Hz
81	**24 V**	**24 V**
16	26 V	28 V
17	28 V	32 V
82	**42 V**	**42 V**
20	42 V	48 V
83	**48 V**	**48 V**
73	**60 V**	**60 V**
74	**100 V** (2)	**100**...110 V (2)
26	105 V (2)	110...127 V (2)
84	**110 V**	**110**...120 V
89	110...**115 V**	**115**...127 V (3)
29	120 V	140 V
30	125...127 V	150 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

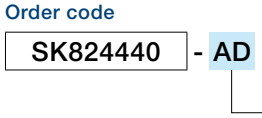
DC coil code
Contactors: AL, AE, GAE

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

Codes in bold for dual frequency coils.
(2) Not for A145 ... A300 contactors.
(3) A145 ... A300 contactors at 60 Hz 115 V only.

EK contactors





Contactor type
EK — AC operated or DC operated

AC coil code
Contactors: EK110 ... EK210

	50 Hz	60 Hz
AA	–	24 V
AB	24 V	–
AC	–	48 V
AD	**48 V**	**–**
AE	–	110 V
AF	110 V	120 V
AG	127 V	–
AZ	–	208 V
AH	190 V	220 V
AK	–	240 V
AL	220...230 V	–
AM	230...240 V	–
AN	–	380 V
AP	380...400 V	440 V
AR	400...415 V	–
AS	–	480 V
AT	440 V	–
AU	500 V	–
AV	–	600 V

AC coil code
Contactors: EK370 ... EK1000

	50 Hz	60 Hz
AD	48 V	–
AE	–	110 V
AF	110 V	120 V
AG	127 V	–
AZ	–	208 V
AH	190 V	220 V
AK	–	240 V
AL	220...230 V	240 V
AM	230...240 V	–
AN	–	380 V
AP	380...400 V	440 V
AR	400...415 V	–
AS	–	480 V
AT	440 V	–
AU	500 V	–
AV	–	600 V

DC coil code
Contactors: EK110 ... EK1000

DA	12 V (4)
DB	24 V
DC	36 V
DD	48 V
DT	60 V
DG	75 V
DE	110 V
DU	125 V
DF	220 V

(4) Not for EK370 ... EK1000 contactors.

Multi-frequency coil code
Contactors: EK110 ... EK210

	40...400 Hz
EF	110...120 V
EG	115...127 V
EL	220...230 V
EM	230...240 V
EP	380...400 V
ER	400...415 V

Dual frequency coil code
Contactors: EK370 ... EK1000

	50 Hz	60 Hz
EF	110 V	110...120 V
EG	110...115 V	115...127 V
EL	220 V	220...240 V
EM	220...230 V	230...255 V
EP	380 V	380...415 V
ER	380...400 V	400...440 V

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

1SBC101601S0201

Notes

TF42
EF19
EF45

Overload relays

Thermal overload relays

T16 (0.10 ... 16.0 A)
Ordering details **6**/2
Technical data **6**/3

TF42 (0.10 ... 38.0 A)
Ordering details **6**/6
Technical data **6**/7

TA25DU (0.10 ... 32.0 A)
Ordering details **6**/10
Technical data **6**/11
Accessories **6**/14

TA42DU (18.0 ... 42.0 A)
Ordering details **6**/15
Technical data **6**/16

TA75DU (18 ... 80 A)
Ordering details **6**/19
Technical data **6**/20

TA80DU (29 ... 80 A)
Ordering details **6**/23
Technical data **6**/24

TA110DU (66 ... 110 A)
Ordering details **6**/27
Technical data **6**/28

TA200DU (66 ... 200 A)
Ordering details **6**/31
Technical data **6**/32

TA450DU (130 ... 310 A)
Ordering details **6**/35
Technical data **6**/36

TA45DU (29.0 ... 45.0 A)
Ordering details **6**/39
Technical data **6**/40

TA85DU (60 ... 85 A)
Ordering details **6**/42
Technical data **6**/43

Electronic overload relays

E16DU, E45DU, E80DU, E140DU (0.10 to 140 A)
Ordering details **6**/45
Technical data **6**/46
Accessories **6**/49

E200DU, E320DU (60 to 320 A)
Ordering details **6**/50
Technical data **6**/51

E500DU, E800DU, E1250DU (150 to 1250 A)
Ordering details **6**/53
Technical data **6**/54

EF19, EF45 (0.10 to 45.0 A)
Ordering details **6**/56
Technical data **6**/57

T16 thermal overload relays
0.10 … 16.0 A

2CDC231012F0011

T16-16

2CDC235002F0011

T16 + DB16

2CDC231002F0011

DB16

Description

The T16 thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure. The devices have trip class 10.

The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- Two electrically isolated auxiliary contacts – 1 N.O. + 1 N.C.
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications

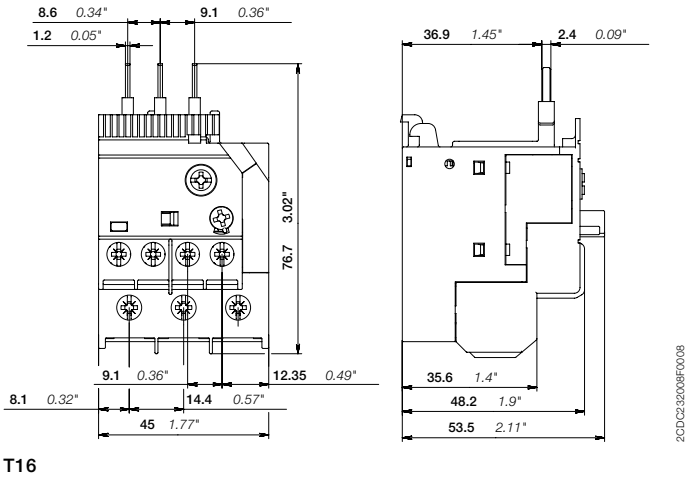
Ordering details

Setting range A	Short-circuit protective device	Trip class	Type	Order code		Weight (1 pce) kg
0.10 ... 0.13	0.5 A, Fuse type T	10	T16-0.13	1SAZ711201R1005		0.100
0.13 ... 0.17	1.0 A, Fuse type T	10	T16-0.17	1SAZ711201R1008		0.100
0.17 ... 0.23	1.0 A, Fuse type T	10	T16-0.23	1SAZ711201R1009		0.100
0.23 ... 0.31	1.0 A, Fuse type T	10	T16-0.31	1SAZ711201R1013		0.100
0.31 ... 0.41	2.0 A, Fuse type gG	10	T16-0.41	1SAZ711201R1014		0.100
0.41 ... 0.55	2.0 A, Fuse type gG	10	T16-0.55	1SAZ711201R1017		0.100
0.55 ... 0.74	4.0 A, Fuse type gG	10	T16-0.74	1SAZ711201R1021		0.100
0.74 ... 1.00	6.0 A, Fuse type gG	10	T16-1.0	1SAZ711201R1023		0.100
1.00 ... 1.30	6.0 A, Fuse type gG	10	T16-1.3	1SAZ711201R1025		0.100
1.30 ... 1.70	10.0 A, Fuse type gG	10	T16-1.7	1SAZ711201R1028		0.100
1.70 ... 2.30	10.0 A, Fuse type gG	10	T16-2.3	1SAZ711201R1031		0.100
2.30 ... 3.10	10.0 A, Fuse type gG	10	T16-3.1	1SAZ711201R1033		0.100
3.10 ... 4.20	20.0 A, Fuse type gG	10	T16-4.2	1SAZ711201R1035		0.100
4.20 ... 5.70	20.0 A, Fuse type gG	10	T16-5.7	1SAZ711201R1038		0.100
5.70 ... 7.60	35.0 A, Fuse type gG	10	T16-7.6	1SAZ711201R1040		0.100
7.60 ... 10.0	35.0 A, Fuse type gG	10	T16-10	1SAZ711201R1043		0.104
10.0 ... 13.0	40.0 A, Fuse type gG	10	T16-13	1SAZ711201R1045		0.104
13.0 ... 16.0	40.0 A, Fuse type gG	10	T16-16	1SAZ711201R1047		0.104

Ordering details accessories

For thermal overload relays	Description	Type	Order code		Weight (1 pce) kg
T16	Single mounting kit	DB16	1SAZ701901R0001		0.032

Main dimensions mm, *inches*



2CDC232008F0008

T16

2CDC106036C0201

T16 thermal overload relays
Technical data

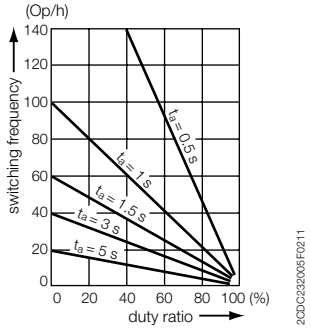
Main circuit – Utilization characteristics according to IEC/EN

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

2CDC106036C0201

T16 thermal overload relays
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

6

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

2CDC106036C0201

T16 thermal overload relays
Technical data

General technical data

Type			**T16**
Pollution degree			3
Phase loss sensitive			Yes
Ambient air temperature			
Operation	Open - compensated without derating		-25 ... +60 °C
	Open		-25 ... +60 °C
Storage			-50 ... +80 °C
Ambient air temperature compensation			Continuous
Maximum operating altitude permissible			2000 m
Resistance to shock acc. to IEC 60068-2-27			25 g / 11 ms
Resistance to vibrations acc. to IEC 60068-2-6			3 g / 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			IP20

Electrical connection

Main circuit

Type			**T16**
Connecting capacity			
	Rigid	**1 x**	0.75 ... 4 mm²
		2 x	0.75 ... 1.5 mm² or 1.5 ... 4 mm² [1]
	Flexible	**1 x or 2 x**	0.75 ... 4 mm²
	Stranded acc. to UL/CSA	**1 x or 2 x**	AWG 18-10
	Flexible acc. to UL/CSA	**1 x or 2 x**	AWG 18-10
Stripping length			12 mm
Tightening torques			1.1 ... 1.5 Nm / 9 ... 13 lb.in
Connection screw			M4 (Pozidriv 2)

[1] Combination of different wires not possible

Auxiliary circuit

Type			**T16**
Connecting capacity			
	Rigid	**1 x or 2 x**	0.75 ... 4 mm²
	Flexible with ferrule	**1 x or 2 x**	0.75 ... 2.5 mm²
	Flexible with insulated ferrule	**1 x**	0.75 ... 2.5 mm²
		2 x	0.75 ... 1.5 mm²
	Flexible	**1 x or 2 x**	0.75 ... 1 mm² or 1 ... 2.5 mm²
	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)

2CDC106036C0201

TF42 thermal overload relays
0.10 … 38.0 A

TF42-38

DB42

Description

The TF42 thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure. The devices have trip class 10.

The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

– Phase loss sensitive acc. to IEC/EN 60947-4-1
– TEST and STOP function – Trip indication on the front
– Suitable for three- and single-phase applications
– Sealable cover

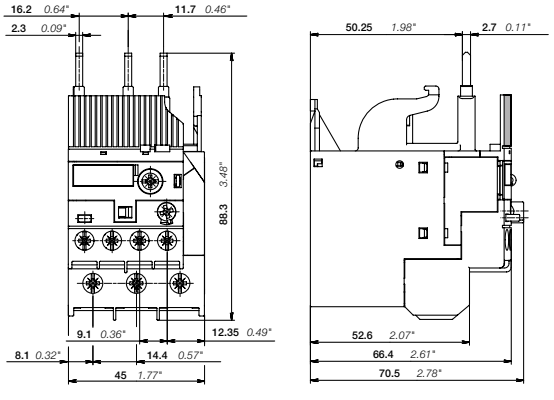
Ordering details

Setting range A	Short-circuit protective device	Trip class	Type	Order code		Weight (1 pce) kg
0.10 ... 0.13	0.5 A, Fuse type T	10	TF42-0.13	1SAZ721201R1005		0.130
0.13 ... 0.17	1.0 A, Fuse type T	10	TF42-0.17	1SAZ721201R1008		0.130
0.17 ... 0.23	1.0 A, Fuse type T	10	TF42-0.23	1SAZ721201R1009		0.130
0.23 ... 0.31	1.0 A, Fuse type T	10	TF42-0.31	1SAZ721201R1013		0.130
0.31 ... 0.41	2.0 A, Fuse type gG	10	TF42-0.41	1SAZ721201R1014		0.130
0.41 ... 0.55	2.0 A, Fuse type gG	10	TF42-0.55	1SAZ721201R1017		0.130
0.55 ... 0.74	4.0 A, Fuse type gG	10	TF42-0.74	1SAZ721201R1021		0.130
0.74 ... 1.00	6.0 A, Fuse type gG	10	TF42-1.0	1SAZ721201R1023		0.130
1.00 ... 1.30	6.0 A, Fuse type gG	10	TF42-1.3	1SAZ721201R1025		0.130
1.30 ... 1.70	10.0 A, Fuse type gG	10	TF42-1.7	1SAZ721201R1028		0.130
1.70 ... 2.30	10.0 A, Fuse type gG	10	TF42-2.3	1SAZ721201R1031		0.130
2.30 ... 3.10	10.0 A, Fuse type gG	10	TF42-3.1	1SAZ721201R1033		0.130
3.10 ... 4.20	20.0 A, Fuse type gG	10	TF42-4.2	1SAZ721201R1035		0.130
4.20 ... 5.70	20.0 A, Fuse type gG	10	TF42-5.7	1SAZ721201R1038		0.130
5.70 ... 7.60	35.0 A, Fuse type gG	10	TF42-7.6	1SAZ721201R1040		0.130
7.60 ... 10.0	35.0 A, Fuse type gG	10	TF42-10	1SAZ721201R1043		0.130
10.0 ... 13.0	40.0 A, Fuse type gG	10	TF42-13	1SAZ721201R1045		0.130
13.0 ... 16.0	40.0 A, Fuse type gG	10	TF42-16	1SAZ721201R1047		0.130
16.0 ... 20.0	63.0 A, Fuse type gG	10	TF42-20	1SAZ721201R1049		0.145
20.0 ... 24.0	63.0 A, Fuse type gG	10	TF42-24	1SAZ721201R1051		0.145
24.0 ... 29.0	63.0 A, Fuse type gG	10	TF42-29	1SAZ721201R1052		0.145
29.0 ... 35.0	80.0 A, Fuse type gG	10	TF42-35	1SAZ721201R1053		0.145
35.0 ... 38.0/40.0	80.0 A, Fuse type gG	10	TF42-38	1SAZ721201R1055		0.145

Ordering details accessories

For thermal overload relays	Description	Type	Order code		Weight (1 pce) kg
TF42	Single mounting kit	DB42	1SAZ701902R0001		0.087

Main dimensions mm, *inches*



TF42

2CDC106046C0201

TF42 thermal overload relays
Technical data

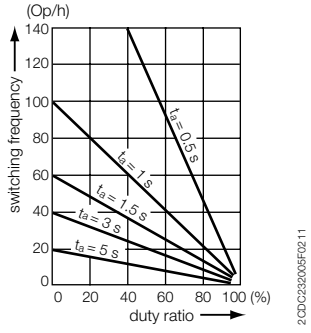
Main circuit – Utilization characteristics according to IEC/EN

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

2CDC106046C0201

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	2.5 A

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device			
		480 / 600 V AC		480 / 600 V AC	
		Short circuit rating RMS symmetrical	Fuse type	Short circuit rating RMS symmetrical	Fuse type
TF42-0.13	0.13 A	18 kA	1 A, K5	100 kA	30 A, Class J
TF42-0.17	0.17 A	18 kA	1 A, K5	100 kA	30 A, Class J
TF42-0.23	0.23 A	18 kA	1 A, K5	100 kA	30 A, Class J
TF42-0.31	0.31 A	18 kA	3 A, K5	100 kA	30 A, Class J
TF42-0.41	0.41 A	18 kA	3 A, K5	100 kA	30 A, Class J
TF42-0.55	0.55 A	18 kA	3 A, K5	100 kA	30 A, Class J
TF42-0.74	0.74 A	18 kA	3 A, K5	100 kA	30 A, Class J
TF42-1.0	1.00 A	18 kA	6 A, K5	100 kA	30 A, Class J
TF42-1.3	1.30 A	18 kA	6 A, K5	100 kA	30 A, Class J
TF42-1.7	1.70 A	18 kA	6 A, K5	100 kA	30 A, Class J
TF42-2.3	2.30 A	18 kA	10 A, K5	100 kA	30 A, Class J
TF42-3.1	3.10 A	18 kA	10 A, K5	100 kA	30 A, Class J
TF42-4.2	4.20 A	18 kA	15 A, K5	100 kA	30 A, Class J
TF42-5.7	5.70 A	18 kA	20 A, K5	100 kA	30 A, Class J
TF42-7.6	7.60 A	18 kA	25 A, K5	100 kA	30 A, Class J
TF42-10	10.0 A	18 kA	35 A, K5	100 kA	45 A, Class J
TF42-13	13.0 A	18 kA	40 A, K5	100 kA	45 A, Class J
TF42-16	16.0 A	18 kA	60 A, K5	100 kA	45 A, Class J
TF42-20	20.0 A	18 kA	80 A, K5	100 kA	60 A, Class J
TF42-24	24.0 A	18 kA	80 A, K5	100 kA	60 A, Class J
TF42-29	29.0 A	18 kA	100 A, K5	100 kA	100 A, Class J
TF42-35	35.0 A	18 kA	150 A, K5	100 kA	175 A, Class J
TF42-38	38.0 A	18 kA	150 A, K5	100 kA	175 A, Class J

2CDC106046C0201

TF42 thermal overload relays
Technical data

General technical data

Type			TF42
Pollution degree			3
Phase loss sensitive			Yes
Ambient air temperature			
Operation	Open - compensated without derating		-25 ... +60 °C
	Open		-25 ... +60 °C
Storage			-50 ... +80 °C
Ambient air temperature compensation			Continuous
Maximum operating altitude permissible			2000 m
Resistance to shock acc. to IEC 60068-2-27			25 g / 11 ms
Resistance to vibrations acc. to IEC 60068-2-6			3 g / 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			IP20

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] Combination of different wires not possible

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)

2CDC106046C0201

TA25DU thermal overload relays
With screw terminals - 0.10 … 32.0 A

TA25DU-0.19

Description

The TA25DU 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.

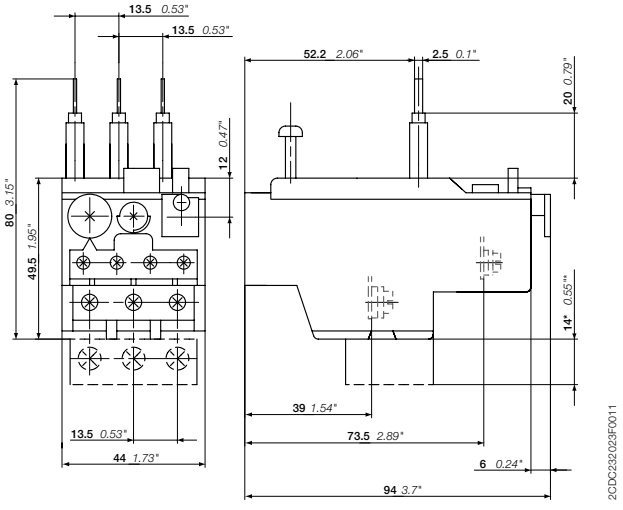
The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release 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
- Two electrically isolated auxiliary contacts – 1 N.O. + 1 N.C.
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications

Ordering details

Setting range A	Short-circuit protective device	Trip class	Type	Order code		Weight (1 pce) kg
0.10 ... 0.16	0.50 A, Fuse type F	10A	TA25DU-0.16	1SAZ211201R1005		0.150
0.16 ... 0.25	0.63 A, Fuse type F	10A	TA25DU-0.25	1SAZ211201R1009		0.150
0.25 ... 0.40	1.25 A, Fuse type F	10A	TA25DU-0.4	1SAZ211201R1013		0.150
0.40 ... 0.63	2 A, Fuse type gG / -	10A	TA25DU-0.63	1SAZ211201R1017		0.150
0.63 ... 1.00	4 A, Fuse type gG / 2 A aM	10A	TA25DU-1.0	1SAZ211201R1021		0.150
1.00 ... 1.40	6 A, Fuse type gG / 2 A aM	10A	TA25DU-1.4	1SAZ211201R1023		0.150
1.30 ... 1.80	6 A, Fuse type gG / 4 A aM	10A	TA25DU-1.8	1SAZ211201R1025		0.150
1.70 ... 2.40	6 A, Fuse type gG / 4 A aM	10A	TA25DU-2.4	1SAZ211201R1028		0.150
2.20 ... 3.10	10 A, Fuse type gG / 6 A aM	10A	TA25DU-3.1	1SAZ211201R1031		0.150
2.80 ... 4.00	10 A, Fuse type gG / 6 A aM	10A	TA25DU-4.0	1SAZ211201R1033		0.150
3.50 ... 5.00	16 A, Fuse type gG / 10 A aM	10A	TA25DU-5.0	1SAZ211201R1035		0.150
4.50 ... 6.50	20 A, Fuse type gG / 16 A aM	10A	TA25DU-6.5	1SAZ211201R1038		0.150
6.00 ... 8.50	20 A, Fuse type gG / 20 A aM	10A	TA25DU-8.5	1SAZ211201R1040		0.150
7.50 ... 11.00	35 A, Fuse type gG / 25 A aM	10A	TA25DU-11	1SAZ211201R1043		0.150
10.00 ... 14.00	35 A, Fuse type gG / 25 A aM	10A	TA25DU-14	1SAZ211201R1045		0.150
13.00 ... 19.00	50 A, Fuse type gG / 35 A aM	10A	TA25DU-19	1SAZ211201R1047		0.170
18.00 ... 25.00	63 A, Fuse type gG / 50 A aM	10A	TA25DU-25	1SAZ211201R1051		0.170
24.00 ... 32.00	80 A, Fuse type gG / 63 A aM	10A	TA25DU-32	1SAZ211201R1053		0.200

Main dimensions mm, *inches*



TA25DU + DX25

2CDC106039C0201

TA25DU thermal overload relays
Technical data

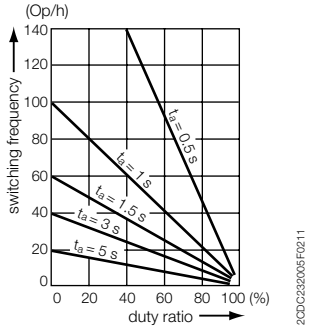
Main circuit – Utilization characteristics according to IEC/EN

Type	TA25DU
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	DC, 50/60 Hz
Frequency range	0 ... 400 Hz
Trip class	10A
Number of poles	3
Duty time	100 %
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	690 V AC

Auxiliary circuit according to IEC/EN

Type		TA25DU
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

2CDC106039C0201

TA25DU thermal overload relays
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	TA25DU
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		TA25DU
Contact rating	N.C., 95-96	C600
	N.O., 97-98	B600
Conventional thermal current		5 A

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device 480 / 600 V AC			480 / 600 V AC		480 / 600 V AC	
		Short circuit rating RMS symmetrical	Fuse type	Listed circuit breaker	Short circuit rating RMS symmetrical	Listed circuit breaker	Short circuit rating RMS symmetrical	Fuse type
TA25DU-0.16	0.16 A	5 kA	1.0 A, K5 / RK5	15 A	35 / 18 kA	15 A	50 kA	30 A, Class J
TA25DU-0.25	0.25 A	5 kA	1.0 A, K5 / RK5	15 A	35 / 18 kA	15 A	50 kA	30 A, Class J
TA25DU-0.4	0.40 A	5 kA	3.0 A, K5 / RK5	15 A	35 / 18 kA	15 A	50 kA	30 A, Class J
TA25DU-0.63	0.63 A	5 kA	3.0 A, K5 / RK5	15 A	35 / 18 kA	15 A	50 kA	30 A, Class J
TA25DU-1.0	1.0 A	5 kA	6.0 A, K5 / RK5	15 A	35 / 18 kA	15 A	50 kA	30 A, Class J
TA25DU-1.4	1.4 A	5 kA	6.0 A, K5 / RK5	15 A	35 / 18 kA	15 A	50 kA	30 A, Class J
TA25DU-1.8	1.8 A	5 kA	6.0 A, K5 / RK5	15 A	35 / 18 kA	15 A	50 kA	30 A, Class J
TA25DU-2.4	2.4 A	5 kA	10 A, K5 / RK5	15 A	35 / 18 kA	15 A	50 kA	30 A, Class J
TA25DU-3.1	3.1 A	5 kA	10 A, K5 / RK5	15 A	35 / 18 kA	15 A	50 kA	30 A, Class J
TA25DU-4.0	4.0 A	5 kA	15 A, K5 / RK5	15 A	35 / 18 kA	15 A	50 kA	30 A, Class J
TA25DU-5.0	5.0 A	5 kA	20 A, K5 / RK5	20 A	35 / 18 kA	20 A	50 kA	30 A, Class J
TA25DU-6.5	6.5 A	5 kA	25 A, K5 / RK5	20 A	35 / 18 kA	20 A	50 kA	30 A, Class J
TA25DU-8.5	8.5 A	5 kA	35 A, K5 / RK5	20 A	35 / 18 kA	20 A	50 kA	30 A, Class J
TA25DU-11	11 A	5 kA	45 A, K5 / RK5	50 A	35 / 18 kA	50 A	50 kA	35 A, Class J
TA25DU-14	14 A	5 kA	60 A, K5 / RK5	50 A	35 / 18 kA	50 A	50 kA	60 A, Class J
TA25DU-19	19 A	5 kA	60 A, K5 / RK5	50 A	35 / 18 kA	50 A	50 kA	60 A, Class J
TA25DU-25	25 A	5 kA	70 A, K5 / RK5	70 A	35 / 18 kA	70 A	50 kA	100 A, Class J
TA25DU-32	32 A	5 kA	100 A, K5 / RK5	100 A	35 / 18 kA	100 A	50 kA	100 A, Class J

2CDC106039C0201

TA25DU thermal overload relays
Technical data

General technical data

Type			TA25DU
Pollution degree			3
Phase loss sensitive			Yes
Ambient air temperature			
Operation	Open - compensated without derating		-25 ... +55 °C
	Open		-25 ... +55 °C
Storage			-40 ... +70 °C
Ambient air temperature compensation			Continuous
Maximum operating altitude permissible			2000 m
Resistance to shock acc. to IEC 60068-2-27			12 g / 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 on DIN rail (35 mm)
Degree of protection			IP20

Electrical connection

Main circuit

Type			TA25DU (0.16-11 A)	TA25DU (14-25 A)	TA25DU (32 A)
Connecting capacity					
	Rigid	**1 x**	0.75 ... 4 mm²	1.5 ... 6 mm²	1.5 ... 10 mm²
		2 x	0.75 ... 4 mm²	1.5 ... 6 mm²	-
	Flexible with insulated ferrule	**1 x or 2 x**[1)]	0.75 ... 4 mm²	1.5 ... 4 mm²	1.5 ... 6 mm²
	Stranded acc. to UL/CSA	**1 x**	AWG 16-8	AWG 16-8	AWG 10-8
		2 x	AWG 16-8	AWG 16-8	-
	Flexible acc. to UL/CSA	**1 x**	AWG 16-8	AWG 16-8	AWG 10-8
		2 x	AWG 16-8	AWG 16-8	-
Stripping length			12 mm	12 mm	15 mm
Tightening torques			1.4 - 2.0 Nm / 12 lb.in	1.4 - 2.0 Nm / 12 lb.in	2.5 - 3.2 Nm / 20 lb.in
Connection screw			M4 (Pozidriv 2)	M4 (Pozidriv 2)	M5 (Pozidriv 2)

[1)] Combination of different wires not possible

Auxiliary circuit

Type			TA25DU
Connecting capacity			
	Rigid	**1 x or 2 x**	0.75 ... 4 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)

2CDC106039C0201

TA25DU thermal overload relays
Accessories

SST01494

DX25

2CDC231017F0006

DB25/25A

SST20491

DS25-A-220/380

SST20591

DR25-A-220/380

Description

The single mounting kits offer the possibility to mount the overload relays separately from the contactor. The DS25-A allows electrically remote tripping of TA25DU. DR25-A coil for remote reset of TA25DU.

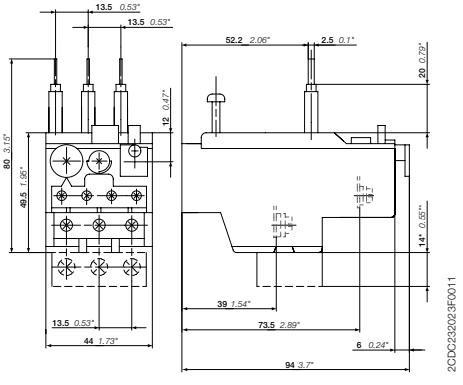
Ordering details

For thermal overload relays	Description	Type	Order code		Weight (1 pce) kg
Terminal block and mounting kits					
TA25DU-0.16 ... 25 / DB25/25 A	Terminal block 10 mm²	DX25	1SAZ201307R0002		0.030
TA25DU-0.16 ... 25	Single mounting kit	DB25/25A	1SAZ201108R0001		0.055
TA25DU-32	Single mounting kit	DB25/32A	1SAZ201108R0002		0.080
Remote tripping coil					
TA25DU	24/48 V, 50/60 Hz	DS25-A-24	1SAZ201501R0001		0.050
TA25DU	110 V, 50/60Hz	DS25-A-110	1SAZ201501R0003		0.050
TA25DU	220/380 V, 50/60 Hz	DS25-A-220/380	1SAZ201501R0005		0.050
TA25DU	500 V, 50/60Hz	DS25-A-500	1SAZ201501R0006		0.050
Remote reset coil					
TA25DU	24 V, 50/60 Hz	DR25-A-24	1SAZ201504R0001		0.050
TA25DU	48 V, 50/60 Hz	DR25-A-48	1SAZ201504R0002		0.050
TA25DU	110 V, 50/60 Hz	DR25-A-110	1SAZ201504R0003		0.050
TA25DU	220/380 V, 50/60 Hz	DR25-A-220/380	1SAZ201504R0005		0.050
TA25DU	500 V, 50/60 Hz	DR25-A-500	1SAZ201504R0006		0.050

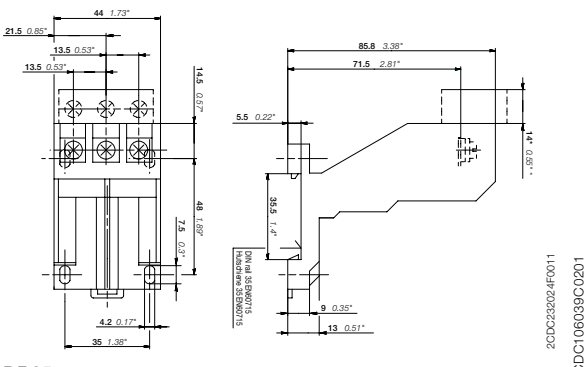
The remote tripping coil is to be connected to auxiliary contact 95-96 of TA25DU.
The coil is not suitable for Continuous operation. Impulse duration: maximum 0.2 seconds.

The remote reset coil is to be connected to auxiliary contact 97-98 of TA25DU.
The coil is not suitable for Continuous operation. Impulse duration: maximum 0.2 seconds.

Main dimensions mm, *inches*



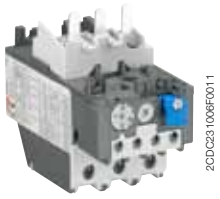
TA25DU + DX25



DB25

2CDC106039C0201

TA42DU thermal overload relays
18.0 … 42.0 A



TA42DU-32

Description

The TA42DU 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
- Two electrically isolated auxiliary contacts – 1 N.O. + 1 N.C.
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications

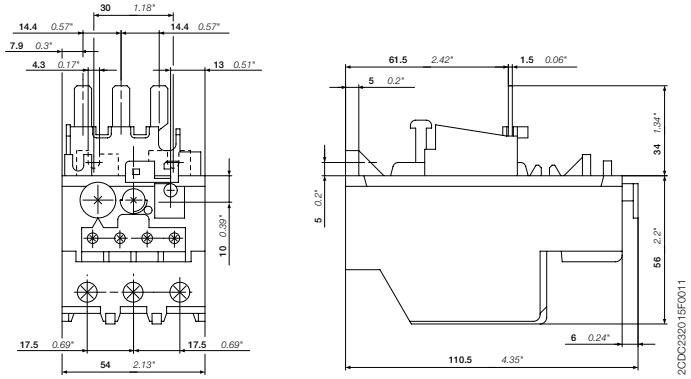
Ordering details

Setting range A	Short-circuit protective device	Trip class	Type	Order code		Weight (1 pce) kg
18 ... 25	63 A, Fuse type gG / 50 A aM	10A	TA42DU-25	1SAZ311201R1001		0.335
22 ... 32	80 A, Fuse type gG / 63 A aM	10A	TA42DU-32	1SAZ311201R1002		0.335
29 ... 42	100 A, Fuse type gG / 80 A aM	10A	TA42DU-42	1SAZ311201R1003		0.335

Ordering details accessories

For thermal overload relays	Description	Type	Order code		Weight (1 pce) kg
TA42DU	Single mounting kit	DB80	1SAZ301110R0001		0.155

Main dimensions mm, *inches*



TA42DU

TA42DU thermal overload relays
Technical data

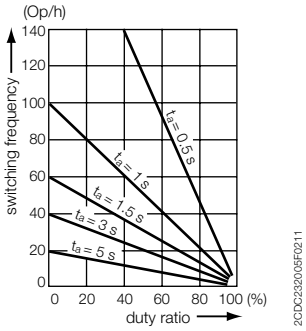
Main circuit – Utilization characteristics according to IEC/EN

Type		TA42DU
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1
Rated operational voltage U_e		690 V AC
Rated frequency		DC, 50/60 Hz
Trip class		10A
Number of poles		3
Duty time		100 %
Operating frequency without early tripping		Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"
Rated impulse withstand voltage U_{imp}		6 kV
Rated insulation voltage U_i		690 V AC

Auxiliary circuit according to IEC/EN

Type		TA42DU
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

2CDC106040C0201

TA42DU thermal overload relays
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	TA42DU
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		TA42DU
Contact rating	N.C., 95-96	C600
	N.O., 97-98	B600
Conventional thermal current		5 A

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device						
		480 / 600 V AC						
		Short circuit rating RMS symmetrical	Fuse type	Listed circuit breaker	Short circuit rating RMS symmetrical	Listed circuit breaker	Short circuit rating RMS symmetrical	Fuse type
TA42DU-25	25 A	5 kA	80 A, K5/ RK5	80 A	35 / 18 kA	80 A	50 kA	100 A, Class J
TA42DU-32	32 A	5 kA	100 A, K5/ RK5	80 A	35 / 18 kA	80 A	50 kA	100 A, Class J
TA42DU-42	42 A	5 kA	150 A, K5/ RK5	80 A	35 / 18 kA	80 A	50 kA	200 A, Class J

2CDC106040C0201

TA42DU thermal overload relays
Technical data

General technical data

Type			TA42DU
Pollution degree			3
Phase loss sensitive			Yes
Ambient air temperature			
Operation	Open - compensated without derating		-25 ... +55 °C
	Open		-25 ... +55 °C
Storage			-40 ... +70 °C
Ambient air temperature compensation			Continuous
Maximum operating altitude permissible			2000 m
Resistance to shock acc. to IEC 60068-2-27			12 g / 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 on DIN rail (35 mm)
Degree of protection			IP20

Electrical connection

Main circuit

Type			TA42DU
Connecting capacity			
	Rigid	**1 x**	2.5 ... 25 mm²
		2 x	2.5 ... 16 mm²
	Flexible with insulated ferrule	**1 x**	2.5 ... 25 mm²
		2 x	2.5 ... 10 mm²
	Stranded acc. to UL/CSA	**1 x or 2 x**	AWG 8-1
	Flexible acc. to UL/CSA	**1 x or 2 x**	AWG 8-1
Stripping length			14 mm
Tightening torques			4.5 Nm / 40 lb.in
Connection screw			M6 (Pozidriv 2)

Auxiliary circuit

Type			TA42DU
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)

2CDC106040C0201

TA75DU thermal overload relays
18 … 80 A

TA75DU-63

Description

The TA75DU 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
- Two electrically isolated auxiliary contacts – 1 N.O. + 1 N.C.
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications

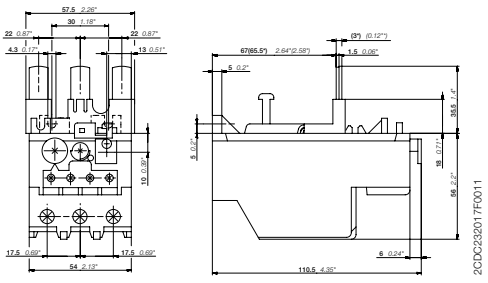
Ordering details

Setting range A	Short-circuit protective device	Trip class	Type	Order code		Weight (1 pce) kg
18 ... 25	63 A, Fuse type gG / 50 A aM	10A	TA75DU-25	1SAZ321201R1001		0.335
22 ... 32	80 A, Fuse type gG / 63 A aM	10A	TA75DU-32	1SAZ321201R1002		0.335
29 ... 42	100 A, Fuse type gG / 80 A aM	10A	TA75DU-42	1SAZ321201R1003		0.335
36 ... 52	125 A, Fuse type gG / 100 A aM	10A	TA75DU-52	1SAZ321201R1004		0.335
45 ... 63	160 A, Fuse type gG / 125 A aM	10A	TA75DU-63	1SAZ321201R1005		0.335
60 ... 80	200 A, Fuse type gG / 160 A aM	10A	TA75DU-80	1SAZ321201R1006		0.370

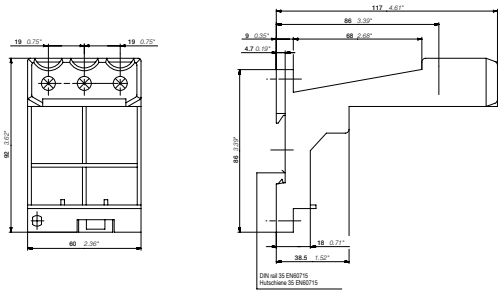
Ordering details accessories

For thermal overload relays	Description	Type	Order code		Weight (1 pce) kg
TA75DU	Single mounting kit	DB80	1SAZ301110R0001		0.155

Main dimensions mm, *inches*



TA75DU



DB80

TA75DU thermal overload relays
Technical data

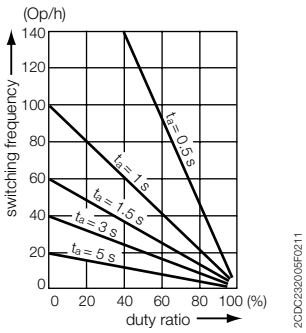
Main circuit – Utilization characteristics according to IEC/EN

Type		TA75DU
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1
Rated operational voltage U_e		690 V AC
Rated frequency		DC, 50/60 Hz
Trip class		10A
Number of poles		3
Duty time		100 %
Operating frequency without early tripping		Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"
Rated impulse withstand voltage U_{imp}		6 kV
Rated insulation voltage U_i		690 V AC

Auxiliary circuit according to IEC/EN

Type		TA75DU
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

2CDC106043C0201

TA75DU thermal overload relays
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	TA75DU
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		TA75DU
Contact rating	N.C., 95-96	C600
	N.O., 97-98	B600
Conventional thermal current		5 A

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device 480 / 600 V AC		
		Short circuit rating RMS symmetrical	Fuse type	Listed circuit breaker
TA75DU-25	25 A	5 kA	80 A, K5 / RK5	80 A
TA75DU-32	32 A	5 kA	100 A, K5 / RK5	80 A
TA75DU-42	42 A	5 kA	150 A, K5 / RK5	80 A
TA75DU-52	52 A	5 kA	175 A, K5 / RK5	125 A
TA75DU-63	63 A	10 kA	200 A, K5 / RK5	125 A
TA75DU-80	80 A	10 kA	250 A, K5 / RK5	125 A

2CDC106043C0201

TA75DU thermal overload relays
Technical data

General technical data

Type			TA75DU
Pollution degree			3
Phase loss sensitive			Yes
Ambient air temperature			
Operation	Open - compensated without derating		-25 ... +55 °C
	Open		-25 ... +55 °C
Storage			-40 ... +70 °C
Ambient air temperature compensation			Continuous
Maximum operating altitude permissible			2000 m
Resistance to shock acc. to IEC 60068-2-27			12 g / 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 on DIN rail (35 mm)
Degree of protection			IP20

Electrical connection

6

Main circuit

Type			TA75DU
Connecting capacity			
	Rigid	**1 x** **2 x**	2.5 ... 25 mm² 2.5 ... 16 mm²
	Flexible with insulated ferrule	**1 x** **2 x**	2.5 ... 25 mm² 2.5 ... 10 mm²
	Stranded acc. to UL/CSA	**1 x or 2 x**	AWG 8-1
	Flexible acc. to UL/CSA	**1 x or 2 x**	AWG 8-1
Stripping length			14 mm
Tightening torques			4.5 Nm / 40 lb.in
Connection screw			M6 (Pozidriv 2)

Auxiliary circuit

Type			TA75DU
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)

2CDC106043C0201

TA80DU thermal overload relays
29 … 80 A

TA80DU-80

DB80

Description

The TA80DU 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
– Two electrically isolated auxiliary contacts – 1 N.O. + 1 N.C.
– TEST and STOP function – Trip indication on the front
– Temperature compensation
– Suitable for three- and single-phase applications

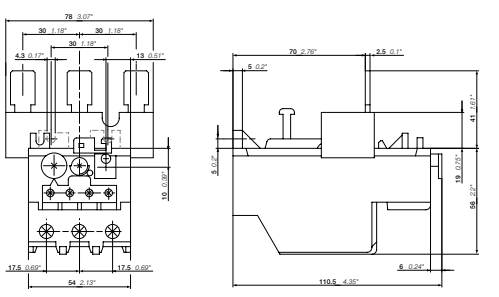
Ordering details

Setting range A	Short-circuit protective device	Trip class	Type	Order code		Weight (1 pce) kg
29 ... 42	100 A, Fuse type gG / 80 A aM	10A	TA80DU-42	1SAZ331201R1003		0.360
36 ... 52	125 A, Fuse type gG / 100 A aM	10A	TA80DU-52	1SAZ331201R1004		0.365
45 ... 63	160 A, Fuse type gG / 125 A aM	10A	TA80DU-63	1SAZ331201R1005		0.365
60 ... 80	200 A, Fuse type gG / 160 A aM	10A	TA80DU-80	1SAZ331201R1006		0.375

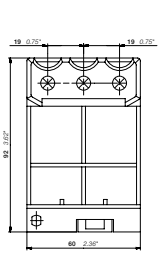
Ordering details accessories

For thermal overload relay	Description	Type	Order code		Weight (1 pce) kg
TA80DU	Single mounting kit	DB80	1SAZ301110R0001		0.155

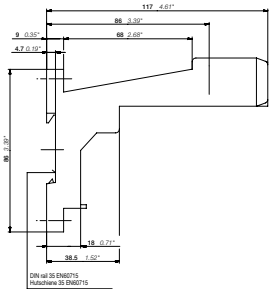
Main dimensions mm, *inches*



TA80DU



DB80



TA80DU thermal overload relays
Technical data

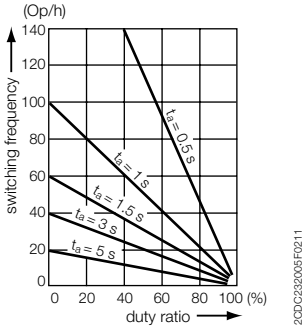
Main circuit – Utilization characteristics according to IEC/EN

Type	**TA80DU**
Standards	IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1
Rated operational voltage U_e	690 V AC
Rated frequency	DC, 50/60 Hz
Frequency range	0 ... 400 Hz
Trip class	10A
Number of poles	3
Duty time	100 %
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	690 V AC

Auxiliary circuit according to IEC/EN

Type		**TA80DU**
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

2CDC106044C0201

TA80DU thermal overload relays
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	TA80DU
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		TA80DU
Contact rating	N.C., 95-96	C600
	N.O., 97-98	B600
Conventional thermal current		5 A

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device 480 / 600 V AC		
		Short circuit rating RMS symmetrical	Fuse type	Listed circuit breaker
TA80DU-42	42 A	5 kA	150 A, K5 / RK5	80 A
TA80DU-52	52 A	5 kA	175 A, K5 / RK5	125 A
TA80DU-63	63 A	10 kA	200 A, K5 / RK5	125 A
TA80DU-80	80 A	10 kA	250 A, K5 / RK5	125 A

2CDC106044C0201

TA80DU thermal overload relays
Technical data

General technical data

Type			TA80DU
Pollution degree			3
Phase loss sensitive			Yes
Ambient air temperature			
Operation	Open - compensated without derating		-25 ... +55 °C
	Open		-25 ... +55 °C
Storage			-40 ... +70 °C
Ambient air temperature compensation			Continuous
Maximum operating altitude permissible			2000 m
Resistance to shock acc. to IEC 60068-2-27			12 g / 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 on DIN rail (35 mm)
Degree of protection			IP20

Electrical connection

6

Main circuit

Type			TA80DU
Connecting capacity			
	Rigid	**1 x** **2 x**	2.5 ... 25 mm² 2.5 ... 16 mm²
	Flexible with insulated ferrule	**1 x** **2 x**	2.5 ... 25 mm² 2.5 ... 10 mm²
	Stranded acc. to UL/CSA	**1 x or 2 x**	AWG 8-1
	Flexible acc. to UL/CSA	**1 x or 2 x**	AWG 8-1
Stripping length			14 mm
Tightening torques			4.5 Nm / 40 lb.in
Connection screw			M6 (Pozidriv 2)

Auxiliary circuit

Type			TA80DU
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)

2CDC106044C0201

TA110DU thermal overload relays
66 ... 110 A

TA110DU-110

Description

The TA110DU 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
- Two electrically isolated auxiliary contacts – 1 N.O. + 1 N.C.
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications

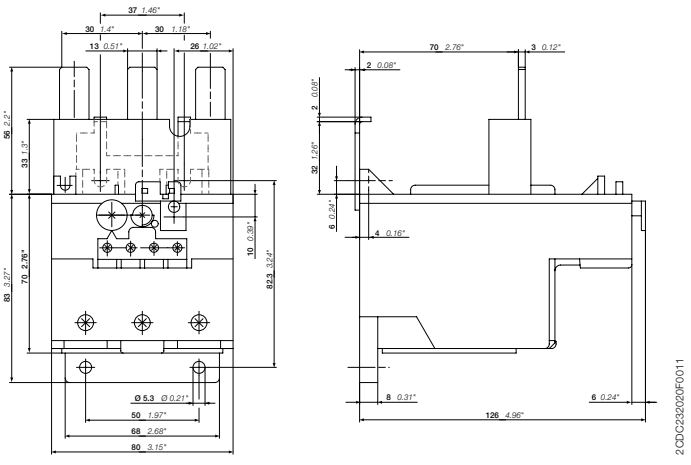
Ordering details

Setting range A	Short-circuit protective device	Trip class	Type	Order code		Weight (1 pce) kg
66 ... 90	200 A, Fuse type gG / 160 A aM	10A	TA110DU-90	1SAZ411201R1001		0.750
80 ... 110	224 A, Fuse type gG / 200 A aM	10A	TA110DU-110	1SAZ411201R1002		0.755

Ordering details accessories

For thermal overload relays	Description	Type	Order code		Weight (1 pce) kg
TA110DU	Single mounting kit	DB200	1SAZ401110R0001		0.225

Main dimensions mm, *inches*



TA110DU

TA110DU thermal overload relays
Technical data

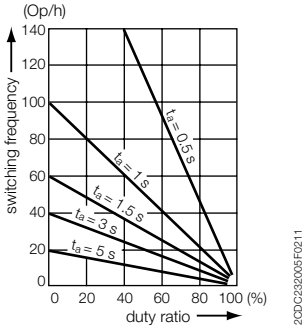
Main circuit – Utilization characteristics according to IEC/EN

Type	**TA110DU**
Standards	IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1
Rated operational voltage U_e	690 V AC
Rated frequency	DC, 50/60 Hz
Frequency range	0 ... 400 Hz
Trip class	10A
Number of poles	3
Duty time	100 %
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	690 V AC

Auxiliary circuit according to IEC/EN

Type		**TA110DU**
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

2CDC106037C0201

TA110DU thermal overload relays
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type		TA110DU
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		TA110DU
Contact rating	N.C., 95-96	C600
	N.O., 97-98	B600
Conventional thermal current		5 A

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device						
		480 / 600 V AC						
		Short circuit rating RMS symmetrical	Fuse type	Listed circuit breaker	Short circuit rating RMS symmetrical	Fuse type	Short circuit rating RMS symmetrical	Listed circuit breaker
TA110DU-90	90 A	10 kA	250 A, K5 / RK5	150 A	65 kA	200 A, Class J	65 / 25 kA	150 A
TA110DU-110	110 A	10 kA	250 A, K5 / RK5	250 A	65 kA	200 A, Class J	65 / 25 kA	150 A

2CDC106037C0201

TA110DU thermal overload relays
Technical data

General technical data

Type			TA110DU
Pollution degree			3
Phase loss sensitive			Yes
Ambient air temperature			
Operation	Open - compensated without derating		-25 ... +55 °C
	Open		-25 ... +55 °C
Storage			-40 ... +70 °C
Ambient air temperature compensation			Continuous
Maximum operating altitude permissible			2000 m
Resistance to shock acc. to IEC 60068-2-27			12 g / 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			IP20

Electrical connection

6

Main circuit

Type			TA110DU
Connecting capacity			
	Rigid	**1 x**	16 ... 35 mm²
		2 x	-
	Flexible	**1 x**	16 ... 35 mm²
		2 x	-
	Stranded acc. to UL/CSA	**1 x or 2 x**	AWG 6-2/0
	Flexible acc. to UL/CSA	**1 x or 2 x**	AWG 6-2/0
Stripping length			25 mm
Tightening torques			7.2 ... 9.6 Nm / 40 lb.in
Connection screw			M8 (Hexagon)

Auxiliary circuit

Type			TA110DU
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)

2CDC106037C0201

TA200DU thermal overload relays
66 … 200 A

TA200DU-200

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
- Two electrically isolated auxiliary contacts – 1 N.O. + 1 N.C.
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications

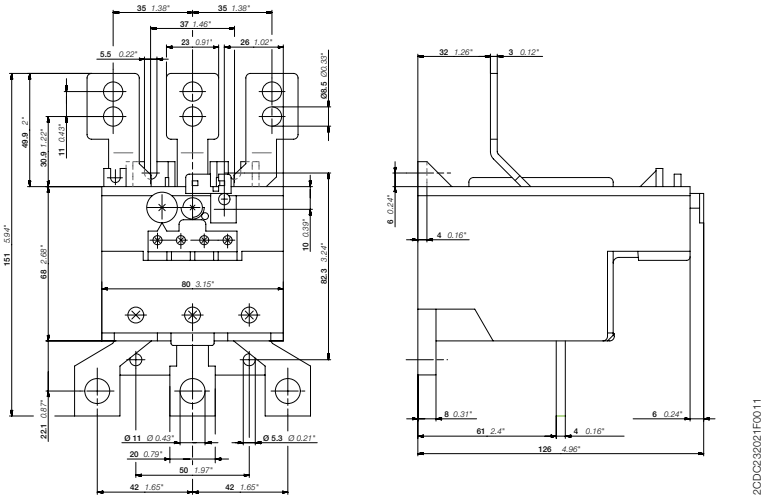
Ordering details

Setting range A	Short-circuit protective device	Trip class	Type	Order code		Weight (1 pce) kg
66 ... 90	200 A, Fuse type gG / 160 A aM	10A	TA200DU-90	1SAZ421201R1001		0.755
80 ... 110	224 A, Fuse type gG / 200 A aM	10A	TA200DU-110	1SAZ421201R1002		0.760
100 ... 135	224 A, Fuse type gG / 200 A aM	10A	TA200DU-135	1SAZ421201R1003		0.760
110 ... 150	250 A, Fuse type gG / 224 A aM	10A	TA200DU-150	1SAZ421201R1004		0.760
130 ... 175	315 A, Fuse type gG / 250 A aM	10A	TA200DU-175	1SAZ421201R1005		0.770
150 ... 200	315 A, Fuse type gG / 250 A aM	10A	TA200DU-200	1SAZ421201R1006		0.785

Ordering details accessories

For thermal overload relays	Description	Type	Order code		Weight (1 pce) kg
TA200DU	Terminal shroud	LT200/A	1SAZ401901R1001		0.090
TA200DU	Single mounting kit	DB200	1SAZ401110R0001		0.225

Main dimensions mm, *inches*



TA200DU

TA200DU thermal overload relays
Technical data

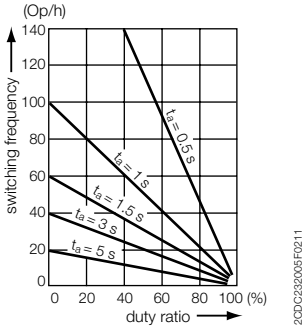
Main circuit – Utilization characteristics according to IEC/EN

Type	**TA200DU**
Standards	IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1
Rated operational voltage U_e	690 V AC
Rated frequency	DC, 50/60 Hz
Frequency range	0 ... 400 Hz
Trip class	10A
Number of poles	3
Duty time	100 %
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	690 V AC

Auxiliary circuit according to IEC/EN

Type		**TA200DU**
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

2CDC106038C0201

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		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	-	-	-	-
TA200DU-110	110 A	10 kA	250 A, K5 / RK5	225 A	-	-	18 kA	125 A
TA200DU-135	135 A	10 kA	300 A, K5 / RK5	225 A	50 kA	400 A, Class J	35 / 18 kA	225 A
TA200DU-150	150 A	10 kA	300 A, K5 / RK5	225 A	65 kA	400 A, Class J	35 / 18 kA	225 A
TA200DU-175	175 A	10 kA	300 A, K5 / RK5	225 A	65 kA	400 A, Class J	35 / 18 kA	225 A
TA200DU-200	200 A	10 kA	400 A, K5 / RK5	400 A	65 kA	400 A, Class J	35 / 18 kA	225 A

2CDC106038C0201

TA200DU thermal overload relays
Technical data

General technical data

		TA200DU
Type		
Pollution degree		3
Phase loss sensitive		Yes
Ambient air temperature		
Operation	Open - compensated without derating	-25 ... +55 °C
	Open	-25 ... +55 °C
Storage		-40 ... +70 °C
Ambient air temperature compensation		Continuous
Maximum operating altitude permissible		2000 m
Resistance to shock acc. to IEC 60068-2-27		12 g / 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		IP20

Electrical connection

Main circuit

			TA200DU
Type			
Connecting capacity			
	Rigid	**1 x**	25 ... 120 mm²
	Flexible	**1 x**	16 ... 35 mm²
	Lugs		L ≤ 12 mm / l > 6 mm
Tightening torques			4 Nm
Connection screw			M6

Auxiliary circuit

			TA200DU
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 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)

2CDC106038C0201

TA450DU thermal overload relays
130 ... 310 A

2CDC231011F0011

TA450DU-310

Description

The TA450DU 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
- Two electrically isolated auxiliary contacts – 1 N.O. + 1 N.C.
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications

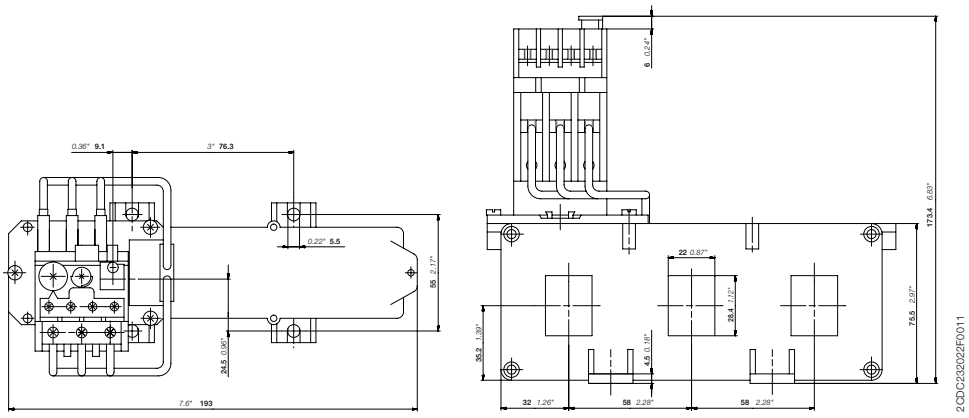
Ordering details

Setting range A	Short-circuit protective device	Trip class	Type	Order code		Weight (1 pce) kg
130 ... 185	not applicable	10A	TA450DU-185	1SAZ511201R1001		1.500
165 ... 235	not applicable	10A	TA450DU-235	1SAZ511201R1002		1.500
220 ... 310	not applicable	10A	TA450DU-310	1SAZ511201R1003		1.500

Ordering details accessories

For thermal overload relays	Description	Type	Order code		Weight (1 pce) kg
TA450DU	Terminal shroud	DT450/A185	1SAZ501901R1001		1.070
TA450DU	Terminal shroud	DT450/A300	1SAZ501902R1001		1.180

Main dimensions mm, *inches*



2CDC230222F0011

TA450DU

2CDC106041C0201

TA450DU thermal overload relays
Technical data

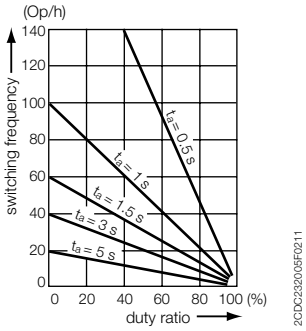
Main circuit – Utilization characteristics according to IEC/EN

Type		TA450DU
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1
Rated operational voltage U_e		1000 V AC
Rated frequency		50/60 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		1000 V AC

Auxiliary circuit according to IEC/EN

Type		TA450DU
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		500 V

Technical diagram – Intermittent periodic duty



t_a: Motor starting time

2CDC106041C0201

TA450DU thermal overload relays
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	TA450DU
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		TA450DU
Contact rating	N.C., 95-96	C600
	N.O., 97-98	B600
Conventional thermal current		5 A

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device 480 / 600 V AC		
		Short circuit rating RMS symmetrical	Fuse type	Listed circuit breaker
TA450DU-185	185 A	10 kA	na	na
TA450DU-235	235 A	10 kA	na	na
TA450DU-310	310 A	18 kA	na	na

2CDC106041C0201

TA450DU thermal overload relays
Technical data

General technical data

Type			TA450DU
Pollution degree			3
Phase loss sensitive			Yes
Ambient air temperature			
	Operation	Open - compensated without derating	-25 ... +55 °C
		Open	-25 ... +55 °C
	Storage		-40 ... +70 °C
Ambient air temperature compensation			Continuous
Maximum operating altitude permissible			2000 m
Resistance to shock acc. to IEC 60068-2-27			12 g / 15 ms
Mounting position			Position 1-6
Degree of protection			IP20

Electrical connection

Main circuit

Type		TA450DU
Connecting capacity		
	Bar	Max. 21 x 28.4 mm

Auxiliary circuit

Type			TA450DU
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)

2CDC106041C0201

TA45DU thermal overload relays
29.0 … 45.0 A

Description

The TA45DU 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
- Two electrically isolated auxiliary contacts – 1 N.O. + 1 N.C.
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications

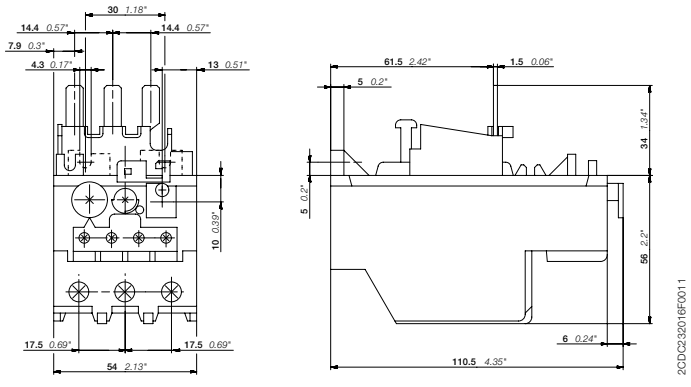
Ordering details

Setting range A	Short-circuit protective device	Trip class	Type	Order code		Weight (1 pce) kg
29 ... 45	-	10A	TA45DU-45	1SAZ341201R1003		0.335

Ordering details accessories

For thermal overload relays A	Description	Type	Order code		Weight (1 pce) kg
TA45DU	Single mounting kit	DB80	1SAZ301110R0001		0.155

Main dimensions mm, *inches*



TA45DU

TA45DU thermal overload relays
Technical data

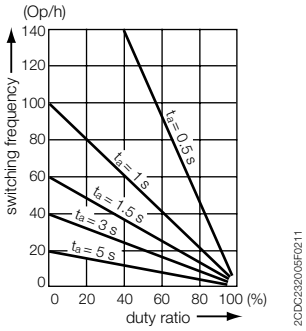
Main circuit – Utilization characteristics according to IEC/EN

Type	TA45DU
Standards	IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1
Rated operational voltage U_e	690 V AC
Rated frequency	DC, 50/60 Hz
Trip class	10A
Number of poles	3
Duty time	100 %
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	690 V AC

Auxiliary circuit according to IEC/EN

Type		TA45DU
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

2CDC106042C0201

TA45DU thermal overload relays
Technical data

General technical data

Type			TA45DU
Pollution degree			3
Phase loss sensitive			Yes
Ambient air temperature			
	Operation	Open - compensated without derating	-25 ... +50 °C
		Open	-25 ... +50 °C
	Storage		-40 ... +70 °C
Ambient air temperature compensation			Continuous
Maximum operating altitude permissible			2000 m
Resistance to shock acc. to IEC 60068-2-27			12 g / 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 on DIN rail (35 mm)
Degree of protection			IP20

Electrical connection

Main circuit

Type			TA45DU
Connecting capacity			
	Rigid	**1 x** **2 x**	2.5 ... 25 mm² 2.5 ... 16 mm²
	Flexible with insulated ferrule	**1 x** **2 x**	2.5 ... 25 mm² 2.5 ... 10 mm²
	Stranded acc. to UL/CSA	**1 x or 2 x**	AWG 8-1
	Flexible acc. to UL/CSA	**1 x or 2 x**	AWG 8-1
Stripping length			14 mm
Tightening torques			4.5 Nm / 40 lb.in
Connection screw			M6 (Pozidriv 2)

Auxiliary circuit

Type			TA45DU
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)

2CDC106042C0201

TA85DU thermal overload relays
60 … 85 A

Description

The TA85DU 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
– Two electrically isolated auxiliary contacts – 1 N.O. + 1 N.C.
– TEST and STOP function – Trip indication on the front
– Temperature compensation
– Suitable for three- and single-phase applications

Ordering details

Setting range A	Short-circuit protective device	Trip class	Type	Order code		Weight (1 pce) kg
60 ... 85	not applicable	10A	TA85DU-85	1SAZ351201R1006		0.335

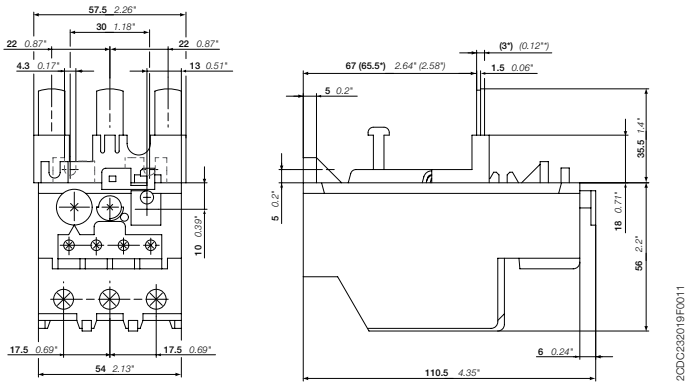
Ordering details accessories

For thermal overload relay A	Description	Type	Order code		Weight (1 pce) kg
TA85DU	Single mounting kit	DB80	1SAZ301110R0001		0.155

2CDC231007S0010

DB80

Main dimensions mm, *inches*



TA85DU

2CDC106045C0201

TA85DU thermal overload relays
Technical data

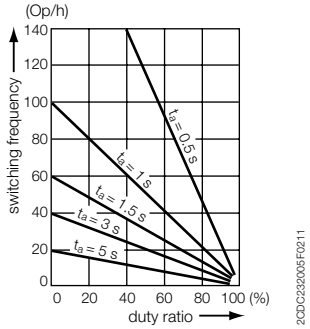
Main circuit – Utilization characteristics according to IEC/EN

Type	**TA85DU**
Standards	IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1
Rated operational voltage U_e	690 V AC
Rated frequency	DC, 50/60 Hz
Frequency range	0 ... 400 Hz
Trip class	10A
Number of poles	3
Duty time	100 %
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	690 V AC

Auxiliary circuit according to IEC/EN

Type		**TA85DU**
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

TA85DU thermal overload relays
Technical data

General technical data

Type			TA85DU
Pollution degree			3
Phase loss sensitive			Yes
Ambient air temperature			
Operation	Open - compensated without derating		-25 ... +50 °C
	Open		-25 ... +50 °C
Storage			-40 ... +70 °C
Ambient air temperature compensation			Continuous
Maximum operating altitude permissible			2000 m
Resistance to shock acc. to IEC 60068-2-27			12 g / 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 on DIN rail (35 mm)
Degree of protection			IP20

Electrical connection

6

Main circuit

Type			TA85DU
Connecting capacity			
	Rigid	**1 x**	2.5 ... 25 mm²
		2 x	2.5 ... 16 mm²
	Flexible with insulated ferrule	**1 x**	2.5 ... 25 mm²
		2 x	2.5 ... 10 mm²
	Stranded acc. to UL/CSA	**1 x or 2 x**	AWG 8-1
	Flexible acc. to UL/CSA	**1 x or 2 x**	AWG 8-1
Stripping length			14 mm
Tightening torques			4.5 Nm / 40 lb.in
Connection screw			M6 (Pozidriv 2)

Auxiliary circuit

Type			TA85DU
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)

2CDC106045C0201

E16DU, E45DU, E80DU, E140DU electronic overload relays
0.10 to 140 A

2CDC231001F0007

E16DU-1.0

2CDC231002F0006

E45DU-30

2CDC231003F0006

E80DU-80

2CDC231004F0006

E140DU-140

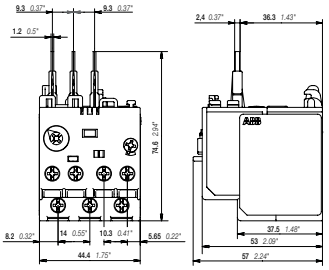
Description

The E16DU up to E140DU 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. Single mounting kits are available as accessory.

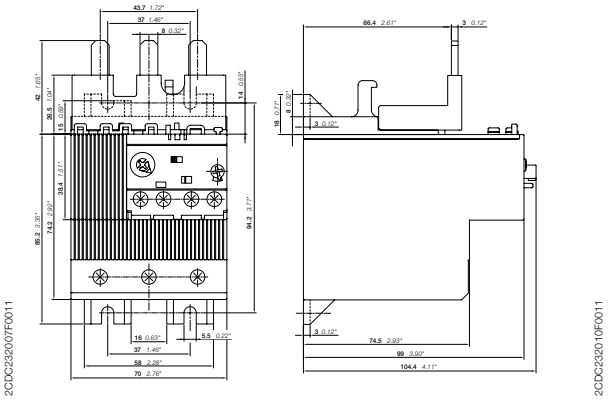
Ordering details

Setting range A	Short-circuit protective device	Trip class	Type	Order code		Weight (1 pce) kg
E16DU electronic overload relays						
0.10 ... 0.32	1 A, Fuse type gG	10E, 20E, 30E	E16DU-0.32	1SAX111001R1101		0.150
0.30 ... 1.00	4 A, Fuse type gG	10E, 20E, 30E	E16DU-1.0	1SAX111001R1102		0.150
0.80 ... 2.70	10 A, Fuse type gG	10E, 20E, 30E	E16DU-2.7	1SAX111001R1103		0.150
1.90 ... 6.30	20 A, Fuse type gG	10E, 20E, 30E	E16DU-6.3	1SAX111001R1104		0.150
5.70 ... 18.9	50 A, Fuse type gG	10E, 20E, 30E	E16DU-18.9	1SAX111001R1105		0.150
E45DU electronic overload relays						
9.00 ... 30.0	160 A, Fuse type gG	10E, 20E, 30E	E45DU-30	1SAX211001R1101		0.350
15.0 ... 45.0	160 A, Fuse type gG	10E, 20E, 30E	E45DU-45	1SAX211001R1102		0.350
E80DU electronic overload relay						
27.0 ... 80.0 A	250 A	10E, 20E, 30E	E80DU-80	1SAX311001R1101		0.770
E140DU electronic overload relay						
50.0 ... 140.0 A	400 A	10E, 20E, 30E	E140DU-140	1SAX321001R1101		0.915

Main dimensions mm, *inches*

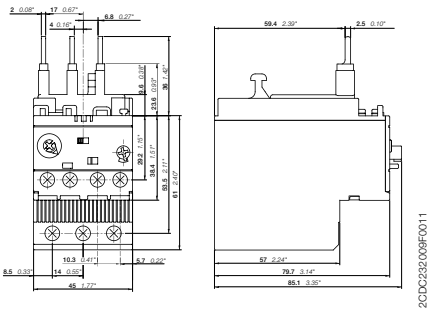


E16DU

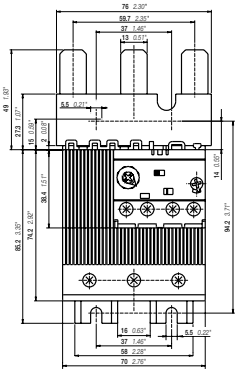

2CDC232007F0011

E80DU

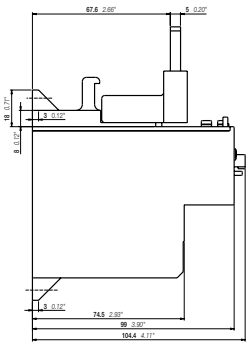
2CDC232010F0011


2CDC232009F0011

E45DU



E140DU


2CDC232008F0011

2CDC107030C0201

E16DU, E45DU, E80DU, E140DU electronic overload relays
Technical data

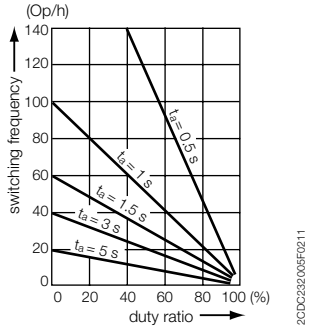
Main circuit – Utilization characteristics according to IEC/EN

Type	E16DU	E45DU	E80DU	E140DU
Standards	IEC 60947-1 / 60947-4-1 / 60947-5-1 and EN 60947-1 / 60947-4-1 / 60947-5-1			
Rated operational voltage U_e	690 V AC		1000 V AC	
Rated frequency	50/60 Hz			
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		1000 V AC	

Auxiliary circuit according to IEC/EN

Type		E16DU	E45DU	E80DU	E140DU
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}		6 kV			
Rated insulation voltage U_i		690 V			

Technical diagram – Intermittent periodic duty



t_a: Motor starting time

2CDC107030C0201

E16DU, E45DU, E80DU, E140DU electronic overload relays
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	E16DU	E45DU	E80DU	E140DU
Standards	UL 508, CSA 22.2, No. 14			
Maximum operational voltage	600 V AC			
Trip rating	125 % of FLA			
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"			
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"			
Short-circuit protective device	See table "Full load amps and short-circuit protective device"			

Auxiliary circuit according to UL/CSA

Type	E16DU	E45DU	E80DU	E140DU
Contact rating	B600,Q300			
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
E16DU-0.32	0.32 A	50 kA	2 A, Class J	5 kA	2 A, K5 / RK5	100 kA	2 A, Class J
E16DU-1.0	1.00 A	50 kA	2 A, K5 / RK5	5 kA	2 A, K5 / RK5	100 kA	2 A, Class J
E16DU-2.7	2.70 A	50 kA	4 A, K5 / RK5	5 kA	4 A, K5 / RK5	100 kA	4 A, Class J
E16DU-6.3	6.30 A	50 kA	15 A, K5 / RK5	5 kA	15 A, K5 / RK5	100 kA	15 A, Class J
E16DU-18.9	18.90 A	50 kA	30 A, K5 / RK5	5 kA	30 A, K5 / RK5	100 kA	30 A, Class J

Type	Full load amps (FLA)	Short-circuit protective device			
		600 V AC			
		SCCR	Fuse type	SCCR	Fuse type
E45DU-30	30 A	18 kA	150 A, K5 / RK5	100 kA	150 A, Class J
E45DU-45	45 A	18 kA	200 A, K5 / RK5	100 kA	200 A, Class J

Type	Full load amps (FLA)	Short-circuit protective device	
		600 V AC	
		SCCR	Fuse type
E80DU-80	80 A	18 kA	300 A, K5 / RK5

Type	Full load amps (FLA)	Short-circuit protective device	
		600 V AC	
		SCCR	Fuse type
E140DU-140	140 A	18 kA	400 A, K5 / RK5

2CDC107030C0201

E16DU, E45DU, E80DU, E140DU electronic overload relays
Technical data

General data

Type			E16DU	E45DU	E80DU	E140DU
Pollution degree			3			
Phase loss sensitive			Yes			
Ambient air temperature						
	Operation	Open - compensated without derating	-25 ... +70 °C			
	Storage		-50 ... +85 °C			
Ambient air temperature compensation			Continuous			
Maximum operating altitude permissible			2000 m			
Resistance to shock acc. to IEC 60068-2-27			15 g / 11 ms			
Resistance to vibrations acc. to IEC 60068-2-6			5 g / 3 ... 150 Hz			
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			IP20			

6

Electrical connection

Main circuit

Type			E16DU	E45DU	E80DU	E140DU
Connecting capacity						
	Rigid	**1 x**	1 ... 4 mm²	2.5 ... 16 mm²	6 ... 95 mm²	6 ... 95 mm²
		2 x	1 ... 4 mm²	2.5 ... 16 mm²	6 ... 35 mm²	6 ... 35 mm²
	Flexible with insulated ferrule	**1 x**	0.75 ... 2.5 mm²	2.5 ... 10 mm²	6 ... 70 mm²	6 ... 70 mm²
		2 x	0.75 ... 2.5 mm²	2.5 ... 10 mm²	6 ... 35 mm²	6 ... 35 mm²
	Stranded acc. to UL/CSA	**1 x**	AWG 16-10	AWG 14-6	AWG 10-0	AWG 8-0
		2 x	AWG 16-10	AWG 14-6	-	-
	Flexible acc. to UL/CSA	**1 x**	AWG 16-10	AWG 14-6	AWG 10-0	AWG 8-0
		2 x	AWG 16-10	AWG 14-6	-	-
Stripping length			9 mm	13 mm	-	-
Tightening torques			0.8 - 1.5 Nm / 7 lb.in	2.3 - 2.6 Nm / 22 lb.in	6 - 6.5 Nm / 53 lb.in	6 - 6.5 Nm / 53 lb.in
Connection screw			M3.5 (Pozidriv 2)	M5 (Pozidriv 2)	M8 (inbus 4)	M8 (inbus 4)

Auxiliary circuit

Type			E16DU	E45DU	E80DU	E140DU
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)			

2CDC107030C0201

E16DU, E45DU, E80DU, E140DU electronic overload relays
Accessories

2CDC231003F0010

DB16E

2CDC231004F0010

DB45E

2CDC231005F0010

DB80E

2CDC231006F0010

DB140E

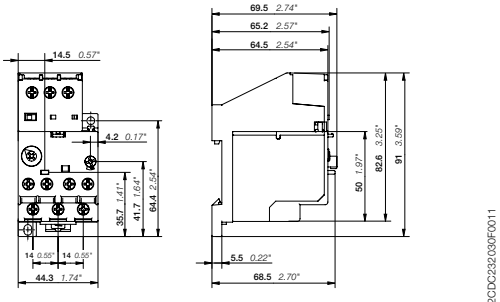
Description

Single mounting kits are available as accessory for E16DU, E45DU, E80DU, and E140DU. The single mounting kits offer the possibility to mount the overload relay separately from the contactor.

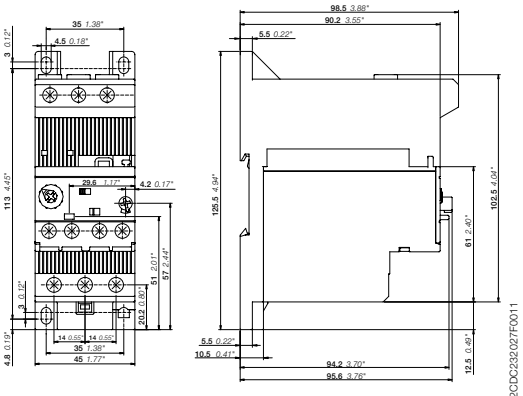
Ordering details

For electronic overload relays	Description	Type	Order code		Weight (1 pce) kg
Single mounting kits					
E16DU	Single mounting kit	DB16E	1SAX101110R0001		0.035
E45DU	Single mounting kit	DB45E	1SAX201110R1001		0.090
E80DU	Single mounting kit	DB80E	1SAX301110R1001		0.145
E140DU	Single mounting kit	DB140E	1SAX301110R1002		0.145

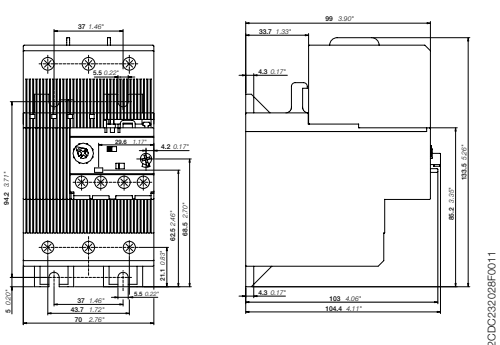
Main dimensions mm, *inches*


2CDC232030F0011

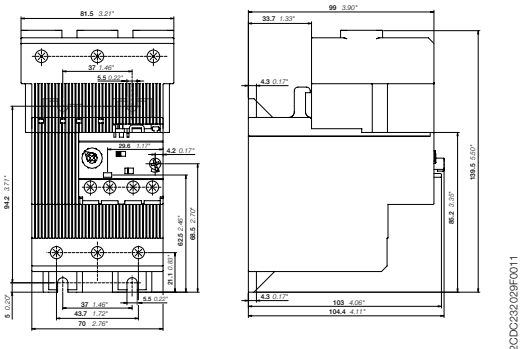
DB16E


2CDC232027F0011

DB45E


2CDC232028F0011

DB80E


2CDC232029F0011

DB140E

E200DU, E320DU electronic overload relays
60 to 320 A

E200DU-200

E320DU-320

Description

The E200DU and E320DU 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.

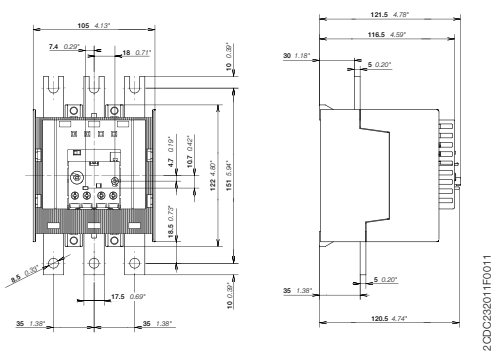
Ordering details

Setting range A	Short-circuit protective device	Trip class	Type	Order code		Weight (1 pce) kg
E200DU electronic overload relay						
60.0 ... 200.0	800 A	10E, 20E, 30E	E200DU-200	1SAX511001R1101		1.210
E320DU electronic overload relay						
100.0 ... 320.0	630 A	10E, 20E, 30E	E320DU-320	1SAX521001R1101		1.430

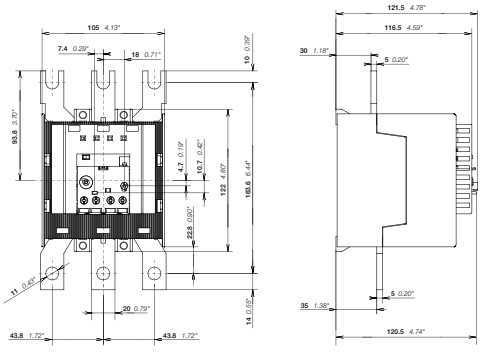
Terminal shrouds for E200DU and E320DU electronic overload relay

For electronic overload relays	Description	Type	Order code		Weight (1 pce) kg
E200DU	LT200E Terminal shroud for E200DU	LT200E	1SAX501904R0001		0.085
E320DU	LT320E Terminal shroud for E320DU	LT320E	1SAX601904R0001		0.105

Main dimensions mm, *inches*



E200DU



E320DU

E200DU, E320DU electronic overload relays
Technical data

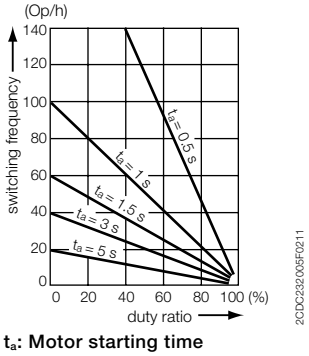
Main circuit – Utilization characteristics according to IEC/EN

Type	E200DU	E320DU
Standards	IEC 60947-1 / 60947-4-1 / 60947-5-1 and EN 60947-1 / 60947-4-1 / 60947-5-1	
Rated operational voltage U_e	1000 V AC	
Rated frequency	50/60 Hz	
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		E16DU	E45DU
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

2CDC107029C0201

E200DU, E320DU electronic overload relays
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type		E200DU	E320DU
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		E200DU	E320DU
Contact rating	**N.C., 95-96**	B600, Q300	
	N.O., 97-98	B600, Q300	
Conventional thermal current		5 A	

General data

Type		E200DU	E320DU
Pollution degree		3	
Phase loss sensitive		Yes	
Ambient air temperature			
Operation	Open - compensated without derating	-25 ... +70 °C	
Storage		-50 ... +85 °C	
Ambient air temperature compensation		Continuous	
Maximum operating altitude permissible		2000 m	
Resistance to shock acc. to IEC 60068-2-27		15 g / 11 ms	
Resistance to vibrations acc. to IEC 60068-2-6		5 g / 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		IP20	

Electrical connection

Auxiliary circuit

Type			E200DU	E320DU
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)	

2CDC107029C0201

E500DU, E800DU, E1250DU electronic overload relays
150 to 1250 A

2CDC231003F0008

E500DU-500

2CDC231004F0008

E800DU-800

1SFC101025F0201

E1250DU-1250

Description

The E500DU 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. The overload relays are connected directly to the contactors. Busbar kits are available as accessory for contactor mounting.

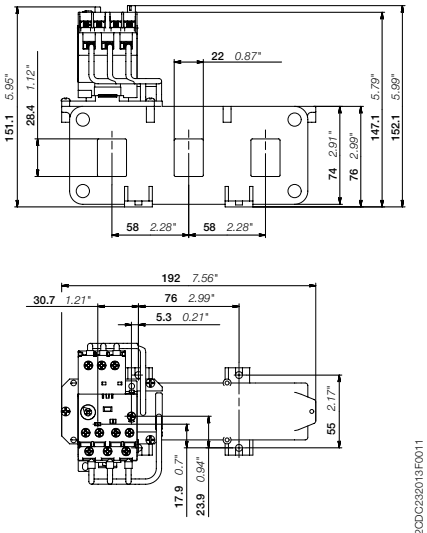
Ordering details

Setting range A	Short-circuit protective device	Trip class	Type	Order code		Weight (1 pce) kg
E500DU electronic overload relay						
150 ... 500	1000 A	10E, 20E, 30E	E500DU-500	1SAX711001R1101		1.170
E800DU electronic overload relay						
250 ... 800	1250 A	10E, 20E, 30E	E800DU-800	1SAX811001R1101		3.905
E1250DU electronic overload relay						
375 ... 1250	-	10E, 20E, 30E	E1250DU-1250	1SFA739001R1000		12.181

Terminal shrouds for E500DU and E800DU electronic overload relay

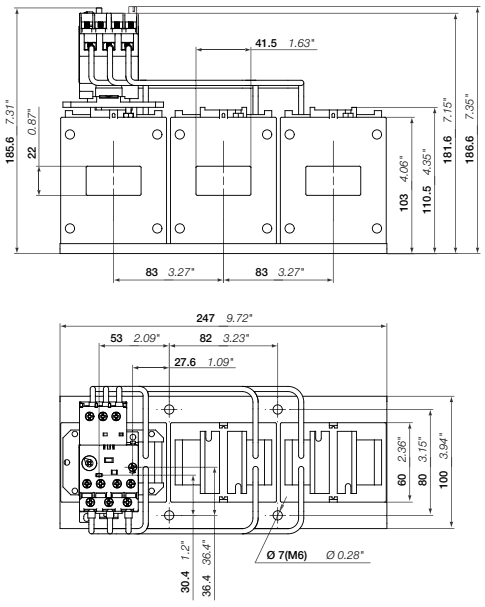
For electronic overload relays	Description	Type	Order code		Weight (1 pce) kg
E500DU	LT500E Terminal shroud for E500DU	LT500E	1SAX701904R0001		0.360
E800DU	LT800E Terminal shroud for E800DU	LT800E	1SAX801904R0001		0.105

Main dimensions mm, *inches*



2CDC232013F0011

E500DU



2CDC232014F0011

E800DU

2CDC107031C0201

E500DU, E800DU, E1250DU electronic overload relays
Technical data

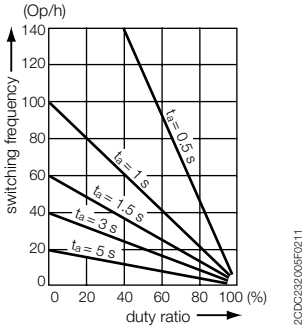
Main circuit – Utilization characteristics according to IEC/EN

Type	E500DU	E800DU	E1250DU
Standards	IEC 60947-1 / 60947-4-1 / 60947-5-1 and EN 60947-1 / 60947-4-1 / 60947-5-1		
Rated operational voltage U_e	1000 V AC		
Rated frequency	50/60 Hz		
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		E500DU	E800DU	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

2CDC107031C0201

E500DU, E800DU, E1250DU electronic overload relays
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	E500DU	E800DU	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		E500DU	E800DU	E1250DU
Contact rating	**N.C., 95-96**	B600, Q300		
	N.O., 97-98	B600, Q300		
Conventional thermal current		5 A		

General data

Type		E500DU	E800DU	E1250DU
Pollution degree		3		
Phase loss sensitive		Yes		
Ambient air temperature				
Operation	Open - compensated without derating	-25 ... +70 °C		
Storage		-50 ... +85 °C		
Ambient air temperature compensation		Continuous		
Maximum operating altitude permissible		2000 m		
Resistance to shock acc. to IEC 60068-2-27		15 g / 11 ms		
Resistance to vibrations acc. to IEC 60068-2-6		5 g / 3 ... 150 Hz		
Degree of protection		IP20		

Electrical connection

Auxiliary circuit

Type		E500DU	E800DU	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)		

2CDC107031C0201

EF19, EF45 electronic overload relays
0.10 to 45.0 A

EF19-18.9

EF45-30

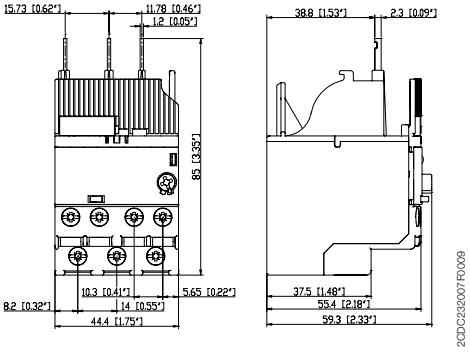
Description

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.

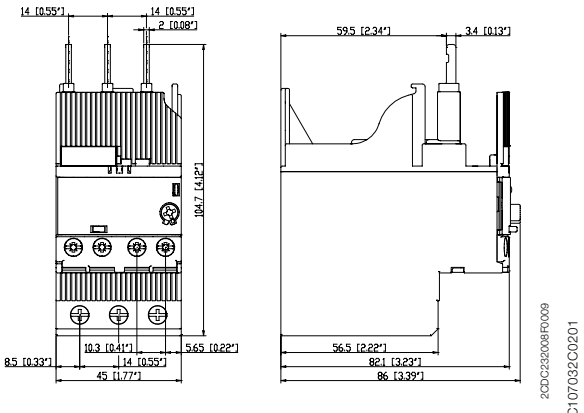
Ordering details

Setting range A	Short-circuit protective device	Trip class	Type	Order code		Weight (1 pce) kg
EF19 electronic overload relays						
0.10 ... 0.32	1 A, Fuse type gG	10E, 20E, 30E	EF19-0.32	1SAX121001R1101		0.158
0.30 ... 1.00	4 A, Fuse type gG	10E, 20E, 30E	EF19-1.0	1SAX121001R1102		0.158
0.80 ... 2.70	10 A, Fuse type gG	10E, 20E, 30E	EF19-2.7	1SAX121001R1103		0.158
1.90 ... 6.30	20 A, Fuse type gG	10E, 20E, 30E	EF19-6.3	1SAX121001R1104		0.158
5.70 ... 18.9	50 A, Fuse type gG	10E, 20E, 30E	EF19-18.9	1SAX121001R1105		0.158
EF45 electronic overload relays						
9.00 ... 30.0	160 A, Fuse type gG	10E, 20E, 30E	EF45-30	1SAX221001R1101		0.362
15.0 ... 45.0	160 A, Fuse type gG	10E, 20E, 30E	EF45-45	1SAX221001R1102		0.362

Main dimensions mm, *inches*



EF19



EF45

2CDC107032C0201

EF19, EF45 electronic overload relays
Technical data

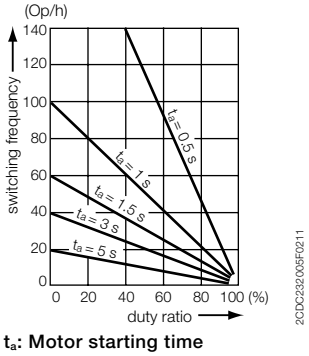
Main circuit – Utilization characteristics according to IEC/EN

Type	EF19	EF45
Standards	IEC 60947-1 / 60947-4-1 / 60947-5-1 and EN 60947-1 / 60947-4-1 / 60947-5-1	
Rated operational voltage U_e	690 V AC	
Rated frequency	50/60 Hz	
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

2CDC107032C0201

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 kA	18 kA	150 A, K5 / RK5	18 kA	150 A, K5 / RK5	100 kA	150 A, Class J
EF45-45	45 kA	18 kA	200 A, K5 / RK5	18 kA	200 A, K5 / RK5	100 kA	200 A, Class J

2CDC107032C0201

EF19, EF45 electronic overload relays
Technical data

General data

Type			EF19	EF45
Pollution degree			3	
Phase loss sensitive			Yes	
Ambient air temperature				
	Operation	Open - compensated without derating	-25 ... +70 °C	
	Storage		-50 ... +85 °C	
Ambient air temperature compensation			Continuous	
Maximum operating altitude permissible			2000 m	
Resistance to shock acc. to IEC 60068-2-27			15 g / 11 ms	
Resistance to vibrations acc. to IEC 60068-2-6			1 g / 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			IP20	

Electrical connection

Main circuit

Type			EF19	EF45
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

Type			EF19	EF45
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)	

2CDC107032C0201

1SBC101728C0201

R contactors

Presentation 7/2

Overview

R contactors for the AC circuits switching **7**/4

R contactors for the DC circuits switching **7**/6

Questionnaire 7/8

1SBC101728C0201

R contactors
85 to 5000 A

R contactors with variable number of poles and their variants (contactors with N.C. + N.O. poles, couplers...) are used for controlling power circuits up to 1000 V AC or 1500 V DC. They are designed with common standard components. With the combination of these elements and the adaptation possibilities, special versions can be provided. Designed for long-lasting operation and demanding applications, the ABB R contactors are used for many applications all over the world.

Flexibility of design
- Variable number of poles
- Adjustable number of auxiliary contacts
- Optional combination of N.O. and N.C. poles
- Mechanical or magnetic latching available.

Easy maintenance
- Direct access to all the components of the contactor
- Complete and didactic instruction manual
- Spare parts available
- Dedicated service for bar contactors.

Exceptional durability
- Mechanical durability up to 10 millions operating cycles
- Mechanical switching frequency up to 1200 cycles per hour
- Electrical durability up to 350 000 operating cycles.

Ideal for heavy duty applications
- High making and breaking capacity
- Fully compatible with the requirements of utilization categories AC-3, DC-3 and DC-5 (control of AC / DC motors for mining, iron and steel industries...).

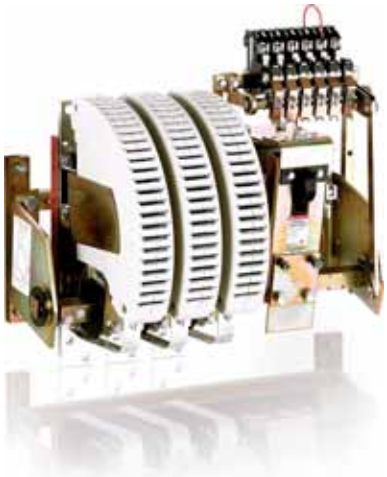
Custom-made solutions
- More than 60 years' experience in dealing with customers projects
- Development of solutions from specifications
- Pre-sales support to identify and define customer requirements
- Specialists available to help you, select your product or optimize your configuration.

1SBC104003S0201

R contactors
For heavy duty applications

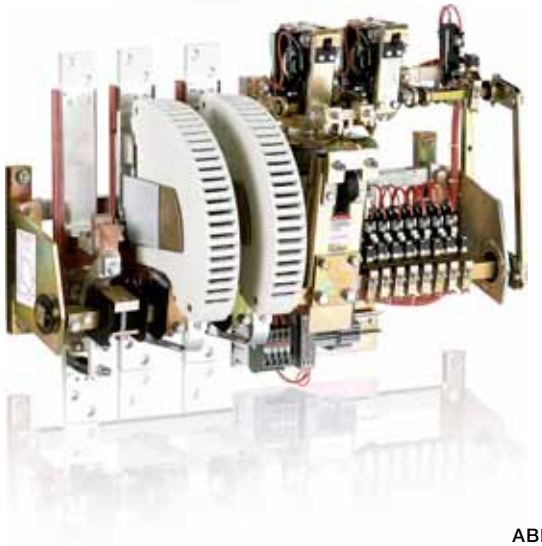
R contactors meet the particular requirements of each AC / DC control application up to 5000 A, where the demands are increasing:
- Power distribution
- Photovoltaic, hydroelectric power stations
- Batteries
- Mining
- Railway networks and rolling stock
- Induction furnaces
- Pump stations
- Travelling cranes.

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



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

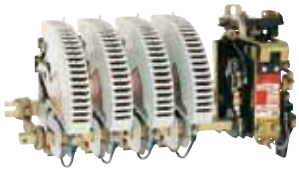
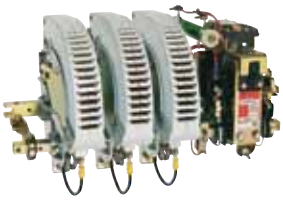
Special applications
AC / DC coupling: LOR.. contactors
Slip ring motor control: FOR.. contactors
AC / DC switching (N.C. / N.O. main poles): NOR & JOR.. contactors
Latching contactors for energy saving and safety requirements: AMA or AME contactors
Field discharge: AM(F)-CC-JORE.. contactors



1SBC104003S0201

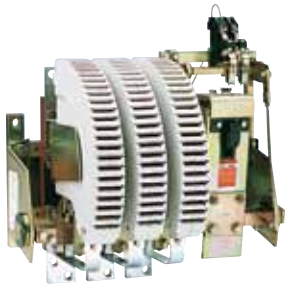
R contactors for the AC circuits switching

Voltage Ue up to **1000 V AC**
Current Ie up to **4500 A**

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



Voltage Ue up to **500 V AC**
Current Ie up to **5000 A**

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**

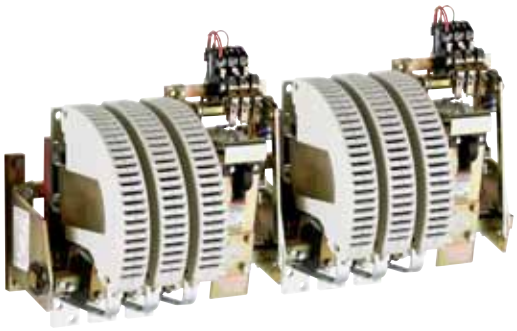
Recap:
All contactors fulfill the IEC 60947-4-1 / EN 60947-4-1 standards.

Utilization category AC-1: max. breaking current = 1.5 x Ie, max. making current = 1.5 x Ie.

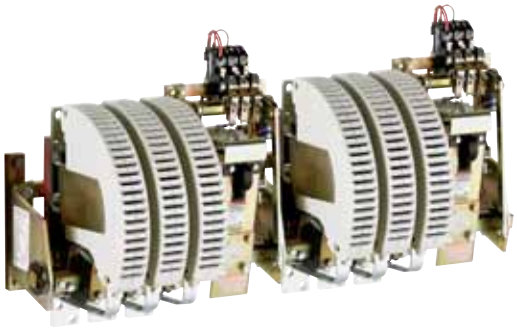
Utilization category AC-3: max. breaking current = 8 x Ie, max. making current = 10 x Ie.

Contactors with NC poles, magnetic or mechanical latching devices on request.

1SBC104002S0201



IORR1400..-MT	IORR1700..-MT	IORR2100..-MT	IORR2500..-MT	IORR3200..-MT	IORR3800..-MT	IORR4500..-MT	IORR5100..-MT
IORE1400..-MT	IORE1700..-MT	IORE2100..-MT	IORE2500..-MT	IORE3200..-MT	IORE3800..-MT	IORE4500..-MT	IORE5100..-MT
1250 A	1650 A	1850 A	2200 A	3000 A	3500 A	4000 A	4500 A
970 A	1170 A	1270 A	–	–	–	–	–
610 A	680 A	810 A	–	–	–	–	–
1000 kW	**1200 kW**	**1300 kW**	–	–	–	–	–



IORR1000	IORR1400	IORR1700	IORR2100	IORR2500	IORR3200	IORR3800	IORR4500	IORR5100
IORE1000	IORE1400	IORE1700	IORE2100	IORE2500	IORE3200	IORE3800	IORE4500	IORE5100
1000 A	1350 A	1650 A	2000 A	2400 A	3200 A	3800 A	4500 A	5000 A
800 A	1060 A	1260 A	1520 A	–	–	–	–	–
800 A	1080 A	1220 A	1340 A	–	–	–	–	–
450 kW	**630 kW**	**750 kW**	**900 kW**	–	–	–	–	–

1SBC104002S0201

R contactors for the DC circuits switching

Voltage Ue up to **1500 V DC**

Current Ie up to **5000 A**

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	140 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	140 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**	140 A**	205 A**	350 A**	500 A**

*Number of poles to be fitted in series according to the operational voltage and the utilization categories.

**Version with increased insulation for 1000 V DC < Ue ≤ 1500 V DC, please consult us.

7

Contactors
UL / CSA approved

Voltage Ue up to **600 V DC**

Current Ie up to **2000 A**

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

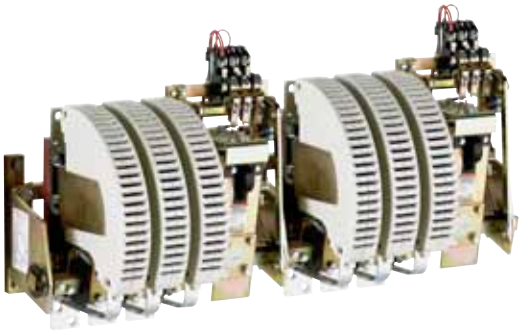
Recap:
All contactors fulfill the IEC 60947-4-1 / EN 60947-4-1 standards.

Utilization category DC-1: max. breaking current = 1.5 x Ie, max. making current = 1.5 x Ie.

Utilization categories DC-3 / DC-5: max. breaking current = 4 x Ie, max. making current = 4 x Ie.

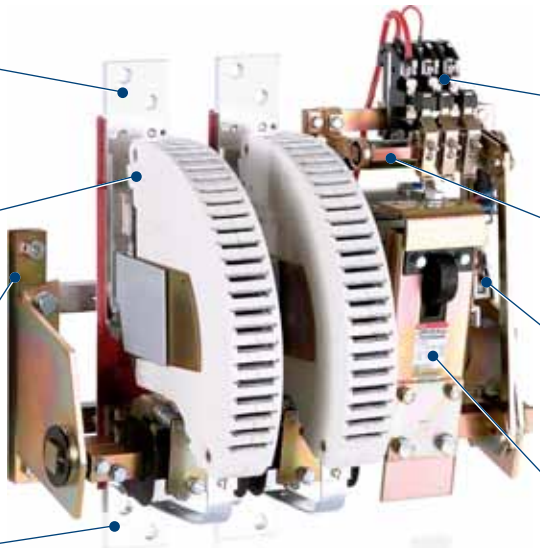
Contactors with NC poles, magnetic or mechanical latching devices on request.

1SBC104001S0201



	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

Product overview



1SBC104001S0201

Questionnaire
Specification for R contactors

Customer .....
Contact person ..... Date .....
Tel. ..... e-mail .....

ABB .....
Contact person .....
Tel. .....

Quantity ..... Requested delivery date .....
Project / Application .....

Power circuit

AC switching

Application type
☐ AC-1 (resistive load)
☐ AC-3 (direct starting, switching off running motors)
☐ No load breaking
☐ Other .....
Number of poles: N.O. ..... N.C. .....
Rated operational current Ie ..... A
Max. making current ..... A
Max. breaking current ..... A
Rated operational voltage Ue ..... V ..... Hz

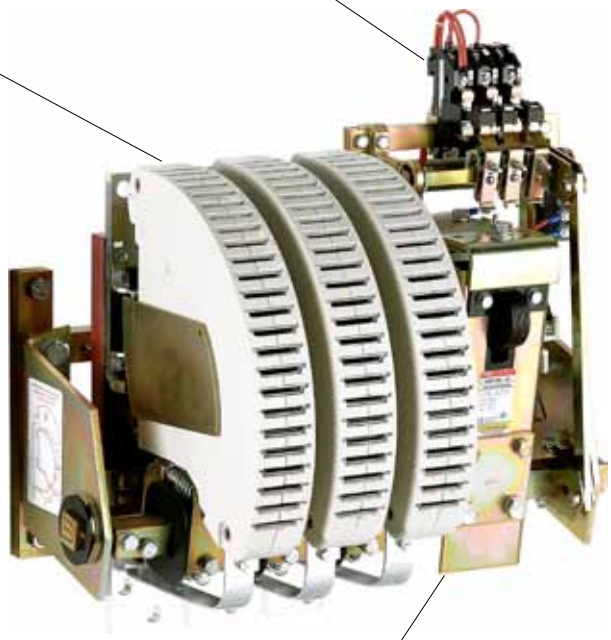
or

DC switching

Application type
☐ DC-1 (resistive load)
☐ DC-3 (shunt motors)
☐ DC-5 (series motors)
☐ No load breaking
☐ Other ..... L/R ..... ms
Number of poles: N.O. ..... N.C. .....
Rated operational current Ie ..... A
Making current ..... A
Breaking current min. ..... A max. ..... A
Rated operational voltage Ue ..... V DC

Auxiliary contacts

Number of N.O. auxiliary contacts .....
Number of N.C. auxiliary contacts .....



Control circuit (coil)

AC ☐ Voltage ..... V ..... Hz
DC ☐ Voltage ..... V DC

Options
☐ Magnetical latching
☐ Mechanical latching

Operating conditions

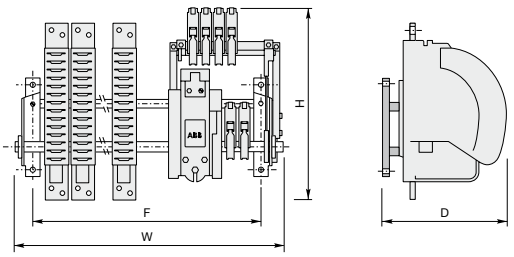
Switching frequency ..... cycles/h
Mech. durability required (millions of operating cycles) .....
Remarks .....

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



Please photocopy and forward. Questionnaire also available on the ABB Website:
www.abb.com/lowvoltage Section: Our offering Select: Control Products > Contactors > Bar mounted contactors

1SBC104004S0201

Questionnaire
Specification for R contactors

Other information / Application type

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

Please photocopy and forward. Questionnaire also available on the ABB Website:
www.abb.com/lowvoltage Section: Our offering Select: Control Products > Contactors > Bar mounted contactors

1SBC104004S0201

2CDC135025C0201

Motor management system

Motor control and protection

Benefits and advantages **8**/2

Technical data **8**/3

2CDC135025C0201

Motor management system
Benefits and advantages

UMC100-FBP is a flexible, modular and expandable motor management system for constant-speed low-voltage range motors.
It's most important tasks include motor protection, prevention of plant standstills and the reduction of down time. This is made possible by early information relating to possible motor problems which avoids unplanned plant standstills. Even if a motor trips, quick diagnosis of the cause of the fault serves to reduce downtime.

UMC100-FBP combines in a very compact unit:

Motor protection
- Overload, underload
- Overvoltage, undervoltage
- Blocked rotor, low / high current
- Phase failure, imbalance, phase sequence
- Earth leakage
- Thermistor protection
- Limitation of starts per time
- One single version with integrated measuring system covers the rated
- motor current from 0,24 to 63 A

Motor control
- Integrated and easy to parametrize motor starter functions like direct, reverse, star-delta,...
- Additionally free programmable logic for application specific control functions
- Expansion modules DX111, DX122 for more I/Os
- Expansion modules VI150, VI155 for 3-phase voltage measuring

Motor diagnostics
- Quick and comprehensive access to all relevant data via fieldbus and/or operator panel
- Current, thermal load
- Phase voltages
- Power factor
- Energy

Communication
- Communication-independent basic device
- Freely selectable fieldbus protocol with FieldBusPlug
- Profibus DP
- DeviceNet
- Modbus
- CANopen

Typical application segments
- Oil & gas
- Cement
- Paper
- Mining
- Steel
- Chemical industry

Further information

UMC & FBP Catalogue	2CDC 190 022 D0204
UMC & FBP Brochure	2CDC 135 011 B0202

2CDC135025C0201

Motor management system
Technical data

Basic device UMC100-FBP

UMC100-FBP allows the connection of one I/O-expansion module DX111 or DX122, and one voltage module VI150 or VI155. Expansion modules are connected via 2-wire bus, the max. distance to UMC100-FBP is 3 m.

Main power	
Voltage	max 1000 V AC
Frequency	45 to 65 Hz
Rated motor current	0.24 to 63 A, without accessories
	Greater currents with transformer
Transformer diameter	11 mm (max 25 mm²)
Tripping classes	5, 10, 20, 30, 40 in accordance with EN/IEC 60947-4-1
Short-circuit protection	Separate fuse on network side

Control unit	
Supply voltage	24 V DC
Reverse polarity protection	yes
Inputs	6 digital inputs 24 V DC
	1 PTC input
Outputs	3 relay outputs relay
	1 digital output transistor
Interfaces	1 for ABB FieldBusPlug
	1 for UMC100-PAN control station
	1 for expansion module
Parametric assignment	via fieldbus, control station and / or software
Addressing	Control station or addressing set
LEDs	3 LEDs: green, yellow, red

Environment and mechanical data	
Fastening	on DIN busbar (EN50022-35) or with 4 screws x M4
Dimensions (W x H x D)	70 x 105 x 110 mm (incl. FieldBusPlug and control panel)
Weight	0.39 kg
Terminal cross-section	max. 2.5 mm² or 2 x 1.5 mm²

I/O-expansion modules DX111 / DX122

Expansion modules to increase the number of I/Os of a UMC100-FBP. Easy use of inputs by parametrizing for fault or warning; individual message on operator panel configurable.

Supply voltage		24 V DC
Inputs	DX111	8 digital inputs 24 V DC
	DX122	8 digital inputs 110/230 V AC
Outputs		4 relay outputs relay 1 analogue output, 0/4 to 20 mA / 0 to 10 V configurable
Fastening		on DIN busbar (EN50022-35)
Dimensions (W x H x D)		45 x 77 x 100 mm (without terminal block)

2CDC135025C0201

Motor management system
Technical data

NEW

Voltage expansion modules

Measures the 3 phase voltages of a motor. Different versions for use in grounded and ungrounded networks.

Supply voltage		24 V DC
Inputs	VI150	3 analogue inputs 150 - 690 V AC
		For use in grounded networks
		Maximum operation altitude 2000 m
	VI155	3 analogue inputs 150 - 690 V AC
		For use in all networks
		Maximum operation altitude > 2000 m
Outputs		1 relay output
Fastening		on DIN busbar (EN50022-35)
Dimensions (W x H x D)		22.5 x 77 x 100 mm (without terminal block)

Control panel UMC100-PAN

Installation on the device or on the switching cabinet door

Graphics-enabled and backlit display, 3 LEDs for status indication

Freely configurable error messages

Multilingual: German, English, French, Italian, Portuguese, Spanish, Russian

8

2CDC135025C0201

Notes

2CDC135025C0201

General technical data

General technical data

Coordination with short-circuit protection devices **9**/2
Standards, specifications and certifying organizations **9**/4
Terms and technical definitions **9**/6
Standards and utilization categories **9**/8
Degrees of protection **9**/10
Climatic withstand of devices **9**/11

Somm_GTD

Coordination with short-circuit protection devices

In compliance with standards IEC 60947-4-1 and EN 60947-4-1, we define for the contactors and starters the type, rating and characteristics of the short-circuit protection devices SCPD which allow selective protection against overloads and ensure protection against short circuits.

Basic functions

Any starter is designed to:
– start motors,
– ensure continuous functioning of motors,
– disconnect motors from the supply line,
– guarantee protection of motors against overloads.

The starter is typically made up of a switching device (contactor) and an overload protection device (thermal overload relay TOR or electronic overload relay EOR).

These two devices MUST be coordinated with equipment capable of providing protection against short circuit (SCPD: short circuit protective device): typically a circuit breaker with magnetic release only or a switch fuse. These are not necessarily part of the starter.

Applicable standards

IEC 60947-4-1 (EN 60947-4-1) precisely defines the different points to be considered in order to carry out correct coordination.

Complete coordination for a combination includes the following points:
– Selectivity test between the overload relay and the short-circuit protection device SCPD.
– Short-circuit condition tests:
  - at prospective "r" currents - These currents depend on the rated operational current of the starter (**Ie** AC-3) and are given by the standard (Table 11). 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 prospective short-circuit current "**Iq**" - This is the maximum current that the combination can withstand, for example 50 kA.

Types of coordination

IEC 60947-4-1 (EN 60947-4-1) defines two types of coordination according to the expected level of service continuity. Acceptable extreme damage for the switchgear is divided into two types.

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

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

The complete ABB offer

ABB has acquired years of experience with respect to problems of coordination and is able to make a complete offer based on tests performed in its qualified laboratories. This offer includes 400 V, 500 V, 690 V networks.

A complete data base of coordination tables, according to IEC 60947-4-1 (EN 60947-4-1), is available on the ABB Website.

In the coordination tables the following short-circuit protection devices are recommended:
– Moulded case circuit-breakers (MCCBs)
– Miniature circuit-breakers (MCBs)
– Switch-disconnector-fuses (aM, gG and BS)
– Manual Motor Starters (M.M.S.).

General remarks applicable to all tables

– Each table is defined for a maximum ambient temperature of 40 °C. For higher temperatures, apply a derating factor according to the following rules:
  - Fuses: factor of 0.8 applied to **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, and 30 for SU types
– In the tables with MCCBs, these are fitted with the magnetic relay alone. Setting is always carried out at > 12.3 **Ie** AC-3 so that the transient current peak occurring during starting does not lead to tripping.

1SBC101590S0201

Coordination with short-circuit protection devices

A motor starter is typically made up of a switching device (contactor) and an overload protection device (see opposite page "Basic functions").

These two devices **must** be coordinated with an equipment capable of providing protection against short circuit (SCPD: Short-Circuit Protection Device).

A complete data base of coordination tables, according to **IEC 60947-4-1** (EN 60947-4-1) **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

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:

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

1SBC101591S0201

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 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 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: 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

1SBC101630S0201

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...

1SBC101630S0201

Terms and technical definitions

Circuits

– auxiliary circuit: All the conductive parts of a contactor designed to be inserted in a different circuit from the main circuit and the contactor control circuits.
– control circuit: All the conductive parts of a contactor (other than the main circuit and the auxiliary circuit) used to control the contactor's closing operation or opening operation or both.
– main circuit: All the conductive parts of a contactor designed to be inserted in the circuit that it controls.

Thermal overload relay tripping classes

IEC 60947-4-1 defines tripping classes 10 A, 10, 20 and 30. Types 10 A, 10, etc. correspond to the maximum tripping time for a making current at 7.2 times the setting current.

Furthermore, for each class the standard specifies the tripping time for 1.5 times the setting current and sets the non tripping condition at 1.05 times the setting current.

All these data are summarized in the table below.

Extract from IEC 60947-4-1:

Tripping class		10 A	10	20	30
Max. tripping time for 1.5 times the setting current (warm state)	s	120	240	480	720
Tripping time for 7.2 times the setting current (cold state)	s	2 - 10	4 - 10	6 - 20	9 - 30
For 1.05 times the setting current		No tripping			

Electromagnetic compatibility

AF... contactors comply with IEC 60947-1, 60947-4-1 and EN 60947-1, 60947-4-1 standards.

Definitions:

Environment A: "Mainly relates to low-voltage non public or industrial networks/locations/installations (EN 50082-2 article 4) including highly disturbing sources".

Environment B: "Mainly relates to low-voltage public networks (EN 50082-1 article 5) such as residential, commercial and light industrial locations/installations. Highly disturbing sources such as arc welders are not covered by this environment".

Notice for AF... contactors: This product has been designed for environment A. Use of this product in environment B may cause unwanted electromagnetic disturbances in wich case the user may be required to take adequate mitigation measures.

Definitions according to SEMI F47 -0706

SEMIF47-0706 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 TOR or electronic overload relay EOR). These two devices MUST be coordinated with equipment capable of providing protection against short circuit (SCPD: short circuit protective device): typically a circuit breaker with magnetic release only or a switch fuse. These are not necessarily part of the starter.

The characteristics of the starter must comply with the international standard IEC 60947-4-1 which defines the above items as follows:

contactor: a mechanical switching device having only one position of rest, operated otherwise than by hand, capable of making, carrying and breaking currents under normal circuit conditions including overload conditions.

overload release: overload relay or release which operates in the case of overload and also in case of loss of phase.

circuit-breaker: defined by IEC 60947-2 as a mechanical switching device, capable of making, carrying and breaking currents under normal circuit conditions and also making, carrying for a specified time and breaking currents under specified abnormal circuit conditions.

IEC publication 60947-4-1 defines coordination types "1" and "2":

– Type "1" coordination requires that, in the event of a short-circuit, the contactor or starter does not endanger persons or installations and will not then be able to operate without being repaired or parts being replaced.
– Type "2" coordination requires that, in short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts being light welded is acceptable. In this case, the manufacturer must stipulate the measures to be taken with respect to maintenance of the equipment.

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.

Electrical durability

Number of on-load operating cycles that the contactor is able to carry out. It depends on the utilization category.

1SBC101625S0201

Terms and technical definitions

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 beginning of the closing operation and the instant the contacts touch on all the poles.
- Opening time: Time interval between the specified starting instant of the opening operation and the instant the contacts separate on all the poles.

Rated control voltage 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.

1SBC101625S0201

Standards and utilization categories

Standards:

IEC publications 60941-1, 60947-4-1 and 60947-5-1 should be referred to on an international level with respect to contactors, contactor relays and thermal O/L relays.

Utilization categories:

A contactor's duty is characterised by the utilization category together with the rated operational voltage and current indicated.

Utilization Categories for Contactors According to IEC 60947-4-1:

Alternating current:	AC-1	Non-inductive or slightly inductive loads, resistance furnaces.
	AC-2	Slip-ring motors: starting, switching off.
	AC-3	Cage motors: starting, switching off running motors.
	AC-4	Cage motors: starting, plugging, inching.
	AC-5a	Discharge lamp switching.
	AC-5b	Incandescent lamp switching.
	AC-6a	Transformer switching.
	AC-6b	Capacitor bank switching.
	AC-8a	Hermetic refrigeration compressor motor control with manual resetting of overload releases.
	AC-8b	Hermetic refrigeration compressor motor control with automatic resetting of overload releases.
Direct current:	DC-1	Non inductive or slightly inductive loads, resistance furnaces.
	DC-3	Shunt motors: starting, plugging, inching, dynamic breaking of 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 7 b).

Transformer switching

Account must be taken of the peaks due to magnetization phenomena when the current is made.

For this application, IEC publication 60947-4-1 stipulates utilization category AC-6a. The operational currents or powers acceptable for the contactors are determined using the values obtained for AC-3 or AC-4 category tests and the calculating formula given in IEC 60947-4-1 (Table 7 b).

Lighting circuit switching

The current peaks occurring on energization of the circuit and the power factor depend on the type of lamps, the connection mode and whether or not there is compensation.

For this application, IEC publication 60947-4-1 stipulates two standard utilization categories:

– AC-5a for discharge lamp switching.
– AC-5b for incandescent lamp switching.

Slip-ring motor switching

The contactors used for short-circuiting rotor resistors can be used for rotor voltages above their natural nominal operational voltage.

The conditions of use of rotor contactors depend on the connection mode of the main poles. IEC 60947-4-1 stipulates AC-2 utilization category.

The current values on circuit closing and the current and voltage values on circuit opening (as well as a generally low load factor) are easily withstood by the contactors.

1SBC101626S0201

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

1SBC101626S0201

Degrees of protection

General

In an installation, the degree of protection required for electrical equipment depends on the environmental characteristics. The degree of protection, ensured by the enclosure of equipment or by the cubicle containing the equipment is expressed by the IP code which gives the level of protection against access to hazardous parts, the ingress of foreign bodies and/or the ingress of water, in compliance with IEC 60529, IEC 60947-1.

Besides the IP symbol, the complete code has two figures followed (optionally) by two additional letters. A short description of the elements used in IP coding is given below.

IP... code	Figures or letters	Specifications for installation protection	Protection of persons
First figure		**Against ingress of foreign bodies**	**Against access to hazardous parts with:**
	0	No protection	No protection
	1	Diameter > 50 mm	Back of hand
	2	Diameter > 12.5 mm	Finger
	3	Diameter > 2.5 mm	Tool
	4	Diameter > 1 mm	Wire
	5	Limited protection against dust	Wire
	6	Total protection against dust	Wire
Second figure		**Against entrance of water having a harmful effect**	
	0	No protection	
	1	Vertical dripping	
	2	Dripping at a vertical angle of < 15°	
	3	Rain at a vertical angle of < 60°	
	4	Splashing	
	5	Low pressure water jet	
	6	Powerful water jets	
	7	Temporary immersion	
	8	Permanent immersion	
Additional letter (optional) for use with:		**Against ingress of foreign bodies**	**Against access to hazardous parts with:**
First figure 0	**A**	Stopped by a barrier with a 50 mm Ø sphere	Back of hand
First figure 0 or 1	**B**	Entrance of test finger limited to 80 mm	Finger
First figure 1 or 2	**C**	Wire with 2.5 mm Ø and length of 100 mm	Tool
First figure 2 or 3	**D**	Wire with 1 mm Ø and length of 100 mm	Wire
Additional letter (optional)		**Specific additional information**	
	H	High voltage apparatus	–
	M	Moving parts which are moving during water test	
	S	Moving parts which are stationary during water test	
	W	Specified atmospheric conditions	

Note: The type of enclosure or cubicle in which the equipment must be installed prevails with respect to the degree of protection.

1SBC101627S0201

Climatic withstand of devices

The life time of devices are mainly influenced by series of climatic factors which cause their corrosion.

In practice, besides climatic conditions, there are other factors which may damage equipment such as fungi, insects (termites), dust, work site dirt and aggressive environment (salty or sulphurous atmosphere, etc.) which can often only be identified at the place of installation.

Climatic stress, definitions and test conditions are dealt with in national publications such as the DIN 50 series and UTE 63-100 publication which are attached to international publications such as IEC 60068.

The test conditions are:

Description	Symbolization	Time of one cycle	Cycle phase time	Temperature in test chamber	Relative humidity
Humidity and variable temperature	IEC 60068-2-30 Test Db	24 hours	12 hours including rise in temperature	40 °C	95 %
			12 hours including cooling (open device)	25 °C	95 %

ABB contactors have been used for many years in the most countries, with hot and humid climates for example: Brazil, Indonesia, India or on ships. Experience has shown that ABB devices can be used in most countries throughout the world.

The climate of the country in which the apparatus is installed is not the determining choice factor.

Account must be taken of:

- the immediate environment of the devices (sheltered, ventilated, temperature),
- the aggressivity of the immediate atmosphere at the place of installation,
- the length and frequency of non operating periods.

In the case of frequent condensation (i.e. the formation of condensation caused by rapid changes in temperature), heating resistors must be installed in cubicles (100 to 250 W per m^3 of enclosure).

The table below gives the cases where heating is necessary.

Environment		Operating conditions	Climate	Internal heating of enclosure
Inside premises	No running water no condensation	Continuous or not	All climates	Without
	With running water	Continuous	All climates	Without
		Frequent or long stops	Temperate	Without
			Tropical	With
Outside, sheltered	No running water no condensation	Continuous or not	Temperate	Without
			Tropical	With
Outside or by the seaside	With running water	Continuous	All climates	Without
		Frequent or long stops	Temperate	Without
			Tropical	With

The entrance of dust, insects, dirt, etc. in devices may be prevented if the appropriate degree of protection according to IEC 60529 is chosen (See "Degree of protection" table).

1SBC101628S0201

Index

Order code classification

Order code	Type	Page
1SAM101901R0001	HK-11	2/51
1SAM101901R0002	HK-20	2/51
1SAM101901R0003	HK-02	2/51
1SAM101903R0024	UAF-24	2/51
1SAM101903R0048	UAF-48	2/51
1SAM101903R0060	UAF-60	2/51
1SAM101903R0110	UAF-110	2/51
1SAM101903R0230	UAF-230	2/51
1SAM101903R0400	UAF-400	2/51
1SAM101903R0415	UAF-415	2/51
1SAM101903R0500	UAF-500	2/51
1SAM101904R0003	SK-11	2/51
1SAM101909R0001	AA-24	2/51
1SAM101909R0002	AA-230	2/51
1SAM101909R0003	AA-400	2/51
1SAM101923R0002	MSMN	2/11
1SAM101923R0012	MSMNO	2/11
1SAM101924R0003	MSOX-32	2/11
1SAM101924R0013	MSOX-30	2/11
1SAM101928R0001	HKF-11	2/51
1SAM101928R0002	HKF-20	2/51
1SAM101937R0012	PS3-2-0	2/50
1SAM101937R0013	PS3-3-0	2/50
1SAM101937R0014	PS3-4-0	2/50
1SAM101937R0015	PS3-5-0	2/50
1SAM101937R0016	PS3-6-0	2/50
1SAM101937R0022	PS3-2-1	2/50
1SAM101937R0023	PS3-3-1	2/50
1SAM101937R0024	PS3-4-1	2/50
1SAM101937R0025	PS3-5-1	2/50
1SAM101937R0032	PS3-2-2	2/50
1SAM101937R0034	PS3-4-2	2/50
1SAM101938R0001	S3-M1	2/50
1SAM101938R0002	S3-M2	2/50
1SAM101938R0003	BS3-3	2/50
1SAM101938R0004	S3-M3	2/50
1SAM101940R1000	IB325-G	2/53
1SAM101940R1001	IB325-Y	2/53
1SAM101941R1000	DMS325-G	2/53
1SAM101941R1001	DMS325-Y	2/53
1SAM101943R0001	CK-11	2/51
1SAM150000R1001	MS325-0.16	2/46
1SAM150000R1002	MS325-0.25	2/46
1SAM150000R1003	MS325-0.4	2/46
1SAM150000R1004	MS325-0.63	2/46
1SAM150000R1005	MS325-1	2/46
1SAM150000R1006	MS325-1.6	2/46
1SAM150000R1007	MS325-2.5	2/46
1SAM150000R1008	MS325-4	2/46
1SAM150000R1009	MS325-6.3	2/46
1SAM150000R1010	MS325-9	2/46
1SAM150000R1011	MS325-12.5	2/46
1SAM150000R1012	MS325-16	2/46
1SAM150000R1013	MS325-20	2/46
1SAM150000R1014	MS325-25	2/46
1SAM150005R0001	MS325-0.16-HKF11	2/46
1SAM150005R0002	MS325-0.25-HKF11	2/46
1SAM150005R0003	MS325-0.4-HKF11	2/46
1SAM150005R0004	MS325-0.63-HKF11	2/46
1SAM150005R0005	MS325-1-HKF11	2/46
1SAM150005R0006	MS325-1.6-HKF11	2/46
1SAM150005R0007	MS325-2.5-HKF11	2/46
1SAM150005R0008	MS325-4-HKF11	2/46
1SAM150005R0009	MS325-6.3-HKF11	2/46
1SAM150005R0010	MS325-9-HKF11	2/46
1SAM150005R0011	MS325-12.5-HKF11	2/46
1SAM150005R0012	MS325-16-HKF11	2/46
1SAM150005R0013	MS325-20-HKF11	2/46
1SAM150005R0014	MS325-25-HKF11	2/46
1SAM160000R1003	MO325-0.4	2/55
1SAM160000R1004	MO325-0.63	2/55
1SAM160000R1005	MO325-1	2/55
1SAM160000R1006	MO325-1.6	2/55
1SAM160000R1007	MO325-2.5	2/55
1SAM160000R1008	MO325-4	2/55
1SAM160000R1009	MO325-6.3	2/55
1SAM160000R1010	MO325-9	2/55
1SAM160000R1011	MO325-12.5	2/55
1SAM160000R1012	MO325-16	2/55
1SAM160000R1013	MO325-20	2/55
1SAM160000R1014	MO325-25	2/55
1SAM201901R1001	HKF1-11	2/7
1SAM201901R1002	HKF1-20	2/7
1SAM201902R1001	HK1-11	2/7
1SAM201902R1002	HK1-20	2/7
1SAM201902R1003	HK1-02	2/7
1SAM201902R1004	HK1-20L	2/7
1SAM201903R1001	SK1-11	2/7
1SAM201903R1002	SK1-20	2/7
1SAM201903R1003	SK1-02	2/7
1SAM201904R1001	UA1-24	2/7
1SAM201904R1002	UA1-48	2/7
1SAM201904R1003	UA1-60	2/7
1SAM201904R1004	UA1-120	2/7
1SAM201904R1005	UA1-230	2/7
1SAM201904R1006	UA1-400	2/7
1SAM201904R1007	UA1-415	2/7
1SAM201904R1008	UA1-208	2/7
1SAM201906R1102	PS1-2-0-65	2/6
1SAM201906R1103	PS1-3-0-65	2/6
1SAM201906R1104	PS1-4-0-65	2/6
1SAM201906R1105	PS1-5-0-65	2/6
1SAM201906R1112	PS1-2-1-65	2/6
1SAM201906R1113	PS1-3-1-65	2/6
1SAM201906R1114	PS1-4-1-65	2/6
1SAM201906R1115	PS1-5-1-65	2/6
1SAM201906R1122	PS1-2-2-65	2/6
1SAM201906R1123	PS1-3-2-65	2/6
1SAM201906R1124	PS1-4-2-65	2/6
1SAM201906R1125	PS1-5-2-65	2/6
1SAM201907R1101	S1-M1-25	2/6
1SAM201907R1102	S1-M2-25	2/6
1SAM201907R1103	S1-M3-25	2/6
1SAM201908R1001	BS1-3	2/6
1SAM201909R1001	FS116	2/6
1SAM201910R1001	AA1-24	2/7
1SAM201910R1002	AA1-110	2/7
1SAM201910R1003	AA1-230	2/7
1SAM201910R1004	AA1-400	2/7
1SAM201911R1010	IB132-G	2/10
1SAM201911R1011	IB132-Y	2/10
1SAM201912R1010	DMS132-G	2/10
1SAM201912R1011	DMS132-Y	2/10
1SAM201913R1103	S1-M3-35	2/6
1SAM201916R1103	PS1-3-0-100	2/6
1SAM201916R1104	PS1-4-0-100	2/6
1SAM201916R1105	PS1-5-0-100	2/6
1SAM201916R1113	PS1-3-1-100	2/6
1SAM201916R1114	PS1-4-1-100	2/6
1SAM201916R1115	PS1-5-1-100	2/6
1SAM201916R1123	PS1-3-2-100	2/6
1SAM201920R1000	MSH-AR	2/11
1SAM201920R1001	MSHD-LB	2/11
1SAM201920R1002	MSHD-LY	2/11
1SAM201920R1011	MSHD-LTB	2/21
1SAM201920R1012	MSHD-LTY	2/21
1SAM250000R1001	MS116-0.16	2/2
1SAM250000R1002	MS116-0.25	2/2
1SAM250000R1003	MS116-0.4	2/2
1SAM250000R1004	MS116-0.63	2/2
1SAM250000R1005	MS116-1.0	2/2
1SAM250000R1006	MS116-1.6	2/2
1SAM250000R1007	MS116-2.5	2/2
1SAM250000R1008	MS116-4.0	2/2
1SAM250000R1009	MS116-6.3	2/2
1SAM250000R1010	MS116-10	2/2
1SAM250000R1011	MS116-16	2/2
1SAM250000R1012	MS116-12	2/2
1SAM250000R1013	MS116-20	2/2
1SAM250000R1014	MS116-25	2/2
1SAM250000R1015	MS116-32	2/2
1SAM250005R1001	MS116-0.16-HKF1-11	2/2
1SAM250005R1002	MS116-0.25-HKF1-11	2/2
1SAM250005R1003	MS116-0.4-HKF1-11	2/2
1SAM250005R1004	MS116-0.63-HKF1-11	2/2
1SAM250005R1005	MS116-1.0-HKF1-11	2/2
1SAM250005R1006	MS116-1.6-HKF1-11	2/2
1SAM250005R1007	MS116-2.5-HKF1-11	2/2
1SAM250005R1008	MS116-4.0-HKF1-11	2/2
1SAM250005R1009	MS116-6.3-HKF1-11	2/2
1SAM250005R1010	MS116-10.0-HKF1-11	2/2
1SAM250005R1011	MS116-16.0-HKF1-11	2/2
1SAM250005R1012	MS116-12.0-HKF1-11	2/2
1SAM250005R1013	MS116-20-HKF1-11	2/2
1SAM250005R1014	MS116-25-HKF1-11	2/2
1SAM250005R1015	MS116-32-HKF1-11	2/2
1SAM301901R1001	CK1-11	2/17
1SAM301901R1002	CK1-20	2/17
1SAM301901R1003	CK1-02	2/17
1SAM350000R1001	MS132-0.16	2/12
1SAM350000R1002	MS132-0.25	2/12
1SAM350000R1003	MS132-0.4	2/12
1SAM350000R1004	MS132-0.63	2/12
1SAM350000R1005	MS132-1.0	2/12
1SAM350000R1006	MS132-1.6	2/12
1SAM350000R1007	MS132-2.5	2/12
1SAM350000R1008	MS132-4.0	2/12
1SAM350000R1009	MS132-6.3	2/12
1SAM350000R1010	MS132-10	2/12
1SAM350000R1011	MS132-16	2/12
1SAM350000R1012	MS132-12	2/12
1SAM350000R1013	MS132-20	2/12
1SAM350000R1014	MS132-25	2/12
1SAM350000R1015	MS132-32	2/12
1SAM350005R1001	MS132-0.16-HKF1-11	2/12
1SAM350005R1002	MS132-0.25-HKF1-11	2/12
1SAM350005R1003	MS132-0.4-HKF1-11	2/12
1SAM350005R1004	MS132-0.63-HKF1-11	2/12
1SAM350005R1005	MS132-1.0-HKF1-11	2/12
1SAM350005R1006	MS132-1.6-HKF1-11	2/12
1SAM350005R1007	MS132-2.5-HKF1-11	2/12
1SAM350005R1008	MS132-4.0-HKF1-11	2/12
1SAM350005R1009	MS132-6.3-HKF1-11	2/12
1SAM350005R1010	MS132-10.0-HKF1-11	2/12
1SAM350005R1011	MS132-16.0-HKF1-11	2/12
1SAM350005R1012	MS132-12.0-HKF1-11	2/12
1SAM350005R1013	MS132-20-HKF1-11	2/12
1SAM350005R1014	MS132-25-HKF1-11	2/12
1SAM350005R1015	MS132-32-HKF1-11	2/12
1SAM360000R1001	MO132-0.16	2/22
1SAM360000R1002	MO132-0.25	2/22
1SAM360000R1003	MO132-0.4	2/22
1SAM360000R1004	MO132-0.63	2/22
1SAM360000R1005	MO132-1.0	2/22
1SAM360000R1006	MO132-1.6	2/22
1SAM360000R1007	MO132-2.5	2/22
1SAM360000R1008	MO132-4.0	2/22
1SAM360000R1009	MO132-6.3	2/22
1SAM360000R1010	MO132-10	2/22
1SAM360000R1011	MO132-16	2/22
1SAM360000R1012	MO132-12	2/22
1SAM360000R1013	MO132-20	2/22
1SAM360000R1014	MO132-25	2/22
1SAM360000R1015	MO132-32	2/22
1SAM401901R1001	HK4-11	2/34
1SAM401901R1002	HK4-W	2/34
1SAM401902R1001	HKS4-11	2/34
1SAM401902R1002	HKS4-20	2/34
1SAM401902R1003	HKS4-02	2/34
1SAM401904R1001	SK4-11	2/34
1SAM401905R1001	UA4-110	2/34
1SAM401905R1002	UA4-230	2/34
1SAM401905R1003	UA4-400	2/34
1SAM401905R1004	UA4-24	2/34
1SAM401906R1001	UA4-HK-230	2/34
1SAM401906R1002	UA4-HK-400	2/34
1SAM401907R1001	AA4-24	2/34
1SAM401907R1002	AA4-110	2/34
1SAM401907R1003	AA4-230	2/34
1SAM401907R1004	AA4-400	2/34
1SAM401908R1001	KA450	2/33
1SAM401910R1001	TB450	2/33
1SAM401911R1001	PS4-2-0	2/33
1SAM401911R1002	PS4-3-0	2/33
1SAM401911R1003	PS4-4-0	2/33
1SAM401911R1004	PS4-2-2	2/33
1SAM401911R1005	PS4-3-2	2/33
1SAM401911R1006	PS4-4-2	2/33
1SAM401911R1007	S4-M1	2/33
1SAM401911R1008	BS4-3	2/33
1SAM401912R1001	DX495	2/33
1SAM450000R1005	MS450-40	2/30
1SAM450000R1006	MS450-45	2/30
1SAM450000R1007	MS450-50	2/30
1SAM460000R1005	MO450-40	2/38
1SAM460000R1006	MO450-45	2/38
1SAM460000R1007	MO450-50	2/38
1SAM470000R1001	MS451-16	2/63
1SAM470000R1002	MS451-20	2/63
1SAM470000R1003	MS451-25	2/63
1SAM470000R1004	MS451-32	2/63
1SAM470000R1005	MS451-40	2/63
1SAM470000R1006	MS451-45	2/63
1SAM470000R1007	MS451-50	2/63
1SAM501901R1001	KA495	2/33
1SAM501902R1001	KA495C	2/33
1SAM550000R1007	MS495-63	2/30
1SAM550000R1008	MS495-75	2/30
1SAM550000R1009	MS495-90	2/30
1SAM550000R1010	MS495-100	2/30
1SAM560000R1007	MO495-63	2/38
1SAM560000R1008	MO495-75	2/38
1SAM560000R1009	MO495-90	2/38
1SAM560000R1010	MO495-100	2/38
1SAM570000R1005	MS496-40	2/63
1SAM570000R1006	MS496-50	2/63
1SAM570000R1007	MS496-63	2/63
1SAM570000R1008	MS496-75	2/63
1SAM570000R1009	MS496-90	2/63
1SAM570000R1010	MS496-100	2/63
1SAM580000R1004	MS497-32	2/30
1SAM580000R1005	MS497-40	2/30
1SAM580000R1006	MS497-50	2/30
1SAM580000R1007	MS497-63	2/30
1SAM580000R1008	MS497-75	2/30
1SAM580000R1009	MS497-90	2/30
1SAM580000R1010	MS497-100	2/30
1SAM590000R1001	MO496-16	2/38
1SAM590000R1002	MO496-20	2/38
1SAM590000R1003	MO496-25	2/38
1SAM590000R1004	MO496-32	2/38
1SAM590000R1005	MO496-40	2/38
1SAM590000R1006	MO496-50	2/38
1SAM590000R1007	MO496-63	2/38
1SAM590000R1008	MO496-75	2/38
1SAM590000R1009	MO496-90	2/38
1SAM590000R1010	MO496-100	2/38
1SAX101110R0001	DB16E	6/49
1SAX111001R1101	E16DU-0.32	6/45
1SAX111001R1102	E16DU-1.0	6/45
1SAX111001R1103	E16DU-2.7	6/45
1SAX111001R1104	E16DU-6.3	6/45
1SAX111001R1105	E16DU-18.9	6/45
1SAX121001R1102	EF19-1.0	6/56
1SAX121001R1103	EF19-2.7	6/56
1SAX121001R1104	EF19-6.3	6/56
1SAX121001R1105	EF19-18.9	6/56
1SAX201110R1001	DB45E	6/49
1SAX211001R1101	E45DU-30	6/45
1SAX211001R1102	E45DU-45	6/45

1SBC101359S0201

Index

Order code classification

Order code	Type	Page
1SAX221001R1101	EF45-30	6/56
1SAX221001R1102	EF45-45	6/56
1SAX301110R1001	DB80E	6/49
1SAX301110R1002	DB140E	6/49
1SAX311001R1101	E80DU-80	6/45
1SAX321001R1101	E140DU-140	6/45
1SAX501904R0001	LT200E	6/50
1SAX511001R1101	E200DU-200	6/50
1SAX521001R1101	E320DU-320	6/50
1SAX601904R0001	LT320E	6/50
1SAX701904R0001	LT500E	6/53
1SAX711001R1101	E500DU-500	6/53
1SAX801904R0001	LT800E	6/53
1SAX811001R1101	E800DU-800	6/53
1SAZ201108R0001	DB25/25A	6/14
1SAZ201108R0002	DB25/32A	6/14
1SAZ201307R0002	DX25	6/14
1SAZ201501R0001	DS25-A-24	6/14
1SAZ201501R0003	DS25-A-110	6/14
1SAZ201501R0005	DS25-A-220/380	6/14
1SAZ201501R0006	DS25-A-500	6/14
1SAZ201504R0001	DR25-A-24	6/14
1SAZ201504R0002	DR25-A-48	6/14
1SAZ201504R0003	DR25-A-110	6/14
1SAZ201504R0005	DR25-A-220/380	6/14
1SAZ201504R0006	DR25-A-500	6/14
1SAZ211201R1005	TA25DU-0.16	6/10
1SAZ211201R1009	TA25DU-0.25	6/10
1SAZ211201R1013	TA25DU-0.4	6/10
1SAZ211201R1017	TA25DU-0.63	6/10
1SAZ211201R1021	TA25DU-1.0	6/10
1SAZ211201R1023	TA25DU-1.4	6/10
1SAZ211201R1025	TA25DU-1.8	6/10
1SAZ211201R1028	TA25DU-2.4	6/10
1SAZ211201R1031	TA25DU-3.1	6/10
1SAZ211201R1033	TA25DU-4.0	6/10
1SAZ211201R1035	TA25DU-5.0	6/10
1SAZ211201R1038	TA25DU-6.5	6/10
1SAZ211201R1040	TA25DU-8.5	6/10
1SAZ211201R1043	TA25DU-11	6/10
1SAZ211201R1045	TA25DU-14	6/10
1SAZ211201R1047	TA25DU-19	6/10
1SAZ211201R1051	TA25DU-25	6/10
1SAZ211201R1053	TA25DU-32	6/10
1SAZ301110R0001	DB80	6/15
1SAZ311201R1001	TA42DU-25	6/15
1SAZ311201R1002	TA42DU-32	6/15
1SAZ311201R1003	TA42DU-42	6/15
1SAZ321201R1001	TA75DU-25	6/19
1SAZ321201R1002	TA75DU-32	6/19
1SAZ321201R1003	TA75DU-42	6/19
1SAZ321201R1004	TA75DU-52	6/19
1SAZ321201R1005	TA75DU-63	6/19
1SAZ321201R1006	TA75DU-80	6/19
1SAZ331201R1003	TA80DU-42	6/23
1SAZ331201R1004	TA80DU-52	6/23
1SAZ331201R1005	TA80DU-63	6/23
1SAZ331201R1006	TA80DU-80	6/23
1SAZ341201R1003	TA45DU-45	6/39
1SAZ351201R1006	TA85DU-85	6/42
1SAZ401110R0001	DB200	6/27
1SAZ401901R1001	LT200/A	6/31
1SAZ411201R1001	TA110DU-90	6/27
1SAZ411201R1002	TA110DU-110	6/27
1SAZ421201R1001	TA200DU-90	6/31
1SAZ421201R1002	TA200DU-110	6/31
1SAZ421201R1003	TA200DU-135	6/31
1SAZ421201R1004	TA200DU-150	6/31
1SAZ421201R1005	TA200DU-175	6/31
1SAZ421201R1006	TA200DU-200	6/31
1SAZ501901R1001	DT450/A185	6/35
1SAZ501902R1001	DT450/A300	6/35
1SAZ511201R1001	TA450DU-185	6/35
1SAZ511201R1002	TA450DU-235	6/35
1SAZ511201R1003	TA450DU-310	6/35
1SAZ701901R0001	DB16	6/2
1SAZ701902R0001	DB42	6/6
1SAZ711201R1005	T16-0.13	4/20
1SAZ711201R1008	T16-0.17	4/20
1SAZ711201R1009	T16-0.23	4/20
1SAZ711201R1013	T16-0.31	4/20
1SAZ711201R1014	T16-0.41	4/20
1SAZ711201R1017	T16-0.55	4/20
1SAZ711201R1021	T16-0.74	4/20
1SAZ711201R1023	T16-1.0	4/20
1SAZ711201R1025	T16-1.3	4/20
1SAZ711201R1028	T16-1.7	4/20
1SAZ711201R1031	T16-2.3	4/20
1SAZ711201R1033	T16-3.1	4/20
1SAZ711201R1035	T16-4.2	4/20
1SAZ711201R1038	T16-5.7	4/20
1SAZ711201R1040	T16-7.6	4/20
1SAZ711201R1043	T16-10	4/20
1SAZ711201R1045	T16-13	4/20
1SAZ711201R1047	T16-16	4/20
1SAZ721201R1005	TF42-0.13	6/6
1SAZ721201R1008	TF42-0.17	6/6
1SAZ721201R1009	TF42-0.23	6/6
1SAZ721201R1013	TF42-0.31	6/6
1SAZ721201R1014	TF42-0.41	6/6
1SAZ721201R1017	TF42-0.55	6/6
1SAZ721201R1021	TF42-0.74	6/6
1SAZ721201R1023	TF42-1.0	6/6
1SAZ721201R1025	TF42-1.3	6/6
1SAZ721201R1028	TF42-1.7	6/6
1SAZ721201R1031	TF42-2.3	6/6
1SAZ721201R1033	TF42-3.1	6/6
1SAZ721201R1035	TF42-4.2	6/6
1SAZ721201R1038	TF42-5.7	6/6
1SAZ721201R1040	TF42-7.6	6/6
1SAZ721201R1043	TF42-10	6/6
1SAZ721201R1045	TF42-13	6/6
1SAZ721201R1047	TF42-16	6/6
1SAZ721201R1049	TF42-20	6/6
1SAZ721201R1051	TF42-24	6/6
1SAZ721201R1052	TF42-29	6/6
1SAZ721201R1053	TF42-35	6/6
1SAZ721201R1055	TF42-38	6/6
1SBH101001R1622	NS22E-16	4/60
1SBH101001R1631	NS31E-16	4/60
1SBH101001R1640	NS40E-16	4/60
1SBH101001R1644	NS44E-16	4/60
1SBH101001R1653	NS53E-16	4/60
1SBH101001R1662	NS62E-16	4/60
1SBH101001R1671	NS71E-16	4/60
1SBH101001R1680	NS80E-16	4/60
1SBH101001R2022	NS22E-20	4/60
1SBH101001R2031	NS31E-20	4/60
1SBH101001R2040	NS40E-20	4/60
1SBH101001R2044	NS44E-20	4/60
1SBH101001R2053	NS53E-20	4/60
1SBH101001R2062	NS62E-20	4/60
1SBH101001R2071	NS71E-20	4/60
1SBH101001R2080	NS80E-20	4/60
1SBH101001R2622	NS22E-26	4/60
1SBH101001R2631	NS31E-26	4/60
1SBH101001R2640	NS40E-26	4/60
1SBH101001R2644	NS44E-26	4/60
1SBH101001R2653	NS53E-26	4/60
1SBH101001R2662	NS62E-26	4/60
1SBH101001R2671	NS71E-26	4/60
1SBH101001R2680	NS80E-26	4/60
1SBH101001R2822	NS22E-28	4/60
1SBH101001R2831	NS31E-28	4/60
1SBH101001R2840	NS40E-28	4/60
1SBH101001R2844	NS44E-28	4/60
1SBH101001R2853	NS53E-28	4/60
1SBH101001R2862	NS62E-28	4/60
1SBH101001R2871	NS71E-28	4/60
1SBH101001R2880	NS80E-28	4/60
1SBH101004R1622	NS22ES-16	4/102
1SBH101004R1631	NS31ES-16	4/102
1SBH101004R1640	NS40ES-16	4/102
1SBH101004R1644	NS44ES-16	4/102
1SBH101004R1653	NS53ES-16	4/102
1SBH101004R1662	NS62ES-16	4/102
1SBH101004R1671	NS71ES-16	4/102
1SBH101004R1680	NS80ES-16	4/102
1SBH101004R2022	NS22ES-20	4/102
1SBH101004R2031	NS31ES-20	4/102
1SBH101004R2040	NS40ES-20	4/102
1SBH101004R2044	NS44ES-20	4/102
1SBH101004R2053	NS53ES-20	4/102
1SBH101004R2062	NS62ES-20	4/102
1SBH101004R2071	NS71ES-20	4/102
1SBH101004R2080	NS80ES-20	4/102
1SBH101004R2622	NS22ES-26	4/102
1SBH101004R2631	NS31ES-26	4/102
1SBH101004R2640	NS40ES-26	4/102
1SBH101004R2644	NS44ES-26	4/102
1SBH101004R2653	NS53ES-26	4/102
1SBH101004R2662	NS62ES-26	4/102
1SBH101004R2671	NS71ES-26	4/102
1SBH101004R2680	NS80ES-26	4/102
1SBH101004R2822	NS22ES-28	4/102
1SBH101004R2831	NS31ES-28	4/102
1SBH101004R2840	NS40ES-28	4/102
1SBH101004R2844	NS44ES-28	4/102
1SBH101004R2853	NS53ES-28	4/102
1SBH101004R2862	NS62ES-28	4/102
1SBH101004R2871	NS71ES-28	4/102
1SBH101004R2880	NS80ES-28	4/102
1SBH103001R8122	NSL22E-81	4/61
1SBH103001R8131	NSL31E-81	4/61
1SBH103001R8140	NSL40E-81	4/61
1SBH103001R8144	NSL44E-81	4/61
1SBH103001R8153	NSL53E-81	4/61
1SBH103001R8162	NSL62E-81	4/61
1SBH103001R8171	NSL71E-81	4/61
1SBH103001R8180	NSL80E-81	4/61
1SBH103001R8322	NSL22E-83	4/61
1SBH103001R8331	NSL31E-83	4/61
1SBH103001R8340	NSL40E-83	4/61
1SBH103001R8344	NSL44E-83	4/61
1SBH103001R8353	NSL53E-83	4/61
1SBH103001R8362	NSL62E-83	4/61
1SBH103001R8371	NSL71E-83	4/61
1SBH103001R8380	NSL80E-83	4/61
1SBH103001R8622	NSL22E-86	4/61
1SBH103001R8631	NSL31E-86	4/61
1SBH103001R8640	NSL40E-86	4/61
1SBH103001R8644	NSL44E-86	4/61
1SBH103001R8653	NSL53E-86	4/61
1SBH103001R8662	NSL62E-86	4/61
1SBH103001R8671	NSL71E-86	4/61
1SBH103001R8680	NSL80E-86	4/61
1SBH103001R8822	NSL22E-88	4/61
1SBH103001R8831	NSL31E-88	4/61
1SBH103001R8840	NSL40E-88	4/61
1SBH103001R8844	NSL44E-88	4/61
1SBH103001R8853	NSL53E-88	4/61
1SBH103001R8862	NSL62E-88	4/61
1SBH103001R8871	NSL71E-88	4/61
1SBH103001R8880	NSL80E-88	4/61
1SBH103004R8122	NSL22ES-81	4/103
1SBH103004R8131	NSL31ES-81	4/103
1SBH103004R8140	NSL40ES-81	4/103
1SBH103004R8144	NSL44ES-81	4/103
1SBH103004R8153	NSL53ES-81	4/103
1SBH103004R8162	NSL62ES-81	4/103
1SBH103004R8171	NSL71ES-81	4/103
1SBH103004R8180	NSL80ES-81	4/103
1SBH103004R8322	NSL22ES-83	4/103
1SBH103004R8331	NSL31ES-83	4/103
1SBH103004R8340	NSL40ES-83	4/103
1SBH103004R8344	NSL44ES-83	4/103
1SBH103004R8353	NSL53ES-83	4/103
1SBH103004R8362	NSL62ES-83	4/103
1SBH103004R8371	NSL71ES-83	4/103
1SBH103004R8380	NSL80ES-83	4/103
1SBH103004R8622	NSL22ES-86	4/103
1SBH103004R8631	NSL31ES-86	4/103
1SBH103004R8640	NSL40ES-86	4/103
1SBH103004R8644	NSL44ES-86	4/103
1SBH103004R8653	NSL53ES-86	4/103
1SBH103004R8662	NSL62ES-86	4/103
1SBH103004R8671	NSL71ES-86	4/103
1SBH103004R8680	NSL80ES-86	4/103
1SBH103004R8822	NSL22ES-88	4/103
1SBH103004R8831	NSL31ES-88	4/103
1SBH103004R8840	NSL40ES-88	4/103
1SBH103004R8844	NSL44ES-88	4/103
1SBH103004R8853	NSL53ES-88	4/103
1SBH103004R8862	NSL62ES-88	4/103
1SBH103004R8871	NSL71ES-88	4/103
1SBH103004R8880	NSL80ES-88	4/103
1SBH136001R2022	NFZ22E-20	5/225
1SBH136001R2031	NFZ31E-20	5/225
1SBH136001R2040	NFZ40E-20	5/225
1SBH136001R2044	NFZ44E-20	5/229
1SBH136001R2053	NFZ53E-20	5/229
1SBH136001R2062	NFZ62E-20	5/229
1SBH136001R2071	NFZ71E-20	5/229
1SBH136001R2080	NFZ80E-20	5/229
1SBH136001R2122	NFZ22E-21	5/225
1SBH136001R2131	NFZ31E-21	5/225
1SBH136001R2140	NFZ40E-21	5/225
1SBH136001R2144	NFZ44E-21	5/229
1SBH136001R2153	NFZ53E-21	5/229
1SBH136001R2162	NFZ62E-21	5/229
1SBH136001R2171	NFZ71E-21	5/229
1SBH136001R2180	NFZ80E-21	5/229
1SBH136001R2222	NFZ22E-22	5/225
1SBH136001R2231	NFZ31E-22	5/225
1SBH136001R2240	NFZ40E-22	5/225
1SBH136001R2244	NFZ44E-22	5/229
1SBH136001R2253	NFZ53E-22	5/229
1SBH136001R2262	NFZ62E-22	5/229
1SBH136001R2271	NFZ71E-22	5/229
1SBH136001R2280	NFZ80E-22	5/229
1SBH136001R2322	NFZ22E-23	5/225
1SBH136001R2331	NFZ31E-23	5/225
1SBH136001R2340	NFZ40E-23	5/225
1SBH136001R2344	NFZ44E-23	5/229
1SBH136001R2353	NFZ53E-23	5/229
1SBH136001R2362	NFZ62E-23	5/229
1SBH136001R2371	NFZ71E-23	5/229
1SBH136001R2380	NFZ80E-23	5/229
1SBH137001R1122	NF22E-11	5/224
1SBH137001R1131	NF31E-11	5/224
1SBH137001R1140	NF40E-11	5/224
1SBH137001R1144	NF44E-11	5/228
1SBH137001R1153	NF53E-11	5/228
1SBH137001R1162	NF62E-11	5/228
1SBH137001R1171	NF71E-11	5/228
1SBH137001R1180	NF80E-11	5/228
1SBH137001R1222	NF22E-12	5/224
1SBH137001R1231	NF31E-12	5/224
1SBH137001R1240	NF40E-12	5/224
1SBH137001R1244	NF44E-12	5/228
1SBH137001R1253	NF53E-12	5/228
1SBH137001R1262	NF62E-12	5/228
1SBH137001R1271	NF71E-12	5/228
1SBH137001R1280	NF80E-12	5/228
1SBH137001R1322	NF22E-13	5/224
1SBH137001R1331	NF31E-13	5/224
1SBH137001R1340	NF40E-13	5/224
1SBH137001R1344	NF44E-13	5/228
1SBH137001R1353	NF53E-13	5/228
1SBH137001R1362	NF62E-13	5/228

1SBC101359S0201

Index

Order code classification

Order code	Type	Page
1SBH137001R1371	NF71E-13	5/228
1SBH137001R1380	NF80E-13	5/228
1SBH137001R1422	NF22E-14	5/224
1SBH137001R1431	NF31E-14	5/224
1SBH137001R1440	NF40E-14	5/224
1SBH137001R1444	NF44E-14	5/228
1SBH137001R1453	NF53E-14	5/228
1SBH137001R1462	NF62E-14	5/228
1SBH137001R1471	NF71E-14	5/228
1SBH137001R1480	NF80E-14	5/228
1SBK103600M1600	VAS09EM-16M	4/44
1SBK103600M2000	VAS09EM-20M	4/44
1SBK103600M2600	VAS09EM-26M	4/44
1SBK103600M2800	VAS09EM-28M	4/44
1SBK103700M8100	VASL09EM-81M	4/45
1SBK103700M8300	VASL09EM-83M	4/45
1SBK103700M8600	VASL09EM-86M	4/45
1SBK103700M8800	VASL09EM-88M	4/45
1SBK103800M1600	VAS09SEM-16M	4/44
1SBK103800M2000	VAS09SEM-20M	4/44
1SBK103800M2600	VAS09SEM-26M	4/44
1SBK103800M2800	VAS09SEM-28M	4/44
1SBK103900M8100	VASL09SEM-81M	4/45
1SBK103900M8300	VASL09SEM-83M	4/45
1SBK103900M8600	VASL09SEM-86M	4/45
1SBK103900M8800	VASL09SEM-88M	4/45
1SBK113600M1600	VAS12EM-16M	4/44
1SBK113600M2000	VAS12EM-20M	4/44
1SBK113600M2600	VAS12EM-26M	4/44
1SBK113600M2800	VAS12EM-28M	4/44
1SBK113700M8100	VASL12EM-81M	4/45
1SBK113700M8300	VASL12EM-83M	4/45
1SBK113700M8600	VASL12EM-86M	4/45
1SBK113700M8800	VASL12EM-88M	4/45
1SBK113800M1600	VAS12SEM-16M	4/44
1SBK113800M2000	VAS12SEM-20M	4/44
1SBK113800M2600	VAS12SEM-26M	4/44
1SBK113800M2800	VAS12SEM-28M	4/44
1SBK113900M8100	VASL12SEM-81M	4/45
1SBK113900M8300	VASL12SEM-83M	4/45
1SBK113900M8600	VASL12SEM-86M	4/45
1SBK113900M8800	VASL12SEM-88M	4/45
1SBK123600M1600	VAS16EM-16M	4/44
1SBK123600M2000	VAS16EM-20M	4/44
1SBK123600M2600	VAS16EM-26M	4/44
1SBK123600M2800	VAS16EM-28M	4/44
1SBK123700M8100	VASL16EM-81M	4/45
1SBK123700M8300	VASL16EM-83M	4/45
1SBK123700M8600	VASL16EM-86M	4/45
1SBK123700M8800	VASL16EM-88M	4/45
1SBK123800M1600	VAS16SEM-16M	4/44
1SBK123800M2000	VAS16SEM-20M	4/44
1SBK123800M2600	VAS16SEM-26M	4/44
1SBK123800M2800	VAS16SEM-28M	4/44
1SBK123900M8100	VASL16SEM-81M	4/45
1SBK123900M8300	VASL16SEM-83M	4/45
1SBK123900M8600	VASL16SEM-86M	4/45
1SBK123900M8800	VASL16SEM-88M	4/45
1SBL101001R1601	AS09-30-01-16	4/14
1SBL101001R1610	AS09-30-10-16	4/10
1SBL101001R1632	AS09-30-32-16	4/34
1SBL101001R2001	AS09-30-01-20	4/14
1SBL101001R2010	AS09-30-10-20	4/10
1SBL101001R2032	AS09-30-32-20	4/34
1SBL101001R2601	AS09-30-01-26	4/14
1SBL101001R2610	AS09-30-10-26	4/10
1SBL101001R2632	AS09-30-32-26	4/34
1SBL101001R2801	AS09-30-01-28	4/14
1SBL101001R2810	AS09-30-10-28	4/10
1SBL101001R2832	AS09-30-32-28	4/34
1SBL101004R1601	AS09-30-01S-16	4/86
1SBL101004R1610	AS09-30-10S-16	4/86
1SBL101004R1632	AS09-30-32S-16	4/87
1SBL101004R2001	AS09-30-01S-20	4/86
1SBL101004R2010	AS09-30-10S-20	4/86
1SBL101004R2032	AS09-30-32S-20	4/87
1SBL101004R2601	AS09-30-01S-26	4/86
1SBL101004R2610	AS09-30-10S-26	4/86
1SBL101004R2632	AS09-30-32S-26	4/87
1SBL101004R2801	AS09-30-01S-28	4/86
1SBL101004R2810	AS09-30-10S-28	4/86
1SBL101004R2832	AS09-30-32S-28	4/87
1SBL103001R8101	ASL09-30-01-81	4/15
1SBL103001R8110	ASL09-30-10-81	4/11
1SBL103001R8132	ASL09-30-32-81	4/35
1SBL103001R8301	ASL09-30-01-83	4/15
1SBL103001R8310	ASL09-30-10-83	4/11
1SBL103001R8332	ASL09-30-32-83	4/35
1SBL103001R8601	ASL09-30-01-86	4/15
1SBL103001R8610	ASL09-30-10-86	4/11
1SBL103001R8632	ASL09-30-32-86	4/35
1SBL103001R8801	ASL09-30-01-88	4/15
1SBL103001R8810	ASL09-30-10-88	4/11
1SBL103001R8832	ASL09-30-32-88	4/35
1SBL103004R8101	ASL09-30-01S-81	4/88
1SBL103004R8110	ASL09-30-10S-81	4/88
1SBL103004R8132	ASL09-30-32S-81	4/89
1SBL103004R8301	ASL09-30-01S-83	4/88
1SBL103004R8310	ASL09-30-10S-83	4/88
1SBL103004R8332	ASL09-30-32S-83	4/89
1SBL103004R8601	ASL09-30-01S-86	4/88
1SBL103004R8610	ASL09-30-10S-86	4/88
1SBL103004R8632	ASL09-30-32S-86	4/89
1SBL103004R8801	ASL09-30-01S-88	4/88
1SBL103004R8810	ASL09-30-10S-88	4/88
1SBL103004R8832	ASL09-30-32S-88	4/89
1SBL111001R1601	AS12-30-01-16	4/14
1SBL111001R1610	AS12-30-10-16	4/10
1SBL111001R1632	AS12-30-32-16	4/34
1SBL111001R2001	AS12-30-01-20	4/14
1SBL111001R2010	AS12-30-10-20	4/10
1SBL111001R2032	AS12-30-32-20	4/34
1SBL111001R2601	AS12-30-01-26	4/14
1SBL111001R2610	AS12-30-10-26	4/10
1SBL111001R2632	AS12-30-32-26	4/34
1SBL111001R2801	AS12-30-01-28	4/14
1SBL111001R2810	AS12-30-10-28	4/10
1SBL111001R2832	AS12-30-32-28	4/34
1SBL111004R1601	AS12-30-01S-16	4/86
1SBL111004R1610	AS12-30-10S-16	4/86
1SBL111004R1632	AS12-30-32S-16	4/87
1SBL111004R2001	AS12-30-01S-20	4/86
1SBL111004R2010	AS12-30-10S-20	4/86
1SBL111004R2032	AS12-30-32S-20	4/87
1SBL111004R2601	AS12-30-01S-26	4/86
1SBL111004R2610	AS12-30-10S-26	4/86
1SBL111004R2632	AS12-30-32S-26	4/87
1SBL111004R2801	AS12-30-01S-28	4/86
1SBL111004R2810	AS12-30-10S-28	4/86
1SBL111004R2832	AS12-30-32S-28	4/87
1SBL113001R8101	ASL12-30-01-81	4/15
1SBL113001R8110	ASL12-30-10-81	4/11
1SBL113001R8132	ASL12-30-32-81	4/35
1SBL113001R8301	ASL12-30-01-83	4/15
1SBL113001R8310	ASL12-30-10-83	4/11
1SBL113001R8332	ASL12-30-32-83	4/35
1SBL113001R8601	ASL12-30-01-86	4/15
1SBL113001R8610	ASL12-30-10-86	4/11
1SBL113001R8632	ASL12-30-32-86	4/35
1SBL113001R8801	ASL12-30-01-88	4/15
1SBL113001R8810	ASL12-30-10-88	4/11
1SBL113001R8832	ASL12-30-32-88	4/35
1SBL113004R8101	ASL12-30-01S-81	4/88
1SBL113004R8110	ASL12-30-10S-81	4/88
1SBL113004R8132	ASL12-30-32S-81	4/89
1SBL113004R8301	ASL12-30-01S-83	4/88
1SBL113004R8310	ASL12-30-10S-83	4/88
1SBL113004R8332	ASL12-30-32S-83	4/89
1SBL113004R8601	ASL12-30-01S-86	4/88
1SBL113004R8610	ASL12-30-10S-86	4/88
1SBL113004R8632	ASL12-30-32S-86	4/89
1SBL113004R8801	ASL12-30-01S-88	4/88
1SBL113004R8810	ASL12-30-10S-88	4/88
1SBL113004R8832	ASL12-30-32S-88	4/89
1SBL121001R1601	AS16-30-01-16	4/14
1SBL121001R1610	AS16-30-10-16	4/10
1SBL121001R1632	AS16-30-32-16	4/34
1SBL121001R2001	AS16-30-01-20	4/14
1SBL121001R2010	AS16-30-10-20	4/10
1SBL121001R2032	AS16-30-32-20	4/34
1SBL121001R2601	AS16-30-01-26	4/14
1SBL121001R2610	AS16-30-10-26	4/10
1SBL121001R2632	AS16-30-32-26	4/34
1SBL121001R2801	AS16-30-01-28	4/14
1SBL121001R2810	AS16-30-10-28	4/10
1SBL121001R2832	AS16-30-32-28	4/34
1SBL121004R1601	AS16-30-01S-16	4/86
1SBL121004R1610	AS16-30-10S-16	4/86
1SBL121004R1632	AS16-30-32S-16	4/87
1SBL121004R2001	AS16-30-01S-20	4/86
1SBL121004R2010	AS16-30-10S-20	4/86
1SBL121004R2032	AS16-30-32S-20	4/87
1SBL121004R2601	AS16-30-01S-26	4/86
1SBL121004R2610	AS16-30-10S-26	4/86
1SBL121004R2632	AS16-30-32S-26	4/87
1SBL121004R2801	AS16-30-01S-28	4/86
1SBL121004R2810	AS16-30-10S-28	4/86
1SBL121004R2832	AS16-30-32S-28	4/87
1SBL123001R8101	ASL16-30-01-81	4/15
1SBL123001R8110	ASL16-30-10-81	4/11
1SBL123001R8132	ASL16-30-32-81	4/35
1SBL123001R8301	ASL16-30-01-83	4/15
1SBL123001R8310	ASL16-30-10-83	4/11
1SBL123001R8332	ASL16-30-32-83	4/35
1SBL123001R8601	ASL16-30-01-86	4/15
1SBL123001R8610	ASL16-30-10-86	4/11
1SBL123001R8632	ASL16-30-32-86	4/35
1SBL123001R8801	ASL16-30-01-88	4/15
1SBL123001R8810	ASL16-30-10-88	4/11
1SBL123001R8832	ASL16-30-32-88	4/35
1SBL123004R8101	ASL16-30-01S-81	4/88
1SBL123004R8110	ASL16-30-10S-81	4/88
1SBL123004R8132	ASL16-30-32S-81	4/89
1SBL123004R8301	ASL16-30-01S-83	4/88
1SBL123004R8310	ASL16-30-10S-83	4/88
1SBL123004R8332	ASL16-30-32S-83	4/89
1SBL123004R8601	ASL16-30-01S-86	4/88
1SBL123004R8610	ASL16-30-10S-86	4/88
1SBL123004R8632	ASL16-30-32S-86	4/89
1SBL123004R8801	ASL16-30-01S-88	4/88
1SBL123004R8810	ASL16-30-10S-88	4/88
1SBL123004R8832	ASL16-30-32S-88	4/89
1SBL136001R2001	AF09Z-30-01-20	5/7
1SBL136001R2010	AF09Z-30-10-20	5/7
1SBL136001R2022	AF09Z-30-22-20	5/43
1SBL136001R2101	AF09Z-30-01-21	5/7
1SBL136001R2110	AF09Z-30-10-21	5/7
1SBL136001R2122	AF09Z-30-22-21	5/43
1SBL136001R2201	AF09Z-30-01-22	5/7
1SBL136001R2210	AF09Z-30-10-22	5/7
1SBL136001R2222	AF09Z-30-22-22	5/43
1SBL136001R2301	AF09Z-30-01-23	5/7
1SBL136001R2310	AF09Z-30-10-23	5/7
1SBL136001R2322	AF09Z-30-22-23	5/43
1SBL136201R2000	AF09Z-40-00-20	5/131
1SBL136201R2100	AF09Z-40-00-21	5/131
1SBL136201R2200	AF09Z-40-00-22	5/131
1SBL136201R2300	AF09Z-40-00-23	5/131
1SBL136501R2000	AF09Z-22-00-20	5/131
1SBL136501R2100	AF09Z-22-00-21	5/131
1SBL136501R2200	AF09Z-22-00-22	5/131
1SBL136501R2300	AF09Z-22-00-23	5/131
1SBL137001R1101	AF09-30-01-11	5/6
1SBL137001R1110	AF09-30-10-11	5/6
1SBL137001R1122	AF09-30-22-11	5/42
1SBL137001R1201	AF09-30-01-12	5/6
1SBL137001R1210	AF09-30-10-12	5/6
1SBL137001R1222	AF09-30-22-12	5/42
1SBL137001R1301	AF09-30-01-13	5/6
1SBL137001R1310	AF09-30-10-13	5/6
1SBL137001R1322	AF09-30-22-13	5/42
1SBL137001R1401	AF09-30-01-14	5/6
1SBL137001R1410	AF09-30-10-14	5/6
1SBL137001R1422	AF09-30-22-14	5/42
1SBL137201R1100	AF09-40-00-11	5/130
1SBL137201R1200	AF09-40-00-12	5/130
1SBL137201R1300	AF09-40-00-13	5/130
1SBL137201R1400	AF09-40-00-14	5/130
1SBL137501R1100	AF09-22-00-11	5/130
1SBL137501R1200	AF09-22-00-12	5/130
1SBL137501R1300	AF09-22-00-13	5/130
1SBL137501R1400	AF09-22-00-14	5/130
1SBL156001R2001	AF12Z-30-01-20	5/7
1SBL156001R2010	AF12Z-30-10-20	5/7
1SBL156001R2022	AF12Z-30-22-20	5/43
1SBL156001R2101	AF12Z-30-01-21	5/7
1SBL156001R2110	AF12Z-30-10-21	5/7
1SBL156001R2122	AF12Z-30-22-21	5/43
1SBL156001R2201	AF12Z-30-01-22	5/7
1SBL156001R2210	AF12Z-30-10-22	5/7
1SBL156001R2222	AF12Z-30-22-22	5/43
1SBL156001R2301	AF12Z-30-01-23	5/7
1SBL156001R2310	AF12Z-30-10-23	5/7
1SBL156001R2322	AF12Z-30-22-23	5/43
1SBL157001R1101	AF12-30-01-11	5/6
1SBL157001R1110	AF12-30-10-11	5/6
1SBL157001R1122	AF12-30-22-11	5/42
1SBL157001R1201	AF12-30-01-12	5/6
1SBL157001R1210	AF12-30-10-12	5/6
1SBL157001R1222	AF12-30-22-12	5/42
1SBL157001R1301	AF12-30-01-13	5/6
1SBL157001R1310	AF12-30-10-13	5/6
1SBL157001R1322	AF12-30-22-13	5/42
1SBL157001R1401	AF12-30-01-14	5/6
1SBL157001R1410	AF12-30-10-14	5/6
1SBL157001R1422	AF12-30-22-14	5/42
1SBL176001R2001	AF16Z-30-01-20	5/7
1SBL176001R2010	AF16Z-30-10-20	5/7
1SBL176001R2022	AF16Z-30-22-20	5/43
1SBL176001R2101	AF16Z-30-01-21	5/7
1SBL176001R2110	AF16Z-30-10-21	5/7
1SBL176001R2122	AF16Z-30-22-21	5/43
1SBL176001R2201	AF16Z-30-01-22	5/7
1SBL176001R2210	AF16Z-30-10-22	5/7
1SBL176001R2222	AF16Z-30-22-22	5/43
1SBL176001R2301	AF16Z-30-01-23	5/7
1SBL176001R2310	AF16Z-30-10-23	5/7
1SBL176001R2322	AF16Z-30-22-23	5/43
1SBL176201R2000	AF16Z-40-00-20	5/131
1SBL176201R2100	AF16Z-40-00-21	5/131
1SBL176201R2200	AF16Z-40-00-22	5/131
1SBL176201R2300	AF16Z-40-00-23	5/131
1SBL176501R2000	AF16Z-22-00-20	5/131
1SBL176501R2100	AF16Z-22-00-21	5/131
1SBL176501R2200	AF16Z-22-00-22	5/131
1SBL176501R2300	AF16Z-22-00-23	5/131
1SBL177001R1101	AF16-30-01-11	5/6
1SBL177001R1110	AF16-30-10-11	5/6
1SBL177001R1122	AF16-30-22-11	5/42
1SBL177001R1201	AF16-30-01-12	5/6
1SBL177001R1210	AF16-30-10-12	5/6
1SBL177001R1222	AF16-30-22-12	5/42
1SBL177001R1301	AF16-30-01-13	5/6
1SBL177001R1310	AF16-30-10-13	5/6
1SBL177001R1322	AF16-30-22-13	5/42
1SBL177001R1401	AF16-30-01-14	5/6
1SBL177001R1410	AF16-30-10-14	5/6
1SBL177001R1422	AF16-30-22-14	5/42
1SBL177201R1100	AF16-40-00-11	5/130
1SBL177201R1200	AF16-40-00-12	5/130

1SBC101359S0201

Index

Order code classification

Order code	Type	Page
1SBL177201R1300	AF16-40-00-13	5/130
1SBL177201R1400	AF16-40-00-14	5/130
1SBL177501R1100	AF16-22-00-11	5/130
1SBL177501R1200	AF16-22-00-12	5/130
1SBL177501R1300	AF16-22-00-13	5/130
1SBL177501R1400	AF16-22-00-14	5/130
1SBL181022R8010	UA16-30-10	5/201
1SBL181022R8110	UA16-30-10	5/201
1SBL181022R8310	UA16-30-10	5/201
1SBL181022R8410	UA16-30-10	5/201
1SBL181022R8510	UA16-30-10	5/201
1SBL181022R8610	UA16-30-10	5/201
1SBL181022R8810	UA16-30-10	5/201
1SBL181024R8010	UA16-30-10RA	5/192
1SBL181024R8110	UA16-30-10RA	5/192
1SBL181024R8310	UA16-30-10RA	5/192
1SBL181024R8410	UA16-30-10RA	5/192
1SBL181024R8510	UA16-30-10RA	5/192
1SBL181024R8610	UA16-30-10RA	5/192
1SBL181024R8810	UA16-30-10RA	5/192
1SBL236001R2000	AF26Z-30-00-20	5/7
1SBL236001R2011	AF26Z-30-11-20	5/43
1SBL236001R2022	AF26Z-30-22-20	5/43
1SBL236001R2100	AF26Z-30-00-21	5/7
1SBL236001R2111	AF26Z-30-11-21	5/43
1SBL236001R2122	AF26Z-30-22-21	5/43
1SBL236001R2200	AF26Z-30-00-22	5/7
1SBL236001R2211	AF26Z-30-11-22	5/43
1SBL236001R2222	AF26Z-30-22-22	5/43
1SBL236001R2300	AF26Z-30-00-23	5/7
1SBL236001R2311	AF26Z-30-11-23	5/43
1SBL236001R2322	AF26Z-30-22-23	5/43
1SBL236201R2000	AF26Z-40-00-20	5/131
1SBL236201R2100	AF26Z-40-00-21	5/131
1SBL236201R2200	AF26Z-40-00-22	5/131
1SBL236201R2300	AF26Z-40-00-23	5/131
1SBL236501R2000	AF26Z-22-00-20	5/131
1SBL236501R2100	AF26Z-22-00-21	5/131
1SBL236501R2200	AF26Z-22-00-22	5/131
1SBL236501R2300	AF26Z-22-00-23	5/131
1SBL237001R1100	AF26-30-00-11	5/6
1SBL237001R1111	AF26-30-11-11	5/42
1SBL237001R1122	AF26-30-22-11	5/42
1SBL237001R1200	AF26-30-00-12	5/6
1SBL237001R1211	AF26-30-11-12	5/42
1SBL237001R1222	AF26-30-22-12	5/42
1SBL237001R1300	AF26-30-00-13	5/6
1SBL237001R1311	AF26-30-11-13	5/42
1SBL237001R1322	AF26-30-22-13	5/42
1SBL237001R1400	AF26-30-00-14	5/6
1SBL237001R1411	AF26-30-11-14	5/42
1SBL237001R1422	AF26-30-22-14	5/42
1SBL237201R1100	AF26-40-00-11	5/130
1SBL237201R1200	AF26-40-00-12	5/130
1SBL237201R1300	AF26-40-00-13	5/130
1SBL237201R1400	AF26-40-00-14	5/130
1SBL237501R1100	AF26-22-00-11	5/130
1SBL237501R1200	AF26-22-00-12	5/130
1SBL237501R1300	AF26-22-00-13	5/130
1SBL237501R1400	AF26-22-00-14	5/130
1SBL241022R8010	UA26-30-10	5/201
1SBL241022R8110	UA26-30-10	5/201
1SBL241022R8310	UA26-30-10	5/201
1SBL241022R8410	UA26-30-10	5/201
1SBL241022R8510	UA26-30-10	5/201
1SBL241022R8610	UA26-30-10	5/201
1SBL241022R8810	UA26-30-10	5/201
1SBL241024R8010	UA26-30-10RA	5/192
1SBL241024R8110	UA26-30-10RA	5/192
1SBL241024R8310	UA26-30-10RA	5/192
1SBL241024R8410	UA26-30-10RA	5/192
1SBL241024R8510	UA26-30-10RA	5/192
1SBL241024R8610	UA26-30-10RA	5/192
1SBL241024R8810	UA26-30-10RA	5/192
1SBL276001R2000	AF30Z-30-00-20	5/7
1SBL276001R2011	AF30Z-30-11-20	5/43
1SBL276001R2022	AF30Z-30-22-20	5/43
1SBL276001R2100	AF30Z-30-00-21	5/7
1SBL276001R2111	AF30Z-30-11-21	5/43
1SBL276001R2122	AF30Z-30-22-21	5/43
1SBL276001R2200	AF30Z-30-00-22	5/7
1SBL276001R2211	AF30Z-30-11-22	5/43
1SBL276001R2222	AF30Z-30-22-22	5/43
1SBL276001R2300	AF30Z-30-00-23	5/7
1SBL276001R2311	AF30Z-30-11-23	5/43
1SBL276001R2322	AF30Z-30-22-23	5/43
1SBL277001R1100	AF30-30-00-11	5/6
1SBL277001R1111	AF30-30-11-11	5/42
1SBL277001R1122	AF30-30-22-11	5/42
1SBL277001R1200	AF30-30-00-12	5/6
1SBL277001R1211	AF30-30-11-12	5/42
1SBL277001R1222	AF30-30-22-12	5/42
1SBL277001R1300	AF30-30-00-13	5/6
1SBL277001R1311	AF30-30-11-13	5/42
1SBL277001R1322	AF30-30-22-13	5/42
1SBL277001R1400	AF30-30-00-14	5/6
1SBL277001R1411	AF30-30-11-14	5/42
1SBL277001R1422	AF30-30-22-14	5/42
1SBL281022R8010	UA30-30-10	5/201
1SBL281022R8110	UA30-30-10	5/201
1SBL281022R8310	UA30-30-10	5/201
1SBL281022R8410	UA30-30-10	5/201
1SBL281022R8510	UA30-30-10	5/201
1SBL281022R8610	UA30-30-10	5/201
1SBL281022R8810	UA30-30-10	5/201
1SBL281024R8010	UA30-30-10RA	5/192
1SBL281024R8110	UA30-30-10RA	5/192
1SBL281024R8310	UA30-30-10RA	5/192
1SBL281024R8410	UA30-30-10RA	5/192
1SBL281024R8510	UA30-30-10RA	5/192
1SBL281024R8610	UA30-30-10RA	5/192
1SBL281024R8810	UA30-30-10RA	5/192
1SBL296001R2000	AF38Z-30-00-20	5/7
1SBL296001R2011	AF38Z-30-11-20	5/43
1SBL296001R2022	AF38Z-30-22-20	5/43
1SBL296001R2100	AF38Z-30-00-21	5/7
1SBL296001R2111	AF38Z-30-11-21	5/43
1SBL296001R2122	AF38Z-30-22-21	5/43
1SBL296001R2200	AF38Z-30-00-22	5/7
1SBL296001R2211	AF38Z-30-11-22	5/43
1SBL296001R2222	AF38Z-30-22-22	5/43
1SBL296001R2300	AF38Z-30-00-23	5/7
1SBL296001R2311	AF38Z-30-11-23	5/43
1SBL296001R2322	AF38Z-30-22-23	5/43
1SBL296201R2000	AF38Z-40-00-20	5/131
1SBL296201R2100	AF38Z-40-00-21	5/131
1SBL296201R2200	AF38Z-40-00-22	5/131
1SBL296201R2300	AF38Z-40-00-23	5/131
1SBL296501R2000	AF38Z-22-00-20	5/131
1SBL296501R2100	AF38Z-22-00-21	5/131
1SBL296501R2200	AF38Z-22-00-22	5/131
1SBL296501R2300	AF38Z-22-00-23	5/131
1SBL297001R1100	AF38-30-00-11	5/6
1SBL297001R1111	AF38-30-11-11	5/42
1SBL297001R1122	AF38-30-22-11	5/42
1SBL297001R1200	AF38-30-00-12	5/6
1SBL297001R1211	AF38-30-11-12	5/42
1SBL297001R1222	AF38-30-22-12	5/42
1SBL297001R1300	AF38-30-00-13	5/6
1SBL297001R1311	AF38-30-11-13	5/42
1SBL297001R1322	AF38-30-22-13	5/42
1SBL297001R1400	AF38-30-00-14	5/6
1SBL297001R1411	AF38-30-11-14	5/42
1SBL297001R1422	AF38-30-22-14	5/42
1SBL297201R1100	AF38-40-00-11	5/130
1SBL297201R1200	AF38-40-00-12	5/130
1SBL297201R1300	AF38-40-00-13	5/130
1SBL297201R1400	AF38-40-00-14	5/130
1SBL297501R1100	AF38-22-00-11	5/130
1SBL297501R1200	AF38-22-00-12	5/130
1SBL297501R1300	AF38-22-00-13	5/130
1SBL297501R1400	AF38-22-00-14	5/130
1SBL321001R8001	A40-30-01	5/10
1SBL321001R8010	A40-30-10	5/10
1SBL321001R8032	A40-30-32	5/46
1SBL321001R8101	A40-30-01	5/10
1SBL321001R8110	A40-30-10	5/10
1SBL321001R8132	A40-30-32	5/46
1SBL321001R8301	A40-30-01	5/10
1SBL321001R8310	A40-30-10	5/10
1SBL321001R8332	A40-30-32	5/46
1SBL321001R8401	A40-30-01	5/10
1SBL321001R8410	A40-30-10	5/10
1SBL321001R8432	A40-30-32	5/46
1SBL321001R8501	A40-30-01	5/10
1SBL321001R8510	A40-30-10	5/10
1SBL321001R8532	A40-30-32	5/46
1SBL321001R8601	A40-30-01	5/10
1SBL321001R8610	A40-30-10	5/10
1SBL321001R8632	A40-30-32	5/46
1SBL321001R8801	A40-30-01	5/10
1SBL321001R8810	A40-30-10	5/10
1SBL321001R8832	A40-30-32	5/46
1SBL323001R8001	AL40-30-01	5/12
1SBL323001R8010	AL40-30-10	5/12
1SBL323001R8022	AL40-30-22	5/48
1SBL323001R8101	AL40-30-01	5/12
1SBL323001R8110	AL40-30-10	5/12
1SBL323001R8122	AL40-30-22	5/48
1SBL323001R8301	AL40-30-01	5/12
1SBL323001R8310	AL40-30-10	5/12
1SBL323001R8322	AL40-30-22	5/48
1SBL323001R8401	AL40-30-01	5/12
1SBL323001R8410	AL40-30-10	5/12
1SBL323001R8422	AL40-30-22	5/48
1SBL323001R8601	AL40-30-01	5/12
1SBL323001R8610	AL40-30-10	5/12
1SBL323001R8622	AL40-30-22	5/48
1SBL323001R8701	AL40-30-01	5/12
1SBL323001R8710	AL40-30-10	5/12
1SBL323001R8722	AL40-30-22	5/48
1SBL323001R8801	AL40-30-01	5/12
1SBL323001R8810	AL40-30-10	5/12
1SBL323001R8822	AL40-30-22	5/48
1SBL323001R8901	AL40-30-01	5/12
1SBL323001R8910	AL40-30-10	5/12
1SBL323001R8922	AL40-30-22	5/48
1SBL323061R5101	TAL40-30-01	5/24
1SBL323061R5110	TAL40-30-10	5/24
1SBL323061R5201	TAL40-30-01	5/24
1SBL323061R5210	TAL40-30-10	5/24
1SBL323061R5401	TAL40-30-01	5/24
1SBL323061R5410	TAL40-30-10	5/24
1SBL323061R5501	TAL40-30-01	5/24
1SBL323061R5510	TAL40-30-10	5/24
1SBL323061R5801	TAL40-30-01	5/24
1SBL323061R5810	TAL40-30-10	5/24
1SBL323061R6201	TAL40-30-01	5/24
1SBL323061R6210	TAL40-30-10	5/24
1SBL323061R6601	TAL40-30-01	5/24
1SBL323061R6610	TAL40-30-10	5/24
1SBL323061R6801	TAL40-30-01	5/24
1SBL323061R6810	TAL40-30-10	5/24
1SBL331201R8000	A45-40-00	5/135
1SBL331201R8100	A45-40-00	5/135
1SBL331201R8300	A45-40-00	5/135
1SBL331201R8400	A45-40-00	5/135
1SBL331201R8500	A45-40-00	5/135
1SBL331201R8600	A45-40-00	5/135
1SBL331201R8800	A45-40-00	5/135
1SBL331501R8000	A45-22-00	5/135
1SBL331501R8100	A45-22-00	5/135
1SBL331501R8300	A45-22-00	5/135
1SBL331501R8400	A45-22-00	5/135
1SBL331501R8500	A45-22-00	5/135
1SBL331501R8600	A45-22-00	5/135
1SBL331501R8800	A45-22-00	5/135
1SBL337201R6900	AF45-40-00	5/137
1SBL337201R7000	AF45-40-00	5/137
1SBL337201R7200	AF45-40-00	5/137
1SBL337501R6900	AF45-22-00	5/137
1SBL337501R7000	AF45-22-00	5/137
1SBL337501R7200	AF45-22-00	5/137
1SBL339201R8000	AE45-40-00	5/136
1SBL339201R8100	AE45-40-00	5/136
1SBL339201R8300	AE45-40-00	5/136
1SBL339201R8400	AE45-40-00	5/136
1SBL339201R8600	AE45-40-00	5/136
1SBL339201R8700	AE45-40-00	5/136
1SBL339201R8800	AE45-40-00	5/136
1SBL339201R8900	AE45-40-00	5/136
1SBL339261R5100	TAE45-40-00	5/140
1SBL339261R5200	TAE45-40-00	5/140
1SBL339261R5400	TAE45-40-00	5/140
1SBL339261R5500	TAE45-40-00	5/140
1SBL339261R5800	TAE45-40-00	5/140
1SBL339261R6200	TAE45-40-00	5/140
1SBL339261R6600	TAE45-40-00	5/140
1SBL339261R6800	TAE45-40-00	5/140
1SBL339501R8000	AE45-22-00	5/136
1SBL339501R8100	AE45-22-00	5/136
1SBL339501R8300	AE45-22-00	5/136
1SBL339501R8400	AE45-22-00	5/136
1SBL339501R8600	AE45-22-00	5/136
1SBL339501R8700	AE45-22-00	5/136
1SBL339501R8800	AE45-22-00	5/136
1SBL339501R8900	AE45-22-00	5/136
1SBL351001R8000	A50-30-00	5/11
1SBL351001R8011	A50-30-11	5/18
1SBL351001R8022	A50-30-22	5/47
1SBL351001R8100	A50-30-00	5/11
1SBL351001R8111	A50-30-11	5/18
1SBL351001R8122	A50-30-22	5/47
1SBL351001R8300	A50-30-00	5/11
1SBL351001R8311	A50-30-11	5/18
1SBL351001R8322	A50-30-22	5/47
1SBL351001R8400	A50-30-00	5/11
1SBL351001R8411	A50-30-11	5/18
1SBL351001R8422	A50-30-22	5/47
1SBL351001R8500	A50-30-00	5/11
1SBL351001R8511	A50-30-11	5/18
1SBL351001R8522	A50-30-22	5/47
1SBL351001R8600	A50-30-00	5/11
1SBL351001R8611	A50-30-11	5/18
1SBL351001R8622	A50-30-22	5/47
1SBL351001R8800	A50-30-00	5/11
1SBL351001R8811	A50-30-11	5/18
1SBL351001R8822	A50-30-22	5/47
1SBL351022R8000	UA50-30-00	5/202
1SBL351022R8011	UA50-30-11	5/203
1SBL351022R8100	UA50-30-00	5/202
1SBL351022R8111	UA50-30-11	5/203
1SBL351022R8300	UA50-30-00	5/202
1SBL351022R8311	UA50-30-11	5/203
1SBL351022R8400	UA50-30-00	5/202
1SBL351022R8411	UA50-30-11	5/203
1SBL351022R8500	UA50-30-00	5/202
1SBL351022R8511	UA50-30-11	5/203
1SBL351022R8600	UA50-30-00	5/202
1SBL351022R8611	UA50-30-11	5/203
1SBL351022R8800	UA50-30-00	5/202
1SBL351022R8811	UA50-30-11	5/203
1SBL351024R8000	UA50-30-00RA	5/193
1SBL351024R8100	UA50-30-00RA	5/193
1SBL351024R8300	UA50-30-00RA	5/193
1SBL351024R8400	UA50-30-00RA	5/193
1SBL351024R8500	UA50-30-00RA	5/193
1SBL351024R8600	UA50-30-00RA	5/193
1SBL351024R8800	UA50-30-00RA	5/193
1SBL351201R8000	A50-40-00	5/135

1SBC101359S0201

Index

Order code classification

Order code	Type	Page
1SBL351201R8100	A50-40-00	5/135
1SBL351201R8300	A50-40-00	5/135
1SBL351201R8400	A50-40-00	5/135
1SBL351201R8500	A50-40-00	5/135
1SBL351201R8600	A50-40-00	5/135
1SBL351201R8800	A50-40-00	5/135
1SBL357001R6900	AF50-30-00	5/14
1SBL357001R6911	AF50-30-11	5/20
1SBL357001R7000	AF50-30-00	5/14
1SBL357001R7011	AF50-30-11	5/20
1SBL357001R7200	AF50-30-00	5/14
1SBL357001R7211	AF50-30-11	5/20
1SBL357201R6900	AF50-40-00	5/137
1SBL357201R7000	AF50-40-00	5/137
1SBL357201R7200	AF50-40-00	5/137
1SBL359001R8000	AE50-30-00	5/13
1SBL359001R8011	AE50-30-11	5/19
1SBL359001R8100	AE50-30-00	5/13
1SBL359001R8111	AE50-30-11	5/19
1SBL359001R8300	AE50-30-00	5/13
1SBL359001R8311	AE50-30-11	5/19
1SBL359001R8400	AE50-30-00	5/13
1SBL359001R8411	AE50-30-11	5/19
1SBL359001R8600	AE50-30-00	5/13
1SBL359001R8611	AE50-30-11	5/19
1SBL359001R8700	AE50-30-00	5/13
1SBL359001R8711	AE50-30-11	5/19
1SBL359001R8800	AE50-30-00	5/13
1SBL359001R8811	AE50-30-11	5/19
1SBL359001R8900	AE50-30-00	5/13
1SBL359001R8911	AE50-30-11	5/19
1SBL359061R5100	TAE50-30-00	5/25
1SBL359061R5111	TAE50-30-11	5/25
1SBL359061R5200	TAE50-30-00	5/25
1SBL359061R5211	TAE50-30-11	5/25
1SBL359061R5400	TAE50-30-00	5/25
1SBL359061R5411	TAE50-30-11	5/25
1SBL359061R5500	TAE50-30-00	5/25
1SBL359061R5511	TAE50-30-11	5/25
1SBL359061R5800	TAE50-30-00	5/25
1SBL359061R5811	TAE50-30-11	5/25
1SBL359061R6200	TAE50-30-00	5/25
1SBL359061R6211	TAE50-30-11	5/25
1SBL359061R6600	TAE50-30-00	5/25
1SBL359061R6611	TAE50-30-11	5/25
1SBL359061R6800	TAE50-30-00	5/25
1SBL359061R6811	TAE50-30-11	5/25
1SBL359201R8000	AE50-40-00	5/136
1SBL359201R8100	AE50-40-00	5/136
1SBL359201R8300	AE50-40-00	5/136
1SBL359201R8400	AE50-40-00	5/136
1SBL359201R8600	AE50-40-00	5/136
1SBL359201R8700	AE50-40-00	5/136
1SBL359201R8800	AE50-40-00	5/136
1SBL359201R8900	AE50-40-00	5/136
1SBL359261R5100	TAE50-40-00	5/140
1SBL359261R5200	TAE50-40-00	5/140
1SBL359261R5400	TAE50-40-00	5/140
1SBL359261R5500	TAE50-40-00	5/140
1SBL359261R5800	TAE50-40-00	5/140
1SBL359261R6200	TAE50-40-00	5/140
1SBL359261R6600	TAE50-40-00	5/140
1SBL359261R6800	TAE50-40-00	5/140
1SBL371001R8000	A63-30-00	5/11
1SBL371001R8011	A63-30-11	5/18
1SBL371001R8022	A63-30-22	5/47
1SBL371001R8100	A63-30-00	5/11
1SBL371001R8111	A63-30-11	5/18
1SBL371001R8122	A63-30-22	5/47
1SBL371001R8300	A63-30-00	5/11
1SBL371001R8311	A63-30-11	5/18
1SBL371001R8322	A63-30-22	5/47
1SBL371001R8400	A63-30-00	5/11
1SBL371001R8411	A63-30-11	5/18
1SBL371001R8422	A63-30-22	5/47
1SBL371001R8500	A63-30-00	5/11
1SBL371001R8511	A63-30-11	5/18
1SBL371001R8522	A63-30-22	5/47
1SBL371001R8600	A63-30-00	5/11
1SBL371001R8611	A63-30-11	5/18
1SBL371001R8622	A63-30-22	5/47
1SBL371001R8800	A63-30-00	5/11
1SBL371001R8811	A63-30-11	5/18
1SBL371001R8822	A63-30-22	5/47
1SBL371022R8000	UA63-30-00	5/202
1SBL371022R8011	UA63-30-11	5/203
1SBL371022R8100	UA63-30-00	5/202
1SBL371022R8111	UA63-30-11	5/203
1SBL371022R8300	UA63-30-00	5/202
1SBL371022R8311	UA63-30-11	5/203
1SBL371022R8400	UA63-30-00	5/202
1SBL371022R8411	UA63-30-11	5/203
1SBL371022R8500	UA63-30-00	5/202
1SBL371022R8511	UA63-30-11	5/203
1SBL371022R8600	UA63-30-00	5/202
1SBL371022R8611	UA63-30-11	5/203
1SBL371022R8800	UA63-30-00	5/202
1SBL371022R8811	UA63-30-11	5/203
1SBL371024R8000	UA63-30-00RA	5/193
1SBL371024R8100	UA63-30-00RA	5/193
1SBL371024R8300	UA63-30-00RA	5/193
1SBL371024R8400	UA63-30-00RA	5/193
1SBL371024R8500	UA63-30-00RA	5/193
1SBL371024R8600	UA63-30-00RA	5/193
1SBL371024R8800	UA63-30-00RA	5/193
1SBL377001R6900	AF63-30-00	5/14
1SBL377001R6911	AF63-30-11	5/20
1SBL377001R7000	AF63-30-00	5/14
1SBL377001R7011	AF63-30-11	5/20
1SBL377001R7200	AF63-30-00	5/14
1SBL377001R7211	AF63-30-11	5/20
1SBL379001R8000	AE63-30-00	5/13
1SBL379001R8011	AE63-30-11	5/19
1SBL379001R8100	AE63-30-00	5/13
1SBL379001R8111	AE63-30-11	5/19
1SBL379001R8300	AE63-30-00	5/13
1SBL379001R8311	AE63-30-11	5/19
1SBL379001R8400	AE63-30-00	5/13
1SBL379001R8411	AE63-30-11	5/19
1SBL379001R8600	AE63-30-00	5/13
1SBL379001R8611	AE63-30-11	5/19
1SBL379001R8700	AE63-30-00	5/13
1SBL379001R8711	AE63-30-11	5/19
1SBL379001R8800	AE63-30-00	5/13
1SBL379001R8811	AE63-30-11	5/19
1SBL379001R8900	AE63-30-00	5/13
1SBL379001R8911	AE63-30-11	5/19
1SBL411001R8000	A75-30-00	5/11
1SBL411001R8011	A75-30-11	5/18
1SBL411001R8022	A75-30-22	5/47
1SBL411001R8100	A75-30-00	5/11
1SBL411001R8111	A75-30-11	5/18
1SBL411001R8122	A75-30-22	5/47
1SBL411001R8300	A75-30-00	5/11
1SBL411001R8311	A75-30-11	5/18
1SBL411001R8322	A75-30-22	5/47
1SBL411001R8400	A75-30-00	5/11
1SBL411001R8411	A75-30-11	5/18
1SBL411001R8422	A75-30-22	5/47
1SBL411001R8500	A75-30-00	5/11
1SBL411001R8511	A75-30-11	5/18
1SBL411001R8522	A75-30-22	5/47
1SBL411001R8600	A75-30-00	5/11
1SBL411001R8611	A75-30-11	5/18
1SBL411001R8622	A75-30-22	5/47
1SBL411001R8800	A75-30-00	5/11
1SBL411001R8811	A75-30-11	5/18
1SBL411001R8822	A75-30-22	5/47
1SBL411022R8000	UA75-30-00	5/202
1SBL411022R8011	UA75-30-11	5/203
1SBL411022R8100	UA75-30-00	5/202
1SBL411022R8111	UA75-30-11	5/203
1SBL411022R8300	UA75-30-00	5/202
1SBL411022R8311	UA75-30-11	5/203
1SBL411022R8400	UA75-30-00	5/202
1SBL411022R8411	UA75-30-11	5/203
1SBL411022R8500	UA75-30-00	5/202
1SBL411022R8511	UA75-30-11	5/203
1SBL411022R8600	UA75-30-00	5/202
1SBL411022R8611	UA75-30-11	5/203
1SBL411022R8800	UA75-30-00	5/202
1SBL411022R8811	UA75-30-11	5/203
1SBL411024R8000	UA75-30-00RA	5/193
1SBL411024R8100	UA75-30-00RA	5/193
1SBL411024R8300	UA75-30-00RA	5/193
1SBL411024R8400	UA75-30-00RA	5/193
1SBL411024R8500	UA75-30-00RA	5/193
1SBL411024R8600	UA75-30-00RA	5/193
1SBL411024R8800	UA75-30-00RA	5/193
1SBL411201R8000	A75-40-00	5/135
1SBL411201R8100	A75-40-00	5/135
1SBL411201R8300	A75-40-00	5/135
1SBL411201R8400	A75-40-00	5/135
1SBL411201R8500	A75-40-00	5/135
1SBL411201R8600	A75-40-00	5/135
1SBL411201R8800	A75-40-00	5/135
1SBL411501R8000	A75-22-00	5/135
1SBL411501R8100	A75-22-00	5/135
1SBL411501R8300	A75-22-00	5/135
1SBL411501R8400	A75-22-00	5/135
1SBL411501R8500	A75-22-00	5/135
1SBL411501R8600	A75-22-00	5/135
1SBL411501R8800	A75-22-00	5/135
1SBL417001R6900	AF75-30-00	5/14
1SBL417001R6911	AF75-30-11	5/20
1SBL417001R7000	AF75-30-00	5/14
1SBL417001R7011	AF75-30-11	5/20
1SBL417001R7200	AF75-30-00	5/14
1SBL417001R7211	AF75-30-11	5/20
1SBL417201R6900	AF75-40-00	5/137
1SBL417201R7000	AF75-40-00	5/137
1SBL417201R7200	AF75-40-00	5/137
1SBL417501R6900	AF75-22-00	5/137
1SBL417501R7000	AF75-22-00	5/137
1SBL417501R7200	AF75-22-00	5/137
1SBL419001R8000	AE75-30-00	5/13
1SBL419001R8011	AE75-30-11	5/19
1SBL419001R8100	AE75-30-00	5/13
1SBL419001R8111	AE75-30-11	5/19
1SBL419001R8300	AE75-30-00	5/13
1SBL419001R8311	AE75-30-11	5/19
1SBL419001R8400	AE75-30-00	5/13
1SBL419001R8411	AE75-30-11	5/19
1SBL419001R8600	AE75-30-00	5/13
1SBL419001R8611	AE75-30-11	5/19
1SBL419001R8700	AE75-30-00	5/13
1SBL419001R8711	AE75-30-11	5/19
1SBL419001R8800	AE75-30-00	5/13
1SBL419001R8811	AE75-30-11	5/19
1SBL419001R8900	AE75-30-00	5/13
1SBL419001R8911	AE75-30-11	5/19
1SBL419061R5100	TAE75-30-00	5/25
1SBL419061R5111	TAE75-30-11	5/25
1SBL419061R5200	TAE75-30-00	5/25
1SBL419061R5211	TAE75-30-11	5/25
1SBL419061R5400	TAE75-30-00	5/25
1SBL419061R5411	TAE75-30-11	5/25
1SBL419061R5500	TAE75-30-00	5/25
1SBL419061R5511	TAE75-30-11	5/25
1SBL419061R5800	TAE75-30-00	5/25
1SBL419061R5811	TAE75-30-11	5/25
1SBL419061R6200	TAE75-30-00	5/25
1SBL419061R6211	TAE75-30-11	5/25
1SBL419061R6600	TAE75-30-00	5/25
1SBL419061R6611	TAE75-30-11	5/25
1SBL419061R6800	TAE75-30-00	5/25
1SBL419061R6811	TAE75-30-11	5/25
1SBL419201R8000	AE75-40-00	5/136
1SBL419201R8100	AE75-40-00	5/136
1SBL419201R8300	AE75-40-00	5/136
1SBL419201R8400	AE75-40-00	5/136
1SBL419201R8600	AE75-40-00	5/136
1SBL419201R8700	AE75-40-00	5/136
1SBL419201R8800	AE75-40-00	5/136
1SBL419201R8900	AE75-40-00	5/136
1SBL419261R5100	TAE75-40-00	5/140
1SBL419261R5200	TAE75-40-00	5/140
1SBL419261R5400	TAE75-40-00	5/140
1SBL419261R5500	TAE75-40-00	5/140
1SBL419261R5800	TAE75-40-00	5/140
1SBL419261R6200	TAE75-40-00	5/140
1SBL419261R6600	TAE75-40-00	5/140
1SBL419261R6800	TAE75-40-00	5/140
1SBL419501R8000	AE75-22-00	5/136
1SBL419501R8100	AE75-22-00	5/136
1SBL419501R8300	AE75-22-00	5/136
1SBL419501R8400	AE75-22-00	5/136
1SBL419501R8600	AE75-22-00	5/136
1SBL419501R8700	AE75-22-00	5/136
1SBL419501R8800	AE75-22-00	5/136
1SBL419501R8900	AE75-22-00	5/136
1SBN010010R1001	CA5-01	5/17
1SBN010010R1010	CA5-10	5/17
1SBN010011R1001	CC5-01	5/254
1SBN010011R1010	CC5-10	5/254
1SBN010013R1001	CB 5-01	5/252
1SBN010013R1010	CB 5-10	5/252
1SBN010015R1001	CE5-01D0.1	5/256
1SBN010015R1010	CE5-10D0.1	5/256
1SBN010016R1001	CE5-01W0.1	5/256
1SBN010016R1010	CE5-10W0.1	5/256
1SBN010017R1001	CE5-01D2	5/256
1SBN010017R1010	CE5-10D2	5/256
1SBN010018R1001	CE5-01W2	5/256
1SBN010018R1010	CE5-10W2	5/256
1SBN010020R1011	CAL5-11	5/17
1SBN010040R1004	CA5-04E	5/254
1SBN010040R1018	CA5-11/11E	5/254
1SBN010040R1022	CA5-22E	5/17
1SBN010040R1031	CA5-31E	5/254
1SBN010040R1040	CA5-40E	5/254
1SBN010040R1104	CA5-04M	5/254
1SBN010040R1113	CA5-13M	5/254
1SBN010040R1118	CA5-11/11M	5/254
1SBN010040R1122	CA5-22M	5/17
1SBN010040R1131	CA5-31M	5/254
1SBN010040R1304	CA5-04U	5/254
1SBN010040R1322	CA5-22U	5/17
1SBN010040R1331	CA5-31U	5/254
1SBN010040R1340	CA5-40U	5/254
1SBN010110R1001	CA4-01	5/9
1SBN010110R1010	CA4-10	5/9
1SBN010110T1001	CA4-01-T	5/9
1SBN010110T1010	CA4-10-T	5/9
1SBN010111R1001	CC4-01	5/9
1SBN010111R1010	CC4-10	5/9
1SBN010120R1011	CAL4-11	5/9
1SBN010120T1011	CAL4-11-T	5/9
1SBN010140R1004	CA4-04E	5/9
1SBN010140R1022	CA4-22E	5/9
1SBN010140R1031	CA4-31E	5/9
1SBN010140R1040	CA4-40E	5/9
1SBN010140R1104	CA4-04M	5/9
1SBN010140R1113	CA4-13M	5/9
1SBN010140R1122	CA4-22M	5/9
1SBN010140R1131	CA4-31M	5/9
1SBN010140R1204	CA4-04N	5/227
1SBN010140R1213	CA4-13N	5/227
1SBN010140R1222	CA4-22N	5/227
1SBN010140R1231	CA4-31N	5/227

1SBC101359S0201

Index

Order code classification

Order code	Type	Page
1SBN010140R1240	CA4-40N	5/227
1SBN010140R1322	CA4-22U	5/9
1SBN010140R1331	CA4-31U	5/9
1SBN010140R1340	CA4-40U	5/9
1SBN010151R1011	CAT4-11E	5/9
1SBN010151R1111	CAT4-11M	5/9
1SBN010151R1311	CAT4-11U	5/9
1SBN011010T1001	CA3-01	4/37
1SBN011010T1010	CA3-10	4/37
1SBN011019T1001	CA3-01S	4/91
1SBN011019T1010	CA3-10S	4/91
1SBN020010R1001	TE5S-24	5/268
1SBN020010R1002	TE5S-120	5/268
1SBN020010R1003	TE5S-240	5/268
1SBN020010R1004	TE5S-440	5/268
1SBN020300R1000	TP40DA	5/17
1SBN020300R1001	TP180DA	5/17
1SBN020301R1000	TP40IA	5/17
1SBN020301R1001	TP180IA	5/17
1SBN021012R1000	TEF3-ON	4/37
1SBN021014R1000	TEF3-OFF	4/37
1SBN030100R1000	VM5-1	5/17
1SBN030105T1000	VM4	5/9
1SBN030110R1000	VE5-1	5/17
1SBN030111R1000	VEM4	5/9
1SBN030210R1000	VE5-2	5/17
1SBN031005T1000	VM3	4/14
1SBN050010R1000	RV5/50	4/37
1SBN050010R1001	RV5/133	4/37
1SBN050010R1002	RV5/250	4/37
1SBN050010R1003	RV5/440	4/37
1SBN050020R1000	RT5/32	4/37
1SBN050020R1001	RT5/65	4/37
1SBN050020R1002	RT5/90	4/37
1SBN050020R1003	RT5/150	4/37
1SBN050020R1004	RT5/264	4/37
1SBN050100R1000	RC5-1/50	4/37
1SBN050100R1001	RC5-1/133	4/37
1SBN050100R1002	RC5-1/250	4/37
1SBN050100R1003	RC5-1/440	4/37
1SBN050200R1000	RC5-2/50	5/17
1SBN050200R1001	RC5-2/133	5/17
1SBN050200R1002	RC5-2/250	5/17
1SBN050200R1003	RC5-2/440	5/17
1SBN060300R1000	RA5-1	5/272
1SBN060300T1000	RA5-1	5/272
1SBN070156T1000	LDC4	5/9
1SBN071303T1000	LY16-4	5/251
1SBN072303T1000	LY38-4	5/251
1SBN072808R1000	LD40	5/276
1SBN073205R1000	LF40	5/281
1SBN073508R1000	LD75	5/276
1SBN073552R1002	LK75-F	5/277
1SBN073552R1003	LK75-L	5/277
1SBN080906R1001	BEA7/325	3/38
1SBN080906R1002	BEA7/132	3/38
1SBN081006T1000	BEA16-3	4/10
1SBN081012R1000	BER16C-3	4/14
1SBN081018R2000	BEY16C-3	4/37
1SBN081020R1000	BEA16-3U	4/91
1SBN081306T1000	BEA16-4	5/9
1SBN081311R1000	BER16-4	5/9
1SBN081313R2000	BEY16-4	5/9
1SBN082306T1000	BEA26-4	5/9
1SBN082306T2000	BEA38-4	5/9
1SBN082311R1000	BER38-4	5/9
1SBN082411R1000	BER40V	5/17
1SBN082713R2000	BEY38-4	5/9
1SBN083206R1000	BEA40/450	5/17
1SBN083302R1000	BES75-40	5/139
1SBN083501R1000	BEM75-30	5/17
1SBN083503R1000	BED50	5/286
1SBN083503R1001	BED50-1	5/286
1SBN083504R1000	BES75-30	5/285
1SBN083506R1000	BEA50/450	5/17
1SBN084103R1000	BED75	5/286
1SBN084103R1001	BED75-1	5/286
1SBN084106R1000	BEA75/495	5/17
1SBN084506R1000	BEA110/495	5/31
1SBN110000R1000	BA5-50	5/265
1SBN110108T1000	BX4	5/9
1SBN110109W1000	BX4-CA	5/9
1SBN110120W1000	BB4	5/45
1SBN111020R1000	BB3	4/80
1SBN111403R1000	BP16	5/265
1SBN112303T1000	BP38-4	5/251
1SBN151410R8006	ZA16	5/290
1SBN151410R8106	ZA16	5/290
1SBN151410R8306	ZA16	5/290
1SBN151410R8406	ZA16	5/290
1SBN151410R8506	ZA16	5/290
1SBN151410R8606	ZA16	5/290
1SBN151410R8806	ZA16	5/290
1SBN152410R8006	ZA40	5/290
1SBN152410R8106	ZA40	5/290
1SBN152410R8306	ZA40	5/290
1SBN152410R8406	ZA40	5/290
1SBN152410R8506	ZA40	5/290
1SBN152410R8606	ZA40	5/290
1SBN152410R8806	ZA40	5/290
1SBN153510R8006	ZA75	5/290
1SBN153510R8106	ZA75	5/290
1SBN153510R8306	ZA75	5/290
1SBN153510R8406	ZA75	5/290
1SBN153510R8506	ZA75	5/290
1SBN153510R8606	ZA75	5/290
1SBN153510R8806	ZA75	5/290
1SBN153570R6906	ZAF75	5/291
1SBN153570R7006	ZAF75	5/291
1SBN153570R7206	ZAF75	5/291
1SBN163502R1000	ZLU50	5/289
1SBN163503R1000	ZL50	5/289
1SBN163702R1000	ZLU63	5/289
1SBN163703R1000	ZL63	5/289
1SBN164102R1000	ZLU75	5/289
1SBN164103R1000	ZL75	5/289
1SCA022509R0120	OSZA15	5/284
1SCA101647R1001	OXS6X85	2/11
1SCA101655R1001	OXS6X130	2/11
1SCA101659R1001	OXS6X180	2/11
1SCA108043R1001	OXS6X105	2/11
1SDA023354R0001	–	5/41
1SDA023356R0001	–	5/41
1SDA023357R0001	–	5/41
1SDA023368R0001	–	5/41
1SDA023370R0001	–	5/41
1SDA023380R0001	–	5/41
1SDA023384R0001	–	5/41
1SDA023387R0001	–	5/41
1SDA025766R0001	–	5/41
1SFA739001R1000	E1250DU-1250	6/53
1SFL431001R8000	A95-30-00	5/28
1SFL431001R8011	A95-30-11	5/32
1SFL431001R8022	A95-30-22	5/47
1SFL431001R8100	A95-30-00	5/28
1SFL431001R8111	A95-30-11	5/32
1SFL431001R8122	A95-30-22	5/47
1SFL431001R8300	A95-30-00	5/28
1SFL431001R8311	A95-30-11	5/32
1SFL431001R8322	A95-30-22	5/47
1SFL431001R8400	A95-30-00	5/28
1SFL431001R8411	A95-30-11	5/32
1SFL431001R8422	A95-30-22	5/47
1SFL431001R8500	A95-30-00	5/28
1SFL431001R8511	A95-30-11	5/32
1SFL431001R8522	A95-30-22	5/47
1SFL431001R8600	A95-30-00	5/28
1SFL431001R8611	A95-30-11	5/32
1SFL431001R8622	A95-30-22	5/47
1SFL431001R8800	A95-30-00	5/28
1SFL431001R8811	A95-30-11	5/32
1SFL431001R8822	A95-30-22	5/47
1SFL431022R8000	UA95-30-00	5/204
1SFL431022R8011	UA95-30-11	5/205
1SFL431022R8100	UA95-30-00	5/204
1SFL431022R8111	UA95-30-11	5/205
1SFL431022R8300	UA95-30-00	5/204
1SFL431022R8311	UA95-30-11	5/205
1SFL431022R8400	UA95-30-00	5/204
1SFL431022R8411	UA95-30-11	5/205
1SFL431022R8500	UA95-30-00	5/204
1SFL431022R8511	UA95-30-11	5/205
1SFL431022R8600	UA95-30-00	5/204
1SFL431022R8611	UA95-30-11	5/205
1SFL431022R8800	UA95-30-00	5/204
1SFL431022R8811	UA95-30-11	5/205
1SFL431024R8000	UA95-30-00RA	5/194
1SFL431024R8100	UA95-30-00RA	5/194
1SFL431024R8300	UA95-30-00RA	5/194
1SFL431024R8400	UA95-30-00RA	5/194
1SFL431024R8500	UA95-30-00RA	5/194
1SFL431024R8600	UA95-30-00RA	5/194
1SFL431024R8800	UA95-30-00RA	5/194
1SFL437001R6900	AF95-30-00	5/29
1SFL437001R6911	AF95-30-11	5/33
1SFL437001R7000	AF95-30-00	5/29
1SFL437001R7011	AF95-30-11	5/33
1SFL437001R7200	AF95-30-00	5/29
1SFL437001R7211	AF95-30-11	5/33
1SFL451001R8000	A110-30-00	5/28
1SFL451001R8011	A110-30-11	5/32
1SFL451001R8022	A110-30-22	5/47
1SFL451001R8100	A110-30-00	5/28
1SFL451001R8111	A110-30-11	5/32
1SFL451001R8122	A110-30-22	5/47
1SFL451001R8300	A110-30-00	5/28
1SFL451001R8311	A110-30-11	5/32
1SFL451001R8322	A110-30-22	5/47
1SFL451001R8400	A110-30-00	5/28
1SFL451001R8411	A110-30-11	5/32
1SFL451001R8422	A110-30-22	5/47
1SFL451001R8500	A110-30-00	5/28
1SFL451001R8511	A110-30-11	5/32
1SFL451001R8522	A110-30-22	5/47
1SFL451001R8600	A110-30-00	5/28
1SFL451001R8611	A110-30-11	5/32
1SFL451001R8622	A110-30-22	5/47
1SFL451001R8800	A110-30-00	5/28
1SFL451001R8811	A110-30-11	5/32
1SFL451001R8822	A110-30-22	5/47
1SFL451022R8000	UA110-30-00	5/204
1SFL451022R8011	UA110-30-11	5/205
1SFL451022R8100	UA110-30-00	5/204
1SFL451022R8111	UA110-30-11	5/205
1SFL451022R8300	UA110-30-00	5/204
1SFL451022R8311	UA110-30-11	5/205
1SFL451022R8400	UA110-30-00	5/204
1SFL451022R8411	UA110-30-11	5/205
1SFL451022R8500	UA110-30-00	5/204
1SFL451022R8511	UA110-30-11	5/205
1SFL451022R8600	UA110-30-00	5/204
1SFL451022R8611	UA110-30-11	5/205
1SFL451022R8800	UA110-30-00	5/204
1SFL451022R8811	UA110-30-11	5/205
1SFL451024R8000	UA110-30-00RA	5/194
1SFL451024R8100	UA110-30-00RA	5/194
1SFL451024R8300	UA110-30-00RA	5/194
1SFL451024R8400	UA110-30-00RA	5/194
1SFL451024R8500	UA110-30-00RA	5/194
1SFL451024R8600	UA110-30-00RA	5/194
1SFL451024R8800	UA110-30-00RA	5/194
1SFL457001R6900	AF110-30-00	5/29
1SFL457001R6911	AF110-30-11	5/33
1SFL457001R7000	AF110-30-00	5/29
1SFL457001R7011	AF110-30-11	5/33
1SFL457001R7200	AF110-30-00	5/29
1SFL457001R7211	AF110-30-11	5/33
1SFL471001R8011	A145-30-11	5/36
1SFL471001R8022	A145-30-22	5/52
1SFL471001R8111	A145-30-11	5/36
1SFL471001R8122	A145-30-22	5/52
1SFL471001R8311	A145-30-11	5/36
1SFL471001R8322	A145-30-22	5/52
1SFL471001R8411	A145-30-11	5/36
1SFL471001R8422	A145-30-22	5/52
1SFL471001R8511	A145-30-11	5/36
1SFL471001R8522	A145-30-22	5/52
1SFL471001R8611	A145-30-11	5/36
1SFL471001R8622	A145-30-22	5/52
1SFL471001R8811	A145-30-11	5/36
1SFL471001R8822	A145-30-22	5/52
1SFL477001R6911	AF145-30-11	5/37
1SFL477001R6922	AF145-30-22	5/53
1SFL477001R7011	AF145-30-11	5/37
1SFL477001R7022	AF145-30-22	5/53
1SFL477001R7211	AF145-30-11	5/37
1SFL477001R7222	AF145-30-22	5/53
1SFL491001R8011	A185-30-11	5/36
1SFL491001R8022	A185-30-22	5/52
1SFL491001R8111	A185-30-11	5/36
1SFL491001R8122	A185-30-22	5/52
1SFL491001R8311	A185-30-11	5/36
1SFL491001R8322	A185-30-22	5/52
1SFL491001R8411	A185-30-11	5/36
1SFL491001R8422	A185-30-22	5/52
1SFL491001R8511	A185-30-11	5/36
1SFL491001R8522	A185-30-22	5/52
1SFL491001R8611	A185-30-11	5/36
1SFL491001R8622	A185-30-22	5/52
1SFL491001R8811	A185-30-11	5/36
1SFL491001R8822	A185-30-22	5/52
1SFL497001R6911	AF185-30-11	5/37
1SFL497001R6922	AF185-30-22	5/53
1SFL497001R7011	AF185-30-11	5/37
1SFL497001R7022	AF185-30-22	5/53
1SFL497001R7211	AF185-30-11	5/37
1SFL497001R7222	AF185-30-22	5/53
1SFL511001R8011	A210-30-11	5/36
1SFL511001R8022	A210-30-22	5/52
1SFL511001R8111	A210-30-11	5/36
1SFL511001R8122	A210-30-22	5/52
1SFL511001R8311	A210-30-11	5/36
1SFL511001R8322	A210-30-22	5/52
1SFL511001R8411	A210-30-11	5/36
1SFL511001R8422	A210-30-22	5/52
1SFL511001R8511	A210-30-11	5/36
1SFL511001R8522	A210-30-22	5/52
1SFL511001R8611	A210-30-11	5/36
1SFL511001R8622	A210-30-22	5/52
1SFL511001R8811	A210-30-11	5/36
1SFL511001R8822	A210-30-22	5/52
1SFL517001R6911	AF210-30-11	5/37
1SFL517001R6922	AF210-30-22	5/53
1SFL517001R7011	AF210-30-11	5/37
1SFL517001R7022	AF210-30-22	5/53
1SFL517001R7211	AF210-30-11	5/37
1SFL517001R7222	AF210-30-22	5/53
1SFL531001R8011	A260-30-11	5/36
1SFL531001R8022	A260-30-22	5/52
1SFL531001R8111	A260-30-11	5/36
1SFL531001R8122	A260-30-22	5/52
1SFL531001R8311	A260-30-11	5/36
1SFL531001R8322	A260-30-22	5/52
1SFL531001R8411	A260-30-11	5/36
1SFL531001R8422	A260-30-22	5/52
1SFL531001R8511	A260-30-11	5/36
1SFL531001R8522	A260-30-22	5/52
1SFL531001R8611	A260-30-11	5/36
1SFL531001R8622	A260-30-22	5/52
1SFL531001R8811	A260-30-11	5/36

1SBC101359S0201

Index

Order code classification

Order code	Type	Page
1SFL531001R8822	A260-30-22	5/52
1SFL537001R6911	AF260-30-11	5/37
1SFL537001R6922	AF260-30-22	5/53
1SFL537001R7011	AF260-30-11	5/37
1SFL537001R7022	AF260-30-22	5/53
1SFL537001R7211	AF260-30-11	5/37
1SFL537001R7222	AF260-30-22	5/53
1SFL551001R8011	A300-30-11	5/36
1SFL551001R8022	A300-30-22	5/52
1SFL551001R8111	A300-30-11	5/36
1SFL551001R8122	A300-30-22	5/52
1SFL551001R8311	A300-30-11	5/36
1SFL551001R8322	A300-30-22	5/52
1SFL551001R8411	A300-30-11	5/36
1SFL551001R8422	A300-30-22	5/52
1SFL551001R8511	A300-30-11	5/36
1SFL551001R8522	A300-30-22	5/52
1SFL551001R8611	A300-30-11	5/36
1SFL551001R8622	A300-30-22	5/52
1SFL551001R8811	A300-30-11	5/36
1SFL551001R8822	A300-30-22	5/52
1SFL557001R6911	AF300-30-11	5/37
1SFL557001R6922	AF300-30-22	5/53
1SFL557001R7011	AF300-30-11	5/37
1SFL557001R7022	AF300-30-22	5/53
1SFL557001R7211	AF300-30-11	5/37
1SFL557001R7222	AF300-30-22	5/53
1SFL577001R6811	AF400-30-11	5/38
1SFL577001R6822	AF400-30-22	5/54
1SFL577001R6911	AF400-30-11	5/38
1SFL577001R6922	AF400-30-22	5/54
1SFL577001R7011	AF400-30-11	5/38
1SFL577001R7022	AF400-30-22	5/54
1SFL577001R7111	AF400-30-11	5/38
1SFL577001R7122	AF400-30-22	5/54
1SFL597001R6811	AF460-30-11	5/38
1SFL597001R6822	AF460-30-22	5/54
1SFL597001R6911	AF460-30-11	5/38
1SFL597001R6922	AF460-30-22	5/54
1SFL597001R7011	AF460-30-11	5/38
1SFL597001R7022	AF460-30-22	5/54
1SFL597001R7111	AF460-30-11	5/38
1SFL597001R7122	AF460-30-22	5/54
1SFL617001R6811	AF580-30-11	5/38
1SFL617001R6822	AF580-30-22	5/54
1SFL617001R6911	AF580-30-11	5/38
1SFL617001R6922	AF580-30-22	5/54
1SFL617001R7011	AF580-30-11	5/38
1SFL617001R7022	AF580-30-22	5/54
1SFL617001R7111	AF580-30-11	5/38
1SFL617001R7122	AF580-30-22	5/54
1SFL637001R6811	AF750-30-11	5/38
1SFL637001R6822	AF750-30-22	5/54
1SFL637001R6911	AF750-30-11	5/38
1SFL637001R6922	AF750-30-22	5/54
1SFL637001R7011	AF750-30-11	5/38
1SFL637001R7022	AF750-30-22	5/54
1SFL637001R7111	AF750-30-11	5/38
1SFL637001R7122	AF750-30-22	5/54
1SFL647001R6811	AF1250-30-11	5/39
1SFL647001R6822	AF1250-30-22	5/55
1SFL647001R6911	AF1250-30-11	5/39
1SFL647001R6922	AF1250-30-22	5/55
1SFL647001R7011	AF1250-30-11	5/39
1SFL647001R7022	AF1250-30-22	5/55
1SFL647001R7111	AF1250-30-11	5/39
1SFL647001R7122	AF1250-30-22	5/55
1SFL657001R7011	AF1350-30-11	5/39
1SFL657001R7022	AF1350-30-22	5/55
1SFL677001R7011	AF1650-30-11	5/39
1SFL677001R7022	AF1650-30-22	5/55
1SFL707001R7011	AF2050-30-11	5/39
1SFL707001R7022	AF2050-30-22	5/55
1SFN010716R1001	CEL18-01	5/256
1SFN010716R1010	CEL18-10	5/256
1SFN010720R1011	CAL18-11	5/31
1SFN010720R3311	CAL18-11B	5/41
1SFN034700R1000	VM300H	5/41
1SFN034701R1000	VM300V	5/262
1SFN035100R1000	VM300/460H	5/41
1SFN035101R1000	VM300/460V	5/262
1SFN035700R1000	VM750H	5/41
1SFN035701R1000	VM750V	5/262
1SFN036503R1000	VM1650H	5/41
1SFN050300R1003	RC5-3/440	5/270
1SFN074303R1000	LY110	5/281
1SFN074307R1000	LW110	5/279
1SFN074308R1000	LD110	5/276
1SFN074352R1000	LK110	5/277
1SFN074703R1000	LY185	5/281
1SFN074707R1000	LW185	5/41
1SFN074709R1000	LZ185-2C/120	5/41
1SFN074710R1000	LX185	5/41
1SFN074712R1000	LP185	5/281
1SFN075103R1000	LY300	5/281
1SFN075107R1000	LW300	5/41
1SFN075110R1000	LX300	5/41
1SFN075112R1000	LP300	5/281
1SFN075703R1000	LY460	5/281
1SFN075707R1000	LW460	5/41
1SFN075710R1000	LX460	5/41
1SFN075712R1000	LP460	5/281
1SFN076103R1000	LY750	5/281
1SFN076107R1000	LW750	5/41
1SFN076110R1000	LX750	5/41
1SFN076112R1000	LP750	5/281
1SFN076407R1000	LW1250	5/41
1SFN084301R1000	BEM110-30	5/31
1SFN084303R1000	BED95	5/286
1SFN084304R1000	BES110	5/285
1SFN084503R1000	BED110	5/286
1SFN084701R1000	BEM185-30	5/285
1SFN084703R1000	BED145A	5/286
1SFN084704R1000	BES185	5/285
1SFN084706R1003	BEA185/T3	5/283
1SFN084706R1004	BEA185D/T3	5/283
1SFN084706R1005	BEA185/T4	5/283
1SFN084706R1006	BEA185D/T4	5/283
1SFN084709R1000	BEF185H/OESA250	5/284
1SFN084903R1000	BED185	5/286
1SFN084908R1000	BEF185/OESA250	5/284
1SFN085101R1000	BEM300-30	5/285
1SFN085103R1000	BED210	5/286
1SFN085104R1000	BES300	5/285
1SFN085106R1003	BEA210/T4	5/283
1SFN085106R1004	BEA300/T5	5/283
1SFN085106R1005	BEA210D/T4	5/283
1SFN085108R1000	BEF300/OESA400	5/284
1SFN085109R1000	BEF300H/OESA400	5/284
1SFN085303R1000	BED300	5/286
1SFN085307R1002	BEA300H/T5	5/283
1SFN085503R1000	BED400	5/286
1SFN085506R1003	BEA300D7T5	5/283
1SFN085701R1000	BEM460-30	5/285
1SFN085703R1000	BED460	5/286
1SFN085704R1000	BES460	5/285
1SFN085708R1000	BEF460/OESA400	5/284
1SFN085709R1000	OESA460H/OESA400	5/284
1SFN085903R1000	BED580	5/286
1SFN085907R1000	BEA460H/T4	5/283
1SFN086101R1000	BEM750-30	5/285
1SFN086103R1000	BED750	5/286
1SFN086104R1000	BES750	5/285
1SFN086106R1000	BEA750/T6	5/283
1SFN086106R1001	BEA750/T5	5/283
1SFN086106R1002	BEA750D/T6	5/283
1SFN086106R1003	BEA750D/T5	5/283
1SFN086108R1000	BEF750/OESA800	5/284
1SFN094301R1000	PN110-21	5/31
1SFN094303R1000	PN110-41	5/287
1SFN094500R1000	PR110-1	5/288
1SFN094700R1000	PR145-1	5/288
1SFN094701R1000	PN185-21	5/287
1SFN094705R1000	PN185-11	5/287
1SFN094900R1000	PR210-1	5/288
1SFN094903R1000	PN185-41	5/287
1SFN095100R1001	PR185-2	5/288
1SFN095101R1000	PN300-21	5/287
1SFN095105R1000	PN300A-11	5/287
1SFN095300R1000	PR300-1	5/288
1SFN095300R1001	PR300-2	5/288
1SFN095503R1000	PN300-41	5/287
1SFN095700R1000	PR460-1	5/288
1SFN095700R1001	PR460-2	5/288
1SFN095700R1002	PR400-2	5/288
1SFN095701R1000	PN460-21	5/287
1SFN095703R1000	PN460-41	5/287
1SFN095705R1000	PN460-11	5/287
1SFN096100R1000	PR750-1	5/288
1SFN096100R1001	PR750-2	5/288
1SFN096100R1002	PR580-2	5/288
1SFN096101R1000	PN750-21	5/287
1SFN096103R1000	PN750-41	5/287
1SFN096105R1000	PN750-11	5/287
1SFN124701R1000	LT185-AC	5/41
1SFN124703R1000	LT185-AL	5/41
1SFN124704R1000	LT185-AY	5/41
1SFN125101R1000	LT300-AC	5/41
1SFN125103R1000	LT300-AL	5/41
1SFN125104R1000	LT300-AY	5/41
1SFN125701R1000	LT460-AC	5/41
1SFN125703R1000	LT460-AL	5/41
1SFN126101R1000	LT750-AC	5/41
1SFN126103R1000	LT750-AL	5/41
1SFN154310R8006	ZA110	5/290
1SFN154310R8106	ZA110	5/290
1SFN154310R8306	ZA110	5/290
1SFN154310R8406	ZA110	5/290
1SFN154310R8506	ZA110	5/290
1SFN154310R8606	ZA110	5/290
1SFN154310R8806	ZA110	5/290
1SFN154370R6906	ZAF110	5/291
1SFN154370R7006	ZAF110	5/291
1SFN154370R7206	ZAF110	5/291
1SFN154710R8006	ZA185	5/290
1SFN154710R8106	ZA185	5/290
1SFN154710R8306	ZA185	5/290
1SFN154710R8406	ZA185	5/290
1SFN154710R8506	ZA185	5/290
1SFN154710R8606	ZA185	5/290
1SFN154710R8806	ZA185	5/290
1SFN154770R6906	ZAF185	5/291
1SFN154770R7006	ZAF185	5/291
1SFN154770R7206	ZAF185	5/291
1SFN155110R8006	ZA300	5/290
1SFN155110R8106	ZA300	5/290
1SFN155110R8306	ZA300	5/290
1SFN155110R8406	ZA300	5/290
1SFN155110R8506	ZA300	5/290
1SFN155110R8606	ZA300	5/290
1SFN155110R8806	ZA300	5/290
1SFN155170R6906	ZAF300	5/291
1SFN155170R7006	ZAF300	5/291
1SFN155170R7206	ZAF300	5/291
1SFN155770R6806	ZAF460	5/291
1SFN155770R6906	ZAF460	5/291
1SFN155770R7006	ZAF460	5/291
1SFN155770R7106	ZAF460	5/291
1SFN156170R6806	ZAF750	5/291
1SFN156170R6906	ZAF750	5/291
1SFN156170R7006	ZAF750	5/291
1SFN156170R7106	ZAF750	5/291
1SFN156570R7026	ZAF1650	5/291
1SFN164302R1000	ZLU95	5/289
1SFN164303R1000	ZL95	5/289
1SFN164502R1000	ZLU110	5/289
1SFN164503R1000	ZL110	5/289
1SFN164703R1000	ZL145	5/289
1SFN164710R1000	ZW185	5/289
1SFN164903R1000	ZL185	5/289
1SFN165103R1000	ZL210	5/289
1SFN165110R1000	ZW300	5/289
1SFN165303R1000	ZL260	5/289
1SFN165503R1000	ZL300	5/289
1SFN165703R1000	ZL400	5/289
1SFN165710R1000	ZW460	5/289
1SFN165903R1000	ZL460	5/289
1SFN166103R1000	ZL580	5/289
1SFN166110R1000	ZW750	5/289
1SFN166303R1000	ZL750	5/289
1SFN166403R1000	ZL1250	5/289
1SFN166503R1000	ZL1350	5/289
1SFN166510R1000	ZW1650	5/289
1SFN166521R1070	ZP1650	5/291
1SFN166703R1000	ZL1650	5/289
1SFN167003R1000	ZL2050	5/289
1SNA235156R2700	BA4	5/251
1SNA235712R2400	HTP500-BA4	5/251
1SNA360010R1500	SPRC 1	5/251
1SVR730210R3300	CT-SDS.22S	4/25
1SVR730211R2300	CT-SDS.23S	4/25
FPTN372726R1001	WB75-A	5/248
FPTN372726R1002	WB75-A	5/248
FPTN372726R1003	WB75-A	5/248
FPTN372726R1004	WB75-A	5/248
FPTN372726R1005	WB75-A	5/248
FPTN372726R1006	WB75-A	5/248
FPTN372726R1007	WB75-A	5/248
FPTN372726R1008	WB75-A	5/248
FPTN472657R0001	BX-TP	5/17
FPTN472734R0001	LH75	5/281
FPTN472735R0001	LF75	5/281
GHV2501902R0002	RV-BC6/60	3/38
GHV2501902R0003	RV-BC6-F/60	3/38
GHV2501903R0002	RV-BC6/250	3/38
GHV2501903R0003	RV-BC6-F/250	3/38
GHV2501904R0002	RV-BC6/380	3/38
GHV2501904R0003	RV-BC6-F/380	3/38
GJF1101903R0001	SA1	2/6
GJF1101903R0002	SA2	2/6
GJF1101903R0003	SA3	2/6
GJH1211001R0221	K6-22Z-01	3/14
GJH1211001R0222	K6-22Z-02	3/14
GJH1211001R0223	K6-22Z-03	3/14
GJH1211001R0311	K6-31Z-01	3/14
GJH1211001R0312	K6-31Z-02	3/14
GJH1211001R0313	K6-31Z-03	3/14
GJH1211001R0401	K6-40E-01	3/14
GJH1211001R0402	K6-40E-02	3/14
GJH1211001R0403	K6-40E-03	3/14
GJH1211001R8220	K6-22Z-80	3/14
GJH1211001R8224	K6-22Z-84	3/14
GJH1211001R8225	K6-22Z-85	3/14
GJH1211001R8310	K6-31Z-80	3/14
GJH1211001R8314	K6-31Z-84	3/14
GJH1211001R8315	K6-31Z-85	3/14
GJH1211001R8400	K6-40E-80	3/14
GJH1211001R8404	K6-40E-84	3/14
GJH1211001R8405	K6-40E-85	3/14
GJH1211003R0221	K6-22Z-F-01	3/35
GJH1211003R0222	K6-22Z-F-02	3/35
GJH1211003R0223	K6-22Z-F-03	3/35
GJH1211003R0311	K6-31Z-F-01	3/35
GJH1211003R0312	K6-31Z-F-02	3/35
GJH1211003R0313	K6-31Z-F-03	3/35
GJH1211003R0401	K6-40E-F-01	3/35
GJH1211003R0402	K6-40E-F-02	3/35
GJH1211003R0403	K6-40E-F-03	3/35
GJH1211003R8220	K6-22Z-F-80	3/35
GJH1211003R8224	K6-22Z-F-84	3/35

1SBC101359S0201

Index

Order code classification

Order code	Type	Page
GJH1211003R8225	K6-22Z-F-85	3/35
GJH1211003R8310	K6-31Z-F-80	3/35
GJH1211003R8314	K6-31Z-F-84	3/35
GJH1211003R8315	K6-31Z-F-85	3/35
GJH1211003R8400	K6-40E-F-80	3/35
GJH1211003R8404	K6-40E-F-84	3/35
GJH1211003R8405	K6-40E-F-85	3/35
GJH1211009R0221	K6-22Z-P-01	3/24
GJH1211009R0222	K6-22Z-P-02	3/24
GJH1211009R0223	K6-22Z-P-03	3/24
GJH1211009R0311	K6-31Z-P-01	3/24
GJH1211009R0312	K6-31Z-P-02	3/24
GJH1211009R0313	K6-31Z-P-03	3/24
GJH1211009R0401	K6-40E-P-01	3/24
GJH1211009R0402	K6-40E-P-02	3/24
GJH1211009R0403	K6-40E-P-03	3/24
GJH1211009R8220	K6-22Z-P-80	3/24
GJH1211009R8224	K6-22Z-P-84	3/24
GJH1211009R8225	K6-22Z-P-85	3/24
GJH1211009R8310	K6-31Z-P-80	3/24
GJH1211009R8314	K6-31Z-P-84	3/24
GJH1211009R8315	K6-31Z-P-85	3/24
GJH1211009R8400	K6-40E-P-80	3/24
GJH1211009R8404	K6-40E-P-84	3/24
GJH1211009R8405	K6-40E-P-85	3/24
GJH1213001R0221	KC6-22Z-01	3/15
GJH1213001R0224	KC6-22Z-04	3/15
GJH1213001R0225	KC6-22Z-05	3/15
GJH1213001R0227	KC6-22Z-07	3/15
GJH1213001R0311	KC6-31Z-01	3/15
GJH1213001R0314	KC6-31Z-04	3/15
GJH1213001R0315	KC6-31Z-05	3/15
GJH1213001R0317	KC6-31Z-07	3/15
GJH1213001R0401	KC6-40E-01	3/15
GJH1213001R0404	KC6-40E-04	3/15
GJH1213001R0405	KC6-40E-05	3/15
GJH1213001R0407	KC6-40E-07	3/15
GJH1213001R1223	KC6-22Z-13	3/15
GJH1213001R1226	KC6-22Z-16	3/15
GJH1213001R1313	KC6-31Z-13	3/15
GJH1213001R1316	KC6-31Z-16	3/15
GJH1213001R1403	KC6-40E-13	3/15
GJH1213001R1406	KC6-40E-16	3/15
GJH1213001R5311	KC6-31Z-2.4-51	3/16
GJH1213001R5401	KC6-40E-2.4-51	3/16
GJH1213001R7221	K6S-22Z-1.7-71	3/16
GJH1213001R7222	K6S-22Z-2.8-72	3/16
GJH1213001R7311	K6S-31Z-1.7-71	3/16
GJH1213001R7312	K6S-31Z-2.8-72	3/16
GJH1213001R7401	K6S-40E-1.7-71	3/16
GJH1213001R7402	K6S-40E-2.8-72	3/16
GJH1213001R8311	KC6-31Z-1.4-81	3/16
GJH1213001R8401	KC6-40E-1.4-81	3/16
GJH1213003R0221	KC6-22Z-F-01	3/36
GJH1213003R0224	KC6-22Z-F-04	3/36
GJH1213003R0225	KC6-22Z-F-05	3/36
GJH1213003R0227	KC6-22Z-F-07	3/36
GJH1213003R0311	KC6-31Z-F-01	3/36
GJH1213003R0314	KC6-31Z-F-04	3/36
GJH1213003R0315	KC6-31Z-F-05	3/36
GJH1213003R0317	KC6-31Z-F-07	3/36
GJH1213003R0401	KC6-40E-F-01	3/36
GJH1213003R0404	KC6-40E-F-04	3/36
GJH1213003R0405	KC6-40E-F-05	3/36
GJH1213003R1226	KC6-22Z-F-16	3/36
GJH1213003R1316	KC6-31Z-F-16	3/36
GJH1213003R1406	KC6-40E-F-16	3/36
GJH1213003R5311	KC6-31Z-F-51	3/37
GJH1213003R5401	KC6-40E-F-51	3/37
GJH1213003R8311	KC6-31Z-F-1.4-81	3/37
GJH1213003R8401	KC6-40E-F-1.4-81	3/37
GJH1213009R0221	KC6-22Z-P-01	3/25
GJH1213009R0224	KC6-22Z-P-04	3/25
GJH1213009R0225	KC6-22Z-P-05	3/25
GJH1213009R0227	KC6-22Z-P-07	3/25
GJH1213009R0311	KC6-31Z-P-01	3/25
GJH1213009R0314	KC6-31Z-P-04	3/25
GJH1213009R0315	KC6-31Z-P-05	3/25
GJH1213009R0401	KC6-40E-P-01	3/25
GJH1213009R0404	KC6-40E-P-04	3/25
GJH1213009R0405	KC6-40E-P-05	3/25
GJH1213009R0407	KC6-40E-P-07	3/25
GJH1213009R1226	KC6-22Z-P-16	3/25
GJH1213009R1316	KC6-31Z-P-16	3/25
GJH1213009R1406	KC6-40E-P-16	3/25
GJH1213009R5311	KC6-31Z-P-2.4-51	3/27
GJH1213009R5401	KC6-40E-P-2.4-51	3/27
GJH1213009R8311	KC6-31Z-P-1.4-81	3/27
GJH1213009R8401	KC6-40E-P-1.4-81	3/27
GJH1213061R5221	TKC6-22Z-51	3/17
GJH1213061R5225	TKC6-22Z-55	3/17
GJH1213061R5311	TKC6-31Z-51	3/17
GJH1213061R5315	TKC6-31Z-55	3/17
GJH1213061R5401	TKC6-40E-51	3/17
GJH1213061R5405	TKC6-40E-55	3/17
GJH1213061R6222	TKC6-22Z-62	3/17
GJH1213061R6228	TKC6-22Z-68	3/17
GJH1213061R6312	TKC6-31Z-62	3/17
GJH1213061R6318	TKC6-31Z-68	3/17
GJH1213061R6402	TKC6-40E-62	3/17
GJH1213061R6408	TKC6-40E-68	3/17
GJL1201317R0001	CA6-11K	3/39
GJL1201317R0002	CA6-11E	3/38
GJL1201317R0003	CA6-11M	3/38
GJL1201317R0004	CA6-11N	3/38
GJL1201318R0001	CA6-11K-F	3/39
GJL1201318R0002	CA6-11E-F	3/38
GJL1201318R0003	CA6-11M-F	3/38
GJL1201318R0004	CA6-11N-F	3/38
GJL1201319R0001	CA6-11K-P	3/39
GJL1201319R0002	CA6-11E-P	3/38
GJL1201319R0003	CA6-11M-P	3/38
GJL1201319R0004	CA6-11N-P	3/38
GJL1201330R0001	CAF6-11K	3/39
GJL1201330R0002	CAF6-11E	3/38
GJL1201330R0003	CAF6-11M	3/38
GJL1201330R0004	CAF6-11N	3/38
GJL1201330R0005	CAF6-20K	3/39
GJL1201330R0006	CAF6-20E	3/38
GJL1201330R0007	CAF6-20M	3/38
GJL1201330R0008	CAF6-20N	3/38
GJL1201330R0009	CAF6-02K	3/39
GJL1201330R0010	CAF6-02E	3/38
GJL1201330R0011	CAF6-02M	3/38
GJL1201330R0012	CAF6-02N	3/38
GJL1201902R0001	LB6	3/38
GJL1201903R0001	LB6-CA	3/38
GJL1201906R0001	LT6-B	3/38
GJL1201907R0001	LP6	3/38
GJL1201908R0001	BSM6-30	3/38
GJL1211001R0011	B6-30-01-01	3/2
GJL1211001R0012	B6-30-01-02	3/2
GJL1211001R0013	B6-30-01-03	3/2
GJL1211001R0101	B6-30-10-01	3/2
GJL1211001R0102	B6-30-10-02	3/2
GJL1211001R0103	B6-30-10-03	3/2
GJL1211001R8010	B6-30-01-80	3/2
GJL1211001R8014	B6-30-01-84	3/2
GJL1211001R8015	B6-30-01-85	3/2
GJL1211001R8100	B6-30-10-80	3/2
GJL1211001R8104	B6-30-10-84	3/2
GJL1211001R8105	B6-30-10-85	3/2
GJL1211003R0011	B6-30-01-F-01	3/28
GJL1211003R0012	B6-30-01-F-02	3/28
GJL1211003R0013	B6-30-01-F-03	3/28
GJL1211003R0101	B6-30-10-F-01	3/28
GJL1211003R0102	B6-30-10-F-02	3/28
GJL1211003R0103	B6-30-10-F-03	3/28
GJL1211003R8010	B6-30-01-F-80	3/28
GJL1211003R8014	B6-30-01-F-84	3/28
GJL1211003R8015	B6-30-01-F-85	3/28
GJL1211003R8100	B6-30-10-F-80	3/28
GJL1211003R8104	B6-30-10-F-84	3/28
GJL1211003R8105	B6-30-10-F-85	3/28
GJL1211009R0011	B6-30-01-P-01	3/18
GJL1211009R0012	B6-30-01-P-02	3/18
GJL1211009R0013	B6-30-01-P-03	3/18
GJL1211009R0101	B6-30-10-P-01	3/18
GJL1211009R0102	B6-30-10-P-02	3/18
GJL1211009R0103	B6-30-10-P-03	3/18
GJL1211009R8010	B6-30-01-P-80	3/18
GJL1211009R8014	B6-30-01-P-84	3/18
GJL1211009R8015	B6-30-01-P-85	3/18
GJL1211009R8100	B6-30-10-P-80	3/18
GJL1211009R8104	B6-30-10-P-84	3/18
GJL1211009R8105	B6-30-10-P-85	3/18
GJL1211201R0001	B6-40-00-01	3/10
GJL1211201R0002	B6-40-00-02	3/10
GJL1211201R0003	B6-40-00-03	3/10
GJL1211201R8000	B6-40-00-80	3/10
GJL1211201R8004	B6-40-00-84	3/10
GJL1211501R0001	B6-22-00-01	3/10
GJL1211501R0002	B6-22-00-02	3/10
GJL1211501R0003	B6-22-00-03	3/10
GJL1211501R8000	B6-22-00-80	3/10
GJL1211501R8004	B6-22-00-84	3/10
GJL1211901R0011	VB6-30-01-01	3/4
GJL1211901R0012	VB6-30-01-02	3/4
GJL1211901R0013	VB6-30-01-03	3/4
GJL1211901R0101	VB6-30-10-01	3/4
GJL1211901R0102	VB6-30-10-02	3/4
GJL1211901R0103	VB6-30-10-03	3/4
GJL1211901R8010	VB6-30-01-80	3/4
GJL1211901R8014	VB6-30-01-84	3/4
GJL1211901R8015	VB6-30-01-85	3/4
GJL1211901R8100	VB6-30-10-80	3/4
GJL1211901R8104	VB6-30-10-84	3/4
GJL1211901R8105	VB6-30-10-85	3/4
GJL1211909R0011	VB6-30-01-P-01	3/20
GJL1211909R0012	VB6-30-01-P-02	3/20
GJL1211909R0013	VB6-30-01-P-03	3/20
GJL1211909R0101	VB6-30-10-P-01	3/20
GJL1211909R0102	VB6-30-10-P-02	3/20
GJL1211909R0103	VB6-30-10-P-03	3/20
GJL1211909R8010	VB6-30-01-P-80	3/20
GJL1211909R8014	VB6-30-01-P-84	3/20
GJL1211909R8015	VB6-30-01-P-85	3/20
GJL1211909R8100	VB6-30-10-P-80	3/20
GJL1211909R8104	VB6-30-10-P-84	3/20
GJL1211909R8105	VB6-30-10-P-85	3/20
GJL1211911R0011	VB6A-30-01-01	3/6
GJL1211911R0012	VB6A-30-01-02	3/6
GJL1211911R0013	VB6A-30-01-03	3/6
GJL1211911R0101	VB6A-30-10-01	3/6
GJL1211911R0102	VB6A-30-10-02	3/6
GJL1211911R0103	VB6A-30-10-03	3/6
GJL1211911R8010	VB6A-30-01-80	3/6
GJL1211911R8014	VB6A-30-01-84	3/6
GJL1211911R8015	VB6A-30-01-85	3/6
GJL1211911R8100	VB6A-30-10-80	3/6
GJL1211911R8104	VB6A-30-10-84	3/6
GJL1211911R8105	VB6A-30-10-85	3/6
GJL1211919R0011	VB6A-30-01-P-01	3/22
GJL1211919R0012	VB6A-30-01-P-02	3/22
GJL1211919R0013	VB6A-30-01-P-03	3/22
GJL1211919R0101	VB6A-30-10-P-01	3/22
GJL1211919R0102	VB6A-30-10-P-02	3/22
GJL1211919R0103	VB6A-30-10-P-03	3/22
GJL1211919R8010	VB6A-30-01-P-80	3/22
GJL1211919R8014	VB6A-30-01-P-84	3/22
GJL1211919R8015	VB6A-30-01-P-85	3/22
GJL1211919R8100	VB6A-30-10-P-80	3/22
GJL1211919R8104	VB6A-30-10-P-84	3/22
GJL1211919R8105	VB6A-30-10-P-85	3/22
GJL1213001R0011	BC6-30-01-01	3/3
GJL1213001R0013	BC6-30-01-03	3/3
GJL1213001R0014	BC6-30-01-04	3/3
GJL1213001R0015	BC6-30-01-05	3/3
GJL1213001R0017	BC6-30-01-07	3/3
GJL1213001R0101	BC6-30-10-01	3/3
GJL1213001R0103	BC6-30-10-03	3/3
GJL1213001R0104	BC6-30-10-04	3/3
GJL1213001R0105	BC6-30-10-05	3/3
GJL1213001R0107	BC6-30-10-07	3/3
GJL1213001R1016	BC6-30-01-16	3/3
GJL1213001R1106	BC6-30-10-16	3/3
GJL1213001R5011	BC6-30-01-2.4-51	3/8
GJL1213001R5101	BC6-30-10-2.4-51	3/8
GJL1213001R7011	B6S-30-01-1.7-71	3/8
GJL1213001R7012	B6S-30-01-2.8-72	3/8
GJL1213001R7101	B6S-30-10-1.7-71	3/8
GJL1213001R7102	B6S-30-10-2.8-72	3/8
GJL1213001R8011	BC6-30-01-1.4-81	3/8
GJL1213001R8101	BC6-30-10-1.4-81	3/8
GJL1213003R0011	BC6-30-01-F-01	3/29
GJL1213003R0013	BC6-30-01-F-03	3/29
GJL1213003R0014	BC6-30-01-F-04	3/29
GJL1213003R0015	BC6-30-01-F-05	3/29
GJL1213003R0017	BC6-30-01-F-07	3/29
GJL1213003R0101	BC6-30-10-F-01	3/29
GJL1213003R0103	BC6-30-10-F-03	3/29
GJL1213003R0104	BC6-30-10-F-04	3/29
GJL1213003R0105	BC6-30-10-F-05	3/29
GJL1213003R0107	BC6-30-10-F-07	3/29
GJL1213003R1016	BC6-30-01-F-16	3/29
GJL1213003R1106	BC6-30-10-F-16	3/29
GJL1213003R5011	BC6-30-01-F-2.4-51	3/34
GJL1213003R5101	BC6-30-10-F-2.4-51	3/34
GJL1213003R8011	BC6-30-01-F-1.4-81	3/34
GJL1213003R8101	BC6-30-10-F-1.4-81	3/34
GJL1213009R0011	BC6-30-01-P-01	3/19
GJL1213009R0013	BC6-30-01-P-03	3/19
GJL1213009R0014	BC6-30-01-P-04	3/19
GJL1213009R0015	BC6-30-01-P-05	3/19
GJL1213009R0017	BC6-30-01-P-07	3/19
GJL1213009R0101	BC6-30-10-P-01	3/19
GJL1213009R0103	BC6-30-10-P-03	3/19
GJL1213009R0104	BC6-30-10-P-04	3/19
GJL1213009R0105	BC6-30-10-P-05	3/19
GJL1213009R0107	BC6-30-10-P-07	3/19
GJL1213009R1016	BC6-30-01-P-16	3/19
GJL1213009R1106	BC6-30-10-P-16	3/19
GJL1213009R5011	BC6-30-01-P-2.4-51	3/26
GJL1213009R5101	BC6-30-10-P-2.4-51	3/26
GJL1213009R8011	BC6-30-01-P-1.4-81	3/26
GJL1213009R8101	BC6-30-10-P-1.4-81	3/26
GJL1213109R0101	BC6-21-10-P-01	3/19
GJL1213109R0103	BC6-21-10-P-03	3/19
GJL1213109R0104	BC6-21-10-P-04	3/19
GJL1213109R0105	BC6-21-10-P-05	3/19
GJL1213109R1106	BC6-21-10-P-16	3/19
GJL1213501R0001	BC6-22-00-01	3/11
GJL1213501R0002	BC6-22-00-02	3/11
GJL1213501R0003	BC6-22-00-03	3/11
GJL1213501R0004	BC6-22-00-04	3/11
GJL1213501R0005	BC6-22-00-05	3/11
GJL1213501R0007	BC6-22-00-07	3/11
GJL1213501R1006	BC6-22-00-16	3/11
GJL1213901R0011	VBC6-30-01-01	3/5
GJL1213901R0013	VBC6-30-01-03	3/5
GJL1213901R0014	VBC6-30-01-04	3/5
GJL1213901R0015	VBC6-30-01-05	3/5
GJL1213901R0017	VBC6-30-01-07	3/5
GJL1213901R0101	VBC6-30-10-01	3/5
GJL1213901R0103	VBC6-30-10-03	3/5
GJL1213901R0104	VBC6-30-10-04	3/5
GJL1213901R0105	VBC6-30-10-05	3/5
GJL1213901R0107	VBC6-30-10-07	3/5
GJL1213901R1016	VBC6-30-01-16	3/5
GJL1213901R1106	VBC6-30-10-16	3/5

1SBC101359S0201

Index

Order code classification

Order code	Type	Page
GJL1213909R0011	VBC6-30-01-P-01	3/21
GJL1213909R0013	VBC6-30-01-P-03	3/21
GJL1213909R0014	VBC6-30-01-P-04	3/21
GJL1213909R0015	VBC6-30-01-P-05	3/21
GJL1213909R0016	VBC6-30-06-P-06	3/21
GJL1213909R0017	VBC6-30-01-P-07	3/21
GJL1213909R0101	VBC6-30-10-P-01	3/21
GJL1213909R0103	VBC6-30-10-P-03	3/21
GJL1213909R0104	VBC6-30-10-P-04	3/21
GJL1213909R0105	VBC6-30-10-P-05	3/21
GJL1213909R0106	VBC6-30-10-P-06	3/21
GJL1213909R0107	VBC6-30-10-P-07	3/21
GJL1213911R0011	VBC6A-30-01-01	3/7
GJL1213911R0013	VBC6A-30-01-03	3/7
GJL1213911R0014	VBC6A-30-01-04	3/7
GJL1213911R0015	VBC6A-30-01-05	3/7
GJL1213911R0017	VBC6A-30-01-07	3/7
GJL1213911R0101	VBC6A-30-10-01	3/7
GJL1213911R0103	VBC6A-30-10-03	3/7
GJL1213911R0104	VBC6A-30-10-04	3/7
GJL1213911R0105	VBC6A-30-10-05	3/7
GJL1213911R0107	VBC6A-30-10-07	3/7
GJL1213911R1016	VBC6A-30-01-16	3/7
GJL1213911R1106	VBC6A-30-10-16	3/7
GJL1311001R0011	B7-30-01-01	3/2
GJL1311001R0012	B7-30-01-02	3/2
GJL1311001R0013	B7-30-01-03	3/2
GJL1311001R0101	B7-30-10-01	3/2
GJL1311001R0102	B7-30-10-02	3/2
GJL1311001R0103	B7-30-10-03	3/2
GJL1311001R8010	B7-30-01-80	3/2
GJL1311001R8014	B7-30-01-84	3/2
GJL1311001R8015	B7-30-01-85	3/2
GJL1311001R8100	B7-30-10-80	3/2
GJL1311001R8104	B7-30-10-84	3/2
GJL1311001R8105	B7-30-10-85	3/2
GJL1311003R0011	B7-30-01-F-01	3/28
GJL1311003R0012	B7-30-01-F-02	3/28
GJL1311003R0013	B7-30-01-F-03	3/28
GJL1311003R0101	B7-30-10-F-01	3/28
GJL1311003R0102	B7-30-10-F-02	3/28
GJL1311003R0103	B7-30-10-F-03	3/28
GJL1311003R8010	B7-30-01-F-80	3/28
GJL1311003R8014	B7-30-01-F-84	3/28
GJL1311003R8015	B7-30-01-F-85	3/28
GJL1311003R8100	B7-30-10-F-80	3/28
GJL1311003R8104	B7-30-10-F-84	3/28
GJL1311003R8105	B7-30-10-F-85	3/28
GJL1311009R0011	B7-30-01-P-01	3/18
GJL1311009R0012	B7-30-01-P-02	3/18
GJL1311009R0013	B7-30-01-P-03	3/18
GJL1311009R0101	B7-30-10-P-01	3/18
GJL1311009R0102	B7-30-10-P-02	3/18
GJL1311009R0103	B7-30-10-P-03	3/18
GJL1311009R8010	B7-30-01-P-80	3/18
GJL1311009R8014	B7-30-01-P-84	3/18
GJL1311009R8015	B7-30-01-P-85	3/18
GJL1311009R8100	B7-30-10-P-80	3/18
GJL1311009R8104	B7-30-10-P-84	3/18
GJL1311009R8105	B7-30-10-P-85	3/18
GJL1311201R0001	B7-40-00-01	3/10
GJL1311201R0002	B7-40-00-02	3/10
GJL1311201R0003	B7-40-00-03	3/10
GJL1311201R8000	B7-40-00-80	3/10
GJL1311201R8004	B7-40-00-84	3/10
GJL1311501R0001	B7-22-00-01	3/10
GJL1311501R0002	B7-22-00-02	3/10
GJL1311501R0003	B7-22-00-03	3/10
GJL1311501R8000	B7-22-00-80	3/10
GJL1311501R8004	B7-22-00-84	3/10
GJL1311901R0011	VB7-30-01-01	3/4
GJL1311901R0012	VB7-30-01-02	3/4
GJL1311901R0013	VB7-30-01-03	3/4
GJL1311901R0101	VB7-30-10-01	3/4
GJL1311901R0102	VB7-30-10-02	3/4
GJL1311901R0103	VB7-30-10-03	3/4
GJL1311901R8010	VB7-30-01-80	3/4
GJL1311901R8014	VB7-30-01-84	3/4
GJL1311901R8015	VB7-30-01-85	3/4
GJL1311901R8100	VB7-30-10-80	3/4
GJL1311901R8104	VB7-30-10-84	3/4
GJL1311901R8105	VB7-30-10-85	3/4
GJL1311903R0011	VB7-30-01-F-01	3/30
GJL1311903R0012	VB7-30-01-F-02	3/30
GJL1311903R0013	VB7-30-01-F-03	3/30
GJL1311903R0101	VB7-30-10-F-01	3/30
GJL1311903R0102	VB7-30-10-F-02	3/30
GJL1311903R0103	VB7-30-10-F-03	3/30
GJL1311903R8010	VB7-30-01-F-80	3/30
GJL1311903R8014	VB7-30-01-F-84	3/30
GJL1311903R8015	VB7-30-01-F-85	3/30
GJL1311903R8100	VB7-30-10-F-80	3/30
GJL1311903R8104	VB7-30-10-F-84	3/30
GJL1311903R8105	VB7-30-10-F-85	3/30
GJL1311909R0011	VB7-30-01-P-01	3/20
GJL1311909R0012	VB7-30-01-P-02	3/20
GJL1311909R0013	VB7-30-01-P-03	3/20
GJL1311909R0101	VB7-30-10-P-01	3/20
GJL1311909R0102	VB7-30-10-P-02	3/20
GJL1311909R0103	VB7-30-10-P-03	3/20
GJL1311909R8010	VB7-30-01-P-80	3/20
GJL1311909R8014	VB7-30-01-P-84	3/20
GJL1311909R8015	VB7-30-01-P-85	3/20
GJL1311909R8100	VB7-30-10-P-80	3/20
GJL1311909R8104	VB7-30-10-P-84	3/20
GJL1311909R8105	VB7-30-10-P-85	3/20
GJL1311911R0011	VB7A-30-01-01	3/6
GJL1311911R0012	VB7A-30-01-02	3/6
GJL1311911R0013	VB7A-30-01-03	3/6
GJL1311911R0101	VB7A-30-10-01	3/6
GJL1311911R0102	VB7A-30-10-02	3/6
GJL1311911R0103	VB7A-30-10-03	3/6
GJL1311911R8010	VB7A-30-01-80	3/6
GJL1311911R8014	VB7A-30-01-84	3/6
GJL1311911R8015	VB7A-30-01-85	3/6
GJL1311911R8100	VB7A-30-10-80	3/6
GJL1311911R8104	VB7A-30-10-84	3/6
GJL1311911R8105	VB7A-30-10-85	3/6
GJL1311913R0011	VB7A-30-01-F-01	3/32
GJL1311913R0012	VB7A-30-01-F-02	3/32
GJL1311913R0013	VB7A-30-01-F-03	3/32
GJL1311913R0101	VB7A-30-10-F-01	3/32
GJL1311913R0102	VB7A-30-10-F-02	3/32
GJL1311913R0103	VB7A-30-10-F-03	3/32
GJL1311913R8010	VB7A-30-01-F-80	3/32
GJL1311913R8014	VB7A-30-01-F-84	3/32
GJL1311913R8015	VB7A-30-01-F-85	3/32
GJL1311913R8100	VB7A-30-10-F-80	3/32
GJL1311913R8104	VB7A-30-10-F-84	3/32
GJL1311913R8105	VB7A-30-10-F-85	3/32
GJL1311919R0011	VB7A-30-01-P-01	3/22
GJL1311919R0012	VB7A-30-01-P-02	3/22
GJL1311919R0013	VB7A-30-01-P-03	3/22
GJL1311919R0101	VB7A-30-10-P-01	3/22
GJL1311919R0102	VB7A-30-10-P-02	3/22
GJL1311919R0103	VB7A-30-10-P-03	3/22
GJL1311919R8010	VB7A-30-01-P-80	3/22
GJL1311919R8014	VB7A-30-01-P-84	3/22
GJL1311919R8015	VB7A-30-01-P-85	3/22
GJL1311919R8100	VB7A-30-10-P-80	3/22
GJL1311919R8104	VB7A-30-10-P-84	3/22
GJL1311919R8105	VB7A-30-10-P-85	3/22
GJL1313001R0011	BC7-30-01-01	3/3
GJL1313001R0013	BC7-30-01-03	3/3
GJL1313001R0014	BC7-30-01-04	3/3
GJL1313001R0015	BC7-30-01-05	3/3
GJL1313001R0017	BC7-30-01-07	3/3
GJL1313001R0101	BC7-30-10-01	3/3
GJL1313001R0104	BC7-30-10-04	3/3
GJL1313001R0105	BC7-30-10-05	3/3
GJL1313001R0107	BC7-30-10-07	3/3
GJL1313001R1016	BC7-30-01-16	3/3
GJL1313001R1103	BC7-30-10-03	3/3
GJL1313001R1106	BC7-30-10-16	3/3
GJL1313001R5011	BC7-30-01-2.4-51	3/8
GJL1313001R5101	BC7-30-10-2.4-51	3/8
GJL1313001R7011	B7S-30-01-1.7-71	3/8
GJL1313001R7012	B7S-30-01-2.8-72	3/8
GJL1313001R7101	B7S-30-10-1.7-71	3/8
GJL1313001R7102	B7S-30-10-2.8-72	3/8
GJL1313001R8011	BC7-30-01-1.4-81	3/8
GJL1313001R8101	BC7-30-10-1.4-81	3/8
GJL1313003R0011	BC7-30-01-F-01	3/29
GJL1313003R0013	BC7-30-01-F-03	3/29
GJL1313003R0014	BC7-30-01-F-04	3/29
GJL1313003R0015	BC7-30-01-F-05	3/29
GJL1313003R0017	BC7-30-01-F-07	3/29
GJL1313003R0101	BC7-30-10-F-01	3/29
GJL1313003R0103	BC7-30-10-F-03	3/29
GJL1313003R0104	BC7-30-10-F-04	3/29
GJL1313003R0105	BC7-30-10-F-05	3/29
GJL1313003R0107	BC7-30-10-F-07	3/29
GJL1313003R1016	BC7-30-01-F-16	3/29
GJL1313003R1106	BC7-30-10-F-16	3/29
GJL1313003R5011	BC7-30-01-F-2.4-51	3/34
GJL1313003R5101	BC7-30-10-F-2.4-51	3/34
GJL1313003R8011	BC7-30-01-F-1.4-81	3/34
GJL1313003R8101	BC7-30-10-F-1.4-81	3/34
GJL1313009R0011	BC7-30-01-P-01	3/19
GJL1313009R0013	BC7-30-01-P-03	3/19
GJL1313009R0014	BC7-30-01-P-04	3/19
GJL1313009R0015	BC7-30-01-P-05	3/19
GJL1313009R0017	BC7-30-01-P-07	3/19
GJL1313009R0101	BC7-30-10-P-01	3/19
GJL1313009R0103	BC7-30-10-P-03	3/19
GJL1313009R0104	BC7-30-10-P-04	3/19
GJL1313009R0105	BC7-30-10-P-05	3/19
GJL1313009R0107	BC7-30-10-P-07	3/19
GJL1313009R1016	BC7-30-01-P-16	3/19
GJL1313009R1106	BC7-30-10-P-16	3/19
GJL1313009R5011	BC7-30-01-P-2.4-51	3/26
GJL1313009R5101	BC7-30-10-P-2.4-51	3/26
GJL1313009R8011	BC7-30-01-P-1.4-81	3/26
GJL1313009R8101	BC7-30-10-P-1.4-81	3/26
GJL1313061R5011	TBC7-30-01-51	3/9
GJL1313061R5015	TBC7-30-01-55	3/9
GJL1313061R5101	TBC7-30-10-51	3/9
GJL1313061R5105	TBC7-30-10-55	3/9
GJL1313061R6012	TBC7-30-01-62	3/9
GJL1313061R6018	TBC7-30-01-68	3/9
GJL1313061R6102	TBC7-30-10-62	3/9
GJL1313061R6108	TBC7-30-10-68	3/9
GJL1313461R5005	TBC7-31-00-55	3/12
GJL1313461R6002	TBC7-31-00-62	3/12
GJL1313461R6008	TBC7-31-00-68	3/12
GJL1313561R5005	TBC7-22-00-55	3/12
GJL1313561R6002	TBC7-22-00-62	3/12
GJL1313561R6008	TBC7-22-00-68	3/12
GJL1313901R0011	VBC7-30-01-01	3/5
GJL1313901R0013	VBC7-30-01-03	3/5
GJL1313901R0014	VBC7-30-01-04	3/5
GJL1313901R0015	VBC7-30-01-05	3/5
GJL1313901R0017	VBC7-30-01-07	3/5
GJL1313901R0101	VBC7-30-10-01	3/5
GJL1313901R0103	VBC7-30-10-03	3/5
GJL1313901R0104	VBC7-30-10-04	3/5
GJL1313901R0105	VBC7-30-10-05	3/5
GJL1313901R0107	VBC7-30-10-07	3/5
GJL1313901R1016	VBC7-30-01-16	3/5
GJL1313901R1106	VBC7-30-10-16	3/5
GJL1313903R0011	VBC7-30-01-F-01	3/31
GJL1313903R0013	VBC7-30-01-F-03	3/31
GJL1313903R0014	VBC7-30-01-F-04	3/31
GJL1313903R0015	VBC7-30-01-F-05	3/31
GJL1313903R0017	VBC7-30-01-F-07	3/31
GJL1313903R0101	VBC7-30-10-F-01	3/31
GJL1313903R0103	VBC7-30-10-F-03	3/31
GJL1313903R0104	VBC7-30-10-F-04	3/31
GJL1313903R0105	VBC7-30-10-F-05	3/31
GJL1313903R0107	VBC7-30-10-F-07	3/31
GJL1313903R1016	VBC7-30-01-F-16	3/31
GJL1313903R1106	VBC7-30-10-F-16	3/31
GJL1313909R0011	VBC7-30-01-P-01	3/21
GJL1313909R0013	VBC7-30-01-P-03	3/21
GJL1313909R0014	VBC7-30-01-P-04	3/21
GJL1313909R0015	VBC7-30-01-P-05	3/21
GJL1313909R0017	VBC7-30-01-P-07	3/21
GJL1313909R0101	VBC7-30-10-P-01	3/21
GJL1313909R0103	VBC7-30-10-P-03	3/21
GJL1313909R0104	VBC7-30-10-P-04	3/21
GJL1313909R0105	VBC7-30-10-P-05	3/21
GJL1313909R0107	VBC7-30-10-P-07	3/21
GJL1313909R1016	VBC7-30-01-P-16	3/21
GJL1313909R1106	VBC7-30-10-P-16	3/21
GJL1313911R0011	VBC7A-30-01-01	3/7
GJL1313911R0013	VBC7A-30-01-03	3/7
GJL1313911R0014	VBC7A-30-01-04	3/7
GJL1313911R0015	VBC7A-30-01-05	3/7
GJL1313911R0016	VBC7A-30-01-16	3/7
GJL1313911R0017	VBC7A-30-01-07	3/7
GJL1313911R0101	VBC7A-30-10-01	3/7
GJL1313911R0103	VBC7A-30-10-03	3/7
GJL1313911R0104	VBC7A-30-10-04	3/7
GJL1313911R0105	VBC7A-30-10-05	3/7
GJL1313911R0107	VBC7A-30-10-07	3/7
GJL1313911R1106	VBC7A-30-10-16	3/7
GJL1313913R0011	VBC7A-30-01-F-01	3/33
GJL1313913R0013	VBC7A-30-01-F-03	3/33
GJL1313913R0014	VBC7A-30-01-F-04	3/33
GJL1313913R0015	VBC7A-30-01-F-05	3/33
GJL1313913R0017	VBC7A-30-01-F-07	3/33
GJL1313913R0101	VBC7A-30-10-F-01	3/33
GJL1313913R0103	VBC7A-30-10-F-03	3/33
GJL1313913R0104	VBC7A-30-10-F-04	3/33
GJL1313913R0105	VBC7A-30-10-F-05	3/33
GJL1313913R0107	VBC7A-30-10-F-07	3/33
GJL1313913R1016	VBC7A-30-01-F-16	3/33
GJL1313913R1106	VBC7A-30-10-F-16	3/33
GJL1313919R0011	VBC7A-30-01-P-01	3/23
GJL1313919R0013	VBC7A-30-01-P-03	3/23
GJL1313919R0014	VBC7A-30-01-P-04	3/23
GJL1313919R0015	VBC7A-30-01-P-05	3/23
GJL1313919R0017	VBC7A-30-01-P-07	3/23
GJL1313919R0101	VBC7A-30-10-P-01	3/23
GJL1313919R0103	VBC7A-30-10-P-03	3/23
GJL1313919R0104	VBC7A-30-10-P-04	3/23
GJL1313919R0105	VBC7A-30-10-P-05	3/23
GJL1313919R0107	VBC7A-30-10-P-07	3/23
GJL1313919R1016	VBC7A-30-01-P-16	3/23
GJL1313919R1106	VBC7A-30-10-P-16	3/23
GJL1317001R0011	B7D-30-01-01	3/3
GJL1317001R0015	B7D-30-01-05	3/3
GJL1317001R0101	B7D-30-10-01	3/3
GJL1317001R0105	B7D-30-10-05	3/3
GJL1317201R0001	B7D-40-00-01	3/11
GJL1317201R0005	B7D-40-00-05	3/11
SK178001-HB	LT150-EK	5/298
SK178001-KB	LT210-EK	5/298
SK178001-LB	LT550-EK	5/298
SK178001-MB	LT1000-EK	5/298
SK824204-A	KZK110	5/306
SK824204-B	KZK150	5/306
SK824440-AD	EK110-40-11	5/144
SK824440-AE	EK110-40-11	5/144
SK824440-AF	EK110-40-11	5/144
SK824440-AL	EK110-40-11	5/144
SK824440-AM	EK110-40-11	5/144
SK824440-AN	EK110-40-11	5/144
SK824440-AP	EK110-40-11	5/144
SK824440-AR	EK110-40-11	5/144

1SBC101359S0201

Index

Order code classification

Order code	Type	Page
SK824440-DA	EK110-40-21	5/145
SK824440-DB	EK110-40-21	5/145
SK824440-DC	EK110-40-21	5/145
SK824440-DD	EK110-40-21	5/145
SK824440-DE	EK110-40-21	5/145
SK824440-DF	EK110-40-21	5/145
SK824440-DG	EK110-40-21	5/145
SK824440-DT	EK110-40-21	5/145
SK824440-DU	EK110-40-21	5/145
SK824441-AD	EK150-40-11	5/144
SK824441-AE	EK150-40-11	5/144
SK824441-AF	EK150-40-11	5/144
SK824441-AL	EK150-40-11	5/144
SK824441-AM	EK150-40-11	5/144
SK824441-AN	EK150-40-11	5/144
SK824441-AP	EK150-40-11	5/144
SK824441-AR	EK150-40-11	5/144
SK824441-DA	EK150-40-21	5/145
SK824441-DB	EK150-40-21	5/145
SK824441-DC	EK150-40-21	5/145
SK824441-DD	EK150-40-21	5/145
SK824441-DE	EK150-40-21	5/145
SK824441-DF	EK150-40-21	5/145
SK824441-DG	EK150-40-21	5/145
SK824441-DT	EK150-40-21	5/145
SK824441-DU	EK150-40-21	5/145
SK824450-AD	EK110-40-22	5/150
SK824450-AE	EK110-40-22	5/150
SK824450-AF	EK110-40-22	5/150
SK824450-AL	EK110-40-22	5/150
SK824450-AM	EK110-40-22	5/150
SK824450-AN	EK110-40-22	5/150
SK824450-AP	EK110-40-22	5/150
SK824450-AR	EK110-40-22	5/150
SK824451-AD	EK150-40-22	5/150
SK824451-AE	EK150-40-22	5/150
SK824451-AF	EK150-40-22	5/150
SK824451-AL	EK150-40-22	5/150
SK824451-AM	EK150-40-22	5/150
SK824451-AN	EK150-40-22	5/150
SK824451-AP	EK150-40-22	5/150
SK824451-AR	EK150-40-22	5/150
SK825204-A	KZK175	5/306
SK825204-B	KZK210	5/306
SK825400-AD	KH210	5/307
SK825400-AE	KH210	5/307
SK825400-AF	KH210	5/307
SK825400-AL	KH210	5/307
SK825400-AM	KH210	5/307
SK825400-AN	KH210	5/307
SK825400-AP	KH210	5/307
SK825400-AR	KH210	5/307
SK825400-DA	KH210	5/309
SK825400-DB	KH210	5/309
SK825400-DC	KH210	5/309
SK825400-DD	KH210	5/309
SK825400-DE	KH210	5/309
SK825400-DF	KH210	5/309
SK825400-DG	KH210	5/309
SK825400-DT	KH210	5/309
SK825400-DU	KH210	5/309
SK825440-AD	EK175-40-11	5/146
SK825440-AE	EK175-40-11	5/146
SK825440-AF	EK175-40-11	5/146
SK825440-AL	EK175-40-11	5/146
SK825440-AM	EK175-40-11	5/146
SK825440-AN	EK175-40-11	5/146
SK825440-AP	EK175-40-11	5/146
SK825440-AR	EK175-40-11	5/146
SK825440-DA	EK175-40-21	5/147
SK825440-DB	EK175-40-21	5/147
SK825440-DC	EK175-40-21	5/147
SK825440-DD	EK175-40-21	5/147
SK825440-DE	EK175-40-21	5/147
SK825440-DF	EK175-40-21	5/147
SK825440-DG	EK175-40-21	5/147
SK825440-DT	EK175-40-21	5/147
SK825440-DU	EK175-40-21	5/147
SK825441-AD	EK210-40-11	5/146
SK825441-AE	EK210-40-11	5/146
SK825441-AF	EK210-40-11	5/146
SK825441-AL	EK210-40-11	5/146
SK825441-AM	EK210-40-11	5/146
SK825441-AN	EK210-40-11	5/146
SK825441-AP	EK210-40-11	5/146
SK825441-AR	EK210-40-11	5/146
SK825441-DA	EK210-40-21	5/147
SK825441-DB	EK210-40-21	5/147
SK825441-DC	EK210-40-21	5/147
SK825441-DD	EK210-40-21	5/147
SK825441-DE	EK210-40-21	5/147
SK825441-DF	EK210-40-21	5/147
SK825441-DG	EK210-40-21	5/147
SK825441-DT	EK210-40-21	5/147
SK825441-DU	EK210-40-21	5/147
SK825448-AD	EK175-40-22	5/151
SK825448-AE	EK175-40-22	5/151
SK825448-AF	EK175-40-22	5/151
SK825448-AL	EK175-40-22	5/151
SK825448-AM	EK175-40-22	5/151
SK825448-AN	EK175-40-22	5/151
SK825448-AP	EK175-40-22	5/151
SK825448-AR	EK175-40-22	5/151
SK825450-DA	KP210	5/308
SK825450-DB	KP210	5/308
SK825450-DC	KP210	5/308
SK825450-DD	KP210	5/308
SK825450-DE	KP210	5/308
SK825450-DF	KP210	5/308
SK825450-DG	KP210	5/308
SK825450-DT	KP210	5/308
SK825450-DU	KP210	5/308
SK825450-EF	KP210	5/308
SK825450-EG	KP210	5/308
SK825450-EL	KP210	5/308
SK825450-EM	KP210	5/308
SK825450-EP	KP210	5/308
SK825450-ER	KP210	5/308
SK825451-AD	EK210-40-22	5/151
SK825451-AE	EK210-40-22	5/151
SK825451-AF	EK210-40-22	5/151
SK825451-AL	EK210-40-22	5/151
SK825451-AM	EK210-40-22	5/151
SK825451-AN	EK210-40-22	5/151
SK825451-AP	EK210-40-22	5/151
SK825451-AR	EK210-40-22	5/151
SK826400-AD	KH300	5/307
SK826400-AE	KH300	5/307
SK826400-AF	KH300	5/307
SK826400-AL	KH300	5/307
SK826400-AM	KH300	5/307
SK826400-AN	KH300	5/307
SK826400-AP	KH300	5/307
SK826400-AR	KH300	5/307
SK826400-DA	KH300	5/309
SK826400-DB	KH300	5/309
SK826400-DC	KH300	5/309
SK826400-DD	KH300	5/309
SK826400-DE	KH300	5/309
SK826400-DF	KH300	5/309
SK826400-DG	KH300	5/309
SK826400-DT	KH300	5/309
SK826400-DU	KH300	5/309
SK826450-DA	KP300	5/308
SK826450-DB	KP300	5/308
SK826450-DC	KP300	5/308
SK826450-DD	KP300	5/308
SK826450-DE	KP300	5/308
SK826450-DF	KP300	5/308
SK826450-DG	KP300	5/308
SK826450-DT	KP300	5/308
SK826450-DU	KP300	5/308
SK826450-EF	KP300	5/308
SK826450-EG	KP300	5/308
SK826450-EL	KP300	5/308
SK826450-EM	KP300	5/308
SK826450-EP	KP300	5/308
SK826450-ER	KP300	5/308
SK827040-AD	EK370-40-11	5/146
SK827040-AR	EK370-40-11	5/146
SK827040-DB	EK370-40-21	5/147
SK827040-DC	EK370-40-21	5/147
SK827040-DD	EK370-40-21	5/147
SK827040-DE	EK370-40-21	5/147
SK827040-DF	EK370-40-21	5/147
SK827040-DG	EK370-40-21	5/147
SK827040-DT	EK370-40-21	5/147
SK827040-DU	EK370-40-21	5/147
SK827040-EF	EK370-40-11	5/146
SK827040-EG	EK370-40-11	5/146
SK827040-EL	EK370-40-11	5/146
SK827040-EM	EK370-40-11	5/146
SK827040-EP	EK370-40-11	5/146
SK827040-ER	EK370-40-11	5/146
SK827041-AD	EK550-40-11	5/146
SK827041-AR	EK550-40-11	5/146
SK827041-DB	EK550-40-21	5/147
SK827041-DC	EK550-40-21	5/147
SK827041-DD	EK550-40-21	5/147
SK827041-DE	EK550-40-21	5/147
SK827041-DF	EK550-40-21	5/147
SK827041-DG	EK550-40-21	5/147
SK827041-DT	EK550-40-21	5/147
SK827041-DU	EK550-40-21	5/147
SK827041-EF	EK550-40-11	5/146
SK827041-EG	EK550-40-11	5/146
SK827041-EL	EK550-40-11	5/146
SK827041-EM	EK550-40-11	5/146
SK827041-EP	EK550-40-11	5/146
SK827041-ER	EK550-40-11	5/146
SK827042-AD	EK370-40-22	5/151
SK827042-AR	EK370-40-22	5/151
SK827042-EF	EK370-40-22	5/151
SK827042-EG	EK370-40-22	5/151
SK827042-EL	EK370-40-22	5/151
SK827042-EM	EK370-40-22	5/151
SK827042-EP	EK370-40-22	5/151
SK827042-ER	EK370-40-22	5/151
SK827043-AD	EK550-40-22	5/151
SK827043-AR	EK550-40-22	5/151
SK827043-EF	EK550-40-22	5/151
SK827043-EG	EK550-40-22	5/151
SK827043-EL	EK550-40-22	5/151
SK827043-EM	EK550-40-22	5/151
SK827043-EP	EK550-40-22	5/151
SK827043-ER	EK550-40-22	5/151
SK827044-AD	EK1000-40-11	5/148
SK827044-AR	EK1000-40-11	5/148
SK827044-DB	EK1000-40-21	5/149
SK827044-DC	EK1000-40-21	5/149
SK827044-DD	EK1000-40-21	5/149
SK827044-DE	EK1000-40-21	5/149
SK827044-DF	EK1000-40-21	5/149
SK827044-DG	EK1000-40-21	5/149
SK827044-DT	EK1000-40-21	5/149
SK827044-DU	EK1000-40-21	5/149
SK827044-EF	EK1000-40-11	5/148
SK827044-EG	EK1000-40-11	5/148
SK827044-EL	EK1000-40-11	5/148
SK827044-EM	EK1000-40-11	5/148
SK827044-EP	EK1000-40-11	5/148
SK827044-ER	EK1000-40-11	5/148
SK827045-AD	EK1000-40-22	5/152
SK827045-AR	EK1000-40-22	5/152
SK827045-EF	EK1000-40-22	5/152
SK827045-EG	EK1000-40-22	5/152
SK827045-EL	EK1000-40-22	5/152
SK827045-EM	EK1000-40-22	5/152
SK827045-EP	EK1000-40-22	5/152
SK827045-ER	EK1000-40-22	5/152
SK827204-A	KZK370	5/306
SK827204-B	KZK550	5/306
SK827204-F	KZK1000	5/306
SK828100-AD	KH800	5/307
SK828100-AR	KH800	5/307
SK828100-DB	KH800	5/309
SK828100-DC	KH800	5/309
SK828100-DD	KH800	5/309
SK828100-DE	KH800	5/309
SK828100-DF	KH800	5/309
SK828100-DG	KH800	5/309
SK828100-DT	KH800	5/309
SK828100-DU	KH800	5/309
SK828100-EF	KH800	5/307
SK828100-EG	KH800	5/307
SK828100-EL	KH800	5/307
SK828100-EM	KH800	5/307
SK828100-EP	KH800	5/307
SK828100-ER	KH800	5/307
SK828150-DB	KP800	5/308
SK828150-DC	KP800	5/308
SK828150-DD	KP800	5/308
SK828150-DE	KP800	5/308
SK828150-DF	KP800	5/308
SK828150-DG	KP800	5/308
SK828150-DT	KP800	5/308
SK828150-DU	KP800	5/308
SK829002-A	CAL16-11A	5/294
SK829002-B	CAL16-11B	5/154
SK829002-C	CAL16-11C	5/154
SK829002-D	CAL16-11D	5/154
SK829002-E	CCL16-11E	5/154
SK829007-A	RC-EH300/48	5/154
SK829007-B	RC-EH300/415	5/154
SK829007-C	RC-EH800/110	5/154
SK829007-D	RC-EH800/600	5/154
SK829070-F	VH800	5/154
SK829071-A	VH145	5/154
SK829071-B	VH300	5/154
SK829075-C	PN210-22	5/302
SK829075-E	PN300-22	5/302
SK829090-B	BSS100	5/154
SK829090-E	BSS550	5/154
SK829090-F	BSS145	5/154
SK829090-G	BSS210	5/154
SK829090-H	BSS1000	5/154

1SBC101359S0201

Index

Type classification

Type	Order code	Page
A110-30-00	1SFL451001R8000	5/28
	1SFL451001R8100	5/28
	1SFL451001R8300	5/28
	1SFL451001R8400	5/28
	1SFL451001R8500	5/28
	1SFL451001R8600	5/28
	1SFL451001R8800	5/28
A110-30-11	1SFL451001R8011	5/32
	1SFL451001R8111	5/32
	1SFL451001R8311	5/32
	1SFL451001R8411	5/32
	1SFL451001R8511	5/32
	1SFL451001R8611	5/32
	1SFL451001R8811	5/32
A110-30-22	1SFL451001R8022	5/47
	1SFL451001R8122	5/47
	1SFL451001R8322	5/47
	1SFL451001R8422	5/47
	1SFL451001R8522	5/47
	1SFL451001R8622	5/47
	1SFL451001R8822	5/47
A145-30-11	1SFL471001R8011	5/36
	1SFL471001R8111	5/36
	1SFL471001R8311	5/36
	1SFL471001R8411	5/36
	1SFL471001R8511	5/36
	1SFL471001R8611	5/36
	1SFL471001R8811	5/36
A145-30-22	1SFL471001R8022	5/52
	1SFL471001R8122	5/52
	1SFL471001R8322	5/52
	1SFL471001R8422	5/52
	1SFL471001R8522	5/52
	1SFL471001R8622	5/52
	1SFL471001R8822	5/52
A185-30-11	1SFL491001R8011	5/36
	1SFL491001R8111	5/36
	1SFL491001R8311	5/36
	1SFL491001R8411	5/36
	1SFL491001R8511	5/36
	1SFL491001R8611	5/36
	1SFL491001R8811	5/36
A185-30-22	1SFL491001R8022	5/52
	1SFL491001R8122	5/52
	1SFL491001R8322	5/52
	1SFL491001R8422	5/52
	1SFL491001R8522	5/52
	1SFL491001R8622	5/52
	1SFL491001R8822	5/52
A210-30-11	1SFL511001R8011	5/36
	1SFL511001R8111	5/36
	1SFL511001R8311	5/36
	1SFL511001R8411	5/36
	1SFL511001R8511	5/36
	1SFL511001R8611	5/36
	1SFL511001R8811	5/36
A210-30-22	1SFL511001R8022	5/52
	1SFL511001R8122	5/52
	1SFL511001R8322	5/52
	1SFL511001R8422	5/52
	1SFL511001R8522	5/52
	1SFL511001R8622	5/52
	1SFL511001R8822	5/52
A260-30-11	1SFL531001R8011	5/36
	1SFL531001R8111	5/36
	1SFL531001R8311	5/36
	1SFL531001R8411	5/36
	1SFL531001R8511	5/36
	1SFL531001R8611	5/36
	1SFL531001R8811	5/36
A260-30-22	1SFL531001R8022	5/52
	1SFL531001R8122	5/52
	1SFL531001R8322	5/52
	1SFL531001R8422	5/52
	1SFL531001R8522	5/52
	1SFL531001R8622	5/52
	1SFL531001R8822	5/52
A300-30-11	1SFL551001R8011	5/36
	1SFL551001R8111	5/36
	1SFL551001R8311	5/36
	1SFL551001R8411	5/36
	1SFL551001R8511	5/36
	1SFL551001R8611	5/36
	1SFL551001R8811	5/36
A300-30-22	1SFL551001R8022	5/52
	1SFL551001R8122	5/52
	1SFL551001R8322	5/52
	1SFL551001R8422	5/52
	1SFL551001R8522	5/52
	1SFL551001R8622	5/52
	1SFL551001R8822	5/52
A40-30-01	1SBL321001R8001	5/10
	1SBL321001R8101	5/10
	1SBL321001R8301	5/10
	1SBL321001R8401	5/10
	1SBL321001R8501	5/10
	1SBL321001R8601	5/10
	1SBL321001R8801	5/10
A40-30-10	1SBL321001R8010	5/10
	1SBL321001R8110	5/10
	1SBL321001R8310	5/10
	1SBL321001R8410	5/10
	1SBL321001R8510	5/10
	1SBL321001R8610	5/10
	1SBL321001R8810	5/10
A40-30-32	1SBL321001R8032	5/46
	1SBL321001R8132	5/46
	1SBL321001R8332	5/46
	1SBL321001R8432	5/46
	1SBL321001R8532	5/46
	1SBL321001R8632	5/46
	1SBL321001R8832	5/46
A45-22-00	1SBL331501R8000	5/135
	1SBL331501R8100	5/135
	1SBL331501R8300	5/135
	1SBL331501R8400	5/135
	1SBL331501R8500	5/135
	1SBL331501R8600	5/135
	1SBL331501R8800	5/135
A45-40-00	1SBL331201R8000	5/135
	1SBL331201R8100	5/135
	1SBL331201R8300	5/135
	1SBL331201R8400	5/135
	1SBL331201R8500	5/135
	1SBL331201R8600	5/135
	1SBL331201R8800	5/135
A50-30-00	1SBL351001R8000	5/11
	1SBL351001R8100	5/11
	1SBL351001R8300	5/11
	1SBL351001R8400	5/11
	1SBL351001R8500	5/11
	1SBL351001R8600	5/11
	1SBL351001R8800	5/11
A50-30-11	1SBL351001R8011	5/18
	1SBL351001R8111	5/18
	1SBL351001R8311	5/18
	1SBL351001R8411	5/18
	1SBL351001R8511	5/18
	1SBL351001R8611	5/18
	1SBL351001R8811	5/18
A50-30-22	1SBL351001R8022	5/47
	1SBL351001R8122	5/47
	1SBL351001R8322	5/47
	1SBL351001R8422	5/47
	1SBL351001R8522	5/47
	1SBL351001R8622	5/47
	1SBL351001R8822	5/47
A50-40-00	1SBL351201R8000	5/135
	1SBL351201R8100	5/135
	1SBL351201R8300	5/135
	1SBL351201R8400	5/135
	1SBL351201R8500	5/135
	1SBL351201R8600	5/135
	1SBL351201R8800	5/135
A63-30-00	1SBL371001R8000	5/11
	1SBL371001R8100	5/11
	1SBL371001R8300	5/11
	1SBL371001R8400	5/11
	1SBL371001R8500	5/11
	1SBL371001R8600	5/11
	1SBL371001R8800	5/11
A63-30-11	1SBL371001R8011	5/18
	1SBL371001R8111	5/18
	1SBL371001R8311	5/18
	1SBL371001R8411	5/18
	1SBL371001R8511	5/18
	1SBL371001R8611	5/18
	1SBL371001R8811	5/18
A63-30-22	1SBL371001R8022	5/47
	1SBL371001R8122	5/47
	1SBL371001R8322	5/47
	1SBL371001R8422	5/47
	1SBL371001R8522	5/47
	1SBL371001R8622	5/47
	1SBL371001R8822	5/47
A75-22-00	1SBL411501R8000	5/135
	1SBL411501R8100	5/135
	1SBL411501R8300	5/135
	1SBL411501R8400	5/135
	1SBL411501R8500	5/135
	1SBL411501R8600	5/135
	1SBL411501R8800	5/135
A75-30-00	1SBL411001R8000	5/11
	1SBL411001R8100	5/11
	1SBL411001R8300	5/11
	1SBL411001R8400	5/11
	1SBL411001R8500	5/11
	1SBL411001R8600	5/11
	1SBL411001R8800	5/11
A75-30-11	1SBL411001R8011	5/18
	1SBL411001R8111	5/18
	1SBL411001R8311	5/18
	1SBL411001R8411	5/18
	1SBL411001R8511	5/18
	1SBL411001R8611	5/18
	1SBL411001R8811	5/18
A75-30-22	1SBL411001R8022	5/47
	1SBL411001R8122	5/47
	1SBL411001R8322	5/47
	1SBL411001R8422	5/47
	1SBL411001R8522	5/47
	1SBL411001R8622	5/47
	1SBL411001R8822	5/47
A75-40-00	1SBL411201R8000	5/135
	1SBL411201R8100	5/135
	1SBL411201R8300	5/135
	1SBL411201R8400	5/135
	1SBL411201R8500	5/135
	1SBL411201R8600	5/135
	1SBL411201R8800	5/135
A95-30-00	1SFL431001R8000	5/28
	1SFL431001R8100	5/28
	1SFL431001R8300	5/28
	1SFL431001R8400	5/28
	1SFL431001R8500	5/28
	1SFL431001R8600	5/28
	1SFL431001R8800	5/28
A95-30-11	1SFL431001R8011	5/32
	1SFL431001R8111	5/32
	1SFL431001R8311	5/32
	1SFL431001R8411	5/32
	1SFL431001R8511	5/32
	1SFL431001R8611	5/32
	1SFL431001R8811	5/32
A95-30-22	1SFL431001R8022	5/47
	1SFL431001R8122	5/47
	1SFL431001R8322	5/47
	1SFL431001R8422	5/47
	1SFL431001R8522	5/47
	1SFL431001R8622	5/47
	1SFL431001R8822	5/47
AA1-110	1SAM201910R1002	2/7
AA1-230	1SAM201910R1003	2/7
AA1-24	1SAM201910R1001	2/7
AA1-400	1SAM201910R1004	2/7
AA-230	1SAM101909R0002	2/51
AA-24	1SAM101909R0001	2/51
AA-400	1SAM101909R0003	2/51
AA4-110	1SAM401907R1002	2/34
AA4-230	1SAM401907R1003	2/34
AA4-24	1SAM401907R1001	2/34
AA4-400	1SAM401907R1004	2/34
AE45-22-00	1SBL339501R8000	5/136
	1SBL339501R8100	5/136
	1SBL339501R8300	5/136
	1SBL339501R8400	5/136
	1SBL339501R8600	5/136
	1SBL339501R8700	5/136
	1SBL339501R8800	5/136
	1SBL339501R8900	5/136
AE45-40-00	1SBL339201R8000	5/136
	1SBL339201R8100	5/136
	1SBL339201R8300	5/136
	1SBL339201R8400	5/136
	1SBL339201R8600	5/136
	1SBL339201R8700	5/136
	1SBL339201R8800	5/136
	1SBL339201R8900	5/136
AE50-30-00	1SBL359001R8000	5/13
	1SBL359001R8100	5/13
	1SBL359001R8300	5/13
	1SBL359001R8400	5/13
	1SBL359001R8600	5/13
	1SBL359001R8700	5/13
	1SBL359001R8800	5/13
	1SBL359001R8900	5/13
AE50-30-11	1SBL359001R8011	5/19
	1SBL359001R8111	5/19
	1SBL359001R8311	5/19
	1SBL359001R8411	5/19
	1SBL359001R8611	5/19
	1SBL359001R8711	5/19
	1SBL359001R8811	5/19
	1SBL359001R8911	5/19
AE50-40-00	1SBL359201R8000	5/136
	1SBL359201R8100	5/136
	1SBL359201R8300	5/136
	1SBL359201R8400	5/136
	1SBL359201R8600	5/136
	1SBL359201R8700	5/136
	1SBL359201R8800	5/136
	1SBL359201R8900	5/136
AE63-30-00	1SBL379001R8000	5/13
	1SBL379001R8100	5/13
	1SBL379001R8300	5/13
	1SBL379001R8400	5/13
	1SBL379001R8600	5/13
	1SBL379001R8700	5/13
	1SBL379001R8800	5/13
	1SBL379001R8900	5/13
AE63-30-11	1SBL379001R8011	5/19
	1SBL379001R8111	5/19
	1SBL379001R8311	5/19
	1SBL379001R8411	5/19
	1SBL379001R8611	5/19
	1SBL379001R8711	5/19
	1SBL379001R8811	5/19
	1SBL379001R8911	5/19
AE75-22-00	1SBL419501R8000	5/136
	1SBL419501R8100	5/136

1SBC101359S0201

Index

Type classification

Type	Order code	Page
	1SBL419501R8300	5/136
	1SBL419501R8400	5/136
	1SBL419501R8600	5/136
	1SBL419501R8700	5/136
	1SBL419501R8800	5/136
	1SBL419501R8900	5/136
AE75-30-00	1SBL419001R8000	5/13
	1SBL419001R8100	5/13
	1SBL419001R8300	5/13
	1SBL419001R8400	5/13
	1SBL419001R8600	5/13
	1SBL419001R8700	5/13
	1SBL419001R8800	5/13
	1SBL419001R8900	5/13
AE75-30-11	1SBL419001R8011	5/19
	1SBL419001R8111	5/19
	1SBL419001R8311	5/19
	1SBL419001R8411	5/19
	1SBL419001R8611	5/19
	1SBL419001R8711	5/19
	1SBL419001R8811	5/19
	1SBL419001R8911	5/19
AE75-40-00	1SBL419201R8000	5/136
	1SBL419201R8100	5/136
	1SBL419201R8300	5/136
	1SBL419201R8400	5/136
	1SBL419201R8600	5/136
	1SBL419201R8700	5/136
	1SBL419201R8800	5/136
	1SBL419201R8900	5/136
AF09-22-00-11	1SBL137501R1100	5/130
AF09-22-00-12	1SBL137501R1200	5/130
AF09-22-00-13	1SBL137501R1300	5/130
AF09-22-00-14	1SBL137501R1400	5/130
AF09-30-01-11	1SBL137001R1101	5/6
AF09-30-01-12	1SBL137001R1201	5/6
AF09-30-01-13	1SBL137001R1301	5/6
AF09-30-01-14	1SBL137001R1401	5/6
AF09-30-10-11	1SBL137001R1110	5/6
AF09-30-10-12	1SBL137001R1210	5/6
AF09-30-10-13	1SBL137001R1310	5/6
AF09-30-10-14	1SBL137001R1410	5/6
AF09-30-22-11	1SBL137001R1122	5/42
AF09-30-22-12	1SBL137001R1222	5/42
AF09-30-22-13	1SBL137001R1322	5/42
AF09-30-22-14	1SBL137001R1422	5/42
AF09-40-00-11	1SBL137201R1100	5/130
AF09-40-00-12	1SBL137201R1200	5/130
AF09-40-00-13	1SBL137201R1300	5/130
AF09-40-00-14	1SBL137201R1400	5/130
AF09Z-22-00-20	1SBL136501R2000	5/131
AF09Z-22-00-21	1SBL136501R2100	5/131
AF09Z-22-00-22	1SBL136501R2200	5/131
AF09Z-22-00-23	1SBL136501R2300	5/131
AF09Z-30-01-20	1SBL136001R2001	5/7
AF09Z-30-01-21	1SBL136001R2101	5/7
AF09Z-30-01-22	1SBL136001R2201	5/7
AF09Z-30-01-23	1SBL136001R2301	5/7
AF09Z-30-10-20	1SBL136001R2010	5/7
AF09Z-30-10-21	1SBL136001R2110	5/7
AF09Z-30-10-22	1SBL136001R2210	5/7
AF09Z-30-10-23	1SBL136001R2310	5/7
AF09Z-30-22-20	1SBL136001R2022	5/43
AF09Z-30-22-21	1SBL136001R2122	5/43
AF09Z-30-22-22	1SBL136001R2222	5/43
AF09Z-30-22-23	1SBL136001R2322	5/43
AF09Z-40-00-20	1SBL136201R2000	5/131
AF09Z-40-00-21	1SBL136201R2100	5/131
AF09Z-40-00-22	1SBL136201R2200	5/131
AF09Z-40-00-23	1SBL136201R2300	5/131
AF110-30-00	1SFL457001R6900	5/29
	1SFL457001R7000	5/29
	1SFL457001R7200	5/29
AF110-30-11	1SFL457001R6911	5/33
	1SFL457001R7011	5/33
	1SFL457001R7211	5/33
AF12-30-01-11	1SBL157001R1101	5/6
AF12-30-01-12	1SBL157001R1201	5/6
AF12-30-01-13	1SBL157001R1301	5/6
AF12-30-01-14	1SBL157001R1401	5/6
AF12-30-10-11	1SBL157001R1110	5/6
AF12-30-10-12	1SBL157001R1210	5/6
AF12-30-10-13	1SBL157001R1310	5/6
AF12-30-10-14	1SBL157001R1410	5/6
AF12-30-22-11	1SBL157001R1122	5/42
AF12-30-22-12	1SBL157001R1222	5/42
AF12-30-22-13	1SBL157001R1322	5/42
AF12-30-22-14	1SBL157001R1422	5/42
AF1250-30-11	1SFL647001R6811	5/39
	1SFL647001R6911	5/39
	1SFL647001R7011	5/39
	1SFL647001R7111	5/39
AF1250-30-22	1SFL647001R6822	5/55
	1SFL647001R6922	5/55
	1SFL647001R7022	5/55
	1SFL647001R7122	5/55
AF12Z-30-01-20	1SBL156001R2001	5/7
AF12Z-30-01-21	1SBL156001R2101	5/7
AF12Z-30-01-22	1SBL156001R2201	5/7
AF12Z-30-01-23	1SBL156001R2301	5/7
AF12Z-30-10-20	1SBL156001R2010	5/7
AF12Z-30-10-21	1SBL156001R2110	5/7
AF12Z-30-10-22	1SBL156001R2210	5/7
AF12Z-30-10-23	1SBL156001R2310	5/7
AF12Z-30-22-20	1SBL156001R2022	5/43
AF12Z-30-22-21	1SBL156001R2122	5/43
AF12Z-30-22-22	1SBL156001R2222	5/43
AF12Z-30-22-23	1SBL156001R2322	5/43
AF1350-30-11	1SFL657001R7011	5/39
AF1350-30-22	1SFL657001R7022	5/55
AF145-30-11	1SFL477001R6911	5/37
	1SFL477001R7011	5/37
	1SFL477001R7211	5/37
AF145-30-22	1SFL477001R6922	5/53
	1SFL477001R7022	5/53
	1SFL477001R7222	5/53
AF16-22-00-11	1SBL177501R1100	5/130
AF16-22-00-12	1SBL177501R1200	5/130
AF16-22-00-13	1SBL177501R1300	5/130
AF16-22-00-14	1SBL177501R1400	5/130
AF16-30-01-11	1SBL177001R1101	5/6
AF16-30-01-12	1SBL177001R1201	5/6
AF16-30-01-13	1SBL177001R1301	5/6
AF16-30-01-14	1SBL177001R1401	5/6
AF16-30-10-11	1SBL177001R1110	5/6
AF16-30-10-12	1SBL177001R1210	5/6
AF16-30-10-13	1SBL177001R1310	5/6
AF16-30-10-14	1SBL177001R1410	5/6
AF16-30-22-11	1SBL177001R1122	5/42
AF16-30-22-12	1SBL177001R1222	5/42
AF16-30-22-13	1SBL177001R1322	5/42
AF16-30-22-14	1SBL177001R1422	5/42
AF16-40-00-11	1SBL177201R1100	5/130
AF16-40-00-12	1SBL177201R1200	5/130
AF16-40-00-13	1SBL177201R1300	5/130
AF16-40-00-14	1SBL177201R1400	5/130
AF1650-30-11	1SFL677001R7011	5/39
AF1650-30-22	1SFL677001R7022	5/55
AF16Z-22-00-20	1SBL176501R2000	5/131
AF16Z-22-00-21	1SBL176501R2100	5/131
AF16Z-22-00-22	1SBL176501R2200	5/131
AF16Z-22-00-23	1SBL176501R2300	5/131
AF16Z-30-01-20	1SBL176001R2001	5/7
AF16Z-30-01-21	1SBL176001R2101	5/7
AF16Z-30-01-22	1SBL176001R2201	5/7
AF16Z-30-01-23	1SBL176001R2301	5/7
AF16Z-30-10-20	1SBL176001R2010	5/7
AF16Z-30-10-21	1SBL176001R2110	5/7
AF16Z-30-10-22	1SBL176001R2210	5/7
AF16Z-30-10-23	1SBL176001R2310	5/7
AF16Z-30-22-20	1SBL176001R2022	5/43
AF16Z-30-22-21	1SBL176001R2122	5/43
AF16Z-30-22-22	1SBL176001R2222	5/43
AF16Z-30-22-23	1SBL176001R2322	5/43
AF16Z-40-00-20	1SBL176201R2000	5/131
AF16Z-40-00-21	1SBL176201R2100	5/131
AF16Z-40-00-22	1SBL176201R2200	5/131
AF16Z-40-00-23	1SBL176201R2300	5/131
AF185-30-11	1SFL497001R6911	5/37
	1SFL497001R7011	5/37
	1SFL497001R7211	5/37
AF185-30-22	1SFL497001R6922	5/53
	1SFL497001R7022	5/53
	1SFL497001R7222	5/53
AF2050-30-11	1SFL707001R7011	5/39
AF2050-30-22	1SFL707001R7022	5/55
AF210-30-11	1SFL517001R6911	5/37
	1SFL517001R7011	5/37
	1SFL517001R7211	5/37
AF210-30-22	1SFL517001R6922	5/53
	1SFL517001R7022	5/53
	1SFL517001R7222	5/53
AF260-30-11	1SFL537001R6911	5/37
	1SFL537001R7011	5/37
	1SFL537001R7211	5/37
AF260-30-22	1SFL537001R6922	5/53
	1SFL537001R7022	5/53
	1SFL537001R7222	5/53
AF26-22-00-11	1SBL237501R1100	5/130
AF26-22-00-12	1SBL237501R1200	5/130
AF26-22-00-13	1SBL237501R1300	5/130
AF26-22-00-14	1SBL237501R1400	5/130
AF26-30-00-11	1SBL237001R1100	5/6
AF26-30-00-12	1SBL237001R1200	5/6
AF26-30-00-13	1SBL237001R1300	5/6
AF26-30-00-14	1SBL237001R1400	5/6
AF26-30-11-11	1SBL237001R1111	5/42
AF26-30-11-12	1SBL237001R1211	5/42
AF26-30-11-13	1SBL237001R1311	5/42
AF26-30-11-14	1SBL237001R1411	5/42
AF26-30-22-11	1SBL237001R1122	5/42
AF26-30-22-12	1SBL237001R1222	5/42
AF26-30-22-13	1SBL237001R1322	5/42
AF26-30-22-14	1SBL237001R1422	5/42
AF26-40-00-11	1SBL237201R1100	5/130
AF26-40-00-12	1SBL237201R1200	5/130
AF26-40-00-13	1SBL237201R1300	5/130
AF26-40-00-14	1SBL237201R1400	5/130
AF26Z-22-00-20	1SBL236501R2000	5/131
AF26Z-22-00-21	1SBL236501R2100	5/131
AF26Z-22-00-22	1SBL236501R2200	5/131
AF26Z-22-00-23	1SBL236501R2300	5/131
AF26Z-30-00-20	1SBL236001R2000	5/7
AF26Z-30-00-21	1SBL236001R2100	5/7
AF26Z-30-00-22	1SBL236001R2200	5/7
AF26Z-30-00-23	1SBL236001R2300	5/7
AF26Z-30-11-20	1SBL236001R2011	5/43
AF26Z-30-11-21	1SBL236001R2111	5/43
AF26Z-30-11-22	1SBL236001R2211	5/43
AF26Z-30-11-23	1SBL236001R2311	5/43
AF26Z-30-22-20	1SBL236001R2022	5/43
AF26Z-30-22-21	1SBL236001R2122	5/43
AF26Z-30-22-22	1SBL236001R2222	5/43
AF26Z-30-22-23	1SBL236001R2322	5/43
AF26Z-40-00-20	1SBL236201R2000	5/131
AF26Z-40-00-21	1SBL236201R2100	5/131
AF26Z-40-00-22	1SBL236201R2200	5/131
AF26Z-40-00-23	1SBL236201R2300	5/131
AF300-30-11	1SFL557001R6911	5/37
	1SFL557001R7011	5/37
	1SFL557001R7211	5/37
AF300-30-22	1SFL557001R6922	5/53
	1SFL557001R7022	5/53
	1SFL557001R7222	5/53
AF30-30-00-11	1SBL277001R1100	5/6
AF30-30-00-12	1SBL277001R1200	5/6
AF30-30-00-13	1SBL277001R1300	5/6
AF30-30-00-14	1SBL277001R1400	5/6
AF30-30-11-11	1SBL277001R1111	5/42
AF30-30-11-12	1SBL277001R1211	5/42
AF30-30-11-13	1SBL277001R1311	5/42
AF30-30-11-14	1SBL277001R1411	5/42
AF30-30-22-11	1SBL277001R1122	5/42
AF30-30-22-12	1SBL277001R1222	5/42
AF30-30-22-13	1SBL277001R1322	5/42
AF30-30-22-14	1SBL277001R1422	5/42
AF30Z-30-00-20	1SBL276001R2000	5/7
AF30Z-30-00-21	1SBL276001R2100	5/7
AF30Z-30-00-22	1SBL276001R2200	5/7
AF30Z-30-00-23	1SBL276001R2300	5/7
AF30Z-30-11-20	1SBL276001R2011	5/43
AF30Z-30-11-21	1SBL276001R2111	5/43
AF30Z-30-11-22	1SBL276001R2211	5/43
AF30Z-30-11-23	1SBL276001R2311	5/43
AF30Z-30-22-20	1SBL276001R2022	5/43
AF30Z-30-22-21	1SBL276001R2122	5/43
AF30Z-30-22-22	1SBL276001R2222	5/43
AF30Z-30-22-23	1SBL276001R2322	5/43
AF38-22-00-11	1SBL297501R1100	5/130
AF38-22-00-12	1SBL297501R1200	5/130
AF38-22-00-13	1SBL297501R1300	5/130
AF38-22-00-14	1SBL297501R1400	5/130
AF38-30-00-11	1SBL297001R1100	5/6
AF38-30-00-12	1SBL297001R1200	5/6
AF38-30-00-13	1SBL297001R1300	5/6
AF38-30-00-14	1SBL297001R1400	5/6
AF38-30-11-11	1SBL297001R1111	5/42
AF38-30-11-12	1SBL297001R1211	5/42
AF38-30-11-13	1SBL297001R1311	5/42
AF38-30-11-14	1SBL297001R1411	5/42
AF38-30-22-11	1SBL297001R1122	5/42
AF38-30-22-12	1SBL297001R1222	5/42
AF38-30-22-13	1SBL297001R1322	5/42
AF38-30-22-14	1SBL297001R1422	5/42
AF38-40-00-11	1SBL297201R1100	5/130
AF38-40-00-12	1SBL297201R1200	5/130
AF38-40-00-13	1SBL297201R1300	5/130
AF38-40-00-14	1SBL297201R1400	5/130
AF38Z-22-00-20	1SBL296501R2000	5/131
AF38Z-22-00-21	1SBL296501R2100	5/131
AF38Z-22-00-22	1SBL296501R2200	5/131
AF38Z-22-00-23	1SBL296501R2300	5/131
AF38Z-30-00-20	1SBL296001R2000	5/7
AF38Z-30-00-21	1SBL296001R2100	5/7
AF38Z-30-00-22	1SBL296001R2200	5/7
AF38Z-30-00-23	1SBL296001R2300	5/7
AF38Z-30-11-20	1SBL296001R2011	5/43
AF38Z-30-11-21	1SBL296001R2111	5/43
AF38Z-30-11-22	1SBL296001R2211	5/43
AF38Z-30-11-23	1SBL296001R2311	5/43
AF38Z-30-22-20	1SBL296001R2022	5/43
AF38Z-30-22-21	1SBL296001R2122	5/43
AF38Z-30-22-22	1SBL296001R2222	5/43
AF38Z-30-22-23	1SBL296001R2322	5/43
AF38Z-40-00-20	1SBL296201R2000	5/131
AF38Z-40-00-21	1SBL296201R2100	5/131
AF38Z-40-00-22	1SBL296201R2200	5/131
AF38Z-40-00-23	1SBL296201R2300	5/131
AF400-30-11	1SFL577001R6811	5/38
	1SFL577001R6911	5/38
	1SFL577001R7011	5/38
	1SFL577001R7111	5/38
AF400-30-22	1SFL577001R6822	5/54
	1SFL577001R6922	5/54
	1SFL577001R7022	5/54
	1SFL577001R7122	5/54
AF45-22-00	1SBL337501R6900	5/137
	1SBL337501R7000	5/137
	1SBL337501R7200	5/137
AF45-40-00	1SBL337201R6900	5/137

1SBC101359S0201

Index

Type classification

Type	Order code	Page
	1SBL337201R7000	5/137
	1SBL337201R7200	5/137
AF460-30-11	1SFL597001R6811	5/38
	1SFL597001R6911	5/38
	1SFL597001R7011	5/38
	1SFL597001R7111	5/38
AF460-30-22	1SFL597001R6822	5/54
	1SFL597001R6922	5/54
	1SFL597001R7022	5/54
	1SFL597001R7122	5/54
AF50-30-00	1SBL357001R6900	5/14
	1SBL357001R7000	5/14
	1SBL357001R7200	5/14
AF50-30-11	1SBL357001R6911	5/20
	1SBL357001R7011	5/20
	1SBL357001R7211	5/20
AF50-40-00	1SBL357201R6900	5/137
	1SBL357201R7000	5/137
	1SBL357201R7200	5/137
AF580-30-11	1SFL617001R6811	5/38
	1SFL617001R6911	5/38
	1SFL617001R7011	5/38
	1SFL617001R7111	5/38
AF580-30-22	1SFL617001R6822	5/54
	1SFL617001R6922	5/54
	1SFL617001R7022	5/54
	1SFL617001R7122	5/54
AF63-30-00	1SBL377001R6900	5/14
	1SBL377001R7000	5/14
	1SBL377001R7200	5/14
AF63-30-11	1SBL377001R6911	5/20
	1SBL377001R7011	5/20
	1SBL377001R7211	5/20
AF750-30-11	1SFL637001R6811	5/38
	1SFL637001R6911	5/38
	1SFL637001R7011	5/38
	1SFL637001R7111	5/38
AF750-30-22	1SFL637001R6822	5/54
	1SFL637001R6922	5/54
	1SFL637001R7022	5/54
	1SFL637001R7122	5/54
AF75-22-00	1SBL417501R6900	5/137
	1SBL417501R7000	5/137
	1SBL417501R7200	5/137
AF75-30-00	1SBL417001R6900	5/14
	1SBL417001R7000	5/14
	1SBL417001R7200	5/14
AF75-30-11	1SBL417001R6911	5/20
	1SBL417001R7011	5/20
	1SBL417001R7211	5/20
AF75-40-00	1SBL417201R6900	5/137
	1SBL417201R7000	5/137
	1SBL417201R7200	5/137
AF95-30-00	1SFL437001R6900	5/29
	1SFL437001R7000	5/29
	1SFL437001R7200	5/29
AF95-30-11	1SFL437001R6911	5/33
	1SFL437001R7011	5/33
	1SFL437001R7211	5/33
AL40-30-01	1SBL323001R8001	5/12
	1SBL323001R8101	5/12
	1SBL323001R8301	5/12
	1SBL323001R8401	5/12
	1SBL323001R8601	5/12
	1SBL323001R8701	5/12
	1SBL323001R8801	5/12
	1SBL323001R8901	5/12
AL40-30-10	1SBL323001R8010	5/12
	1SBL323001R8110	5/12
	1SBL323001R8310	5/12
	1SBL323001R8410	5/12
	1SBL323001R8610	5/12
	1SBL323001R8710	5/12
	1SBL323001R8810	5/12
	1SBL323001R8910	5/12
AL40-30-22	1SBL323001R8022	5/48
	1SBL323001R8122	5/48
	1SBL323001R8322	5/48
	1SBL323001R8422	5/48
	1SBL323001R8622	5/48
	1SBL323001R8722	5/48
	1SBL323001R8822	5/48
	1SBL323001R8922	5/48
AS09-30-01-16	1SBL101001R1601	4/14
AS09-30-01-20	1SBL101001R2001	4/14
AS09-30-01-26	1SBL101001R2601	4/14
AS09-30-01-28	1SBL101001R2801	4/14
AS09-30-01S-16	1SBL101004R1601	4/86
AS09-30-01S-20	1SBL101004R2001	4/86
AS09-30-01S-26	1SBL101004R2601	4/86
AS09-30-01S-28	1SBL101004R2801	4/86
AS09-30-10-16	1SBL101001R1610	4/10
AS09-30-10-20	1SBL101001R2010	4/10
AS09-30-10-26	1SBL101001R2610	4/10
AS09-30-10-28	1SBL101001R2810	4/10
AS09-30-10S-16	1SBL101004R1610	4/86
AS09-30-10S-20	1SBL101004R2010	4/86
AS09-30-10S-26	1SBL101004R2610	4/86
AS09-30-10S-28	1SBL101004R2810	4/86
AS09-30-32-16	1SBL101001R1632	4/34
AS09-30-32-20	1SBL101001R2032	4/34
AS09-30-32-26	1SBL101001R2632	4/34
AS09-30-32-28	1SBL101001R2832	4/34
AS09-30-32S-16	1SBL101004R1632	4/87
AS09-30-32S-20	1SBL101004R2032	4/87
AS09-30-32S-26	1SBL101004R2632	4/87
AS09-30-32S-28	1SBL101004R2832	4/87
AS12-30-01-16	1SBL111001R1601	4/14
AS12-30-01-20	1SBL111001R2001	4/14
AS12-30-01-26	1SBL111001R2601	4/14
AS12-30-01-28	1SBL111001R2801	4/14
AS12-30-01S-16	1SBL111004R1601	4/86
AS12-30-01S-20	1SBL111004R2001	4/86
AS12-30-01S-26	1SBL111004R2601	4/86
AS12-30-01S-28	1SBL111004R2801	4/86
AS12-30-10-16	1SBL111001R1610	4/10
AS12-30-10-20	1SBL111001R2010	4/10
AS12-30-10-26	1SBL111001R2610	4/10
AS12-30-10-28	1SBL111001R2810	4/10
AS12-30-10S-16	1SBL111004R1610	4/86
AS12-30-10S-20	1SBL111004R2010	4/86
AS12-30-10S-26	1SBL111004R2610	4/86
AS12-30-10S-28	1SBL111004R2810	4/86
AS12-30-32-16	1SBL111001R1632	4/34
AS12-30-32-20	1SBL111001R2032	4/34
AS12-30-32-26	1SBL111001R2632	4/34
AS12-30-32-28	1SBL111001R2832	4/34
AS12-30-32S-16	1SBL111004R1632	4/87
AS12-30-32S-20	1SBL111004R2032	4/87
AS12-30-32S-26	1SBL111004R2632	4/87
AS12-30-32S-28	1SBL111004R2832	4/87
AS16-30-01-16	1SBL121001R1601	4/14
AS16-30-01-20	1SBL121001R2001	4/14
AS16-30-01-26	1SBL121001R2601	4/14
AS16-30-01-28	1SBL121001R2801	4/14
AS16-30-01S-16	1SBL121004R1601	4/86
AS16-30-01S-20	1SBL121004R2001	4/86
AS16-30-01S-26	1SBL121004R2601	4/86
AS16-30-01S-28	1SBL121004R2801	4/86
AS16-30-10-16	1SBL121001R1610	4/10
AS16-30-10-20	1SBL121001R2010	4/10
AS16-30-10-26	1SBL121001R2610	4/10
AS16-30-10-28	1SBL121001R2810	4/10
AS16-30-10S-16	1SBL121004R1610	4/86
AS16-30-10S-20	1SBL121004R2010	4/86
AS16-30-10S-26	1SBL121004R2610	4/86
AS16-30-10S-28	1SBL121004R2810	4/86
AS16-30-32-16	1SBL121001R1632	4/34
AS16-30-32-20	1SBL121001R2032	4/34
AS16-30-32-26	1SBL121001R2632	4/34
AS16-30-32-28	1SBL121001R2832	4/34
AS16-30-32S-16	1SBL121004R1632	4/87
AS16-30-32S-20	1SBL121004R2032	4/87
AS16-30-32S-26	1SBL121004R2632	4/87
AS16-30-32S-28	1SBL121004R2832	4/87
ASL09-30-01-81	1SBL103001R8101	4/15
ASL09-30-01-83	1SBL103001R8301	4/15
ASL09-30-01-86	1SBL103001R8601	4/15
ASL09-30-01-88	1SBL103001R8801	4/15
ASL09-30-01S-81	1SBL103004R8101	4/88
ASL09-30-01S-83	1SBL103004R8301	4/88
ASL09-30-01S-86	1SBL103004R8601	4/88
ASL09-30-01S-88	1SBL103004R8801	4/88
ASL09-30-10-81	1SBL103001R8110	4/11
ASL09-30-10-83	1SBL103001R8310	4/11
ASL09-30-10-86	1SBL103001R8610	4/11
ASL09-30-10-88	1SBL103001R8810	4/11
ASL09-30-10S-81	1SBL103004R8110	4/88
ASL09-30-10S-83	1SBL103004R8310	4/88
ASL09-30-10S-86	1SBL103004R8610	4/88
ASL09-30-10S-88	1SBL103004R8810	4/88
ASL09-30-32-81	1SBL103001R8132	4/35
ASL09-30-32-83	1SBL103001R8332	4/35
ASL09-30-32-86	1SBL103001R8632	4/35
ASL09-30-32-88	1SBL103001R8832	4/35
ASL09-30-32S-81	1SBL103004R8132	4/89
ASL09-30-32S-83	1SBL103004R8332	4/89
ASL09-30-32S-86	1SBL103004R8632	4/89
ASL09-30-32S-88	1SBL103004R8832	4/89
ASL12-30-01-81	1SBL113001R8101	4/15
ASL12-30-01-83	1SBL113001R8301	4/15
ASL12-30-01-86	1SBL113001R8601	4/15
ASL12-30-01-88	1SBL113001R8801	4/15
ASL12-30-01S-81	1SBL113004R8101	4/88
ASL12-30-01S-83	1SBL113004R8301	4/88
ASL12-30-01S-86	1SBL113004R8601	4/88
ASL12-30-01S-88	1SBL113004R8801	4/88
ASL12-30-10-81	1SBL113001R8110	4/11
ASL12-30-10-83	1SBL113001R8310	4/11
ASL12-30-10-86	1SBL113001R8610	4/11
ASL12-30-10-88	1SBL113001R8810	4/11
ASL12-30-10S-81	1SBL113004R8110	4/88
ASL12-30-10S-83	1SBL113004R8310	4/88
ASL12-30-10S-86	1SBL113004R8610	4/88
ASL12-30-10S-88	1SBL113004R8810	4/88
ASL12-30-32-81	1SBL113001R8132	4/35
ASL12-30-32-83	1SBL113001R8332	4/35
ASL12-30-32-86	1SBL113001R8632	4/35
ASL12-30-32-88	1SBL113001R8832	4/35
ASL12-30-32S-81	1SBL113004R8132	4/89
ASL12-30-32S-83	1SBL113004R8332	4/89
ASL12-30-32S-86	1SBL113004R8632	4/89
ASL12-30-32S-88	1SBL113004R8832	4/89
ASL16-30-01-81	1SBL123001R8101	4/15
ASL16-30-01-83	1SBL123001R8301	4/15
ASL16-30-01-86	1SBL123001R8601	4/15
ASL16-30-01-88	1SBL123001R8801	4/15
ASL16-30-01S-81	1SBL123004R8101	4/88
ASL16-30-01S-83	1SBL123004R8301	4/88
ASL16-30-01S-86	1SBL123004R8601	4/88
ASL16-30-01S-88	1SBL123004R8801	4/88
ASL16-30-10-81	1SBL123001R8110	4/11
ASL16-30-10-83	1SBL123001R8310	4/11
ASL16-30-10-86	1SBL123001R8610	4/11
ASL16-30-10-88	1SBL123001R8810	4/11
ASL16-30-10S-81	1SBL123004R8110	4/88
ASL16-30-10S-83	1SBL123004R8310	4/88
ASL16-30-10S-86	1SBL123004R8610	4/88
ASL16-30-10S-88	1SBL123004R8810	4/88
ASL16-30-32-81	1SBL123001R8132	4/35
ASL16-30-32-83	1SBL123001R8332	4/35
ASL16-30-32-86	1SBL123001R8632	4/35
ASL16-30-32-88	1SBL123001R8832	4/35
ASL16-30-32S-81	1SBL123004R8132	4/89
ASL16-30-32S-83	1SBL123004R8332	4/89
ASL16-30-32S-86	1SBL123004R8632	4/89
ASL16-30-32S-88	1SBL123004R8832	4/89
B6-22-00-01	GJL1211501R0001	3/10
B6-22-00-02	GJL1211501R0002	3/10
B6-22-00-03	GJL1211501R0003	3/10
B6-22-00-80	GJL1211501R8000	3/10
B6-22-00-84	GJL1211501R8004	3/10
B6-30-01-01	GJL1211001R0011	3/2
B6-30-01-02	GJL1211001R0012	3/2
B6-30-01-03	GJL1211001R0013	3/2
B6-30-01-80	GJL1211001R8010	3/2
B6-30-01-84	GJL1211001R8014	3/2
B6-30-01-85	GJL1211001R8015	3/2
B6-30-01-F-01	GJL1211003R0011	3/28
B6-30-01-F-02	GJL1211003R0012	3/28
B6-30-01-F-03	GJL1211003R0013	3/28
B6-30-01-F-80	GJL1211003R8010	3/28
B6-30-01-F-84	GJL1211003R8014	3/28
B6-30-01-F-85	GJL1211003R8015	3/28
B6-30-01-P-01	GJL1211009R0011	3/18
B6-30-01-P-02	GJL1211009R0012	3/18
B6-30-01-P-03	GJL1211009R0013	3/18
B6-30-01-P-80	GJL1211009R8010	3/18
B6-30-01-P-84	GJL1211009R8014	3/18
B6-30-01-P-85	GJL1211009R8015	3/18
B6-30-10-01	GJL1211001R0101	3/2
B6-30-10-02	GJL1211001R0102	3/2
B6-30-10-03	GJL1211001R0103	3/2
B6-30-10-80	GJL1211001R8100	3/2
B6-30-10-84	GJL1211001R8104	3/2
B6-30-10-85	GJL1211001R8105	3/2
B6-30-10-F-01	GJL1211003R0101	3/28
B6-30-10-F-02	GJL1211003R0102	3/28
B6-30-10-F-03	GJL1211003R0103	3/28
B6-30-10-F-80	GJL1211003R8100	3/28
B6-30-10-F-84	GJL1211003R8104	3/28
B6-30-10-F-85	GJL1211003R8105	3/28
B6-30-10-P-01	GJL1211009R0101	3/18
B6-30-10-P-02	GJL1211009R0102	3/18
B6-30-10-P-03	GJL1211009R0103	3/18
B6-30-10-P-80	GJL1211009R8100	3/18
B6-30-10-P-84	GJL1211009R8104	3/18
B6-30-10-P-85	GJL1211009R8105	3/18
B6-40-00-01	GJL1211201R0001	3/10
B6-40-00-02	GJL1211201R0002	3/10
B6-40-00-03	GJL1211201R0003	3/10
B6-40-00-80	GJL1211201R8000	3/10
B6-40-00-84	GJL1211201R8004	3/10
B6S-30-01-1.7-71	GJL1213001R7011	3/8
B6S-30-01-2.8-72	GJL1213001R7012	3/8
B6S-30-10-1.7-71	GJL1213001R7101	3/8
B6S-30-10-2.8-72	GJL1213001R7102	3/8
B7-22-00-01	GJL1311501R0001	3/10
B7-22-00-02	GJL1311501R0002	3/10
B7-22-00-03	GJL1311501R0003	3/10
B7-22-00-80	GJL1311501R8000	3/10
B7-22-00-84	GJL1311501R8004	3/10
B7-30-01-01	GJL1311001R0011	3/2
B7-30-01-02	GJL1311001R0012	3/2
B7-30-01-03	GJL1311001R0013	3/2
B7-30-01-80	GJL1311001R8010	3/2
B7-30-01-84	GJL1311001R8014	3/2
B7-30-01-85	GJL1311001R8015	3/2
B7-30-01-F-01	GJL1311003R0011	3/28
B7-30-01-F-02	GJL1311003R0012	3/28
B7-30-01-F-03	GJL1311003R0013	3/28
B7-30-01-F-80	GJL1311003R8010	3/28
B7-30-01-F-84	GJL1311003R8014	3/28
B7-30-01-F-85	GJL1311003R8015	3/28
B7-30-01-P-01	GJL1311009R0011	3/18
B7-30-01-P-02	GJL1311009R0012	3/18
B7-30-01-P-03	GJL1311009R0013	3/18
B7-30-01-P-80	GJL1311009R8010	3/18
B7-30-01-P-84	GJL1311009R8014	3/18
B7-30-01-P-85	GJL1311009R8015	3/18

1SBC101359S0201

Index

Type classification

Type	Order code	Page
B7-30-10-01	GJL1311001R0101	3/2
B7-30-10-02	GJL1311001R0102	3/2
B7-30-10-03	GJL1311001R0103	3/2
B7-30-10-80	GJL1311001R8100	3/2
B7-30-10-84	GJL1311001R8104	3/2
B7-30-10-85	GJL1311001R8105	3/2
B7-30-10-F-01	GJL1311003R0101	3/28
B7-30-10-F-02	GJL1311003R0102	3/28
B7-30-10-F-03	GJL1311003R0103	3/28
B7-30-10-F-80	GJL1311003R8100	3/28
B7-30-10-F-84	GJL1311003R8104	3/28
B7-30-10-F-85	GJL1311003R8105	3/28
B7-30-10-P-01	GJL1311009R0101	3/18
B7-30-10-P-02	GJL1311009R0102	3/18
B7-30-10-P-03	GJL1311009R0103	3/18
B7-30-10-P-80	GJL1311009R8100	3/18
B7-30-10-P-84	GJL1311009R8104	3/18
B7-30-10-P-85	GJL1311009R8105	3/18
B7-40-00-01	GJL1311201R0001	3/10
B7-40-00-02	GJL1311201R0002	3/10
B7-40-00-03	GJL1311201R0003	3/10
B7-40-00-80	GJL1311201R8000	3/10
B7-40-00-84	GJL1311201R8004	3/10
B7D-30-01-01	GJL1317001R0011	3/3
B7D-30-01-05	GJL1317001R0015	3/3
B7D-30-10-01	GJL1317001R0101	3/3
B7D-30-10-05	GJL1317001R0105	3/3
B7D-40-00-01	GJL1317201R0001	3/11
B7D-40-00-05	GJL1317201R0005	3/11
B7S-30-01-1.7-71	GJL1313001R7011	3/8
B7S-30-01-2.8-72	GJL1313001R7012	3/8
B7S-30-10-1.7-71	GJL1313001R7101	3/8
B7S-30-10-2.8-72	GJL1313001R7102	3/8
BA4	1SNA235156R2700	5/251
BA5-50	1SBN110000R1000	5/265
BB3	1SBN111020R1000	4/80
BB4	1SBN110120W1000	5/45
BC6-21-10-P-01	GJL1213109R0101	3/19
BC6-21-10-P-03	GJL1213109R0103	3/19
BC6-21-10-P-04	GJL1213109R0104	3/19
BC6-21-10-P-05	GJL1213109R0105	3/19
BC6-21-10-P-16	GJL1213109R1106	3/19
BC6-22-00-01	GJL1213501R0001	3/11
BC6-22-00-02	GJL1213501R0002	3/11
BC6-22-00-03	GJL1213501R0003	3/11
BC6-22-00-04	GJL1213501R0004	3/11
BC6-22-00-05	GJL1213501R0005	3/11
BC6-22-00-07	GJL1213501R0007	3/11
BC6-22-00-16	GJL1213501R1006	3/11
BC6-30-01-01	GJL1213001R0011	3/3
BC6-30-01-03	GJL1213001R0013	3/3
BC6-30-01-04	GJL1213001R0014	3/3
BC6-30-01-05	GJL1213001R0015	3/3
BC6-30-01-07	GJL1213001R0017	3/3
BC6-30-01-1.4-81	GJL1213001R8011	3/8
BC6-30-01-16	GJL1213001R1016	3/3
BC6-30-01-2.4-51	GJL1213001R5011	3/8
BC6-30-01-F-01	GJL1213003R0011	3/29
BC6-30-01-F-03	GJL1213003R0013	3/29
BC6-30-01-F-04	GJL1213003R0014	3/29
BC6-30-01-F-05	GJL1213003R0015	3/29
BC6-30-01-F-07	GJL1213003R0017	3/29
BC6-30-01-F-1.4-81	GJL1213003R8011	3/34
BC6-30-01-F-16	GJL1213003R1016	3/29
BC6-30-01-F-2.4-51	GJL1213003R5011	3/34
BC6-30-01-P-01	GJL1213009R0011	3/19
BC6-30-01-P-03	GJL1213009R0013	3/19
BC6-30-01-P-04	GJL1213009R0014	3/19
BC6-30-01-P-05	GJL1213009R0015	3/19
BC6-30-01-P-07	GJL1213009R0017	3/19
BC6-30-01-P-1.4-81	GJL1213009R8011	3/26
BC6-30-01-P-16	GJL1213009R1016	3/19
BC6-30-01-P-2.4-51	GJL1213009R5011	3/26
BC6-30-10-01	GJL1213001R0101	3/3
BC6-30-10-03	GJL1213001R0103	3/3
BC6-30-10-04	GJL1213001R0104	3/3
BC6-30-10-05	GJL1213001R0105	3/3
BC6-30-10-07	GJL1213001R0107	3/3
BC6-30-10-1.4-81	GJL1213001R8101	3/8
BC6-30-10-16	GJL1213001R1106	3/3
BC6-30-10-2.4-51	GJL1213001R5101	3/8
BC6-30-10-F-01	GJL1213003R0101	3/29
BC6-30-10-F-03	GJL1213003R0103	3/29
BC6-30-10-F-04	GJL1213003R0104	3/29
BC6-30-10-F-05	GJL1213003R0105	3/29
BC6-30-10-F-07	GJL1213003R0107	3/29
BC6-30-10-F-1.4-81	GJL1213003R8101	3/34
BC6-30-10-F-16	GJL1213003R1106	3/29
BC6-30-10-F-2.4-51	GJL1213003R5101	3/34
BC6-30-10-P-01	GJL1213009R0101	3/19
BC6-30-10-P-03	GJL1213009R0103	3/19
BC6-30-10-P-04	GJL1213009R0104	3/19
BC6-30-10-P-05	GJL1213009R0105	3/19
BC6-30-10-P-07	GJL1213009R0107	3/19
BC6-30-10-P-1.4-81	GJL1213009R8101	3/26
BC6-30-10-P-16	GJL1213009R1106	3/19
BC6-30-10-P-2.4-51	GJL1213009R5101	3/26
BC7-30-01-01	GJL1313001R0011	3/3
BC7-30-01-03	GJL1313001R0013	3/3
BC7-30-01-04	GJL1313001R0014	3/3
BC7-30-01-05	GJL1313001R0015	3/3
BC7-30-01-07	GJL1313001R0017	3/3
BC7-30-01-1.4-81	GJL1313001R8011	3/8
BC7-30-01-16	GJL1313001R1016	3/3
BC7-30-01-2.4-51	GJL1313001R5011	3/8
BC7-30-01-F-01	GJL1313003R0011	3/29
BC7-30-01-F-03	GJL1313003R0013	3/29
BC7-30-01-F-04	GJL1313003R0014	3/29
BC7-30-01-F-05	GJL1313003R0015	3/29
BC7-30-01-F-07	GJL1313003R0017	3/29
BC7-30-01-F-1.4-81	GJL1313003R8011	3/34
BC7-30-01-F-16	GJL1313003R1016	3/29
BC7-30-01-F-2.4-51	GJL1313003R5011	3/34
BC7-30-01-P-01	GJL1313009R0011	3/19
BC7-30-01-P-03	GJL1313009R0013	3/19
BC7-30-01-P-04	GJL1313009R0014	3/19
BC7-30-01-P-05	GJL1313009R0015	3/19
BC7-30-01-P-07	GJL1313009R0017	3/19
BC7-30-01-P-1.4-81	GJL1313009R8011	3/26
BC7-30-01-P-16	GJL1313009R1016	3/19
BC7-30-01-P-2.4-51	GJL1313009R5011	3/26
BC7-30-10-01	GJL1313001R0101	3/3
BC7-30-10-03	GJL1313001R1103	3/3
BC7-30-10-04	GJL1313001R0104	3/3
BC7-30-10-05	GJL1313001R0105	3/3
BC7-30-10-07	GJL1313001R0107	3/3
BC7-30-10-1.4-81	GJL1313001R8101	3/8
BC7-30-10-16	GJL1313001R1106	3/3
BC7-30-10-2.4-51	GJL1313001R5101	3/8
BC7-30-10-F-01	GJL1313003R0101	3/29
BC7-30-10-F-03	GJL1313003R0103	3/29
BC7-30-10-F-04	GJL1313003R0104	3/29
BC7-30-10-F-05	GJL1313003R0105	3/29
BC7-30-10-F-07	GJL1313003R0107	3/29
BC7-30-10-F-1.4-81	GJL1313003R8101	3/34
BC7-30-10-F-16	GJL1313003R1106	3/29
BC7-30-10-F-2.4-51	GJL1313003R5101	3/34
BC7-30-10-P-01	GJL1313009R0101	3/19
BC7-30-10-P-03	GJL1313009R0103	3/19
BC7-30-10-P-04	GJL1313009R0104	3/19
BC7-30-10-P-05	GJL1313009R0105	3/19
BC7-30-10-P-07	GJL1313009R0107	3/19
BC7-30-10-P-1.4-81	GJL1313009R8101	3/26
BC7-30-10-P-16	GJL1313009R1106	3/19
BC7-30-10-P-2.4-51	GJL1313009R5101	3/26
BEA110/495	1SBN084506R1000	5/31
BEA16-3	1SBN081006T1000	4/10
BEA16-3U	1SBN081020R1000	4/91
BEA16-4	1SBN081306T1000	5/9
BEA185/T3	1SFN084706R1003	5/283
BEA185/T4	1SFN084706R1005	5/283
BEA185D/T3	1SFN084706R1004	5/283
BEA185D/T4	1SFN084706R1006	5/283
BEA210/T4	1SFN085106R1003	5/283
BEA210D/T4	1SFN085106R1005	5/283
BEA26-4	1SBN082306T1000	5/9
BEA300/T5	1SFN085106R1004	5/283
BEA300D7T5	1SFN085506R1003	5/283
BEA300H/T5	1SFN085307R1002	5/283
BEA38-4	1SBN082306T2000	5/9
BEA40/450	1SBN083206R1000	5/17
BEA460H/T4	1SFN085907R1000	5/283
BEA50/450	1SBN083506R1000	5/17
BEA7/132	1SBN080906R1002	3/38
BEA7/325	1SBN080906R1001	3/38
BEA75/495	1SBN084106R1000	5/17
BEA750/T5	1SFN086106R1001	5/283
BEA750/T6	1SFN086106R1000	5/283
BEA750D/T5	1SFN086106R1003	5/283
BEA750D/T6	1SFN086106R1002	5/283
BED110	1SFN084503R1000	5/286
BED145A	1SFN084703R1000	5/286
BED185	1SFN084903R1000	5/286
BED210	1SFN085103R1000	5/286
BED300	1SFN085303R1000	5/286
BED400	1SFN085503R1000	5/286
BED460	1SFN085703R1000	5/286
BED50	1SBN083503R1000	5/286
BED50-1	1SBN083503R1001	5/286
BED580	1SFN085903R1000	5/286
BED75	1SBN084103R1000	5/286
BED750	1SFN086103R1000	5/286
BED75-1	1SBN084103R1001	5/286
BED95	1SFN084303R1000	5/286
BEF185/OESA250	1SFN084908R1000	5/284
BEF185H/OESA250	1SFN084709R1000	5/284
BEF300/OESA400	1SFN085108R1000	5/284
BEF300H/OESA400	1SFN085109R1000	5/284
BEF460/OESA400	1SFN085708R1000	5/284
BEF750/OESA800	1SFN086108R1000	5/284
BEM110-30	1SFN084301R1000	5/31
BEM185-30	1SFN084701R1000	5/285
BEM300-30	1SFN085101R1000	5/285
BEM460-30	1SFN085701R1000	5/285
BEM750-30	1SFN086101R1000	5/285
BEM75-30	1SBN083501R1000	5/17
BER16-4	1SBN081311R1000	5/9
BER16C-3	1SBN081012R1000	4/14
BER38-4	1SBN082311R1000	5/9
BER40V	1SBN082411R1000	5/17
BES110	1SFN084304R1000	5/285
BES185	1SFN084704R1000	5/285
BES300	1SFN085104R1000	5/285
BES460	1SFN085704R1000	5/285
BES750	1SFN086104R1000	5/285
BES75-30	1SBN083504R1000	5/285
BES75-40	1SBN083302R1000	5/139
BEY16-4	1SBN081313R2000	5/9
BEY16C-3	1SBN081018R2000	4/37
BEY38-4	1SBN082713R2000	5/9
BP16	1SBN111403R1000	5/265
BP38-4	1SBN112303T1000	5/251
BS1-3	1SAM201908R1001	2/6
BS3-3	1SAM101938R0003	2/50
BS4-3	1SAM401911R1008	2/33
BSM6-30	GJL1201908R0001	3/38
BSS100	SK829090-B	5/154
BSS1000	SK829090-H	5/154
BSS145	SK829090-F	5/154
BSS210	SK829090-G	5/154
BSS550	SK829090-E	5/154
BX4	1SBN110108T1000	5/9
BX4-CA	1SBN110109W1000	5/9
BX-TP	FPTN472657R0001	5/17
CA3-01	1SBN011010T1001	4/37
CA3-01S	1SBN011019T1001	4/91
CA3-10	1SBN011010T1010	4/37
CA3-10S	1SBN011019T1010	4/91
CA4-01	1SBN010110R1001	5/9
CA4-01-T	1SBN010110T1001	5/9
CA4-04E	1SBN010140R1004	5/9
CA4-04M	1SBN010140R1104	5/9
CA4-04N	1SBN010140R1204	5/227
CA4-10	1SBN010110R1010	5/9
CA4-10-T	1SBN010110T1010	5/9
CA4-13M	1SBN010140R1113	5/9
CA4-13N	1SBN010140R1213	5/227
CA4-22E	1SBN010140R1022	5/9
CA4-22M	1SBN010140R1122	5/9
CA4-22N	1SBN010140R1222	5/227
CA4-22U	1SBN010140R1322	5/9
CA4-31E	1SBN010140R1031	5/9
CA4-31M	1SBN010140R1131	5/9
CA4-31N	1SBN010140R1231	5/227
CA4-31U	1SBN010140R1331	5/9
CA4-40E	1SBN010140R1040	5/9
CA4-40N	1SBN010140R1240	5/227
CA4-40U	1SBN010140R1340	5/9
CA5-01	1SBN010010R1001	5/17
CA5-04E	1SBN010040R1004	5/254
CA5-04M	1SBN010040R1104	5/254
CA5-04U	1SBN010040R1304	5/254
CA5-10	1SBN010010R1010	5/17
CA5-11/11E	1SBN010040R1018	5/254
CA5-11/11M	1SBN010040R1118	5/254
CA5-13M	1SBN010040R1113	5/254
CA5-22E	1SBN010040R1022	5/17
CA5-22M	1SBN010040R1122	5/17
CA5-22U	1SBN010040R1322	5/17
CA5-31E	1SBN010040R1031	5/254
CA5-31M	1SBN010040R1131	5/254
CA5-31U	1SBN010040R1331	5/254
CA5-40E	1SBN010040R1040	5/254
CA5-40U	1SBN010040R1340	5/254
CA6-11E	GJL1201317R0002	3/38
CA6-11E-F	GJL1201318R0002	3/38
CA6-11E-P	GJL1201319R0002	3/38
CA6-11K	GJL1201317R0001	3/39
CA6-11K-F	GJL1201318R0001	3/39
CA6-11K-P	GJL1201319R0001	3/39
CA6-11M	GJL1201317R0003	3/38
CA6-11M-F	GJL1201318R0003	3/38
CA6-11M-P	GJL1201319R0003	3/38
CA6-11N	GJL1201317R0004	3/38
CA6-11N-F	GJL1201318R0004	3/38
CA6-11N-P	GJL1201319R0004	3/38
CAF6-02E	GJL1201330R0010	3/38
CAF6-02K	GJL1201330R0009	3/39
CAF6-02M	GJL1201330R0011	3/38
CAF6-02N	GJL1201330R0012	3/38
CAF6-11E	GJL1201330R0002	3/38
CAF6-11K	GJL1201330R0001	3/39
CAF6-11M	GJL1201330R0003	3/38
CAF6-11N	GJL1201330R0004	3/38
CAF6-20E	GJL1201330R0006	3/38
CAF6-20K	GJL1201330R0005	3/39
CAF6-20M	GJL1201330R0007	3/38
CAF6-20N	GJL1201330R0008	3/38
CAL16-11A	SK829002-A	5/294
CAL16-11B	SK829002-B	5/154
CAL16-11C	SK829002-C	5/154
CAL16-11D	SK829002-D	5/154
CAL18-11	1SFN010720R1011	5/31
CAL18-11B	1SFN010720R3311	5/41
CAL4-11	1SBN010120R1011	5/9
CAL4-11-T	1SBN010120T1011	5/9
CAL5-11	1SBN010020R1011	5/17
CAT4-11E	1SBN010151R1011	5/9
CAT4-11M	1SBN010151R1111	5/9
CAT4-11U	1SBN010151R1311	5/9

1SBC101359S0201

Index

Type classification

Type	Order code	Page
CB 5-01	1SBN010013R1001	5/252
CB 5-10	1SBN010013R1010	5/252
CC4-01	1SBN010111R1001	5/9
CC4-10	1SBN010111R1010	5/9
CC5-01	1SBN010011R1001	5/254
CC5-10	1SBN010011R1010	5/254
CCL16-11E	SK829002-E	5/154
CE5-01D0.1	1SBN010015R1001	5/256
CE5-01D2	1SBN010017R1001	5/256
CE5-01W0.1	1SBN010016R1001	5/256
CE5-01W2	1SBN010018R1001	5/256
CE5-10D0.1	1SBN010015R1010	5/256
CE5-10D2	1SBN010017R1010	5/256
CE5-10W0.1	1SBN010016R1010	5/256
CE5-10W2	1SBN010018R1010	5/256
CEL18-01	1SFN010716R1001	5/256
CEL18-10	1SFN010716R1010	5/256
CK1-02	1SAM301901R1003	2/17
CK-11	1SAM101943R0001	2/51
CK1-11	1SAM301901R1001	2/17
CK1-20	1SAM301901R1002	2/17
CT-SDS.22S	1SVR730210R3300	4/25
CT-SDS.23S	1SVR730211R2300	4/25
DB140E	1SAX301110R1002	6/49
DB16	1SAZ701901R0001	6/2
DB16E	1SAX101110R0001	6/49
DB200	1SAZ401110R0001	6/27
DB25/25A	1SAZ201108R0001	6/14
DB25/32A	1SAZ201108R0002	6/14
DB42	1SAZ701902R0001	6/6
DB45E	1SAX201110R1001	6/49
DB80	1SAZ301110R0001	6/15
DB80E	1SAX301110R1001	6/49
DMS132-G	1SAM201912R1010	2/10
DMS132-Y	1SAM201912R1011	2/10
DMS325-G	1SAM101941R1000	2/53
DMS325-Y	1SAM101941R1001	2/53
DR25-A-110	1SAZ201504R0003	6/14
DR25-A-220/380	1SAZ201504R0005	6/14
DR25-A-24	1SAZ201504R0001	6/14
DR25-A-48	1SAZ201504R0002	6/14
DR25-A-500	1SAZ201504R0006	6/14
DS25-A-110	1SAZ201501R0003	6/14
DS25-A-220/380	1SAZ201501R0005	6/14
DS25-A-24	1SAZ201501R0001	6/14
DS25-A-500	1SAZ201501R0006	6/14
DT450/A185	1SAZ501901R1001	6/35
DT450/A300	1SAZ501902R1001	6/35
DX25	1SAZ201307R0002	6/14
DX495	1SAM401912R1001	2/33
E1250DU-1250	1SFA739001R1000	6/53
E140DU-140	1SAX321001R1101	6/45
E16DU-0.32	1SAX111001R1101	6/45
E16DU-1.0	1SAX111001R1102	6/45
E16DU-18.9	1SAX111001R1105	6/45
E16DU-2.7	1SAX111001R1103	6/45
E16DU-6.3	1SAX111001R1104	6/45
E200DU-200	1SAX511001R1101	6/50
E320DU-320	1SAX521001R1101	6/50
E45DU-30	1SAX211001R1101	6/45
E45DU-45	1SAX211001R1102	6/45
E500DU-500	1SAX711001R1101	6/53
E800DU-800	1SAX811001R1101	6/53
E80DU-80	1SAX311001R1101	6/45
EF19-1.0	1SAX121001R1102	6/56
EF19-18.9	1SAX121001R1105	6/56
EF19-2.7	1SAX121001R1103	6/56
EF19-6.3	1SAX121001R1104	6/56
EF45-30	1SAX221001R1101	6/56
EF45-45	1SAX221001R1102	6/56
EK1000-40-11	SK827044-AD	5/148
	SK827044-AR	5/148
	SK827044-EF	5/148
	SK827044-EG	5/148
	SK827044-EL	5/148
	SK827044-EM	5/148
	SK827044-EP	5/148
	SK827044-ER	5/148
EK1000-40-21	SK827044-DB	5/149
	SK827044-DC	5/149
	SK827044-DD	5/149
	SK827044-DE	5/149
	SK827044-DF	5/149
	SK827044-DG	5/149
	SK827044-DT	5/149
	SK827044-DU	5/149
EK1000-40-22	SK827045-AD	5/152
	SK827045-AR	5/152
	SK827045-EF	5/152
	SK827045-EG	5/152
	SK827045-EL	5/152
	SK827045-EM	5/152
	SK827045-EP	5/152
	SK827045-ER	5/152
EK110-40-11	SK824440-AD	5/144
	SK824440-AE	5/144
	SK824440-AF	5/144
	SK824440-AL	5/144
	SK824440-AM	5/144
	SK824440-AN	5/144
	SK824440-AP	5/144
	SK824440-AR	5/144
EK110-40-21	SK824440-DA	5/145
	SK824440-DB	5/145
	SK824440-DC	5/145
	SK824440-DD	5/145
	SK824440-DE	5/145
	SK824440-DF	5/145
	SK824440-DG	5/145
	SK824440-DT	5/145
	SK824440-DU	5/145
EK110-40-22	SK824450-AD	5/150
	SK824450-AE	5/150
	SK824450-AF	5/150
	SK824450-AL	5/150
	SK824450-AM	5/150
	SK824450-AN	5/150
	SK824450-AP	5/150
	SK824450-AR	5/150
EK150-40-11	SK824441-AD	5/144
	SK824441-AE	5/144
	SK824441-AF	5/144
	SK824441-AL	5/144
	SK824441-AM	5/144
	SK824441-AN	5/144
	SK824441-AP	5/144
	SK824441-AR	5/144
EK150-40-21	SK824441-DA	5/145
	SK824441-DB	5/145
	SK824441-DC	5/145
	SK824441-DD	5/145
	SK824441-DE	5/145
	SK824441-DF	5/145
	SK824441-DG	5/145
	SK824441-DT	5/145
	SK824441-DU	5/145
EK150-40-22	SK824451-AD	5/150
	SK824451-AE	5/150
	SK824451-AF	5/150
	SK824451-AL	5/150
	SK824451-AM	5/150
	SK824451-AN	5/150
	SK824451-AP	5/150
	SK824451-AR	5/150
EK175-40-11	SK825440-AD	5/146
	SK825440-AE	5/146
	SK825440-AF	5/146
	SK825440-AL	5/146
	SK825440-AM	5/146
	SK825440-AN	5/146
	SK825440-AP	5/146
	SK825440-AR	5/146
EK175-40-21	SK825440-DA	5/147
	SK825440-DB	5/147
	SK825440-DC	5/147
	SK825440-DD	5/147
	SK825440-DE	5/147
	SK825440-DF	5/147
	SK825440-DG	5/147
	SK825440-DT	5/147
	SK825440-DU	5/147
EK175-40-22	SK825448-AD	5/151
	SK825448-AE	5/151
	SK825448-AF	5/151
	SK825448-AL	5/151
	SK825448-AM	5/151
	SK825448-AN	5/151
	SK825448-AP	5/151
	SK825448-AR	5/151
EK210-40-11	SK825441-AD	5/146
	SK825441-AE	5/146
	SK825441-AF	5/146
	SK825441-AL	5/146
	SK825441-AM	5/146
	SK825441-AN	5/146
	SK825441-AP	5/146
	SK825441-AR	5/146
EK210-40-21	SK825441-DA	5/147
	SK825441-DB	5/147
	SK825441-DC	5/147
	SK825441-DD	5/147
	SK825441-DE	5/147
	SK825441-DF	5/147
	SK825441-DG	5/147
	SK825441-DT	5/147
	SK825441-DU	5/147
EK210-40-22	SK825451-AD	5/151
	SK825451-AE	5/151
	SK825451-AF	5/151
	SK825451-AL	5/151
	SK825451-AM	5/151
	SK825451-AN	5/151
	SK825451-AP	5/151
	SK825451-AR	5/151
EK370-40-11	SK827040-AD	5/146
	SK827040-AR	5/146
	SK827040-EF	5/146
	SK827040-EG	5/146
	SK827040-EL	5/146
	SK827040-EM	5/146
	SK827040-EP	5/146
	SK827040-ER	5/146
EK370-40-21	SK827040-DB	5/147
	SK827040-DC	5/147
	SK827040-DD	5/147
	SK827040-DE	5/147
	SK827040-DF	5/147
	SK827040-DG	5/147
	SK827040-DT	5/147
	SK827040-DU	5/147
EK370-40-22	SK827042-AD	5/151
	SK827042-AR	5/151
	SK827042-EF	5/151
	SK827042-EG	5/151
	SK827042-EL	5/151
	SK827042-EM	5/151
	SK827042-EP	5/151
	SK827042-ER	5/151
EK550-40-11	SK827041-AD	5/146
	SK827041-AR	5/146
	SK827041-EF	5/146
	SK827041-EG	5/146
	SK827041-EL	5/146
	SK827041-EM	5/146
	SK827041-EP	5/146
	SK827041-ER	5/146
EK550-40-21	SK827041-DB	5/147
	SK827041-DC	5/147
	SK827041-DD	5/147
	SK827041-DE	5/147
	SK827041-DF	5/147
	SK827041-DG	5/147
	SK827041-DT	5/147
	SK827041-DU	5/147
EK550-40-22	SK827043-AD	5/151
	SK827043-AR	5/151
	SK827043-EF	5/151
	SK827043-EG	5/151
	SK827043-EL	5/151
	SK827043-EM	5/151
	SK827043-EP	5/151
	SK827043-ER	5/151
–	1SDA023354R00015/41,	5/280
	1SDA023356R00015/41,	5/280
	1SDA023357R00015/41,	5/280
	1SDA023368R00015/41,	5/280
	1SDA023370R00015/41,	5/280
	1SDA023380R00015/41,	5/280
	1SDA023384R00015/41,	5/280
	1SDA023387R00015/41,	5/280
	1SDA025766R0001	5/41
FS116	1SAM201909R1001	2/6
HK-02	1SAM101901R0003	2/51
HK1-02	1SAM201902R1003	2/7
HK-11	1SAM101901R0001	2/51
HK1-11	1SAM201902R1001	2/7
HK1-20	1SAM201902R1002	2/7
HK1-20L	1SAM201902R1004	2/7
HK-20	1SAM101901R0002	2/51
HK4-11	1SAM401901R1001	2/34
HK4-W	1SAM401901R1002	2/34
HKF-11	1SAM101928R0001	2/51
HKF1-11	1SAM201901R1001	2/7
HKF1-20	1SAM201901R1002	2/7
HKF-20	1SAM101928R0002	2/51
HKS4-02	1SAM401902R1003	2/34
HKS4-11	1SAM401902R1001	2/34
HKS4-20	1SAM401902R1002	2/34
HTP500-BA4	1SNA235712R2400	5/251
IB132-G	1SAM201911R1010	2/10
IB132-Y	1SAM201911R1011	2/10
IB325-G	1SAM101940R1000	2/53
IB325-Y	1SAM101940R1001	2/53
K6-22Z-01	GJH1211001R0221	3/14
K6-22Z-02	GJH1211001R0222	3/14
K6-22Z-03	GJH1211001R0223	3/14
K6-22Z-80	GJH1211001R8220	3/14
K6-22Z-84	GJH1211001R8224	3/14
K6-22Z-85	GJH1211001R8225	3/14
K6-22Z-F-01	GJH1211003R0221	3/35
K6-22Z-F-02	GJH1211003R0222	3/35
K6-22Z-F-03	GJH1211003R0223	3/35
K6-22Z-F-80	GJH1211003R8220	3/35
K6-22Z-F-84	GJH1211003R8224	3/35
K6-22Z-F-85	GJH1211003R8225	3/35
K6-22Z-P-01	GJH1211009R0221	3/24
K6-22Z-P-02	GJH1211009R0222	3/24
K6-22Z-P-03	GJH1211009R0223	3/24
K6-22Z-P-80	GJH1211009R8220	3/24
K6-22Z-P-84	GJH1211009R8224	3/24
K6-22Z-P-85	GJH1211009R8225	3/24
K6-31Z-01	GJH1211001R0311	3/14
K6-31Z-02	GJH1211001R0312	3/14
K6-31Z-03	GJH1211001R0313	3/14
K6-31Z-80	GJH1211001R8310	3/14
K6-31Z-84	GJH1211001R8314	3/14
K6-31Z-85	GJH1211001R8315	3/14
K6-31Z-F-01	GJH1211003R0311	3/35
K6-31Z-F-02	GJH1211003R0312	3/35
K6-31Z-F-03	GJH1211003R0313	3/35

1SBC101359S0201

Index

Type classification

Type	Order code	Page
K6-31Z-F-80	GJH1211003R8310	3/35
K6-31Z-F-84	GJH1211003R8314	3/35
K6-31Z-F-85	GJH1211003R8315	3/35
K6-31Z-P-01	GJH1211009R0311	3/24
K6-31Z-P-02	GJH1211009R0312	3/24
K6-31Z-P-03	GJH1211009R0313	3/24
K6-31Z-P-80	GJH1211009R8310	3/24
K6-31Z-P-84	GJH1211009R8314	3/24
K6-31Z-P-85	GJH1211009R8315	3/24
K6-40E-01	GJH1211001R0401	3/14
K6-40E-02	GJH1211001R0402	3/14
K6-40E-03	GJH1211001R0403	3/14
K6-40E-80	GJH1211001R8400	3/14
K6-40E-84	GJH1211001R8404	3/14
K6-40E-85	GJH1211001R8405	3/14
K6-40E-F-01	GJH1211003R0401	3/35
K6-40E-F-02	GJH1211003R0402	3/35
K6-40E-F-03	GJH1211003R0403	3/35
K6-40E-F-80	GJH1211003R8400	3/35
K6-40E-F-84	GJH1211003R8404	3/35
K6-40E-F-85	GJH1211003R8405	3/35
K6-40E-P-01	GJH1211009R0401	3/24
K6-40E-P-02	GJH1211009R0402	3/24
K6-40E-P-03	GJH1211009R0403	3/24
K6-40E-P-80	GJH1211009R8400	3/24
K6-40E-P-84	GJH1211009R8404	3/24
K6-40E-P-85	GJH1211009R8405	3/24
K6S-22Z-1.7-71	GJH1213001R7221	3/16
K6S-22Z-2.8-72	GJH1213001R7222	3/16
K6S-31Z-1.7-71	GJH1213001R7311	3/16
K6S-31Z-2.8-72	GJH1213001R7312	3/16
K6S-40E-1.7-71	GJH1213001R7401	3/16
K6S-40E-2.8-72	GJH1213001R7402	3/16
KA450	1SAM401908R1001	2/33
KA495	1SAM501901R1001	2/33
KA495C	1SAM501902R1001	2/33
KC6-22Z-01	GJH1213001R0221	3/15
KC6-22Z-04	GJH1213001R0224	3/15
KC6-22Z-05	GJH1213001R0225	3/15
KC6-22Z-07	GJH1213001R0227	3/15
KC6-22Z-13	GJH1213001R1223	3/15
KC6-22Z-16	GJH1213001R1226	3/15
KC6-22Z-F-01	GJH1213003R0221	3/36
KC6-22Z-F-04	GJH1213003R0224	3/36
KC6-22Z-F-05	GJH1213003R0225	3/36
KC6-22Z-F-07	GJH1213003R0227	3/36
KC6-22Z-F-16	GJH1213003R1226	3/36
KC6-22Z-P-01	GJH1213009R0221	3/25
KC6-22Z-P-04	GJH1213009R0224	3/25
KC6-22Z-P-05	GJH1213009R0225	3/25
KC6-22Z-P-07	GJH1213009R0227	3/25
KC6-22Z-P-16	GJH1213009R1226	3/25
KC6-31Z-01	GJH1213001R0311	3/15
KC6-31Z-04	GJH1213001R0314	3/15
KC6-31Z-05	GJH1213001R0315	3/15
KC6-31Z-07	GJH1213001R0317	3/15
KC6-31Z-1.4-81	GJH1213001R8311	3/16
KC6-31Z-13	GJH1213001R1313	3/15
KC6-31Z-16	GJH1213001R1316	3/15
KC6-31Z-2.4-51	GJH1213001R5311	3/16
KC6-31Z-F-01	GJH1213003R0311	3/36
KC6-31Z-F-04	GJH1213003R0314	3/36
KC6-31Z-F-05	GJH1213003R0315	3/36
KC6-31Z-F-07	GJH1213003R0317	3/36
KC6-31Z-F-1.4-81	GJH1213003R8311	3/37
KC6-31Z-F-16	GJH1213003R1316	3/36
KC6-31Z-F-51	GJH1213003R5311	3/37
KC6-31Z-P-01	GJH1213009R0311	3/25
KC6-31Z-P-04	GJH1213009R0314	3/25
KC6-31Z-P-05	GJH1213009R0315	3/25
KC6-31Z-P-1.4-81	GJH1213009R8311	3/27
KC6-31Z-P-16	GJH1213009R1316	3/25
KC6-31Z-P-2.4-51	GJH1213009R5311	3/27
KC6-40E-01	GJH1213001R0401	3/15
KC6-40E-04	GJH1213001R0404	3/15
KC6-40E-05	GJH1213001R0405	3/15
KC6-40E-07	GJH1213001R0407	3/15
KC6-40E-1.4-81	GJH1213001R8401	3/16
KC6-40E-13	GJH1213001R1403	3/15
KC6-40E-16	GJH1213001R1406	3/15
KC6-40E-2.4-51	GJH1213001R5401	3/16
KC6-40E-F-01	GJH1213003R0401	3/36
KC6-40E-F-04	GJH1213003R0404	3/36
KC6-40E-F-05	GJH1213003R0405	3/36
KC6-40E-F-1.4-81	GJH1213003R8401	3/37
KC6-40E-F-16	GJH1213003R1406	3/36
KC6-40E-F-51	GJH1213003R5401	3/37
KC6-40E-P-01	GJH1213009R0401	3/25
KC6-40E-P-04	GJH1213009R0404	3/25
KC6-40E-P-05	GJH1213009R0405	3/25
KC6-40E-P-07	GJH1213009R0407	3/25
KC6-40E-P-1.4-81	GJH1213009R8401	3/27
KC6-40E-P-16	GJH1213009R1406	3/25
KC6-40E-P-2.4-51	GJH1213009R5401	3/27
KH210	SK825400-AD	5/307
	SK825400-AE	5/307
	SK825400-AF	5/307
	SK825400-AL	5/307
	SK825400-AM	5/307
	SK825400-AN	5/307
	SK825400-AP	5/307
	SK825400-AR	5/307
	SK825400-DA	5/309
	SK825400-DB	5/309
	SK825400-DC	5/309
	SK825400-DD	5/309
	SK825400-DE	5/309
	SK825400-DF	5/309
	SK825400-DG	5/309
	SK825400-DT	5/309
	SK825400-DU	5/309
KH300	SK826400-AD	5/307
	SK826400-AE	5/307
	SK826400-AF	5/307
	SK826400-AL	5/307
	SK826400-AM	5/307
	SK826400-AN	5/307
	SK826400-AP	5/307
	SK826400-AR	5/307
	SK826400-DA	5/309
	SK826400-DB	5/309
	SK826400-DC	5/309
	SK826400-DD	5/309
	SK826400-DE	5/309
	SK826400-DF	5/309
	SK826400-DG	5/309
	SK826400-DT	5/309
	SK826400-DU	5/309
KH800	SK828100-AD	5/307
	SK828100-AR	5/307
	SK828100-DB	5/309
	SK828100-DC	5/309
	SK828100-DD	5/309
	SK828100-DE	5/309
	SK828100-DF	5/309
	SK828100-DG	5/309
	SK828100-DT	5/309
	SK828100-DU	5/309
	SK828100-EF	5/307
	SK828100-EG	5/307
	SK828100-EL	5/307
	SK828100-EM	5/307
	SK828100-EP	5/307
	SK828100-ER	5/307
KP210	SK825450-DA	5/308
	SK825450-DB	5/308
	SK825450-DC	5/308
	SK825450-DD	5/308
	SK825450-DE	5/308
	SK825450-DF	5/308
	SK825450-DG	5/308
	SK825450-DT	5/308
	SK825450-DU	5/308
	SK825450-EF	5/308
	SK825450-EG	5/308
	SK825450-EL	5/308
	SK825450-EM	5/308
	SK825450-EP	5/308
	SK825450-ER	5/308
KP300	SK826450-DA	5/308
	SK826450-DB	5/308
	SK826450-DC	5/308
	SK826450-DD	5/308
	SK826450-DE	5/308
	SK826450-DF	5/308
	SK826450-DG	5/308
	SK826450-DT	5/308
	SK826450-DU	5/308
	SK826450-EF	5/308
	SK826450-EG	5/308
	SK826450-EL	5/308
	SK826450-EM	5/308
	SK826450-EP	5/308
	SK826450-ER	5/308
KP800	SK828150-DB	5/308
	SK828150-DC	5/308
	SK828150-DD	5/308
	SK828150-DE	5/308
	SK828150-DF	5/308
	SK828150-DG	5/308
	SK828150-DT	5/308
	SK828150-DU	5/308
KZK1000	SK827204-F	5/306
KZK110	SK824204-A	5/306
KZK150	SK824204-B	5/306
KZK175	SK825204-A	5/306
KZK210	SK825204-B	5/306
KZK370	SK827204-A	5/306
KZK550	SK827204-B	5/306
LB6	GJL1201902R0001	3/38
LB6-CA	GJL1201903R0001	3/38
LD110	1SFN074308R1000	5/276
LD40	1SBN072808R1000	5/276
LD75	1SBN073508R1000	5/276
LDC4	1SBN070156T1000	5/9
LF40	1SBN073205R1000	5/281
LF75	FPTN472735R0001	5/281
LH75	FPTN472734R0001	5/281
LK110	1SFN074352R1000	5/277
LK75-F	1SBN073552R1002	5/277
LK75-L	1SBN073552R1003	5/277
LP185	1SFN074712R1000	5/281
LP300	1SFN075112R1000	5/281
LP460	1SFN075712R1000	5/281
LP6	GJL1201907R0001	3/38
LP750	1SFN076112R1000	5/281
LT1000-EK	SK178001-MB	5/298
LT150-EK	SK178001-HB	5/298
LT185-AC	1SFN124701R1000	5/41
LT185-AL	1SFN124703R1000	5/41
LT185-AY	1SFN124704R1000	5/41
LT200/A	1SAZ401901R1001	6/31
LT200E	1SAX501904R0001	6/50
LT210-EK	SK178001-KB	5/298
LT300-AC	1SFN125101R1000	5/41
LT300-AL	1SFN125103R1000	5/41
LT300-AY	1SFN125104R1000	5/41
LT320E	1SAX601904R0001	6/50
LT460-AC	1SFN125701R1000	5/41
LT460-AL	1SFN125703R1000	5/41
LT500E	1SAX701904R0001	6/53
LT550-EK	SK178001-LB	5/298
LT6-B	GJL1201906R0001	3/38
LT750-AC	1SFN126101R1000	5/41
LT750-AL	1SFN126103R1000	5/41
LT800E	1SAX801904R0001	6/53
LW110	1SFN074307R1000	5/279
LW1250	1SFN076407R1000	5/41
LW185	1SFN074707R1000	5/41
LW300	1SFN075107R1000	5/41
LW460	1SFN075707R1000	5/41
LW750	1SFN076107R1000	5/41
LX185	1SFN074710R1000	5/41
LX300	1SFN075110R1000	5/41
LX460	1SFN075710R1000	5/41
LX750	1SFN076110R1000	5/41
LY110	1SFN074303R1000	5/281
LY16-4	1SBN071303T1000	5/251
LY185	1SFN074703R1000	5/281
LY300	1SFN075103R1000	5/281
LY38-4	1SBN072303T1000	5/251
LY460	1SFN075703R1000	5/281
LY750	1SFN076103R1000	5/281
LZ185-2C/120	1SFN074709R1000	5/41
MO132-0.16	1SAM360000R1001	2/22
MO132-0.25	1SAM360000R1002	2/22
MO132-0.4	1SAM360000R1003	2/22
MO132-0.63	1SAM360000R1004	2/22
MO132-1.0	1SAM360000R1005	2/22
MO132-1.6	1SAM360000R1006	2/22
MO132-10	1SAM360000R1010	2/22
MO132-12	1SAM360000R1012	2/22
MO132-16	1SAM360000R1011	2/22
MO132-2.5	1SAM360000R1007	2/22
MO132-20	1SAM360000R1013	2/22
MO132-25	1SAM360000R1014	2/22
MO132-32	1SAM360000R1015	2/22
MO132-4.0	1SAM360000R1008	2/22
MO132-6.3	1SAM360000R1009	2/22
MO325-0.4	1SAM160000R1003	2/55
MO325-0.63	1SAM160000R1004	2/55
MO325-1	1SAM160000R1005	2/55
MO325-1.6	1SAM160000R1006	2/55
MO325-12.5	1SAM160000R1011	2/55
MO325-16	1SAM160000R1012	2/55
MO325-2.5	1SAM160000R1007	2/55
MO325-20	1SAM160000R1013	2/55
MO325-25	1SAM160000R1014	2/55
MO325-4	1SAM160000R1008	2/55
MO325-6.3	1SAM160000R1009	2/55
MO325-9	1SAM160000R1010	2/55
MO450-40	1SAM460000R1005	2/38
MO450-45	1SAM460000R1006	2/38
MO450-50	1SAM460000R1007	2/38
MO495-100	1SAM560000R1010	2/38
MO495-63	1SAM560000R1007	2/38
MO495-75	1SAM560000R1008	2/38
MO495-90	1SAM560000R1009	2/38
MO496-100	1SAM590000R1010	2/38
MO496-16	1SAM590000R1001	2/38
MO496-20	1SAM590000R1002	2/38
MO496-25	1SAM590000R1003	2/38
MO496-32	1SAM590000R1004	2/38
MO496-40	1SAM590000R1005	2/38
MO496-50	1SAM590000R1006	2/38
MO496-63	1SAM590000R1007	2/38
MO496-75	1SAM590000R1008	2/38
MO496-90	1SAM590000R1009	2/38
MS116-0.16	1SAM250000R1001	2/2
MS116-0.16-HKF1-11	1SAM250005R1001	2/2
MS116-0.25	1SAM250000R1002	2/2
MS116-0.25-HKF1-11	1SAM250005R1002	2/2
MS116-0.4	1SAM250000R1003	2/2
MS116-0.4-HKF1-11	1SAM250005R1003	2/2
MS116-0.63	1SAM250000R1004	2/2
MS116-0.63-HKF1-11	1SAM250005R1004	2/2
MS116-1.0	1SAM250000R1005	2/2
MS116-1.0-HKF1-11	1SAM250005R1005	2/2
MS116-1.6	1SAM250000R1006	2/2
MS116-1.6-HKF1-11	1SAM250005R1006	2/2

1SBC101359S0201

Index

Type classification

Type	Order code	Page
MS116-10	1SAM250000R1010	2/2
MS116-10.0-HKF1-11	1SAM250005R1010	2/2
MS116-12	1SAM250000R1012	2/2
MS116-12.0-HKF1-11	1SAM250005R1012	2/2
MS116-16	1SAM250000R1011	2/2
MS116-16.0-HKF1-11	1SAM250005R1011	2/2
MS116-2.5	1SAM250000R1007	2/2
MS116-2.5-HKF1-11	1SAM250005R1007	2/2
MS116-20	1SAM250000R1013	2/2
MS116-20-HKF1-11	1SAM250005R1013	2/2
MS116-25	1SAM250000R1014	2/2
MS116-25-HKF1-11	1SAM250005R1014	2/2
MS116-32	1SAM250000R1015	2/2
MS116-32-HKF1-11	1SAM250005R1015	2/2
MS116-4.0	1SAM250000R1008	2/2
MS116-4.0-HKF1-11	1SAM250005R1008	2/2
MS116-6.3	1SAM250000R1009	2/2
MS116-6.3-HKF1-11	1SAM250005R1009	2/2
MS132-0.16	1SAM350000R1001	2/12
MS132-0.16-HKF1-11	1SAM350005R1001	2/12
MS132-0.25	1SAM350000R1002	2/12
MS132-0.25-HKF1-11	1SAM350005R1002	2/12
MS132-0.4	1SAM350000R1003	2/12
MS132-0.4-HKF1-11	1SAM350005R1003	2/12
MS132-0.63	1SAM350000R1004	2/12
MS132-0.63-HKF1-11	1SAM350005R1004	2/12
MS132-1.0	1SAM350000R1005	2/12
MS132-1.0-HKF1-11	1SAM350005R1005	2/12
MS132-1.6	1SAM350000R1006	2/12
MS132-1.6-HKF1-11	1SAM350005R1006	2/12
MS132-10	1SAM350000R1010	2/12
MS132-10.0-HKF1-11	1SAM350005R1010	2/12
MS132-12	1SAM350000R1012	2/12
MS132-12.0-HKF1-11	1SAM350005R1012	2/12
MS132-16	1SAM350000R1011	2/12
MS132-16.0-HKF1-11	1SAM350005R1011	2/12
MS132-2.5	1SAM350000R1007	2/12
MS132-2.5-HKF1-11	1SAM350005R1007	2/12
MS132-20	1SAM350000R1013	2/12
MS132-20-HKF1-11	1SAM350005R1013	2/12
MS132-25	1SAM350000R1014	2/12
MS132-25-HKF1-11	1SAM350005R1014	2/12
MS132-32	1SAM350000R1015	2/12
MS132-32-HKF1-11	1SAM350005R1015	2/12
MS132-4.0	1SAM350000R1008	2/12
MS132-4.0-HKF1-11	1SAM350005R1008	2/12
MS132-6.3	1SAM350000R1009	2/12
MS132-6.3-HKF1-11	1SAM350005R1009	2/12
MS325-0.16	1SAM150000R1001	2/46
MS325-0.16-HKF11	1SAM150005R0001	2/46
MS325-0.25	1SAM150000R1002	2/46
MS325-0.25-HKF11	1SAM150005R0002	2/46
MS325-0.4	1SAM150000R1003	2/46
MS325-0.4-HKF11	1SAM150005R0003	2/46
MS325-0.63	1SAM150000R1004	2/46
MS325-0.63-HKF11	1SAM150005R0004	2/46
MS325-1	1SAM150000R1005	2/46
MS325-1.6	1SAM150000R1006	2/46
MS325-1.6-HKF11	1SAM150005R0006	2/46
MS325-12.5	1SAM150000R1011	2/46
MS325-12.5-HKF11	1SAM150005R0011	2/46
MS325-16	1SAM150000R1012	2/46
MS325-16-HKF11	1SAM150005R0012	2/46
MS325-1-HKF11	1SAM150005R0005	2/46
MS325-2.5	1SAM150000R1007	2/46
MS325-2.5-HKF11	1SAM150005R0007	2/46
MS325-20	1SAM150000R1013	2/46
MS325-20-HKF11	1SAM150005R0013	2/46
MS325-25	1SAM150000R1014	2/46
MS325-25-HKF11	1SAM150005R0014	2/46
MS325-4	1SAM150000R1008	2/46
MS325-4-HKF11	1SAM150005R0008	2/46
MS325-6.3	1SAM150000R1009	2/46
MS325-6.3-HKF11	1SAM150005R0009	2/46
MS325-9	1SAM150000R1010	2/46
MS325-9-HKF11	1SAM150005R0010	2/46
MS450-40	1SAM450000R1005	2/30
MS450-45	1SAM450000R1006	2/30
MS450-50	1SAM450000R1007	2/30
MS451-16	1SAM470000R1001	2/63
MS451-20	1SAM470000R1002	2/63
MS451-25	1SAM470000R1003	2/63
MS451-32	1SAM470000R1004	2/63
MS451-40	1SAM470000R1005	2/63
MS451-45	1SAM470000R1006	2/63
MS451-50	1SAM470000R1007	2/63
MS495-100	1SAM550000R1010	2/30
MS495-63	1SAM550000R1007	2/30
MS495-75	1SAM550000R1008	2/30
MS495-90	1SAM550000R1009	2/30
MS496-100	1SAM570000R1010	2/63
MS496-40	1SAM570000R1005	2/63
MS496-50	1SAM570000R1006	2/63
MS496-63	1SAM570000R1007	2/63
MS496-75	1SAM570000R1008	2/63
MS496-90	1SAM570000R1009	2/63
MS497-100	1SAM580000R1010	2/30
MS497-32	1SAM580000R1004	2/30
MS497-40	1SAM580000R1005	2/30
MS497-50	1SAM580000R1006	2/30
MS497-63	1SAM580000R1007	2/30
MS497-75	1SAM580000R1008	2/30
MS497-90	1SAM580000R1009	2/30
MSH-AR	1SAM201920R1000	2/11
MSHD-LB	1SAM201920R1001	2/11
MSHD-LTB	1SAM201920R1011	2/21
MSHD-LTY	1SAM201920R1012	2/21
MSHD-LY	1SAM201920R1002	2/11
MSMN	1SAM101923R0002	2/11
MSMNO	1SAM101923R0012	2/11
MSOX-30	1SAM101924R0013	2/11
MSOX-32	1SAM101924R0003	2/11
NF22E-11	1SBH137001R1122	5/224
NF22E-12	1SBH137001R1222	5/224
NF22E-13	1SBH137001R1322	5/224
NF22E-14	1SBH137001R1422	5/224
NF31E-11	1SBH137001R1131	5/224
NF31E-12	1SBH137001R1231	5/224
NF31E-13	1SBH137001R1331	5/224
NF31E-14	1SBH137001R1431	5/224
NF40E-11	1SBH137001R1140	5/224
NF40E-12	1SBH137001R1240	5/224
NF40E-13	1SBH137001R1340	5/224
NF40E-14	1SBH137001R1440	5/224
NF44E-11	1SBH137001R1144	5/228
NF44E-12	1SBH137001R1244	5/228
NF44E-13	1SBH137001R1344	5/228
NF44E-14	1SBH137001R1444	5/228
NF53E-11	1SBH137001R1153	5/228
NF53E-12	1SBH137001R1253	5/228
NF53E-13	1SBH137001R1353	5/228
NF53E-14	1SBH137001R1453	5/228
NF62E-11	1SBH137001R1162	5/228
NF62E-12	1SBH137001R1262	5/228
NF62E-13	1SBH137001R1362	5/228
NF62E-14	1SBH137001R1462	5/228
NF71E-11	1SBH137001R1171	5/228
NF71E-12	1SBH137001R1271	5/228
NF71E-13	1SBH137001R1371	5/228
NF71E-14	1SBH137001R1471	5/228
NF80E-11	1SBH137001R1180	5/228
NF80E-12	1SBH137001R1280	5/228
NF80E-13	1SBH137001R1380	5/228
NF80E-14	1SBH137001R1480	5/228
NFZ22E-20	1SBH136001R2022	5/225
NFZ22E-21	1SBH136001R2122	5/225
NFZ22E-22	1SBH136001R2222	5/225
NFZ22E-23	1SBH136001R2322	5/225
NFZ31E-20	1SBH136001R2031	5/225
NFZ31E-21	1SBH136001R2131	5/225
NFZ31E-22	1SBH136001R2231	5/225
NFZ31E-23	1SBH136001R2331	5/225
NFZ40E-20	1SBH136001R2040	5/225
NFZ40E-21	1SBH136001R2140	5/225
NFZ40E-22	1SBH136001R2240	5/225
NFZ40E-23	1SBH136001R2340	5/225
NFZ44E-20	1SBH136001R2044	5/229
NFZ44E-21	1SBH136001R2144	5/229
NFZ44E-22	1SBH136001R2244	5/229
NFZ44E-23	1SBH136001R2344	5/229
NFZ53E-20	1SBH136001R2053	5/229
NFZ53E-21	1SBH136001R2153	5/229
NFZ53E-22	1SBH136001R2253	5/229
NFZ53E-23	1SBH136001R2353	5/229
NFZ62E-20	1SBH136001R2062	5/229
NFZ62E-21	1SBH136001R2162	5/229
NFZ62E-22	1SBH136001R2262	5/229
NFZ62E-23	1SBH136001R2362	5/229
NFZ71E-20	1SBH136001R2071	5/229
NFZ71E-21	1SBH136001R2171	5/229
NFZ71E-22	1SBH136001R2271	5/229
NFZ71E-23	1SBH136001R2371	5/229
NFZ80E-20	1SBH136001R2080	5/229
NFZ80E-21	1SBH136001R2180	5/229
NFZ80E-22	1SBH136001R2280	5/229
NFZ80E-23	1SBH136001R2380	5/229
NS22E-16	1SBH101001R1622	4/60
NS22E-20	1SBH101001R2022	4/60
NS22E-26	1SBH101001R2622	4/60
NS22E-28	1SBH101001R2822	4/60
NS22ES-16	1SBH101004R1622	4/102
NS22ES-20	1SBH101004R2022	4/102
NS22ES-26	1SBH101004R2622	4/102
NS22ES-28	1SBH101004R2822	4/102
NS31E-16	1SBH101001R1631	4/60
NS31E-20	1SBH101001R2031	4/60
NS31E-26	1SBH101001R2631	4/60
NS31E-28	1SBH101001R2831	4/60
NS31ES-16	1SBH101004R1631	4/102
NS31ES-20	1SBH101004R2031	4/102
NS31ES-26	1SBH101004R2631	4/102
NS31ES-28	1SBH101004R2831	4/102
NS40E-16	1SBH101001R1640	4/60
NS40E-20	1SBH101001R2040	4/60
NS40E-26	1SBH101001R2640	4/60
NS40E-28	1SBH101001R2840	4/60
NS40ES-16	1SBH101004R1640	4/102
NS40ES-20	1SBH101004R2040	4/102
NS40ES-26	1SBH101004R2640	4/102
NS40ES-28	1SBH101004R2840	4/102
NS44E-16	1SBH101001R1644	4/60
NS44E-20	1SBH101001R2044	4/60
NS44E-26	1SBH101001R2644	4/60
NS44E-28	1SBH101001R2844	4/60
NS44ES-16	1SBH101004R1644	4/102
NS44ES-20	1SBH101004R2044	4/102
NS44ES-26	1SBH101004R2644	4/102
NS44ES-28	1SBH101004R2844	4/102
NS53E-16	1SBH101001R1653	4/60
NS53E-20	1SBH101001R2053	4/60
NS53E-26	1SBH101001R2653	4/60
NS53E-28	1SBH101001R2853	4/60
NS53ES-16	1SBH101004R1653	4/102
NS53ES-20	1SBH101004R2053	4/102
NS53ES-26	1SBH101004R2653	4/102
NS53ES-28	1SBH101004R2853	4/102
NS62E-16	1SBH101001R1662	4/60
NS62E-20	1SBH101001R2062	4/60
NS62E-26	1SBH101001R2662	4/60
NS62E-28	1SBH101001R2862	4/60
NS62ES-16	1SBH101004R1662	4/102
NS62ES-20	1SBH101004R2062	4/102
NS62ES-26	1SBH101004R2662	4/102
NS62ES-28	1SBH101004R2862	4/102
NS71E-16	1SBH101001R1671	4/60
NS71E-20	1SBH101001R2071	4/60
NS71E-26	1SBH101001R2671	4/60
NS71E-28	1SBH101001R2871	4/60
NS71ES-16	1SBH101004R1671	4/102
NS71ES-20	1SBH101004R2071	4/102
NS71ES-26	1SBH101004R2671	4/102
NS71ES-28	1SBH101004R2871	4/102
NS80E-16	1SBH101001R1680	4/60
NS80E-20	1SBH101001R2080	4/60
NS80E-26	1SBH101001R2680	4/60
NS80E-28	1SBH101001R2880	4/60
NS80ES-16	1SBH101004R1680	4/102
NS80ES-20	1SBH101004R2080	4/102
NS80ES-26	1SBH101004R2680	4/102
NS80ES-28	1SBH101004R2880	4/102
NSL22E-81	1SBH103001R8122	4/61
NSL22E-83	1SBH103001R8322	4/61
NSL22E-86	1SBH103001R8622	4/61
NSL22E-88	1SBH103001R8822	4/61
NSL22ES-81	1SBH103004R8122	4/103
NSL22ES-83	1SBH103004R8322	4/103
NSL22ES-86	1SBH103004R8622	4/103
NSL22ES-88	1SBH103004R8822	4/103
NSL31E-81	1SBH103001R8131	4/61
NSL31E-83	1SBH103001R8331	4/61
NSL31E-86	1SBH103001R8631	4/61
NSL31E-88	1SBH103001R8831	4/61
NSL31ES-81	1SBH103004R8131	4/103
NSL31ES-83	1SBH103004R8331	4/103
NSL31ES-86	1SBH103004R8631	4/103
NSL31ES-88	1SBH103004R8831	4/103
NSL40E-81	1SBH103001R8140	4/61
NSL40E-83	1SBH103001R8340	4/61
NSL40E-86	1SBH103001R8640	4/61
NSL40E-88	1SBH103001R8840	4/61
NSL40ES-81	1SBH103004R8140	4/103
NSL40ES-83	1SBH103004R8340	4/103
NSL40ES-86	1SBH103004R8640	4/103
NSL40ES-88	1SBH103004R8840	4/103
NSL44E-81	1SBH103001R8144	4/61
NSL44E-83	1SBH103001R8344	4/61
NSL44E-86	1SBH103001R8644	4/61
NSL44E-88	1SBH103001R8844	4/61
NSL44ES-81	1SBH103004R8144	4/103
NSL44ES-83	1SBH103004R8344	4/103
NSL44ES-86	1SBH103004R8644	4/103
NSL44ES-88	1SBH103004R8844	4/103
NSL53E-81	1SBH103001R8153	4/61
NSL53E-83	1SBH103001R8353	4/61
NSL53E-86	1SBH103001R8653	4/61
NSL53E-88	1SBH103001R8853	4/61
NSL53ES-81	1SBH103004R8153	4/103
NSL53ES-83	1SBH103004R8353	4/103
NSL53ES-86	1SBH103004R8653	4/103
NSL53ES-88	1SBH103004R8853	4/103
NSL62E-81	1SBH103001R8162	4/61
NSL62E-83	1SBH103001R8362	4/61
NSL62E-86	1SBH103001R8662	4/61
NSL62E-88	1SBH103001R8862	4/61
NSL62ES-81	1SBH103004R8162	4/103
NSL62ES-83	1SBH103004R8362	4/103
NSL62ES-86	1SBH103004R8662	4/103
NSL62ES-88	1SBH103004R8862	4/103
NSL71E-81	1SBH103001R8171	4/61
NSL71E-83	1SBH103001R8371	4/61
NSL71E-86	1SBH103001R8671	4/61
NSL71E-88	1SBH103001R8871	4/61
NSL71ES-81	1SBH103004R8171	4/103
NSL71ES-83	1SBH103004R8371	4/103
NSL71ES-86	1SBH103004R8671	4/103
NSL71ES-88	1SBH103004R8871	4/103
NSL80E-81	1SBH103001R8180	4/61
NSL80E-83	1SBH103001R8380	4/61
NSL80E-86	1SBH103001R8680	4/61
NSL80E-88	1SBH103001R8880	4/61

1SBC101359S0201

Index

Type classification

Type	Order code	Page
NSL80ES-81	1SBH103004R8180	4/103
NSL80ES-83	1SBH103004R8380	4/103
NSL80ES-86	1SBH103004R8680	4/103
NSL80ES-88	1SBH103004R8880	4/103
OESA460H/OESA400	1SFN085709R1000	5/284
OSZA15	1SCA022509R0120	5/284
OXS6X105	1SCA108043R1001	2/11
OXS6X130	1SCA101655R1001	2/11
OXS6X180	1SCA101659R1001	2/11
OXS6X85	1SCA101647R1001	2/11
PN110-21	1SFN094301R1000	5/31
PN110-41	1SFN094303R1000	5/287
PN185-11	1SFN094705R1000	5/287
PN185-21	1SFN094701R1000	5/287
PN185-41	1SFN094903R1000	5/287
PN210-22	SK829075-C	5/302
PN300-21	1SFN095101R1000	5/287
PN300-22	SK829075-E	5/302
PN300-41	1SFN095503R1000	5/287
PN300A-11	1SFN095105R1000	5/287
PN460-11	1SFN095705R1000	5/287
PN460-21	1SFN095701R1000	5/287
PN460-41	1SFN095703R1000	5/287
PN750-11	1SFN096105R1000	5/287
PN750-21	1SFN096101R1000	5/287
PN750-41	1SFN096103R1000	5/287
PR110-1	1SFN094500R1000	5/288
PR145-1	1SFN094700R1000	5/288
PR185-2	1SFN095100R1001	5/288
PR210-1	1SFN094900R1000	5/288
PR300-1	1SFN095300R1000	5/288
PR300-2	1SFN095300R1001	5/288
PR400-2	1SFN095700R1002	5/288
PR460-1	1SFN095700R1000	5/288
PR460-2	1SFN095700R1001	5/288
PR580-2	1SFN096100R1002	5/288
PR750-1	1SFN096100R1000	5/288
PR750-2	1SFN096100R1001	5/288
PS1-2-0-65	1SAM201906R1102	2/6
PS1-2-1-65	1SAM201906R1112	2/6
PS1-2-2-65	1SAM201906R1122	2/6
PS1-3-0-100	1SAM201916R1103	2/6
PS1-3-0-65	1SAM201906R1103	2/6
PS1-3-1-100	1SAM201916R1113	2/6
PS1-3-1-65	1SAM201906R1113	2/6
PS1-3-2-100	1SAM201916R1123	2/6
PS1-3-2-65	1SAM201906R1123	2/6
PS1-4-0-100	1SAM201916R1104	2/6
PS1-4-0-65	1SAM201906R1104	2/6
PS1-4-1-100	1SAM201916R1114	2/6
PS1-4-1-65	1SAM201906R1114	2/6
PS1-4-2-65	1SAM201906R1124	2/6
PS1-5-0-100	1SAM201916R1105	2/6
PS1-5-0-65	1SAM201906R1105	2/6
PS1-5-1-100	1SAM201916R1115	2/6
PS1-5-1-65	1SAM201906R1115	2/6
PS1-5-2-65	1SAM201906R1125	2/6
PS3-2-0	1SAM101937R0012	2/50
PS3-2-1	1SAM101937R0022	2/50
PS3-2-2	1SAM101937R0032	2/50
PS3-3-0	1SAM101937R0013	2/50
PS3-3-1	1SAM101937R0023	2/50
PS3-4-0	1SAM101937R0014	2/50
PS3-4-1	1SAM101937R0024	2/50
PS3-4-2	1SAM101937R0034	2/50
PS3-5-0	1SAM101937R0015	2/50
PS3-5-1	1SAM101937R0025	2/50
PS3-6-0	1SAM101937R0016	2/50
PS4-2-0	1SAM401911R1001	2/33
PS4-2-2	1SAM401911R1004	2/33
PS4-3-0	1SAM401911R1002	2/33
PS4-3-2	1SAM401911R1005	2/33
PS4-4-0	1SAM401911R1003	2/33
PS4-4-2	1SAM401911R1006	2/33
RA5-1	1SBN060300R1000	5/272
	1SBN060300T1000	5/272
RC5-1/133	1SBN050100R1001	4/37
RC5-1/250	1SBN050100R1002	4/37
RC5-1/440	1SBN050100R1003	4/37
RC5-1/50	1SBN050100R1000	4/37
RC5-2/133	1SBN050200R1001	5/17
RC5-2/250	1SBN050200R1002	5/17
RC5-2/440	1SBN050200R1003	5/17
RC5-2/50	1SBN050200R1000	5/17
RC5-3/440	1SFN050300R1003	5/270
RC-EH300/415	SK829007-B	5/154
RC-EH300/48	SK829007-A	5/154
RC-EH800/110	SK829007-C	5/154
RC-EH800/600	SK829007-D	5/154
RT5/150	1SBN050020R1003	4/37
RT5/264	1SBN050020R1004	4/37
RT5/32	1SBN050020R1000	4/37
RT5/65	1SBN050020R1001	4/37
RT5/90	1SBN050020R1002	4/37
RV5/133	1SBN050010R1001	4/37
RV5/250	1SBN050010R1002	4/37
RV5/440	1SBN050010R1003	4/37
RV5/50	1SBN050010R1000	4/37
RV-BC6/250	GHV2501903R0002	3/38
RV-BC6/380	GHV2501904R0002	3/38
RV-BC6/60	GHV2501902R0002	3/38
RV-BC6-F/250	GHV2501903R0003	3/38
RV-BC6-F/380	GHV2501904R0003	3/38
RV-BC6-F/60	GHV2501902R0003	3/38
S1-M1-25	1SAM201907R1101	2/6
S1-M2-25	1SAM201907R1102	2/6
S1-M3-25	1SAM201907R1103	2/6
S1-M3-35	1SAM201913R1103	2/6
S3-M1	1SAM101938R0001	2/50
S3-M2	1SAM101938R0002	2/50
S3-M3	1SAM101938R0004	2/50
S4-M1	1SAM401911R1007	2/33
SA1	GJF1101903R0001	2/6
SA2	GJF1101903R0002	2/6
SA3	GJF1101903R0003	2/6
SK1-02	1SAM201903R1003	2/7
SK-11	1SAM101904R0003	2/51
SK1-11	1SAM201903R1001	2/7
SK1-20	1SAM201903R1002	2/7
SK4-11	1SAM401904R1001	2/34
SPRC 1	1SNA360010R1500	5/251
T16-0.13	1SAZ711201R1005	4/20
T16-0.17	1SAZ711201R1008	4/20
T16-0.23	1SAZ711201R1009	4/20
T16-0.31	1SAZ711201R1013	4/20
T16-0.41	1SAZ711201R1014	4/20
T16-0.55	1SAZ711201R1017	4/20
T16-0.74	1SAZ711201R1021	4/20
T16-1.0	1SAZ711201R1023	4/20
T16-1.3	1SAZ711201R1025	4/20
T16-1.7	1SAZ711201R1028	4/20
T16-10	1SAZ711201R1043	4/20
T16-13	1SAZ711201R1045	4/20
T16-16	1SAZ711201R1047	4/20
T16-2.3	1SAZ711201R1031	4/20
T16-3.1	1SAZ711201R1033	4/20
T16-4.2	1SAZ711201R1035	4/20
T16-5.7	1SAZ711201R1038	4/20
T16-7.6	1SAZ711201R1040	4/20
TA110DU-110	1SAZ411201R1002	6/27
TA110DU-90	1SAZ411201R1001	6/27
TA200DU-110	1SAZ421201R1002	6/31
TA200DU-135	1SAZ421201R1003	6/31
TA200DU-150	1SAZ421201R1004	6/31
TA200DU-175	1SAZ421201R1005	6/31
TA200DU-200	1SAZ421201R1006	6/31
TA200DU-90	1SAZ421201R1001	6/31
TA25DU-0.16	1SAZ211201R1005	6/10
TA25DU-0.25	1SAZ211201R1009	6/10
TA25DU-0.4	1SAZ211201R1013	6/10
TA25DU-0.63	1SAZ211201R1017	6/10
TA25DU-1.0	1SAZ211201R1021	6/10
TA25DU-1.4	1SAZ211201R1023	6/10
TA25DU-1.8	1SAZ211201R1025	6/10
TA25DU-11	1SAZ211201R1043	6/10
TA25DU-14	1SAZ211201R1045	6/10
TA25DU-19	1SAZ211201R1047	6/10
TA25DU-2.4	1SAZ211201R1028	6/10
TA25DU-25	1SAZ211201R1051	6/10
TA25DU-3.1	1SAZ211201R1031	6/10
TA25DU-32	1SAZ211201R1053	6/10
TA25DU-4.0	1SAZ211201R1033	6/10
TA25DU-5.0	1SAZ211201R1035	6/10
TA25DU-6.5	1SAZ211201R1038	6/10
TA25DU-8.5	1SAZ211201R1040	6/10
TA42DU-25	1SAZ311201R1001	6/15
TA42DU-32	1SAZ311201R1002	6/15
TA42DU-42	1SAZ311201R1003	6/15
TA450DU-185	1SAZ511201R1001	6/35
TA450DU-235	1SAZ511201R1002	6/35
TA450DU-310	1SAZ511201R1003	6/35
TA45DU-45	1SAZ341201R1003	6/39
TA75DU-25	1SAZ321201R1001	6/19
TA75DU-32	1SAZ321201R1002	6/19
TA75DU-42	1SAZ321201R1003	6/19
TA75DU-52	1SAZ321201R1004	6/19
TA75DU-63	1SAZ321201R1005	6/19
TA75DU-80	1SAZ321201R1006	6/19
TA80DU-42	1SAZ331201R1003	6/23
TA80DU-52	1SAZ331201R1004	6/23
TA80DU-63	1SAZ331201R1005	6/23
TA80DU-80	1SAZ331201R1006	6/23
TA85DU-85	1SAZ351201R1006	6/42
TAE45-40-00	1SBL339261R5100	5/140
	1SBL339261R5200	5/140
	1SBL339261R5400	5/140
	1SBL339261R5500	5/140
	1SBL339261R5800	5/140
	1SBL339261R6200	5/140
	1SBL339261R6600	5/140
	1SBL339261R6800	5/140
TAE50-30-00	1SBL359061R5100	5/25
	1SBL359061R5200	5/25
	1SBL359061R5400	5/25
	1SBL359061R5500	5/25
	1SBL359061R5800	5/25
	1SBL359061R6200	5/25
	1SBL359061R6600	5/25
	1SBL359061R6800	5/25
TAE50-30-11	1SBL359061R5111	5/25
	1SBL359061R5211	5/25
	1SBL359061R5411	5/25
	1SBL359061R5511	5/25
	1SBL359061R5811	5/25
	1SBL359061R6211	5/25
	1SBL359061R6611	5/25
	1SBL359061R6811	5/25
TAE50-40-00	1SBL359261R5100	5/140
	1SBL359261R5200	5/140
	1SBL359261R5400	5/140
	1SBL359261R5500	5/140
	1SBL359261R5800	5/140
	1SBL359261R6200	5/140
	1SBL359261R6600	5/140
	1SBL359261R6800	5/140
TAE75-30-00	1SBL419061R5100	5/25
	1SBL419061R5200	5/25
	1SBL419061R5400	5/25
	1SBL419061R5500	5/25
	1SBL419061R5800	5/25
	1SBL419061R6200	5/25
	1SBL419061R6600	5/25
	1SBL419061R6800	5/25
TAE75-30-11	1SBL419061R5111	5/25
	1SBL419061R5211	5/25
	1SBL419061R5411	5/25
	1SBL419061R5511	5/25
	1SBL419061R5811	5/25
	1SBL419061R6211	5/25
	1SBL419061R6611	5/25
	1SBL419061R6811	5/25
TAE75-40-00	1SBL419261R5100	5/140
	1SBL419261R5200	5/140
	1SBL419261R5400	5/140
	1SBL419261R5500	5/140
	1SBL419261R5800	5/140
	1SBL419261R6200	5/140
	1SBL419261R6600	5/140
	1SBL419261R6800	5/140
TAL40-30-01	1SBL323061R5101	5/24
	1SBL323061R5201	5/24
	1SBL323061R5401	5/24
	1SBL323061R5501	5/24
	1SBL323061R5801	5/24
	1SBL323061R6201	5/24
	1SBL323061R6601	5/24
	1SBL323061R6801	5/24
TAL40-30-10	1SBL323061R5110	5/24
	1SBL323061R5210	5/24
	1SBL323061R5410	5/24
	1SBL323061R5510	5/24
	1SBL323061R5810	5/24
	1SBL323061R6210	5/24
	1SBL323061R6610	5/24
	1SBL323061R6810	5/24
TB450	1SAM401910R1001	2/33
TBC7-22-00-55	GJL1313561R5005	3/12
TBC7-22-00-62	GJL1313561R6002	3/12
TBC7-22-00-68	GJL1313561R6008	3/12
TBC7-30-01-51	GJL1313061R5011	3/9
TBC7-30-01-55	GJL1313061R5015	3/9
TBC7-30-01-62	GJL1313061R6012	3/9
TBC7-30-01-68	GJL1313061R6018	3/9
TBC7-30-10-51	GJL1313061R5101	3/9
TBC7-30-10-55	GJL1313061R5105	3/9
TBC7-30-10-62	GJL1313061R6102	3/9
TBC7-30-10-68	GJL1313061R6108	3/9
TBC7-31-00-55	GJL1313461R5005	3/12
TBC7-31-00-62	GJL1313461R6002	3/12
TBC7-31-00-68	GJL1313461R6008	3/12
TE5S-120	1SBN020010R1002	5/268
TE5S-24	1SBN020010R1001	5/268
TE5S-240	1SBN020010R1003	5/268
TE5S-440	1SBN020010R1004	5/268
TEF3-OFF	1SBN021014R1000	4/37
TEF3-ON	1SBN021012R1000	4/37
TF42-0.13	1SAZ721201R1005	6/6
TF42-0.17	1SAZ721201R1008	6/6
TF42-0.23	1SAZ721201R1009	6/6
TF42-0.31	1SAZ721201R1013	6/6
TF42-0.41	1SAZ721201R1014	6/6
TF42-0.55	1SAZ721201R1017	6/6
TF42-0.74	1SAZ721201R1021	6/6
TF42-1.0	1SAZ721201R1023	6/6
TF42-1.3	1SAZ721201R1025	6/6
TF42-1.7	1SAZ721201R1028	6/6
TF42-10	1SAZ721201R1043	6/6
TF42-13	1SAZ721201R1045	6/6
TF42-16	1SAZ721201R1047	6/6
TF42-2.3	1SAZ721201R1031	6/6
TF42-20	1SAZ721201R1049	6/6
TF42-24	1SAZ721201R1051	6/6
TF42-29	1SAZ721201R1052	6/6
TF42-3.1	1SAZ721201R1033	6/6
TF42-35	1SAZ721201R1053	6/6
TF42-38	1SAZ721201R1055	6/6
TF42-4.2	1SAZ721201R1035	6/6
TF42-5.7	1SAZ721201R1038	6/6
TF42-7.6	1SAZ721201R1040	6/6
TKC6-22Z-51	GJH1213061R5221	3/17

1SBC101359S0201

Index

Type classification

Type	Order code	Page
TKC6-22Z-55	GJH1213061R5225	3/17
TKC6-22Z-62	GJH1213061R6222	3/17
TKC6-22Z-68	GJH1213061R6228	3/17
TKC6-31Z-51	GJH1213061R5311	3/17
TKC6-31Z-55	GJH1213061R5315	3/17
TKC6-31Z-62	GJH1213061R6312	3/17
TKC6-31Z-68	GJH1213061R6318	3/17
TKC6-40E-51	GJH1213061R5401	3/17
TKC6-40E-55	GJH1213061R5405	3/17
TKC6-40E-62	GJH1213061R6402	3/17
TKC6-40E-68	GJH1213061R6408	3/17
TP180DA	1SBN020300R1001	5/17
TP180IA	1SBN020301R1001	5/17
TP40DA	1SBN020300R1000	5/17
TP40IA	1SBN020301R1000	5/17
UA110-30-00	1SFL451022R8000	5/204
	1SFL451022R8100	5/204
	1SFL451022R8300	5/204
	1SFL451022R8400	5/204
	1SFL451022R8500	5/204
	1SFL451022R8600	5/204
	1SFL451022R8800	5/204
UA110-30-00RA	1SFL451024R8000	5/194
	1SFL451024R8100	5/194
	1SFL451024R8300	5/194
	1SFL451024R8400	5/194
	1SFL451024R8500	5/194
	1SFL451024R8600	5/194
	1SFL451024R8800	5/194
UA110-30-11	1SFL451022R8011	5/205
	1SFL451022R8111	5/205
	1SFL451022R8311	5/205
	1SFL451022R8411	5/205
	1SFL451022R8511	5/205
	1SFL451022R8611	5/205
	1SFL451022R8811	5/205
UA1-120	1SAM201904R1004	2/7
UA1-208	1SAM201904R1008	2/7
UA1-230	1SAM201904R1005	2/7
UA1-24	1SAM201904R1001	2/7
UA1-400	1SAM201904R1006	2/7
UA1-415	1SAM201904R1007	2/7
UA1-48	1SAM201904R1002	2/7
UA1-60	1SAM201904R1003	2/7
UA16-30-10	1SBL181022R8010	5/201
	1SBL181022R8110	5/201
	1SBL181022R8310	5/201
	1SBL181022R8410	5/201
	1SBL181022R8510	5/201
	1SBL181022R8610	5/201
	1SBL181022R8810	5/201
UA16-30-10RA	1SBL181024R8010	5/192
	1SBL181024R8110	5/192
	1SBL181024R8310	5/192
	1SBL181024R8410	5/192
	1SBL181024R8510	5/192
	1SBL181024R8610	5/192
	1SBL181024R8810	5/192
UA26-30-10	1SBL241022R8010	5/201
	1SBL241022R8110	5/201
	1SBL241022R8310	5/201
	1SBL241022R8410	5/201
	1SBL241022R8510	5/201
	1SBL241022R8610	5/201
	1SBL241022R8810	5/201
UA26-30-10RA	1SBL241024R8010	5/192
	1SBL241024R8110	5/192
	1SBL241024R8310	5/192
	1SBL241024R8410	5/192
	1SBL241024R8510	5/192
	1SBL241024R8610	5/192
	1SBL241024R8810	5/192
UA30-30-10	1SBL281022R8010	5/201
	1SBL281022R8110	5/201
	1SBL281022R8310	5/201
	1SBL281022R8410	5/201
	1SBL281022R8510	5/201
	1SBL281022R8610	5/201
	1SBL281022R8810	5/201
UA30-30-10RA	1SBL281024R8010	5/192
	1SBL281024R8110	5/192
	1SBL281024R8310	5/192
	1SBL281024R8410	5/192
	1SBL281024R8510	5/192
	1SBL281024R8610	5/192
	1SBL281024R8810	5/192
UA4-110	1SAM401905R1001	2/34
UA4-230	1SAM401905R1002	2/34
UA4-24	1SAM401905R1004	2/34
UA4-400	1SAM401905R1003	2/34
UA4-HK-230	1SAM401906R1001	2/34
UA4-HK-400	1SAM401906R1002	2/34
UA50-30-00	1SBL351022R8000	5/202
	1SBL351022R8100	5/202
	1SBL351022R8300	5/202
	1SBL351022R8400	5/202
	1SBL351022R8500	5/202
	1SBL351022R8600	5/202
	1SBL351022R8800	5/202
UA50-30-00RA	1SBL351024R8000	5/193
	1SBL351024R8100	5/193
	1SBL351024R8300	5/193
	1SBL351024R8400	5/193
	1SBL351024R8500	5/193
	1SBL351024R8600	5/193
	1SBL351024R8800	5/193
UA50-30-11	1SBL351022R8011	5/203
	1SBL351022R8111	5/203
	1SBL351022R8311	5/203
	1SBL351022R8411	5/203
	1SBL351022R8511	5/203
	1SBL351022R8611	5/203
	1SBL351022R8811	5/203
UA63-30-00	1SBL371022R8000	5/202
	1SBL371022R8100	5/202
	1SBL371022R8300	5/202
	1SBL371022R8400	5/202
	1SBL371022R8500	5/202
	1SBL371022R8600	5/202
	1SBL371022R8800	5/202
UA63-30-00RA	1SBL371024R8000	5/193
	1SBL371024R8100	5/193
	1SBL371024R8300	5/193
	1SBL371024R8400	5/193
	1SBL371024R8500	5/193
	1SBL371024R8600	5/193
	1SBL371024R8800	5/193
UA63-30-11	1SBL371022R8011	5/203
	1SBL371022R8111	5/203
	1SBL371022R8311	5/203
	1SBL371022R8411	5/203
	1SBL371022R8511	5/203
	1SBL371022R8611	5/203
	1SBL371022R8811	5/203
UA75-30-00	1SBL411022R8000	5/202
	1SBL411022R8100	5/202
	1SBL411022R8300	5/202
	1SBL411022R8400	5/202
	1SBL411022R8500	5/202
	1SBL411022R8600	5/202
	1SBL411022R8800	5/202
UA75-30-00RA	1SBL411024R8000	5/193
	1SBL411024R8100	5/193
	1SBL411024R8300	5/193
	1SBL411024R8400	5/193
	1SBL411024R8500	5/193
	1SBL411024R8600	5/193
	1SBL411024R8800	5/193
UA75-30-11	1SBL411022R8011	5/203
	1SBL411022R8111	5/203
	1SBL411022R8311	5/203
	1SBL411022R8411	5/203
	1SBL411022R8511	5/203
	1SBL411022R8611	5/203
	1SBL411022R8811	5/203
UA95-30-00	1SFL431022R8000	5/204
	1SFL431022R8100	5/204
	1SFL431022R8300	5/204
	1SFL431022R8400	5/204
	1SFL431022R8500	5/204
	1SFL431022R8600	5/204
	1SFL431022R8800	5/204
UA95-30-00RA	1SFL431024R8000	5/194
	1SFL431024R8100	5/194
	1SFL431024R8300	5/194
	1SFL431024R8400	5/194
	1SFL431024R8500	5/194
	1SFL431024R8600	5/194
	1SFL431024R8800	5/194
UA95-30-11	1SFL431022R8011	5/205
	1SFL431022R8111	5/205
	1SFL431022R8311	5/205
	1SFL431022R8411	5/205
	1SFL431022R8511	5/205
	1SFL431022R8611	5/205
	1SFL431022R8811	5/205
UAF-110	1SAM101903R0110	2/51
UAF-230	1SAM101903R0230	2/51
UAF-24	1SAM101903R0024	2/51
UAF-400	1SAM101903R0400	2/51
UAF-415	1SAM101903R0415	2/51
UAF-48	1SAM101903R0048	2/51
UAF-500	1SAM101903R0500	2/51
UAF-60	1SAM101903R0060	2/51
VAS09EM-16M	1SBK103600M1600	4/44
VAS09EM-20M	1SBK103600M2000	4/44
VAS09EM-26M	1SBK103600M2600	4/44
VAS09EM-28M	1SBK103600M2800	4/44
VAS09SEM-16M	1SBK103800M1600	4/44
VAS09SEM-20M	1SBK103800M2000	4/44
VAS09SEM-26M	1SBK103800M2600	4/44
VAS09SEM-28M	1SBK103800M2800	4/44
VAS12EM-16M	1SBK113600M1600	4/44
VAS12EM-20M	1SBK113600M2000	4/44
VAS12EM-26M	1SBK113600M2600	4/44
VAS12EM-28M	1SBK113600M2800	4/44
VAS12SEM-16M	1SBK113800M1600	4/44
VAS12SEM-20M	1SBK113800M2000	4/44
VAS12SEM-26M	1SBK113800M2600	4/44
VAS12SEM-28M	1SBK113800M2800	4/44
VAS16EM-16M	1SBK123600M1600	4/44
VAS16EM-20M	1SBK123600M2000	4/44
VAS16EM-26M	1SBK123600M2600	4/44
VAS16EM-28M	1SBK123600M2800	4/44
VAS16SEM-16M	1SBK123800M1600	4/44
VAS16SEM-20M	1SBK123800M2000	4/44
VAS16SEM-26M	1SBK123800M2600	4/44
VAS16SEM-28M	1SBK123800M2800	4/44
VASL09EM-81M	1SBK103700M8100	4/45
VASL09EM-83M	1SBK103700M8300	4/45
VASL09EM-86M	1SBK103700M8600	4/45
VASL09EM-88M	1SBK103700M8800	4/45
VASL09SEM-81M	1SBK103900M8100	4/45
VASL09SEM-83M	1SBK103900M8300	4/45
VASL09SEM-86M	1SBK103900M8600	4/45
VASL09SEM-88M	1SBK103900M8800	4/45
VASL12EM-81M	1SBK113700M8100	4/45
VASL12EM-83M	1SBK113700M8300	4/45
VASL12EM-86M	1SBK113700M8600	4/45
VASL12EM-88M	1SBK113700M8800	4/45
VASL12SEM-81M	1SBK113900M8100	4/45
VASL12SEM-83M	1SBK113900M8300	4/45
VASL12SEM-86M	1SBK113900M8600	4/45
VASL12SEM-88M	1SBK113900M8800	4/45
VASL16EM-81M	1SBK123700M8100	4/45
VASL16EM-83M	1SBK123700M8300	4/45
VASL16EM-86M	1SBK123700M8600	4/45
VASL16EM-88M	1SBK123700M8800	4/45
VASL16SEM-81M	1SBK123900M8100	4/45
VASL16SEM-83M	1SBK123900M8300	4/45
VASL16SEM-86M	1SBK123900M8600	4/45
VASL16SEM-88M	1SBK123900M8800	4/45
VB6-30-01-01	GJL1211901R0011	3/4
VB6-30-01-02	GJL1211901R0012	3/4
VB6-30-01-03	GJL1211901R0013	3/4
VB6-30-01-80	GJL1211901R8010	3/4
VB6-30-01-84	GJL1211901R8014	3/4
VB6-30-01-85	GJL1211901R8015	3/4
VB6-30-01-P-01	GJL1211909R0011	3/20
VB6-30-01-P-02	GJL1211909R0012	3/20
VB6-30-01-P-03	GJL1211909R0013	3/20
VB6-30-01-P-80	GJL1211909R8010	3/20
VB6-30-01-P-84	GJL1211909R8014	3/20
VB6-30-01-P-85	GJL1211909R8015	3/20
VB6-30-10-01	GJL1211901R0101	3/4
VB6-30-10-02	GJL1211901R0102	3/4
VB6-30-10-03	GJL1211901R0103	3/4
VB6-30-10-80	GJL1211901R8100	3/4
VB6-30-10-84	GJL1211901R8104	3/4
VB6-30-10-85	GJL1211901R8105	3/4
VB6-30-10-P-01	GJL1211909R0101	3/20
VB6-30-10-P-02	GJL1211909R0102	3/20
VB6-30-10-P-03	GJL1211909R0103	3/20
VB6-30-10-P-80	GJL1211909R8100	3/20
VB6-30-10-P-84	GJL1211909R8104	3/20
VB6-30-10-P-85	GJL1211909R8105	3/20
VB6A-30-01-01	GJL1211911R0011	3/6
VB6A-30-01-02	GJL1211911R0012	3/6
VB6A-30-01-03	GJL1211911R0013	3/6
VB6A-30-01-80	GJL1211911R8010	3/6
VB6A-30-01-84	GJL1211911R8014	3/6
VB6A-30-01-85	GJL1211911R8015	3/6
VB6A-30-01-P-01	GJL1211919R0011	3/22
VB6A-30-01-P-02	GJL1211919R0012	3/22
VB6A-30-01-P-03	GJL1211919R0013	3/22
VB6A-30-01-P-80	GJL1211919R8010	3/22
VB6A-30-01-P-84	GJL1211919R8014	3/22
VB6A-30-01-P-85	GJL1211919R8015	3/22
VB6A-30-10-01	GJL1211911R0101	3/6
VB6A-30-10-02	GJL1211911R0102	3/6
VB6A-30-10-03	GJL1211911R0103	3/6
VB6A-30-10-80	GJL1211911R8100	3/6
VB6A-30-10-84	GJL1211911R8104	3/6
VB6A-30-10-85	GJL1211911R8105	3/6
VB6A-30-10-P-01	GJL1211919R0101	3/22
VB6A-30-10-P-02	GJL1211919R0102	3/22
VB6A-30-10-P-03	GJL1211919R0103	3/22
VB6A-30-10-P-80	GJL1211919R8100	3/22
VB6A-30-10-P-84	GJL1211919R8104	3/22
VB6A-30-10-P-85	GJL1211919R8105	3/22
VB7-30-01-01	GJL1311901R0011	3/4
VB7-30-01-02	GJL1311901R0012	3/4
VB7-30-01-03	GJL1311901R0013	3/4
VB7-30-01-80	GJL1311901R8010	3/4
VB7-30-01-84	GJL1311901R8014	3/4
VB7-30-01-85	GJL1311901R8015	3/4
VB7-30-01-F-01	GJL1311903R0011	3/30
VB7-30-01-F-02	GJL1311903R0012	3/30
VB7-30-01-F-03	GJL1311903R0013	3/30
VB7-30-01-F-80	GJL1311903R8010	3/30
VB7-30-01-F-84	GJL1311903R8014	3/30
VB7-30-01-F-85	GJL1311903R8015	3/30
VB7-30-01-P-01	GJL1311909R0011	3/20
VB7-30-01-P-02	GJL1311909R0012	3/20
VB7-30-01-P-03	GJL1311909R0013	3/20
VB7-30-01-P-80	GJL1311909R8010	3/20
VB7-30-01-P-84	GJL1311909R8014	3/20
VB7-30-01-P-85	GJL1311909R8015	3/20
VB7-30-10-01	GJL1311901R0101	3/4
VB7-30-10-02	GJL1311901R0102	3/4

1SBC101359S0201

Index

Type classification

Type	Order code	Page
VB7-30-10-03	GJL1311901R0103	3/4
VB7-30-10-80	GJL1311901R8100	3/4
VB7-30-10-84	GJL1311901R8104	3/4
VB7-30-10-85	GJL1311901R8105	3/4
VB7-30-10-F-01	GJL1311903R0101	3/30
VB7-30-10-F-02	GJL1311903R0102	3/30
VB7-30-10-F-03	GJL1311903R0103	3/30
VB7-30-10-F-80	GJL1311903R8100	3/30
VB7-30-10-F-84	GJL1311903R8104	3/30
VB7-30-10-F-85	GJL1311903R8105	3/30
VB7-30-10-P-01	GJL1311909R0101	3/20
VB7-30-10-P-02	GJL1311909R0102	3/20
VB7-30-10-P-03	GJL1311909R0103	3/20
VB7-30-10-P-80	GJL1311909R8100	3/20
VB7-30-10-P-84	GJL1311909R8104	3/20
VB7-30-10-P-85	GJL1311909R8105	3/20
VB7A-30-01-01	GJL1311911R0011	3/6
VB7A-30-01-02	GJL1311911R0012	3/6
VB7A-30-01-03	GJL1311911R0013	3/6
VB7A-30-01-80	GJL1311911R8010	3/6
VB7A-30-01-84	GJL1311911R8014	3/6
VB7A-30-01-85	GJL1311911R8015	3/6
VB7A-30-01-F-01	GJL1311913R0011	3/32
VB7A-30-01-F-02	GJL1311913R0012	3/32
VB7A-30-01-F-03	GJL1311913R0013	3/32
VB7A-30-01-F-80	GJL1311913R8010	3/32
VB7A-30-01-F-84	GJL1311913R8014	3/32
VB7A-30-01-F-85	GJL1311913R8015	3/32
VB7A-30-01-P-01	GJL1311919R0011	3/22
VB7A-30-01-P-02	GJL1311919R0012	3/22
VB7A-30-01-P-03	GJL1311919R0013	3/22
VB7A-30-01-P-80	GJL1311919R8010	3/22
VB7A-30-01-P-84	GJL1311919R8014	3/22
VB7A-30-01-P-85	GJL1311919R8015	3/22
VB7A-30-10-01	GJL1311911R0101	3/6
VB7A-30-10-02	GJL1311911R0102	3/6
VB7A-30-10-03	GJL1311911R0103	3/6
VB7A-30-10-80	GJL1311911R8100	3/6
VB7A-30-10-84	GJL1311911R8104	3/6
VB7A-30-10-85	GJL1311911R8105	3/6
VB7A-30-10-F-01	GJL1311913R0101	3/32
VB7A-30-10-F-02	GJL1311913R0102	3/32
VB7A-30-10-F-03	GJL1311913R0103	3/32
VB7A-30-10-F-80	GJL1311913R8100	3/32
VB7A-30-10-F-84	GJL1311913R8104	3/32
VB7A-30-10-F-85	GJL1311913R8105	3/32
VB7A-30-10-P-01	GJL1311919R0101	3/22
VB7A-30-10-P-02	GJL1311919R0102	3/22
VB7A-30-10-P-03	GJL1311919R0103	3/22
VB7A-30-10-P-80	GJL1311919R8100	3/22
VB7A-30-10-P-84	GJL1311919R8104	3/22
VB7A-30-10-P-85	GJL1311919R8105	3/22
VBC6-30-01-01	GJL1213901R0011	3/5
VBC6-30-01-03	GJL1213901R0013	3/5
VBC6-30-01-04	GJL1213901R0014	3/5
VBC6-30-01-05	GJL1213901R0015	3/5
VBC6-30-01-07	GJL1213901R0017	3/5
VBC6-30-01-16	GJL1213901R1016	3/5
VBC6-30-01-P-01	GJL1213909R0011	3/21
VBC6-30-01-P-03	GJL1213909R0013	3/21
VBC6-30-01-P-04	GJL1213909R0014	3/21
VBC6-30-01-P-05	GJL1213909R0015	3/21
VBC6-30-01-P-07	GJL1213909R0017	3/21
VBC6-30-06-P-06	GJL1213909R0016	3/21
VBC6-30-10-01	GJL1213901R0101	3/5
VBC6-30-10-03	GJL1213901R0103	3/5
VBC6-30-10-04	GJL1213901R0104	3/5
VBC6-30-10-05	GJL1213901R0105	3/5
VBC6-30-10-07	GJL1213901R0107	3/5
VBC6-30-10-16	GJL1213901R1106	3/5
VBC6-30-10-P-01	GJL1213909R0101	3/21
VBC6-30-10-P-03	GJL1213909R0103	3/21
VBC6-30-10-P-04	GJL1213909R0104	3/21
VBC6-30-10-P-05	GJL1213909R0105	3/21
VBC6-30-10-P-06	GJL1213909R0106	3/21
VBC6-30-10-P-07	GJL1213909R0107	3/21
VBC6A-30-01-01	GJL1213911R0011	3/7
VBC6A-30-01-03	GJL1213911R0013	3/7
VBC6A-30-01-04	GJL1213911R0014	3/7
VBC6A-30-01-05	GJL1213911R0015	3/7
VBC6A-30-01-07	GJL1213911R0017	3/7
VBC6A-30-01-16	GJL1213911R1016	3/7
VBC6A-30-10-01	GJL1213911R0101	3/7
VBC6A-30-10-03	GJL1213911R0103	3/7
VBC6A-30-10-04	GJL1213911R0104	3/7
VBC6A-30-10-05	GJL1213911R0105	3/7
VBC6A-30-10-07	GJL1213911R0107	3/7
VBC6A-30-10-16	GJL1213911R1106	3/7
VBC7-30-01-01	GJL1313901R0011	3/5
VBC7-30-01-03	GJL1313901R0013	3/5
VBC7-30-01-04	GJL1313901R0014	3/5
VBC7-30-01-05	GJL1313901R0015	3/5
VBC7-30-01-07	GJL1313901R0017	3/5
VBC7-30-01-16	GJL1313901R1016	3/5
VBC7-30-01-F-01	GJL1313903R0011	3/31
VBC7-30-01-F-03	GJL1313903R0013	3/31
VBC7-30-01-F-04	GJL1313903R0014	3/31
VBC7-30-01-F-05	GJL1313903R0015	3/31
VBC7-30-01-F-07	GJL1313903R0017	3/31
VBC7-30-01-F-16	GJL1313903R1016	3/31

Type	Order code	Page
VBC7-30-01-P-01	GJL1313909R0011	3/21
VBC7-30-01-P-03	GJL1313909R0013	3/21
VBC7-30-01-P-04	GJL1313909R0014	3/21
VBC7-30-01-P-05	GJL1313909R0015	3/21
VBC7-30-01-P-07	GJL1313909R0017	3/21
VBC7-30-01-P-16	GJL1313909R1016	3/21
VBC7-30-10-01	GJL1313901R0101	3/5
VBC7-30-10-03	GJL1313901R0103	3/5
VBC7-30-10-04	GJL1313901R0104	3/5
VBC7-30-10-05	GJL1313901R0105	3/5
VBC7-30-10-07	GJL1313901R0107	3/5
VBC7-30-10-16	GJL1313901R1106	3/5
VBC7-30-10-F-01	GJL1313903R0101	3/31
VBC7-30-10-F-03	GJL1313903R0103	3/31
VBC7-30-10-F-04	GJL1313903R0104	3/31
VBC7-30-10-F-05	GJL1313903R0105	3/31
VBC7-30-10-F-07	GJL1313903R0107	3/31
VBC7-30-10-F-16	GJL1313903R1106	3/31
VBC7-30-10-P-01	GJL1313909R0101	3/21
VBC7-30-10-P-03	GJL1313909R0103	3/21
VBC7-30-10-P-04	GJL1313909R0104	3/21
VBC7-30-10-P-05	GJL1313909R0105	3/21
VBC7-30-10-P-07	GJL1313909R0107	3/21
VBC7-30-10-P-16	GJL1313909R1106	3/21
VBC7A-30-01-01	GJL1313911R0011	3/7
VBC7A-30-01-03	GJL1313911R0013	3/7
VBC7A-30-01-04	GJL1313911R0014	3/7
VBC7A-30-01-05	GJL1313911R0015	3/7
VBC7A-30-01-07	GJL1313911R0017	3/7
VBC7A-30-01-16	GJL1313911R0016	3/7
VBC7A-30-01-F-01	GJL1313913R0011	3/33
VBC7A-30-01-F-03	GJL1313913R0013	3/33
VBC7A-30-01-F-04	GJL1313913R0014	3/33
VBC7A-30-01-F-05	GJL1313913R0015	3/33
VBC7A-30-01-F-07	GJL1313913R0017	3/33
VBC7A-30-01-F-16	GJL1313913R1016	3/33
VBC7A-30-01-P-01	GJL1313919R0011	3/23
VBC7A-30-01-P-03	GJL1313919R0013	3/23
VBC7A-30-01-P-04	GJL1313919R0014	3/23
VBC7A-30-01-P-05	GJL1313919R0015	3/23
VBC7A-30-01-P-07	GJL1313919R0017	3/23
VBC7A-30-01-P-16	GJL1313919R1016	3/23
VBC7A-30-10-01	GJL1313911R0101	3/7
VBC7A-30-10-03	GJL1313911R0103	3/7
VBC7A-30-10-04	GJL1313911R0104	3/7
VBC7A-30-10-05	GJL1313911R0105	3/7
VBC7A-30-10-07	GJL1313911R0107	3/7
VBC7A-30-10-16	GJL1313911R1106	3/7
VBC7A-30-10-F-01	GJL1313913R0101	3/33
VBC7A-30-10-F-03	GJL1313913R0103	3/33
VBC7A-30-10-F-04	GJL1313913R0104	3/33
VBC7A-30-10-F-05	GJL1313913R0105	3/33
VBC7A-30-10-F-07	GJL1313913R0107	3/33
VBC7A-30-10-F-16	GJL1313913R1106	3/33
VBC7A-30-10-P-01	GJL1313919R0101	3/23
VBC7A-30-10-P-03	GJL1313919R0103	3/23
VBC7A-30-10-P-04	GJL1313919R0104	3/23
VBC7A-30-10-P-05	GJL1313919R0105	3/23
VBC7A-30-10-P-07	GJL1313919R0107	3/23
VBC7A-30-10-P-16	GJL1313919R1106	3/23
VE5-1	1SBN030110R1000	5/17
VE5-2	1SBN030210R1000	5/17
VEM4	1SBN030111R1000	5/9
VH145	SK829071-A	5/154
VH300	SK829071-B	5/154
VH800	SK829070-F	5/154
VM1650H	1SFN036503R1000	5/41
VM3	1SBN031005T1000	4/14
VM300/460H	1SFN035100R1000	5/41
VM300/460V	1SFN035101R1000	5/262
VM300H	1SFN034700R1000	5/41
VM300V	1SFN034701R1000	5/262
VM4	1SBN030105T1000	5/9
VM5-1	1SBN030100R1000	5/17
VM750H	1SFN035700R1000	5/41
VM750V	1SFN035701R1000	5/262
WB75-A	FPTN372726R1001	5/248
	FPTN372726R1002	5/248
	FPTN372726R1003	5/248
	FPTN372726R1004	5/248
	FPTN372726R1005	5/248
	FPTN372726R1006	5/248
	FPTN372726R1007	5/248
	FPTN372726R1008	5/248
ZA110	1SFN154310R8006	5/290
	1SFN154310R8106	5/290
	1SFN154310R8306	5/290
	1SFN154310R8406	5/290
	1SFN154310R8506	5/290
	1SFN154310R8606	5/290
	1SFN154310R8806	5/290
ZA16	1SBN151410R8006	5/290
	1SBN151410R8106	5/290
	1SBN151410R8306	5/290
	1SBN151410R8406	5/290
	1SBN151410R8506	5/290
	1SBN151410R8606	5/290
	1SBN151410R8806	5/290
ZA185	1SFN154710R8006	5/290
	1SFN154710R8106	5/290

Type	Order code	Page
	1SFN154710R8306	5/290
	1SFN154710R8406	5/290
	1SFN154710R8506	5/290
	1SFN154710R8606	5/290
	1SFN154710R8806	5/290
ZA300	1SFN155110R8006	5/290
	1SFN155110R8106	5/290
	1SFN155110R8306	5/290
	1SFN155110R8406	5/290
	1SFN155110R8506	5/290
	1SFN155110R8606	5/290
	1SFN155110R8806	5/290
ZA40	1SBN152410R8006	5/290
	1SBN152410R8106	5/290
	1SBN152410R8306	5/290
	1SBN152410R8406	5/290
	1SBN152410R8506	5/290
	1SBN152410R8606	5/290
	1SBN152410R8806	5/290
ZA75	1SBN153510R8006	5/290
	1SBN153510R8106	5/290
	1SBN153510R8306	5/290
	1SBN153510R8406	5/290
	1SBN153510R8506	5/290
	1SBN153510R8606	5/290
	1SBN153510R8806	5/290
ZAF110	1SFN154370R6906	5/291
	1SFN154370R7006	5/291
	1SFN154370R7206	5/291
ZAF1650	1SFN156570R7026	5/291
ZAF185	1SFN154770R6906	5/291
	1SFN154770R7006	5/291
	1SFN154770R7206	5/291
ZAF300	1SFN155170R6906	5/291
	1SFN155170R7006	5/291
	1SFN155170R7206	5/291
ZAF460	1SFN155770R6806	5/291
	1SFN155770R6906	5/291
	1SFN155770R7006	5/291
	1SFN155770R7106	5/291
ZAF75	1SBN153570R6906	5/291
	1SBN153570R7006	5/291
	1SBN153570R7206	5/291
ZAF750	1SFN156170R6806	5/291
	1SFN156170R6906	5/291
	1SFN156170R7006	5/291
	1SFN156170R7106	5/291
ZL110	1SFN164503R1000	5/289
ZL1250	1SFN166403R1000	5/289
ZL1350	1SFN166503R1000	5/289
ZL145	1SFN164703R1000	5/289
ZL1650	1SFN166703R1000	5/289
ZL185	1SFN164903R1000	5/289
ZL2050	1SFN167003R1000	5/289
ZL210	1SFN165103R1000	5/289
ZL260	1SFN165303R1000	5/289
ZL300	1SFN165503R1000	5/289
ZL400	1SFN165703R1000	5/289
ZL460	1SFN165903R1000	5/289
ZL50	1SBN163503R1000	5/289
ZL580	1SFN166103R1000	5/289
ZL63	1SBN163703R1000	5/289
ZL75	1SBN164103R1000	5/289
ZL750	1SFN166303R1000	5/289
ZL95	1SFN164303R1000	5/289
ZLU110	1SFN164502R1000	5/289
ZLU50	1SBN163502R1000	5/289
ZLU63	1SBN163702R1000	5/289
ZLU75	1SBN164102R1000	5/289
ZLU95	1SFN164302R1000	5/289
ZP1650	1SFN166521R1070	5/291
ZW1650	1SFN166510R1000	5/289
ZW185	1SFN164710R1000	5/289
ZW300	1SFN165110R1000	5/289
ZW460	1SFN165710R1000	5/289
ZW750	1SFN166110R1000	5/289

1SBC101359S0201

Contact us

ABB France
Low Voltage Products Division
10, rue Ampère Z.I. - B.P. 114
F-69685 Chassieu cedex / France

ABB STOTZ-KONTAKT GmbH
Eppelheimer Straße 82
D-69123 Heidelberg / Germany

ABB AB/ Cewe-Control
Motorgränd 20
S-721 61 Västerås / Sweden

You can find the address of your local sales organisation on the ABB home page
http://www.abb.com/contacts -> Low Voltage products

Note
We reserve the right to make technical changes or modify the contents of this document without prior notice.
ABB does not accept any responsibility whatsoever for potential errors or possible lack of information in this document.

We reserve all rights in this document and in the subject matter and illustrations contained therein. Any reproduction, disclosure to third parties or utilization of its contents – in whole or in parts – is forbidden without prior written consent of ABB.

Copyright© 2012 ABB - All rights reserved

1SBC100167C0201 - Printed in France (09.2012 PDF)