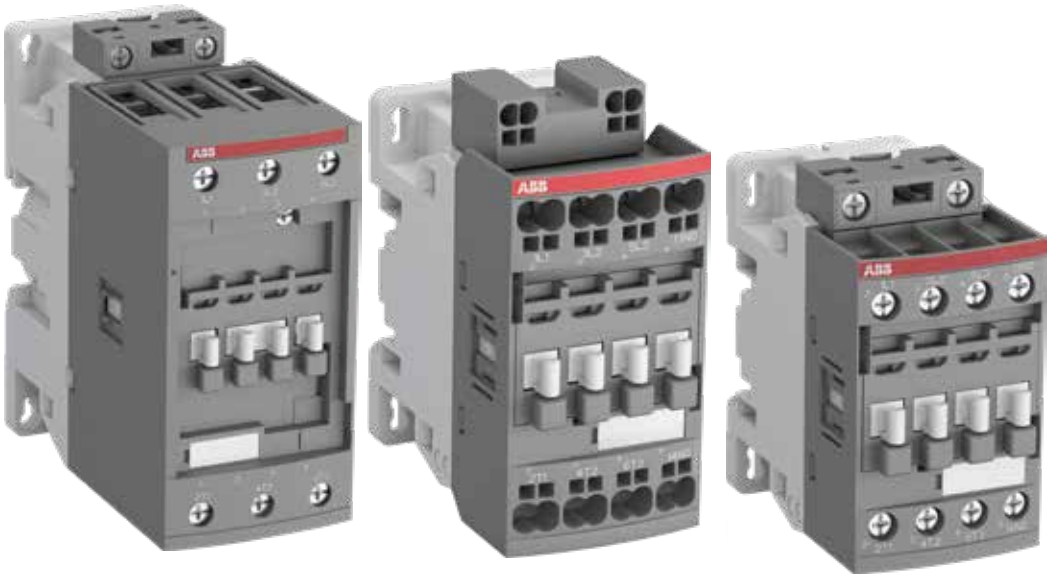
AFC contactors for motor starting and power switching up to 96 A

Motor protection and control with AFC contactors and NFC contactor relays

AFC contactors for AC control applications

ABB's AF platform is now extended with AFC contactors bringing AC control to the offer. It provides an additional choice, fitting to even more solutions up to 45 kW (400 V - 96 A AC-3). With a single footprint, design work is simpler and installation time is shorter – all with the advantage of ABB's trusted quality and global support.



Speed up your projects

One modular design

AF platform shares the same footprint – giving standalone contactors and starter combinations the same space requirements. The short-circuit performance is equivalent, making it possible to use one common circuit design for multiple applications. Plug-and-play it – save time!

Optimum interface

One contactor platform

AF platform is available with screw or Push-in Spring terminals and has a common range of accessories and protection devices. Reducing stock levels, minimizing mounting errors and maximizing interchangeability - the new AFC contactors are good for business.

Global availability

Expand your market

Use ABB's global distribution channels to source your AFC contactors. The range is compliant with all major international standards and approvals and suitable for use in most countries. Supported by ABB's global service network all around the word, get peace of mind.

For AC control up to 96 A, 45 kW AC-3

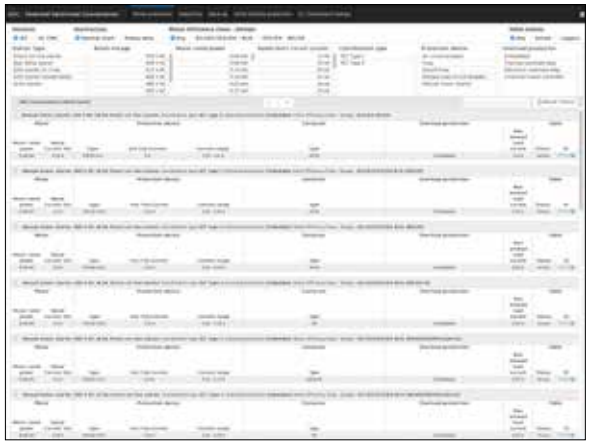
Optimized operating time for AC control applications
Within the ABB's AF platform, AFC contactors offer an optimized operating time, providing more alternatives to motor starters.

For installations requiring electromagnetic control
Tender specifications or existing customer applications might require control panels with AC electromagnetic coil control - AFC contactors offer the perfect solution.

Part of the AF platform
AFC contactors are an extension of the AF platform. Sharing same footprint and having equivalent electrical performance, installation design and maintenance are easier and faster. Protection devices (manual motor starters, overload relays), accessories (auxiliary contacts, electronic timers, ...) and connection kits (direct-on-line, reversing, star-delta) are common to the entire platform.

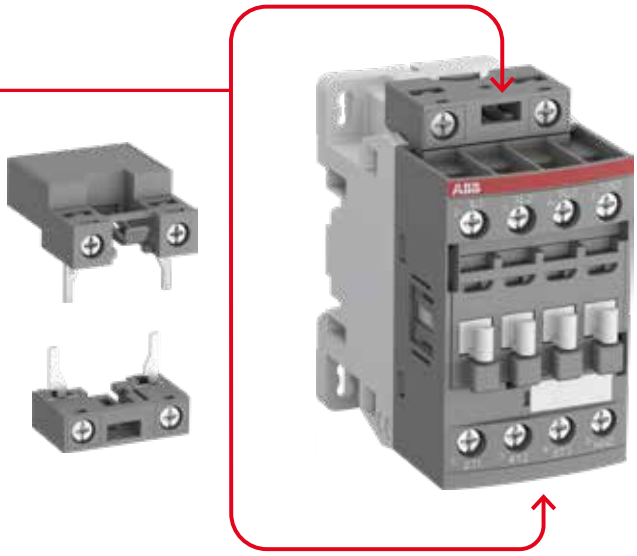
Select Optimized Coordination tool (SOC)
The AF platform is available in ABB Selected Optimized Coordination - SOC, a web tool for the selection of ABB products to be used in the following applications:

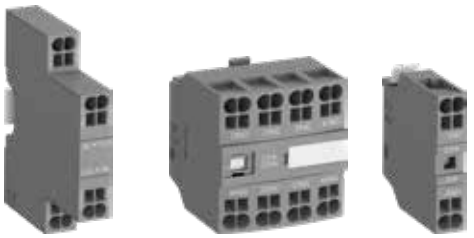
- motor starting and protection
- selectivity between protection devices
- back-up protection
- other devices protection
- UL component ratings.



Flexible and safe

Great flexibility for coil terminal access and surge suppressor
AFC contactors offer free choice of coil terminal access from top, bottom or front. Surge suppressor can be mounted from top or bottom.





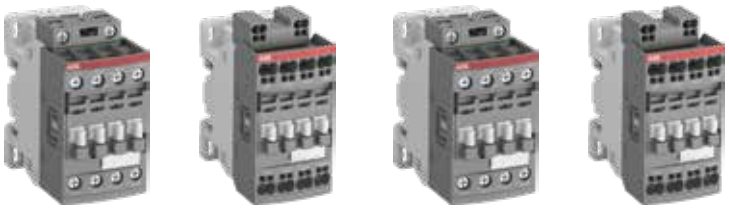
Compatible and easy to use accessories
1-pole, 2-pole and 4-pole auxiliary contact blocks (front or side mounted) are available with screw and Push-in Spring terminals. Accessories with Push-in Spring terminals can be mounted on every contactor of the AF platform, whatever its terminal connection type.

Easy, fast and secure starters assembly

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

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

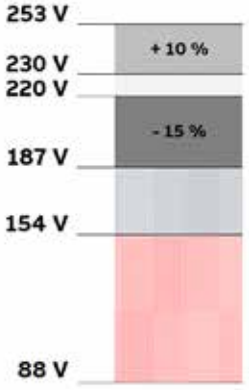
Select contactor dedicated to your application
The complement to the AF contactors

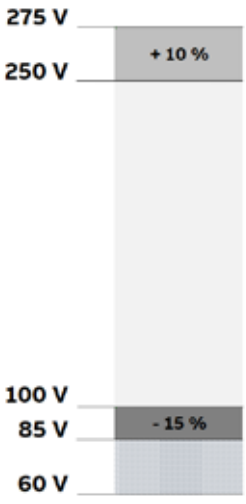


			AFC contactors AFC09 ... AFC96		AF contactors AF09 ... AF96
Main Pole IEC	AC-3/AC-3e rated operational power 380-400 V	**kW**	4 ... 45		4 ... 45
	AC-3/AC-3e rated operational current 380-400 V	**A**	9 ... 96		9 ... 96
	AC-1 rated operational current 690 V	**A**	25 ... 130		25 ... 130
	Rated operational voltage Ue max	**V**	690 V Ue max = 690V		
Main Pole UL/CSA	3-phase motor rating 440-480 V	**hp**	5 ... 60		5 ... 60
	General use rating 600 V	**A**	25 ... 115		25 ... 115
Terminal types			Screw Push-in Spring		Screw Push-in Spring
Control circuit	Control circuit		AC		AC / DC
	Number of coils		9		4
	Rated control circuit voltage 50 Hz	**V**	Coil 81 : 24 Coil 84 : 110 Coil 80 : 220 ... 230 Coil 88 : 230 ... 240 Coil 85 : 380 ... 400 Coil 86 : 400 ... 415	Coil 34 : 175 Coil 42 : 230 ... 240 Coil 51 : 400 ... 415	Coil 11 : 24...60 V 50/60 Hz / 20...60 V DC Coil 12 : 48...130 V 50/60 Hz / DC Coil 13 : 100...250 V 50/60 Hz / DC Coil 14 : 250...500 V 50/60 Hz / DC
	Rated control circuit voltage 60 Hz	**V**	Coil 81 : 24 Coil 84 : 110 ... 120 Coil 80 : 230 ... 240 Coil 88 : 240 ... 260 Coil 85 : 400 ... 415 Coil 86 : 415 ... 440	Coil 34 : 208 Coil 42 : 277 Coil 51 : 480	
	Surge suppressor		External		Built-in
	Operating time - NO contact opening	**ms**	max. 18		max. 95
	Operating time - NO contact closing	**ms**	max. 26		max. 95

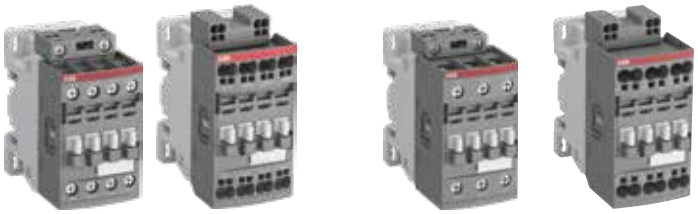
Coil operating limits and drop zone

+ 10 % UC max. acc. to IEC
Uc coil nominal voltage
- 15% Uc min. according to IEC
Uncertain drop zone
Safe holding zone





AFC 3-pole contactors and motor protection



AFC 3-pole contactors

IEC	**AC-3 Rated operational power**	θ ≤ 60 °C, 400 V	**kW**	4	5.5	7.5	11	15	18.5
AC Control supply		~	Type	**AFC09** **AFC09..K**	**AFC12** **AFC12..K**	**AFC16** **AFC16..K**	**AFC26** **AFC26..K**	**AFC30** **AFC30..K**	**AFC38** **AFC38..K**
IEC	AC-3 Rated operational current	θ ≤ 60 °C, 400 V	**A**	9	12	18	26	32	38
	AC-1 Rated operational current	θ ≤ 40 °C, 690 V	**A**	25	28	30	45	50	50

Main accessories

Auxiliary contact blocks	Front mounting	**CA4-10** (1 x N.O.) **CA4-01** (1 x N.C.)	
	Side mounting	**CAL4-11** (1 x N.O. + 1 x N.C.)	
Timers	Electronic	**TEF4-ON** **TEF4-OFF**	
Interlocking units	Mechanical	**VM4**	
	Mechanical / Electrical	**VEM4**	
Connection sets	For reversing contactors	**BER16-4**	**BER38-4**
Surge suppressors	Varistor (AC)	**RV4-1**	
	RC type (AC)	**RC4-1**	

Overload relays

Thermal relays	Class 10	**TF42** (0.10...38A)		
Electronic relays	Class 10E, 20E, 30E	**EF19** (0.10...18.9 A)	**EF19** (0.10...18.9 A) **EF45** (9...45 A)	
Accessories (for single mounting)	Thermal relays	**DB42**	-	
	Electronic relays	**DB19EF**	**DB45EF**	

Manual motor starters

	Thermal / magnetic protection Class 10	**MS116 (0.10...32 A)** Ics up to 50 kA for class 10A		**MS165** (10...80 A) Ics up to 100 kA (1)
		MS132 (0.10...32 A) Ics up to 100 kA		
	Magnetic only types	**MO132 (0.16...32 A)** Ics up to 100 kA		**MO165** (16...80 A) Ics up to 100 kA (1)
Accessories	For contactor mounting	**BEA16-4**	**BEA38-4**	

(1) MS165/MO165 are suitable for use with AFC09 ... AFC30 for North american applications.
(2) BEA65-4 suitable for MS165 and MO165 only.

	18.5	22	30	37	45
	AFC40	**AFC52**	**AFC65**	**AFC80**	**AFC96**
	40 70	53 100	65 105	80 125	96 130

	CA4-10 (1 x N.O.) **CA4-01** (1 x N.C.)	
	CAL4-11 (1 x N.O. + 1 x N.C.)	
	TEF4-ON **TEF4-OFF**	
	VM96-4	
	-	
	BER65-4	**BER96-4**
	-	
	RC4-2	

	TF65 (22...67 A)	**TF96** (40...96 A)
	EF65 (20...70 A)	**EF96** (36...100 A)
	DB65	**DB96**
		DB96

	MS165 (10...80 A) Ics up to 100 kA
	MO165 (16...80 A) Ics up to 100 kA
	BEA65-4 (2)

AFC 4-pole contactors and NFC contactor relays

AFC 4-pole contactors




IEC	**AC-1 Rated operational current**	θ ≤ 40 °C, 690 V	**A**	25	30	45	55	70	100	125
AC Control supply			Type	**AFC09**	**AFC16**	**AFC26**	**AFC38**	**AFC40**	**AFC52**	**AFC80**
IEC	AC-3 Rated operational current	θ ≤ 60 °C, 400 V	**A**	9	18	22	22	40	53	80
	AC-1 Rated operational current	θ ≤ 40 °C, 690 V	**A**	25	30	45	55	70	100	125

NFC 4-pole contactor relays


IEC	**AC-15 Rated operational current**	400 V	**A**	3		
UL/CSA	**Pilot duty**			**A600, Q600**		
				2 2	3 1	4 0
AC Control supply			Type	**NFC22E**	**NFC31E**	**NFC40E**
				NFC22EK	**NFC31EK**	**NFC40EK**

NFC 8-pole contactor relays


IEC	**AC-15 Rated operational current**	400 V		3				
UL/CSA	**Pilot duty**			**A600, Q600**				
				4 4	5 3	6 2	7 1	8 0
AC Control supply			Type	**NFC44E**	**NFC53E**	**NFC62E**	**NFC71E**	**NFC80E**
				NFC44EK	**NFC53EK**	**NFC62EK**	**NFC71EK**	**NFC80KE**

AFC contactors and NFC contactor relays

For direct product details information, use product type or order code, ex:

www.abb.com/productdetails/**AFC09-30-10-81**
or
www.abb.com/productdetails/**1SBL131001R8110**

AFC 3-pole contactors

AFC09 ... AFC16 3-pole contactors
4 to 7.5 kW
AC operated

AFC09-30-10

The AFC09 ... AFC16 3-pole contactors are designed for the control of motors or power circuits, offering an optimized operating time for AC control applications with electromagnetic control. AFC contactors have a block type design and can be easily extended with add-on auxiliary contact blocks and a wide range of additional accessories.

- 690 V IEC or 600 V UL/CSA
- 3 N.O. main poles, 1 N.O. or 1 N.C. built-in auxiliary contact
- IEC Switching capacity up to 7.5 kW / 400 V AC (AC-3)
- UL Switching capacity up to 10 hp / 480 V AC
- Control circuit: 24...415 V AC 50Hz / 24...440 V AC 60Hz
- Screw terminals
- Common accessory range for the complete AF platform.

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 Hz	V 60 Hz				kg
4	25	5	25	24	24	1 0	AFC09-30-10-81	1SBL131001R8110	0.331
						0 1	AFC09-30-01-81	1SBL131001R8101	0.331
				110	110 ... 120	1 0	AFC09-30-10-84	1SBL131001R8410	0.328
						0 1	AFC09-30-01-84	1SBL131001R8401	0.328
				220 ... 230	230 ... 240	1 0	AFC09-30-10-80	1SBL131001R8010	0.322
						0 1	AFC09-30-01-80	1SBL131001R8001	0.322
				230 ... 240	240 ... 260	1 0	AFC09-30-10-88	1SBL131001R8810	0.324
						0 1	AFC09-30-01-88	1SBL131001R8801	0.324
				380 ... 400	400 ... 415	1 0	AFC09-30-10-85	1SBL131001R8510	0.318
						0 1	AFC09-30-01-85	1SBL131001R8501	0.318
				400 ... 415	415 ... 440	1 0	AFC09-30-10-86	1SBL131001R8610	0.321
						0 1	AFC09-30-01-86	1SBL131001R8601	0.321
5.5	28	7.5	28	24	24	1 0	AFC12-30-10-81	1SBL151001R8110	0.331
						0 1	AFC12-30-01-81	1SBL151001R8101	0.331
				110	110 ... 120	1 0	AFC12-30-10-84	1SBL151001R8410	0.328
						0 1	AFC12-30-01-84	1SBL151001R8401	0.328
				220 ... 230	230 ... 240	1 0	AFC12-30-10-80	1SBL151001R8010	0.322
						0 1	AFC12-30-01-80	1SBL151001R8001	0.322
				230 ... 240	240 ... 260	1 0	AFC12-30-10-88	1SBL151001R8810	0.324
						0 1	AFC12-30-01-88	1SBL151001R8801	0.324
				380 ... 400	400 ... 415	1 0	AFC12-30-10-85	1SBL151001R8510	0.318
						0 1	AFC12-30-01-85	1SBL151001R8501	0.318
				400 ... 415	415 ... 440	1 0	AFC12-30-10-86	1SBL151001R8610	0.321
						0 1	AFC12-30-01-86	1SBL151001R8601	0.321
7.5	30	10	30	24	24	1 0	AFC16-30-10-81	1SBL171001R8110	0.331
						0 1	AFC16-30-01-81	1SBL171001R8101	0.331
				110	110 ... 120	1 0	AFC16-30-10-84	1SBL171001R8410	0.328
						0 1	AFC16-30-01-84	1SBL171001R8401	0.328
				220 ... 230	230 ... 240	1 0	AFC16-30-10-80	1SBL171001R8010	0.322
						0 1	AFC16-30-01-80	1SBL171001R8001	0.322
				230 ... 240	240 ... 260	1 0	AFC16-30-10-88	1SBL171001R8810	0.324
						0 1	AFC16-30-01-88	1SBL171001R8801	0.324
				380 ... 400	400 ... 415	1 0	AFC16-30-10-85	1SBL171001R8510	0.318
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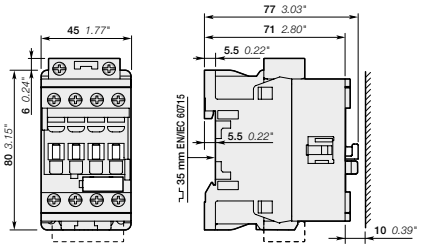
				400 ... 415	415 ... 440	1 0	AFC16-30-10-86	1SBL171001R8610	0.321
						0 1	AFC16-30-01-86	1SBL171001R8601	0.321



AFC09, AFC12, AFC16

Main dimensions mm, inches

AFC09 ... AFC16 3-pole contactors

4 to 7.5 kW

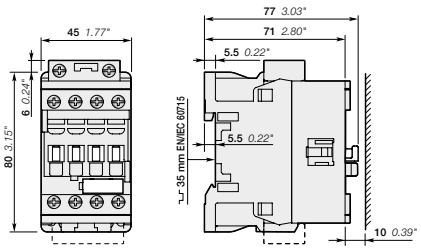
AC operated - With specific 60 Hz voltage

AFC09-30-10

The AFC09 ... AFC16 3-pole contactors are designed for the control of motors or power circuits, offering an optimized operating time for AC control applications with electromagnetic control. AFC contactors have a block type design and can be easily extended with add-on auxiliary contact blocks and a wide range of additional accessories.

- 690 V IEC or 600 V UL/CSA
- 3 N.O. main poles, 1 N.O. or 1 N.C. built-in auxiliary contact
- IEC Switching capacity up to 7.5 kW / 400 V AC (AC-3)
- UL Switching capacity up to 10 hp / 480 V AC
- Control circuit: 175...415 V AC 50Hz / 208...480 V AC 60Hz
- Screw terminals
- Common accessory range for the complete AF platform.

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 Hz	V 60 Hz				kg
4	25	5	25	175	208	1 0	AFC09-30-10-34	1SBL131001R3410	0.328
						0 1	AFC09-30-01-34	1SBL131001R3401	0.328
				230 ... 240	277	1 0	AFC09-30-10-42	1SBL131001R4210	0.323
						0 1	AFC09-30-01-42	1SBL131001R4201	0.323
				400 ... 415	480	1 0	AFC09-30-10-51	1SBL131001R5110	0.321
						0 1	AFC09-30-01-51	1SBL131001R5101	0.321
5.5	28	7.5	28	175	208	1 0	AFC12-30-10-34	1SBL151001R3410	0.328
						0 1	AFC12-30-01-34	1SBL151001R3401	0.328
				230 ... 240	277	1 0	AFC12-30-10-42	1SBL151001R4210	0.323
						0 1	AFC12-30-01-42	1SBL151001R4201	0.323
				400 ... 415	480	1 0	AFC12-30-10-51	1SBL151001R5110	0.321
						0 1	AFC12-30-01-51	1SBL151001R5101	0.321
7.5	30	10	30	175	208	1 0	AFC16-30-10-34	1SBL171001R3410	0.328
						0 1	AFC16-30-01-34	1SBL171001R3401	0.328
				230 ... 240	277	1 0	AFC16-30-10-42	1SBL171001R4210	0.323
						0 1	AFC16-30-01-42	1SBL171001R4201	0.323
				400 ... 415	480	1 0	AFC16-30-10-51	1SBL171001R5110	0.321
						0 1	AFC16-30-01-51	1SBL171001R5101	0.321



AFC09, AFC12, AFC16

Main dimensions mm, inches

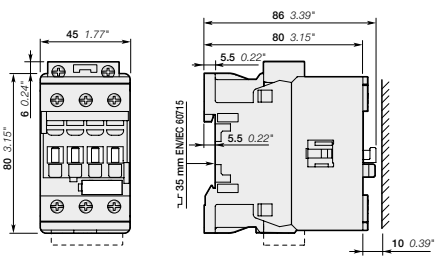
AFC26 ... AFC38 3-pole contactors
11 to 18.5 kW
AC operated

AFC26-30-10

The AFC26 ... AFC38 3-pole contactors are designed for the control of motors or power circuits, offering an optimized operating time for AC control applications with electromagnetic control. AFC contactors have a block type design and can be easily extended with add-on auxiliary contact blocks and a wide range of additional accessories.

- 690 V IEC or 600 V UL/CSA
- 3 N.O. main poles
- IEC Switching capacity up to 18.5 kW / 400 V AC (AC-3)
- UL Switching capacity up to 25 hp / 480V AC
- Control circuit: 24...415 V AC 50Hz / 24...440 V AC 60Hz
- Screw terminals
- Common accessory range for the complete AF platform.

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 Hz	V 60 Hz				kg
11	45	15	45	24	24	0 0	AFC26-30-00-81	1SBL231001R8100	0.383
				110	110 ... 120	0 0	AFC26-30-00-84	1SBL231001R8400	0.380
				220 ... 230	230 ... 240	0 0	AFC26-30-00-80	1SBL231001R8000	0.374
				230 ... 240	240 ... 260	0 0	AFC26-30-00-88	1SBL231001R8800	0.376
				380 ... 400	400 ... 415	0 0	AFC26-30-00-85	1SBL231001R8500	0.370
				400 ... 415	415 ... 440	0 0	AFC26-30-00-86	1SBL231001R8600	0.373
15	50	20	50	24	24	0 0	AFC30-30-00-81	1SBL271001R8100	0.383
				110	110 ... 120	0 0	AFC30-30-00-84	1SBL271001R8400	0.380
				220 ... 230	230 ... 240	0 0	AFC30-30-00-80	1SBL271001R8000	0.374
				230 ... 240	240 ... 260	0 0	AFC30-30-00-88	1SBL271001R8800	0.376
				380 ... 400	400 ... 415	0 0	AFC30-30-00-85	1SBL271001R8500	0.370
				400 ... 415	415 ... 440	0 0	AFC30-30-00-86	1SBL271001R8600	0.373
18.5	50	25	50	24	24	0 0	AFC38-30-00-81	1SBL291001R8100	0.383
				110	110 ... 120	0 0	AFC38-30-00-84	1SBL291001R8400	0.380
				220 ... 230	230 ... 240	0 0	AFC38-30-00-80	1SBL291001R8000	0.374
				230 ... 240	240 ... 260	0 0	AFC38-30-00-88	1SBL291001R8800	0.376
				380 ... 400	400 ... 415	0 0	AFC38-30-00-85	1SBL291001R8500	0.370
				400 ... 415	415 ... 440	0 0	AFC38-30-00-86	1SBL291001R8600	0.373



AFC26, AFC30, AFC38

Main dimensions mm, inches

AFC26 ... AFC38 3-pole contactors

11 to 18.5 kW

AC operated - With specific 60 Hz voltage

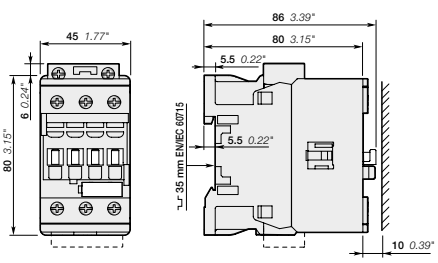
1SBC101001V0014

AFC26-30-10

The AFC26 ... AFC38 3-pole contactors are designed for the control of motors or power circuits, offering an optimized operating time for AC control applications with electromagnetic control. AFC contactors have a block type design and can be easily extended with add-on auxiliary contact blocks and a wide range of additional accessories.

- 690 V IEC or 600 V UL/CSA
- 3 N.O. main poles
- IEC Switching capacity up to 18.5 kW / 400 V AC (AC-3)
- UL Switching capacity up to 25 hp / 480V AC
- Control circuit: 175...415 V AC 50Hz / 208...480 V AC 60Hz
- Screw terminals
- Common accessory range for the complete AF platform.

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 Hz	V 60 Hz				kg
11	45	15	45	175	208	0 0	AFC26-30-00-34	1SBL231001R3400	0.379
				230 ... 240	277	0 0	AFC26-30-00-42	1SBL231001R4200	0.374
				400 ... 415	480	0 0	AFC26-30-00-51	1SBL231001R5100	0.372
15	50	20	50	175	208	0 0	AFC30-30-00-34	1SBL271001R3400	0.379
				230 ... 240	277	0 0	AFC30-30-00-84	1SBL271001R8400	0.374
				400 ... 415	480	0 0	AFC30-30-00-51	1SBL271001R5100	0.372
18.5	50	25	50	175	208	0 0	AFC38-30-00-34	1SBL291001R3400	0.379
				230 ... 240	277	0 0	AFC38-30-00-42	1SBL291001R4200	0.374
				400 ... 415	280	0 0	AFC38-30-00-51	1SBL291001R5100	0.372



AFC26, AFC30, AFC38

Main dimensions mm, inches

20

AFC40 ... AFC96 3-pole contactors

18.5 to 45 kW

AC operated

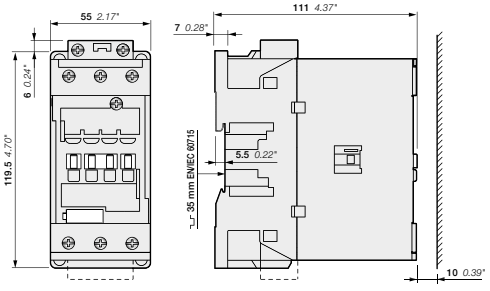
AFC40-30-00

AFC80-30-00

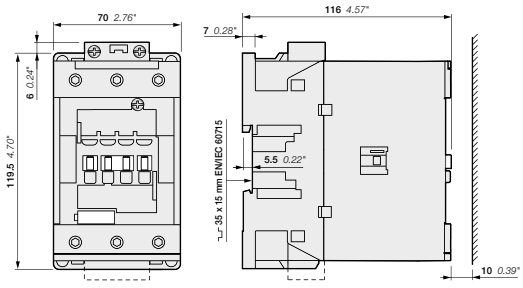
The AFC40 ... AFC96 3-pole contactors are designed for the control of motors or power circuits, offering an optimized operating time for AC control applications with electromagnetic control. AFC contactors have a block type design and can be easily extended with add-on auxiliary contact blocks and a wide range of additional accessories.

- 690 V IEC or 600 V UL/CSA
- 3 N.O. main poles
- IEC Switching capacity up to 45 kW / 400 V AC (AC-3)
- UL Switching capacity up to 60 hp / 480 V AC
- Control circuit: 24…415 V AC 50Hz / 24…440 V AC 60Hz
- Screw terminals
- Common accessory range for the complete AF platform.

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	60 Hz				kg
18.5	70	30	60	24	24	0 0	AFC40-30-00-81	1SBL341001R8100	0.972
				110	110 ... 120	0 0	AFC40-30-00-84	1SBL341001R8400	0.969
				220 ... 230	230 ... 240	0 0	AFC40-30-00-80	1SBL341001R8000	0.963
				230 ... 240	240 ... 260	0 0	AFC40-30-00-88	1SBL341001R8800	0.965
				380 ... 400	400 ... 415	0 0	AFC40-30-00-85	1SBL341001R8500	0.959
				400 ... 415	415 ... 440	0 0	AFC40-30-00-86	1SBL341001R8600	0.962
22	100	40	80	24	24	0 0	AFC52-30-00-81	1SBL361001R8100	0.972
				110	110 ... 120	0 0	AFC52-30-00-84	1SBL361001R8400	0.969
				220 ... 230	230 ... 240	0 0	AFC52-30-00-80	1SBL361001R8000	0.963
				230 ... 240	240 ... 260	0 0	AFC52-30-00-88	1SBL361001R8800	0.965
				380 ... 400	400 ... 415	0 0	AFC52-30-00-85	1SBL361001R8500	0.959
				400 ... 415	415 ... 440	0 0	AFC52-30-00-86	1SBL361001R8600	0.962
30	105	50	90	24	24	0 0	AFC65-30-00-81	1SBL381001R8100	0.972
				110	110 ... 120	0 0	AFC65-30-00-84	1SBL381001R8400	0.969
				220 ... 230	230 ... 240	0 0	AFC65-30-00-80	1SBL381001R8000	0.963
				230 ... 240	240 ... 260	0 0	AFC65-30-00-88	1SBL381001R8800	0.965
				380 ... 400	400 ... 415	0 0	AFC65-30-00-85	1SBL381001R8500	0.959
				400 ... 415	415 ... 440	0 0	AFC65-30-00-86	1SBL381001R8600	0.962
37	125	60	105	24	24	0 0	AFC80-30-00-81	1SBL391001R8100	1.193
				110	110 ... 120	0 0	AFC80-30-00-84	1SBL391001R8400	1.199
				220 ... 230	230 ... 240	0 0	AFC80-30-00-80	1SBL391001R8000	1.204
				230 ... 240	240 ... 260	0 0	AFC80-30-00-88	1SBL391001R8800	1.196
				380 ... 400	400 ... 415	0 0	AFC80-30-00-85	1SBL391001R8500	1.194
				400 ... 415	415 ... 440	0 0	AFC80-30-00-86	1SBL391001R8600	1.198
45	130	60	115	24	24	0 0	AFC96-30-00-81	1SBL401001R8100	1.193
				110	110 ... 120	0 0	AFC96-30-00-84	1SBL401001R8400	1.199
				220 ... 230	230 ... 240	0 0	AFC96-30-00-80	1SBL401001R8000	1.204
				230 ... 240	240 ... 260	0 0	AFC96-30-00-88	1SBL401001R8800	1.196
				380 ... 400	400 ... 415	0 0	AFC96-30-00-85	1SBL401001R8500	1.194
				400 ... 415	415 ... 440	0 0	AFC96-30-00-86	1SBL401001R8600	1.198



AFC40, AFC52, AFC65-30-00-..



AFC80, AFC96-30-00-..

Main dimensions mm, inches

AFC40 ... AFC96 3-pole contactors

18.5 to 45 kW

AC operated - With specific 60 Hz voltage

1SBC101014V0014

AFC40-30-00

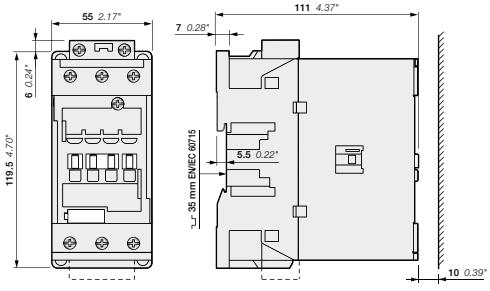
1SBC100016V0014

AFC80-30-00

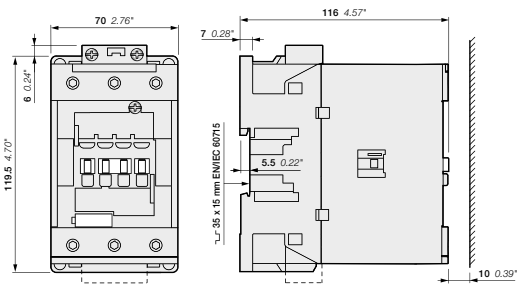
The AFC40 ... AFC96 3-pole contactors are designed for the control of motors or power circuits, offering an optimized operating time for AC control applications with electromagnetic control. AFC contactors have a block type design and can be easily extended with add-on auxiliary contact blocks and a wide range of additional accessories.

- 690 V IEC or 600 V UL/CSA
- 3 N.O. main poles
- IEC Switching capacity up to 45 kW / 400 V AC (AC-3)
- UL Switching capacity up to 60 hp / 480 V AC
- Control circuit: 175...415 V AC 50Hz / 208...480 V AC 60Hz
- Screw terminals
- Common accessory range for the complete AF platform.

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	60 Hz				kg
18.5	70	30	60	175	208	0 0	AFC40-30-00-34	1SBL341001R3400	0.969
				230 ... 240	277	0 0	AFC40-30-00-42	1SBL341001R4200	0.964
				400 ... 415	480	0 0	AFC40-30-00-51	1SBL341001R5100	0.962
22	100	40	80	175	208	0 0	AFC52-30-00-34	1SBL361001R3400	0.969
				230 ... 240	277	0 0	AFC52-30-00-42	1SBL361001R4200	0.964
				400 ... 415	480	0 0	AFC52-30-00-51	1SBL361001R5100	0.962
30	105	50	90	175	208	0 0	AFC65-30-00-34	1SBL381001R3400	0.969
				230 ... 240	277	0 0	AFC65-30-00-42	1SBL381001R4200	0.964
				400 ... 415	480	0 0	AFC65-30-00-51	1SBL381001R5100	0.962
37	125	60	105	175	208	0 0	AFC80-30-00-34	1SBL391001R3400	1.197
				230 ... 240	277	0 0	AFC80-30-00-42	1SBL391001R4200	1.196
				400 ... 415	480	0 0	AFC80-30-00-51	1SBL391001R5100	1.198
45	130	60	115	175	208	0 0	AFC96-30-00-34	1SBL401001R3400	1.197
				230 ... 240	277	0 0	AFC96-30-00-42	1SBL401001R4200	1.196
				400 ... 415	480	0 0	AFC96-30-00-51	1SBL401001R5100	1.198



AFC40, AFC52, AFC65-30-00-..

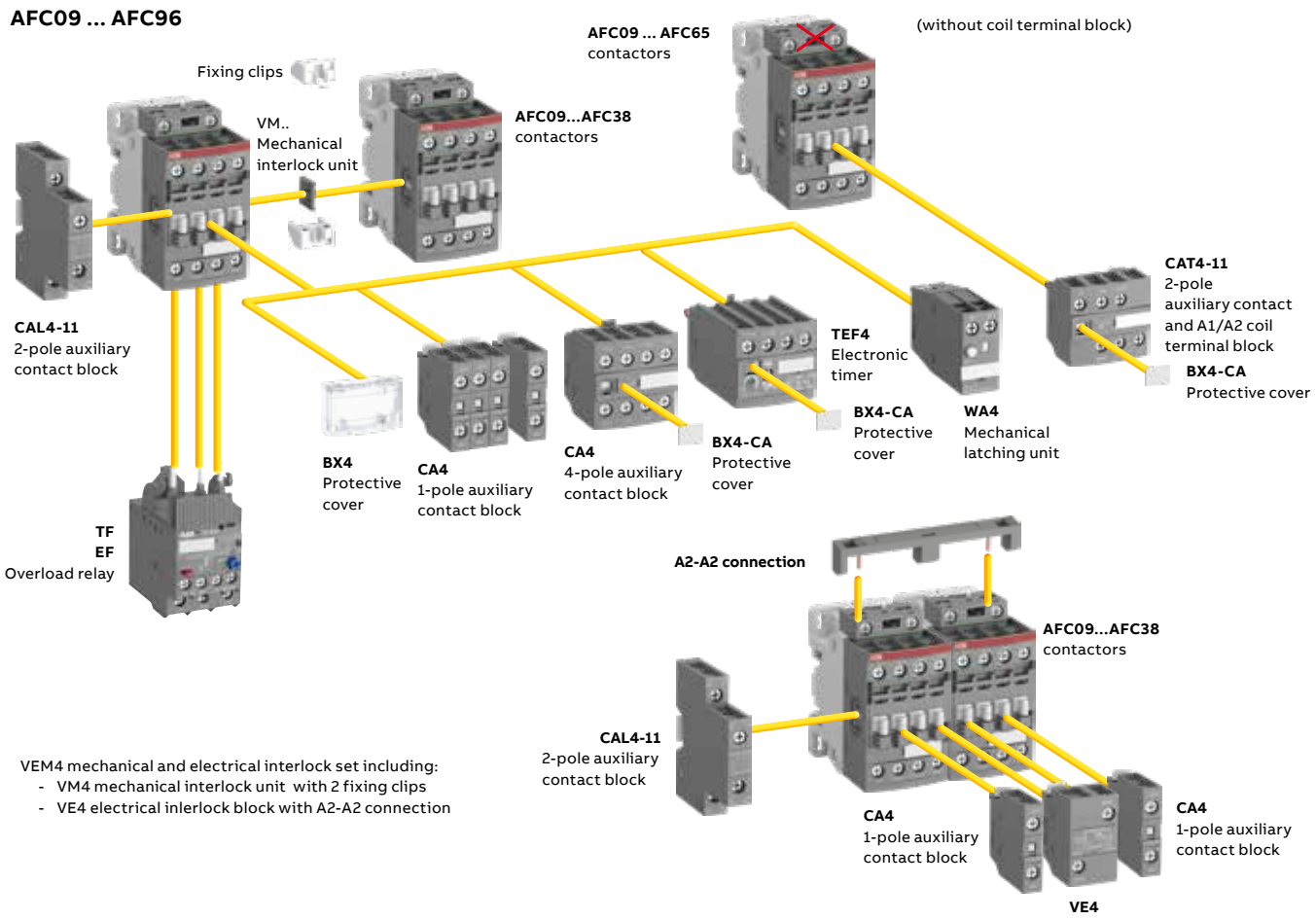


AFC80, AFC96-30-00-..

Main dimensions mm, inches

AFC09 ... AFC96 3-pole contactors

Contactors and main accessories



VEM4 mechanical and electrical interlock set including:
- VM4 mechanical interlock unit with 2 fixing clips
- VE4 electrical inlerlock block with A2-A2 connection

Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories

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			Electronic timer	Mechanical latching unit	Electrical and mechanical interlock set (between 2 contactors)	Side-mounted accessories Auxiliary contact blocks	
			1-pole CA4	2-pole CAT4-11	4-pole CA4	TEF4 (3)	WA4 (2)	VEM4	2-pole CAL4-11 Left side	2-pole CAL4-11 Right side
AFC09 ... AFC38 (1)										
AFC09 ... AFC16	3 0	0 1	4 max.	or 1	or 1	or 1	or 1	–	+ 1	–
AFC09 ... AFC16	3 0	1 0	2 max.	or 1	–	or 1	or 1	–	+ 1	+ 1
AFC26 ... AFC38	3 0	0 0	3 max.	–	–	–	–	+ 1	+ 1	or 1
AFC40 ... AFC96										
AFC40 ... AFC65	3 0	0 0	4 max.	or 1	–	or 1	–	–	+ 1	+ 1
AFC80, AFC96	3 0	0 0	4 max.	–	–	or 1	–	–	+ 1	+ 1

(1) Including add-on and built-in contacts : 4 N.C. auxiliary contacts max on positions 1, 2, 3, 4 and 3 N.C. auxiliary contacts max. on positions 1 ±30°, 5.
(2) Use WA4 for ACF09...AFC38.
Accept 1-pole CA4 auxiliary contacts (1 block on each side of the mechanical latch) in respect to the total number of built-in or additional N.C. auxiliary contacts.
(3) Not to be used for Star-Delta starter. For a compatible Star-Delta timer, please use CT-SDS.22S, CT-SDS.23S or CT-SDC.22

Overload relays fitting details (4)

Contactor types	Thermal overload relays	Electronic overload relays
AFC09 ... AFC38	TF42 (0.10...38 A)	EF19 (0.10...19 A)
AFC26 ... AFC38	TF42 (0.10...38 A)	EF45 (9...45 A)
AFC40 ... AFC65	TF65 (22...67 A)	EF65 (20...70 A)
AFC80, AFC96	TF96 (40...96 A)	EF96 (36...100 A)

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

AFC40 ... AFC96 3-pole contactors

18.5 to 45 kW

AC operated with 1N.O. + 1N.C. auxiliary contacts

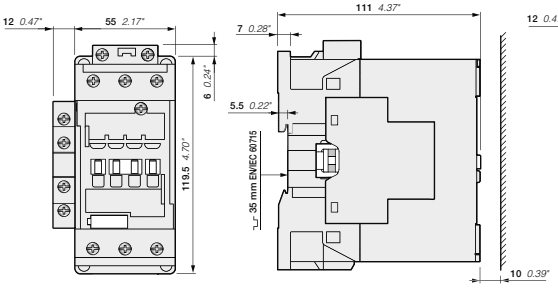
AFC40-30-11

AFC80-30-11

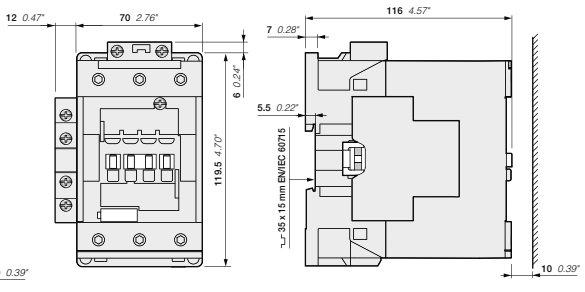
The AFC40 ... AFC96 3-pole contactors are designed for the control of motors or power circuits, offering an optimized operating time for AC control applications with electromagnetic control AFC contactors have a block type design and can be easily extended with add-on auxiliary contact blocks and a wide range of additional accessories.

- 690 V IEC or 600 V UL/CSA
- 3 N.O. main poles with factory mounted 1 N.O. + 1 N.C. auxiliary contacts
- IEC Switching capacity up to 45 kW / 400 V AC (AC-3)
- UL Switching capacity up to 60 hp / 480 V AC
- Control circuit: 24...415 V AC 50Hz / 24...440 V AC 60Hz
- Screw terminals
- Common accessory range for the complete AF platform.

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	60 Hz				kg
18.5	70	30	60	24	24	0 0	AFC40-30-11-81	1SBL341001R8111	1.012
				110	110 ... 120	0 0	AFC40-30-11-84	1SBL341001R8411	1.009
				220 ... 230	230 ... 240	0 0	AFC40-30-11-80	1SBL341001R8011	1.003
				230 ... 240	240 ... 260	0 0	AFC40-30-11-88	1SBL341001R8811	1.005
				380 ... 400	400 ... 415	0 0	AFC40-30-11-85	1SBL341001R8511	0.999
				400 ... 415	415 ... 440	0 0	AFC40-30-11-86	1SBL341001R8611	1.002
22	100	40	80	24	24	0 0	AFC52-30-11-81	1SBL361001R8111	1.012
				110	110 ... 120	0 0	AFC52-30-11-84	1SBL361001R8411	1.009
				220 ... 230	230 ... 240	0 0	AFC52-30-11-80	1SBL361001R8011	1.003
				230 ... 240	240 ... 260	0 0	AFC52-30-11-88	1SBL361001R8811	1.005
				380 ... 400	400 ... 415	0 0	AFC52-30-11-85	1SBL361001R8511	0.999
				400 ... 415	415 ... 440	0 0	AFC52-30-11-86	1SBL361001R8611	1.002
30	105	50	90	24	24	0 0	AFC65-30-11-81	1SBL381001R8111	1.012
				110	110 ... 120	0 0	AFC65-30-11-84	1SBL381001R8411	1.009
				220 ... 230	230 ... 240	0 0	AFC65-30-11-80	1SBL381001R8011	1.003
				230 ... 240	240 ... 260	0 0	AFC65-30-11-88	1SBL381001R8811	1.005
				380 ... 400	400 ... 415	0 0	AFC65-30-11-85	1SBL381001R8511	0.999
				400 ... 415	415 ... 440	0 0	AFC65-30-11-86	1SBL381001R8611	1.002
37	125	60	105	24	24	0 0	AFC80-30-11-81	1SBL391001R8111	1.233
				110	110 ... 120	0 0	AFC80-30-11-84	1SBL391001R8411	1.239
				220 ... 230	230 ... 240	0 0	AFC80-30-11-80	1SBL391001R8011	1.244
				230 ... 240	240 ... 260	0 0	AFC80-30-11-88	1SBL391001R8811	1.236
				380 ... 400	400 ... 415	0 0	AFC80-30-11-85	1SBL391001R8511	1.234
				400 ... 415	415 ... 440	0 0	AFC80-30-11-86	1SBL391001R8611	1.238
45	130	60	115	24	24	0 0	AFC96-30-11-81	1SBL401001R8111	1.233
				110	110 ... 120	0 0	AFC96-30-11-84	1SBL401001R8411	1.239
				220 ... 230	230 ... 240	0 0	AFC96-30-11-80	1SBL401001R8011	1.244
				230 ... 240	240 ... 260	0 0	AFC96-30-11-88	1SBL401001R8811	1.236
				380 ... 400	400 ... 415	0 0	AFC96-30-11-85	1SBL401001R8511	1.234
				400 ... 415	415 ... 440	0 0	AFC96-30-11-86	1SBL401001R8611	1.238



AFC40, AFC52, AFC65-30-11-..



AFC80, AFC96-30-11-..

Main dimensions mm, inches

AFC40 ... AFC96 3-pole contactors

18.5 to 45 kW

AC operated with 1N.O. + 1N.C. auxiliary contacts - With specific 60 Hz voltage

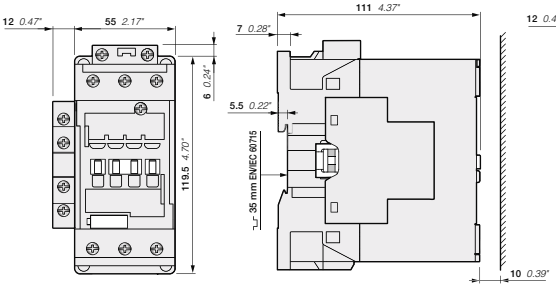
AFC40-30-11

AFC80-30-11

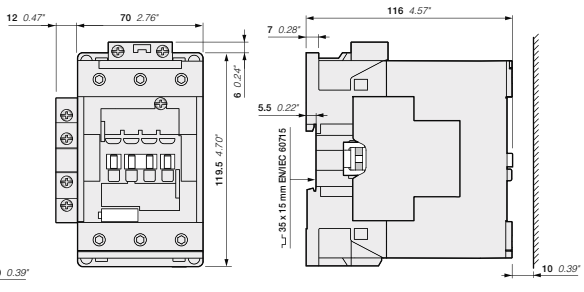
The AFC40 ... AFC96 3-pole contactors are designed for the control of motors or power circuits, offering an optimized operating time for AC control applications with electromagnetic control. AFC contactors have a block type design and can be easily extended with add-on auxiliary contact blocks and a wide range of additional accessories.

- 690 V IEC or 600 V UL/CSA
- 3 N.O. main poles
- IEC Switching capacity up to 45 kW / 400 V AC (AC-3)
- UL Switching capacity up to 60 hp / 480 V AC
- Control circuit: 175...415 V AC 50Hz / 208...480 V AC 60Hz
- Screw terminals
- Common accessory range for the complete AF platform.

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	60 Hz				kg
18.5	70	30	60	175	208	0 0	AFC40-30-11-34	1SBL341001R3411	1.009
				230 ... 240	277	0 0	AFC40-30-11-42	1SBL341001R4211	1.004
				400 ... 415	480	0 0	AFC40-30-11-51	1SBL341001R5111	1.002
22	100	40	80	175	208	0 0	AFC52-30-11-34	1SBL361001R3411	1.009
				230 ... 240	277	0 0	AFC52-30-11-42	1SBL361001R4211	1.004
				400 ... 415	480	0 0	AFC52-30-11-51	1SBL361001R5111	1.002
30	105	50	90	175	208	0 0	AFC65-30-11-34	1SBL381001R3411	1.009
				230 ... 240	277	0 0	AFC65-30-11-42	1SBL381001R4211	1.004
				400 ... 415	480	0 0	AFC65-30-11-51	1SBL381001R5111	1.002
37	125	60	105	175	208	0 0	AFC80-30-11-34	1SBL391001R3411	1.237
				230 ... 240	277	0 0	AFC80-30-11-42	1SBL391001R4211	1.236
				400 ... 415	480	0 0	AFC80-30-11-51	1SBL391001R5111	1.238
45	130	60	115	175	208	0 0	AFC96-30-11-34	1SBL401001R3411	1.237
				230 ... 240	277	0 0	AFC96-30-11-42	1SBL401001R4211	1.236
				400 ... 415	480	0 0	AFC96-30-11-51	1SBL401001R5111	1.238



AFC40, AFC52, AFC65-30-11-..

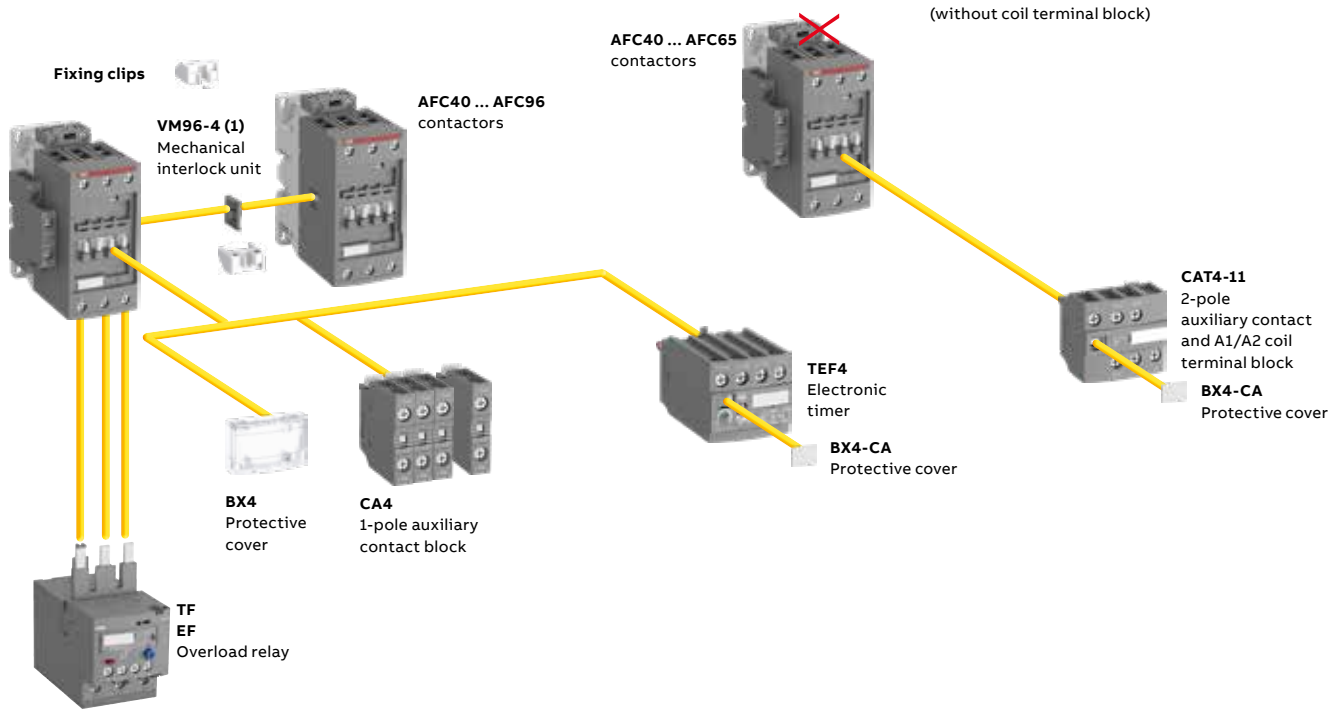


AFC80, AFC96-30-11-..

Main dimensions mm, inches

AFC40 ... AFC96 3-pole contactors with 1 N.O. + 1 N.C. auxiliary contacts

Contactors and main accessories



Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories

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			Electronic timer	Mechanical latching unit	Side-mounted accessories Mechanical interlock set (between 2 contactors)		Auxiliary contact blocks	
			1-pole CA4	2-pole CAT4-11	4-pole CA4	TEF4 (2)	WA4	VM96-4 (1)		2-pole CAL4-11 Left side	Right side
AFC40 ... AFC65	3 0	1 1	4 max.	or 1	–	or 1	–	+ 1		–	–
			4 max.	or 1	–	or 1	–	–	+	–	1
AFC80, AFC96	3 0	1 1	4 max.	–	–	or 1	–	+ 1		–	–
			4 max.	–	–	or 1	–	–	+	–	1

(1) Use VM96-4 revision B of later.
For contactors AFC80, AFC96 mounted side by side, ambient temperature should remain <60°C
(2) Not to be used for Star-Delta starter. For a compatible Star-Delta timer, please use CT-SDS.22S, CT-SDS.23S or CT-SDC.22.

Overload relays fitting details (3)

Contactor types	Thermal overload relays	Electronic overload relays
AFC40 ... AFC65	TF65 (22...67 A)	EF65 (20...70 A)
AFC80, AFC96	TF96 (40...96 A)	EF96 (36...100 A)

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

20

AFC09..K ... AFC16..K 3-pole contactors with Push-in Spring terminals

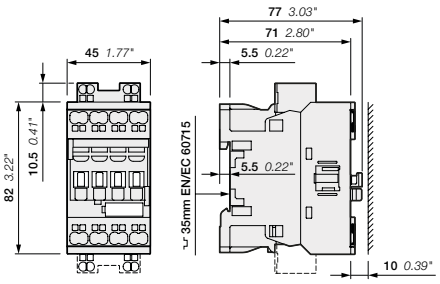
4 to 7.5 kW
AC operated

AFC09-30-10K

The AFC09..K ... AFC16..K 3-pole contactors are designed for the control of motors or power circuits, offering an optimized operating time for AC control applications with electromagnetic control. AFC contactors have a block type design and can be easily extended with add-on auxiliary contact blocks and a wide range of additional accessories.

- 690 V IEC or 600 V UL/CSA
- 3 N.O. main poles, 1 N.O. or 1 N.C. built-in auxiliary contact
- IEC Switching capacity up to 7.5 kW / 400 V AC (AC-3)
- UL Switching capacity up to 10 hp / 480V AC
- Control circuit: 24...415 V AC 50Hz / 24...440 V AC 60Hz
- Push-in Spring terminals
- Common accessory range for the complete AF platform.

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 Hz	V 60 Hz				kg
4	25	5	25	24	24	1 0	AFC09-30-10K-81	1SBL131005R8110	0.337
						0 1	AFC09-30-01K-81	1SBL131005R8101	0.337
				110	110 ... 120	1 0	AFC09-30-10K-84	1SBL131005R8410	0.334
						0 1	AFC09-30-01K-84	1SBL131005R8401	0.334
				220 ... 230	230 ... 240	1 0	AFC09-30-10K-80	1SBL131005R8010	0.328
						0 1	AFC09-30-01K-80	1SBL131005R8001	0.328
				230 ... 240	240 ... 260	1 0	AFC09-30-10K-88	1SBL131005R8810	0.330
						0 1	AFC09-30-01K-88	1SBL131005R8801	0.330
				380 ... 400	400 ... 415	1 0	AFC09-30-10K-85	1SBL131005R8510	0.324
						0 1	AFC09-30-01K-85	1SBL131005R8501	0.324
				400 ... 415	415 ... 440	1 0	AFC09-30-10K-86	1SBL131005R8610	0.327
						0 1	AFC09-30-01K-86	1SBL131005R8601	0.327
5.5	28	7.5	28	24	24	1 0	AFC12-30-10K-81	1SBL151005R8100	0.337
						0 1	AFC12-30-01K-81	1SBL151005R8101	0.337
				110	110 ... 120	1 0	AFC12-30-10K-84	1SBL151005R8410	0.334
						0 1	AFC12-30-01K-84	1SBL151005R8401	0.334
				220 ... 230	230 ... 240	1 0	AFC12-30-10K-80	1SBL151005R8010	0.328
						0 1	AFC12-30-01K-80	1SBL151005R8001	0.328
				230 ... 240	240 ... 260	1 0	AFC12-30-10K-88	1SBL151005R8810	0.330
						0 1	AFC12-30-01K-88	1SBL151005R8801	0.330
				380 ... 400	400 ... 415	1 0	AFC12-30-10K-85	1SBL151005R8510	0.324
						0 1	AFC12-30-01K-85	1SBL151005R8501	0.324
				400 ... 415	415 ... 440	1 0	AFC12-30-10K-86	1SBL151005R8610	0.327
						0 1	AFC12-30-01K-86	1SBL151005R8601	0.327
7.5	30	10	30	24	24	1 0	AFC16-30-10K-81	1SBL171005R8110	0.337
						0 1	AFC16-30-01K-81	1SBL171005R8101	0.337
				110	110 ... 120	1 0	AFC16-30-10K-84	1SBL171005R8410	0.334
						0 1	AFC16-30-01K-84	1SBL171005R8401	0.334
				220 ... 230	230 ... 240	1 0	AFC16-30-10K-80	1SBL171005R8010	0.328
						0 1	AFC16-30-01K-80	1SBL171005R8001	0.328
				230 ... 240	240 ... 260	1 0	AFC16-30-10K-88	1SBL171005R8810	0.330
						0 1	AFC16-30-01K-88	1SBL171005R8801	0.330
				380 ... 400	400 ... 415	1 0	AFC16-30-10K-85	1SBL171005R8510	0.324
						0 1	AFC16-30-01K-85	1SBL171005R8501	0.324
				400 ... 415	415 ... 440	1 0	AFC16-30-10K-86	1SBL171005R8610	0.327
						0 1	AFC16-30-01K-86	1SBL171005R8601	0.327



AFC09, AFC12, AFC16..K

Main dimensions mm, inches

AFC09..K ... AFC16..K 3-pole contactors with Push-in Spring terminals

4 to 7.5 kW

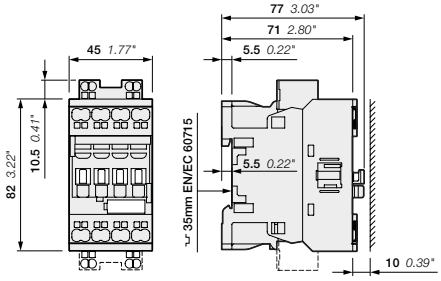
AC operated - With specific 60 Hz voltage

AFC09-30-10K

The AFC09..K ... AFC16..K 3-pole contactors are designed for the control of motors or power circuits, offering an optimized operating time for AC control applications with electromagnetic control. AFC contactors have a block type design and can be easily extended with add-on auxiliary contact blocks and a wide range of additional accessories.

- 690 V IEC or 600 V UL/CSA
- 3 N.O. main poles, 1 N.O. or 1 N.C. built-in auxiliary contact
- IEC Switching capacity up to 7.5 kW / 400 V AC (AC-3)
- UL Switching capacity up to 10 hp / 480V AC
- Control circuit: 175...415 V AC 50Hz / 208...480 V AC 60Hz
- Push-in Spring terminals
- Common accessory range for the complete AF platform.

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 Hz	V 60 Hz				kg
4	25	5	25	175	208	1 0	AFC09-30-10K-34	1SBL131005R3410	0.334
						0 1	AFC09-30-01K-34	1SBL131005R3401	0.334
				230 ... 240	277	1 0	AFC09-30-10K-42	1SBL131005R4210	0.329
						0 1	AFC09-30-01K-42	1SBL131005R4201	0.329
				400 ... 415	480	1 0	AFC09-30-10K-51	1SBL131005R5110	0.327
						0 1	AFC09-30-01K-51	1SBL131005R5101	0.327
5.5	28	7.5	28	175	208	1 0	AFC12-30-10K-34	1SBL151005R3410	0.334
						0 1	AFC12-30-01K-34	1SBL151005R3401	0.334
				230 ... 240	277	1 0	AFC12-30-10K-42	1SBL151005R4210	0.329
						0 1	AFC12-30-01K-42	1SBL151005R4201	0.329
				400 ... 415	480	1 0	AFC12-30-10K-51	1SBL151005R5110	0.327
						0 1	AFC12-30-01K-51	1SBL151005R5101	0.327
7.5	30	10	30	175	208	1 0	AFC16-30-10K-34	1SBL171005R3410	0.334
						0 1	AFC16-30-01K-34	1SBL171005R3401	0.334
				230 ... 240	277	1 0	AFC16-30-10K-42	1SBL171005R4210	0.329
						0 1	AFC16-30-01K-42	1SBL171005R4201	0.329
				400 ... 415	480	1 0	AFC16-30-10K-51	1SBL171005R5110	0.327
						0 1	AFC16-30-01K-51	1SBL171005R5101	0.327



AFC09, AFC12, AFC16..K

Main dimensions mm, inches

AFC26..K ... AFC38..K 3-pole contactors with Push-in Spring terminals

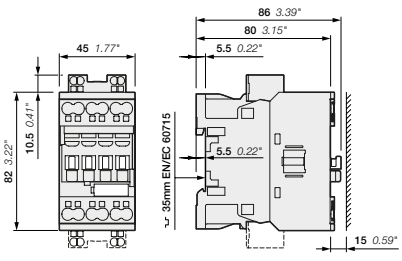
11 to 18.5 kW
AC operated

AFC26-30-10-K

The AFC26..K ... AFC38..K 3-pole contactors are designed for the control of motors or power circuits, offering an optimized operating time for AC control applications with electromagnetic control. AFC contactors have a block type design and can be easily extended with add-on auxiliary contact blocks and a wide range of additional accessories.

- 690 V IEC or 600V UL/CSA
- 3 N.O. main poles
- IEC Switching capacity up to 18.5 kW / 400 V AC (AC-3)
- UL Switching capacity up to 25 hp / 480 V AC
- Control circuit: 24...415 V AC 50Hz / 24...440 V AC 60Hz
- Push-in Spring terminals
- Common accessory range for the complete AF platform.

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 Hz	V 60 Hz				kg
11	45	15	42	24	24	0 0	AFC26-30-00K-81	1SBL231005R8100	0.386
				110	110 ... 120	0 0	AFC26-30-00K-84	1SBL231005R8400	0.383
				220 ... 230	230 ... 240	0 0	AFC26-30-00K-80	1SBL231005R8000	0.377
				230 ... 240	240 ... 260	0 0	AFC26-30-00K-88	1SBL231005R8800	0.379
				380 ... 400	400 ... 415	0 0	AFC26-30-00K-85	1SBL231005R8500	0.373
				400 ... 415	415 ... 440	0 0	AFC26-30-00K-86	1SBL231005R8600	0.376
15	50	20	45	24	24	0 0	AFC30-30-00K-81	1SBL271005R8100	0.386
				110	110 ... 120	0 0	AFC30-30-00K-84	1SBL271005R8400	0.383
				220 ... 230	230 ... 240	0 0	AFC30-30-00K-80	1SBL271005R8000	0.377
				230 ... 240	240 ... 260	0 0	AFC30-30-00K-88	1SBL271005R8800	0.379
				380 ... 400	400 ... 415	0 0	AFC30-30-00K-85	1SBL271005R8500	0.373
				400 ... 415	415 ... 440	0 0	AFC30-30-00K-86	1SBL271005R8600	0.376
18.5	50	25	45	24	24	0 0	AFC38-30-00K-81	1SBL291005R8100	0.386
				110	110 ... 120	0 0	AFC38-30-00K-84	1SBL291005R8400	0.383
				220 ... 230	230 ... 240	0 0	AFC38-30-00K-80	1SBL291005R8000	0.377
				230 ... 240	240 ... 260	0 0	AFC38-30-00K-88	1SBL291005R8800	0.379
				380 ... 400	400 ... 415	0 0	AFC38-30-00K-85	1SBL291005R8500	0.373
				400 ... 415	415 ... 440	0 0	AFC38-30-00K-86	1SBL291005R8600	0.376



AFC26..K, AFC30..K, AFC38..K

Main dimensions mm, inches

AFC26..K ... AFC38..K 3-pole contactors with Push-in Spring terminals

11 to 18.5 kW

AC operated - With specific 60 Hz voltage

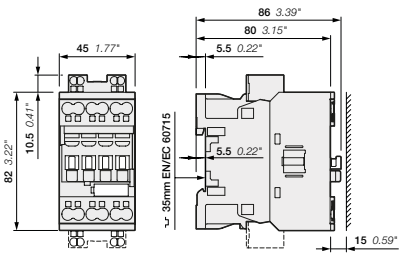
1SBC101562V0014

AFC26-30-10-K

The AFC26..K ... AFC38..K 3-pole contactors are designed for the control of motors or power circuits, offering an optimized operating time for AC control applications with electromagnetic control. AFC contactors have a block type design and can be easily extended with add-on auxiliary contact blocks and a wide range of additional accessories.

- 690 V IEC or 600V UL/CSA
- 3 N.O. main poles
- IEC Switching capacity up to 18.5 kW / 400 V AC (AC-3)
- UL Switching capacity up to 25 hp / 480 V AC
- Control circuit: 175...415 V AC 50Hz / 208...480 V AC 60Hz
- Push-in Spring terminals
- Common accessory range for the complete AF platform.

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 Hz	V 60 Hz				kg
11	45	15	42	175	208	0 0	AFC26-30-00K-34	1SBL231005R3400	0.383
				230 ... 240	277	0 0	AFC26-30-00K-42	1SBL231005R4200	0.378
				400 ... 415	480	0 0	AFC26-30-00K-51	1SBL231005R5100	0.376
15	50	20	45	175	208	0 0	AFC30-30-00K-34	1SBL271005R3400	0.383
				230 ... 240	277	0 0	AFC30-30-00K-42	1SBL271005R4200	0.378
				400 ... 415	480	0 0	AFC30-30-00K-51	1SBL271005R5100	0.376
18.5	50	25	45	175	208	0 0	AFC38-30-00K-34	1SBL291005R3400	0.383
				230 ... 240	277	0 0	AFC38-30-00K-42	1SBL291005R4200	0.378
				400 ... 415	480	0 0	AFC38-30-00K-51	1SBL291005R5100	0.376



AFC26..K, AFC30..K, AFC38..K

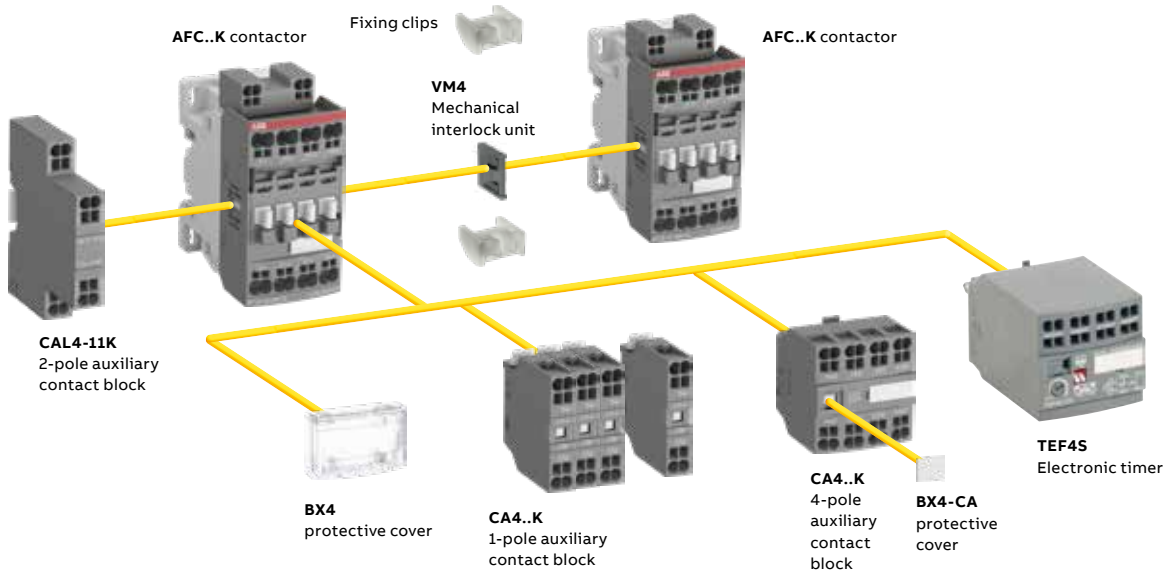
Main dimensions mm, inches

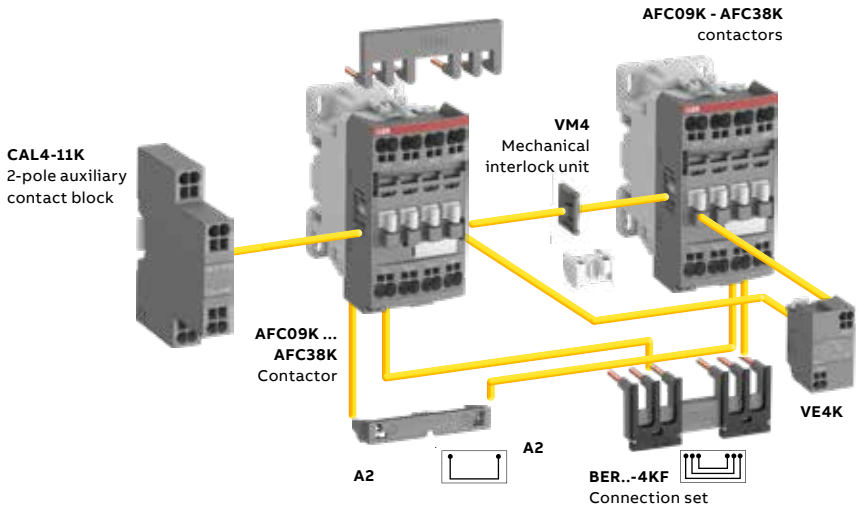
AFC09..K ... AFC38..K 3-pole contactors - with Push-in Spring terminals

Main accessories

Contactor and main accessories (other accessories available)

AFC09..K ... AFC38..K





VEM4K mechanical and electrical interlock set including:
- VM4 mechanical interlock unit with 2 fixing clips
- VE4K electrical inlerlock block with A2-A2 connection

Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories

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

Contactor types	Main poles	Built-in auxiliary contacts	Front-mounted accessories					Side-mounted accessories	
			Auxiliary contact blocks		Electronic timer	Electrical and mechanical interlock set		Auxiliary contact blocks	
						(between 2 contactors)		Left side	Right side
			1-pole CA4..K	4-pole CA4..K	TEF4S	VEM4K		2-pole CAL4-11K	
AFC09..K ... AFC38..K (1)									
AFC09..K ... AFC16..K	3 0	0 1	4 max.	**or** 1	**or** 1	–	+	1	–
AFC09..K ... AFC16..K	3 0	1 0	2 max.	–	**or** 1	–	+	1	+ 1
AFC26..K ... AFC38..K	3 0	0 0	3 max.	–	–	+ 1	+	1	**or** 1

(1) Including add-on and built-in contacts: 4 N.C. auxiliary contacts max. on positions 1, 2, 3, 4 and 3 N.C. auxiliary contacts max. on positions 1 ±30°, 5

AFC09(..K) ... AFC38(..K) 3-pole contactors

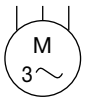
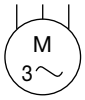
Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC operated	AFC09(..K)	AFC12(..K)	AFC16(..K)	AFC26(..K)	AFC30(..K)	AFC38(..K)
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, AC-3e Utilization category							
For air temperature close to contactor θ ≤ 60 °C							
Ie / Max. rated operational current AC-3, AC-3e							
3-phase motors	220-230-240 V	9 A	12 A	18 A	26 A	32 A	40 A
	380-400 V	9 A	12 A	18 A	26 A	32 A	38 A
	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, AC-3e							
1500 r.p.m. 50 Hz	220-230-240 V	2.2 kW	3 kW	4 kW	6.5 kW	9 kW	11 kW
1800 r.p.m. 60 Hz	380-400 V	4 kW	5.5 kW	7.5 kW	11 kW	15 kW	18.5 kW
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, AC-3e		10 x Ie AC-3, 12 x Ie AC-3e acc. to IEC 60947-4-1					
Rated breaking capacity AC-3, AC-3e		8 x Ie AC-3, 8.5 x Ie AC-3e 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							
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 / 1.14 W	1 / 1.43 W	1.2 / 1.64 W	1.8 / 2 W	2.4 / 2.44 W	2.4 / 2.44 W
Screw terminal /Push-in Spring terminal	Ie / AC-3	0.1 / 0.26 W	0.2 / 0.26 W	0.35 / 0.6 W	0.6 / 0.66 W	0.9 / 1 W	1.3 / 1.41 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		

AFC40 ... AFC96 3-pole contactors
Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC operated	AFC40	AFC52	AFC65	AFC80	AFC96
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1				
Rated operational voltage Ue max.		690 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		105 A	105 A	105 A	130 A	130 A
With conductor cross-sectional area		35 mm²	35 mm²	35 mm²	50 mm²	50 mm²
AC-1 Utilization category						
For air temperature close to contactor						
Ie / Rated operational current AC-1	θ ≤ 40 °C	70 A	100 A	105 A	125 A	130 A
Ue max. ≤ 690 V, 50/60 Hz	θ ≤ 60 °C	60 A	80 A	90 A	100 A	105 A
	θ ≤ 70 °C	50 A	70 A	80 A	85 A	90 A
With conductor cross-sectional area		25 mm²	35 mm²	35 mm²	50 mm²	50 mm²
AC-3, AC-3e Utilization category						
For air temperature close to contactor θ ≤ 60 °C						
Ie / Max. rated operational current AC-3, AC-3e (1)						
AC-3e Ue ≤ 690 V	220-230-240 V	40 A	53 A	65 A	80 A	96 A
	380-400 V	40 A	53 A	65 A	80 A	96 A
 3-phase motors	415 V	40 A	53 A	65 A	80 A	96 A
	440 V	40 A	53 A	65 A	80 A	96 A
	500 V	35 A	45 A	55 A	65 A	80 A
	690 V	25 A	35 A	39 A	49 A	57 A
	1000 V	-	-	-	-	-
Rated operational power AC-3, AC-3e (1)						
AC-3e Ue ≤ 690 V	220-230-240 V	11 kW	15 kW	18.5 kW	22 kW	25 kW
	380-400 V	18.5 kW	22 kW	30 kW	37 kW	45 kW
 1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors	415 V	22 kW	30 kW	37 kW	45 kW	55 kW
	440 V	22 kW	30 kW	37 kW	45 kW	55 kW
	500 V	22 kW	30 kW	37 kW	45 kW	55 kW
	690 V	22 kW	30 kW	37 kW	45 kW	55 kW
	1000 V	-	-	-	-	-
Rated making capacity AC-3, AC-3e		10 x Ie AC-3, 12 x Ie AC-3e acc. to IEC 60947-4-1				
Rated breaking capacity AC-3, AC-3e		8 x Ie AC-3, 8.5 x Ie AC-3e acc. to IEC 60947-4-1				
AC-8a Utilization category						
(without thermal overload relay						
Ue 400 V 50/60 Hz - θ ≤ 40 °C)						
Ie / Rated operational current AC-8a		53 A	70 A	85 A	105 A	120 A
Rated operational power AC-8a		25 kW	37 kW	45 kW	55 kW	65 kW
Short-circuit protection device for contactors						
without thermal overload relay - Motor protection excluded (2)						
Ue ≤ 500 V AC - gG type fuse		100 A	125 A	160 A	160 A	200 A
Rated short-time withstand current Icw	1 s	1000 A	1000 A	1000 A	1200 A	1200 A
at 40 °C ambient temperature,	10 s	600 A	600 A	600 A	780 A	780 A
in free air from a cold state	30 s	350 A	350 A	350 A	450 A	450 A
	1 min	250 A	250 A	250 A	300 A	300 A
	15 min	110 A	110 A	110 A	140 A	140 A
Maximum breaking capacity						
cos ϕ = 0.45	at 440 V	950 A	950 A	950 A	1150 A	1150 A
	at 690 V	600 A	600 A	600 A	750 A	750 A
Power dissipation per pole	Ie / AC-1	3 W	6.3 W	7 W	7.6 W	8.2 W
	Ie / AC-3, AC-3e	1 W	1.7 W	2.7 W	3 W	4.5 W
Max. electrical switching frequency	AC-1	600 cycles/h				
	AC-3, AC-3e	1200 cycles/h				
	AC-2, AC-4	150 cycles/h				

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

AFC09(..K) ... AFC38(..K) 3-pole contactors

Technical data

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

Contactor types	AC operated	AFC09(..K)	AFC12(..K)	AFC16(..K)	AFC26(..K)	AFC30(..K)	AFC38(..K)
Standards		UL 60947-4-1, CSA C22.2 N°60947-4-1					
Maximum 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 Screw / Push-in Spring							
	600 V AC	25 A	28 A	30 A	45 / 42 A	50 / 45 A	50 /45 A
With conductor cross-sectional area		AWG 10	AWG 10	AWG 10	AWG 8	AWG 8	AWG 8
1 pole	80 V DC	25 A	28 A	30 A	45 / 42 A	50 / 45 A	50 / 45 A
2 poles in serie	160 V DC	25 A	28 A	30 A	45 / 42 A	50 /45 A	50 / 45 A
3 poles in serie	240 V DC	25 A	28 A	30 A	45 / 42 A	50 / 45 A	50 / 45 A
With conductor cross-sectional area		AWG 10	AWG 10	AWG 10	AWG 8	AWG 8	AWG 8
UL / CSA maximum 1-phase motor rating							
Full load current	120 V AC	13.8 A	16 A	20 A	24 A	24 A	24 A
	240 V AC	10 A	12 A	17 A	17 A	28 A	28 A
Horse power rating	120 V AC	3/4 hp	1 hp	1-1/2 hp	2 hp	2 hp	2 hp
	240 V AC	1-1/2 hp	2 hp	3 hp	3 hp	5 hp	5 hp
UL / CSA maximum 3-phase motor rating							
Full load current (1)	200-208 V AC	7.8 A	11 A	17.5 A	25.3 A	32.2 A	32.2 A
	220-240 V AC	6.8 A	9.6 A	15.2 A	22 A	28 A	28 A
	440-480 V AC	7.6 A	11 A	14 A	21 A	27 A	34 A
	550-600 V AC	9 A	11 A	17 A	22 A	27 A	32 A
Horse power rating (1)	200-208 V AC	2 hp	3 hp	5 hp	7-1/2 hp	10 hp	10 hp
	220-240 V AC	2 hp	3 hp	5 hp	7-1/2 hp	10 hp	10 hp
	440-480 V AC	5 hp	7-1/2 hp	10 hp	15 hp	20 hp	25 hp
	550-600 V AC	7-1/2 hp	10 hp	15 hp	20 hp	25 hp	30 hp
UL / CSA - DC motor starting - 3 poles in series							
Full Load Amps (FLA)	125 V DC	9.5 A	13.2 A	17 A	25 A	25 A	25 A
	250 V DC	8.5 A	12.2 A	12.2 A	20 A	29 A	29 A
Horse power rating	125 V DC	1 hp	1-1/2 hp	2 hp	3 hp	3 hp	3 hp
	250 V DC	2 hp	3 hp	3 hp	5 hp	7-1/2 hp	7-1/2 hp
Short-circuit protection device for contactors							
without thermal overload relay - Motor protection excluded							
High fault current		100 kA					
Fuse rating		30 A	30 A	60 A	60 A	100 A	100 A
Fuse type, 600 V : Screw / Push-in		J / RK5					
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”.

AFC40 ... AFC96 3-pole contactors
Technical data

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

Contactor types	AC operated	AFC40	AFC52	AFC65	AFC80	AFC96
Standards		UL 60947-1, UL 60947-4-1, CSA C22.2 N° 60947-1-13, CSA C22.2 N° 60947-4-1-14				
Maximum operational voltage		600 V				
NEMA size		2	-	-	3	-
NEMA continuous amp rating	Thermal current	45 A	-	-	90 A	-
NEMA maximum horse power ratings						
1-phase, 60 Hz	115 V AC	3 hp	-	-	-	-
	230 V AC	7.5 hp	-	-	-	-
NEMA maximum horse power ratings						
3-phase, 60 Hz	200 V AC	10 hp	-	-	25 hp	-
	230 V AC	15 hp	-	-	30 hp	-
	460 V AC	25 hp	-	-	50 hp	-
	575 V AC	25 hp	-	-	50 hp	-
UL / CSA general use rating						
	600 V AC	60 A	80 A	90 A	105 A	115 A
With conductor cross-sectional area		AWG 6	AWG 4	AWG 3	AWG 2	AWG 2
1 pole	80 V DC	60 A	80 A	90 A	105 A	115 A
2 poles in serie	160 V DC	60 A	80 A	90 A	105 A	115 A
3 poles in serie	240 V DC	60 A	80 A	90 A	105 A	115 A
With conductor cross-sectional area		AWG 6	AWG 4	AWG 3	AWG 2	AWG 2
UL / CSA maximum 1-phase motor rating						
Full load current	120 V AC	34 A	34 A	56 A	80 A	80 A
	240 V AC	40 A	50 A	68 A	68 A	88 A
Horse power rating	120 V AC	3 hp	3 hp	5 hp	7-1/2 hp	7-1/2 hp
	240 V AC	7-1/2 hp	10 hp	15 hp	15 hp	20 hp
UL / CSA maximum 3-phase motor rating						
Full load current (1)	200-208 V AC	32.2 A	48.3 A	62.1 A	78.2 A	92 A
	220-240 V AC	42 A	54 A	68 A	80 A	80 A
	440-480 V AC	40 A	52 A	65 A	77 A	77 A
	550-600 V AC	41 A	52 A	62 A	77 A	77 A
Horse power rating (1)	200-208 V AC	10 hp	15 hp	20 hp	25 hp	30 hp
	220-240 V AC	15 hp	20 hp	25 hp	30 hp	30 hp
	440-480 V AC	30 hp	40 hp	50 hp	60 hp	60 hp
	550-600 V AC	40 hp	50 hp	60 hp	75 hp	75 hp
UL / CSA - DC motor starting - 3 poles in series						
Full Load Amps (FLA)	125 V DC	40 A	58 A	76 A	76 A	110 A
	250 V DC	38 A	55 A	72 A	89 A	106 A
Horse power rating	125 V DC	5 hp	7-1/2 hp	10 hp	10 hp	15 hp
	250 V DC	10 hp	15 hp	20 hp	25 hp	30 hp
Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded						
High fault current		100 kA				
Fuse rating		150 A	150 A	150 A	200 A	200 A
Fuse type, 600 V		J				
Maximum electrical switching frequency						
For general use		600 cycles/h				
For motor use		1200 cycles/h				

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

AFC40 ... AFC96 3-pole contactors

Technical data

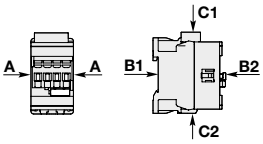
Main pole utilization characteristics - 3 N.O. non-reversing contactors

Contactor types	AC operated	AFC40	AFC52	AFC65	AFC80	AFC96
HVAC application - UL / CSA						
Definite purpose heating rating - 3-phase						
Full Load Amps (FLA)		60 A	80 A	90 A	105 A	115 A
Locked Rotor Amps (LRA)	200-208 V AC	360 A	480 A	540 A	630 A	690 A
	220-240 V AC	360 A	480 A	540 A	630 A	690 A
	440-480 V AC	360 A	480 A	540 A	630 A	690 A
	550-600 V AC	240 A	320 A	360 A	420 A	460 A
Definite purpose air conditioning rating - 3-phase						
Full Load Amps (FLA)		60 A	80 A	90 A	105 A	115 A
Locked Rotor Amps (LRA)	200-208 V AC	360 A	480 A	540 A	630 A	690 A
	220-240 V AC	360 A	480 A	540 A	630 A	690 A
	440-480 V AC	360 A	480 A	540 A	630 A	690 A
	550-600 V AC	240 A	320 A	360 A	420 A	460 A
AC Resistance air heating						
Full Load Amps (FLA)	600 V AC	65 A	80 A	90 A	105 A	115 A
Elevator control, load switching, 500 000 electrical operating cycles acc. to CSA B44.1 / ASME 17.5 paragraph 19.2.1						
1-phase						
Horse power rating	110-120 V AC	3 hp	3 hp	3 hp	5 hp	5 hp
	220-240 V AC	5 hp	7-1/2 hp	10 hp	10 hp	10 hp
3-phase						
Horse power rating	200-208 V AC	10 hp	10 hp	15 hp	15 hp	15 hp
	220-240 V AC	10 hp	15 hp	20 hp	20 hp	20 hp
	440-480 V AC	25 hp	30 hp	40 hp	40 hp	40 hp
	550-600 V AC	30 hp	40 hp	40 hp	50 hp	50 hp
Elevator control, 500 000 mechanical operating cycles, 5 electrical operating cycles acc. to CSA B44.1 / ASME 17.5 paragraph 19.2.2						
1-phase						
Horse power rating	110-120 V AC	3 hp	3 hp	5 hp	7-1/2 hp	7-1/2 hp
	220-240 V AC	7-1/2 hp	7-1/2 hp	10 hp	15 hp	20 hp
3-phase						
Horse power rating	200-208 V AC	10 hp	15 hp	20 hp	25 hp	30 hp
	220-240 V AC	15 hp	20 hp	25 hp	30 hp	30 hp
	440-480 V AC	30 hp	40 hp	50 hp	60 hp	60 hp
	550-600 V AC	40 hp	50 hp	60 hp	75 hp	75 hp
Lighting application - UL / CSA						
Tungsten lamps						
1-phase per pole	347 V AC	65 A	80 A	90 A	105 A	115 A
3-phase break all lines	600 V AC	65 A	80 A	90 A	105 A	115 A
Electrical discharge lamps (ballast)						
1-phase per pole	347 V AC	65 A	80 A	90 A	105 A	115 A
3-phase break all lines	600 V AC	65 A	80 A	90 A	105 A	115 A

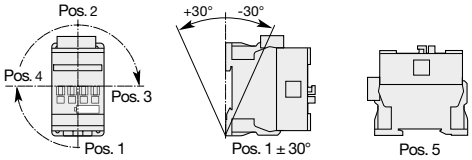
AFC09(..K) ... AFC38(..K) 3-pole contactors

Technical data

General technical data

Contactor types	AC operated	AFC09(..K)	AFC12(..K)	AFC16(..K)	AFC26(..K)	AFC30(..K)	AFC38(..K)
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					
Pollution degree		3					
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					
Max. switching frequency		3600 cycles/h					
Shock withstand							
acc. to IEC 60068-2-27 and EN 60068-2-27							
Mounting position 1							
	Shock direction	1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position					
	A	30 g					
	B1	25 g closed position / 5 g open position					
	B2	15 g					
	C1	25 g					
	C2	25 g					
Vibration withstand		5...300 Hz					
acc. to IEC 60068-2-6		4 g closed position / 2 g open position					

Mounting characteristics and conditions for use

Contactor types	AC operated	AFC09(..K)	AFC12(..K)	AFC16(..K)	AFC26(..K)	AFC30(..K)	AFC38(..K)
Mounting positions							
		Max. N.C. built-in and add-on N.C. auxiliary contacts: see accessory fitting details for a 3-pole contactor AFC09 ... AFC38					
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					

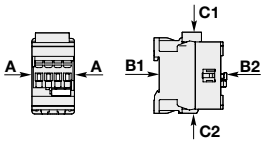
Magnet system characteristics for AFC09(..K) ... AFC38(..K) contactors - AC operated

Contactor types	AC operated	AFC09(..K)	AFC12(..K)	AFC16(..K)	AFC26(..K)	AFC30(..K)	AFC38(..K)
Coil operating limits	AC supply	At θ ≤ 60 °C 0.85...1.1 x Uc					
acc. to IEC 60947-4-1		At θ ≤ 70 °C 1 x Uc					
AC control voltage							
Rated control circuit voltage Uc	50 Hz	24...415 V					
	60 Hz	24...480 V					
Coil consumption	Average pull-in value at 50 Hz	70 VA					
	at 60 Hz	66 VA					
	Average holding value	8 VA / 2.3 W					
Drop-out voltage	50 Hz	40...65 % of Uc min.					
	60 Hz	40...70 % of Uc min.					
Operating time (-40°C ... +60°C)							
Between coil energization and:	N.O. contact closing	10...26 ms					
	N.C. contact opening	7...21 ms					
Between coil de-energization and:	N.O. contact opening	4...18 ms					
	N.C. contact closing	9...20 ms					

AFC40 ... AFC96 3-pole contactors

Technical data

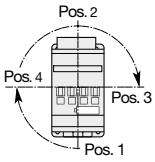
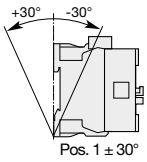
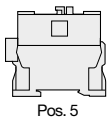
General technical data

Contactor types	AC operated	AFC40	AFC52	AFC65	AFC80	AFC96
Rated insulation voltage Ui						
acc. to IEC 60947-4-1		690 V			1000 V	
acc. to UL / CSA		600 V				
Rated impulse withstand voltage Uimp.		6 kV			8 kV	
Pollution degree		3				
Ambient air temperature close to contactor						
Operation	Fitted with thermal overload relay	-40...+70 °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			4 millions	
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	25 g				
	B1	25 g closed position / 5 g open position				
	B2	15 g				
	C1	25 g				
	C2	25 g				
Vibration withstand		5...300 Hz				
acc. to IEC 60068-2-6		3 g closed position / 3 g open position				

Magnet system characteristics

Contactor types	AC operated	AFC40	AFC52	AFC65	AFC80	AFC96
Coil operating limits	AC supply	At θ ≤ 60 °C 0.85...1.1 x Uc				
acc. to IEC 60947-4-1		At 70°C Uc				
AC control voltage						
Rated control circuit voltage Uc	50 Hz	24...415 V AC				
	60 Hz	24...480 V AC				
Coil consumption	Average pull-in value at 50 Hz	150 VA			236 VA	
	at 60 Hz	151 VA			260 VA	
	Average holding value	20 VA / 6 W				
Drop-out voltage		≤ 60 % of Uc min.				
Operating time (-40°C ... +60°C)						
Between coil energization and:	N.O. contact closing	7...21 ms			7...22 ms	
	N.C. contact opening	3...16 ms			3...17 ms	
Between coil de-energization and:	N.O. contact opening	4...14 ms			5...16 ms	
	N.C. contact closing	6...19 ms			7...21 ms	

Mounting characteristics and conditions

Contactor types	AC operated	AFC40	AFC52	AFC65	AFC80	AFC96
Mounting positions						
		Max. N.C. built-in and add-on N.C. auxiliary contacts: see accessory fitting details for a 3-pole contactor AFC40 ... AFC96				
Mounting distances		The contactors can be assembled side by side			At θ < 60 °C, the contactors can be assembled side by side At θ ≤ 70 °C, contactors must be spaced by 5 mm	
Fixing						
On rail according to IEC 60715, EN 60715		35 x 7.5 mm or 35 x 15 mm			35 x 15 mm	
By screws (not supplied)		2 x M4 or 2 x M6 screws placed diagonally				

AFC09 ... AFC38 3-pole contactors

Technical data

Connecting characteristics

Contactor types	AC operated	AFC09	AFC12	AFC16	AFC26	AFC30	AFC38
Main terminals		 Screw terminals with cable clamp					
Connection capacity (min. ... max.)							
Main conductors (poles)							
Rigid Solid (≤ 4 mm²)	1 x	1...6 mm²			2.5...10 mm²		
Stranded (≥ 1 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		
L 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 / Stranded	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					

AFC09(..K) ... AFC38(..K) 3-pole contactors

Technical data

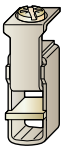
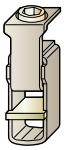
Connecting characteristics

Contactor types			AC operated	AFC09..K	AFC12..K	AFC16..K	AFC26..K	AFC30..K	AFC38..K
Main terminals				 Push-in Spring terminals					
Connection capacity (min. ... max.)									
Main conductors (poles)									
	Rigid	Solid (≤ 2.5 mm²)	1 x	1 ... 6 mm²			1 ... 10 mm²		
		Stranded (≥ 4 mm²)	2 x	1 ... 6 mm²			1 ... 10 mm²		
	Flexible		1 x	1 (push-in) / 0.5 (spring) ... 4 mm²			1 ... 6 mm²		
	with non insulated ferrule		2 x	1 (push-in) / 0.5 (spring) ... 4 mm²			1 ... 6 mm²		
	Flexible with insulated ferrule		1 x	1 (push-in) / 0.5 (spring) ... 4 mm²			1 ... 6 mm²		
			2 x	1 (push-in) / 0.5 (spring) ... 2.5 mm²			1 ... 6 mm²		
	Flexible without ferrule		1 x	(spring) 0.5 ... 4 mm²			(spring) 1 ... 6 mm²		
			2 x	(spring) 0.5 ... 4 mm²			(spring) 1 ... 6 mm²		
Connection capacity acc. to UL/CSA (Solid ≤ AWG 14)			1 or 2 x	AWG 18 ... 10			AWG 18 ... 8		
Stripping length				12 mm			14 mm		
Auxiliary conductors (built-in auxiliary terminals + coil terminals)									
	Rigid solid		1 x	1 ... 2.5 mm²					
			2 x	1 ... 2.5 mm²					
	Flexible with		1 x	1 (push-in) / 0.5 (spring) ... 2.5 mm²					
	non insulated ferrule		2 x	1 (push-in) / 0.5 (spring) ... 2.5 mm²					
	Flexible with insulated ferrule		1 x	1 (push-in) / 0.5 (spring) ... 1.5 mm²					
			2 x	1 (push-in) / 0.5 (spring) ... 1.5 mm²					
	Flexible without ferrule		1 x	(spring) 0.5 ... 2.5 mm²					
			2 x	(spring) 0.5 ... 2.5 mm²					
Connection capacity acc. to UL/CSA			1 or 2 x	AWG 18 ... 14					
Stripping length				10 mm					
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529									
Main terminals				IP20					
Coil terminals				IP20					
Built-in auxiliary terminals				IP20					
Screwdriver type			All terminals	Flat Ø 3 mm x 0.5 mm					

AFC40 ... AFC96 3-pole contactors

Technical data

Connecting characteristics

Contactor types	AC operated	AFC40	AFC52	AFC65	AFC80	AFC96
Main terminals		 Screw terminals with double connector 2 x (9.3 width x 7.9/10.3 depth)			 Screw terminals with double connector 2 x (12.4 width x 9.3/11.1 depth)	
Connection capacity (min. ... max.)						
Main conductors (poles)						
Rigid Stranded (≥ 6 mm²)	1 x	6...35 mm²			6...70 mm²	
	2 x	6...35 mm²			6...50 mm²	
Flexible with non insulated ferrule	1 x	4...35 mm²			6...50 mm²	
	2 x	4...35 mm²			6...50 mm²	
Flexible with insulated ferrule	1 x	4...35 mm²			6...50 mm²	
	2 x	4...35 mm²			6...50 mm²	
Bars or lugs	L <	9.2 mm			12.2 mm	
Connection capacity acc. to UL/CSA	1 or 2 x	AWG 10...2			AWG 6...1	
Stripping length		16 mm			17 mm	
Tightening torque		4 Nm / 35 lb.in			6 Nm / 53 lb.in	
Auxiliary conductors (built-in auxiliary terminals + coil terminals)						
Rigid solid / Stranded	1 x	1...2.5 mm²				
	2 x	1...2.5 mm²				
Flexible with non insulated ferrule	1 x	0.75...2.5 mm²				
	2 x	0.75...2.5 mm²				
Flexible with insulated ferrule	1 x	0.75...2.5 mm²				
	2 x	0.75...1.5 mm²				
Lugs	L <	8 mm				
Connection capacity acc. to UL/CSA	1 or 2 x	AWG 18...14				
Stripping length		10 mm				
Tightening torque						
Coil terminals		1.2 Nm / 11 lb.in				
Built-in auxiliary terminals		1.2 Nm / 11 lb.in				
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529						
Main terminals		IP10 *				
Coil terminals		IP20				
Built-in auxiliary terminals		IP20				
Screw terminals		Delivered in open position, screws of unused terminals must be tightened				
Main terminals		M6			M8	
Screwdriver type		Flat Ø 6.5 / Pozidriv 2			Hexagon socket (s = 4 mm)	
Coil terminals		M3.5				
Screwdriver type		Flat Ø 5.5 / Pozidriv 2				
Built-in auxiliary terminals		M3.5				
Screwdriver type		Flat Ø 5.5 / Pozidriv 2				

* For IP20 degree of protection, use LT terminal shroud accessory.

AFC09(..K) ... AFC38(..K) 3-pole contactors

Technical data

Built-in auxiliary contacts according to IEC

Contactor types	AC operated	AFC09	AFC12	AFC16	AFC26	AFC30	AFC38	AFC40	AFC52	AFC65	AFC80	AFC96
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 operated	AFC09	AFC12	AFC16	AFC25	AFC26	AFC30	AFC38	AFC40	AFC52	AFC65	AFC80	AFC96
Max. operational voltage		600 V											
Pilot duty		A600, Q600											
AC thermal rated current		10 A											
AC maximum volt-ampere making		7200 VA											
AC maximum volt-ampere breaking		720 VA											
DC thermal rated current		2.5 A											
DC maximum volt-ampere making-breaking		69 VA											

3-pole contactors

Electrical durability and utilization categories

General

Utilization categories determine the current making and breaking conditions relating to the characteristics of the loads to be controlled by the contactors. International standard IEC 60947-4-1 and European standard EN 60947-4-1 are the standards to be referred to.
If Ic is the current to be broken by the contactor and Ie the rated operational current normally drawn by the load, then:

- Categories AC-1 and AC-3: ..... Ic = Ie
- Category AC-2: ..... Ic = 2.5 x Ie
- Category AC-4: ..... Ic = 6 x Ie

Generally speaking Ic = m x Ie where m is a multiple of the load operational current.
On next pages, the curves corresponding to categories AC-1, AC-3 and AC-4 represent the electrical durability variation of standard contactors in relation to the breaking current Ic.
Electrical durability is expressed in millions of operating cycles.

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

- Note the characteristics of the load to be controlled:
  - Operational voltage ..... Ue
  - Current normally drawn ..... Ie (Ue / Ie / kW relation for motors, see "Motor rated operational powers and currents").
  - Utilization category ..... AC-1, AC-2, AC-3 or AC-4
  - Breaking current ..... Ic = Ie for AC-1 and for AC-3 ; Ic = 2.5 x Ie for AC-2 ; Ic = 6 x Ie for AC-4
- Define the number of operating cycles N required.
- On the diagram corresponding to the operational category, select the contactor with the curve immediately above the intersection point (Ic ; N).

Electrical durability forecast and contactor selection for mixed duty motor control: AC-3 (Ic = Ie) type switching off while "motor running" and, occasionally, AC-4 (Ic = 6 x Ie) type switching off while "motor accelerating"

- Note the characteristics of the motor to be controlled:
  - Operational voltage ..... Ue
  - Current normally drawn while "motor running" ..... Ie (Ue / Ie / kW relation for motors, see "Motor rated operational powers and currents")
  - Breaking current for AC-3 ..... Ic = Ie
  - Breaking current for AC-4 while "motor accelerating"..... Ic = 6 x Ie
  - Percentage of AC-4 operating cycles ..... K (on the basis of the total number of operating cycles)
- Define the total number of operating cycles N required.
- Note the smallest contactor rating compatible for AC-3 (Ue / Ie) on Main pole utilization characteristic table (see “Technical data”).
- For the selected contactor make a note of the following in relation to the voltage using diagram AC-3 in next pages:
  - The number of operating cycles A for Ic = Ie (AC-3)
  - The number of operating cycles B for Ic = 6 x Ie (AC-4)
- Calculate the estimated number of cycles N’ (N’ is always below A)

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

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

Case of uninterrupted duty
For uninterrupted duty, some verifications of preventing maintenance are necessary to check the functionality of the concerned product (consult us).
The combined effect of environmental conditions and the proper temperature of the product may require some disposals.
As a matter of fact, for this duty, the use duration prevails over the number of operating cycles.

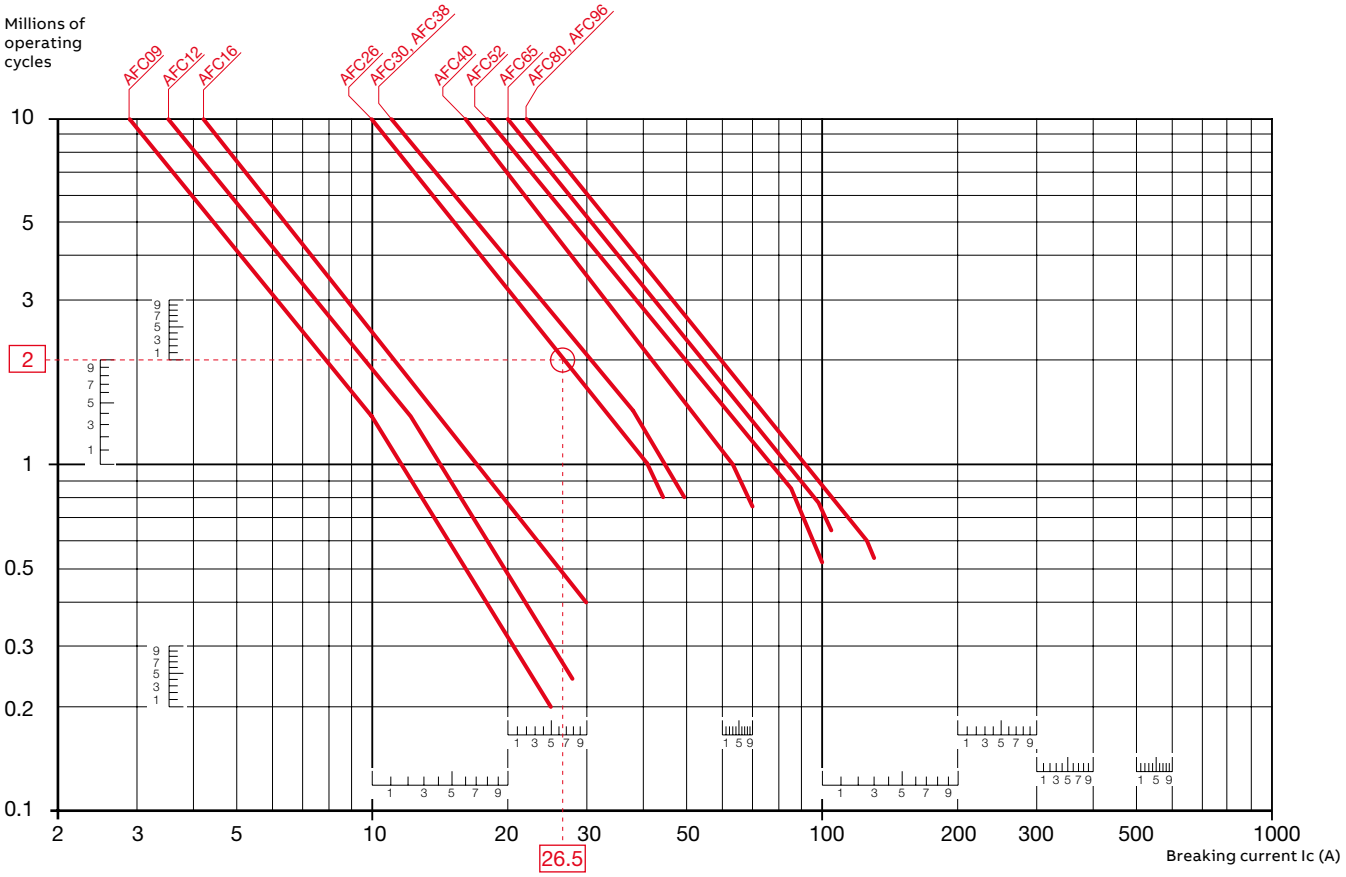
3-pole contactors

Electrical durability

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

Switching non-inductive or slightly inductive loads. The breaking current Ic for AC-1 is equal to the rated operational current of the load.

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



Example:

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

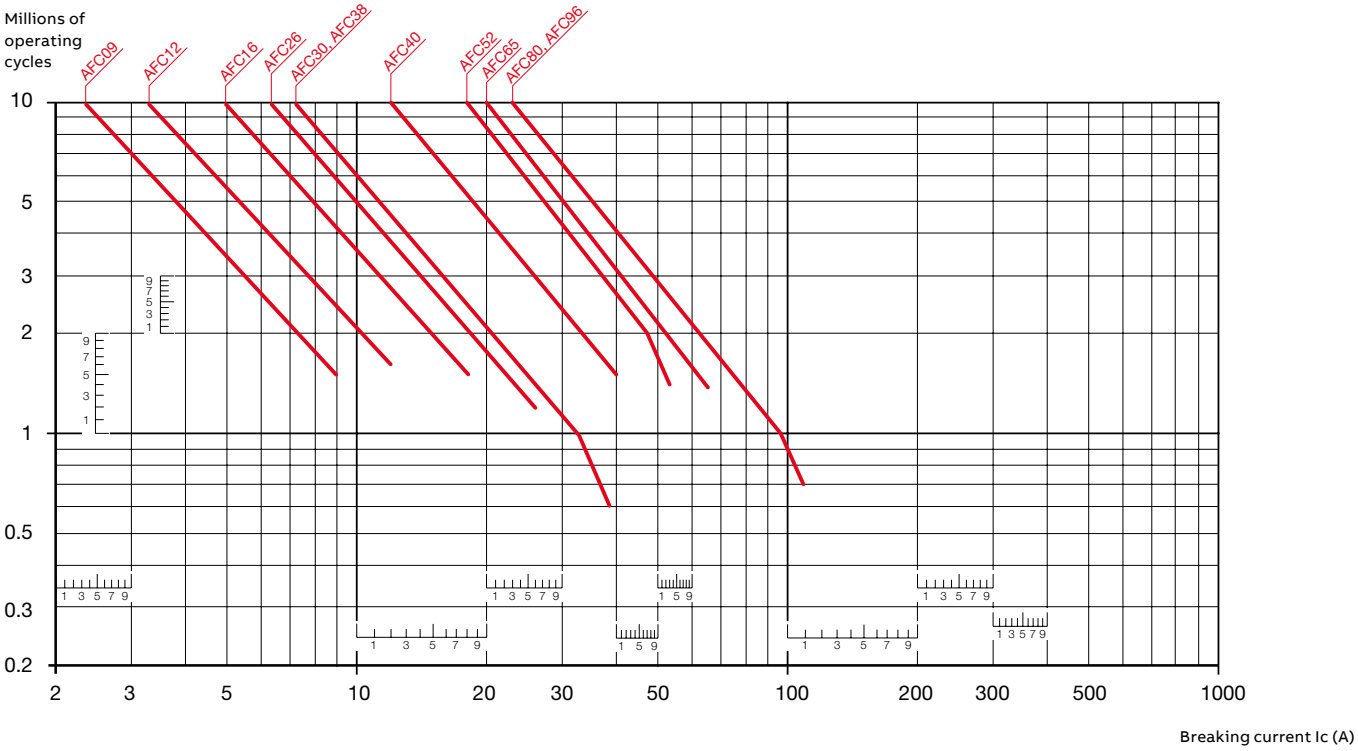
Using the AC-1 curves above select the AFC26 contactor at intersection "○" (26.5 A / 2 millions operating cycles).

3-pole contactors

Electrical durability

Electrical durability for AC-3 utilization category - Ue ≤ 440 V.

Switching cage motors: starting and switching off running motors. The breaking current Ic for AC-3 is equal to the rated operational current Ie (Ie = motor full load current).
Ambient temperature and maximum electrical switching frequency: see "Technical data".

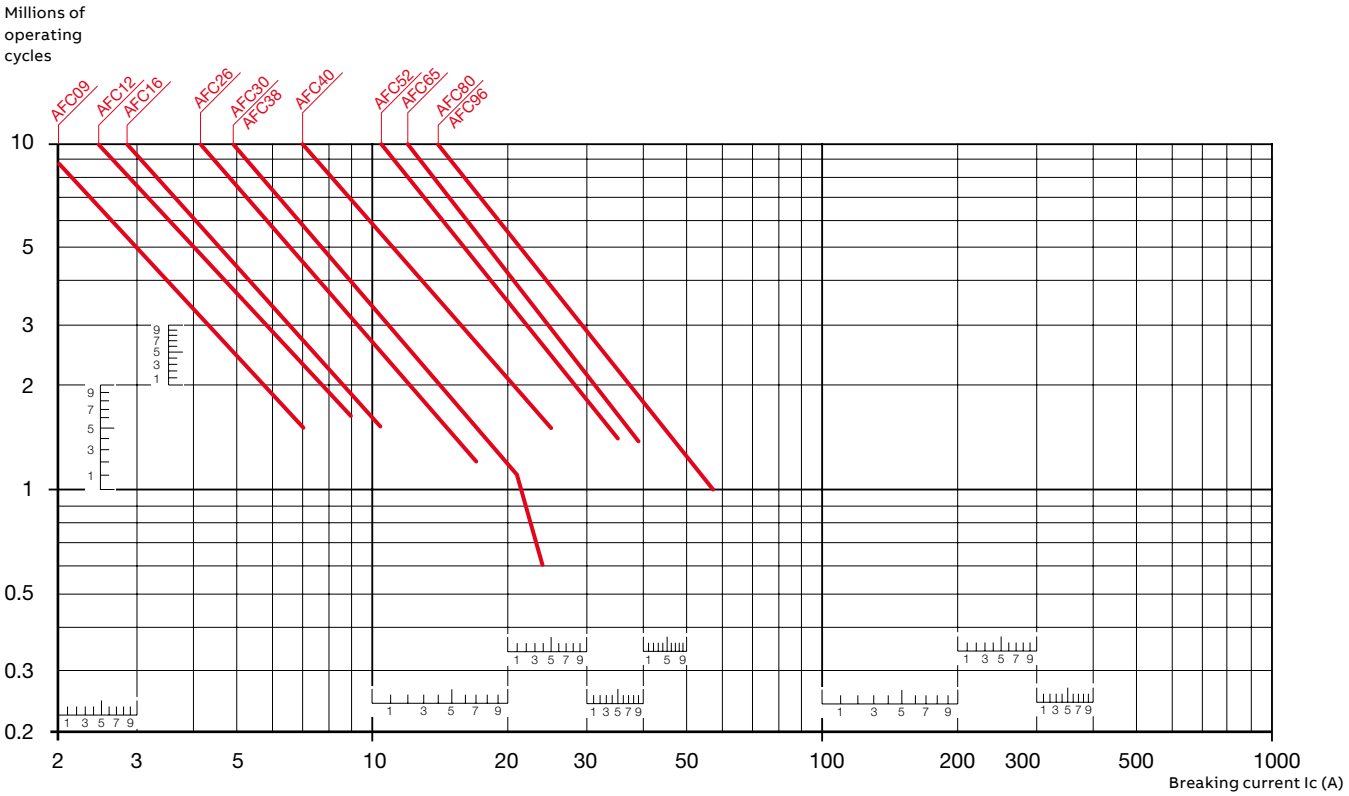


3-pole contactors

Electrical durability

Electrical durability for AC-3 utilization category - 440 V < Ue ≤ 690 V.

Switching cage motors: starting and switching off running motors. The breaking current Ic for AC-3 is equal to the rated operational current Ie (Ie = motor full load current).
Ambient temperature and maximum electrical switching frequency: see "Technical data".

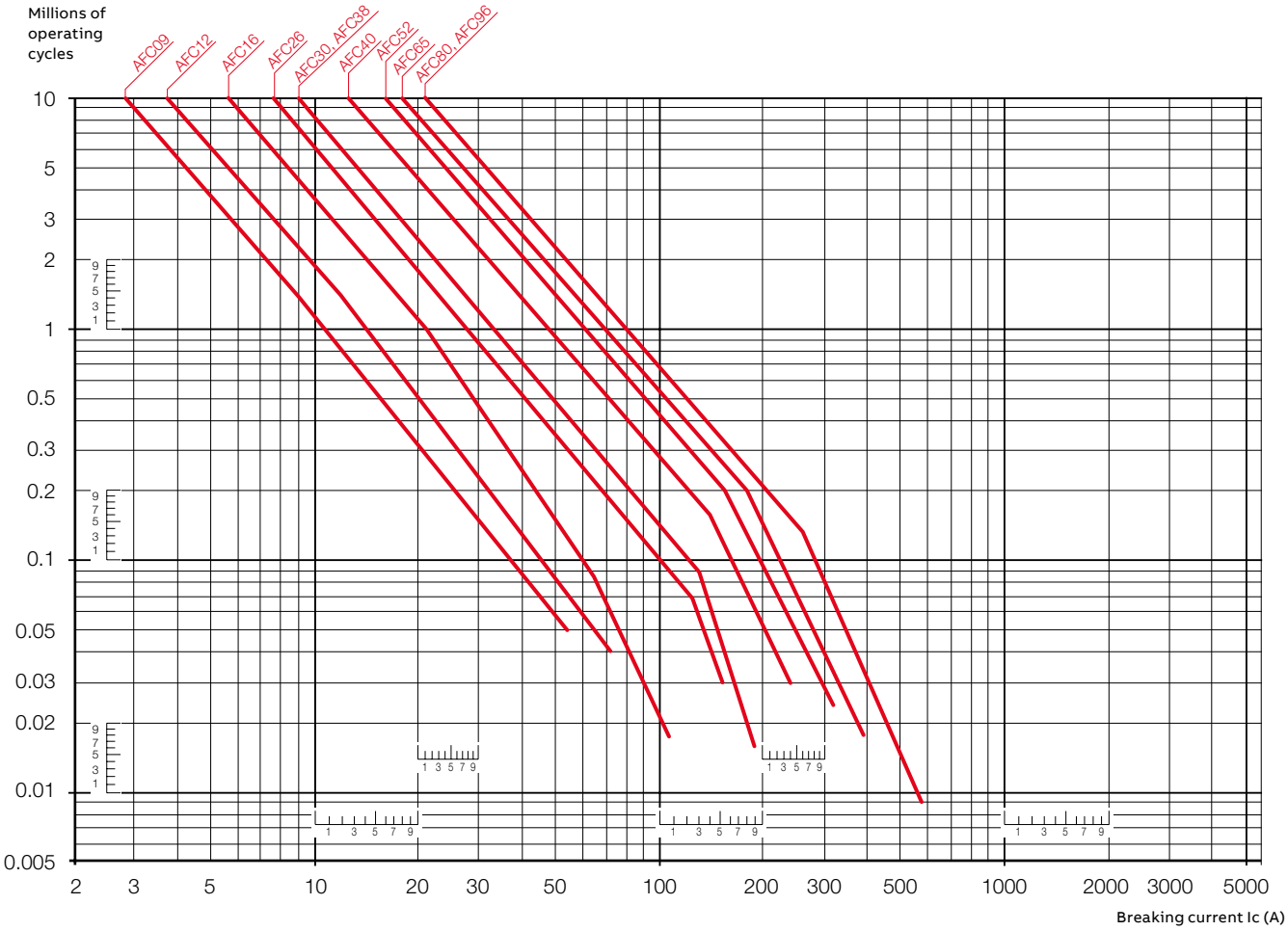


3-pole contactors

Electrical durability

Electrical durability for AC-2 or AC-4 utilization category - Ue ≤ 440 V
Ambient temperature ≤ 60 °C for AFC09 ... AFC96.
Switching cage motors: starting, reverse operation and step-by-step operation. The breaking current Ic is equal to 2.5 x Ie for AC-2 and 6 x Ie for AC-4, keeping in mind that Ie is the motor rated operational current (Ie = motor full-load current).

Maximum electrical switching frequency: see "Technical data".

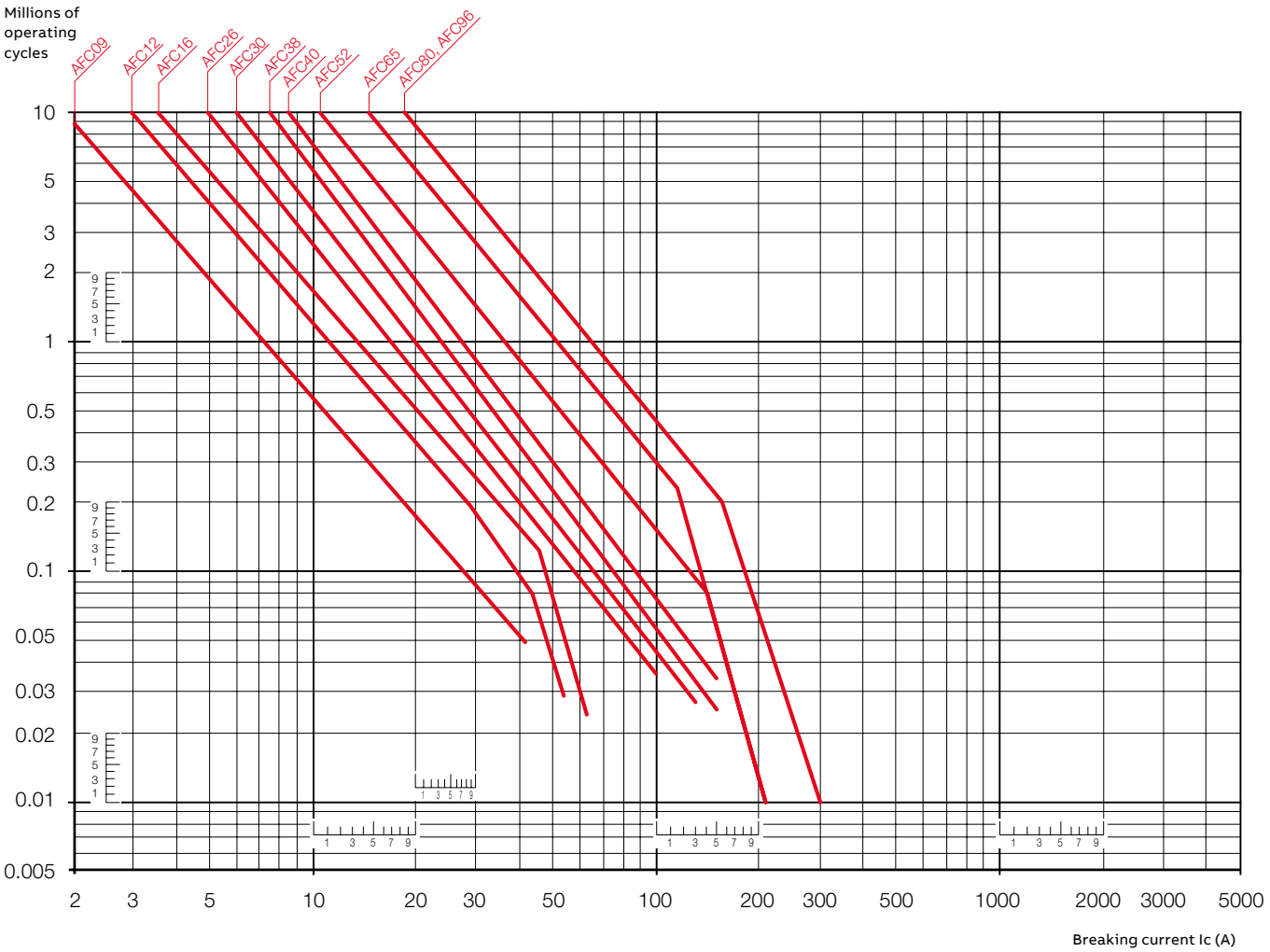


3-pole contactors

Electrical durability

Electrical durability for AC-2 or AC-4 utilization category - 440 V < Ue ≤ 690 V
Ambient temperature ≤ 60 °C for AFC09 ... AFC96

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".



For direct product details information, use product type or order code, ex:

www.abb.com/productdetails/**AFC09-40-00-80**

or

www.abb.com/productdetails/**1SBL131201R8000**

AFC 4-pole contactors

AFC09, AFC16 4-pole contactors

25 to 30 A AC-1

AC operated

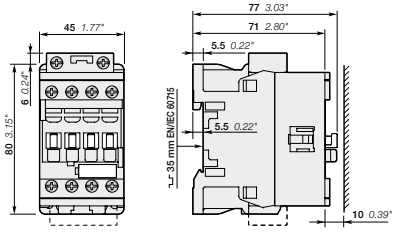
1SBC101095F0014

AFC09-40-00

The AFC09 and AFC16 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e resistance furnaces...), offering an optimized operating time for AC control applications with electromagnetic control. AFC contactors have a block type design and can be easily extended with add-on auxiliary contact blocks and a wide range of additional accessories.

- 690 V IEC or 600 V UL/CSA
- 4 main poles : 4 N.O, 4 N.C (AFC16-04 only) or 2 N.O. + 2 N.C.
- Switching capacity up to 30 A (AC-1)
- Control circuit: 24...415 V AC 50Hz / 24...440 V AC 60Hz
- Screw terminals
- Common accessory range for the complete AF platform.

IEC	UL/CSA	Rated control circuit voltage Uc		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational current $\theta \leq 40$ °C AC-1	General use rating 600 V AC						Pkg (1 pce)
A	A	V 50 Hz	V 60 Hz				kg
4 N.O. main poles							
25	25	24	24	0 0	AFC09-40-00-81	1SBL131201R8100	0.331
		110	110 ... 120	0 0	AFC09-40-00-84	1SBL131201R8400	0.328
		220 ... 230	230 ... 240	0 0	AFC09-40-00-80	1SBL131201R8000	0.322
		230 ... 240	240 ... 260	0 0	AFC09-40-00-88	1SBL131201R8800	0.324
		380 ... 400	400 ... 415	0 0	AFC09-40-00-85	1SBL131201R8500	0.318
		400 ... 415	415 ... 440	0 0	AFC09-40-00-86	1SBL131201R8600	0.321
30	30	24	24	0 0	AFC16-40-00-81	1SBL171201R8100	0.331
		110	110 ... 120	0 0	AFC16-40-00-84	1SBL171201R8400	0.328
		220 ... 230	230 ... 240	0 0	AFC16-40-00-80	1SBL171201R8000	0.322
		230 ... 240	240 ... 260	0 0	AFC16-40-00-88	1SBL171201R8800	0.324
		380 ... 400	400 ... 415	0 0	AFC16-40-00-85	1SBL171201R8500	0.318
		400 ... 415	415 ... 440	0 0	AFC16-40-00-86	1SBL171201R8600	0.321
4 N.C. main poles							
30	30	24	24	0 0	AFC16-04-00-81	1SBL171101R8100	0.331
		110	110 ... 120	0 0	AFC16-04-00-84	1SBL171101R8400	0.328
		220 ... 230	230 ... 240	0 0	AFC16-04-00-80	1SBL171101R8000	0.322
		230 ... 240	240 ... 260	0 0	AFC16-04-00-88	1SBL171101R8800	0.324
		380 ... 400	400 ... 415	0 0	AFC16-04-00-85	1SBL171101R8500	0.318
		400 ... 415	415 ... 440	0 0	AFC16-04-00-86	1SBL171101R8600	0.321
2 N.O. + 2 N.C. main poles							
25	25	24	24	0 0	AFC09-22-00-81	1SBL131501R8100	0.331
		110	110 ... 120	0 0	AFC09-22-00-84	1SBL131501R8400	0.328
		220 ... 230	230 ... 240	0 0	AFC09-22-00-80	1SBL131501R8000	0.322
		230 ... 240	240 ... 260	0 0	AFC09-22-00-88	1SBL131501R8800	0.324
		380 ... 400	400 ... 415	0 0	AFC09-22-00-85	1SBL131501R8500	0.318
		400 ... 415	415 ... 440	0 0	AFC09-22-00-86	1SBL131501R8600	0.321
30	30	24	24	0 0	AFC16-22-00-81	1SBL171501R8100	0.331
		110	110 ... 120	0 0	AFC16-22-00-84	1SBL171501R8400	0.328
		220 ... 230	230 ... 240	0 0	AFC16-22-00-80	1SBL171501R8000	0.322
		230 ... 240	240 ... 260	0 0	AFC16-22-00-88	1SBL171501R8800	0.324
		380 ... 400	400 ... 415	0 0	AFC16-22-00-85	1SBL171501R8500	0.318
		400 ... 415	415 ... 440	0 0	AFC16-22-00-86	1SBL171501R8600	0.321



AFC09, AFC16

Main dimensions mm, inches

AFC09, AFC16 4-pole contactors

25 to 30 A AC-1

AC operated - With specific 60 Hz voltage

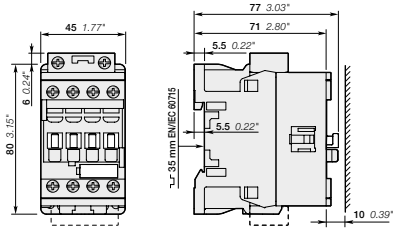
1SBC101095F0014

AFC09-40-00

The AFC09 and AFC16 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e resistance furnaces...), offering an optimized operating time for AC control applications with electromagnetic control. AFC contactors have a block type design and can be easily extended with add-on auxiliary contact blocks and a wide range of additional accessories.

- 690 V IEC or 600 V UL/CSA
- 4 main poles : 4 N.O, 4 N.C (AFC16-04 only) or 2 N.O. + 2 N.C.
- Switching capacity up to 30 A (AC-1)
- Control circuit: 175...415 V AC 50Hz / 208...480 V AC 60Hz
- Screw terminals
- Common accessory range for the complete AF platform.

IEC	UL/CSA	Rated control circuit voltage Uc		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational current $\theta \leq 40$ °C AC-1	General use rating 600 V AC						Pkg (1 pce)
A	A	V 50 Hz	V 60 Hz				kg
4 N.O. main poles							
25	25	175	208	0 0	AFC09-40-00-34	1SBL131201R3400	0.328
		230 ... 240	277	0 0	AFC09-40-00-42	1SBL131201R4200	0.324
		400 ... 415	480	0 0	AFC09-40-00-51	1SBL131201R5100	0.321
30	30	175	208	0 0	AFC16-40-00-34	1SBL171201R3400	0.328
		230 ... 240	277	0 0	AFC16-40-00-42	1SBL171201R4200	0.324
		400 ... 415	480	0 0	AFC16-40-00-51	1SBL171201R5100	0.321
4 N.C. main poles							
30	30	175	208	0 0	AFC16-04-00-34	1SBL171101R3400	0.328
		230 ... 240	277	0 0	AFC16-04-00-42	1SBL171101R4200	0.324
		400 ... 415	480	0 0	AFC16-04-00-51	1SBL171101R5100	0.321
2 N.O. + 2 N.C. main poles							
25	25	175	208	0 0	AFC09-22-00-34	1SBL131501R3400	0.328
		230 ... 240	277	0 0	AFC09-22-00-42	1SBL131501R4200	0.324
		400 ... 415	480	0 0	AFC09-22-00-51	1SBL131501R5100	0.321
30	30	175	208	0 0	AFC16-22-00-34	1SBL171501R3400	0.328
		230 ... 240	277	0 0	AFC16-22-00-42	1SBL171501R4200	0.324
		400 ... 415	480	0 0	AFC16-22-00-51	1SBL171501R5100	0.321



AFC09, AFC16

Main dimensions mm, inches

AFC26, AFC38 4-pole contactors

45 to 55 A AC-1

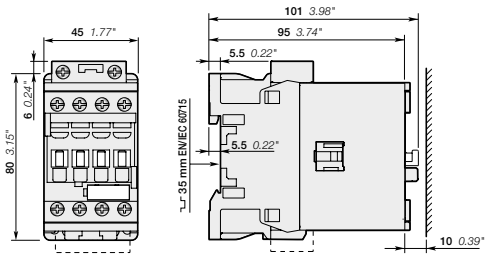
AC operated

AFC26-40-00

The AFC26 and AFC38 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e resistance furnaces...), offering an optimized operating time for AC control applications with electromagnetic control. AFC contactors have a block type design and can be easily extended with add-on auxiliary contact blocks and a wide range of additional accessories.

- 690 V IEC or 600 V UL/CSA
- 4 main poles : 4 N.O. or 2 N.O. + 2 N.C.
- Switching capacity up to 55 A (AC-1)
- Control circuit: 24...415 V AC 50Hz / 24...440 V AC 60Hz
- Screw terminals
- Common accessory range for the complete AF platform.

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 50 Hz	V 60 Hz				kg
4 N.O. main poles							
45	45	24	24	0 0	AFC26-40-00-81	1SBL231201R8100	0.423
		110	110 ... 120	0 0	AFC26-40-00-84	1SBL231201R8400	0.420
		220 ... 230	230 ... 240	0 0	AFC26-40-00-80	1SBL231201R8000	0.414
		230 ... 240	240 ... 260	0 0	AFC26-40-00-88	1SBL231201R8800	0.416
		380 ... 400	400 ... 415	0 0	AFC26-40-00-85	1SBL231201R8500	0.410
		400 ... 415	415 ... 440	0 0	AFC26-40-00-86	1SBL231201R8600	0.411
55	55	24	24	0 0	AFC38-40-00-81	1SBL291201R8100	0.423
		110	110 ... 120	0 0	AFC38-40-00-84	1SBL291201R8400	0.420
		220 ... 230	230 ... 240	0 0	AFC38-40-00-80	1SBL291201R8000	0.414
		230 ... 240	240 ... 260	0 0	AFC38-40-00-88	1SBL291201R8800	0.416
		380 ... 400	400 ... 415	0 0	AFC38-40-00-85	1SBL291201R8500	0.410
		400 ... 415	415 ... 440	0 0	AFC38-40-00-86	1SBL291201R8600	0.411
2 N.O. + 2 N.C. main poles							
45	45	24	24	0 0	AFC26-22-00-81	1SBL231501R8100	0.423
		110	110 ... 120	0 0	AFC26-22-00-84	1SBL231501R8400	0.420
		220 ... 230	230 ... 240	0 0	AFC26-22-00-80	1SBL231501R8000	0.414
		230 ... 240	240 ... 260	0 0	AFC26-22-00-88	1SBL231501R8800	0.416
		380 ... 400	400 ... 415	0 0	AFC26-22-00-85	1SBL231501R8500	0.410
		400 ... 415	415 ... 440	0 0	AFC26-22-00-86	1SBL231501R8600	0.411
55	55	24	24	0 0	AFC38-22-00-81	1SBL291501R8100	0.423
		110	110 ... 120	0 0	AFC38-22-00-84	1SBL291501R8400	0.420
		220 ... 230	230 ... 240	0 0	AFC38-22-00-80	1SBL291501R8000	0.414
		230 ... 240	240 ... 260	0 0	AFC38-22-00-88	1SBL291501R8800	0.416
		380 ... 400	400 ... 415	0 0	AFC38-22-00-85	1SBL291501R8500	0.410
		400 ... 415	415 ... 440	0 0	AFC38-22-00-86	1SBL291501R8600	0.411



AFC26, AFC38

Main dimensions mm, inches

AFC26, AFC38 4-pole contactors

45 to 55 A AC-1

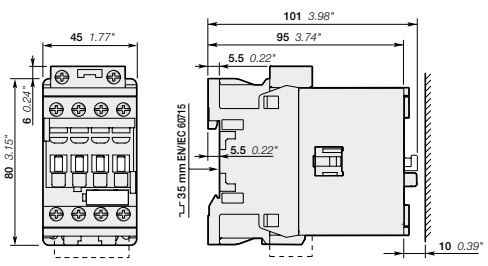
AC operated - With specific 60 Hz voltage

AFC26-40-00

The AFC26 and AFC38 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e resistance furnaces...), offering an optimized operating time for AC control applications with electromagnetic control. AFC contactors have a block type design and can be easily extended with add-on auxiliary contact blocks and a wide range of additional accessories.

- 690 V IEC or 600 V UL/CSA
- 4 main poles : 4 N.O. or 2 N.O. + 2 N.C.
- Switching capacity up to 55 A (AC-1)
- Control circuit: 24...415 V AC 50Hz / 24...440 V AC 60Hz
- Screw terminals
- Common accessory range for the complete AF platform.

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 50 Hz	V 60 Hz				kg
4 N.O. main poles							
45	45	175	208	0 0	AFC26-40-00-34	1SBL231201R3400	0.418
		230 ... 240	277	0 0	AFC26-40-00-42	1SBL231201R4200	0.413
		400 ... 415	480	0 0	AFC26-40-00-51	1SBL231201R5100	0.411
55	55	175	208	0 0	AFC38-40-00-34	1SBL291201R3400	0.418
		230 ... 240	277	0 0	AFC38-40-00-42	1SBL291201R4200	0.413
		400 ... 415	480	0 0	AFC38-40-00-51	1SBL291201R5100	0.411
2 N.O. + 2 N.C. main poles							
45	45	175	208	0 0	AFC26-22-00-34	1SBL231501R3400	0.418
		230 ... 240	277	0 0	AFC26-22-00-42	1SBL231501R4200	0.413
		400 ... 415	480	0 0	AFC26-22-00-51	1SBL231501R5100	0.411
55	55	175	208	0 0	AFC38-22-00-34	1SBL291501R3400	0.418
		230 ... 240	277	0 0	AFC38-22-00-42	1SBL291501R4200	0.413
		400 ... 415	480	0 0	AFC38-22-00-51	1SBL291501R5100	0.411



AFC26, AFC38

Main dimensions mm, inches

20

AFC40 ... AFC80 4-pole contactors

70 to 125 A AC-1

AC operated

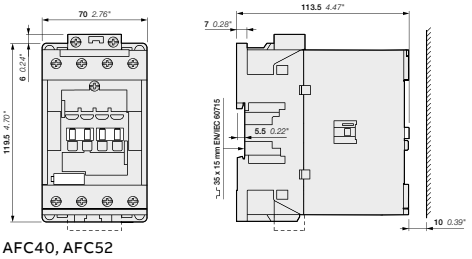
AFC40-40-00

AFC80-40-00

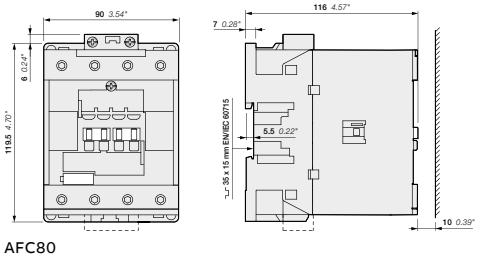
The AFC40 ... AFC80 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 440 V DC. AFC contactors have a block type design and can be easily extended with add-on auxiliary contact blocks and a wide range of additional accessories.

- 690 V IEC or 600 V UL/CSA
- 4 main poles : 4. N.O. or 2 N.O. + 2 N.C
- Switching capacity up to 125 A (AC-1)
- Control circuit: 24...415 V AC 50Hz / 24...440 V AC 60Hz
- Screw terminals
- Common accessory range for the complete AF platform.

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 50 Hz	60 Hz				kg
4 N.O. main poles							
70	60	24	24	0 0	AFC40-40-00-81	1SBL341201R8100	1.154
		110	110 ... 120	0 0	AFC40-40-00-84	1SBL341201R8400	1.160
		220 ... 230	230 ... 240	0 0	AFC40-40-00-80	1SBL341201R8000	1.165
		230 ... 240	240 ... 260	0 0	AFC40-40-00-88	1SBL341201R8800	1.157
		380 ... 400	400 ... 415	0 0	AFC40-40-00-85	1SBL341201R8500	1.155
		400 ... 415	415 ... 440	0 0	AFC40-40-00-86	1SBL341201R8600	1.159
100	80	24	24	0 0	AFC52-40-00-81	1SBL361201R8100	1.154
		110	110 ... 120	0 0	AFC52-40-00-84	1SBL361201R8400	1.160
		220 ... 230	230 ... 240	0 0	AFC52-40-00-80	1SBL361201R8000	1.165
		230 ... 240	240 ... 260	0 0	AFC52-40-00-88	1SBL361201R8800	1.157
		380 ... 400	400 ... 415	0 0	AFC52-40-00-85	1SBL361201R8500	1.155
		400 ... 415	415 ... 440	0 0	AFC52-40-00-86	1SBL361201R8600	1.159
125	105	24	24	0 0	AFC80-40-00-81	1SBL391201R8100	1.449
		110	110 ... 120	0 0	AFC80-40-00-84	1SBL391201R8400	1.455
		220 ... 230	230 ... 240	0 0	AFC80-40-00-80	1SBL391201R8000	1.460
		230 ... 240	240 ... 260	0 0	AFC80-40-00-88	1SBL391201R8800	1.452
		380 ... 400	400 ... 415	0 0	AFC80-40-00-85	1SBL391201R8500	1.450
		400 ... 415	415 ... 440	0 0	AFC80-40-00-86	1SBL391201R8600	1.454
2 N.O. + 2 N.C. main poles							
70	60	24	24	0 0	AFC40-22-00-81	1SBL341501R8100	1.159
		110	110 ... 120	0 0	AFC40-22-00-84	1SBL341501R8400	1.165
		220 ... 230	230 ... 240	0 0	AFC40-22-00-80	1SBL341501R8000	1.170
		230 ... 240	240 ... 260	0 0	AFC40-22-00-88	1SBL341501R8800	1.162
		380 ... 400	400 ... 415	0 0	AFC40-22-00-85	1SBL341501R8500	1.160
		400 ... 415	415 ... 440	0 0	AFC40-22-00-86	1SBL341501R8600	1.164
125	105	24	24	0 0	AFC80-22-00-81	1SBL391501R8100	1.458
		110	110 ... 120	0 0	AFC80-22-00-84	1SBL391501R8400	1.464
		220 ... 230	230 ... 240	0 0	AFC80-22-00-80	1SBL391501R8000	1.469
		230 ... 240	240 ... 260	0 0	AFC80-22-00-88	1SBL391501R8800	1.461
		380 ... 400	400 ... 415	0 0	AFC80-22-00-85	1SBL391501R8500	1.459
		400 ... 415	415 ... 440	0 0	AFC80-22-00-86	1SBL391501R8600	1.463



AFC40, AFC52



AFC80

Main dimensions mm, inches

AFC40 ... AFC80 4-pole contactors

70 to 125 A AC-1

AC operated - With specific 60 Hz voltage

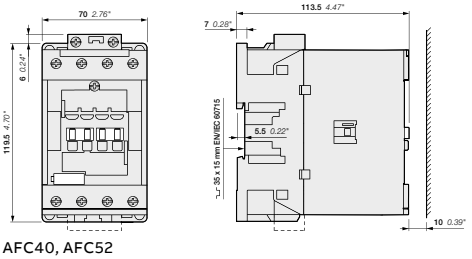
AFC40-40-00

AFC80-40-00

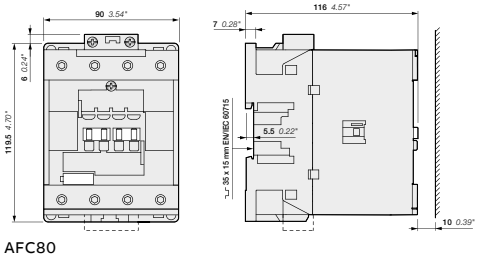
The AFC40 ... AFC80 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 440 V DC. AFC contactors have a block type design and can be easily extended with add-on auxiliary contact blocks and a wide range of additional accessories.

- 690 V IEC or 600 V UL/CSA
- 4 main poles : 4. N.O. or 2 N.O. + 2 N.C.
- Switching capacity up to 125 A (AC-1)
- Control circuit: 175...415 V AC 50Hz / 208...480 V AC 60Hz
- Screw terminals
- Common accessory range for the complete AF platform.

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 50 Hz	60 Hz				kg
4 N.O. main poles							
70	60	175	208	0 0	AFC40-40-00-34	1SBL341201R3400	1.158
		230 ... 240	277	0 0	AFC40-40-00-42	1SBL341201R4200	1.157
		400 ... 415	480	0 0	AFC40-40-00-51	1SBL341201R5100	1.159
100	80	175	208	0 0	AFC52-40-00-34	1SBL361201R3400	1.158
		230 ... 240	277	0 0	AFC52-40-00-42	1SBL361201R4200	1.157
		400 ... 415	480	0 0	AFC52-40-00-51	1SBL361201R5100	1.159
125	105	175	208	0 0	AFC80-40-00-34	1SBL391201R3400	1.453
		230 ... 240	277	0 0	AFC80-40-00-42	1SBL391201R4200	1.452
		400 ... 415	480	0 0	AFC80-40-00-51	1SBL391201R5100	1.454
2 N.O. + 2 N.C. main poles							
70	60	175	208	0 0	AFC40-22-00-34	1SBL341501R3400	1.163
		230 ... 240	277	0 0	AFC40-22-00-42	1SBL341501R4200	1.162
		400 ... 415	480	0 0	AFC40-22-00-51	1SBL341501R5100	1.164
125	105	175	208	0 0	AFC80-22-00-34	1SBL391501R3400	1.462
		230 ... 240	277	0 0	AFC80-22-00-42	1SBL391501R4200	1.461
		400 ... 415	480	0 0	AFC80-22-00-51	1SBL391501R5100	1.463



AFC40, AFC52



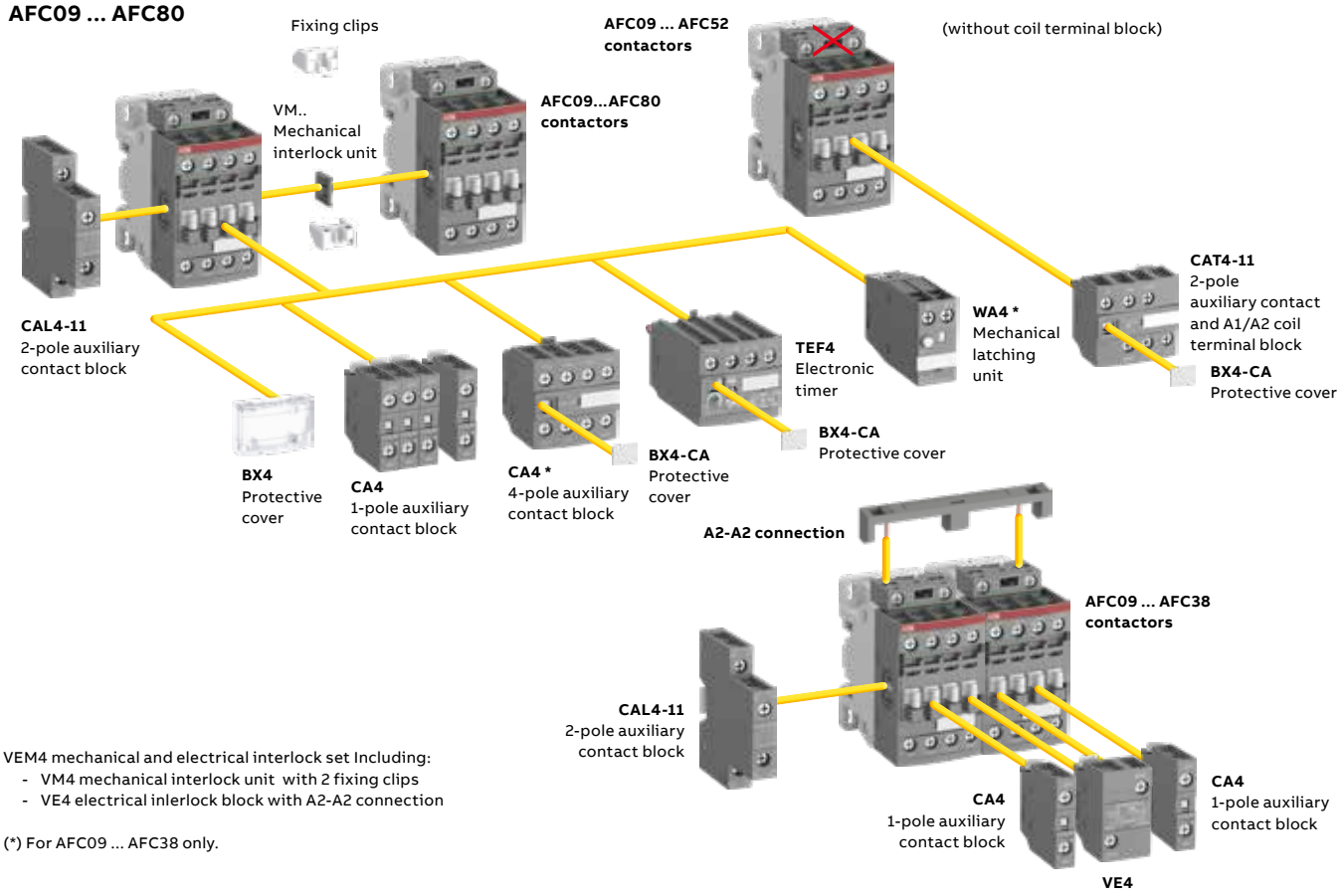
AFC80

Main dimensions mm, inches

20

AFC09 ... AFC80 4-pole contactors

Contactors and main accessories



VEM4 mechanical and electrical interlock set Including:
- VM4 mechanical interlock unit with 2 fixing clips
- VE4 electrical inlerlock block with A2-A2 connection

(*) For AFC09 ... AFC38 only.

Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories
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			Electronic timer	Mechanical latching unit	Electrical and mechanical interlock set (between 2 contactors)	Side-mounted accessories Auxiliary contact blocks	
			1-pole CA4	2-pole CAT4-11	4-pole CA4	TEF4	WA4 (5)	VEM4	2-pole CAL4-11 Left side	2-pole CAL4-11 Right side
AFC09 ... AFC38										
AFC09 ... AFC16	4 0	0 0 (1)	4 max.	**or** 1	**or** 1	**or** 1	**or** 1	–	+ 1	–
AFC26 ... AFC38	4 0	0 0 (2)	2 max.	**or** 1	–	**or** 1	**or** 1	–	+ 1	+ 1
			3 max.	–	–	–	–	+ 1	+ 1	or 1
AFC09 ... AFC38	2 2	0 0 (2)	4 max.	**or** 1	**or** 1	**or** 1	**or** 1	–	+ 1	–
			2 max.	**or** 1	–	**or** 1	**or** 1	–	+ 1	+ 1
AFC16-04	0 4	0 0 (3)	4 max.	**or** 1	**or** 1	**or** 1	**or** 1	– (6)	+ –	–
			4 max.	–	**or** 1	**or** 1	**or** 1	– (6)	+ 1	or 1
AFC40 ... AFC80										
AFC40 ... AFC52	4 0	0 0	4 max.	**or** 1	–	**or** 1	–	–	+ 1	+ 1
AFC80	4 0	0 0	4 max.	–	–	**or** 1	–	–	+ 1	+ 1
AFC40	2 2	0 0 (4)	4 max.	**or** 1	–	**or** 1	–	–	+ 1	–
			4 max.	–	–	**or** 1	–	–	+ 1	+ 1
AFC80	2 2	0 0 (4)	4 max.	–	–	**or** 1	–	–	+ 1	+ 1

(1) Including add-on contacts: 4 N.C. auxiliary contacts max. on positions 1, 2, 3, 4 and 3 N.C. auxiliary contacts max. on positions 1 ±30°, 5.
(2) Including add-on contacts: 3 N.C. auxiliary contacts max. on positions 1, 2, 3, 4 and 2 N.C. auxiliary contacts max. on positions 1 ±30°, 5.
(3) Including add-on contacts: 1 N.C. auxiliary contact max. on positions 1, 1+/-30°, 2, 3, 4. Mounting position 5 not allowed.
(4) Including add-on contacts: 2 N.C. auxiliary contacts max. on positions 1, 1 ±30°, 2, 3, 4, 5
(5) Accept 1-pole CA4 auxiliary contacts (1 block on each side of the mechanical latch) in respect to the total number of built-in or additional N.C. auxiliary contacts.
(6) For VM4 and VEM4 use with AFC16-04-00, please see your ABB sales representative.

AFC09 ... AFC80 4-pole contactors
Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC / DC operated	AFC09	AFC16	AFC16-04	AFC26	AFC38	AFC40	AFC52	AFC80
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	30 A	55 A	55 A	105 A	105 A	125 A
With conductor cross-sectional area		6 mm²	6 mm²	6 mm²	16 mm²	16 mm²	35 mm²	35 mm²	50 mm²
AC-1 Utilization category									
For air temperature close to contactor									
Ie / Rated operational current AC-1	θ ≤ 40 °C	25 A	30 A	30 A	45 A	55 A	70 A	100 A	125 A
Ue max. ≤ 690 V, 50/60 Hz	θ ≤ 60 °C	25 A	30 A	30 A	40 A	45 A	60 A	80 A	105 A
	θ ≤ 70 °C	22 A	26 A	26 A	32 A	37 A	50 A	70 A	90 A
With conductor cross-sectional area		4 mm²	6 mm²	6 mm²	10 mm²	16 mm²	35 mm²	35 mm²	50 mm²
AC-3 Utilization category									
For air temperature close to contactor θ ≤ 60 °C									
Ie / Max. rated operational current AC-3 (1)									
3-phase motors	220-230-240 V	9 A	18 A	4.9 A	23.2 A	23.2 A	40 A	53 A	80 A
	380-400 V	9 A	18 A	5.2 A	22 A	22 A	40 A	53 A	80 A
	415 V	9 A	18 A	5.2 A	21.2 A	21.2 A	40 A	53 A	80 A
	440 V	9 A	18 A	5.7 A	20 A	20 A	40 A	53 A	80 A
	500 V	9.5 A	15 A	5.1 A	17.6 A	17.6 A	35 A	45 A	65 A
	690 V	7 A	10.5 A	-	10.5 A	10.5 A	25 A	35 A	49 A
	1000 V	-	-	-	-	-	-	-	-
Rated operational power AC-3 (1)									
1500 r.p.m. 50 Hz	220-230-240 V	2.2 kW	4 kW	1.1 kW	5.5 kW	5.5 kW	11 kW	15 kW	22 kW
1800 r.p.m. 60 Hz	380-400 V	4 kW	7.5 kW	2.2 kW	11 kW (3)	11 kW (3)	18.5 kW	22 kW	37 kW
3-phase motors	415 V	4 kW	9 kW	2.2 kW	11 kW	11 kW	22 kW	30 kW	45 kW
	440 V	4 kW	9 kW	3 kW	11 kW	11 kW	22 kW	30 kW	45 kW
	500 V	5.5 kW	9 kW	4 kW	11 kW	11 kW	22 kW	30 kW	45 kW
	690 V	5.5 kW	9 kW	-	9 kW	9 kW	22 kW	30 kW	45 kW
	1000 V	-	-	-	-	-	-	-	-
Rated making capacity AC-3		10 x Ie AC-3 acc. to IEC 60947-4-1							
Rated breaking capacity AC-3		8 x Ie AC-3 acc. to IEC 60947-4-1							
Short-circuit protection device for contactors									
Without thermal overload relay - Motor protection excluded									
Ue ≤ 500 V AC - gG type fuse		25 A	32 A	32 A	50 A	63 A	80 A	110 A	160 A
Rated short-time withstand current Icw	1 s	300 A	300 A	300 A	450 A	450 A	1000 A	1000 A	1200 A
At 40 °C ambient temperature,	10 s	150 A	150 A	150 A	300 A	300 A	600 A	600 A	780 A
in free air from a cold state	30 s	80 A	80 A	80 A	225 A	225 A	350 A	350 A	450 A
	1 min	60 A	60 A	60 A	150 A	150 A	250 A	250 A	300 A
	15 min	35 A	35 A	35 A	55 A	55 A	110 A	110 A	140 A
Maximum breaking capacity N.O. main pole	at 440 V	250 A	250 A	250 A	-	-	950 A	950 A	1100 A
cos ϕ = 0.45	at 690 V	106 A	106 A	106 A	-	-	600 A	600 A	750 A
N.C. Main pole	at 440 V	-	-	-	-	-	600 A	-	900 A
	at 690 V	-	-	-	-	-	300 A	-	750 A
Power dissipation per pole	Ie / AC-1	0.8 W	1.2 W	1.2 W	1.6 W	2.3 W	3 W	6.3 W	8 W
	Ie / AC-3	0.1 W	0.35 W	0.35 W	0.42 W	0.42 W	1 W	1.7 W	3.2 W
Max. electrical switching frequency	AC-1	600 cycles/h							

(1) For the corresponding kW/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor Rated Operational Powers and Currents"
(2) For the protection of motor starters against short circuits, see "Coordination with Short-circuit Protection Devices".
(3) 400 V 3-phase motors only.

AFC09 ... AFC80 4-pole contactors
Technical data

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

Contactor types	AC / DC operated	AFC09	AFC16	AFC16-04	AFC26	AFC38	AFC40	AFC52	AFC80
Standards		UL 60947-1, UL 60947-4-1, CSA C22.2 N° 60947-1-13, CSA C22.2 N° 60947-4-1-14							
Max. operational voltage		600 V							
UL / CSA general use rating									
	600 V AC	25 A	30 A	-	45 A	55 A	60 A	80 A	105 A
With conductor cross-sectional area		AWG 10	AWG 10	-	AWG 8	AWG 6	AWG 6	AWG 4	AWG 2
1 pole	80 V DC	25 A (1)	30 A (1)	-	45 A	55 A	60 A	80 A	105 A
2 poles in serie	160 V DC	25 A (1)	30 A (1)	-	45 A	55 A	60 A	80 A	105 A
3 poles in serie	240 V DC	25 A	30 A	-	45 A	55 A	60 A	80 A	105 A
4 poles in serie	320 V DC	25 A	30 A	-	45 A	55 A	60 A	80 A	105 A
With conductor cross-sectional area		AWG 10	AWG 10	-	AWG 8	AWG 8	AWG 6	AWG 4	AWG 2
Max. electrical switching frequency									
For general use		600 cycles/h							

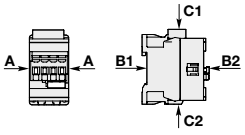
Note: 4-pole contactors fitted with 2 N.O. + 2 N.C. main poles, see "General technical data".
(1) 20 A for AFC09..-22-00 and AFC16..-22-00.

AFC09 ... AFC38 4-pole contactors

Technical data

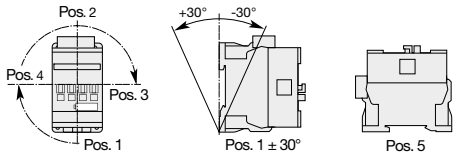
General technical data

Contactor types	AC operated	AFC09	AFC16	AFC26	AFC38	AFC40	AFC52	AFC80
Rated insulation voltage Ui								
acc. to IEC 60947-4-1		690 V						1000 V
acc. to UL / CSA		600 V						
Rated impulse withstand voltage Uimp.		6 kV						8 kV
Pollution degree		3						
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				6 millions		4 millions
Max. switching frequency		3600 cycles/h						
Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27 Mounting position 1 (1)								
Shock direction		1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position						
4 N.O. Main poles	A	30 g				20 g		
	B1	25 g Closed position / 5 g Open position				20 g Closed position / 5 g Open position		
	B2	15 g				10 g		
	C1	25 g				20 g		
	C2	25 g				20 g		
2 N.O. + 2 N.C. Main poles 4 N.C. Main poles	A	30 g		30 g Closed position / 25 g Open position		20 g		
	B1	25 g (1) Closed position / 5 g Open position		25 g Closed position / 5 g Open position		20 g Closed position / 5 g Open position		20 g Closed position / 4 g Open position
	B2	15 g		15 g Closed position / 10 g Open position		10 g		
	C1	25 g		25 g Closed position / 20 g Open position		20 g		
	C2	25 g		25 g Closed position / 20 g Open position		20 g		
Vibration withstand acc. to IEC 60068-2-6		5 ... 300 Hz 4 g Closed position / 2 g Open position				5 ... 300 Hz 3 g Closed position / 2 g Open position		



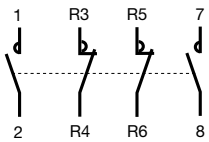
(1) AFC16-04 Shock witstand in B1 direction: 20g.

Mounting characteristics and conditions for use

Contactor types	AFC09	AFC16	AFC26	AFC38	AFC40	AFC52	AFC80
Mounting positions	 Position 5 not allowed for AF16-04 contacts. Max. add-on N.C. auxiliary contacts: see accessory fitting details for a 4-pole contactor AFC09 ... AFC80						
Mounting distances	The contactors can be assembled side by side						(2)
Fixing							
On rail according to IEC 60715, EN 60715	35 x 7.5 mm or 35 x 15 mm				35 x 15 mm		
By screws (not supplied)	2 x M4 screws placed diagonally				2 x M4 or 2 x M6 screws placed diagonally		

(2) At θ < 60 °C, the contactors can be assembled side by side; At θ ≤ 70 °C, contactors must be spaced by 5 mm

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

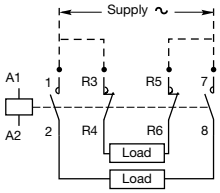


These contactors are suitable for controlling 2 separate circuits, i.e. 2 loads with 2 separate supplies, or 1 circuit comprising 2 separate loads with a single supply (see diagrams beside). When the contactor operates there is no mechanical overlapping between the N.O. poles and the N.C. poles: BREAK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

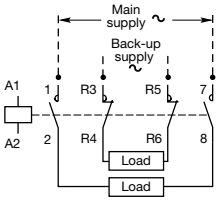
These contactors are not suitable for a reversing starter or for controlling a single load from 2 separate supplies.

Block diagrams

- Single supply and 2 separate loads



- 2 separate supplies and 2 separate loads



AFC09 ... AFC80 4-pole contactors

Technical data

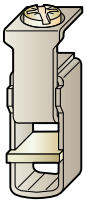
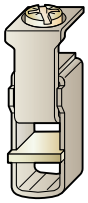
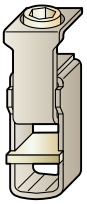
Magnet system characteristics AFC09 ... AFC80 contactors - AC operated

Contactor types		AC operated	AFC09	AFC16	AFC26	AFC38	AFC40	AFC52	AFC80
Coil operating limits acc. to IEC 60947-4-1		AC supply	At θ ≤ 60 °C 0.85...1.1 x Uc At θ ≤ 70 °C 1 x Uc						
AC control voltage			24...500 V AC						
Rated control circuit voltage Uc		50 Hz	24...415 V						
		60 Hz	24...480 V						
Coil consumption		Average value at 50 Hz	70 VA				150 VA		235 VA
		at 60 Hz	66 VA				151 VA		260 VA
		Average holding value	8 VA / 2.3 W				20 VA / 6 W		
Drop-out voltage		50 Hz	40...65 % of Uc min.				≤ 60 % of Uc min.		
		60 Hz	40...70 % of Uc min.						
Operating time (-40°C ... +60°C)									
Between coil energization and:		N.O. contact closing	10...26 ms				7 ... 22 ms		
		N.C. contact opening	7...21 ms				3 ... 15 ms		
Between coil de-energization and:		N.O. contact opening	4...18 ms				4 ... 16 ms		
		N.C. contact closing	9...20 ms				6 ... 20 ms		

AFC09 ... AFC80 4-pole contactors

Technical data

Connecting characteristics

Contactor types		AFC09 / AFC16	AFC26 / AFC38	AF40 / AF52	AF80
Main terminals		 Screw terminals with cable clamp	 Screw terminals with double connector 2 x (5.5 width x 6.8 depth)	 Screw terminals with double connector 2 x (9.3 width x 7.9/10.3 depth)	 Screw terminals with double connector 2 x (12.4 width x 9.3/11.1 depth)
Connection capacity (min. ... max.)					
Main conductors (poles)					
Rigid / Stranded	1 x	1...6 mm²	1.5...16 mm²	6...35 mm²	6...70 mm²
Rigid / Stranded	2 x	1...6 mm²	1.5...16 mm²	6...35 mm²	6...50 mm²
Flexible with non insulated ferrule	1 x	0.75...6 mm²	1.5...16 mm²	4...35 mm²	6...50 mm²
Flexible with non insulated ferrule	2 x	0.75...6 mm²	1.5...16 mm²	4...35 mm²	6...50 mm²
Flexible with insulated ferrule	1 x	0.75...4 mm²	1.5...16 mm²	4...35 mm²	6...50 mm²
Flexible with insulated ferrule	2 x	0.75...2.5 mm²	1.5...16 mm²	4...35 mm²	6...50 mm²
Bars or lugs	L <	9.6 mm	-	9.2 mm	12.2 mm
Connection capacity acc. to UL/CSA	1 or 2 x	AWG 16...10	AWG 16...6	AWG 10...2	AWG 6...1
Stripping length		10 mm	12 mm	16 mm	17 mm
Tightening torque		1.5 Nm / 13 lb.in	2.5 Nm / 22 lb.in	4 Nm / 35 lb.in	6 Nm / 53 lb.in
Auxiliary conductors (coil terminals)					
Rigid solid	1 x	1...2.5 mm²			
Rigid solid	2 x	1...2.5 mm²			
Flexible with non insulated ferrule	1 x	0.75...2.5 mm²			
Flexible with non insulated ferrule	2 x	0.75...2.5 mm²			
Flexible with insulated ferrule	1 x	0.75...2.5 mm²			
Flexible with insulated ferrule	2 x	0.75...1.5 mm²			
Lugs	L <	8 mm			
Connection capacity acc. to UL/CSA	1 or 2 x	AWG 18...14			
Stripping length		10 mm			
Tightening torque		1.2 Nm / 11 lb.in			
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529					
Main terminals		IP20		IP10 *	
Coil terminals		IP20			
Screw terminals		Delivered in open position, screws of unused terminals must be tightened			
Main terminals		M3.5	M4.5	M6	M8
Screwdriver type		Flat Ø 5.5 / Pozidriv 2		Flat Ø 6.5 / Pozidriv 2	hexagon socket (s = 4 mm)
Coil terminals		M3.5			
Screwdriver type		Flat Ø 5.5 / Pozidriv 2			

4-pole contactors

Electrical durability and utilization categories

General

Utilization categories determine the current making and breaking conditions relating to the characteristics of the loads to be controlled by the contactors. International standard IEC 60947-4-1 and European standard EN 60947-4-1 are the standards to be referred to.
If Ic is the current to be broken by the contactor and Ie the rated operational current normally drawn by the load, then:

- Categories AC-1: Ic = Ie

Generally speaking Ic = m x Ie where m is a multiple of the load operational current.
On next pages, the curves corresponding to categorie AC-1 represent the electrical durability variation of standard contactors in relation to the breaking current Ic.

Electrical durability curves:

- categories AC-1: the curves represent the electrical durability variation of standard contactors in relation to the breaking current Ic.

Electrical durability is expressed in millions of operating cycles.

Curve utilization mode
Electrical durability forecast and contactor selection for categories AC-1

- Note the characteristics of the load to be controlled:
  - Operational voltage..... Ue
  - Current normally drawn..... Ie (Ue / Ie / kW relation for motors, see "Motor rated operational powers and currents").
  - Utilization category..... AC-1
  - Breaking current..... Ic = Ie for AC-1
- Define the number of operating cycles N required.
- On the diagram corresponding to the operational category, select the contactor with the curve immediately above the intersection point (Ic ; N).

Case of uninterrupted duty

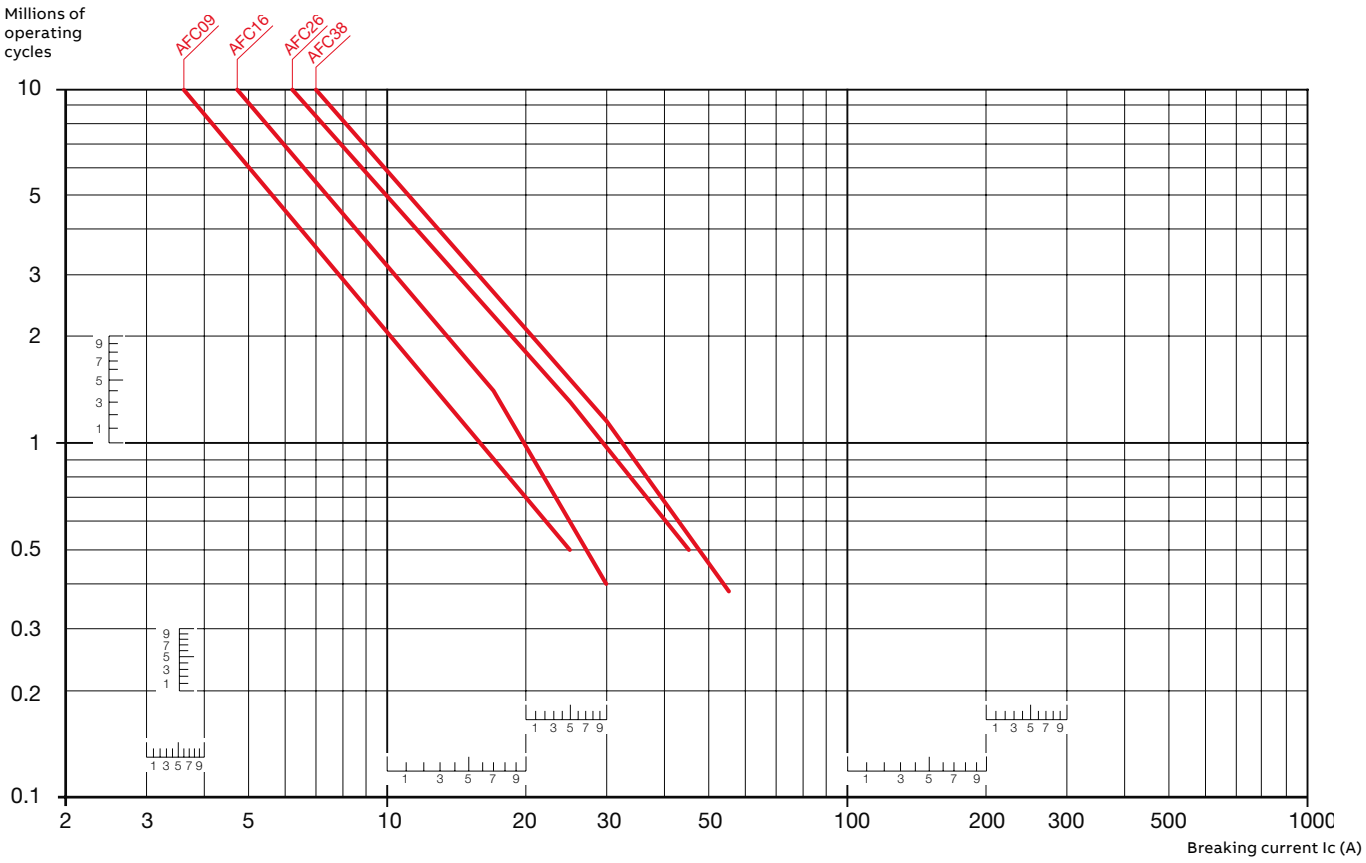
For uninterrupted duty, some verifications of preventing maintenance are necessary to check the functionality of the concerned product (consult us).
The combined effect of environmental conditions and the proper temperature of the product may require some disposals.
As a matter of fact, for this duty, the use duration prevails over the number of operating cycles.

4-pole contactors

Electrical durability

Electrical durability for AC-1 utilization category - Ue ≤ 690 V
Switching non-inductive or slightly inductive loads. The breaking current Ic for AC-1 is equal to the rated operational current of the load.

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



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

UL/CSA	Motor nominal current: single and three phase (according to UL 60947-4-1A)									
Motor power	120 V 1-ph	200 V 1-ph	200 V 3-ph	208 V 1-ph	208 V 3-ph	220-240 V 1-ph	220-240 V 3-ph	380-415 V 3-ph	440-480 V 3-ph	550-600 V 3-ph
hp	A	A	A	A	A	A	A	A	A	A
1/10	3	–	–	–	–	1.5	–	–	–	–
1/8	3.8	–	–	–	–	1.9	–	–	–	–
1/6	4.4	2.5	–	2.4	–	2.2	–	–	–	–
1/4	5.8	3.3	–	3.2	–	2.9	–	–	–	–
1/3	7.2	4.1	–	4	–	3.6	–	–	–	–
1/2	9.8	5.6	2.5	5.4	2.4	4.9	2.2	1.3	1.1	0.9
3/4	13.8	7.9	3.7	7.6	3.5	6.9	3.2	1.8	1.6	1.3
1	16	9.2	4.8	8.8	4.6	8	4.2	2.3	2.1	1.7
1-1/2	20	11.5	6.9	11	6.6	10	6	3.3	3	2.4
2	24	13.8	7.8	13.2	7.5	12	6.8	4.3	3.4	2.7
3	34	19.6	11	18.7	10.6	17	9.6	6.1	4.8	3.9
5	56	32.2	17.5	30.8	16.7	28	15.2	9.7	7.6	6.1
7-1/2	80	46	25.3	44	24.2	40	22	14	11	9
10	100	57.5	32.2	55	30.8	50	28	18	14	11
15	135	–	48.3	–	46.2	68	42	27	21	17
20	–	–	62.1	–	59.4	88	54	34	27	22
25	–	–	78.2	–	74.8	110	68	44	34	27
30	–	–	92	–	88	136	80	51	40	32
40	–	–	120	–	114	176	104	66	52	41
50	–	–	150	–	143	216	130	83	65	52
60	–	–	177	–	169	–	154	103	77	62
75	–	–	221	–	211	–	192	128	96	77
100	–	–	285	–	273	–	248	165	124	99
125	–	–	359	–	343	–	312	208	156	125
150	–	–	414	–	396	–	360	240	180	144
200	–	–	552	–	528	–	480	320	240	192
250	–	–	–	–	–	–	604	403	302	242
300	–	–	–	–	–	–	722	482	361	289
350	–	–	–	–	–	–	828	560	414	336
400	–	–	–	–	–	–	954	636	477	382
450	–	–	–	–	–	–	1030	–	515	412
500	–	–	–	–	–	–	1180	786	590	472

For direct product details information, use product type or order code, ex:

www.abb.com/productdetails/**NFC22E-80**
or
www.abb.com/productdetails/**1SBH131001R8022**

NFC contactor relays

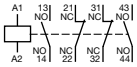
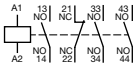
NFC 4-pole contactor relays

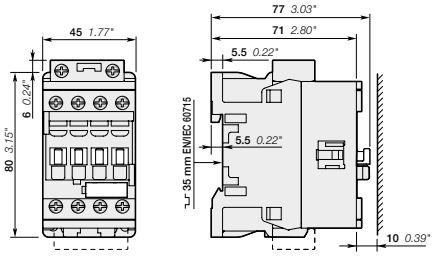
AC operated

NFC22E

The NFC 4-pole contactor relays are mainly used for switching auxiliary and control circuits, offering an optimized operating time for AC control applications with electromagnetic control. NFC contactor relays have a block type design and can be easily extended with add-on auxiliary contact blocks and a wide range of additional accessories.

- 690 V IEC or 600 V UL/CSA
- 4 poles: 2 N.O. + 2 N.C., 3 N.O. + 1 N.C, 4 N.O.
- Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- Control circuit: 24…415 V AC 50Hz / 24…440 V AC 60Hz
- Screw terminals
- Common accessory range for the complete AF platform.

Number of contacts	Rated control circuit voltage Uc		Type	Order code	Weight Pkg (1 pce)
	V 50 Hz	V 60Hz			kg
	24	24	NFC22E-81	1SBH131001R8122	0.331
	110	110 ... 120	NFC22E-84	1SBH131001R8422	0.328
	220 ... 230	230 ... 240	NFC22E-80	1SBH131001R8022	0.322
	230 ... 240	240 ... 260	NFC22E-88	1SBH131001R8822	0.324
	380 ... 400	400 ... 415	NFC22E-85	1SBH131001R8522	0.318
	400 ... 415	415 ... 440	NFC22E-86	1SBH131001R8622	0.321
	24	24	NFC31E-81	1SBH131001R8131	0.331
	110	110 ... 120	NFC31E-84	1SBH131001R8431	0.328
	220 ... 230	230 ... 240	NFC31E-80	1SBH131001R8031	0.322
	230 ... 240	240 ... 260	NFC31E-88	1SBH131001R8831	0.324
	380 ... 400	400 ... 415	NFC31E-85	1SBH131001R8531	0.318
	400 ... 415	415 ... 440	NFC31E-86	1SBH131001R8631	0.321
	24	24	NFC40E-81	1SBH131001R8140	0.331
	110	110 ... 120	NFC40E-84	1SBH131001R8440	0.328
	220 ... 230	230 ... 240	NFC40E-80	1SBH131001R8040	0.322
	230 ... 240	240 ... 260	NFC40E-88	1SBH131001R8840	0.324
	380 ... 400	400 ... 415	NFC40E-85	1SBH131001R8540	0.318
	400 ... 415	415 ... 440	NFC40E-86	1SBH131001R8640	0.321



NFC22E, NFC31E, NFC40E

Main dimensions mm, inches

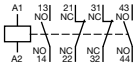
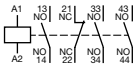
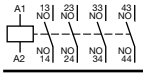
NFC 4-pole contactor relays

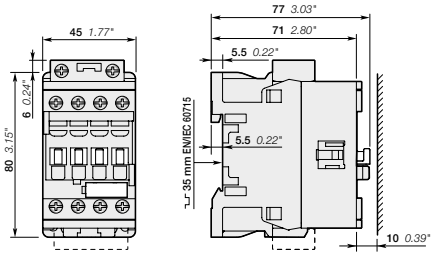
AC operated - With specific 60 Hz voltage

NFC22E

The NFC 4-pole contactor relays are mainly used for switching auxiliary and control circuits, offering an optimized operating time for AC control applications with electromagnetic control. NFC contactor relays have a block type design and can be easily extended with add-on auxiliary contact blocks and a wide range of additional accessories.

- 690 V IEC or 600 V UL/CSA
- 4 poles: 2 N.O. + 2 N.C., 3 N.O. + 1 N.C, 4 N.O.
- Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- Control circuit: 175…415 V AC 50Hz / 208…480 V AC 60Hz
- Screw terminals
- Common accessory range for the complete AF platform.

Number of contacts	Rated control circuit voltage Uc		Type	Order code	Weight Pkg (1 pce)
	V 50 Hz	V 60Hz			kg
	175	208	NFC22E-34	1SBH131001R3422	0.328
	230 ... 240	277	NFC22E-42	1SBH131001R4222	0.323
	400 ... 415	480	NFC22E-51	1SBH131001R5122	0.321
	175	208	NFC31E-34	1SBH131001R3431	0.328
	230 ... 240	277	NFC31E-42	1SBH131001R4231	0.323
	400 ... 415	480	NFC31E-51	1SBH131001R5131	0.321
	175	208	NFC40E-34	1SBH131001R3440	0.328
	230 ... 240	277	NFC40E-42	1SBH131001R4240	0.323
	400 ... 415	480	NFC40E-51	1SBH131001R5140	0.321



NFC22E, NFC31E, NFC40E

Main dimensions mm, inches

NFC 8-pole contactor relays

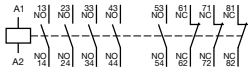
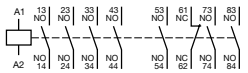
AC operated

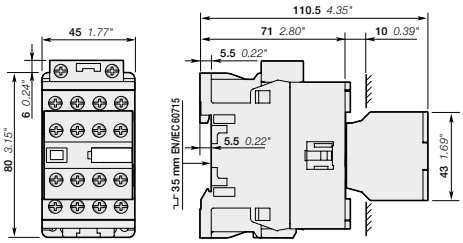
1SBC101029V0014

NFC44E

The NFC 8-pole contactor relays are mainly used for switching auxiliary and control circuits, offering an optimized operating time for AC control applications with electromagnetic control. NFC contactor relays have a block type design and can be easily extended with add-on auxiliary contact blocks and a wide range of additional accessories.

- 690 V IEC or 600 V UL/CSA
- 8 poles: 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.
- Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- Control circuit: 24…415 V AC 50Hz / 24…440 V AC 60Hz
- Screw terminals
- Common accessory range for the complete AF platform.

Number of contacts	Rated control circuit voltage Uc		Type	Order code	Weight Pkg (1 pce)
	V 50 Hz	V 60Hz			kg
8-pole contactor relays					
	24	24	NFC44E-81	1SBH131001R8144	0.381
	110	110 … 120	NFC44E-84	1SBH131001R8444	0.378
	220 … 230	230 … 240	NFC44E-80	1SBH131001R8044	0.372
	230 … 240	240 … 260	NFC44E-88	1SBH131001R8844	0.374
	380 … 400	400 … 415	NFC44E-85	1SBH131001R8544	0.368
	400 … 415	415 … 440	NFC44E-86	1SBH131001R8644	0.371
	24	24	NFC53E-81	1SBH131001R8153	0.381
	110	110 … 120	NFC53E-84	1SBH131001R8453	0.378
	220 … 230	230 … 240	NFC53E-80	1SBH131001R8053	0.372
	230 … 240	240 … 260	NFC53E-88	1SBH131001R8853	0.374
	380 … 400	400 … 415	NFC53E-85	1SBH131001R8553	0.368
	400 … 415	415 … 440	NFC53E-86	1SBH131001R8653	0.371
	24	24	NFC62E-81	1SBH131001R8162	0.381
	110	110 … 120	NFC62E-84	1SBH131001R8462	0.378
	220 … 230	230 … 240	NFC62E-80	1SBH131001R8062	0.372
	230 … 240	240 … 260	NFC62E-88	1SBH131001R8862	0.374
	380 … 400	400 … 415	NFC62E-85	1SBH131001R8562	0.368
	400 … 415	415 … 440	NFC62E-86	1SBH131001R8662	0.371
	24	24	NFC71E-81	1SBH131001R8171	0.381
	110	110 … 120	NFC71E-84	1SBH131001R8471	0.378
	220 … 230	230 … 240	NFC71E-80	1SBH131001R8071	0.372
	230 … 240	240 … 260	NFC71E-88	1SBH131001R8871	0.374
	380 … 400	400 … 415	NFC71E-85	1SBH131001R8571	0.368
	400 … 415	415 … 440	NFC71E-86	1SBH131001R8671	0.371
	24	24	NFC80E-81	1SBH131001R8180	0.381
	110	110 … 120	NFC80E-84	1SBH131001R8480	0.378
	220 … 230	230 … 240	NFC80E-80	1SBH131001R8080	0.372
	230 … 240	240 … 260	NFC80E-88	1SBH131001R8880	0.374
	380 … 400	400 … 415	NFC80E-85	1SBH131001R8580	0.368
	400 … 415	415 … 440	NFC80E-86	1SBH131001R8680	0.371



NFC44E, NFC53E, NFC62, NFC71E, NFC80E

Main dimensions mm, inches

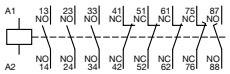
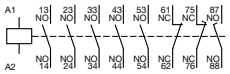
NFC 8-pole contactor relays

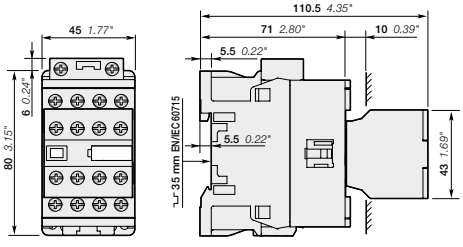
AC operated

NFC33/11

The NFC../11 8-pole contactor relays are mainly used for switching auxiliary and control circuits, offering an optimized operating time for AC control applications with electromagnetic control. NFC contactor relays have a block type design and can be easily extended with add-on auxiliary contact blocks and a wide range of additional accessories.

- 690 V IEC or 600 V UL/CSA
- 8 poles: 3 N.O. + 3 N.C. or 5 N.O. + 1 N.C. with overlapping of 1 N.C. lagging contact and 1 N.O. leading contact
- Control circuit: 24…415 V AC 50Hz / 24…440 V AC 60Hz
- Screw terminals
- Common accessory range for the complete AF platform.

Number of contacts	Rated control circuit voltage Uc		Type	Order code	Weight Pkg (1 pce)
	V 50 Hz	V 60Hz			kg
8-pole contactor relays with overlapping of lagging / leading contacts					
	24	24	NFC33/11-81	1SBH131001R8139	0.381
	110	110 ... 120	NFC33/11-84	1SBH131001R8439	0.378
	220 ... 230	230 ... 240	NFC33/11-80	1SBH131001R8039	0.372
	230 ... 240	240 ... 260	NFC33/11-88	1SBH131001R8839	0.374
	380 ... 400	400 ... 415	NFC33/11-85	1SBH131001R8539	0.368
	400 ... 415	415 ... 440	NFC33/11-86	1SBH131001R8639	0.371
	24	24	NFC51/11-81	1SBH131001R8159	0.381
	110	110 ... 120	NFC51/11-84	1SBH131001R8459	0.378
	220 ... 230	230 ... 240	NFC51/11-80	1SBH131001R8059	0.372
	230 ... 240	240 ... 260	NFC51/11-88	1SBH131001R8859	0.374
	380 ... 400	400 ... 415	NFC51/11-85	1SBH131001R8559	0.368
	400 ... 415	415 ... 440	NFC51/11-86	1SBH131001R8659	0.371



NFC33/11, NFC51/11

Main dimensions mm, inches

20

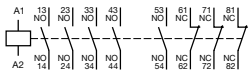
NFC 8-pole contactor relays

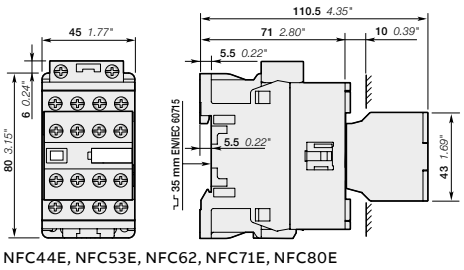
AC operated - With specific 60 Hz voltage

NFC44E

The NFC 8-pole contactor relays are mainly used for switching auxiliary and control circuits, offering an optimized operating time for AC control applications with electromagnetic control. NFC contactor relays have a block type design and can be easily extended with add-on auxiliary contact blocks and a wide range of additional accessories.

- 690 V IEC or 600 V UL/CSA
- 8 poles: 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.
- Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- Control circuit: 175…415 V AC 50Hz / 208…480 V AC 60Hz
- Screw terminals
- Common accessory range for the complete AF platform.

Number of contacts	Rated control circuit voltage Uc		Type	Order code	Weight Pkg (1 pce)
	V 50 Hz	V 60Hz			kg
8-pole contactor relays					
	175	208	NFC44E-34	1SBH131001R3444	0.378
	230 … 240	277	NFC44E-42	1SBH131001R4244	0.372
	400 … 415	480	NFC44E-51	1SBH131001R5144	0.370
	175	208	NFC53E-34	1SBH131001R3453	0.378
	230 … 240	277	NFC53E-42	1SBH131001R4253	0.372
	400 … 415	480	NFC53E-51	1SBH131001R5153	0.370
	175	208	NFC62E-34	1SBH131001R3462	0.378
	230 … 240	277	NFC62E-42	1SBH131001R4262	0.372
	400 … 415	480	NFC62E-51	1SBH131001R5162	0.370
	175	208	NFC71E-34	1SBH131001R3471	0.378
	230 … 240	277	NFC71E-42	1SBH131001R4271	0.372
	400 … 415	480	NFC71E-51	1SBH131001R5171	0.370
	175	208	NFC80E-34	1SBH131001R3480	0.378
	230 … 240	277	NFC80E-42	1SBH131001R4280	0.372
	400 … 415	480	NFC80E-51	1SBH131001R5180	0.370



NFC44E, NFC53E, NFC62, NFC71E, NFC80E

Main dimensions mm, inches

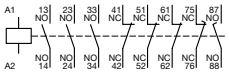
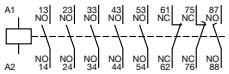
NFC 8-pole contactor relays

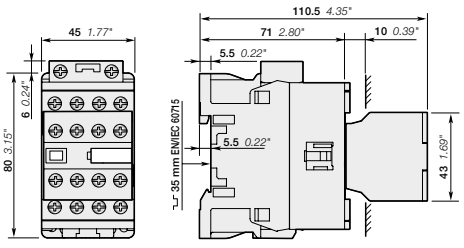
AC operated - With specific 60 Hz voltage

NFC33/11

The NFC../11 8-pole contactor relays are mainly used for switching auxiliary and control circuits, offering an optimized operating time for AC control applications with electromagnetic control. NFC contactor relays have a block type design and can be easily extended with add-on auxiliary contact blocks and a wide range of additional accessories.

- 690 V IEC or 600 V UL/CSA
- 8 poles: 3 N.O. + 3 N.C. or 5 N.O. + 1 N.C. with overlapping of 1 N.C. lagging contact and 1 N.O. leading contact
- Control circuit: 175…415 V AC 50Hz / 208…480 V AC 60Hz
- Screw terminals
- Common accessory range for the complete AF platform.

Number of contacts	Rated control circuit voltage Uc		Type	Order code	Weight Pkg (1 pce)
	V 50 Hz	V 60Hz			kg
8-pole contactor relays with overlapping of lagging / leading contacts					
	175	208	NFC33/11-34	1SBH131001R3439	0.378
	230 ... 240	277	NFC33/11-42	1SBH131001R4239	0.372
	400 ... 415	480	NFC33/11-51	1SBH131001R5139	0.370
	175	208	NFC51/11-34	1SBH131001R3459	0.378
	230 ... 240	277	NFC51/11-42	1SBH131001R4259	0.372
	400 ... 415	480	NFC51/11-51	1SBH131001R5159	0.370

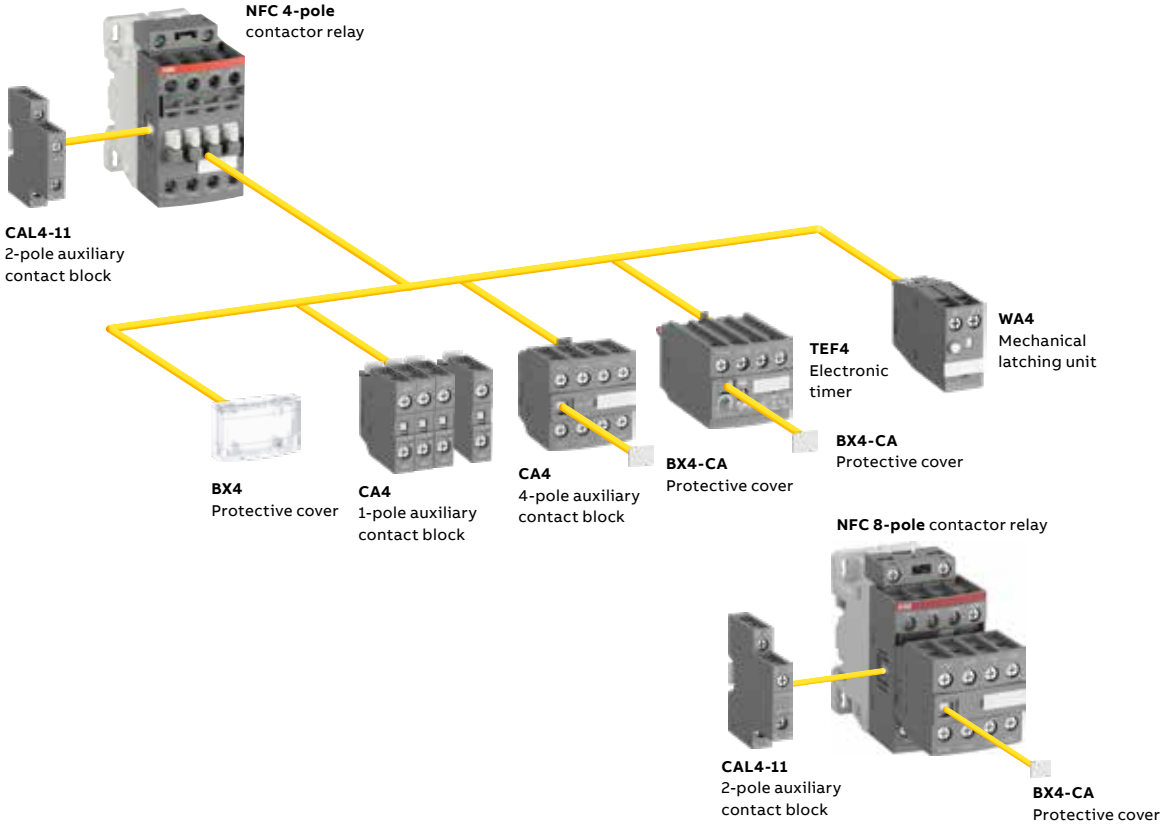


NFC33/11, NFC51/11

Main dimensions mm, inches

NFC Contactor relays

Contactor relays and main accessories



Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories

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

Contactor relay types	Main poles		Front-mounted accessories					Side-mounted accessories	
			Auxiliary contact blocks		Electronic timer	Mechanical latching unit		Auxiliary contact blocks	
								2-pole CAL4-11	
			1-pole CA4	4-pole CA4	TEF4	WA4 (3)		Left side	Right side
NFC									
NFC 4-pole	2 2	E (1)	4 max.	**or** 1	**or** 1	**or** 1	+	1	–
	3 1	E (1)	2 max.	–	**or** 1	**or** 1	+	1	+ 1
	4 0	E (2)							
NFC 8-pole	4 4	E	–	–	–	–	+	1	–
	5 3	E							
	6 2	E							
	7 1	E							
	8 0	E							
	3 3	/ 1 1							
	5 1	/ 1 1							

(1) Including add-on contacts: 3 N.C. auxiliary contacts max. on positions 1, 2, 3, 4 and 2 N.C. max. on positions 1 ±30°, 5.
(2) Including add-on contacts: 4 N.C. auxiliary contacts max. on positions 1, 2, 3, 4 and 3 N.C. max. on positions 1 ±30°, 5.
(3) Accept 1-pole CA4 auxiliary contacts (1 block on each side of the mechanical latch) in respect to the total number of additional N.C. auxiliary contacts.

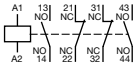
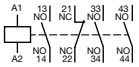
NFC..K 4-pole contactor relays with Push-in Spring terminals

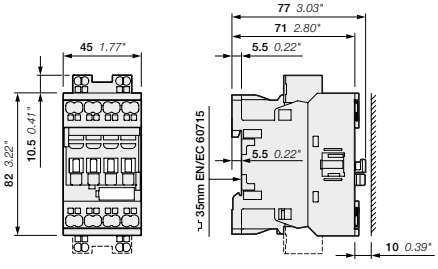
AC operated

NFC22EK

The NFC..K 4-pole contactor relays are mainly used for switching auxiliary and control circuits, offering an optimized operating time for AC control applications with electromagnetic control. NFC..K contactor relays have a block type design and can be easily extended with add-on auxiliary contact blocks and a wide range of additional accessories.

- 690 V IEC or 600 V UL/CSA
- 4 poles : 2 N.O. + 2 N.C., 3 N.O. + 1 N.C., 4 N.O.
- Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- Control circuit: 24…415 V AC 50Hz / 24…440 V AC 60Hz
- Push-in Spring terminals
- Common accessory range for the complete AF platform.

Number of contacts	Rated control circuit voltage Uc		Type	Order code	Weight Pkg (1 pce)
	V 50 Hz	V 60HzC			kg
	24	24	NFC22EK-81	1SBH131005R8122	0.340
	110	110 ... 120	NFC22EK-84	1SBH131005R8422	0.337
	220 ... 230	230 ... 240	NFC22EK-80	1SBH131005R8022	0.331
	230 ... 240	240 ... 260	NFC22EK-88	1SBH131005R8822	0.333
	380 ... 400	400 ... 415	NFC22EK-85	1SBH131005R8522	0.327
	400 ... 415	415 ... 440	NFC22EK-86	1SBH131005R8622	0.330
	24	24	NFC31EK-81	1SBH131005R8131	0.340
	110	110 ... 120	NFC31EK-84	1SBH131005R8431	0.337
	220 ... 230	230 ... 240	NFC31EK-80	1SBH131005R8031	0.331
	230 ... 240	240 ... 260	NFC31EK-88	1SBH131005R8831	0.333
	380 ... 400	400 ... 415	NFC31EK-85	1SBH131005R8531	0.327
	400 ... 415	415 ... 440	NFC31EK-86	1SBH131005R8631	0.330
	24	24	NFC40EK-81	1SBH131005R8140	0.340
	110	110 ... 120	NFC40EK-84	1SBH131005R8440	0.337
	220 ... 230	230 ... 240	NFC40EK-80	1SBH131005R8040	0.331
	230 ... 240	240 ... 260	NFC40EK-88	1SBH131005R8840	0.333
	380 ... 400	400 ... 415	NFC40EK-85	1SBH131005R8540	0.327
	400 ... 415	415 ... 440	NFC40EK-86	1SBH131005R8640	0.330



NFC22EK, NFC31EK, NFC40EK

Main dimensions mm, inches

20

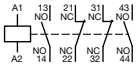
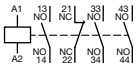
NFC..K 4-pole contactor relays with Push-in Spring terminals

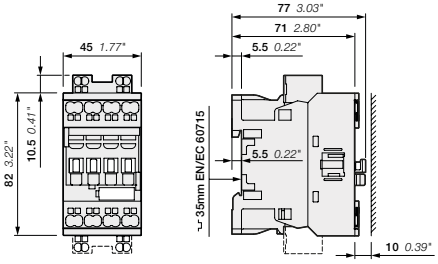
AC operated - With specific 60 Hz voltage

NFC22EK

The NFC..K 4-pole contactor relays are mainly used for switching auxiliary and control circuits, offering an optimized operating time for AC control applications with electromagnetic control. NFC..K contactor relays have a block type design and can be easily extended with add-on auxiliary contact blocks and a wide range of additional accessories.

- 690 V IEC or 600 V UL/CSA
- 4 poles : 2 N.O. + 2 N.C., 3 N.O. + 1 N.C., 4 N.O.
- Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- Control circuit: 175…415 V AC 50Hz / 208…480 V AC 60Hz
- Push-in Spring terminals
- Common accessory range for the complete AF platform.

Number of contacts	Rated control circuit voltage Uc		Type	Order code	Weight Pkg (1 pce)
	V 50 Hz	V 60HzC			kg
	175	208	NFC22EK-34	1SBH131005R3422	0.337
	230 ... 240	277	NFC22EK-42	1SBH131005R4222	0.332
	400 ... 415	480	NFC22EK-51	1SBH131005R5122	0.330
	175	208	NFC31EK-34	1SBH131005R3431	0.337
	230 ... 240	277	NFC31EK-42	1SBH131005R4231	0.332
	400 ... 415	480	NFC31EK-51	1SBH131005R5131	0.330
	175	208	NFC40EK-34	1SBH131005R3440	0.337
	230 ... 240	277	NFC40EK-42	1SBH131005R4240	0.332
	400 ... 415	480	NFC40EK-51	1SBH131005R5140	0.330



NFC22EK, NFC31EK, NFC40EK

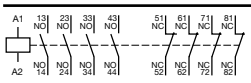
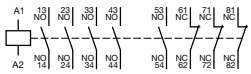
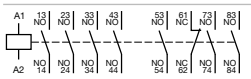
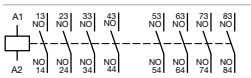
NFC..K 8-pole contactor relays with Push-in Spring terminals

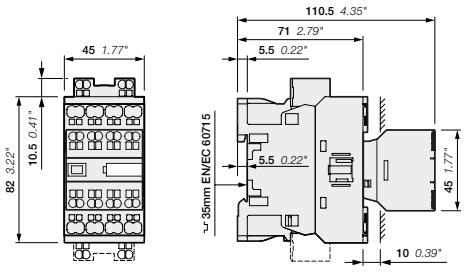
AC operated

NFC44EK

The NFC..K 8-pole contactor relays are mainly used for switching auxiliary and control circuits, offering an optimized operating time for AC control applications with electromagnetic control. NFC..K contactor relays have a block type design and can be easily extended with add-on auxiliary contact blocks and a wide range of additional accessories.

- 690 V IEC or 600 V UL/CSA
- 8 poles : 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.
- Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- Control circuit: 24...240 V AC 50Hz / 24...260 V AC 60Hz
- Push-in Spring terminals
- Common accessory range for the complete AF platform.

Number of contacts	Rated control circuit voltage Uc		Type	Order code	Weight Pkg (1 pce)
	V 50 Hz	V 60 Hz			kg
8-pole contactor relays					
	24	24	NFC44EK-81	1SBH131005R8144	0.391
	110	110 ... 120	NFC44EK-84	1SBH131005R8444	0.388
	220 ... 230	230 ... 240	NFC44EK-80	1SBH131005R8044	0.382
	230 ... 240	240 ... 260	NFC44EK-88	1SBH131005R8844	0.384
	380 ... 400	400 ... 415	NFC44EK-85	1SBH131005R8544	0.378
	400 ... 415	415 ... 440	NFC44EK-86	1SBH131005R8644	0.381
	24	24	NFC53EK-81	1SBH131005R8153	0.391
	110	110 ... 120	NFC53EK-84	1SBH131005R8453	0.388
	220 ... 230	230 ... 240	NFC53EK-80	1SBH131005R8053	0.382
	230 ... 240	240 ... 260	NFC53EK-88	1SBH131005R8853	0.384
	380 ... 400	400 ... 415	NFC53EK-85	1SBH131005R8553	0.378
	400 ... 415	415 ... 440	NFC53EK-86	1SBH131005R8653	0.381
	24	24	NFC62EK-81	1SBH131005R8162	0.391
	110	110 ... 120	NFC62EK-84	1SBH131005R8462	0.388
	220 ... 230	230 ... 240	NFC62EK-80	1SBH131005R8062	0.382
	230 ... 240	240 ... 260	NFC62EK-88	1SBH131005R8862	0.384
	380 ... 400	400 ... 415	NFC62EK-85	1SBH131005R8562	0.378
	400 ... 415	415 ... 440	NFC62EK-86	1SBH131005R8662	0.381
	24	24	NFC71EK-81	1SBH131005R8171	0.391
	110	110 ... 120	NFC71EK-84	1SBH131005R8471	0.388
	220 ... 230	230 ... 240	NFC71EK-80	1SBH131005R8071	0.382
	230 ... 240	240 ... 260	NFC71EK-88	1SBH131005R8871	0.384
	380 ... 400	400 ... 415	NFC71EK-85	1SBH131005R8571	0.378
	400 ... 415	415 ... 440	NFC71EK-86	1SBH131005R8671	0.381
	24	24	NFC80EK-81	1SBH131005R8180	0.391
	110	110 ... 120	NFC80EK-84	1SBH131005R8480	0.388
	220 ... 230	230 ... 240	NFC80EK-80	1SBH131005R8080	0.382
	230 ... 240	240 ... 260	NFC80EK-88	1SBH131005R8880	0.384
	380 ... 400	400 ... 415	NFC80EK-85	1SBH131005R8580	0.378
	400 ... 415	415 ... 440	NFC80EK-86	1SBH131005R8680	0.381



NFC44EK, NFC53EK, NFC62K, NFC71EK, NFC80EK

Main dimensions mm, inches

20

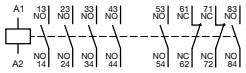
NFC..K 8-pole contactor relays with Push-in Spring terminals

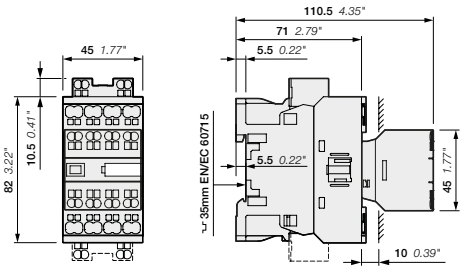
AC operated - With specific 60 Hz voltage

NFC44EK

The NFC..K 8-pole contactor relays are mainly used for switching auxiliary and control circuits, offering an optimized operating time for AC control applications with electromagnetic control. NFC..K contactor relays have a block type design and can be easily extended with add-on auxiliary contact blocks and a wide range of additional accessories.

- 690 V IEC or 600 V UL/CSA
- 8 poles : 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.
- Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- Control circuit: 175…415 V AC 50Hz / 208…480 V AC 60Hz
- Push-in Spring terminals
- Common accessory range for the complete AF platform.

Number of contacts	Rated control circuit voltage Uc		Type	Order code	Weight Pkg (1 pce)
	V 50 Hz	V 60 Hz			kg
8-pole contactor relays					
	175	208	NFC44EK-34	1SBH131005R3444	0.388
	230 ... 240	277	NFC44EK-42	1SBH131005R4244	0.383
	400 ... 415	480	NFC44EK-51	1SBH131005R5144	0.381
	175	208	NFC53EK-34	1SBH131005R3453	0.388
	230 ... 240	277	NFC53EK-42	1SBH131005R4253	0.383
	400 ... 415	480	NFC53EK-51	1SBH131005R5153	0.381
	175	208	NFC62EK-34	1SBH131005R3462	0.388
	230 ... 240	277	NFC62EK-42	1SBH131005R4262	0.383
	400 ... 415	480	NFC62EK-51	1SBH131005R5162	0.381
	175	208	NFC71EK-34	1SBH131005R3471	0.388
	230 ... 240	277	NFC71EK-42	1SBH131005R4271	0.383
	400 ... 415	480	NFC71EK-51	1SBH131005R5171	0.381
	175	208	NFC80EK-34	1SBH131005R3480	0.388
	230 ... 240	277	NFC80EK-42	1SBH131005R4280	0.383
	400 ... 415	480	NFC80EK-51	1SBH131005R5180	0.381

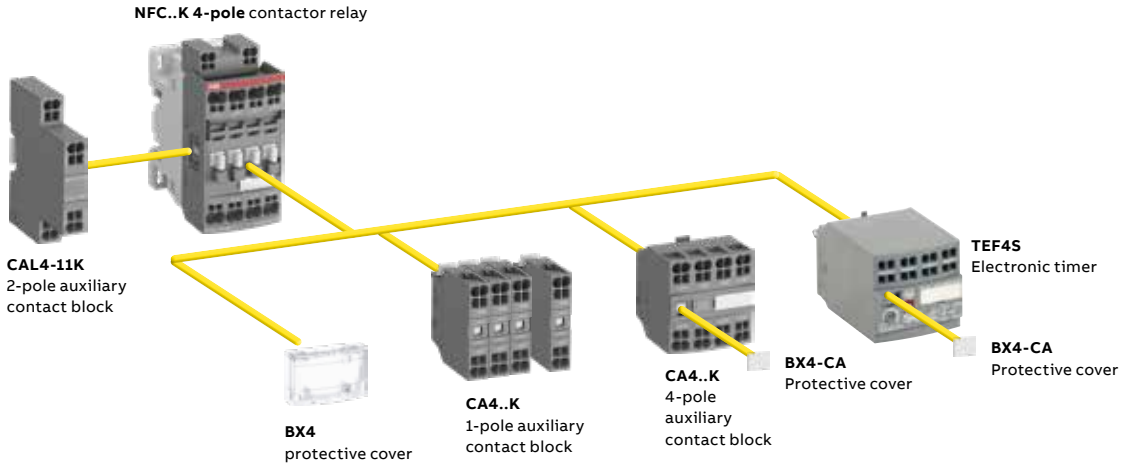


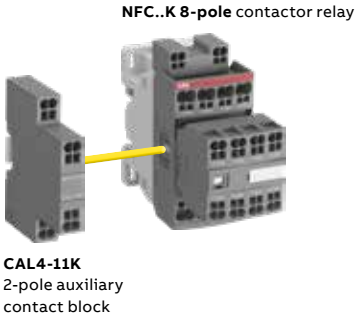
NFC44EK, NFC53EK, NFC62K, NFC71EK, NFC80EK

Main dimensions mm, inches

NFC..K contactor relays with Push-in Spring terminals

Contactor relays and main accessories





Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories
Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

Contactor relay types	Main poles		Front-mounted accessories					Side-mounted accessories	
			Auxiliary contact blocks		Electronic timer			Auxiliary contact blocks 2-pole CAL4-11K	
			1-pole CA4..K	4-pole CA4..K	TEF4S			Left side	Right side
NFC..K									
NFC..K 4-pole	2 2	EK (1)	4 max.	or 1	or 1		+	1	-
	3 1	EK (1)	2 max.	-	or 1		+	1	+ 1
	4 0	EK (2)							
NFC..K 8-pole	4 4	EK	-	-	-	-	+	1	-
	5 3	EK							
	6 2	EK							
	7 1	EK							
	8 0	EK							

(1) Including add-on contacts: 3 N.C. max. on positions 1, 2, 3, 4 and 2 N.C. max. on positions 1 ±30°, 5
(2) Including add-on contacts: 4 N.C. max. on positions 1, 2, 3, 4 and 3 N.C. max. on positions 1 ±30°, 5

NFC(..K) contactor relays
Technical data

Contact utilization characteristics according to IEC

Contactor relay types	AC operated	**NFC(..K)**
Standards		IEC 60947-1 / 60947-5-1 and EN 60947-1 / 60947-5-1
Rated operational voltage Ue max.		690 V AC
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
Conditional short-circuit current		1 kA
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

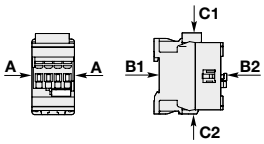
Contactor relay types	AC operated	**NFC(..K)**
Standards		UL 60947-1, UL 60947-5-1, CSA C22.2 N° 60947-1-13, CSA C22.2 N° 60947-5-1-14
Max. operational voltage		600 V AC
Pilot duty		A600, Q600
AC thermal rated current		10 A
AC maximum volt-ampere making		7200 VA
AC maximum volt-ampere breaking		720 VA
DC thermal rated current		2.5 A
DC maximum volt-ampere making-breaking		69 VA

NFC(..K) contactor relays
Technical data

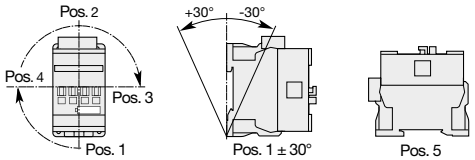
Magnet System Characteristics - NFC(..K) contactor relays AC operated

Contactor relay types	AC operated	**NFC(..K)**
Coil operating limits	AC supply	At θ ≤ 60 °C 0.85 ... 1.1 x Uc
acc. to IEC 60947-5-1		At θ ≤ 70 °C 1 x Uc
AC control voltage		
Rated control circuit voltage Uc	50 HZ	24...415 V
	60 HZ	24...480 V
Coil consumption	Average pull-in value at 50 Hz	70 VA
	at 60 Hz	66 VA
	Average holding value	8 VA / 2.3 W
Drop-out voltage	50 Hz	40...65 % of Uc min.
	60 Hz	40...70 % of Uc min.
Operating times (-40°C ... +60°C)		
Between coil energization and:	N.O. contact closing	10...26 ms
	N.C. contact opening	7...21 ms
Between coil de-energization and:	N.O. contact opening	4...18 ms
	N.C. contact closing	9...20 ms

General technical data

Contactor relay types	AC operated	**NFC(..K)**
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
Pollution degree		3
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
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

Mounting characteristics

Contactor relay types	AC operated	**NFC(..K)**
Mounting positions		
		Max. add-on N.C. auxiliary contacts: see accessory fitting details for a NFC 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

NFC(..K) contactor relays
Technical data

Connecting characteristics

Contactor relay types	AC operated	**NFC**
Main terminals		 Screw terminals with cable clamp
Connection capacity (min. ... max.)		
Pole and coil terminals		
Rigid Solid/Stranded	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

Contactor relay types	AC operated	**NFC..K**
Main terminals		 Push-in Spring terminals
Connection capacity (min. ... max.) Pole and coil terminals		
Rigid	1 x	1 ... 2.5 mm²
	2 x	1 ... 2.5 mm²
Flexible with non insulated ferrule	1 x	1 (push-in) / 0.5 (spring) ... 2.5 mm²
	2 x	1 (push-in) / 0.5 (spring) ... 2.5 mm²
Flexible with insulated ferrule	1 x	1 (push-in) / 0.5 (spring) ... 1.5 mm²
	2 x	1 (push-in) / 0.5 (spring) ... 1.5 mm²
Flexible without ferrule	1 x	(spring) 0.5 ... 2.5 mm²
	2 x	(spring) 0.5 ... 2.5 mm²
Connection capacity acc. to UL/CSA	1 or 2 x	AWG 18 ... 14
Stripping length		10 mm
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		IP20
Screwdriver type	All terminals	Flat Ø 3 mm x 0.5 mm

Accessories for AFC 3-pole and 4-pole contactors and NFC contactor relays

For direct product details information, use product type or order code, ex:

- www.abb.com/productdetails/**CA4-10**
- or www.abb.com/productdetails/**1SBN010110R1010**

Auxiliary contact blocks for AFC09 ... AFC96 contactors and NFC contactor relays


1SBC100001V0014

CA4-10


1SBC100007V0014

CAL4-11


1SBC100006V0014

CA4-22E


1SBC100002V0014

CAT4-11E

The auxiliary contact blocks are used for the operation of auxiliary circuits and control circuits for standard industrial environments.

Types of auxiliary contact blocks for front mounting:

- CA4 1 or 4-pole block, with instantaneous N.O., N.C. contacts
- CC4 1-pole block, with N.O. leading contact or N.C. lagging contact
- CAT4 2-pole block, with instantaneous N.O. + N.C. contacts and A1 / A2 coil terminal connection on front face.

Select the 4-pole auxiliary contact blocks CA4-..E, CA4-..M, CA4-..U or CA4-..N type, according to the contactor or contactor relay type for compliance with the standard requirements (see "Terminal marking and positioning").

Types of auxiliary contact blocks for side mounting:

- CAL4 2-pole block, with instantaneous N.O. + N.C. contacts.

For clipping onto the right- and/or left-hand side of the contactors.

The auxiliary contact blocks are equipped with screw type connecting terminals delivered open, protected against accidental direct contact and bear the corresponding function marking.

For contactors	Auxiliary contacts		Type	Order code	Pkg qty	Weight (1 pce) kg
Front-mounted instantaneous auxiliary contact blocks						
AFC09 ... AFC96	1 0	– –	CA4-10	1SBN010110R1010	1	0.014
4-pole NFC	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
AFC09 ... AFC16-30-10	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
AFC26 ... AFC38-30 (1)	2 2	– –	CA4-22E	1SBN010140R1022	1	0.055
AFC09 ... AFC38-40 (1)	3 1	– –	CA4-31E	1SBN010140R1031	1	0.055
AFC09 ... AFC38-22 (1)	4 0	– –	CA4-40E	1SBN010140R1040	1	0.055
	0 4	– –	CA4-04E	1SBN010140R1004	1	0.055
AFC16-04	3 1	– –	CA4-31E	1SBN010140R1031	1	0.055
AFC09 ... AFC16-30-01	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 NFC	2 2	– –	CA4-22N	1SBN010140R1222	1	0.055
	3 1	– –	CA4-31N	1SBN010140R1231	1	0.055
	4 0	– –	CA4-40N	1SBN010140R1240	1	0.055
	1 3	– –	CA4-13N	1SBN010140R1213	1	0.055
NFC..40E	0 4	– –	CA4-04N	1SBN010140R1204	1	0.055

(1) WARNING : 4-pole CA4 are forbidden for use with AFC40 ...AFC96.

Front-mounted auxiliary contact blocks with N.O. leading contact and N.C. lagging contact

AFC09 ... AFC96	– –	1 0	CC4-10	1SBN010111R1010	1	0.014
4-pole NFC	– –	0 1	CC4-01	1SBN010111R1001	1	0.014

Note: - 1 max CC4-10 and 1 max CC4-01. AFC16-04: 2 max CC4-10. No CC4-01 use.
CC4-01 use: on each "Accessory fitting details" table, the allowed number of N.C. add-on and built-in contacts including CC4-01, is decreased by one.

Side-mounted instantaneous auxiliary contact blocks

AFC09 ... AFC96	1 1	– –	CAL4-11	1SBN010120R1011	1	0.040
NFC	1 1	– –	CAL4-11-T	1SBN010120T1011	10	0.040

Front-mounted instantaneous auxiliary contact and A1/A2 coil terminal blocks

AFC09 ... AFC16-30-10	1 1	– –	CAT4-11M	1SBN010151R1111	1	0.040
AFC26 ... AFC65-30-00 AFC09 ... AFC38-40-00 AFC09 ... AFC40-22-00 AFC16-04-00	1 1	– –	CAT4-11E	1SBN010151R1011	1	0.040
AFC09 ... AFC16-30-01	1 1	– –	CAT4-11U	1SBN010151R1311	1	0.040

For each contactor or contactor relay type, refer to "Accessory fitting details" table.

Auxiliary contact blocks for AFC09 ... AFC96 contactors and NFC contactor relays
Technical data

Contact utilization characteristics according to IEC

Types			**1-pole CA4, 1-pole CC4, 4-pole CA4, 2-pole CAT4, 2-pole CAL4**
Standards			IEC 60947-5-1 and EN 60947-5-1
Rated insulation voltage Ui acc. to IEC 60947-5-1			690 V
Rated impulse withstand voltage Uimp.			6 kV
Pollution degree			3
Rated operational voltage Ue max.			24...690 V
Conventional thermal current Ith - $\theta \leq 40$ °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
Conditional short-circuit current			1 kA
Rated short-time withstand current Icw		for 1.0 s	100 A
θ = 40 °C		for 0.1 s	140 A
Minimum switching capacity			12 V / 3 mA
with failure rate acc. to IEC 60947-5-4			10^{-7}
Power dissipation per pole at 6 A			0.1 W
Mechanical durability	Number of operating cycles		10 millions operating cycles
	Max. switching frequency		3600 cycles/h
Max. electrical switching frequency		AC-15	1200 cycles/h
		DC-13	900 cycles/h
Mechanically linked contacts acc. to annex L of IEC 60947-5-1			Additional N.O. or N.C. auxiliary contacts (CA4, CAL4, CAT4) are mechanically linked contacts
Mirror contacts acc. to annex F of IEC 60947-4-1			Additional N.C. auxiliary contacts (CA4, CAL4, CAT4) are mirror contacts

Contact utilization characteristics according to UL / CSA

Types	**1-pole CA4, 1-pole CC4, 4-pole CA4, 2-pole CAT4, 2-pole CAL4**
Standards	UL 60947-5-1, CSA C22.2 N° 60947-5-1-14
Max. operational voltage	600 V AC, 600 V DC
Pilot duty	A600, Q600
AC thermal rated current	10 A
AC maximum volt-ampere making	7200 VA
AC maximum volt-ampere breaking	720 VA
DC thermal rated current	2.5 A
DC maximum volt-ampere making-breaking	69 VA

Connecting characteristics

Types		**1-pole CA4, 1-pole CC4, 4-pole CA4, 2-pole CAT4, 2-pole CAL4**
Connection capacity (min. ... max.)		
Rigid Solid/Stranded	1 x	1...2.5 mm²
	2 x	1...2.5 mm²
Flexible with non insulated ferrule	1 x	0.75...2.5 mm²
	2 x	0.75...2.5 mm²
Flexible with insulated ferrule	1 x	0.75...2.5 mm²
	2 x	0.75...1.5 mm²
Lugs	L <	8 mm
Connection capacity acc. to UL/CSA	1 or 2 x	AWG 18...14
Stripping length		10 mm
Tightening torque		1.2 Nm / 11 lb.in
Degree of protection		
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		IP20
Screw terminals		Delivered in open position, screws of unused terminals must be tightened
All terminals		M3.5
Screwdriver type		Flat Ø 5.5 / Pozidriv 2

Auxiliary contact blocks for AFC09 ... AFC96 contactors and NFC contactor relays with Push-in Spring terminals


1SBC100080V0014

CA4-10K


1SBC100081V0014

CA4-22EK


1SBC100082V0014

CAL4-11K

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..K 1 or 4-pole block, with instantaneous N.O., N.C. contacts

Select the 4-pole auxiliary contact blocks CA4-..EK, CA4-..MK or CA4-..NK 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..K 2-pole block, with instantaneous N.O. + N.C. contacts.

For clipping onto the right- and/or left-hand side of the contactors.

The auxiliary contact blocks are equipped with push-in spring terminals protected against accidental direct contact and bear the corresponding function marking.

For contactors	Auxiliary contacts	Type	Order code	Pkg qty	Weight (1 pce) kg
Front-mounted instantaneous auxiliary contact blocks					
AFC09 ... AFC96 4-pole NFC	1 0	CA4-10K	1SBN010160R1010	1	0.012
	1 0	CA4-10K-T	1SBN010160T1010	10	0.012
	0 1	CA4-01K	1SBN010160R1001	1	0.012
	0 1	CA4-01K-T	1SBN010160T1001	10	0.012
AFC09 ... AFC16-30-10	2 2	CA4-22MK	1SBN010146R1122	1	0.050
	3 1	CA4-31MK	1SBN010146R1131	1	0.050
	1 3	CA4-13MK	1SBN010146R1113	1	0.050
	0 4	CA4-04MK	1SBN010146R1104	1	0.050
AFC26 ... AFC38-30 (1) AFC09 ... AFC38-40 (1) AFC09 ... AFC38-22 (1)	2 2	CA4-22EK	1SBN010146R1022	1	0.050
	3 1	CA4-31EK	1SBN010146R1031	1	0.050
	4 0	CA4-40EK	1SBN010146R1040	1	0.050
AFC16-04	3 1	CA4-31EK	1SBN010146R1031	1	0.050
4-pole NFC	1 3	CA4-13NK	1SBN010146R1213	1	0.050
	2 2	CA4-22NK	1SBN010146R1222	1	0.050
	3 1	CA4-31NK	1SBN010146R1231	1	0.050
	4 0	CA4-40NK	1SBN010146R1240	1	0.050
NFC40E	0 4	CA4-04NK	1SBN010146R1204	1	0.050

(1) 4-pole CA4 are forbidden for use with AFC40 ...AFC96.

Side-mounted instantaneous auxiliary contact blocks

3-pole					
AFC09 ... AFC96 NFC	1 1	CAL4-11K	1SBN010134R1011	1	0.030

Note: for each contactor or contactor relay type, refer to "Accessory fitting details" table.

Auxiliary contact blocks for AFC09 ... AFC96 contactors and NFC contactor relays with Push-in Spring terminals

Technical data

Contact utilization characteristics according to IEC

Contactor relay types			**1-pole CA4..K, 4-pole CA4..K, 2-pole CAL4..K**
Standards			IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1
Rated insulation voltage Ui acc. to IEC 60947-5-1			690 V
Rated impulse withstand voltage Uimp.			6 kV
Pollution degree			3
Rated operational voltage Ue max.			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
Conditional short-circuit current			1 kA
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 million 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) are mechanically linked contacts.
Mirror contacts acc. to annex F of IEC 60947-4-1			Additional N.C. auxiliary contacts (CA4, CAL4) are mirror contacts.

Contact utilization characteristics according to UL / CSA

Standards	UL 60947-5-1, CSA C22 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	1 (push-in) / 0.5 (spring) ... 2.5 mm²
		2 x	1 (push-in) / 0.5 (spring) ... 2.5 mm²
	Flexible with insulated ferrule	1 x	1 (push-in) / 0.5 (spring) ... 1.5 mm²
		2 x	1 (push-in) / 0.5 (spring) ... 1.5 mm²
	Flexible without ferrule	1 x	(spring) 0.5 ... 2.5 mm²
		2 x	(spring) 0.5 ... 2.5 mm²
Connection capacity acc. to UL/CSA		1 or 2 x	AWG 18 ... 14
Stripping length			10 mm
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			IP20
Screwdriver type			Flat Ø 3 mm x 0.5 mm

Auxiliary contact blocks for severe industrial environments

For AFC09 ... AFC96 contactors and NFC contactor relays

CE5-10W

The auxiliary contact blocks are used for the operation of auxiliary circuits and control circuits for severe industrial environments.

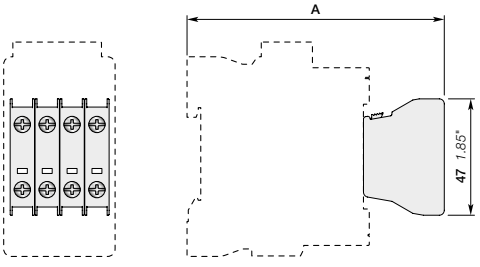
Types of auxiliary contact blocks for front mounting:

- CE5 1-pole block, instantaneous with N.O. contact or N.C. contact, available in 2 IP degrees
  - CE5 D with built-in microswitch IP40, degree of protection (IP20 on terminals)
  - CE5 W with built-in microswitch IP67, degree of protection (IP20 on terminals).

The auxiliary contact blocks are equipped with screw type connecting terminals delivered open, protected against accidental direct contact and bear the corresponding function marking.

For contactor and contactor relays (1)	Auxiliary contacts		Type	Order code	Pkg qty	Weight (1 pce) kg
AFC09 ... AFC96 (2) NFC	1 0	– –	CE5-10D0.1	1SBN010015R1010	1	0.020
	0 1	– –	CE5-01D0.1	1SBN010015R1001	1	0.020
	1 0	– –	CE5-10D2	1SBN010017R1010	1	0.020
	0 1	– –	CE5-01D2	1SBN010017R1001	1	0.020
	1 0	– –	CE5-10W0.1	1SBN010016R1010	1	0.020
	0 1	– –	CE5-01W0.1	1SBN010016R1001	1	0.020
	1 0	– –	CE5-10W2	1SBN010018R1010	1	0.020
	0 1	– –	CE5-01W2	1SBN010018R1001	1	0.020

(1) For each device type, refer to "Accessory fitting details" table.
(2) AFC16-04: CE5 use not allowed.



1-pole CE5 on	A
AFC09 ... AFC16-30-xx 1 stack AFC09, AFC16-40/22-00 NFC..E 1-stack	103.5 mm / 4.07"
AFC26 ... AFC38-30-00	112.5 mm / 4.43"
AFC26, AFC38-40/22-00	127.5 mm / 5.02"
AFC40 ... AFC65-30-00	137 mm / 5.39"
AFC40 ... AFC65-40/22-00	140 mm / 5.51"
AFC80 ... AFC96-30-00	142 mm / 5.59"
AFC80-40/22-00	142 mm / 5.59"

Main dimensions mm, inches

Auxiliary contact blocks for severe industrial environments

Technical data

Types		Front mounted 1-pole CE5-..0.1	1-pole CE5-..2
Contact utilization characteristics according to IEC			
Standards		IEC 60947-5-1 and EN 60947-5-1	
Rated insulation voltage Ui acc. to IEC 60947-5-1		250 V	
Pollution degree		3	
Rated operational voltage Ue max.		125 V	250 V
Conventional thermal current Ith - θ ≤ 40 °C		0.1 A	2 A
Rated frequency (without derating)		50 / 60 Hz	
Ie / Rated operational current		AC-14	AC-15
acc. to IEC 60947-5-1	24-127 V 50/60 Hz	0.1 A	2 A
	220-240 V 50/60 Hz	–	2 A
Making capacity		6 x Ie AC-14 acc. to IEC 60947-5-1	10 x Ie AC-15 acc. to IEC 60947-5-1
Breaking capacity		6 x Ie AC-14 acc. to IEC 60947-5-1	10 x Ie AC-15 acc. to IEC 60947-5-1
Ie / Rated operational current DC-12			
acc. to IEC 60947-5-1	24 V DC	0.1 A	2 A
	48 V DC	0.1 A	1 A
	72 V DC	0.1 A	0.3 A
	110 V DC	0.1 A	0.2 A
	125 V DC	–	0.2 A
	220 V DC	–	0.1 A
Short-circuit protection device FF type fuse (1)		0.1 A	10 A
Conditional short-circuit current		1 kA	1 kA
Minimum switching capacity			
AFC09 ... AFC38 contactors		3 V / 1 mA	17 V / 1 mA
with failure rate acc. to IEC 60947-5-4		–	≤ 10^{-7}
Mechanical durability			
Number of operating cycles		5 millions for CE5-..D0.1	5 millions for CE5-..D2
		2.5 millions for CE5-..W0.1	2.5 millions for CE5-..W2
Max. switching frequency		3600 cycles/h	
Electrical durability			
Number of operating cycles		2.5 millions for CE5-..D0.1	1 million for CE5-..D2
		0.7 millions for CE5-..W0.1	0.3 millions for CE5-..W2
Max. electrical switching frequency			
	AC-14	1200 cycles/h	
	AC-15	1200 cycles/h	
	DC-12	900 cycles/h	
Contact utilization characteristics according to UL / CSA			
Standards		UL 508, CSA C22.2 N°14	
Max. operational voltage		125 V AC / 110 V DC	250 V AC / 220 V DC
Pilot duty			
AC thermal rated current		0.1 A	2 A
Connecting characteristics			
Connection capacity (min. ... max.)			
Rigid solid	1 x	1...4 mm²	
	2 x	1...4 mm²	
Flexible with ferrule	1 x	0.75...2.5 mm²	
	2 x	0.75...2.5 mm²	
Lugs	L ≤	7.7 mm	
	l >	3.7 mm	
Connecting capacity acc. to UL / CSA	1 or 2 x	AWG 18...14	
Stripping length		10 mm	
Tightening torque		1 Nm	
Degree of protection	Terminals	IP20	
acc. to IEC 60947-1 / EN 60947-1 and	Microswitches	IP40 for CE5-..D0.1	IP40 for CE5-..D2
IEC 60529 / EN 60529		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	

Auxiliary contact blocks for severe industrial environments

For AFC09 ... AFC96 3-pole contactors and AFC09 ... AFC80 4-pole contactors

For AFC contactors

Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories

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

Contactor types	Main poles	Built-in auxiliary contacts	Front-mounted accessories: Auxiliary contact blocks		Electrical and mechanical interlock set		Side-mounted accessories: Auxiliary contact blocks	
					(Between 2 contactors)		Left side	Right side
			1-pole CE5	1-pole CA4	VEM4		2-pole CAL4-11	
3-pole contactors AFC09 ... AFC96								
On positions 1, 2, 3, 4 ; Max. N.C. built-in and add-on N.C. auxiliary contacts (CA4, CAL4, VEM4): 2 max. with 1 CE5, none with 2 CE5								
AFC09 ... AFC16	3	0 1	1	+ 3 max.	–	+	1	–
AFC09 ... AFC16	3	1 0	2	+ 2 max.	–		–	–
AFC26 ... AFC38	3	0 0	1	+ 3 max.	–	+	1	–
			1	+ 1 max.	–	+	1	+ 1
			1	+ 2 max.	+ 1	+	1	–
On positions 1 ±30°, 5 ; Max. N.C. built-in or add-on N.C. auxiliary contacts (CA4, CAL4, VEM4): 1 max. with 1 CE5								
AFC09 ... AFC16	3	0 1	1	+ 3 max.	–		–	–
AFC09 ... AFC16	3	1 0	1	+ 3 max.	–	+	1	–
AFC26 ... AFC38	3	0 0	1	+ 2 max.	+ 1		–	–
On positions 1, 1 ±30°, 2, 3, 4, 5 ; Max. add-on N.C. auxiliary contacts (CA4, CAL4): 4 max. with 1 CE5, 2 max. with 2 CE5								
AFC40 ... AFC96	3	0 0	2	+ 2 max.	–	+	1	+ 1
			1	+ 3 max.	–	+	1	+ 1
4-pole contactors AFC09 ... AFC80								
On positions 1, 2, 3, 4 ; Max. add-on N.C. auxiliary contacts (CA4, CAL4, VEM4): 2 max. with 1 CE5, none with 2 CE5								
AFC09, AFC16	4	0 0	2	+ 2 max.	–		–	–
			1	+ 3 max.	–	+	1	–
			1	+ 1 max.	–	+	1	+ 1
			1	+ 2 max.	+ 1	+	1	–
On positions 1, 2, 3, 4 ; Max. add-on N.C. auxiliary contacts (CA4, CAL4, VEM4): 1 max. with 1 CE5								
AFC26, AFC38	4	0 0	1	+ 3 max.	–	+	1	–
			1	+ 2 max.	+ 1		–	–
AFC09 ... AFC38	2	2 0 0	1	+ 3 max.	–	+	1	–
On positions 1 ±30°, 5 ; Max. add-on N.C. auxiliary contacts (CA4, CAL4, VEM4): 1 max. with 1 CE5								
AFC09, AFC16	4	0 0	1	+ 3 max.	–	+	1	–
			1	+ 2 max.	+ 1		–	–
On positions 1 ±30°, 5 ; No add-on N.C. auxiliary contacts								
AFC26, AFC38	4	0 0	1	+ 3 max.	–		–	–
AFC09 ... AFC38	2	2 0 0						
On positions 1, 1 ±30°, 2, 3, 4, 5 ; Max. add-on N.C. auxiliary contacts (CA4, CAL4): 4 max. with 1 CE5, 2 max. with 2 CE5								
AFC40 ... AFC80	4	0 0	2	+ 2 max.	–	+	1	+ 1
			1	+ 3 max.	–	+	1	+ 1
On positions 1, 1 ±30°, 2, 3, 4, 5 ; No add-on N.C. auxiliary contacts								
AFC40, AFC80	2	2 0 0	1	+ 3 max.	–		–	–

Auxiliary contact blocks for severe industrial environments

For NFC contactor relays

Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories

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

Contactor relay types	Main poles 		**Front-mounted accessories** Auxiliary contact blocks 1-pole CE5	1-pole CA4			**Side-mounted accessories** Auxiliary contact blocks Left side 2-pole CAL4-11	Right side
On positions 1, 2, 3, 4 ; Max. add-on N.C. auxiliary contacts (CA4, CAL4): 1 max. with 1 CE5								
NFC	2 2 3 1	E E	1	+ 3 max.	–	+	1	–
On positions 1, 2, 3, 4 ; Max. add-on N.C. auxiliary contacts (CA4, CAL4): 2 max. with 1 CE5, none with 2 CE5								
NFC	4 0	E	2	+ 2 max.	–		–	–
			1	+ 3 max.	–	+	1	–
			1	+ 1 max.	–	+	1	+ 1
On positions 1 ±30°, 5 ; Max. add-on N.C. auxiliary contacts (CA4): none with 1 CE5								
NFC	2 2 3 1	E E	1	+ 3 max.	–		–	–
On positions 1 ±30°, 5 ; Max. add-on N.C. auxiliary contacts (CA4, CAL4): 1 max. with 1 CE5								
NFC	4 0	E	1	+ 3 max.	–	+	1	–

Electronic timers

TEF4-ON

TEF4-OFF

TEF4S-ON

TEF4S-OFF

TEF4 frontal electronic timers are used for realizing timing function and are available in ON-delay and OFF-delay versions.

Compact solution in cabinet compared to separate timers

TEF4 electronic timers are front-mounted and locked on AFC contactors or NFC contactor relays. A mechanical indicator allows to show the state of the contactor.

Safe and cost-reduced wiring

TEF4 electronic timers are supplied by a direct plug-in parallel connection to the coil terminals A1 - A2 of the contactor or contactor relay. A varistor is integrated on the timer to offer a built-in protection against surges in the contactor coil.

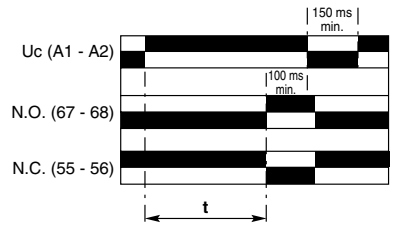
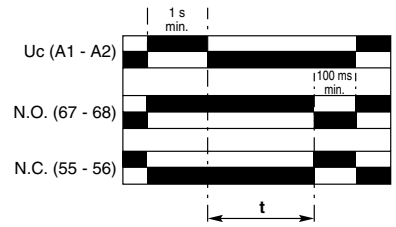
Available for a wide control voltage range 24...240 V AC/DC

TEF4-ON or TEF4-OFF allow time-delayed functions up to 100 s in 3 distinct time ranges, independently of the control system. The time delay ranges are selected by a switch and the time delay can be adjusted by means of a rotary switch. The timing function is activated by closing or opening the device on which the timer is mounted. The OFF-delay version operates without additional control supply.

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
With screw terminals								
AFC09 ... AFC96 NFC	0.1...1 s 1...10 s 10...100 s	ON-delay OFF-delay	24...240 24...240	1 1 1 1	TEF4-ON TEF4-OFF	1SBN020112R1000 1SBN020114R1000		0.065 0.065
With spring terminals								
AFC09 ... AFC96 NFC	0.1...1 s 1...10 s 10...100 s	ON-delay OFF-delay	24...240 24...240	1 1 1 1	TEF4S-ON TEF4S-OFF	1SBN020113R1000 1SBN020115R1000		0.065 0.065

Electronic timers
Technical data

Contact utilization characteristics according to IEC

Types			TEF4-ON	TEF4-OFF
Standards			IEC 60947-5-1 and EN 60947-5-1	
Rated insulation voltage Ui acc. to IEC 60947-5-1			400 V	
Rated impulse withstand voltage Uimp			4 kV	
Rated operational voltage Ue max.			240V AC / 24 V DC	
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			10 A	
Conditional short-circuit current			1 kA	
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	

Interlocks

VM4

Mechanical interlock units

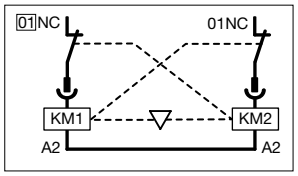
The VM mechanical interlock units are designed for the interlocking of two AFC contactors. When mounted between two contactors, the VM mechanical interlock unit prevents one of the contactors from closing as long as the other contactor is closed.
The mechanical interlock units VM4 and VM96-4 include 2 fixing clips (BB4).

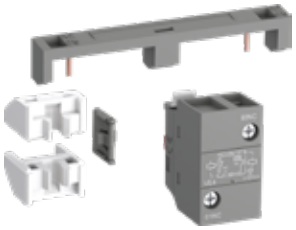
For contactors	Mounting	Type	Order code	Pkg qty	Weight (1 pce) kg
Mechanical interlock units for two contactors mounted side by side					
AFC09 ... AFC38..-30-.. AFC09 ... AFC38..-40-00		VM4	1SBN030105T1000	10	0.005
AFC40 ... AFC96-30-..		VM96-4	1SBN033405T1000	10	0.006

Note: Accessories limitation with VM96. Only use VM96-4 revision B and later.
(1) For contactors AFC80, AFC96 mounted side by side, ambient temperature must remain <60°C
(2) For VM4 use with AFC16-04-00, please see your ABB sales representative.

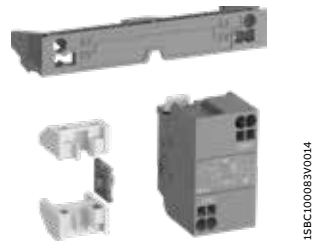
Mechanical and electrical interlock sets

VEM4 and VEM4K mechanical and electrical interlock sets for the respective interlocking of two AFC and AFC..K contactors.
VEM4(K) set includes a mechanical interlock unit VM4 with 2 fixing clips (BB4) and a VE4(K) 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(K) block must be used with A2-A2 connection to respect the electrical connection diagram.





VEM4



VEM4K

For contactors	Auxiliary contacts 	Type	Order code	Pkg qty	Weight (1 pce) kg
Mechanical and electrical interlock set for AFC with screw terminals					
For same size contactors: AFC09 ... AFC16..-30-.. AFC26 ... AFC38..-30-00 AFC09, AFC16..-40-00 AFC26, AFC38..-40-00	0 2	VEM4	1SBN030111R1000	1	0.035
Mechanical and electrical interlock set for AFC...K with Push-in Spring terminals					
AFC09..K ... AFC16..K AFC26..K ... AFC38..K	02	VEM4K	1SBN030113R1000	1	0.030

Fixing clips

BB4

AFC09 ... AFC65	BB4	1SBN110120W1000	50	0.002

Note: For VM4 use with AFC16-04-00, please see your ABB sales representative.

Interlocks
Technical data

Mechanical interlock units

Types		**VM4, VM96**
Mechanical durability	Number of operating cycles	5 millions operating cycles
	Max. mechanical switching frequency	1800 cycles/h

Mechanical and electrical interlock sets

Contact utilization characteristics according to IEC

Types		**VEM4, VEM4K**
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
Pollution degree 3		
Rated control circuit voltage Uc		
	AC 50 Hz control voltage	24...240 V AC
	AC 60 Hz control voltage	24...260 V AC
Conventional thermal current Ith - $\theta \leq 40$ °C		16 A
Mechanical durability	Number of operating cycles	5 millions operating cycles
	Max. mechanical switching frequency	1800 cycles/h
Electrical durability	Max. electrical switching frequency	1200 cycles/h

Contact utilization characteristics according to UL / CSA

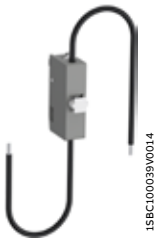
Types	**VEM4**
Standards	UL 60947-1, UL 60947-4-1, CSA C22.2 N° 60947-1, CSA C22.2 N° 60947-4-1
Max. operational voltage	240 V 50 Hz, 260 V 60 Hz

Connecting characteristics

Types		**VEM4**
Connection capacity (min. ... max.)		
Rigid Solid/Stranded	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

Types		**VEM4K**
Connection capacity (min. ... max.)		
Rigid solid	1 x	1 ... 2.5 mm²
	2 x	1 ... 2.5 mm²
Flexible with ferrule	1 x	1 (push-in) / 0.5 (spring) ... 2.5 mm²
	2 x	1 (push-in) / 0.5 (spring) ... 2.5 mm²
Flexible with insulated ferrule	1 x	1 (push-in) / 0.5 (spring) ... 1.5 mm²
	2 x	1 (push-in) / 0.5 (spring) ... 1.5 mm²
Flexible without ferrule	1 x	(spring) 0.5 ... 2.5 mm²
	2 x	(spring) 0.5 ... 2.5 mm²
Connection capacity acc. to UL/CSA	1 or 2 x	AWG 18 ... 14
Stripping length		10 mm
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		IP20
Screwdriver type		Flat Ø 3 mm x 0.5 mm

Impulse contact blocks



CB5

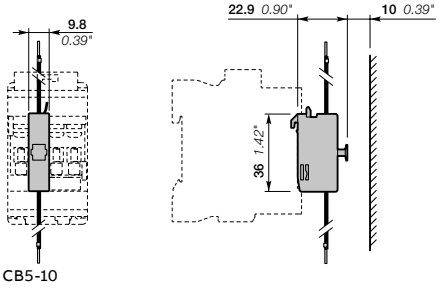
Impulse contact blocks are designed for use in enclosures, in association with an adjustable mechanical pushbutton. Two types are available:

- CB5-10: N.O. contact with a black actuator ("ON" function)
- CB5-01: N.C. contact with a light grey actuator ("OFF" function).

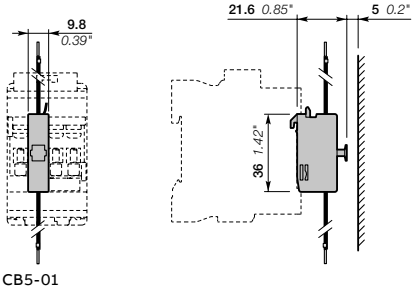
These blocks are equipped with 2 connecting leads 0.5 mm² with end, approximately 18 cm long.

Mounting: Clipped onto the front face of the contactors.

For contactors	Contacts		Type	Order code	Pkg qty	Weight (1 pce)
						kg
AFC09 ... AFC96	1	–	CB5-10	1SBN010013R1010	1	0.012
	–	1	CB5-01	1SBN010013R1001	1	0.012



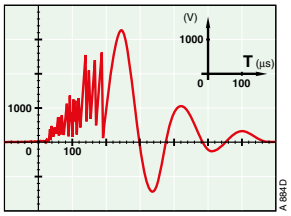
CB5-10



CB5-01

Main dimensions mm, inches

Surge suppressors for contactor coils



The operation of inductive circuits such as contactors coil can cause high over-voltage surges, in particular on opening of the contactor. These over-voltage surges need to be avoided as they can go up to several kilovolts (even for low supply voltage) causing interferences and possible damages to sensitives electronic in the installation.

RV4 and RC4 surge suppressors have been designed to be used with AFC contactors or NFC contactor relays (top or bottom mounted). They are including the coil connection terminals and can be used with all AFC and NFC coils up to 260 V 50/60 Hz :

- RV4: Surge suppressor fitted with varistor circuit
- RC4: Surge suppressor fitted with RC circuit

RV4-1/50

RC4-1/50

For contactors	Rated control circuit voltage Uc V AC	Type	Order code	Pkg qty	Weight (1 pce) kg
AFC09 ... AFC96	24...50	RV4-1/50	1SBN050410R1000	2	0.015
	50...130	RV4-1/130	1SBN050410R1001	2	0.015
	110...260	RV4-1/260	1SBN050410R1002	2	0.015
	250...440	RV4-1/440	1SBN050410R1003	2	0.015
AFC09 ... AFC38	24...50	RC4-1/50	1SBN050400R1000	2	0.015
	50...130	RC4-1/130	1SBN050400R1001	2	0.015
	110...260	RC4-1/260	1SBN050400R1002	2	0.015
	250...440	RC4-1/440	1SBN050400R1003	2	0.015
AFC40 ... AFC96	24...50	RC4-2/50	1SBN050500R1000	2	0.015
	50...130	RC4-2/130	1SBN050500R1001	2	0.015
	110...260	RC4-2/260	1SBN050500R1002	2	0.015
	250...440	RC4-2/440	1SBN050500R1003	2	0.015

Note: The use of a surge suppressor will modify the operating time of the contactor or contactor relay. For more information about product availability or technical data, please consult ABB sales support team.

Surge suppressors for contactor coils

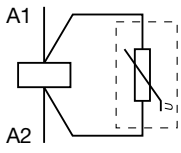
Technical data

Varistor	**RV4-1/50**	**RV4-1/130**	**RV4-1/260**	**RV4-1/440**
Rated control circuit voltage Uc	24...50 V AC	50...130 V AC	110...260 V AC	260 ... 440 V AC
Residual overvoltage (clipping voltage)	132 V AC	270 V AC	480 V AC	900 V AC
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 (1), thus voltage front up to this point.			

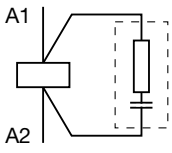
(1) Uvdr = Varistor operating voltage (voltage dependent resistor), tolerance ±10 %.

RC type	**RC4-1/50** **RC4-2/50**	**RC4-1/130** **RC4-2/130**	**RC4-1/260** **RC4-2/260**	**RV4-1/440** **RV4-2/440**
Rated control circuit voltage Uc	24...50 V AC	50...130 V AC	110...260 V AC	260 ... 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.			

Wiring diagrams



Varistor



RC type

Mechanical latching unit

WA4

The WA4 mechanical latching unit for AFC09 ... AFC38 contactors and NFC contactor relays ensures that the contactor or contactor relay remains switched on even if there is a lack or a failure of voltage. Standard contactors can be easily converted into compact latched contactors.

The WA4 block contains a mechanical latching device with electromagnetic impulse unlatching (AC or DC) or manual unlatching.

Operation

After closing, the contactor continues to be held in the closed position by the latching mechanism should the supply voltage fail at the contactor coil terminals.

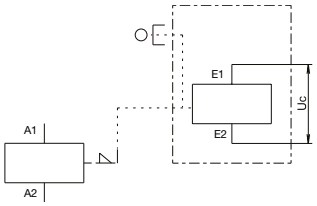
Contactor opening can be controlled:

- electrically by an impulse (AC or DC) on the WA4 block coil (the coil is not designed to be permanently energized)
- manually by pressing the pushbutton on the front face of the WA4 block.

Mounting

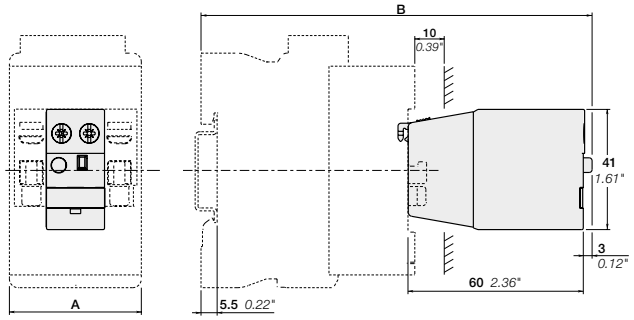
The WA4 block is clipped onto the front face of the 1-stack contactor where it takes up two slots in central position (see fig. below).
The two other slots may accept CA4 single pole auxiliary contacts (1 block on each side of the mechanical latch).

Additional CAL4 can be fitted on the side of the contactor in respect to the total number of built-in or additional N.O. and N.C. auxiliary contacts as described in the accessory fitting details part of each contactor type.



Wiring diagram

For contactors and contactor relays	Rated control circuit voltage Uc		Type	Order code	Pkg qty	Weight (1 pce)
	V AC 50/60 Hz	V DC				kg
AFC09 ... AFC38, 4-pole NFC	24...60	24...60	WA4-11	1SBN040100R1011	1	0.080
	48...130	48...130	WA4-12	1SBN040100R1012	1	0.080
	100...250	100...250	WA4-13	1SBN040100R1013	1	0.080
	250...500	250...500	WA4-14	1SBN040100R1014	1	0.080
Mechanical latching unit for 24 V DC - 500 mA PLC control						
AFC09 ... AFC38, 4-pole NFC	–	24	WA4-10	1SBN040100R1010	1	0.080



WA4 + AFC09 ... AFC38, NFC 4-pole

Main dimensions mm, inches

For contactors and contactor relays	A mm in.	B mm in.
AFC09 ... 16-30-.. AFC09 ... 16-40/22/04-.. NFC 4-pole	45 1.77"	133.5 5.25"
AFC26 ... 38-30-00	45 1.77"	142.5 5.61"
AFC26 ... 38-40/22-00	45 1.77"	157.5 1.77"

Mechanical latching unit
Technical data

Types			**WA4**	**WA4**
Coil voltage code			11, 12, 13, 14	10
Standards			IEC 60947-4-1	
Rated insulation voltage Ui				
acc. to IEC 60947-1			690 V AC	
Coil operating limits		AC supply	At θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max	–
acc. to IEC 60947-4-1		DC supply	At θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max	At θ ≤ 70 °C 0.85 x Uc ... 1.1 x Uc
Control circuit voltage				
AC control voltage 50/60 Hz				
Rated control circuit voltage Uc			24 ... 500 V AC 50/60 Hz	–
Coil consumption		Average pull-in value	15 ... 100 VA	–
DC control voltage 50/60 Hz				
Rated control circuit voltage Uc			24 ... 500 V DC	24 V DC
Coil consumption		Average pull-in value	15 ... 100 W	12 W
Max. electrical impulse time				
On AC control supply (with load factor 1.6%)			4 s	–
On DC control supply (with load factor 1.6%)			4 s	
Min. electrical impulse time				
For latching, energizing of the contactor coil			120 ms	
For unlatching, energizing of the mechanical latching unit coil			50 ms	
Operating time				
On contactor closing (latching) between coil energization and:				
N.O. contact closing			No difference with the operation of a contactor without mechanical latching unit	
N.C. contact opening			No difference with the operation of a contactor without mechanical latching unit	
On contactor opening (unlatching) between mechanical latching unit coil energization and:				
N.O. contact opening			8 ... 15 ms	
N.C. contact closing			10 ... 17 ms	
Ambient air temperature				
Operation			-25 ... +70 °C	
Storage			-60 ... +80 °C	
Climatic withstand			Category B according to IEC 60947-1 Annex Q	
Max. operating altitude			≤ 3000 m	
Mounting positions			Mounting positions 1, 1+/- 30°, 2, 3, 4, 5	
Mechanical durability			AFC09 ... AFC38, NFC: 1 million operating cycles	
Max. switching frequency				
with on-load factor of 1.6%	cycles/h		600	

Connecting characteristics

Connection capacity (min. ... max.)			
	Rigid solid	1 x	1 ... 2.5 mm²
		2 x	1 ... 2.5 mm²
	Flexible with non insulated ferrule	1 x	0.75 ... 2.5 mm²
		2 x	0.75 ... 2.5 mm²
	Flexible with insulated ferrule	1 x	0.75 ... 2.5 mm²
		2 x	0.75 ... 1.5 mm²
	Lugs	L <	8 mm
Connection capacity acc. to UL / CSA		1 or 2 x	AWG 18 ... 14
Stripping length			10 mm
Tightening torque			1.2 Nm / 11 lb.in
Degree of protection			
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			IP20
Screw terminals			Delivered in open position
All terminals			M3.5
Screwdriver type			Flat Ø 5.5 / Pozidriv 2

Other accessories

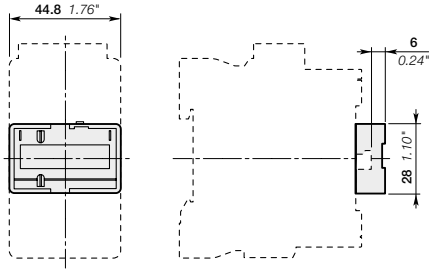
LDC4

LDC4K

BX4

BX4-CA

For contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
Additional coil terminal blocks				
Additional coil terminal blocks for a top and/or bottom access to the coil terminals of contactors or contactor relays.				
With screw terminal				
AFC09 ... AFC96, NFC	LDC4	1SBN070156T1000	10	0.010
With Push-in Spring terminal				
AFC09 ... AFC96, NFC	LDC4K	1SBN070159T1000	10	0.010
Protective covers				
Sealable and transparent protective covers BX4 and non-removable BX4-CA to protect the devices against accidental contact.				
AFC09 ... AFC96 1-stack contactors and NFC contactor relays	BX4	1SBN110108T1000	10	0.006
4-pole CA4, 2-pole CAT4 auxiliary contact blocks and TEF4 electronic timer	BX4-CA	1SBN110109W1000	50	0.001



BX4

Main dimensions mm, inches

Other accessories

BP38-4

BDT4
For AFC09 ... AFC96, NFC

BA4

For contactors		Type	Order code	Pkg qty	Weight (1 pce) kg
Mounting piece for replacing installed contactors fixed by screws by AF contactors.					
From contactor	**To contactor**				
A26 ... A40	AFC09 ... AFC38	BP38-4	1SBN112303T1000	10	0.003
A50 ... A75	AFC40 ... AFC65	BP65-4	1SBN113403T1000	10	0.004
A95, A7110, AF95, AF110	AFC80 ... AFC96	BP96-4	1SBN113903T1000	10	0.005

Test block

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

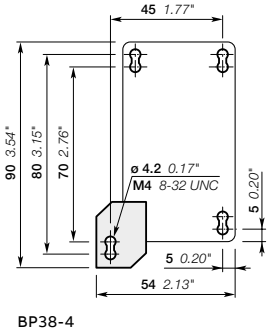
AFC09...AFC65, NFC	BDT4	1SBN110122T1000	10	0.007

Function markers AFC09 ... AFC96

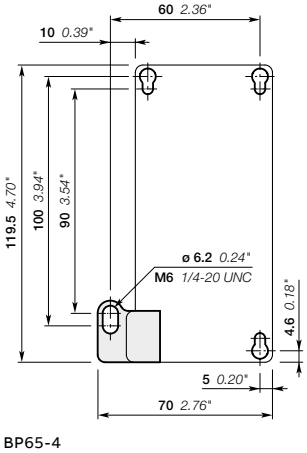
Function markers designed to be clipped onto the front face of the contactor, manual motor starter or overload relays to identify them. Details can be added to these markers using a ball point pen, indelible felt-tip pen or pentel white.
Self-adhesive labels (not supplied) can also be added to them.

- BA4 : box with 16 blank cards (16 markers by card).
  Marker dimensions: 7 x 20 mm (.276" x .787").

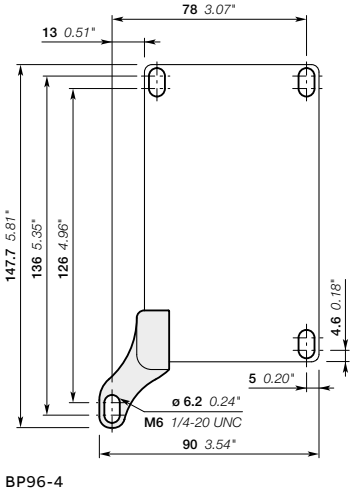
AFC09 ... AFC96 contactors, TF thermal overload relays, EF electronic overload relays and MS116, MS132 manual motor starters	BA4	1SNA235156R2700	16	0.011



BP38-4



BP65-4



BP96-4

Main dimensions mm, inches

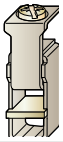
Additional terminal blocks

LD38-4

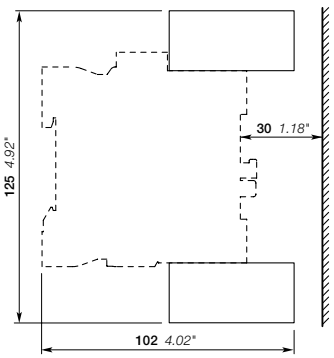
The LD terminal block is designed to increase the connecting capacity of 3-pole AFC26 ... AFC38 contactors on which it is fitted and for preparation of the wiring before final connection to the contactor. LD38-4 blocks are 3-pole terminal blocks with tunnel terminals.

For contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
AFC26 ... AFC38	LD38-4	1SBN072308R1000	2	0.070

Technical data

Types			LD38-4
Rated insulation voltage Ui			
acc. to IEC 60947-4-1			690 V
acc. to UL / CSA			600 V
Pollution degree			3
Main terminals			
			Screw terminals with double connector 2 x (7 width x 5.8/9.2 depth)
Connection capacity (min. ... max.)			
	Rigid	Solid (≤ 4 mm²)	1x 2.5...25 mm²
		Stranded (≥ 6 mm²)	1x 2.5...25 mm² + 1x 2.5...16mm²
	Flexible with non insulated ferrule		1x 2.5...16 mm²
			1x 2.5...16mm² + 1x 2.5...10mm²
	Flexible with insulated ferrule		1x 2.5...16mm²
			1x 2.5...16mm² + 1x 2.5...10mm²
Connection capacity acc. to UL / CSA			1x AWG 8-4
			2x AWG 8-6
Stripping length			14 mm
Tightening torque			2.5 Nm / 22 lb.in
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			IP20
Screw terminals			Delivered in closed position, screws of unused terminals must be tightened
Main terminals			M5
		Screwdriver type	Flat Ø 6.5 / Pozidriv 2

Note: The utilization of LD38-4 additional terminal blocks does not allow the use of BER and BEY connection sets.



Main dimensions mm, inches

Terminals for control lead connections

LK96-4F

Terminal designed to connect the control conductors to the main poles of the AFC40 ... AFC96 contactors and derivative versions.

Accessory clipped into the slots placed above each power terminal connector.

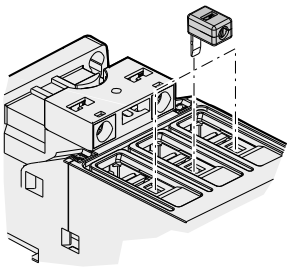
The LK96-4F is fitted with a pin designed to hold them in place until the connector has been fully clamped with its power cable.

For contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
AFC40 ... AFC96	LK96-4F	1SBN073452R2000	2	0.005

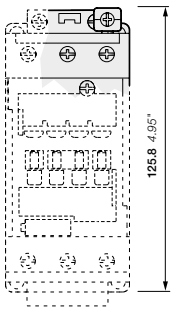
Note : LK96 not compatible with LT Terminal shrouds

Technical data

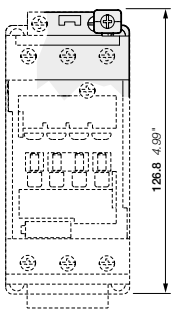
Types		LK96-4F
Connection capacity (min. ... max.)		
Rigid	1 x	1...2.5 mm²
	2 x	1...2.5 mm²
Flexible with non insulated ferrule	1 x	0.75...2.5 mm²
	2 x	0.75...2.5 mm²
Flexible with insulated ferrule	1 x	0.75...2.5 mm²
	2 x	0.75...1.5 mm²
Lugs	L ≤	8 mm
Connection capacity acc. to UL / CSA	1 or 2 x	AWG 18...14
Stripping length		10 mm
Tightening torque		1.2 N.m / 11 lb.in
Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529		IP20
Screw terminals		Delivered in open position, screws of unused terminals should be tightened
All terminals		M3.5
Screwdriver type		Flat Ø 5.5 / Pozidriv 2



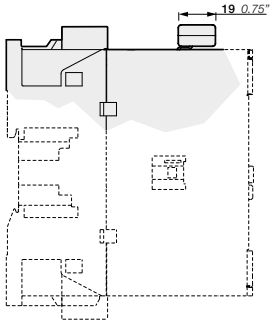
LK positioning



AFC40, AFC52, AFC65 + LK96-4F



AFC80, AFC96 + LK96-4F



Main dimensions mm, inches

Terminal connecting strips and shorting bars


1SBC100024V0014

LY16-4

Parallel and series connection of 3-pole contactors:

- To obtain a star point (3 parallel-connected poles)
- To connect poles in parallel and thus increase the AC load passing through the flow path made up of the parallel-connected poles: LP, LY, LH, LF, LG.
  The relevant cable cross-sectional area may limit the maximum permissible current. Consult information in table below
- To connect poles in series and thus increase the DC voltage controlled by the poles: LP, LY (only LY16-4 and LY38-4 secable strips).


1SBC100035V0014

LH38-4

Types	for connection of "n" poles	with terminal	insulated
LP	n = 2	no	no (1)
LY	n = 2 (secable LY16-4, LY38-4 connecting strips)	no	yes
	n = 3	no	yes (1)
LH	n = 2	yes	no
LF	n = 3	yes	yes
LG	n = 4	yes	yes

(1) LP460 ... LP750, LY185 ... LY750 not insulated. Use terminal shrouds.

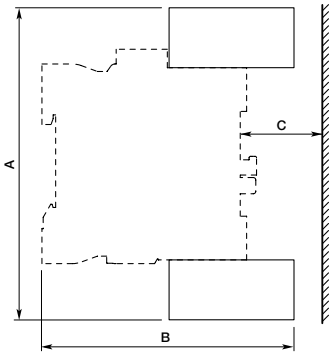

1SBC100037V0014

LF16-4


1SBC100036V0014

LG16-4

For contactors	max. nominal continuous current with "n" poles				Cable cross-sectional area	Type	Order code	Pkg qty	Weight (1 pce)
	in parallel			in series					
	2 poles	3 poles	4 poles	2 poles					
	A				mm²				kg
AFC09	30	33	–	25	6	LY16-4	1SBN071303T1000	10	0.006
AFC12	32	36	–	27					
AFC16	34	40	–	30					
AFC26	50	60	–	45	10	LY38-4	1SBN072303T1000	10	0.012
AFC09	45		–	–	10	LH38-4	1SBN072304R1000	2	0.012
AFC12	50		–	–	10				
AFC16	54		–	–	16				
AFC26	81		–	–	25				
AFC30, AFC38	90		–	–	25				
AFC09		62	–		16	LF16-4	1SBN071305R1000	2	0.020
AFC12		70	–		25				
AFC16		75	–		25				
AFC26		112	–		35	LF38-4	1SBN072305R1000	2	0.040
AFC30, AFC38		125	–		50				
AFC09	–	–	70	–	25	LG16-4	1SBN071306R1000	2	0.025
AFC12	–	–	78	–	25				
AFC16	–	–	84	–	25				



Main dimensions

Type	For contactors	Dimensions					
		A		B		C	
		mm	inch	mm	inch	mm	inch
LH38-4	AFC09 ... AFC16	111.20	4.38"	83	3.27"	22	0.87"
	AFC26 ... AFC38	114	4.49"	86	3.39"	16	0.63"
LF16-4	AFC09 ... AFC16	121	4.76"	87	3.43"	23	0.91"
LF38-4	AFC26 ... AFC38	135.20	5.32"	103	4.06"	31	1.22"
LG16-4	AFC09 ... AFC16	124.20	4.89"	87	3.43"	23	0.91"

Connection accessories for starting solutions

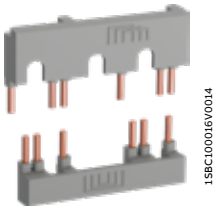
BEA16-4

Connecting links with manual motor starters

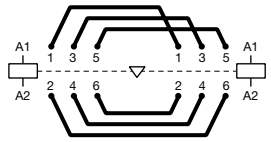
The BEA insulated 3-pole connecting links are used to connect AFC09 ... AFC65 contactors with the MS116 or MS132 or MS165 manual motor starters. The BEA insulated 3-pole connecting links ensure the electrical and mechanical connection between the contactor and the associated manual motor starter.

For 3-pole contactors	Manual motor starter	Type	Order code	Pkg qty	Weight (1 pce) kg
AFC09 ... AFC16	MS116-0.16 ... MS116-25, MS132-0.16... MS132-25	BEA16-4	1SBN081306T1000	10	0.025
AFC26 ... AFC38	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
AFC40 ... AFC65	MS165-16 ... MS165-65	BEA65-4	1SBN083406R1000	1	0.090
	MS165-16 ... MS165-65 (1)	BPR65-4 (2)	1SBN113405R1000	1	0.014

(1) Applicable for MS165 manufactured after week 31, 2016 (date code > 16214).
(2) Use one BPR65-4 for each contactor AFC40 ... AFC65.



BER16-4



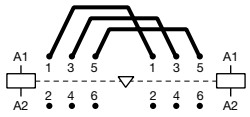
BER
Reversing connections

Connection sets for reversing contactors

The BER connection sets are used to connect the main poles of two 3-pole contactors mounted side by side. The BER connection sets are made up of 1 upstream and 1 downstream connections. BER connection sets are insulated and made of solid copper bars.

For 3-pole contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
AFC09 ... AFC16	BER16-4	1SBN081311R1000	1	0.045
AFC26 ... AFC38	BER38-4	1SBN082311R1000	1	0.100
AFC40 ... AFC65	BER65-4	1SBN083411R1000	1	0.175
AFC80, AFC96	BER96-4	1SBN083911R1000	1	0.250

BEP16-30



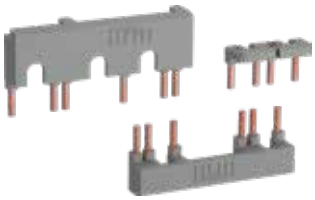
BEP
3-pole phase to phase connections

Phase to phase connections

The BEP connection sets are used to connect phase to phase between the main poles of two contactors mounted side by side. The BEP connection sets contain 1 busbar used for upstream or downstream connection. BEP connection sets are insulated and made of solid copper bars.

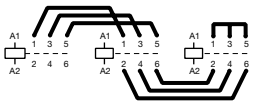
For contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
3-pole contactors				
AFC09 ... AFC16	BEP16-30	1SBN081314R1000	1	0.025
AFC26 ... AFC38	BEP38-30	1SBN082314R1000	1	0.050

Connection accessories for starting solutions



1SBC100018V0014

BEY16-4



AFC09 ... AFC96
Line-delta-star connection

Connection sets for star-delta starter

The BEY connection sets are used to connect the main poles of the Line, Delta and Star contactors of a star-delta starter.

The connection sets are made up of:

- Line contactor / delta contactor upstream phase to phase connection
- Delta contactor / star contactor: downstream connection in parallel
- Star contactor: star point upstream
- Insulated, solid copper bar.

For 3-pole line, delta & star contactors	Interlock unit between delta & star contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
AFC09 ... AFC16	With or without VM4 or VEM4	BEY16-4	1SBN081313R2000	1	0.050
AFC26 ... AFC38	With or without VM4 or VEM4	BEY38-4	1SBN082713R2000	1	0.110
AFC40 ... AFC65	With or without VM96-4	BEY65-4	1SBN083416R2000	1	0.200
AFC80, AFC96	With or without VM96-4	BEY96-4	1SBN083913R2000	1	0.250

Connection accessories for starting solutions with Push-in Spring terminals

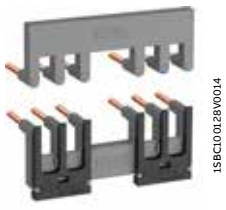
BEA16-4KF

Connecting links with manual motor starters

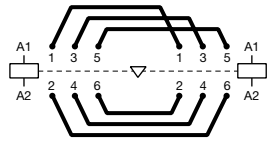
The BEA..-4KF insulated 3-pole connecting links are used to connect AFC09..K ... AFC38..K contactors with the MS132-K manual motor starters. The BEA..-4KF insulated 3-pole connecting links ensure the electrical and mechanical connection between the contactor and the associated manual motor starter. Black fork pieces help for a quick dismounting of the DOL starter.

For 3-pole contactors	Manual motor starter	Type	Order code	Pkg qty	Weight (1 pce) kg
AFC09..K ... AFC16..K	MS132-0.16 â€¦ MS132-25	BEA16-4KF	1SBN081325T1000	10	0.052
AFC26..K ... AFC38..K	MS132-0.16 ... MS132-32	BEA38-4KF	1SBN082325T2000	10	0.057

(1) Applicable for MS165 manufactured after week 31, 2016 (date code > 16214).
(2) Use one BPR65-4 for each contactor AFC40 ... AFC65.



BER16-4KF

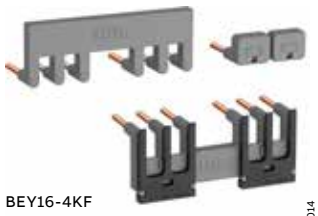


BER
Reversing connections

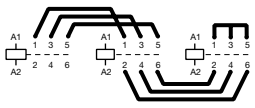
Connection sets for reversing contactors

The BER..-4KF connection sets are used to connect the main poles of two 3-pole AFC09..K ... AFC38..K contactors mounted side by side.
The connection sets are made up of:
- 1 upstream and 1 downstream connections
- Insulated, solid copper bars
- Black fork pieces for a quick dismounting of reversing contactors.

For 3-pole contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
AFC09..K ... AFC16..K	BEA16-4KF	1SBN081322R1000	1	0.050
AFC26..K ... AFC38..K	BEA38-4KF	1SBN082322R1000	1	0.080



BEY16-4KF

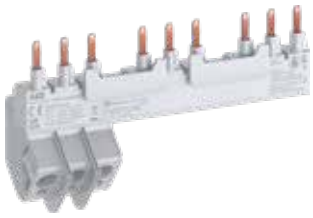


BEY
Line-delta-star connection

Connection sets for star-delta starter

The BEY..-4KF connection sets are used to connect the main poles of the Line, Delta and Star AFC09..K ... AFC38..K 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
- Insulated, solid copper bar
- Black fork pieces for a quick dismounting of reversing contactors.

For 3-pole contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
AFC09..K ... AFC16..K	BEA16-4KF	1SBN081323R2000	1	0.055
AFC26..K ... AFC38..K	BEA38-4KF	1SBN082323R2000	1	0.090



PS 1-3-1-65K busbar
with Push-in Spring terminals

Busbars with Push-in Spring terminals

Suitable for	Rated operational current A	No. of manual motor starters	Number of lateral auxiliary contacts	Type	Order code	Pkg qty	Weight (1 pce) kg
MS132K, MS132-KT	65	2	0	PS1-2-0-65K	1SAM301903R1002	1	0,091
	65	3	0	PS1-3-0-65K	1SAM301903R1003	1	0,116
	65	4	0	PS1-4-0-65K	1SAM301903R1004	1	0,140
	65	5	0	PS1-5-0-65K	1SAM301903R1005	1	0,165
	65	2	1	PS1-2-1-65K	1SAM301903R1012	1	0,094
	65	3	1	PS1-3-1-65K	1SAM301903R1013	1	0,123

Contactors and contactor relays Terminal marking and positioning, Dimensions

For direct product details information, use product type or order code, ex:

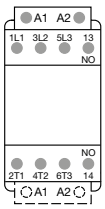
- www.abb.com/productdetails/**AFC09-30-10-81**
- or www.abb.com/productdetails/**1SBL131001R8110**

AFC09 ... AFC96 3-pole contactors

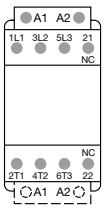
Terminal marking and positioning

AFC09 ... AFC96 contactors

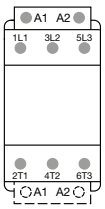
Standard devices without addition of auxiliary contacts



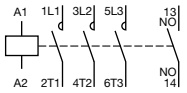
AFC09 ... AFC16-30-10 (1)



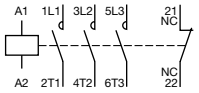
AFC09 ... AFC16-30-01 (1)



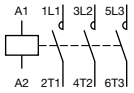
AFC26 ... AFC96-30-00 (1)



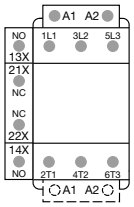
AFC09 ... AFC16-30-10 (1)



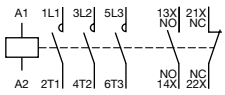
AFC09 ... AFC16-30-01 (1)



AFC26 ... AFC96-30-00 (1)

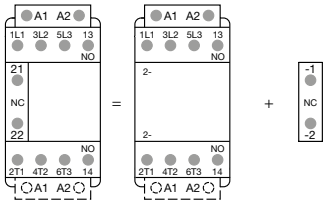


AFC40 ... AFC96-30-11

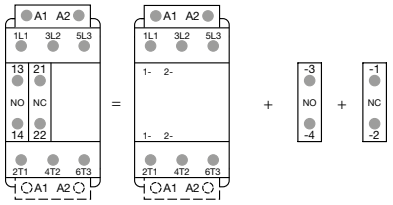


AFC40 ... AFC96-30-11

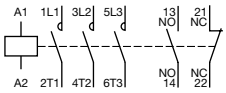
Other possible contact combinations with auxiliary contacts added by the user



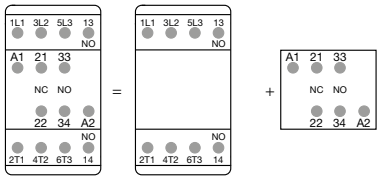
Combination 11 = AFC09 ... AFC16-30-10 + CA4-01 (1)



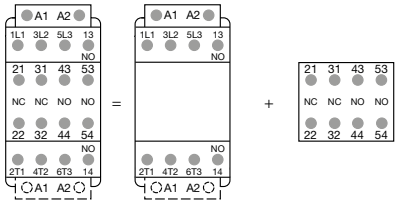
Combination 11 = AFC26 ... AFC96-30-00 + CA4-10 + CA4-01 (1)



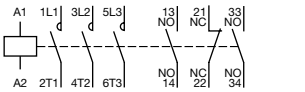
Combination 11



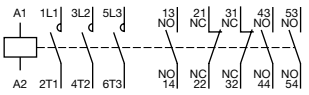
Combination 21 = AFC09 ... AFC16-30-10 + CAT4-11M



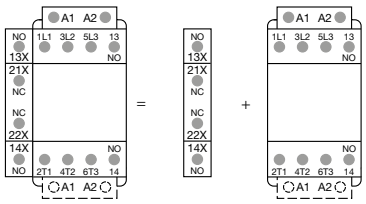
Combination 32 = AFC09 ... AFC16-30-10 + CA4-22M (1)



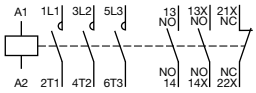
Combination 21



Combination 32



Combination 21 = CAL4-11 + AFC09 ... AFC16-30-10 (1)



Combination 21

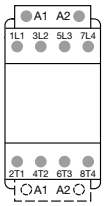
(1) For AFC09..K ... AFC38..K contactors with Push-in Spring terminals, terminal marking and positioning are the same.

AFC09 ... AFC80 4-pole contactors

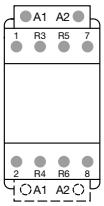
Terminal marking and positioning

AFC09 ... AFC80 contactors - AC operated

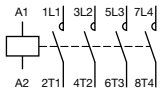
Standard devices without addition of auxiliary contacts



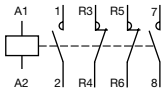
AFC09 ... AFC80-40-00



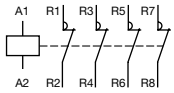
AFC09 ... AFC80-22-00



AFC09 ... AFC80-40-00

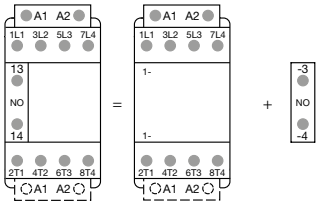


AFC09 ... AFC80-22-00

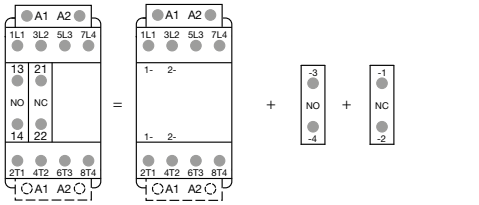


AFC16-04-00

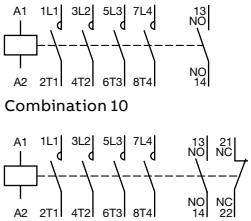
Other possible contact combinations with auxiliary contacts added by the user



Combination 10 = AFC09 ... AFC80-40-00 + CA4-10

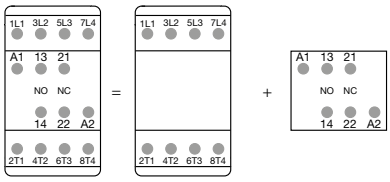


Combination 11 = AFC09 ... AFC80-40-00 + CA4-10 + CA4-01

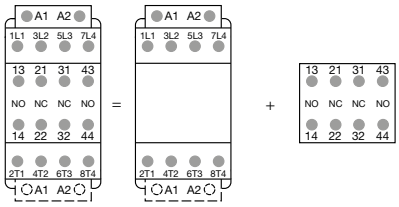


Combination 10

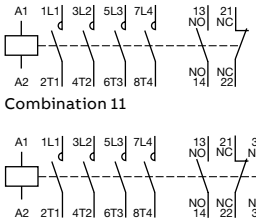
Combination 11



Combination 11 = AFC09 ... AFC80-40-00 + CAT4-11E

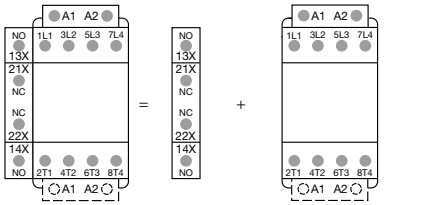


Combination 22 = AFC09 ... AFC80-40-00 + CA4-22E

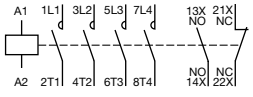


Combination 11

Combination 22



Combination 11 = CAL4-11 + AFC09 ... AFC80-40-00



Combination 11

Add-on auxiliary contacts for AFC09 ... AFC96 contactors

Terminal marking and positioning

1-pole auxiliary contacts

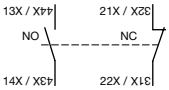
CA4-01 (1)

CA4-10 (1)

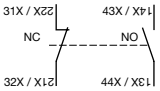
CC4-01

CC4-10

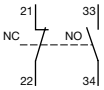
2-pole auxiliary contacts



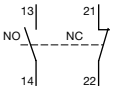
CAL4-11 (1)
(Left-side mounted)



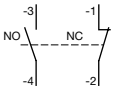
CAL4-11 (1)
(Right-side mounted)



CAT4-11M

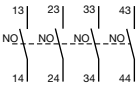


CAT4-11E

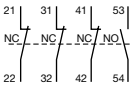


CAT4-11U

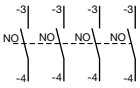
4-pole auxiliary contacts



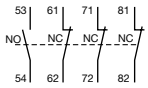
CA4-40E (1)



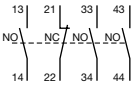
CA4-13M (1)



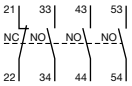
CA4-40U



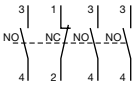
CA4-13N (1)



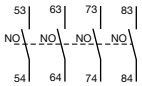
CA4-31E (1)



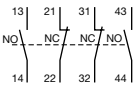
CA4-31M (1)



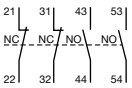
CA4-31U



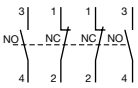
CA4-40N (1)



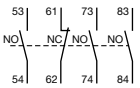
CA4-22E (1)



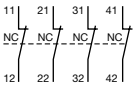
CA4-22M (1)



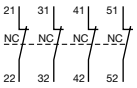
CA4-22U



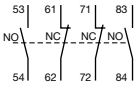
CA4-31N (1)



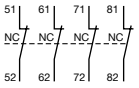
CA4-04E



CA4-04M (1)



CA4-22N (1)



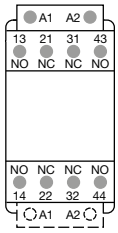
CA4-04N (1)

(1) available with Push-in Spring terminals

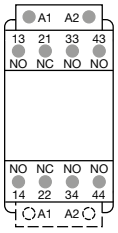
NFC contactor relays

Terminal marking and positioning

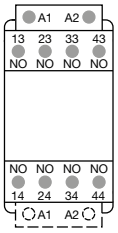
Standard devices without addition of auxiliary contacts



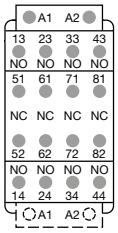
NFC22E



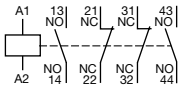
NFC31E



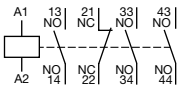
NFC40E



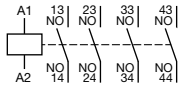
NFC44E



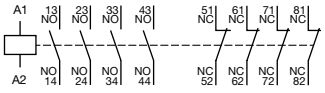
NFC22E



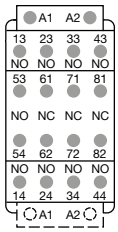
NFC31E



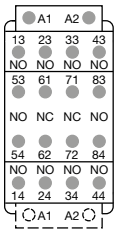
NFC40E



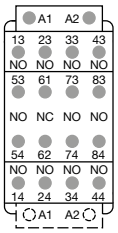
NFC44E



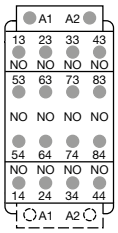
NFC53E



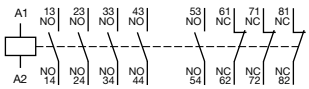
NFC62E



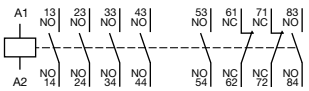
NFC71E



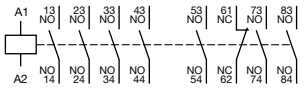
NFC80E



NFC53E

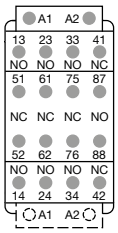


NFC62E

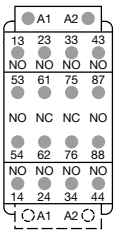


NFC71E

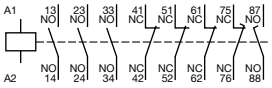
NFC80E



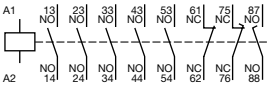
NFC..33/11



NFC..51/11

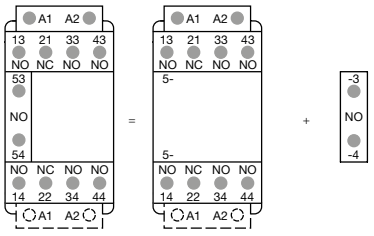


NF..33/11

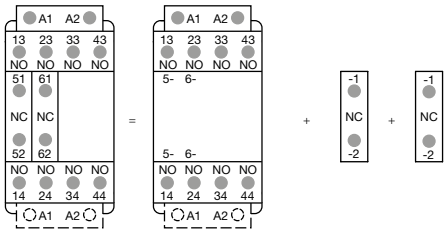


NF..51/11

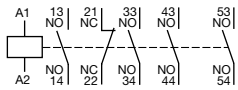
Other possible contact combinations with auxiliary contacts added by the user



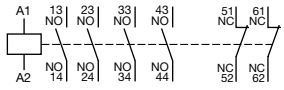
Combination 41 = NFC31E + CA4-10



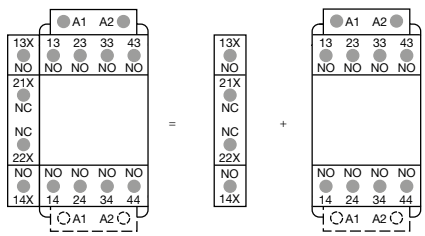
Combination 42 = NFC40E + CA4-01+CA4-01



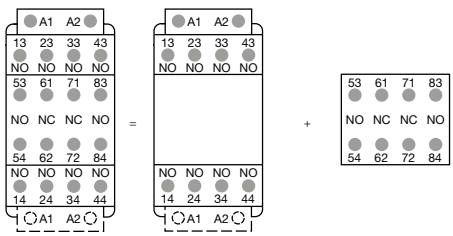
Combination 41 E



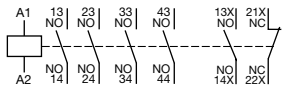
Combination 42 E



Combination 51 = CAL4-11 + NFC40E



Combination 62 = NFC40E + CA4-22N



Combination 51 E

Combination 62 E

NFC add-on auxiliary contacts

Terminal marking and positioning

1-pole auxiliary contacts

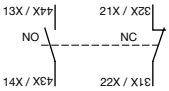
CA4-01 (1)

CA4-10 (1)

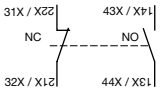
CC4-01

CC4-10

2-pole auxiliary contacts

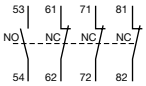


CAL4-11 (1)
(Left side-mounted)

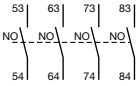


CAL4-11 (1)
(Right side-mounted)

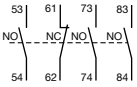
4-pole auxiliary contacts



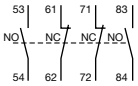
CA4-13N (1)



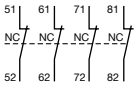
CA4-40N (1)



CA4-31N (1)



CA4-22N (1)

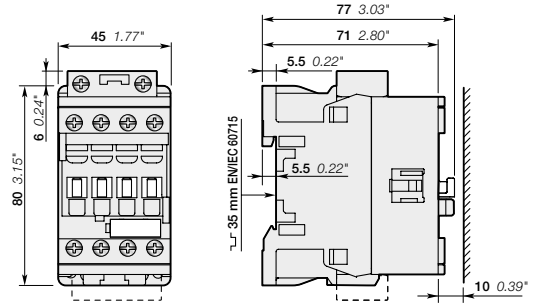


CA4-04N (1)

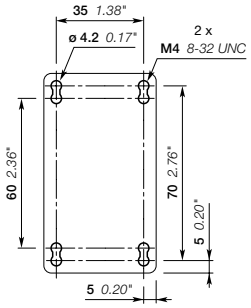
(1) Available with Push-in Spring terminals.

AFC09, AFC12, AFC16 3-pole contactors

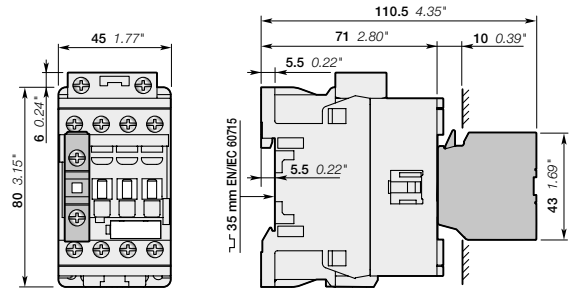
Dimensions



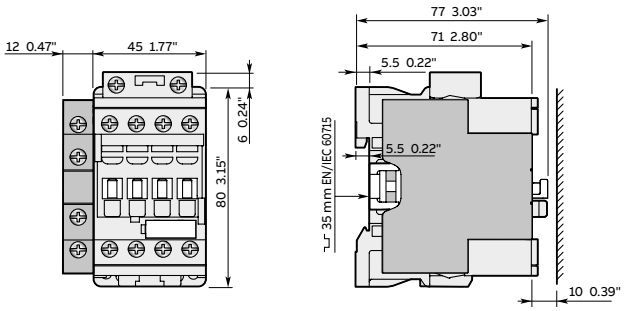
AFC09, AFC12, AFC16



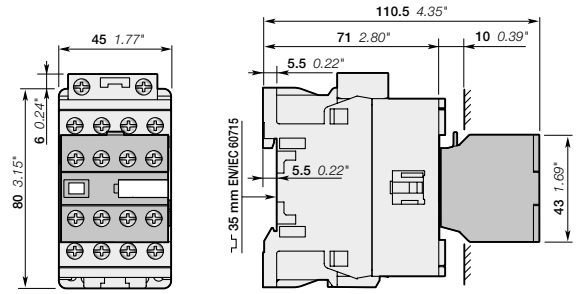
AFC09, AFC12, AFC16



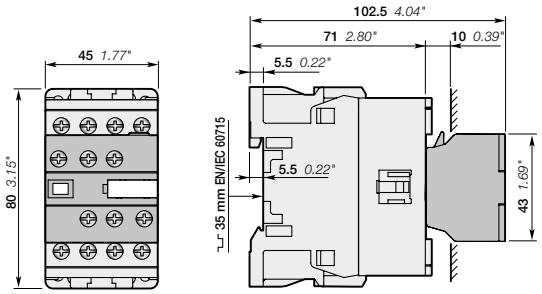
AFC09, AFC12, AFC16
+ CA4, CC4 1-pole auxiliary contact block



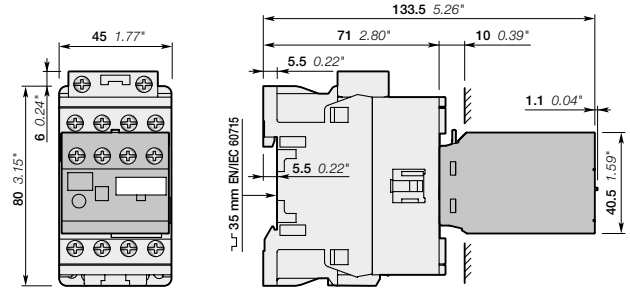
AFC09, AFC12, AFC16
+ CAL4-11 2-pole auxiliary contact block



AFC09, AFC12, AFC16
+ CA4 4-pole auxiliary contact block



AFC09, AFC12, AFC16
+ CAT4 2-pole auxiliary contact and coil terminal block



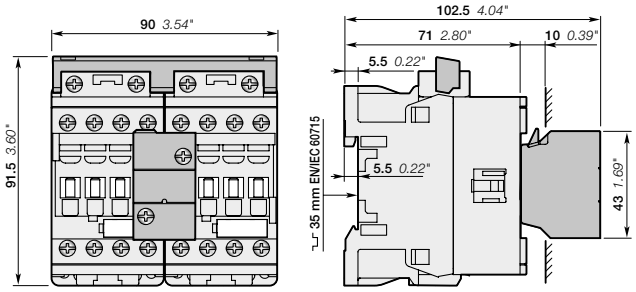
AFC09, AFC12, AFC16
+ TEF4 electronic timer

(1) Note: For AFC09 ... AFC16 contactors, lateral distance to grounded component 2 mm 0.08" min.
Note : Use of surge suppressor increase the total height by 8mm

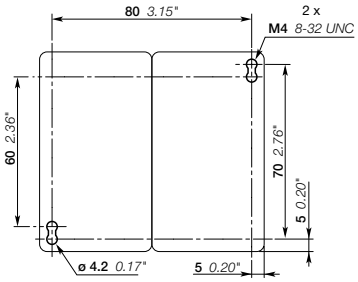
Main dimensions mm, inches (1)

AFC09, AFC12, AFC16 3-pole contactors

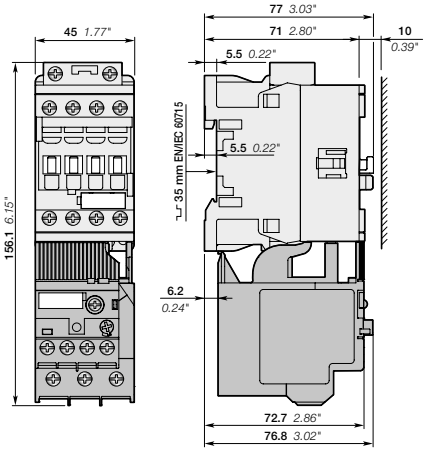
Dimensions



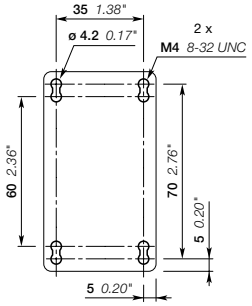
AFC09, AFC12, AFC16
+ VEM4 mechanical and electrical interlock set



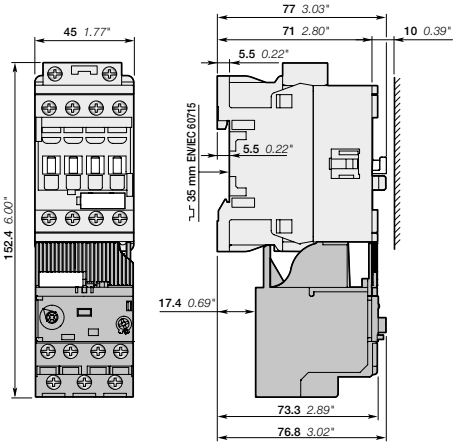
AFC09, AFC12, AFC16
+ VEM4 mechanical and electrical interlock set



AFC09, AFC12, AFC16
+ TF42 thermal overloard relay



AFC09, AFC12, AFC16
+ TF42, EF19



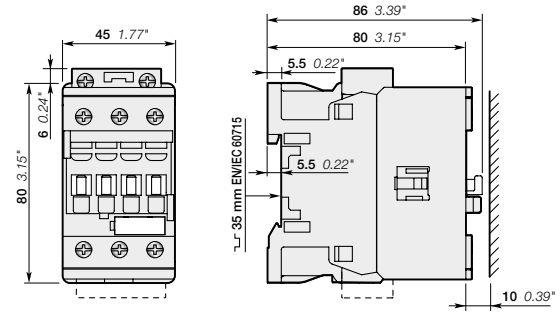
AFC09, AFC12, AFC16 3-pole contactors
+ EF19 electronic overload relay

(1) Note: For AFC09 ... AFC16 contactors, lateral distance to grounded component 2 mm 0.08" min.
Note : Use of surge suppressor increase the total height by 8mm

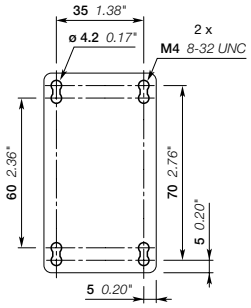
Main dimensions mm, inches (1)

AFC26, AFC30, AFC38 3-pole contactors

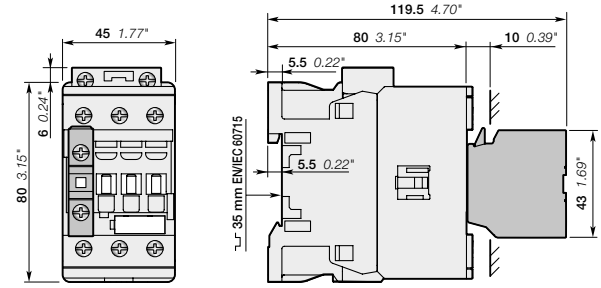
Dimensions



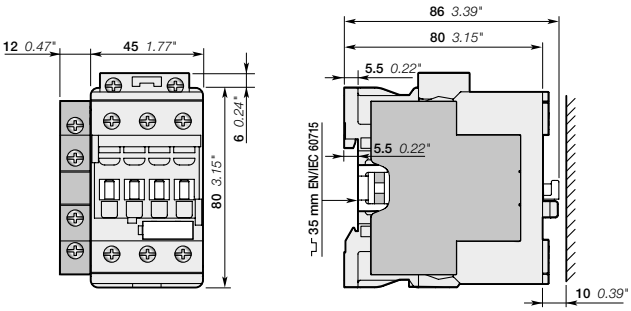
AFC26, AFC30, AFC38



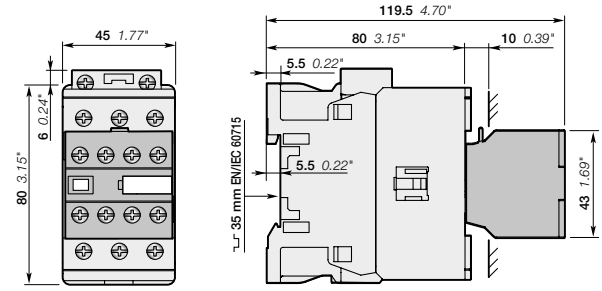
AFC26, AFC30, AFC38



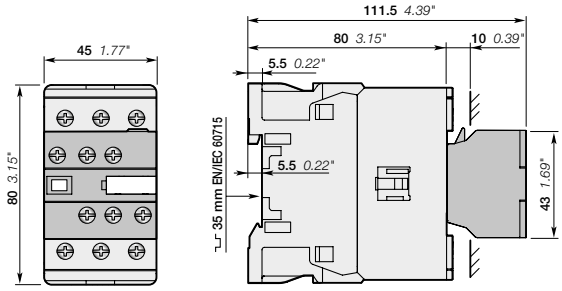
AFC26, AFC30, AFC38
+ CA4, CC4 1-pole auxiliary contact block



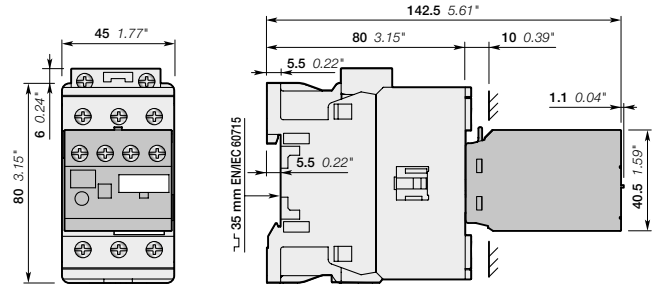
AFC26, AFC30, AFC38
+ CAL4-11 2-pole auxiliary contact block



AFC26, AFC30, AFC38
+ CA4 4-pole auxiliary contact block



AFC26, AFC30, AFC38
+ CAT4 2-pole auxiliary contact and coil terminal block



AFC26, AFC30, AFC38
+ TEF4 electronic timer

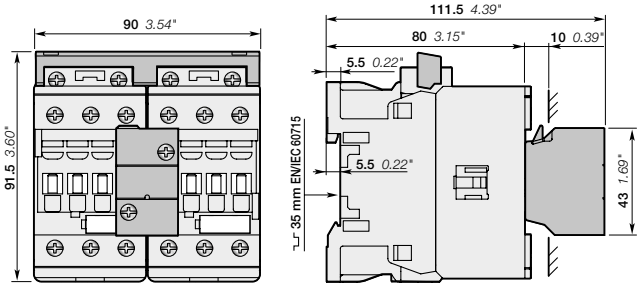
(1) Note: For AFC26 ... AFC38 contactors, lateral distance to grounded component 2 mm (0.08") min.
Note : Use of surge suppressor increase the total height by 8mm

Main dimensions mm, inches (1)

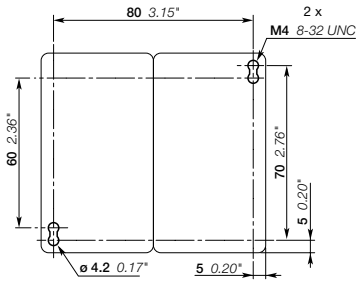
20

AFC26, AFC30, AFC38 3-pole contactors

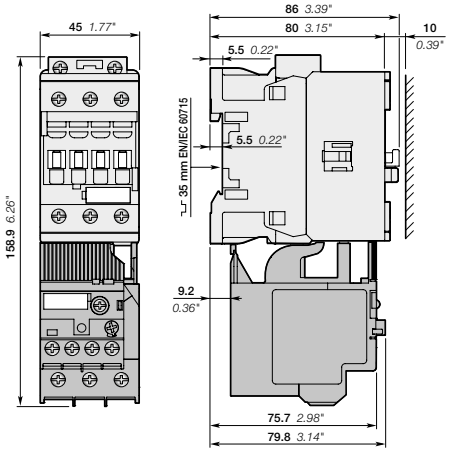
Dimensions



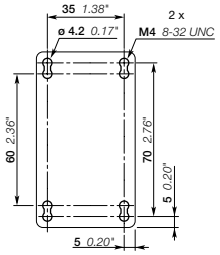
AFC26, AFC30, AFC38
+ VEM4 mechanical and electrical interlock set



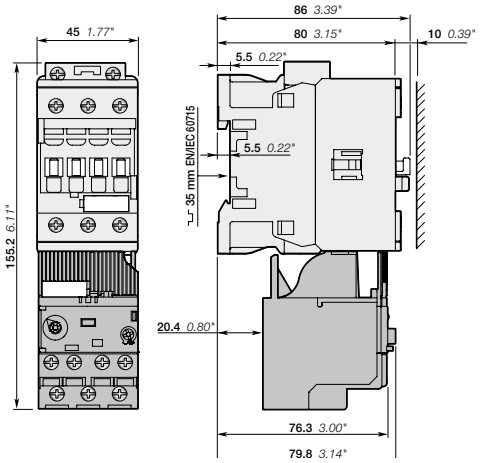
AFC26, AFC30, AFC38
+ VEM4 mechanical and electrical interlock set



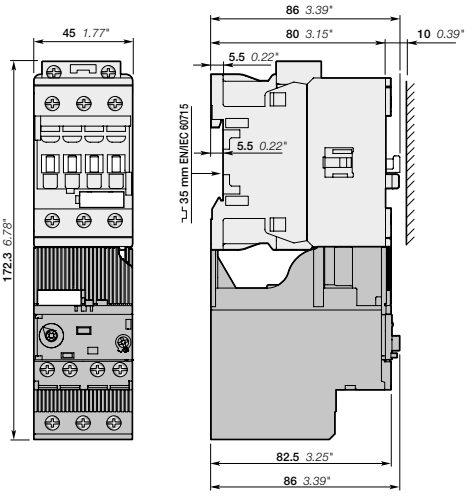
AFC26, AFC30, AFC38
+ TF42 thermal overload relay



AFC26, AFC30, AFC38
+ TF42, EF19, EF45



AFC26 3-pole contactors
+ EF19 electronic overload relay

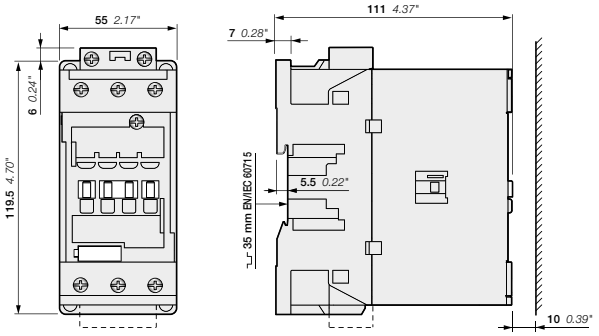


AFC26, AFC30, AFC38 3-pole contactors
+ EF45 electronic overload relay

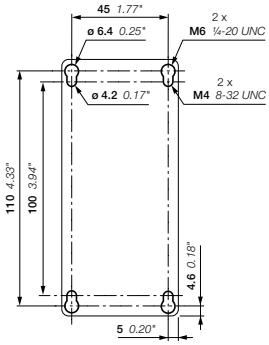
(1) Note: For AFC26 ... AFC38 contactors, lateral distance to grounded component 2 mm (0.08") min.
Note : Use of surge suppressor increase the total height by 8mm

Main dimensions mm, inches (1)

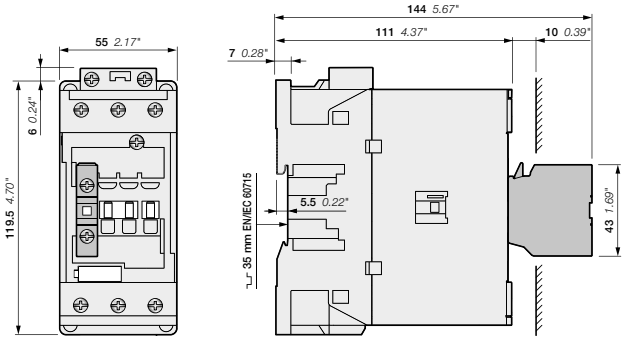
AFC40 ... AFC65 3-pole contactors
Dimensions



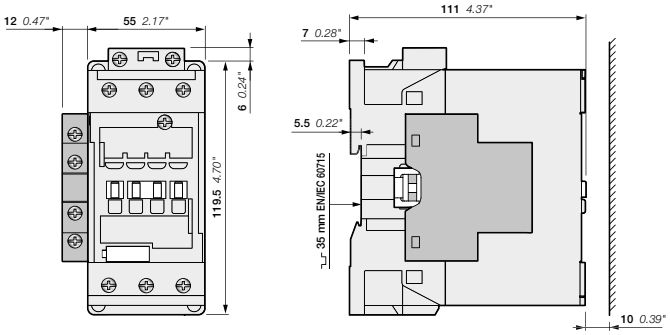
AFC40, AFC52, AF65



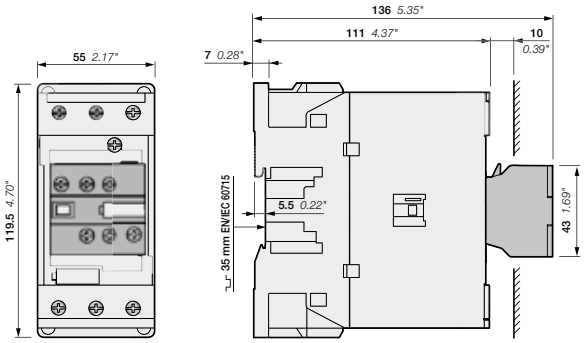
AFC40, AFC52, AFC65



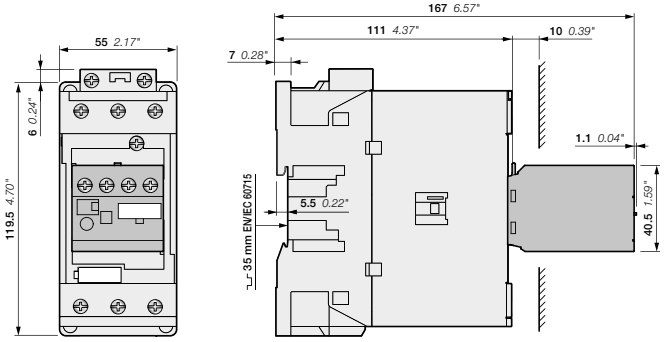
AFC40, AFC52, AF65
+ CA4, CC4 1-pole auxiliary contact block



AFC40, AFC52, AFC65-30-00 + CAL4-11 2-pole auxiliary contact block
AFC40, AFC52, AFC65-30-11



AFC40, AFC52, AFC65
+ CAT4 2-pole auxiliary contact and coil terminal block



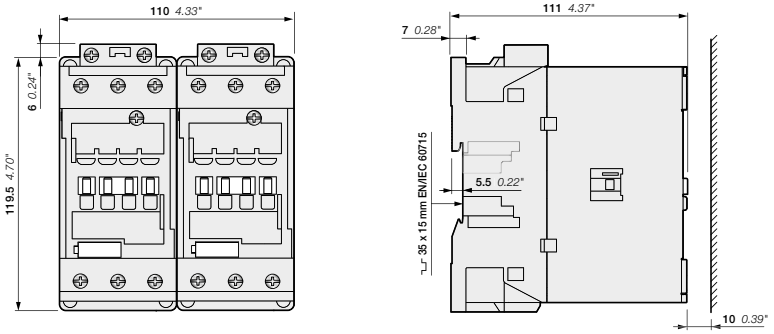
AFC40, AFC52, AFC65
+ TEF4 electronic timer

Note: for contactors mounted side-by-side, max ambient temperature must remain < 60°C.
For higher temperature contactors must have at least 5 mm space on each side.
Note : Use of surge suppressor increase the total height by 8mm

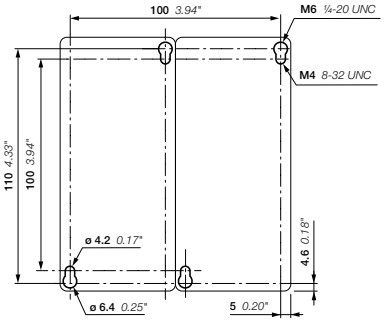
Main dimensions mm, inches

AFC40 ... AFC65 3-pole contactors

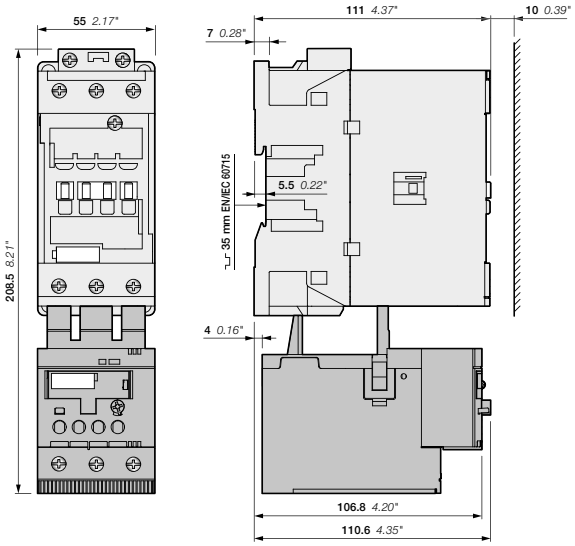
Dimensions



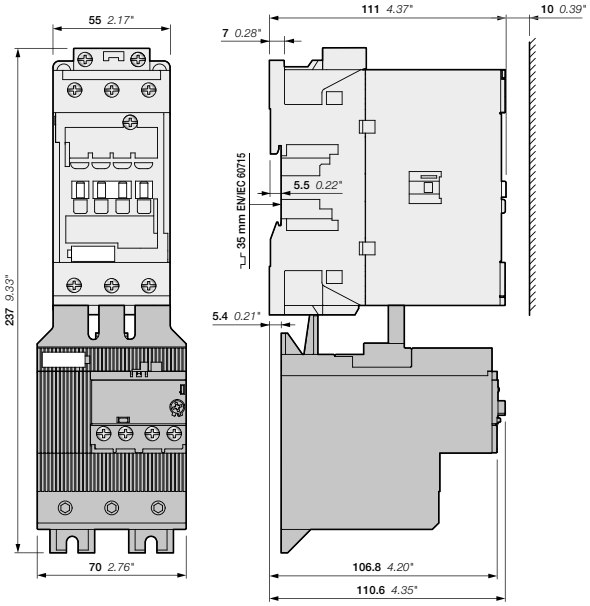
AFC40, AFC52, AFC65
+ VM96-4 mechanical interlock unit



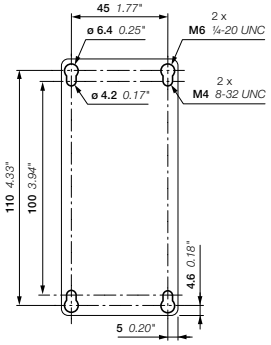
AFC40, AFC52, AFC65
+ VM96-4 mechanical interlock set



AFC40, AFC52, AFC65
+ TF65 thermal overload relay



AFC40, AFC52, AFC65
+ EF65 electronic overload relay



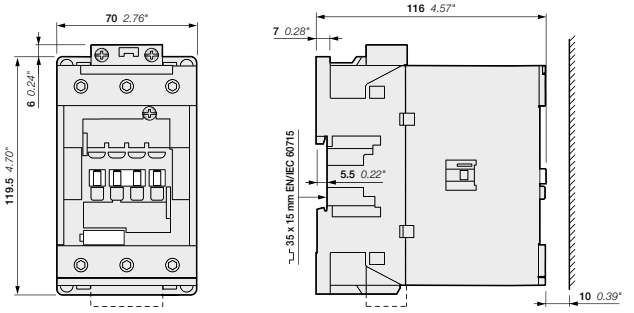
AFC40, AFC52, AFC65
+ TF65, EF65

Note: for contactors mounted side-by-side, max ambient temperature must remain < 60°C.
For higher temperature contactors must have at least 5 mm space on each side.
Note : Use of surge suppressor increase the total height by 8mm

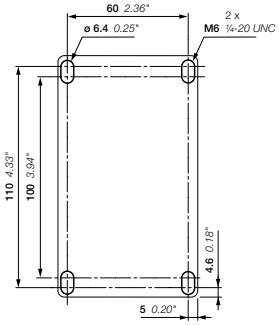
Main dimensions mm, inches

AFC80 ... AFC96 3-pole contactors

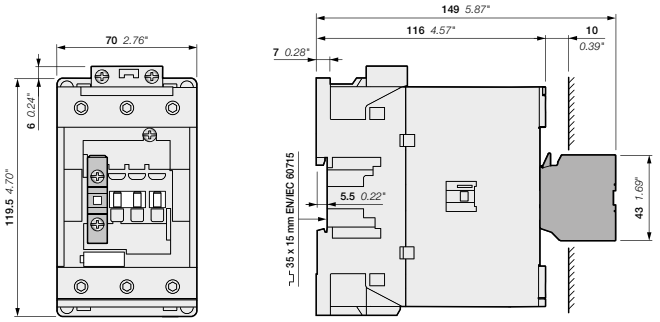
Dimensions



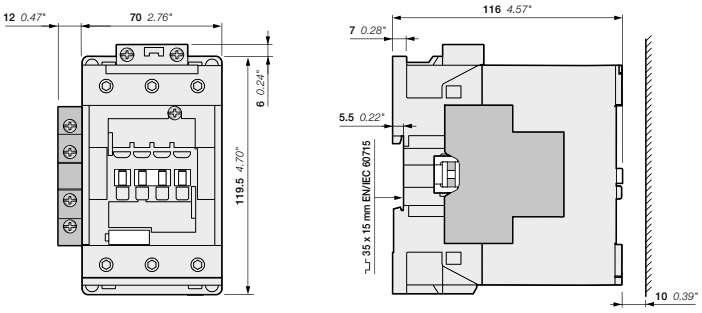
AFC80, AFC96



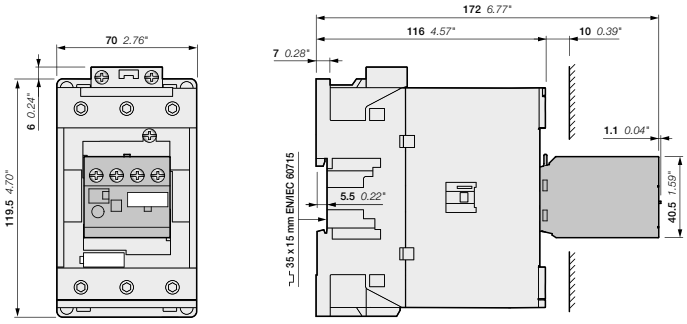
AFC80, AFC96



AFC80, AFC96
+ CA4, CC4 1-pole auxiliary contact block



AFC80, AFC96-30-00 + CAL4-11 2-pole auxiliary contact block
AFC80, AFC96-30-11



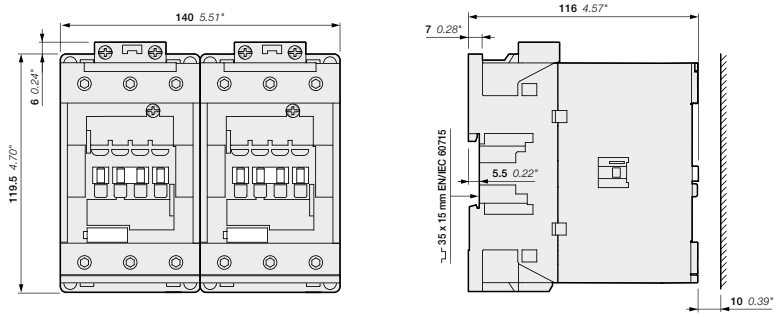
AFC80, AFC96
+ TEF4 electronic timer

Note: for contactors mounted side-by-side, max ambient temperature must remain < 60°C.
For higher temperature contactors must have at least 5 mm space on each side.
Note : Use of surge suppressor increase the total height by 8mm

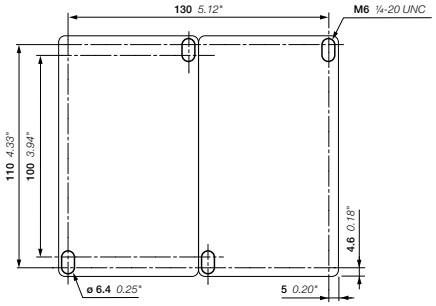
Main dimensions mm, inches

AFC80 ... AFC96 3-pole contactors

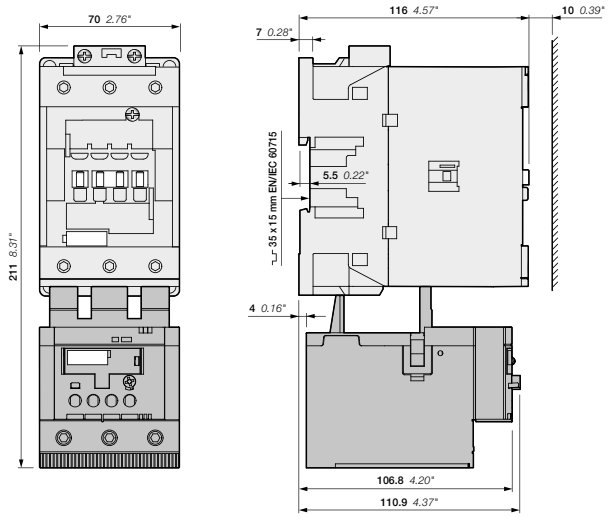
Dimensions



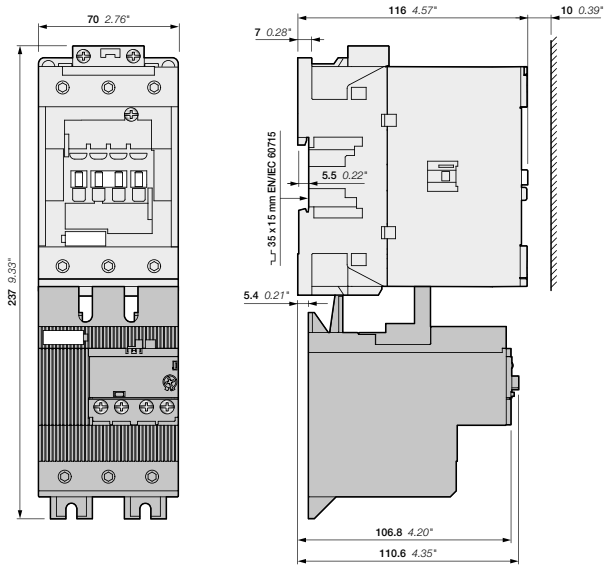
AFC80, AFC96
+ VM96-4 mechanical interlock unit



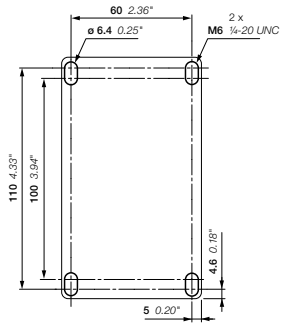
AFC80, AFC96
+ VM96-4 mechanical interlock set



AFC80, AFC96
+ TF96 thermal overload relay



AFC80, AFC96
+ EF96 electronic overload relay



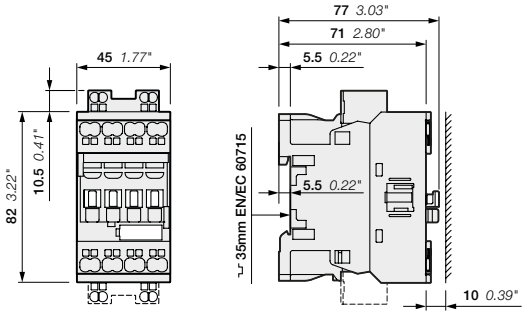
AFC80, AFC96
+ TF96, EF96

Note: for contactors mounted side-by-side, max ambient temperature must remain < 60°C.
For higher temperature contactors must have at least 5 mm space on each side.
Note : Use of surge suppressor increase the total height by 8mm

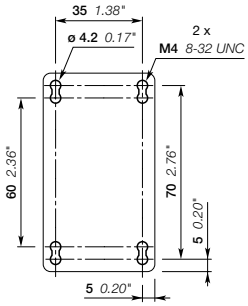
Main dimensions mm, inches

AFC09..K, AFC12..K, AFC16..K 3-pole contactors - with Push-in Spring terminals

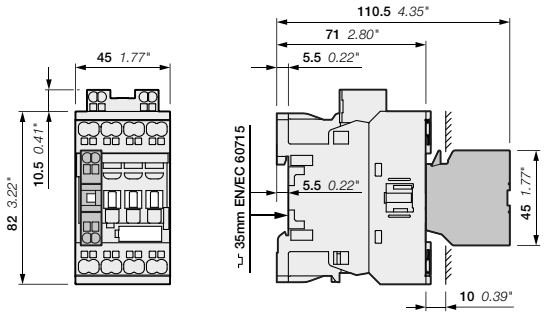
Dimensions



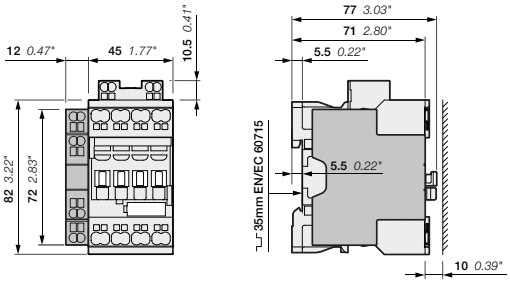
AFC09..K, AFC12..K, AFC16..K



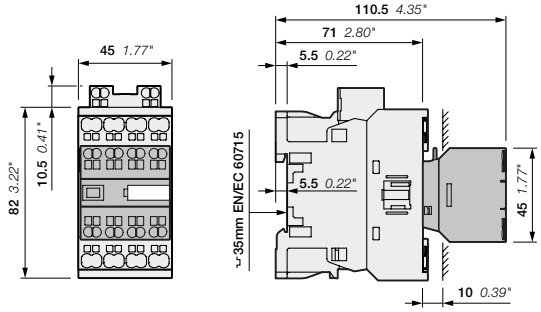
AFC09..K, AFC12..K, AFC16..K



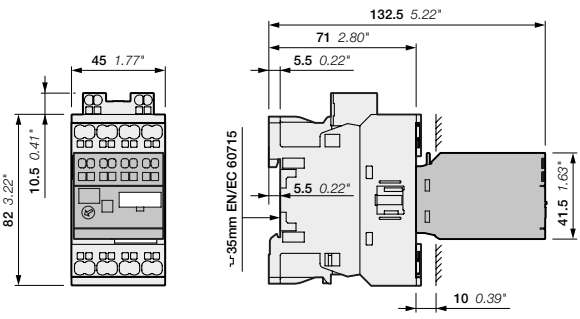
AFC09..K, AFC12..K, AFC16..K
+ CA4..K 1-pole auxiliary contact block



AFC09..K, AFC12..K, AFC16..K
+ CAL4-11K 2-pole auxiliary contact block



AFC09..K, AFC12..K, AFC16..K
+ CA4..K 4-pole auxiliary contact block



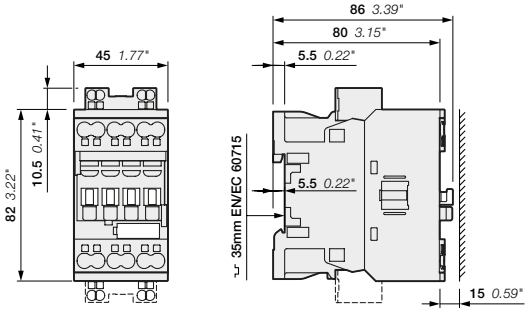
AFC09..K, AFC12..K, AFC16..K
+ TEF4S electronic timer

Note: For AFC09..K ... AFC16..K contactors, lateral distance to grounded component 2 mm 0.08" min
Note : Use of surge suppressor increase the total height by 8mm

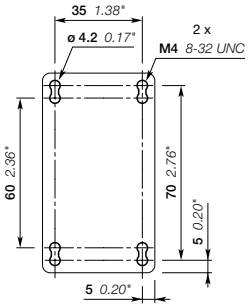
Main dimensions mm, inches

AFC26..K, AFC30..K, AFC38..K 3-pole contactors - with Push-in Spring terminals

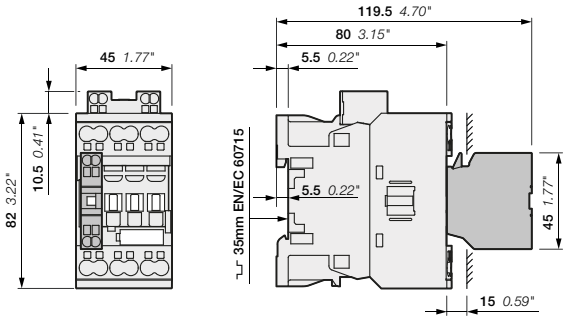
Dimensions



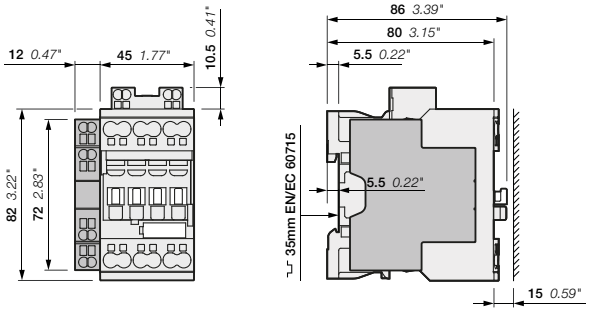
AFC26..K, AFC30..K, AFC38..K



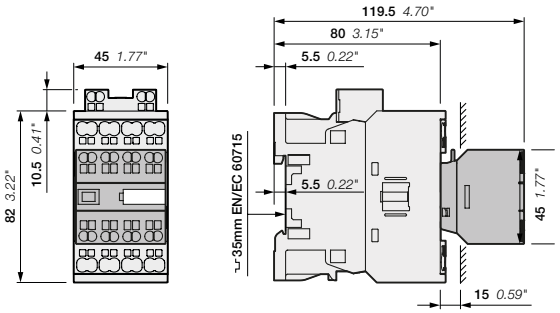
AFC26..K, AFC30..K, AFC38..K



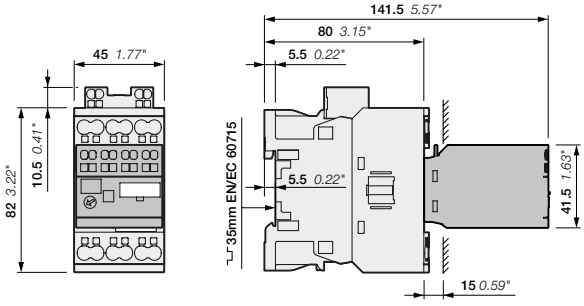
AFC26..K, AFC30..K, AFC38..K
+ CA4..K 1-pole auxiliary contact block



AFC26..K, AFC30..K, AFC38..K
+ CAL4-11K 2-pole auxiliary contact block



AFC26..K, AFC30..K, AFC38..K
+ CA4..K 4-pole auxiliary contact block



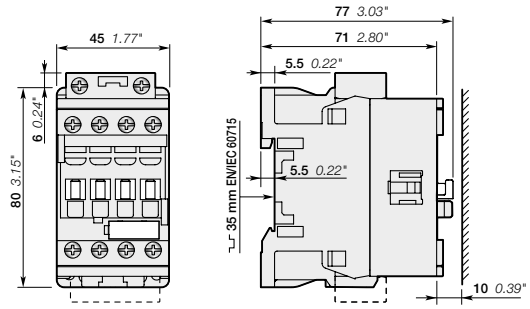
AFC26..K, AFC30..K, AFC38..K
+ TEF4S electronic timer

Note: For AFC26..K ... AFC38..K contactors, lateral distance to grounded component 2 mm 0.08" min
Note : Use of surge suppressor increase the total height by 8mm

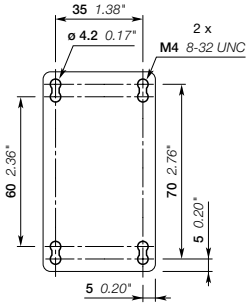
Main dimensions mm, inches

AFC09, AFC16 4-pole contactors

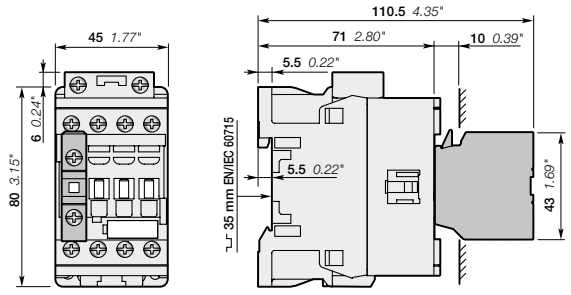
Dimensions



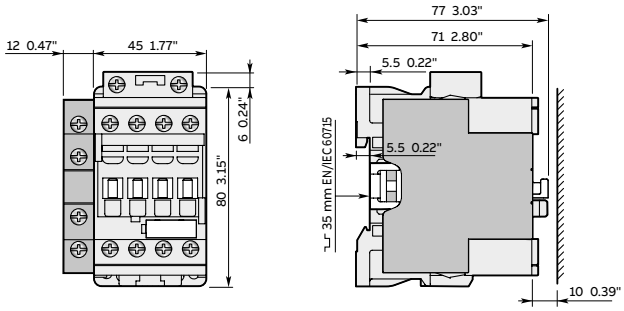
AFC09, AFC16



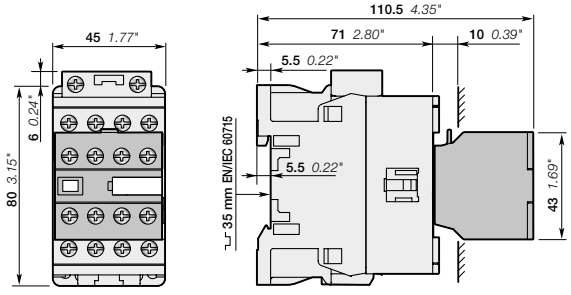
AFC09, AFC16



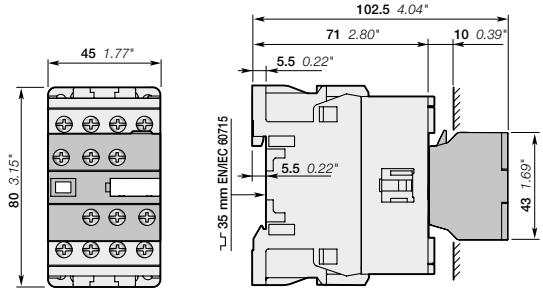
AFC09, AFC16
+ CA4, CC4 1-pole auxiliary contact block



AFC09, AFC16
+ CAL4-11 2-pole auxiliary contact block



AFC09, AFC16
+ CA4 4-pole auxiliary contact block



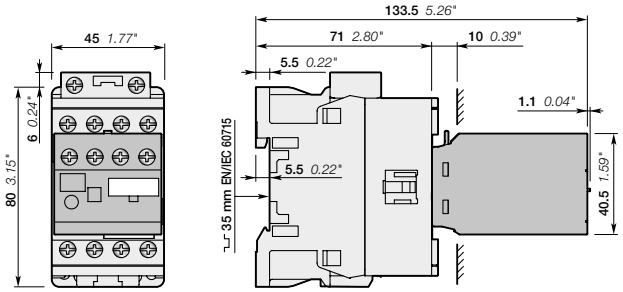
AFC09, AFC16
+ CAT4 2-pole auxiliary contact and coil terminal block

(1) Note: contactor lateral distance to grounded component 2 mm 0.08" min.
Note : Use of surge suppressor increase the total height by 8mm

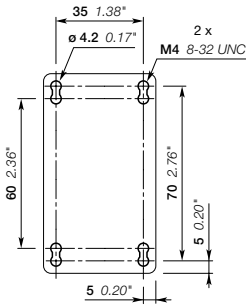
Main dimensions mm, inches (1)

AFC09, AFC16 4-pole contactors

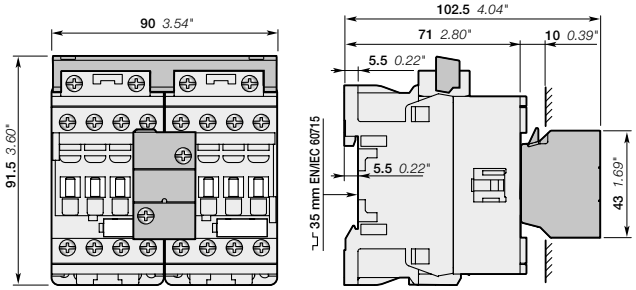
Dimensions



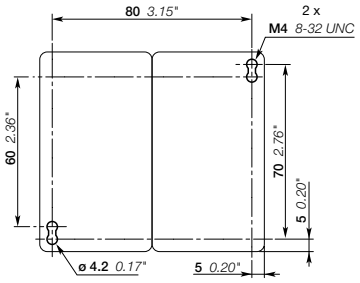
AFC09, AFC16
+ TEF4 electronic timer



AFC09, AFC16



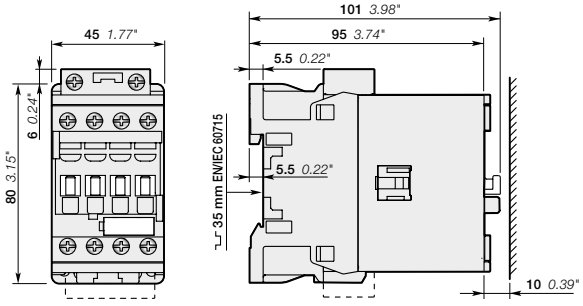
AFC09-40-00, AFC16-40-00
+ VEM4 mechanical and electrical interlock set



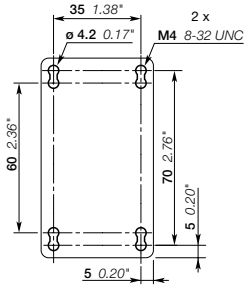
AFC09-40-00, AFC16-40-00
+ VEM4 mechanical and electrical interlock set

(1) Note: contactor lateral distance to grounded component 2 mm 0.08" min.
Note : Use of surge suppressor increase the total height by 8mm

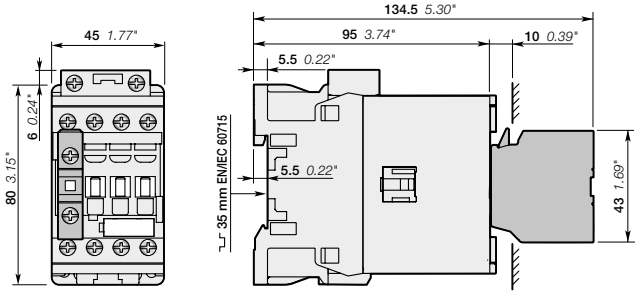
AFC26, AFC38 4-pole contactors
Dimensions



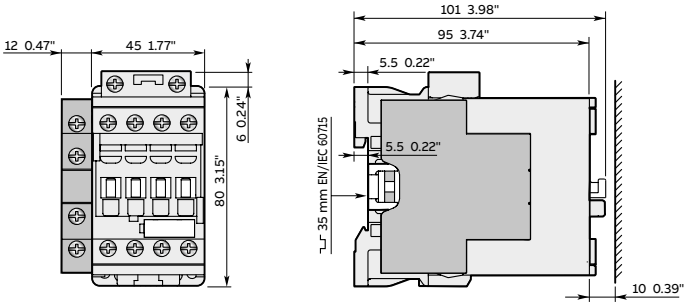
AFC26, AFC38



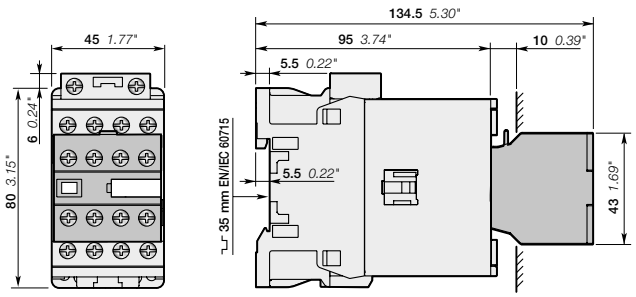
AFC26, AFC38



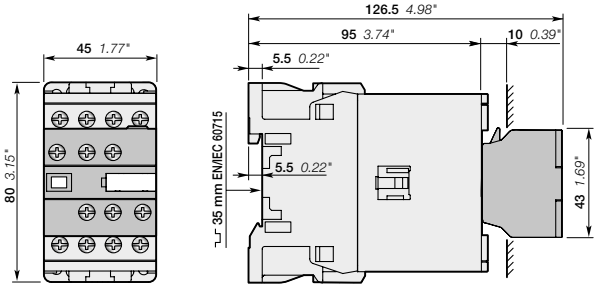
AFC26, AFC38
+ CA4, CC4 1-pole auxiliary contact block



AFC26, AFC38
+ CAL4-11 2-pole auxiliary contact block



AFC26, AFC38
+ CA4 4-pole auxiliary contact block



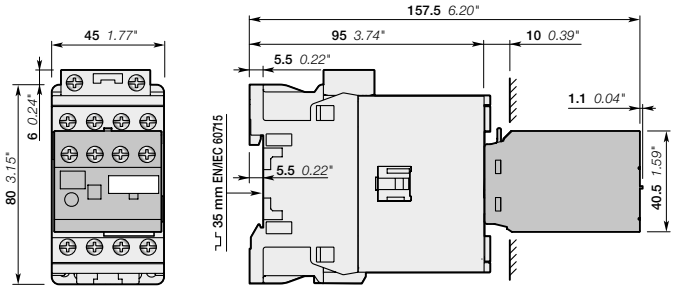
AFC26, AFC38
+ CAT4 2-pole auxiliary contact and coil terminal block

Note: For AFC26 and AFC38 contactors, lateral distance to grounded component 2 mm 0.08" min.
Note : Use of surge suppressor increase the total height by 8mm

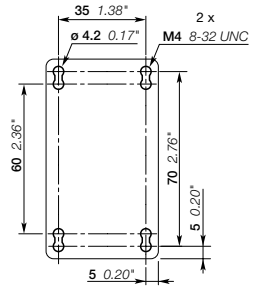
Main dimensions mm, inches

AFC26, AFC38 4-pole contactors

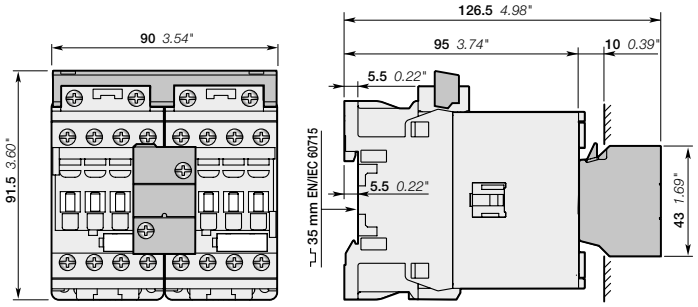
Dimensions



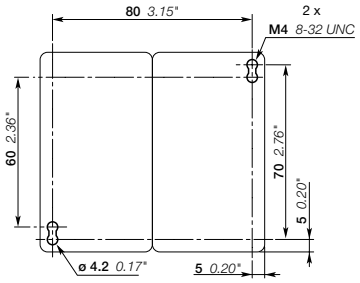
AFC26, AFC38
+ TEF4 electronic timer



AFC26, AFC38



AFC26-40-00, AFC38-40-00
+ VEM4 mechanical and electrical interlock set



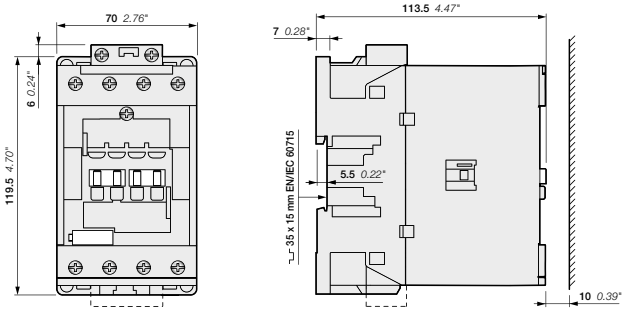
AFC26-40-00, AFC38-40-00
+ VEM4 mechanical and electrical interlock set

(1) Note: For AFC26 and AFC38 contactors, lateral distance to grounded component 2 mm 0.08" min.
Note : Use of surge suppressor increase the total height by 8mm

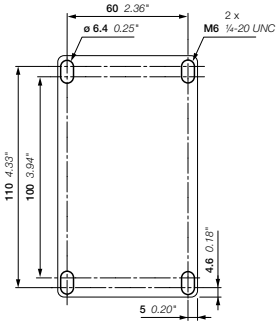
Main dimensions mm, inches (1)

AFC40, AFC52 4-pole contactors

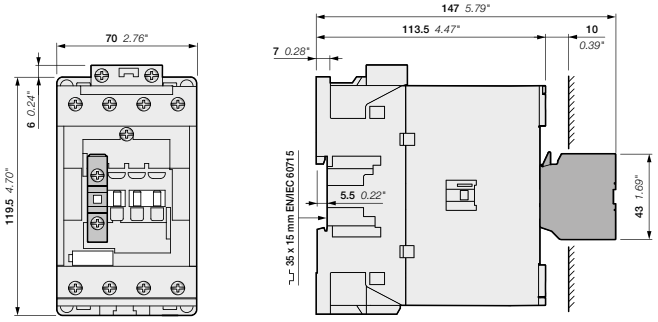
Dimensions



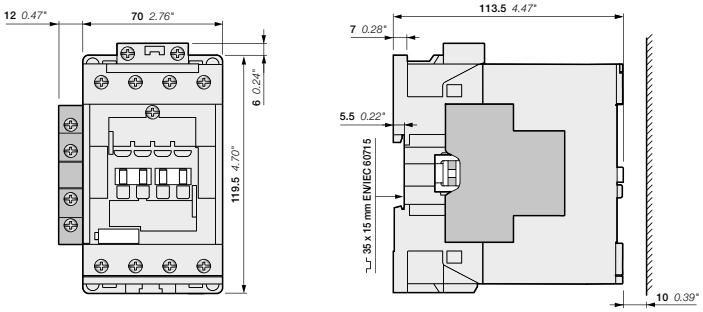
AFC40, AFC52



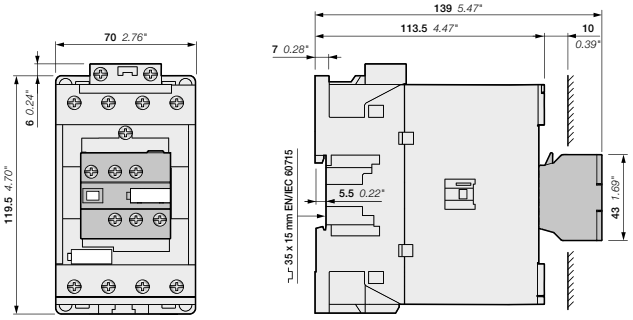
AFC40, AFC52



AFC40, AFC52
+ CA4, CC4 1-pole auxiliary contact block



AFC40, AFC52
+ CAL4-11 2-pole auxiliary contact block



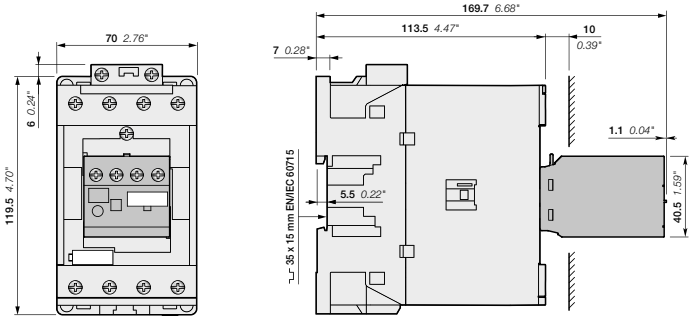
AFC40, AFC52
+ CAT4 2-pole auxiliary contact and coil terminal block

Note: for contactors mounted side-by-side, max ambient temperature must remain < 60°C.
For higher temperature contactors must have at least 5 mm space on each side.
Note : Use of surge suppressor increase the total height by 8mm

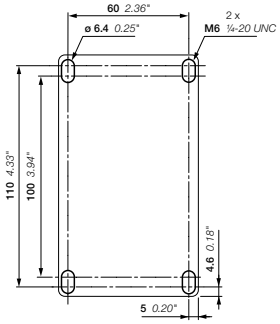
Main dimensions mm, inches

AFC40, AFC52 4-pole contactors

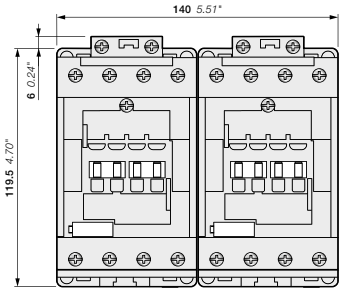
Dimensions

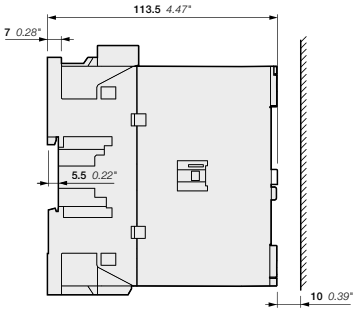


AFC40, AFC52
+ TEF4 electronic timer

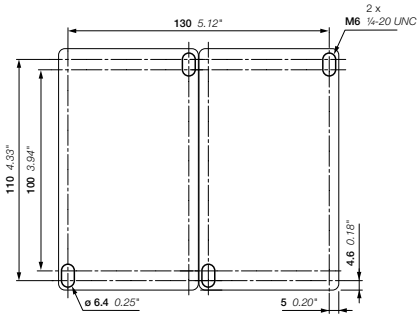


AFC40, AFC52





AFC40, AFC52
+ VM96-4 mechanical interlock unit



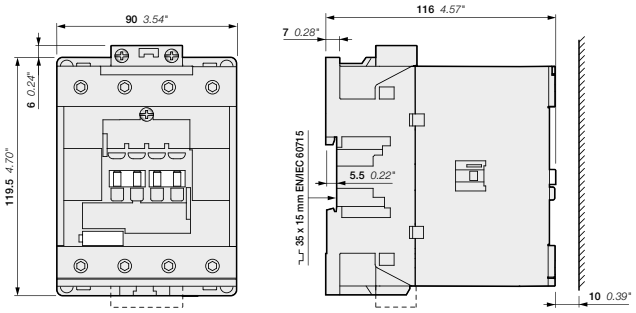
AFC40, AFC52
+ VM96-4 mechanical interlock unit

Note: for contactors mounted side-by-side, max ambient temperature must remain < 60°C.
For higher temperature contactors must have at least 5 mm space on each side.
Note : Use of surge suppressor increase the total height by 8mm

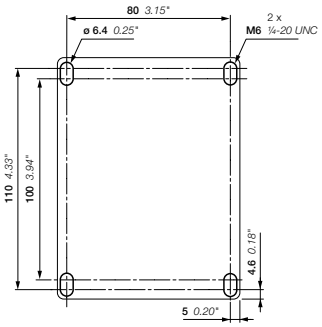
Main dimensions mm, inches

AFC80 4-pole contactors

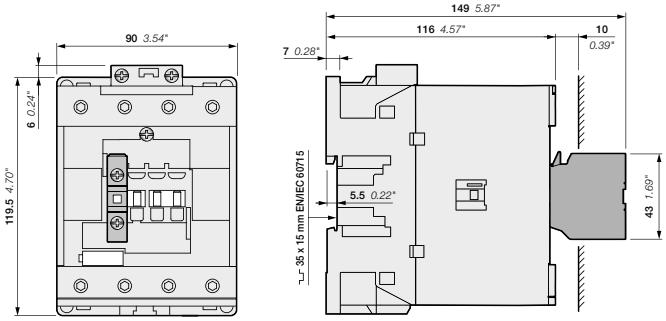
Dimensions



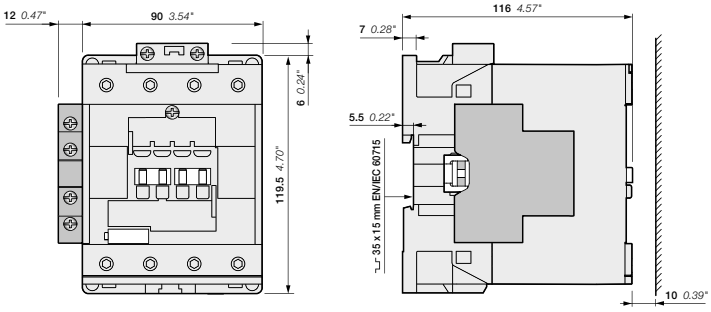
AFC80



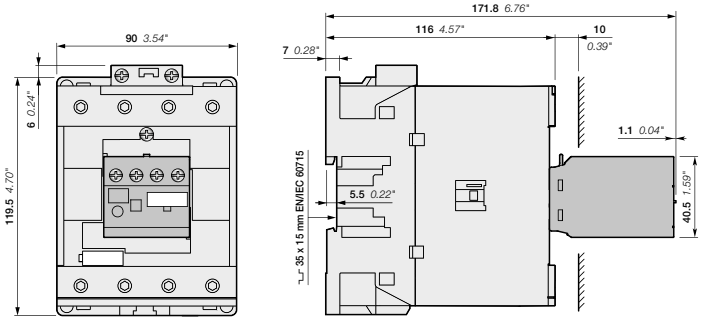
AFC80



AFC80
+ CA4, CC4 1-pole auxiliary contact block



AFC80
+ CAL4-11 2-pole auxiliary contact block



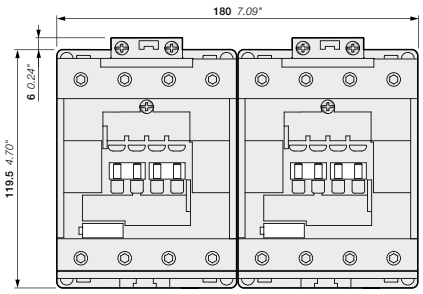
AFC80
+ TEF4 Electronic timer

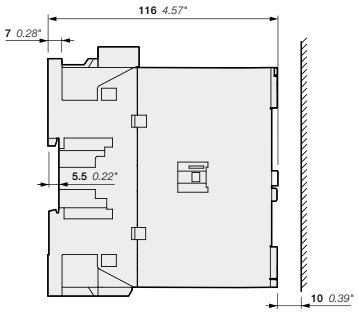
Note: for contactors mounted side-by-side, max ambient temperature must remain < 60°C.
For higher temperature contactors must have at least 5 mm space on each side.
Note : Use of surge suppressor increase the total height by 8mm

Main dimensions mm, inches

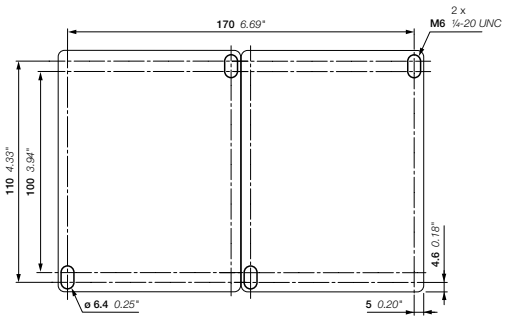
AFC80 4-pole contactors

Dimensions





AFC80
+ CA4, CC4 1-pole auxiliary contact block



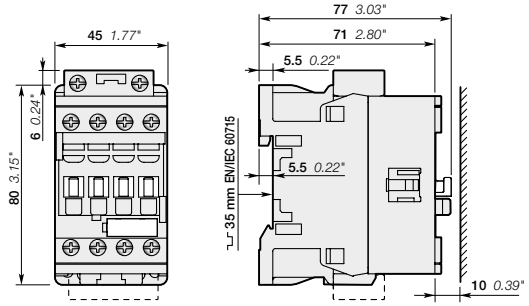
AFC80
+ VM96-4 mechanical interlock unit

Note: for contactors mounted side-by-side, max ambient temperature must remain < 60°C.
For higher temperature contactors must have at least 5 mm space on each side.
Note : Use of surge suppressor increase the total height by 8mm

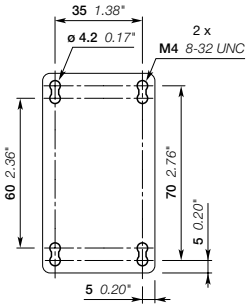
Main dimensions mm, inches (1)

NFC contactor relays

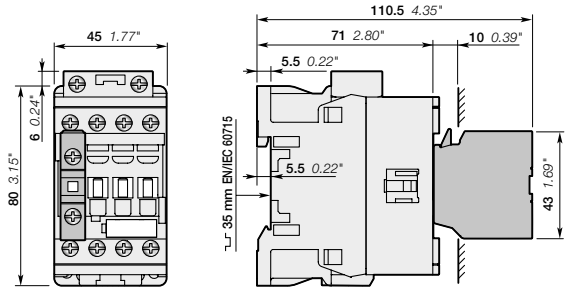
Dimensions



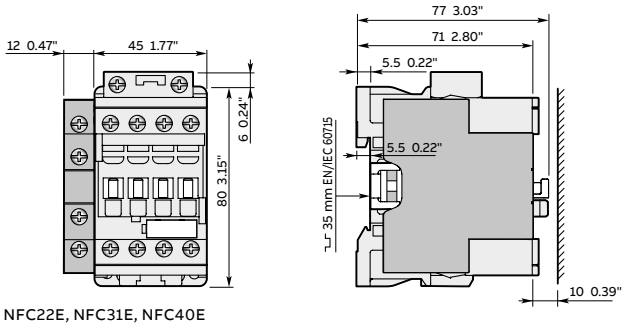
NFC22E, NFC31E, NFC40E



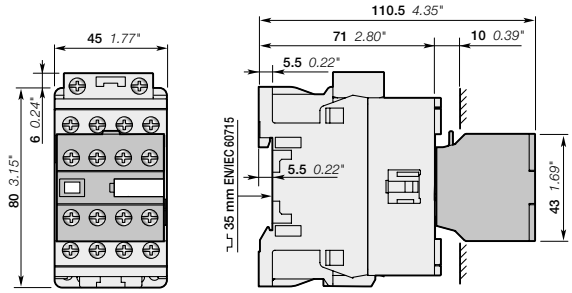
NFC



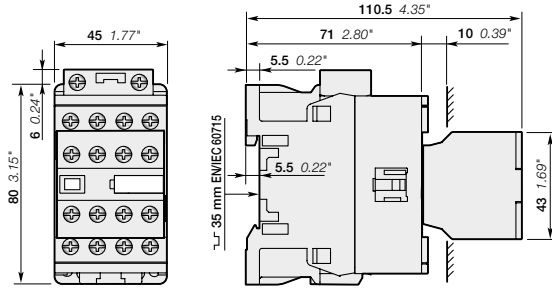
NFC22E, NFC31E, NFC40E
+ CA4, CC4 1-pole auxiliary contact block



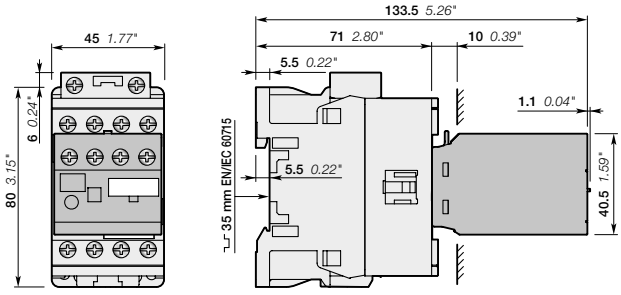
NFC22E, NFC31E, NFC40E
+ CAL4-11 2-pole auxiliary contact block



NFC22E, NFC31E, NFC40E
+ CA4 4-pole auxiliary contact block



NFC44E, NFC53E, NFC62E, NFC71E, NFC80E, NFC33/11, NFC51/11



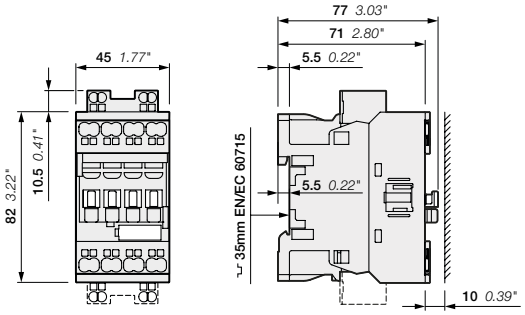
NFC22E, NFC31E, NFC40E
+ TEF4 electronic timer

(1) Note: contactor relay lateral distance to grounded component 2 mm 0.08" min.
Note : Use of surge suppressor increase the total height by 8mm

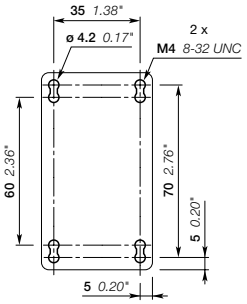
Main dimensions mm, inches (1)

NFC..K contactor relays - with Push-in Spring terminals

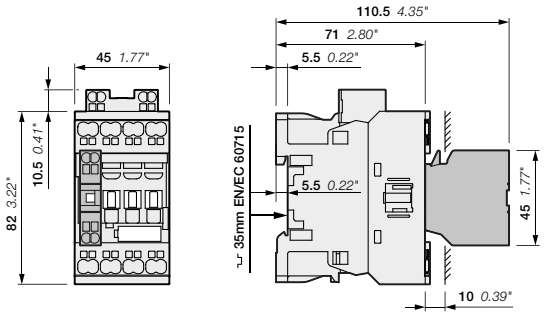
Dimensions



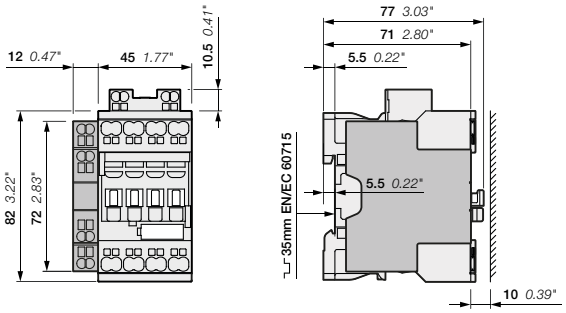
NFC22EK, NFC31EK, NFC40EK



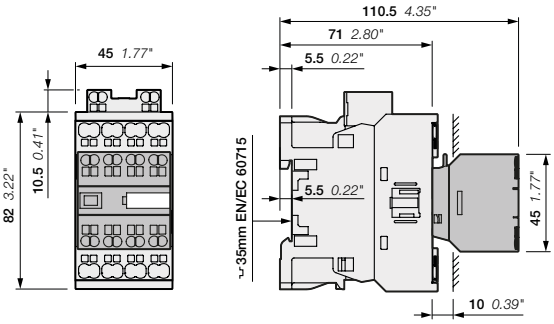
NFC22EK, NFC31EK, NFC40EK



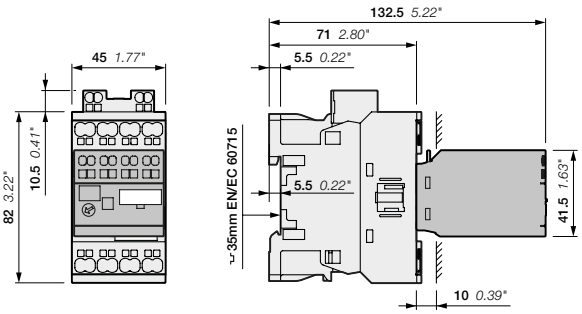
NFC22EK, NFC31EK, NFC40EK
+ CA4..K 1-pole auxiliary contact block



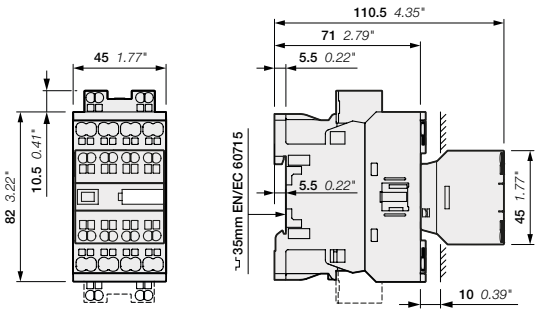
NFC22EK, NFC31EK, NFC40EK
+ CAL4-11K 2-pole auxiliary contact block



NFC22EK, NFC31EK, NFC40EK
+ CA4..K 4-pole auxiliary contact block



NFC22EK, NFC31EK, NFC40EK
+ TEF4S electronic timer



NFC44EK, NFC53EK, NFC62EK,
NFC71EK, NFC80EK

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

Main dimensions mm, inches

For more information please find our electronic data sheets online, for example:

www.abb.com/productdetails/**MS116-0.16**

or

www.abb.com/productdetails/**1SAM250000R1001**

Manual motor starters & circuit breakers for transformer protection

MS and MO manual motor starters
A complete motor protection concept

Fuseless protection saves costs, space and ensures a quick reaction under overload and short-circuit condition by switching off the motor within milliseconds. The full range of motor starters offers protection from 0.1 A to up to 100 A. The new family range has a harmonized range of accessories and offers the same features up to 80 A.

Protection and control
Protect equipment and installations

ABB offers a broad range of manual motor starters, for protection and control in almost every situation including hazardous areas, protecting installations from short-circuits, overloads and phase failures while also controlling the current flow through a simple ON/OFF switch.

Continuous operation
Secure uptime

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

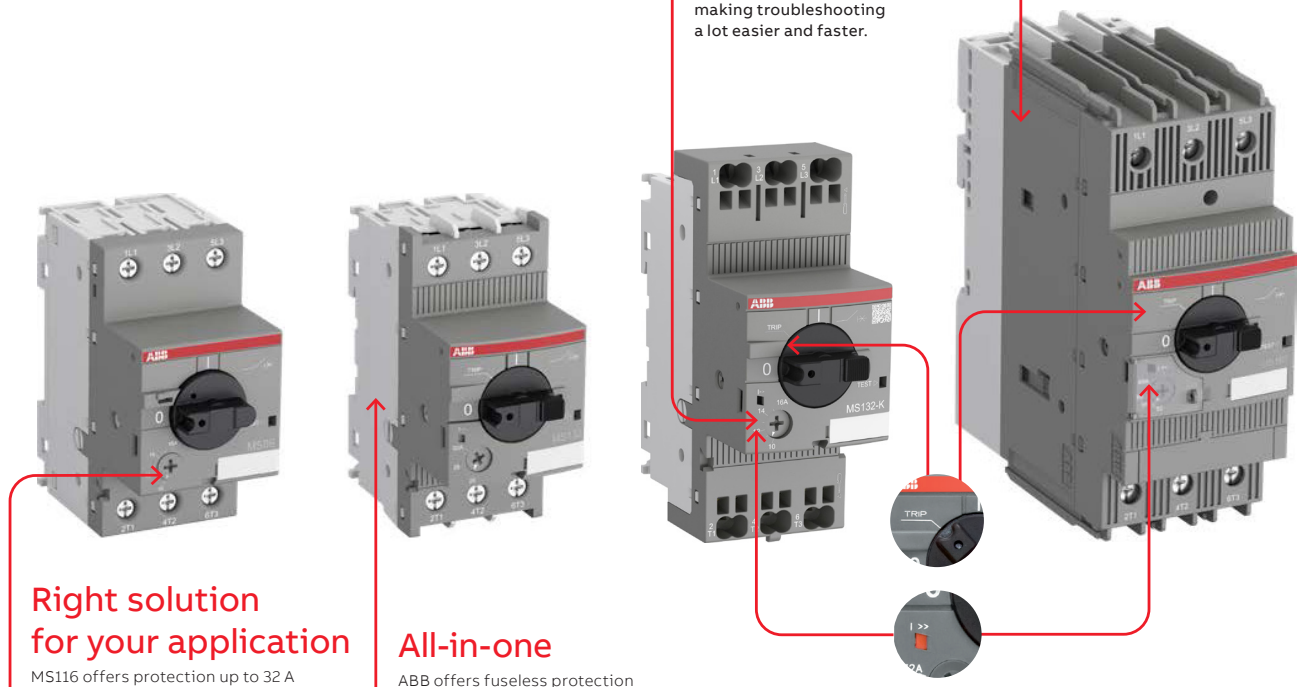
Speed up your projects
Simplified design

Manual motor starters can be connected easily with ABB contactors or soft starters using the respective accessory. Additionally, the main range of accessories is shared across multiple starters (both with screw and Push-in Spring terminals available), making logistics and planning simpler.

MS and MO manual motor starters
A complete motor protection concept

High performance in compact size
MS132 and MS165 manual motor starters cover short-circuit breaking capacities up to 100 kA. In addition, every manual motor starter is temperature compensated up to 60 °C.

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



Right solution for your application
MS116 offers protection up to 32 A and a breaking capacity up to 100 kA – all in a 45 mm wide housing. They are designed to meet requirements of most standard applications.

All-in-one
ABB offers fuseless protection against short-circuits, phase failures and overloads including disconnect function – all in one single compact product.

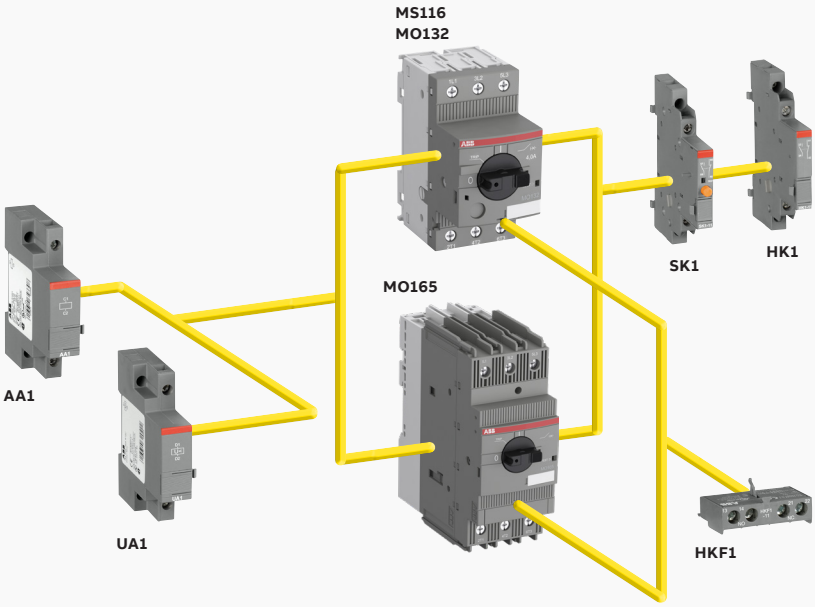
Protection wherever you are
Manual motor starters are suitable for worldwide use. The wide range of certifications covers standards like IEC (CB), cULus, CCC, EAC and various ship approvals. MS132 and MS165 also apply to ATEX standards for hazardous areas.

BV France · DNV · LR Gr. Britain · RINa Italy · ABS USA

Ready for IE3 and IE4 motors
MS116/MS132/MO132/MS165/MO165 comply with the latest IE3 and IE4 N/H and NE/HE motors. NE/HE requires utilization category AC-3e.

Just push it
With the new Push-in Spring terminals, one push is all you need for a faster than ever installation, an easier than ever wiring and a reliable as ever connection which eliminates routine re-tightening.

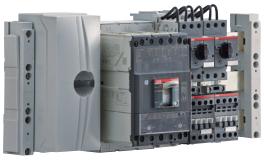
Protection and control
The right accessories for your applications



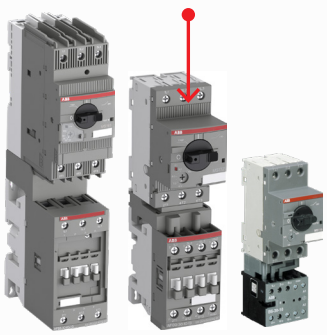
Harmonized range of accessories
All types up to 80 A share the same main accessories like auxiliary contacts, signaling contacts, shunt trips and undervoltage releases. This significantly reduces the part list and makes selection of the right accessories easy.

Compatible with Unifix AD new distribution system

Unifix AD allows an easy, safe and fast mounting of various components (manual motor starters, Tmax XT, circuit breakers, contactors etc.) without drilling the busbars, it's sufficient to clip them on the busbar system.



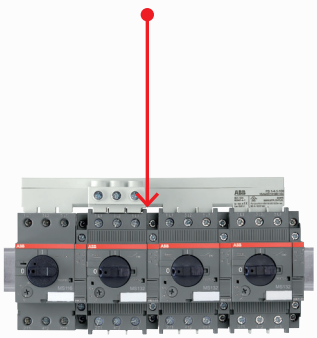
Save wiring time
and avoid mistakes by using a connecting link



Easy to connect

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

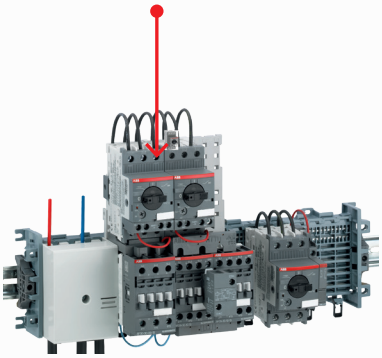
Up to 5 manual motor starters
can be fitted next to each other



Busbar connectors and enclosures

With busbar connectors, up to 5 manual motor starters can be fitted next to each other with optional spacing for auxiliary contacts. Enclosures or door handle kits are available as well.

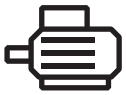
With a lockable handle
maintenance will be safe for every technician



Compatible with SMISSLINE TP plug-in distribution system

SMISSLINE TP allows to snap on and off load-free devices and components under voltage. When working under load please follow the applicable regulations and laws according to the country.

Application examples



MOTOR PROTECTION

No matter what type of starter is required by the application (direct-on-line, star-delta, soft starter or variable frequency drive), MS and MO manual motor starters (also known as motor protection circuit breakers or manual motor protectors) are the right protection devices for electric motors from 100 mA up to 100 A.

STARTER PROTECTION

MO (magnetic-only) manual motor starters are
typically used, when motor overload protection is provided by a separate overload protection device.
This setup is specially beneficial for applications that require auto- or remote-reset of the starter in case of an overload tripping event (e.g. windmills or HVAC fans).

CIRCUIT PROTECTION AND CONTROL

ABB's manual motor starters are fuseless circuit breakers (approved acc. to IEC60947-2) that can be used to control circuits and protect cables / lines in industrial and commercial applications from overloads and short-circuits. The built-in disconnect function allows the usage as main On-/Off-switch, typically for de-centralized applications (e.g. small machinery or laboratory systems).

RESISTIVE LOADS

Manual motor starters are not only for motors! They are also an efficient solution for AC-1 applications, where it is required to protect and switch resistive loads (for example resistive furnaces or heaters).

DC LOADS

Manual motor starters are not only for AC applications!
MS132 and MS165 manual motor starters are also rated for direct current loads (e.g. for motors used in solar panel tracking systems).

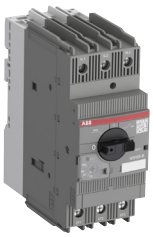
EXTREME CONDITIONS

Regardless if high-altitudes, shock and vibration environments or hazardous areas, ABB's manual motor starters are designed and certified to withstand harsh conditions. Specific versions for rolling stock applications are part of our offer.


ABB
JUNGFRAUBAHN

Manual motor starters

Overview



Type	MS116	MS132	MS165
Thermal and electromagnetic protection	Yes	Yes	Yes
Electromagnetic protection	-	-	-
Phase loss sensitivity	Yes	Yes	Yes
Switch position	ON/OFF	ON/OFF/TRIP	ON/OFF/TRIP
Magnetic trip indication	-	Yes	Yes
Lockable handle without accessories	-	Yes	Yes
Disconnecting feature	Yes	Yes	Yes
Width	45 mm	45 mm	55 mm
Rated operational current Ie	0.10 ... 32 A	0.10 ... 32 A	10 ... 80 A
Setting range	0.10 ... 32 A	0.10 ... 32 A	10 ... 80 A
Ambient air temperature	-25 ... +55 °C (1)	-25 ... +60 °C (1)	-25 ... +60 °C (1)

(1) Compensated

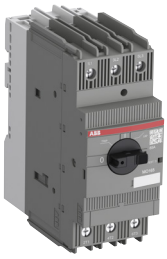
Accessories

Auxiliary contact		HKF1, HK1 (2)	
Signaling contact	for tripped alarm	SK1 (2)	
	for short-circuit alarm	-	CK1
Shunt trip		AA1	
Undervoltage release		UA1	

Table for short-circuit ratings for 400 V AC

	Standard range		Performance range		
	MS116		MS132, MS165		
Selection parameters					
Rated operational power	**Setting range for thermal release**	**Type**	**Short-circuit breaking capacity**	**Type**	**Short-circuit breaking capacity**
			Icu / Ics		Icu / Ics
0.03 kW (1)	0.1 ... 0.16 A	MS116-0.16	100 kA / 50 kA	MS132-0.16 (2)	100 kA / 100 kA
0.06 kW	0.16 ... 0.25 A	MS116-0.25	100 kA / 50 kA	MS132-0.25 (2)	100 kA / 100 kA
0.09 kW	0.25 ... 0.4 A	MS116-0.4	100 kA / 50 kA	MS132-0.4 (2)	100 kA / 100 kA
0.18 kW	0.4 ... 0.63 A	MS116-0.63	100 kA / 50 kA	MS132-0.63 (2)	100 kA / 100 kA
0.25 kW	0.63 ... 1.0 A	MS116-1.0	100 kA / 50 kA	MS132-1.0 (2)	100 kA / 100 kA
0.55 kW	1.0...1.6 A	MS116-1.6	100 kA / 50 kA	MS132-1.6 (2)	100 kA / 100 kA
0.75 kW	1.6...2.5 A	MS116-2.5	75 kA / 50 kA	MS132-2.5 (2)	100 kA / 100 kA
1.5 kW	2.5...4.0 A	MS116-4.0	75 kA / 50 kA	MS132-4.0 (2)	100 kA / 100 kA
2.2 kW	4.0...6.3 A	MS116-6.3	75 kA / 50 kA	MS132-6.3 (2)	100 kA / 100 kA
4.0 kW	6.3...10 A	MS116-10	75 kA / 50 kA	MS132-10 (2)	100 kA / 100 kA
5.5 kW	8...12 A	MS116-12	50 kA / 25 kA	MS132-12	100 kA / 100 kA
7.5 kW	10...16 A	MS116-16	16 kA / 16 kA	MS132-16 (2) / MS165-16	100 kA / 100 kA
7.5 kW	14 ... 20 A			MS165-20	100 kA / 100 kA
7.5 kW	16...20 A	MS116-20	16 kA / 10 kA	MS132-20 (2)	100 kA / 100 kA
11 kW	18 ... 25 A			MS165-25	100 kA / 100 kA
11 kW	20...25 A	MS116-25	16 kA / 10 kA	MS132-25 (2)	50 kA / 50 kA
15 kW	25...32 A	MS116-32	16 kA / 10 kA	MS132-32 (2)	50 kA / 30 kA
15 kW	23 ... 32 A			MS165-32	100 kA / 100 kA
22 kW	30 ... 42 A			MS165-42	50 kA / 50 kA
22 kW	40 ... 54 A			MS165-54	50 kA / 30 kA
30 kW	52 ... 65 A			MS165-65	50 kA / 30 kA
37 kW	62 ... 73 A			MS165-73	30 kA / 30 kA
45 kW	70 ... 80 A			MS165-80	30 kA / 30 kA

(1) 690 V AC
(2) Available with Push-in Spring terminals.



Type	MO132	MO165	MS132-T
Thermal and electromagnetic protection	-	-	Yes
Electromagnetic protection	Yes	Yes	-
Phase loss sensitivity	-	-	Yes
Switch position	ON/OFF/TRIP	ON/OFF/TRIP	ON/OFF/TRIP
Magnetic trip indication	-	-	Yes
Lockable handle without accessories	Yes	Yes	Yes
Disconnecting feature	Yes	Yes	Yes
Width	45 mm	55 mm	45 mm
Rated operational current Ie	0.16 ... 32 A	16 ... 80 A	0.16 ... 25 A
Setting range	-	-	0.10 ... 25 A
Ambient air temperature	-25 ... +60 °C	-25 ... +60 °C	-25 ... +60 °C (1)

(1) Compensated

Accessories

Auxiliary contact		HKF1, HK1 (2)	HKF1, HK1 (2)
Signaling contact	for tripped alarm	SK1 (2)	SK1 (2)
	for short-circuit alarm	-	CK1
Shunt trip		AA1	AA1
Undervoltage release		UA1	UA1

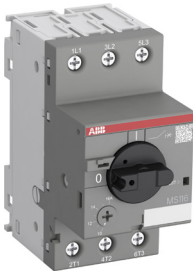
Table for short-circuit ratings for 400 V AC

	Performance range			**Transformer protection**	
	MO132, MO165			**MS132-T**	
Selection parameters					
Rated operational power	**Type**	**Short-circuit breaking capacity**		**Type**	**Short-circuit breaking capacity**
		Icu	Ics		Icu / Ics
0.03 kW (1)	MO132-0.16	100 kA	100 kA	MS132-0.16T (2)	100 kA
0.06 kW	MO132-0.25	100 kA	100 kA	MS132-0.25T (2)	100 kA
0.09 kW	MO132-0.4	100 kA	100 kA	MS132-0.4T (2)	100 kA
0.18 kW	MO132-0.63	100 kA	100 kA	MS132-0.63T (2)	100 kA
0.25 kW	MO132-1.0	100 kA	100 kA	MS132-1.0T (2)	100 kA
0.55 kW	MO132-1.6	100 kA	100 kA	MS132-1.6T (2)	100 kA
0.75 kW	MO132-2.5	100 kA	100 kA	MS132-2.5T (2)	100 kA
1.5 kW	MO132-4.0	100 kA	100 kA	MS132-4.0T (2)	100 kA
2.2 kW	MO132-6.3	100 kA	100 kA	MS132-6.3T (2)	100 kA
4.0 kW	MO132-10	100 kA	100 kA	MS132-10T (2)	100 kA
5.5 kW	MO132-12	100 kA	100 kA	MS132-12T	100 kA
7.5 kW	MO132-16 / MO165-16	100 kA	100 kA	MS132-16T (2)	100 kA
7.5 kW	MO165-20	100 kA	100 kA		
7.5 kW	MO132-20	100 kA	100 kA	MS132-20T (2)	100 kA
11 kW					
11 kW	MO132-25 / MO165-25	50 kA / 100 kA	50 kA / 100 kA	MS132-25T (2)	50 kA
15 kW	MO132-32	50 kA	30 kA	Transformer protection: The instantaneous short-circuit current setting Ii is 20 times the maximum rated operational current.	
15 kW	MO165-32	100 kA	100 kA		
22 kW	MO165-42	50 kA	50 kA		
22 kW	MO165-54	50 kA	30 kA		
30 kW	MO165-65	50 kA	30 kA		
37 kW	MO165-73	30 kA	30 kA		
45 kW	MO165-80	30 kA	30 kA		

(1) 690 V AC
(2) Available with Push-in Spring terminals.

MS116 manual motor starters

0.10 to 32 A – with thermal and electromagnetic protection


2CDC241004V0017

MS116-16


2CDC241017V0017

MS116-25


2CDC241019V0017

MS116-0.16-HKF1-11

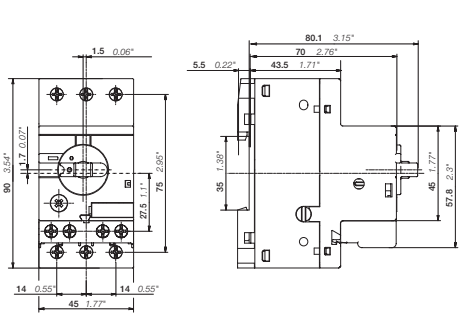

2CDC241020V0017

MS116-32-HKF1-11

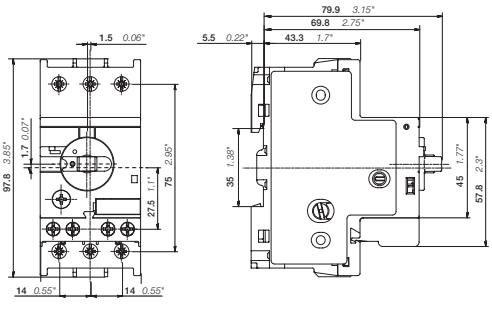
MS116 is a compact and economic range for motor protection up to 15 kW (400 V) / 32 A in width of 45 mm. Further features are the built-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication. The manual motor starter is suitable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

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

Note: Manual motor starters should always be selected so that the actual motor current is within the setting range.
(1) 690 V



MS116 ≤ 16 A & MS116-HKF1-11 ≤ 16 A



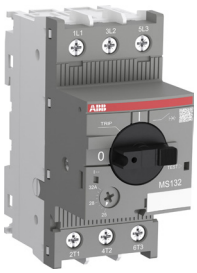
MS116 ≥ 20 A & MS116-HKF1-11 ≥ 20 A

Main dimensions mm, inches

MS132 manual motor starters

0.10 to 32 A – with thermal and electromagnetic protection

MS132-10



MS132-32

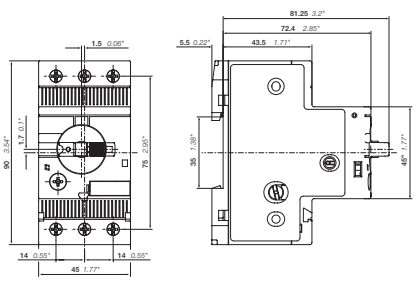
MS132-0.16-HKF1-11

MS132-32-HKF1-11

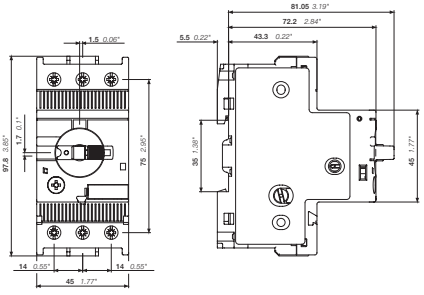
MS132 is a compact and powerful range for motor protection up to 15 kW (400 V) / 32 A in width of 45 mm. This type has §a clear and reliable indication of fault in a separate window in the event of short-circuit tripping. Further features are the built-in disconnect function, temperature compensation,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

Rated operational power 400 V AC-3, AC-3e kW	Setting range A	Short-circuit breaking capacity Ics at 400 V AC kA	Rated instantaneous short-circuit current setting Ii A	Type	Order code	Weight (1 pce) kg
0.03 (1)	0.10 ... 0.16	100	2.00	MS132-0.16	1SAM350000R1001	0.215
0.06	0.16 ... 0.25	100	3.10	MS132-0.25	1SAM350000R1002	0.215
0.09	0.25 ... 0.40	100	5.00	MS132-0.4	1SAM350000R1003	0.215
0.18	0.40 ... 0.63	100	7.90	MS132-0.63	1SAM350000R1004	0.215
0.25	0.63 ... 1.00	100	12.5	MS132-1.0	1SAM350000R1005	0.215
0.55	1.00 ... 1.60	100	20.0	MS132-1.6	1SAM350000R1006	0.265
0.75	1.60 ... 2.50	100	31.3	MS132-2.5	1SAM350000R1007	0.265
1.50	2.50 ... 4.00	100	50.0	MS132-4.0	1SAM350000R1008	0.265
2.20	4.00 ... 6.30	100	78.8	MS132-6.3	1SAM350000R1009	0.265
4.00	6.30 ... 10.0	100	150	MS132-10	1SAM350000R1010	0.265
5.50	8.00 ... 12.0	100	180	MS132-12	1SAM350000R1012	0.310
7.50	10.0 ... 16.0	100	240	MS132-16	1SAM350000R1011	0.310
7.50	16.0 ... 20.0	100	300	MS132-20	1SAM350000R1013	0.310
11.0	20.0 ... 25.0	50	375	MS132-25	1SAM350000R1014	0.310
15.0	25.0 ... 32.0	30	480	MS132-32	1SAM350000R1015	0.310
Mounted Auxiliary Contacts 1 N.O. + 1 N.C.						
0.03 (1)	0.10 ... 0.16	100	2.00	MS132-0.16-HKF1-11	1SAM350005R1001	0.231
0.06	0.16 ... 0.25	100	3.10	MS132-0.25-HKF1-11	1SAM350005R1002	0.231
0.09	0.25 ... 0.40	100	5.0	MS132-0.4-HKF1-11	1SAM350005R1003	0.231
0.18	0.40 ... 0.63	100	7.90	MS132-0.63-HKF1-11	1SAM350005R1004	0.231
0.25	0.63 ... 1.00	100	12.5	MS132-1.0-HKF1-11	1SAM350005R1005	0.231
0.55	1.00 ... 1.60	100	20.0	MS132-1.6-HKF1-11	1SAM350005R1006	0.281
0.75	1.60 ... 2.50	100	31.3	MS132-2.5-HKF1-11	1SAM350005R1007	0.281
1.50	2.50 ... 4.00	100	50.0	MS132-4.0-HKF1-11	1SAM350005R1008	0.281
2.20	4.00 ... 6.30	100	78.8	MS132-6.3-HKF1-11	1SAM350005R1009	0.281
4.00	6.30 ... 10.0	100	150	MS132-10.0-HKF1-11	1SAM350005R1010	0.281
5.50	8.00 ... 12.0	100	180	MS132-12.0-HKF1-11	1SAM350005R1012	0.326
7.50	10.0 ... 16.0	100	240	MS132-16.0-HKF1-11	1SAM350005R1011	0.326
7.50	16.0 ... 20.0	100	300	MS132-20-HKF1-11	1SAM350005R1013	0.326
11.0	20.0 ... 25.0	50	375	MS132-25-HKF1-11	1SAM350005R1014	0.326
15.0	25.0 ... 32.0	30	480	MS132-32-HKF1-11	1SAM350005R1015	0.326
Mounted Auxiliary Contacts 2 N.O. + 0 N.C.						
7.50	10 ... 16	100	240	MS132-16-HKF1-20	1SAM350006R1011	0.326

Note: Manual motor starters should always be selected so that the actual motor current is within the setting range.
(1) 690 V



MS132 ≤ 10 A



MS132 ≥ 12 A

Main dimensions mm, inches

MS132-K manual motor starters with Push-in Spring terminals

0.10 to 32 A – with thermal and electromagnetic protection

2CDC241025V0017

MS132-32K

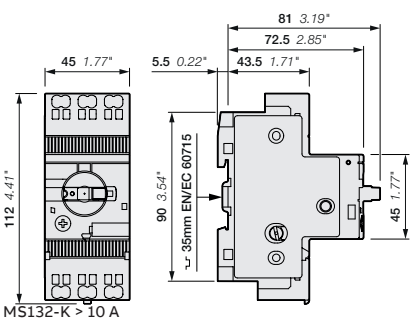
The MS132-K series is a compact and powerful range for motor protection up to 15 kW (400 V) / 32 A with a width of only 45 mm. The innovative Push-in Spring terminals enable tool-free wiring and eliminate the need for routine re-tightening.

The MS132-K also has a clear and reliable indication of fault in a separate window in the event of short-circuit tripping. Further features are the built-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication.

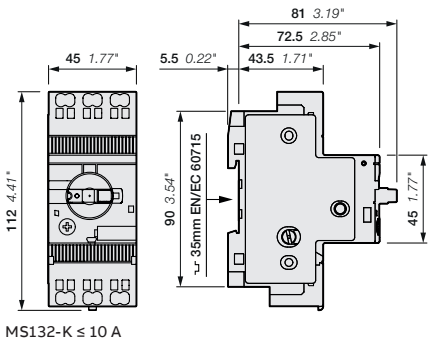
The manual motor starter is suitable for three- and single-phase applications. The handle is lockable to protect against unauthorized changes. Auxiliary contacts, signaling contacts, undervoltage releases, shunt trips, power in-feed blocks are available as accessory. These are suitable throughout the MS116/MS132/MS165-range.

Rated operational power 400 V AC-3, AC-3e	Setting range	Short-circuit breaking capacity Ics at 400 V AC	Rated instantaneous short-circuit current setting Ii	Type	Order code	Weight (1 pce)
kW	A	kA	A			kg
0.03(1)	0.10 ... 0.16	100	2.00	MS132-0.16K	1SAM350010R1001	0.256
0.06	0.16 ... 0.25	100	3.10	MS132-0.25K	1SAM350010R1002	0.256
0.09	0.25 ... 0.40	100	5.00	MS132-0.4K	1SAM350010R1003	0.256
0.18	0.40 ... 0.63	100	7.90	MS132-0.63K	1SAM350010R1004	0.256
0.25	0.63 ... 1.00	100	12.5	MS132-1.0K	1SAM350010R1005	0.256
0.55	1.00 ... 1.60	100	20.0	MS132-1.6K	1SAM350010R1006	0.298
0.75	1.60 ... 2.50	100	31.3	MS132-2.5K	1SAM350010R1007	0.280
1.50	2.50 ... 4.00	100	50.0	MS132-4.0K	1SAM350010R1008	0.286
2.20	4.00 ... 6.30	100	78.8	MS132-6.3K	1SAM350010R1009	0.289
4.00	6.30 ... 10.0	100	150	MS132-10K	1SAM350010R1010	0.296
7.50	10.0 ... 16.0	100	240	MS132-16K	1SAM350010R1011	0.316
7.50	16.0 ... 20.0	100	300	MS132-20K	1SAM350010R1013	0.317
11.0	20.0 ... 25.0	50	375	MS132-25K	1SAM350010R1014	0.316
15.0	25.0 ... 32.0	25	480	MS132-32K	1SAM350010R1015	0.316

Note: Manual motor starters should always be selected so that the actual motor current is within the setting range.
(1) 690 V



MS132-K > 10 A

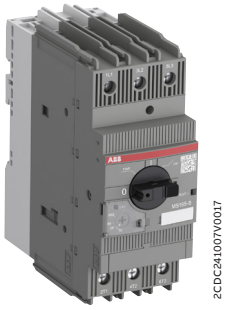


MS132-K ≤ 10 A

Main dimensions mm, inches

MS165 manual motor starters

10 to 80 A – with thermal and electromagnetic protection



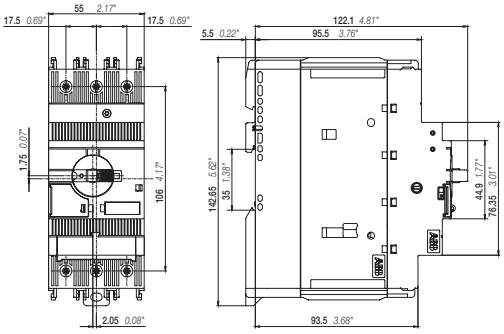
2CDC241007V0017

MS165-65

MS165 is a compact and powerful range for motor protection up to 45 kW (400 V) / 80 A in width of 55 mm. This type also has a clear and reliable indication of fault in a separate window in the event of short-circuit tripping. Further features are the built-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication. The manual motor starter is suitable for three- and single-phase applications. The handle is lockable to protect against unauthorized changes. Auxiliary contacts, signaling contacts, undervoltage releases, shunt trips, power in-feed blocks are available as accessory. These are suitable throughout the MS116/MS132/MS165-range.

Rated operational power 400 V AC-3, AC-3e kW	Setting range A	Short-circuit breaking capacity Ics at 400 V AC kA	Rated instantaneous short-circuit current setting Ii A	Type	Order code	Weight (1 pce) kg
7.5	10 ... 16	100	240	MS165-16	1SAM451000R1011	0.950
7.5	14 ... 20	100	300	MS165-20	1SAM451000R1012	0.950
11	18 ... 25	100	375	MS165-25	1SAM451000R1013	0.960
15	23 ... 32	100	480	MS165-32	1SAM451000R1014	0.970
22	30 ... 42	50	630	MS165-42	1SAM451000R1015	0.970
22	40 ... 54	30	810	MS165-54	1SAM451000R1016	0.970
30	52 ... 65	30	975	MS165-65	1SAM451000R1017	0.980
37	62 ... 73	30	1022	MS165-73	1SAM451000R1018	1.000
45	70 ... 80	30	1120	MS165-80	1SAM451000R1019	1.000

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



MS165

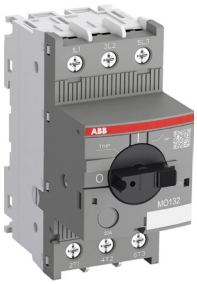
Main dimensions mm, inches

MO132 manual motor starters magnetic only

0.16 to 32 A – with electromagnetic protection

2CDC241018V0017

MO132-6.3



2CDC241015V0017

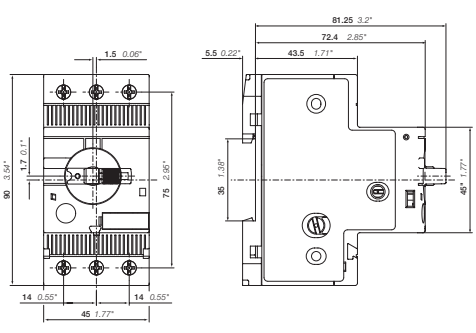
MO132-32

The MO132 manual motor starter magnetic only is a compact and powerful range for motor protection up to 15 kW (400 V AC) in width of 45 mm. The devices are used to manually switch on and off loads/motors and to protect them reliably and without the need for a fuse from short-circuits.

The manual motor starter offers a rated service short-circuit breaking capacity up to 100 kA at 400 V AC. A combination together with overload relays or motor controllers allows the protection of motors. Further features are the built-in disconnect function, trip-free mechanism and a rotary handle with a clear switch position indication. The manual motor starters magnetic only are suitable for three- and single-phase applications. The handle is lockable to protect against unauthorized changes. Auxiliary contacts, signaling contacts, undervoltage releases, shunt trips, 3-phase busbars and power in-feed blocks are available as accessory.

Rated operational power 400 V AC-3, AC-3e kW	Rated operational current A	Short-circuit breaking capacity Ics at 400 V AC kA	Rated instantaneous short-circuit current setting Ii A	Type	Order code	Weight (1 pce) kg
0.03 (1)	0.16	100	2.00	MO132-0.16	1SAM360000R1001	0.215
0.06	0.25	100	3.10	MO132-0.25	1SAM360000R1002	0.215
0.09	0.40	100	5.00	MO132-0.4	1SAM360000R1003	0.215
0.12	0.63	100	7.90	MO132-0.63	1SAM360000R1004	0.215
0.25	1.0	100	12.5	MO132-1.0	1SAM360000R1005	0.215
0.55	1.6	100	20.0	MO132-1.6	1SAM360000R1006	0.265
0.75	2.5	100	31.3	MO132-2.5	1SAM360000R1007	0.265
1.5	4.0	100	50.0	MO132-4.0	1SAM360000R1008	0.265
2.2	6.3	100	78.8	MO132-6.3	1SAM360000R1009	0.265
4.0	10	100	125	MO132-10	1SAM360000R1010	0.265
5.5	12	100	150	MO132-12	1SAM360000R1012	0.310
7.5	16	100	200	MO132-16	1SAM360000R1011	0.310
7.5	20	100	250	MO132-20	1SAM360000R1013	0.310
11	25	50	313	MO132-25	1SAM360000R1014	0.310
15	32	30	400	MO132-32	1SAM360000R1015	0.310

Note: For overload protection of motors, an appropriate thermal or electronic overload relay must be used.
(1) 690 V



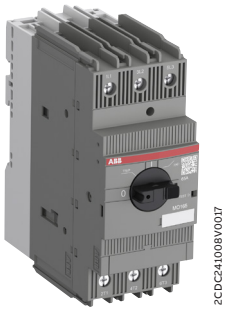
MO132 ≤ 10 A

MO132 ≥ 12 A

Main dimensions mm, inches

MO165 manual motor starters magnetic only

16 to 80 A – with electromagnetic protection



2CDC241008V0017

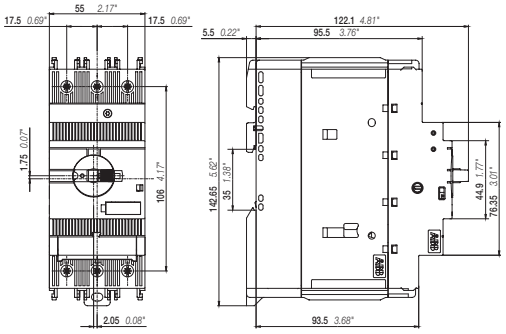
MO165-65

The MO165 manual motor starter magnetic only is a compact and powerful range for motor protection up to 45 kW (400 V AC) in width of 55 mm. The devices are used to manually switch on and off loads/motors and to protect them reliably and without the need for a fuse from short-circuits. The manual motor starter offers a rated service short-circuit breaking capacity up to 100 kA at 400 V AC. A combination together with overload relays or motor controllers allows the protection of motors. Further features are the built-in disconnect function, trip-free mechanism and a rotary handle with a clear switch position indication.

The manual motor starters magnetic only are suitable for three- and single-phase applications. The handle is lockable to protect against unauthorized changes. Auxiliary contacts, signaling contacts, undervoltage releases, shunt trips, 3-phase bus bars and power in-feed blocks are available as accessory.

Rated operational power 400 V AC-3, AC-3e kW	Rated operational current A	Short-circuit breaking capacity Ics at 400 V AC kA	Rated instantaneous short-circuit current setting Ii A	Type	Order code	Weight (1 pce) kg
7.5	16	100	240	MO165-16	1SAM461000R1011	0.950
7.5	20	100	300	MO165-20	1SAM461000R1012	0.950
11	25	100	375	MO165-25	1SAM461000R1013	0.960
15	32	100	480	MO165-32	1SAM461000R1014	0.970
22	42	50	630	MO165-42	1SAM461000R1015	0.970
22	54	30	810	MO165-54	1SAM461000R1016	0.970
30	65	30	975	MO165-65	1SAM461000R1017	0.980
37	73	30	1022	MO165-73	1SAM461000R1018	1.000
45	80	30	1120	MO165-80	1SAM461000R1019	1.000

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



MO165

Main dimensions mm, inches

03

MS116, MS132, MS165, MO132, MO165

Technical data

Main circuit – Utilization characteristics according to IEC/EN

Type		MS116	MS132	MS165	MO132	MO165
Standards		IEC/EN 60947–2, IEC/EN 60947-4-1, IEC/EN 60947-1				
Rated operational voltage Ue		690 V AC	690 V AC / 250 V DC	690 V AC / 250 V DC	690 V AC	690 V AC / 250 V DC
Rated frequency		50/60 Hz	DC, 50/60 Hz	DC, 50/60 Hz	50/60 Hz	DC, 50/60 Hz
Operational frequency		50/60 Hz	0 ... 400 Hz	0 ... 400 Hz	0 ... 400 Hz	0 ... 400 Hz
Trip class		10A	10	10	–	–
Number of poles		3				
Duty time		100%				
Mechanical durability		100000 cycles	100000 cycles	50000 cycles	100000 cycles	50000 cycles
Electrical durability	up to 10 A	up to 100000 cycles	up to 100000 cycles	up to 25000 cycles	up to 100000 cycles	up to 50000 cycles
	up to 16 A	100000 cycles	50000 cycles	25000 cycles	50000 cycles	25000 cycles
	20 ... 65 A	50000 cycles	50000 cycles	25000 cycles	50000 cycles	25000 cycles
	65 ... 80 A	–	–	20000 cycles	–	20000 cycles
Rated impulse withstand voltage Uimp		6 kV	6 kV	8 kV	6 kV	8 kV
Rated insulation voltage Ui		690 V	690 V	1000 V	690 V	1000 V
Rated operational current Ie		See ordering details				
Rated operational current DC-5 Ie 3 conducting paths in series up to 250 V		–	See "Rated operational current Ie"	See "Rated operational current Ie"	–	See "Rated operational current Ie"
Rated instantaneous short-circuit current setting Ii		See ordering details				
Rated service short-circuit breaking capacity Ics		See table "Short-circuit breaking capacity and back-up fuses"				
Rated ultimate short-circuit breaking capacity Icu		See table "Short-circuit breaking capacity and back-up fuses"				
Rated service short-circuit breaking capacity DC Ics 3 conducting paths in series up to 250 V		–	10 kA	100 kA	–	100 kA
Suitable for use in IT networks		Yes				

Short-circuit breaking capacity and back-up fuses – MS116

Ics Rated service short-circuit breaking capacity

Icu Rated ultimate short-circuit breaking capacity

Iq (Icc) Rated conditional short-circuit current

\- No back-up fuse required, because short-circuit proof up to Icu (for Icu see table below)

Short-circuit breaking capacity and back-up fuses – MS116

Type	230 V AC			400 V AC			440 V AC			500 V AC			690 V AC		
	Ics kA	Icu kA	gG, aM A	Ics kA	Icu kA	gG, aM A	Ics kA	Icu kA	gG, aM A	Ics kA	Icu kA	gG, aM A	Ics kA	Icu kA	gG, aM A
MS116-0.16	50	100	-	50	100	-	50	100	-	30	100	-	30	100	-
MS116-0.25	50	100	-	50	100	-	50	100	-	30	100	-	30	100	-
MS116-0.4	50	100	-	50	100	-	50	100	-	30	100	-	30	100	-
MS116-0.63	50	100	-	50	100	-	50	100	-	30	100	-	30	100	-
MS116-1.0	50	100	-	50	100	-	50	100	-	30	100	-	30	100	-
MS116-1.6	50	100	-	50	100	-	50	100	-	30	100	-	30	100	-
MS116-2.5	50	75	-	50	75	-	10	30	25 (1)	10	20	25 (1)	5	10	25 (1)
MS116-4.0	50	75	-	50	75	-	6	18	25 (1)	6	15	25 (1)	2	3	25 (1)
MS116-6.3	50	75	-	50	75	-	6	18	63 (1)	6	15	63 (1)	2	3	40 (1)
MS116-10	50	75	-	50	75	-	6	18	63 (1)	6	15	63 (1)	2	3	50 (1)
MS116-12	25	50	80 (1)	25	50	80 (1)	6	15	63 (1)	6	15	63 (1)	2	3	50 (1)
MS116-16	16	16	80 (1)	16	16	80 (1)	6	15	63 (1)	4	10	63 (1)	2	3	63 (1)
MS116-20	10	16	125 (1)	10	16	125 (1)	3	15	125 (1)	3	10	125 (1)	2	3	80 (1)
MS116-25	10	16	125 (1)	10	16	125 (1)	3	15	125 (1)	3	10	125 (1)	2	3	100 (1)
MS116-32	10	16	125 (1)	10	16	125 (1)	3	15	125 (1)	3	10	125 (1)	2	3	100 (1)

(1) Maximum rated current of the back-up fuse for short circuit up to 50 kA if Icc > Ics

MS116, MS132, MS165, MO132, MO165
Technical data

Ics Rated service short-circuit breaking capacity
Icu Rated ultimate short-circuit breaking capacity
Iq (Icc) Rated conditional short-circuit current
- No back-up fuse required, because short-circuit proof up to Icu (for Icu see table below)

Short-circuit breaking capacity and back-up fuses – MS132

Type	230 V AC			400 V AC			440 V AC			500 V AC			690 V AC			250 V DC(2)		
	Ics kA	Icu kA	gG, aM A	Ics kA	Icu kA	gG, aM A	Ics kA	Icu kA	gG, aM A	Ics kA	Icu kA	gG, aM A	Ics kA	Icu kA	gG, aM A	Ics kA	Icu kA	gG, aM A
MS132-0.16	100	100	-	100	100	-	100	100	-	100	100	-	100	100	-	10	10	-
MS132-0.25	100	100	-	100	100	-	100	100	-	100	100	-	100	100	-	10	10	-
MS132-0.4	100	100	-	100	100	-	100	100	-	100	100	-	100	100	-	10	10	-
MS132-0.63	100	100	-	100	100	-	100	100	-	100	100	-	100	100	-	10	10	-
MS132-1.0	100	100	-	100	100	-	100	100	-	100	100	-	100	100	-	10	10	-
MS132-1.6	100	100	-	100	100	-	100	100	-	100	100	-	100	100	-	10	10	-
MS132-2.5	100	100	-	100	100	-	100	100	-	100	100	-	100	100	-	10	10	-
MS132-4.0	100	100	-	100	100	-	30	30	35(1)	20	20	35(1)	3	3	32(1)	10	10	-
MS132-6.3	100	100	-	100	100	-	30	30	63(1)	20	20	63(1)	3	3	50(1)	10	10	-
MS132-10	100	100	-	100	100	-	30	30	100(1)	20	20	100(1)	3	3	50(1)	10	10	-
MS132-12	100	100	-	100	100	-	30	30	100(1)	20	20	100(1)	3	3	63(1)	10	10	-
MS132-16	100	100	-	100	100	-	30	30	125(1)	20	20	125(1)	3	3	63(1)	10	10	-
MS132-20	100	100	-	100	100	-	30	30	125(1)	20	20	125(1)	3	3	80(1)	10	10	-
MS132-25	50	50	125(1)	50	50	125(1)	30	30	125(1)	10	10	125(1)	3	3	100(1)	10	10	-
MS132-32	30	50	125(1)	30	50	125(1)	30	30	125(1)	10	10	125(1)	3	3	100(1)	10	10	-

(1) Maximum rated current of the back-up fuse for short circuit up to 100kA if Icc > Ics
(2) 3 poles in series

Short-circuit breaking capacity and back-up fuses – MS165

Type	230 V AC			400 V AC			415 V AC			440 V AC			500 V AC			690 V AC			250 V DC (2)		
	Ics kA	Icu kA	gG A	Ics kA	Icu kA	gG A	Ics kA	Icu kA	gG A	Ics kA	Icu kA	gG A	Ics kA	Icu kA	gG A	Ics kA	Icu kA	gG A	Ics kA	Icu kA	gG A
MS165-16	100	100	-	100	100	-	100	100	-	75	75	125 (1)	40	40	125 (1)	10	10	63 (1)	100	100	-
MS165-20	100	100	-	100	100	-	100	100	-	75	75	125 (1)	40	40	125 (1)	10	10	63 (1)	100	100	-
MS165-25	100	100	-	100	100	-	100	100	-	50	50	125 (1)	30	30	125 (1)	10	10	80 (1)	100	100	-
MS165-32	100	100	-	100	100	-	100	100	-	50	50	125 (1)	30	30	125 (1)	10	10	100 (1)	100	100	-
MS165-42	50	50	125 (1)	50	50	125 (1)	50	50	125	50	50	125 (1)	30	30	125 (1)	10	10	100 (1)	100	100	-
MS165-54	30	50	125 (1)	30	50	125 (1)	30	45	125	30	45	125 (1)	20	20	125 (1)	6	8	100 (1)	100	100	-
MS165-65	30	50	125 (1)	30	50	125 (1)	30	45	125	30	45	125 (1)	20	20	125 (1)	6	8	100 (1)	100	100	-
MS165-73	30	30	200 (1)	30	30	200 (1)	18	18	200 (1)	18	18	200 (1)	10	10	200 (1)	6	8	160 (1)	100	100	-
MS165-80	30	30	200 (1)	30	30	200 (1)	18	18	200 (1)	18	18	200 (1)	10	10	200 (1)	6	8	160 (1)	100	100	-

(1) Maximum rated current of the back-up fuse for short circuit up to 100kA if Icc > Ics
(2) 3 poles in series

Short-circuit breaking capacity and back-up fuses - MO132

Type	230 V AC			400 V AC			440 V AC			500 V AC			690 V AC		
	Ics kA	Icu kA	gG, aM A	Ics kA	Icu kA	gG, aM A	Ics kA	Icu kA	gG, aM A	Ics kA	Icu kA	gG, aM A	Ics kA	Icu kA	gG, aM A
MO132-0.16	100	100	-	100	100	-	100	100	-	100	100	-	100	100	-
MO132-0.25	100	100	-	100	100	-	100	100	-	100	100	-	100	100	-
MO132-0.4	100	100	-	100	100	-	100	100	-	100	100	-	100	100	-
MO132-0.63	100	100	-	100	100	-	100	100	-	100	100	-	100	100	-
MO132-1.0	100	100	-	100	100	-	100	100	-	100	100	-	100	100	-
MO132-1.6	100	100	-	100	100	-	100	100	-	100	100	-	100	100	-
MO132-2.5	100	100	-	100	100	-	100	100	-	100	100	-	100	100	-
MO132-4.0	100	100	-	100	100	-	30	30	35 (1)	20	20	35 (1)	3	3	32 (1)
MO132-6.3	100	100	-	100	100	-	30	30	63 (1)	20	20	63 (1)	3	3	50 (1)
MO132-10	100	100	-	100	100	-	30	30	100 (1)	20	20	100 (1)	3	3	50 (1)
MO132-12	100	100	-	100	100	-	30	30	100 (1)	20	20	100 (1)	3	3	63 (1)
MO132-16	100	100	-	100	100	-	30	30	125 (1)	20	20	125 (1)	3	3	63 (1)
MO132-20	100	100	-	100	100	-	30	30	125 (1)	20	20	125 (1)	3	3	80 (1)
MO132-25	50	50	125 (1)	50	50	125 (1)	30	30	125 (1)	10	10	125 (1)	3	3	100 (1)
MO132-32	30	50	125 (1)	30	50	125 (1)	30	30	125 (1)	10	10	125 (1)	3	3	100 (1)

(1) Maximum rated current of the back-up fuse for short circuit up to 100kA if Icc > Ics

MS116, MS132, MS165, MO132, MO165
Technical data

Ics Rated service short-circuit breaking capacity
Icu Rated ultimate short-circuit breaking capacity
Iq (Icc) Rated conditional short-circuit current
- No back-up fuse required, because short-circuit proof up to Icu (for Icu see table below)

Short-circuit breaking capacity and back-up fuses – MO165

Type	230 V AC			400 V AC			415 V AC			440 V AC			500 V AC			690 V AC			250 V DC (2)		
	Ics kA	Icu kA	gG A	Ics kA	Icu kA	gG A	Ics kA	Icu kA	gG A	Ics kA	Icu kA	gG A	Ics kA	Icu kA	gG A	Ics kA	Icu kA	gG A	Ics kA	Icu kA	gG A
MO165-16	100	100	-	100	100	-	100	100	-	75	75	125 (1)	40	40	125 (1)	10	10	63 (1)	100	100	-
MO165-20	100	100	-	100	100	-	100	100	-	75	75	125 (1)	40	40	125 (1)	10	10	63 (1)	100	100	-
MO165-25	100	100	-	100	100	-	100	100	-	50	50	125 (1)	30	30	125 (1)	10	10	80 (1)	100	100	-
MO165-32	100	100	-	100	100	-	100	100	-	50	50	125 (1)	30	30	125 (1)	10	10	100 (1)	100	100	-
MO165-42	50	50	125 (1)	50	50	125 (1)	50	50	125	50	50	125 (1)	30	30	125 (1)	10	10	100 (1)	100	100	-
MO165-54	30	50	125 (1)	30	50	125 (1)	30	45	125	30	45	125 (1)	20	20	125 (1)	6	8	100 (1)	100	100	-
MO165-65	30	50	125 (1)	30	50	125 (1)	30	45	125	30	45	125 (1)	20	20	125 (1)	6	8	100 (1)	100	100	-
MO165-73	30	30	200 (1)	30	30	200 (1)	18	18	200 (1)	18	18	200 (1)	10	10	200 (1)	6	8	160 (1)	100	100	-
MO165-80	30	30	200 (1)	30	30	200 (1)	18	18	200 (1)	18	18	200 (1)	10	10	200 (1)	6	8	160 (1)	100	100	-

(1) Maximum rated current of the back-up fuse for short circuit up to 100kA if Icc > Ics
(2) 3 poles in series

Main circuit – Utilization characteristics according to UL/CSA

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

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

UL/CSA ratings overview

Type	MS116	MS132	MS165	MO132	MO165
Manual Motor Controller	x	x	x	x	x
Manual Motor Controller, Suitable as Motor Disconnect	x	x	x	x	x
Manual Motor Controller, Suitable for use in Group Installations	x	x	x	x	x
Manual Motor Controller, Suitable for Tap Conductor Protection in Group Installations	-	x	x	x	x
Manual self-protected Combination Motor Controller (Type E)	-	x	x	-	-
Combination Motor Controller (Type F)	-	with AF contactor	with AF contactor (up to 80 A)	with AF contactor and EOL	with AF contactor and EOL or TOL (up to 80 A)

MS116, MS132, MS165, MO132, MO165

Technical data

UL/CSA Motor ratings, three phase – MS116

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

UL/CSA Motor ratings, three phase – MS132

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

UL/CSA Motor ratings, three phase – MS165

Type	200 V AC			208 V AC			220 ... 240 V AC			440 ... 480 V AC			550 ... 600 V AC		
	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA
MS165-16	3	11	73.6	3	10.6	71	5	15.2	92	10	14	81	10	11	64.8
MS165-20	5	17.5	105.8	5	16.7	102	5	15.2	92	10	14	81	15	17	93
MS165-25	5	17.5	105.8	7 1/2	24.2	140	7 1/2	22	127	15	21	116	20	22	116
MS165-32	7 1/2	25.3	146	10	30.8	179	10	28	162	20	27	145	30	32	174
MS165-42	10	32.2	186.3	10	30.8	179	15	42	232	30	40	218	40	41	232
MS165-54	15	48.3	267	15	46.2	257	20	54	290	40	52	290	50	52	290
MS165-65	20	62.1	334	20	59.4	321	20	54	290	50	65	363	60	62	348
MS165-73	20	62.1	334	20	59.4	321	25	68	365	50	65	363	60	62	348
MS165-80	25	78.2	420	25	74.8	404	30	80	435	60	77	435	75	77	434

hp Horsepower
FLA Full Load Amps
LRA Locked Rotor Amps

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

MS116, MS132, MS165, MO132, MO165

Technical data

UL/CSA Motor ratings, three phase – MO132

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

UL/CSA Motor ratings, three phase – MO165

Type	200 V AC			208 V AC			220 ... 240 V AC			440 ... 480 V AC			550 ... 600 V AC		
	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA
MO165-16	3	11	73.6	3	10.6	71	5	15.2	92	10	14	81	10	11	64.8
MO165-20	5	17.5	105.8	5	16.7	102	5	15.2	92	10	14	81	15	17	93
MO165-25	5	17.5	105.8	7 1/2	24.2	140	7 1/2	22	127	15	21	116	20	22	116
MO165-32	7 1/2	25.3	146	10	30.8	179	10	28	162	20	27	145	30	32	174
MO165-42	10	32.2	186.3	10	30.8	179	15	42	232	30	40	218	40	41	232
MO165-54	15	48.3	267	15	46.2	257	20	54	290	40	52	290	50	52	290
MO165-65	20	62.1	334	20	59.4	321	20	54	290	50	65	363	60	62	348
MO165-73	20	62.1	334	20	59.4	321	25	68	365	50	65	363	60	62	348
MO165-80	25	78.2	420	25	74.8	404	30	80	435	60	77	435	75	77	434

hp Horsepower
FLA Full Load Amps
LRA Locked Rotor Amps

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

MS116, MS132, MS165, MO132, MO165
Technical data

UL/CSA Maximum short-circuit current ratings – MS116

Type	Manual Motor Controllers Branch circuit protection, max. size per NEC/CEC (1)		Maximum short-circuit current for motor disconnect (2)		for group installations	
	Fuses	Circuit breaker	480 V	600 V	480 V	600 V
	A	A	kA	kA	kA	kA
MS116-0.16	Any listed fuses. Size per NEC/CEC	Any listed UL489 / CSA C22.2 N° 5 circuit breaker. Size per NEC/CEC	30	5	30	5
MS116-0.25			30	5	30	5
MS116-0.40			30	5	30	5
MS116-0.63			30	5	30	5
MS116-1.0			30	5	30	5
MS116-1.6			30	5	30	5
MS116-2.5			30	5	30	5
MS116-4.0			18	5	18	5
MS116-6.3			18	5	18	5
MS116-10			18	5	18	5
MS116-12			18	5	18	5
MS116-16			18	5	18	5
MS116-20			18	5	18	5
MS116-25			18	5	18	5
MS116-32			18	5	18	5

(1) NEC: NFPA®70 National Electrical Code®; CEC: CSA C22.1 Canadian Electrical Code.
(2) Suitable as motor disconnect with padlock adaptor SA1 or SA3.

UL/CSA Maximum short-circuit current ratings – MS132

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

(1) NEC: NFPA®70 National Electrical Code®; CEC: CSA C22.1 Canadian Electrical Code.
(2) In combination with feeder block S1-M3-xx or terminal spacer TS1-M3-S1 (for 0.16 ... 10 A) / TS1-M3-S2 (for 12 ... 32 A).

MS116, MS132, MS165, MO132, MO165
Technical data

UL/CSA Maximum short-circuit current ratings – MS116 with AF contactors

Type	Motor Disconnect, Group Installations, Coordination Type 2			
	480 V		600 V	
	Minimum contactor size	kA	Minimum contactor size	kA
MS116-0.16	AF09-AF16	30	AF09-AF16	5
MS116-0.25	AF09-AF16	30	AF09-AF16	5
MS116-0.4	AF09-AF16	30	AF09-AF16	5
MS116-0.63	AF09-AF16	30	AF09-AF16	5
MS116-1.0	AF09-AF16	30	AF09-AF16	5
MS116-1.6	AF09-AF16	30	AF09-AF16	5
MS116-2.5	AF26-AF38	30	AF16	5
MS116-4.0	AF26-AF38	18	AF16	5
MS116-6.3	AF26-AF38	18	AF26-AF38	5
MS116-10	AF26-AF38	18	AF30-AF38	5
MS116-12	AF26-AF38	18	AF30-AF38	5
MS116-16	AF26-AF38	18	AF40	5
MS116-20	AF26-AF38	18	AF40	5
MS116-25	AF30-AF38	18	AF40	5
MS116-32	AF38	18	AF40	5

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

Type	Combination Motor Controllers (Type F) (1)					
	Coordination type 1			Coordination type 2		
	Minimum contactor size	480Y / 277 V kA	600Y / 347 V kA	Minimum contactor size	480Y / 277 V kA	600Y / 347 V kA
MS132-0.16	AF09 ... AF38	100	50	AF26 ... AF38	65	47
MS132-0.25	AF09 ... AF38	100	50	AF26 ... AF38	65	47
MS132-0.40	AF09 ... AF38	100	50	AF26 ... AF38	65	47
MS132-0.63	AF09 ... AF38	100	50	AF26 ... AF38	65	47
MS132-1.0	AF09 ... AF38	100	50	AF26 ... AF38	65	47
MS132-1.6	AF09 ... AF38	100	50	AF26 ... AF38	65	47
MS132-2.5	AF09 ... AF38	100	50	AF26 ... AF38	65	47
MS132-4.0	AF09 ... AF38	100	50	AF26 ... AF38	65	47
MS132-6.3	AF09 ... AF38	100	47	AF26 ... AF38	65	47
MS132-10	AF09 ... AF38	100	30	AF26 ... AF38	65	47
MS132-12	AF09 ... AF38	65	30	AF26 ... AF38	30	-
MS132-16	AF26 ... AF38	65	30	AF26 ... AF38	30	-
MS132-20	AF26 ... AF38	65	–	AF26 ... AF38	30	-
MS132-25	AF26 ... AF38	50	–	AF26 ... AF38	30	-
MS132-32	AF38	50	–	AF26 ... AF38	30	-

(1) In combination with feeder block S1-M3-xx or terminal spacer TS1-M3-S1 (for 0.16 ... 10 A) / TS1-M3-S2 (for 12 ... 32 A).

MS116, MS132, MS165, MO132, MO165
Technical data

UL/CSA Maximum short-circuit current ratings – MO132 with electronic overload relays and AF contactors

Type	EOL	Combination Motor Controllers (Type F) (1) Coordination type 1 Minimum contactor size	480Y / 277 V kA	600Y / 347 V kA
MO132-0.16	EF19	AF09 ... AF38	100	50
MO132-0.25	EF19	AF09 ... AF38	100	50
MO132-0.40	EF19	AF09 ... AF38	100	50
MO132-0.63	EF19	AF09 ... AF38	100	50
MO132-1.0	EF19	AF09 ... AF38	100	50
MO132-1.6	EF19	AF09 ... AF38	100	50
MO132-2.5	EF19	AF09 ... AF38	100	50
MO132-4.0	EF19	AF09 ... AF38	100	50
MO132-6.3	EF19	AF09 ... AF38	100	50
MO132-10	EF19	AF09 ... AF38	100	30
MO132-12	EF19	AF09 ... AF38	65	30
MO132-16	EF19	AF12 ... AF38	65	30
MO132-20	EF19	AF16 ... AF38	65	–
MO132-25	EF45-30	AF26 ... AF38	50	–
MO132-32	EF45-45	AF38	50	–

NOTE : More coordination tables are available in our SOC (selected optimized coordination) tool: https://applications.it.abb.com/SOC/Motor.
(1) In combination with feeder block S1-M3-xx or terminal spacer TS1-M3-S1 (for 0.16 ... 10 A) / TS1-M3-S2 (for 12 ... 32 A).

UL/CSA Maximum short-circuit current ratings – MS165

Type	Manual Motor Controllers Branch circuit protection, max. size per NEC/CEC (1)		for motor disconnect		for group installations		for tap conductor protection in group installations		Manual self-protected Combination Motor Controllers (Type E)	
	Fuses A	Circuit breaker A	480 V kA	600 V kA	480 V kA	600 V kA	480Y / 277 V kA	600Y / 347 V kA	480Y / 277 V kA	600Y / 347 V kA
MS165-16	Any Listed fuses. Size per NEC/CEC	Any Listed UL489 / CSA C22.2 No.5 circuit breaker. Size per NEC/CEC	65	30	65	30	65	30	65	30
MS165-20			65	30	65	30	65	30	65	30
MS165-25			65	30	65	30	65	30	65	30
MS165-32			65	30	65	30	65	30	65	30
MS165-42			65	30	65	30	65	30	65	30
MS165-54			65	30	65	30	65	30	65	30
MS165-65			65	30	65	30	65	30	65	30
MS165-73			50	10	50	10	50	10	50	–
MS165-80			50	10	50	10	50	10	50	–

(1) NEC: NFPA®70 National Electrical Code®; CEC: CSA C22.1 Canadian Electrical Code.

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

Type	Manual self-protected Combination Motor Controllers (Type F) Coordination type 1				Manual self-protected Combination Motor Controllers (Type F) Coordination type 2			
	Minimum contactor size	480Y / 277 V kA	Minimum contactor size	600Y / 347 V kA	Minimum contactor size	480Y / 277 V kA	Minimum contactor size	600Y / 347 V kA
MS165-16	AF09...AF38	65	AF09...AF38	50	AF26...AF38	65	AF09...AF38	30
MS165-20	AF26...AF38	65	AF26...AF38	50	AF26...AF38	65	AF09...AF38	30
MS165-25	AF26...AF38	65	AF26...AF38	50	AF26...AF38	65	AF40...AF65	30
MS165-32	AF26...AF38	65	AF26...AF38	50	AF26...AF38	65	AF40...AF65	30
MS165-42	AF40...AF65	65	AF40...AF65	30	AF40...AF65	65	AF40...AF65	30
MS165-54	AF40...AF65	65	AF40...AF65	30	AF40...AF65	65	AF40...AF65	30
MS165-65	AF40...AF65	65	AF40...AF65	30	AF40...AF65	65	AF40...AF65	30
MS165-73	AF80...AF96	50	–	–	AF80...AF96	50	–	–
MS165-80	AF80...AF96	50	–	–	AF80...AF96	50	–	–

MS116, MS132, MS165, MO132, MO165
Technical data

More coordination tables are available in our SOC (selected optimized coordination) tool:
https://applications.it.abb.com/SOC/Motor

UL/CSA Maximum short-circuit current ratings – MO132

Type	Manual Motor Controllers							
	Branch circuit protection, max. size per NEC/CEC (1)		for motor disconnect		for group installations		for tap conductor protection in group installations	
	Fuses	Circuit breaker	480 V	600 V	480 V	600 V	480 Y / 277 V	600 Y / 347 V
	A	A	kA	kA	kA	kA	kA	kA
MO132-0.16	Any Listed fuses. Size per NEC/CEC	Any Listed UL489 / CSA C22.2 No.5 circuit breaker. Size per NEC/CEC	65	47	65	47	65	47
MO132-0.25			65	47	65	47	65	47
MO132-0.40			65	47	65	47	65	47
MO132-0.63			65	47	65	47	65	47
MO132-1.0			65	47	65	47	65	47
MO132-1.6			65	47	65	47	65	47
MO132-2.5			65	47	65	47	65	47
MO132-4.0			65	47	65	47	65	47
MO132-6.3			65	18	65	18	65	18
MO132-10			65	18	65	18	65	18
MO132-12			30	18	30	18	30	18
MO132-16			30	18	30	18	30	18
MO132-20			30	18	30	18	30	18
MO132-25			30	18	30	18	30	18
MO132-32			30	18	30	18	30	18

(1) NEC: NFPA®70 National Electrical Code®; CEC: CSA C22.1 Canadian Electrical Code.

UL/CSA Maximum short-circuit current ratings – MO165

Type	Manual Motor Controllers							
	Branch circuit protection, max. size per NEC/CEC (1)		for motor disconnect		for group installations		for tap conductor protection in group installations	
	Fuses	Circuit breaker	480 V	600 V	480 V	600 V	480Y / 277 V	600Y / 347 V
	A	A	kA	kA	kA	kA	kA	kA
MO165-16	Any Listed fuses. Size per NEC/CEC	Any Listed UL489 / CSA C22.2 No.5 circuit breaker. Size per NEC/CEC	65	30	65	30	65	30
MO165-20			65	30	65	30	65	30
MO165-25			65	30	65	30	65	30
MO165-32			65	30	65	30	65	30
MO165-42			65	30	65	30	65	30
MO165-54			65	30	65	30	65	30
MO165-65			65	30	65	30	65	30
MO165-73			50	10	50	10	50	10
MO165-80			50	10	50	10	50	10

(1) NEC: NFPA®70 National Electrical Code®; CEC: CSA C22.1 Canadian Electrical Code.

MS116, MS132, MS165, MO132, MO165

Technical data

UL/CSA Maximum short-circuit current ratings – MO165 with AF contactors and electronic overload relays

Type	Combination Motor Controllers (Type F) Coordination type 1					
	480Y / 277 V kA	OL Relay	Contactor	600Y / 347 V kA	OL Relay	Contactor
MO165-16	65	EF19-18.9	AF09...AF38	50	EF19-18.9	AF09...AF38
MO165-20	65	EF45-30	AF26...AF38	50	EF45-30	AF26...AF38
MO165-25	65	EF45-30	AF26...AF38	50	EF45-30	AF26...AF38
MO165-32	65	EF45-45	AF26...AF38	50	EF45-45	AF26...AF38
MO165-42	65	EF65	AF40...AF65	30	EF65	AF40...AF65
MO165-54	65	EF65	AF40...AF65	30	EF65	AF40...AF65
MO165-65	65	EF65	AF40...AF65	30	EF65	AF40...AF65
MO165-73	50	EF96	AF80 ... AF96	–	–	–
MO165-80	50	EF96	AF80 ... AF96	–	–	–

UL/CSA Maximum short-circuit current ratings – MO165 with AF contactors and thermal overload relays

Type	Combination Motor Controllers (Type F) Coordination type 1					
	480Y / 277 V kA	OL Relay	Contactor	600Y / 347 V kA	OL Relay	Contactor
MO165-16	65	TF42	AF09...AF38	30	TF42	AF09...AF38
MO165-20	65	TF42	AF26...AF38	30	TF42	AF09...AF38
MO165-25	65	TF42	AF26...AF38	50	TF42	AF26...AF38
MO165-32	65	TF42	AF26...AF38	50	TF42	AF26...AF38
MO165-42	65	TF65	AF40...AF65	30	TF65	AF40...AF65
MO165-54	65	TF65	AF40...AF65	30	TF65	AF40...AF65
MO165-65	65	TF65	AF40...AF65	30	TF65	AF40...AF65
MO165-73	50	TF96	AF80 ... AF96	–	–	–
MO165-80	50	TF96	AF80 ... AF96	–	–	–

MS116, MS132, MS165, MO132, MO165

Technical data

General technical data

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

(1) Push-in Spring terminals : IP20
(2) Please refer to application note: **2CDC131183M0201**

Connecting characteristics - Main circuit

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

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

Type		MS132-K with Push-in Spring terminals
Connecting capacity		
Rigid solid	1 or 2 x	1 ... 2.5 mm²
Rigid stranded	1 or 2 x	1 ... 6 mm²
Flexible with ferrule	1 or 2 x	1 (push-in) / 0.5 (spring) ... 4 mm²
Flexible with insulated ferrule	1 x	1 (push-in) / 0.5 (spring) ... 4 mm²
	1/2 x	1 (push-in) / 0.5 (spring) ... 2.5 mm²
Flexible	1 or 2 x	0.5 (spring) ... 4 mm²
Stranded acc. to UL/CSA	1/2 x	AWG 18 ... 10 (push-in) / AWG 18 ... 8 (spring)
	1 x	AWG 8
Wire stripping length		12 mm
Screwdriver		Flat Ø 3 mm x 0.5 mm

Connecting characteristics - Main circuit

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

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

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

MS132-T circuit breakers for transformer protection

Low voltage transformers are used to supply power to control and auxiliary circuits in distribution and automation boards and to provide galvanic isolation. These transformers may be damaged by an electrical failure (short-circuit or overload on the primary side), therefore a proper protection should be provided.

Complete portfolio

Manual motor starter accessories are suitable throughout the complete range. Moreover ABB offers special accessories for fast single-phase setup.

S1-PB1-25 PB1-1-32

Troubleshooting made easy

MS132-T feature a magnetic trip indicator. This way, every tripping event will be distinguished, making troubleshooting a lot easier and faste

Transformer protection

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

Circuit breakers for transformers protection are specially designed for fuseless protection of control transformers on the primary side against overloads and short-circuits.

Selection table MS132-T with ABB control transformers:
Please refer to document no. 2CDC131111D0201

Application example
Protection of transformers for power supply of control and auxiliary circuits, both in distribution and automation boards (checking, signaling, interlock, etc).

MS132-T circuit breakers for transformer protection

0.10 to 25 A – with thermal and electromagnetic protection

2CDC241009V0017

MS132-10T

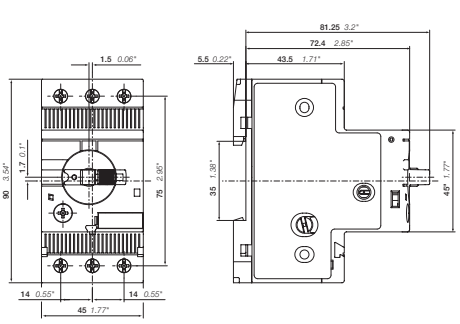
2CDC241002F0014

MS132-25T

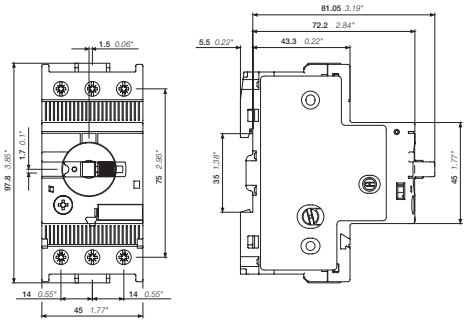
Circuit breakers for transformer protection are electro-mechanical protection devices specially designed to protect control transformers on the primary side. They allow fuseless protection against overload and short-circuit, saving space and cost and ensuring a quick reaction under short-circuit condition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

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

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



MS132T ≤ 10 A



MS132T ≥ 12 A

Main dimensions mm, inches

MS132-KT circuit breakers for transformer protection with Push-in Spring terminals

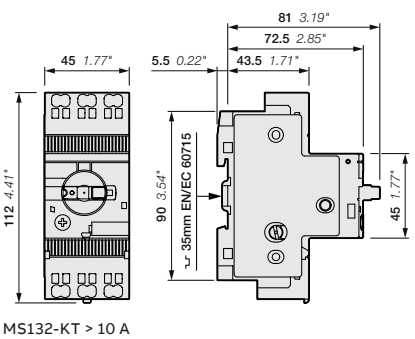
0.10 to 25 A – with thermal and electromagnetic protection

MS132-KT

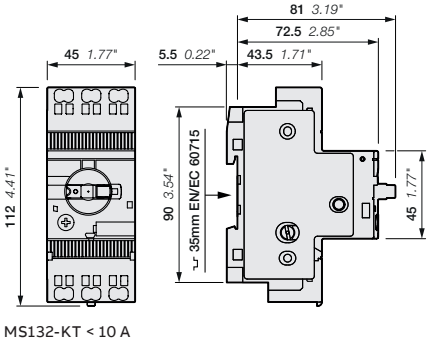
Circuit breakers for transformer protection with Push-in Spring terminals are electro-mechanical protection devices specially designed to protect control transformers on the primary side. They allow fuseless protection against overload and short-circuit, saving space and cost and ensuring a quick reaction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

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

Setting range A	Short-circuit breaking capacity Ics at 400 V AC kA	Rated instantaneous short-circuit current setting Ii A	Type	Order code	Weight (1 pce) kg
0.10 ... 0.16	100	3.2	MS132-0.16KT	1SAM340010R1001	0.256
0.16 ... 0.25	100	5	MS132-0.25KT	1SAM340010R1002	0.256
0.25 ... 0.40	100	8	MS132-0.4KT	1SAM340010R1003	0.256
0.40 ... 0.63	100	12.6	MS132-0.63KT	1SAM340010R1004	0.256
0.63 ... 1.00	100	20	MS132-1.0KT	1SAM340010R1005	0.256
1.00 ... 1.60	100	32	MS132-1.6KT	1SAM340010R1006	0.298
1.60 ... 2.50	100	50	MS132-2.5KT	1SAM340010R1007	0.280
2.50 ... 4.00	100	80	MS132-4.0KT	1SAM340010R1008	0.286
4.00 ... 6.30	100	126	MS132-6.3KT	1SAM340010R1009	0.289
6.30 ... 10.0	100	200	MS132-10KT	1SAM340010R1010	0.296
10.0 ... 16.0	100	320	MS132-16KT	1SAM340010R1011	0.316
16.0 ... 20.0	100	400	MS132-20KT	1SAM340010R1013	0.317
20.0 ... 25.0	50	500	MS132-25KT	1SAM340010R1014	0.316



MS132-KT > 10 A



MS132-KT < 10 A

Main dimensions mm, inches

MS132-T, MS132-KT

Technical data

Main circuit – Utilization characteristics according to IEC/EN

Type	MS132-T / -KT
Standards	IEC/EN 60947–2, IEC/EN 60947-4-1, IEC/EN 60947-1
Rated operational voltage Ue	690 V AC
Rated frequency	50/60 Hz
Operational frequency	0 ... 400 Hz
Trip class	10
Number of poles	3
Duty time	100%
Mechanical durability	100000 cycles
Electrical durability	50000 cycles
Rated impulse withstand voltage Uimp	6 kV
Rated insulation voltage Ui	690 V
Rated operational current Ie	See ordering details
Rated instantaneous short-circuit current setting Ii	See ordering details
Rated service short-circuit breaking capacity Ics	See table "Short-circuit breaking capacity and back-up fuses"
Rated ultimate short-circuit breaking capacity Icu	See table "Short-circuit breaking capacity and back-up fuses"
Suitable for use in IT networks	Yes

Short-circuit breaking capacity and back-up fuses

Ics Rated service short-circuit breaking capacity

Icu Rated ultimate short-circuit breaking capacity

Iq (Icc) Rated conditional short-circuit current

\- No back-up fuse required, because short-circuit proof up to Icu (for Icu see table below)

Type	230 V AC			400 V AC			440 V AC			500 V AC			690 V AC		
	Ics kA	Icu kA	gG, aM A	Ics kA	Icu kA	gG, aM A	Ics kA	Icu kA	gG, aM A	Ics kA	Icu kA	gG, aM A	Ics kA	Icu kA	gG, aM A
MS132-0.16(K)T	100	100	-	100	100	-	100	100	-	100	100	-	100	100	-
MS132-0.25(K)T	100	100	-	100	100	-	100	100	-	100	100	-	100	100	-
MS132-0.4(K)T	100	100	-	100	100	-	100	100	-	100	100	-	100	100	-
MS132-0.63(K)T	100	100	-	100	100	-	100	100	-	100	100	-	100	100	-
MS132-1.0(K)T	100	100	-	100	100	-	100	100	-	100	100	-	100	100	-
MS132-1.6(K)T	100	100	-	100	100	-	100	100	-	100	100	-	100	100	-
MS132-2.5(K)T	100	100	-	100	100	-	100	100	-	100	100	-	100	100	-
MS132-4.0(K)T	100	100	-	100	100	-	30	30	35 (1)	20	20	35 (1)	3	3	35 (1)
MS132-6.3(K)T	100	100	-	100	100	-	30	30	63 (1)	20	20	63 (1)	3	3	50 (1)
MS132-10(K)T	100	100	-	100	100	-	30	30	100 (1)	20	20	100 (1)	3	3	50 (1)
MS132-12T	100	100	-	100	100	-	30	30	100 (1)	20	20	100 (1)	3	3	63 (1)
MS132-16(K)T	100	100	-	100	100	-	30	30	125 (1)	20	20	125 (1)	3	3	63 (1)
MS132-20(K)T	100	100	-	100	100	-	30	30	125 (1)	20	20	125 (1)	3	3	80 (1)
MS132-25(K)T	50	50	125 (1)	50	50	125 (1)	30	30	125 (1)	10	10	125 (1)	3	3	100 (1)

(1) Maximum rated current of the back-up fuse for short circuit up to 100kA if Icc > Ics

MS132-T, MS132-KT
Technical data

Main circuit – Utilization characteristics according to UL

Type	**MS132-T / -KT**
Standards	UL 60947-1, UL 60947-4-1
Rated operational voltage Ue acc. to UL/CSA	600 V AC
Trip class	10
Motor ratings (1) Full Load Amps (FLA)	see table UL current ratings

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

UL/CSA ratings overview

Type	**MS132-T / -KT**
Manual Controller for Control Transformer Protection	x
Manual Motor Controller	not applicable
Manual Motor Controller, Suitable as Motor Disconnect	not applicable
Manual Motor Controller, Suitable for use in Group Installations	not applicable
Manual Motor Controller, Suitable for Tap Conductor Protection in Group Installations	x
Manual self-protected Combination Motor Controller (Type E)	not applicable
Combination Motor Controller (Type F)	not applicable

UL current ratings, single-phase – MS132-T / -KT

Type	**110 ... 120 V AC** FLA	**220 ... 240 V AC** FLA
MS132-0.16(K)T	0.16	0.16
MS132-0.25(K)T	0.25	0.25
MS132-0.4(K)T	0.4	0.4
MS132-0.63(K)T	0.63	0.63
MS132-1.0(K)T	1	1
MS132-1.6(K)T	1.6	1.6
MS132-2.5(K)T	2.5	2.5
MS132-4.0(K)T	4	4
MS132-6.3(K)T	6.3	6.3
MS132-10(K)T	9.8	10
MS132-12T	9.8	12
MS132-16(K)T	16	12
MS132-20(K)T	20	17
MS132-25(K)T	24	17

Manual controller for tap conductor protection and for control transformers – MS132-T / -KT

Type	**Max. short-circuit current rating when used with upstream protection device** 480Y / 277 V kA	 600Y / 347 V kA
MS132-0.16(K)T	65	47
MS132-0.25(K)T	65	47
MS132-0.4(K)T	65	47
MS132-0.63(K)T	65	47
MS132-1.0(K)T	65	47
MS132-1.6(K)T	65	47
MS132-2.5(K)T	65	47
MS132-4.0(K)T	65	47
MS132-6.3(K)T	65	18
MS132-10(K)T	65	18
MS132-12T	30	18
MS132-16(K)T	30	18
MS132-20(K)T	30	18
MS132-25(K)T	30	18

MS132-T, MS132-KT
Technical data

General technical data

Type			**MS132-T / - KT**
Pollution degree			3
Phase loss sensitivity			Yes
Disconnect function acc. to IEC/EN 60947-2			Yes
Ambient air temperature			
	Operation	Open - compensated	-25 ... +60 °C
		Open	-25 ... +70 °C
		Enclosed (IB132)	0 ... +40 °C
	Storage		-50 ... +80 °C
Ambient air temperature compensation			Acc. to IEC/EN60947-4-1
Maximum operating altitude permissible			2000 m
Resistance to shock acc. to IEC 60068-2-27			25g / 11 ms
Resistance to vibrations acc. to IEC 60068-2-6			5g / 3 ... 150 Hz
Mounting position			Position 1-6 (optional for single mounting)
Mounting			DIN-rail (EN 60715)
Group mounting			-
Recommended screw for mounting plate			-
Screw torque for mounting plate			-
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		Housing	IP20
		Main circuit terminals	IP10 (Push-in Spring terminals: IP20)

Connecting characteristics - main circuit

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

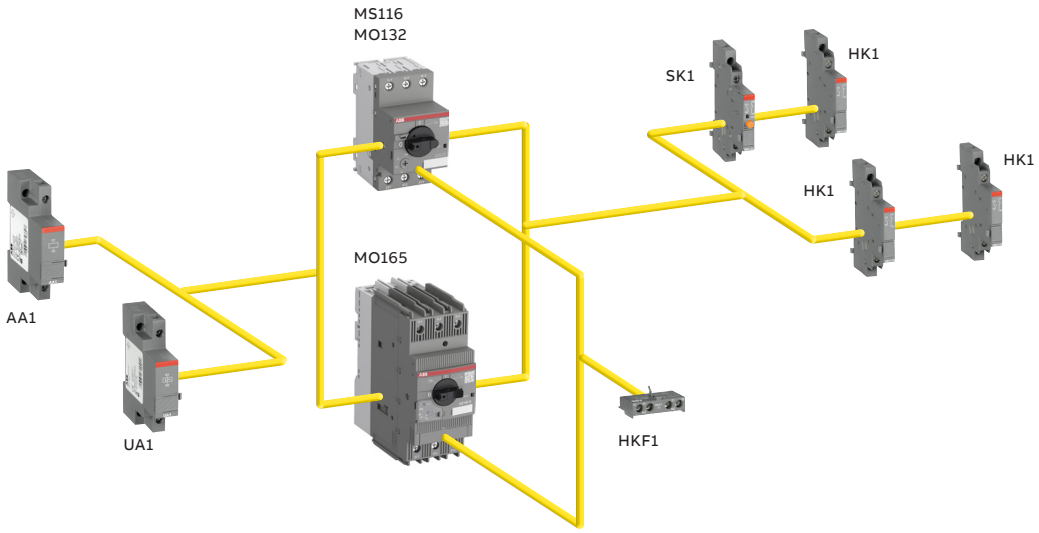
Connecting characteristics - main circuit

Type			**MS132-KT with Push-in Spring terminals**
Connecting capacity			
	Rigid solid	1 or 2 x	1 ... 2.5 mm²
	Rigid stranded	1 or 2 x	1 ... 6 mm²
	Flexible with ferrule	1 or 2 x	1 (push-in) / 0.5 (spring) ... 4 mm²
	Flexible with insulated ferrule	1 x	1 (push-in) / 0.5 (spring) ... 4 mm²
		1/2 x	1 (push-in) / 0.5 (spring) ... 2.5 mm²
	Flexible	1 or 2 x	0.5 (spring) ... 4 mm²
	Stranded acc. to UL/CSA	1/2 x	AWG 18 ... 10 (push-in) / AWG 18 ... 8 (spring)
		1 x	AWG 8
Wire stripping length			12 mm
Screwdriver			Flat Ø 3 mm x 0.5 mm

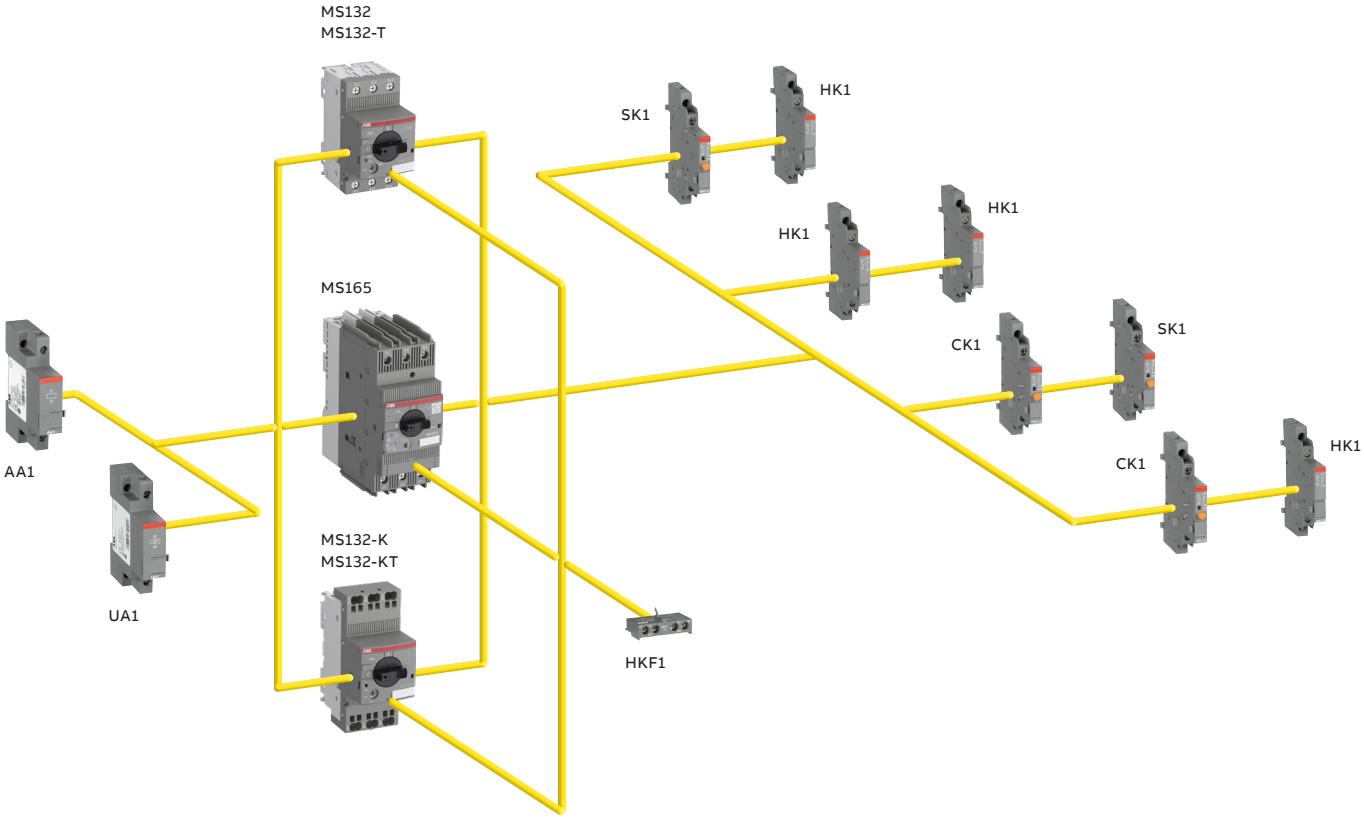
Accessories

MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT

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



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



Note: The combination of MS132-K + UA1 + CK1 is not possible

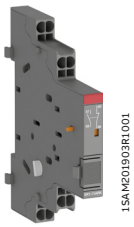
Accessories

MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT

HKF1-11

HK1-11

SK1-11



SK1-11AR

CK1-11

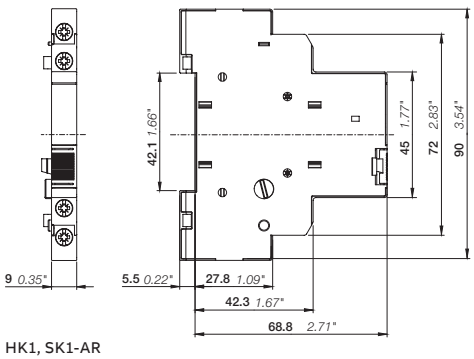
Manual motor starters and MS132-T can be equipped with auxiliary contacts for lateral/front mounting, signaling contacts for lateral mounting, undervoltage releases and shunt trips. Accessories can be fitted wiring free and without tools to the main device. A variety of combinations is possible as required for the specific application.

Auxiliary contacts HK1/HKF1 change position with the main contacts of the main device. Signaling contact CK1 signals tripping in case it was caused by short-circuit. Signaling contacts SK1/SK1-AR signal tripping regardless if it was caused by short-circuit or overload or electrical release (UA1 or AA1). With the SK1-AR, a red flag in a window on the front of the device indicates the tripping event, while for SK1 and CK1 the indication on the device itself is done with a protruding orange button. Another difference between SK1 and SK1-AR is that the contact positions of SK1-AR don't need to be manually reset after a tripping event, while for SK1 and CK1 this is done by pushing the orange button. The contacts of SK1-AR are reset to their original position when the manual motor starter is switched back on.

Undervoltage releases are used for remote tripping of the manual motor starters, especially for emergency stop circuits. Shunt trips release the manual motor starters used for remote tripping.

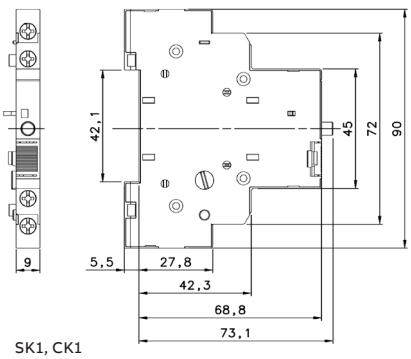
Suitable for	Auxiliary contacts N.O.	Auxiliary contacts N.C.	Description	Type	Order code	Pkg qty	Weight (1 pce) kg
Auxiliary contacts – mountable on the front							
MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT	1	1		HKF1-11	1SAM201901R1001	10	0.015
	1	0		HKF1-10	1SAM201901R1003	10	0.013
	0	1		HKF1-01	1SAM201901R1004	10	0.013
	2	0		HKF1-20	1SAM201901R1002	10	0.015
Auxiliary contacts – mountable on the right							
MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT	1	1	max. 2 pieces	HK1-11	1SAM201902R1001	2	0.035
	2	0	max. 2 pieces	HK1-20	1SAM201902R1002	2	0.035
	0	2	max. 2 pieces	HK1-02	1SAM201902R1003	2	0.035
MS116, MS132, MO132, MS132-T, MS132-K, MS132-KT	2	0	max. 2 pieces with leading contacts	HK1-20L	1SAM201902R1004	2	0.035
MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT	1	1	max. 2 pieces, terminal marking (13/14, 21/22)	HK1-11A	1SAM201902R1011	2	0.035
	1	1	max. 2 pieces, terminal marking (43/44, 31/32)	HK1-11B	1SAM201902R1021	2	0.035
	0	2	max. 2 pieces, terminal marking (13/14, 23/24)	HK1-20A	1SAM201902R1012	2	0.035
Signaling contacts – mountable on the right							
MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT	1	1	for tripped alarm, with manual reset	SK1-11	1SAM201903R1001	2	0.035
	2	0	for tripped alarm, with manual reset	SK1-20	1SAM201903R1002	2	0.035
	0	2	for tripped alarm, with manual reset	SK1-02	1SAM201903R1003	2	0.035
MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT	1	1	for tripped alarm	SK1-11AR	1SAM201903R1004	2	0.036
	2	0	for tripped alarm	SK1-20AR	1SAM201903R1005	2	0.036
	0	2	for tripped alarm	SK1-02AR	1SAM201903R1006	2	0.036
MS132, MS165, MS132-T, MS132-K, MS132-KT	1	1	for short-circuit alarm	CK1-11	1SAM301901R1001	2	0.035
	2	0	for short-circuit alarm	CK1-20	1SAM301901R1002	2	0.035
	0	2	for short-circuit alarm	CK1-02	1SAM301901R1003	2	0.035

Note : F or BEA connecting links with AF, AS and B mini and M mini contactors please refer to chapters 3, 4 and 5.



HK1, SK1-AR

Main dimensions mm, inches



SK1, CK1

Main dimensions mm, inches

Accessories

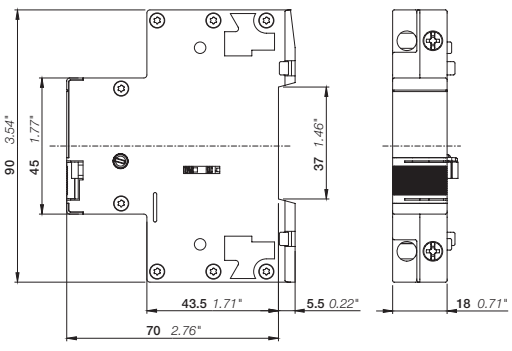
MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT

AA1-24

UA1-24

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

Note : For BEA..-4K Push-in Spring connecting links with AF09..K ... AF38..K please refer to chapter 3 - "Connection accessories for starting solutions with Push-in Spring terminals".



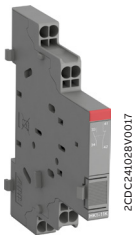
AA1, UA1

Main dimensions mm, inches

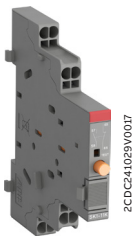
Accessories with Push-in Spring terminals

MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT

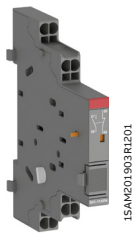
HKF1-11K



HK1-11K



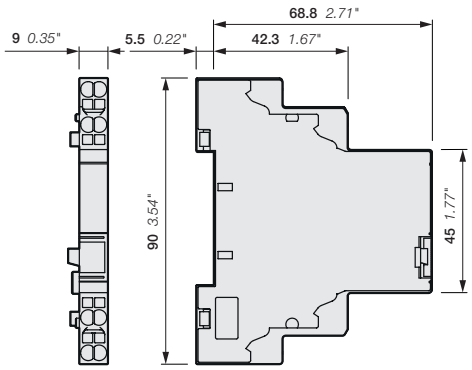
SK1-11K



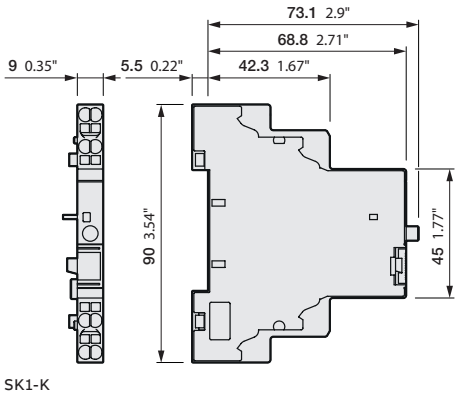
SK1-11ARK

Manual motor starters and MS132-T can be equipped with auxiliary contacts for lateral/front mounting as well as signaling contacts for lateral mounting. Accessories can be fitted wiring free and without tools to the main device. This goes hand in hand with the Push-in Spring terminals of these accessories. Innovative Push-in Spring terminals enable tool-free wiring and eliminate the need for routine re-tightening. A variety of combinations is possible as required for the specific application. Auxiliary contacts HK1-K/HKF1-K change position with the main contacts of the main device. Signaling contacts SK1-K/SK1-ARK signal tripping regardless if it was caused by short-circuit or overload or electrical release (UA1 or AA1). With the SK1-ARK, a red flag in a window on the front of the device indicates the tripping event, while for SK1-K the indication on the device itself is done with a protruding orange button. Another difference between SK1-K and SK1-ARK is that the contact positions of SK1-ARK don't need to be manually reset after a tripping event, while for SK1-K this is done by pushing the orange button. The contacts of SK1-ARK are reset to their original position when the manual motor starter is switched back on.

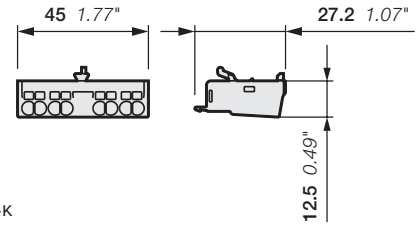
Suitable for	Auxiliary contacts N.O.	Auxiliary contacts N.C.	Description	Type	Order code	Pkg qty	Weight (1 pce) kg
Auxiliary contacts - mountable on the front							
MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT	1	1		HKF1-11K	1SAM201901R1201	10	0.016
	2	0		HKF1-20K	1SAM201901R1202	10	0.016
Auxiliary contacts - mountable on the right							
MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT	1	1	max. 2 pieces	HK1-11K	1SAM201902R1201	2	0.035
	2	0	max. 2 pieces	HK1-20K	1SAM201902R1202	2	0.035
	0	2	max. 2 pieces	HK1-02K	1SAM201902R1203	2	0.035
	2	0	with leading contacts	HK1-20LK	1SAM201902R1204	2	0.035
Signaling contacts - mountable on the right							
MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT	1	1	for tripped alarm, with manual reset	SK1-11K	1SAM201903R1201	2	0.035
	2	0	for tripped alarm, with manual reset	SK1-20K	1SAM201903R1202	2	0.035
	0	2	for tripped alarm, with manual reset	SK1-02K	1SAM201903R1203	2	0.035
	1	1	for tripped alarm	SK1-11ARK	1SAM201903R1204	2	0.035
	2	0	for tripped alarm	SK1-20ARK	1SAM201903R1205	2	0.035
	0	2	for tripped alarm	SK1-02ARK	1SAM201903R1206	2	0.035



HK1-K, SK1-ARK



SK1-K



HKF1-K

Main dimensions mm, inches

Accessories

MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT

General technical data

Type		HK1, SK1	CK1	HKF1
Standards		IEC/EN 60947–1, IEC/EN 60947-5-1		
Rated operational voltage Ue		690 V AC / 600 V DC		250 V AC / 250 V DC
Conventional free-air thermal current Ith		6 A		5 A
Rated frequency		50/60 Hz		
Rated impulse withstand voltage Uimp		6 kV		
Rated insulation voltage Ui		690 V AC		250 V AC
Pollution degree		3		
Ambient air temperature	Operation	-25 ... +60 °C		
	Storage	-50 ... +80 °C		
Resistance to shock acc. to IEC 60068-2-27		25g / 11 ms		
Resistance to vibrations acc. to IEC 60068-2-6		5g / 3 ... 150 Hz		
Ie / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category				
	24 V, 120 V	6 A		3 A
	240 V	4 A		1.5 A
	400 V	3 A		-
	440 V, 690 V	1 A		-
Ie / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category				
	24 V	2 A		1 A
	125 V	0.55 A		0.27 A
	250 V	0.27 A		0.11 A
	440 V, 600 V	0.15 A		-
Minimum switching capacity		17 V / 5 mA		
Short-circuit protective device	N.C., 95-96	10 A Type gG		
	N.O., 97-98	10 A Type gG		
Duty time		100 %		
Mounting		Right side of manual motor starters / MS132-T		Front of manual motor starters / MS132-T
Mounting positions		1-6		
Mechanical durability		100000 cycles	10000 cycles	-
Electrical durability		100000 cycles	10000 cycles	-

Contact utilization characteristics according to UL/CSA

Type	HK1, SK1, CK1	HKF1
Standards	UL 60947-1, UL 60947-5-1 (UL 508), CSA C22.2 No.60947-5-1 (CSA C22.2 No.14)	
Rated operational voltage Ue acc. to UL/CSA	600 V AC / 600 V DC	250 V AC / 250 V DC
Pilot duty	B600, Q600	B300, R300
AC thermal rated current	5 A	5 A
AC maximum volt-ampere making	3600 VA	3600 VA
AC maximum volt-ampere breaking	360 VA	360 VA
DC thermal rated current	2.5 A	1 A
DC maximum volt-ampere making-breaking	69 VA	28 VA

Connecting characteristics - Auxiliary circuit

Type		HK1, SK1, CK1	HKF1
Connecting capacity			
Rigid	1 or 2 x	1 ... 1.5 mm²	1 ... 2.5 mm²
		0.5 (spring) / 1 (push-in) ... 2.5 mm²	
Flexible with ferrule	1 or 2 x	0.75 ... 1.5 mm²	
		0.5 (spring) / 1 (push-in) ... 2.5 mm²	
Flexible with insulated ferrule	1 or 2 x	0.75 ... 1.5 mm²	
		0.5 (spring) / 1 (push-in) ... 1.5 mm²	
Flexible	1 or 2 x	0.75 ... 1.5 mm²	0.75 ... 2.5 mm²
		0.5 ... 2.5 mm² (with Push-in Spring terminals)	
Stranded acc. to UL/CSA	1 or 2 x	AWG 16 ... 14	
		AWG 20 ... 14 (with Push-in Spring terminals)	
Stripping length		8 mm	
		10 mm (with Push-in Spring terminals)	
Tightening torque		0.8 ... 1.2 Nm / 7 lb.in	
Recommended screw driver		Pozidriv 2	
		Flat Ø 3 mm x 0.5 mm (with Push-in Spring terminals)	

Accessories

MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT

General technical data

Type			UA1	AA1
Standards			IEC/EN 60947-1, IEC/EN 60947-5-1, UL 60947-1, UL 60947-5-1 (UL 508), CSA C22.2 No.60947-4-1 (CSA C22.2 No.14)	
Rated control supply voltage			see ordering details	AA1-24: 20-24 V 50/60 Hz; 20-70 V 50/60 Hz ON-Period = 5 s (1), 20-70 V DC ON-Period = 5 s (1) AA1-100: 110 V 50/60 Hz; 110-200 V 50/60 Hz ON-Period = 5 s (1), 110-200 V DC ON-Period = 5 s (1) AA1-230: 200-240 V 50/60 Hz, 200-350 V 50/60 Hz ON-Period = 5 s (1), 200-350 V DC ON-Period = 5 s (1) AA1-400: 350-415 V 50/60 Hz, 350-500 V 50/60 Hz ON-Period = 5 s (1), 350-500 V DC ON-Period = 5 s (1)
Rated frequency			see ordering details	50/60 Hz, DC
Operating voltage	Tripping		0.35 ... 0.7 x Us	0.7 ... 1.1 x Us
	Coil operating voltage		0.85 ... 1.1 x Us	-
Power consumption	Holding	AC	on request	-
		DC	on request	-
Rated impulse withstand voltage Uimp			6 kV	6 kV
Rated insulation voltage Ui			690 V	690 V
Pollution degree			3	3
Ambient air temperature	Operation		-25 .... +60 °C	-25 .... +60 °C
	Storage		-50 ...+80 °C	-50 ...+80 °C
Resistance to shock acc. to IEC 60068-2-27			15g / 11 ms	15g / 11 ms
Resistance to vibrations acc. to IEC 60068-2-6			5g / 3 ... 150 Hz	5g / 3 ... 150 Hz
Mounting			left side of manual motor starters / MS132-T	left side of manual motor starters / MS132-T
Mounting positions			-	-

(1) ON-Period: max. 5 s actuation time. Please consider 15 min OFF-period after max. 5 s ON-period, for voltages above the rated values.
The mechanical and electrical durability of manual motor starters in combination with UA1/AA1 is reduced. Values are provided on request.

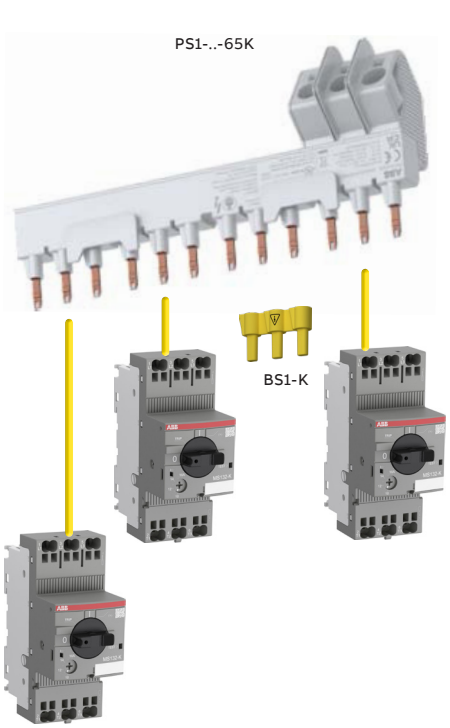
Connecting characteristics - Auxiliary circuit

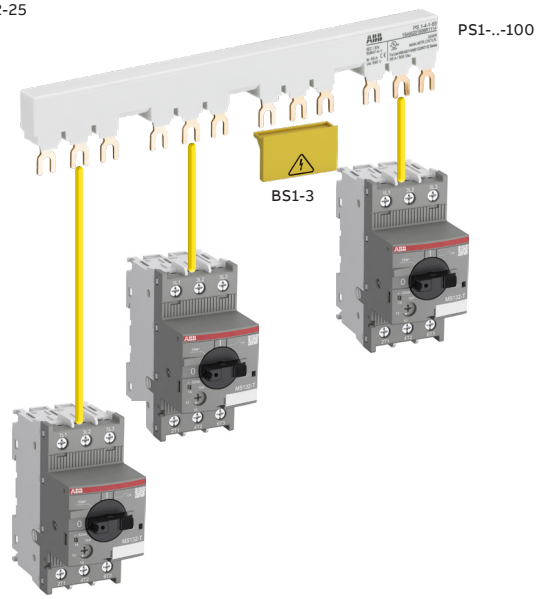
Type			UA1	AA1
Connecting capacity				
	Rigid	1 or 2 x	1 ... 4 mm²	
	Flexible with ferrule	1 or 2 x	0.75 ... 2.5 mm²	
	Flexible with insulated ferrule	1 x	0.75 ... 2.5 mm²	
		2 x	0.75 ... 1.5 mm²	
	Flexible	1 or 2 x	0.75 ... 2.5 mm²	
	Stranded acc. to UL/CSA	1 or 2 x	AWG 16 ... 12	
Stripping length	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

Accessories

MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT

Manual motor starters with three-phase busbar systems (MS116, MS132, MO132, MS132-T, MS132-K, MS132-KT)



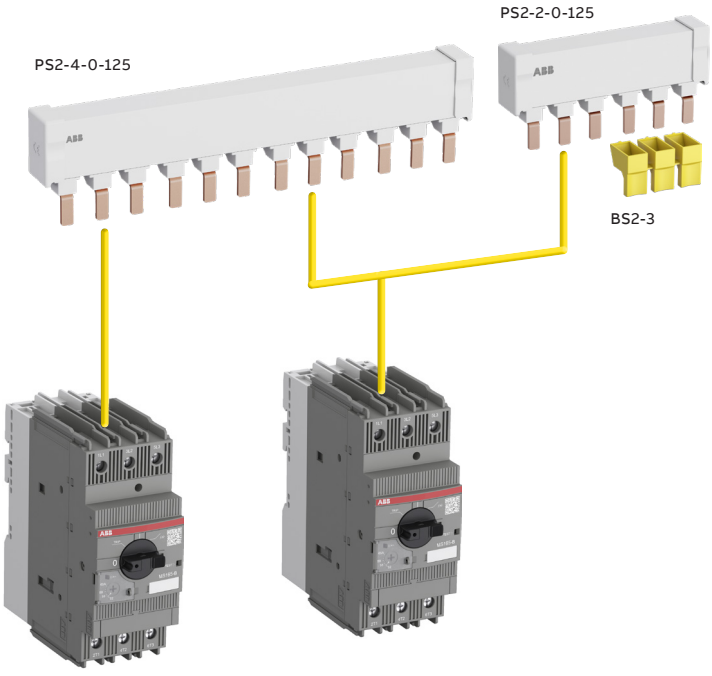


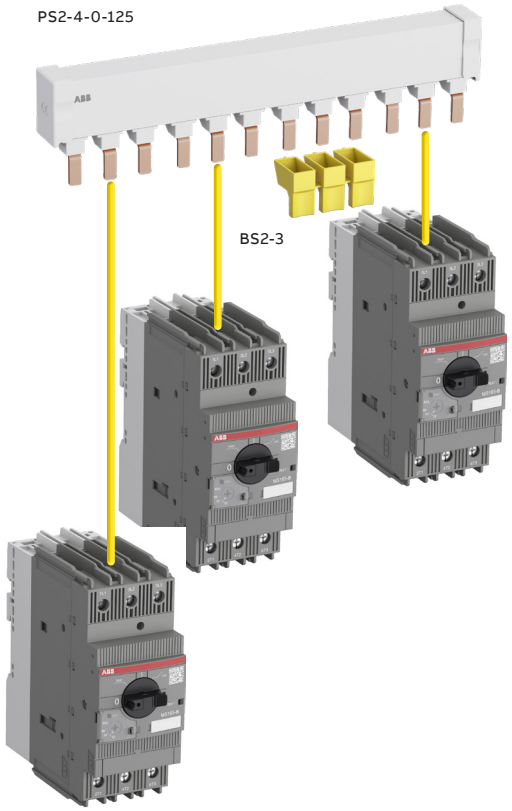
Three phase busbar with Push-in Spring terminals up to 65 A

Three-phase busbar up to 100 A

Note: feeder blocks are only suitable for screw versions.

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



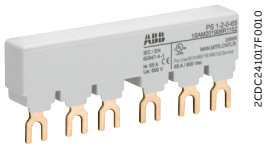


Three-phase busbar up to 125 A

Three-phase busbar up to 125 A

Accessories

MS116, MS132, MO132, MS132-T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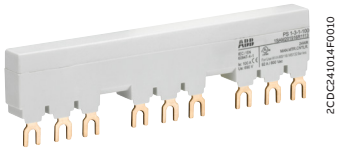
PS1-2-0-65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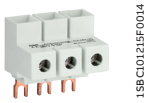
PS1-3-1-100


1SBC101215F0014

S1-M3-35


1SBC101266F0014

S1-M2-25


2CDC241013V0019

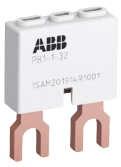
TS1-M30-S1


2CDC241023F0013

SA2


SK0108B91

SA1


2CDC241004F0014

PB1-1-32


2CDC241005S0014

S1-PB1-25

Three-phase busbars

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 part of the assortment. Between 2 and 4 manual motor starters with none, one or two lateral auxiliary contacts can be connected. Different three-phase feeder terminals are available according to the application.

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

Suitable for	Rated operational current A	Number of manual motor starters	Number of lateral auxiliary contacts	Type	Order code	Pkg qty	Weight (1 pce) kg
MS116, MS132, MO132, MS132-T	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

Note: Above busbars are only suitable for screw versions. For busbars with Push-in Spring terminals please see next page.

Three-phase feeder terminals

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

Suitable for	Description	Type	Order code	Pkg qty	Weight (1 pce) kg
Terminal spacers, Type E/F					
MS132 <10 A, MO132 < 10 A, MS132-T <10 A	UL/CSA Type E/F and IEC	TS1-M3-S1	1SAM301911R1001	2	0.012
MS132 ≥ 12 A, MO132 ≥ 12 A, MS132-T ≥ 12 A	UL/CSA Type E/F and IEC	TS1-M3-S2	1SAM301912R1001	2	0.012

Note: For product availability, please consult your ABB local sales organization

Additional accessories

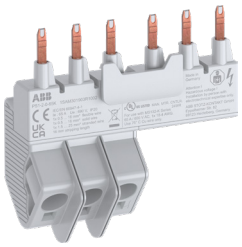
MS116, MS132, MO132, MS132-T	Protection cover for busbars	BS1-3	1SAM201908R1001	50	0.003
	Screw fixing kit	FS116	1SAM201909R1001	1	0.020
	Padlock + two keys	SA2	GJF1101903R0002	10	0.020
MS116	Lock handle	SA1	GJF1101903R0001	10	0.003
	Lock handle box SA1/SA2	SA3	GJF1101903R0003	10	0.050

Accessories for single-phase connection (IEC only)

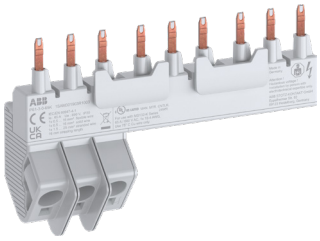
MS116, MS132, MO132, MS132-T	Phase connecting link	PB1-1-32	1SAM201914R1001	1	0.009
	Phase power infeed block	S1-PB1-25	1SAM201914R1002	1	0.013

Accessories with Push-in Spring terminals

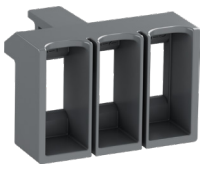
MS132-K, MS132-KT



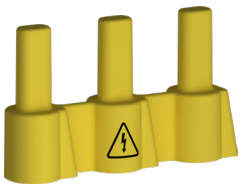
PS1-2-0-65K



PS1-3-1-65K



TS1-M3-K



BS1-K

SA2

Three-phase busbars with Push-in Spring terminals

Three-phase busbars ensure a quick and safe connection and are therefore a cost effective solution. Busbars with Push-in Spring terminals enable tool-free wiring and eliminate the need for routine re-tightening. Between 2 and 5 manual motor starters with none or one lateral auxiliary contact can be connected. There is also a terminal spacer as well as a protection cover available for busbars with Push-in Spring technology.

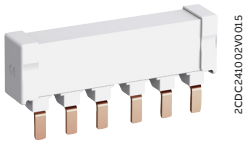
Suitable for	Rated operational current A	Number of Manual motor starters	Number of lateral auxiliary contacts	Type	Order code	Pkg qty	Weight (1 pce) kg
MS132-K, MS132-KT	65	2	0	PS1-2-0-65K	1SAM301903R1002	1	0.091
	65	3	0	PS1-3-0-65K	1SAM301903R1003	1	0.116
	65	4	0	PS1-4-0-65K	1SAM301903R1004	1	0.140
	65	5	0	PS1-5-0-65K	1SAM301903R1005	1	0.165
	65	2	1	PS1-2-1-65K	1SAM301903R1012	1	0.094
	65	3	1	PS1-3-1-65K	1SAM301903R1013	1	0.123
	65	4	1	PS1-4-1-65K	1SAM301903R1014	1	0.151
	65	4	1	PS1-5-1-65K	1SAM301903R1015	1	0.178

NOTE: For product availability, please consult your ABB local sales organization.

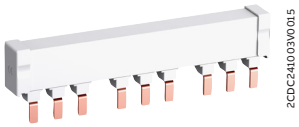
Suitable for	Description	Type	Order code	Pkg qty	Weight (1 pce) kg
Terminal spacers, Type E/F					
MS132-K, MS132-KT	UL/CSA Type E/F and IEC	TS1-M3-K	1SAM301913R1001	2	0.012
Additional accessories					
MS132-K, MS132-KT	Protection cover for PS1-K busbars	BS1-K	1SAM301904R1001	1	0.002
	Padlock + two keys	SA2	GJF1101903R0002	1	0.020

Accessories

MS165, MO165

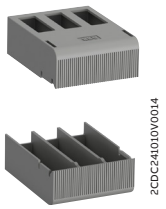


PS2-2-0-125



PS2-3-0-125

S2-M3-50



KA165

BS2-3

SA2

Three-phase busbars

Three-phase busbars ensure a quick and safe connection and are therefore a cost effective solution. A variety of different three-phase busbars up to 125 A are part of the assortment. Between 2 and 4 manual motor starters with none, one or two lateral auxiliary contacts can be connected.

Suitable for	Rated operational current A	Number of Manual motor starters	Number of lateral auxiliary contacts	Type	Order code	Pkg qty	Weight (1 pce) kg
MS165, MO165	125	2	0	PS2-2-0-125	1SAM401920R1002	10	0.100
	125	3	0	PS2-3-0-125	1SAM401920R1003	10	0.162
	125	4	0	PS2-4-0-125	1SAM401920R1004	10	0.226
	125	2	2	PS2-2-2-125	1SAM401920R1022	10	0.117
	125	3	2	PS2-3-2-125	1SAM401920R1023	10	0.197
	125	4	2	PS2-4-2-125	1SAM401920R1024	10	0.277

Other busbar types on request.

Feeder block

Suitable for	Rated operational current A	Rated cross section mm²	Mounting form	Type	Order code	Pkg qty	Weight (1 pce) kg
MS165, MO165	125	50	UL508A and IEC	S2-M3-50	1SAM401923R1003	1	0.172

Additional accessories

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

Accessories

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

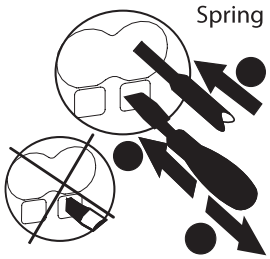
General technical data

Type		PS1-xxx-65(K)	PS1-xxx-100	S1-Mx-25	S1-Mx-35	PS2-xxx-125	S2-M3-50
Standards		IEC/EN 60947-4-1, IEC/EN 60947-1, UL 60947-1, UL 60947-4-1 (UL 508), CSA C22.2 No.60947-4-1 (CSA C22.2 No.14)					
Rated operational voltage Ue		690 V AC / 250 V DC				690 V AC	
Rated operational voltage Ue acc. to UL/CSA		600 V AC					
Rated operational current Ie		65 A	100 A	65 A	100 A	125 A	125 A
Rated operational current Ie acc. to UL/CSA		65 A	92 A	65 A	92 A	125 A	120 A
Rated frequency		50/60 Hz					
Rated impulse withstand voltage Uimp		6 kV				8 kV	
Rated insulation voltage Ui		690 V AC					
Pollution degree		3					
Ambient air temperature	Operation	-25 ... +70 °C				-25 ... +40 °C	-25 ... +60 °C (1)
	Storage	-50 ... +80 °C					
Resistance to shock acc. to IEC 60068-2-27		15g / 11 ms				25g / 11 ms	
Resistance to vibrations acc. to IEC 60068-2-6		5g / 3 ... 150 Hz					

(1) Applicable for single mounting. If S2-M3-50 is used with PS2-xxx-125, ambient air temperature for operation is: -25 ... +40°C

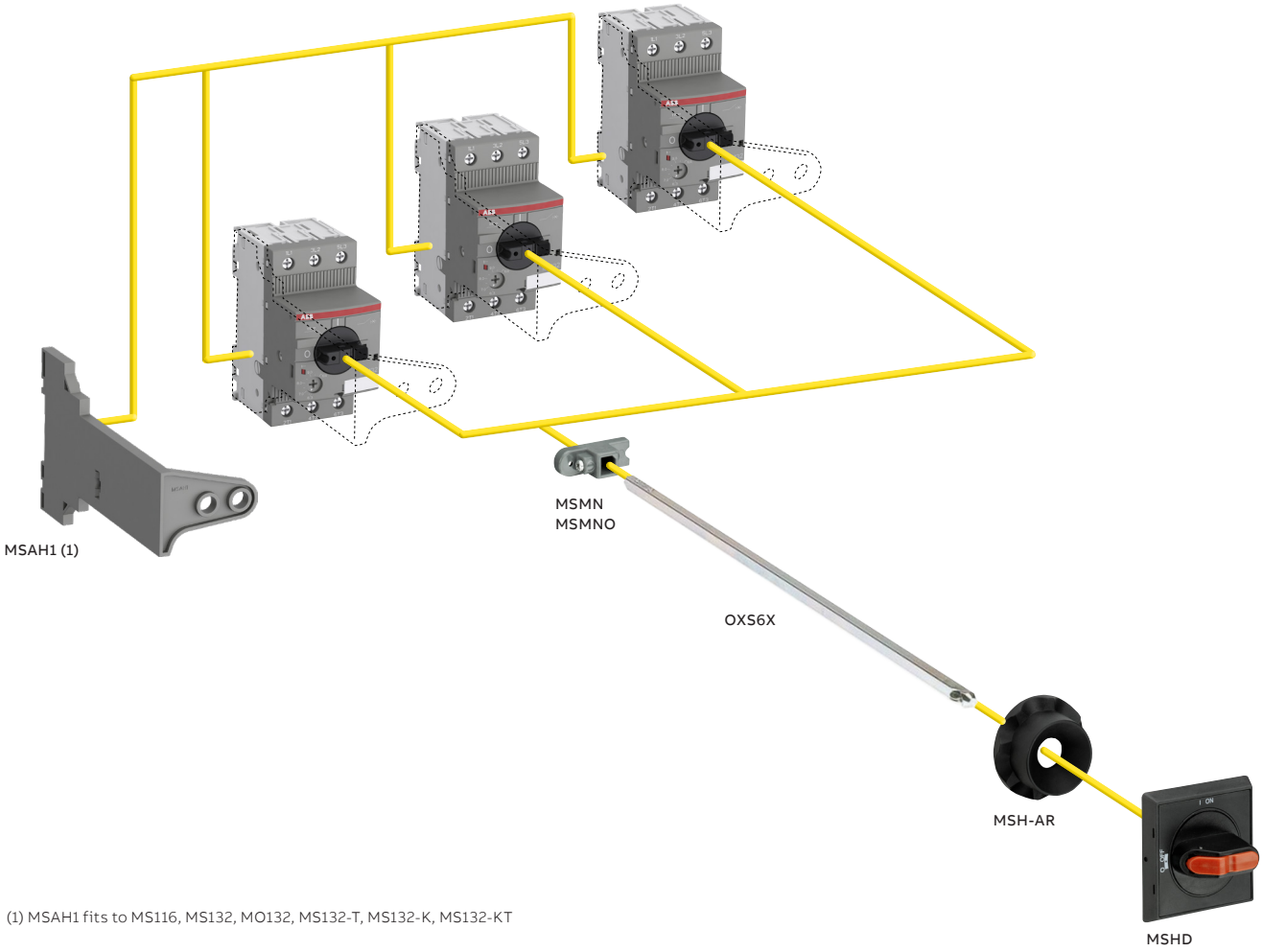
Electrical connection – Main circuit

Type			S1-M1-25	S1-M2-25	S1-M3-25	S1-M3-35	S2-M3-50
Connecting capacity							
	Rigid	1 x	2.5 ... 25 mm²	4 ... 25 mm²	2.5 ... 25 mm²	10 ... 35 mm²	10 mm²
	Flexible with ferrule	1 x	–	–	–	–	10 ... 50 mm²
	Flexible with insulated ferrule	1 x	–	–	–	–	10 ... 50 mm²
	Flexible	1 x	2.5 ... 16 mm²	4 ... 16 mm²	2.5 ... 16 mm²	10 ... 35 mm²	10 ... 50 mm²
	Stranded acc. to UL/CSA	1 x	AWG 14 ... 4	AWG 12 ... 4	AWG 14 ... 4	AWG 8 ... 2	AWG 8 ... 0
	Flexible acc. to UL/CSA	1 x	AWG 14 ... 6	AWG 12 ... 6	AWG 14 ... 6	AWG 8 ... 2	AWG 8 ... 0
Stripping length			10 mm			12 mm	16 mm
Tightening torque			2.5 Nm / 22 lb.in			4.5 Nm / 40 lb.in	6 Nm / 54 lb.in
Recommended screwdriver			Pozidriv 2			Hexagon SW4	Hexagon SW5

			PS1-xxx-65K with Push-in Spring terminals
 Push-in		1 x	6 ... 25 mm² / AWG 8 ... 4
		2 x	–
		1 x	4 ... 16 mm²
		2 x	–
		1 x	4 ... 16 mm²
		2 x	–
		1 x	4 ... 16 mm²
		2 x	–
		1 x	4 ... 6 mm²
		2 x	–
 Spring		1 x	1.5 ... 25 mm² / AWG 18 ... 4
		2 x	–
		1 x	0.5 ... 16 mm²
		2 x	–
		1 x	0.5 ... 16 mm²
		2 x	–
		1 x	0.5 ... 16 mm²
		2 x	–
		1 x	0.5 ... 16 mm²
		2 x	–
		1 x	0.5 ... 6 mm²
		2 x	–
			fi 4 mm
			x 0.5 mm
			16 mm

Accessories

MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT



(1) MSAH1 fits to MS116, MS132, MO132, MS132-T, MS132-K, MS132-KT

Accessories

MS116, MS132, MO132, MS132-T, MS132-K, MS132-KT

IB132-Y

IB132-G

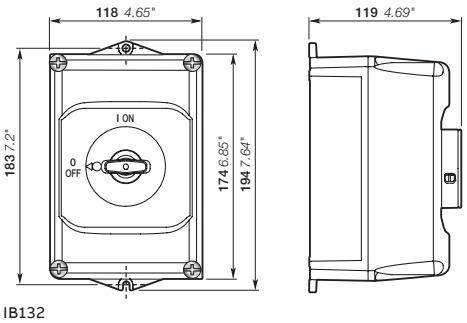
DMS132-Y

DMS132-G

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

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

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



IB132 DMS132

Main dimensions mm, inches

Accessories

MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K

2CDC241003F0011

MSHD-LB

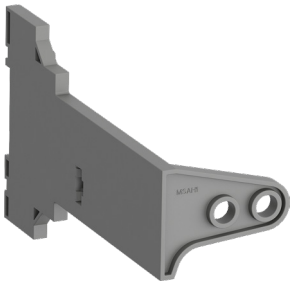
MSHD-LY


2CDC241004F0011

MSMN


2CDC241001F0012

MSH-AR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MSAH1

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

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

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

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

(1) Indication I-O and ON-OFF (recommended for MS116)
(2) Indication I-O and ON-OFF + Trip indication
(3) Coded - Positioning of ON indication dependent on mounting orientation of the MMS
(4) Uncoded - Positioning of ON indication independent of mounting orientation of the MMS.

For direct product details information, use product type or order code, ex:

www.abb.com/productdetails/**TF42-0.13**

or

www.abb.com/productdetails/**1SAZ721201R1005**

Overload relays

Thermal and electronic overload relays

Thermal overload relays



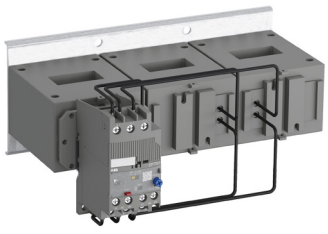
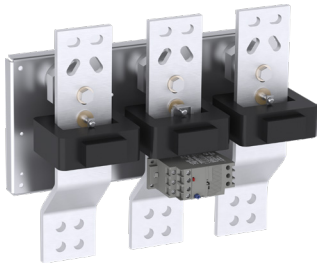
IEC: rated operational power AC-3	400 V	0.06 ... 7.5 kW		0.06 ... 18.5 kW	11 ... 37 kW
UL/CSA: 3-phase hp-ratings	480 V	1/2 ... 10 hp		1/2 ... 25 hp	15 ... 50 hp
Fitting to contactors		B6, B7, MC1, MC2		AF09 ... AF38	AF40, AF52, AF65
Type		**T16**		**TF42**	**TF65**
Current range		0.10 ... 16 A		0.10 ... 38 A	22 ... 67 A
Trip class		10		10	10
Suitable for 1-phase		yes		yes	yes
Single mounting kit		DB16		DB42	DB65

Electronic overload relays
with integrated CT

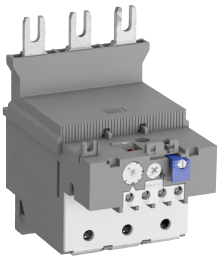
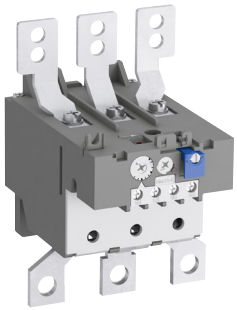



IEC: rated operational power AC-3	400 V	0.06 ... 7.5 kW	0.06 ... 7.5 kW	4 ... 22 kW	7.5 ... 37 kW
UL/CSA: 3-phase hp-ratings	480 V	1/2 ... 10 hp	1/2 ... 10 hp	5 ... 30 hp	15 ... 50 hp
Fitting to contactors		B6, B7, BC6, BC7, VB6, VB7, VBC6, VBC7	AF09 ... AF38	AF26 ... AF38	AF40, AF52, AF65
Type		**E16DU**	**EF19**	**EF45**	**EF65**
Current range		0.10 ... 18.9 A	0.10 ... 18.9 A	9 ... 45 A	20 ... 70 A
Trip class		10E, 20E, 30E selectable			
Suitable for 1-phase		no	no	no	no
Single mounting kit		DB16E	DB19EF	DB45EF	-

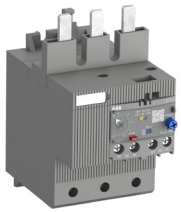
Electronic overload relays
with external separate CT

IEC: rated operational power AC-3	400 V	75 ... 250 kW	132 ... 400 kW	250 ... 710 kW
UL/CSA: 3-phase hp-ratings	480 V	100 ... 400 hp	200 ... 500 hp	600 ... 900 hp
Fitting to contactors		AF400, AF460	AF580, AF750, AF1250	AF1350, AF1650, AF2050
Type		**EF460**	**EF750**	**EF1250DU**
Current range		150 ... 500 A	250 ... 800 A	375 ... 1250 A
Trip class		10E, 20E, 30E selectable		

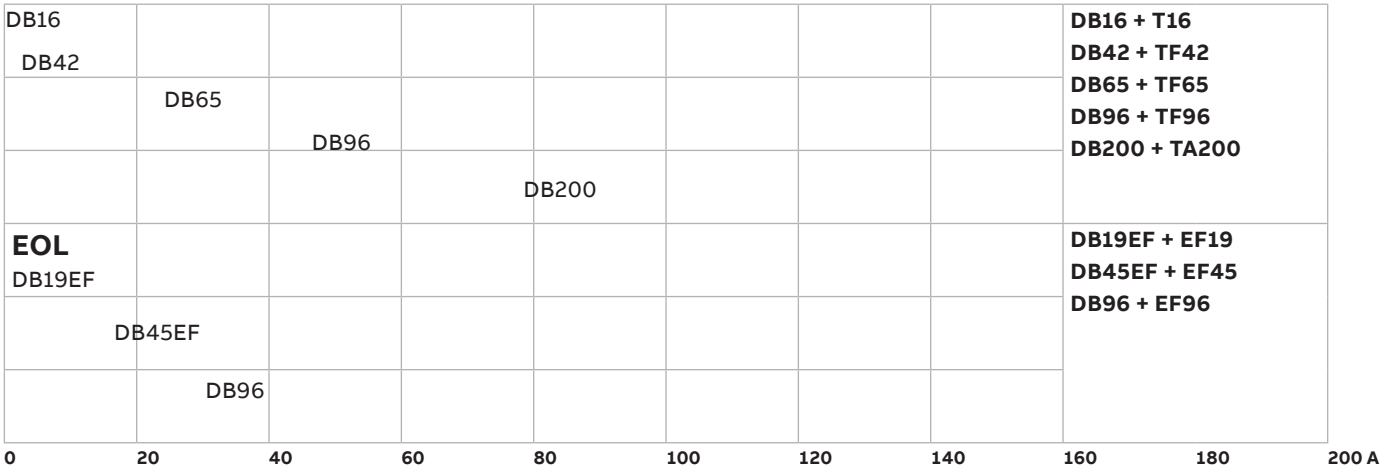
18.5 ... 45 kW	37 ... 75 kW	37 ... 110 kW	
30 ... 75 hp	50 ... 100 hp	50 ... 150 hp	
AF80, AF96	AF116, AF140, AF146	AF190, AF205	
TF96	**TF140DU**	**TA200DU**	
40 ... 96 A	66 ... 142 A	66 ... 200 A	
10	10A	10A	
yes	yes	yes	
DB96	-	DB200	




22 ... 55 kW	30 ... 75 kW	37 ... 110 kW	75 ... 200 kW
30 ... 75 hp	50 ... 100 hp	50 ... 150 hp	100 ... 300 hp
AF80, AF96	AF116, AF140, AF146	AF190, AF205	AF265, AF305, AF370
EF96	**EF146**	**EF205**	**EF370**
20 ... 100 A	54 ... 150 A	63 ... 210 A	115 ... 380 A
10E, 20E, 30E selectable			
no	no	no	no
DB96	-	-	-

Single mounting kit overview

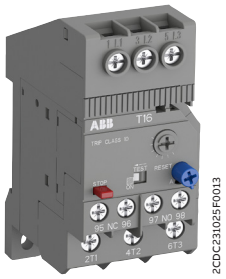
TOL



T16 thermal overload relays – 0.10 to 16.0 A

Ordering details

T16



T16 + DB16

KPR-101L

DB16

The T16 thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure.
The devices have trip class 10.

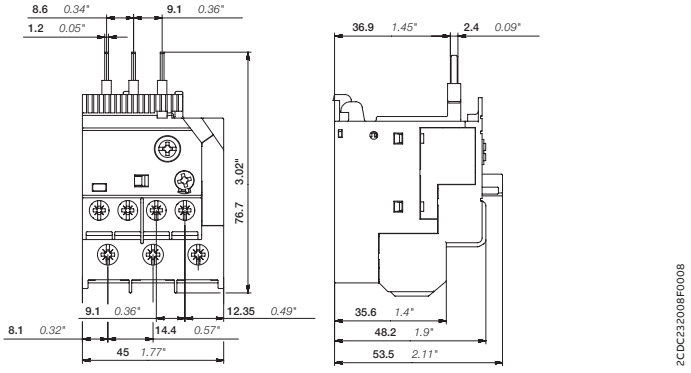
The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications

Setting range A	Short-circuit protective device	Trip class	Type	Order code	Weight (1 pce) kg
Suitable for AS09...AS16, B6, B7, MC1 and MC2 all variants					
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

Description	Suitable for	Type	Order code	Weight (1 pce) kg
Single mounting kit	T16	DB16	1SAZ701901R0001	0.032
Reset push button	E16, EF, TF, T16, TA200	KPR-101L	1SFA616162R1014	0.027



T16

Main dimensions mm, inches

T16 thermal overload relays – 0.10 to 16.0 A
Technical data

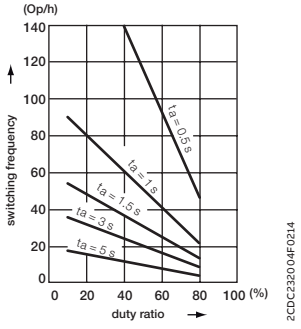
Main circuit – Utilization characteristics according to IEC/EN

Type	**T16**
Standards	IEC/EN 60947–4–1, IEC/EN 60947-5-1, IEC/EN 60947-1
Rated operational voltage Ue	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 Uimp	6 kV
Rated insulation voltage Ui	690 V AC

Auxiliary circuit according to IEC/EN

Type		**T16**
Rated operational voltage Ue		600 V
Conventional free air thermal current Ith	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.
Ie / 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	0.50 A
220-230-240 V	N.C., 95-96	3.00 A
	N.O., 97-98	0.50 A
440 V	N.C., 95-96	0.75 A
	N.O., 97-98	0.50 A
480-500 V	N.C., 95-96	0.75 A
	N.O., 97-98	0.50 A
Ie / 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 Uimp		6 kV
Rated insulation voltage Ui		690 V

Technical diagram – Intermittent periodic duty



ta: Motor starting time

T16 thermal overload relays – 0.10 to 16.0 A
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type		T16
Standards		UL 508, CSA 22.2 No. 14
Maximum operational voltage		600 V AC
Trip rating		125% of FLA
Full load amps (FLA)		See table "Full load amps and short-circuit protective device"
Short-circuit rating RMS symmetrical		See table "Full load amps and short-circuit protective device"
Short-circuit protective device		See table "Full load amps and short-circuit protective device"

Auxiliary circuit according to UL/CSA

Type		T16
Contact rating	N.C., 95-96	B600, Q300
	N.O., 97-98	D300, Q300
Conventional thermal current	N.C., 95-96	5 A
	N.O., 97-98	2.5 A

Full load amps and short-circuit protective device

Type	Full load amps (FLA)	Short-circuit protective device			
		480 / 600 V AC		480 / 600 V AC	
		Short circuit rating RMS symmetrical	Fuse type	Short circuit rating RMS symmetrical	Fuse type
T16-0.13	0.13 A	18 kA	1 A, K5	100 kA	30 A, Class J
T16-0.17	0.17 A	18 kA	1 A, K5	100 kA	30 A, Class J
T16-0.23	0.23 A	18 kA	1 A, K5	100 kA	30 A, Class J
T16-0.31	0.31 A	18 kA	3 A, K5	100 kA	30 A, Class J
T16-0.41	0.41 A	18 kA	3 A, K5	100 kA	30 A, Class J
T16-0.55	0.55 A	18 kA	3 A, K5	100 kA	30 A, Class J
T16-0.74	0.74 A	18 kA	3 A, K5	100 kA	30 A, Class J
T16-1.0	1.00 A	18 kA	6 A, K5	100 kA	30 A, Class J
T16-1.3	1.30 A	18 kA	6 A, K5	100 kA	30 A, Class J
T16-1.7	1.70 A	18 kA	6 A, K5	100 kA	30 A, Class J
T16-2.3	2.30 A	18 kA	10 A, K5	100 kA	30 A, Class J
T16-3.1	3.10 A	18 kA	10 A, K5	100 kA	30 A, Class J
T16-4.2	4.20 A	18 kA	15 A, K5	100 kA	30 A, Class J
T16-5.7	5.70 A	18 kA	20 A, K5	100 kA	30 A, Class J
T16-7.6	7.60 A	18 kA	25 A, K5	100 kA	30 A, Class J
T16-10	10.0 A	18 kA	35 A, K5	100 kA	45 A, Class J
T16-13	13.0 A	18 kA	40 A, K5	100 kA	45 A, Class J
T16-16	16.0 A	18 kA	60 A, K5	100 kA	45 A, Class J

T16 thermal overload relays – 0.10 to 16.0 A
Technical data

General technical data

Type			**T16**
Pollution degree			3
Phase loss sensitive			Yes
Ambient air temperature			
Operation	Open - compensated		-25 ... +60 °C
	Open		-25 ... +60 °C
Storage			-50 ... +80 °C
Ambient air temperature compensation			Acc. to IEC/EN60947-4-1
Maximum operating altitude permissible			2000 m
Resistance to shock acc. to IEC 60068-2-27			25g / 11 ms
Resistance to vibrations acc. to IEC 60068-2-6			3g / 3 ... 150 Hz
Mounting position			Position 1-5
Mounting			Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit on DIN rail (35 mm)
Degree of protection	Housing		IP20
	Main circuit terminals		IP10

Electrical connection

Main circuit

Type			**T16**
Connecting capacity			
Rigid		1 x	0.75 ... 4 mm²
		2 x	0.75 ... 1.5 mm² or 1.5 ... 4 mm² (1)
Flexible		1 or 2 x	0.75 ... 4 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			12 mm
Tightening torque			1.1 ... 1.5 Nm / 9 ... 13 lb.in
Recommended screw driver			M4 (Pozidriv 2)

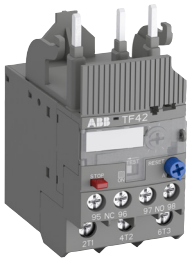
Auxiliary circuit

Type			**T16**
Connecting capacity			
Rigid		1 or 2 x	0.75 ... 4 mm²
Flexible with ferrule		1 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 or 2 x	0.75 ... 1 mm² or 1 ... 2.5 mm² (1)
	Stranded acc. to UL/CSA	1 or 2 x	AWG 18-12
	Flexible acc. to UL/CSA	1 or 2 x	AWG 18-12
Stripping length			9 mm
Tightening torque			1.1 ... 1.5 Nm / 9 ... 13 lb.in
Recommended screw driver			M3 (Pozidriv 2)

(1) Only connect two different "conductor/wire" cross-sections, if they are within the indicated ranges

TF42 thermal overload relays – 0.10 to 38.0 A

Ordering details



TF42

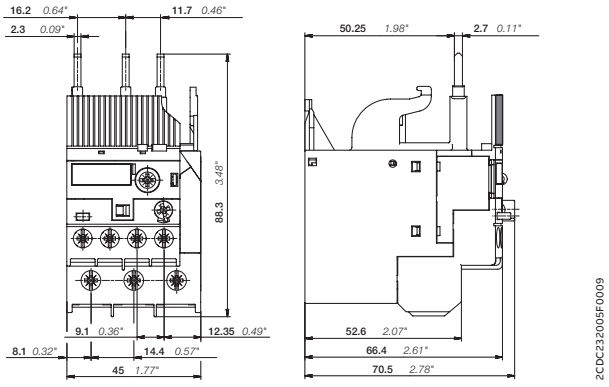
TF42 + DB42

The TF42 thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure. The devices have trip class 10.

The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications
- With ATEX certification

Setting range A	Short-circuit protective device	Trip class	Type	Order code	Weight (1 pce) kg
Suitable for AF09...AF38 contactors					
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	0.130
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



TF42

Main dimensions mm, inches

TF42 thermal overload relays – 0.10 to 38.0 A
Ordering details

DB42

KPR-101L

DRS-F

Ordering details accessories

Description	Suitable for	Type	Order code	Weight (1 pce) kg
Single mounting kit	TF42	DB42	1SAZ701902R0001	0.087
Reset push button	EF, TF, T16, TA200	KPR-101L	1SFA616162R1014	0.019
Remote reset coil 24-30 V AC/DC	TF42, TF65, TF96	DRS-F-01	1SAX101911R1001	0.076
Remote reset coil 48-60 V AC/DC		DRS-F-02	1SAX101911R1002	0.077
Remote reset coil 110-127 V AC/DC		DRS-F-03	1SAX101911R1003	0.078
Remote reset coil 220-240 V AC/DC		DRS-F-04	1SAX101911R1004	0.076
Remote stop coil 24-30 V DC		DRS-F-TF-01	1SAZ701904R1001	0.072
Remote stop coil 48-60 V DC		DRS-F-TF-02	1SAZ701904R1002	0.075
Remote stop coil 110-127 V DC		DRS-F-TF-03	1SAZ701904R1003	0.071
Remote stop coil 220-240 V DC		DRS-F-TF-04	1SAZ701904R1004	0.076

TF42 thermal overload relays – 0.10 to 38.0 A
Technical data

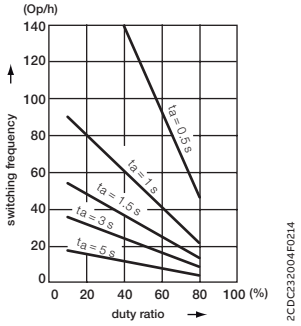
Main circuit – Utilization characteristics according to IEC/EN

Type	TF42
Standards	IEC/EN 60947–4–1, IEC/EN 60947-5-1, IEC/EN 60947-1
Rated operational voltage Ue	690 V AC, 600 V DC
Rated frequency	DC, 50/60 Hz, 400 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 Uimp	6 kV
Rated insulation voltage Ui	690 V AC

Auxiliary circuit according to IEC/EN

Type		TF42
Rated operational voltage Ue		600 V
Conventional free air thermal current Ith	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.
Ie / 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	0.50 A
220-230-240 V	N.C., 95-96	3.00 A
	N.O., 97-98	0.50 A
440 V	N.C., 95-96	0.75 A
	N.O., 97-98	0.50 A
480-500 V	N.C., 95-96	0.75 A
	N.O., 97-98	0.50 A
Ie / 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 Uimp		6 kV
Rated insulation voltage Ui		690 V

Technical diagram – Intermittent periodic duty



ta: Motor starting time

TF42 thermal overload relays – 0.10 to 38.0 A
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	**TF42**
Standards	UL 508, CSA 22.2 No. 14
Maximum operational voltage	600 V AC/DC
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, B600, Q600
	N.O., 97-98	D300, Q600
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

TF42 thermal overload relays – 0.10 to 38.0 A
Technical data

General technical data

Type			**TF42**
Pollution degree			3
Phase loss sensitive			Yes
Ambient air temperature			
	Operation	Open - compensated	-25 ... +60 °C
		Open	-25 ... +60 °C
	Storage		-50 ... +80 °C
Ambient air temperature compensation			Acc. to IEC/EN60947-4-1
Maximum operating altitude permissible			2000 m
Resistance to shock acc. to IEC 60068-2-27			25g / 11 ms
Resistance to vibrations acc. to IEC 60068-2-6			5g / 3 ... 150 Hz
Mounting position			Position 1-5
Mounting			Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit on DIN rail (35 mm)
Degree of protection		Housing	IP20
		Main circuit terminals	IP10

Electrical connection

Main circuit

Type			**TF42 (TF42-0.13 ... TF42-16)**	**TF42 (TF42-20 ... TF42-38)**
Connecting capacity				
	Rigid	1 or 2 x	0.75 ... 4 mm²	1.5 ... 2.5 mm² or 2.5 ... 10 mm² (1)
	Flexible with insulated ferrule	1 or 2 x	0.75 ... 4 mm²	2.5 ... 4 mm² or 4 ... 6 mm² (1)
	Stranded acc. to UL/CSA	1 or 2 x	AWG 18-10	AWG 14-6
	Flexible acc. to UL/CSA	1 or 2 x	AWG 18-10	AWG 14-6
Stripping length			12 mm	
Tightening torque			1.5 - 2.5 Nm / 13 ... 22 lb.in	2.5 - 2.7 Nm / 22 lb.in
Recommended screw driver			M4 (Pozidriv 2)	

Auxiliary circuit

Type			**TF42**
Connecting capacity			
	Rigid	1 or 2 x	0.75 ... 4 mm²
	Flexible with ferrule	1 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 or 2 x	0.75 ... 1 mm² or 1 ... 2.5 mm² (1)
	Stranded acc. to UL/CSA	1 or 2 x	AWG 18-12
	Flexible acc. to UL/CSA	1 or 2 x	AWG 18-12
Stripping length			9 mm
Tightening torque			1 ... 1.2 Nm / 9 ... 11 lb.in
Recommended screw driver			M3 (Pozidriv 2)

(1) Only connect two different "conductor/wire" cross-sections, if they are within the indicated ranges.

TF65 thermal overload relays – 22.0 to 67.0 A
Ordering details

TF65

DB65

DB65 + TF65

KPR-101L

DRS-F

The TF65 thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure.
The devices have trip class 10.

The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

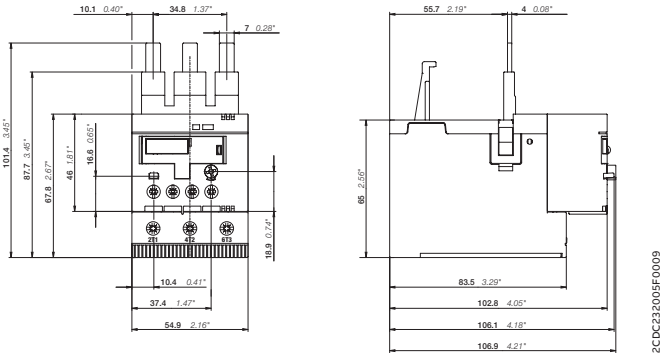
- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications
- With ATEX certification (1)

Setting range A	Short-circuit protective device	Trip class	Type	Order code	Weight (1 pce) kg
Suitable for AF40...AF65 contactors					
22.0 ... 28.0	80 A, gG Type Fuses	10	TF65-28	1SAZ811201R1001	0.372
25.0 ... 33.0	80 A, gG Type Fuses	10	TF65-33	1SAZ811201R1002	0.372
30.0 ... 40.0	100 A, gG Type Fuses	10	TF65-40	1SAZ811201R1003	0.372
36.0 ... 47.0	125 A, gG Type Fuses	10	TF65-47	1SAZ811201R1004	0.372
44.0 ... 53.0	125 A, gG Type Fuses	10	TF65-53	1SAZ811201R1005	0.372
50.0 ... 60.0	125 A, gG Type Fuses	10	TF65-60	1SAZ811201R1006	0.382
57.0 ... 67.0	160 A, gG Type Fuses	10	TF65-67	1SAZ811201R1007	0.382

Ordering details accessories

Description	Suitable for	Type	Order code	Weight (1 pce) kg
Single mounting kit	TF65	DB65	1SAZ801901R1001	0.132
Reset push button	E16, EF, TF, T16, TA200	KPR-101L	1SFA616162R1014	0.019
Remote reset coil 24-30 V AC / DC	TF42, TF65, TF96	DRS-F-01	1SAX101911R1001	0.076
Remote reset coil 48-60 V AC / DC		DRS-F-02	1SAX101911R1002	0.077
Remote reset coil 110-127 V AC / DC		DRS-F-03	1SAX101911R1003	0.078
Remote reset coil 220-240 V AC / DC		DRS-F-04	1SAX101911R1004	0.076
Remote stop coil 24-30 V DC		DRS-F-TF-01	1SAZ701904R1001	0.072
Remote stop coil 48-60 V DC		DRS-F-TF-02	1SAZ701904R1002	0.075
Remote stop coil 110-127 V DC		DRS-F-TF-03	1SAZ701904R1003	0.071
Remote stop coil 220-240 V DC		DRS-F-TF-04	1SAZ701904R1004	0.076

1) ATEX is valid for products, produced from week 26, 2015.



TF65

Main dimensions mm, inches

TF65 thermal overload relays – 22.0 to 67.0 A
Technical data

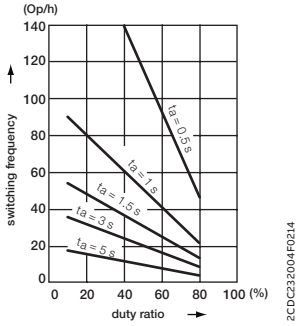
Main circuit – Utilization characteristics according to IEC/EN

Type		**TF65**
Standards		IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1
Rated operational voltage Ue		690 V AC, 440 V DC
Rated frequency		DC, 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 Uimp		8 kV
Rated insulation voltage Ui		690 V

Auxiliary circuit according to IEC/EN

Type		**TF65**
Rated operational voltage Ue		600 V
Conventional free air thermal current Ith	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.
Ie / 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	0.50 A
220-230-240 V	N.C., 95-96	3.00 A
	N.O., 97-98	0.50 A
440 V	N.C., 95-96	0.75 A
	N.O., 97-98	0.50 A
480-500 V	N.C., 95-96	0.75 A
	N.O., 97-98	0.50 A
Ie / 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		12 V / 3 mA
Short-circuit protective device	N.C., 95-96	6 A, gG Type Fuses
	N.O., 97-98	4 A, gG Type Fuses
Rated impulse withstand voltage Uimp		6 kV
Rated insulation voltage Ui		690 V

Technical diagram – Intermittent periodic duty



ta: Motor starting time

TF65 thermal overload relays – 22.0 to 67.0 A
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type		**TF65**
Standards		UL 60947-1, UL 60947-4-1
Maximum operational voltage		600 V AC/DC
Trip rating		125% of FLA
Full load amps (FLA)		See table "Full load amps and short-circuit protective device"
Short-circuit rating RMS symmetrical		See table "Full load amps and short-circuit protective device"
Short-circuit protective device		See table "Full load amps and short-circuit protective device"

Auxiliary circuit according to UL/CSA

Type		**TF65**
Contact rating	N.C., 95-96	B600, Q600
	N.O., 97-98	D300, Q600
Conventional thermal current	N.C., 95-96	5 A
	N.O., 97-98	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**
TF65-28	28 A	5 kA	100 A, K5 / RK5	100 kA	110 A, Class J
TF65-33	33 A	5 kA	100 A, K5 / RK5	100 kA	110 A, Class J
TF65-40	40 A	5 kA	100 A, K5 / RK5	100 kA	110 A, Class J
TF65-47	47 A	5 kA	125 A, K5 / RK5	100 kA	125 A, Class J
TF65-53	53 A	10 kA	125 A, K5 / RK5	100 kA	125 A, Class J
TF65-60	60 A	10 kA	150 A, K5 / RK5	100 kA	150 A, Class J
TF65-67	67 A	10 kA	150 A, K5 / RK5	100 kA	150 A, Class J

TF65 thermal overload relays – 22.0 to 67.0 A
Technical data

General technical data

Type		**TF65**
Pollution degree		3
Phase loss sensitive		Yes
Ambient air temperature		
Operation (1)	Open - compensated	-40 ... +70 °C
	Open	-40 ... +70 °C
Storage		-50 ... +85 °C
Ambient air temperature compensation		Acc. to IEC/EN 60947-4-1
Maximum operating altitude permissible		2000 m
Resistance to shock acc. to IEC 60068-2-27		25g / 11 ms
Resistance to vibrations acc. to IEC 60068-2-6		5g / 3 ... 150 Hz
Mounting position		Position 1 to 6
Mounting		Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit on DIN rail (35 mm)
Degree of protection	Housing	IP20
	Main circuit terminals	IP10

(1) Valid for TF65 produced from week 11, 2016. Otherwise, -25 ...+60 °C range is valid.
Derating might be applicable for temperatures > 50°C. Data on request

Electrical connection

Main circuit

Type			**TF65**
Connecting capacity			
Rigid		1 or 2 x	2.5 ... 16 mm²
		1 x	2.5 ... 35 mm²
Flexible with ferrule		1 or 2 x	2.5 ... 10 mm²
		1 x	2.5 ... 35 mm²
Flexible with insulated ferrule		1 or 2 x	2.5 ... 10 mm²
		1 x	2.5 ... 35 mm²
Flexible		1 or 2 x	2.5 ... 16 mm²
		1 x	2.5 ... 35 mm²
	Stranded acc. to UL/CSA	1 x	AWG 12 ... 2
		2 x	AWG 12 ... 6
	Flexible acc. to UL/CSA	1 x	AWG 12 ... 2
		2 x	AWG 12 ... 6
Stripping length			17 mm
Tightening torque			4.0 - 4.5 Nm / 35 ... 40 lb.in
Recommended screw driver			M6 (Pozidriv 2)

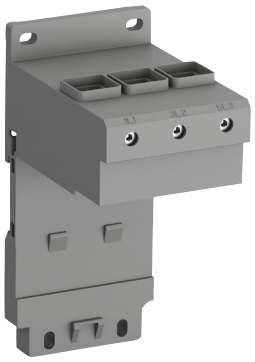
Auxiliary circuit

Type			**TF65**
Connecting capacity			
Rigid		1 or 2 x	0.75 ... 4 mm²
Flexible with ferrule		1 or 2 x	0.75 ... 4 mm²
Flexible with insulated ferrule		1 x	0.75 ... 2.5 mm²
		2 x	0.75 ... 1.5 mm²
Flexible		1 or 2 x	0.75 ... 1 mm² or 1 ... 2.5 mm²
	Stranded acc. to UL/CSA	1 or 2 x	AWG 18 ... 12
	Flexible acc. to UL/CSA	1 or 2 x	AWG 18 ... 12
Stripping length			9 mm
Tightening torque			1 ... 1.2 Nm / 9 ... 11 lb.in
Recommended screw driver			M3 (Pozidriv 2)

TF96 thermal overload relays – 40.0 to 96.0 A

Ordering details

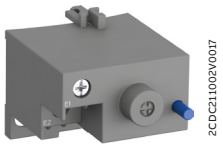
TF96



DB96

DB96 + TF96

KPR-101L



DRS-F

The TF96 thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure. The devices have trip class 10.

The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

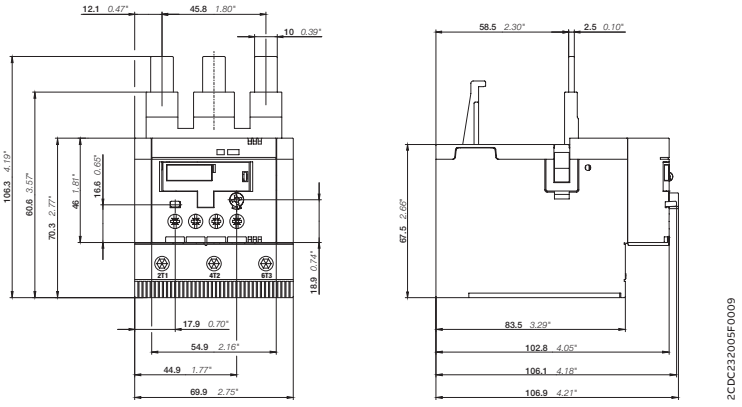
- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications
- With ATEX certification (1)

Setting range A	Short-circuit protective device	Trip class	Type	Order code	Weight (1 pce) kg
Suitable for AF80, AF96 contactors					
40.0 ... 51.0	125 A, gG Type Fuses	10	TF96-51	1SAZ911201R1001	0.520
48.0 ... 60.0	160 A, gG Type Fuses	10	TF96-60	1SAZ911201R1002	0.520
57.0 ... 68.0	160 A, gG Type Fuses	10	TF96-68	1SAZ911201R1003	0.520
65.0 ... 78.0	200 A, gG Type Fuses	10	TF96-78	1SAZ911201R1004	0.520
75.0 ... 87.0	200 A, gG Type Fuses	10	TF96-87	1SAZ911201R1005	0.520
84.0 ... 96.0	250 A, gG Type Fuses	10	TF96-96	1SAZ911201R1006	0.530

Ordering details accessories

Description	Suitable for	Type	Order code	Weight (1 pce) kg
Single mounting kit	TF96, EF96	DB96	1SAZ901901R1001	0.190
Reset push button	E16, EF, TF, T16, TA200	KPR-101L	1SFA616162R1014	0.019
Remote reset coil 24-30 V AC/DC	TF42, TF65, TF96	DRS-F-01	1SAX101911R1001	0.076
Remote reset coil 48-60 V AC/DC		DRS-F-02	1SAX101911R1002	0.077
Remote reset coil 110-127 V AC/DC		DRS-F-03	1SAX101911R1003	0.078
Remote reset coil 220-240 V AC/DC		DRS-F-04	1SAX101911R1004	0.076
Remote stop coil 24-30 V DC		DRS-F-TF-01	1SAZ701904R1001	0.072
Remote stop coil 48-60 V DC		DRS-F-TF-02	1SAZ701904R1002	0.077
Remote stop coil 110-127 V DC		DRS-F-TF-03	1SAZ701904R1003	0.071
Remote stop coil 220-240 V DC		DRS-F-TF-04	1SAZ701904R1004	0.076

(1) ATEX is valid for products, produced from week 26, 2015.



TF96

Main dimensions mm, inches

TF96 thermal overload relays – 40.0 to 96.0 A
Technical data

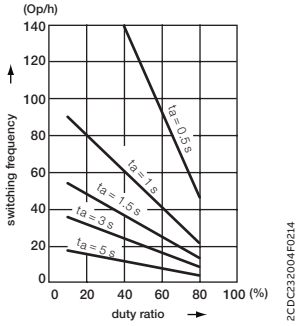
Main circuit – Utilization characteristics according to IEC/EN

Type		**TF96**
Standards		IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1
Rated operational voltage Ue		690 V AC, 440 V DC
Rated frequency		DC, 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 Uimp		8 kV
Rated insulation voltage Ui		690 V

Auxiliary circuit according to IEC/EN

Type		**TF96**
Rated operational voltage Ue		600 V
Conventional free air thermal current Ith	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.
Ie / 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	0.50 A
220-230-240 V	N.C., 95-96	3.00 A
	N.O., 97-98	0.50 A
440 V	N.C., 95-96	0.75 A
	N.O., 97-98	0.50 A
480-500 V	N.C., 95-96	0.75 A
	N.O., 97-98	0.50 A
Ie / 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		12 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 Uimp		6 kV
Rated insulation voltage Ui		690 V

Technical diagram – Intermittent periodic duty



ta: Motor starting time

TF96 thermal overload relays – 40.0 to 96.0 A
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	**TF96**
Standards	UL 60947-1, UL 60947-4-1
Maximum operational voltage	600 V AC/DC
Trip rating	125% of FLA
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"
Short-circuit protective device	See table "Full load amps and short-circuit protective device"

Auxiliary circuit according to UL/CSA

Type		**TF96**
Contact rating	N.C., 95-96	B600, Q600
	N.O., 97-98	D300, Q600
Conventional thermal current	N.C., 95-96	5 A
	N.O., 97-98	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**
TF96-51	51 A	5 kA	150 A, K5 / RK5	100 kA	125 A, Class J
TF96-60	60 A	10 kA	150 A, K5 / RK5	100 kA	150 A, Class J
TF96-68	68 A	10 kA	150 A, K5 / RK5	100 kA	150 A, Class J
TF96-78	78 A	10 kA	175 A, K5 / RK5	100 kA	175 A, Class J
TF96-87	87 A	10 kA	200 A, K5 / RK5	100 kA	200 A, Class J
TF96-96	96 A	10 kA	250 A, K5 / RK5	100 kA	200 A, Class J

TF96 thermal overload relays – 40.0 to 96.0 A
Technical data

General technical data

Type		**TF96**
Pollution degree		3
Phase loss sensitive		Yes
Ambient air temperature		
Operation (1)	Open - compensated	-40 ... +70 °C
	Open	-40 ... +70 °C
Storage		-50 ... +85 °C
Ambient air temperature compensation		Acc. to IEC/EN60947-4-1
Maximum operating altitude permissible		2000 m
Resistance to shock acc. to IEC 60068-2-27		25g / 11 ms
Resistance to vibrations acc. to IEC 60068-2-6		5g / 3 ... 150 Hz
Mounting position		Position 1 to 6
Mounting		Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit on DIN rail (35 mm)
Degree of protection	Housing	IP20
	Main circuit terminals	IP10

(1) Valid for TF96 produced from week 11, 2016. Otherwise, -25 ...+60 °C range is valid.
Derating might be applicable for temperatures > 50°C. Data on request.

Electrical connection

Main circuit

Type			**TF96**
Connecting capacity			
	Rigid	1 or 2 x	6 ... 35 mm²
		1 x	6 ... 50 mm²
	Flexible with ferrule	1 or 2 x	6 ... 35 mm²
		1 x	6 ... 50 mm²
	Flexible with insulated ferrule	1 or 2 x	6 ... 16 mm²
		1 x	6 ... 50 mm²
	Flexible	1 or 2 x	6 ... 35 mm²
		1 x	6 ... 50 mm²
	Stranded acc. to UL/CSA	1 x	AWG 8 ... 1
		2 x	AWG 8 ... 3
	Flexible acc. to UL/CSA	1 x	AWG 8 ... 1
		2 x	AWG 8 ... 3
Stripping length			20 mm (1)
Tightening torque			6 ... 9 Nm / 53 ... 80 lb.in (2)
Recommended screw driver			M8 (Hexagon)

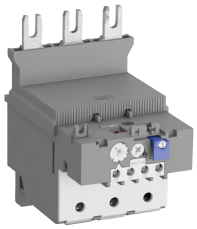
(2) Valid for products, produced from week 27, 2015

Auxiliary circuit

Type			**TF96**
Connecting capacity			
	Rigid	1 or 2 x	0.75 ... 4 mm²
	Flexible with ferrule	1 or 2 x	0.75 ... 4 mm²
	Flexible with insulated ferrule	1 x	0.75 ... 2.5 mm²
		2 x	0.75 ... 1.5 mm²
	Flexible	1 or 2 x	0.75 ... 1 mm² or 1 ... 2.5 mm²
	Stranded acc. to UL/CSA	1 or 2 x	AWG 18 ...12
	Flexible acc. to UL/CSA	1 or 2 x	AWG 18 ... 12
Stripping length			9 mm
Tightening torque			1 ... 1.2 Nm / 9 ... 11 lb.in
Recommended screw driver			M3 (Pozidriv 2)

TF140DU thermal overload relays – 66 to 142 A

Ordering details



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TF140DU

1SFC151224F0002

KPR-101L

The TF140DU thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure. The devices have trip class 10A.

The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

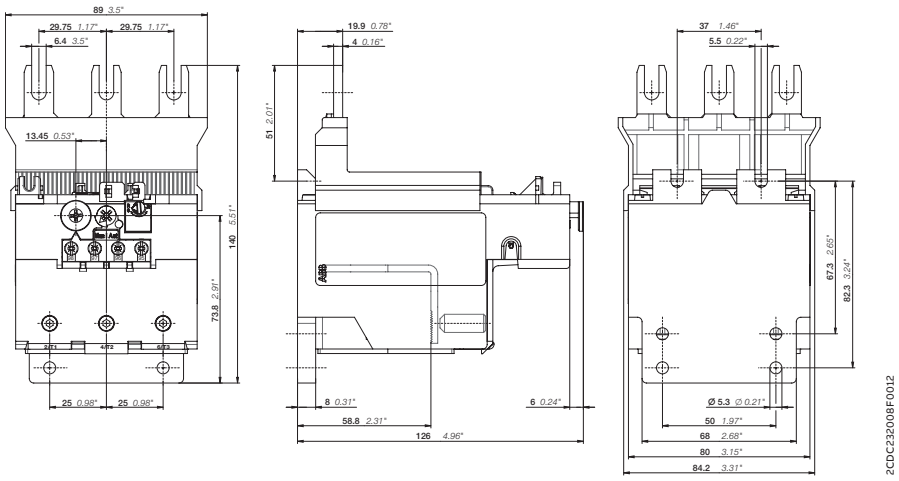
- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications
- ATEX variants available

Setting range A	Short-circuit protective device	Trip class	Type	Order code	Weight (1 pce) kg
Suitable for AF116...AF140 contactors					
66 ... 90	200 A, fuse type gG	10A	TF140DU-90	1SAZ431201R1001	0.882
80 ... 110	224 A, fuse type gG	10A	TF140DU-110	1SAZ431201R1002	0.824
100 ... 135	224 A, fuse type gG	10A	TF140DU-135	1SAZ431201R1003	0.818
110 ... 142	250 A, fuse type gG	10A	TF140DU-142	1SAZ431201R1004	0.828
66 ... 90	200 A, fuse type gG	10A	TF140DU-90-V1000*	1SAZ431301R1001	0.882
80 ... 110	224 A, fuse type gG	10A	TF140DU-110-V1000*	1SAZ431301R1002	0.824
100 ... 135	224 A, fuse type gG	10A	TF140DU-135-V1000*	1SAZ431301R1003	0.818
110 ... 142	250 A, fuse type gG	10A	TF140DU-142-V1000*	1SAZ431301R1004	0.828

*Note: ATEX variant

Ordering details accessories

Description	Suitable for	Type	Order code	Weight (1 pce) kg
Reset push button	E16, EF, TF, T16, TA200	KPR-101L	1SFA616162R1014	0.027



TF140DU

Main dimensions mm, inches

TF140DU thermal overload relays – 66 to 142 A
Technical data

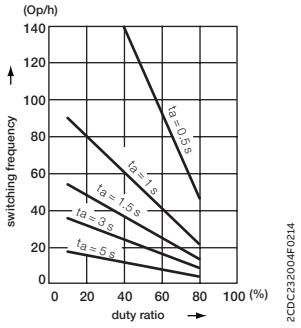
Main circuit – Utilization characteristics according to IEC/EN

Type		**TF140DU / TF140DU-V1000**
Standards		IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1
Rated operational voltage Ue		690 V AC, 440 V DC
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 Uimp		8 kV
Rated insulation voltage Ui		690 V

Auxiliary circuit according to IEC/EN

Type		**TF140DU / TF140DU-V1000**
Rated operational voltage Ue		500 V AC, 440 V DC
Conventional free air thermal current Ith	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.
Ie / 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
Ie / 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 Uimp		6 kV
Rated insulation voltage Ui		690 V

Technical diagram – Intermittent periodic duty



ta: Motor starting time

TF140DU thermal overload relays – 66 to 142 A
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	**TF140DU / TF140DU-V1000**
Standards	UL 508, CSA 22.2 No. 14, UL 60947-4-1A
Maximum operational voltage	600 V AC/DC
Trip rating	125% of FLA
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"
Short-circuit protective device	See table "Full load amps and short-circuit protective device"

Auxiliary circuit according to UL/CSA

Type		**TF140DU / TF140DU-V1000**
Contact rating	N.C., 95-96	C600
	N.O., 97-98	B600
Conventional thermal current	N.C./N.O.	10 A / 6 A

Full load amps and short-circuit protective device

Type	**Full load amps (FLA)**	**Short-circuit protective device**					
		480 / 600 V AC		**480 / 600 V AC**		**480 / 600 V AC**	
		Short circuit rating RMS symmetrical	**Fuse type**	**Short circuit rating RMS symmetrical**	**Fuse type**	**Short circuit rating RMS symmetrical**	**Listed circuit breaker**
TF140DU-90 / TF140DU-90-V1000	90 A	10 kA	250 A, K5 / RK5	100 kA	250 A, Class J	100 kA	250 A
TF140DU-110 / TF140DU-110-V1000	110 A	10 kA	250 A, K5 / RK5	100 kA	250 A, Class J	100 kA	250 A
TF140DU-135 / TF140DU-135-V1000	135 A	10 kA	250 A, K5 / RK5	100 kA	250 A, Class J	100 kA	250 A
TF140DU-142 / TF140DU-142-V1000	142 A	10 kA	250 A, K5 / RK5	100 kA	250 A, Class J	100 kA	250 A

TF140DU thermal overload relays – 66 to 142 A
Technical data

General technical data

Type			**TF140DU / TF140DU-V1000**
Pollution degree			3
Phase loss sensitive			Yes
Ambient air temperature			
	Operation	Open - compensated	-25 ... +55 °C
		Open	-25 ... +55 °C
	Storage		-40 ... +70 °C
Ambient air temperature compensation			Acc. to IEC/EN 60947-4-1
Maximum operating altitude permissible			2000 m
Resistance to shock acc. to IEC 60068-2-27			15 g / 11 ms
Mounting position			Position 1-5
Mounting			Mount on the contactor and tighten the screws of the main circuit terminals
Degree of protection	Housing		IP20
	Main circuit terminals		IP10

Electrical connection

Main circuit

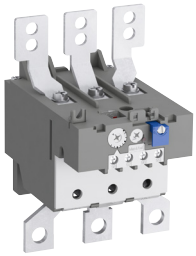
Type			**TF140DU / TF140DU-V1000**
Connecting capacity			
	Rigid	1 x	16 ... 70 mm²
		2 x	-
	Flexible	1 x	16 ... 70 mm²
		2 x	-
	Stranded acc. to UL/CSA	1 or 2 x	AWG 6-2/0
	Flexible acc. to UL/CSA	1 or 2 x	AWG 6-2/0
Stripping length			25 mm
Tightening torque			8 ... 10 Nm / 77 ... 88 lb.in
Recommended screw driver			M8 (Hexagon)

Auxiliary circuit

Type			**TF140DU / TF140DU-V1000**
Connecting capacity			
	Rigid	1 or 2 x	0.75 ... 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 18-14
	Flexible acc. to UL/CSA	1 or 2 x	AWG 18-14
Stripping length			9 mm
Tightening torque			0.8 ... 1.2 Nm / 12 lb.in
Recommended screw driver			M3.5 (Pozidriv 2)

TA200DU thermal overload relays – 66 to 200 A

Ordering details



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TA200DU

1SFC151224F0002

KPR-101L

The TA200DU thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure. The devices have trip class 10A.

The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

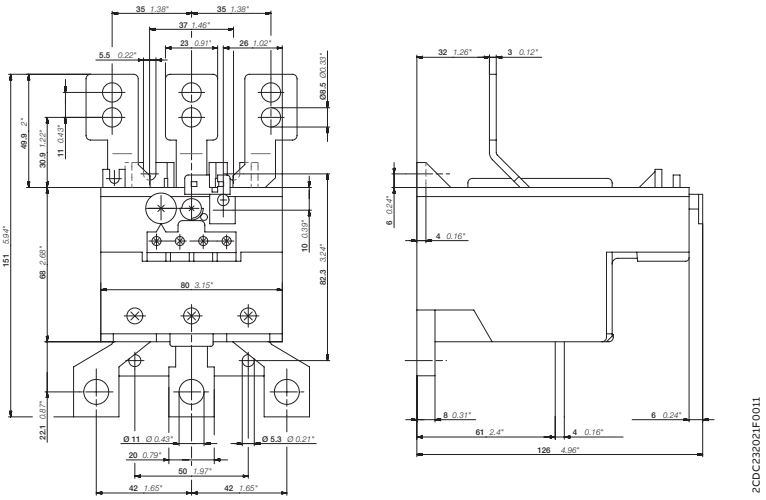
- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications
- ATEX variants available

Setting range A	Short-circuit protective device	Trip class	Type	Order code	Weight (1 pce) kg
Suitable for AF145...AF2050 contactors					
66 ... 90	200 A, fuse type gG / 125 A aM	10A	TA200DU-90	1SAZ421201R1001	0.755
80 ... 110	224 A, fuse type gG / 160 A aM	10A	TA200DU-110	1SAZ421201R1002	0.760
100 ... 135	224 A, fuse type gG / 200 A aM	10A	TA200DU-135	1SAZ421201R1003	0.760
110 ... 150	250 A, fuse type gG / 200 A aM	10A	TA200DU-150	1SAZ421201R1004	0.760
130 ... 175	315 A, fuse type gG / 250 A aM	10A	TA200DU-175	1SAZ421201R1005	0.770
150 ... 200	315 A, fuse type gG / 250 A aM	10A	TA200DU-200	1SAZ421201R1006	0.785
66 ... 90	200 A, fuse type gG / 125 A aM	10A	TA200DU-90-V1000 (1)	1SAZ421301R1001	0.755
80 ... 110	224 A, fuse type gG / 160 A aM	10A	TA200DU-110-V1000 (1)	1SAZ421301R1002	0.760
100 ... 135	224 A, fuse type gG / 200 A aM	10A	TA200DU-135-V1000 (1)	1SAZ421301R1003	0.760
110 ... 150	250 A, fuse type gG / 200 A aM	10A	TA200DU-150-V1000 (1)	1SAZ421301R1004	0.760
130 ... 175	315 A, fuse type gG / 250 A aM	10A	TA200DU-175-V1000 (1)	1SAZ421301R1005	0.770
150 ... 200	315 A, fuse type gG / 250 A aM	10A	TA200DU-200-V1000 (1)	1SAZ421301R1006	0.785

(1) ATEX variant

Ordering details accessories

Description	Suitable for	Type	Order code	Weight (1 pce) kg
Terminal shroud	TA200DU	LT200/A	1SAZ401901R1001	0.090
Single mounting kit	TA200DU	DB200	1SAZ401110R0001	0.225
Reset push button	E16, EF, TF, T16, TA200	KPR-101L	1SFA616162R1014	0.027



2CDC232021F0011

TA200DU

Main dimensions mm, inches

TA200DU thermal overload relays – 66 to 200 A
Technical data

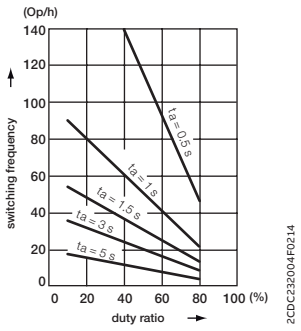
Main circuit – Utilization characteristics according to IEC/EN

Type		**TA200DU / TA200DU-V1000**
Standards		IEC/EN 60947-1, IEC/EN 60947-4-1
Rated operational voltage Ue		690 V AC / 440 V DC
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 Uimp		6 kV
Rated insulation voltage Ui		690 V AC

Auxiliary circuit according to IEC/EN

Type		**TA200DU / TA200DU-V1000**
Rated operational voltage Ue		500 V AC, 440 V DC
Conventional free air thermal current Ith	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.
Ie / 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	1.20 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
Ie / 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 Uimp		6 kV
Rated insulation voltage Ui		690 V

Technical diagram – Intermittent periodic duty



ta: Motor starting time

TA200DU thermal overload relays – 66 to 200 A
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	**TA200DU / TA200DU-V1000**
Standards	UL 508, CSA 22.2 No. 14
Maximum operational voltage	600 V AC/DC
Trip rating	125% of FLA
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"
Short-circuit protective device	See table "Full load amps and short-circuit protective device"

Auxiliary circuit according to UL/CSA

Type		**TA200DU / TA200DU-V1000**
Contact rating	N.C., 95-96	C600
	N.O., 97-98	B600
Conventional thermal current		5 A

Full load amps and short-circuit protective device

Type	**Full load amps (FLA)**	**Short-circuit protective device**						
		480 / 600 V AC						
		Short circuit rating RMS symmetrical	**Fuse type**	**Listed circuit breaker**	**Short circuit rating RMS symmetrical**	**Fuse type**	**Short circuit rating RMS symmetrical**	**Listed circuit breaker**
TA200DU-90 / TA200DU-90-V1000	90 A	10 kA	250 A, K5 / RK5	225 A	100 kA	250 A, Class J	100 kA	250 A
TA200DU-110 / TA200DU-110-V1000	110 A	10 kA	250 A, K5 / RK5	225 A	100 kA	250 A, Class J	100 kA	250 A
TA200DU-135 / TA200DU-135-V1000	135 A	10 kA	300 A, K5 / RK5	225 A	100 kA	250 A, Class J	100 kA	250 A
TA200DU-150 / TA200DU-150-V1000	150 A	10 kA	300 A, K5 / RK5	225 A	100 kA	250 A, Class J	100 kA	250 A
TA200DU-175 / TA200DU-175-V1000	175 A	10 kA	300 A, K5 / RK5	225 A	100 kA	300 A, Class J	100 kA	300 A
TA200DU-200 / TA200DU-200-V1000	200 A	10 kA	400 A, K5 / RK5	400 A	100 kA	400 A, Class J	100 kA	400 A

TA200DU thermal overload relays – 66 to 200 A
Technical data

General technical data

Type			TA200DU	TA200DU-V1000
Pollution degree			3	
Phase loss sensitive			Yes	
Ambient air temperature				
	Operation	Open - compensated	-25 ... +55 °C	-5 ... +40 °C
		Open	-25 ... +55 °C	-5 ... +40 °C
	Storage		-40 ... +70 °C	
Ambient air temperature compensation			Acc. to IEC/EN60947-4-1	
Maximum operating altitude permissible			2000 m	
Resistance to shock acc. to IEC 60068-2-27			12g / 15 ms	
Mounting position			Position 1-6	
Mounting			Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit	
Degree of protection		Housing	IP20	
		Main circuit terminals	IP00	

Electrical connection

Main circuit

Type			TA200DU / TA200DU-V1000
Connecting capacity			
	Rigid	1 x	25 ... 120 mm²
	Flexible	1 x	25 ... 120 mm²
	Stranded acc. to UL/CSA	1 x	AWG 4 ... 0000
	Flexible acc. to UL/CSA	1 x	AWG 4 ... 0000
	Lugs		L > 10 mm
Tightening torque			25 Nm / 220 lb.in
Recommended screwdriver			Open bars

Auxiliary circuit

Type			TA200DU / TA200DU-V1000
Connecting capacity			
	Rigid	1 or 2 x	0.75 ... 4 mm²
	Flexible with ferrule	1 or 2 x	0.75 ... 2.5 mm²
	Flexible with insulated ferrule	1 x	0.75 ... 2.5 mm²
		2 x	0.75 ... 1 mm²
	Flexible	1 or 2 x	0.75 ... 2.5 mm²
	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			9 mm
Tightening torque			0.8 ... 1.3 Nm / 12 lb.in
Recommended screwdriver			M3.5 (Pozidriv 2)

EF19, EF45 electronic overload relays – 0.10 to 45.0 A

Ordering details

1SBC101147F0010

EF19-18.9

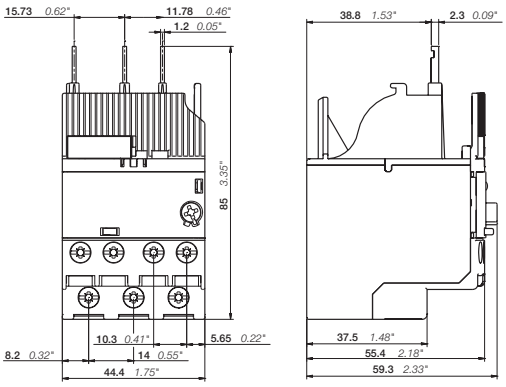
1SBC101148F0010

EF45-30

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. The EF19 and EF45 have ATEX and IECEx certification (1).

Setting range A	Short-circuit protective device	Trip class	Type	Order code	Weight (1 pce) kg
EF19 electronic overload relays, suitable for AF09 ... AF38 / AFC09 ... AFC38 (1)					
0.10 ... 0.32	1 A, fuse type gG	10E, 20E, 30E	EF19-0.32	1SAX121001R1101	0.158
0.30 ... 1.00	4 A, fuse type gG	10E, 20E, 30E	EF19-1.0	1SAX121001R1102	0.158
0.80 ... 2.70	10 A, fuse type gG	10E, 20E, 30E	EF19-2.7	1SAX121001R1103	0.158
1.90 ... 6.30	20 A, fuse type gG	10E, 20E, 30E	EF19-6.3	1SAX121001R1104	0.158
5.70 ... 18.9	50 A, fuse type gG	10E, 20E, 30E	EF19-18.9	1SAX121001R1105	0.158
EF45-30 also suitable for AF26 ... AF38 (1)					
9.00 ... 30.0	160 A, fuse type gG	10E, 20E, 30E	EF45-30	1SAX221001R1101	0.362
15.0 ... 45.0	160 A, fuse type gG	10E, 20E, 30E	EF45-45	1SAX221001R1102	0.362

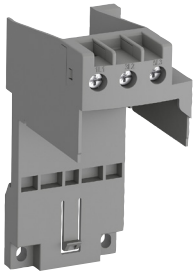
(1) ATEX is valid for products produced from week 42, 2014. IECEx is valid for products produced from week 15, 2017.



EF19, EF45

Main dimensions mm, inches

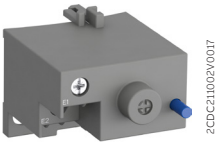
E16DU, EF19, EF45 electronic overload relays – 0.10 to 45.0 A
Ordering details



DB19EF

DB45EF

KPR-101L

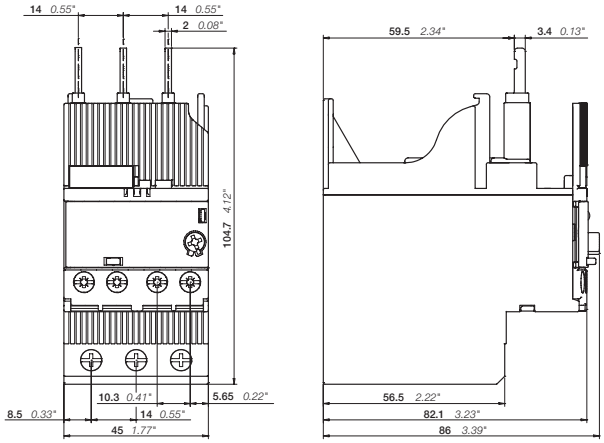


DRS-F

Ordering details accessories

Description	Suitable for	Type	Order code	Weight (1 pce) kg
Single mounting kit	E16DU	DB16E	1SAX101110R0001	0.035
Single mounting kit	EF19	DB19EF	1SAX101910R1001	0.046
Single mounting kit	EF45	DB45EF	1SAX201910R0001	0.100
Reset push button	E16, EF, TF, T16, TA200	KPR-101L	1SFA616162R1014	0.019
Remote reset coil 24-30 V DC	EF19, EF45, EF65, EF96, EF146, EF205, EF370, EF460, EF750	DRS-F-01	1SAX101911R1001	0.076
Remote reset coil 48-60 V DC		DRS-F-02	1SAX101911R1002	0.077
Remote reset coil 110-127 V DC		DRS-F-03	1SAX101911R1003	0.078
Remote reset coil 220-240 V DC		DRS-F-04	1SAX101911R1004	0.076
Remote stop coil 24-30 V AC/DC		DRS-F-EF-01	1SAX101911R1011	0.075
Remote stop coil 48-60 V AC/DC		DRS-F-EF-02	1SAX101911R1012	0.076
Remote stop coil 110-127 V AC/DC		DRS-F-EF-03	1SAX101911R1013	0.076
Remote stop coil 220-240 V AC/DC		DRS-F-EF-04	1SAX101911R1014	0.074

E16DU, EF19, EF45 electronic overload relays – 0.10 to 45.0 A
Technical data



EF45

Main circuit – Utilization characteristics according to IEC/EN

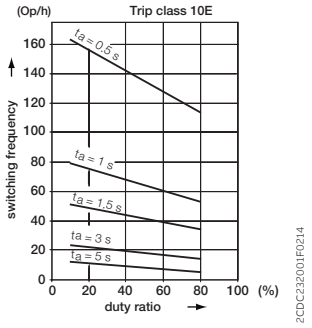
Type	E16DU	EF19	EF45
Standards	IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1		
Rated operational voltage Ue	690 V AC		
Rated frequency	50/60 Hz – not suitable for DC applications		
Trip class	10E, 20E, 30E, selectable		
Number of poles	3		
Duty time	100%		
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"		
Rated impulse withstand voltage Uimp	6 kV		
Rated insulation voltage Ui	690 V AC		

Auxiliary circuit according to IEC/EN

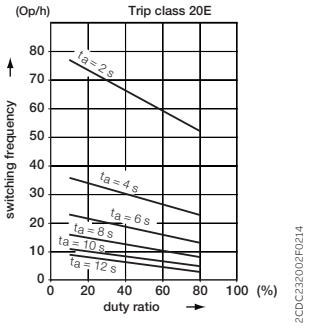
Type		E16DU	EF19	EF45
Rated operational voltage Ue		600 V AC / DC		
Conventional free air thermal current Ith		6 A		
Rated frequency		DC, 50/60 Hz		
Number of poles		1 N.C. + 1 N.O.		
Ie / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category				
110-120 V	50/60 Hz	3.00 A		
220-230-240 V	50/60 Hz	3.00 A		
400 V	50/60 Hz	1.10 A		
480-500 V	50/60 Hz	0.72 A	0.75 A	
Ie / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category				
24 V		1.50 A		
60 V		0.55 A		
110-120-125 V		0.55 A		
250 V		0.27 A		
Minimum switching capacity		12 V / 3 mA		
Short-circuit protective devices		6 A, fuse type gG		
Rated impulse withstand voltage Uimp		6 kV		
Rated insulation voltage Ui		690 V		

E16DU, EF19, EF45 electronic overload relays – 0.10 to 45.0 A
Technical data

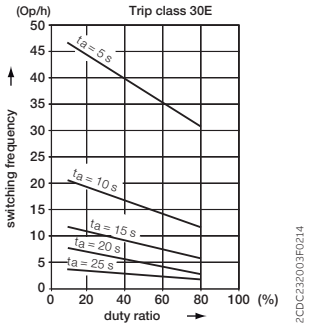
Technical diagram – Intermittent periodic duty



Trip class 10E



Trip class 20E



Trip class 30E

Main circuit – Utilization characteristics according to UL/CSA

Type	E16DU	EF19	EF45
Standards	UL 508, CSA 22.2 No. 14		
Maximum operational voltage	600 V AC		
Trip rating	125% of FLA		
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"		
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"		
Short-circuit protective device	See table "Full load amps and short-circuit protective device"		

Auxiliary circuit according to UL/CSA

Type		E16DU	EF19	EF45
Contact rating	N.C., 95-96	B600, Q300	B600, Q600	
	N.O., 97-98	B600, Q300	B600, Q600	
Conventional free-air thermal current		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					
		480 V AC		600 V AC			
		SCCR	Fuse type	SCCR	Fuse type	SCCR	Fuse type
EF19-0.32	0.32 A	50 kA	2 A, Class J	5 kA	2 A, K5 / RK5	100 kA	2 A, Class J
EF19-1.0	1.00 A	50 kA	2 A, K5 / RK5	5 kA	2 A, K5 / RK5	100 kA	2 A, Class J
EF19-2.7	2.70 A	50 kA	4 A, K5 / RK5	5 kA	4 A, K5 / RK5	100 kA	4 A, Class J
EF19-6.3	6.30 A	50 kA	15 A, K5 / RK5	5 kA	15 A, K5 / RK5	100 kA	15 A, Class J
EF19-18.9	18.90 A	50 kA	30 A, K5 / RK5	5 kA	30 A, K5 / RK5	100 kA	30 A, Class J

Type	Full load amps (FLA)	Short-circuit protective device					
		480 V AC		600 V AC			
		SCCR	Fuse type	SCCR	Fuse type	SCCR	Fuse type
EF45-30	30 A	18 kA	150 A, K5 / RK5	18 kA	150 A, K5 / RK5	100 kA	150 A, Class J
EF45-45	45 A	18 kA	200 A, K5 / RK5	18 kA	200 A, K5 / RK5	100 kA	200 A, Class J

E16DU, EF19, EF45 electronic overload relays – 0.10 to 45.0 A
Technical data

General data

Type			E16DU	EF19	EF45
Pollution degree			3		
Phase loss sensitive			Yes		
Ambient air temperature					
	Operation	Open - compensated	-25 ... +70 °C		
	Storage		-50 ... +85 °C		
Ambient air temperature compensation			Acc. to IEC/EN60947-4-1		
Maximum operating altitude permissible			2000 m		
Resistance to shock acc. to IEC 60068-2-27			15g / 11 ms pulse	25g / 11 ms pulse	
Resistance to vibrations acc. to IEC 60068-2-6			5g / 3 ... 150 Hz	3g / 3 ... 150 Hz	5g / 3 ... 150 Hz
Mounting position			Position 1-6		
Mounting			Mount on the contactor and tighten the screws of the main circuit terminals		
Degree of protection	Housing		IP20		
	Main circuit terminals		IP20		

Electrical connection

Main circuit

Type			E16DU	EF19	EF45
Connecting capacity					
Rigid		1 or 2 x	1 ... 4 mm²	1 ... 4 mm²	2.5 ... 16 mm²
Flexible with insulated ferrule		1 or 2 x	0.75 ... 2.5 mm²	0.75 ... 2.5 mm²	2.5 ... 10 mm²
Stranded acc. to UL/CSA		1 or 2 x	AWG 16-10	AWG 16-10	AWG 14-6
Flexible acc. to UL/CSA		1 or 2 x	AWG 16-10	AWG 16-10	AWG 14-6
Stripping length			9 mm	9 mm	13 mm
Tightening torque			0.8 ... 1.5 Nm / 7 ... 13 lb.in	0.8 ... 1.5 Nm / 7 ... 13 lb.in	2.3 ... 2.6 Nm / 20 ... 22 lb.in
Recommended screw driver			M3.5 (Pozidriv 2)	M3.5 (Pozidriv 2)	M5 (Pozidriv 2)

Auxiliary circuit

Type			E16DU	EF19	EF45
Connecting capacity					
Rigid		1 or 2 x	1 ... 4 mm²	1 ... 4 mm²	1 ... 4 mm²
Flexible with ferrule		1 or 2 x	0.75 ... 2.5 mm²	0.75 ... 2.5 mm²	0.75 ... 2.5 mm²
Flexible with insulated ferrule		1 or 2 x	0.75 ... 2.5 mm²	0.75 ... 2.5 mm²	0.75 ... 2.5 mm²
Flexible		1 or 2 x	0.75 ... 2.5 mm²	0.75 ... 2.5 mm²	0.75 ... 2.5 mm²
Stranded acc. to UL/CSA		1 or 2 x	AWG 16-10	AWG 18-10	AWG 18-10
Flexible acc. to UL/CSA		1 or 2 x	AWG 16-10	AWG 18-10	AWG 18-10
Stripping length			9 mm	9 mm	9 mm
Tightening torque			0.8 ... 1.2 Nm / 7 ... 11 lb.in	0.8 ... 1.2 Nm / 7 ... 11 lb.in	0.8 ... 1.2 Nm / 7 ... 11 lb.in
Recommended screw driver			M3.5 (Pozidriv 2)	M3.5 (Pozidriv 2)	M3.5 (Pozidriv 2)

EF65, EF96, EF146 electronic overload relays – 20 to 150 A
Ordering details

EF65-70

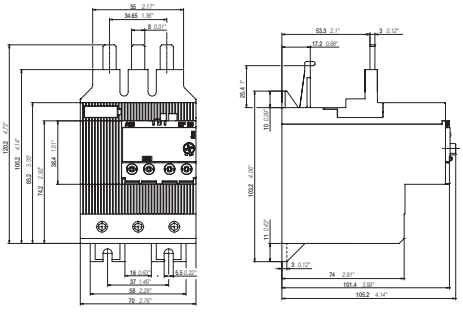
EF96-100

EF146-150

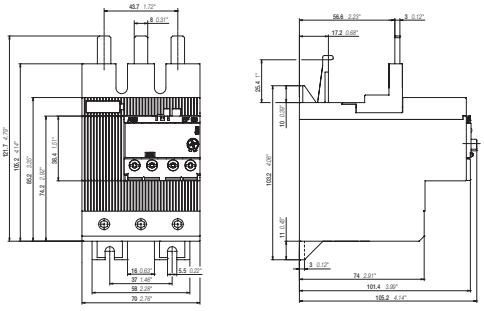
The EF65, EF96 and EF146 are self-supplied electronic overload relays, which means no extra external supply is needed. It offers reliable protection for motors in the event of overload or phase failure. Easy to use like a thermal overload relay and compatible with standard motor applications, the electronic overload relay is convincing, above all, due to its wide setting range, high accuracy, high operational temperature range and the possibility to select a trip class (10E, 20E, 30E). Further features are the temperature compensation, trip contact (N.C.), signal contact (N.O.), automatic or manual reset selectable, trip-free mechanism, STOP and TEST function and a trip indication. The overload relays are connected directly to the contactors. The EF65, EF96 and EF146 have ATEX and IECEx certification (1).

Setting range A	Short-circuit protective device	Trip class	Type	Order code	Weight (1 pce) kg
Suitable for AF40, AF52, AF65					
20 ... 56	160 A, fuse type gG	10E, 20E, 30E	EF65-56	1SAX331001R1102	0.821
25 ... 70	160 A, fuse type gG	10E, 20E, 30E	EF65-70	1SAX331001R1101	0.821
Suitable for AF80, AF96					
20 ... 56	160A, fuse type gG	10E, 20E, 30E	EF96-56	1SAX341001R1102	0.802
36 ... 100	200 A, fuse type gG	10E, 20E, 30E	EF96-100	1SAX341001R1101	0.802
Suitable for AF116, AF140, AF146					
54 ... 150	315 A, fuse type gG	10E, 20E, 30E	EF146-150	1SAX351001R1101	0.890

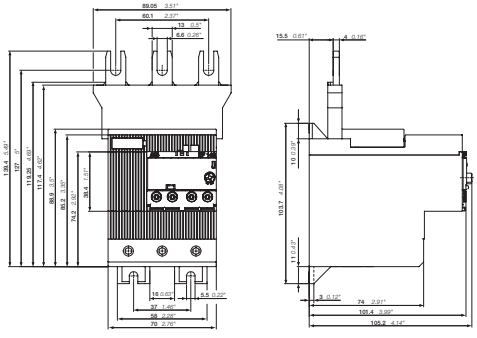
(1) ATEX is valid for products produced from week 42, 2014. ATEX certification is valid for EF65-56 produced from week 47, 2015. IECEx is valid for products produced from week 15, 2017.



EF65-56 / EF65-70



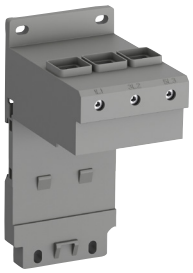
EF96-56 / EF96-100



EF146-150

Main dimensions mm, inches

EF65, EF96, EF146 electronic overload relays – 20 to 150 A
Ordering details



DB96

DB96 + EF96

KPR-101L

DRS-F

Ordering details accessories

Description	Suitable for	Type	Order code	Weight (1 pce) kg
Single mounting kit	EF96, TF96	DB96	1SAZ901901R1001	0.190
Reset push button	E16, EF, TF, T16, TA200	KPR-101L	1SFA616162R1014	0.019
Remote reset coil 24-30 V DC	EF19, EF45, EF65, EF96, EF146, EF205, EF370, EF460, EF750	DRS-F-01	1SAX101911R1001	0.076
Remote reset coil 48-60 V DC		DRS-F-02	1SAX101911R1002	0.077
Remote reset coil 110-127 V DC		DRS-F-03	1SAX101911R1003	0.078
Remote reset coil 220-240 V DC		DRS-F-04	1SAX101911R1004	0.076
Remote stop coil 24-30 V AC/DC		DRS-F-EF-01	1SAX101911R1011	0.075
Remote stop coil 48-60 V AC/DC		DRS-F-EF-02	1SAX101911R1012	0.076
Remote stop coil 110-127 V AC/DC		DRS-F-EF-03	1SAX101911R1013	0.076
Remote stop coil 220-240 V AC/DC		DRS-F-EF-04	1SAX101911R1014	0.074

EF65, EF96, EF146 electronic overload relays – 20 to 150 A
Technical data

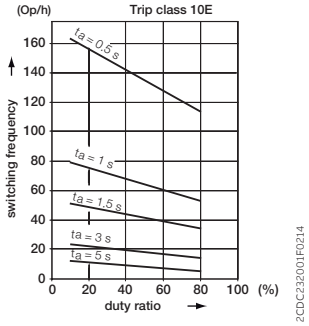
Main circuit – Utilization characteristics according to IEC/EN

Type	**EF65, EF96, EF146**
Standards	IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1
Rated operational voltage Ue	1000 V AC
Rated frequency	50/60 Hz – not suitable for DC applications
Trip class	10E, 20E, 30E, selectable
Number of poles	3
Duty time	100%
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"
Rated impulse withstand voltage Uimp	8 kV
Rated insulation voltage Ui	1000 V

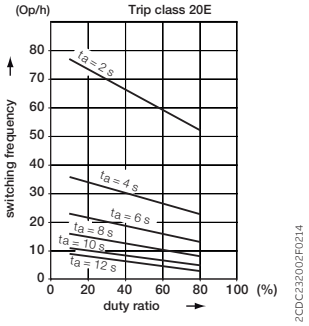
Auxiliary circuit according to IEC/EN

Type		**EF65, EF96, EF146**
Rated operational voltage Ue		600 V AC / DC
Conventional free air thermal current Ith		6 A
Rated frequency		DC, 50/60 Hz
Number of poles		1 N.C. + 1 N.O.
Ie / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category		
110-120 V	50/60 Hz	3.00 A
220-230-240 V	50/60 Hz	3.00 A
400 V	50/60 Hz	1.10 A
480-500 V	50/60 Hz	0.75 A
Ie / 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 Uimp		6 kV
Rated insulation voltage Ui		690 V

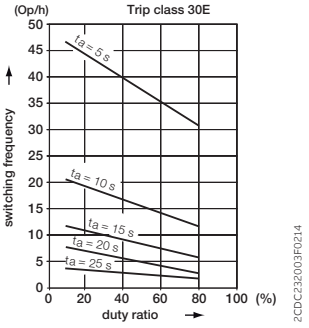
Technical diagram – Intermittent periodic duty



Trip class 10E



Trip class 20E



Trip class 30E

EF65, EF96, EF146 electronic overload relays – 20 to 150 A
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type		**EF65, EF96, EF146**
Standards		UL 508, CSA 22.2 No. 14, UL 60947-4-1A
Maximum operational voltage		600 V AC
Trip rating		125% of FLA
Full load amps (FLA)		See table "Full load amps and short-circuit protective device"
Short-circuit rating RMS symmetrical		See table "Full load amps and short-circuit protective device"
Short-circuit protective device		See table "Full load amps and short-circuit protective device"

Auxiliary circuit according to UL/CSA

Type		**EF65, EF96, EF146**
Contact rating	N.C., 95-96	B600, Q600
	N.O., 97-98	B600, Q600
Conventional thermal current		5 A

Full load amps and short-circuit protective device

Type	**Full load amps (FLA)**	**Short-circuit protective device**					
		480 V AC		**600 V AC**			
		SCCR	**Fuse type**	**SCCR**	**Fuse type**	**SCCR**	**Fuse type**
EF65-56	56 A	10 kA	150 A, K5/RK5	10 kA	150 A, K5/RK5	100 kA	150 A, J
EF65-70	70 A	10 kA	150 A, K5/RK5	10 kA	150 A, K5/RK5	100 kA	150 A, J
EF96-65	56 A	10 kA	150 A, K5/RK5	10 kA	150 A, K5/RK5	100 kA	150 A, J
EF96-100	100 A	10 kA	200 A, K5/RK5	10 kA	200 A, K5/RK5	100 kA	200 A, J
EF146-150	150 A	10 kA	250 A, K5/RK5	10 kA	250 A, K5/RK5	100 kA	200 A, J

EF65, EF96, EF146 electronic overload relays – 20 to 150 A
Technical data

General data

Type			**EF65, EF96, EF146**
Pollution degree			3
Phase loss sensitive			Yes
Ambient air temperature			
	Operation	Open - compensated	-25 ... +70 °C
	Storage		-50 ... +85 °C
Ambient air temperature compensation			Acc. to IEC/EN 60947-4-1
Maximum operating altitude permissible			2000 m
Resistance to shock acc. to IEC 60068-2-27			15g / 11 ms
Resistance to vibrations acc. to IEC 60068-2-6			5g / 3 ... 150 Hz
Mounting position			Position 1-6
Mounting			Mount on the contactor and tighten the screws of the main circuit terminals
Degree of protection	Housing		IP20
	Main circuit terminals		IP10

Electrical connection

Main circuit

Type			**EF65**	**EF96**	**EF146**
Connecting capacity					
	Rigid (1)	1 x	4 ... 35 mm²	4 ... 70 mm²	10 ... 95 mm²
		2 x	4 ... 35 mm²	4 ... 35 mm²	10 ... 35 mm²
	Flexible (1)	1 x	4 ... 35 mm²	4 ... 50 mm²	10 ... 70 mm²
		2 x	2.5 ... 35 mm²	4 ... 35 mm²	10 ... 35 mm²
	Stranded acc. to UL/CSA	1 x	AWG 10-2	AWG 10-2	AWG 6-00
		2 x			AWG 6-2
	Flexible acc. to UL/CSA	1 x	AWG 10-2	AWG 10-2	AWG 6-00
		2 x			AWG 6-2
Stripping length			20 mm	20 mm	20 mm
Tightening torque			4 Nm / 35 lb.in	6 Nm / 55 lb.in	10 Nm / 70 lb.in
Recommended screw driver			M8 (Pozidriv 2)	M8 (Hexagon 4)	M8 (Hexagon 4)

(1) Only one wire size allowed when using 2 wires

Auxiliary circuit

Type			**EF65, EF96, EF146**
Connecting capacity			
	Rigid	1 or 2 x	1 ... 4 mm²
	Flexible with ferrule	1 or 2 x	0.75 ... 2.5 mm²
	Flexible with insulated ferrule	1 or 2 x	0.75 ... 2.5 mm²
	Flexible	1 or 2 x	0.75 ... 2.5 mm²
	Stranded acc. to UL/CSA	1 or 2 x	AWG 18-10
	Flexible acc. to UL/CSA	1 or 2 x	AWG 18-10
Stripping length			9 mm
Tightening torque			0.8 ... 1.2 Nm / 7 ... 11 lb.in
Recommended screw driver			M3.5 (Pozidriv 2)

EF205, EF370 electronic overload relays – 63 to 380 A

Ordering details

EF205-210

EF370-380

KPR-101L

DRS-F

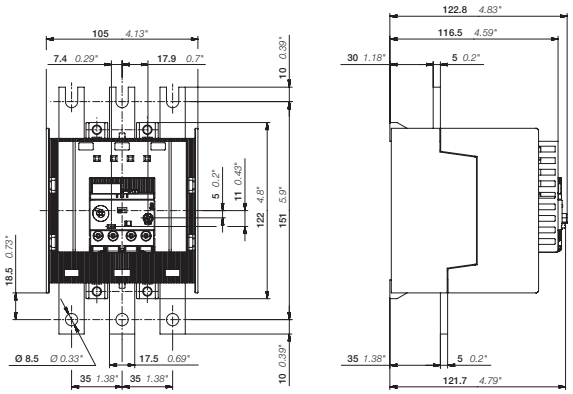
The EF205 and EF370 are self-supplied electronic overload relays, which means no extra external supply is needed. It offers reliable protection for motors in the event of overload or phase failure. Easy to use like a thermal overload relay and compatible with standard motor applications, the electronic overload relay is convincing, above all, due to its wide setting range, high accuracy, high operational temperature range and the possibility to select a trip class (10E, 20E, 30E). Further features are the temperature compensation, trip contact (N.C.), signal contact (N.O.), automatic or manual reset selectable, trip-free mechanism, STOP and TEST function and a trip indication. The overload relays are connected directly to the contactors. The EF205 and EF370 have ATEX and IECEx certification (1).

Setting range A	Short-circuit protective device	Trip class	Type	Order code	Weight (1 pce) kg
Suitable for AF145, AF185, AF190, AF205					
63 ... 210	1250 A, fuse type gG	10E, 20E, 30E	EF205-210	1SAX531001R1101	1.210
Suitable for AF210, AF260, AF265, AF300, AF305, AF370					
115 ... 380	1600 A, fuse type gG	10E, 20E, 30E	EF370-380	1SAX611001R1101	1.430

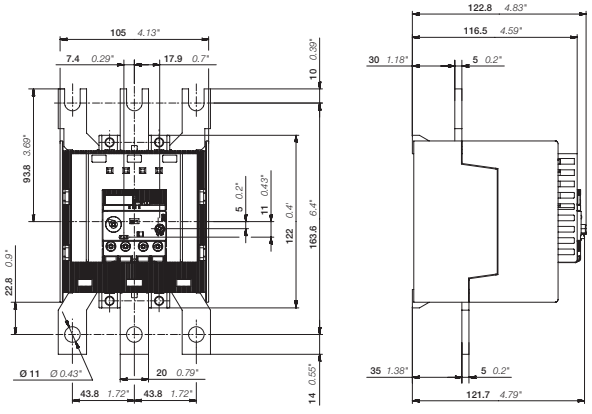
(1) ATEX is valid for products produced from week 42, 2015. IECEx is valid for products produced from week 15, 2017.

Ordering details accessories

Description	Suitable for	Type	Order code	Weight (1 pce) kg
Reset push button	E16, EF, TF, T16, TA200	KPR-101L	1SFA616162R1014	0.027
Terminal shroud	EF205	LT200E	1SAX501904R0001	0.085
Terminal shroud	EF370	LT320E	1SAX601904R0001	0.105
Remote reset coil 24-30 V DC	EF19, EF45, EF65, EF96, EF146, EF205, EF370, EF460, EF750	DRS-F-01	1SAX101911R1001	0.077
Remote reset coil 48-60 V DC		DRS-F-02	1SAX101911R1002	0.077
Remote reset coil 110-127 V DC		DRS-F-03	1SAX101911R1003	0.077
Remote reset coil 220-240 V DC		DRS-F-04	1SAX101911R1004	0.077
Remote stop coil 24-30 V AC/DC		DRS-F-EF-01	1SAX101911R1011	0.077
Remote stop coil 48-60 V AC/DC		DRS-F-EF-02	1SAX101911R1012	0.077
Remote stop coil 110-127 V AC/DC		DRS-F-EF-03	1SAX101911R1013	0.077
Remote stop coil 220-240 V AC/DC		DRS-F-EF-04	1SAX101911R1014	0.077



EF205-210



EF370-380

Main dimensions mm, inches

EF205, EF370 electronic overload relays – 63 to 380 A
Technical data

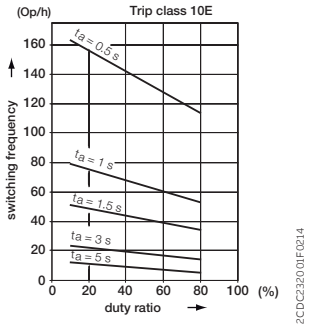
Main circuit – Utilization characteristics according to IEC/EN

Type	**EF205, EF370**
Standards	IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1
Rated operational voltage Ue	1000 V AC
Rated frequency	50/60 Hz – not suitable for DC applications
Trip class	10E, 20E, 30E, selectable
Number of poles	3
Duty time	100%
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"
Rated impulse withstand voltage Uimp	8 kV
Rated insulation voltage Ui	1000 V

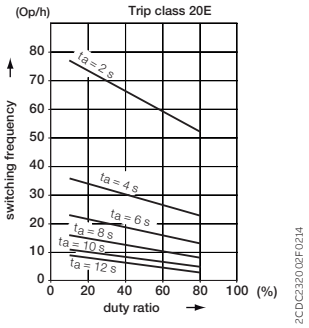
Auxiliary circuit according to IEC/EN

Type		**EF205, EF370**
Rated operational voltage Ue		600 V AC / DC
Conventional free air thermal current Ith		6 A
Rated frequency		DC, 50/60 Hz
Number of poles		1 N.C. + 1 N.O.
Ie / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category		
110-120 V	50/60 Hz	3.00 A
220-230-240 V	50/60 Hz	3.00 A
400 V	50/60 Hz	1.10 A
480-500 V	50/60 Hz	0.75 A
Ie / 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 Uimp		6 kV
Rated insulation voltage Ui		690 V

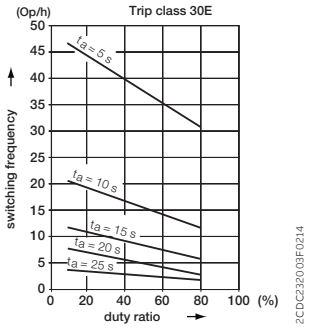
Technical diagram – Intermittent periodic duty



Trip class 10E



Trip class 20E



Trip class 30E

EF205, EF370 electronic overload relays – 63 to 380 A
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	**EF205, EF370**
Standards	UL 508, CSA 22.2 No. 14, UL 60947-4-1A
Maximum operational voltage	600 V AC
Trip rating	125% of FLA
Full load amps (FLA)	See table "Full load amps and short-circuit protective device"
Short-circuit rating RMS symmetrical	See table "Full load amps and short-circuit protective device"
Short-circuit protective device	See table "Full load amps and short-circuit protective device"

Auxiliary circuit according to UL/CSA

Type		**EF205, EF370**
Contact rating	N.C., 95-96	B600, Q600
	N.O., 97-98	B600, Q600
Conventional thermal current		6 A

Full load amps and short-circuit protective device

Type	**Full load amps (FLA)**	**Short-circuit protective device**					
		480 V AC		**600 V AC**			
		SCCR	Fuse type	SCCR	Fuse type	SCCR	Fuse type
EF205-210	210 A	10 kA	400 A, R5/RK5	10kA	400 A, R5/RK5	100 kA	400 A, J
EF370-380	380 A	18 kA	800 A, L/T	18kA	800 A, L/T	-	-

EF205, EF370 electronic overload relays – 63 to 380 A
Technical data

General data

Type			**EF205**	**EF370**
Pollution degree			3	
Phase loss sensitive			Yes	
Ambient air temperature				
	Operation	Open - compensated	-25 ... +70 °C	
	Storage		-50 ... +85 °C	
Ambient air temperature compensation			Acc. to IEC/EN 60947-4-1	
Maximum operating altitude permissible			2000 m	
Resistance to shock acc. to IEC 60068-2-27			25g / 11 ms	
Resistance to vibrations acc. to IEC 60068-2-6			5g / 3 ... 150 Hz	
Mounting position			Position 1-6	
Mounting			Mount on the contactor and tighten the screws of the main circuit terminals	
Degree of protection	Housing		IP20	
	Main circuit terminals		IP00	

Electrical connection

Main circuit

Type			**EF205**	**EF370**
Connecting capacity				
	Rigid	1 x	16 ... 185 mm²	50 ... 240 mm²
		2 x	16 ... 120 mm²	50 ... 150 mm²
	Flexible	1 x	16 ... 185 mm²	50 ... 240 mm²
		2 x	16 ... 120 mm²	50 ... 150 mm²
	Lugs	L ≤	24 mm	32 mm
	Bars	Ø >	8 mm	10 mm
	Stranded acc. to UL/CSA	1 x	AWG 6-0000	AWG 1-500 kcmil
		2 x	AWG 6-0000	AWG 1-500 kcmil
	Flexible acc. to UL/CSA	1 x	AWG 6-0000	AWG 1-500 kcmil
		2 x	AWG 6-0000	AWG 1-500 kcmil
Stripping length			-	-
Tightening torque			18 Nm / 160 lb.in	28 Nm / 247 lb.in
Recommended screw driver			M8	M10

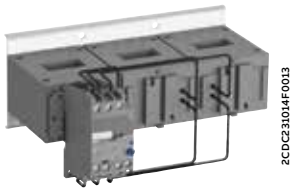
Auxiliary circuit

Type			**EF205, EF370**
Connecting capacity			
	Rigid	1 or 2 x	1 ... 4 mm²
	Flexible with ferrule	1 or 2 x	0.75 ... 2.5 mm²
	Flexible with insulated ferrule	1 or 2 x	0.75 ... 2.5 mm²
	Flexible	1 or 2 x	0.75 ... 2.5 mm²
	Stranded acc. to UL/CSA	1 or 2 x	AWG 18-10
	Flexible acc. to UL/CSA	1 or 2 x	AWG 18-10
Stripping length			9 mm
Tightening torque			0.8 ... 1.2 Nm / 7 ... 11 lb.in
Recommended screw driver			M3.5 (Pozidriv 2)

EF460, EF750, EF1250DU electronic overload relays – 150 to 1250 A

Ordering details

EF460-500



EF750-800

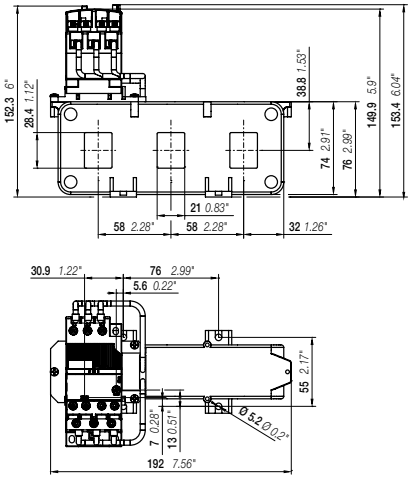
EF1250DU-1250

The EF460, EF750 and EF1250DU are self-supplied electronic overload relays, which means no extra external supply is needed. It offers reliable protection for motors in the event of overload or phase failure. Easy to use like a thermal overload relay and compatible with standard motor applications, the electronic overload relay is convincing, above all, due to its wide setting range, high accuracy, high operational temperature range and the possibility to select a trip class (10E, 20E, 30E). Further features are the temperature compensation, trip contact (N.C.), signal contact (N.O.), automatic or manual reset selectable, trip-free mechanism, STOP and TEST function and a trip indication. Busbar kits are available as accessory for contactor mounting. The EF460 and EF750 have ATEX and IECEx certification (1).

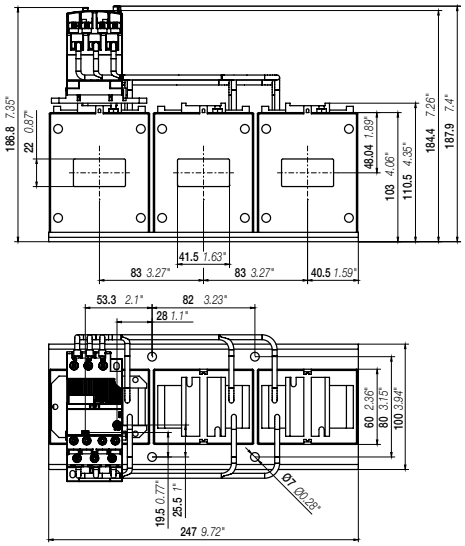
Setting range A	Short-circuit protective device	Trip class	Type	Order code	Weight (1 pce) kg
EF460 electronic overload relay, suitable for AF400, AF460 (1)					
150 ... 500	690 V: 630 A, Type gG 1000 V: 1600 A, Type gG	10E, 20E, 30E	EF460-500	1SAX721001R1101	1.170
EF750 electronic overload relay, suitable for AF580, AF750 (1)					
250 ... 800	690 V: 800 A, Type gG 1000 V: 1600 A, Type gG	10E, 20E, 30E	EF750-800	1SAX821001R1101	3.905
EF1250DU electronic overload relay, suitable for AF1350, AF1650, AF2050					
375 ... 1250	500 V: 1600 A, Type gG	10E, 20E, 30E	EF1250DU-1250	1SFA739001R1001	

(1) ATEX is valid for products produced from week 42, 2014. IECEx is valid for products produced from week 15, 2017.

Main dimensions
mm, inches



EF460-500



EF750-800

EF460, EF750, EF1250DU electronic overload relays – 150 to 1250 A

Ordering details

KPR-101L

DRS-F

Ordering details accessories

Description	Suitable for	Type	Order code	Weight (1 pce) kg
Reset push button	E16, EF, TF, T16, TA200	KPR-101L	1SFA616162R1014	0.027
Terminal shroud	EF460	LT460EF	1SAX701904R0002	0.320
Terminal shroud	EF750	LT750EF	1SAX801904R0002	0.440
DT500/AF460-S Mounting Kit short for mounting of EF460DU on AF460	EF460	DT500/AF460-S	1SAX701902R1011	0.635
DT500/AF460-L Mounting Kit long for mounting of EF460DU on AF460	EF460	DT500/AF460-L	1SAX701902R1001	0.740
DT800/AF750-S Mounting Kit short for mounting of EF750DU on AF750	EF750	DT800/AF750-S	1SAX801902R1011	1.000
DT800/AF750-L Mounting Kit long for mounting of EF750DU on AF750	EF750	DT800/AF750-L	1SAX801902R1001	1.475
Remote reset coil 24-30 V DC	EF19, EF45, EF65, EF96, EF146, EF205, EF370, EF460, EF750	DRS-F-01	1SAX101911R1001	0.076
Remote reset coil 48-60 V DC		DRS-F-02	1SAX101911R1002	0.077
Remote reset coil 110-127 V DC		DRS-F-03	1SAX101911R1003	0.078
Remote reset coil 220-240 V DC		DRS-F-04	1SAX101911R1004	0.076
Remote stop coil 24-30 V AC/DC		DRS-F-EF-01	1SAX101911R1011	0.075
Remote stop coil 48-60 V AC/DC		DRS-F-EF-02	1SAX101911R1012	0.076
Remote stop coil 110-127 V AC/DC		DRS-F-EF-03	1SAX101911R1013	0.076
Remote stop coil 220-240 V AC/DC		DRS-F-EF-04	1SAX101911R1014	0.074

EF460, EF750, EF1250DU electronic overload relays – 150 to 1250 A
Technical data

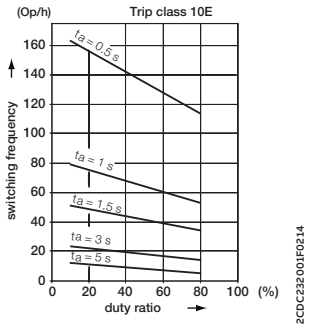
Main circuit – Utilization characteristics according to IEC/EN

Type	EF460	EF750	EF1250DU
Standards	IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1		
Rated operational voltage Ue	1000 V AC		
Rated frequency	50/60 Hz – not suitable for DC applications		
Trip class	10E, 20E, 30E, selectable		
Number of poles	3		
Duty time	100%		
Operating frequency without early tripping	Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty"		
Rated impulse withstand voltage Uimp	8 kV		
Rated insulation voltage Ui	1000 V AC		

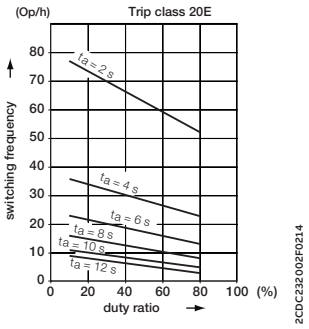
Auxiliary circuit according to IEC/EN

Type		EF460	EF750	EF1250DU
Rated operational voltage Ue		600 V AC / DC		
Conventional free air thermal current Ith		6 A		
Rated frequency		DC, 50/60 Hz		
Number of poles		1 N.C. + 1 N.O.		
Ie / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category				
110-120 V	50/60 Hz	3.00 A		
220-230-240 V	50/60 Hz	3.00 A		
400 V	50/60 Hz	1.10 A		
480-500 V	50/60 Hz	0.75 A		
Ie / 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 Uimp		6 kV		
Rated insulation voltage Ui		690 V		

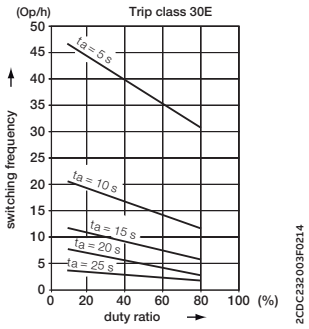
Technical diagram – Intermittent periodic duty



Trip class 10E



Trip class 20E



Trip class 30E

EF460, EF750, EF1250DU electronic overload relays – 150 to 1250 A
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	EF460	EF750	EF1250DU
Standards	UL60947-1, UL60947-4-1		
Maximum operational voltage	600 V AC		
Trip rating	125% of FLA		

Auxiliary circuit according to UL/CSA

Type		EF460	EF750	EF1250DU
Contact rating	N.C., 95-96	B600, Q600		
	N.O., 97-98	B600, Q600		
Conventional thermal current		5 A		

General data

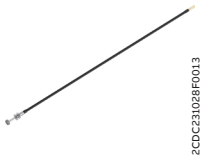
Type		EF460	EF750	EF1250DU
Pollution degree		3		
Phase loss sensitive		Yes		
Ambient air temperature				
Operation	Open - compensated	-25 ... +70 °C		
Storage		-50 ... +85 °C		
Ambient air temperature compensation		Acc. to IEC/EN60947-4-1		
Maximum operating altitude permissible		2000 m		
Resistance to shock acc. to IEC 60068-2-27		25g / 11 ms		
Resistance to vibrations acc. to IEC 60068-2-6		5g / 3 ... 150 Hz		
Degree of protection	Housing	IP20		
	Main circuit terminals	IP00		

Electrical connection

Auxiliary circuit

Type		EF460	EF750	EF1250DU
Connecting capacity				
Rigid	1 or 2 x	1 ... 4 mm²		
Flexible with ferrule	1 or 2 x	0.75 ... 2.5 mm²		
Flexible with insulated ferrule	1 or 2 x	0.75 ... 2.5 mm²		
Flexible	1 or 2 x	0.75 ... 2.5 mm²		
Stranded acc. to UL/CSA	1 or 2 x	AWG 18-10		
Flexible acc. to UL/CSA	1 or 2 x	AWG 18-10		
Stripping length		9 mm		
Tightening torque		0.8 ... 1.2 Nm / 7 ... 11 lb.in		
Recommended screw driver		M3.5 (Pozidriv 2)		

Thermal and electronic overload relays
General accessories



WRB-400

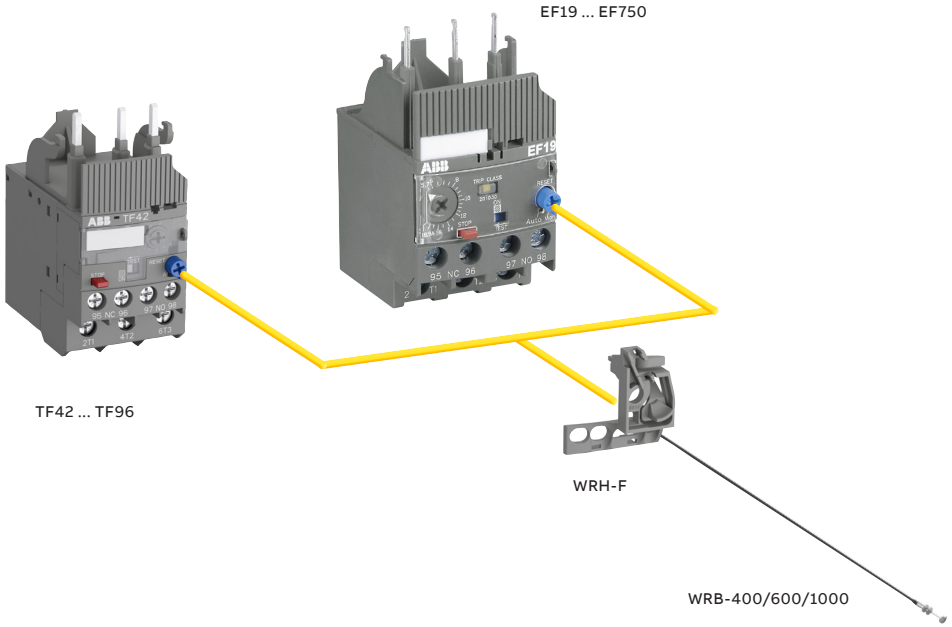
WRH-F

The wire reset is a general accessory for thermal and electronic overloads relays. In installations which are difficult to access, like a motor control centre or compact cubical, the accessory allows the user to remotely reset the overload relays.

The wire reset consists of two parts, the bowden wire with actuator and the holder. The actuator should be mounted into a door of a panel. The holder will be mounted on the overload relay. The actuator and holder are connected via the bowden wire.

Suitable for	Description	Length mm	Type	Order code	Weight (1 pce) kg
Holder					
TF42, TF65, TF96, EF19, EF45, EF65, EF96, EF146, EF205, EF370, EF460, EF750	Holder for tool less direct mounting		WRH-F	1SAZ701903R1001	0.006
Bowden wire with actuator					
WRH-F	Bowden wire with actuator, hole diameter: 7.3 mm, maximum panel thickness: 12 mm	400	WRB-400	1SAZ701903R1011	0.030
		600	WRB-600	1SAZ701903R1012	0.040
		1000	WRB-1000	1SAZ701903R1013	0.060
IP54 gasket					
WRB-400 WRB-600 WRB-1000	IP54 Panel seal gasket		WRBG	1SAZ701903R1030	0.037

Overload relays with accessory wire reset (WRH, WRB)



For direct product details information, use product type or order code, ex:

www.abb.com/productdetails/**AF09-30-10-13**

or

www.abb.com/productdetails/**1SBL137001R1310**

Certifications and approvals
General technical data

Certifications and approvals

Designed according to the appropriate specifications, the devices in this catalogue have been built and tested. They can be used in most countries without any further certifications.
Some countries, however, require certification according to their own national standards. In other cases, the Marine for example, approvals ratifying that particular specifications have been met are necessary.
The table below shows the approvals and certifications for different devices.
The following documents may be obtained on request:

- Certificates of conformity
- Certificates of certification or approval.

The use of certified devices does not exonerate the equipment supplier from complying with the legal specifications of the country concerned.

Explanation of symbols:

■ **Standard design approved**, the company labels bear the certification mark when this is required.

	Certifications						**Approvals: ship classification societies**							
Mark														
Abbreviation **Approved in**	CSA Canada	UL USA	cULus North America	CCC China	GOST or EAC Russia	KC Korea	BV France	DNV-GL	LR Gr.Britain	RINa Italy	ABS USA	RMRS Russia	CCS China shipping	ClassNK Japan
3-pole contactors with screw terminals														
4 to 45 kW														
AC operated AFC09, AFC12, AFC16, AFC26, AFC30, AFC38			■ E312527	■		■	■	■	■	■	■		■	■
AC operated AFC40, AFC52, AFC65, AFC80, AFC96			■ E312527	■		■	■	■	■	■	■		■	■
4-pole contactors with screw terminals														
25 to 125 A, AC-1														
AC operated AFC09, AFC16, AFC26, AFC38			■ E319322	■		■	■	■	■	■	■		■	■
AC operated AFC40, AFC52, AFC80			■ E312527	■		■		■		■	■		■	■
3-pole contactors with Push-in Spring terminals														
4 to 11 KW														
AC operated AFC09..K AFC12..K, AFC16..K			■ E312527	■			■	■		■	■		■	■
AFC26..K				■			■	■		■	■		■	■
Contactor relays with Push-in Spring terminals														
AC operated 4-pole, 8-pole - NFC..K			■ E252354	■			■	■		■	■		■	

(1) For 2650 only.

(1) AF116 ... AF265 only. KC only applicable to devices up to 300 A. (2) Marine approvals for AF116 ... AF370 with built-in PLC interface: only DNV is available.
All AF contactors are (RCM) marked.

Certifications and approvals

	Certifications					Approvals: ship classification societies							
Mark													
Abbreviation	CSA	UL	cULus	CCC	GOST or EAC	BV	DNV-GL	LR	RINa	ABS	RMRS	CCS	ClassNK
Approved in	Canada	USA	North America	China	Russia	France		Gr.Britain	Italy	USA	Russia	China shipping	Japan
Accessories for AFC09 ... AFC96 and NFC contactor relays													
Auxiliary contacts													
CA4, CC4			■ E252354	■	■	■ (CA4)	■ (CA4)	■	■	■	■		□
CAT4			■ E252354	■	■	■	■	■	■	■	■		□
CAL4			■ E252354	■	■	■	■	■	■	■	■		□
CE5...D0.1			■ E319322	■	■								
CE5...D2			■ E319322	■	■								
CE5...W0.1			■ E319322	■	■								
CE5...W2			■ E319322		■								
CA4..K, CAL4..K			■ E252354	■	■	■	■		■	■	■		
Electronic timer													
TEF4			■ E252354		■								
Mechanical / electrical interlock unit													
VEM4			■ E312527	■	■								
Mechanical interlock units													
VM4, VM96-4			■ E312527		■	□	□	□	□	□	□	□	□
Interface relay													
RA4			■ E252354		■								
Latching unit													
WA4			■ E312527										
Connecting links with manual motor starters													
BEA16-4(KF), BEA26-4, BEA38-4(KF), BEA65-4			■ E312527		■	□	□	□	□	□	□	□	□
Connection sets for reversing contactors													
BER16-4(KF), BER38-4(KF)			■ E312527		■	□	□	□	□	□	□	□	□
BER65-4, BER96-4			■ E312527		■	□	□	□	□	□	□	□	□
Connection sets for star-delta starters													
BEY16-4(KF), BEY38-4(KF)			■ E312527		■	□	□	□	□	□	□	□	□
BEY65-4, BEY96-4			■ E312527		■	□	□	□	□	□	□	□	□
Terminal connecting strips and shorting bars													
LY16-4, LY38-4			■ E312527		■	□	□	□	□	□	□	□	□
LH38-4			■ E312527		■	□	□	□	□	□	□	□	□
LF16-4, LF38-4			■ E312527		■	□	□	□	□	□	□	□	□
LG16-4			■ E312527		■	□	□	□	□	□	□	□	□
LK96-4F			■ E312527			□	□	□	□	□	□	□	□
Additional coil terminal blocks													
LD38-4			■ E312527			□	□	□	□	□	□	□	□
Additional terminal blocks													
LDC4			■ E312527			□	□	□	□	□	□	□	□
Protective covers													
BX4, BX4-CA			■ E252354			□	□	□	□	□	□	□	□
Terminal shrouds													
LT65-30 ... LT96-30			–			□	□	□	□	□	□	□	□
LT52-40 ... LT80-40			–			□	□	□	□	□	□	□	□

■ Marine approvals not needed for this accessory.

Certifications and approvals

	Certifications								Approvals: ship classification societies						
Mark															
Abbreviation	CSA	UL	cULus	CCC	GOST or EAC	ATEX	IEC Ex	KC	BV	DNV-GL	LR	RINa	ABS	RMRS	ClassNK
Approved in	Canada	USA	North America	China	Russia			Korea	France		Gr.Britain	Italy	USA	Russia	Japan
Function marker															
BA4			E252354			□			□	□	□	□	□	□	□
Fixing clip															
BB4			E312527			□			□	□	□	□	□	□	□
Manual motor starters															
MS116			E137861	■	■			■	■	■	■		■	■	
MS132			E137861 E345003	■	■	■	■ (1)	■	■	■	■	■	■	■	
MS165			E137861 E345003	■	■	■		■	■	■	■	■	■	■	
MS132-K				■	■	■	■	■			■			■	
Manual motor starters magnetic only															
MO132			E137861 E345003	■	■			■	■	■	■	■	■	■	
MO165			E137861 E345003	■	■			■	■	■	■	■	■	■	
Circuit breaker for transformer protection															
MS132-T			E137861	■	■			■							
MS132-KT			E137864	■											
Thermal overload relays															
TF42			E48139	■	■	■			■	■	■	■	■	■	
TF65			E48139	■	■	■ (4)			■	■	■	■	■	■	
TF96			E48139	■	■	■ (4)			■	■	■	■	■	■	
Electronic overload relays															
0.10...45 A															
E16DU			E48139	■	■									■	
EF19			E48139	■	■	■	■ (1)		■	■	■	■	■	■	
EF45			E48139	■	■	■	■ (1)		■	■	■	■	■	■	
20...150 A															
EF65			E48139	■	■	■ (3)	■ (2)		■	■	■	■ (3)	■	■	
EF96			E48139	■	■	■	■ (2)		■	■	■	■	■	■	

(1) Valid for production date week 47, 2018. ■ Marine approvals not needed for this accessory.
(2) IECEx is valid for product produced from week15, 2017. (3) EF65-56 has no RINa approval and ATEX certification is valid for EF65-56 produced from week 47, 2015.
(4) ATEX is valid for products produced from week 26, 2015. All electronic overload relays are (RCM) marked : EF produced from week 47, 2015; E produced from week 14, 2016. (4) 2 separate certificate available: 1 for DNV and 1 for GL.

Coordination with short-circuit protection devices

Definition

The coordination of control and protection devices in compliance with IEC 60947-4-1, EN 60947-4-1 and UL 60947-4-1 between the branch circuit protective device and the motor starter standards defines for the contactors and starters the type rating and characteristics of the short-circuit protection devices SCPD which allow selective protection against overloads and ensure protection against short circuits.

Basic functions

Any starter is designed to:

- start motors
- ensure continuous functioning of motors
- disconnect motors from the supply line
- guarantee protection of motors against overloads.

The starter is typically made up of a switching device (contactor) and an overload protection device (thermal overload relay or electronic overload relay). These two devices MUST be coordinated with each other and with equipment capable of providing protection against short-circuit: 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) and UL 60947-4-1 precisely defines the different points to be considered between the branch circuit protective device and the motor starter in order to carry out correct coordination. Complete coordination for a combination includes the below 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 / AC-3e) and are given by the standard (Table 13).
  For example:
  - r = 1 kA for Ie AC-3/AC-3e ≤ 16 A
  - r = 3 kA for 16 A < Ie AC-3/AC-3e ≤ 63 A
  - r = 5 kA for 63 A < Ie AC-3/AC-3e ≤ 125 A etc.
- Short-circuit condition tests at the rated conditional short-circuit current “Iq”.
  This is the maximum prospective current that the combination can withstand, for example 50 kA.

Types of coordination

IEC 60947-4-1 (EN 60947-4-1) UL 60947-4-1 defines two types of coordination between the branch circuit protective device and the motor starter according to the expected level of service continuity. Acceptable extreme damage for the switchgear is divided into two types.

- Type 1: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will not be able to then operate without being repaired or having parts replaced.
- Type 2: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts light welding is acceptable. In this case, the manufacturer must stipulate the measures to be taken with respect to maintenance of the equipment.

Combination Motor Controllers (CMC)

Article 409 of the National Electrical Code (NFPA 70) requires industrial control panels to be marked with a SCCR (Short-Circuit Current Rating). According to the National Electrical Code (NEC), UL 508A Supplement SB - Standard for Industrial Control Panels - provides an accepted method for determining the SCCR of the control panel. Industrial control panel manufacturers can use Selected Optimized Coordination tool (SOC) for guidance. SOC tool is intended for those manufacturers that purchase the discrete components and assemble combination motor controllers within their panels to achieve a combination SCCR that is higher than the lowest-rated individual component.

Failure of components under fault conditions can lead to safety concerns for personnel working in close proximity to electrical equipment. The harmonized UL 60947-4-1 and CSA C22.2 No.60947-4-1 standards define acceptance criteria for these components.

Several criteria exist for all devices:
- The short-circuit protective device successfully interrupts the fault
- The enclosure door has not blown open, and it remains possible to open it manually
- No damage to, or separation between, the conductors and the terminals
- No damage to the insulating bases of live parts, and no access to current carrying parts.

For Combination Motor Controllers, the included circuit-breaker / manual motor starter or switch should be capable of being manually operated, and should not be damaged, exposing conductive parts.

Coordination with short-circuit protection devices

Identification number A, C, D, E or F is assigned as a reference by the submitter for each combination motor controller (CMC) construction or rating:

- Type A fusible combination:
  disconnector, fuse, contactor and overload relay
- Type C MCCB combination:
  inverse-time circuit breaker, contactor and overload relay
- Type D MCP (magnetic only) combination:
  instantaneous-only circuit breaker, contactor and overload relay
- Type E:
  Self protected combination motor controller
- Type F:
  Self protected combination motor controller: manual motor starter and contactor

Motor efficiency class and design type

IEC coordination tables are displayed for IE1, IE2, IE3 and IE4 motor efficiency classes in regards with N/H or NE/HE motor design use:

- asynchronous IE1/IE2/IE3/IE4 motors may be of the design N or H
- asynchronous IE3/IE4 motors may be of the design NE or HE,

having extended / locked rotor apparent power and current than design N and H motors.

- International Efficiency (IE) classes for single speed electric motors IEC 60034-30-1:2014 standard defines four International Efficiency (IE) classes for single speed three-phase cage rotor induction motors designed for operation on sinusoidal voltage:
  - IE4 = Super premium efficiency
  - IE3 = Premium efficiency
  - IE2 = High efficiency
  - IE1 = Standard efficiency

- Motor design N/H and NE/HE
  IEC 60034-12:2016 standard defines motor design categories as below:
  - **Design N**
    Normal starting torque with normal locked rotor current
  - **Design H**
    High starting torque with normal locked rotor current
  - **Design NE**
    Normal starting torque with higher locked rotor current
  - **Design HE**
    High starting torque with higher locked rotor current.

For additional information, please consult our application note for NEMA Premium® Efficiency motor starting

- US Motor Minimum Efficiency Performance Standards
  Most of 3-phase industrial motors are required to meet the efficiencies listed in ANSI/NEMA MG-1, table 12-1x (NEMA Premium® efficiency).
  Following motor efficiency classes are typically known:
  - Super Premium Efficiency (comparable to IEC IE4)
  - Premium Efficiency (comparable to IEC IE3)
  - High Efficiency (comparable to IEC IE2)
  - Standard Efficiency (comparable to IEC IE1).

UL Component ratings

Components used within combination motor controllers are required to have individual component ratings tested and certified according to the appropriate UL Standard for that component.

The results of this testing show the UL Listed/Recognized product provides a safe and code-compliant installation when installed according to the manufacturer's instructions. In this case, a safe installation means that the installation has been found to be reasonably free of the risk of fire, electric shock and other hazards to public health.

Each component must be appropriately labeled:

- Company name and model number
- Identification of the specific component in the combination motor controller.

Individual component ratings:

- **HP:** Horsepower rating for component, if provided
- **kA:** Marked short-circuit current rating (SCCR) on individual component
- **Max Amps:** Maximum ampere rating of individual component
- **V:** Voltage rating of individual component

For additional information, please consult our application note

Coordination with short-circuit protection devices

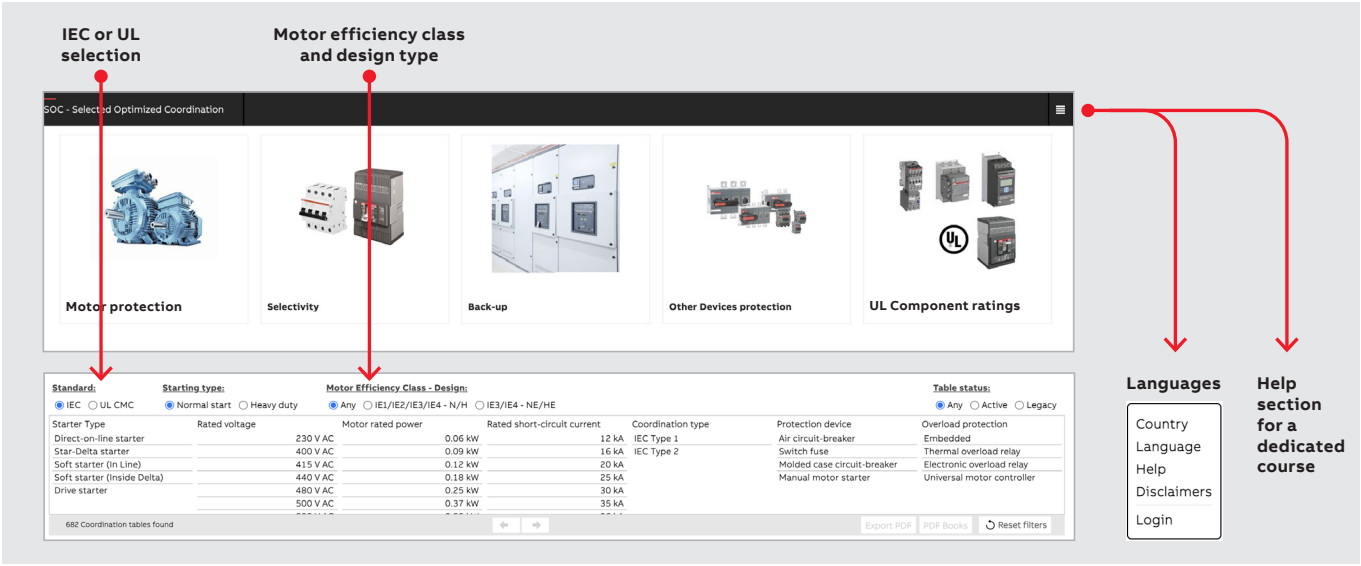
A complete data base of coordination tables, is available on below ABB Website:

- Motor protection
  - coordination according to IEC 60947-4-1 standards,
  - Combination Motor Controllers (CMC) according to UL508, UL 60947-4-1
- UL component ratings for the selection of UL Listed/Recognized products

Access

To find the coordination tables for motor protection, please see:

https://www.lowvoltage-tools.abb.com/soc/



Features

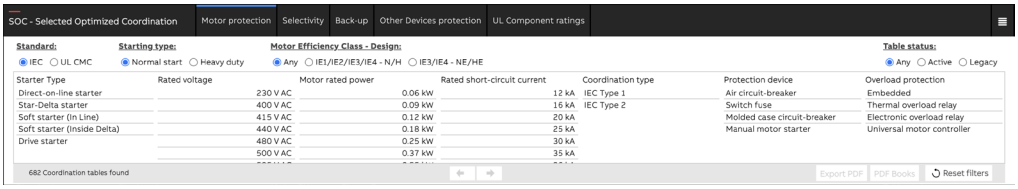
- User-friendly selection and new smart search for fast coordination table configuration
- Optimized motor protection coordination tables for IE3/IE4 high-efficiency class with respect to N/H or NE/HE motor design
- Follow-up of the sales status of the products included inside the motor protection coordination tables
- Includes dedicated product ranges available in your country
- New export PDF and e-mail sharing options
- Main languages localization for interface display and PDF documentation exportation
- New help section to train all users in an easy and quick way

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.
- Indication of the status (Active, Legacy) of the selected tables
- Possible to print the selected pages to a PDF book or from your printer
- “Result filters” function to deselect all selected.

—

Motor protection IEC and UL CMC



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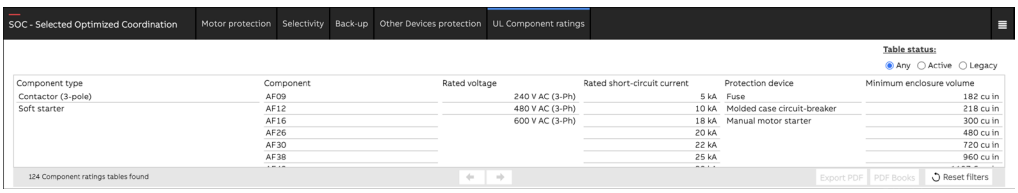
UL Component ratings



To consult the last information about SOC tool, please see:

https://new.abb.com/low-voltage/support/software/selected-optimized-coordination-soc

Standards, specifications and certifying organizations

Definitions

ABB low voltage devices are developed and manufactured in accordance with the applicable regulations as stated in the international IEC standards, the European EN standards and the national ones such as NF, DIN, GB and BS. For devices installed in ships, an approval issued by independent classification societies is demanded by the maritime insurance companies.

CB scheme

Certification Body certificates (CB certificates) are available to prove the complete conformity to standards

The IEC CB (Certification Body) scheme is multilateral agreement between the National Certification Bodies to allow international certification of electrical and electronic products so that a single certification allows worldwide market access.

The CB Scheme was established by the International Electrotechnical Committee for conformity testing to standards for electrical equipment (IECEE).

Certified products

In some cases, products are validated and tested according to a standard by a certification body and the manufacturer is regularly visited by this body in order to check the respect of the design and the materials used. This process creates a certified product. This is the case of UL (Underwriters Laboratories) and CSA (Canadian Standard Association) for instance (see below).

Specifications

International Specifications

The International Electrotechnical Commission, IEC, which is part of the International Standards Organization, ISO, publishes IEC publications which act as a basis for the world market.

European Specifications and National Specifications

The European committee for electrotechnical standardization (CENELEC), which groups together European countries, publishes EN standards.

These European standards may differ very little from IEC international standards and have similar numbering.

The same applies for national standards which use, without exception, the same numbering and reproduce the texts of these unified standards in their entirety. Contradicting national standards are withdrawn.

European Directives

The guarantee of the free movement of goods within the European Community means that any regulatory differences between member states have been eliminated. The European directives set up common rules that are included in the legislation of each state while contradictory regulations are cancelled.

Three directives are essential:

- **Low Voltage Directive** 2006/95/EC (until April 2016, 19th) and 2014/35/EC (from April 2016, 20th) concerns electrical equipment from 0 to 1000 V AC and from 0 to 1500 V DC.

This specifies that compliance with the requirements that it sets out is acquired if the equipment conforms to the standards harmonized on an European level. EN 60947-1 and EN 60947-4-1 for contactors.

- **Machinery Directive** 2006/42/EC for safety specifications of machines and equipment on complete machines.
- **Electromagnetic Compatibility Directive** 2004/108/EC (until April 2016, 19th) and 2014/30/EC (from April 2016, 20th) which concerns all devices able to create electromagnetic disturbance.

CE Marking:

CE marking indicates that the marked equipment conforms to the relevant EU directive.

CE marking is part of an administrative procedure and guarantees free movement of the product within the European Community.

UKCA marking

The UKCA marking (UK Conformity Assessed) is a UK product marking that is used for products being placed on the market in Great Britain (England, Wales, and Scotland).

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.

China Compulsory Certification (CCC): The CCC mark is a compulsory certification mark in the field of safety for products sold on the Chinese market.

EAC: Russia (please consult your local ABB sales office)

C-Tick: The C-Tick mark certifies compliance with the Australian EMC requirements. The mark is also recognized in New Zealand

ANCE: Mexico

Standards, specifications and certifying organizations

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

Specifications (cont.)

International Standards

IEC 60947-1 Low-voltage switchgear and controlgear – Part 1: General rules

IEC 60947-4-1 Low-voltage switchgear and controlgear – Part 4: Contactors and motor starters – Section 1: Electromechanical contactors and motor starters

IEC 60947- 5-1 Low-voltage switchgear and controlgear – Part 5: Control circuit devices and switching elements – Section 1: Electromechanical control circuit devices

IEC 60947-5-4 Low-voltage switchgear and controlgear – Part 5-4: Control circuit devices and switching elements. Method of assessing the performance of low-energy contacts. Special tests

IEC 60947- 6-1 Low-voltage switchgear and controlgear – Part 6: Multiple function equipment – Section 1: Automatic transfer switching equipment

IEC 60204-1 Electrical equipment of industrial machines – Part 1: General requirements

IEC 60715 Dimensions of low-voltage switchgear and controlgear. Standardized mounting on rails for mechanical support of electrical devices in switchgear and controlgear installations

European Standards

EN 50 005 Low-voltage switchgear and controlgear for industrial use – Terminal marking and distinctive number: General rules

(Annex L of IEC 60947-1).

EN 50 011 Low-voltage switchgear and controlgear for industrial use – Terminal marking, distinctive number and distinctive letter for particular contactor relays (Annex M of IEC 60947-5-1)

EN 60947-1 Low-voltage switchgear and controlgear – Part 1: General rules.

EN 60947-4-1 Low-voltage switchgear and controlgear – Part 4: Contactors and motor starters – Section 1: Electromechanical contactors and motor starters.

EN 60947-5-1 Low-voltage switchgear and controlgear – Part 5: Control circuit devices and switching elements – Section 1: Electromechanical control circuit devices.

EN 60947-5-4 Low-voltage switchgear and controlgear – Part 5-4: Control circuit devices and switching elements. Method of assessing the performance of low-energy contacts. Special tests.

EN 60947- 6-1 Low-voltage switchgear and controlgear – Part 6: Multiple function equipment – Section 1: Automatic transfer switching equipment.

EN 60204-1 Electrical equipment of industrial machines – Part 1: General requirements.

EN 60 715 Dimensions of low-voltage switchgear and controlgear. Standardized mounting on rails for mechanical support of electrical devices in switchgear and controlgear installations.

National Standards

European countries national standards reproduce the corresponding EN... standards. Codification is built by addition of a prefix to EN numbering.

For instance:

- France **NF** EN...
- Germany **DIN** EN...
- Great Britain **BS** EN...
- Italy **CEI** EN...
- Sweden **SS** EN...

Terms and technical definitions

Circuits

- auxiliary circuit: All the conductive parts of a contactor designed to be inserted in a different circuit from the main circuit and the contactor control circuits.
- control circuit: All the conductive parts of a contactor (other than the main circuit and the auxiliary circuit) used to control the contactor's closing operation or opening operation or both.
- main circuit: All the conductive parts of a contactor designed to be inserted in the circuit that it controls.

Thermal overload relay tripping classes

IEC 60947-4-1 defines tripping classes 10 A, 10, 20 and 30. Types 10 A, 10, etc. correspond to the maximum tripping time for a making current at 7.2 times the setting current.

Furthermore, for each class the standard specifies the tripping time for 1.5 times the setting current and sets the non tripping condition at 1.05 times the setting current.

All these data are summarized in the table below.

Extract from IEC 60947-4-1:

Tripping class		10 A	10	20	30
Max. tripping time for 1.5 times the setting current (warm state)	s	120	240	480	720
Tripping time for 7.2 times the setting current (cold state)	s	2 - 10	4 - 10	6 - 20	9 - 30
For 1.05 times the setting current		No tripping			

Electromagnetic compatibility

AF... contactors comply with IEC 60947-1, 60947-4-1 and EN 60947-1, 60947-4-1 standards.

Definitions:

Environment A: "Mainly relates to low-voltage non public or industrial networks/locations/installations (EN 50082-2 article 4) including highly disturbing sources".

Environment B: "Mainly relates to low-voltage public networks (EN 50082-1 article 5) such as residential, commercial and light industrial locations/installations. Highly disturbing sources such as arc welders are not covered by this environment".

Notice for AF09…AF2650 contactors:

- AF09 … AF38 contactors and NF contactor relays (produced since week 08-2013), AF40 ... AF96 contactors have been designed for environment B.
- AF09 … AF38-..-..-12 contactors and NF..E-12 contactor relays (48...130 V 50/60 Hz-DC), AF116 ... AF2650 contactors: these products have been designed for environment A.
  Use of this product in environment B may cause unwanted electromagnetic disturbances in which case the user may be required to take adequate mitigation measures.

Note: for 48...130 V 50/60 Hz-DC in environment B, AF09Z … AF38Z-..-..-22 contactor or NFZ..E-22 contactor relays can be selected.

Definitions according to SEMI F47-0706

SEMI F47-0706 defines the voltage sag immunity required for semiconductor processing, metrology and automated test equipment, and on subsystems and components which are used in the construction of semiconductor processing equipment including but not limited to:

- Power supplies
- Generators
- Robots and factory interface
- Chillers, pumps, blowers
- AC operated contactors and contactor relays...

voltage sag: an rms reduction in the AC voltage, at the power frequency, for durations from a half cycle to a few seconds.

The IEC terminology for this phenomenon is voltage dip.

voltage sag immunity: the ability of equipment to withstand momentary electrical power interruptions or sags.

Coordination of protections against short circuit

The goal here is to protect electromechanical starters and soft-starters.

Any starter is designed to:

- start motors,
- ensure continuous functioning of motors,
- disconnect motors from the supply line,
- guarantee protection of motors against overloads.

The starter is typically made up of a switching device (contactor) and an overload protection device (thermal overload relay or electronic overload relay). These two devices MUST be coordinated with equipment capable of providing protection against short circuit (SCPD: short circuit protective device): typically a circuit breaker with magnetic release only or a switch fuse. These are not necessarily part of the starter.

The characteristics of the starter must comply with the international standard IEC 60947-4-1 which defines the above items as follows:

contactor: a mechanical switching device having only one position of rest, operated otherwise than by hand, capable of making, carrying and breaking currents under normal circuit conditions including overload conditions.

overload release: overload relay or release which operates in the case of overload and also in case of loss of phase.

circuit-breaker: defined by IEC 60947-2 as a mechanical switching device, capable of making, carrying and breaking currents under normal circuit conditions and also making, carrying for a specified time and breaking currents under specified abnormal circuit conditions.

IEC publication 60947-4-1 defines coordination types "1" and "2":

- Type "1" coordination requires that, in the event of a short-circuit, the contactor or starter does not endanger persons or installations and will not then be able to operate without being repaired or parts being replaced.
- Type "2" coordination requires that, in short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts being light welded is acceptable. In this case, the manufacturer must stipulate the measures to be taken with respect to maintenance of the equipment.

IEC coordination tables are displayed for IE1, IE2, IE3 and IE4 motor efficiency classes in regards with N/H or NE/HE motor design use.

International Efficiency (IE) classes for single speed electric motors

IEC 60034-30-1:2014 standard defines four International Efficiency (IE) classes for single speed three-phase cage rotor induction motors designed for operation on sinusoidal voltage:

- IE4 = Super premium efficiency
- IE3 = Premium efficiency
- IE2 = High efficiency
- IE1 = Standard efficiency

Terms and technical definitions

Motor design N/H and NE/HE

IEC 60034-12:2016 standard defines motor design categories as below:

- **Design N**
  Normal starting torque with normal locked rotor current
- **Design H**
  High starting torque with normal locked rotor current
- **Design NE**
  Normal starting torque with higher locked rotor current
- **Design HE**
  High starting torque with higher locked rotor current.

Asynchronous IE1/IE2/IE3/IE4 motors may be of the design N or H. Asynchronous IE3/IE4 motors may be of the design NE or HE, having extended/locked rotor apparent power and current than design N and H motors.

IEC 60947-4-1 Ed.4 introduces now a new AC-3e utilization category for AC circuit switching and keeps the use and definition of existing AC-3 utilization category unchanged.

- AC-3: Refer to the asynchronous motor of designs N and H according to IEC 60034-12:2016
- AC-3e: Refer to the asynchronous motor of designs NE and HE, according to IEC 60034-12:2016, with extended / higher locked rotor apparent power and current than design N and H respectively, to achieve a higher efficiency class according to IEC 60034-30-1.
  AC-3e category is defined for the use and the selection of MS116, MS132, MS165 manual motor starters, 3-pole AF09… AF190 contactors and B mini-contactors: please see their respective data pages.

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 operational current, the operational voltage and the utilization category.

Mechanical durability

Number of no-current operating cycles that a contactor is able to carry out.

Assessed failure rate

Defined according to IEC 60947-5-4. This rate is given in standard industrial environments for the contactor relays and for the built-in auxiliary contact of contactors.

Load factor

Ratio of the on-load operating time to the total cycle time x 100.

Switching frequency

Number of switching cycles per hour.

Plugging

Stopping or fast reversal in rotation direction of a motor by two supply leads being interchanged while the motor is running.

Inching

Energization of a motor's circuit repeatedly or for short periods with the aim of obtaining small movements of the driven mechanism.

Coil operating limits

Expressed in multiples of the nominal control circuit voltage Uc for the upper and lower limits.

Mounting position

Comply with the manufacturer's instructions. Restrictions are to be taken into account for certain mounting positions.

Rated breaking or making capacity

Root mean square (r.m.s.) value of the current that the contactor is able to break or make at a given voltage according to the conditions specified by standards and for a given utilization category.

Intermittent duty

Duty during which the contactor is successively closed or open for periods which are too short to enable the contactor to achieve thermal balance.

Ambient temperature

Air temperature close to the contactor.

Time

- Time constant: Ratio of the inductance to the resistance (L/R = mH/Ω = ms).
- Short-time withstand current: Current that the contactor is able to withstand in closed position for a short time interval and in specified conditions.
- Closing time: Time interval between the coil energization and the instant the contacts touch on all the poles.
- Opening time: Time interval between the coil de-energization and the instant the contacts separate on all the poles.

Rated control voltage Uc

Control voltage value for which the control circuit is sized.

Terms and technical definitions

Rated operational voltage Ue

Voltage to which the contactor's utilization characteristics refer. In three-phase it is the phase-to-phase voltage.

Rated insulation voltage Ui

Reference voltage for dielectric tests and creepage distances.

Rated impulse withstand voltage Uimp

Peak value of an impulse voltage, having a specified form and polarity, which does not cause breakdown in specific test conditions.

Shock withstand

Requirement for vehicles, crane drives, installations on board ships and plug-in equipment. For the acceptable "g" values, the contacts must not change position and the thermal overload relays must not trip.

Resistance to vibrations

Requirements for vehicles, boats and other means of transport. For the specified vibration amplitude and frequency values the device must remain able to operate.

Mirror contacts 

Definitions of mirror contact acc. to IEC 60947-4-1, Annex F 2.1. Normally closed auxiliary contact (N.C.) which cannot be in the closed position simultaneously with the normally open (N.O.) main contact.

Mechanically linked contact 

Definitions of mechanically linked elements acc. to IEC 60947-5-1, Annex L. Combination of "n" Make auxiliary contact element(s) and "m" Break auxiliary contact element(s) are designed in such a way that they cannot be in the closed position simultaneously.

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

Standards and utilization categories

Utilization categories:

A contactor's duty is characterised by the utilization category together with the rated operational voltage and current indicated.

Utilization categories for contactors according to IEC 60947-4-1:

Alternating current:	AC-1	Non-inductive or slightly inductive loads, resistance furnaces.
	AC-2	Slip-ring motors: starting, switching off.
	AC-3	Cage motors: starting, switching off running motors.
	AC-3e	Cage motors with higher locked rotor current: starting, switching off running motors.
	AC-4	Cage motors: starting, plugging, inching.
	AC-5a	Discharge lamp switching.
	AC-5b	Incandescent lamp switching.
	AC-6a	Transformer switching.
	AC-6b	Capacitor bank switching.
	AC-8a	Hermetic refrigeration compressor motor control with manual resetting of overload releases.
	AC-8b	Hermetic refrigeration compressor motor control with automatic resetting of overload releases.
Direct current:	DC-1	Non inductive or slightly inductive loads, resistance furnaces.
	DC-3	Shunt motors: starting, plugging, inching, dynamic breaking of DC motors.
	DC-5	Series motors: starting, plugging, inching, dynamic breaking of DC motors.
	DC-6	Incandescent lamp switching.

Utilization categories for contactor relays according to IEC 60947-5-1:

Alternating current:	AC-12	Control of resistive loads and static loads with opto-coupler isolation.
	AC-13	Control of static loads with transformer isolation.
	AC-14	Control of weak electromagnetic loads (≤ 72 VA).
	AC-15	Control of electromagnetic loads (> 72 VA).
Direct current:	DC-12	Control of resistive loads and static loads with opto-coupler isolation.
	DC-13	Control of DC electromagnets.
	DC-14	Control of DC electromagnets having economy resistors.

In fact some applications, and the specific criteria characterizing the various loads controlled by contactors, may modify the utilization characteristics of the contactors. The main applications concerned are:

Capacitor bank switching

Account must be taken of high peaks when the current is made and of harmonic currents during continuous duty. For this application, IEC publication 60947-4-1 stipulates utilization category AC-6b. The operational currents or powers acceptable for the contactors are determined by our electrical tests; IEC publication 60947-4-1 gives the calculating formula for determining the operational current (Table 9).

Transformer switching

Account must be taken of the peaks due to magnetization phenomena when the current is made.
For this application, IEC publication 60947-4-1 stipulates utilization category AC-6a. The operational currents or powers acceptable for the contactors are determined using the values obtained for AC-3 or AC-4 category tests and the calculating formula given in IEC 60947-4-1 (Table 9).

Lighting circuit switching

The current peaks occurring on energization of the circuit and the power factor depend on the type of lamps, the connection mode and whether or not there is compensation.
For this application, IEC publication 60947-4-1 stipulates two standard utilization categories:
AC-5a for discharge lamp switching.
AC-5b for incandescent lamp switching.

Slip-ring motor switching

The contactors used for short-circuiting rotor resistors can be used for rotor voltages up to 2 times the rated operational voltage.
The conditions of use of rotor contactors depend on the connection mode of the main poles. IEC 60947-4-1 stipulates AC-2 utilization category for startor contactor.

Standards and utilization categories

Utilization categories (cont.)

DC power circuit switching

Arc suppression is more difficult in direct current than in alternating current. Higher the time constant and voltage, heavier the breaking conditions: consequently several poles have to be connected in series.

AC high current circuit switching

Possibility of increasing performances by connecting poles in parallel.

Circuit switching during temporary and intermittent duty

In these cases higher operational currents are acceptable.

Influence of the length of the conductors used in the contactor control circuit

According to the operational voltages, the cross-sectional areas, the coil consumption and the control layout, difficulties due to line resistances and capacitances may appear during contactor closing and opening orders.

Making and breaking conditions for utilization categories

Utilization category		Durability test conditions						Occasional operation Making and breaking capacities - 50 operating cycles					
		Making conditions			Breaking conditions			Making conditions			Breaking conditions		
		I/Ie	U/Ue	Cos. ϕ or L/R (ms)	I/Ie	U/Ue	Cos. ϕ or L/R (ms)	Ic/Ie	Ur/Ue	Cos. ϕ or L/R (ms)	Ic/Ie	Ur/Ue	Cos. ϕ or L/R (ms)
Contactors for AC circuit switching													
AC-1		1	1	0.95	1	1	0.95	1.5	1.05	0.8	1.5	1.05	0.8
AC-2		2.5	1	0.65	2.5	1	0.65	4	1.05	0.65	4	1.05	0.65
AC-3	Ie ≤ 17 A	6	1	0.65	1	0.17	0.65	10	1.05	0.45	8	1.05	0.45
	17 < Ie ≤ 100 A	6	1	0.35	1	0.17	0.35	10	1.05	0.45	8	1.05	0.45
	Ie > 100 A	6	1	0.35	1	0.17	0.35	10	1.05	0.35	8	1.05	0.35
AC-4	Ie ≤ 17 A	6	1	0.65	6	1	0.65	12	1.05	0.45	10	1.05	0.45
	17 < Ie ≤ 100 A	6	1	0.35	6	1	0.35	12	1.05	0.45	10	1.05	0.45
	Ie > 100 A	6	1	0.35	6	1	0.35	12	1.05	0.35	10	1.05	0.35
Contactors for DC circuit switching													
DC-1		1	1	1	1	1	1	1.5	1.05	1	1.5	1.05	1
DC-3		2.5	1	2	2.5	1	2	4	1.05	2.5	4	1.05	2.5
DC-5		2.5	1	7.5	2.5	1	7.5	4	1.05	15	4	1.05	15
Contactor relays for AC circuit switching													
AC-14	(≤ 72 VA)	–	–	–	–	–	–	6	1.1	0.7	6	1.1	0.7
AC-15	(> 72 VA)	10	1	0.7	1	1	0.4	10	1.1	0.3	10	1.1	0.3

Contactor relays for DC 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	T0.95	I/Ie	U/Ue	T0.95	Ic/Ie	Ur/Ue	T0.95	Ic/Ie	Ur/Ue	T0.95
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
T0.95 = time required to reach 95 % of the current in steady-state conditions, expressed in milliseconds

North American standards and utilization categories

Depending on the utilization category or intended rating for a contactor, North American standards require two main tests: an endurance test to simulate conventional device making and breaking capacity over its lifetime, and an overload test to simulate periodic conditions demanding higher making and breaking capacity than is conventional for the application. The test setups differ in regards to current, power factor, and number of electrical operating cycles.

The tables below provide a comparison of the types of load testing for contactors rated up to 100 A.

AC load testing for contactors rated up to 100 A

Harmonized test			Rating designation	Endurance (conventional) test			Overload (conditional) test			Required load marking
IEC	UL	CSA		Multiple of current	Power factor	Number of cycles	Multiple of current	Power factor	Number of cycles	
General use, non-inductive or slighting inductive loads, resistance furnaces and heaters										
■	■	■	AC-1: general use	1	0.8	6000	1.5	0.8	50	–
	■	■	AC resistance	1	1	6000	1.5	1	50	"Resistive"
	■	■	AC resistance air heating	1	1	100000	1.5	1	50	"Resistance"
		■	AC electrical heating control	1	1	250000	1.5	1	50	–
Motor loads										
■	■	■	AC-2: slip-ring motors	2	0.65	6000	4	0.65	50	–
■			AC-3: squirrel cage motors	2	0.45	6000	10 for make 8 for make break	0.45	50 make + 50 make break	–
	■	■	AC motor (across-the-line switching)	2	0.40 – 0.50	1000	LRA (~6)	0.40 – 0.50	50	–
	■	■	Elevator control, AC motor	2	0.50	500000	n/a	n/a	n/a	"Elevator duty"
■	■	■	AC-4: plugging, inching, jogging	6	0.45	6000	12 for make 10 for make break	0.45	50 make + 50 make break	–
Lamps and lighting loads										
■	■	■	AC-5a: electric discharge lamps	2	0.45	6000	3	0.45	50	"Ballast"
■	■	■	AC-5b: incandescent lamps	1	Lamp	6000	1.5	Lamp	50	"Tungsten"
Transformers and capacitors										
■			AC-6a: transformers	The manufacturer shall verify the AC-6a rating by testing with a transformer, or may derive the rating from the values for AC-3.						
■			AC-6b: capacitors	Capacitive ratings may be derived by capacitor switching tests or assigned on the basis of established practice and experience.						
	■	■	Capacitive switching (kVar)	1	Capacitor	6000	1.5	Capacitor	50	–
Hermetic refrigerant compressor motors										
■	■	■	AC-8a: hermetic refrigerant compressor	1	0.8	30000	6	0.45	50	"Hermetic refrigeration compressor"
■	■	■	AC-8b: hermetic refrigerant compressor (recycle rating)	6	0.45	6000	6	0.45	50	–

Note: the information above is an overview of UL 60947-4-1 tables 1, 7, 10, 5.4.1DV.1.1, 8.2.4.1DV.1.1, and 8.2.4.2DV.1.1 and is intended for comparison purposes only.

DC load testing for contactors rated up to 100 A

Harmonized test			Rating designation	Endurance test			Overload test			Required load marking
IEC	UL	CSA		Multiple of current	L/R ms	Number of cycles	Multiple of current	L/R ms	Number of cycles	
General use, non-inductive or slighting inductive loads, resistance furnaces and heaters										
■	■	■	DC-1: general use	1	1	6000	1.5	1	50	–
	■	■	DC resistance	1	1	6000	1.5	1	50	"Resistive"
	■	■	DC resistance air heating	1	1	100000	1.5	1	50	"Resistance"
Motor loads										
■			DC-3: shunt motors	2.5	2	6000	4	2.5	50	–
	■	■	DC motor (across-the-line switching)	2	n/a	1000	10	n/a	50	–
	■	■	Elevator control, DC motor	2	n/a	500000	Not applicable			"Elevator duty"
■			DC-5: series motors	2.5	7.5	6000	4	15	50	–
Lamps and lighting loads										
■	■	■	DC-6: incandescent lamps	1	Lamp	6000	1.5	Lamp	50	"Tungsten"

Note: the information above is an overview of UL 60947-4-1 tables 1, 7, 10, 5.4.1DV.1.1, 8.2.4.1DV.1.1, and 8.2.4.2DV.1.1 and is intended for comparison purposes only.

Degrees of protection

General

In an installation, the degree of protection required for electrical equipment depends on the environmental characteristics. The degree of protection, ensured by the enclosure of equipment or by the cubicle containing the equipment is expressed by the IP code which gives the level of protection against access to hazardous parts, the ingress of foreign bodies and/or the ingress of water, in compliance with IEC 60529, IEC 60947-1.

Besides the IP symbol, the complete code has two figures followed (optionally) by two additional letters. A short description of the elements used in IP coding is given below.

IP... code	Figures or letters	Specifications for installation protection	Protection of persons
First figure		**Against ingress of foreign bodies**	**Against access to hazardous parts with:**
	0	No protection	No protection
	1	Diameter > 50 mm	Back of hand
	2	Diameter > 12.5 mm	Finger
	3	Diameter > 2.5 mm	Tool
	4	Diameter > 1 mm	Wire
	5	Limited protection against dust	Wire
	6	Total protection against dust	Wire
Second figure		**Against entrance of water having a harmful effect**	
	0	No protection	
	1	Vertical dripping	
	2	Dripping at a vertical angle of < 15°	
	3	Rain at a vertical angle of < 60°	
	4	Splashing	
	5	Low pressure water jet	
	6	Powerful water jets	
	7	Temporary immersion	
	8	Permanent immersion	
Additional letter (optional) for use with:		**Against ingress of foreign bodies**	**Against access to hazardous parts with:**
First figure 0	**A**	Stopped by a barrier with a 50 mm Ø sphere	Back of hand
First figure 0 or 1	**B**	Entrance of test finger limited to 80 mm	Finger
First figure 1 or 2	**C**	Wire with 2.5 mm Ø and length of 100 mm	Tool
First figure 2 or 3	**D**	Wire with 1 mm Ø and length of 100 mm	Wire
Additional letter (optional)		**Specific additional information**	
	H	High voltage apparatus	–
	M	Moving parts which are moving during water test	
	S	Moving parts which are stationary during water test	
	W	Specified atmospheric conditions	

Note: The type of enclosure or cubicle in which the equipment must be installed prevails with respect to the degree of protection.

Climatic withstand of devices

The life time of devices are mainly influenced by series of climatic factors which cause their corrosion.

In practice, besides climatic conditions, there are other factors which may damage equipment such as fungi, insects (termites), dust, work site dirt and aggressive environment (salty or sulphurous atmosphere, etc.) which can often only be identified at the place of installation.

Climatic stress, definitions and test conditions are dealt with in national publications such as the DIN 50 series and UTE 63-100 publication which are attached to international publications such as IEC 60068.

The test conditions are:

Description	Symbolization	Time of one cycle	Cycle phase time	Temperature in test chamber	Relative humidity
Humidity and variable temperature	IEC 60068-2-30 Test Db	24 hours	12 hours including rise in temperature	40 °C	95 %
			12 hours including cooling (open device)	25 °C	95 %

ABB contactors have been used for many years in the most countries, with hot and humid climates for example: Brazil, Indonesia, India or on ships. Experience has shown that ABB devices can be used in most countries throughout the world.

The climate of the country in which the apparatus is installed is not the determining choice factor.

Account must be taken of:

- the immediate environment of the devices (sheltered, ventilated, temperature),
- the aggressivity of the immediate atmosphere at the place of installation,
- the length and frequency of non operating periods.

In the case of frequent condensation (i.e. the formation of condensation caused by rapid changes in temperature), heating resistors must be installed in cubicles (100 to 250 W per 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).

For direct product details information, use product type or order code, ex:

www.abb.com/productdetails/**AF09-30-10-13**
www.abb.com/productdetails/**1SBL137001R1310**

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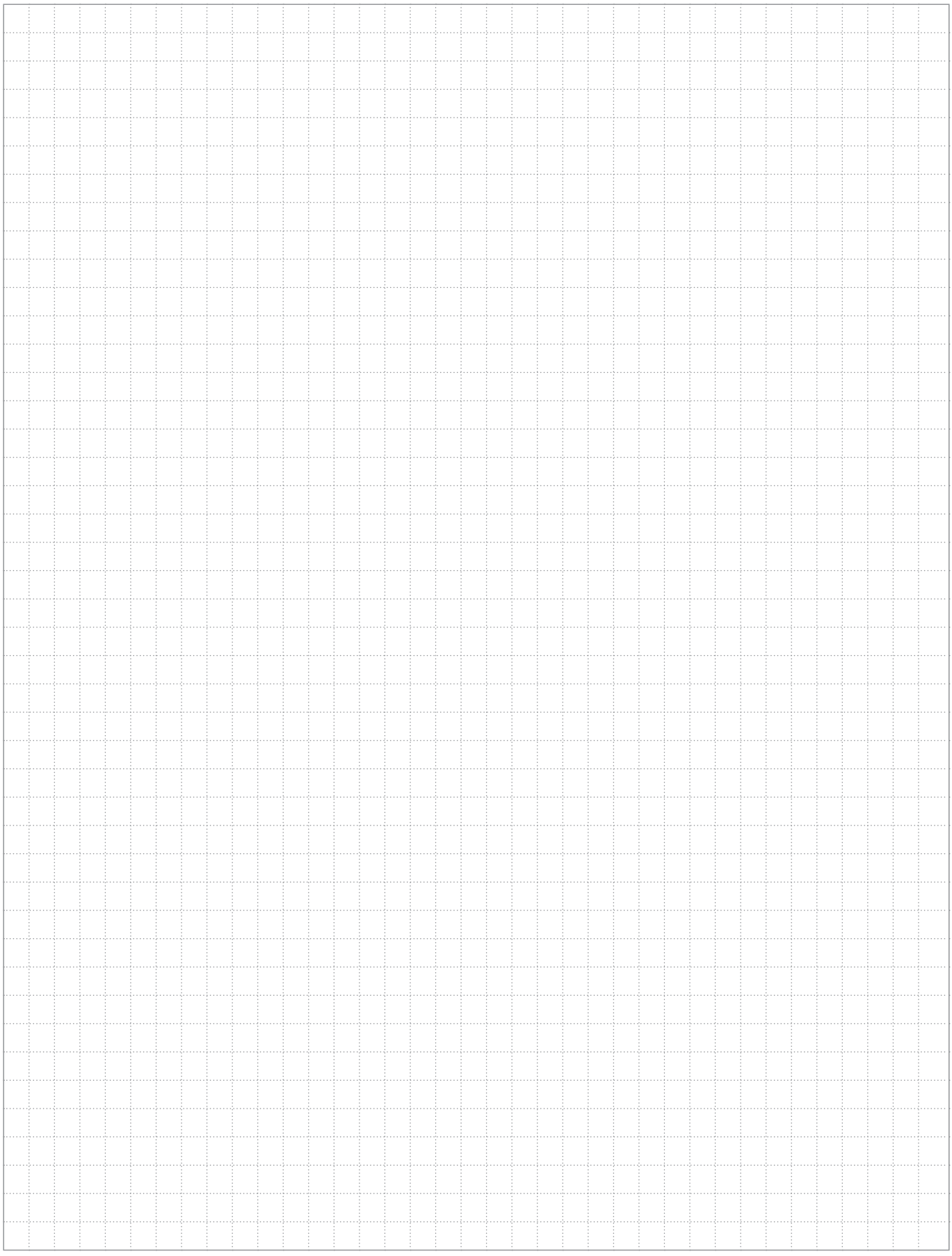

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